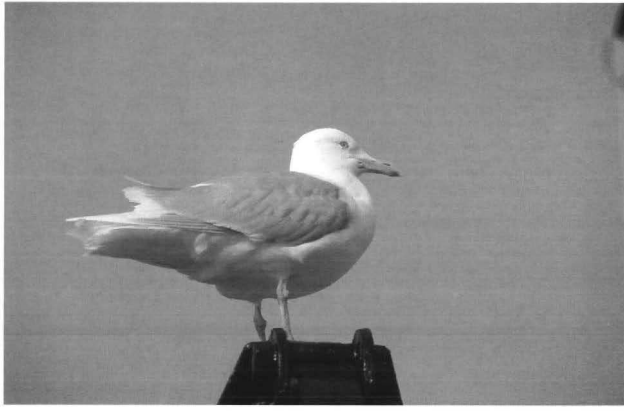
Atlantic Seabirds



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LONGLINE FISHING AT TRISTAN DA CUNHA: IMPACTS ON SEABIRDS

LIJNVISSERIJ BIJ TRISTAN DA CUNHA EN DE GEVOLGEN VOOR ZEEVOGELS

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Tristan da Cunha and Gough Islands in the central South Atlantic Ocean support globally important seabird populations. Two longline fisheries occur within Tristan's Exclusive Economic Zone: a pelagic fishery for tunas and a demersal fishery for bluefish and alfoncino. Fishery observers have accompanied all three licensed demersal cruises. Despite attracting considerable numbers of birds and setting lines during the day, only one bird (a Great Sheawater Puffinus gravis*) was killed (mortality rate 0.001 birds per 1000 hooks). By comparison, the pelagic fishery for tuna, which exceeds demersal fishing effort, probably has a much greater impact. Observations aboard one vessel in mid-winter suggest a bycatch rate of >1 bird killed per 1000 hooks; this could be even higher in summer when more birds are breeding at the islands. Stricter regulations are required for pelagic vessels, including routine placing of observers on board. The gravest threat posed by longline fishing to Tristan's seabirds comes from vessels fishing illegally in Tristan waters, as well as vessels in international waters that do not use basic mitigation measures. There is a pressing need for better policing of Tristan's waters.*

Glass N., Lavarello I., Glass J.P. & Ryan P.G. 2000. Longline fishing at Tristan da Cunha: impacts on seabirds. Atlantic Seabirds 2(2): 49-56.

INTRODUCTION

Longline fishing has been identified as the major cause behind long-term population decreases in several seabird species (e.g. Weimerskirch & Jouventin 1987, Croxall *et al.* 1990, Brothers 1991, Brothers et al. 1999). As a result, the Food and Agriculture Organization (FAO) of the United Nations has requested member nations to produce International Plans of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA-SEABIRDS, FAO 1999). In the first instance this requires that member states assess whether a problem exists with seabird bycatch in their longline fisheries.

Tristan da Cunha (37°S, 12°W) is a United Kingdom Overseas Territory located in the central South Atlantic Ocean, roughly midway between

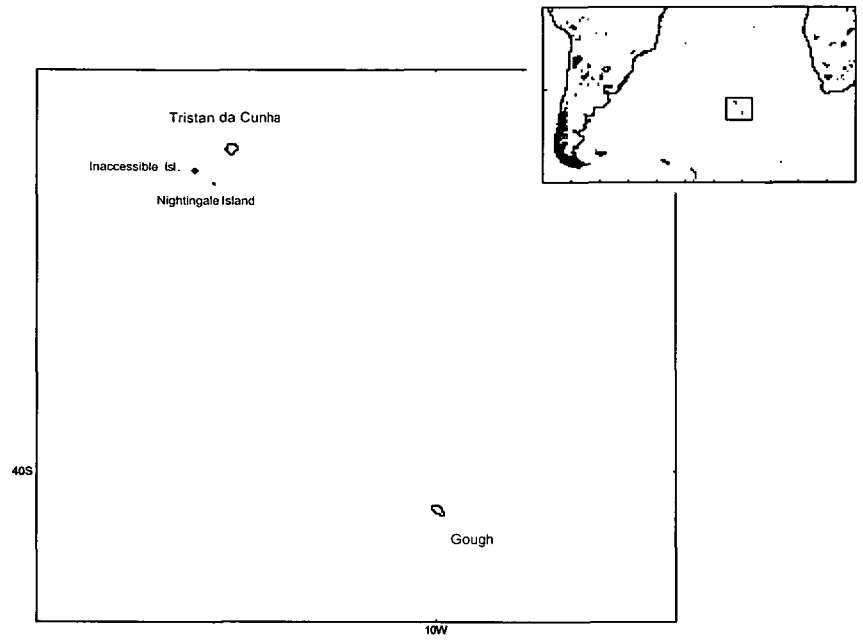

Fig. 1. Tristan da Cunha and Cough Island in the South Atlantic Ocean.
Fig. 1. Tristan da Cunha en Cough Island in de Zuid-Atlantische Oceaan.

South Africa and South America (Fig. 1). The three islands in the Tristan group and Gough Island (40°S, 10°W) all support globally important seabird populations (Richardson 1984). They are the sole breeding locations for Tristan Albatross *Diomedea [exulans] dabbenena*, Atlantic Yellow-nosed Albatross [Mollymawk] *Thalassarche [c.] chlororhynchos*, Spectacled Petrel *Procellaria conspicillata* and Atlantic Petrel *Pterodroma incerta*, and support the majority of the world populations of Northern Rockhopper Penguins *Eudyptes [chrysocome] moseleyi*, Sooty Albatross *Phoebetria fusca* and Great Shearwaters *Puffinus gravis*. The main island of Tristan has a small community of some 300 people who derive most of their income from fishing. The primary fishery is for Tristan Rock Lobster *Jasus tristani* which takes place in the narrow shelf waters surrounding the islands in the Tristan group and at Gough Island (Ryan 1991). This fishery is operated by a single concession holder that has exclusive commercial fishing rights within 50 nautical miles of the islands (Tristan da Cunha Fishery Limits Ordinance 1983, as amended 1991, 1992 & 1997). This fishery has limited impacts on seabird populations, primarily causing some mortality from night-strikes when birds become disoriented by the ships' lights (Ryan 1991).

Prior to 1995, the lobster fishery was the only sanctioned commercial fishery, although unlicensed fishing was known to occur at least occasionally, including the use of drift-nets with adverse effects on seabirds (Ryan & Cooper 1991). Permits to fish in waters 50-200 nautical miles (the outer limit of the Exclusive Economic Zone, EEZ) from the Tristan islands and Gough have been sold annually since 1995. To date, all licensed fishing in these waters has been with longlines, although an application to trawl for demersal and midwater fish on seamounts has been approved. Nothing is known about the interactions of these fisheries with the seabirds that breed on the Tristan islands. This paper summarises the information currently available on longline fishery-seabird interactions at Tristan da Cunha.

METHODS

Tristan's Natural Resources Department administers the sale of permits to fish with longlines in Tristan waters. Most vessels applying for permits in Tristan waters target pelagic fish such as tunas while en route between fishing grounds in the south-west and south-east Atlantic Ocean. Consequently it is difficult to require permit holders to report to Tristan to take aboard fishery observers before commencing fishing. Only one observer from Tristan's Natural Resources Department (NG) has been on a pelagic longliner, and he was returned to Tristan after only two sets, ostensibly because the vessel experienced technical problems. Other than this, there is no record of pelagic fishing effort other than the numbers of permits sold each year.

By comparison, longline vessels targeting demersal and midwater fish visit Tristan's waters specifically to fish on various seamounts within Tristan's 200 nm EEZ. The permit conditions for these vessels require that they call at Tristan and take aboard fishery observers before any fishing can take place. Once the observers are dropped back on Tristan the vessels can no longer fish, and must immediately leave Tristan waters. Observers have inspected fishing operations on all three demersal longline fishing cruises to Tristan waters since 1995. They observed all hauls and recorded the numbers of seabirds killed. On the most recent cruise in November 1999, NG and IL also estimated the numbers of seabirds attending the vessel during shooting and hauling operations. Because hauling and shooting often took place in quick succession it was not feasible to separate the birds attending the different fishing activities.

RESULTS

Longline fisheries in Tristan waters target both pelagic (e.g. tunas *Thunnus* spp.) and demersal or midwater fish species (e.g. alfoncino *Beryx splendens* and Antarctic bluefish *Hyperoglyphe antarctica*). In the five years 1995-99, 21

Table 1. Numbers of longline permits sold for Tristan waters, the nationality of the operating company, and the type of fishing activity.
Tabel 1. Aantal uitgegeven vergunningen voor lijnvisserij bij Tristan da Cunha naar nationaliteit en type visvangst (pelagisch of demersaal).

Year	Pelagic (tuna)		Demersal/midwater	Total
	Japan	Portugal	South Africa	
1995	6			6
1996	4		1*	5
1997	3	1		4
1998	1	1	1*	3
1999	2		1	3
Total	16	2	3	21

* ship registered in Argentina, but operated by a South African company

longline permits have been issued (Table 1). All but three (86%) have been for pelagic longlining, with most being to Japanese tuna vessels. The numbers of permits sold each year has halved since the system was initiated in 1995, with the number of pelagic permits sold falling to one third the number originally sold (Table 1).

Pelagic fishery The only observer data for the pelagic fishery are for a Japanese vessel in mid-winter (29 July to 1 August 2000). Only two sets were observed. Each involved some 3000 hooks and setting took almost 6 hours to complete. The first set took place during the day (07:20-12:55h) and attracted 10-12 Black-browed Albatrosses [Mollymawks] *Thalassarche melanophris* and 15-25 Great Shearwaters *Puffinus gravis*. The second commenced in the early morning (02:45h) and was completed approximately 1.5 hours after dawn (08:05h), by which time 2-5 Black-browed Albatrosses and 6-8 Great Shearwaters were in attendance. No bird scaring line was used for either set. The observer was able to watch only *c.* 60% of each haul, and crew members rapidly discarded birds caught. However, at least 4 Black-browed Albatrosses were caught on the first set; none was seen on the second set. All four birds were sodden, and thus apparently were caught during setting. This represents a mortality rate of 1.5 birds per 1000 hooks set (based on the numbers of hooks actually observed during the haul).

Demersal fishery The three demersal longline cruises set 693 700 hooks (Table 2). Due to the exploratory nature of the cruises, hook loss was relatively high (13.5% overall), but decreased with each cruise. Although not a permit requirement, bird scaring lines were deployed during all sets. Daylight setting was permitted on the understanding that it would be prohibited should bird

Table 2. Details of all three demersal longline fishing cruises in Tristan waters with fishery observers on board.
Tabel 2. Waarnemingen aan boord van lijnvissers bij Tristan da Cunha: aantal uitgezette en verspeelde haken en de waarnemers aan boord.

Fishing dates	Hooks set	Hooks lost	Observers
24 Dec. 1997 to 1 Feb. 1998	323 400	50 000	J. Glass
20 Feb. to 19 Mar. 1998	220 300	30 900	I. Lavarello
5 to 23 Nov. 1999	150 000	12 750	N. Glass & I. Lavarello
Total	693 700	93 650	

Table 3. Numbers of hooks set during November 1999 in relation to the time of day when setting took place.
Tabel 3. Aantal uitgezette haken in november 1999 en de tijd van de dag.

Time of day	Number of hooks	%
Dawn *zonsopkomst*	6 000	4.0
Day *overdag*	87 000	58.0
Dusk *zonsondergang*	10 000	6.7
Night *'s nachts*	47 000	31.3
Total	150 000	

bycatch become significant. During the November 1999 cruise, more than two thirds of the 150 000 hooks were set during daylight, or at dawn and dusk (Table 3). An average of 273 seabirds from six species attended the vessel during fishing operations (Table 4). The most abundant species was the Great Shearwater, but there were substantial numbers of both Tristan Albatross and Atlantic Yellow-nosed Albatross (Table 4). Despite the reasonably large numbers of birds attending fishing operations, only one bird was reported killed: a single Great Shearwater. This gives a bycatch rate of only 0.007 birds per 1000 hooks. No birds were reported killed on the other two cruises, giving a combined bycatch rate for the demersal fishery of only 0.001 birds/1000 hooks.

Cetaceans often also are attracted to longline vessels, and can cause significant losses by eating fish as the line is hauled. This can lead to friction between fishers and cetaceans. Long-finned Pilot Whales *Globicephala melas* and Dusky Dolphins *Lagenorhynchus obscurus* were observed during the November 1999 demersal cruise, but the only cetacean that appeared to be attracted by the fishery was a single beaked whale (possibly Shepherd's Beaked Whale *Tasmacetus shepherdi*). This individual stayed with the vessel for approximately two hours on 8 November 1999 while the line was being hauled. It was not possible to tell whether it removed fish from the line.

Table 4. Numbers of seabirds attending demersal longline sets and hauls during November 1999 in Tristan waters (n = 8 counts).
Tabel 4. Aantallen zeevogels aangetrokken door lijnvissers in november 1999 in de omgeving van Tristan da Cunha (n= 8 tellingen).

Species	Mean	SD	range
Great Shearwater	202.5	207.0	30-600
Tristan Albatross	22.6	18.5	3-50
Yellow-nosed Albatross	22.6	13.5	5-45
Giant petrels *Macronectes* spp.	10.9	10.4	0-30
Sooty Albatross	8.3	12.9	0-40
Subantarctic Skua *Catharacta antartica*	6.6	4.9	0-15
All species	273.4	267.2	38-780

DISCUSSION

The seabird bycatch rate in the small demersal longline fishery off Tristan is exceptionally low, and suggests little cause for concern. The fact that licensed longline fishing is only permitted at least 50 nautical miles from the breeding island probably contributes to the small numbers of birds killed, because seabird bycatch in the Patagonian Toothfish *Dissostichus eleginoides* fishery around the sub-Antarctic Prince Edward Islands decreases markedly with increasing distance from the islands (Ryan & Purves 1998; Ryan & Watkins 1999).

By comparison, the limited bycatch data for the more extensive pelagic longline fishery suggests that this fishery poses a significant threat to seabirds in Tristan waters. Other pelagic fisheries in the Southern Hemisphere have high bycatch rates (>1 bird per 1000 hooks set), and albatrosses in particular are more prone to being killed (e.g. Brothers 1991; Ryan & Boix-Hinzen 1998; Brothers *et al.* 1999; Neves *et al.* 2000; Olmos *et al.* 2000). Seabird bycatch rates by pelagic longline vessels operating in Tristan waters are likely to even higher in summer, when more seabirds are present around the islands. We recommend that permit holders should be encouraged wherever possible to apply mitigation measures to reduce seabird bycatch. Such measures include:

- Setting lines only at night (defined as nautical dusk-dawn).
- Using an effective bird-scaring line during all sets.
- Ensuring that the line sinks quickly through sufficient weighting and slow setting speed (demersal fisheries) and through using thawed bait with punctured swim bladders (pelagic fisheries).
- Limiting the amount of offal discarded, and only dumping offal on the side away from the hauling station (to avoid birds scavenging at the offal chute being entangled).

Making these measures mandatory may be counter-productive, however, because vessels without observers might be tempted to modify their logbooks to show that lines were set only during the night, and thus affect fishery statistics (e.g. altered soak times would bias estimates of catch per unit effort).

The dilemma facing Tristan's Natural Resources Department is to promote seabird-friendly fishing without encouraging licensed fishers to join the ranks of unlicensed fishers. 'Pirate' fishing vessels are sighted regularly, but the island's fishery patrol vessel lacks the ability to force vessels to stop for inspection. The decrease in the numbers of pelagic longline permits sold since 1995 (Table 1) probably reflects the low chance of being caught fishing without a permit rather than a decrease in the desire to fish in Tristan waters. More effective policing of Tristan's waters by UK naval vessels is essential to limit the numbers of unlicensed vessels fishing. This will not only increase revenues to the island from permit fees, but also allow better management of the fish and seabird resources. A recent observation from Gough Island gives an indication of the possible impact of unlicensed longline vessels on seabirds. Nick du Plessis, Captain of the *Kelso*, one of the ships used in the lobster fishery, reported ten Tristan Albatrosses floating dead off Gough in February 2000. At the time, Spanish conversations were heard on short-range (VHF) radio channels, suggesting that longline vessels were fishing illegally inside the island's EEZ. The Tristan Albatross only breeds at Gough and Inaccessible Island, and is considered Endangered (Croxall & Gales 1998).

The importance of Tristan's seabird colonies emphasises the need to incorporate Tristan da Cunha in the United Kingdom's National Plan of Action for reducing incidental catch of seabirds in longline fisheries. Many of the seabirds breeding at Tristan and Gough forage well outside the 200 nautical mile EEZ, however, and we know that large numbers of birds are killed by longlining throughout the South Atlantic (Cooper 1994; Ryan & Boix-Hinzen 1998; Neves *et al.* 2000; Olmos *et al.* 2000). Effective long term conservation of Tristan's seabirds requires that these fisheries also significantly reduce their seabird bycatch.

ACKNOWLEDGEMENTS

We thank the officers and crews of vessels that carried Tristan fishery observers for their co-operation. John Cooper provided useful comments on this manuscript. PGR thanks the University of Cape for sabbatical leave that allowed him to visit Tristan in 1999-2000; financial support was received from the World Wide Fund for Nature, UK.

SAMENVATTING

Tot de grootste bedreigingen voor zeevogels behoort de bijvangst in de lijnenvisserij ('long-line fishery'). De duizenden met aas haken aan elk van de uitgezette lijnen oefenen een onweerstaanbare aantrekkingskracht op albatrossen en stormvogels uit. Per ongeluk aangehaakte vogels sterven de verdrinkingsdood. Rond Tristan da Cunha en Cough Eiland, zeer geïsoleerde eilandjes met interna-

tionaal belangrijke populaties broedvogels vind, zowel een gereguleerde visserij (met vergunning) als piratenvisserij plaats. Hier worden de bevindingen van waarnemers aan boord van toegestane vissersvaartuigen beschreven. Twee soorten visserij werden onderzocht: een meer op de bodemfauna gerichte demersale visserij en de tonijnenvangst (pelagische visserij). De eerste bevindingen wijzen uit dat de demersale visserij bij de huidige praktijk weinig bijvangstrisico's met zich meebrengt, maar in de tonijnenvisserij zou aanzienlijk zorgvuldiger gewerkt kunnen worden. Tevens wordt gerapporteerd over wat de waarschijnlijke gevolgen van een illegaal vissende Spaanse visser moeten zijn geweest: tenminste 10 kadavers van zojuist verdronken. endemische Tristan (Reuzen-) Albatrossen Diomedea [exulans] dabbenena.

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AGE ASYMMETRIES IN THE AERIAL DISPLAY OF LITTLE GULLS *LARUS MINUTUS*

LEEFTIJDSVERSCHILLEN IN DE LUCHTBALTS VAN DWERGMEEUWEN LARUS MINUTUS

THEUNIS PIERSMA

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Aspects of age differences in the aerial display of Little Gulls Larus minutus *are described based on fieldwork carried out in May 1983 in the Lauwersmeer area, The Netherlands. Aerial displays occur when an initiator or 'sender' approaches a 'receiving' individual. The sender initially makes (individually identifiable)* kay *notes, followed by several* ke-kèh *repeats. Once the sender has approached the receiver to within a few meters, it increases flight speed, jerks up the head to almost a vertical position whilst starting to call a repeated* ke-kôo. *The head-up part of the display is rounded off with a short glide over the receiver, but often the display is aborted somewhere along the sequence. This is especially the case when immatures are the initiators. Immatures seem particularly keen to exercise the display, and when doing so preferentially act towards adults. During display flights between adults, receivers tended to respond with their own display flights. However, in aerial interactions initiated by immatures the receivers tended to either flee or to retaliate by attack. I suggest that the aerial display presents a compound quality signal (possibly derived from aerial mosquito-catching movements), that requires much physical and social practising, even during the immature stages of life.*

Piersma T. 2000. Age asymmetries in the aerial display of Little Gulls *Larus minutus*. Atlantic Seabirds 2(2): 57-67.

INTRODUCTION

Little Gulls *Larus minutus* are amazingly attractive little gulls. Whether on the hunt for flying insects above the marshes and the lakes, or interacting with each other in the air near their cryptic colonies, their elegance, the pink shine of their breeding dress, and the clear and almost song-like calls, are a pleasure to the human senses. I shared the breeding season of 1983 with Little Gulls, whilst working on an undergraduate project with Jan Veen, then of the Ethology-group of Professor Gerard Baerends at the University of Groningen. We studied several aspects of the communication of the gulls (see Veen & Piersma 1986, Piersma & Veen 1988), and also the gulls' aerial display (unpublished).

More than 15 years later, much of the data collected on the Little Gulls, which themselves have disappeared from the study areas in Lauwersmeer since

then (Koks 1998), remain hidden on old video and computer tapes and, in partially analysed form, in dark boxes. Having realised how preciously little new information on this species has seen the light of day since the 1980's (e.g. Burger & Gochfeld 1996), I have assembled my observations on the aerial display of Little Gulls, and discuss the striking age differences in behaviour.

STUDY AREA AND METHODS

The study was carried out in the central parts of Lauwersmeer, an estuary of the Wadden Sea that became embanked and that was turned into a freshwater wetland in 1969. On some of the former tidal flats, in areas with short grassy vegetation, small colonies of Little Gulls got established for the first time in 1972, often in the vicinity of much larger colonies of Black-headed Gulls *Larus ridibundus* (Veen 1980; Koks 1998). Observations on aerial display were carried out from 18 to 31 May 1983. The areas of observation consisted of mosaics of shallow water, reedbed and rough pasture. The areas where Little Gulls showed intense aerial display were often quite close to small colonies that became established in the latter half of May.

Observations were either carried out by a single observer, or simultaneously by two observers, in which case one spoke a running commentary in a cassette-recorder whereas the other recorded the sounds made by the Little Gulls by a Sennheiser directional microphone (MKH 405) on Uher tape-recorder. Single observer observations yielded information on group sizes, frequencies of aerial display, and the sorts of interactions going on in the air, whereas the observations made by pairs of observers made it possible to link up sounds and visual features of the behaviour. In all cases we tried to document: the age of the approaching (the 'sender') and the approached individual (the 'receiver'), the total number of birds in flocks in which the aerial display was recorded, the type of sounds and the movements that were made (see next paragraphs), and the minimal distance between the approaching and the approached individual. In a few cases we managed to get complete counts of the total number of adults and immatures in the general area of a few hectares over which the aerial displays were recorded for a certain length of time.

Immature birds (birds in their second calendar year) and adults (birds in their third calendar year and more) are easy to tell apart, especially in the air, as the former have dark zigzag markings on their back and upper wings, as well as a dark band at the end of an otherwise white tail, features that are absent in adults (see Fig. 1, based on Veen 1980). The head of immatures is usually not as dark as it is in adults, and they lack the pinkly shine of the white contour feathers characteristic of sexually mature individuals during the mating season (Cramp & Simmons 1983). Whereas the adults tended to arrive in Lauwersmeer

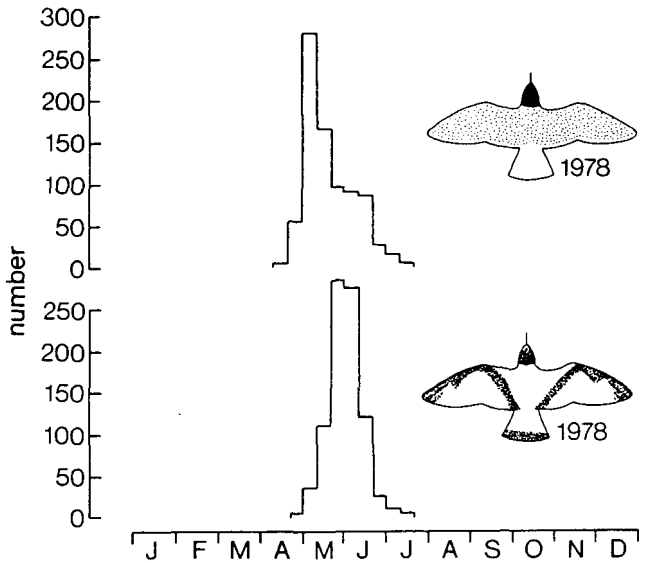

Figure 1. Maximum number of adult (top) and immature (bottom) Little Gulls recorded per 10-day period in Lauwermeer in 1978 (modified from Veen 1980).
Figuur 1. Maximale aantallen in het Lauwermeer waargenomen oude (bovenste paneel) en jonge (onderste paneel) Dwergmeeuwen per decade in 1978 (veranderd uit Veen 1980).

in early May (Fig. 1), the majority of immatures only arrived in the course of that month. Even though the immatures actively participate in the aerial display that we recorded in May 1983, they have not been found to breed at this age (Veen 1980).

All detailed recordings were examined on a Uniscan 4500 Spectrum analyser (range 0-10 000 Hz), which shows frequency/time and frequency/amplitude sound spectrograms on a monitor. Hardy copy sonographs were produced on a Kay SonaGraph model 6061B, using a wide band (300 Hz) filter setting (see Veen 1985).

A DESCRIPTION OF THE AERIAL SONG AND DISPLAY

The general outline of an aerial display sequence, or 'ceremony' is as follows (see also Cramp & Simmons 1983). An initiator approaches another individual

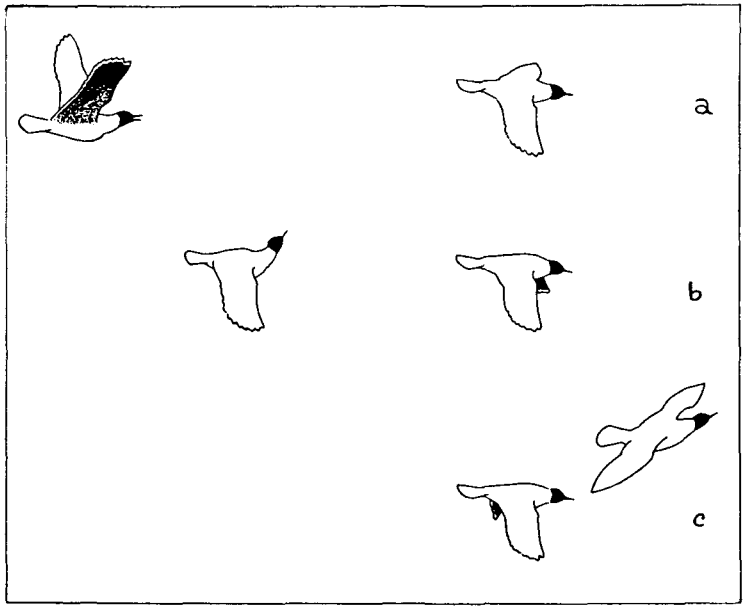

Figure 2. Scheme of a complete aerial display ceremony by two adult Little Gulls: (a) the far-range approach, the approaching bird calling kay *and a repeated* ke-kèh, *(b) the close approach, the approaching bird changing from a repeated* ke-kèh *in a repeated* ke-kôo *when it turns the head up, and (c) final episode of the complete interaction as the approaching bird passes the approached individual very closely with a slightly upturned head keeping its wings still for a few seconds and being silent. After drawings by Jan Veen; see also Cramp & Simmons (1983:p. 735).*

Figuur 2. Schema van een volledige luchtbalts-ceremonie van twee volwassen Dwergmeeuwen, waarbij in (a) een Dwergmeeuw al kay *en* ke-kèh *roepend een soortgenoot nadert, en (b) dichtbij gekomen z'n kop omhoog gooit en van een herhaald* ke-kèh *overgaat in een herhaald* ke-kôo, *en dan (c) zonder geluid, met iets opgeheven kop en vleugels die een paar seconden stijf gehouden worden in een soort zweefvluchtje over de benaderde vogel heen vliegt. De tekeningen zijn gemaakt door Jan Veen, en in iets andere vorm eerder gepubliceerd door Cramp & Simmons (1983:p. 735).*

from quite afar (Fig. 2a), initially making *kay* sounds (Fig. 3, and see discussion of notes below) and then calling a repeated *ke-kèh*. Upon close approach (a few meters), the approaching bird changes sound from a repeated *ke-kèh* towards a repeated *ke-kôo*. As it changes to *ke-kôo* it turns the head up and accelerates its speed with stiff and rapid wing beats (Fig. 2b). In a complete sequence this is immediately followed by the approaching bird passing closely ('gliding') over the receiving individual, the silent sender keeping its wings still for a few seconds with the head still turned up (Fig. 2c). The complete sequence of calls, as well as the upward thrust of the head when starting to call the repeated *ke-kôo*, is similar to the display behaviour on the ground, the sequence of notes being called the 'long call' (Cramp & Simmons 1983; Veen 1985). The receiver can respond to a display ceremony accompanied by ignoring, accepting or actively resisting the display, as will be detailed below.

The notes made during aerial display as part of the long call thus consist of the following notes (Fig. 3; naming following Veen 1985): (1) the short *ke* (as in the Spanish question *¿Que?*), (2) the similarly sounding but slightly longer *kèh*, (3) the *kay*-note (as in the English word 'gay') that, on the basis of the large interindividual variation and results of playback-experiments (Veen 1985), is thought to convey individual identity, (4) the longer wailing sound *kôo* (as in the English word 'claw'), and (5) the *kwèh* note that on the sonograph look like a hybrid between *kay* and *kôo* notes, but sounds more like an intermediate between *kèh* and *kôo* notes.

The sequence of the notes in long calls of immature and adult Little Gulls during aerial display, even upon visual inspection (Fig. 4), shows clear patterning. *Kay*'s come first, and are often followed by one or sometimes two *kwèh* 's, before being followed by repeated *ke-kèh* and/or *ke-kôo* series. An analysis of transition probabilities supports this brief poetic description in statistical terms. Furthermore, it is apparent that long calls of adults contain more *kay*-notes than those of immatures, and that the *ke-kèh* series of immatures tend to be longer than those of adults, and the *ke-kôo* series shorter. A big difference between the aerial displays with and without *ke-kôo* series relates to the nearest approaching distance between sender and receiver (Fig. 6 in Veen 1985). In aerial displays/long calls with *ke-kôo* the nearest approaching distances are much shorter (mainly 1-2 m) than those without *ke-kôo* (5-50 m). In a detailed study on the long calls of Little Gulls, including those made on the ground and on or near the nest, Veen (1985) suggested that *ke-kèh* notes signal the intention of the sender to approach, whereas *ke-kôo* indicates the intention to approach peacefully at very close range.

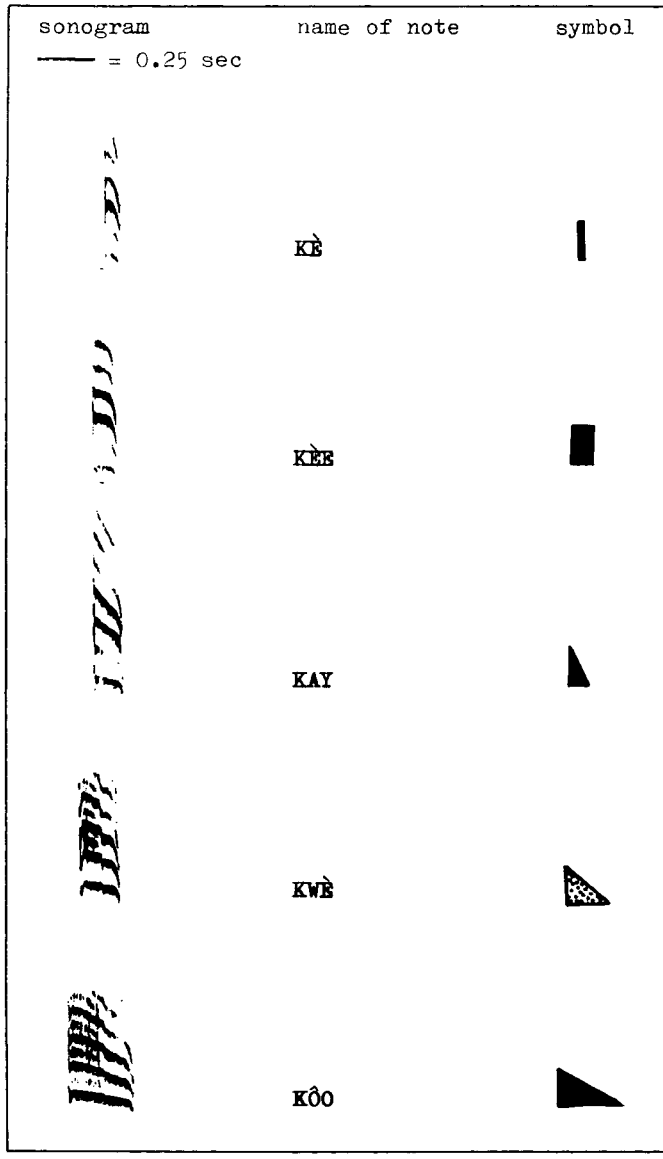
sonogram
name of note
symbol
—— = 0.25 sec
KÈ
KÈÈ
KAY
KWÈ
KÔO

Figure 3. Sonograms, names en symbols for the different notes utterd by Little Gulls during aerial display. The sonograms give the sound intensities in the 5 kHz range (see Cramp & Simmons 1983:p. 737 and Veen 1985:p.66 for comparison). The symbols on the right are the ones used to present full sequences in Fig. 4.

Figuur 3. Sonogrammen, namen en symbolen voor de noten die Dwergmeeuwen tijdens de luchtbalts gebruiken. De sonogrammen geven veranderingen in geluidintensiteit weer over een variatiebreedte van 5 kiloHertz (bekijk ter vergelijking eventueel ook Cramp & Simmons 1983:p. 737 en Veen 1985:p.66). De grafische symbolen die in de rechter kolom staan worden gebruikt om in Fig. 4 de volledige roepen weer te geven.

←

DIFFERENTIAL PARTICIPATION OF THE AGE CLASSES

More important than the composition in terms of different notes of the long calls of immature and adult Little Gulls, was the relative intensity with which the different age categories approached each other in the air with intense display (i.e. long calls' including *ke-kôo*). A few times I scored the occurrence of such display as they were initiated by immatures and adults and directed at each other (Table 1). In all three cases the occurrence of displays among interaction-categories was significantly different from the predictions based on the numerical presence of the two age classes. Immatures were much more likely to direct aerial displays to adults than to immatures, and almost all displays by adults were directed towards adults; there was only one exception where an adult approached an immature. Thus, adults are the preferred receivers, both when adult birds and when immature birds initiate the aerial interaction.

Another important difference in the occurrence of aerial displays of immatures and adults concerns the sizes of the groups in which the displays are carried out. Interactions involving adult senders consist of groups sizes of two (i.e. a pair) in 90% of the cases (n = 136). Interactions with immature senders consist of pairs in only 35% of the cases (n = 196), displays sometimes taking place in groups as large as 10 birds.

ASYMMETRIC INTERACTIONS IN THE AIR

When a Little Gull in flight finds itself approached at close range by a displaying conspecific that has its head up, calls *ke-kôo* a few times, and soars for a few seconds, it can accept the approach and respond 'in gratitude' by answering the display with a display flight of its own directed at the original sender (either or not including the vertical head and *ke-kôo* notes). However, it can also 'actively resist' the approach by evading the sender by fast flight or by quickly turning away, and it can even retaliate by an attack on the sender. Of course, a receiver can also simply fly on, and behave as if nothing has happened.

Table 1. Comparison of the occurrence of aerial displays containing ke-kôo *notes (and the vertical head posture accompanying these notes) between immature (Imm) and adult (Ad) Little Gulls in relation to the prediction of the frequencies of their occurrence based on relative numbers of both age categories at the time of observation. In the expected/observed columns the age category mentioned first is the 'sender', the age category mentioned second the 'receiver'. The Chi-square (χ^2) values (df = 3) are all very significantly different from zero ($P < 0.001$).*

Tabel 1. Het voorkomen van baltsvluchten met ke-kôo*'s (inclusief de verticale kopstand) tussen jonge (Imm) en oude (Ad) Dwergmeeuwen in verhouding tot de verwachte aantallen op grond van de relatieve aantallen aanwezige oude en jonge vogels. Bij het berekenen van de verwachtingswaarden werd ervan uit gegaan dat de kans dat bijvoorbeeld een volwassen vogel een jonge benadert met een baltsvlucht (Ad - Imm) even groot is als het omgekeerde (Imm - Ad). De toetsingrootheid χ^2 is steeds significant groter dan nul (P-waarden kleiner dan 0.001).*

Date	Time of day	Imm. present	Adults present	Numbers Expected/**observed**				χ^2
				Imm-Imm	Imm-Ad	Ad-Imm	Ad-Ad	
21 May	14.00-16.00	65	15	61/**21**	14/**50**	14/**0**	3/**21**	241
29 May	17.00-18.00	100	15	82/**15**	12/**79**	12/**1**	2/**13**	499
31 May	18.00-18.20	50	10	17/**2**	4/**21**	4/**0**	1/**3**	93

The way in which the Little Gulls tended to respond depended strongly on the age of the sender (Table 2). Immatures approaching an adult with aerial display were usually treated by avoidance or by attack, and the situation was not much different when the receiver was an immature. In contrast, the adults that were observed during aerial interactions accepted each other's display flights in the majority of cases.

DISCUSSION

The long calls of Little Gulls, whether made in ground or aerial display, are nice compound signals (Veen 1985). The first notes, the *kay*'s, reveal the identity of the sender, the *ke-kèh* series indicate the intention to approach from afar, whereas the vertical head accompanied with *ke-kôo* notes indicates the additional willingness to come in close and friendly contact. The longer *ke-kèh* series of immatures may thus be interpreted as their failure to establish close enough contact to continue with the *ke-kôo* part of the long call. Aerial display occurs predominantly in the early part of the breeding season, and is obviously related to the establishment and maintenance of pair bonds. That aerial display and long calls fulfil the latter role is suggested by the observation that once the birds are incubating, such display only occurs after serious disturbances of the small colonies. It was as if the birds wanted to appease each other on such

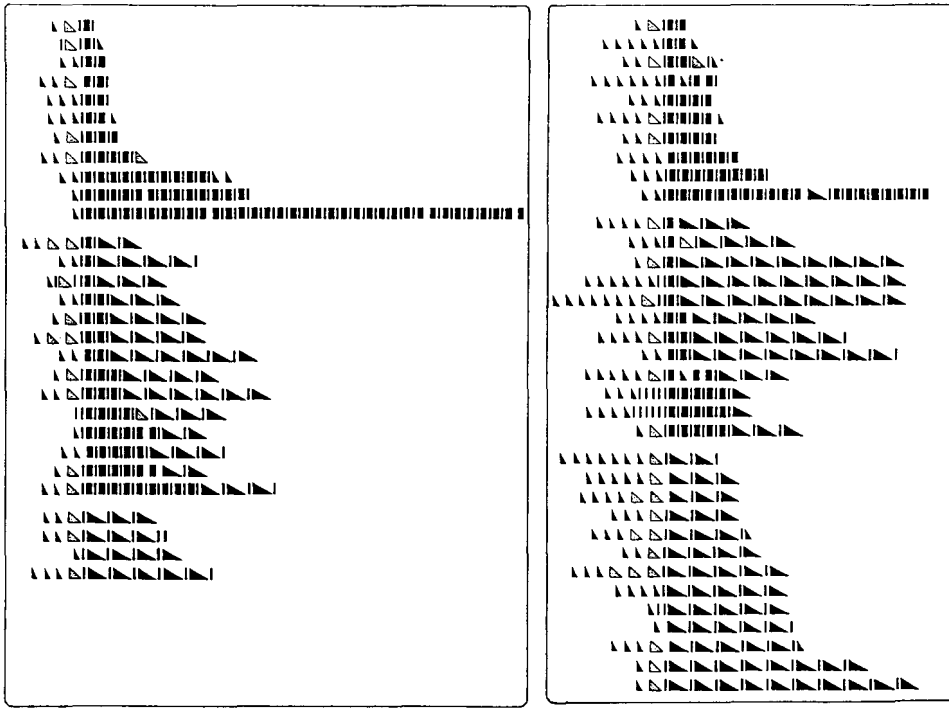

Figure 4. Composition and sequences of complete 'long calls' during aerial display of immature (left) and adult (right) Little Gulls in Lauwersmeer in May 1983. These observations are based on complete sonographic analyses, backed up by running comments.

Figuur 4. Samenstelling van de volledige roepen (de zogenaamde 'long calls') tijdens luchtbalts van jonge (links) en volwassen (rechts) Dwergmeeuwen in het Lauwersmeer in mei 1983, gebaseerd op nauwkeurige sonografische analyses.

Table 2. Response on the part of the receivers of approaches with aerial displays containing ke-kôo *notes (and the vertical head posture accompanying these notes) by senders of different age.*

Tabel 2. De manier waarop baltsvluchtjes met ke-kôo*'s (inclusief de verticale kopstand) werden beantwoord door de ontvanger ('receiver') als functie van de leeftijd van de initiator ('sender').*

Age of		Displays	Reaction of receiver		
sender	receiver	(*n*)	Acceptance	Refusal	No reaction
Immature	Immature	27	11%	71%	18%
Immature	Adult	156	3%	86%	11%
Adult	Adult	70	74%	10%	16%

occasions, even though the lack of individual marking did not allow us to establish whom was directing its aerial display at whom.

The apparent urge with which immatures in pre-breeding flocks try to direct aerial display at adults and fellow immatures is striking. Are they exercising a practice that is very important to them, perhaps later in life? Are they 'testing the waters' by performing at unwilling adults, learning the details of differential responses? Nuptial displays such as the aerial performances of Little Gulls are commonly interpreted as 'quality indicators' nowadays (Gould & Gould 1996; Zahavi & Zahavi 1997). Could it be possible that flying fast with a head up *and* calling at the same time, rounding this off with an elegant glide, is a difficult game, one that needs much practise as well as stamina? Does this particular display reflect the sender's capability to perform fast mosquito-snapping movements, often with the head up? Is the last part of the aerial display (vertical head and *ke-kôo*) a kind of ritualised feeding sequence that honestly reflects aspects of health, vigour and 'quality' of these small insectivorous gulls?

ACKNOWLEDGEMENTS

I dedicate this paper to Jan Veen, my inspiring mentor in ethology with whom I spent the field season of 1983, in the hope that reduced managerial responsibilities will allow him to re-open his true treasure-trove of observations on communication in gulls, and share them with the world. I thank Kees Camphuysen for giving me an incentive to write this note, and for editing a draft.

SAMENVATTING

Dwergmeeuwen Larus minutus *onderscheiden zich van de grotere meeuwen door een tamelijk melodieuze en elegante luchtbalts. Op grond van in mei 1983 verzameldE waarnemingen in het centrale gedeelte van het Lauwersmeergebied, wordt een algemene beschrijving van deze luchtbalts gegeven, en worden enkele nieuwe aspecten beschreven met betrekking tot verschillen in luchtbalts tussen jonge en oude vogels. De luchtbalts bestaat uit een geritualiseerd 'vluchtje' waarbij een*

aantal verschillende en uitermate goed herkenbare geluiden worden gemaakt. Een vogel (de 'zender') nadert een andere (de 'ontvanger'), en roept in eerste instantie een aantal keren kay *(deze noten zijn waarschijnlijk karakteristiek voor individuen, en dus voor andere Dwergmeeuwen herkenbaar), en vervolgens een aantal keren* ke-kèh. *Als de zender de ontvanger tot op een paar meter is genaderd trekt ie z'n kop omhoog, gaat met een stijve snelle vleugelslag wat sneller vliegen terwijl* ke-kèh *overgaat in* ke-kôo. *Daarna volgt zonder geluid een glijvluchtje zo dicht mogelijk over of langs de ontvanger. Deze ontvanger kan zo'n baltsvlucht beantwoorden met een eigen baltsvlucht; dat zie je vooral tussen volwassen vogels. Als een jonge vogel probeert een baltsvlucht uit te voeren, wordt dat erg vaak beantwoord met een aanval; haast nooit wordt zo'n vluchtje 'geaccepteerd'. Regelmatig moet een baltsvluchtje worden afgebroken. Niettemin proberen jonge vogels wel steeds te baltsen; als het even kan, gericht op volwassen vogels die er dus geen boodschap aan hebben. Mogelijk fungeert de luchtbalts als een kwaliteitssignaal dat een rol speelt bij de vorming en het 'onderhoud' van de paarband en dat is ontstaan uit de jacht op vliegjes in de lucht (waarbij tijdens de vlucht de kop ook omhoog wordt bewogen). Jonge vogels moeten kennelijk goed oefenen om één of meer jaren later een partner te kunnen veroveren.*

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THE FEATHER LICE OF THE LEVANTINE SHEARWATER *PUFFINUS YELKOUAN* AND ITS TAXONOMIC STATUS

VEERLUIZEN VAN DE YELKOUANPIJLSTORMVOGEL PUFFINUS YELKOUAN EN DE TAXONOMISCHE STATUS DAARVAN

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Four species of feather lice (Insecta: Phthiraptera) *were found on one fresh dead and five museum skins of Levantine Shearwaters* Puffinus yelkouan *from various localities in the Mediterranean. Two of them,* Halipeurus diversus *(Kellogg, 1896) and* Saemundssonia (Puffinoecus) kosswigi *Timmermann, 1962 (unique to* P. yelkouan*), had been recorded previously from this host; the other two,* Austromenopon paululum *(Kellogg & Chapman, 1899) and* A. echinatum *Edwards, 1960, represent new host-louse records. One bird collected fresh in Cyprus yielded the most lice, including 20 specimens of* A. echinatum. *The taxonomic position of the Levantine Shearwater is discussed briefly and the opinion that it be regarded as a distinct species is supported.*

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INTRODUCTION

Two species of feather lice (Insecta: Phthiraptera) have been recorded from *Puffinus* shearwaters in the Mediterranean. The Levantine Shearwater *Puffinus yelkouan* is host to *Halipeurus diversus* (Kellogg, 1896) and a unique louse, *Saemundssonia (Puffinoecus) kosswigi* Timmermann, 1962 (on the status of *Puffinoecus*, see Palma 1994). Palma *et al.* (1997) recorded only a single species of feather louse (*H. diversus*) on 19 systematically deloused specimens of Balearic Shearwater *Puffinus mauretanicus* Lowe, 1821 from the Balearic archipelago. Those records contrast with eight louse species collected by Fowler & Shaw (1990) from the Manx Shearwater *Puffinus puffinus* Brünnich, 1764 from 230 birds systematically deloused in Wales. These included an unidentified species of *Saemundssonia.* Compared with the other two shearwaters, there have been no collections of lice made systematically from *P. yelkouan.*

The phylogenetic relationships and the taxonomic status of these three closely related shearwaters from the North Atlantic Ocean and the

Table 1. Feather lice from a Levantine Shearwater collected in Cyprus.
Tabel 1. Veerluizen van een op Cyprus verzamelde Yelkouanpijlstormvogel.

	Males man	Females vrouw	Nymphs pop
Austromenopon echinatum	3	12	5
Halipeurus diversus	12	34	20
Saemundssonia (P.) kosswigi	2	1	0

Table 2. Feather lice from the Levantine Shearwater collected from five museum skins.
Tabel 2. Veerluizen van vijf museumexemplaren van de Yelkouanpijlstormvogel.

	Males man	Females vrouw	Nymphs pop
Austromenopon paululum	1	0	0
Halipeurus diversus	13	12	5
Saemundssonia (P.) kosswigi	2	2	3

Mediterranean Sea have been a matter of controversy for many years (Bourne *et al.* 1988; Walker *et al.* 1990). Although originally described as a full species, the Levantine Shearwater has been variously regarded as a subspecies, either as *P. p. yelkouan* (see Jouanin & Mougin 1979) or as *P. yelkouan yelkouan* (see Bourne *et al.* 1988). Knowledge of its ectoparasites, especially feather lice, may help to elucidate its true relationships. In this paper we report on the lice found on a fresh corpse of *P. yelkouan* collected recently in Cyprus, and from five other birds preserved as skins in museum collections.

METHODS AND MATERIALS

On 14 July 1996, A. Kelly picked up a fresh dead *P. yelkouan* from the roadside near Çatalky, northern Cyprus. The bird appeared to have been struck by a car on an open road some distance inland. The specimen, an emaciated juvenile male, was preserved frozen and taken to Glasgow where it was skinned and systematically deloused. Five skins of *P. yelkouan* from the collection of the Royal Museum of Scotland, Edinburgh, were also deloused. All lice were slide-mounted and identified, and have been deposited in the collection of the Museum of New Zealand, Wellington, New Zealand.

RESULTS

Four species of feather lice were collected from the six *P. yelkouan* individuals. The names and numbers of these are shown in Table 1 (fresh dead) and Table 2 (museum study skins).

DISCUSSION

P. yelkouan breeds on several islets in the Mediterranean Sea from France to Yugoslavia (Jouanin & Mougin 1979). It has not been recorded breeding in Cyprus (Sultana 1993) but has been collected dead on beaches there (a juvenile male found in Akrotiri on 26 August 1969 is in the collection of the Royal Museum of Scotland, Edinburgh) and is regularly seen offshore.

The first records of lice from *P. yelkouan* were published by Balát (1958); they were "*Halipeurus hanáki* n. sp." (now a junior synonym of *H. diversus*) and "*Saemundssonia* sp." (now *Saemundssonia (P.) kosswigi*). In addition to these, we have collected two species of *Austromenopon.*

H. diversus parasitises several species of *Puffinus*, including *P. yelkouan, P. mauretanicus* and *P. puffinus* (see Edwards 1961). *Austromenopon paululum* (Kellogg & Chapman, 1899) has been recorded from an even wider range of *Puffinus* species, including *P. puffinus* (see Price & Clay 1972). In contrast, the other two louse species have previously been recorded only as parasitic on single host species: *Austromenopon echinatum* Edwards, 1960 on the three subspecies of Cory's Shearwater, *Calonectris diomedea* (Scopoli, 1769), and *Saemundssonia (P.) kosswigi* on *P. yelkouan*.

The louse sample from Cyprus is notable when compared with those taken from *P. mauretanicus* (Palma *et al.* 1997) and from *P. yelkouan* skins held by museums. Firstly, three species were present on a single bird specimen whereas only one species was found on 19 *P. mauretanicus* individuals. Secondly, *A. echinatum* is a new louse record for *P. yelkouan*, although this shearwater may not be a regular host because we have also found *A. paululum.* It might be argued that a single male *A. paululum* from an old skin of *P. yelkouan* is not adequate to establish a host-louse association, but from the wide host range of *A. paululum*, we believe this to be the regular *Austromenopon* species parasitic on *P. yelkouan.*

Our collection of 20 *A. echinatum* specimens from an unexpected host species is unusual. Feather lice are flightless and therefore permanent residents on the host and so can be transferred only by physical contact. Given that the *P. yelkouan* from Cyprus was at no stage in contact or close to a specimen of *C. diomedea* after it was recovered dead, we must conclude that all the specimens of *A. echinatum* are either natural stragglers that must have transferred from a *C.*

diomedea host to the *P. yelkouan*, perhaps while the latter bird was prospecting a burrow occupied by the former, or alternatively, are regular parasites of *P. yelkouan*, but with an unexpected host distribution. Although we believe that the first scenario is the more likely, further sampling is required to clarify the status of *Austromenopon* lice on the Levantine Shearwater.

In contrast, *Saemundssonia (P.) kosswigi* is unique to *P. yelkouan* and has not been found on any other species of bird, even as a straggler. Fowler & Shaw (1990) reported one female and six nymphs of a *Saemundssonia* sp. from *P. puffinus*, but in the absence of a male specimen a definite species identification was not possible. However, if indeed *P. yelkouan* proves to be the only host of *S. (P.) kosswigi*, it would suggest several possible scenarios. Among these are:

1) *Saemundssonia (P.) kosswigi* or its ancestor parasitised all three closely related shearwaters - *P. yelkouan, P. mauretanicus* and *P. puffinus* - but became extinct on *P. mauretanicus* and *P. puffinus*;

(2) *Saemundssonia (P.) kosswigi* or its ancestor parasitised all three closely related shearwaters, became extinct on *P. mauretanicus* but evolved into a different species on *P. puffinus*;

(3) *Saemundssonia (P.) kosswigi* is an indicator of a closer relationship between *P. yelkouan* and the Persian Shearwater, *P. persicus* Hume, 1873, than had previously been realised. *Puffinus persicus* is the unique host of *Saemundssonia (P.) persica* Timmermann, 1962, a distinct species but morphologically closely related to *Saemundssonia (P.) kosswigi*.

It is clear that the two sympatric shearwaters in the Mediterranean Sea, *P. mauretanicus* and *P. yelkouan*, do not interbreed, have different feather louse faunas, are osteologically separable (Walker *et al.* 1990), have different post-breeding dispersal patterns, and have consistent plumage differences (i.e. axillary patterns; B. Zonfrillo, pers. obs.) . Their calls, although superficially similar, are different in frequency (sonogram analyses; B. Zonfrillo, pers. obs.). In addition, the Balearic Shearwater has a larger mean wing length. Wink *et al.* (1993) showed the Cytochrome-*b* gene clearly separates *P. yelkouan* from *P. puffinus* (*P. mauretanicus* was not examined). The above differences suggest that these two shearwaters should be treated as distinct species - the Levantine Shearwater as *P. yelkouan* and the Balearic Shearwater as *P. mauretanicus*.

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THE STATUS AND DISTRIBUTION OF FEA'S PETREL *PTERODROMA FEAE* IN THE CAPE VERDE ISLANDS

STATUS EN VERSPREIDING VAN DE GON-GON PTERODROMA FEAE *OP DE KAAPVERDISCHE EILANDEN*

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A census of Fea's Petrel was conducted in the Cape Verde Islands during January and February 1998. Counts were made on three of the four islands where the taxon has historically been known to breed: Fogo, São Nicolau and Santo Antão. The persistence of those colonies previously reported on these islands was confirmed and several undocumented colonies were located. The population on Fogo was c. 80 pairs, on São Nicolau c. 30 pairs and that on Santo Antão c. 200 pairs. The surveys of Fogo and Santo Antão were incomplete, so the population size could be higher there than indicated by the present data. No survey of Santiago was attempted and further surveys are needed to establish the status of Fea's Petrel in the Cape Verde Islands as a whole. The colonies on Santo Antão and São Nicolau were generally situated on inaccessible cliff faces above dry river valleys, while those on Fogo were among boulders in dry river beds, among rubble and tubes in old lava flows and on cliffs. Fea's Petrel continues to be threatened by human exploitation and predation by cats and rats, particularly on Fogo and some areas of Santo Antão where the colonies are most accessible.

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INTRODUCTION

The taxonomy of the gadfly petrels of the genus *Pterodroma* that breed on islands in the north-east Atlantic has for long been a source of controversy. Salvadori (1899) named and described *Oestrelata* (= *Pterodroma*) *feae* from the Cape Verde Islands and found it specifically distinct from *P. mollis* of the

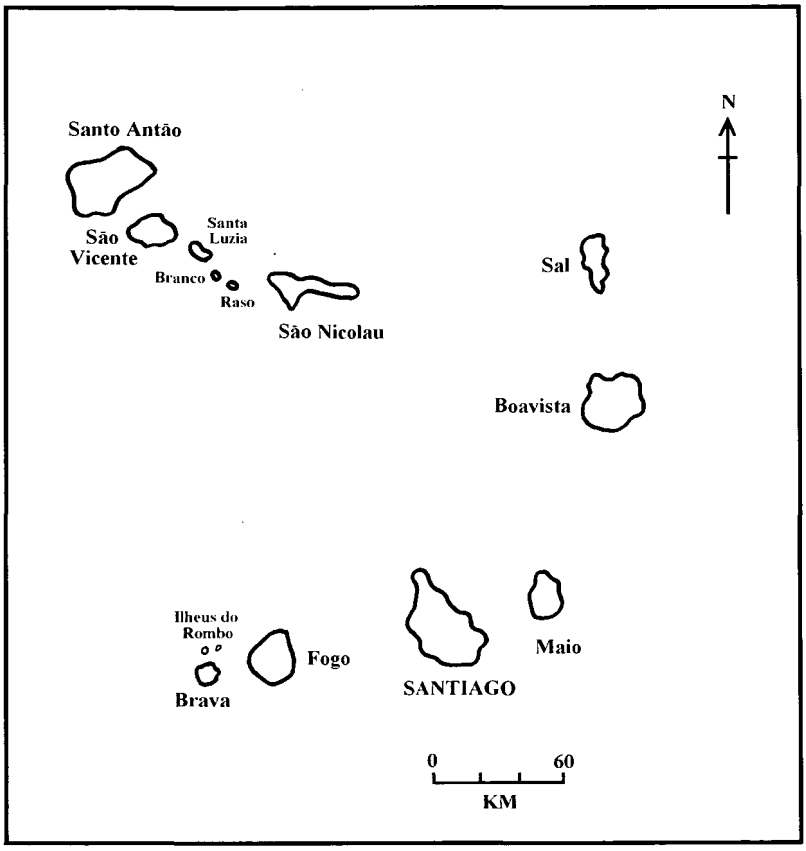

Figure 1. Cape Verde Islands.
Figuur 1. Kaapverdische Eilanden.

southern oceans. Based on phenetic criteria, the populations from mainland Madeira and the Desertas were separated by Mathews (1934a, b) as 'subspecies' *madeira* and *deserta*, respectively. For much of this century, all of these north-east Atlantic forms have been treated as conspecific with Soft-plumaged Petrel *P. mollis* (e.g. Bourne 1957; Vaurie 1965; Cramp & Simmons 1977; Jouanin & Mougin 1979), although Murphy (1967) cautiously noted that "the relationship of all of these [east Atlantic forms] with the circumpolar antiboreal petrel, *P. mollis mollis*, is likely to prove more remote than suggested by current nomenclature".

In recent years, a consensus has emerged to assign *P. madeira* and *P. feae* (including *deserta*) specific status (e.g. Bourne 1983; Imber 1985; Zino &

Zino 1986). Recent phylogenetic analyses of cyt-*b* mtDNA sequences have shown that North Atlantic taxa comprise a distinct clade not closely related to *P. mollis*, with which it does not even share a sister-taxon relationship (Nunn & Stanley 1998; Nunn & Zino in press).

As no blood samples of *feae* from the Cape Verde Islands were available for these studies, its taxonomic relationship to other north Atlantic gadfly petrels, in particular *deserta*, remains unresolved. However, differences in their morphometrics (Bretagnolle 1995; Snow & Perrins 1998), their different breeding phenology (laying in December-January on Cape Verde, July–August on Desertas; Cramp & Simmons 1977) and the distance between breeding sites strongly suggest that these two taxa are effectively reproductively isolated through philopatry and are probably cryptic species. Further phylogenetic analyses are necessary to test this hypothesis and elucidate the position of *P. feae* (*sensu stricto*) within the clade of north Atlantic *Pterodroma* petrels.

Irrespective of taxonomy, *P. feae* (*sensu lato*) is a Macaronesian endemic that is classed as globally threatened (Collar *et al.* 1994) and vulnerable (Hazevoet 1996; Stattersfield *et al.* 1998). In Cape Verde, it breeds in the mountainous interior of the islands of Santo Antão, São Nicolau, Fogo and Santiago (Hazevoet 1994, 1995). The population on the Desertas is confined exclusively to Bugio islet (off Madeira) where it breeds mainly in deep burrows in the soil-capped plateau (Jouanin *et al.* 1969; Zino & Zino 1986; Zino & Biscoito 1994). Birds similar to Fea's Petrel have also been reported from two small islets in the Azores (Bibby & del Nevo 1991; Monteiro & Furness 1995) so a tiny breeding population may exist there. In addition, gadfly petrels have also been heard calling on Great Salvage island during 1983 (James & Robertson 1985), but have not been recorded subsequently despite the presence of wardens.

The breeding population on Bugio islet is considered to be around 150-200 pairs and appears to be stable (Jouanin *et al.* 1969; Zino & Zino 1986; Zino & Biscoito 1994; Zino *et al.* 1996). In contrast, little is known about the location of breeding sites or status and trends of the population in the Cape Verde Islands. The only information available are notes on the locations of a few nests, records of sites at which museum skins were collected and anecdotal information gained from local people (summarised by Hazevoet 1995). Based on this information, the approximate locations of some colonies were established and the population size was estimated to be between 500 and 1000 pairs (Hazevoet 1995). However, such information is inadequate as a basis for assessing population status and trends.

A survey of Fea's Petrels in Cape Verde was clearly a high priority in order to establish the status and distribution of this vulnerable Atlantic seabird. An expedition was therefore mounted in 1998 with the aim of locating the

breeding colonies of Fea's Petrel on Fogo, São Nicolau and Santo Antão and to estimate the number of pairs on each of these islands. This paper presents the results of this survey, discusses their implications for conservation and makes recommendations for further survey work.

METHODS

The Cape Verde Islands comprise 10 islands and several islets of volcanic origin situated off north-west Africa (14°48' to 17°22'N and 22°44' to 25°22'W). The three islands surveyed for Fea's Petrel were Fogo (NR, PO, AV, CJH), São Nicolau (NR, CJH, LRM) and Santo Antão (FZ, PO, AV, HCN, EAZ) (Fig. 1). Due to lack of time and resources, no attempt was made to survey Santiago, the only other island in the archipelago where Fea's Petrel has been found breeding. The survey was timed to coincide with the incubation period, fieldwork being conducted between 11 January and 20 February 1998. Surveying on Fogo took place between 11 and 31 January, on São Nicolau between 1 and 20 February, and on Santo Antão between 26 January and 12 February.

Areas surveyed A truly systematic survey of each island would have been impossible in the time available, so none of the island surveys can be regarded as comprehensive, although coverage of suitable habitat on São Nicolau was almost complete (see below). Sampling densities and extrapolation to the area of suitable habitat was also impossible owing to insufficient knowledge of habitat characteristics. The survey therefore aimed to survey as many colonies as possible and produce an absolute minimum estimate of population size and distribution. Despite the limitations of minimum estimates these represent a considerable advance on previous information.

For each island, areas where breeding birds had been located in the past were targeted initially and the search was then extended to adjacent areas of similar habitat. Results should therefore be regarded as conservative estimates of distribution and status since some colonies may have been missed. Dialogue with local people was often essential for establishing the approximate locations of breeding sites prior to initiating surveys. Fea's Petrel is known as "gon-gon" on Fogo and São Nicolau and "biôrro" on Santo Antão. We asked people if they were familiar with the birds and, if so, where they nested, roughly how many there were, whether numbers and distribution had changed, and what factors may have contributed to any declines. All information was checked by survey work wherever possible.

Colonies were located by listening for the birds distinctive moaning calls at points adjacent to suitable sites. Survey work was conducted between 20:00h and midnight, the time when petrels return to their colonies and calling

intensity is greatest. The calls can be heard up to 1 km away in favourable weather and topography (pers. obs.). The locations of any breeding sites identified during nocturnal surveys were marked on a 1:25 000 topographical map.

Population estimates The colonies on Santo Antão and São Nicolau could not be reached on foot because the birds bred in cavities in precipitous cliffs and pinnacles. Most of the breeding sites on Fogo could be accessed with some difficulty, but the nest sites were dispersed and difficult to find, so merely counting nests would have produced a marked under-estimate of abundance. Therefore, the only survey method available was that used by Wingate (1964) to survey Black-capped Petrel *P. hasitata* colonies on inaccessible cliffs in Haiti. This involved comparing nocturnal calling intensity at these colonies with that of the colony of the closely related Cahow *P. cahow* in Bermuda, where the number of breeding pairs was known. In this survey, the calling intensity of Fea's petrel colonies in Cape Verde was scored relative to the colonies of *P. madeira* in Madeira that has 20-30 breeding pairs and that of *P. f. deserta* on Bugio that has 150-200 breeding pairs (Zino & Biscoito 1994). This was used to develop the following ordinal score of the number of pairs at a breeding site (range in parentheses):

1 No calls: no pairs present;
2 Calls infrequent, never more than two birds calling at one time: *c.* 2 pairs (1-4);
3 Calls more frequent, intensity lower than that in the *P. madeira* colony: *c.* 10 pairs (5-15);
4 Intensity of calling similar to that in the *P. madeira* colony: *c.* 25 pairs (16-35);
5 Calling intensity higher than that in the *P. madeira* colony, but less than in the *P. deserta* colony: *c.* 50 pairs (36-100).

Most of the vocalisations at petrel colonies are made by pre-breeding birds (Warham 1996), so this method assumes that the size of the pre-breeding and breeding populations at a colony are correlated. The method also assumes that the calling intensity of the petrel colonies on Madeira are similar to those in Cape Verde. The estimates are therefore at best a crude index of status and relative abundance of the colonies.

Nocturnal surveys were conducted only on moonless nights on Fogo and São Nicolau because Fea's Petrel seldom calls in moonlight (Zino & Zino 1986). The largest colony at Cha das Caldeira was almost completely silent on moonlit nights but very vocal once the moon had set. Due to time constraints on Santo Antão, some surveys were conducted on moonlit nights, so when calls were detected at breeding sites here numbers will be under-estimates; such moonlit surveys are not recommended for future surveys.

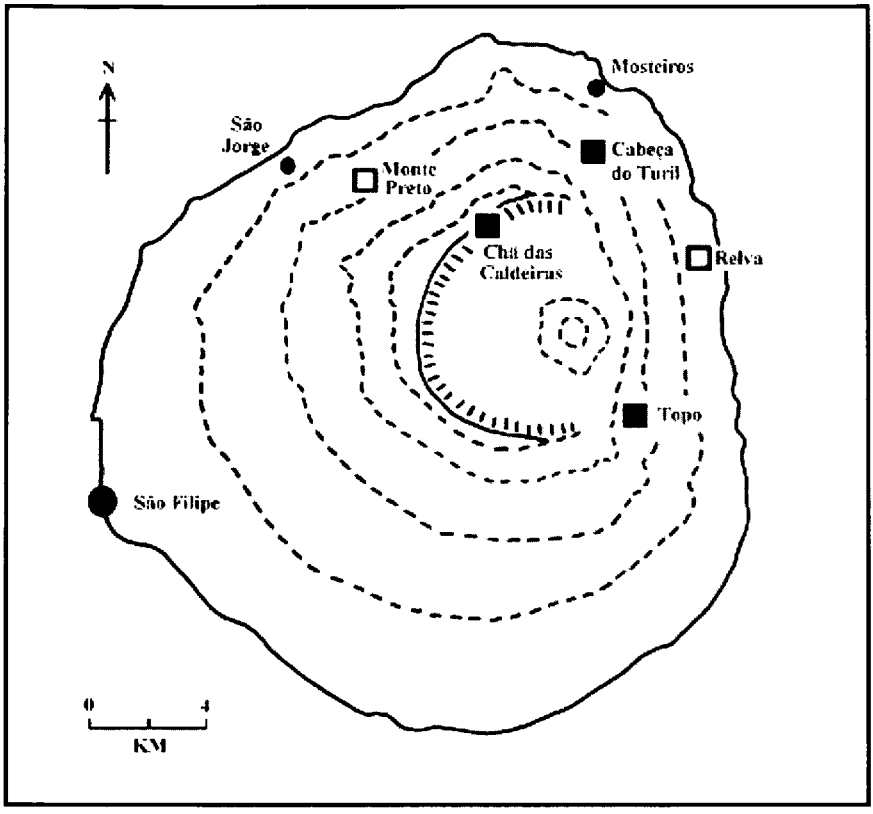

Figure 2. The distribution of Fea's petrel on Fogo. Filled squares represent confirmed Fea's petrel colonies and open squares represent places where colonies were reported to exist but were not confirmed by survey work. Main settlements are shown as filled circles. The dashed lines represent contours with a 500 m interval.

Figuur 2. De verspreiding van Gon-gons op Fogo. Zwarte vierkantjes geven bevestigde kolonies aan, open vierkantjes geven kolonies aan waarvan het bestaan niet tijdens dit onderzoek kon worden bevestigd. Dorpjes zijn weergegeven als zwarte stippen. Gestippelde hoogtelijnen (500m intervallen).

RESULTS

Fogo The entire crater wall of the Chã das Caldeiras (Fig. 2) was searched at night for breeding sites of Fea's Petrel, but these were found only in the area around the village of Bangueira. Birds were heard calling from three of the four

dry river valleys in the caldeira wall, with each having *c.* 2 pairs. The other river valley appeared to be suitable for breeding but several nocturnal searches failed to locate any calling birds. A search of this valley during the day located the remains of three adult birds that had been eaten by cats. An incubating bird was found in a cavity under a boulder in the bed of one of the dry river valleys and several apparent breeding burrows were in similar habitat. Two colonies were also found in cliffs just below the crest of the crater wall, one with *c.* 10 pairs and the other with *c.* 25 pairs. The birds were probably nesting in the many cavities that occurred in these cliffs, but a search failed to find any conclusive evidence of this.

Two more colonies were found in old lava flows at Topo and Cabeça do Turil (Fig. 2), each of which held *c.* 10 pairs. Birds were nesting in cavities among basalt rubble and tunnels on gently sloping ground, a habitat that occurs around most of the north-eastern quarter of the island. No other areas on Fogo were searched, although we were informed that there were colonies similar in size to those at Topo and Cabeça do Turil at Monte Preto and Relva (Fig. 2). As received information was accurate for all the other sites surveyed, it is likely that colonies of around 10 pairs exist there. From this survey we would estimate that the population size on Fogo is approximately 80 pairs, although it is possible that more colonies exist on the slopes around the island.

São Nicolau Breeding sites were found at three locations in the mountains of São Nicolau (Fig. 3). All of these colonies were relatively small with *c.* 10 pairs each. The colonies were situated on the cliffs of Monte Deserto above Canto, on the pinnacles of a ridge off the north-west slopes of Monte de Sentinha and on the easterly cliffs of the ridge between Ribeira Funda and Ribeira da Covoada (Fig. 3). All were located on inaccessible cliffs so closer inspection was impossible. As nocturnal coverage of the central highlands of São Nicolau was almost complete it is unlikely that any other colonies occur there. The population size on the island is therefore approximately 30 pairs. Inhabitants at Canto informed us that "gon-gons" used to breed under boulders much lower in the valley but no longer did so (presumably due to human exploitation or cat predation) about two or three decades ago.

Santo Antão The survey of Santo Antão showed that Fea's Petrel was widely distributed on the cliffs above river valleys throughout the north and east of the island (Fig. 4). Santo Antão is a large (779km^2) and mountainous island with many areas of apparently suitable habitat not all of which could be surveyed, so the survey gives a minimal estimate of distribution and abundance there.

Birds were heard calling from two sites in the cliffs along Ribeira Grande at Faja dos Cumes and near Corda, each of which had *c.* 10 pairs. Local

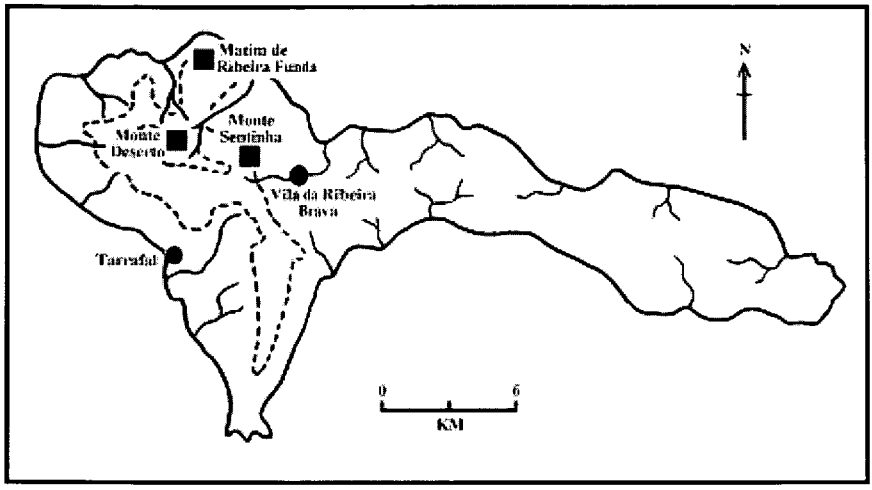

Figure 3. The distribution of Fea's petrel on São Nicolau. The location of colonies is denoted by filled squares and main settlements are shown as filled circles. The dashed lines represent contours with a 500 m interval and the solid lines represent main river valleys.

Figuur 3. De verspreiding van Gon-gons op São Nicolau. Zwarte vierkantjes geven bevestigde kolonies aan, open vierkantjes geven kolonies aan waarvan het bestaan niet tijdens dit onderzoek kon worden bevestigd. Dorpjes zijn weergegeven als zwarte stippen. Gestippelde hoogtelijnen (500m intervallen), rivierdalen als getrokken lijntjes.

people claimed to have caught birds for food at three other sites within the valley. In the adjacent river basin of Ribeira da Torre, local people were also familiar with Fea's Petrel and indicated that they were distributed throughout the high cliffs above the valley. However, only one colony with *c.* 2 pairs was found here. A second survey higher up this valley failed to detect any calling birds, although this survey was conducted in moonlight. A site with *c.* 2 pairs was found in the cliffs above Ribeira do Paúl and another of a similar size was located nearby at Aguas das Caldeiras. The cliffs above Ribeira Fria contained a colony of *c.* 10 pairs.

Three colonies with *c.* 25 pairs were located in mountains above the villages of Escabeçada, Alto Mira and above Chã da Norte at Carvoeirinho (Fig. 4) and local people at all three reported that they catch and eat Fea's Petrels. A total of five active nests was found in the colony at Carvoeirinho and three above Alto Mira, but most of the breeding sites were probably on inaccessible cliffs. The largest colony located during the entire survey was at Tope do Biôrro

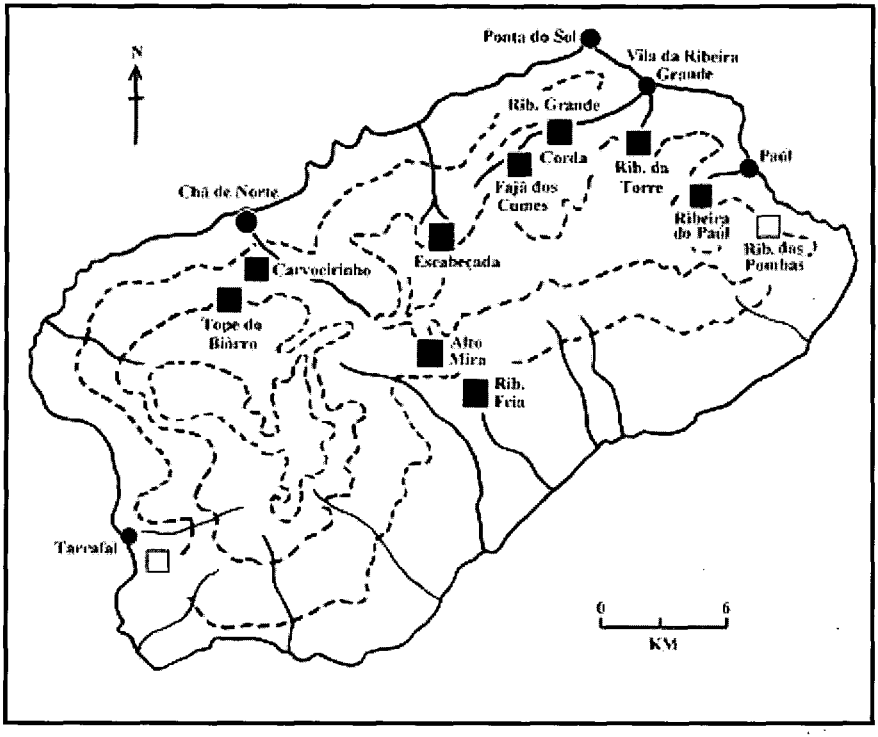

Figure 4. The distribution of Fea's petrel on Santo Antão. Filled squares represent confirmed Fea's petrel colonies and open squares represent places where colonies were reported to exist but surveys of which were conducted in moonlight and no calls were heard. The dashed lines represent contours with a 500 m interval and the solid lines represent main river valleys.

Figuur 4. De verspreiding van Gon-gons op Santo Antão. Zwarte vierkantjes geven bevestigde kolonies aan, open vierkantjes geven kolonies aan waarvan het bestaan niet tijdens dit onderzoek kon worden bevestigd. Dorpjes zijn weergegeven als zwarte stippen. Gestippelde hoogtelijnen (500m intervallen), rivierdalen als getrokken lijntjes.

(named after the bird) above the village of Chã Dura, where *c.* 50 pairs were likely to be breeding.

Surveys were also conducted along Ribeira das Pombas and in the mountains above Tarrafal, but the presence of Fea's Petrel could not be established here, probably due to a full moon during these surveys. However, local people in these areas gave a good impression of Fea's Petrel calls and said that they had caught them for food, so their presence at these sites is likely.

Given that the survey was incomplete and some surveys were conducted during moonlight and had little chance of detecting colonies even if they were present, the status of Fea's Petrels on Santo Antão is difficult to establish. However, approximately 150 pairs were located and further colonies were likely to exist, so there is little doubt that Santo Antão is the most important island for breeding Fea's Petrels in the Cape Verde archipelago. We would suggest a population of 200 pairs on Santo Antão might be a conservative estimate.

DISCUSSION

Although incomplete, this survey has provided valuable information on the distribution and relative abundance of Fea's Petrel on three of the four Cape Verde Islands where historically the taxon has been known to breed. The continued presence of the colony, first reported by de Naurois (1969), at the Chã das Caldeiras on Fogo was confirmed, despite concerns that a volcanic eruption in 1995 may have destroyed it. In fact, lava flows from that eruption were 200 m below and 1 km from the nearest nesting area. This survey also found that the colonies previously reported at Ribeira Grande, Ribeira do Paúl and Alto Mira on Santo Antão and at Canto on São Nicolau (de Naurois 1969; Hazevoet 1995) were still extant. On all of the islands surveyed, previously undocumented breeding sites were identified.

The population estimate for São Nicolau was *c.* 30 pairs, for Fogo *c.* 80 pairs, and for Santo Antão *c.* 200 pairs and it is likely that more colonies exist on Fogo and Santo Antão. It is clear that Santo Antão is the most important island for breeding Fea's Petrels. Previous reports had suggested Fogo held the largest breeding population (Hazevoet 1994, 1995), highlighting the unreliablility of old records and anecdotal information. The importance of Santo Antão as a breeding colony explains why numbers seen at sea near there have been considerably higher than those near the other islands. More than 120 Fea's Petrels were counted at sea along the northern coast of Santo Antão during the afternoon of 8 March 1996, while sea-watches along the northern coast of São Nicolau on 14 and 16 March 1996 yielded only *c.* 10 birds on both dates (Hazevoet 1997). In addition, during the morning of 26 February 1999, at least 50 were seen off Ponta do Sol, northern Santo Antão, while *c.* 300 were counted there the afternoon of the same date (S. Haavisto, pers. comm.). No such reports of large numbers at sea are known from anywhere else in the archipelago.

Based on the present survey, the total breeding population in the archipelago is probably between 500 and 1000 breeding pairs, a figure that agrees with the earlier estimate by Hazevoet (1995). However, this estimate is an absolute minimum as further colonies almost certainly exist on Fogo and

Santo Antao and Fea's Petrel has also been found breeding in the central mountain range of Santiago (de Naurois 1969; Hazevoet 1995) which was not surveyed during this expedition. More visita to Fogo, Santo Antão and also Santiago are needed to explore unsurveyed areas so that undiscovered colonies may be located and their status assessed. In this manner, a comprehensive picture of status and distribution of Fea's petrels on Cape Verde might be built up over time. Future expeditons should also revisit the colonies described in this report so that their persistence can be monitored.

The population of Fea's Petrel in the Cape Verde Islands is probably smaller and its distribution more restricted than in the past and this has been blamed on soil erosion due to overgrazing by goats, human exploitation and predation by cats and rats (Collar & Stuart 1985; Hazevoet 1994).

Human exploitation, first reported by de Naurois (1964), still continues. On Santo Antão there is a strong culture of eating wild birds, and people admitted to eating Fea's Petrel adults, eggs and chicks whenever they could obtain them. A recently published Santo Antão cookery book lists many avian delicacies of the island, and especially recommends recipes for "biôrro", "cagarra" (*Calonectris edwardsii*) and "pedrêr" (*Puffinus* [*assimilis*] *boydi*). According to residents of the Chã das Caldeiras and Topo, several birds are still taken every year for pseudo-medicinal purposes on Fogo, with the fat of the birds being used as a folk remedy for aches and rheumatism, as previously documented by de Naurois (1964). The current level of human exploitation on São Nicolau is apparently negligible (if any) as the colonies there were completely inaccessible without modern climbing equipment and the local people appeared to be largely uninterested in the birds as a source of food.

Feral cats were seen in the vicinity of many areas where Fea's Petrels breed and evidence of cat predation on three adults was found in one of the valleys on Fogo. Cats are efficient predators of seabirds, and their introduction to several other islands around the world has been associated with declines or extirpation of populations of gadfly petrels (Moors & Atkinson 1984). Petrel population trends are particularly sensitive to small increases in adult mortality (Simons 1984) and so even low predation rates by cats or humans can lead to rapid population declines.

The breeding sites of Fea's Petrel on São Nicolau and most of those on Santo Antão are now confined to cavities in precipitous cliffs that are inaccessible to humans. Similarly, Black-capped Petrels in Haiti are now confined to inaccessible cliffs because of human exploitation and predation (Wingate 1964). Cats have been recorded preying on *P. madeira* in the mountainous interior of Madeira (Zino 1992) where the terrain is as steep as that in São Nicolau and Santo Antão. However, the birds on Madeira breed at higher density in burrows on vegetated ledges, and so are more prone to cat predation

than those on São Nicolau and Santo Antão, which nest at lower densities in cliff-face cavities. Such colonies are probably safe from human exploitation and high cat predation, although it is possible that rats could gain access to the colonies and cause breeding failures, as has been reported for *P. madeira* (Buckle & Zino 1989, Zino & Biscoito 1994). With continuing predation by humans and cats, the remaining populations at the easily accessible colonies on Santo Antão are likely to decline until extirpated. On Fogo, all the colonies in the valleys and outside the caldeira are easily accessible to both humans and cats so predation there could continue until the population becomes limited to the two cliff sites above the caldeira.

Cape Verde is one of the poorest countries in the world and conservation of birds, and biodiversity in general, is inevitably of low priority. In addition, educational attainment among the human population is low and there is little sense of responsibility for the natural environment. Any initiative to conserve the unique avifauna of the Cape Verde Islands (Hazevoet 1995), including Fea's Petrel, will have to come from the 'developed' world. With foreign aid, a National Park is being established at Chã das Caldeiras on Fogo; the conservation of Fea's Petrel will hopefully be incorporated into the park's agenda. Any conservation programme will need to include local education and seasonal, long-term cat and rat control in order to achieve increases in the petrel's population there.

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Short notes

SEABIRDS DROWNED IN FISHING NETS OFF JAN MAYEN (GREENLAND SEA)

ZEEVOGELSTERFTE IN VISNETTEN ROND JAN MAYEN (GROENLANDZEE)

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Bits and pieces of fishing nets found at Jan Mayen island (central Greenland Sea) often contained the entangled remains of seabirds. Brünnich's Guillemots Uria lomvia *and Little Auks* Alle alle alle *were the commonest species encountered, but also Puffin* Fratercula arctica naumanni *and Northern Fulmars* Fulmarus glacialis *were found. Pieces of coarse trawl nets and fine gill nets were found, and it is suggested that the birds drowned when the nets were discarded or lost (ghost-nets). Only few and brief visits were made on Jan Mayen's beaches between 1983 and 2000, but the recent finds suggests that substantial numbers of seabirds may drown in fishing gear around this remote island in the North Atlantic.*

Camphuysen C.J. 2000. Seabirds drowned in fishing nets off Jan Mayen (Greenland Sea). Atlantic Seabirds 2(2): 87-91.

During a brief visit of Jan Mayen (71°N 8°30'W) in June 2000 remarkable numbers of dead seabirds entangled in fishing gear were found on the beach. Jan Mayen is a remote island in the Greenland Sea, situated approximately 1000 km west of Svalbard and Norway, 500 km east of Greenland and 600 km north of Iceland, that accommodates large colonies of seabirds (Van Franeker *et al.* 1998). Little is known of the commercial fisheries around the island, although the small shelf will probably restrict the possibilities for demersal fisheries. Pelagic trawls, long-lines and gill nets may all be used in this part of the Greenland Sea and in surrounding areas, for catches of cod *Gadus morhua* or other gadoids, Atlanto-scandian herring *Clupea harengus*, capelin *Mallotus villosus*, redfish *Sebastes* spp. or deepwater shrimp *Pandalus borealis* (FAO 1972).

On 11/12 June 2000, walking a stretch of only 2 km of beach between Maria Muschbukta and Kota (east of Haugenstranda) on the northwest side of the island, 24 bits and pieces of fishing net were found on the tideline (12 fragments/km). Of these, 18 (75%) contained at least one entangled carcass of a seabird (Table 1). In total, 29 Brünnich's Guillemots *Uria lomvia* (14.5/km), 22

Table 1. Entangled corpses of seabirds in pieces of fishing net found at Jan Mayen. 11/12 June 2000.
Tabel 1. Verstrikte lijken van zeevogels in stukken visnet gevonden op Jan Mayen, 11/12 juni 2000.

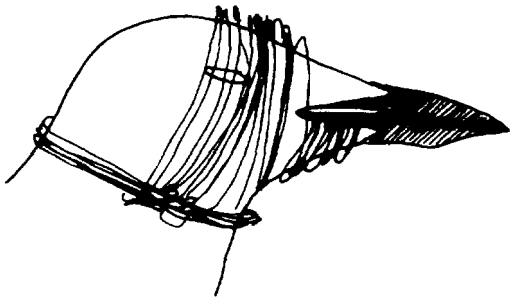
type of net	birds entangled	*n* =
light gillnet	16 Little Auks	1x
coarse trawlnet	2 Little Auks	3x
coarse trawlnet	1 Brünnich's Guillemot	2x
coarse trawlnet	2 Brünnich's Guillemot	7x
coarse trawlnet	3 Brünnich's Guillemot	1x
coarse trawlnet	4 Brünnich's Guillemot	2x
coarse trawlnet	1 Brünnich's Guillemot, 1 Northern Fulmar	1x
coarse trawlnet	1 Brünnich's Guillemot, 1 Atlantic Puffin	1x
coarse trawlnet	no birds	6x

Little Auks *Alle alle* (11/km), one Northern Fulmar *Fulmarus glacialis* and one Atlantic Puffin *Fratercula arctica* (both 0.5/km) were found entangled.

During previous brief visits of the island, annually between 1985 and 1988, and in 1998, entangled auks on Jan Mayen's beaches were not recorded. During a long-lasting expedition to the island in 1983, however, entangled Brünnich's Guillemots were recorded on five occasions (totalling 7 individuals). Of these, six were found entangled in fish nets (type not carefully recorded), while one individual had its head 'wrapped' in fine nylon thread (illustrated).

Jan Mayen has approximately 70 km of accessible beaches where debris and corpses may accumulate on the tideline. Extrapolating the finding of fishing nets on the beach in June 2000, would result into *c.* 840 fishnet fragments. Of these, 630 may have contained entangled seabirds, including 1000 Brünnich's Guillemots, 770 Little Auks and small numbers of Fulmars and Puffins. The arctic environment will 'conserve' corpses on beaches and the nylon netting is unlikely to break up very fast, so that the observed density of fishing gear and entangled corpses may have been the result of a very long period. The condition of the corpses found in June 2000 suggested that most had washed ashore at least a couple of months earlier (dried wing pairs, no flesh remaining on the sternum). However, Jan Mayen's beaches are heavily reworked by ocean, wind and ice so that debris washing ashore is more likely to become buried under sand and driftwood rather than to remain visible. Largely intact casualties were all in summer plumage, suggesting that the mortality had most likely taken place in spring or early summer 2000.

Most net fragments were at least several metres wide and long, although some pieces were distinctly smaller. The gill net fragment was very difficult to



Head of Brünnich's Guillemot with nylon thread around it (specimen JM023, 24 June 1983, Brielletårnet, Jan Mayen).

Kop van Dikbekzeekoet met nylondraad omwikkeld (verz. nr. JM023, 24 juni 1983, Brielse Toren, Jan Mayen).

Drawing C.J. Camphuysen)

measure, because it was simply a giant knot with wings sticking out, within a piece of coarse trawlnet and mixed with plastic sheets (see photograph). The birds may have drowned when the nets were still in use or may have become entangled in so-called 'ghost-nets' (fragments of nets floating freely in the ocean). It is unlikely that any fishermen would cut a big 2x3m hole in a trawl just to free (or get rid of) a drowned Brünnich's Guillemot. So, it is quite possible that most birds drowned in bits and pieces of fishing gear floating around in the Greenland Seas. Most nets examined in June 2000 were very similar in colour (bluish-green) and structure. Drift wood washing ashore at Jan Mayen is known to originate mainly from very distant areas, particularly from Siberia (Transpolar Drift Stream, East Greenland Current; Abarbanel & Young 1987; Johansen 1998). Johansen (1998) demonstrated a considerable potential for pollutants to reach Jan Mayen from the Kara and Barents Seas. Hence, in addition to local fishing activities, Barents Sea fisheries could be identified as the most likely and nearby source of ghost nests floating around Jan Mayen.

Auks are seabirds that are most commonly taken as bycatch in fisheries around Iceland (Petersen 1994). In those waters, for as far as auks are concerned, gillnets are the most common cause of fishing mortality. For the pelagic auks (Common Guillemot *Uria aalge*, Razorbill *Alca torda* and Atlantic Puffin) cod nets are the most dangerous, while lumpsucker (*Cyclopterus lumpus*) nets have been identified as taking most Black Guillemots *Cepphus grylle*. Apparently, in Icelandic waters there have been incidences with up to 4000 auks drowned overnight in nets from one boat. In May 1990, about 10 000 auks were killed in cod nets off Grímsey (N Iceland). Auk mortality in fishing gear is of great and perhaps increasing significance, not only in the arctic but also in more temperate waters (Mead 1993). Petersen's report, as most similar accounts on bycatches of auks in arctic waters (e.g. Piatt & Reddin 1984; Piatt *et al.* 1984; Piatt & Nettleship 1987; Kampp *et al.* 1994), refers to bycatches in actively used gear. The observations at Jan Mayen suggest that these are mainly ghost-nets, trapping birds after being discarded or lost (Breen 1990). It is hoped

Little Auks *Alle alle* in gill net, June 2000 *Kleine Alken in warnet, juni 2000 (photo C.J. Camphuysen).*

that future visitors to Jan Mayen will check the presence of fishing nets containing seabirds, preferably survey at least a few stretches of coast, carefully describe the type of nets found with and without birds, and report their findings. With such additional data, a better idea of the scale and frequency of seabird entanglements in fishing gear around Jan Mayen may be obtained.

Tijdens een kort bezoek aan Jan Mayen (71°N, 8°30'W; Groenland Zee) in juni 2000 viel het op dat er op het strand veel stukken visnet te vinden waren en dat er in veel van die netten vogels verstrikt

zaten. Een systematische telling over een afstand van 2 km leverde 24 netfragmenten op, waarvan 18 (75%) met vogels erin. Het aantal slachtoffers varieerde van 16 Kleine Alken Alle alle *in een stuk warnet ('gill net') tot een enkele Dikbekzeekoet* Uria lomvia, *Noordse Stormvogel* Fulmarus glacialis *of Papegaaiduiker* Fratercula arctica *(Tabel 1). Eerdere korte bezoeken van Jan Mayen in 1985-88 en in 1998 hadden geen vondsten opgeleverd, maar tijdens een maandenlange expeditie naar het eiland in 1983 waren ook al verschillende verdronken Dikbekzeekoeten in visnetten of nylondraad aangetroffen. Zo te zien ging het steeds om verspeeld vistuig (ghost-nets). Wanneer de vondsten in 2000 (12 netfragmenten per km, 9 daarvan met verstrikte zeevogels erin) gebruikt worden om te schatten hoeveel slachtoffers er op de gehele 70km lange kustlijn kunnen zijn aangespoeld (alleen voor stranden waar drijfhout en afval kunnen aanspoelen en blijven liggen; de eigenlijke kustlijn is veel langer), dan zouden er op het moment van de telling ongeveer 840 netfragmenten gelegen kunnen hebben, 630 daarvan met vogels. In totaal zouden er zeker 1000 Dikbekzeekoeten en 700 Kleine Alken kunnen zijn aangespoeld. Toekomstige bezoekers worden opgeroepen hun vondsten te documenteren en publiceren, zodat een completer beeld ontstaat van de sterfte in ronddrijvende brokken visnet in de omgeving van Jan Mayen.*

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COMMON GUILLEMOTS *URIA AALGE* SUCCESSFULLY FEED TWO CHICKS

ZEEKOETEN VOEREN MET SUCCES TWEE KUIKENS

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A pair of Common Guillemots Uria aalge *with a small chick adopted a second and successfully reared both to normal fledging age. A single day's feeding watch suggested that the pair doubled the normal feeding rate and the adults spent little time together at the nest-site, though the chick was never left unattended.*

Harris M.P., Bull J. & Wanless S. 2000. Common Guillemots *Uria aalge* successfully feed two chicks. Atlantic Seabirds 2(2): 92-94.

The Common Guillemot *Uria aalge* is an extremely social bird that nests at densities of up to 70 pairs per m^2 (Cramp 1985). It lays a single egg and has evolved an efficient auditory mechanism whereby an adult and its chick recognise each other (Tschanz 1968). Normally a breeding Guillemot will not tolerate a strange chick and either repels it or sometimes, if it is small, kills it but if the colony is severely disturbed, e.g. by a human intruder, adults will temporarily shelter or brood neighbouring chicks that have been left unattended (Tuck 1961). However, rarely a bird will help rear a neighbour's chick by sheltering it or, less commonly, feeding it (Tschanz 1979; Wanless & Harris 1985). Such helpers are generally failed breeders and care is usually restricted to brooding large chicks, often when both parents are away from the colony when food is difficult to find (Birkhead & Nettleship 1984). In 2000, while studying a completely undisturbed group of about 40 pairs of individually marked Guillemots on the Isle of May, Firth of Forth, Scotland on a day-to-day basis, we documented an instance of a pair of Common Guillemots with a small chick adopting another and raising both to fledging age.

On 7 June a three-day old chick fell from its nest-site, probably after a failed change-over by its parents, and ended up being brooded at another site, about 1m away, by a pair of adults which had failed to breed in 2000. The chick was present here until 10 June and during this time the true parents repeatedly tried to bring fish to it but were driven off by the site-owners. We did not watch continuously so do not know whether the chick received food from any of the four adults. The chick was missing on 11 June but the next day it was discovered two nest-sites away, about 0.5 m further down the cliff, being looked

after by foster parents that already had a two-day-old chick of their own. Both chicks were always brooded by a single adult, one under each wing and we did not see any aggression between the two young. The pair continued to brood and feed both chicks up to and including 25 June. The intruding young disappeared that night when aged 22 days, the age when a chick normally is taken to sea by the male parent who continues to feed the chick for several weeks (Varoujean *et al.* 1979). Many young Guillemots departed from the Isle of May colony that night so we assume that this adopted chick left the colony voluntarily, though since this chick's foster and true parents all continued to visit the colony the next and on subsequent days we concluded that the chick had not met up with an adult and had perished. The other chick was taken to sea by its male parent on the evening of 3 July when aged 23 days.

During 24 July we conducted an all-day watch on the 29 pairs with young in the study group. The foster-siblings, which always had at least one adult present, received a total of 12 feeds (6 small and 1 medium sprats *Sprattus sprattus,* 5 small sandeels *Ammodytes marinus*), 8 from the female and 4 from the male. We could not be certain how these fish were allocated but certainly both young received some. During the day the average time after a feed before one of the pair went off to forage again was 6.3 minutes and the pair spent a total of 75 minutes together. The other 28 young received between 2 and 8 fish that day (mean 5.4), members of pairs spent an average of 30 minutes together after a feed and a total of 162 minutes together during the day. Thus the pair with the two young increased the provisioning rate by 122%, decreased change-over time by 79% and decreased the total time the adults spent together by 54%.

This particularly experienced pair, that had remained intact from the start of our study in 1982 and reared a chick in 14 of the previous 17 seasons, appeared to have had little trouble feeding two young, although the species' unusual breeding strategy of the male taking the chick to sea and continuing to feed it precluded a truly successful outcome. The evidence suggests that 2000 was a moderate breeding season for Common Guillemots on the Isle of May with a breeding success of 0.73 young reared per pair and a mean weight of a chick near fledging of 252 g. These figures compare with means (± SE) of 0.79 ± 1.1 young and 251 ± 4.0 g for the period 1982-99. The outcome might well have been different in a less good season.

A very similar happening with a pair rearing two young to fledging age but with one leaving the colony without an adult has been reported in Brunnich's Guillemot *U. lomvia* (Gaston *et al.* 1995) but not apparently in the Common Guillemot. This is the only time that we have seen such an adoption in over 14 000 breeding attempts of Common Guillemots that we have documented on the Isle of May and thus must be considered quite exceptional.

Zeekoeten Uria aalge *zijn koloniebroeders die bij voorkeur dicht opeen gepakt 'nestelen' op smalle richels van steile kliffen, bijvoorbeeld op de Britse Eilanden. Zeekoetenpaartjes legeen slechts één enkel ei en het kuiken verlaat de kolonie als donsjong na drie weken met een lichaamsgewicht dat minder is dan de helft van dat van een adulte vogel. Ofschoon het buitengewoon sociale vogels zijn (broedend in dichtheden van meer dan 70 paar per m²), zullen broedende Zeekoeten geen 'vreemde' jongen in hun buurt tolereren en wanneer jongen van naburige paartjes toch te dichtbij komen, dan zullen zij of worden verjaagd (grotere kuikens) of doodgepikt (kleine kuikens). Alleen na grootschalige verstoring, bijvoorbeeld doordat mensen te dicht bij een volgepakte richel komen, kunnen wel eens tijdelijk de verkeerde jongen rekenen op de attentie en bebroeding van de verkeerde vogel. Nadat de rust is weergekeerd komen toch meestal alle kuikens weer bij hun eigen ouders terecht (of zij gaan verloren). Het is wel eens gezien dat een buurvogel 'hielp' bij het voederen van jongen van anderen, maar het gaat daarbij vrijwel zonder uitzonderingen om vogels waarvan het eigen legsel verloren is gegaan.*

In deze korte bijdrage wordt een geval gedocumenteerd waarin een toevallig (één richeltje) omlaag gevallen pullus door een ander paartje werd geadopteerd en werd grootgebracht tot de tijd gekomen was om in zee te springen. Het kuiken was eerst van het eigen nestplaatsje gerold (vermoedelijk tijdens een mislukte wisseling van de wacht van beide ouders) en kwam terecht bij een ander paartje. Deze adopteerden het jong kennelijk en verdreven de werkelijke ouders die met prooi aankwamen om hun jong in het verkeerde territorium te voeren. Het is niet duidelijk of het kuiken uiteindelijk gevoerd werd door één van de vier adulte vogels. Enkele dagen later was het jong echter verdwenen, maar het werd teruggevonden bij een ander paartje dat al een eigen jong verzorgde, een halve meter lager op de klif. Beide kuikens werden vervolgens bebroed door de pleegouders (onder elke vleugel een kuiken) en later werd vastgesteld dat beide jongen gevoerd werden. Alle waarnemingen wijzen erop dat beide kuikens met succes werden grootgebracht, althans tot op de leeftijd waarop de kolonie normaal verlaten wordt.

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News and notices

BOOK REVIEWS

TICKELL, W.L.N. 2000. *Albatrosses*. Pica Press, East Sussex. ISBN 1-873403-94-1, hardback, 448pp. Price £ 40,=.

This is a noteworthy book, being the first modern review of the family and also a virtual encyclopaedia of published information, formal and informal, learned and anecdotal, on albatrosses.

The main part of the book is divided into two sections. The first is on the species or species groups of albatrosses; this is itself divided into three: a) southern albatrosses (mollymawks, sooty and great albatrosses), with introductory chapters on the Southern Ocean and detailed descriptions of their breeding islands; b) tropical albatrosses (only the Galapagos albatross), introduced by a brief section on the equatorial Pacific Ocean; and c) northern albatrosses (Laysan, Black-footed and Steller's), introduced by a short account of the north Pacific Ocean. These chapters are workmanlike compilations, including many figures and tables, with full account taken of historical data as well as summarising the findings of more recent research. The chapters that seem best balanced to me are those on the northern albatrosses - though this may reflect the lack of much recent research, making compilation and synthesis more straightforward. The treatment of the southern albatrosses was disappointing. The mollymawk chapter is typical in that much space is devoted to oceanic distribution (10 pages) and to the location of colonies on breeding islands (10 pages), whereas the whole of breeding biology is summarised in eight pages and food and feeding ecology in just five. Inevitably, this fails to do justice to the extensive recent research, on a variety of species (some from more than one site), revealing interesting features of the relationships between foraging range, feeding area and features of the marine environment.

The second section of the book comprises chapters on moult, flight, behaviour and ecology. The chapter on moult is inevitably brief, principally recapitulating Peter Prince's work on Grey-headed, Black-browed and Wandering Albatrosses at South Georgia. The opportunity is missed to try to reconcile these interpretations, based on inferring past moult from the age of feathers in the wing, with data based on examination of specimens of Laysan and Black-footed Albatrosses in active moult (the work of Langston and collaborators). The treatment of flight is better, though overly relying on extensive extracts from the pioneering studies. In contrast, the behaviour chapter does provide a real new synthesis of information and represents essential

reading for anyone interested in the complex and varied rituals of these species at their breeding sites.

Considering the volume of work on albatross feeding ecology and population dynamics in recent years, the chapter on ecology fails to convey the substantial advances in our understanding of inter-relationships between breeding frequency, breeding performance and survival, in appreciating interspecific differences in demography and, in particular, the range of novel insights into the life of these birds at sea. There is only brief mention of how we have become able to relate what they eat to how they catch it to where they find it and to how they organise the provisioning of their offspring, including quantification of trade-offs between parent and offspring priorities.

These major sections of the book are complemented by interesting accounts of: (a) naming of albatrosses and the naturalists associated with their discovery and study; (b) the main characteristics of the family; and (c) albatrosses in verse. There is also a rather perfunctory account of threats to albatrosses and work to address these.

Despite some shortcomings this is still a fine book and, particularly because of its extensive use of quotations and wide reference to historical accounts, immensely readable. It gives an excellent historical background to the family and a competent review of the literature. Thus it provides the building blocks but does not arrange them to develop new insights or to highlight the research challenges of the future. Nevertheless it will be read widely by ornithologists, especially seabird biologists, and notably by those with a fascination for these charismatic birds and their remote nesting places.

John P. Croxall

NEWS

STEVE GEELHOED JOINS EDITORIAL BOARD

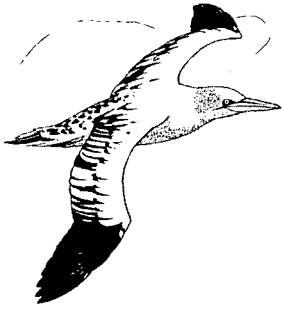
The unacceptable delays in the production of *Atlantic Seabirds* have largely been due to a structural shortage of time by the editors in chief of this new journal. We are glad to announce that Steve Geelhoed (Dutch Seabird Group, Haarlem) was prepared to join the editorial board, mainly as a managing editor, responsible for lay out (of future volumes) and production. We hope that we are now able to produce this journal more regularly.

CJC/JBR

the **Seabird Group**

was founded in 1966 to circulate news of work in progress on seabirds and to promote research. It is run by an elected Executive Committee and maintains close links with the three major British national ornithological bodies the British Ornithologists' Union, the British Trust for Ornithology, and the Royal Society for the Protection of Birds. Membership is open to all with an interest in seabirds.

Current Executive Committee Chair M.P. Harris, Secretary R. Swann, Treasurer J.C. Davies, Membership Secretary S. Russell, AS Editor J.B. Reid, Newsletter Editor C. Wernham, also A. Douse, S. Sutcliffe and S. Hunter. General correspondence: *The Seabird Group* c/o BTO, The Nunnery, Thetford, Norfolk IP24 2PU, UK, email: seabird@bto.org. For membership prices and correspondence address Membership Secretary see inside front cover.



Nederlandse Zeevogelgroep (NZG)

(Dutch Seabird Group), sectie van de Nederlandse Ornithologische Unie, opgericht 1 januari 1991, als voortzetting van de Club van Zeetrekwaarnemers (1972-1990) en het Nederlands Stookolieslachtoffer-Onderzoek (1977-1990). De Nederlandse Zeevogelgroep stelt zich tot doel: het stimuleren van zeevogelonderzoek in en vanuit Nederland en het uitwisselen van informatie met de uitgave van het tijdschrift, aanvankelijk *Sula*, vanaf 1999 *Atlantic Seabirds*.

Voor zover samenvallend met onderzoek aan zeevogels worden activiteiten aan zeezoogdieren mede in de doelstelling betrokken. Door een viertal werkgroepen wordt onderzoek gestimuleerd naar broedende zeevogels, de verspreiding van vogels en zoogdieren op open zee (offshore), strandingen, zeetrek en de gevolgen van olievervuiling. Leden ontvangen *Atlantic Seabirds* en de *Nieuwsbrief NZG*. Voor lidmaatschapsprijzen en correspondentieadres zie binnenzijde voorkaft. Voor informatie over werkgroepen zie *Nieuwsbrief NZG*.

Dagelijks bestuur Voorzitter en Nieuwsbrief redacteur M.F. Leopold, Secretaris J.A. van Franeker, Penningmeester Y. Hermes, *AS* Eindredacteur C.J. Camphuysen, en verder A.J. van Dijk, E.W.M. Stienen en C.J.N. Winter. Correspondentie p/a secretaris NZG J.A. van Franeker, De Houtmanstraat 46, 1792 BC Oudeschild, Texel, The Netherlands, E-mail Ned.zeevogelgroep@planet.nl

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