



Mortality and Serious Injury Determinations for Baleen Whale Stocks along the Gulf of Mexico, United States East Coast and Atlantic Canadian Provinces, 2006-2010

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US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts

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Editorial Treatment: To distribute this report quickly, it has not undergone the normal technical and copy editing by the Northeast Fisheries Science Center's (NEFSC's) Editorial Office as have most other issues in the NOAA Technical Memorandum NMFS-NE series. Other than the four covers and first two preliminary pages, all writing and editing have been performed by the authors listed within. This report was reviewed by the Stock Assessment Review Committee, a panel of assessment experts from the Center for Independent Experts (CIE), University of Miami.

Information Quality Act Compliance: In accordance with section 515 of Public Law 106-554, the Northeast Fisheries Science Center completed both technical and policy reviews for this report. These predissemination reviews are on file at the NEFSC Editorial Office.

This document may be cited as:

Henry AG, Cole TVN, Garron M, Hall L, Ledwell W, Reid A. 2012. Mortality and Serious Injury Determinations for Baleen Whale Stocks along the Gulf of Mexico, United States East Coast and Atlantic Canadian Provinces, 2006-2010. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 12-11; 24 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at <http://www.nefsc.noaa.gov/nefsc/publications/>

ABSTRACT

The Northeast Fisheries Science Center (NEFSC) has developed criteria to evaluate reports of human-caused injury and mortality to large whales. The criteria minimize the likelihood of incorrectly assigning whale mortalities and serious injuries to human causes and provide a minimum count of such human-caused incidents. Serious injury is defined as an injury that is likely to lead to death. This report describes determinations made for reports received from 2006 - 2010 involving North Atlantic right (*Eubalaena glacialis*), humpback (*Megaptera novaeangliae*), fin (*Balaenoptera physalus*), sei (*B. borealis*), blue (*B. musculus*), minke (*B. acutorostrata*), and Bryde's (*B. edeni*) whales observed along coastal Gulf of Mexico, the eastern seaboard of the United States, and the Atlantic Canadian provinces. A total of 500 unique large whale events were verified during the period, of which 264 (53%) involved human interactions, 16 (3%) did not involve a human interaction, and for 220 (44%) of the events it was unknown if a human interaction occurred. Of the events involving human interactions, we confirmed 206 unique entanglements and 58 vessel strikes. Four events had evidence of both entanglement and vessel strike, and are included in the totals for both these event categories. Twenty-four (12%) of the entanglements and 28 (48%) of the vessel strikes were fatal. Serious injury was sustained in 33 (16%) of the entanglement events and in 1 (2%) of the confirmed vessel strikes. Serious injury was prevented due to disentanglement efforts in 28 (14%) entanglement events. Forty-five (22%) of the entanglements and 9 (16%) of the vessel strike events did not have adequate documentation to determine if serious injury occurred. Seventy-three (35%) of the entanglement events and 17 (29%) of the vessel strike events were determined to have not caused serious injury or death. We also confirmed a total of 313 mortalities: 52 (17%) due to human interaction, 16 (5%) due to natural causes and 245 (78%) which lacked sufficient evidence to determine cause of death. Humpback whales had the greatest number of entanglement mortalities (n=9), the highest number of serious injury events resulting from entanglements (n=20); and the greatest number of vessel strike mortalities (n=10); and right whales had the only serious injury (n=1) from vessel strikes. These mortality and serious injury numbers are minimum counts because of poor detection probabilities and inadequate documentation for the majority of events. Thus, the true level of human impact to these stocks is assumed to be greater than that reported here; the amount greater is unknown.

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INTRODUCTION

As part of the 1994 amendments to the Marine Mammal Protection Act (MMPA), the NOAA National Marine Fisheries Service (NMFS) is mandated to establish monitoring programs to estimate incidental mortality and serious injury of marine mammals taken during commercial fishing operations. The agency is also charged with developing Take Reduction Plans (TRPs) that reduce commercial takes of strategic stocks of marine mammals to levels below their Potential Biological Removal (PBR) level within six months of implementation. The longer-term goal of all the TRPs is to reduce--within 5 years of implementation--commercial takes of marine mammals to insignificant levels approaching zero mortality, which has been defined as 10% of PBR (Federal Register/Vol. 69, No. 138 p. 43338/Tuesday, July 20, 2004¹).

The average rate of human-caused serious injury and mortality for the most recent five years of data is reported for each species in the annual marine mammal stock assessment report (SAR). This rate, when compared to a population's PBR, can be used as an index of the success of a recovery plan. The PBR is defined as the maximum number of animals-- not including natural mortalities--which may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population size (Wade and Angliss 1997).

This report presents the method and results of a process that calculates the rate of observed human-caused serious injury and mortality for North Atlantic right (*Eubalaena glacialis*), humpback (*Megaptera novaeangliae*), fin (*Balaenoptera physalus*), sei (*B. borealis*), blue (*B. musculus*), minke (*B. acutorostrata*), and Bryde's (*B. edeni*) whale stocks along the Gulf of Mexico, the eastern seaboard of the US, and the Atlantic Canadian provinces for the period 2006 - 2010.

METHODS

Members of the US and Canadian regional stranding networks, large whale disentanglement teams, the US and Canadian Coast Guard, and civilians provided marine mammal stranding and human interaction reports to either the NMFS Northeast Regional Office (NERO), Southeast Regional Office (SERO), or the Northeast Fisheries Science Center (NEFSC). The Regional Offices obtained all available information for each report (photos, necropsy reports, etc.), which was then reviewed by NEFSC and NERO staff members. Confirmed reports were designated "events," and the species involved was verified, duplicate records identified, and relevant information from each source consolidated into a single record. Information from additional sightings of a previously documented event was added to the existing record. If an identified whale was involved in a second interaction, a new event record was assigned. Subsequent sighting and demographic information for injured whales were obtained, where available, from local population monitoring studies. Analysis of entangling gear is conducted by NERO and is included in annual Take Reduction Team (TRT) reports. NEFSC staff reviewed each mortality event and assigned a cause of death following the confirmation criteria listed below. Each injury event was similarly examined for indications of cause and identified as a serious injury if it was likely to lead to the whale's death. One staff member reviewed all determinations each year to ensure consistency in the application of determination criteria within and across years. Criteria indicated by an asterisk (*) in the lists below are new and were developed to accommodate events that were not well addressed by existing criteria. The revised criteria were applied to the 2007 - 2010 events only. Application of the revised criteria to events prior to 2007 will be completed in a separate document. These analyses are different from a serious injury determination process currently being developed at a national level by NMFS (see Andersen *et al.* 2008).

¹ http://www.nero.noaa.gov/prod_res/atgrp/mmpa/ZMRG%20Final%20Rule%2069-43338.pdf

Some large whale events from Newfoundland and Labrador are included in this analysis. Because some species in these areas are not found in US waters, only events identified to species and involving trans-boundary stocks (i.e., stocks known to enter into US waters) were included in tallies. Since humpbacks from these regions are known to be from feeding stocks that are distinct from the Gulf of Maine stock (Palsbøll et al. 2001), humpback events from these regions were not included in tallies.

Also, incidental take data provided by the National Marine Fisheries Service Observer Programs are not included in this report. These data are addressed in NESFC fisheries bycatch technical memoranda and included in separate tables in the relevant SARs.

Confirmation Criteria for Species and Event (listed in order of certainty)

The species and/or event was considered confirmed if it met one of the following criteria:

1. Photographs or video allowed identification;
2. A marine mammal expert reported the event and/or species as certain;
3. The report was made by trained observer or member of the disentanglement network and was then verified via interview by NMFS, disentanglement or stranding network staff; or
4. A fisherman reported a whale entangled in gear or a shipper reported colliding with a whale.

The species and/or event was considered confirmed in the following less certain cases:

1. Photographs or video allowed probable identification;
2. A marine mammal expert reported the event and/or species as possible;
3. An inexperienced observer's report allowed probable identification; or
4. An inexperienced observer's report was verified via interview by NMFS, disentanglement or stranding network staff.

The species and/or event was considered unconfirmed if:

1. Photographs or video were of insufficient quality to verify;
2. An inexperienced observer's report lacked photographs or video and/or detail to confirm;
3. An incomplete examination did not allow for identification; or
4. A carcass was too decomposed to identify.

Human-induced Mortality Determinations

Events were categorized as entanglement mortalities if one of the following indications were confirmed to be present on a whale carcass:

1. Fishing line constricted any body part, and subdermal hemorrhaging or extensive necrosis was present at point of attachment;
2. An extensive entanglement was evident*;
3. An entanglement prevented feeding*; or
4. A code 2 (fresh dead) whale was pulled up during fishing operations*.

Events were categorized as vessel strike mortalities if one of the following indications was confirmed to be present on a whale carcass:

1. Large linear laceration(s) was present anywhere on body, as opposed to just dorsally as in Kraus (1990);
2. Large area(s) of subdermal hemorrhaging, hematoma, or edema was evident;
3. Extensive skeletal fracturing was evident; or
4. A code 2 (fresh dead) carcass was found on the bow of a ship.

Serious Injury Determinations

Events were categorized as entanglement serious injuries if one of the following indications was confirmed on a living whale:

1. Fishing line constricted any body part or was likely to become constricting as the whale grew;
2. It was uncertain if the line was constricting, but appendages near the entanglement's point of attachment were discolored and likely compromised;
3. The whale showed a marked decline in appearance following entanglement, including skin discoloration, lesions near the nares, fat loss, or increased cyamid loads;
4. The entanglement prevented feeding*;
5. The whale was anchored; or
6. The entanglement was extensive*.

A whale was typically not considered seriously injured if all constricting lines were removed or shed.

Events were categorized as ship-strike serious injuries if, following the appearance of a linear laceration or large gouge, a living whale exhibited a marked decline in appearance, including skin discoloration, lesions near the nares, fat loss, or increased cyamid loads.

No forecasts were made as to how an entanglement or injury might increase the whale's susceptibility to further injury (e.g., from additional entanglements or collisions with vessels).

RESULTS

A total of 500 unique events were confirmed during 2006 - 2010, involving both live and dead whales (Table 1). Of these, 264 (53%) involved human interactions, 16 (3%) did not involve a human interaction, and for 220 (44%) of the events it was unknown if a human interaction had occurred. Human interaction events were categorized as either entanglement or vessel strikes, with four cases having evidence of both types of interaction. These four events are included in the totals for both entanglement and vessel strike event categories. Of these human interactions, 206 entanglement events were verified, determined to be the cause of death in 24 events and cause of serious injury in 33 events. There were 73 entanglement events which did not result in serious injuries (this includes cases where the animal was freed by a disentanglement team or shed gear on its own). Twenty-eight of these events warranted serious injury classification had the animal not been disentangled. Additionally, there were 45 entanglement events for which the available information was not sufficient to determine if a serious injury had occurred (Table 2). The remaining 31 entanglement events were mortalities where cause of death could not be confirmed as entanglement. Of the 58 confirmed vessel strike events, 28 were determined to have been lethal and one caused serious injury. Eighteen vessel strike events occurred which did not result in serious injury and 9 vessel strikes lacked sufficient evidence to make a determination (Table 3). The remaining two events were mortalities where cause of death could not be

confirmed as vessel. There were 5 events involving whales entrapped in fishing weirs, all of which occurred in Canadian waters. Three minke and one right whale were successfully released from the weirs and deemed non-seriously injured. One minke did not have adequate documentation to determine if serious injury or mortality occurred. These events are not classified as entanglements as the animals were not wrapped in any of the weirs' lines.

A total of 313 mortalities were documented, of which 52 (17%) were confirmed to be the result of human interactions, 16 (5%) were due to natural causes and 245 (78%) for which there was insufficient evidence to determine cause of death (Table 1). The average annual confirmed human-caused mortality and serious injury rates for 2006 - 2010 are presented for each large whale stock in Table 4. Tables 5 - 10 provide details by stock of each confirmed human interaction event resulting in serious injury or mortality.

Over the 5 year period, North Atlantic right whales were involved in 55 confirmed events, of which 33 were confirmed entanglements and 13 were confirmed vessel strikes (Tables 1-3). Of the 19 verified right whale mortalities, 4 were due to entanglements, 5 due to vessel strikes, 5 due to natural causes, and 5 were from undetermined causes (Table 1). Serious injury was assigned for five entanglement events and one vessel strike (Tables 2 and 3). Detailed records for confirmed human-caused mortality and serious injury are provided in Table 5. For six additional entanglements, serious injury classification would have been warranted if not for intervention of disentanglement teams.

Humpbacks, involved in 208 verified events, were the species most commonly observed entangled (101), hit by vessels (21), and observed dead (119; Table 1-3). Of the 119 confirmed humpback whale mortalities, 9 were due to entanglements, 10 due to vessel strikes, 2 due to natural causes and cause of death was undetermined for the remaining 98 events (Table 1). Of the 101 confirmed entanglements, 9 resulted in mortality and 20 in serious injury (Table 2). An additional 13 events would have resulted in serious injury had disentanglement teams not intervened. Humpbacks were involved in 21 verified vessel strike events, 10 of which were fatal (Table 3). Detailed records for human-caused mortality and serious injury are provided in Table 6. We assumed all humpback events occurring in or near US and southeast Canadian waters involved the Gulf of Maine stock unless a whale was confirmed to be from another stock. Humpback events from Labrador and Newfoundland were assumed to not involve the Gulf of Maine stock and are therefore not included in this report.

There were 43 documented fin whale events, 15 of which were confirmed entanglements and 8 of which were confirmed vessel strikes (Tables 1-3). Of the 31 verified fin whale mortalities, 2 were due to entanglement, 6 due to vessel strikes, 4 due to natural causes, and 19 were from undetermined causes (Table 1). Two of the entanglements resulted in serious injury (Tables 2). Detailed records for human-caused mortality and serious injury are provided in Table 7.

There were 12 events involving sei whales including 3 confirmed entanglements and 3 vessel strikes (Tables 1-3). Mortalities accounted for 10 of the 12 confirmed events, with 1 attributed to entanglement, 3 due to vessel strikes, and 6 where cause of death was undetermined (Table 1). Two of the entanglement events resulted in serious injury (Table 2). Detailed records for human-caused mortality and serious injury are provided in Table 8.

Minke whales were involved in 112 verified events, of which 48 were confirmed entanglements and 2 were confirmed as vessel strikes (Tables 1-3). Seven of the entanglement events were fatal, while four resulted in serious injury (Table 2). In nine entanglement events, disentanglement teams removed gear that would have warranted a serious injury classification. There were only two verified vessel strike events, both of which resulted in mortality (Table 3). Detailed records for human-caused mortality and serious injury are provided in Table 9.

Bryde's whales' two documented events were both mortalities (Table 1). One was attributed to natural causes while the other mortality was a result of vessel strike (Table 3), the details for which are provided in Table 10.

Blue whales had the lowest number of documented events – one mortality – where cause of death could not be determined (Table 1).

In 67 of the 500 confirmed unique large whale events during 2006 - 2010, positive species identification was not possible (Table 1). In four of the 67 events, the similarity in body shape and size between fin and sei whales prevented us from distinguishing which of these two species were involved. In another nine events, the whales could only be identified as balaenopteridae based on the presence of ventral pleats. The taxonomic identity of the whales involved in the remaining 54 events could not be assigned with any certainty. Entanglement was confirmed in 6 and vessel strike was confirmed in 10 of these 67 events (Tables 2 and 3). Fifty-two of the 67 events involving unidentified whales were confirmed mortalities, one of which was attributed to entanglement and one to vessel strike. The cause of death could not be determined for the remaining fifty mortalities (Table 1).

DISCUSSION

The criteria employed in this report evolved from recommendations of serious injury workshops (Andersen et al. 2008; Angliss and DeMaster 1998) and our experience examining large whale reports collected since 1990. The criteria attempt to encompass all event scenarios and minimize the likelihood of incorrectly assigning whale mortalities and serious injuries to human causes. The resulting values provide a minimum count of such human-caused incidents. Despite minimum values, the mean annual observed human-caused mortality and serious injury rate exceeds PBR for four of the seven stocks examined, including North Atlantic right, humpback, sei, and Bryde's whales (Table 4).

Differentiating injuries that cause mortalities from preexisting injuries or postmortem damage is problematic but can be accomplished through necropsy or, in many cases, parsimonious evaluation of available evidence. In our determinations, fishing line constrictions were considered circumstantial evidence of premortem entanglement, as these constrictions were likely the result of force applied by an active animal. Vessel collisions frequently lack external evidence and may not be detected unless a necropsy is conducted; necropsies frequently identified subdermal hemorrhaging or hematomas, indicating that blood was still circulating at the time of injury. Large lacerations were considered an indication of a premortem vessel collision since only whales at depth would be exposed to the propellers of a ship; floating carcasses would be pushed aside by the ship's bow wave (Knowlton et al. 1995).

Assessment of serious injury was guided by regulation 50 *CFR* 229.2, which defines serious injury as "any injury that will likely result in mortality." Evidence of the whale's deteriorating health was used as confirmation of serious injury. A whale's physiological response to tissue damage includes increased secretion of glucocorticoids, which suppresses lymphocytes, and if sustained (because of chronic destruction of tissue by gear or hydrodynamic forces) compromises the ability of an animal to fight other infections. External indications of poor health, including skin discoloration, lesions near the nares, fat loss, or increased cyanid loads, are part of a cascade of immunological disorders. Cases of constricting entanglements invariably exhibit these signs of declining health over time. Removal of constricting gear typically reversed the decline in appearance, and disentanglement was generally considered to prevent serious injury. Whales only loosely entangled in line typically did not have external indications of poor health; some whales have carried loose wraps for years.

Over the five year period, 245 of 313 confirmed mortalities (78%) lacked sufficient evidence to determine cause of death (Table 1). Of those 245 mortalities, evidence of entanglement was confirmed in 31 and vessel strike in 2 events, but could not be confirmed as the cause of death. Likewise, insufficient documentation precluded determination of fate in 45 of 206 confirmed entanglement events (22%) and 8 of 58 vessel strike events (14%). Carcasses floating at sea often cannot be examined sufficiently for either internal or external indications if they are not towed ashore and necropsied.

Perhaps of greater concern is the number of injured animals that are never observed. Humpback whale scar evidence suggests that only 6-12% of entanglements are witnessed and reported (Robbins 2009, 2010). Thus, whales may succumb to entanglement before the event can be detected. It is also likely that some number of vessel strikes are not detected or reported. Negatively buoyant species are less likely to be detected after death, and positively buoyant species, such as North Atlantic right whales, may become negatively buoyant if an injury precludes effective feeding for an extended period (Moore et al. 2004). Given the likelihood that some number of entanglement and vessel strike serious injuries and mortalities are not observed and that the serious injury and mortality criteria applied here are designed to minimize the likelihood of incorrectly assigning whale mortalities and serious injuries to human causes, the numbers in this report represent the minimum values for human-caused serious injury and mortality to large whale stocks along the Gulf of Mexico, the US east coast, and the Atlantic Canadian provinces.

ACKNOWLEDGEMENTS

We are especially grateful to the Gulf of Mexico, US, and Canadian Maritime Provinces and Newfoundland stranding and entanglement networks, whose members searched for and examined whales both live and dead. It is a difficult, dirty and ceaseless job that deserves special recognition. The United States Coast Guard was instrumental in conveying sightings reported by mariners, investigating carcasses at sea, and assisting in disentanglement efforts. We are also grateful to the staff of the Provincetown Center for Coastal Studies (PCCS), New England Aquarium, Whale Center of New England (WCNE), NOAA aerial survey teams, Wildlife Trust, the states of Florida and Georgia, Northeast Fisheries Observer Program, Marine Animal Response Society, New Brunswick Museum, Atlantic Veterinary College, Grand Manan Whale and Seabird Research Station, Whale Release and Stranding, and many others for providing the sightings that have allowed this work to be conducted. Betty Lentell and Misty Nelson assisted in verifying records. PCCS and WCNE provided sighting histories and demographic information. Members of the Atlantic Scientific Review Group have provided numerous helpful comments on the protocols described here. We also thank the anonymous reviewers of earlier drafts of this report.

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Table 1. Summary of all unique whale events and mortalities observed along the Gulf of Mexico Coast, US East Coast and Atlantic Canadian Provinces, 2006-2010. Determinations of human-caused mortality follow the criteria established by the NEFSC.

Species	Western North Atlantic right whale (<i>Eubalaena glacialis</i>)	Gulf of Maine humpback whale (<i>Megaptera novaeangliae</i>)	Western North Atlantic fin whale (<i>Balaenoptera physalus</i>)	Nova Scotian sei whale (<i>B.borealis</i>)	Western North Atlantic blue whale (<i>B. musculus</i>)	Canadian East Coast minke whale (<i>B. acutorostrata</i>)	Northern Gulf of Mexico Bryde's whale (<i>B. edeni</i>)	Unidentified fin/sei whale	Unidentified balaenopterid ^c	Unidentified whale spp.	Totals
Total events ^{a,b} (2006, 2007, 2008, 2009, 2010)	55 (12, 6, 14, 15, 8)	208 (49, 37, 47, 42, 33)	43 (9, 13, 6, 8, 7)	12 (5, 1, 4, 2, 0)	1 (0, 0, 0, 0, 1)	112 (25, 27, 24, 15, 21)	2 (1, 0, 0, 1, 0)	4 (2, 1, 0, 0, 1)	9 (1, 2, 0, 1, 5)	54 (13, 9, 11, 8, 13)	500
Total confirmed mortalities	19 (6, 3, 3, 4, 3)	119 (33, 21, 27, 21, 17)	31 (7, 8, 5, 5, 6)	10 (4, 1, 3, 2, 0)	1 (0, 0, 0, 0, 1)	79 (18, 20, 17, 9, 15)	2 (1, 0, 0, 1, 0)	3 (1, 1, 0, 0, 1)	9 (1, 2, 0, 1, 5)	40 (10, 6, 8, 6, 10)	313
Confirmed entanglement mortalities	4 (1, 1, 0, 0, 2)	9 (1, 1, 2, 2, 3)	2 (0, 2, 0, 0, 0)	1 (0, 0, 1, 0, 0)	0	7 (2, 1, 4, 0, 0)	0	0	0	1 (0, 1, 0, 0, 0)	24
Confirmed vessel strike mortalities	5 (4, 0, 0, 0, 1)	10 (3, 3, 1, 0, 3)	6 (0, 2, 1, 1, 2)	3 (1, 1, 0, 1, 0)	0	2 (0, 0, 0, 1, 1)	1 (0, 0, 0, 1, 0)	0	0	1 (0, 0, 0, 0, 1)	28
Confirmed mortalities, NOT vessel strike or entanglement	5 (0, 1, 3, 1, 0)	2 (1, 0, 0, 0, 1)	4 (0, 0, 2, 1, 1)	0	0	4 (1, 1, 0, 1, 1)	1 (1, 0, 0, 0, 0)	0	0	0	16
Confirmed mortalities, IITD ^d	5 (1, 1, 0, 3, 0)	98 (28, 17, 24, 19, 10)	19 (7, 4, 2, 3, 3)	6 (3, 0, 2, 1, 0)	1 (0, 0, 0, 0, 1)	66 (15, 18, 13, 7, 13)	0	3 (1, 1, 0, 0, 1)	9 (1, 2, 0, 1, 5)	38 (10, 5, 8, 6, 9)	245

^a Includes the following types of events : entanglements, vessel strikes, natural causes, and unconfirmed origin or fate. Does not include entrapments.

^b Excludes resights of previously reported individuals unless a new injury was documented.

^c Described as having throat grooves (rorqual pleats).

^d IITD = insufficient information to determine cause of death or if the injury was serious and likely lethal.

Table 2. Summary of confirmed large whale entanglement events along the Gulf of Mexico Coast, US East Coast and Atlantic Canadian Provinces, 2006-2010. Determinations of human-caused mortality and serious injury follow the criteria established by the NEFSC.

Species	Western North Atlantic right whale (<i>Eubalaena glacialis</i>)	Gulf of Maine humpback whale (<i>Megaptera novaeangliae</i>)	Western North Atlantic fin whale (<i>Balaenoptera physalus</i>)	Nova Scotian sei whale (<i>B. borealis</i>)	Western North Atlantic blue whale (<i>B. musculus</i>)	Canadian East Coast minke whale (<i>B. acutorostrata</i>)	Northern Gulf of Mexico Bryde's whale (<i>B. edeni</i>)	Unidentified fin/sei whale	Unidentified balaenopterid	Unidentified whale spp.	Totals
Confirmed entanglement events (2006, 2007, 2008, 2009, 2010)	33 (5, 4, 10, 8, 6)	101 (20, 14, 22, 24, 21)	15 (2, 6, 2, 4, 1)	3 (1, 0, 2, 0, 0)	0	48 (8, 12, 15, 7, 6)	0	1 (1, 0, 0, 0, 0)	0	5 (1, 1, 1, 0, 2)	206
Confirmed entanglement mortalities	4 (1, 1, 0, 0, 2)	9 (1, 1, 2, 2, 3)	2 (0, 2, 0, 0, 0)	1 (0, 0, 1, 0, 0)	0	7 (2, 1, 4, 0, 0)	0	0	0	1 (0, 1, 0, 0, 0)	24
Confirmed entanglement serious injuries	5 (0, 0, 1, 2, 2)	20 (4, 2, 4, 3, 7)	2 (1, 1, 0, 0, 0)	2 (1, 0, 1, 0, 0)	0	4 (0, 1, 0, 2, 1)	0	0	0	0	33
Confirmed entanglement events, NOT serious injury/mortality ^a	21 (3, 2, 9, 5, 2)	37 (8, 7, 7, 9, 6)	2 (0, 1, 1, 0, 0)	0	0	13 (4, 3, 1, 2, 3)	0	0	0	0	73
Confirmed entanglement events, IITD ^b	2 (1, 0, 0, 1, 0)	20^c (3, 4, 5, 5, 3)	6 (1, 2, 0, 3, 0)	0	0	14^c (2, 3, 6, 2, 1)	0	1 (1, 0, 0, 0, 0)	0	2 (1, 0, 0, 0, 1)	45
Mortality with evidence of entanglement, but not confirmed as COD ^d	1 (0, 1, 0, 0, 0)	15 (3, 1, 4, 5, 2)	3 (0, 0, 1, 1, 1)	0	0	10 (0, 4, 4, 1, 1)	0	0	0	2 (0, 0, 1, 0, 1)	31

^a Includes cases where animal shed gear or was disentangled thereby potentially avoiding serious injury.

^b IITD = insufficient information to determine cause of death or if the injury was serious and likely lethal.

^c This value includes one event where evidence of both recent entanglement and vessel strike was present, but vessel strike was determined to be the primary cause of injury.

^d COD = cause of death

Table 3. Summary of confirmed large whale vessel strike events along the Gulf of Mexico Coast, US East Coast and Atlantic Canadian Provinces, 2006-2010. Determinations of human-caused mortality and serious injury follow the criteria established by the NEFSC.

Species	Western North Atlantic right whale (<i>Eubalaena glacialis</i>)	Gulf of Maine humpback whale (<i>Megaptera novaeangliae</i>)	Western North Atlantic fin whale (<i>Balaenoptera physalus</i>)	Nova Scotian sei whale (<i>B.borealis</i>)	Western North Atlantic blue whale (<i>B. musculus</i>)	Canadian East Coast minke whale (<i>B. acutorostrata</i>)	Northern Gulf of Mexico Bryde's whale (<i>B. edeni</i>)	Unidentified fin/sei whale	Unidentified balaenopterid	Unidentified whale spp.	Totals
Confirmed vessel strike events (2006, 2007, 2008, 2009, 2010)	13 (6, 1, 1, 3, 2)	21 (3, 5, 5, 4, 4)	8 (0, 3, 1, 1, 3)	3 (1, 1, 0, 1, 0)	0	2 (0, 0, 0, 1, 1)	1 (0, 0, 0, 1, 0)	0	1 (0, 0, 0, 0, 1)	9 (3, 2, 1, 2, 1)	58
Confirmed vessel strike mortalities	5 (4, 0, 0, 0, 1)	10 (3, 3, 1, 0, 3)	6 (0, 2, 1, 1, 2)	3 (1, 1, 0, 1, 0)	0	2 (0, 0, 0, 1, 1)	1 (0, 0, 0, 1, 0)	0	0	1 (0, 0, 0, 0, 1)	28
Confirmed vessel strike serious injuries	1 (1, 0, 0, 0, 0)	0	0	0	0	0	0	0	0	0	1
Confirmed vessel strike events, NOT serious injury/mortality	5 (1, 1, 0, 2, 1)	11^a (0, 2, 4, 4, 1)	2 (0, 1, 0, 0, 1)	0	0	0	0	0	0	0	18
Confirmed vessel strike events, IITD ^b	2^a (0, 0, 1, 1, 0)	0	0	0	0	0	0	0	0	7 (2, 2, 1, 2, 0)	9
Mortality with evidence of vessel strike, but not confirmed as COD ^c	0	0	0	0	0	0	0	0	1 (0, 0, 0, 0, 1)	1 (1, 0, 0, 0, 0)	2

^a This value includes one event where evidence of both recent entanglement and vessel strike was present, but entanglement was determined to be the primary cause of injury.

^b IITD = insufficient information to determine cause of death or if the injury was serious and likely lethal.

^c COD = cause of death

Table 4. Five-year average rates of confirmed human-caused mortality and serious injury (SI) involving baleen whale stocks along the Gulf of Mexico Coast, US East Coast, and Atlantic Canadian Provinces, 2006-2010 (number of events attributed to entanglements or vessel collisions by year in parentheses).

Stock	Mean annual mortality and SI rate (PBR ¹ for reference)	Entanglements			Vessel Collisions		
		Annual rate (US waters / Canadian waters)	Confirmed mortalities (2006, 2007, 2008, 2009, 2010)	Confirmed SIs (2006, 2007, 2008, 2009, 2010)	Annual rate (US waters / Canadian waters)	Confirmed mortalities (2006, 2007, 2008, 2009, 2010)	Confirmed SIs (2006, 2007, 2008, 2009, 2010)
Western North Atlantic right whale (<i>Eubalaena glacialis</i>)	3.0 (0.9)	1.8 (1.6 / 0.2)	(1, 1, 0, 0, 2)	(0, 0, 1, 2, 2)	1.2 (0.8 / 0.4)	(4, 0, 0, 0, 1)	(1, 0, 0, 0, 0)
Gulf of Maine humpback whale (<i>Megaptera novaeangliae</i>)	7.8 (2.7)	5.8 (5.2 / 0.6)	(1, 1, 2, 2, 3)	(4, 2, 4, 3, 7)	2.0 (2.0 / 0)	(3, 3, 1, 0, 3)	0
Western North Atlantic fin whale (<i>Balaenoptera physalus</i>)	2.0 (5.6)	0.8 (0.6 / 0.2)	(0, 2, 0, 0, 0)	(1, 1, 0, 0, 0)	1.2 (1.2 / 0)	(0, 2, 1, 1, 2)	0
Nova Scotian sei whale (<i>B. borealis</i>)	1.2 (0.6)	0.6 (0.4 / 0.2)	(0, 0, 1, 0, 0)	(1, 0, 1, 0, 0)	0.6 (0.6 / 0)	(1, 1, 0, 1, 0)	0
Western North Atlantic blue whale (<i>B. musculus</i>)	0 (0.9)	0	0	0	0	0	0
Canadian East Coast minke whale (<i>B. acutorostrata</i>)	2.6 (162)	2.2 (1.0 / 1.2)	(2, 1, 4, 0, 0)	(0, 1, 0, 2, 1)	0.4 (0.4 / 0)	(0, 0, 0, 1, 1)	0
Northern Gulf of Mexico Bryde's whale (<i>B. edeni</i>)	0.2 (0.1)	0	0	0	0.2 (0.2 / 0)	(0, 0, 0, 1, 0)	0

¹ Potential Biological Removal (PBR) (Waring *et al* 2011)

Table 5. Confirmed human-caused mortality and serious injury records of Western North Atlantic right whales (*Eubalaena glacialis*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, ID, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel Strike	Entanglement/ Fishery interaction	
1/10/2006	mortality	Calf Male 5.4m w/out fluke	Jacksonville, FL	P		Propeller lacerations associated with hemorrhaging and edema; flukes completely severed
1/22/2006	mortality	Calf Female ^b 5.6m	off Ponte Vedra Beach, FL		P	Significant premortem lesions from entanglement in apparent monofilament netting; no gear present
3/11/2006	serious injury	Yearling Male #3522	Off Cumberland Island, GA	P		11 propeller lacerations across dorsal surface
7/24/2006	mortality	age unknown Female 9.6m	Campobello Island, NB	P		Propeller lacerations through blubber, into muscle and ribs
8/24/2006	mortality	Adult Female 14.7m	Roseway Basin, NS	P		16 fractured vertebrae; dorsal blubber bruise from head to genital region
12/30/2006	mortality	Yearling Male #3508 12.6m	off Brunswick, GA	P		20 propeller lacerations along right side of head and back with associated hemorrhaging
3/31/2007	mortality	Calf Male 7.7m	Outer Banks, NC		P	Edema associated with flipper and dorsal & ventral thoracic musculature; epidermal abrasion indicated entangling body and flipper wraps; no gear recovered

a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.

b. Additional information on previous event that was not included in previous reports.

c. Additional event not included in previous reports.

Table 5, continued. Confirmed human-caused mortality and serious injury records of Western North Atlantic right whales (*Eubalaena glacialis*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, ID, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel Strike	Entanglement/ Fishery interaction	
9/24/2008 ^c	serious injury	Adult Male #2110	Jeffreys Ledge	S	P	Spinal scoliosis associated with fresh entanglement injuries; compromised pectorals; emaciated; heavy cyamid load; pale skin; healed lacerations from previously documented vessel strike injury potentially exacerbate scoliosis; no gear present
1/14/2009	serious injury	Juvenile sex unknown #3311	off Brunswick, GA		P	Partial disentanglement; embedded wrap in rostrum & lip removed; decline in health; fixed trap/pot gear
1/27/2009	serious injury	Juvenile Male #3710 9.8m	Cape Lookout Shoals, NC		P	Live stranded w/ spinal scoliosis; euthanized; necropsy determined scoliosis due to entanglement and not congenital; entanglement wounds chronically infected; no gear recovered
6/27/2010	mortality	Adult Male	off Cape May, NJ		P	Evidence of constricting rostrum, mouth & flipper wraps w/ associated hemorrhage and bone damage; no gear recovered
7/2/2010	mortality	Calf Male 7.9m	off Great Wass Island, ME	P		2 large lacerations from dorsal to ventral surface
8/12/2010	mortality	Adult Male 14.1m	Digby Neck, NS		P	Evidence of entanglement with associated hemorrhaging around right flipper; no gear present
9/10/2010	serious injury	Adult Female #1503	off Cape Ann, MA		P	Constricting rostrum wrap; evidence of health decline; no gear recovered
12/25/2010	serious injury	Juvenile Female #3911	off Jacksonville, FL		P	Embedded line in mouth and on flipper; severe health decline; acute cause of death was shark predation; fixed trap/pot gear

a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.

b. Additional information on previous event that was not included in previous reports.

c. Additional event not included in previous reports.

Table 6. Confirmed human-caused mortality and serious injury records of Gulf of Maine humpback whales (*Megaptera novaeangliae*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, ID, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel strike	Entanglement/ Fishery interaction	
1/9/2006	mortality	Adult Female #8667 14.0m	off Charleston, SC	P		Extensive muscle hemorrhaging; rib fractures; dislocated flipper on left side of animal
3/17/2006	mortality	Juvenile Female 10.0m	Virginia Beach, VA	P		Crushed cranium and fractured mandible; hemorrhaging associated with fractures; ventral lacerations consistent with propeller wounds
3/25/2006	serious injury	Juvenile sex unknown 8m (est)	Flagler Beach, FL (confirmed Canadian gear) ^b		P	Heavy cyamid load; emaciated; spinal deformity that may or may not have been caused by the entanglement; line and buoys of lobster pot gear
8/6/2006	serious injury	age & sex unknown	Georges Bank		P	Multiple constricting wraps around head; line cutting into upper lip; wraps around both flippers; no gear recovered
8/23/2006	serious injury	age & sex unknown 12m (est)	Great South Channel		P	Flukes necrotic and nearly severed as a result of entanglement; pale skin and emaciated; gear recovered included heavy line and wire trap
9/6/4206 ^c	mortality	age & sex unknown	East of Cape Cod, MA		P	Whale entangled through mouth, continuing back to multiple wraps around peduncle; no gear recovered
9/27/4206 ^d	serious injury	age & sex unknown	off Cape May, NJ		P	Line anchored in mouthline & crosses over back; extent of entanglement unknown but animal is emaciated; no gear recovered

a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.

b. Gear origin not included in previous reports.

c. Record was added after review of carcasses sighted on 08/20/06 and 09/06/06. Previous reports stated these were the same animal. Recent review could not confirm the resight; therefore they are now being treated as two separate events. There was inconclusive evidence with regard to the carcass on 08/20/06 to determine mortality caused by entanglement.

d. Record not included in previous reports

Table 6, continued. Confirmed human-caused mortality and serious injury records of Gulf of Maine humpback whales (*Megaptera novaeangliae*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, ID, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel strike	Entanglement/ Fishery interaction	
10/15/2006	mortality	Juvenile Female 10.1m	off Fenwick Island, DE	P	S	Large laceration, penetrating through the bone, across rostrum with accompanying fractures; marks around right flipper consistent with entanglement; subdermal hemorrhaging and bone trauma at entanglement point; no gear present
1/27/2007	serious injury	age & sex unknown	off Beach Haven, NJ		P	Body wrap likely to become constricting; random cyamid patches; thin body condition; probable flipper wraps; no gear recovered
5/10/2007	mortality	Adult Female 12.5m	off Wachapreague, VA	P		Cranium shattered, hemorrhaging on left lateral side midway between flippers & fluke
5/13/2007	mortality	Juvenile Male 9.3m	Rockport, MA	P		Areas of hemorrhaging indicate major blunt trauma to chest, neck, & head
6/23/2007	serious injury	age unknown Male "Egg Toss"	Wildcat Knoll		P	Body wrap of gear imbedded; no gear recovered
6/24/2007	mortality	Juvenile Female "Tofu" 9.9m	Stellwagen Bank	P		Subdermal hemorrhaging involving blubber, fascia, & muscle extending from/around the insertion of the right flipper ventrally to the axilla

a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.

b. Gear origin not included in previous reports.

c. Record was added after review of carcasses sighted on 08/20/06 and 09/06/06. Previous reports stated these were the same animal. Recent review could not confirm the resight; therefore they are now being treated as two separate events. There was inconclusive evidence with regard to the carcass on 08/20/06 to determine mortality caused by entanglement.

d. Record not included in previous reports

Table 6, continued. Confirmed human-caused mortality and serious injury records of Gulf of Maine humpback whales (*Megaptera novaeangliae*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, ID, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel strike	Entanglement/ Fishery interaction	
12/21/2007	mortality	age unknown Male 9.4m	Ocean Sands, Corolla, NC		P	Documented wrapped in gear, gear removed without permission prior to necropsy; external lesions at flukes, flippers, mouth, dorsal fin, dorsal keel, & ventral pleats consistent with gillnet entanglement; emaciated; no gear recovered
1/6/2008	serious injury	age & sex unknown 10m (est)	off Cape Lookout, NC		P	Constricting line cutting into right flipper in several places; heavy cyamid load; emaciated; no gear recovered
5/30/2008	mortality	age & sex unknown	Georges Bank		P	Constricting body wraps, one wrap under lower jaw; open wound on right flipper; no gear recovered
6/9/2008	mortality	age & sex unknown	Georges Bank		P	Constricting body wrap; lobster buoy and 7/8" diameter rope
7/8/2008	serious injury	Adult Female "Estuary"	off Nauset, MA		P	Cuts were made, but no gear was removed; emaciated; moderate cyamid coverage; deep wounds in fluke blades from gear; hunched over position maintained after cuts were made to the gear; 7/8" diameter poly rope
8/13/2008	serious injury	age & sex unknown 10m (est)	off NJ		P	Partial disentanglement; emaciated; lethargic; heavy cyamid load; no gear recovered

a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.

b. Gear origin not included in previous reports.

c. Record was added after review of carcasses sighted on 08/20/06 and 09/06/06. Previous reports stated these were the same animal. Recent review could not confirm the resight; therefore they are now being treated as two separate events. There was inconclusive evidence with regard to the carcass on 08/20/06 to determine mortality caused by entanglement.

d. Record not included in previous reports

Table 6, continued. Confirmed human-caused mortality and serious injury records of Gulf of Maine humpback whales (*Megaptera novaeangliae*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, ID, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel strike	Entanglement/ Fishery interaction	
8/21/2008	serious injury	age & sex unknown	off Chatham, MA		P	Evidence of decline in health; no gear recovered
11/4/2008	mortality	Juvenile Male 10.1m	Assateague Island, MD	P		Cranial fractures with associated hemorrhaging
2/8/2009	mortality	age unknown Male 9.7m	Cape Fear, NC		P	Evidence of entanglement at mouthline, peduncle, and flipper with associated hemorrhaging; emaciated; no gear present
2/16/2009	mortality	Juvenile Male 10.0m	Nags Head, NC		P	Evidence of entanglement involving anchoring or heavily weighted gear with associated hemorrhaging; no gear present
2/25/2009	serious injury	Juvenile sex unknown	off Sandy Hook, NJ		P	Disentangled from anchoring gear; maintained hunched body position post-disentanglement; no gear recovered
6/9/2009	serious injury	age & sex unknown	Stellwagen Bank		P	Constricting body wrap just forward of the flippers; no gear recovered
12/9/2009	serious injury	age & sex unknown	off Jacksonville, FL (confirmed Canadian gear) ^b		P	Disentangled; evidence of health decline; pelagic gillnet
3/7/2010	serious injury	age & sex unknown	off Ponte Vedre, FL		P	Constricting body & flipper wraps; evidence of severe health decline

a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.

b. Gear origin not included in previous reports.

c. Record was added after review of carcasses sighted on 08/20/06 and 09/06/06. Previous reports stated these were the same animal. Recent review could not confirm the resight; therefore they are now being treated as two separate events. There was inconclusive evidence with regard to the carcass on 08/20/06 to determine mortality caused by entanglement.

d. Record not included in previous reports

Table 6, continued. Confirmed human-caused mortality and serious injury records of Gulf of Maine humpback whales (*Megaptera novaeangliae*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, ID, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel strike	Entanglement/ Fishery interaction	
3/13/2010	mortality	Juvenile Female 9.1m	Ocean City, MD	P		Skull fractures with associated hemorrhaging
5/5/2010	serious injury	Juvenile sex unknown	Chesapeake Bay		P	Gear likely to become constricting as animal grows; evidence of health decline; no gear recovered
5/8/2010	mortality	Adult Female 9.8m	Narragansett, RI		P	Evidence of constricting gear with associated hemorrhaging; fluid filled lungs; sink gillnet gear
5/15/2010	serious injury	Juvenile Male 8.8m	off Hatteras Inlet, NC		P	Live stranded; euthanized; necrotic infected injuries consistent with entanglement; no gear present
5/18/2010	serious injury	Adult sex unknown "Pinch"	Stellwagen Bank		P	Constricting body wrap; no gear recovered
5/28/2010	mortality	Adult Female 11.2m	Edgartown, MA		P	Evidence of entanglement with associated bruising & edema; 6" poly netting
6/10/2010	mortality	Juvenile Male 9.6m	Jones Beach State Park, NY	P		Extensive hemorrhage & edema on right dorsal lateral surface
7/4/2010	mortality	Juvenile Female 8.7m	off Assateague, MD	P		Extensive hemorrhage & edema to left lateral area
8/13/2010	serious injury	age & sex unknown	off Nauset, MA		P	Head wrap likely to become constricting; endline of lobster pot gear

a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.

b. Gear origin not included in previous reports.

c. Record was added after review of carcasses sighted on 08/20/06 and 09/06/06. Previous reports stated these were the same animal. Recent review could not confirm the resight; therefore they are now being treated as two separate events. There was inconclusive evidence with regard to the carcass on 08/20/06 to determine mortality caused by entanglement.

d. Record not included in previous reports

Table 6, continued. Confirmed human-caused mortality and serious injury records of Gulf of Maine humpback whales (*Megaptera novaeangliae*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, ID, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel strike	Entanglement/ Fishery interaction	
8/20/2010	serious injury	Juvenile sex unknown 2008 calf of "Trident"	Stellwagen Bank		P	Embedded peduncle wrap; evidence of health decline; no gear recovered
11/27/2010	mortality	Juvenile Male 7.5m (est)	Bay of Fundy		P	Evidence of constricting wraps on fluke, peduncle, and flipper; no gear recovered
12/23/2010	serious injury	age & sex unknown	off Port Everglades Inlet, FL		P	Evidence of entanglement & severe health decline; no gear present
<p>a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.</p> <p>b. Gear origin not included in previous reports.</p> <p>c. Record was added after review of carcasses sighted on 08/20/06 and 09/06/06. Previous reports stated these were the same animal. Recent review could not confirm the resight; therefore they are now being treated as two separate events. There was inconclusive evidence with regard to the carcass on 08/20/06 to determine mortality caused by entanglement.</p> <p>d. Record not included in previous reports</p>						

Table 7. Confirmed human-caused mortality and serious injury records of Western North Atlantic fin whales (*Balaenoptera physalus*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel strike	Entanglement/ Fishery interaction	
9/17/2006	serious injury	age & sex unknown 18m (est)	off Mt. Desert Rock, ME		P	Pale skin overall; cyamid load at point of attachment; emaciated; no gear recovered
3/25/2007	mortality	age unknown Female 18.0m	Norfolk, VA	P		Extensive fracturing of ribs, skull, and vertebrae w/ associated hemorrhage & edema
5/24/2007	mortality	age unknown Male	Newark Bay, NJ	P		Hemorrhage (epaxial muscle, diaphragm, pleural lining) and multiple fractures of the ribs, vertebrae, & sternum and the trailing tissue of the animal was marked by propeller cuts
6/25/2007	serious injury	age & sex unknown	Great South Channel		P	Wrap on tail assoc w/ cyamid load; flippers & mouth involved; extremely emaciated; lethargic; no gear recovered
8/11/2007	mortality	age & sex unknown	Cabot Strait, NS		P	Constricting wrap around body, between the head and flippers; no gear recovered
9/26/2007	mortality	Juvenile Male 13m (est)	off Martha's Vineyard, MA		P	Freshly dead, scavenged carcass with gear present; evidence of multiple body wraps with associated hemorrhaging; no gear recovered
7/2/2008	mortality	age unknown Male 14.8m	Barnegat Inlet, NJ	P		Vertebral fractures with associated hemorrhaging; hemorrhaging around ball joint of right flipper
10/1/2009	mortality	age & sex unknown	Port Elizabeth, NJ	P		Fresh carcass with broken flipper, hematomas, and abrasions
3/18/2010	mortality	Adult Female 18.6m	off Bethany Beach, DE	P		Fractured skull w/ associated hemorrhaging; abrasion mid-dorsal consistent w/ being folded over the bow of a ship
9/3/2010	mortality	Juvenile Male 9.5m	Cape Henlopen State Park, DE	P		Large laceration & vertebral fractures with associated hemorrhaging
<p>a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.</p>						

Table 8. Confirmed human-caused mortality and serious injury records of Nova Scotian sei whales (*Balaenoptera borealis*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel Strike	Entanglement/ Fish interaction	
4/17/2006	mortality	Juvenile Male 10.9m	Baltimore, MD	P		Brought in on bow of ship, freshly dead; massive hemorrhaging on right side; large blood clot behind head; several broken ribs
9/16/2006	serious injury	age & sex unknown	Jeffreys Ledge		P	Constricting wrap cutting into skin; no gear recovered
5/30/2007	mortality	Adult Female 14.4m	off Deer Island, MA	P		Broken left flipper, 8 vertebral processes, and 4 ribs; right flipper sheared off; lower jaw dislocated; hemorrhaging and/or edema associated with lower jaw and left flipper region
4/9/2008	serious injury	age & sex unknown	Great South Channel		P	Constricting wrap on fluke; skin sloughing; no gear recovered
6/29/2008	mortality	age & sex unknown 15m (est)	Slack's Cove, NB		P	Extensive entanglement evident; no gear present
5/19/2009	mortality	Juvenile Male 12.7 m	off Rehobeth Beach, DE	P		Posterior portion of skull & right mandible fractured; hemorrhaging dorsal to left pectoral

a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.

Table 9. Confirmed human-caused mortality and serious injury records of Canadian East Coast minke whales (*Balaenoptera acutorostrata*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel strike	Entanglement/ Fishery interaction	
08/16/06 ^b	mortality	age & sex unknown 4.7m	Straits View, Northern Peninsula, NL		P	Twine around fluke; mackerel trap
09/22/06 ^b	mortality	age & sex unknown	Woods Cove, Great Northern Peninsula, NL		P	Anchored by tail in doorways of the gear; mackerel trap
7/16/2007	serious injury	age & sex unknown 10m (est)	Trescott, ME		P	Wrapped in gear and anchored; no gear recovered
8/5/2007	mortality	Juvenile Female 4.3m	Cape Cod Bay, MA		P	Chronic entanglement with severe emaciation and dehydration and loss of protein; line lacerated blubber layer across back and at flipper insertions; severe hemorrhage and necrosis of blubber at gear entanglement points; 11/16" diameter floating rope
6/14/2008	mortality	Juvenile Female 4.7m	Orleans, MA		P	Braided line impressions wrapped the body in 3 places and left a deep, hemorrhaged laceration across the rostrum and blowholes; hemorrhaged abrasions present on roof of mouth; wet, blood-filled lungs indicate drowning; no gear present
7/23/2008	mortality	age & sex unknown 7m (est)	Kelligrews, NL		P	Constricting wraps of gear on caudal peduncle; 5/8" polypropylene rope
7/26/2008	mortality	age & sex unknown	Conception Bay, NL		P	Constricting wraps of gear through mouth and around tail; blackback flounder nets
8/25/2008	mortality	age & sex unknown 8m (est)	off Richibucto Cape, NB		P	Evidence of constricting body wraps; no gear recovered

a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.

b. Additional record which was not included in previous reports.

Table 9, continued. Confirmed human-caused mortality and serious injury records of Canadian East Coast minke whales (*Balaenoptera acutorostrata*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel strike	Entanglement/ Fishery interaction	
5/20/2009	mortality	Adult sex unknown 8m (est)	off Point Pleasant, NJ	P		Large hemorrhage at right pectoral
6/3/2009	serious injury	age & sex unknown	off Tadoussac, Quebec		P	Free-swimming with tight rostrum wrap; no gear recovered
8/11/2009	serious injury	age & sex unknown	off Plymouth, MA		P	Constricting wrap on rostrum & poor skin condition; no gear recovered
7/9/2010	mortality	Juvenile Male 5.7m	Fire Island, NY	P		3-4 large dorsal lacerations associated with fractured ribs
8/21/2010	serious injury	Adult sex unknown	Plymouth Harbor, MA		P	Embedded rostrum wrap; no gear recovered
<p>a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.</p> <p>b. Additional record which was not included in previous reports.</p>						

Table 10. Confirmed human-caused mortality and serious injury records of Northern Gulf of Mexico Bryde's whales (*Balaenoptera edeni*), 2006 - 2010.

Date ^a	Report Type	Age, Sex, Length	Location ^a	Assigned Cause: P=primary, S=secondary		Notes/Observations
				Vessel strike	Entanglement/ Fishery interaction	
10/4/2009	mortality	Adult Female 12.7m	Tampa, FL	P		Vertebral separation; lung damage; subdermal contusions
<p>a. The date sighted and location provided in the table are not necessarily when or where the serious injury or mortality occurred; rather, this information indicates when and where the whale was first reported beached, entangled, or injured.</p>						

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