# Annex A

Modelling species presence-absence in the ecological niche theory framework using shape-constrained generalized additive models

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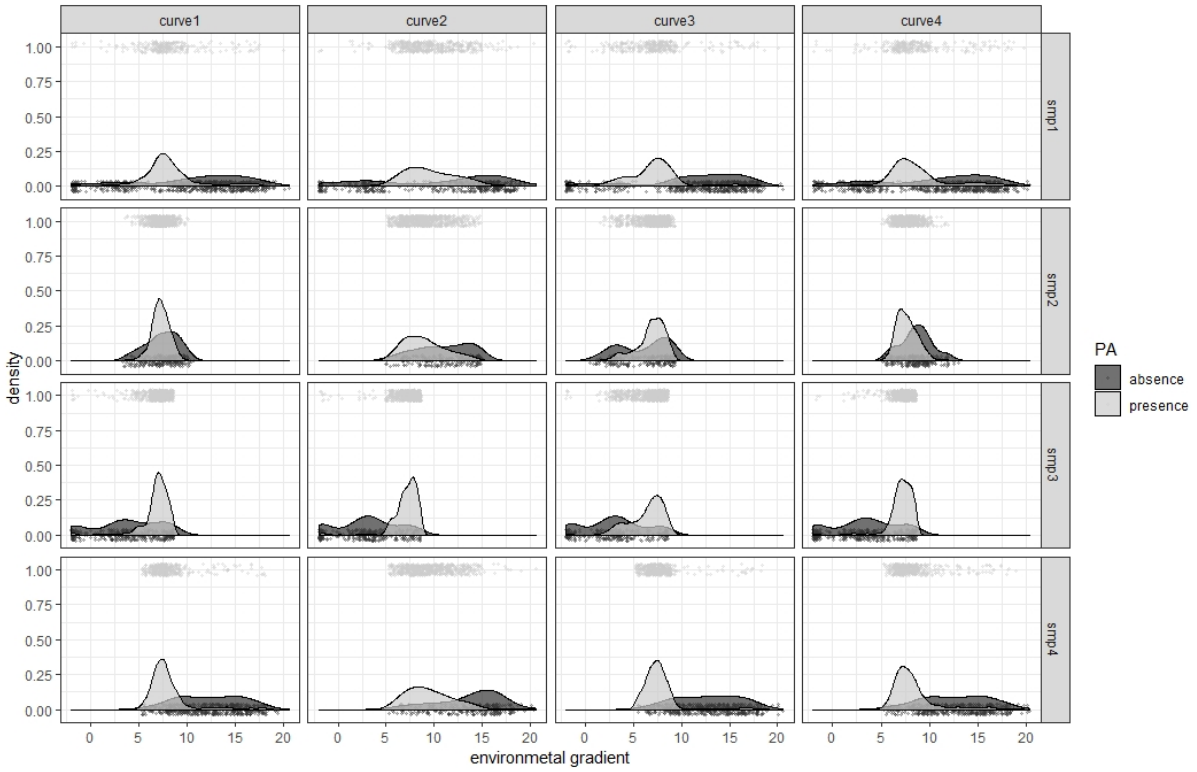


Figure A. 1: Presence data points and density (in grey) and absence data points and density (in black) along the environmental gradient for each simulation scenario for a single replicate.

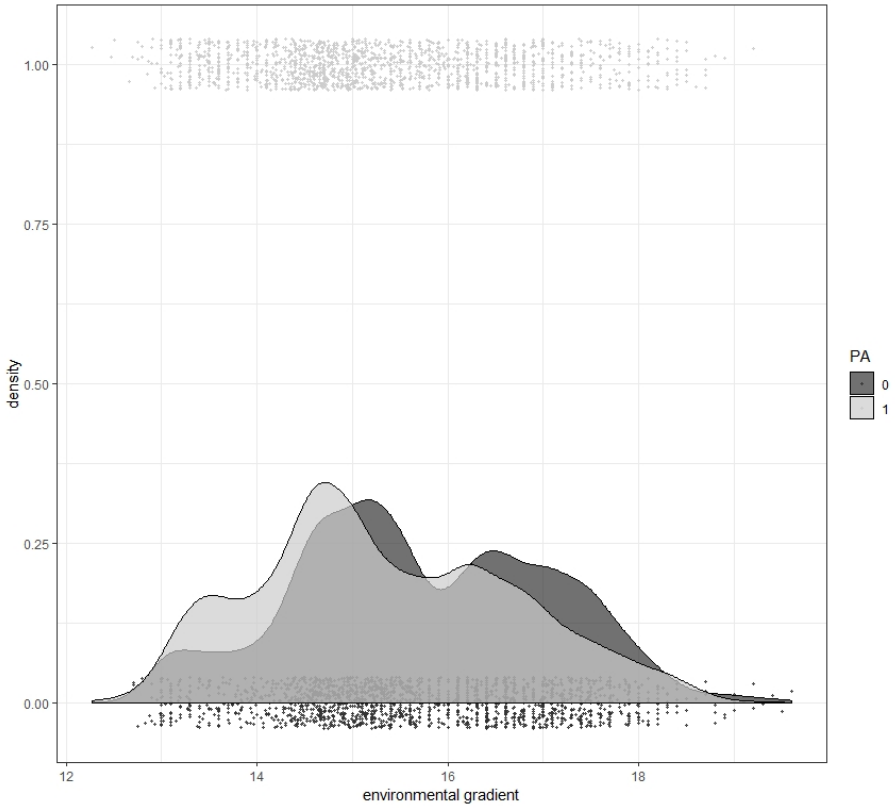


Figure A. 2: Presence data points and density (in grey) and absence data points and density (in black) along the environmental gradient (SST in this case) for real data used in "Thermal niche for sardine eggs" case study (section 4.1).

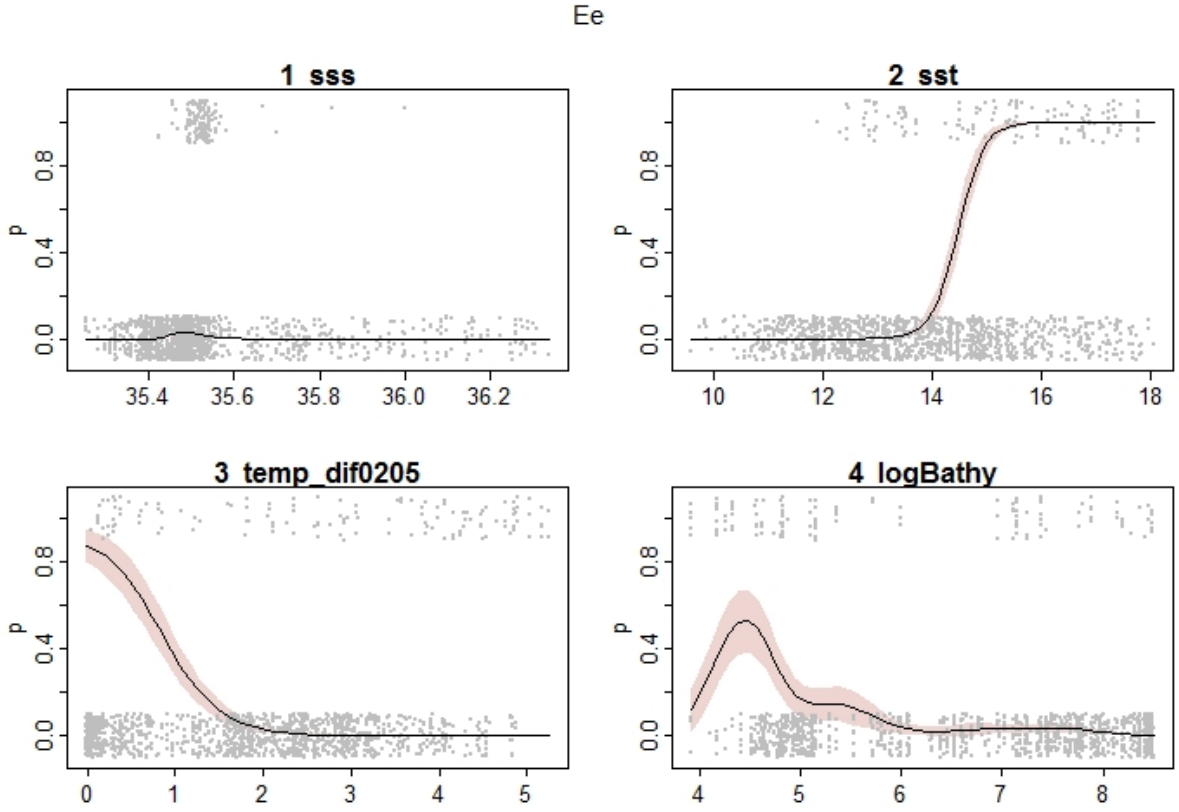


Figure A. 3: Anchovy (*Engraulis encrasicolus*) egg real presence-absence data (grey points), fitted response curves (in black), with the 95% CI (shaded area) along the selected 4 environmental variables.

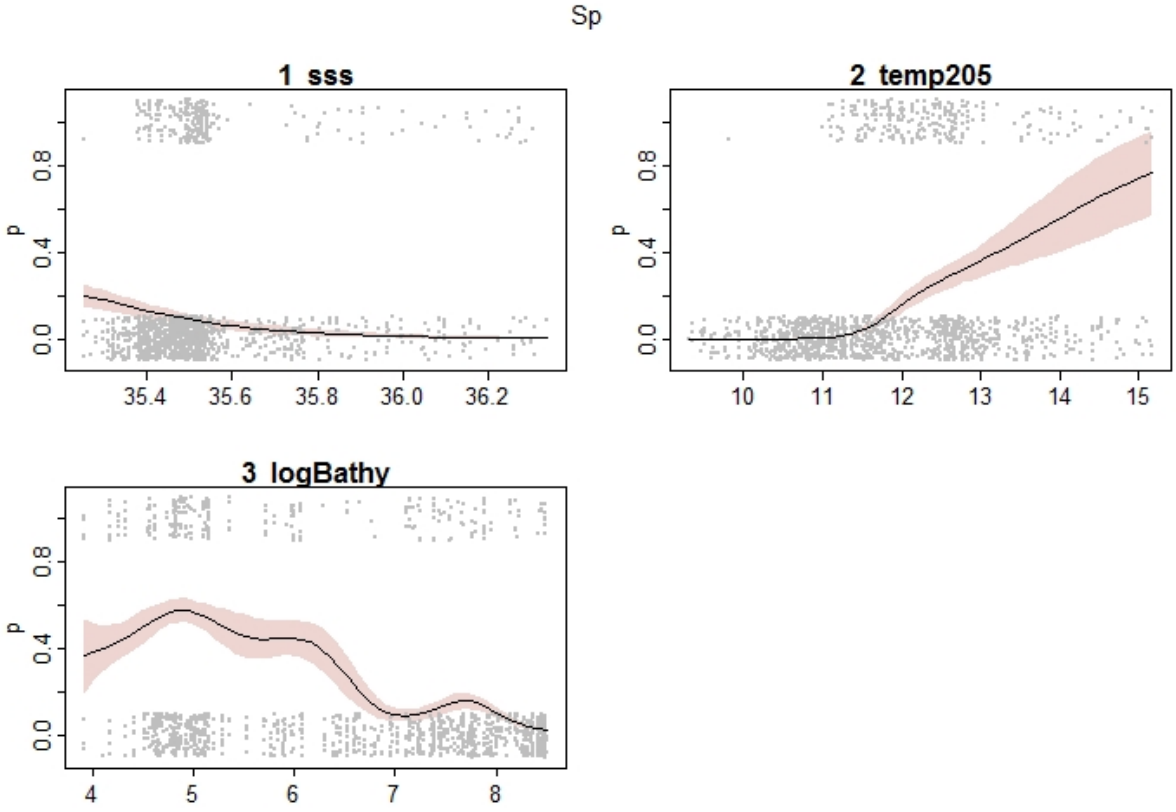


Figure A. 4: Sardine (*Sardine pilchardus*) egg real presence-absence data (grey points), fitted response curves (in black), with the 95% CI (shaded area) along the selected 3 environmental variables.

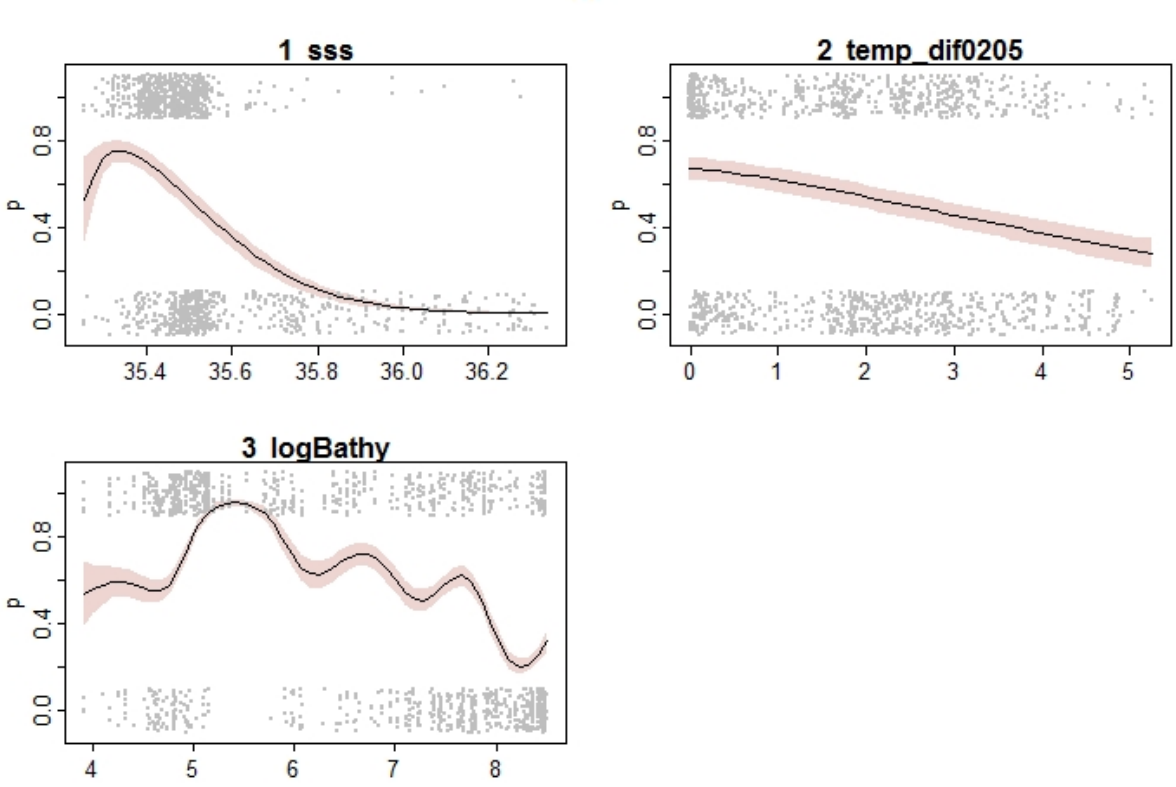


Figure A. 5: Mackerel (*Scomber scombrus*) egg real presence-absence data (grey points), fitted response curves (in black), with the 95% CI (shaded area) along the selected 3 environmental variables.

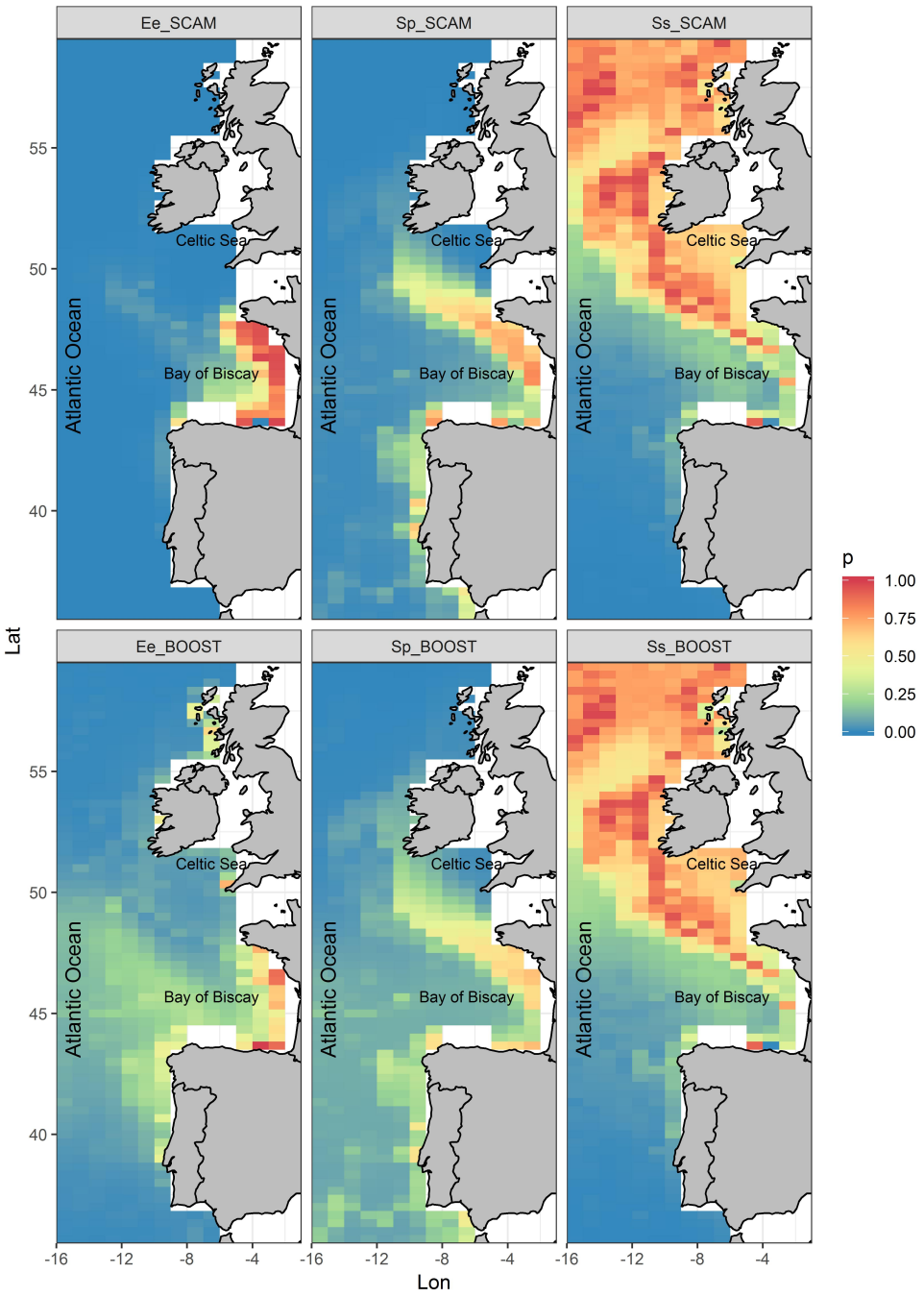


Figure A. 6: Predicted occurrence probabilities (p) in each map cell for each species (from left to right, anchovy, sardine and mackerel) with SCAM method (up) and Boosting method (bottom).