Amphibia-Reptilia

Sex, size and eco-geographic factors affect the feeding ecology of the Iberian adder, *Vipera seoanei*

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Supplementary material

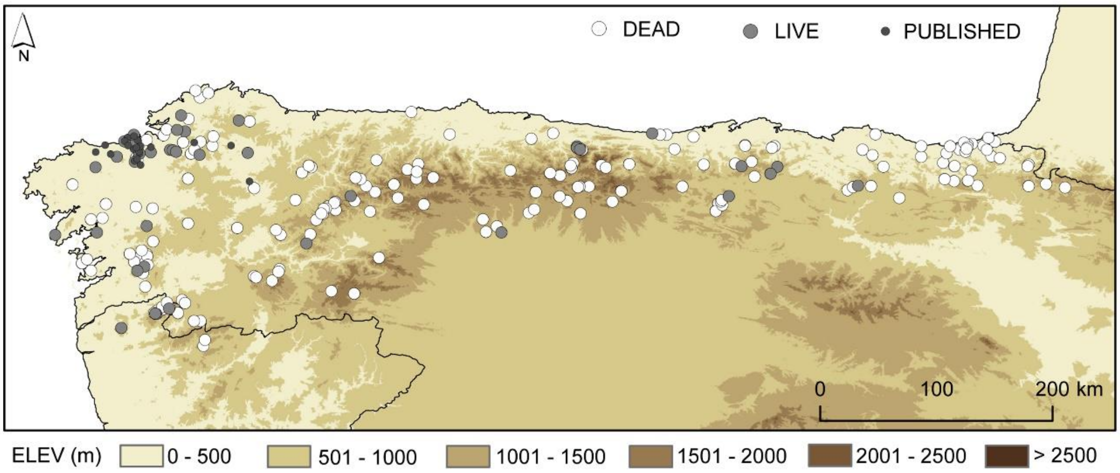

Figure S1. Distribution of specimens examined in this work.

Table S1. List of predictors including set, code, meaning type – units and % of specimens available. It is depicted the codes of Corine Land Cover categories used to construct the habitat eco-geographical predictors.

Set	Code	Meaning	Type - Units	Specimens %
biological	SVL	snout-vent-length	continuous - mm	88.8
	SEX	sex	categorical - F, female; M - male	77.4
	SIZE	size	categorical - J - juvenile, SA - subadult and A - adult	88.8
	REPRO	reproductive status of adult females	categorical – reproductive and non-reproductive	52.3
	COL	colouration pattern	categorical - bilineata, cantabrica, classic, melanistic and uniform	88.8
temporal	SEASON	season of the year	categorical - WINTER, SPRING, SUMMER and AUTUMN	85.6
eco-geographic	ELEV	elevation above sea level	continuous - m. Asl	95.5
	FOREST	% of forest, including broad-leaved, coniferous and mixed forest (CLC - 311 + 312 + 313)	continuous - % of pixels	95.5
	PAST	% of pastures and grasslands (CLC - 231 + 321)	continuous - % of pixels	95.5

MOORS	% of moors and heathlands (CLC - 322)	continuous - % of pixels	95.5
AGRIC	% of agriculture areas (CLC - 211 + 212)	continuous - % of pixels	95.5
MeanT	Annual Mean Temperature	continuous - ºC	95.5
MaxT	Max Temperature of Warmest Month	continuous - ºC	95.5
APrec	Annual Precipitation	continuous - mm	95.5
DrPrec	Precipitation of Driest Month	continuous - mm	95.5

Text S1. Logistic regression analysis of the factors related to feeding frequency.

Stepwise logistic regression to analyse the influence of five predictors, including three biological traits (i.e., SEX, COL and SVL), the temporal-predictor SEASON and the eco-geographic predictor ELEV, in the probability of the binomial distribution 0 – no prey, 1 – prey. Model itineration process started with all predictors included, which were subsequently removed until reaching the most parsimonious solution (i.e. the model with the lowest value of Akaike Information Criterion; AIC).

Model	AIC
PREY ~ SEX + COL + SVL + SEASON + ELEV	243.97
PREY ~ SEX + COL + SVL + SEASON	242.08
PREY ~ SEX + COL + SVL	240.62
PREY ~ SEX + SVL	239.11

The significance of the regression coefficients of predictors is evaluated by Maximum Likelihood $\chi 2$ tests. The effectiveness of the final model is assessed by the Hosmer-Lemeshow and McFadden’s pseudo R-squared tests.

Formula: PREY ~ SEX + SVL	DF	Deviance	Resid. DF	Resid. Dev	Pr(>χ2)
			239	309.52	
SEX	1	14.5228	238	295	0.000

SVL	1	3.9855	237	291.01	0.046

Hosmer and Lemeshow, P = 0.06

McFadden's R2 = 0.28

Logistic regressions performed in R Studio version 1.1.463, using the available family of GLM stats in R.

Text S2. Logistic regression analysis of biological and temporal predictors in the dietary consumption of major prey groups.

Stepwise logistic regression to analyse the influence of four factors, including three biological traits (i.e., SEX, COL and SVL) and the temporal-predictor SEASON, in the probability of the binomial distribution consuming one prey group against the other two, i.e., amphibians *vs* reptiles + mammals, reptiles vs amphibians + mammals, mammals *vs* amphibians + reptiles, coding first group as 1 and the other as 0. For each model, the itineration process started with all predictors included, which were subsequently removed until reaching the most parsimonious solution (i.e. the model with the lowest value of Akaike Information Criterion; AIC). The significance of the regression coefficients of predictors is evaluated by Maximum Likelihood $\chi 2$ tests. The effectiveness of the final model is assessed by the Hosmer-Lemeshow and McFadden's pseudo R-squared tests. Logistic regressions performed in R Studio version 1.1.463, using the available family of GLM stats in R.

<u>Amphibians *vs* reptiles + mammals</u> (n = 15 *vs* 167)

Model	AIC
PREY ~ SEX + COL + SVL + SEASON	31.96
PREY ~ COL + SVL + SEASON	29.96
PREY ~ SVL + SEASON	28.02
PREY ~ SVL	26.09

formula: PREY ~ SVL	DF	Deviance Resid.	DF	Resid. Dev	Pr(>Chi)

			145	72.919	
SVL	1	16.933	144	55.986	**0.000**

Hosmer and Lemeshow, P = 0.232

McFadden's R2 = 243

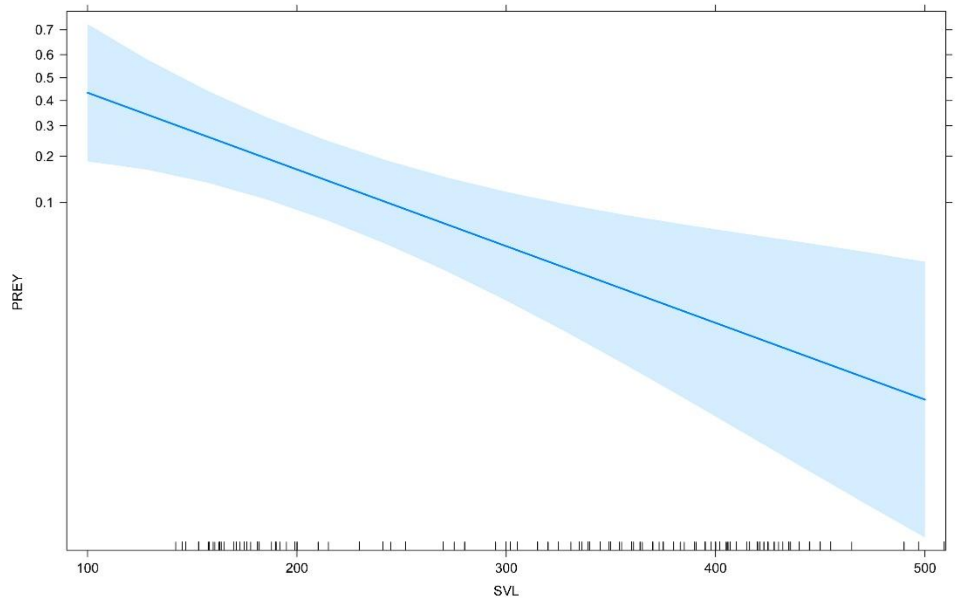

Figure S2. Response plot resulting from the logistic regression of the consumption of amphibians according to SVL (in mm).

<u>Reptiles *vs* amphibians + mammals</u> (n = 31 *vs* 151)

Model	AIC
PREY ~ SEX + COL + SVL + SEASON	66.58
PREY ~ SEX + COL + SVL	64.6
PREY ~ COL + SVL	63.2

Formula: PREY ~ COL + SVL	DF	Deviance Resid.	DF	Resid. Dev	Pr(>Chi)
			119	117.217	
COL	1	0.027	117	89.202	0.269
SVL	1	28.042	118	89.229	**0.000**

Hosmer and Lemeshow, P = 0.227

McFadden's R2 = -0.205

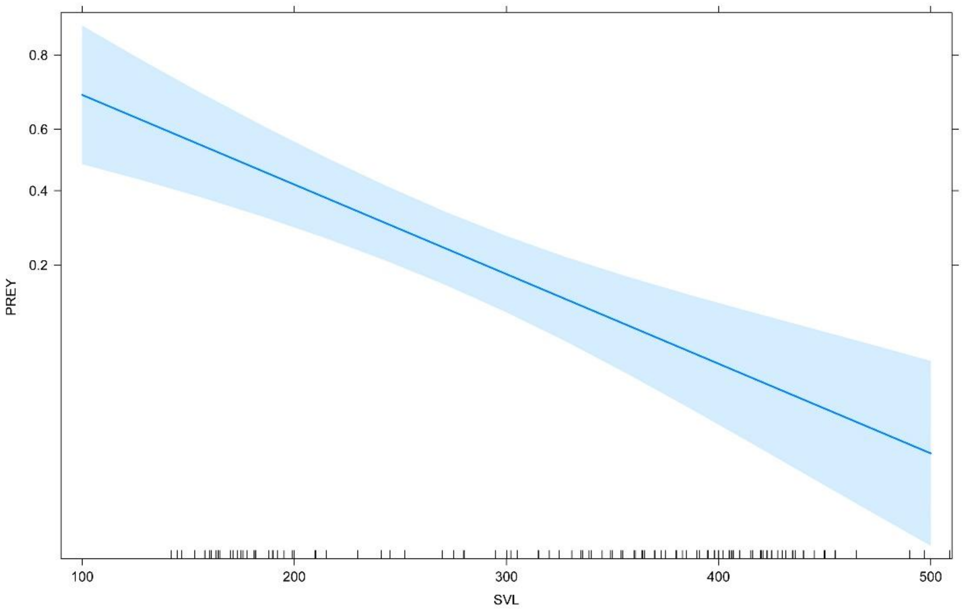

Figure S3. Response plot resulting from the logistic regression of the consumption of reptiles according to SVL (in mm).

Mammals *vs* amphibians + reptiles (n = 136 *vs* 46)

Model	AIC
PREY ~ SEX + COL + SVL + SEASON	70.13
PREY ~ SEX + COL + SVL	68.15
PREY ~ COL + SVL	66.69
PREY ~ SVL	66.3

Formula: PREY ~ SVL	DF	Deviance Resid.	DF	Resid. Dev	Pr(>Chi)
			145	165.29	
SVL	1	56.163	144	109.13	**0.000**

Hosmer and Lemeshow, P = .34

McFadden's R2 = -0.474

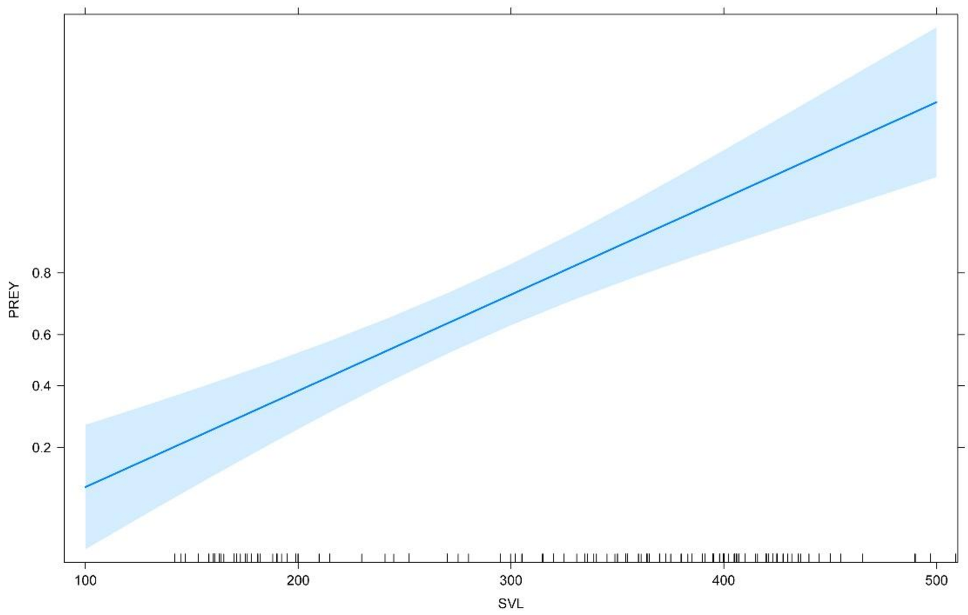

Figure S4. Response plot resulting from the logistic regression of the consumption of mammals according to SVL (in mm).

Text S3. Logistic regression analysis of eco-geographic predictors in the dietary consumption of major prey groups.

Stepwise logistic regression to analyse the influence of eight eco-geographic predictors, four habitat (FOREST, MOORS, PAST and AGRIC) and four climatic (MeanT, MaxT, APrec and DrPrec), in the probability of the binomial distribution consuming one prey group against the other two, i.e., amphibians *vs* reptiles + mammals, reptiles vs amphibians + mammals, mammals *vs* amphibians + reptiles, coding first group as 1 and the other as 0. For each pair of groups, model itineration process started with all predictors included, which were subsequently removed until reaching the most parsimonious solution (i.e. the model with the lowest value of Akaike Information Criterion; AIC). The significance of the regression coefficients of predictors is evaluated by Maximum Likelihood $\chi 2$ tests. The effectiveness of the final model is assessed by the Hosmer-Lemeshow and McFadden's pseudo R-squared tests. Response plots depicting the relation between prey consumption and statistically significant eco-geographic factors are available in Figure 3. Logistic regressions performed in R Studio version 1.1.463, using the available family of GLM stats in R.

<u>Amphibians *vs* reptiles + mammals</u> (n = 15 *vs* 167)

Model	AIC
PREY ~ FOREST + MOORS + PAST + AGRIC + MeanT + MaxT + APrec + DrPrec	96.86

PREY ~ FOREST + PAST + AGRIC + MeanT + MaxT + APrec + DrPrec	94.86
PREY ~ FOREST + PAST + AGRIC + MeanT + APrec + DrPrec	93.29
PREY ~ FOREST + PAST + AGRIC + MeanT + APrec	91.73
PREY ~ FOREST + PAST + AGRIC + APrec	91.35

Formula: PREY ~ FOREST + PAST + AGRIC + APrec	DF	Deviance Resid.	DF	Resid. Dev	Pr(>Chi)
			176	102.734	
FOREST	1	4.368	175	98.367	**0.037**
PAST	1	1.708	174	96.659	0.191
AGRIC	1	2.527	173	94.132	0.112
APrec	1	12.786	172	81.346	**0.000**

Hosmer and Lemeshow, P = 0.208

McFadden's R2 = 0.215

Reptiles *vs* amphibians + mammals (n = 31 *vs* 151)

Model	AIC
PREY ~ FOREST + MOORS + PAST + AGRIC + MeanT + MaxT + APrec + DrPrec	160.03
PREY ~ FOREST + MOORS + AGRIC + MeanT + MaxT + APrec + DrPrec	158.45
PREY ~ FOREST + MOORS + AGRIC + MeanT + MaxT + APrec + DrPrec	157.45
PREY ~ FOREST + AGRIC + MeanT + MaxT + APrec	156.27
PREY ~ AGRIC + MeanT + MaxT + APrec	155.27
PREY ~ AGRIC + MaxT + APrec	154.51

Formula: PREY ~ AGRIC + MaxT + Aprec	DF	Deviance Resid.	DF	Resid. Dev	Pr(>Chi)
			176	161.1	
AGRIC	1	4.598	175	156.5	**0.032**
MaxT	1	7.265	174	149.24	**0.007**

APrec	1	2.725	173	146.51	0.099

Hosmer and Lemeshow, P = 0.091

McFadden's R2 = 0.118

<u>Mammals *vs* amphibians + reptiles</u> (n = 136 *vs* 46)

Model	AIC
PREY ~ FOREST + MOORS + PAST + AGRIC + MeanT + MaxT + APrec + DrPrec	191.87
PREY ~ FOREST + MOORS + PAST + AGRIC + MeanT + MaxT + DrPrec	190.94
PREY ~ FOREST + PAST + AGRIC + MeanT + MaxT + DrPrec	189.65
PREY ~ FOREST + PAST + AGRIC + MeanT + MaxT	188.82
PREY ~ FOREST + PAST + AGRIC + MaxT	188.53

Formula: PREY ~ FOREST + PAST + AGRIC + MaxT	DF	Deviance Resid.	DF	Resid. Dev	Pr(>Chi)
			176	200.7	

FOREST	1	2.795	175	197.9	0.095
PAST	1	1.155	174	196.75	0.282
AGRIC	1	9.280	173	187.47	**0.002**
MaxT	1	8.935	172	178.53	**0.003**

Hosmer and Lemeshow, P = 0.11

McFadden's R2 = 0.132