Aquatic Mammals 2022, *48*(6), 574-577, DOI 10.1578/AM.48.6.2022.574

Rare Sighting of a North Atlantic Minke Whale (*Balaenoptera acutorostrata*) Mother–Calf Pair in Massachusetts Bay

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The North Atlantic minke whale (*Balaenoptera acutorostrata*) is a common, but enigmatic, mysticete in New England waters. Sightings are usually brief—a glimpse of a dorsal fin and dark back before submergence. Minke whales along the U.S. East Coast are considered part of the Canadian East Coast population, but key questions about stock structure and population trends remain uncertain (Hayes et al., 2021). Details about calving grounds and migratory patterns are limited despite passive acoustic monitoring studies (Risch et al., 2013, 2014b). Immature animals are generally believed to linger in lower latitude areas during summer months (National Oceanic and Atmospheric Administration [NOAA] Fisheries, 2021), and calves are rarely recorded in Massachusetts waters.

Our sighting of an adult minke whale and calf in Massachusetts Bay on 27 August 2021 is therefore noteworthy. This observation was opportunistic and occurred while returning from a whale watch. At 1348 h, we spotted two minke whales ahead of us in close proximity to each other. The whales coordinated dive times and appeared to be traveling north. They were first seen at latitude 42.20.04 and longitude -70.29.44. Winds were variable at a Beaufort scale of 1, and there was no swell or surface glare. The whales dove but reappeared almost immediately to our starboard. Two experienced observers witnessed this sighting from the second-level cabin of a 37 m catamaran, but obtaining satisfactory photographs proved difficult due to the small space inside. However, species identification was straightforward: we had excellent views of the sickle-shaped dorsal fin and the diagnostic white bands on the flippers ("minke mittens") of both whales. The adult surfaced next to the bow and was estimated to be about 8 m in length; the accompanying calf was approximately half the size of the adult, or around 4 m. (We estimate length and distances in the field by using our 37 m catamaran as a benchmark for comparison, a process in which we are experienced.) Minke whale aging in the field is a complicated subject (Christensen, 1981; Olsen & Sunde, 2002; Hayes et al., 2021), but given the existing literature, we would estimate the calf to be an unweaned individual of ~5 to 6 mo of age, based on its length. The two minke whales were traveling when first sighted, but the smaller whale changed behavior and made several close approaches to the vessel while we drifted. Minkes are often elusive in this area, surfacing only once or twice during sightings (pers. obs.); however, the presumed calf surfaced ~7 times during our observations, often within 2 m of our vessel. In total, the sighting lasted 9 min, during which time the adult minke never strayed more than 3 m from the smaller individual. Given that other mysticete mothers seek to maintain proximity with calves (Taber & Thomas, 1982; Szabo & Duffus, 2008), the close distance maintained between individuals supports our assumption that this was a mother–calf pair.

Murphy (1996) wrote one of the few accounts of minke whales in the area; she reported only three calves sighted in more than 10,000 cruises between 1979 and 1992. In 5,261 whale watches operated by Boston Harbor City Cruises and the New England Aquarium between 2013 and 2021, this is the only confirmed sighting of a likely minke mother and calf (Boston Harbor City Cruises, unpub. data, 2013-2021).

A single sighting cannot answer questions definitively, but it can stimulate them. The best estimate of the Canadian East Coast population of minke whales (in a survey area stretching from Newfoundland to Florida) is 21,968, with a minimum estimate of 17,022 (Hayes et al., 2021). Still, there are several uncertainties surrounding this population estimate. The assessment acknowledged the need for "more information on the spatio-temporal variability of the species' dive profile" (Hayes et al., 2021, p. 47). Minke whales are generally assumed to travel to low latitude breeding grounds to calve, but identifying breeding areas has proven difficult (Risch et al., 2013). Breeding has been described

as "diffusely seasonal" (Perrin et al., 2018, p. 611). Neonates range between 2.4 and 3.5 m; calves are believed to be weaned when they reach the ages of 4 to 6 mo, at lengths ranging from 4.4 to 5.5 m (Kavanagh et al., 2018; NOAA Fisheries, 2021). It has been hypothesized that in the Northeast Atlantic, some minkes might calve in more northerly water (Anderwald et al., 2007; Kavanagh et al., 2018). It is possible that northerly calving occurs in the Northwest Atlantic too, where there is less published research.

This observed mother–calf pair could be explained by two hypotheses. The first is that the mother did not travel south, and the calf was born in a higher latitude, probably between October 2020 and February 2021. Kavanagh et al. (2018) suggested that warmer water might affect birth locations in the Atlantic. This assumes that migration is driven in part by a need for warmer water for parturition—a theory that is still debated (Corkeron & Connor, 1999). For smaller animals, migration is physically more costly than it is for a humpback (*Megaptera novaeangliae*) or North Atlantic right (*Eubalaena glacialis*) whale (Corkeron & Connor, 1999); calving in more northerly latitudes would reduce that physical cost for minkes. The second hypothesis is that the calf traveled with its mother from a more southerly locale. While breeding grounds remain hard to confirm, observations and passive acoustic monitoring suggest that the southeastern U.S. and Caribbean are likely breeding and calving areas (Murphy, 1996; Risch et al., 2014b). Passive acoustic monitoring has suggested that the waters of Massachusetts Bay are more of a migration corridor than feeding ground for North Atlantic

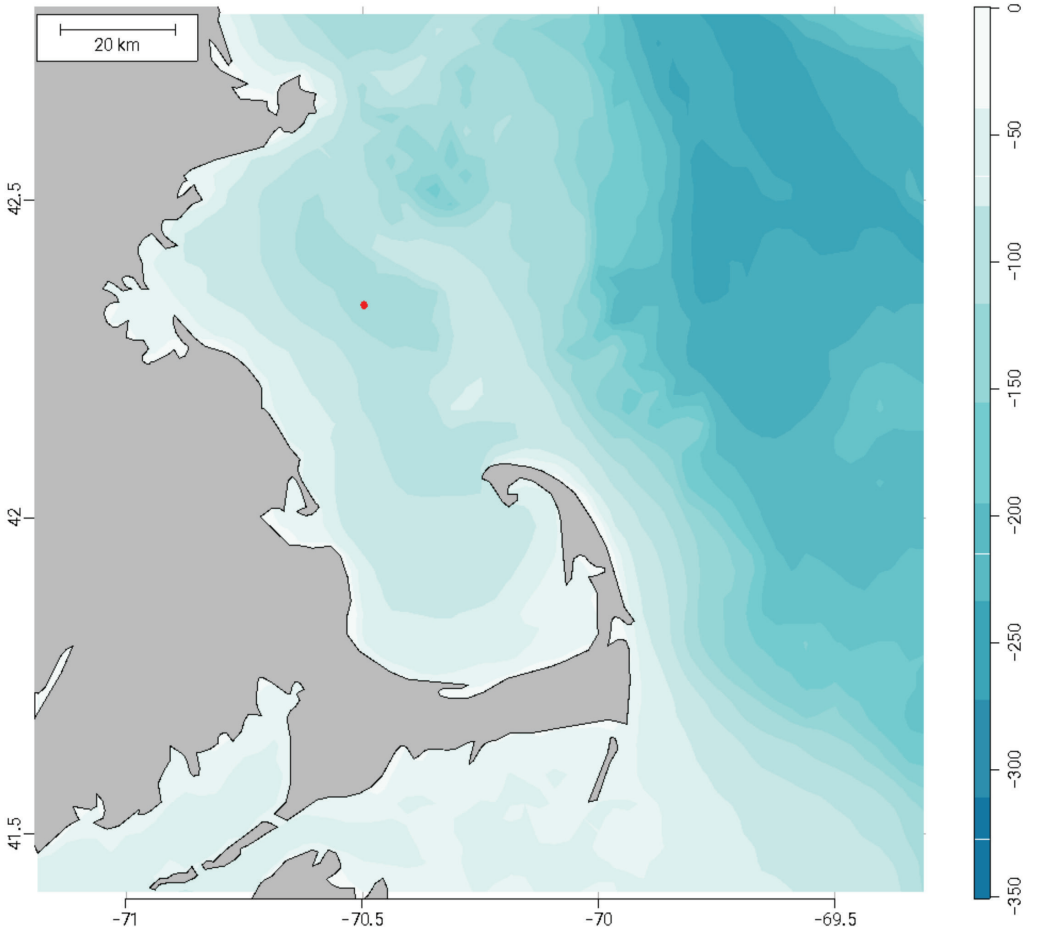

Figure 1. Location of minke whale (*Balaenoptera acutorostrata*) mother–calf sighting within Massachusetts Bay on 27 August 2021 shown as a red dot. Land is colored in grey, while blue shading corresponds to water depth ranging from 0 to 350 m.

minke whales (Risch et al., 2013, 2014a); in this scenario, the whales would pass through Massachusetts Bay on their way to Canadian waters. The calf's size does suggest that while it was still with its mother, it was nearing the age where it would soon be fully weaned. It is therefore conceivable that this particular calf accompanied its mother up north from its place of birth to Massachusetts Bay. We do see minkes feeding in Massachusetts Bay quite frequently on whale watches, though it is often difficult to follow them for long. At this particular location (Figure 1), the seabed is undulating, and the changes in depth allow for upwelling and abundant food.

The population structure of the North Atlantic minke whale remains poorly understood (Risch et al., 2013; Hayes et al., 2022); and in other places (i.e., Iceland and Norway), minkes continue to be harvested commercially. If mother–calf pairs use or increase their use of Massachusetts Bay and the Gulf of Maine regularly, conservation measures will need to reflect that use. We do know that whales in our region are threatened by entanglement in fishing gear and by vessel strikes (Moore, 2021). Furthermore, climate change has caused a shift in the movements of North Atlantic right whales (Meyer-Gutbrod et al., 2021) and has changed distributions of humpbacks, blue whales (*Balaenoptera musculus*), fin whales (*Balaenoptera physalus*), and sei whales (*Balaenoptera borealis*) (Davis et al., 2020). Just what impact a changing climate will have on minke whales' migratory movements remains to be seen.

A single opportunistic sighting like ours cannot address all these issues definitively. But in showing us something that we were not expecting to see, a sighting like this should inspire further research, whether through passive acoustic monitoring or aerial and vessel-based surveys. Long term scientific research, citizen science, and careful observation can all deepen our understanding of the whales that call Massachusetts Bay home and better inform regional conservation policies.

Acknowledgments

Our thanks go to three institutions: Boston Harbor City Cruises, the New England Aquarium, and the Center for Coastal Studies. We thank the captains and crew of Boston Harbor City Cruises who make our whale watches possible. Special thanks to Captain Jeff Eagan. Our thanks, too, to the naturalists of Boston Harbor City Cruises and interns of the New England Aquarium who collected the data we drew on. The reviewers of this manuscript provided excellent, thoughtful feedback for which we are very grateful.

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