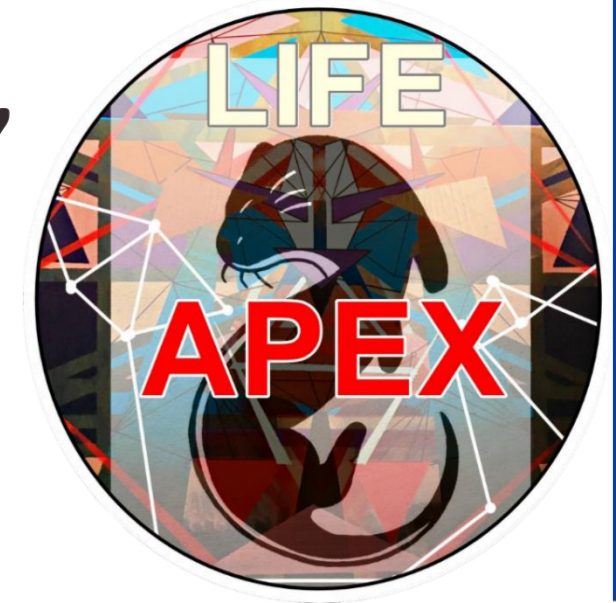




Shinji Ozaki^{1*}, P. Movalli², A. Cincinelli³, N. Alygizakis^{4,5}, A. Badry⁶, J.S. Chaplow¹, D. Claßen⁶, R.W.R.J. Dekker², B. Dodd¹, G. Duke¹, J. Koschorreck⁶, M.G. Pereira¹, E. Potter¹, J. Slobodnik⁴, S. Thacker¹, N. S. Thomaidis⁵, G. Treu⁶, and L. Walker¹

1.UKCEH (UK); 2.Naturalis Biodiversity Center (Netherlands); 3.University of Florence (Italy); 4.Environmental Institute, (Slovak Republic); 5.University of Athens (Greece); 6.Umweltbundesamt (Germany)



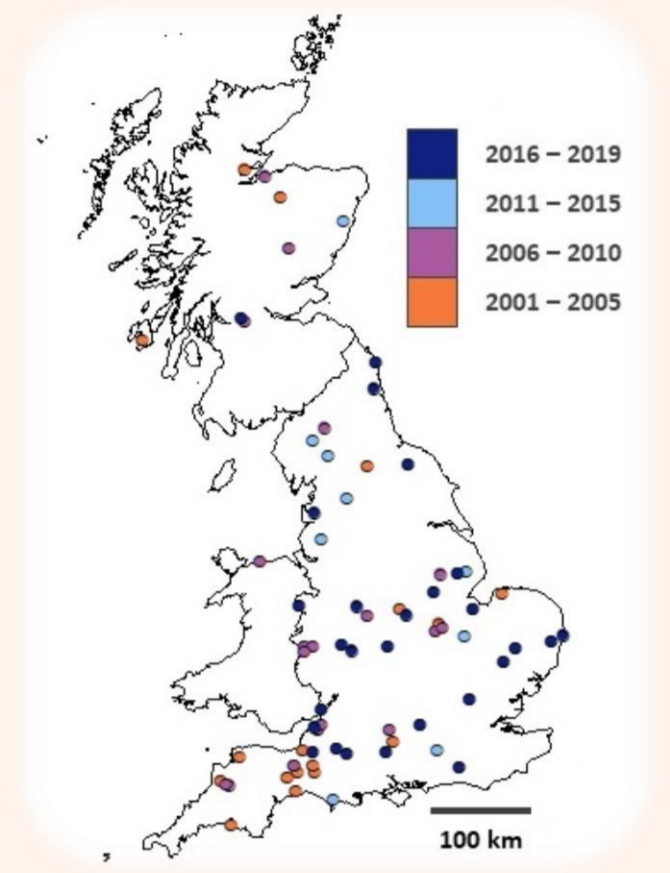
*e-mail: ShiOza@ceh.ac.uk

Background & Aims

Avian predators are widely exposed to second-generation anticoagulant rodenticides (SGARs) by feeding on contaminated prey. Several studies have reported seasonal variation in the exposure of raptors to SGARs. However, it remains unclear if studies considered the seasonal variation in exposure and whether this would lead to different risk assessment conclusions.



In this study, we have investigated whether and how the inclusion of seasonality within the time-trend model modifies the conclusions for exposure of wildlife to SGARs, based on SGAR residues in the liver of Common Buzzards (*Buteo buteo*) from the United Kingdom.



Methods

Buzzards:

- 72 carcasses were collected from 2001 to 2019
- Month of collection was recorded

SGARs in the liver (ng/g ww):

- Bromadiolone
- Difenacoum
- Brodifacoum
- Sum of SGARs (Σ SGARs)

Statistical analysis:

- Detection rates were modelled by generalised linear models (GLM).
- Residue magnitude of individuals with detected SGARs was modelled by linear models (LM).
- **Time trend over years** and **seasonality**^[1] were included in these models, which were compared using AICc.

[1] Ramanathan et al., 2020.

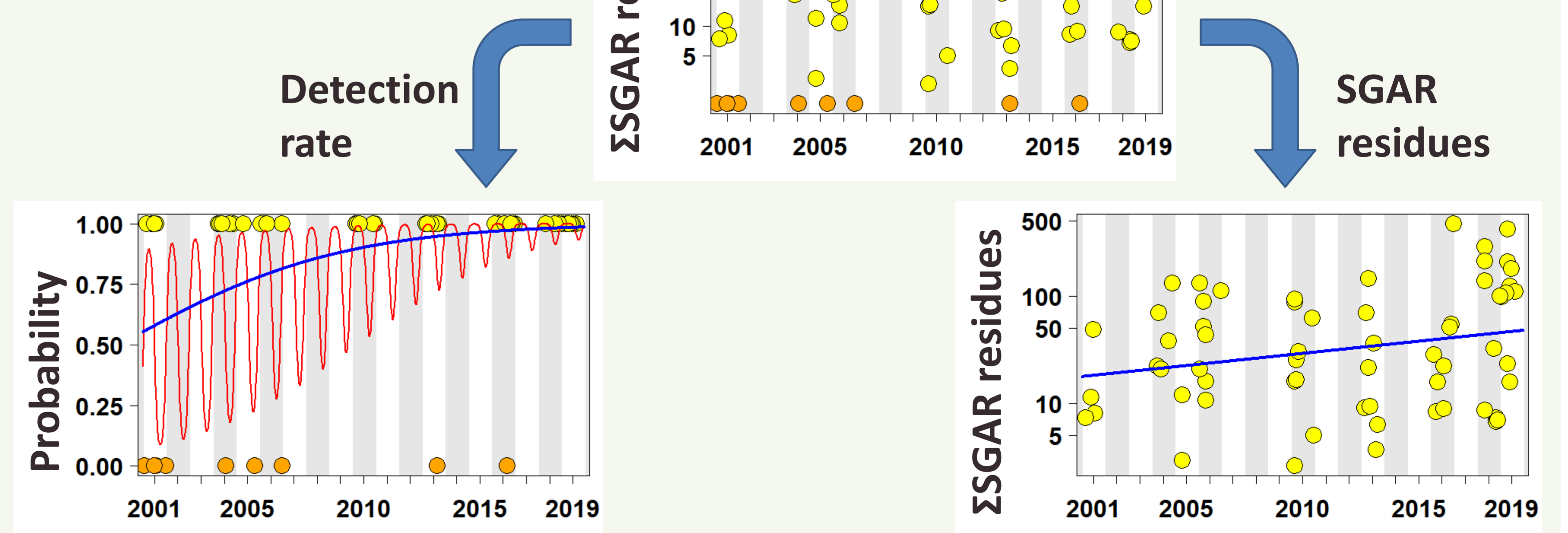
Results

Table. Best models describing SGARs in the liver

	Detection rate	SGAR residues
Bromadiolone	Seasonality	(Null)
Difenacoum	Annual + Seasonality	Seasonality
Brodifacoum	Annual	Annual
Σ SGARs (Figure)	Annual + Seasonality	Annual

- In general, detection rates were better explained by GLM including **seasonality**.
- In contrast, including **seasonality** in LM for SGAR residues did not improve the model.

Figure. Annual and seasonal trends of Σ SGARs



Discussion & Conclusion

- Excluding seasonality as a variable might not necessarily lead to misleading conclusions on biomonitoring on SGARs residues but may affect temporal trend analysis on the detection rate of SGARs.
- **Where possible, seasonal variation should be included in monitoring the detection of SGARs, as this may improve the assessment of exposure and the consequent risk assessment.**



Predatory Bird Monitoring Scheme

enquiries@ceh.ac.uk

www.ceh.ac.uk

Should the seasonal pattern be integrated into the monitoring of wildlife?

Yes, it is a factor that potentially influences the exposure of wildlife to SGARs.