April 2014

MINKE WHALE (*Balaenoptera acutorostrata acutorostrata*): Canadian East Coast Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Minke whales have a cosmopolitan distribution in temperate, tropical, and high-latitude waters. In the North Atlantic, there are four recognized populations—Canadian East Coast, west Greenland, central North Atlantic, and northeastern North Atlantic (Donovan 1991). These divisions were defined by examining segregation by sex and length, catch distributions, sightings, marking data and pre-existing ICES boundaries. However, there were very few data from the Canadian East Coast population. Anderwald *et al.* (2011) found no evidence for geographic structure comparing these putative populations but did, using individual genotypes and likelihood assignment methods, identify two cryptic stocks distributed across the North Atlantic. Until better information is available, minke whales off the eastern coast of the United States are considered to be part of the Canadian East Coast stock, which inhabits the area from the western half of the Davis Strait (45ºW) to the Gulf of Mexico. It is also uncertain if there are separate sub-stocks within the Canadian East Coast stock.

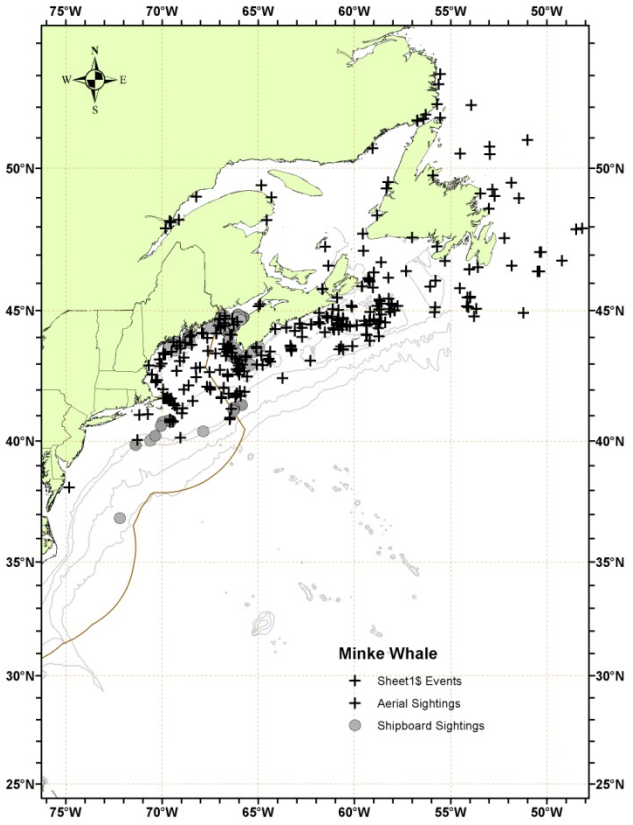

Figure 1. *Distribution of minke whale sightings from NEFSC and SEFSC shipboard and aerial surveys during the summers of 1995, 1998, 1999, 2002, 2004, 2006, 2007, 2008, 2010, and 2011and DFO's 2007 TNASS survey. Isobaths are the 100-m, 1000-m and 4000-m depth contours.*

The minke whale is common and widely distributed within the U.S. Atlantic Exclusive Economic Zone (EEZ) (CETAP 1982). There appears to be a strong seasonal component to minke whale distribution. Spring and summer are times of relatively widespread and common occurrence, and when the whales are most abundant in New England waters. In New England waters during fall there are fewer minke whales, while during winter the species appears to be largely absent. Like most other baleen whales, minke whales generally occupy the continental shelf proper (< 100 m deep), rather than the continental shelf-edge region. Records summarized by Mitchell (1991) hint at a possible winter distribution in the West Indies, and in the mid-ocean south and east of Bermuda. As with several other cetacean species, the possibility of a deep-ocean component to the distribution of minke whales exists but remains unconfirmed.

POPULATION SIZE

Multiple estimates are available for portions of minke whale habitat (see Appendix IV for details on these surveys and estimates). The best recent abundance estimate for this stock is 20,741 (CV=0.30) minke whales. This is the estimate derived from the Canadian Trans-North Atlantic Sighting Survey (TNASS) in July-August 2007 and is considered best because, while it did not cover any U.S. waters, the survey covered more of the minke whale range than the other surveys reported here.

Earlier estimates

For earlier abundance estimates please see Appendix IV.

Recent surveys and abundance estimates

An abundance estimate of 3,312 (CV=0.74) minke whales was generated from an aerial survey conducted in August 2006, which surveyed 10,676 km of trackline in the region from the 2000-m depth contour on the southern edge of Georges Bank to the upper Bay of Fundy and to the entrance of the Gulf of St. Lawrence. (Table 1; Palka pers. comm.). The value of *g(0)* used for this estimation was derived from the pooled 2002, 2004 and 2006 aerial survey data.

An abundance estimate of 20,741 (CV=0.30) minke whales was generated from the TNASS in July-August 2007. This survey covered from northern Labrador to the Scotian Shelf, providing full coverage of the Atlantic Canadian coast (Lawson and Gosselin 2009). The abundance estimates from this survey have been corrected for perception and availability bias, when possible. In general this involved correcting for perception bias using mark-recapture distance sampling, and correcting for availability bias using dive/surface times, as reported in the literature, and the Laake (1997) analysis method (Lawson and Gosselin 2011).

An abundance estimate of 2,591 (CV=0.81) minke whales was generated from a shipboard and aerial survey conducted during June-August 2011 (Palka 2012). The aerial portion that contributed to the abundance estimate covered 5,313 km of tracklines that were over waters north of New Jersey from the coastline to the 100-m depth contour through the U.S. and Canadian Gulf of Maine, and up to and including the lower Bay of Fundy. The shipboard portion covered 3,107 km of tracklines that were in waters offshore of central Virginia to Massachusetts (waters that were deeper than the 100-m depth contour out to beyond the U.S. EEZ). Both sighting platforms used a double-platform data collection procedure, which allows estimation of abundance corrected for perception bias of the detected species (Laake and Borchers, 2004). Estimation of the abundance was based on the independent observer approach assuming point independence (Laake and Borchers 2004) and calculated using the multiple covariate distance sampling (MCDS) option in the computer program Distance (version 6.0, release 2, Thomas *et al.* 2009).

Table 1. Summary of abundance estimates for the Canadian east coast stock of minke whales (*Balaenoptera acutorostrata acutorostrata*) with month, year, and area covered during each abundance survey, and resulting abundance estimate (N_{best}) and coefficient of variation. (CV).

Month/Year	Area	N_{best}	CV
Aug 2006	S. Gulf of Maine to upper Bay of Fundy to Gulf of St. Lawrence	3,312	0.74
Jul-Aug 2007	N. Labrador to Scotian Shelf	20,741	0.30
Jul-Aug 2011	Central Virginia to lower Bay of Fundy	2,591	0.81

Minimum Population Estimate

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally distributed best abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997). The best estimate of abundance for minke whales is 20,741animals (CV=0.30). The minimum population estimate for the Canadian East Coast minke whale is 16,199 animals.

Current Population Trend

A trend analysis has not been conducted for this stock. The statistical power to detect a trend in abundance for this stock is poor due to the relatively imprecise abundance estimates and long survey interval. For example, the power to detect a precipitous decline in abundance (i.e., 50% decrease in 15 years) with estimates of low precision (e.g., CV > 0.30) remains below 80% (alpha = 0.30) unless surveys are conducted on an annual basis (Taylor *et al.* 2007).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. Life history parameters that could be used to estimate net productivity are that females mature between 6 and 8 years of age, and pregnancy rates are approximately 0.86 to 0.93. Based on these parameters, the calving interval is between 1 and 2 years. Calves are

probably born during October to March after 10 to 11 months gestation and nursing lasts for less than 6 months. Maximum ages are not known, but for Southern Hemisphere minke whales maximum age appears to be about 50 years (IWC 1991; Katona *et al.* 1993).

For purposes of this assessment, the maximum net productivity rate was assumed to be 0.04. This value is based on theoretical modeling showing that cetacean populations may not grow at rates much greater than 4% given the constraints of their reproductive life history (Barlow *et al.* 1995).

POTENTIAL BIOLOGICAL REMOVAL

Potential Biological Removal (PBR) is the product of minimum population size, one-half the maximum productivity rate, and a recovery factor (MMPA Sec. 3. 16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is 16,199. The maximum productivity rate is 0.04, the default value for cetaceans. The recovery factor, which accounts for endangered, depleted, or threatened stocks, or stocks of unknown status, relative to optimum sustainable population (OSP) is assumed to be 0.5 because this stock is of unknown status. PBR for the Canadian east coast minke whale is 162.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

During 2007 to 2011, the average annual minimum detected human-caused mortality and serious injury was 7.85 minke whales per year (1.8 minke whales per year from observed U.S. fisheries, 5.05 minke whales per year (unknown CV) from U.S. and Canadian fisheries using strandings and entanglement data, and 1.0 per year from ship strikes.

Data to estimate the mortality and serious injury of minke whales come from the Northeast Fisheries Science Center Observer Program, the At-Sea Monitor Program, and from records of strandings and entanglements in U.S. and Canadian waters. For the purposes of this report, only those unobserved strandings and entanglement records considered confirmed human-caused mortalities or serious injuries are shown in Table 2, while mortalities and serious injuries recorded by the Observer or At-Sea Monitor Programs are recorded in Table 3.

Detected interactions in the strandings and entanglement data should not be considered an unbiased representation of human-caused mortality. Detections are haphazard and not the result of a designed sampling scheme. As such they represent a minimum estimate which is almost certainly biased low.

New Serious Injury Guidelines

NMFS updated its serious injury designation and reporting process, which uses guidance from previous serious injury workshops, expert opinion, and analysis of historic injury cases to develop new criteria for distinguishing serious from non-serious injury (Angliss and DeMaster 1998; Andersen *et al*. 2008; NOAA 2012). NMFS defines serious injury as an "*injury that is more likely than not to result in mortality*". All injury determinations for this stock assessment were performed under the new guidelines. The new process involves proration of serious injury determinations where there is uncertainty regarding the severity or cause.

Fishery Information

Detailed fishery information is reported in Appendix III.

Earlier Interactions

For more details on the historical fishery interactions prior to 1999, see Waring *et al.* (2007).

In 2002, one minke whale mortality and one live release were attributed to the lobster trap fishery. A June 2003 mortality, while wrapped in lobster gear, cannot be confirmed to have become entangled in the area, and so is not attributed to the fishery. Annual mortalities due to the Northeast/mid-Atlantic Lobster Trap/Pot fishery, as determined from strandings and entanglement records that have been audited, were 1 in 1991, 2 in 1992, 1 in 1994, 1 in 1995, 0 in 1996, 1 in 1997, 0 in 1998 to 2001, 1 in 2002, and 0 in 2003 through 2011.

U.S.

Northeast Bottom Trawl

The fishery is active in New England waters in all seasons. Detailed fishery information is reported in Appendix III. One freshly dead minke whale was caught in 2004 on the northeastern tip of Georges Bank in U.S. waters. Two dead minkes were reported by observers in 2008. Fisheries observer data from the years 2005 through 2009 were pooled and bycatch rates for minke whales were estimated using a stratified ratio-estimator. Estimated bycatch rates from the pooled fisheries observer data were expanded by annual (2006–2010) fisheries data collected from mandatory vessel trip reports. The estimated annual mortality (CV in parentheses) attributed to this fishery was 3.7

(0.73) for 2006, 3.3 (0.72) for 2007, 2.9 (0.73) for 2008, 2.9 (0.75) for 2009 and 0 for 2010 and 2011. Annual average estimated minke whale mortality and serious injury from the Northeast bottom trawl fishery during 2007 to 2011 was 1.8 (CV=0.42)(Table 3).

Pelagic Longline

In 2010, a minke whale was caught but released alive (no serious injury) in the pelagic longline fishery, South Atlantic Bight fishing area (Garrison and Stokes 2012).

Other Fisheries

The audited NE Regional Office/NMFS entanglement/stranding database contains records of minke whales, of which the confirmed mortalities and serious injuries from the last five years are reported in Table 2. During 2007 to 2011, as determined from stranding and entanglement records confirmed to be of U.S. origin or first sighted in U.S. waters, the minimum detected average annual mortality and serious injury was 3.0 minke whales per year in U.S. fisheries. Most cases where gear was recovered and identified involved gillnet or pot/trap gear.

CANADA

Read (1994) reported interactions between minke whales and gillnets in Newfoundland and Labrador, in cod traps in Newfoundland, and in herring weirs in the Bay of Fundy. Hooker *et al.* (1997) summarized bycatch data from a Canadian fisheries observer program that placed observers on all foreign fishing vessels operating in Canadian waters, on between 25% and 40% of large Canadian fishing vessels (greater than 100 feet long), and on approximately 5% of smaller Canadian fishing vessels. During 1991 through 1996, no minke whales were observed taken.

Herring Weirs

During 1980 to 1990, 15 of 17 minke whales were released alive from herring weirs in the Bay of Fundy. During January 1991 to September 2002, 26 minke whales were trapped in herring weirs in the Bay of Fundy. Of these 26, 1 died (H. Koopman, pers. comm.) and several (number unknown) were released alive and unharmed (A. Westgate, pers. comm.). Four minke whales were reported released alive from Grand Manan herring weirs in 2009 (H. Koopman pers. comm.).

Other Fisheries

Mortalities and serious injuries that were likely a result of an interaction with an unknown Canadian fishery are detailed in Table 2. During 2007 to 2011, as determined from stranding and entanglement records confirmed to be of Canadian origin or first sighted in Canadian waters, the minimum detected average annual mortality and serious injury was 2.05 (prorated value) minke whales per year in Canadian fisheries.

Table 2. Confirmed human-caused mortality records of minke whales (*Balaenoptera acutorostrata acutorostrata*) where the cause was assigned as either an entanglement (EN) or a ship strike (SS): 2007-2011 [a]

Date[b]	Report Type	ID	Location[b]	Assigned Cause	Value against PBR[c]	Country[d]	Gear Type[e]	Description
7/7/2007	Unknown		Provincetown harbor, MA	EN	0.75	XU	NR	Unable to relocate or to determine extent of entanglement.
7/11/2007	Unknown		Duntarra, Trinity Bay	EN	0.75	CN	GN	Entangled in cod gillnets. Partially disentangled by tourists. Unknown configuration of gear remaining.

7/16/2007	Serious Injury		1 nm S of Eastern Head, Trescott, ME; 27 nm NE of Jonesport, ME	EN	1	US	NR	Anchored. No photos. Not relocated.
8/5/2007	Mortality		Cape Cod Bay, MA	EN	1	XU	GU	Chronic entanglement w/ severe emaciation & dehydration & loss of protein; line lacerated blubber layer across back & at pectoral insertions; severe hemorrhage & necrosis at gear entanglement points
9/24/2007	Unknown		Massachusetts Bay; 8 nm E of Marblehead Neck and 8 nm S of Gloucester, MA	EN	0.75	XU	NR	Unable to determine extent of entanglement from photos & description.
3/11/2008	Unknown		Off Yarmouth, NS	EN	0.75	XC	NR	No photos or description to determine extent of entanglement.
6/14/2008	Mortality		Orleans, MA	EN	1	US	NP	Braided line impressions wrapped body in 3 places & left a deep, hemorrhaged laceration across the rostrum & blowholes; hemorrhaged abrasions present on roof of mouth; wet, bloodfilled lungs indicate drowning
6/19/2008	Unknown		Grand Manan Island, NB	EN	0.75	XC	NR	No photos or description to determine extent of entanglement.

7/23/2008	Mortality		Kelligrews, NL	EN	1	CN	GU	Constricting wraps of gear on caudal peduncle
7/26/2008	Mortality		Conception Bay, NL	EN	1	CN	GN	Constricting wraps of gear through mouth & around tail
7/28/2008	Unknown		Hopeall Point, Trinity Bay	EN	0.75	CN	GN	Gear removed from whale, but unclear if some gear remains. Whale not resighted after disentanglement.
8/20/2008	Unknown		off Outer Heron Island, Boothbay Harbor, ME	EN	0.75	XU	NR	No photos. Unable to determine extent of entanglement.
8/25/2008	Mortality		off Richibucto Cape, NB	EN	1	CN	NR	Evidence of constricting body wraps
9/21/2008	Unknown		~8 nm SSW of Port Clyde, ME	EN	0.75	XU	NR	No photos. Inadequate description of gear to determine extent of entanglement of if whale anchored.
10/9/2008	Unknown		near Isles of Shoals, NH	EN	0.75	XU	NR	Extent of entanglement unknown.
4/19/2009	Unknown		Grand Le Pierre, Fortune Bay, Labrador	EN	0.75	CN	PT	Entanglement configuration unknown.
5/20/2009	Mortality		off Point Pleasant, NJ	SS	1	US	-	Large hemorrhage at right pectoral
6/3/2009	Serious Injury		Tadoussac, Northern Gulf of St. Lawrence	EN	1	CN	NR	Tight wrap on rostrum.
8/11/2009	Serious Injury		8 mi E of Plymouth, MA	EN	1	XU	NR	Constricting wrap & poor skin condition indicating health decline.
9/2/2009	Unknown		~5 mi S of Pumpkin Island, ME	EN	0.75	XU	NR	Entanglement configuration unknown.
10/11/2009	Serious Injury		~ 9 mi from Cape Cod National Sea	EN	1	US	MT	In net and on deck for short period. Released

			Shore					& swam off.
7/9/2010	Mortality		Fire Island, NY	SS	1	US	-	3-4 large dorsal lacerations associated w/ fractured ribs
8/21/2010	Serious Injury		Plymouth Harbor, MA	EN	1	XU	NR	Constricting wrap embedded in rostrum.
5/6/2011	Mortality		off Martha's Vineyard, MA	EN	1	US	PT	Anchored in gear; embedded line at fluke; evidence of entanglement w/ associated hemorrhaging at mouth corners & insertion of pectorals
7/17/2011	Unknown		outside Boston Harbor	EN	0.75	XU	NR	Entanglement configuration unknown. No resights.
7/24/2011	Unknown		Highland Light, Cape Cod	EN	0.75	XU	NR	Entanglement configuration unknown. No resights.
8/4/2011	Mortality		off Sandy Hook, NJ	SS	1	US	-	4 propellar lacerations across dorsal surface; fractured ribs w/ associated hemorrhaging
8/26/2011	Mortality		off Sandy Hook, NJ	EN	1	US	NP	Fresh carcass w/ evidence of extensive entanglement
8/29/2011	Mortality		Moriches, NY	SS	1	US	-	Extensive hemorrhage & edema along dorsal & both lateral surfaces
9/7/2011	Unknown		Greenspond, BB	EN	0.75	CN	GN	Anchored initially. Freed but some gear may have still been attached. Configuration unknown.

9/19/2011	Unknown		Northumberland Strait, Pointe-Sapin, PEI	EN	0.75	CN	NR	Anchored initially. Freed but some gear may have still been attached. Configuration unknown.
10/6/2011	Mortality		off Matinicus Island, ME	EN	1	US	PT	Fresh carcass anchored in gear
12/7/2011	Mortality		Carolina Beach, NC	SS	1	US	-	Healed deep & superficial propellar lacerations; internal lesions associated w/ deep lacerations indicative of peritonitis & infection
12/19/2011	Mortality		Bay of Fundy	EN	1	CN	PT	Live entanglement; recovered dead in gear the following day; constricting peduncle wraps
Five-year averages		Shipstrike (US/CN/XU/XC)			1.00 (1.00/ 0.00/ 0.00/ 0.00)			
		Entanglement (US/CN/XU/XC)			5.05 (1.20/ 1.75/ 1.80/ 0.30)			

a. For more details on events please see Cole and Henry 2013 and Henry *et al*. 2013.

b. 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.

c. Mortality events are counted as 1 against PBR. Serious injury events have been prorated using NMFS guidelines (NOAA 2012)

d. CN=Canada, US=United States, XC=Unk 1st sight in CN, XU=Unk 1st sight in US

e. H=hook, GN=gillnet, GU=gear unidentifiable, MF=monofilament, MT=Midwater Trawl, NP=none present, NR=none recovered/received, PT=pot/trap, WE=weir

Table 3. Summary of the incidental mortality of Canadian East Coast stock of minke whales (*Balaenoptera acutorostrata acutorostrata*) by commercial fishery including the years sampled, the type of data used, the annual observer coverage, the serious injuries and mortalities recorded by on-board observers , the estimated annual serious injury and mortality, the estimated CV of the combined annual mortality and the mean annual mortality (CV in parentheses).

Fishery [a]	Years	Data Type [b]	Observer Coverage [c]	Observed Serious Injury	Observed Mortality	Estimated Serious Injury	Estimated Mortality	Estimated Combined Mortality	Estimated CVs	Mean Combined Annual Mortality
Northeast Bottom Trawl	07-11	Obs. Data, Trip Logbook	.06, .08, .09, .16, .26	0, 0, 0, 0, 0	0, 2, 0, 0, 0	0, 0, 0, 0, 0	3.3, 2.9, 2.9, 0, 0	3.3, 2.9, 2.9, 0, 0	.72, .73, .75, 0, 0	1.8 (.42)
TOTAL										1.8 (.42)

[a]Bycatch rates were estimated from fisheries observer data pooled over years 2005-2009. Fisheries observer data from the years 2010-2014 will be pooled to estimate bycatch rates for minke whales for the same five year time period. No takes of minke whales were observed or monitored in 2010 or 2011. As a result the estimated mortality is zero.

[b]. Observer data (Obs. Data), used to measure bycatch rates, are collected within the Northeast Fisheries Observer Program and mandatory Vessel Trip Reports (VTR) (Trip Logbook) are used to determine the spatial distribution of landings and fishing effort.

[c]Northeast bottom trawl fishery coverage is ratios based on trips. Total observer coverage reported for bottom trawl gear in the year 2010 and 2011 includes samples collected from traditional fisheries observers, in addition to at-sea fishery monitors (both programs currently run through the Northeast Fisheries Observer Program (NEFOP).

Other Mortality

Minke whales have been and continue to be hunted in the North Atlantic outside of U.S. waters. From the Canadian East Coast population, documented whaling occurred from 1948 to 1972 with a total kill of 1,103 animals (IWC 1992). Animals from other North Atlantic minke populations are presently still being harvested.

U.S.

Minke whales inhabit coastal waters during much of the year and are thus susceptible to collision with vessels. According to the NMFS/NER marine mammal entanglement and stranding database, on 7 July 1974, a necropsy of a minke whale suggested a vessel collision; on 15 March 1992, a juvenile female minke whale with propeller scars was found floating east of the St. Johns Channel entrance (R. Bonde, USFWS, Gainesville, FL, pers. comm.); and on 15 July 1996 the captain of a vessel reported hitting a minke whale offshore of Massachusetts. After reviewing this record, it was concluded the animal struck was not a serious injury or mortality. On 12 December 1998, a minke whale was struck and presumed killed by a whale-watching vessel in Cape Cod Bay off Massachusetts.

During 1999 to 2003, no minke whale was confirmed struck by a ship. During 2004 and 2005, one minke whale mortality was attributed to ship strike in each year. During 2006 to 2008, no minke whale was confirmed struck by a ship. During 2009, one minke whale was confirmed dead due to a ship strike off New Jersey. In 2010 a juvenile male minke was discovered killed by ship strike off Fire Island, New York. In 2011, three juvenile minkes were confirmed dead due to a ship strike: a female off Sandy Hook, NJ, female off Moriches, NY, and a male off of Carolina Beach, NC. Thus, during 2007–2011, as determined from stranding and entanglement records, the minimum detected annual average was 1.0 minke whale per year struck by ships in U.S. waters.

In October 2003, an Unusual Mortality Event was declared involving minke whales and harbor seals along the coast of Maine; since then, the number of minke whale stranding reports has returned to normal. Stranding mortalities and serious injuries that have been determined to be human-caused are included in Table 2 (Henry *et al.* 2013).

On 11 October 2009, the NOAA research vessel FSV Delaware II captured a minke whale during mid-water

trawling operations associated with the 2009 Atlantic Herring Acoustics survey. Although brought on deck, the animal was released alive and appeared to exhibit healthy behavior upon release. This record was evaluated under the serious injury determination guidelines (NOAA 2012) and included in Table 2 as a serious injury.

CANADA

The Nova Scotia Stranding Network documented whales and dolphins stranded on the coast of Nova Scotia between 1991 and 1996 (Hooker *et al.* 1997). Researchers with the Department of Fisheries and Oceans, Canada documented strandings on the beaches of Sable Island (Lucas and Hooker 2000). Sable Island is approximately 170 km southeast of mainland Nova Scotia. Lucas and Hooker (2000) reported 4 minke whales stranded on Sable Island between 1970 and 1998, 1 in spring 1982, 1 in January 1992, and a mother/calf in December 1998. On the mainland of Nova Scotia, a total of 7 minke whales stranded during 1991 to 1996. The 1996 stranded minke whale was released alive off Cape Breton on the Atlantic Ocean side, the rest were found dead. All the minke whales stranded between July and October. One was from the Atlantic Ocean side of Cape Breton, 1 from Minas Basin, 1 was at an unknown location, and the rest stranded in the vicinity of Halifax, Nova Scotia. It is unknown how many of the strandings resulted from fishery interactions.

Whales and dolphins stranded between 1997 and 2011 on the coast of Nova Scotia as recorded by the Marine Animal Response Society (MARS) and the Nova Scotia Stranding Network are as follows: 4 minke whales stranded in 1997, 0 documented strandings in 1998 to 2000, 1 in September 2001, 4 in 2002, 2 in 2003, 0 in 2004, 3 in 2005, 8 in 2006, 1 in 2007, 4 (including the entangled animal listed in Table 2) in 2008, 5 in 2009 (including one minke released alive from a weir), 0 in 2010 and 4 in 2011 (including 2 animals released or relocated).

The Whale Release and Strandings program has reported 7 minke whale stranding mortalities in Newfoundland and Labrador between 2007 and 2011; 2 in 2007, 3 in 2008, 1 in 2009, 1 in 2010 and 0 in 2011. Two of these records are included in Table 2 (Ledwell and Huntington 2004; 2006; 2007; 2008; 2009; 2010, 2011, 2012). The 2011 Bay of Fundy minke whale entanglement mortality reported in Table 2 was reported by the Nova Scotia Marine Animal Response Society (T. Wimmer, pers. comm.).

STATUS OF STOCK

Minke whales are not listed as threatened or endangered under the Endangered Species Act, and the Canadian east coast stock is not considered strategic under the Marine Mammal Protection Act. The total U.S. fishery-related mortality and serious injury for this stock is less than 10% of the calculated PBR and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate. The status of minke whales, relative to OSP, in the U.S. Atlantic EEZ is unknown.

REFERENCES CITED

Anderwald, P., A.K. Daníelsdóttir, T. Haug, F. Larsen, V. Lesage, R.J. Reid, G.A. Víkingsson, and A.R. Hoelzel 2011. Possible cryptic stock structure for minke whales in the North Atlantic: Implications for conservation and management. Biol. Cons. 144(10):2479-2489.

Barlow, J., S.L. Swartz, T.C. Eagle and P.R. Wade 1995. U.S. marine mammal stock assessments: Guidelines for preparation, background, and a summary of the 1995 assessments. NOAA Tech. Memo. NMFS-OPR-6. 73 pp.

CETAP 1982. A characterization of marine mammals and turtles in the mid- and North Atlantic areas of the U.S. outer continental shelf, final report, Cetacean and Turtle Assessment Program, University of Rhode Island. Bureau of Land Management, Washington, DC. #AA551-CT8-48**:** 576.

Cole, T.V.N. and Henry, A.G. 2013. Serious injury determinations for baleen whale stocks along the Gulf of Mexico, United States East Coast and Atlantic Canadian Provinces, 2007-2011, Northeast Fish Sci Cent Ref Doc. 13-24. 20 pp

Donovan, G. P. 1991. A review of IWC stock boundaries. Rep. Int. Whal. Comm. (Special Issue) 13: 39-68.

Garrison, L. P. and L. Stokes. 2012. Estimated bycatch of marine mammals and sea turtles in the U.S. Atlantic pelagic longline fleet during 2010. NOAA Tech. Memo. NMFS-SEFSC-624. 19p.

Henry, A.G., T.V.N. Cole, M. Garron, L. Hall, W. Ledwell and A. Reid. 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, Northeast Fish Sci Cent Ref Doc. 12-11. 24 pp.

Henry, A.H., T.V.N. Cole and M. Garron 2013. Mortality determinations for baleen whale stocks along the United States eastern seaboard and adjacent Canadian Maritimes, 2007-2011. Northeast Fish Sci Cent Ref Doc. 13-18. 15 pp.

Hooker, S.K., R.W. Baird and M.A. Showell 1997. Cetacean strandings and bycatches in Nova Scotia, eastern

Canada, 1991-1996. Meeting document SC/49/O5 submitted to the 1997 International Whaling Commission Scientific Committee meeting in Bournemouth, UK.
IWC 1991. Appendix 11. Biological parameters of North Atlantic minke whales. *In* Annex F, report of the sub-committee on North Atlantic minke whales. Rep. Int. Whal. Comm. 41: 160.
IWC 1992. Annex K. Report of the working group on North Atlantic minke trials. Rep. Int. Whal. Comm. 42: 246-251.
Katona, S. K., V. Rough and D. T. Richardson 1993. A field guide to whales, porpoises, and seals from Cape Cod to Newfoundland. Smithsonian Institution Press, Washington, DC. 316 pp.
Laake, J.L., J. Calambokidis, S.D. Osmek, and D.J. Rugh 1997. Probability of detecting harbor porpoise from aerial surveys: estimating g (0). J. Wildl. Manage. 63–75.
Laake, J.L., and D.L. Borchers 2004. Methods for incomplete detection at distance zero, In: Advanced distance sampling, edited by S. T. Buckland, D. R. Andersen, K. P. Burnham, J. L. Laake, and L. Thomas, pp. 108–189, Oxford University Press, New York.
Lawson, J.W. and J.-F. Gosselin 2009. Distribution and preliminary abundance estimates for cetaceans seen during Canada's Marine Megafauna Survey - A component of the 2007 TNASS. Can. Sci. Advisory Sec. Res. Doc. 2009/031. 33 pp.
Lawson, J.W. and J.-F-. Gosselin. 2011. Fully-corrected cetacean abundance estimates from the Canadian TNASS survey. Working Paper 10. National Marine Mammal Peer Review Meeting. Ottawa, Can. 28 p.
Ledwell, W. and J. Huntington 2004. Marine animal entrapments in fishing gear in Newfoundland and Labrador and a summary of the Whale Release and Strandings Program during 2004. Report to the Department of Fisheries and Oceans. St. John's, Newfoundland, Canada. 3 pp.
Ledwell, W. and J. Huntington 2006. Whale, leatherback sea turtles. and basking shark entrapments in fishing gear in Newfoundland and Labrador and a summary of the Whale Release and Strandings Program during 2005. Report to the Department of Fisheries and Oceans. St. John's, Newfoundland, Canada. 18 pp.
Ledwell, W. and J. Huntington 2007. Whale and leatherback sea turtle entrapment in fishing gear in Newfoundland and Labrador and a summary of the Whale Release and Strandings Program during 2006. Report to the Department of Fisheries and Oceans. St. John's, Newfoundland, Canada. 3 pp.
Ledwell, W. and J. Huntington 2008. Incidental entrapments in fishing gear reported in 2007 in Newfoundland and Labrador and a summary of the Whale Release and Strandings Program. A report to the Department of Fisheries and Oceans, Canada, , St. John's, Newfoundland, Canada. 20 pp.
Ledwell, W. and J. Huntington 2009. Incidental entrapments in fishing gear and strandings reported to the whale release and strandings group in Newfoundland and Labrador and a summary of the Whale Release and Strandings Program during 2008. A report to the Department of Fisheries and Oceans Canada, St. John's, Newfoundland, Canada. 29 pp.
Ledwell, W. and J. Huntington 2010. Whale, leatherback sea turtles. and basking sharks entrapped in fishing gear in Newfoundland and Labrador and a summary or the strandings, sightings and education work during 2009-2010. A preliminary report to Fisheries and Oceans Canada, St. John's, Newfoundland, Canada. 23 pp.
Ledwell, W. and J. Huntington 2011. Whale, leatherback sea turtles. and basking sharks entrapped in fishing gear in Newfoundland and Labrador and a summary or the strandings, sightings and education work during 2010-2011. A preliminary report to Fisheries and Oceans Canada, St. John's, Newfoundland, Canada. 25 pp.
Ledwell, W. and J. Huntington 2012. Incidental entanglements of cetacean and leatherback sea turtles in fishing gear reported during 2011-2012 and a summary of the Whale Release and Strandings Group activities. A preliminary report to Fisheries and Oceans Canada, St. John's, Newfoundland, Canada. 17 pp.
Lucas, Z.N. and S.K. Hooker 2000. Cetacean strandings on Sable Island, Nova Scotia, 1970-1998. Can. Field-Nat. 114(1): 46-61.
Mitchell, E.D. 1991. Winter records of the minke whale (*Balaenoptera acutorostrata* Lacepede 1804) in the southern North Atlantic. Rep. Int. Whal. Comm. 41: 455-457.
Palka, D.L. 2012. Cetacean abundance estimates in US northwestern Atlantic Ocean waters from summer 2011 line transect survey. Northeast Fish. Sci. Cent. Ref. Doc. 12-29. 37 pp. http://www.nefsc.noaa.gov/nefsc/publications/crd/crd1229/
Read, A. J. 1994. Interactions between cetaceans and gillnet and trap fisheries in the northwest Atlantic. Rep. Int. Whal. Comm. (Special Issue) 15: 133-147.
Thomas L, J.L. Laake, E. Rexstad, S. Strindberg, F.F.C. Marques, S.T. Buckland, D.L. Borchers, D.R. Anderson, K.P. Burnham, M.L. Burt, S.L. Hedley, J.H. Pollard, J.R.B. Bishop and T.A. Marques. 2009. Distance 6.0. Release 2. [Internet]. University of St. Andrews (UK): Research Unit for Wildlife Population Assessment. Available from: http://www.ruwpa.st-and.ac.uk/distance/

Wade, P.R. and R.P. Angliss 1997. Guidelines for assessing marine mammal stocks: Report of the GAMMS Workshop April 3-5, 1996, Seattle, Washington. NOAA Tech. Memo. NMFS-OPR-12. 93 pp.

Waring, G.T., P. Gerrior, P.M. Payne, B.L. Parry and J.R. Nicolas 1990. Incidental take of marine mammals in foreign fishery activities off the northeast United States, 1977-1988. Fish. Bull. 88(2): 347-360.

Waring, G.T., E. Josephson, C.P. Fairfield and K. Maze-Foley, eds. 2007. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments – 2006. NOAA Tech. Memo. NMFS-NE-201.