Arctic Skua *Stercorarius parasiticus*

Summary

Arctic Skua is projected to decline to zero in the INTERREG VA area from 1998-2002 to 2050 under climate change. Due to a paucity of data, model behaviour was unusual for this species, and therefore projections may be less reliable than for other species. Overall, Arctic Skua is projected (with moderate confidence) to have high vulnerability under climate change in the INTERREG VA area.

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

Area	1998-2002	Projection for 2050	
GB & Ireland	2136	0	↓-100%
INTERREG VA area	177	0	↓ -100%
Argyll	21	0	↓ -100%
Co. Down – Co. Louth	0	0	↓ -100%
N Coast Ireland – N Channel	0	0	↓ -100%
Outer Hebrides	156	0	↓ -100%

Under climate change, Arctic Skua **population size** is projected to **decline** to zero in both the INTERREG VA area and Britain and Ireland between 1998-2002 and 2050 (Table 1, Fig. 2a).

It is unlikely that new sites will become more suitable for Arctic Skua under climate change (Fig. 2b); therefore this projected decline in abundance is unlikely to be compensated for by colonisation.

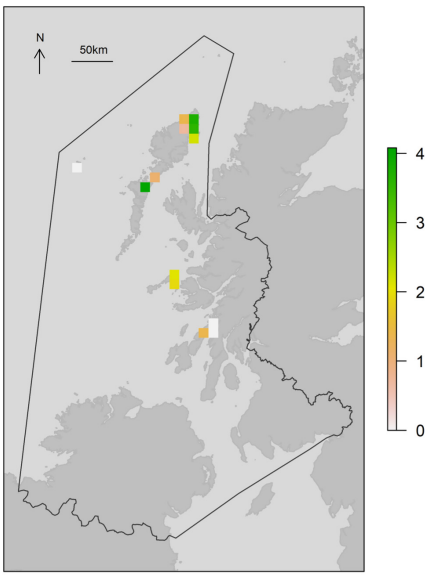

Figure 1. Observed Arctic Skua abundance (log breeding pairs), 1998-2002. Black polygon = INTERREG VA area.

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

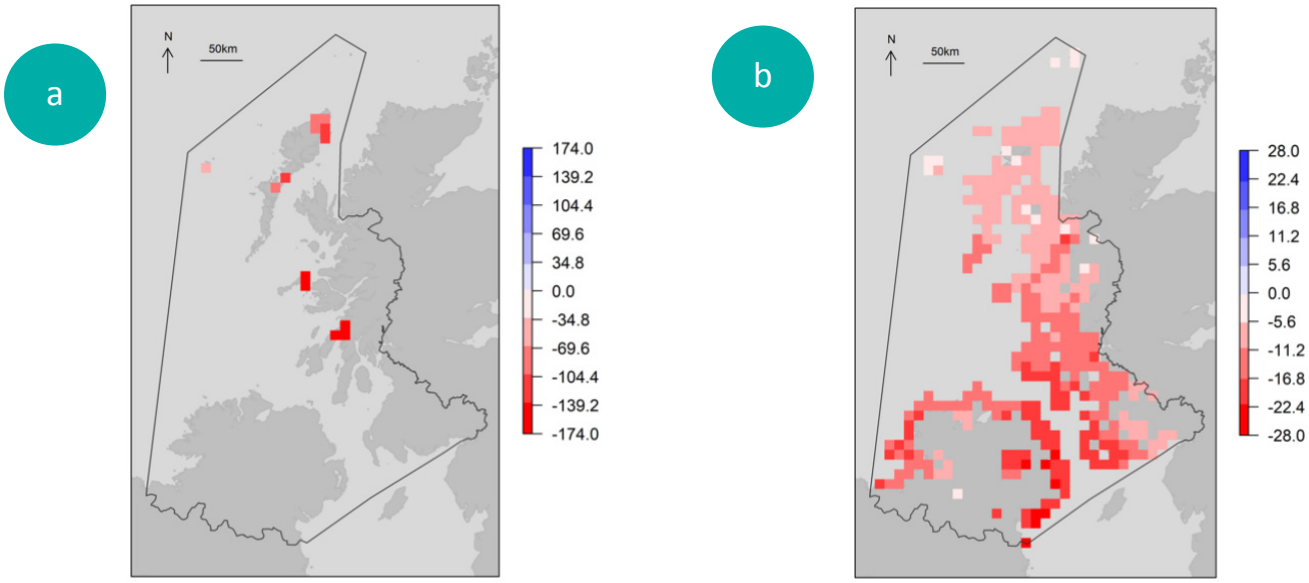

Figure 2. Projected change (1998-2002 to 2050; log proportional change) in: a) Arctic Skua breeding pairs, for all cells where Arctic Skua was present in 1998-2002; (b) Arctic Skua presence probability for all squares where any seabird was censused in 1985-1988 or 1998-2002. White/blue = increase, red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

Due to a paucity of data, model behaviour was unusual for this species, and therefore projections may be less reliable than for other species*. Model predictive power was excellent for the presence/absence component of the model, and poor for the abundance component. Arctic Skua 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	-	
(Winter minimum temperature)^2	-	
(Winter precipitation)^2	-	
(Breeding season potential energy anomaly)^2		-
Breeding season sea surface temperature		-
(Breeding season sea surface temperature)^2		-
(Winter sea surface temperature)^2	-	
Bathymetry	+	+
Coast length	+	
Small islands area		+

Table 3. Projected change for Arctic Skua at the seven sites holding 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*)
North Uist[D]	59	0 (0, 0)	-100 (-100, -100)
Lewis and Harris – Skua Survey[D]	51	0 (0, 0)	-100 (-100, -100)
Lewis – AMEC Arctic Skua Survey[D]	42	0 (0, 0)	-100 (-100, -100)
Coll[A]	15	0 (0, 0)	-100 (-100, -100)
Jura[A]	6	0 (0, 0)	-100 (-100, -100)
Killegray – Harris[D]	3	0 (0, 0)	-100 (-100, -100)
Hirta, St Kilda[D]	1	0 (0, 0)	-100 (-100, -100)

* 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 largely indirect effects of climate on the demography and population size of Skuas as a group, often passed in complex ways through prey or predator species. More directly, being at the southern edge of their range in Europe, breeding Skuas in Britain and Ireland are susceptible to heat stress at the nest in high air temperatures.

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

Citation: Arctic Skua 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