COMMON 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. They are 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 on both the continental shelf and in deeper, off-shelf waters. Spring to fall are times of relatively widespread and common acoustic occurrence on the shelf (e.g., Risch *et al.* 2013), while September through April is the period of highest acoustic occurrence in deep-ocean waters throughout most of the western North Atlantic (Clark and Gagnon 2002; *Risch et al.* 2014). In New England waters the whales are most abundant during the spring-fall period. Records based on visual sightings and summarized by Mitchell (1991) hinted at a possible winter distribution in the West Indies, and in the mid-ocean south and east of Bermuda, a suggestion that has been validated by acoustic detections throughout broad ocean areas off the Caribbean from late September through early June (Clark and Gagnon 2002; Risch *et al.* 2014).

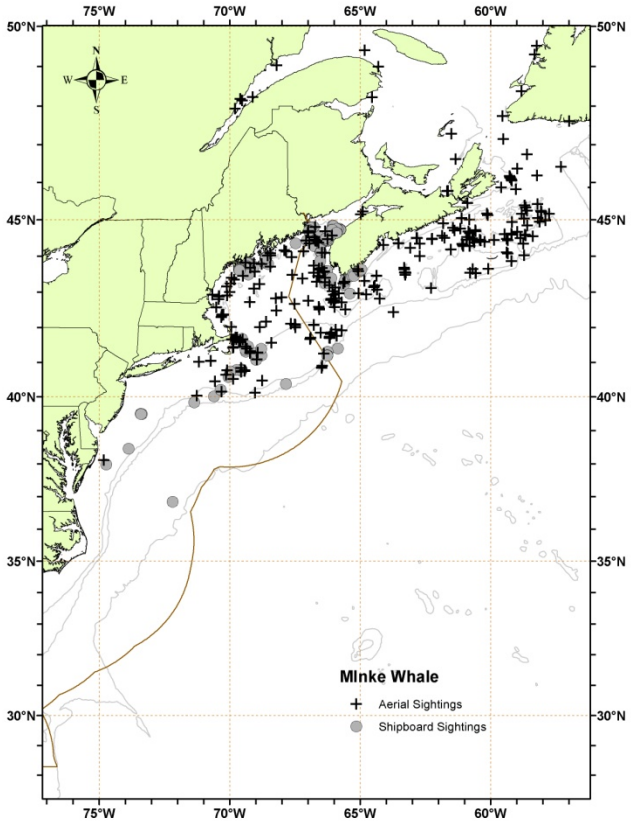

Figure 1. Distribution of minke whale sightings from NEFSC and SEFSC shipboard and aerial surveys during the summers of 1995, 1998, 1999, 2002, 2004, 2006, 2007, 2008, 2010, and 2011and DFO's 2007 TNASS survey. Isobaths are the 100-m, 1000-m and 4000-m depth contours.

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, common 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.

In summary, key uncertainties about stock structure are due to the limited understanding of the distribution, movements, and genetic structure of this stock. It is unknown whether the stock may contain multiple demographically independent populations that should be separate stocks. To date, no analyses of stock structure within this stock have been performed.

POPULATION SIZE

The best available current abundance estimate for common minke whales in the Canadian East Coast stock is 2,591 (CV=0.81; Palka 2012), resulting from a June–August 2011 U.S. survey. However, this estimate only covers U.S. waters and slightly beyond into Canadian waters, and thus does not cover the habitat of the entire Canadian East Coast stock. In contrast, the estimate from the 2015 SAR (20,741, CV=.30) was from the 2007 TNASS surveys of Nova Scotian and Newfoundland Canadian waters, which covered a larger portion of this stock. For the purposes of this SAR, as recommended in the guidelines for preparing stock assessment reports (NMFS 2016), estimates older than eight years are deemed unreliable, so the 2007 TNASS estimate is no longer appropriate. The 2011 U.S. estimate should not be interpreted as a decline in abundance of this stock, as previous estimates are not directly comparable.

A key uncertainty in the current abundance estimate is the number of animals in Canadian waters. Additionally, the current abundance estimate does not account for availability bias due to submerged animals. Without a correction for this bias, the abundance estimate is likely biased low.

Earlier estimates

Please see Appendix IV for a summary of abundance estimates, including earlier estimates and survey descriptions. As recommended in the 2016 guidelines for preparing stock assessment reports (NMFS 2016), estimates older than eight years are deemed unreliable for the determination of the current PBR.

Recent surveys and abundance estimates

An abundance estimate of 2,591 (CV=0.81) common 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 visually 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 option in the computer program Distance (version 6.0, release 2, Thomas *et al.* 2009).

Table 1. Summary of recent abundance estimates for the Canadian East Coast stock of common minke whales (Balaenoptera acutorostrata acutorostrata) by month, year, and area covered during each abundance survey, and resulting abundance estimate (Nbest) and and coefficient of variation. (CV).

Month/Year	Area	N_{best}	CV
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 the Canadian East Coast stock of common minke whales is 2,591animals (CV=0.81). The minimum population estimate is 1,425 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 variable survey design (see Appendix IV for a survey history of this stock). 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 mean 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).

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). Key uncertainties about the maximum net productivity rate are due to the limited understanding of the stock-specific life history parameters; thus the default value was used.

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 1,425. The maximum productivity rate is 0.04, the default value for cetaceans. The recovery factor is 0.5, the default value for stocks of unknown status relative to OSP and with the CV of the average mortality estimate less than 0.3 (Wade and Angliss 1997). PBR for the Canadian east coast common minke whale is 14.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

During 2012 to 2016, the average annual minimum detected human-caused mortality and serious injury was 7.7 minke whales per year, which is the sum of 6.5 (1.5 U.S./2.35 Canada/2.3 unassigned but first reported in the U.S./0.35 unassigned but first reported in Canada) minke whales per year (unknown CV) from U.S. and Canadian fisheries using strandings and entanglement data, 1.0 (0.6 U.S./0.4 Canada) per year from vessel strikes, and 0.2 takes in observed U.S. fishing gear.

Data to estimate the mortality and serious injury of common 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, mortalities and serious injuries from reports of strandings and entanglements considered to be confirmed human-caused mortalities or serious injuries are shown in Table 2 while those recorded by the Observer or At-Sea Monitor Programs are shown in Table 3.

A key uncertainty in the estimate of the annual human-caused mortality and serious injury for this stock, along with other large whales, is due to using strandings and entanglement data as the primary data source. 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.

Fishery Information

Detailed fishery information is reported in Appendix III.

Earlier Interactions

See Appendix V for information on historical takes.

U.S.

Northeast Mid-water Trawl Fishery (Including Pair Trawl)

In July 2013, one minke whale was observed dead in the mid-water otter trawl fishery on Georges Bank. This animal was too decomposed to have been taken in a haul that was only 3 hours long. Annual average estimated minke whale mortality and serious injury from the mid-Atlantic mid-water trawl (including pair trawl) during 2012 to 2016 was 0.

Mid-Atlantic Gillnet

In December 2016 one minke whale mortality was observed mid-Atlantic gillnet gear. Annual average estimated minke whale mortality and serious injury from the mid-Atlantic sink gillnet during 2012 to 2016 was 0.2.

Other Fisheries

Confirmed mortalities and serious injuries of common minke whales in the last five years as recorded in the audited Greater Atlantic Regional Office/NMFS entanglement/stranding database are reported in Table 2. During 2012 to 2016, as determined from stranding and entanglement records confirmed to be of U.S. origin or first sighted in U.S. waters, yielded a minimum detected average annual mortality and serious injury of 3.8 common minke whales per year in U.S. fisheries (Table 2a). Most cases in which gear was recovered and identified involved gillnet or pot/trap gear.

CANADA

Read (1994) reported interactions between common 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 common minke whales were observed taken. More current observer data are not available.

Other Fisheries

Mortalities and serious injuries that were likely a result of an interaction with an unknown Canadian fishery are detailed in Table 2b. During 2012 to 2016, 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 2.7 minke whales per year in Canadian fisheries (Table 2b; prorated value).

Table 2a. Confirmed human-caused mortality and serious injury records of common minke whales (Balaenoptera acutorostrata acutorostrata) first reported in U.S. waters or attributed to U.S.: 2012–2016[a]

Date[b]	Injury determination	ID	Location[b]	Assigned Cause[f]	Value against PBR[c]	Country[d]	Gear Type[e]	Description
2/4/2012	Prorated Injury	-	off Virginia Beach, VA	EN	0.75	XU	CE	Reported with hook/monofilament gear. Attachment point unknown.
3/16/2012	Mortality	-	Ipswich, MA	EN	1	US	NP	Evidence of extensive, constricting gear w/ associated hemorrhaging
6/21/2012	Serious Injury	-	off Frenchboro, ME	EN	1	XU	NR	Constricting body wrap, flipper pinned, embedded in mouthline; emaciated
6/23/2012	Mortality	-	Newark, NJ	VS	1	US	-	Fresh carcass on bow of ship. Deep laceration across ventral surface; Cause of death: disembowelment & hypovolemic shock
7/1/2012	Prorated Injury	-	off Portsmouth, NH	EN	0.75	XU	NR	Full configuration unknown
7/13/2012	Prorated Injury	-	off Jonesport, ME	EN	0.75	US	NR	Anchored. Partial disentanglement; Final configuration unknown
7/17/2012	Serious Injury	-	off Chatham, MA	EN	1	XU	NR	Tight wrap across back; health decline: emaciated
8/2/2012	Prorated Injury	-	off Provincetown, MA	EN	0.75	XU	NR	Full configuration unknown
8/5/2012	Mortality	-	Chatham, MA	EN	1	US	NR	Multiple constricting wraps through & around mouth and on fluke blades; COD: acute underwater entrapment
10/4/2012	Mortality	-	Cliff Island,	EN	1	US	NR	Evidence of constricting gear at

Date[b]	Injury determination	ID	Location[b]	Assigned Cause[f]	Value against PBR[c]	Country[d]	Gear Type[e]	Description
			ME					mouthline, across ventral pleats, & at peduncle
7/23/2013	Prorated Injury	-	off Newport, RI	EN	0.75	XU	NR	Full configuration unknown
8/17/2013	Serious Injury	-	off Newburyport, MA	EN	1	XU	NR	Constricting rostrum wrap cutting into upper lip
10/04/2013	Prorated Injury	-	off Seal Harbor, ME	EN	0.75	US	NR	Anchored, partially disentangled, final configuration unknown
6/9/2014	Mortality	-	off Truro, MA	EN	1	US	PT	Fresh carcass anchored, hog-tied in gear. COD: peracute underwater entrapment.
7/10/2014	Prorated Injury	-	S of Bristol, ME	EN	0.75	XU	NR	Free-swimming, trailing 2 buoys. Attachment point(s) unknown.
7/12/2014	Serious Injury	-	South Shinnecock Inlet, NY	EN	1	XU	NR	Free-swimming with yellow plastic strapping cutting into top and sides of rostrum. No trailing gear.
7/17/2014	Mortality	-	South Addison, ME	EN	1	XU	NP	Fresh carcass with line impression across ventral surface & evidence of constricting gear around peduncle and fluke insertion. Bruising evident at fluke injuries. No gear present.
12/24/2014	Mortality	-	Dam Neck, VA	VS	1	US	-	Fresh carcass with broken ribs & fractured vertebrae w/ extensive hemorrhage & edema.
03/26/2015	Serious Injury	-	off Cape Canaveral, FL	EN	1	XU	NR	Evidence of constricting rostrum wrap, but unable to determine if gear still present. Emaciated.
05/09/2015	Mortality	-	Duck, NC	EN	1	XU	GU	Live stranded and euthanized. Embedded gear cutting into bone of mandible. Emaciated. Proximate COD: entanglement. Ultimate COD: euthanasia.
06/06/2015	Mortality	-	Coney Island,	VS	1	US	-	Fresh carcass with deep lacerations to

Date[b]	Injury determination	ID	Location[b]	Assigned Cause[f]	Value against PBR[c]	Country[d]	Gear Type[e]	Description
			NY					throat area and head missing. Large area of bruising on dorsal surface.
06/14/2015	Prorated Injury	-	off Chatham, MA	EN	.75	XU	NR	Free-swimming with acorn buoy trailing 20-30 ft. Attachment point(s) and configuration unknown.
09/01/2015	Mortality	-	Gloucester, MA	EN	1	US	NP	Evidence of extensive, constricting gear with associated hemorrhaging. No gear present.
03-May-16	Mortality	-	Biddeford, ME	EN	1	US	PT	Carcass in gear. Line through mouth and evidence of constricting wraps on ventral pleats and peduncle with associated hemorrhaging.

Assigned Cause	5-Year mean (US/XU)
Vessel strike (US/ XU)	0.6 (0.6/ 0.00)
Entanglement (US/ XU)	3.8 (1.5/ 2.3)

a. For more details on events please see Henry *et al.* in press.
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 evaluated using NMFS guidelines (NOAA 2012).
d. US=United States, XU=Unassigned 1st sight in US.
e. H=hook, GN=gillnet, GU=gear unidentifiable, MF=monofilament, NP=none present, NR=none recovered/received, PT=pot/trap, WE=weir.
f. Assigned cause: EN=entanglement, VS=vessel strike, ET=entrapment (summed with entanglement).

Table 2b. Confirmed human-caused mortality and serious injury records of minke whales (Balaenoptera acutorostrata acutorostrata) first reported in Canadian waters or attributed to Canada: 2012–2016a

Date[b]	Injury determination	ID	Location[b]	Assigned Cause[f]	Value against PBR[c]	Country[d]	Gear Type[e]	Description
5/15/2012	Serious Injury	-	Sable Island Bank, Canada	EN	1	CN	PT	Disentangled from gear embedded down to bone of peduncle.
6/26/2012	Mortality	-	Renews Rock, NL	EN	1	CN	PT	Fresh carcass w/ constricting gear around peduncle
6/30/2012	Mortality	-	off Naufrage, PEI	EN	1	CN	PT	Fresh carcass anchored in gear
7/1/2012	Mortality	-	Northern Lake Harbor, PEI	EN	1	CN	PT	Constricting gear w/ associated hemorrhaging; COD: drowning
8/31/2013	Mortality	-	Miminegash, PEI	EN	1	CN	NP	Fresh carcass w/ evidence of extensive, constricting gear
7/2/2014	Mortality	-	Northumberland Strait, NB	EN	1	CN	NR	Carcass with constricting gear around lower jaw. Large open injury at attachment point on the left side.
7/29/2014	Mortality	-	5 nm E of Herring Cove, NS	VS	1	CN	-	Live animal w/ tongue completely ballooned out, forcing its jaws 90 degrees apart. Found dead at same location the next day. Carcass recovered with two traps & constricting line around the peduncle. Necropsy found indication of blunt trauma to right jaw. Animal anchored in gear was subsequently struck by a vessel (primary cause of death)
04/16/2015	Mortality	-	Lockes Island, Shelburne, NS	EN	1	CN	NP	Fresh carcass with evidence of constricting wraps. No gear present. Robust, pregnant, fish in stomach and intestines. No other abnormalities noted.
06/23/2015	Prorated Injury	-	off Ingonish, NS	EN	.75	CN	PT	Entangled in traps and buoys. Partially disentangled by fisherman. Original and final configuration unknown.

Date[b]	Injury determination	ID	Location[b]	Assigned Cause[f]	Value against PBR[c]	Country[d]	Gear Type[e]	Description
07/07/2015	Mortality		off Funk Island, NL	EN	1	CN	PT	Found at 340m depth in between two pots. Gear through mouth and wrapped around peduncle.
08/18/2015	Mortality		Roseville, PEI	EN	1	CN	NP	Evidence of constricting body, peduncle, and fluke wraps. No gear present. No necropsy but robust body condition supports entanglement as COD.
09/21/2015	Mortality		Cape Wolfe, Burton, PEI	EN	1	CN	NP	Evidence of constricting body wraps. No gear present. No necropsy but experts state peractute underwater entrapment most parsimonious.
11/16/2015	Mortality		Chetticamp, NS	VS	1	CN	-	Carcass with broken jaw and indication of edema. No necropsy but experts state blunt trauma most parsimonious.
12/06/2015	Mortality		off Port Joli, NS	EN	1	CN	PT	Live animal anchored in gear. Carcass recovered 4 days later.
7/21/2016	Serious Injury	-	Digby, NS	EN	1	XC	GU	Free-swimming with netting deeply embedded in rostrum. Disentangled, but significant health decline.
11/02/2016	Prorated Injury	-	Bonne Bay, Gros Morne National Park, NL	EN	0.75	XC	NR	Free-swimming and towing gear. Attachment point(s) and configuration unknown. No resights post 06 Nov 2016.

Assigned Cause	5-Year mean (CN/XC)
Vessel strike	0.40 (0.40/ 0.00)
Entanglement	2.7 (2.35/ 0.35)

a. For more details on events please see Henry *et al*. in press.
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 evaluated using NMFS guidelines (NOAA 2012).
d. CN=Canada, XC=Unassigned 1st sight in CN
e. H=hook, GN=gillnet, GU=gear unidentifiable, MF=monofilament, NP=none present, NR=none recovered/received, PT=pot/trap, WE=weir.
f. Assigned cause: EN=entanglement, VS=vessel strike, ET=entrapment (summed with entanglement).

Table 3. From observer program data, summary of the incidental mortality of the Canadian East Coast stock of minke whales (Balaenoptera acutorostrata) by commercial fishery including the years sampled, the type of data used, the annual observer coverage,

Fishery	Years	Data Type [a]	Observer Coverage [b]	Observed Serious Injury [c]	Observed Mortality	Estimated Serious Injury	Estimated Mortality	Combined Serious Injury	Estimated CVs	Mean Annual Combined Mortality
Mid-Atlantic Gillnet	2012	Obs. Data, Weighout	0.02	0	0	0	0	0	0	0.2 (na)
	2013		0.03	0	0	0	0	0	0	
	2014		0.05	0	0	0	0	0	0	
	2015		0.06	0	0	0	0	0	0	
	2016		0.08	0	1	0	1	1	na	
TOTAL	-	-	-	-	-	-	-	-	-	0.2 (na)

a. Observer data (Obs. Data), used to measure bycatch rates, are collected within the Northeast Observer Program and At-sea Monitoring Program. NEFSC collects landings data (unallocated Dealer Data or Allocated Dealer Data) which are used as a measure of total landings and mandatory Vessel Trip Reports (VTR) (Trip Logbook) are used to determine the spatial distribution of landings and fishing effort in the sink gillnet, bottom trawl and mid-water trawl fisheries. In addition, the Trip Logbooks are the primary source of the measure of total effort (tow duration) in the mid-water and bottom trawl fisheries.

b. Observer coverage for the U.S. Northeast and mid-Atlantic coastal gillnet fisheries is based on tons of fish landed. Northeast bottom trawl fishery coverages are ratios based on trips.

c. Serious injuries were evaluated since 2011 using new guidelines and include both at-sea monitor and traditional observer data (Josephson et al. 2019).

Other Mortality

North Atlantic common minke whales have been and continue to be hunted. 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 common minke populations (e.g., Iceland) are presently being harvested.

U.S.

Common minke whales inhabit coastal waters during much of the year and are thus susceptible to collision with vessels. In 2012, a confirmed vessel strike resulted in a mortality off Newark, New Jersey. In 2014, a confirmed vessel strike resulted in a mortality off Dam Neck, Virginia. In 2015, a fresh carcass of a common minke whale was reported off Coney Island, New York with wounds consistent with vessel strike. Thus, during 2012–2016, as determined from stranding and entanglement records, the minimum detected annual average was 0.6 common minke whales per year struck by vessels in U.S. waters or first seen in U.S. waters (Table 2a; Henry *et al.* in press).

An Unusual Mortality Event was established for minke whales in January 2017 due to elevated stranding along the Atlantic coast (https://www.fisheries.noaa.gov/national/marine-life-distress/ 2017-2018-minke-whale-unusual-mortality-event-along-atlantic-coast). Anthropogenic mortalities and serious injuries that occurred in 2017 will be reported in the 2019 SAR.

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). Starting in 1997, common minke whales stranded on the coast of Nova Scotia were recorded by the Marine Animal Response Society (MARS) and the Nova Scotia Stranding Network. The events that were determined to be human-caused serious injury or mortality are included in Table 2b.

The Whale Release and Strandings program reported the following common minke whale stranding mortalities in Newfoundland and Labrador for the time period of this report: 3 in 2012, and 0 in 2013 and 1 in 2014, and 2 in 2015, 0 in 2016. Those that have been determined to be human-caused serious injury or mortality are included in Table 2b (Ledwell and Huntington 2012a, 2012b, 2013, 2014, 2015).

During 2012–2016, as determined from stranding and entanglement records, the minimum detected annual average was 0.4 common minke whales per year struck by vessels in Canadian waters or first seen in Canadian waters (Table 2b; Henry *et al.* in press).

STATUS OF STOCK

Common 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 not less than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate. The status of common minke whales relative to OSP in the U.S. Atlantic EEZ is unknown.

It is expected that the uncertainties described above will have little effect on the designation of the status of the entire stock. Even though the estimate of human-caused mortality and serious injury in this assessment is negatively biased due to using strandings and entanglement data as the primary source, the abundance estimate is a very negatively-biased estimate for the entire stock as it only includes the U.S. portion of the Canadian East Coast common minke whale stock's habitat. If the current PBR representing only the U.S. portion of the stock (9.4) is compared to only the negatively-biased U.S. mortalities and serious injuries (5.8), the stock would still be designated as not strategic. However, this designation may be reversed if the negative bias in the mortality estimate is large. Thus, key uncertainties that need to be resolved include the stock structure, particularly as it is influenced by movement patterns between U.S. and Canadian waters, and the estimated human-caused mortalities and serious injuries.

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 pp.

Clark, C.W., and Gagnon, G.C. 2002. Low-frequency vocal behaviors of baleen whales in the North Atlantic: Insights from IUSS detections, locations and tracking from 1992 to 1996. J. Underwater Acoust. (USN), 52(3):609–640.

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

Henry, A.G., T.V.N. Cole, L. Hall, W. Ledwell, D. Morin and A. Reid. in press. Mortality and Serious Injury determinations for baleen whale stocks along the Gulf of Mexico, United States East Coast and Atlantic Canadian Provinces, 2012-2016, NEFSC Reference Document

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.

Laake, J.L. and D.L. Borchers. 2004. Methods for incomplete detection at distance zero, Pages 108–189 *in*: Advanced distance sampling, S.T. Buckland, D.R. Andersen, K.P. Burnham, J.L. Laake, and L. Thomas, (eds.), Oxford University Press, New York.

Ledwell, W. and J. Huntington. 2012a. 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. Report to the Department of Fisheries and Oceans Canada, St. John's, Newfoundland, Canada. 17 pp.

Ledwell, W. and J. Huntington 2012b. Incidental entrapments in fishing gear and stranding reported to and responded to by the Whale Release and Strandings Group in Newfoundland and Labrador and a summary of the Whale Release and Strandings program during 2012. Report to the Department of Fisheries and Oceans Canada, St. John's, Newfoundland, Canada. 18 pp.

Ledwell, W., J. Huntington and E. Sacrey 2013. Incidental entrapments in fishing gear and stranding reported to and responded to by the Whale Release and Strandings Group in Newfoundland and Labrador and a summary of the Whale Release and Strandings program during 2013. Report to the Department of Fisheries and Oceans Canada, St. John's, Newfoundland, Canada. 19 pp.

Ledwell, W. and J. Huntington 2014. Incidental entrapments and entanglements of cetaceans and leatherback sea turtles, strandings, ice entrapments reported to the Whale Release and Strandings Group in Newfoundland and Labrador and a summary of the Whale Release and Strandings program during 2014. Report to the Department of Fisheries and Oceans Canada, St. John's, Newfoundland, Canada. 23 pp.

Ledwell, W. and J. Huntington 2015. Incidental entrapments and entanglements of cetaceans and leatherback sea turtles, strandings, ice entrapments reported to the Whale Release and Strandings Group in Newfoundland and Labrador and a summary of the Whale Release and Strandings program during 2015. Report to the Department of Fisheries and Oceans Canada, St. John's, Newfoundland, Canada. 22 pp.

Ledwell, W. and J. Huntington 2017. Incidental entrapments and entanglements of cetaceans and leatherback sea turtles, strandings, ice entrapments reported to the Whale Release and Strandings Group in Newfoundland and Labrador and a summary of the Whale Release and Strandings program during 2016. Report to the Department of Fisheries and Oceans Canada, St. John's, Newfoundland, Canada. 22 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.

National Marine Fisheries Service (NMFS). 2016. Guidelines for preparing stock assessment reports pursuant to the 1994 amendments to the Marine Mammal Protection Act. 23 pp. Available online: https://www.fisheries.noaa.gov/national/marine-mammal-protection/guidelines-assessing-marine-mammal-stocks. Accessed July 2017.

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.

Risch, D., C.W. Clark, P.J. Dugan, M. Popescu, U. Siebert and S.M. VanParijs 2013. Minke whale acoustic behavior and multi-year seasonal and diel vocalization patterns in Massachusetts Bay, USA. Mar. Ecol. Prog. Ser. 489:279–295.

Risch, D., M. Castellote, C.W. Clark, G.E. Davis, P.J. Dugan, L.E.W. Hodge, A. Kumar, K. Lucke, D.K. Mellinger, S.L. Nieukirk, C.M. Popescu, C. Ramp, A.J. Read, A.N. Rice, M.A. Silva, U. Siebert, K.M. Stafford, H. Verdaat, S.M. VanParijs. 2014. Seasonal migrations of North Atlantic minke whales: novel insights from large-scale passive acoustic monitoring networks. Movement Ecol. 2:24.

Taylor, B.L., M. Martinez, T. Gerrodette, J. Barlow and Y.N. Hrovat. 2007. Lessons from monitoring trends in abundance in marine mammals. Mar. Mamm. Sci. 23(1):157–175.

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://distancesampling.org/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.