



## Detectability of reptiles in standardised surveys: a test using grass snake *Natrix helvetica* models

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Parameter estimates and standard errors, z-tests, and P-values for the twelve Generalised Linear Mixed Models (GLMM) testing the dependence of detectability of grass snakes on size (large vs small); posture (coiled vs uncoiled); colouration (with vs without collar); and observer group (inexperienced Group A, inexperienced Group B, experienced observer [baseline]). Location was included as a random factor, and the mixed model compared to the fixed factor only model by comparing the deviances using chi-squared. Significant ( $P < 0.05$ ) predictors emboldened.

### Model 12: Group, Size, Group x Size

	$\beta$	SE	z-value	P
Intercept	0.731	0.373	1.96	0.0501
Group A	-1.031	0.470	-2.193	<b>0.0283</b>
Group B	-1.450	0.486	-2.983	<b>0.0029</b>
Large size	1.065	0.560	1.901	0.0574
Group A x Large size	-0.159	0.681	-0.233	0.8155
Group B x Large size	1.308	0.719	1.820	0.0687

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=11.10$ ,  $df=1$ , **P=0.0009**

### Model 5: Group, Size, Coiling

	$\beta$	SE	z-value	P
Intercept	0.274	0.351	0.780	0.4353
Group A	-1.115	0.352	-3.167	<b>0.0015</b>
Group B	-0.852	0.348	-2.449	<b>0.0143</b>
Large size	1.410	0.362	3.897	<b>&lt;0.0001</b>
Uncoiled	0.577	0.347	1.665	0.0958

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=8.84$ ,  $df=1$ , **P=0.0029**

### Model 7: Group, Size, Coiling, Collar, Group x Size

	$\beta$	SE	z-value	P
Intercept	0.290	0.437	0.664	0.5068
Group A	-1.026	0.469	-2.189	<b>0.0286</b>
Group B	-1.444	0.485	-2.979	<b>0.0029</b>
Large size	1.056	0.555	1.903	0.0570
Uncoiled	0.593	0.357	1.661	0.0967
With collar	0.290	0.354	0.818	0.4135
Group A x Large size	-0.160	0.357	1.661	0.8143
Group B x Large size	1.303	0.718	1.815	0.0696

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=9.69$ ,  $df=1$ , **P=0.0019**

**Model 8: Group, Size**

	$\beta$	SE	z-value	P
Intercept	0.562	0.315	1.784	0.0744
Group A	-1.116	0.352	-3.168	<b>0.0015</b>
Group B	-0.852	0.348	-2.450	<b>0.0143</b>
Large size	1.416	0.367	3.855	<b>0.0001</b>

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=9.87$ ,  $df=1$ , **P=0.0017**

**Model 6: Group, Size, Coiling, Collar**

	$\beta$	SE	z-value	P
Intercept	0.136	0.387	0.350	0.7261
Group A	-1.114	0.352	-3.166	<b>0.0016</b>
Group B	-0.851	0.348	-2.448	<b>0.0144</b>
Large size	1.406	0.360	3.909	<b>&lt;0.00001</b>
Uncoiled	0.575	0.345	1.666	0.0957
With collar	0.282	0.342	0.824	0.4109

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=8.86$ ,  $df=1$ , **P=0.0035**

**Model 9: Group, Size, Coiling, Size x Coiling**

	$\beta$	SE	z-value	P
Intercept	0.197	0.385	0.512	0.6090
Group A	-1.116	0.352	-3.168	<b>0.0015</b>
Group B	-0.852	0.348	-2.450	<b>0.0143</b>
Large size	1.572	0.498	3.156	<b>0.0016</b>
Uncoiled	0.733	0.474	1.545	0.1224
Large size x Uncoiled	-0.335	0.690	-0.485	0.6274

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=8.83$ ,  $df=1$ , **P=0.0030**

**Model 1: Size**

	$\beta$	SE	z-value	P
Intercept	-0.091	0.223	-0.410	0.6816
Large size	1.326	0.342	3.881	<b>&lt;0.0001</b>

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=7.75$   $df=1$ , **P=0.0053**

**Model 10: Size, Coiling, Size x Coiling**

	$\beta$	SE	z-value	P
Intercept	-0.432	0.313	-1.383	0.1667
Large size	1.472	0.465	3.166	<b>0.0016</b>
Uncoiled	0.685	0.443	1.545	0.1224
Large size x Uncoiled	-0.309	0.647	-0.477	0.6336

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=6.85$ ,  $df=1$ , **P=0.0089**

**Model 4: Group**

	$\beta$	SE	z-value	P
Intercept	1.282	0.304	4.215	<b>&lt;0.0001</b>
Group A	-1.123	0.354	-3.174	<b>0.0015</b>
Group B	-0.857	0.349	-2.454	<b>0.0141</b>

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=16.29$   $df=1$ , **P<0.0001**

**Model 11: Group, Coiling, Group x Coiling**

	$\beta$	SE	z-value	P
Intercept	0.862	0.390	2.211	0.0271
Group A	-0.753	0.472	-1.598	0.1101
Group B	-0.858	0.473	-1.814	0.0696
Uncoiled	0.891	0.578	1.541	0.1232
Group A x Uncoiled	-0.792	0.692	-1.144	0.2528
Group B x Uncoiled	-0.030	0.693	-0.043	0.9657

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=15.69$ ,  $df=1$ , **P=0.0001**

**Model 2: Coiling**

	$\beta$	SE	z-value	P
Intercept	0.303	0.002	180.4	<0.00001
Uncoiled	0.558	0.002	332.7	<0.00001

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=12.51$ ,  $df=1$ , **P<0.0001**

**Model 3: Collar**

	$\beta$	SE	z-value	P
Intercept	0.440	0.246	1.786	0.074
With collar	0.273	0.348	0.786	0.432

Comparison of deviance of mixed model with fixed factor only model:  $\chi^2=13.18$ ,  $df=1$ , **P=0.0003**

## Data Accessibility

The original data file on which these analyses are based is available at <https://kar.kent.ac.uk/>