ORJIP project: Modelling framework for the joint analysis of survey and telemetry data in seabirds

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Abstract

BLA.

Contents

1 Simulation scenario

A realistic scenario for developing the framework would include the following features

- A sufficiently large spatial extent, compared to the grid resolution used.
- A sufficiently complex coastline, to challenge the model with regard to land-shadowing effects.

- Multiple colonies of different sizes arranged along the coastline.
- Environmental covariates that may be continuous, or categorical.
- Individual-level movement rules, to enable the model to collect tracking data
- A tendency to return to the colony periodically
- A distinction in the strength of this homing tendency between provisioning adults and juveniles
- Flexible and realistic user-defined options for the distribution of tagging effort (by colony and by individual)
- Flexible and realistic user defined options for transect survey design

1.1 Environmental covariates

One continuous, one factor.

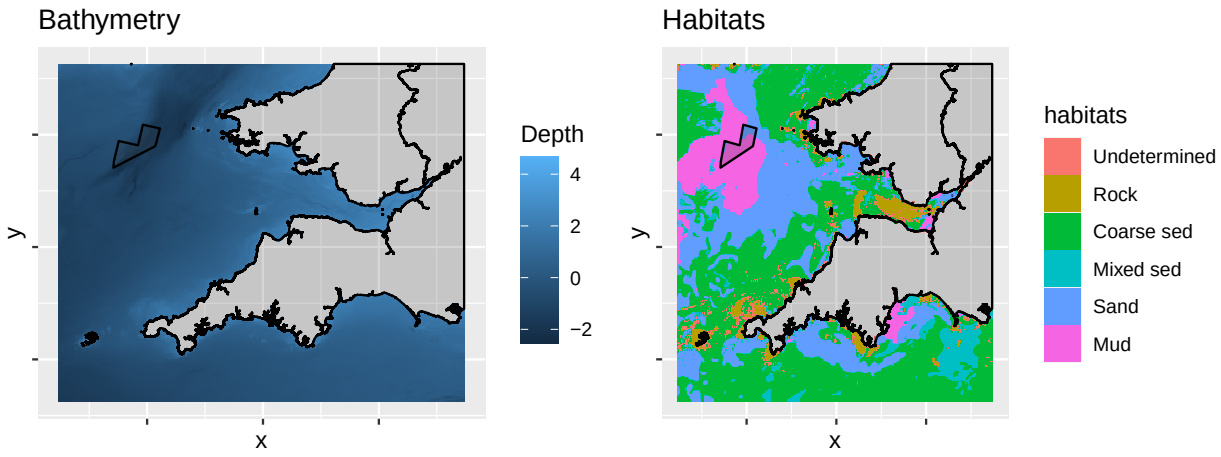
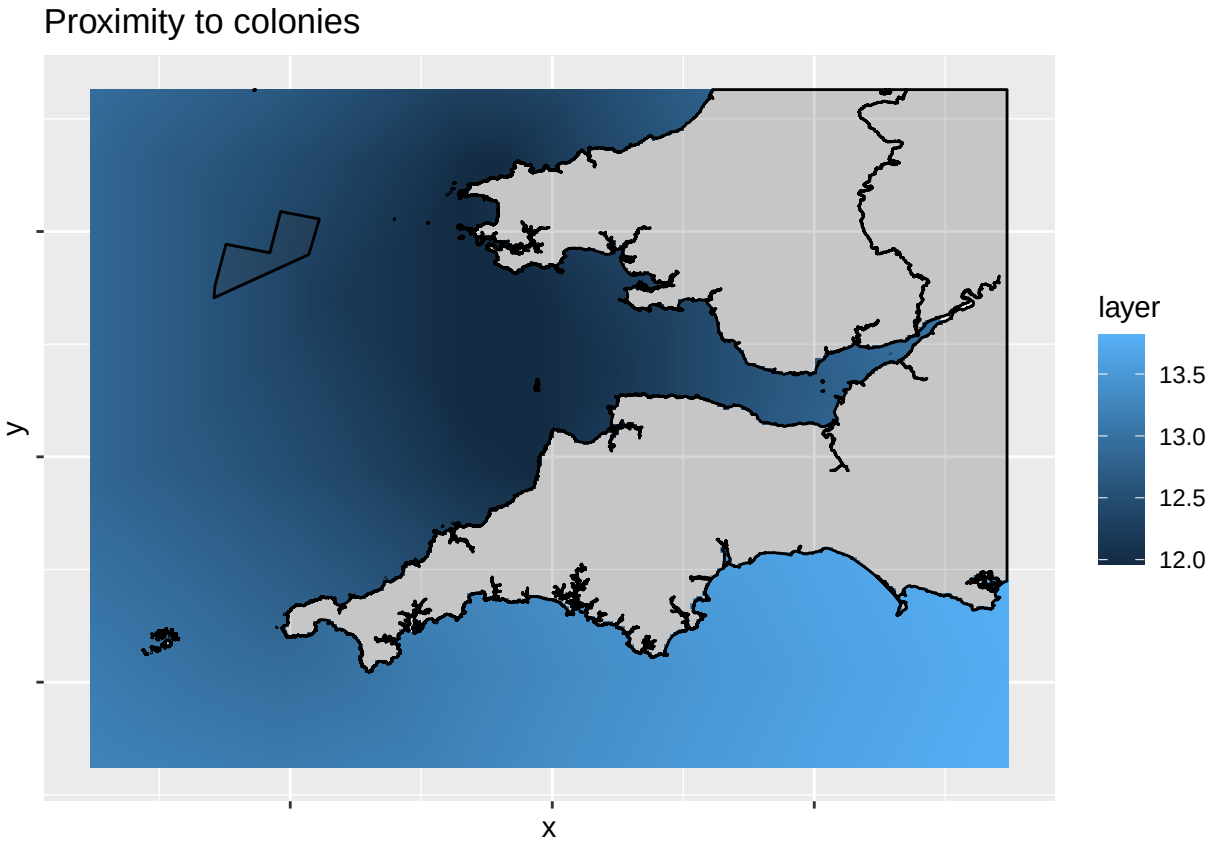


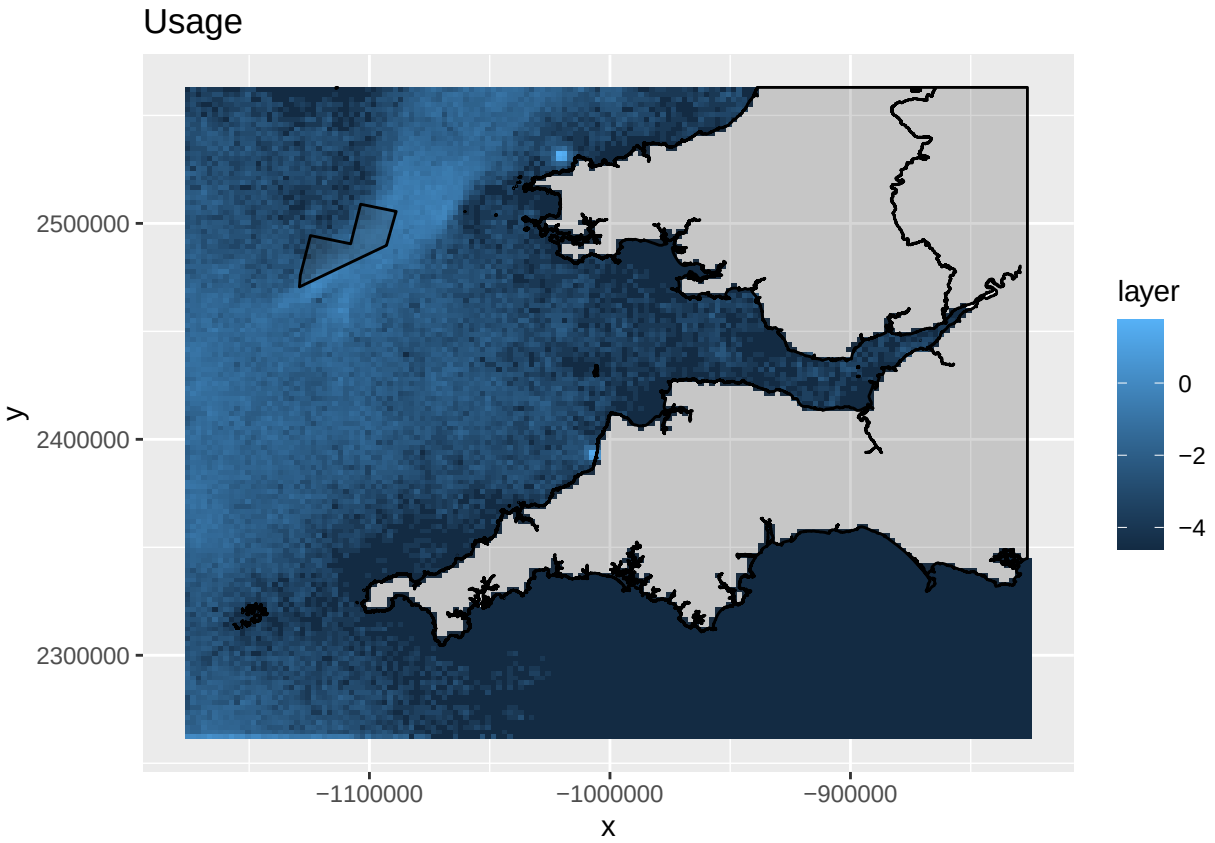
Figure 1: The coastline definition and the associated marine covariate

1.2 Derived covariates

Distance-to-colony calculation

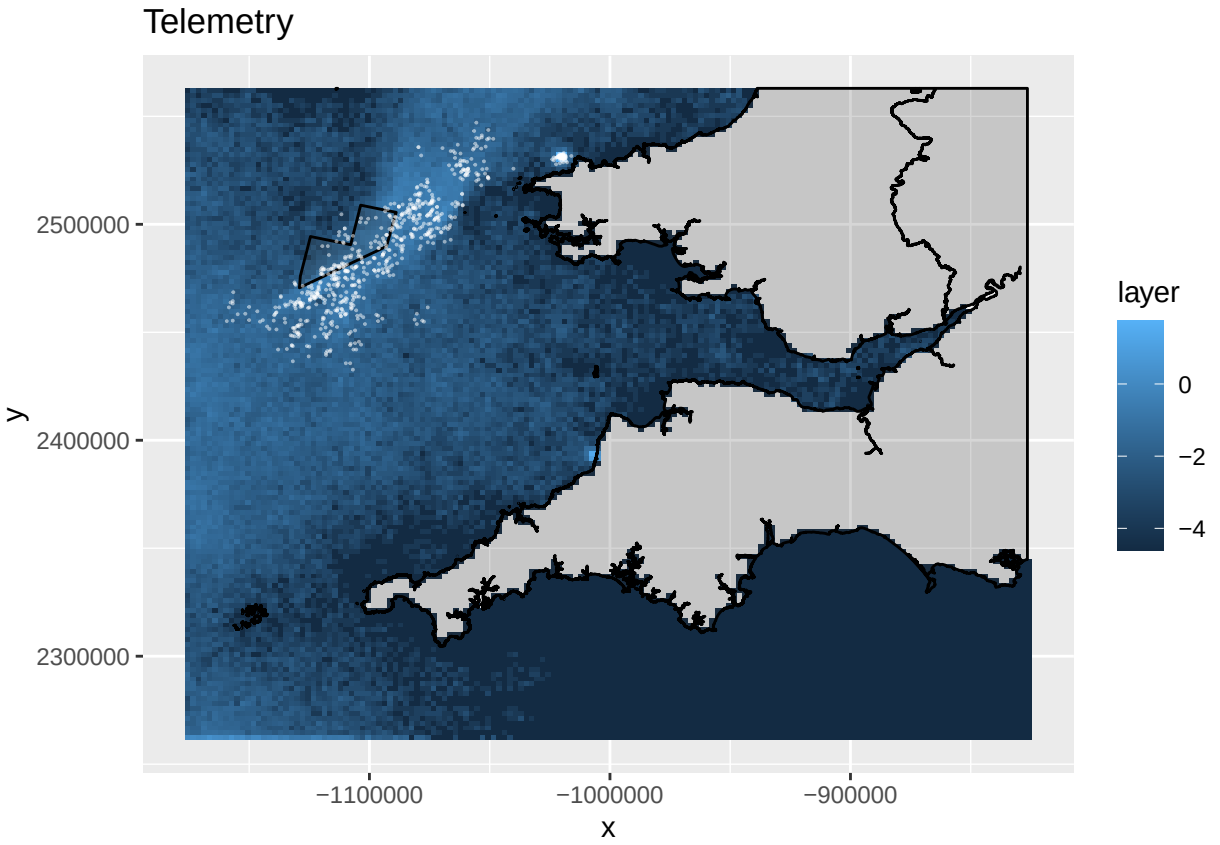

Proximity to colonies
y
x
layer
13.5
13.0
12.5
12.0

1.3 Individual-based simulation

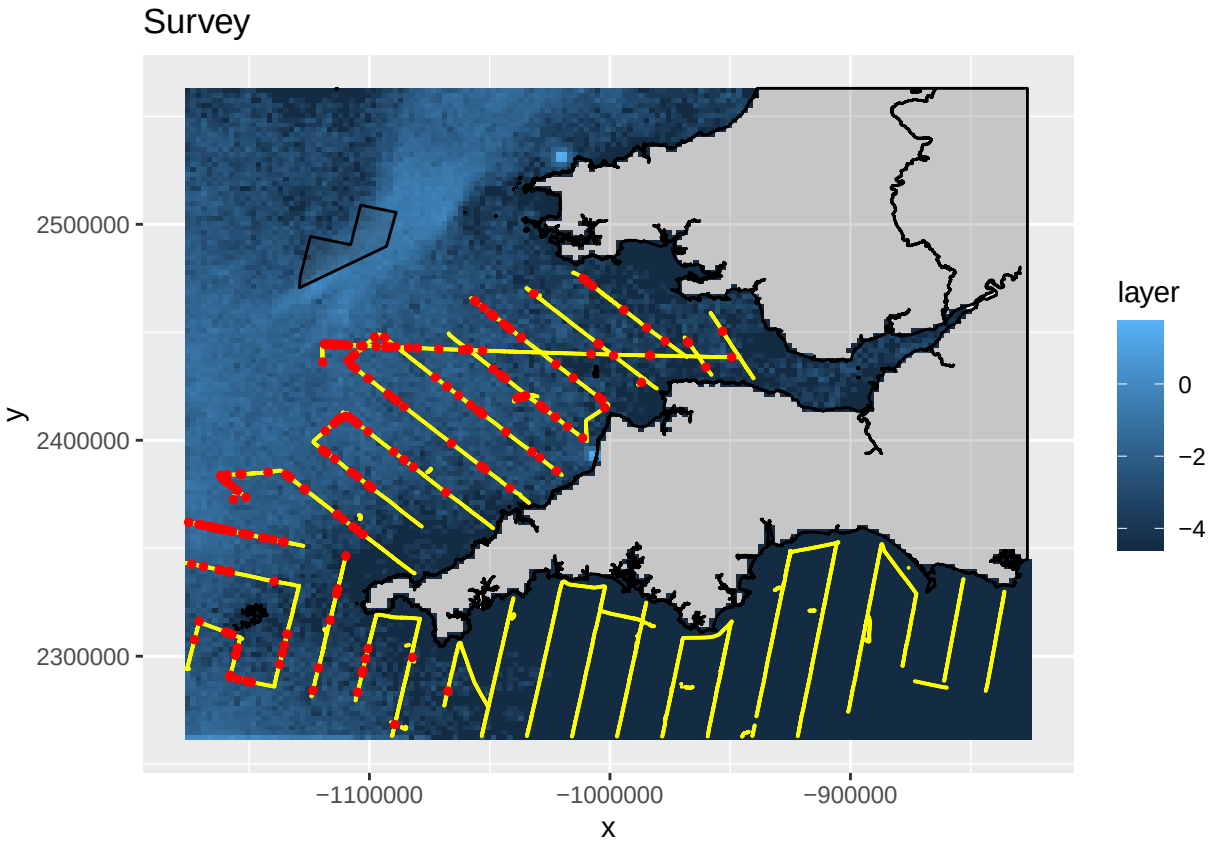


1.4 Survey transects

Import real transects and decide on different thinning regimes (i.e. truncate at ends, or introduce breaks between lines, how much to truncate, how long the breaks?) Perform data collection



For a faithful simulation of the true process, we would need to simulate thousands of animal trajectories for several thousands of time instants each, and then require that each of the points detected by the transects is within a spatial **and** temporal distance threshold of a particular survey point. This is quite wasteful computationally, so to create our detections dataset, we simply select a subset of the true animal locations that were in the spatial viscinity of a transect location, irrespective of the timing.



1.5 Tagging effort

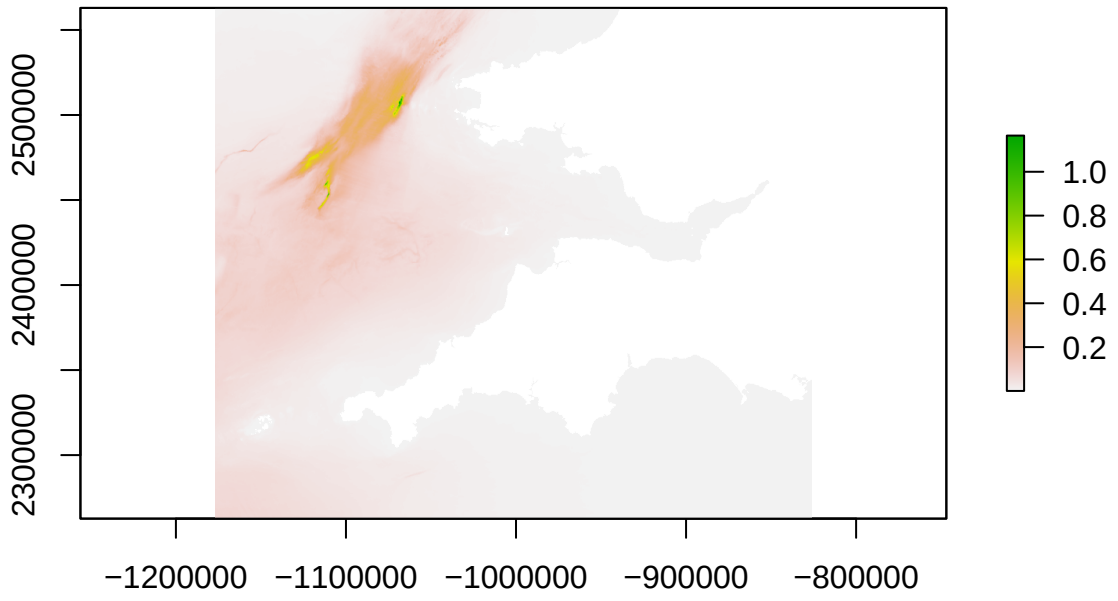
How many individuals, for how much time, what is the split in effort between the two colonies? Perform data collection

2 Inference

2.1 Inference on telemetry data (SSF)

2.2 Inference on survey data (HSF)

The first attempt is to approach the survey inference by a standard Poisson GLM.



Joint inference

3 Appendix