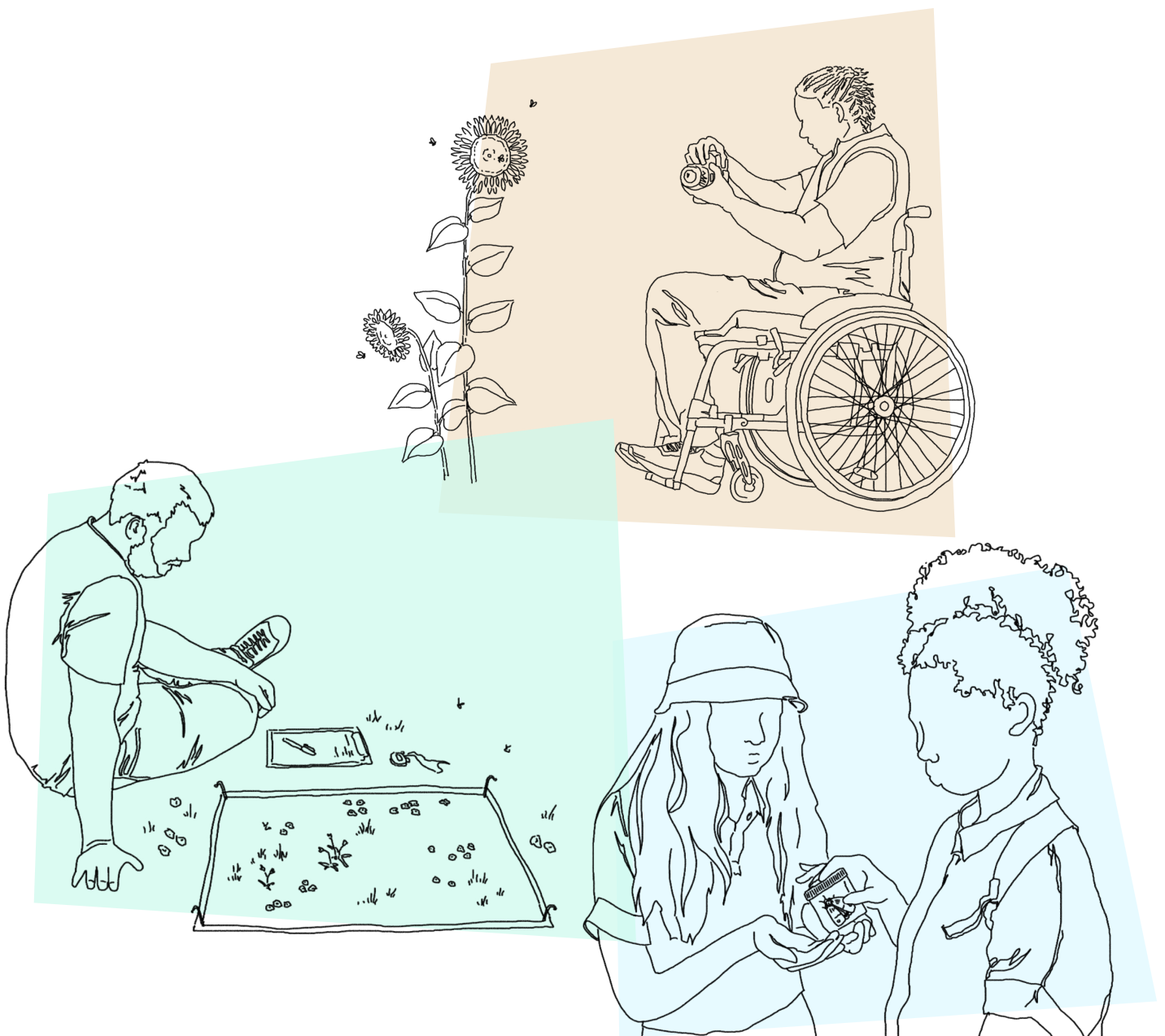


Pollinator Monitoring and Citizen Science

A practical guide for project organisers and participants



UK Centre for
Ecology & Hydrology



JNCC

Acknowledgements

Funding: Natural Capital Ecosystem Assessment

Authors: Miranda S. Bane, Michael J.O. Pocock

Design: Andy Sier, UKCEH

Illustrations: Miranda Bane

Photos: Barry Wells (www.barrywells.co.uk) except for photo on page 8 (courtesy Cumbria Wildlife Trust)

We thank Paul Woodcock (JNCC), Martin Harvey and Claire Carvell (UKCEH) for advice in developing this guide. We also thank Úna FitzPatrick (National Biodiversity Data Centre, Ireland) and the Guernsey Pollinator Project for their input.

Thank you to all the stakeholders who shared their knowledge and experience in focus groups for the development of this guide.

Citation

To cite this work please use the following information:

Bane M.S. and Pocock M.J.O., 2023. Pollinator monitoring and citizen science: a practical guide for project initiators and participants. UK Centre for Ecology & Hydrology, Wallingford, UK.

DOI: [10.5281/zenodo.8091250](https://doi.org/10.5281/zenodo.8091250)

Distribution and Copyright

This guide can be freely distributed in its original form for non-commercial purposes. Please feel free to forward it to anyone you think will be interested. All content is copyrighted by authors and no images or sections of text can be extracted and used elsewhere without first obtaining permission.



UK Centre for
Ecology & Hydrology

The UK Centre for Ecology & Hydrology (UKCEH) is an independent, not-for-profit research institute carrying out excellent environmental science with impact. We have a long history of investigating, monitoring and modelling environmental change. Our 500+ staff provide the data and insights that researchers, governments and businesses need to create a productive, resilient and healthy environment.

www.ceh.ac.uk



The Joint Nature Conservation Committee (JNCC) is the only statutory nature advisor to all four countries of the UK. We provide robust scientific evidence and advice to help decision makers turn science into action for nature conservation and recovery. We work across land, sea and air with partners throughout the UK, the UK Overseas Territories, the Crown Dependencies and around the world.

jncc.gov.uk



This work was funded by the UK Department for Environment, Food and Rural Affairs through the [Natural Capital and Ecosystem Assessment programme](#)

About this guide

This guide was produced by UKCEH and JNCC as part of the Natural Capital and Ecosystem Assessment Programme.

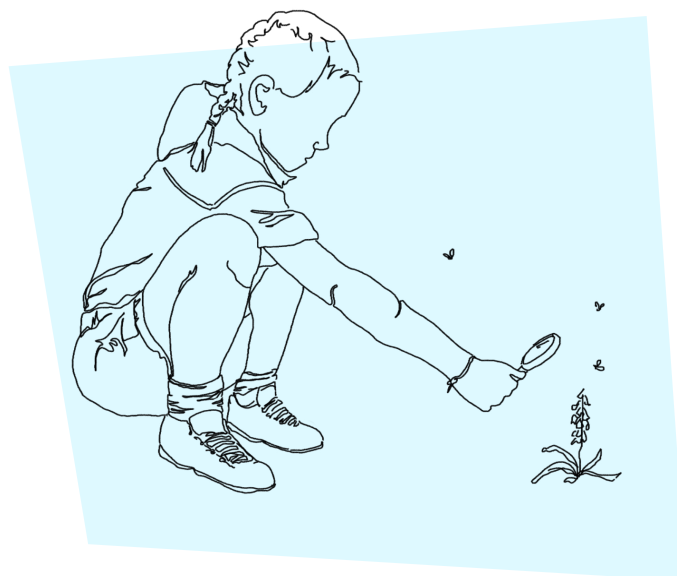
Monitoring pollinators is important. Data on pollinators contributes to research, conservation, and policy. Understanding more about pollinators helps us to protect them and restore their populations.

Citizen science is a fantastic way to collect data on pollinators whilst engaging the public in science and conservation. There are many

different approaches that can be tailored to your needs, and many existing pollinator monitoring schemes that you can participate in.

This guide will help you decide if citizen science is the right approach for you, and to help you choose the best methods.

It was written with the users, for the users. We thank all the stakeholders who shared their experience and needs with us during focus groups. They included conservation practitioners, community group leaders, educators, researchers, and policy advisors.



Further reading

For more general information about developing and using citizen science please see:

- Tweddle, J.C., Robinson, L.D., Pocock, M.J.O. & Roy, H.E (2012). **Guide to citizen science: developing, implementing and evaluating citizen science to study biodiversity and the environment in the UK.** Natural History Museum and NERC Centre for Ecology & Hydrology for UKEOF. Available online: www.ceh.ac.uk/citizen-science-best-practice-guide
- Pocock, M.J.O., Chapman, D.S., Sheppard, L.J. & Roy, H.E. (2014). **Choosing and Using Citizen Science: a guide to when and how to use citizen science to monitor biodiversity and the environment.** Centre for Ecology & Hydrology. Available online: www.ceh.ac.uk/citizen-science-best-practice-guide

Contents

About this guide	2
Is this guide for me?	4
How to use this guide	4
Introduction	5
What do we monitor?	6
Why monitor pollinators?	7
Citizen Science for pollinators	9
Identification: the challenge of recording pollinators	13
A starter's guide to citizen science pollinator monitoring	14
Step 1: Get ready	16
Step 2: Get planning	19
The future of monitoring	35
Pollinator monitoring schemes and organisations in the spotlight	36

Is this guide for me?

This guide is for anyone interested in monitoring pollinators including:

- Conservation, community, and volunteer groups
- NGOs
- Businesses
- Teachers
- Individuals
- Researchers
- Policymakers.

This guide focuses on citizen science approaches for pollinator monitoring. It is targeted at pollinator monitoring in urban areas, like towns and cities, but can be used to support pollinator monitoring in any location.

This guide is designed to help you answer the following questions:

- **Why monitor pollinators?**
- **Is citizen science the right approach for me?**
- **How can I use citizen science for pollinator monitoring and engagement?**
- **What methods are most appropriate for my aims?**
- **How can I participate in existing schemes and projects?**

How to use this guide

If you are completely new to pollinator monitoring, we suggest you start at the beginning and work your way through.

If you want to monitor pollinators but are not yet sure if citizen science is the right approach for you, start with the section on 'Citizen science for pollinators', (p. 9)

If you are ready to start planning your citizen science pollinator monitoring, jump to our 'Starter's Guide' on page 14 and get going.

If you want to learn about existing schemes for pollinator monitoring, go to p. 36 where you can find out what's already out there and how to participate.

If you are already monitoring pollinators and want to know what to do with your data, jump to p. 30.

Introduction

What do we mean by monitoring?

Biodiversity monitoring is the process of keeping track of nature: collecting and interpreting data about living things and their environment over time. By collecting data across time and in different places, we understand how and why nature is changing and what we can do to help.

What are pollinators?

Pollinators are creatures that visit flowers – often to feed on nectar or collect pollen. By doing this they may ‘pollinate’ flowers (if they move pollen grains between the sexual organs of flowers). This helps wild and cultivated plants to grow fruits, nuts and seeds, and contributes to the genetic diversity of plants.

In the UK, a vast number of different insects are pollinators¹. Honeybees are well known, but there are more than 250 species of bee in Britain, including bumblebees and solitary bees. Other insects – hoverflies and moths in particular – are important pollinators, but can be overlooked. Beetles, butterflies, flies and wasps are also pollinators.



Some examples of pollinators

Clockwise from top left: Bumblebee (*Bombus terrestris/lucorum*); Hoverfly (*Chrysotoxum bicinctum*); Nomad bee (*Nomada fulvicornis*), Hoverfly (*Eristalis tenax*); Butterfly (Green-veined White); Solitary bee (leafcutter bee, *Megachile centuncularis*)

¹ Technically, these flower-visiting insects are potential pollinators. Not every insect flower visitor is a pollinator, and not every visit by a pollinator will lead to pollination. However, for simplicity, we refer to flower-visiting insects as pollinators throughout this guide.

What do we monitor?

Broadly, we can collect five different types of information about pollinators:

Presence of a pollinator species

What – where – when?

Species records tell us what pollinators were present at a given location and time. Often these records are collected as and when people chose, so are called 'unstructured'. When analysed they show the changing distribution of species: which are being lost, and which are moving into new locations.

Abundance of pollinators

How many pollinators are there in this place?

Counting the number of pollinators in a set place and time gives 'abundance' data, which can be compared with other places or times. Abundance data of species at single location shows which species are common, and which are rare.

Pollinator behaviour: feeding and nesting

What plants are pollinators visiting and feeding upon?

Some pollinators are dependent on specific plants for their survival, and others have wide preferences.

Where and when are pollinators nesting?

Pollinators need homes as well as flowers. Some solitary bees nest in holes in lawns, or in 'bee hotels'; nests and larvae of other pollinators are more difficult to find.

Pollination outcomes

Was the flower pollinated?

Some plants, including many fruits and vegetables, need to be pollinated by insects. If good quality fruit and seeds are produced, this suggests that there is a good population of pollinators in the area.

Presence and condition of habitats for pollinators

What is the environment for pollinators like?

By recording which habitats are where, and monitoring their condition (e.g. the number of flowers), we can learn which areas are good for pollinators, and which could be improved.

Why monitor pollinators?

Across the world, insects are threatened and numbers are declining. Intensive agriculture, loss of habitat, climate change and pesticides can all harm pollinating insects. There are still many gaps in our knowledge about pollinators and their threats.

Monitoring enables us to better understand the ecology, behaviour, and conservation of pollinators.

With good monitoring we can answer questions like:

- How are the different types of pollinators faring at a local and national scale?
- What can we do to conserve and help pollinators? And are our actions helping?
- Which habitats are important to pollinators?

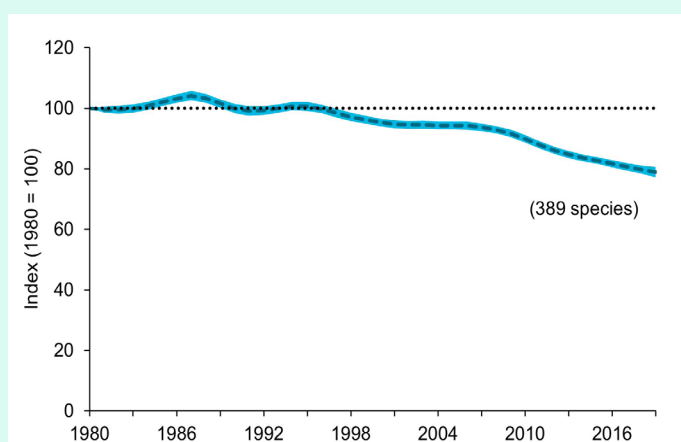
At the local level, data about pollinators can be used to focus the conservation efforts of individuals, organisations, and communities. At the national scale, data about pollinators can be used to answer research questions and help shape policy.

National-scale monitoring

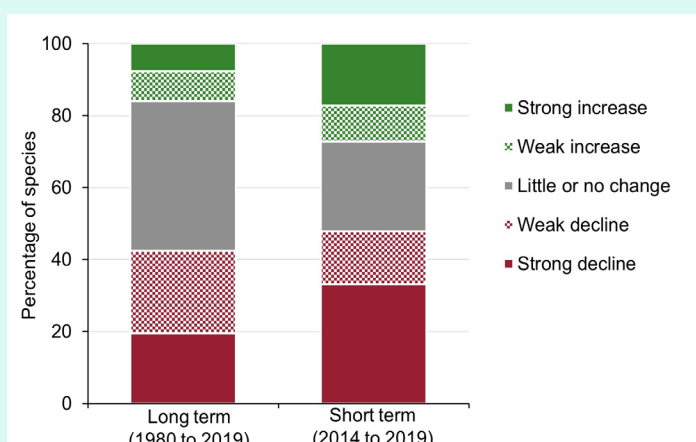
In the UK, volunteers have made tens of thousands of records of pollinator species, such as bees and hoverflies. These volunteers have been supported by the Bees, Wasps and Ants Recording Society and the Hoverfly Recording Scheme. Experts from those schemes have verified and collated the records. These large datasets have been analysed by scientists at UKCEH to produce indicators of the state of pollinators. They are used in the *UK Biodiversity Indicators* and the *State of Nature* reports. They have also been used to assess the impact of threats like neonicotinoid pesticides. The results are used by government to guide new policy, and by conservation charities to plan large-scale conservation actions.

Examples of data use

Trend in the distribution of UK pollinators



Long- and short-term changes in individual species trends for UK pollinators



Examples of how data about pollinators is used to identify trends at a national scale from the *UK Biodiversity Indicator D1c – The Status of Pollinating Insects*²

² Department for Environment, Food and Rural Affairs, UK. 2022. UK Biodiversity Indicators 2022 hub.jncc.gov.uk/assets/3de3abe1-d7d1-417e-9684-1348dd8b9a5a

Local-scale monitoring

Cumbria Wildlife Trust has been using pollinator monitoring to improve the landscape for pollinators across North and West Cumbria.

The Planting for Pollinators project covers over fifty sites and 158 hectares of habitat. Together with Cumbria County Council, the Trust has created, improved, and connected a mosaic of pollinator-friendly habitats, in turn providing food, shelter and nesting places for bees, butterflies, wasps and other insects. The sites are varied and include roadside verges, farmland, community green spaces, orchards, church grounds, and public & private gardens. Cumbria Wildlife Trust has been carrying out surveys on each site with the help of landowners and land managers whilst offering advice on how to restore and manage habitats for the benefit of pollinators.

Monitoring pollinators has helped Cumbria Wildlife Trust to draw up bespoke restoration plans for each site. Habitat restoration and planting were then carried out with the support of local communities and volunteers. Training in pollinator identification and recording was offered to anyone from the local area ensuring local people now have the skills and knowledge to continue to monitor which pollinators are present at each site. Alongside the habitat improvement works, continuing monitoring will build understanding and lead to a better future for Cumbria's pollinators.



Photo Credit: Cumbria Wildlife Trust



Citizen Science for pollinators

What is citizen science?

Citizen science refers to any approach in which public volunteers get involved in doing scientific research – in particular, collecting data. Citizen science is also known as community science, participatory research, volunteer research, or volunteer monitoring.

All the key types of data on pollinators (see page 6) can be collected with citizen science.

People with any level of knowledge can participate in citizen science. For some, they are involved to learn and develop new skills;

others want to use their existing expertise. Participants gain benefits by being more connected to nature, and more empowered to make a difference for nature.

For more information on citizen science, see the Best Practice guides at www.ceh.ac.uk/citizen-science.

Citizen science is a great way to monitor pollinators and engage with people.

Why use citizen science for pollinator monitoring?

Benefits for data

Many records with wide spatial coverage

Citizen science helps us to collect data on a scale not otherwise possible: more records, across long time periods and in many diverse locations. This includes private gardens, which would otherwise be difficult for scientists to access.

Good quality data

Citizen science can produce good-quality data. There are scientific methods to validate data, and analysis can take account of sampling uncertainty or data gaps.

Detecting rare events

When lots of people are involved, the chance of detecting a rare event is increased, for example a species spreading into new areas.

Benefits for people

Engagement

Through citizen science, people can find out more about pollinators and do something to help. They often describe citizen science as fun and a simple way to contribute something meaningful. Citizen science lets them engage with nature and with science.

Creating communities

Taking part in citizen science connects participants to a local community and national, even global, online networks. It can connect people to your project or organisation. People can take part on their own, with friends and family, or as part of a group.

Health & well-being

Research shows that taking part in nature-based citizen science can increase people's physical and mental well-being. In turn, they are then more likely to make changes to benefit nature.

Education & learning

Children and adults can gain new skills and knowledge. Participants can learn directly from scientists and each other.

Using their expertise

Some volunteers will be experienced naturalists. Taking part allows them to contribute their expertise.

Increasing inclusivity

Citizen science can allow a greater diversity of people to be engaged with nature, science and conservation. Projects will need to be designed to reach particular audiences.

Other benefits

Benefits from technology

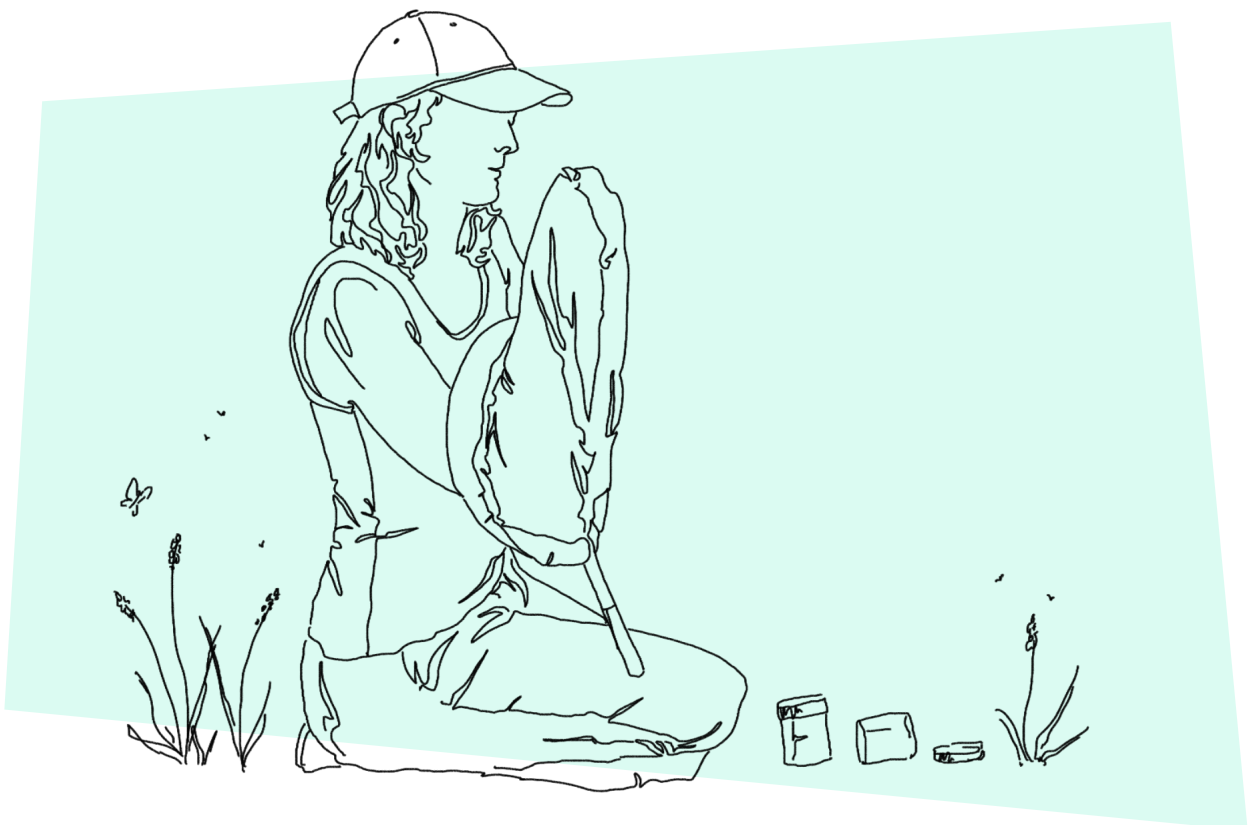
Many citizen science projects make great use of technology. Some projects have smartphone apps, making it easy to contribute and receive feedback. Recent advances in artificial intelligence are being used to help participants identify plants and pollinators using the camera on a smartphone. These methods are rapidly improving.

Diversity of approaches

There are so many different citizen science projects and methods available. These can be tailored to the specific needs of the individual/community/group. This guide is written to help you find the right approaches for you.

Cost efficiency

Citizen science is not free, it requires resources to support volunteers and create recording tools, but it is often a cost-efficient way of gathering data.



Challenges with using citizen science

Although citizen science has many strengths, consider these challenges:

- **Methods need to be carefully chosen.** Monitoring can be simple or complex. Use this guide to help you find the right balance between the best data and the ability of the participants.
- **Data quality requires verification.** Citizen science data can be of mixed quality. You can provide training for volunteers in advance (in person or via online training materials) to enhance data quality. Data should also be verified using automated and manual checks, e.g. highlighting unusual records, or using photos for verification. Manual checking is time consuming.
- **Volunteers need to be recruited and supported.** It takes time and effort to recruit volunteers. Volunteers need to be supported throughout the project so that they stay involved.
- **Citizen science is not free!** Volunteers generously give their time, but time and money are needed to organise, run, and maintain citizen science. Staff may be required to support and train volunteers. It is easy to under-estimate the resources required to be successful.

Citizen science versus monitoring by professionals

Citizen science does not replace 'professional' scientific monitoring (i.e. using paid staff), but complements it. Sometimes it might be more time- and cost-effective to employ someone to do the sampling rather than use citizen science.

Or you could take a hybrid approach where citizen science volunteers and professionals share the tasks; perhaps professionals could monitor more challenging areas or help train volunteers.



Identification: the challenge of recording pollinators

Identifying pollinator species can be hard! Volunteers need to be confident making accurate records, and may need training or mentoring.

Distinguishing the broad types of pollinators can be tricky. For instance:

- Honeybees can easily be mistaken for many other pollinators (especially some hoverflies)
- Many bumblebee species can be distinguished by their colour patterns, but this may not be easy for a beginner. To add confusion, some hoverflies mimic bumblebees.
- Social wasps look superficially like some hoverflies.
- Many smaller bees and hoverflies look very similar to each other.
- Flies are a hugely diverse group, and it is very challenging to identify many of them without some training.

But don't despair! You can:

- **Provide training for volunteers** to support their identification skills: some people will be very motivated to learn. For example, see the "Guide to Recognising Insects" on the FIT Counts website (<https://ukpoms.org.uk/fit-counts>). Also the French project SpiPoll (<https://www.spipoll.org/>) provides an interactive key to help people identify pollinators that they have photographed.
- **Focus on a group of pollinators** that can be accurately and confidently identified by your participants.
- **Record broad groups of pollinators** rather than species. The Flower-Insect Timed (FIT) Count survey used by the UK Pollinator Monitoring Scheme takes this approach and provides detailed online training guides. Remember to check that your volunteers are confident in recording these groups.
- **Encourage volunteers to submit photos** to platforms like iNaturalist where a global online community can help provide identifications.
- Rather than identifying insects, you could **collect other kinds of information** to understand the suitability of the wider environment for pollinators (e.g. numbers of flowers).

Examples of similar-looking pollinators



Beeflies and some hoverflies (left) can be very convincing bumblebee mimics

These flies (right) are mimicking wasps and hornets, protecting themselves from predation



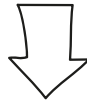
A Starter's Guide to Citizen Science Pollinator Monitoring



A starter's guide to citizen science pollinator monitoring

If you've decided citizen science pollinator monitoring is for you, use this starter's guide to get planning.

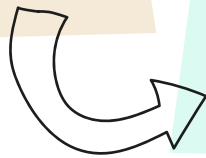
START HERE



Step 1. Get ready

What is your aim?

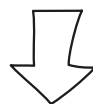
Page
16



What are your resources?

e.g. funding, experience in team,
existing volunteers

Page
18



Step 2. Get planning

Survey design

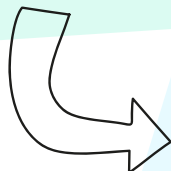
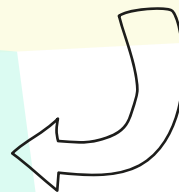
Page
19

1. What sampling method will you use?
2. What survey design will you use?
3. When, where and how frequently to record?

Page
30

Data management and analysis

4. What data to collect?
5. What will you do with your data?



Communication and engagement

6. Who will you engage with?
7. How will you communicate with them?

Page
33

Track your progress
through the guide



Step 1: Get ready

What is your aim?

Be clear about your aim - it will help you plan your pollinator monitoring. It is possible to have more than one aim but, for this Starter's Guide, we suggest that you decide on the most important one. You can incorporate other aims later.

Common aims:

- **To collect information on the pollinators in your area:** You might simply want to know what pollinators are present, or discover the best habitats for pollinators in your area. The information can be used to influence local planners and policymakers to conserve pollinators.
- **To contribute to existing monitoring schemes:** You might be concerned about pollinator declines. Contributing to existing schemes is an opportunity to help our understanding of pollinators nationally. The data submitted to existing pollinator monitoring schemes is used to inform policy and research.
- **To engage or educate the public:** You might want to help people in your local community engage with nature by observing pollinators and learning about biodiversity. Citizen science is a great way to involve people in nature, conservation and science while collecting valuable data.
- **To collect evidence on the outcome of pollinator-friendly actions:** If you are planning actions to support pollinators, then you could monitor what difference you've made. Sometimes it is a requirement of funding for pollinator-friendly actions to monitor the impacts. See Question 2 under Step 2 for more discussion about survey designs to achieve this.

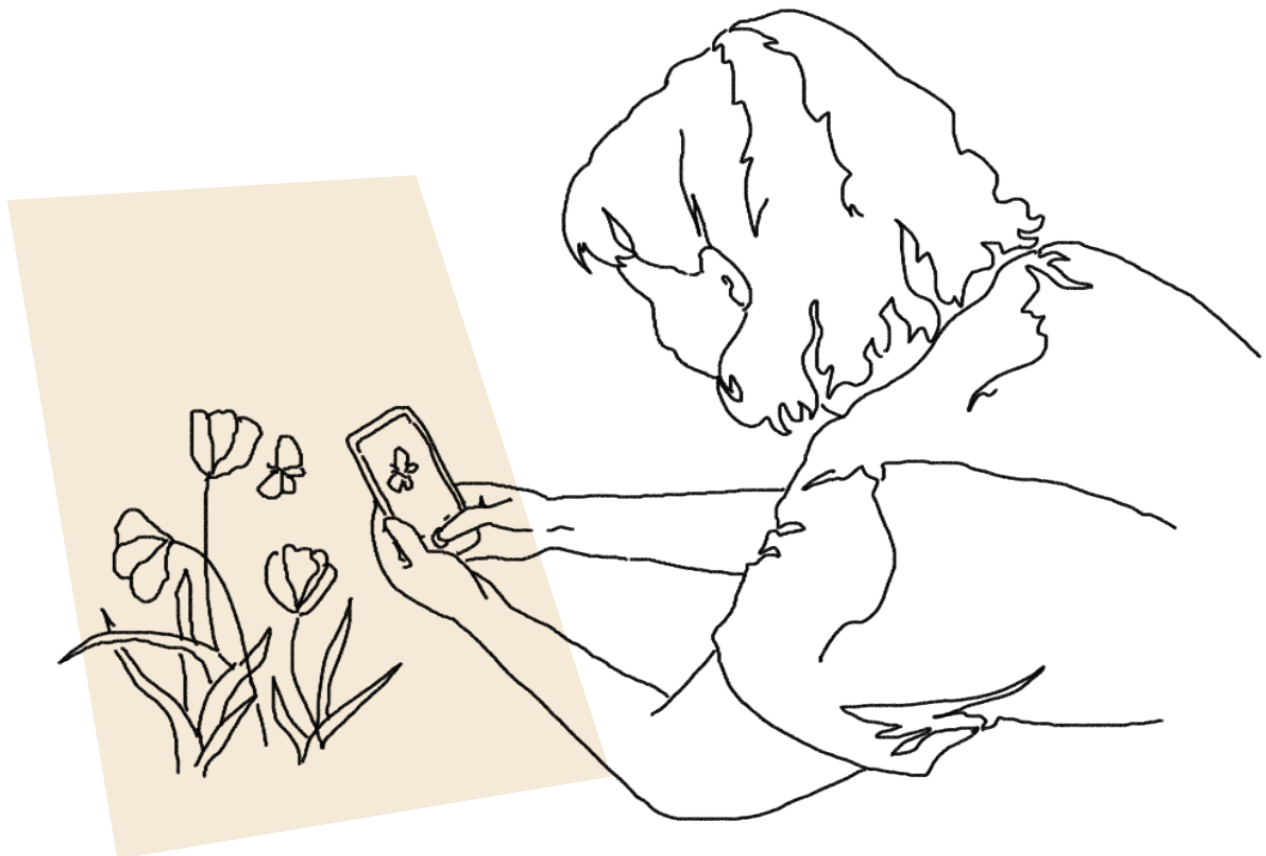


Local relevance versus national value: You don't need to re-invent the wheel

Your project needs to be locally relevant, but we'd strongly recommend you consider tapping into an existing pollinator monitoring scheme. By doing this you gain many benefits:

- You are using sampling methodologies that are tried and tested
- Your dataset will have comparability and compatibility with other datasets, so your project can make an even greater contribution to pollinators
- Tools for submitting and storing data securely have been developed, making it easier and more efficient for you
- Organisers have thought how to validate and verify their data (making sure the quality is good enough) and how to do the analysis
- By taking part you'll also be contributing to larger projects that support decision-making.

The disadvantage is that, for some projects, it is currently difficult to get access to your volunteers' data. We discuss this more under Step 2, Question 5. Make sure that any existing project you get involved with shares its data. Projects we mention in this guide all share their data, but it is easier to get your project's data back with some than with others.



What are your resources?

The resources you require will depend on the scale of your ambition; and **your ambition should be shaped by the resources available**. For example, evaluating the impact of pollinator-friendly actions across a whole city (e.g. to report to funders) requires more resources than a project simply getting local people collecting pollinator records.

Resources that might be valuable include:

- A team of project organisers, which could include one or more people:
 - willing to recruit and support volunteers
 - with knowledge about pollinators and monitoring, or other scientific skills
- A network of existing or potential volunteers
- Funding to support volunteers, e.g. in providing resources or training.

Timescale

Consider the long-term sustainability of your project right from the start. If you only have support for a short period of time be careful about creating expectations the project will continue, and think about how to ensure your findings remain accessible afterwards. The aim to monitor over multiple years will tend to require longer-term commitment, but can help you to build a valuable dataset. For example long-term data are required to distinguish overall trends from annual changes due to weather patterns.

Smart Design

Engage with and 'co-design' your methods with potential volunteers from the start.

By doing this, you will begin to build the community, and have a better understanding of what monitoring methods will work (and what may not). Answer the 'Get Planning' questions in step 2 on the next page to decide on possible approaches. Try out methods with small groups of people, get their feedback and then reflect on the 'Get Planning' questions again. Adapt your methods so that your project is as successful as possible.

Lots from few people, or few from lots of people?

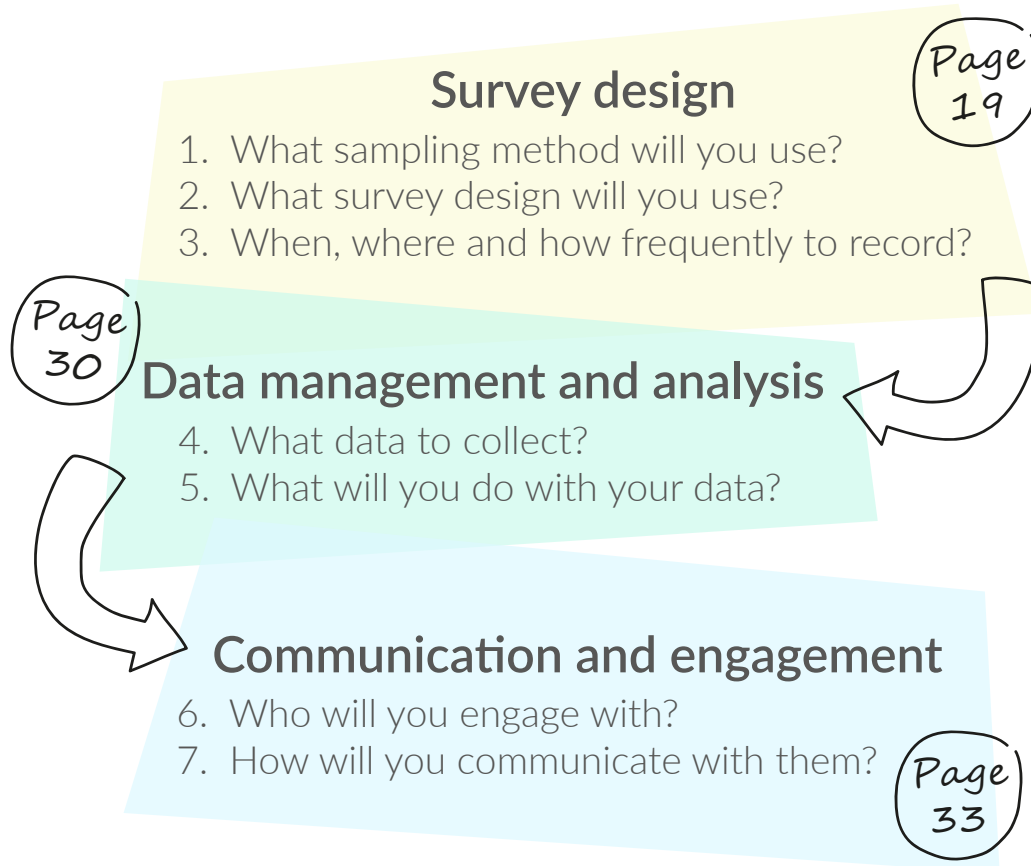
A critical decision is who you recruit versus the quality of their data. Consider your aims.

- You could invest in fewer well-trained volunteers to provide high quality records (following a protocol, recording consistently and regularly in the same locations).
- Alternatively, you could engage lots of people recording in lots of locations, following a simple protocol, but accept that accuracy might be more variable.

The 'Get Planning' questions (p19) should help you decide which is best for you.

Step 2: Get planning

For Step 2 there are **7 key questions**. Going through the questions should help you make good decisions on how to run your pollinator citizen science monitoring. Keep your aim in mind as you go through the questions:



Survey design

Q1 What sampling method will you use?

The sampling method you choose to monitor pollinators is one of the most important decisions you will make. Changing the sampling method during a project makes it difficult to compare the data before and after. Your sampling method should depend on your aims and the potential participants.

You can develop your own methods, but we recommend choosing from the tried-and-tested methods described in this section.

Remember to record any pollinator-friendly actions that have been done at any of the sites that you monitor, e.g. planting for pollinators or putting up 'bee hotels'.

We have provided guidance to help you assess the suitability of nine major methods for monitoring pollinators. The guidance is based on the categories below.

Table 1: Assessing the suitability of these methods for citizen science pollinator monitoring
With a focus on urban settings

Consideration	Definition
Likely suitability?	A simple summary of the likely suitability of each method for your pollinator citizen science, based on the criteria given in the table. (⊕ ⊕ ⊕ ⊕ to ⊕)
Key information	The key information that is collected by the methodology. See 'What do we monitor' (p. 6)
Diversity of pollinators recorded*	Potential for the methodology to provide good information on a wide range of different pollinators. This is valuable because it is often better not to be restricted to just one 'indicator' group. (High to Low)
Potential for beginners*	All these methods could be suitable for beginners, so we highlight those that are particularly suitable for those who do not have strong skills in insect identification or access to specialist equipment. (High to Low)
Ease of participation*	Specifically considering the time or effort required. Methods that require less time and less commitment may be more sustainable for volunteers. (High , e.g. can be completed in 10 minutes or so, to Low , e.g. requires much more time or longer-term planning)
Repeatable methodology	It is valuable to use methods that are repeatable. This will mean that differences in results are more likely to be real than due to chance differences. (High to Low)
Suitability for public spaces	Methods that do not have risk of interference are likely to be more suitable for public spaces, especially in urban areas. (High to Low)

* In practice, many of these attributes will depend on how the method is use. For example, focal timed counts could involve identifying pollinators to group level or to species level, and the latter would require more expertise. Similarly, a short transect will have a lower time commitment than a long transect. The summary table is intended to give an idea of the typical use of the method.

Summary of the methods and their main advantages and limitations

Focal timed counts

Identifying and counting pollinators seen over a specified period in a set place, for example 10 minutes recording at a 50 x 50 cm patch of flowers

Examples:

FIT Counts (part of the UK Pollinator Monitoring Scheme)

Likely suitability?

⊕ ⊕ ⊕ ⊕

Key information:

Pollinator abundance

Diversity of pollinators recorded:

High

Potential for beginners:

Medium-High

Ease of participation:

High

Repeatable methodology:

High

Suitability for public spaces:

High

Key uses and advantages

- Great activity to engage people and introduce them to pollinator monitoring
- Being focussed on a small area (e.g. 50 x 50cm) allows volunteers to focus on making good identifications
- FIT Count methodology in UKPoMS has good online resources

Main limitations

- Requires some training in identifying different types of insects
- Counts take place in small areas over short times, so can be influenced by many variables (like weather)
- Large sample sizes are required for rigorous analysis, although using focal timed counts with a good scientific design (see Step 2, Question 2) enables sites to be compared

Transects

A fixed route which is walked at a steady pace. Pollinators within a set distance (typically 2m) of the observer are counted

Examples:

BBCT BeeWalk

UK Butterfly Monitoring Scheme transects

Likely suitability?

⊕ ⊕ ⊕

Key information:

Pollinator abundance

Diversity of pollinators recorded:

Medium

Potential for beginners:

Medium-High

Ease of participation:

Medium

Repeatable methodology:

High

Suitability for public spaces:

High

Key uses and advantages

- Using a set transect that is walked regularly is great for surveying pollinators across a larger area
- Transects can be subdivided so abundance can be linked to habitat in different parts of the transect

Main limitations

- Limited to pollinators that can be more easily identified with experience (e.g. butterflies or bumblebees)
- Requires enough area to run a transect (e.g. at least 100m)

Roving timed counts

Counting the pollinators you see over a specified period of time in one place. For example, recording all butterflies seen in a park for 15 minutes

Examples:

[Big Butterfly Count](#)

[ButterflyCount app](#)

Likely suitability? ⊕ ⊕ ⊕

Key information:

Diversity of pollinators recorded:

Potential for beginners:

Ease of participation:

Repeatable methodology:

Suitability for public spaces:

⊕ ⊕ ⊕

Pollinator abundance

Medium

High

High

Medium

High

Key uses and advantages

- Simple activity that allows people to look for and report pollinator sightings over a set period of time (e.g. 10-15 minutes)
- Great for insect groups like butterflies which are easily seen and counted
- Apps exist to support roving timed counts for butterflies

Main limitations

- The area searched is not defined, so the data are less standardised than focal timed counts
- Less suitable for smaller insects that are harder to identify, like solitary bees and flies

Ad hoc species recording

This may be 'casual' recording: recording pollinators that you see, as and when you choose. It may be part of a more thorough search for all the species present

Examples:

[iRecord](#) (records are validated by UK recording schemes)

[iNaturalist](#) (an online community contributes to the identification)

Likely suitability? ⊕ ⊕

Key information:

Diversity of pollinators recorded:

Potential for beginners:

Ease of participation:

Repeatable methodology:

Suitability for public spaces:

⊕ ⊕

Pollinator presence

High

Medium

High

Low

High

Key uses and advantages

- Great for getting lists of species observed at a site
- Apps support people making records and getting feedback, including using AI (image recognition) to support identifications (but see the limitations opposite)
- Can also gather information on the flowers that pollinators are visiting

Main limitations

- Many species cannot be identified from photos, so require a specimen to be captured and examined under a hand lens or microscope
- Even for those that can be identified from photos, it can be hard to get photos good enough for identification
- Unless someone is an expert, this is likely to be biased toward more conspicuous species

Insect trapping

Involves leaving a trap to collect insects for a set period. The insects are usually killed in the trap and retained for later identification by an expert, or by DNA analysis

Likely suitability? ⊕ ⊕

Key information:

Diversity of pollinators recorded:

Potential for beginners:

Ease of participation:

Repeatable methodology:

Suitability for public spaces:

⊕ ⊕

Pollinator abundance

High

Medium

Low

High

Low

Key uses and advantages

- A wide range of methods that can provide standardised sampling of a wide range of insects (see examples below)
- Samples can be retained for detailed identification (including DNA analysis), so can be good for species that are difficult (or impossible) to identify in the field
- Traps can be left out for a long period of time, so short-term variation in weather is less problematic than for other methods
- Attractant traps can collect specific types of insect, making recording even easier

Main limitations

- Kill sampling, so this will be unacceptable to some people and possibly to project organisers
- Killing more insects than required could be regarded as unethical
- Different traps will be better at capturing different types of pollinator

Table 2: Trapping methods

A wide range of traps can be used in different circumstances. Here are some popular examples for pollinators. Usually these are lethal traps.

Pan traps	Coloured bowls (usually bright yellow, sometimes also white and blue) containing water and a little detergent – insects are attracted to the colour and then fall into the water. Usually left out for 6-48 hours
Yellow sticky traps	Sheets of yellow paper with a non-drying sticky surface. Insects are attracted to the yellow colour and then get stuck to the trap. Can be left out for a week or two
Attractant traps	For example, beer traps used in the Big Wasp Survey or pheromone traps, which are designed to attract specific types of insects (often a single species). Pheromone traps are mostly available for pest species of moths, rather than all pollinators
Malaise traps	Tent-like structures that insects fly into and are then collected in a bottle of preserving liquid

Flower surveys

Counting the flowers available for pollinators in a fixed area. This can be converted to the amount of nectar available for pollinators

Examples:

Every Flower Counts run by Plantlife each May

E-Surveyor developed for farmers, uses AI to record plants from photos

Likely suitability? ⊕ ⊕

Key information:

Flower abundance (habitat quality)

Diversity of pollinators recorded:

n/a

Potential for beginners:

High

Ease of participation:

High

Repeatable methodology:

High

Suitability for public spaces:

High

Key uses and advantages

- A simple method that can be done whatever the weather and repeated many times across a site and across a season
- Provides information on the flowers supporting pollinators

Main limitations

- Does not provide information on the pollinators themselves

Pollination studies

Recording fruit set or seed set in plants that require cross-pollination by insects. This is usually done as an experiment in which people grow the same variety of plant

Examples:

Strawberries, sunflowers, and beans are often used in citizen science experiments³

Likely suitability? ⊕

Key information:

Plant pollination

Diversity of pollinators recorded:

n/a

Potential for beginners:

Medium

Ease of participation:

Low

Repeatable methodology:

Medium

Suitability for public spaces:

Low

Key uses and advantages

- Directly measures pollination, not simply pollinators, so valuable where this is a priority, e.g. for growers.
- Could be suitable for gardeners who are growing the plants already

Main limitations

- Fruit/seed set will be affected by the local conditions, e.g. watering.
- Requires commitment to grow the plants and make detailed records (e.g. counts or mass of seeds)

³ For example, Birkin, L. and Goulson, D. (2015), Using citizen science to monitor pollination services. *Ecol Entomol*, 40: 3-11. doi.org/10.1111/een.12227

Bee hotel surveys

Counting the use of nesting holes in 'bee hotels'.
Checking bee hotels provides information on the mason bees and leaf-cutter bees that regularly use them

Examples:

Apart from 'bee hotels', it is difficult to survey for nesting sites of bees or larval habitats of most other pollinators

Likely suitability? \oplus

Key information:

Diversity of pollinators recorded:

Potential for beginners:

Ease of participation:

Repeatable methodology:

Suitability for public spaces:

Pollinator abundance

Low

Medium

Low

Low

Low

Key uses and advantages

- Provides information on nesting of pollinators, which is otherwise difficult to obtain

Main limitations

- Only a few species of solitary bee use 'bee hotels' (bumblebees do not use them)
- Use of bee hotels can depend on many factors, such as the specific location

Moth recording

Moths are valuable night time pollinators. Many species can be surveyed using a light trap that attracts moths, allowing them to be recorded and released unharmed

Likely suitability? \oplus

Key information:

Diversity of pollinators recorded:

Potential for beginners:

Ease of participation:

Repeatable methodology:

Suitability for public spaces:

Pollinator abundance

Low

Low

Low

Medium

Low

Key uses and advantages

- A way of gathering information on often-overlooked night time pollinators
- Other forms of moth recording, e.g. transects using a torch with a red filter, can be used, but the rate at which moths are encountered is often low

Main limitations

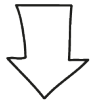
- Only traps moths (although can capture many species)
- Light traps are the most efficient method of sampling (traps can be left out and checked in the morning) but are expensive and require a source of power. Traps could be subject to disturbance
- Other methods require people to go out at night

Q2 What survey design will you use?

A survey design is the way you will use your sampling methodology (see Question 1). You will need a good survey design to make comparisons across different locations and/or across time. Remember that the survey design needs to support your aim for monitoring.

If your aim is:

- Engaging and educating people about pollinators
- Contributing to existing monitoring schemes
- Collecting simple information on pollinators in your local area



No specific design is needed

People can record as and when they want, e.g. using a method like FIT Counts or doing species recording. If contributing to an existing monitoring scheme, follow guidance that they provide. Scientists in the projects will do research with the submitted data to understand large-scale trends in pollinators and contribute to pollinator conservation.

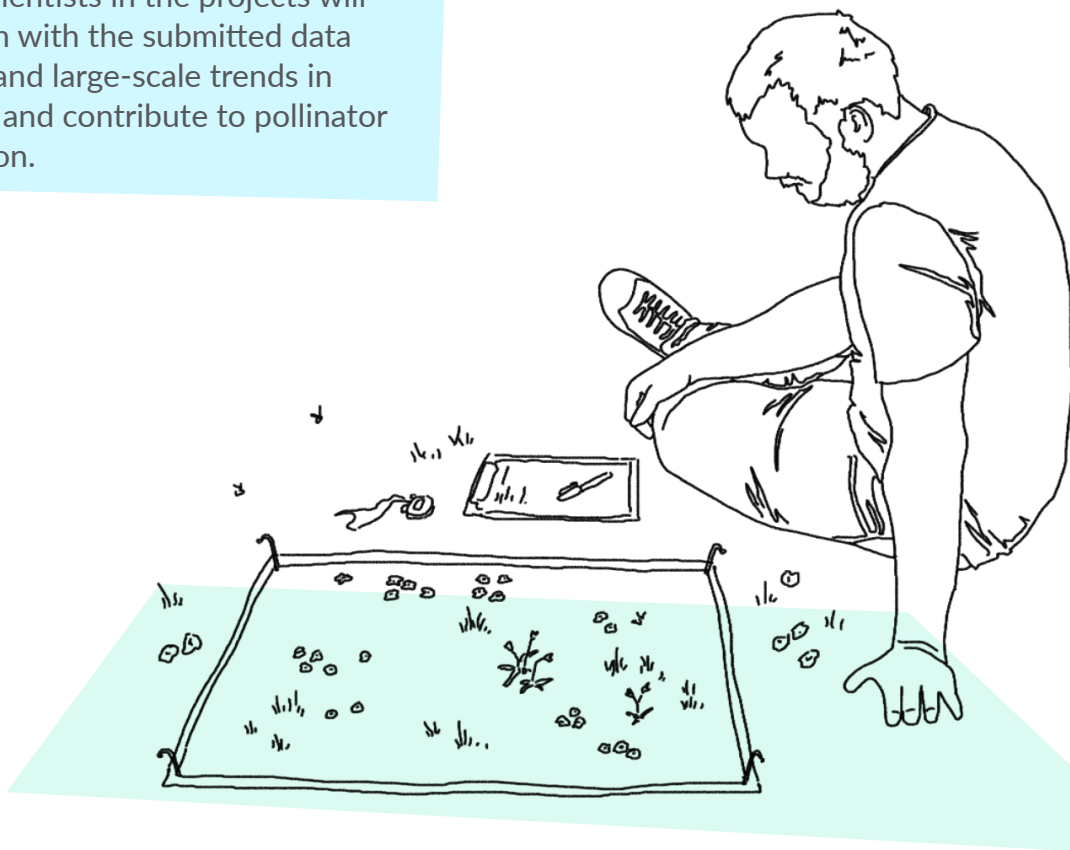
If your aim is:

- Collecting more detailed information on pollinators in your local area
- Collecting evidence on the outcome of pollinator-friendly actions



We recommend that you consider a scientific sampling design

Good options for the design are given on the next page. These designs can be applied with any of the survey methods listed earlier.



Before-after: If there are pollinator-friendly actions at one or more sites, then monitoring can take place before and after to assess the impact of the actions.

- ⊕ Great where there is long-term monitoring (e.g. at a nature reserve) and then an action takes place
- ⊕ Doesn't necessarily require monitoring at lots of sites
- ⊖ Some years are good for pollinators, and others are worse, so it is tricky to be confident about the results. It may take several years for any effects to become clear
- ⊖ It is difficult to know that the effects are due to the pollinator-friendly action without information on how pollinators are changing elsewhere: perhaps populations would have changed at your site anyway
- ⊖ It requires good planning. Monitoring should run for at least a couple of years prior to any pollinator-friendly actions.

Control-intervention and Space-for-time:

Monitoring is done in two (or more) types of sites. This could be done across two habitats to compare their value for pollinators, or sites at different distances from an urban nature reserve. Often funding for actions for pollinators means that there just isn't a chance to do monitoring beforehand, so monitoring can be done at sites that have the pollinator-friendly action and sites that do not (a 'space-for-time' design) to evaluate the impact of the action.

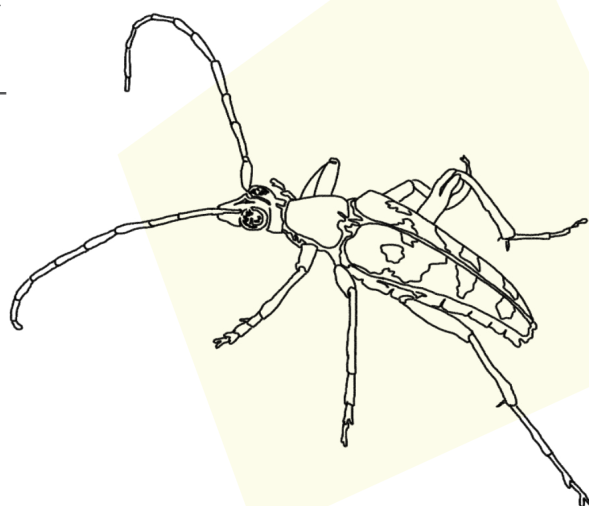
- ⊕ Great for when there is funding for pollinator-friendly actions and their impact needs to be measured
- ⊕ Doesn't necessarily need planning for long-term monitoring

- ⊖ Requires suitable 'control' sites to be found. These need to be similar to the sites where the pollinator-friendly action is being applied, otherwise you won't be certain whether differences are due to the action or if the sites were different in the first place
- ⊖ Requires the control sites to be monitored; but volunteers might be most motivated to monitor where the actions have taken place. This can be addressed through clear, positive communication with volunteers.

Before-after-control-intervention (BACI):

Monitoring takes place (i) before and after an action (an 'intervention' like pollinator-friendly planting), and (ii) at control sites at the same times to act as a comparison. (Control sites have similar habitat and in a similar general location, but do not have the intervention. Matched pairs are when each intervention site is matched to a very similar control site. Usually there are a similar number of control and intervention sites.)

- ⊕ The 'gold standard' scientific approach for assessing the impacts of actions
- ⊕ Variables like the weather and the site can be taken into account in the results
- ⊖ It requires good planning. Monitoring should run for at least a couple of years prior to any pollinator-friendly actions
- ⊖ The need to monitor many sites repeatedly can require a lot of resources.



Q3 Where, when and how often to record?

Where to record? Pollinators are found in both urban and rural areas, in gardens, parks, fields, road verges... anywhere with suitable nesting habitat and plants for them to feed on. It is easy to assume that the best places to monitor pollinators are areas that are green and beautiful: nature reserves, floral parks, and botanic gardens. However, it is often the less obvious places where data is needed – road verges, wastelands, and more built-up areas.

Don't forget about monitoring in gardens. If volunteers have gardens they might be particularly keen to monitor there.

Research has shown that some urban environments can be more valuable to some pollinators than rural habitats⁴. Gardens and allotments, in particular, provide a varied and rich source of flowers for pollinators. There are great benefits for people and pollinators in monitoring and taking positive action for pollinators in urban environments.

Where you record will be affected by your overall aim and your survey design (see Question 2). If you are monitoring to contribute to an existing monitoring scheme, check the scheme guidance. Think about the following:

- Do I need to monitor a particular habitat or a particular site?
- Do I want to cover many different locations, or focus on one?
- What are the logistics of accessing locations for monitoring, e.g. can participants get there easily and is it safe?

Doing repeated surveys at particular locations:

- great for analysing changes over time
- can help people engage with the project because they don't have to choose where to monitor
- locations can be chosen by the project organisers, or the volunteers can be given flexibility where to start monitoring.

Allowing people to record where they choose:

- much more flexible for volunteers
- allows for a greater sense of exploration
- can provide a broader perspective on the species present
- harder to analyse than repeat surveys due to the lack of consistency in location (if this isn't taken into account, findings could be partly just reflecting where volunteers have chosen to survey).

When to record? Pollinators are best monitored on warm, dry days during the spring and summer (e.g. from April to September). Sunny weather is best for monitoring pollinators, although if the weather is warm enough (e.g. above 15°C), pollinators can be active even when it is cloudy. On very hot days fewer pollinators will be active, so monitoring is best done earlier or later in the day.

Pollinators can be picky about the weather! Give volunteers guidelines to monitor when it is warm, sunny (ideally), and not too windy to help make sure that your results aren't being too influenced by the weather. Don't make records when the weather is unsuitable.

Monitoring multiple times throughout the season helps you build a good dataset, and can provide interest for volunteers. Different types of pollinators are found at different times

4 Baldock et al. (2015). Where is the UK's pollinator biodiversity? The importance of urban areas for flower-visiting insects. Proc. Roy. Soc. B 282, doi.org/10.1098/rspb.2014.2849

of the year. For example, queen bumblebees actively visit flowers in early spring, whereas the abundance of many pollinators peaks in mid-summer. (If you use FIT Counts you will need to select different focal flower species depending on the time of year. See the “Guide to the flowers you can use for the count” at ukpoms.org.uk for guidance.)

Also, recording frequently can be good for participants (boosting motivation to stay involved and increasing their time in nature), while also creating more data.

However, asking people to record too frequently can feel like a burden and risks losing volunteers. So how frequently is enough? This decision should be made with a good understanding of your volunteers, their interest in the project and your aims and need for data.

Think about the resources you have to support volunteers and remind them to do the recording.

In general, if monitoring pollinators, asking volunteers to **record fortnightly or monthly during summer months** seems a good balance between getting enough data and not making it too much of a burden. Projects like the BeeWalk Survey Scheme ask volunteers to record monthly from March to October. Alternatively, projects like the Big Butterfly Count ask volunteers to record as many times as they like during a specific three-week period in mid-summer. For some of the other monitoring methods, such as pollination studies or flower surveys, the timing and frequency of monitoring will be specific to what you are interested in.

How Many Samples?

Knowing how many samples to collect is a very common question across many types of monitoring and is not easy to give a definitive answer. For example, if you’re trying to compare sites using focal timed counts you might want to ensure you’ve got a certain minimum number of counts at each site so you can be more confident that any differences are real and not just due to chance. You could also think about the size and variability of the areas you’re interested in. In general, a large site with different types of habitat will need more samples than a small site with just one habitat. For citizen science, you also need to think about the trade off between people’s enthusiasm (they may be keen to do lots of recording) and the sustainability of their involvement (don’t ask too much of people at the start).

Test the planned method yourself or with a small number of volunteers to help give you an idea of what to expect, and ask for feedback. This allows you to adjust the method before starting your project.

Data management and analysis

Q4 What data to collect?

If you've decided on the most suitable method for your project aims and your volunteers (see Question 1) then you'll have a good idea of what to record.

If you are using methods for contributing to an existing project, then use the recording forms from that project. If you are setting up your own project, consider producing a standard recording form to help volunteers record everything consistently.

Whatever your project, there are four (or five) key pieces of data that should always be recorded:

- **Where?** Where was the record observed? Ordnance Survey grid reference, latitude/longitude or other methods (like [What3Words](#)) ensure that the record can be accurately located. Site name is also valuable.
- **When?** When was the record made? Date is essential; time of day is valuable.

- **By whom?** Who made the record. This is important for data verification (see Question 5) and most monitoring schemes require this.
- **What?** What is the record of? Depending on the method (see previous section) this might be the name of the species (using the common or scientific name) or might be a group, e.g. "bumblebee" or "fly".
- **How many?** Depending on the sampling method (see Question 1), recording how many of each type of insect is the final crucial piece of data.

Additional data

Other data can be valuable to support analysis, but it is important to balance this against volunteer motivations and time. Asking for a lot of additional data can be off-putting, so if you need this then explain the reasons why it's important. Some examples of additional data are given below, but what is most useful will depend on your project.

- **Weather conditions.** Pollinators are impacted by weather so recording the conditions when you are monitoring means this can be taken account of in analysis.

Recording weather in FIT Count surveys

The FIT Counts survey asks participants to provide simple weather data. This is easy to record and provides valuable information used in analysis of the counts:

Sky above your location:

- ☐ All or mostly blue
- ☐ Half blue and half cloud
- ☐ All or mostly cloud

During the 10-minute count, was your 50×50cm patch:

- ☐ Entirely in sunshine
- ☐ Partly in sun and partly shaded
- ☐ Entirely shaded

Wind strength (for all plants in area, not just target flowers):

- ☐ Leaves still/moving occasionally
- ☐ Leaves moving gently all the time
- ☐ Leaves moving strongly

- **The local habitat**, e.g. information describing the garden or park where recording took place.
- **Information about the surrounding area.** This can be helpful for interpreting results. Any questions need to be carefully planned to ensure the data are useful. Alternatively, land cover datasets or satellite images can be used.

Pencil and paper versus using technology?

Apps and online recording forms make it easy to submit your data to an existing scheme. However, don't underestimate the value of pencil and paper! Some people might not have access to technology or, are not comfortable using online methods. It can be difficult to view a smartphone screen in sunny weather, and some people prefer to be technology-free when in nature. Just remember someone will need to enter handwritten data at some point. If using paper forms, it is best to provide them for people in advance. Always test forms with volunteers to make sure they are as clear and simple as possible.

Q5 What will you do with your data?

In this guide we focus mainly on ways of collecting data, but it is also important to consider the 'data journey', that is, what happens after a record has been made.

Validation and verification

Validation is the process of making sure that a record is complete and accurate (e.g. the location is not accidentally recorded as being in the sea). When contributing to an existing recording scheme this is often done automatically.

Verification is the process of making sure (as far as able) that the record is correct, e.g. the species has been correctly identified, or the count is not unusually high. Additional information, like photographs, can help verifiers confirm that the record is likely to be correct. For insect trapping, samples can be sent to an expert for confirmation.

- Can you support data accuracy through training and providing resources before volunteers do recording? This will reduce the burden of verification.
- Can you use automated verification tools, ideally at the point of data submission, to help people submit accurate records? Automated approaches include flagging unusually high counts, or using image recognition to support insect identification (where this is available).
- Can you do the verification (or employ experts to do it), or are you relying on existing recording schemes? If you will be generating large numbers of records for submission to an existing recording scheme, it is best to consult them in advance, to ensure that they have capacity for verification.
- What level of accuracy do you need? This will depend on your aims and your method: what is 'good enough' given the intended use for your data?

Data submission and data sharing

You may be collecting data for your own specific purpose, or you may be contributing to an existing scheme. Either way, it's important to recognise that your records have more value when shared with others.

If taking part in an existing monitoring scheme, follow that scheme's instructions for submitting records. It is best for volunteers to submit their records (using apps or websites, depending on the project) at the time of recording, otherwise there is the risk that records are not submitted.

You may need access to the data for your own project. Ideally, volunteers would contribute to an existing monitoring scheme so can use their ready-made data collection systems, and then you get back the data from your volunteers (e.g. for summarising reports for your area or using them for analysis). At the time of writing, it is not easy to get access to the records from your volunteers from many existing monitoring schemes⁵. It is important for you to consider the best options for you, and keep an eye on the websites of existing monitoring schemes to see when solutions for local reporting are developed. Alternatively contact these schemes directly.

You could design your own data portal for record submission, especially if records could be automatically shared with existing monitoring schemes, but we do not generally recommend this – there are many good options already available, and there are substantial costs in setting up and maintaining a data portal.

Analysis and reporting

Analysis transforms data into understanding. If you are collecting data for your own purpose, think about how you will analyse it from the start of the project:

- What are the specific questions you want to answer – are you collecting data and have you identified the analysis required to enable you to answer these questions?
- Do you have someone with the skill set to visualise and analyse the data?
- Do you have the time and resources to carry out analysis?

Statistical analysis (e.g. measuring the impact of a pollinator-friendly action or estimating how pollinator populations are changing over time) often requires quite large datasets to take account of different variables that can influence pollinators, such as the weather. This is why using tried-and-tested sampling methods and sharing data is so good. However, you can also report on summary data from your project. Reporting what you have done is important to motivate volunteers (see Question 7 on communicating with volunteers). Summarising data in a graph can be a good way to make simple comparisons, e.g. number of pollinators counted in different locations, but be aware that this doesn't replace the value of more detailed statistical analysis and be careful not to over-interpret your results: differences (or similarities) in pollinators between sites or across time can be affected by weather and many other factors. This is the benefit of joining up with existing monitoring schemes that employ scientists to do analysis. Existing monitoring schemes often produce annual reports, which can be accessed and shared with your participants, helping them to see the value of their monitoring.

⁵ However, this functionality is being explored in the UK Pollinator Monitoring Scheme, and if you are interested in species recording then it is easy to set up a 'Project' in iNaturalist or an 'Activity' in iRecord that your volunteers can join. Both options provide ways to view the records from your volunteers.

Communication and engagement

Q6 Who will you engage?

When planning your monitoring, think about the participants. You might have a community of people who already want to do something for nature, or you could use citizen science as an opportunity to engage people who do not yet know much about pollinators.

Think carefully about:

- **Existing skills** – If potential participants are not experienced in identifying pollinators, use methods that do not require identification to the species level, or focus on more easily identifiable insects, such as butterflies or bumblebees (although even bumblebees can be quite tricky to identify). It is important to trial any methods with potential participants and to get their feedback.
- **Training needs** – Are potential participants likely to be happy to receive training to improve their skills?
 - Some projects provide excellent training materials, including online video tutorials or downloadable handbooks (see [UK Pollinator Monitoring Scheme](#) or [BeeWalk Survey Scheme](#) for examples).
 - Some species recording tools, like [iNaturalist](#), allow recorders to link to an online community of people willing to identify species from photographs, or provide suggestions from artificial intelligence. This can give ‘on the job’ training for identification skills.
 - In-person training can be a great opportunity to bring people together to be inspired and trained.
 - Mentoring can be provided through some projects, like the BeeWalk Survey Scheme. If there are volunteer experts in your project, they may be willing to train beginners.
- **Time/resources required** – Consider the likely willingness of people to be involved – and how frequently or where they would monitor. Being ambitious is good, but be realistic too.

As you develop your project, consider providing different tiers of involvement, so people with more time or skills could be involved in more complex or time-consuming methods.



Q7 How will you communicate with volunteers? Promoting your project and maintaining interest

Right from the start, think about the way in which you will promote your project. How will you recruit people to take part and, crucially, how can you keep them involved in the monitoring?

Communication is key. It is important to let people know about the value of their contribution: what the results are, and whether it is making a difference for pollinators.

Social media is a great way for keeping in touch with volunteers, inspiring them and helping them feel part of a community.

Facebook groups are an excellent way of communicating, and if the groups are open then it can attract more volunteers to your project. Whatsapp can be useful for connecting smaller groups of volunteers. Instagram and TikTok can be useful when seeking to connect with younger audiences. Providing regular content such as good news stories or photos, as well as the results of the monitoring, will support volunteers. Volunteers can also add their own posts to these groups, so further building the community. Remember that volunteers are your greatest asset!

Motivations of citizen science participants and connecting people with nature

Recent research has explored the different motivations of people to get involved and stay involved in citizen science⁶. Important reasons are:

- Feeling connected to where monitoring takes place (a 'sense of place')
- Being part of and contributing to a community (which could be local or virtual)
- Interest in nature
- Gaining a sense of exploration and discovery
- Being concerned about the state of nature and wanting to make a difference
- Learning something new

As well as these motivations, being involved with citizen science benefits people by supporting physical activity and boosting their wellbeing⁷

- 6 West, S. and Pateman, R., 2016. Recruiting and Retaining Participants in Citizen Science: What Can Be Learned from the Volunteering Literature?. *Citizen Science: Theory and Practice*, 1(2), p.15. DOI: doi.org/10.5334/cstp.8; West, S., Dyke, A. and Pateman, R., 2021. Variations in the Motivations of Environmental Citizen Scientists. *Citizen Science: Theory and Practice*, 6(1), p.14. DOI: doi.org/10.5334/cstp.370
- 7 Pocock, M. J. O., Hamlin, I., Christelow, J., Passmore, H.-A., & Richardson, M. (2023). The benefits of citizen science and nature-noticing activities for well-being, nature connectedness and pro-nature conservation behaviours. *People and Nature*, 5, 591– 606. DOI: doi.org/10.1002/pan3.10432

The future of monitoring

Technology is making more things possible than we ever imagined! Two types of technology that are already used in research for pollinator monitoring are DNA analysis and automated identification using sensors.

DNA analysis

It can be too costly (in terms of money or time) for an expert to identify pollinators to species level, or identify all the insects caught in a trap. DNA analysis allows the identification of insect specimens, and this technology is getting cheaper and more portable. Researchers can analyse 'environmental DNA' (or eDNA) to identify insects or pollen from the water in 'pan traps', or even from the DNA left by insects on flowers that they have visited! For now, these technologies are mainly the remit of research projects but might be an integral part of monitoring in the near future.

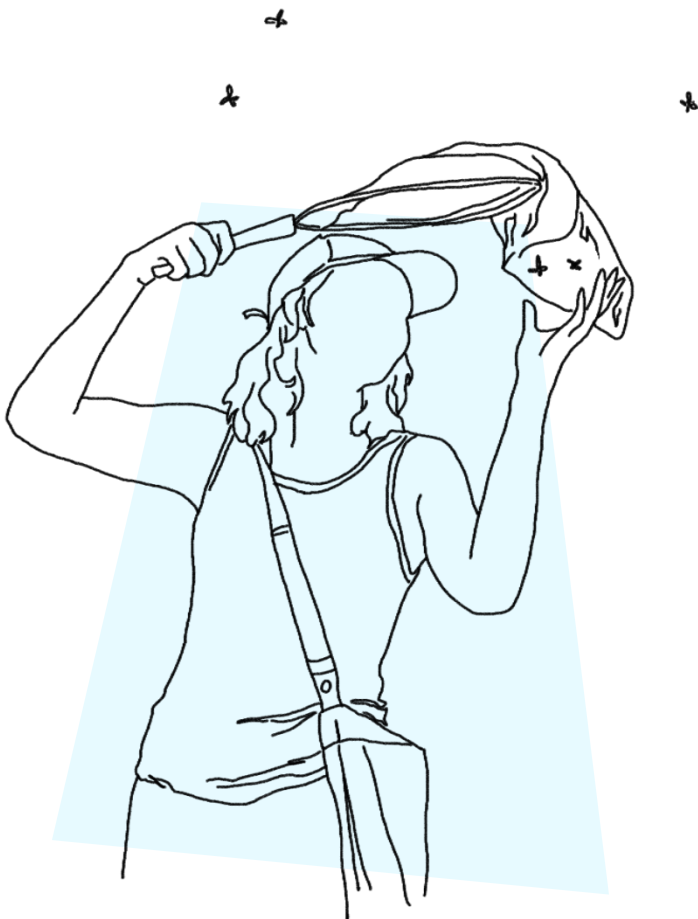
Sensors and automated identifications

There are new automated monitoring tools being developed which use remote cameras or sound recording to identify and record pollinators. Image recognition is getting better and better (although obviously still depends on obtaining images of good enough quality). Researchers are experimenting to see if types of pollinators can be automatically recorded from the sound of their wings. It is likely that within the next few years people could purchase and install automated monitoring tools in gardens or other secured places.

What does the future hold?

Where will these technologies go in the future and how will new technologies support our monitoring?

We may not know for certain, but we are confident that these methods won't replace the more 'conventional' citizen science methods described here, but they could be fantastic additions to our toolkit for pollinator monitoring. They would provide even more opportunities for people to get involved in monitoring pollinators, for the benefits of the conservation of pollinators and for people.



Pollinator monitoring schemes and organisations in the spotlight

(Note that this is intended to show some of the ongoing work involving pollinators, not to be an exhaustive list.)

UK Pollinator Monitoring Scheme – UKPoMS

ukpoms.org.uk | Twitter: [@PoMScheme](https://twitter.com/PoMScheme)

UKPoMS was the first scheme in the world to begin systematically monitoring the abundance of bees, hoverflies and other flower-visiting insects at a national scale. Together with long-term records collated by the Bees, Wasps and Ants Recording Society (BWARS) and Hoverfly Recording Scheme, these data form an invaluable resource from which to measure trends in pollinator populations and target conservation efforts.

The UK Pollinator Monitoring Scheme (UK PoMS) is a partnership funded jointly by the UK Centre for Ecology & Hydrology (UKCEH) and Joint Nature Conservation Committee (JNCC) (through funding from the Department for Environment, Food & Rural Affairs, Scottish Government, Welsh Government and Department of Agriculture, Environment and Rural Affairs for Northern Ireland). UK PoMS is co-ordinated by UKCEH, with partners including the Bumblebee Conservation Trust, Butterfly Conservation, British Trust for Ornithology, Hymettus, Natural History Museum, the University of Reading and University of Leeds.

UKPoMS has two activities for monitoring pollinators:

FIT Counts

Flowers-Insect Timed (FIT) counts are a simple survey that collects data on the total number of insects that visit a particular flower, ideally chosen from a list of 14 target flowers.

FIT Counts can be done anywhere, including gardens and parks, in warm, dry weather any time from April to September. You do not need to identify species for the FIT Count; insects are recorded in groups.

1 km square surveys

The 1 km square surveys take a systematic approach, using pan traps to capture samples of insects from a set of 95 1 km squares across the UK. This is done by a team of volunteers who 'adopt' the squares and help carry out the surveys. Each square is visited four times a year, once each in May, June, July and August.

Since 2017, with the help of volunteers and with the introduction of the new FIT Count mobile app in 2021, PoMS data has steadily increased, with a total of 12,187 FIT Counts representing 133,471 flower-insect interactions received to date, and more than 1000 sampling visits to PoMS squares between 2017 and 2022. Together, these large-scale datasets are helping build a unique picture of the status and trends in pollinating insects across the UK.

BeeWalk – Bumblebee Conservation Trust

beewalk.org.uk

BeeWalk is a national scheme run by the Bumblebee Conservation Trust to monitor the abundance of bumblebees on transects across the country. Volunteers identify and count the bumblebees they see on a monthly walk along a set route from March to October. The information collected by BeeWalk volunteers assesses how bumblebee populations change through time in response to changes in land-use and climate change, and detects early warning signs of population declines.

UK Butterfly Monitoring Scheme

ukbms.org

The United Kingdom Butterfly Monitoring Scheme (UKBMS) is one of the longest running insect monitoring schemes in the world. The scheme began in 1976 and now records data on over 2,000 sites per year; incorporating butterfly transects, the Wider Countryside Butterfly Survey (WCBS), and timed-counts. The resulting UKBMS dataset is one of the most important resources for understanding changes in insect populations.

eBMS Butterfly Count app

butterfly-monitoring.net/ebms-app

The European Butterfly Monitoring Scheme (eBMS) is a joint initiative of Butterfly Conservation Europe and the UK Centre for Ecology & Hydrology to support butterfly monitoring across Europe. They have the Butterfly Count app that supports recorders in making 15-minute roving timed counts of butterflies in the UK (and elsewhere in Europe) which also automatically tracks your location when recording.

Buglife

www.buglife.org.uk/our-work/pollinator-projects/

Buglife is an organisation dedicated to the protection of all invertebrates. They have a range of projects dedicated to pollinators and the importance of pollinator monitoring.

Buzz Club

www.thebuzzclub.uk/

A club providing instructions for a range of citizen science projects on pollinators. Many of these are experimental to test out the effects of pollinator-friendly activities that gardeners can do. Hosted by the University of Sussex.

iRecord and UK National Species Recording Schemes and Societies

iRecord

irecord.org.uk

iRecord is an online platform for sharing, managing and validating biological records. The data are passed on to, and verified by, the relevant Recording Schemes and Societies.

- If you upload a photo, records can be verified by experts
- iRecord has an app so you can submit records easily from your phone
- iRecord creates maps, reports and graphs for you to explore your data
- It has AI for image recognition to help validate records and suggest identifications.

iRecord is run by the Biological Records Centre (BRC, www.brc.ac.uk) at the UK Centre for Ecology & Hydrology with support from many volunteers within the national recording schemes.

BWARS – Bees, Wasps and Ants Recording Society

www.bwars.com

BWARS is a volunteer recording society that collects data on bees, wasps and ants. They provide lots of information about monitoring these species on their website, and the records they collect are shared for research and conservation. BWARS run citizen science data collection projects focussing on particular species.

Dipterists Forum (and Hoverfly Recording Scheme)

www.dipterists.org.uk/home

The Dipterists Forum promotes the study, recording and conservation of flies (Diptera) in the British Isles. Dipterists Forum has been instrumental in monitoring and mapping flies. The society accepts records of flies and has numerous schemes dedicated to monitoring specific groups, including the Hoverfly Recording Scheme. Further information: ukpoms.org.uk/species-recording

iNaturalist

www.inaturalist.org

iNaturalist is an online platform and app for nature records, which includes AI to help you identify species from photographs. It is run by the California Academy of Sciences and the National Geographic Society.

- Anyone can contribute, or correct, identifications for submitted records.
- Records submitted to iNaturalist can be used by scientists.
- You can use the iNaturalist website or platform to create 'projects' that people can join. This helps you keep your community's data in one accessible place.

Local Environmental Records Centres (LERC)

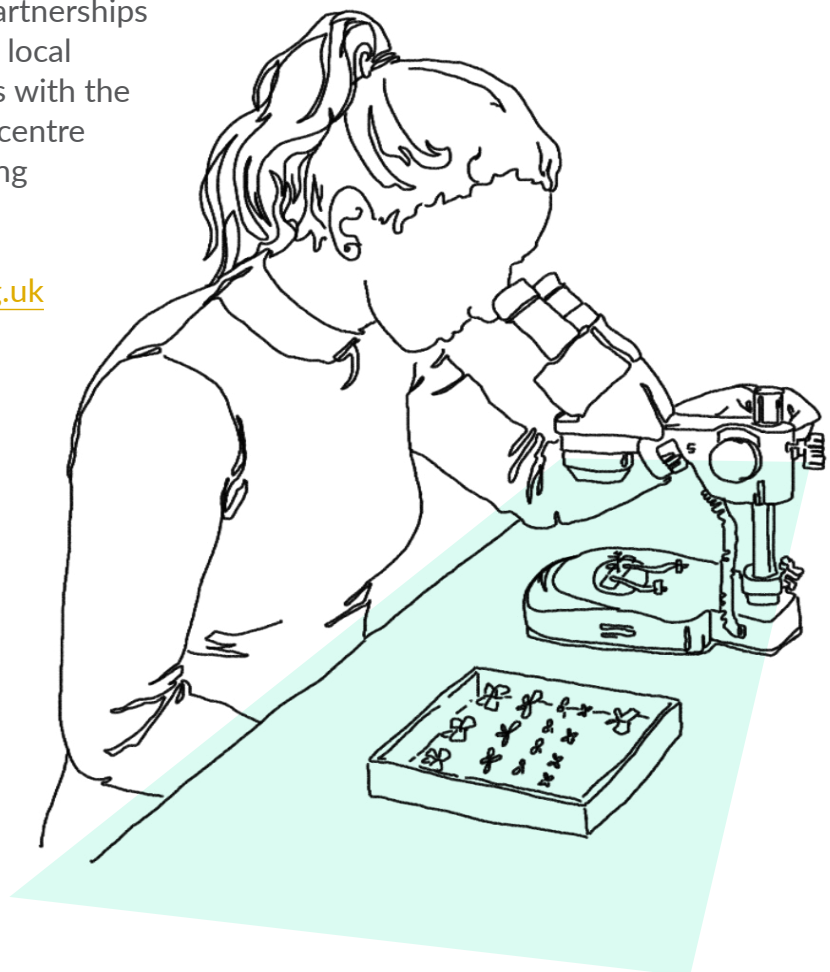
Records submitted via iRecord and iNaturalist are automatically available to Local Environmental Record Centres (LERCs). LERCs are organisations, normally run as partnerships with other groups, to bring together local information on nature and share this with the local community. Your local records centre will also manage any county recording schemes. They are a good source of information, data, and advice.

Find your LERC here: www.alerc.org.uk

X-Polli:Nation

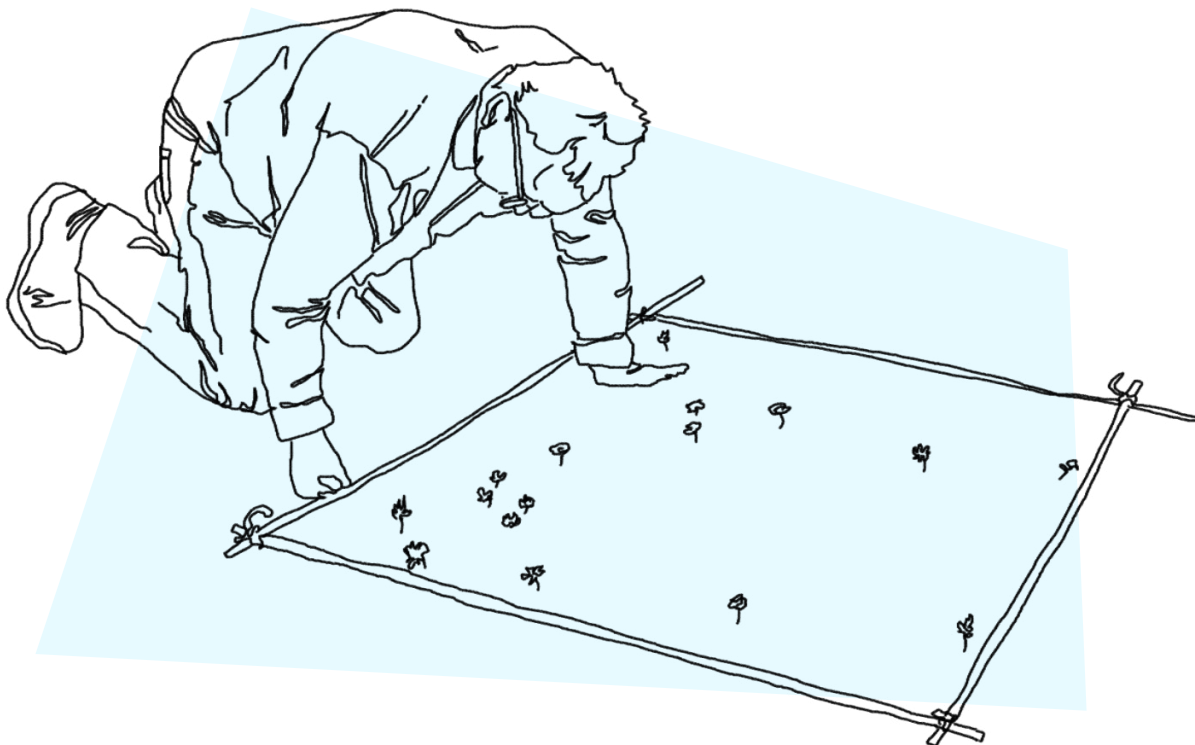
xpollination.org/

A project aimed at schools for pupils to be involved in Focal Timed Counts of pollinators (using the UKPoMS FIT Count methodology) and species identification (ad hoc recording of bumblebees). It was linked to pollinator-friendly actions in school grounds and so schools were encouraged to record habitats and at particular flowers. The data supported the Planting for Pollinators guidance to encourage planting flowers for bumblebees.



Pollinator monitoring and citizen science: a practical guide for project initiators and participants

Miranda S. Bane and
Michael J.O. Pocock



© 2023, UK Centre for Ecology & Hydrology