Short Communication: First documented migration of an Icelandic humpback whale mother and calf pair from the West Indies breeding grounds

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ABSTRACT

Photo-identification images of the ventral tail flukes of an individual humpback whale with calf were taken off Barbados, West Indies in March 2022. These images were matched to photographs taken in Westfjords Iceland between August–September 2022. This adult female whale had previously been documented in Northeast and Westfjords Iceland in several years between 2006–2019. This represents the first documented within-year mother and calf migration to the Icelandic feeding ground. Additionally, it represents the most southerly confirmed match of an individual identified in Icelandic waters to a West Indies breeding ground, in an area where there has been little dedicated research.

KEY WORDS: HUMPBACK WHALE, BARBADOS, ICELAND, MIGRATION, PHOTO-IDENTIFICATION, SITE FIDELITY

Humpback whales are a globally distributed species known for their long seasonal migrations between high-latitude summer feeding grounds and low-latitude winter breeding grounds (Clapham, 2000). These annual migrations have been documented using photo-identification of tail flukes for decades (e.g., Katona and Whitehead, 1981). Worldwide, the species is split into separate feeding populations, including Southern Hemisphere, North Pacific and North Atlantic (Carwardine, 2020). The North Atlantic humpback whale population has been further split into seemingly discrete sub-populations based on their feeding grounds in Iceland, Norway, Western Greenland, Eastern USA and Eastern Canada; however, these sub-populations mix in their tropical breeding grounds located around the West Indies and Cape Verde Islands (Katona and Beard, 1990; Stevick *et al*., 2003; 2018). The central North Atlantic sub-population of humpback whales – the majority of which were surveyed in Icelandic waters – is estimated to be approximately 10,000 individuals (Pike *et al*., 2019).

Over nearly four decades, the Marine and Freshwater Research Institute of Iceland (MFRI) created and now curates the national humpback whale catalogue of Iceland (ÍSland Megaptera Novaeangliae (ISMN) catalogue); a product of compiling data collected through a national collaboration between universities, whale-watching companies and citizen-scientists. It contains approximately 1,520 unique individuals to date (MFRI, *pers. comm*.), identified from photographs of the unique and distinctive pigmentation patterns on the ventral side of the tail

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flukes (as described by Katona and Whitehead, 1981). A similar international effort – through the North Atlantic Humpback Whale Catalogue (NAHWC) – has revealed that whales from the Icelandic sub-population have been observed in low-latitude breeding areas on both sides of the North Atlantic Ocean. Individuals identified in the ISMN and NAHWC catalogues have been matched to photographs taken around the Cape Verde Islands, off the coast of Northwest Africa (Jan *et al*., 2003) and the West Indies, including the Dominican Republic, Puerto Rico and Guadeloupe (Katona and Beard, 1990; Stevick *et al*., 2018).

Currently, the largest concentration of humpback whales in the West Indies during the breeding season occurs in the northern Greater Antilles, particularly the Dominican Republic (Reeves *et al*., 2001). However, the Lesser Antilles were historically known as an important humpback whale breeding area that supported significant whaling activity (Reeves *et al*., 2001, Fielding and Kiszka, 2021). There has been relatively little recent research in the Lesser Antilles, especially in the southernmost islands (Stevick *et al*., 2016; 2018). Nevertheless, there is evidence that the sub-population of whales using the Lesser Antilles represents a distinct breeding population segment within the North Atlantic that should be considered separate from that of the Greater Antilles (Stevick *et al*., 2016; 2018; Chosson *et al*., 2015). This was based on information of the timing, movements, and disproportionate matches to the feeding grounds of whales found in this area compared to the Greater Antilles, particularly the Dominican Republic, with a larger proportion of whales recorded in the Lesser Antilles having matches to Iceland and Norway (Stevick *et al*., 2018). Much like the lack of exchange between Pacific humpback whale sub-populations separated by a few hundred kilometers (Urbán *et al*., 2000), there is little known exchange of individuals between the Greater and Lesser Antilles. Further, there is a lack of information about which feeding sub-population the whales breeding in the southerly islands of the Lesser Antilles belong to. Given that more than 650 humpback whales were hunted between 1823–1984 in this area by St Vincent and the Grenadines (SVG) alone, and a further 45 were captured between 1986 and the present by the IWC-sanctioned aboriginal whaling operation in Bequia, SVG (Reeves *et al*., 2001; Fielding and Kiszka, 2021), the identification of the feeding sub-population from which these whales are being harvested is of considerable scientific interest.

On 13 March 2022, a humpback whale mother and calf pair were photographed from land at Speightstown, Barbados (13°14' N, 59°38' W). A fluke photograph of the mother was identified in Iceland as ISMN0028/ Mn33-'Copyright' (a.k.a. NA04652 in the NAHWC). The mother and calf pair were then re-sighted in Ísafjarðardjúp (66°03' N, –22°47' W), approximately 5.5 months (169 days) after the sighting in Barbados, on 28 August 2022, and again on 14 September 2022 (Figure 1). This is an approximate straight-line migration distance of 6,500km. ISMN0028 was first sighted in Iceland in June 2006 in Skjálfandi Bay off Húsavík, Northeast (66°05' N, –17°33' W) and was previously last sighted in August 2019 in Ísafjarðardjúp, off Ísafjörður, Westfjords (66°07' N, –23°03' W). During the 14 September 2022 sighting, a DJI Phantom 4 Pro V2 drone with an attached LiDAR system was used to film ISMN0028 and her calf for photogrammetry measurements. She was determined to be 12.66m long; her calf 8.58 m long. Though genetic sampling to confirm their relationship was not possible, combined with photographic and life history evidence – humpback whale calves are known to usually stay with their mothers for between 1–1.5 years (Clapham 2000) – these length measurements further suggest that they are a mother and yearling-calf pair, particularly as previous studies have considered calves to be less than 9m in length (e.g., Gabriele *et al*., 2001).

Between 2006–2022, there has been a total of 74 days with opportunistic sightings recorded of the mother, ISMN0028, in Skjálfandi Bay and Eyjafjörður (65°50' N, 18°07' W), Northeast Iceland and Ísafjarðardjúp (Table 1). There was a notable sighting of this individual with a previous calf in Skjálfandi Bay in June 2018, which first confirmed her sex (University of Iceland's Research Centre in Húsavík, unpub. data).

This represents the first photographic match and documented within-year migration between Iceland and Barbados. Notably, this is the first record of a within-year migration of a humpback whale mother and calf pair travelling from a breeding ground to the Icelandic feeding ground. It is also the most southerly match to a breeding ground for an individual identified in Icelandic waters. These mother-calf migrations have rarely been documented in the North Atlantic, though the migration of a mother-calf pair was previously documented from the Greater Antilles (Dominican Republic) to the Norway feeding ground by satellite tagging of a pregnant female, as opposed to photo-identification (Kettemer *et al*., 2022).

ISMN0028 and her calf were sighted in Ísafjarðardjúp in 2022, the same location that she was last sighted in Iceland in 2019, suggesting that individual humpback whales from this feeding ground can have strong site fidelity

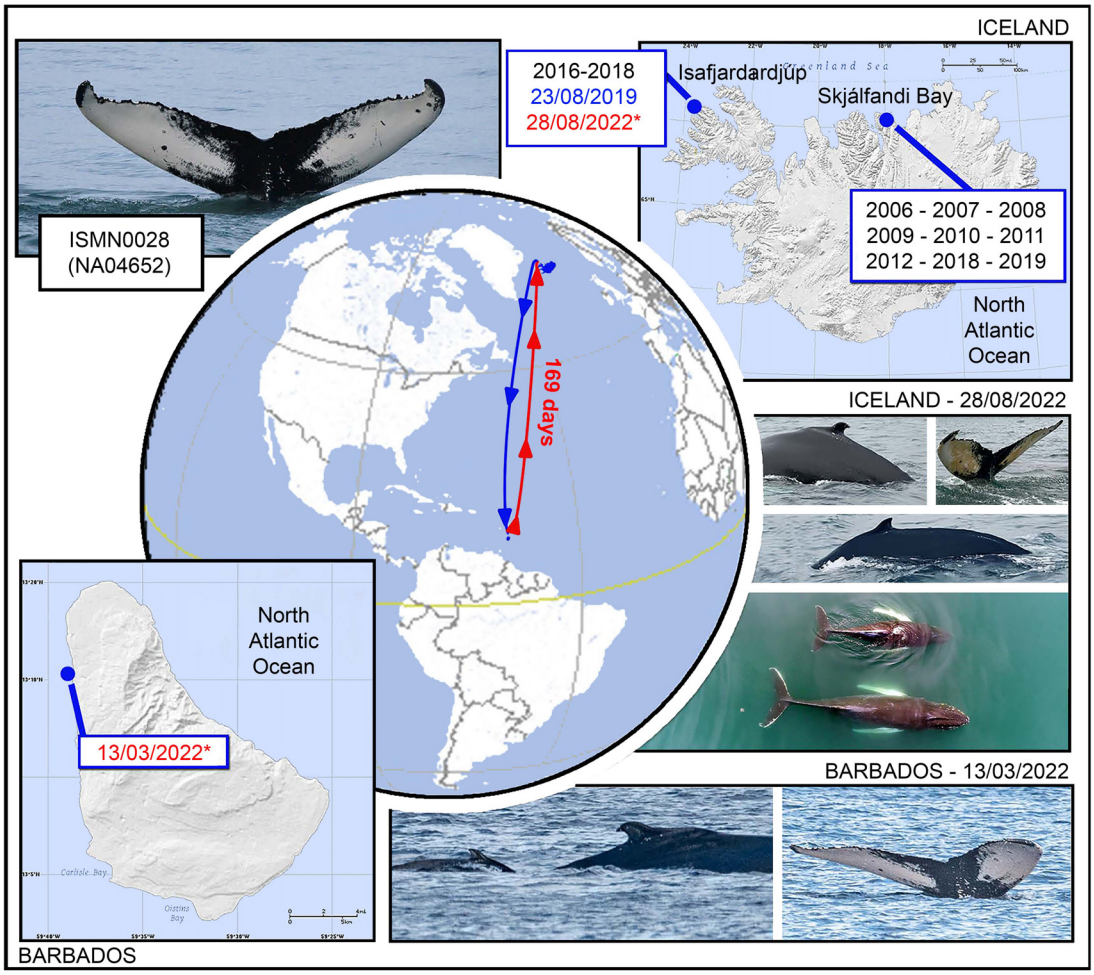

Figure 1. Map and photographs showing the sighting locations, dates and photographic evidence of ISMN0028 and her calf. Dates in red text, denoted with *, indicate the within-year migration of the mother-calf pair between Barbados and Iceland.

Table 1

Number of days per month that ISMN0028/MN33-'Copyright' was recorded in Iceland each year. †denotes sightings in Northeast Iceland (Skjálfandi Bay and Eyjafjörður). *denotes sightings in Ísafjarðardjúp.

	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Total
2006	–	7†	1†	8†	–	–	–	16
2007	–	–	–	1†	–	–	–	1
2008	–	–	7†	–	–	–	–	7
2009	–	6†	9†	–	–	–	–	15
2010	1†	2†	–	–	–	–	–	3
2011	1†	1†	2†	–	–	–	–	4
2012	–	–	12†	–	2†	2†	–	16
2016	–	–	–	–	–	–	1*	1
2018	–	1†	3†	2*	–	–	–	6
2019	1†	–	1*	1*	–	–	–	3
2022	–	–	–	1*	1*	–	–	2
Total								**74**

that they pass on to their offspring. This was also shown by the satellite-tagged female on the Norway feeding ground, who returned to the same area she was tagged, with her calf, 10 months later (Kettemer *et al*., 2022). Site fidelity is often exhibited in the Eastern USA feeding grounds, where humpback whale calves are first documented with their mothers on the feeding ground, before those calves are observed returning to the same area in subsequent years after becoming independent (e.g., Clapham and Mayo, 1987; 1990; Clapham *et al*., 2003). This has yet to be documented in the Icelandic feeding ground.

The photographic match of this individual between Iceland and Barbados gives further support to a connection between the Lesser Antilles breeding area and the eastern North Atlantic feeding areas. Given the sparsity of information about humpback whales in this breeding area, further research effort would be extremely valuable. In addition to dedicated research, the submission of fluke photographs for all landed whales, past and present, in Bequia – as requested by the Scientific Committee in 2017 – would be a significant contribution to our understanding of the migratory movements of the potentially distinct sub-population of breeding humpback whales at the southern end of the Lesser Antilles.

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