



SHORT NOTE

## Wear of rings used on Guillemots *Uria aalge*: caution in the estimation of survival rates

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When ashore, a Guillemot *Uria aalge* usually walks with the tarsus in contact with the ground and this results in severe wear of rings. Even the change from soft to hard metal rings in the early 1960s only increased the useful life of a ring placed on a Guillemot to around 10 years, after which the ring numbers still became illegible if the ring had turned or had been put on upside down. During the early 1980s the British Trust for Ornithology (BTO) developed a special ring for use on Guillemots in an attempt to reduce the adverse effects of wear on the longevity and legibility of rings. The ring is approximately triangular when viewed end-on with a flat base that should be in contact with the ground, the number stamped on each side and the return address placed above one of the numbers. This ring came into general use in 1983, since when over 200,000 have been used with 80% of these being on chicks. The ring has proved extremely successful in eliminating the loss of the ring number by abrasion. Recently, however, a new problem has come to light in that some rings placed on chicks have turned, with the result that the pointed apex of the ring is in contact with the ground. This concentrates the wear on a small area and exposes the return address to abrasion.

Each year since 1983 about 300 Guillemot chicks on the Isle of May, southeast Scotland have been metal-ringed, individually colour-ringed and had their ages estimated from their wing lengths. In 2000-03 MPH used a x60 telescope to determine whether or not the BTO rings had turned on 389 birds that had been colour-ringed as chicks and had subsequently returned to prospect for breeding sites. Twenty-five birds with turned rings were caught and their rings replaced.

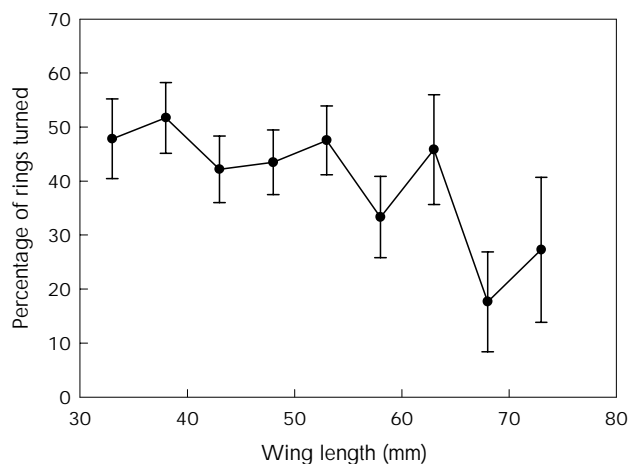
Most (82%) of the 389 birds examined were between three and six years old, an age when birds prospecting for nest-sites are easily observed. Older birds are normally breeding which makes rings difficult to see and two-year-olds rarely attend colonies. On 168 (43%) of these colour-ringed birds, the BTO guillemot special ring had turned. These rings are an excellent fit on adult Guillemots and we have found it impossible to reverse a

turned ring without removing it from the bird. None of the guillemot special rings placed on 748 full-grown Guillemots that we colour-ringed at the same time have turned, so it appears as though turning occurred soon after chicks were ringed, presumably before they become full-sized, some 2-3 months after fledging.

We examined the effects of year and wing length at ringing on the chances of a ring turning using logistic regression with the response as a binary score (ring turned = 1, ring not turned = 0). There was a highly significant effect of year ( $\chi^2_9 = 38.62$ ,  $P < 0.001$ ) with the proportion of rings turning in years where there were reasonable samples varying from 28% to 70% (Table 1). The variation between years could not be accounted for by annual variation in wing length since there was also a highly significant effect of year after allowing for wing length ( $\chi^2_9 = 38.24$ ,  $P < 0.001$ ). We cannot explain these between-year differences.

The chances of a ring turning were reduced with an increase in wing length at ringing (ignoring year effects: ( $\chi^2_1 = 5.06$ ,  $P = 0.024$ ; allowing for year effects:  $\chi^2_1 = 4.68$ ,  $P = 0.031$ ). However, only in chicks with a wing length of 60 mm or more was there a marked improvement and, even then, 21% of the largest chicks (> 65 mm) had turned rings (Fig 1).

For there to be any meaningful reduction in the chances of a ring turning, ringing would have to be restricted to just the very largest chicks. On the Isle of May, chicks reach a wing length of 50 mm when aged 13-14 days and the mean wing length of 5,497 chicks ringed at this colony during the period 1982-2003 was 48 mm (se = 0.2). The average time spent on the ledges by young Guillemots at this colony decreases significantly as the season progresses, from 23-24 days for the earliest-hatching chicks to 18-19 days for those hatching a month later (Wanless & Harris 1988). Restricting ringing to the large chicks would effectively prevent late chicks from being ringed. Such a biased sample would form a very unsatisfactory basis on which to attempt to estimate the post-fledging survival of young.



**Figure 1.** The percentage ( $\pm$  se) of rings that later turned, placed on 389 young Guillemots in relation to wing length at ringing (grouped in 5-mm size categories).

Of the 25 turned rings removed, ten (youngest eight years old) had the return address completely worn away, nine (youngest six years) had lost 'British Museum' but retained 'London SW7' and six still had a complete address. Eight of the turned rings also showed signs of substantial wear on the point of the ring that would have potentially reduced the useful life of the ring. We have no record of a colour-ringed bird losing its numbered ring, even after 15 years by when most chicks that we colour-ringed had lost their colour rings. Hence we have limited power to detect such loss. In an attempt to reduce the chance of rings not being returned, the address is now being moved to below the number on one side of the ring where it is less likely to become abraded if the ring turns.

Currently, methods used to estimate the survival of birds from ringing data rely on the basic assumption that there is an equal chance of any ringed bird that is found being reported (Williams *et al* 2002). This assumption is obviously invalid for Guillemots ringed as chicks on the Isle of May since an unknown, but potentially high, proportion of older rings will not be reported by the finders. This will result in under-estimation of the annual survival rate of older birds. This reduction in the reporting rate could at least partly explain the discrepancy between the annual survival rate of full-grown Guillemots of 88% calculated from the recoveries of Guillemots ringed with guillemot special rings and the higher values of 92-97% resulting from the retrapping and resighting of colour-ringed birds at three Scottish colonies over approximately the same time period (Wernham *et al* 1997, Harris *et al* 2000).

Turned rings have also been reported from Canna, Skomer and Sanda (R Swann pers comm, TR Birkhead

**Table 1.** Results of examinations of the state of guillemot special rings on individually colour-ringed Guillemot chicks on the Isle of May in 2000-03.

Year ringed	Birds examined (n)	Rings turned (n)	Percentage (%)
1991	2	1	50
1992	17	11	65
1993	9	1	11
1994	28	10	36
1995	29	8	28
1996	73	23	32
1997	75	27	36
1998	81	43	53
1999	56	39	70
2000	19	5	21
Total	389	168	43

pers comm, R Morton pers comm) but appear not to occur on Fair Isle or Sumburgh Head (D Shaw pers comm, D Okill pers comm), perhaps because Guillemots at these Shetland colonies are larger than those elsewhere in Britain (Jones 1988). Razorbills *Alca torda* are ringed with a similar, though smaller ring and these too can turn, with the subsequent later loss of the return address (R Swann pers comm). Care must therefore be exercised in the calculation of survival rates from recoveries of Guillemot and Razorbill chicks marked with these rings.

## ACKNOWLEDGEMENTS

We thank many ringers for help with the initial ringing and measuring of chicks, Tom Dewdney for catching some of the Guillemots with turned rings, other Guillemot ringers mentioned above for sharing their experiences and Chris Wernham for useful comments on an earlier draft of this note.

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(MS received 20 September 2003; MS accepted 24 November 2003)