NORTHERN RIGHT WHALE (*Eubalaena glacialis*): Western Atlantic Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Individuals of the western Atlantic northern right whale population range from wintering and calving grounds in coastal waters of the southeastern United States to summer feeding and nursery grounds in New England waters and northward to the Bay of Fundy the Scotian Shelf and the Gulf of St. Lawrence. Knowlton *et al.* (1992) reported several long-distance movements as far north as Newfoundland, the Labrador Basin, and southeast of Greenland; in addition, recent resightings of photographically identified individuals have been made off Iceland, arctic Norway and in the old Cape Farewell whaling ground east of Greenland (Jacobsen *et al.* 2004). The Norwegian sighting (in September 1999) represents one of only two published sightings this century of a right whale in Norwegian waters, and the first since 1926. Together, these long-range matches indicate an extended range for at least some individuals and perhaps the existence of important habitat areas not presently well described. Similarly, records from the Gulf of Mexico (Moore and Clark 1963, Schmidly *et al.* 1972) represent either geographic anomalies or a more extensive historic range beyond the sole known calving and wintering ground in the waters of the southeastern United States. Whatever the case, the location of most of the population is unknown during the winter. Offshore (greater than 30 miles) surveys flown off the coast of northeastern Florida and southeastern Georgia from 1996 to 2001 had 3 sightings in 1996, 1 in 1997, 13 in 1998, 6 in 1999, 11 in 2000 and 6 in 2001 (within each year, some were repeat sightings of previously recorded individuals). The frequency with which right whales occur in offshore waters in the southeastern U.S. remains unclear.

Research results suggest the existence of six major habitats or congregation areas for western Atlantic northern right whales: the coastal waters of the southeastern United States; the Great South Channel; Georges Bank/Gulf of Maine; Cape Cod and Massachusetts Bays; the Bay of Fundy; and the Scotian Shelf. However, movements within and between habitats may be more extensive than thought. Results from satellite tags clearly indicate that sightings separated by perhaps two weeks should not necessarily be assumed to indicate a stationary or resident animal. Instead, telemetry data have shown rather lengthy and somewhat distant excursions, including into deep water off the continental shelf (Mate *et al.* 1997, Baumgartner and Mate 2005). Systematic surveys conducted off the coast of North Carolina during the winters of 2001 and 2002 sighted 8 calves, suggesting the calving grounds may extend as far north as Cape Fear. Four of the calves were not sighted by surveys conducted further south. One of the cows photographed was new to researchers, having effectively eluded identification over the period of its maturation (McLellan *et al.* 2004). The Northeast Fisheries Science Center conducts an extensive multi-year aerial survey program throughout the Gulf of Maine region; this program is intended to better establish the distribution of right whales, including evaluating inter-annual variability in right whale occurrence in previously poorly studied habitats.

New England waters are a primary feeding habitat for right whales, which feed primarily on copepods (largely of the genera *Calanus* and *Pseudocalanus*) in this area. Research suggests that right whales must locate and exploit extremely dense patches of zooplankton to feed efficiently (Mayo and Marx 1990). These dense zooplankton patches are likely a primary characteristic of the spring, summer, and fall right whale habitats (Kenney *et al.* 1986, 1995). Acceptable surface copepod resources are limited to perhaps 3% of the region during the peak feeding season in Cape Cod and Massachusetts Bays (C. Mayo pers. comm.). While feeding in the coastal waters off Massachusetts has been better studied than in other areas, right whale feeding has also been observed on the margins of Georges Bank, in the Gulf of Maine, in the Bay of Fundy, and over the Scotian Shelf. The characteristics of acceptable prey distribution in these areas are beginning to emerge (Baumgartner and Mate 2003, Baugartner *et al.* 2003). In addition, New England waters serve as a nursery area for calves. NMFS (National Marine Fisheries Service) and Center for Coastal Studies aerial surveys during springs of 1999-2005 found right whales along the Northern Edge of Georges Bank, in Georges Basin, and in various locations in the Gulf of Maine including Cashes Ledge, Platts Bank and Wilkinson Basin. The consistency with which right whales occur in such locations is relatively high, but these new data further highlight high interannual variability in right whale use of some habitats.

Genetic analyses based upon direct sequencing of mitochondrial DNA (mtDNA) have identified five mtDNA haplotypes in the western Atlantic northern right whale (Malik *et al.* 1999). Schaeff *et al.* (1997) compared the genetic variability of North Atlantic and southern right whales (*E. australis*), and found the former to be significantly less diverse, a finding broadly replicated from sequence data by Malik *et al.* (2000). These findings might be indicative of inbreeding in the population, but no definitive conclusion can be reached using current data. Additional work comparing modern and historic genetic population structure in right whales, using DNA extracted from museum and archaeological specimens of baleen and bone, is also underway (Rosenbaum *et al.* 1997, 2000). Preliminary results suggest that the eastern and western North Atlantic populations were not genetically distinct (Rosenbaum *et al.* 2000). However, the virtual extirpation of the eastern stock and its lack of recovery in the last hundred years strongly suggests population subdivision over a protracted (but not evolutionary) timescale. Results also suggest that, as expected, the principal loss of genetic diversity occurred during major exploitation events prior to the 20th century.

To date, skin biopsy sampling has resulted in the compilation of a DNA library of more than 300 North Atlantic right whales. When work is completed, a genetic profile will be established for each individual, and an assessment provided on the level of genetic variation in the population, the number of reproductively active individuals, reproductive fitness, the basis for associations and social units in each habitat area, and the mating system. Tissue analysis has also aided in sex identification: the sex ratio of the photo-identified and catalogued population appears slightly skewed toward males (196M:187F). Analyses based on both genetics and sighting histories of photographically identified individuals also suggest that in this stock approximately one-third of the females with calves use summer feeding grounds other than the Bay of Fundy (New England Aquarium, unpublished data). As described above, a related question is where individuals other than calving females and a few juveniles overwinter. One or more additional wintering and summering grounds may exist in unsurveyed locations, although it is also possible that missing animals simply disperse over a wide area at these times. Identification of such areas, and the possible threats to right whales there, is a research priority.

POPULATION SIZE

Based on a census of individual whales identified using photo-identification techniques and an assumption of mortality of whales not seen in seven years, the western North Atlantic stock size was estimated to be 295 individuals in 1992 (Knowlton *et al.* 1994). An updated analysis using the same method gave an estimate of 299 animals in 1998 (Kraus *et al.* 2001). An IWC workshop on status and trends of western North Atlantic right whales gave a minimum direct-count estimate of 263 right whales alive in 1996 and noted that the true population was unlikely to be substantially greater than this (Best *et al.* 2001). A review of the photo-id recapture database on June 15, 2006, indicated that 313 individually recognized whales were known to be alive during 2001. Because this was a nearly complete census, it is assumed that this estimate represents a minimum population size. However, no estimate of abundance with an associated coefficient of variation has been calculated for the population.

Historical Abundance

An estimate of pre-exploitation population size is not available. Basque whalers may have taken right whales during the 1500s in the Strait of Belle Isle region (Aguilar 1986), although genetic analysis has shown that a large percent of the remains found in that area are, in fact, those of bowhead whales (Rastogi *et al.* 2004). The stock of right whales may have already been substantially reduced by the time whaling was begun by colonists in the Plymouth area in the 1600s (Reeves and Mitchell 1987). A modest but persistent whaling effort along the coast of the eastern U.S. lasted three centuries, and the records include one report of 29 whales killed in Cape Cod Bay in a single day during January 1700. Based on incomplete historical whaling data, Reeves and Mitchell (1987) could conclude only that there were at least hundreds of right whales present in the western North Atlantic during the late 1600s. In a later study (Reeves *et al.* 1992), a series of population trajectories were plotted using historical data and assuming a present day population size of 350 animals. The results suggest that there may have been at least 1,000 right whales in the population during the early to mid-1600's, with the greatest population decline occurring in the early 1700s. The authors cautioned, however, that the record of removals is incomplete, the results were preliminary, and refinements are required. Based on back calculations using the present population size and growth rate, the population may have numbered fewer than 100 individuals by 1935 when international protection for right whales came into effect (Hain 1975, Reeves *et al.* 1992, Kenney *et al.* 1995). However, little is known about the population dynamics of right whales in the intervening years.

Minimum Population Estimate

The western North Atlantic population size was estimated to be at least 313 individuals in 2002 based on a census of individual whales identified using photo-identification techniques. This value is a minimum and does not include animals that were alive prior to 2002, but not recorded in the individual sightings database as seen during from 1 January 2002 to 15 June 2005. It also does not include any calves known to be born during 2002, but not yet entered as new animals in the catalog.

Current Population Trend

The population growth rate reported for the period 1986-1992 by Knowlton *et al.* (1994) was 2.5% (CV=0.12), suggesting that the stock was showing signs of slow recovery. However, work by Caswell *et al.* (1999) suggested that crude survival probability declined from about 0.99 in the early 1980s to about 0.94 in the late 1990s. The decline was statistically significant. Additional work conducted in 1999 was reviewed by the IWC workshop on status and trends in this population (Best *et al.* 2001); the workshop concluded based on several analytical approaches that survival had indeed declined in the 1990s. Although capture heterogeneity could negatively bias survival estimates, the workshop concluded that this factor could not account for the entire observed decline, which appeared to be particularly marked in adult females. Another workshop was convened by NMFS in September 2002, and reached similar conclusions regarding the decline in the population (Clapham 2002).

Some indication of trend is evident by examination of the minimum number alive as calculated from the individual sightings database, as it existed on June 15 2006, for the years 1995-2002 (Table1). These data indicate a slight increase in the number of catalogued whales during this period, but with significant variation due to apparent losses exceeding gains during 1998-99.

Table 1. Minimum number alive, apparent losses and gains as calculated from the 15 June 2006 individual right whale sightings database for the years 1995-2002

	YEAR							
DEMOGRAPHIC	1995	1996	1997	1998	1999	2000	2001	2002
Minimum number alive[a]	284	297	305	301	293	296	310	313
Losses from previous year	4	8	9	6	11	7	7	16
Gains from previous year	8	21	17	2	3	10	21	19

[a]Minimum number of catalogued individuals known to be alive in any given year includes all whales known to be alive prior to that year and seen in that year or subsequently plus all whales newly catalogued that year. It does not include calves born that year but not yet catalogued. Later years may increase slightly as the backlog of unmatched but high quality photographs are matched to previously known individuals or become newly identified whales.

Recent mortalities, including those in the first half of 2005, suggest an increase in the annual mortality rate (Kraus *et al.* 2005). Calculations based on demographic data through 1999 (Fujiwara and Caswell 2001) indicate that this mortality rate increase would reduce population growth by approximately 10% per year (Kraus *et al.* 2005). Of these recent mortalities, six were adult females, three of which were carrying near-term fetuses. Furthermore, four of these females were just starting to bear calves, and since the average lifetime calf production is 5.25 calves (Fujiwara and Caswell 2001), the deaths of these females represent a lost reproductive potential of as many as 21 animals.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

During 1980-1992, 145 calves were born to 65 identified cows. The number of calves born annually ranged from 5 to 17, with a mean of 11.2 (SE=0.90). The reproductively active female pool was static at approximately 51 individuals during 1987-1992. Mean calving interval, based on 86 records, was 3.67 years. There was an indication that calving intervals may have been increasing over time, although the trend was not statistically significant (P=0.083) (Knowlton *et al.* 1994).

Since that report, total reported calf production in 92/93 was 9; 93/94, 9; 94/95, 7; 95/96, 21; 96/97, 19; 97/98, 5; 98/99, 4; 99/00, 1; 00/01, 31; 01/02, 21; 02/03, 19; 03/04, 16: 04/05 28 and 05/06 19 [mean 14.9 , (13.0-17.1; 95% C.I)]. However, this total calf production should be reduced by reported calf mortalities: 2 mortalities in 1993, 3 in 1996, 1 in 1997, 1 in 1998, 4 in 2001 and 2 in 2002. During 2002, 2 mortalities and 1 serious injury involved what were likely calves from 00/01. Of the three calf mortalities in 1996, available data suggested one was not included in the reported 21 mother/calf pairs, resulting in a total of 22 calves born. During 04/05 calving season, 3 adult females were found dead with near term fetuses. Eleven of the 21 mothers in 1996 were observed with calves for the first time (i.e., were "new" mothers that year). Three of these were at least 10 years old, 2 were 9 years old, and 6 were of unknown age. An updated analysis of calving interval through the 1997/1998 season suggests that mean calving interval increased since 1992 from 3.67 years to more than 5 years, a significant trend (Kraus *et al.* 2001). This conclusion is supported by modeling work reviewed by the IWC workshop on status and trends in this population (Best *et al.* 2001); the workshop agreed that calving intervals had indeed increased and further that the reproductive rate was approximately half that reported from studied populations of *E. australis*. A workshop on possible causes of reproductive failure was held in April 2000 (Reeves *et al.* 2001). Factors considered included contaminants, biotoxins, nutrition/food limitation, disease and inbreeding problems. While no conclusions were reached, a research plan to further investigate this topic was developed. Analyses completed since that workshop found that in the most recent years, calving intervals were closer to three years (Kraus *et al.* 2007).

The annual population growth rate during 1986-1992 was estimated to be 2.5% (CV=0.12) using photo-identification techniques (Knowlton *et al.* 1994). A population increase rate of 3.8% was estimated from the annual increase in aerial sighting rates in the Great South Channel, 1979-1989 (Kenney *et al.* 1995). However, as noted above, more recent work indicated that the population was in decline in the 1990s (Caswell *et al.* 1999, Best *et al.* 2001).

An analysis of the age structure of this population suggests that it contains a smaller proportion of juvenile whales than expected (Hamilton *et al.* 1998, Best *et al.* 2001), which may reflect lowered recruitment and/or high juvenile mortality. In addition, it is possible that the apparently low reproductive rate is due in part to an unstable age structure or to reproductive senescence on the part of some females. However, little data are available on either factor and senescence has not been documented for any baleen whale.

POTENTIAL BIOLOGICAL REMOVAL

Potential biological removal (PBR) is specified as the product of minimum population size, one-half the maximum net productivity rate and a "recovery" factor for endangered, depleted, threatened stocks, or stocks of unknown status relative to OSP (MMPA Sec. 3. 16 U.S.C. 1362, Wade and Angliss 1997). The recovery factor for right whales is 0.10 because this species is listed as endangered under the Endangered Species Act (ESA). However, in view of the population decline indicated by recent demographic analyses (Caswell *et al.* 1999, Best *et al.* 2001), the PBR for this population is set to zero.

ANNUAL HUMAN-CAUSED SERIOUS INJURY AND MORTALITY

For the period 2001 through 2005, the minimum rate of annual human-caused mortality and serious injury to right whales averaged 3.2 per year (U.S. waters, 2.0; Canadian waters, 1.2). This is derived from two components: 1) non-observed fishery entanglement records at 1.4 per year (U.S. waters, 0.4; Canadian waters, 1.0), and 2) ship strike records at 1.8 per year (U.S. waters, 1.6; Canadian waters, 0.2). Beginning with the 2001 Stock Assessment Report, Canadian records were incorporated into the mortality and serious injury rates of this report to reflect the effective range of this stock. It is also important to stress that serious injury determinations are made based upon the best available information; these determinations may change with the availability of new information (Cole *et al.* 2005). For the purposes of this report, discussion is primarily limited to those records considered confirmed human-caused mortalities or serious injuries. For more information on determinations for this period, see Nelson *et al.* 2007.

Background

The details of a particular mortality or serious injury record often require a degree of interpretation. The assigned cause is based on the best judgment of the available data; additional information may result in revisions. When reviewing Table 2 below, several factors should be considered: 1) a ship strike or entanglement may occur at some distance from the reported location; 2) the mortality or injury may involve multiple factors; for example, whales that have been both ship struck and entangled are not uncommon; 3) the actual vessel or gear type/source is often uncertain; and 4) in entanglements, several types of gear may be involved.

The serious injury determinations are most susceptible to revision. There are several records where a struck and injured whale was re-sighted later, apparently healthy, or where an entangled or partially disentangled whale was re-sighted later free of gear. The reverse may also be true: a whale initially appearing in good condition after being struck or entangled is later re-sighted and found to have been seriously injured by the event. Entanglements of juvenile whales are typically considered serious injuries because the constriction on the animal is likely to become increasingly harmful as the whale grows (Cole *et al.* 2005, Nelson *et al.* 2007).

A serious injury was defined in 50 CFR part 229.2 as an injury that is likely to lead to mortality. We therefore limited the serious injury designation to only those reports that had substantiated evidence that the injury, whether from entanglement or vessel collision, was likely to lead to the whale's death (Cole *et al.* 2005, Nelson *et al.* 2007). Determinations of serious injury were made on a case-by-case basis following recommendations from the workshop conducted in 1997 on differentiating serious and non-serious injuries (Angliss and DeMaster 1998). Injuries that impeded a whale's locomotion or feeding were not considered serious injuries unless they were likely to be fatal in the foreseeable future. There was no forecasting of how the entanglement or injury may increase the whale's susceptibility to further injury, namely from additional entanglements or vessel collisions. This conservative approach likely underestimates serious injury rates.

With these caveats, the total estimated annual average human-induced mortality and serious injury incurred by this stock (including fishery and non-fishery related causes) is 3.2 right whales per year (U.S. waters 2.0; Canadian waters, 1.2). As with entanglements, some injury or mortality due to ship strikes is almost certainly undetected, particularly in offshore waters. Decomposed and/or unexamined animals (e.g., carcasses reported but not retrieved or necropsied) represent lost data, some of which may relate to human impacts. For these reasons, the estimate of 3.2 right whales per year must be regarded as a minimum estimate (Nelson *et al.* 2007).

Further, the small population size and low annual reproductive rate of right whales suggest that human sources of mortality may have a greater effect relative to population growth rates for other whales. The principal factors believed to be retarding growth and recovery of the population are ship strikes and entanglement with fishing gear. Between 1970 and 1999, a total of 45 right whale mortalities were recorded (IWC 1999, Knowlton and Kraus 2001). Of these, 13 (28.9%) were neonates that are believed to have died from perinatal complications or other natural causes. Of the remainder, 16 (35.6%) were resulted from ship strikes, 3 (6.7%) were related to entanglement in fishing gear (in two cases lobster gear, and one gillnet gear), and 13 (28.9%) were of unknown cause. At a minimum, therefore, 42.2% of the observed total for the period and 50% of the 32 non-calf deaths were attributable to human impacts (calves accounted for three deaths from ship strikes).

Young animals, ages 0-4 years, are apparently the most impacted portion of the population (Kraus 1990). Finally, entanglement or minor vessel collisions may not kill an animal directly, but may weaken or otherwise affect it so that it is more likely to become vulnerable to further injury. Such was apparently the case with the two-year-old right whale killed by a ship off Amelia Island, Florida, in March 1991 after having carried gillnet gear wrapped around its tail region since the previous summer (Kenney and Kraus 1993). A similar fate befell right whale #2220, found dead on Cape Cod in 1996.

Fishery-Related Serious Injury and Mortality

Reports of mortality and serious injury relative to PBR as well as total human impacts are contained in records maintained by the New England Aquarium and the NMFS Northeast and Southeast Regional Offices (Table 2). From 2001 through 2005, 7 of 16 records of mortality or serious injury (including records from both USA and Canadian waters) involved entanglement or fishery interactions. Information from an entanglement event often does not include the detail necessary to assign the entanglements to a particular fishery or location.

Although disentanglement is either unsuccessful or not possible for the majority of cases, during the period 2001 through 2005, there were at least five documented cases of entanglements for which the intervention of disentanglement teams averted a likely serious injury determination. On 7/20/01, #2427, a seven-year-old male was sighted off Portsmouth, New Hampshire, with line wrapped tightly around the rostrum and through the mouth. The whale was disentangled later that day, and subsequent resightings indicated that the injuries were healing. However, observers also noted that the whale's baleen was damaged, and that the whale was holding its head high out of the water and not diving as frequently as other whales in the area. A yearling male, #3120, first sighted off the North Carolina coast on 4/7/02, may have avoided serious injury due to being partially disentangled on 8/25/02 by researchers in the Bay of Fundy, Canada. An unidentified right whale was disentangled in the Bay of Fundy, Canada on 7/09/03. The gear was tentatively identified as US lobster gear and other unknown gear. On 12/6/04, a one-year-old of unknown gender, #3314, was sighted with line wrapped on both its head and tail which would likely be fatal. Following more than three weeks of attempts, the constricting fishing gear was removed. On December 3, 2005, #3445--the 2004 calf of #2145--was first sighted off Brunswick, Georgia, with line across its back and around its right flipper. Over 300 feet of trailing line was removed. This whale was resighted 6/12/2006 apparently gear free.

In January 1997, NMFS changed the classification of the Gulf of Maine and U.S. mid-Atlantic lobster pot fisheries from Category III to Category I based on examination of stranding and entanglement records of large whales from 1990 to 1994 (62 FR 33, Jan. 2, 1997).

Bycatch of a right whale has been observed by the Northeast Fisheries Observer Program in the pelagic drift gillnet fishery, but no mortalities or serious injuries have been documented in any of the other fisheries monitored by

NMFS. The only bycatch of a right whale documented by the Northeast Fisheries Observer Program was a female released from a pelagic drift gillnet in 1993.

In an analysis of the scarification of right whales, a total of 75.6% of 447 whales examined during 1980-2002 were scarred at least once by fishing gear (Knowlton *et al.* 2005). Further research using the North Atlantic Right Whale Catalogue has indicated that, annually, between 14% and 51% of right whales are involved in entanglements (Knowlton *et al.* 2005). Entanglement records from 1970 through 2004 maintained by NMFS Northeast Regional Office (NMFS, unpublished data) included at least 92 right whale entanglements or possible entanglements, including right whales in weirs, in gillnets, and in trailing line and buoys. An additional record (M. J. Harris, pers. comm.) reported a 9.1-10.6m right whale entangled and released south of Ft. Pierce, Florida, in March 1982 (this event occurred during a sampling program and was not related to a commercial fishery). Incidents of entanglements in groundfish gillnet gear, cod traps, and herring weirs in waters of Atlantic Canada and the U.S. east coast were summarized by Read (1994). In six records of right whales becoming entangled in groundfish gillnet gear in the Bay of Fundy and Gulf of Maine between 1975 and 1990, the whales were either released or escaped on their own, although several whales were observed carrying net or line fragments. A right whale mother and calf were released alive from a herring weir in the Bay of Fundy in 1976. For all areas, specific details of right whale entanglement in fishing gear are often lacking. When direct or indirect mortality occurs, some carcasses come ashore and are subsequently examined, or are reported as "floaters" at sea. The number of unreported and unexamined carcasses is unknown, but may be significant in the case of floaters. More information is needed about fisheries interactions and where they occur.

Other Mortality

Ship strikes are a major cause of mortality and injury to right whales (Kraus 1990, Knowlton and Kraus 2001). Records from 2001 through 2005 have been summarized in Table 2. For this time frame, the average reported mortality and serious injury to right whales due to ship strikes was 1.8 whales per year (U.S. waters, 1.6; Canadian waters, 0.2). In 2000, two right whales were sighted in the Bay of Fundy with large open wounds that were likely the result of collisions with vessels. Right whale #2820, a male of unknown age, was first seen injured on 7/9/00. He was sighted intermittently throughout the remainder of that summer, was seen again in the Bay of Fundy in 2001 and seen once in 2002. The second whale, #2660, was a five-year-old female who was sighted with a wound on the left side of her head, just forward of the blowholes. She was seen with a calf in December 2005. Although both of these injuries were gruesome in appearance, in the absence of a chronic stressor (i.e., entangling fishing gear), they were apparently not fatal.

Table 2. Confirmed human-caused mortality and serious injury records of North Atlantic right whales, January 2001 through December 2005.

Date[a]	Report Type[b]	Sex, age, ID	Location[a]	Assigned Cause: P=primary, S=secondary		Notes
				Ship strike	Entang./ Fsh inter	
3/17/01	mortality	Male calf	Assateague, VA	P		Large fresh propeller gashes on dorsal caudal and acute muscular hemorrhage
6/8/01	serious injury	Adult male #1102	58 mi east of Cape Cod, MA		P	Entangling gear deeply embedded; numerous signs of poor health including emaciation, skin discoloration, and abnormal cyamid distribution
6/18/01	mortality	female calf	Long Island, NY	P		Dorsal propeller wounds, sub-dermal hemorrhage
11/3/01	mortality	14 m Adult male #1238	Magdellen Islands, Canada		P	Thoroughly wrapped up in Danish Seine gear, whale seen alive and well five months earlier

7/6/02	mortality	11 m female #3107	Observed alive off Briar Island, NS Canada		P	carcass ashore on Nantucket, MA; caudal peduncle severely lacerated where entangled; gear consistent with inshore lobster fishery
8/22/02	serious injury	Adult female #1815	Scotian Shelf, Canada		P	line tightly wrapped around head and tail stock; no gear recovered
8/22/02	mortality	12.6m female 1y.o.	off Ocean City, MD	P		large laceration on dorsal surface
8/30/02	serious injury	#3210 age & sex unknown	Bay of Fundy, NS		P	line tightly wrapped around rostrum, resighted in 2004 in poor condition; no gear recovered
1/14/03	serious injury	Adult female #2240	Jacksonville, FL		P	body condition poor; no gear recovered
10/02/03	mortality	Adult female #2150	Digby, NS	P		Large fracture in skull, sub-dermal hemorrhage
2/7/04	mortality	Adult female #1004	Virginia Beach, VA	P		Severe subdermal bruising, complete fracture of rostrum and laceration of oral rete.
9/6/04	mortality	Adult female #2301	Roseway Basin, NS		P	Extensive constricting line on head and left flipper. Found dead March 3, 2005 on Ship Shoal Island, VA.
11/24/04	mortality	Adult female #1909	Ocean Sands, NC	P		Left fluke lobe severed and large bore blood vessels exposed.
1/12/05	mortality	Adult female #2143	Cumberland Island, GA	P		Healed propeller wounds from strike as a calf re-opened as a result of pregnancy
3/10/05	serious injury	#2425 age & sex unknown	Cumberland Island, GA	P		43' power yacht partially severed left fluke; resighted 9/4/05 in extremely poor condition
4/28/05	mortality	Adult female #2617	Monomoy Island, MA	P		Significant bruising and multiple vertebral fractures

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. National guidelines for determining what constitutes a serious injury have not been finalized. Interim criteria as established by NERO/NMFS (Nelson *et al.* 2007) have been used here. Some assignments may change as new information becomes available and/or when national standards are established.

STATUS OF STOCK

The size of this stock is considered to be extremely low relative to OSP in the U.S. Atlantic EEZ, and this species is listed as endangered under the ESA. The North Atlantic right whale is considered one of the most critically endangered populations of large whales in the world (Clapham *et al.* 1999). A Recovery Plan has been published for the North Atlantic right whale and is in effect (NMFS 2005). Three critical habitats, Cape Cod Bay/Massachusetts Bay, Great South Channel, and the Southeastern U.S. were designated by NMFS (59 FR 28793, June 3, 1994). A National Marine Fisheries Service ESA 1996 review of Northern Right Whale status concluded that the western North Atlantic population of the northern right whale remains endangered [Note that 'northern right whale' is nomenclature that is now outdated in the scientific literature but not yet modified in rule makings. Scientific literature recognizes north Atlantic and north Pacific right whales as two distinct species]; this conclusion was reinforced by the International Whaling Commission (Best *et al.* 2001), which expressed grave concern regarding the status of this stock. Relative to populations of southern right whales, there are also concerns about growth rate, percentage of reproductive females, and calving intervals in this population. The total level of human-caused mortality and serious injury is unknown, but reported human-caused mortality and serious injury has been a minimum of 3.2 right whales per year from 2001 through 2005. Given that PBR has been set to zero, no mortality or serious injury for this stock can be considered insignificant. This is a strategic stock because the average annual human-related mortality and serious injury exceeds PBR, and also because the Northern right whale is an endangered species.

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