nature portfolio

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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our Editorial Policies and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed	
☐	☒	The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒	A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☒	☐	The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒	A description of all covariates tested
☒	☐	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒	A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒	For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☐	☒	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☐	☒	For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☒	☐	Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	No software was used for the collection of data.
Data analysis	We used R and JAGS for the analysis of data, along with their associated libraries. Versions and dependencies described in README file.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:
- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

All data are publicly available and can be found at the following GitHub repository : https://github.com/JasonMat/GannetHPAI

Research involving human participants, their data, or biological material

Policy information about studies with [human participants or human data](). See also policy information about [sex, gender (identity/presentation), and sexual orientation]() and [race, ethnicity and racism]().

Reporting on sex and gender	NA
Reporting on race, ethnicity, or other socially relevant groupings	NA
Population characteristics	NA
Recruitment	NA
Ethics oversight	NA

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences ☐ Behavioural & social sciences ☒ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see [nature.com/documents/nr-reporting-summary-flat.pdf]()

Ecological, evolutionary & environmental sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	A Bayesian analysis of highly fragmented, error-prone and temporally irregular carcass data from all European colonies of the Northern Gannet. State-space modelling imputation techniques were used to simultaneously estimate vital parameters and missing population states.
Research sample	The research sample comprises all 43 colonies of the Gannet metapopulation. Samples of carcass collections within each colony were determined by the effort of international teams working on each colony.
Sampling strategy	During the outbreak, different groups from different countries were variably permitted to collect data from affected colonies. The main advantage of this paper is that it extracts consistent inferences from these difficult data sets.
Data collection	The carcass data compilation is described in detail in Lane et al. (2024). Briefly, we contacted fieldworkers, reserve wardens and relevant authorities in all countries spanning the Gannet colony network. For the German, French, one Norwegian and some UK colonies, direct observational data on carcass numbers or their absence were available. For colonies in Iceland, Norway and Ireland, we derived sightings of dead Gannets from the Norwegian Species observation system (https://www.artsobservasjoner.no/), from the Icelandic Food and Veterinary Authority, and from the Department of Agriculture, Food and the Marine's (DAFM) Avian Check App (https://aviancheck.apps.services.agriculture.gov.ie/). We associated carcass sightings with the nearest Gannet colonies if dead birds were sighted within 50 km of the colony. We summarized the resulting data set to weekly carcass numbers for each colony in the Gannet colony network (See map in Lane et al. 2024). We set carcass numbers in the weeks before the first date of outbreak or for Bjørnøya, the only colony without outbreak (Lane et al. 2024) to 0, and carcass numbers for subsequent weeks and colonies without information to NA.
Timing and spatial scale	February 2022 to November 2022. Colonies spanning locations from Northern France to the north of Norway and Iceland.
Data exclusions	No data were excluded
Reproducibility	The analysis is Bayesian and can be re-run with the addition of new data. However, given that these were opportunistic data collected from a disease pandemic, there is no opportunity for repeated data collection. However, the implementation of the model fitting and post-hoc analyses as Markdown documents, with embedded code chunks should allow reproducibility of the analysis, given the available data.
Randomization	No randomisation was possible.
Blinding	No blinding was possible

Did the study involve field work?	☒ Yes	☐ No

Field work, collection and transport

Field conditions	Repeated measurements were taken by different teams at different times. Colonies were variably accessible and biohazard restrictions were in force.
Location	All 43 European colonies.
Access & import/export	None of the data used in this study were collected as part of this work. Ethics, access and regulatory adherence are described in the original papers and reports cited here.
Disturbance	None, specifically by this modelling study.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☐	☒ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Animals and other research organisms

Policy information about studies involving animals; ARRIVE guidelines recommended for reporting animal research, and Sex and Gender in Research

Laboratory animals	NA
Wild animals	No live animals were handled as part of this work. Carcass counts of Norther Atlantic Gannets (Morus bassanus). Age and sex were mostly hard to determine at different stages of decomposition.
Reporting on sex	No distinction was made between sexes.
Field-collected samples	NA
Ethics oversight	Ethics as applicable to local authorities associated with wardens or scientist groups.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Plants

Seed stocks	NA
Novel plant genotypes	NA
Authentication	NA