

Sandwich Tern *Thalasseus sandvicensis*

Summary

Sandwich Tern is projected to decline considerably 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, Sandwich Tern is projected (with poor confidence) to have moderate vulnerability under climate change in the INTERREG VA area.

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

Area	1998-2002	Projection for 2050
GB & Ireland	13977	4300 ↓-69%
INTERREG VA area	2282	534 ↓-77%
Argyll	0	0
Co. Down – Co. Louth	1555	231 ↓-85%
N Coast Ireland – N Channel	606	212 ↓-65%
Outer Hebrides	0	0

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

Sandwich Tern is projected to **decline** in almost everywhere across the INTERREG VA area (Fig. 2a). However, some new sites may become more suitable for Sandwich Tern under climate change (Fig. 2b); therefore this projected decline in abundance may be compensated for to some extent by colonisation.

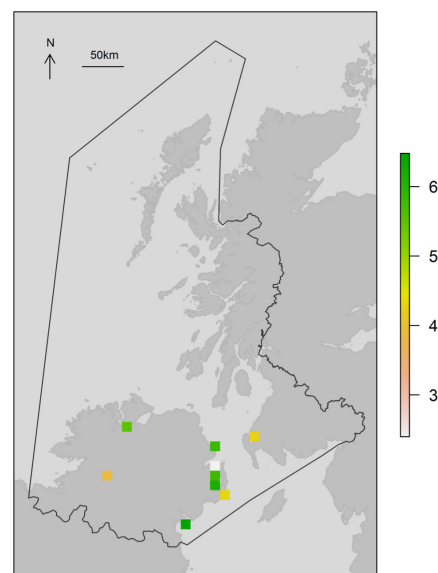
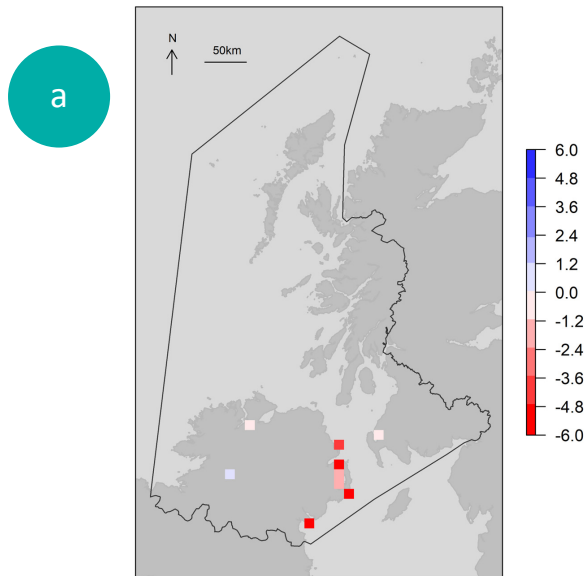


Figure 1. Observed Sandwich Tern abundance (log breeding pairs), 1998-2002. Black polygon = INTERREG VA area.

Projected change in breeding pairs



Projected change in presence probability

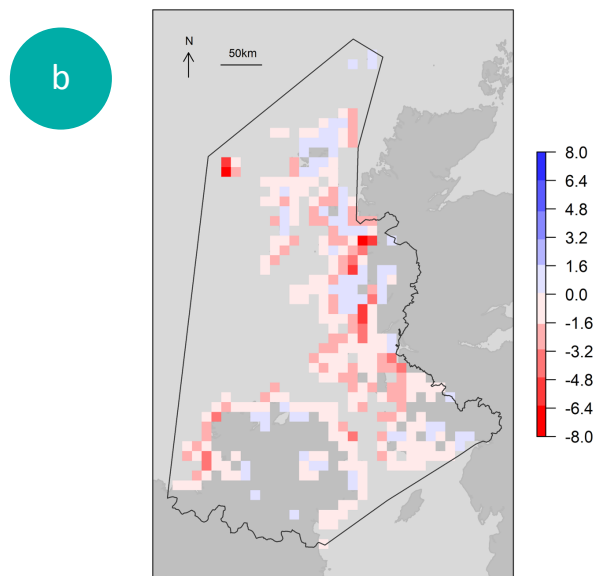


Figure 2. Projected change (1998-2002 to 2050; log proportional change) in: a) Sandwich Tern breeding pairs, for all cells where Sandwich Tern was present in 1998-2002; (b) Sandwich tern presence probability for all squares where any seabird was censused in 1985-1988 or 1998-2002. White/blue = increase, 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 moderate for the presence/absence component of the model, and poor for the abundance component. Sandwich Tern 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) ²		-
Winter precipitation	-	
(Winter precipitation) ²	-	
Breeding season sea surface temperature	+	
Bathymetry	-	
Coast length	+	

Table 3. Projected change for Sandwich Tern 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*)
Strangford Lough ^B	905	228 (7, 6908)	-74.8 (-99.3, +663.3)
Carlingford Lough ^B	650	3 (0, 17159)	-99.5 (-100, +2539.9)
Larne Lough ^C	348	4 (0, 17563)	-98.8 (-100, +4946.7)
Inch Island ^C	258	208 (7, 6030)	-19.5 (-97.3, +2237.4)
Loch Ryan, Mochram Lochs, Gennoch Rocks	70	36 (0, 3478)	-49.2 (-99.9, +4869.1)
Lower Lough Erne	51	55 (0, 18302)	+7.8 (-99.7, +35786.1)

* 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 demographic parameters of terns as a group. For Sandwich Tern in particular, foraging success is particularly sensitive to wind speed and sea choppiness.

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

Citation: Sandwich Tern 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