

NESTING CAVITY CHOICE BY BLACK GUILLEMOTS *CEPPHUS GRYLLE*

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Greenwood J.G. 2002. Nesting cavity choice by Black Guillemots *Cephus grylle*. Atlantic Seabirds 4(3): 119-122. *The study examined the characteristics of nesting cavities of Black Guillemots Cephus 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 (Löhr 1986). A number of seabirds, including Black Guillemots *Cephus 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 $\times$ 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 $\times$ 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 = $39.7409 - 3.0022 \text{ exposure} + 1.3049 \text{ steps}$ ($F = 25.87$; $df = 2, 12$; $P < 0.001$; $r^2 = 0.81$).

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 NESTELLENDE 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 nestholte 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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