

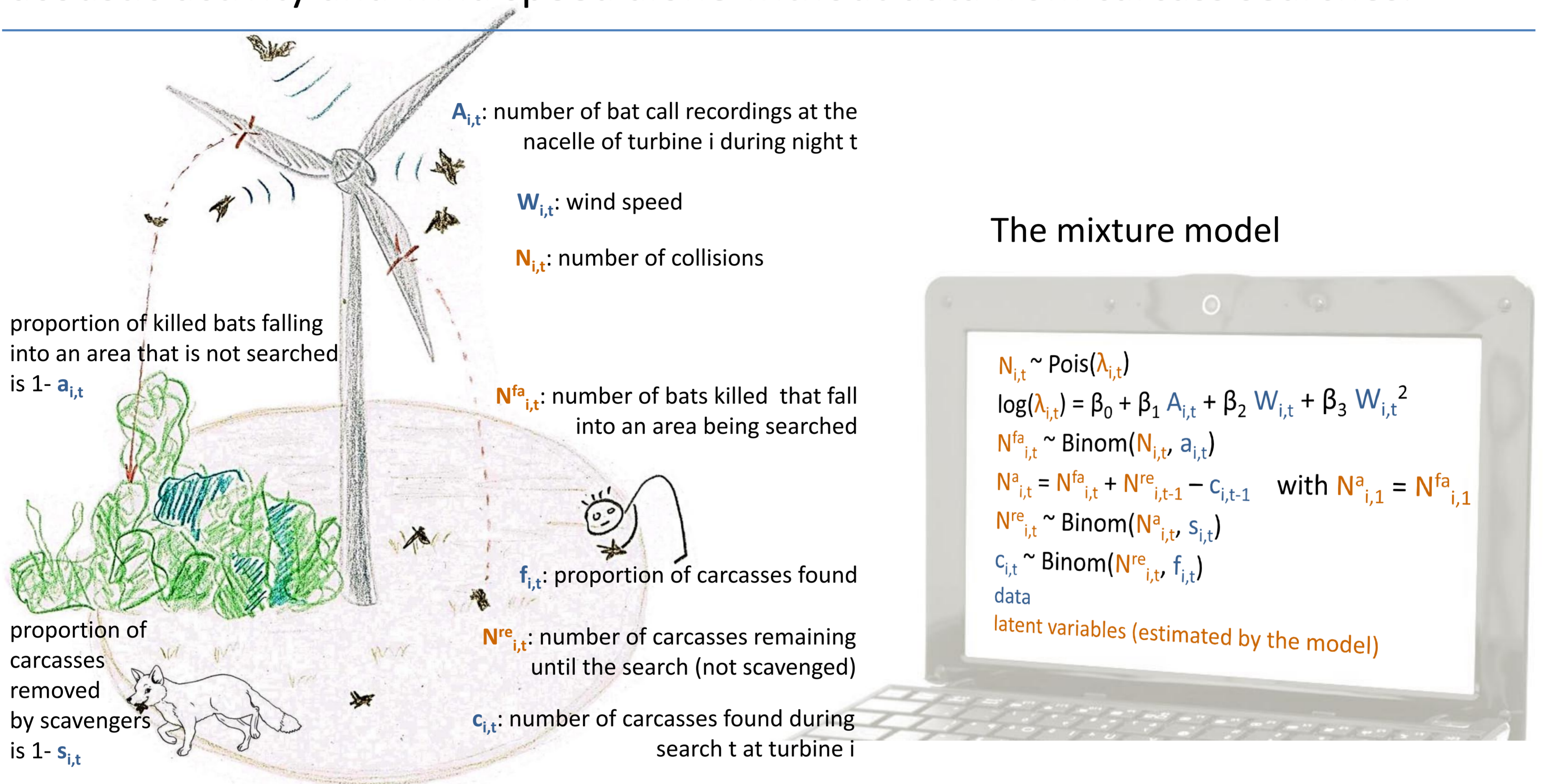
Estimating Bat Mortality at Wind Energy Turbines from Acoustic Activity and Carcass Searches by Mixture Models

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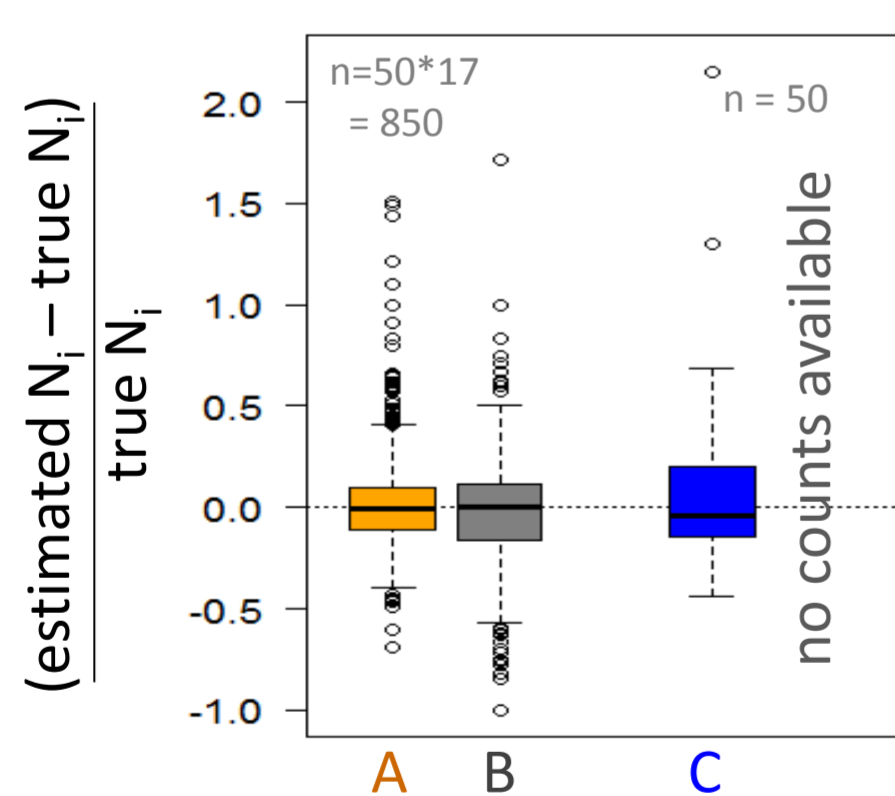
oikostat.ch oikostat GmbH, Ettiswil CH; FrIn d T Freiburg Institute of Applied Animal Ecology GmbH, Freiburg D;

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We combine data on acoustic activity and from carcass searches including experimental data on carcass persistence and searcher efficiency. The model can estimate mortality rates and predict mortality rates for new turbines from acoustic activity and wind speed alone without data from carcass searches.



Simulation study to assess bias



N_i : total number of collisions at turbine i

A: Bias of estimated N_i for 17 turbines of which data was used to fit the model to

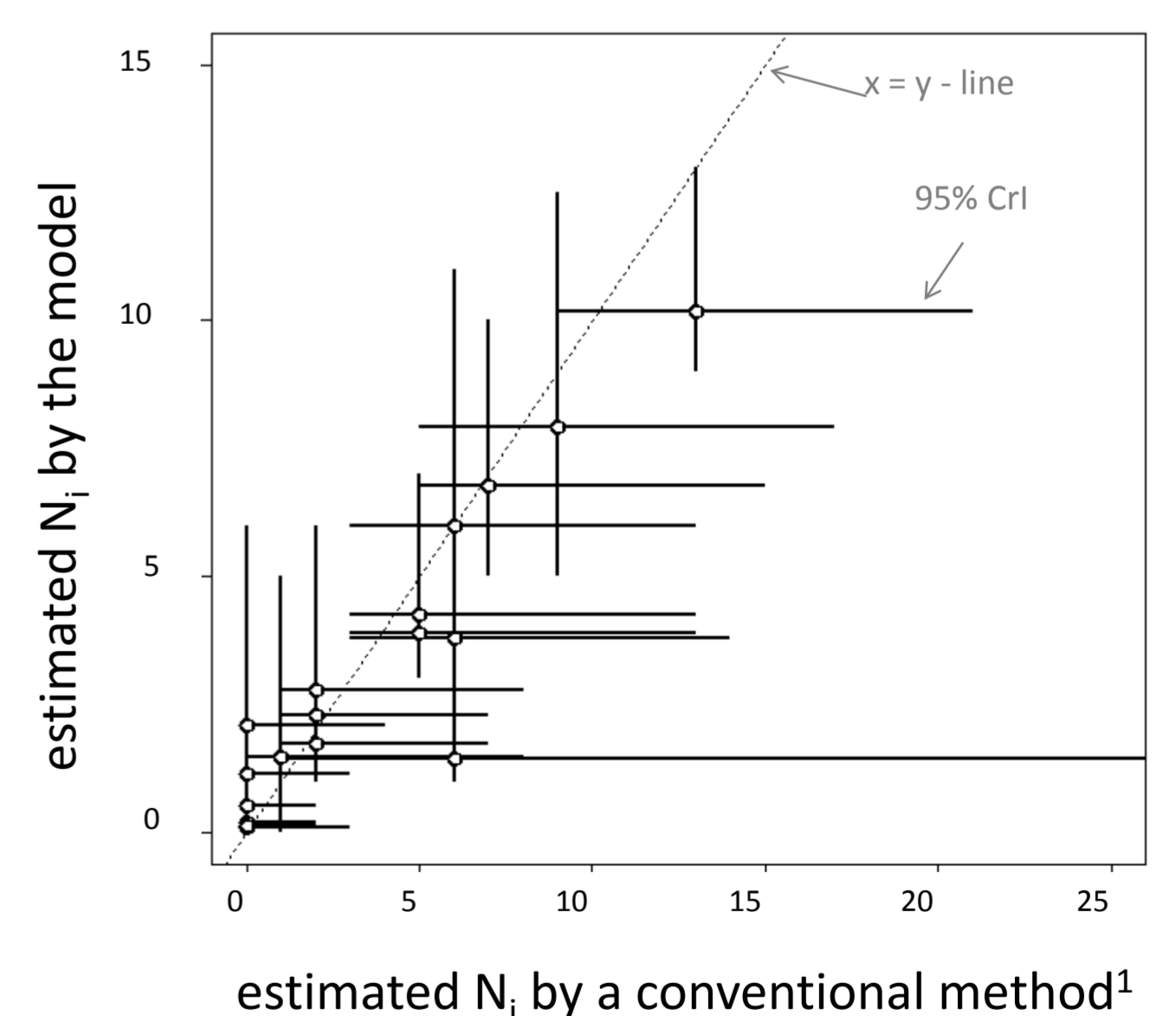
B: Bias of estimated N_i by a conventional method¹

C: Bias of estimated N_i for a new turbine without carcass search data

- Estimated number of collisions by the model were unbiased and more precise than the conventional estimator.
- Predicted number of collisions for new turbines were unbiased and precision similar to that of the conventional estimator.

Application to real data

- 18 turbines in Germany
- 1225 nights
- 16263 bat call recordings
- 35 carcasses found with mean detection probability of 0.61



- Estimated number of collisions per turbine correlated with those estimated by a conventional method.

► The model can be used to identify factors influencing collision risk, to quantify and predict collision risk and to develop curtailment algorithms.

¹) «correcting» the number of carcasses found by the detection probability (e.g. Huso 2010, Korner-Nievergelt et al. 2011)

An earlier version of the model is published in: Brinkmann, R., O. Behr, I. Niermann, and M. Reich. 2011. Entwicklung von Methoden zur Untersuchung und Reduktion des Kollisionsrisikos von Fledermäusen an Onshore-Windenergieanlagen. Cuvillier Verlag, Göttingen.