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LIFE Oak Processionary

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1. Context

This report presents findings from the Action ‘B.1 Predation by Birds’, carried out between 2020 and 2024.

Previous field observations, shared in several online publications, suggested that Eurasian blue tits and great tits may feed their chicks with the hairy caterpillars of the oak processionary moth (OPC) (Hellingman and van Vliet 2015, 2018b, Hellingman et al. 2019). Based on this, researchers proposed that installing nest boxes to attract these birds could help control OPC caterpillar populations (Hellingman and van Vliet 2018a, 2019). However, those early findings were based on limited data from just one test site and two control sites, and other measures were also taken at the same locations—making it hard to isolate the effect of the nest boxes. Still, other studies have shown that encouraging insect-eating birds by providing nest boxes can reduce pest damage in places like apple orchards (García et al. , Mols and Visser 2007). So, while more research is needed, it’s reasonable to think that tit predation could help manage oak processionary caterpillar numbers.

2. Objectives

To test whether tits can help control OPC populations, we installed nest boxes at 24 locations and compared caterpillar numbers with 24 similar sites that had no nest boxes, over a five-year period from 2020 to 2024. Based on earlier findings in the Netherlands, we expected that around 80% of the nest boxes would be used by birds, and that OPC numbers would be about 50% lower at the sites with nest boxes compared to those without.

We shared our methods and results with local stakeholders to encourage them to adopt this approach. The goal was to have at least 3,000 nest boxes installed by municipalities and residents.

3. Material and methods

3.1. Field sites

In 2020, we selected 48 locations across Antwerp, Limburg, Gelderland, and Noord-Brabant—12 sites in each province. Each site included a row of 15 large oak trees affected by oak processionary caterpillars (Figure 1). At six sites per province, we installed a nest box on every tree to attract insect-eating birds. The remaining six sites served as controls and did not receive nest boxes. To inform the public, we placed project information boards at all trial sites (Figure 2).

Importantly, we reached an agreement with local authorities to ensure that no other measures—such as using pesticides or removing caterpillar nests—would be carried out at any of the sites during the experiment. This allowed us to study the impact of the nest boxes without interference.



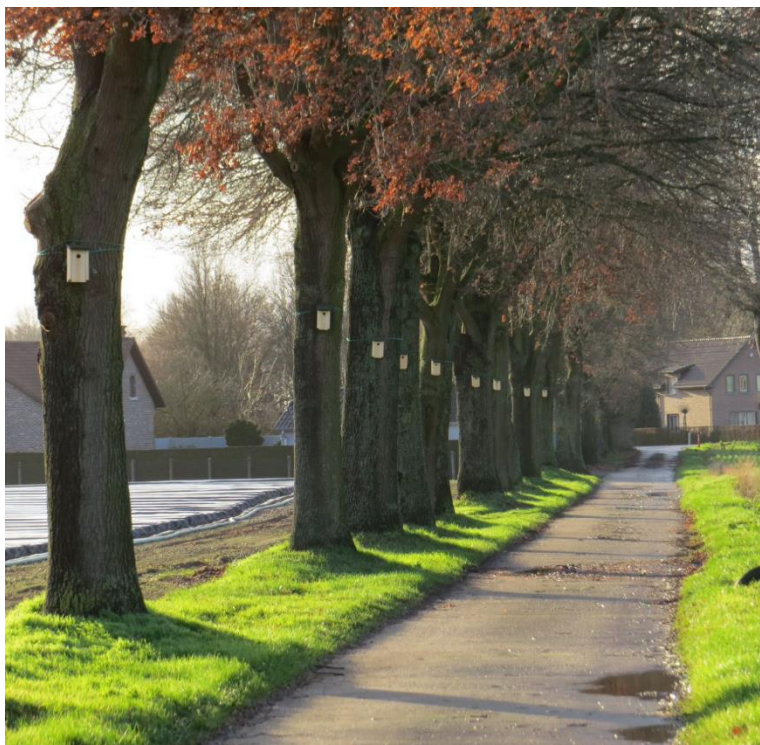


Figure 1: Nest boxes at one of the trial locations



Figure 2: Information board at a trial location

3.2. Monitoring nest boxes

From 2021 to 2024, we monitored insect-eating birds at both the test and control sites each March, as the breeding season began. During April and May, we checked the nest boxes twice—about a month apart—to count the number of eggs and young birds (Figures 3 and 4). After each breeding season, the nest boxes were cleaned and made ready for the following year.





Figure 3: Left - counting the litter size; right - Installing a nest box camera

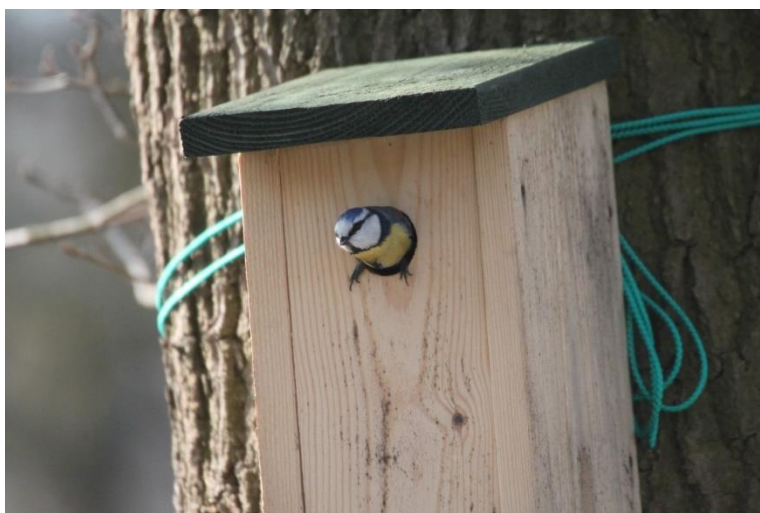


Figure 5: An occupied nest box - Eurasian Blue Tit



3.1. OPC population size

To estimate the size of the OPC population at each site, we counted the number of caterpillar nests in the trees and assessed their size. We did this by visually comparing the nests to familiar ball sizes—ping pong balls, tennis balls, handballs, and volleyballs. On average, these nest sizes corresponded to approximately 15, 43, 147, and 600 caterpillars per nest, respectively.

3.2. Dissemination

At the start of the Life project, many municipalities in the region were already showing interest in installing nest boxes, inspired by earlier reports published on the Nature Today website. To build on this momentum, we regularly shared updates through media outlets—for example, by telling the story of the tits on local Antwerp television station ATV.

Throughout the project, we held meetings with environmental officers from participating municipalities to explain the goals and share early positive results. We also created easy-to-follow guides on how to build, install, and maintain nest boxes, which were distributed to municipalities and residents. These guides, along with short [instructional videos](#), are available for [download](#) on our project website: <https://eikenprocessierups.life>.

Unfortunately, we couldn't get exact figures from municipalities on how many nest boxes were installed, and they were also unable to track installations by individual citizens. To estimate the impact, we conducted a media search using targeted keywords. This allowed us to collect reports from newspapers, TV, social media, and other sources to get a sense of how many nest boxes were put up. While this method doesn't provide a precise count, it does offer a reliable minimum estimate.



4. Results

4.1. Birds present

At the beginning of each breeding season, we observed more than twice as many birds at the sites with nest boxes compared to the control sites without them (Figure 7). Bird numbers remained fairly consistent from 2021 to 2023, with a slight decline in 2024.

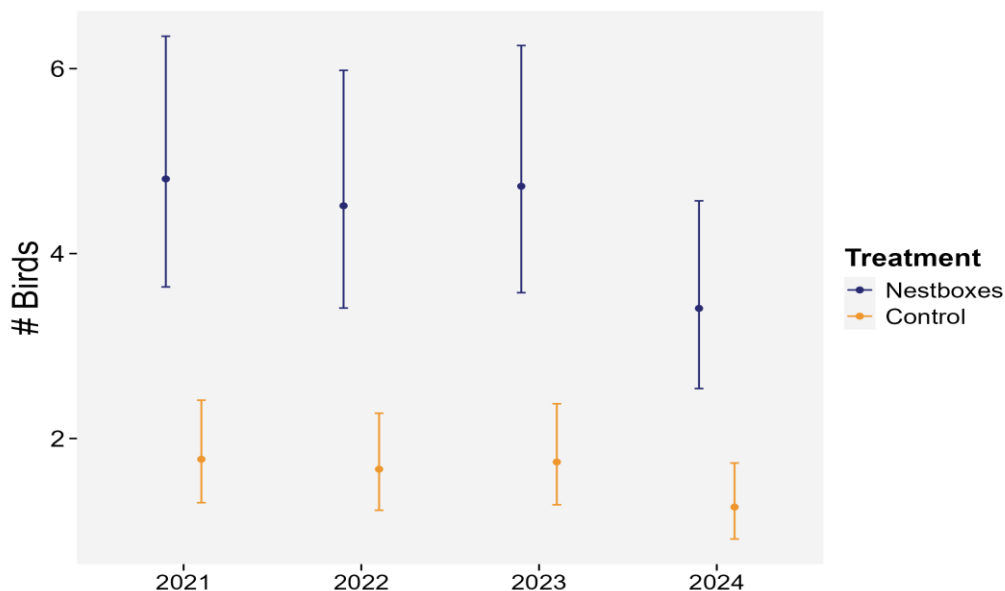


Figure 7: Mean number of birds present at a site with and without nest boxes at the start of the breeding season.

Table 1: The overall numbers reflect all 24 sites combined over the four-year period, showing which bird species successfully laid eggs or raised young in the nest boxes.

Species	2021	2022	2023	2024
Blue tit	22	22	22	22
Great tit	24	23	24	22
House sparrow	1			
Nuthatch		3	2	3
Pied flycatcher	4	5	10	9

During the breeding season, more than 80% of the nest boxes were used by birds at five locations—Asten (Noord-Brabant), Bree and Hechtel-Eksel (Limburg), Klarenbeek (Gelderland), and Wortel (Antwerp)—in at least one year. In contrast, nest box use dropped below 20% at two sites—Wageningen (Gelderland) and Retie (Antwerp)—during at least one year. Overall, across all locations, eggs were found in roughly half of the nest boxes (see Figure 8). Later in the season, young birds were present in roughly one-third of the boxes—except in 2023, when that number dropped to 25%. These patterns were similar across all provinces. As expected, most of the nest boxes were used by great tits and Eurasian blue tits (Table 1). Other species we encountered included the European pied flycatcher, Eurasian nuthatch, and one nest belonging to a house sparrow.



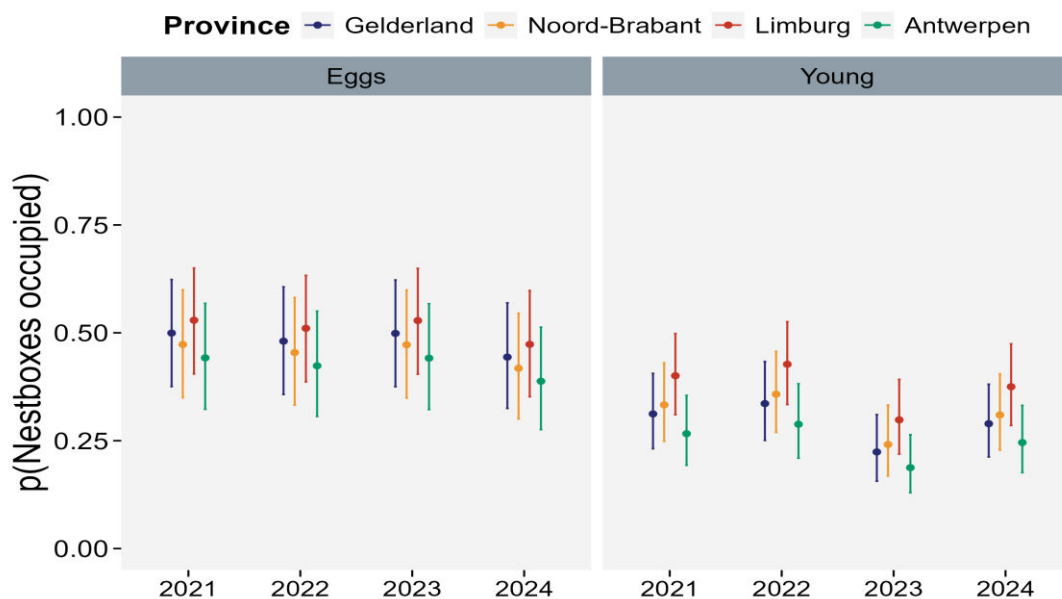


Figure 4: The proportion of nest boxes with eggs or later with young birds at sites with nest boxes.

4.2. Effects on OPC population size

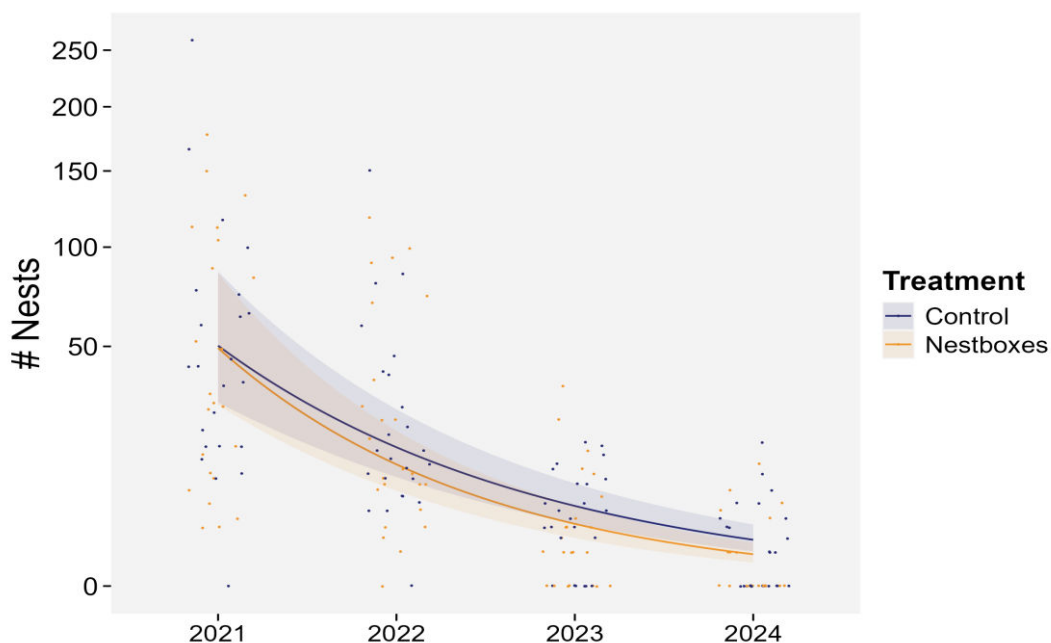


Figure 6: Decreasing trends in the number of OPC nests at sites with and without nestboxes.

Over the course of the Life project, the number of OPC nests gradually declined across all locations—both at sites with nest boxes and those without. This overall drop in caterpillar numbers in Flanders and the Netherlands was likely due to natural population cycles and changing weather conditions.

The impact varied by community. The most significant reductions were seen in Merksplas (Antwerp) and Brummen (Gelderland), where OPC nest numbers fell 43% and 34% faster per year, respectively, compared to control sites. In contrast, no difference was observed between treated and untreated sites in Oud Gastel (North Brabant) and Hechtel-Eksel (Limburg). Due to the high variation among communities, there was no overall consistent difference between sites with and without nest boxes.



Although nest boxes had no effect on the number of nests, the nests became smaller over time (Figure 7). This trend was seen at nearly all sites, regardless of nest box presence, but the reduction in nest size was more pronounced at the treated locations. Specifically, the proportion of nests in the smallest size category (C1) increased more quickly, while the number of larger nests (C3 and C4) declined faster. On average, sites with nest boxes move toward smaller size classes about 40% faster than the control sites.

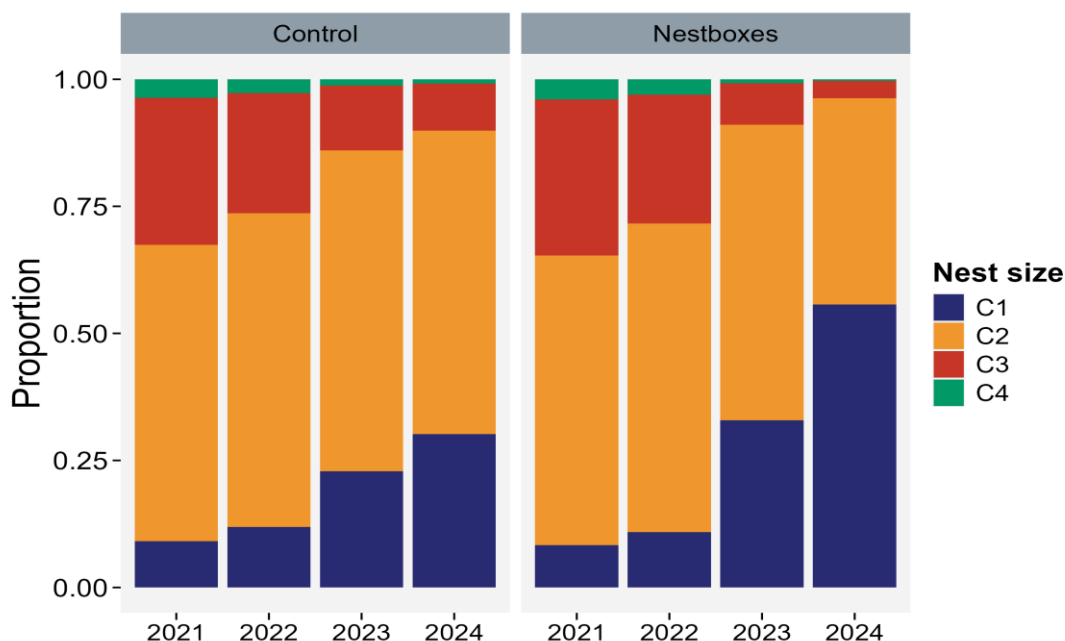


Figure 7: The distribution of nest size classes over time. Nest sizes are grouped in 4 classes from C1 (smallest nests – mean 15 caterpillars) up to C4 (largest nests – mean 600 caterpillars). Over time, the proportion of smaller nests increases, while the proportion of larger nests decreases.

4.3. Dissemination

Up to the end of 2021, local governments in Flanders and the Netherlands reported that 7.528 nest boxes were installed in about forty municipalities to control the OPC.

5. Discussion

5.1. Nest box occupation

Although nest boxes were used by birds at a rate of 80% or more at five locations during at least one year, the overall average usage across all sites was only about 50%. This is below our target of 80%.

Great tits and Eurasian blue tits are territorial birds, meaning they defend their space. Research has shown that when nest boxes are placed too close together, especially for great tits, they are less likely to be used (Krebs 1971, Minot and Perrins 1986). Territorial behaviour in great tits can extend up to 40 to 50 meters from their nest. A study in the UK found that the minimum distance between nest boxes used by both species was around 40 meters, although the average spacing between nest boxes was between 20 and 30 meters (Deeming et al. 2017). While great tits and blue tits don't actively avoid nesting near each other, they do compete for the same preferred nesting spots (Minot and Perrins 1986).



In our study areas, oak trees are spaced only 10 to 15 meters apart, which is too close for these birds. As a result, many nest boxes were left empty. If we had skipped placing a box on every tree and spaced them out more, occupancy rates likely would have been much higher—possibly reaching or even exceeding 80% at all sites, without changing the absolute number of occupied nest boxes. This also suggests that we may have already reached the maximum number of tits that the local environment can support.

5.2. Impact on the OPC population

During our study, we saw a strong decline in the OPC population, mainly due to environmental conditions. The number of nests dropped at a similar rate whether nest boxes were present or not. However, at sites with nest boxes, OPC nests became smaller more quickly—about 40% faster each year compared to sites without nest boxes.

Both Great Tits and Eurasian Blue Tits are flexible eaters and can adapt their diet to what's available (Naef-Daenzer and Keller, 1999; Mols and Visser, 2002). During the breeding season, they mostly feed their chicks with caterpillars, especially those from moth families like geometrids and tortricids.

Researchers have observed that both species can catch and feed oak processionary caterpillars (OPC) to their young. Great Tits, in particular, have been seen eating not just the caterpillars, but also their egg clusters, young and older larvae, and even adult moths of a related species—the pine processionary caterpillar—in Southern Europe.

Interestingly, Great Tits can form a kind of mental image, known as a search image, which helps them recognize specific prey more easily—even when the prey is well hidden, like OPC caterpillars in their nests (Lawrence 1986).

6. Dissemination

With around 7.500 nest boxes installed to control OPC after our call, the indicator 'Min 3000 nest boxes installed by other local municipalities and citizens' has been greatly exceeded.

7. Possibilities for additional research

Two experiments were designed in this project to further investigate the dietary habits of the tits and to determine the conditions under which OPC will be used as a food source. They were not started or discontinued in 2024 due to the lack of OPC. These experiments could be repeated/continued in the future.

- **Preference test:**
 - Objective: To determine the extent to which great tits prefer OPC over other species as a food source for their young at a feeding site.
 - Setup:
 - 5 nest box locations with OPC nests nearby, 5 locations without;
 - Place one feeding table at each location;
 - One week of acclimation;
 - Offering caterpillars in waterfalls, combinations of winter moth, OPC, and both;
 - 30 minutes of observation per round;
 - repeating 10 times over a period of three caterpillar instars.
- **Habituation test:**



- Objective: To determine the extent to which great tits can habituate to feeding on OPC
- Setup:
 - Install a nest box in a tree colonized by OPC.
 - Wait until nest box occupied
 - Set up a feeding station and place a camera pointed at the feeding station
 - Offer mealworms regularly for a week
 - Offer OPC daily for a week and observe
 - Stop offering them
 - Monitor the camera footage
 - Remove OPC nests and place them in traps to monitor the number of emerging butterflies.

8. Conclusions

- The average usage of nest boxes across all sites was around 50%. This is below our target of 80%. The territorial nature of these birds was very probably the reason for the lower occupancy.
- Despite this, after four years OPC numbers were about 70% lower at the sites with nest boxes compared to those without, above the expected 50% rate.
- So, providing nest boxes for great and Eurasian blue tit greatly helps to reduce the OPC populations at an infested site. Most of this effect was due to the faster decrease in caterpillar nest size.
- A good communication with stakeholders of local communities via direct contacts and social media stimulates to put up nest boxes at infested sites and reduces the use of chemical control measures (see C.1.1 Monitoring the use of biocides (final version)).

9. Acknowledgements

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