

Glasgow's Buzzing: Pollinator Surveys Year 2



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Summary

In total, eight parks were surveyed for pollinators during year two of the Glasgow Buzzing project. This includes five parks from year one of the project (Linn Park, Hogganfield Park, Cranhill Park, Trinley Brae and Glasgow Green) and three that have been chosen for meadow habitat creation and enhancement during year two (Pollok Country Park, Bellahouston Park and Victoria Park).

It has been a poor year for many species of invertebrates, especially for pollinating insects, in 2012 due to extreme weather conditions. This was identified during this year's invertebrate survey.

Of the parks surveyed the highest number of pollinators was recorded at Hogganfield Park which had a total of 27 invertebrate species. The lowest number of species was recorded from Victoria Park with 8 species and this park has yet to have its meadow enhanced for biodiversity. An interesting diversity of invertebrates were recorded from the already well established meadow in Linn Park including the leaf beetle *Galeruca tanacetii*, conopid fly *Conops quadrifasciatus*, Blue winged olive mayfly (*Serratella ignita*) leaf cutter bee *Megachile centuncularis* and flower beetle *Oedemera virescens*.

By providing habitat for pollinating insects including a range of native wildflower species that flower throughout the year as well as leaving areas long over the winter, this will provide vital habitat for a number of invertebrate species.

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1. Introduction

A massive 97% (over 3,000,000 hectares) of flower-rich grassland have been lost in the UK since the 1940's through agricultural intensification to produce more home-grown food, and through wider development (housing, transport infrastructure and industry). These flower-rich areas are vital habitats for many invertebrate species and are particularly important to pollinators such as bees, butterflies and hoverflies. The loss of wildflower meadows has resulted in a massive decline in UK pollinators as well as other invertebrate species.

Eighty percent of plants need insects for pollination and without these plants we would not have the air we breathe and the food we eat. Pollination of agricultural crops by insects in Britain is valued at more than £400 million. National reports in the press stress the importance of honeybees in food production but wild bees and other insects are even more important as they are adapted to pollinate a much wider range of plants.

2. Project Outline

Buglife has joined forces with Land and Environmental Services, Glasgow City Council to transform mown grassland in urban areas into colourful and wildlife-rich wildflower meadows. These wildflower meadows will benefit a whole range of invertebrate species. This project is funded by the Landfill Communities Fund.

Invertebrate surveys are to be undertaken by Buglife during each year of the project. In year two, eight parks have been surveyed for invertebrates, including five parks from year one of the project (Hogganfield Park, Cranhill Park, Trinley Brae, Glasgow Green and Linn Park) and three parks that will be additionally managed during year two of the project (Bellahouston Park, Pollok Country Park and Victoria Park).

Invertebrate surveys concentrated on pollinating insects such as bees and wasps (Hymenoptera), hoverflies (Diptera) and butterflies and moths (Lepidoptera). Other invertebrate species found during the survey were also recorded (Figure 1).



Figure 1. A Buff tailed bumblebee (*Bombus terrestris*) feeding on Devil's-bit scabious (*Succisa pratensis*) at Linn Park.

3. Method

Invertebrates were surveyed during a single visit to each park. The surveyor walked a transect across the park using sweep nets and direct observations to survey for invertebrates, concentrating on pollinating insects. The surveys were undertaken during warm and sunny days in August at a similar date to surveys in year 1 of the project.

3.1. Sweep nets

Sweep nets were used to collect pollinators from vegetation, particularly from flower heads. The net was swept over vegetation in a figure of eight for one minute in a transect across a site. Specimens collected in this way were either put into a pot with 70% ethanol to be identified later, or if they could be identified by the surveyor at the park the specimen was later released.

3.2. Direct observations

Direct observation of Hymenoptera (principally bumblebees), Lepidoptera and Diptera (principally hoverflies) species visiting wildflowers or in flight was made during a site survey. Sweep nets were sometimes used to aid in identification of a species which could then be released. Other species identified through direct observations included Orthoptera (grasshoppers), and Coleoptera (beetles).

4. Results

Invertebrates were surveyed at each park once by the surveyor (Table 1); Hogganfield Park was surveyed twice due to a separate visit to the bee bank created during year one of the project that identified further pollinating insects through direct observations, and Linn Park was visited a second time because part of the meadow created during year one was not visited during the first visit.

Table 1. Date each park was surveyed for pollinators.

Park	Grid reference	Date surveyed
Bellahouston Park	NS545635	10/08/2012
Cranhill Park	NS644655, NS645654	09/08/2012
Glasgow Green	NS602638, NS597642	23/08/2012
Hogganfield Park	NS6467	09/08/2012, 15/08/2012
Linn Park	NS583589, NS585594	10/08/2012, 27/09/2012
Pollok Country Park	NS557619, NS548620	10/08/2012
Trinley Brae	NS533700	09/08/2012
Victoria Park	NS539671	09/08/2012

A total of 57 invertebrate species were recorded during the survey. Hoverflies made up the greatest number of species recorded by the surveyor across the 8 parks as a total of 18 species were identified (Figure 2). Hymenoptera (bees, wasps and ants)

recorded 13 species and Lepidoptera (butterflies and moths) recorded 7 species (Figure 2). Some of the other invertebrate species recorded included Aranaea (spiders: 2 species), Coleoptera (beetles: 8 species), Orthoptera (grasshoppers: 1 species), Hemiptera (true bugs: 4 species) (Figure 2). A complete list of invertebrate species recorded can be found in Appendix 1.

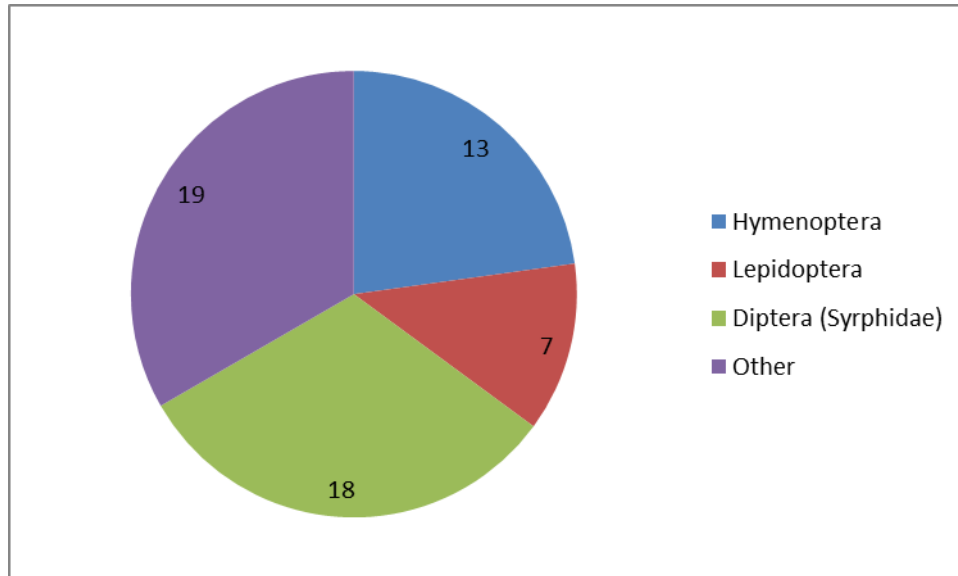


Figure 2. Total number of pollinator species (Hymenoptera (bees, wasps and ants), Diptera (hoverflies), and Lepidoptera (butterflies and moths)) and other invertebrate species recorded across the eight parks in Glasgow.

Hogganfield Park had the greatest number of invertebrate species recorded with a total of 27 species, this included the highest number of hoverfly species recorded with 9 and butterfly and moth species recorded with 5 (Figure 3). The greatest number of Hymenopteran species was recorded from Trinley Brae, Bellahouston Park and Linn Park with 8 species at each park (Figure 3). Victoria Park had the least number of invertebrate species recorded with 8 (Figure 3). No species of Lepidoptera were recorded from Glasgow Green or Victoria Park (Figure 3).

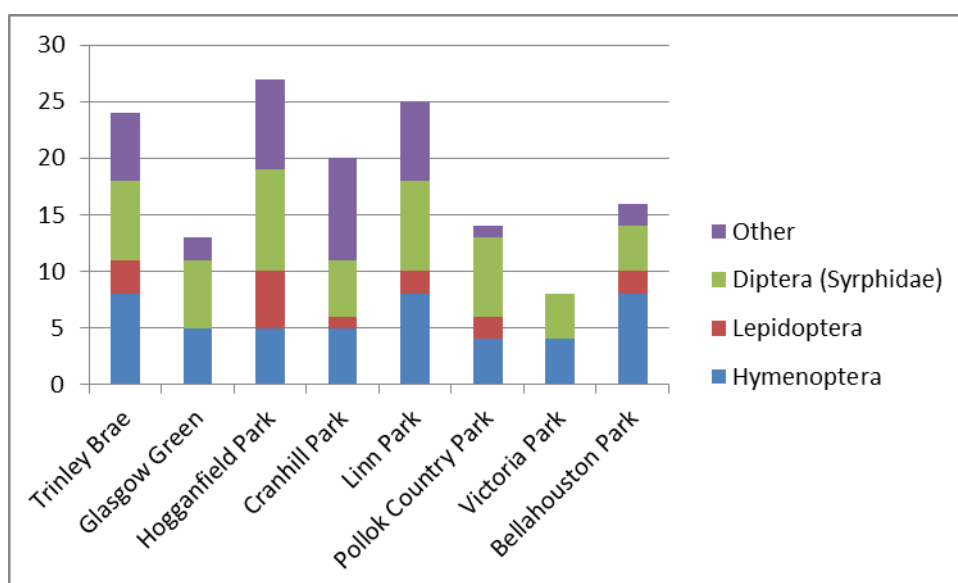


Figure 3. Graph showing the total number of pollinator species (Hymenoptera, Diptera (Syrphidae) and Lepidoptera) and other invertebrate species recorded at each park surveyed in Glasgow.

Of the five parks surveyed for pollinators in year one and two of this project, Hogganfield Park had the total highest number with 41 species (Figure 4). During the two surveys at this park 16 species were recorded in year one only and 16 were recorded in year two only and 10 species were recorded at the park during both years. Trinley Brae had a total of 40 species over the two years with only 10 additional species recorded in year two. Linn Park had a total of 35 species and Cranhill a total of 27 species recorded over the two surveys in year one and two. Glasgow Green had the lowest total number as only 1 species was recorded at the park in year one and 13 species were recorded in year two (Figure 4).

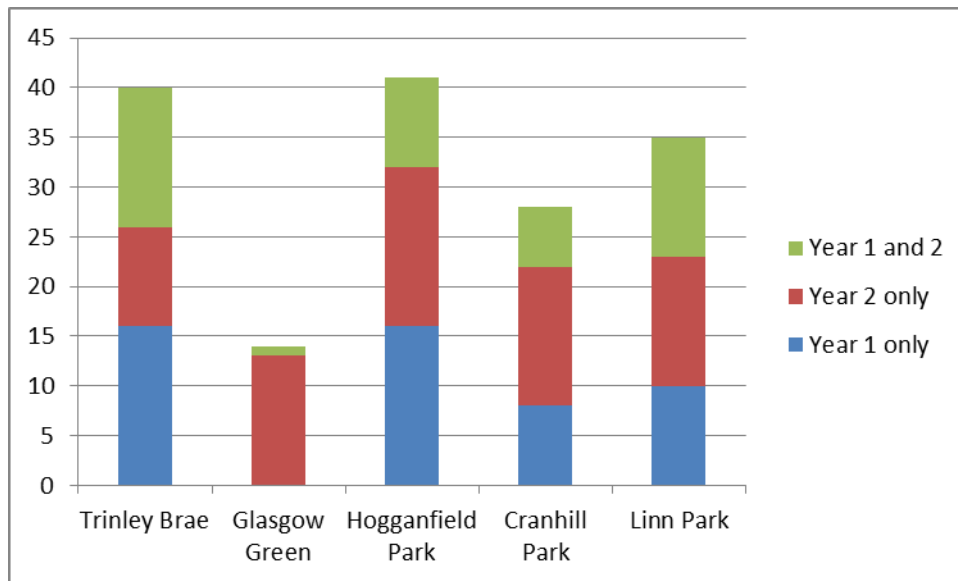


Figure 4. Number of species recorded during year one only, year two only and both year one and two at the parks managed during year one of the project that will also be managed during year two.

5. Discussion

It is well known that summers in Scotland have a mixture of dry and wet weather which varies from year to year across the country. Generally speaking the east coast is cool and dry whereas the west coast is warmer and wetter. This changeable weather is being further influenced by climate change which is causing summer droughts, flooding and other local extreme weather events.

The climate this year in Scotland in spring and summer was unsettled with many cold and wet days. There were a couple of warm weeks in late March/early April and a brief few days in late May with warm and dry weather that provided a new temperature record in Scotland. Due to the volume of rain over the last few months along with the cooler temperature, many invertebrate species especially pollinating insects have been seen in fewer numbers across Britain.

Butterfly Conservation recorded low numbers of butterflies and day flying moths during its Big Butterfly Count this year. Low numbers of butterflies and moths were observed by the surveyor during this years pollinator surveys and they were recorded at seven of the parks in low numbers. Lepidoptera were also recorded in low numbers in year one surveys and from only four of the seven parks; Linn Park, Trinley Brae, Cranhill Park and Hogganfield Park. A continuation of bad weather in future years may put further pressures on butterfly and moth populations, enhancing

the importance of the creation of wildflower meadows in urban areas for pollinating insects.

It was noted by the surveyor that numbers of bumblebees and some species of hoverfly were low and that no records were obtained for some insect groups that were recorded during year one surveys.

Various species of Hymenoptera were recorded at each park surveyed. Of the bumblebees, the Red tailed (*Bombus lapidarius*) was identified as being the most frequently recorded although Buff tailed (*B. terrestris*) and Common carder (*B. pascuorum*) were recorded at most of the parks surveyed (Appendix 1). The solitary bee *Colletes daviesanus* was recorded feeding on flowers at three of the parks including Hogganfield Park, Bellahouston Park and Cranhill Park (Figure 5). Three new species to Glasgow include the solitary bee *Andrena denticulata* and potter wasp *Ancistrocerus gazella* from Trinley Brae and the leaf cutter bee *Megachile centuncularis* from Linn Park.

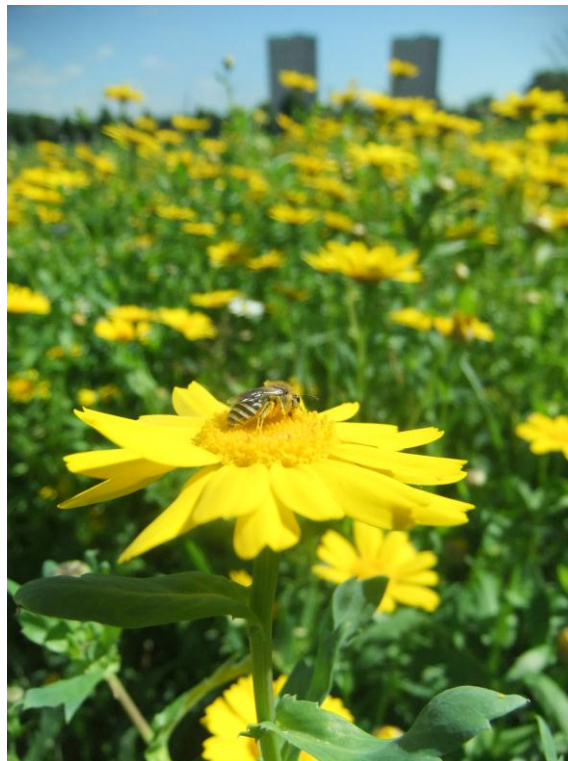


Figure 5. The solitary bee *Colletes daviesanus* feeding on Corn Marigold (*Glebionis segetum*) at Bellahouston Park.

Honeybees (*Apis mellifera*) were recorded in relatively large numbers at three of the parks; Linn Park, Bellahouston Park and Pollok Country Park. These three parks are situated fairly close together within the south of Glasgow. Honeybees are not a native species of bee and are poor pollinators of wildflowers when compared to native pollinating insects such as bumblebees and solitary bees. It has also been suggested that honeybees can outcompete native bee species. Due to the increase in popularity of keeping bee hives within allotments and other areas across Glasgow this may explain the increase in observations of honeybees feeding on wildflowers within the parks. It is important that a balance between non-native honeybees and native pollinators is struck across Glasgow. By providing a wide range of wildflowers

species that flower throughout the year across the parks in Glasgow that is being achieved through this project, both honeybees and native pollinators will benefit.

Several species of hoverfly with larvae associated with aquatic habitats were recorded in abundance across the parks and this may be due to the level of water that has been left lying over the summer. In total, 18 species of hoverfly were recorded across the eight parks. The species *Platycheirus albimanus*, *Helophilus pendulus* and *Melanostoma scalare* were recorded at most of the parks surveyed. Other hoverflies seen in abundance during the surveys include *Sericomyia silentis* and *Eristalis tenax*. Larvae of *H. pendulus*, *S. silentis* and *E. tenax* are aquatic and the species have been very successful this year due to the wet weather. Hoverflies with larvae associated with drier terrestrial habitats were noticeably few in numbers including the Marmalade hoverfly (*Episyrrhus balteatus*) and *Melanostoma mellinum* that were recorded in large numbers during year one surveys.

There were no records of Odonata (dragonfly and damselfly) or Neuroptera (lacewing) during this year's pollinator surveys; 4 species of Odonata and a species of Neuroptera were recorded during the surveys in August 2011. This year's surveys occurred during warm dry days in early August and it is unusual that no dragonflies or damselflies were recorded, especially from Hogganfield Park which has several areas of open water of varying size across the meadow.

The total number of invertebrate species recorded over the eight parks was 57 and this is higher than the overall total number of species last year which was 55.

The highest number of invertebrate species recorded during this year's survey was at Hogganfield Park with a total of 27. This is slightly more than what was recorded during year one of the project at this park (26 species), but less than the total highest last year at Trinley Brae (29 species). Wildflower meadows at Hogganfield Park include wet and dry areas and also areas of acid grassland. These different areas have a range of wildflower species and each is rich in a variety of different wildflower species including areas of Autumnal hawkbit (*Leontodon autumnalis*), Heath bedstraw (*Galium saxatile*) and Common birds-foot trefoil (*Lotus corniculatus*).

A bee bank was created at Hogganfield Park for ground nesting solitary bees and other warmth loving invertebrates early in 2012. So far this year, no solitary bees have been found nesting in the bank although they have been recorded feeding on wildflowers surrounding the bee bank. Other warmth loving invertebrates recorded on the bank include ground beetles (*Bembidion* species), centipedes and spiders.

From year one and two surveys, Hogganfield Park had the total highest number of invertebrate species recorded with a total of 41. This includes 16 species that were recorded during year one only and 16 species recorded in year two only and a further 9 species recorded during both years.

Surveys at Trinley Brae identified 24 species this year including the potter wasp *Ancistrocerus gazella*, hoverfly *Merodon equestris* and Meadow brown butterfly (*Maniola jurtina*) that were not collected last year during the survey. The highest number of invertebrate species was recorded at this park last year and was probably

due to the two site visits. Over the two year pollinator surveys a total of 40 invertebrate species have been recorded at the meadows within this park.

Surveys at Glasgow Green during year one of the project highlighted how poor the park was for pollinators as only 1 invertebrate species was recorded, the Common wasp (*Vespula vulgaris*). During surveys this year 14 species were recorded showing that the addition of a small meadow greatly benefits invertebrates, especially pollinating insects including the bumblebees Red tailed (*Bombus lapidarius*) and Buff tailed (*Bombus terrestris*) and the hoverflies Marmalade hoverfly (*Episyrphus balteatus*) and Tiger hoverfly (*Helophilus pendulus*). It was also recognised that the meadow at Glasgow Green was important for craneflies and 7 spot ladybirds (*Coccinella septempunctata*).

The meadow being created at Victoria Park during year two of this project is an area that has been left uncut over the summer. This small area is already providing habitat for pollinating insects and 8 species were recorded within this area. Patrolling male hoverflies *Melanostoma scalare* were recorded throughout this small meadow. This park had the total lowest number of invertebrates recorded at the parks during the surveys this year. When the meadow is enhanced and extended through year two of this project it will provide further habitat for pollinating insects as well as other invertebrate species.

Bellahouston Park has a strip of meadow called 'The Ribbon' that was created a few years ago as part of an art project (Figure 6). This was re-sown in spring 2012 with annual and perennial wildflowers. The Corn marigolds that were included in the wildflower mix sown through this strip of meadow provided valuable habitat for foraging bees, especially solitary bees (Figure 5). In 2011, two additional meadows were created by rotovating and sowing with annual and perennial wildflowers, as part of another project, to create a 'Bee Meadow'. Volunteers from TCV have carried out additional planting of perennial wildflowers.



Figure 6. Meadow art strip 'The Ribbon' at Bellahouston Park.

There are already two wildflower meadows present at Pollok Country Park. These separate meadows were surveyed for invertebrates during this year's survey and Common green grasshopper (*Omocestus viridulus*), and the hoverflies *Melanostoma scalare* and *Myathropa flovea* were recorded. A wider range of wildflowers will be planted into the meadows at Pollok Country Park to provide more foraging habitat for pollinating insects.

The extension of the meadow at Cranhill Park during year 1 of the project has provided further habitat for invertebrates. The meadow was seen to be important for Hemiptera (true bugs) including the Marsh damsel bug (*Nabis limbatus*), Lucerne bug (*Adelphocoris lineolatus*) and the Potato capsid (*Closterotomus norwegicus*).

A number of interesting invertebrate species were recorded at Linn Park during this year's survey. The original wildflower meadow within the park is well established and has a range of wildflower species present that are important for invertebrates including Common knapweed (*Centaurea nigra*), Field scabious (*Knautia arvensis*) and Meadows cranesbill (*Geranium pratense*). This meadow has now been extended through this project. The Blue winged olive mayfly (*Serratella ignita*) was recorded resting within the wildflower meadow and this species probably breeds within the White Cart water that passes through Linn Park. A female flower beetle *Oedemera virescens* was feeding on Autumnal hawkbit (*Leontodon autumnalis*) within the extended meadow. An adult female conopid fly *Conops quadrifasciatus* was collected from the wildflower meadow. The adults of this group of flies feed on flowers and lay their eggs on bumblebees as the larvae are endoparasites of bees from the genus *Bombus*. A female leaf cutter bee *Megachile centuncularis* was collected from this park. Several adults of the leaf beetle *Galeruca tanacetii* were recorded on one of the large clumps of Common knapweed within the established meadow (Figure 7). Within this group there were several gravid females that had abdomens heavily swollen with eggs (Figure 7).



Figure 7. A gravid female leaf beetle *Galeruca tanacetii* at Linn Park.

The wildflower meadows that were created or enhanced during year one of the project have provided important habitat with a range of wildflowers for invertebrates, especially pollinating insects. By leaving the grass uncut this is allowing wildflowers already present within the meadows to flourish providing a nectar source for pollinators. By further meadow enhancement and creation with the planting of a rich range of wildflower species across the parks in year two of this project, this will provide further habitat for invertebrates with a vital food source for pollinating insects.

Appendix 1

Order	Common name	Scientific name	Trinley Brae	Glasgow Green	Hogganfield	Cranhill park	Linn Park	Pollok Country Park	Victoria Park	Bellahouston Park
Aranaea	Orb weaver spider	<i>Larinoidea cornutus</i>			•					
Aranaea	Crab spider	<i>Xysticus</i> species				•				
Coleoptera	Ground beetle	<i>Bembidion</i> species			•					
Coleoptera	7 spot ladybird	<i>Coccinella septempunctata</i>	•	•			•			•
Coleoptera	Ground beetle	<i>Elaphrus</i> species			•					
Coleoptera	Leaf beetle	<i>Galeruca tanacetii</i>					•			
Coleoptera	Rove beetle	<i>Ocypus aeneocephalus</i>			•					
Coleoptera	False blister beetle	<i>Oedemera virescens</i>					•			
Coleoptera	Red soldier beetle	<i>Rhagonycha fulva</i>	•		•	•				•
Coleoptera	Rove beetle	<i>Stenus similis</i>				•				
Dermaptera	Earwig	<i>Forficula auricularia</i>	•	•		•				
Diptera	Conopid fly	<i>Conops quadrifasciatus</i>					•			
Diptera	Marmalade hoverfly	<i>Episyrphus balteatus</i>		•		•			•	
Diptera	Drone fly	<i>Eristalis pertinax</i>	•							
Diptera	Drone fly	<i>Eristalis tenax</i>	•	•	•		•	•		
Diptera	Hoverfly	<i>Helophilus pendulus</i>	•	•	•	•	•	•		•
Diptera	Hoverfly	<i>Melanostoma mellinum</i>			•					
Diptera	Hoverfly	<i>Melanostoma scalare</i>	•	•	•		•	•	•	
Diptera	Hoverfly	<i>Melanostoma</i> species				•				
Diptera	Hoverfly	<i>Merodon equestris</i>	•							
Diptera	Hoverfly	<i>Myathropa flovea</i>						•		

Order	Common name	Scientific name	Trinley Brae	Glasgow Green	Hogganfield	Cranhill park	Linn Park	Pollok Country Park	Victoria Park	Bellahouston Park
Diptera	Hoverfly	<i>Parasyrphus lineola</i>								•
Diptera	Hoverfly	<i>Platycheirus albimanus</i>		•	•	•	•	•	•	•
Diptera	Hoverfly	<i>Platycheirus clypeatus</i>			•		•			
Diptera	Hoverfly	<i>Platycheirus granditarsus</i>						•		
Diptera	Yellow dung fly	<i>Scathophaga species</i>				•	•			
Diptera	Hoverfly	<i>Sericomyia silentis</i>	•		•	•	•			•
Diptera	Hoverfly	<i>Sphaerophoria interrupta</i>			•					
Diptera	Hoverfly	<i>Sphaerophoria species</i>	•	•	•					
Diptera	Hoverfly	<i>Syrphus ribesii</i>						•	•	
Diptera	Hoverfly	<i>Syrphus vitripennis/ribesii</i>					•			
Ephemeroptera	Blue winged olive mayfly	<i>Serratella ignita</i>					•			
Hemiptera	Lucerne bug	<i>Adelphocoris lineolatus</i>				•				
Hemiptera	Potato capsid	<i>Closterotomus norwegicus</i>				•	•			
Hemiptera	Meadow plant bug	<i>Leptopterna dolabrata</i>	•		•	•				
Hemiptera	Marsh damsel bug	<i>Nabis limbatus</i>	•		•	•				
Hymenoptera	Potter wasp	<i>Ancistrocerus gazella</i>	•							
Hymenoptera	Solitary bee	<i>Andrena denticulata</i>	•							
Hymenoptera	Honey bee	<i>Apis mellifera</i>					•	•		•
Hymenoptera	Garden bee	<i>Bombus hortorum</i>					•			
Hymenoptera	Red tailed bee	<i>Bombus lapidarius</i>	•	•	•	•	•			•
Hymenoptera	White tailed bee	<i>Bombus lucorum</i>	•	•	•	•	•			•

Order	Common name	Scientific name	Trinley Brae	Glasgow Green	Hogganfield	Cranhill park	Linn Park	Pollok Country Park	Victoria Park	Bellahouston Park
Hymenoptera	Common carder bee	<i>Bombus pascuorum</i>	•	•			•	•	•	•
Hymenoptera	Buff tailed bee	<i>Bombus terrestris</i>	•	•	•	•	•	•	•	•
Hymenoptera	Solitary bee	<i>Colletes daviesanus</i>			•	•				•
Hymenoptera	Black garden ant	<i>Lasius niger</i>							•	
Hymenoptera	Leaf cutter bee	<i>Megachile centuncularis</i>					•			
Hymenoptera	Sawfly	<i>Tenthredinidae</i>	•			•			•	•
Hymenoptera	Common wasp	<i>Vespula vulgaris</i>	•	•	•		•	•		•
Lepidoptera	Small tortoiseshell	<i>Aglais urtica</i>			•		•			
Lepidoptera	Chamomile Shark	<i>Cucullia chamomillae</i>								•
Lepidoptera	Meadow brown	<i>Maniola jurtina</i>	•		•					
Lepidoptera	Large yellow underwing	<i>Noctua pronuba</i>								•
Lepidoptera	Green veined white	<i>Pieris napi</i>	•		•			•		
Lepidoptera	Small white butterfly	<i>Pieris rapae</i>	•		•	•	•	•		
Lepidoptera	6 spot burnet moth	<i>Zygaena filipendulae</i>			•					
Orthoptera	Common green grasshopper	<i>Omocestus viridulus</i>	•		•		•	•		