ПРИЛОЖЕНИЕ 2

**Список использованных пакетов для R**

* Anderson SC, Ward EJ, English PA, Barnett LAK, Thorson JT (2024). “sdmTMB: an R package for fast, flexible, and user-friendly generalized linear mixed effects models with spatial and spatiotemporal random fields.” *bioRxiv*, *2022.03.24.485545*. doi:10.1101/2022.03.24.485545 <https://doi.org/10.1101/2022.03.24.485545>.
* Barrett T, Dowle M, Srinivasan A, Gorecki J, Chirico M, Hocking T (2024). *data.table: Extension of data.frame*. R package version 1.15.4, [https://CRAN.R-project.org/package=data.table](https://CRAN.R-project.org/package%3Ddata.table).
* Becker OScbRA, Minka ARWRvbRBEbTP, Deckmyn. A (2023). *maps: Draw Geographical Maps*. R package version 3.4.2, [https://CRAN.R-project.org/package=maps](https://CRAN.R-project.org/package%3Dmaps).
* Bengtsson H (2021). “A Unifying Framework for Parallel and Distributed Processing in R using Futures.” *The R Journal*, *13*(2), 208-227. doi:10.32614/RJ-2021-048 <https://doi.org/10.32614/RJ-2021-048>, <https://doi.org/10.32614/RJ-2021-048>.
* Bengtsson H (2024). *matrixStats: Functions that Apply to Rows and Columns of Matrices (and to Vectors)*. R package version 1.3.0, [https://CRAN.R-project.org/package=matrixStats](https://CRAN.R-project.org/package%3DmatrixStats).
* Daniel Baston (2023). *exactextractr: Fast Extraction from Raster Datasets using Polygons*. R package version 0.10.0, [https://CRAN.R-project.org/package=exactextractr](https://CRAN.R-project.org/package%3Dexactextractr).
* Hernangómez D (2023). “Using the tidyverse with terra objects: the tidyterra package.” *Journal of Open Source Software*, *8*(91), 5751. ISSN 2475-9066, doi:10.21105/joss.05751 <https://doi.org/10.21105/joss.05751>, <https://doi.org/10.21105/joss.05751>.
* Hijmans R (2024). *terra: Spatial Data Analysis*. R package version 1.7-78, [https://CRAN.R-project.org/package=terra](https://CRAN.R-project.org/package%3Dterra).
* Hyndman R, Athanasopoulos G, Bergmeir C, Caceres G, Chhay L, O’Hara-Wild M, Petropoulos F, Razbash S, Wang E, Yasmeen F (2024). *forecast: Forecasting functions for time series and linear models*. R package version 8.23.0, <https://pkg.robjhyndman.com/forecast/>. Hyndman RJ, Khandakar Y (2008). “Automatic time series forecasting: the forecast package for R.” *Journal of Statistical Software*, *27*(3), 1-22. doi:10.18637/jss.v027.i03 <https://doi.org/10.18637/jss.v027.i03>.
* Jassby AD, Cloern JE (2024). *wq: Exploring water quality monitoring data*. R package version 1.0.1, [https://CRAN.R-project.org/package=wq](https://CRAN.R-project.org/package%3Dwq).
* Lindgren F (2024). *fmesher: Triangle Meshes and Related Geometry Tools*. R package version 0.1.7, [https://CRAN.R-project.org/package=fmesher](https://CRAN.R-project.org/package%3Dfmesher).
* Makowski D, Lüdecke D, Patil I, Thériault R, Ben-Shachar M, Wiernik B (2023). “Automated Results Reporting as a Practical Tool to Improve Reproducibility and Methodological Best Practices Adoption.” *CRAN*. <https://easystats.github.io/report/>.
* Massicotte P, South A (2023). *rnaturalearth: World Map Data from Natural Earth*. R package version 1.0.1, [https://CRAN.R-project.org/package=rnaturalearth](https://CRAN.R-project.org/package%3Drnaturalearth).
* Ooms J (2024). *writexl: Export Data Frames to Excel ‘xlsx’ Format*. R package version 1.5.0, [https://CRAN.R-project.org/package=writexl](https://CRAN.R-project.org/package%3Dwritexl).
* Pebesma E, Bivand R (2023). *Spatial Data Science: With applications in R*. Chapman and Hall/CRC. doi:10.1201/9780429459016 <https://doi.org/10.1201/9780429459016>, <https://r-spatial.org/book/>. Pebesma E (2018). “Simple Features for R: Standardized Support for Spatial Vector Data.” *The R Journal*, *10*(1), 439-446. doi:10.32614/RJ-2018-009 <https://doi.org/10.32614/RJ-2018-009>, <https://doi.org/10.32614/RJ-2018-009>.
* Pierce D (2023). *ncdf4: Interface to Unidata netCDF (Version 4 or Earlier) Format Data Files*. R package version 1.22, [https://CRAN.R-project.org/package=ncdf4](https://CRAN.R-project.org/package%3Dncdf4).
* Pinheiro J, Bates D, R Core Team (2024). *nlme: Linear and Nonlinear Mixed Effects Models*. R package version 3.1-165, [https://CRAN.R-project.org/package=nlme](https://CRAN.R-project.org/package%3Dnlme). Pinheiro JC, Bates DM (2000). *Mixed-Effects Models in S and S-PLUS*. Springer, New York. doi:10.1007/b98882 <https://doi.org/10.1007/b98882>.
* Plummer M (2023). *rjags: Bayesian Graphical Models using MCMC*. R package version 4-15, [https://CRAN.R-project.org/package=rjags](https://CRAN.R-project.org/package%3Drjags).
* Plummer M, Best N, Cowles K, Vines K (2006). “CODA: Convergence Diagnosis and Output Analysis for MCMC.” *R News*, *6*(1), 7-11. <https://journal.r-project.org/archive/>.
* R Core Team (2024). *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>.
* Simpson G (2024). *gratia: Graceful ggplot-Based Graphics and Other Functions for GAMs Fitted using mgcv*. R package version 0.9.2, <https://gavinsimpson.github.io/gratia/>.
* South A, Michael S, Massicotte P (2024). *rnaturalearthdata: World Vector Map Data from Natural Earth Used in ‘rnaturalearth’*. R package version 1.0.0, [https://CRAN.R-project.org/package=rnaturalearthdata](https://CRAN.R-project.org/package%3Drnaturalearthdata).
* Su Y, Yajima M (2024). *R2jags: Using R to Run ‘JAGS’*. R package version 0.8-5, [https://CRAN.R-project.org/package=R2jags](https://CRAN.R-project.org/package%3DR2jags).
* Thorson J (2023). *FishLife: Predict Life History Parameters For Any Fish*. R package version 3.1.0, commit 6830c38bc52d92d310bd34933e83df05ef3fcaea, <https://github.com/james-thorson/FishLife>.
* Wickham H (2016). *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. ISBN 978-3-319-24277-4, <https://ggplot2.tidyverse.org>.
* Wickham H, François R, Henry L, Müller K, Vaughan D (2023). *dplyr: A Grammar of Data Manipulation*. R package version 1.1.4, [https://CRAN.R-project.org/package=dplyr](https://CRAN.R-project.org/package%3Ddplyr).
* Winker H, Carvalho F, Kapur M (2024). *JABBA: Just Another Bayesian Biomass Assessment*. R package version 2.3.0, commit 9cc01d736e96c47851ce2e4c7d7061bb67da0e59, <https://github.com/jabbamodel/JABBA>.
* Wood SN (2011). “Fast stable restricted maximum likelihood and marginal likelihood estimation of semiparametric generalized linear models.” *Journal of the Royal Statistical Society (B)*, *73*(1), 3-36. Wood S, N., Pya, S”afken B (2016). “Smoothing parameter and model selection for general smooth models (with discussion).” *Journal of the American Statistical Association*, *111*, 1548-1575. Wood SN (2004). “Stable and efficient multiple smoothing parameter estimation for generalized additive models.” *Journal of the American Statistical Association*, *99*(467), 673-686. Wood S (2017). *Generalized Additive Models: An Introduction with R*, 2 edition. Chapman and Hall/CRC. Wood SN (2003). “Thin-plate regression splines.” *Journal of the Royal Statistical Society (B)*, *65*(1), 95-114.