

Ecography

E6878

Brotons, L., De Cáceres, M., Fall, A. and Fortin, M.-J.
2011. Modeling bird species distribution change in fire
prone Mediterranean landscapes: incorporating species
dispersal and landscape dynamics. – *Ecography* 34:
xxx–xxx.

Supplementary material

Table A1. Description of environmental variables for the habitat suitability (HS) model. Calculated on 1×1 km cells.

Variable	Description
<i>Dynamic landscape variables</i>	
Burnt shrubland	Percentage of the cell occupied by shrubland that was burnt during the last 25 years, weighted by precipitation to account for the amount of surrounding vegetation structure.
Burnt shrubland on south-facing slopes	For south-facing cells, percentage of the cell occupied by shrubland that was burnt during the last 25 years, weighted by precipitation to account for the amount of surrounding vegetation structure.
Stable shrublands	Percentage of the cell occupied by shrubland that was never burnt during the last 25 years, weighted by precipitation to account for the amount of surrounding vegetation structure.
Stable shrublands on south-facing slopes	For south-facing cells, percentage of the cell occupied by shrubland that was never burnt during the last 25 years, weighted by precipitation to account for the amount of surrounding vegetation structure.
Old forest	Percentage of the cell occupied by forests that have not burned in 20 years.
Regenerating forest	Percentage of the cell occupied by regenerating (low height) trees in recently burned areas (less than 20 years).
Regenerating forest on south-facing slopes	For south-facing cells, percentage of the cell occupied by regenerating (low height) trees in recently burned areas (less than 20 years).
<i>Static landscape variables</i>	
Slope	The slope of the cell, calculated in degrees.
Alpine grasslands	Percentage of the cell occupied by alpine meadows.
Dry croplands	Percentage of the cell occupied by dry croplands (cereals, vineyards or trees).
Dry grass croplands	Percentage of the cell occupied by dry grass croplands (cereals).
Dry grass croplands weighted	Percentage of the cell occupied by dry grass croplands (cereals), weighted by precipitation to account for the amount of surrounding vegetation structure.
Urban zone	Percentage of the cell occupied by urban area.

Table A2. Habitat suitability (HS) model after performing AIC-based model selection (explained deviance 14.8%). The table shows the selected variables and their parameter estimates.

	Estimate	Std. error	p-value
(Intercept)	-4.331598	0.255503	< 2e-16
Burnt shrubland	0.057773	0.005833	< 2e-16
Regenerating forest	0.041530	0.010742	0.000111
Stable shrubland	0.054133	0.006907	4.58e-15

Table A3. Model evaluation using either the common bird survey data (a, CBS) or monitoring data from burnt habitats (b, DINDIS), and for two different periods (2006-2007, 2008-2009). Values shown are averages and standard deviations computed over the 10 landscape simulations. For each combination of time period and evaluation data, the best model according to each evaluation statistic is indicated in bold. Coefficient of determination (R^2) for a given model was computed comparing the log-likelihood of the data with the log-likelihood of the data under a null model (*LL Null*) where the species prevalence is the only information available (Nagelkerke 1991) (*' indicates those cases where the coefficient of determination was not computed because the likelihood of the target model was more negative than that of the null model). Correlative SDMs: IPO, initial occupancy model; HS, habitat suitability model, CHS, combined habitat suitability model (IPO+HS).

(a)		CBS $n = 880$ 2006-2007						CBS $n = 895$ 2008-2009					
		<i>Log-likelihood</i>		R^2 (<i>LL Null</i> -138.0)		<i>AUC</i>		<i>Log-likelihood</i>		R^2 (<i>LL Null</i> -157.2)		<i>AUC</i>	
		<i>Mean</i>	<i>S.d.</i>	<i>Mean</i>	<i>S.d.</i>	<i>Mean</i>	<i>S.d.</i>	<i>Mean</i>	<i>S.d.</i>	<i>Mean</i>	<i>S.d.</i>	<i>Mean</i>	<i>S.d.</i>
Correlative SDMs													
	<i>IPO (static)</i>	-91.6	-	0.336	-	0.934	-	-102.8	-	0.346	-	0.935	-
	<i>HS</i>	-112.7	0.2	0.183	0.001	0.846	0.002	-132.7	0.2	0.156	0.001	0.824	0.001
	<i>CHS</i>	-96.2	2.3	0.303	0.016	0.901	0.005	-118.5	2.3	0.246	0.009	0.897	0.009
Hybrid models													
	<i>No dispersal</i>												
	<i>ND</i>	-95.7	2.3	0.307	0.016	0.905	0.004	-115.7	1.5	0.264	0.010	0.901	0.010
	<i>Restricted dispersal</i>												
	<i>D1</i>	-94.8	1.8	0.313	0.013	0.905	0.003	-116.6	2.3	0.258	0.015	0.907	0.009
	<i>D2</i>	-94.6	1.9	0.314	0.013	0.905	0.003	-117.0	1.9	0.256	0.012	0.903	0.012
	<i>D3</i>	-95.7	2.3	0.307	0.017	0.901	0.006	-118.6	2.0	0.246	0.013	0.892	0.006
	<i>D1C</i>	-95.4	1.7	0.309	0.012	0.905	0.003	-116.5	2.4	0.259	0.015	0.906	0.011
	<i>D2C</i>	-95.1	2.1	0.311	0.015	0.905	0.004	-116.0	2.0	0.261	0.013	0.906	0.007
	<i>D3C</i>	-95.9	2.0	0.305	0.014	0.903	0.004	-117.5	1.6	0.253	0.010	0.905	0.009

<i>Long dispersal</i>	<i>D4</i>	-96.2	1.8	0.303	0.013	0.900	0.006	-118.0	2.7	0.249	0.017	0.901	0.011
	<i>D5</i>	-96.3	2.5	0.302	0.018	0.901	0.005	-118.1	3.2	0.248	0.020	0.898	0.015
	<i>D4C</i>	-94.8	1.3	0.313	0.010	0.904	0.005	-116.9	1.3	0.256	0.008	0.899	0.008
	<i>D5C</i>	-96.5	2.0	0.301	0.014	0.900	0.004	-117.9	2.6	0.250	0.016	0.901	0.008

(b)		DINDIS $n = 552$ 2006-2007 R^2						DINDIS $n = 538$ 2008-2009 R^2					
		<i>Log-likelihood</i>		<i>(LL Null -225.7)</i>		<i>AUC</i>		<i>Log-likelihood</i>		<i>(LL Null -262.3)</i>		<i>AUC</i>	
		<i>Mean</i>	<i>S.d.</i>	<i>Mean</i>	<i>S.d.</i>	<i>Mean</i>	<i>S.d.</i>	<i>Mean</i>	<i>S.d.</i>	<i>Mean</i>	<i>S.d.</i>	<i>Mean</i>	<i>S.d.</i>
Correlative SDMs													
	<i>IPO (static)</i>	-207.0	-	0.083	-	0.755	-	-305.7	-	*	-	0.643	-
	<i>HS</i>	-234.2	0.3	*	*	0.639	0.002	-248.0	0.4	0.054	0.001	0.574	0.004
	<i>CHS</i>	-200.7	2.6	0.111	0.011	0.713	0.011	-220.5	2.9	0.159	0.011	0.677	0.014
Hybrid models													
	<i>No dispersal</i>												
	<i>ND</i>	-214.6	2.4	0.049	0.011	0.726	0.014	-334.1	3.5	*	*	0.563	0.019
	<i>Restricted dispersal</i>												
	<i>D1</i>	-170.4	2.0	0.245	0.009	0.796	0.004	-196.4	3.4	0.251	0.013	0.784	0.006
	<i>D2</i>	-167.7	1.5	0.257	0.007	0.798	0.005	-191.7	2.4	0.269	0.009	0.782	0.008
	<i>D3</i>	-170.4	3.6	0.245	0.016	0.793	0.009	-191.3	1.8	0.270	0.007	0.776	0.004
	<i>D1C</i>	-173.0	1.6	0.234	0.007	0.792	0.005	-201.6	2.2	0.231	0.009	0.779	0.005
	<i>D2C</i>	-166.5	1.9	0.262	0.008	0.799	0.005	-189.3	2.8	0.278	0.010	0.789	0.007
	<i>D3C</i>	-165.2	2.0	0.268	0.009	0.805	0.007	-189.0	3.7	0.279	0.014	0.784	0.010
	<i>Long dispersal</i>												
	<i>D4</i>	-188.3	2.0	0.166	0.009	0.749	0.012	-216.4	3.0	0.175	0.011	0.693	0.014
	<i>D5</i>	-195.9	2.7	0.132	0.012	0.724	0.012	-217.9	2.2	0.169	0.008	0.684	0.012
	<i>D4C</i>	-182.8	2.8	0.190	0.013	0.765	0.008	-212.1	2.7	0.191	0.010	0.707	0.012
	<i>D5C</i>	-188.4	2.8	0.165	0.012	0.746	0.011	-216.6	3.8	0.174	0.014	0.692	0.012