Zamenis scalaris prefers abandoned citrus orchards in Eastern Spain.
Ecological insights from a radio-tracking survey

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Supplementary material

Text S1. Compositional analyses of seasonal habitat use for the four snakes.

This analysis is done following Aebischer et al. (1993) and performed in R ver. 3.4.3 (R Development Core Team, 2018) using the adehabitat package (Calenge, 2006). It is carried out in two steps: first the significance of habitat selection is tested (using a Wilks lambda); and then, a ranking matrix is built, indicating whether the habitat type in row is significantly (t-test) used more or less than the habitat type in column.

The ranking matrix is a square matrix with nh rows and nh columns, where nh is the number of habitat types under study. At the intersection of the row i and of the column j, there is a "+" when the habitat i is more used than the habitat in column, and "-" otherwise. When the difference is significant, the sign is tripled.

Locations inside two-month period core areas (K50) were used as selected habitats. Habitats available for snakes were defined as landscape features included in a 50 m buffer polygon around annual K95 for each snake from each zone. Analyses were performed for the four snakes together and each snake separately over the annual cycle.

References

Aebischer, N.J., Robertson, P.A., Kenward, R.E. (1993): Compositional analysis of habitat use from animal radio-tracking data. Ecol. **74**: 1313-1325.

Calenge, C. (2006): The package adehabitat for the R software: a tool for the analysis of space and habitat use by animals. Ecol. Model. **197**: 516-519.

R Development Core Team (2016): R: A Language and Environment for Statistical Computing. Vienna, R Development Core Team.

Analysis for the four snakes and 6 habitat types

1. Test of the habitat selection (Wilks lambda)

   Lambda = NaN

   d.f. = 5

   P = NaN

2. Ranking of habitats (profile)

habitat	1	3	6	5	2	4
1		+	+	+	+++	+
3	-		+	+	+	+
6	-	-		+	-+	+++
5	-	-	-		+	+
2	---	-	-	-		+
4	-	-	---	-	-	

Matrix of t-test values

habitat	1	2	3	4	5	6
1	0	2.821764	1.004166	1.665915	0.911813	0.61435
2	-2.82176	0	-0.78425	0.544935	-0.25677	-0.25661
3	-1.00417	0.784249	0	0.78887	0.152257	0.074638
4	-1.66591	-0.54493	-0.78887	0	-0.55568	-4.17076
5	-0.91181	0.256773	-0.15226	0.555683	0	-0.03753
6	-0.61435	0.256605	-0.07464	4.17076	0.037535	0

Analysis for the snake A-ZS-1M * 6 two-month periods and 6 habitat types

1. Test of the habitat selection (Wilks lambda)

  Lambda = 0

  d.f. = 5

  P = 0.494

2. Ranking of habitats (profile)

habitat	1	3	5	2	6	4
1		+	+	+	+++	+++
3	-		+	+	+	+
5	-	-		+	+	+
2	-	-	-		+	+
6	---	-	-	-		+++
4	---	-	-	-	---	

Matrix of t-test values

habitat	1	2	3	4	5	6
1	0	3.253344	2.10883	4.750059	3.027964	3.30314
2	-3.25334	0	-1.14451	1.496715	-0.22538	0.049796
3	-2.10883	1.144514	0	2.641229	0.919134	1.19431
4	-4.75006	-1.49672	-2.64123	0	-1.7221	-1.44692
5	-3.02796	0.22538	-0.91913	1.722095	0	0.275176
6	-3.30314	-0.0498	-1.19431	1.446919	-0.27518	0

Analysis for the snake A-ZS-2F * 6 two-month periods and 6 habitat types

1. Test of the habitat selection (Wilks lambda)

  Lambda = 0

  d.f. = 5

  P = 0.49

2. Ranking of habitats (profile)

habitat	6	1	3	5	2	4
6		+	+	+++	+++	+++
1	-		+	+	+++	+++
3	-	-		+	+++	+++
5	---	-	-		+++	+++
2	---	---	---	---		+++
4	---	---	---	---	---	

Matrix of t-test values

habitat	1	2	3	4	5	6
1	0	2.899074	0.167353	4.521138	0.767012	-0.51046
2	-2.89907	0	-3.16614	2.135314	-2.11584	-3.37116
3	-0.16735	3.166135	0	3.49308	0.920944	-0.88363
4	-4.52114	-2.13531	-3.49308	0	-2.98092	-4.50535
5	-0.76701	2.115837	-0.92094	2.980923	0	-1.88897
6	0.510456	3.371157	0.88363	4.505352	1.888972	0

Analysis for the snake B-ZS-1F * 6 two-month periods and 6 habitat types

1. Test of the habitat selection (Wilks lambda)

  Lambda = 0

  d.f. = 5

  P = 0.118

2. Ranking of habitats (profile)

habitat	4	1	5	6	2	3
4		+	+	+++	+++	+++
1	-		+	+	+++	+++
5	-	-		+	+	+
6	---	-	-		+	+++
2	---	---	-	-		+
3	---	---	-	---	-	

Matrix of t-test values

habitat	1	2	3	4	5	6
1	0	2.467388	2.935377	-0.51774	0.829423	1.77935
2	-2.46739	0	0.655793	-3.10915	-0.98308	-1.1548
3	-2.93538	-0.65579	0	-3.57991	-1.84347	Inf
4	0.517743	3.109147	3.579906	0	1.229333	2.434078
5	-0.82942	0.983077	1.843475	-1.22933	0	0.472048
6	-1.77935	1.154797	Inf	-2.43408	-0.47205	0

Analysis for the snake B-ZS-2M * 6 two-month periods and 6 habitat types

1. Test of the habitat selection (Wilks lambda)

   Lambda = 0

   d.f. = 5

   P = 0.554

2. Ranking of habitats (profile)

habitat	6	4	1	3	5	2
6		+++	+++	+++	+++	+++
4	---		+	+	+++	+++
1	---	-		+	+	+
3	---	-	-		+	+
5	---	---	-	-		+
2	---	---	-	-	-	

Matrix of t-test values

habitat	1	2	3	4	5	6
1	0	0.878159	0.431631	-0.46919	1.156998	-2.94778
2	-0.87816	0	-0.90353	-2.32467	-0.06488	-7.16941
3	-0.43163	0.903533	0	-1.0523	0.651621	-4.01792
4	0.469185	2.324674	1.052303	0	2.275784	-2.36065
5	-1.157	0.064883	-0.65162	-2.27578	0	Inf
6	2.947785	7.169408	4.017921	2.360648	Inf	0

Figure S1. Two-month periods home ranges (K95) and core areas (K50), and habitat selection inside core areas for each of the four snakes monitored in this study (A-ZS-1M, in green; A-ZS-2F, in blue; B-ZS-1F, in red; and B-ZS-2M, in yellow). Habitat selection is expressed as percentage of records in six habitat classes (1- abandoned citrus orchards; 2- active citrus orchards; 3- forest; 4- areas with herbaceous vegetation; 5- bare areas; and 6- farms).