Black Guillemot *Cepphus grylle*

Summary

Black Guillemot is projected to decline in population size in the INTERREG VA area from 1998-2002 to 2050 under climate change, particularly in the south and east. Overall, Black Guillemot is projected (with poor confidence) to have high vulnerability under climate change in the INTERREG VA area.

Table 1. Current (observed) and future (projected) Black Guillemot population size (breeding pairs) in GB & Ireland, INTERREG VA area and MarPAMM management areas.

Area	1998-2002	Projection for 2050	
GB & Ireland	42701	26454	↓-38%
INTERREG VA area	14452	9077	↓-37%
Argyll	2513	1440	↓-43%
Co. Down – Co. Louth	272	128	↓-53%
N Coast Ireland – N Channel	1849	968	↓-48%
Outer Hebrides	4577	3157	↓-31%

Under climate change, Black Guillemot **population size** is projected to **decline** in the INTERREG VA area between 1998-2002 and 2050, at a slightly lower rate than across Britain and Ireland as a whole (Table 1, Fig. 2a).

Black Guillemot is projected to decline in abundance everywhere across the INTERREG VA area, but at a slightly greater rate in the south and east of the area (Fig. 2a). Some sites, particularly in the north of the area may become more suitable for Black Guillemot under climate change (Fig. 2b); therefore this projected decline in abundance may be partially compensated for by colonisation.

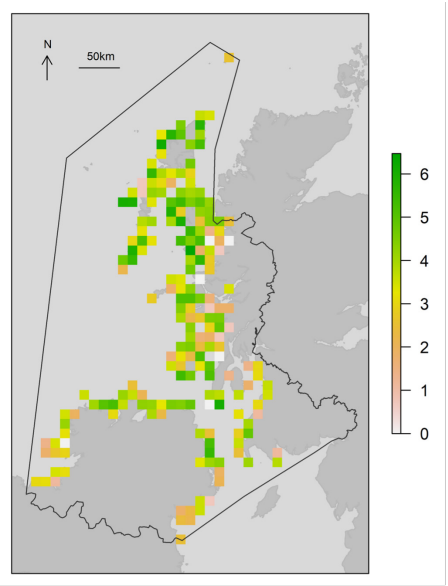

Figure 1. Observed Black Guillemot abundance (log breeding pairs), 1998-2002. Black polygon = INTERREG VA area.

This work was produced as part of the Marine Protected Area Management and Monitoring (MarPAMM) project. MarPAMM has been supported by the European Union's INTERREG VA Programme, managed by the Special EU Programmes Body.

Projected change in breeding pairs

Projected change in presence probability

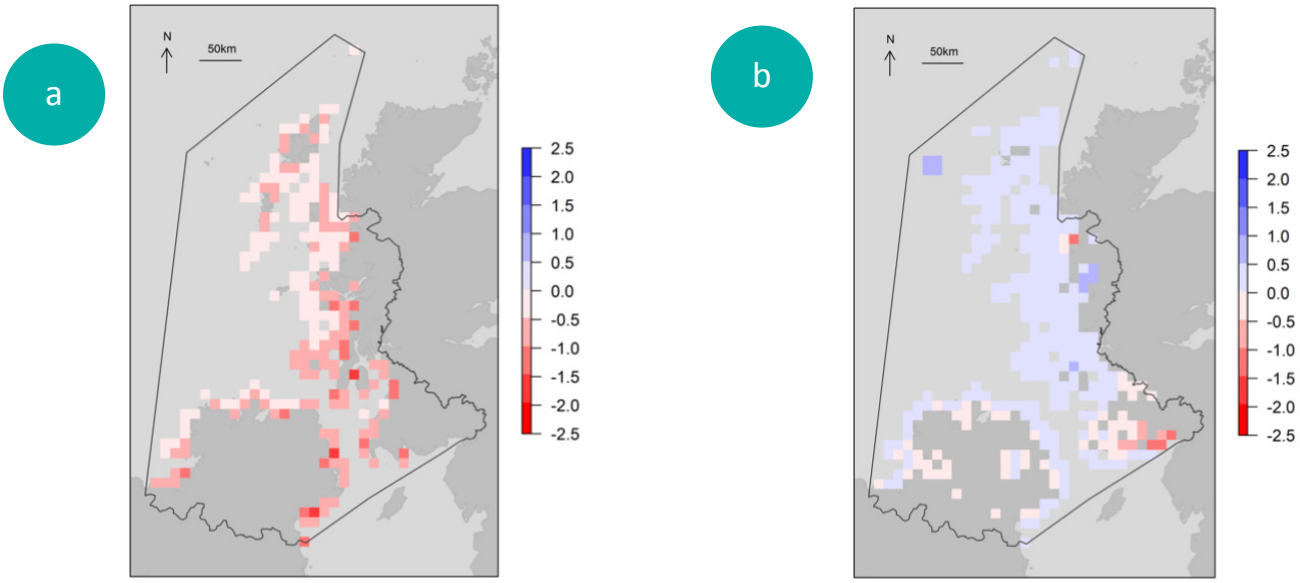

Figure 2. Projected change (1998-2002 to 2050; log proportional change) in: a) Black Guillemot breeding pairs, for all cells where Black Guillemot was present in 1998-2002; (b) Black Guillemot presence probability for all squares where any seabird was censused in 1985-1988 or 1998-2002. White/blue = increase, red = decrease. Black polygon = INTERREG VA area.

Model predictive power was excellent for the presence/absence component of the model, and good for the abundance component*. Black Guillemot presence/absence and abundance had significant relationships with terrestrial climate, oceanographic and nuisance variables (Table 2).

Table 2. Effect on presence and abundance for significant variables in model*. Variables included in table if significant in at least one model component; field left blank if variable not significant in that model component. Variables shown in parentheses represent quadratic terms. Projections made using full model (i.e. not just significant variables).

Variable	Presence	Abundance
Breeding season maximum temperature		-
Winter minimum temperature	+	+
Breeding season precipitation	+	
Winter precipitation		-
(Winter precipitation)^2	-	
Breeding season potential energy anomaly	+	
Winter potential energy anomaly	-	
(Winter potential energy anomaly)^2	+	
Coast length	+	+
Distance inside coast	-	

Table 3. Projected change for Black Guillemot at the ten sites with the most breeding pairs in 1998-2002. Superscript denotes MarPAMM management region: [A], Argyll; [B], Co. Down - Co. Louth; [C], North Coast Ireland - North Channel; [D], Outer Hebrides.

Site	Breeding pairs, 1998-2002 (count)	Projected breeding pairs, 2050 (median & 95% CI*)	Projected % change in breeding pairs (median & 95% CI*)
Lewis and Harris[D]	2264	1490 (472, 4503)	-34.2 (-79.1, +98.9)
Monach Isles – Tysties[D]	819	673 (114, 2733)	-17.8 (-86.1, +233.7)
Mull – tysties (incl. Treshnish)[A]	724	461 (105, 1589)	-36.3 (-85.5, +119.5)
Isle of Rum	645	291 (97, 862)	-54.9 (-85, +33.7)
Skye – Neist to Meall Greepa	639	517 (108, 1759)	-19.1 (-83.2, +175.3)
Islay (Tysties)[A]	610	310 (59, 1198)	-49.2 (-90.3, +96.4)
Argyll 4 – Mainland and Islets	533	265 (54, 964)	-50.2 (-89.9, +80.8)
Islands South of Barra[D]	473	307 (68, 1044)	-35.2 (-85.7, +120.7)
Barra and Vatersay – tysties[D]	375	244 (52, 845)	-35 (-86, +125.4)
Skye – Fang nan Each to Lyndale Point	369	274 (54, 967)	-25.7 (-85.3, +162.2)

* See main report for details of modelling, variables, categories of model predictive power and derivation of confidence intervals for projections.

Climate Change Mechanisms

The review of climate change mechanisms affecting seabirds (Johnston et al. 2021) identified relatively few relationships between Black Guillemot demography and climatic variation. Black Guillemot productivity may be sensitive to flooding due to heavy precipitation or extreme storm swell. Black Guillemot breeding phenology is related to spring air temperatures.

Overall, climate change is projected (with **poor confidence**) to present Black Guillemot with **high risk** and **low opportunity** in the INTERREG VA area.

Citation: Black Guillemot species factsheet. From Davies, J.G., Humphreys, E.M. & Pearce-Higgins, J.W. 2021. Projected future vulnerability of seabirds within the INTERREG VA area to climate change. Report to Agri-Food and Biosciences Institute and Marine Scotland Science as part of the MarPAMM Project. BTO, Thetford

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www.mpa-management.eu