



Gray whale sightings in the Canadian Beaufort Sea, September 2014



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ABSTRACT

Gray whales (*Eschrichtius robustus*) are distributed within the productive neritic and estuarine waters of the North Pacific Ocean, the Bering Sea, and adjacent waters of the Arctic Ocean. They migrate to high-latitude feeding grounds each spring. Their main feeding grounds in the Arctic include the Chirikov Basin, the northeastern Chukchi Sea from Pt. Hope to Cape Lisburne and Pt. Lay to Pt. Barrow, and the northwestern Chukchi Sea along the Chukotka coast. Although sightings are rare in the Canadian Beaufort Sea, we observed three gray whales in two groups in this area in September 2014. A mud plume was observed near one of the whales, suggesting the animal had been feeding. In the Alaskan Beaufort Sea, large-scale monitoring of the distributions of marine mammals has been continuously conducted since 1979; however, there has been less monitoring in the Canadian Beaufort Sea. Therefore, it is necessary to record opportunistic sightings, such as those described here.

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1. Introduction

Gray whales (*Eschrichtius robustus*) are confined to the productive neritic and estuarine waters of the North Pacific Ocean, the Bering Sea, and adjacent waters of the Arctic Ocean (Jones and Schwartz, 2009). Each spring they migrate north to feeding grounds, mainly in the Bering and Chukchi seas, covering an average distance of ~8000 km and making an annual round trip of 15,000–20,000 km (Jones and Schwartz, 2009; Rugh et al., 2001). The whales feed on a wide variety of prey (Jones and Schwartz, 2009; Nerini, 1984), mainly benthic organisms in shallow seas (Nerini, 1984; Rice and Wolman, 1971). In recent years, important feeding grounds in the eastern Chukchi and Bering seas have been located in the Chirikov Basin, off Point Hope, and from Wainwright to Point Barrow (Clarke et al., 2013, 2014, 2015b; Ferguson et al., 2015; Kuletz et al., 2015; Schonberg et al., 2014). The Chirikov Basin, in the Bering Sea, has been an important gray whale feeding area, at least intermittently, since the 1980s (Ferguson et al., 2015; Moore et al., 1986, 2003), with large numbers of feeding whales having been sighted during aerial surveys in 1980, 1981, 1982, and 1985 (Moore et al., 1986, 2003). Although the number of gray

whales dramatically decreased during the 1990s, in parallel with the collapse of populations of their amphipod prey (Moore et al., 2003), in September 2014 a large aggregation of gray whales was observed in the Chirikov Basin (Ferguson et al., 2015). Therefore, the Chirikov Basin remains an important feeding area (Ferguson et al., 2015). Since the 1980s, marine mammal aerial surveys have consistently documented gray whales feeding during summer and fall in the northeastern Chukchi Sea, from Pt. Hope to Cape Lisburne and from Pt. Lay to Pt. Barrow (Clarke et al., 2015a; Kuletz et al., 2015; Schonberg et al., 2014). Gray whales were consistently seen feeding near Hanna Shoal in September and October in the late 1980s and early 1990s (Clarke and Moore, 2002), but were generally absent after 2008 (Clarke et al., 2014, 2015a). This suggests that local changes in feeding grounds have occurred during recent decades in the eastern Chukchi and Bering seas. Although gray whales were occasionally seen in the 1950s near Point Barrow, which is the entrance to the Beaufort Sea (Maher, 1960), their abundance there was likely also low in the 1970s (Marquette and Braham, 1980). Moore et al. (2006) noted that in recent years hunters have reported increasing numbers of gray whales near Barrow in the late summer and autumn, and aerial surveys conducted each summer and fall in that area since 2009 have confirmed the common occurrence of these whales (Clarke et al., 2015b). The increasing occurrence of gray whales near Barrow could reflect an increase in their population (Rugh et al., 2005), climate-induced changes in

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habitat (Moore et al., 2003), or both. Despite this, they have been rare visitors to the Beaufort Sea since the 1950s (Maher, 1960), and there have been few records of sightings (Brower et al., 2015; Marquette and Braham, 1980; National Marine Mammal Laboratory, Historical BWASP and COMIDA database: <http://www.afsc.noaa.gov/nmml/software/bwasp-comida.php>). In the Canadian Beaufort Sea in particular, sightings were only reported in 1980 (Rugh and Fraker, 1981), although surveys have been limited in this region. Following a gap of 27 years, one gray whale was observed in an aerial survey in 2007, and another was sighted and satellite tagged in 2009 (Conlan et al., 2013; Harris et al., 2008; Quakenbush et al., 2010). Here we report on gray whale sightings recorded during a ship sighting survey in the Canadian Beaufort Sea in 2014.

2. Material and methods

The visual survey was conducted in the Beaufort Sea from the bridge (14 m above sea level) of the Canadian research icebreaker *Amundsen*, from 10 September to 25 September 2014 (Fig. 1). Observations were conducted while the vessel was moving between sampling stations during daylight hours, and commenced 1 h following sunrise and ceased 1 h prior to sunset. During the cruise, two observers constantly scanned the survey area (90° to each side of the bow), using 8 × power binoculars (Nikon). Both observers had previous experience in identifying marine mammals during shipboard surveys, including in the Chukchi Sea. When marine mammals were seen, the time (UTC), number of animals, position in latitude and longitude of the ship, distance from the ship, angle from the front of the ship, and animal behavior were recorded. The ship did not approach any marine mammals. We also recorded the weather, wind speed, wind force (Beaufort scale), wave height, visibility, and glare every 30 min. The vessel speed was automatically recorded every minute.

To determine the interannual change in the ice-free period at the locations where gray whales were sighted and where they potentially used to reach the Canadian Beaufort Sea, we determined the number of ice-free days at the four stations (St. 1:

71°60'N, 155°30'W; St. 2: 70°30'N, 146°W; St. 3: 70°N, 136°W; St. 4: 70°50'N, 130°25'W) from 1979 to 2014; this was based on historical remotely-sensed sea ice concentration (SIC) data, calculated using NASA-Team Algorithm 2 (Markus and Cavalieri, 2000). The SIC datasets at 25-km gridded resolution were collected using the scanning multichannel microwave radiometer (SMMR) and the special sensor microwave/imager (SSM/I), and were retrieved from the National Snow and Ice Data Center (NSIDC). We defined non-ice-covered pixels when sea ice concentrations were <20%. In addition, to investigate the relationship between sea-ice-edge and gray whale position, we calculated the distance between the observed gray whale positions and the sea-ice edge. We defined the sea-ice edge as the outer line of the area where the average sea ice concentration in the survey period was 20%.

3. Results

On 24 September 2014 we observed three gray whales, comprising one pair and one individual (Fig. 1). The pair was observed at 70°48'N, 130°46'W on 24 September 2014 at 00:01, and the individual was observed at 70°55'N, 130°1'W on the same day, at 01:20. The bottom depths at the observation points were 32 m and 30 m, respectively. Species identification was based on observation of the mottled gray skin, and the back having a hump followed by a series of fleshy knobs along the tailstock. The ship sailed continuously in a direct line without diverting to the Amundsen Gulf, and therefore the individual whale was not one of the pair. We observed several blows and dives during each sighting. One of the two whales in the pair made a mud plume (Fig. 2). At the time of the sightings the ship speed was approximately 12 knots, the wind force was 2 on the Beaufort scale, and there was no fog or glare. We did not observe any sea ice during the day on which we observed the whales. The distance of the ice edge from the ship when we observed the whales was >90 km (Fig. 1).

4. Discussion

The area in which we observed gray whales is characterized as a

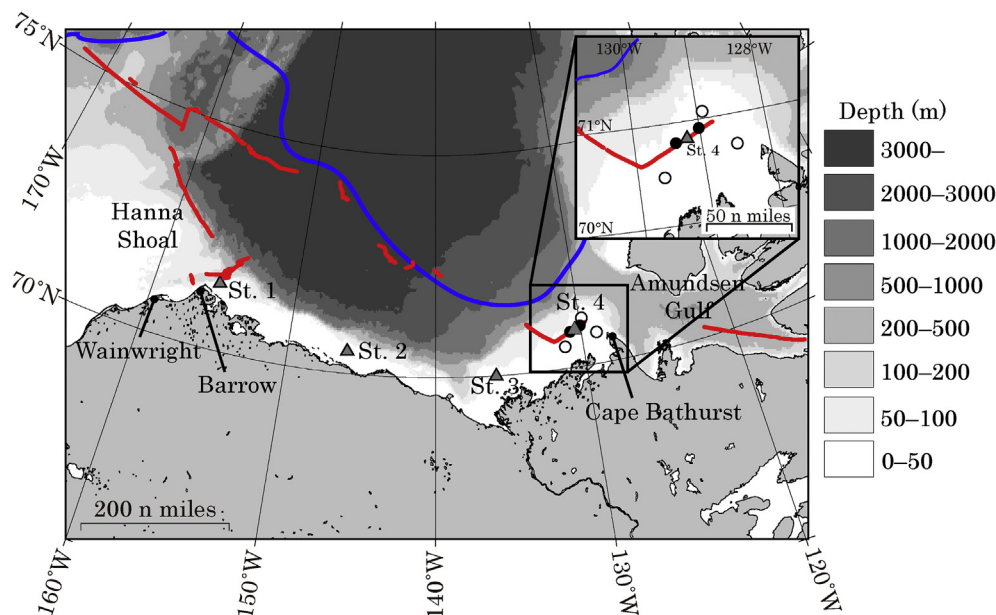


Fig. 1. Map of the study area in the Beaufort Sea. Red lines represent visual surveys. White circles represent whales observed in 1980 (Rugh and Fraker, 1981) and black circles represent whales observed in this study, in 2014. Gray triangles represent the stations where interannual variations in the number of ice-free days were monitored. The blue line represents the location of the sea ice edge during our survey period (10–25 September 2014).

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