

‘Canadian Arctic flyway’ – possible route for Short-tailed Shearwater to access North Atlantic?

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Short-tailed Shearwater *Ardenna tenuirostris* is an abundant tubenose that breeds in Australia, in the southern summer, after which the vast majority of the population migrates to rich feeding grounds off north-eastern Japan and in the Bering Sea and Chukchi Sea (Flood & Fisher 2020; figure 1). A moribund Short-tailed found at Sanibel island, Florida, USA, on 7 July 2000 was the first for the North Atlantic (Kratter & Steadman 2003). Then, two apparently healthy individuals were photographed off Bretagne, France: one on 9 September 2015 and one on 8 August 2020 (Février et al in press), and photographs taken at Race Point, Massachusetts, USA, in 2017, on 18 August, 23 September, 24 September and 14 October, show at least two apparently healthy birds (based

on primary moult timing). On 22 June 2020, a moribund individual was found at Tramore, Waterford, Ireland (Archer et al 2021).

Most of these North Atlantic records result from recent improved knowledge about the field separation of Short-tailed Shearwater from the similar-looking Sooty Shearwater *A. grisea* (eg, Howell & Zufelt 2019, Flood & Fisher 2020). However, by which route did they travel to the North Atlantic? **1** It is possible that small numbers of Short-tailed have been regular visitors originating from the 1000s of birds now known to visit high latitudes of the South Atlantic (Flood & Fisher 2020). **2** It is also possible that the recent reduction of Arctic ice cover due to global warming has created new access for Short-tailed, from the Chukchi

FIGURE 1 Arctic North America showing sites mentioned in text including following locations of records of Short-tailed Shearwater *Ardenna tenuirostris* (Ashley Fisher). **A** Collinson Head, Herschel-Qikiqtaruk Island, Yukon, Canada; **B** Inuvik, Northwest, Canada; **C** Bathurst Inlet, Nunavut, Canada; **D** Ferguson Lake, Cambridge Bay, Victoria Island, Nunavut, Canada; **E** Southern James Bay, Netitishi Point, Ontario, Canada (Short-tailed Shearwater or Sooty Shearwater *A. grisea*).

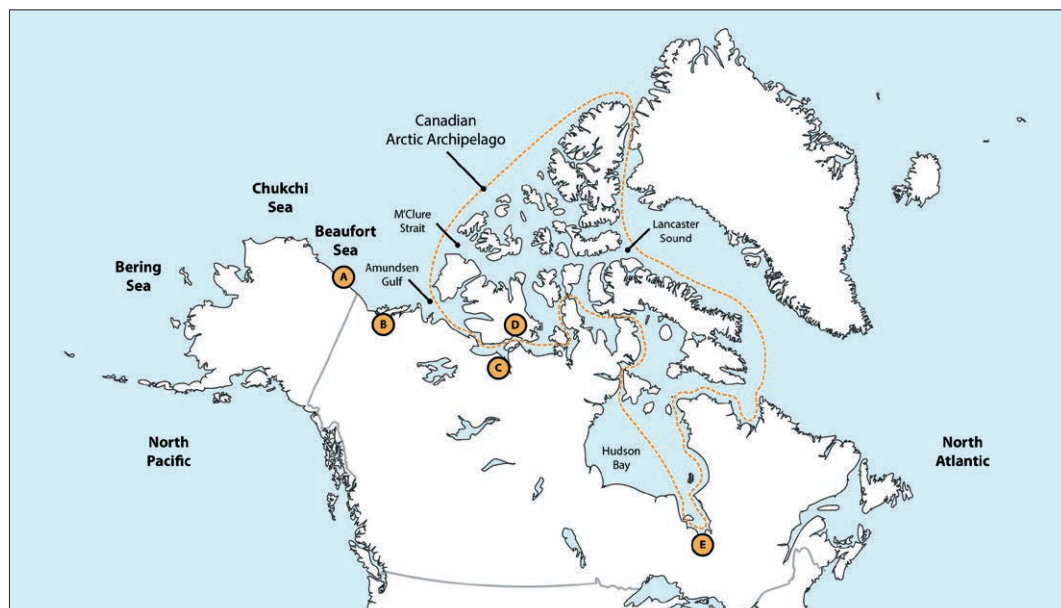




FIGURE 2 Sea ice extent in Arctic Ocean on 15 September 2020 (white area) and median ice edge in 1981-2010 (marked by orange line) (CIS 2020).

Sea to the North Atlantic via the Arctic Ocean or the waterways of the Canadian Arctic Archipelago. Both options could be true. This note considers the evidence that some Short-tailed may reach the North Atlantic by travelling over open water of the Canadian Arctic Archipelago – the ‘Canadian Arctic flyway’.

Ice melt in the Arctic

Since the start of the 21st century, the Canadian Arctic Archipelago has experienced relatively ice-free conditions multiple times (Lindsey & Scott 2020). The Northwest Passage is a system of gulfs, straits, sounds and channels in the Canadian Arctic Archipelago (Haas & Howell 2015; figure 1). In summer, sea ice concentration has decreased notably through three gateways of the Northwest Passage: Amundsen Gulf, Lancaster Sound and M’Clure Strait (figure 1). Sea ice concentration in these areas is lowest in September, with a distribution pattern of high sea ice concentrations along the northern region of the Northwest Passage and low concentrations along the southern regions (CIS 2020). Further, over the past 40 years, the area of the Arctic Ocean covered by ice has shown a dramatic decline, with more ice melting away in the summers and less new ice forming in the winters (figure 2). Current models suggest that by 2050, perhaps as early as 2035, the Arctic Ocean in its entirety could be completely ice-free during September (McKeon et al 2016, Thorniley-Walker 2017, Clairbaux et al 2019).

Faunal exchange through Canadian Arctic Archipelago

Accelerating loss of sea ice in the Arctic is creating open water connecting the North Atlantic and North Pacific for longer periods each year, potentially increasing the ease and frequency with which marine mammals and seabirds can move between the two oceans. Such movements have increased in recent decades (eg, Day et al 2013, Miller & Ruiz 2014). Bowhead Whales *Balaena mysticetus* from the two oceans have come together in the Northwest Passage (Heide-Jørgensen et al 2011). There are reports of Grey Whale *Eschrichtius robustus* in the Atlantic Ocean, a species that normally occupies margins of the North Pacific Ocean, although the route by which they arrived is unknown. Orca *Orcinus orca* has expanded its range into ice-free regions of Hudson Bay, Canada (McKeon et al 2016).

Removing the ice barrier is likely to modify migration of at least some of the Arctic-breeding seabird species that currently migrate in the North Atlantic or in the North Pacific (McKeon et al 2016, Clairbaux et al 2019). A Northern Gannet *Morus bassanus* was observed twice in Alaska in 2010 (Day et al 2013) and one reached the Farallon Islands off northern California in April 2012 (McKeon et al 2016) and is still present at the time of publication.

Several Pacific auks have recently been observed in the North Atlantic. Sightings of Long-billed Murrelet *Brachyramphus perdix* and Ancient Murrelet *Synthliboramphus antiquus* have increased (eg, Haas 2012, Howell et al 2014, Peter Flood in litt); Tufted Puffin *Fratercula cirrhata* has been recorded off Maine, USA (Ralph Eldridge in litt), north-western Greenland (Burnham et al 2020), and four times in northern European waters (eg, Wright 2011, Haas 2012, Mobakken 2021, Helgi Fossdal in litt); and a Horned Puffin *F. corniculata* has been recorded in north-western Greenland (Burnham et al 2020). Also, the bridled morph of Common Murre *Uria aalge*, common in some northerly North Atlantic colonies, was first recorded in the North Pacific in 2008 (Schmidt & Warzybok 2011). There is similar evidence for recent increased ocean exchange of ocean-specific (sub)species of seaducks (Haas 2012, 2017, McKeon et al 2016).

Given the above, what evidence is there that Short-tailed Shearwater has already reached or is likely to reach the North Atlantic via the Canadian Arctic flyway?



260 Short-tailed Shearwater / Dunbekpjlstormvogel *Ardenna tenuirostris*, Ferguson Lake, Cambridge Bay, Victoria Island, Nunavut, Canada, 19 June 2020 (Shannon McCallum). Found dead by Roland Emingak, Dennis Kaomayok, Jamie Panioyak and Donna Tikhak. Note relatively short bill, large whitish throat and low contrast of under primaries versus adjacent underwing-coverts. **261** Short-tailed Shearwater / Dunbekpjlstormvogel *Ardenna tenuirostris*, Ferguson Lake, Cambridge Bay, Victoria Island, Nunavut, Canada, 25 June 2020 (Shannon McCallum). Same bird as plate 260 and 262. Measurements by Chad McCallum. Length of bill is c 31 mm, near to mean measurements for Short-tailed Shearwater and considerably shorter than mean measurements around c 42 mm for Sooty Shearwater *A grisea* (Archer et al 2021). Mid-section gap (culminicorn) is c 28.1%, near to mean for Short-tailed, considerably less than mean of 34.4% for Sooty (Flood & Fisher 2020). Length of mid-section gap is distance between end of nostrils on culminicorn and first perceptible rise of maxillary unguis from culminicorn. **262** Short-tailed Shearwater / Dunbekpjlstormvogel *Ardenna tenuirostris*, Ferguson Lake, Cambridge Bay, Victoria Island, Nunavut, Canada, 25 June 2020 (Shannon McCallum). Same bird as plate 260-261. Measurements by Chad McCallum. Approximate wing length falls somewhere within 265-275 mm, which encompasses all but one mean figure in range of mean figures for Short-tailed Shearwater and is considerably less than range of mean figures of 293-304 mm for Sooty Shearwater *A grisea* (Archer et al 2021).

Short-tailed Shearwater and Canadian Arctic Archipelago

Short-tailed Shearwaters arrive in the Bering Sea in April (non-/failed breeders) and are joined by breeders in May-June, remaining until September (breeders), or October (non-breeders) (Flood & Fisher 2020). Millions reach St Lawrence Island, in the north-eastern Bering Sea, during late August-October (Howell 2012) and large numbers enter the Chukchi Sea. For example, c 100 000 presumably non-breeders were recorded off Cape Dezhnev, on the west side of the Bering Strait, which connects the Bering Sea and Chukchi Sea, on 21 September 2017 (John Ryan in litt; figure 1). The

seasonal northward movement of Short-tailed is related to krill (euphausiids) abundance (Nishizawa et al 2017) but, even so, the most northerly occurrence frequently coincides with minimum sea ice extent across Arctic Canada in September (Lindsey & Scott 2020). Interestingly, in offshore waters of the Chukchi Sea, piscivorous birds predominated in 1975-81 but planktivorous birds predominated in 2007-12, possibly related to ice melt, and Short-tailed is one of the few key planktivorous species (consuming euphausiids; Gall et al 2017).

There are numerous records of Short-tailed Shearwater from the Chukchi Sea and from the western Beaufort Sea in August-October (www.

eBird.org). An at-sea survey in northern summer months found Short-tailed throughout the Chukchi Sea and Beaufort Sea (Kuletz et al 2019). The researchers found that Short-tailed numbers drop off east of 150°W but then there is an uptick near 130°W (notably, with scant coverage in that region). More Short-tailed are using the northern Chukchi Sea in recent years (Kuletz et al 2020).

In the eastern Beaufort Sea, one Short-tailed Shearwater was observed on 3 August 2017 and another on 10 August 2017, off Collinson Head, Herschel-Qikiqtaruk Island, Yukon, Canada (www.eBird.org; A in figure 1). At the same location, 18 birds were recorded on 6 August 2019 and nine next day (www.eBird.org). One bird was found alive at Inuvik, Northwest Territories, Canada, on 25 October 1990 but later died (B in figure 1); the skin is now a specimen at the Canadian Museum of Nature, Ottawa, Ontario, Canada (NMCAV 95102; Sirois & Liepins 1991). At-sea surveys showed small numbers of shearwaters (presumably Short-tailed) reaching Amundsen Gulf in the northern autumn (Kuletz et al 2015).

There is evidence that some Short-tailed Shearwaters move even farther east into the southern Northwest Passage. One was found dead at Bathurst Inlet, Nunavut, Canada, in February 1994 (C in figure 1). It appeared to have died there the previous autumn based on the condition of the carcass. The skin is now a specimen also held at the Canadian Museum of Nature (CMNAV 96696; Wormington & Cranford 2011, Richards & Gaston 2018).

We report here, for the first time, a bird found dead and a second individual flying about at Ferguson Lake, 35 km north of Cambridge Bay, Victoria Island, Nunavut, Canada, on 19 June 2020 (D in figure 1). Photographs and measurements of the carcass confirm the identification of the dead individual (plate 260-262). Unfortunately, the carcass was not kept.

A Short-tailed Shearwater or Sooty Shearwater was observed and photographed over the waters of southern James Bay, Netitishi Point, Ontario, Canada, on 13 November 2010 (E in figure 1; Wormington & Cranford 2011), out of range of both species (however, it could have been a Sooty originating from the North Atlantic).

Conclusion

Given the sightings and specimens from the eastern Beaufort Sea and central Canadian Arctic, small numbers of Short-tailed Shearwaters may already have made their way through the Northwest Passage to the North Atlantic. We anticipate that

more opportunities for such transits will arise in the future as open water continues to spread through the waterways of the Canadian Arctic Archipelago in late summer. It is also possible that Short-tailed Shearwaters have reached the North Atlantic by travelling west from the Bering Sea (we are currently researching this option). Moreover, given current scenarios for a completely ice-free Arctic Ocean in late summer in coming decades, it seems inevitable that Short-tailed and other seabirds will travel across the ‘Canadian Arctic flyway’ and the western route with increasing frequency.

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Samenvatting

‘CANADESE ARCTISCHE TREKBAAN’ – MOGELIJKE ROUTE VOOR DUNBEKPIJLSTORMVOGEL OM NOORDELIJKE ATLANTISCHE OCEAAN TE BEREIKEN? Dunbekpijlstormvogel *Ardenna tenuirostris* broedt in Australië en de meeste vogels verblijven buiten de broedtijd in de Beringzee en de Tsjoecksjenzee (ten noorden van de Beringstraat). Dunbekpijlstormvogel is in de noordelijke Atlantische Oceaan een extreme dwaalgast. De recente reductie van de oppervlakte arctisch zee-ijs door de wereldwijde klimaatverandering heeft voor Dunbekpijlstormvogels nieuwe mogelijkheden gecreëerd om vanuit de Beringzee en de Tsjoecksjenzee de noordelijke Atlantische Oceaan te bereiken via de Noordelijke IJszee of via de wateren van de Canadese Arctische Archipel – de ‘Canadese Arctische Trekbaan’. Dit artikel onderbouwt dat sommige Dunbekpijlstormvogels via laatstgenoemde route de noordelijke Atlantische Oceaan kunnen bereiken.

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'Canadian Arctic flyway' – possible route for Short-tailed Shearwater to access North Atlantic?

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