

Evidence that Humpback Whales (*Megaptera novaeangliae*), Including Calves, Use Isolated Johnston Atoll in the Tropical Central North Pacific

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We report two observations, one firsthand (RLP), of humpback whales (*Megaptera novaeangliae*), including calves, at Johnston Atoll, 1,330 km southwest of Hawaii (Honolulu). Stories of humpback whales at Johnston Atoll have been circulating for decades, but they have been difficult to verify (Johnston et al., 2007; Darling et al., 2020). A preliminary scientific survey conducted there in 2007 reported no whale sightings (Johnston et al., 2007). The observations herein provide credibility to the lay accounts, and, occurring 9 years apart, suggest that this habitat is, at least sporadically, a breeding location for North Pacific humpback whales.

Little is known about the presence of humpback whales in the North Pacific between Hawaii and the western Pacific winter breeding assemblies (Figure 1). There have been few surveys and sightings in this vast area. A Japanese visual cetacean survey reported a single humpback whale on 5 February 1993 at 19.38° N, 168.65° W, approximately 1,400 km west of Hawaii (Ohizumi et al., 2002). In 2019, during the Hawaii–Asia segment of the acoustic Humpback Pacific Survey (HUMPACS), humpback whale songs were detected in the deep ocean on 1 January 2019 at 19.89° N, 159.72° W, 363 km west of Hawaii, and from 24 to 29 January 2019 between 20.16° N, 172.38° W and 19.86° N, 174.93° W, about 1,900 km west of Hawaii (Darling et al., 2020). Humpback whales were also reported as “continually present” from December 2014 to January 2015 during an acoustic survey of the seamounts to the southwest of Hawaii; the most distant is the Cross Seamount at 18.75° N, 158.25° W, 260 km southwest of the Big Island of Hawaii (Klinck et al., 2015, p. ES-1). While this area of detection is relatively close to the known breeding concentrations in the Hawaiian Islands, it is of interest due to its location to the southwest and the presence of humpback whales at the seamounts (Figure 1).

Johnston Atoll (16.73° N, 169.53° W; Figure 1, inset) encompasses approximately 130 km², including four islands (two natural and two artificial) with a total exposed land mass of 2.8 km². The largest is Johnston Island, which accommodates an airport and a former U.S. military facility. Johnston Island has been uninhabited since 2004 and is currently a National Wildlife Refuge administered by the U.S. Fish and Wildlife Service. Instead of having a continuous fringing reef, the atoll has a 12-km reef crest on the northwestern edge that creates a shallow lagoon 3 to 10 m deep. Seawater temperature is approximately 27°C in winter (“Johnston Atoll,” n.d.; *Johnston Atoll National Wildlife Refuge*, n.d.; Parrott-Sheffer, n.d.).

Our firsthand sighting occurred in 1992 while RLP was conducting seabird research at the atoll. RLP heard from local fishermen that they had seen some whales in the lagoon the previous day. The next day (5 April), he joined another fishing party in the lagoon for 5 h, hoping to see the whales. Observation conditions were good (Beaufort 3), and a minimum of four humpbacks were observed, including two single adults and a likely cow–calf pair (calf less than half the size of the attendant whale). The presumed calf breached four to five times ~0.5 km from the vessel. The boat operators said they had also seen four humpback whales on the previous day, which they assumed was the same group. They further reported that the earlier whales were fluking and showing the white undersides of their tails.

The first report of humpback whales at Johnston Atoll that we are aware of comes from a 1983 Draft Environmental Impact Statement prepared by the U.S. Army Corps of Engineers for construction of the Johnston Atoll Chemical Agent Disposal System. The report states that there had been no previously confirmed sightings of humpback whales at Johnston Atoll until the fishing vessel *F/V Magic Dragon* reported “a number of

humpback whales including at least three adults and a calf at JA [Johnston Atoll] during a fishing trip there in March of 1983.” The report also stated, “We do not know if this is a recent phenomenon or has been occurring for some time without recorded sightings” (U.S. Army Corps of Engineers, 1983, p. 85).

There are three main humpback whale breeding assemblages in the North Pacific: (1) the eastern Pacific off Mexico and Central America; (2) the

central Pacific around the Hawaiian Islands, including the northwestern chain; and (3) the western Pacific off several island chains, including the Mariana Islands, the Babuyan Islands in the northern Philippines, and the Japanese islands of Okinawa and Ogasawara (e.g., Wolman & Jurasz, 1977; Rice, 1978; Urbán & Aguayo, 1987; Darling & Mori, 1993; Acebes et al., 2007; Johnston et al., 2007; Lammers et al., 2011; Kobayashi et al., 2017; Hill et al., 2020). These areas all share two

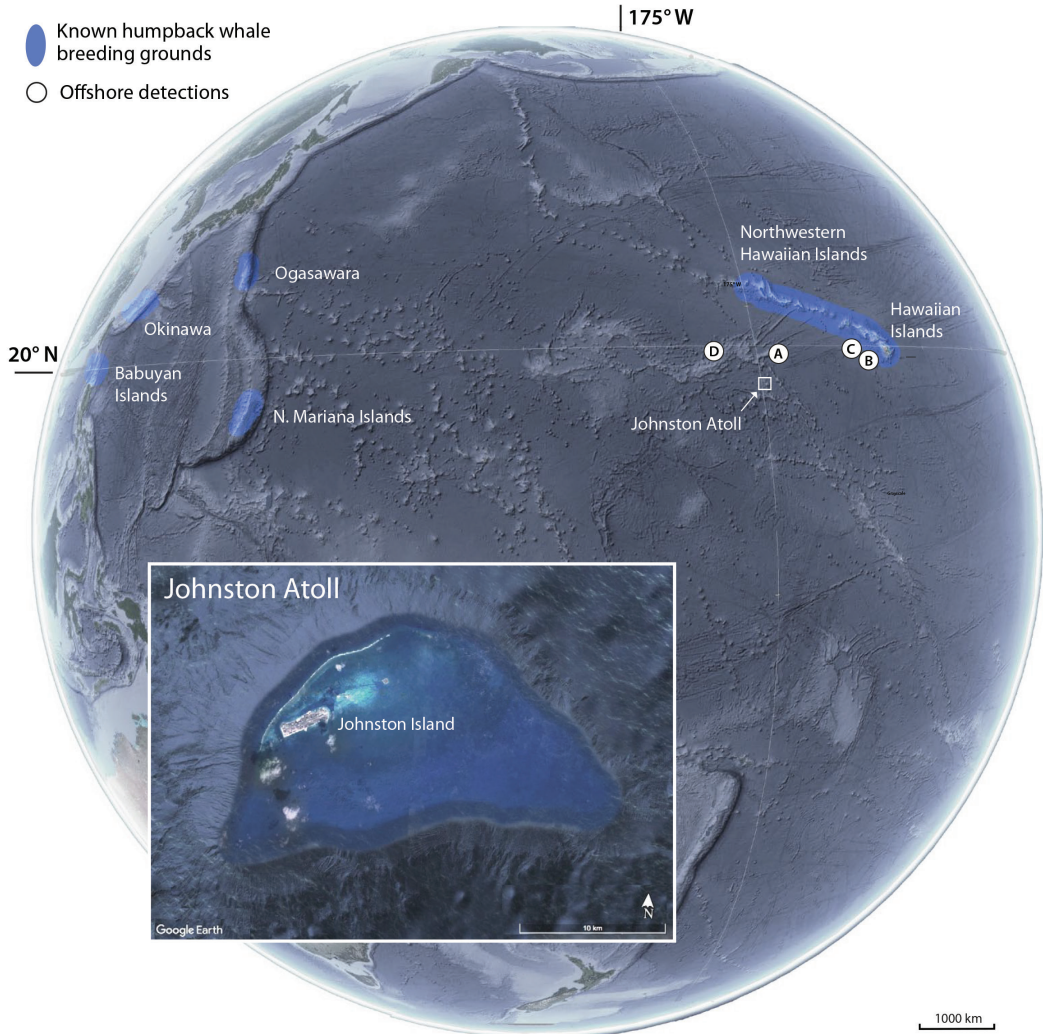


Figure 1. The central-western North Pacific with known humpback whale (*Megaptera novaeangliae*) breeding grounds and Johnston Atoll. The circled letters indicate the locations of offshore humpback whale detections west of Hawaii. Sources: (A) 1993 Japanese cetacean visual sighting survey of Northwest Pacific (Ohizumi et al., 2002); (B) 2014–2015 U.S. Naval autonomous glider acoustic survey of seamounts southwest of Hawaii (Klinck et al., 2015); and (C & D) 2019 Humpback Pacific Survey (HUMPACS), which recorded acoustic signals with a wave glider west of Hawaii (Darling et al., 2020). See the citations above for the survey courses.

habitat characteristics apparently necessary for breeding/calving humpbacks: (1) shallow waters (< 200 m) and (2) warm sea temperatures (21 to 28°C) (Johnston et al., 2007; Rasmussen et al., 2007). Within waters of this temperature range in the eastern Pacific, there is only deep ocean between the westernmost breeding grounds off Mexico (i.e., Islas Revillagigedo) and Hawaii. Between the known breeding areas in Hawaii and the western Pacific, however, there are numerous potential breeding sites, including seamounts, atolls, and islands (Figure 1).

The single sighting during the 1993 Japanese survey and the 2019 HUMPACS song detections described above were all in waters > 1,000 m deep (Figure 1). One possible explanation for these unexpected occurrences was that whales were travelling to or from, known or unknown, shallow-water breeding grounds. The Japanese survey sighting was approximately 315 km north of Johnston Atoll; the closest 2019 HUMPACS song detection was ~478 km northwest of the atoll (Ohizumi et al., 2002; Darling et al., 2020). For perspective, the distance from the southernmost to northernmost main Hawaiian Islands (Kona, on the island of Hawaii, to Kauai) is ~425 km.

These observations confirm that Johnston Atoll is visited by humpback whales, including calves, during at least some years; determining how many and how often will require further study. The occurrence of humpbacks at Johnston Atoll also provides a potential explanation for the deep-water detections < 500 km to the north and northwest of the atoll. Perhaps most importantly, these observations raise the possibility of alternate or additional breeding grounds beyond the well-known locations in Mexico, Hawaii, and the western Pacific—locations scattered among the numerous islands, atolls, and seamounts in the tropical central-western North Pacific.

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