



# Action B.1 Increasing predation by birds

## Interim analysis

### 1. Context

A study at one site in the Netherlands has shown that hairy caterpillars are highly affected by predation by birds (Hellingman, 2018). In locations where nest boxes were provided, birds such as Great Tit (*Parus major*) and Eurasian Blue Tit (*Cyanistes caeruleus*) preyed on OPM.

### 2. Objectives

According to the study mentioned above, attracting insectivorous birds by installing nest boxes helps to reduce OPM population size with 85% especially in suburban areas where the number of suitable nesting sites is limited. We set up this experiment to check and hopefully confirm these findings.

The main objectives of this action are to:

1. Provide a solid (statistical) basis for its implementation within the area affected by OPM
2. Demonstrate to all stakeholders the effectiveness of the measure by showing them, on site, the contribution of the predation of the tits on the reduced number of OPM nests
3. Convince the different stakeholders to implement the method
4. Integrate the conclusions in a decision support system

To obtain these goals, we implemented and monitored this technique on a large scale.

Quantified expected results at the end of the project:

- 80% of the nest boxes occupied,
- 50% decrease in the number of caterpillars by predation of birds (50% fewer or smaller nests)
- Min 3000 nest boxes installed by other local municipalities and citizens.

### 3. Experiment setup

This action is coordinated by the Province of Antwerp. Kathleen Verstraete is the work package leader. Our field assistant Toon Willems, who is employed by the Province of Limburg, does most of the fieldwork. In Gelderland and Noord-Brabant a contractor was hired to install the nest boxes. In Antwerp, two bachelor students supported the camera monitoring in 2022 and 2023 under supervision of Kathleen Verstraete.

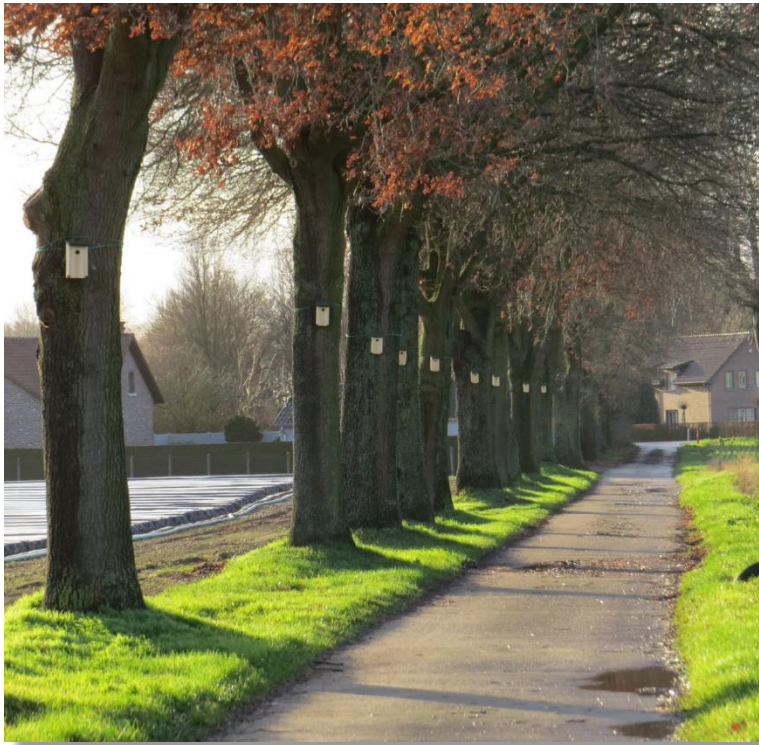
In this action we planned three sub actions:

### Action B.1.1 Installation nest boxes

In 2020, we selected 48 locations in Antwerp, Limburg, Gelderland, and Noord-Brabant, 12 locations per province. Each consists of a row of 15 large oak trees infected with oak processionary caterpillars (OPM). At six trial locations per province, we installed a nest box in each of the 15 oaks, thus 360 nest boxes in total. The other six locations per province serve as a control, without nest boxes. At all trial locations we installed a project information board.

Both at the trial and the control locations, we agreed with the managing government that no actions impacting the OPM (like the use of biocide or the removal of nests) were going to take place during the lifetime of the experiment.

We created information folders of how to construct, hang and clean a nest box and spread them among municipalities and citizens. The information folder can also be [downloaded](#) from our project website and also short [instruction videos](#) have been made available.



*Figure 1: Nest boxes at one of the trial locations*



*Figure 2: An occupied nest box - Eurasian Blue Tit*



*Figure 3: Information board at a trial location*

### **Action B.1.2 Monitoring occupied nest boxes**

Each year in March we monitor the territorial behaviour of male tits on the trial locations with nest boxes and on the control locations without nest boxes. In April-May we count the number of inhabited nest boxes and the numbers of eggs or juvenile tits. In this way we expect to link any changes in the number and size of the OPM nests to the presence of the tits.





Figure 4: Counting the litter size.



Figure 5: Installing a nest box camera.



Figure 6: Blue tits feeding their young

In 2022 and 2023 a bachelor student monitored and analysed camera images of the feeding behaviour of the tits in some of our nest boxes. Actual camera images can be seen [here](#) and [here](#).

During the summers of 2021 and 2022 we assessed the number and size of OPM nests in each of the 15 trees in all 48 locations, thus in 720 trees in total, and this will be repeated in 2023 and 2024.

### Action B.1.3 Cleaning and disinfecting nest boxes.

We clean the nest boxes every autumn to remove old nesting material and parasites so that new birds can breed in optimal conditions the following spring. This action has been shown to increase the survival rate in the coming season.

### Additional action B.1.4 Set up an expert/advice group.

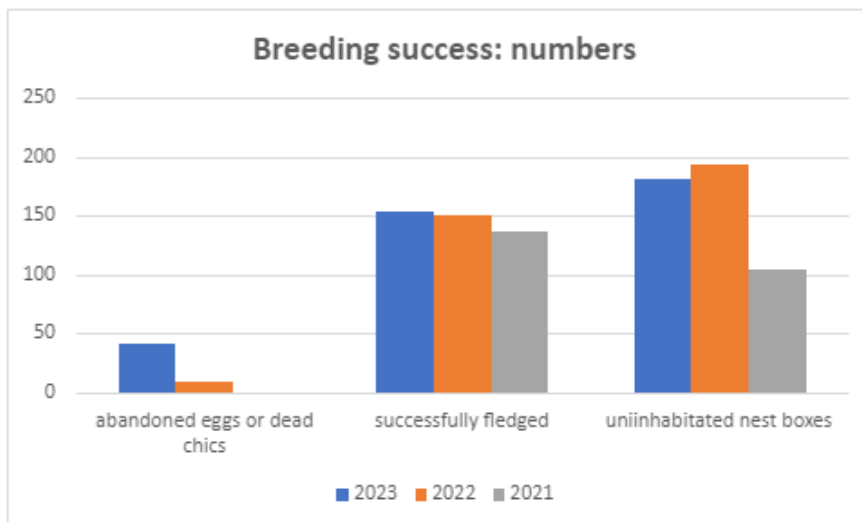
Dutch and Flemish researchers were asked to criticize the original experimental design. Once a year, they discuss the interim results, report problems, and offer solutions. If there is a need for more consultation, this is done by email. Prof. Dr. Erik Matthysen, Evolutionary Ecology Group, University of Antwerp, Senior Scientist Kees van Oers, Department of Animal Ecology, Netherlands Institute of Ecology (NIOO-KNAW), and Luc De Bruyn (data-analyst research Institute for Nature and Forest (EV INBO) are present in this advisory body.

## 4. Preliminary results

In the field season of 2021, we found nesting material in 68% of our nest boxes, and in 46% also eggs and/or chicks. From 57% of the nest boxes young birds could successfully fledge.

In 2022, young birds could fledge successfully from 42% of the nest boxes. Moreover, the nest size was bigger in 2022, with on average 10 chicks per nest, as compared to 7 chicks per nest in 2021. Also, less nest boxes with dead chicks were found in 2022 (3 compared to 9 in 2021). Thus, in 2022 more birds were raised and fledged from the nest boxes compared to 2021.

In 2023, approximately the same breeding success will be achieved as in 2021, 41%. Unfortunately, more dead chicks or abandoned nests have been counted this year.



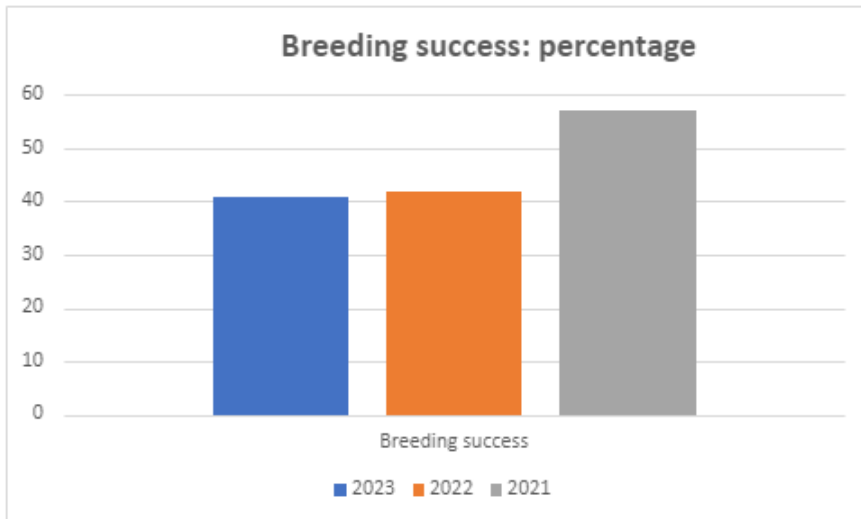


Figure 7: Breeding success (eggs + chicks) in the nest boxes

Further, our data showed that there were significantly more tits in tree rows with nest boxes than in tree rows without nest boxes. Additionally, we found that there were significantly more blue tits than great tits inhabiting our nest boxes.

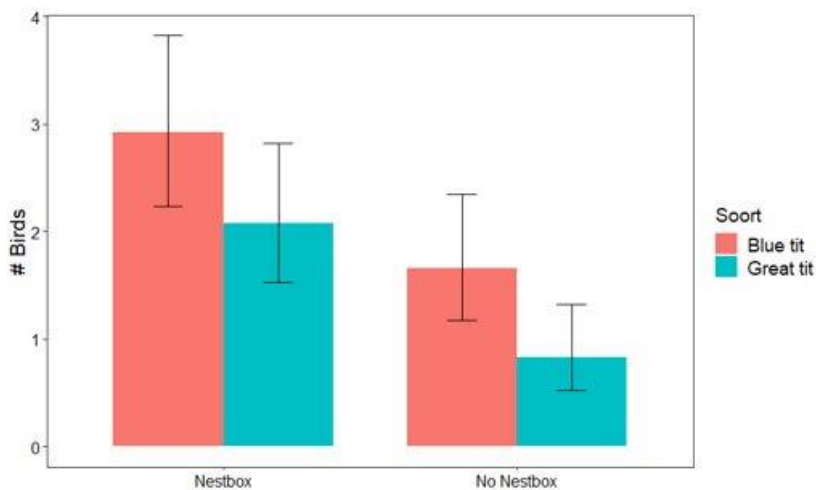


Figure 8: Number of birds on locations with (left) and without nest boxes (right) for blue tits and great tits

However, the data of the past two years show no significant impact of providing nest boxes for tits on the number or size of OPM nests, even when we consider the breeding success of the tits.

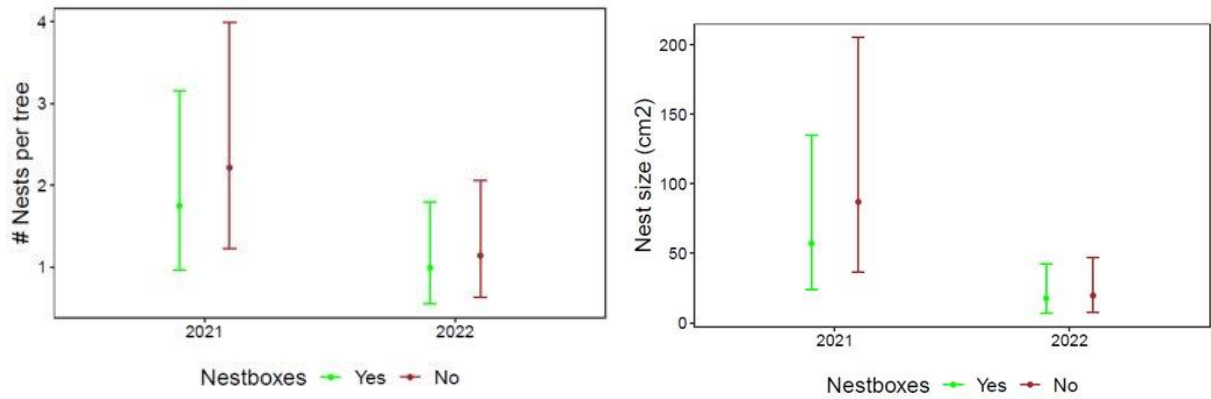


Figure 9: Number of OPM nests per tree and nest size in locations with (green) and without (red) nest boxes for 2021 and 2022

When considering the individual test locations, in some locations (like Arnhem, Brummen, Retie, Wageningen and Westerhoven) there seems to be a negative impact from tit predation on both the number of nests per tree and the nest size, but this is certainly not consistent overall. In other locations like Asten, Kinrooi and Oud-Gastel the correlation is even inverse.

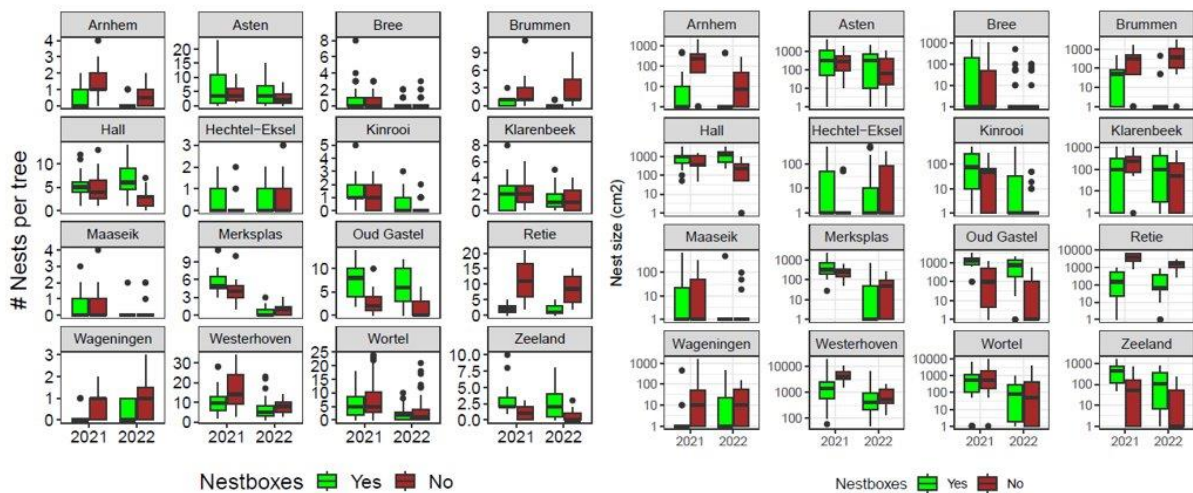


Figure 10: Number of OPM nests per tree and nest size in locations with and without nest boxes by test location

A reason for this unexpected result may be found in the feeding behaviours of the tits. Camera observations in 2022 showed that parent tits rarely fed their chicks hairy caterpillars, even when they were available. The results seem to indicate that the tit chicks hatched too late in the season to take advantage of the abundance of OPM caterpillars.

To check the possible impact, we looked at the average dates OPM caterpillars hatched and moulted in the last 17 years, the earliest year data are available for the project locations, and we compared them with the average tit hatching dates.

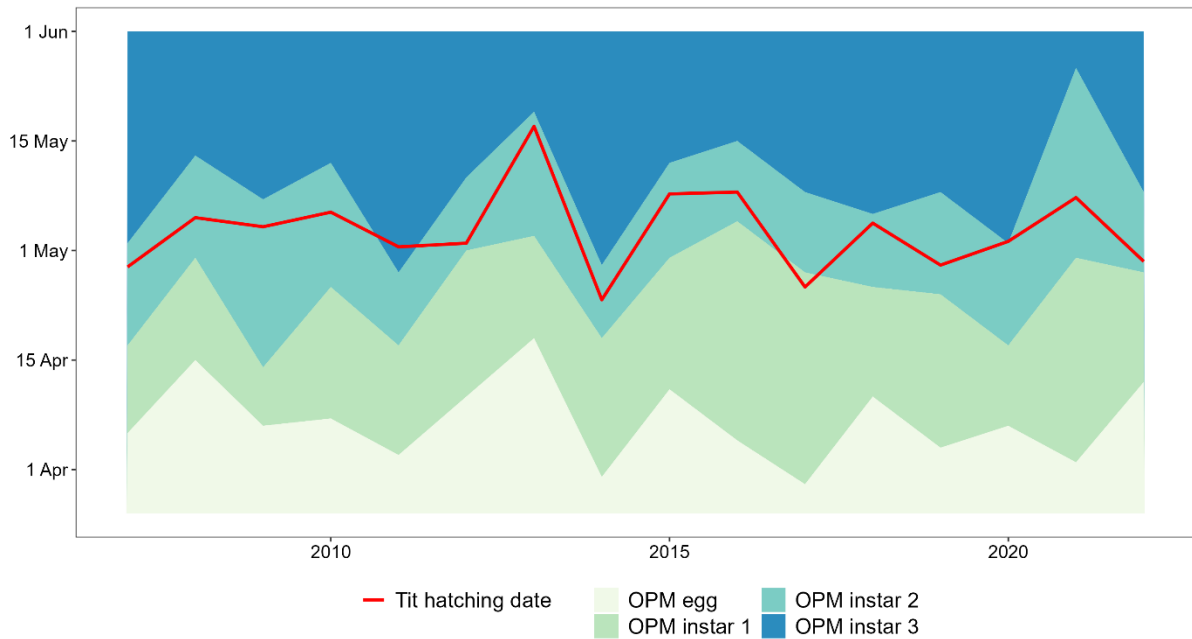


Figure 11: Development of the average OPM hatching and moulting dates vs. tit hatching dates from 2007 to 2022

The results seem to indicate that the tit chicks hatched too late in the season to take advantage of the abundance of OPM caterpillars of the first two instars. The second instar caterpillars are only available for the young birds for a few days. The third instar has hairs that are too long and have irritating hairs and seem to be avoided by the birds. Also, at that same time other caterpillars without irritating hairs (like that of the Mottled Umber (*Erannis defoliaria*)) are available for the tits to feed their young with less preparation needed.

## 5. Interim conclusion

The data of the first two years of the experiment clearly demonstrate that putting up nest boxes attracts extra birds. Additionally, we found that there were significantly more blue tits than great tits inhabiting our nest boxes.

However, we cannot (yet) conclude there is a significant impact of providing nest boxes for tits on the number or size of OPM nests, even when we consider the breeding success of the tits. This seems to contradict our original hypothesis based on existing studies. The reason for this seems to be that OPM caterpillars suitable for the young (the first two instars) are only available for a few days when the young hatch.

## 6. Continuation & corrective actions planned.

We will continue the bird predation experiment in the following years, as foreseen in the project proposal. We expect to have more meaningful results with a larger data set.

To better understand the preliminary result, we will also continue to monitor the feeding habitats of the tits on a few nest boxes near OPM nests with cameras, as to check if the dietary habits of the birds change from year to year. The actual field work will be done by a bachelor student and has minor impact on the budget.



An issue we encountered in 2022 but is growing in 2023, is the downward trend of OPM in the project area. The relative low abundance of the species in the last two years makes it more difficult to draw reliable conclusions on our research. We described the consequences in the technical report in **Issue 5. Decreasing OPM abundance in the project area**