Herring Gull *Larus argentatus*

Summary

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

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

Area	1998-2002	Projection for 2050
GB & Ireland	148849	105568 ↓-29%
INTERREG VA area	31327	26742 ↓-15%
Argyll	10573	8575 ↓-19%
Co. Down – Co. Louth	608	518 ↓-15%
N Coast Ireland – N Channel	1011	646 ↓-36%
Outer Hebrides	2662	2442 ↓-8%

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

Herring Gull **abundance** trend is projected to **vary** across the INTERREG VA area, with declines more likely in the south and west (Fig. 2a). Some sites in the south and east may become more suitable for Herring Gull under climate change (Fig. 2b); therefore this projected decline in abundance may be partially compensated for by colonisation.

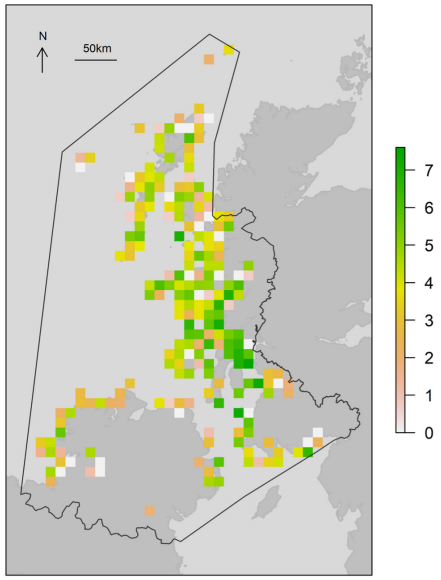

Figure 1. Observed Herring Gull abundance (log breeding pairs), 1998-2002. Black polygon = INTERREG VA area.

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

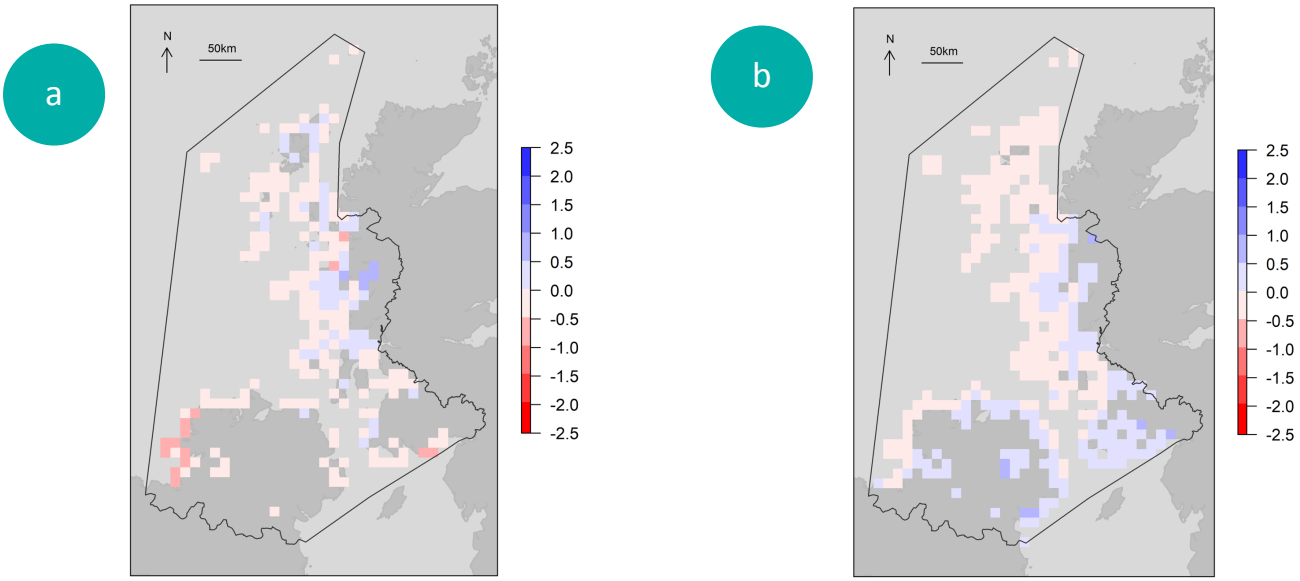

Figure 2. Projected change (1998-2002 to 2050; log proportional change) in: a) Herring Gull breeding pairs, for all cells where Herring Gull was present in 1998-2002; (b) Herring Gull presence probability for all squares where any seabird was censused in 1985-1988 or 1998-2002. White/blue = increase,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

Model predictive power was good for the presence/absence component of the model, but poor for the abundance component*. Herring Gull 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	-	-
(Breeding season maximum temperature)^2	+	
Winter minimum temperature	+	
Breeding season precipitation	-	
(Winter precipitation)^2		-
Breeding season potential energy anomaly		-
Winter potential energy anomaly	+	+
Breeding season sea surface temperature	+	+
Coast length	+	+
Distance inside coast	-	-
Small islands area		+

Table 3. Projected change for Herring Gull at the ten sites with the most breeding pairs in 1998-2002. Sites are as defined in Seabird 2000 census. Superscript denotes MarPAMM management region, where applicable: [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*)
Little Cumbrae	2000	1514 (488, 4180)	-24.3 (-75.6, +109)
Inchmarnock Island, Bute	1550	1181 (303, 4144)	-23.8 (-80.4, +167.3)
Lady Isle	1500	1075 (297, 3482)	-28.4 (-80.2, +132.1)
Loch Fyne	1470	1603 (586, 4409)	+9 (-60.1, +199.9)
Ailsa Craig	1450	1153 (282, 4042)	-20.5 (-80.6, +178.8)
Sound of Jura[A]	1435	1019 (258, 3701)	-29 (-82, +157.9)
Isle of Canna	1138	1022 (241, 3924)	-10.2 (-78.8, +244.8)
Firth of Lorn[A]	838	536 (173, 1542)	-36 (-79.4, +84)
Tiree[A]	822	789 (193, 2812)	-4 (-76.5, +242.1)
Isle of Colonsay[A]	803	665 (196, 1966)	-17.1 (-75.6, +144.8)

* 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 that gulls as a group are typically influenced indirectly by climatic variation, mediated through food supply. Low-lying gull nests are susceptible to flooding, and so sea level rise or increased storminess under climate change may reduce population size or productivity. In the north-west Atlantic, Herring Gull breeding success is negatively related to stratification due to cold SSTs, while egg volume is negatively related to spring SST and NAO; these relationships may be mediated through food supply or adverse weather. In the north-east Atlantic, Herring Gull's range dynamics (both in the breeding season and in winter) are related to the NAO.

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

Citation: Herring Gull 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