

Colony interchange in Baltic Guillemots *Uria aalge*

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(Med et dansk resumé: Ind- og udvandring hos Lomvier *Uria aalge* i Østersøen)

Introduction

Very little is known about colony interchange in Guillemots *Uria aalge*, and indeed in most alcids. An auk rarely if ever change colony when it has first started breeding, but emigration and immigration of young birds may have significance for alcid populations, as can be deduced from cases where colony growth rate has exceeded the population's intrinsic rate of increase (e.g. Hudson 1985). However, apart from recapture data on Puffins *Fratercula arctica* (Harris 1983, Harris & Wanless 1991) little evidence of movements between colonies has been published.

This paper presents recapture data on Baltic Guillemots ringed as chicks, and shows that intercolony movements occur regularly. Some figures differ from those formerly given by Lynngs (1992a) because new information has since become available, but the conclusions remain unchanged.

The Baltic Guillemot population numbered around 13000 breeding pairs in the mid-1980s (SOF 1990, Lynngs 1992a), with more than 90% in three colonies: about 7500 pairs at Stora Karlsö, 2500 pairs at Lilla Karlsö and 2000 pairs at Græsholmen (Fig. 1). The population has grown throughout this century (Hedgren 1975); during the 1970s and 1980s the main colonies increased by 2-4% annually and some small colonies by 10-14% annually (Lynngs 1992a). Most of the Baltic Guillemots winter in the Baltic Sea and the inner Danish waters (Anon. 1991, Lynngs 1992a).

Material and methods

Approximately 36000 Baltic Guillemots were ringed during 1960-1988, the majority (97%) as chicks. Except for Græsholmen in 1974-80, there have been no systematic efforts to recapture ringed Guillemots, but some have been caught accidentally during ringing of adults, especially on Grän and Svenska Högarna and to a lesser extent in six other colonies (Tab. 1). Swedish data including 1988 have been extracted from Anon. (1984-91),

and data from 1989-91 were kindly forwarded by the Swedish Bird-ringing Centre. Data from Græsholmen 1928-92 were published by Lynngs (1992b), and Hario (1982) reported some results from Finland. In total, 674 Guillemots ringed as full-grown (524) or chicks (150), and later recaptured in a colony, were available for analysis.

Results

A total of 134 Guillemots ringed as chicks were subsequently recaptured in other colonies (Tab. 1). Chicks ringed on Stora Karlsö have been found in all Baltic colonies where trapping has taken place. The data also indicate that the small and recently

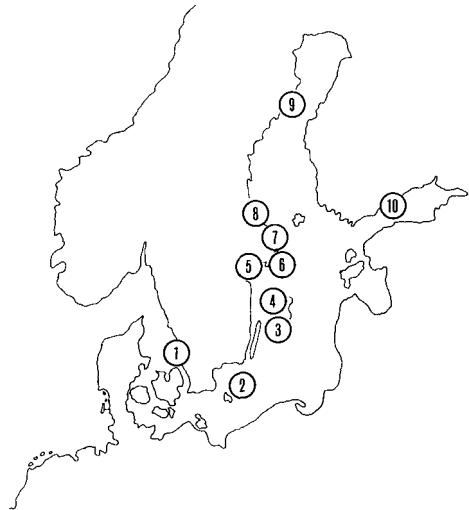


Fig. 1. Guillemot colonies mentioned in the text. (1) Hallands Väderö (56°27'N 12°34'E), (2) Græsholmen (55°19'N 15°11'E), (3) Stora Karlsö (57°17'N 17°58'E), (4) Lilla Karlsö (57°19'N 18°04'E), (5) Källskären (58°34'N 17°13'E), (6) Grän (58°52'N 18°12'E), (7) Svenska Högarna (59°27'N 19°31'E), (8) Understen (60°14'N 18°53'E), (9) Bonden (63°26'N 20°03'E), (10) Aspskär (60°15'N 26°25'E).
Beliggenheden af de lomviekolonier, der nævnes i teksten.

Tab. 1. Natal colony and colony of subsequent recapture for 150 Guillemots ringed as chicks and controlled as full-grown. Distances are measured over the sea. See Fig. 1 for colony numbers and positions.

Oprindeleskoloni og genfangststed for 150 Lomvier ringmærket som unger og kontrolleret som udvoksede. Afstanden er målt over havet. Koloniernes numre og beliggenheder fremgår af Fig. 1.

Ringed <i>Ringmærket</i>	Recaptured <i>Genfanget</i>	Number <i>Antal</i>	Distance (km) <i>Afstand (km)</i>	
(1) Hallands Väderö	(6) Grän	1	700	
(2) Græsholmen	(1) Hallands Väderö	1	290	
	(2) Græsholmen	13	0	
	(6) Grän	1	420	
(3) Stora Karlsö	(2) Græsholmen	43	280	
	(3) Stora Karlsö	2	0	
	(5) Källskären	8	150	
	(6) Grän	32	170	
	(7) Svenska Högarna	25	260	
	(8) Understen	5	330	
	(9) Bonden	4	780	
	(10) Aspskär	13	590	
	(6) Grän	(6) Grän	1	0
	(8) Understen	(9) Bonden	1	400

established Guillemot colony on Hallands Väderö (the only colony in the Kattegat, with 10 pairs in 1988; SOF 1990) is linked with the Baltic population.

Age at recapture of birds hatched on Stora Karlsö and controlled elsewhere is shown in Tab. 2. The age-distribution strongly suggests that most of these birds were breeders. Guillemots seem normally to initiate breeding when about 5 years old but may do so already at 4 or even at 3 years (Swann & Ramsay 1983, Hudson 1985).

The fact that only 16 birds ringed as chicks were later recaptured in their natal colony (Tab. 1) is caused by a bias in the data. A large majority of the chicks were ringed on Stora Karlsö where the recapture effort has been virtually nil. Thirteen of the birds controlled in their natal colony are from Græsholmen, where recaptures stopped before many of the ringed chicks had reached an age of 4 years (Tab. 3). The two birds from Græsholmen re-trapped elsewhere were both 8 years old.

Of 524 birds ringed when full-grown and later recaptured, 517 were found in the colony of ringing. The remaining 7 birds were found 2-8 years later in colonies lying 1 km (1 bird), 65 km (1), 140 km (1), 400 km (1) and 420 km (3) away from the colony of ringing. Twenty-eight birds ringed as chicks and subsequently controlled away from their natal colony were re-trapped more than once, all of them in the same colony (Tabs 2 and 3).

Discussion

Many studies have shown that adult Guillemots display a very high nesting site fidelity when they have first started breeding, and a change of breeding colony has never been demonstrated (Hudson 1985). The Baltic Guillemots appear to conform to this pattern, although 7 birds ringed when full-grown were later found in other colonies; they may, however, have been immatures when first ringed.

That young Guillemots may settle and start breeding away from their natal colony is well known, and the data presented here suggest that it occurs fairly regularly, at least in the Baltic Sea. Unfortunately, quantifying in terms of emigration and immigration rates is hampered by the lack of reliable estimates of mortality rates and other parameters relating to the population dynamics of the Baltic Guillemots, and by the varying and largely unknown trapping efforts in different colonies. In case of the 1974 cohort born on Stora Karlsö and subsequently recaptured on Græsholmen, however, it is at least possible to suggest some reasonable magnitudes.

Of the estimated 5120 chicks fledged on Stora Karlsö in 1974, 3109 were ringed (Hedgren 1975). Five of these were captured on Græsholmen in 1978-81, among a total of 886 full-grown Guillemots (here assumed to be breeders). With an estimated 2300 birds breeding on Græsholmen in

Photo: Peter Lyngs.



1978-81 (Lyngs 1992a) one should, by controlling all breeders, have captured 13.0 (5/886x2300) chicks ringed on Stora Karlsö in 1974, or 21.4 (13.0x5120/3109) of the chicks fledged that year. If about 8% of the breeding Guillemots were hatched in 1974 (as would be the case in a stable population with an annual mortality of adults of 8%), the 21.4 Stora Karlsö birds present would

constitute 12% of the entire 1974 cohort of about 184 birds. So, if the 1974 cohort was typical in this respect, 12% of the entire Græsholmen population of Guillemots were hatched on Stora Karlsö.

These calculations obviously contain large elements of uncertainty. For example, just one more control would have given an immigration rate of 14%, and one less 9%, instead of 12%; and some assumptions were somewhat arbitrary and not quite consistent mutually. The results suggest, however, that immigration from Stora Karlsö may have been significant for the population development on Græsholmen. Seen from Stora Karlsö the

Tab. 2. Age at recapture of 128 Guillemots ringed as chicks on Stora Karlsö and controlled as full-grown in other colonies.

Alder ved genfangst af 128 Lomvier ringmærket som unger på Stora Karlsö og kontrolleret som fuldvoksne i andre kolonier.

Age (years) Alder (år)	Number ^a Antal ^a	
	first controlled	last controlled
3	3	3
4	12	10
5	16	12
6	17	12
7	16	19
8	13	12
9	9	10
10	10	10
11	8	10
12	11	12
13	5	5
14	2	3
15	1	2
16	2	2
17	3	4
18-24	0	2

a: 25 birds were recaptured more than once
25 fugle blev genfanget flere gange

Tab. 3. Age at recapture of 13 Guillemots ringed as chicks and subsequently controlled on Græsholmen. Note, however, that most chicks were ringed in 1976-80, and that trapping almost ceased after 1980.

Alder ved genfangst af 13 Lomvier ringmærket som unger og senere kontrolleret på Græsholmen. Bemærk dog, at hovedparten af ungerne blev mærket i årene 1976-80, og at genfangsten stort set ophørte efter 1980.

Age (years) Alder (år)	Number ^a Antal ^a	
	first controlled	last controlled
1	2	0
2	6	5
3	2	5
4	0	0
5	2	2
6	0	0
7	0	0
8	1	1

a: 3 birds were recaptured more than once
3 fugle blev genfanget flere gange

situation is different - the calculated 21.4 emigrants amount to only 0.42% of the cohort, or 1 % of the surviving birds if survival to breeding age is assumed to be 40%. Immigration from large colonies may significantly influence the population development of smaller colonies, even if the natal fidelity of immatures surviving to breeding age is high. In fact, some small Baltic colonies apparently owe their existence to immigration: 45 years after its establishment, Hario (1982) found that the small Finnish colony at Aspskär only survived by virtue of continual immigration.

The recorded colony interchange occurred during a period of growth in the Baltic Guillemot population, contradicting the supposition that emigration is density dependent (determined by a shortage of suitable nesting sites or available food). Also, emigration has occurred not only from big colonies but also from very small and expanding ones. Before we can reliably define the factors governing emigration of young Guillemots, more data are needed on the status of the involved colonies, and also on the sex, dominance status and other characteristics of the emigrating birds.

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Resumé

Ind- og udvandring hos Lomvier *Uria aalge* i Østersøen

Siden 1974 er den baltiske lomviebestand vokset fra ca 8800 par til ca 13000 par i midten af 1980'erne (Lyngs 1992a). Over 90% af bestanden yngler på Stora og Lilla Karlsö og på Græsholmen.

Der er i årene 1960-88 blevet ringmærket omkring 36000 Lomvier i Østersøen. Langt de fleste er mærket som unger på Stora Karlsö, hvor der på den anden side næsten ikke er ringmærket adulte. Det er der til gengæld i 7 ud af 10 andre kolonier, især Græsholmen, Grän og Svenska Högarna. I forbindelse med ringmærkning af adulte er der blevet kontrolleret i alt 150 Lomvier mærket som unger og 524 mærket som "adulte". Af de sidstnævnte blev 517 kontrolleret i samme koloni de var mærket i, og da de resterende 7 kan have været ikke-ynglende ungfugle ved mærkningen ligger der ikke heri noget bevis for, at adulte Lomvier kan skifte koloni. Unger fra Stora Karlsö er som adulte kontrolleret i alle de 7 nævnte kolonier, ligesom enkelte unger herfra senere er kontrolleret i andre kolonier (Tab. 1).

Da ringmærkningsindsats og antallet af kontrollerede fugle svinger stærkt, er det ikke muligt at beregne hvor mange ungfugle, der faktisk udvandrer. Ringmærknings-

tal og ungeproduktion på Stora Karlsö 1974 (Hedgren 1975) sammenholdt med antallet af kontrollerede adulte på Græsholmen 1978-81 antyder, at i størrelsesordenen 12% af ynglefuglene på Græsholmen er klækket på Stora Karlsö, svarende til at omkring 1% af de overlevende unger fra Stora Karlsö er udvandret til Græsholmen. Udvandring fra store kolonier kan potentielt spille en betydelig rolle for bestandsvæksten i små.

Af genfangsterne kan vi konkludere, at ungfugle regelmæssigt udvandrer og slår sig ned i andre kolonier end den de er klækket i. De faktorer, der bestemmer hvor mange og hvilke ungfugle, der udvandrer, er imidlertid ukendte. Den her registrerede udvandring er sket i en periode med stadig vækst i kolonierne, så det ser ikke ud til at tæthedsafhængige faktorer (f.eks. tilgængelige redepladser eller føde) spiller den store rolle. At udvandring også sker fra ganske små kolonier peger i samme retning. Der er derfor behov for et mere detaljeret kendskab til de involverede koloniers status, ligesom oplysninger om de udvandrede Lomviers køn og dominansstatus er nødvendige for at forklare udvandringens årsager og dynamik.

References

- Anonymous 1984-91: Report on Swedish Bird-Ringing 1972-88. - Bird-ringing Centre, Swedish Museum of Natural History.
- Hario, M. 1982: On the size and recruitment of a peripheral breeding colony of the Guillemot *Uria aalge*. - *Ornis Fenn.* 59: 193-194.
- Harris, M. P. 1983: Biology and survival of the immature Puffin *Fratercula arctica*. - *Ibis* 125: 56-73.
- Harris, M. P. & S. Wanless 1991: Population studies and conservation of Puffins *Fratercula arctica*. Pp. 230-248 in: C. M. Perrins, J.-D. Lebreton & G. J. M. Hirons (eds): Bird population studies. - Oxford University Press.
- Hedgren, S. 1975: The breeding population of Guillemot *Uria aalge* in the Baltic Sea. - *Vår Fågelvärld* 34: 43-52. (Swedish with English summary.)
- Hudson, P. J. 1985: Population parameters for the Atlantic Alcidae. Pp. 233-254 in: D. N. Nettleship & T. R. Birkhead (eds): The Atlantic Alcidae. - Academic Press.
- Lyngs, P. 1992a: Breeding birds on Græsholmen, Ertholmene in the Baltic Sea, 1925-90. - *Dansk Orn. Foren. Tidsskr.* 86: 1-93. (Danish with English summary.)
- Lyngs, P. 1992b: Ringmærkning, genfund og kontrol af alkefugle (Alcidae) på Ertholmene 1928-92. - Skov- og Naturstyrelsen, Miljøministeriet.
- SOF 1990: Sveriges fåglar. 2:a uppl. - Stockholm.
- Swann, R. L. & A. D. K. Ramsay 1983: Movements from and age at return to an expanding Scottish Guillemot colony. - *Bird Study* 30: 207-214.

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