

## Designing volunteer based monitoring programs for Natura 2000 species in Flanders

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**Abstract:** European member states have to report every six years on the conservation status of Natura 2000 species in the framework of the Habitat and Bird Directive. The European Commission (EC) demand that this reporting is based on statistically sound data. The monitoring network should be able to detect a decline of the population with about one quarter in a period of 24 year. In Flanders, monitoring data will be mainly collected by volunteers. Therefore designing monitoring networks is not just a statistical exercise, but it also has a social dimension. Volunteers tend to prefer visiting sites closer to their homes and the more ‘interesting’ sites. It’s a challenge to find a good balance between optimal design from a statistical point of view and site preferences by volunteers.

We follow two complementary approaches to fill in information needs: (1) standardized monitoring networks for a set of priority species, and (2) analysis of unstandardized data using site-occupancy models. Standardized monitoring networks provide the best guarantee to obtain unbiased results but are quite expensive. We aimed at achieving a pragmatic design that both provides the necessary information and guarantees sufficient participation of volunteers. To guide this process we performed power analyses and closely involved volunteer organisations. This process revealed that it is not possible to develop monitoring networks for all species due to its high costs or practical constraints. Therefore, for a number of species we decided to rely on unstandardized data collected and reported by volunteers. The challenge is to analyse the data taking into account site selection bias and differences in observation effort between years. Site-occupancy models have been proven successful in deriving trends in occupancy while coping with differences in observation effort. Yet, we should be aware of its limitations.