Thick-billed murre studies in the Ritenbenk/Innaq colony in Disko Bay

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The thick-billed murre colony at Ritenbenk (Innaq) is the last remaining thick-billed murre colony in Disko Bay. It has been declining for more than 50 years from about 46,000 to only a 1300 birds in 2012. As part of the background study program, studies of thick-billed murre were carried out in the colony in 2005 and 2006 (Mosbech et al. 2009) and again in 2011. The overall aim has been to gain a better understanding of the population development, the causes for the decline as well as the potential for increase, and to identify important areas for the birds especially during the swimming migration.

The thick-billed murre is the most important hunted bird species in Greenland and it is also very vulnerable to marine oil spills. The hunting season and the hunting bag have been effectively reduced with new legislation in 2001 (Merkel & Christensen 2008). However, oil activity in the Disko West Area is a new challenge to the thick-billed murre population and makes it important to identify migration routes and important habitats.

The project has included studies of colony attendance, population estimates, population modelling, sustainable harvest modelling, chick feeding and foraging activities, and migration based on ringing recoveries and satellite telemetry.

Population trend

The entire colony was counted both directly and from digital photos. In order to correct the total counts for diurnal as well as day-to-day variation in murre numbers, repeated counts of study plots were carried out. The most reliable count was 2,447 individuals, based on a total direct count on 19 July 2006 and corrected for diurnal and day-to-day variation. Taking colony attendance into account, this is estimated to correspond to 1,835 breeding pairs.

The most recent previous count of the Ritenbenk colony was in 1998, when a comparable survey method provided an estimate of 3,415 individuals. This corresponds to a decline of 28 % or 4 % per year.

Both the total counts and the repeated counts of study plots indicate an increase in the number of birds present from 2005 to 2006. However, this positive result should not be overemphasized, since considerable year-to-year variations in attendance may mean that the negative trend in colony size has not been reversed. And indeed the results from the counts in 2011 and 2012 indicate a further decline in the thick-billed murre population (direct count in 2011: 1480 birds, and direct count in 2012: 1315 birds; none of these corrected for diurnal variation).

Population model

In order to investigate the mechanisms behind the population decline a simple matrix model of the thick-billed murre population at Ritenbenk was constructed. The model estimates the maximum sustainable harvest based on a number of assumptions. Model results were compared to the reported numbers of birds shot available from the official harvest statistics (*Piniarneq*). Harvest statistics show that the *Annual Hunting Bag* in Ilulissat municipality in 1993-2001 was between 100 and 206 birds (except 40 in 1998). These birds were presumably mainly adult breeders, since few immatures occur near the colonies at this time of year. A comparison with results of the harvest model indicates that shooting of adult breeders is the most likely cause for the decline in the size of the colony until 2001,

when summer hunting was banned. The model indicates that, if this ban is respected and winter hunting pressure remains constant, there is a chance that the population will stabilise.

Moult and autumn migration

When the young thick-billed murres leap from the ledges at an age of 2-3 weeks, they are unable to fly and glide through the air to the water, usually closely followed by one or two adults. Once in the water, the chick starts a swimming migration accompanied by the male adult, which during the first weeks of the swimming migration moults its flying feathers and becomes flightless. The female typically continues to attend the ledge for about two weeks before starting the migration and the moult. During the swimming migration, murres are very vulnerable to oil slicks on the sea surface.

To identify the migration routes of thick-billed murres from the colonies at Inaq/Ritenbenk twenty-seven murres were equipped with satellite transmitters in July (26 g pressure proof implantable Microwave satellite transmitter (PTT Platform Terminal Transmitter)). Murres with chicks were selected and were tracked for up to 112 days. The obtained tracks showed that 15 out of 16 males left Disko Bay through Vaigat (swimming), whereas females used routes N and S of Disko Island equally (Figure 1 and 2).

Later in August and September most tracked murres occurred dispersed in SE Baffin Bay (Figure 3). While most birds thus moult their flight feathers in Baffin Bay, two of the birds migrated SW towards Labrador and Newfoundland (Figure 4). It is concluded that a large part of the population migrate through Vaigat and past Hareø around 1 August, during this time they will be very sensitive to an oil spill in this area. Similarly, the population will be very sensitive to oil spills in Disko Bay when they arrive in May.

Foraging behaviour and feeding conditions

Foraging behaviour (dive activity and chick feeding) was studied in 2006 to investigate whether food limitation during the breeding season might affect chick survival and thus population growth. Dive activity was recorded using miniature leg-mounted data loggers (Figure 5), whereas chick feeding frequencies were observed directly. Capelin was an important food item in 2006 (Figure 6), feeding trips were relatively short, and the proportion of time birds spent diving was relatively low (< 10 %) (Figure 7). The overall impression was that food availability was sufficient in 2006 and preliminary results indicate that this was also the case in 2011. Most likely the cause for the continued decline in the colony should be found outside the breeding season.

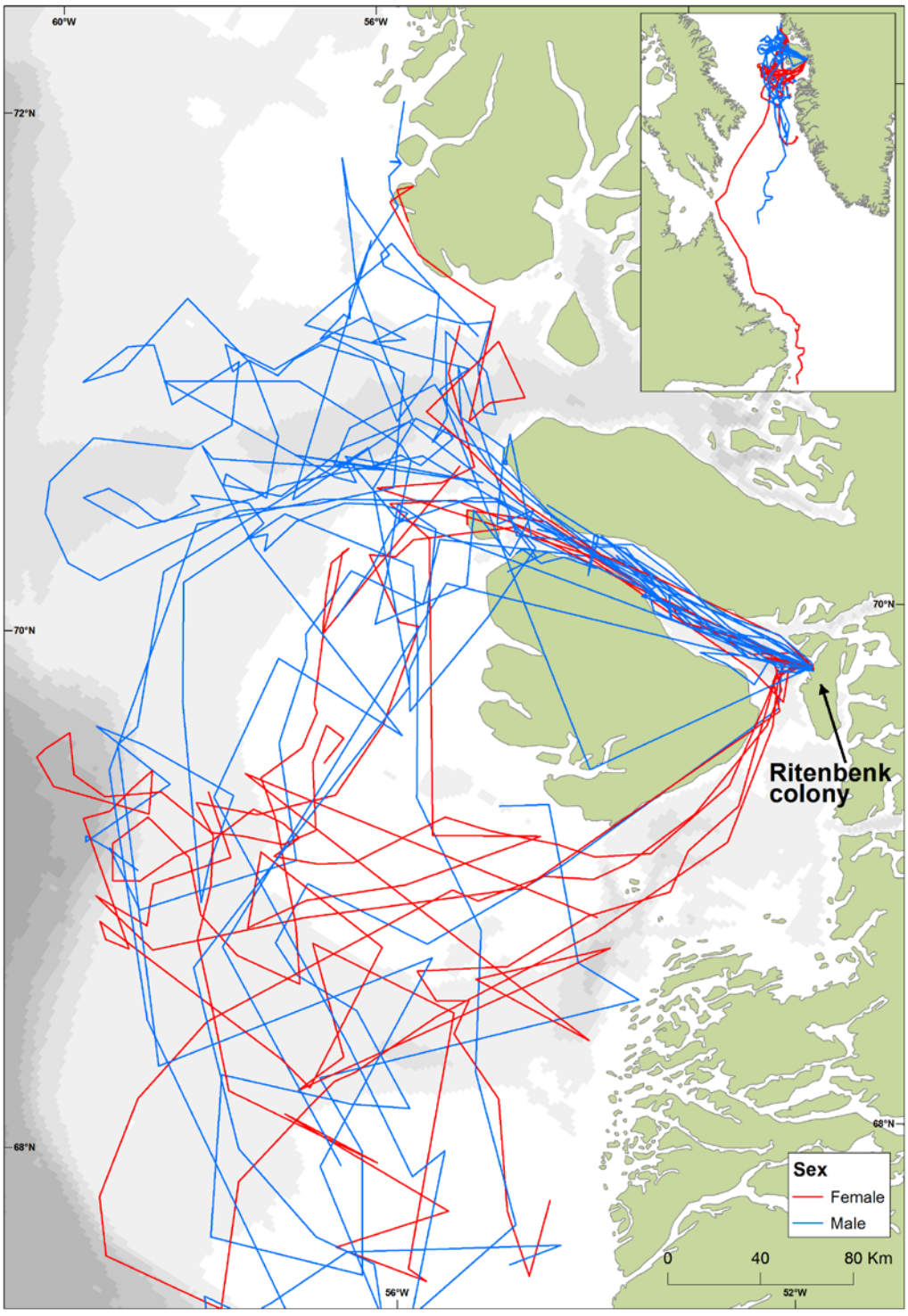

Figure 1. Tracking routes of 27 thick-billed murres from the Ritenbenk colony in 2005 and 2006.

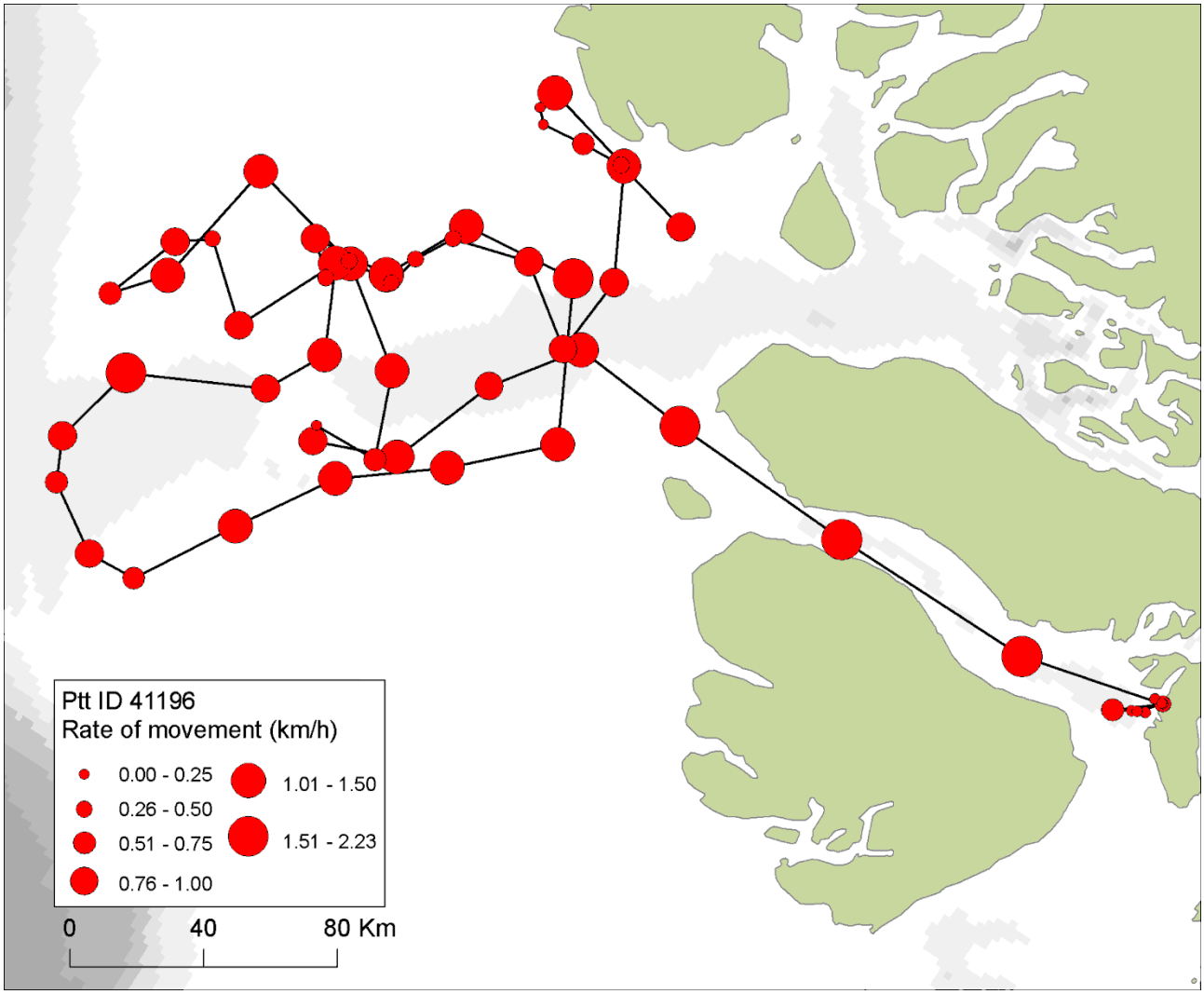

Figure 2. The route tracked for a male thick-billed murre using a subcutaneous satellite transmitter. The male took up parental care on the breeding ledge and later left the ledge with the chick and started swimming migration. Average rate of movement is calculated between the best quality locations in consecutive transmission periods (Best Pick location in each of 56 28 hour cycles).

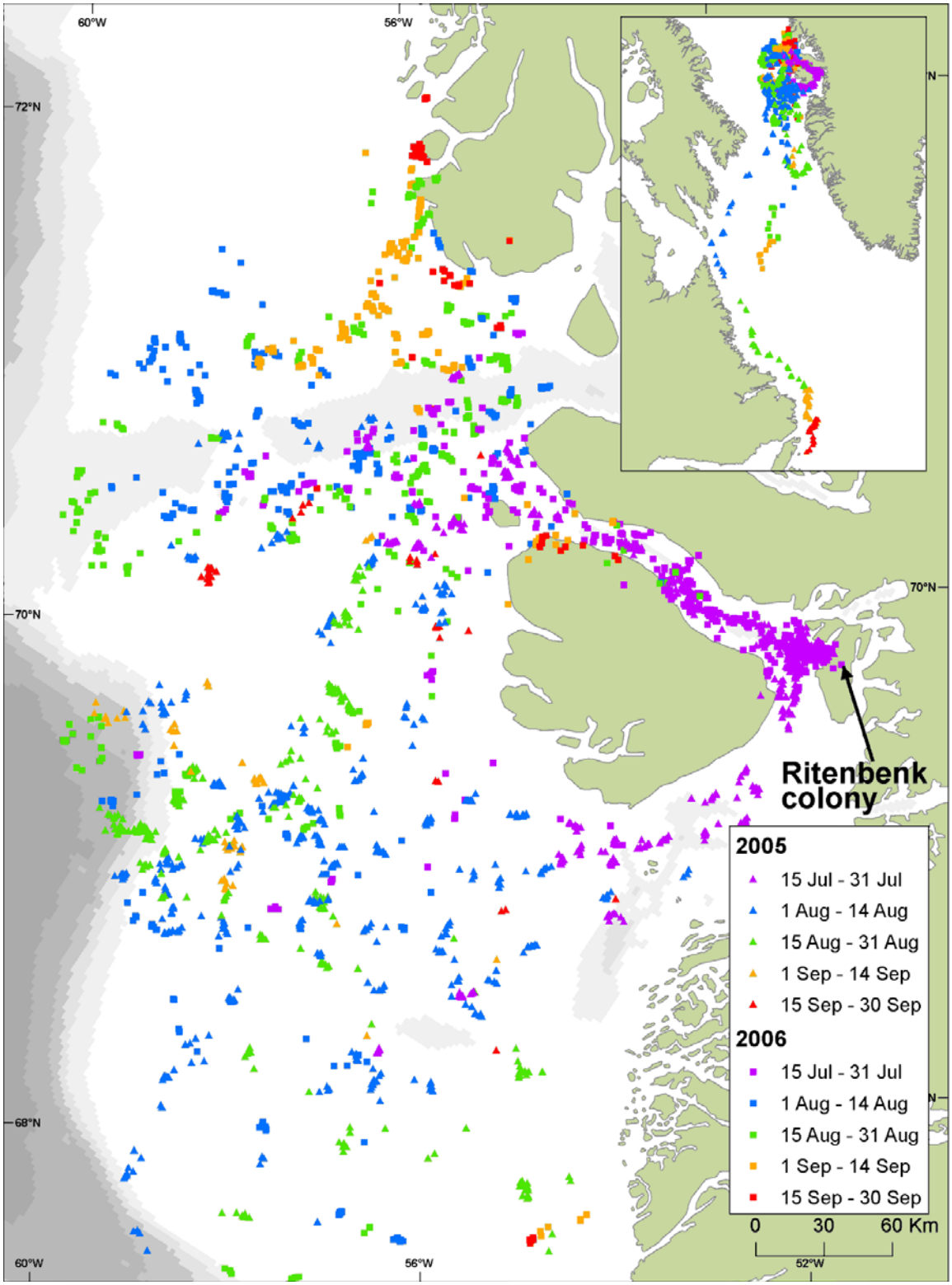

Figure 3.Temporal and spatial distribution of locations from 27 thick-billed murres tracked from the Ritenbenk colony.

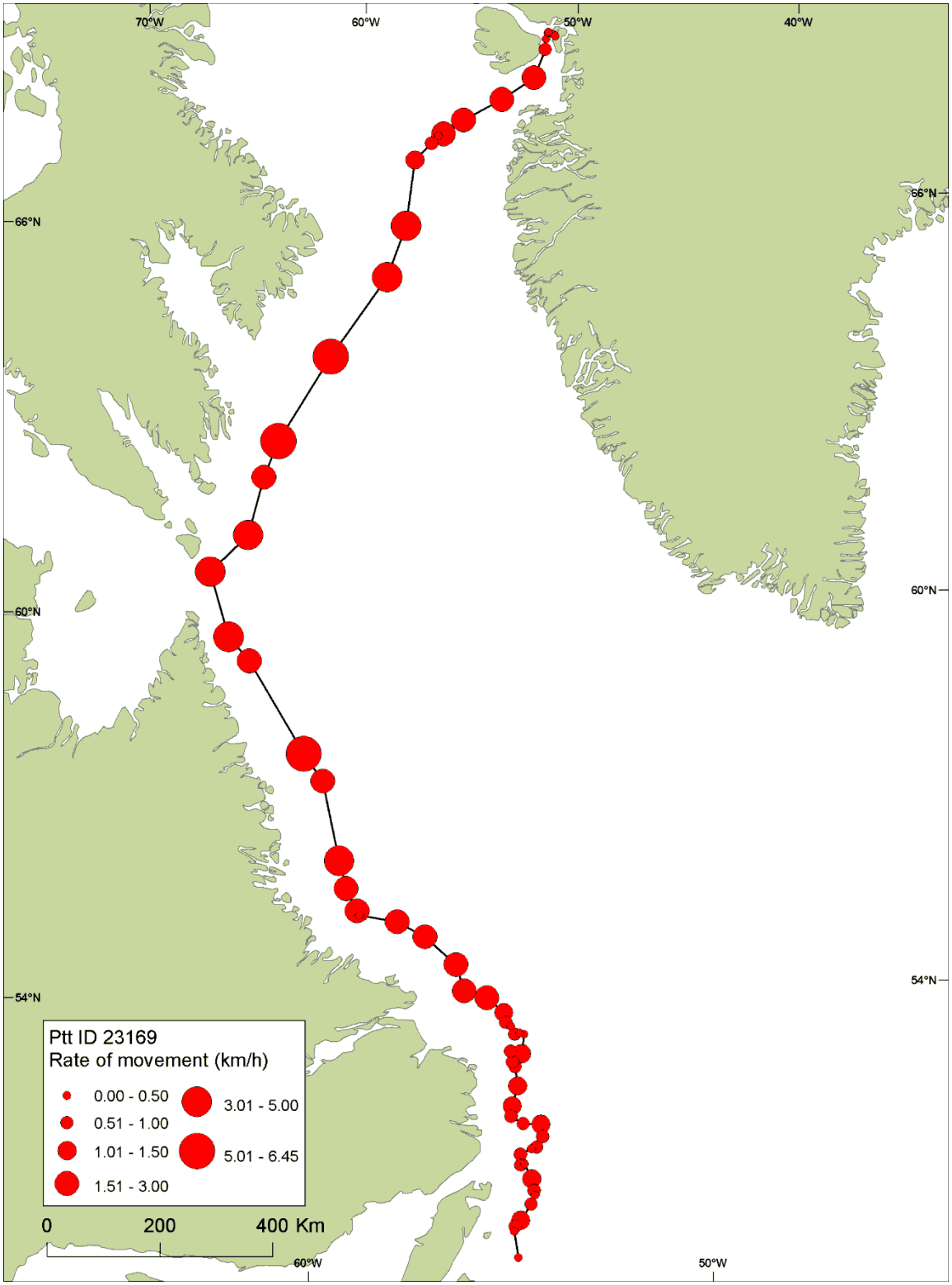

Figure 4.The route of a female thick-billed murre (#4137507) tracked from Ritenbenk and arriving in northern Newfoundland in the first half of August 2005. The average rate of movement was calculated between the best quality locations in consecutive transmission periods ('best pick' locations). At the coast of Labrador the average rate of movement fell below 3km/h indicating that most likely wing moult started here.

Figure 5. Data logger attached to a metal tarsus band on a thick-billed murre

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Figure 6. Thick-billed murre arriving at nesting ledge with capelin for its chick at Ritenbenk, July 2005.

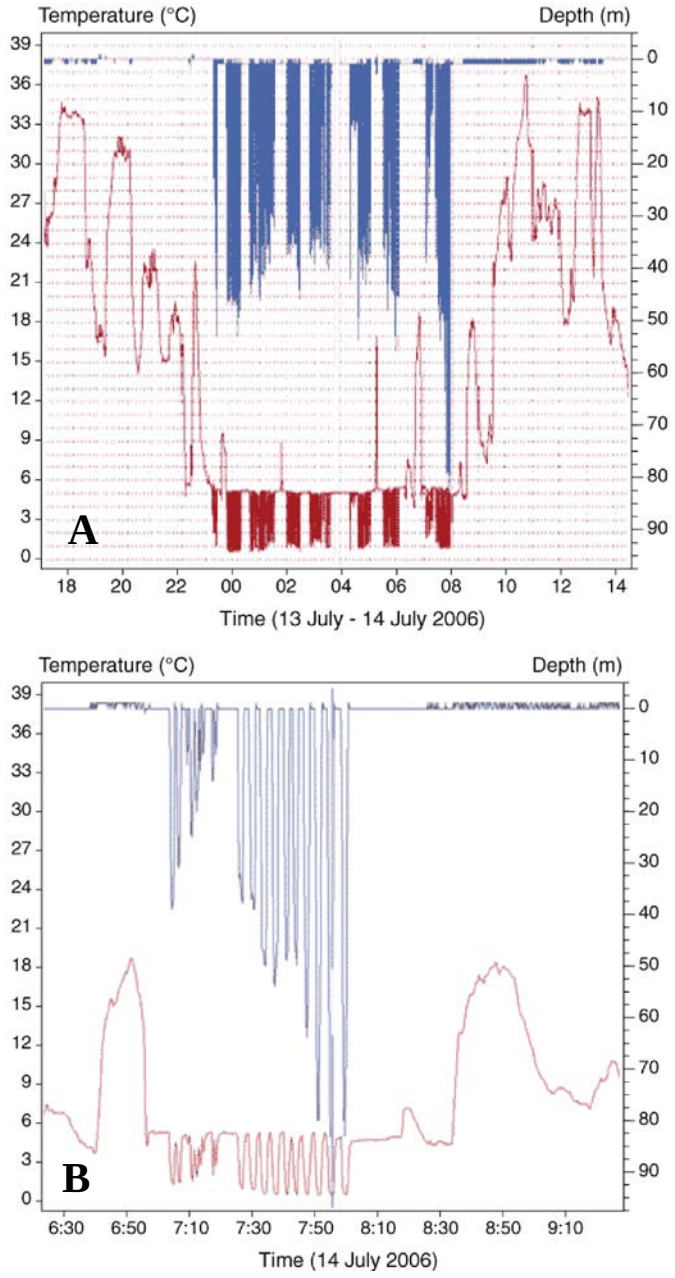

Figure 7. ***A****) Diving behaviour recorded with Time-Depth Recorder (TDR) for a thick-billed murre on a foraging trip the night between 13 and 14 July 2006. Between 11 PM and 8 AM the murre made 9 feeding bouts. Most dives (blue) went to about 40 m, but in the last feeding bout dives exceeded 80 m depth. The temperature (red)at the sea surface was ca. 5 °C, decreasing to ca. 1 °C at 40 m and remaining at that level down to 80 m.* ***B****) Enlargement of the last feeding bout in Figure (A).*