Buzz Club Newsletter

University of Sussex

Welcome, and first a **huge thank you** to everyone who has taken part in the Buzz Club this year; whether you're been able to participate in projects, asked questions or sent us information and photos, because we can't do any of this without you!

It was certainly a *varied* year, with a damp spring giving way to July's unprecedented heatwave, but one of the brilliant things about insects is that there's always going to be something interesting happening when you look closely. So, starting off with the project updates—**what did we do in 2022?**

Inside this issue:

Garden Shop calculator

*Recording domestic harvests (e.g. the weight picked) using the project spreadsheet to calculate: a) how much it would cost to buy in a shop and b) what proportion of that harvest can be **directly** attributed to insect pollination.*

The summer heatwave impacts were definitely felt in this project, with participant feedback highlighting problems for usual heavy-hitters in calculator contributors, such as tomatoes (splitting and suffering blossom-end rot) and squashes (seeing loss of flowers or aborted early fruits) due to water-stress and high temperatures. In contrast, bush and tree fruits with strong root systems that were able to avoid water stress have done much better than usual—seeing large crops of early blackberries and a notably good year for apples across the UK.

Adding together the totals from returned member spreadsheets, the Buzz Club's 'hypothetical farm shop' didn't do quite as well as last year, but not bad for a difficult summer! Participants recorded **£2300** of produce (using organic prices to value) this year, compared to last year's £3000. With ~**£1500** of this year's value directly produced via insect pollination, we've also seen a small increase in the *overall* reliance on insects (**62%,** compared to last year's 60%); likely due to fruits such as apples (which need to be well pollinated by insects for success) making up a larger portion of the yields.

Figure 1: A 'bee waterer' (above) and Hoverfly Lagoon (below).

With frequency of heat events like this summer predicted to increase, supporting your local insects through tough weather is getting more important. Adding water to your garden is a great way to do this, since most insects drink, and many bees need water for other reasons such as cooling their hives, or to make mud for solitary nest holes. Water sources like bee waterers and hoverfly lagoons can really help, especially if you don't / can't have a pond (Figure 1).

Polli-Nightors

A project looking at the nocturnal insect life found in our gardens.

This year, the Polli-Nightors project focused on investigating what invertebrates were specifically interacting with plants that are **flowering** at night, and what they seemed to be doing there. Participants completed a short walk around their gardens / open spaces, focusing on any plants that had open flowers, and recording what they spotted on or nearby those plants.

The project recorded **539** invertebrates in total, with **355** being found directly on a flower. It proved quite difficult to identify exactly what activity was being undertaken—e.g. **feeding** was clear for some larger insects like moths (with long visible tongues) or those that were actively chewing; but it was difficult to standardise the activities in detail. Most invertebrates spotted did seem to be doing *something* (Figure 2).

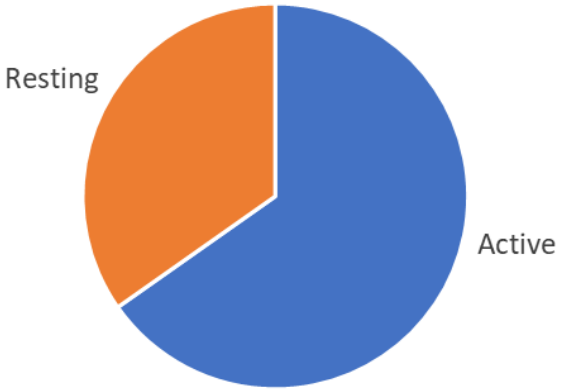


Figure 2: How active were the recorded invertebrates?

Figure 3: Earwigs were very active on sunflowers this year; while bees like to sleep in them!

Figure 4: Crab spiders lying in wait on flowers for nocturnal visitors.

Figure 5: Moths actively feeding on a buddleia.

While this was a different protocol than last year, moths made up a similar proportion of the total count (37% this year, 39% last year), but counts of other invertebrates was notably different. Last year flies were the most frequently-spotted group; in 2022, **moths**, **earwigs** (11%), **woodlice** (9%), **beetles** (9%) and **spiders** (6%) were the top 5 groups. The 2022 method focused on what invertebrates were *on* flowers, so those that are more likely to be flying are not picked up.

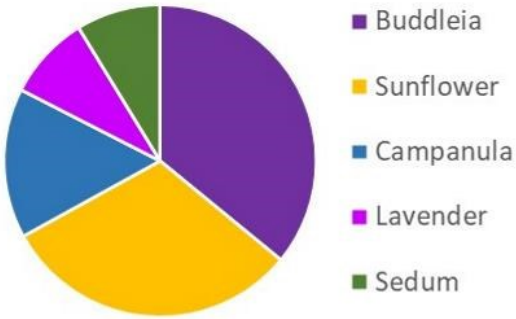


Figure 6: The flowering plants most visited by invertebrates at night.

The flowering plants that showed the most invertebrate interest over the project are shown in Figure 6, with **buddleia** and **sunflowers** being the most popular. These flowers remain open at night and are highly attractive to insects (and are also easy to grow) so may represent good focal plants for future projects.

This project was likely impacted quite hard by the 2022 heatwave, with participants reporting that they felt they saw fewer of some types of invertebrates during the hot, dry summer than they did last year (although bear in mind that we do not really have the numbers required to test statistically if this is more than anecdotal).

Hoverfly Lagoons

Creating homes for overlooked pollinators, using a container of water and decomposing plant material to mimic natural 'rot hole' habitats, and recording the number / abundance of species found in different lagoon types.

Dr Ellie Rotheray

It was a reasonable year for the Lagoons project, though these artificial habitats for hoverflies struggled to attract or maintain individuals from August, possibly due to the lack of rain and the midsummer heat we experienced. Some predation was also reported, with birds considered the most likely culprits.

Our peak abundance of **larvae** in Lagoons was **June** (similar to previous years), with a mean number of 32 larvae per lagoon (Figure 7); and a maximum found in one lagoon of 203 larvae! Number dropped sharply from July onwards, with larvae per lagoon struggling to reach 10. A bonus count in November (added because of the mild autumn) recorded counts as high as 20 per lagoon.

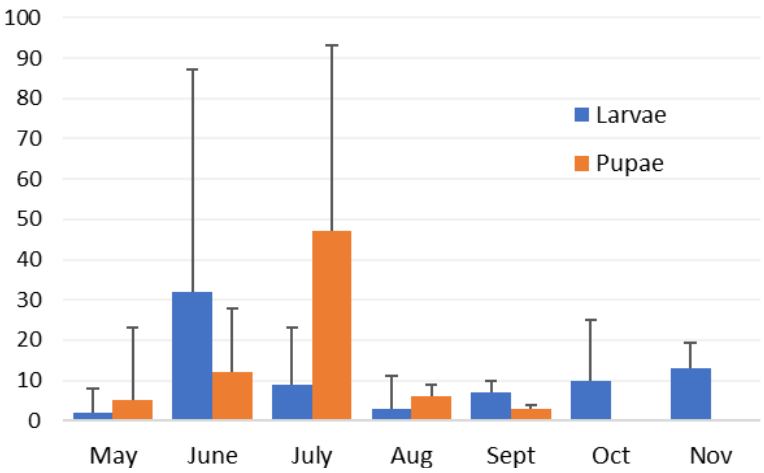


Figure 7: Mean counts of hoverfly larvae and pupae found in 2022 Hoverfly Lagoons, by month.

Though the earliest **pupating** larvae were recorded in the last week of May, **July** was peak pupae-count month, reaching a mean of 47 per lagoon (the maximum was 113 pupae from one Lagoon).

Figure 8: M. florea (left); and S. pipiens (right), (Martin Cooper, 2013; Flickr. CC BY 2.0)

Two main hoverfly species were identified by participants this year: the 'Batman Hoverfly' *Myathropa florea* and the 'thick legged hoverfly' *Syritta pipiens* (Figure 8). These are two quite contrasting Lagoon dwellers as the former prefers a watery environment while the latter likes a drier, more dense Lagoon.

In the wild

Ellie has spent the year on the lookout for **natural tree rot holes**, similar to the habitat our artificial containers are designed to mimic. This often means not being able to resist shimmying up any trees (right) that have a tell-tale oozing trail seeping from forked branch or trunk. Some of the pockets of water she found barely retained a shallow puddle, yet most contained hoverfly larvae.

Figure 9: A tell-tale trail.

Does this mean our semi-aquatic hoverfly species are struggling to find habitat, depositing eggs in any transient pockets of water or damp cracks?

Maintaining suitable water bodies is crucial as the climate warms and we experience more extreme weather events. Monitoring how hoverflies cope with the changes could be a way to keep our finger on the pulse of nature.

Figure 10: 'Field' work

Earwi'GO!

*Earwigs are oft-maligned in gardens for their omnivory, but they do a lot of **good** too (including eating lots of aphids!). This project looks into making 'hotels' for earwigs; using upturned plant pots with different fillings.*

The second year of Earwi'GO! reduced the choices of hotel filling to two—**cardboard** and **straw**—based on last year's results. Hotels were inspected weekly to count and record the invertebrates found in each filling type (see Figure 11, right), and find which filling was most attractive. Earwigs showed a clear favourite, with **cardboard** hotels receiving many more earwig visitors than the straw ones. Although, similar to last year, non-earwig invertebrates seemed to like both kinds of hotel equally.

Earwigs seem to really like cardboard!

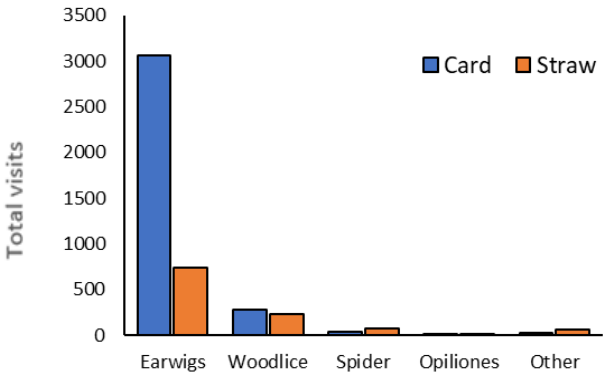
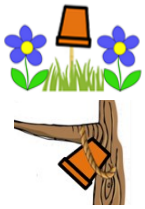


*Figure 11: **Total** counts of **all visits** to hotels with different fillings (split into major groups).*

Earwi'GO! - Mobile Homes

The new part of this project this year was the 'Mobile Homes' variant, where participants were investigating whether earwig hotels could be used to *move* earwigs from places in the garden where you might not want them (e.g. in amongst the flowerbeds) to somewhere else (e.g. on a fruit tree for biocontrol, or just somewhere they won't be tempted by a fancy petal salad). A big part of this was testing out the altered methodology compared to Earwi'GO — and the effort and feedback from this year's participants highlighted a couple of problems with this variant of the project.

Piloting projects like this is a **really valuable thing** we can do as the Buzz Club, since we are working in real-garden environments, and it is very difficult when designing a project to take into account all the possible variables that can turn up when a protocol is 'released into the wild'. The issues raised were:



Trees vs. flowerbeds. An assumption of the project was that the 'Mobile' hotels set up in flower beds, raised up on a ~1m stick, would be attractive to earwigs that were in the flowerbeds. However, participants in 2022 found few earwigs in the Mobile hotels to begin with; either suggesting that there **were not many earwigs in the flowerbeds** or that they **did not like that hotel design** as much as the ones in trees.

Hot hotels vs. shady hideaways. Overall, the flowerbed hotels were more likely to be exposed to **direct sunlight** than the tree hotels. We suggested a ~1m stick to mean that earwigs could have something to climb (as they like to do), but this meant that the hotels were often raised **above** the surrounding plants. This likely meant that they were much **warmer** than the tree hotels (which were more likely to be in shade), and may not have been attracting earwigs in the first place.

Do exposed hotels get too hot?

Even tree hotels might have been getting **too warm**, with participants finding earwigs sheltering in nearby (shadier) places like nest boxes and ivy, despite earwigs found in hotels placed in the same position last year.

Earwi'GO! (continued): Where do we 'GO! from 'ere?

The 'Mobile Homes' question is still one we want to look into, because if moving earwigs around within the garden does work it would be a practical bit of wildlife gardening that folks could easily do; **but** we need to address the issues raised this year first. So, we need to investigate:

1) Do earwigs actually **use** hotels that are set up in flower beds?
2) Is it better to have the hotels **on the ground**, or **raised up** in flower beds?
3) How do we prevent hotels from getting **too hot?**
4) Is there another filling to test out?

Figure 12: Earwigs found in ground level bamboo tubes.

An **alternative filling** was identified this year—Linda kept finding lots of earwigs hiding out in cut-up hollow bamboo pieces (originally intended for bee hotels, but not used / spare), specifically ones left on the floor (Figure 12).

Earwi'GO! 2023 proposed changes:

The next version of Earwi'GO! needs to focus on earwigs that are **not on trees**. We know they like cardboard, so we will want to test out **cardboard** filling hotels in **different positions** in flower and vegetable beds, comparing invertebrate interest in:

Hotel on a stick

The ~1m stick used previously, raising the hotel off the ground to mimic a 'tree' (or at least provide 'up' for the earwigs to travel).

Hotel at ground level

Hotel placed at the base of the plants to see if earwigs seek shelter lower down in flower / vegetable beds.

Bamboo hotel

Hotel at ground level, using short hollowed-out bamboo canes as filling.

Return to the bee hotel business

Looking at bee hotels again to see what would make a good Buzz Club project.

Bee hotels! These wildlife gardening interventions have really taken off in recent years, as folks become increasingly aware of the importance of wild bees and want to provide space for these insects in their green spaces. The Buzz Club has looked into some bee hotels before and we get a lot of questions about them, so we're heading back into being habitat hoteliers. This year we asked for your experiences of using bee hotels, and ran a couple of little at-home experiments ourselves to try out some ideas.

Questionnaire

Our big hotels questionnaire demonstrated the sheer variety of bee hotels out there (**a big thank you to everyone who responded**). We had 3 broad areas of questions: for people who had never had bee hotels; those who used to have them, but no longer did; and those who currently have them. We also asked for more detailed information on current hotels, if possible. In summary:

1) Those who had **never had** a bee hotel mostly reported they just never got around to it; with a sub-set of respondents unsure if it was just a gimmick.
2) Those who had had them in the past but **no longer did** mostly had (understandably) given up because of a lack of bees showing interest in the hotels.

For current bee-hoteliers (3), the overall impression from our results was of sheer variety in hotel design and success rates. While this makes being able to narrow down an 'ideal' bee hotel design a lot tricker, but it also means that there is a lot of freedom to try things out and find the best design for *your* space and local bees (and how much e.g. maintenance effort you want to do). From the in-depth questions (detailed responses for **35** bee hotels), in summary:

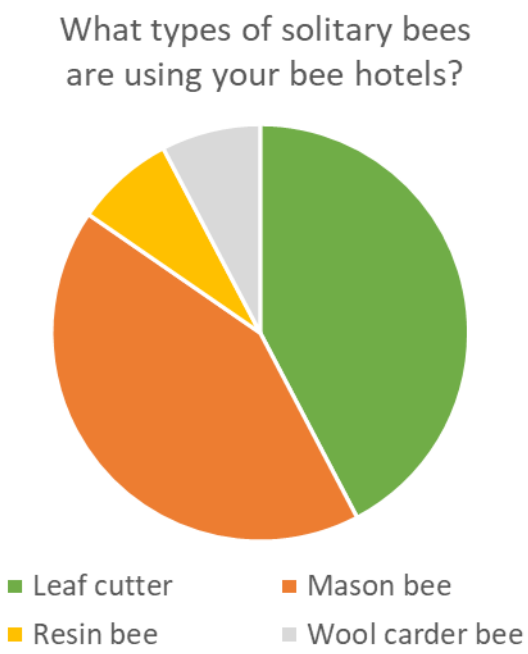
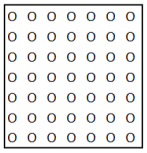


Figure 13: Types of solitary bees known to be using respondents' hotels.



Most hotels had **less than 50 holes**.
This is good, since large aggregations of solitary bees may attract predators and parasites.

Most hotels had **round holes**; made from **bamboo** or **drilled into wood.**
Natural materials (e.g. canes) tend to be round, as are drill bits. Bees can smooth out cavities with mud / leaves. Is this important, or easier?

Most holes were **8-10mm in diameter**.
This is the generally-advised size for bee hotel holes, particularly for mason bees. But not **all** solitary bees are the same **size** as mason bees.

Most hotels are not designed / instructed to be cleaned. Ones with e.g. removable cardboard tubes can be, but they are often more expensive / intensive to use.

Bee hotels continued:

Figure 14: Some photos of bee hotels submitted by Buzz Club members - a great variety of shapes and sizes!

Size—does it matter?

8mm diameter is the hole diameter that is usually recommended for bee hotels, but solitary bees (and wasps) some in many different sizes; 8mm might be a squeeze for some, or cavernous for others! Natural habitats like hollow stems come in a variety of sizes, and **Dave** did an experiment this year to see whether our more manufactured hotels are really one-size fits all. The full video series is on his YouTube channel*; and if you want to have a go for yourself, here is how:

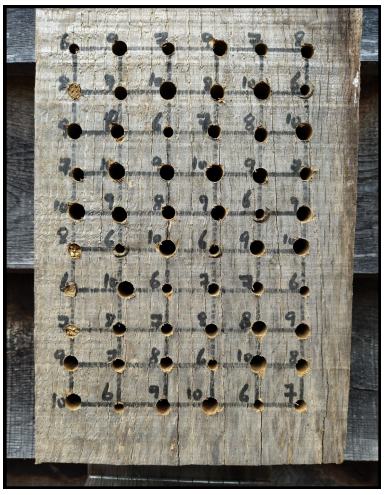


Figure 15: Dave's bee hotel with randomised room sizes.

1) Sketch out a grid pattern on a suitable block of wood (thick enough so you can drill a tunnel easily without going through all the way), allowing for repeats of your hole sizes. In this case, five hole sizes were used (6-10mm), and repeated 12 times (Figure 13).
2) Randomise the order of hole sizes. Important to do just in case e.g. 'being at the edge' is particularly attractive / unattractive for bees.
3) Drill.
4) Hang up your experimental bee hotel somewhere that you think will get visitors (near where you have had hotels before is good).
5) Observe!

Results: The red mason bees didn't seem to show much preference, using whatever size holes were available. However, later in the year the leaf cutter bees seemed to prefer the larger holes (9-10mm). Leaf cutters tend to be larger bees, so preferring a roomier tunnel makes a lot of sense. While bees didn't seem as interested in the smaller diameter holes, two species of small solitary wasp were spotted using the 6mm tunnels. Watch the full results video for more details, along with bird drama and graphs.

Would this be a project you would be interested in doing with the Buzz Club?

Bee hotels continued:

Linda's bee hotels

Linda was previously in the 'never had bee hotels' category, but this year she tried out a few different homemade types of hotel—inspired by bees previously nesting in old drill holes in a wall. Progress:

26th April: Hollowed bamboo canes, old drainpipe, and an elaborate amount of string, to avoid drilling into walls.

1st May: First visitor! Red mason bee.

4th of May: Bringing her friends—more masons.

10th June: Final mason nest capped.

15th July: First leaf-cutter bee, with characteristic bum.

September: Hotel ready for winter; no disturbance.

<- bonus in August: a little Ectemnius (?) wasp visitor

This hotel was put up at the end of April, which is probably a little late. Next year—bigger hotel / more made in different ways / up earlier!

Figure 16: 'Post' hotel was robbed out by birds.

'Post' hotel in the back garden. This one seemed to get different bees: e.g. mud and leaf mix used to close holes, which wasn't seen in the pipe hotel; no leaf cutters (holes might have been too small, based on Dave's experiment above). Unfortunately, this hotel also suffered from bird predation, pecking at the holes—finally emptied out by a woodpecker!

Introducing: the DoPI!

A new, open-access database of UK pollinators and flowers.

By Dave Goulson.

DoPI is a new, searchable, open-access database about UK pollinators and the flowers they visit (https://www.sussex.ac.uk/lifesci/ebe/dopi). It is the brainchild of Dr Nick Balfour (until recently of University of Sussex) working with other Sussex scientists including Buzz Club's Dave Goulson; with financial support from the British Beekeepers Association and the Eva Crane Trust. The database contains thousands of records of insects visiting flowers, extracted mainly from published scientific papers from 1867 to the present. So far, 327,000 records have been included!

DoPI can be **searched by plant or insect**. So, suppose you want to know which flowers to grow to attract tiger-stripe hoverflies: type in the Latin name (*Helophilus pendulus*), and you find 162 records of them visiting flowers. The most records are for heather, bramble, water-mint, ox-eye daisy, creeping thistle, ragwort, marsh thistle and hog weed. **Common names** also work for insects with widely-used names.

Plant	Pollinator	Sources	Interactions
Calluna vulgaris	Helophilus pendulus	2	24
Rubus fruticosus agg.	Helophilus pendulus	6	15

Clicking the name of any species will jump you to the **National Biodiversity Network** (NBN) page for that species, where you can find pictures, a description, and a distribution map.

You'll quickly see that some plants have huge numbers of records, such as black knapweed (22,950), bird's foot trefoil (16,527), red clover (13,186), borage (9,389), marjoram (7,727), hogweed (7,700) and bramble (6,250). This doesn't *necessarily* mean they are the best plants for pollinators, since these are very common plants, but it does show where most pollinating insects are finding their lunch. The most common insect/flower combination in the UK is for **red-tailed bumblebees visiting black knapweed**, for which there are a whopping 10,290 records.

A familiar sight - red-tailed bumblebee (*Bombus lapidarius)* female visiting a knapweed flower (credit: David Nicholls; Priory Water; 01 July 2005; www.naturespot.org.uk/species/red-tailed-bumblebee)

Garden plants **are** included in the database, but since the majority of ecological studies are done in the countryside, native plants tend to dominate the records.

Go on, have a look, and click a few buttons!

It's very easy to use, and might give you some inspiration for new plants to grow, or make room for.

Sow Wild! in Helinski

Dr Janine Griffiths-Lee

It was a busy year for Janine and the Sow Wild! project. We detailed pre-publication results of the project last year in Newsletter 14, and the full paper is now available as open-access in the Journal of Insect Conservation (check it out here for full details).

Hot on the heels of publication, Janine attended the XXVI International Congress of Entomology in Helsinki, Finland; presenting the results in a talk titled: "**Sow Wild! Citizen scientists find sown mini-meadows increase pollinator diversity in gardens."** Attendees were very interested in the use of citizen science, asking lots of questions about our methods and relationship with volunteers—and were impressed how well our participants contributed to an experimental project!

*Paper: Griffiths-Lee, J., Nicholls, E. & Goulson, D. Sown mini-meadows increase pollinator diversity in gardens. J Insect Conserv **26**, 299–314 (2022). https://doi.org/10.1007/s10841-022-00387-2*

Cavan-Monaghan Science Festival: Minibeast Mythbusting

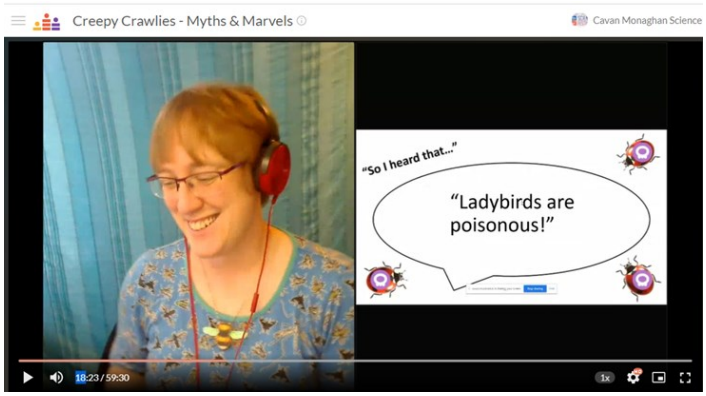
Dr Linda Birkin

A little less far afield, but still Buzz Club international, Linda went (digitally) to Ireland in November, returning to the Cavan-Monaghan science festival for another 'Minibeast Mythbusting' session. She discussed some invertebrate myths and misconceptions, and some **real** strange facts including:

- The theatrics of insect communication.
- Whether it would be a good idea to eat a bowl of ladybirds for breakfast.
- What spiders are *really* up to in your bath.
- **And more!**

If you'd like to watch along, the session is freely available to watch back on the festival's Crowdcast replay site:

https://www.crowdcast.io/e/creepycrawlies/1



*Minibeast mythbusting **and** being extremely fashionable.*

Thanks again, from the Buzz Club Team!

We're always on the look out for new project ideas, new questions to think about, and new problems to get stuck into, so give us a **Buzz** if you have any ideas!

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