Supplementary Material

Assessing the temporal transferability of raptor distribution models: Implications for conservation

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ASSESSING THE TEMPORAL TRANSFERABILITY OF RAPTOR DISTRIBUTION MODELS: IMPLICATIONS FOR CONSERVATION

TAPIA L.¹, REGOS A.^{1,2,3}, GIL-CARRERA A.⁴ & DOMÍNGUEZ J.¹

Appendix S1. This appendix shows the variable importance for each species, across each modelling algorithm and year, at the scale of 500 meters.



Fig. S1.1. Variable importance for Montagu's harrier (*Circus pygargus*) for each modelling algorithm, year (2001 and 2014) at the scale of 500 meters. Acronyms: Open shrubland (OShr), Deciduous forest (DeFo), Coniferous forest (CoFor, Meadows and fallow land (Medw), Arable or farm land (ArLa), Closed shrubland (CShr); generalized linear models (GLM), generalized additive models (GAM), generalized boosted models (GBM; also known as Booted Regressions Tress, BRT), flexible discriminant analysis (FDA), classification tree analysis (CTA), multivariate adaptive regression splines (MARS), surface range envelope (SRE, a.k.a. BIOCLIM), maximum entropy (MaxEnt), random forest (RF), and artificial neural networks (ANN).



Fig. S1.2. Variable importance for Common kestrel (*Falco tinnunculus*) for each modelling algorithm, year (2001 and 2014) at the scale of 500 meters. Acronyms: Open shrubland (OShr), Deciduous forest (DeFo), Coniferous forest (CoFor, Meadows and fallow land (Medw), Arable or farm land (ArLa), Closed shrubland (CShr); generalized linear models (GLM), generalized additive models (GAM), generalized boosted models (GBM; also known as Booted Regressions Tress, BRT), flexible discriminant analysis (FDA), classification tree analysis (CTA), multivariate adaptive regression splines (MARS), surface range envelope (SRE, a.k.a. BIOCLIM), maximum entropy (MaxEnt), random forest (RF), and artificial neural networks (ANN).

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Appendix S2. This appendix shows the species-habitat relationship curves resulting from the different methods implemented in biomod2 at the scale of 500 meters, for 2001 and 2014 respectively.

Fig. S2.1. Response curves for Montagu's harrier (*Circus pygargus*) for each modelling algorithm, at the scale of 500 meters for 2001 and 2014 respectively. Acronyms: Open shrubland (LCT_OShr), Deciduous forest (LCT_DeFo), Coniferous forest (LCT_CoFor, Meadows and fallow land (LCT_Medw), Arable or farm land (LCT_ArLa), Closed shrubland (LCT_CShr); generalized linear models (GLM), generalized additive models (GAM), generalized boosted models (GBM; also known as Booted Regressions Tress, BRT), flexible discriminant analysis (FDA), classification tree analysis (CTA), multivariate adaptive regression splines (MARS), random forest (RF), and artificial neural networks (ANN). Only response curves for those models with AUC values higher than 0.7 are plotted. Response curves for SRE models are not supported yet by biomod2.



_	CPYG_AllData_RUN1_GLM
—	CPYG_AllData_RUN3_GLM
—	CPYG_AllData_RUN10_GLM
—	CPYG_AllData_RUN17_GLM
	CPYG_AllData_RUN20_GLM
—	CPYG_AllData_RUN24_GLM









CPYG_AIIData_RUN4_GAM
CPYG_AIIData_RUN7_GAM
CPYG_AIIData_RUN22_GAM
CPYG_AIIData_RUN26_GAM
CPYG_AIIData_RUN28_GAM



_	CPYG_AllData_RUN3_GBM
	CPYG_AllData_RUN4_GBM
	CPYG_AllData_RUN8_GBM
	CPYG_AllData_RUN12_GBM
—	CPYG_AllData_RUN15_GBM
	CPYG_AllData_RUN17_GBM
	CPYG_AllData_RUN18_GBM
	CPYG_AllData_RUN26_GBM
—	CPYG_AllData_RUN27_GBM
—	CPYG_AllData_RUN29_GBM





---- CPYG_AllData_RUN4_MARS



	CPYG_AIIData_HUN2_FDA
—	CPYG_AllData_RUN3_FDA
	CPYG_AllData_RUN4_FDA
	CPYG_AllData_RUN18_FDA
—	CPYG_AllData_RUN24_FDA
	CPYG_AllData_RUN26_FDA
—	CPYG_AllData_RUN29_FDA



_	CPYG_AllData_RUN1_CTA
—	CPYG_AllData_RUN3_CTA
—	CPYG_AllData_RUN4_CTA
_	CPYG_AllData_RUN6_CTA
—	CPYG_AllData_RUN12_CTA
—	CPYG_AllData_RUN14_CTA
	CPYG_AllData_RUN17_CTA
—	CPYG_AllData_RUN18_CTA
_	CPYG_AllData_RUN27_CTA
	CPYG_AllData_RUN29_CTA



CPYG_AllData_RUN11_CTA CPYG_AllData_RUN26_CTA



—	CPYG_AllData_RUN3_RF
_	CPYG_AllData_RUN8_RF
—	CPYG_AllData_RUN12_RF
—	CPYG_AllData_RUN18_RF
—	CPYG_AllData_RUN27_RF
—	CPYG_AllData_RUN29_RF



CPYG_AIIData_RUN3_ANN CPYG_AIIData_RUN14_ANN



Fig. S2.2. Response curves for Common kestrel (*Falco tinnunculus*) for each modelling algorithm, at the scale of 500 meters, for 2001 and 2014 respectively. Acronyms: Open shrubland (LCT_OShr), Deciduous forest (LCT_DeFo), Coniferous forest (LCT_CoFor, Meadows and fallow land (LCT_Medw), Arable or farm land (LCT_ArLa), Closed shrubland (LCT_CShr); generalized linear models (GLM), generalized additive models (GAM), generalized boosted models (GBM; also known as Booted Regressions Tress, BRT), flexible discriminant analysis (FDA), classification tree analysis (CTA), multivariate adaptive regression splines (MARS), random forest (RF), and artificial neural networks (ANN). Only response curves for those models with AUC values higher than 0.7 are plotted. Response curves for SRE models are not supported yet by biomod2.



	FTIN_AllData_RUN2_GLM
	FTIN_AllData_RUN10_GLM
	FTIN_AllData_RUN11_GLM
—	FTIN_AllData_RUN26_GLM
	FTIN_AllData_RUN27_GLM
	FTIN AllData BUN29 GLM





FTIN_AIIData_RUN8_GAM







_	FTIN_	AllData	RUN5_	FDA
_	FTIN_	AllData	RUN8_	FDA
_	FTIN_	AllData	_RUN15	5_FDA
	FTIN_	AllData	_RUN26	5_FDA





FTIN_AIIData_RUN8_CTA FTIN_AIIData_RUN15_CTA





FTIN_AIIData_RUN3_MARS FTIN_AIIData_RUN10_MARS









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Appendix S3. This appendix shows the correlation between each pair of predictors for years 2001 and 2014 to explore the potential effects of multicollinearity on model performance.

Correlation between land cover variables was moderate or low for almost all pairs of predictors, except for 'Meadows and fallow land' and 'Arable or farm land' for year 2001 (Pearson correlation coefficient r > 0.7, see Fig. S3.1).



Fig S3. 1. Pearson correlation coefficient for year 2001 and 2014 at the scale of 500 meters. Acronyms: Open shrubland (LCT_OShr), Deciduous forest (LCT_DeFo), Coniferous forest (LCT_CoFor, Meadows and fallow land (LCT_Medw), Arable or farm land (LCT_ArLa), Closed shrubland (LCT_CShr).