the clear advice would be: don't touch or touch only with proper personal protection, understanding that as long as the chemical identity of a substance is unknown, a toxic cocktail may be involved, potentially inducing serious health risks.

This case study illustrates the risks that seabirds face in the North Sea, even when mineral oil pollution is declining. Under MARPOL Annex II, PIB is listed under category Z of noxious liquid substances in bulk: *substances presenting a minor hazard to either marine resources or human health and therefore justify less stringent restrictions on the quality and quantity of the discharge into the marine environment*. One may wonder if this ranking is justified given the observed and immediate impact of PIB on marine wildlife in the 1998 and 2010 incidents.

References

Anon. 1992. Number of tanker spills falls. *Marine Pollution Bulletin* 24: 175–176.

Anon. 1993. GESAMP reports decline in oil pollution. *Marine Pollution Bulletin* 26: 471–472.

Camphuysen, C. J. 1998. Beached bird surveys indicate decline in chronic oil pollution in the North Sea. *Marine Pollution Bulletin* 36: 519–526.

Camphuysen, C. J. 2010. Declines in oil rates of stranded birds in the North Sea highlight spatial patterns in reductions of chronic oil pollution. *Marine Pollution Bulletin* doi: 10.1016/j.marpolbul.2010.03.012.

Camphuysen, C. J., Barreveld, H., Dahlmann, G. & van Franeker, J. A. 1999. Seabirds in the North Sea demobilised and killed by polyisobutylene $(C_4H_8)_n$. *Marine Pollution Bulletin* 38: 1171–1176.

Camphuysen, C. J. & de Leeuw, J. In press. The impact of hydrophobic and insoluble chemicals released from merchant shipping on European marine ecosystems and wildlife. In: McDonough, N. & Calewaert, J.-B. (eds.) *Monitoring of existing and emerging chemicals in the European marine and coastal environment*: Chapter 5. Marine Board-ESF Position Paper 15, European Science Foundation, Marine Board, Strasbourg.

Verduin, E. C., de Kort, M. J., Vanagt, T. J. & Vissers, M. J. M. 2010. *Trends in lozingen op de Noordzee*. Report Grontmij Nederland BV, Houten, 13/99096903/vZ, revision D1. Rijkswaterstaat Dienst Noordzee, Rijswijk.

Leach's Storm-petrels *Oceanodroma leucorhoa* nesting at a new site in Shetland

Miles, W. T. S.[1*], Tallack, R. M.[2], Thomason, B. H.[3] and Okill, J. D.[4]

** Correspondence author. Email: willtsmiles@hotmail.com*

[1] *29 Highfield Avenue, Cambridge CB4 2AJ, UK;* [2] *Sotland, Haroldswick, Unst, Shetland ZE2 9EQ, UK;* [3] *Shetland Nature, Rohan, Baltasound, Unst, Shetland ZE2 9DS, UK;* [4] *Heilinabretta, Trondra, Shetland ZE1 0XL, UK.*

Abstract

In August 2010, six small islands in northern Shetland were prospectively surveyed for breeding colonies of Leach's Storm-petrels *Oceanodroma leucorhoa* using vocalisation playback methods. Four adult birds, two with a nest, were located on 10 August in burrows at a new site for the species in the UK: Gloup Holm, off north Yell. Under license, three birds were temporarily extracted and examined; all had brood patches entirely bare of feathering and highly vascularised. Eggs and chicks were not located but burrows were all too deep to check conclusively. Future surveys of Gloup Holm and other small islands in the north of Shetland, carried out in June, may locate further adults, eggs and chicks.

Introduction

In Britain and Ireland, the vast majority of breeding Leach's Storm-petrels *Oceanodroma leucorhoa* nest on islands and sea stacks in the Western Isles, Scotland, in particular on St Kilda, the Flannan Isles and North Rona, where a total of c. 48,000 pairs were found between 1999 and 2001

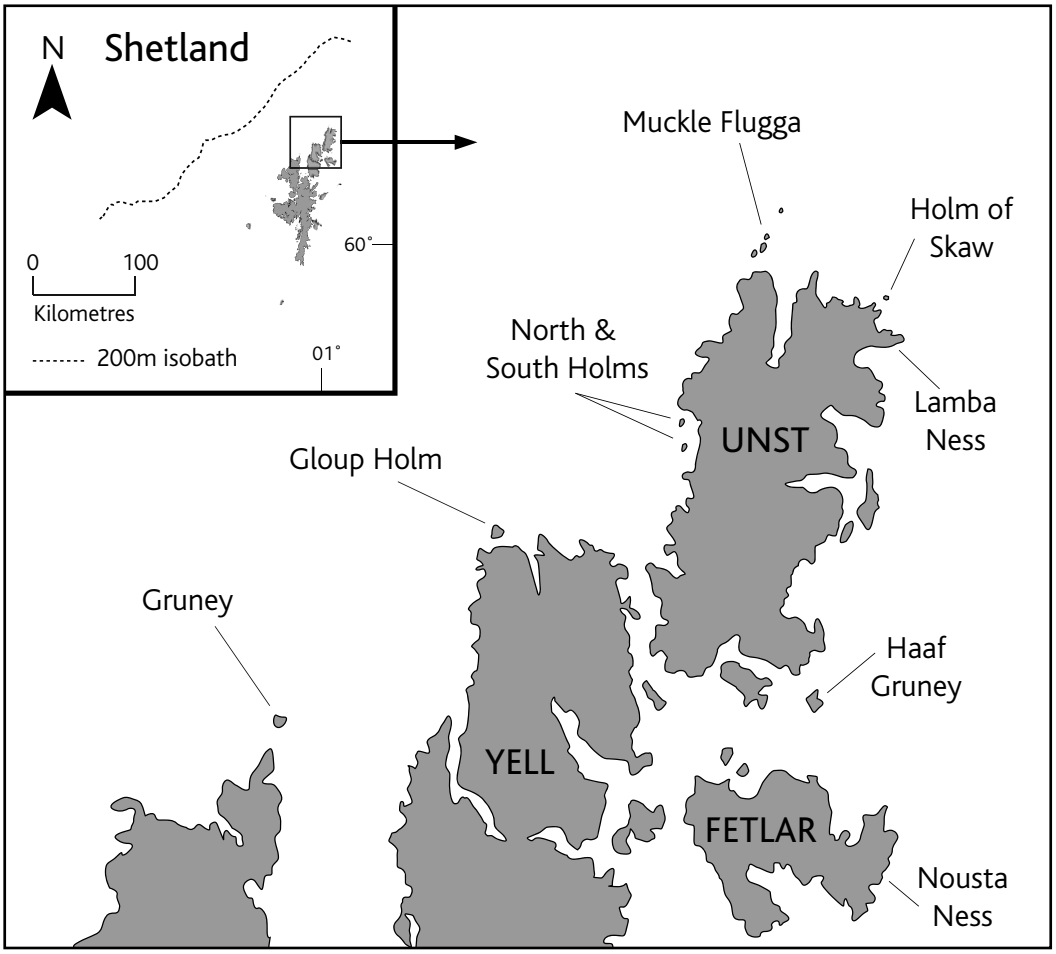

Figure 1. Shetland (inset) and the northern Shetland Islands, showing the location of Gruney, the other islands and holms visited during this study, and the sites on Unst and Fetlar where storm-petrel mist-netting was carried out.

(Mitchell 2004). In the Northern Isles, breeding pairs and colonies are far fewer, with less than five pairs recorded historically at one site (Sule Skerry) in Orkney (Robinson 1934) and a total of c. 35 pairs recorded breeding at two sites in Shetland (Fowler 1982; Mitchell 2004).

The first Leach's Storm-petrel colony recorded in Shetland was on Foula, where breeding had been suspected since the early 1900s and was confirmed in 1974 (Mainwood 1975; Pennington *et al*. 2004). An estimated total of 15 apparently occupied nest sites were recorded in 2001–02 (Mitchell 2004); however, individuals have been found predated by feral cats *Felis catus* and the Foula colony could possibly be extinct (Shetland Ringing Group). In August 1980, using tape playback of Leach's Storm-petrel calls, Fowler (1982) found birds in burrows on the island of Gruney (Figure 1). One adult was temporarily extracted and found to have a brood patch, but no eggs were located. In July 1981, Gruney was resurveyed and seven burrows were found containing adults, including two with eggs (Fowler & Butler 1982). Since then, the colony has been monitored by RSPB and between 17 and 23 occupied burrows recorded (1992–99: Pennington *et al*. 2004). It seems probable that Leach's Storm-petrels

may also have bred in Shetland on Fair Isle, where a downy juvenile was found at the South Lighthouse in October 1975, three were heard calling from the north cliffs in July 1981 and at least two were heard singing from the cliffs and scree in the Kirn o' Scroo in July 2006 and July 2007 (Fair Isle Bird Observatory Reports 1970–2007).

It has been speculated that the species might breed on other islands in Shetland (Pennington *et al*. 2004). This, combined with unusually frequent captures of individuals during ringing sessions on Unst and Fetlar (see Discussion), led us to visit six small islands (each < 1 km^2) off Unst and Yell in August 2010 to prospect for breeding Leach's Storm-petrels.

Methods

Gloup Holm, North and South Holms (of Woodwick), Muckle Flugga, the Holm of Skaw and Haaf Gruney (Figure 1) were visited between 8 and 15 August 2010. These islands were selected not least because cats and Brown Rats *Rattus norvegicus* are thought to be absent (e.g. de León *et al*. 2006). Islands were accessed by small fishing boat between 11.00 hours and 20.00 hours. Landing durations varied between one and three hours, according to island size and terrain. A custom digital loop-track of male and female Leach's Storm-petrel purring and chatter calls was played over all accessible areas of potential storm-petrel breeding habitat on all islands, using two mp3 players and handheld speakers, carried slowly c. 30 cm above the ground.

Results

Leach's Storm-petrels were found in burrows on the northernmost peninsula of Gloup Holm (60°44'N 01°06'W) on 10 August 2010, responding vocally to our digital chatter call tracks. In total, four birds were heard: a pair of adults in one burrow and two other adults in separate burrows. Three of these, including the pair, were temporarily extracted and examined under SNH Schedule 1 Species License, and all found to have brood patches entirely bare of feathering and highly vascularised (Figure 2). Within the burrow containing the pair, a nest was found, formed from grasses. Eggs and chicks were not located, but all burrows examined were extremely deep (greater than arm's length) and it was never possible to reach the end, where the chick frequently sits (WM pers. obs. St Kilda & North Rona 2008–10). All active burrows were located on the peninsula's grassy plateau, within relatively deep, damp, spongy peat (> 30 cm depth), overlain by an ungrazed, relatively thick vegetation layer predominantly composed of Red Fescue *Festuca rubra,* Sea Plantain *Plantago maritima*, Tufted Vetch *Vicia cracca* and Thrift *Armeria maritima*. Burrow entrances were very hard to find within the sward; Figure 3 shows a relatively exposed entrance. Leach's Storm-petrels were not encountered on any other island we surveyed, although European Storm-petrels *Hydrobates pelagicus* were heard emitting 'terr-chick' calls (in response to Leach's Storm-petrel playback tracks) from rock crevices on Muckle Flugga and Haaf Gruney, and one found by smell was temporarily removed and examined from a burrow in peaty soil on the southern plateau of Gloup Holm.

Discussion

Given that Leach's Storm-petrel eggs and chicks were not located on Gloup Holm, the possibility that the adults present might all have been non-breeders 'trying out' a potential breeding site cannot be entirely ruled out. However, on St Kilda in 2007 and 2008 and North Rona in 2010, less than 30% of all birds that responded to call playback and were examined from burrows were non-breeders without an egg or chick (Money 2007, 2008; Money *et al*. 2008; S. Votier, T. Bicknell & WM pers. obs.). It therefore seems probable that one or more of the four adults found on Gloup Holm was actively breeding, with an egg or chick that was simply out of reach. More responses from adult Leach's Storm-petrels to playback of calls occur in June than in other months of the breeding season, primarily because peak incubation occurs in June and more breeding adults are present in their burrows during the day in this period than

Figure 2. Leach's Storm-petrel *Oceanodroma leucorhoa* brood patch, entirely bare of feathering and highly vascularised, Gloup Holm, Shetland, August 2010. © *Brydon H. Thomason*.

Figure 3. Entrance of a Leach's Storm-petrel *Oceanodroma leucorhoa* burrow, Gloup Holm, Shetland, August 2010. © *Brydon H. Thomason*.

are at any other time of the year (Ellis *et al*. 1998; Gilbert *et al*. 1998; Money 2007, 2008). In August, both adults may frequently be away from their burrow foraging for food for the chick; it is quite conceivable that there may have been additional active burrows containing chicks on Gloup Holm at the time of our visit, but which remained undetected because the adults were absent. As on Gruney in 1981, a resurvey of Gloup Holm using call playback methods in June would be extremely useful, and may locate further adults and eggs.

The peaty, lush, ungrazed maritime grassland in which the birds on Gloup Holm were found was not encountered on the five other islands visited. Nonetheless, it would be worth resurveying these in June, as from this study we could not be certain that breeders were absent, even though none were heard and the habitat did not appear particularly favourable. Muckle Flugga, the North and South Holms and the Holm of Skaw were much rockier than Gloup Holm, with very thin soils, the Holm of Skaw, the North and South Holms and Haaf Gruney were heavily grazed by Greylag Geese *Anser anser*, and Haaf Gruney was also grazed by sheep.

Under BTO licence, we mist-netted storm-petrels using tape lures on Lamba Ness, Unst, and Nousta Ness, Fetlar (Figure 1) on nine nights between 3 and 16 August 2010. Every night, except for one when weather conditions were unfavourable and a Leach's Storm-petrel was seen but not caught, one to four previously unringed Leach's Storm-petrels were mist-netted. In total 18 birds were caught, an estimated 15 or more others were seen around the nets, and on six nights one or more were trapped relatively early, within an hour of dusk. Such numbers, and the regularity and timing of captures away from known breeding sites were unprecedented in Shetland (Pennington *et al*. 2004) and more akin to capture patterns when mist-netting near active colonies (WM pers. obs. St Kilda and North Rona 2007–10).

It seems likely that small colonies of Leach's Storm-petrels could be present at suitable

sites in the north of Shetland, other than on Gruney and Gloup Holm. All known UK colonies are located within 70 km of the 200 m isobath (the continental shelf break; Figure 1) and many of the islands and sea stacks in northern Shetland fall within this zone. Whilst emphasis has always correctly been given to the importance of large colonies, such as St Kilda and North Rona, checking smaller sites at suitable times may expand our knowledge of the distribution of this species. With population changes and predation pressures often issues at the larger colonies (Phillips *et al*. 1999; Votier *et al*. 2005; Newson *et al*. 2008), it would be useful to know that there are a number of small, more widely distributed sites where breeding also occurs.

Acknowledgements

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Figure 4. Leach's Storm-petrel *Oceanodroma leucorhoa* and ungrazed, maritime grassland breeding habitat, Gloup Holm, Shetland, August 2010. © *Brydon H. Thomason*.

References

de León, A., Mínguez, E., Harvey, P., Meek, E., Crane, J. E. & Furness, R. W. 2006. Factors affecting breeding distribution of Storm-petrels *Hydrobates pelagicus* in Orkney and Shetland. *Bird Study* 53: 64–72.

Ellis, P., Ratcliffe, N. & Suddaby, D. 1998. Seasonal variation in diurnal attendance and response to playback by Leach's Petrels *Oceanodroma leucorhoa* on Gruney, Shetland. *Ibis* 140: 337–339.

Fair Isle Bird Observatory Reports (various editors). 1970–2007. *Fair Isle Bird Observatory Reports*, reports archive. Fair Isle Bird Observatory Trust, Fair Isle, Shetland.

Fowler, J. A. 1982. Leach's Petrels present on Ramna Stacks, Shetland. *Seabird Report* 6: 93.

Fowler, J. A. & Butler, C. J. 1982. A new colony of Leach's Petrels. *Scottish Birds* 12: 86–87.

Gilbert, G., Gibbons, D. W. & Evans, J. 1998. *Bird monitoring methods, a manual of techniques for key UK species*. RSPB, Sandy.

Mainwood, A. R. 1975. Leach's Petrel breeding on Foula. *Scottish Birds* 8: 321–323.

Mitchell. P. I. 2004. Leach's Storm-petrel *Oceanodroma leucorhoa*. In: Mitchell, P. I., Newton, S. F., Ratcliffe, N. & Dunn, T. E. (eds.) *Seabird Populations of Britain and Ireland*: 101–114. Poyser, London.

Money, S. L. 2007 & 2008. *St Kilda Seabird & Marine Ranger's Reports*. Unpublished Reports, Scottish Natural Heritage and The National Trust for Scotland St Kilda reports archive. The National Trust for Scotland, Edinburgh.

Money, S., Söhle, I. & Parsons, M. 2008. A pilot study of the phenology and breeding success of Leach's Storm-petrel *Oceanodroma leucorhoa* on St Kilda, Western Isles. *Seabird* 21: 98–101.

Newson, S. E., Mitchell, P. I., Parsons, M., O'Brien, S. H., Austin, G. E., Benn, S., Black, J., Blackburn, J., Brodie, B., Humphreys, E., Leech, D., Prior, M. & Webster, M. 2008. Population decline of Leach's Storm-petrel *Oceanodroma leucorhoa* within the largest colony in Britain and Ireland. *Seabird* 21: 77–84.

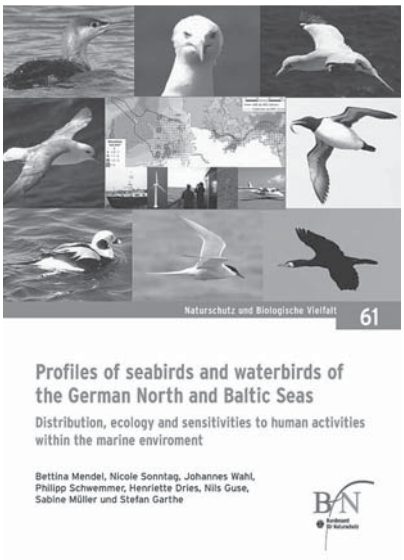
Pennington, M., Osborn, K., Harvey, P., Riddington, R., Okill, D., Ellis, P. & Heubeck, M. 2004. *The Birds of Shetland*. Christopher Helm, London.

Phillips, R. A., Thompson, D. R. & Hamer, K. C. 1999. The impact of skua predation on seabird populations at St Kilda: a bioenergetics model. *Journal of Applied Ecology* 36: 218–232.

Robinson, H. W. 1934. First nesting by Leach's Fork-tailed Petrel in Orkney. *The Scottish Naturalist* 1934: 93.

Votier, S. C., Crane, J. E., Bearhop, S., de León, A., McSorley, C. A., Mínguez, E., Mitchell, P. I., Parsons, M., Phillips, R. A. & Furness, R. W. 2005. Nocturnal foraging by great skuas *Stercorarius skua*: implications for conservation of storm-petrel populations. *Journal of Ornithology* 147: 405–413.

REVIEWS



Profiles of seabirds and waterbirds of the German North and Baltic Seas. Distribution, ecology and sensitivities to human activities within the marine environment By Bettina Mendel, Nicole Sonntag, Johannes Wahl, Philipp Schwemmer, Henriette Dries, Nils Guse, Sabine Müller and Stefan Garthe. Naturschutz und Biologische Vielfalt 61. Bundesamt für Naturschutz, Bonn - Bad Godesberg. 2008. ISBN 978-3-7843-3961-0. 2008 427 pages, numerous maps, figures and tables. Paperback. €30.00. Available from BfN-Schriftenvertrieb im Landwirtschaftsverlag, 48084 Münster, Germany.

This book describes the status, ecology and conservation of the 27 most abundant species of inshore and pelagic seabirds that occur within the German waters of the Baltic and North Seas. It is written in English and divided into five chapters: an introduction; a detailed account of how each species account was compiled; the 27 individual species accounts; a long reference list and finally a glossary and a list of abbreviations. Each of the 27 species accounts includes a section describing their identification, distribution and population,