

**Table S1:** Mean density and depth of vertebrate and invertebrate holes per site. N = number of plots.

Unit	Animals	PdA	SG	LC	NA
Mean	Vertebrates	1.46	6.75	5.60	1.70
density	Invertebrates	16.3	9.90	7.07	3.20
Mean	Vertebrates	2.84	2.44	2.87	2.44
depth	Invertebrates	0.74	0.73	0.76	0.72

**Table S2:** Summary of the collected UAV data sets (PdA = Pan de Azúcar, SG = Santa Gracia, LC = La Campana, NA = Nahuelbuta; Aspect = the average direction that hillsides are facing counterclockwise from the east; Extent = the minimum and maximum longitude and latitude values of the generated orthophotos of the hillsides [EPSG:4326WGS 84]; Inclination = mean inclination of the hillsides in degrees; Altitude range [a.s.l.] = minimum and maximum altitudes of the hillsides in meters above sea level).

Site	Aspect [°]	Extent	Inclination [°]	Altitude range [m a.s.l.]	Ground Sampling Distance [cm]	Covered area [km²]
PdA	173.10	-70.61875999999	16.42	485–760	2.57	0.34
		-25.97690569047				
		-70.61122717402				
		-25.97072500000				
	73.10	-70.61747800000	6.62	633–720	3.07	0.58
		-25.98792750527				
		-70.61004863371				
		-25.97936899999				
SG	204.84	-71.169226580458	11.73	630–740	2.57	0.27
		-29.758944299143				
		-71.162390068944				
		-29.754619999691				
	86.76	-71.167225099000	4.18	611–723	1.76	0.28
		-29.764107785292				
		-71.162634910771				
		-29.758786575999				
LC	225.36	-71.09082499999	11.09	433–591	2.74	0.67
		-32.94316192996				
		-71.08180970164				
		-32.93423200000				
	87.84	-71.09315231476	17.01	399–541	1.58	0.30
		-32.93436314092				
		-71.08806183080				
		-32.92908755615				
NA	65.90	-73.01619835389	10.50	1190–1248	2.59	0.31
		-37.80900328612				
		-73.00848544256				
		-37.80456593102				
	185.00	-73.01734991663	5.04	1190–1240	2.59	0.33
		-37.811992231189				
		-73.01034841517				
		-37.80787731366				

**Table S3:** Hierarchy of classes for the land-cover classification (PdA = Pan de Azúcar, SG = Santa Gracia, LC = La Campana, NA = Nahuelbuta, X = class represented within the site).

Main class	Sub-class	PdA	SG	LC	NA
Soil	Soil			X	X
	Weathered granite soil	X	X		
	Saprolite	X	X		
	Soil covered by soil crusts	X			
Cacti	<i>Copiapoa</i>	X			
	<i>Eulychnia</i>	X	X		
	Other cacti		X		
Shrubs	Shrubs	X	X	X	X
Herbs	Herbs	X	X	X	X
Skeleton	Skeleton	X	X	X	
	Rocks				X
	Boulders				X
Trees	Trees		X	X	
	Araucaria				X
	Other genera				X

**Table S4:** Sensitivity of individual land-cover classes of the land-cover classification models trained for each site separately. Sensitivity = the proportion [%] of positives that are correctly identified.

Main class	Sub-class	PdA	SG	LC	NA
Soil	Soil	94		94	78
	Granite	87	83		
	Saprolite	86	1		
	Soil crusts	95			
Cacti	<i>Copiapoa</i>	77			
	<i>Eulychnia</i>	84	85		
	Other cacti		92		
Shrubs	Shrubs	82	47	84	68
Herbs	Herbs	53	79	83	60
Skeleton	Skeleton	90	58	72	
	Rocks				59
	Boulders				69
Trees	Trees			81	
	Araucaria				80
	Other genera				92

**Table S5:** Performance of models trained with each predictor set separately.

Predictor sets	Hole density				Hole depth			
	Vertebrates		Invertebrate		Vertebrates		Invertebrate	
	R <sup>2</sup>	MAE	R <sup>2</sup>	MAE	R <sup>2</sup>	MAE	R <sup>2</sup>	MAE
Spectral bands	0.08	4.6	0.01	6.4	0.13	2.25	0.23	0.27
Climate	0.10	4.2	0.36	5.2	0.18	2.52	0.13	0.29
Land-cover fractions	0.10	4.3	0.50	4.1	0.05	2.38	0.10	0.28
Diversity indices	0.28	4.0	0.16	5.7	0.16	2.3	0.10	0.31

Vegetation height	0.24	3.8	0.33	5.0	0.14	2.2	0.29	0.25
Vegetation indices	0.28	3.7	0.26	5.4	0.08	2.2	0.03	0.32
Texture metrics	0.28	3.8	0.31	5.3	0.07	2.4	0.10	0.30
Topography	0.06	4.4	0.33	5.1	0.06	2.4	0.01	0.39

**Table S6:** Significant variables selected by the linear mixed model for the vertebrate hole density ( $R^2 = 0.83$ ;  $p < 0.0001$ ).  $p\text{-value}^* < 0.05$ .  $p\text{-value}^{**} < 0.01$ .  $p\text{-value}^{***} < 0.001$ .

Predictors	Estimate	Error	t value	p-value
(Intercept)	1.06027	1.74163	0.609	0.546291
Vegetation cover	0.43305	0.03806	11.377	8.41e-14 ***
Skeleton	-0.45436	0.22290	-2.038	0.048510 *
Shrub diameter	-4.20671	1.17676	-3.575	0.000974 ***
Site LC	6.24868	2.43901	2.562	0.014497 *
Vegetation cover at site LC	-0.50120	0.04753	-10.546	7.64e-13 ***
Vegetation cover at site PdA	-0.48401	0.04961	-9.755	6.76e-12 ***
Shrub diameter at site LC	4.10939	1.22249	3.361	0.001778 **

**Table S7:** Significant variables selected by the linear mixed model for the invertebrate hole density ( $R^2 = 0.76$ ;  $p < 0.0001$ ).  $p\text{-value}^* < 0.05$ ;  $p\text{-value}^{**} < 0.01$ ;  $p\text{-value}^{***} < 0.001$ .

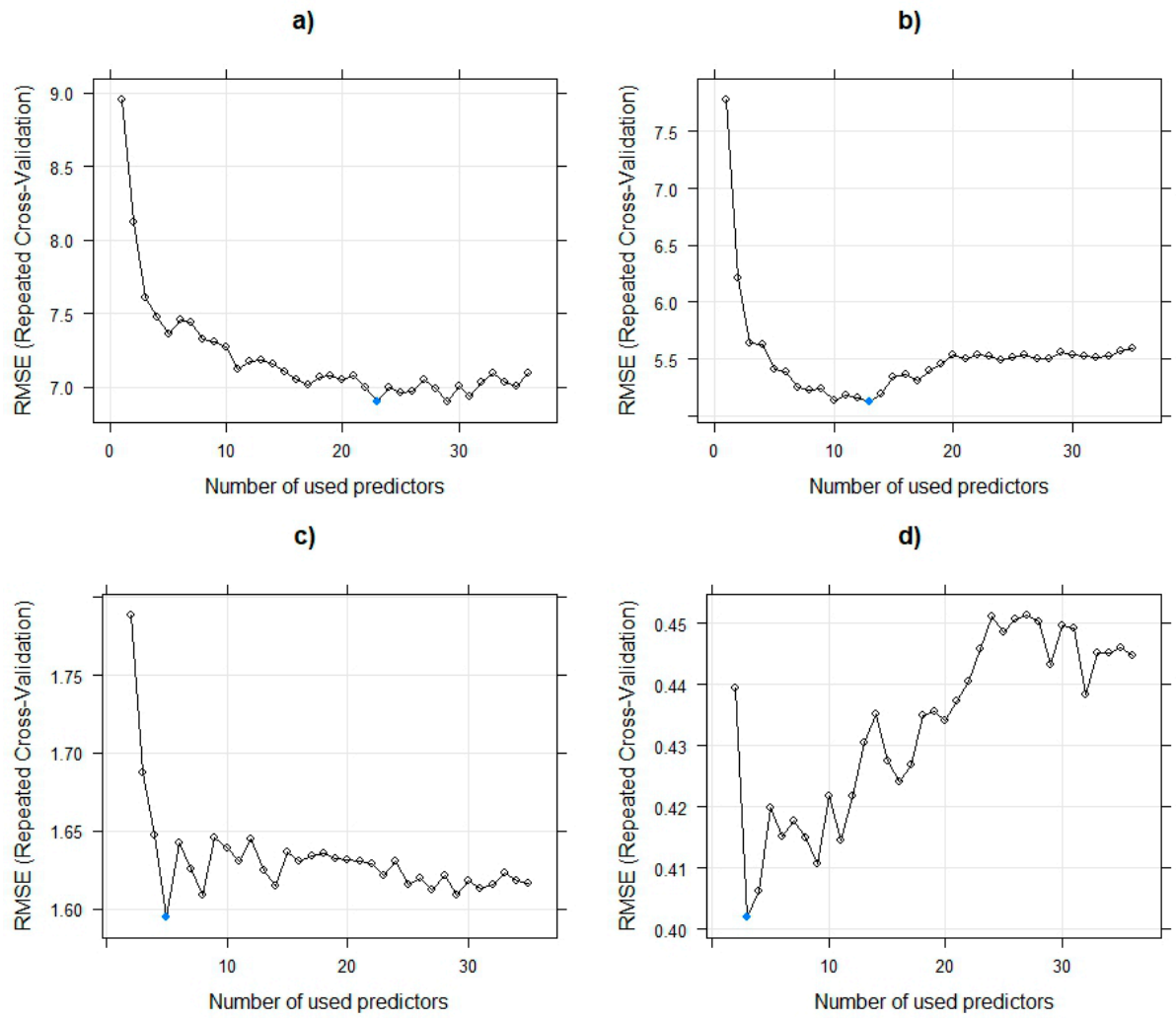
Predictors	Estimate	Error	t value	p-value
(Intercept)	9.21479	2.21611	4.158	0.000183 ***
Cacti height	-7.87052	2.33218	-3.375	0.001746 **
Cacti abundance	-0.43325	0.08503	-5.095	1.05e-05 ***
Site PdA	13.96073	3.27388	4.264	0.000133 ***
Vegetation cover at site PdA	0.19026	0.09018	2.110	0.041715 *

**Table S8:** Significant variables selected by the linear mixed model for the vertebrate hole depth ( $R^2 = 0.84$ ;  $p < 0.0001$ ).  $p\text{-value}^* < 0.05$ ;  $p\text{-value}^{**} < 0.01$ ;  $p\text{-value}^{***} < 0.001$ .

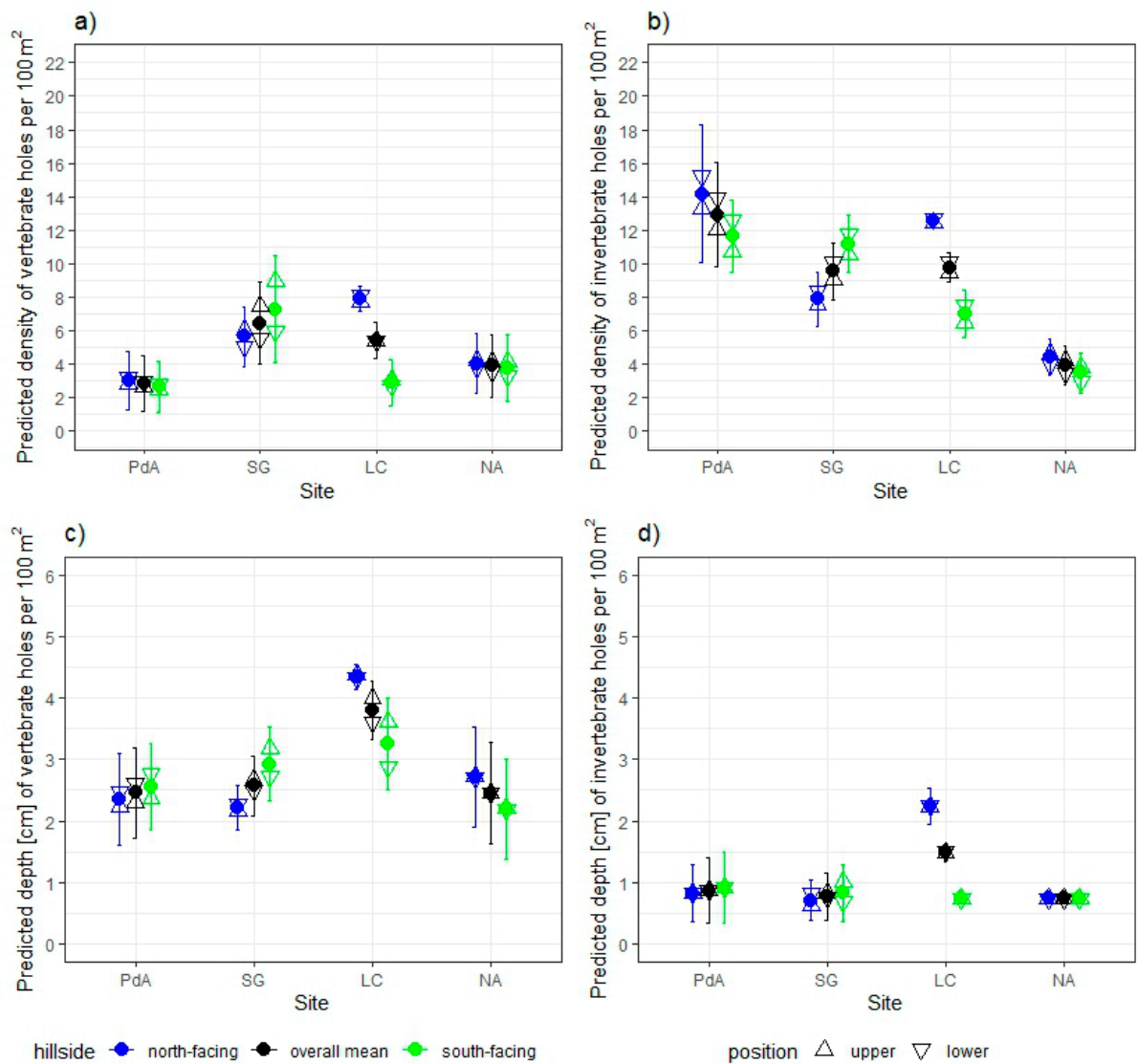
Predictors	Estimate	Error	t value	p-value
(Intercept)	4.628e+00	2.013e+00	2.299	0.029762 *
Vegetation cover	-4.134e-01	1.847e-01	-2.238	0.033974 *
Shrub cover	-5.319e-01	2.110e-01	-2.521	0.018179 *
Cacti cover	-1.911e+00	5.529e-01	-3.456	0.001895 **
Trees cover	-4.609e-01	1.508e-01	-3.056	0.005136 **
Trees diameter	3.595e+00	1.529e+00	2.351	0.026570 *
Cacti abundance	7.804e-01	3.292e-01	2370	0.025467 *
Tree abundance	6.068e-01	1.714e-01	3540	0.001532 **
Skeleton abundance	2.984e-01	7.706e-02	3873	0.000651 ***
Cover heterogeneity	2.172e-01	8.778e-02	2474	0.020196 *
Site SG	-3.475e+01	5.572e+00	-6237	1.34e-06 ***
Site LC	-5.881e+00	2.632e+00	-2235	0.034260 *
Vegetation cover at site SG	5.890e-01	1.900e-01	3099	0.004617 **
Shrub diameter at site SG	6.031e+01	2.632e+00	2476	0.020108 *
Cover heterogeneity at site SG	-2.696e-01	8.794e-02	-3066	0.005015 **
Cover heterogeneity at site LC	-1.878e-01	8.524e-02	-2203	0.036630 *
Cover heterogeneity at site NA	-1.823e-01	8.518e-02	-2141	0.041846 *
Abundance heterogeneity at site SG	-4.936e-02	2.182e-02	-2263	0.032247 *

**Table S9:** Summary of the linear mixed model for the invertebrate hole depth ( $R^2 = 0.64$ ;  $p < 0.01$ ). p-value\*  $< 0.05$ ; p-value\*\*  $< 0.01$ ; p-value\*\*\*  $< 0.001$ .

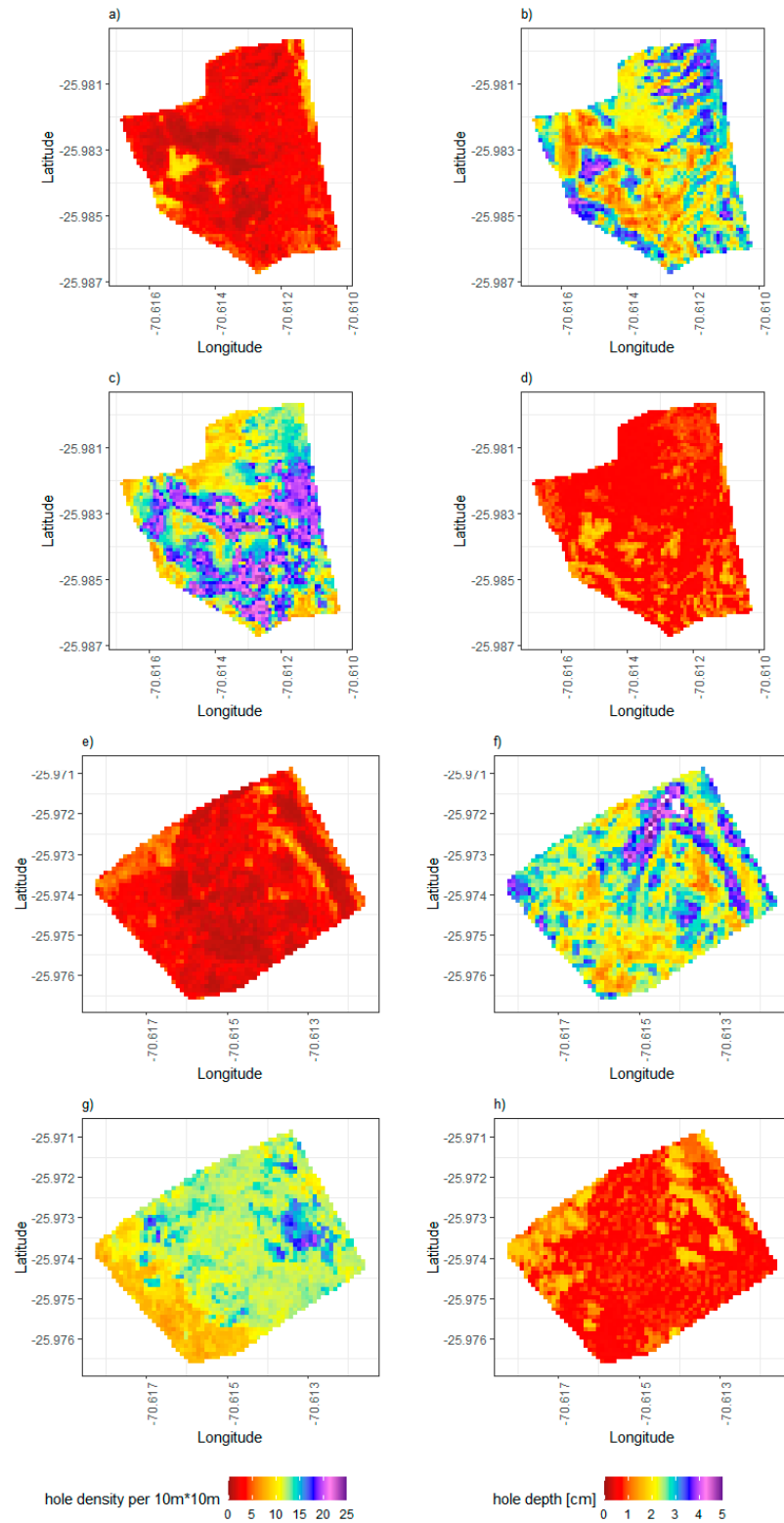
	Estimate	Error	t value	p-value
(Intercept)	-1.648610	0.712062	-2.315	0.026095 *
Cacti cover	-0.228478	0.077160	-2.961	0.005260 **
Soil cover	0.015397	0.006048	2.546	0.015081 *
Shrub diameter	-11.838280	2.812155	-4.210	0.000151 ***
Cacti diameter	0.609415	0.232873	2.617	0.012664 *
Shrub height	12.358300	2.907531	4.250	0.000133 ***
Shrubs abundance	0.056238	0.011687	4.812	2.38e-05 ***
Cacti abundance	0.064426	0.016059	4.012	0.000273 ***
Trees abundance	0.048822	0.001302	4.086	0.000219 ***
Cover heterogeneity	-0.038438	0.016170	-2.377	0.022586 *
Abundance heterogeneity	-0.004589	0.001302	-3.525	0.001123 **
Site SG	-1.687547	0.784658	-2.151	0.037926 *
Site NA	1.361993	0.586687	2.321	0.025720 *
Vegetation cover at site NA	-0.054720	0.026520	-2.063	0.045961 *
Shrub diameter at site SG	13.354248	2.946862	4.532	5.67e-05 ***
Shrub diameter at site LC	11.910892	2.817994	4.227	0.000143 ***
Shrub diameter at site NA	11.735616	2.818636	4.164	0.000173 ***
Shrub height at site SG	-12.367284	2.939758	-4.207	0.000152 ***
Shrub height at site LC	-12.819465	2.936441	-4.392	8.68e-05 ***
Shrub height at site NA	-12.718590	2.936441	-4.331	0.000104 ***
Cover heterogeneity at site LC	0.035311	0.016198	2.180	0.035529 *
Cover heterogeneity at site NA	0.040147	0.016192	2.479	0.017710 *
Abundance heterogeneity at site NA	0.004269	0.001525	2.800	0.007988 **



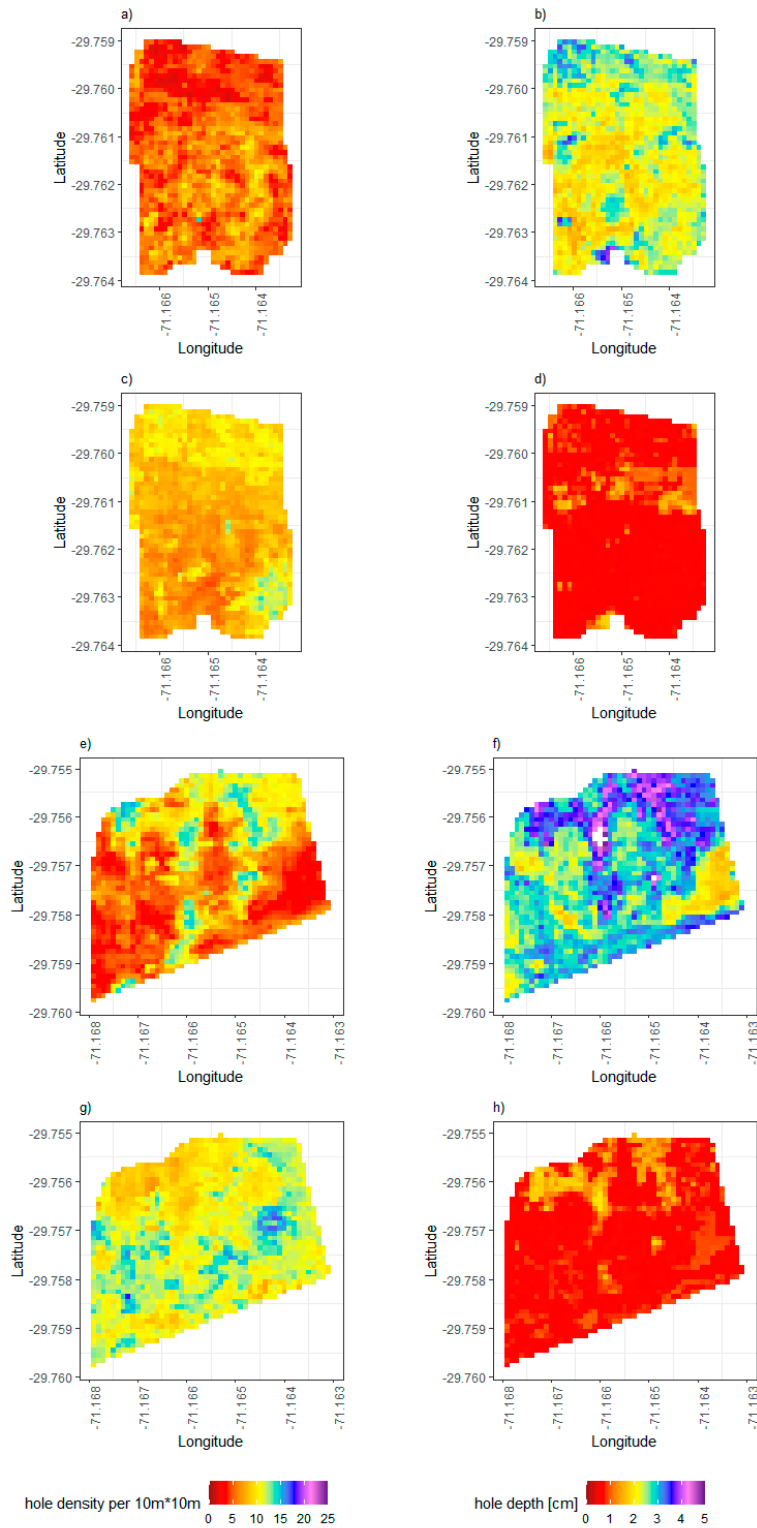
**Figure S1.** Predictor selection by means of recursive feature elimination (RFE). The blue points show the number of selected predictors with the lowest achieved RMSE: **(a)** Vertebrate hole density; **(b)** Invertebrate hole density; **(c)** Vertebrate hole depth; and **(d)** Invertebrate hole depth.



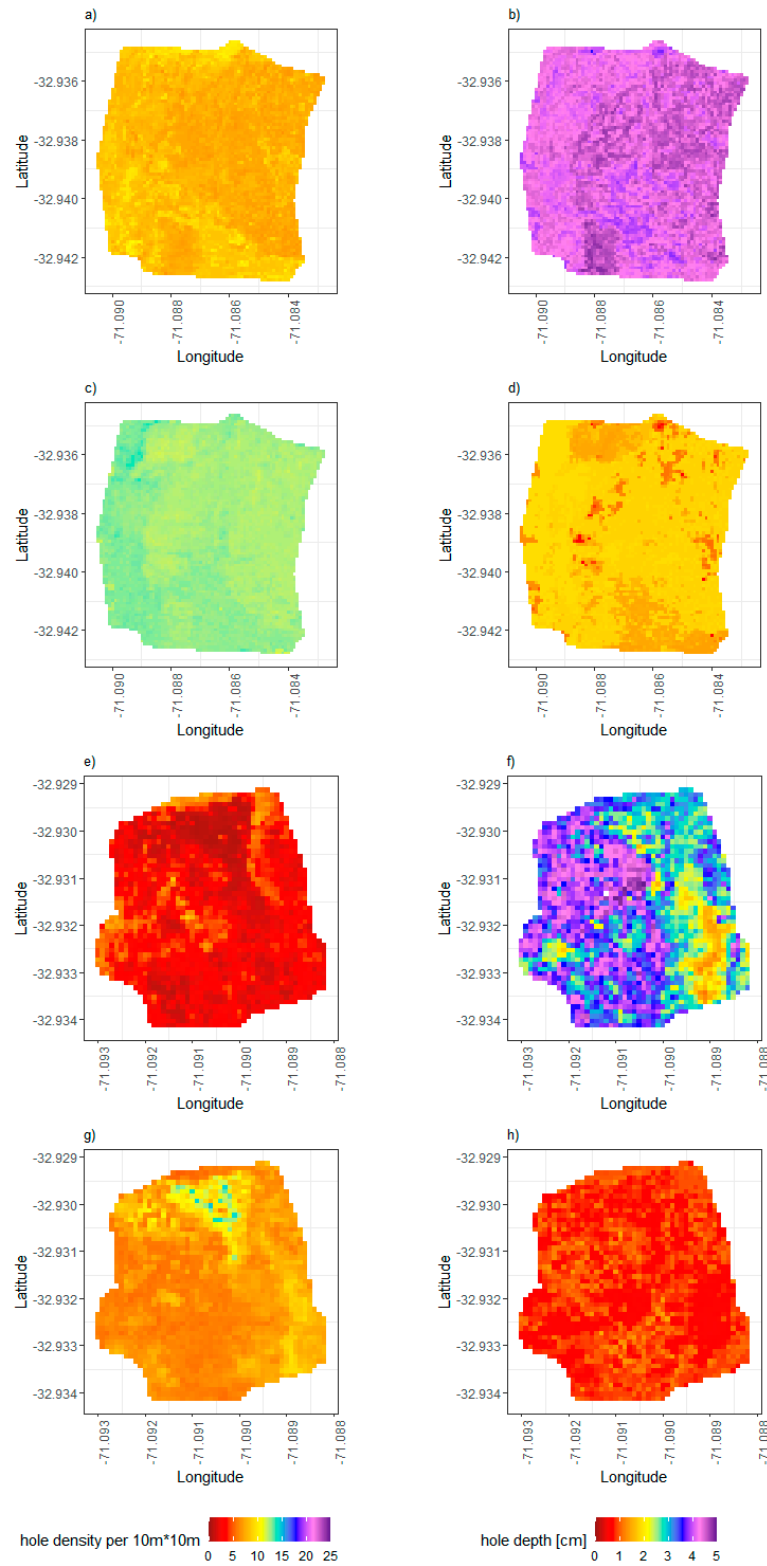
**Figure S2.** Predicted hole density and depth across hillsides. The position refers to the position on either the upper or lower part of the hillside. The upper part of the hillside is the convex part of the hillside, while the lower part of the hillside is the concave part of the hillside. The points represent the mean overall value, the triangles are the mean overall values on the upper or lower part of the hillside, and the error bars are the standard deviations. **(a)** Predicted vertebrate hole density; **(b)** predicted invertebrate hole density; **(c)** predicted vertebrate hole depth; and **(d)** predicted invertebrate hole depth.



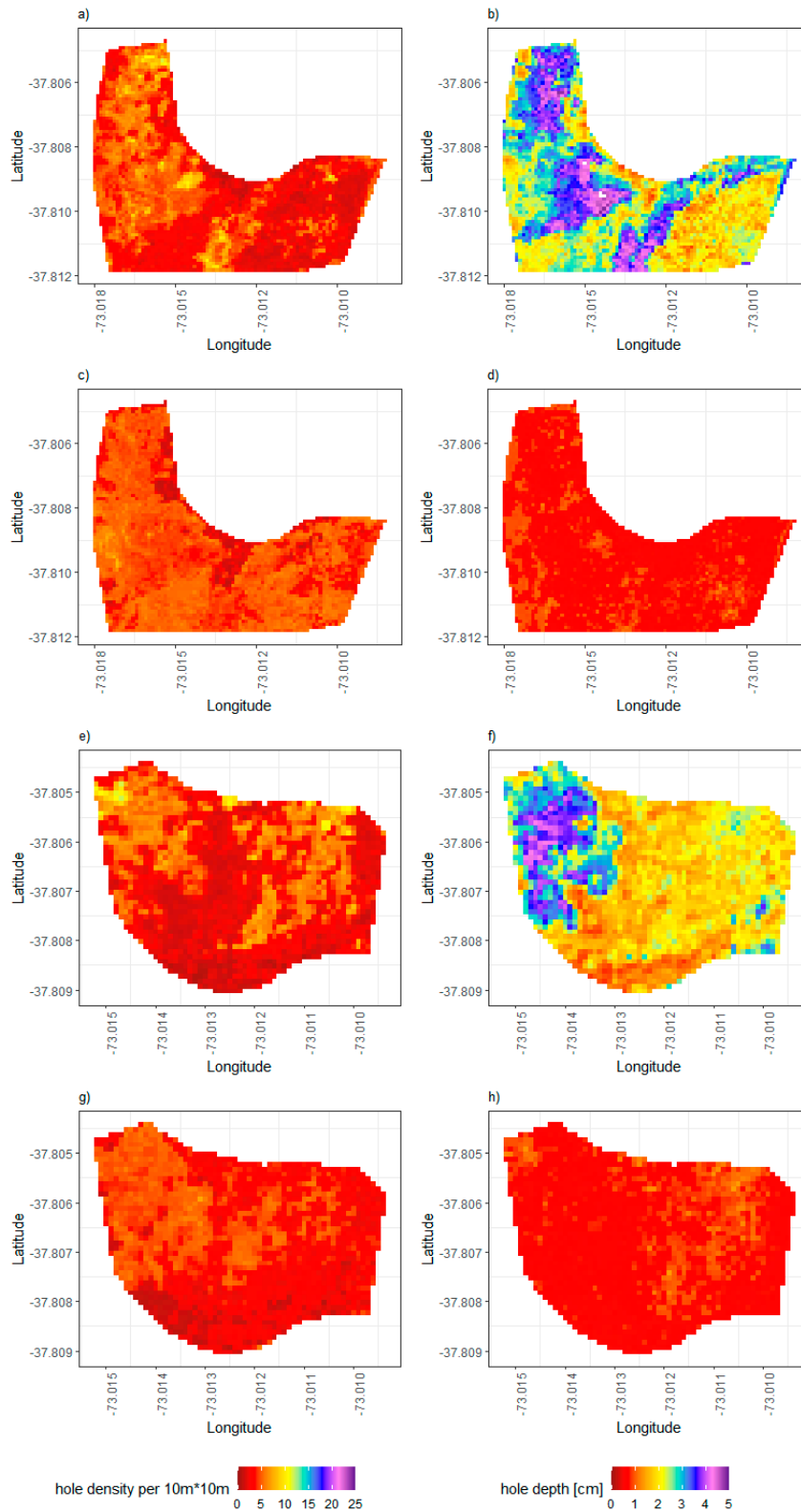
**Figure S3.** Predicted hole density and depth in PdA (arid climate zone). **(a)** Vertebrate hole density on the north-facing hillside; **(b)** Vertebrate hole depth on the north-facing hillside; **(c)** Invertebrate hole density on the north-facing hillside; **(d)** Invertebrate hole depth on the north-facing hillside; **(e)** Vertebrate hole density on the south-facing hillside; **(f)** Vertebrate hole depth on the south-facing hillside; **(g)** Invertebrate hole density on the south-facing hillside; **(h)** Invertebrate hole depth on the south-facing hillside.



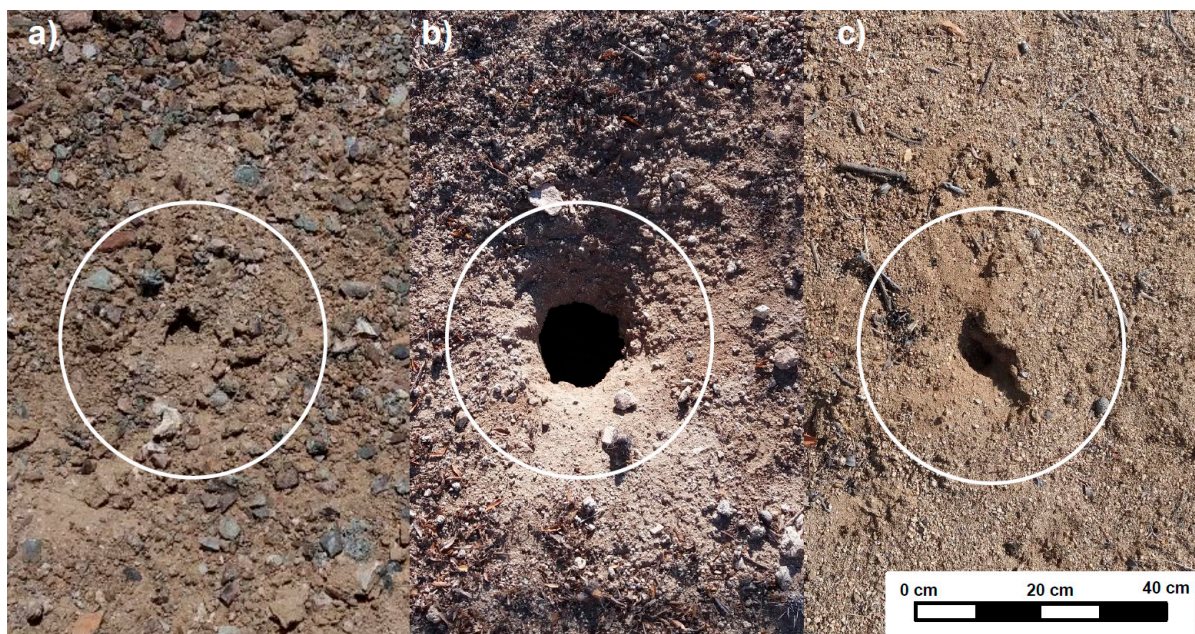
**Figure S4.** Predicted hole density and depth in SG (semi-arid climate zone). **(a)** Vertebrate hole density on the north-facing hillside; **(b)** Vertebrate hole depth on the north-facing hillside; **(c)** Invertebrate hole density on the north-facing hillside; **(d)** Invertebrate hole depth on the north-facing hillside; **(e)** Vertebrate hole density on the south-facing hillside; **(f)** Vertebrate hole depth on the south-facing hillside; **(g)** Invertebrate hole density on the south-facing hillside; **(h)** Invertebrate hole depth on the south-facing hillside.



**Figure S5.** Predicted hole density and depth in LC (Mediterranean-type climate zone). **(a)** Vertebrate hole density on the north-facing hillside; **(b)** Vertebrate hole depth on the north-facing hillside; **(c)** Invertebrate hole density on the north-facing hillside; **(d)** Invertebrate hole depth on the north-facing hillside; **(e)** Vertebrate hole density on the south-facing hillside; **(f)** Vertebrate hole depth on the south-facing hillside; **(g)** Invertebrate hole density on the south-facing hillside; **(h)** Invertebrate hole depth on the south-facing hillside.



**Figure S6.** Predicted hole density and depth in NA (humid-temperate climate zone). **(a)** Vertebrate hole density on the north-facing hillside; **(b)** Vertebrate hole depth on the north-facing hillside; **(c)** Invertebrate hole density on the north-facing hillside; **(d)** Invertebrate hole depth on the north-facing hillside; **(e)** Vertebrate hole density on the south-facing hillside; **(f)** Vertebrate hole depth on the south-facing hillside; **(g)** Invertebrate hole density on the south-facing hillside; **(h)** Invertebrate hole depth on the south-facing hillside.



**Figure S7.** Examples of measured holes. (a) in PdA; (b) in SG; (c) in LC.