Supplementary material

Appendix S1. Sampling effort and bat passes at each survey location are indicated in the table below. Sites are anonymised to support landowner privacy.

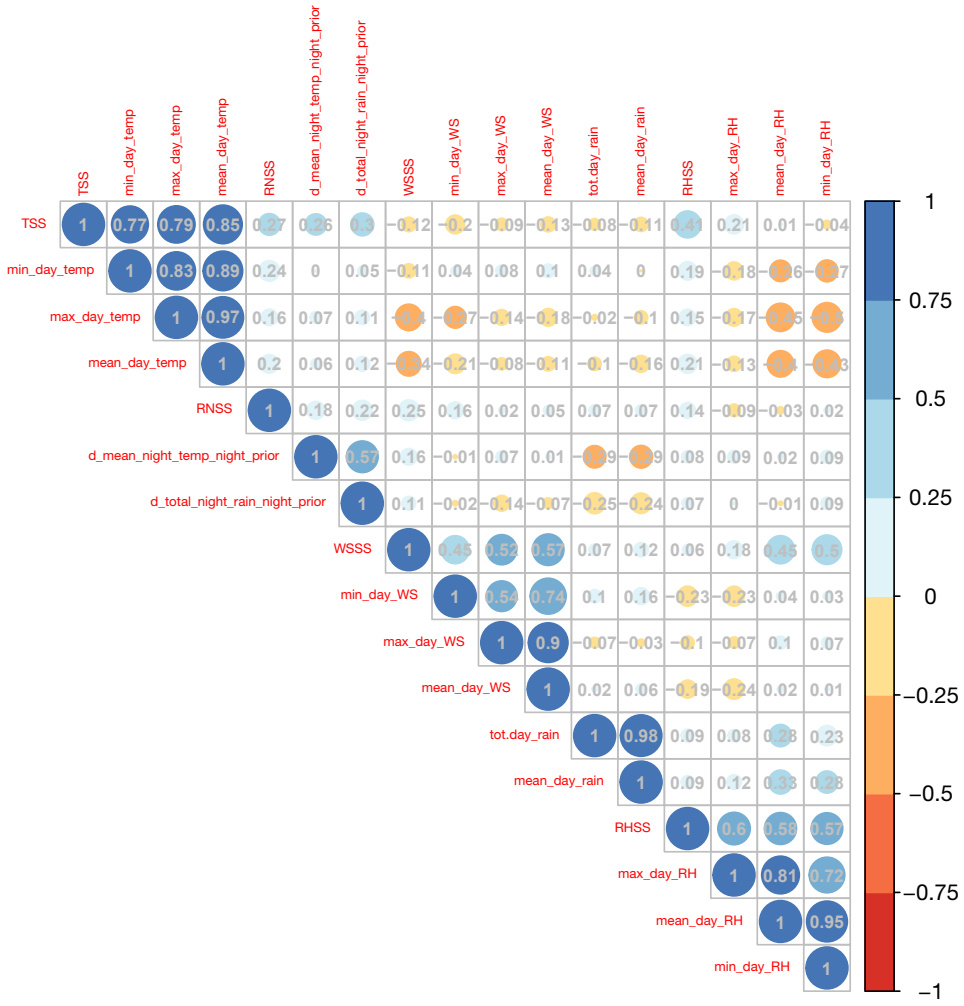
ABM sites	Number of nights surveyed	Total bat passes recorded
AA	12	69
AB	2	0
AC	11	85
AD	1	0
AE	4	0
AF	2	0
AG	5	73
AH	1	0
AI	1	0
AJ	12	1
AK	8	0
AL	10	7
AM	1	0
AN	4	2
AO	1	0
AP	5	0
AQ	4	2
AR	1	0
AS	4	0
AT	1	0
AU	10	0
AV	7	0
AW	13	2
AX	11	277
AY	7	1
AZ	8	3
BA	4	0
BB	4	0
BC	5	0
BD	7	1
BE	7	0
BF	6	0
BG	11	0
BH	7	0
BI	1	0
BJ	4	0
BK	7	107
BL	13	122
BM	10	1
BN	13	49
BO	8	1
BP	4	0
BQ	3	0
BR	2	0
BS	4	0
BT	1	0
BU	9	46
BV	6	72
BW	4	0
BX	5	1
BY	4	14
BZ	9	12

Appendix S2. Predictor selection—night model. Seventeen potential predictor variables were identified that may affect bat detection, these included measures of temperature, rainfall quantity, windspeed and relative humidity and their derivations. Specifically, the following were considered:

(1) Temperature at sunset (TSS)
(2) Minimum temperature recorded during the day (min_day_temp)
(3) Maximum temperature recorded during the day (max_day_temp)
(4) Mean temperature recorded during the day (mean_day_temp)
(5) Rainfall at sunset (RNSS)
(6) Change in mean temperature (mean temperature on the night of measurement - mean temperature on preceding night; d_mean_night_temp_night_prior)
(7) Change in rainfall (total rainfall on the night of measurement - total rainfall on preceding night; d_total_night_rain_night_prior)
(8) Wind speed at sunset (WSSS)
(9) Minimum windspeed recorded during the day (min_day_WS)
(10) Maximum windspeed recorded during the day (max_day_WS)
(11) Mean windspeed recorded during the day (mean_day_WS)
(12) Total rainfall recorded that day (tot.day_rain)
(13) Mean rainfall recorded that day (mean_day_rain)
(14) Relative humidity at sunset (RHSS)
(15) Minimum relative humidity recorded during the day (min_day_RH)
(16) Maximum relative humidity recorded during the day (max_day_RH)
(17) Mean relative humidity recorded during the day (mean_day_RH)

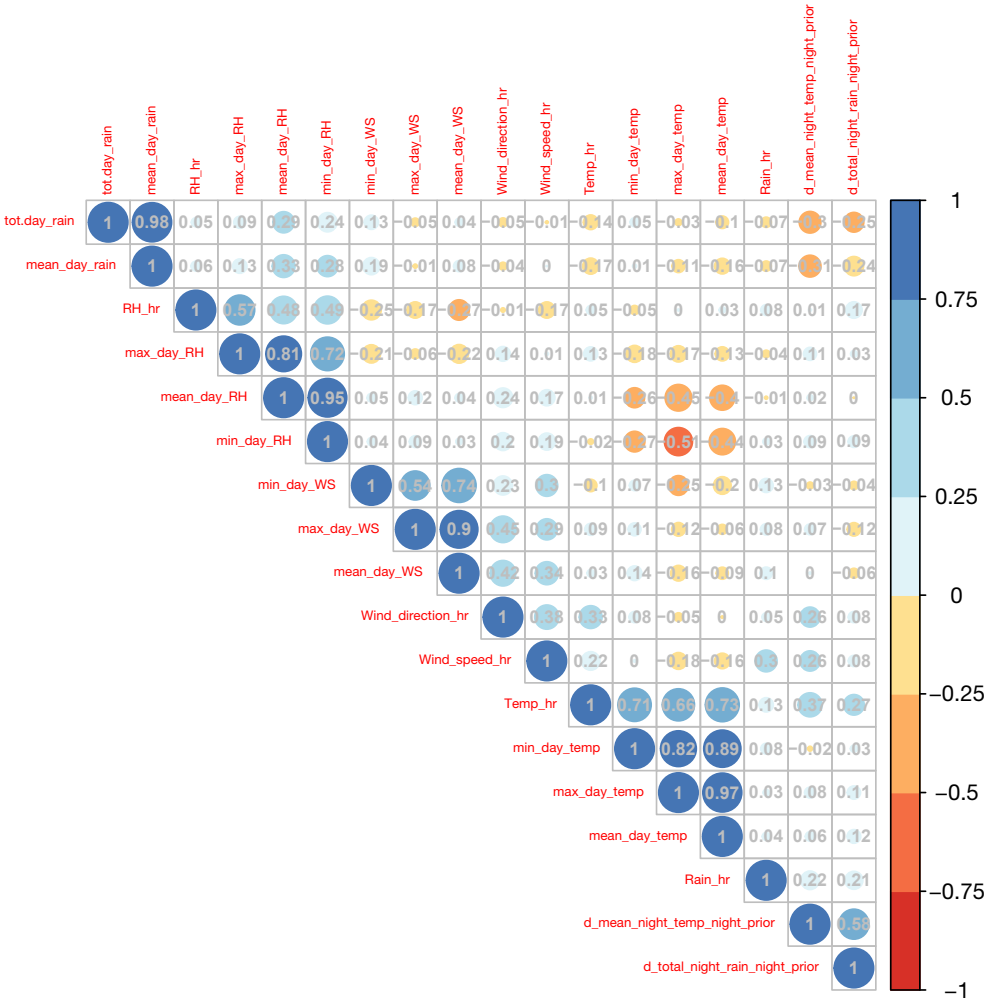
We checked for collinearity between variables using Pearson's correlation coefficient. Substantial correlation was found (Appendix S3). We chose one predictor from each group of correlated variables. We chose between correlated variables based on visual inspection of their relationship with the response variable (total passes), as overall correlations of environmental predictors with the response variable were low (< 0.1). This was presumably due to the high proportion of zero counts.

Appendix S3. Correlations among the predictor variables considered in this analysis for the night model.



Appendix S4. Predictor selection—hour model. The same process was used to select predictor variables for the hourly model as for the daily model. Predictor correlations are provided in Appendix S5.

Appendix S5. Correlations among the predictor variables considered in this analysis for the hourly model.



Appendix S6. Model selection statistics; the final model selected for each category is in bold.

Name	Model	AIC	AIC weights	BIC	BIC weights	RMSE	Sigma	Score_log	Score_ spherical	R^2	R^2 (adj.)	Nagelkerke's R^2	R^2 conditional	R^2 marginal
Night model														
m1	zeroinfl	1717.331	0.019	1792.394	<0.001	9.188	9.424	−2.187	0.045	0.751	0.744			
m2	zeroinfl	1715.343	0.05	1786.454	<0.001	9.186	9.409	−2.187	0.045	0.753	0.746			
m3	zeroinfl	1713.463	0.128	1780.624	0.003	9.185	9.395	−2.187	0.045	0.758	0.752			
m4	zeroinfl	1711.976	0.27	1775.186	0.049	9.225	9.423	−2.187	0.045	0.745	0.738			
m5	zeroinfl	1858.328	<0.001	1893.884	<0.001	9.343	9.454	−2.396	0.045	0.686	0.683			
m6	**zeroinfl**	**1710.729**	**0.503**	**1769.989**	**0.665**	**9.244**	**9.43**	**−2.188**	**0.045**	**0.742**	**0.735**			
m7	zeroinfl	1741.52	<0.001	1796.829	<0.001	9.252	9.425	−2.231	0.045	0.718	0.712			
m8	zeroinfl	1743.021	<0.001	1794.379	<0.001	9.207	9.367	−2.236	0.045	0.715	0.709			
m9	zeroinfl	1788.087	<0.001	1835.495	<0.001	9.262	9.41	−2.297	0.045	0.685	0.678			
m10	zeroinfl	1786.653	<0.001	1830.11	<0.001	9.261	9.396	−2.298	0.045	0.684	0.678			
m11	zeroinfl	1716.396	0.03	1771.705	0.282	9.253	9.426	−2.198	0.045	0.721	0.714			
mnull	glm	4222.434	<0.001	4261.94	<0.001	9.448	3.245	−5.472	0.033			0.78		
Hourly model														
a1	glmmTMB	944.275	0.002	1030.463	<0.001	2.226	1	−0.347	0.028				0.643	0.258
a2	glmmTMB	942.277	0.004	1023.395	<0.001	2.227	1	−0.347	0.028				0.646	0.259
a3	glmmTMB	938.424	0.029	1009.402	<0.001	2.229	1	−0.347	0.028				0.645	0.258
a4	glmmTMB	936.888	0.062	1002.797	<0.001	2.212	1	−0.348	0.028				0.644	0.264
a5	glmmTMB	935.222	0.144	996.061	0.002	2.211	1	−0.348	0.028				0.644	0.26
a6	glmmTMB	933.643	0.316	989.412	0.053	2.213	1	−0.348	0.028				0.637	0.253
a7	**glmmTMB**	**932.97**	**0.443**	**983.669**	**0.945**	**2.198**	**1**	**−0.349**	**0.028**				**0.629**	**0.253**
a8	glmmTMB	1021.848	<0.001	1067.477	<0.001	2.139	1	−0.388	0.028				0.55	0.05
a9	glmmTMB	1021.072	<0.001	1061.631	<0.001	2.148	1	−0.388	0.028				0.556	0.049
a10	glmmTMB	978.866	<0.001	1024.495	<0.001	2.217	1	−0.369	0.028				0.609	0.168
a11	glmmTMB	977.554	<0.001	1018.113	<0.001	2.227	1	−0.369	0.028				0.609	0.176
mnull	glmerMod	1731.303	<0.001	1766.792	<0.001	2.076	1	−0.683	0.027				0.725	0.155

Appendix S7. Parameters within each final model and supporting test statistics.

Model	Type	Parameter	Estimate	Standard error	z-value
Night model	Count model	Intercept	−0.45	0.45	−1.01
		TSS Polynomial 1st term	0.32	1.27	0.26
		TSS Polynomial 2nd term	−3.30	1.21	−2.73
		WSSS	0.03	0.01	4.55
		$Rain_{\Sigma d}$	−0.11	0.04	−3.09
		RHSS	0.03	0.01	5.49
		TΔ Polynomial 1st term	5.44	1.43	3.80
		TΔ Polynomial 2nd term	−8.89	1.33	−6.69
		Rain Δ Polynomial 1st term	−4.30	0.90	−4.80
		Rain Δ Polynomial 2nd term	8.70	0.85	10.21
	Zero-inflation	Intercept	2.46	0.62	4.00
		TSS	−0.13	0.05	−2.57
		TΔ	−0.10	0.05	−1.99
		Habitat: pasture	3.31	1.02	3.24
		Habitat: regenerating native area	1.09	0.36	3.02
Hour model	Count model	Intercept	−2.57	0.72	−3.53
		T_h Polynomial 1st term	34.01	5.74	5.93
		T_h Polynomial 2nd term	−42.24	5.27	−8.02
		WS_h	0.09	0.03	3.55
		H Polynomial 1st term	−2.54	3.43	−0.74
		H Polynomial 2nd term	−18.05	2.79	−6.46
	Zero-inflation	Habitat: pasture	2.72	1.29	2.12
		Habitat: regenerating native area	0.51	0.62	0.40
	Random effect	Location	–	–	–