Table 1: Model selection explaining lemming distribution during increase years at regional scale. 'CurvTang' and 'CurvProf' correspond to tangential and profile curvature, respectively. 'Prim. Prod.' corresponds to primary productivity.

Models	Variables	k	AICc	ΔAICc	w_i
m1	Altitude + Eastness + Eastness² + Northness + Northness² + CurvTang + CurvTang² + CurvProf + CurvProf² + Slope + Prim. Prod. + Prim. Prod.² + Year	14	113.80	4.85	0.019
m2	Altitude + Eastness + Eastness² + Northness + Northness² + CurvTang + CurvTang² + CurvProf + CurvProf² + Slope + Prim. Prod. + Prim. Prod.²	13	112.30	3.35	0.040
m3	Altitude + Eastness + Eastness² + Northness + Northness² + CurvTang + CurvTang² + CurvProf + CurvProf² + Slope + Prim. Prod.²	12	111.07	2.12	0.074
m4	Altitude + Eastness + Eastness² + Northness + Northness² + CurvTang² + CurvProf + CurvProf² + Slope + Prim. Prod.²	11	110.16	1.21	0.116
m5	Eastness + Eastness² + Northness + Northness² + CurvTang² + CurvProf + CurvProf² + Slope + Prim. Prod.²	10	109.50	0.55	0.161
m6	Eastness + Eastness² + Northness + Northness² + CurvTang² + CurvProf² + Slope + Prim. Prod.²	9	108.95	0	0.213
m7	**Eastness + Northness + Northness² + CurvTang² + CurvProf² + Slope + Prim. Prod.²**	**8**	**109.92**	**0.97**	**0.131**
m8	Eastness + Northness + Northness² + CurvProf² + Slope + Prim. Prod.²	7	111.60	2.65	0.057
m9	Eastness + Northness² + CurvProf² + Slope + Prim. Prod.²	6	111.18	2.23	0.070
m10	Eastness + Northness² + Slope + Prim. Prod.²	5	111.77	2.82	0.052
m11	Eastness + Northness² + Prim. Prod.²	4	113.33	4.38	0.024
m12	Eastness + Prim. Prod.²	3	112.01	3.06	0.046

Best model is indicated in bold. k is the number of parameters in the model. ΔAICc is the difference of AICc compared to the best model. w_i corresponds to the AIC weight and represents the probability of model i being the best among the models presented.

Table 2: Model selection of lemming distribution during peak years at regional scale. 'CurvTang' and 'CurvProf' correspond to tangential and profile curvature, respectively. 'Prim. Prod.' corresponds to primary productivity.

Models	Variables	k	AIC	ΔAIC	w_i
m1	Altitude + Eastness + Eastness² + Northness + Northness² + CurvTang + CurvTang² + CurvProf + CurvProf² + Slope + Prim. Prod. + Prim. Prod.² + Year	15	160.23	13.00	<0.001
m2	Altitude + Eastness² + Northness + Northness² + CurvTang + CurvTang² + CurvProf + CurvProf² + Slope + Prim. Prod. + Prim. Prod.² + Year	14	158.23	11.01	0.001
m3	Altitude + Eastness² + Northness + Northness² + CurvTang + CurvTang² + CurvProf + Slope + Prim. Prod. + Prim. Prod.² + Year	13	156.24	9.01	0.003
m4	Altitude + Eastness² + Northness + Northness² + CurvTang + CurvTang² + CurvProf + Slope + Prim. Prod. + Year	12	154.30	7.07	0.007
m5	Altitude + Eastness² + Northness + CurvTang + CurvTang² + CurvProf + Slope + Prim. Prod. + Year	11	152.39	5.16	0.019
m6	Altitude + Eastness² + Northness + CurvTang + CurvTang² + Slope + Prim. Prod. + Year	10	150.81	3.58	0.043
m7	Altitude + Eastness² + Northness + CurvTang² + Slope + Prim. Prod. + Year	9	149.49	2.27	0.082
m8	Altitude + Eastness² + Northness + Slope + Prim. Prod. + Year	8	148.31	1.08	0.149
m9	Eastness² + Northness + Slope + Prim. Prod. + Year	7	147.84	0.62	0.188
m10	Eastness² + Northness + Prim. Prod. + Year	6	147.23	0	0.256
m11	**Northness + Prim. Prod. + Year**	**5**	**147.69**	**0.46**	**0.203**
m12	Prim. Prod. + Year	4	150.66	3.44	0.046
m13	Northness + Year	4	158.25	11.03	0.001
m14	Northness + Prim. Prod.	3	170.35	23.12	<0.001

Best model is indicated in bold. k is the number of parameters in the model. ΔAIC is the difference of AIC compared to the best model. w_i corresponds to the AIC weight and represents the probability of model i being the best among the models presented.

Table 3: Model selection of lemming distribution during peak years at local scale. 'CurvTang' and 'CurvProf' correspond to tangential and profile curvature, respectively. 'Prim. Prod.' corresponds to primary productivity.

Models	Variables	k	AIC	ΔAIC	w_i
m1	Altitude + Eastness + Eastness² + Northness + Northness² + CurvTang + CurvTang² + CurvProf + CurProf² + Slope + Prim. Prod. + Prim. Prod.² + Year	14	262.78	15.33	<0.001
m2	Altitude + Eastness + Eastness² + Northness + Northness² + CurvTang + CurvProf + CurProf² + Slope + Prim. Prod. + Prim. Prod.² + Year	13	260.78	13.34	<0.001
m3	Altitude + Eastness + Eastness² + Northness + Northness² + CurvTang + CurvProf + Slope + Prim. Prod. + Prim. Prod.² + Year	12	258.95	11.50	0.001
m4	Eastness + Eastness² + Northness + Northness² + CurvTang + CurvProf + Slope + Prim. Prod. + Prim. Prod.² + Year	11	256.97	9.52	0.002
m5	Eastness + Eastness² + Northness + Northness² + CurvTang + CurvProf + Prim. Prod. + Prim. Prod.² + Year	10	254.99	7.54	0.006
m6	Eastness² + Northness + Northness² + CurvTang + CurvProf + Prim. Prod. + Prim. Prod.² + Year	9	253.15	5. 07	0.015
m7	Eastness² + Northness + CurvTang + CurvProf + Prim. Prod. + Prim. Prod.² + Year	8	251.30	3.86	0.037
m8	Eastness² + Northness + CurvTang + CurvProf + Prim. Prod. + Year	7	249.53	2.08	0.009
m9	Eastness² + CurvTang + CurvProf + Prim. Prod. + Year	6	248.50	1.05	0.151
m10	Eastness² + CurvProf + Prim. Prod. + Year	5	248.57	1.12	0.145
m11	CurvProf + Prim. Prod. + Year	4	247.45	0	0.255
m12	**Prim. Prod. + Year**	**3**	**247.64**	**0.19**	**0.232**
m13	Year	2	250.12	2.67	0.067
m14	Prim. Prod.	2	394.91	147.47	<0.001

Best model is indicated in bold. k is the number of parameters in the model. ΔAIC is the difference of AIC compared to the best model. w_i corresponds to the AIC weight and represents the probability of model i being the best among the models presented.