

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
<i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i> |
| ☒ | ☐ | 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
<i>Give P values as exact values whenever suitable.</i> |
| ☒ | ☐ | 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	We obtained freely available data that were used in the analysis from their respective websites or through R packages.
Data analysis	All analyses were undertaken in the R statistical computing environment (version 4.1.1; https://www.r-project.org/) and the Climate Data Operators (CDO) software https://doi.org/10.5281/zenodo.7112925 . The code used to do the analysis is archived in https://doi.org/10.5281/zenodo.8271292 .

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](#)

Datasets generated and analyzed in the study are currently available online. The digitized seasonal catch per unit effort for the 15 different fish taxa are available in Buenafe et al. (2022) <https://www.nature.com/articles/s41597-022-01528-7>. Global monthly projections for: i) temperature; ii) oxygen; iii) pH; iv) chlorophyll a; v) salinity; vi) mixed layer thickness; vii) nitrate; viii) phosphate; ix) ammonium; x) zonal velocity; and xi) meridional velocity were downloaded from the Coupled Model

Intercomparison Project Phase 6 (<https://esgf.nci.org.au/projects/esgf-nci/>). We used the mean depth layer from the General Bathymetric Chart of the Ocean (GEBCO; <https://www.gebco.net/>). The distance to the nearest coastline was calculated using `rnaturalearth` and `sf` R packages. We used AquaMaps for the adult probabilities (<https://www.aquamaps.org/>) and the full data were retrieved by requesting the data from the AquaMaps team. Data used for this study are available at Zenodo (<https://doi.org/10.5281/zenodo.8271292>).

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 This study does not include any human participants.

Reporting on race, ethnicity, or other socially relevant groupings This study does not include any human participants.

Population characteristics This study does not include any human participants.

Recruitment This study does not include any human participants.

Ethics oversight This study does not include any human participants.

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](https://www.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 This study identifies near-global larval hotspots and describes spawning strategies of large pelagic fish.

Research sample The digitized seasonal catch per unit effort for the 15 different fish taxa are available in Buenafe et al. (2022) <https://www.nature.com/articles/s41597-022-01528-7>, which had a total of 15,551 1 degree x 1 degree cells across 40N to 40S of the Indian and Pacific Oceans. Response and predictor values for all these grid cells were provided. Global monthly projections for: i) temperature; ii) oxygen; iii) pH; iv) chlorophyll a; v) salinity; vi) mixed layer thickness; vii) nitrate; viii) phosphate; ix) ammonium; x) zonal velocity; and xi) meridional velocity were downloaded from the Coupled Model Intercomparison Project Phase 6 (<https://esgf.nci.org.au/projects/esgf-nci/>). We used the mean depth layer from the General Bathymetric Chart of the Ocean (GEBCO; <https://www.gebco.net/>). The distance to the nearest coastline was calculated using `rnaturalearth` and `sf` R packages. We used AquaMaps for the adult probabilities (<https://www.aquamaps.org/>) and the full data were retrieved by requesting the data from the AquaMaps team. Data used for this study are available at Zenodo (<https://doi.org/10.5281/zenodo.8271292>). We interpolated all response and predictor layers to these 1 degree x 1 degree cells.

Sampling strategy Not applicable.

Data collection We used data freely available and were downloaded from online databases.

Timing and spatial scale The larval data were from 1956-1981 and originally spanned 50N - 50S of the Indian, Pacific, and Atlantic Oceans. We have constrained the analysis to the Indian and Pacific Oceans primarily because seasonal sampling was sparse in the Atlantic Oceans.

Data exclusions Analysis was constrained to the Indian and Pacific Oceans given the data sparsity in the sampling points in the Atlantic for the larval data (see Buenafe et al. (2022) <https://www.nature.com/articles/s41597-022-01528-7>)

Reproducibility The code to reproduce the main results is available at: <https://github.com/SnBuenafe/LarvaDistModels>. The code used to do the analysis is archived in <https://doi.org/10.5281/zenodo.8271292>.

Randomization Not applicable.

Blinding Not applicable.

Did the study involve field work? ☐ Yes ☒ No

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

Plants

Seed stocks	Not applicable.
Novel plant genotypes	Not applicable.
Authentication	Not applicable.