

# UCD Bumblebee Monitoring Transect

## Report on 2019 season

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*Photo 1 Alison O'Reilly walking along the first section of the UCD bumblebee monitoring transect (in Rosemount Environmental Research Station). Photo credit: Arrian Karbassioon*

## Summary

- Seven bumblebee species were recorded on UCD campus during monitoring from March-October in 2019.
- Current management practices for promoting pollinators and wildlife on campus such as the wildflower meadow, wildlife area in Conway, plantings in chess garden and outside sports centre host the most bees both in abundance and diversity. The no mow/wild sections host a higher diversity and abundance for a longer period throughout the season, and also has the potential to provide nesting sites. Mown grass areas, paved areas and woodland supported less bumblebees.
- Wildlife areas and pollinator friendly planting should be maintained on campus and could be enhanced further in new areas to increase bumblebee habitat. Improvements in mown and paved areas across campus for bumblebees would contribute further to pollinator conservation at UCD.

## UCD Transect Overview

The UCD bumblebee monitoring transect was set-up in 2019 by the Stanley Ecology research group in the School of Agriculture and Food Science to contribute to the [National Biodiversity Data Centre's \(NBDC\) Bumblebee Monitoring Scheme](#). The NBDC monitoring scheme was established in 2011 as part of the [Irish Pollinator Initiative](#) in order to monitor one of Ireland's most important wild pollinator groups – bumblebees. Of the 21 bumblebee species found in Ireland, 6 are currently under threat and 3 are 'near threatened' (Regional Red List of Irish Bees). There are currently over 100 monitoring transects walked across Ireland as part of the monitoring scheme, and data collected across all transects are analysed by the NBDC every year and help to track changes in bumblebee abundance in Ireland over time.

The UCD bumblebee monitoring transect is 1.8 km in length, and takes in a variety of different parts of campus. It is split into 13 sections based on 'habitat' (see **Table 1** for overview of sections and **Image 1** for route overview). These sections include some areas that are managed by UCD Estates as part of the Campus Pollinator Plan. For ease of interpretation, each transect section has been assigned to one of 5 'management' categories (no mow area/wild, woodland, mown area, paved surfaces and plantings).

The transect was walked once a month from March-October on a suitable day, following protocols set by the Bumblebee monitoring scheme. Honeybees were also recorded along this transect, please see section (i) of the Appendix to find out more.

**Table 1:** Breakdown of the 13 sections of the UCD bumblebee monitoring transect into ‘habitat’ type, corresponding ‘management’ category and length (m)

<b>Section No.</b>	<b>‘Habitat’ type</b>	<b>‘Management’ type</b>	<b>Length (m)</b>
<b>1</b>	Apple Orchard (Rosemount)	Woodland*	250
<b>2</b>	Woodland trail	Woodland	220
<b>3</b>	Wildflower meadow	No-mow area/wild	150
<b>4</b>	Woodland trail (shaded)	Woodland	150
<b>5</b>	Woodland trail (bright)	Woodland	170
<b>6</b>	Roadside/river bank (brambles on one side)	No-mow area/wild	100
<b>7</b>	Bee garden location	No-mow area/wild	80
<b>8</b>	Road/trail	Mown area	180
<b>9</b>	Campus concourse	Paved surfaces	40
<b>10</b>	Chess Garden (planted w. bee friendly plants)	Plantings	30
<b>11</b>	Campus concourse	Paved surfaces	200
<b>12</b>	Sports Centre (planted w. bee friendly plants)	Plantings	100
<b>(13)</b>	Managed for wildlife area (Conway)	No-mow areas/wild	144

\*Section 1 has been assigned a ‘woodland’ management category as it was most similar to woodland, although it has a mixture of natural hedgerow and mown area.

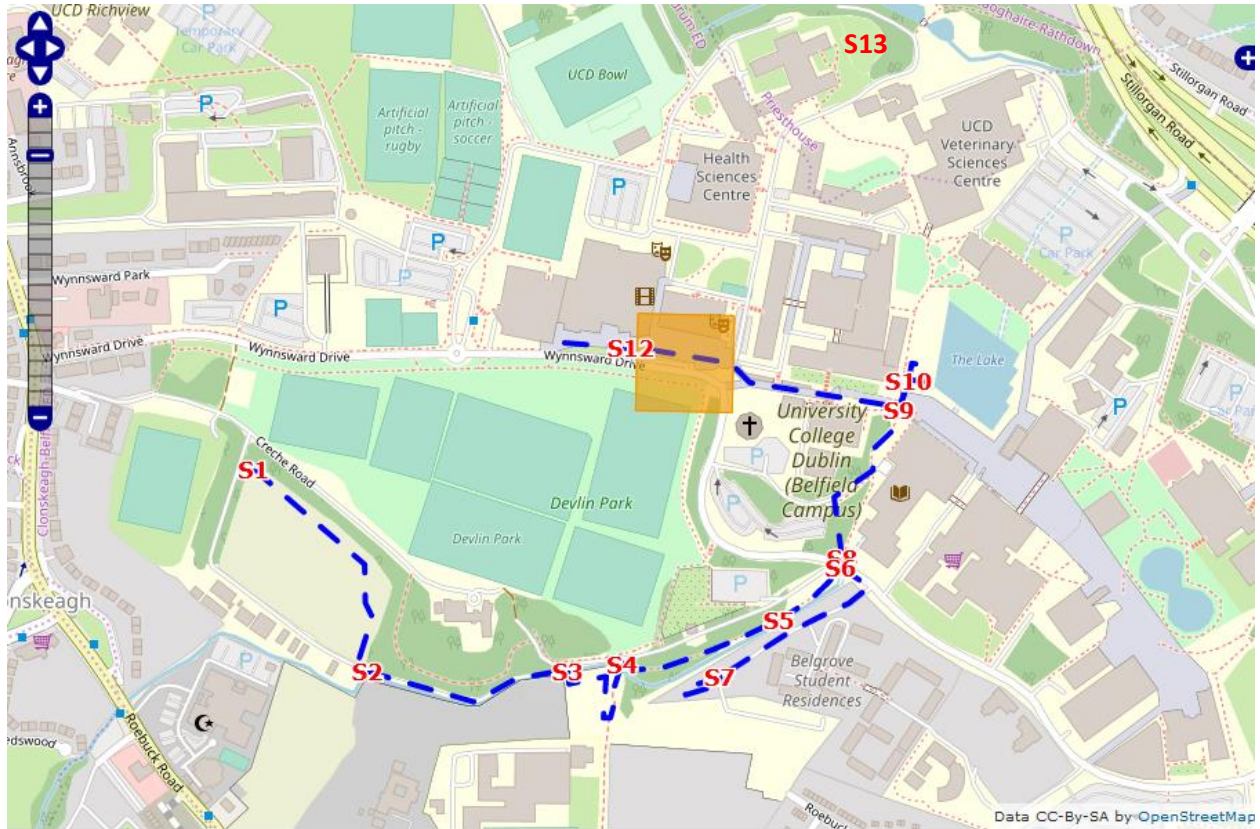


Image 1: UCD bumblebee transect route which is broken into 13 sections (blue dashed lines)

## 2019 UCD Transect Results Overview

A total of 322 individuals and 7 species of bumblebee (*Bombus terrestris*, *B. pratorum*, *B. lucorum*, *B. hortorum*, *B. jonellus*, *B. pascuorum* and *B. lapidarius* – See Image 2 a-g)) were recorded on campus over the course of the transect (from March to October 2019).



Image 2(a-g) Bumblebee species recorded along transect in 2019. Top row (L-R) *Bombus terrestris*, *B. lucorum*, *B. hortorum*. Bottom row (L-R) *B. jonellus*, *B. pascuorum* and *B. lapidarius*, *B. pratorum* (Image credit: All Ireland Pollinator Plan website)

The highest number of bumblebees were recorded in the month of May (147 individuals) and the lowest numbers were recorded in months April and October (1 or less individuals) (See Figure 1). Recording in April and October took place on days where the temperature was colder than the recommended 13°C which, for the month of April at least, might explain why no bees were recorded.

## UCD Bumblebee Monitoring Transect 2019 Summary

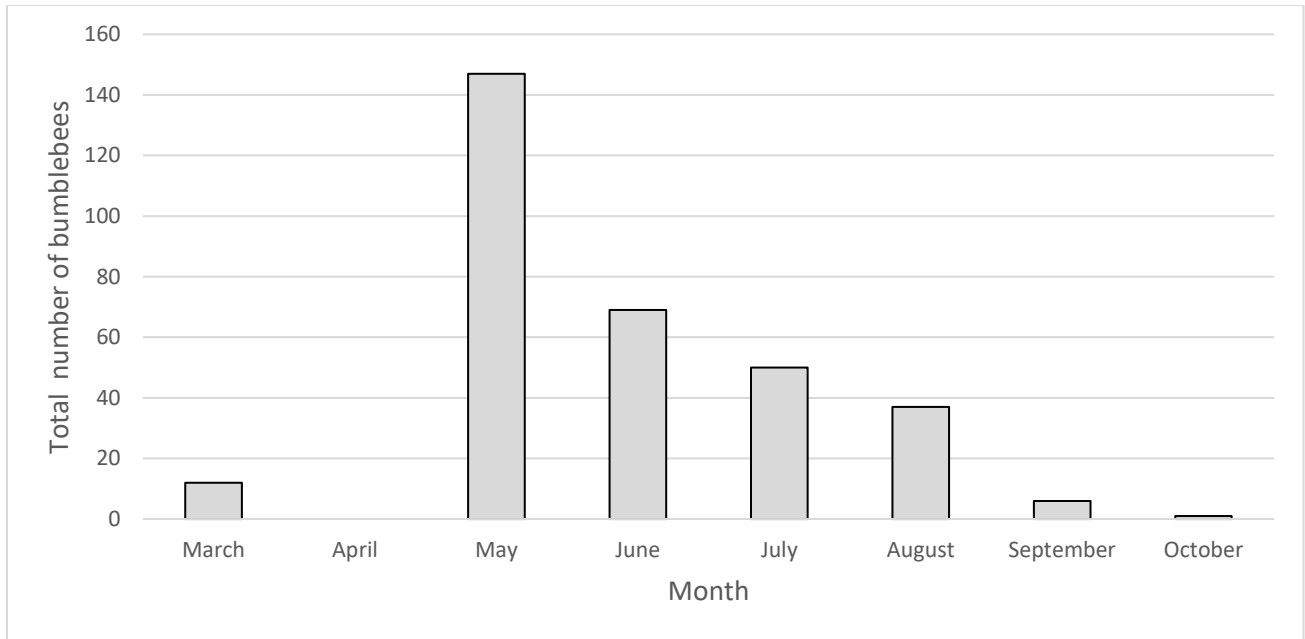


Figure 1: Total bumblebee abundance recorded each month (March – October) along UCD bumblebee monitoring transect 2019

The highest number of species (out of 7) were recorded in March (total of 6 species) and the lowest number in October (1 species). Three or more species were recorded on all the other months, with a decline through the season (July – September). (See Figure 2)

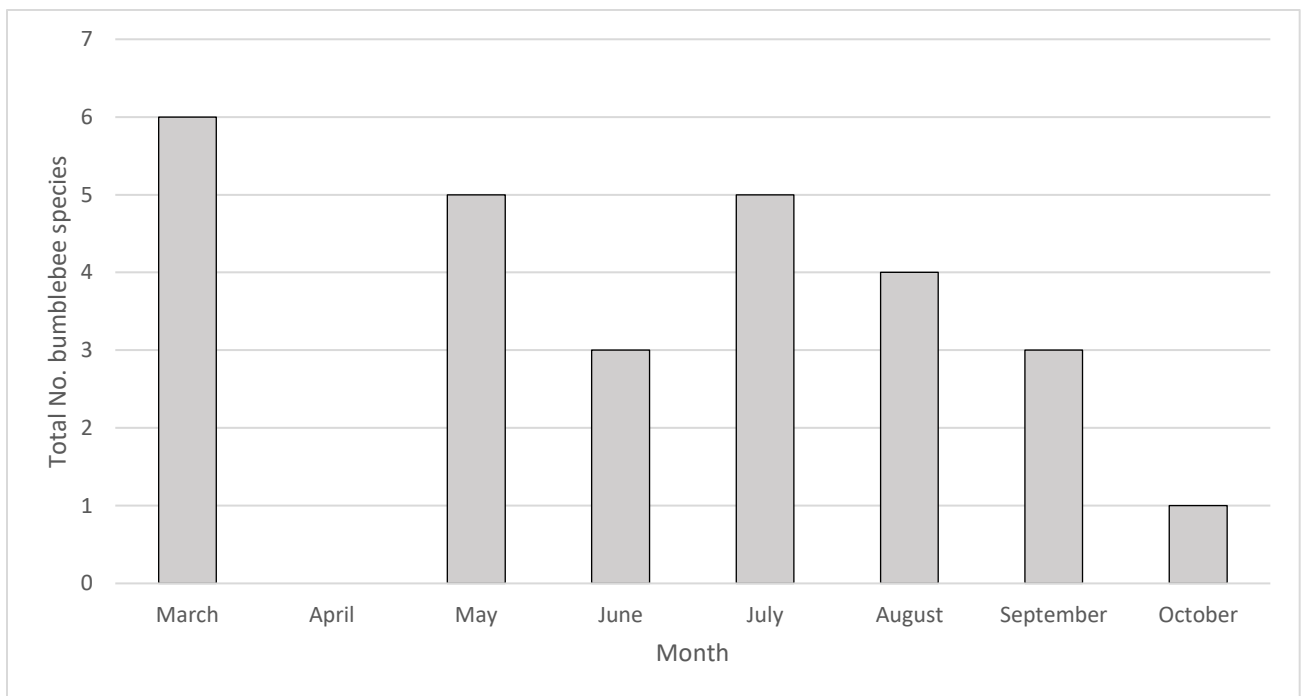


Figure 2: Total number of bumblebee species recorded for each month of the transect (March-October)

The different sections of the transect varied in the number of bumblebee species that were recorded (see Table 2 for an overview, not taking into account differences in section lengths). Six of the seven species of bumblebee were recorded in the wildflower meadow and managed for wildlife area in Conway (sections 3 and 13 respectively). The lowest number of species (1 species) was recorded along the road/trail (section 8) of the transect. The chess garden (section 10) was the only section where the species *Bombus hortorum* (the garden bumblebee) was recorded. Two species of bee, *Bombus jonellus* (the heath bumblebee) and *Bombus lapidarius* (the red-tailed bumblebee) were only recorded in the wildflower meadow (Section 3) and the chess garden (Section 10) of the transect. The red-tailed bumblebee was also recorded along the shaded woodland trail (Section 4).

Table 2: Overview of presence [x] – absence [ ] of bumblebee species found across the 13 sections of the UCD transect across the entire 8 month monitoring period. This overview does not take into account that the sections are different in length.

Section No.	<i>B. terrestris</i>	<i>B. pratorum</i>	<i>B. lucorum</i>	<i>B. hortorum</i>	<i>B. jonellus</i>	<i>B. pascuorum</i>	<i>B. lapidarius</i>	Total (out of 7)
1	x	x	x			x		4
2	x	x	x			x		4
3	x	x	x		x	x	x	6
4						x	x	2
5			x			x		2
6	x	x	x			x		4
7	x	x	x					3
8	x							1
9								0
10	x	x	x	x		x		5
11								0
12		x	x			x		3
13	x	x	x		x	x	x	6



As the transect sections were not the same length, bumblebee abundance and species richness (i.e. number of species) were analysed by scaling up all of the sections to 250 metres (i.e. the longest section of the transect). This way we were able to compare across the different sections and or management categories.

Overall, across the entire monitoring period (March – October) the ‘plantings’ and ‘no-mow area/wild’ ranked the highest for number of bumblebee species per metre, with the ‘woodland’ category ranking moderate and the ‘mown area’ and ‘paved surfaces’ categories having the lowest ranking. See Table 3 for overview.

*Table 3 Number of bumblebee species per metre for each section of the transect, based on arbitrary cut off points good, moderate and poor status were assigned to each section e.g. values >0.03 are considered good (green), values <0.03 are considered moderate (orange) and anything <0.01 is considered poor (red)*

Section No.	‘Habitat’ type	‘Management’ type	sp/1m	Status
10	Chess Garden	Plantings	0.1666667	Good
13	Managed for wildlife area (Conway)	No-mow area/wild	0.0416667	Good
3	Wildflower meadow	No-mow area/wild	0.04	Good
6	Roadside/river bank	No-mow area/wild	0.04	Good
7	Bee garden location	No-mow area/wild	0.0375	Good
12	Sports Centre	Plantings	0.03	Good
2	Woodland trail	Woodland	0.0181818	Moderate
1	Apple Orchard (Rosemount)	Woodland*	0.016	Moderate
4	Woodland trail (shaded)	Woodland	0.0133333	Moderate
5	Woodland trail (bright)	Woodland	0.0117647	Moderate
8	Road/trail	Mown area	0.0055556	Poor
9	Campus concourse	Paved surfaces	0	Poor
11	Campus concourse	Paved surfaces	0	Poor

When we look at bumblebee abundance and richness in the different management categories, our transect results show that the highest bumblebee numbers are recorded in sections that are under the “no mow/wild area” and “plantings” categories (see Figure 3). For these, we see the highest abundances in the month of May, followed by a decrease in bee abundance through the season (May – September). There are on average less than 10 individuals recorded in the ‘woodland’ sections on all months except October. No bees were recorded in the ‘paved surfaces’ section across the monitoring period. A small number of bees (less than 3) were recorded in the ‘mown area’ section in the month of March only. This could be due to the presence of isolated flowers during this time in between mowing, or perhaps the bees recorded were simply flying through. Overall, in terms of bee abundance, it would appear that the “no mow area/wild” sections attract bees from early on in the flowering season (March) whereas the “planted” sections only do so from May onwards. A more in depth view of the results are provided in section (ii) of the Appendix if required.

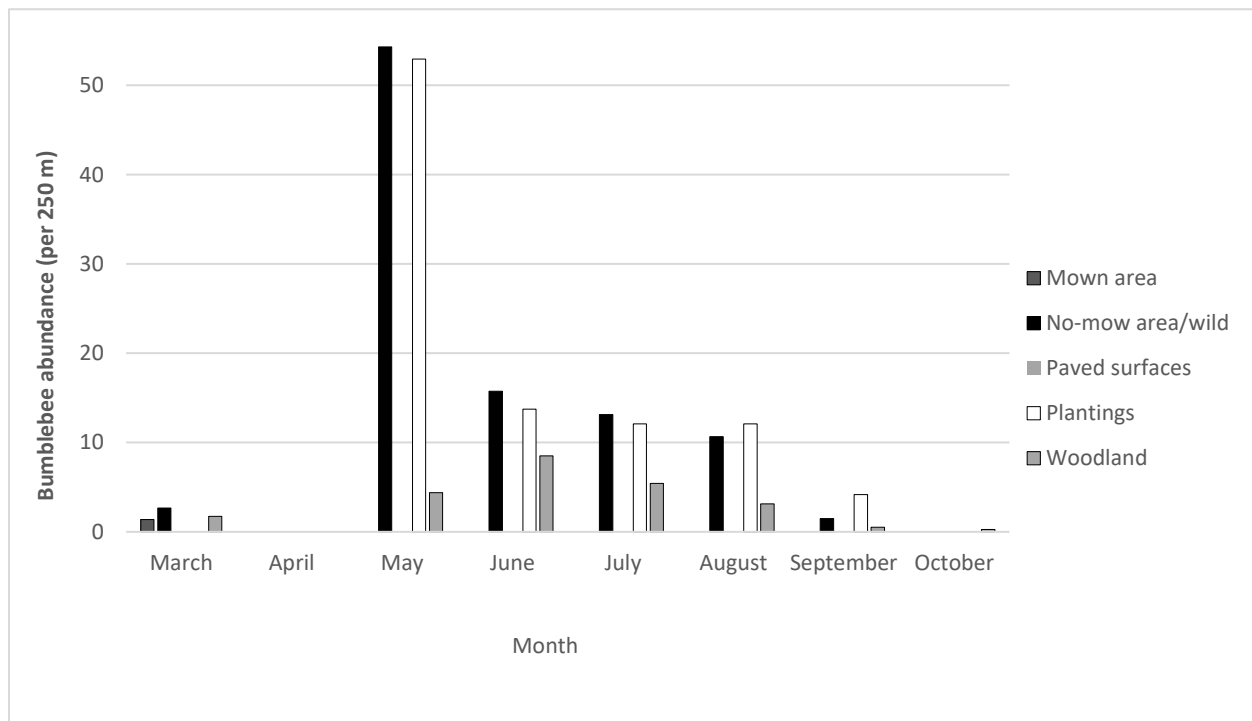


Figure 3 Bumblebee abundance (per 250 metres) throughout the entire transect period (March - October) for the five 'management' categories (mown area, no-mow area/wild, paved surfaces, plantings and woodland)

## Management recommendations/suggestions

Bumblebee species diversity on UCD campus is relatively high, with all the main species we would expect to see in an urban setting. However, some parts of campus are more beneficial for bumblebees than others. Based on the findings of the 2019 bumblebee monitoring transect, below are some conclusions which may be useful for future management (Table 4).

- Pollinator-friendly plantings for pollinators on campus as part of the Campus Pollinator Plan (e.g. Chess garden and outside sports centre) are visited by large numbers of bumblebees.
- Areas managed for wildlife as part of the Campus Pollinator plan (e.g. wildflower meadow, area beside Conway) are also visited by large numbers of bumblebees.
- While the areas with pollinator friendly plants benefitted bumblebees in the middle of the summer, the areas managed for wildlife provided important resources at the beginning of the season as well. We would therefore recommend increasing the amount of both areas on campus to benefit bumblebees, with a preference for the areas managed for wildlife. These areas with longer grass and vegetation also have the potential to act as nest sites for bumblebees, which are not provided by pollinator-friendly plantings. In addition, the importance of natural hedgerows should be highlighted as an important resource for pollinators, particularly at the end of the season.
- The areas of least use for bumblebees include the mown and paved areas. If the mown areas were mown less frequently certain plants such as clovers and dandelions might have a chance to flower, which would increase the usefulness of these areas for bees. Paved areas could be supplemented with pollinator friendly plantings or flower boxes.
- Woodland areas were not heavily used by bumblebees, apart from sections of the path with more light and understory plants. This is to be expected as woodlands naturally have less flowers, but woodlands are important habitats for other components of wildlife (e.g. birds, small mammals etc).
- Increased areas of bumblebee habitat on campus could increase bumblebee abundance overall, and may be capable of attracting some of the less common bumblebee species such as *Bombus muscorum* (the large carder bee).

We plan to continue our bumblebee transect along the same route in 2020.

*Table 4 Recommendations (to improve – orange or maintain- green current practice) for each ‘management’ category of the UCD bumblebee monitoring transect*

<b>‘Management’ category</b>	<b>Recommendation</b>
Mown area	Improve
Paved surfaces	Improve
No mow area/wild	Maintain and increase
Woodland	Maintain and increase
Plantings	Maintain and increase

## Acknowledgements

Thank you to those in the Stanley Lab that took part in recording bees for the UCD Monitoring transect in 2019; Alison O’Reilly, Linzi Jay Thompson, Arrian Karbassioon, Katie Burns, Natalie Barry and Richard Boakye.

Thank you also to Brian Tobin and to UCD Estate Services in particular Ciaran Bennett, Ash Middleton and David Mc Cormack for their feedback and consultation.

## References

National Biodiversity Data Centre’s (NBDC) Bumblebee Monitoring Scheme:

<https://www.biodiversityireland.ie/projects/monitoring-scheme-initiatives/bumblebee-monitoring-scheme/about-the-monitoring-scheme/>

Irish Pollinator Initiative: <https://www.biodiversityireland.ie/projects/irish-pollinator-initiative/>

Regional Red List of Irish Bees: [https://www.biodiversityireland.ie/wordpress/wp-content/uploads/RL\\_2006\\_Bees.pdf](https://www.biodiversityireland.ie/wordpress/wp-content/uploads/RL_2006_Bees.pdf)

## Appendix

### (i) Honey bees

A total of 466 honey bee individuals were recorded on campus over the course of the monitoring. The highest abundance of honeybees were recorded in Rosemount (Section 1) with the highest numbers recorded in this Section in July (237 individuals). See Figure 4

This is unsurprising given that there are honeybee hives located in Rosemount Environmental Research Station. Note that honeybees were recorded from May onwards.

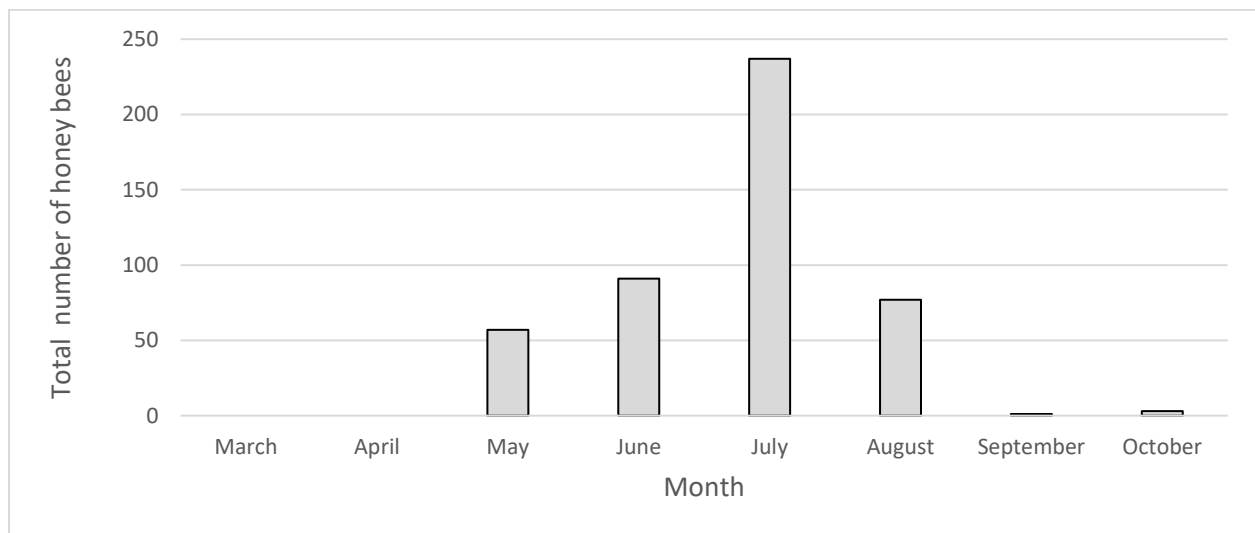


Figure 4: Honeybee abundance recorded along the transect from May to October

### (ii) A closer look at the UCD Bumblebee Monitoring Transect 2019 results

When we look at bee species richness (i.e. number of bee species) across the different management categories, we find that on average there are more species recorded in the “no mow/wild” and “plantings” sections than the rest. The highest numbers of species are recorded for both, in the months May- August (See Figure 5). When we compare the sections in the two categories, species recorded in the “plantings” section are higher in months July and August whereas those recorded in the “no mow area/wild” section are higher in months May and June.

This highlights the complementary nature of both management categories in sustaining bee numbers across the season. That said, the “no mow area/wild” sections are particularly valuable as they host bee abundance and diversity in the months that “plantings” sections do not (March and October).

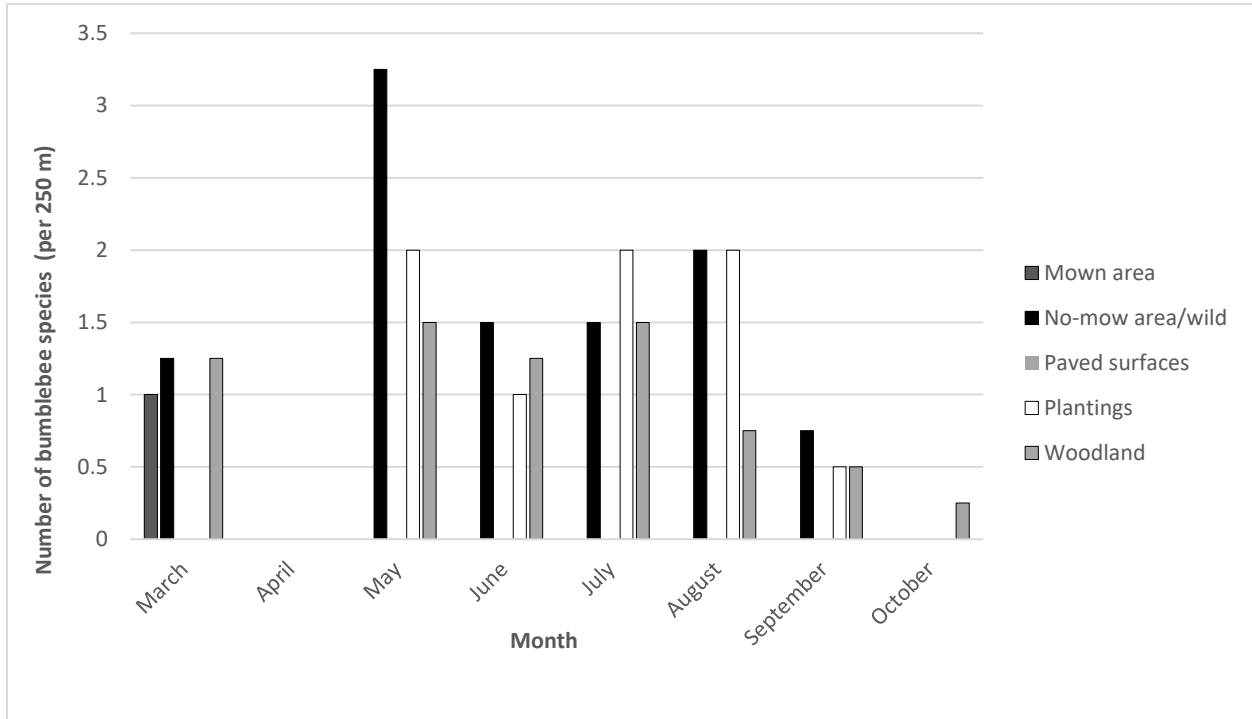


Figure 5 Number of bumblebee species (per 250 metres) throughout the entire transect period (March - October) for the 5 'management' categories (mown area, no-mow area/wild, paved surfaces, plantings and woodland). Note that Section 1 is driving the observed 'woodland' numbers in October. As all bumblebee records in Section 1 were recorded from the naturally wild component of this section, i.e. natural hedgerows, for management purposes this is interpreted to be 'no mow/wild'.

A look closer look at the two categories (“no mow area/wild” and “plantings”) that have the most bumblebee abundance and diversity reveals once again the differing value of each section depending on the month. In particular focusing on the wildflower meadow and managed for wildlife area in Conway as the “no mow area/wild” sections, when we compare these with the “plantings” sections (Chess garden and outside sports centre) we find a few points of interest.

The chess garden section supports a huge number of bees (80 or more individuals on average per metre) in May, which decreases steadily through the season (Figure 6). The managed for wildlife section in Conway also sees a huge number of bees in May but in contrast has almost twice the number of species during this time (Figure 7). This section also sees a decrease in bee abundance across the season but remains higher than those found in the chess garden. In addition, this section has higher numbers of species in August as well. The wildflower meadow section has a similar number of species recorded across the season and unlike the other sections sees a decrease in numbers over time, albeit much smaller numbers compared to the previously mentioned sections.

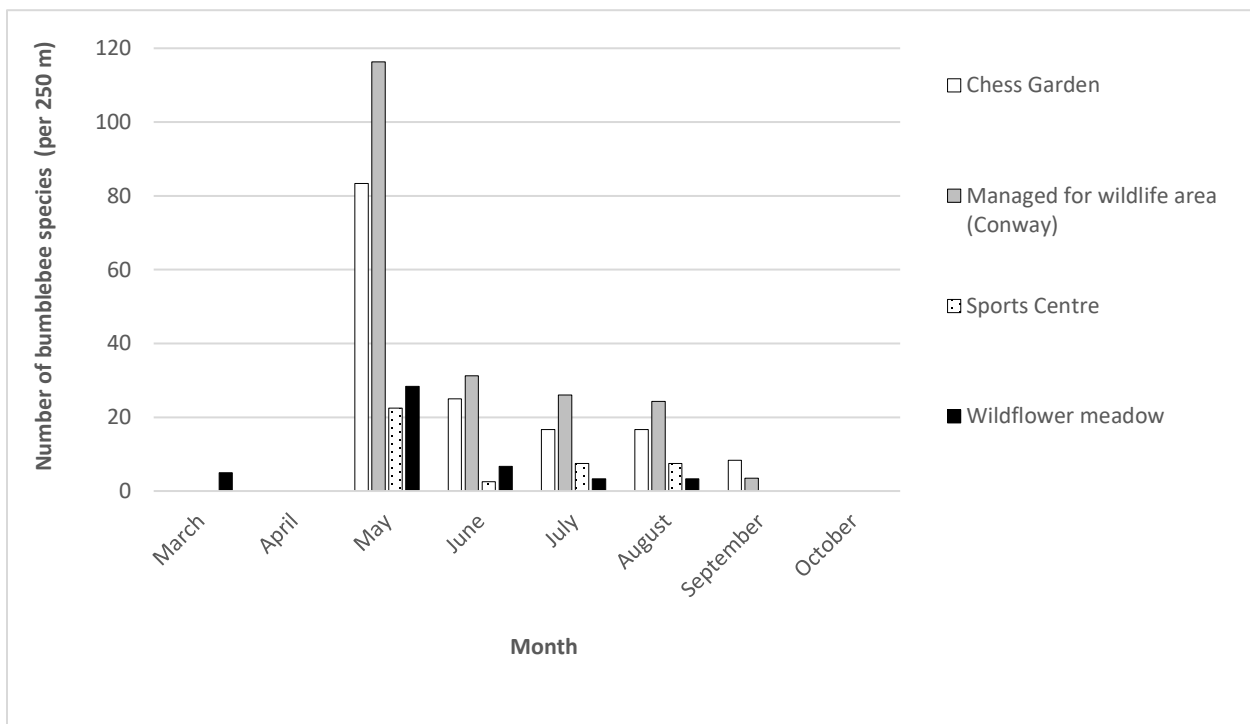


Figure 6 Bumblebee abundance (per 250 metres) throughout the entire transect period (March - October) for four sections included in the 'management' categories: 'plantings' (chess garden, sports centre) and 'no-mow area/wild' (managed for wildlife Conway, wildflower meadow)

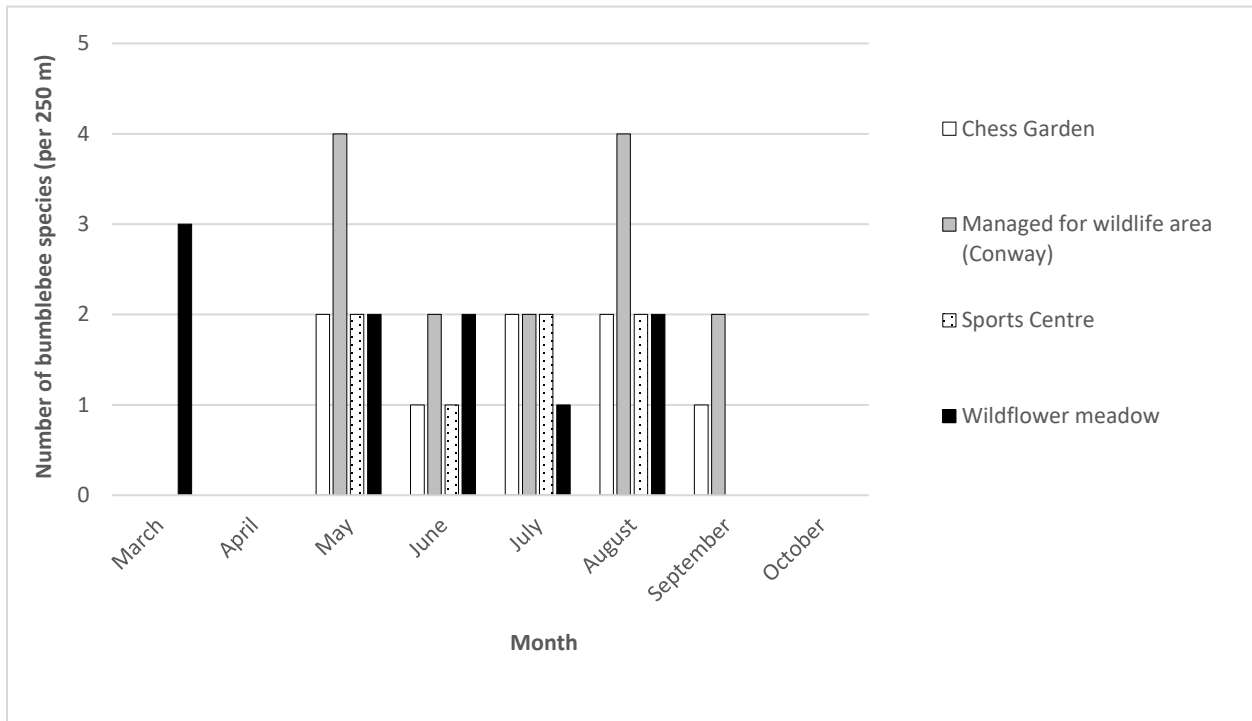


Figure 7 Number of bumblebee species (per metre) throughout the entire transect period (March - October) for four sections included in the 'management' categories: 'plantings' (chess garden, sports centre) and 'no-mow area/wild' (managed for wildlife Conway, wildflower meadow)