Jersey Pilot Pollinator Monitoring Scheme

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Executive summary

This 6 week project aimed to trial UK pollinator monitoring scheme methods in Jersey to determine their suitability for future use; whether this be as a citizen science initiative, carried out in schools or continuously used by a monitoring party in order to establish a baseline for local pollinator populations. Throughout the project, 58 FIT Counts were carried out and data was collected from 5 pan traps in order to thoroughly evaluate the methodology and the potential success of the scheme in Jersey. Through the FIT Count method a total of 512 individual insects were recorded; with 139 of these being solitary bees, 64 bumble bees, 38 honeybees and 26 hoverflies. The pan traps resulted in the capture of 239 insects, however due to the nature of this survey it was determined that it is unsuitable for regular future use, whereas the FIT Counts could be extremely successful in the generation of a pollinator database for Jersey. The internship and conclusions reached in this report could not have been achieved without the support of EarthWatch Europe and their work in conjunction with the Government of Jersey to provide the means for this project to be undertaken.

Introduction

After finance and tourism, agriculture is one of Jersey's most important industries; the preservation of pollinators is crucial for our crop production to support the local economy and livelihoods. Wild pollinators play a critical role in food production, providing around 84% of EU crop pollination and are responsible for the pollination of 80% of wildflower species (Buglife, 2019). Increasing biodiversity will help preserve pollinator populations meanwhile benefitting human wellbeing and the aesthetic of the island which is significant for tourism in Jersey. With constant reports of declines in insect populations around the world, and concerns about the negative effects this will have on global biodiversity and ecosystem health, there has never been a more crucial time to document evidence of change within local pollinator populations.

In 2018, Jersey began taking part in an inter-island Pollinator Project having been inspired by the initiative set up in Guernsey the previous year. This involved partnership with many organisations across the island to establish dedicated pollinator patches in community spaces, including some school sites, and to promote households and businesses to set aside areas of their land for pollinators. Jersey has limited data on local pollinator populations, with reports and sightings often focusing on individuals of a species and not necessarily the bigger picture of numbers present. Therefore it is very difficult to see overall trends of increase and decline without a consistent monitoring process. Currently the only long term pollinator surveying scheme used in Jersey is the Butterfly Monitoring Scheme which produced a report in 2015 and continues to create the islands most consistent dataset. Although this scheme is thorough, it only targets one group of pollinating insects and therefore introducing new methodologies is crucial in monitoring island-wide pollinator populations.

This project aimed to explore the potential methodologies, currently used by the UK's Pollinator Monitoring Scheme (PoMS), to determine whether they are suitable for data collection in Jersey to help create a baseline for our pollinator populations. PoMS uses a citizen science survey of Flower-Insect Timed Counts, better known as FIT Counts.

To test these methods thoroughly, the FIT Counts were carried out in the pollinator patches that were planted as part of the Jersey Pollinator Project to evaluate the efficiency of the survey and also to analyse the success of the seed mix used. FIT Counts were also completed on agricultural land being managed with a green cover crop, and semi-natural areas to compare the differences in

pollinator attraction to the plants found in the different habitats. It was important to use different areas to ensure that the survey method could be used in a variety of environments across the island. The Pan Traps were set up within the NPMS km^2, the same as they are in the UK, however due to land limitations caused by Jersey's size and land use; land parcels are small and fragmented with multiple landownership issues, there was a slight adaptation to this methodology; explored later on in this report. All of the data collected was to be entered into iRecord, an online database, in order for it to be formatted by PoMS UK and returned in an easier layout to analyse.

The final part of this project was to create school resources, suitable for Key Stage 3 students to provide guidance on how to carry out a FIT Count while supporting lessons taught in the current school curriculum. These resources would consist of an adapted plant identification sheet with added species more suitable for Jersey, a concise insect identification sheet more tailored to students and using images of common species seen in Jersey, and finally an instruction sheet for the teacher of the class. These adaptations to the PoMS FIT Count resources would be determined by the success and ease experienced using the guidance they provide for UK citizen scientists and also the range of species encountered in the field during the data collection of this project.

Methods

Health and Safety

Prior to carrying out the FIT Counts there were several potential issues that needed preventing or addressing. The first necessary step before data collection could commence was a written risk assessment having explored all the possible hazards that may be encountered during the project. Then, as the data collection would be taking place not only on public land but also within schools and in agricultural fields, permission to survey these areas was required before the counts could be carried out.

Survey and ID Training

As I was due to be working independently in the field carrying out the FIT Counts and collecting data, I felt it was important to be confident in my ability to identify insects to group level. This involved practice of identification skills at several bug hunts carried out with the Jersey Biodiversity Centre and a trip to the Bee Keeper's Association Bee Field to explore the differences between solitary bees, honeybees and bumblebees. The bug hunts within schools offered an opportunity to attempt conducting FIT Counts with a class of students and aided creating a teaching resource. However, the sampling was mainly with Key Stage 2 pupils, rather than Key Stage 3.

Surveys Sites and Selection

The Pollinator Patches set up as part of the inter-island Pollinator Monitoring Scheme are located all across Jersey and use several different seed mixes depending on who planted them. Therefore, to maintain the validity of the data, 10 sites that used the original urban seed mix were selected. These were mostly on public land and therefore easy to access, however a couple of patches were located in primary schools which required permission to survey.

The Semi-Natural sites were chosen from a list of Sites of Special Interest (SSI) that the Government of Jersey and Natural Trust have access to, however most of these are also open to the public and so permission was not required. A range of sites were selected to attempt to cover a wide range of Jersey habitats including heathland, gorse land and wild hedgerow.

Social media platforms, including sharing posts on Facebook, were used to advertise the need for agricultural fields under green cover management to survey. The response was extremely positive and provided plenty of viable sites as many local land owners were eager to help. 10 sites were then selected from the fields provided by citizens, alongside a few agricultural sites managed by local groups such as the Bee Keeper's Association.

Data inputting and storage

It was also important to test out some of the technical aspects of the project as well as the practical features, and so I created a pilot iRecord record was completed using a painted lady sighting. After this input was successful, the iRecord account was linked to a Jersey Biodiversity Centre account and the connection between the two databases was confirmed when the painted lady data was transferred across. This ensures any sightings recorded in Jersey also become part of the JBC's records. However, due to the nature of the FIT Count data being grouped not by taxon, this currently means these records cannot be obtained from iRecord by the JBC.

Fit Count Survey

These require a 50cm by 50cm quadrat to be placed in a wildflower patch, such as a meadow or hedgerow, and the survey is carried out for 10 minutes recording any insect that lands, within the quadrat, on a flower of the target species chosen. The target flower species is chosen from a suggested list of 14 plants provided by PoMS (Appendix 1) however they do allow flowers outside of this list to be used if the species is known. Here it must be explored whether the common pollinator plant species found in the UK are also suited to Jersey's wildflower make-up and whether any changes should be made to the methodology if it is to be used here continuously in the future.

Figure 1. Demonstration of a FIT Count survey with Knapweed as the target flower

Pan trapping

Pan Trapping is also used as a pollinator survey method by PoMS and these are carried out across the UK by setting up 5 traps diagonally though the National Plant Monitoring Scheme (NPMS) squares which are areas of 1km^2. In the UK, each square kilometre is assigned to a volunteer who are provided with PoMS guidance notes (Appendix 2). The traps consist of coloured shallow bowls containing a mix of unscented dish soap and water which prevents insects from escaping once they have landed within it, believing it to be a flower.

All equipment was provided by Jon Rault at the Jersey Natural Trust who had previously carried out a similar survey.

Figure 2. Image of the pan trap apparatus

School Resources

Using the insight gained through the completion of the data collection, KS3 school resources were designed and drafted. These required local images and therefore permission to use someone's photos. Tim Ransom agreed to supply his own images with credit to his work given on the final resources. The resources consisted of an instruction sheet explaining how to carry out a FIT Count, suitable for a classroom teacher or demonstrator and flower and insect identification guides suitable

for KS3 and tailored to Jersey's local pollinators. To create these resources, practice FIT Counts were carried out with primary school classes; shadowing the work of Sarah Maguire with the Jersey Biodiversity Centre (JBC). Sarah had designed her own ID guides, more simple than the ones provided by PoMS. Seeing the children use these guides helped determine the design of the resources in this project, along with the guidance from a secondary school teacher and now royal jersey agricultural and horticultural society employee, Jessica McGovern. After reviewing the PoMS resources, previous school resources and the current KS2 and KS3 science curriculum, new resources were designed and produced using local photography (Appendix 3).

Results

Fit Counts

The data collection consisted of FIT Counts being carried out at 10 Pollinator Patches, 10 semi-natural sites and 10 agricultural sites, resulting in 30 surveys which were then repeated. However, due to difficulty accessing school grounds during their summer holiday, 2 FIT Count locations were not repeated meaning 58 out of the proposed 60 data sites were completed. Aside from this, the FIT Counts ran smoothly and successfully with the weather being the only issue causing data collection to sometimes be separated by a couple of days due to rain. The most common group of insect counted were the solitary bees, closely followed by the group known as 'other flies' which refer to all Diptera excluding hoverflies. The least recorded group of pollinators was the 'small insects' group, referring to all insects smaller than 3mm and including creatures such as aphids.

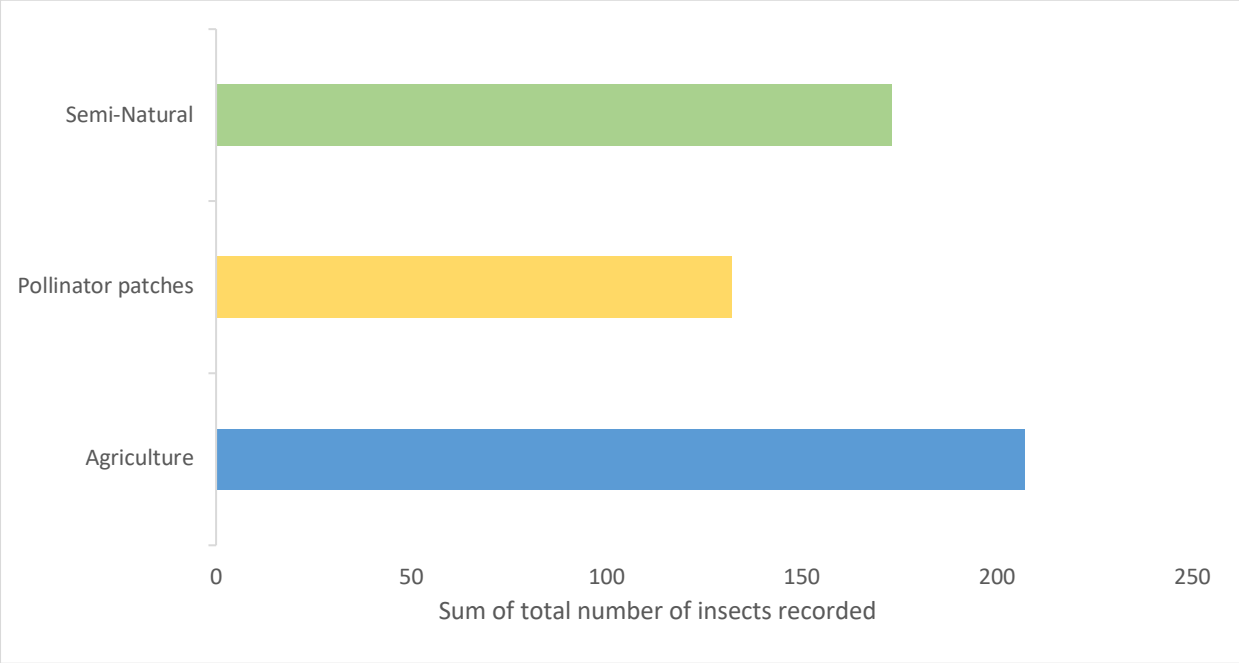


Figure 3. Total number of insects sighted through FIT Counts across 3 different habitats

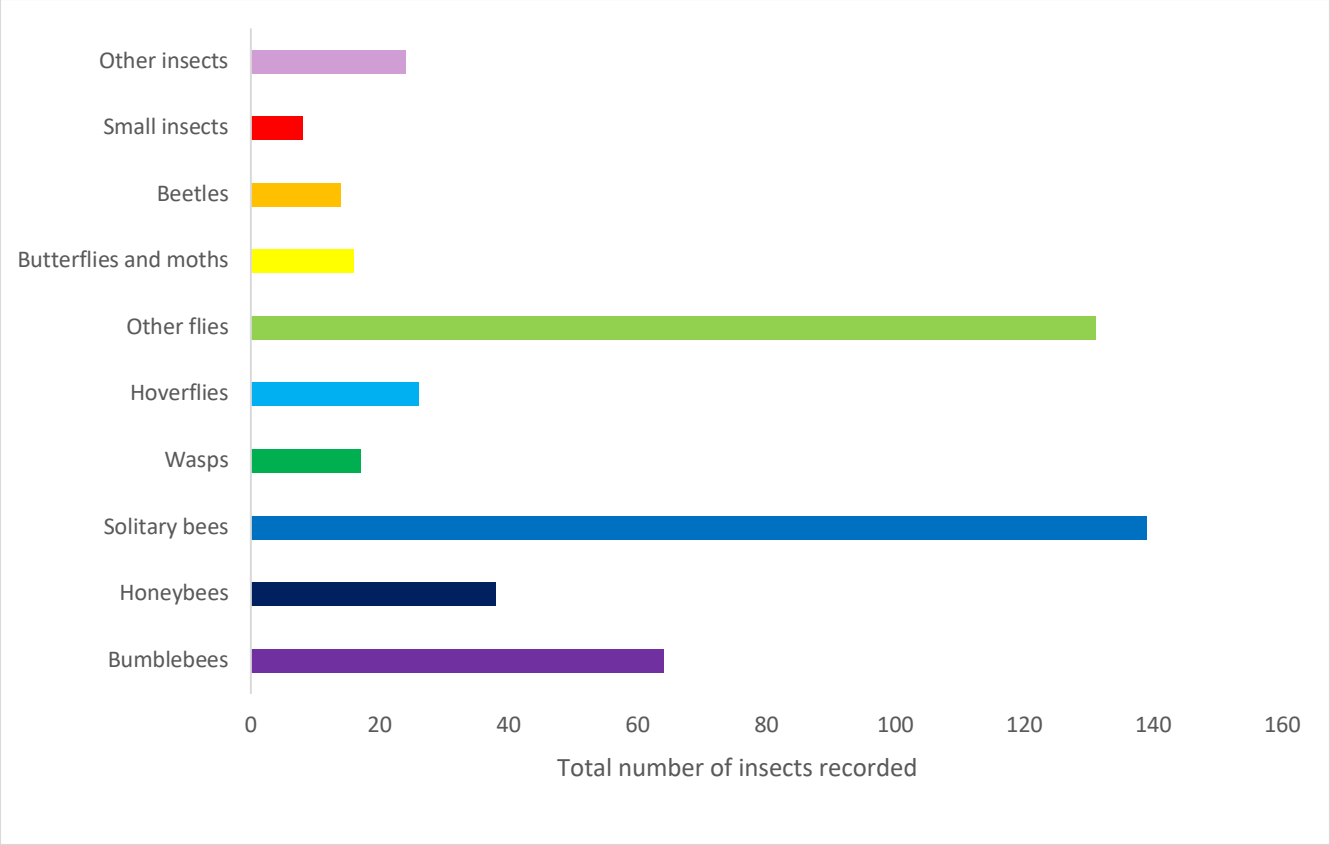


Figure 4. Total number of each insect group recorded during the FIT Counts

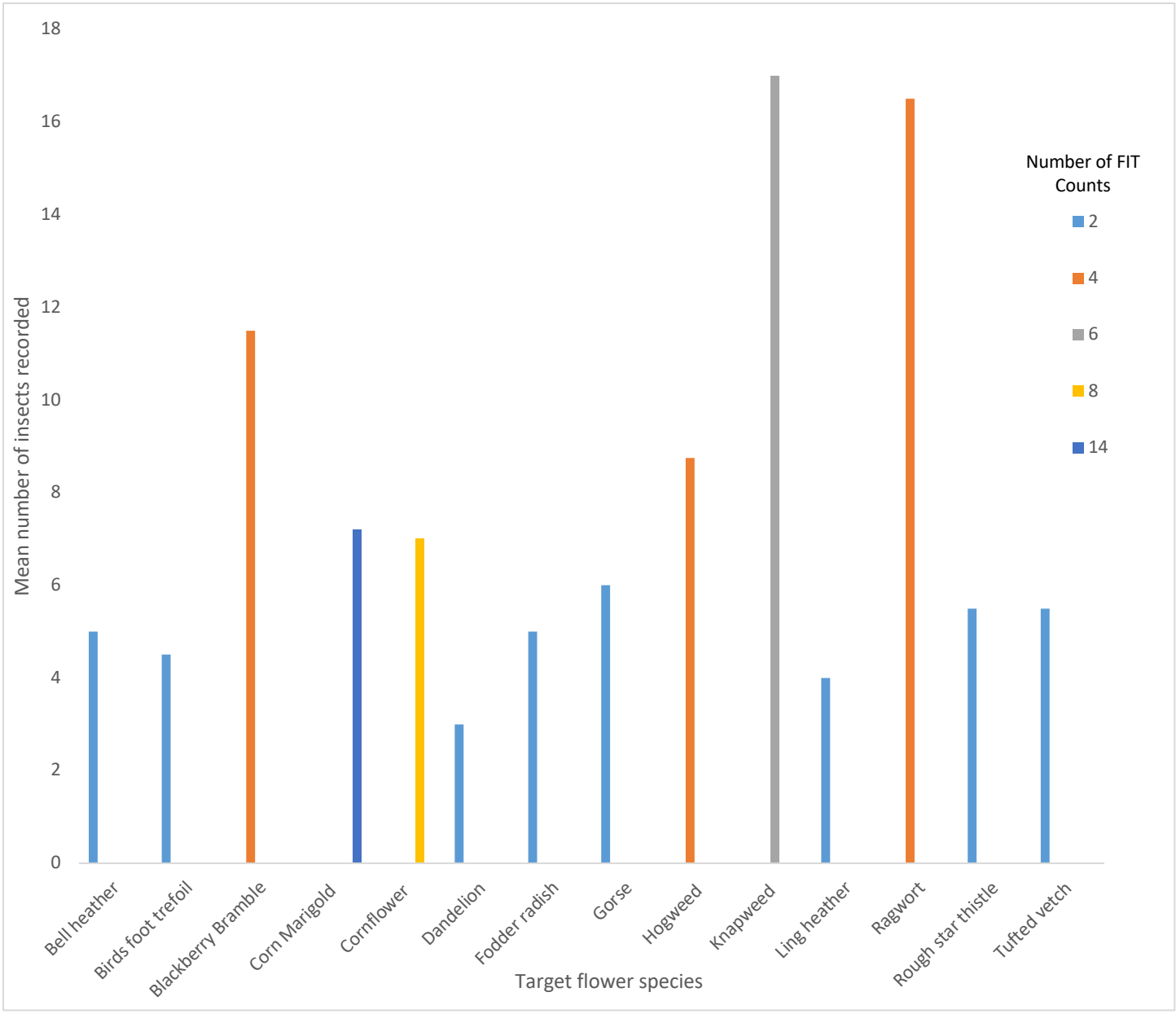


Figure 5. Mean number of insects sighted on different target flower species during FIT Counts

Figures 3 and 4 depict graphical portrayal of quick data analysis as an example of what citizen science collection could provide. These were created from the spreadsheet of data rather than the formatted version from PoMS (Appendix 4) so as to allow the differences between the pollinator patches, agricultural and semi-natural sites to be explored. Figure 3 shows that the Pollinator Project patches had the lowest total number of insects recorded, however it is important to note that the two samples that were not repeated, due to being on school grounds, would have been a part of this group. It is also exciting to see, in Figure 5, that Knapweed was visited by the highest mean number of insects. This is a perennial plant meaning it regrows every spring but takes a year before it first grows. Knapweed is part of the Pollinator Project seed mix and so next year should be in full bloom and attracting many more pollinators.

Pan Trapping

Local entomologist Tim Ransom was kind enough to offer his expertise to identify the samples collected to species level. Not only did this allow the data to be sent back to PoMS for them to use but it also facilitated a full evaluation of the methodology including the time and resources required for the identification processes.

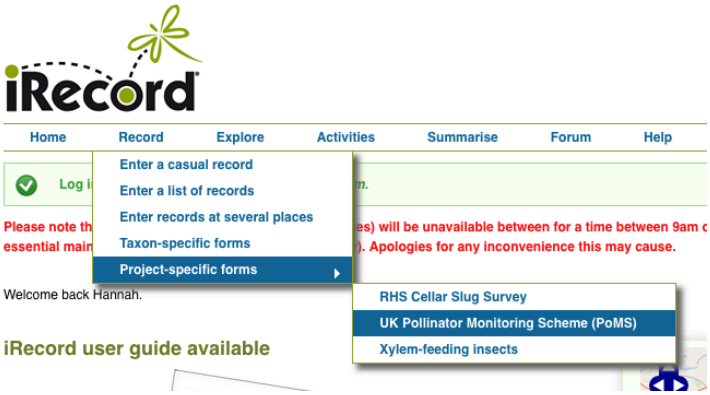
Table 1. Specimen data collected from the five pan traps

Pan Trap	Group	Number	Species	Common name	Sex (M/F/worker)
1	Sawfly	2	Athalia rosae	Turnip Sawfly	
	Stilleto fly	1	Thereva sp		M
	Flies	27			
2	Bee	1	Epeolus variegatus	Black-thighed Epeolus	F
	Bee	1	Panurgus calcaratus	Small Shaggy Bee	F
	Bee	1	Lasioglossum morioo	Green Furrow Bee	F
	Bee	1	Bombus pratorum	Early Bumblebee	Worker
	Bee	1	Bombus pratorum	Early Bumblebee	M
	Flies	37			
3	Bee	1	Andrena sp		F
	Bee	1	Lasioglossum leucozonium	Four-spotted Furrow Bee	M
	Beetle	1	Paracorymbia fulva	Tawny Longhorn Beetle	
	Beetle	1	Pseudovadonia lividia	Fairy-ring Longhorn Beetle	
	Flies	56			
4	Bee	1	Andrena agilissima	Violet-winded Mining Bee	F
	Bee	3	Andrea flavipes	Yellow-legged Mining Bee	F
	Bee	1	Andrena sp		F
	Bee	1	Bombus lapidaries	Red-tailed Bumblebee	Worker
	Beetle	1	Oedemera nobilis	Thick-legged Flower Beetle	F
	Beetle	1	Propylea 14-guttata	14-spot Ladybird	
	Flies	41			
5	Bee	2	Andrena flavipes	Yellow-legged Mining Bee	F
	Bee	1	Andrena sp		F
	Bug	2	Closterotomus norwegicus	Potato Capsid	
	Hoverfly	1	Eristalis abusivus	Levels Dronefly	M
	Hoverfly	1	Eumerus funeralis	Lesser Bulb Fly	F
	Flies	51			

Database and Mapping

In order to analyse the data, it was entered into the PoMS online survey form in iRecord (See Figures 6 and 7). This process was simple and not too time consuming, however it was unclear as to whether the formatted data would be returned in advance of this report and so the data was also typed separately into a spreadsheet. This spreadsheet was also used alongside ArcMap, a GIS programme, to map firstly the island's pollinator patches and then all the FIT Counts and Pan Traps. The initial pollinator patch map was in Cadcorp, another GIS programme, and so the swap from this to ArcMap was the first hurdle but was achieved successfully. Due to the layout of the FIT Count data there

were several issues in translating the spreadsheet onto a map, however the patience and experience of David Tipping and Liz Walsh prevailed, resulting in a complete map of the data points (See Figure 8).



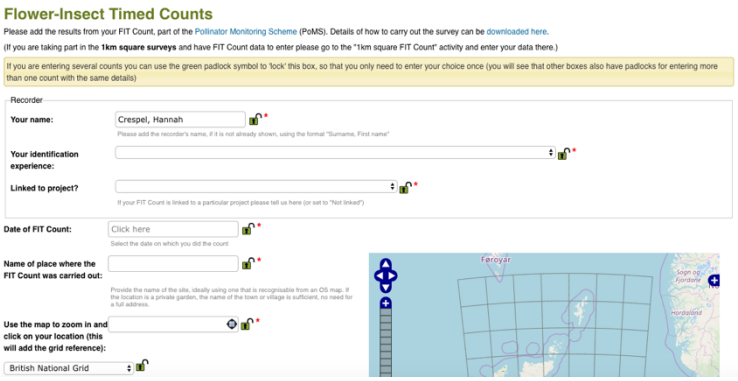


Figure 6 and 7. Screenshots of the online FIT Count survey form through iRecord

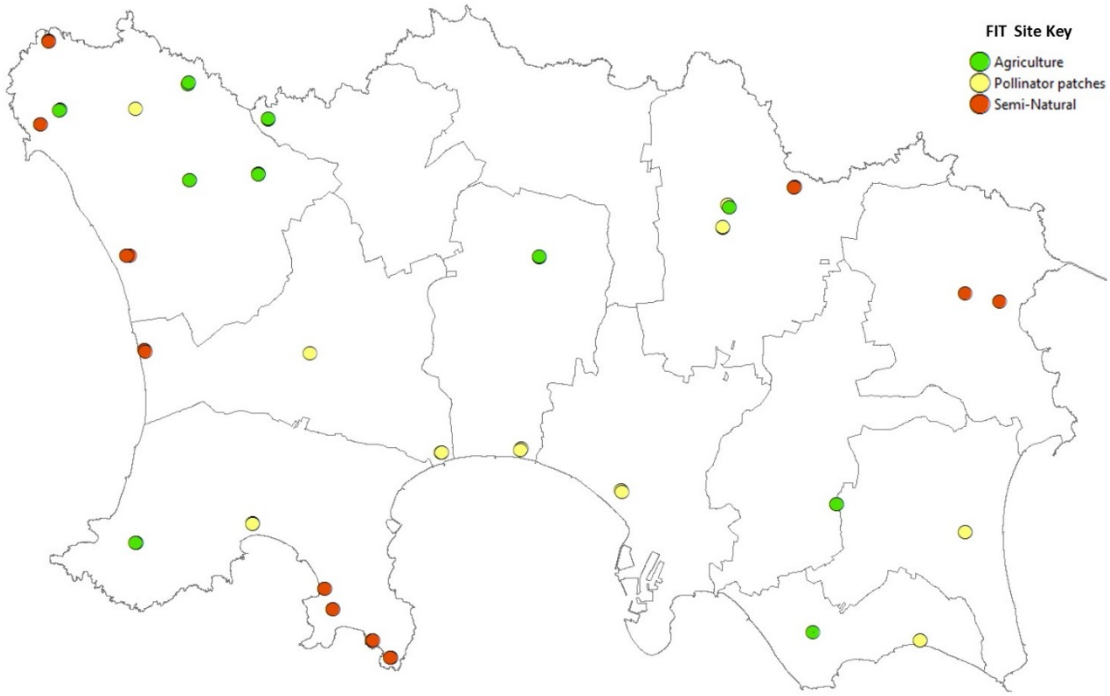


Figure 8. Mapped locations of FIT Counts using ArcMap

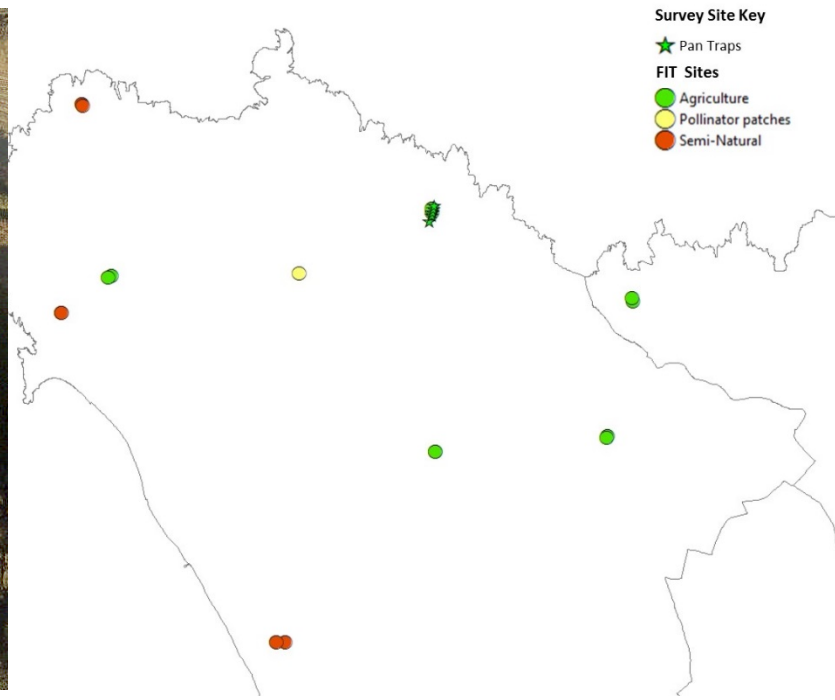


Figure 9 and 10. Mapped positions of pan traps using ArcMap

Conclusion

There was an overwhelmingly positive response from both landowners and passers-by as to what pollinators were being recorded during the FIT Count surveys carried out near their homes. During several surveys, members of the public would ask enthusiastic questions and watch the quadrat to observe the insects visiting those flowers. For the majority of the time, these people were surprised at the range of pollinators seen but were also eager to inform that since the presence of the new pollinator patches they had definitely seen an increase in the presence of more noticeable insects such as bumblebees and butterflies.

Fit Counts

Overall, the agricultural sites with green cover crops had the highest number of insects sighted through the FIT Counts (See Figure 3) with a total of 207 recorded, followed by the semi-natural sites with 173 and then the pollinator patches with 132 (See Figure 4). Semi-natural sites are mostly untouched and would therefore perhaps be expected to attract the majority of wild pollinators, however the agricultural sites that are regularly managed with pollinator friendly cover crop but also have and ancient seed bank from continuous farming use for many decades seems to result in the most attractive habitat. The pollinator patches are relatively new seed banks and next year perennial flowers will bloom alongside the wildflowers seen this year and therefore hopefully attract and even wider range of pollinators. However it is clear to see that these patches are attracting lots of pollinators in more urban environments, but furthermore are providing the public with areas of education from which they can learn about Jersey's insect communities.

From the perspective of the recorder, with the use of the guidance resources provided by PoMS (Appendix 1), the FIT Count methodology was easy to understand and the 10-minute survey made data collection quick which is an appealing aspect for citizen science projects. However, accurately identifying differences between some of the insects can be extremely difficult; for example some

small solitary bees can easily be mistaken as flies to the untrained eye. Mistakes such as these will not necessarily be countered for within a large dataset as Jersey's population is roughly 500 times smaller than that of the UK. Therefore I believe the best way to ensure the collection of a successful dataset would be to train local citizens to the level of identification required for FIT Counts.

The data obtained from island wide FIT Counts is easily analysed once formatted and can show a range of interactions and relationships between pollinators and flower species as well as a trend in populations over time.

If owners of land containing pollinator patches or areas of wild flowers were to be involved as volunteers, this could result in perhaps monthly repeats of FIT Counts in the same areas which would provide an excellent dataset for observing trends in pollinator populations across the island. Having seen the positive responses to the surveys carried out in this project, this idea for the future is definitely achievable. I believe a format such as this, rather than hiring a separate monitoring party or relying solely on citizen input, would be the best route to generating a valid pollinator baseline for Jersey. Alongside this, the use of teaching resources to carry out FIT Counts as a part of the KS3 Biology school curriculum would generate data from school sites and promote the planting of pollinator patches. It would also produce a more educated generation of citizen scientists, introduce students to ways of getting involved with their local communities, and encourage young people to be outdoors within nature.

Volunteer and School Resources

Having used the resources provided by PoMS to carry out the FIT Counts, I believe that for training Jersey inhabitants and for use in schools, a handheld and more concise insect and flower guide would be more suitable for use in the field. These could potentially be further tailored to our island pollinators with use of local images of insects that citizens are likely to encounter. In the resources created as a part of this project these issues have been amended and the target flower list has been adapted to incorporate species commonly found in pollinator patches, agricultural and semi-natural sites across Jersey. However, these resources are yet to be trialled in schools and have not been examined by the team at UK PoMS and so are to be considered a first draft. Within primary schools that have pollinator patches as a part of the Pollinator Project it could be possible that, with teacher assistance, FIT Counts are introduced in KS2. Regular afterschool activities such as bug hunts should also be encouraged as it offers an early start for children to be exposed to different areas of nature and discover aspects that they enjoy.

Pan Trapping

Although the data collected from the pan traps was sufficient, the exact methodology used in the UK of placing 5 traps diagonally across the NPMS 1km^2 was not viable as this area covered several fields which required permission to access. Therefore the traps were set up across a smaller area with 20 metres between each one (See Figures 9 and 10). This method works well in the UK due to there being more accessible, open space; therefore fields that span this kind of area whereas in Jersey we are limited because of field size. The pan traps themselves were easy to set up although they required the presence of at least two people in order to carry the equipment and safely hammer the stakes into the ground (See Figure 2). The traps were then left for 6 hours to attract insects, and the collection process was easy to conduct following the PoMS guidance resource however yet again required the presence of two or more people. The data collected was in the form of 5 pots, one for each trap, containing ethanol and the caught specimens (See Table 1). However, with only the hoverflies and bees to be identified to species level this resulted in a vast amount of insects ending

up dead for no real purpose other than to be recorded in groups, the same way they would have in a FIT Count. On top of this, the identification process to species level is slow and intricate in order to be accurate and requires a high level of expertise which the UK PoMS do not currently have the facilities to address data collected in Jersey. Therefore, because it would be difficult to find consistent local volunteers with the advanced knowledge required and due to the land restrains we suffer as a small island, I believe that pan trapping would be an unsuccessful method to pursue for data collection on pollinator populations in Jersey. However, I do believe that were the Government of Jersey to continue working with the UK Pollinator Monitoring Scheme with FIT Count data collection, it could be a useful partnership for both parties and potential funding from the Government could result in a more successful system for both UK and Jersey PoMS.

Recommendations

It is apparent that this 6 week project trialling the UK pollinator monitoring methods in Jersey was successful to a certain extent, but has resulted in some suggestions regarding future use. FIT Counts are a great citizen science survey, suitable for Jersey that should be used continuously in the future to obtain a large dataset as a means of monitoring island pollinator populations. To obtain both a vast quantity of data with valid quality, it would work best to provide short training sessions; demonstrating a FIT Count but concentrating on achieving the required level of insect identification to complete the survey. Working closely with land owners made this report possible and I believe it would be an excellent way for members of the local community to connect with the Pollinator Project if they were to continuously monitor their own patches. This would not only create a constant conversation between the Government, environmental stakeholders and citizens but also provide ample repeat data; perfect for observing trends in pollinator populations over time.

Schools are also an excellent place to introduce these processes; creating a new generation of citizen scientists, and by slightly adapting the UK resources to be more tailored to Jersey's insect and plant communities, I believe collecting data through schools will not only benefit the dataset but also the mind-set of many students. I do believe that it is crucial that all year groups are involved with the project; introducing a simpler survey and therefore suitable for KS1 students, would be a successful method of introducing students to data collection meanwhile allowing them to be out in nature. Sarah Maguire at the Jersey Biodiversity Centre (JBC) has recently been trialling the methods within the primary school's pollinator patches but has found the survey called Every Flower Counts that involves counting the number of pollinator sources within a quadrat, which is much more suited to the younger year groups as their identification skills are not yet as developed. Future continued use of this survey will encourage younger students to take interest in their pollinator patches and the wildlife living there. It also allows teachers to be involved and incorporate the outside areas into their lessons.

Regarding the PoMS pan trapping survey, this does not appear to be a suitable method for data collection in Jersey due to the island typography and land use, and further work is required to determine if this survey or something similar could work in the future as it is something that needs to be carried out on a large scale in both manpower and space; something our island cannot currently provide. However, I do not feel that these methods are necessary in order to observe the pollinator community and that FIT Counts alone would provide a clear image of pollinator populations in Jersey without the capture and demise of many insects. However, should there are several tasks that would need to be carried out for the data collection to be successful. Local citizens should be trained to the level of insect identification required for FIT Counts, potentially in short

sessions that demonstrate the survey techniques alongside improving identification skills using a situation similar to a bug hunt. If these volunteer citizens could involve land owners or areas containing pollinator patches and or wildflower habitats, this could result in perhaps monthly repeats of FIT Counts and therefore a consistent dataset providing clear trends.

For the best method of data collection and analysis, the form based in iRecord was easy to use and fit for purpose. Using iRecord would be the most cost effective way for Jersey to enter data collected from FIT Counts, however access to this data would need to be granted through the Jersey Biodiversity Centre website which uses an Indicia database. A possible solution to this would be that there is a link in iRecord to a Channel Island form on the JBC site. This would also allow uploaded photos of sightings to be verified and identified by a qualified Jersey inhabitant rather than the Centre for Ecology and Hydrology (CEH) as they are currently lacking staff to accommodate for Jersey's data. This could be a route in which the inter-island pollinator scheme links with the UK PoMS through potential support and funding their database to allow for our data to be used and analysed alongside theirs. If Jersey was to go down the route of an adapted pan trapping survey then the same would apply**.**

Beginning to create a baseline dataset for Jersey is becoming increasingly important as recent global investigations are often reporting a decline in insect populations, however there is currently no way for Jersey to comment on this due to a lack of data regarding a wide range of pollinators. These creatures are often overlooked and undervalued in their importance but they play a crucial role in nutrient cycling and crop pollination in all ecosystems. Monitoring them is the first step in preserving pollinator populations and using citizen science allows people involved to be educated of their importance.

References

https://www.buglife.org.uk/bugs-and-habitats/pollination last accessed 08/08/2019

Appendices

Appendix 1. FIT Count guidance notes and data collection form

UK Pollinator Monitoring Scheme: Flower-Insect Timed Count guidance

Version 4, 2019

Many wild and cultivated plants depend on insects to pollinate their flowers, with successful pollination leading to successful seed or fruit production. There are concerns that numbers of pollinating insects such as bees and flies may be declining, but we need more data to be able to track changes in abundance across the country. The Flower-Insect Timed Count (FIT Count) is designed to collect new data on numbers of flower-visiting insects, as part of a wider set of surveys under the UK Pollinator Monitoring Scheme (PoMS).

Bumblebee on Bramble flower (photo by Nadine Mitschunas)

This document contains all the information you need to carry out a FIT Count. The Count is not difficult to do, but we need to collect data as carefully as possible so that it can be analysed to provide information on potential changes in insect numbers. Please do follow this guidance as closely as you can.

Planning your FIT Count

What will I need to carry out a survey?

- You need about 15 minutes of time – the count itself lasts for 10 minutes.
- Counts need to take place between the beginning of April and the end of September, in dry and reasonably warm weather, see weather conditions below.
- You will need to find a location containing a target flower species to watch during the FIT Count. This can be in a garden or park, in the countryside or on a nature reserve – anywhere that has suitable flowers can be used. See below for the target flower list.
- You need to watch insects in a 50cm by 50cm square patch – the easiest way to define this is to use a quadrat (see below).
- You are asked to take a digital photo of your target flower species, and on at least some of your counts to take photos of *examples of* the different types of insect you have seen.
- Print out the recording form, and make sure you have a pencil or pen to record your counts.
- If needed, print out the identification guides to plants and insects.
- After the count, please add your results to the PoMS form on the iRecord website (you will need to register on iRecord first).

What weather conditions are suitable?

A FIT Count can be carried out at any time of day between the beginning of April and the end of September, as long as the weather is dry and warm:

- If sky is clear (less than half cloud) the minimum temperature for a count is 13°C
- If sky is cloudy (half cloud or more) the minimum temperature for a count is 15°C

Please do not carry out counts when the temperature is below the above thresholds. You are asked to provide simple information about the amount of sun and shade during your count, and the wind conditions. See the recording form for details.

What location can I use?

Your location can be anywhere where there are flowers to attract pollinating insects. An urban garden or park is suitable, or in more rural areas it could be on farmland, on a nature reserve – anywhere where suitable flowers are growing, where you have permission to be, and where it is safe to go (see the Stay safe section below). Your count results will be visible to others via the iRecord website, so when entering your results it is best to give a town or village name, not your full address.

Centre for Ecology & Hydrology · Bumblebee Conservation Trust · Butterfly Conservation · BTO · Hymettus · University of Leeds · University of Reading

https://www.ceh.ac.uk/sites/default/files/FIT%20Count%20survey%20guidance%20v4.pdf

UK Pollinator Monitoring Scheme: www.ceh.ac.uk/pollinator-monitoring

FIT Count field recording form

version 4, 2019

UK Pollinator Monitoring Scheme

A Flower-Insect Timed Count can be carried out at any time of day between the beginning of April and the end of September, wherever a suitable target flower can be found, and when the weather is dry and warm:

- If sky is **clear** (less than half cloud) the minimum temperature for a count is **13°C**
- If sky is **cloudy** (half cloud or more) the minimum temperature for a count is **15°C**

1. About you

Your name: _____

☐ I am new to identifying wildlife
☐ I am familiar with identifying some wildlife (e.g. birds or butterflies) but not most pollinating insects
☐ I am familiar with recognising the main **groups** of pollinating insect
☐ I am confident in identifying the commonly-occurring pollinating insects **to species level**

2. Date and location of count

Date of count: _____

Location name: _____ (e.g. town/village, not full address)

Grid ref if known (or select from online map later): _____

Habitat (tick one box that is the best match):

☐ Garden
☐ School grounds
☐ Parkland with trees
☐ Churchyard
☐ Grassy verge or hedgerow edge
☐ Grassland with wild flowers (e.g. meadow)
☐ Amenity grassland (usually mown short)
☐ Farm crops or grassy pastures
☐ Upland moorland
☐ Lowland heath
☐ Brownfield or other 'waste ground'
☐ Woodland

☐ Other habitat type (please describe): _____

Please use one of the 'target flowers' if you possibly can:

- Dandelion
- Buttercup
- White Dead-nettle
- Hawthorn
- Bramble/Blackberry
- Lavender (English)
- Common/Greater Knapweed
- Heather (*Calluna* or *Erica*)
- Hogweed
- White Clover
- Ragwort
- Thistle (*Carduus* or *Cirsium*)
- Buddleja
- Ivy

(only choose another insect-attracting flower if none of the above are available)

3. Target flower (from the list on the left if possible)

Which target flower have you chosen? _____

☐ Target flowers cover less than half of 50×50cm patch
☐ Target flowers cover about half of patch
☐ Target flowers cover more than half of patch

Number of flowers in patch: _____

I counted:

☐ individual flowers 
☐ flower heads 
☐ flower umbels 
☐ flower spikes 

Is your 50x50cm patch of target flowers:

☐ Growing in a larger patch of the same flower
☐ Growing in a larger patch of many different flowers
☐ More or less isolated

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4. FIT Count

Once you are ready to start, check your timer so that you can record for exactly ten minutes. Please count **EVERY** insect that you see that **LANDS** on one of your target **FLOWERS** (if you're not sure what type it is just add it to the "Other insects" category). Please try to count each individual insect just once, and try not to lean over the flowers you are watching, as this can cast shadows and prevent insects approaching.

Time of count start (use British Summer Time): _____

Insect group	**Tally of number seen: 𝍸 || = 7, etc.**
Bumblebees	
Honeybees	
Solitary bees	
Wasps (including ichneumon wasps)	
Hoverflies (including 'non-typical' hoverflies)	
Other flies	
Butterflies and moths	
Beetles (larger than 3mm)	
Small insects (such as pollen beetles) less than 3mm long	
Other insects	

5. Weather conditions

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

Don't forget to **take a photo** of your target flower species, and **add your counts** to the iRecord form (www.brc.ac.uk/irecord/poms-fit-count)! You can also add photos of *examples* of the insects you have seen, but this is optional (please don't take photos during the count as this may disturb the visiting insects).

Appendix 2 . Pan trap guidance notes and data collection form

UK Pollinator Monitoring Scheme

1km SQUARE SURVEY

GUIDANCE NOTES

Version 1.0 April 2018

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https://www.ceh.ac.uk/our-science/projects/pollinator-monitoring

1km Square Pan trap Recording Form

UK Pollinator Monitoring Scheme

Grid Ref: **Square no.:**		**Recorder:**			
Location name:		**Date:**			
Pan Trap Station	**1**	**2**	**3**	**4**	**5**
Full Grid Ref if moved					
Time Out					
Time In					
Disturbance (Y/N)					
Conditions at start					
Temp (deg C):					
Wind:					
Cloud (% cover):					
Conditions at end					
Temp (deg C):					
Wind:					
Cloud (% cover):					
Sun (% duration exposure):					
Cast shadow (% duration exp):					

Local flower abundance (number of units per plant species within 2m radius of trap station)

Plant species	Unit*	1	2	3	4	5

* Flower unit abbreviations I = individual flowers; H = flower heads; U = umbels; S = spikes.

If you need more lines for plant species around Pan traps 4-5, write the plant species name within the box under the pan trap column

Vegetation Height (average height within the 2m radius around each trap station)					
Average height (cm)					
Habitat type within 2m radius (refer to Habitat classifications H1 - 40)					
Primary habitat					
Secondary habitat					

Pan trap sample labels to cut or tear on sampling days – one per tube

1km Grid Ref	1km Grid Ref	1km Grid Ref	1km Grid Ref	1km Grid Ref
Trap station 1	Trap station 2	Trap station 3	Trap station 4	Trap station 5
Date:	Date:	Date:	Date:	Date:
Recorder:	Recorder:	Recorder:	Recorder:	Recorder:

Checklist for a 1km square survey day (please refer to detailed guidance notes)

1. Contact landowner(s) to give notice of visit at least 1 day before survey.
2. On day of survey gather survey kit, fill 2L bottle with water and add a drop of washing up liquid, fill 300ml bottle with 70% ethanol.
3. On arrival at site take rucksack with the following items: **5 wooden stakes (with permission sign attached), 5 wire supports, 15 pan traps (3 yellow. 3 white, 3 blue), 2L bottle with water, mallet, map with location of pan trap stations, map with landowner access details, Pan trap and FIT Count recording forms, 1km summary report from 2017, pencil, thermometer, watch, GPS or smartphone.**
4. Walk to each pan trap location and set up the pan trap station (hammer in stake, attach wire support, put pan traps into wire support (1 yellow, 1 white and 1 blue pan trap per station), fill pan traps with water).
5. Fill out at least the time, temperature, wind speed and cloud cover for each pan trap station when setting up on Pan trap recording sheet, everything else can be filled out later.
6. After setting everything up wait 6 h (since setting up the first trap) before collecting the pan traps.
7. Conduct flower counts within a 2m radius of each pan trap station, assign a habitat type/s and record on the Pan trap recording form.
8. Carry out at least two FIT counts on suitable flowers within the PoMS survey square (see below).
9. After 6 h take the following items for collecting the pan traps: **300 ml 70% ethanol, sieve, 5 (15 cm x 15cm) pieces of fleece, 5 sampling tubes, zip-lock plastic bag, permanent marker, map with location of pan trap stations, map with landowner access details, Pan trap recording form, pencil, scissors, thermometer, watch.**
10. Go to each pan trap station in the same order you set them up.
11. At each pan trap station drain the insects from all 3 pan traps into the fleece using the sieve, discard the water. Put fleece with insects into sampling tube with filled in label (cut out from Pan trap recording form and use pencil). Fill up to half of sampling tube with 70% ethanol. Complete the Pan trap recording form.
12. Put all 5 sampling tubes into labeled zip-lock plastic bag.
13. Keep samples as cool as possible and post them back to CEH as soon as possible.
14. Submit your survey data to iRecord.

Checklist for carrying out a FIT Count within your square

1. You need the following items to carry out the FIT Count: **50cm x 50cm quadrat, FIT Count recording form, watch, pencil, camera, guide to the flowers you can use for the count (optional), guide to recognizing the insect groups (optional)**
2. Find a flower patch, put your quadrat on the flowers, count flowers in the quadrat
3. Watch the flowers in the quadrat for 10 min, count every new insect landing on the flowers
4. Complete other details required on the FIT Count recording form (weather etc.)
5. Submit your count data to iRecord.

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Appendix 3. New school FIT Count resources

Target Flower Identification Guide

Main flowering time	Target flower name	Flower type
	Pollinator Monitoring Scheme target flowers	
Apr to Sep	Buttercup – *Ranunculus species* 	Individual flowers
Apr to Sep	Dandelion - *Taraxacum officinale* 	Flower head
Apr to Jun	Hawthorn – *Crataegus* 	Individual flowers
Apr to Sep	White Dead-nettle - *Lamium album* 	Flower spike
May/Jun to Sep	Bramble (Blackberry) - *Rubus fruticosus* 	Individual flowers
Jun to Aug	Lavender (English) - *Lavandula angustifolia* 	Flower spike
Jun to Sep	Hogweed - *Heracleum sphondylium* 	Umbel
Jun to Sep	Knapweed (Common or Greater) - *Centarea nigra* or *scabiosa* 	Flower head
Jun to Sep	Ragwort - *Senecio jacobaea* and relatives 	Flower head
Jun to Sep	White Clover - *Trifolium repens* 	Flower head
Jun to Sep	Buddleja 	Flower spike

Main flowering time	Target flower name	Flower type
	Pollinator Monitoring Scheme target flowers	
Jun to Sep	Heather - *Calluna vulgaris* or *Erica* species 	Flower spike
Jun to Sep	Thistle - *Cirsium* or *Carduus* 	Flower head
Sep	Ivy - *Hedera helix* 	Flower head
Additional target flowers suggested for Jersey		
Jun to Sep	Cornflower- *Centaurea cyanus* 	Flower head
Jun to Sep	Corn Marigold - *Glebionis segetum* 	Flower head

Jun to Sep	Birds-foot trefoil - *Lotus corniculatu* 	Flower spike
Jun to Aug	Tufted Vetch- *Vicia cracca* 	Flower spike
Jan to Jun but can be seen throughout the year	Common Gorse - *Ulex Europaeus* 	Flower spike
Jun to Sep	Fodder radish- *Raphanus sativus var. oleiformis* 	Individual flowers
Jun to Sep	White Mustard- *Sinapis alba* 	Individual flowers
Jun to Sep	Rough star thistle - *Centaurea aspera* 	Flower head

Flower-Insect Timed (FIT) Count Teaching Resource

Ecology is a key area within Biology that is often not focussed on or taught in depth in schools. However, it is extremely important for children to connect with nature and learn about their local environment and exercises such as this can help support the KS3 school curriculum. An experiment in the field such as this can be used to demonstrate the importance of 'fair tests' in collecting valid data, and practices their abilities to follow instructions. The data collected can then be mathematically analysed using techniques such as taking averages. This can then be interpreted and from these trends the students can come up with their own hypotheses that could later be explored. This idea of looking at the relationships between pollinators and flowers ties in with curriculum topics regarding ecosystems and the importance of insect pollination in plant reproduction and therefore food security.

FIT Counts are Flower-Insect Timed Counts that use a 10 minute survey technique to observe an area of wildflowers and record all the insects that land there. They are a method of citizen science, currently used by the Pollinator Monitoring Scheme in the UK to gauge large scale pollinator populations. It is important for projects like this to be introduced to young students in order to produce the next generation of citizen scientists. It also allows students to develop their practical skills and explore other areas of Biology that they don't often have access to within a classroom.

Commonly asked questions/ things to be aware of

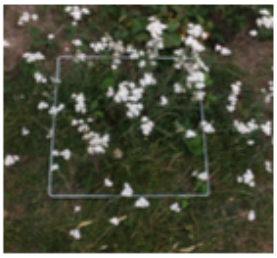
- When counting the number of flowers within the quadrat, be careful not to count dead/withered flowers that will not serve as a pollen source to insects.
- When carrying out the FIT count be sure not to double count an insect, if one bee for example visits multiple flowers within the quadrat it is only recorded as one bee.
- And the insect must land on the flower head of only the target species chosen, not another species of flower that may be within the quadrat.

Equipment required per group (best in pairs or groups of 3)

- An area such as hedgerow or meadow containing wildflowers (preferably plants from the target flower identification guide)
- A 50cmx50m quadrat placed purposely over a patch of wildflowers, not random sampling
- A timer or stopwatch
- Handheld GPS or App on phone that provides co-ordinates
- Clipboard and pen
- Copy of the Pollinator Monitoring Scheme FIT Count recording form (found in the following link; https://www.ceh.ac.uk/sites/default/files/FIT%20Count%20survey%20form%20v4.pdf)
- Copy of the plant and insect identification guides provided

How to carry out the FIT Count

- Instructions provided by PoMs can be found with the following link: https://www.ceh.ac.uk/sites/default/files/FIT%20Count%20survey%20guidance%20v4.pdf
- Here is a very useful demonstrative video: https://youtu.be/luTiPEJI8rQ
- Suggested that students work in pairs or groups of 3
- The quadrat is placed over an area where the target flower is present, similar to these photos;



- The recording form is filled out regarding number of flowers present within the quadrat and the species of flower chosen
- GPS co-ordinates also recorded using a map app on phone or a handheld GPS
- Then a timer is set for 10 minutes
- During this time, using the insect identification guide provided, any insect that lands on a flower of the **target species** within the quadrat is recorded on the sheet within its relevant group using a tally format
- An insect must land on the target flower, insects that just fly through the quadrat should not be recorded
- After the 10 minute survey the weather conditions are also recorded on the form and the survey is complete
- Photos can be taken of the quadrat, the target flower, the surrounding area, any insects seen however it is important to stay focussed during the 10 minutes and not to disturb the quadrat and so pictures should be taken before or after the survey and not during. These can be used in online data input described below
- Double check the form has been completely filled out, you have taken any photos you wish and the quadrat has been picked up before leaving the site

What to do with your results

- Results can be entered into a spreadsheet and used for own classwork such as calculating averages
- Data can be entered into an online version of the recording form found on iRecord (https://www.brc.ac.uk/irecord/poms-fit-count) this requires a log-in to be created and so it is recommended that the teacher registers an account for the school and the students take turns entering the data through that account. It is unnecessary to enter repeats of the same location from the same time period and so taking an average of what was recorded and entering that as a single sample is preferred
- This data is sent to the PoMS database in the UK and used in their annual reports of pollinator populations
- The online form is the same as the paper version however there is an opportunity to submit any photos taken of the FIT Count

FIT Count fun facts

- Pollinators are responsible for 80% of the UK's food production
- Pollinators aren't just bees and butterflies! Birds, bees, bats, butterflies, moths, flies, beetles, wasps and small mammals are all common pollinators. Other animals, as well as the wind, can carry pollen from flower to flower as well.
- The data provided by carrying out FIT Counts allows pollinator populations to be monitored and tracked to see if declines are taking place and how we can then counteract them.
- Growing pollinator-friendly plants like the wildflowers seen during FIT Counts can be a way to support insect communities locally.

Useful links

Link to all PoMS sheets: https://www.ceh.ac.uk/our-science/projects/pollinator-monitoring

FIT Count form on iRecord: https://www.brc.ac.uk/irecord/poms-fit-count

FIT Count demonstration video: https://youtu.be/IuTiPEJI8rQ

Appendix 4. Formatted data from the Centre for Ecology and Hydrology

sample_id	recorders	country	location_name	date	sample_gridref	comment	digitised_by	recorder_type	habitat	habitat_other_detail	target_flower
6438165	Crespel, Hannah	Jersey	Portlet footpath	03-Aug-19	49.170N, 2.173W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Heathers - Calluna and Erica species
6438075	Crespel, Hannah	Jersey	Field MY105	02-Aug-19	49.246N, 2.196W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Ragwort - Senecio jacobaea and relatives
6438010	Crespel, Hannah	Jersey	Judith Queree's Garden	02-Aug-19	49.238N, 2.199W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Knapweeds (Common or Greater) - Centaurea nigra or scabiosa
6437976	Crespel, Hannah	Jersey	Field O724	02-Aug-19	49.237N, 2.214W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Dandelion - Taraxacum officinale
6437948	Crespel, Hannah	Jersey	Hamptonne	02-Aug-19	49.226N, 2.136W		Crespel, Hannah	I am familiar with identifying some wildlife groups (eg. birds or butterflies) but not most pollinating insects	Grassland with wild flowers (e.g. meadow)		Knapweeds (Common or Greater) - Centaurea nigra or scabiosa
6437911	Crespel, Hannah	Jersey	Overdale Horticultural Garden	02-Aug-19	49.191N, 2.118W		Crespel, Hannah	I am familiar with identifying some wildlife groups (eg. birds or butterflies) but not most pollinating insects	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6437864	Crespel, Hannah	Jersey	Bee Field	02-Aug-19	49.190N, 2.070W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Knapweeds (Common or Greater) - Centaurea nigra or scabiosa
6437830	Crespel, Hannah	Jersey	Field C54	02-Aug-19	49.171N, 2.075W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6427128	Crespel, Hannah	Jersey	Good Life Jersey	02-Aug-19	49.170N, 2.052W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6427087	Crespel, Hannah	Jersey	Grouville school	02-Aug-19	49.186N, 2.042W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6427064	Crespel, Hannah	Jersey	St Catherine's woods	02-Aug-19	49.219N, 2.034W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6427042	Crespel, Hannah	Jersey	Jardin D'Olivet	02-Aug-19	49.236N, 2.080W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Other - please describe below
6427011	Crespel, Hannah	Jersey	Grosnez	31-Jul-19	49.257N, 2.245W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Lowland heath		Heathers - Calluna and Erica species
6426962	Crespel, Hannah	Jersey	Field O938	31-Jul-19	49.247N, 2.243W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Thistle - Cirsium or Carduus
6426931	Crespel, Hannah	Jersey	Les Landes du Ouest	31-Jul-19	49.245N, 2.247W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Lowland heath		Other - please describe below
6426874	Crespel, Hannah	Jersey	Wetland Centre	31-Jul-19	49.212N, 2.224W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Other - please describe below
6426855	Crespel, Hannah	Jersey	Trees for Life	31-Jul-19	49.226N, 2.228W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Ragwort - Senecio jacobaea and relatives
6426819	Crespel, Hannah	Jersey	Field B398	31-Jul-19	49.184N, 2.226W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6426772	Crespel, Hannah	Jersey	Churchill Memorial Park	31-Jul-19	49.187N, 2.200W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6426723	Crespel, Hannah	Jersey	Ouaisne Common	31-Jul-19	49.177N, 2.184W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Bramble (Blackberry) - Rubus fruticosus
6426683	Crespel, Hannah	Jersey	Portlet Common	31-Jul-19	49.175N, 2.182W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Hogweed - Heracleum sphondylium
6426676	Crespel, Hannah	Jersey	Portlet Common	31-Jul-19	49.175N, 2.182W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Hogweed - Heracleum sphondylium
6424363	Crespel, Hannah	Jersey	Portlet Footpath	31-Jul-19	49.170N, 2.173W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Heathers - Calluna and Erica species
6424358	Crespel, Hannah	Jersey	Noirmont	31-Jul-19	49.168N, 2.169W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Hogweed - Heracleum sphondylium
6424355	Crespel, Hannah	Jersey	Goose Green Car Park	31-Jul-19	49.197N, 2.158W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6424340	Crespel, Hannah	Jersey	Millbrook Park	31-Jul-19	49.198N, 2.140W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6341495	Crespel, Hannah	Jersey	Howard Davis Farm Orchard	29-Jul-19	49.233N, 2.094W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Bramble (Blackberry) - Rubus fruticosus
6341168	Crespel, Hannah	Jersey	Howard Davis Farm	29-Jul-19	49.233158 -2.094271		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6339972	Crespel, Hannah	Jersey	Royal Jersey Showground Cultivate Garden	29-Jul-19	49.230N, 2.096W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6298303	Crespel, Hannah	Jersey	Field C54	26-Jul-19	49.171N, 2.075W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6298224	Crespel, Hannah	Jersey	Wetland Centre	26-Jul-19	49.212N, 2.224W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Other - please describe below
6298092	Crespel, Hannah	Jersey	Trees for life	26-Jul-19	49.226N, 2.227W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Ragwort - Senecio jacobaea and relatives
6298024	Crespel, Hannah	Jersey	Field O724	26-Jul-19	49.237N, 2.214W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Dandelion - Taraxacum officinale
6298004	Crespel, Hannah	Jersey	Judith Queree Gradens	26-Jul-19	49.238N, 2.198W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Knapweeds (Common or Greater) - Centaurea nigra or scabiosa
6297983	Crespel, Hannah	Jersey	Field MY105	26-Jul-19	49.245N, 2.196W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Ragwort - Senecio jacobaea and relatives
6278782	Crespel, Hannah	Jersey	Dolmen des Geonnais	25-Jul-19	49.251N, 2.214W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6278766	Crespel, Hannah	Jersey	Dolmen des Geonnais	23-Jul-19	49.251N, 2.214W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6278747	Crespel, Hannah	Jersey	Field O938	25-Jul-19	49.247N, 2.242W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Thistle - Cirsium or Carduus
6278653	Crespel, Hannah	Jersey	Field B398	25-Jul-19	49.184N, 2.225W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6273112	Crespel, Hannah	Jersey	Howard Davis Farm Orchard	24-Jul-19	49.233N, 2.094W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Bramble (Blackberry) - Rubus fruticosus
6273070	Crespel, Hannah	Jersey	Jardin D'olivet	24-Jul-19	49.236N, 2.080W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Other - please describe below
6273008	Crespel, Hannah	Jersey	The Elms (walled garden)	24-Jul-19	49.229N, 2.166W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6272967	Crespel, Hannah	Jersey	Hamptonne Farm	24-Jul-19	49.226N, 2.136W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Knapweeds (Common or Greater) - Centaurea nigra or scabiosa
6272914	Crespel, Hannah	Jersey	Portlet Common	24-Jul-19	49.175N, 2.182W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Hogweed - Heracleum sphondylium
6267110	Crespel, Hannah	Jersey	Dolmen des Geonnais (SN)	23-Jul-19	49.251N, 2.214W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Ragwort - Senecio jacobaea and relatives
6267017	Crespel, Hannah	Jersey	Les Landes Racecourse	23-Jul-19	49.257N, 2.245W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Lowland heath		Heathers - Calluna and Erica species
6254032	Crespel, Hannah	Jersey	Les Landes Du Ouest	23-Jul-19	49.247N, 2.248W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Lowland heath		Other - please describe below
6249319	Crespel, Hannah	Jersey	Portlet Footpath	22-Jul-19	49.170N, 2.173W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Other - please describe below
6249297	Crespel, Hannah	Jersey	Ouaisne Common	22-Jul-19	49.177N, 2.184W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Bramble (Blackberry) - Rubus fruticosus
6249285	Crespel, Hannah	Jersey	Noirmont	22-Jul-19	49.168N, 2.169W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Hogweed - Heracleum sphondylium
6249271	Crespel, Hannah	Jersey	The Bee Field (SN)	22-Jul-19	49.190N, 2.070W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Ragwort - Senecio jacobaea and relatives
6249267	Crespel, Hannah	Jersey	The Bee Field	22-Jul-19	49.190N, 2.070W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Knapweeds (Common or Greater) - Centaurea nigra or scabiosa
6249215	Crespel, Hannah	Jersey	St Catherine's woods	22-Jul-19	49.220N, 2.042W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassy verge or hedgerow edge		Other - please describe below
6186320	Crespel, Hannah	Jersey	Jersey Good Life (la Grande route de la Cote)	18-Jul-19	49.170N, 2.053W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6185228	Crespel, Hannah	Jersey	Royal Jersey Showground Cultivate Garden	18-Jul-19	49.230N, 2.096W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6184882	Crespel, Hannah	Jersey	Grouville School	17-Jul-19	49.186N, 2.041W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6174146	Crespel, Hannah	Jersey	Howard Davis Farm	16-Jul-19	49.233N, 2.095W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6174130	Crespel, Hannah	Jersey	St Peter's School	16-Jul-19	49.212N, 2.187W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6174123	Crespel, Hannah	Jersey	Les Landes School	16-Jul-19	49.247N, 2.226W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6174076	Crespel, Hannah	Jersey	Churchill Memorial Park	16-Jul-19	49.187N, 2.199W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6174048	Crespel, Hannah	Jersey	Overdale horticultural garden	16-Jul-19	49.192N, 2.118W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6168019	Crespel, Hannah	Jersey	Millbrook Park	15-Jul-19	49.198N, 2.140W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below
6167980	Crespel, Hannah	Jersey	Goose Green Car Park	15-Jul-19	49.197N, 2.158W		Crespel, Hannah	I am familiar with recognising the main groups of pollinating insect	Grassland with wild flowers (e.g. meadow)		Other - please describe below

target_other_name	flower_cover	floral_unit_count	floral_unit	flower_context	count_start	cloud_cover	sunshine	wind_speed
Bell heather (Erica cinerea)	Target flowers cover more than half of patch	51	flower spike	More or less isolated	14:35	All or mostly cloud	Partly in sun and partly shaded	Leaves moving strongly
	Target flowers cover about half of patch	22	flower head	Growing in a larger patch of many different flowers	15:23	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
	Target flowers cover more than half of patch	53	flower head	Growing in a larger patch of many different flowers	14:49	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
	Target flowers cover about half of patch	34	flower head	Growing in a larger patch of many different flowers	14:20	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
	Target flowers cover less than half of patch	11	flower head	Growing in a larger patch of many different flowers	13:18	All or mostly blue	Partly in sun and partly shaded	Leaves still/moving occasionally
Corn marigold (Glebionis segetum)	Target flowers cover more than half of patch	39	flower head	Growing in a larger patch of many different flowers	12:32	All or mostly blue	Entirely shaded	Leaves still/moving occasionally
	Target flowers cover more than half of patch	71	flower head	Growing in a larger patch of many different flowers	11:52	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
Cornflower (Centaurea cyanus)	Target flowers cover more than half of patch	56	flower head	Growing in a larger patch of many different flowers	11:22	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
Corn marigold (Glebionis segetum)	Target flowers cover less than half of patch	11	individual flower	Growing in a larger patch of many different flowers	11:02	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
Corn marigold (Glebionis segetum)	Target flowers cover about half of patch	26	individual flower	Growing in a larger patch of many different flowers	10:38	All or mostly blue	Entirely shaded	Leaves still/moving occasionally
Birds foot trefoil (Lotus corniculatus)	Target flowers cover about half of patch	28	flower head	Growing in a larger patch of many different flowers	10:08	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
Tufted Vetch (Vicia cracca)	Target flowers cover less than half of patch	22	flower spike	Growing in a larger patch of many different flowers	09:43	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
Ling heather (Calluna)	Target flowers cover more than half of patch	237	flower spike	Growing in a larger patch of the same flower	15:14	All or mostly cloud	Entirely shaded	Leaves moving strongly
	Target flowers cover less than half of patch	16	flower head	Growing in a larger patch of many different flowers	14:55	All or mostly cloud	Entirely shaded	Leaves moving strongly
Grose (Ulex)	Target flowers cover more than half of patch	51	flower spike	Growing in a larger patch of many different flowers	14:37	All or mostly cloud	Entirely shaded	Leaves moving gently all the time
Rough star thistle (Centaurea aspera)	Target flowers cover about half of patch	36	flower head	Growing in a larger patch of the same flower	13:55	All or mostly cloud	Entirely shaded	Leaves moving strongly
	Target flowers cover more than half of patch	25	flower head	More or less isolated	14:11	All or mostly cloud	Entirely shaded	Leaves still/moving occasionally
Cornflower (Centaurea cyanus)	Target flowers cover about half of patch	19	flower head	Growing in a larger patch of many different flowers	13:26	All or mostly cloud	Entirely shaded	Leaves moving gently all the time
Corn marigold (Glebionis segetum)	Target flowers cover more than half of patch	28	flower head	Growing in a larger patch of many different flowers	12:59	All or mostly cloud	Entirely shaded	Leaves moving gently all the time
	Target flowers cover less than half of patch	18	individual flower	Growing in a larger patch of many different flowers	12:23	All or mostly cloud	Entirely shaded	Leaves still/moving occasionally
	Target flowers cover about half of patch	32	flower umbel	More or less isolated	12:01	All or mostly cloud	Entirely shaded	Leaves moving gently all the time
	Target flowers cover about half of patch	32	flower umbel	More or less isolated	12:01	All or mostly cloud	Entirely shaded	Leaves moving gently all the time
Erica Cinerea	Target flowers cover more than half of patch	85	flower spike	More or less isolated	11:20	All or mostly cloud	Entirely shaded	Leaves moving strongly
	Target flowers cover more than half of patch	37	flower umbel	Growing in a larger patch of the same flower	10:53	All or mostly cloud	Entirely shaded	Leaves moving strongly
Cornflower (Centaurea cyanus)	Target flowers cover less than half of patch	13	flower head	Growing in a larger patch of many different flowers	10:27	All or mostly cloud	Entirely shaded	Leaves moving gently all the time
Corn marigold (Glebionis segetum)	Target flowers cover more than half of patch	28	flower head	Growing in a larger patch of many different flowers	10:05	Half blue and half cloud	Entirely in sunshine	Leaves moving gently all the time
	Target flowers cover less than half of patch	21	individual flower	Growing in a larger patch of the same flower	16:09	All or mostly cloud	Entirely shaded	Leaves moving gently all the time
Corn marigold (Glebionis segetum)	Target flowers cover about half of patch	17	individual flower	Growing in a larger patch of many different flowers	15:53	All or mostly cloud	Entirely shaded	Leaves moving strongly
Cornflower (Centaurea cyanus)	Target flowers cover less than half of patch	15	flower head	Growing in a larger patch of many different flowers	15:31	All or mostly cloud	Partly in sun and partly shaded	Leaves moving strongly
Cornflower (Centaurea cyanus)	Target flowers cover about half of patch	27	flower head	Growing in a larger patch of many different flowers	14:51	All or mostly cloud	Entirely shaded	Leaves moving strongly
Rough star thistle (Centaurea aspera)	Target flowers cover more than half of patch	36	flower head	Growing in a larger patch of the same flower	14:06	All or mostly cloud	Partly in sun and partly shaded	Leaves moving gently all the time
	Target flowers cover more than half of patch	43	flower head	More or less isolated	13:43	All or mostly cloud	Partly in sun and partly shaded	Leaves still/moving occasionally
	Target flowers cover more than half of patch	63	flower head	Growing in a larger patch of the same flower	12:54	All or mostly cloud	Partly in sun and partly shaded	Leaves still/moving occasionally
	Target flowers cover more than half of patch	38	flower head	Growing in a larger patch of many different flowers	12:18	All or mostly cloud	Entirely shaded	Leaves moving gently all the time
	Target flowers cover more than half of patch	39	flower head	Growing in a larger patch of many different flowers	11:41	All or mostly cloud	Partly in sun and partly shaded	Leaves moving strongly
Fodder radish (Raphanus sativus var. oleiformis)	Target flowers cover about half of patch	141	individual flower	Growing in a larger patch of many different flowers	10:30	Half blue and half cloud	Partly in sun and partly shaded	Leaves still/moving occasionally
Fodder radish (Raphanus sativus var. oleiformis)	Target flowers cover more than half of patch	61	individual flower	Growing in a larger patch of many different flowers	11:18	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
	Target flowers cover about half of patch	32	flower head	Growing in a larger patch of many different flowers	10:53	Half blue and half cloud	Entirely in sunshine	Leaves moving gently all the time
Cornflower (Centaurea cyanus)	Target flowers cover more than half of patch	48	flower head	Growing in a larger patch of many different flowers	11:29	Half blue and half cloud	Entirely in sunshine	Leaves moving gently all the time
	Target flowers cover less than half of patch	10	individual flower	Growing in a larger patch of many different flowers	14:56	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
Tufted Vetch (Vicia cracca)	Target flowers cover more than half of patch	56	flower spike	Growing in a larger patch of many different flowers	14:31	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
Tufted vetch (Vicia cracca)	Target flowers cover more than half of patch	78	flower spike	Growing in a larger patch of many different flowers	13:43	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
	Target flowers cover about half of patch	27	flower head	Growing in a larger patch of many different flowers	13:02	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
	Target flowers cover about half of patch	32	flower umbel	More or less isolated	12:12	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
	Target flowers cover more than half of patch	324	flower head	More or less isolated	11:02	All or mostly blue	Entirely in sunshine	Leaves moving strongly
Calluna	Target flowers cover more than half of patch	382	flower spike	Growing in a larger patch of the same flower	10:27	All or mostly blue	Entirely in sunshine	Leaves moving strongly
Gorse (Ulex)	Not recorded	104	flower spike	Growing in a larger patch of the same flower	09:57	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
Oxeye daisy (Leucanthemum vulgare)	Target flowers cover about half of patch	76	individual flower	Growing in a larger patch of the same flower	15:31	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
	Target flowers cover less than half of patch	57	individual flower	Growing in a larger patch of the same flower	14:56	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
	Target flowers cover more than half of patch	43	flower umbel	Growing in a larger patch of the same flower	14:25	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
	Target flowers cover more than half of patch	53	flower head	Growing in a larger patch of many different flowers	11:18	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
	Target flowers cover more than half of patch	41	flower head	Growing in a larger patch of many different flowers	10:53	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
Birds foot trefoil (Lotus corniculatus)	Target flowers cover about half of patch	42	flower umbel	Growing in a larger patch of the same flower	10:15	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
Cornflower marigold (Glebionis segetum)	Target flowers cover about half of patch	25	individual flower	Growing in a larger patch of many different flowers	14:43	Half blue and half cloud	Partly in sun and partly shaded	Leaves moving gently all the time
Cornflower (Centaurea cyanus)	Target flowers cover about half of patch	24	individual flower	Growing in a larger patch of many different flowers	11:36	All or mostly cloud	Entirely shaded	Leaves moving gently all the time
Cornflower marigold (Glebionis segetum)	Target flowers cover more than half of patch	38	individual flower	Growing in a larger patch of many different flowers	14:04	Half blue and half cloud	Entirely shaded	Leaves moving gently all the time
Marigold Cornflower (Glebionis segetum)	Target flowers cover about half of patch	19	individual flower	Growing in a larger patch of many different flowers	15:18	All or mostly blue	Entirely in sunshine	Leaves moving strongly
Marigold Cornflower (Glebionis segetum)	Target flowers cover about half of patch	21	individual flower	Growing in a larger patch of many different flowers	14:17	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
Marigold Cornflower (Glebionis segetum)	Target flowers cover more than half of patch	68	individual flower	Growing in a larger patch of many different flowers	13:07	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
Marigold Cornflower (Glebionis segetum)	Target flowers cover about half of patch	18	individual flower	Growing in a larger patch of many different flowers	12:08	All or mostly blue	Entirely in sunshine	Leaves moving gently all the time
Marigold Cornflower (Glebionis segetum)	Target flowers cover more than half of patch	43	individual flower	Growing in a larger patch of many different flowers	11:08	All or mostly blue	Entirely in sunshine	Leaves still/moving occasionally
Corn Marigold (Glebionis segetum)	Target flowers cover about half of patch	56	individual flower	Growing in a larger patch of many different flowers	14:21	All or mostly blue	Partly in sun and partly shaded	Leaves moving gently all the time
Cornflower (Centaurea cyanus)	Target flowers cover less than half of patch	15	individual flower	Growing in a larger patch of many different flowers	13:52	All or mostly blue	Entirely in sunshine	Leaves moving strongly

enjoyment	difficulty	project_link	bumblebees	honeybees	solitary_bees	wasps	hoverflies	other_flies	butterflies_moths	beetles	insects_small	insects_other	all_insects_total
Really fun!	Okay	Not linked to a project			1			3	1				5
Really fun!	Okay	Not linked to a project			1			2	1				4
Really fun!	Okay	Not linked to a project	11		9			1	3				24
Really fun!	Okay	Not linked to a project						2			1		3
Really fun!	Okay	Not linked to a project	5					1				1	7
Really fun!	Okay	Not linked to a project			9			3			1		13
Really fun!	Okay	Not linked to a project	13		12		1		3				29
Really fun!	Okay	Not linked to a project	8	3	1	2	2	2					18
Really fun!	Okay	Not linked to a project			4		1	1					6
Really fun!	Okay	Not linked to a project						1			2		3
Really fun!	Okay	Not linked to a project			1			2		1		1	5
Really fun!	Okay	Not linked to a project			1				1				2
Really fun!	Okay	Not linked to a project	2					3					5
Really fun!	Okay	Not linked to a project			1			3		6			10
Really fun!	Okay	Not linked to a project			1			4	1				6
Really fun!	Okay	Not linked to a project	1					1	1	1			4
Really fun!	Okay	Not linked to a project			6			8		6			20
Really fun!	Okay	Not linked to a project		1				3				1	5
Really fun!	Okay	Not linked to a project						3					3
Really fun!	Okay	Not linked to a project			3			3		1			7
Really fun!	Okay	Not linked to a project						4		1			5
Really fun!	Okay	Not linked to a project						4		1			5
Really fun!	Okay	Not linked to a project	4									1	5
Really fun!	Okay	Not linked to a project						4				1	5
Really fun!	Okay	Not linked to a project	1		2		2						5
Really fun!	Okay	Not linked to a project			5		1	1					7
Really fun!	Okay	Not linked to a project			2								2
Really fun!	Okay	Not linked to a project				1	1	4					6
Really fun!	Okay	Not linked to a project		1		1		3					5
Really fun!	Okay	Not linked to a project	1		1			3				1	6
Really fun!	Okay	Not linked to a project	2							2		3	7
Really fun!	Okay	Not linked to a project	1		5		1	7		1			15
Really fun!	Okay	Not linked to a project			1			1		1			3
Really fun!	Okay	Not linked to a project	11	2	9	1		1					24
Really fun!	Okay	Not linked to a project		1	2	2	5	3		3		1	17
Really fun!	Okay	Not linked to a project			1			1		1			3
Really fun!	Okay	Not linked to a project	2	3	2								7
Really fun!	Okay	Not linked to a project	1				1	3		7			12
Really fun!	Okay	Not linked to a project	1		2	1							4
Really fun!	Okay	Not linked to a project		7	2	1	1	1					12
Really fun!	Okay	Not linked to a project			6	1		2					9
Really fun!	Okay	Not linked to a project		1	11			2		1			15
Really fun!	Okay	Not linked to a project	2	5	6				1				14
Really fun!	Okay	Not linked to a project			1			8	1				10
Really fun!	Okay	Not linked to a project			4	2	3	5	1			2	17
Really fun!	Okay	Not linked to a project						3					3
Really fun!	Okay	Not linked to a project						3				3	6
Really fun!	Okay	Not linked to a project			4			5				1	10
Really fun!	Okay	Not linked to a project	1	7	6			1	2	6		2	25
Really fun!	Okay	Not linked to a project			3	1	2	8				1	15
Really fun!	Okay	Not linked to a project		2			8	5		6		1	22
Really fun!	Okay	Not linked to a project	2		4	2	1	5				1	15
Really fun!	Okay	Not linked to a project		1	1			1				1	4
Really fun!	Okay	Not linked to a project		1			1	1				2	5
Really fun!	Okay	Not linked to a project			5		1	3					9
Really fun!	Okay	Not linked to a project			4			1				1	6
Really fun!	Okay	Not linked to a project					2	2		2		1	7
Really fun!	Okay	Not linked to a project			3	1		4		1			9
Really fun!	Okay	Not linked to a project			9	1		4				1	15
Really fun!	Okay	Not linked to a project			4			1	4				9
Really fun!	Okay	Not linked to a project		2	11		1				1		15
Really fun!	Okay	Not linked to a project		1	2							1	4
Really fun!	Okay	Not linked to a project		1			1				3		5