European Storm-petrel *Hydrobates pelagicus*

Summary

European Storm-petrel is projected to decline to close to zero in population size 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, European Storm-petrel is projected (with poor confidence) to have high vulnerability under climate change in the INTERREG VA area.

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

Area	1998-2002	Projection for 2050	
GB & Ireland	82818	14799	↓-82%
INTERREG VA area	7731	6	↓-100%
Argyll	5048	1	↓-100%
Co. Down – Co. Louth	0	0	
N Coast Ireland – N Channel	650	0	↓-100%
Outer Hebrides	1833	0	↓-100%

Under climate change, European Storm-petrel **population size** is projected to **decline** to close to zero in the INTERREG VA area between 1998-2002 and 2050, and to decline considerably across Britain and Ireland as a whole (Table 1, Fig. 2a).

European Storm-petrel is projected to decline to zero at all existing sites in the INTERREG VA area (Fig. 2a). However, some new sites in the east of the area may become more suitable for European Storm-petrel under climate change (Fig. 2b); therefore this projected decline in abundance may be compensated for to some extent by colonisation.

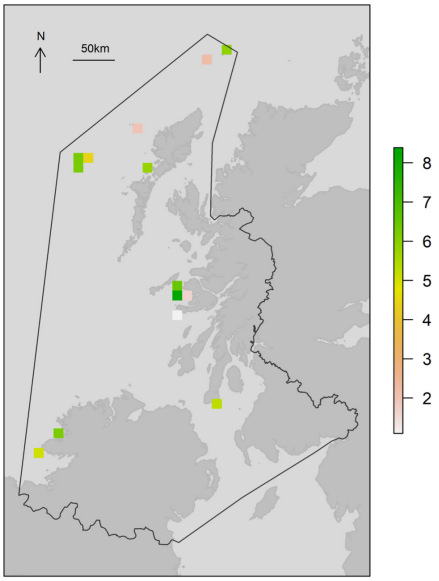

Figure 1. Observed European Storm-petrel abundance (log breeding pairs), 1998-2002. Black polygon = INTERREG VA area.

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

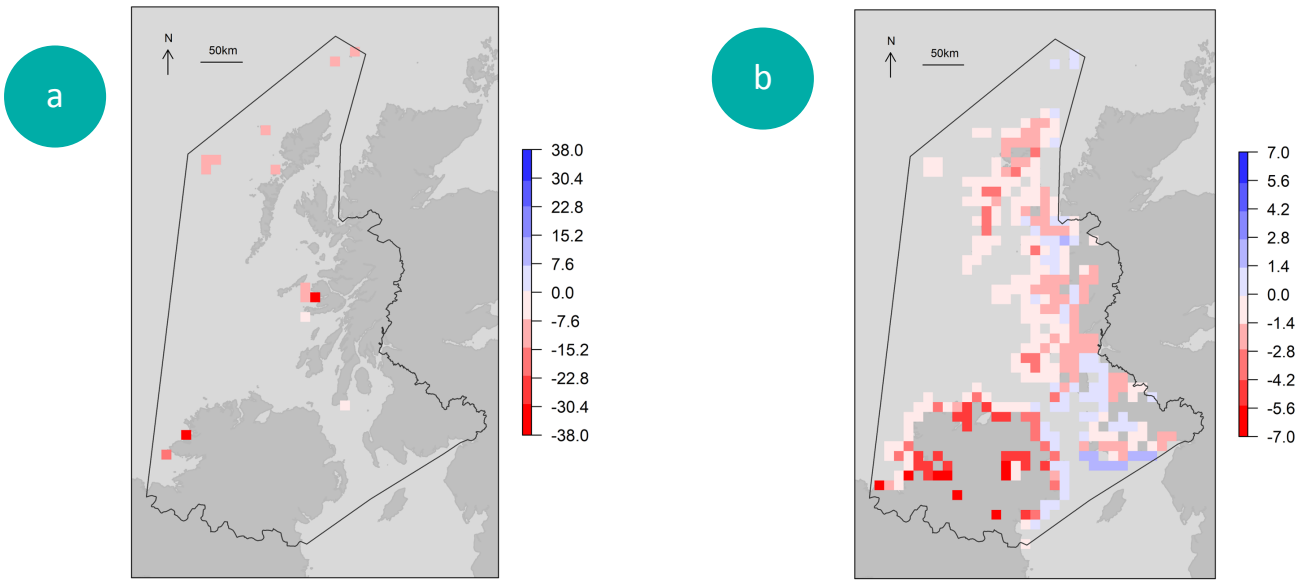

Figure 2. Projected change (1998-2002 to 2050; log proportional change) in: a) European Storm-petrel breeding pairs, for all cells where European Storm-petrel was present in 1998-2002; (b) European Storm-petrel presence probability for all squares where any seabird was censused in 1985-1988 or 1998-2002. 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, but very poor for the abundance component. European Storm-petrel 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 precipitation	-	
Breeding season potential energy anomaly		-
Winter potential energy anomaly		+
(Breeding season sea surface temperature)^2	+	
Coast length	+	
Small islands area	+	

Table 3. Projected change for European Storm-petrel 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*)
Treshnish Isles[A]	5040	1 (0, 48153)	-100 (-100, +855.4)
Soay, St Kilda[D]	529	0 (0, 152)	-100 (-100, -71.3)
Hirta, St Kilda[D]	508	0 (0, 155)	-100 (-100, -69.6)
Roaninish Island[C]	491	0 (0, 0)	-100 (-100, -100)
North Rona[D]	368	0 (0, 1579)	-100 (-100, +329)
Shillay[D]	328	0 (0, 53)	-100 (-100, -83.9)
Sanda Island, Sheep Island and Glunimore Island	200	4 (0, 176069)	-97.9 (-100, +87934.3)
Rathlin Island[C]	159	0 (0, 6)	-100 (-100, -95.9)
Boreray, St Kilda[D]	84	0 (0, 23)	-100 (-100, -72.4)
Sula Sgeir Island[D]	9	0 (0, 16)	-100 (-100, +79.9)

* 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 various impacts of adverse weather on demographic parameters of the procellariforms in general, often operating in complex ways. The effects of climatic variation on the demography of European Storm-petrel in particular remain relatively un-studied in the region, and represent a current knowledge gap.

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

Citation: European Storm-petrel 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

For more information on the MarPAMM project please visit the project website:

www.mpa-management.eu