DISTINGUISHING BLACK-LEGGED KITTIWAKE MATES AT THE NEST-SITE USING WING TIP PATTERNS

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Chardine, J.W. 2002. Distinguishing Black-legged Kittiwake mates at the nest-site using wing tip patterns. Atlantic Seabirds 4(3): 81-90. *Inter-individual differences in the patterns of black and white on the tips of primary feathers 5 through 10 are reported for Black-legged Kittiwakes* (Rissa tridactyla) *from Arctic Canada and Newfoundland. Primaries were classified into five types according to the amount of white at the tip. Primaries 5 or 6 (depending on location) were the most variable between individuals and fell more evenly into the five types, compared with primaries 9 and 10, almost all of which were of one type. The Shannon-Weaver index was used to quantify this variation. The shape, number and position of the black patches at the tip of primaries 5 and 6 also varied between individuals, as did the relative size of apical white spots on primaries 6 through 10. These differences could be observed in the field with a spotting scope or binoculars and were used successfully to distinguish between members of the pair at the nest-site with 100% accuracy. Left-right symmetry in wing tip pattern within a bird was high but not perfect. Similarly, patterns were largely, but not perfectly, consistent across two successive wing moults. In conjunction with observations of courtship feeding or copulation, individual differences in wing tip pattern allow the study of birds of known sex at the nest-site, in situations when their capture and marking is undesirable or not possible. Other gull species may exhibit similar variation in wing tip patterns between individuals.*

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INTRODUCTION

Although individual animals often look superficially alike to human observers, closer inspection sometimes reveals extensive inter-individual variation in external characteristics such as coloration or patterning. Such differences have been used to identify individuals without having to mark them (e.g. Humpback Whale *Megaptera novaeangliae*, Katona and Whitehead 1981; Leatherback Turtle *Dermochelys coriacea*, S. Sadove, *pers. comm.*). A good example of individual variation in patterning or coloration is Bewick's Swan *Cygnus columbianus bewickii*, where bill and facial patterns have been used to distinguish individuals (Evans 1977; Scott 1966). Bretagnolle *et al.* (1994) found variation in the head patterns of Ospreys (*Pandion haliaetus*) that could be used to recognise individuals.

Figure 1. Right wing tip of a Black-legged Kittiwake showing how the pattern is typically presented in a folded wing. Primaries 5 through 10 are labelled.
Figuur 1. Rechtervleugelpunt van een Drieteenmeeuw, waarbij het patroon bij een gevouwen vleugel zichtbaar is. Handpennen P5 t/m P10 zijn aangegeven.

Studies of birds at the nest-site often require that males and females in each pair are identifiable. This is straightforward in sexually dimorphic species but for monomorphic species, at least one member of the pair would need to be marked in some way, and this usually entails capture. The ability to tell individual birds apart through variation in some external feature would be an obvious advantage in situations where capture and/or marking are not possible or are undesirable.

The Black-legged Kittiwake *Rissa tridactyla* is a small, sexually monomorphic gull that usually nests on steep cliffs by the sea (Baird 1994). Capture of breeding Black-legged Kittiwakes for purposes of individual identification is often difficult or impossible and, if attempted, can result in disturbance of breeding birds and possible loss of eggs or chicks. While studying geographic variation in the amount of white and black in the wing tips ("wing tip pattern") of Black-legged Kittiwakes (Chardine 2002), I noticed considerable variation among individuals that was easy to assess in the field from a distance. Here I report on this variation and explore its utility in distinguishing partners at the nest-site.

METHODS

I observed 119 Black-legged Kittiwakes at Prince Leopold Island (PLI), Nunavut (74° 02' N, 90° 00' W) in August 1988, 20 at Cape St. Mary's, Newfoundland (46° 50' N, 54° 12' W) in June 1991, and 15 at Great Island, Newfoundland (47° 11' N, 52° 49' W) in July 1992. Newfoundland samples were combined in the analysis. When on the nest, adult Black-legged Kittiwakes usually oriented themselves facing or parallel to the cliff (see Hodges 1975) such that at least one wing tip was almost always in view. Figure 1 shows a Black-legged Kittiwake wing tip as it typically would be seen in a folded wing. The tips of each primary were usually visible with the exception of primary 10 (p10), which was sometimes obscured by p9, and p5, which was sometimes obscured by tertial feathers. Movement of the bird during preening or wing-flapping usually allowed examination of these primaries.

During observations a 20x or 25x spotting scope, or 7x binoculars were used to examine the dorsal side of the outermost six primaries (p5-p10) of breeding birds attending nest-sites. I observed either the right or left folded wing of one or both birds nesting in one study plot at each location, and classified each primary into one of five types according to the scheme outlined in Figure 2. For each classified primary, I calculated the Shannon-Weaver Index (H') within samples from PLI and Newfoundland thus:

$$H' = -\sum_{i=1}^{s}(p_i)(\log_2 p_i)$$

where p_i is proportion of sample belonging to the i^{th} primary-type and s is the total number of types. The index combined a measure of the "type" variability of each primary and the evenness of the distributions among each of the types, and so provided a numerical index of the usefulness of each primary in differentiating individuals. I also sketched the pattern of black and white at the tip of p5 and p6 and from this determined differences in the shape, size, and position of black patches between mates. If both mates at a nest were examined, the relative size of any apical white spots in the primaries also was recorded.

In order to study right-left symmetry in wing tip patterns I classified primaries on both wings of a small sample of skins (n = 12) collected in Newfoundland and held by Memorial University, St. John's. A preliminary assessment of the consistency of patterns within the same individual between moults was made by classifying the primaries of seven colour-marked individuals captured on Gull Island, Newfoundland (47° 16' N, 52° 46' W) in 1996, and again in 1997.

Figure 2. Sketches of each Black-legged Kittiwake primary-type. Typical types for each primary are illustrated.
Figuur 2. Schets van de verschillende karakteristieke "handpentypen" van de Drieteenmeeuw.

Table 1. Proportions (%) of primaries 5 through 10 falling into each primary-type in 119 Black-legged Kittiwake adults examined at Prince Leopold Island (PLI) and in 35 examined at Cape St. Mary's and Great Island, Newfoundland (NF).

Tabel 1. Aandeel (%) van P5 t/m P10 per "handpentype" voor adulte Drieteenmeeuwen op Prince Edward Island (PLI, n = 119) en op Cape St. Mary's en Great Island, Newfoundland (NF, n = 35)

Type[1]		all black	white spot	black bar	black spot(s)	all white	H'[2]
p5	PLI	0	0	0	7	93	0.36
	NF	0	0	6	37	57	1.23
p6	PLI	0	22	56	18	4	1.58
	NF	0	77	20	3	0	0.90
p7	PLI	11	89	0	0	0	0.50
	NF	46	54	0	0	0	1.00
p8	PLI	54	46	0	0	0	1.00
	NF	97	3	0	0	0	0.19
p9	PLI	99	1	0	0	0	0.07
	NF	100	0	0	0	0	0.00
p10	PLI	100	0	0	0	0	0.00
	NF	100	0	0	0	0	0.00

[1] For primary-type definitions see Fig. 2
[2] Shannon-Weaver Index of diversity and evenness

RESULTS

Observable variation in p5-p10 Table 1 shows the proportion of primaries 5 through 10 classified as each type in the samples from Prince Leopold Island and Newfoundland. Birds from different locations were considered separately because of inter-regional differences in wing tip patterns (Chardine 2002). The outer four primaries (p10-p7) were classified only as either "all black" or "white spot". In contrast, p6 and p5 were more variable, and were of all types except "all black". Also, the frequencies of each primary type were more evenly distributed in some primaries (e.g. p7 and p6) than in others (e.g. p9 and p10). The Shannon-Weaver Index for each primary (Table 1) confirmed these differences. Primary 6 for PLI and p5 for Newfoundland had the highest indices and thus contained the most information with which individuals could be identified. Primary 8 in Newfoundland birds, and p9 and 10 in both groups contained little or no information.

Opposite page: Figure 3. Drawings of the tip of primaries 5 (p5) and 6 (p6) showing examples of the variation in black and white patterning observed in Black-legged Kittiwakes in this study. Primaries are labelled according to types shown in Figure 2.

Tegenoverliggende pagina: Figuur 3. Variatie in tekening van de zwart-witpatronen van de top van de vijfde (P5) en zesde (P6) handpen bij Drieteenmeeuw. Handpennen zijn gekwalificeerd volgens de typen in figuur 2.

In addition to variation among birds in the way primaries were classified, there was also considerable variation in the size, shape, position, and number of black patches or spots on each vane of p5 and p6. Figure 3 shows a sample of p5 and p6 patterns from sketches made of birds at PLI and Cape St. Mary's; examples were chosen to show the wide variation observed in these primaries.

Differentiation of mates at the nest-site I tested the ability to distinguish mates at 23 nest-sites at which I was able to record wing tip patterns for both members of the pair (18 at Cape St. Mary's and five at Prince Leopold Island). Partners could be identified unambiguously in all pairs, but by different means. Partners in 15 of the 23 pairs could be identified readily based on differences (either type or shape of black patch) in p6 alone. For pairs in which p6 was similar, the primary type or number of black spots on p5 differed in four pairs. In the remaining four pairs, differences in the type of p8 or the size of apical white spots on p6 and 7 were sufficient to distinguish mates. Despite the small sample size, the success in distinguishing mates at the nest-site was significantly better than random (Fisher Test, $p < 0.0001$).

Left-right symmetry in wing tip patterns Of the 10 skins examined for left-right symmetry, eight showed virtually identical patterns of black and white on p10-p5 of both left and right wings. The left and right wings of the other two birds were also similar, with the exception that in one, the size of the apical white spot on p7 was larger in the left than in the right wing, and in the another, the black spot at the tip of p5 was larger in the left wing than the right.

Consistency of wing tip patterns between moults Of the seven colour-marked birds examined in the hand in 1996 and 1997, primary type of p5-p10 remained consistent from one year to the next. One bird had an "all white" p5 in 1996 and a "black spot(s)" p5 in 1997. Another had a "black spot(s)" p5 in 1996 and an "all white" p5 in 1997. In another, p6 was categorised as a "black bar" in 1996 and a "white spot" in 1997. Viewed another way, of the 42 (7 birds by 6 primaries categorised) possible opportunities for a primary to change type in the two years, they did so on only three occasions (7%).

DISCUSSION

Patterns of black and white at the tip of some primaries varied substantially between individual Black-legged Kittiwakes in this study. Such variation was readily observable in the field with a spotting scope or binoculars, and could be used to differentiate between members of the pair at the nest-site. Once partners were distinguished in this manner, it was a relatively straightforward matter to determine the sex of the birds through observations of courtship feeding or copulation, and then follow the activities of individual, known-sex birds at the nest. Clearly, it would be preferable to capture and mark birds for individual recognition if disruption to breeding activities was minimal; however, observation of wing tip patterns provides a reasonable and practical alternative in many situations. The method does not work well when several birds are visiting a nest-site and nest-site "ownership" has not been established. In these cases, birds may not visit the site long enough to be able to observe wing tip patterns, or there may be too many birds visiting a nest-site to keep track of individuals. However, these cases are relatively rare compared with the usual pattern where only two birds are ever seen at a particular nest-site from the point at which the site becomes occupied.

Rather than categorise and sketch every primary of those individual birds of interest, a more efficient method would be to record the minimum information necessary to distinguish mates. Ideally this would involve identifying one key difference in the wing tip pattern that could be used "at a glance" to identify mates. Based on the diversity and evenness of types seen in each of the classified primaries, and other patterns of inter-individual variation, I recommend the following procedure:

- Record the type of p5 and p6 based on the classification system described here; in particular, look for "white spot" vs. "black bar" on p6 and the presence of any black on p5;
- Sketch the shape of the black patch(es) in p5 and p6; look for asymmetry between feather vanes, the shape of the demarcation between black and white, and the number and position of any black spots;
- Record the outermost primary showing an apical white spot; this will usually be p7 or p8; and
- Note the relative size (between mates) of apical white spots on p6-p8.

The system of individual identification described here relies on the relative differences in wing tip patterns between mates at the nest. As such, it is not analogous to the use of human fingerprints or the ventral fluke patterns of humpbacks to uniquely identify individuals. It is likely that because of the degrees of freedom available for variation, a full description would yield a unique wing tip pattern for each bird. However, some birds may be separable only through careful measurements of birds in the hand, rather than at a distance. How consistent these patterns might be over the lifetime of a bird is not known; the data presented here suggest some degree of consistency at least across two successive moults. Bretagnolle *et al.* (1994) found that the unique pattern of head markings in Ospreys was similar in four individuals observed over two successive years, but that the dark markings were larger in the second year than in the first. The authors suggested that there may be an age effect whereby the dark head markings increase in size with age. There also may be an age effect with Black-legged Kittiwake wing tip patterns; Black-legged Kittiwake chicks and fledglings show more black in the wing tips than adults (*pers. obs.)* and Coulson (1959) found that immature Black-legged Kittiwakes could be distinguished from breeders by the more extensive black on the outer vane of the outermost primaries. Perhaps in Black-legged Kittiwakes, wing tip patterns change as the bird matures, then stabilise for the remainder of the bird's lifetime.

Several other species of gulls have black-tipped outer primaries with various amounts of white within the black ("mirrors") and/or at the extreme primary tips. It is reasonable to expect inter-individual variation in wing tip patterns of these species, and it may be fruitful for investigators to inspect wing tip patterns closely if they need to identify individual birds in situations where alternatives to capture and colour marking are sought.

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HERKENNING VAN DRIETEENMEEUWEN *RISSA TRIDACTYLA* OP DE NESTPLAATS MET BEHULP VAN HET PATROON OP DE VLEUGELPUNT

Bij Drieteenmeeuwen *Rissa tridactyla* in arctisch Canada en Newfoundland werden individuele verschillen in het zwart-witpatroon op de punten van de buitenste handpennen (P) vastgesteld. Aan de hand van de hoeveelheid wit op de punt werden vijf typen onderscheiden. Afhankelijk van de locatie vertoonden P5 en P6 de meeste, individuele variatie. In vergelijking met P9 en P10 die vrijwel alle tot één type behoorden, waren P5 en P6 gelijkmatiger over de vijf typen verdeeld (tabel 1). De beschreven variatie werd gekwantificeerd met de Shannon-Weaverindex. Vorm, aantal en positie van de zwarte vlekken op de punt van P5 en P6 vertoonden ook individuele variatie, evenals de relatieve grootte van de apicale vlekken op P6 t/m 10. De beschreven verschillen konden in het veld gebruikt worden om beide partners van een paar op de nestplaats met 100% zekerheid van

elkaar te onderscheiden. Het patroon op de linker- en rechtervleugel was vrijwel gelijk. Ook het patroon na twee opeenvolgende ruicycli was vrijwel altijd gelijk. In situaties waarbij het ongewenst of onmogelijk is om vogels op de nestplaats te vangen en te merken maakt de combinatie van waarnemingen van *courtship feeding* of copulatie en individuele variatie in het patroon van de vleugelpunt studie van vogels met bekend geslacht mogelijk. Andere meeuwensoorten vertonen mogelijk een vergelijkbare, individuele variatie in patroon op de vleugelpunt.

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STATUS OF THE LESSER BLACK-BACKED GULL *LARUS [FUSCUS] GRAELLSII*[1] IN TRINIDAD AND TOBAGO

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Hayes F.E., White G.L., Kenefick M. & Kilpatrick H.. 2002. Status of the Lesser Black-backed Gull *Larus [fuscus] graellsii* in Trinidad and Tobago. Atlantic Seabirds 4(3): 91-100. *The Lesser Black-backed Gull* Larus [fuscus] graellsii *is an Old World species whose numbers have increased dramatically in the New World, but its status in South America is poorly documented. We summarise data for 36 records of an estimated 51 individuals (70.6% immature, 29.4% adult) in western Trinidad (47 ind.) and southwestern Tobago (4) from August 1978 through April 2002. All associated with flocks of Laughing Gull* L. atricilla *along the coast. Most records were in winter (esp. Jan-Feb), but four stayed in Trinidad throughout the summer of 2000. A few individuals that first appeared in March-April may have been northbound migrants wintering farther south. Up to 13 individuals occurred during autumn-spring in Trinidad and up to two in Tobago. Maximum daily counts included eight for Trinidad and two for Tobago. The gulls may have arrived by migrating southward across the Caribbean or westward across the central Atlantic.*

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INTRODUCTION

The Lesser Black-backed Gull *Larus [fuscus] graellsii*[1] is an Old World species whose numbers have increased dramatically in the Americas during the past decades (Post & Lewis 1995). Although most New World records are from North America, the species has been recorded from several localities in the Caribbean and northeastern South America (Post & Lewis 1995; Raffaele *et al.* 1998; Ebels 2002), including Trinidad and Tobago (ffrench 1991), where its current status is not well known. In this paper we summarise the historical and current status of the Lesser Black-backed Gull in Trinidad and Tobago, and provide data on habitat use, seasonality, maximum counts, age classes, plumage, and moults. We further discuss their potential migratory routes.

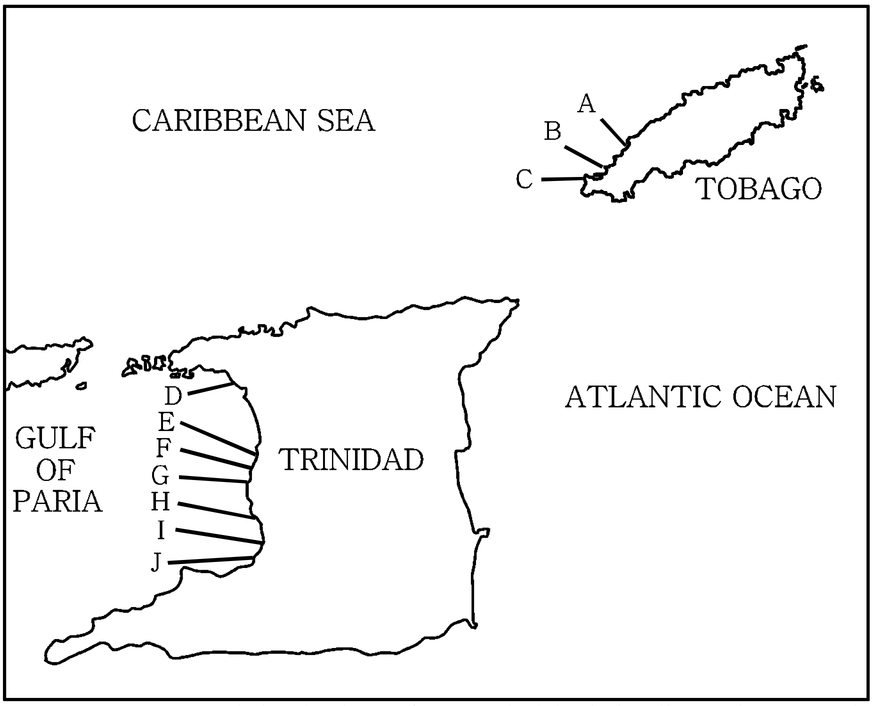

Figure 1. Sites in Trinidad and Tobago of Lesser Black-backed Gull records. A = Turtle Beach; B = Buccoo; C = Pigeon Point; D = Port of Spain; E = Waterloo; F = Orange Valley; G = Carli Bay; H = Claxton Bay; I = Pointe-a-Pierre; J = San Fernando.

Figuur 1. Locaties in Trinidad en Tobago waar Kleine Mantelmeeuwen zijn waargenomen (zie voor verklaring het Engelstalige onderschrift).

STUDY AREA AND METHODS

The islands of Trinidad and Tobago are located on the continental shelf of South America just north of the Orinoco River Delta. The relatively shallow Gulf of Paria separates Trinidad from the continental mainland and borders Trinidad's west coast, where several major ports, along with several extensive tidal mudflats, are located; elsewhere in Trinidad the ports and mudflats are relatively insignificant. Tobago, which is located between the Caribbean Sea and Atlantic Ocean, offers only two major ports. Extensive sandbars and rocks, but no mudflats, are exposed during low tide in southwest Tobago. Fishing boats operate along all coastlines of Trinidad, but attract large numbers of gulls only in the Gulf of Paria.

We compiled data on published records and recent sightings of Lesser Black-backed Gulls in Trinidad and Tobago. From autumn 1997 to summer 2002, we routinely scanned flocks of wintering Laughing Gulls *Larus atricilla* for rare species of gulls at various localities along the west coast of Trinidad. During 1997-2000 our efforts were concentrated at Waterloo and Orange Valley. During 2000-2002 we expanded our searches southward to include San Fernando. With the aid of binoculars and telescopes, we attempted to age all Lesser Black-backed Gulls encountered by the criteria of Harrison (1983) and Grant (1986); although precise ageing, especially of older immatures, is complicated by the extreme variability in moult strategies. We scrutinised individual birds for unique features in bill colouration, plumage and moult, which helped distinguish them from other individuals.

RESULTS

We compiled 36 records of an estimated 51 individual Lesser Black-backed Gulls in Trinidad and Tobago (Table 1). Of these, 32 records of 47 individuals are from Trinidad and only four records of four individuals are from Tobago. Some records presumably refer to the same individuals returning for consecutive winters. The first record was on 25 August 1978 (ffrench 1979). Ring recoveries are lacking but several records from Trinidad have been documented by photographs.

In Trinidad, all records are from the west coast, which is a major wintering area for Laughing Gulls (up to 5000) and other gull species (Hayes *et al.* unpubl. data). The wintering gulls often congregated on mudflats during low tide, with the highest concentrations in the vicinity of Waterloo, Orange Valley and Pointe-a-Pierre, during January-March; large numbers (up to 2000) also congregated at the wharf and fish market at San Fernando during high tide (Hayes *et al.* unpubl. data). All Lesser Black-backed Gulls were seen along the coast, with the exception of one individual in a sewage pond 600 m from the coast in 1985. In Tobago, all records were from the western end of the island, where several hundred Laughing Gulls often congregated at Turtle Beach, Buccoo Reef and Pigeon Point.

Wintering Lesser Black-backed Gulls began to arrive in August and September; numbers peaked in January and February, and declined afterward (Table 2). Several individuals were first detected in March (one in 1999) and April (two in 2000). In 2000, at least one adult and three immatures remained all summer (Table 1), providing the first summer records; in 2002, an immature lingered until at least 15 June. A distinctive third-fourth winter immature, thought to be the same individual with a black smudge on the tip of the upper

Table 1. Lesser Black-backed Gull records in Trinidad and Tobago.
Tabel 1. Waarnemingen van Kleine Mantelmeeuwen in Trinidad en Tobago.

Location	Date	Number and age	Source[b]
TRINIDAD			
Claxton Bay	25 Aug-09 Sep 1978	1 ad.	ffrench 1979
Pointe-a-Pierre	Sep-Oct 1979	2 ad.	ffrench 1981
Pointe-a-Pierre	11 Oct 1983	1 ad.	ffrench 1983
San Fernando	23 Apr 1984	1 ad.; 1 imm.	Norton 1984
Port of Spain	06 Oct 1985	1 3rd-yr. imm.[a]	Hayes & White 2000[c]
Waterloo	26 Dec 1993	1 ad.; 1 1st- or 2nd-yr.	ffrench & Hayes 1998[c]
Waterloo	11 Jan 1996	1 subadult (3rd-yr. imm.?)	ffrench & Hayes 1998[c]
Cangrejos Bay	21 Dec 1997	1 ad.	White & Hayes 2002[c]
Waterloo	08 Dec 97-11 Jan 98	3 1st-yr. imm.	White & Hayes 2002[c]
Waterloo/Or. Valley	11 Jan-01 Mar 1998	1 3rd-yr. imm.	White & Hayes 2002[c]
Waterloo	22 Feb-01 Mar 1998	1 2nd-yr. imm.	White & Hayes 2002[c]
Waterloo	06 Dec 98-03 Jan 99	1 3rd-yr. imm.	GW, FH
Port of Spain	05 Jan 1999	1 1st-yr. imm.	DM, FH
Waterloo	14 Mar 1999	1 ad.	White & Hayes 2002[c]
Waterloo/Or. Valley	26 Dec 99-10 Feb 01	1 1st-yr. to 2nd-yr. imm.[a]	FH
Waterloo/Or. Valley	09 Jan-12 Apr 2000 04 Oct 00- 19 Feb 01	1 3rd/4th-yr. imm.[a] (absent during summer)	GW, FH, MK
Orange Valley	12 Feb-20 Apr 2000	1 3rd-yr. imm.	FH, GW
Orange Valley/ San Fernando	12 Feb-12 Apr 2000	2 2nd to 3rd-yr. imm.[a]	FH, GW, MK
Waterloo/Or. Valley	27 Feb-01 Mar 2000	1 1st-yr. imm.	FH, GW
Waterloo	11 Apr 00-12 Apr 01	1 ad.[a]	GW, FH, MK
Waterloo	20 Apr 2000	1 3rd/4th-yr. imm.	GW
San Fernando	10 Nov 00-11 Mar 01	2 ad.[a]	FH, MK, HK
San Fernando	10 Nov 00-11 Mar 01	2 2nd-yr. imm.	FH, MK, HK
Waterloo/San Fernando	03 Dec 00-11 Mar 01	3 1st-yr. imm.	GW, FH, HK
Waterloo/Or. Valley	03 Dec 00-03 Mar 01	1 3rd/4th yr. imm.	GW, FH, MK
San Fernando	21 Jan 2001	1 3rd/4th yr. imm.	FH
Waterloo/Carli Bay/ San Fernando	23 Sep 01-27 Jan 02	2 ad.	MK, FH, HK
Waterloo/San Fernando	26 Sep 01 - 26 Feb 02	2 2nd-yr. imm.[a]	MK, FH, HK
San Fernando	02 Dec 01- 26 Feb 02	1 2nd-yr. imm.[a]	FH, HK
San Fernando	12 Jan-15 June 2002	4 1st-yr. imm.[a]	FH, HK, MK
San Fernando	09-26 Feb 2002	1 3rd-yr. imm.	FH, HK, MK
San Fernando	24 Mar 2002	1 3rd/4th-yr. imm.	FH
TOBAGO			
Buccoo	14 Jan 1988	1 ad.	ffrench 1991
Turtle Beach	19 Jan 1992	1 1st-yr. imm.	ffrench 1993
Turtle Beach	15 Jan-20 Mar 1997	1 1st-yr. imm.	ffrench & White 1999[c]
Pigeon Point	20 Mar 1997	1 ad.	ffrench & White 1999[c]

[a]photographed; many are posted at Southeastern Caribbean Birds Photo Gallery website (http://www.geocities.com/secaribbirds); [b]observers: Floyd E. Hayes (FH), Martyn Kenefick (MK), Howard Kilpatrick (HK), Douglas B. McNair (DM), Graham White (GW); [c]accepted by the Trinidad and Tobago Rare Bird Committee (Hayes and White 2000, White and Hayes 2002)

Table 2. Seasonal distribution of Lesser Black-backed Gull in Trinidad and Tobago by year, based on actual observations of the minimum number of individuals of adults (a) or immatures (i) per month. Birds thought to represent the same individuals from one extreme date to another are not included for intervening months not observed.

Tabel 2. Verdeling van waargenomen Kleine Mantelmeeuwen in Trinidad en Tobago (minimum aantal verschillende exemplaren). a= adult, i = onvolwassen.

YEAR	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
TRINIDAD												
1978	-	-	-	-	-	-	-	1a	1a	-	-	-
1979	-	-	-	-	-	-	-	-	2a	2a	-	-
1983	-	-	-	1i 1a	-	-	-	-	-	1a	-	-
1985	-	-	-	-	-	-	-	-	-	1i	-	-
1993	-	-	-	-	-	-	-	-	-	-	-	1i, 1a
1996	1i	-	-	-	-	-	-	-	-	-	-	-
1997	-	-	-	-	-	-	-	-	-	-	-	1i, 1a
1998	4i	2i	2i	-	-	-	-	-	-	-	-	1i
1999	2i	-	1a	-	-	-	-	-	-	-	-	1i
2000	1a	4i, 1a	-	5i, 1a	2i, 1a	3i, 1a	3i, 1a	1i, 1a	3i, 1a	2i, 1a	3i, 1a	6i, 1a
2001	7i, 1a	7i, 3a	4i, 3a	1a	-	-	-	-	1i, 1a	-	1i, 1a	2i, 2a
2002	4i, 2a	6i, 1a	3i	3i	2i	1i	-	-	-			
TOBAGO												
1988	1a	-	-	-	-	-	-	-	-	-	-	-
1992	1i	-	-	-	-	-	-	-	-	-	-	-
1997	1i	1i	1i, 1a	-	-	-	-	-	-	-	-	-
Trinidad	22	24	13	12	5	5	4	3	9	7	6	17
Tobago	3	1	2	-	-	-	-	-	-	-	-	-
TOTALS	25	25	15	12	5	5	4	3	9	7	6	17

bill, was present during winter 1999-2000, disappeared during summer 2000 and reappeared in winter 2000-2001 (Table 1).

In Trinidad, at least six different Lesser Black-backed Gulls were identified along the west coast of Trinidad during winter 1997-98, three during 1998-99, eight during 1999-2000, 13 during 2000-01 and 11 during 2001-02 (Table 1). Daily high counts increased consistently, with four on 11 January 1998 (White *et al.*), five on 20 April 2000 (White), six on 3 December 2000

(White et. al.), seven on 27 February 2001 (Hayes) and eight on 10 February 2001 (Hayes). The high count in Tobago was two on 20 March 1997 (Hayes).

Of an estimated 51 different birds, 36 (70.6%) were immatures and 15 (29.4%) were adults. Of the immatures, 15 were identified as first-winter, eight as second-winter, one as first/second-winter and 11 as third/fourth-winter (summering first- and second-winter birds moved up an age class during the subsequent autumn). All adults and older immatures appeared to be relatively light-mantled, representing *L. graellsii* of the southern end of their distribution range rather than dark-mantled individuals of the central North Sea (previously named *L. f. intermedius*), which are by far the most numerous occurring in North America (Post & Lewis 1995).

The scapulars, wing coverts and tertials were often moulted during winter; the remiges and rectrices were replaced in late summer and autumn individuals and invariably appeared worn in spring and summer individuals. An unusually fresh first-winter immature photographed on 24 Mar 2002 (Hayes) had just moulted its scapulars, coverts and tertials in one wave. All first-winter birds were dark-billed, except one with a distinctly yellowish tip and late spring and summer individuals which were acquiring a pale base. All second-winter immatures had notably pale-based bills except one whose bill was about 95% dark. A few advanced third-winter or fourth-winter immatures had yellow bills with a black smudge or dot near the tip.

DISCUSSION

Our observations indicate that the Lesser Black-backed Gull is currently an uncommon winter and rare summer visitor to Trinidad, and a rare winter visitor to Tobago. Records are no longer reviewed by the Trinidad and Tobago Rare Bird Committee (White & Hayes 2002). The west coast of Trinidad hosts the greatest numbers of Lesser Black-backed Gull in the Caribbean and South America. Furthermore, its occurrence in Trinidad is undoubtedly linked to the abundance of wintering Laughing Gulls, with which it invariably associates, and the local fishing industry. Although Herklots (1961) stated that Laughing Gulls were never seen in large numbers in Trinidad and Tobago, ffrench (1973, 1991) reported them to be most common from March-November, when flocks of up to 2000 birds were recorded along the west coast of Trinidad at Pointe-a-Pierre, but less common or absent during December-March, with flocks of up to 500 at Pointe-a-Pierre and 200 at Port of Spain. In recent years we have observed larger numbers of Laughing Gull along the west coast of Trinidad during winter than during other months of the year (Hayes *et al.* unpubl. data), suggesting that Laughing Gull numbers are increasing and their seasonal occurrence is changing.

Lesser Black-backed Gull associated with Laughing Gulls, San Fernando Trinidad
Kleine Mantelmeeuw tussen de Lachmeeuwen, San Fernando Trinidad *(F.E. Hayes)*

The seemingly dramatic increase in Lesser Black-backed Gull populations in Trinidad and Tobago within the past 5 years is undoubtedly attributable to increased scrutiny of Laughing Gull flocks, especially in San Fernando. Nevertheless, their numbers have increased within the past several decades, paralleling the increase in North American populations (Post & Lewis 1995). In recent years the Lesser Black-backed Gull greatly outnumbered other vagrant gull species in Trinidad and Tobago. From December 1997 to April 2002, we recorded an estimated 41 different Lesser Black-backed Gulls (some may have returned for consecutive winters) along the west coast of Trinidad (Table 1). During this period the only other vagrant gull species that we observed in these areas included an estimated six Franklin's Gulls *L. pipixcan* (McNair *et al.* 2002), three Black-headed Gulls *L. ridibundus*, five Ring-billed Gulls *L. delawarensis*, two Kelp Gulls *L. dominicanus* (Hayes *et al.* 2002) and a Sabine's Gull *L. sabini*.

Given the complex variation of moult schedules in Lesser Black-backed Gull, our data on age classes should be viewed with caution. First-winter birds were generally distinctive, but advanced individuals of a given age class often resembled older birds and retarded individuals resembled younger (Grant 1986).

Nevertheless, our data provide evidence that immatures, especially first-year birds, are more likely to stray to Trinidad and Tobago than adults. Unfortunately we obtained few useful details on moult cycles. Because of the paucity of information on moult in Lesser Black-backed Gulls in tropical latitudes, further details on moult patterns should be acquired by experienced observers.

We postulate three hypothetical migratory routes for the autumn-winter arrival of Lesser Black-backed Gulls in Trinidad and Tobago: (1) flying westward across the tropical Atlantic directly from southwestern Europe; (2) flying southward through the Lesser Antilles from southeastern North America; or (3) flying southward along Central America and then eastward along the coast of northern South America.

The first hypothesis is supported by the near absence of this species in the western Caribbean (thus discrediting the third hypothesis), its rarity throughout the northern and eastern Caribbean (Post & Lewis 1995; Raffaele *et al.* 1998; Ebels 2002), and its apparent regularity along the northeastern coast of South America in French Guiana (Tostain & Dujardin 1989) and Trinidad. However, there are only a few records for Barbados (E. Massiah & T. Frost *pers. comm.*), where other species of Eurasian vagrants occur more frequently than in other parts of the Caribbean (e.g. Raffaele *et al.* 1998) and are thought to have crossed the tropical Atlantic directly from south-western Europe. The rarity of Lesser Black-backed Gulls elsewhere in the Caribbean may be attributed to the paucity of observers and to the scarcity of Laughing Gulls wintering in the region (Raffaele *et al.* 1998; Ebels 2002). Lesser Black-backed Gulls migrating from southeastern North America could feasibly pass through the eastern Caribbean without detection before encountering and lingering with the large flocks of Laughing Gulls wintering in Trinidad and Tobago. The first appearance of several adults in March and April suggest that they were northbound migrants that had wintered farther south (e.g., French Guiana) or had wandered across the Atlantic from northern Africa. In conclusion, the migratory route of Lesser Black-backed Gulls wintering in Trinidad and Tobago remains uncertain.

Finally, given the potential pitfalls of identifying gulls, especially immatures (Harrison 1983; Grant 1986), all large gulls within the region should be carefully scrutinised. In Trinidad, observers have mistakenly identified an immature Lesser Black-backed Gull as a Herring Gull (*L. argentatus*), an immature Lesser Black-backed Gull as a Yellow-legged Gull (*L. michahellis*), and an adult Kelp Gull as an adult Lesser Black-backed Gull. The recent appearance of several tentatively identified Yellow-legged Gulls in Barbados during the winter of 1999-2000 (E. Massiah, T. Frost & M. Gawn *pers. comm.*) suggests that some of our Lesser Black-backed Gulls could have been misidentified Yellow-legged Gulls. Although the upperparts of all adults and older immatures appeared too dark (darker than Laughing Gulls), first-year birds are extremely difficult to distinguish in the field. Several colleagues have pointed out that some of our photographs of immature Lesser Black-backed Gulls appear to be atypical. For example, a first-summer immature photographed at Waterloo, Trinidad, on 10 July 2000 (White), appears to be too bulky and short-winged for a Lesser Black-backed Gull and may represent a Kelp Gull (L. Atherton, A. Jaramillo & M. Reid *pers. comm.*). The recent hybridization of Kelp Gulls with Herring Gulls in Louisiana poses another identification problem in that F1 hybrids resemble Lesser Black-backed Gulls, but are larger and have a more restricted dark wedge on the under surface of the primaries (Dittmann & Cardiff 1998). All large gulls, especially immatures, should be documented by detailed descriptions and photographs (if possible) in order to facilitate accurate identification.

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STATUS VAN KLEINE MANTELMEEUW *LARUS GRAELLSII* OP TRINIDAD EN TOBAGO

De Kleine Mantelmeeuw *Larus graellsii* is een soort van de Oude Wereld, waarvan de aantallen in de Nieuwe Wereld sterk zijn toegenomen. De status in Zuid-Amerika is echter nauwelijks gedocumenteerd. In dit artikel worden 36 waarnemingen van 51 individuen (70.6% onvolwassen, 29.4% adult) van augustus 1978 t/m april 2002 in westelijk Trinidad (47 ind) en zuidwestelijk Tobago (4 ind) gepresenteerd (tabel 1). Alle vogels waren geassocieerd met Lachmeeuwen *L. atricilla* langs de kust. De meeste waarnemingen werden in de winter gedaan, met name in januari en februari (tabel 2). Vier vogels bleven de zomer van 2000 in Trinidad. Een paar individuen die in maart en april opdoken, waren mogelijk noordwaarts trekkende overwinteraars uit meer zuidelijk gelegen gebieden. Tijdens de herfst-lente kwamen tot 13 individuen voor in Trinidad en tot twee in Tobago. Dagmaxima bedroegen acht vogels in Trinidad en twee in Tobago. Kleine Mantelmeeuwen kunnen in Trinidad en Tobago terecht komen door zuidwaartse trek door het Caribisch gebied of westwaartse trek over de centrale Atlantische Oceaan.

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[1] Nomenclature followed in this article is according to the Dutch Commission for Avian Systematics (*Ardea 87: 139-165*): *Larus graellsii* formerly/elsewhere known as *Larus fuscus graellsii* and *Larus fuscus intermedius,* both are now considered conspecific and specifically distinct from the Baltic Gull *Larus fuscus*, formerly known as the third race, *Larus fuscus fuscus*.

MOVEMENTS OF YELLOW-LEGGED GULLS *LARUS [CACHINNANS] MICHAHELLIS*[1] FROM TWO SMALL WESTERN MEDITERRANEAN COLONIES

ALEJANDRO MARTÍNEZ-ABRAÍN[1], DANIEL ORO[1], JOSEP CARDA[2] & XAVIER DEL SEÑOR[2]

Martínez-Abraín A., Oro D., Carda J.& del Señor X. 2002. Movements of Yellow-legged Gulls *Larus [cachinnans] michahellis* from two small western Mediterranean colonies. Atlantic Seabirds 4(3): 101-108. *In this study we analyse recoveries and resightings of ringed Yellow-legged Gulls* Larus [cachinnans] michahellis *from two small colonies located along the E and SE Mediterranean Iberian coast. Results show that birds follow the same migratory routes as birds of other colonies of the western Mediterranean. Gulls move to the Atlantic coast of France and Iberia after fledging, where they summer and winter, although equally important numbers probably remain close to their natal colonies. Immature gulls (1y + 2y) seem to return and stay in the vicinity of their natal colonies during spring. Long-range movements target Atlantic areas with a high primary production during periods of food scarcity in the western Mediterranean. Adult gulls probably do shorter-term long-range dispersal movements than juveniles and immatures, owing to their larger experience on where to find alternative food sources.*

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INTRODUCTION

Yellow-legged Gulls *Larus [cachinnans] michahellis* have become increasingly common during the last 30 years due to protection of breeding sites, development of industrial fisheries and proliferation of open-air garbage dumps. Today, the western Mediterranean population numbers at least 120 000 breeding pairs (Vidal *et al*. 1998). It is important to know the location of wintering quarters to understand patterns of winter survival which influence the growth of colonies.

Yellow-legged Gulls from the Iberian Mediterranean were considered as sedentary in the past owing to the paucity of observations through the Gibraltar Straits during autumn and spring migrations (Tellería 1981). More recently, a N-NW movement was identified, albeit it was at first thought to be mere summer dispersal, corresponding with the period of complete moult (Carrera *et al*. 1993). However, although Iberian Atlantic populations show non-

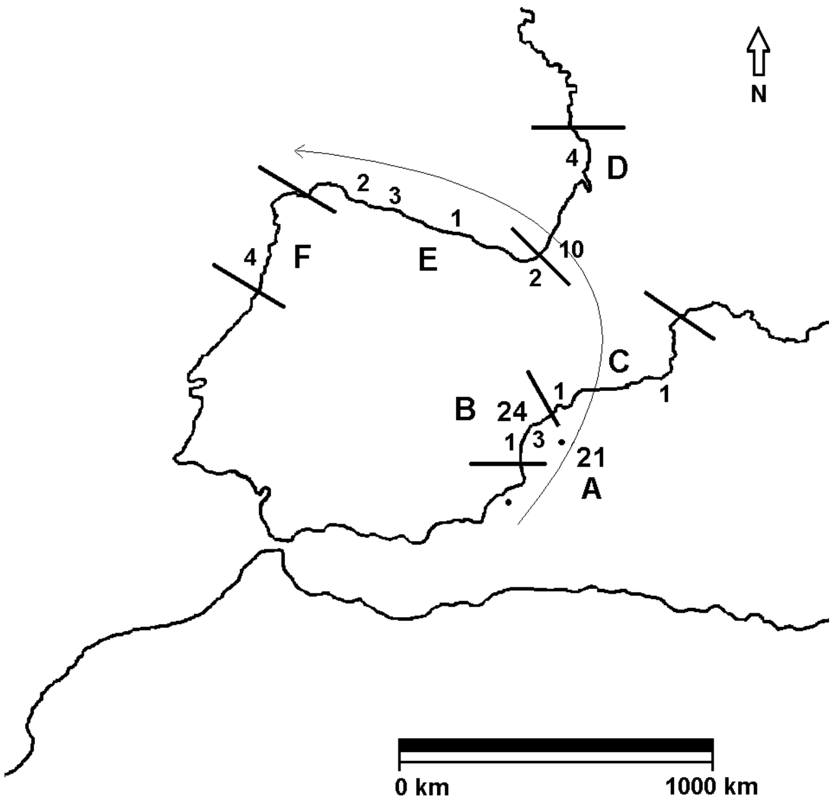

Figure 1. The number and approximate geographic location of recoveries and sightings of Yellow-legged Gulls ringed at colonies of the Columbretes Islands and the Island of Benidorm. Solid dots show the location of both islands and the solid arrow indicates the most likely overall migration route. Letters correspond to the geographical sectors used in the paper to study variations in migratory patterns in relation to age and season: A = Columbretes archipelago; B = East Iberian Mediterranean coast; C = Northeast Iberian Mediterranean coast; D = French Atlantic coast; E = Cantabric Iberian coast; F = North Portugal.

Figuur 1. Het aantal en de locatie van terugmeldingen en waarnemingen van geringde Geelpootmeeuwen afkomstig van de Columbretes Eilanden en het eiland Benidorm. Zwarte stippen geven de locatie van beide eilanden aan, de pijl geeft een indicatie van de meest waarschijnlijke trekweg. De letters corresponderen met de geografische sectoren die in dit artikel worden gebruikt: A = Columbretes archipel; B = Oost-Iberische Middellandse zeekust; C = Noordoost-Iberische Middellandse zeekust; D = Franse Atlantische kust; E = Cantabrische Iberische kust; F = Noord-Portugal.

migratory habits (Munilla 1997), it has been demonstrated that increasing numbers of western Mediterranean Yellow-legged Gulls undertake long summer migrations. Gulls fly overland to the Bay of Biscay, French Brittany, the English Channel, the southern North Sea and even to alpine lakes, following major river valleys (Yésou 1985, Le Mao & Yésou 1993, Carrera *et al*. 1993, Munilla 1997). Western Mediterranean birds known to migrate to the Atlantic and southern North Sea originate from Sardinia, colonies along the coast from the Hyères archipelago (France) to the Ebro Delta (Spain), the Balearic Islands and probably Corsica (Carrera *et al*. 1993). The aim of this paper is to characterise the migration routes, phenology and age structure of gulls ringed at two small colonies of the Western Mediterranean and compare this with information on Yellow-legged Gull migration reported so far.

METHODS

The study area includes the Columbretes archipelago and the island of Benidorm. The Columbretes archipelago is a protected area consisting of a 19 ha volcanic outcrop comprising four major islet groups, located ca. 57 km off Castellón (39º54'N, 00º41'E), close to the edge of a wide continental shelf. Gulls breed mainly on the largest of the islands, Grossa Island, with a surface area of about 13 ha. The number of breeding pairs, around 500 pairs, has not changed much over the last 15 years (Table 1). A total of 1411 chicks have been marked during annual campaigns since 1993. Since 1998 most chicks (471 chicks; Table 1) have been ringed with a yellow darvic band engraved with a black alphanumeric code (beginning either with 0 or 1) and with a metal ring. In 2001, gulls were only marked with darvic bands due to a lack of metal rings. The island of Benidorm is a 6.5 ha limestone outcrop at ca. 3 km off the coast of Benidorm (38º30'N, 00º08'E), 165 km to the south of the Columbretes Islands. The breeding population of Yellow-legged Gulls has tripled during 1999-2001 (Table 1) and 231 gulls have been marked in that same period. Of these, 201 were also marked with the same type of darvic bands as used in Columbretes and again, in 2001 gulls were only marked with darvic bands due to a lack of metal rings. No resighting effort was done on the island. Resightings of engraved darvic rings (with an individual and unique alphanumeric code) and recoveries of metal rings were considered together. The frequencies used should be seen as an index, combining information on relative abundance, degree of permanence and degree of fidelity of marked gulls to a given site, since we pooled all sighting data and not only one record for each individual resighted (*cf.* North 1987). Four age classes were considered:

1y juveniles in their first year of life,

2y	sub-adults in their second year of life,
3y	sub-adults in their third year of life, and
4y	adults in their fourth year or older.

Ages of birds recovered are given to the nearest year (i.e. gulls recovered after 1 May were considered to belong to the next year age class). Juvenile birds found dead at the breeding colony one year after ringing were not considered for dispersal analysis to avoid confusion in dating recoveries of fledglings, which probably died before fledging (see Coulson & Wooller 1976, Møller 1981). Recoveries were grouped in three sets of months:

March-June	breeding period
July-October	post-fledging dispersal, and
November-February	wintering

Contingency tables together with the Chi-square statistic were used when appropriate. Yate's correction was applied to 2x2 contingency tables (Zar 1984).

RESULTS

A total of 77 recoveries and sightings were reported up to the end of 2001, of which 73 (2 metal rings, 71 darvic rings) corresponded to 41 individuals ringed at the Columbretes archipelago. Of the 71 resightings of darvic bands, 14 corresponded to sightings of gulls ringed at Columbretes as adults. These sightings corresponded to five individual birds, controlled several times from March to October at their colony of origin. Only 4 resightings of gulls from Benidorm were reported, all on sites located further north from Benidorm where gulls from Columbretes were also recorded.

Young gulls performed large-scale movements. Juvenile birds seemed to move north along the Mediterranean coast and once they reached the French border they moved west or northwest across the continent to reach French Brittany, the Bay of Biscay (Cantabria, Asturias) and up to the north coast of Portugal (Figure 1 and Table 2). Juvenile gulls seemed to reach their long-distance dispersal quarters not before September, since most sightings occurred in winter (November-February; Table 2) and provided that a constant effort between months is assumed. In contrast, Carrera *et al.* (1993) reported that the bulk of Yellow-legged Gulls arrive to their summer quarters during the second half of July.

A contingency analysis revealed highly significant differences in the proportions of gulls resighted close (sectors A+B+C, see Figure 1) or far (D+E+F) from natal colonies within (March-June) or outside (July-February) the breeding season ($\chi^2_1 = 8.39$, $P < 0.01$). Studentised residuals of the

Table 1. Yellow-legged Gulls ringed at the Columbretes and Benidorm Islands, which have been recovered or resighted from 1993-2001. BP = number of breeding pairs. Number of adults between brackets.
Tabel 1. Op de Columbretes en op Benidorm geringde Geelpootmeeuwen die tussen 1993 en 2001 werden teruggevonden of teruggezien. BP = aantal broedparen. Het aantal adulte vogels is tussen haakjes weergegeven.

		COLUMBRETES				BENIDORM				
		Gulls ringed		Recoveries			Gulls ringed		Recoveries	
Year	BP	Metal	Darvic	Metal	Darvic	BP	Metal	Darvic	Metal	Darvic
1993	425	165	0	0	0					
1994	425	135	0	0	0					
1995	475	102	0	0	0					
1996	675	88	0	0	0					
1997	650	96	0	0	0					
1998	500	160	141	0	2					
1999	530	40 (51)	16 (12)	2	28(1)	193	18 (1)	18 (1)	0	1
2000	400	154 (13)	154 (13)	0	30(13)	361	126 (26)	96 (26)	0	0
2001	420	0	160	0	13	652	0	87	0	3
Total		940 (64)	471 (25)	2	71(14)		144 (27)	201 (27)	0	4

contingency table showed that the proportion of gulls resighted close to the Columbretes colony was higher during the breeding season whereas gulls outside the breeding season were equally frequently resighted close and far from the colonies.

DISCUSSION

Migratory routes The analysis of ringing recoveries suggests that the birds of the two colonies under study follow the same migratory routes as those of other western Mediterranean colonies studied so far (i.e. move north and northwest after fledging; see Carrera *et al.* 1993, Le Mao & Yésou 1993). This is probably because Yellow-legged Gulls simply follow the shortest way, and because they can find food on mainland sources (e.g. following river valleys). Oceanic seabirds like Balearic Shearwaters *Puffinus [puffinus] mauretanicus* travel from the western Mediterranean (Balearics) to similar post-nuptial quarters, but have to pass through Gibraltar Straits and follow the Atlantic Iberian coast (Le Mao & Yésou 1993).

Age and movements of gulls. According to our data, adult birds seem to be either sedentary or move north late in the season (November-February). The lack of observations of adult gulls during the winter months in northern

Table 2. Number of recoveries and sightings (number and proportion) of Yellow-legged Gulls ringed at Columbretes and Benidorm Islands by age and geographical sector (see Fig. 1). Percentages between brackets.
Tabel 2. Aantal terugmeldingen (en percentage) van Geelpootmeeuwen van verschillende leeftijden en van de diverse geografische sectoren (zie Fig. 1).

	March-June				July-October				November-February			
	1y	2y	3y	4y	1y	2y	3y	4y	1y	2y	3y	4y
Columbretes	3	1	1	9	0	0	1	5	0	1	0	0
	15.8%	9.1%	100%	100%			100%	100%		16.7%		
E Iberia	14	4	0	0	3	3	0	0	4	0	0	0
	73.7%	36.4%			50%	100%			25%			
NE Iberia	1	0	0	0	0	0	0	0	0	1	0	0
	5.3%									16.7%		
French Atl.	0	4	0	0	0	0	0	0	6	4	0	0
		36.4%							37.5%	66.7%		
Cantabric	1	2	0	0	2	0	0	0	3	0	0	0
	5.3%	18.2%			33.3%				18.8%			
N Portugal	0	0	0	0	1	0	0	0	3	0	0	0
					16.7%				18.8%			
Total	19	11	1	9	6	3	1	5	16	6	0	0

locations could alternatively be interpreted as an artefact, due to the low number of adults ringed. The chicks marked with darvic bands had not yet attained adult ages during our study. Munilla (1997) suggested that adult Yellow-legged Gulls ringed at Medes Islands (NW Mediterranean) performed long-range movements from July to February although Sol *et al*. (1995) found that adults from the Medes colony tended to stay closer to their natal colonies during the winter than juveniles. By direct observation of colonies outside the breeding season we know that a large number of adult and sub-adult gulls concentrate in both islands (Columbretes and Benidorm) in autumn (with decreasing numbers as winter begins) and that adult birds in colonies may start sexual displays and defence of territories as early as December (own data). However, if rough weather conditions prevail around colonies (e.g. during November-December), gulls may be deprived of one of their most important food sources (i.e. fisheries discards), since trawler boats can not work out at sea (Arcos 2001) and, hence, some gulls might be forced to move. This may be especially true for the Columbretes Islands, located much farther from the mainland coast than Benidorm Island, and where access to alternative food sources on the mainland becomes more difficult.

Juveniles and immatures were involved in long-range movements, as it is the case in other gull species (Coulson & Butterfield 1986, Belant & Dolbeer 1993). Young Yellow-legged Gulls did not travel north only to summer, as reported so far (Carrera *et al*. 1993), but also to overwinter. Results suggest that during spring immature gulls (1y + 2y) move south to the vicinity of their natal colonies, when food availability is more favourable due to oceanographic conditions.

Food abundance and movements Oceanographic conditions of the Mediterranean are characterised by the development of a thermocline, which forces a decrease in primary productivity during the summer (Rodríguez 1982; Margalef 1985). On the contrary, the coast of the French Brittany and the Bay of Biscay are dominated by upwellings and large surfaces of tidal flats where food is abundant (Le Mao & Yésou 1993). These features probably explain why gulls move northwards to their summer and winter quarters. However, since the ratio of adults to juveniles observed during the summer feeding behind trawler boats in the western Mediterranean is favourable to adults as a rule (Martínez-Abraín et al, 2002), it is likely that long-term long-range movements involve more juveniles and immatures than adults. In fact, first-age classes of other gull species breeding in the Mediterranean, like Audouin's Gull *Larus audouinii* are linked to other upwelling systems (Oro & Martínez-Vilalta 1994), whereas subadults and adults are more independent of these sites. Hence, the interaction among age, time period and location in Mediterranean Yellow-legged Gulls is probably mediated by the experience acquired by gulls on where to find alternative food sources as refuse tips or fishing discards.

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We are most grateful to the wardens of the Columbretes archipelago and Benidorm island for their help ringing gulls. We also thank a long list of friends who helped during ringing campaigns in both islands and all those anonymous persons that reported recoveries and sightings of rings and bands. Juan Jimenez (former director of the Columbretes Nature Reserve) always encouraged ringing efforts in Columbretes and first suggested the interest of beginning analysis of recoveries reported so far. Marc Bosch provided valuable ringing information. M.A. Monsalve kindly commented on an early draft of the paper.

TREKBEWEGINGEN VAN GEELPOOTMEEUWEN *LARUS MICHAHELLIS* AFKOMSTIG VAN TWEE KLEINE KOLONIES IN DE WESTELIJKE MIDDELLANDSE ZEE

Sinds 1993 worden jaarlijks Geelpootmeeuwen *Larus michahellis* geringd op de Columbretes eilanden op 57 km voor de kust van Castellón (39°54'N, 00°41'O). In totaal zijn 1411 kuikens geringd. Sinds 1998 wordt behalve een metalen ring ook een gele kleurring met inscriptie aangebracht. In 2001, toen de metalen ringen op waren, werden de vogels alleen met kleurringen gemerkt. Op het eiland Benidorm, 3 km voor de kust van Benidorm (38°30'N, 00°08'O) werden gedurende 1999-2001 eveneens Geelpootmeeuwen ge(kleur)ringd. Net als op de Columbretes eilanden ging het hier in 2001 alleen om kleurringen. In totaal werden 77 terugmeldingen verzameld, waarvan 73 van vogels van de Columbretes eilanden. Van deze groep ging het om twee terugmeldingen van metalen ringen en om 71 waarnemingen van gekleurringde vogels. Onder de

waargenomen individuen bevonden zich 14 meldingen van in totaal vijf verschillende adulte Geelpootmeeuwen in de omgeving van de kolonie. De jonge meeuwen bleken zich net als veel andere Geelpootmeeuwen in het westelijke Middellandse Zeegebied over veel langere afstanden te verplaatsen. De vogels trokken kennelijk noordwaarts tot aan de Franse grens en vervolgens noordwestelijk om over land Bretagne, de Golf van Biskaje en de noordkust van Portugal te bereiken. De uit de Middellandse Zee wegtrekkende vogels profiteren wellicht van de rijkere voedselaanbod door *upwelling* bij Bretagne en in de Golf van Biskaje in een periode waarin er in de Middellandse Zee minder te halen valt. De trek over land is mogelijk doordat de meeuwen ook in terrestrische habitats aan de kost kunnen komen.

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[1] *Larus cachinnans michahellis* is presently known as *Larus michahellis* on the Dutch list (*Ardea* 87: 139-165).

MAGELLANIC PENGUIN *SPHENISCUS MAGELLANICUS* AND FISH AS BYCATCH IN THE CORNALITO *SORGENTINIA INCISA* FISHERY AT PUERTO QUEQUÉN, ARGENTINA

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Tamini L.L., Perez J.E., Chiaramonte G.E. & Cappozzo H.L. 2002. Magellanic Penguin *Spheniscus magellanicus* and fish as bycatch in the cornalito *Sorgentinia incisa* fishery at Puerto Quequén, Argentina. Atlantic Seabirds 4(3): 109-114. *Bycatch rates of fish and Magellanic Penguins* Spheniscus magellanicus *in the cornalito* Sorgentinia incisa *fishery at Puerto Quequén, Argentina is described. An estimated 100 penguins may be killed annuallly in the fishery. Although of no likely impact by itself, this bycatch should be placed in the wider context of other impacts on Magellanic Penguin populations in Patagonia.*

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Some fishing gear is very selective in its operations, but most gear catches other, non-targeted organisms (Tillman 1993). During fishing operations the capture of non-target species (bycatch) causes a decrease in fishery efficiency, damages gear, and causes incidental mortality of other species, such as invertebrates, fish, birds and mammals (Hall 1996; Kennelly 1995). Most bycatch is discarded at sea dead or moribund because it has little or no economic value or because its retention is prohibited by law (Hall 1996).

Between 1990 and 1998, total landings in Argentina of cornalito *Sorgentinia incisa* (a silverside species) were over 335 tonnes (t) per year, reaching a maximum of 704 t in 1992 (Anon. 1990–1998). Landings at Puerto Quequén (38°37'S, 58°50'W; Fig. 1) over the same period peaked at 62.3 t in 1994 (14% of total Argentinean landings). As part of a bycatch study on the fleet operating from Puerto Quequén (27 coastal vessels), we worked with a small part of the fleet that fished cornalito when the species was available and there was market demand. This note describes the bycatch in this cornalito fishery.

The cornalito fishery uses a pelagic trawling gear, with a maximum headline length of 15 m and a minimum mesh size of 10 mm. Three sets of pair trawlers (22% of the coastal fleet) worked 11, eight and two fishing days per pair during the 1998 cornalito season (5 May to 5 June), landing 20.3 t (65% of

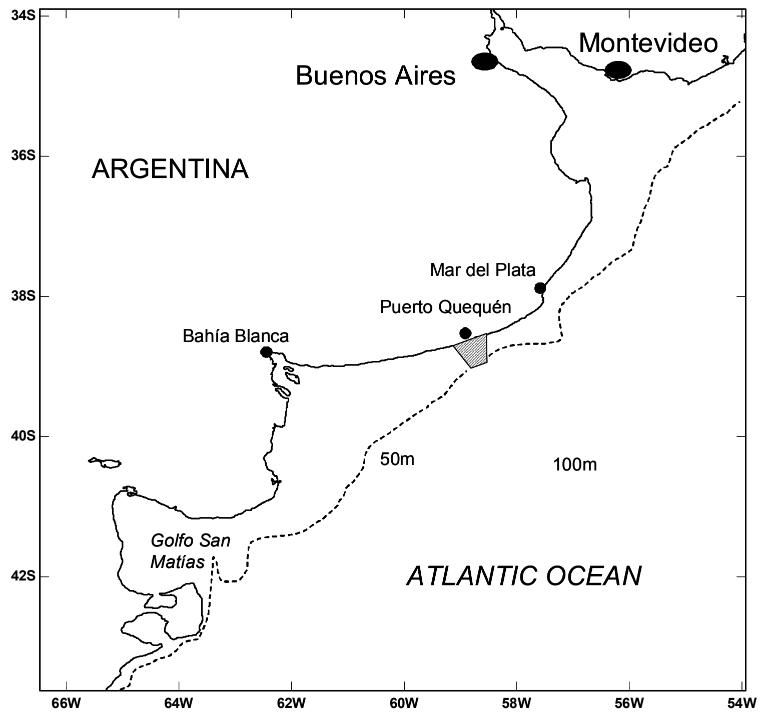

Figure 1. Puerto Quequén area; shaded: trawling grounds.
Figuur 1. Puerto Quequén; het gebied van de visserij is gearceerd.

the total landing for Argentina) at Puerto Quequén. One of the pairs was studied during fishing operations on 22 and 23 May by on-board observers. Data from nine fishing tows were analysed. For each tow, the position, duration, speed and depth of the trawl were recorded, as was the total catch, including bycatch. The material was analysed in the laboratory; we recorded the species composition, the weight (W) of each individual and, in the case of fish, the standard length (S_L). All specimens of fishes were identified using Menni *et al.* (1984). We estimated fishing effort (F_E) as

F_E = (observed tows/observed fishing trips) x total number of trips of the fleet during the season

and the Annual Fishing Mortality of bycatch as

$A_{FM} = n$/observed tows x F_E

Displayng Magellanic Pinguin, nature reserve Gypsy Cove northeast of Stanley (Falkland Islands) 8 February 2002 Balkende Magelhaenpinguïn in natuurreservaat Gypsy Cove ten noordoosten van Stanley (Falkland Islands) 8 februari 2002 *(CJ Camphuysen)*

where *n* = number of total specimens observed for the study season. In order to relate feeding behaviour of penguins with the target species of the fishery we collected the stomachs of three individuals and analysed their contents.

Trawl operations were diurnal (between 08:00 hrs and 18:00 hrs) and were made between 1.8 and 3.8 nautical miles (nm) from the coast (3.2 ± 0.6 nm); trawling duration was 80-120 mins (104 ± 15.4 mins) with a trajectory parallel to the coastline. Each trawl was conducted from 23.6-29.2 m depth (27.1 ± 2.2 m). The fishing effort of the fleet was 94.5 tows. Total biomass caught in the nine tows was 2817.2 kg. Fishing operations reported a biomass of 307.7 ± 73.4 kg tow^{-1} of cornalito. The bycatch biomass (Table 1) was 48.2 kg (1.7% of the total biomass captured) and consisted of fish (1.8 kg tow^{-1}) and birds (3.5 kg tow^{-1}). The fish identified as bycatch were: another silverside species, locally named pejerrey *Odonthestes sp*. (frequency of occurrence, f_o = 100%, *n* = 46); blue fish *Pomatomus saltatrix* (f_o = 55%, *n* = 67); parona leatherjack *Parona signata* (f_o = 33%, *n* = 7); and the anchovy *Lycengraulis grossidens* (f_o = 11%, *n* = 1). The only bird species identified in the bycatch was the Magellanic penguin *Spheniscus magellanicus* (f_o = 55%, *n* = 9). The A_{FM} for each species is given in Table 1. The S_L of the pejerrey was between 250 to 295

Table 1. Overall abundance of bycatch from the cornalito fishery at Puerto Quequén. n = number of individuals, B = biomass, F_o = frequency of occurrence, A_{FM} = annual fishing mortality.
Tabel 1. Bijvangsten in de cornalito visserij bij Puerto Quequén. n= number of individuals, B = biomassa, F_o = frequentie van voorkomen, A_{FM} = jaarlijkse sterfte door visserij.

Taxon	*n*	%	B (kg)	% B	F_o	A_{FM}
Silverside *Odonthestes sp.*	46	35.4	10.4	21.6	1.0	483.0
Blue fish *Pomatomus saltatrix*	67	51.5	3.2	6.6	0.5	703.5
Parona leatherjack *Parona signata*	7	5.4	2.6	5.4	0.3	73.5
Anchovy *Lycengraulis grossidens*	1	0.8	0.1	0.2	0.1	10.5
Magellanic Penguin *S. magellanicus*	9	6.9	31.9	66.2	0.5	99.2
TOTAL	130	100	48.2	100		

mm and for the blue fish, the sample of which contained a greater proportion of juveniles, between 55 to 300 mm.

The Magellanic penguin comprised 66.3% of total bycatch biomass; of the nine specimens collected three were juveniles. Two of three penguin stomachs analysed contained cornalito exclusively, while the third contained cornalito plus one blue fish. The total weights of the stomach contents were 75, 155 and 270 g respectively. The stomach contents of each penguin comprised five, six and five intact cornalito specimens (69 ± 18 mm S_L, 2.9 ± 1.5 g), and other cornalito specimens partially digested. There were 75 cornalito heads in the stomach weighing 270 g.

This study was developed using data from approximately 22% of the fleet working in the cornalito fishery during 1998. Immature blue fish were numerically the most common species present in the bycatch. Considering the penguin annual mortality associated with this fishery (around 100 specimens/year; Table 1) and the total population estimated for Magellanic penguin in Argentina (about 2 million breeding individuals; Yorio *et al.* 1999), the cornalito fishery studied would not by itself affect the population.

Furness & Monaghan (1987) point out that competition for prey is one of the most important interactions between seabirds and fisheries. Although some kind of interaction is certainly possible between the cornalito fishery and the piscivorous Magellanic Penguin, Frere *et al.* (1996) reported that fish other than cornalito were the principal prey of Magellanic Penguins along the Patagonian coast in summer. *Austroatherina* (=*Sorgentinia*) sp. was a secondary prey item (f_o 7% and 27%) in two of the three localities that were sampled but they were not found in the samples taken nearest our study area. This is probably due to a combination of the offshore-inshore and north-south movements of the cornalito schools, and the season of the samples - summer in the case of Frere *et al.* (1996) and autumn in the present study.

This kind of fishing is very selective and little bycatch results (1.7% of the total biomass). Compared to other fisheries studied (e.g. Andrew & Pepperell 1992; Fenessy 1994; Liggins *et al*. 1996; McBride & Fotland 1996; Penchaszadeh *et al*. 1984; Pettovello 1999) the cornalito fishery in Puerto Quequén is very efficient and would appear to have a low impact on non-target species. However, other impacts, including fisheries, on Magellanic Penguin populations demand that bycatch should be minimised; several thousand birds are killed each fishing season by gill-net fisheries off the coast of southern Patagonia (Gandini & Frere 2000) and an estimated 40 000+ birds are killed annually by chronic oil pollution off the coast of Argentina (Gandini *et al*. 1994).

We are grateful to the crews of the fishing vessels *Dele Dele* and *La Cruz del Sur* and their captains Roque Incorvaia and Marcelo Zuasua for their help and for allowing us to join them during fishing operations. We also thank Sergio Gomez and Ricardo Ferriz for their useful comments on the first draft of this paper. Prefectura Naval Argentina of the Puerto Quequén gave us support. Roque Bruno from “Santa Cecilia” helped us during our work at Puerto Quequén. Jim Reid, Mark Tasker and an anonymous referee helped us improve the paper.

BIJVANGSTEN VAN MAGELHAENPINGUÏNS *SPHENISCUS MAGELLANICUS* IN DE *CORNALITO*-VISSERIJ BIJ PUERTO QUEQUÉN (ARGENTINIË)

In deze bijdrage wordt een overzicht gegeven van de bijvangsten van Magelhaenpinguïns *Spheniscus magellanicus* tijdens de visserij op 'cornalito' *Sorgentina incisa*, een aan koornaarsvissen (Atherinidae) verwante vissoort. Het bleek dat, gecorrigeerd voor de intensiteit van de visserij, jaarlijks ongeveer 100 Magelhaenpinguïns in de visnetten verdronken. Ofschoon dit aantal op het eerste gezicht klein is, betogen de auteurs dat deze sterfte optreedt in een situatie waarin de pinguïns blootstaan aan een flink aantal verschillende bedreigingen, zoals de staand-wantvisserij bij Patagonië en olievervuiling langs de Argentijnse kust. De auteurs bepleiten daarom maatregelen om de bijvangst te beperken.

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RED-BILLED TROPICBIRDS *PHAETHON AETHEREUS* IN THE SOUTHEASTERN ATLANTIC OCEAN

LES G. UNDERHILL[1] & ALBERT CHIPPS[2]

Underhill L.G. & Chipps A. 2002. Red-billed Tropicbirds *Phaethon aethereus* in the southeastern Atlantic Ocean. Atlantic Seabirds 4(3): 115-118. *Six records of Red-billed Tropicbirds* Phaethon aethereus *have been made in the southeastern sector of the Atlantic Ocean. Three were made during the austral summer 2000/01, including the first specimen record. Four of the six records were off the coast of South Africa and two off Namibia.*

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The Red-billed Tropicbird *Phaethon aethereus* breeds on tropical islands in the Atlantic, Pacific and Indian Oceans (del Hoyo *et al*. 1992) and occurs in southern African waters as a vagrant (Ryan 1997). This short note reports details of the first specimen and reviews sight records of this species in the southeastern Atlantic Ocean, off Namibia and South Africa. The nearest breeding colony to southern Africa is at St Helena (15°55'S, 5°43'W) in the Atlantic Ocean (Rowlands *et al.* 1998).

An adult Red-billed Tropicbird circled around the deep-sea tug *John Ross* and the ship it was towing for an hour on 9 January 2001. During this period it made numerous abortive attempts to land; ultimately, it crashed exhausted on the deck of the tug. The tug was then at 32°41'S 15°30'E, 300 km northwest of Cape Town, and approximately 210 km offshore (Fig. 1, #5). The tropicbird was brought to Cape Town and sent to the rescue centre of the Southern African Foundation for the Conservation of Coastal Birds (SANCCOB). It died six days later and was found on post mortem to have a bacterial plug proximal to the bifurcation of the trachea. It weighed 750 g on arrival at SANCCOB. The wing-length was 325 mm, bill-length (exposed culmen) 63.6 mm, total head-length 125.9 mm, tarsus 30.3 mm, foot-length 81 mm; these measurements were taken as described by Baker (1993). The length of the single tail streamer, which was abraided, was 590 mm; the longest 'normal' tail feather was 135 mm. There was no primary moult.

There are currently six records of the Red-billed Tropicbird off southern Africa, three having been made in the austral summer 2000/01 (Table

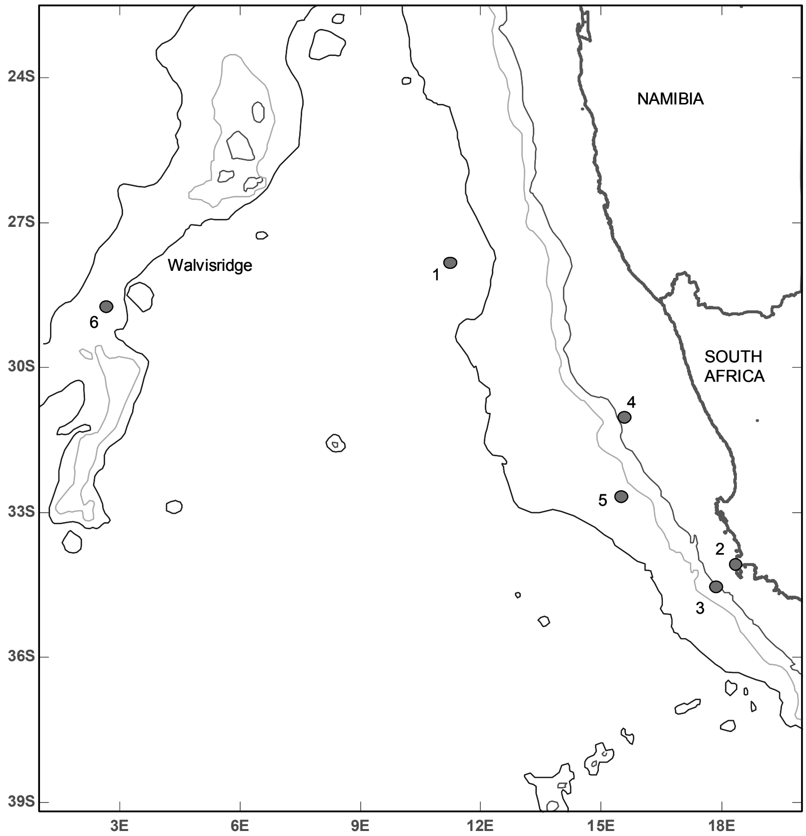

Figure 1. Localities where Red-billed Tropicbirds have been recorded in the southeastern Atlantic Ocean (see Table 1)
Figuur 1. Plaatsen waar Roodsnavelkeerkringvogels in de zuidoostelijke Atlantische Oceaan zijn waargenomen (zie Tabel 1).

1; Fig. 1). Four were made off the coast of South Africa, the first having been seen and photographed close inshore from Chapman's Peak Drive on the Cape Peninsula in 1984. There are two records far offshore of the Namibian coast, made in 1972 and 2001. Although Angola is underexplored ornithologically, there are no records from the coastline of this country (Dean 2000). There are no records from Tristan da Cunha (Richardson 1984).

The specimen was of the nominate subspecies which breeds on islands of the Atlantic Ocean south of the equator. St Helena and Ascension Island are along the mid-Atlantic Ridge, and Abrolhos and Fernando de Noronha are

Table 1. Records of Red-billed Tropicbird in the southeastern Atlantic Ocean, off Namibia and South Africa.
Tabel 1. Meldingen van Roodsnavelkeerkringvogels in de zuidoostelijke Atlantische Oceaan, voor de kust van Namibië en Zuid-Afrika.

#	Place	Date	Distance to St Helena (km)	Distance offshore (km)	Reference
1	27°50'S 11°15'E	early Apr 1972[1]	2190	420	Summerhayes *et al* 1974
2	34°05'S 18°21'E Chapman's Peak Drive, Cape Peninsula	25 Nov 1984	3190	<1	Schmidt 1986
3	34°33'S 17 52'E	9 Feb 1989	3130	55	Hockey *et al*. 1989; B. Rose *in litt*.
4	31°02'S 15°35'E	10 Dec 2000	2740	180	AC pers. obs.
5	32°41'S 15°30'E	9 Jan 2001	2830	210	AC pers. obs.
6	28°45'S 02°41'E	3 Feb 2001	2670	1270	C.J. Camphuysen *in litt*.

[1]Summerhayes *et al*. (1974) provided no date for this record. However, the only occasion on which they were in the position given for the sighting was during a research cruise between 24 March and 8 April 1972, and a date in early April is the most likely.

offshore of Brazil (Antas 1991, del Hoyo *et al*. 1992). The total population of this subspecies on these islands is believed to be fewer than 3000 pairs (del Hoyo *et al*. 1992). Although this bird could have come from any of these islands, St Helena is the closest to the localities of the five records, and it is most likely that they originate from this island. The catalogue of sightings at sea of Red-billed Tropicbird off St Helena prepared by Rowlands *et al*. (1998) suggests that most records are within a radius of 400 km of the island. The records reported here are at distances between 2000 km and 3200 km from St Helena (Table 1).

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ROODSNAVELKEERKRINGVOGELS *PHAETHON AETHEREUS* IN DE ZUIDOOSTELIJKE ATLANTISCHE OCEAAN

In de zuidoostelijke sector van de Atlantische Oceaan, voor de kust van Zuid-Afrika en Namibië, werden tot dusverre zes maal Roodsnavelkeerkringvogels *Phaethon aethereus* gemeld. Drie van deze gevallen stammen uit de winter 2000/2001. Hieronder bevond zich het eerste verzamelde exemplaar. Aangenomen wordt dat de in dit gebied waargenomen keerkringvogels afkomstig zijn van de populatie op Sint Helena, 2000-3200 km noordelijk van de plaats van de waarnemingen. In figuur 1 en tabel 1 zijn alle gevallen weergegeven.

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NESTING CAVITY CHOICE BY BLACK GUILLEMOTS *CEPPHUS GRYLLE*

JULIAN G. GREENWOOD

Greenwood J.G. 2002. Nesting cavity choice by Black Guillemots *Cepphus grylle*. Atlantic Seabirds 4(3): 119-122. *The study examined the characteristics of nesting cavities of Black Guillemots* Cepphus grylle *at a pier in the harbour of Bangor, Co. Down, Northern Ireland during the period 1985–2001. Although the 15 nesting cavities in the pier appear superficially to be the same, there must be differences that the bird detect as some cavities were used every year and others rarely. Whilst one cavity was never used, another was used in all 17 years of the study. A number of nest cavity characteristics were measured and used as independent variables in a multiple regression with the total number of eggs laid in the cavity as the dependent variable. An exposure index (width x height / depth of cavity) and distance to the nearest steps were the two significant independent variables indicating that Black Guillemots chose the least exposed and least disturbed cavities in the pier.*

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It has been well documented for passerines that hole-nesting species make choices with regard to cavity size for nesting. For example, Great Tits *Parus major* avoid nest-boxes that are too shallow or too deep, as well as those with small internal diameters (Löhrl 1986). A number of seabirds, including Black Guillemots *Cepphus grylle*, use a variety of natural holes and crevices for breeding. Characteristically, Black Guillemots choose boulder-strewn shores and low cliffs with fissures, the nesting position usually not being visible from the entrance (Harris & Birkhead 1985; Gaston & Jones 1998). Black Guillemots also use a variety of artificial nesting sites, including holes in harbour walls, under floors and roofs of buildings, under fish-boxes and other anthropogenic shore debris as well as purpose built nest-boxes (Asbirk 1979; Kuyt *et al.* 1976; Carnduff 1981; Greenwood 1998). It is the exploitation of such artificial sites that has allowed breeding range extension, for instance in the Irish Sea (Greenwood 1988, in press). Cairns (1980) provided data on nest characteristics of Black Guillemots breeding in northeastern Canada; he found that the most consistent characteristic was the diameter of the cavity. However Cairns (1980) provided no information on cavity choice by Black Guillemots. In this note I describe the important characteristics of nesting cavities chosen by Black Guillemots.

I have been observing Black Guillemots at a breeding colony in the marina at Bangor, Co. Down, Northern Ireland (54°39'N, 5°40'W), since 1985 (see Greenwood 1998 for a full description of the site). The traditional site at

Table 1. The six variables that characterise each of the 15 nesting cavities in the North Pier, Bangor, and with the number of eggs laid in each cavity: distance from the top of the cavity entrance to the pier top *(cm), an* exposure *index - the width x height/depth of each cavity, the distance along the* pier *from the first cavity (cm), the distance to the* nearest *adjacent cavity (cm), the distance of each cavity to the nearest* steps *or ladder (cm), and the distance of each cavity from the* centre *(cavity 8) of the colony (cm). Cavity use was measured as the number of* eggs *laid by breeding females over the 17 years of the study.*

Tabel 1. De zes variabelen die de nestholtes karakteriseren van 15 nesten van Zwarte Zeekoeten op de noordelijke pier van Bangor met het total aantal gelegde eieren in elk van de holtes: afstand van de tot van de tunnelingang tot de bovenzijde van de pier (cm), een index voor expositie (breedte x hoogte / diepte van elk nesthol), de afstand langs de pier vanaf het eerste nesthol (cm), de afstand van elke nestholte tot de dichtstbijzijnde ladder langs de pier(cm) en de afstand van elk nesthol tot het middelste hol in de kolonie (cm). Het gebruik van elke nestholte was uitgedrukt als het totaal aantal gelegde eieren door broedende wijfjes gedurende de 17 jaren van onderzoek.

cavity	pier top	exposure	pier	nearest	steps	centre	eggs
1	40	4.62	0	1840	505	4045	29
2	60	6.56	1840	360	440	2205	33
3	60	5.63	2200	365	800	1845	34
4	63	5.83	2565	365	1165	1480	31
5	59	6.03	2940	370	880	1105	33
6	56	6.76	3310	370	510	735	26
7	44	8.4	3680	370	140	365	7
8	46	14.73	4045	375	65	0	1
9	45	9.9	4420	375	440	375	11
10	46	7.12	4800	380	610	755	33
11	43	9.45	5280	380	130	1235	4
12	46	8.05	5650	360	130	1605	25
13	46	5.5	6010	360	490	1965	32
14	46	8.4	6380	370	860	2335	31
15	48	15.54	6840	460	630	2795	0

Bangor is the North Pier, where Black Guillemots have nested since 1911. The present study concerns the North Pier where there are fifteen nesting cavities, which to the casual observer all look very much the same. However, to Black Guillemots they must appear to be different because while some cavities have been used in all seventeen years (1985-2001) of this study, others have been used only occasionally and one cavity has never been used at all. Clearly, the birds are making choices for cavities.

All fifteen cavities in the North Pier have a south facing aspect. They have a square or almost square entrance hole and each cavity delves perpendicularly back into the concrete and stone pier. Some characteristics of the cavities vary and I measured six of these – the distance from the top of the cavity entrance to the pier top, exposure - the width x height/depth of each cavity, the distance along the pier from the first cavity, the distance to the nearest adjacent cavity, the distance of each cavity to the nearest steps or ladder, and the distance of each cavity from the centre of the colony. Table 1 presents details of these for each of the 15 cavities, together with the number of eggs laid in each cavity. Black Guillemots usually lay clutches of two eggs; of the 175 clutches laid over the 17 year period, only 20 consisted of one egg (the mean being 1.89). Table 1 shows that cavity 15 was never used for breeding, whereas 34 eggs were laid in cavity 3 (2 egg clutches in all 17 years). Cavities 7, 8 and 11 were used infrequently. In order to identify the characteristics of cavities important for successful breeding, the number of eggs laid in each cavity was used as the dependent variable against the six independent variables in a multiple regression (forward selection) with the following result:

Number of eggs = 39.7409 – 3.0022 exposure + 1.3049 steps ($F = 25.87$; df = 2,12; $P < 0.001$; $r^2 = 0.81$).

The more important of the two significant independent variables was exposure (negative), this being an index of height x width/depth of cavity. So Black Guillemots selected those cavities with a smaller entrance hole with a greater depth, presumably rendering themselves and their eggs less conspicuous than if they were to nest in a shorter chamber with a larger entrance. Although still visible to potential predators (including humans), the birds clearly chose the safer cavity type. It is also interesting to note that the second significant variable in the analysis was the distance to the nearest steps (positive), indicating that birds chose those cavities that were further from steps and, therefore, possible disturbance. Black Guillemots seemed to choose cavities that exposed themselves and their eggs as little as possible, just as they prefer to use natural cavities that hide the contents from view from the entrance (Harris & Birkhead 1985; Gaston & Jones 1998). Such findings have implications for those who may wish to build artificial nesting cavities for Black Guillemots. Du Feu (1993) recommends that cavities be 40 cm long. The results of this study indicate that Black Guillemots prefer cavities longer than 100 cm. Shorter cavities may be used successfully, especially if they have a 90° end so that both birds and eggs remain unseen from the entrance; such cavities have been used by captive alcids (Douma & Carlson 1994).

DE KEUZE VAN NESTHOLTES DOOR NESTELENDE ZWARTE ZEEKOETEN *CEPPHUS GRYLLE*

In dit onderzoek werd voor de holenbroedende Zwarte Zeekoet uitgezocht welke karakteristieken de nestholtes van de meest succesvolle broedvogels hadden in een pier in Bangor (Noord-Ierland). In deze pier nestelen Zwarte Zeekoeten voor zover bekend als sinds 1911 en de kolonie wordt sinds 1985 bestudeerd. De 15 nestholtes lijken oppervlakkig gezien enorm op elkaar, maar toch worden sommige nestholtes jaarlijks en andere zelden benut. Er moeten dus verschillen zijn de kwaliteit van de nestgelegenheid. Tabel 1 laat zien dat nesholte 15 nooit werd benut, terwijl in nest 3 in totaal 34 eieren werden gelegd (17 twee-legsels, benut in elk jaar van onderzoek). De nestholtes werden opgemeten en een aantal andere karakteristieken werd vastgesteld, zoals de onderlinge afstand, de afstand tot de bovenzijde van de pier of de afstand tot ladders die gebruikt worden om de pier te beklimmen. Het bleek dat de 'expositie' (blootstelling aan elementen en predatoren) van het legsel een belangrijke factor was waardoor sommige holtes veel minder geschikt bleken dan andere. De vogels kozen het liefst holtes van een meter diep met een hoek van 90° waardoor het legsel van buiten af niet te zien was.

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COMMON GUILLEMOTS *URIA AALGE* SUCCESSFULLY REAR A RAZORBILL *ALCA TORDA* CHICK

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Harris, M.P. & L.J. Wilson 2002. Common Guillemots *Uria aalge* successfully rear a Razorbill *Alca torda* chick. Atlantic Seabirds 4(3): 123-126. *In 2002 on the Isle of May (south-east Scotland) a pair of Common Guillemots* Uria aalge *successfully reared a young Razorbill* Alca torda *apparently following fighting for nest-sites.*

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Two cases of Razorbills *Alca torda* successfully rearing young Common Guillemots *Uria aalge* have been recorded at the mixed seabird colony on the Isle of May, south-east Scotland (Harris & Wanless 2002). These two auks have very similar patterns of breeding and feed their young on the same species of fish. However, Razorbills are 35% smaller than Common Guillemots and typically bring in loads of small fish for their young rather than a single bigger fish (Harris 1970). Hence, although young Common Guillemots should have no problem in swallowing fish brought to them by Razorbills, the reverse might not be true. Here we report, apparently for the first time, on the successful rearing of a Razorbill chick by a pair of Common Guillemots on the Isle of May.

During late April and early May 2002, we noted much fighting among members of a pair of Razorbills and a pair of Common Guillemots on a small (<0.5 m long) ledge near the top of a cliff. These pairs were at long-established sites less than 20 cm apart (Fig. 1). The male Common Guillemot was uniquely colour-ringed and had bred at this site for several years; the other birds were unringed, but we believe that the Razorbill pair was newly established, or at least new to the site, as previously there had been a colour-ringed female at this site. On 10 May, the colour-ringed Guillemot was incubating an egg but by the next morning it was not there and the site was occupied by two unringed Razorbills, presumably from the neighbouring site. We next checked the site four days later when the Common Guillemot was again incubating an egg. We did not record a Razorbill at this site again that season. The egg hatched on 14 June and it soon became apparent that the Common Guillemots were rearing a Razorbill chick (Fig. 2). From our observations, we believe that fighting between the neighbouring pairs during 10 or 11 May resulted in the Common

Figure 1. The positions of the two long-established sites of the Razorbill (partly hidden between a stone and the wall, left) and Common Guillemot (in the open, right) in 2001 (Mike Harris)
Figuur 1. Locaties van de nestplaatsen van de Alk (links, gedeeltelijke verborgen tussen een steen en de muur) en de Zeekoet (rechts) in 2001 (Mike Harris)

Guillemot pair losing their egg and the Razorbill pair temporarily occupying the site. The Razorbill pair must have laid an egg on or very soon after this and this egg was subsequently usurped by the Common Guillemot pair.

The Razorbill chick fledged on the night of 8/9 July. The usual chick-rearing period for the Razorbill on the Isle of May is 19 days (n = 336; 95% Confidence Interval 18-20 days; personal records), so the 24 days in this case was rather long. The chick had lost all its down feathers by 1 July and we were surprised that it remained so long. Although we did not handle the chick, it appeared to us to be very small and thin compared with other Razorbill chicks in the area that were near fledging age. In 2002, Common Guillemots on the Isle of May fed their chicks sprats *Sprattus sprattus* 10-13 cm long and lesser sandeels *Ammodytes marinus* 9-12 cm long. These sprats, and to a lesser extent the sandeels, were substantially larger than those normally fed to young

Figure 2. A male Common Guillemot with the Razorbill chick that it had reared a few hours before the chick fledged in 2002 (Janos Hennicke).
Figuur 2. Man Zeekoet met het door hem groot gebrachte kuiken van de Alk, een paar uur voor het kuiken "uitvloog" (Janos Hennicke).

Razorbills. Most of these fish could probably have been swallowed by a large Razorbill chick but some would have posed problems to a small chick. Perhaps this chick's growth had been retarded by unsuitable food.

In both these species, the male parent takes the chick to sea. In the Common Guillemot, if a chick is lost at or soon after fledging, the male often, perhaps always, returns to the colony (Harris & Wanless in press). The colour-ringed male Common Guillemot was not seen again in 2002 so we are confident that this young Razorbill fledged successfully.

ZEEKOETEN *URIA AALGE* BRENGEN MET SUCCES EEN KUIKEN VAN EEN ALK *ALCA TORDA* GROOT

In 2001 bracht een paar Zeekoeten op Isle of May met succes een kuiken van een Alk groot. Tijdens een "gevecht" met een paar Alken ging het ei van de Zeekoeten verloren. Daarna bezetten de Alken het zeekoetnest tijdelijk en hebben er een ei gelegd. Met het bezetten van hun oorspronkelijke nest hebben de Zeekoeten ook het ei overgenomen en uitgebroed Hoewel het kuiken klein leek is het, na een lange kuikenfase, met succes "uitgevlogen".

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FIRST PURE PAIRS OF YELLOW-LEGGED GULL *LARUS [CACHINNANS] MICHAHELLIS*[1] ALONG THE NORTH SEA COASTS

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Vercruijsse H.J.P., Stienen E.W.M. & Van Waeyenberge J. 2002. First pure pairs of Yellow-legged Gull *Larus [cachinnans] michahellis* along the North Sea coasts. Atlantic Seabirds 4(3): 127-129. In 2002, two pure pairs of Yellow-legged Gull *Larus [cachinnans] michahellis* were found breeding in the outer harbour of Zeebrugge (51°21'N, 3°11'E), Belgium. These are the first pure pairs breeding along the North Sea coast. Pellets found in the vicinity of the nests suggest that the diet of their chicks consisted of fish and young rabbits. Both pairs fledged two chicks.

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Since 1985, newly created land in the outer harbour of Zeebrugge (51°21'N, 3°11'E), Belgium, supports fast growing populations of gulls, terns and plovers (Seys *et al.* 1998; Stienen *et al.* 2002). In 2002, 2100 pairs of Black-headed Gull *Larus ridibundus*, 3400 pairs of Lesser Black-backed Gull *L.[fuscus]graellsii*[2], 950 pairs of Herring Gull *L. argentatus*, 2450 pairs of Common Tern *Sterna hirundo* and smaller numbers of Ringed Plover *Charadrius hiaticula*, Kentish Plover *C. alexandrinus*, Mediterranean Gull *L. melanocephalus*, Common Gull *L. canus*, Sandwich Tern *S. sandvicensis* and Little Tern *S. albifrons* were found breeding here. In the same year, the first two pure pairs of Yellow-legged Gull *Larus [cachinnans] michahellis* settled in the outer harbour of Zeebrugge. Their nests were situated less than 50 m apart, the territories bordered one another and there was regular interaction between the individuals of the two pairs. Back-calculating from the assumed hatching date, the eggs were laid in the first and third week of April, respectively, much sooner than those of most Herring and Lesser Black-backed Gulls breeding at Zeebrugge. The pure pairs were highly productive: both fledged three chicks. Within 200 m distance from the pure pairs, two Yellow-legged Gulls were found interbreeding with Herring Gull and Lesser Black-backed Gull, respectively. In the surroundings of the nests of both pure and mixed pairs many pellets containing either fish remains or bones of young rabbits were found, suggesting that these were important prey items.

The colonisation of the Belgian coast fits well into the ongoing expansion of the breeding distribution of Yellow-legged Gull to the north. In the

One of the males of the pure pairs Yellow-legged Gulls Een van de mannetjes van de zuivere broedparen Geelpootmeeuwen *(Geert Spanoghe)*

second half of the twentieth century, Yellow-Legged Gulls originating from colonies in the Mediterranean have expanded their breeding range northwards (Nicolau-Guilaumet 1977; Yésou & Beaubrun 1994). Nowadays, colonies are found in the valleys of the Rhône and its affluents, along the north Atlantic coast of French, in the Lake Region of Switzerland, in the valley of the upper Rhine at the border between France and Germany and even in Poland (Yésou 1991; Yésou & Beaubrun 1994; Schmid *et al.* 1998; Faber *et al.* 2001). By the end of the twentieth century many instances of Yellow-legged Gull interbreeding with Herring or Lesser Black-backed Gull were reported from countries bordering the North Sea (Vercruijsse 1995; De Scheemaeker & Lust 1996; Van Swelm 1998; Faber *et al.* 2001; Ogilvie *et al.* 2001). To our knowledge, the pairs in Zeebrugge are the first pure ones breeding along the North Sea coasts.

EERSTE ZUIVERE BROEDPAREN VAN GEELPOOTMEEUW *LARUS MICHAHELLIS* LANGS DE NOORDZEE

Vanaf 1985 worden nieuw opgespoten delen van de voorhaven van Zeebrugge (51°21'N, 3°11'O), België, in toenemende mate gebruikt door kustbroedvogels. In 2002 broedden er 2100 paren Kokmeeuw *Larus ridibundus*, 3400 paren Kleine Mantelmeeuw *L. graellsii*, 950 paren Zilvermeeuw *L. argentatus*, 2450 paren Visdief *Sterna hirundo* en kleinere aantallen van Bontbekplevier *Charadrius hiaticula*, Strandplevier *C. alexandrinus,* Zwartkopmeeuw *L. melanocephalus*, Stormmeeuw *L. canus*, Grote Stern *S. sandvicensis* en Dwergstern *S. albifrons*. Ook broedden in 2002 de eerste twee zuivere paren Geelpootmeeuw *L. michahellis* in de Zeebrugse voorhaven, terwijl er ook twee gemengde paren (Geelpootmeeuw x Zilvermeeuw respectievelijk Kleine

Mantelmeeuw) werden aangetroffen. Braakballen die bij de nesten werden gevonden, bevatten voornamelijk resten vis en konijn. Beide zuivere paren brachten drie kuikens groot. De kolonisatie van de Belgische kust past goed in de noordelijke opmars van deze soort vanuit het Mediterrane gebied gedurende de laatste decennia. Het is echter vermeldenswaard omdat het hier gaat om de eerste zuivere paren langs de Noordzeekust.

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[1] *Larus cachinnans michahellis* is presently known as *Larus michahellis* on the Dutch list (*Ardea* 87: 139-165).

[2] *Larus fuscus graellsii* is presently known as *Larus graellsii* on the Dutch list (*Ardea* 87: 139-165).

Opinion

THE *PRESTIGE* OIL SPILL IN SPAIN

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Camphuysen C.J., Heubeck M., Cox S.L., Bao R., Humple D., Abraham C. & Sandoval A. 2002. The *Prestige* oil spill in Spain. Atlantic Seabirds 4(3): 131-140. *The oil tanker* Prestige*, carrying a cargo of 77,000 tonnes of heavy bunker oil, sank off the coast of Galicia (NW Spain) on 19 November 2002. Most of the Galician coast was severely polluted with oil and hundreds of oiled seabirds were retrieved from beaches in the first weeks of the incident. The decision taken by Spanish authorities to tow the damaged vessel to deeper offshore waters has been described as a criminal act and was the reason why such a large area was affected. Seabird distribution in the offshore waters of Galicia has not been studied well and as a result, the impact of this spill on vulnerable populations is difficult to predict. Preliminary observations during dissections suggest that the most numerous victims (in decreasing order of abundance) have been: juvenile Razorbills (winter visitors), adult Atlantic Puffins (winter visitors), adult European Shags (residents), adult Northern Gannets (passage migrants), and juvenile Common Guillemots (winter visitors). By 23/24th November 2002 it was estimated that over 80% of Yellow-legged Gulls seen in coastal Galicia were oil-fouled, but relatively few of these were found dead or were received in rehabilitation centres. Proper impact assessments of oil spills have often been neglected in the past and would have been neglected here again. It is concluded that we need to be better prepared for dealing with the seabird casualties of the next major oil spill in Europe and that there is an urgent need for a contingency plan for Europe to establish such procedures.*

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INTRODUCTION

The Bahamas-flagged oil tanker *Prestige*, carrying 77,000 tonnes of heavy bunker oil, ran into trouble off the Spanish north west coast on 13 November

Table 1. Large oil tanker spills along the European west coast (after Clark 2001, modified).
Tabel 1. Belangrijke tankerongelukken langs de Europese westkust (naar Clark 2001, aangepast).

Shipname	(oil spilled)	Date	Location (N→S)
Braer	(84,000t)	January 1993	Shetland Islands, U.K.
Sea Empress	(72,000t)	December 1996	Wales, U.K.
Torry Canyon	(120,000t)	March 1967	Scilly Isles, U.K.
Amoco Cadiz	(223,000t)	March 1978	Brittany, France
Gino	(32,000t)	April 1979	Brittany, France
Erika	(20,000t)	December 1999	Brittany, France
Aegean Sea	(73,000t)	December 1992	Galicia, Spain
Andros Patria	(50,000t)	December 1978	Galicia, Spain
Prestige	(77,000t)	November 2002	Galicia, Spain
Urquiola	(100,000t)	May 1976	Galicia, Spain
Jacob Maersk	(88,000t)	January 1975	Leixoes, Portugal
Khark 5	(80,000t)	December 1989	off Morocco, Atlantic

2002. The ship appeared to have a long crack in one of its oil tanks amidships and leaked oil. Helicopter teams rescued the crew and the ship was towed to deep waters in gale-force winds. On 19 November 2002, the ship broke in two and sank quickly, in 3500m deep waters off the coast of Galicia. By late November 2002, much of the Galician coast had become heavily oiled, while the wreck was still releasing oil and very large oil slicks were drifting towards the Spanish coast.

The *Prestige* oil spill, yet another spill along Europe's west coast (Table 1), had already caused considerable damage and the situation was still deteriorating further when this report was written. Long stretches of coast have been covered in heavy bunker fuel oil, thousands of seabirds have been killed and the effects on sub-littoral fauna and flora can only be guessed at. Have the most appropriate measures been taken to minimise the ecological damage? We believe not. Furthermore, while the Spanish authorities proudly presented the arrest and custody of the captain of the *Prestige*, the most criminal act was the decision of that same authority to tow a severely damaged tanker into the open ocean *"so that it would pose less of a threat to the Galician coastline, an important fishing area."* So why have important lessons from the past not been learnt?

THE *PRESTIGE* INCIDENT

When the *Prestige* got into trouble on 13 November 2002, it moved towards the Galician coast between 43°05'N, 10°W (15:00h) and 42°55'N, 9°35'W (19:00h), just off Cabo Fisterra (Cape Finisterre). Early next day, the ship was very close to the shore, at 43°03'N, 09°25'W (off Cabo Touriñán) and it was decided to tug it away in a north-westerly direction. Early morning 15 November the ship was positioned at approx. 43°50'N, 10°15'W (*c.* 60 nautical miles offshore). Bad weather hindered salvage operations and the oil proved to be too viscous to be pumped into other vessels. Decision making was chaotic, but it was finally decided to drag the vessel further away from the coast, in a south-westerly direction. No harbours were found prepared to receive the leaking ship. On 19 November, at 42°12'N, 12°05'W, *c.* 130 nm WSW of Cabo Fisterra, the ship broke in two and sank.

When the ship reported trouble, it had already leaked oil from tanks amidships that were severely damaged. Aerial photographs revealed serious damage over at least 40-50 m of the 250m long vessel, so that the risk of breaking was obvious. From the type of oil, heavy bunker fuel oil, it was all too obvious that as with the *Erika* off Brittany in 1999 (Table 1), it would not respond to spraying by dispersants and any natural dispersion would be very slow. A substantial spill offshore would simply mean that in the prevailing westerly winds of winter, large amounts of oil would come ashore sooner or later, most likely in Spain, but with Portugal and France also at risk. The decision to tow the tanker out into the open ocean, instead of escorting her to a sheltered anchorage or port where she could have been boomed off and unloaded of her cargo with limited or controlled coastal pollution, was an exceptionally stupid decision. The west coast of Spain in winter, as most of the Bay of Biscay further to the north, is a stormy area where depressions from the west arrive one after the other. Short spells of calm weather are followed by periods with violent (westerly) storms. To decide and tow a severely damaged tanker into such seas was, at best, an extremely badly calculated risk against the ship breaking up and causing pollution on a regional if not an international scale (oil washing ashore in Portugal and France, slicks in the Bay of Biscay).

The Galician coast is rocky and heavily indented, with numerous sandy beaches and estuarine areas. The most threatened, coastal important bird areas in Galicia include the Cíes and Ons Islands, the estuary of Ria de Arousa, the Costa da Morte, the Ferrolterra-Valdoviño coast, and Cape Candelaria to Cape Estaca de Bares, including the Ortigueira estuary (Viada 2000). Resident seabirds at risk are European Shag *Stictocarbo aristotelis*, Yellow-legged Gull *Larus michahellis*, Lesser Black-backed Gull *Larus graellsii*, Black-legged Kittiwake *Rissa tridactyla* and the rare Iberian race of the Common Guillemot

Uria aalge. The decision to tow the tanker out into the open ocean meant spreading the risk of oiling from a small, localised area to a very large and unpredictable one. Most ecological damage and the most widespread oiling of coasts by stricken tankers such as the *Torrey Canyon* (1967) and the *Amoco Cadiz* (1978) have come from oil spilled in the open sea, with much less and more localised damage being caused by the oil spilled when such vessels finally wrecked ashore. The *Erika* incident was a clear example of how a badly damaged tanker should *not* have been treated! She eventually sank in water too deep for her cargo to be salvaged or sealed in, and oil subsequently came ashore in bouts lasting several months. Major oil spills from tankers have occurred repeatedly in Galicia in the past decades (Table 1), but the Spanish authorities have been particularly lax and inept at not learning lessons from the *Erika* sinking, just three years ago and only at the northern end of the Bay of Biscay, but instead embarking on a course of action that virtually replicated that disaster.

SEABIRDS AT RISK

So, the Spanish authorities can be blamed for being not prepared, but how well did *we* know the area and what would have been the quality of advice given on seabirds with respect to this incident? In fact we know alarmingly little of this potentially important seabird area. Only after the *Erika* sank was it realised that it had gone down in a part of the Bay of Biscay that was unsurveyed for offshore, wintering seabirds. The enormous number of casualties (some 77,000 oiled seabirds were actually recorded; Cadiou *et al.* 2002) was largely unexpected, because we had little idea about wintering seabirds in that area. The same appears to be true for offshore waters of NW Spain. While resident Galician seabird populations are fairly well-known (Paterson 1997; Purroy 1997; Viada 2000), and while careful recording of passage migrants from headlands has revealed information on the timing and abundance of migratory species (Antonio Sandoval Rey/GIAM), we have very little data on wintering seabirds out at sea.

Great Northern Divers *Gavia immer*, Northern Gannets *Morus bassanus*, Great Cormorants *Phalacrocorax carbo*, Common Scoters *Melanitta nigra*, Mediterranean Gulls *Larus melanocephalus*, Black-headed Gulls *Larus ridibundus*, Lesser Black-backed Gulls, Black-legged Kittiwakes, Common Guillemots, Razorbills *Alca torda*, and Atlantic Puffins *Fratercula arctica* are examples of species that are known to migrate through these waters in late autumn or are known to winter in numbers. Where are these birds and which are the most vulnerable areas in Galician waters? Balearic Shearwaters *Puffinus mauretan*

Table 2. Seabirds potentially at risk along the Galician coast in November/December (after Paterson 1997; Purroy 1997; Antonio Sandoval Rey, unpubl. data.).
Tabel 2. Zeevogels in het vervuilde gebied voor de kust van Galicië in november/december (naar Paterson 1997; Purroy 1997; Antonio Sandoval Rey, ongepubl.).

Species	Breed	Winter visitors/passage migrants: inshore	Winter visitors/passage migrants: offshore	Notes
Gavia immer		scarce		still arriving
Gavia arctica		very scarce		arrival Nov/Dec
Gavia stellata		very scarce		arrival Nov/Dec
Podiceps nigricollis		very scarce		might be present
Fulmarus glacialis			very scarce	might be present
Calonectris borealis		scarce		scarce from mid-Nov.
Puffinus gravis			v. common	passage migrant
Puffinus griseus			common	passage migrant
Puffinus puffinus			common	passage migrant
Puffinus mauretanicus		common		
Hydrobates pelagicus	++		common	
Oceanodroma leucorhoa			common	
Morus bassanus		v. common	v. common	
Phalacrocorax carbo		v. common		
Stictocarbo aristotelis	++	v. common		
Melanitta nigra		common		
Phalaropus fulicaria			v. common	on passage
Stercorarius pomarinus			v. common	on passage
Stercorarius parasiticus			v. common	on passage
Stercorarius skua			v. common	on passage & wintering
Larus melanocephalus		common	common	
Larus minutes			common	mainly passage migrant
Larus sabini			common	mainly passage migrant
Larus ridibundus		v. common		
Larus graellsii	++	v. common	v. common	
Larus michahellis	++	v. common	v. common	
Larus marinus		common		
Rissa tridactyla	2 cols		v. common	the only Spanish colonies
Sterna sandvicensis		scarce		some wintering birds
Sterna hirundo		scarce		most of passage finished
Sterna paradisaea		scarce		most of passage finished
Uria aalge	2 cols		v. common	the only Spanish colonies
Alca torda		common	v. common	
Fratercula arctica			common	
Alle alle			scarce	

icus, currently listed as "Lower risk/Near threatened" (Stattersfield & Capper 2000), but seriously declining and restricted as breeding birds to the Balearic Islands, are known to move into the southern Bay of Biscay in autumn (Paterson 1997). Could this rare species be at risk from this spill?

Our knowledge of the Galician offshore waters is, at best, incomplete, particularly so with respect to the winter situation. Indications as "common offshore" (Table 2) are often derived from the fact that relatively few are seen from the coast, while the species should be an abundant migrant in the general area. Great Northern Divers and European Shags will be restricted to inshore waters, but the marine distribution of wintering Atlantic Puffins and Razorbills is something we have little concrete information about. Dedicated (ship-based) surveys off the Galician coast are urgently required to obtain the essential information on species and age-composition of seabirds in the southern Bay of Biscay and beyond. Such a programme will be too late for the victims of the *Prestige* oil spill, but we must learn our own lessons! There are more tanker accidents to come, considering the fact that (old) single hull tankers are still used and will be used until 2020.

DAMAGE OBSERVED

It is far too soon to properly evaluate the damage done by the *Prestige* oil spill. There is some preliminary information, however, worth presenting: numbers of birds examined during systematic dissections (autopsies) at A Coruña University between 20 November and 3 December 2002. These birds were collected by volunteers along most of the Galician coast and brought to the Centro de Recuperación de Fauna Salvaje de Santa Cruz (Oleiros, A Coruña), together with the casualties that were still alive. The latter were kept at the rescue centre in an attempt to rehabilitate them, the corpses were labelled and kept until the authors could retrieve them and transport them to the university for identification and dissection. From these dissected birds, the worst affected species in terms of numbers of casualties are the Razorbill, the Atlantic Puffin, the European Shag and the Northern Gannet (Table 3). Nearly half the corpses examined during the first days of the spill were Razorbills and almost all were first winter birds. Atlantic Puffins predominated early December and most these birds were mature. Most of the European Shags and Northern Gannets were adults. The former were almost certainly local breeding birds and the fact that most examined specimens were mature birds, often in breeding condition, suggests that damage to the Galician breeding population will be considerable. Common Guillemots were next most numerous. Most of these were juveniles, but four adult birds showed characteristics of the Iberian population (very small

Table 3. Seabirds collected in Galicia via Santa Cruz rescue Centre, 20 Nov-3 Dec 2002, as they were identified at A Coruña University by the authors.
Tabel 3. Verzamelde zeevogels, door de auteurs op de Universiteit van A Coruña gedetermineerd tussen 20 november en 3 december 2002.

	20	21	22	23	24	25	26	27	28	29	30	1	2	3	Total
Gavia immer	3					1			1						5
Tachybaptus ruficollis						1									1
Calonectris sp.												1			1
Puffinus gravis					2							1	1		4
Puffinus assimilis											1				1
Hydrobates pelagicus										1					1
Morus bassanus	2		6	8	13	9	1	4	10	2	4	2	2	1	64
Phalacrocorax carbo				2	1		2		1	1	1	1			9
Stictocarbo aristotelis	1		3	5	9	5	3	6	3	5	9	5	11	2	67
Ardea cinerea	1												1		2
Anas platyrhynchos	1														1
Melanitta nigra		1		2	3	2	2				2		1		13
Accipiter nisus							1								1
Limosa lapponica									1						1
Stercorarius skua					1										1
Stercorarius spec.											1				1
Larus ridibundus							1	1	1						3
Larus graellsii							2		2	1					5
Larus argentatus								2							2
Larus michahellis			3	2	3	1	1	5	2	3	1	1	2	2	26
Larus spec.									2	1	4	3	1	1	12
Rissa tridactyla				1	1	2				1	4	1	1	1	12
Larus spec.	1				3				1	8		2	2		17
Uria aalge	4		3	2	3	3	1	3	2	3	2	2	3	3	34
Alca torda	16	4	14	37	29	22	7	7	16	16	11	7	7	3	196
Alle alle		1		1	1			1		1	1				6
Fratercula arctica	3		3	8	11	5	4	3	2	11	14	31	38	27	160
Columba livia											1				1
Alcedo atthis												1			1
unidentified bird							1	1			1		1	1	5
unidentified passerine												1			1
	32	6	32	68	80	51	26	33	44	54	57	59	71	41	654

size). The overlap in size between Iberian Common Guillemots and birds from France and southern Britain is considerable, however, and there is currently no accurate means of assessing breeding origin of these auks with certainty except through ringing (Hope Jones 1984).

Visits to coastal areas of Galicia in late November 2002 revealed that this is only part of the picture. Some 2000 Yellow-legged Gulls were seen in roosts between Cabo Fisterra and Camariñas, 80% of which were at least slightly oil-fouled. Relatively few gulls were retrieved dead from beaches and few were received alive at rescue centres. As in other major spills, large gulls that are seen oiled but alive in the immediate coastal area seem to 'disappear', perhaps to die unrecorded inland, or to survive after preening thoroughly.

The number of corpses and live birds retrieved oiled in the first two weeks of the spill were hundreds rather than thousands, but the threat posed by the oil is not over yet. Subsequent observations suggest that the Atlantic Puffin outnumbered all other species in the first month of the incident (A. Sandoval, *unpubl. data*). Estimates of total numbers of casualties will undoubtedly become several thousands in the weeks to follow. More winter visitors will arrive from more northerly waters during December, while new oil slicks will form from the sunken wreck out in the ocean. The oil that has not washed ashore yet, from its characteristics, will pose a great danger for as long as it stays at sea. The ledges of the few pairs of Iberian Common Guillemots remaining before this disaster, as could be seen from the air, had become heavily oiled and the prospects for this dwindling population are bleak. With a high proportion of adults found oiled so far, systematic counts of Galician colonies of European Shags will be required next summer to document their undoubted decline. Most affected Razorbills, on the other hand, were juveniles, so that little if any measurable effect in colonies may be expected in the next four years.

IMPACT ASSESSMENT

Visiting Galicia in an attempt to assist in the establishment of a proper impact assessment of the oil spill made us realise that this aspect has so often been neglected in the past and would have been neglected here again. Field surveys producing numbers of observed oiled and unoiled birds by species are a necessary part of oil spill response in order to determine wildlife effects. Very important information is for example lost during attempts by volunteers to clean beaches if instructions are not given to separate oil from oiled birds and to collect the latter for further inspection. We certainly need to be better prepared for dealing with the seabird casualties of the next major oil spill in Europe.

There are a number of operations required in a response that are generic to any major spill: co-ordination of intensive searches of beaches, collection and transport of live and dead birds to respective processing centres, establishing the specific identity, likely breeding origin (via biometrics and rings) and age structure (via both external and internal examination) of the mortality, and establishing procedures for the disposal of the biological material accumulated, and for the release of birds successfully cleaned and restored to health. There is an urgent need for a contingency plan for Europe to establish such procedures, to ensure that individual countries and regions pre-identify organisations and locations that should be utilised in such a response and what their roles would be, and to ensure that there is a clear understanding that the reasonable (and relatively minor) costs involved in such a response should be recoverable from the insurers of the offending vessel - under the principle that the polluter pays.

ACKNOWLEDGEMENTS

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DE OLIERAMP MET DE *PRESTIGE* IN SPANJE

De olietanker *Prestige*, geladen met 77.000 ton zware stookolie, raakte half november 2002 voor de Spaanse noordwestkust in de problemen. Toen de kapitein dit voor het eerst wereldkundig maakte, bevond het schip zich op korte afstand van de kust ter hoogte van Kaap Finisterre. Aan de zijkant van het 250 meter lange schip bevond zich een 40-50 meter lange scheur en uit de beschadigde tank verloor het schip grote hoeveelheden olie. De Spaanse autoriteiten meenden van het probleem af te kunnen komen door het schip naar open zee weg te slepen en nadat de meeste bemanningsleden van boord gehaald waren werd het wrak naar een positie op ongeveer 60 zeemijl ten noordwesten van de kust gebracht. Eenmaal daar aangekomen bleek dat het schip niet lang meer drijvend gehouden kon worden en na een chaotische reeks van tegenstrijdige beslissingen werd het schip in zuidwestelijke richting naar Portugese wateren getrokken. Op 19 november brak het schip in twee stukken en zonk in 3500 meter diep water op 42°12'N, 12°05'W, ongeveer 130 zeemijl westzuidwestelijk van Kaap Finisterre.

De beslissing om het schip naar zee te slepen is de grootste blunder die men had kunnen begaan. In plaats van het schip naar een beschutte baai of haven te slepen, waar de onvermijdelijke vervuiling beter te controleren en op te ruimen zou zijn geweest, werd getracht de kust te vrijwaren door het schip op afstand te houden. Het gevolg is dat de olie een veel groter deel van de Spaanse kust heeft besmeurd, terwijl het zo goed als onbereikbare wrak nog steeds olie lekt, waardoor het incident zeker nog vele maanden zal duren. Van een lokaal probleem is het incident verworden tot een regionaal en zelfs een internationaal probleem (olie in Portugal en Frankrijk, olievelden in de Golf van Biskaje). Van eerdere olie-incidenten hadden de autoriteiten kunnen leren hoe het *niet* moet en het wrange is, dat alle fouten die gemaakt werden bij de *Prestige* ervoor gezorgd hebben dat we hier een kopie zien van de ramp met de *Erika*, nog maar drie jaar geleden, in het noorden van de Golf van Biskaje!

Net als de *Erika*, zonk ook de *Prestige* in een gebied waarvan we weinig weten wat betreft het voorkomen van zeevogels op zee. Langs de kust worden veel trekwaarnemingen verricht en de broedvogelbevolking is redelijk bekend, maar er worden hier in elk geval 's winters geen systematische tellingen uitgevoerd op grond waarvan de offshore zeevogelrijkdom geschat kan worden. De eerste auteurs zijn naar Spanje vertrokken om in elk geval te zorgen dat er een goede inschatting gemaakt kan worden van de schade van de ramp. Zij hebben een systeem opgezet waarbij de vogels door vrijwilligers worden opgeraapt, verzameld in een vogelopvangcentrum om vervolgens door deskundigen te kunnen worden gedetermineerd, op leeftijd gebracht en inwendig worden onderzocht. Van de eerste 654 dode vogels is de soortsamenstelling in tabel 3 weergegeven. Op basis van deze gegevens, niet meer dan een eerste indruk, kon worden vastgesteld dat tot de meest talrijke slachtoffers behoren (in afnemende volgorde): hoofdzakelijk juveniele Alken (wintergasten), adulte Papegaaiduikers (wintergasten), adulte Kuifaalscholvers (locale populatie), adulte Jan van Genten (doortrekkers), en juveniele Zeekoeten (wintergasten, wellicht ook de eigen broedvogels). Rond 23/24 november 2002 werd geschat dat 80% van de Geelpootmeeuwen in het kustgebied van Galicië met olie besmeurd was. Relatief weinig meeuwen werden tot dusverre dood aangetroffen of nog levend naar de opvangcentra gebracht. Geconcludeerd wordt dat het belang van een goed systeem van *"impact assessment"* bij olierampen vaak te laat wordt ingezien. De opvang van levende slachtoffers geldt doorgaans als een eerste prioriteit, waardoor waardevolle gegevens over al omgekomen slachtoffers verloren gaan. Dit was in Spanje niet anders. Het is zaak om beter voorbereid te zijn bij toekomstige olie-incidenten, en daarom wordt een plan van aanpak aanbevolen waarbij één of enkele teams deskundigen op afroep beschikbaar zijn om het werk ter plaatse op te zetten en zo lang als nodig is uit te voeren.

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Scientific names used in this paper follow recommendations of the Dutch committee for avian systematics (*Ardea* 87: 139-165); *Puffinus mauretanicus* = *Puffinus puffinus mauretanicus* or *P. yelkouan mauretanicus*, *Calonectris* sp. = *Calonectris diomedea* subsp., *Stictocarbo aristotelis* = *Phalacrocorax aristotelis*, *Phalaropus fulicaria* = *Phalaropus fulicarius*, *Stercorarius skua* = *Catharacta skua*, *Larus graellsii* = *Larus fuscus graellsii*, *Larus michahellis* = *Larus cachinnans michahellis*, *Larus sabini* = *Xema sabini*

Letters to the editors

RECRUITMENT TO THE BREEDING GROUP IN THE BLACK-LEGGED KITTIWAKE RISSA TRIDACTYLA

In their recent paper, Rothery, Harris, Wanless & Shaw (2000), *Atlantic Seabirds* 4: 17-28, use the assumption that the Black-legged Kittiwakes breeding on Fair Isle are an inbreeding, isolated group or population and that the recruits to this breeding group are all or mainly produced from within that small island. This assumption is almost certainly incorrect.

While many Kittiwakes, particularly males, are philopatric and return to breed where they hatched, an appreciable proportion of both sexes move considerable distances and breed elsewhere (Coulson & Neve de Mevergnies 1992, *Ardea* 80: 187-197). For example, at the study colony at North Shields, northeast England, two ringed breeding birds were reared in Norway, two hatched at Dunbar, east Scotland and several were from the Farne Islands, northeast England. Chicks from North Shields and the Farne Islands subsequently bred in Sweden, Helgoland, Scilly Isles, southwest England and France, and there are many other records of similar movements. At North Shields, fewer than 40% of the recruits to the breeding group were hatched there. In another colony being currently studied, philopatric breeding birds comprise fewer than 10% of the total number nesting. This dispersal behaviour is not restricted to the Kittiwake and similar patterns are known from studies on *Larus* gulls. This dispersal of young from the natal area is of great importance in developing management policies for colonies of large *Larus* gulls. It also moderates local, poor breeding performance.

The size of the recruitment of new breeding Kittiwakes to a colony is only partially affected by the breeding success in that colony a few years previously. We need to know what factors attract the dispersing recruits. How do these birds select the colony in which they eventually breed? One factor is likely to be the numbers of potential recruits produced within a large geographical area, and others may be the size of and conditions for breeding within the colony under consideration, including the state of feeding areas that can be reached from it. Thus, it is inappropriate to assume in a model that poor young production in a particular colony will reliably and realistically measure and predict recruitment rates there in future years.

If in the next few years Kittiwakes decline dramatically on Fair Isle, as is predicted for the future by Rothery *et al*., this is likely to be but coincidence since the authors have not used an appropriate and realistic population model to arrive at their predictions. Increased adult mortality rates should not be ruled out as a cause of decline. It has already been implicated in a major decline of Kittiwakes elsewhere (Coulson & Strowger 1999; *Waterbirds* 22: 3-13).

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REPLY BY THE AUTHORS

John Coulson criticizes us for one of our assumptions in our population model, of Black-legged Kittiwakes on Fair Isle, namely that this is a closed unit. We share his concern about this and were careful to state this assumption explicitly in the methods. We also pointed out that although there is evidence of emigration/immigration in this species, there are currently no measures for this colony that could be used to parameterise a more complex, and hopefully, more realistic model.

A recent study by Suryan & Irons (2001, *Auk* 118: 636-649) on Black-legged Kittiwakes in Prince William Sound, Alaska found that, although there was evidence of non-natal recruitment, changes in the numbers of birds at a particular colony were significantly influenced by reproductive success at that colony 5 years previously, indicating that natal recruitment (the mean age of first breeding was 5 years) was an important component of colony dynamics. The demography of the Kittiwake in the Pacific and Atlantic may differ (Coulson 2002, *Journal of Avian Biology* 33: 111-112) so we need to be cautious about extrapolating between the two areas but this finding gives some empirical support for our approach.

The main aim of our paper was to present the first estimate of the survival of adult Black-legged Kittiwakes in northern Britain. However, we considered it of interest to see how well a simple model explained previous changes in numbers, provide some tentative population projections and highlight the need for detailed population studies to collect more demographic data. Coulson & Neve de Mevergnies (1992, *Ardea* 80: 187-197) estimated that 79% of Kittiwakes recruited to a colony within 100 km of where they had been hatched. During the last 15 years the numbers of Kittiwakes breeding within this radius of Fair Isle have declined by almost half (Heubeck 2000; *Atlantic Seabirds* 2: 227-244; Thompson & Walsh 2000, *Atlantic Seabirds* 2: 103-132). We are therefore reassured that our results from Fair Isle will be applicable to a wider area.

The Fair Isle Kittiwake population has continued to decline. Monitoring counts in 2001 and 2002 were 695 and 421 nests. Both these figures are within the range of the projected values.

P. Rothery, M.P. Harris, S. Wanless & D. N. Shaw