10.1071/WF23023
International Journal of Wildland Fire

Supplementary Material

Can predators influence small rodent foraging activity rates immediately after wildfires?

Roger Puig-Gironès[A,B,*]

[A]Departament de Ciències Ambientals, University of Girona, C/Maria Aurèlia Capmany 69, 17003 Girona, Catalonia, Spain

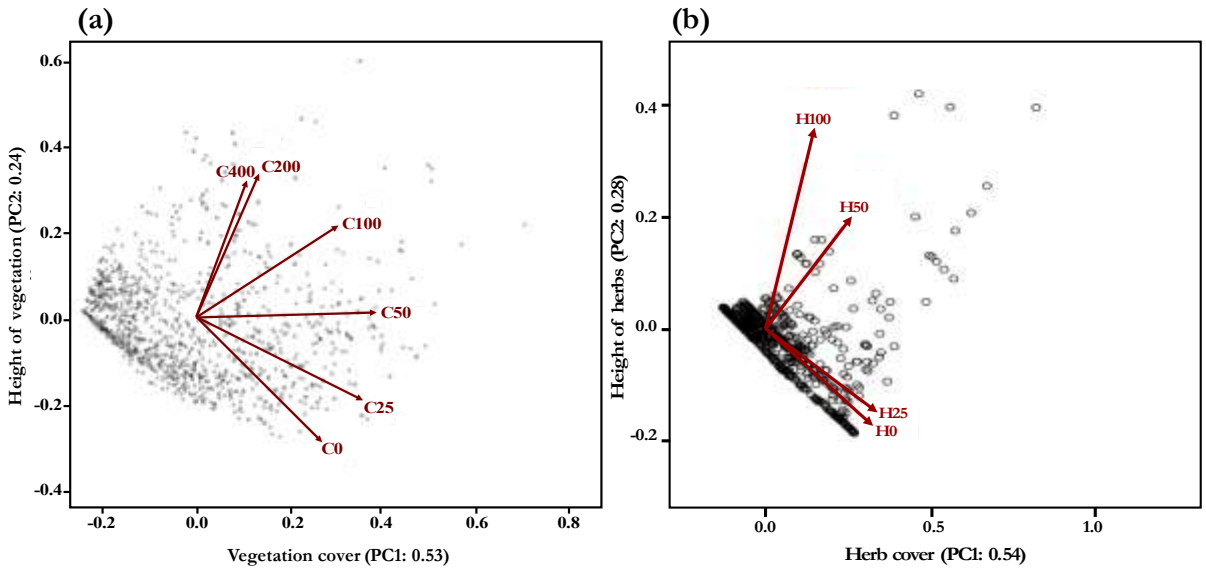
[B]Equip de Biologia de la Conservació. Departament de Biologia Evolutiva, Ecologia i Ciències Ambientals & Institut de la Recerca de la Biodiversitat (IRBIO), Universitat de Barcelona, Av. Diagonal 643, 08028 Barcelona, Catalonia, Spain

*Correspondence to: Email: roger.puig.girones@gmail.com

Supplementary File S1a and b.

Principal component analysis of habitat structure

Principal component analysis (PCA) of (a) six virtual vegetation height layers and (b) four herb covers of the height layers. The bottom table shows the eigenvectors (reflect both common and unique variance of the variables, being linear combinations of the original variables weighted by their contribution to explaining the variance in a particular orthogonal dimension); and the percentage of contribution of the variables (if a factor has a low value, then it has a low contribution to explaining the variance of the variables).



Virtual vegetation height layers			Herb covers of the height layers		
Height layers	**Plant cover**	**Height of vegetation**	**Height layers**	**Herb cover**	**Height of herbs**
C0 (0 to 0.25 m)	0.29	-0.38	**H0 (0 to 0.25 m)**	0.58	-0.37
C25 (0.25 to 0.50 m)	0.32	-0.21	**H25 (0.25 to 0.50 m)**	0.61	-0.31
C50 (0.50 to 1 m)	0.36	0.02	**H50 (0.50 to 1 m)**	0.47	0.43
C100 (1 to 2 m)	0.34	0.21	**H100 (1 to 2 m)**	0.27	0.76
C200 (2 to 4 m)	0.15	0.34			
C400 (more than 4 m)	0.10	0.31			

Supplementary Table S1.

Selected GLMM models and criteria

Models structure for acorn removal response variable selected following criteria of greater AIC weight ($AIC\omega_i$). If there was no clearly most parsimonious model than the rest, I proceeded to estimate the average final model, from all those models considered with an adjustment equivalent to the best model, i.e., models that showed an increase in AIC ($\Delta AICc_i$) less than 2. The final model selected is shown in bold.

Model	**df**	**AICc**	**ΔAICci**	**AICωi**
TSF + VC + Rodent	**8**	**-935.09**	**0.00**	**0.58**
TSF + VC + SMarten + Rodent	9	-934.46	0.63	0.42

TSF: Time since fire (months).
Perimeter: Distance from the burnt area perimeter (m).
TSF*Perimeter = Time since fire and Distance from the burnt area perimeter interaction.
Rock = Distance from rocky outcrops
VC = Plant cover component. HV = Height of vegetation component. HC = Herb cover component. HH = Height of herbs component.
Rodent = Rodent abundance
SMarten = Stone marten frequency of occurrence.
RFox = Red fox frequency of occurrence.

Table S2.

Selected SEM models and criteria

I removed non-significant terms to model simplification from the initial model until model fit (assessed using Akaike Information Criterion) no longer improved. If model fit did not differ significantly between two competing models (the difference in AIC score was <2), I selected the most parsimonious (the model with fewest parameters) and the most appropriate model due to comparative fit index (CFI values greater than 0.95), root mean square error of approximation (RMSEA values less than 0.08) and standardized root mean square residual (SRMR less than 0.08) criteria.

Model		**Number of model parameters**	**AIC**	**ΔAIC**	**CFI**	**RMSEA**	**SRMR**
Stone marten	Model 19	15	11258.37	0.0	0.99	0.01	0.01
	Model 16	18	11259.29	0.92	0.99	0.01	0.01
	Model 18	16	11260.18	1.81	0.99	0.02	0.01
	Initial model	33	23165.74	-	0.76	0.12	0.06
Red fox	Model 18	14	11281.84	0.0	1.00	0.00	0.01
	Model 17	15	11282.29	0.45	0.99	0.01	0.01
	Model 19	13	11283.33	1.04	0.99	0.02	0.01
	Initial model	33	23206.76	-	0.77	0.18	0.06

Table S3.

Stone marten SEM direct and indirect standardized effects

Structural equation modelling (SEM) direct and indirect standardized effects and the associated z-value and p-value for all effects tested on the final model on foraging rates and stone marten.

Type of effects	Response variable	Explicative variables	Standardized effects	z-value	p-value
Direct	Rodent foraging activity rates	Rodent relative abundance	0.36±0.02	14.46	< 0.001
		Stone marten occurrence	0.1±0.02	4.07	< 0.001
		Plant cover (PC1)	0.2±0.02	7.98	< 0.001
		Height of vegetation (PC2)	0.09±0.02	3.77	< 0.001
		Herb cover (PC3)	-0.06±0.02	-2.68	0.007
		Distance from rocky outcrops	-0.09±0.02	-3.86	< 0.001
	Rodent relative abundance	Stone marten occurrence	0.07±.025	2.63	0.009
		Plant cover (PC1)	0.36±.025	14.49	< 0.001
		Height of vegetation (PC2)	-0.10±.025	-4.1	< 0.001
		Height of herbs (PC4)	0.07±0.025	2.84	0.004
	Stone marten occurrence	Plant cover (PC1)	0.14±0.027	5.11	< 0.001
		Herb cover (PC3)	-0.06±.027	-2.34	0.02
Indirect	Rodent foraging activity rates	Stone marten → Rodent abundance	0.02±0.01	2.59	0.01
		Plant cover → Rodent abundance	0.13±0.01	10.24	< 0.001
		Plant cover → Stone marten	0.01±0.004	3.18	0.001
		Height of vegetation → Rodent abundance	-0.04±0.01	-3.95	< 0.001
		Herb cover → Stone marten	-0.006±0.003	-2.03	0.04
		Height of herbs → Rodent abundance	0.02±0.01	2.79	0.005
	Rodent relative abundance	Plant cover → Stone marten	0.009±0.004	2.34	0.02

Table S4.

Red fox SEM direct and indirect standardized effects

Structural equation modelling (SEM) direct and indirect standardized effects and the associated z-value and p-value for all effects tested on the final model on foraging rates and red fox.

Type of effects	Response variable	Explicative variables	Standardized effects	z-value	p-value
Direct	Rodent foraging activity rates	Rodent relative abundance	0.37 ± 0.02	14.69	<0.001
		Plant cover (PC1)	0.21 ± 0.02	8.38	<0.001
		Height of vegetation (PC2)	0.1 ± 0.03	3.91	<0.001
		Herb cover (PC3)	-0.07 ± 0.02	-2.86	0.004
		Distance from rocky outcrops	-0.09 ± 0.02	-3.98	<0.001
	Rodent relative abundance	Red fox occurrence	0.1 ± 0.02	4.23	<0.001
		Plant cover (PC1)	0.36 ± 0.02	14.68	<0.001
		Height of vegetation (PC2)	-0.1 ± 0.03	-3.98	<0.001
		Height of herbs (PC4)	0.07 ± 0.02	2.91	0.004
	Red fox occurrence	Plant cover (PC1)	0.07 ± 0.03	2.78	0.006
		Herb cover (PC3)	-0.05 ± 0.03	-1.75	0.08
Indirect	Rodent foraging activity rates	Red fox → Rodent abundance	0.04 ± 0.01	4.06	<0.001
		Plant cover → Rodent abundance	0.13 ± 0.01	10.38	<0.001
		Height of vegetation → Rodent abundance	-0.04 ± 0.01	-3.84	<0.001
		Height of herbs → Rodent abundance	0.03 ± 0.01	2.86	0.004
	Rodent relative abundance	Plant cover → Red fox	0.01 ± 0.003	2.32	0.02
		Herb cover → Red fox	-0.005 ± 0.003	-1.61	0.11

Supplementary Fig. S1.

Vegetation components trend after the fire.

Comparison of plant cover (PC1), the height of vegetation (PC2), herb cover (PC3) and height of herbs (PC4) through time since fire (months). Time since fire was grouped into eight categories according to the sampling frequency variation to obtain similar sample sizes even if the time interval was uneven (1 to 2 months; 3 to 4, 5 to 6, 7 to 10, 11 to 15, 16 to 20, 21 to 25 and 26 to end of study).

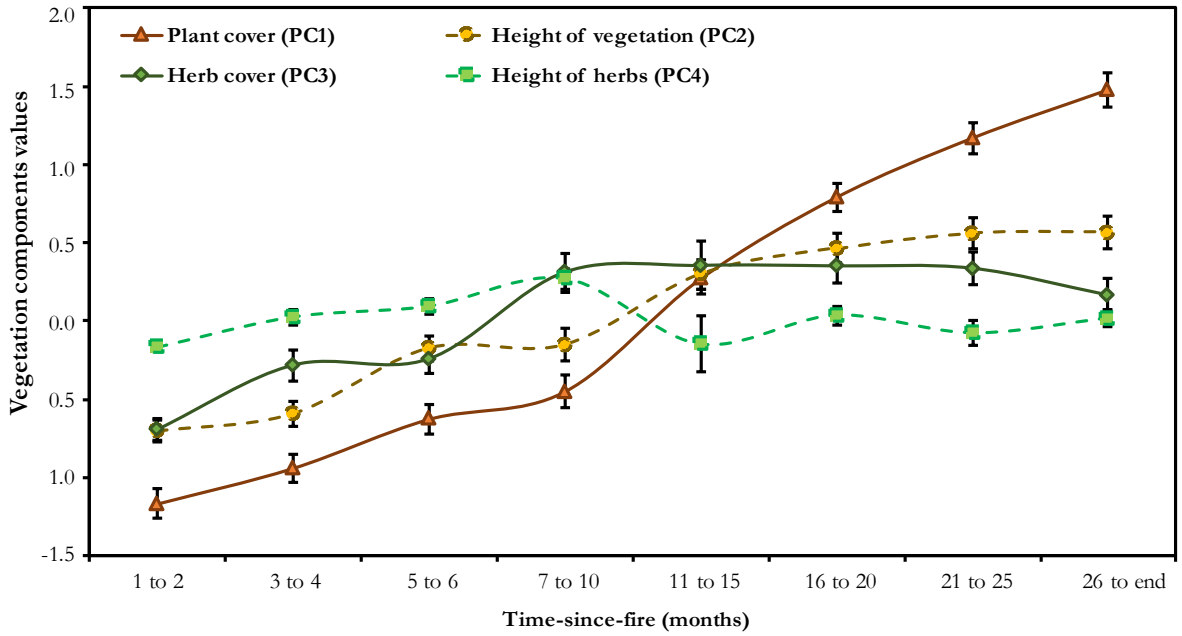


Table S5.

Microhabitat effects on foraging activity rates by rodents.

Models structure for acorn removal response variable selected following criteria of greater AIC weight ($AIC\omega_i$). If there was no clearly most parsimonious model than the rest, I proceeded to estimate the average final model, from all those models considered with an adjustment equivalent to the best model, i.e., models that showed an increase in AIC ($\Delta AICc_i$) less than 2. The final model selected is shown in bold.

Variable	Model	df	AICc	ΔAICci	AICωi
One night	**C_2550 + Dist_pile**	**5**	**-1231.6**	**0.00**	**0.98**
	C_2550 + Dist_pile + rocks	6	-1218.9	12.66	0.02
Three nights	**C_2550 + Dist_pile**	**5**	**-343.9**	**0.0**	**0.88**
	C_2550 + Dist_pile + rocks	6	-339	4.93	0.07
Rodent abundance	**Dist_pile + C_2550**	**5**	**-4726**	**0.0**	**1**
	Dist_pile + C_2550 + C_025	6	-4709.9	16.09	0

TSF: Time since fire.
Perimeter: Distance from the burnt area perimeter (m).
Dist_pile = Distance to wood debris piles (m).
C_025 = Percentage of foliage cover between 0 and 25 cm in height.
C2550 = Percentage of foliage cover between 25 and 50 cm in height.
Rocks = Percentage of rocks cover.