PRE-BREEDING MIGRATION OF MANX SHEARWATER *PUFFINUS PUFFINUS* IN THE WESTERN ATLANTIC: NEW INSIGHT FROM A SURVEY IN GUADELOUPE, LESSER ANTILLES

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Levesque, A. & Yésou, P. 2006. Pre-breeding migration of Manx Shearwater *Puffinus puffinus* in the western Atlantic: new insight from a survey in Guadeloupe, Lesser Antilles. Atlantic Seabirds 8(1/2): 81-86. *A sea-watching routine set up from 2001 to 2004 in Guadeloupe, Lesser Antilles, showed that large numbers of Manx Shearwaters* Puffinus puffinus *regularly migrate through this area from February to May, peaking in March. It has been estimated that each year on average 26,000 (95% confidence interval: 17,000-38,100) individuals are passing within 4 nautical miles off the coast, while more birds could be passing further offshore. It is suggested that these birds follow a northwestward direction from northern Brazil, and probably continue following the Gulf Stream up to their main summer range in northwestern Europe.*

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INTRODUCTION

Little is known about the migration route followed by Manx Shearwaters *Puffinus puffinus* from their winter quaters off South America to their summer range in Europe. It is usually assumed that they follow a straight route, crossing the Atlantic Ocean from the northern coast of Brazil and flying straight to the Azores area, then continuing to NW Europe. Both the major handbooks (Cramp & Simmons 1977; del Hoyo *et al.* 1992) and the main monograph devoted to the Manx Shearwater (Brooke 1990) have mapped such a hypothetical route, which implies that the whole migration takes place east of 40°W (Figure 1).

In such a context, it was not surprising that Manx Shearwaters were rarely encountered in the West Indies (Raffaele *et al.* 1998). Moreover, although birds ringed in the British Isles had been recovered in Trinidad, Grenada and Guadeloupe, it was initially proposed that most records there should relate to migrants from the small population breeding in the NW Atlantic, particularly in Newfoundland (Keith & Keith 2003), as already suggested for Manx Shearwaters observed off southeastern USA (Lee 1995).

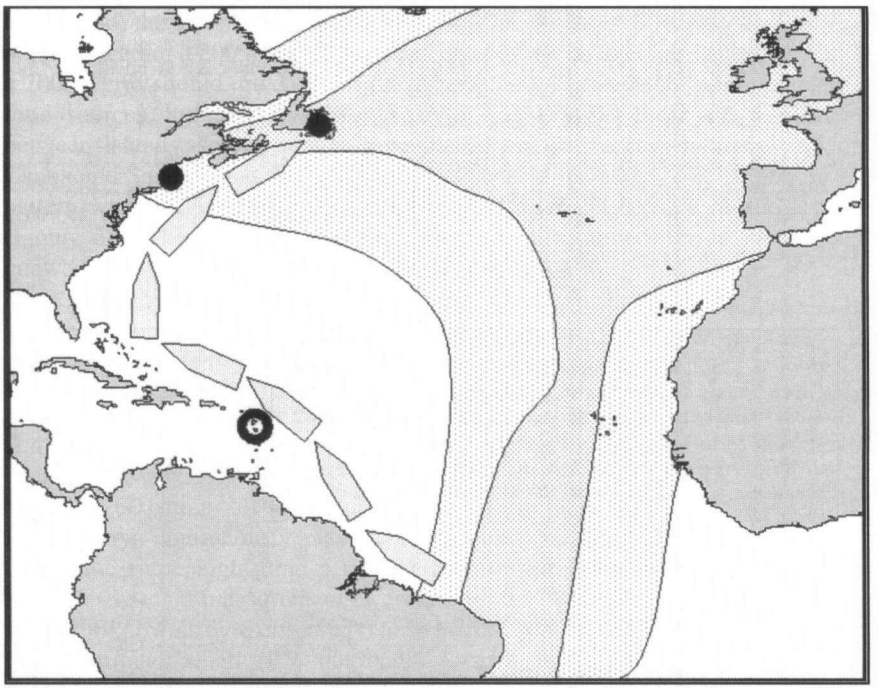

Figure 1. Distribution of Manx Shearwater as mapped by Cramp & Simmons (1977: darker grey shade) and del Hoyo et al. *(1992: paler grey shade). Filled circles: North American breeding localities. Open circle: study site in Guadeloupe. Line of arrows: western migration route as proposed in this paper.*

Figuur 1. Verspreiding van Noordse Pijlstormvogel volgens Cramp & Simmons (1977: donkergrijs) en del Hoyo et al. *(1992: lichtgrijs). Dichte cirkels: Noord-Amerikaanse broedlocaties. Open cirkel: studiegebied op Guadeloupe. Pijlen: westelijke trekroute zoals in dit artikel voorgesteld.*

STUDY AREA AND METHODS

The observations were carried out from 2001 to 2004 from Petite-Terre, in the Guadeloupe archipelago: at 16°15'N – 61°7'W is one of the easternmost islands in the Lesser Antilles and is bordered by a rather narrow Continental Shelf, with ocean sea-floor depths of 88 m, 376 m and 456 m at 2, 3 and 4 NM (nautical miles) respectively. Periods of 15 minutes non-stop observation were carried out from the top of a cliff (c. 7 m above sea level), looking through a tripod-mounted telescope (x20-60 zoom, lens used at x30 during search). A few minutes rest was systematically taken between two consecutive 15 min-periods, which were designed as to take place within each one-hour daylight period of

each day (i.e. 6 to 7 am and so on, time zone UTC/GTM –4 hours). The distribution of observation effort was uneven, as the main passage periods received extra coverage to better document the birds' status at that time. Logistical reasons also resulted in higher observation effort at early and late hours of the day. Simultaneous, co-ordinated, observations from the study spot and from a boat using GPS positioning showed that large-sized birds such as Manx Shearwater were detected through the telescope when passing up to 4 NM off at sea, with much of the observed passage occurring between 1 NM and 3 NM from the islet. Data obtained during each 15 min-period (including 'zero' data) were pooled both per hour and per month, leading to the calculation of the mean number of individuals observed per hour during a given month. Multiplied by the number of hours with daylight and the number of days per month, this allows a rough estimate of the number of birds that have been passing through the study area over a given period. AL is responsible for most of the field work. PY, who has long experience with shearwaters and has been particularly involved in the study of taxa related to the Manx Shearwater, joined for ten days in April 2004, mostly to assist in checking the validity of identification characters used in the separation of Manx Shearwater from Audubon's Shearwater *Puffinus lherminieri*. Preliminary results relating to the nine species of Procellariiformes observed during this survey were given in Levesque & Yésou (2005), while here we discuss in more detail the observed status of the Manx Shearwater.

RESULTS

Out of 3330 small shearwaters (either Manx or Audubon's) seen during the four-year survey, only 6% were left unidentified. Most of the identified birds were Manx Shearwaters (N = 2543) which accounted for 34% of all tubenoses recorded, 40% of all shearwaters and 76% off all small shearwaters (81% of all identified small shearwaters).

Manx Shearwaters were recorded off the observation point, singly or in small flocks of up to 18 birds, from mid-Autumn (earliest date 5 November) through late-Spring (latest date 10 June), but remained scarce outside the Spring passage, which occurred from February to May, peaking in March (Fig. 2). The February-May passage has been observed each year, with 72% of the birds recorded in March. The highest count was on 3 March 2004, when 597 birds were recorded in 4 hours during strong north-easterlies (wind speed up to 80 kmph) which had begun the previous day.

From these observations, it can be estimated that on average an amazing 26,000 (95% confidence interval: 17,000-38,100) Manx Shearwaters are passing by the observation spot in February-May each year. There is much inter-year

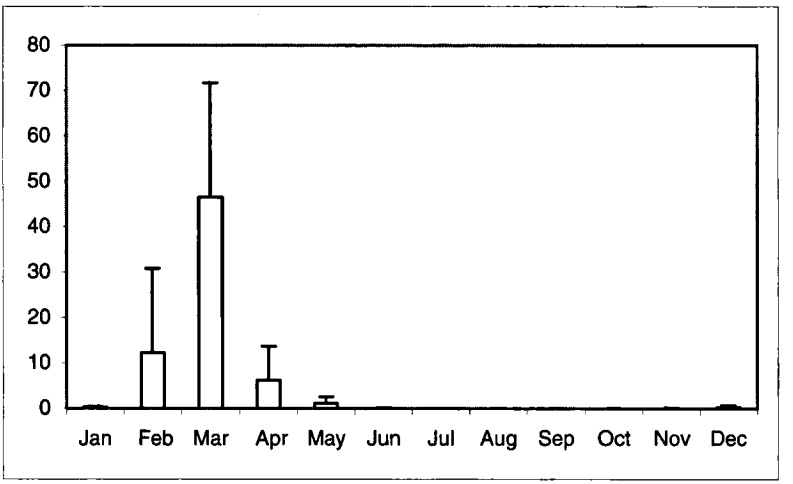

Figure 2. Mean numbers of Manx Shearwater recorded per hour from Petite-Terre, Guadeloupe, 2001-2004. The Standard Error illustrates the between-year variability.

Figuur 2. Gemiddeld aantal waargenomen Noordse Pijlstormvogels vanaf Petite-Terre, Guadeloupe, 2001-2004. De standaardfout is een maat voor de jaarlijkse variatie.

variation in the intensity of passage within sight of land, however, with an estimated passage of only c.18,000 (95% CI: 10,600-28,500) birds in 2002 but over 33,000 (95% CI: 22,700-46,300) in 2004.

DISCUSSION

The first record of Manx Shearwater for Guadeloupe was a corpse found washed ashore at Désirade island on 30 April 1997, which had been ringed in 1978 as a flying bird (born before that year) at a colony in Saint Kilda, Scotland (Keith & Keith 2003; J. Clark/BTO *pers. comm.*), and no bird was recorded alive in waters surrounding Guadeloupe until 2001 (Levesque & Jaffard 2002). Thus it was a great surprise when the Manx Shearwater proved to be the most abundant species of Procellariiformes, and probably the most abundant of all seabirds off Guadeloupe, although no systematiced counts of terns and noddies have been undertaken.

The above estimates can be disputed with regard to the fact that huge movements of Manx Shearwaters passing off the observation spot have

occasionally been given extra coverage: this may lead to slightly higher estimates than in a case of a strict protocol where observation are conducted over pre-defined periods. Regardless of the precision of the estimates, this survey has clearly shown that Manx Shearwaters regularly migrate close to the Lesser Antilles by the thousands. In such a pelagic species, movements detected from land might be just one part of a wider context. Thus can we conceive that much higher numbers than those reported here are passing offshore in West Indian waters?

The observed and infered numbers are such that the presence of Manx Shearwaters off the Lesser Antilles can no longer be related to the very small population which breeds in the NW Atlantic (the tenuous breeding population in Newfoundland, which seems to have declined since the 1980s, has been estimated at only 55-170 individuals in 2004-2005: Robertson 2005). The numbers involved make it obvious that the spring movement observed each year off the Lesser Antilles is part of the return migration of the European population of Manx Shearwater. We suggest that these birds leave the South American waters in a northwest direction, following the nutrient-rich plumes of the Amazonian rivers off the Guyanas and the Antilles, to reach the Gulf Stream along which feeding conditions may be of importance to these birds during their return journey to Europe (the significance of the Gulf Stream as a feeding area is known for other seabirds species, including various shearwater species and other Procellariiformes: e.g. Brown *et al.* 1981; Haney 1986, 1987).

Which part of the population actually follow this western route and at which latitude do these birds turn eastward are questions still to be answered. Since breeders arrive at their colonies from late February to early April (Brooke 1990; C. Perrins *pers. comm.*), their pre-breeding migration must be earlier than observed here, suggesting that, at least, most of the Manx Shearwaters migrating off the Antilles are non-breeding birds. This agrees with the time schedule of the older immatures, which reach the breeding grounds as prospectors in May (C. Perrins *pers. comm.*), and with the fact that most recoveries of British Manx Shearwaters in the eastern coast of North America correspond to 2nd calendar year birds (Cramp & Simmons 1977); even recoveries of older birds (such as the first record for Guadeloupe –in late April) could correspond to non-breeders, e.g. birds having a sabbatical. Given the species' regular presence in spring further north off southeastern USA and Newfoundland (Lee 1995, Robertson 2005), it is entirely possible that this migration route follows the Gulf Stream all the way back to the Western Approaches.

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VOORJAARSTREK VAN NOORDSE PIJLSTORMVOGEL *PUFFINUS PUFFINUS* IN DE WESTELIJKE ATLANTISCHE OCEAAN: NIEUWE INZICHTEN DOOR ZEETREKTELLINGEN OP GUADELOUPE

Een zeetrektelprogramma dat van 2001 tot 2004 op Guadeloupe liep, liet zien dat grote aantallen Noordse Pijlstormvogels Puffinus puffinus van februari t.m mei, met een piek in maart, regelmatig door dit gebied trekken. Naar schatting passeren gemiddeld 26000 (95%-betrouwbaarheidsinterval 17000-38100) individuen binnen vier zeemijl van de kust, terwijl er meer vogels verder op zee kunnen passeren. Mogelijk volgen deze vogels een noordwestelijke koers vanaf Noord-Brazilië om vervolgens de Golfstroom te volgen naar hun belangrijkste zomergebieden in het noordwesten van Europa.

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