

*Supplementary Materials*

Exploring the use of red fox (*Vulpes vulpes*) counts during deer censuses as a tool to evaluate the fox population trend in the framework of disease surveillance

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**Data analysis of fox spotlight counts**

For this analysis, transects were classified into four classes depending on their length, using the quartiles of their distribution as break points: Class 1 (<10 km); Class 2 (10-15.3 km); Class 3 (15.4-23.2 km); Class 4 (>23.3 km).

The spotlight counts were modelled using Generalised Linear Mixed Models (GLMM), choosing the negative binomial distribution as the response distribution. The year of observation and the distance class were included in the model as fixed effect, whereas the IDs of the transects, nested within the distance classes, were considered as random effects

Results of data analysis of fox spotlight counts are summarized in the following tables, Tab. S1 and Tab. S2.

**Table S1** Ls-means and standard errors obtained applying GLMM analyses on fox counts.

| Effect                         | Fox counts          |           |         |         |        |
|--------------------------------|---------------------|-----------|---------|---------|--------|
|                                | Ls-Mean             | Std. Err. | F value | P value |        |
| <b>Year</b>                    | <b>2010</b>         | 1.760     | 0.197   |         |        |
|                                | <b>2011</b>         | 2.021     | 0.218   |         |        |
|                                | <b>2012</b>         | 2.772     | 0.280   | 6.63    | <0.001 |
|                                | <b>2013</b>         | 2.142     | 0.229   |         |        |
|                                | <b>2014</b>         | 1.775     | 0.198   |         |        |
| <b>Transect distance class</b> | <b>&lt;10 km</b>    | 1.691     | 0.2451  |         |        |
|                                | <b>10-15.3 km</b>   | 1.366     | 0.2165  | 6.20    | <0.001 |
|                                | <b>15.4-23.2 km</b> | 2.670     | 0.3660  |         |        |
|                                | <b>&gt;23.3 km</b>  | 2.993     | 0.4440  |         |        |

**Table S2** Pairwise differences of Ls-Means of fox counts between years in 2010-2014.

| <b>Year 1</b> | <b>Year 2</b> | <b>Exponentiated Estimate</b> | <b><i>p</i> value</b> |
|---------------|---------------|-------------------------------|-----------------------|
| <b>2010</b>   | <b>2011</b>   | 1.148                         | 0.216                 |
| <b>2010</b>   | <b>2012</b>   | 1.575                         | <0.001                |
| <b>2010</b>   | <b>2013</b>   | 1.217                         | 0.078                 |
| <b>2010</b>   | <b>2014</b>   | 1.008                         | 0.939                 |
| <b>2011</b>   | <b>2012</b>   | 1.371                         | 0.002                 |
| <b>2011</b>   | <b>2013</b>   | 1.059                         | 0.590                 |
| <b>2011</b>   | <b>2014</b>   | 0.878                         | 0.248                 |
| <b>2012</b>   | <b>2013</b>   | 0.772                         | 0.010                 |
| <b>2012</b>   | <b>2014</b>   | 0.640                         | <0.001                |
| <b>2013</b>   | <b>2014</b>   | 0.828                         | 0.091                 |

The average length of transects (n=75) was 16.84 km (Standard Error=0.97), ranging from 2.40 to 40.00 km.

The transect length was significantly associated with the fox number, showing higher counts in longer transects. A significant association with the year was observed (*p*-value < 0.001). As well as IKA, the number of counted foxes peaked in 2012, and subsequently decreased until 2014. The overall number of foxes encountered resulted about 60% higher in 2012 than in 2010 and 2014, indicating that an average of one fox more per transect was observed in 2012.