

Supplemental material

For

**Combined influence of food availability and agricultural intensification on a declining
aerial insectivore**

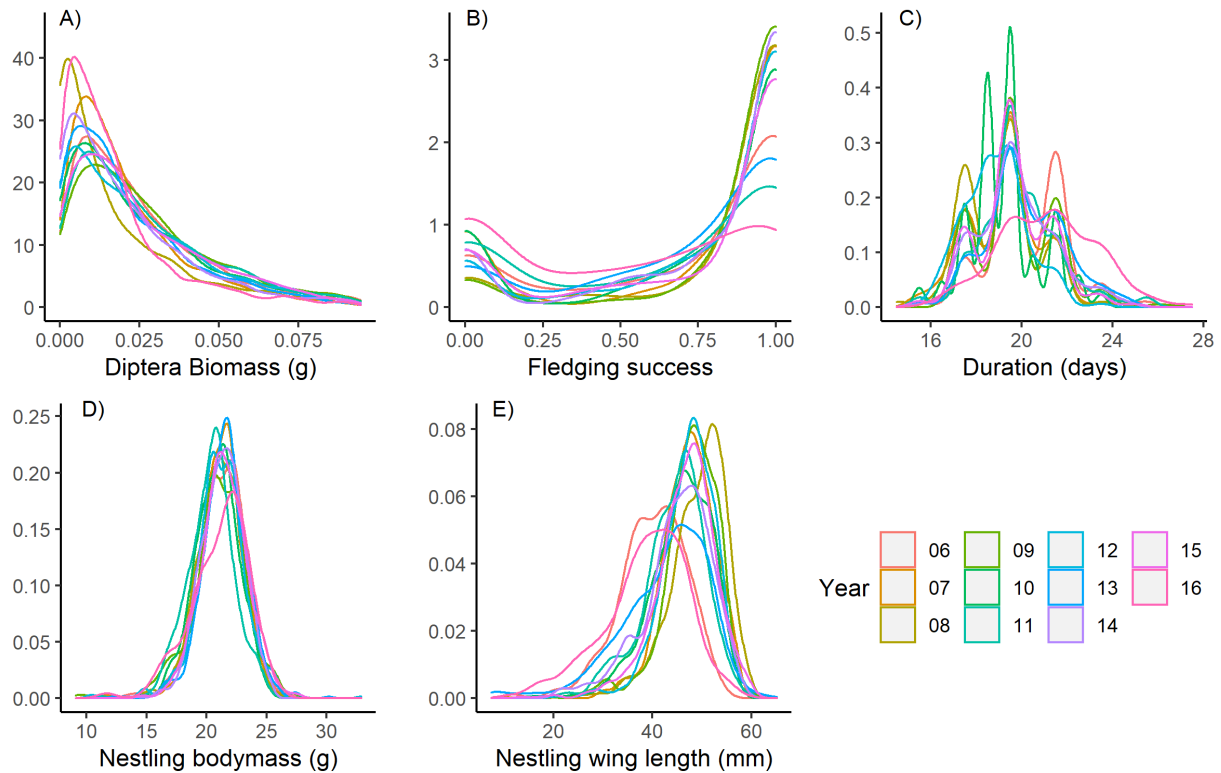
By

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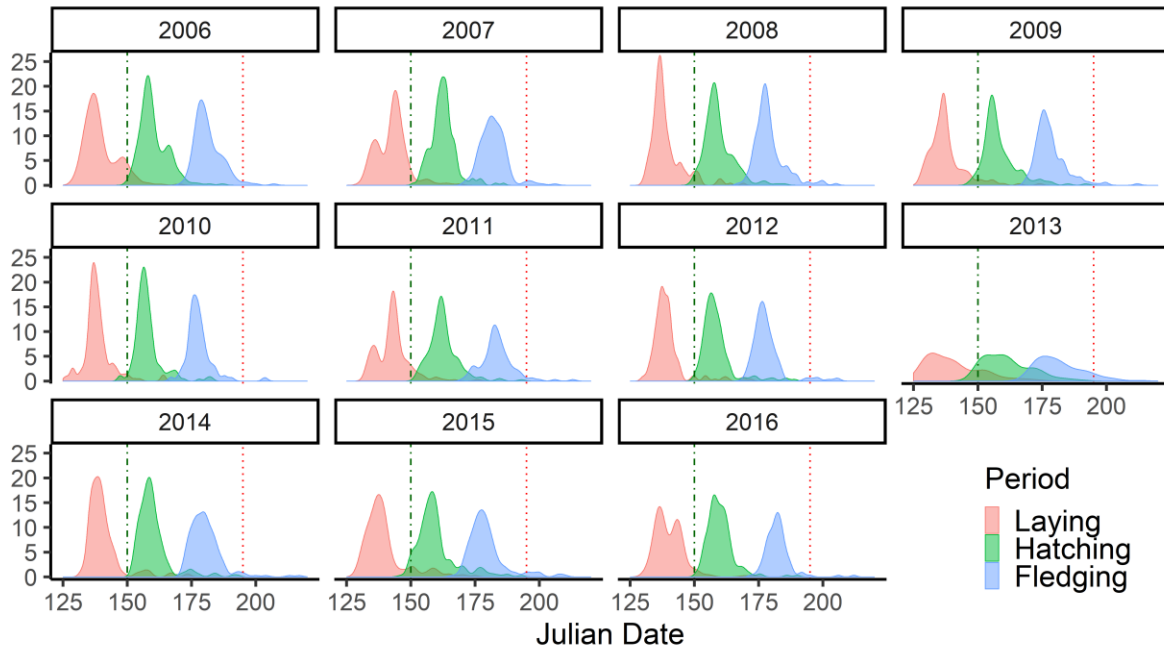
Supplemental S1: Results of the model selection process, including details regarding the model groups found within each candidate model. Composition of covariates within each model group are found in Table 1. Rain * Land and Time * Land include interaction terms with only Comp.1. Food * Land includes the two-way interaction terms between FDM and both Site scores. Modeling was via LMMs for Diptera biomass (N=15,916), GLMM with a binomial error distribution and a log link function for fledging success (N=1,897), and LMMs for the duration of the nestling rearing period (N=1,556), as well as both the body mass (N=6,001) and wing length at 16 days of age (N=6,054). All models received year and farm as random effects. Nest box ID was also included in both the fledging success and the duration of the nestling period as a random effect. Brood ID was also included in both the body mass and wing length as a random effect.

Response	Candidate model	K	ΔAICc	w_i
Biomass	Base + Rain * Land + Time * Land	29	0.00	0.81
	Base + Rain * Land	27	2.88	0.19
	Base + Time * Land	28	17.11	0.00
	Base + Land	26	19.61	0.00
	Base	23	27.60	0.00
	Null	14	228.60	0.00
	Proportion	Base + Food * Land	16	0.00
Base + Food + Land		14	5.68	0.05
Base + Food		11	6.76	0.03
Base + Land		13	9.37	0.01
Base		10	9.91	0.01
Null		4	123.66	0.00
Duration		Base + Land	14	0.00
	Base + Food + Land	15	0.74	0.31
	Base + Food * Land	17	1.30	0.23
	Base + Food	12	8.91	0.01
	Base	11	9.21	0.00
	Null	5	75.17	0.00
	Mass	Base + Food	12	0.00
Base + Food + Land		15	0.67	0.23
Base		11	0.67	0.23
Base + Land		14	1.31	0.17
Base + Food * Land		17	4.03	0.04
Null		5	50.11	0.00

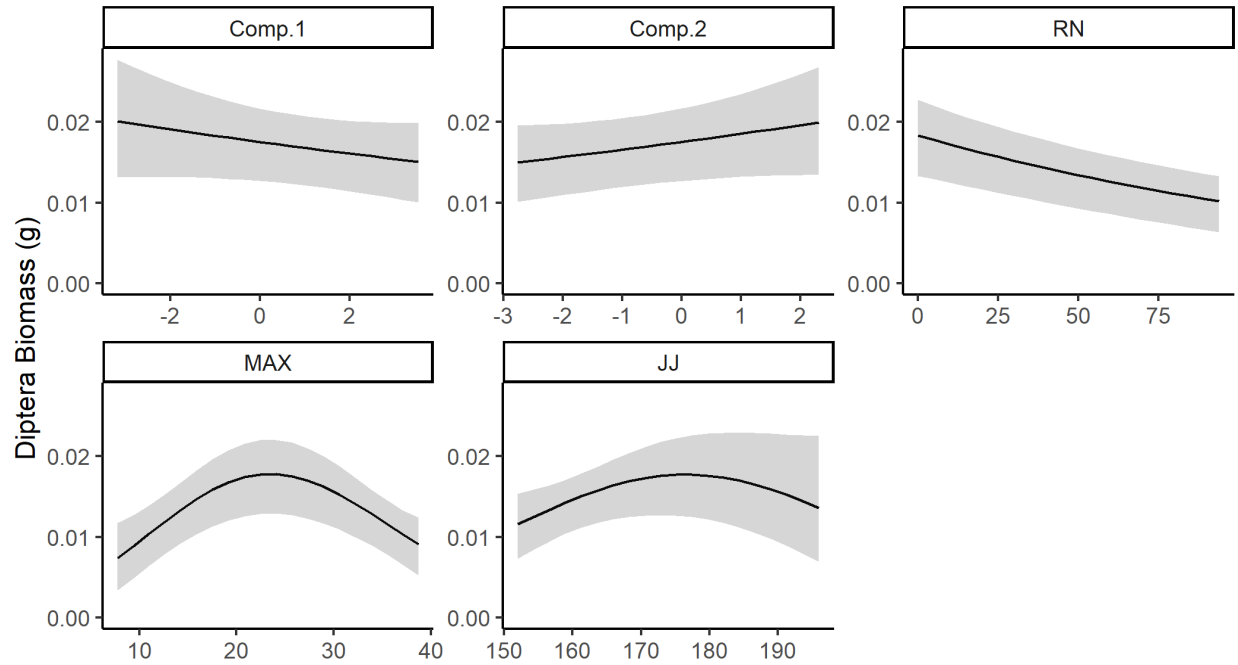
Response	Candidate model	K	$\Delta AICc$	w_i
Wing	Base + Land	14	0.00	0.55
	Base + Food + Land	15	1.28	0.29
	Base + Food * Land	17	2.85	0.13
	Base	11	7.14	0.02
	Base + Food	12	7.69	0.01
	Null	5	81.42	0.00



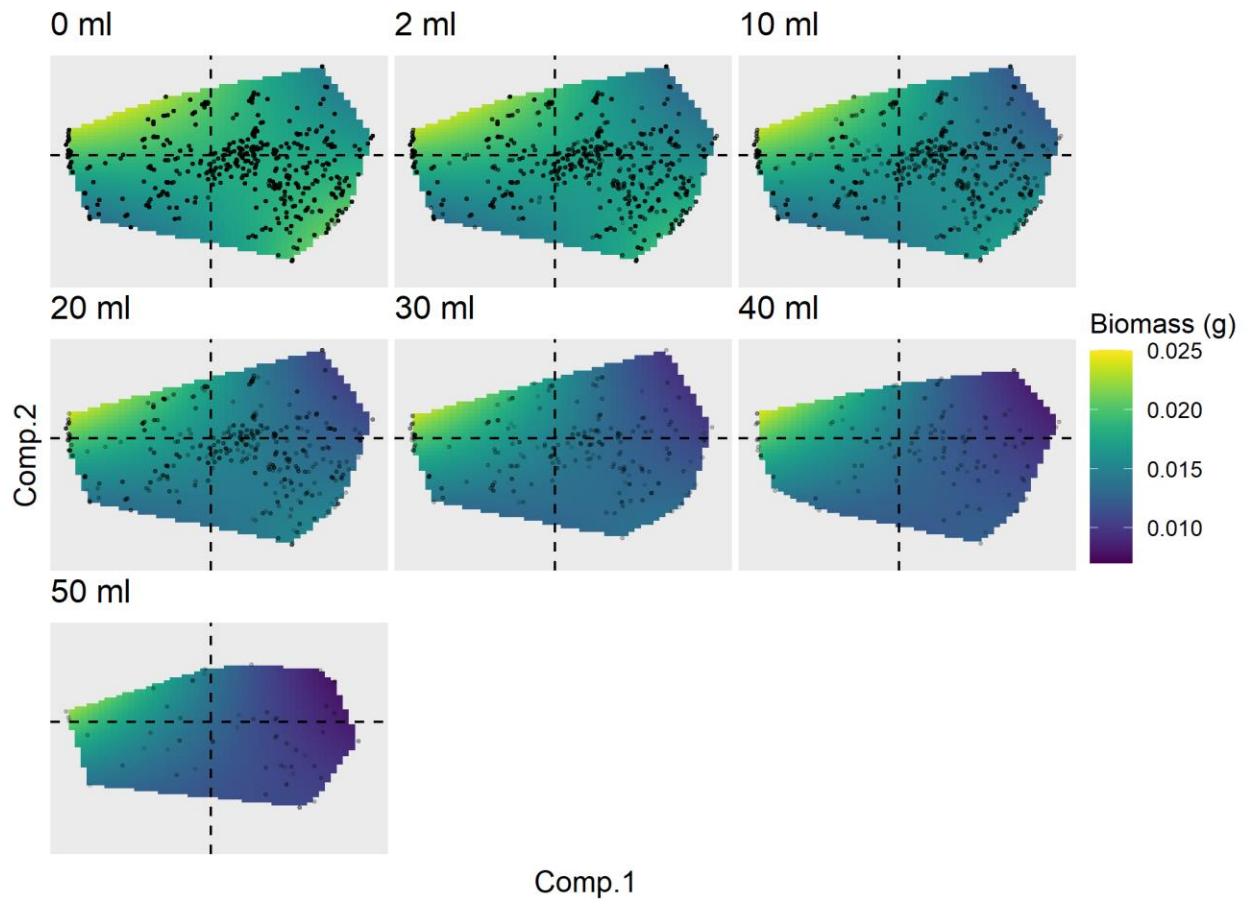
Supplemental S2: Kernel density estimate plot of each response variable throughout each year (2006-2016) of a study on the breeding ecology of a Tree swallow population distributed along a gradient of agricultural intensification in southern Québec, Canada. A) Diptera Biomass (reduced to the lower 95% of values, (± 0.0001 g)), dried biomass of Diptera from two insect traps on each farm and collected every two days between June 1st to July 15th (representing over 95% of the first breeding attempts), B) Fledging success, the proportion of a brood that fledged (i.e. the number of fledglings/brood size), C) The duration of the nestling period, the difference between the mean Julian dates of the brood fledging and hatching, D) Nestling body mass (± 0.01 g), measured at 16 days of age with digital scales, E) Nestling wing length (± 1 mm), measured at 16 days of age with wing rules.



Supplemental S3: Histogram of the primary breeding periods experienced each breeding season for Tree swallow nesting in southern Québec between 2006 and 2016. Julian date is the number of days past the 1 January. Vertical green (dashed) and red bars (dotted) represent the start and finish of the insect processing period, respectively.

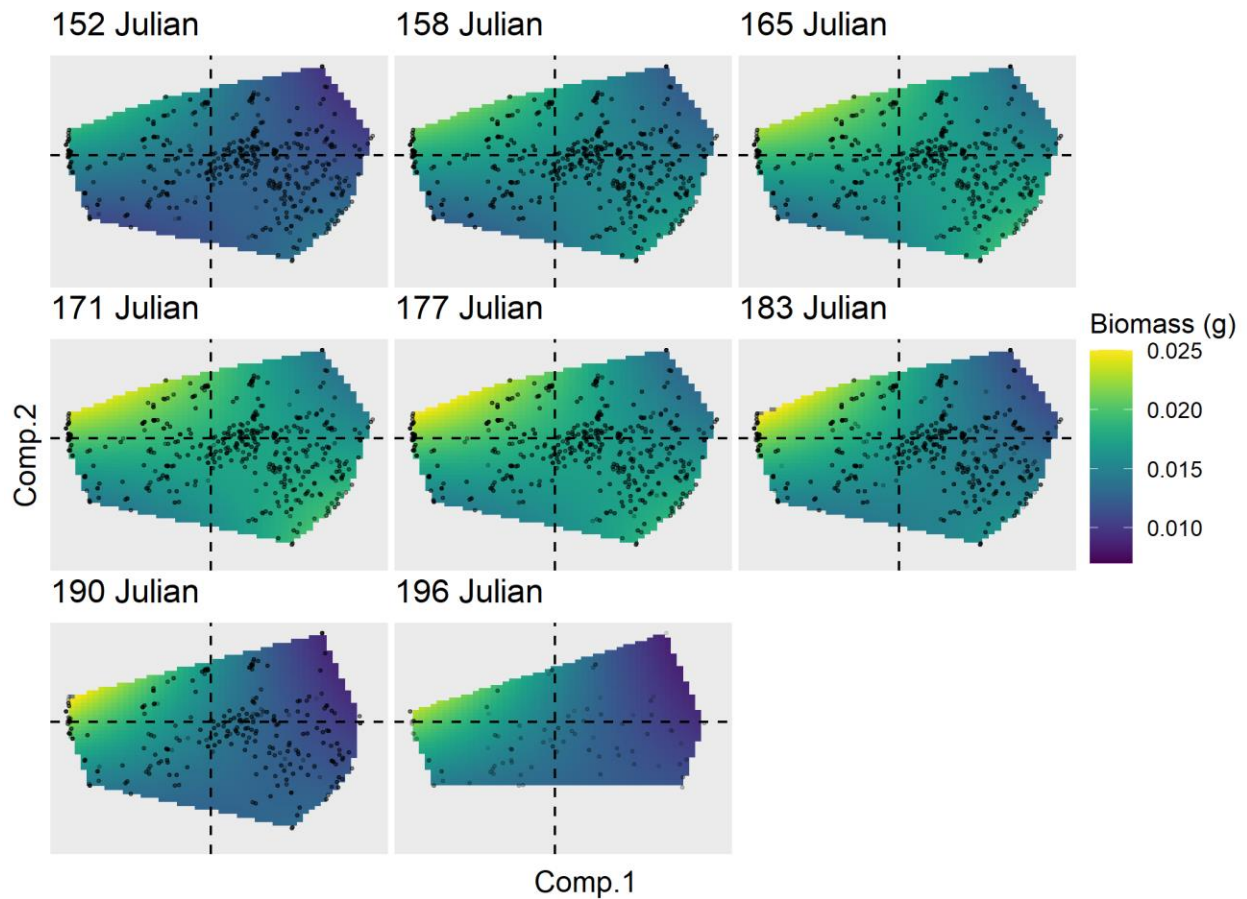


Supplemental S4: Predicted prey availability (Diptera dry biomass) with unconditional 95% confidence intervals against each covariate of interest. In each case, the values of all other covariates have been set to their mean and the predictor under consideration has been back transformed onto its original scale. See Table 1 for meaning of covariate acronyms.



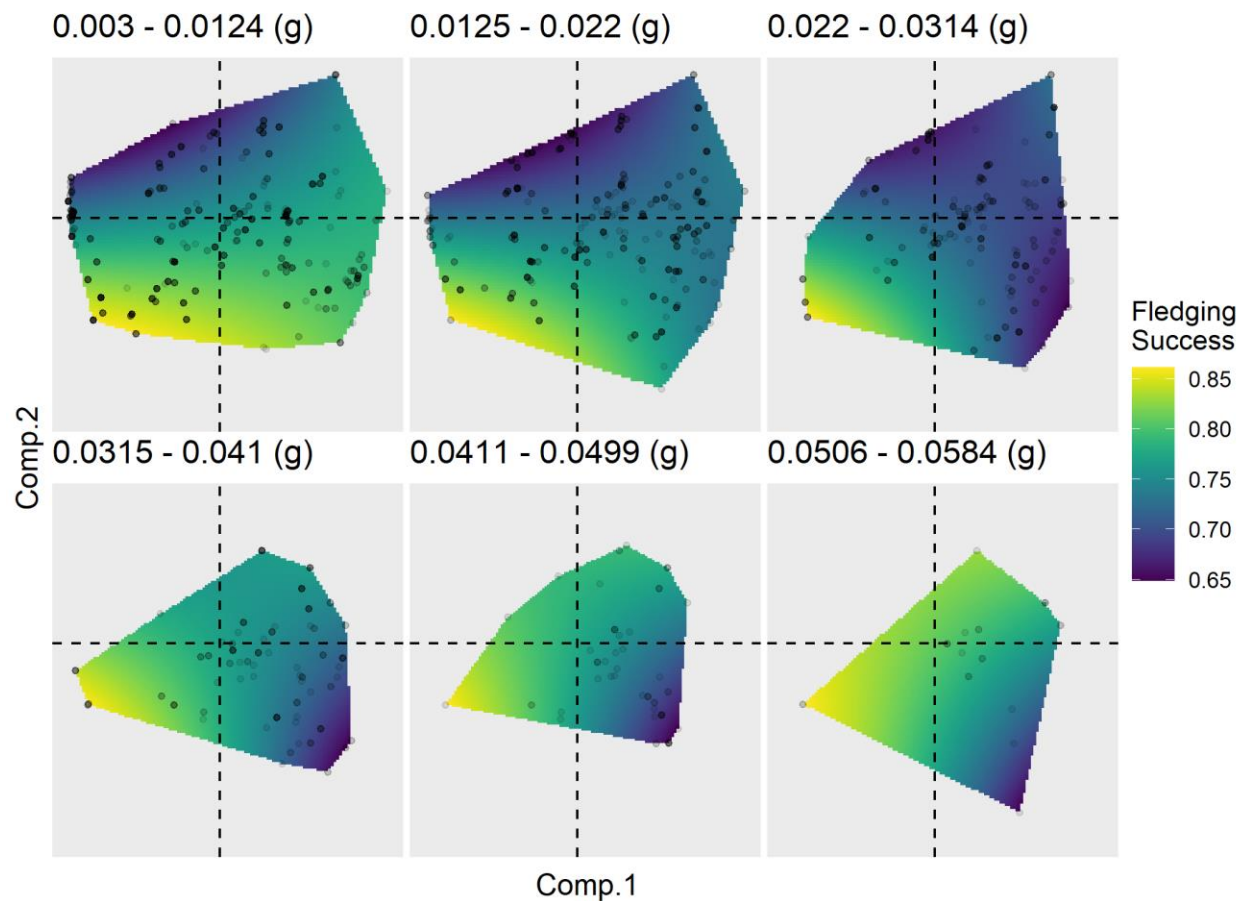
Supplemental S5: Predicted prey availability (Diptera dry biomass) against the first two components of the robust PCA describing landscape context for increasing levels of precipitation. Predictions and their covariates have been back transformed to either the response or unstandardized scale respectively. Vertical and horizontal hashed lines represent the zero values for both components. Each prediction surface represents a different precipitation group. Precipitation groups are the samples collected during different levels of Precipitation (two-day accumulation) between 0 ml to 50 ml at 10-ml increments (except for 0 ml to 2 ml, as this represents a vast majority of samples). Thus, raw values (points within background) represent the sites scores for the distribution of samples within each precipitation group. Prediction surfaces of precipitation group were produced by first calculating the mean value of precipitation (with the exception of 0 ml and 2 ml, in which we used the minimum), delineating out a bounding box of

extreme site scores, and then deriving predictions based on these values, while keeping all other covariates at their mean. The range of colors represent the minimum (deep blue) and maximum (yellow) predicted values of each response variable given site score values.



Supplemental S6: Predicted prey availability (Diptera dry biomass) against the first two components of the robust PCA describing landscape context for increasing levels of Julian date. Predictions and their covariates have been back transformed to either the response or unstandardized scale respectively. Vertical and horizontal hashed lines represent the zero values for both components. Each prediction surface represents a different Julian date group. Julian date groups are the samples collected during different Julian dates between 152 to 196 for 6-day increments. Thus, raw values (points within background) represent the sites scores for the distribution of samples within each Julian date group. Prediction surfaces of each Julian date group were produced by first calculating the minimum Julian date, delineating out a bounding box of extreme site scores, and then deriving predictions based on these values, while keeping all other

covariates at their mean. The range of colors represent the minimum (deep blue) and maximum (yellow) predicted values of each response variable given site score values.



Supplemental S7: Predicted fledging success against the first two components of the robust PCA describing landscape context for increasing levels of prey availability (Diptera dry biomass). Predictions and their covariates have been back transformed to either the response or unstandardized scale, respectively. Vertical and horizontal hashed lines represent the zero values for both components. Each prediction surface represents a different prey availability group. Prey availability groups are breeding attempts occurring under six different levels of prey availability between 0.0003 g to 0.0584 g, representing the minimum to the 99th quantile of observed levels of prey availability. Thus, raw values (points within background) represent the sites scores for the distribution of breeding attempts within each prey availability group. Prediction surfaces of each prey availability group were produced by first calculating the median value of prey availability within each group, delineating out a bounding box of extreme site scores, and then deriving

predictions based on these values, all while keeping all other covariates at their mean. The range of colors represent the minimum (deep blue) and maximum (yellow) predicted values of each response variable given site score values.