

EFFECTIVENESS OF UK AGRI-ENVIRONMENT SCHEMES IN SUPPORTING CAVITY-NESTING SOLITARY BEES

Thesis submitted for the Degree of Doctor of Philosophy,
University of Oxford



Word Count: 89,576

Catherine E. A. Gresty
Green Templeton College



Abstract

Bees provide a vital pollination service to many important crops and wildflowers yet are experiencing population declines across European and North American agricultural landscapes. The conservation of bee communities on farmland is a priority of the UK agri-environment schemes, which support pollinators through the provision of natural and semi-natural habitat, foraging resources and nesting sites. Data are needed to evaluate the effectiveness of these interventions in supporting bee communities and to allow the refinement of effective, evidence-based policy. This thesis examines the effectiveness of agri-environment management, though the provision of natural habitat, foraging resources and nesting sites, in supporting solitary bees, an important group of pollinators of which there are 250 species in the UK.

Cavity nesting solitary bees and wasps were surveyed on 19 farms situated across central southern England, ranging from farms under no agri-environment scheme, to farms showcasing higher-level agri-environment management. Data on bee and wasp communities was collected by deploying solitary bee nest boxes. These nest boxes are marketed widely as nesting resources for solitary bees and are provided to farmers as part of Higher Level agri-environment schemes. Over the course of the study, 4002 solitary bees and wasps, comprising 10 species, were recorded.

Natural Habitat: A positive relationship was identified between the abundance and species richness of bees and wasps and the proportion of natural habitat across farms. The availability of natural habitat also had a positive influence on the structural stability of bee and wasp parasitism networks; a positive association was identified with network link density. Link density measures the mean number of links per species within a network. Higher measures of link density are believed to confer greater resilience to species loss as individuals have more flexibility to switch interaction partner, limiting the risk of a cascade of secondary species extinctions. This set of results is encouraging, suggesting that the natural habitat types being promoted are effective in supporting solitary bee and wasp communities.

Foraging resources: Examination of bee foraging preferences, through next generation sequencing of brood cell pollen DNA, demonstrated that the agri-environment scheme sown wildflower mixes do not support the foraging requirements of solitary bees effectively. Of the 15 plants included currently in the wildflower mixes that were recorded as present on the study farms, pollen from only one species, *Ranunculus acris*, was used by the bees. *Rosa canina* was identified as the most popular forage plant. The leaves of this species are also a preferred nesting material for *Megachile* leafcutter bees, providing strong justification for the inclusion of *R. canina* within the selection of hedgerow plants encouraged by agri-environment schemes. *Tripleurospermum inodorum* and *Trifolium repens* were also identified as good candidates for inclusion in wildflower seed mixtures.

Nesting sites: A strong positive relationship between the density of solitary bee nest boxes and the rate of brood cell parasitism was identified, indicating that a high local density of nest boxes may expose bee larvae to a higher risk of parasitism. An enhanced risk of larval mortality could counteract the benefit of additional nest site provision. No significant effect of nest box provision on nest box colonization was identified across these study sites, suggesting that their placement across landscapes to encourage more pollinators may be counter-productive. It would be prudent to advise, given the results of this study, for the provision of a small number of dispersed nest boxes, this might more accurately mimic the availability of nesting resources in nature and reduce the risk of enhanced parasitism rates.

Acknowledgements

There are many people to whom I must extend thanks for supporting me through this project. First and foremost, my supervisors, Professor Owen Lewis and Professor Kathy Willis; I am especially grateful for all of the support and advice they have given me over the last three years. This DPhil would also not have been possible without the funding provided by the Christopher Welch Board of Management; to them I very incredibly thankful.

I would also like to thank all of the farmers and land managers who granted me permission to place bee nest boxes on their land. Among those that offered particularly strong support, I must thank Caroline Corsie at the Worcester Wildlife Trust for her enthusiasm and fantastic support of this project.

Special thanks must also go to Professor Charles Godfray, Dr Mark Shaw, Dr Dick Askew and Nigel Wyatt for their help identifying parasitoid specimens.

I would also like to extend thanks to my field assistants, Stephen MacFarlane, Leoma Williams, Steven Cuell, Caitlin Schindler, Alison Boyes and my brother, James Gresty for all of their work, helping me to monitor my nest boxes across the study farms. Most of all though, I would like to say a massive thank you to my father for helping me put up and collect all of the 484 nest boxes on the farms, often in extremely muddy conditions!

Huge thanks also to the lab groups of Kathy Willis and Owen Lewis; I am so lucky to have had such a wonderful (and entertaining!) support network.

My last thanks go to my family and friends, particularly those at Green Templeton College, who have supported me so wonderfully throughout the DPhil; to you all I am indebted.

Table of Contents

Abstract	1
Acknowledgements	2
Table of Contents	3
Chapter 1	4
Introduction	
Chapter 2	23
Testing the impact of agri-environment scheme management on the abundance, species richness and diversity of cavity nesting solitary bee and wasps on UK farms	
Chapter 3	89
Examination of the impact of agri-environment management on the structure and stability of farmland solitary bee and wasp parasitism networks	
Chapter 4	128
Determining the benefits of agri-environment management, favoured floral resources and the structure of pollen transport networks for solitary bees	
Chapter 5	174
Assessing the effectiveness of nest box provision as an intervention for the conservation of solitary bees on farmland	
Chapter 6	213
General discussion and concluding remarks	
Bibliography	224
Appendix	236

Introduction

The last 50 years has seen a decline in the abundance of managed honeybee colonies and wild bee species across European and American agricultural landscapes (Biesmeijer et al., 2006; Williams & Osborne, 2009; Potts et al., 2010). Given that bees provide a vital pollination service to wild plant communities and many globally important crop plants, this decline is of international concern (Ashman et al., 2004). The global economic value of insect-mediated pollination for agriculture is estimated at \$209 billion a year (Gallai et al., 2009). Approximately 70% of crop species, representing around 35% of total global food production, by volume, are dependent on insect pollination to some extent (Klein et al., 2007), with bees responsible for a large proportion of this pollination service, although this has yet to be quantified precisely (Rollin et al., 2013). Continuing bee declines may therefore trigger pollination shortfalls as the cultivation of pollination-dependent crops continues to expand globally (Holden, 2006; Gross, 2008; Aizen & Harder, 2009). Determining how best to restore bee populations on agricultural land is an urgent priority.

Drivers of Bee Declines

Bees, closely related to wasps and ants, are a monophyletic lineage within the superfamily Apoidea. Over 20,000 species are estimated to occur globally (Danforth et al., 2006), present on every continent except Antarctica. There are three major groups of bees; social nesters, including honeybees and bumblebees; solitary nesters, consisting of both ground and cavity nesting species; and cuckoo bees, which parasitise the nests of both solitary and social species (Falk & Lewington, 2015).

All three groups of bee are believed to have experienced population decline across European and North American agricultural landscapes; for honeybees, this has been inferred from analysis of hive counts and reporting of large scale seasonal losses (Hayes et al., 2008; Potts et al., 2010 Cameron et al., 2011). Particularly high losses

have been reported for honeybees in the US and Germany; although it is interesting to note that in some countries such as Chile and Argentina, the number of hives has actually increased (Aizen & Harder, 2009). For bumblebees and solitary bees, for which there are less data available, significant population declines are suspected, inferred from observation of contractions in species' geographic ranges (Biesmeijer et al., 2006; Kosior et al., 2007; Goulson et al., 2008; Potts et al., 2010). Bee population declines are attributed to the following key drivers (Goulson, et al., 2015):

Loss of Natural Habitat: The first driver, and the focus of this thesis, is habitat loss. It is vital that bees have access to appropriate floral foraging resources throughout the adult flight season (which ranges significantly across taxa and geographic regions, from a few weeks to year-long) and to nesting sites. Reductions in the availability of these resources are believed to have contributed substantially to long term bee declines (Goulson et al., 2008; Brown & Paxton, 2009; Vanbergen, 2013) which have been driven to a large extent by the conversion of natural and semi-natural flower-rich habitat to intensive farmland, over the last century. Across the UK, agricultural land now covers over 71% of the total land area (DEFRA, 2015). In the process of agricultural intensification, approximately 97% of flower-rich grasslands have been lost over the course of the 20th century (Howard et al., 2003). This has resulted in a substantial decline in the availability of habitat for bees, providing limitations to foraging resource and nesting site availability.

Parasites & Disease: The second driver is parasites and disease. Bees suffer naturally from a range of parasites, parasitoids, and pathogens. Recently, parasites and pathogens of honeybees and commercial bumblebee colonies have been spread widely throughout the world, through the long distance transportation of bees by humans. The introduction of these non-native pathogens and parasites is exerting additional pressure on bee populations (Otterstatter & Thomson, 2008; Meeus et al., 2011) including, for example, the external parasitic mite *Varroa destructor* Anderson &

Trueman, 2000, originally a parasite of the Asian honeybee *Apis cerana* Fabricius, 1793. This parasite has jumped hosts to the European honeybee *Apis mellifera* Linnaeus, 1758, which appears to have little natural resistance. The Varroa mite acts as a vector for several pathogens such as the Acute Paralysis Virus and the combined impact of the mite itself and the diseases it carries has contributed substantially to honeybee colony losses (Rosenkranz et al., 2010; Nazzi, 2012). Of additional concern is now the accumulating evidence to suggest that some of these parasites and pathogens are now spreading from managed honeybee and commercial bumblebee colonies to wild bee species (Furst et al., 2014).

Pesticides: Pesticides are the third driver of bee declines. The widespread application of herbicides across farmland reduces the availability of foraging resources, in the form of wildflowers, for bees (Goulson et al., 2008). In addition, bees are often exposed to pesticides throughout their development and adult lives. There is evidence that these may be contributing to bee declines (Goulson, 2013; Pisa et al., 2015), although, at present, the effects are poorly understood. Much research is being conducted in this area, particularly focusing on neonicotinoid pesticides, which have been identified as potentially particularly harmful to bees (Kessler et al., 2015; Rundlöf et al., 2015).

These three stress factors; habitat loss, disease and pesticides, are interacting, in some cases synergistically, to drive declines in bee populations. For example, there is evidence that the combined affect of food stress, as a result of lack of foraging resources, and pesticide exposure may impair the immune response of bees, rendering them more susceptible to parasites and disease (Brown et al., 2000; Di Prisco et al., 2013). In addition to these three key drivers, additional stress factors such as the introduction of non-native, invasive competitors and climate change may exert further pressure on some species (Goulson, 2003; Williams & Osborne, 2009).

Addressing bee population declines

Countering bee population declines is essential if there are to be adequate pollination services for insect-pollinated crops and wildflowers in the future (Klein et al., 2007; Rollin et al., 2013). In particular, it is important that conservation efforts are focused on increasing populations of both managed and wild bee species; over-reliance on a few species of managed pollinators, such as honeybees and a few bumblebee species risks supply failure. Although many farmers continue to rely on managed honeybee colonies to pollinate their crops, the pollination service provided by wild bee species is substantial and often under-estimated (Breeze et al., 2011; Garibaldi et al., 2013). The presence of a diverse assemblage of pollinators provides greater levels of functional complementarity in crop pollination and ensures higher levels of resilience in pollination service delivery (Klein et al., 2003; Winfree et al., 2007; Hoehn et al., 2008; Winfree & Kremen, 2009; Freund, 2013; Garibaldi et al., 2013).

The focus of this thesis is wild bee populations and the impact of habitat loss, widely identified as the most important cause of their long term decline (Winfree & Kremen, 2009; Brown & Paxton, 2009; Vanbergen, 2013). The expansion and intensification of agriculture over the last century is largely responsible for the significant decline in the availability of natural habitat for bees and other pollinators across Europe and North America (Samson & Knopf, 1994; Howard et al., 2003). It is paradoxical that agriculture represents one of the primary threats to bee populations while the pollination service provided by insect pollinators to the main global food crops is estimated at \$209 billion per annum (Gallai et al., 2009). In order to restore bee populations and secure their delivery of pollination services to agriculture, it is imperative that strategies are developed to integrate pollinator conservation into agricultural land management.

The UK National Pollinator Strategy and Agri-Environment Schemes

Within the UK, the service provided by insect pollinators to crop pollination has been

valued at £430 million per annum (Garratt et al., 2014). The UK government, recognizing the important pollination service provided by bees and other insect pollinators, launched the National Pollinator Strategy in 2014: a 10-year national policy initiative focused on conserving insect pollinators within the UK (DEFRA, 2014). Restoring pollinator communities on agricultural land is a particular priority and as a consequence, pollinator conservation is now a key element of the UK Agri-Environment Schemes (Dicks et al., 2010). These schemes, introduced under the European Union's Common Agricultural Policy, financially incentivize farmers for providing interventions to conserve biodiversity and improve ecosystem functioning on their land (Natural England, 2016). Over 70% of agricultural land in England is managed under an agri-environment scheme, comprising 6.9 million hectares in total (Natural England, 2016).

In 2005, the UK agri-environment schemes were structured into Environmental Stewardship agreements. These were divided into two tiers: Entry Level Stewardship and Organic Entry Level Stewardship (the more basic agreements) and Higher Level Stewardship and Organic Higher Level Stewardship (more comprehensive agreements). Pollinator conservation was integrated in all of these agreements, although under Higher Level Stewardship, farmers received greater subsidies for a higher level of investment in conservation interventions. From late 2015, new Countryside Stewardship agreements have been replacing Environmental Stewardship agreements gradually. Although Countryside Stewardship agreements are structured slightly differently, the conservation interventions implemented by farmers for bees and other insect pollinators remain essentially the same, with a few minor additions, notably the provision of solitary bee nest boxes within Higher Level agreements (Natural England, 2016). Within the Countryside Stewardship agreements, conservation interventions for insect pollinators are grouped together under a specific 'Wild Pollinator and Farm Wildlife' package.

The pollinator conservation interventions implemented under these schemes focus on increasing the availability of natural and semi-natural habitat for bees and other insect pollinators, with particular emphasis on increasing the availability of foraging resources and nesting sites (DEFRA, 2014; Natural England, 2016). Interventions to promote nesting site availability include restoring hedgerows, taking field corners out of management and providing solitary bee nesting boxes. Interventions to enhance foraging resources include maintaining flower-rich field margins and plots, maintaining species-rich grassland and actively sowing wildflower seed mixtures containing species attractive to pollinators, such as Clover (*Trifolium* sp.), Mustard (*Sinapsis* sp.) and Alfafa (*Medicago* sp.) (Dicks et al., 2010; Natural England, 2016). Table 1 lists the pollinator conservation interventions available to farmers under the Countryside Stewardship Wild Pollinator and Farm Wildlife Package (Natural England, 2016).

Table 1 Summary of the pollinator conservation interventions available within the Countryside Stewardship Wild Pollinator and Farm Wildlife Package (Natural England, 2016)

Resources	Options available
Nectar and pollen sources for insect pollinators	AB1 Nectar flower mix
	AB8 Flower-rich margins and plots
	AB15 Two-year sown legume fallow
	AB16 Autumn sown Bumblebird mix
	AB11 Cultivated areas for arable plants
	GS4 Legume and herb-rich swards
	GS2 Permanent grassland with very low inputs
	GS17 Lenient grazing supplement
	OP4 Multi-species ley
	WD3 Woodland edges on arable land
WT2 Buffering in-field ponds and ditches on arable land	
Nesting habitat for insect pollinators	BE3 Management of hedgerows
	GS1 Take field corners out of management
	WB1,2 & 3 Small, medium and large wildlife boxes (i.e. solitary bee nest boxes)

Effectiveness of pollinator conservation interventions on UK farmland

At present, there are insufficient data to allow thorough assessment of the effectiveness of these pollinator conservation interventions in conserving wild bee communities on farmland, a knowledge gap that policy makers are keen to address (Dicks et al., 2010; Garibaldi et al., 2014; Dicks et al., 2013; Dicks et al., 2015). This is particularly important in the context of ongoing budget constraints, which necessitate identifying strategically the most effective interventions to ensure pollination service delivery. A particular knowledge gap exists concerning the effectiveness of these interventions in supporting wild solitary bee communities on UK farmland. There have been many studies investigating the relative effectiveness of these interventions in supporting honeybee and bumblebee populations, identifying some success (Pywell et al., 2005; Carvell et al., 2007;; Morandin et al., 2007; Rudloff, 2008; Garibaldi et al., 2014), however, few studies have focused specifically on solitary bees (Wood et al., 2015; Wood et al., 2016).

Solitary Bees

Solitary bees are the most species rich group of bees within the UK; of the 275 bee species present in Britain, 250 species are solitary (Falk & Lewington, 2015). Among the 25 colony nesters, there are just 24 species of bumblebee and 1 species of honeybee, *Apis mellifera* (Falk & Lewington, 2015). The solitary bee lifecycle is illustrated in Figure 1.

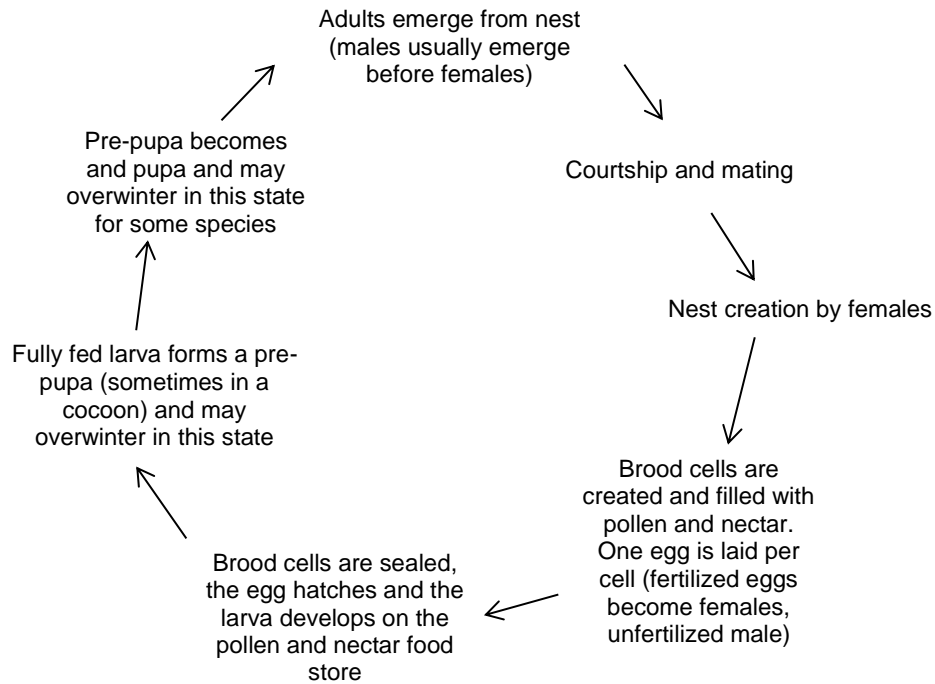


Figure 1 Lifecycle of a solitary bee (Falk & Lewington, 2015)

Solitary bees are divided into ground and cavity nesting species (Falk & Lewington, 2015). Ground nesting species, such as *Adrena* spp., create sub-terranean nesting chambers by burrowing into the ground, often selecting south facing patches of sparsely vegetated, sandy soil as nesting sites. By contrast, cavity nesters, such as *Osmia* spp., typically nest above ground, using hollow plant stems and cavities in dead wood or mortar in walls (Michener, 2000). Cavity nesting species will also occupy artificial solitary bee nesting boxes, which provide appropriate sized nesting cavities, typically in the form of bundles of bamboo shoot and reed stem or holes drilled into blocks of wood. These nest boxes are marketed widely as nesting resources for solitary bees; available for purchase by the general public and provided to farmers as part of Higher Level agri-environment schemes.

Ecologists take advantage of the readiness of cavity nesting solitary bees to occupy these nesting boxes and deploy them regularly for the collection of community data (Tscharrntke et al., 1998; Steffan-Dewenter et al., 2002; Tylianakis et al., 2006; Steckel

et al., 2014). Occupied bamboo or reed stems are extracted from the nest boxes and the bees reared in controlled laboratory conditions, facilitating the collection of data on bee abundance, species richness and diversity. In addition, there is the potential for pollen samples to be extracted from the brood cells and analysed to identify plant species composition and bee forage preferences (Sickel et al., 2015). Rearing within controlled conditions also facilitates the collection and identification of solitary bee parasitoids, which include many species of aculeate wasp and sarcophagid fly and cleptoparasites, including a range of drosophilid flies and gasterutiid wasps (Falk, 2015).

The foraging behaviour of solitary bees varies considerably across species. Many are polylectic, obtaining pollen from several plant families; examples include *Osmia bicornis* (Linnaeus, 1758) and *Megachile centuncularis* (Linnaeus, 1758). Polylectic species may occur in a wide variety of habitats, such as *Andrena scotica* Perkins, 1916, whose geographic range covers most of the UK, spanning a variety of open and wooded, acidic and base-rich, rural and urban habitats. Other solitary bees are oligolectic and forage on a more narrow range of plants, such as *Andrena humilis* Imhoff, 1832, which forages on yellow hawkish Asteraceae such as Cat's ear, *Hypochaeris radicata* L.. A small selection of species are monolectic and forage on a single plant species; for example *Macropis europaea* Warncke, 1973, which forages exclusively on Yellow Loosestrife, *Lysimachia vulgaris* L. (Falk & Lewington, 2015). There is a strong association between dietary specialisation and vulnerability to population decline among solitary bees; oligolectic and monolectic species have declined significantly in Britain over recent decades, to a much greater extent than more generalist polylectic species, most likely as a result of their more specific habitat requirements (Biesmeijer et al., 2006).

The pollination service provided by solitary bees is substantial; in a recent global review of the pollination service provided by wild bees, (estimated at \$3,251 ha⁻¹,

similar to the contribution of managed honeybees), seven out of the ten wild bee species identified as providing the highest mean contribution to crop production were solitary (Kleijn et al., 2015). For some important pollinator-dependant crops grown within the UK, such as apple, solitary bees have been demonstrated to be more efficient pollinators than honeybees (Delaplane et al., 2000; Garratt et al., 2013). As the cultivation of insect pollination dependant crops continues to expand (Aizen et al., 2009), the conservation of solitary bee communities on farmland is important; it is estimated that current honeybee populations are capable of supplying just 34% of the pollination service demand within the UK (Breeze et al., 2011). As mentioned above, in order to provide foraging and nesting habitat for these wild bees, there are a number of government funded initiatives to ensure that suitable environments are created and enhanced on existing farming. However, to date there has been few attempts to quantitatively assess the efficacy of these initiatives (POST, 2010; POST, 2013). Are the pollinator conservation interventions being deployed on UK farmland as part of the agri-environment schemes effective in conserving solitary bee communities? This thesis aims to address this specific knowledge gap.

Research Focus

The project has been designed specifically to address two questions, identified by policy makers as important for informing the optimum design of the pollinator conservation interventions of the UK agri-environment schemes (Dicks et al., 2010; Dicks et al., 2013; POST, 2010; POST, 2013):

- ⇒ How effective are current conservation interventions in supporting wild insect pollinator communities?
- ⇒ How can we enhance the effectiveness of current interventions?

These questions, provide the over-arching framework for the thesis and are addressed in specific reference to cavity nesting solitary bee communities. The majority of previous studies investigating the effectiveness of agri-environment management in supporting wild bee communities, aside from focusing predominantly on bumblebees, have utilised species abundance, richness and diversity metrics to evaluate the impact of conservation interventions (Goulson et al., 2002; Kleijn & Sutherland, 2003; Kleijn et al., 2006; Pywell et al., 2005; Lye et al., 2009). While this thesis examines cavity nesting solitary bee abundance, species richness and diversity metrics, it also investigates whether agri-environment management has an effect on community stability, by examining the response of solitary bee interaction networks to these conservation interventions.

The importance of examining the response of species interaction networks, in addition to species abundance, richness and diversity metrics, when examining the effect of land management on biodiversity, has been emphasised in the ecological literature (McCann, 2000; Montoya et al., 2006; Thébault & Fontaine, 2010). Examination of interaction networks has, in previous studies, revealed subtle effects of land management on species interactions; effects that cannot be identified from examination of species richness or diversity metrics and may have important consequences for ecosystem functioning and community stability (Tylianakis et al., 2007; Spiesman & Inouye, 2013). Few studies have examined the influence of agri-environment management on the structure of species interaction networks and thus identify these subtle effects (Kleijn & Sutherland, 2003). This thesis examines the effect of agri-environment scheme management on both the pollen transport network and parasitism network structure of cavity nesting solitary bees, enabling examination of the impact of pollinator conservation interventions on the structure of these networks and key quantitative indices of network stability.

Scope of thesis

Very little is known about the effectiveness of the UK agri-environment schemes in supporting solitary bee communities and the important pollination services they provide on farmland. This thesis addresses this knowledge gap and examines critically the effectiveness of current agri-environment scheme pollinator conservation interventions in supporting cavity nesting solitary bee communities.

This project involved surveying solitary bee communities on farmland situated across central southern England and managed under a range of agri-environment scheme levels. This ranged from farms under no agri-environment scheme with no interventions for the conservation of insect pollinators, to farms under higher-level agri-environment management, showcasing pollinator conservation interventions. The method used to gather key data on cavity nesting solitary bee communities was the deployment of solitary bee nest boxes; which are now provided to farmers under the UK agri-environment schemes. The deployment of solitary bee nest boxes, in addition to enabling the collection of bee community data within this project, is tested as an effective conservation tool in Chapter 5 of the thesis. The four data chapters of the thesis are outlined below.

- ⇒ Testing the impact of agri-environment scheme management on the abundance, species richness and diversity of trap nesting solitary bee and wasp communities on UK farmland
- ⇒ Examination of the impact of agri-environment management on the structure and stability of farmland solitary bee and wasp parasitism networks
- ⇒ Determining the benefits of agri-environment management, favoured floral resources and the structure of pollen transport networks for solitary bees
- ⇒ Assessing the effectiveness of nest box provision for the conservation of solitary bees on farmland

Given that this project assesses critically the effectiveness of agri-environment management in supporting solitary bee communities on UK farmland, an important objective of the UK National Pollinator Strategy, outputs from this thesis have the potential to assist a critical evaluation of the success of government policy for the conservation of wild insect pollinators on farmland. The results are also of significant relevance to countries outside of the UK.

Works Cited

Aizen, M.A. and Harder, L.D., 2009. The global stock of domesticated honey bees is growing slower than agricultural demand for pollination. *Current biology*, 19(11), pp.915-918.

Aizen, M.A., Garibaldi, L.A., Cunningham, S.A. and Klein, A.M., 2009. How much does agriculture depend on pollinators? Lessons from long-term trends in crop production. *Annals of botany*, p.mcp076.

Ashman, T.L., Knight, T.M., Steets, J.A., Amarasekare, P., Burd, M., Campbell, D.R., Dudash, M.R., Johnston, M.O., Mazer, S.J., Mitchell, R.J. and Morgan, M.T., 2004. Pollen limitation of plant reproduction: ecological and evolutionary causes and consequences. *Ecology*, 85(9), pp.2408-2421.

Biesmeijer, J.C., Roberts, S.P.M., Reemer, M., Ohlemüller, R., Edwards, M., Peeters, T., Schaffers, A.P., Potts, S.G., Kleukers, R., Thomas, C.D. and Settele, J., 2006. Parallel declines in pollinators and insect-pollinated plants in Britain and the Netherlands. *Science*, 313(5785), pp.351-354.

Burkle, L.A., Marlin, J.C. and Knight, T.M., 2013. Plant-pollinator interactions over 120 years: loss of species, co-occurrence, and function. *Science*, 339(6127), pp.1611-1615.

Breeze, T.D., Bailey, A.P., Balcombe, K.G. and Potts, S.G., 2011. Pollination services in the UK: How important are honeybees?. *Agriculture, Ecosystems & Environment*, 142(3), pp.137-143.

Brown, M.J.F., Loosli, R. and Schmid-Hempel, P., 2000. Condition-dependent expression of virulence in a trypanosome infecting bumblebees. *Oikos*, 91(3), pp.421-427.

Brown, M.J.F. and Paxton, R.J., 2009. The conservation of bees: a global perspective. *Apidologie*, 40(3), pp.410-416.

Cameron, S.A., Lozier, J.D., Strange, J.P., Koch, J.B., Cordes, N., Solter, L.F. and Griswold, T.L., 2011. Patterns of widespread decline in North American bumble bees. *Proceedings of the National Academy of Sciences*, 108(2), pp.662-667.

Carvell, C., Meek, W.R., Pywell, R.F., Goulson, D. and Nowakowski, M., 2007. Comparing the efficacy of agri-environment schemes to enhance bumble bee abundance and diversity on arable field margins. *Journal of Applied Ecology*, 44(1), pp.29-40.

Danforth, B.N., Sipes, S., Fang, J. and Brady, S.G., 2006. The history of early bee diversification based on five genes plus morphology. *Proceedings of the National Academy of Sciences*, 103(41), pp.15118-15123.

DEFRA, 2014. *The National pollinator Strategy for bees and other pollinators in England*. [Online] Available at: https://www.gov.uk/government/uploads/attachment_data/file/409431/pb14221-national-pollinators-strategy.pdf[Accessed 18th April 2016].

DEFRA, 2015. Agriculture in the United Kingdom 2014. *Publications - GOV.UK*
www.gov.uk.

Delaplane, K.S., Mayer, D.R. and Mayer, D.F., 2000. *Crop pollination by bees*. Cabi.

Kennedy, C.M., Lonsdorf, E., Neel, M.C., Williams, N.M., Ricketts, T.H., Winfree, R., Bommarco, R., Brittain, C., Burley, A.L., Cariveau, D. and Carvalho, L.G., 2013. A global quantitative synthesis of local and landscape effects on wild bee pollinators in agroecosystems. *Ecology letters*, 16(5), pp.584-599.

Di Prisco, G., Cavaliere, V., Annoscia, D., Varricchio, P., Caprio, E., Nazzi, F., Gargiulo, G. and Pennacchio, F., 2013. Neonicotinoid clothianidin adversely affects insect immunity and promotes replication of a viral pathogen in honey bees. *Proceedings of the National Academy of Sciences*, 110(46), pp.18466-18471.

Dicks, L.V., Showler, D.A. and Sutherland, W.J., 2010. *Bee conservation: evidence for the effects of interventions* (Vol. 1). Pelagic Publishing.

Dicks, L.V., Abrahams, A., Atkinson, J., Biesmeijer, J., Bourn, N., Brown, C., Brown, M.J., Carvell, C., Connolly, C., Cresswell, J.E. and Croft, P., 2013. Identifying key knowledge needs for evidence-based conservation of wild insect pollinators: a collaborative cross-sectoral exercise. *Insect Conservation and Diversity*, 6(3), pp.435-446.

Dicks, L.V., Baude, M., Roberts, S.P., Phillips, J., Green, M. and Carvell, C., 2015. How much flower-rich habitat is enough for wild pollinators? Answering a key policy question with incomplete knowledge. *Ecological entomology*, 40(S1), pp.22-35.

Falk, S.J. and Lewington, R., 2015. *Field guide to the bees of Great Britain and Ireland*. British Wildlife Publishing Lt.

Fürst, M.A., McMahon, D.P., Osborne, J.L., Paxton, R.J. and Brown, M.J.F., 2014. Disease associations between honeybees and bumblebees as a threat to wild pollinators. *Nature*, 506(7488), pp.364-366.

Fründ, J., Dormann, C.F., Holzschuh, A. and Tscharrntke, T., 2013. Bee diversity effects on pollination depend on functional complementarity and niche shifts. *Ecology*, 94(9), pp.2042-2054.

Gallai, N., Salles, J.M., Settele, J. and Vaissière, B.E., 2009. Economic valuation of the vulnerability of world agriculture confronted with pollinator decline. *Ecological economics*, 68(3), pp.810-821.

Garibaldi, L.A., Steffan-Dewenter, I., Winfree, R., Aizen, M.A., Bommarco, R., Cunningham, S.A., Kremen, C., Carvalho, L.G., Harder, L.D., Afik, O. and Bartomeus, I., 2013. Wild pollinators enhance fruit set of crops regardless of honey bee abundance. *science*, 339(6127), pp.1608-1611.

Garibaldi, L.A., Carvalho, L.G., Leonhardt, S.D., Aizen, M.A., Blaauw, B.R., Isaacs, R., Kuhlmann, M., Kleijn, D., Klein, A.M., Kremen, C. and Morandin, L., 2014. From research to action: enhancing crop yield through wild pollinators. *Frontiers in Ecology and the Environment*, 12(8), pp.439-447.

- Garratt, M.P.D., Truslove, C.L., Coston, D.J., Evans, R.L., Moss, E.D., Dodson, C., Jenner, N., Biesmeijer, J.C. and Potts, S.G., 2014. Pollination deficits in UK apple orchards. *Journal of Pollination Ecology*, 12(2), pp.9-14.
- Goulson, D., Hughes, W., Derwent, L. and Stout, J., 2002. Colony growth of the bumblebee, *Bombus terrestris*, in improved and conventional agricultural and suburban habitats. *Oecologia*, 130(2), pp.267-273.
- Goulson, D., 2003. Effects of introduced bees on native ecosystems. *Annual Review of Ecology, Evolution, and Systematics*, pp.1-26.
- Goulson, D., Lye, G.C. and Darvill, B., 2008. Decline and conservation of bumble bees. *Annu. Rev. Entomol.*, 53, pp.191-208.
- Goulson, D., 2013. Review: An overview of the environmental risks posed by neonicotinoid insecticides. *Journal of Applied Ecology*, 50(4), pp.977-987.
- Goulson, D., Nicholls, E., Botías, C. and Rotheray, E.L., 2015. Bee declines driven by combined stress from parasites, pesticides, and lack of flowers. *Science*, 347(6229), p.1255957.
- Gross, M., 2008. Bee gloom deepens. *Current Biology*, 18(23), p.R1073.
- Holden, C., 2006. Report warns of looming pollination crisis in North America. *Science*, 314(5798), pp.397-397.
- Hayes Jr, J., Underwood, R.M. and Pettis, J., 2008. A survey of honey bee colony losses in the US, fall 2007 to spring 2008. *PloS one*, 3(12), p.e4071.
- Hoehn, P., Tscharrntke, T., Tylianakis, J.M. and Steffan-Dewenter, I., 2008. Functional group diversity of bee pollinators increases crop yield. *Proceedings of the Royal Society of London B: Biological Sciences*, 275(1648), pp.2283-2291.
- Howard, D.C., Watkins, J.W., Clarke, R.T., Barnett, C.L. and Stark, G.J., 2003. Estimating the extent and change in broad habitats in Great Britain. *Journal of Environmental Management*, 67(3), pp.219-227.
- Kessler, S.C., Tiedeken, E.J., Simcock, K.L., Derveau, S., Mitchell, J., Softley, S., Stout, J.C. and Wright, G.A., 2015. Bees prefer foods containing neonicotinoid pesticides. *Nature*, 521(7550), pp.74-76.
- Klein, A.M., Steffan–Dewenter, I. and Tscharrntke, T., 2003. Fruit set of highland coffee increases with the diversity of pollinating bees. *Proceedings of the Royal Society of London B: Biological Sciences*, 270(1518), pp.955-961.
- Kleijn, D. and Sutherland, W.J., 2003. How effective are European agri-environment schemes in conserving and promoting biodiversity?. *Journal of applied ecology*, 40(6), pp.947-969.
- Kleijn, D., Baquero, R.A., Clough, Y., Diaz, M., Esteban, J.D., Fernández, F., Gabriel, D., Herzog, F., Holzschuh, A., Jöhl, R. and Knop, E., 2006. Mixed biodiversity

benefits of agri-environment schemes in five European countries. *Ecology letters*, 9(3), pp.243-254.

Kleijn, D., Winfree, R., Bartomeus, I., Carvalheiro, L.G., Henry, M., Isaacs, R., Klein, A.M., Kremen, C., M'gonigle, L.K., Rader, R. and Ricketts, T.H., 2015. Delivery of crop pollination services is an insufficient argument for wild pollinator conservation. *Nature communications*, 6.

Klein, A.M., Vaissiere, B.E., Cane, J.H., Steffan-Dewenter, I., Cunningham, S.A., Kremen, C. and Tscharntke, T., 2007. Importance of pollinators in changing landscapes for world crops. *Proceedings of the Royal Society of London B: Biological Sciences*, 274(1608), pp.303-313.

Kosior, A., Celary, W., Olejniczak, P., Fijal, J., Król, W., Solarz, W. and Plonka, P., 2007. The decline of the bumble bees and cuckoo bees (Hymenoptera: Apidae: Bombini) of Western and Central Europe. *Oryx*, 41(01), pp.79-88.

Lye, G., Park, K., Osborne, J., Holland, J. and Goulson, D., 2009. Assessing the value of Rural Stewardship schemes for providing foraging resources and nesting habitat for bumblebee queens (Hymenoptera: Apidae). *Biological Conservation*, 142(10), pp.2023-2032.

Meeus, I., Brown, M.J., De Graaf, D.C. and Smagghe, G.U.Y., 2011. Effects of invasive parasites on bumble bee declines. *Conservation Biology*, 25(4), pp.662-671.

Michener, C.D., 2000. *The bees of the world* (Vol. 1). JHU Press.

Montoya, J.M., Pimm, S.L. and Solé, R.V., 2006. Ecological networks and their fragility. *Nature*, 442(7100), pp.259-264.

Morandin, L.A., Winston, M.L., Abbott, V.A. and Franklin, M.T., 2007. Can pastureland increase wild bee abundance in agriculturally intense areas?. *Basic and Applied Ecology*, 8(2), pp.117-124.

Natural England, 2016. [Online] *Countryside Stewardship*
Available at: <https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-land-management#higher-tier> [Accessed 28 September 2016].

Nazzi, F., Brown, S.P., Annoscia, D., Del Piccolo, F., Di Prisco, G., Varricchio, P., Della Vedova, G., Cattonaro, F., Caprio, E. and Pennacchio, F., 2012. Synergistic parasite-pathogen interactions mediated by host immunity can drive the collapse of honeybee colonies. *PLoS Pathog*, 8(6), p.e1002735.

Otterstatter, M.C. and Thomson, J.D., 2008. Does pathogen spillover from commercially reared bumble bees threaten wild pollinators?. *PLoS One*, 3(7), p.e2771.

Pisa, L.W., Amaral-Rogers, V., Belzunces, L.P., Bonmatin, J.M., Downs, C.A., Goulson, D., Kreutzweiser, D.P., Krupke, C., Liess, M., McField, M. and Morrissey, C.A., 2015. Effects of neonicotinoids and fipronil on non-target invertebrates. *Environmental Science and Pollution Research*, 22(1), pp.68-102.

- Parliamentary Office of Science and Technology (POST), 2010. *Insect Pollination* POST-PN-348
- Parliamentary Office of Science and Technology (POST), 2013. *Reversing Insect Pollinator Decline* POST-PN-442
- Potts, S.G., Biesmeijer, J.C., Kremen, C., Neumann, P., Schweiger, O. and Kunin, W.E., 2010. Global pollinator declines: trends, impacts and drivers. *Trends in ecology & evolution*, 25(6), pp.345-353.
- Potts, S.G., Roberts, S.P., Dean, R., Marris, G., Brown, M.A., Jones, R., Neumann, P. and Settele, J., 2010. Declines of managed honey bees and beekeepers in Europe. *Journal of Apicultural Research*, 49(1), pp.15-22.
- Pywell, R.F., Warman, E.A., Carvell, C., Sparks, T.H., Dicks, L.V., Bennett, D., Wright, A., Critchley, C.N.R. and Sherwood, A., 2005. Providing foraging resources for bumblebees in intensively farmed landscapes. *Biological conservation*, 121(4), pp.479-494.
- Rollin, O., Bretagnolle, V., Decourtye, A., Aptel, J., Michel, N., Vaissière, B.E. and Henry, M., 2013. Differences of floral resource use between honey bees and wild bees in an intensive farming system. *Agriculture, Ecosystems & Environment*, 179, pp.78-86.
- Rosenkranz, P., Aumeier, P. and Ziegelmann, B., 2010. Biology and control of *Varroa destructor*. *Journal of invertebrate pathology*, 103, pp.S96-S119.
- Rundlöf, M., Nilsson, H. and Smith, H.G., 2008. Interacting effects of farming practice and landscape context on bumble bees. *Biological Conservation*, 141(2), pp.417-426.
- Rundlöf, M., Andersson, G.K., Bommarco, R., Fries, I., Hederström, V., Herbertsson, L., Jonsson, O., Klatt, B.K., Pedersen, T.R., Yourstone, J. and Smith, H.G., 2015. Seed coating with a neonicotinoid insecticide negatively affects wild bees. *Nature*, 521(7550), pp.77-80.
- Samson, F. and Knopf, F., 1994. Prairie conservation in north america. *BioScience*, 44(6), pp.418-421.
- Sickel, W., Ankenbrand, M.J., Grimmer, G., Holzschuh, A., Härtel, S., Lanzen, J., Steffan-Dewenter, I. and Keller, A., 2015. Increased efficiency in identifying mixed pollen samples by meta-barcoding with a dual-indexing approach. *BMC ecology*, 15(1), p.20.
- Spiesman, B.J. and Inouye, B.D., 2013. Habitat loss alters the architecture of plant–pollinator interaction networks. *Ecology*, 94(12), pp.2688-2696.
- Steckel, J., Westphal, C., Peters, M.K., Bellach, M., Rothenwoehrer, C., Erasmi, S., Scherber, C., Tschardtke, T. and Steffan-Dewenter, I., 2014. Landscape composition and configuration differently affect trap-nesting bees, wasps and their antagonists. *Biological Conservation*, 172, pp.56-64.

- Steffan-Dewenter, I., Münzenberg, U., Bürger, C., Thies, C. and Tscharrntke, T., 2002. Scale-dependent effects of landscape context on three pollinator guilds. *Ecology*, 83(5), pp.1421-1432.
- Thébault, E. and Fontaine, C., 2010. Stability of ecological communities and the architecture of mutualistic and trophic networks. *Science*, 329(5993), pp.853-856.
- Tscharrntke, T., Gathmann, A. and Steffan-Dewenter, I., 1998. Bioindication using trap-nesting bees and wasps and their natural enemies: community structure and interactions. *Journal of applied ecology*, 35(5), pp.708-719.
- Tylianakis, J.M., Klein, A.M., Lozada, T. and Tscharrntke, T., 2006. Spatial scale of observation affects α , β and γ diversity of cavity-nesting bees and wasps across a tropical land-use gradient. *Journal of Biogeography*, 33(7), pp.1295-1304.
- Tylianakis, J.M., Tscharrntke, T. and Lewis, O.T., 2007. Habitat modification alters the structure of tropical host-parasitoid food webs. *Nature*, 445(7124), pp.202-205.
- Vanbergen, A.J., 2013. Threats to an ecosystem service: pressures on pollinators. *Frontiers in Ecology and the Environment*, 11(5), pp.251-259.
- Williams, P.H. and Osborne, J.L., 2009. Bumblebee vulnerability and conservation world-wide. *Apidologie*, 40(3), pp.367-387.
- Winfree, R., Williams, N.M., Dushoff, J. and Kremen, C., 2007. Native bees provide insurance against ongoing honey bee losses. *Ecology letters*, 10(11), pp.1105-1113.
- Winfree, R. and Kremen, C., 2009. Are ecosystem services stabilized by differences among species? A test using crop pollination. *Proceedings of the Royal Society of London B: Biological Sciences*, 276(1655), pp.229-237.

Testing the impact of agri-environment scheme management on the abundance, species richness and diversity of cavity nesting solitary bees and wasps on UK farms

Abstract

The conservation of wild bee populations on farmland is a key priority of the UK's National Pollinator Strategy. Government policy to meet this objective is centered on the integration of pollinator conservation interventions into the UK's agri-environment schemes. These focus on the provision of natural and semi-natural habitat, floral foraging resources and nesting sites, for insect pollinators on farmland.

This study, conducted on farmland across central southern England, examined the impact of agri-environment management (specifically, the provision of natural habitat and floral foraging resources) on the abundance, species richness and diversity of cavity nesting solitary bees and wasps. A positive correlation was identified between the level of agri-environment management and the proportion of natural and semi-natural habitat, floral-unit abundance and plant species richness across sites.

The abundance of floral-units and plant species richness at the farm level had no significant effect on bee and wasp abundance, species richness or diversity. However, preferred forage species for the solitary bees surveyed in this study, identified through analysis of brood cell pollen samples, were present in low abundance across the study farms. As a consequence, these species were not well represented in the floral-unit abundance and plant species richness metrics used in this analysis; this could explain the absence of a significant effect.

A positive relationship was identified between solitary bee and wasp abundance and species richness and the proportion of natural and semi-natural habitat across sites.

This result suggests that the solitary bees and wasps surveyed in this study respond positively to the natural and semi-natural habitat types promoted by the UK agri-environment schemes. This reinforces the importance of habitat provision for the conservation of wild insect pollinators within UK agri-environment policy.

Introduction

The expansion and intensification of agricultural production over the last century has driven significant declines in biodiversity across European and North American landscapes (Krebs et al., 1999; Petit et al., 2001; Benton et al., 2002; Tscharntke et al., 2005). Within the UK, over 71% of land is managed as intensive farmland (DEFRA, 2015), markedly reducing the availability of natural and semi-natural habitat for wildlife (Tilman et al., 2001). Wild bee populations have suffered particularly severe declines across agricultural landscapes, as a result of reductions in foraging resource and nesting site availability (Kremen et al., 2002; Howard et al., 2003; Biesmeijer et al., 2006; Potts et al., 2010).

This is of concern; bees provide a critical pollination service to wild plant communities and many important crops (Ashman et al., 2004). The global economic value of insect-mediated pollination for agriculture is estimated at \$209 billion a year (Gallai et al., 2009). Bees are responsible for a significant proportion of this pollination service although this has yet to be quantified precisely (Rollin et al., 2013). The maintenance of a diverse assemblage of wild bee species on farmland is important (Westerkamp & Gottsberger, 2000; Klein et al., 2003; Winfree & Kremen, 2009); current honeybee populations are capable of supplying just 34% of pollination service demand within the UK (Breeze et al., 2011). If this pollination shortfall is to be met, the presence of abundant and diverse wild bee communities on agricultural land is essential (Kremen et al., 2002; Klein et al., 2007).

Pollinator conservation is now a key priority of the UK's agri-environment schemes (DEFRA, 2014; Natural England, 2016). These schemes, introduced under the European Union's Common Agricultural Policy, subsidize farmers for implementing interventions to conserve biodiversity and improve ecosystem functioning on their land (Natural England, 2016). As part of these schemes, specific interventions have been introduced to support populations of bees and other wild insect pollinators on farmland (DEFRA, 2014). These interventions focus on increasing the availability of natural and semi-natural habitat, floral foraging resources and nesting sites for pollinators (Natural England, 2016) (DEFRA, 2014). The full list of interventions is outlined in Table 1 of the Thesis Introduction. Landscape scale interventions to promote nesting site availability include restoring hedgerows and taking field corners out of management. Interventions to increase foraging resources include maintaining flower-rich field margins, actively sowing wildflower seed mixtures containing species presumed to be attractive to pollinators and maintaining species-rich grassland (Natural England, 2016).

At the time this study was conducted, the UK agri-environment schemes were structured into Environmental Stewardship agreements. There were two tiers of agreement: Entry Level Stewardship and Organic Entry Level Stewardship (the more basic agreements) and Higher Level Stewardship and Organic Higher Level Stewardship (more comprehensive agreements). Pollinator conservation was a component of all of these, although under Higher Level Stewardship, farmers received higher subsidies for a greater level of investment in pollinator conservation interventions. In late 2015, the Environmental Stewardship agreements were re-structured into Countryside Stewardship agreements. The interventions for pollinator conservation remain the same, with a few minor additions, notably the provision of solitary bee nest boxes within Higher Level agreements (Natural England, 2016).

However, it has been recognized that insufficient data exist to allow comprehensive

evaluation of the effectiveness of the UK agri-environment schemes in supporting wild bee communities on farmland (Dicks et al., 2010; Garibaldi et al., 2014; Dicks et al., 2015). The development of a strong evidence base is crucial to inform the more strategic design of farmland pollinator conservation interventions (Kleijn & Sutherland, 2003; POST, 2010; POST, 2013). The success of these interventions is vital to the UK's National Pollinator Conservation Strategy (DEFRA, 2014). In particular, very few studies have examined the effectiveness of agri-environment management in supporting solitary bee communities on UK farmland (Kleijn & Sutherland, 2003; Fabian et al., 2013; Wood et al., 2015; Wood et al., 2016).

There are 250 species of solitary bee in the UK: 24 species of bumblebee and one species of honeybee, *Apis mellifera* (Linnaeus 1758). There is evidence that the pollinator conservation interventions of the UK agri-environment schemes benefit bumblebee and honeybee populations, particularly through the provision of foraging resources (Edwards, 2003; Pywell et al., 2005; Carvell et al., 2007; Rundlöf et al., 2008; Holland et al., 2015; Wood et al., 2015). However, limited data exist for solitary bees, despite their high species richness and recognition as important crop pollinators (Bohart, 1972; Bosch & Kemp, 2002; Haaland et al., 2011). For example, in UK apple orchards, it has been estimated that 600 solitary bees can provide pollination services equivalent to 30,000 honeybees (Delaplane et al., 2000; Garratt et al., 2014).

The aim of this study therefore was to examine the effectiveness of the conservation interventions being deployed on UK farmland in supporting solitary bee communities (POST, 2010; POST, 2013). In particular, it aimed to determine whether investment in the pollinator conservation interventions of the UK agri-environment schemes has a positive impact on the abundance, species richness and diversity of cavity nesting solitary bee communities on farmland. Cavity nesting solitary wasps were also recorded and analyzed; in addition to providing important bio-control services within agro-ecosystems, many feed on nectar and in the process, may provide pollination

services to plants (O'Neill, 2001). Very little is known about how solitary wasp communities are responding to agri-environment scheme management (Fabian et al., 2013, Wood et al., 2015).

In this study, the abundance, species richness and diversity of cavity nesting solitary bees and wasps was surveyed at 19 farms within Central Southern England. The farms were selected to represent a gradient of increasing investment in the pollinator conservation interventions of the UK agri-environment schemes. They ranged from farms managed under no agri-environment scheme to those showcasing Higher Level agreements with a high level of investment in pollinator conservation interventions. The hypothesis was that if the pollinator conservation interventions of the UK's agri-environment schemes are of benefit to solitary bees and wasps, a significant, positive association between the level of agri-environment management on each farm and the abundance, species richness and/or diversity of solitary bees and wasps would be observed.

Methods

Site Selection

Nineteen farms were selected within a 60-mile radius of Oxford, representing a gradient of investment in agri-environment schemes and pollinator conservation interventions. This ranged from intensive farms under no Environmental Stewardship agreement, with no interventions to benefit insect pollinators, to farms managed under Higher Level Stewardship showcasing pollinator conservation options (see Figure 1).

All farms were mixed arable and pastoral (except three, Pennyhooks, Kilmester and Greystones Farms which were pastoral) and ranged in size from 334842-16259444 m² (Table 1).

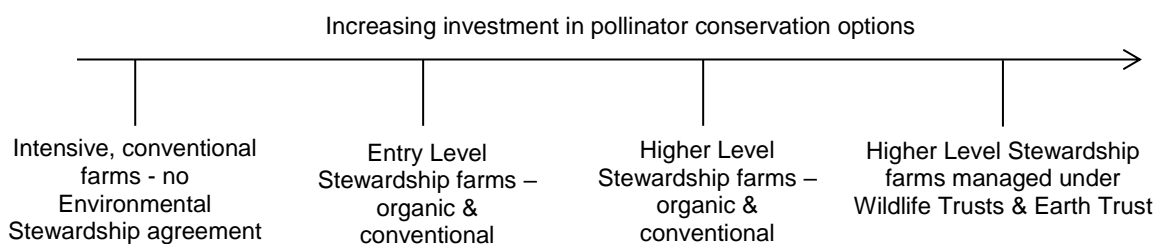


Figure 2 Diagram displaying farm agri-environment management gradient

Table 2 Study farms listed according to their Environmental Stewardship category. The farms are ranked from those under no stewardship scheme to those showcasing Higher Level agreements. Within each stewardship category, organically managed farms are ranked above conventional ones. If there was more than organic or conventional farm within a category, the farms were ranked according to the proportion of natural and semi-natural habitat across each site.

Farm	Location	Environmental Stewardship Level	Farm Size (m ²)
1. Heath Farm	52°10'32"N 1°39'59"W	No Environmental Stewardship agreement	1262404
2. Wincott Farm	52°08'28"N 1°43'50"W	No Environmental Stewardship agreement	782625
3. Whitchurch Farm	52°08'03"N 1°40'37"W	No Environmental Stewardship agreement	1185310
4. Stepstones Farm	52°06'29"N 1°37'42"W	No Environmental Stewardship agreement	636314
5. Bellingdon Farm	51°44'46"N 0°38'51"W	Entry Level Stewardship	383767
6. Middle Farm	51°59'16"N 1°06'52"W	Entry Level Stewardship	1982602
7. Old Farm Dorn	52°00'15"N 1°42'19"W	Entry Level Stewardship	1031550
8. Daylesford	51°55'42"N 1°38'25"W	Organic Entry Level Stewardship	7933978
9. Grange Farm	51°30'23"N 2°19'49"W	Higher Level Stewardship	3094816
10. East Hanney	51°38'06"N 1°23'14"W	Higher Level Stewardship	1897862
11. Marcham	51°39'56"N 1°20'37"W	Higher Level Stewardship	4102809
12. Rotherfield Park	51°19'57"N 0°37'45"W	Higher Level Stewardship	16259444
13. Colleymore Farm	51°38'30"N 1°38'30"W	Organic Higher Level Stewardship	2824027
14. Kilmester Farm	51°40'39"N 1°38'22"W	Organic Higher Level Stewardship	1613061
15. Pennyhooks	51°36'31"N 1°39'36"W	Organic Higher Level Stewardship	334842
16. Wytham Farm	51°46'58"N 1°18'57"W	Organic Higher Level Stewardship	4246974
17. Earth Trust	51°37'50"N 1°11'21"W	Higher Level Stewardship, Earth Trust Management	5039674
18. Greystones	51°53'08"N 1°45'05"W	Organic Higher Level Stewardship Gloucester Wildlife Trust, SSSI	666743
19. Lower Smite	52°13'40"N 2°09'27"W	Higher Level Stewardship Worcester Wildlife Trust, SSSI	623146

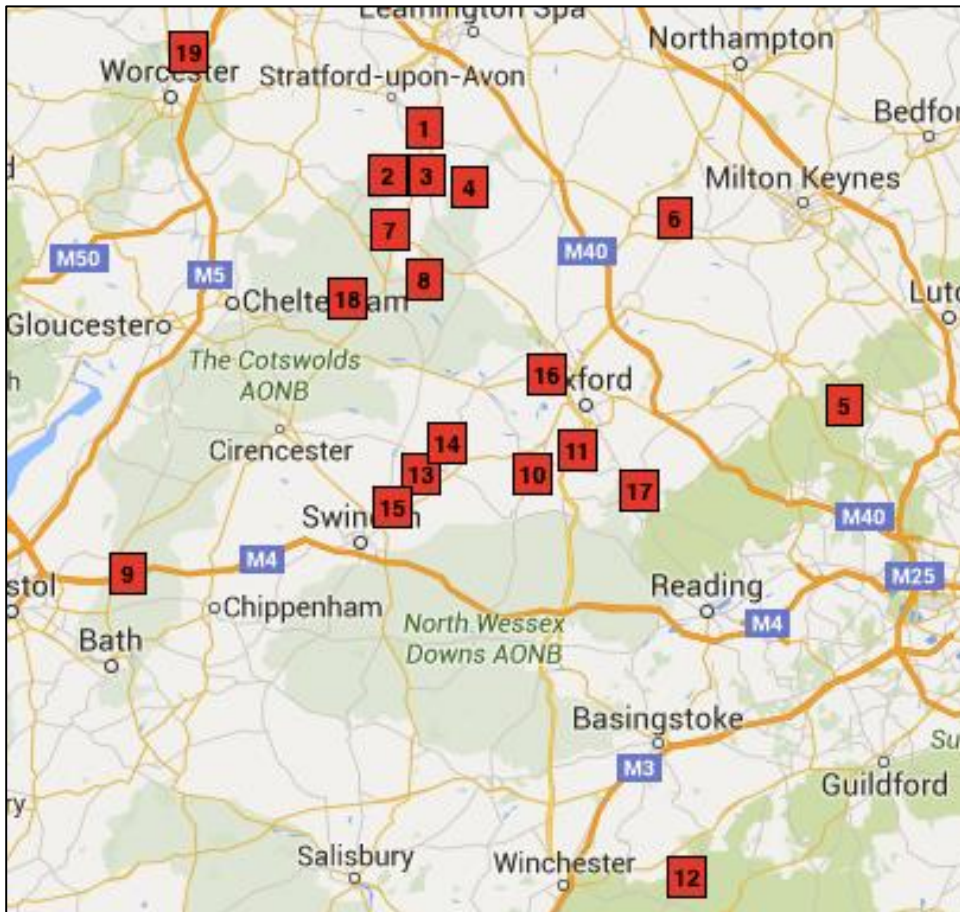


Figure 3 Map displaying distribution of farms, labelled according to numbering in Table 1

Solitary bee nest boxes

Fifteen solitary bee nest boxes were placed on each of the 19 farms from February-March 2014, constituting 285 nests in total. The nest boxes used in the study were constructed based on designs demonstrated to be occupied by cavity nesting solitary bees (Tylianakis et al., 2007; Williams & Kremen, 2007; Fabian et al., 2013; Steckel et al., 2014). Each consisted of a 20 cm long plastic cylinder, of diameter 10cm, filled with hollow, untreated sections of bamboo ranging from 4-12mm in diameter, the size range preferred by most species (Tylianakis et al., 2007; Falk & Lewington, 2015). Each nest was attached perpendicular to a 1.5m vertical wooden stake, with the entrance to the nest box oriented to the south (Figures 3 and 4).



Figure 4 A nest box on Greystones farm



Figure 4 A *Megachile* bee sealing the entrance to its nest

The 15 trap nests were placed approximately equidistant across the whole of each farm (at least 20m apart in all directions), the local criterion being that the nest had to be situated on a south facing field margin as bees prefer nesting sites exposed to direct sunlight (Falk & Lewington, 2015). The nests also had to be placed out of the way of livestock, to prevent them being trampled and situated away from flooded areas (the nests were put in place at a time when Southern England was experiencing severe flooding). The map shown in Figure 5 displays the distribution of nest boxes across the Earth Trust Farm in Little Wittenham, illustrating how the nest boxes were distributed on all farms.

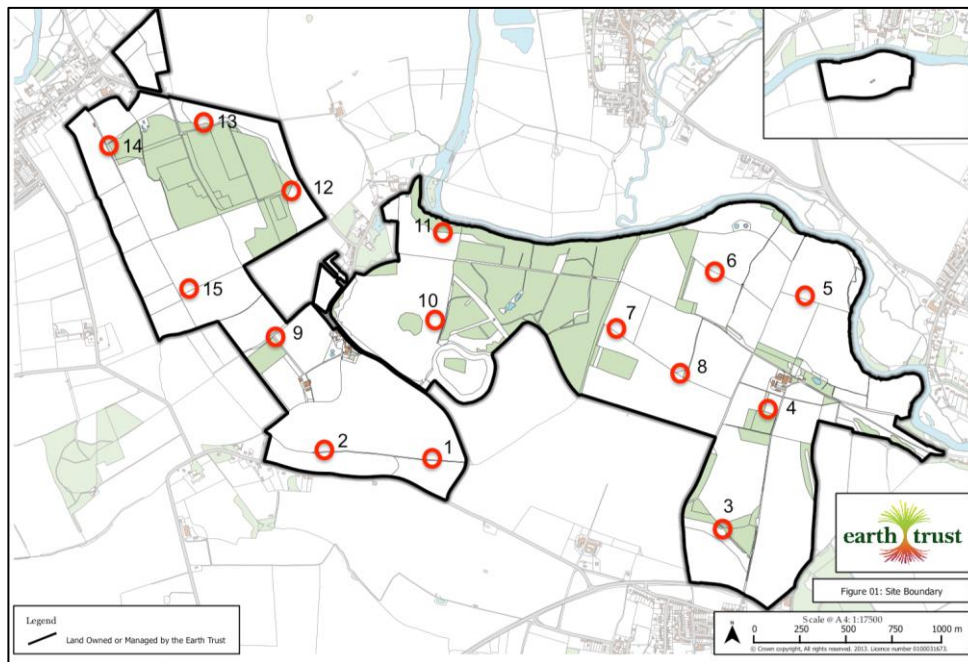


Figure 5 Map displaying the distribution of nest boxes across the Earth Trust farm at Little Wittenham

The nest boxes were installed during February-March 2014 in time for the emergence of the first solitary bee species in early April. Bee activity ceases by the end of September (Falk & Lewington, 2015).

In November 2014, the nests were collected from the farms and the occupied bamboo tubes extracted. The bamboo tubes were opened to record the total number of brood cells. The bamboo tubes were re-sealed and placed in a climatically controlled room at 5°C over winter. In March 2015, the temperature was raised to 20°C to stimulate adult emergence. All solitary bees and wasps emerging from the tubes were identified to species level using the following resources (Yeo & Corbet, 1929; Archer, 2014; Falk & Lewington, 2015) and released into the wild. Parasitoids were collected upon emergence, killed and mounted, and were identified to species or genus level with assistance from entomology specialists at the University of Oxford, University of Edinburgh and Natural History Museum, London. All brood cells from which no individual emerged successfully were dissected in September 2015 and the bees,

wasps and parasitoids within identified as far as possible given their stage of development.

The following response variables were quantified for each nest box, on each farm:

1. The total number of brood cells
2. Solitary bee and wasp abundance, species richness and diversity
3. Parasitoid species richness and parasitism rate.

Parasitism rate was defined as the fraction of all brood cells that were parasitized, as oppose to the fraction of successfully emerging cells that produced parasitoids. This definition of parasitism rate has been used in similar studies on trap nesting Hymenopteran communities on European farmland (Holzschuh et al., 2010; Fabian et al., 2013; Pereira-Peixoto et al., 2016).

Quantifying local foraging resource abundance

To quantify the abundance of foraging resources present for insect pollinators, floral surveys were conducted three times on each farm (April-May, June-July and August-September). All flowering entomophilous plants within a 15m radius of each nest box were identified to species level. The relative abundance of floral units of each species was recorded on a scale of 1-5, using a version of the DAFOR Scale (1 being Rare and 5 Dominant). Floral units were categorized as a single solitary flower or capitulum (e.g. *Leucanthemum vulgare*), cyme (e.g. *Myosotis arvensis*), raceme (e.g. *Lysimachia vulgaris*), umbel (e.g. *Anthriscus sylvestris*), corymb (e.g. *Jacobeia vulgaris*) or panicle (e.g. *Centranthus ruber*) as appropriate, following (Clapham, Tutin & Moore, 1987; Rose, 2016; Staces, 2010). See (Appendix, Table 5) for a description of the floral unit for each plant species recorded across the farms and a list of all species authorities.

As the nest boxes were strategically placed equidistant and spread evenly across the entirety of each farm, the data, when amalgamated, provides a good assessment of the overall floral-unit abundance and plant species richness at the whole-farm level.

However, nectar and pollen resources provided by floral units varies across plant species (and this variation was not taken into account in the floral surveys). Thus, floral-unit abundance in this study must be treated as an approximate estimate of foraging resource availability.

Quantifying the abundance of natural and semi-natural habitat for pollinators

The land-cover classes of the landscape on each study farm was categorized in order to quantify the proportion of natural and semi-natural habitat on each farm. Natural and semi-natural habitat was defined in accordance with agri-environment scheme guidelines (Natural England, 2016) as land falling into the following categories: hedgerows, field margins, buffer strips, wildflower strips, woodland and species rich grassland. Gardens were also included as pollinator habitat as a reflection of the relatively high abundance and diversity of floral foraging resources they may provide (Ahrne et al., 2009).

Farm polygons were drawn in Google Earth, version 7.1.5.1557, following the farm boundaries. In order to account for solitary bee foraging beyond the farm boundaries, radial buffer zones of 600m around each nest box were separately drawn (as this is estimated to be the maximum foraging range of solitary bees (Gathmann & Tschardt, 2002)). The farm polygons were intersected with the set of nest box radial buffers corresponding to that farm using the Spatial Analyst Toolbox in ArcGIS 10.2, in order to create farm zones that included solitary bee foraging range around the nest boxes.

Within each farm zone, landscape categorization was conducted in Google Earth 7.1.5.1557 using the following data sets; the high resolution satellite imagery (sub 1-meter resolution) provided on the Google Earth Platform itself, Environmental Stewardship farm maps, DEFRA's online mapping resource, MAGIC (DEFRA, Magic Map Application) and occasionally ground-truthing. Land cover polygons were digitized in reference to the above data sets in order to create a set of shapefiles for each farm

zone. Zonal summary statistics of coverage of each land cover class were then calculated in ArcGIS 10.2, again using the Spatial Analyst Toolbox, to calculate the proportion of natural and semi-natural habitat within each farm zone.

Results

Nest Box Occupancy

Altogether, 255 solitary bee nest boxes were recovered, containing a total of 3178 brood cells. Thirty nest boxes had been destroyed by a combination of cows, deer and sheep. The loss of these nest boxes has been accounted for in comparisons of the number of brood cells across farms, by taking the average number of brood cells recorded within the remaining nest boxes on each farm and scaling up to 15 nest boxes.

Of the 3178 brood cells, 1110 (34.8%) emerged successfully, producing live bees, wasps or parasitoids. The 2068 remaining brood cells from which no individual emerged successfully were dissected in September 2015 and the bees, wasps and parasitoids within identified as far as possible given their stage of development. The majority of individuals (1,861 of these brood cells) had died at an advanced stage of development and were identifiable to genus or species level. In the few cases (207 brood cells) where the individuals had died at a very early stage of development, it was usually possible to identify the individuals to species or genus level because in most cases, at least one of the brood cells from the same bamboo tube had produced either a live or fully developed individual that could be identified confidently. Bamboo tubes are used typically by just one individual female, so it was assumed that all of the brood cells present within each tube belonged to the same species.

The identification of parasitized brood cells was facilitated by the fact that the majority

of brood cells (2971 out of 3178) produced live or fully developed individuals, including parasitoids, where parasitism had occurred. The casings of these parasitized brood cells were marked by small puncture holes made by the parasitoid. In the few cases (207 brood cells) where the individuals had died at a very early stage of development, these puncture marks were used to help identify incidents of parasitism.

Overall, 69.4% of brood cells, 2204 in total, were solitary bee cells, while the remaining 974 (30.6%) were solitary wasp cells. The total number of brood cells ranged from 0-534 across the farms. For bees, this ranged from 0-413 cells and for wasps 0-146 cells (Figure 6).

Solitary Bee and Wasp Species Richness and Diversity

Ten species of solitary bee and wasp were identified upon adult emergence; this is a conservative estimate as 1175 of the individuals that died before emergence could be identified only to genus level. There were five species of bee: *Osmia bicornis* (Linnaeus, 1758), *Osmia caerulea* (Linnaeus, 1758), *Megachile versicolor* Smith, F., 1844, *Megachile ligniseca* (Kirby, 1802) and *Hylaeus confusus* Nylander, 1852. Four species of solitary wasp: *Ancistrocerus trifasciatus* (Muller, 1776), *Symmorphus crassicornis* (Panzer 1798), *Symmorphus gracilis* (Brullé, 1832) and *Trypoxylon attenuatum* Smith, 1851. The species richness of solitary bees and wasps, at the farm level, ranged from 0-7 species. The species diversity of solitary bees and wasps (calculated using Simpson's Index of Diversity) ranged from 0.426-0.794 across farms (see Figure 6). For the calculation of species diversity, it was assumed that the individuals that could be identified only to Genus level belonged to the species of that genus known to be present on that farm. Where multiple species of that genera were present on the farm, individuals were assigned to the species in proportion to the relative abundance of individuals known to belong to each species. No prior surveys of cavity nesting solitary bees and wasps had been conducted across these study

farms, or more generally across the counties in which the farms were situated, so there are no species records to compare with the species assemblage captured in this study. See (Supplementary Information, Tables 2 and 3) for solitary bee and wasp community composition data for each farm and (Supplementary Information, Table 7) for a summary of total brood cell number, species richness and diversity across farms. See Table 1 in the Appendix for the raw solitary bee, wasp and parasitoid emergence data across all occupied bamboo shoots, from all nest boxes, across all farms.

Parasitism

There was a parasitism rate of 0.061 across all brood cells of all species on all farms, ranging from 0-0.141 for individual farms.

The following parasitoid species were recorded; *Pteromalidus apum* Retzius, 1783, *Ephialtes manifestator* (Linnaeus, 1758), *Melittobia acasta* Walker, 1839, *Sapyga quinquepunctata* (Fabricius, 1781), *Gasteruption jaculator* (Linnaeus, 1758), *Dibrachys microgastri* (Bouche, 1834) and *Amobia signata* (Meigen, 1824). In addition, 26 specimens were identified to genus level, as *Chrysis* spp. (*Chrysis* individuals are extremely hard to identify to species level) and gregarious parasitoid specimens from three brood cells to superfamily level (Chalcidoidea).

The species richness of parasitoids ranged from 0-4 across farms. This is a conservative estimate, as it assumes, for the 26 *Chrysis* individuals only identifiable to genus level and the few Chalcidoidea specimens that all individuals from each farm belonged to the same species. See Figure 7 and for raw parasitoid emergence data across all bamboo shoots, from all nest boxes on all farms, Table 1 in the Appendix.

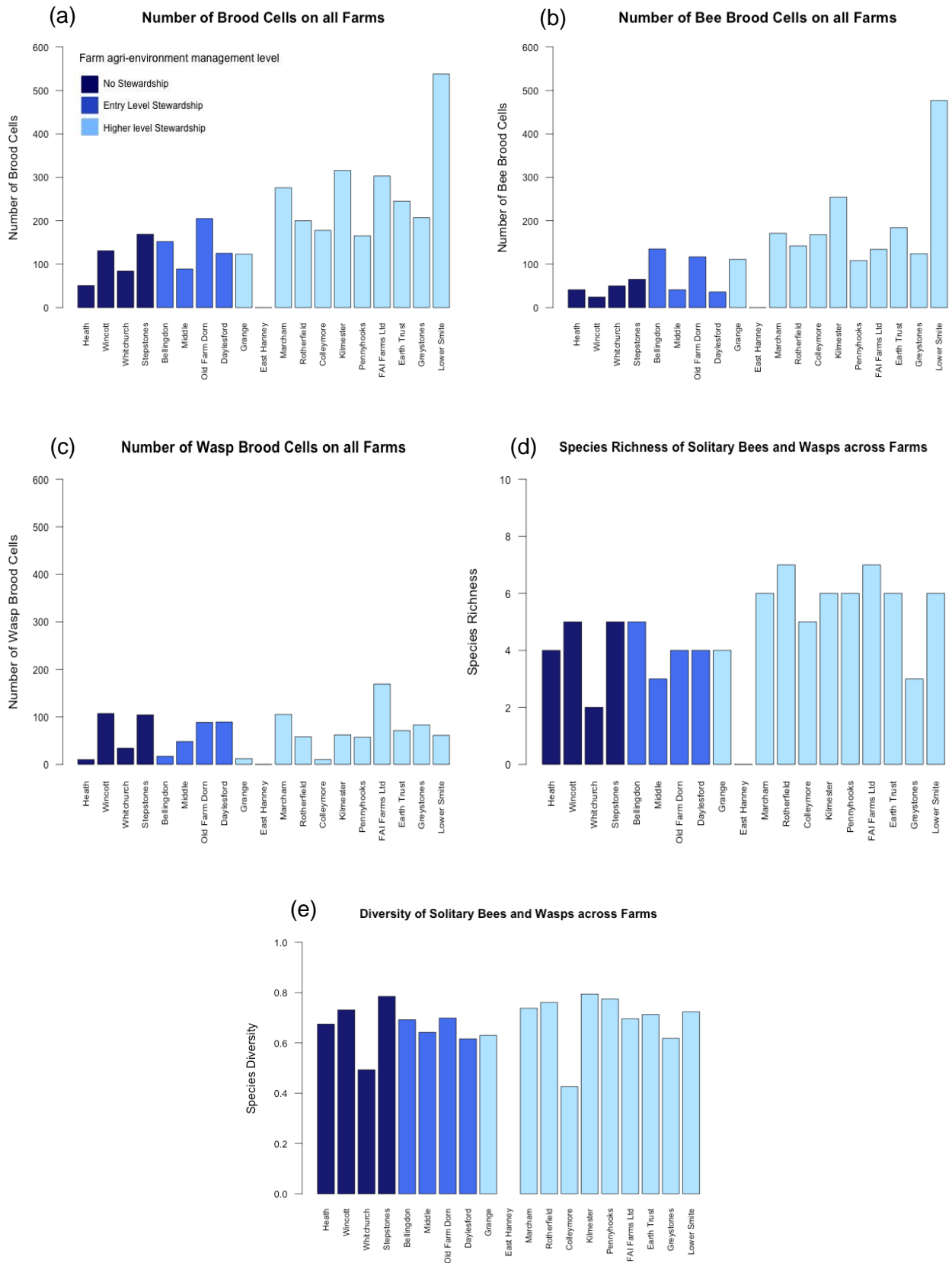


Figure 6 Bar Charts displaying (a) the number of bee & wasp brood cells (b) the number of bee cells (c) the number of wasp cells (d) the species richness of bees and wasps and (e) the species diversity of bees and wasps, across all study farms. The farms are ordered according to their level of Environmental Stewardship agreement in the order specified in Table 1

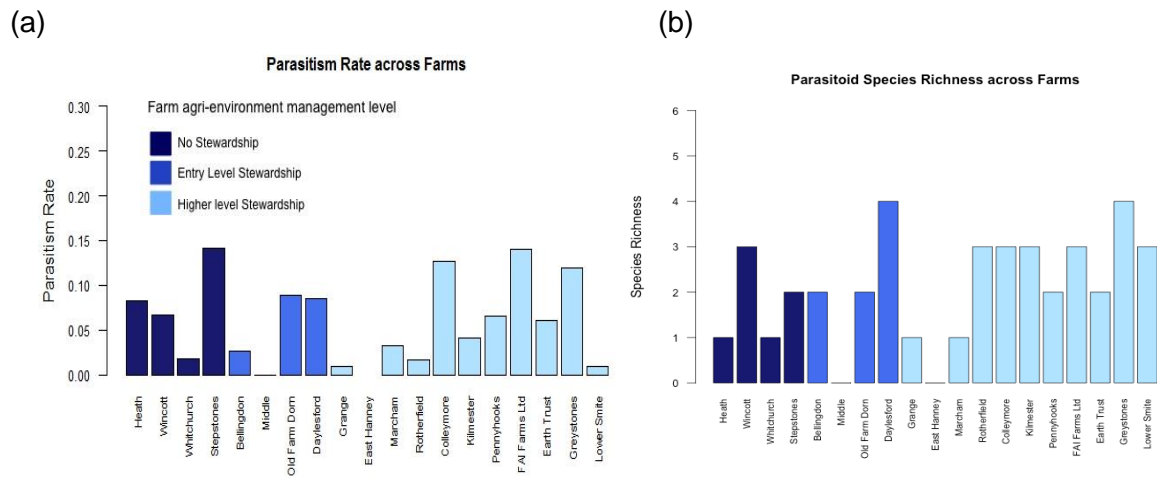


Figure 7 Bar charts displaying (a) the parasitism rate and (b) species richness of parasitoids across all study farms. The farms are ordered according to their level of Environmental Stewardship category in the order specified in Table 1

Natural and semi-natural habitat for pollinators

The proportion of natural and semi-natural habitat for pollinators ranged from 0.081-0.359 across the sites (see Figure 8 and Supplementary Information, Table 7). A spearman's rank correlation was run in R 2.14.0 (R Team, 2013) in order to assess the relationship between the Environmental Stewardship management level of each farm and the proportion of natural and semi-natural habitat across each site. A spearman's correlation was selected in place of a regression or a conventional parametric correlation due to the small number of farms within each Environmental Stewardship level category (only 4 farms for the no Stewardship and Entry Level Stewardship categories). The farms were ranked according to the level of Environmental Stewardship agreement in the order specified in Table 1, from farms under no stewardship scheme to those showcasing Higher Level agreements, with organically managed farms ranked above the conventional ones within each level of stewardship category. If there was more than organic or conventional farm in each category, the farms were ranked according to the proportion of natural and semi-natural habitat across each site.

There was a significant positive correlation between the level of farm Environmental Stewardship agreement and the proportion of natural and semi-natural habitat across sites (Spearman's Correlation, $r_s(17)=0.547$, $p\text{-value}=0.017$).

To ascertain that this correlation was identified not simply as a consequence of the farms within each Environmental Stewardship category being ranked according to the proportion of natural and semi-natural habitat across each site in some cases, the analysis was re-run using a different rank order within these sub-categories. A significant correlation between Environmental Stewardship level and the proportion of natural and semi-natural habitat across sites was still identified (Spearman's Correlation, $r_s(17)=0.481$, $p\text{-value}=0.039$).

Pollinator foraging resource availability

Plant species richness across the sites ranged from 27-67 species (Figure 8 and Supplementary Information, Table 7). See (Supplementary Information, Tables 4 & 5) for plant community data across farms and Table 2 in the Appendix for raw plant community data at the level of the nest box. A spearman's correlation was conducted in R 2.14.0 (R Team, 2013) to examine the relationship between the Environmental Stewardship management level of each farm, species richness and floral-unit abundance across sites. The farms were again ranked according to the level of Environmental Stewardship agreement in the order specified in Table 1. There was a significant positive correlation between the level of farm Environmental Stewardship agreement and the abundance of floral units (Spearman's Correlation, $r_s(17)=0.546$, $p\text{-value}=0.017$). There was also a positive correlation between the level of farm Environmental Stewardship agreement and plant species richness (Spearman's Correlation, $r_s=0.603$, $p\text{-value}=0.006$).

Plant species richness correlated strongly and significantly with the abundance of floral units across farms (Pearson product-moment correlation, $r(17)=0.803$, p -

value= <0.001) (Figure 8). Therefore, for the statistical analysis, the abundance of floral units was utilized as the sole indicator of bee foraging resource availability across farms.

Floral unit abundance also correlated significantly with the proportion of natural and semi-natural habitat for pollinators on each farm (Pearson product-moment correlation, $r(17)=0.611$, $p\text{-value}=0.005$) (Figure 8).

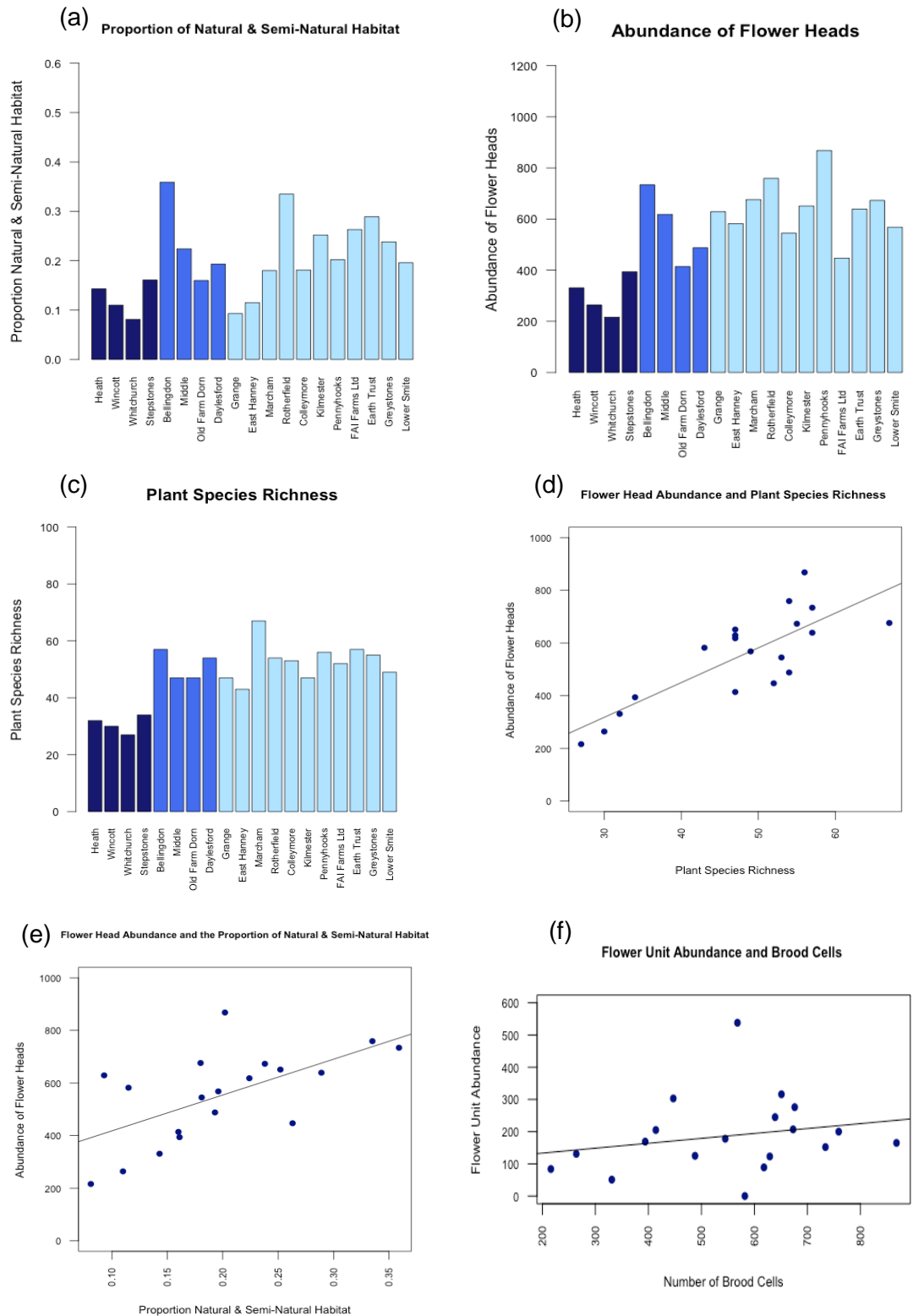


Figure 8 From left to right, top to bottom. Bar charts displaying (a) the proportion of natural & semi-natural habitat, (b) floral abundance and (c) species richness across farms. Scatter plots displaying the relationship between (d) floral abundance and floral species richness and (e) floral abundance and the proportion of natural & semi-natural habitat across farms. (f) floral unit abundance and the number of brood cells across farms. Farms are ordered according to Environmental Stewardship Level, in the order specified in Table 1

Effect of natural habitat and forage resource availability on solitary bee and wasp abundance, species richness and diversity

Generalized linear models were constructed in R 2.14.0 (R Team, 2013) to investigate the effect of the following explanatory variables on the abundance, species richness and diversity of solitary bees and wasps across the study farms:

- I. Floral-unit abundance
- II. Proportion of natural habitat
- III. Pesticide use (whether the farm was organically or conventionally managed)
- IV. Farm area

Farm area was included as a random factor within the analyses as the farms varied substantially in size and as a result, in the spacing between nest boxes. This could potentially have meant that larger farms, with more dispersed nest boxes, might have higher levels of colonization per nest box due to a reduced level of overlap in bee foraging zones between nest boxes. None of the response and explanatory variables included within these models required transformation (ascertained using the Shapiro-Wilk test), except for solitary bee and wasp species diversity which was arcsine transformed to ensure normality of errors.

A Gaussian error structure was selected for all of the models. Although Poisson or Quasi-Poisson error structures are generally preferred for count data, the Gaussian error structure was a much better fit for the data, producing superior validation plots. Full models, including all explanatory variables (but no interactions) were constructed in the first instance and then simplified following the method outlined by (Crawley, 2005), using the Akaike information criterion, to identify the minimum adequate models. The Akaike information criterion was calculated in R 2.14.0 using the MASS add on package (Venables & Ripley, 2002). Examination of the model validation plots indicated that, in each case, the model assumptions were met. See (Supplementary

Information, Table 7) for the raw data input into the model.

Solitary bee and wasp abundance

Lower Smite farm, which had 70% more solitary bee and wasp brood cells than the farm with the second highest number of cells, was omitted from this model as it appeared as an extreme outlier on the Residuals-Leverage plot and Normal Q-Q plot.

The best-fitting model included the proportion of natural and semi-natural habitat and pesticide use as the sole explanatory variables. The proportion of natural habitat was positively associated with solitary bee and wasp abundance (GLM, $F(1,16)=5.948$, $p\text{-value}=0.0268$; Figure 9). Pesticide use had no significant effect on abundance (GLM, $F(1,15)=4.155$, $p\text{-value}=0.0596$). For further model detail, including AIC scores, see Supplementary Information, Table 6. The raw data input for the model is also provided in the Supplementary Information (Table 7).

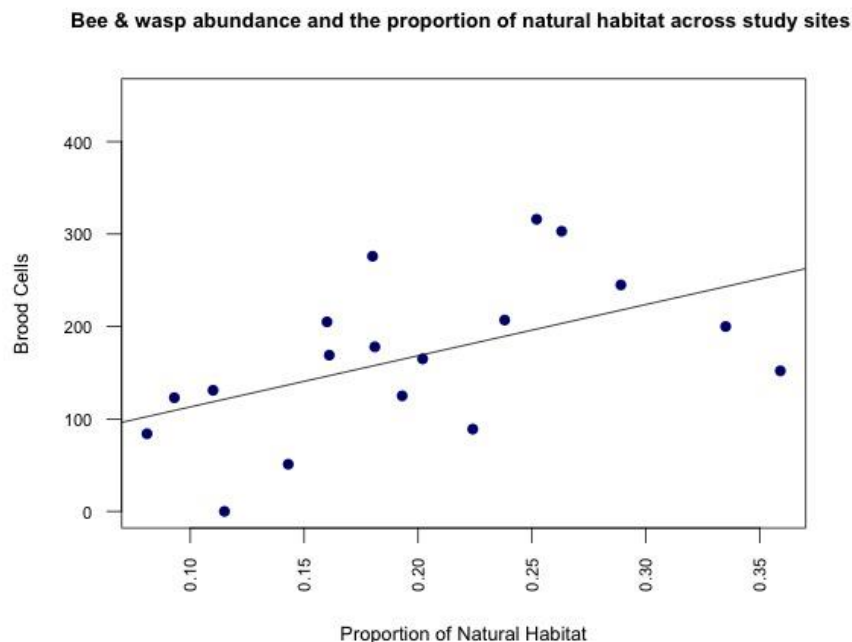


Figure 9 Scatter plot displaying the relationship between the total number of solitary bee and wasp brood cells and the proportion of natural and semi-natural habitat across study sites (Lower Smite farm is excluded as an extreme outlier).

If Lower Smite farm was included within the analysis, the proportion of natural habitat

across study sites was non-significant (GLM, $F(1,17)=2.477$, $p\text{-value}=0.134$).

Solitary bee and wasp species richness

The best-fit model included the proportion of natural and semi-natural habitat as the sole explanatory variable. The proportion of natural habitat had a positive effect on solitary bee and wasp species richness (GLM, $F(1,17)=7.621$, $p\text{-value}=0.0134$; Figure 11). See Supplementary Information, Table 6.

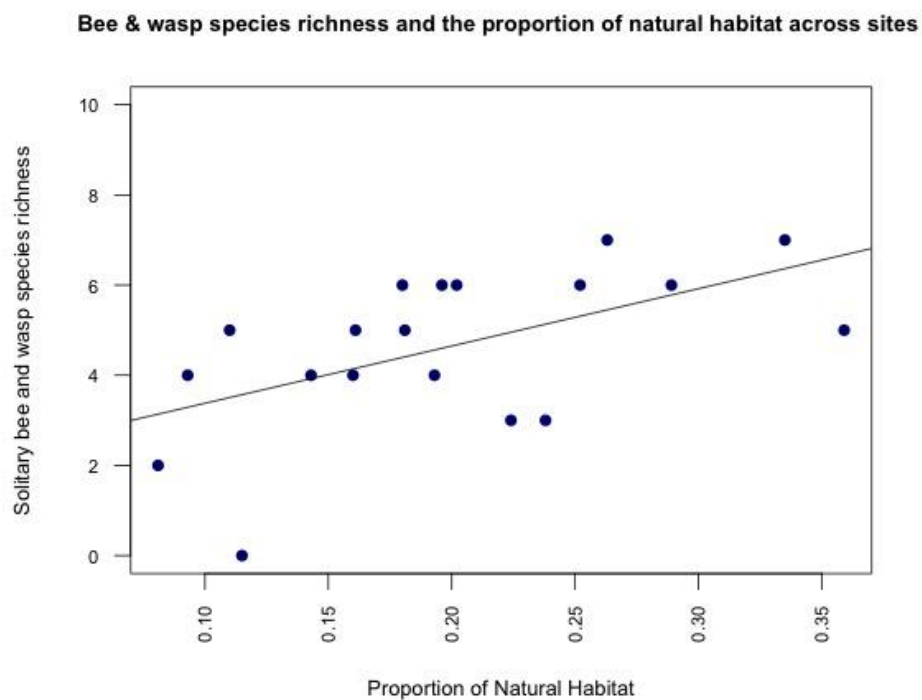


Figure 11 Scatter plot displaying the relationship between solitary bee and wasp species richness and the proportion of natural and semi-natural habitat across study sites

Solitary bee and wasp species diversity

None of the explanatory variables had a significant effect on solitary bee and wasp species diversity. See Supplementary Information, Table 6 for model detail.

Parasitism

General linear models were also constructed to investigate the effect of the following explanatory variables on the species richness of parasitoids and parasitism rate across farms:

- I. Floral-unit abundance
- II. Proportion of natural habitat
- III. Pesticide Use
- IV. Farm Area
- V. Number of host brood cells
- VI. Host species richness

A Gaussian error structure was selected for both models, producing the best validation plots. Full models, including all explanatory variables (but no interactions) were constructed in the first instance and then simplified following the method outlined by (Crawley, 2005) to identify the minimum adequate models. Examination of the model validation plots indicated that, in both cases, the data met the model assumptions.

Parasitoid species richness

None of the explanatory variables had a significant effect on parasitoid species richness (critical p-value set at 0.05). For full model results, see Supplementary Information, Table 6.

Parasitism rate

The best-fit model included floral unit abundance and pesticide use as the sole explanatory variables. Pesticide use had a positive effect on parasitism rate (GLM, $F(1,15)= 4.544$, $p\text{-value}=0.05$; Figure 11) whilst floral unit abundance had no significant effect (GLM, $F(1,16)= 1.736$, $p\text{-value}=0.134$). For full model results, see Supplementary Information, Table 6.

Discussion

The UK agri-environment schemes intend to support wild insect pollinators on farmland through the provision of natural and semi-natural habitat, floral foraging resources and nesting sites (DEFRA, 2014). The availability of these resources is believed to play an important role in supporting bee communities (Potts et al., 2005; Holzschuh et al., 2010). Across the farms included within this study, a positive correlation was identified between the level of farm agri-environment agreement and the proportion of natural and semi-natural habitat, floral-unit abundance and plant species richness. This indicates that on these farms, agri-environment management has been effective in enhancing the availability natural habitat and foraging resources.

A positive relationship was found between the proportion of natural and semi-natural habitat across sites and the abundance and species richness of cavity nesting solitary bees and wasps. This indicates that the natural and semi-natural habitat types promoted by the UK agri-environment schemes, such as hedgerows and species rich grassland, are effective in supporting the requirements of cavity nesting solitary bees and wasps, or at least the species recorded in this study.

An increasing number of studies have examined the effect of natural habitat provision, through agri-environment management, on the abundance and species richness of wild insect pollinators (Kleijn & Sutherland, 2003; Ricketts et al., 2008; Scheper et al., 2013). Hedgerows, uncultivated field margins and species rich grassland are believed to provide a benefit for macro and micro-moth communities (Fuentes-Montemayor et al., 2011; Merckx et al., 2012). The importance of flower rich grasslands and field margins for bumblebees (Pywell et al., 2005; Carvell et al., 2007; Lye et al., 2009) and butterflies (Öckinger & Smith, 2007) has also been demonstrated. Before this work, few studies had examined the impact of natural and semi-natural habitat provision, through agri-environment management, on solitary bee abundance and species

richness specifically within European agricultural landscapes (Holzschuh et al., 2010; Fabian et al., 2013; Steckel et al., 2014; Wood et al., 2015). One study conducted in Switzerland identified a positive relationship between landscape heterogeneity and the proportion of forest cover on the abundance and species richness of farmland cavity nesting solitary bees and wasps (Fabian et al., 2013). A significant relationship between landscape complexity, measured as the proportion of natural habitat, and cavity nesting solitary bee and wasp species richness was identified by a study conducted within an agricultural landscape in Germany (Steckel et al., 2014). However, the results presented here are the first to demonstrate quantitatively a positive relationship between the provision of natural habitat, through agri-environment management, and the abundance and species richness of farmland cavity nesting solitary bee and wasps within the UK. This reinforces the importance of natural habitat provision within the UK agri-environment schemes for the conservation of wild insect pollinators.

Floral-unit abundance and plant species richness had no significant effect on the abundance, species richness or diversity of cavity nesting solitary bees and wasps across farms. The absence of a significant effect could be because the bees and wasps recorded in this study are selective foragers; it is the availability of their forage species of preference that is important, rather than the overall diversity or availability of floral-units. Chapter 4 of the thesis identifies, through next generation sequencing of brood cell pollen samples, which plants the bees surveyed within this study chose to collect pollen from. Interestingly, only 13% of the plant species recorded across the farms were represented in these pollen samples, and they constituted just 33% of total floral-unit abundance. The majority of entomophilous plants recorded on the farms and therefore represented in the farm level floral-unit abundance and species richness metrics were not used by the bees. This may explain why no significant affect of floral-unit abundance or plant richness on bee abundance, species richness or diversity was

identified. The results presented in Chapter 4 identify that few of the forage species of preference for the solitary bees surveyed in this study are promoted currently by the UK agri-environment schemes. Although a positive relationship was identified between farm agri-environment management level and floral-unit abundance and plant richness; this will not necessarily translate into a benefit for solitary bees if their specific forage plants are not promoted.

In summary, although there was a positive correlation between the proportion of natural and semi-natural habitat and floral-unit abundance across farms, whilst the availability of natural habitat had a positive effect on bee and wasp abundance and species richness, the abundance of floral-units and plant species richness had no significant effect. This indicates that the availability of natural habitat had a positive influence on bee and wasp communities through the provision of nesting resources and shelter, rather than foraging resources. Chapter 5 of the thesis examines this further and investigates, by means of controlled manipulation of nest box density, the relative importance of nesting site availability versus foraging resources in influencing the local abundance of cavity nesting solitary bees on farmland.

Among the selection of farms included in this study was Lower Smite Farm, a small Higher Level Stewardship farm managed by the Worcester Wildlife Trust and also a Site of Special Scientific Interest. This farm had a significantly higher abundance of solitary bees and wasps than any of the other farms included in this study: 538 brood cells compared to a mean of 182 cells across all farms. The farm with the second highest number of bees and wasps had 316 brood cells for comparison, so Lower Smite was a significant outlier, so much so that it had to be omitted from the generalized linear model for solitary bee and wasp abundance.

The proportion of natural and semi-natural habitat and the abundance of foraging resources recorded on Lower Smite were not significantly higher than at other Higher

Level Stewardship farms, so these two factors cannot explain the unusually high abundance of bees and wasps recorded. However, Worcester Wildlife Trust has placed particular emphasis on wild pollinator conservation and implements interventions tailored specifically to support different taxa, including cavity-nesting solitary bees. For example, channels have been drilled into wooden fences across the farm to provide nesting sites for cavity nesting solitary bees. In addition, foraging resources are maintained throughout the bee flight season through strategic planting and by deliberately delaying the cutting of flower rich field margins. On most farms within the UK, flower rich field margins are cut at the beginning of August, coinciding with harvest. For all of the other farms included within this study, this dramatically reduced the availability of foraging resources from August onwards, which may have negatively affected nest box colonization. The *Megachile* species recorded in this study (*Megachile versicolor*, *M. ligniseca* and *M. centuncularis*) all have flight seasons extending to early September (Falk & Lewington, 2015). 234 out of the 538 brood cells obtained from the nest boxes on Lower Smite were *M. versicolor* or *M. ligniseca*. It is possible that the abundance of these two *Megachile* species on Lower Smite may have been promoted by the protection of foraging resources in the later part of the bee flight the season through delayed cutting.

The much higher abundance of bees and wasps recorded at Lower Smite suggests that the additional pollinator conservation strategies implemented there could have benefit solitary bee and wasp populations. The design of this study did not allow specific examination of the relative impact of these additional interventions but this could represent an opportunity for further research. If demonstrated to be effective in augmenting solitary bee populations and able to be reasonably implemented by farmers, these additional interventions could be candidates for inclusion in the Wild Pollinator and Farm Wildlife Package of the Countryside Stewardship Scheme.

There was no significant effect of pesticide use on the abundance, species richness or

diversity of solitary bees and wasps across study farms. The sample size and thus statistical power for this analysis was low; only six of the nineteen study farms were managed organically. An additional caveat was that on the organic farms, the bees that occupied the nest boxes will most likely have been exposed to pesticides while foraging. This is because the organic farms included in this study were all bordered by conventional ones, lying well within the 600m foraging range of solitary bees (Gathmann & Tschardt, 2002). It proved difficult, due to farmer confidentiality constraints, to collect more specific data on pesticide use across the study sites, which might have allowed a more accurate estimation of pesticide exposure. As a consequence, this analysis cannot provide a robust evaluation of the effect of pesticide exposure in influencing the abundance, species richness or diversity of cavity nesting solitary bees and wasps.

Finally, switching focus to parasitism, previous studies that have examined parasitism within cavity nesting solitary bee and wasp communities on European farmland have often identified host dynamics; specifically bee and wasp abundance and species richness; as important in influencing parasitism rate and parasitoid species richness (Holzschuh et al., 2010; Steckel et al., 2014; Pereira-Peixoto et al., 2016). One of these studies identified a positive association between landscape heterogeneity and parasitism rate (Steckel et al., 2014) and another between parasitoid species richness and the availability of natural and semi-natural habitat (Steffan-Dewenter, 2002). In contrast, this study identified no significant effect of host abundance or species richness on parasitism rate or parasitoid species richness. In addition the landscape metrics analysed in this study; the proportion of natural and semi-natural habitat, floral-unit abundance and plant species richness, had no significant effect on either variable. Chapter 3 of the thesis examines the incidents of parasitism recorded in this study more closely and compares parasitism network structure across farms, in specific relation to these landscape metrics.

Conclusion

To conclude, this study identified a strong positive association between the proportion of natural and semi-natural habitat and solitary bee and wasp abundance and species richness across study farms. This result provides the first evidence that the natural habitat types promoted by the UK agri-environment schemes are effective in supporting solitary bee communities, likely through the provision of nesting resources and shelter, as oppose to foraging resources; Chapter 5 will examine this more closely. No significant effect of farm level floral-unit abundance and plant species richness on solitary bee abundance and species richness was identified. However, the majority of plants present on the study farms were not forage species of preference for the bees surveyed; the availability of preferred, rather than general foraging resources is more likely to limit bee abundance and species richness. Agri-environment management, although effective in augmenting the abundance of floral-units and plant richness at the farm level, needs to support the forage requirements of solitary bees and other wild pollinators more effectively. Chapter 4 of the thesis addresses this issue further and presents recommendations for plant species that could be included in the agri-environment scheme wildflower seed mixtures, to ensure the foraging requirements of solitary bees are supported.

Works Cited

Ahrne, K., Bengtsson, J. and Elmqvist, T., 2009. Bumble bees (*Bombus* spp.) along a gradient of increasing urbanization. *PLoS One*, 4(5), p.e5574.

Ashman, T.L., Knight, T.M., Steets, J.A., Amarasekare, P., Burd, M., Campbell, D.R., Dudash, M.R., Johnston, M.O., Mazer, S.J., Mitchell, R.J. and Morgan, M.T., 2004. Pollen limitation of plant reproduction: ecological and evolutionary causes and consequences. *Ecology*, 85(9), pp.2408-2421.

Archer, M.E., 2014. The vespoid wasps (Tiphiidae, Mutillidae, Sapygidae, Scoliidae and Vespidae) of the British Isles. Royal Entomological Society.

Barbosa A.M., Brown J.A., Jimenez-Valverde A., Real R., 2016. *Model Evaluation and Analysis: Package 'modEvA'*. <http://modeva.r-forge.r-project.org/>

Benton, T.G., Bryant, D.M., Cole, L. and Crick, H.Q., 2002. Linking agricultural practice to insect and bird populations: a historical study over three decades. *Journal of Applied Ecology*, 39(4), pp.673-687.

Biesmeijer, J.C., Roberts, S.P.M., Reemer, M., Ohlemüller, R., Edwards, M., Peeters, T., Schaffers, A.P., Potts, S.G., Kleukers, R., Thomas, C.D. and Settele, J., 2006. Parallel declines in pollinators and insect-pollinated plants in Britain and the Netherlands. *Science*, 313(5785), pp.351-354.

Bohart, G.E., 1972. Management of wild bees for the pollination of crops. *Annual review of entomology*, 17(1), pp.287-312.

Bosch, J. and Kemp, W.P., 2002. Developing and establishing bee species as crop pollinators: the example of *Osmia* spp. (Hymenoptera: Megachilidae) and fruit trees. *Bulletin of entomological research*, 92(01), pp.3-16.

Breeze, T.D., Bailey, A.P., Balcombe, K.G. and Potts, S.G., 2011. Pollination services in the UK: How important are honeybees?. *Agriculture, Ecosystems & Environment*, 142(3), pp.137-143.

Carvell, C., Meek, W.R., Pywell, R.F. and Nowakowski, M., 2004. The response of foraging bumblebees to successional change in newly created arable field margins. *Biological Conservation*, 118(3), pp.327-339.

Carvell, C., Meek, W.R., Pywell, R.F., Goulson, D. and Nowakowski, M., 2007. Comparing the efficacy of agri-environment schemes to enhance bumble bee abundance and diversity on arable field margins. *Journal of Applied Ecology*, 44(1), pp.29-40.

Clapham, A.R., Tutin, T.G. and Moore, D.M., 1990. *Flora of the British Isles*. CUP Archive.

Crawley, M. J., 2005. *Statistics, An Introduction Using R*. Chichester: John Wiley & Sons, Ltd.

DEFRA, 2014. *The National pollinator Strategy for bees and other pollinators in England*. [Online] Available at:

https://www.gov.uk/government/uploads/attachment_data/file/409431/pb14221-national-pollinators-strategy.pdf [Accessed 18th April 2016].

DEFRA, 2015. Agriculture in the United Kingdom 2014. *Publications - GOV.UK* www.gov.uk.

DEFRA, *Magic Map Application*. [Online] Available at: www.magic.defra.gov.org [Accessed August 2015].

Delaplane, K.S., Mayer, D.R. and Mayer, D.F., 2000. *Crop pollination by bees*. Cabi.

Dicks, L.V., Showler, D.A. and Sutherland, W.J., 2010. *Bee conservation: evidence for the effects of interventions* (Vol. 1). Pelagic Publishing.

Dicks, L.V., Baude, M., Roberts, S.P., Phillips, J., Green, M. and Carvell, C., 2015. How much flower-rich habitat is enough for wild pollinators? Answering a key policy question with incomplete knowledge. *Ecological entomology*, 40(S1), pp.22-35.

Edwards, M., 2003. Aculeate conservation group annual report. *Unpublished report for the UK BAP bumblebee working group, Midhurst, UK*.

Fabian, Y., Sandau, N., Bruggisser, O.T., Aebi, A., Kehrl, P., Rohr, R.P., Naisbit, R.E. and Bersier, L.F., 2013. The importance of landscape and spatial structure for hymenopteran-based food webs in an agro-ecosystem. *Journal of Animal Ecology*, 82(6), pp.1203-1214.

Falk, S.J. and Lewington, R., 2015. *Field guide to the bees of Great Britain and Ireland*. British Wildlife Publishing Lt.

Fuentes-Montemayor, E., Goulson, D. and Park, K.J., 2011. The effectiveness of agri-environment schemes for the conservation of farmland moths: assessing the importance of a landscape-scale management approach. *Journal of Applied Ecology*, 48(3), pp.532-542.

Gallai, N., Salles, J.M., Settele, J. and Vaissière, B.E., 2009. Economic valuation of the vulnerability of world agriculture confronted with pollinator decline. *Ecological economics*, 68(3), pp.810-821.

Garibaldi, L.A., Carvalheiro, L.G., Leonhardt, S.D., Aizen, M.A., Blaauw, B.R., Isaacs, R., Kuhlmann, M., Kleijn, D., Klein, A.M., Kremen, C. and Morandin, L., 2014. From research to action: enhancing crop yield through wild pollinators. *Frontiers in Ecology and the Environment*, 12(8), pp.439-447.

Garratt, M.P.D., Truslove, C.L., Coston, D.J., Evans, R.L., Moss, E.D., Dodson, C., Jenner, N., Biesmeijer, J.C. and Potts, S.G., 2014. Pollination deficits in UK apple orchards. *Journal of Pollination Ecology*, 12(2), pp.9-14.

Gathmann, A. and Tscharrntke, T., 2002. Foraging ranges of solitary bees. *Journal of animal ecology*, 71(5), pp.757-764.

Haaland, C., Naisbit, R.E. and BERSIER, L.F., 2011. Sown wildflower strips for insect conservation: a review. *Insect Conservation and Diversity*, 4(1), pp.60-80.

Holland, J.M., Smith, B.M., Storkey, J., Lutman, P.J. and Aebischer, N.J., 2015.

- Managing habitats on English farmland for insect pollinator conservation. *Biological Conservation*, 182, pp.215-222.
- Holzschuh, A., Steffan-Dewenter, I. and Tscharntke, T., 2010. How do landscape composition and configuration, organic farming and fallow strips affect the diversity of bees, wasps and their parasitoids?. *Journal of Animal Ecology*, 79(2), pp.491-500.
- Howard, D.C., Watkins, J.W., Clarke, R.T., Barnett, C.L. and Stark, G.J., 2003. Estimating the extent and change in broad habitats in Great Britain. *Journal of Environmental Management*, 67(3), pp.219-227.
- Klein, A.M., Steffan-Dewenter, I. and Tscharntke, T., 2003. Fruit set of highland coffee increases with the diversity of pollinating bees. *Proceedings of the Royal Society of London B: Biological Sciences*, 270(1518), pp.955-961.
- Kleijn, D. and Sutherland, W.J., 2003. How effective are European agri-environment schemes in conserving and promoting biodiversity?. *Journal of applied ecology*, 40(6), pp.947-969.
- Klein, A.M., Vaissiere, B.E., Cane, J.H., Steffan-Dewenter, I., Cunningham, S.A., Kremen, C. and Tscharntke, T., 2007. Importance of pollinators in changing landscapes for world crops. *Proceedings of the Royal Society of London B: Biological Sciences*, 274(1608), pp.303-313.
- Krebs, J.R., Wilson, J.D., Bradbury, R.B. and Siriwardena, G.M., 1999. The second silent spring?. *Nature*, 400(6745), pp.611-612.
- Kremen, C., Williams, N.M. and Thorp, R.W., 2002. Crop pollination from native bees at risk from agricultural intensification. *Proceedings of the National Academy of Sciences*, 99(26), pp.16812-16816.
- Lye, G., Park, K., Osborne, J., Holland, J. and Goulson, D., 2009. Assessing the value of Rural Stewardship schemes for providing foraging resources and nesting habitat for bumblebee queens (Hymenoptera: Apidae). *Biological Conservation*, 142(10), pp.2023-2032.
- Merckx, T., Marini, L., Feber, R.E. and Macdonald, D.W., 2012. Hedgerow trees and extended-width field margins enhance macro-moth diversity: implications for management. *Journal of Applied Ecology*, 49(6), pp.1396-1404.
- Natural England, 2016. [Online] *Countryside Stewardship* Available at: <https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-land-management#higher-tier> [Accessed 28 September 2016].
- Öckinger, E. and G Smith, H., 2007. Asymmetric dispersal and survival indicate population sources for grassland butterflies in agricultural landscapes. *Ecography*, 30(2), pp.288-298.
- O'Neill, K.M., 2001. *Solitary wasps: behavior and natural history*. Cornell University Press.
- Parliamentary Office of Science and Technology (POST), 2010. *Insect Pollination* POST-PN-348

Parliamentary Office of Science and Technology (POST), 2013. *Reversing Insect Pollinator Decline* POST-PN-442

Pereira-Peixoto, M.H., Pufal, G., Staab, M., Feitosa Martins, C.E.L.S.O. and Klein, A., 2016. Diversity and specificity of host-natural enemy interactions in an urban-rural interface. *Ecological Entomology*. 41(3), pp.241-252

Petit, S., Firbank, L., Wyatt, B. and Howard, D., 2001. MIRABEL: models for integrated review and assessment of biodiversity in European landscapes. *AMBIO: A Journal of the Human Environment*, 30(2), pp.81-88.

Potts, S.G., Vulliamy, B., Roberts, S., O'Toole, C., Dafni, A., Ne'eman, G. and Willmer, P., 2005. Role of nesting resources in organising diverse bee communities in a Mediterranean landscape. *Ecological Entomology*, 30(1), pp.78-85.

Potts, S.G., Biesmeijer, J.C., Kremen, C., Neumann, P., Schweiger, O. and Kunin, W.E., 2010. Global pollinator declines: trends, impacts and drivers. *Trends in ecology & evolution*, 25(6), pp.345-353.

Pywell, R.F., Warman, E.A., Carvell, C., Sparks, T.H., Dicks, L.V., Bennett, D., Wright, A., Critchley, C.N.R. and Sherwood, A., 2005. Providing foraging resources for bumblebees in intensively farmed landscapes. *Biological conservation*, 121(4), pp.479-494.

Ricketts, T.H., Regetz, J., Steffan-Dewenter, I., Cunningham, S.A., Kremen, C., Bogdanski, A., Gemmill-Herren, B., Greenleaf, S.S., Klein, A.M., Mayfield, M.M. and Morandin, L.A., 2008. Landscape effects on crop pollination services: are there general patterns?. *Ecology letters*, 11(5), pp.499-515.

Rollin, O., Bretagnolle, V., Decourtye, A., Aptel, J., Michel, N., Vaissière, B.E. and Henry, M., 2013. Differences of floral resource use between honey bees and wild bees in an intensive farming system. *Agriculture, Ecosystems & Environment*, 179, pp.78-86.

Rose, F., 2006. *The Wild Flower Key: how to identify wild flowers, trees & shrubs in Britain and Ireland*, Penguin Books Ltd

Rundlöf, M., Nilsson, H. and Smith, H.G., 2008. Interacting effects of farming practice and landscape context on bumble bees. *Biological Conservation*, 141(2), pp.417-426.

Scheper, J., Holzschuh, A., Kuussaari, M., Potts, S.G., Rundlöf, M., Smith, H.G. and Kleijn, D., 2013. Environmental factors driving the effectiveness of European agri-environmental measures in mitigating pollinator loss—a meta-analysis. *Ecology letters*, 16(7), pp.912-920.

Stace, C., 2010. *New flora of the British Isles*. Cambridge University Press.

Steckel, J., Westphal, C., Peters, M.K., Bellach, M., Rothenwoehrer, C., Erasmi, S., Scherber, C., Tschardtke, T. and Steffan-Dewenter, I., 2014. Landscape composition and configuration differently affect trap-nesting bees, wasps and their antagonists. *Biological Conservation*, 172, pp.56-64.

Steffan-Dewenter, I. "Landscape context affects trap-nesting bees, wasps, and their natural enemies." *Ecological Entomology* 27, no. 5 (2002): 631-637.

- R. Team, 2013. R: A language and environment for statistical computing.
- Tilman, D., Fargione, J., Wolff, B., D'Antonio, C., Dobson, A., Howarth, R., Schindler, D., Schlesinger, W.H., Simberloff, D. and Swackhamer, D., 2001. Forecasting agriculturally driven global environmental change. *Science*, 292(5515), pp.281-284.
- Tscharntke, T., Klein, A.M., Kruess, A., Steffan-Dewenter, I. and Thies, C., 2005. Landscape perspectives on agricultural intensification and biodiversity–ecosystem service management. *Ecology letters*, 8(8), pp.857-874.
- Tylianakis, J.M., Tscharntke, T. and Lewis, O.T., 2007. Habitat modification alters the structure of tropical host–parasitoid food webs. *Nature*, 445(7124), pp.202-205.
- Venables, W. N. & Ripley, B. D. (2002) Modern Applied Statistics with S. Fourth Edition. Springer, New York
- Westerkamp, C. and Gottsberger, G., 2000. Diversity pays in crop pollination. *Crop science*, 40(5), pp.1209-1222.
- Williams, N.M. and Kremen, C., 2007. Resource distributions among habitats determine solitary bee offspring production in a mosaic landscape. *Ecological applications*, 17(3), pp.910-921.
- Winfree, R. and Kremen, C., 2009. Are ecosystem services stabilized by differences among species? A test using crop pollination. *Proceedings of the Royal Society of London B: Biological Sciences*, 276(1655), pp.229-237.
- Wood, T.J., Holland, J.M. and Goulson, D., 2015. Pollinator-friendly management does not increase the diversity of farmland bees and wasps. *Biological Conservation*, 187, pp.120-126.
- Wood, T.J., Holland, J.M. and Goulson, D., 2016. Providing foraging resources for solitary bees on farmland: current schemes for pollinators benefit a limited suite of species. *Journal of Applied Ecology*.
- Yeo, P., Corbet, S.A., 1929. Solitary Wasps. The Richmond Pub. Co.

Supplementary Information

Table 2 Solitary bee and wasp community composition on each farm. The table lists the species present on each farm, the number of brood cells of each species and the percentage of the total brood cells for that farm belonging to each species. Individuals that could not be accurately identified to species level (because they had died before emergence) are listed under genera. See Table 1 in the Appendix for raw solitary bee, wasp and parasitism emergence data across all occupied bamboo shoots, across all nest boxes on all farms.

Farm	Solitary Bee/Wasp Species	Number of Brood Cells	% of brood cells
Bellingdon Farm	<i>Hylaeus confusus</i>	6	3.95%
Bellingdon Farm	<i>Megachile ligniseca</i>	11	7.24%
Bellingdon Farm	<i>Megachile versicolor</i>	40	26.32%
Bellingdon Farm	<i>Osmia</i> sp.	78	51.32%
Bellingdon Farm	<i>Symmorphus crassicornis</i>	13	8.55%
Bellingdon Farm	<i>Symmorphus/Ancistrocerus</i> sp.	4	2.63%
	Total	152	100.00%
Colleymore Farm	<i>Megachile</i> sp.	11	7.75%
Colleymore Farm	<i>Megachile versicolor</i>	11	7.75%
Colleymore Farm	<i>Osmia bicornis</i>	3	2.11%
Colleymore Farm	<i>Osmia caerulea</i>	66	46.48%
Colleymore Farm	<i>Osmia</i> sp.	37	26.06%
Colleymore Farm	<i>Symmorphus crassicornis</i>	7	4.93%
Colleymore Farm	<i>Symmorphus gracilis</i>	1	0.70%
Colleymore Farm	<i>Symmorphus/Ancistrocerus</i> sp.	6	4.23%
	Total	142	100.00%
Daylesford	<i>Megachile ligniseca</i>	7	5.98%
Daylesford	<i>Megachile versicolor</i>	27	23.08%
Daylesford	<i>Symmorphus crassicornis</i>	7	5.98%
Daylesford	<i>Symmorphus gracilis</i>	25	21.37%
Daylesford	<i>Symmorphus</i> sp.	37	31.62%
Daylesford	<i>Symmorphus/Ancistrocerus</i> sp.	14	11.97%
	Total	117	100.00%
Earth Trust	<i>Ancistrocerus trifasciatus</i>	12	4.90%
Earth Trust	<i>Megachile ligniseca</i>	6	2.45%
Earth Trust	<i>Megachile</i> sp.	14	5.71%
Earth Trust	<i>Megachile versicolor</i>	85	34.69%
Earth Trust	<i>Osmia caerulea</i>	11	4.49%
Earth Trust	<i>Osmia</i> sp.	68	27.76%
Earth Trust	<i>Symmorphus crassicornis</i>	27	11.02%

Earth Trust	<i>Symmorphus/Ancistrocerus</i> sp.	8	3.27%
Earth Trust	<i>Trypoxylon attenuatum</i>	14	5.71%
	Total	245	100.00%
Grange Farm	<i>Megachile centuncularis</i>	28	26.17%
Grange Farm	<i>Megachile</i> sp.	21	19.63%
Grange Farm	<i>Megachile versicolor</i>	40	37.38%
Grange Farm	<i>Osmia</i> sp.	8	7.48%
Grange Farm	<i>Symmorphus gracilis</i>	10	9.35%
	Total	107	100.00%
Greystones Farm	<i>Megachile</i> sp.	16	8.29%
Greystones Farm	<i>Megachile versicolor</i>	13	6.74%
Greystones Farm	<i>Osmia caerulea</i>	45	23.32%
Greystones Farm	<i>Osmia</i> sp.	76	39.38%
Greystones Farm	<i>Symmorphus crassicornis</i>	42	21.76%
Greystones Farm	<i>Symmorphus/Ancistrocerus</i> sp.	1	0.52%
	Total	193	100.00%
Heath Farm	<i>Megachile</i> sp.	8	16.67%
Heath Farm	<i>Megachile versicolor</i>	9	18.75%
Heath Farm	<i>Osmia caerulea</i>	20	41.67%
Heath Farm	<i>Osmia</i> sp.	1	2.08%
Heath Farm	<i>Symmorphus crassicornis</i>	4	8.33%
Heath Farm	<i>Symmorphus gracilis</i>	6	12.50%
	Total	48	100.00%
Kilmester Farm	<i>Ancistrocerus trifasciatus</i>	7	2.37%
Kilmester Farm	<i>Megachile lignisea</i>	36	12.20%
Kilmester Farm	<i>Megachile</i> sp.	19	6.44%
Kilmester Farm	<i>Megachile versicolor</i>	70	23.73%
Kilmester Farm	<i>Osmia bicornis</i>	11	3.73%
Kilmester Farm	<i>Osmia caerulea</i>	7	2.37%
Kilmester Farm	<i>Osmia</i> sp.	80	27.12%
Kilmester Farm	<i>Symmorphus gracilis</i>	19	6.44%
Kilmester Farm	<i>Symmorphus/Ancistrocerus</i> sp.	46	15.59%
	Total	295	100.00%
Lower Smite Farm	<i>Megachile lignisea</i>	30	6.44%
Lower Smite Farm	<i>Megachile</i> sp.	21	4.51%
Lower Smite Farm	<i>Megachile versicolor</i>	186	39.91%
Lower Smite Farm	<i>Osmia bicornis</i>	19	4.08%
Lower Smite Farm	<i>Osmia caerulea</i>	36	7.73%

Lower Smite Farm	<i>Osmia</i> sp.	131	28.11%
Lower Smite Farm	<i>Symmorphus/Ancistrocerus</i> sp.	7	1.50%
Lower Smite Farm	<i>Trypoxylon attenuatum</i>	36	7.73%
	Total	466	100.00%
Marcham Farm	<i>Ancistrocerus trifasciatus</i>	15	6.28%
Marcham Farm	<i>Megachile ligniseca</i>	3	1.26%
Marcham Farm	<i>Megachile</i> sp.	8	3.35%
Marcham Farm	<i>Megachile versicolor</i>	30	12.55%
Marcham Farm	<i>Osmia bicornis</i>	12	5.02%
Marcham Farm	<i>Osmia</i> sp.	95	39.75%
Marcham Farm	<i>Symmorphus crassicornis</i>	11	4.60%
Marcham Farm	<i>Symmorphus gracilis</i>	42	17.57%
Marcham Farm	<i>Symmorphus/Ancistrocerus</i> sp.	23	9.62%
	Total	239	100.00%
Middle Farm	<i>Ancistrocerus trifasciatus</i>	17	20.48%
Middle Farm	<i>Osmia bicornis</i>	27	32.53%
Middle Farm	<i>Osmia</i> sp.	11	13.25%
Middle Farm	<i>Symmorphus crassicornis</i>	28	33.73%
	Total	83	100.00%
Old Farm Dorn	<i>Ancistrocerus trifasciatus</i>	15	7.85%
Old Farm Dorn	<i>Megachile versicolor</i>	56	29.32%
Old Farm Dorn	<i>Osmia caerulea</i>	15	7.85%
Old Farm Dorn	<i>Osmia</i> sp.	39	20.42%
Old Farm Dorn	<i>Symmorphus crassicornis</i>	36	18.85%
Old Farm Dorn	<i>Symmorphus/Ancistrocerus</i> sp.	30	15.71%
	Total	191	100.00%
Pennyhooks Farm	<i>Ancistrocerus trifasciatus</i>	24	15.58%
Pennyhooks Farm	<i>Megachile ligniseca</i>	27	17.53%
Pennyhooks Farm	<i>Megachile</i> sp.	10	6.49%
Pennyhooks Farm	<i>Megachile versicolor</i>	28	18.18%
Pennyhooks Farm	<i>Osmia</i> sp.	31	20.13%
Pennyhooks Farm	<i>Symmorphus crassicornis</i>	2	1.30%
Pennyhooks Farm	<i>Symmorphus gracilis</i>	20	12.99%
Pennyhooks Farm	<i>Symmorphus/Ancistrocerus</i> sp.	12	7.79%
	Total	154	100.00%
Rotherfield	<i>Ancistrocerus trifasciatus</i>	7	3.74%
Rotherfield	<i>Megachile ligniseca</i>	7	3.74%
Rotherfield	<i>Megachile</i> sp.	12	6.42%

Rotherfield	<i>Megachile versicolor</i>	71	37.97%
Rotherfield	<i>Osmia caerulescens</i>	17	9.09%
Rotherfield	<i>Osmia</i> sp.	26	13.90%
Rotherfield	<i>Symmorphus crassicornis</i>	9	4.81%
Rotherfield	<i>Symmorphus gracilis</i>	16	8.56%
Rotherfield	<i>Symmorphus/Ancistrocerus</i> sp.	9	4.81%
Rotherfield	<i>Trypoxylon attenuatum</i>	10	5.35%
Rotherfield	Unknown solitary wasp (cells destroyed)	3	1.60%
	Total	187	100.00%
Stepstones Farm	<i>Ancistrocerus trifasciatus</i>	20	14.81%
Stepstones Farm	<i>Megachile ligniseca</i>	14	10.37%
Stepstones Farm	<i>Megachile</i> sp.	10	7.41%
Stepstones Farm	<i>Megachile versicolor</i>	31	22.96%
Stepstones Farm	<i>Symmorphus crassicornis</i>	20	14.81%
Stepstones Farm	<i>Symmorphus gracilis</i>	34	25.19%
Stepstones Farm	<i>Symmorphus/Ancistrocerus</i> sp.	6	4.44%
	Total	135	100.00%
Whitchurch Farm	<i>Ancistrocerus trifasciatus</i>	9	16.07%
Whitchurch Farm	<i>Osmia bicornis</i>	26	46.43%
Whitchurch Farm	<i>Osmia</i> sp.	7	12.50%
Whitchurch Farm	<i>Symmorphus/Ancistrocerus</i> sp.	14	25.00%
Whitchurch Farm	Total	56	100.00%
Wincott Farm	<i>Ancistrocerus trifasciatus</i>	16	15.24%
Wincott Farm	<i>Megachile versicolor</i>	18	17.14%
Wincott Farm	<i>Osmia caerulescens</i>	4	3.81%
Wincott Farm	<i>Symmorphus crassicornis</i>	13	12.38%
Wincott Farm	<i>Symmorphus gracilis</i>	11	10.48%
Wincott Farm	<i>Symmorphus/Ancistrocerus</i> sp.	43	40.95%
	Total	105	100.00%
Fai Farms - Wytham	<i>Ancistrocerus trifasciatus</i>	10	3.80%
Fai Farms - Wytham	<i>Megachile ligniseca</i>	19	7.22%
Fai Farms - Wytham	<i>Megachile</i> sp.	10	3.80%
Fai Farms - Wytham	<i>Megachile versicolor</i>	69	26.24%
Fai Farms - Wytham	<i>Osmia bicornis</i>	9	3.42%
Fai Farms - Wytham	<i>Osmia caerulescens</i>	35	13.31%
Fai Farms - Wytham	<i>Osmia</i> sp.	15	5.70%
Fai Farms - Wytham	<i>Symmorphus crassicornis</i>	3	1.14%
Fai Farms - Wytham	<i>Symmorphus gracilis</i>	44	16.73%
Fai Farms - Wytham	<i>Symmorphus/Ancistrocerus</i> sp.	49	18.63%

	Total	263	100.00%
	Grand Total	3178	

Table 3 Bee and wasp community composition across all farms. The table lists the percentage of all brood cells collected from all farms belonging to each species. *Osmia* spp. and *Symmorphus/Ancistrocerus* spp. categories contain individuals that could only be identified to genus level and whose species identity could not be confirmed from other fully developed individuals from the same bamboo shoot. These categories may contain individuals from species listed in the table.

Solitary Bee & Wasp Species	% of Total Brood Cells
<i>Ancistrocerus trifasciatus</i>	4.78%
<i>Hylaeus confusus</i>	0.19%
<i>Megachile centuncularis</i>	0.88%
<i>Megachile ligniseca</i>	5.03%
<i>Megachile</i> sp.	5.03%
<i>Megachile versicolor</i>	24.67%
<i>Osmia bicornis</i>	3.37%
<i>Osmia caeruleascens</i>	8.06%
<i>Osmia</i> sp.	22.12%
<i>Symmorphus crassicornis</i>	6.99%
<i>Symmorphus gracilis</i>	7.17%
<i>Symmorphus</i> sp.	1.16%
<i>Symmorphus/Ancistrocerus</i> sp.	8.56%
<i>Trypoxylon attenuatum</i>	1.89%
Unknown solitary wasp (cells destroyed)	0.09%
Grand Total	100.00%

Table 4 Plant species recorded on each study farm and their abundance of floral units. For a table of what constituted a floral unit for each plant species, see Table 5 in the Appendix. For a list of plant species and floral abundance by nest box location on each farm, see Appendix, Table 2.

Farm	Sum of floral unit abundance
Bellingdon	734
<i>Alliaria petiolata</i>	3
<i>Anagallis arvensis</i>	34
<i>Anthriscus sylvestris</i>	14
<i>Bellis perennis</i>	1
<i>Brassica napus</i>	2
<i>Buddleja</i> sp.	3
<i>Calystegia sepium</i>	1

<i>Calystegia silvatica</i>	6
<i>Cardamine hirsuta</i>	1
<i>Centaurea nigra</i>	9
<i>Cirsium arvense</i>	12
<i>Cirsium palustre</i>	33
<i>Conopodium majus</i>	4
<i>Convolvulus arvensis</i>	16
<i>Crataegus monogyna</i>	38
<i>Dipsacus fullonum</i>	6
<i>Epilobium angustifolium</i>	4
<i>Epilobium hirsutum</i>	15
<i>Epilobium montanum</i>	3
<i>Geranium molle</i>	19
<i>Geranium robertianum</i>	6
<i>Heracleum sphondylium</i>	20
<i>Hieracium</i> sp.	22
<i>Hyacinthoides hispanica</i>	18
<i>Hypericum perforatum</i>	13
<i>Ilex aquifolium</i>	2
<i>Jacobaea vulgaris</i>	30
<i>Lamium album</i>	1
<i>Lamium purpureum</i>	1
<i>Leucanthemum vulgare</i>	3
<i>Lotus corniculatus</i>	20
<i>Matricaria discoidea</i>	61
<i>Medicago lupulina</i>	24
<i>Melilotus altissimus</i>	3
<i>Myosotis arvensis</i>	8
<i>Papaver rhoeas</i>	14
<i>Prunella vulgaris</i>	6
<i>Ranunculus acris</i>	14
<i>Ranunculus repens</i>	17
<i>Rosa</i> sp.	1
<i>Rubus fruticosus</i>	86
<i>Sambucus nigra</i>	6
<i>Senecio vulgaris</i>	7
<i>Silene dioica</i>	2
<i>Sinapsis arvensis</i>	10
<i>Solanum dulcamara</i>	1
<i>Sonchus arvensis</i>	21
<i>Stachys sylvatica</i>	1
<i>Stellaria holostea</i>	9
<i>Stellaria media</i>	2

<i>Succisa pratensis</i>	1
<i>Taraxacum officinale</i>	18
<i>Trifolium pratense</i>	13
<i>Trifolium repens</i>	19
<i>Ulex europaeus</i>	1
<i>Veronica persica</i>	25
<i>Viola arvensis</i>	4
Colleymore	545
<i>Anagallis arvensis</i>	1
<i>Angelica sylvestris</i>	10
<i>Anthemis austriaca</i>	4
<i>Anthriscus sylvestris</i>	33
<i>Arum maculatum</i>	2
<i>Bellis perennis</i>	2
<i>Brassica napus</i>	12
<i>Calystegia sepium</i>	11
<i>Calystegia silvatica</i>	3
<i>Centaurea cyanus</i>	2
<i>Centaurea nigra</i>	5
<i>Cirsium arvense</i>	12
<i>Cirsium palustre</i>	11
<i>Convolvulus arvensis</i>	3
<i>Crataegus monogyna</i>	28
<i>Crepis capillaris</i>	1
<i>Epilobium hirsutum</i>	9
<i>Filipendula ulmaria</i>	1
<i>Geranium molle</i>	17
<i>Geranium robertianum</i>	2
<i>Glechoma hederacea</i>	13
<i>Heracleum sphondylium</i>	24
<i>Lamium album</i>	2
<i>Lamium purpureum</i>	7
<i>Leucanthemum vulgare</i>	2
<i>Lotus corniculatus</i>	2
<i>Malva neglecta</i>	1
<i>Matricaria discoidea</i>	10
<i>Medicago lupulina</i>	4
<i>Melilotus altissimus</i>	2
<i>Myosotis arvensis</i>	13
<i>Papaver rhoeas</i>	14
<i>Pentaglottis sempervirens</i>	2
<i>Ranunculus acris</i>	44
<i>Ranunculus repens</i>	3

<i>Rosa acicularis</i>	8
<i>Rosa</i> sp.	2
<i>Rubus fruticosus</i>	67
<i>Sambucus nigra</i>	12
<i>Senecio vulgaris</i>	3
<i>Silene latifolia</i>	2
<i>Sinapsis arvensis</i>	15
<i>Sonchus arvensis</i>	6
<i>Stachys sylvatica</i>	10
<i>Stellaria graminea</i>	4
<i>Taraxacum officinale</i>	36
<i>Teesdalia nudicaulis</i>	3
<i>Trifolium pratense</i>	1
<i>Trifolium repens</i>	41
<i>Veronica chamaedrys</i>	3
<i>Veronica persica</i>	11
<i>Vicia faba</i>	8
<i>Viola arvensis</i>	1
Daylesford	488
<i>Agrostemma githago</i>	2
<i>Anthriscus sylvestris</i>	27
<i>Bellis perennis</i>	7
<i>Calystegia sepium</i>	8
<i>Calystegia silvatica</i>	12
<i>Centaurea cyanus</i>	3
<i>Centaurea nigra</i>	7
<i>Cichorium intybus</i>	2
<i>Cirsium arvense</i>	19
<i>Cirsium palustre</i>	13
<i>Convolvulus arvensis</i>	7
<i>Crataegus monogyna</i>	26
<i>Dipsacus fullonum</i>	2
<i>Epilobium hirsutum</i>	16
<i>Filipendula ulmaria</i>	2
<i>Fragaria × ananassa</i>	9
<i>Geranium molle</i>	5
<i>Glechoma hederacea</i>	2
<i>Heracleum sphondylium</i>	2
<i>Hieracium</i> sp.	13
<i>Jacobaea vulgaris</i>	2
<i>Knautia arvensis</i>	4
<i>Lamium album</i>	18
<i>Lamium purpureum</i>	2

<i>Lavandula angustifolia</i>	18
<i>Leucanthemum vulgare</i>	8
<i>Lotus corniculatus</i>	10
<i>Lychnis flos-cuculi</i>	2
<i>Lythrum salicaria</i>	2
<i>Malus domestica</i>	11
<i>Matricaria discoidea</i>	4
<i>Medicago lupulina</i>	6
<i>Myosotis arvensis</i>	5
<i>Onobrychis viciifolia</i>	10
<i>Origanum vulgare</i>	3
<i>Papaver rhoeas</i>	4
<i>Pentaglottis sempervirens</i>	2
<i>Primula veris</i>	4
<i>Prunus domestica</i>	4
<i>Ranunculus acris</i>	29
<i>Ranunculus repens</i>	5
<i>Rosa canina</i>	4
<i>Rubus fruticosus</i>	18
<i>Sambucus nigra</i>	9
<i>Silene dioica</i>	7
<i>Silene latifolia</i>	2
<i>Sinapsis arvensis</i>	4
<i>Sonchus arvensis</i>	4
<i>Taraxacum officinale</i>	49
<i>Tilia</i> sp.	3
<i>Trifolium pratense</i>	14
<i>Trifolium repens</i>	30
<i>Veronica persica</i>	1
<i>Vicia sativa</i>	6
Earth Trust	639
<i>Anthriscus sylvestris</i>	30
<i>Arctium minus</i>	1
<i>Bellis perennis</i>	8
<i>Brassica napus</i>	7
<i>Calystegia sepium</i>	5
<i>Calystegia silvatica</i>	11
<i>Centaureum erythraea</i>	1
<i>Centaurea nigra</i>	7
<i>Cichorium intybus</i>	8
<i>Cirsium arvense</i>	25
<i>Cirsium palustre</i>	29
<i>Conopodium majus</i>	3

<i>Convolvulus arvensis</i>	10
<i>Crataegus monogyna</i>	43
<i>Epilobium angustifolium</i>	5
<i>Epilobium hirsutum</i>	12
<i>Geranium pratense</i>	6
<i>Geranium robertianum</i>	3
<i>Glechoma hederacea</i>	2
<i>Heracleum sphondylium</i>	12
<i>Hieracium sp.</i>	19
<i>Ilex aquifolium</i>	4
<i>Jacobaea vulgaris</i>	18
<i>Knautia arvensis</i>	11
<i>Lamium album</i>	18
<i>Lamium purpureum</i>	9
<i>Leucanthemum vulgare</i>	8
<i>Lotus corniculatus</i>	21
<i>Malus domestica</i>	5
<i>Matricaria discoidea</i>	11
<i>Medicago lupulina</i>	4
<i>Melilotus altissimus</i>	5
<i>Myosotis arvensis</i>	5
<i>Primula veris</i>	25
<i>Prunella vulgaris</i>	6
<i>Ranunculus acris</i>	24
<i>Ranunculus repens</i>	2
<i>Rosa acicularis</i>	3
<i>Rosa canina</i>	3
<i>Rubus fruticosus</i>	25
<i>Senecio vulgaris</i>	7
<i>Silene dioica</i>	1
<i>Silene latifolia</i>	1
<i>Sonchus arvensis</i>	10
<i>Stellaria media</i>	10
<i>Symphytum officinale</i>	8
<i>Taraxacum officinale</i>	37
<i>Trifolium pratense</i>	3
<i>Trifolium repens</i>	59
<i>Veronica chamaedrys</i>	3
<i>Veronica persica</i>	13
<i>Vicia cracca</i>	3
<i>Vicia faba</i>	10
<i>Vicia sativa</i>	4
<i>Viola arvensis</i>	2

<i>Malus sylvestris</i>	2
<i>Sonchus</i> sp.	12
East Hanney	582
<i>Anthriscus sylvestris</i>	22
<i>Arctium minus</i>	9
<i>Bellis perennis</i>	3
<i>Brassica napus</i>	5
<i>Calystegia sepium</i>	13
<i>Calystegia silvatica</i>	10
<i>Capsella bursa-pastoris</i>	2
<i>Cirsium arvense</i>	14
<i>Cirsium palustre</i>	27
<i>Conopodium majus</i>	2
<i>Convolvulus arvensis</i>	22
<i>Crataegus monogyna</i>	31
<i>Dipsacus fullonum</i>	5
<i>Epilobium hirsutum</i>	17
<i>Euphorbia</i> sp.	2
<i>Geranium molle</i>	12
<i>Glechoma hederacea</i>	4
<i>Heracleum sphondylium</i>	44
<i>Hieracium</i> sp.	6
<i>Hyacinthoides hispanica</i>	1
<i>Jacobaea vulgaris</i>	15
<i>Lamium album</i>	35
<i>Leucanthemum vulgare</i>	4
<i>Lotus corniculatus</i>	12
<i>Malva neglecta</i>	1
<i>Matricaria discoidea</i>	12
<i>Medicago lupulina</i>	21
<i>Myosotis arvensis</i>	10
<i>Papaver rhoeas</i>	6
<i>Ranunculus acris</i>	14
<i>Rosa acicularis</i>	11
<i>Rubus fruticosus</i>	26
<i>Sambucus nigra</i>	7
<i>Silene latifolia</i>	2
<i>Sinapsis arvensis</i>	15
<i>Sonchus arvensis</i>	42
<i>Stachys sylvatica</i>	4
<i>Symphytum officinale</i>	24
<i>Taraxacum officinale</i>	29
<i>Trifolium repens</i>	31

<i>Tripleurospermum inodorum</i>	6
<i>Veronica persica</i>	2
<i>Vicia sativa</i>	2
Wytham (Fai Farms)	447
<i>Anthriscus sylvestris</i>	24
<i>Arctium minus</i>	5
<i>Ballota nigra</i>	5
<i>Calystegia sepium</i>	15
<i>Calystegia silvatica</i>	5
<i>Cardamine hirsuta</i>	1
<i>Carduus nutans</i>	2
<i>Centaurea nigra</i>	4
<i>Cirsium arvense</i>	24
<i>Cirsium palustre</i>	5
<i>Convolvulus arvensis</i>	16
<i>Crataegus monogyna</i>	36
<i>Daucus carota</i>	1
<i>Epilobium hirsutum</i>	10
<i>Geranium molle</i>	20
<i>Geranium robertianum</i>	3
<i>Geranium sp.</i>	1
<i>Glechoma hederacea</i>	3
<i>Heracleum sphondylium</i>	4
<i>Hieracium sp.</i>	5
<i>Hyacinthoides hispanica</i>	1
<i>Jacobaea vulgaris</i>	6
<i>Knautia arvensis</i>	4
<i>Lamium album</i>	41
<i>Lamium purpureum</i>	7
<i>Leucanthemum vulgare</i>	14
<i>Lotus corniculatus</i>	4
<i>Malus domestica</i>	7
<i>Malva neglecta</i>	1
<i>Matricaria discoidea</i>	12
<i>Medicago lupulina</i>	3
<i>Myosotis arvensis</i>	1
<i>Papaver rhoeas</i>	4
<i>Prunus sp.</i>	3
<i>Ranunculus acris</i>	23
<i>Rosa acicularis</i>	7
<i>Rosa sp.</i>	1
<i>Rubus fruticosus</i>	27
<i>Sambucus nigra</i>	12

<i>Silene latifolia</i>	2
<i>Sinapsis arvensis</i>	6
<i>Sonchus arvensis</i>	4
<i>Stachys sylvatica</i>	4
<i>Stellaria holostea</i>	3
<i>Taraxacum officinale</i>	12
<i>Teesdalia nudicaulis</i>	1
<i>Torilis japonica</i>	10
<i>Trifolium repens</i>	18
<i>Tripleurospermum inodorum</i>	1
<i>Veronica persica</i>	12
<i>Vicia sativa</i>	7
Grange Farm	629
<i>Anthriscus sylvestris</i>	45
<i>Atropa bella-donna</i>	3
<i>Brassica napus</i>	35
<i>Calystegia sepium</i>	4
<i>Calystegia silvatica</i>	2
<i>Capsella bursa-pastoris</i>	4
<i>Cirsium arvense</i>	24
<i>Cirsium palustre</i>	15
<i>Convolvulus arvensis</i>	22
<i>Crataegus monogyna</i>	21
<i>Dipsacus fullonum</i>	6
<i>Epilobium hirsutum</i>	14
<i>Epilobium montanum</i>	2
<i>Euphorbia peplus</i>	2
<i>Geranium molle</i>	20
<i>Geranium pratense</i>	8
<i>Geranium robertianum</i>	10
<i>Heracleum sphondylium</i>	38
<i>Hieracium</i> sp.	8
<i>Jacobaea vulgaris</i>	11
<i>Knautia arvensis</i>	1
<i>Lamium album</i>	21
<i>Lamium purpureum</i>	1
<i>Leucanthemum vulgare</i>	4
<i>Malus domestica</i>	2
<i>Malva neglecta</i>	1
<i>Matricaria discoidea</i>	2
<i>Medicago lupulina</i>	26
<i>Myosotis arvensis</i>	8
<i>Papaver rhoeas</i>	12

<i>Pulicaria dysenterica</i>	4
<i>Pulicaria vulgaris</i>	2
<i>Ranunculus acris</i>	26
<i>Ranunculus repens</i>	3
<i>Rosa acicularis</i>	6
<i>Rubus fruticosus</i>	37
<i>Sambucus nigra</i>	30
<i>Silene latifolia</i>	2
<i>Solanum dulcamara</i>	2
<i>Sonchus arvensis</i>	22
<i>Stachys sylvatica</i>	7
<i>Stellaria media</i>	2
<i>Taraxacum officinale</i>	45
<i>Trifolium pratense</i>	9
<i>Trifolium repens</i>	52
<i>Veronica persica</i>	4
<i>Vicia sativa</i>	4
Greystones	673
<i>Aegopodium podagraria</i>	3
<i>Ajuga reptans</i>	7
<i>Anthriscus sylvestris</i>	36
<i>Argentina anserina</i>	2
<i>Arum maculatum</i>	2
<i>Atropa bella-donna</i>	2
<i>Bellis perennis</i>	4
<i>Calystegia sepium</i>	2
<i>Calystegia silvatica</i>	3
<i>Capsella bursa-pastoris</i>	2
<i>Cardamine pratensis</i>	10
<i>Centaurea nigra</i>	2
<i>Cirsium arvense</i>	22
<i>Cirsium palustre</i>	15
<i>Conopodium majus</i>	1
<i>Convolvulus arvensis</i>	9
<i>Crataegus monogyna</i>	52
<i>Dactylorhiza fuchsii</i>	2
<i>Dactylorhiza majalis</i>	4
<i>Epilobium hirsutum</i>	14
<i>Filipendula ulmaria</i>	3
<i>Geranium molle</i>	22
<i>Glechoma hederacea</i>	8
<i>Heracleum sphondylium</i>	19
<i>Hieracium</i> sp.	7

<i>Hypericum perforatum</i>	1
<i>Lamium album</i>	16
<i>Lamium purpureum</i>	2
<i>Lotus corniculatus</i>	3
<i>Lychnis flos-cuculi</i>	2
<i>Lysimachia vulgaris</i>	4
<i>Matricaria discoidea</i>	3
<i>Medicago lupulina</i>	2
<i>Myosotis arvensis</i>	4
<i>Primula veris</i>	6
<i>Ranunculus acris</i>	101
<i>Rosa acicularis</i>	10
<i>Rubus fruticosus</i>	14
<i>Sambucus nigra</i>	21
<i>Sanicula europaea</i>	2
<i>Silene dioica</i>	3
<i>Silene latifolia</i>	2
<i>Solanum dulcamara</i>	2
<i>Stachys sylvatica</i>	6
<i>Stellaria media</i>	21
<i>Succisa pratensis</i>	4
<i>Symphytum officinale</i>	7
<i>Taraxacum officinale</i>	71
<i>Torilis japonica</i>	2
<i>Trifolium pratense</i>	21
<i>Trifolium repens</i>	48
<i>Veronica chamaedrys</i>	35
<i>Veronica persica</i>	2
<i>Vicia cracca</i>	2
<i>Vicia sativa</i>	3
Heath Farm	331
<i>Anagallis arvensis</i>	1
<i>Anthriscus sylvestris</i>	18
<i>Brassica napus</i>	20
<i>Calystegia sepium</i>	10
<i>Calystegia silvatica</i>	5
<i>Cirsium arvense</i>	5
<i>Cirsium palustre</i>	2
<i>Convolvulus arvensis</i>	5
<i>Crataegus monogyna</i>	26
<i>Daucus carota</i>	10
<i>Epilobium hirsutum</i>	4
<i>Geranium molle</i>	10

<i>Geranium robertianum</i>	5
<i>Geranium</i> sp.	2
<i>Jacobaea vulgaris</i>	2
<i>Lamium album</i>	27
<i>Lamium purpureum</i>	1
<i>Matricaria discoidea</i>	10
<i>Myosotis arvensis</i>	6
<i>Papaver rhoeas</i>	7
<i>Pentaglottis sempervirens</i>	2
<i>Rosa acicularis</i>	4
<i>Rosa</i> sp.	1
<i>Rubus fruticosus</i>	30
<i>Senecio vulgaris</i>	30
<i>Silene latifolia</i>	1
<i>Sinapsis arvensis</i>	9
<i>Sonchus arvensis</i>	21
<i>Taraxacum officinale</i>	4
<i>Veronica persica</i>	11
<i>Vicia faba</i>	22
<i>Vicia sativa</i>	20
Kilmester	651
<i>Anagallis arvensis</i>	3
<i>Anthriscus sylvestris</i>	45
<i>Arum maculatum</i>	1
<i>Bellis perennis</i>	8
<i>Calystegia sepium</i>	13
<i>Calystegia silvatica</i>	3
<i>Centaurea nigra</i>	12
<i>Cirsium arvense</i>	21
<i>Cirsium palustre</i>	21
<i>Convolvulus arvensis</i>	15
<i>Crataegus monogyna</i>	31
<i>Daucus carota</i>	4
<i>Dipsacus fullonum</i>	2
<i>Epilobium hirsutum</i>	4
<i>Geranium molle</i>	7
<i>Glechoma hederacea</i>	16
<i>Heracleum sphondylium</i>	32
<i>Hieracium</i> sp.	8
<i>Jacobaea vulgaris</i>	1
<i>Lamium album</i>	24
<i>Leucanthemum vulgare</i>	10
<i>Lotus corniculatus</i>	2

<i>Malva neglecta</i>	2
<i>Matricaria discoidea</i>	2
<i>Medicago lupulina</i>	18
<i>Myosotis arvensis</i>	12
<i>Papaver rhoeas</i>	3
<i>Primula veris</i>	1
<i>Ranunculus acris</i>	43
<i>Ranunculus repens</i>	5
<i>Rosa acicularis</i>	2
<i>Rosa sp.</i>	5
<i>Rubus fruticosus</i>	39
<i>Sambucus nigra</i>	2
<i>Silene dioica</i>	7
<i>Sinapsis arvensis</i>	15
<i>Solanum dulcamara</i>	4
<i>Sonchus arvensis</i>	5
<i>Stachys sylvatica</i>	5
<i>Symphytum officinale</i>	39
<i>Syringa sp.</i>	1
<i>Taraxacum officinale</i>	62
<i>Trifolium pratense</i>	4
<i>Trifolium repens</i>	85
<i>Veronica chamaedrys</i>	3
<i>Vicia cracca</i>	2
<i>Vicia sativa</i>	2
Lower Smite	568
<i>Anthemis arvensis</i>	2
<i>Anthriscus sylvestris</i>	24
<i>Arctium minus</i>	2
<i>Bellis perennis</i>	2
<i>Calystegia sepium</i>	15
<i>Calystegia silvatica</i>	5
<i>Cardina draba</i>	12
<i>Centaurea nigra</i>	6
<i>Cichorium intybus</i>	44
<i>Cirsium arvense</i>	23
<i>Cirsium palustre</i>	19
<i>Convolvulus arvensis</i>	20
<i>Crataegus monogyna</i>	8
<i>Dipsacus fullonum</i>	1
<i>Epilobium hirsutum</i>	5
<i>Fragaria x ananassa</i>	5
<i>Geranium molle</i>	25

<i>Geranium robertianum</i>	3
<i>Helianthus annuus</i>	1
<i>Heracleum sphondylium</i>	3
<i>Hieracium</i> sp.	2
<i>Hydrangea</i> sp.	6
<i>Jacobaea vulgaris</i>	15
<i>Lamium album</i>	6
<i>Leucanthemum vulgare</i>	4
<i>Lotus corniculatus</i>	15
<i>Malva sylvestris</i>	2
<i>Matricaria discoidea</i>	12
<i>Medicago lupulina</i>	11
<i>Melilotus altissimus</i>	5
<i>Papaver rhoeas</i>	6
<i>Primula veris</i>	3
<i>Prunus domestica</i>	4
<i>Ranunculus acris</i>	34
<i>Ranunculus repens</i>	1
<i>Rubus fruticosus</i>	17
<i>Sinapsis arvensis</i>	18
<i>Sonchus arvensis</i>	5
<i>Stellaria media</i>	16
<i>Tanacetum parthenium</i>	2
<i>Tanacetum vulgare</i>	2
<i>Taraxacum officinale</i>	5
<i>Trifolium incarnatum</i>	1
<i>Trifolium pratense</i>	63
<i>Trifolium repens</i>	54
<i>Veronica chamaedrys</i>	3
<i>Veronica persica</i>	4
<i>Vicia cracca</i>	4
<i>Vicia sativa</i>	23
Marcham	676
<i>Agrostemma githago</i>	12
<i>Angelica sylvestris</i>	14
<i>Anthriscus sylvestris</i>	39
<i>Arctium minus</i>	10
<i>Bellis perennis</i>	2
<i>Brassica napus</i>	20
<i>Calystegia sepium</i>	21
<i>Calystegia silvatica</i>	2
<i>Capsella bursa-pastoris</i>	12
<i>Carduus nutans</i>	5

<i>Centaurea cyanus</i>	3
<i>Chamerion angustifolium</i>	2
<i>Cirsium arvense</i>	29
<i>Cirsium palustre</i>	9
<i>Conopodium majus</i>	3
<i>Convolvulus arvensis</i>	5
<i>Crataegus monogyna</i>	30
<i>Daucus carota</i>	5
<i>Dipsacus fullonum</i>	4
<i>Echium vulgare</i>	4
<i>Epilobium hirsutum</i>	31
<i>Epilobium montanum</i>	2
<i>Filipendula ulmaria</i>	1
<i>Geranium molle</i>	20
<i>Geranium robertianum</i>	2
<i>Geranium sp.</i>	3
<i>Glechoma hederacea</i>	16
<i>Heracleum sphondylium</i>	3
<i>Hieracium sp.</i>	14
<i>Jacobaea vulgaris</i>	7
<i>Lamium album</i>	32
<i>Lamium purpureum</i>	4
<i>Leucanthemum vulgare</i>	16
<i>Lotus corniculatus</i>	17
<i>Malus domestica</i>	7
<i>Malva neglecta</i>	6
<i>Malva sylvestris</i>	3
<i>Matricaria discoidea</i>	12
<i>Medicago lupulina</i>	5
<i>Myosotis arvensis</i>	4
<i>Onobrychis viciifolia</i>	1
<i>Papaver rhoeas</i>	9
<i>Pentaglottis sempervirens</i>	2
<i>Prunus sp.</i>	2
<i>Pulicaria dysenterica</i>	2
<i>Ranunculus acris</i>	11
<i>Rosa acicularis</i>	2
<i>Rosa sp.</i>	2
<i>Rubus fruticosus</i>	28
<i>Sambucus nigra</i>	7
<i>Senecio vulgaris</i>	5
<i>Silene dioica</i>	2
<i>Silene latifolia</i>	5

<i>Sinapsis arvensis</i>	12
<i>Sonchus arvensis</i>	16
<i>Stachys sylvatica</i>	2
<i>Stellaria media</i>	2
<i>Symphytum officinale</i>	13
<i>Taraxacum officinale</i>	32
<i>Teesdalia nudicaulis</i>	7
<i>Trifolium pratense</i>	9
<i>Trifolium repens</i>	33
<i>Tripleurospermum inodorum</i>	5
<i>Veronica persica</i>	16
<i>Vicia sativa</i>	5
<i>Vinca major</i>	4
<i>Viola arvensis</i>	6
Middle Farm	618
<i>Anagallis arvensis</i>	1
<i>Anthriscus sylvestris</i>	35
<i>Arum maculatum</i>	1
<i>Brassica napus</i>	69
<i>Calystegia sepium</i>	3
<i>Calystegia silvatica</i>	7
<i>Cirsium arvense</i>	10
<i>Cirsium palustre</i>	7
<i>Convolvulus arvensis</i>	4
<i>Crataegus monogyna</i>	28
<i>Daucus carota</i>	3
<i>Epilobium hirsutum</i>	4
<i>Geranium molle</i>	54
<i>Geranium robertianum</i>	1
<i>Geranium sp.</i>	1
<i>Glechoma hederacea</i>	3
<i>Heracleum sphondylium</i>	24
<i>Hieracium sp.</i>	2
<i>Hyacinthoides hispanica</i>	3
<i>Lamium purpureum</i>	8
<i>Malus domestica</i>	2
<i>Matricaria discoidea</i>	33
<i>Medicago lupulina</i>	9
<i>Myosotis arvensis</i>	15
<i>Papaver rhoeas</i>	27
<i>Ranunculus acris</i>	11
<i>Ranunculus repens</i>	5
<i>Rosa acicularis</i>	4

<i>Rosa</i> sp.	1
<i>Rubus fruticosus</i>	32
<i>Sambucus nigra</i>	9
<i>Senecio vulgaris</i>	11
<i>Silene latifolia</i>	18
<i>Silene vulgaris</i>	3
<i>Sinapsis arvensis</i>	26
<i>Sonchus oleraceus</i>	1
<i>Stachys sylvatica</i>	11
<i>Stellaria media</i>	8
<i>Taraxacum officinale</i>	31
<i>Teesdalia nudicaulis</i>	15
<i>Trifolium repens</i>	31
<i>Ulex europaeus</i>	2
<i>Veronica arvensis</i>	2
<i>Veronica chamaedrys</i>	3
<i>Veronica persica</i>	32
<i>Viburnum</i> sp.	2
<i>Viola arvensis</i>	6
Old Farm Dorn	414
<i>Alliaria petiolata</i>	2
<i>Angelica sylvestris</i>	2
<i>Anthemis austriaca</i>	4
<i>Anthriscus sylvestris</i>	23
<i>Arctium minus</i>	1
<i>Argyranthemum frutescens</i>	2
<i>Brassica napus</i>	47
<i>Calystegia sepium</i>	1
<i>Carduus nutans</i>	1
<i>Cirsium arvense</i>	7
<i>Cirsium palustre</i>	13
<i>Convolvulus arvensis</i>	3
<i>Crataegus monogyna</i>	39
<i>Epilobium hirsutum</i>	12
<i>Geranium molle</i>	15
<i>Geranium robertianum</i>	5
<i>Glechoma hederacea</i>	4
<i>Heracleum sphondylium</i>	24
<i>Hieracium</i> sp.	1
<i>Hyacinthoides hispanica</i>	1
<i>Jacobaea vulgaris</i>	1
<i>Lamium album</i>	19
<i>Lamium purpureum</i>	1

<i>Leucanthemum vulgare</i>	1
<i>Lotus corniculatus</i>	2
<i>Matricaria discoidea</i>	11
<i>Medicago lupulina</i>	4
<i>Myosotis arvensis</i>	20
<i>Papaver rhoeas</i>	12
<i>Ranunculus acris</i>	7
<i>Ranunculus ficaria</i>	2
<i>Ranunculus repens</i>	4
<i>Rosa acicularis</i>	6
<i>Rubus fruticosus</i>	44
<i>Sambucus nigra</i>	7
<i>Senecio vulgaris</i>	12
<i>Silene dioica</i>	6
<i>Sinapsis arvensis</i>	8
<i>Stachys sylvatica</i>	5
<i>Stellaria media</i>	1
<i>Taraxacum officinale</i>	11
<i>Trifolium repens</i>	3
<i>Veronica persica</i>	12
<i>Viburnum sp.</i>	1
<i>Vicia sativa</i>	4
<i>Vicia sepium</i>	1
<i>Viola arvensis</i>	2
Pennyhooks	868
<i>Ajuga reptans</i>	2
<i>Allium ursinum</i>	2
<i>Anthriscus sylvestris</i>	55
<i>Argentina anserina</i>	10
<i>Bellis perennis</i>	43
<i>Calystegia sepium</i>	14
<i>Calystegia silvatica</i>	4
<i>Cardamine pratensis</i>	9
<i>Cirsium arvense</i>	40
<i>Cirsium palustre</i>	21
<i>Cirsium vulgare</i>	1
<i>Convolvulus arvensis</i>	9
<i>Crataegus monogyna</i>	64
<i>Dipsacus fullonum</i>	5
<i>Epilobium hirsutum</i>	29
<i>Epilobium strictum</i>	2
<i>Filipendula ulmaria</i>	5
<i>Galium verum</i>	9

<i>Geranium molle</i>	24
<i>Geranium robertianum</i>	2
<i>Glechoma hederacea</i>	18
<i>Heracleum sphondylium</i>	30
<i>Knautia arvensis</i>	5
<i>Lamium album</i>	22
<i>Lamium purpureum</i>	6
<i>Lotus corniculatus</i>	6
<i>Lychnis flos-cuculi</i>	1
<i>Malus domestica</i>	2
<i>Medicago lupulina</i>	3
<i>Mentha aquatica</i>	15
<i>Myosotis arvensis</i>	3
<i>Primula veris</i>	7
<i>Prunus avium</i>	2
<i>Pyrus communis</i>	2
<i>Ranunculus acris</i>	85
<i>Ranunculus ficaria</i>	7
<i>Ranunculus repens</i>	16
<i>Rosa acicularis</i>	4
<i>Rosa canina</i>	4
<i>Rosa sp.</i>	2
<i>Rubus fruticosus</i>	49
<i>Sambucus nigra</i>	12
<i>Silene dioica</i>	2
<i>Silene latifolia</i>	2
<i>Solanum dulcamara</i>	8
<i>Sonchus arvensis</i>	2
<i>Stachys sylvatica</i>	4
<i>Stellaria graminea</i>	9
<i>Stellaria media</i>	12
<i>Symphytum officinale</i>	13
<i>Tanacetum parthenium</i>	30
<i>Taraxacum officinale</i>	62
<i>Trifolium pratense</i>	5
<i>Trifolium repens</i>	55
<i>Veronica chamaedrys</i>	11
<i>Veronica persica</i>	2
Rotherfield	759
<i>Anthriscus sylvestris</i>	23
<i>Brassica napus</i>	15
<i>Calystegia sepium</i>	8
<i>Capsella bursa-pastoris</i>	4

<i>Centaurea nigra</i>	22
<i>Chamerion angustifolium</i>	5
<i>Cichorium intybus</i>	26
<i>Cirsium arvense</i>	22
<i>Cirsium palustre</i>	14
<i>Conopodium majus</i>	2
<i>Convolvulus arvensis</i>	5
<i>Crataegus monogyna</i>	34
<i>Crepis capillaris</i>	2
<i>Daucus carota</i>	1
<i>Digitalis purpurea</i>	2
<i>Dipsacus fullonum</i>	3
<i>Filipendula ulmaria</i>	1
<i>Geranium molle</i>	17
<i>Geranium robertianum</i>	2
<i>Heracleum sphondylium</i>	36
<i>Hieracium</i> sp.	11
<i>Jacobaea vulgaris</i>	19
<i>Knautia arvensis</i>	2
<i>Lamium album</i>	14
<i>Lamium purpureum</i>	7
<i>Leucanthemum vulgare</i>	21
<i>Linum usitatissimum</i>	17
<i>Lotus corniculatus</i>	5
<i>Matricaria discoidea</i>	51
<i>Medicago lupulina</i>	23
<i>Myosotis arvensis</i>	12
<i>Papaver rhoeas</i>	8
<i>Primula veris</i>	4
<i>Ranunculus acris</i>	36
<i>Ranunculus repens</i>	4
<i>Rosa acicularis</i>	9
<i>Rosa canina</i>	2
<i>Rosa</i> sp.	2
<i>Rubus fruticosus</i>	45
<i>Sambucus nigra</i>	24
<i>Senecio vulgaris</i>	3
<i>Silene dioica</i>	4
<i>Silene latifolia</i>	14
<i>Sinapsis arvensis</i>	13
<i>Sonchus arvensis</i>	9
<i>Stachys sylvatica</i>	3
<i>Stellaria media</i>	20

<i>Taraxacum officinale</i>	27
<i>Trifolium pratense</i>	32
<i>Trifolium repens</i>	48
<i>Tripleurospermum inodorum</i>	8
<i>Veronica chamaedrys</i>	5
<i>Veronica persica</i>	2
<i>Vicia sativa</i>	11
Stepstones	394
<i>Anthriscus sylvestris</i>	28
<i>Brassica napus</i>	15
<i>Calystegia sepium</i>	29
<i>Calystegia silvatica</i>	23
<i>Cirsium arvense</i>	17
<i>Cirsium palustre</i>	5
<i>Convolvulus arvensis</i>	12
<i>Crataegus monogyna</i>	17
<i>Dipsacus fullonum</i>	4
<i>Epilobium hirsutum</i>	26
<i>Filipendula ulmaria</i>	1
<i>Geranium molle</i>	13
<i>Heracleum sphondylium</i>	1
<i>Hieracium</i> sp.	2
<i>Jacobaea vulgaris</i>	6
<i>Lamium album</i>	18
<i>Myosotis arvensis</i>	1
<i>Papaver rhoeas</i>	2
<i>Pentaglottis sempervirens</i>	2
<i>Ranunculus acris</i>	6
<i>Rubus fruticosus</i>	64
<i>Sambucus nigra</i>	17
<i>Senecio vulgaris</i>	2
<i>Silene dioica</i>	1
<i>Silene latifolia</i>	7
<i>Sinapsis arvensis</i>	18
<i>Solanum dulcamara</i>	2
<i>Sonchus arvensis</i>	17
<i>Symphytum officinale</i>	6
<i>Taraxacum officinale</i>	8
<i>Thlaspi arvense</i>	2
<i>Trifolium pratense</i>	8
<i>Trifolium repens</i>	11
<i>Veronica persica</i>	3
Whitchurch	216

<i>Anthriscus sylvestris</i>	18
<i>Arctium minus</i>	2
<i>Bellis perennis</i>	1
<i>Brassica napus</i>	10
<i>Calystegia sepium</i>	5
<i>Capsella bursa-pastoris</i>	6
<i>Cirsium arvense</i>	9
<i>Cirsium palustre</i>	11
<i>Conopodium majus</i>	1
<i>Convolvulus arvensis</i>	10
<i>Crataegus monogyna</i>	21
<i>Epilobium hirsutum</i>	3
<i>Geranium molle</i>	11
<i>Lamium album</i>	11
<i>Lamium purpureum</i>	5
<i>Linum usitatissimum</i>	30
<i>Matricaria discoidea</i>	8
<i>Papaver rhoeas</i>	3
<i>Ranunculus acris</i>	4
<i>Rubus fruticosus</i>	17
<i>Sambucus nigra</i>	9
<i>Silene dioica</i>	1
<i>Silene latifolia</i>	1
<i>Sinapsis arvensis</i>	8
<i>Stellaria media</i>	1
<i>Taraxacum officinale</i>	5
<i>Veronica persica</i>	5
Wincott	264
<i>Anthriscus sylvestris</i>	23
<i>Arctium minus</i>	5
<i>Bellis perennis</i>	2
<i>Brassica napus</i>	5
<i>Calystegia sepium</i>	2
<i>Calystegia silvatica</i>	2
<i>Centaurea nigra</i>	3
<i>Cirsium arvense</i>	21
<i>Cirsium palustre</i>	9
<i>Conopodium majus</i>	9
<i>Convolvulus arvensis</i>	12
<i>Crataegus monogyna</i>	14
<i>Epilobium hirsutum</i>	8
<i>Geranium molle</i>	3
<i>Lamium album</i>	9

<i>Matricaria discoidea</i>	2
<i>Myosotis arvensis</i>	2
<i>Ranunculus acris</i>	14
<i>Rosa acicularis</i>	1
<i>Rubus fruticosus</i>	27
<i>Senecio vulgaris</i>	1
<i>Silene dioica</i>	2
<i>Sinapsis arvensis</i>	19
<i>Sonchus arvensis</i>	10
<i>Stachys sylvatica</i>	1
<i>Taraxacum officinale</i>	3
<i>Trifolium repens</i>	13
<i>Veronica persica</i>	2
<i>Vicia faba</i>	38
<i>Vicia sativa</i>	2
Grand Total	10496

Table 5 This table lists the plant species recorded across all study farms. For each plant species, the percentage of total floral unit abundance it accounted for across all farms is listed.

Farm	Percentage of total floral unit abundance
<i>Aegopodium podagraria</i>	0.03%
<i>Agrostemma githago</i>	0.13%
<i>Ajuga reptans</i>	0.09%
<i>Alliaria petiolata</i>	0.05%
<i>Allium ursinum</i>	0.02%
<i>Anagallis arvensis</i>	0.38%
<i>Angelica sylvestris</i>	0.25%
<i>Anthemis arvensis</i>	0.02%
<i>Anthemis austriaca</i>	0.08%
<i>Anthriscus sylvestris</i>	5.35%
<i>Arctium minus</i>	0.33%
<i>Argentina anserina</i>	0.11%
<i>Argyranthemum frutescens</i>	0.02%
<i>Arum maculatum</i>	0.06%
<i>Atropa bella-donna</i>	0.05%
<i>Ballota nigra</i>	0.05%
<i>Bellis perennis</i>	0.79%
<i>Brassica napus</i>	2.50%
<i>Buddleja</i> sp.	0.03%
<i>Calystegia sepium</i>	1.71%
<i>Calystegia silvatica</i>	0.98%

<i>Capsella bursa-pastoris</i>	0.29%
<i>Cardamine hirsuta</i>	0.02%
<i>Cardamine pratensis</i>	0.18%
<i>Cardina draba</i>	0.11%
<i>Carduus nutans</i>	0.08%
<i>Centaureum erythraea</i>	0.01%
<i>Centaurea cyanus</i>	0.08%
<i>Centaurea nigra</i>	0.73%
<i>Chamerion angustifolium</i>	0.07%
<i>Cichorium intybus</i>	0.76%
<i>Cirsium arvense</i>	3.39%
<i>Cirsium palustre</i>	2.66%
<i>Cirsium vulgare</i>	0.01%
<i>Conopodium majus</i>	0.24%
<i>Convolvulus arvensis</i>	1.95%
<i>Crataegus monogyna</i>	5.59%
<i>Crepis capillaris</i>	0.03%
<i>Dactylorhiza fuchsii</i>	0.02%
<i>Dactylorhiza majalis</i>	0.04%
<i>Daucus carota</i>	0.23%
<i>Digitalis purpurea</i>	0.02%
<i>Dipsacus fullonum</i>	0.36%
<i>Echium vulgare</i>	0.04%
<i>Epilobium angustifolium</i>	0.09%
<i>Epilobium hirsutum</i>	2.22%
<i>Epilobium montanum</i>	0.07%
<i>Epilobium strictum</i>	0.02%
<i>Euphorbia peplus</i>	0.02%
<i>Euphorbia sp.</i>	0.02%
<i>Filipendula ulmaria</i>	0.13%
<i>Fragaria x ananassa</i>	0.09%
<i>Fragaria x ananassa</i>	0.05%
<i>Galium verum</i>	0.09%
<i>Geranium molle</i>	2.99%
<i>Geranium pratense</i>	0.13%
<i>Geranium robertianum</i>	0.42%
<i>Geranium sp.</i>	0.07%
<i>Glechoma hederacea</i>	0.85%
<i>Helianthus annuus</i>	0.01%
<i>Heracleum sphondylium</i>	3.01%
<i>Hieracium sp.</i>	1.14%
<i>Hyacinthoides hispanica</i>	0.23%
<i>Hydrangea sp.</i>	0.06%

<i>Hypericum perforatum</i>	0.13%
<i>Ilex aquifolium</i>	0.06%
<i>Jacobaea vulgaris</i>	1.27%
<i>Knautia arvensis</i>	0.26%
<i>Lamium album</i>	3.18%
<i>Lamium purpureum</i>	0.58%
<i>Lavandula angustifolia</i>	0.17%
<i>Leucanthemum vulgare</i>	0.91%
<i>Linum usitatissimum</i>	0.45%
<i>Lotus corniculatus</i>	1.13%
<i>Lychnis flos-cuculi</i>	0.05%
<i>Lysimachia vulgaris</i>	0.04%
<i>Lythrum salicaria</i>	0.02%
<i>Malus domestica</i>	0.34%
<i>Malus sylvestris</i>	0.02%
<i>Malva neglecta</i>	0.11%
<i>Malva sylvestris</i>	0.05%
<i>Matricaria discoidea</i>	2.44%
<i>Medicago lupulina</i>	1.55%
<i>Melilotus altissimus</i>	0.14%
<i>Mentha aquatica</i>	0.14%
<i>Myosotis arvensis</i>	1.23%
<i>Onobrychis viciifolia</i>	0.10%
<i>Origanum vulgare</i>	0.03%
<i>Papaver rhoeas</i>	1.25%
<i>Pentaglottis sempervirens</i>	0.10%
<i>Primula veris</i>	0.48%
<i>Prunella vulgaris</i>	0.11%
<i>Prunus avium</i>	0.02%
<i>Prunus domestica</i>	0.08%
<i>Prunus sp.</i>	0.05%
<i>Pulicaria dysenterica</i>	0.06%
<i>Pulicaria vulgaris</i>	0.02%
<i>Pyrus communis</i>	0.02%
<i>Ranunculus acris</i>	5.01%
<i>Ranunculus ficaria</i>	0.09%
<i>Ranunculus repens</i>	0.62%
<i>Rosa acicularis</i>	0.73%
<i>Rosa canina</i>	0.12%
<i>Rosa sp.</i>	0.16%
<i>Rubus fruticosus</i>	6.59%
<i>Sambucus nigra</i>	1.75%
<i>Sanicula europaea</i>	0.02%

<i>Senecio vulgaris</i>	0.77%
<i>Silene dioica</i>	0.36%
<i>Silene latifolia</i>	0.58%
<i>Silene vulgaris</i>	0.03%
<i>Sinapsis arvensis</i>	1.87%
<i>Solanum dulcamara</i>	0.18%
<i>Sonchus arvensis</i>	1.85%
<i>Sonchus oleraceus</i>	0.01%
<i>Sonchus</i> sp.	0.11%
<i>Stachys sylvatica</i>	0.60%
<i>Stellaria graminea</i>	0.12%
<i>Stellaria holostea</i>	0.11%
<i>Stellaria media</i>	0.91%
<i>Succisa pratensis</i>	0.05%
<i>Symphytum officinale</i>	1.05%
<i>Syringa</i> sp.	0.01%
<i>Tanacetum parthenium</i>	0.30%
<i>Tanacetum vulgare</i>	0.02%
<i>Taraxacum officinale</i>	5.21%
<i>Teesdalia nudicaulis</i>	0.25%
<i>Thlaspi arvense</i>	0.02%
<i>Tilia</i> sp.	0.03%
<i>Torilis japonica</i>	0.11%
<i>Trifolium incarnatum</i>	0.01%
<i>Trifolium pratense</i>	1.73%
<i>Trifolium repens</i>	6.01%
<i>Tripleurospermum inodorum</i>	0.19%
<i>Ulex europaeus</i>	0.03%
<i>Veronica arvensis</i>	0.02%
<i>Veronica chamaedrys</i>	0.63%
<i>Veronica persica</i>	1.51%
<i>Viburnum</i> sp.	0.03%
<i>Vicia cracca</i>	0.10%
<i>Vicia faba</i>	0.74%
<i>Vicia sativa</i>	0.89%
<i>Vicia sepium</i>	0.01%
<i>Vinca major</i>	0.04%
<i>Viola arvensis</i>	0.20%
Grand Total	100.00%

Table 6 Presented are statistics of the best minimal adequate Generalized Linear Models. Model selection was based on AIC values, and ΔAIC indicates the difference between the best and next best model. Where the $\Delta AIC < 0.5$, the next best model is also shown – as in for Model 2 where the second best model also identified the proportion of natural habitat as the sole significant variable. Coefficients of determination, D^2 (the amount of deviance accounted for by the model) are provided – these were calculated using the “modEvA” package in R (Barbosa, et al., 2016). The full set of explanatory variables included in the full models for Models 1-3 were: floral-unit abundance, the proportion of natural habitat, pesticide use and farm area. For Models 4& 5 these were: floral-unit abundance, the proportion of natural habitat, pesticide use, farm area, the number of host cells and host species richness.

Model	Response Variable	Explanatory Variables	df	F	P
Best model, AIC = 207.84, Adj. D^2 = 0.307, ΔAIC = 1.01					
1	Solitary bee & wasp abundance (number of brood cells)	Proportion of natural habitat	1,16	5.948	0.027
		Pesticide use	1,15	4.155	0.060
Best model, AIC = 73.56, Adj. D^2 = 0.223, ΔAIC = 0.36					
2(a)	Solitary bee & wasp species richness	Proportion of natural habitat	1,17	7.621	0.013
Next best model, AIC = 73.92, Adj. D^2 = 0.24, ΔAIC = 1.67					
2(b)	Solitary bee & wasp species richness	Proportion of natural habitat	1,16	8.106	0.012
		Pesticide use	1,15	2.02	0.176
Full model and all simplified models had negative D^2 values					
3	Solitary bee and wasp species diversity	The model had no explanatory value	1,16	1.927	0.184
Best model, AIC = 60.15, Adj. D^2 = 0.194, ΔAIC = 1.15					
4	Parasitoid species richness	Number of host cells	1,17	5.6637	0.062
		Pesticide use	1,16	2.1697	0.160
Best model, AIC=-58.29, Adj. D^2 = 0.144, ΔAIC = 1.45					
5	Parasitism rate	Floral unit abundance	1,16	1.736	0.134
		Pesticide use	1,15	4.544	0.050

Table 7 Presented is a table displaying the raw data input for the Generalized Linear Models. The table includes the following data for each farm: agri-environment agreement, farm area, total abundance of floral units, plant species richness, the proportion of natural habitat, number of brood cells, the number of nest boxes surviving, the estimated number of brood cells if all 15 nest boxes had survived, host (bee and wasp) species richness & diversity and finally parasitoid species richness and diversity. The estimated number of brood cells if all 15 nest boxes had survived was calculated by dividing the number of brood cells by the number of nest boxes remaining to find the average number of brood cells/nest. This was then multiplied by 15. This value was used as the measure of bee and wasp abundance in the generalized linear models.

Farm	Agri-Env Agreement	Area (hect)	Org/Conv	Abund. Floral Units	Plant Sp. Richness	Prop. Nat. Habitat	No. Brood Cells	Nests Surviving/15	Est. No. Brood Cells*	Bee & Wasp Sp. Rich	Bee & Wasp Sp. Div	Parasitoid Sp. Rich	Parasitism rate
Heath	None	1424606	Conventional	331	32	0.143	48	14	51	4	0.675	1	0.083
Wincott	None	1465268	Conventional	264	30	0.11	105	12	131	5	0.731	3	0.067
Whitchurch	None	1348758	Conventional	216	27	0.081	56	10	84	2	0.493	1	0.018
Stepstones	None	1146043	Conventional	394	34	0.161	135	12	169	5	0.785	2	0.141
Bellingdon	Entry Level Stewardship	991746	Conventional	734	57	0.359	152	15	152	5	0.692	2	0.026
Middle	Entry Level Stewardship	1807760	Conventional	618	47	0.224	83	14	89	3	0.642	0	0
Old Farm Dorn	Entry Level Stewardship	1652566	Organic	414	47	0.16	191	14	205	4	0.699	2	0.089
Daylesford	Entry Level Stewardship	4142292	Organic	488	54	0.193	117	14	125	4	0.616	4	0.085
Grange	Higher Level Stewardship	3166962	Conventional	629	47	0.093	107	13	123	4	0.63	1	0.009
East Hanney	Higher Level Stewardship	2302043	Conventional	582	43	0.115	0	15	0	0 NA		0 NA	
Marcham	Higher Level Stewardship	3207822	Conventional	676	67	0.18	239	13	276	6	0.738	1	0.033
Rotherfield	Higher Level Stewardship	6926502	Conventional	759	54	0.335	187	14	200	7	0.761	3	0.016
Colleymore	Higher Level Stewardship	2479087	Organic	545	53	0.181	142	12	178	5	0.426	3	0.127
Kilmester	Higher Level Stewardship	1794198	Organic	651	47	0.252	295	14	316	6	0.794	3	0.041
Pennyhooks	Higher Level Stewardship	844482	Organic	868	56	0.202	154	14	165	6	0.775	2	0.065
FAI Farms Ltd	Higher Level Stewardship	2375132	Organic	447	52	0.263	263	13	303	7	0.696	3	0.14
Earth Trust	Higher Level Stewardship	3968275	Organic	639	57	0.289	245	15	245	6	0.713	2	0.061
Greystones	Higher Level Stewardship	1227756	Conventional	673	55	0.238	193	14	207	3	0.618	4	0.119
Lower Smitte	Higher Level Stewardship	1148592	Conventional	568	49	0.196	466	13	538	6	0.724	3	0.009

Examination of the impact of agri-environment management on the structure and stability of farmland solitary bee and wasp parasitism networks

Abstract

A key objective of the UK agri-environment schemes is to promote abundant and diverse communities of wild insect pollinators on farmland. To date, studies that have examined the effectiveness of agri-environment management in supporting wild insect pollinators have focused examination on abundance and species richness metrics. Whilst inspection of these metrics is important, very few studies have gone beyond this and examined the response of pollinator species interaction networks to agri-environment management. This is an omission; interaction network structure has an important influence on community stability and for wild insect pollinators, pollination service delivery. This study examined the impact of agri-environment management on the structure of solitary bee and wasp parasitism networks, on farmland surveyed across Central Southern England. The impact of increasing the abundance of natural habitat and floral foraging resource availability, through agri-environment management, on key quantitative indices of network stability was examined.

A significant positive relationship was identified between link density and the proportion of natural and semi-natural habitat across farms. Link density measures the mean number of links per species within a network and is influenced by the level of generalism among interacting species. Higher measures of link density are believed to confer greater resilience to species loss as individuals have more flexibility to switch interaction partner, limiting the risk of a cascade of secondary species extinctions. The positive relationship identified between network link density and natural habitat is encouraging and provides evidence that agri-environment management may have a

positive influence on the stability of farmland cavity nesting solitary bee and wasp parasitism networks through the provision of natural habitat. This is the first time this has been demonstrated for wild insect pollinators within the UK and adds strength to the evidence base in support of UK agri-environment pollinator conservation policy.

Introduction

The intensification and industrialisation of agricultural production over the last century has had profound ramifications for farmland biodiversity (Tilman et al., 2001; Vickery et al., 2001). Population declines have been reported across a wide range of species and taxa, particularly among habitat specialists (Fuller et al., 1995; Donald et al., 2001; Butler et al., 2007). There is strong evidence linking these declines to the homogenisation of our agricultural landscapes and associated loss of natural habitat for wildlife, exacerbated by agro-chemical exposure (Smart et al., 2000; Benton et al., 2002; Benton et al., 2003; Kleijn et al., 2009).

The decline in farmland biodiversity across the UK has been well documented (Krebs et al., 1999; Benton et al., 2002), however, uncertainty exists concerning the consequences of this biodiversity loss for ecosystem functioning and service delivery within agro-ecosystems (Swift et al., 2004; Tscharntke et al., 2005). Delivery of important ecosystem services such as crop pollination and biological pest control may be disrupted if biodiversity declines continue unchecked (Krebs et al., 1999; Tscharntke et al., 2005).

Agri-environment schemes were introduced by the UK government, in accordance with EU Agri-Environment Policy, in response to concerns over the consequences of farmland biodiversity loss for ecosystem functioning and service delivery (Natural England, 2016). These schemes, under which over 70% of farmland within the UK is now managed (Natural England, 2016), offer financial incentives to farmers for

conserving biodiversity on their land. A major focus of conservation efforts is on the restoration of natural and semi-natural habitat for wildlife, through interventions such as restoring hedgerows, maintaining species rich grassland and creating specific habitat for taxa of conservation concern, such as sown wildflower strips for insect pollinators (DEFRA, 2014; Natural England 2016).

There is uncertainty, however, over the effectiveness of agri-environment schemes in conserving farmland biodiversity. Whilst many studies have reported positive responses, others have reported neutral or even negative effects for some species (Kleijn & Sutherland, 2003; Kleijn et al., 2006). In addition, most of the studies have examined species-level effects of agri-environment management (Kleijn & Sutherland, 2003; Tscharrntke et al., 2005). At the community level, there have been far fewer studies on how agri-environment schemes affect the structure of ecological networks and the consequences for community stability, ecosystem functioning and service delivery (Fabian et al., 2013; Steckel et al., 2014).

Much research has been devoted to examining the relationship between ecological network structure and community stability (McCann, 2000; Montoya et al., 2006; Thébault & Fontaine, 2010). There are many definitions of community stability; here it is defined in accordance with (McCann, 2000) as general stability, higher among communities with lower variability in population densities over time. Evidence suggests that declines in species diversity and a loss of inter-specific interactions threaten community stability (Montoya et al., 2006). In mutualistic networks, such as pollination networks, a highly connected and nested architecture is believed to enhance community stability and increase resilience to species loss. For antagonistic networks, such as parasitism networks, compartmentalisation is thought to promote stability, by localising the impact of interaction disruption (Thébault & Fontaine, 2010).

However, to date, few studies have examined whether agri-environment management has a positive effect on key indices of community stability within agro-ecological networks. This information is required for thorough assessment of the effectiveness of these schemes in enhancing ecosystem functioning and associated biodiversity on farmland. Previous studies that have examined the response of ecological network structure to agricultural land management have revealed subtle effects of land management on species interactions; effects that cannot be identified from examination of species richness or diversity metrics alone (Tylianakis et al., 2007; Fabian et al., 2013; Spiesman & Inouye, 2013). Very few studies within the literature have examined the influence of agri-environment management on the structure of species interaction networks (Kleijn & Sutherland, 2003; Fabian et al., 2013). These more subtle responses to agri-environment management are important to examine; they may have important consequences for ecosystem functioning, community stability and ecosystem service delivery.

This study investigated the impact of agri-environment management on the antagonistic network structure of farmland cavity nesting solitary bee and wasp communities, and their parasitoids. The maintenance of diverse and abundant solitary bee and wasp communities on farmland is important for two reasons. First, cavity nesting solitary wasps provide important biocontrol services by preying on herbivorous arthropods, including Aphididae, Lepidoptera and Curculionidae (O'Neill, 2001). Second, solitary bees, of which there are 250 species in the UK (Falk & Lewington, 2015), provide important pollination services, particularly in their pollination of fruit crops (Delaplane et al., 2000; Garratt et al., 2014). The objective of this study was to examine whether agri-environment management has a positive influence on key indices of structural stability within these parasitism networks.

Methods

Site Selection

Nineteen farms were selected within a 60-mile radius of Oxford, representing a gradient of investment in agri-environment schemes. This ranged from intensive farms under no agri-environment scheme to farms managed by the Wildlife Trusts, showcasing higher-level schemes.

At the time this study was conducted, the UK agri-environment schemes were structured into Environmental Stewardship agreements. There were two tiers of agreement: Entry Level Stewardship and Organic Entry Level Stewardship (the more basic agri-environment agreements) and Higher Level Stewardship and Organic Higher Level Stewardship (more comprehensive agreements). The farms selected for this study spanned a range of these agreements, from the more basic to higher level (Table 1). All farms were mixed arable and pastoral, except three which were pastoral and ranged in size from 334842-16259444 m².

Table 1 Study farms listed according to their level of agri-environment agreement. The farms are ranked according to the level of agreement, from farms under no Environmental Stewardship scheme to those showcasing Higher Level schemes.

Farm	Location	Agri-Environment Level	Farm Size (m ²)
1. Heath Farm	52°10'32"N 1°39'59"W	No Environmental Stewardship agreement	1262404
2. Wincott Farm	52°08'28"N 1°43'50"W	No Environmental Stewardship agreement	782625
3. Whitchurch Farm	52°08'03"N 1°40'37"W	No Environmental Stewardship agreement	1185310
4. Stepstones Farm	52°06'29"N 1°37'42"W	No Environmental Stewardship agreement	636314
5. Bellingdon Farm	51°44'46"N 0°38'51"W	Entry Level Stewardship	383767
6. Middle Farm	51°59'16"N 1°06'52"W	Entry Level Stewardship	1982602
7. Old Farm Dorn	52°00'15"N 1°42'19"W	Entry Level Stewardship	1031550
8. Daylesford	51°55'42"N 1°38'25"W	Organic Entry Level Stewardship	7933978
9. Grange Farm	51°30'23"N 2°19'49"W	Higher Level Stewardship	3094816
10. East Hanney	51°38'06"N 1°23'14"W	Higher Level Stewardship	1897862
11. Marcham	51°39'56"N 1°20'37"W	Higher Level Stewardship	4102809
12. Rotherfield Park	51°19'57"N 0°37'45"W	Higher Level Stewardship	16259444
13. Colleymore Farm	51°38'30"N 1°38'30"W	Organic Higher Level Stewardship	2824027
14. Kilmester Farm	51°40'39"N 1°38'22"W	Organic Higher Level Stewardship	1613061
15. Pennyhooks Farm	51°36'31"N 1°39'36"W	Organic Higher Level Stewardship	334842
16. Wytham Farm	51°46'58"N 1°18'57"W	Organic Higher Level Stewardship	4246974
17. Earth Trust	51°37'50"N 1°11'21"W	Higher Level Stewardship, Earth Trust Management	5039674
18. Greystones Farm	51°53'08"N 1°45'05"W	Organic Higher Level Stewardship Gloucester Wildlife Trust, SSSI	666743
19. Lower Smite	52°13'40"N 2°09'27"W	Higher Level Stewardship Worcester Wildlife Trust, SSSI	623146

Natural and semi-natural habitat

The provision of areas of natural and semi-natural habitat constitutes the primary strategy of the UK Agri-Environment Schemes for conserving farmland biodiversity. The land-cover classes of the landscape on each study farm was categorized in order to quantify the proportion of natural and semi-natural habitat on each farm. Natural and semi-natural habitat was defined in accordance with agri-environment scheme guidelines (Natural England, 2016) as land falling into the following categories: hedgerows, field margins, buffer strips, wildflower strips, woodland and species rich grassland. Gardens were also included as pollinator habitat as a reflection of the relatively high abundance and diversity of floral foraging resources they may provide (Ahrne et al., 2009).

Farm polygons were drawn in Google Earth, version 7.1.5.1557, following the farm boundaries. In order to account for solitary bee foraging beyond the farm boundaries, radial buffer zones of 600m around each nest box were separately drawn (as this is estimated to be the maximum foraging range of solitary bees (Gathmann & Tscharrntke, 2002)). The farm polygons were intersected with the set of nest box radial buffers corresponding to that farm using the Spatial Analyst Toolbox in ArcGIS 10.2, in order to create farm zones that included solitary bee foraging range around the nest boxes.

Within each farm zone, landscape categorization was conducted in Google Earth 7.1.5.1557 using the following data sets; the high resolution satellite imagery (sub 1-meter resolution) provided on the Google Earth Platform itself, Environmental Stewardship farm maps, DEFRA's online mapping resource, MAGIC (DEFRA, Magic Map Application) and ground-truthing. Land cover polygons were digitized in reference to the above data sets in order to create a set of shapefiles for each farm zone. Zonal summary statistics of coverage of each land cover class were then calculated in

ArcGIS 10.2, again using the Spatial Analyst Toolbox, to calculate the proportion of natural and semi-natural habitat within each farm zone.

Pollinator foraging resource availability

The augmentation of floral foraging resources, for example through the sowing of wildflower seed mixtures on areas of set aside, is a key strategy of the UK agri-environment schemes for conserving insect pollinators. To quantify the availability of foraging resources present on each farm, floral surveys were conducted three times on each farm, in spring, early and late summer, to coincide with the solitary bee flight season, which ranges from March to mid-September (Falk & Lewington, 2015). All flowering entomophilous plants within a 15m radius of each nest box were identified to species level. The relative abundance of floral units of each species was recorded on a scale of 1-5, using a version of the DAFOR Scale (1 being Rare and 5 Dominant). Floral units were categorized as a single solitary flower or capitulum (e.g. *Leucanthemum vulgare*), cyme (e.g. *Myosotis arvensis*), raceme (e.g. *Lysimachia vulgaris*), umbel (e.g. *Anthriscus sylvestris*), corymb (e.g. *Jacobea vulgaris*) or panicle (e.g. *Centranthus ruber*) as appropriate, following (Clapham, Tutin & Moore, 1987; Rose, 2016; Staces, 2010). See (Appendix, Table 5) for a description of the floral unit for each plant species recorded across the farms.

As the nest boxes were strategically placed equidistant and spread evenly across the entirety of each farm, the data, when amalgamated, provides an assessment of the overall abundance of floral units and plant species richness at the whole-farm level. However, nectar and pollen resources provided by floral units varies across plant species (and this variation was not taken into account in the floral surveys). Thus, 'floral-unit abundance' in this study must be treated as an approximate estimate of foraging resource availability.

Solitary bee nest boxes

Fifteen nest boxes were placed on each of the 19 farms in March 2014. The nest boxes were constructed based on designs demonstrated to be occupied by solitary bees and wasps and were placed approximately equidistant across the whole of each farm (Tylianakis et al., 2007; Williams & Kremen, 2007; Fabian et al., 2013; Steckel et al., 2014). Each consisted of a 20 cm long plastic cylinder, of diameter 10cm, filled with hollow, untreated sections of bamboo ranging from 4-12mm in diameter (the size range preferred by most species (Tylianakis et al., 2007; Falk & Lewington, 2015)). Each nest was attached perpendicular to a 1.5m vertical wooden stake, with the entrance to the nest box oriented to the south.

The nests were installed in March 2014 in preparation for the emergence of the first solitary bee and wasp species in April (Falk & Lewington, 2015) and were collected in November 2014. In November, the occupied bamboo tubes were extracted from each nest and opened to record the total number of brood cells (Figure 1).



Figure 1 An occupied bamboo shoot split open to reveal a row of Megachilidae brood cells

The bamboo tubes were re-sealed and placed in a climatically controlled room at 5°C over winter. In March 2015, they were transferred to room temperature to stimulate adult emergence. All solitary bees and wasps emerging from the bamboo tubes were identified to species level using the following resources (Yeo & Corbet, 1929; Archer,

2014; Falk & Lewington, 2015) and released into the wild. Parasitoids were collected upon emergence and identified to species or genus level with assistance from entomology specialists at the University of Oxford, University of Edinburgh and Natural History Museum, London.

Brood cells from which no insects hatched successfully were dissected in September 2015 and the solitary bees, wasps and parasitoids present were identified to genus or species level. The parasitism rate was calculated for each farm and was defined as the fraction of all brood cells that were parasitized (not the fraction of brood cells developing successfully from which parasitoids rather than hosts emerged). This definition of parasitism rate has been used in similar studies on trap nesting Hymenopteran communities on European farmland (Holzschuh et al., 2010; Fabian et al., 2013; Pereira-Peixoto et al., 2016).

Network Metrics

Quantitative host–enemy (solitary bee and wasp - parasitoid) interaction networks were constructed for 17 of the 19 farms (those where parasitism was recorded), amalgamating data collected from all 15 nest boxes distributed across each farm. Incidents of parasitism were identified at the level of the brood cell and cases where a host brood cell had been parasitized by a gregarious parasitoid were recorded as single incidents of interaction. Some host and parasitoid specimens were identifiable only to genus level; as a consequence, the networks include a combination of species and, in some cases, genus level interactions.

The following quantitative, weighted network metrics were calculated following the methods outlined by (Bersier et al., 2002) using the bipartite package (Dormann et al., 2009) in R 2.14.0 (R Team, 2013).

- ⇒ **Connectance:** the fraction of all possible links within a network that are realised. The higher the level of network connectance, the greater the degree of generalism of the species involved, which is hypothesized to confer greater resilience to species loss as there is more flexibility for species to switch interaction partner. This is believed to limit the risk of a cascade of secondary species extinctions (Dunne et al., 2002; Montoya et al., 2006; Thébault & Fontaine, 2010). A quantitative, weighted measure of connectance (Bersier et al., 2002) was selected in order to take into account the relative frequency of interactions between host and parasitoid species.
- ⇒ **Link Density:** the mean number of links per species within the network. Higher link density is believed to correlate with greater resilience to species loss in a similar way to network connectance (Dunne et al., 2002; Montoya et al., 2006; Thébault & Fontaine, 2010). A weighted measure of link density was selected to incorporate the relative frequency of interactions between host and parasitoid species (Bersier et al., 2002).
- ⇒ **Interaction Diversity:** the Shannon diversity of interactions, weighted to incorporate the relative frequency of interactions between host and parasitoid species, and reflecting the number and the evenness of interactions within the network (Bersier et al., 2002; Banašek-Richter et al., 2004). Higher values for this metric are also believed to correlate with greater network stability (Dunne et al., 2002)
- ⇒ **Vulnerability:** the mean number of parasitoid species per host species within the network, weighted to incorporate the relative frequency of interactions between host and parasitoid species (Bersier et al., 2002). Higher levels of vulnerability are associated with a higher degree of generalism among parasitoids. High levels of vulnerability are thought to increase network stability by reducing the sensitivity of host species to perturbations in the population size of the parasitoid species with

which they interact. If one or more interactions are disrupted, the impact will be lower for a host species with many interaction partners, reducing the risk of extreme population responses (McCann, 2000; Tylianakis et al., 2010).

⇒ **Generality:** the mean number of host species per parasitoid species within the network, again weighted to incorporate the relative frequency of interactions between host and parasitoid species (Bersier et al., 2002). Higher levels of generality among parasitoids is believed to increase network stability again by reducing the sensitivity of parasitoid species to perturbations in the population size of the host species with which they interact. If one or more interactions are disrupted, the impact will be lower for a parasitoid species with many interaction partners, reducing the risk of an extreme population responses or extinction (McCann, 2000; Tylianakis et al., 2010).

⇒ **The number of compartments:** defined as the number of sub-webs with no connection to any other sub-web within the network (Bersier et al., 2002). It is thought that the greater the degree of compartmentalization within a network, the more the effects of species losses are limited to specific compartments, reducing the chance of cascading extinctions throughout the network (Krause et al., 2003).

These network metrics were selected as they are identified as good indicators of stability for antagonistic networks (Bersier et al., 2002; Dunne et al., 2002; Montoya et al., 2006; Tylianakis et al., 2010). They are the metrics of choice in most other studies that have examined the parasitism network structure of trap nesting Hymenoptera (Tylianakis et al., 2007; Fabian et al., 2013; Osorio et al., 2015; Pereira-Peixoto et al., 2016). They were calculated for 13 of the 19 farms; those with interactions between at least two host and parasitoid species, the minimum required for the metrics to be calculated.

Results

Trap Nest Occupation and Host Species Richness

Two hundred and fifty-five trap nests were recovered from the field containing 3178 brood cells, 2204 (69.4%) of which were solitary bee cells and 974 (30.6%) solitary wasp cells. See Table 1 in the Appendix for raw solitary bee, wasp and parasitoid emergence data across all occupied bamboo shoots, from all nest boxes, across all farms. Of the 3178 brood cells, 1110 (34.9%) emerged successfully, producing live bees, wasps or parasitoids. The 2068 brood cells from which no individual successfully emerged were dissected and the bees, wasps and parasitoids within identified. The majority of individuals (1,861 of these brood cells) had died at an advanced stage of development and were identifiable to species or at least genus level.

In the few cases where the individuals had died at a very early stage of development (207 brood cells), it was usually possible to identify the individuals to species or genus level because in most cases, at least one of the brood cells from the same bamboo tube had produced either a live or fully developed individual that could be identified confidently. Bamboo tubes are used typically by just one individual female, so it was assumed that all of the brood cells present within a tube belonged to the same species.

The identification of parasitized brood cells was facilitated by the fact that the majority of brood cells (2971 out of 3178) produced live or fully developed individuals, including parasitoids, where parasitism had occurred. The casings of these parasitized brood cells were marked by small puncture holes made by the parasitoid. In the few cases (207 brood cells) where the individuals had died at a very early stage of development, these puncture marks were used to help identify incidents of parasitism.

Six species of solitary bee were recorded: *Osmia bicornis* (Linnaeus, 1758), *Osmia caerulescens* (Linnaeus, 1758), *Megachile versicolor* Smith, F., 1844, *Megachile*

ligniseca (Kirby, 1802) and *Hylaeus confusus* Nylander, 1852. Four species of solitary wasp were recorded: *Ancistrocerus trifasciatus* (Muller, 1776), *Symmorphus crassicornis* (Panzer 1798), *Symmorphus gracilis* (Brulle, 1832) and *Trypoxylon attenuatum* Smith, 1851. This is a conservative estimate as 1,198 of the 2068 individuals that died before emergence could be identified only to Genus level. See Figure 2, graphs (a) and (b).

Parasitism rate and parasitoid species richness

There was a parasitism rate of 0.061 across all brood cells on all farms, ranging from 0-0.141 for individual farms. The parasitoid species recorded were *Pteromalidus apum* Retzius, 1783, *Ephialtes manifestator* (Linnaeus, 1758), *Melittobia acasta* Walker, 1839, *Sapyga quinquepunctata* (Fabricius, 1781), *Gasteruption jaculator* (Linnaeus, 1758), *Dibrachys microgastri* (Bouche, 1834) and *Amobia signata* (Meigen, 1824). In addition, 26 specimens were identified to genus level, as *Chrysis* spp. (*Chrysis* individuals are extremely hard to identify to species level) and gregarious parasitoid specimens from 3 brood cells to superfamily level (Chalcidoidea). Kleptoparasitism by the cuckoo bee *Coelioxys elongata* (Lepelletier, 1841) was also recorded and included in calculations of brood cell parasitism. See Figure 2, graphs (c) and (d). For a summary of parasitism data across farms, see Supplementary Information, Table 6 and for raw parasitoid emergence data from bamboo shoots, see Table 1 in the Appendix.

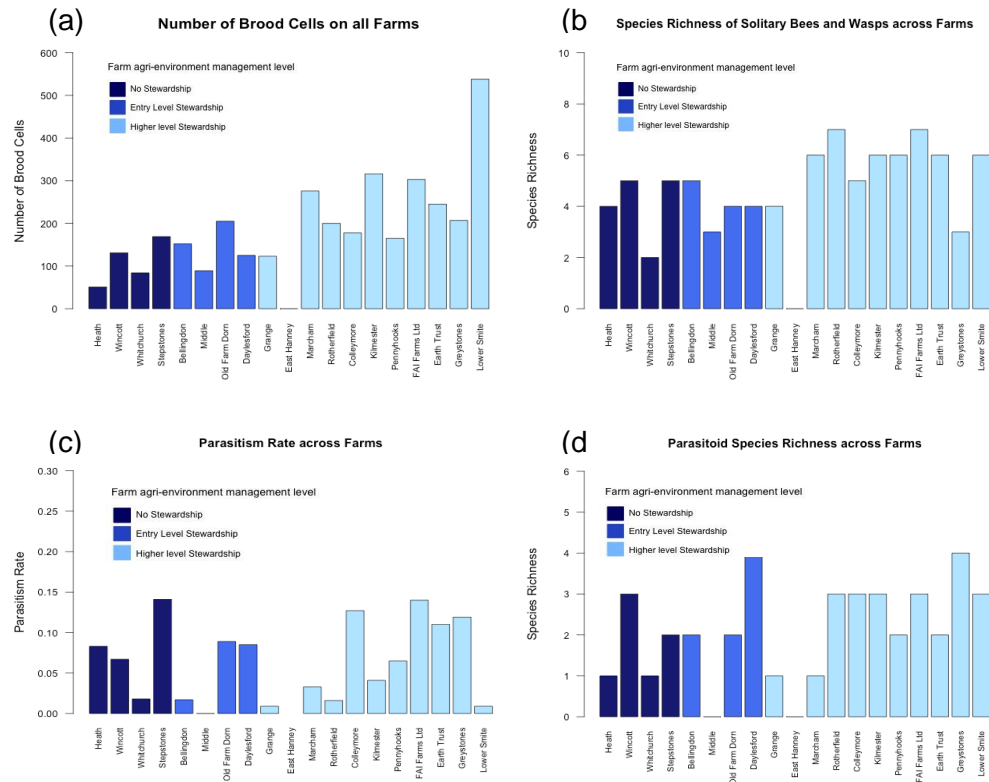


Figure 2 Bar graphs displaying (a) the number of brood cells, (b) the solitary bee and wasp species richness, (c) the parasitism rate and (d) the species richness of parasitoids, across farms. In each bar graph, the farms are ordered and colour coded according to agri-environment management level.

Proportion of Natural Habitat and Floral Foraging Resources across Farms

As detailed in Chapter 2, there was a significant positive correlation between the level of farm agri-environment agreement and the proportion of natural and semi-natural habitat (Spearman's Correlation, $r_s(17)=0.547$, $p\text{-value}=0.017$). There was also a significant positive correlation between the level of farm agri-environment agreement and the abundance of floral-units (Spearman's Correlation, $r_s(17)=0.546$, $p\text{-value}=0.017$) and plant species richness (Spearman's Correlation, $r_s(17)=0.603$, $p\text{-value}=0.006$). Plant species richness correlated significantly with floral-unit abundance across farms (Pearson product-moment correlation, $r(17)=0.803$, $p\text{-value}<0.001$). Therefore, for the statistical analysis, floral-unit abundance was used as the sole indicator of bee foraging resource availability.

Parasitism networks and network metrics

Parasitism networks were constructed for the 17 farms on which parasitism occurred (see Supplementary Information, Figure 4 for all individual farm networks and Table 6 for underlying farm summary data). The weighted network metrics connectance, link density, interaction diversity, vulnerability, generality and the number of compartments were calculated for the 13 farm networks that were of adequate size for metric computation (Table 2). The individual farm parasitism networks were pooled into two groups: the no-Stewardship with the Entry Level Stewardship farms, and separately the Higher Level Stewardship Farms to allow comparison of network structures between farms under low and high agri-environment scheme management levels (Figure 3). The mean network metric values for these sets of farms are displayed in Table 3. One way ANOVAs were conducted in R 2.14.0 (R Team, 2013) to test whether management under low or high levels of stewardship influenced significantly the value of the farm network metrics. None of the network metrics were influenced significantly by the level of farm agri-environment management level (see Table 4 for a full report of ANOVA results). Examination of the model validation plots suggested that parametric test assumptions were met and that the data did not require transformation or specification of an alternative error structure.

Table 2 Network metrics for all farms which had a minimum network size for metric calculation

Farm	Management	Connectance	Link Density	Interaction Diversity	Generality	Vulnerability	No of Compartments
Wincott	No Stewardship	0.444	1.534	1.277	1.686	1.381	2
Stepstones	No Stewardship	0.500	1.231	1.020	1.461	1.000	2
Bellingdon	Entry Level	0.500	1.000	0.562	1.000	1.000	2
Old Farm Dorn	Entry Level	0.833	1.926	1.385	2.342	1.510	1
Daylesford	Entry Level	0.500	1.780	1.366	1.000	1.561	2
Rotherfield	Higher Level	0.333	1.000	1.099	1.000	1.000	3
Colleymore	Higher Level	0.667	1.982	1.355	1.606	2.358	1
Kilmester	Higher Level	0.417	1.414	1.314	1.661	1.167	2
Pennyhooks	Higher Level	0.667	1.567	1.168	1.793	1.342	1
Wytham	Higher Level	0.417	1.915	1.952	2.328	1.501	1
Earth Trust	Higher Level	0.625	1.727	1.338	2.322	1.133	1
Greystones	Higher Level	0.375	1.549	1.369	1.508	1.789	2
Lower Smite	Higher Level	0.500	1.334	1.040	1.000	1.667	2

Table 3 Mean network metrics for farms under a low level of agri-management (no Stewardship (NS) & Entry Level (EL) Stewardship farms) and separately for the farms under a higher level of agri-environment management ((Higher Level (HL) Stewardship farms).

Farm agri-environment level	Sample size of farms	Connectance	Link Density	Interaction Diversity	Generality	Vulnerability	No of Compartments
Low (NS&EL)	5	0.555	1.494	1.122	1.500	1.290	1.800
High (HL)	8	0.500	1.593	1.329	1.652	1.495	1.625

Table 4 One-way ANOVA results: comparison of network metrics between farms under low agri-environment management high agri-environment management

Model Type	Network Metric	Predictor	df	F	P
One way Anova	Network Connectance	Farm Stewardship Level: Low (NS & EL) or High (HL)	1,11	0.45	0.51
	No of Compartments	Farm Stewardship Level: Low (NS & EL) or High (HL)	1,11	0.22	0.65
	Vulnerability	Farm Stewardship Level: Low (NS & EL) or High (HL)	1,11	0.85	0.38
	Generality	Farm Stewardship Level: Low (NS & EL) or High (HL)	1,11	0.27	0.62
	Link Density	Farm Stewardship Level: Low (NS & EL) or High (HL)	1,11	0.12	0.74
	Interaction Diversity	Farm Stewardship Level: Low (NS & EL) or High (HL)	1,11	1.41	0.26

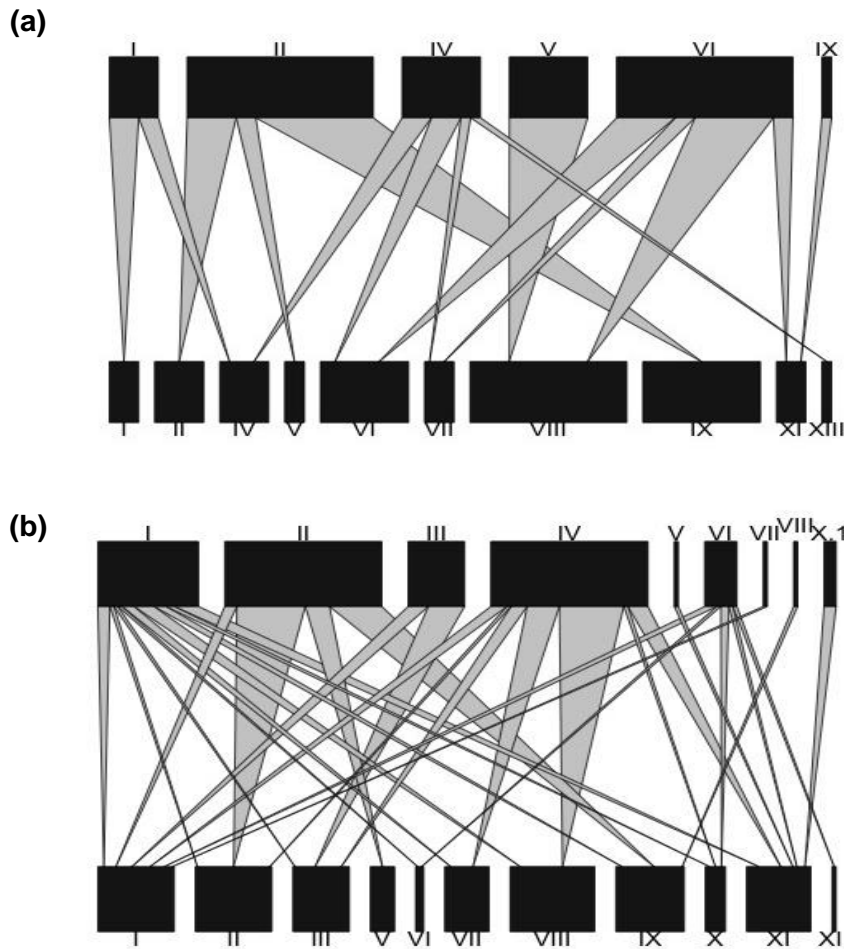


Figure 3: Parasitism networks for no Stewardship and Entry Level Stewardship Farms (a) and Higher Level Stewardship Farms (b). For each network, the lower bars represent the host species and the upper bars represent parasitoid species. The bars are weighted according to the number of host and parasitoid species involved in parasitism events. Linkage width indicates the frequency of each interaction.

The host species are as follows: I *Osmia* spp., II *Megachile versicolor*, III *Osmia Caerulescens*, IV *Symmorphus* spp., V *Megachile ligniseca*, VI *Ancistrocerus trifasciatus*, VII *Ancistrocerus/Symmorphus* spp., VIII *Symmorphus crassicornis*, IX *Megachile* spp., X *Trypoxylon attenuatum*, XI *Symmorphus gracilis*, XII unknown, XIII *Osmia bicornis*. The parasitoid species are as follows: I *Ephialtes manifestator*, II *Pteromalidus apum*, III *Sapyga quinquepunctata*, IV *Amoeba signata*, V *Melittobia acasta*, VI *Chrysis* spp., VII *Dibrachys microgastri*, VIII *Coelioxys elongata*, IX *Gasteruption jaculator*, X Chalcidoidea spp.

Occasionally, host and parasitoid specimens could not be identified confidently to species level. These individuals were grouped into Genus or Superfamily level categories, i.e. IV *Symmorphus* spp., VII *Ancistrocerus/Symmorphus* spp, IX *Megachile* spp, VI *Chrysis* spp. and X Chalcidoidea spp. It is possible that some of these individuals may have belonged to species represented in the networks; however, this was not possible to ascertain. Therefore, they are included in separate Genus or Superfamily level categories out of caution.

Effects of habitat metrics on network structure

Generalized linear models were constructed in R 2.14.0 (R Team, 2013) to investigate the effect of the following explanatory variables on the value of the network metrics across the 13 study farms:

- V. Proportion of natural habitat
- VI. Floral-unit abundance
- VII. Pesticide use (whether the farm was organic or conventionally managed)
- VIII. The number of parasitism events recorded

The number of parasitism events recorded on each farm was included as an explanatory variable to take into account the difference in parasitism sample sizes across farms. The number of parasitism events ranged from 3-37 across the 13 study farms for which network metrics were calculated.

A Gaussian error structure was selected for all of the models. Full models, including all explanatory variables (but no interactions) were constructed in the first instance and then simplified following the method outlined by (Crawley, 2005), using the Akaike information criterion, to identify the minimum adequate models. The Akaike information criterion was calculated in R 2.14.0 using the MASS add on package (Venables & Ripley, 2002). Examination of the model validation plots indicated that, in each case, the data met the model assumptions.

Connectance: None of the explanatory variables had a significant effect on connectance (all p-values > 0.05). See Supplementary Information, Table 5 for detailed model results.

Link Density: The best-fitting model included pesticide use, natural habitat and the number of parasitism events recorded as the sole explanatory variables. Link density increased significantly with pesticide use (GLM, $F(1,11)=31.426$, $p\text{-value} < 0.003$),

natural habitat (GLM, $F(1,10)=8.819$, $p\text{-value}=0.022$) and the number of parasitism events (GLM, $F(1,9)=5.352$ $p\text{-value}=0.046$). See Supplementary Information, Table 5 for detailed model results.

Interaction Diversity: The best-fitting model included the number of parasitism events recorded and pesticide use as the sole explanatory variables. Interaction diversity increased significantly with the number of parasitism events (GLM, $F(1,10)=11.396$, $p\text{-value}=0.007$). Pesticide use had no significant effect on interaction diversity (GLM, $F(1,11)=11.047$, $p\text{-value}=0.108$). See Supplementary Information, Table 5 for detailed model results.

Vulnerability: None of the explanatory variables had a significant effect on vulnerability (all $p\text{-values} > 0.05$). See Supplementary Information, Table 5 for detailed model results.

Generality: None of the explanatory variables had a significant effect on generality (all $p\text{-values} > 0.05$). See Supplementary Information, Table 5 for detailed model results.

Number of Compartments: None of the explanatory variables had a significant effect on the number of compartments (all $p\text{-values} > 0.05$). See Supplementary Information, Table 5 for detailed model results.

Discussion

The aim of this study was to investigate whether agri-environment management influences the structure and stability of cavity nesting solitary bee and wasp antagonistic networks. The provision of natural and semi-natural habitat is the primary method by which the UK agri-environment schemes strive to conserve farmland biodiversity, with the provision of floral foraging resources, through the protection of flower rich habitat and sowing of wildflower seed mixtures on areas of set-aside, an additional intervention for the conservation of insect pollinators (DEFRA, 2014; Natural

England, 2016). This study examined specifically the impact of increasing the proportion of natural and semi-natural habitat and pollinator forage resource availability on parasitism network structure and key quantitative measures of network stability. The hypothesis was that if agri-environment management promotes greater community stability, higher quantitative measures of network stability would be observed on farms with a greater abundance of natural habitat and pollinator foraging resources.

Nest box occupation varied substantially across farms; the number of brood cells collected from the nests ranged from 0-568 brood cells per farm. As discussed in Chapter 2, a significant positive relationship was identified between the number of solitary bee and wasp brood cells and the proportion of natural and semi-natural habitat across farms, evidence that the provision of habitat through agri-environment management may increase solitary bee and wasp abundance.

The parasitism rate across farms ranged from 0-14.1%, with a mean parasitism rate of 6.1% across all brood cells from all farms. The rate of parasitism in this study is lower than the rate recorded for trap nesting hymenoptera in other recent studies conducted on farmland across temperate Europe, where the rate ranged from 16.3%-20.9% (Albrecht et al., 2007; Holzschuh et al., 2010; Fabian et al., 2013; Pereira-Peixoto et al., 2016). This finding is unlikely to be a consequence of sample size: as discussed in Chapter 2, the abundance of host cells collected on each farm had no significant effect on the rate of parasitism. This result is interesting as previous studies that have examined parasitism within cavity nesting solitary bee and wasp communities on European farmland have identified host dynamics; specifically, bee and wasp abundance and species richness; as important in influencing parasitism rate and parasitoid species richness (Holzschuh et al., 2010; Steckel et al., 2014; Pereira-Peixoto et al., 2016).

The results presented in Chapter 2 also demonstrated the rate of parasitism recorded across the study farms to be independent of farm size, the proportion of natural and semi-natural habitat and the abundance of floral-units. Of the few studies that have examined the response of cavity nesting solitary bee and wasp parasitism to agri-environment management, two studies, conducted within agricultural landscapes in Germany, identified positive associations between rates of parasitism and landscape heterogeneity (Steckel et al., 2014) and the availability of natural and semi-natural habitat (Steffan-Dewenter, 2002). An additional study conducted in Switzerland identified higher rates of brood cell parasitism on restored compared to intensively managed meadows (Albrecht et al., 2007). This study, the first to examine the response of cavity nesting solitary bee and wasp parasitism to agri-environment management within the UK, identifies no significant effect of natural habitat or pollinator foraging resource provision on rates of brood cell parasitism or parasitoid species richness.

A consequence of the relatively low number of parasitism events recorded across the farms within this study is that the parasitism networks are based on a small number of interactions and contain a low host and parasitoid species richness. The network metrics calculated within this study (connectance, link density, interaction diversity, vulnerability, generality and the number of compartments), are sensitive to the number of interactions recorded within the network (Goldwasser & Roughgarden, 1997; Tylianakis et al., 2010). In order to address this sensitivity, the number of parasitism events recorded within each network was included as an explanatory variable in the Generalized Linear Models that assessed the response of the network metrics to natural habitat and forage resource availability, to ensure that this was taken into account for the statistical analysis.

Connectance describes the fraction of all possible links within a network that are realised and is used as a standard measure of food web complexity (Tylianakis et al.,

2010). The higher the level of connectance for a given species richness, the greater the degree of generalism of the species involved, which is hypothesized to confer greater resilience to species loss as there is increased flexibility for species to switch interaction partner. This is believed to limit the risk of a cascade of secondary species extinctions (Dunne et al., 2002; Montoya et al., 2006; Thébault & Fontaine, 2010). None of the explanatory variables investigated had a significant effect on network connectance. Link density, which measures the mean number of links per species, provides a similar measure of network complexity. Higher link density is thought to be associated with greater resilience to species loss in a similar way to network connectance. However, in contrast to connectance, link density was influenced positively by pesticide use, the proportion of natural and semi-natural habitat and the number of parasitism events recorded across study sites.

The finding that the number of parasitism events recorded on each farm appears to exert a positive influence on link density, demonstrates the influence of sample size, in terms of the number of recorded interactions, on this network metric. However, it is encouraging that the proportion of natural and semi-natural habitat was found to have a positive effect on link density. This provides preliminary evidence that increasing the abundance of natural habitat through agri-environment management may have the potential to enhance network stability. Only one other study within the ecological literature (Fabian et al., 2013) has examined the response of farmland cavity nesting solitary bee and wasp parasitism network metrics to agri-environment management; it was conducted across an agricultural landscape in Switzerland. This study identified a positive correlation between link density, forest cover and proximity to the nearest wildflower strip (Fabian et al., 2013). The results presented in this study support this result and provide further evidence that the provision of natural habitat, through agri-environment management, is influential in supporting cavity nesting solitary bee and wasp communities and may enhance community stability.

Interaction diversity provides a measure of the number and evenness of interactions within a network. In the food web literature, there is support for the idea that the presence of many weak to intermediate strength links within a network may enhance stability by lessening the impact of fluctuations in the population sizes of interacting species (Paine, 1992; McCann et al., 1998; Kokkoris et al., 1999). Interaction diversity is known to be highly sensitive to sample size (Banašek-Richter et al., 2004) and indeed, the generalized linear model identified a positive relationship between interaction diversity and the number of parasitism events recorded at each site. No significant effect was identified for any of the other explanatory variables included in the model; the proportion of natural habitat, floral-unit abundance and pesticide use. The (Fabian et al., 2013) study had identified a positive correlation between interaction diversity, landscape heterogeneity and the proportion of forest cover, indicating that interaction diversity might be influenced positively by the availability of natural and semi-natural habitat. No such effect was identified in this study however; natural habitat availability had a significant influence on link density but not interaction diversity.

The proportion of natural and semi-natural habitat, floral abundance, pesticide use and the number of parasitism events recorded across sites were found to have no significant effect on vulnerability or generality, where vulnerability describes the mean number of parasitoid species per host species whilst generality measures the mean number of host species per parasitoid species. These two metrics provide an indication of the degree of specialism of the hosts and parasitoid species included in the networks. High levels of specialism within a network are thought to reduce community resilience by increasing the vulnerability of species to perturbations in the population size of the species with which they interact. If one or more interactions are disrupted, the impact will be much greater for a more specialist species with few interaction partners, increasing the risk of secondary extinction (McCann, 2000; Tylianakis et al., 2010). The species richness of hosts and parasitoids recorded in this study was low,

consisting of 1-7 host species and 1-4 parasitoid species across farms, limiting the extent to which the vulnerability and generality metrics calculated can provide an accurate representation of the specialism of the species involved in these networks. It is likely that some of these host and parasitoid species interact with other species not recorded in this study; certainly some of the parasitoid species recorded here, such as *Amobia signata* and *Melittobia acasta* are known to be generalist parasitoids and interact with a variety of other cavity (and ground nesting) solitary bee and wasp host species (Falk & Lewington, 2015). *Melittobia acasta* is also known to be a parasitoid of bumblebees (Kwon et al., 2012).

In the ecological network literature, a higher degree of compartmentalisation is believed to enhance stability in antagonistic networks by reducing the extent to which perturbations, resulting from species loss or population size fluctuations, spread throughout a network (Krause et al., 2003). None of the explanatory variables investigated had a significant effect on the number of compartments present within the farm networks. As the parasitism networks within this study were small, the number of compartments present in the networks was low, with 5 of the farm networks containing just 1 compartment, 7 containing 2 compartments and just 1 network containing 3 compartments. This small range of compartments limited the extent to which the effect of investment in agri-environment management on compartment number, through the provision of natural habitat and floral foraging resources, could be examined critically in this study. Nonetheless, the degree of compartmentalization within a network is believed to be an important indicator of network stability; the effect of agri-environment management on this metric is an important relationship to assess further. The (Fabian et al., 2013) study identified a significant relationship between the compartment diversity of their solitary bee and wasp parasitism networks (which measures the heterogeneity in the size of compartments within a network), plant species richness and plant biomass across study sites. This evidence suggests that the

compartmentalization of these networks could be influenced by agri-environment management, specifically the provision of pollinator foraging resources.

Comparison of network metrics for the no Stewardship and Entry Level Stewardship farms (representing a lower level of agri-environment management) and the Higher Level Stewardship farms (representing a higher level of agri-environment management), identified slightly higher mean values for link density, interaction diversity, generality, vulnerability and the number of compartments among the Higher Level Stewardship farms. These higher values are suggested in the pooled networks for these two sets of farms (see Figure 3). Statistical comparison of the network metrics between high and low level agri-environment managed farms did not identify a significant difference in metric value between the two groups. However, given the very small sample of farms available for comparison (5 in the low level and 8 in the higher level category), further investigation of this comparison may be an interesting opportunity for further study.

Conclusion

A number of interesting findings have emerged from this study examining the response of farmland cavity nesting solitary bee and wasp parasitism networks to agri-environment management. These include a significant positive relationship between network link density and the proportion of natural and semi-natural habitat. This supports the results presented by the one other study that has assessed the response of these parasitism networks to agri-environment management (Fabian et al., 2013) and provides preliminary evidence that the provision of habitat, through agri-environment management, may have a positive influence on network stability by conferring greater resilience to species loss. This results strengthens support for the provision of natural and semi-natural habitat within UK agri-environment policy.

A greater sample of parasitism events across a larger sample of farms, capturing a

higher species richness of hosts and parasitoids, is required to gain a more complete picture of how farmland cavity nesting solitary bee and wasp parasitism networks are responding to agri-environment management; given these preliminary findings, this is an interesting avenue for future research.

Works Cited

Ahrne, K., Bengtsson, J. and Elmqvist, T., 2009. Bumble bees (*Bombus* spp) along a gradient of increasing urbanization. *PLoS One*, 4(5), p.e5574.

Albrecht, M., Duelli, P., Schmid, B. and Müller, C.B., 2007. Interaction diversity within quantified insect food webs in restored and adjacent intensively managed meadows. *Journal of Animal Ecology*, 76(5), pp.1015-1025.

Archer, M.E., 2014. The vespoid wasps (Tiphidae, Mutillidae, Sapygidae, Scolidae and Vespidae) of the British Isles. Royal Entomological Society.

Banašek-Richter, C., Cattin, M.F. and Bersier, L.F., 2004. Sampling effects and the robustness of quantitative and qualitative food-web descriptors. *Journal of Theoretical Biology*, 226(1), pp.23-32.

Barbosa A.M., Brown J.A., Jimenez-Valverde A., Real R., 2016. Model Evaluation and Analysis: Package 'modEVA'. <http://modeva.r-forge.r-project.org/>

Benton, T.G., Bryant, D.M., Cole, L. and Crick, H.Q., 2002. Linking agricultural practice to insect and bird populations: a historical study over three decades. *Journal of Applied Ecology*, 39(4), pp.673-687.

Benton, T.G., Vickery, J.A. and Wilson, J.D., 2003. Farmland biodiversity: is habitat heterogeneity the key?. *Trends in Ecology & Evolution*, 18(4), pp.182-188.

Bersier, L.F., Banašek-Richter, C. and Cattin, M.F., 2002. Quantitative descriptors of food-web matrices. *Ecology*, 83(9), pp.2394-2407.

Butler, S.J., Vickery, J.A. and Norris, K., 2007. Farmland biodiversity and the footprint of agriculture. *Science*, 315(5810), pp.381-384.

Carvell, C., Meek, W.R., Pywell, R.F. and Nowakowski, M., 2004. The response of foraging bumblebees to successional change in newly created arable field margins. *Biological Conservation*, 118(3), pp.327-339.

Clapham, A.R., Tutin, T.G. and Moore, D.M., 1990. *Flora of the British isles*. CUP Archive.

Crawley, M. J., 2005. *Statistics, An Introduction Using R*. Chichester: John Wiley & Sons, Ltd.

- DEFRA, 2014. *The National pollinator Strategy for bees and other pollinators in England*. [Online] Available at: https://www.gov.uk/government/uploads/attachment_data/file/409431/pb14221-national-pollinators-strategy.pdf [Accessed 18th April 2016].
- DEFRA, *Magic Map Application*. [Online] Available at: www.magic.defra.gov.org [Accessed August 2015].
- Delaplane, K.S., Mayer, D.R. and Mayer, D.F., 2000. *Crop pollination by bees*. Cabi.
- Kennedy, C.M., Lonsdorf, E., Neel, M.C., Williams, N.M., Ricketts, T.H., Winfree, R., Bommarco, R., Brittain, C., Burley, A.L., Cariveau, D. and Carvalho, L.G., 2013. A global quantitative synthesis of local and landscape effects on wild bee pollinators in agroecosystems. *Ecology letters*, 16(5), pp.584-599.
- Donald, P.F., Green, R.E. and Heath, M.F., 2001. Agricultural intensification and the collapse of Europe's farmland bird populations. *Proceedings of the Royal Society of London B: Biological Sciences*, 268(1462), pp.25-29.
- Dormann, C.F., Fründ, J., Blüthgen, N. and Gruber, B., 2009. Indices, graphs and null models: analyzing bipartite ecological networks.
- Dunne, J.A., Williams, R.J. and Martinez, N.D., 2002. Network structure and biodiversity loss in food webs: robustness increases with connectance. *Ecology letters*, 5(4), pp.558-567.
- Fabian, Y., Sandau, N., Bruggisser, O.T., Aebi, A., Kehrl, P., Rohr, R.P., Naisbit, R.E. and Bersier, L.F., 2013. The importance of landscape and spatial structure for hymenopteran-based food webs in an agro-ecosystem. *Journal of Animal Ecology*, 82(6), pp.1203-1214.
- Falk, S.J. and Lewington, R., 2015. *Field guide to the bees of Great Britain and Ireland*. British Wildlife Publishing Lt.
- Fuller, R.J., Gregory, R.D., Gibbons, D.W., Marchant, J.H., Wilson, J.D., Baillie, S.R. and Carter, N., 1995. Population declines and range contractions among lowland farmland birds in Britain. *Conservation Biology*, 9(6), pp.1425-1441.
- Garratt, M.P.D., Coston, D.J., Truslove, C.L., Lappage, M.G., Polce, C., Dean, R., Biesmeijer, J.C. and Potts, S.G., 2014. The identity of crop pollinators helps target conservation for improved ecosystem services. *Biological Conservation*, 169, pp.128-135.
- Gathmann, A. and Tscharrntke, T., 2002. Foraging ranges of solitary bees. *Journal of animal ecology*, 71(5), pp.757-764.
- Goldwasser, L. and Roughgarden, J., 1997. Sampling effects and the estimation of food-web properties. *Ecology*, 78(1), pp.41-54.
- Holzschuh, A., Steffan-Dewenter, I. and Tscharrntke, T., 2010. How do landscape composition and configuration, organic farming and fallow strips affect the diversity of bees, wasps and their parasitoids?. *Journal of Animal Ecology*, 79(2), pp.491-500.

- Kleijn, D. and Sutherland, W.J., 2003. How effective are European agri-environment schemes in conserving and promoting biodiversity?. *Journal of applied ecology*, 40(6), pp.947-969.
- Kleijn, D., Baquero, R.A., Clough, Y., Diaz, M., Esteban, J.D., Fernández, F., Gabriel, D., Herzog, F., Holzschuh, A., Jöhl, R. and Knop, E., 2006. Mixed biodiversity benefits of agri-environment schemes in five European countries. *Ecology letters*, 9(3), pp.243-254.
- Klein, A.M., Vaissiere, B.E., Cane, J.H., Steffan-Dewenter, I., Cunningham, S.A., Kremen, C. and Tscharntke, T., 2007. Importance of pollinators in changing landscapes for world crops. *Proceedings of the Royal Society of London B: Biological Sciences*, 274(1608), pp.303-313.
- Kleijn, D., Kohler, F., Báldi, A., Batáry, P., Concepción, E.D., Clough, Y., Diaz, M., Gabriel, D., Holzschuh, A., Knop, E. and Kovács, A., 2009. On the relationship between farmland biodiversity and land-use intensity in Europe. *Proceedings of the Royal Society of London B: Biological Sciences*, 276(1658), pp.903-909.
- Kokkoris, G.D., Troumbis, A.Y. and Lawton, J.H., 1999. Patterns of species interaction strength in assembled theoretical competition communities. *Ecology Letters*, 2(2), pp.70-74.
- Krause, A.E., Frank, K.A., Mason, D.M., Ulanowicz, R.E. and Taylor, W.W., 2003. Compartments revealed in food-web structure. *Nature*, 426(6964), pp.282-285.
- Krebs, J.R., Wilson, J.D., Bradbury, R.B. and Siriwardena, G.M., 1999. The second silent spring?. *Nature*, 400(6745), pp.611-612.
- Kremen, C., Williams, N.M. and Thorp, R.W., 2002. Crop pollination from native bees at risk from agricultural intensification. *Proceedings of the National Academy of Sciences*, 99(26), pp.16812-16816..
- Kwon, Y.J., Amin, M.R. and Inn, N.S.L., 2012. Parasitism and oviposition of *Melittobia acasta* on *Bombus terrestris*: Impact of larval overwintering and host status on pupation and adult emergence. *Entomological Research*, 42(2), pp.94-98.
- McCann, K., Hastings, A. and Huxel, G.R., 1998. Weak trophic interactions and the balance of nature. *Nature*, 395(6704), pp.794-798.
- McCann, K.S., 2000. The diversity–stability debate. *Nature*, 405(6783), pp.228-233.
- Montoya, J.M., Pimm, S.L. and Solé, R.V., 2006. Ecological networks and their fragility. *Nature*, 442(7100), pp.259-264.
- Natural England, 2016. [Online] *Countryside Stewardship* Available at: <https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-land-management#higher-tier> [Accessed 28 September 2016].
- O'Neill, K.M., 2001. *Solitary wasps: behavior and natural history*. Cornell University Press.
- Osorio, S., Arnan, X., Bassols, E., Vicens, N. and Bosch, J., 2015. Local and landscape effects in a host–parasitoid interaction network along a forest–cropland gradient. *Ecological Applications*, 25(7), pp.1869-1879.

- Paine, R.T. (1992). Food-web analysis through field measurement of per capita interaction strength. *Nature*, 355, 73–75.
- Pereira-Peixoto, M.H., Pufal, G., Staab, M., Feitosa Martins, C.E.L.S.O. and Klein, A., 2016. Diversity and specificity of host-natural enemy interactions in an urban-rural interface. *Ecological Entomology*.41(3), pp.241-252
- R. Team, 2013. R: A language and environment for statistical computing.
- Rose, F., 2006. The Wild Flower Key: how to identify wild flowers, trees & shrubs in Britain and Ireland, Penguin Books Ltd
- Smart, S.M., Firbank, L.G., Bunce, R.G.H. and Watkins, J.W., 2000. Quantifying changes in abundance of food plants for butterfly larvae and farmland birds. *Journal of Applied Ecology*, 37(3), pp.398-414.
- Stace, C., 2010. *New flora of the British Isles*. Cambridge University Press.
- Steckel, J., Westphal, C., Peters, M.K., Bellach, M., Rothenwoehrer, C., Erasmi, S., Scherber, C., Tschardtke, T. and Steffan-Dewenter, I., 2014. Landscape composition and configuration differently affect trap-nesting bees, wasps and their antagonists. *Biological Conservation*, 172, pp.56-64.
- Steffan-Dewenter, I. Landscape context affects trap-nesting bees, wasps, and their natural enemies. *Ecological Entomology* 27, no. 5 (2002): 631-637.
- Swift, M.J., Izac, A.M. and van Noordwijk, M., 2004. Biodiversity and ecosystem services in agricultural landscapes—are we asking the right questions?. *Agriculture, Ecosystems & Environment*, 104(1), pp.113-134.
- Thébault, E. and Fontaine, C., 2010. Stability of ecological communities and the architecture of mutualistic and trophic networks. *Science*, 329(5993), pp.853-856.
- Tilman, D., Fargione, J., Wolff, B., D'Antonio, C., Dobson, A., Howarth, R., Schindler, D., Schlesinger, W.H., Simberloff, D. and Swackhamer, D., 2001. Forecasting agriculturally driven global environmental change. *Science*, 292(5515), pp.281-284.
- Tschardtke, T., Klein, A.M., Kruess, A., Steffan-Dewenter, I. and Thies, C., 2005. Landscape perspectives on agricultural intensification and biodiversity–ecosystem service management. *Ecology letters*, 8(8), pp.857-874.
- Tylianakis, J.M., Tschardtke, T. and Lewis, O.T., 2007. Habitat modification alters the structure of tropical host–parasitoid food webs. *Nature*, 445(7124), pp.202-205.
- Tylianakis, J.M., Laliberté, E., Nielsen, A. and Bascompte, J., 2010. Conservation of species interaction networks. *Biological conservation*, 143(10), pp.2270-2279.
- Venables, W. N. & Ripley, B. D. (2002) *Modern Applied Statistics with S*. Fourth Edition. Springer, New York
- Vickery, J.A., Tallwin, J.R., Feber, R.E., Asteraki, E.J., Atkinson, P.W., Fuller, R.J. and Brown, V.K., 2001. The management of lowland neutral grasslands in Britain:

effects of agricultural practices on birds and their food resources. *Journal of Applied Ecology*, 38(3), pp.647-664.

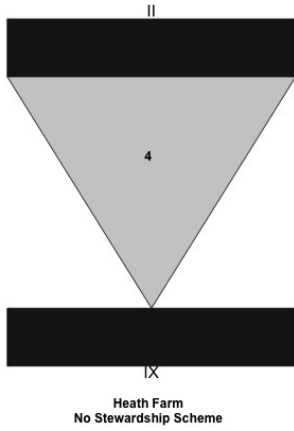
Williams, N.M. and Kremen, C., 2007. Resource distributions among habitats determine solitary bee offspring production in a mosaic landscape. *Ecological applications*, 17(3), pp.910-921.

Wood, T.J., Holland, J.M. and Goulson, D., 2015. Pollinator-friendly management does not increase the diversity of farmland bees and wasps. *Biological Conservation*, 187, pp.120-126.

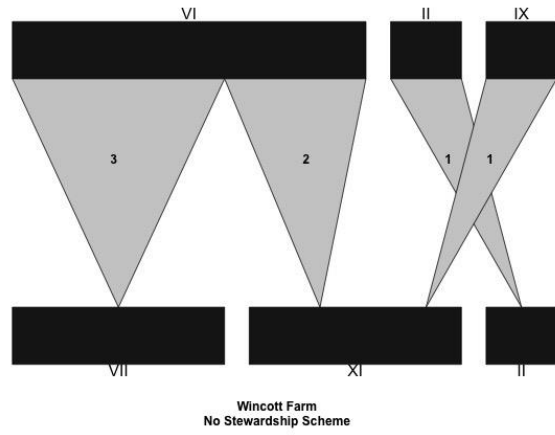
Yeo, P., Corbet, S.A., 1929. Solitary Wasps. The Richmond Pub. Co.

Supplementary Information

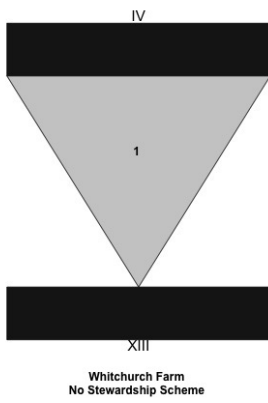
(a)



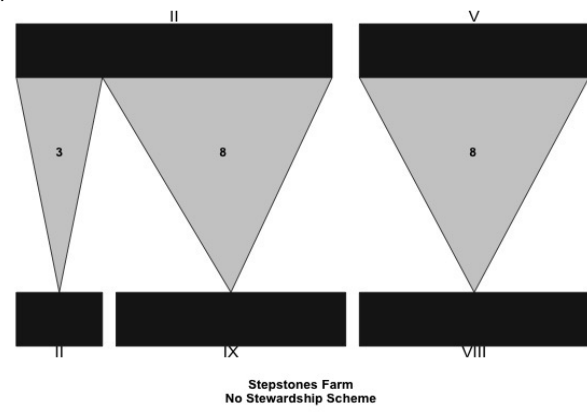
(b)



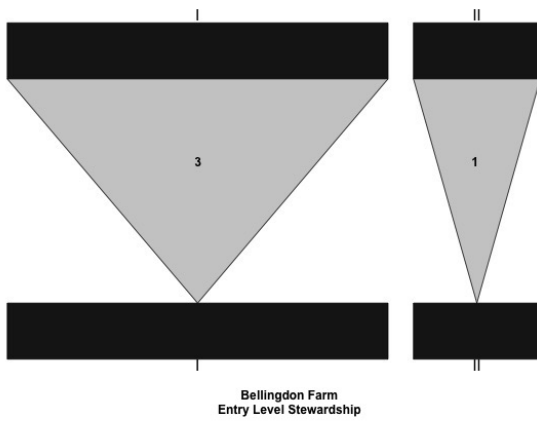
(c)



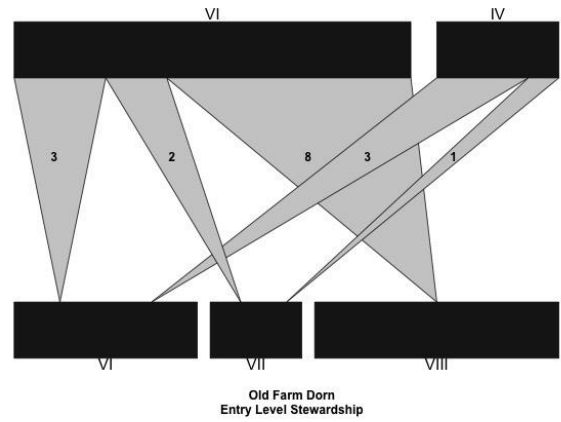
(d)



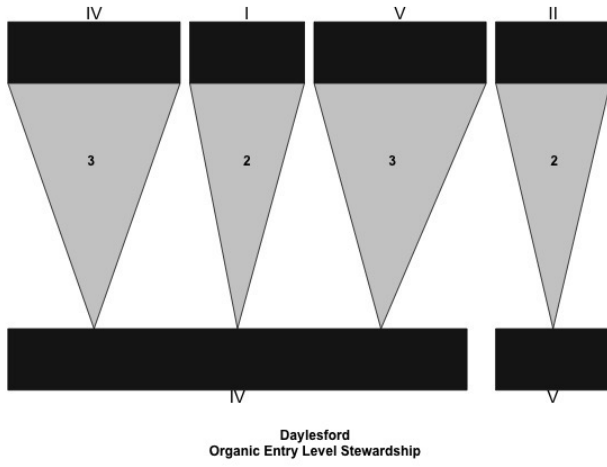
(e)



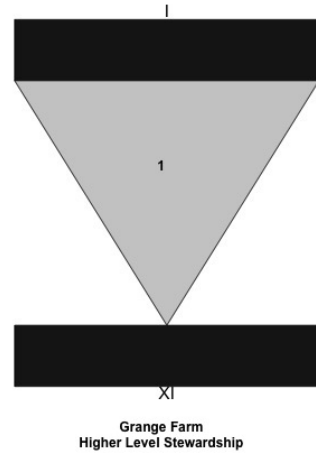
(f)



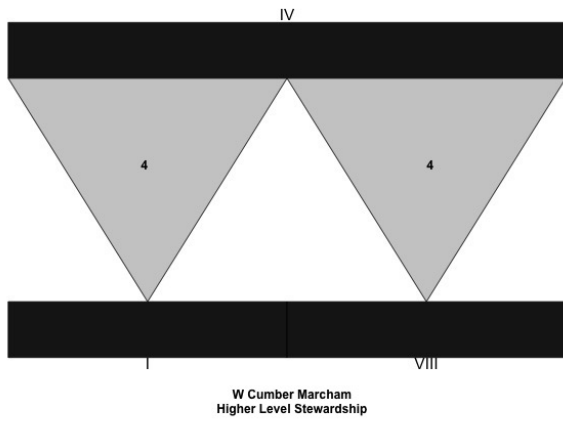
(g)



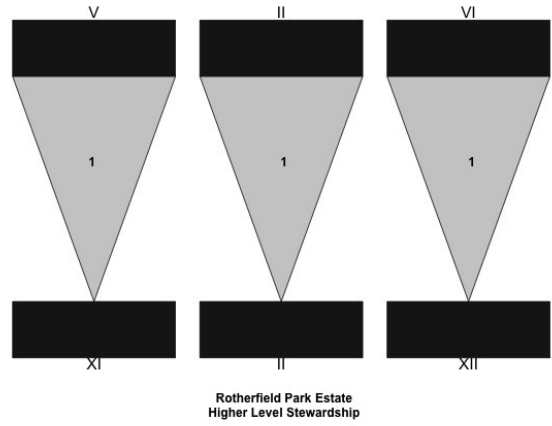
(h)



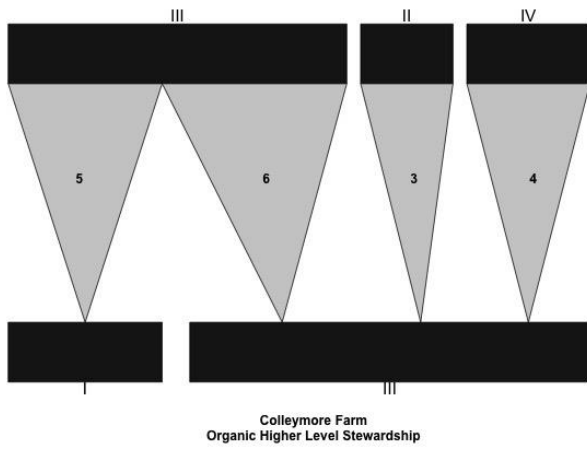
(i)



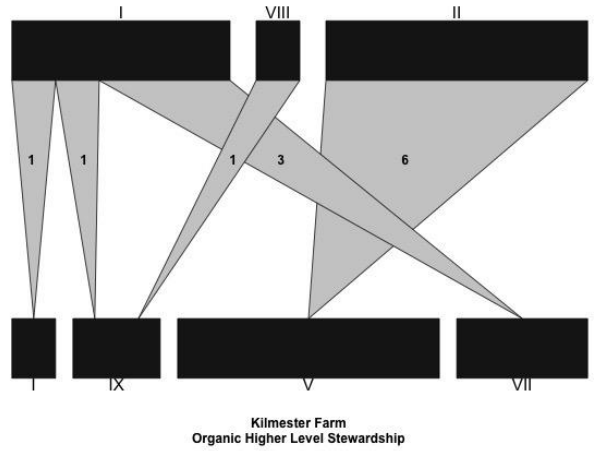
(j)



(k)



(l)



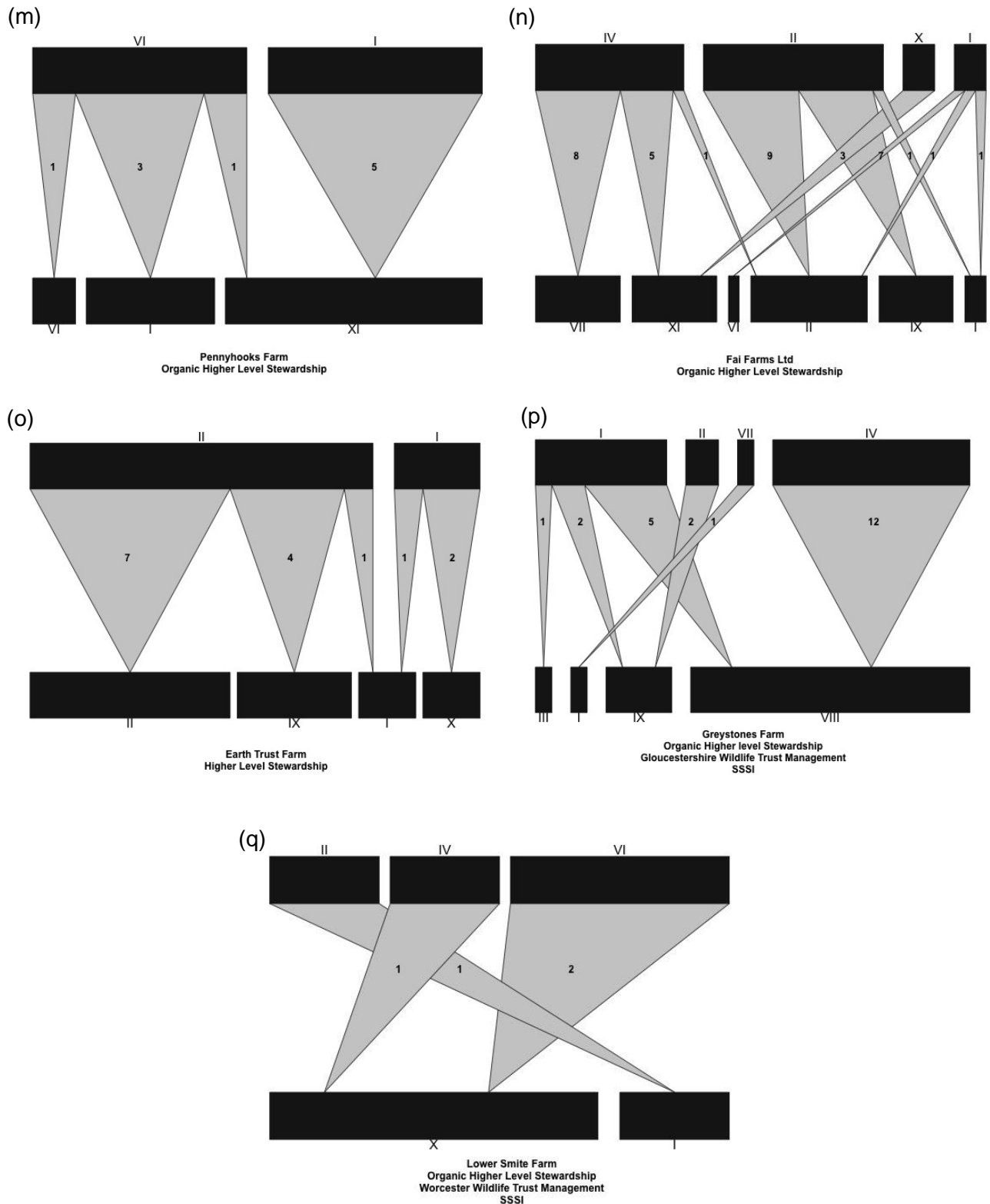


Figure 4 (a-q) Parasitism networks for all farms on which parasitism events were recorded. For each network, the lower bars represent the host species and the upper bars represent parasitoid species. The bars are weighted according to the number of host and parasitoid species involved in parasitism events. Additional information continues on to next page.

Linkage width indicates the frequency of each interaction (the number of interactions is also written on each link). The host species are as follows: I *Osmia* spp., II *Megachile versicolor*, III *Osmia Caerulescens*, IV *Symmorphus* spp., V *Megachile ligniseca*, VI *Ancistrocerus trifasciatus*, VII *Ancistrocerus/Symmorphus* spp., VIII *Symmorphus crassicornis*, IX *Megachile* spp., X *Trypoxylon attenuatum*, XI *Symmorphus gracilis*, XII unknown, XIII *Osmia bicornis*. The parasitoid species are as follows: I *Ephialtes manifestator*, II *Pteromalidus apum*, III *Sapyga quinquepunctata*, IV *Amoeba signata*, V *Melittobia acasta*, VI *Chrysis* spp., VII *Dibrachys microgastri*, VIII *Coelioxys elongata*, IX *Gasteruption jaculator*, X Chalcidoidea spp.

Occasionally, host and parasitoid specimens could not be identified confidently to species level. These individuals were grouped into Genus or Superfamily level categories, i.e. IV *Symmorphus* spp., VII *Ancistrocerus/Symmorphus* spp, IX *Megachile* spp, VI *Chrysis* spp. and X Chalcidoidea spp. It is possible that some of these individuals may have belonged to species represented in the networks; however, this was not possible to ascertain. Therefore, they are included in separate Genus or Superfamily level categories out of caution.

Table 5 Presented are statistics of the best minimal adequate Generalized Linear Models. Model selection was based on AIC values, and ΔAIC indicates the difference between the best and next best model. If the $\Delta AIC < 0.5$, as for Models 1 and 3, the next best models are also shown. For Model 1, there was no difference in outcome between the two models; all explanatory variables included were non-significant. For Model 3, there was also no difference in outcome; the number of parasitism events remained the sole significant variable. Coefficients of determination, D2 (the amount of deviance accounted for by the model) are provided – these were calculated using the “modEvA” package in R (Barbosa, et al., 2016). The full set of explanatory variables included in the full models for Models were: floral-unit abundance, the proportion of natural habitat, pesticide use and the number of parasitism events recorded.

Model	Response Variables	Explanatory variables	df	F	P
Best model, AIC = -13.75, Adj. D2 = 0.156, $\Delta AIC = 0.05$					
1(a)	Connectance	Pesticide Use	1,11	4.638	0.054
<i>Next Best model, AIC = -13.7, Adj. D2 = 0.192, $\Delta AIC = 0.95$</i>					
1(b)	Connectance	Proportion of natural habitat	1,10	1.613	0.051
		Pesticide Use	1,11	4.896	0.233
Best model, AIC = -6.33, Adj. D2 = 0.753, $\Delta AIC = 1.56$					
2	Link Density	Number of parasitism events	1,9	5.352	0.046
		Proportion of natural habitat	1,10	8.819	0.022
		Pesticide Use	1,11	31.426	0.003
Best model, AIC = -1.8, Adj. D2 = 0.589, $\Delta AIC = 0.34$					
3(a)	Interaction Diversity	Pesticide Use	1,11	11.047	0.108
		Number of parasitism events	1,10	11.396	0.007
<i>Next Best model, AIC = -1.46, Adj. D2 = 0.593, $\Delta AIC = 1.05$</i>					
3(b)	Interaction Diversity	Pesticide Use	1,11	11.294	0.082
		Number of parasitism events	1,10	11.65	0.02
		Floral unit abundance	1,9	1.223	0.297
Best model, AIC = 14.43, Adj. D2 = 0.027, $\Delta AIC = 0.82$					
4	Vulnerability	Proportion of natural habitat	1,11	2.562	0.138
Best model, AIC = 15.39, Adj. D2 = -0.166, $\Delta AIC = 1.48$					
5	Generality	Pesticide Use	1,11	0.858	0.376
		Number of parasitism events	1,10	0.578	0.465
Best model, AIC = 36.14, Adj. D2 = 0.43, $\Delta AIC = 0.52$					
6	Number of compartments	None of the explanatory variables	NA	NA	NA

Table 6 Summary of parasitism data across farms. Listed are the parasitoid species recorded across farms, and the total number of brood cells each species parasitized, broken down by host species. For raw parasitism data across bamboo shoots and nest boxes, see Table 1 in the Appendix.

Parasitoid and Host Species across Farms	Sum of Number of Brood Cells Parasitized
Bellingdon Farm	4
<i>Ephialtes manifestator</i>	3
<i>Osmia</i> sp.	3
<i>Pteromalidus apum</i>	1
<i>Megachile versicolor</i>	1
Colleymore Farm	18
<i>Amobia signata</i>	4
<i>Osmia caerulescens</i>	4
<i>Pteromalidus apum</i>	3
<i>Osmia caerulescens</i>	3
<i>Sapyga quinquepunctata</i>	11
<i>Osmia caerulescens</i>	6
<i>Osmia</i> sp.	5
Daylesford	10
<i>Amobia signata</i>	3
<i>Symmorphus</i> sp.	3
<i>Ephialtes manifestator</i>	2
<i>Symmorphus</i> sp.	2
<i>Melittobia acasta</i>	3
<i>Symmorphus</i> sp.	3
<i>Pteromalidus apum</i>	2
<i>Megachile ligniseca</i>	2
Earth Trust	15
<i>Ephialtes manifestator</i>	3
<i>Osmia</i> sp.	1
<i>Trypoxylon attenuatum</i>	2
<i>Pteromalidus apum</i>	12
<i>Megachile</i> sp.	4
<i>Megachile versicolor</i>	7
<i>Osmia</i> sp.	1
Grange Farm	1
<i>Ephialtes manifestator</i>	1
<i>Symmorphus gracilis</i>	1
Greystones Farm	23
<i>Amobia signata</i>	12
<i>Symmorphus crassicornis</i>	12
<i>Dibrachys microgastris</i>	1

<i>Osmia</i> sp.	1
<i>Ephialtes manifestator</i>	8
<i>Megachile</i> sp.	2
<i>Osmia caerulea</i>	1
<i>Symmorphus crassicornis</i>	5
<i>Pteromalidus apum</i>	2
<i>Megachile</i> sp.	2
Heath Farm	4
<i>Pteromalidus apum</i>	4
<i>Megachile</i> sp.	4
Kilmester Farm	12
<i>Coelioxys elongata</i>	1
<i>Megachile</i> sp.	1
<i>Ephialtes manifestator</i>	5
<i>Ancistrocerus/Symmorphus</i> sp.	3
<i>Megachile</i> sp.	1
<i>Osmia</i> sp.	1
<i>Pteromalidus apum</i>	6
<i>Megachile ligniseca</i>	6
Lower Smite Farm	4
<i>Amobia signata</i>	1
<i>Trypoxylon attenuatum</i>	1
<i>Chrysis</i> sp.	2
<i>Trypoxylon attenuatum</i>	2
<i>Pteromalidus apum</i>	1
<i>Osmia</i> sp.	1
Marcham Farm	8
<i>Amobia signata</i>	8
<i>Osmia</i> sp.	4
<i>Symmorphus crassicornis</i>	4
Old Farm Dorn	17
<i>Amobia signata</i>	4
<i>Ancistrocerus trifasciatus</i>	3
<i>Ancistrocerus/Symmorphus</i> sp.	1
<i>Chrysis</i> sp.	13
<i>Ancistrocerus trifasciatus</i>	3
<i>Ancistrocerus/Symmorphus</i> sp.	2
<i>Symmorphus crassicornis</i>	8
Pennyhooks Farm	10
<i>Chrysis</i> sp.	5
<i>Ancistrocerus trifasciatus</i>	1
<i>Osmia</i> sp.	3
<i>Symmorphus gracilis</i>	1

<i>Ephialtes manifestator</i>	5
<i>Symmorphus gracilis</i>	5
Rotherfield	3
<i>Chrysis</i> sp.	1
Unknown	1
<i>Melittobia acasta</i>	1
<i>Symmorphus gracilis</i>	1
<i>Pteromalidus apum</i>	1
<i>Megachile versicolor</i>	1
Stepstones Farm	19
<i>Melittobia acasta</i>	8
<i>Symmorphus crassicornis</i>	8
<i>Pteromalidus apum</i>	11
<i>Megachile</i> sp.	8
<i>Megachile versicolor</i>	3
Whitchurch Farm	1
<i>Amobia signata</i>	1
<i>Osmia bicornis</i>	1
Wincott Farm	7
<i>Chrysis</i> sp.	5
<i>Ancistrocerus/Symmorphus</i> sp.	3
<i>Symmorphus gracilis</i>	2
<i>Gasteruption jaculator</i>	1
<i>Symmorphus gracilis</i>	1
<i>Pteromalidus apum</i>	1
<i>Megachile versicolor</i>	1
Wytham Farm (Fai Farms Ltd)	37
<i>Amobia signata</i>	14
<i>Ancistrocerus/Symmorphus</i> sp.	8
<i>Megachile versicolor</i>	1
<i>Symmorphus gracilis</i>	5
<i>Chalcidoidea</i> sp.	3
<i>Symmorphus gracilis</i>	3
<i>Ephialtes manifestator</i>	3
<i>Ancistrocerus trifasciatus</i>	1
<i>Megachile versicolor</i>	1
<i>Osmia</i> sp.	1
<i>Pteromalidus apum</i>	17
<i>Megachile</i> sp.	7
<i>Megachile versicolor</i>	9
<i>Osmia</i> sp.	1

Determining the benefits of agri-environment management, favoured floral resources and the structure of pollen transport networks for solitary bees

Abstract

The provision of appropriate floral foraging resources for insect pollinators across agricultural landscapes is critical to the success of bee conservation efforts and a key focus of the UK agri-environment schemes. The objective of this study was to document pollen transport networks for cavity nesting solitary bee communities on farms in Central Southern England spanning a gradient of agri-environment scheme management levels. The aim was to identify the forage plants of preference for solitary bees and assess the extent to which the sown wildflower seed mixtures of the UK agri-environment schemes support these foraging preferences. An additional objective was to examine whether the structure of the solitary bee pollen transport networks and key indices of network stability were influenced positively by agri-environment management.

In total, 136 pollen samples were extracted from 286 brood cells of 6 common solitary bee species and the plant species identified using a novel next generation sequencing approach. Of the 32 plant species included currently in agri-environment scheme sown wildflower mixes, 15 were present on the study farms. However, pollen from just 1 of these species, *Ranunculus acris*, was identified within the brood cell pollen samples. The plant species that occurred with the highest frequency within the samples was *Rosa canina*. This species appears to be a forage plant of preference for solitary bees, in addition to providing a nesting resource for *Megachile* leafcutter bees. The findings from this study indicate that this plant species should be encouraged within the agri-environment schemes. *Rosa canina* is a climbing deciduous shrub and so is not

suitable for inclusion in wildflower seed mixtures; however, it could be encouraged as a hedgerow plant. Interestingly, *Tripleurospermum inodorum* and *Trifolium repens*, which have been identified by previous studies as important foraging resources for solitary bees, were also present in high frequency. These two species may be good candidates for inclusion in wildflower seed mixtures.

Analysis of pollen transport network metrics across farms identified a positive relationship between floral-unit abundance and network connectance and nestedness. Connectance describes the fraction of all possible links within a network that are realised; the higher the level of connectance within a network, the greater the degree of generalism of the species involved. This is believed to confer greater resilience to species loss as individuals have more flexibility to switch interaction partner, limiting the risk of a cascade of secondary species extinctions. The degree of nestedness within a network describes the extent to which the more specialist pollinator species interact with subsets of the plant species with whom more generalist pollinators interact. Higher levels of nestedness are believed to enhance community stability by ensuring a redundancy of interactions; if one pollinator species goes extinct, the plant species that it visited would still be visited by other species. This set of results suggests that the provision of increased floral-unit abundance, through agri-environment management may enhance the structural stability of solitary bee pollen transport networks. This is encouraging as it provides evidence that agri-environment management may promote the stability of cavity nesting solitary bee and wasp communities and their delivery of pollination services.

Introduction

The UK National Pollinator Strategy places strong emphasis on enhancing the availability of floral foraging resources for bees across urban and rural landscapes (DEFRA, 2014). It is vital that bees have access to appropriate floral foraging resources throughout the adult flight season (Müller et al., 2006; Vaudo et al., 2015). The availability of wildflower foraging resources has declined substantially across much of the British countryside over the last century and is believed to be a major contributor to long-term bee population declines (Goulson et al., 2008; Brown & Paxton, 2009; Vanbergen, 2013; Baude et al., 2016).

The reduction in wildflower foraging resources across the countryside has been driven to a large extent by the conversion of natural and semi-natural flower-rich habitat to intensive farmland. Across the UK, approximately 97% of flower-rich grasslands have been lost over the course of the 20th century (Howard et al., 2003). In order to mitigate the impact of agricultural intensification on floral resource availability, the UK agri-environment schemes now place key focus on the provision of floral foraging resources for bees and other insect pollinators on farmland (DEFRA, 2014; Natural England, 2016).

Under agri-environment scheme management, the availability of floral foraging resources on farmland is augmented via two strategies (Dicks et al., 2015). The first aims to increase the availability of naturally occurring wildflowers through the conservation of flower rich habitat, such as species rich grassland and hedgerows. The second strategy pays farmers to sow wildflower seed mixtures on their land, containing species believed to be attractive to insect pollinators. The options available currently under the 'Wild Pollinator and Farm Wildlife' package of the agri-environment schemes for implementation by farmers are listed in Table 1 (Natural England, 2016).

Table 3 Summary of interventions to enhance foraging resource availability for insect pollinators under the UK Countryside Stewardship Wild Pollinator and Farm Wildlife Package (Natural England, 2016). The specific codes for each option are included in the table as these are cited commonly in the Countryside Stewardship handbooks and wider literature.

Options available for implementation by farmers to provide nectar and pollen sources for insect pollinators
AB1 Nectar flower mix
AB8 Flower-rich margins and plots
AB15 Two-year sown legume fallow
AB16 Autumn sown Bumblebird mix
AB11 Cultivated areas for arable plants
BE3 Management of hedgerows
GS1 Take field corners out of management
GS2 Permanent grassland with very low inputs
GS4 Legume and herb-rich swards
OP4 Multi-species ley
WD3 Woodland edges on arable land
WT2 Buffering in-field ponds and ditches on arable land

There is evidence that these interventions, and the plant species they promote, support the foraging requirements of bumblebees and honeybees (Edwards, 2003; Pywell et al., 2005; Carvell et al., 2007; Rundlöf et al., 2008; Holland, 2015). However, questions have been raised over whether these interventions provide benefit to other wild insect pollinators (Wood et al., 2015).

The plant species included within the sown wildflower seed mixtures, such as the 'Bumblebird' mix (AB16), have been selected predominantly on the basis of honeybee and bumblebee foraging data (Haaland et al., 2011). The plants typically included within these seed mixtures, such as *Trifolium* spp, *Centaurea nigra* L. and *Lotus corniculatus* L., although foraged on extensively by bumblebees and honeybees, appear of limited utility to other wild insect pollinators (Wood et al., 2015). Particular concern exists concerning the effectiveness of current wildflower seed mixtures in supporting the foraging requirements of solitary bees.

Solitary bees are important and efficient pollinators, with 250 species in the UK (Dicks et al., 2010; Garibaldi et al., 2014; Dicks et al., 2015; Wood et al., 2015). A recent publication (Wood et al., 2016), based on flower visitation observation and pollen load analysis, found evidence that the majority of plant species included in the sown agri-environment wildflower seed mixtures are not visited by solitary bees. This has raised the question of whether the current agri-environment scheme wildflower seed mixtures contain the right combination of flowers and whether they might need to be re-formulated to ensure a diverse pollinator community, including solitary bees, in addition to honeybees and bumblebees, is promoted.

This study aimed to characterise the pollen transport networks of cavity nesting solitary bees on farmland managed under a gradient of investment in agri-environment management. The objective was to identify, within UK agricultural landscapes, the key plant species that solitary bees visited and selected pollen for provisioning to their offspring, and assess whether the sown wildflower seed mixtures of the agri-environment schemes support these foraging preferences. An additional objective was to investigate whether agri-environment management; through the provision of floral foraging resources and natural habitat; influences the structure of cavity nesting solitary bee pollen transport networks. The structure of these networks is thought to have an important influence on the stability of cavity nesting solitary bee communities and their delivery of pollination services.

Much research has been devoted to examining the relationship between ecological network structure and community stability (McCann, 2000; Montoya et al., 2006; Thébault & Fontaine, 2010). Within mutualistic networks, such as pollen transport networks, a highly connected structure with a diversity of interactions between plant and pollinator species is believed to enhance community stability by increasing resilience to species loss. Individuals have more flexibility to switch interaction partner, limiting the risk of a cascade of secondary species extinctions in response to the loss

of one species (Dunne et al., 2002; Montoya et al., 2006; Thébault & Fontaine, 2010). A nested structure, in which more specialist pollinator species interact with subsets of the plant species with whom more generalist pollinators interact, is also thought to promote stability (Bascompte et al., 2003; Bastolla et al., 2009). Nestedness ensures a redundancy of interactions; if one pollinator species goes extinct, the plant species that it visited can still be pollinated by other pollinators (Thébault & Fontaine, 2010).

Very few studies have investigated, within a temperate agricultural context, the impact of wildlife friendly management, such as that promoted by agri-environment schemes, on the structural stability of farmland pollination networks. Two studies have examined the impact of organic versus conventional farming on pollination network structure; the first, conducted on dairy farms in the Republic of Ireland, identified no effect of organic management on key indices of network stability (Power & Stout, 2011). The second study, conducted on South African vineyards, also identified no significant effect of organic management on pollination network structure (Kehinde & Samways, 2014). This study is the first to examine the impact of agri-environment management specifically on the structure of pollen transport networks and key quantitative measures of network stability.

For the construction of the pollen transport networks in this study, pollen samples were collected directly from the brood cells of cavity nesting solitary bees and the species composition of the pollen samples identified using next generation DNA sequencing. These networks provide the first accurate representation of the pollen species solitary bees select for provisioning to their offspring within UK agricultural landscapes. Previous studies, (e.g. Wood et al., 2016) utilised flower visitation observation and pollen load analysis, using light microscopy, to identify the forage species of preference for solitary bees. However, it is often not possible to distinguish from flower visitation observation, which plant species are selected specifically for offspring provisioning, among those visited for general foraging. In addition, it is often challenging to identify

pollen to species level using light microscopy, particularly for families such as Asteraceae and Brassicaceae (Williams & Kremen, 2007). Next generation sequencing of pollen DNA has the advantage of providing finer definition of species-specific foraging preferences for plant families whose pollen is difficult to distinguish morphologically (Bruni et al., 2015; Hawkins et al., 2015; Kraaijeveld et al., 2015; Bell et al., 2016). For example, two recent studies have compared the results of honeybee pollen identification from light microscopy and DNA sequencing and found that although significant overlap existed in the plant Families and Genera identified by the two techniques, the DNA sequencing methodology was able to achieve significantly higher species resolution (Keller et al., 2015; Smart et al., 2017).

DNA analysis has an additional advantage over flower visitation observation in that, not being restricted by field sampling effort, it allows identification of a wider range of forage species. For example, a recent study comparing the efficiency of pollen metabarcoding to flower visitation observation found that metabarcoding revealed 2.5 times more plant species than the observation methodology (Pornon et al., 2016).

A number of recent studies have used DNA sequencing to identify the foraging preference of honeybees and the floral composition of their honey (Valentini et al., 2010; Jain et al., 2013; Galimberti et al., 2014; Hawkins et al., 2015; Bruni et al., 2015; de Vere et al., 2017) but only two studies to date have used pollen DNA sequencing to identify solitary bee foraging preferences (Wilson et al., 2010; Sickel et al., 2015). This study is the first to use pollen DNA sequencing to identify solitary bee foraging preferences within an agricultural landscape with an applied objective of evaluating the suitability of forage resource provision.

Methodology

Site Selection

Nineteen farms were selected within a 60-mile radius of Oxford, representing a gradient of investment in agri-environment schemes. This ranged from intensive farms under no agri-environment scheme with no interventions to enhance the availability of wildflower foraging resources, to farms managed under higher-level agri-environment schemes, showcasing interventions to enhance pollinator foraging resource availability.

At the time this study was conducted, the UK agri-environment schemes were structured into Environmental Stewardship agreements. There were two tiers of agreement: Entry Level Stewardship and Organic Entry Level Stewardship (the more basic agri-environment agreements) and Higher Level Stewardship and Organic Higher Level Stewardship (more comprehensive agreements). The farms selected for this study spanned a range of these agreements, from the more basic to higher level (Table 2). All farms were mixed arable and pastoral, except three which were pastoral and ranged in size from 334842-16259444 m².

Table 2 Study farms listed according to their level of agri-environment agreement. The farms are ranked according to the level of agreement, from farms under no Environmental Stewardship scheme to those showcasing Higher Level schemes.

Farm	Location	Agri-Environment Level	Farm Size (m ²)
1. Heath Farm	52°10'32"N 1°39'59"W	No Environmental Stewardship agreement	1262404
2. Wincott Farm	52°08'28"N 1°43'50"W	No Environmental Stewardship agreement	782625
3. Whitchurch Farm	52°08'03"N 1°40'37"W	No Environmental Stewardship agreement	1185310
4. Stepstones Farm	52°06'29"N 1°37'42"W	No Environmental Stewardship agreement	636314
5. Bellingdon Farm	51°44'46"N 0°38'51"W	Entry Level Stewardship	383767
6. Middle Farm	51°59'16"N 1°06'52"W	Entry Level Stewardship	1982602
7. Old Farm Dorn	52°00'15"N 1°42'19"W	Entry Level Stewardship	1031550
8. Daylesford	51°55'42"N 1°38'25"W	Organic Entry Level Stewardship	7933978
9. Grange Farm	51°30'23"N 2°19'49"W	Higher Level Stewardship	3094816
10. East Hanney	51°38'06"N 1°23'14"W	Higher Level Stewardship	1897862
11. Marcham	51°39'56"N 1°20'37"W	Higher Level Stewardship	4102809
12. Rotherfield Park	51°19'57"N 0°37'45"W	Higher Level Stewardship	16259444
13. Colleymore Farm	51°38'30"N 1°38'30"W	Organic Higher Level Stewardship	2824027
14. Kilmester Farm	51°40'39"N 1°38'22"W	Organic Higher Level Stewardship	1613061
15. Pennyhooks Farm	51°36'31"N 1°39'36"W	Organic Higher Level Stewardship	334842
16. Wytham Farm	51°46'58"N 1°18'57"W	Organic Higher Level Stewardship	4246974
17. Earth Trust	51°37'50"N 1°11'21"W	Higher Level Stewardship, Earth Trust Management	5039674
18. Greystones Farm	51°53'08"N 1°45'05"W	Organic Higher Level Stewardship Gloucester Wildlife Trust, SSSI	666743
19. Lower Smite	52°13'40"N 2°09'27"W	Higher Level Stewardship Worcester Wildlife Trust, SSSI	623146

Solitary bee nest boxes

Fifteen solitary bee nest boxes were placed on each of the 19 farms in March 2014, so that they were available in time for colonisation by early-emerging solitary bees and wasps (Falk & Lewington, 2015). The nest boxes were constructed based on designs demonstrated to be occupied successfully by solitary bees and wasps (Tylianakis et al., 2007; Williams & Kremen, 2007; Fabian et al., 2013; Steckel et al., 2014). Each consisted of a 20 cm long plastic cylinder, of diameter 10cm, filled with hollow, untreated sections of bamboo ranging from 4-12mm in diameter (the size range preferred by most species (Tylianakis et al., 2007; Falk & Lewington, 2015)). They were placed approximately equidistant across the whole of each farm. The nest boxes were collected in November as the solitary bee flight season extends to mid-September (Falk & Lewington, 2015).

Pollinator foraging resource availability

Floral surveys were conducted on each farm to quantify the abundance and species richness of floral foraging resources available for insect pollinators while the solitary bee nest boxes were in the field.

The floral surveys were conducted three times on each farm; once in spring (April-May 2014), once in early-midsummer (June-July 2014) and once in late summer-early autumn (August-September 2014). All flowering entomophilous plants (all plants in flower and not wind pollinated) within a 15m radius of each nest box were identified to species level. The abundance of floral units of each species was recorded on a scale of 1-5, using a version of the DAFOR Scale (1 rare and 5 dominant). Floral units were categorized as a single solitary flower or capitulum (e.g. *Leucanthemum vulgare*), cyme (e.g. *Myosotis arvensis*), raceme (e.g. *Lysimachia vulgaris*), umbel (e.g. *Anthriscus sylvestris*), corymb (e.g. *Jacobea vulgaris*) or panicle (e.g. *Centranthus ruber*) as appropriate, following (Clapham, Tutin & Moore, 1987; Rose, 2016; Staces,

2010). See (Appendix, Table 5) for a description of the floral unit for each plant species recorded across the farms and the species authorities.

As the nest boxes were strategically placed equidistant and spread evenly across the entirety of each farm, the data, when amalgamated, provide an assessment of the overall floral-unit abundance and species richness of foraging resources at the whole-farm level. However, nectar and pollen resources provided by floral units varies across plant species (and this variation was not taken into account in the floral surveys). Thus, floral-unit abundance in this study is an approximate estimate of foraging resource availability.

Collection of pollen samples

In November 2014, all occupied bamboo tubes were extracted from the solitary bee nest boxes. Each bamboo was opened to record the total number of brood cells present and, for the 275 bamboo tubes occupied by solitary bees, to collect samples of residual brood cell pollen. Typically, a single female bee uses a bamboo tube and so for each bamboo, it was assumed that the same female created all of the brood cells present. Pollen samples were collected from two of the brood cells within each bamboo: the two cells either end of the tube, and pooled for analysis. These two brood cells were selected in order to achieve a good representation of the pollen collected by the female bee. By collecting samples from each end of the tube, it was hoped that the plant species visited by the female at the beginning and at the end of her flight season would be sampled.

Rearing and identification of bees

The bamboo tubes were re-sealed after pollen collection and placed in a climatically controlled room at 5°C over winter. In March 2015, they were transferred to room temperature to stimulate adult emergence. All solitary bees emerging from the bamboo

tubes were identified to species level and released into the wild. Only the pollen samples collected from bamboo tubes from which at least one bee successfully emerged were selected for pollen transport network analysis. In total this resulted in 164 pollen samples.

Next Generation Sequencing of pollen sample DNA

The pollen samples from each nest were sent to the Royal Botanic Gardens, Kew, for next generation sequencing. The samples were cleaned in 70% ethanol and DNA extracted using the DNeasy Plant Mini Kit (Qiagen), following the manufacturer's protocol.

PCR amplification of the internal transcribed spacer region 2 (ITS2) was carried out on the individual samples using the ITS3 and ITS4 primers (White et al., 1990). The PCR reaction mix contained; 25µl of Q5® High-Fidelity 2X Master Mix (New England Biolabs), 2.5µl each of the ITS3 and ITS4 primer, 2µl of genomic DNA and 18µl of nuclease free water. The cycling program was; 98°C 30sec, {98°C 10sec, 63°C 30Sec, 72°C 30sec } for 32 cycles, 72°C 2min. The products were cleaned using the UltraClean 96 PCR Cleanup Kit (384) (Qiagen) following the manufacturer's protocol and measured using a Quantus™ Fluorometer (Promega).

Amplicon libraries were prepared using 200ng of each PCR product and the NEBNext® Ultra™ II DNA Library Prep Kit for Illumina® with dual indexing. The products were end repaired and 'A' tailed using the NEBNext End Prep module, NEBNext adaptors were ligated onto the amplicons using the NEB Adaptor Ligation Module and dual indexes incorporated during the PCR enrichment step using NEBNext Ultra II Q5 Master Mix and NEB Next Multiplex Oligos for Illumina. The final products were cleaned using Ampure XP beads and pooled into 2 batches of 80 samples.

The pooled samples were normalised to 4nM, denatured with 0.2M NaOH, diluted with loading buffer to 17.5pM and run on as a 2x300 paired end read on a MiSeq using Reagent Kit v3 (600-cycles). PhiEx was added to the pooled samples (5%) to provide the required variability for adequate cluster recognition on the MiSeq flowcell. The FastQ output files were submitted to Dr Elizabeth Clare at Queen Mary University of London for analysis and species identification

Samples from the DNA bank at Kew or the living collections of species recorded on the study farms were Sanger sequenced bidirectionally using the same initial PCR primers and parameters as for the libraries. The sequences obtained were used as part of a reference database for species identification along with NCBI GenBank sequences. This reference database was converted to a BLAST database using makeblastdb in the BLAST suit (Bethesda, 2008).

Processing of the FastQ output files included assembling reads in MOTHUR (Kozich et al., 2013) and adapter removal using CUTADAPT (Martin, 2011) with any reads which could not be assembled or with incomplete adaptors excluded from further analysis. The reads were screened to remove those with ambiguous base calls or longer than 389bp (suggesting incorrect assembly). These values were determined following an iterative process of testing to retain best quality data in MOTHUR (Kozich et al., 2013) though this may exclude some rare taxa with very long sequences in this region. The reads were reduced to unique haplotypes for identification.

The data was then compared to the reference database using the BLAST method and the results were parsed using custom python scripts which retain only the top 10 matches for each read. Fungal matches were removed. Only matches which showed 100% similarity to the reference database with a bit score > 600 were considered. This represents a conservative approach to taxonomic assignment and will remove low

quality matches and putative chimeric sequences in the process. The reference database was examined using both sequence alignments and neighbor joining trees to identify taxa which cannot be reliably separated using this region (e.g. species with the same haplotype). For example, species within the genus *Veronica* are indistinguishable thus matches to the data are retained only at genus level. Following all processing steps, 1580 haplotypes were retained representing 136 of the original samples.

Network Construction

Quantitative pollen transport networks were constructed in R 2.14.0 (R Team, 2013) using the bipartite package (Dormann et al., 2009) for the 15 farms for which pollen samples, identifiable to specific bee species, were available. The NGS method used to identify the species present in each pollen sample only identified the presence of species and not the relative abundance of pollen belonging to each species. Therefore, the pollen transport networks are quantified instead based on the number of pollen samples in which each plant species was identified (i.e., incidence), for each bee species.

For the purposes of visualization and comparison of network structures between low and high agri-environment scheme management levels, the pollen transport networks were pooled for the no agri-environment scheme and Entry Level agri-environment scheme farms and separately for the farms under Higher Level agri-environment management.

Network Metrics

Quantitative (weighted) network metrics were calculated for each farm following the methods outlined by (Bersier et al., 2002), using the bipartite package (Dormann et al., 2009) in R 2.14.0 (R Team, 2013). The following weighted network metrics were

selected as they are identified as good indicators of stability for pollination networks (Bascompte et al., 2003; Bastolla et al., 2009; Tylianakis et al., 2010):

⇒ **Connectance:** the fraction of all possible links within a network that are realised.

The higher the level of network connectance, the greater the degree of generalism of the plant and pollinator species involved. This is hypothesized to confer greater resilience to species loss as there is more flexibility for individuals to switch interaction partner, limiting the risk of a cascade of secondary species extinctions (Dunne et al., 2002; Montoya et al., 2006; Thébault & Fontaine, 2010). A quantitative, weighted measure of connectance (Bersier et al., 2002) was selected to take into account the relative frequency of interactions between plants and pollinators.

⇒ **Link Density:** the mean number of links per species within the network. Higher link density is believed to correlate with greater resilience to species loss in a similar way to network connectance (Dunne et al., 2002; Montoya et al., 2006; Thébault & Fontaine, 2010). A weighted measure of link density was selected to take into account the relative frequency of interactions (Bersier et al., 2002).

⇒ **Generality (plant species):** the mean number of pollinator species per plant species within the network, weighted to take into account the relative frequency of interactions (Bersier et al., 2002). Higher levels of generalism are thought to increase network stability by decreasing the vulnerability of plant species to perturbations in the population size of the pollinator species with which they interact. If one or more interactions are disrupted, the impact will be lower for a generalist plant with many pollinators (McCann, 2000; Tylianakis et al., 2010).

⇒ **Generality (bee species):** the mean number of plant species visited by each pollinator species within the network, again weighted to take into account the relative frequency of interactions (Bersier et al., 2002). Higher generality is thought to increase network stability by decreasing the vulnerability of pollinator species to

perturbations in the population size of the plant species that they visit. If one or more interactions are disrupted, the impact will be lower for more generalist pollinators that are able to visit many plant species, conferring greater resilience to plant species loss (McCann, 2000; Tylianakis et al., 2010).

⇒ **Nestedness:** the extent to which the more specialist pollinator species within the network interact with subsets of the plant species with whom more generalist pollinators interact, weighted to take into account the relative frequency of interactions (Bastolla et al., 2009). Higher levels of nestedness are believed to enhance community stability by ensuring a redundancy of interactions; if one pollinator species goes extinct, the plant species that it visited will still be pollinated by other species (Bascompte et al., 2003; Bastolla et al., 2009).

These network metrics were calculated for the 14 out of the 15 individual farms where the networks were of minimum size for metric computation (the networks must contain interactions between a minimum of two plant and bee species for these metrics to be calculated).

Results

Nest Box Occupancy

Altogether, 255 solitary bee nest boxes were recovered from the farms, containing a total of 275 occupied bamboo tubes and a total of 2204 solitary bee brood cells. 164 of the occupied bamboo tubes produced at least one successfully emerging bee that could be identified with confidence to species level. The pollen samples from these 164 bamboo tubes were selected for analysis. Of the bees that emerged successfully, 6 species were identified: *Osmia bicornis* (Linnaeus, 1758), *Osmia caerulescens* (Linnaeus, 1758), *Megachile versicolor* Smith, F., 1844., *Megachile ligniseca* (Kirby, 1802), *Megachile centuncularis* (Linnaeus, 1758), and *Hylaeus confusus* Nylander, 1852.

Floral foraging resource availability

Plant species richness ranged from 27-67 species across farms. For a list of all plant species recorded across all nest boxes on all farms and their relative floral unit abundance, see (Appendix, Table 2). For a summary of plant species and their relative abundance across farms, see Chapter 2, Supplementary Information, Tables 4 and 5. As detailed in Chapter 2, there was a significant positive correlation between farm agri-environment management level and both the abundance of floral-units (Spearman's Correlation, $r_s(17)=0.546$, $p\text{-value}=0.017$) and species richness (Spearman's Correlation, $r_s(17)=0.603$, $p\text{-value}=0.006$). A spearman's correlation was selected in place of an ANOVA due to the small number of farms within each agri-environment level category (there were only 4 farms in the no Stewardship and Entry Level Stewardship categories). Plant species richness correlated significantly with floral-unit abundance across all farms (Pearson product-moment correlation, $r(17)=0.803$, $p\text{-value}<0.001$).

In total, 15 of the 34 plant species included in the sown wildflower seed mixes of the agri-environment schemes (Carvell et al., 2004; Carvell et al., 2007; Pywell et al., 2011; Wood et al., 2016) were recorded on the 15 study farms from which brood cell pollen samples were sequenced successfully (Table 3). Overall, these 15 plant species constituted 11.9% of total floral-unit abundance.

Table 3 Plant species included currently in the sown wildflower seed mixtures of the UK agri-environment schemes (Wood et al., 2016) (Carvell et al., 2004) (Carvell et al., 2007) (Pywell et al., 2011) and their representation across study farms.

Species included currently in sown wildflower seed mixtures	Recorded on study farms	% Of total floral-unit abundance (across all study farms)
<i>Achillea millefolium</i> L.	No	-
<i>Centaurea cyanus</i> L.	Yes	0.08
<i>Centaurea nigra</i> L.	Yes	0.73
<i>Centaurea scabiosa</i> L.	No	-
<i>Daucus carota</i> L.	No	-
<i>Galium verum</i> L.	Yes	0.09
<i>Geranium pratense</i> L.	Yes	0.13
<i>Knautia arvensis</i> L.	Yes	0.26
<i>Lathyrus pratensis</i> L.	No	-
<i>Leontodon hispidus</i> L.	No	-
<i>Leucanthemum vulgare</i> L.	Yes	0.91
<i>Lotus corniculatus</i> L.	Yes	1.13
<i>Lotus pedunculatus</i> Cav.	No	-
<i>Lychnis flos-cuculi</i> L.	Yes	0.05
<i>Malva moschata</i> L.	No	-
<i>Medicago lupulina</i> L.	Yes	1.55
<i>Medicago sativa</i> L.	No	-
<i>Mellilotus officinalis</i> L.	No	-
<i>Onobrychis viciifolia</i> L.	Yes	0.10
<i>Origanum vulgare</i> L.	Yes	0.03
<i>Phacelia tanacetifolia</i> L.	No	-
<i>Plantago lanceolate</i> L.	No	-
<i>Plantago media</i> L.	No	-
<i>Primula veris</i> L.	Yes	0.48
<i>Prunella vulgaris</i> L.	Yes	0.11
<i>Ranunculus acris</i> L.	Yes	5.01
<i>Rhinanthus minor</i> L.	No	-
<i>Rumex acetosella</i> L.	No	-
<i>Sanguisorba minor</i> L.	No	-
<i>Silene dioica</i> L.	Yes	0.36
<i>Sonchus arvensis</i> L.	Yes	1.96
<i>Trifolium hybridum</i> L.	No	-

Pollen Species Identification

Pollen DNA from 136 of the original 164 pollen samples was sequenced successfully and identified to species level. The 28 pollen samples that were not sequenced successfully failed as a result of lack of high quality pollen DNA. Twenty-three plant species were identified within the pollen samples that were sequenced (Table 4). They are all relatively common British wildflowers (Blamey, 2013).

Table 4 Plant species identified within the pollen samples. For each bee species, the percentage of pollen samples sequenced for that species in which each plant occurred is displayed. The cells are shaded according to this % value. *Ranunculus acris* is marked with an asterisk as this is the only plant species from the list included currently in the agri-environment scheme wildflower seed mixtures. The plant species are ranked according to the number of pollen samples each was present in, from highest to lowest.

	<i>Osmia bicornis</i>	<i>Osmia caerulescens</i>	<i>Megachile versicolor</i>	<i>Megachile ligniseca</i>	<i>Megachile centuncularis</i>	<i>Hylaeus confusus</i>
No pollen samples analysed	12	23	78	18	3	2
<i>Rosa canina</i> L.	83.30	91.30	97.44	100.00	100.00	50.00
<i>Malva sylvestris</i> L.	16.70	43.48	12.82	5.60	66.66	50.00
<i>Tripleurospermum inodorum</i> L.	0.00	4.35	16.67	22.20	0.00	0.00
<i>Ranunculus acris</i> L. *	33.30	8.70	10.26	5.60	0.00	50.00
<i>Trifolium repens</i> L.	0.00	56.52	2.56	5.60	0.00	0.00
<i>Epilobium hirsutum</i> L.	0.00	4.35	15.38	5.60	0.00	0.00
<i>Stachys sylvatica</i> L.	0.00	39.13	1.28	5.60	0.00	50.00
<i>Clematis vitalba</i> L.	8.30	0.00	6.41	16.70	33.33	0.00
<i>Heracleum sphondylium</i> L.	0.00	39.13	1.28	0.00	0.00	0.00
<i>Dipsacus fullonum</i> L.	0.00	0.00	3.85	33.30	0.00	0.00
<i>Crepis capillaris</i> L.	0.00	0.00	10.26	5.60	0.00	0.00
<i>Anthriscus sylvestris</i> L.	33.30	8.70	0.00	0.00	0.00	0.00
<i>Convolvulus arvensis</i> L.	0.00	0.00	6.41	5.60	0.00	0.00
<i>Pentaglottis sempervirens</i> L.	16.70	0.00	3.85	0.00	0.00	0.00
<i>Lamium album</i> L.	8.30	8.70	0.00	0.00	0.00	0.00
<i>Ajuga reptans</i> L.	0.00	8.70	0.00	0.00	0.00	0.00
<i>Geranium robertianum</i> L.	8.30	0.00	1.28	0.00	0.00	0.00
<i>Carduus nutans</i> L.	0.00	0.00	0.00	5.60	0.00	0.00
<i>Eupatorium cannabinum</i> L.	0.00	0.00	0.00	5.60	0.00	0.00
<i>Ilex aquifolium</i> L.	0.00	0.00	1.28	0.00	0.00	0.00
<i>Lysimachia vulgaris</i> L.	8.30	0.00	0.00	0.00	0.00	0.00
<i>Matricaria discoidea</i> DC.	0.00	0.00	1.28	0.00	0.00	0.00
<i>Pulicaria dysenterica</i> L.	0.00	0.00	1.28	0.00	0.00	0.00

Percentage of pollen samples in which each plant species was recorded

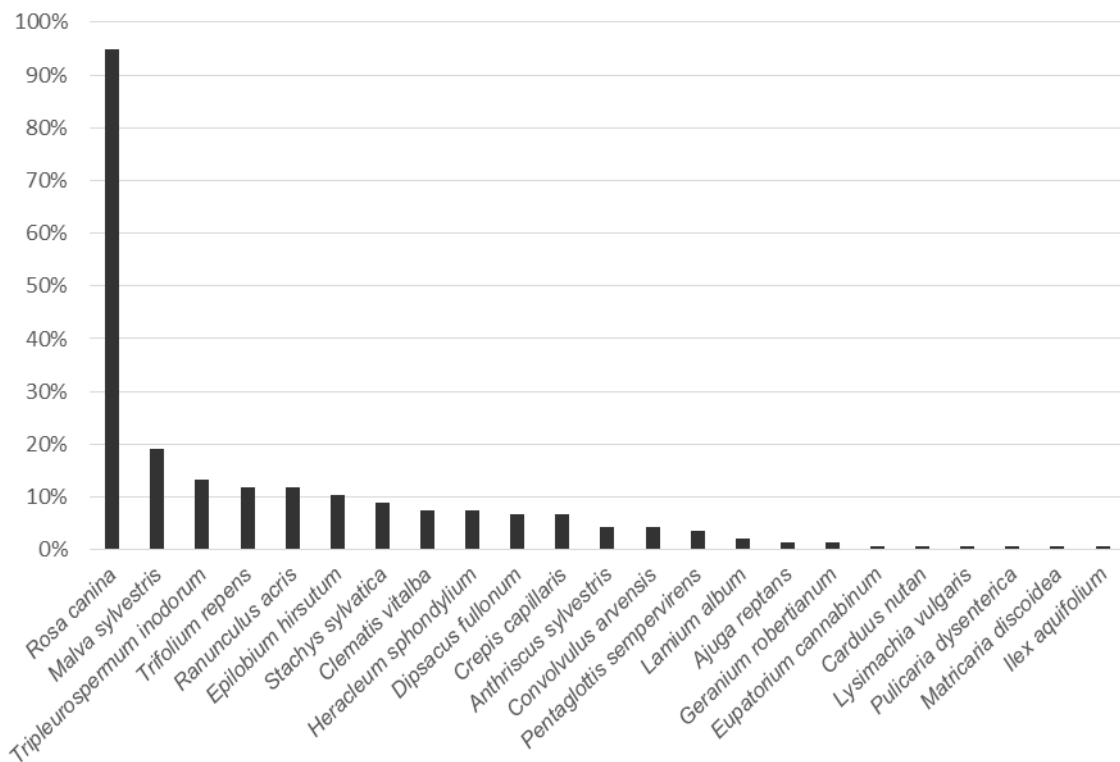


Figure 5 Bar chart displaying, for all 136 pollen samples sequenced successfully, the percentage of samples in which each plant species was recorded

Pollen transport networks and network metrics

Pollen transport networks were constructed for the 15 farms where pollen samples, which could be linked to a specific species of bee, were available (see Supplementary Information, Figure 3 (a-n) and supporting data, Table 5). The networks were pooled into two groups: the no-Stewardship with the Entry Level Stewardship farms (see Figure 2 (a)), and separately for Higher Level Stewardship Farms (see Figure 2 (b)) to allow comparison of network structures between farms under low and high agri-environment scheme management levels.

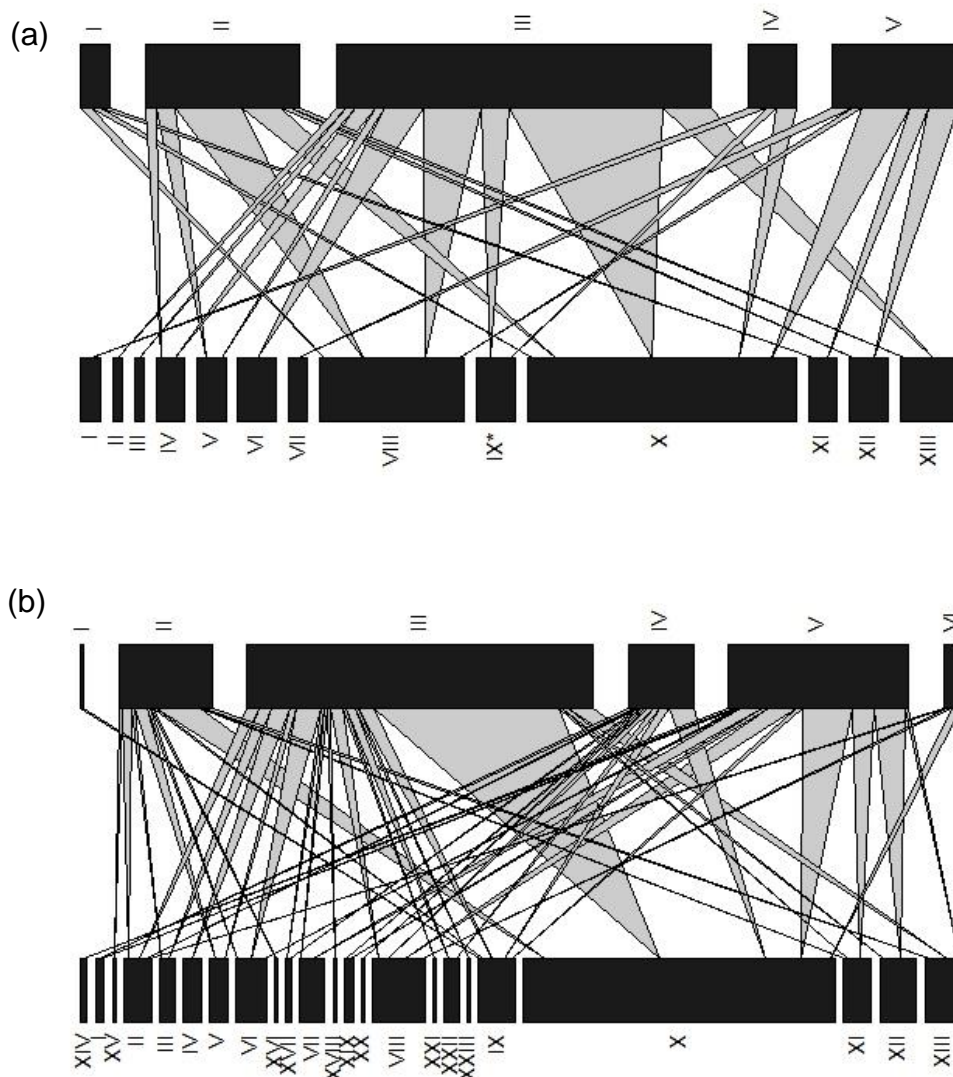


Figure 6 (a) pollen transport network for farms under low agri-environment management (no stewardship and Entry Level Stewardship farms) & (b) network for farms under high agri-environment management (Higher-level Stewardship farms). The lower bars represent the plant species and the upper bars represent bee species. Linkage width indicates the fraction of pollen samples from that bee species in which the plant species. The length of the bars for the bee species represents the number of pollen samples available for each species. The length of the bars for plant species represents the frequency of occurrence of each species within the pollen samples.

For bee species I *H. confusus*, II *M. ligniseca*, III *M. versicolor*, IV *O. bicornis*, V *O. caerulescens* & VI *M. centuncularis*. For plant species I *A. sylvestris*, II *C. vitalba*, III *C. arvensis*, IV *C. capillaris*, V *D. fullonum*, VI *E. hirsutum*, VII *H. sphondylium*, VIII *M. sylvestris*, IX *R. acris*, X *R. canina*, XI *S. sylvatica*, XII *T. repens*, XIII *T. inodorum*, XIV *A. reptans*, XV *C. nutans*, XVI *E. cannabinum*, XVII *G. robertianum*, XVIII *I. aquifolium*, XIX *L. album*, XX *L. vulgaris*, XXI *M. discoidea*, XXII *P. sempervirens*, XXIII *P. dysenterica*

The weighted network metrics connectance, link density, generality (plants), generality (bees) and nestedness were calculated for 14 of the farms, where sufficient data were available (a minimum of two pollinator and plant species; Table 4).

Table 4 Network metrics for the 14 farms where the networks were of sufficient size for metric computation. Pollen sample size refers to the number of pollen samples available for each farm

Farm	Stewardship	Pollen Sample Size	Connectance	Link Density	Generality (plants)	Generality (bees)	Nestedness
Heath Farm	None	2	0.750	1.667	1.667	1.667	NA
Wincott	None	2	0.625	2.000	1.400	2.600	-0.174
Bellingdon	EL	8	0.583	3.481	2.104	4.859	0.609
Daylesford	EL	5	0.625	1.916	1.436	2.396	-0.204
Old Farm Dorn	EL	10	0.625	2.888	1.441	4.336	-0.307
Colleymore	HL	10	0.455	3.718	1.464	5.971	0.489
Grange Farm	HL	7	0.667	2.548	1.633	3.464	0.288
Kilmester	HL	10	0.375	2.836	2.078	3.595	0.207
Lower Smite	HL	27	0.425	2.724	1.926	3.522	0.273
Earth Trust	HL	11	0.500	2.205	1.650	2.760	0.742
Marcham	HL	8	0.375	2.467	1.381	3.558	NA
Fai Farms	HL	15	0.393	3.582	2.345	4.820	0.079
Pennyhooks	HL	9	0.700	2.511	1.668	3.355	0.900
Rotherfield	HL	9	0.542	3.348	1.999	4.698	0.769

Comparison of network metrics between low and high agri-environment managed farms

One way ANOVAs were conducted in R 2.14.0 (R Team, 2013) in order to examine whether a significant difference in mean metric value was observed between farms managed under low versus higher levels of agri-environment agreements (no Stewardship and Entry Level Stewardship farms compared to those managed under Higher Level Stewardship). The full results of the ANOVAs are presented in Table 6. None of the network metrics were effected significantly by the level of agri-environment agreement (significant p-value set at <0.05). Examination of the model validation plots

suggested that the parametric test assumptions were met and that the data did not require transformation or specification of an alternative error structure.

Table 5 One-way ANOVA results: comparison of network metrics between farms under low agri-environment management (No Stewardship & Entry Level Stewardship farms) and high agri-environment management (Higher Level Stewardship Farms)

Model Type	Network Metric	Predictor	df	F	P
One-way ANOVA	Connectance	Agri-environment management level: Low or High	2,11	3.37	0.07
	Generality (bees)	Agri-environment management level: Low or High	2,11	2.66	0.11
	Generality (plants)	Agri-environment management level: Low or High	2,11	0.63	0.55
	Link Density	Agri-environment management level: Low or High	2,11	2.76	0.11
	Nestedness	Agri-environment management level: Low or High	2,9	2.61	0.13

Across farm analysis of network metrics

Generalized linear models were constructed in R 2.14.0 (R Team, 2013) to investigate the effect of the following explanatory variables on the value of the network metrics across the 14 study farms for which metrics could be calculated:

- IX. Farm floral-unit abundance
- X. Farm plant species richness
- XI. The number of pollen samples available for each farm
- XII. The number of bee species from which pollen samples were taken

The number of pollen samples available for each farm and the number of bee species from which pollen samples were taken were included as explanatory variables to take into account differences in sample size across farms.

Gaussian error structures were specified for all of the models. Models including all explanatory variables, but no interactions, were constructed in the first instance and then simplified following the method outlined by (Crawley, 2005), using the Akaike

information criterion, to identify the minimum adequate models. The Akaike information criterion was calculated in R 2.14.0 using the MASS add on package (Venables & Ripley, 2002). Examination of the model validation plots indicated that, in each case, the model assumptions were met.

Connectance: The best-fitting model included floral-unit abundance, plant species richness and the number of bee species as explanatory variables. Floral-unit abundance had a positive effect on connectance (GLM, $F(1,12)=2.497$, $p\text{-value}<0.007$), as did plant species richness (GLM, $F(1,11)=23.394$, $p\text{-value}=0.004$) and the number of bee species from which pollen samples were taken (GLM, $F(1,10)=51.167$, $p\text{-value}<0.001$). See Supplementary Information, Table 6 for more detail on model output and selection.

Link Density: The best-fitting model included the number of bee species from which pollen samples were taken as the sole explanatory variable. The number of bee species had no significant effect on link density (GLM, $F(1,12)=3.3694$, $p\text{-value} = 0.0913$). See Supplementary Information, Table 6 for model detail.

Generality (plants): The best-fitting model included bee species richness as the sole explanatory variable. Bee species richness had a significant effect on Generality (plants) (GLM, $F(1,12)=5.844$, $p\text{-value} = 0.032$). See Supplementary Information, Table 6 for model detail.

Generality (bees): The best-fitting model included plant species richness as the sole explanatory variable. Plant species richness had no significant effect on Generality (bees) (GLM, $F(1,12)=2.754$, $p\text{-value} = 0.123$). See Supplementary Information, Table 6 for model detail.

Nestedness: The best-fitting model included floral-unit abundance as the sole explanatory variable. Floral-unit abundance had a positive effect on nestedness (GLM,

$F(1,10)=29.953$, $p\text{-value}=<0.001$). See Supplementary Information, Table 6 for detailed model output.

Number of plant species visited within farm networks: The best-fitting model included the number of bee species from which pollen samples were taken, floral-unit abundance and plant species richness as the sole explanatory variables. The number of bee species had a positive effect on the number of plant species visited within the networks (GLM, $F(1,11)=9.356$, $p\text{-value}=0.011$). Floral-unit abundance had no significant effect (GLM, $F(1,13)=2.685$, $p\text{-value}=0.223$) and neither did plant species richness (GLM, $F(1,12)=5.098$, $p\text{-value}=0.175$). See Supplementary Information, Table 6 for detailed model output.

Discussion

This is the first study to document pollen transport networks for cavity nesting solitary bee communities on UK farmland. Pollen samples were obtained from 6 species of solitary bee: *Osmia bicornis*, *Osmia caerulea*, *Megachile versicolor*, *Megachile ligniseca*, *Megachile centuncularis* and *Hylaeus confusus*. All species are widely distributed across the UK, commonly occupy solitary bee nest boxes and are important pollinators (Gruber et al., 2011; Falk & Lewington, 2015). Therefore, they can be considered a reasonably good selection of species for this analysis of cavity nesting solitary bee foraging preferences.

Fifteen of the plant species included currently in the UK agri-environment scheme sown wildflower mixes were recorded as present on the study farms. However, pollen from only one of these species, *Ranunculus acris* was present within the bee brood cell pollen samples. This is concerning as it indicates that among the 15 plant species included in current wildflower seed mixes and available on the farms, only *Ranunculus*

acris pollen was collected by the solitary bee species surveyed in this study. This supports other recent findings by (Wood et al., 2016) which suggested that many of the plant species included currently in the agri-environment scheme sown wildflower mixtures are of limited utility to solitary bees.

The plant species that occurred most frequently in pollen samples was *Rosa canina*, which was present in 129 of the 136 samples. *Rosa canina* was not present in particularly high abundance across the study farms; it constituted just 0.12% of total floral-unit abundance. Its frequent occurrence in pollen samples therefore cannot be explained by a high abundance in the environment. It is well known that leafcutter bees of the genus *Megachile* often construct their brood cells out of rose leaves. This may explain why 97% of the pollen samples obtained from *Megachile versicolor* and 100% from *Megachile ligniseca* and *Megachile centuncularis* contained *Rosa canina* DNA, if their pollen samples were contaminated by brood cell leaf DNA (Falk & Lewington, 2015). However, the fact that *Rosa canina* pollen was also identified in 91% of the pollen samples from *Osmia caerulescens*, 83% of the samples from *Osmia bicornis* and 50% of samples from *Hylaeus confusus* implies that *Rosa canina* may, in fact, be a highly popular forage plant for solitary bees. This information, combined with the fact that rose leaves are known to be important nesting material for *Megachile* leafcutter bees, provides strong justification for the inclusion of *Rosa canina* within the group of pollinator forage plants encouraged by agri-environment schemes. *Rosa canina* is a climbing deciduous shrub and so is not suitable for inclusion in wildflower seed mixtures; however, it could be encouraged as a hedgerow plant.

The other plant species that occurred with high frequency within samples (ranked within the top 5 species) were *Malva sylvestris*, *Tripleurospermum inodorum*, *Ranunculus acris* and *Trifolium repens*. None of these plant species were present in especially high abundance on the study farms: *Malva sylvestris* constituted 0.05% of

total floral-unit abundance across farms, *Tripleurospermum inodorum* 0.19%, *Ranunculus acris* 5.01% and *Trifolium repens* 6.01%.

Of the top five species recorded within this study, *Tripleurospermum inodorum* and *Trifolium repens* were also identified as important forage plants for solitary bees in a recent study on agri-environment managed farms in Hampshire and West Sussex by (Wood et al., 2016), from field observation and pollen load analysis. This previous study examined the foraging preferences of 72 species of solitary bees (Wood et al., 2016). As both sets of farms were situated in central southern England and managed under the same set of agri-environment scheme agreements, it can be assumed that the plant assemblages present would be quite similar. The identification of *Tripleurospermum inodorum* and *Trifolium repens* as important solitary bee forage plants by both studies suggests that these could be considered as additional candidates for inclusion in the agri-environment scheme sown wildflower seed mixtures. Both species thrive on a variety of soil types and across a broad range of habitats within the UK, so could be grown successfully and widely by farmers.

The number of pollen samples collected across bee species and across farms within this study varied considerably (there was a range of 2-75 samples across bee species and 2-27 samples across farms). The network metrics calculated within this study for the farm pollination networks are highly sensitive to the number of recorded interactions and species richness. Therefore, the number of pollen samples analysed and species richness of bees was taken into account in the statistical analysis of network metrics across farms.

Floral-unit abundance, plant species richness and the number of bee species from which pollen samples were obtained were identified as having a positive effect on network connectance. Connectance describes the fraction of all possible links within a network that are realised and is a standard measure of food web complexity (Tylianakis

et al., 2010; Rooney & McCann, 2012). The higher the level of connectance for a given network size, the greater the degree of generalism of the species involved. This is believed to confer greater resilience to species loss as there is more flexibility for individuals to switch interaction partner, limiting the risk of a cascade of secondary species extinctions (Dunne et al., 2002; Montoya et al., 2006; Thébault & Fontaine, 2010). Farm level floral-unit abundance and species richness had a positive effect on connectivity, suggesting that the provision of a high abundance and species richness of forage plants within the farmed environment, through agri-environment management, may increase the connectivity and stability, of solitary bee pollen transport networks.

None of the explanatory variables significantly influenced the generality of bee species and only the species richness of bees significantly affected the generality of plant species. These metrics provide an indication of the degree of specialism of the species present in the networks. High levels of specialism within a network can reduce community resilience by increasing the vulnerability of species to perturbations in the population size of the species with which they interact (McCann, 2000; Thebault & Fontaine, 2010; Tylianakis et al., 2010). The generality of the bees within these networks was unaffected by the abundance of floral-units and plant species richness in the environment. The number of plant species from which the bees collected pollen was also unaffected by floral-unit abundance or plant species richness.

Bee foraging behaviour is known to be influenced by the quantity and quality of the foraging resources available in the environment (Goulson, 1999). Unfortunately, the relative proportion of pollen species present within each sample could not be quantified within this study, as the next generation sequencing approach could only identify the presence of species. If available, these additional data would have allowed more accurate quantitative construction of the pollen transport networks, perhaps allowing the detection of more subtle variations in bee foraging behaviour according to the

availability of foraging resources in the environment. Additional data, capturing a larger number of pollen samples per bee species and quantifying the composition of plant species present within each sample is required to study foraging specialism within these networks more precisely.

However, the abundance of floral-units in the environment was identified as having a significant, positive effect on the level of nestedness within the pollen transport networks. The degree of nestedness within a network describes the extent to which the plant species interacting with specialist pollinators are a proper subset of the plants interacting with generalists (Bastolla et al., 2009; Tylianakis et al., 2010). A nested structure is believed to enhance the stability of pollination networks by ensuring that, if a specialist pollinator goes extinct, more generalist pollinators still pollinate the plant species that the specialist visited (Memmott et al., 2004; Thébault & Fontaine, 2010). The significant positive relationship identified between network nestedness and the abundance of floral-units implies that network stability might be enhanced by a high local abundance of foraging resources. Network connectance was also enhanced by the abundance of floral-units in the environment, suggesting that the provision of floral resources through agri-environment management may exert a positive influence on the stability of solitary bee pollen transport networks.

Conclusion

The foraging data presented in this study supports recent evidence (Wood et al., 2015; Wood et al., 2016) suggesting that the sown wildflower seed mixtures of the UK agri-environment schemes are not supporting the foraging requirements of solitary bee communities as effectively as they might. Pollen from only one of the 15 plant species included currently in agri-environment scheme sown wildflower mixes and present on the study farms was used for offspring provisioning by solitary bees (*Ranunculus acris*). *Rosa canina* was identified as a particularly important forage plant for solitary

bees and nesting resource for *Megachile* leafcutter bees; this species could be encouraged as a hedgerow plant within the agri-environment schemes. *Tripleurospermum inodorum* and *Trifolium repens*, which were identified by the (Wood et al., 2016) study as important foraging resources for solitary bees, were also found to be popular forage plants in this study, suggesting that they may be good candidates for inclusion in wildflower seed mixtures.

Analysis of pollen transport network structure identified that network connectance and nestedness were influenced positively by the abundance of floral-units in the environment. This suggests that the provision of floral foraging resources, through agri-environment management, may have the potential to enhance the stability of solitary bee pollen transport networks and pollination service delivery. If forage resource provision was to support the specific foraging requirements of solitary bees more effectively, by including more species of preference, a stronger positive effect of floral-unit abundance on pollen transport network stability might be observed.

The results presented in this study are highly relevant to the pollinator conservation policy of the UK agri-environment schemes. They reinforce the importance of forage resource provision, identifying a positive association between floral-unit abundance and the stability of cavity nesting solitary bee pollen transport networks. The results also provide specific recommendations for plant species to encourage within the UK agri-environment schemes, to ensure the forage requirements of solitary bees are supported more effectively.

Works Cited

- Barbosa A.M., Brown J.A., Jimenez-Valverde A., Real R., 2016. *Model Evaluation and Analysis: Package 'modEvA'*. <http://modeva.r-forge.r-project.org/>
- Bascompte, J., Jordano, P., Melián, C.J. and Olesen, J.M., 2003. The nested assembly of plant–animal mutualistic networks. *Proceedings of the National Academy of Sciences*, 100(16), pp.9383-9387.
- Bastolla, U., Fortuna, M.A., Pascual-García, A., Ferrera, A., Luque, B. and Bascompte, J., 2009. The architecture of mutualistic networks minimizes competition and increases biodiversity. *Nature*, 458(7241), pp.1018-1020.
- Baude, M., Kunin, W.E., Boatman, N.D., Conyers, S., Davies, N., Gillespie, M.A., Morton, R.D., Smart, S.M. and Memmott, J., 2016. Historical nectar assessment reveals the fall and rise of floral resources in Britain. *Nature*, 530(7588), pp.85-88.
- Bell, K.L., de Vere, N., Keller, A., Richardson, R.T., Gous, A., Burgess, K.S. and Brosi, B.J., 2016. Pollen DNA barcoding: current applications and future prospects 1. *Genome*, 59(9), pp.629-640.
- Bethesda (MD): National Center for Biotechnology Information (US); 2008-. BLAST® Command Line Applications User Manual [Internet]: Building a BLAST database with local sequences. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK279688/>
- Blamey, M., 2013. *Wild Flowers of Britain and Ireland: 2nd edn.* Bloomsbury Natural History.
- Brown, M.J.F. and Paxton, R.J., 2009. The conservation of bees: a global perspective. *Apidologie*, 40(3), pp.410-416.
- Bruni, I., Galimberti, A., Caridi, L., Scaccabarozzi, D., De Mattia, F., Casiraghi, M. and Labra, M., 2015. A DNA barcoding approach to identify plant species in multiflower honey. *Food chemistry*, 170, pp.308-315.
- Carvell, C., Meek, W.R., Pywell, R.F. and Nowakowski, M., 2004. The response of foraging bumblebees to successional change in newly created arable field margins. *Biological Conservation*, 118(3), pp.327-339.
- Carvell, C., Meek, W.R., Pywell, R.F., Goulson, D. and Nowakowski, M., 2007. Comparing the efficacy of agri-environment schemes to enhance bumble bee abundance and diversity on arable field margins. *Journal of Applied Ecology*, 44(1), pp.29-40.
- Clapham, A.R., Tutin, T.G. and Moore, D.M., 1990. *Flora of the British Isles.* CUP Archive.
- Crawley, M. J., 2005. *Statistics, An Introduction Using R.* Chichester: John Wiley & Sons, Ltd.
- DEFRA, 2014. *The National pollinator Strategy for bees and other pollinators in England.* [Online] Available at:

https://www.gov.uk/government/uploads/attachment_data/file/409431/pb14221-national-pollinators-strategy.pdf [Accessed 18th April 2016].

de Vere, N., Jones, L.E., Gilmore, T., Moscrop, J., Lowe, A., Smith, D., Hegarty, M.J., Creer, S. and Ford, C.R., 2017. Using DNA metabarcoding to investigate honey bee foraging reveals limited flower use despite high floral availability. *Scientific Reports*, 7.

Dicks, L.V., Showler, D.A. and Sutherland, W.J., 2010. *Bee conservation: evidence for the effects of interventions* (Vol. 1). Pelagic Publishing.

Dicks, L.V., Baude, M., Roberts, S.P., Phillips, J., Green, M. and Carvell, C., 2015. How much flower-rich habitat is enough for wild pollinators? Answering a key policy question with incomplete knowledge. *Ecological entomology*, 40(S1), pp.22-35.

Dormann, C.F., Fründ, J., Blüthgen, N. and Gruber, B., 2009. Indices, graphs and null models: analyzing bipartite ecological networks.

Dunne, J.A., Williams, R.J. and Martinez, N.D., 2002. Network structure and biodiversity loss in food webs: robustness increases with connectance. *Ecology letters*, 5(4), pp.558-567.

Edwards, M., 2003. Aculeate conservation group annual report. *Unpublished report for the UK BAP bumblebee working group, Midhurst, UK*.

Fabian, Y., Sandau, N., Bruggisser, O.T., Aebi, A., Kehrl, P., Rohr, R.P., Naisbit, R.E. and Bersier, L.F., 2013. The importance of landscape and spatial structure for hymenopteran-based food webs in an agro-ecosystem. *Journal of Animal Ecology*, 82(6), pp.1203-1214.

Falk, S.J. and Lewington, R., 2015. *Field guide to the bees of Great Britain and Ireland*. British Wildlife Publishing Lt.

Galimberti, A., De Mattia, F., Bruni, I., Scaccabarozzi, D., Sandionigi, A., Barbuto, M., Casiraghi, M. and Labra, M., 2014. A DNA barcoding approach to characterize pollen collected by honeybees. *PloS one*, 9(10), p.e109363.

Garibaldi, L.A., Carvalheiro, L.G., Leonhardt, S.D., Aizen, M.A., Blaauw, B.R., Isaacs, R., Kuhlmann, M., Kleijn, D., Klein, A.M., Kremen, C. and Morandin, L., 2014. From research to action: enhancing crop yield through wild pollinators. *Frontiers in Ecology and the Environment*, 12(8), pp.439-447.

Goulson, D., 1999. Foraging strategies of insects for gathering nectar and pollen, and implications for plant ecology and evolution. *Perspectives in plant ecology, evolution and systematics*, 2(2), pp.185-209.

Goulson, D., Lye, G.C. and Darvill, B., 2008. Decline and conservation of bumble bees. *Annu. Rev. Entomol.*, 53, pp.191-208.

Gruber, B., Eckel, K., Everaars, J. and Dormann, C.F., 2011. On managing the red mason bee (*Osmia bicornis*) in apple orchards. *Apidologie*, 42(5), pp.564-576.

Haaland, C., Naisbit, R.E. and Bersier, L.F., 2011. Sown wildflower strips for insect conservation: a review. *Insect Conservation and Diversity*, 4(1), pp.60-80.

- Hawkins, J., de Vere, N., Griffith, A., Ford, C.R., Allainguillaume, J., Hegarty, M.J., Baillie, L. and Adams-Groom, B., 2015. Using DNA metabarcoding to identify the floral composition of honey: a new tool for investigating honey bee foraging preferences. *PloS one*, 10(8), p.e0134735.
- Holland, J.M., Smith, B.M., Storkey, J., Lutman, P.J. and Aebischer, N.J., 2015. Managing habitats on English farmland for insect pollinator conservation. *Biological Conservation*, 182, pp.215-222.
- Howard, D.C., Watkins, J.W., Clarke, R.T., Barnett, C.L. and Stark, G.J., 2003. Estimating the extent and change in broad habitats in Great Britain. *Journal of Environmental Management*, 67(3), pp.219-227.
- Jain, S.A., Jesus, F.T.D., Marchioro, G.M. and Araújo, E.D.D., 2013. Extraction of DNA from honey and its amplification by PCR for botanical identification. *Food Science and Technology (Campinas)*, 33(4), pp.753-756.
- Kehinde, T. and Samways, M.J., 2014. Insect–flower interactions: network structure in organic versus conventional vineyards. *Animal Conservation*, 17(5), pp.401-409.
- Keller, A., Danner, N., Grimmer, G., Ankenbrand, M.V.D., Ohe, K.V.D., Ohe, W., Rost, S., Härtel, S. and Steffan-Dewenter, I., 2015. Evaluating multiplexed next-generation sequencing as a method in palynology for mixed pollen samples. *Plant Biology*, 17(2), pp.558-566.
- Kozich JJ, Westcott SL, Baxter NT, Highlander SK, Schloss PD. (2013): Development of a dual-index sequencing strategy and curation pipeline for analyzing amplicon sequence data on the MiSeq Illumina sequencing platform. *Applied and Environmental Microbiology*. 79(17):5112-20.
- Kraaijeveld, K., Weger, L.A., Ventayol García, M., Buermans, H., Frank, J., Hiemstra, P.S. and Dunnen, J.T., 2015. Efficient and sensitive identification and quantification of airborne pollen using next-generation DNA sequencing. *Molecular ecology resources*, 15(1), pp.8-16.
- Martin, M., 2011. Cutadapt removes adapter sequences from high-throughput sequencing reads. *EMBnet. journal*, 17(1), pp.pp-10.
- McCann, K.S., 2000. The diversity–stability debate. *Nature*, 405(6783), pp.228-233.
- Memmott, J., Waser, N.M. and Price, M.V., 2004. Tolerance of pollination networks to species extinctions. *Proceedings of the Royal Society of London B: Biological Sciences*, 271(1557), pp.2605-2611.
- Montoya, J.M., Pimm, S.L. and Solé, R.V., 2006. Ecological networks and their fragility. *Nature*, 442(7100), pp.259-264.
- Müller, A., Diener, S., Schnyder, S., Stutz, K., Sedivy, C. and Dorn, S., 2006. Quantitative pollen requirements of solitary bees: Implications for bee conservation and the evolution of bee–flower relationships. *Biological Conservation*, 130(4), pp.604-615.

Natural England, 2016. [Online] *Countryside Stewardship*
Available at: <https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-land-management#higher-tier> [Accessed 28 September 2016].

Pornon, A., Escaravage, N., Burrus, M., Holota, H., Khimoun, A., Mariette, J., Pellizzari, C., Iribar, A., Etienne, R., Taberlet, P. and Vidal, M., 2016. Using metabarcoding to reveal and quantify plant-pollinator interactions. *Scientific reports*, 6.

Power, E.F. and Stout, J.C., 2011. Organic dairy farming: impacts on insect–flower interaction networks and pollination. *Journal of Applied Ecology*, 48(3), pp.561-569.

Pywell, R.F., Warman, E.A., Carvell, C., Sparks, T.H., Dicks, L.V., Bennett, D., Wright, A., Critchley, C.N.R. and Sherwood, A., 2005. Providing foraging resources for bumblebees in intensively farmed landscapes. *Biological conservation*, 121(4), pp.479-494.

Pywell, R.F., Meek, W.R., Loxton, R.G., Nowakowski, M., Carvell, C. and Woodcock, B.A., 2011. Ecological restoration on farmland can drive beneficial functional responses in plant and invertebrate communities. *Agriculture, ecosystems & environment*, 140(1), pp.62-67.

R. Team., 2013. R: A language and environment for statistical computing.

Rooney, N. and McCann, K.S., 2012. Integrating food web diversity, structure and stability. *Trends in ecology & evolution*, 27(1), pp.40-46.

Rose, F., 2006. *The Wild Flower Key: how to identify wild flowers, trees & shrubs in Britain and Ireland*, Penguin Books Ltd

Rundlöf, M., Nilsson, H. and Smith, H.G., 2008. Interacting effects of farming practice and landscape context on bumble bees. *Biological Conservation*, 141(2), pp.417-426.

Sickel, W., Ankenbrand, M.J., Grimmer, G., Holzschuh, A., Härtel, S., Lanzen, J., Steffan-Dewenter, I. and Keller, A., 2015. Increased efficiency in identifying mixed pollen samples by meta-barcoding with a dual-indexing approach. *BMC ecology*, 15(1), p.20.

Smart, M.D., Cornman, R.S., Iwanowicz, D.D., McDermott-Kubeczko, M., Pettis, J.S., Spivak, M.S. and Otto, C.R.V., 2017. A Comparison of Honey Bee-Collected Pollen From Working Agricultural Lands Using Light Microscopy and ITS Metabarcoding. *Environmental Entomology*, p.nvw159.

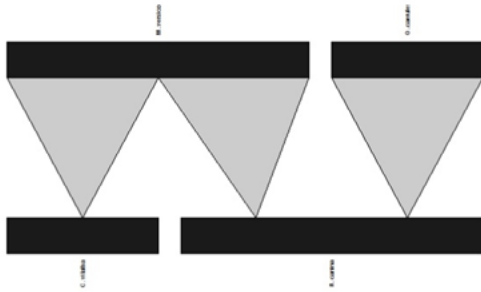
Stace, C., 2010. *New flora of the British Isles*. Cambridge University Press.

Steckel, J., Westphal, C., Peters, M.K., Bellach, M., Rothenwoehrer, C., Erasmi, S., Scherber, C., Tschardtke, T. and Steffan-Dewenter, I., 2014. Landscape composition and configuration differently affect trap-nesting bees, wasps and their antagonists. *Biological Conservation*, 172, pp.56-64.

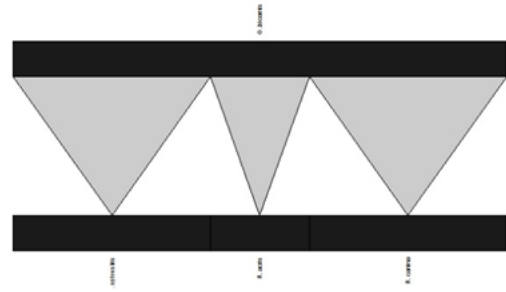
Thébault, E. and Fontaine, C., 2010. Stability of ecological communities and the architecture of mutualistic and trophic networks. *Science*, 329(5993), pp.853-856.

- Tylianakis, J.M., Tscharntke, T. and Lewis, O.T., 2007. Habitat modification alters the structure of tropical host–parasitoid food webs. *Nature*, 445(7124), pp.202-205.
- Tylianakis, J.M., Laliberté, E., Nielsen, A. and Bascompte, J., 2010. Conservation of species interaction networks. *Biological conservation*, 143(10), pp.2270-2279.
- Valentini, A., Miquel, C. and Taberlet, P., 2010. DNA barcoding for honey biodiversity. *Diversity*, 2(4), pp.610-617.
- Vanbergen, A.J., 2013. Threats to an ecosystem service: pressures on pollinators. *Frontiers in Ecology and the Environment*, 11(5), pp.251-259.
- Vaudo, A.D., Tooker, J.F., Grozinger, C.M. and Patch, H.M., 2015. Bee nutrition and floral resource restoration. *Current Opinion in Insect Science*, 10, pp.133-141.
- Venables, W. N. & Ripley, B. D. (2002) *Modern Applied Statistics with S*. Fourth Edition. Springer, New York
- White, T.J., Bruns, T., Lee, S.J.W.T. and Taylor, J.W., 1990. Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. *PCR protocols: a guide to methods and applications*, 18(1), pp.315-322.
- Williams, N.M. and Kremen, C., 2007. Resource distributions among habitats determine solitary bee offspring production in a mosaic landscape. *Ecological applications*, 17(3), pp.910-921.
- Wilson, E.E., Sidhu, C.S., LeVAN, K.E. and Holway, D.A., 2010. Pollen foraging behaviour of solitary Hawaiian bees revealed through molecular pollen analysis. *Molecular ecology*, 19(21), pp.4823-4829.
- Wood, T.J., Holland, J.M. and Goulson, D., 2015. Pollinator-friendly management does not increase the diversity of farmland bees and wasps. *Biological Conservation*, 187, pp.120-126.
- Wood, T.J., Holland, J.M. and Goulson, D., 2016. Providing foraging resources for solitary bees on farmland: current schemes for pollinators benefit a limited suite of species. *Journal of Applied Ecology*.

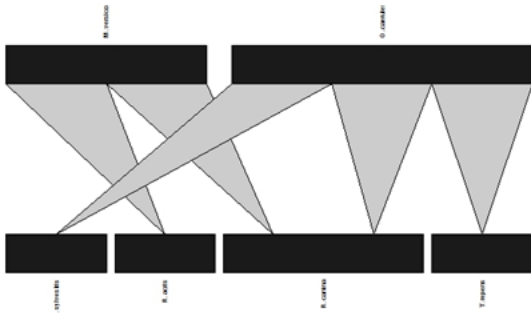
Supplementary Information



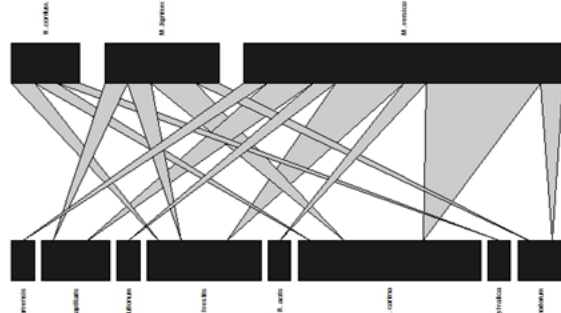
(a) Heath Farm



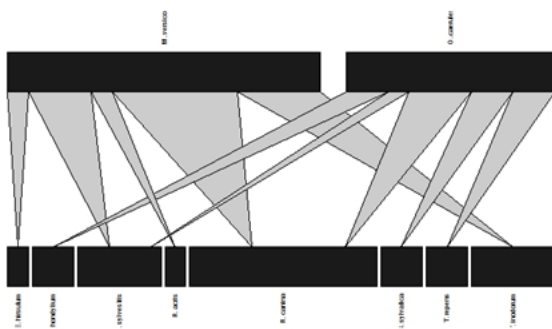
(b) Whitchurch Farm



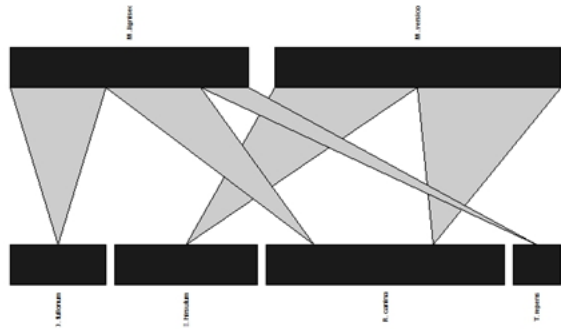
(c) Wincott Farm



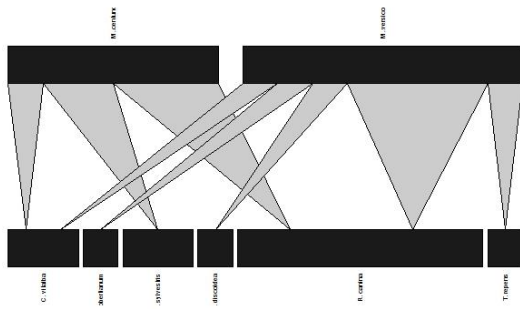
(d) Bellingdon Farm



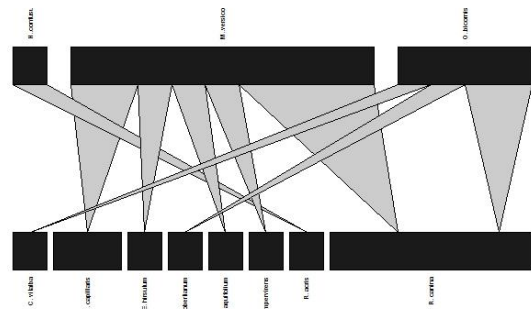
(e) Old Farm Dorn



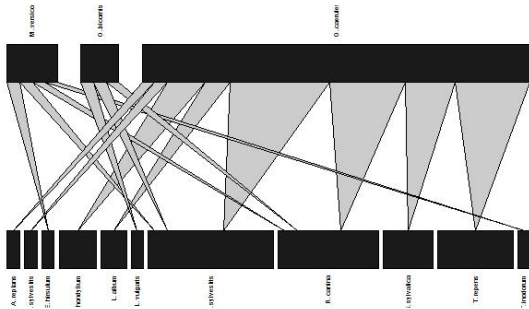
(f) Daylesford



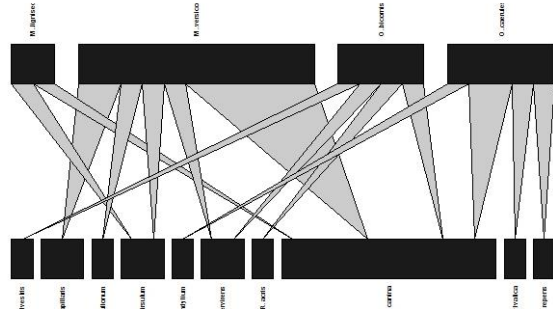
(g) Grange Farm



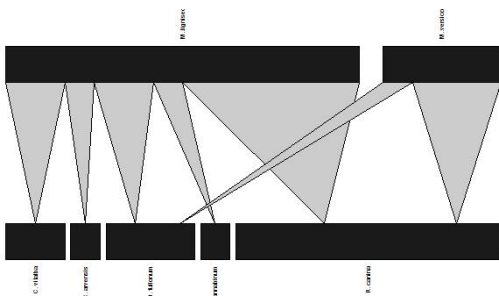
(h) Marcham Farm



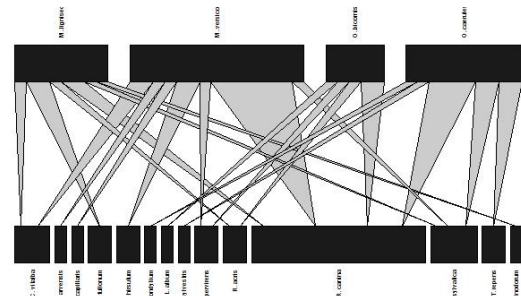
(i) Collymore Farm



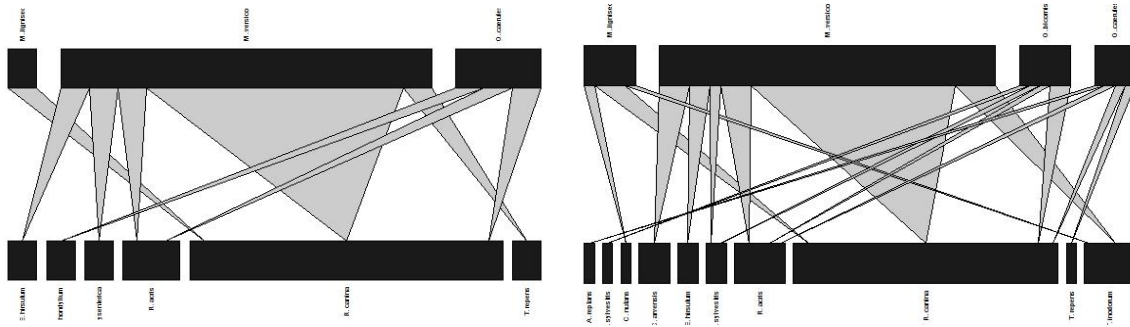
(j) Kilmester Farm



(k) Pennyhooks Farm



(l) Wytham Farm (FAI Farms)



(m) Earth Trust Farm

(n) Lower Smite Farm

Figure 3 (a-n) Pollen transport network for all farms. The lower bars represent the plant species and the upper bars represent bee species. Linkage width indicates the fraction of pollen samples from that bee species in which the plant species occurred. The length of the bars for the bee species represents the number of pollen samples sequenced for each species. The length of the bars for plant species represents the frequency of occurrence of each species within the pollen samples.

Table 5 This table provides the full pollen DNA output data for this Chapter. Listed are the pollen sample IDs (this corresponds to the nest box and bamboo shoot the pollen was extracted from), the farm the pollen sample was taken from, the bee species the pollen sample came from and the plant species identified from the DNA analysis.

Sample ID	Farm	Bee Species	Plant Species
B9-1	Bellingdon	<i>Hylaeus confusus</i>	<i>Malva sylvestris</i>
B9-1	Bellingdon	<i>Hylaeus confusus</i>	<i>Rosa canina</i>
B9-1	Bellingdon	<i>Hylaeus confusus</i>	<i>Stachys sylvatica</i>
B9-4	Bellingdon	<i>Megachile ligniseca</i>	<i>Malva sylvestris</i>
B9-4	Bellingdon	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
B9-8	Bellingdon	<i>Megachile ligniseca</i>	<i>Crepis capillaris</i>
B9-8	Bellingdon	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
B9-8	Bellingdon	<i>Megachile ligniseca</i>	<i>Tripleurospermum inodorum</i>
B14-2	Bellingdon	<i>Megachile versicolor</i>	<i>Ranunculus acris</i>
B14-2	Bellingdon	<i>Megachile versicolor</i>	<i>Rosa canina</i>
B9-2	Bellingdon	<i>Megachile versicolor</i>	<i>Crepis capillaris</i>
B9-2	Bellingdon	<i>Megachile versicolor</i>	<i>Dipsacus fullonum</i>
B9-2	Bellingdon	<i>Megachile versicolor</i>	<i>Malva sylvestris</i>
B9-2	Bellingdon	<i>Megachile versicolor</i>	<i>Rosa canina</i>
B9-2	Bellingdon	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
B9-5	Bellingdon	<i>Megachile versicolor</i>	<i>Malva sylvestris</i>

B9-5	Bellingdon	<i>Megachile versicolor</i>	<i>Rosa canina</i>
B9-6	Bellingdon	<i>Megachile versicolor</i>	<i>Convolvulus arvensis</i>
B9-6	Bellingdon	<i>Megachile versicolor</i>	<i>Crepis capillaris</i>
B9-6	Bellingdon	<i>Megachile versicolor</i>	<i>Malva sylvestris</i>
B9-6	Bellingdon	<i>Megachile versicolor</i>	<i>Rosa canina</i>
B9-7	Bellingdon	<i>Megachile versicolor</i>	<i>Rosa canina</i>
C14-6	Colleymore	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
C14-6	Colleymore	<i>Megachile versicolor</i>	<i>Malva sylvestris</i>
C14-6	Colleymore	<i>Megachile versicolor</i>	<i>Rosa canina</i>
C14-6	Colleymore	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
C14-1	Colleymore	<i>Osmia bicornis</i>	<i>Lysimachia vulgaris</i>
C14-1	Colleymore	<i>Osmia bicornis</i>	<i>Malva sylvestris</i>
C14-1	Colleymore	<i>Osmia bicornis</i>	<i>Rosa canina</i>
C11-2	Colleymore	<i>Osmia caerulescens</i>	<i>Malva sylvestris</i>
C11-2	Colleymore	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
C11-2	Colleymore	<i>Osmia caerulescens</i>	<i>Stachys sylvatica</i>
C11-2	Colleymore	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>
C11-3	Colleymore	<i>Osmia caerulescens</i>	<i>Lamium album</i>
C11-3	Colleymore	<i>Osmia caerulescens</i>	<i>Malva sylvestris</i>
C11-3	Colleymore	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
C11-3	Colleymore	<i>Osmia caerulescens</i>	<i>Stachys sylvatica</i>
C11-3	Colleymore	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>
C11-4	Colleymore	<i>Osmia caerulescens</i>	<i>Malva sylvestris</i>
C11-4	Colleymore	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
C14-2	Colleymore	<i>Osmia caerulescens</i>	<i>Ajuga reptans</i>
C14-2	Colleymore	<i>Osmia caerulescens</i>	<i>Anthriscus sylvestris</i>
C14-2	Colleymore	<i>Osmia caerulescens</i>	<i>Heracleum sphondylium</i>
C14-2	Colleymore	<i>Osmia caerulescens</i>	<i>Lamium album</i>
C14-2	Colleymore	<i>Osmia caerulescens</i>	<i>Malva sylvestris</i>
C14-2	Colleymore	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
C14-2	Colleymore	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>
C14-4	Colleymore	<i>Osmia caerulescens</i>	<i>Malva sylvestris</i>
C14-4	Colleymore	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
C14-4	Colleymore	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>
C14-7	Colleymore	<i>Osmia caerulescens</i>	<i>Heracleum sphondylium</i>
C14-7	Colleymore	<i>Osmia caerulescens</i>	<i>Malva sylvestris</i>
C14-7	Colleymore	<i>Osmia caerulescens</i>	<i>Stachys sylvatica</i>
C14-7	Colleymore	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>
C14-8	Colleymore	<i>Osmia caerulescens</i>	<i>Heracleum sphondylium</i>
C14-8	Colleymore	<i>Osmia caerulescens</i>	<i>Malva sylvestris</i>
C14-8	Colleymore	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
C14-8	Colleymore	<i>Osmia caerulescens</i>	<i>Stachys sylvatica</i>
C14-8	Colleymore	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>

C4-5	Colleymore	<i>Osmia caerulescens</i>	<i>Malva sylvestris</i>
D14-1	Daylesford	<i>Megachile ligniseca</i>	<i>Dipsacus fullonum</i>
D14-1	Daylesford	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
D14-2	Daylesford	<i>Megachile ligniseca</i>	<i>Dipsacus fullonum</i>
D14-2	Daylesford	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
D14-2	Daylesford	<i>Megachile ligniseca</i>	<i>Trifolium repens</i>
D13-1	Daylesford	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
D13-1	Daylesford	<i>Megachile versicolor</i>	<i>Rosa canina</i>
D13-2	Daylesford	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
D13-2	Daylesford	<i>Megachile versicolor</i>	<i>Rosa canina</i>
D13-3	Daylesford	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
D13-3	Daylesford	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LW3-2	Earth Trust	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
LW10-6	Earth Trust	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LW14-1	Earth Trust	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LW14-3	Earth Trust	<i>Megachile versicolor</i>	<i>Pulicaria dysenterica</i>
LW14-3	Earth Trust	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LW14-3	Earth Trust	<i>Megachile versicolor</i>	<i>Trifolium repens</i>
LW3-1	Earth Trust	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LW9-1	Earth Trust	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
LW9-1	Earth Trust	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LW9-12	Earth Trust	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LW9-3	Earth Trust	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LW9-7	Earth Trust	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LW9-8	Earth Trust	<i>Megachile versicolor</i>	<i>Ranunculus acris</i>
LW9-8	Earth Trust	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LW11-2	Earth Trust	<i>Osmia caerulescens</i>	<i>Heracleum sphondylium</i>
LW11-2	Earth Trust	<i>Osmia caerulescens</i>	<i>Ranunculus acris</i>
LW11-2	Earth Trust	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
O14-13	Fai Farms	<i>Megachile ligniseca</i>	<i>Dipsacus fullonum</i>
O14-13	Fai Farms	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
O14-13	Fai Farms	<i>Megachile ligniseca</i>	<i>Stachys sylvatica</i>
O14-18	Fai Farms	<i>Megachile ligniseca</i>	<i>Clematis vitalba</i>
O14-18	Fai Farms	<i>Megachile ligniseca</i>	<i>Dipsacus fullonum</i>
O14-18	Fai Farms	<i>Megachile ligniseca</i>	<i>Ranunculus acris</i>
O14-18	Fai Farms	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
O14-18	Fai Farms	<i>Megachile ligniseca</i>	<i>Tripleurospermum inodorum</i>
O13-2	Fai Farms	<i>Megachile versicolor</i>	<i>Pentaglottis sempervirens</i>
O13-2	Fai Farms	<i>Megachile versicolor</i>	<i>Rosa canina</i>
O14-16	Fai Farms	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
O14-16	Fai Farms	<i>Megachile versicolor</i>	<i>Rosa canina</i>
O14-17	Fai Farms	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
O14-17	Fai Farms	<i>Megachile versicolor</i>	<i>Rosa canina</i>

O14-17	Fai Farms	<i>Megachile versicolor</i>	<i>Stachys sylvatica</i>
O14-3	Fai Farms	<i>Megachile versicolor</i>	<i>Convolvulus arvensis</i>
O14-3	Fai Farms	<i>Megachile versicolor</i>	<i>Rosa canina</i>
O14-5	Fai Farms	<i>Megachile versicolor</i>	<i>Clematis vitalba</i>
O14-5	Fai Farms	<i>Megachile versicolor</i>	<i>Rosa canina</i>
O14-9	Fai Farms	<i>Megachile versicolor</i>	<i>Rosa canina</i>
O15-1	Fai Farms	<i>Megachile versicolor</i>	<i>Clematis vitalba</i>
O15-1	Fai Farms	<i>Megachile versicolor</i>	<i>Crepis capillaris</i>
O15-1	Fai Farms	<i>Megachile versicolor</i>	<i>Rosa canina</i>
O6-1	Fai Farms	<i>Osmia bicornis</i>	<i>Lamium album</i>
O6-1	Fai Farms	<i>Osmia bicornis</i>	<i>Rosa canina</i>
O6-3	Fai Farms	<i>Osmia bicornis</i>	<i>Pentaglottis sempervirens</i>
O6-3	Fai Farms	<i>Osmia bicornis</i>	<i>Ranunculus acris</i>
O6-3	Fai Farms	<i>Osmia bicornis</i>	<i>Rosa canina</i>
O14-15	Fai Farms	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
O14-15	Fai Farms	<i>Osmia caerulescens</i>	<i>Stachys sylvatica</i>
O14-15	Fai Farms	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>
O14-4	Fai Farms	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
O14-4B	Fai Farms	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
O14-7	Fai Farms	<i>Osmia caerulescens</i>	<i>Heracleum sphondylium</i>
O14-7	Fai Farms	<i>Osmia caerulescens</i>	<i>Malva sylvestris</i>
O14-7	Fai Farms	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
O14-7	Fai Farms	<i>Osmia caerulescens</i>	<i>Stachys sylvatica</i>
O14-7	Fai Farms	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>
GF12-3	Grange Farm	<i>Megachile centuncularis</i>	<i>Malva sylvestris</i>
GF12-3	Grange Farm	<i>Megachile centuncularis</i>	<i>Rosa canina</i>
GF12-5	Grange Farm	<i>Megachile centuncularis</i>	<i>Clematis vitalba</i>
GF12-5	Grange Farm	<i>Megachile centuncularis</i>	<i>Malva sylvestris</i>
GF12-5	Grange Farm	<i>Megachile centuncularis</i>	<i>Rosa canina</i>
GF13-1	Grange Farm	<i>Megachile centuncularis</i>	<i>Rosa canina</i>
GF14-1	Grange Farm	<i>Megachile versicolor</i>	<i>Rosa canina</i>
GF14-2	Grange Farm	<i>Megachile versicolor</i>	<i>Geranium robertianum</i>
GF14-2	Grange Farm	<i>Megachile versicolor</i>	<i>Rosa canina</i>
GF14-3	Grange Farm	<i>Megachile versicolor</i>	<i>Rosa canina</i>
GF14-3	Grange Farm	<i>Megachile versicolor</i>	<i>Trifolium repens</i>
GF5-4	Grange Farm	<i>Megachile versicolor</i>	<i>Clematis vitalba</i>
GF5-4	Grange Farm	<i>Megachile versicolor</i>	<i>Matricaria discoidea</i>
GF5-4	Grange Farm	<i>Megachile versicolor</i>	<i>Rosa canina</i>
H14-2	Heath Farm	<i>Megachile versicolor</i>	<i>Clematis vitalba</i>
H14-2	Heath Farm	<i>Megachile versicolor</i>	<i>Rosa canina</i>
H8-2	Heath Farm	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
K14-4	Kilmester	<i>Megachile ligniseca</i>	<i>Epilobium hirsutum</i>
K14-4	Kilmester	<i>Megachile ligniseca</i>	<i>Rosa canina</i>

K11-1	Kilmester	<i>Megachile versicolor</i>	<i>Rosa canina</i>
K11-3	Kilmester	<i>Megachile versicolor</i>	<i>Rosa canina</i>
K11-4	Kilmester	<i>Megachile versicolor</i>	<i>Crepis capillaris</i>
K11-4	Kilmester	<i>Megachile versicolor</i>	<i>Pentaglottis sempervirens</i>
K11-4	Kilmester	<i>Megachile versicolor</i>	<i>Rosa canina</i>
K14-3	Kilmester	<i>Megachile versicolor</i>	<i>Rosa canina</i>
K7-2	Kilmester	<i>Megachile versicolor</i>	<i>Rosa canina</i>
K8-2	Kilmester	<i>Megachile versicolor</i>	<i>Crepis capillaris</i>
K8-2	Kilmester	<i>Megachile versicolor</i>	<i>Dipsacus fullonum</i>
K8-2	Kilmester	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
K8-2	Kilmester	<i>Megachile versicolor</i>	<i>Rosa canina</i>
K11-2	Kilmester	<i>Osmia bicornis</i>	<i>Anthriscus sylvestris</i>
K11-2	Kilmester	<i>Osmia bicornis</i>	<i>Pentaglottis sempervirens</i>
K11-2	Kilmester	<i>Osmia bicornis</i>	<i>Ranunculus acris</i>
K11-2	Kilmester	<i>Osmia bicornis</i>	<i>Rosa canina</i>
K13-2	Kilmester	<i>Osmia caerulescens</i>	<i>Heracleum sphondylium</i>
K13-2	Kilmester	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
K13-2	Kilmester	<i>Osmia caerulescens</i>	<i>Stachys sylvatica</i>
K13-2	Kilmester	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>
K14-2	Kilmester	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
LS13-1	Lower Smite	<i>Megachile ligniseca</i>	<i>Carduus nutan</i>
LS13-1	Lower Smite	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
LS9-2	Lower Smite	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
LS9-2	Lower Smite	<i>Megachile ligniseca</i>	<i>Tripleurospermum inodorum</i>
LS9-4	Lower Smite	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
LS11-1	Lower Smite	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
LS11-1	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS11-3	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS11-4	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS11-5	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS11-6	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS11-8	Lower Smite	<i>Megachile versicolor</i>	<i>Malva sylvestris</i>
LS11-8	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS13-2	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS14-1	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS14-2	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS14-4	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS14-5	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS14-5	Lower Smite	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
LS14-6	Lower Smite	<i>Megachile versicolor</i>	<i>Convolvulus arvensis</i>
LS14-6	Lower Smite	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
LS14-6	Lower Smite	<i>Megachile versicolor</i>	<i>Ranunculus acris</i>
LS14-6	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>

LS14-6	Lower Smite	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
LS14-7	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS2-3B	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS5-4	Lower Smite	<i>Megachile versicolor</i>	<i>Convolvulus arvensis</i>
LS5-5	Lower Smite	<i>Megachile versicolor</i>	<i>Ranunculus acris</i>
LS5-5	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS9-1	Lower Smite	<i>Megachile versicolor</i>	<i>Convolvulus arvensis</i>
LS9-1	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS9-11	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS9-3	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS9-3	Lower Smite	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
LS9-5	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS9-8	Lower Smite	<i>Megachile versicolor</i>	<i>Ranunculus acris</i>
LS9-8	Lower Smite	<i>Megachile versicolor</i>	<i>Rosa canina</i>
LS9-8	Lower Smite	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
LS15-1	Lower Smite	<i>Osmia bicornis</i>	<i>Anthriscus sylvestris</i>
LS15-1	Lower Smite	<i>Osmia bicornis</i>	<i>Malva sylvestris</i>
LS15-1	Lower Smite	<i>Osmia bicornis</i>	<i>Ranunculus acris</i>
LS15-1	Lower Smite	<i>Osmia bicornis</i>	<i>Rosa canina</i>
LS15-2	Lower Smite	<i>Osmia bicornis</i>	<i>Rosa canina</i>
LS2-7	Lower Smite	<i>Osmia caerulea</i>	<i>Ajuga reptans</i>
LS2-7	Lower Smite	<i>Osmia caerulea</i>	<i>Ranunculus acris</i>
LS2-7	Lower Smite	<i>Osmia caerulea</i>	<i>Rosa canina</i>
LS2-7	Lower Smite	<i>Osmia caerulea</i>	<i>Trifolium repens</i>
M3-1	Marcham	<i>Hylaeus confusus</i>	<i>Ranunculus acris</i>
M1-1	Marcham	<i>Megachile versicolor</i>	<i>Rosa canina</i>
M10-3	Marcham	<i>Megachile versicolor</i>	<i>Ilex aquifolium</i>
M10-3	Marcham	<i>Megachile versicolor</i>	<i>Pentaglottis sempervirens</i>
M10-3	Marcham	<i>Megachile versicolor</i>	<i>Rosa canina</i>
M15-11	Marcham	<i>Megachile versicolor</i>	<i>Crepis capillaris</i>
M15-11	Marcham	<i>Megachile versicolor</i>	<i>Rosa canina</i>
M15-6	Marcham	<i>Megachile versicolor</i>	<i>Crepis capillaris</i>
M15-6	Marcham	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
M15-6	Marcham	<i>Megachile versicolor</i>	<i>Rosa canina</i>
M3-2	Marcham	<i>Osmia bicornis</i>	<i>Clematis vitalba</i>
M3-5	Marcham	<i>Osmia bicornis</i>	<i>Geranium robertianum</i>
M3-5	Marcham	<i>Osmia bicornis</i>	<i>Rosa canina</i>
M9-3	Marcham	<i>Osmia bicornis</i>	<i>Rosa canina</i>
OD3-1	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Rosa canina</i>
OD3-1	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
OD3-2	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Rosa canina</i>
OD6-1	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Malva sylvestris</i>
OD6-1	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Rosa canina</i>

OD6-1	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
OD6-2	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Malva sylvestris</i>
OD6-2	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
OD6-3	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Epilobium hirsutum</i>
OD6-3	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Malva sylvestris</i>
OD6-3	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Ranunculus acris</i>
OD6-3	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Rosa canina</i>
OD6-3	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
OD6-4	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Rosa canina</i>
OD7-1	Old Farm Dorn	<i>Megachile versicolor</i>	<i>Rosa canina</i>
OD2-4	Old Farm Dorn	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
OD3-3	Old Farm Dorn	<i>Osmia caerulescens</i>	<i>Heracleum sphondylium</i>
OD3-3	Old Farm Dorn	<i>Osmia caerulescens</i>	<i>Malva sylvestris</i>
OD3-3	Old Farm Dorn	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
OD3-3	Old Farm Dorn	<i>Osmia caerulescens</i>	<i>Stachys sylvatica</i>
OD3-3	Old Farm Dorn	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>
OD3-5	Old Farm Dorn	<i>Osmia caerulescens</i>	<i>Heracleum sphondylium</i>
OD3-5	Old Farm Dorn	<i>Osmia caerulescens</i>	<i>Rosa canina</i>
OD3-5	Old Farm Dorn	<i>Osmia caerulescens</i>	<i>Stachys sylvatica</i>
OD3-5	Old Farm Dorn	<i>Osmia caerulescens</i>	<i>Trifolium repens</i>
P12-1	Pennyhooks	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
P14-1	Pennyhooks	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
P14-2	Pennyhooks	<i>Megachile ligniseca</i>	<i>Dipsacus fullonum</i>
P14-2	Pennyhooks	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
P14-4	Pennyhooks	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
P4-1	Pennyhooks	<i>Megachile ligniseca</i>	<i>Clematis vitalba</i>
P4-1	Pennyhooks	<i>Megachile ligniseca</i>	<i>Convolvulus arvensis</i>
P4-1	Pennyhooks	<i>Megachile ligniseca</i>	<i>Dipsacus fullonum</i>
P4-1	Pennyhooks	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
P4-2	Pennyhooks	<i>Megachile ligniseca</i>	<i>Clematis vitalba</i>
P4-2	Pennyhooks	<i>Megachile ligniseca</i>	<i>Eupatorium cannabinum</i>
P4-2	Pennyhooks	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
P11-1	Pennyhooks	<i>Megachile versicolor</i>	<i>Rosa canina</i>
P11-2	Pennyhooks	<i>Megachile versicolor</i>	<i>Dipsacus fullonum</i>
P11-2	Pennyhooks	<i>Megachile versicolor</i>	<i>Rosa canina</i>
P14-3	Pennyhooks	<i>Megachile versicolor</i>	<i>Rosa canina</i>
R8-1	Rotherfield	<i>Megachile ligniseca</i>	<i>Rosa canina</i>
R8-1	Rotherfield	<i>Megachile ligniseca</i>	<i>Tripleurospermum inodorum</i>
R12-3	Rotherfield	<i>Megachile versicolor</i>	<i>Crepis capillaris</i>
R12-3	Rotherfield	<i>Megachile versicolor</i>	<i>Malva sylvestris</i>
R12-3	Rotherfield	<i>Megachile versicolor</i>	<i>Rosa canina</i>
R12-3	Rotherfield	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
R12-5	Rotherfield	<i>Megachile versicolor</i>	<i>Rosa canina</i>

R12-6	Rotherfield	<i>Megachile versicolor</i>	<i>Rosa canina</i>
R12-6	Rotherfield	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
R13-1	Rotherfield	<i>Megachile versicolor</i>	<i>Clematis vitalba</i>
R13-1	Rotherfield	<i>Megachile versicolor</i>	<i>Heracleum sphondylium</i>
R13-1	Rotherfield	<i>Megachile versicolor</i>	<i>Malva sylvestris</i>
R13-1	Rotherfield	<i>Megachile versicolor</i>	<i>Ranunculus acris</i>
R13-1	Rotherfield	<i>Megachile versicolor</i>	<i>Rosa canina</i>
R13-1	Rotherfield	<i>Megachile versicolor</i>	<i>Tripleurospermum inodorum</i>
R3-1	Rotherfield	<i>Megachile versicolor</i>	<i>Rosa canina</i>
R8-3	Rotherfield	<i>Megachile versicolor</i>	<i>Rosa canina</i>
R1-2	Rotherfield	<i>Osmia caerulea</i>	<i>Heracleum sphondylium</i>
R1-2	Rotherfield	<i>Osmia caerulea</i>	<i>Rosa canina</i>
R1-2	Rotherfield	<i>Osmia caerulea</i>	<i>Tripleurospermum inodorum</i>
R1-5	Rotherfield	<i>Osmia caerulea</i>	<i>Epilobium hirsutum</i>
R1-5	Rotherfield	<i>Osmia caerulea</i>	<i>Rosa canina</i>
WT12-3	Whitchurch	<i>Osmia bicornis</i>	<i>Anthriscus sylvestris</i>
WT12-4	Whitchurch	<i>Osmia bicornis</i>	<i>Anthriscus sylvestris</i>
WT12-4	Whitchurch	<i>Osmia bicornis</i>	<i>Rosa canina</i>
WT12-7	Whitchurch	<i>Osmia bicornis</i>	<i>Ranunculus acris</i>
WT12-7	Whitchurch	<i>Osmia bicornis</i>	<i>Rosa canina</i>
WN11-2	Wincott	<i>Megachile versicolor</i>	<i>Ranunculus acris</i>
WN11-2	Wincott	<i>Megachile versicolor</i>	<i>Rosa canina</i>
WN15-1	Wincott	<i>Osmia caerulea</i>	<i>Anthriscus sylvestris</i>
WN15-1	Wincott	<i>Osmia caerulea</i>	<i>Rosa canina</i>
WN15-1	Wincott	<i>Osmia caerulea</i>	<i>Trifolium repens</i>

Table 6 Presented are statistics of the best minimal adequate Generalized Linear Models. Model selection was based on AIC values, and Δ AIC indicates the difference between the best and next best model. Coefficients of determination, D^2 (the amount of deviance accounted for by the model) are provided – these were calculated using the “modEVA” package in R (Barbosa, et al., 2016). The full set of explanatory variables included in the full models for models were: floral-unit abundance, the proportion of natural habitat, the number of pollen samples available and the number of bee samples from which pollen samples were taken for each farm.

Model	Response Variable	Explanatory Variables	df	F	P
Best model, AIC = -39.56, Adj. D2 =0.834, Δ AIC = 1.23					
1	Connectance	Floral unit abundance	1,12	2.497	0.007
		Plant species richness	1,11	23.394	0.004
		Bee species richness	1,10	51.167	<0.001
Best model, AIC = 29, Adj. D2 =0.077, Δ AIC =0.35					
2	Link density	Bee species richness	1,12	3.369	0.0913
Best model, AIC =45.82, Adj. D2 =0.0388 Δ AIC = 0.97					
3	Generality (bees)	Plant species richness	1,12	2.754	0.123
Best model, AIC = 6.28, Adj. D2 = 0.205, Δ AIC = 1.79					
4	Generality (plants)	Bee species richness	1,12	5.844	0.032
Best model, AIC = 0.74, Adj. D2 = 0.694, Δ AIC = 1.73					
5	Nestedness	Floral unit abundance	1,10	29.953	<0.001
Best model, AIC = 73.19, Adj. D2 = 0.453, Δ AIC = 0.23					
6	Number of plant species visited within farm networks	Floral unit abundance	1,13	2.685	0.222
		Plant species richness	1,12	5.098	0.175
		Bee species richness	1,11	9.356	0.011

Assessing the effectiveness of nest box provision for the conservation of solitary bees on farmland

Abstract

Solitary bee nest boxes are marketed across the UK as an effective means of supporting cavity nesting solitary bees. They are provided to farmers as part of the pollinator conservation strategy of the UK agri-environment schemes, which otherwise focuses on the provision of floral foraging resources and natural and semi-natural habitat on farmland. This study investigated the relative importance of nest box, foraging resource and natural habitat availability in influencing nest box colonization by solitary bees and wasps on farmland surveyed across Central Southern England. This knowledge is of strategic importance to the design of the UK agri-environment scheme pollinator conservation strategy.

Two hundred meter transects of farmland, under Higher Level agri-environment management, were selected across Central Southern England. Each transect varied in the local availability of natural and semi-natural habitat, floral-unit abundance and plant species richness. Each transect was randomly assigned a nest box treatment, ranging from 1-33 nest boxes per 200m transect.

A significant positive relationship was identified between proportion of natural and semi-natural habitat within the 600m radius bee foraging range around each transect and nest box colonization (defined as the total number of brood cells collected from all nest boxes at each transect). No significant effect of foraging resource availability on nest box colonization was identified. The number of nest boxes installed on each transect also had no effect on nest box colonization. This result reinforces the importance of habitat provision within the UK agri-environment schemes, indicating

that across these study sites, the availability of natural habitat limits the local abundance of solitary bees and wasps.

However, a significant positive relationship was also identified between the density of nest boxes per transect and the rate of brood cell parasitism. This is concerning as it suggests the presence of a high local density of nest boxes may increase bee mortality by enhancing parasitism risk. Within this study, this increased mortality outweighed the benefit of increased nesting site provision; the number of nest boxes installed at each site had no effect on nest box colonization. It is necessary to therefore examine critically the extent to which bee nest boxes should be promoted as an effective conservation tool in light of this finding. A low density of nest boxes is advocated at the very least to reduce parasitism risk and better mimic the dispersal of nesting resources in nature.

Introduction

Wild bee populations are in decline across Europe and North America and concern is growing over the implications for the pollination of crops and wildflowers (Biesmeijer et al., 2006; Holden, 2006; Gross, 2008; Potts et al., 2010; Burkle et al., 2013; Ollerton et al., 2014). Within the UK, the major focus of conservation interventions, reinforced by the 2014 Pollinator Conservation Strategy, has been to enhance the quality of habitat for bees across agricultural and urban landscapes (DEFRA, 2014). The specific objective is to increase the availability of plant foraging resources and nesting sites, both of which have declined substantially over the last century as a result of agricultural intensification and urban development (Howard et al., 2003; Brown & Paxton, 2009; Potts et al., 2010; Vanbergen, 2013; Ollerton et al., 2014; Baude et al., 2016).

The UK agri-environment schemes now provide specific subsidies to farmers for increasing the abundance of natural and semi-natural habitat and foraging resources

for bees and other insect pollinators on their land (DEFRA, 2014). Foraging resources are augmented through interventions such as planting flower-rich field margins, creating legume and herb-rich swards and maintaining species-rich grassland (Natural England, 2016). Interventions to increase the abundance of natural and semi-natural habitat include taking field corners out of management, restoring hedgerows, maintaining species rich grassland and protecting woodland edges (Natural England, 2016).

The provision of natural and semi-natural habitat is intended to support bees and other wild insect pollinators by providing foraging resources, nesting sites and shelter. Evidence is accumulating to suggest that the provision of natural and semi-natural habitat within the farmed landscape can have a positive impact on wild bee abundance and species richness (Williams & Kremen, 2007; Holzschuh et al., 2008; Rundlöf et al., 2008; Batáry et al., 2011; Kennedy et al., 2013) and that pollination service delivery to crop plants may decrease with increasing isolation from natural habitat (Ricketts et al., 2008; Garibaldi et al., 2011). There is additional evidence that the provision of natural habitat provides the greatest benefit to wild bee populations within more intensively managed, conventionally farmed agricultural landscapes with low landscape heterogeneity (Rundlöf et al., 2008; Batáry et al., 2011; Concepcion et al., 2012; Kennedy et al., 2013). This has been demonstrated for cavity-nesting solitary bees in regards to foraging resource provision; a study conducted within an agricultural landscape in California found that solitary bee offspring production and survival on conventionally managed farms significantly decreased with increasing distance from natural habitat (Williams & Kremen, 2007). No such significant effect was identified for bees nesting on organic farms. Pollen sample analysis revealed that the bees on the conventional farms were relying heavily on the plants growing within the patches of natural and semi-habitat for forage, while the bees nesting on the organic farms were able to forage on plants growing within the local farmed environment (Williams &

Kremen, 2007). This set of evidence has demonstrated the importance of providing patches of natural habitat within the farmed environment to support the foraging requirements of wild bees and has provided strong justification for natural habitat provision within UK agri-environment scheme pollinator conservation policy.

An additional intervention, recently included within the pollinator conservation policy to provide nesting resources for cavity nesting solitary bee species specifically, is the provision of solitary bee-nesting boxes (Natural England, 2016). Solitary bee-nesting boxes were originally developed in the US as a means of housing the alfalfa leafcutter bee, *Megachile rotundata* (Fabricius, 1787) and have long been used by ecologists to study cavity-nesting hymenopteran communities (Tscharntke et al., 1998; Steffan-Dewenter et al., 2002; Tylianakis et al., 2006; Steckel et al., 2014). In nature, cavity nesting solitary bees occupy naturally occurring cavities, typically in dead wood and masonry or hollow-stemmed plants (Falk & Lewington, 2015). These nest boxes provide appropriately-sized artificial cavities, typically constructed from bundles of plant stems or holes drilled into blocks of wood (Krombein & Wasps, 1967). In addition to inclusion in the UK agri-environment schemes, they are being marketed across the UK increasingly as a means of enhancing wild bee populations and are widely available for purchase by the general public (MacIvor & Packer, 2015).



Figure 7 A selection of solitary bee nest boxes available for purchase from Wildlife World http://www.wildlifeworld.co.uk/c/products-by-species_solitary-bees_ready-made-bee-hotels

There is some preliminary evidence to suggest that enhancing the availability of nesting sites through the provision of nest boxes may increase the local abundance of cavity nesting bee species (Wójtowski et al., 1995; Steffan-Dewenter & Schiele, 2008). However, currently, the quality and quantity of data is inadequate for a robust assessment of the benefits of nest box provision (Maclvor & Packer, 2015). If the provision of nest boxes is demonstrated to augment local solitary bee abundance, the provision of nest boxes is of strategic importance, validating their inclusion within the UK agri-environment scheme pollinator conservation strategy and widespread marketing to the general public.

Further data are required to assess critically the effectiveness of nest box provision as a conservation tool for solitary bees, relative to the importance of augmenting floral foraging resources and natural and semi-natural habitat availability (Roulston & Goodell, 2011). To date, no study has examined the relative effectiveness of these three key conservation interventions in promoting the abundance of farmland cavity nesting solitary bee and wasp communities. It is important that this is done; the provision of natural habitat, foraging resources and nest sites is the focus of UK agri-environment scheme pollinator conservation policy (Natural England, 2016). Understanding which of these resources is most limiting for solitary bee communities

on British farmland will allow more strategic and effective allocation of investment across these three conservation interventions.

Concern has been raised that by artificially encouraging bees to nest in aggregations solitary bee nest boxes may enhance rates of parasitism and disease transmission (Wcislo & Cane, 1996; Maclvor & Salehi, 2014; Maclvor & Packer, 2015). In nature, most cavity nesting species do not nest in such close proximity (Falk & Lewington, 2015) and within the wider host-parasitoid literature, there is theoretical and empirical support for a direct density dependant response of parasitism rate to host density (Lessells, 1985; Walde & Murdoch, 1988; Pacala et al., 1990; Bezemer & Mills, 2001; Costamagna et al., 2004). Parasitoids are, of course, a natural component of species rich insect communities and are worthy of conservation in their own right. They play an important role in regulating host population dynamics, which can provide an ecosystem service in cases where the host species is an agricultural pest (Shaw & Hochberg, 2001). However, within a bee conservation context, where the objective is to maximise pollination service delivery within agricultural landscapes, the promotion of higher rates of bee parasitism is not particularly strategic. No study has yet examined the risk that the provision of nest boxes may enhance bee parasitism rates (Maclvor & Packer, 2015); this risk must be examined in an evaluation of whether the provision of nest boxes has net positive effect on bee communities.

This study examines the benefit of nest box provision, by means of controlled manipulation of nest box availability on farmland managed under Higher Level agri-environment management. The relative importance of nest box availability versus the abundance of foraging resources and natural and semi-natural habitat in influencing the level of nest box colonization by solitary bees on farmland is examined. If the provision of an increasing number of nest boxes is of benefit to solitary bees, the hypothesis was that a significant positive relationship between the number of nest boxes supplied at each site and nest box colonization by solitary bees (taking into

account the influence of habitat and forage availability) would be observed. Note that nest box colonization refers to the total number of solitary bee and wasp brood cells collected from all of the nest boxes installed at each site. If the abundance of natural habitat and/or foraging resources limits the local abundance of solitary bees, the hypothesis was that a significant positive relationship between nest box colonization and the abundance of one or both of these resources was expected.

Parasitism within the nest boxes is also examined to assess whether the provision of an increasing density of nest boxes enhances bee parasitism. The hypothesis was that a significant positive relationship between the number of nest boxes supplied and parasitism rate would be observed, if the presence of a high local density of nest boxes enhances parasitism rates.

Methods

Site Selection

Four mixed arable and pastoral farms managed under Higher Level agri-environment schemes were selected across Oxfordshire, Gloucestershire and Worcestershire. Twelve 200m transects were established along south facing hedgerows across the four farms. These transects had been surveyed as part of the study in Chapter 1 during spring/summer 2014 for cavity nesting solitary bees. Each transect was known to vary in the local abundance of bee foraging resources and natural and semi-natural habitat, although cavity nesting solitary bee species had been recorded at all transects. See Table 1 for transect information.

Table 6 Transect Information

Farm	Transect	GPS Coordinates	Organic/Conventional	Nest Boxes per site
Earth Trust	1	51°37'46"N 01°11'35"W	Conventional	24
Earth Trust	2	51°37'57"N 1°11'52"W	Conventional	21
Earth Trust	3	51°37'14"N 1°9'75"W	Conventional	33
Earth Trust	4	51°38'16"N 1°10'54"W	Conventional	15
Wytham	5	51°46'34"N 1°19'13"W	Organic	27
Wytham	6	51°47'1"N 1°18'40"W	Organic	1
Greystones	7	51°53'34"N 1°44'30"W	Conventional	30
Greystones	8	51°53'21"N 1°44'21"W	Conventional	12
Lower Smite	9	52°13'57"N 2°9'9"W	Organic	6
Lower Smite	10	51°13'37"N 2°9'24"W	Organic	3
Lower Smite	11	52°13'57"N 2°9'38"W	Organic	18
Lower Smite	12	52°13'48"N 2°9'59"W	Conventional	9

Nest Box Treatment

The nest boxes used in the study were constructed based on designs demonstrated to be successfully occupied by solitary bees (Tylianakis et al., 2007; Williams & Kremen, 2007; Fabian et al., 2013; Steckel et al., 2014). Each consisted of a 20x10cm plastic cylinder filled with hollow, untreated sections of bamboo stem ranging from 4-12mm in diameter (the size range preferred by most species (Falk & Lewington, 2015)). Each nest was attached to a 1.5m wooden stake. A nest box treatment level was assigned randomly to each transect using a random number generator. The treatment levels were 1,3,6,9,12,15,18,21,24,27,30,33 nest boxes per 200m transect (see Table 1). The nest boxes were placed along the south facing hedgerows, with the nest entrances oriented to the south. The nests were put in place in February 2015 and were left in place for the duration of the bee flight season, removed in October 2015.



Figure 8 A row of 30 nest boxes on Greystones Farm, Transect 7

Quantifying the proportion of natural & semi-natural habitat at each site

Landscape surveys were conducted in order to quantify the proportion of natural and semi-natural habitat within a 600m radius of each transect (600m was selected as the typical maximum foraging range of solitary bees (Gathmann & Tscharrntke, 2002)). Natural and semi-natural habitat was defined in accordance with Agri-Environment Scheme guidelines (Natural England, 2016) as land falling into the following categories: hedgerows, field margins, buffer strips, wildflower strips, woodland and species rich grassland. Gardens, where they occurred, were also included as pollinator habitat as a reflection of the relatively high abundance and diversity of plant foraging resources they may provide (Ahrne et al., 2009).

Radial buffer zones of 600m around each transect were drawn in Google Earth, version 7.1.5.1557. Within each buffer zone, landscape categorization was conducted in Google Earth 7.1.5.1557 using the following data sets; the high resolution satellite imagery (sub 1-meter resolution) provided on the Google Earth Platform itself, Environmental Stewardship farm maps, DEFRA's online mapping resource, MAGIC

(DEFRA, Magic Map Application) and ground-truthing. Land cover polygons were digitized in reference to the above data sets in order to create a set of shapefiles for each buffer zone. Zonal summary statistics of coverage of each land cover class were then calculated in ArcGIS 10.2, again using the Spatial Analyst Toolbox, to calculate the proportion of natural and semi-natural habitat within each buffer zone.

Quantifying local foraging resource abundance

The species richness and abundance of flowering entomophilous plants surrounding each transect was quantified by means of visual surveys. The surveys were conducted each month from April-September 2015 and the data collated to give a total measure of floral-unit abundance and species richness at each transect. All flowering entomophilous plants (all plants in flower and not wind pollinated) along each 200m transect and within a 15m buffer zone on either side of the transects were identified to species level. The relative abundance of floral units of each species was recorded on a scale of 1-5, using a version of the DAFOR Scale (1 being Rare and 5 Dominant). Floral units were categorized as a single solitary flower or capitulum (e.g. *Leucanthemum vulgare*), cyme (e.g. *Myosotis arvensis*), raceme (e.g. *Lysimachia vulgaris*), umbel (e.g. *Anthriscus sylvestris*), corymb (e.g. *Jacobea vulgaris*) or panicle (e.g. *Centranthus ruber*) as appropriate, following (Clapham, Tutin & Moore, 1987; Rose, 2016; Staces, 2010). See (Appendix, Table 5) for a description of the floral unit for each plant species recorded across the transects and species authorities.

The abundance scores for each species were summed to give a quantitative measure of floral-unit abundance surrounding each transect. However, the nectar and pollen resources provided by floral units varies across plant species (and this variation was not taken into account in the floral surveys). Thus, floral-unit abundance in this study is an approximate estimate of foraging resource availability.

Quantifying natural nest site availability

The availability of natural nesting sites (excluding the nest-boxes) was quantified at each transect to control for natural nest site availability when analyzing the effect of nest box treatment. This was assessed via visual surveys, conducted once in September 2015, after all crops had been harvested and hay cutting completed. The abundance of dead wood, masonry and reed stem, the most popular nesting materials for cavity nesting bees, was ranked individually on a scale of 1-5 (1 rare and 5 abundant). This was done along each 200m transect and within a 15m buffer zone on either side of each transect. The rankings for each of the three type of nesting material was then summed for each transect, to give an overall measure of natural nesting site availability (the highest potential score was 15).

Rearing of bee, wasps and parasitoids

All solitary bee and wasp cells were extracted from the nest boxes in October 2015 after collection from the field. The cells were then stored at external temperature over winter, from October-March. In March, the bees were transferred to a climatically controlled room, set at 18°C (and later 20°C from June onwards) to stimulate adult emergence. All emerging bees, solitary wasps and parasitoids were identified as far as possible to species, genus or family level. All brood cells from which no individual successfully emerged were dissected in September 2016 and the bees, wasps and parasitoids present identified as far as possible given their stage of development. Parasitism rate was defined and calculated as the fraction of all brood cells that were parasitized (rather than the fraction of successfully emerging cells that produced parasitoids). This definition of parasitism rate is used in other studies on trap nesting hymenoptera on European farmland (Holzschuh et al., 2010; Fabian et al., 2013; Pereira-Peixoto et al., 2016).

Results

Nest Box Occupancy

Altogether, 191 of the 199 nest boxes originally placed across the 12 transects were collected from the farms. Eight nest boxes from transect 8 were destroyed when a herd of cows was accidentally let into the field. Twelve nest boxes had been placed on this transect originally and the remaining four were unoccupied, making it difficult to estimate what the abundance of brood cells on this transect might have been had all nest boxes remained in place. Therefore, this transect was dropped from the statistical analysis of nest box occupancy. The 187 nest boxes collected from the remaining 11 transects contained a total of 778 solitary bee and wasp brood cells, with a range of 0-204 brood cells across transects (Figure 3(a) and Supplementary Information, Table 6). 94.1% of the brood cells across all transects were solitary bee cells; the remainder were wasp cells. See Appendix, Table 3 for the raw solitary bee, wasp and parasitoid emergence data across transects.

Solitary bee and wasp species community composition

The hatching success of the brood cells was very low; only 11.23% (87 out of 778) individuals successfully hatched from their cells. Of the 778 brood cells, 732 (94%) were solitary bee cells and 46 (6%) solitary wasp cells (see Supplementary Information, Table 6 and for raw data, Appendix, Table 3). The majority of individuals (95%) of those that did not emerge successfully had died at an advanced stage of development; most could be identified only to genus level. Of the bees, 178 individuals could be identified confidently to species level. These belonged to the following species: *Osmia bicornis* (Linnaeus, 1758), *Osmia caerulescens* (Linnaeus, 1758), *Megachile ligniseca* (Kirby, 1802), *Megachile versicolor* Smith, F., 1844 and *Megachile centuncularis* (Linnaeus, 1758). The remaining 554 individuals belonged to the genera *Osmia* and *Megachile*.

The hatching success of the solitary wasps was very low; only 5 individuals (10.9%) emerged successfully. All 46 solitary wasp individuals belonged to the genera *Ancistrocerus*, *Symmorphus* and *Trypoxylon*. For a summary of solitary bee and wasp community composition at each transect, see (Supplementary Information, Table 2).

Local foraging resource availability

The abundance of flowering entomophilous plant species (specifically measured as the abundance of floral units, using a version of the DAFOR scale) ranged from 40-243 across transects (Figure 3(b)) and plant species richness ranged from 17-61 species (see Supplementary Information, Table 4 for plant community data across transects). Plant species richness correlated very strongly and significantly with floral-unit abundance across transects (Pearson product-moment correlation, $r(10)=0.871$, $p\text{-value}=\leq 0.001$), see Figure 3(d). Therefore, for the statistical analysis, floral-unit abundance was utilized as the sole indicator of bee foraging resource availability across transects. The Pearson product-moment correlation was conducted in R 2.14.0 (R Team, 2013).

Proportion of natural and semi-natural habitat

The proportion of natural and semi-natural habitat ranged from 0.07-0.44 across transects, see (Figure 3(c)) and (Supplementary Information, Table 6). There was no significant correlation between the proportion of natural and semi-natural habitat across transects and the abundance of floral-units (Pearson product-moment correlation, $r(10)=0.247$, $p\text{-value}=0.439$), again conducted in R 2.14.0 (R Team, 2013).

Availability of Natural Nesting Sites

The availability of natural nesting sites ranged from 3-10 across transects (15 was the highest score possible), see (Figure 3(d)) and (Supplementary Information, Table 6). No significant correlation was found between the availability of natural nesting sites

and the proportion of natural and semi-natural habitat across transects (Pearson product-moment correlation, $r(10)=0.418$, $p\text{-value}=0.176$), this analysis was again conducted in R 2.14.0 (R Team, 2013).

Parasitism

There was a parasitism rate of 0.0642 across all brood cells of all species on all farms, ranging from 0-0.172 for individual farms, see Figure 3(e) and (Supplementary Information, Table 6). For the brood cells from which no individual had emerged successfully, the identification of parasitism was facilitated as the majority (95%) of individuals, including parasitoids where parasitism had occurred, had died at an advanced stage of development. The casings of these parasitized brood cells were marked by small puncture holes made by the parasitoid. In the few cases (39 brood cells) where the individuals had died at a very early stage of development, these puncture marks were used to help identify incidents of parasitism.

The following parasitoid was identified to species level: *Sapyga quinquepunctata* (Fabricius, 1781); the following to genus level: *Chrysis* spp. and the following to family level; Chalcidoidea and Gasteruptiidae. Seven kleptoparasitic bees of the genus *Coelioxys* hatched from *Megachile* cells. These incidents of keptoparasitism have been included in the calculation of brood cell parasitism across sites. For a summary of parasitoid community composition across transects, see (Supplementary Information, Table 3).

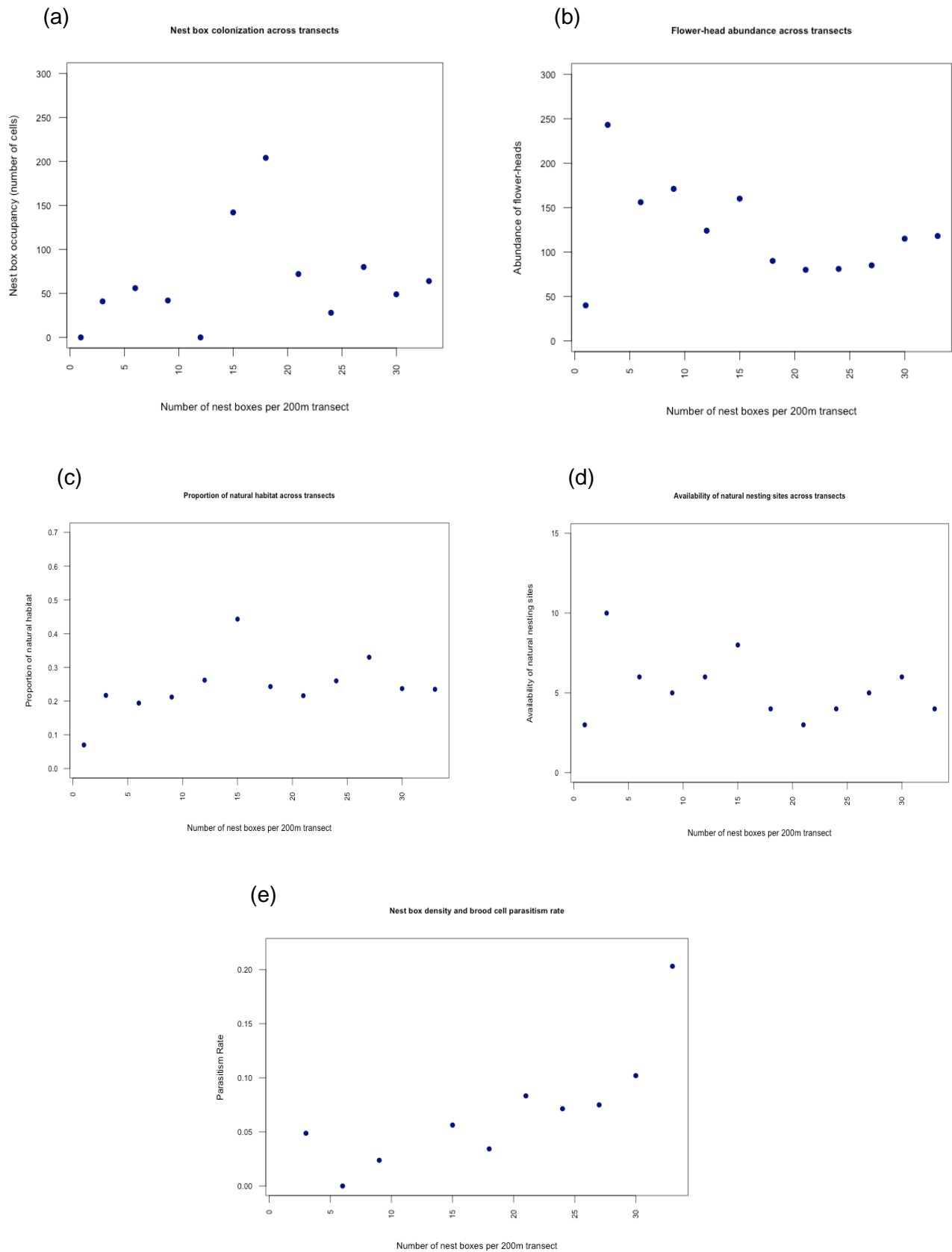


Figure 3: In all of the graphs, transects are labelled and ordered on the x axis according to their nest box treatment (the number of nests installed, from low to high). (a) nest box colonization (the total number of brood cells collected from all nest boxes placed on each transect). (b) abundance of floral-units across transects (c) the proportion of natural and semi-natural habitat across transects (d) abundance of natural nesting sites across transects (e) the parasitism rate across transects.

Analysis of nest box colonization and parasitism rate

Nest Box Colonization

A generalized linear model was constructed in R 2.14.0 (R Team, 2013) to test for the effect of the following explanatory variables on nest box colonization across the study sites (the total number of brood cells collected from all nest boxes at each transect):

- XIII. Nest box treatment (i.e. number of nest boxes installed)
- XIV. Proportion of natural & semi-natural habitat within the 600m bee foraging radius surrounding each transect
- XV. Floral-unit abundance, within a 15m radius of each transect
- XVI. Natural nesting site availability, within a 15m radius of each transect
- XVII. Pesticide use (i.e. whether the transect was situated on an organic or conventional farm)

See (Supplementary Information, Table 6) for the raw data input into this model. A Gaussian error structure was selected for this model. Although a Poisson or Quasi-Poisson error structure is usually preferred for count data, the Gaussian error structure was a better fit for the data, producing superior validation plots. One of the transects on Lower Smite farm (transect 11) was omitted from the model as it had such a high abundance of brood cells (204 cells, 43% higher than the transect with the second highest number of brood cells) that it appeared as a significant outlier on the Residuals-Leverage plot and Normal Q-Q plot. It is worth noting that excluding this transect had no effect on the outcome of the model, in terms of the significance of explanatory variables. Transect 8 was also excluded as 8 out of 12 of the nest boxes on this transect were destroyed and the rest un-occupied.

A full model, including all explanatory variables but no interactions (nest box density, natural habitat, floral abundance, pesticide use and natural nesting site availability) was constructed in the first instance and then simplified following the methodology

outlined by (Crawley, 2005), using the Akaike information criterion, to identify the minimum adequate model. The Akaike information criterion was calculated in R 2.14.0 using the MASS add on package (Venables & Ripley, 2002). The best-fitting model included the proportion of natural and semi-natural habitat as the sole explanatory variable. The proportion of natural habitat had a significant positive effect on nest box colonization (GLM, $F(1,8)=31.575$, $p\text{-value}=0.005$). Figure 4 displays the relationship between the abundance of solitary bee and wasp brood cells and the proportion of natural and semi-natural habitat across transects. See Supplementary Information, Table 5 for further model detail.

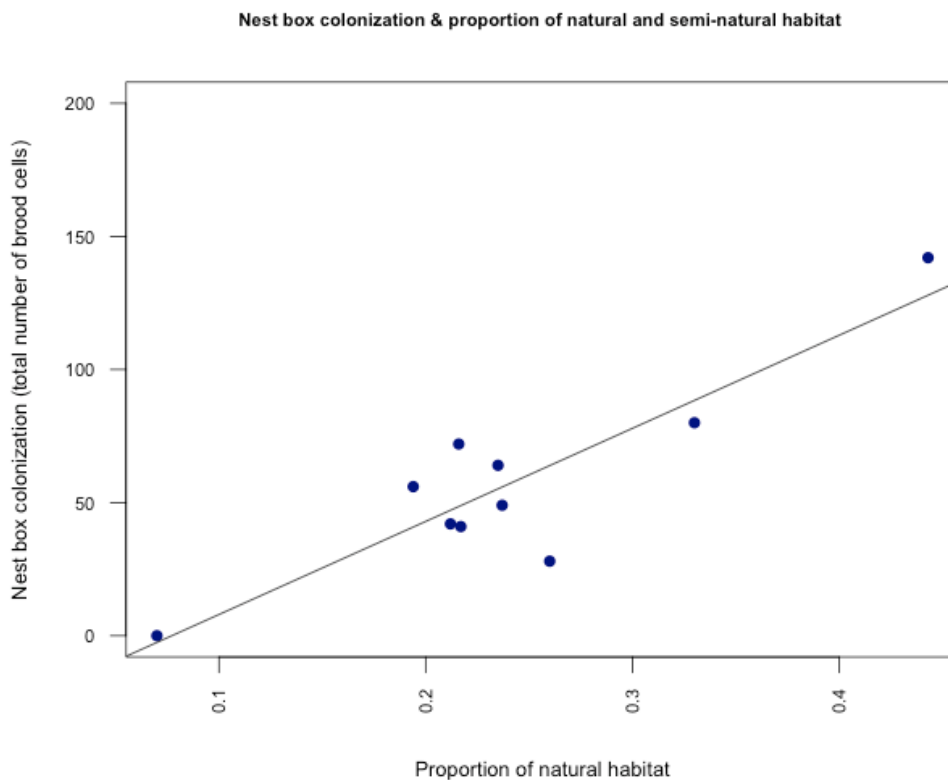


Figure 4 Scatterplot displaying the relationship between nest box colonization (measured as the total number of brood cells collected from all nest boxes placed on each transect) and proportion of natural and semi-natural habitat within the 600m bee foraging radius around each transect

Parasitism Rate

A second generalized linear model was constructed in R 2.14.0 (R Team, 2013) to test for the effect of the following explanatory variables on the parasitism rate of brood cells across study sites:

- I. Nest box treatment (i.e. number of nest boxes installed)
- II. Proportion of natural & semi-natural habitat within the 600m bee foraging radius surrounding each transect
- III. Floral-unit abundance, within a 15m radius of each transect
- IV. Natural nesting site availability
- V. Pesticide use (i.e. whether the transect was situated on an organic or conventional farm)
- VI. Total number of brood cells collected from each site

A Gaussian error structure was again selected for this model. A full model, including all explanatory variables but no interactions was first constructed then simplified, again following the methodology outlined by (Crawley, 2005), using the Akaike information criterion, to identify the minimum adequate models. The Akaike information criterion was calculated in R 2.14.0 using the MASS add on package (Venables & Ripley, 2002).

The best-fitting model included nest box treatment, floral-unit abundance and natural nest site availability as explanatory variables. Nest box treatment had a significant positive effect on parasitism rate (GLM, $F(1,7)=38.474$, $p\text{-value}<0.001$). Floral-unit abundance had no significant effect (GLM, $F(1,8)=4.9915$, $p\text{-value}=0.067$) and nor did natural nesting site availability (GLM, $F(1,6)=2.985$, $p\text{-value}=0.135$). Figure 5 displays the relationship between the number of nest boxes placed across transects and brood cell parasitism rates across transects, Figure 6 further visualizes the raw data. See Supplementary Information, Table 5, for additional model detail.

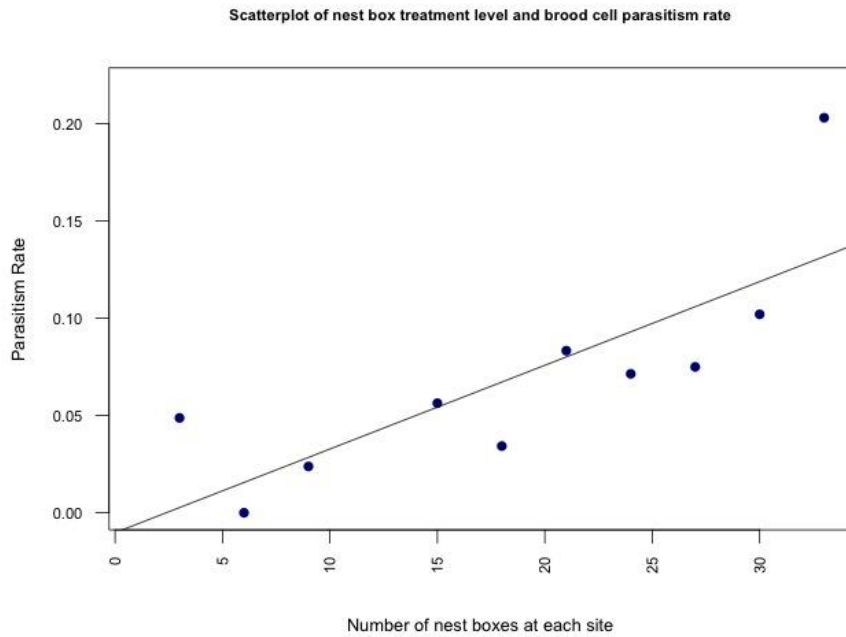


Figure 5 Scatterplot displaying the relationship between the number of nest boxes placed at each transect and the brood cell parasitism rate

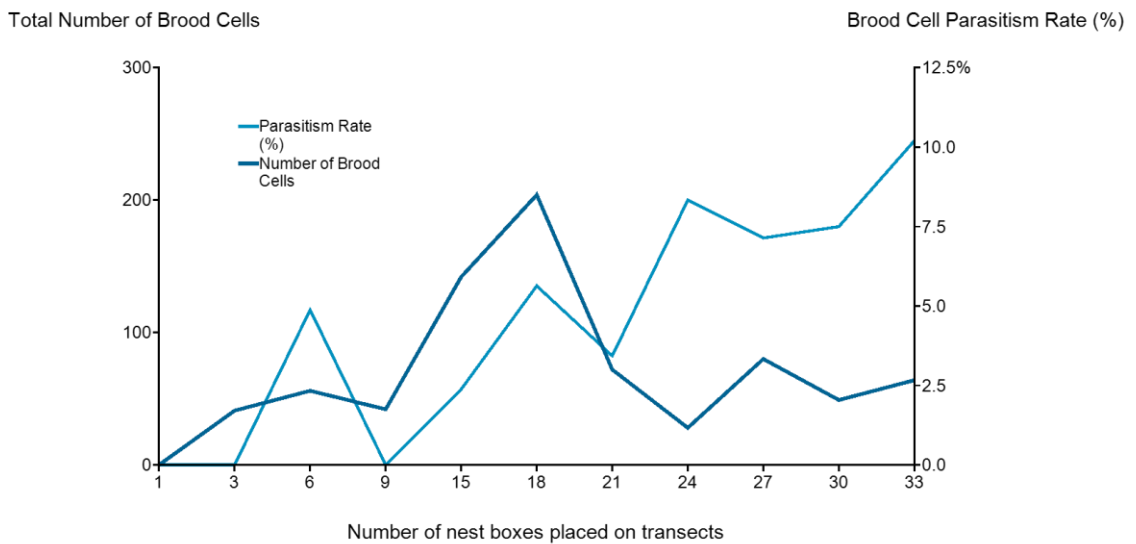


Figure 6 Line graph displaying the total number of brood cells and the brood cell parasitism rate according to the number of nest boxes placed across transects.

Discussion

This study addressed two key questions; (1) What is the relative importance of nest box availability, floral-unit abundance and the availability of natural and semi-natural habitat, in influencing nest box colonization by solitary bees on farmland? (2) Does the provision of a high local density of nest boxes expose solitary bees and wasps to higher rates of parasitism, by encouraging nesting in un-naturally dense aggregations? Both questions are important for the strategic design of the solitary bee conservation interventions of the UK agri-environment schemes, which focus on habitat, foraging resource and nest site provision.

The first generalized linear model identified a strong positive relationship between nest box colonization (the total number of brood cells collected from all nest boxes) and the proportion of natural and semi-natural habitat within bee foraging range of each transect. This finding supports the results presented in Chapter 2 of the thesis, where a significant positive relationship between solitary bee and wasp abundance and species richness and the proportion of natural habitat across sites was identified.

Two other studies within the literature have examined the effect of natural habitat availability on cavity nesting solitary bee and wasp abundance, within agri-environment managed farmland in Europe. The first, conducted in Switzerland, identified a positive relationship between landscape heterogeneity and the proportion of forest cover on the abundance of cavity nesting solitary bees and wasps (Fabian et al., 2013). The second, conducted in Germany, identified a significant relationship between the abundance of natural habitat and cavity nesting solitary bee and wasp species richness, but not abundance (Steckel et al., 2014).

This set of results provides good evidence that the provision of a higher abundance of natural and semi-natural habitat within the farmed environment provides benefit to cavity nesting solitary bee and wasp communities and may enhance local population

densities. This reinforces the importance of habitat provision for solitary bees and wasps within UK agri-environment pollinator conservation policy.

No significant relationship was identified between floral-unit abundance and nest box colonization across transects. This might indicate that the local density of bees and wasps was not limited by the availability of foraging resources within the environment. An additional explanation could be that the forage plants of preference for the bees surveyed in this study were either not well captured by the plant surveys (if they fell outside the 15m survey radius around each transect) or not present in high abundance on the farms. Only 11% of the plant species recorded around the transects were identified by the brood cell pollen DNA analysis of Chapter 4, as forage plants of preference for these bee species. These plants constituted just 20% of total floral-unit abundance across transects. This may explain why no significant relationship between nest box colonization and floral-unit abundance was detected. Chapter 4 of the thesis and another recent study (Wood et al., 2016) have identified that the current agri-environment scheme sown wildflower seed mixtures contain very few of the forage species of preference for solitary bees. These wildflower seed mixtures were sown widely across these study farms; this is likely to explain why the forage plants of preference for the focal solitary bee species were not well represented within the plant surveys; having not been planted specifically, these plants were present in low abundance. This emphasises the importance of ensuring the sown wildflower seed mixtures of the agri-environment schemes are re-formulated to better promote the abundance of preferred forage plants for solitary bees on UK farmland.

The number of nest boxes placed on each transect had no effect on nest box colonization, indicating that the provision of additional nesting resources, through the deployment of an increasing number of nesting boxes was of limited utility for the solitary bees and wasps across these study sites. It is worth noting that the sites surveyed within this study were managed under higher-level agri-environment

agreements and as such, had a higher abundance of natural nesting sites than one would expect on more intensive farmland. It could be that nesting site availability plays a more important role in limiting local bee abundance on intensive farmland where natural nesting sites are scarce. This is the first study to examine the role of nesting resources in influencing the local population density of cavity nesting solitary bees and wasps on farmland, in fact very few studies have examined the role of nesting resources in limiting bee abundance at all (Roulston & Goodell, 2011); further studies, conducted over a greater range of land management intensities, would allow further investigation of this result.

Probably the most important result to emerge from this study, however, was the identification of a strong, positive relationship between the number of nest boxes and the parasitism rate of brood cells across transects. This is concerning as it indicates that having a high local density of solitary bee nest boxes increases the likelihood of a brood cell being parasitized.

It is difficult to estimate what the natural rate of solitary bee and wasp brood cell parasitism is due to the difficulty of monitoring parasitism across natural nesting sites; all studies in the literature have recorded rates of brood cell parasitism within trap nests. Recent studies on trap nesting solitary bee and wasp communities across agricultural landscapes in northern Europe have recorded parasitism rates ranging from 16.3%-20.85% (Kleijn & Sutherland, 2003; Holzschuh, 2010; Fabian et al., 2013; Pereira-Peixoto et al., 2016), these studies used the same definition of parasitism rate as used here. Within this study, parasitism ranged from 0% to 17.2%, with a mean of 6.6%, so on average, lower than the rates recorded in other studies. However, these other studies did not compare parasitism rates across a range of nest box treatments; this is the first study to do so. Despite the relatively low parasitism rates recorded across sites, the significant relationship between parasitism rate and nest box treatment is nevertheless concerning as it indicates that the provision of a high local

density of nest boxes may increase the exposure of bees to parasitoids. This increased risk of mortality may therefore counterbalance any positive effects of nest box provision on solitary bee and wasp populations. This combined with the result above, that an increase in the provision of nest boxes does not increase nest box colonization by solitary bees, suggests that their placement across landscapes to encourage more pollinators may be counter-productive.

In light of these results, it is necessary to examine critically whether the promotion of solitary bee nest boxes as a means of increasing pollination services across agricultural landscapes, is strategic. If a high density of nest boxes enhances brood cell parasitism, it would be sensible to advocate, at the very least, for the wide spacing of a low number of nest boxes in order to mitigate parasitism risk. In nature, natural nesting resources such as dead wood and hollow stems would be dispersed widely; if people are instructed to distribute nest boxes widely, natural conditions could be mimicked more effectively, perhaps lowering parasitism exposure.

Conclusion

This study reports a significant positive relationship between nest box colonization by solitary bees and wasps and the proportion of natural and semi-natural habitat across sites. The number of nest boxes installed at each site and the abundance of floral foraging resources had no significant effect on nest box colonization. This indicates that the availability of natural and semi-natural habitat is exerting the strongest limitation on solitary bee and wasp abundance across these sites, demonstrating the importance of habitat provision as an effective conservation intervention for solitary bees under the UK agri-environment schemes.

The significant positive relationship between the number of nest boxes installed at each site and brood cell parasitism is concerning as it indicates that having a high local abundance of nest boxes may increase the risk of exposure of solitary bees and wasps

to parasitism. This may counterbalance any potential positive effect of providing nesting resources for solitary bees through the provision of solitary bee nest boxes. As a precaution, if nest boxes are to be provided for bees, a low density of nest boxes is advocated to mimic natural nesting conditions and mitigate parasitism risk.

Works Cited

Ahrne, K., Bengtsson, J. and Elmqvist, T., 2009. Bumble bees (*Bombus* spp) along a gradient of increasing urbanization. *PLoS One*, 4(5), p.e5574.

Barbosa A.M., Brown J.A., Jimenez-Valverde A., Real R., 2016. *Model Evaluation and Analysis: Package 'modEVA'*. <http://modeva.r-forge.r-project.org/>

Batáry, P., Báldi, A., Kleijn, D. and Tschardtke, T., 2011. Landscape-moderated biodiversity effects of agri-environmental management: a meta-analysis. *Proceedings of the Royal Society of London B: Biological Sciences*, 278(1713), pp.1894-1902.

Baude, M., Kunin, W.E., Boatman, N.D., Conyers, S., Davies, N., Gillespie, M.A., Morton, R.D., Smart, S.M. and Memmott, J., 2016. Historical nectar assessment reveals the fall and rise of floral resources in Britain. *Nature*, 530(7588), pp.85-88.

Bezemer, T.M. and Mills, N.J., 2001. Host density responses of *Mastrus ridibundus*, a parasitoid of the codling moth, *Cydia pomonella*. *Biological Control*, 22(2), pp.169-175.

Biesmeijer, J.C., Roberts, S.P.M., Reemer, M., Ohlemüller, R., Edwards, M., Peeters, T., Schaffers, A.P., Potts, S.G., Kleukers, R., Thomas, C.D. and Settele, J., 2006. Parallel declines in pollinators and insect-pollinated plants in Britain and the Netherlands. *Science*, 313(5785), pp.351-354.

Brown, M.J.F. and Paxton, R.J., 2009. The conservation of bees: a global perspective. *Apidologie*, 40(3), pp.410-416.

Burkle, L.A., Marlin, J.C. and Knight, T.M., 2013. Plant-pollinator interactions over 120 years: loss of species, co-occurrence, and function. *Science*, 339(6127), pp.1611-1615.

Clapham, A.R., Tutin, T.G. and Moore, D.M., 1990. *Flora of the British Isles*. CUP Archive.

Concepcion, E.D., Díaz, M., Kleijn, D., Baldi, A., Batáry, P., Clough, Y., Gabriel, D., Herzog, F., Holzschuh, A., Knop, E. and Marshall, E.J.P., 2012. Interactive effects of landscape context constrain the effectiveness of local agri-environmental management. *Journal of Applied Ecology*, 49(3), pp.695-705.

Costamagna, A.C., Menalled, F.D. and Landis, D.A., 2004. Host density influences parasitism of the armyworm *Pseudaletia unipuncta* in agricultural landscapes. *Basic and applied ecology*, 5(4), pp.347-355.

Crawley, M. J., 2005. *Statistics, An Introduction Using R*. Chichester: John Wiley & Sons, Ltd.

DEFRA, 2014. *The National pollinator Strategy for bees and other pollinators in England*. [Online] Available at: https://www.gov.uk/government/uploads/attachment_data/file/409431/pb14221-national-pollinators-strategy.pdf [Accessed 18th April 2016].

DEFRA, *Magic Map Application*. [Online] Available at: www.magic.defra.gov.org [Accessed August 2015].

Fabian, Y., Sandau, N., Bruggisser, O.T., Aebi, A., Kehrl, P., Rohr, R.P., Naisbit, R.E. and Bersier, L.F., 2013. The importance of landscape and spatial structure for hymenopteran-based food webs in an agro-ecosystem. *Journal of Animal Ecology*, 82(6), pp.1203-1214.

Falk, S.J. and Lewington, R., 2015. *Field guide to the bees of Great Britain and Ireland*. British Wildlife Publishing Lt.

Garibaldi, L.A., Steffan-Dewenter, I., Kremen, C., Morales, J.M., Bommarco, R., Cunningham, S.A., Carvalheiro, L.G., Chacoff, N.P., Dudenhöffer, J.H., Greenleaf, S.S. and Holzschuh, A., 2011. Stability of pollination services decreases with isolation from natural areas despite honey bee visits. *Ecology letters*, 14(10), pp.1062-1072.

Gathmann, A. and Tschardtke, T., 2002. Foraging ranges of solitary bees. *Journal of animal ecology*, 71(5), pp.757-764.

Gross, M., 2008. Bee gloom deepens. *Current Biology*, 18(23), p.R1073.

Holden, C., 2006. Report warns of looming pollination crisis in North America. *Science*, 314(5798), pp.397-397.

Holzschuh, A., Steffan-Dewenter, I. and Tschardtke, T., 2008. Agricultural landscapes with organic crops support higher pollinator diversity. *Oikos*, 117(3), pp.354-361.

Holzschuh, A., Steffan-Dewenter, I. and Tschardtke, T., 2010. How do landscape composition and configuration, organic farming and fallow strips affect the diversity of bees, wasps and their parasitoids?. *Journal of Animal Ecology*, 79(2), pp.491-500.

Howard, D.C., Watkins, J.W., Clarke, R.T., Barnett, C.L. and Stark, G.J., 2003. Estimating the extent and change in broad habitats in Great Britain. *Journal of Environmental Management*, 67(3), pp.219-227.

Kennedy, C.M., Lonsdorf, E., Neel, M.C., Williams, N.M., Ricketts, T.H., Winfree, R., Bommarco, R., Brittain, C., Burley, A.L., Cariveau, D. and Carvalheiro, L.G., 2013. A global quantitative synthesis of local and landscape effects on wild bee pollinators in agroecosystems. *Ecology letters*, 16(5), pp.584-599.

- Kleijn, D. and Sutherland, W.J., 2003. How effective are European agri-environment schemes in conserving and promoting biodiversity?. *Journal of applied ecology*, 40(6), pp.947-969.
- Krombein, K.V. and Wasps, T.N., 1967. Bees. Life Histories, Nests and Associates.
- Macivor, J.S. and Salehi, B., 2014. Bee species-specific nesting material attracts a generalist parasitoid: Implications for co-occurring bees in nest box enhancements. *Environmental entomology*, 43(4), pp.1027-1033.
- Macivor, J.S. and Packer, L., 2015. 'Bee hotels' as tools for native pollinator conservation: a premature verdict?. *PLoS one*, 10(3), p.e0122126.
- Natural England, 2016. [Online] *Countryside Stewardship* Available at: <https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-land-management#higher-tier> [Accessed 28 September 2016].
- Lessells, C.M., 1985. Parasitoid foraging: should parasitism be density dependent?. *The Journal of Animal Ecology*, pp.27-41.
- Ollerton, J., Erenler, H., Edwards, M. and Crockett, R., 2014. Extinctions of aculeate pollinators in Britain and the role of large-scale agricultural changes. *Science*, 346(6215), pp.1360-1362.
- Pacala, S.W., Hassell, M.P. and May, R.M., 1990. Host parasitoid associations in patchy environments. *Nature*, 344, pp.150-153
- Pereira-Peixoto, M.H., Pufal, G., Staab, M., Feitosa Martins, C.E.L.S.O. and Klein, A., 2016. Diversity and specificity of host-natural enemy interactions in an urban-rural interface. *Ecological Entomology*. 41(3), pp.241-252
- Potts, S.G., Biesmeijer, J.C., Kremen, C., Neumann, P., Schweiger, O. and Kunin, W.E., 2010. Global pollinator declines: trends, impacts and drivers. *Trends in ecology & evolution*, 25(6), pp.345-353.
- Ricketts, T.H., Regetz, J., Steffan-Dewenter, I., Cunningham, S.A., Kremen, C., Bogdanski, A., Gemmill-Herren, B., Greenleaf, S.S., Klein, A.M., Mayfield, M.M. and Morandin, L.A., 2008. Landscape effects on crop pollination services: are there general patterns?. *Ecology letters*, 11(5), pp.499-515.
- R Core Team, 2013. R: A language and environment for statistical computing.
- Roulston, T.A.H. and Goodell, K., 2011. The role of resources and risks in regulating wild bee populations. *Annual review of entomology*, 56, pp.293-312.
- Rose, F., 2006. The Wild Flower Key: how to identify wild flowers, trees & shrubs in Britain and Ireland, Penguin Books Ltd
- Roulston, T.A.H. and Goodell, K., 2011. The role of resources and risks in regulating wild bee populations. *Annual review of entomology*, 56, pp.293-312.
- Rundlöf, M., Nilsson, H. and Smith, H.G., 2008. Interacting effects of farming practice and landscape context on bumble bees. *Biological Conservation*, 141(2), pp.417-426.

- Shaw, M.R. and Hochberg, M.E., 2001. The neglect of parasitic Hymenoptera in insect conservation strategies: the British fauna as a prime example. *Journal of Insect Conservation*, 5(4), pp.253-263.
- Stace, C., 2010. *New flora of the British Isles*. Cambridge University Press.
- Steckel, J., Westphal, C., Peters, M.K., Bellach, M., Rothenwoehrer, C., Erasmi, S., Scherber, C., Tschardtke, T. and Steffan-Dewenter, I., 2014. Landscape composition and configuration differently affect trap-nesting bees, wasps and their antagonists. *Biological Conservation*, 172, pp.56-64.
- Steffan-Dewenter, I., Münzenberg, U., Bürger, C., Thies, C. and Tschardtke, T., 2002. Scale-dependent effects of landscape context on three pollinator guilds. *Ecology*, 83(5), pp.1421-1432.
- Steffan-Dewenter, I. and Schiele, S., 2008. Do resources or natural enemies drive bee population dynamics in fragmented habitats. *Ecology*, 89(5), pp.1375-1387.
- Tschardtke, T., Gathmann, A. and Steffan-Dewenter, I., 1998. Bioindication using trap-nesting bees and wasps and their natural enemies: community structure and interactions. *Journal of applied ecology*, 35(5), pp.708-719.
- Tylianakis, J.M., Klein, A.M., Lozada, T. and Tschardtke, T., 2006. Spatial scale of observation affects α , β and γ diversity of cavity-nesting bees and wasps across a tropical land-use gradient. *Journal of Biogeography*, 33(7), pp.1295-1304.
- Vanbergen, A.J., 2013. Threats to an ecosystem service: pressures on pollinators. *Frontiers in Ecology and the Environment*, 11(5), pp.251-259.
- Venables, W. N. & Ripley, B. D. (2002) *Modern Applied Statistics with S*. Fourth Edition. Springer, New York
- Walde, S.J. and Murdoch, W.W., 1988. Spatial density dependence in parasitoids. *Annual review of entomology*, 33(1), pp.441-466.
- Wcislo, W.T. and Cane, J.H., 1996. Floral resource utilization by solitary bees (Hymenoptera: Apoidea) and exploitation of their stored foods by natural enemies. *Annual review of entomology*, 41(1), pp.257-286.
- Williams, N.M. and Kremen, C., 2007. Resource distributions among habitats determine solitary bee offspring production in a mosaic landscape. *Ecological applications*, 17(3), pp.910-921.
- Wójtowski, F., Wilkaniec, Z. and Szymas, B., 1995. Increasing the total number of *Osmia rufa* (L.)(Megachilidae) in selected biotopes by controlled introduction method. *Changes in fauna of wild bees in Europe*, pp.177-180.
- Wood, T.J., Holland, J.M. and Goulson, D., 2016. Providing foraging resources for solitary bees on farmland: current schemes for pollinators benefit a limited suite of species. *Journal of Applied Ecology*.

Supplementary Information

Table 2 Solitary bee and wasp community data for each transect. The table lists the species recorded on each transect, the number of brood cells of each species and the total number of brood cells for each transect. *Osmia* spp., *Megachile* spp. and *Symmorphus/Ancistrocerus* spp. categories contain individuals that could only be identified to genus level and whose species identity could not be confirmed from other fully developed individuals from the same bamboo shoot. These categories may contain individuals from species listed elsewhere in the table. Note that transect 8 is excluded from the table as 8 out of 12 of the nest boxes were destroyed when a herd of cows was accidentally let into the field – this transect was excluded from analyses of nest box occupancy. For raw emergence data at the level of the bamboo shoot and nest box, see Appendix, Table 3.

Solitary bee and wasp species recorded at each transect	Number of brood cells
Transect 1	28
<i>Megachile centuncularis</i>	17
<i>Megachile</i> spp.	11
Transect 2	72
<i>Ancistrocerus/Symmorphus</i> spp.	9
<i>Megachile ligniseca</i>	8
<i>Megachile</i> spp.	37
<i>Megachile versicolor</i>	10
<i>Megachile versicolor/ligniseca</i>	5
<i>Osmia</i> spp.	3
Transect 3	64
<i>Ancistrocerus/Symmorphus</i> spp.	8
<i>Megachile ligniseca</i>	7
<i>Megachile</i> spp.	16
<i>Megachile versicolor</i>	7
<i>Osmia caeruleascens</i>	3
<i>Osmia</i> spp.	23
Transect 4	142
<i>Ancistrocerus/Symmorphus</i> spp	2
<i>Megachile ligniseca</i>	11
<i>Megachile</i> spp.	111
<i>Megachile versicolor/centuncularis</i>	6
<i>Osmia caeruleascens/leiana</i>	7
<i>Osmia</i> spp.	5
Transect 5	80
<i>Ancistrocerus/Symmorphus</i> spp	23
<i>Megachile</i> spp.	29
<i>Megachile versicolor</i>	10
<i>Osmia caeruleascens</i>	3

<i>Osmia</i> spp.	15
Transect 7	49
<i>Ancistrocerus/Symmorphus</i> spp	4
<i>Megachile</i> spp.	15
<i>Megachile versicolor</i>	4
<i>Megachile versicolor/centuncularis</i>	4
<i>Osmia caerulescens</i>	2
<i>Osmia caerulescens/leiana</i>	6
<i>Osmia</i> spp.	14
Transect 9	56
<i>Megachile ligniseca</i>	6
<i>Megachile</i> spp.	23
<i>Osmia</i> spp.	27
Transect 10	41
<i>Megachile</i> spp.	6
<i>Osmia</i> spp.	35
Transect 11	204
<i>Megachile</i> spp.	54
<i>Megachile versicolor</i>	52
<i>Megachile versicolor/centuncularis</i>	5
<i>Osmia bicornis</i>	17
<i>Osmia caerulescens</i>	4
<i>Osmia caerulescens/leiana</i>	5
<i>Osmia</i> spp,	67
Transect 12	42
<i>Megachile ligniseca</i>	8
<i>Megachile versicolor</i>	9
<i>Osmia</i> spp.	25
Grand Total	778

Table 3 Parasitism events recorded at each transect (where parasitism occurred). *Coelioxys* is a genus of klepto-parasitic solitary bee, *Coelioxys* parasitism is also recorded.

Transect	Parasitoid Species	Host Species	Parasitized Cells
1	Gasteruptiidae sp.	<i>Megachile</i> sp.	2
2	Gasteruptiidae sp.	<i>Ancistrocerus/Symmorphus</i> sp.	3
2	Gasteruptiidae sp.	<i>Ancistrocerus/Symmorphus</i> sp.	3
3	<i>Chrysid</i> sp.	<i>Osmia</i> sp.	2
3	<i>Chrysid</i> sp.	<i>Ancistrocerus/Symmorphus</i> sp.	1
3	<i>Sapyga quinquepunctata</i>	<i>Osmia</i> sp.	3

3	<i>Sapyga quinquepunctata</i>	<i>Osmia</i> sp.	7
4	Chalcidoidea sp.	<i>Megachile</i> sp.	1
4	<i>Chrysid</i> sp.	<i>Osmia caerulescens/leiana</i> sp.	2
4	Chalcidoidea sp.	<i>Ancistrocerus/Symmorphus</i> sp.	2
4	Chalcidoidea sp.	<i>Megachile</i> sp.	1
4	<i>Coeloxys</i> sp.	<i>Megachile</i> sp.	2
5	<i>Chrysid</i> sp.	<i>Ancistrocerus/Symmorphus</i> sp.	2
5	Gasteruptiidae sp.	<i>Osmia</i> sp.	2
5	Gasteruptiidae sp.	<i>Osmia</i> sp.	1
5	Gasteruptiidae sp.	<i>Ancistrocerus/Symmorphus</i> sp.	1
10	<i>Coeloxys</i> sp.	<i>Megachile</i> sp.	2
7	Chalcidoidea sp.	<i>Megachile versicolor/centuncularis</i> sp.	1
7	1 Chalcidoidea sp., 1 Gasteruptiidae sp.	<i>Osmia</i> sp.	2
7	Gasteruptiidae sp.	<i>Osmia</i> sp.	1
7	Gasteruptiidae sp.	<i>Osmia</i> sp.	1
11	Gasteruptiidae sp.	<i>Osmia</i> sp.	1
11	Gasteruptiidae sp.	<i>Megachile</i> sp.	1
11	<i>Coeloxys</i> sp.	<i>Megachile</i> sp.	1
11	<i>Coeloxys</i> sp.	<i>Megachile versicolor/centuncularis</i> sp.	1
11	Gasteruptiidae sp.	<i>Megachile</i> sp.	1
11	1 Gasteruptiidae sp. 1 <i>Coeloxys</i> sp.	<i>Megachile</i> sp.	2
12	<i>Coeloxys</i> sp.	<i>Megachile ligniseca</i>	1

Table 4 Plant species recorded across all transects and the abundance of floral units of each species at each transect. See Appendix, Table 5 for a description of what constituted a floral unit for each species.

Transect	Sum of floral unit abundance
1	
<i>Anthriscus sylvestris</i>	3
<i>Arctium minus</i>	2
<i>Centaurea nigra</i>	2
<i>Cichorium intybus</i>	3
<i>Cirsium arvense</i>	9
<i>Epilobium hirsutum</i>	5
<i>Geranium molle</i>	1
<i>Hieracium</i> sp.	7
<i>Jacobaea vulgaris</i>	4
<i>Leucanthemum vulgare</i>	4
<i>Lotus corniculatus</i>	3
<i>Prunus spinosa</i>	2

<i>Ranunculus acris</i>	5
<i>Rosa canina</i>	2
<i>Sonchus arvensis</i>	4
<i>Stellaria media</i>	1
<i>Trifolium repens</i>	12
<i>Tripleurospermum inodorum</i>	2
<i>Veronica chamaedrys</i>	1
<i>Vicia sativa</i>	1
<i>Taraxacum officinale</i>	8
2	
<i>Agrimonia eupatoria</i>	1
<i>Anthriscus sylvestris</i>	3
<i>Calystegia sepium</i>	2
<i>Centaurea nigra</i>	4
<i>Cirsium arvense</i>	3
<i>Convolvulus arvensis</i>	4
<i>Crataegus monogyna</i>	2
<i>Hieracium</i> sp.	2
<i>Hydrangea</i> sp.	2
<i>Jacobaea vulgaris</i>	2
<i>Lotus corniculatus</i>	11
<i>Papaver rhoeas</i>	3
<i>Rosa canina</i>	5
<i>Rubus fruticosus</i>	6
<i>Sambucus nigra</i>	5
<i>Sinapsis arvensis</i>	5
<i>Sonchus arvensis</i>	2
<i>Trifolium repens</i>	11
<i>Tripleurospermum inodorum</i>	2
<i>Vicia cracca</i>	3
<i>Taraxacum officinale</i>	2
3	
<i>Achillea millefolium</i>	1
<i>Agrimonia eupatoria</i>	1
<i>Anagallis arvensis</i>	1
<i>Arctium minus</i>	2
<i>Bellis perennis</i>	1
<i>Centaurea nigra</i>	5
<i>Cirsium vulgare</i>	3
<i>Clinopodium vulgare</i>	2
<i>Convolvulus arvensis</i>	4
<i>Crataegus monogyna</i>	4
<i>Epilobium hirsutum</i>	1

<i>Galium verum</i>	2
<i>Geranium molle</i>	1
<i>Hieracium</i> sp.	4
<i>Hypericum perforatum</i>	3
<i>Jacobaea vulgaris</i>	7
<i>Knautia arvensis</i>	5
<i>Leucanthemum vulgare</i>	14
<i>Lotus corniculatus</i>	9
<i>Lychnis flos-cuculi</i>	3
<i>Lysimachia punctata</i>	1
<i>Malva neglecta</i>	2
<i>Medicago lupulina</i>	5
<i>Medicago sativa</i>	1
<i>Myosotis arvensis</i>	2
<i>Papaver rhoeas</i>	2
<i>Primula veris</i>	5
<i>Prunella vulgaris</i>	1
<i>Ranunculus acris</i>	5
<i>Rosa canina</i>	3
<i>Rubus fruticosus</i>	3
<i>Silene latifolia</i>	1
<i>Sonchus arvensis</i>	2
<i>Trifolium repens</i>	5
<i>Veronica chamaedrys</i>	3
<i>Veronica persica</i>	1
<i>Taraxacum officinale</i>	3
4	
<i>Anthriscus sylvestris</i>	10
<i>Bellis perennis</i>	2
<i>Calystegia sepium</i>	6
<i>Carduus nutans</i>	3
<i>Cirsium arvense</i>	13
<i>Cirsium vulgare</i>	2
<i>Epilobium hirsutum</i>	10
<i>Geranium molle</i>	2
<i>Geranium pratense</i>	2
<i>Glechoma hederacea</i>	3
<i>Hieracium</i> sp.	7
<i>Iris pseudacorus</i>	4
<i>Jacobaea vulgaris</i>	7
<i>Lamium album</i>	5
<i>Lotus corniculatus</i>	4
<i>Lycopus europaeus</i>	2

<i>Lythrum salicaria</i>	3
<i>Prunus spinosa</i>	3
<i>Pulicaria dysenterica</i>	5
<i>Ranunculus acris</i>	9
<i>Ranunculus ficaria</i>	5
<i>Rosa canina</i>	5
<i>Sambucus nigra</i>	4
<i>Sinapsis arvensis</i>	1
<i>Sonchus arvensis</i>	3
<i>Symphytum officinale</i>	13
<i>Trifolium pratense</i>	2
<i>Trifolium repens</i>	12
<i>Vicia cracca</i>	9
<i>Vicia sativa</i>	2
<i>Taraxacum officinale</i>	2
5	
<i>Anthriscus sylvestris</i>	3
<i>Brassica napus</i>	5
<i>Calystegia sepium</i>	2
<i>Centaurea cyanus</i>	3
<i>Cirsium arvense</i>	12
<i>Cirsium vulgare</i>	3
<i>Crataegus monogyna</i>	4
<i>Epilobium hirsutum</i>	7
<i>Hieracium sp.</i>	4
<i>Jacobaea vulgaris</i>	4
<i>Leucanthemum vulgare</i>	4
<i>Lotus corniculatus</i>	4
<i>Ranunculus acris</i>	6
<i>Sambucus nigra</i>	4
<i>Sinapsis arvensis</i>	2
<i>Sonchus arvensis</i>	2
<i>Trifolium pratense</i>	3
<i>Trifolium repens</i>	9
<i>Tripleurospermum inodorum</i>	2
<i>Veronica persica</i>	1
<i>Taraxacum officinale</i>	1
6	
<i>Anthriscus sylvestris</i>	2
<i>Arctium minus</i>	2
<i>Calystegia sepium</i>	1
<i>Cirsium arvense</i>	5
<i>Crataegus monogyna</i>	3

<i>Epilobium hirsutum</i>	3
<i>Glechoma hederacea</i>	1
<i>Lamium album</i>	2
<i>Malva sylvestris</i>	1
<i>Rosa canina</i>	1
<i>Sambucus nigra</i>	2
<i>Scorzoneroïdes autumnalis</i>	2
<i>Silene dioica</i>	1
<i>Silene latifolia</i>	2
<i>Sinapsis arvensis</i>	2
<i>Trifolium repens</i>	6
<i>Taraxacum officinale</i>	4
7	
<i>Ajuga reptans</i>	5
<i>Anthriscus sylvestris</i>	3
<i>Centaurea nigra</i>	2
<i>Centranthus ruber</i>	2
<i>Cirsium arvense</i>	3
<i>Crataegus monogyna</i>	7
<i>Dactylorhiza praetermissa</i>	2
<i>Epilobium hirsutum</i>	6
<i>Filipendula ulmaria</i>	5
<i>Hieracium sp.</i>	1
<i>Iris pseudacorus</i>	1
<i>Jacobaea vulgaris</i>	1
<i>Lamium album</i>	1
<i>Lotus corniculatus</i>	4
<i>Lychnis flos-cuculi</i>	2
<i>Lysimachia punctata</i>	2
<i>Lysimachia vulgaris</i>	7
<i>Mentha aquatica</i>	2
<i>Mentha aquatica</i>	1
<i>Primula veris</i>	9
<i>Prunella vulgaris</i>	3
<i>Ranunculus acris</i>	12
<i>Ranunculus ficaria</i>	2
<i>Sambucus nigra</i>	3
<i>Solanum dulcamara</i>	1
<i>Stellaria media</i>	3
<i>Trifolium pratense</i>	4
<i>Trifolium repens</i>	5
<i>Veronica chamaedrys</i>	7
<i>Vicia cracca</i>	1

<i>Taraxacum officinale</i>	8
8	
<i>Achillea millefolium</i>	1
<i>Agrimonia eupatoria</i>	2
<i>Anthriscus sylvestris</i>	12
<i>Arctium minus</i>	1
<i>Bellis perennis</i>	2
<i>Calystegia sepium</i>	8
<i>Centaurea nigra</i>	1
<i>Cirsium arvense</i>	5
<i>Convolvulus arvensis</i>	9
<i>Crataegus monogyna</i>	4
<i>Geranium molle</i>	4
<i>Geranium pratense</i>	3
<i>Glechoma hederacea</i>	2
<i>Hieracium sp.</i>	2
<i>Hypericum perforatum</i>	3
<i>Lamium album</i>	11
<i>Lamium purpureum</i>	2
<i>Matricaria discoidea</i>	1
<i>Prunus spinosa</i>	4
<i>Ranunculus acris</i>	5
<i>Rubus fruticosus</i>	2
<i>Sambucus nigra</i>	2
<i>Silene dioica</i>	2
<i>Silene latifolia</i>	3
<i>Stellaria media</i>	4
<i>Trifolium pratense</i>	3
<i>Trifolium repens</i>	12
<i>Veronica chamaedrys</i>	4
<i>Taraxacum officinale</i>	10
9	
<i>Achillea millefolium</i>	1
<i>Anthriscus sylvestris</i>	3
<i>Calystegia sepium</i>	3
<i>Centaurea nigra</i>	11
<i>Cichorium intybus</i>	11
<i>Cirsium arvense</i>	7
<i>Cirsium vulgare</i>	2
<i>Convolvulus arvensis</i>	3
<i>Crataegus monogyna</i>	2
<i>Epilobium hirsutum</i>	3
<i>Helminthotheca echioides</i>	7

<i>Jacobaea vulgaris</i>	6
<i>Leucanthemum vulgare</i>	4
<i>Lotus corniculatus</i>	8
<i>Papaver rhoeas</i>	1
<i>Ranunculus acris</i>	10
<i>Ranunculus repens</i>	7
<i>Rosa canina</i>	2
<i>Sinapsis arvensis</i>	8
<i>Trifolium pratense</i>	16
<i>Trifolium repens</i>	18
<i>Vicia cracca</i>	6
<i>Vicia faba</i>	5
<i>Vicia sativa</i>	2
<i>Taraxacum officinale</i>	10
10	
<i>Achillea millefolium</i>	6
<i>Agrostemma githago</i>	6
<i>Anthriscus sylvestris</i>	12
<i>Arctium minus</i>	4
<i>Bellis perennis</i>	4
<i>Bergenia sp.</i>	1
<i>Buddleja sp.</i>	4
<i>Calystegia sepium</i>	4
<i>Centaurea cyanus</i>	2
<i>Centaurea nigra</i>	6
<i>Cerintho sp.</i>	1
<i>Chaenomeles sp.</i>	1
<i>Chamerion angustifolium</i>	4
<i>Cirsium vulgare</i>	5
<i>Convolvulus arvensis</i>	6
<i>Dipsacus sylvestris</i>	4
<i>Eryngium maritimum</i>	2
<i>Geranium pratense</i>	5
<i>Helianthus annuus</i>	1
<i>Hyacinthoides hispanica</i>	2
<i>Iris sp.</i>	1
<i>Jacobaea vulgaris</i>	7
<i>Knautia arvensis</i>	6
<i>Lamium album</i>	5
<i>Lamium purpureum</i>	1
<i>Lathyrus latifolius</i>	4
<i>Lavandula sp.</i>	8
<i>Leucanthemum vulgare</i>	3

<i>Lithospermum arvense</i>	2
<i>Lotus corniculatus</i>	11
<i>Lunaria annua</i>	2
<i>Lythrum salicaria</i>	5
<i>Malus domestica</i>	4
<i>Malva neglecta</i>	1
<i>Medicago lupulina</i>	3
<i>Medicago sativa</i>	6
<i>Myosotis arvensis</i>	6
<i>Papaver rhoeas</i>	6
<i>Pentaglottis sempervirens</i>	3
<i>Phacelia tanacetifolia</i>	4
<i>Primula veris</i>	4
<i>Primula vulgaris</i>	2
<i>Prunus avium</i>	3
<i>Ranunculus acris</i>	6
<i>Rhinanthus minor</i>	3
<i>Rosa canina</i>	4
<i>Rosa sp.</i>	4
<i>Salvia sp.</i>	4
<i>Sambucus nigra</i>	4
<i>Scrophularia nodosa</i>	2
<i>Sinapsis arvensis</i>	3
<i>Symphytum officinale</i>	3
<i>Syringa vulgaris</i>	1
<i>Tanacetum vulgare</i>	4
<i>Thymus vulgaris</i>	4
<i>Trifolium pratense</i>	3
<i>Trifolium repens</i>	5
<i>Valeriana officinalis</i>	4
<i>Veronica persica</i>	2
<i>Vicia sativa</i>	2
<i>Taraxacum officinale</i>	8
11	
<i>Anthriscus sylvestris</i>	6
<i>Arctium minus</i>	2
<i>Calystegia sepium</i>	4
<i>Cichorium intybus</i>	15
<i>Cirsium arvense</i>	4
<i>Cirsium vulgare</i>	4
<i>Dipsacus sylvestris</i>	2
<i>Epilobium hirsutum</i>	2
<i>Helminthotheca echioides</i>	3

<i>Lotus corniculatus</i>	12
<i>Ranunculus acris</i>	6
<i>Rosa canina</i>	2
<i>Sambucus nigra</i>	2
<i>Trifolium pratense</i>	18
<i>Trifolium repens</i>	7
<i>Taraxacum officinale</i>	1
12	
<i>Anthemis arvensis</i>	4
<i>Anthriscus sylvestris</i>	4
<i>Centaurea nigra</i>	2
<i>Cichorium intybus</i>	14
<i>Cirsium arvense</i>	2
<i>Cirsium vulgare</i>	6
<i>Convolvulus arvensis</i>	2
<i>Crataegus monogyna</i>	2
<i>Epilobium hirsutum</i>	3
<i>Fragaria virginiana</i>	6
<i>Helianthus annuus</i>	4
<i>Helminthotheca echioides</i>	5
<i>Hieracium sp.</i>	3
<i>Jacobaea vulgaris</i>	1
<i>Lamium album</i>	4
<i>Leucanthemum vulgare</i>	4
<i>Lotus corniculatus</i>	12
<i>Medicago sativa</i>	11
<i>Papaver rhoeas</i>	1
<i>Prunella vulgaris</i>	2
<i>Ranunculus acris</i>	9
<i>Rosa canina</i>	2
<i>Sambucus nigra</i>	2
<i>Sinapsis arvensis</i>	11
<i>Sonchus arvensis</i>	4
<i>Trifolium incarnatum</i>	5
<i>Trifolium pratense</i>	9
<i>Trifolium repens</i>	18
<i>Trifolium resupinatum</i>	3
<i>Tripleurospermum inodorum</i>	5
<i>Vicia cracca</i>	1
<i>Vicia sativa</i>	2
<i>Taraxacum officinale</i>	8
Grand Total	1463

Table 5 Presented are statistics of the best minimal adequate Generalized Linear Models. Model selection was based on AIC values, and ΔAIC indicates the difference between the best and next best model. If the $\Delta AIC < 0.5$, the next best model is also shown. This was only the case for Model 2 where the best and next best models both identified solely nest box treatment as significant. Coefficients of determination, D^2 (the amount of deviance accounted for by the model) are provided – these were calculated using the “modEvA” package in R (Barbosa, et al., 2016). The full set of explanatory variables included in the full models for models were: floral-unit abundance, the proportion of natural habitat, the number of pollen samples available and the number of bee samples from which pollen samples were taken for each farm.

Model	Response Variable	Explanatory Variables	df	F	P
Best model, AIC = 89.83, Adj. D^2 = 0.74, ΔAIC = 1.71					
1	Nest box colonization	Proportion of natural habitat	1,8	31.575	0.005
Best model, AIC = -42.12, Adj. D^2 = 0.794, ΔAIC = 0.44					
2(a)	Parasitism rate	Floral unit abundance	1,8	4.992	0.067
		Nest box treatment	1,7	38.474	<0.001
		Natural nest site availability	1,6	2.985	0.135
<i>Next best model, AIC = -41.68, Adj. D^2 = 0.78, ΔAIC = 1.99</i>					
2(b)	Parasitism rate	Floral unit abundance	1,8	4.8625	0.079
		Nest box treatment	1,7	37.48	0.001
		Natural nest site availability	1,6	2.908	0.149
		Pesticide use	1,5	0.845	0.4

Table 6 Raw data input for the Generalized Linear Models. The table includes the following data for each transect: the farm on which the transect was placed, the number of nest boxes installed, floral-unit abundance, plant species richness, the availability of natural nesting sites, the proportion of natural habitat, number of brood cells, the number of parasitized brood cells and parasitism rate. Note transects 8 & 11 were excluded from the first Generalized Linear Model and just transect 8 was excluded from the second Generalized linear model.

Farm	Transect	Nest Boxes	Flower Unit Abundance	Plant Species Richness	Nesting site availability	Prop Natural Habitat	Organic/Conventional	Total Brood Cells	Parasitised cells	Parasitism Rate
Earth Trust	1	24	81	21	4	0.26	Conventional	28	2	0.071428571
Earth Trust	2	21	80	21	3	0.216	Conventional	72	6	0.083333333
Earth Trust	3	33	118	37	4	0.235	Conventional	64	13	0.203125
Earth Trust	4	15	160	31	8	0.443	Conventional	142	8	0.056338028
Wytham	5	27	85	21	5	0.33	Organic	80	6	0.075
Wytham	6	1	40	17	3	0.07	Organic	0	NA	NA
Greystones	7	30	115	31	6	0.237	Conventional	49	5	0.102040816
Greystones	8	12	124	29	6	0.262	Conventional	0	NA	NA
Lower Smite	9	6	156	25	6	0.194	Organic	56	0	0
Lower Smite	10	3	243	61	10	0.217	Organic	41	2	0.048780488
Lower Smite	11	18	90	16	4	0.243	Conventional	204	7	0.034313725
Lower Smite	12	9	171	33	5	0.212	Organic	42	1	0.023809524

General Discussion

The conservation of wild insect pollinators on farmland is a major focus of the UK's National Pollinator Conservation Strategy (DEFRA, 2014). The government intends to achieve this through the integration of pollinator conservation interventions into the UK agri-environment schemes. These conservation interventions focus on three key areas; 1) the provision of natural habitat 2) the augmentation of floral foraging resource availability and 3) the provision of nesting sites, for insect pollinators on farmland (Natural England, 2016).

The collection of data that evaluate the effectiveness of current conservation interventions in restoring wild pollinator communities on farmland is a research priority; vital for the refinement of effective, evidence based policy (Dicks et al., 2013; POST, 2013). Over the last decade, an increasing number of studies have been published, evaluating the effectiveness of agri-environment management in supporting insect pollinators (Kleijn & Sutherland, 2003; Pywell et al., 2005; Albrecht et al., 2007; Carvell et al., 2007; Scheper et al., 2013). However, these studies have captured a limited suite of pollinator species, with emphasis on bumblebees and honeybees, with little attention devoted to other important wild pollinators such as solitary bees, moths and hoverflies (Dicks et al., 2013).

The focus of the work presented in this thesis was on assessing the effectiveness of the UK agri-environment scheme pollinator conservation interventions in supporting solitary bees, of which there are 250 species in the UK (Falk & Lewington, 2015). Only one study to date, among those that have examined the effectiveness of UK agri-environment management in supporting pollinator communities, has focused specifically on solitary bees (Wood et al., 2016). This study found evidence that the sown wildflower seed mixtures for insect pollinators, provided to farmers as part of the UK agri-environment schemes, are of limited benefit to solitary bees; their specific

forage requirements appear not well supported. This preliminary finding has serious implications; it is estimated that current honeybee populations are capable of supplying just 34% of the pollination service demand within the UK (Breeze et al., 2011), other wild insect pollinators are required to meet this pollination shortfall.

This thesis assesses the extent to which the three pollinator conservation interventions of the UK agri-environment schemes; the provision of natural and semi-natural habitat, foraging resources and nesting sites, support farmland cavity nesting solitary bee communities. The aims of the thesis were firstly, to examine the effect of natural habitat and foraging resource provision on the abundance, species richness and diversity of farmland cavity nesting solitary bees and wasps. Secondly, to examine whether the provision of natural habitat and foraging resources has a positive impact on solitary bee and wasp community stability, specifically on key indices of stability within their parasitism and pollen transport networks. The third, to assess the extent to which the agri-environment scheme sown wildflower seed mixtures support the forage requirements of cavity nesting solitary bees and to provide recommendations for plant species that could be included to improve the formulation of current mixes. Finally, to evaluate the relative importance of nest site, natural habitat and forage resource availability in influencing the local density of cavity nesting solitary bees on farmland and examine the suitability of solitary bee nest box provision as a conservation intervention.

The policy implications of the results presented in this thesis are outlined below, in specific relation to the three key focus areas of the UK agri-environment scheme pollinator conservation interventions; natural habitat, plant foraging resource and nesting site provision.

Natural Habitat

The first question addressed in this thesis was whether increasing the proportion of natural and semi-natural habitat on farmland influenced the abundance, species richness and diversity of cavity nesting solitary bees and wasps.

Data presented in Chapters 2 and 5 of the thesis identified a significant tendency for the abundance and species richness of bees and wasps to increase with the proportion of natural and semi-natural habitat within the environment. Before this work, only two studies had examined the impact of natural and semi-natural habitat provision, through agri-environment management, on solitary bee abundance and species richness within European agricultural landscapes. One study conducted in Switzerland identified a positive relationship between landscape heterogeneity and the proportion of forest cover on the abundance and species richness of farmland cavity nesting solitary bees and wasps (Fabian et al., 2013). A significant relationship between landscape complexity, measured as the proportion of natural habitat, and cavity nesting solitary bee and wasp species richness was identified by second study conducted within an agricultural landscape in Germany (Steckel et al., 2014). The studies in Chapters 2 and 5 are the first to examine the relationship between natural habitat availability and solitary bee and wasp abundance, species richness and diversity on UK farmland. The results are encouraging, suggesting that the natural habitat types promoted by the UK agri-environment schemes are effective in supporting cavity nesting solitary bee and wasp abundance and species richness.

In addition, Chapter 3 of the thesis identified a positive relationship between natural habitat availability and key quantitative indices of community stability within farmland cavity nesting solitary bee and wasp parasitism networks. A significant positive relationship was identified between network link density and the proportion of natural and semi-natural habitat across farms. Link density measures the mean number of

links per species within a network and is influenced by the level of generalism among interacting species. Higher measures of link density are believed to confer greater resilience to species loss as individuals have more flexibility to switch interaction partner, limiting the risk of a cascade of secondary species extinctions. The results presented in Chapter 3 are the first to demonstrate quantitatively a positive relationship between natural habitat provision through UK agri-environment management and cavity nesting solitary bee and wasp network stability. Only one other study (Fabian et al., 2013) has examined the response of farmland cavity nesting solitary bee and wasp parasitism networks to agri-environment management; it was conducted across an agricultural landscape in Switzerland. This study identified a positive correlation between link density, forest cover and proximity to the nearest wildflower strip (Fabian et al., 2013). These two sets results, taken together, provide evidence that the provision of natural habitat, through agri-environment, may enhance the stability of farmland cavity nesting solitary bee and wasp parasitism network structure and as a consequence, provide a stabilising influence on community dynamics.

The set of results presented in this thesis suggest that the natural and semi-natural habitats promoted by the UK agri-environment schemes; species rich grassland, uncultivated field margins, sown wildflower strips, woodlands (and gardens) are beneficial to cavity nesting solitary bee and wasp communities. The results reinforce the importance of protecting these landcover classes and provide strong additional justification for the enhancement of these habitats on farmland within the pollinator conservation strategy of UK agri-environment schemes and European schemes more generally. Following on from this finding, an important further piece of work is to elucidate the aspects of these habitats that are most important in supporting cavity nesting solitary bee communities, for example through the provision of appropriate floral foraging resources and or nesting habitat.

Plant Foraging Resources

A second key question addressed by this thesis, of significant relevance to pollinator conservation policy, was whether the sown wildflower seed mixtures of the UK agri-environment schemes provided to farmers support the foraging requirements of cavity nesting solitary bees.

The data presented in Chapter 3 of the thesis provides further detailed evidence in support of the findings of (Wood et al., 2016), that the current sown wildflower mixes do not support the foraging requirements of solitary bee communities as effectively as they might. Of the 15 plant species included currently in the sown wildflower mixes provided to farmers and recorded as present on the study farms, pollen from only one species, *Ranunculus acris* L., was used by the bees.

Current wildflower seed formulations are known to support the foraging requirements of bumblebees and honeybees reasonably effectively (Pywell et al., 2005; Carvell et al., 2007) but results from this study indicate that consideration must also be given to how they support the requirements of other wild insect pollinators to ensure a diverse pollinator community is promoted (Wood et al., 2015). *Tripleurospermum inodorum* L. and *Trifolium repens* L. were identified by both this study and (Wood et al., 2016) as important forage plants of solitary bees. These species thrive on a variety of soil types and are presented as strong candidates for inclusion in agri-environment wildflower seed mixtures.

Another finding from this study was that overall, *Rosa canina* L. was most popular forage plant for solitary bees, despite a relatively low abundance in the environment. The leaves of this species are also a preferred nesting material for *Megachile* leafcutter bees. This provides strong justification for the inclusion of *Rosa canina* within the selection of forage plants encouraged by agri-environment schemes, for example as an important hedgerow plant.

In terms of methodological advances, Chapter 4 of the thesis demonstrated the ability of next generation DNA sequencing to identify pollinator foraging preferences at a fine species level resolution from analysis of pollen samples. This is the first time next generation sequencing of pollen DNA has been used to identify pollinator foraging preferences within an agricultural landscape and inform a critical evaluation of conservation policy. In future work, this technique could be used, in combination with less expensive and technically demanding flower visitation observation studies, to identify the foraging preferences of other wild pollinator taxa, such as ground nesting solitary bees, hoverflies and moths for which few data are available currently (Kleijn & Sutherland, 2003; Haaland et al., 2011; Wood et al., 2015). The identification of these foraging preferences is imperative to the formulation of appropriate wildflower seed mixtures.

Nesting Sites

Chapter 5 of the thesis examined the suitability of nest box provision as a conservation intervention for solitary bees on farmland. The availability of appropriate nesting resources is believed to play an important role in structuring bee communities and limiting population densities (Potts et al., 2005). The provision of solitary bee nest boxes was included recently among UK agri-environment scheme interventions to augment the availability of nesting resources for insect pollinators on farmland (Natural England, 2016). Although solitary bee nest boxes are known to be occupied readily by a number of cavity nesting species, concern has been raised that by encouraging nesting in un-naturally dense aggregations, they may expose bees to higher rates of parasitism (Maclvor & Packer, 2015). The study presented in Chapter 5 of the thesis is the first to address this concern.

A strong positive relationship between the density of solitary bee nest boxes placed on farmland and the rate of brood cell parasitism was identified. This is concerning: it

indicates that providing a high local density of nest boxes may expose bee larvae to a higher risk of parasitism. An enhanced risk of larval mortality could counteract the benefit of additional nesting site provision. This study demonstrated no significant effect of nest box provision on nest box colonization, indicating that across these study sites at least, the availability of nesting resources was not exerting a limiting influence on local bee abundance. Providing a high density of nest boxes provided no benefit, in the form of nesting resources, for bees and actually had a negative effect, enhancing the exposure of the bees that used the nest boxes to parasitism.

In more intensively managed farmland, where the availability of natural nesting sites may be low, the provision of nesting resources for solitary bees could be important; the benefit of nest box provision might outweigh the risk of increased parasitism. Additional data collected across a larger range of farmland, including more intensive farmland, are required to evaluate thoroughly whether nest box provision can provide a net benefit for local bee populations and in what context.

Until such data is available, it would be prudent to advise, at the very least, given the results of this study, against the provision of a high local density of nest boxes. It is difficult to provide a specific recommendation for what the maximum nest box density should be, above which brood cell parasitism exceeds the rate observed in nature. This is because the natural rate of solitary bee brood cell parasitism is not known; studies that have examined brood cell parasitism have analysed data from solitary bee nest boxes (Albrecht et al., 2007; Holzschuh et al., 2010; Fabian et al., 2013; Pereira-Peixoto et al., 2016). If nest boxes are to be provided on farmland, results from this work suggest it should be a relatively small number of nest boxes, widely dispersed across farmland. Certainly the very large nest boxes or 'solitary bee hotels' that are often marketed in garden centres, which encourage nesting in large, dense aggregations should be discouraged. The provision of small, highly dispersed nest boxes might more accurately mimic the availability of nesting resources in nature and

reduce the risk of enhanced parasitism rates.

Concluding Remarks

This thesis, in its evaluation of the effectiveness of the UK agri-environment schemes in supporting solitary bee communities is, for logistical reasons, based on data collected from a relatively small range of farms and across a limited subset of bee species. Notwithstanding, it begins to determine the relative success of current conservation interventions in supporting solitary bee communities, identifies areas in need of improvement and priorities for future research.

This data, I hope, can be of service to the formulation of evidence-based policy for the conservation of wild insect pollinator communities within the UK and across temperate agricultural landscapes more generally. The identification of the link between solitary bee nest box provision and elevated brood cell parasitism has relevance outside of the UK; solitary bee nest boxes are marketed throughout Europe, North America and Canada for bee conservation (Maclvor & Packer, 2015). In addition, many of the natural habitat types promoted by the UK agri-environment schemes and demonstrated, in this study, to be of benefit to solitary bees, such as hedgerows, buffer strips and species rich grassland are promoted by the agri-environment schemes of other European countries (Ovenden et al., 1998; Kleijn & Sutherland, 2003; Kleijn et al., 2006; Whittingham, 2007; Whittingham, 2011). Certainly the data presented in this study, in regards to nesting site and natural habitat provision, are of relevance beyond UK agri-environment scheme pollinator conservation policy.

Works Cited

Albrecht, M., Duelli, P., Schmid, B. and Müller, C.B., 2007. Interaction diversity within quantified insect food webs in restored and adjacent intensively managed meadows. *Journal of Animal Ecology*, 76(5), pp.1015-1025.

Breeze, T.D., Bailey, A.P., Balcombe, K.G. and Potts, S.G., 2011. Pollination services in the UK: How important are honeybees?. *Agriculture, Ecosystems & Environment*, 142(3), pp.137-143.

Carvell, C., Meek, W.R., Pywell, R.F., Goulson, D. and Nowakowski, M., 2007. Comparing the efficacy of agri-environment schemes to enhance bumble bee abundance and diversity on arable field margins. *Journal of Applied Ecology*, 44(1), pp.29-40.

DEFRA, 2014. *The National pollinator Strategy for bees and other pollinators in England*. [Online] Available at: https://www.gov.uk/government/uploads/attachment_data/file/409431/pb14221-national-pollinators-strategy.pdf [Accessed 18th April 2016].

Dicks, L.V., Abrahams, A., Atkinson, J., Biesmeijer, J., Bourn, N., Brown, C., Brown, M.J., Carvell, C., Connolly, C., Cresswell, J.E. and Croft, P., 2013. Identifying key knowledge needs for evidence-based conservation of wild insect pollinators: a collaborative cross-sectoral exercise. *Insect Conservation and Diversity*, 6(3), pp.435-446.

Fabian, Y., Sandau, N., Bruggisser, O.T., Aebi, A., Kehrl, P., Rohr, R.P., Naisbit, R.E. and Bersier, L.F., 2013. The importance of landscape and spatial structure for hymenopteran-based food webs in an agro-ecosystem. *Journal of Animal Ecology*, 82(6), pp.1203-1214.

Falk, S.J. and Lewington, R., 2015. *Field guide to the bees of Great Britain and Ireland*. British Wildlife Publishing Lt.

Fuentes-Montemayor, E., Goulson, D. and Park, K.J., 2011. The effectiveness of agri-environment schemes for the conservation of farmland moths: assessing the importance of a landscape-scale management approach. *Journal of Applied Ecology*, 48(3), pp.532-542.

Haaland, C., Naisbit, R.E. and Bersier, L.F., 2011. Sown wildflower strips for insect conservation: a review. *Insect Conservation and Diversity*, 4(1), pp.60-80.

Kleijn, D. and Sutherland, W.J., 2003. How effective are European agri-environment schemes in conserving and promoting biodiversity?. *Journal of applied ecology*, 40(6), pp.947-969.

Kleijn, D., Baquero, R.A., Clough, Y., Diaz, M., Esteban, J.D., Fernández, F., Gabriel, D., Herzog, F., Holzschuh, A., Jöhl, R. and Knop, E., 2006. Mixed biodiversity benefits of agri-environment schemes in five European countries. *Ecology letters*, 9(3), pp.243-254.

Lye, G., Park, K., Osborne, J., Holland, J. and Goulson, D., 2009. Assessing the value of Rural Stewardship schemes for providing foraging resources and nesting

habitat for bumblebee queens (Hymenoptera: Apidae). *Biological Conservation*, 142(10), pp.2023-2032.

MacIvor, J.S. and Packer, L., 2015. 'Bee hotels' as tools for native pollinator conservation: a premature verdict?. *PloS one*, 10(3), p.e0122126.

Merckx, T., Marini, L., Feber, R.E. and Macdonald, D.W., 2012. Hedgerow trees and extended-width field margins enhance macro-moth diversity: implications for management. *Journal of Applied Ecology*, 49(6), pp.1396-1404.

Natural England, 2016. [Online] *Countryside Stewardship*
Available at: <https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-land-management#higher-tier> [Accessed 28 September 2016].

Öckinger, E. and G Smith, H., 2007. Asymmetric dispersal and survival indicate population sources for grassland butterflies in agricultural landscapes. *Ecography*, 30(2), pp.288-298.

Ovenden, G.N., Swash, A.R. and Smallshire, D., 1998. Agri-environment schemes and their contribution to the conservation of biodiversity in England. *Journal of Applied Ecology*, pp.955-960.

Parliamentary Office of Science and Technology (POST), 2013. *Reversing Insect Pollinator Decline* POST-PN-442

Pereira-Peixoto, M.H., Pufal, G., Staab, M., Feitosa Martins, C.E.L.S.O. and Klein, A., 2016. Diversity and specificity of host-natural enemy interactions in an urban-rural interface. *Ecological Entomology*. 41(3), pp.241-252

Potts, S.G., Vulliamy, B., Roberts, S., O'Toole, C., Dafni, A., Ne'eman, G. and Willmer, P., 2005. Role of nesting resources in organising diverse bee communities in a Mediterranean landscape. *Ecological Entomology*, 30(1), pp.78-85.

Pywell, R.F., Warman, E.A., Carvell, C., Sparks, T.H., Dicks, L.V., Bennett, D., Wright, A., Critchley, C.N.R. and Sherwood, A., 2005. Providing foraging resources for bumblebees in intensively farmed landscapes. *Biological conservation*, 121(4), pp.479-494.

Steckel, J., Westphal, C., Peters, M.K., Bellach, M., Rothenwoehrer, C., Erasmi, S., Scherber, C., Tschardtke, T. and Steffan-Dewenter, I., 2014. Landscape composition and configuration differently affect trap-nesting bees, wasps and their antagonists. *Biological Conservation*, 172, pp.56-64

Whittingham, M. J., 2007. Will agri-environment schemes deliver substantial biodiversity gain, and if not why not?. *Journal of Applied Ecology*, 44, pp.1-5

Whittingham, M.J., 2011. The future of agri-environment schemes: biodiversity gains and ecosystem service delivery?. *Journal of applied ecology*, 48(3), pp.509-513.

Wood, T.J., Holland, J.M. and Goulson, D., 2015. Pollinator-friendly management does not increase the diversity of farmland bees and wasps. *Biological Conservation*, 187, pp.120-126.

Wood, T.J., Holland, J.M. and Goulson, D., 2016. Providing foraging resources for solitary bees on farmland: current schemes for pollinators benefit a limited suite of species. *Journal of Applied Ecology*.

Bibliography

Ahrne, K., Bengtsson, J. and Elmqvist, T., 2009. Bumble bees (*Bombus* spp) along a gradient of increasing urbanization. *PLoS One*, 4(5), p.e5574.

Aizen, M.A., Garibaldi, L.A., Cunningham, S.A. and Klein, A.M., 2008. Long-term global trends in crop yield and production reveal no current pollination shortage but increasing pollinator dependency. *Current Biology*, 18(20), pp.1572-1575.

Albrecht, M., Duelli, P., Schmid, B. and Müller, C.B., 2007. Interaction diversity within quantified insect food webs in restored and adjacent intensively managed meadows. *Journal of Animal Ecology*, 76(5), pp.1015-1025.

Ashman, T.L., Knight, T.M., Steets, J.A., Amarasekare, P., Burd, M., Campbell, D.R., Dudash, M.R., Johnston, M.O., Mazer, S.J., Mitchell, R.J. and Morgan, M.T., 2004. Pollen limitation of plant reproduction: ecological and evolutionary causes and consequences. *Ecology*, 85(9), pp.2408-2421.

Asner, G.P., Elmore, A.J., Olander, L.P., Martin, R.E. and Harris, A.T., 2004. Grazing systems, ecosystem responses, and global change. *Annu. Rev. Environ. Resour.*, 29, pp.261-299.

Barbosa A.M., Brown J.A., Jimenez-Valverde A., Real R., 2016. *Model Evaluation and Analysis: Package 'modEvA'*. <http://modeva.r-forge.r-project.org/>

Banašek-Richter, C., Cattin, M.F. and Bersier, L.F., 2004. Sampling effects and the robustness of quantitative and qualitative food-web descriptors. *Journal of Theoretical Biology*, 226(1), pp.23-32.

Baude, M., Kunin, W.E., Boatman, N.D., Conyers, S., Davies, N., Gillespie, M.A., Morton, R.D., Smart, S.M. and Memmott, J., 2016. Historical nectar assessment reveals the fall and rise of floral resources in Britain. *Nature*, 530(7588), pp.85-88.

Bell, K.L., Burgess, K.S., Okamoto, K.C., Aranda, R. and Brosi, B.J., 2016. Review and future prospects for DNA barcoding methods in forensic palynology. *Forensic Science International: Genetics*, 21, pp.110-116.

Benton, T.G., Bryant, D.M., Cole, L. and Crick, H.Q., 2002. Linking agricultural practice to insect and bird populations: a historical study over three decades. *Journal of Applied Ecology*, 39(4), pp.673-687.

Benton, T.G., Vickery, J.A. and Wilson, J.D., 2003. Farmland biodiversity: is habitat heterogeneity the key?. *Trends in Ecology & Evolution*, 18(4), pp.182-188.

Bersier, L.F., Banašek-Richter, C. and Cattin, M.F., 2002. Quantitative descriptors of food-web matrices. *Ecology*, 83(9), pp.2394-2407.

Bersier, L.F., 2013. The importance of landscape and spatial structure for hymenopteran-based food webs in an agro-ecosystem. *Journal of Animal Ecology*, 82(6), pp.1203-1214.

Falk, S.J. and Lewington, R., 2015. *Field guide to the bees of Great Britain and Ireland*. British Wildlife Publishing Lt.

Biesmeijer, J.C., Roberts, S.P.M., Reemer, M., Ohlemüller, R., Edwards, M., Peeters, T., Schaffers, A.P., Potts, S.G., Kleukers, R., Thomas, C.D. and Settele, J., 2006. Parallel declines in pollinators and insect-pollinated plants in Britain and the Netherlands. *Science*, 313(5785), pp.351-354.

Blamey, M., 2013. *Wild Flowers of Britain and Ireland: 2nd edn.* Bloomsbury Natural History.

Bohart, G.E., 1972. Management of wild bees for the pollination of crops. *Annual review of entomology*, 17(1), pp.287-312.

Bosch, J. and Kemp, W.P., 2002. Developing and establishing bee species as crop pollinators: the example of *Osmia* spp.(Hymenoptera: Megachilidae) and fruit trees. *Bulletin of entomological research*, 92(01), pp.3-16.

Breeze, T.D., Bailey, A.P., Balcombe, K.G. and Potts, S.G., 2011. Pollination services in the UK: How important are honeybees?. *Agriculture, Ecosystems & Environment*, 142(3), pp.137-143.

Bruni, I., Galimberti, A., Caridi, L., Scaccabarozzi, D., De Mattia, F., Casiraghi, M. and Labra, M., 2015. A DNA barcoding approach to identify plant species in multiflower honey. *Food chemistry*, 170, pp.308-315.

Brown, M.J.F., Loosli, R. and Schmid-Hempel, P., 2000. Condition-dependent expression of virulence in a trypanosome infecting bumblebees. *Oikos*, 91(3), pp.421-427.

Brown, M.J.F. and Paxton, R.J., 2009. The conservation of bees: a global perspective. *Apidologie*, 40(3), pp.410-416.

Burkle, L.A., Marlin, J.C. and Knight, T.M., 2013. Plant-pollinator interactions over 120 years: loss of species, co-occurrence, and function. *Science*, 339(6127), pp.1611-1615.

Butler, S.J., Vickery, J.A. and Norris, K., 2007. Farmland biodiversity and the footprint of agriculture. *Science*, 315(5810), pp.381-384.

Carvell, C., Meek, W.R., Pywell, R.F. and Nowakowski, M., 2004. The response of foraging bumblebees to successional change in newly created arable field margins. *Biological Conservation*, 118(3), pp.327-339.

Carvell, C., Meek, W.R., Pywell, R.F., Goulson, D. and Nowakowski, M., 2007. Comparing the efficacy of agri-environment schemes to enhance bumble bee abundance and diversity on arable field margins. *Journal of Applied Ecology*, 44(1), pp.29-40.

Clapham, A.R., Tutin, T.G. and Moore, D.M., 1990. *Flora of the British isles.* CUP Archive.

Crawley, M. J., 2005. *Statistics, An Introduction Using R.* Chichester: John Wiley & Sons, Ltd.

Danforth, B.N., Sipes, S., Fang, J. and Brady, S.G., 2006. The history of early bee diversification based on five genes plus morphology. *Proceedings of the National Academy of Sciences*, 103(41), pp.15118-15123.

DEFRA, 2014. *The National pollinator Strategy for bees and other pollinators in England*. [Online] Available at: https://www.gov.uk/government/uploads/attachment_data/file/409431/pb14221-national-pollinators-strategy.pdf [Accessed 18th April 2016].

DEFRA, 2015. Agriculture in the United Kingdom 2014. *Publications - GOV.UK* www.gov.uk.

DEFRA, *Magic Map Application*. [Online] Available at: www.magic.defra.gov.org [Accessed August 2015].

Delaplane, K.S., Mayer, D.R. and Mayer, D.F., 2000. *Crop pollination by bees*. Cabi. Kennedy, C.M., Lonsdorf, E., Neel, M.C., Williams, N.M., Ricketts, T.H., Winfree, R., Bommarco, R., Brittain, C., Burley, A.L., Cariveau, D. and Carvalheiro, L.G., 2013. A global quantitative synthesis of local and landscape effects on wild bee pollinators in agroecosystems. *Ecology letters*, 16(5), pp.584-599.

Di Prisco, G., Cavaliere, V., Annoscia, D., Varricchio, P., Caprio, E., Nazzi, F., Gargiulo, G. and Pennacchio, F., 2013. Neonicotinoid clothianidin adversely affects insect immunity and promotes replication of a viral pathogen in honey bees. *Proceedings of the National Academy of Sciences*, 110(46), pp.18466-18471.

Dicks, L.V., Showler, D.A. and Sutherland, W.J., 2010. *Bee conservation: evidence for the effects of interventions* (Vol. 1). Pelagic Publishing.

Dicks, L.V., Abrahams, A., Atkinson, J., Biesmeijer, J., Bourn, N., Brown, C., Brown, M.J., Carvell, C., Connolly, C., Cresswell, J.E. and Croft, P., 2013. Identifying key knowledge needs for evidence-based conservation of wild insect pollinators: a collaborative cross-sectoral exercise. *Insect Conservation and Diversity*, 6(3), pp.435-446.

Dicks, L.V., Baude, M., Roberts, S.P., Phillips, J., Green, M. and Carvell, C., 2015. How much flower-rich habitat is enough for wild pollinators? Answering a key policy question with incomplete knowledge. *Ecological entomology*, 40(S1), pp.22-35.

Donald, P.F., Green, R.E. and Heath, M.F., 2001. Agricultural intensification and the collapse of Europe's farmland bird populations. *Proceedings of the Royal Society of London B: Biological Sciences*, 268(1462), pp.25-29.

Dormann, C.F., Fründ, J., Blüthgen, N. and Gruber, B., 2009. Indices, graphs and null models: analyzing bipartite ecological networks.

Dunne, J.A., Williams, R.J. and Martinez, N.D., 2002. Network structure and biodiversity loss in food webs: robustness increases with connectance. *Ecology letters*, 5(4), pp.558-567.

Ebeling, A., Klein, A.M. and Tscharntke, T., 2011. Plant–flower visitor interaction webs: temporal stability and pollinator specialization increases along an experimental plant diversity gradient. *Basic and Applied Ecology*, 12(4), pp.300-309.

Edwards, M., 2003. Aculeate conservation group annual report. *Unpublished report for the UK BAP bumblebee working group, Midhurst, UK.*

Fabian, Y., Sandau, N., Bruggisser, O.T., Aebi, A., Kehrl, P., Rohr, R.P., Naisbit, R.E. and Bersier, L.F., 2013. The importance of landscape and spatial structure for hymenopteran-based food webs in an agro-ecosystem. *Journal of Animal Ecology*, 82(6), pp.1203-1214.

Falk, S.J. and Lewington, R., 2015. *Field guide to the bees of Great Britain and Ireland*. British Wildlife Publishing Lt.

Ferreira, P.A., Boscolo, D. and Viana, B.F., 2013. What do we know about the effects of landscape changes on plant–pollinator interaction networks?. *Ecological indicators*, 31, pp.35-40.

Foley, J.A., Ramankutty, N., Brauman, K.A., Cassidy, E.S., Gerber, J.S., Johnston, M., Mueller, N.D., O'Connell, C., Ray, D.K., West, P.C. and Balzer, C., 2011. Solutions for a cultivated planet. *Nature*, 478(7369), pp.337-342.

Fuller, R.J., Gregory, R.D., Gibbons, D.W., Marchant, J.H., Wilson, J.D., Baillie, S.R. and Carter, N., 1995. Population declines and range contractions among lowland farmland birds in Britain. *Conservation Biology*, 9(6), pp.1425-1441.

Fürst, M.A., McMahon, D.P., Osborne, J.L., Paxton, R.J. and Brown, M.J.F., 2014. Disease associations between honeybees and bumblebees as a threat to wild pollinators. *Nature*, 506(7488), pp.364-366.

Galimberti, A., De Mattia, F., Bruni, I., Scaccabarozzi, D., Sandionigi, A., Barbuto, M., Casiraghi, M. and Labra, M., 2014. A DNA barcoding approach to characterize pollen collected by honeybees. *PloS one*, 9(10), p.e109363.

Gallai, N., Salles, J.M., Settele, J. and Vaissière, B.E., 2009. Economic valuation of the vulnerability of world agriculture confronted with pollinator decline. *Ecological economics*, 68(3), pp.810-821.

Garibaldi, L.A., Steffan-Dewenter, I., Winfree, R., Aizen, M.A., Bommarco, R., Cunningham, S.A., Kremen, C., Carvalheiro, L.G., Harder, L.D., Afik, O. and Bartomeus, I., 2013. Wild pollinators enhance fruit set of crops regardless of honey bee abundance. *science*, 339(6127), pp.1608-1611.

Garibaldi, L.A., Carvalheiro, L.G., Leonhardt, S.D., Aizen, M.A., Blaauw, B.R., Isaacs, R., Kuhlmann, M., Kleijn, D., Klein, A.M., Kremen, C. and Morandin, L., 2014. From research to action: enhancing crop yield through wild pollinators. *Frontiers in Ecology and the Environment*, 12(8), pp.439-447.

Garratt, M.P.D., Coston, D.J., Truslove, C.L., Lappage, M.G., Polce, C., Dean, R., Biesmeijer, J.C. and Potts, S.G., 2014. The identity of crop pollinators helps target conservation for improved ecosystem services. *Biological Conservation*, 169, pp.128-135.

Garratt, M.P.D., Truslove, C.L., Coston, D.J., Evans, R.L., Moss, E.D., Dodson, C., Jenner, N., Biesmeijer, J.C. and Potts, S.G., 2014. Pollination deficits in UK apple orchards. *Journal of Pollination Ecology*, 12(2), pp.9-14.

- Gathmann, A. and Tschardtke, T., 2002. Foraging ranges of solitary bees. *Journal of animal ecology*, 71(5), pp.757-764.
- Goldwasser, L. and Roughgarden, J., 1997. Sampling effects and the estimation of food-web properties. *Ecology*, 78(1), pp.41-54.
- Goulson, D., 1999. Foraging strategies of insects for gathering nectar and pollen, and implications for plant ecology and evolution. *Perspectives in plant ecology, evolution and systematics*, 2(2), pp.185-209.
- Goulson, D., Hughes, W., Derwent, L. and Stout, J., 2002. Colony growth of the bumblebee, *Bombus terrestris*, in improved and conventional agricultural and suburban habitats. *Oecologia*, 130(2), pp.267-273.
- Goulson, D., 2003. Effects of introduced bees on native ecosystems. *Annual Review of Ecology, Evolution, and Systematics*, pp.1-26.
- Goulson, D., Lye, G.C. and Darvill, B., 2008. Decline and conservation of bumble bees. *Annu. Rev. Entomol.*, 53, pp.191-208.
- Goulson, D., 2013. Review: An overview of the environmental risks posed by neonicotinoid insecticides. *Journal of Applied Ecology*, 50(4), pp.977-987.
- Goulson, D., Nicholls, E., Botías, C. and Rotheray, E.L., 2015. Bee declines driven by combined stress from parasites, pesticides, and lack of flowers. *Science*, 347(6229), p.1255957.
- Gross, M., 2008. Bee gloom deepens. *Current Biology*, 18(23), p.R1073.
- Gruber, B., Eckel, K., Everaars, J. and Dormann, C.F., 2011. On managing the red mason bee (*Osmia bicornis*) in apple orchards. *Apidologie*, 42(5), pp.564-576.
- Haaland, C., Naisbit, R.E. and BERSIER, L.F., 2011. Sown wildflower strips for insect conservation: a review. *Insect Conservation and Diversity*, 4(1), pp.60-80.
- Hawkins, J., de Vere, N., Griffith, A., Ford, C.R., Allainguillaume, J., Hegarty, M.J., Baillie, L. and Adams-Groom, B., 2015. Using DNA metabarcoding to identify the floral composition of honey: a new tool for investigating honey bee foraging preferences. *PloS one*, 10(8), p.e0134735.
- Holden, C., 2006. Report warns of looming pollination crisis in North America. *Science*, 314(5798), pp.397-397.
- Holland, J.M., Smith, B.M., Storkey, J., Lutman, P.J. and Aebischer, N.J., 2015. Managing habitats on English farmland for insect pollinator conservation. *Biological Conservation*, 182, pp.215-222.
- Holzschuh, A., Steffan-Dewenter, I. and Tschardtke, T., 2009. Grass strip corridors in agricultural landscapes enhance nest-site colonization by solitary wasps. *Ecological Applications*, 19(1), pp.123-132.
- Holzschuh, A., Steffan-Dewenter, I. and Tschardtke, T., 2010. How do landscape composition and configuration, organic farming and fallow strips affect the diversity of bees, wasps and their parasitoids?. *Journal of Animal Ecology*, 79(2), pp.491-500.

- Howard, D.C., Watkins, J.W., Clarke, R.T., Barnett, C.L. and Stark, G.J., 2003. Estimating the extent and change in broad habitats in Great Britain. *Journal of Environmental Management*, 67(3), pp.219-227.
- Kehinde, T. and Samways, M.J., 2014. Insect–flower interactions: network structure in organic versus conventional vineyards. *Animal Conservation*, 17(5), pp.401-409.
- Keller, A., Danner, N., Grimmer, G., Ankenbrand, M., Ohe, K., Ohe, W., Rost, S., Härtel, S. and Steffan-Dewenter, I., 2015. Evaluating multiplexed next-generation sequencing as a method in palynology for mixed pollen samples. *Plant Biology*, 17(2), pp.558-566.
- Kessler, S.C., Tiedeken, E.J., Simcock, K.L., Derveau, S., Mitchell, J., Softley, S., Stout, J.C. and Wright, G.A., 2015. Bees prefer foods containing neonicotinoid pesticides. *Nature*, 521(7550), pp.74-76.
- Kleijn, D., Berendse, F., Smit, R. and Gilissen, N., 2001. Agri-environment schemes do not effectively protect biodiversity in Dutch agricultural landscapes. *Nature*, 413(6857), pp.723-725.
- Klein, A.M., Steffan–Dewenter, I. and Tscharntke, T., 2003. Fruit set of highland coffee increases with the diversity of pollinating bees. *Proceedings of the Royal Society of London B: Biological Sciences*, 270(1518), pp.955-961.
- Kleijn, D. and Sutherland, W.J., 2003. How effective are European agri-environment schemes in conserving and promoting biodiversity?. *Journal of applied ecology*, 40(6), pp.947-969.
- Kleijn, D., Baquero, R.A., Clough, Y., Diaz, M., Esteban, J.D., Fernández, F., Gabriel, D., Herzog, F., Holzschuh, A., Jöhl, R. and Knop, E., 2006. Mixed biodiversity benefits of agri-environment schemes in five European countries. *Ecology letters*, 9(3), pp.243-254.
- Klein, A.M., Vaissiere, B.E., Cane, J.H., Steffan-Dewenter, I., Cunningham, S.A., Kremen, C. and Tscharntke, T., 2007. Importance of pollinators in changing landscapes for world crops. *Proceedings of the Royal Society of London B: Biological Sciences*, 274(1608), pp.303-313.
- Kleijn, D., Kohler, F., Báldi, A., Batáry, P., Concepción, E.D., Clough, Y., Diaz, M., Gabriel, D., Holzschuh, A., Knop, E. and Kovács, A., 2009. On the relationship between farmland biodiversity and land-use intensity in Europe. *Proceedings of the Royal Society of London B: Biological Sciences*, 276(1658), pp.903-909.
- Kokkoris, G.D., Troumbis, A.Y. and Lawton, J.H., 1999. Patterns of species interaction strength in assembled theoretical competition communities. *Ecology Letters*, 2(2), pp.70-74.
- Krause, A.E., Frank, K.A., Mason, D.M., Ulanowicz, R.E. and Taylor, W.W., 2003. Compartments revealed in food-web structure. *Nature*, 426(6964), pp.282-285.
- Krebs, J.R., Wilson, J.D., Bradbury, R.B. and Siriwardena, G.M., 1999. The second silent spring?. *Nature*, 400(6745), pp.611-612.

- Kremen, C., Williams, N.M. and Thorp, R.W., 2002. Crop pollination from native bees at risk from agricultural intensification. *Proceedings of the National Academy of Sciences*, 99(26), pp.16812-16816.
- Kremen, C., Williams, N.M., Aizen, M.A., Gemmill-Herren, B., LeBuhn, G., Minckley, R., Packer, L., Potts, S.G., Steffan-Dewenter, I., Vazquez, D.P. and Winfree, R., 2007. Pollination and other ecosystem services produced by mobile organisms: a conceptual framework for the effects of land-use change. *Ecology letters*, 10(4), pp.299-314.
- Krombein, K.V. and Wasps, T.N., 1967. Bees. Life Histories, Nests and Associates.
- Lye, G., Park, K., Osborne, J., Holland, J. and Goulson, D., 2009. Assessing the value of Rural Stewardship schemes for providing foraging resources and nesting habitat for bumblebee queens (Hymenoptera: Apidae). *Biological Conservation*, 142(10), pp.2023-2032.
- Macfadyen, S., Gibson, R., Polaszek, A., Morris, R.J., Craze, P.G., Planque, R., Symondson, W.O. and Memmott, J., 2009. Do differences in food web structure between organic and conventional farms affect the ecosystem service of pest control?. *Ecology Letters*, 12(3), pp.229-238.
- Maclvor, J.S., Cabral, J.M. and Packer, L., 2014. Pollen specialization by solitary bees in an urban landscape. *Urban ecosystems*, 17(1), pp.139-147.
- Macivor, J.S. and Salehi, B., 2014. Bee species-specific nesting material attracts a generalist parasitoid: Implications for co-occurring bees in nest box enhancements. *Environmental entomology*, 43(4), pp.1027-1033.
- Maclvor, J.S. and Packer, L., 2015. 'Bee hotels' as tools for native pollinator conservation: a premature verdict?. *PloS one*, 10(3), p.e0122126.
- McCann, K., Hastings, A. and Huxel, G.R., 1998. Weak trophic interactions and the balance of nature. *Nature*, 395(6704), pp.794-798.
- McCann, K.S., 2000. The diversity–stability debate. *Nature*, 405(6783), pp.228-233.
- McCann, K., 2007. Protecting biostructure. *Nature*, 446(7131), pp.29-29.
- Meeus, I., Brown, M.J., De Graaf, D.C. and Smagghe, G.U.Y., 2011. Effects of invasive parasites on bumble bee declines. *Conservation Biology*, 25(4), pp.662-671.
- Memmott, J., Waser, N.M. and Price, M.V., 2004. Tolerance of pollination networks to species extinctions. *Proceedings of the Royal Society of London B: Biological Sciences*, 271(1557), pp.2605-2611.
- Michener, C.D., 2000. *The bees of the world* (Vol. 1). JHU Press.
- Montoya, J.M., Pimm, S.L. and Solé, R.V., 2006. Ecological networks and their fragility. *Nature*, 442(7100), pp.259-264.
- Morandin, L.A. and Winston, M.L., 2005. Wild bee abundance and seed production in conventional, organic, and genetically modified canola. *Ecological applications*, 15(3), pp.871-881.

Morandin, L.A., Winston, M.L., Abbott, V.A. and Franklin, M.T., 2007. Can pastureland increase wild bee abundance in agriculturally intense areas?. *Basic and Applied Ecology*, 8(2), pp.117-124.

Müller, A., Diener, S., Schnyder, S., Stutz, K., Sedivy, C. and Dorn, S., 2006. Quantitative pollen requirements of solitary bees: Implications for bee conservation and the evolution of bee–flower relationships. *Biological Conservation*, 130(4), pp.604-615.

Natural England, 2016. [Online] *Countryside Stewardship*
Available at: <https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-land-management#higher-tier> [Accessed 28 September 2016].

Nazzi, F., Brown, S.P., Annoscia, D., Del Piccolo, F., Di Prisco, G., Varricchio, P., Della Vedova, G., Cattonaro, F., Caprio, E. and Pennacchio, F., 2012. Synergistic parasite-pathogen interactions mediated by host immunity can drive the collapse of honeybee colonies. *PLoS Pathog*, 8(6), p.e1002735.

Ollerton, J., Erenler, H., Edwards, M. and Crockett, R., 2014. Extinctions of aculeate pollinators in Britain and the role of large-scale agricultural changes. *Science*, 346(6215), pp.1360-1362.

O'Neill, K.M., 2001. *Solitary wasps: behavior and natural history*. Cornell University Press.

Otterstatter, M.C. and Thomson, J.D., 2008. Does pathogen spillover from commercially reared bumble bees threaten wild pollinators?. *PLoS One*, 3(7), p.e2771.

Pisa, L.W., Amaral-Rogers, V., Belzunces, L.P., Bonmatin, J.M., Downs, C.A., Goulson, D., Kreutzweiser, D.P., Krupke, C., Liess, M., McField, M. and Morrissey, C.A., 2015. Effects of neonicotinoids and fipronil on non-target invertebrates. *Environmental Science and Pollution Research*, 22(1), pp.68-102.

Pereira-Peixoto, M.H., Pufal, G., Staab, M., Feitosa, M., and Klein, A., 2016. Diversity and specificity of host-natural enemy interactions in an urban-rural interface. *Ecological Entomology*.

Petit, S., Firbank, L., Wyatt, B. and Howard, D., 2001. MIRABEL: models for integrated review and assessment of biodiversity in European landscapes. *AMBIO: A Journal of the Human Environment*, 30(2), pp.81-88.

Parliamentary Office of Science and Technology (POST), 2010. *Insect Pollination* POST-PN-348

Parliamentary Office of Science and Technology (POST), 2013. *Reversing Insect Pollinator Decline* POST-PN-442

Potts, S.G., Vulliamy, B., Roberts, S., O'Toole, C., Dafni, A., Ne'eman, G. and Willmer, P., 2005. Role of nesting resources in organising diverse bee communities in a Mediterranean landscape. *Ecological Entomology*, 30(1), pp.78-85.

- Potts, S.G., Biesmeijer, J.C., Kremen, C., Neumann, P., Schweiger, O. and Kunin, W.E., 2010. Global pollinator declines: trends, impacts and drivers. *Trends in ecology & evolution*, 25(6), pp.345-353.
- Potts, S. and Wentworth, J., 2013. Reversing insect pollinator decline.
- Power, E.F. and Stout, J.C., 2011. Organic dairy farming: impacts on insect–flower interaction networks and pollination. *Journal of Applied Ecology*, 48(3), pp.561-569.
- Pywell, R.F., Warman, E.A., Carvell, C., Sparks, T.H., Dicks, L.V., Bennett, D., Wright, A., Critchley, C.N.R. and Sherwood, A., 2005. Providing foraging resources for bumblebees in intensively farmed landscapes. *Biological conservation*, 121(4), pp.479-494.
- Pywell, R.F., Meek, W.R., Loxton, R.G., Nowakowski, M., Carvell, C. and Woodcock, B.A., 2011. Ecological restoration on farmland can drive beneficial functional responses in plant and invertebrate communities. *Agriculture, ecosystems & environment*, 140(1), pp.62-67.
- Richardson, R.T., Lin, C.H., Sponsler, D.B., Quijia, J.O., Goodell, K. and Johnson, R.M., 2015. Application of ITS2 metabarcoding to determine the provenance of pollen collected by honey bees in an agroecosystem. *Applications in plant sciences*, 3(1), p.1400066.
- Roulston, T.A.H. and Goodell, K., 2011. The role of resources and risks in regulating wild bee populations. *Annual review of entomology*, 56, pp.293-312.
- Rollin, O., Bretagnolle, V., Decourtye, A., Aptel, J., Michel, N., Vaissière, B.E. and Henry, M., 2013. Differences of floral resource use between honey bees and wild bees in an intensive farming system. *Agriculture, Ecosystems & Environment*, 179, pp.78-86.
- Rooney, N. and McCann, K.S., 2012. Integrating food web diversity, structure and stability. *Trends in ecology & evolution*, 27(1), pp.40-46.
- Rosenkranz, P., Aumeier, P. and Ziegelmann, B., 2010. Biology and control of *Varroa destructor*. *Journal of invertebrate pathology*, 103, pp.S96-S119.
- Rundlöf, M., Nilsson, H. and Smith, H.G., 2008. Interacting effects of farming practice and landscape context on bumble bees. *Biological Conservation*, 141(2), pp.417-426.
- Rundlöf, M., Andersson, G.K., Bommarco, R., Fries, I., Hederström, V., Herbertsson, L., Jonsson, O., Klatt, B.K., Pedersen, T.R., Yourstone, J. and Smith, H.G., 2015. Seed coating with a neonicotinoid insecticide negatively affects wild bees. *Nature*, 521(7550), pp.77-80.
- Salisbury, A., Armitage, J., Bostock, H., Perry, J., Tatchell, M. and Thompson, K., 2015. EDITOR'S CHOICE: Enhancing gardens as habitats for flower-visiting aerial insects (pollinators): should we plant native or exotic species?. *Journal of Applied Ecology*, 52(5), pp.1156-1164.
- Samson, F. and Knopf, F., 1994. Prairie conservation in north america. *BioScience*, 44(6), pp.418-421.

- Sickel, W., Ankenbrand, M.J., Grimmer, G., Holzschuh, A., Härtel, S., Lanzen, J., Steffan-Dewenter, I. and Keller, A., 2015. Increased efficiency in identifying mixed pollen samples by meta-barcoding with a dual-indexing approach. *BMC ecology*, 15(1), p.20.
- Smart, S.M., Firbank, L.G., Bunce, R.G.H. and Watkins, J.W., 2000. Quantifying changes in abundance of food plants for butterfly larvae and farmland birds. *Journal of Applied Ecology*, 37(3), pp.398-414.
- Spiesman, B.J. and Inouye, B.D., 2013. Habitat loss alters the architecture of plant–pollinator interaction networks. *Ecology*, 94(12), pp.2688-2696.
- Stace, C., 2010. *New flora of the British Isles*. Cambridge University Press.
- Steckel, J., Westphal, C., Peters, M.K., Bellach, M., Rothenwoehrer, C., Erasmi, S., Scherber, C., Tschardtke, T. and Steffan-Dewenter, I., 2014. Landscape composition and configuration differently affect trap-nesting bees, wasps and their antagonists. *Biological Conservation*, 172, pp.56-64.
- Steffan-Dewenter, I., Münzenberg, U., Bürger, C., Thies, C. and Tschardtke, T., 2002. Scale-dependent effects of landscape context on three pollinator guilds. *Ecology*, 83(5), pp.1421-1432.
- Steffan-Dewenter, I. and Schiele, S., 2008. Do resources or natural enemies drive bee population dynamics in fragmented habitats. *Ecology*, 89(5), pp.1375-1387.
- Swift, M.J., Izac, A.M. and van Noordwijk, M., 2004. Biodiversity and ecosystem services in agricultural landscapes—are we asking the right questions?. *Agriculture, Ecosystems & Environment*, 104(1), pp.113-134.
- R. Team., 2013. R: A language and environment for statistical computing.
- Thébault, E. and Fontaine, C., 2010. Stability of ecological communities and the architecture of mutualistic and trophic networks. *Science*, 329(5993), pp.853-856.
- Tilman, D., Fargione, J., Wolff, B., D'Antonio, C., Dobson, A., Howarth, R., Schindler, D., Schlesinger, W.H., Simberloff, D. and Swackhamer, D., 2001. Forecasting agriculturally driven global environmental change. *Science*, 292(5515), pp.281-284.
- Tschardtke, T., Gathmann, A. and Steffan-Dewenter, I., 1998. Bioindication using trap-nesting bees and wasps and their natural enemies: community structure and interactions. *Journal of applied ecology*, 35(5), pp.708-719.
- Tschardtke, T., Klein, A.M., Kruess, A., Steffan-Dewenter, I. and Thies, C., 2005. Landscape perspectives on agricultural intensification and biodiversity–ecosystem service management. *Ecology letters*, 8(8), pp.857-874.
- Tylianakis, J.M., Klein, A.M., Lozada, T. and Tschardtke, T., 2006. Spatial scale of observation affects α , β and γ diversity of cavity-nesting bees and wasps across a tropical land-use gradient. *Journal of Biogeography*, 33(7), pp.1295-1304.
- Tylianakis, J.M., Tschardtke, T. and Lewis, O.T., 2007. Habitat modification alters the structure of tropical host–parasitoid food webs. *Nature*, 445(7124), pp.202-205.

- Tylianakis, J.M., Laliberté, E., Nielsen, A. and Bascompte, J., 2010. Conservation of species interaction networks. *Biological conservation*, 143(10), pp.2270-2279.
- Valentini, A., Miquel, C. and Taberlet, P., 2010. DNA barcoding for honey biodiversity. *Diversity*, 2(4), pp.610-617.
- Vanbergen, A.J., 2013. Threats to an ecosystem service: pressures on pollinators. *Frontiers in Ecology and the Environment*, 11(5), pp.251-259.
- Vaudo, A.D., Tooker, J.F., Grozinger, C.M. and Patch, H.M., 2015. Bee nutrition and Sutherland, W.J., Pullin, A.S., Dolman, P.M. and Knight, T.M., 2004. The need for evidence-based conservation. *Trends in ecology & evolution*, 19(6), pp.305-308.
- Vickery, J.A., Tallowin, J.R., Feber, R.E., Asteraki, E.J., Atkinson, P.W., Fuller, R.J. and Brown, V.K., 2001. The management of lowland neutral grasslands in Britain: effects of agricultural practices on birds and their food resources. *Journal of Applied Ecology*, 38(3), pp.647-664.
- Wcislo, W.T. and Cane, J.H., 1996. Floral resource utilization by solitary bees (Hymenoptera: Apoidea) and exploitation of their stored foods by natural enemies. *Annual review of entomology*, 41(1), pp.257-286.
- Wcislo, W.T., 1996. Parasitism rates in relation to nest site in bees and wasps (Hymenoptera: Apoidea). *Journal of Insect Behavior*, 9(4), pp.643-656.
- Weiner, C.N., Werner, M., Linsenmair, K.E. and Blüthgen, N., 2014. Land-use impacts on plant–pollinator networks: interaction strength and specialization predict pollinator declines. *Ecology*, 95(2), pp.466-474.
- Westerkamp, C. and Gottsberger, G., 2000. Diversity pays in crop pollination. *Crop science*, 40(5), pp.1209-1222.
- White, T.J., Bruns, T., Lee, S.J.W.T. and Taylor, J.W., 1990. Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. *PCR protocols: a guide to methods and applications*, 18(1), pp.315-322.
- Williams, N.M. and Kremen, C., 2007. Resource distributions among habitats determine solitary bee offspring production in a mosaic landscape. *Ecological applications*, 17(3), pp.910-921.
- Williams, P.H. and Osborne, J.L., 2009. Bumblebee vulnerability and conservation world-wide. *Apidologie*, 40(3), pp.367-387.
- Williams, R., 2012. An Introduction to Bees in Britain. *Bees Wasps & Ants Recording Society*.
- Winfree, R. and Kremen, C., 2009. Are ecosystem services stabilized by differences among species? A test using crop pollination. *Proceedings of the Royal Society of London B: Biological Sciences*, 276(1655), pp.229-237.
- Winfree, R., Aguilar, R., Vázquez, D.P., LeBuhn, G. and Aizen, M.A., 2009. A meta-analysis of bees' responses to anthropogenic disturbance. *Ecology*, 90(8), pp.2068-2076.

Wójtowski, F., Wilkaniec, Z. and Szymas, B., 1995. Increasing the total number of *Osmia rufa* (L.)(Megachilidae) in selected biotopes by controlled introduction method. *Changes in fauna of wild bees in Europe*, pp.177-180.

Wood, T.J., Holland, J.M. and Goulson, D., 2015. Pollinator-friendly management does not increase the diversity of farmland bees and wasps. *Biological Conservation*, 187, pp.120-126.

Wood, T.J., Holland, J.M. and Goulson, D., 2016. Providing foraging resources for solitary bees on farmland: current schemes for pollinators benefit a limited suite of species. *Journal of Applied Ecology*.

Appendix

Table 7 Raw solitary bee, wasp and parasitoid emergence data across all occupied bamboo shoots, from all nest boxes, across all farms (this is the underlying data for Chapters 2, 3 and 4). Bamboo shoots from which pollen DNA samples were successfully analyzed are marked as 'yes' in the last column (Pollen DNA Analyzed). Where parasitoids emerged from the bamboo shoot, the parasitoid species is marked as a parasitoid in the Parasitoid Y/N column, the number of brood cells it parasitized listed in the 'Brood Cells Parasitized' column and the host species it parasitized listed in the 'Host Species' column.

Farm	Nest Box	Bamboo Shoot	Species Emerging	Parasitoid Y/N	# Brood Cells	Brood Cells Parasitized	Host Species	Pollen DNA Analyzed
Bellingdon Farm	B1	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	4			
Bellingdon Farm	B2	2	<i>Megachile versicolor</i>	No	8			
Bellingdon Farm	B3	1	<i>Osmia</i> sp.	No	3			
Bellingdon Farm	B3	2	<i>Osmia</i> sp.	No	9			
Bellingdon Farm	B3	3	<i>Osmia</i> sp.	No	10			
Bellingdon Farm	B3	3	<i>Ephialtes manifestator</i>	Yes	NA	1	<i>Osmia</i> sp.	
Bellingdon Farm	B3	4	<i>Osmia</i> sp.	No	10			
Bellingdon Farm	B3	5	<i>Osmia</i> sp.	No	13			
Bellingdon Farm	B6	1	<i>Symmorphus crassicornis</i>	No	9			
Bellingdon Farm	B8	1	<i>Symmorphus crassicornis</i>	No	1			
Bellingdon Farm	B9	1	<i>Hylaeus confusus</i>	No	6			Yes
Bellingdon Farm	B9	2	<i>Megachile versicolor</i>	No	5			Yes
Bellingdon Farm	B9	3	<i>Symmorphus crassicornis</i>	No	3			
Bellingdon Farm	B9	4	<i>Megachile ligniseca</i>	No	7			Yes
Bellingdon Farm	B9	5	<i>Megachile versicolor</i>	No	9			Yes
Bellingdon Farm	B9	6	<i>Megachile versicolor</i>	No	8			Yes
Bellingdon Farm	B9	7	<i>Pteromalidus apum</i>	Yes	NA	1	<i>Megachile versicolor</i>	
Bellingdon Farm	B9	7	<i>Megachile versicolor</i>	No	4			Yes
Bellingdon Farm	B9	8	<i>Megachile ligniseca</i>	No	4			Yes
Bellingdon Farm	B10	1	<i>Osmia</i> sp.	No	3			
Bellingdon Farm	B10	2	<i>Osmia</i> sp.	No	11			
Bellingdon Farm	B10	3	<i>Osmia</i> sp.	No	7			
Bellingdon Farm	B10	4	<i>Osmia</i> sp.	No	7			
Bellingdon Farm	B10	4	<i>Ephialtes manifestator</i>	Yes	NA	2	<i>Osmia</i> sp.	
Bellingdon Farm	B10	5	<i>Osmia</i> sp.	No	5			

Bellingdon Farm	B14	2	<i>Megachile versicolor</i>	No	6			Yes
Colleymore Farm	C2	1	<i>Symmorhus crassicornis</i>	No	7			
Colleymore Farm	C2	2	<i>Symmorhus/Ancistrocerus</i> sp.	No	6			
Colleymore Farm	C4	5	<i>Osmia caerulescens</i>	No	8			Yes
Colleymore Farm	C4	7	<i>Osmia</i> sp.	No	1			
Colleymore Farm	C4	7	<i>Sapyga quinquepunctata</i>	Yes	NA	1	<i>Osmia</i> sp.	
Colleymore Farm	C5	1	<i>Osmia</i> sp.	No	6			
Colleymore Farm	C5	2	<i>Osmia</i> sp.	No	6			
Colleymore Farm	C5	3	<i>Osmia</i> sp.	No	7			
Colleymore Farm	C5	4	<i>Osmia</i> sp.	No	6			
Colleymore Farm	C11	1	<i>Osmia</i> sp.	No	4			
Colleymore Farm	C11	2	<i>Osmia caerulescens</i>	No	13			Yes
Colleymore Farm	C11	3	<i>Osmia caerulescens</i>	No	10			Yes
Colleymore Farm	C11	4	<i>Pteromalidus apum</i>	Yes	NA	3	<i>Osmia caerulescens</i>	
Colleymore Farm	C11	4	<i>Osmia caerulescens</i>	No	7			Yes
Colleymore Farm	C11	5	<i>Megachile</i> sp.	No	11			
Colleymore Farm	C11	6	<i>Osmia</i> sp.	No	3			
Colleymore Farm	C14	1	<i>Symmorhus gracilis</i>	No	1			
Colleymore Farm	C14	1	<i>Osmia bicornis</i>	No	3			Yes
Colleymore Farm	C14	2	<i>Osmia caerulescens</i>	No	5			Yes
Colleymore Farm	C14	3	<i>Osmia</i> sp.	No	4			
Colleymore Farm	C14	3	<i>Sapyga quinquepunctata</i>	Yes	NA	4	<i>Osmia</i> sp.	
Colleymore Farm	C14	4	<i>Osmia caerulescens</i>	No	5			Yes
Colleymore Farm	C14	4	<i>Amobia signata</i>	Yes	NA	4	<i>Osmia caerulescens</i>	
Colleymore Farm	C14	5	<i>Osmia caerulescens</i>	No	6			
Colleymore Farm	C14	6	<i>Megachile versicolor</i>	No	11			Yes
Colleymore Farm	C14	7	<i>Osmia caerulescens</i>	No	7			Yes
Colleymore Farm	C14	7	<i>Sapyga quinquepunctata</i>	Yes	NA	4	<i>Osmia caerulescens</i>	
Colleymore Farm	C14	8	<i>Osmia caerulescens</i>	No	5			Yes

Colleymore Farm	C14	8	<i>Sapyga quinquepunctata</i>	Yes	NA	2	<i>Osmia caerulea</i>	
Daylesford	D1	1	<i>Symmorphus gracilis</i>	No	13			
Daylesford	D1	2	<i>Symmorphus/Ancistrocerus</i> sp.	No	1			
Daylesford	D1	3	<i>Symmorphus crassicornis</i>	No	7			
Daylesford	D6	1	<i>Symmorphus</i> sp.	No	5			
Daylesford	D6	1	<i>Amobia signata</i>	Yes	NA	3	<i>Symmorphus</i> sp.	
Daylesford	D9	1	<i>Symmorphus</i> sp.	No	5			
Daylesford	D9	1	<i>Ephialtes manifestator</i>	Yes	NA	2	<i>Symmorphus</i> sp.	
Daylesford	D9	1	<i>Symmorphus</i> sp.	No	14			
Daylesford	D10	1	<i>Melittobia acasta</i>	Yes	NA	1	<i>Symmorphus</i> sp.	
Daylesford	D10	2	<i>Symmorphus gracilis</i>	No	11			
Daylesford	D10	3	<i>Symmorphus/Ancistrocerus</i> sp.	No	11			
Daylesford	D12	1	<i>Symmorphus</i> sp.	No	4			
Daylesford	D12	1	<i>Melittobia acasta</i>	Yes	NA	1	<i>Symmorphus</i> sp.	
Daylesford	D12	2	<i>Symmorphus/Ancistrocerus</i> sp.	No	2			
Daylesford	D12	3	<i>Symmorphus</i> sp.	No	9			
Daylesford	D12	3	<i>Melittobia acasta</i>	Yes	NA	1	<i>Symmorphus</i> sp.	
Daylesford	D13	1	<i>Megachile versicolor</i>	No	9			Yes
Daylesford	D13	2	<i>Megachile versicolor</i>	No	9			Yes
Daylesford	D13	3	<i>Megachile versicolor</i>	No	9			Yes
Daylesford	D14	1	<i>Pteromalidis apum</i>	Yes	NA	2	<i>Megachile ligniseca</i>	
Daylesford	D14	1	<i>Megachile ligniseca</i>	No	7			Yes
Daylesford	D14	2	<i>Symmorphus gracilis</i>	No	1			
Earth Trust	LW3	1	<i>Megachile versicolor</i>	No	7			Yes
Earth Trust	LW3	2	<i>Megachile ligniseca</i>	No	6			Yes
Earth Trust	LW3	3	<i>Symmorphus/Ancistrocerus</i> sp.	No	2			
Earth Trust	LW3	4	<i>Symmorphus crassicornis</i>	No	3			
Earth Trust	LW8	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	6			
Earth Trust	LW9	1	<i>Pteromalidis apum</i>	Yes	NA	2	<i>Megachile versicolor</i>	
Earth Trust	LW9	1	<i>Megachile versicolor</i>	No	9			Yes
Earth Trust	LW9	2	<i>Pteromalidis apum</i>	Yes	NA	2	<i>Megachile versicolor</i>	

Earth Trust	LW9	2	<i>Megachile versicolor</i>	No	9			
Earth Trust	LW9	3	<i>Pteromalidus apum</i>	Yes	NA	3	<i>Megachile versicolor</i>	
Earth Trust	LW9	3	<i>Megachile versicolor</i>	No	8			Yes
Earth Trust	LW9	4	<i>Trypoxylon attenuatum</i>	No	7			
Earth Trust	LW9	5	<i>Megachile versicolor</i>	No	2			
Earth Trust	LW9	5	<i>Osmia</i> sp.	No	8			
Earth Trust	LW9	7	<i>Megachile versicolor</i>	No	10			Yes
Earth Trust	LW9	8	<i>Megachile versicolor</i>	No	5			Yes
Earth Trust	LW9	9	<i>Osmia</i> sp.	No	8			
Earth Trust	LW9	10	<i>Megachile versicolor</i>	No	4			
Earth Trust	LW9	10	<i>Osmia</i> sp.	No	6			
Earth Trust	LW9	11	<i>Megachile</i> sp.	No	8			
Earth Trust	LW9	11	<i>Pteromalidus apum</i>	Yes	NA	1	<i>Megachile</i> sp.	
Earth Trust	LW9	12	<i>Megachile versicolor</i>	No	5			Yes
Earth Trust	LW9	13	<i>Osmia</i> sp.	No	6			
Earth Trust	LW9	13	<i>Pteromalidus apum</i>	Yes	NA	1	<i>Osmia</i> sp.	
Earth Trust	LW9	14	<i>Megachile</i> sp.	No	3			
Earth Trust	LW9	14	<i>Pteromalidus apum</i>	Yes	NA	3	<i>Megachile</i> sp.	
Earth Trust	LW10	6	<i>Megachile versicolor</i>	No	10			Yes
Earth Trust	LW11	1	<i>Ephialtes manifestator</i>	Yes	NA	2	<i>Trypoxylon attenuatum</i>	
Earth Trust	LW11	1	<i>Trypoxylon attenuatum</i>	No	7			
Earth Trust	LW11	2	<i>Osmia caerulea</i>	No	11			Yes
Earth Trust	LW11	3	<i>Osmia</i> sp.	No	13			
Earth Trust	LW11	4	<i>Megachile</i> sp.	No	3			
Earth Trust	LW11	5	<i>Osmia</i> sp.	No	1			
Earth Trust	LW11	6	<i>Osmia</i> sp.	No	3			
Earth Trust	LW11	7	<i>Osmia</i> sp.	No	8			
Earth Trust	LW11	7	<i>Ephialtes manifestator</i>	Yes	NA	1	<i>Osmia</i> sp.	
Earth Trust	LW11	8	<i>Osmia</i> sp.	No	6			
Earth Trust	LW11	9	<i>Osmia</i> sp.	No	9			
Earth Trust	LW14	1	<i>Megachile versicolor</i>	No	8			Yes
Earth Trust	LW14	3	<i>Megachile versicolor</i>	No	8			Yes
Earth Trust	LW15	1	<i>Symmorphus crassicornis</i>	No	7			
Earth Trust	LW15	2	<i>Ancistrocerus trifasciatus</i>	No	12			
Earth Trust	LW15	3	<i>Symmorphus crassicornis</i>	No	12			

Earth Trust	LW15	4	<i>Symmorphus crassicornis</i>	No	5			
Grange Farm	GF5	1	<i>Osmia</i> sp.	No	8			
Grange Farm	GF5	2	<i>Megachile versicolor</i>	No	7			
Grange Farm	GF5	3	<i>Megachile</i> sp.	No	8			
Grange Farm	GF5	4	<i>Megachile versicolor</i>	No	4			Yes
Grange Farm	GF7	1	<i>Ephialtes manifestator</i>	Yes	NA	1	<i>Symmorphus gracilis</i>	
Grange Farm	GF7	1	<i>Symmorphus gracilis</i>	No	10			
Grange Farm	GF12	1	<i>Megachile centuncularis</i>	No	7			
Grange Farm	GF12	2	<i>Megachile</i> sp.	No	7			
Grange Farm	GF12	3	<i>Megachile centuncularis</i>	No	7			Yes
Grange Farm	GF12	4	<i>Megachile</i> sp.	No	1			
Grange Farm	GF12	5	<i>Megachile centuncularis</i>	No	3			Yes
Grange Farm	GF12	6	<i>Megachile</i> sp.	No	5			
Grange Farm	GF13	1	<i>Megachile centuncularis</i>	No	11			Yes
Grange Farm	GF14	1	<i>Megachile versicolor</i>	No	11			Yes
Grange Farm	GF14	2	<i>Megachile versicolor</i>	No	8			Yes
Grange Farm	GF14	3	<i>Megachile versicolor</i>	No	10			Yes
Greystones Farm	G3	1	<i>Osmia caerulescens</i>	No	9			
Greystones Farm	G3	2	<i>Osmia caerulescens</i>	No	3			
Greystones Farm	G3	3	<i>Osmia caerulescens</i>	No	3			
Greystones Farm	G3	4	<i>Megachile</i> sp.	No	10			
Greystones Farm	G3	5	<i>Osmia caerulescens</i>	No	4			
Greystones Farm	G3	6	<i>Osmia</i> sp.	No	10			
Greystones Farm	G3	8	<i>Osmia caerulescens</i>	No	4			
Greystones Farm	G3	9	<i>Osmia caerulescens</i>	No	2			
Greystones Farm	G5	1	<i>Symmorphus crassicornis</i>	No	2			
Greystones Farm	G5	2	<i>Symmorphus/Ancistrocerus</i> sp.	No	1			
Greystones Farm	G7	1	<i>Megachile versicolor</i>	No	6			
Greystones Farm	G7	2	<i>Megachile versicolor</i>	No	7			

Greystones Farm	G7	3	<i>Ephialtes manifestator</i>	Yes	NA	1	<i>Osmia caerulescens</i>	
Greystones Farm	G7	3	<i>Osmia caerulescens</i>	No	9			
Greystones Farm	G7	5	<i>Megachile</i> sp.	No	6			
Greystones Farm	G7	5	<i>Pteromalidus apum</i>	Yes	NA	2	<i>Megachile</i> sp.	
Greystones Farm	G7	5	<i>Ephialtes manifestator</i>	Yes	NA	2	<i>Megachile</i> sp.	
Greystones Farm	G7	6	<i>Osmia caerulescens</i>	No	11			
Greystones Farm	G10	1	<i>Dibrachys microgastris</i>	Yes	NA	1	<i>Osmia</i> sp.	
Greystones Farm	G10	1	<i>Osmia</i> sp.	No	9			
Greystones Farm	G10	2	<i>Osmia</i> sp.	No	8			
Greystones Farm	G10	3	<i>Osmia</i> sp.	No	3			
Greystones Farm	G10	4	<i>Osmia</i> sp.	No	11			
Greystones Farm	G11	1	<i>Osmia</i> sp.	No	14			
Greystones Farm	G11	2	<i>Osmia</i> sp.	No	12			
Greystones Farm	G11	3	<i>Osmia</i> sp.	No	9			
Greystones Farm	G15	1	<i>Ephialtes manifestator</i>	Yes	NA	4	<i>Symmorphus crassicornis</i>	
Greystones Farm	G15	1	<i>Symmorphus crassicornis</i>	No	9			
Greystones Farm	G15	2	<i>Amobia signata</i>	Yes	NA	7	<i>Symmorphus crassicornis</i>	
Greystones Farm	G15	2	<i>Symmorphus crassicornis</i>	No	7			
Greystones Farm	G15	3	<i>Ephialtes manifestator</i>	Yes	NA	1	<i>Symmorphus crassicornis</i>	
Greystones Farm	G15	3	<i>Symmorphus crassicornis</i>	No	12			
Greystones Farm	G15	3	<i>Amobia signata</i>	Yes	NA	5	<i>Symmorphus crassicornis</i>	
Greystones Farm	G15	4	<i>Symmorphus crassicornis</i>	No	12			
Heath Farm	H4	1	<i>Osmia caerulescens</i>	No	10			
Heath Farm	H8	1	<i>Symmorphus crassicornis</i>	No	4			
Heath Farm	H8	2	<i>Osmia caerulescens</i>	No	10			
Heath Farm	H8	2	<i>Symmorphus gracilis</i>	No	6			Yes
Heath Farm	H14	1	<i>Megachile</i> sp.	No	4			
Heath Farm	H14	1	<i>Pteromalidus apum</i>	Yes	NA	4	<i>Megachile</i> sp.	

Heath Farm	H14	2	<i>Megachile versicolor</i>	No	9			Yes
Heath Farm	H14	3	<i>Megachile</i> sp.	No	4			
Heath Farm	H14	3	<i>Osmia</i> sp.	No	1			
Kilmester Farm	K1	1	<i>Osmia</i> sp.	No	13			
Kilmester Farm	K1	2	<i>Osmia</i> sp.	No	11			
Kilmester Farm	K1	4	<i>Osmia</i> sp.	No	8			
Kilmester Farm	K1	5	<i>Osmia</i> sp.	No	10			
Kilmester Farm	K4	1	<i>Symmorphus gracilis</i>	No	8			
Kilmester Farm	K4	2	<i>Symmorphus/Ancistrocerus</i> sp.	No	9			
Kilmester Farm	K4	3	<i>Symmorphus/Ancistrocerus</i> sp.	No	13			
Kilmester Farm	K6	1	<i>Symmorphus gracilis</i>	No	11			
Kilmester Farm	K6	2	<i>Ancistrocerus trifasciatus</i>	No	7			
Kilmester Farm	K6	3	<i>Symmorphus/Ancistrocerus</i> sp.	No	10			
Kilmester Farm	K7	2	<i>Megachile versicolor</i>	No	11			Yes
Kilmester Farm	K7	3	<i>Osmia</i> sp.	No	10			
Kilmester Farm	K7	4	<i>Osmia</i> sp.	No	12			
Kilmester Farm	K7	5	<i>Symmorphus/Ancistrocerus</i> sp.	No	5			
Kilmester Farm	K7	6	<i>Osmia</i> sp.	No	3			
Kilmester Farm	K7	6	<i>Ephialtes manifestator</i>	Yes	NA	1	<i>Osmia</i> sp.	
Kilmester Farm	K7	7	<i>Megachile ligniseca</i>	No	9			
Kilmester Farm	K8	1	<i>Ephialtes manifestator</i>	Yes	NA	3	<i>Ancistrocerus/Symmorphus</i> sp.	
Kilmester Farm	K8	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	9			
Kilmester Farm	K8	2	<i>Megachile versicolor</i>	No	9			Yes
Kilmester Farm	K8	3	<i>Megachile versicolor</i>	No	11			
Kilmester Farm	K8	4	<i>Megachile</i> sp.	No	3			
Kilmester Farm	K8	4	<i>Ephialtes manifestator</i>	Yes	NA	1	<i>Megachile</i> sp.	
Kilmester Farm	K11	1	<i>Megachile versicolor</i>	No	7			Yes
Kilmester Farm	K11	2	<i>Osmia bicornis</i>	No	3			Yes
Kilmester Farm	K11	2	<i>Megachile versicolor</i>	No	2			
Kilmester Farm	K11	3	<i>Megachile versicolor</i>	No	5			Yes
Kilmester Farm	K11	4	<i>Megachile versicolor</i>	No	12			Yes
Kilmester Farm	K11	5	<i>Osmia bicornis</i>	No	8			
Kilmester Farm	K11	6	<i>Osmia</i> sp.	No	8			

Kilmester Farm	K11	7	<i>Megachile versicolor</i>	No	5			
Kilmester Farm	K11	8	<i>Megachile</i> sp.	No	7			
Kilmester Farm	K11	8	<i>Coelioxys elongata</i>	Yes	NA	1	<i>Megachile</i> sp.	
Kilmester Farm	K11	9	<i>Megachile ligniseca</i>	No	7			
Kilmester Farm	K11	10	<i>Megachile</i> sp.	No	6			
Kilmester Farm	K13	1	<i>Osmia</i> sp.	No	5			
Kilmester Farm	K13	2	<i>Osmia caerulescens</i>	No	7			Yes
Kilmester Farm	K14	1	<i>Megachile</i> sp.	No	3			
Kilmester Farm	K14	2	<i>Pteromalidis apum</i>	Yes	NA	6	<i>Megachile ligniseca</i>	
Kilmester Farm	K14	2	<i>Megachile ligniseca</i>	No	10			Yes
Kilmester Farm	K14	3	<i>Megachile versicolor</i>	No	8			Yes
Kilmester Farm	K14	4	<i>Megachile ligniseca</i>	No	10			Yes
Lower Smite Farm	LS1	1	<i>Osmia bicornis</i>	No	9			
Lower Smite Farm	LS2	1	<i>Osmia</i> sp.	No	14			
Lower Smite Farm	LS2	2	<i>Osmia</i> sp.	No	10			
Lower Smite Farm	LS2	3	<i>Megachile versicolor</i>	No	7			Yes
Lower Smite Farm	LS2	4	<i>Osmia caerulescens</i>	No	14			
Lower Smite Farm	LS2	5	<i>Osmia caerulescens</i>	No	6			
Lower Smite Farm	LS2	5	<i>Megachile versicolor</i>	No	5			
Lower Smite Farm	LS2	6	<i>Osmia</i> sp.	No	7			
Lower Smite Farm	LS2	7	<i>Osmia caerulescens</i>	No	6			Yes
Lower Smite Farm	LS2	8	<i>Megachile versicolor</i>	No	6			
Lower Smite Farm	LS2	8	<i>Osmia</i> sp.	No	5			
Lower Smite Farm	LS2	9	<i>Osmia</i> sp.	No	9			
Lower Smite Farm	LS2	10	<i>Osmia</i> sp.	No	9			
Lower Smite Farm	LS2	10	<i>Pteromalidis apum</i>	Yes	NA	1	<i>Osmia</i> sp.	
Lower Smite Farm	LS2	11	<i>Osmia</i> sp.	No	6			
Lower Smite Farm	LS2	12	<i>Megachile</i> sp.	No	8			
Lower Smite Farm	LS2	13	<i>Osmia</i> sp.	No	10			
Lower Smite Farm	LS2	14	<i>Osmia caerulescens</i>	No	10			
Lower Smite Farm	LS2	15	<i>Osmia</i> sp.	No	10			
Lower Smite Farm	LS5	1	<i>Trypoxylon attenuatum</i>	No	5			
Lower Smite Farm	LS5	1	<i>Amobia signata</i>	Yes	NA	1	<i>Trypoxylon attenuatum</i>	

Lower Smite Farm	LS5	2	<i>Trypoxylon attenuatum</i>	No	5			
Lower Smite Farm	LS5	2	<i>Chrysis</i> sp.	Yes	NA	1	<i>Trypoxylon attenuatum</i>	
Lower Smite Farm	LS5	3	<i>Trypoxylon attenuatum</i>	No	11			
Lower Smite Farm	LS5	3	<i>Chrysis</i> sp.	Yes	NA	1	<i>Trypoxylon attenuatum</i>	
Lower Smite Farm	LS5	4	<i>Megachile versicolor</i>	No	8			Yes
Lower Smite Farm	LS5	5	<i>Megachile versicolor</i>	No	7			Yes
Lower Smite Farm	LS6	1	<i>Osmia</i> sp.	No	8			
Lower Smite Farm	LS6	2	<i>Osmia</i> sp.	No	5			
Lower Smite Farm	LS6	3	<i>Osmia</i> sp.	No	9			
Lower Smite Farm	LS6	4	<i>Osmia</i> sp.	No	8			
Lower Smite Farm	LS6	5	<i>Osmia</i> sp.	No	10			
Lower Smite Farm	LS9	1	<i>Megachile versicolor</i>	No	8			Yes
Lower Smite Farm	LS9	2	<i>Megachile ligniseca</i>	No	7			Yes
Lower Smite Farm	LS9	3	<i>Megachile versicolor</i>	No	5			Yes
Lower Smite Farm	LS9	4	<i>Megachile ligniseca</i>	No	9			Yes
Lower Smite Farm	LS9	5	<i>Megachile versicolor</i>	No	8			Yes
Lower Smite Farm	LS9	6	<i>Megachile</i> sp.	No	5			
Lower Smite Farm	LS9	7	<i>Megachile</i> sp.	No	8			
Lower Smite Farm	LS9	8	<i>Megachile versicolor</i>	No	11			Yes
Lower Smite Farm	LS9	9	<i>Megachile ligniseca</i>	No	7			
Lower Smite Farm	LS9	10	<i>Osmia</i> sp.	No	9			
Lower Smite Farm	LS9	11	<i>Megachile versicolor</i>	No	7			Yes
Lower Smite Farm	LS10	1	<i>Megachile versicolor</i>	No	7			
Lower Smite Farm	LS10	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	2			
Lower Smite Farm	LS11	1	<i>Megachile versicolor</i>	No	5			Yes
Lower Smite Farm	LS11	2	<i>Trypoxylon attenuatum</i>	No	5			
Lower Smite Farm	LS11	3	<i>Megachile versicolor</i>	No	8			Yes
Lower Smite Farm	LS11	4	<i>Megachile versicolor</i>	No	10			Yes
Lower Smite Farm	LS11	5	<i>Megachile versicolor</i>	No	10			Yes
Lower Smite Farm	LS11	6	<i>Megachile versicolor</i>	No	10			Yes
Lower Smite Farm	LS11	7	<i>Trypoxylon attenuatum</i>	No	10			
Lower Smite Farm	LS11	8	<i>Megachile versicolor</i>	No	7			Yes
Lower Smite Farm	LS13	1	<i>Megachile ligniseca</i>	No	7			Yes
Lower Smite Farm	LS13	2	<i>Megachile versicolor</i>	No	7			Yes

Lower Smite Farm	LS14	1	<i>Megachile versicolor</i>	No	9			Yes
Lower Smite Farm	LS14	2	<i>Megachile versicolor</i>	No	10			Yes
Lower Smite Farm	LS14	3	<i>Megachile versicolor</i>	No	9			
Lower Smite Farm	LS14	4	<i>Megachile versicolor</i>	No	9			Yes
Lower Smite Farm	LS14	5	<i>Megachile versicolor</i>	No	3			Yes
Lower Smite Farm	LS14	6	<i>Megachile versicolor</i>	No	3			Yes
Lower Smite Farm	LS14	7	<i>Megachile versicolor</i>	No	7			Yes
Lower Smite Farm	LS15	1	<i>Osmia bicornis</i>	No	5			Yes
Lower Smite Farm	LS15	2	<i>Osmia bicornis</i>	No	5			Yes
Lower Smite Farm	LS15	3	<i>Symmorphus/Ancistrocerus</i> sp.	No	5			
Lower Smite Farm	LS15	4	<i>Osmia</i> sp.	No	2			
Marcham Farm	M1	1	<i>Megachile versicolor</i>	No	7			Yes
Marcham Farm	M3	1	<i>Amobia signata</i>	Yes	NA	1	<i>Osmia</i> sp.	
Marcham Farm	M3	1	<i>Osmia</i> sp.	No	9			
Marcham Farm	M7	2	<i>Ancistrocerus trifasciatus</i>	No	11			
Marcham Farm	M8	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	1			
Marcham Farm	M8	2	<i>Osmia</i> sp.	No	10			
Marcham Farm	M8	2	<i>Amobia signata</i>	Yes	NA	2	<i>Osmia</i> sp.	
Marcham Farm	M8	3	<i>Symmorphus/Ancistrocerus</i> sp.	No	3			
Marcham Farm	M9	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	1			
Marcham Farm	M9	2	<i>Osmia bicornis</i>	No	5			
Marcham Farm	M9	2	<i>Symmorphus/Ancistrocerus</i> sp.	No	12			
Marcham Farm	M9	3	<i>Osmia bicornis</i>	No	7			Yes
Marcham Farm	M10	1	<i>Osmia</i> sp.	No	9			
Marcham Farm	M10	2	<i>Megachile ligniseca</i>	No	3			
Marcham Farm	M10	2	<i>Osmia</i> sp.	No	6			
Marcham Farm	M10	3	<i>Megachile versicolor</i>	No	6			Yes
Marcham Farm	M10	5	<i>Osmia</i> sp.	No	6			
Marcham Farm	M10	5	<i>Amobia signata</i>	Yes	NA	1	<i>Osmia</i> sp.	
Marcham Farm	M10	6	<i>Osmia</i> sp.	No	11			
Marcham Farm	M10	7	<i>Osmia</i> sp.	No	12			
Marcham Farm	M10	8	<i>Osmia</i> sp.	No	5			
Marcham Farm	M10	9	<i>Osmia</i> sp.	No	7			
Marcham Farm	M10	10	<i>Megachile</i> sp.	No	8			

Marcham Farm	M10	11	<i>Osmia</i> sp.	No	9		
Marcham Farm	M12	1	<i>Ancistrocerus trifasciatus</i>	No	4		
Marcham Farm	M12	2	<i>Amobia signata</i>	Yes	NA	4	<i>Symmorphus crassicornis</i>
Marcham Farm	M12	2	<i>Symmorphus crassicornis</i>	No	7		
Marcham Farm	M15	1	<i>Symmorphus crassicornis</i>	No	4		
Marcham Farm	M15	2	<i>Osmia</i> sp.	No	11		
Marcham Farm	M15	3	<i>Symmorphus gracilis</i>	No	6		
Marcham Farm	M15	4	<i>Symmorphus gracilis</i>	No	10		
Marcham Farm	M15	5	<i>Symmorphus gracilis</i>	No	7		
Marcham Farm	M15	6	<i>Megachile versicolor</i>	No	7		Yes
Marcham Farm	M15	7	<i>Symmorphus gracilis</i>	No	8		
Marcham Farm	M15	8	<i>Symmorphus/Ancistrocerus</i> sp.	No	4		
Marcham Farm	M15	9	<i>Symmorphus/Ancistrocerus</i> sp.	No	2		
Marcham Farm	M15	10	<i>Symmorphus gracilis</i>	No	11		
Marcham Farm	M15	11	<i>Megachile versicolor</i>	No	10		Yes
Middle Farm	M3	1	<i>Osmia bicornis</i>	No	9		Yes
Middle Farm	M3	2	<i>Osmia bicornis</i>	No	9		Yes
Middle Farm	M3	3	<i>Ancistrocerus trifasciatus</i>	No	7		
Middle Farm	M3	4	<i>Osmia</i> sp.	No	11		
Middle Farm	M3	5	<i>Osmia bicornis</i>	No	9		Yes
Middle Farm	M11	1	<i>Ancistrocerus trifasciatus</i>	No	10		
Middle Farm	M13	1	<i>Symmorphus crassicornis</i>	No	8		
Middle Farm	M15	1	<i>Symmorphus crassicornis</i>	No	12		
Middle Farm	M15	2	<i>Symmorphus crassicornis</i>	No	8		
Old Farm Dorn	OD2	2	<i>Osmia</i> sp.	No	10		
Old Farm Dorn	OD2	3	<i>Osmia</i> sp.	No	6		
Old Farm Dorn	OD2	4	<i>Osmia caerulescens</i>	No	6		Yes
Old Farm Dorn	OD2	5	<i>Osmia</i> sp.	No	3		
Old Farm Dorn	OD2	6	<i>Osmia</i> sp.	No	11		
Old Farm Dorn	OD2	7	<i>Osmia</i> sp.	No	9		
Old Farm Dorn	OD3	1	<i>Megachile versicolor</i>	No	9		Yes
Old Farm Dorn	OD3	2	<i>Megachile versicolor</i>	No	10		Yes

Old Farm Dorn	OD3	3	<i>Osmia caerulea</i>	No	3			Yes
Old Farm Dorn	OD3	4	<i>Symmorphus crassicornis</i>	No	4			
Old Farm Dorn	OD3	5	<i>Osmia caerulea</i>	No	4			Yes
Old Farm Dorn	OD6	1	<i>Megachile versicolor</i>	No	10			Yes
Old Farm Dorn	OD6	2	<i>Megachile versicolor</i>	No	5			Yes
Old Farm Dorn	OD6	3	<i>Megachile versicolor</i>	No	4			Yes
Old Farm Dorn	OD6	4	<i>Megachile versicolor</i>	No	8			Yes
Old Farm Dorn	OD6	5	<i>Symmorphus crassicornis</i>	No	10			
Old Farm Dorn	OD6	6	<i>Symmorphus crassicornis</i>	No	10			
Old Farm Dorn	OD7	1	<i>Megachile versicolor</i>	No	10			Yes
Old Farm Dorn	OD9	1	<i>Ancistrocerus trifasciatus</i>	No	4			
Old Farm Dorn	OD9	1	<i>Chrysis</i> sp.	Yes	NA	3		<i>Ancistrocerus trifasciatus</i>
Old Farm Dorn	OD9	2	<i>Ancistrocerus trifasciatus</i>	No	5			
Old Farm Dorn	OD9	2	<i>Amobia signata</i>	Yes	NA	3		<i>Ancistrocerus trifasciatus</i>
Old Farm Dorn	OD9	3	<i>Symmorphus/Ancistrocerus</i> sp.	No	6			
Old Farm Dorn	OD9	4	<i>Ancistrocerus trifasciatus</i>	No	6			
Old Farm Dorn	OD10	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	2			
Old Farm Dorn	OD10	1	<i>Chrysis</i> sp.	Yes	NA	1		<i>Ancistrocerus/Symmorphus</i> sp.
Old Farm Dorn	OD10	2	<i>Symmorphus/Ancistrocerus</i> sp.	No	3			
Old Farm Dorn	OD10	3	<i>Symmorphus/Ancistrocerus</i> sp.	No	3			
Old Farm Dorn	OD10	3	<i>Amobia signata</i>	Yes	NA	1		<i>Ancistrocerus/Symmorphus</i> sp.
Old Farm Dorn	OD10	4	<i>Symmorphus/Ancistrocerus</i> sp.	No	1			
Old Farm Dorn	OD10	5	<i>Symmorphus/Ancistrocerus</i> sp.	No	1			
Old Farm Dorn	OD10	5	<i>Chrysis</i> sp.	Yes	NA	1		<i>Ancistrocerus/Symmorphus</i> sp.
Old Farm Dorn	OD11	1	<i>Symmorphus crassicornis</i>	No	1			
Old Farm Dorn	OD11	1	<i>Chrysis</i> sp.	Yes	NA	1		<i>Symmorphus</i>

							<i>crassicornis</i>	
Old Farm Dorn	OD11	2	<i>Symmorphus/Ancistrocerus</i> sp.	No	1			
Old Farm Dorn	OD11	3	<i>Chrysis</i> sp.	Yes	NA	7	<i>Symmorphus crassicornis</i>	
Old Farm Dorn	OD11	3	<i>Symmorphus crassicornis</i>	No	11			
Old Farm Dorn	OD12	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	13			
Old Farm Dorn	OD12	4	<i>Osmia caerulescens</i>	No	2			
Pennyhooks Farm	P2	1	<i>Ancistrocerus trifasciatus</i>	No	3			
Pennyhooks Farm	P2	2	<i>Ancistrocerus trifasciatus</i>	No	2			
Pennyhooks Farm	P2	2	<i>Chrysis</i> sp.	Yes	NA	1	<i>Ancistrocerus trifasciatus</i>	
Pennyhooks Farm	P3	1	<i>Symmorphus crassicornis</i>	No	2			
Pennyhooks Farm	P3	2	<i>Osmia</i> sp.	No	3			
Pennyhooks Farm	P3	2	<i>Chrysis</i> sp.	Yes	NA	3	<i>Osmia</i> sp.	
Pennyhooks Farm	P3	3	<i>Symmorphus gracilis</i>	No	8			
Pennyhooks Farm	P3	4	<i>Symmorphus/Ancistrocerus</i> sp.	No	11			
Pennyhooks Farm	P3	5	<i>Symmorphus/Ancistrocerus</i> sp.	No	1			
Pennyhooks Farm	P3	6	<i>Symmorphus gracilis</i>	No	5			
Pennyhooks Farm	P3	6	<i>Chrysis</i> sp.	Yes	NA	1	<i>Symmorphus gracilis</i>	
Pennyhooks Farm	P4	1	<i>Megachile ligniseca</i>	No	5			Yes
Pennyhooks Farm	P4	2	<i>Megachile ligniseca</i>	No	7			Yes
Pennyhooks Farm	P4	3	<i>Ephialtes manifestator</i>	Yes	NA	5	<i>Symmorphus gracilis</i>	
Pennyhooks Farm	P4	3	<i>Symmorphus gracilis</i>	No	7			
Pennyhooks Farm	P5	1	<i>Osmia</i> sp.	No	9			
Pennyhooks Farm	P5	2	<i>Osmia</i> sp.	No	4			
Pennyhooks Farm	P5	3	<i>Osmia</i> sp.	No	6			
Pennyhooks Farm	P5	4	<i>Osmia</i> sp.	No	9			
Pennyhooks Farm	P5	5	<i>Megachile</i> sp.	No	10			
Pennyhooks Farm	P11	1	<i>Megachile versicolor</i>	No	7			Yes
Pennyhooks Farm	P11	2	<i>Megachile versicolor</i>	No	9			Yes
Pennyhooks Farm	P12	1	<i>Megachile ligniseca</i>	No	5			Yes
Pennyhooks Farm	P13	1	<i>Ancistrocerus trifasciatus</i>	No	10			

Pennyhooks Farm	P13	2	<i>Ancistrocerus trifasciatus</i>	No	9		
Pennyhooks Farm	P14	1	<i>Megachile ligniseca</i>	No	4		Yes
Pennyhooks Farm	P14	2	<i>Megachile ligniseca</i>	No	6		Yes
Pennyhooks Farm	P14	3	<i>Megachile versicolor</i>	No	9		Yes
Pennyhooks Farm	P14	4	<i>Megachile versicolor</i>	No	3		Yes
Rotherfield	R1	1	<i>Osmia</i> sp.	No	2		
Rotherfield	R1	2	<i>Osmia caerulescens</i>	No	10		Yes
Rotherfield	R1	3	<i>Megachile versicolor</i>	No	9		
Rotherfield	R1	4	<i>Osmia</i> sp.	No	7		
Rotherfield	R1	5	<i>Osmia caerulescens</i>	No	7		Yes
Rotherfield	R1	6	<i>Osmia</i> sp.	No	11		
Rotherfield	R1	7	<i>Osmia</i> sp.	No	6		
Rotherfield	R2	1	<i>Symmorphus crassicornis</i>	No	9		
Rotherfield	R3	1	<i>Megachile versicolor</i>	No	9		Yes
Rotherfield	R7	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	9		
Rotherfield	R7	2	<i>Symmorphus gracilis</i>	No	3		
Rotherfield	R7	2	<i>Melittobia acasta</i>	Yes	NA	1	<i>Symmorphus gracilis</i>
Rotherfield	R7	3	<i>Symmorphus gracilis</i>	No	13		
Rotherfield	R8	1	<i>Megachile ligniseca</i>	No	7		Yes
Rotherfield	R8	2	<i>Megachile</i> sp.	No	8		
Rotherfield	R8	3	<i>Megachile versicolor</i>	No	8		Yes
Rotherfield	R9	1	Unknown solitary wasp (cells destroyed)	No	3		
Rotherfield	R9	1	<i>Chrysis</i> sp.	Yes	NA	1	Unknown
Rotherfield	R12	1	<i>Ancistrocerus trifasciatus</i>	No	7		
Rotherfield	R12	2	<i>Trypoxylon attenuatum</i>	No	10		
Rotherfield	R12	3	<i>Megachile versicolor</i>	No	10		Yes
Rotherfield	R12	4	<i>Megachile</i> sp.	No	4		
Rotherfield	R12	5	<i>Megachile versicolor</i>	No	11		Yes
Rotherfield	R12	6	<i>Megachile versicolor</i>	No	11		Yes
Rotherfield	R12	7	<i>Megachile versicolor</i>	No	7		
Rotherfield	R13	1	<i>Pteromalidus apum</i>	Yes	NA	1	<i>Megachile versicolor</i>
Rotherfield	R13	1	<i>Megachile versicolor</i>	No	6		Yes
Stepstones Farm	SS4	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	6		

Stepstones Farm	SS4	2	<i>Pteromalidus apum</i>	Yes	NA	3	<i>Megachile versicolor</i>	
Stepstones Farm	SS4	2	<i>Megachile versicolor</i>	No	8			Yes
Stepstones Farm	SS4	3	<i>Megachile versicolor</i>	No	8			Yes
Stepstones Farm	SS4	4	<i>Megachile</i> sp.	No	10			Yes
Stepstones Farm	SS4	4	<i>Pteromalidus apum</i>	Yes	NA	8	<i>Megachile</i> sp.	
Stepstones Farm	SS4	5	<i>Megachile versicolor</i>	No	8			Yes
Stepstones Farm	SS5	1	<i>Symmorphus crassicornis</i>	No	12			
Stepstones Farm	SS5	1	<i>Melittobia acasta</i>	Yes	NA	8	<i>Symmorphus crassicornis</i>	
Stepstones Farm	SS5	2	<i>Symmorphus gracilis</i>	No	10			
Stepstones Farm	SS6	1	<i>Megachile versicolor</i>	No	7			Yes
Stepstones Farm	SS6	2	<i>Megachile ligniseca</i>	No	8			Yes
Stepstones Farm	SS7	1	<i>Megachile ligniseca</i>	No	6			Yes
Stepstones Farm	SS8	1	<i>Symmorphus crassicornis</i>	No	8			
Stepstones Farm	SS8	2	<i>Symmorphus gracilis</i>	No	13			
Stepstones Farm	SS8	3	<i>Ancistrocerus trifasciatus</i>	No	10			
Stepstones Farm	SS8	4	<i>Ancistrocerus trifasciatus</i>	No	10			
Stepstones Farm	SS8	6	<i>Symmorphus gracilis</i>	No	11			
Whitchurch Farm	WT12	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	14			
Whitchurch Farm	WT12	2	<i>Osmia</i> sp.	No	1			
Whitchurch Farm	WT12	3	<i>Osmia bicornis</i>	No	6			Yes
Whitchurch Farm	WT12	3	<i>Amobia signata</i>	Yes	NA	1	<i>Osmia bicornis</i>	
Whitchurch Farm	WT12	4	<i>Osmia bicornis</i>	No	8			Yes
Whitchurch Farm	WT12	5	<i>Osmia</i> sp.	No	6			
Whitchurch Farm	WT12	6	<i>Osmia bicornis</i>	No	5			
Whitchurch Farm	WT12	7	<i>Osmia bicornis</i>	No	7			Yes
Whitchurch Farm	WT12	8	<i>Ancistrocerus trifasciatus</i>	No	9			
Wincott Farm	WN4	1	<i>Chrysis</i> sp.	Yes	NA	3	<i>Ancistrocerus/Symmorphus</i> sp.	
Wincott Farm	WN4	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	6			
Wincott Farm	WN5	1	<i>Megachile versicolor</i>	No	3			
Wincott Farm	WN5	2	<i>Pteromalidus apum</i>	Yes	NA	1	<i>Megachile versicolor</i>	
Wincott Farm	WN5	2	<i>Megachile versicolor</i>	No	6			
Wincott Farm	WN5	3	<i>Ancistrocerus trifasciatus</i>	No	2			

Wincott Farm	WN6	1	<i>Symmorphus crassicornis</i>	No	13			
Wincott Farm	WN6	2	<i>Symmorphus/Ancistrocerus</i> sp.	No	9			
Wincott Farm	WN6	3	<i>Ancistrocerus trifasciatus</i>	No	11			
Wincott Farm	WN7	1	<i>Symmorphus gracilis</i>	No	4			
Wincott Farm	WN7	1	<i>Chrysis</i> sp.	Yes	NA	2	<i>Symmorphus gracilis</i>	
Wincott Farm	WN7	1	<i>Gasteruptio n jaculator</i>	Yes	NA	1	<i>Symmorphus gracilis</i>	
Wincott Farm	WN9	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	10			
Wincott Farm	WN9	2	<i>Symmorphus gracilis</i>	No	7			
Wincott Farm	WN9	3	<i>Symmorphus/Ancistrocerus</i> sp.	No	9			
Wincott Farm	WN9	4	<i>Symmorphus/Ancistrocerus</i> sp.	No	9			
Wincott Farm	WN11	1	<i>Ancistrocerus trifasciatus</i>	No	3			
Wincott Farm	WN11	2	<i>Megachile versicolor</i>	No	9			Yes
Wincott Farm	WN15	1	<i>Osmia caerulescens</i>	No	4			Yes
Wytham Farm	O1	1	<i>Symmorphus crassicornis</i>	No	3			
Wytham Farm	O6	1	<i>Osmia bicornis</i>	No	4			Yes
Wytham Farm	O6	2	<i>Osmia</i> sp.	No	4			
Wytham Farm	O6	3	<i>Osmia bicornis</i>	No	5			Yes
Wytham Farm	O7	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	14			
Wytham Farm	O7	2	<i>Symmorphus gracilis</i>	No	6			
Wytham Farm	O9	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	16			
Wytham Farm	O9	2	<i>Symmorphus gracilis</i>	No	5			
Wytham Farm	O13	1	<i>Symmorphus/Ancistrocerus</i> sp.	No	12			
Wytham Farm	O13	1	<i>Amobia signata</i>	Yes	NA	6	<i>Ancistrocerus/Symmorphus</i> sp.	
Wytham Farm	O13	2	<i>Amobia signata</i>	Yes	NA	1	<i>Megachile versicolor</i>	
Wytham Farm	O13	2	<i>Megachile versicolor</i>	No	6			Yes
Wytham Farm	O13	3	<i>Symmorphus gracilis</i>	No	9			
Wytham Farm	O13	4	<i>Symmorphus gracilis</i>	No	12			
Wytham Farm	O13	4	<i>Amobia signata</i>	Yes	NA	5	<i>Symmorphus gracilis</i>	
Wytham Farm	O13	5	<i>Symmorphus gracilis</i>	No	7			

Wytham Farm	O14	1	<i>Osmia</i> sp.	No	5			
Wytham Farm	O14	1	<i>Pteromalidus apum</i>	Yes	NA	1	<i>Osmia</i> sp.	
Wytham Farm	O14	2	<i>Pteromalidus apum</i>	Yes	NA	5	<i>Megachile versicolor</i>	
Wytham Farm	O14	2	<i>Megachile versicolor</i>	No	10			
Wytham Farm	O14	3	<i>Megachile versicolor</i>	No	7			Yes
Wytham Farm	O14	4	<i>Osmia caerulescens</i>	No	5			Yes
Wytham Farm	O14	5	<i>Pteromalidus apum</i>	Yes	NA	1	<i>Megachile versicolor</i>	
Wytham Farm	O14	5	<i>Megachile versicolor</i>	No	6			Yes
Wytham Farm	O14	6	<i>Chalcidoidea</i> sp.	Yes	NA	3	<i>Symmorphus gracilis</i>	
Wytham Farm	O14	6	<i>Symmorphus gracilis</i>	No	5			
Wytham Farm	O14	7	<i>Osmia caerulescens</i>	No	6			Yes
Wytham Farm	O14	8	<i>Amobia signata</i>	Yes	NA	2	<i>Ancistrocerus/Symmorphus</i> sp.	
Wytham Farm	O14	8	<i>Symmorphus/Ancistrocerus</i> sp.	No	7			
Wytham Farm	O14	9	<i>Megachile versicolor</i>	No	10			Yes
Wytham Farm	O14	9	<i>Ephialtes manifestator</i>	Yes	NA	1	<i>Megachile versicolor</i>	
Wytham Farm	O14	10	<i>Megachile</i> sp.	No	10			
Wytham Farm	O14	10	<i>Pteromalidus apum</i>	Yes	NA	7	<i>Megachile</i> sp.	
Wytham Farm	O14	11	<i>Ancistrocerus trifasciatus</i>	No	10			
Wytham Farm	O14	11	<i>Ephialtes manifestator</i>	Yes	NA	1	<i>Ancistrocerus trifasciatus</i>	
Wytham Farm	O14	12	<i>Osmia</i> sp.	No	6			
Wytham Farm	O14	12	<i>Ephialtes manifestator</i>	Yes	NA	1	<i>Osmia</i> sp.	
Wytham Farm	O14	13	<i>Megachile ligniseca</i>	No	8			Yes
Wytham Farm	O14	14	<i>Osmia caerulescens</i>	No	12			
Wytham Farm	O14	15	<i>Osmia caerulescens</i>	No	12			Yes
Wytham Farm	O14	16	<i>Megachile versicolor</i>	No	9			Yes
Wytham Farm	O14	16	<i>Pteromalidus apum</i>	Yes	NA	3	<i>Megachile versicolor</i>	
Wytham Farm	O14	17	<i>Megachile versicolor</i>	No	12			Yes
Wytham Farm	O14	18	<i>Megachile ligniseca</i>	No	11			Yes
Wytham Farm	O15	1	<i>Megachile versicolor</i>	No	9			Yes

Table 8 This table lists all plant species recorded at each nest box site on each farm and the relative abundance of flower units of each species.

Farm	Nest Box	Plant Species	Abundance
Bellingdon	B1	<i>Anagallis arvensis</i>	2
Bellingdon	B1	<i>Rosa sp.</i>	1
Bellingdon	B1	<i>Geranium molle</i>	4
Bellingdon	B1	<i>Centaurea nigra</i>	2
Bellingdon	B1	<i>Cirsium palustre</i>	2
Bellingdon	B1	<i>Convolvulus arvensis</i>	2
Bellingdon	B1	<i>Crataegus monogyna</i>	4
Bellingdon	B1	<i>Epilobium hirsutum</i>	1
Bellingdon	B1	<i>Heracleum sphondylium</i>	2
Bellingdon	B1	<i>Hieracium sp.</i>	2
Bellingdon	B1	<i>Hyacinthoides hispanica</i>	3
Bellingdon	B1	<i>Hypericum perforatum</i>	2
Bellingdon	B1	<i>Jacobaea vulgaris</i>	3
Bellingdon	B1	<i>Lotus corniculatus</i>	3
Bellingdon	B1	<i>Matricaria discoidea</i>	8
Bellingdon	B1	<i>Medicago lupulina</i>	3
Bellingdon	B1	<i>Papaver rhoeas</i>	3
Bellingdon	B1	<i>Prunella vulgaris</i>	1
Bellingdon	B1	<i>Rubus fruticosus</i>	7
Bellingdon	B1	<i>Senecio vulgaris</i>	3
Bellingdon	B1	<i>Sonchus arvensis</i>	2
Bellingdon	B1	<i>Stellaria holostea</i>	2
Bellingdon	B1	<i>Ulex europaeus</i>	1
Bellingdon	B1	<i>Veronica persica</i>	2
Bellingdon	B2	<i>Senecio vulgaris</i>	4
Bellingdon	B2	<i>Anagallis arvensis</i>	2
Bellingdon	B2	<i>Anthriscus sylvestris</i>	2
Bellingdon	B2	<i>Geranium molle</i>	4
Bellingdon	B2	<i>Centaurea nigra</i>	2
Bellingdon	B2	<i>Cirsium palustre</i>	2
Bellingdon	B2	<i>Convolvulus arvensis</i>	2
Bellingdon	B2	<i>Crataegus monogyna</i>	4
Bellingdon	B2	<i>Conopodium majus</i>	2
Bellingdon	B2	<i>Epilobium hirsutum</i>	1
Bellingdon	B2	<i>Heracleum sphondylium</i>	2
Bellingdon	B2	<i>Lamium purpureum</i>	1
Bellingdon	B2	<i>Hieracium sp.</i>	2
Bellingdon	B2	<i>Hypericum perforatum</i>	2

Bellingdon	B2	<i>Jacobaea vulgaris</i>	4
Bellingdon	B2	<i>Leucanthemum vulgare</i>	3
Bellingdon	B2	<i>Lotus corniculatus</i>	2
Bellingdon	B2	<i>Matricaria discoidea</i>	8
Bellingdon	B2	<i>Medicago lupulina</i>	3
Bellingdon	B2	<i>Papaver rhoeas</i>	2
Bellingdon	B2	<i>Prunella vulgaris</i>	1
Bellingdon	B2	<i>Ranunculus acris</i>	2
Bellingdon	B2	<i>Ranunculus repens</i>	2
Bellingdon	B2	<i>Rubus fruticosus</i>	8
Bellingdon	B2	<i>Sinapsis arvensis</i>	2
Bellingdon	B2	<i>Sonchus arvensis</i>	6
Bellingdon	B2	<i>Taraxacum officinale</i>	2
Bellingdon	B3	<i>Stellaria holostea</i>	4
Bellingdon	B3	<i>Anagallis arvensis</i>	7
Bellingdon	B3	<i>Anthriscus sylvestris</i>	2
Bellingdon	B3	<i>Geranium molle</i>	4
Bellingdon	B3	<i>Cirsium palustre</i>	2
Bellingdon	B3	<i>Convolvulus arvensis</i>	2
Bellingdon	B3	<i>Crataegus monogyna</i>	4
Bellingdon	B3	<i>Heracleum sphondylium</i>	2
Bellingdon	B3	<i>Hieracium sp.</i>	2
Bellingdon	B3	<i>Hyacinthoides hispanica</i>	2
Bellingdon	B3	<i>Hypericum perforatum</i>	2
Bellingdon	B3	<i>Jacobaea vulgaris</i>	2
Bellingdon	B3	<i>Lotus corniculatus</i>	2
Bellingdon	B3	<i>Matricaria discoidea</i>	9
Bellingdon	B3	<i>Medicago lupulina</i>	3
Bellingdon	B3	<i>Myosotis arvensis</i>	1
Bellingdon	B3	<i>Papaver rhoeas</i>	2
Bellingdon	B3	<i>Prunella vulgaris</i>	1
Bellingdon	B3	<i>Ranunculus repens</i>	5
Bellingdon	B3	<i>Rubus fruticosus</i>	7
Bellingdon	B3	<i>Sinapsis arvensis</i>	1
Bellingdon	B3	<i>Taraxacum officinale</i>	3
Bellingdon	B3	<i>Viola arvensis</i>	2
Bellingdon	B4	<i>Crataegus monogyna</i>	3
Bellingdon	B4	<i>Allaria petiolata</i>	3
Bellingdon	B4	<i>Anagallis arvensis</i>	7
Bellingdon	B4	<i>Anthriscus sylvestris</i>	2
Bellingdon	B4	<i>Geranium molle</i>	4
Bellingdon	B4	<i>Cirsium palustre</i>	2
Bellingdon	B4	<i>Convolvulus arvensis</i>	2

Bellingdon	B4	<i>Heracleum sphondylium</i>	2
Bellingdon	B4	<i>Hieracium sp.</i>	2
Bellingdon	B4	<i>Hypericum perforatum</i>	2
Bellingdon	B4	<i>Jacobaea vulgaris</i>	2
Bellingdon	B4	<i>Lotus corniculatus</i>	2
Bellingdon	B4	<i>Matricaria discoidea</i>	9
Bellingdon	B4	<i>Medicago lupulina</i>	3
Bellingdon	B4	<i>Myosotis arvensis</i>	3
Bellingdon	B4	<i>Papaver rhoeas</i>	2
Bellingdon	B4	<i>Prunella vulgaris</i>	1
Bellingdon	B4	<i>Ranunculus repens</i>	5
Bellingdon	B4	<i>Rubus fruticosus</i>	3
Bellingdon	B4	<i>Rubus fruticosus</i>	4
Bellingdon	B4	<i>Sinapsis arvensis</i>	1
Bellingdon	B4	<i>Stellaria holostea</i>	3
Bellingdon	B4	<i>Stellaria media</i>	2
Bellingdon	B4	<i>Taraxacum officinale</i>	3
Bellingdon	B4	<i>Veronica persica</i>	2
Bellingdon	B4	<i>Viola arvensis</i>	2
Bellingdon	B5	<i>Sinapsis arvensis</i>	2
Bellingdon	B5	<i>Anagallis arvensis</i>	2
Bellingdon	B5	<i>Geranium molle</i>	3
Bellingdon	B5	<i>Cirsium palustre</i>	2
Bellingdon	B5	<i>Convolvulus arvensis</i>	2
Bellingdon	B5	<i>Crataegus monogyna</i>	3
Bellingdon	B5	<i>Heracleum sphondylium</i>	2
Bellingdon	B5	<i>Hieracium sp.</i>	2
Bellingdon	B5	<i>Hypericum perforatum</i>	2
Bellingdon	B5	<i>Jacobaea vulgaris</i>	4
Bellingdon	B5	<i>Lotus corniculatus</i>	2
Bellingdon	B5	<i>Matricaria discoidea</i>	5
Bellingdon	B5	<i>Matricaria discoidea</i>	3
Bellingdon	B5	<i>Medicago lupulina</i>	3
Bellingdon	B5	<i>Papaver rhoeas</i>	3
Bellingdon	B5	<i>Prunella vulgaris</i>	1
Bellingdon	B5	<i>Ranunculus repens</i>	2
Bellingdon	B5	<i>Rubus fruticosus</i>	14
Bellingdon	B5	<i>Sonchus arvensis</i>	4
Bellingdon	B6	<i>Ranunculus acris</i>	2
Bellingdon	B6	<i>Anagallis arvensis</i>	2
Bellingdon	B6	<i>Anthriscus sylvestris</i>	1
Bellingdon	B6	<i>Calystegia sepium</i>	1
Bellingdon	B6	<i>Cirsium arvense</i>	4

Bellingdon	B6	<i>Cirsium palustre</i>	2
Bellingdon	B6	<i>Convolvulus arvensis</i>	2
Bellingdon	B6	<i>Convolvulus arvensis</i>	2
Bellingdon	B6	<i>Crataegus monogyna</i>	2
Bellingdon	B6	<i>Epilobium hirsutum</i>	5
Bellingdon	B6	<i>Epilobium montanum</i>	3
Bellingdon	B6	<i>Heracleum sphondylium</i>	2
Bellingdon	B6	<i>Hieracium sp.</i>	2
Bellingdon	B6	<i>Hypericum perforatum</i>	2
Bellingdon	B6	<i>Jacobaea vulgaris</i>	4
Bellingdon	B6	<i>Lotus corniculatus</i>	2
Bellingdon	B6	<i>Matricaria discoidea</i>	7
Bellingdon	B6	<i>Medicago lupulina</i>	3
Bellingdon	B6	<i>Papaver rhoeas</i>	2
Bellingdon	B6	<i>Prunella vulgaris</i>	1
Bellingdon	B6	<i>Rubus fruticosus</i>	3
Bellingdon	B6	<i>Sinapsis arvensis</i>	4
Bellingdon	B6	<i>Taraxacum officinale</i>	2
Bellingdon	B6	<i>Veronica persica</i>	2
Bellingdon	B7	<i>Hyacinthoides hispanica</i>	4
Bellingdon	B7	<i>Geranium robertianum</i>	1
Bellingdon	B7	<i>Cirsium palustre</i>	2
Bellingdon	B7	<i>Crataegus monogyna</i>	3
Bellingdon	B7	<i>Epilobium angustifolium</i>	2
Bellingdon	B7	<i>Hypericum perforatum</i>	1
Bellingdon	B7	<i>Ranunculus acris</i>	1
Bellingdon	B7	<i>Rubus fruticosus</i>	2
Bellingdon	B7	<i>Veronica persica</i>	5
Bellingdon	B8	<i>Cirsium palustre</i>	2
Bellingdon	B8	<i>Rubus fruticosus</i>	4
Bellingdon	B8	<i>Veronica persica</i>	2
Bellingdon	B9	<i>Ranunculus acris</i>	3
Bellingdon	B9	<i>Anagallis arvensis</i>	5
Bellingdon	B9	<i>Anthriscus sylvestris</i>	2
Bellingdon	B9	<i>Geranium robertianum</i>	1
Bellingdon	B9	<i>Cirsium palustre</i>	3
Bellingdon	B9	<i>Epilobium hirsutum</i>	1
Bellingdon	B9	<i>Heracleum sphondylium</i>	2
Bellingdon	B9	<i>Hieracium sp.</i>	3
Bellingdon	B9	<i>Hyacinthoides hispanica</i>	4
Bellingdon	B9	<i>Jacobaea vulgaris</i>	2
Bellingdon	B9	<i>Matricaria discoidea</i>	6
Bellingdon	B9	<i>Ranunculus repens</i>	3

Bellingdon	B9	<i>Rubus fruticosus</i>	2
Bellingdon	B9	<i>Sambucus nigra</i>	6
Bellingdon	B9	<i>Taraxacum officinale</i>	2
Bellingdon	B9	<i>Trifolium repens</i>	6
Bellingdon	B9	<i>Veronica persica</i>	4
Bellingdon	B10	<i>Cirsium palustre</i>	3
Bellingdon	B10	<i>Anagallis arvensis</i>	3
Bellingdon	B10	<i>Cirsium arvense</i>	2
Bellingdon	B10	<i>Heracleum sphondylium</i>	2
Bellingdon	B10	<i>Rubus fruticosus</i>	2
Bellingdon	B10	<i>Stachys sylvatica</i>	1
Bellingdon	B10	<i>Veronica persica</i>	2
Bellingdon	B11	<i>Ranunculus acris</i>	2
Bellingdon	B11	<i>Anagallis arvensis</i>	2
Bellingdon	B11	<i>Calystegia silvatica</i>	2
Bellingdon	B11	<i>Cardamine hirsuta</i>	1
Bellingdon	B11	<i>Cirsium arvense</i>	3
Bellingdon	B11	<i>Cirsium palustre</i>	2
Bellingdon	B11	<i>Crataegus monogyna</i>	4
Bellingdon	B11	<i>Conopodium majus</i>	2
Bellingdon	B11	<i>Rubus fruticosus</i>	7
Bellingdon	B11	<i>Veronica persica</i>	3
Bellingdon	B12	<i>Ranunculus acris</i>	1
Bellingdon	B12	<i>Anthriscus sylvestris</i>	2
Bellingdon	B12	<i>Centaurea nigra</i>	3
Bellingdon	B12	<i>Crataegus monogyna</i>	3
Bellingdon	B12	<i>Dipsacus fullonum</i>	2
Bellingdon	B12	<i>Epilobium hirsutum</i>	3
Bellingdon	B12	<i>Hieracium sp.</i>	3
Bellingdon	B12	<i>Jacobaea vulgaris</i>	2
Bellingdon	B12	<i>Melilotus altissimus</i>	1
Bellingdon	B12	<i>Rubus fruticosus</i>	3
Bellingdon	B12	<i>Sonchus arvensis</i>	5
Bellingdon	B12	<i>Succisa pratensis</i>	1
Bellingdon	B12	<i>Trifolium pratense</i>	5
Bellingdon	B12	<i>Trifolium repens</i>	3
Bellingdon	B13	<i>Anthriscus sylvestris</i>	2
Bellingdon	B13	<i>Anagallis arvensis</i>	2
Bellingdon	B13	<i>Geranium robertianum</i>	2
Bellingdon	B13	<i>Buddleja sp</i>	2
Bellingdon	B13	<i>Calystegia silvatica</i>	2
Bellingdon	B13	<i>Cirsium arvense</i>	3
Bellingdon	B13	<i>Cirsium palustre</i>	4

Bellingdon	B13	<i>Convolvulus arvensis</i>	2
Bellingdon	B13	<i>Crataegus monogyna</i>	3
Bellingdon	B13	<i>Dipsacus fullonum</i>	4
Bellingdon	B13	<i>Epilobium angustifolium</i>	2
Bellingdon	B13	<i>Epilobium hirsutum</i>	4
Bellingdon	B13	<i>Heracleum sphondylium</i>	2
Bellingdon	B13	<i>Hieracium sp.</i>	2
Bellingdon	B13	<i>Ilex aquifolium</i>	2
Bellingdon	B13	<i>Jacobaea vulgaris</i>	2
Bellingdon	B13	<i>Lamium album</i>	1
Bellingdon	B13	<i>Lotus corniculatus</i>	2
Bellingdon	B13	<i>Matricaria discoidea</i>	2
Bellingdon	B13	<i>Medicago lupulina</i>	4
Bellingdon	B13	<i>Myosotis arvensis</i>	1
Bellingdon	B13	<i>Rubus fruticosus</i>	7
Bellingdon	B13	<i>Silene dioica</i>	2
Bellingdon	B13	<i>Sonchus arvensis</i>	2
Bellingdon	B13	<i>Taraxacum officinale</i>	4
Bellingdon	B13	<i>Trifolium pratense</i>	2
Bellingdon	B13	<i>Trifolium repens</i>	2
Bellingdon	B13	<i>Veronica persica</i>	3
Bellingdon	B14	<i>Crataegus monogyna</i>	2
Bellingdon	B14	<i>Geranium robertianum</i>	1
Bellingdon	B14	<i>Brassica napus</i>	2
Bellingdon	B14	<i>Bellis perennis</i>	1
Bellingdon	B14	<i>Calystegia silvatica</i>	2
Bellingdon	B14	<i>Centaurea nigra</i>	2
Bellingdon	B14	<i>Cirsium palustre</i>	3
Bellingdon	B14	<i>Hieracium sp.</i>	2
Bellingdon	B14	<i>Hyacinthoides hispanica</i>	2
Bellingdon	B14	<i>Jacobaea vulgaris</i>	3
Bellingdon	B14	<i>Lotus corniculatus</i>	5
Bellingdon	B14	<i>Matricaria discoidea</i>	4
Bellingdon	B14	<i>Medicago lupulina</i>	2
Bellingdon	B14	<i>Ranunculus acris</i>	1
Bellingdon	B14	<i>Rubus fruticosus</i>	7
Bellingdon	B14	<i>Sonchus arvensis</i>	2
Bellingdon	B14	<i>Taraxacum officinale</i>	2
Bellingdon	B14	<i>Trifolium pratense</i>	2
Bellingdon	B14	<i>Trifolium repens</i>	3
Bellingdon	B15	<i>Crataegus monogyna</i>	3
Bellingdon	B15	<i>Anthriscus sylvestris</i>	1
Bellingdon	B15	<i>Geranium robertianum</i>	1

Bellingdon	B15	<i>Buddleja sp</i>	1
Bellingdon	B15	<i>Cirsium palustre</i>	2
Bellingdon	B15	<i>Heracleum sphondylium</i>	2
Bellingdon	B15	<i>Hyacinthoides hispanica</i>	3
Bellingdon	B15	<i>Jacobaea vulgaris</i>	2
Bellingdon	B15	<i>Melilotus altissimus</i>	2
Bellingdon	B15	<i>Myosotis arvensis</i>	3
Bellingdon	B15	<i>Ranunculus acris</i>	2
Bellingdon	B15	<i>Rubus fruticosus</i>	6
Bellingdon	B15	<i>Solanum dulcamara</i>	1
Bellingdon	B15	<i>Trifolium pratense</i>	4
Bellingdon	B15	<i>Trifolium repens</i>	5
Daylesford	D1	<i>Taraxacum officinale</i>	3
Daylesford	D1	<i>Anthriscus sylvestris</i>	2
Daylesford	D1	<i>Cirsium palustre</i>	2
Daylesford	D1	<i>Crataegus monogyna</i>	4
Daylesford	D1	<i>Rubus fruticosus</i>	4
Daylesford	D1	<i>Sambucus nigra</i>	2
Daylesford	D1	<i>Trifolium repens</i>	2
Daylesford	D2	<i>Anthriscus sylvestris</i>	3
Daylesford	D2	<i>Calystegia sepium</i>	4
Daylesford	D2	<i>Cirsium arvense</i>	2
Daylesford	D2	<i>Cirsium palustre</i>	1
Daylesford	D2	<i>Lamium album</i>	2
Daylesford	D2	<i>Ranunculus acris</i>	3
Daylesford	D2	<i>Sinapsis arvensis</i>	2
Daylesford	D3	<i>Taraxacum officinale</i>	1
Daylesford	D2	<i>Trifolium repens</i>	2
Daylesford	D3	<i>Anthriscus sylvestris</i>	2
Daylesford	D3	<i>Cirsium palustre</i>	1
Daylesford	D3	<i>Ranunculus repens</i>	2
Daylesford	D3	<i>Rubus fruticosus</i>	5
Daylesford	D3	<i>Taraxacum officinale</i>	1
Daylesford	D3	<i>Trifolium pratense</i>	2
Daylesford	D3	<i>Trifolium repens</i>	3
Daylesford	D4	<i>Anthriscus sylvestris</i>	2
Daylesford	D4	<i>Centaurea nigra</i>	2
Daylesford	D4	<i>Cirsium arvense</i>	2
Daylesford	D4	<i>Convolvulus arvensis</i>	2
Daylesford	D4	<i>Crataegus monogyna</i>	2
Daylesford	D4	<i>Epilobium hirsutum</i>	3
Daylesford	D4	<i>Geranium molle</i>	2
Daylesford	D4	<i>Taraxacum officinale</i>	2

Daylesford	D5	<i>Ranunculus acris</i>	3
Daylesford	D5	<i>Bellis perennis</i>	2
Daylesford	D5	<i>Hieracium sp.</i>	3
Daylesford	D5	<i>Lavandula angustifolia</i>	9
Daylesford	D5	<i>Leucanthemum vulgare</i>	2
Daylesford	D5	<i>Lotus corniculatus</i>	4
Daylesford	D5	<i>Medicago lupulina</i>	3
Daylesford	D5	<i>Myosotis arvensis</i>	2
Daylesford	D5	<i>Onobrychis viciifolia</i>	5
Daylesford	D5	<i>Papaver rhoeas</i>	2
Daylesford	D5	<i>Primula veris</i>	2
Daylesford	D5	<i>Sonchus arvensis</i>	2
Daylesford	D5	<i>Taraxacum officinale</i>	4
Daylesford	D5	<i>Trifolium pratense</i>	5
Daylesford	D5	<i>Trifolium repens</i>	4
Daylesford	D5	<i>Vicia sativa</i>	2
Daylesford	D6	<i>Ranunculus acris</i>	3
Daylesford	D6	<i>Bellis perennis</i>	3
Daylesford	D6	<i>Glechoma hederacea</i>	2
Daylesford	D6	<i>Hieracium sp.</i>	3
Daylesford	D6	<i>Lavandula angustifolia</i>	9
Daylesford	D6	<i>Leucanthemum vulgare</i>	2
Daylesford	D6	<i>Lotus corniculatus</i>	4
Daylesford	D6	<i>Medicago lupulina</i>	3
Daylesford	D6	<i>Myosotis arvensis</i>	2
Daylesford	D6	<i>Onobrychis viciifolia</i>	5
Daylesford	D6	<i>Papaver rhoeas</i>	2
Daylesford	D6	<i>Primula veris</i>	2
Daylesford	D6	<i>Ranunculus repens</i>	2
Daylesford	D6	<i>Silene dioica</i>	3
Daylesford	D6	<i>Silene latifolia</i>	1
Daylesford	D6	<i>Sonchus arvensis</i>	2
Daylesford	D6	<i>Taraxacum officinale</i>	5
Daylesford	D6	<i>Trifolium pratense</i>	6
Daylesford	D6	<i>Trifolium repens</i>	5
Daylesford	D6	<i>Vicia sativa</i>	2
Daylesford	D7	<i>Crataegus monogyna</i>	2
Daylesford	D7	<i>Anthriscus sylvestris</i>	1
Daylesford	D7	<i>Bellis perennis</i>	2
Daylesford	D7	<i>Cirsium palustre</i>	1
Daylesford	D7	<i>Geranium molle</i>	1
Daylesford	D7	<i>Taraxacum officinale</i>	6
Daylesford	D7	<i>Trifolium pratense</i>	1

Daylesford	D7	<i>Trifolium repens</i>	3
Daylesford	D8	<i>Crataegus monogyna</i>	3
Daylesford	D8	<i>Agrostemma githago</i>	2
Daylesford	D8	<i>Centaurea cyanus</i>	3
Daylesford	D8	<i>Centaurea nigra</i>	5
Daylesford	D8	<i>Fragaria x ananassa</i>	9
Daylesford	D8	<i>Heracleum sphondylium</i>	2
Daylesford	D8	<i>Hieracium sp.</i>	2
Daylesford	D8	<i>Knautia arvensis</i>	4
Daylesford	D8	<i>Lamium purpureum</i>	2
Daylesford	D8	<i>Leucanthemum vulgare</i>	4
Daylesford	D8	<i>Lotus corniculatus</i>	2
Daylesford	D8	<i>Lychnis flos-cuculi</i>	2
Daylesford	D8	<i>Malus domestica</i>	8
Daylesford	D8	<i>Origanum vulgare</i>	3
Daylesford	D8	<i>Prunus domestica</i>	4
Daylesford	D8	<i>Ranunculus acris</i>	3
Daylesford	D8	<i>Silene dioica</i>	2
Daylesford	D8	<i>Taraxacum officinale</i>	2
Daylesford	D8	<i>Vicia sativa</i>	2
Daylesford	D9	<i>Anthriscus sylvestris</i>	3
Daylesford	D9	<i>Cirsium arvense</i>	1
Daylesford	D9	<i>Cirsium palustre</i>	2
Daylesford	D9	<i>Convolvulus arvensis</i>	2
Daylesford	D9	<i>Crataegus monogyna</i>	3
Daylesford	D9	<i>Hieracium sp.</i>	1
Daylesford	D9	<i>Lamium album</i>	4
Daylesford	D9	<i>Ranunculus acris</i>	2
Daylesford	D9	<i>Taraxacum officinale</i>	1
Daylesford	D10	<i>Lamium album</i>	6
Daylesford	D10	<i>Anthriscus sylvestris</i>	2
Daylesford	D10	<i>Cirsium arvense</i>	2
Daylesford	D10	<i>Cirsium palustre</i>	2
Daylesford	D10	<i>Convolvulus arvensis</i>	3
Daylesford	D10	<i>Crataegus monogyna</i>	3
Daylesford	D10	<i>Matricaria discoidea</i>	2
Daylesford	D10	<i>Rubus fruticosus</i>	3
Daylesford	D10	<i>Silene latifolia</i>	1
Daylesford	D11	<i>Ranunculus acris</i>	2
Daylesford	D11	<i>Anthriscus sylvestris</i>	2
Daylesford	D11	<i>Cirsium arvense</i>	2
Daylesford	D11	<i>Cirsium palustre</i>	2
Daylesford	D11	<i>Crataegus monogyna</i>	2

Daylesford	D11	<i>Jacobaea vulgaris</i>	2
Daylesford	D11	<i>Lamium album</i>	2
Daylesford	D11	<i>Taraxacum officinale</i>	6
Daylesford	D11	<i>Trifolium repens</i>	4
Daylesford	D12	<i>Ranunculus acris</i>	2
Daylesford	D12	<i>Anthriscus sylvestris</i>	2
Daylesford	D12	<i>Calystegia sepium</i>	2
Daylesford	D12	<i>Calystegia silvatica</i>	2
Daylesford	D12	<i>Cichorium intybus</i>	2
Daylesford	D12	<i>Cirsium arvense</i>	4
Daylesford	D12	<i>Crataegus monogyna</i>	2
Daylesford	D12	<i>Epilobium hirsutum</i>	2
Daylesford	D12	<i>Lamium album</i>	2
Daylesford	D12	<i>Lythrum salicaria</i>	2
Daylesford	D12	<i>Taraxacum officinale</i>	1
Daylesford	D13	<i>Hieracium sp.</i>	2
Daylesford	D13	<i>Anthriscus sylvestris</i>	2
Daylesford	D13	<i>Cirsium arvense</i>	2
Daylesford	D13	<i>Crataegus monogyna</i>	2
Daylesford	D13	<i>Epilobium hirsutum</i>	2
Daylesford	D13	<i>Geranium molle</i>	2
Daylesford	D13	<i>Matricaria discoidea</i>	2
Daylesford	D13	<i>Myosotis arvensis</i>	1
Daylesford	D13	<i>Ranunculus acris</i>	3
Daylesford	D13	<i>Rosa canina</i>	2
Daylesford	D13	<i>Rubus fruticosus</i>	3
Daylesford	D13	<i>Sambucus nigra</i>	4
Daylesford	D13	<i>Taraxacum officinale</i>	5
Daylesford	D13	<i>Veronica persica</i>	1
Daylesford	D14	<i>Sinapsis arvensis</i>	2
Daylesford	D14	<i>Anthriscus sylvestris</i>	2
Daylesford	D14	<i>Pentaglottis sempervirens</i>	2
Daylesford	D14	<i>Calystegia sepium</i>	2
Daylesford	D14	<i>Calystegia silvatica</i>	6
Daylesford	D14	<i>Cirsium arvense</i>	2
Daylesford	D14	<i>Cirsium palustre</i>	2
Daylesford	D14	<i>Dipsacus fullonum</i>	2
Daylesford	D14	<i>Epilobium hirsutum</i>	5
Daylesford	D14	<i>Filipendula ulmaria</i>	2
Daylesford	D14	<i>Hieracium sp.</i>	2
Daylesford	D14	<i>Malus domestica</i>	3
Daylesford	D14	<i>Ranunculus acris</i>	4
Daylesford	D14	<i>Ranunculus repens</i>	1

Daylesford	D14	<i>Rosa canina</i>	2
Daylesford	D14	<i>Rubus fruticosus</i>	3
Daylesford	D14	<i>Sambucus nigra</i>	3
Daylesford	D14	<i>Silene dioica</i>	2
Daylesford	D14	<i>Taraxacum officinale</i>	7
Daylesford	D14	<i>Tilia sp</i>	3
Daylesford	D14	<i>Trifolium repens</i>	4
Daylesford	D15	<i>Ranunculus acris</i>	4
Daylesford	D15	<i>Anthriscus sylvestris</i>	4
Daylesford	D15	<i>Calystegia silvatica</i>	4
Daylesford	D15	<i>Cirsium arvense</i>	2
Daylesford	D15	<i>Crataegus monogyna</i>	3
Daylesford	D15	<i>Epilobium hirsutum</i>	4
Daylesford	D15	<i>Lamium album</i>	2
Daylesford	D15	<i>Taraxacum officinale</i>	5
Daylesford	D15	<i>Trifolium repens</i>	3
Colleymore	C1	<i>Anthriscus sylvestris</i>	1
Colleymore	C1	<i>Calystegia sepium</i>	2
Colleymore	C1	<i>Crataegus monogyna</i>	3
Colleymore	C1	<i>Geranium molle</i>	2
Colleymore	C1	<i>Glechoma hederacea</i>	2
Colleymore	C1	<i>Heracleum sphondylium</i>	2
Colleymore	C1	<i>Melilotus altissimus</i>	2
Colleymore	C1	<i>Ranunculus acris</i>	1
Colleymore	C1	<i>Ranunculus repens</i>	1
Colleymore	C1	<i>Rosa acicularis</i>	2
Colleymore	C1	<i>Rubus fruticosus</i>	2
Colleymore	C1	<i>Trifolium pratense</i>	1
Colleymore	C1	<i>Trifolium repens</i>	3
Colleymore	C2	<i>Crataegus monogyna</i>	4
Colleymore	C2	<i>Anthriscus sylvestris</i>	3
Colleymore	C2	<i>Calystegia sepium</i>	4
Colleymore	C2	<i>Heracleum sphondylium</i>	3
Colleymore	C2	<i>Lamium album</i>	1
Colleymore	C2	<i>Papaver rhoeas</i>	1
Colleymore	C2	<i>Rosa acicularis</i>	2
Colleymore	C2	<i>Rubus fruticosus</i>	6
Colleymore	C2	<i>Sambucus nigra</i>	2
Colleymore	C2	<i>Stachys sylvatica</i>	2
Colleymore	C2	<i>Taraxacum officinale</i>	2
Colleymore	C2	<i>Trifolium repens</i>	2
Colleymore	C3	<i>Anthriscus sylvestris</i>	2
Colleymore	C3	<i>Anagallis arvensis</i>	1

Colleymore	C3	<i>Anthemis austriaca</i>	2
Colleymore	C3	<i>Brassica napus</i>	5
Colleymore	C3	<i>Cirsium arvense</i>	1
Colleymore	C3	<i>Cirsium palustre</i>	2
Colleymore	C3	<i>Crepis capillaris</i>	1
Colleymore	C3	<i>Geranium molle</i>	2
Colleymore	C3	<i>Heracleum sphondylium</i>	1
Colleymore	C3	<i>Lamium purpureum</i>	1
Colleymore	C3	<i>Matricaria discoidea</i>	1
Colleymore	C3	<i>Myosotis arvensis</i>	1
Colleymore	C3	<i>Papaver rhoeas</i>	1
Colleymore	C3	<i>Ranunculus acris</i>	3
Colleymore	C3	<i>Ranunculus repens</i>	1
Colleymore	C3	<i>Senecio vulgaris</i>	3
Colleymore	C3	<i>Sinapsis arvensis</i>	3
Colleymore	C3	<i>Veronica persica</i>	2
Colleymore	C4	<i>Anthriscus sylvestris</i>	4
Colleymore	C4	<i>Arum maculatum</i>	1
Colleymore	C4	<i>Rosa sp.</i>	1
Colleymore	C4	<i>Calystegia silvatica</i>	2
Colleymore	C4	<i>Glechoma hederacea</i>	1
Colleymore	C4	<i>Heracleum sphondylium</i>	3
Colleymore	C4	<i>Lamium purpureum</i>	1
Colleymore	C4	<i>Ranunculus acris</i>	4
Colleymore	C4	<i>Rubus fruticosus</i>	4
Colleymore	C4	<i>Stachys sylvatica</i>	2
Colleymore	C4	<i>Taraxacum officinale</i>	2
Colleymore	C5	<i>Taraxacum officinale</i>	4
Colleymore	C5	<i>Angelica sylvestris</i>	1
Colleymore	C5	<i>Anthriscus sylvestris</i>	1
Colleymore	C5	<i>Centaurea cyanus</i>	2
Colleymore	C5	<i>Centaurea nigra</i>	5
Colleymore	C5	<i>Cirsium palustre</i>	1
Colleymore	C5	<i>Heracleum sphondylium</i>	6
Colleymore	C5	<i>Leucanthemum vulgare</i>	2
Colleymore	C5	<i>Matricaria discoidea</i>	5
Colleymore	C5	<i>Papaver rhoeas</i>	1
Colleymore	C5	<i>Ranunculus acris</i>	3
Colleymore	C5	<i>Ranunculus repens</i>	1
Colleymore	C5	<i>Rubus fruticosus</i>	5
Colleymore	C5	<i>Sambucus nigra</i>	3
Colleymore	C5	<i>Sonchus arvensis</i>	3
Colleymore	C5	<i>Stellaria graminea</i>	2

Colleymore	C5	<i>Trifolium repens</i>	3
Colleymore	C6	<i>Crataegus monogyna</i>	5
Colleymore	C6	<i>Anthriscus sylvestris</i>	3
Colleymore	C6	<i>Cirsium arvense</i>	2
Colleymore	C6	<i>Cirsium palustre</i>	1
Colleymore	C6	<i>Glechoma hederacea</i>	2
Colleymore	C6	<i>Lamium album</i>	1
Colleymore	C6	<i>Malva neglecta</i>	1
Colleymore	C6	<i>Matricaria discoidea</i>	1
Colleymore	C6	<i>Rosa acicularis</i>	2
Colleymore	C6	<i>Rubus fruticosus</i>	5
Colleymore	C6	<i>Sambucus nigra</i>	1
Colleymore	C6	<i>Taraxacum officinale</i>	6
Colleymore	C7	<i>Ranunculus acris</i>	3
Colleymore	C7	<i>Bellis perennis</i>	2
Colleymore	C7	<i>Crataegus monogyna</i>	3
Colleymore	C7	<i>Lamium purpureum</i>	1
Colleymore	C7	<i>Taraxacum officinale</i>	2
Colleymore	C7	<i>Veronica chamaedrys</i>	3
Colleymore	C8	<i>Anthriscus sylvestris</i>	4
Colleymore	C8	<i>Angelica sylvestris</i>	2
Colleymore	C8	<i>Calystegia silvatica</i>	1
Colleymore	C8	<i>Cirsium arvense</i>	2
Colleymore	C8	<i>Cirsium palustre</i>	2
Colleymore	C8	<i>Heracleum sphondylium</i>	2
Colleymore	C8	<i>Ranunculus acris</i>	4
Colleymore	C8	<i>Rubus fruticosus</i>	11
Colleymore	C8	<i>Stachys sylvatica</i>	2
Colleymore	C8	<i>Taraxacum officinale</i>	3
Colleymore	C8	<i>Taraxacum officinale</i>	2
Colleymore	C8	<i>Trifolium repens</i>	2
Colleymore	C9	<i>Anthriscus sylvestris</i>	4
Colleymore	C9	<i>Angelica sylvestris</i>	2
Colleymore	C9	<i>Arum maculatum</i>	1
Colleymore	C9	<i>Cirsium arvense</i>	2
Colleymore	C9	<i>Convolvulus arvensis</i>	1
Colleymore	C9	<i>Epilobium hirsutum</i>	2
Colleymore	C9	<i>Papaver rhoeas</i>	2
Colleymore	C9	<i>Ranunculus acris</i>	4
Colleymore	C9	<i>Rubus fruticosus</i>	7
Colleymore	C9	<i>Sambucus nigra</i>	2
Colleymore	C9	<i>Taraxacum officinale</i>	3
Colleymore	C9	<i>Trifolium repens</i>	2

Colleymore	C10	<i>Brassica napus</i>	5
Colleymore	C10	<i>Anthriscus sylvestris</i>	1
Colleymore	C10	<i>Cirsium arvense</i>	1
Colleymore	C10	<i>Convolvulus arvensis</i>	2
Colleymore	C10	<i>Geranium molle</i>	3
Colleymore	C10	<i>Glechoma hederacea</i>	3
Colleymore	C10	<i>Lotus corniculatus</i>	2
Colleymore	C10	<i>Matricaria discoidea</i>	1
Colleymore	C10	<i>Myosotis arvensis</i>	2
Colleymore	C10	<i>Papaver rhoeas</i>	3
Colleymore	C10	<i>Ranunculus acris</i>	4
Colleymore	C10	<i>Rubus fruticosus</i>	5
Colleymore	C10	<i>Sinapsis arvensis</i>	2
Colleymore	C10	<i>Stachys sylvatica</i>	2
Colleymore	C10	<i>Taraxacum officinale</i>	2
Colleymore	C10	<i>Trifolium repens</i>	4
Colleymore	C10	<i>Veronica persica</i>	6
Colleymore	C10	<i>Vicia faba</i>	5
Colleymore	C11	<i>Ranunculus acris</i>	5
Colleymore	C11	<i>Anthemis austriaca</i>	2
Colleymore	C11	<i>Anthriscus sylvestris</i>	1
Colleymore	C11	<i>Calystegia sepium</i>	3
Colleymore	C11	<i>Cirsium arvense</i>	2
Colleymore	C11	<i>Cirsium palustre</i>	2
Colleymore	C11	<i>Crataegus monogyna</i>	3
Colleymore	C11	<i>Epilobium hirsutum</i>	4
Colleymore	C11	<i>Geranium molle</i>	4
Colleymore	C11	<i>Geranium robertianum</i>	2
Colleymore	C11	<i>Glechoma hederacea</i>	3
Colleymore	C11	<i>Lamium purpureum</i>	1
Colleymore	C11	<i>Matricaria discoidea</i>	2
Colleymore	C11	<i>Myosotis arvensis</i>	2
Colleymore	C11	<i>Rubus fruticosus</i>	6
Colleymore	C11	<i>Sambucus nigra</i>	2
Colleymore	C11	<i>Sinapsis arvensis</i>	6
Colleymore	C11	<i>Sonchus arvensis</i>	1
Colleymore	C11	<i>Taraxacum officinale</i>	2
Colleymore	C11	<i>Trifolium repens</i>	4
Colleymore	C11	<i>Vicia faba</i>	3
Colleymore	C12	<i>Anthriscus sylvestris</i>	3
Colleymore	C12	<i>Angelica sylvestris</i>	1
Colleymore	C12	<i>Crataegus monogyna</i>	2
Colleymore	C12	<i>Geranium molle</i>	2

Colleymore	C12	<i>Heracleum sphondylium</i>	2
Colleymore	C12	<i>Myosotis arvensis</i>	2
Colleymore	C12	<i>Papaver rhoeas</i>	2
Colleymore	C12	<i>Ranunculus acris</i>	3
Colleymore	C12	<i>Rosa acicularis</i>	2
Colleymore	C12	<i>Rubus fruticosus</i>	5
Colleymore	C12	<i>Sambucus nigra</i>	2
Colleymore	C12	<i>Taraxacum officinale</i>	4
Colleymore	C12	<i>Trifolium repens</i>	6
Colleymore	C13	<i>Crataegus monogyna</i>	3
Colleymore	C13	<i>Anthriscus sylvestris</i>	3
Colleymore	C13	<i>Heracleum sphondylium</i>	2
Colleymore	C13	<i>Ranunculus acris</i>	4
Colleymore	C13	<i>Rubus fruticosus</i>	6
Colleymore	C13	<i>Sinapsis arvensis</i>	4
Colleymore	C13	<i>Stachys sylvatica</i>	2
Colleymore	C13	<i>Taraxacum officinale</i>	2
Colleymore	C13	<i>Trifolium repens</i>	4
Colleymore	C14	<i>Crataegus monogyna</i>	2
Colleymore	C14	<i>Angelica sylvestris</i>	2
Colleymore	C14	<i>Anthriscus sylvestris</i>	1
Colleymore	C14	<i>Calystegia sepium</i>	2
Colleymore	C14	<i>Cirsium arvense</i>	2
Colleymore	C14	<i>Cirsium palustre</i>	3
Colleymore	C14	<i>Epilobium hirsutum</i>	3
Colleymore	C14	<i>Filipendula ulmaria</i>	1
Colleymore	C14	<i>Geranium molle</i>	2
Colleymore	C14	<i>Glechoma hederacea</i>	2
Colleymore	C14	<i>Heracleum sphondylium</i>	2
Colleymore	C14	<i>Lamium purpureum</i>	1
Colleymore	C14	<i>Myosotis arvensis</i>	3
Colleymore	C14	<i>Ranunculus acris</i>	6
Colleymore	C14	<i>Rubus fruticosus</i>	5
Colleymore	C14	<i>Sonchus arvensis</i>	2
Colleymore	C14	<i>Trifolium repens</i>	6
Colleymore	C15	<i>Anthriscus sylvestris</i>	2
Colleymore	C15	<i>Angelica sylvestris</i>	2
Colleymore	C15	<i>Pentaglottis sempervirens</i>	2
Colleymore	C15	<i>Crataegus monogyna</i>	3
Colleymore	C15	<i>Geranium molle</i>	2
Colleymore	C15	<i>Heracleum sphondylium</i>	1
Colleymore	C15	<i>Lamium purpureum</i>	1
Colleymore	C15	<i>Lamium purpureum</i>	1

Colleymore	C15	<i>Medicago lupulina</i>	4
Colleymore	C15	<i>Myosotis arvensis</i>	3
Colleymore	C15	<i>Rosa sp.</i>	1
Colleymore	C15	<i>Papaver rhoeas</i>	4
Colleymore	C15	<i>Silene latifolia</i>	2
Colleymore	C15	<i>Stellaria graminea</i>	2
Colleymore	C15	<i>Taraxacum officinale</i>	2
Colleymore	C15	<i>Teesdalia nudicaulis</i>	3
Colleymore	C15	<i>Trifolium repens</i>	5
Colleymore	C15	<i>Veronica persica</i>	3
Colleymore	C15	<i>Viola arvensis</i>	1
Colleymore	C15	<i>Brassica napus</i>	2
East Hanney	EH1	<i>Lamium album</i>	3
East Hanney	EH1	<i>Anthriscus sylvestris</i>	1
East Hanney	EH1	<i>Arctium minus</i>	1
East Hanney	EH1	<i>Bellis perennis</i>	3
East Hanney	EH1	<i>Calystegia sepium</i>	2
East Hanney	EH1	<i>Calystegia silvatica</i>	2
East Hanney	EH1	<i>Cirsium arvense</i>	3
East Hanney	EH1	<i>Cirsium palustre</i>	2
East Hanney	EH1	<i>Convolvulus arvensis</i>	2
East Hanney	EH1	<i>Conopodium majus</i>	2
East Hanney	EH1	<i>Geranium molle</i>	2
East Hanney	EH1	<i>Jacobaea vulgaris</i>	2
East Hanney	EH1	<i>Matricaria discoidea</i>	5
East Hanney	EH1	<i>Myosotis arvensis</i>	4
East Hanney	EH1	<i>Papaver rhoeas</i>	1
East Hanney	EH1	<i>Ranunculus acris</i>	3
East Hanney	EH1	<i>Rubus fruticosus</i>	9
East Hanney	EH1	<i>Sonchus arvensis</i>	3
East Hanney	EH1	<i>Stachys sylvatica</i>	1
East Hanney	EH1	<i>Symphytum officinale</i>	4
East Hanney	EH1	<i>Taraxacum officinale</i>	5
East Hanney	EH2	<i>Taraxacum officinale</i>	7
East Hanney	EH2	<i>Anthriscus sylvestris</i>	3
East Hanney	EH2	<i>Arctium minus</i>	2
East Hanney	EH2	<i>Calystegia silvatica</i>	2
East Hanney	EH2	<i>Cirsium arvense</i>	2
East Hanney	EH2	<i>Convolvulus arvensis</i>	2
East Hanney	EH2	<i>Crataegus monogyna</i>	2
East Hanney	EH2	<i>Epilobium hirsutum</i>	2
East Hanney	EH2	<i>Geranium molle</i>	2
East Hanney	EH2	<i>Heracleum sphondylium</i>	1

East Hanney	EH2	<i>Jacobaea vulgaris</i>	3
East Hanney	EH2	<i>Lamium album</i>	1
East Hanney	EH2	<i>Matricaria discoidea</i>	1
East Hanney	EH2	<i>Medicago lupulina</i>	2
East Hanney	EH2	<i>Myosotis arvensis</i>	2
East Hanney	EH2	<i>Papaver rhoeas</i>	2
East Hanney	EH2	<i>Ranunculus acris</i>	2
East Hanney	EH2	<i>Sonchus arvensis</i>	5
East Hanney	EH2	<i>Trifolium repens</i>	3
East Hanney	EH2	<i>Vicia sativa</i>	2
East Hanney	EH3	<i>Anthriscus sylvestris</i>	4
East Hanney	EH3	<i>Cirsium arvense</i>	3
East Hanney	EH3	<i>Convolvulus arvensis</i>	3
East Hanney	EH3	<i>Crataegus monogyna</i>	2
East Hanney	EH3	<i>Epilobium hirsutum</i>	3
East Hanney	EH3	<i>Heracleum sphondylium</i>	4
East Hanney	EH3	<i>Lamium album</i>	4
East Hanney	EH3	<i>Medicago lupulina</i>	4
East Hanney	EH3	<i>Myosotis arvensis</i>	1
East Hanney	EH3	<i>Rosa acicularis</i>	2
East Hanney	EH3	<i>Sambucus nigra</i>	2
East Hanney	EH3	<i>Sonchus arvensis</i>	3
East Hanney	EH3	<i>Trifolium repens</i>	2
East Hanney	EH3	<i>Tripleurospermum inodorum</i>	2
East Hanney	EH4	<i>Crataegus monogyna</i>	3
East Hanney	EH4	<i>Anthriscus sylvestris</i>	1
East Hanney	EH4	<i>Arctium minus</i>	2
East Hanney	EH4	<i>Calystegia silvatica</i>	2
East Hanney	EH4	<i>Cirsium palustre</i>	10
East Hanney	EH4	<i>Crataegus monogyna</i>	3
East Hanney	EH4	<i>Dipsacus fullonum</i>	2
East Hanney	EH4	<i>Geranium molle</i>	2
East Hanney	EH4	<i>Heracleum sphondylium</i>	3
East Hanney	EH4	<i>Jacobaea vulgaris</i>	3
East Hanney	EH4	<i>Lamium album</i>	2
East Hanney	EH4	<i>Medicago lupulina</i>	3
East Hanney	EH4	<i>Rosa acicularis</i>	3
East Hanney	EH4	<i>Rubus fruticosus</i>	8
East Hanney	EH4	<i>Sambucus nigra</i>	2
East Hanney	EH4	<i>Silene latifolia</i>	2
East Hanney	EH4	<i>Sonchus arvensis</i>	2
East Hanney	EH4	<i>Taraxacum officinale</i>	3
East Hanney	EH4	<i>Trifolium repens</i>	3

East Hanney	EH5	<i>Lamium album</i>	6
East Hanney	EH5	<i>Anthriscus sylvestris</i>	3
East Hanney	EH5	<i>Calystegia sepium</i>	1
East Hanney	EH5	<i>Cirsium arvense</i>	2
East Hanney	EH5	<i>Convolvulus arvensis</i>	3
East Hanney	EH5	<i>Heracleum sphondylium</i>	3
East Hanney	EH5	<i>Ranunculus acris</i>	3
East Hanney	EH5	<i>Rosa acicularis</i>	2
East Hanney	EH5	<i>Taraxacum officinale</i>	2
East Hanney	EH6	<i>Lamium album</i>	4
East Hanney	EH6	<i>Anthriscus sylvestris</i>	3
East Hanney	EH6	<i>Arctium minus</i>	2
East Hanney	EH6	<i>Calystegia sepium</i>	2
East Hanney	EH6	<i>Cirsium arvense</i>	2
East Hanney	EH6	<i>Cirsium palustre</i>	2
East Hanney	EH6	<i>Convolvulus arvensis</i>	2
East Hanney	EH6	<i>Crataegus monogyna</i>	2
East Hanney	EH6	<i>Geranium molle</i>	1
East Hanney	EH6	<i>Heracleum sphondylium</i>	2
East Hanney	EH6	<i>Matricaria discoidea</i>	3
East Hanney	EH6	<i>Medicago lupulina</i>	1
East Hanney	EH6	<i>Myosotis arvensis</i>	2
East Hanney	EH6	<i>Rubus fruticosus</i>	5
East Hanney	EH6	<i>Sambucus nigra</i>	3
East Hanney	EH6	<i>Stachys sylvatica</i>	1
East Hanney	EH6	<i>Taraxacum officinale</i>	1
East Hanney	EH6	<i>Tripleurospermum inodorum</i>	2
East Hanney	EH7	<i>Lamium album</i>	3
East Hanney	EH7	<i>Anthriscus sylvestris</i>	1
East Hanney	EH7	<i>Cirsium palustre</i>	2
East Hanney	EH7	<i>Crataegus monogyna</i>	3
East Hanney	EH7	<i>Heracleum sphondylium</i>	3
East Hanney	EH7	<i>Hieracium sp.</i>	4
East Hanney	EH7	<i>Leucanthemum vulgare</i>	2
East Hanney	EH7	<i>Medicago lupulina</i>	4
East Hanney	EH7	<i>Ranunculus acris</i>	2
East Hanney	EH7	<i>Rosa acicularis</i>	2
East Hanney	EH7	<i>Symphytum officinale</i>	2
East Hanney	EH7	<i>Trifolium repens</i>	3
East Hanney	EH8	<i>Anthriscus sylvestris</i>	2
East Hanney	EH8	<i>Calystegia sepium</i>	2
East Hanney	EH8	<i>Cirsium palustre</i>	2
East Hanney	EH8	<i>Heracleum sphondylium</i>	4

East Hanney	EH8	<i>Ranunculus acris</i>	2
East Hanney	EH8	<i>Sinapsis arvensis</i>	1
East Hanney	EH8	<i>Sonchus arvensis</i>	2
East Hanney	EH8	<i>Taraxacum officinale</i>	3
East Hanney	EH9	<i>Lamium album</i>	3
East Hanney	EH9	<i>Anthriscus sylvestris</i>	2
East Hanney	EH9	<i>Brassica napus</i>	5
East Hanney	EH9	<i>Cirsium palustre</i>	1
East Hanney	EH9	<i>Convolvulus arvensis</i>	3
East Hanney	EH9	<i>Dipsacus fullonum</i>	2
East Hanney	EH9	<i>Euphorbia sp</i>	2
East Hanney	EH9	<i>Glechoma hederacea</i>	2
East Hanney	EH9	<i>Heracleum sphondylium</i>	5
East Hanney	EH9	<i>Hieracium sp.</i>	2
East Hanney	EH9	<i>Hyacinthoides hispanica</i>	1
East Hanney	EH9	<i>Lotus corniculatus</i>	2
East Hanney	EH9	<i>Malva neglecta</i>	1
East Hanney	EH9	<i>Medicago lupulina</i>	3
East Hanney	EH9	<i>Papaver rhoeas</i>	2
East Hanney	EH9	<i>Sinapsis arvensis</i>	3
East Hanney	EH9	<i>Sonchus arvensis</i>	5
East Hanney	EH9	<i>Symphytum officinale</i>	1
East Hanney	EH9	<i>Taraxacum officinale</i>	1
East Hanney	EH9	<i>Trifolium repens</i>	4
East Hanney	EH10	<i>Lamium album</i>	1
East Hanney	EH10	<i>Calystegia sepium</i>	2
East Hanney	EH10	<i>Convolvulus arvensis</i>	2
East Hanney	EH10	<i>Crataegus monogyna</i>	4
East Hanney	EH10	<i>Epilobium hirsutum</i>	3
East Hanney	EH10	<i>Heracleum sphondylium</i>	3
East Hanney	EH10	<i>Lotus corniculatus</i>	5
East Hanney	EH10	<i>Matricaria discoidea</i>	3
East Hanney	EH10	<i>Medicago lupulina</i>	2
East Hanney	EH10	<i>Papaver rhoeas</i>	1
East Hanney	EH10	<i>Sinapsis arvensis</i>	5
East Hanney	EH10	<i>Sonchus arvensis</i>	5
East Hanney	EH10	<i>Trifolium repens</i>	7
East Hanney	EH11	<i>Taraxacum officinale</i>	1
East Hanney	EH11	<i>Arctium minus</i>	2
East Hanney	EH11	<i>Calystegia silvatica</i>	2
East Hanney	EH11	<i>Convolvulus arvensis</i>	3
East Hanney	EH11	<i>Crataegus monogyna</i>	4
East Hanney	EH11	<i>Dipsacus fullonum</i>	1

East Hanney	EH11	<i>Epilobium hirsutum</i>	4
East Hanney	EH11	<i>Geranium molle</i>	3
East Hanney	EH11	<i>Heracleum sphondylium</i>	3
East Hanney	EH11	<i>Jacobaea vulgaris</i>	3
East Hanney	EH11	<i>Lamium album</i>	3
East Hanney	EH11	<i>Lotus corniculatus</i>	2
East Hanney	EH11	<i>Medicago lupulina</i>	2
East Hanney	EH11	<i>Rosa acicularis</i>	2
East Hanney	EH11	<i>Sinapsis arvensis</i>	2
East Hanney	EH11	<i>Sonchus arvensis</i>	4
East Hanney	EH11	<i>Symphytum officinale</i>	2
East Hanney	EH11	<i>Trifolium repens</i>	7
East Hanney	EH12	<i>Symphytum officinale</i>	3
East Hanney	EH12	<i>Cirsium palustre</i>	4
East Hanney	EH12	<i>Crataegus monogyna</i>	4
East Hanney	EH12	<i>Epilobium hirsutum</i>	5
East Hanney	EH12	<i>Geranium molle</i>	2
East Hanney	EH12	<i>Glechoma hederacea</i>	2
East Hanney	EH12	<i>Heracleum sphondylium</i>	3
East Hanney	EH12	<i>Lamium album</i>	2
East Hanney	EH12	<i>Leucanthemum vulgare</i>	2
East Hanney	EH12	<i>Myosotis arvensis</i>	1
East Hanney	EH12	<i>Ranunculus acris</i>	2
East Hanney	EH12	<i>Sinapsis arvensis</i>	1
East Hanney	EH12	<i>Sonchus arvensis</i>	5
East Hanney	EH12	<i>Stachys sylvatica</i>	2
East Hanney	EH12	<i>Symphytum officinale</i>	6
East Hanney	EH12	<i>Taraxacum officinale</i>	2
East Hanney	EH12	<i>Tripleurospermum inodorum</i>	2
East Hanney	EH13	<i>Lamium album</i>	3
East Hanney	EH13	<i>Calystegia silvatica</i>	2
East Hanney	EH13	<i>Cirsium palustre</i>	2
East Hanney	EH13	<i>Convolvulus arvensis</i>	2
East Hanney	EH13	<i>Crataegus monogyna</i>	4
East Hanney	EH13	<i>Heracleum sphondylium</i>	3
East Hanney	EH13	<i>Lotus corniculatus</i>	3
East Hanney	EH13	<i>Rubus fruticosus</i>	4
East Hanney	EH13	<i>Sinapsis arvensis</i>	2
East Hanney	EH13	<i>Sonchus arvensis</i>	5
East Hanney	EH13	<i>Symphytum officinale</i>	6
East Hanney	EH13	<i>Taraxacum officinale</i>	2
East Hanney	EH13	<i>Trifolium repens</i>	2
East Hanney	EH13	<i>Veronica persica</i>	2

East Hanney	EH14	<i>Taraxacum officinale</i>	1
East Hanney	EH14	<i>Calystegia sepium</i>	2
East Hanney	EH14	<i>Capsella bursa-pastoris</i>	2
East Hanney	EH14	<i>Cirsium arvense</i>	2
East Hanney	EH14	<i>Cirsium palustre</i>	2
East Hanney	EH14	<i>Heracleum sphondylium</i>	3
East Hanney	EH14	<i>Sinapsis arvensis</i>	1
East Hanney	EH14	<i>Sonchus arvensis</i>	1
East Hanney	EH15	<i>Taraxacum officinale</i>	1
East Hanney	EH15	<i>Anthriscus sylvestris</i>	2
East Hanney	EH15	<i>Calystegia sepium</i>	2
East Hanney	EH15	<i>Heracleum sphondylium</i>	4
East Hanney	EH15	<i>Jacobaea vulgaris</i>	4
East Hanney	EH15	<i>Sonchus arvensis</i>	2
Grange Farm	GF1	<i>Anthriscus sylvestris</i>	5
Grange Farm	GF2	<i>Cirsium arvense</i>	4
Grange Farm	GF3	<i>Convolvulus arvensis</i>	3
Grange Farm	GF4	<i>Crataegus monogyna</i>	4
Grange Farm	GF5	<i>Epilobium hirsutum</i>	4
Grange Farm	GF6	<i>Geranium pratense</i>	2
Grange Farm	GF7	<i>Heracleum sphondylium</i>	5
Grange Farm	GF8	<i>Jacobaea vulgaris</i>	6
Grange Farm	GF9	<i>Lamium purpureum</i>	1
Grange Farm	GF10	<i>Pulicaria dysenterica</i>	4
Grange Farm	GF11	<i>Ranunculus acris</i>	4
Grange Farm	GF12	<i>Stachys sylvatica</i>	2
Grange Farm	GF13	<i>Taraxacum officinale</i>	3
Grange Farm	GF14	<i>Trifolium repens</i>	2
Grange Farm	GF2	<i>Anthriscus sylvestris</i>	3
Grange Farm	GF2	<i>Crataegus monogyna</i>	3
Grange Farm	GF2	<i>Geranium pratense</i>	2
Grange Farm	GF2	<i>Geranium robertianum</i>	2
Grange Farm	GF2	<i>Papaver rhoeas</i>	2
Grange Farm	GF2	<i>Ranunculus acris</i>	2
Grange Farm	GF2	<i>Rubus fruticosus</i>	2
Grange Farm	GF2	<i>Taraxacum officinale</i>	1
Grange Farm	GF3	<i>Sambucus nigra</i>	3
Grange Farm	GF3	<i>Anthriscus sylvestris</i>	4
Grange Farm	GF3	<i>Cirsium arvense</i>	1
Grange Farm	GF3	<i>Convolvulus arvensis</i>	2
Grange Farm	GF3	<i>Crataegus monogyna</i>	3
Grange Farm	GF3	<i>Knautia arvensis</i>	1
Grange Farm	GF3	<i>Lamium album</i>	1

Grange Farm	GF3	<i>Medicago lupulina</i>	2
Grange Farm	GF3	<i>Rosa acicularis</i>	2
Grange Farm	GF3	<i>Rubus fruticosus</i>	5
Grange Farm	GF3	<i>Sonchus arvensis</i>	2
Grange Farm	GF3	<i>Stachys sylvatica</i>	2
Grange Farm	GF3	<i>Taraxacum officinale</i>	1
Grange Farm	GF3	<i>Trifolium repens</i>	2
Grange Farm	GF3	<i>Vicia sativa</i>	2
Grange Farm	GF4	<i>Anthriscus sylvestris</i>	5
Grange Farm	GF4	<i>Brassica napus</i>	5
Grange Farm	GF4	<i>Cirsium arvense</i>	3
Grange Farm	GF4	<i>Convolvulus arvensis</i>	3
Grange Farm	GF4	<i>Epilobium hirsutum</i>	3
Grange Farm	GF4	<i>Geranium pratense</i>	4
Grange Farm	GF4	<i>Heracleum sphondylium</i>	3
Grange Farm	GF4	<i>Lamium album</i>	4
Grange Farm	GF4	<i>Rubus fruticosus</i>	2
Grange Farm	GF4	<i>Sambucus nigra</i>	2
Grange Farm	GF4	<i>Taraxacum officinale</i>	2
Grange Farm	GF5	<i>Geranium molle</i>	3
Grange Farm	GF5	<i>Anthriscus sylvestris</i>	4
Grange Farm	GF5	<i>Cirsium arvense</i>	1
Grange Farm	GF5	<i>Convolvulus arvensis</i>	3
Grange Farm	GF5	<i>Crataegus monogyna</i>	5
Grange Farm	GF5	<i>Epilobium montanum</i>	2
Grange Farm	GF5	<i>Heracleum sphondylium</i>	3
Grange Farm	GF5	<i>Lamium album</i>	4
Grange Farm	GF5	<i>Ranunculus repens</i>	3
Grange Farm	GF5	<i>Rubus fruticosus</i>	2
Grange Farm	GF5	<i>Sambucus nigra</i>	2
Grange Farm	GF5	<i>Sonchus arvensis</i>	2
Grange Farm	GF5	<i>Taraxacum officinale</i>	5
Grange Farm	GF5	<i>Trifolium repens</i>	5
Grange Farm	GF6	<i>Ranunculus acris</i>	2
Grange Farm	GF6	<i>Anthriscus sylvestris</i>	4
Grange Farm	GF6	<i>Cirsium arvense</i>	2
Grange Farm	GF6	<i>Convolvulus arvensis</i>	3
Grange Farm	GF6	<i>Geranium robertianum</i>	2
Grange Farm	GF6	<i>Heracleum sphondylium</i>	4
Grange Farm	GF6	<i>Lamium album</i>	2
Grange Farm	GF6	<i>Malus domestica</i>	2
Grange Farm	GF6	<i>Sambucus nigra</i>	4
Grange Farm	GF6	<i>Stachys sylvatica</i>	1

Grange Farm	GF6	<i>Taraxacum officinale</i>	3
Grange Farm	GF6	<i>Trifolium repens</i>	5
Grange Farm	GF7	<i>Trifolium repens</i>	6
Grange Farm	GF7	<i>Anthriscus sylvestris</i>	3
Grange Farm	GF7	<i>Atropa belladonna</i>	1
Grange Farm	GF7	<i>Cirsium palustre</i>	2
Grange Farm	GF7	<i>Convolvulus arvensis</i>	3
Grange Farm	GF7	<i>Geranium molle</i>	2
Grange Farm	GF7	<i>Geranium robertianum</i>	2
Grange Farm	GF7	<i>Heracleum sphondylium</i>	2
Grange Farm	GF7	<i>Leucanthemum vulgare</i>	2
Grange Farm	GF7	<i>Ranunculus acris</i>	2
Grange Farm	GF7	<i>Sambucus nigra</i>	2
Grange Farm	GF7	<i>Solanum dulcamara</i>	2
Grange Farm	GF7	<i>Taraxacum officinale</i>	6
Grange Farm	GF8	<i>Trifolium pratense</i>	7
Grange Farm	GF8	<i>Brassica napus</i>	5
Grange Farm	GF8	<i>Calystegia sepium</i>	4
Grange Farm	GF8	<i>Cirsium arvense</i>	5
Grange Farm	GF8	<i>Cirsium palustre</i>	5
Grange Farm	GF8	<i>Dipsacus fullonum</i>	4
Grange Farm	GF8	<i>Epilobium hirsutum</i>	5
Grange Farm	GF8	<i>Geranium molle</i>	1
Grange Farm	GF8	<i>Heracleum sphondylium</i>	6
Grange Farm	GF8	<i>Hieracium sp.</i>	3
Grange Farm	GF8	<i>Jacobaea vulgaris</i>	5
Grange Farm	GF8	<i>Ranunculus acris</i>	3
Grange Farm	GF8	<i>Rubus fruticosus</i>	8
Grange Farm	GF8	<i>Sambucus nigra</i>	2
Grange Farm	GF8	<i>Silene latifolia</i>	2
Grange Farm	GF8	<i>Sonchus arvensis</i>	3
Grange Farm	GF8	<i>Taraxacum officinale</i>	4
Grange Farm	GF8	<i>Trifolium repens</i>	8
Grange Farm	GF8	<i>Vicia sativa</i>	2
Grange Farm	GF9	<i>Brassica napus</i>	5
Grange Farm	GF9	<i>Anthriscus sylvestris</i>	4
Grange Farm	GF9	<i>Cirsium palustre</i>	2
Grange Farm	GF9	<i>Crataegus monogyna</i>	2
Grange Farm	GF9	<i>Geranium molle</i>	3
Grange Farm	GF9	<i>Geranium robertianum</i>	2
Grange Farm	GF9	<i>Heracleum sphondylium</i>	2
Grange Farm	GF9	<i>Hieracium sp.</i>	3
Grange Farm	GF9	<i>Lamium album</i>	3

Grange Farm	GF9	<i>Malva neglecta</i>	1
Grange Farm	GF9	<i>Papaver rhoeas</i>	2
Grange Farm	GF9	<i>Ranunculus acris</i>	2
Grange Farm	GF9	<i>Rosa acicularis</i>	2
Grange Farm	GF9	<i>Rubus fruticosus</i>	5
Grange Farm	GF9	<i>Sambucus nigra</i>	3
Grange Farm	GF9	<i>Stachys sylvatica</i>	2
Grange Farm	GF9	<i>Taraxacum officinale</i>	5
Grange Farm	GF9	<i>Trifolium repens</i>	6
Grange Farm	GF10	<i>Geranium robertianum</i>	2
Grange Farm	GF10	<i>Anthriscus sylvestris</i>	2
Grange Farm	GF10	<i>Brassica napus</i>	5
Grange Farm	GF10	<i>Cirsium arvense</i>	2
Grange Farm	GF10	<i>Cirsium palustre</i>	4
Grange Farm	GF10	<i>Crataegus monogyna</i>	2
Grange Farm	GF10	<i>Dipsacus fullonum</i>	2
Grange Farm	GF10	<i>Geranium molle</i>	2
Grange Farm	GF10	<i>Heracleum sphondylium</i>	2
Grange Farm	GF10	<i>Leucanthemum vulgare</i>	2
Grange Farm	GF10	<i>Medicago lupulina</i>	3
Grange Farm	GF10	<i>Myosotis arvensis</i>	2
Grange Farm	GF10	<i>Ranunculus acris</i>	3
Grange Farm	GF10	<i>Sambucus nigra</i>	2
Grange Farm	GF10	<i>Stellaria media</i>	2
Grange Farm	GF10	<i>Trifolium pratense</i>	2
Grange Farm	GF10	<i>Trifolium repens</i>	3
Grange Farm	GF11	<i>Lamium album</i>	2
Grange Farm	GF11	<i>Anthriscus sylvestris</i>	2
Grange Farm	GF11	<i>Brassica napus</i>	5
Grange Farm	GF11	<i>Calystegia silvatica</i>	1
Grange Farm	GF11	<i>Papaver rhoeas</i>	1
Grange Farm	GF11	<i>Rubus fruticosus</i>	6
Grange Farm	GF11	<i>Sambucus nigra</i>	3
Grange Farm	GF11	<i>Taraxacum officinale</i>	2
Grange Farm	GF12	<i>Geranium molle</i>	5
Grange Farm	GF12	<i>Anthriscus sylvestris</i>	2
Grange Farm	GF12	<i>Brassica napus</i>	5
Grange Farm	GF12	<i>Capsella bursa-pastoris</i>	4
Grange Farm	GF12	<i>Cirsium palustre</i>	2
Grange Farm	GF12	<i>Convolvulus arvensis</i>	2
Grange Farm	GF12	<i>Euphorbia peplus</i>	2
Grange Farm	GF12	<i>Heracleum sphondylium</i>	2
Grange Farm	GF12	<i>Hieracium sp.</i>	2

Grange Farm	GF12	<i>Lamium album</i>	1
Grange Farm	GF12	<i>Medicago lupulina</i>	3
Grange Farm	GF12	<i>Myosotis arvensis</i>	3
Grange Farm	GF12	<i>Papaver rhoeas</i>	4
Grange Farm	GF12	<i>Rubus fruticosus</i>	4
Grange Farm	GF12	<i>Taraxacum officinale</i>	3
Grange Farm	GF12	<i>Trifolium repens</i>	2
Grange Farm	GF13	<i>Brassica napus</i>	5
Grange Farm	GF13	<i>Anthriscus sylvestris</i>	2
Grange Farm	GF13	<i>Cirsium arvense</i>	3
Grange Farm	GF13	<i>Epilobium hirsutum</i>	2
Grange Farm	GF13	<i>Heracleum sphondylium</i>	2
Grange Farm	GF13	<i>Medicago lupulina</i>	9
Grange Farm	GF13	<i>Myosotis arvensis</i>	3
Grange Farm	GF13	<i>Papaver rhoeas</i>	2
Grange Farm	GF13	<i>Ranunculus acris</i>	3
Grange Farm	GF13	<i>Sambucus nigra</i>	3
Grange Farm	GF13	<i>Sonchus arvensis</i>	5
Grange Farm	GF13	<i>Taraxacum officinale</i>	4
Grange Farm	GF13	<i>Trifolium repens</i>	3
Grange Farm	GF13	<i>Veronica persica</i>	2
Grange Farm	GF14	<i>Ranunculus acris</i>	2
Grange Farm	GF14	<i>Atropa belladonna</i>	2
Grange Farm	GF14	<i>Calystegia silvatica</i>	1
Grange Farm	GF14	<i>Crataegus monogyna</i>	2
Grange Farm	GF14	<i>Heracleum sphondylium</i>	2
Grange Farm	GF14	<i>Matricaria discoidea</i>	2
Grange Farm	GF14	<i>Medicago lupulina</i>	5
Grange Farm	GF14	<i>Papaver rhoeas</i>	1
Grange Farm	GF14	<i>Pulicaria vulgaris</i>	2
Grange Farm	GF14	<i>Rosa acicularis</i>	2
Grange Farm	GF14	<i>Rubus fruticosus</i>	3
Grange Farm	GF14	<i>Sambucus nigra</i>	4
Grange Farm	GF14	<i>Sonchus arvensis</i>	10
Grange Farm	GF14	<i>Taraxacum officinale</i>	4
Grange Farm	GF14	<i>Trifolium repens</i>	7
Grange Farm	GF15	<i>Geranium molle</i>	4
Grange Farm	GF15	<i>Anthriscus sylvestris</i>	5
Grange Farm	GF15	<i>Cirsium arvense</i>	3
Grange Farm	GF15	<i>Convolvulus arvensis</i>	3
Grange Farm	GF15	<i>Heracleum sphondylium</i>	5
Grange Farm	GF15	<i>Lamium album</i>	4
Grange Farm	GF15	<i>Medicago lupulina</i>	4

Grange Farm	GF15	<i>Ranunculus acris</i>	3
Grange Farm	GF15	<i>Taraxacum officinale</i>	2
Grange Farm	GF15	<i>Trifolium repens</i>	3
Grange Farm	GF15	<i>Veronica persica</i>	2
Greystones	G1	<i>Anthriscus sylvestris</i>	5
Greystones	G1	<i>Cirsium arvense</i>	3
Greystones	G1	<i>Crataegus monogyna</i>	2
Greystones	G1	<i>Heracleum sphondylium</i>	2
Greystones	G1	<i>Myosotis arvensis</i>	2
Greystones	G1	<i>Ranunculus acris</i>	7
Greystones	G1	<i>Sambucus nigra</i>	2
Greystones	G1	<i>Taraxacum officinale</i>	2
Greystones	G1	<i>Trifolium pratense</i>	3
Greystones	G1	<i>Veronica chamaedrys</i>	3
Greystones	G2	<i>Silene dioica</i>	2
Greystones	G2	<i>Anthriscus sylvestris</i>	3
Greystones	G2	<i>Cirsium arvense</i>	5
Greystones	G2	<i>Cirsium palustre</i>	4
Greystones	G2	<i>Crataegus monogyna</i>	2
Greystones	G2	<i>Lamium purpureum</i>	2
Greystones	G2	<i>Lotus corniculatus</i>	2
Greystones	G2	<i>Geranium molle</i>	1
Greystones	G2	<i>Primula veris</i>	2
Greystones	G2	<i>Ranunculus acris</i>	4
Greystones	G2	<i>Sambucus nigra</i>	3
Greystones	G2	<i>Sanicula europaea</i>	2
Greystones	G2	<i>Stachys sylvatica</i>	1
Greystones	G2	<i>Stellaria media</i>	2
Greystones	G2	<i>Taraxacum officinale</i>	4
Greystones	G2	<i>Veronica chamaedrys</i>	5
Greystones	G3	<i>Cardamine pratensis</i>	2
Greystones	G3	<i>Ajuga reptans</i>	5
Greystones	G3	<i>Calystegia silvatica</i>	2
Greystones	G3	<i>Centaurea nigra</i>	2
Greystones	G3	<i>Cirsium arvense</i>	3
Greystones	G3	<i>Crataegus monogyna</i>	2
Greystones	G3	<i>Dactylorhiza fuchsii</i>	2
Greystones	G3	<i>Epilobium hirsutum</i>	5
Greystones	G3	<i>Heracleum sphondylium</i>	2
Greystones	G3	<i>Lychnis flos-cuculi</i>	2
Greystones	G3	<i>Lysimachia vulgaris</i>	4
Greystones	G3	<i>Primula veris</i>	4
Greystones	G3	<i>Ranunculus acris</i>	7

Greystones	G3	<i>Taraxacum officinale</i>	4
Greystones	G3	<i>Veronica chamaedrys</i>	3
Greystones	G4	<i>Succisa pratensis</i>	2
Greystones	G4	<i>Anthriscus sylvestris</i>	6
Greystones	G4	<i>Bellis perennis</i>	2
Greystones	G4	<i>Glechoma hederacea</i>	2
Greystones	G4	<i>Heracleum sphondylium</i>	2
Greystones	G4	<i>Hieracium sp.</i>	2
Greystones	G4	<i>Hypericum perforatum</i>	1
Greystones	G4	<i>Lamium album</i>	2
Greystones	G4	<i>Ranunculus acris</i>	7
Greystones	G4	<i>Stachys sylvatica</i>	3
Greystones	G4	<i>Stellaria media</i>	3
Greystones	G4	<i>Taraxacum officinale</i>	7
Greystones	G4	<i>Torilis japonica</i>	2
Greystones	G4	<i>Trifolium pratense</i>	8
Greystones	G4	<i>Trifolium repens</i>	7
Greystones	G4	<i>Veronica chamaedrys</i>	2
Greystones	G4	<i>Vicia sativa</i>	3
Greystones	G5	<i>Taraxacum officinale</i>	5
Greystones	G5	<i>Cirsium arvense</i>	2
Greystones	G5	<i>Cirsium palustre</i>	3
Greystones	G5	<i>Crataegus monogyna</i>	3
Greystones	G5	<i>Epilobium hirsutum</i>	4
Greystones	G5	<i>Filipendula ulmaria</i>	1
Greystones	G5	<i>Geranium molle</i>	2
Greystones	G5	<i>Heracleum sphondylium</i>	2
Greystones	G5	<i>Myosotis arvensis</i>	2
Greystones	G5	<i>Ranunculus acris</i>	6
Greystones	G5	<i>Sambucus nigra</i>	2
Greystones	G5	<i>Stellaria media</i>	4
Greystones	G5	<i>Trifolium pratense</i>	2
Greystones	G6	<i>Veronica chamaedrys</i>	3
Greystones	G6	<i>Argentina anserina</i>	2
Greystones	G6	<i>Cardamine pratensis</i>	3
Greystones	G6	<i>Cirsium arvense</i>	2
Greystones	G6	<i>Dactylorhiza majalis</i>	2
Greystones	G6	<i>Heracleum sphondylium</i>	2
Greystones	G6	<i>Lotus corniculatus</i>	1
Greystones	G6	<i>Ranunculus acris</i>	8
Greystones	G6	<i>Sambucus nigra</i>	2
Greystones	G6	<i>Stellaria media</i>	6
Greystones	G6	<i>Taraxacum officinale</i>	4

Greystones	G6	<i>Trifolium repens</i>	3
Greystones	G6	<i>Vicia cracca</i>	2
Greystones	G7	<i>Ajuga reptans</i>	2
Greystones	G7	<i>Cardamine pratensis</i>	2
Greystones	G7	<i>Cirsium palustre</i>	4
Greystones	G7	<i>Convolvulus arvensis</i>	3
Greystones	G7	<i>Geranium molle</i>	2
Greystones	G7	<i>Hieracium sp.</i>	3
Greystones	G7	<i>Ranunculus acris</i>	8
Greystones	G7	<i>Rosa acicularis</i>	2
Greystones	G7	<i>Sambucus nigra</i>	2
Greystones	G7	<i>Solanum dulcamara</i>	2
Greystones	G7	<i>Stellaria media</i>	6
Greystones	G7	<i>Taraxacum officinale</i>	6
Greystones	G7	<i>Trifolium repens</i>	2
Greystones	G8	<i>Veronica chamaedrys</i>	2
Greystones	G8	<i>Capsella bursa-pastoris</i>	2
Greystones	G8	<i>Cardamine pratensis</i>	3
Greystones	G8	<i>Cirsium arvense</i>	2
Greystones	G8	<i>Cirsium palustre</i>	2
Greystones	G8	<i>Dactylorhiza majalis</i>	2
Greystones	G8	<i>Epilobium hirsutum</i>	3
Greystones	G8	<i>Filipendula ulmaria</i>	2
Greystones	G8	<i>Heracleum sphondylium</i>	3
Greystones	G8	<i>Ranunculus acris</i>	8
Greystones	G8	<i>Taraxacum officinale</i>	7
Greystones	G8	<i>Trifolium repens</i>	6
Greystones	G9	<i>Anthriscus sylvestris</i>	4
Greystones	G9	<i>Atropa belladonna</i>	2
Greystones	G9	<i>Cirsium palustre</i>	2
Greystones	G9	<i>Convolvulus arvensis</i>	1
Greystones	G9	<i>Crataegus monogyna</i>	6
Greystones	G9	<i>Geranium molle</i>	5
Greystones	G9	<i>Glechoma hederacea</i>	2
Greystones	G9	<i>Lamium album</i>	2
Greystones	G9	<i>Ranunculus acris</i>	7
Greystones	G9	<i>Rosa acicularis</i>	2
Greystones	G9	<i>Rubus fruticosus</i>	2
Greystones	G9	<i>Sambucus nigra</i>	2
Greystones	G9	<i>Stachys sylvatica</i>	2
Greystones	G9	<i>Taraxacum officinale</i>	7
Greystones	G9	<i>Trifolium repens</i>	6
Greystones	G10	<i>Geranium molle</i>	4

Greystones	G10	<i>Anthriscus sylvestris</i>	5
Greystones	G10	<i>Bellis perennis</i>	2
Greystones	G10	<i>Calystegia sepium</i>	2
Greystones	G10	<i>Cirsium arvense</i>	1
Greystones	G10	<i>Convolvulus arvensis</i>	5
Greystones	G10	<i>Crataegus monogyna</i>	5
Greystones	G10	<i>Conopodium majus</i>	1
Greystones	G10	<i>Glechoma hederacea</i>	2
Greystones	G10	<i>Heracleum sphondylium</i>	4
Greystones	G10	<i>Lamium album</i>	4
Greystones	G10	<i>Ranunculus acris</i>	5
Greystones	G10	<i>Rosa acicularis</i>	2
Greystones	G10	<i>Rubus fruticosus</i>	2
Greystones	G10	<i>Sambucus nigra</i>	2
Greystones	G10	<i>Taraxacum officinale</i>	7
Greystones	G10	<i>Trifolium repens</i>	3
Greystones	G10	<i>Veronica chamaedrys</i>	3
Greystones	G10	<i>Veronica persica</i>	2
Greystones	G11	<i>Geranium molle</i>	5
Greystones	G11	<i>Anthriscus sylvestris</i>	2
Greystones	G11	<i>Crataegus monogyna</i>	8
Greystones	G11	<i>Epilobium hirsutum</i>	2
Greystones	G11	<i>Glechoma hederacea</i>	2
Greystones	G11	<i>Heracleum sphondylium</i>	2
Greystones	G11	<i>Lamium album</i>	2
Greystones	G11	<i>Ranunculus acris</i>	8
Greystones	G11	<i>Rubus fruticosus</i>	3
Greystones	G11	<i>Sambucus nigra</i>	2
Greystones	G11	<i>Taraxacum officinale</i>	8
Greystones	G11	<i>Trifolium pratense</i>	3
Greystones	G11	<i>Trifolium repens</i>	5
Greystones	G11	<i>Veronica chamaedrys</i>	2
Greystones	G12	<i>Anthriscus sylvestris</i>	4
Greystones	G12	<i>Cirsium arvense</i>	2
Greystones	G12	<i>Crataegus monogyna</i>	3
Greystones	G12	<i>Lamium album</i>	2
Greystones	G12	<i>Ranunculus acris</i>	8
Greystones	G12	<i>Trifolium pratense</i>	2
Greystones	G12	<i>Trifolium repens</i>	5
Greystones	G12	<i>Veronica chamaedrys</i>	2
Greystones	G13	<i>Anthriscus sylvestris</i>	5
Greystones	G13	<i>Arum maculatum</i>	1
Greystones	G13	<i>Cirsium arvense</i>	2

Greystones	G13	<i>Crataegus monogyna</i>	7
Greystones	G13	<i>Lamium album</i>	4
Greystones	G13	<i>Matricaria discoidea</i>	3
Greystones	G13	<i>Medicago lupulina</i>	2
Greystones	G13	<i>Ranunculus acris</i>	6
Greystones	G13	<i>Silene latifolia</i>	2
Greystones	G13	<i>Symphytum officinale</i>	7
Greystones	G13	<i>Taraxacum officinale</i>	5
Greystones	G13	<i>Trifolium pratense</i>	3
Greystones	G13	<i>Trifolium repens</i>	3
Greystones	G13	<i>Veronica chamaedrys</i>	2
Greystones	G14	<i>Ranunculus acris</i>	5
Greystones	G14	<i>Arum maculatum</i>	1
Greystones	G14	<i>Crataegus monogyna</i>	11
Greystones	G14	<i>Ranunculus acris</i>	3
Greystones	G14	<i>Rosa acicularis</i>	2
Greystones	G14	<i>Rubus fruticosus</i>	4
Greystones	G14	<i>Sambucus nigra</i>	2
Greystones	G14	<i>Silene dioica</i>	1
Greystones	G14	<i>Succisa pratensis</i>	2
Greystones	G14	<i>Taraxacum officinale</i>	5
Greystones	G14	<i>Trifolium repens</i>	4
Greystones	G14	<i>Veronica chamaedrys</i>	5
Greystones	G15	<i>Veronica chamaedrys</i>	3
Greystones	G15	<i>Aegopodium podagraria</i>	3
Greystones	G15	<i>Anthriscus sylvestris</i>	2
Greystones	G15	<i>Calystegia silvatica</i>	1
Greystones	G15	<i>Crataegus monogyna</i>	3
Greystones	G15	<i>Geranium molle</i>	3
Greystones	G15	<i>Hieracium sp.</i>	2
Greystones	G15	<i>Ranunculus acris</i>	4
Greystones	G15	<i>Rosa acicularis</i>	2
Greystones	G15	<i>Rubus fruticosus</i>	3
Greystones	G15	<i>Sambucus nigra</i>	2
Greystones	G15	<i>Trifolium repens</i>	4
Heath Farm	H1	<i>Anthriscus sylvestris</i>	2
Heath Farm	H1	<i>Calystegia sepium</i>	1
Heath Farm	H1	<i>Calystegia silvatica</i>	1
Heath Farm	H1	<i>Crataegus monogyna</i>	3
Heath Farm	H1	<i>Rosa sp.</i>	1
Heath Farm	H1	<i>Sonchus arvensis</i>	2
Heath Farm	H2	<i>Senecio vulgaris</i>	2
Heath Farm	H2	<i>Anthriscus sylvestris</i>	2

Heath Farm	H2	<i>Calystegia silvatica</i>	1
Heath Farm	H2	<i>Crataegus monogyna</i>	2
Heath Farm	H2	<i>Geranium molle</i>	1
Heath Farm	H2	<i>Lamium album</i>	2
Heath Farm	H2	<i>Papaver rhoeas</i>	1
Heath Farm	H2	<i>Sonchus arvensis</i>	2
Heath Farm	H3	<i>Senecio vulgaris</i>	2
Heath Farm	H3	<i>Anthriscus sylvestris</i>	3
Heath Farm	H3	<i>Calystegia silvatica</i>	1
Heath Farm	H3	<i>Crataegus monogyna</i>	1
Heath Farm	H3	<i>Geranium molle</i>	2
Heath Farm	H3	<i>Sonchus arvensis</i>	2
Heath Farm	H3	<i>Veronica persica</i>	1
Heath Farm	H4	<i>Lamium album</i>	2
Heath Farm	H4	<i>Anagallis arvensis</i>	1
Heath Farm	H4	<i>Anthriscus sylvestris</i>	2
Heath Farm	H4	<i>Cirsium palustre</i>	2
Heath Farm	H4	<i>Crataegus monogyna</i>	2
Heath Farm	H4	<i>Geranium molle</i>	1
Heath Farm	H4	<i>Geranium robertianum</i>	2
Heath Farm	H4	<i>Matricaria discoidea</i>	1
Heath Farm	H4	<i>Rubus fruticosus</i>	5
Heath Farm	H5	<i>Crataegus monogyna</i>	2
Heath Farm	H5	<i>Anthriscus sylvestris</i>	1
Heath Farm	H5	<i>Pentaglottis sempervirens</i>	2
Heath Farm	H5	<i>Calystegia silvatica</i>	2
Heath Farm	H5	<i>Cirsium arvense</i>	3
Heath Farm	H5	<i>Rubus fruticosus</i>	2
Heath Farm	H5	<i>Senecio vulgaris</i>	1
Heath Farm	H6	<i>Anthriscus sylvestris</i>	2
Heath Farm	H6	<i>Cirsium arvense</i>	2
Heath Farm	H6	<i>Geranium molle</i>	1
Heath Farm	H6	<i>Matricaria discoidea</i>	3
Heath Farm	H6	<i>Rubus fruticosus</i>	2
Heath Farm	H6	<i>Senecio vulgaris</i>	2
Heath Farm	H6	<i>Taraxacum officinale</i>	4
Heath Farm	H6	<i>Vicia faba</i>	2
Heath Farm	H7	<i>Vicia sativa</i>	5
Heath Farm	H7	<i>Anthriscus sylvestris</i>	2
Heath Farm	H7	<i>Calystegia sepium</i>	2
Heath Farm	H7	<i>Epilobium hirsutum</i>	1
Heath Farm	H7	<i>Lamium album</i>	2
Heath Farm	H7	<i>Rubus fruticosus</i>	2

Heath Farm	H7	<i>Senecio vulgaris</i>	5
Heath Farm	H7	<i>Sonchus arvensis</i>	2
Heath Farm	H7	<i>Vicia faba</i>	4
Heath Farm	H8	<i>Vicia sativa</i>	5
Heath Farm	H8	<i>Anthriscus sylvestris</i>	2
Heath Farm	H8	<i>Calystegia sepium</i>	2
Heath Farm	H8	<i>Convolvulus arvensis</i>	1
Heath Farm	H8	<i>Epilobium hirsutum</i>	1
Heath Farm	H8	<i>Lamium album</i>	1
Heath Farm	H8	<i>Myosotis arvensis</i>	1
Heath Farm	H8	<i>Geraniums sp.</i>	2
Heath Farm	H8	<i>Rubus fruticosus</i>	2
Heath Farm	H8	<i>Sonchus arvensis</i>	2
Heath Farm	H8	<i>Vicia faba</i>	4
Heath Farm	H9	<i>Lamium album</i>	4
Heath Farm	H9	<i>Calystegia sepium</i>	2
Heath Farm	H9	<i>Crataegus monogyna</i>	3
Heath Farm	H9	<i>Epilobium hirsutum</i>	1
Heath Farm	H9	<i>Geranium molle</i>	1
Heath Farm	H9	<i>Rubus fruticosus</i>	3
Heath Farm	H9	<i>Sinapis arvensis</i>	2
Heath Farm	H9	<i>Sonchus arvensis</i>	2
Heath Farm	H10	<i>Lamium album</i>	4
Heath Farm	H10	<i>Calystegia sepium</i>	2
Heath Farm	H10	<i>Crataegus monogyna</i>	3
Heath Farm	H10	<i>Epilobium hirsutum</i>	1
Heath Farm	H10	<i>Geranium molle</i>	1
Heath Farm	H10	<i>Lamium purpureum</i>	1
Heath Farm	H10	<i>Rubus fruticosus</i>	2
Heath Farm	H10	<i>Silene latifolia</i>	1
Heath Farm	H10	<i>Sinapis arvensis</i>	2
Heath Farm	H10	<i>Sonchus arvensis</i>	2
Heath Farm	H11	<i>Lamium album</i>	3
Heath Farm	H11	<i>Crataegus monogyna</i>	3
Heath Farm	H11	<i>Daucus carota</i>	2
Heath Farm	H11	<i>Geranium molle</i>	1
Heath Farm	H11	<i>Matricaria discoidea</i>	2
Heath Farm	H11	<i>Papaver rhoeas</i>	2
Heath Farm	H11	<i>Rubus fruticosus</i>	3
Heath Farm	H11	<i>Senecio vulgaris</i>	2
Heath Farm	H11	<i>Sinapis arvensis</i>	2
Heath Farm	H11	<i>Veronica persica</i>	2
Heath Farm	H11	<i>Vicia faba</i>	4

Heath Farm	H12	<i>Lamium album</i>	3
Heath Farm	H12	<i>Crataegus monogyna</i>	3
Heath Farm	H12	<i>Daucus carota</i>	4
Heath Farm	H12	<i>Geranium molle</i>	1
Heath Farm	H12	<i>Matricaria discoidea</i>	2
Heath Farm	H12	<i>Papaver rhoeas</i>	2
Heath Farm	H12	<i>Rubus fruticosus</i>	2
Heath Farm	H12	<i>Senecio vulgaris</i>	5
Heath Farm	H12	<i>Veronica persica</i>	2
Heath Farm	H12	<i>Vicia faba</i>	4
Heath Farm	H12	<i>Vicia sativa</i>	5
Heath Farm	H13	<i>Lamium album</i>	3
Heath Farm	H13	<i>Crataegus monogyna</i>	3
Heath Farm	H13	<i>Daucus carota</i>	4
Heath Farm	H13	<i>Geranium molle</i>	1
Heath Farm	H13	<i>Matricaria discoidea</i>	2
Heath Farm	H13	<i>Papaver rhoeas</i>	2
Heath Farm	H13	<i>Rubus fruticosus</i>	2
Heath Farm	H13	<i>Senecio vulgaris</i>	5
Heath Farm	H13	<i>Sinapis arvensis</i>	3
Heath Farm	H13	<i>Sonchus arvensis</i>	1
Heath Farm	H13	<i>Veronica persica</i>	4
Heath Farm	H13	<i>Vicia faba</i>	4
Heath Farm	H13	<i>Vicia sativa</i>	5
Heath Farm	H14	<i>Lamium album</i>	3
Heath Farm	H14	<i>Brassica napus</i>	10
Heath Farm	H14	<i>Convolvulus arvensis</i>	2
Heath Farm	H14	<i>Geranium robertianum</i>	3
Heath Farm	H14	<i>Myosotis arvensis</i>	3
Heath Farm	H14	<i>Rosa acicularis</i>	2
Heath Farm	H14	<i>Rubus fruticosus</i>	3
Heath Farm	H14	<i>Senecio vulgaris</i>	3
Heath Farm	H14	<i>Sonchus arvensis</i>	2
Heath Farm	H14	<i>Veronica persica</i>	2
Heath Farm	H15	<i>Brassica napus</i>	10
Heath Farm	H15	<i>Anthriscus sylvestris</i>	2
Heath Farm	H15	<i>Calystegia sepium</i>	1
Heath Farm	H15	<i>Convolvulus arvensis</i>	2
Heath Farm	H15	<i>Crataegus monogyna</i>	1
Heath Farm	H15	<i>Jacobaea vulgaris</i>	2
Heath Farm	H15	<i>Myosotis arvensis</i>	2
Heath Farm	H15	<i>Rosa acicularis</i>	2
Heath Farm	H15	<i>Rubus fruticosus</i>	2

Heath Farm	H15	<i>Senecio vulgaris</i>	3
Heath Farm	H15	<i>Sonchus arvensis</i>	4
Kilmester	K1	<i>Anthriscus sylvestris</i>	3
Kilmester	K1	<i>Convolvulus arvensis</i>	5
Kilmester	K1	<i>Crataegus monogyna</i>	1
Kilmester	K1	<i>Glechoma hederacea</i>	2
Kilmester	K1	<i>Heracleum sphondylium</i>	2
Kilmester	K1	<i>Lamium album</i>	2
Kilmester	K1	<i>Ranunculus repens</i>	1
Kilmester	K1	<i>Trifolium repens</i>	3
Kilmester	K2	<i>Anthriscus sylvestris</i>	4
Kilmester	K2	<i>Arum maculatum</i>	1
Kilmester	K2	<i>Cirsium palustre</i>	1
Kilmester	K2	<i>Convolvulus arvensis</i>	1
Kilmester	K2	<i>Crataegus monogyna</i>	3
Kilmester	K2	<i>Glechoma hederacea</i>	2
Kilmester	K2	<i>Heracleum sphondylium</i>	2
Kilmester	K2	<i>Jacobaea vulgaris</i>	1
Kilmester	K2	<i>Primula veris</i>	1
Kilmester	K2	<i>Ranunculus acris</i>	3
Kilmester	K2	<i>Ranunculus repens</i>	2
Kilmester	K2	<i>Rosa acicularis</i>	1
Kilmester	K2	<i>Rubus fruticosus</i>	2
Kilmester	K2	<i>Silene dioica</i>	1
Kilmester	K2	<i>Taraxacum officinale</i>	2
Kilmester	K2	<i>Trifolium repens</i>	8
Kilmester	K3	<i>Anthriscus sylvestris</i>	3
Kilmester	K3	<i>Bellis perennis</i>	1
Kilmester	K3	<i>Cirsium palustre</i>	2
Kilmester	K3	<i>Crataegus monogyna</i>	3
Kilmester	K3	<i>Heracleum sphondylium</i>	3
Kilmester	K3	<i>Ranunculus repens</i>	1
Kilmester	K3	<i>Rubus fruticosus</i>	4
Kilmester	K3	<i>Stachys sylvatica</i>	2
Kilmester	K3	<i>Taraxacum officinale</i>	5
Kilmester	K3	<i>Trifolium repens</i>	4
Kilmester	K4	<i>Anthriscus sylvestris</i>	3
Kilmester	K4	<i>Calystegia silvatica</i>	2
Kilmester	K4	<i>Cirsium arvense</i>	2
Kilmester	K4	<i>Cirsium palustre</i>	2
Kilmester	K4	<i>Crataegus monogyna</i>	3
Kilmester	K4	<i>Heracleum sphondylium</i>	2
Kilmester	K4	<i>Lamium album</i>	2

Kilmester	K4	<i>Ranunculus acris</i>	2
Kilmester	K4	<i>Rubus fruticosus</i>	7
Kilmester	K4	<i>Taraxacum officinale</i>	2
Kilmester	K4	<i>Trifolium repens</i>	5
Kilmester	K5	<i>Bellis perennis</i>	5
Kilmester	K5	<i>Anthriscus sylvestris</i>	4
Kilmester	K5	<i>Calystegia sepium</i>	2
Kilmester	K5	<i>Convolvulus arvensis</i>	1
Kilmester	K5	<i>Crataegus monogyna</i>	3
Kilmester	K5	<i>Glechoma hederacea</i>	1
Kilmester	K5	<i>Heracleum sphondylium</i>	2
Kilmester	K5	<i>Lamium album</i>	1
Kilmester	K5	<i>Leucanthemum vulgare</i>	1
Kilmester	K5	<i>Ranunculus repens</i>	1
Kilmester	K5	<i>Taraxacum officinale</i>	3
Kilmester	K5	<i>Trifolium repens</i>	6
Kilmester	K6	<i>Vicia sativa</i>	2
Kilmester	K6	<i>Anthriscus sylvestris</i>	2
Kilmester	K6	<i>Centaurea nigra</i>	3
Kilmester	K6	<i>Cirsium palustre</i>	4
Kilmester	K6	<i>Crataegus monogyna</i>	3
Kilmester	K6	<i>Glechoma hederacea</i>	2
Kilmester	K6	<i>Hieracium sp.</i>	3
Kilmester	K6	<i>Leucanthemum vulgare</i>	4
Kilmester	K6	<i>Lotus corniculatus</i>	2
Kilmester	K6	<i>Ranunculus acris</i>	6
Kilmester	K6	<i>Rubus fruticosus</i>	3
Kilmester	K6	<i>Symphytum officinale</i>	4
Kilmester	K6	<i>Taraxacum officinale</i>	7
Kilmester	K6	<i>Trifolium repens</i>	8
Kilmester	K7	<i>Crataegus monogyna</i>	3
Kilmester	K7	<i>Anthriscus sylvestris</i>	2
Kilmester	K7	<i>Calystegia sepium</i>	3
Kilmester	K7	<i>Centaurea nigra</i>	3
Kilmester	K7	<i>Cirsium arvense</i>	2
Kilmester	K7	<i>Heracleum sphondylium</i>	2
Kilmester	K7	<i>Lamium album</i>	3
Kilmester	K7	<i>Leucanthemum vulgare</i>	2
Kilmester	K7	<i>Ranunculus acris</i>	7
Kilmester	K7	<i>Rubus fruticosus</i>	2
Kilmester	K7	<i>Sinapsis arvensis</i>	2
Kilmester	K7	<i>Symphytum officinale</i>	2
Kilmester	K7	<i>Taraxacum officinale</i>	7

Kilmester	K7	<i>Trifolium repens</i>	8
Kilmester	K8	<i>Sinapsis arvensis</i>	2
Kilmester	K8	<i>Cirsium arvense</i>	5
Kilmester	K8	<i>Cirsium palustre</i>	4
Kilmester	K8	<i>Dipsacus fullonum</i>	2
Kilmester	K8	<i>Glechoma hederacea</i>	3
Kilmester	K8	<i>Heracleum sphondylium</i>	2
Kilmester	K8	<i>Hieracium sp.</i>	1
Kilmester	K8	<i>Lamium album</i>	2
Kilmester	K8	<i>Malva neglecta</i>	2
Kilmester	K8	<i>Medicago lupulina</i>	3
Kilmester	K8	<i>Ranunculus acris</i>	3
Kilmester	K8	<i>Symphytum officinale</i>	7
Kilmester	K8	<i>Taraxacum officinale</i>	7
Kilmester	K8	<i>Trifolium repens</i>	6
Kilmester	K8	<i>Vicia cracca</i>	2
Kilmester	K9	<i>Anthriscus sylvestris</i>	1
Kilmester	K9	<i>Cirsium arvense</i>	2
Kilmester	K9	<i>Crataegus monogyna</i>	2
Kilmester	K9	<i>Hieracium sp.</i>	1
Kilmester	K9	<i>Lamium album</i>	2
Kilmester	K9	<i>Myosotis arvensis</i>	2
Kilmester	K9	<i>Ranunculus acris</i>	1
Kilmester	K9	<i>Rubus fruticosus</i>	5
Kilmester	K9	<i>Syringa sp</i>	1
Kilmester	K10	<i>Taraxacum officinale</i>	3
Kilmester	K10	<i>Anthriscus sylvestris</i>	3
Kilmester	K10	<i>Calystegia sepium</i>	1
Kilmester	K10	<i>Convolvulus arvensis</i>	1
Kilmester	K10	<i>Crataegus monogyna</i>	3
Kilmester	K10	<i>Heracleum sphondylium</i>	3
Kilmester	K10	<i>Lamium album</i>	2
Kilmester	K10	<i>Rubus fruticosus</i>	2
Kilmester	K10	<i>Stachys sylvatica</i>	1
Kilmester	K10	<i>Trifolium repens</i>	4
Kilmester	K10	<i>Veronica chamaedrys</i>	3
Kilmester	K11	<i>Silene dioica</i>	6
Kilmester	K11	<i>Anthriscus sylvestris</i>	4
Kilmester	K11	<i>Calystegia silvatica</i>	1
Kilmester	K11	<i>Convolvulus arvensis</i>	2
Kilmester	K11	<i>Heracleum sphondylium</i>	4
Kilmester	K11	<i>Lamium album</i>	2
Kilmester	K11	<i>Myosotis arvensis</i>	1

Kilmester	K11	<i>Rosa sp.</i>	5
Kilmester	K11	<i>Rubus fruticosus</i>	8
Kilmester	K11	<i>Symphytum officinale</i>	4
Kilmester	K11	<i>Taraxacum officinale</i>	4
Kilmester	K11	<i>Trifolium repens</i>	8
Kilmester	K12	<i>Symphytum officinale</i>	9
Kilmester	K12	<i>Anthriscus sylvestris</i>	3
Kilmester	K12	<i>Calystegia sepium</i>	2
Kilmester	K12	<i>Convolvulus arvensis</i>	1
Kilmester	K12	<i>Crataegus monogyna</i>	4
Kilmester	K12	<i>Heracleum sphondylium</i>	2
Kilmester	K12	<i>Lamium album</i>	2
Kilmester	K12	<i>Matricaria discoidea</i>	2
Kilmester	K12	<i>Ranunculus acris</i>	5
Kilmester	K12	<i>Rubus fruticosus</i>	2
Kilmester	K12	<i>Sinapsis arvensis</i>	1
Kilmester	K12	<i>Taraxacum officinale</i>	4
Kilmester	K12	<i>Trifolium repens</i>	5
Kilmester	K13	<i>Anthriscus sylvestris</i>	3
Kilmester	K13	<i>Bellis perennis</i>	2
Kilmester	K13	<i>Calystegia sepium</i>	2
Kilmester	K13	<i>Convolvulus arvensis</i>	1
Kilmester	K13	<i>Crataegus monogyna</i>	3
Kilmester	K13	<i>Heracleum sphondylium</i>	3
Kilmester	K13	<i>Rubus fruticosus</i>	4
Kilmester	K13	<i>Sinapsis arvensis</i>	2
Kilmester	K13	<i>Stachys sylvatica</i>	2
Kilmester	K13	<i>Trifolium repens</i>	6
Kilmester	K14	<i>Taraxacum officinale</i>	9
Kilmester	K14	<i>Anthriscus sylvestris</i>	5
Kilmester	K14	<i>Calystegia sepium</i>	3
Kilmester	K14	<i>Centaurea nigra</i>	2
Kilmester	K14	<i>Cirsium arvense</i>	5
Kilmester	K14	<i>Cirsium palustre</i>	3
Kilmester	K14	<i>Epilobium hirsutum</i>	4
Kilmester	K14	<i>Glechoma hederacea</i>	3
Kilmester	K14	<i>Heracleum sphondylium</i>	5
Kilmester	K14	<i>Lamium album</i>	3
Kilmester	K14	<i>Geranium molle</i>	2
Kilmester	K14	<i>Medicago lupulina</i>	5
Kilmester	K14	<i>Myosotis arvensis</i>	2
Kilmester	K14	<i>Ranunculus acris</i>	9
Kilmester	K14	<i>Rosa acicularis</i>	1

Kilmester	K14	<i>Sambucus nigra</i>	2
Kilmester	K14	<i>Sinapsis arvensis</i>	3
Kilmester	K14	<i>Symphytum officinale</i>	4
Kilmester	K14	<i>Trifolium pratense</i>	4
Kilmester	K14	<i>Trifolium repens</i>	5
Kilmester	K15	<i>Taraxacum officinale</i>	9
Kilmester	K15	<i>Anagallis arvensis</i>	3
Kilmester	K15	<i>Anthriscus sylvestris</i>	5
Kilmester	K15	<i>Centaurea nigra</i>	4
Kilmester	K15	<i>Cirsium arvense</i>	5
Kilmester	K15	<i>Cirsium palustre</i>	5
Kilmester	K15	<i>Convolvulus arvensis</i>	3
Kilmester	K15	<i>Glechoma hederacea</i>	3
Kilmester	K15	<i>Hieracium sp.</i>	3
Kilmester	K15	<i>Lamium album</i>	3
Kilmester	K15	<i>Leucanthemum vulgare</i>	3
Kilmester	K15	<i>Geranium molle</i>	5
Kilmester	K15	<i>Medicago lupulina</i>	10
Kilmester	K15	<i>Myosotis arvensis</i>	7
Kilmester	K15	<i>Papaver rhoeas</i>	3
Kilmester	K15	<i>Ranunculus acris</i>	7
Kilmester	K15	<i>Sinapsis arvensis</i>	5
Kilmester	K15	<i>Solanum dulcamara</i>	4
Kilmester	K15	<i>Sonchus arvensis</i>	5
Kilmester	K15	<i>Symphytum officinale</i>	9
Kilmester	K15	<i>Trifolium repens</i>	9
Kilmester	K15	<i>Daucus carota</i>	4
Earth Trust	LW1	<i>Crataegus monogyna</i>	4
Earth Trust	LW1	<i>Anthriscus sylvestris</i>	5
Earth Trust	LW1	<i>Centarium erythraea</i>	1
Earth Trust	LW1	<i>Centaurea nigra</i>	2
Earth Trust	LW1	<i>Cirsium palustre</i>	3
Earth Trust	LW1	<i>Heracleum sphondylium</i>	2
Earth Trust	LW1	<i>Jacobaea vulgaris</i>	2
Earth Trust	LW1	<i>Lamium album</i>	4
Earth Trust	LW1	<i>Leucanthemum vulgare</i>	2
Earth Trust	LW1	<i>Lotus corniculatus</i>	3
Earth Trust	LW1	<i>Primula veris</i>	4
Earth Trust	LW1	<i>Prunella vulgaris</i>	2
Earth Trust	LW1	<i>Trifolium repens</i>	1
Earth Trust	LW2	<i>Brassica napus</i>	5
Earth Trust	LW2	<i>Anthriscus sylvestris</i>	3
Earth Trust	LW2	<i>Centaurea nigra</i>	2

Earth Trust	LW2	<i>Cirsium palustre</i>	4
Earth Trust	LW2	<i>Convolvulus arvensis</i>	1
Earth Trust	LW2	<i>Geranium pratense</i>	3
Earth Trust	LW2	<i>Lamium album</i>	3
Earth Trust	LW2	<i>Leucanthemum vulgare</i>	2
Earth Trust	LW2	<i>Lotus corniculatus</i>	5
Earth Trust	LW2	<i>Malus sylvestris</i>	1
Earth Trust	LW2	<i>Primula veris</i>	3
Earth Trust	LW2	<i>Ranunculus acris</i>	2
Earth Trust	LW2	<i>Sonchus arvensis</i>	1
Earth Trust	LW2	<i>Trifolium repens</i>	5
Earth Trust	LW2	<i>Veronica chamaedrys</i>	3
Earth Trust	LW3	<i>Vicia faba</i>	5
Earth Trust	LW3	<i>Bellis perennis</i>	3
Earth Trust	LW3	<i>Calystegia sepium</i>	1
Earth Trust	LW3	<i>Cichorium intybus</i>	2
Earth Trust	LW3	<i>Cirsium arvense</i>	7
Earth Trust	LW3	<i>Crataegus monogyna</i>	3
Earth Trust	LW3	<i>Epilobium hirsutum</i>	2
Earth Trust	LW3	<i>Jacobaea vulgaris</i>	1
Earth Trust	LW3	<i>Lamium purpureum</i>	2
Earth Trust	LW3	<i>Lotus corniculatus</i>	2
Earth Trust	LW3	<i>Medicago lupulina</i>	2
Earth Trust	LW3	<i>Melilotus altissima</i>	3
Earth Trust	LW3	<i>Myosotis arvensis</i>	3
Earth Trust	LW3	<i>Primula veris</i>	3
Earth Trust	LW3	<i>Rubus fruticosus</i>	4
Earth Trust	LW3	<i>Taraxacum officinale</i>	2
Earth Trust	LW3	<i>Trifolium repens</i>	5
Earth Trust	LW3	<i>Veronica persica</i>	3
Earth Trust	LW4	<i>Vicia faba</i>	5
Earth Trust	LW4	<i>Bellis perennis</i>	2
Earth Trust	LW4	<i>Cirsium arvense</i>	1
Earth Trust	LW4	<i>Convolvulus arvensis</i>	2
Earth Trust	LW4	<i>Crataegus monogyna</i>	5
Earth Trust	LW4	<i>Heracleum sphondylium</i>	2
Earth Trust	LW4	<i>Leucanthemum vulgare</i>	2
Earth Trust	LW4	<i>Lotus corniculatus</i>	2
Earth Trust	LW4	<i>Matricaria discoidea</i>	4
Earth Trust	LW4	<i>Melilotus altissima</i>	2
Earth Trust	LW4	<i>Primula veris</i>	3
Earth Trust	LW4	<i>Trifolium repens</i>	2
Earth Trust	LW5	<i>Veronica persica</i>	4

Earth Trust	LW5	<i>Anthriscus sylvestris</i>	3
Earth Trust	LW5	<i>Bellis perennis</i>	1
Earth Trust	LW5	<i>Brassica napus</i>	1
Earth Trust	LW5	<i>Convolvulus arvensis</i>	2
Earth Trust	LW5	<i>Crataegus monogyna</i>	5
Earth Trust	LW5	<i>Heracleum sphondylium</i>	1
Earth Trust	LW5	<i>Hieracium sp.</i>	1
Earth Trust	LW5	<i>Lamium purpureum</i>	2
Earth Trust	LW5	<i>Matricaria discoidea</i>	1
Earth Trust	LW5	<i>Ranunculus acris</i>	4
Earth Trust	LW5	<i>Silene dioica</i>	1
Earth Trust	LW5	<i>Silene latifolia</i>	1
Earth Trust	LW5	<i>Taraxacum officinale</i>	4
Earth Trust	LW5	<i>Trifolium repens</i>	6
Earth Trust	LW5	<i>Viola arvensis</i>	2
Earth Trust	LW5	<i>Sonchus sp.</i>	12
Earth Trust	LW6	<i>Myosotis arvensis</i>	2
Earth Trust	LW6	<i>Anthriscus sylvestris</i>	2
Earth Trust	LW6	<i>Brassica napus</i>	1
Earth Trust	LW6	<i>Cirsium palustre</i>	2
Earth Trust	LW6	<i>Crataegus monogyna</i>	5
Earth Trust	LW6	<i>Hieracium sp.</i>	1
Earth Trust	LW6	<i>Geranium robertianum</i>	3
Earth Trust	LW6	<i>Lamium album</i>	2
Earth Trust	LW6	<i>Lamium purpureum</i>	3
Earth Trust	LW6	<i>Ranunculus acris</i>	2
Earth Trust	LW6	<i>Rosa canina</i>	3
Earth Trust	LW6	<i>Rubus fruticosus</i>	5
Earth Trust	LW6	<i>Senecio vulgaris</i>	2
Earth Trust	LW7	<i>Anthriscus sylvestris</i>	2
Earth Trust	LW7	<i>Cirsium palustre</i>	1
Earth Trust	LW7	<i>Hieracium sp.</i>	2
Earth Trust	LW7	<i>Malus domestica</i>	3
Earth Trust	LW7	<i>Rubus fruticosus</i>	3
Earth Trust	LW7	<i>Taraxacum officinale</i>	2
Earth Trust	LW7	<i>Trifolium repens</i>	2
Earth Trust	LW8	<i>Lamium album</i>	4
Earth Trust	LW8	<i>Anthriscus sylvestris</i>	2
Earth Trust	LW8	<i>Crataegus monogyna</i>	5
Earth Trust	LW8	<i>Leucanthemum vulgare</i>	2
Earth Trust	LW8	<i>Lotus corniculatus</i>	2
Earth Trust	LW8	<i>Malus domestica</i>	2
Earth Trust	LW8	<i>Matricaria discoidea</i>	6

Earth Trust	LW8	<i>Senecio vulgaris</i>	5
Earth Trust	LW8	<i>Symphytum officinale</i>	2
Earth Trust	LW8	<i>Trifolium pratense</i>	2
Earth Trust	LW8	<i>Trifolium repens</i>	2
Earth Trust	LW8	<i>Veronica persica</i>	3
Earth Trust	LW9	<i>Taraxacum officinale</i>	5
Earth Trust	LW9	<i>Anthriscus sylvestris</i>	2
Earth Trust	LW9	<i>Cirsium arvense</i>	5
Earth Trust	LW9	<i>Cirsium palustre</i>	8
Earth Trust	LW9	<i>Epilobium angustifolium</i>	2
Earth Trust	LW9	<i>Epilobium hirsutum</i>	2
Earth Trust	LW9	<i>Heracleum sphondylium</i>	1
Earth Trust	LW9	<i>Hieracium sp.</i>	2
Earth Trust	LW9	<i>Ilex aquifolium</i>	4
Earth Trust	LW9	<i>Jacobaea vulgaris</i>	4
Earth Trust	LW9	<i>Lotus corniculatus</i>	2
Earth Trust	LW9	<i>Prunella vulgaris</i>	2
Earth Trust	LW9	<i>Ranunculus acris</i>	2
Earth Trust	LW9	<i>Sonchus arvensis</i>	2
Earth Trust	LW9	<i>Trifolium repens</i>	2
Earth Trust	LW10	<i>Taraxacum officinale</i>	3
Earth Trust	LW10	<i>Bellis perennis</i>	2
Earth Trust	LW10	<i>Calystegia silvatica</i>	2
Earth Trust	LW10	<i>Centaurea nigra</i>	2
Earth Trust	LW10	<i>Cirsium palustre</i>	2
Earth Trust	LW10	<i>Convolvulus arvensis</i>	3
Earth Trust	LW10	<i>Hieracium sp.</i>	2
Earth Trust	LW10	<i>Jacobaea vulgaris</i>	3
Earth Trust	LW10	<i>Knautia arvensis</i>	1
Earth Trust	LW10	<i>Lamium album</i>	2
Earth Trust	LW10	<i>Lamium purpureum</i>	2
Earth Trust	LW10	<i>Primula veris</i>	3
Earth Trust	LW10	<i>Trifolium pratense</i>	1
Earth Trust	LW10	<i>Trifolium repens</i>	5
Earth Trust	LW10	<i>Veronica persica</i>	3
Earth Trust	LW11	<i>Taraxacum officinale</i>	2
Earth Trust	LW11	<i>Anthriscus sylvestris</i>	5
Earth Trust	LW11	<i>Arctium minus</i>	1
Earth Trust	LW11	<i>Calystegia sepium</i>	3
Earth Trust	LW11	<i>Calystegia silvatica</i>	4
Earth Trust	LW11	<i>Cirsium arvense</i>	4
Earth Trust	LW11	<i>Conopodium majus</i>	3
Earth Trust	LW11	<i>Epilobium angustifolium</i>	3

Earth Trust	LW11	<i>Epilobium hirsutum</i>	8
Earth Trust	LW11	<i>Glechoma hederacea</i>	2
Earth Trust	LW11	<i>Heracleum sphondylium</i>	2
Earth Trust	LW11	<i>Hieracium sp.</i>	3
Earth Trust	LW11	<i>Jacobaea vulgaris</i>	5
Earth Trust	LW11	<i>Lamium album</i>	3
Earth Trust	LW11	<i>Lotus corniculatus</i>	4
Earth Trust	LW11	<i>Ranunculus acris</i>	3
Earth Trust	LW11	<i>Ranunculus repens</i>	2
Earth Trust	LW11	<i>Rosa acicularis</i>	3
Earth Trust	LW11	<i>Sonchus arvensis</i>	5
Earth Trust	LW11	<i>Symphytum officinale</i>	6
Earth Trust	LW11	<i>Trifolium repens</i>	7
Earth Trust	LW11	<i>Vicia cracca</i>	3
Earth Trust	LW12	<i>Taraxacum officinale</i>	4
Earth Trust	LW12	<i>Cichorium intybus</i>	2
Earth Trust	LW12	<i>Cirsium arvense</i>	3
Earth Trust	LW12	<i>Cirsium palustre</i>	3
Earth Trust	LW12	<i>Crataegus monogyna</i>	3
Earth Trust	LW12	<i>Geranium pratense</i>	3
Earth Trust	LW12	<i>Heracleum sphondylium</i>	2
Earth Trust	LW12	<i>Hieracium sp.</i>	4
Earth Trust	LW12	<i>Jacobaea vulgaris</i>	2
Earth Trust	LW12	<i>Knautia arvensis</i>	4
Earth Trust	LW12	<i>Malus sylvestris</i>	1
Earth Trust	LW12	<i>Primula veris</i>	2
Earth Trust	LW12	<i>Prunella vulgaris</i>	2
Earth Trust	LW12	<i>Ranunculus acris</i>	6
Earth Trust	LW12	<i>Rubus fruticosus</i>	10
Earth Trust	LW12	<i>Stellaria media</i>	3
Earth Trust	LW12	<i>Taraxacum officinale</i>	4
Earth Trust	LW12	<i>Trifolium repens</i>	5
Earth Trust	LW12	<i>Vicia sativa</i>	1
Earth Trust	LW13	<i>Taraxacum officinale</i>	6
Earth Trust	LW13	<i>Calystegia sepium</i>	1
Earth Trust	LW13	<i>Calystegia silvatica</i>	3
Earth Trust	LW13	<i>Cichorium intybus</i>	2
Earth Trust	LW13	<i>Cirsium arvense</i>	5
Earth Trust	LW13	<i>Cirsium palustre</i>	4
Earth Trust	LW13	<i>Crataegus monogyna</i>	4
Earth Trust	LW13	<i>Hieracium sp.</i>	2
Earth Trust	LW13	<i>Jacobaea vulgaris</i>	1
Earth Trust	LW13	<i>Knautia arvensis</i>	3

Earth Trust	LW13	<i>Primula veris</i>	3
Earth Trust	LW13	<i>Ranunculus acris</i>	3
Earth Trust	LW13	<i>Stellaria media</i>	4
Earth Trust	LW13	<i>Trifolium repens</i>	10
Earth Trust	LW14	<i>Crataegus monogyna</i>	5
Earth Trust	LW14	<i>Anthriscus sylvestris</i>	3
Earth Trust	LW14	<i>Calystegia silvatica</i>	2
Earth Trust	LW14	<i>Cichorium intybus</i>	2
Earth Trust	LW14	<i>Heracleum sphondylium</i>	2
Earth Trust	LW14	<i>Hieracium sp.</i>	2
Earth Trust	LW14	<i>Knautia arvensis</i>	3
Earth Trust	LW14	<i>Lotus corniculatus</i>	1
Earth Trust	LW14	<i>Medicago lupulina</i>	2
Earth Trust	LW14	<i>Primula veris</i>	4
Earth Trust	LW14	<i>Ranunculus acris</i>	2
Earth Trust	LW14	<i>Sonchus arvensis</i>	2
Earth Trust	LW14	<i>Stellaria media</i>	3
Earth Trust	LW14	<i>Taraxacum officinale</i>	3
Earth Trust	LW14	<i>Trifolium repens</i>	2
Earth Trust	LW14	<i>Vicia sativa</i>	3
Earth Trust	LW15	<i>Anthriscus sylvestris</i>	3
Earth Trust	LW15	<i>Centaurea nigra</i>	1
Earth Trust	LW15	<i>Cirsium palustre</i>	2
Earth Trust	LW15	<i>Convolvulus arvensis</i>	2
Earth Trust	LW15	<i>Crataegus monogyna</i>	4
Earth Trust	LW15	<i>Rubus fruticosus</i>	3
Earth Trust	LW15	<i>Taraxacum officinale</i>	2
Earth Trust	LW15	<i>Trifolium repens</i>	5
Lower Smite	LS1	<i>Vicia sativa</i>	3
Lower Smite	LS1	<i>Anthriscus sylvestris</i>	2
Lower Smite	LS1	<i>Cichorium intybus</i>	8
Lower Smite	LS1	<i>Cirsium palustre</i>	2
Lower Smite	LS1	<i>Convolvulus arvensis</i>	3
Lower Smite	LS1	<i>Crataegus monogyna</i>	2
Lower Smite	LS1	<i>Geranium molle</i>	3
Lower Smite	LS1	<i>Hieracium sp.</i>	2
Lower Smite	LS1	<i>Hydrangea sp.</i>	2
Lower Smite	LS1	<i>Jacobaea vulgaris</i>	2
Lower Smite	LS1	<i>Lotus corniculatus</i>	3
Lower Smite	LS1	<i>Matricaria discoidea</i>	2
Lower Smite	LS1	<i>Ranunculus acris</i>	2
Lower Smite	LS1	<i>Sinapsis arvensis</i>	2
Lower Smite	LS1	<i>Taraxacum officinale</i>	2

Lower Smite	LS1	<i>Trifolium pratense</i>	8
Lower Smite	LS1	<i>Trifolium repens</i>	4
Lower Smite	LS1	<i>Veronica persica</i>	2
Lower Smite	LS2	<i>Ranunculus acris</i>	2
Lower Smite	LS2	<i>Centaurea nigra</i>	2
Lower Smite	LS2	<i>Cichorium intybus</i>	10
Lower Smite	LS2	<i>Cirsium arvense</i>	6
Lower Smite	LS2	<i>Hydrangea sp.</i>	2
Lower Smite	LS2	<i>Lotus corniculatus</i>	6
Lower Smite	LS2	<i>Matricaria discoidea</i>	2
Lower Smite	LS2	<i>Sinapsis arvensis</i>	2
Lower Smite	LS2	<i>Trifolium pratense</i>	5
Lower Smite	LS2	<i>Trifolium repens</i>	5
Lower Smite	LS3	<i>Ranunculus acris</i>	4
Lower Smite	LS3	<i>Anthriscus sylvestris</i>	3
Lower Smite	LS3	<i>Cichorium intybus</i>	5
Lower Smite	LS3	<i>Cirsium arvense</i>	3
Lower Smite	LS3	<i>Cirsium palustre</i>	2
Lower Smite	LS3	<i>Hydrangea sp.</i>	2
Lower Smite	LS3	<i>Leucanthemum vulgare</i>	2
Lower Smite	LS3	<i>Lotus corniculatus</i>	4
Lower Smite	LS3	<i>Trifolium incarnatum</i>	1
Lower Smite	LS3	<i>Matricaria discoidea</i>	2
Lower Smite	LS3	<i>Melilotus altissima</i>	3
Lower Smite	LS3	<i>Trifolium pratense</i>	3
Lower Smite	LS3	<i>Veronica persica</i>	2
Lower Smite	LS3	<i>Vicia cracca</i>	4
Lower Smite	LS3	<i>Vicia sativa</i>	2
Lower Smite	LS4	<i>Trifolium pratense</i>	9
Lower Smite	LS4	<i>Anthriscus sylvestris</i>	3
Lower Smite	LS4	<i>Cichorium intybus</i>	8
Lower Smite	LS4	<i>Cirsium arvense</i>	1
Lower Smite	LS4	<i>Cirsium palustre</i>	1
Lower Smite	LS4	<i>Convolvulus arvensis</i>	3
Lower Smite	LS4	<i>Geranium molle</i>	3
Lower Smite	LS4	<i>Matricaria discoidea</i>	2
Lower Smite	LS4	<i>Ranunculus acris</i>	4
Lower Smite	LS4	<i>Sonchus arvensis</i>	2
Lower Smite	LS4	<i>Stellaria media</i>	3
Lower Smite	LS4	<i>Trifolium repens</i>	5
Lower Smite	LS4	<i>Vicia sativa</i>	2
Lower Smite	LS5	<i>Trifolium pratense</i>	5
Lower Smite	LS5	<i>Anthriscus sylvestris</i>	3

Lower Smite	LS5	<i>Centaurea nigra</i>	2
Lower Smite	LS5	<i>Cirsium arvense</i>	2
Lower Smite	LS5	<i>Cirsium palustre</i>	3
Lower Smite	LS5	<i>Convolvulus arvensis</i>	4
Lower Smite	LS5	<i>Geranium molle</i>	3
Lower Smite	LS5	<i>Jacobaea vulgaris</i>	1
Lower Smite	LS5	<i>Lotus corniculatus</i>	2
Lower Smite	LS5	<i>Malva sylvestris</i>	2
Lower Smite	LS5	<i>Ranunculus acris</i>	4
Lower Smite	LS5	<i>Stellaria media</i>	3
Lower Smite	LS5	<i>Trifolium repens</i>	5
Lower Smite	LS5	<i>Vicia sativa</i>	2
Lower Smite	LS6	<i>Ranunculus acris</i>	4
Lower Smite	LS6	<i>Anthriscus sylvestris</i>	2
Lower Smite	LS6	<i>Bellis perennis</i>	2
Lower Smite	LS6	<i>Geranium molle</i>	2
Lower Smite	LS6	<i>Jacobaea vulgaris</i>	2
Lower Smite	LS6	<i>Rubus fruticosus</i>	5
Lower Smite	LS6	<i>Stellaria media</i>	3
Lower Smite	LS6	<i>Taraxacum officinale</i>	3
Lower Smite	LS6	<i>Trifolium repens</i>	6
Lower Smite	LS6	<i>Vicia sativa</i>	3
Lower Smite	LS7	<i>Sinapsis arvensis</i>	5
Lower Smite	LS7	<i>Cardina draba</i>	4
Lower Smite	LS7	<i>Cirsium palustre</i>	3
Lower Smite	LS7	<i>Convolvulus arvensis</i>	2
Lower Smite	LS7	<i>Crataegus monogyna</i>	3
Lower Smite	LS7	<i>Heracleum sphondylium</i>	3
Lower Smite	LS7	<i>Jacobaea vulgaris</i>	2
Lower Smite	LS7	<i>Medicago lupulina</i>	4
Lower Smite	LS7	<i>Papaver rhoeas</i>	3
Lower Smite	LS7	<i>Trifolium pratense</i>	4
Lower Smite	LS7	<i>Trifolium repens</i>	4
Lower Smite	LS7	<i>Vicia sativa</i>	3
Lower Smite	LS8	<i>Trifolium pratense</i>	3
Lower Smite	LS8	<i>Convolvulus arvensis</i>	2
Lower Smite	LS8	<i>Crataegus monogyna</i>	3
Lower Smite	LS8	<i>Jacobaea vulgaris</i>	2
Lower Smite	LS8	<i>Leucanthemum vulgare</i>	2
Lower Smite	LS8	<i>Medicago lupulina</i>	4
Lower Smite	LS8	<i>Papaver rhoeas</i>	1
Lower Smite	LS8	<i>Sinapsis arvensis</i>	5
Lower Smite	LS8	<i>Vicia sativa</i>	3

Lower Smite	LS9	<i>Ranunculus acris</i>	4
Lower Smite	LS9	<i>Anthemis arvensis</i>	2
Lower Smite	LS9	<i>Anthriscus sylvestris</i>	2
Lower Smite	LS9	<i>Cardina draba</i>	3
Lower Smite	LS9	<i>Cirsium arvense</i>	2
Lower Smite	LS9	<i>Cirsium palustre</i>	2
Lower Smite	LS9	<i>Geranium molle</i>	3
Lower Smite	LS9	<i>Jacobaea vulgaris</i>	2
Lower Smite	LS9	<i>Matricaria discoidea</i>	4
Lower Smite	LS9	<i>Medicago lupulina</i>	3
Lower Smite	LS9	<i>Melilotus altissima</i>	2
Lower Smite	LS9	<i>Sinapsis arvensis</i>	3
Lower Smite	LS9	<i>Sonchus arvensis</i>	3
Lower Smite	LS9	<i>Fragaria x anassa</i>	5
Lower Smite	LS9	<i>Tanacetum parthenium</i>	2
Lower Smite	LS9	<i>Trifolium pratense</i>	7
Lower Smite	LS9	<i>Trifolium repens</i>	5
Lower Smite	LS9	<i>Vicia sativa</i>	3
Lower Smite	LS10	<i>Geranium molle</i>	2
Lower Smite	LS10	<i>Anthriscus sylvestris</i>	2
Lower Smite	LS10	<i>Cardina draba</i>	2
Lower Smite	LS10	<i>Convolvulus arvensis</i>	2
Lower Smite	LS11	<i>Jacobaea vulgaris</i>	1
Lower Smite	LS11	<i>Papaver rhoeas</i>	2
Lower Smite	LS11	<i>Anthriscus sylvestris</i>	2
Lower Smite	LS11	<i>Cardina draba</i>	3
Lower Smite	LS11	<i>Cichorium intybus</i>	10
Lower Smite	LS11	<i>Cirsium palustre</i>	2
Lower Smite	LS11	<i>Geranium molle</i>	3
Lower Smite	LS11	<i>Geranium robertianum</i>	3
Lower Smite	LS11	<i>Rubus fruticosus</i>	4
Lower Smite	LS11	<i>Trifolium pratense</i>	7
Lower Smite	LS11	<i>Trifolium repens</i>	7
Lower Smite	LS12	<i>Anthriscus sylvestris</i>	3
Lower Smite	LS12	<i>Calystegia silvatica</i>	5
Lower Smite	LS12	<i>Cirsium arvense</i>	3
Lower Smite	LS12	<i>Epilobium hirsutum</i>	5
Lower Smite	LS12	<i>Geranium molle</i>	2
Lower Smite	LS12	<i>Jacobaea vulgaris</i>	1
Lower Smite	LS12	<i>Lamium album</i>	4
Lower Smite	LS12	<i>Ranunculus repens</i>	1
Lower Smite	LS12	<i>Rubus fruticosus</i>	5
Lower Smite	LS12	<i>Trifolium pratense</i>	4

Lower Smite	LS12	<i>Trifolium repens</i>	7
Lower Smite	LS13	<i>Stellaria media</i>	3
Lower Smite	LS13	<i>Anthriscus sylvestris</i>	2
Lower Smite	LS13	<i>Arctium minus</i>	2
Lower Smite	LS13	<i>Calystegia sepium</i>	4
Lower Smite	LS13	<i>Cichorium intybus</i>	3
Lower Smite	LS13	<i>Cirsium arvense</i>	3
Lower Smite	LS13	<i>Cirsium palustre</i>	2
Lower Smite	LS13	<i>Geranium molle</i>	2
Lower Smite	LS13	<i>Ranunculus acris</i>	4
Lower Smite	LS13	<i>Rubus fruticosus</i>	3
Lower Smite	LS13	<i>Sinapsis arvensis</i>	1
Lower Smite	LS13	<i>Trifolium pratense</i>	4
Lower Smite	LS13	<i>Trifolium repens</i>	2
Lower Smite	LS14	<i>Stellaria media</i>	2
Lower Smite	LS14	<i>Calystegia sepium</i>	3
Lower Smite	LS14	<i>Cirsium palustre</i>	2
Lower Smite	LS14	<i>Geranium molle</i>	2
Lower Smite	LS14	<i>Ranunculus acris</i>	2
Lower Smite	LS15	<i>Ranunculus acris</i>	4
Lower Smite	LS15	<i>Calystegia sepium</i>	8
Lower Smite	LS15	<i>Centaurea nigra</i>	2
Lower Smite	LS15	<i>Cirsium arvense</i>	3
Lower Smite	LS15	<i>Convolvulus arvensis</i>	4
Lower Smite	LS15	<i>Dipsacus fullonum</i>	1
Lower Smite	LS15	<i>Helianthus annuus</i>	1
Lower Smite	LS15	<i>Jacobaea vulgaris</i>	2
Lower Smite	LS15	<i>Lamium album</i>	2
Lower Smite	LS15	<i>Primula veris</i>	3
Lower Smite	LS15	<i>Prunus domestica</i>	4
Lower Smite	LS15	<i>Stellaria media</i>	2
Lower Smite	LS15	<i>Tanacetum vulgare</i>	2
Lower Smite	LS15	<i>Trifolium pratense</i>	4
Lower Smite	LS15	<i>Trifolium repens</i>	4
Lower Smite	LS15	<i>Veronica chamaedrys</i>	3
Lower Smite	LS15	<i>Vicia sativa</i>	2
Marcham Farm	M1	<i>Ranunculus acris</i>	6
Marcham Farm	M1	<i>Anthriscus sylvestris</i>	2
Marcham Farm	M1	<i>Arctium minus</i>	2
Marcham Farm	M1	<i>Calystegia sepium</i>	2
Marcham Farm	M1	<i>Capsella bursa-pastoris</i>	5
Marcham Farm	M1	<i>Cirsium palustre</i>	3
Marcham Farm	M1	<i>Epilobium hirsutum</i>	5

Marcham Farm	M1	<i>Epilobium montanum</i>	2
Marcham Farm	M1	<i>Filipendula ulmaria</i>	1
Marcham Farm	M1	<i>Geranium molle</i>	1
Marcham Farm	M1	<i>Glechoma hederacea</i>	1
Marcham Farm	M1	<i>Lamium album</i>	5
Marcham Farm	M1	<i>Malva neglecta</i>	2
Marcham Farm	M1	<i>Geranium molle</i>	1
Marcham Farm	M1	<i>Matricaria discoidea</i>	4
Marcham Farm	M1	<i>Rubus fruticosus</i>	3
Marcham Farm	M1	<i>Sonchus arvensis</i>	5
Marcham Farm	M1	<i>Symphytum officinale</i>	2
Marcham Farm	M1	<i>Taraxacum officinale</i>	4
Marcham Farm	M1	<i>Trifolium repens</i>	4
Marcham Farm	M1	<i>Veronica persica</i>	2
Marcham Farm	M2	<i>Vinca major</i>	2
Marcham Farm	M2	<i>Anthriscus sylvestris</i>	2
Marcham Farm	M2	<i>Brassica napus</i>	5
Marcham Farm	M2	<i>Calystegia sepium</i>	2
Marcham Farm	M2	<i>Cirsium arvense</i>	2
Marcham Farm	M2	<i>Cirsium palustre</i>	1
Marcham Farm	M2	<i>Epilobium hirsutum</i>	5
Marcham Farm	M2	<i>Heracleum sphondylium</i>	2
Marcham Farm	M2	<i>Hieracium sp.</i>	2
Marcham Farm	M2	<i>Lamium album</i>	5
Marcham Farm	M2	<i>Geranium molle</i>	2
Marcham Farm	M2	<i>Matricaria discoidea</i>	2
Marcham Farm	M2	<i>Papaver rhoeas</i>	5
Marcham Farm	M2	<i>Ranunculus acris</i>	2
Marcham Farm	M2	<i>Rubus fruticosus</i>	3
Marcham Farm	M2	<i>Sinapsis arvensis</i>	2
Marcham Farm	M2	<i>Sonchus arvensis</i>	2
Marcham Farm	M2	<i>Taraxacum officinale</i>	1
Marcham Farm	M2	<i>Trifolium repens</i>	4
Marcham Farm	M2	<i>Tripleurospermum inodorum</i>	2
Marcham Farm	M2	<i>Veronica persica</i>	2
Marcham Farm	M3	<i>Brassica napus</i>	5
Marcham Farm	M3	<i>Anthriscus sylvestris</i>	8
Marcham Farm	M3	<i>Arctium minus</i>	2
Marcham Farm	M3	<i>Brassica napus</i>	5
Marcham Farm	M3	<i>Calystegia sepium</i>	2
Marcham Farm	M3	<i>Cirsium arvense</i>	2
Marcham Farm	M3	<i>Crataegus monogyna</i>	2
Marcham Farm	M3	<i>Epilobium hirsutum</i>	5

Marcham Farm	M3	<i>Lamium album</i>	4
Marcham Farm	M3	<i>Leucanthemum vulgare</i>	2
Marcham Farm	M3	<i>Malva neglecta</i>	2
Marcham Farm	M3	<i>Geranium molle</i>	2
Marcham Farm	M3	<i>Matricaria discoidea</i>	2
Marcham Farm	M3	<i>Papaver rhoeas</i>	1
Marcham Farm	M3	<i>Ranunculus acris</i>	1
Marcham Farm	M3	<i>Rosa acicularis</i>	2
Marcham Farm	M3	<i>Rubus fruticosus</i>	8
Marcham Farm	M3	<i>Sambucus nigra</i>	2
Marcham Farm	M3	<i>Teesdalia nudicaulis</i>	2
Marcham Farm	M3	<i>Trifolium repens</i>	3
Marcham Farm	M3	<i>Veronica persica</i>	2
Marcham Farm	M4	<i>Vinca major</i>	2
Marcham Farm	M4	<i>Anthriscus sylvestris</i>	4
Marcham Farm	M4	<i>Cirsium arvense</i>	2
Marcham Farm	M4	<i>Convolvulus arvensis</i>	2
Marcham Farm	M4	<i>Crataegus monogyna</i>	3
Marcham Farm	M4	<i>Geranium molle</i>	1
Marcham Farm	M4	<i>Hieracium sp.</i>	2
Marcham Farm	M4	<i>Lamium album</i>	3
Marcham Farm	M4	<i>Medicago lupulina</i>	2
Marcham Farm	M4	<i>Rubus fruticosus</i>	2
Marcham Farm	M4	<i>Sambucus nigra</i>	3
Marcham Farm	M4	<i>Sinapsis arvensis</i>	1
Marcham Farm	M4	<i>Stachys sylvatica</i>	2
Marcham Farm	M4	<i>Taraxacum officinale</i>	1
Marcham Farm	M4	<i>Trifolium repens</i>	2
Marcham Farm	M5	<i>Taraxacum officinale</i>	2
Marcham Farm	M5	<i>Angelica sylvestris</i>	3
Marcham Farm	M5	<i>Calystegia sepium</i>	2
Marcham Farm	M5	<i>Cirsium arvense</i>	2
Marcham Farm	M5	<i>Conopodium majus</i>	3
Marcham Farm	M5	<i>Epilobium hirsutum</i>	4
Marcham Farm	M5	<i>Geranium molle</i>	2
Marcham Farm	M5	<i>Glechoma hederacea</i>	1
Marcham Farm	M5	<i>Hieracium sp.</i>	2
Marcham Farm	M5	<i>Sinapsis arvensis</i>	2
Marcham Farm	M5	<i>Sonchus arvensis</i>	3
Marcham Farm	M5	<i>Symphytum officinale</i>	2
Marcham Farm	M5	<i>Trifolium repens</i>	5
Marcham Farm	M5	<i>Viola arvensis</i>	2
Marcham Farm	M6	<i>Taraxacum officinale</i>	2

Marcham Farm	M6	<i>Angelica sylvestris</i>	3
Marcham Farm	M6	<i>Anthriscus sylvestris</i>	2
Marcham Farm	M6	<i>Calystegia sepium</i>	2
Marcham Farm	M6	<i>Capsella bursa-pastoris</i>	3
Marcham Farm	M6	<i>Cirsium arvense</i>	2
Marcham Farm	M6	<i>Crataegus monogyna</i>	4
Marcham Farm	M6	<i>Glechoma hederacea</i>	2
Marcham Farm	M6	<i>Lamium album</i>	2
Marcham Farm	M6	<i>Malus domestica</i>	2
Marcham Farm	M6	<i>Senecio vulgaris</i>	3
Marcham Farm	M6	<i>Sinapsis arvensis</i>	2
Marcham Farm	M6	<i>Sonchus arvensis</i>	1
Marcham Farm	M6	<i>Veronica persica</i>	3
Marcham Farm	M6	<i>Viola arvensis</i>	2
Marcham Farm	M7	<i>Taraxacum officinale</i>	3
Marcham Farm	M7	<i>Angelica sylvestris</i>	2
Marcham Farm	M7	<i>Anthriscus sylvestris</i>	2
Marcham Farm	M7	<i>Arctium minus</i>	1
Marcham Farm	M7	<i>Calystegia sepium</i>	2
Marcham Farm	M7	<i>Chamerion angustifolium</i>	2
Marcham Farm	M7	<i>Cirsium arvense</i>	2
Marcham Farm	M7	<i>Crataegus monogyna</i>	4
Marcham Farm	M7	<i>Dipsacus fullonum</i>	2
Marcham Farm	M7	<i>Epilobium hirsutum</i>	3
Marcham Farm	M7	<i>Hieracium sp.</i>	3
Marcham Farm	M7	<i>Geranium molle</i>	2
Marcham Farm	M7	<i>Rubus fruticosus</i>	3
Marcham Farm	M7	<i>Sonchus arvensis</i>	2
Marcham Farm	M8	<i>Taraxacum officinale</i>	3
Marcham Farm	M8	<i>Anthriscus sylvestris</i>	2
Marcham Farm	M8	<i>Arctium minus</i>	3
Marcham Farm	M8	<i>Calystegia sepium</i>	2
Marcham Farm	M8	<i>Cirsium arvense</i>	3
Marcham Farm	M8	<i>Cirsium palustre</i>	1
Marcham Farm	M8	<i>Crataegus monogyna</i>	8
Marcham Farm	M8	<i>Dipsacus fullonum</i>	2
Marcham Farm	M8	<i>Epilobium hirsutum</i>	1
Marcham Farm	M8	<i>Geranium molle</i>	2
Marcham Farm	M8	<i>Glechoma hederacea</i>	3
Marcham Farm	M8	<i>Lotus corniculatus</i>	3
Marcham Farm	M8	<i>Malus domestica</i>	2
Marcham Farm	M8	<i>Rubus fruticosus</i>	3
Marcham Farm	M8	<i>Sonchus arvensis</i>	3

Marcham Farm	M8	<i>Symphytum officinale</i>	3
Marcham Farm	M8	<i>Trifolium pratense</i>	1
Marcham Farm	M8	<i>Tripleurospermum inodorum</i>	3
Marcham Farm	M8	<i>Veronica persica</i>	1
Marcham Farm	M9	<i>Anthriscus sylvestris</i>	3
Marcham Farm	M9	<i>Angelica sylvestris</i>	2
Marcham Farm	M9	<i>Calystegia silvatica</i>	2
Marcham Farm	M9	<i>Convolvulus arvensis</i>	3
Marcham Farm	M9	<i>Epilobium hirsutum</i>	2
Marcham Farm	M9	<i>Geranium molle</i>	1
Marcham Farm	M9	<i>Glechoma hederacea</i>	3
Marcham Farm	M9	<i>Lamium album</i>	4
Marcham Farm	M9	<i>Malus domestica</i>	3
Marcham Farm	M9	<i>Malva sylvestris</i>	3
Marcham Farm	M9	<i>Prunus sp.</i>	2
Marcham Farm	M9	<i>Rubus fruticosus</i>	2
Marcham Farm	M9	<i>Sambucus nigra</i>	2
Marcham Farm	M9	<i>Taraxacum officinale</i>	2
Marcham Farm	M10	<i>Angelica sylvestris</i>	2
Marcham Farm	M10	<i>Anthriscus sylvestris</i>	6
Marcham Farm	M10	<i>Calystegia sepium</i>	2
Marcham Farm	M10	<i>Cirsium arvense</i>	4
Marcham Farm	M10	<i>Cirsium palustre</i>	2
Marcham Farm	M10	<i>Epilobium hirsutum</i>	3
Marcham Farm	M10	<i>Hieracium sp.</i>	3
Marcham Farm	M10	<i>Lamium album</i>	2
Marcham Farm	M10	<i>Rubus fruticosus</i>	4
Marcham Farm	M10	<i>Symphytum officinale</i>	2
Marcham Farm	M10	<i>Taraxacum officinale</i>	1
Marcham Farm	M11	<i>Lamium album</i>	3
Marcham Farm	M11	<i>Angelica sylvestris</i>	2
Marcham Farm	M11	<i>Calystegia sepium</i>	2
Marcham Farm	M11	<i>Capsella bursa-pastoris</i>	4
Marcham Farm	M11	<i>Cirsium arvense</i>	3
Marcham Farm	M11	<i>Epilobium hirsutum</i>	3
Marcham Farm	M11	<i>Sinapsis arvensis</i>	1
Marcham Farm	M11	<i>Symphytum officinale</i>	4
Marcham Farm	M11	<i>Taraxacum officinale</i>	2
Marcham Farm	M12	<i>Crataegus monogyna</i>	9
Marcham Farm	M12	<i>Calystegia sepium</i>	3
Marcham Farm	M12	<i>Cirsium arvense</i>	2
Marcham Farm	M12	<i>Heracleum sphondylium</i>	1
Marcham Farm	M12	<i>Hieracium sp.</i>	2

Marcham Farm	M12	<i>Jacobaea vulgaris</i>	2
Marcham Farm	M12	<i>Lotus corniculatus</i>	6
Marcham Farm	M12	<i>Pentaglottis sempervirens</i>	2
Marcham Farm	M12	<i>Medicago lupulina</i>	3
Marcham Farm	M12	<i>Onobrychis viciifolia</i>	1
Marcham Farm	M12	<i>Ranunculus acris</i>	2
Marcham Farm	M12	<i>Silene latifolia</i>	2
Marcham Farm	M12	<i>Taraxacum officinale</i>	3
Marcham Farm	M12	<i>Trifolium pratense</i>	2
Marcham Farm	M12	<i>Trifolium repens</i>	3
Marcham Farm	M12	<i>Vicia sativa</i>	2
Marcham Farm	M13	<i>Teesdalia nudicaulis</i>	2
Marcham Farm	M13	<i>Anthriscus sylvestris</i>	6
Marcham Farm	M13	<i>Arctium minus</i>	2
Marcham Farm	M13	<i>Carduus nutans</i>	2
Marcham Farm	M13	<i>Cirsium arvense</i>	5
Marcham Farm	M13	<i>Cirsium palustre</i>	2
Marcham Farm	M13	<i>Geranium molle</i>	2
Marcham Farm	M13	<i>Glechoma hederacea</i>	2
Marcham Farm	M13	<i>Geranium robertianum</i>	2
Marcham Farm	M13	<i>Centaurea cyanus</i>	3
Marcham Farm	M13	<i>Agrostemma githago</i>	12
Marcham Farm	M13	<i>Jacobaea vulgaris</i>	3
Marcham Farm	M13	<i>Lamium album</i>	2
Marcham Farm	M13	<i>Lamium purpureum</i>	2
Marcham Farm	M13	<i>Leucanthemum vulgare</i>	2
Marcham Farm	M13	<i>Malva neglecta</i>	2
Marcham Farm	M13	<i>Matricaria discoidea</i>	4
Marcham Farm	M13	<i>Pulicaria dysenterica</i>	2
Marcham Farm	M13	<i>Senecio vulgaris</i>	2
Marcham Farm	M13	<i>Taraxacum officinale</i>	6
Marcham Farm	M13	<i>Trifolium repens</i>	5
Marcham Farm	M13	<i>Veronica persica</i>	2
Marcham Farm	M13	<i>Viola arvensis</i>	2
Marcham Farm	M14	<i>Leucanthemum vulgare</i>	10
Marcham Farm	M14	<i>Carduus nutans</i>	3
Marcham Farm	M14	<i>Echium vulgare</i>	2
Marcham Farm	M14	<i>Geranium molle</i>	2
Marcham Farm	M14	<i>Glechoma hederacea</i>	2
Marcham Farm	M14	<i>Jacobaea vulgaris</i>	1
Marcham Farm	M14	<i>Lotus corniculatus</i>	4
Marcham Farm	M14	<i>Myosotis arvensis</i>	2
Marcham Farm	M14	<i>Papaver rhoeas</i>	2

Marcham Farm	M14	<i>Silene latifolia</i>	3
Marcham Farm	M14	<i>Sinapsis arvensis</i>	3
Marcham Farm	M14	<i>Rosa sp.</i>	2
Marcham Farm	M14	<i>Stellaria media</i>	2
Marcham Farm	M14	<i>Taraxacum officinale</i>	1
Marcham Farm	M14	<i>Teesdalia nudicaulis</i>	3
Marcham Farm	M14	<i>Trifolium pratense</i>	4
Marcham Farm	M14	<i>Trifolium repens</i>	3
Marcham Farm	M14	<i>Veronica persica</i>	2
Marcham Farm	M14	<i>Vicia sativa</i>	3
Marcham Farm	M15	<i>Silene dioica</i>	2
Marcham Farm	M15	<i>Anthriscus sylvestris</i>	2
Marcham Farm	M15	<i>Bellis perennis</i>	2
Marcham Farm	M15	<i>Brassica napus</i>	5
Marcham Farm	M15	<i>Echium vulgare</i>	2
Marcham Farm	M15	<i>Geranium molle</i>	2
Marcham Farm	M15	<i>Glechoma hederacea</i>	2
Marcham Farm	M15	<i>Geranium sp.</i>	3
Marcham Farm	M15	<i>Daucus carota</i>	3
Marcham Farm	M15	<i>Daucus carota</i>	2
Marcham Farm	M15	<i>Jacobaea vulgaris</i>	1
Marcham Farm	M15	<i>Lamium album</i>	2
Marcham Farm	M15	<i>Lamium purpureum</i>	2
Marcham Farm	M15	<i>Leucanthemum vulgare</i>	2
Marcham Farm	M15	<i>Lotus corniculatus</i>	4
Marcham Farm	M15	<i>Myosotis arvensis</i>	2
Marcham Farm	M15	<i>Papaver rhoeas</i>	1
Marcham Farm	M15	<i>Sinapsis arvensis</i>	1
Marcham Farm	M15	<i>Taraxacum officinale</i>	1
Marcham Farm	M15	<i>Trifolium pratense</i>	2
Marcham Farm	M15	<i>Trifolium repens</i>	4
Marcham Farm	M15	<i>Veronica persica</i>	2
Middle Farm	M1	<i>Anthriscus sylvestris</i>	4
Middle Farm	M1	<i>Arum maculatum</i>	1
Middle Farm	M1	<i>Convolvulus arvensis</i>	1
Middle Farm	M1	<i>Epilobium hirsutum</i>	1
Middle Farm	M1	<i>Geranium molle</i>	2
Middle Farm	M1	<i>Geranium robertianum</i>	1
Middle Farm	M1	<i>Heracleum sphondylium</i>	4
Middle Farm	M1	<i>Matricaria discoidea</i>	4
Middle Farm	M1	<i>Myosotis arvensis</i>	1
Middle Farm	M1	<i>Papaver rhoeas</i>	2
Middle Farm	M1	<i>Ranunculus acris</i>	1

Middle Farm	M1	<i>Rubus fruticosus</i>	1
Middle Farm	M1	<i>Senecio vulgaris</i>	4
Middle Farm	M1	<i>Silene latifolia</i>	1
Middle Farm	M1	<i>Stachys sylvatica</i>	2
Middle Farm	M1	<i>Taraxacum officinale</i>	5
Middle Farm	M1	<i>Trifolium repens</i>	5
Middle Farm	M2	<i>Veronica persica</i>	2
Middle Farm	M2	<i>Anthriscus sylvestris</i>	4
Middle Farm	M2	<i>Calystegia sepium</i>	2
Middle Farm	M2	<i>Calystegia silvatica</i>	1
Middle Farm	M2	<i>Epilobium hirsutum</i>	2
Middle Farm	M2	<i>Geranium molle</i>	5
Middle Farm	M2	<i>Myosotis arvensis</i>	2
Middle Farm	M2	<i>Papaver rhoeas</i>	3
Middle Farm	M2	<i>Ranunculus acris</i>	3
Middle Farm	M2	<i>Ranunculus repens</i>	1
Middle Farm	M2	<i>Rosa acicularis</i>	2
Middle Farm	M2	<i>Silene latifolia</i>	1
Middle Farm	M2	<i>Stachys sylvatica</i>	2
Middle Farm	M2	<i>Taraxacum officinale</i>	2
Middle Farm	M2	<i>Trifolium repens</i>	5
Middle Farm	M3	<i>Anthriscus sylvestris</i>	4
Middle Farm	M3	<i>Anagallis arvensis</i>	1
Middle Farm	M3	<i>Calystegia sepium</i>	1
Middle Farm	M3	<i>Calystegia silvatica</i>	2
Middle Farm	M3	<i>Convolvulus arvensis</i>	1
Middle Farm	M3	<i>Epilobium hirsutum</i>	1
Middle Farm	M3	<i>Heracleum sphondylium</i>	3
Middle Farm	M3	<i>Matricaria discoidea</i>	4
Middle Farm	M3	<i>Papaver rhoeas</i>	3
Middle Farm	M3	<i>Ranunculus acris</i>	3
Middle Farm	M3	<i>Rubus fruticosus</i>	5
Middle Farm	M3	<i>Senecio vulgaris</i>	1
Middle Farm	M3	<i>Sinapsis arvensis</i>	1
Middle Farm	M3	<i>Sonchus oleraceus</i>	1
Middle Farm	M3	<i>Stachys sylvatica</i>	2
Middle Farm	M3	<i>Taraxacum officinale</i>	1
Middle Farm	M3	<i>Trifolium repens</i>	4
Middle Farm	M3	<i>Veronica persica</i>	3
Middle Farm	M4	<i>Anthriscus sylvestris</i>	2
Middle Farm	M4	<i>Veronica chamaedrys</i>	3
Middle Farm	M4	<i>Heracleum sphondylium</i>	1
Middle Farm	M4	<i>Sambucus nigra</i>	2

Middle Farm	M4	<i>Daucus carota</i>	3
Middle Farm	M4	<i>Calystegia silvatica</i>	2
Middle Farm	M5	<i>Cirsium arvense</i>	3
Middle Farm	M5	<i>Cirsium palustre</i>	3
Middle Farm	M5	<i>Crataegus monogyna</i>	3
Middle Farm	M5	<i>Matricaria discoidea</i>	3
Middle Farm	M5	<i>Myosotis arvensis</i>	2
Middle Farm	M5	<i>Papaver rhoeas</i>	1
Middle Farm	M5	<i>Rosa acicularis</i>	2
Middle Farm	M5	<i>Rubus fruticosus</i>	4
Middle Farm	M5	<i>Sambucus nigra</i>	3
Middle Farm	M5	<i>Silene latifolia</i>	2
Middle Farm	M5	<i>Sinapsis arvensis</i>	1
Middle Farm	M5	<i>Stachys sylvatica</i>	2
Middle Farm	M5	<i>Veronica persica</i>	3
Middle Farm	M6	<i>Crataegus monogyna</i>	4
Middle Farm	M6	<i>Anthriscus sylvestris</i>	3
Middle Farm	M6	<i>Brassica napus</i>	9
Middle Farm	M6	<i>Cirsium arvense</i>	2
Middle Farm	M6	<i>Geranium molle</i>	6
Middle Farm	M6	<i>Glechoma hederacea</i>	1
Middle Farm	M6	<i>Heracleum sphondylium</i>	3
Middle Farm	M6	<i>Matricaria discoidea</i>	3
Middle Farm	M6	<i>Medicago lupulina</i>	3
Middle Farm	M6	<i>Myosotis arvensis</i>	2
Middle Farm	M6	<i>Papaver rhoeas</i>	2
Middle Farm	M6	<i>Rubus fruticosus</i>	3
Middle Farm	M6	<i>Sambucus nigra</i>	2
Middle Farm	M6	<i>Senecio vulgaris</i>	3
Middle Farm	M6	<i>Silene latifolia</i>	2
Middle Farm	M6	<i>Sinapsis arvensis</i>	2
Middle Farm	M6	<i>Sinapsis arvensis</i>	2
Middle Farm	M6	<i>Stellaria media</i>	3
Middle Farm	M6	<i>Taraxacum officinale</i>	3
Middle Farm	M6	<i>Teesdalia nudicaulis</i>	2
Middle Farm	M6	<i>Trifolium repens</i>	3
Middle Farm	M6	<i>Veronica persica</i>	2
Middle Farm	M7	<i>Taraxacum officinale</i>	2
Middle Farm	M7	<i>Anthriscus sylvestris</i>	4
Middle Farm	M7	<i>Brassica napus</i>	10
Middle Farm	M7	<i>Cirsium palustre</i>	2
Middle Farm	M7	<i>Crataegus monogyna</i>	3
Middle Farm	M7	<i>Geranium molle</i>	2

Middle Farm	M7	<i>Heracleum sphondylium</i>	3
Middle Farm	M7	<i>Matricaria discoidea</i>	3
Middle Farm	M7	<i>Medicago lupulina</i>	3
Middle Farm	M7	<i>Papaver rhoeas</i>	3
Middle Farm	M7	<i>Ranunculus repens</i>	2
Middle Farm	M7	<i>Rubus fruticosus</i>	4
Middle Farm	M7	<i>Sambucus nigra</i>	2
Middle Farm	M7	<i>Silene latifolia</i>	2
Middle Farm	M7	<i>Sinapsis arvensis</i>	2
Middle Farm	M7	<i>Teesdalia nudicaulis</i>	2
Middle Farm	M7	<i>Trifolium repens</i>	3
Middle Farm	M8	<i>Crataegus monogyna</i>	2
Middle Farm	M8	<i>Anthriscus sylvestris</i>	3
Middle Farm	M8	<i>Brassica napus</i>	10
Middle Farm	M8	<i>Geranium molle</i>	8
Middle Farm	M8	<i>Heracleum sphondylium</i>	2
Middle Farm	M8	<i>Hieracium sp.</i>	1
Middle Farm	M8	<i>Medicago lupulina</i>	3
Middle Farm	M8	<i>Papaver rhoeas</i>	2
Middle Farm	M8	<i>Ranunculus acris</i>	1
Middle Farm	M8	<i>Ranunculus repens</i>	1
Middle Farm	M8	<i>Sinapsis arvensis</i>	2
Middle Farm	M8	<i>Sinapsis arvensis</i>	2
Middle Farm	M8	<i>Teesdalia nudicaulis</i>	3
Middle Farm	M8	<i>Trifolium repens</i>	3
Middle Farm	M8	<i>Veronica persica</i>	4
Middle Farm	M8	<i>Viburnum</i>	2
Middle Farm	M8	<i>Viola arvensis</i>	2
Middle Farm	M9	<i>Taraxacum officinale</i>	5
Middle Farm	M9	<i>Cirsium arvense</i>	1
Middle Farm	M9	<i>Cirsium palustre</i>	2
Middle Farm	M9	<i>Geranium molle</i>	3
Middle Farm	M9	<i>Hieracium sp.</i>	1
Middle Farm	M9	<i>Papaver rhoeas</i>	1
Middle Farm	M9	<i>Rubus fruticosus</i>	2
Middle Farm	M9	<i>Stellaria media</i>	2
Middle Farm	M10	<i>Taraxacum officinale</i>	2
Middle Farm	M10	<i>Cirsium arvense</i>	2
Middle Farm	M10	<i>Crataegus monogyna</i>	3
Middle Farm	M10	<i>Glechoma hederacea</i>	2
Middle Farm	M10	<i>Geranium sp.</i>	1
Middle Farm	M10	<i>Myosotis arvensis</i>	1
Middle Farm	M10	<i>Papaver rhoeas</i>	2

Middle Farm	M10	<i>Ranunculus repens</i>	1
Middle Farm	M10	<i>Rubus fruticosus</i>	6
Middle Farm	M10	<i>Silene latifolia</i>	2
Middle Farm	M10	<i>Silene vulgaris</i>	1
Middle Farm	M10	<i>Sinapsis arvensis</i>	2
Middle Farm	M10	<i>Stellaria media</i>	3
Middle Farm	M10	<i>Trifolium repens</i>	6
Middle Farm	M11	<i>Geranium molle</i>	8
Middle Farm	M11	<i>Cirsium arvense</i>	1
Middle Farm	M11	<i>Heracleum sphondylium</i>	1
Middle Farm	M11	<i>Lamium purpureum</i>	3
Middle Farm	M11	<i>Malus domestica</i>	2
Middle Farm	M11	<i>Papaver rhoeas</i>	1
Middle Farm	M11	<i>Ranunculus acris</i>	2
Middle Farm	M11	<i>Silene vulgaris</i>	1
Middle Farm	M11	<i>Sinapsis arvensis</i>	3
Middle Farm	M11	<i>Taraxacum officinale</i>	3
Middle Farm	M11	<i>Teesdalia nudicaulis</i>	3
Middle Farm	M11	<i>Ulex europaeus</i>	2
Middle Farm	M11	<i>Veronica persica</i>	3
Middle Farm	M12	<i>Rosa sp.</i>	1
Middle Farm	M12	<i>Anthriscus sylvestris</i>	3
Middle Farm	M12	<i>Brassica napus</i>	10
Middle Farm	M12	<i>Calystegia silvatica</i>	2
Middle Farm	M12	<i>Convolvulus arvensis</i>	1
Middle Farm	M12	<i>Crataegus monogyna</i>	4
Middle Farm	M12	<i>Geranium molle</i>	7
Middle Farm	M12	<i>Heracleum sphondylium</i>	1
Middle Farm	M12	<i>Lamium purpureum</i>	2
Middle Farm	M12	<i>Matricaria discoidea</i>	3
Middle Farm	M12	<i>Papaver rhoeas</i>	1
Middle Farm	M12	<i>Rubus fruticosus</i>	3
Middle Farm	M12	<i>Senecio vulgaris</i>	3
Middle Farm	M12	<i>Silene latifolia</i>	2
Middle Farm	M12	<i>Silene vulgaris</i>	1
Middle Farm	M12	<i>Sinapsis arvensis</i>	1
Middle Farm	M12	<i>Sinapsis arvensis</i>	2
Middle Farm	M12	<i>Stachys sylvatica</i>	3
Middle Farm	M12	<i>Taraxacum officinale</i>	4
Middle Farm	M12	<i>Teesdalia nudicaulis</i>	3
Middle Farm	M12	<i>Trifolium repens</i>	2
Middle Farm	M12	<i>Veronica persica</i>	3
Middle Farm	M13	<i>Brassica napus</i>	10

Middle Farm	M13	<i>Anthriscus sylvestris</i>	2
Middle Farm	M13	<i>Cirsium arvense</i>	1
Middle Farm	M13	<i>Crataegus monogyna</i>	3
Middle Farm	M13	<i>Geranium molle</i>	5
Middle Farm	M13	<i>Heracleum sphondylium</i>	2
Middle Farm	M13	<i>Matricaria discoidea</i>	5
Middle Farm	M13	<i>Myosotis arvensis</i>	2
Middle Farm	M13	<i>Papaver rhoeas</i>	2
Middle Farm	M13	<i>Silene latifolia</i>	2
Middle Farm	M13	<i>Sinapsis arvensis</i>	2
Middle Farm	M13	<i>Taraxacum officinale</i>	2
Middle Farm	M13	<i>Veronica arvensis</i>	2
Middle Farm	M13	<i>Veronica persica</i>	2
Middle Farm	M14	<i>Veronica persica</i>	6
Middle Farm	M14	<i>Anthriscus sylvestris</i>	4
Middle Farm	M14	<i>Brassica napus</i>	10
Middle Farm	M14	<i>Convolvulus arvensis</i>	1
Middle Farm	M14	<i>Crataegus monogyna</i>	3
Middle Farm	M14	<i>Geranium molle</i>	4
Middle Farm	M14	<i>Heracleum sphondylium</i>	2
Middle Farm	M14	<i>Lamium purpureum</i>	3
Middle Farm	M14	<i>Matricaria discoidea</i>	4
Middle Farm	M14	<i>Myosotis arvensis</i>	2
Middle Farm	M14	<i>Papaver rhoeas</i>	2
Middle Farm	M14	<i>Silene latifolia</i>	2
Middle Farm	M14	<i>Sinapsis arvensis</i>	2
Middle Farm	M15	<i>Brassica napus</i>	10
Middle Farm	M15	<i>Anthriscus sylvestris</i>	2
Middle Farm	M15	<i>Crataegus monogyna</i>	3
Middle Farm	M15	<i>Geranium molle</i>	4
Middle Farm	M15	<i>Heracleum sphondylium</i>	2
Middle Farm	M15	<i>Hyacinthoides hispanica</i>	3
Middle Farm	M15	<i>Matricaria discoidea</i>	4
Middle Farm	M15	<i>Myosotis arvensis</i>	3
Middle Farm	M15	<i>Papaver rhoeas</i>	2
Middle Farm	M15	<i>Ranunculus acris</i>	1
Middle Farm	M15	<i>Rubus fruticosus</i>	4
Middle Farm	M15	<i>Silene latifolia</i>	2
Middle Farm	M15	<i>Sinapsis arvensis</i>	2
Middle Farm	M15	<i>Taraxacum officinale</i>	2
Middle Farm	M15	<i>Teesdalia nudicaulis</i>	2
Middle Farm	M15	<i>Veronica persica</i>	4
Middle Farm	M15	<i>Viola arvensis</i>	4

Old Farm Dorn	OD1	<i>Veronica persica</i>	2
Old Farm Dorn	OD1	<i>Anthemis austriaca</i>	2
Old Farm Dorn	OD1	<i>Anthriscus sylvestris</i>	4
Old Farm Dorn	OD1	<i>Arctium minus</i>	1
Old Farm Dorn	OD1	<i>Convolvulus arvensis</i>	1
Old Farm Dorn	OD1	<i>Crataegus monogyna</i>	2
Old Farm Dorn	OD1	<i>Geranium molle</i>	3
Old Farm Dorn	OD1	<i>Glechoma hederacea</i>	1
Old Farm Dorn	OD1	<i>Heracleum sphondylium</i>	3
Old Farm Dorn	OD1	<i>Matricaria discoidea</i>	2
Old Farm Dorn	OD1	<i>Myosotis arvensis</i>	1
Old Farm Dorn	OD1	<i>Papaver rhoeas</i>	4
Old Farm Dorn	OD1	<i>Rubus fruticosus</i>	4
Old Farm Dorn	OD1	<i>Sambucus nigra</i>	2
Old Farm Dorn	OD2	<i>Senecio vulgaris</i>	4
Old Farm Dorn	OD2	<i>Anthriscus sylvestris</i>	4
Old Farm Dorn	OD2	<i>Carduus nutans</i>	1
Old Farm Dorn	OD2	<i>Cirsium palustre</i>	1
Old Farm Dorn	OD2	<i>Convolvulus arvensis</i>	1
Old Farm Dorn	OD2	<i>Epilobium hirsutum</i>	3
Old Farm Dorn	OD2	<i>Geranium molle</i>	3
Old Farm Dorn	OD2	<i>Heracleum sphondylium</i>	3
Old Farm Dorn	OD2	<i>Hieracium sp.</i>	1
Old Farm Dorn	OD2	<i>Matricaria discoidea</i>	2
Old Farm Dorn	OD2	<i>Medicago lupulina</i>	2
Old Farm Dorn	OD2	<i>Papaver rhoeas</i>	2
Old Farm Dorn	OD2	<i>Rubus fruticosus</i>	2
Old Farm Dorn	OD2	<i>Sambucus nigra</i>	1
Old Farm Dorn	OD2	<i>Taraxacum officinale</i>	1
Old Farm Dorn	OD2	<i>Veronica persica</i>	2
Old Farm Dorn	OD3	<i>Brassica napus</i>	5
Old Farm Dorn	OD3	<i>Angelica sylvestris</i>	2
Old Farm Dorn	OD3	<i>Cirsium palustre</i>	1
Old Farm Dorn	OD3	<i>Crataegus monogyna</i>	3
Old Farm Dorn	OD3	<i>Epilobium hirsutum</i>	1
Old Farm Dorn	OD3	<i>Geranium molle</i>	2
Old Farm Dorn	OD3	<i>Heracleum sphondylium</i>	2
Old Farm Dorn	OD3	<i>Lamium album</i>	2
Old Farm Dorn	OD3	<i>Ranunculus acris</i>	2
Old Farm Dorn	OD3	<i>Rubus fruticosus</i>	5
Old Farm Dorn	OD3	<i>Taraxacum officinale</i>	1
Old Farm Dorn	OD4	<i>Senecio vulgaris</i>	2
Old Farm Dorn	OD4	<i>Anthriscus sylvestris</i>	2

Old Farm Dorn	OD4	<i>Brassica napus</i>	5
Old Farm Dorn	OD4	<i>Cirsium palustre</i>	1
Old Farm Dorn	OD4	<i>Crataegus monogyna</i>	5
Old Farm Dorn	OD4	<i>Epilobium hirsutum</i>	3
Old Farm Dorn	OD4	<i>Geranium molle</i>	4
Old Farm Dorn	OD4	<i>Glechoma hederacea</i>	2
Old Farm Dorn	OD4	<i>Lamium album</i>	3
Old Farm Dorn	OD4	<i>Lotus corniculatus</i>	1
Old Farm Dorn	OD4	<i>Matricaria discoidea</i>	2
Old Farm Dorn	OD4	<i>Medicago lupulina</i>	2
Old Farm Dorn	OD4	<i>Myosotis arvensis</i>	2
Old Farm Dorn	OD4	<i>Ranunculus acris</i>	2
Old Farm Dorn	OD4	<i>Rosa acicularis</i>	2
Old Farm Dorn	OD4	<i>Rubus fruticosus</i>	4
Old Farm Dorn	OD4	<i>Sinapsis arvensis</i>	2
Old Farm Dorn	OD4	<i>Stachys sylvatica</i>	1
Old Farm Dorn	OD5	<i>Lamium album</i>	2
Old Farm Dorn	OD5	<i>Anthriscus sylvestris</i>	2
Old Farm Dorn	OD5	<i>Brassica napus</i>	10
Old Farm Dorn	OD5	<i>Crataegus monogyna</i>	2
Old Farm Dorn	OD5	<i>Heracleum sphondylium</i>	4
Old Farm Dorn	OD5	<i>Lamium purpureum</i>	1
Old Farm Dorn	OD5	<i>Leucanthemum vulgare</i>	1
Old Farm Dorn	OD5	<i>Myosotis arvensis</i>	2
Old Farm Dorn	OD5	<i>Papaver rhoeas</i>	1
Old Farm Dorn	OD5	<i>Rubus fruticosus</i>	2
Old Farm Dorn	OD5	<i>Senecio vulgaris</i>	1
Old Farm Dorn	OD5	<i>Sinapsis arvensis</i>	1
Old Farm Dorn	OD5	<i>Veronica persica</i>	2
Old Farm Dorn	OD5	<i>Viola arvensis</i>	1
Old Farm Dorn	OD6	<i>Anthriscus sylvestris</i>	2
Old Farm Dorn	OD6	<i>Brassica napus</i>	5
Old Farm Dorn	OD6	<i>Cirsium palustre</i>	3
Old Farm Dorn	OD6	<i>Crataegus monogyna</i>	3
Old Farm Dorn	OD6	<i>Geranium molle</i>	2
Old Farm Dorn	OD6	<i>Heracleum sphondylium</i>	4
Old Farm Dorn	OD6	<i>Matricaria discoidea</i>	2
Old Farm Dorn	OD6	<i>Myosotis arvensis</i>	4
Old Farm Dorn	OD6	<i>Papaver rhoeas</i>	3
Old Farm Dorn	OD6	<i>Senecio vulgaris</i>	3
Old Farm Dorn	OD6	<i>Sinapsis arvensis</i>	2
Old Farm Dorn	OD6	<i>Veronica persica</i>	1
Old Farm Dorn	OD6	<i>Viola arvensis</i>	1

Old Farm Dorn	OD7	<i>Brassica napus</i>	10
Old Farm Dorn	OD7	<i>Anthemis austriaca</i>	2
Old Farm Dorn	OD7	<i>Calystegia sepium</i>	1
Old Farm Dorn	OD7	<i>Crataegus monogyna</i>	3
Old Farm Dorn	OD7	<i>Heracleum sphondylium</i>	2
Old Farm Dorn	OD7	<i>Lamium album</i>	2
Old Farm Dorn	OD7	<i>Matricaria discoidea</i>	3
Old Farm Dorn	OD7	<i>Rosa acicularis</i>	2
Old Farm Dorn	OD7	<i>Rubus fruticosus</i>	5
Old Farm Dorn	OD7	<i>Senecio vulgaris</i>	2
Old Farm Dorn	OD7	<i>Silene dioica</i>	1
Old Farm Dorn	OD7	<i>Veronica persica</i>	2
Old Farm Dorn	OD7	<i>Brassica napus</i>	2
Old Farm Dorn	OD8	<i>Brassica napus</i>	10
Old Farm Dorn	OD8	<i>Cirsium arvense</i>	2
Old Farm Dorn	OD8	<i>Crataegus monogyna</i>	4
Old Farm Dorn	OD8	<i>Lamium album</i>	1
Old Farm Dorn	OD8	<i>Myosotis arvensis</i>	2
Old Farm Dorn	OD8	<i>Sambucus nigra</i>	2
Old Farm Dorn	OD8	<i>Sinapsis arvensis</i>	2
Old Farm Dorn	OD8	<i>Stachys sylvatica</i>	4
Old Farm Dorn	OD8	<i>Taraxacum officinale</i>	1
Old Farm Dorn	OD9	<i>Crataegus monogyna</i>	3
Old Farm Dorn	OD9	<i>Anthriscus sylvestris</i>	2
Old Farm Dorn	OD9	<i>Cirsium arvense</i>	1
Old Farm Dorn	OD9	<i>Epilobium hirsutum</i>	2
Old Farm Dorn	OD9	<i>Heracleum sphondylium</i>	1
Old Farm Dorn	OD9	<i>Lamium album</i>	2
Old Farm Dorn	OD9	<i>Rubus fruticosus</i>	8
Old Farm Dorn	OD9	<i>Viburnum</i>	1
Old Farm Dorn	OD10	<i>Taraxacum officinale</i>	1
Old Farm Dorn	OD10	<i>Cirsium palustre</i>	2
Old Farm Dorn	OD10	<i>Heracleum sphondylium</i>	2
Old Farm Dorn	OD10	<i>Ranunculus repens</i>	2
Old Farm Dorn	OD10	<i>Rubus fruticosus</i>	1
Old Farm Dorn	OD11	<i>Myosotis arvensis</i>	4
Old Farm Dorn	OD11	<i>Alliaria petiolata</i>	2
Old Farm Dorn	OD11	<i>Anthriscus sylvestris</i>	4
Old Farm Dorn	OD11	<i>Argyranthemum frutescens</i>	2
Old Farm Dorn	OD11	<i>Epilobium hirsutum</i>	3
Old Farm Dorn	OD11	<i>Geranium robertianum</i>	5
Old Farm Dorn	OD11	<i>Heracleum sphondylium</i>	3
Old Farm Dorn	OD11	<i>Lamium album</i>	3

Old Farm Dorn	OD11	<i>Myosotis arvensis</i>	2
Old Farm Dorn	OD11	<i>Ranunculus acris</i>	2
Old Farm Dorn	OD11	<i>Ranunculus ficaria</i>	2
Old Farm Dorn	OD11	<i>Ranunculus repens</i>	2
Old Farm Dorn	OD11	<i>Rosa acicularis</i>	2
Old Farm Dorn	OD11	<i>Rubus fruticosus</i>	9
Old Farm Dorn	OD11	<i>Silene dioica</i>	5
Old Farm Dorn	OD11	<i>Taraxacum officinale</i>	2
Old Farm Dorn	OD11	<i>Vicia sativa</i>	4
Old Farm Dorn	OD12	<i>Crataegus monogyna</i>	2
Old Farm Dorn	OD12	<i>Cirsium arvense</i>	2
Old Farm Dorn	OD12	<i>Cirsium palustre</i>	1
Old Farm Dorn	OD12	<i>Geranium molle</i>	1
Old Farm Dorn	OD12	<i>Papaver rhoeas</i>	2
Old Farm Dorn	OD12	<i>Sinapsis arvensis</i>	1
Old Farm Dorn	OD12	<i>Stellaria media</i>	1
Old Farm Dorn	OD12	<i>Taraxacum officinale</i>	4
Old Farm Dorn	OD13	<i>Anthriscus sylvestris</i>	3
Old Farm Dorn	OD13	<i>Cirsium palustre</i>	1
Old Farm Dorn	OD13	<i>Convolvulus arvensis</i>	1
Old Farm Dorn	OD13	<i>Crataegus monogyna</i>	6
Old Farm Dorn	OD13	<i>Lamium album</i>	2
Old Farm Dorn	OD13	<i>Rubus fruticosus</i>	3
Old Farm Dorn	OD13	<i>Sambucus nigra</i>	1
Old Farm Dorn	OD14	<i>Crataegus monogyna</i>	3
Old Farm Dorn	OD14	<i>Cirsium arvense</i>	1
Old Farm Dorn	OD14	<i>Cirsium palustre</i>	2
Old Farm Dorn	OD14	<i>Hyacinthoides hispanica</i>	1
Old Farm Dorn	OD14	<i>Jacobaea vulgaris</i>	1
Old Farm Dorn	OD14	<i>Lamium album</i>	2
Old Farm Dorn	OD14	<i>Lotus corniculatus</i>	1
Old Farm Dorn	OD14	<i>Myosotis arvensis</i>	2
Old Farm Dorn	OD14	<i>Myosotis arvensis</i>	1
Old Farm Dorn	OD14	<i>Taraxacum officinale</i>	1
Old Farm Dorn	OD14	<i>Trifolium repens</i>	2
Old Farm Dorn	OD14	<i>Veronica persica</i>	3
Old Farm Dorn	OD14	<i>Vicia sepium</i>	1
Old Farm Dorn	OD15	<i>Crataegus monogyna</i>	3
Old Farm Dorn	OD15	<i>Cirsium arvense</i>	1
Old Farm Dorn	OD15	<i>Cirsium palustre</i>	1
Old Farm Dorn	OD15	<i>Glechoma hederacea</i>	1
Old Farm Dorn	OD15	<i>Ranunculus acris</i>	1
Old Farm Dorn	OD15	<i>Rubus fruticosus</i>	1

Old Farm Dorn	OD15	<i>Sambucus nigra</i>	1
Old Farm Dorn	OD15	<i>Trifolium repens</i>	1
Pennyhooks	P1	<i>Bellis perennis</i>	7
Pennyhooks	P1	<i>Anthriscus sylvestris</i>	4
Pennyhooks	P1	<i>Cirsium arvense</i>	1
Pennyhooks	P1	<i>Convolvulus arvensis</i>	1
Pennyhooks	P1	<i>Crataegus monogyna</i>	5
Pennyhooks	P1	<i>Geranium molle</i>	3
Pennyhooks	P1	<i>Glechoma hederacea</i>	3
Pennyhooks	P1	<i>Lamium album</i>	4
Pennyhooks	P1	<i>Ranunculus acris</i>	5
Pennyhooks	P1	<i>Rosa canina</i>	2
Pennyhooks	P1	<i>Rubus fruticosus</i>	6
Pennyhooks	P1	<i>Silene latifolia</i>	1
Pennyhooks	P1	<i>Taraxacum officinale</i>	7
Pennyhooks	P1	<i>Trifolium repens</i>	5
Pennyhooks	P1	<i>Veronica chamaedrys</i>	4
Pennyhooks	P2	<i>Lamium purpureum</i>	2
Pennyhooks	P2	<i>Anthriscus sylvestris</i>	4
Pennyhooks	P2	<i>Bellis perennis</i>	6
Pennyhooks	P2	<i>Cirsium arvense</i>	1
Pennyhooks	P2	<i>Crataegus monogyna</i>	5
Pennyhooks	P2	<i>Geranium molle</i>	1
Pennyhooks	P2	<i>Glechoma hederacea</i>	2
Pennyhooks	P2	<i>Lamium album</i>	3
Pennyhooks	P2	<i>Medicago lupulina</i>	3
Pennyhooks	P2	<i>Ranunculus acris</i>	5
Pennyhooks	P2	<i>Rosa acicularis</i>	1
Pennyhooks	P2	<i>Rubus fruticosus</i>	2
Pennyhooks	P2	<i>Silene latifolia</i>	1
Pennyhooks	P2	<i>Taraxacum officinale</i>	5
Pennyhooks	P2	<i>Trifolium repens</i>	1
Pennyhooks	P2	<i>Veronica chamaedrys</i>	4
Pennyhooks	P2	<i>Veronica persica</i>	2
Pennyhooks	P3	<i>Ranunculus acris</i>	5
Pennyhooks	P3	<i>Anthriscus sylvestris</i>	4
Pennyhooks	P3	<i>Calystegia silvatica</i>	2
Pennyhooks	P3	<i>Cirsium palustre</i>	3
Pennyhooks	P3	<i>Convolvulus arvensis</i>	5
Pennyhooks	P3	<i>Crataegus monogyna</i>	5
Pennyhooks	P3	<i>Epilobium hirsutum</i>	5
Pennyhooks	P3	<i>Epilobium strictum</i>	2
Pennyhooks	P3	<i>Heracleum sphondylium</i>	5

Pennyhooks	P3	<i>Knautia arvensis</i>	1
Pennyhooks	P3	<i>Lamium album</i>	3
Pennyhooks	P3	<i>Lychnis flos-cuculi</i>	1
Pennyhooks	P3	<i>Malus domestica</i>	2
Pennyhooks	P3	<i>Myosotis arvensis</i>	3
Pennyhooks	P3	<i>Prunus avium</i>	2
Pennyhooks	P3	<i>Pyrus communis</i>	2
Pennyhooks	P3	<i>Ranunculus repens</i>	2
Pennyhooks	P3	<i>Rubus fruticosus</i>	5
Pennyhooks	P3	<i>Sambucus nigra</i>	3
Pennyhooks	P3	<i>Silene dioica</i>	2
Pennyhooks	P3	<i>Taraxacum officinale</i>	5
Pennyhooks	P3	<i>Trifolium repens</i>	2
Pennyhooks	P4	<i>Ranunculus acris</i>	4
Pennyhooks	P4	<i>Calystegia sepium</i>	2
Pennyhooks	P4	<i>Cardamine pratensis</i>	3
Pennyhooks	P4	<i>Cirsium palustre</i>	2
Pennyhooks	P4	<i>Crataegus monogyna</i>	5
Pennyhooks	P4	<i>Epilobium hirsutum</i>	4
Pennyhooks	P4	<i>Glechoma hederacea</i>	3
Pennyhooks	P4	<i>Heracleum sphondylium</i>	1
Pennyhooks	P4	<i>Mentha aquatica</i>	4
Pennyhooks	P4	<i>Primula veris</i>	3
Pennyhooks	P4	<i>Ranunculus acris</i>	2
Pennyhooks	P4	<i>Ranunculus repens</i>	4
Pennyhooks	P4	<i>Sambucus nigra</i>	2
Pennyhooks	P4	<i>Solanum dulcamara</i>	2
Pennyhooks	P5	<i>Ranunculus acris</i>	5
Pennyhooks	P5	<i>Allium ursinum</i>	2
Pennyhooks	P5	<i>Anthriscus sylvestris</i>	5
Pennyhooks	P5	<i>Calystegia sepium</i>	3
Pennyhooks	P5	<i>Cirsium arvense</i>	5
Pennyhooks	P5	<i>Crataegus monogyna</i>	5
Pennyhooks	P5	<i>Epilobium hirsutum</i>	5
Pennyhooks	P5	<i>Galium verum</i>	3
Pennyhooks	P5	<i>Heracleum sphondylium</i>	5
Pennyhooks	P5	<i>Lamium album</i>	4
Pennyhooks	P5	<i>Ranunculus acris</i>	5
Pennyhooks	P5	<i>Solanum dulcamara</i>	2
Pennyhooks	P5	<i>Stellaria graminea</i>	3
Pennyhooks	P5	<i>Symphytum officinale</i>	7
Pennyhooks	P5	<i>Tanacetum parthenium</i>	8
Pennyhooks	P5	<i>Taraxacum officinale</i>	4

Pennyhooks	P5	<i>Trifolium repens</i>	4
Pennyhooks	P6	<i>Primula veris</i>	2
Pennyhooks	P6	<i>Anthriscus sylvestris</i>	2
Pennyhooks	P6	<i>Bellis perennis</i>	2
Pennyhooks	P6	<i>Calystegia sepium</i>	3
Pennyhooks	P6	<i>Cardamine pratensis</i>	2
Pennyhooks	P6	<i>Cirsium arvense</i>	5
Pennyhooks	P6	<i>Cirsium palustre</i>	2
Pennyhooks	P6	<i>Crataegus monogyna</i>	3
Pennyhooks	P6	<i>Dipsacus fullonum</i>	1
Pennyhooks	P6	<i>Epilobium hirsutum</i>	5
Pennyhooks	P6	<i>Galium verum</i>	3
Pennyhooks	P6	<i>Heracleum sphondylium</i>	3
Pennyhooks	P6	<i>Knautia arvensis</i>	2
Pennyhooks	P6	<i>Mentha aquatica</i>	3
Pennyhooks	P6	<i>Geranium robertianum</i>	2
Pennyhooks	P6	<i>Ranunculus acris</i>	7
Pennyhooks	P6	<i>Ranunculus repens</i>	5
Pennyhooks	P6	<i>Rubus fruticosus</i>	6
Pennyhooks	P6	<i>Solanum dulcamara</i>	2
Pennyhooks	P6	<i>Stachys sylvatica</i>	2
Pennyhooks	P6	<i>Stellaria graminea</i>	3
Pennyhooks	P6	<i>Symphytum officinale</i>	2
Pennyhooks	P6	<i>Tanacetum parthenium</i>	8
Pennyhooks	P6	<i>Taraxacum officinale</i>	6
Pennyhooks	P6	<i>Trifolium repens</i>	6
Pennyhooks	P7	<i>Anthriscus sylvestris</i>	5
Pennyhooks	P7	<i>Bellis perennis</i>	6
Pennyhooks	P7	<i>Cirsium palustre</i>	1
Pennyhooks	P7	<i>Crataegus monogyna</i>	5
Pennyhooks	P7	<i>Geranium molle</i>	5
Pennyhooks	P7	<i>Heracleum sphondylium</i>	2
Pennyhooks	P7	<i>Lamium purpureum</i>	2
Pennyhooks	P7	<i>Ranunculus acris</i>	5
Pennyhooks	P7	<i>Rubus fruticosus</i>	2
Pennyhooks	P7	<i>Sambucus nigra</i>	2
Pennyhooks	P7	<i>Taraxacum officinale</i>	6
Pennyhooks	P7	<i>Trifolium repens</i>	5
Pennyhooks	P8	<i>Ranunculus acris</i>	7
Pennyhooks	P8	<i>Anthriscus sylvestris</i>	5
Pennyhooks	P8	<i>Bellis perennis</i>	5
Pennyhooks	P8	<i>Cirsium arvense</i>	2
Pennyhooks	P8	<i>Crataegus monogyna</i>	5

Pennyhooks	P8	<i>Geranium molle</i>	4
Pennyhooks	P8	<i>Glechoma hederacea</i>	2
Pennyhooks	P8	<i>Heracleum sphondylium</i>	2
Pennyhooks	P8	<i>Lamium album</i>	1
Pennyhooks	P8	<i>Lamium purpureum</i>	2
Pennyhooks	P8	<i>Ranunculus ficaria</i>	2
Pennyhooks	P8	<i>Rosa acicularis</i>	1
Pennyhooks	P8	<i>Rubus fruticosus</i>	6
Pennyhooks	P8	<i>Stellaria media</i>	3
Pennyhooks	P8	<i>Taraxacum officinale</i>	5
Pennyhooks	P8	<i>Trifolium repens</i>	5
Pennyhooks	P9	<i>Geranium molle</i>	3
Pennyhooks	P9	<i>Anthriscus sylvestris</i>	5
Pennyhooks	P9	<i>Bellis perennis</i>	7
Pennyhooks	P9	<i>Cirsium palustre</i>	1
Pennyhooks	P9	<i>Convolvulus arvensis</i>	1
Pennyhooks	P9	<i>Crataegus monogyna</i>	3
Pennyhooks	P9	<i>Geranium molle</i>	1
Pennyhooks	P9	<i>Lamium album</i>	3
Pennyhooks	P9	<i>Ranunculus acris</i>	3
Pennyhooks	P9	<i>Rubus fruticosus</i>	6
Pennyhooks	P9	<i>Sambucus nigra</i>	2
Pennyhooks	P9	<i>Taraxacum officinale</i>	5
Pennyhooks	P9	<i>Trifolium repens</i>	5
Pennyhooks	P10	<i>Ranunculus acris</i>	5
Pennyhooks	P10	<i>Anthriscus sylvestris</i>	4
Pennyhooks	P10	<i>Bellis perennis</i>	5
Pennyhooks	P10	<i>Calystegia silvatica</i>	2
Pennyhooks	P10	<i>Cirsium palustre</i>	2
Pennyhooks	P10	<i>Cirsium vulgare</i>	1
Pennyhooks	P10	<i>Convolvulus arvensis</i>	2
Pennyhooks	P10	<i>Crataegus monogyna</i>	5
Pennyhooks	P10	<i>Geranium molle</i>	3
Pennyhooks	P10	<i>Taraxacum officinale</i>	6
Pennyhooks	P10	<i>Trifolium repens</i>	4
Pennyhooks	P11	<i>Ranunculus acris</i>	8
Pennyhooks	P11	<i>Calystegia sepium</i>	3
Pennyhooks	P11	<i>Cardamine pratensis</i>	2
Pennyhooks	P11	<i>Cirsium arvense</i>	7
Pennyhooks	P11	<i>Cirsium palustre</i>	2
Pennyhooks	P11	<i>Crataegus monogyna</i>	3
Pennyhooks	P11	<i>Dipsacus fullonum</i>	1
Pennyhooks	P11	<i>Epilobium hirsutum</i>	5

Pennyhooks	P11	<i>Filipendula ulmaria</i>	2
Pennyhooks	P11	<i>Galium verum</i>	3
Pennyhooks	P11	<i>Heracleum sphondylium</i>	3
Pennyhooks	P11	<i>Knautia arvensis</i>	2
Pennyhooks	P11	<i>Mentha aquatica</i>	3
Pennyhooks	P11	<i>Ranunculus repens</i>	3
Pennyhooks	P11	<i>Rubus fruticosus</i>	7
Pennyhooks	P11	<i>Solanum dulcamara</i>	2
Pennyhooks	P11	<i>Stellaria graminea</i>	3
Pennyhooks	P11	<i>Stellaria media</i>	2
Pennyhooks	P11	<i>Symphytum officinale</i>	2
Pennyhooks	P11	<i>Tanacetum parthenium</i>	8
Pennyhooks	P11	<i>Taraxacum officinale</i>	6
Pennyhooks	P11	<i>Trifolium repens</i>	5
Pennyhooks	P12	<i>Crataegus monogyna</i>	5
Pennyhooks	P12	<i>Anthriscus sylvestris</i>	3
Pennyhooks	P12	<i>Cirsium arvense</i>	5
Pennyhooks	P12	<i>Cirsium palustre</i>	1
Pennyhooks	P12	<i>Geranium molle</i>	2
Pennyhooks	P12	<i>Glechoma hederacea</i>	2
Pennyhooks	P12	<i>Ranunculus acris</i>	2
Pennyhooks	P12	<i>Ranunculus ficaria</i>	2
Pennyhooks	P12	<i>Rosa canina</i>	2
Pennyhooks	P12	<i>Stellaria media</i>	2
Pennyhooks	P12	<i>Taraxacum officinale</i>	2
Pennyhooks	P12	<i>Trifolium repens</i>	3
Pennyhooks	P13	<i>Ranunculus acris</i>	5
Pennyhooks	P13	<i>Anthriscus sylvestris</i>	4
Pennyhooks	P13	<i>Argentina anserina</i>	5
Pennyhooks	P13	<i>Calystegia sepium</i>	3
Pennyhooks	P13	<i>Cardamine pratensis</i>	2
Pennyhooks	P13	<i>Cirsium arvense</i>	7
Pennyhooks	P13	<i>Cirsium palustre</i>	4
Pennyhooks	P13	<i>Dipsacus fullonum</i>	1
Pennyhooks	P13	<i>Epilobium hirsutum</i>	5
Pennyhooks	P13	<i>Filipendula ulmaria</i>	1
Pennyhooks	P13	<i>Heracleum sphondylium</i>	5
Pennyhooks	P13	<i>Lamium album</i>	4
Pennyhooks	P13	<i>Ranunculus repens</i>	2
Pennyhooks	P13	<i>Sonchus arvensis</i>	2
Pennyhooks	P13	<i>Symphytum officinale</i>	2
Pennyhooks	P13	<i>Tanacetum parthenium</i>	3
Pennyhooks	P13	<i>Trifolium pratense</i>	2

Pennyhooks	P13	<i>Rosa sp.</i>	2
Pennyhooks	P14	<i>Anthriscus sylvestris</i>	5
Pennyhooks	P14	<i>Ajuga reptans</i>	2
Pennyhooks	P14	<i>Argentina anserina</i>	5
Pennyhooks	P14	<i>Bellis perennis</i>	5
Pennyhooks	P14	<i>Cirsium arvense</i>	5
Pennyhooks	P14	<i>Cirsium palustre</i>	1
Pennyhooks	P14	<i>Crataegus monogyna</i>	5
Pennyhooks	P14	<i>Dipsacus fullonum</i>	2
Pennyhooks	P14	<i>Glechoma hederacea</i>	3
Pennyhooks	P14	<i>Heracleum sphondylium</i>	2
Pennyhooks	P14	<i>Lotus corniculatus</i>	3
Pennyhooks	P14	<i>Mentha aquatica</i>	5
Pennyhooks	P14	<i>Primula veris</i>	2
Pennyhooks	P14	<i>Ranunculus acris</i>	5
Pennyhooks	P14	<i>Ranunculus ficaria</i>	3
Pennyhooks	P14	<i>Rosa acicularis</i>	2
Pennyhooks	P14	<i>Rubus fruticosus</i>	6
Pennyhooks	P14	<i>Sambucus nigra</i>	1
Pennyhooks	P14	<i>Tanacetum parthenium</i>	3
Pennyhooks	P14	<i>Trifolium pratense</i>	1
Pennyhooks	P14	<i>Trifolium repens</i>	5
Pennyhooks	P14	<i>Veronica chamaedrys</i>	3
Pennyhooks	P15	<i>Crataegus monogyna</i>	5
Pennyhooks	P15	<i>Anthriscus sylvestris</i>	5
Pennyhooks	P15	<i>Cirsium arvense</i>	2
Pennyhooks	P15	<i>Cirsium palustre</i>	2
Pennyhooks	P15	<i>Filipendula ulmaria</i>	2
Pennyhooks	P15	<i>Geranium molle</i>	2
Pennyhooks	P15	<i>Glechoma hederacea</i>	3
Pennyhooks	P15	<i>Heracleum sphondylium</i>	2
Pennyhooks	P15	<i>Lotus corniculatus</i>	3
Pennyhooks	P15	<i>Ranunculus acris</i>	7
Pennyhooks	P15	<i>Rubus fruticosus</i>	3
Pennyhooks	P15	<i>Sambucus nigra</i>	2
Pennyhooks	P15	<i>Stachys sylvatica</i>	2
Pennyhooks	P15	<i>Stellaria media</i>	5
Pennyhooks	P15	<i>Taraxacum officinale</i>	5
Pennyhooks	P15	<i>Trifolium pratense</i>	2
Pennyhooks	P15	<i>Trifolium repens</i>	5
Rotherfield	R1	<i>Ranunculus acris</i>	2
Rotherfield	R1	<i>Anthriscus sylvestris</i>	2
Rotherfield	R1	<i>Brassica napus</i>	5

Rotherfield	R1	<i>Calystegia sepium</i>	4
Rotherfield	R1	<i>Cirsium arvense</i>	5
Rotherfield	R1	<i>Cirsium palustre</i>	5
Rotherfield	R1	<i>Crataegus monogyna</i>	3
Rotherfield	R1	<i>Heracleum sphondylium</i>	1
Rotherfield	R1	<i>Hieracium sp.</i>	1
Rotherfield	R1	<i>Jacobaea vulgaris</i>	1
Rotherfield	R1	<i>Lamium album</i>	2
Rotherfield	R1	<i>Lamium purpureum</i>	2
Rotherfield	R1	<i>Linum usitatissimum</i>	4
Rotherfield	R1	<i>Matricaria discoidea</i>	7
Rotherfield	R1	<i>Papaver rhoeas</i>	1
Rotherfield	R1	<i>Ranunculus repens</i>	2
Rotherfield	R1	<i>Rubus fruticosus</i>	4
Rotherfield	R1	<i>Sambucus nigra</i>	2
Rotherfield	R1	<i>Stellaria media</i>	2
Rotherfield	R1	<i>Taraxacum officinale</i>	4
Rotherfield	R1	<i>Trifolium pratense</i>	2
Rotherfield	R1	<i>Trifolium repens</i>	4
Rotherfield	R1	<i>Tripleurospermum inodorum</i>	2
Rotherfield	R2	<i>Anthriscus sylvestris</i>	4
Rotherfield	R2	<i>Capsella bursa-pastoris</i>	2
Rotherfield	R2	<i>Cirsium arvense</i>	4
Rotherfield	R2	<i>Cirsium palustre</i>	5
Rotherfield	R2	<i>Crataegus monogyna</i>	4
Rotherfield	R2	<i>Geranium molle</i>	2
Rotherfield	R2	<i>Heracleum sphondylium</i>	3
Rotherfield	R2	<i>Jacobaea vulgaris</i>	2
Rotherfield	R2	<i>Lamium album</i>	2
Rotherfield	R2	<i>Lamium purpureum</i>	3
Rotherfield	R2	<i>Linum usitatissimum</i>	5
Rotherfield	R2	<i>Matricaria discoidea</i>	7
Rotherfield	R2	<i>Myosotis arvensis</i>	3
Rotherfield	R2	<i>Ranunculus acris</i>	2
Rotherfield	R2	<i>Sambucus nigra</i>	2
Rotherfield	R2	<i>Taraxacum officinale</i>	2
Rotherfield	R2	<i>Tripleurospermum inodorum</i>	2
Rotherfield	R2	<i>Veronica persica</i>	2
Rotherfield	R3	<i>Ranunculus acris</i>	2
Rotherfield	R3	<i>Cichorium intybus</i>	5
Rotherfield	R3	<i>Cirsium arvense</i>	3
Rotherfield	R3	<i>Crataegus monogyna</i>	3
Rotherfield	R3	<i>Geranium molle</i>	2

Rotherfield	R3	<i>Heracleum sphondylium</i>	2
Rotherfield	R3	<i>Lamium album</i>	2
Rotherfield	R3	<i>Matricaria discoidea</i>	3
Rotherfield	R3	<i>Rosa canina</i>	2
Rotherfield	R3	<i>Rubus fruticosus</i>	9
Rotherfield	R3	<i>Sambucus nigra</i>	2
Rotherfield	R3	<i>Silene latifolia</i>	2
Rotherfield	R3	<i>Stachys sylvatica</i>	3
Rotherfield	R4	<i>Ranunculus acris</i>	4
Rotherfield	R4	<i>Anthriscus sylvestris</i>	4
Rotherfield	R4	<i>Centaurea nigra</i>	5
Rotherfield	R4	<i>Convolvulus arvensis</i>	3
Rotherfield	R4	<i>Crataegus monogyna</i>	4
Rotherfield	R4	<i>Conopodium majus</i>	2
Rotherfield	R4	<i>Digitalis purpurea</i>	2
Rotherfield	R4	<i>Filipendula ulmaria</i>	1
Rotherfield	R4	<i>Heracleum sphondylium</i>	3
Rotherfield	R4	<i>Jacobaea vulgaris</i>	2
Rotherfield	R4	<i>Lamium album</i>	2
Rotherfield	R4	<i>Leucanthemum vulgare</i>	4
Rotherfield	R4	<i>Medicago lupulina</i>	3
Rotherfield	R4	<i>Primula veris</i>	2
Rotherfield	R4	<i>Geranium molle</i>	2
Rotherfield	R4	<i>Rosa acicularis</i>	2
Rotherfield	R4	<i>Silene latifolia</i>	2
Rotherfield	R4	<i>Taraxacum officinale</i>	3
Rotherfield	R4	<i>Trifolium pratense</i>	3
Rotherfield	R4	<i>Trifolium repens</i>	6
Rotherfield	R4	<i>Veronica chamaedrys</i>	3
Rotherfield	R4	<i>Vicia sativa</i>	2
Rotherfield	R5	<i>Ranunculus acris</i>	2
Rotherfield	R5	<i>Anthriscus sylvestris</i>	2
Rotherfield	R5	<i>Calystegia sepium</i>	2
Rotherfield	R5	<i>Capsella bursa-pastoris</i>	2
Rotherfield	R5	<i>Rosa sp.</i>	1
Rotherfield	R5	<i>Heracleum sphondylium</i>	2
Rotherfield	R5	<i>Matricaria discoidea</i>	3
Rotherfield	R5	<i>Papaver rhoeas</i>	1
Rotherfield	R5	<i>Rubus fruticosus</i>	8
Rotherfield	R5	<i>Stellaria media</i>	2
Rotherfield	R5	<i>Taraxacum officinale</i>	1
Rotherfield	R6	<i>Crataegus monogyna</i>	4
Rotherfield	R6	<i>Anthriscus sylvestris</i>	2

Rotherfield	R6	<i>Centaurea nigra</i>	2
Rotherfield	R6	<i>Heracleum sphondylium</i>	2
Rotherfield	R6	<i>Leucanthemum vulgare</i>	2
Rotherfield	R6	<i>Linum usitatissimum</i>	3
Rotherfield	R6	<i>Matricaria discoidea</i>	10
Rotherfield	R6	<i>Ranunculus acris</i>	3
Rotherfield	R6	<i>Rubus fruticosus</i>	4
Rotherfield	R6	<i>Sinapsis arvensis</i>	2
Rotherfield	R6	<i>Stellaria media</i>	2
Rotherfield	R6	<i>Taraxacum officinale</i>	2
Rotherfield	R6	<i>Trifolium pratense</i>	4
Rotherfield	R6	<i>Crataegus monogyna</i>	1
Rotherfield	R7	<i>Anthriscus sylvestris</i>	4
Rotherfield	R7	<i>Centaurea nigra</i>	6
Rotherfield	R7	<i>Cirsium arvense</i>	2
Rotherfield	R7	<i>Crataegus monogyna</i>	3
Rotherfield	R7	<i>Geranium molle</i>	4
Rotherfield	R7	<i>Heracleum sphondylium</i>	3
Rotherfield	R7	<i>Hieracium sp.</i>	3
Rotherfield	R7	<i>Jacobaea vulgaris</i>	1
Rotherfield	R7	<i>Leucanthemum vulgare</i>	4
Rotherfield	R7	<i>Matricaria discoidea</i>	6
Rotherfield	R7	<i>Medicago lupulina</i>	4
Rotherfield	R7	<i>Ranunculus acris</i>	4
Rotherfield	R7	<i>Ranunculus repens</i>	1
Rotherfield	R7	<i>Rubus fruticosus</i>	5
Rotherfield	R7	<i>Sambucus nigra</i>	3
Rotherfield	R7	<i>Silene latifolia</i>	2
Rotherfield	R7	<i>Stellaria media</i>	3
Rotherfield	R7	<i>Trifolium pratense</i>	5
Rotherfield	R7	<i>Trifolium repens</i>	4
Rotherfield	R7	<i>Vicia sativa</i>	3
Rotherfield	R8	<i>Ranunculus acris</i>	3
Rotherfield	R8	<i>Brassica napus</i>	5
Rotherfield	R8	<i>Calystegia sepium</i>	2
Rotherfield	R8	<i>Cichorium intybus</i>	9
Rotherfield	R8	<i>Cirsium arvense</i>	3
Rotherfield	R8	<i>Cirsium palustre</i>	3
Rotherfield	R8	<i>Crataegus monogyna</i>	5
Rotherfield	R8	<i>Geranium molle</i>	3
Rotherfield	R8	<i>Heracleum sphondylium</i>	3
Rotherfield	R8	<i>Hieracium sp.</i>	2
Rotherfield	R8	<i>Myosotis arvensis</i>	5

Rotherfield	R8	<i>Papaver rhoeas</i>	2
Rotherfield	R8	<i>Primula veris</i>	2
Rotherfield	R8	<i>Rosa acicularis</i>	3
Rotherfield	R8	<i>Rubus fruticosus</i>	2
Rotherfield	R8	<i>Senecio vulgaris</i>	3
Rotherfield	R8	<i>Stellaria media</i>	3
Rotherfield	R8	<i>Taraxacum officinale</i>	3
Rotherfield	R8	<i>Trifolium pratense</i>	7
Rotherfield	R8	<i>Trifolium repens</i>	6
Rotherfield	R8	<i>Tripleurospermum inodorum</i>	2
Rotherfield	R8	<i>Veronica chamaedrys</i>	2
Rotherfield	R9	<i>Brassica napus</i>	5
Rotherfield	R9	<i>Anthriscus sylvestris</i>	2
Rotherfield	R9	<i>Centaurea nigra</i>	5
Rotherfield	R9	<i>Cichorium intybus</i>	7
Rotherfield	R9	<i>Dipsacus fullonum</i>	3
Rotherfield	R9	<i>Heracleum sphondylium</i>	4
Rotherfield	R9	<i>Jacobaea vulgaris</i>	4
Rotherfield	R9	<i>Knautia arvensis</i>	2
Rotherfield	R9	<i>Leucanthemum vulgare</i>	4
Rotherfield	R9	<i>Matricaria discoidea</i>	2
Rotherfield	R9	<i>Medicago lupulina</i>	4
Rotherfield	R9	<i>Papaver rhoeas</i>	4
Rotherfield	R9	<i>Ranunculus acris</i>	2
Rotherfield	R9	<i>Rubus fruticosus</i>	5
Rotherfield	R9	<i>Sambucus nigra</i>	3
Rotherfield	R9	<i>Sinapsis arvensis</i>	4
Rotherfield	R9	<i>Sonchus arvensis</i>	6
Rotherfield	R9	<i>Taraxacum officinale</i>	4
Rotherfield	R9	<i>Trifolium pratense</i>	2
Rotherfield	R9	<i>Trifolium repens</i>	8
Rotherfield	R10	<i>Ranunculus acris</i>	2
Rotherfield	R10	<i>Centaurea nigra</i>	2
Rotherfield	R10	<i>Cirsium arvense</i>	2
Rotherfield	R10	<i>Crataegus monogyna</i>	3
Rotherfield	R10	<i>Geranium molle</i>	2
Rotherfield	R10	<i>Heracleum sphondylium</i>	2
Rotherfield	R10	<i>Jacobaea vulgaris</i>	3
Rotherfield	R10	<i>Leucanthemum vulgare</i>	2
Rotherfield	R10	<i>Lotus corniculatus</i>	2
Rotherfield	R10	<i>Medicago lupulina</i>	4
Rotherfield	R10	<i>Rosa acicularis</i>	2
Rotherfield	R10	<i>Rubus fruticosus</i>	3

Rotherfield	R10	<i>Silene dioica</i>	1
Rotherfield	R10	<i>Silene latifolia</i>	3
Rotherfield	R10	<i>Stellaria media</i>	3
Rotherfield	R10	<i>Trifolium pratense</i>	5
Rotherfield	R10	<i>Trifolium repens</i>	3
Rotherfield	R10	<i>Vicia sativa</i>	3
Rotherfield	R11	<i>Ranunculus acris</i>	3
Rotherfield	R11	<i>Cichorium intybus</i>	2
Rotherfield	R11	<i>Convolvulus arvensis</i>	1
Rotherfield	R11	<i>Crepis capillaris</i>	2
Rotherfield	R11	<i>Heracleum sphondylium</i>	2
Rotherfield	R11	<i>Hieracium sp.</i>	3
Rotherfield	R11	<i>Jacobaea vulgaris</i>	4
Rotherfield	R11	<i>Leucanthemum vulgare</i>	3
Rotherfield	R11	<i>Linum usitatissimum</i>	5
Rotherfield	R11	<i>Matricaria discoidea</i>	4
Rotherfield	R11	<i>Rubus fruticosus</i>	3
Rotherfield	R11	<i>Sinapsis arvensis</i>	5
Rotherfield	R11	<i>Sonchus arvensis</i>	1
Rotherfield	R12	<i>Hieracium sp.</i>	2
Rotherfield	R12	<i>Cichorium intybus</i>	3
Rotherfield	R12	<i>Cirsium palustre</i>	1
Rotherfield	R12	<i>Convolvulus arvensis</i>	1
Rotherfield	R12	<i>Geranium molle</i>	3
Rotherfield	R12	<i>Heracleum sphondylium</i>	2
Rotherfield	R12	<i>Jacobaea vulgaris</i>	2
Rotherfield	R12	<i>Leucanthemum vulgare</i>	2
Rotherfield	R12	<i>Lotus corniculatus</i>	3
Rotherfield	R12	<i>Medicago lupulina</i>	5
Rotherfield	R12	<i>Myosotis arvensis</i>	2
Rotherfield	R12	<i>Sambucus nigra</i>	2
Rotherfield	R12	<i>Sinapsis arvensis</i>	2
Rotherfield	R12	<i>Sonchus arvensis</i>	2
Rotherfield	R12	<i>Stellaria media</i>	2
Rotherfield	R12	<i>Taraxacum officinale</i>	5
Rotherfield	R12	<i>Trifolium repens</i>	7
Rotherfield	R12	<i>Vicia sativa</i>	3
Rotherfield	R13	<i>Trifolium repens</i>	2
Rotherfield	R13	<i>Chamerion angustifolium</i>	5
Rotherfield	R13	<i>Cirsium arvense</i>	3
Rotherfield	R13	<i>Heracleum sphondylium</i>	4
Rotherfield	R13	<i>Matricaria discoidea</i>	2
Rotherfield	R13	<i>Medicago lupulina</i>	3

Rotherfield	R13	<i>Ranunculus acris</i>	2
Rotherfield	R13	<i>Rosa acicularis</i>	2
Rotherfield	R13	<i>Geranium robertianum</i>	2
Rotherfield	R13	<i>Trifolium pratense</i>	2
Rotherfield	R13	<i>Trifolium repens</i>	2
Rotherfield	R14	<i>Daucus carota</i>	1
Rotherfield	R14	<i>Centaurea nigra</i>	2
Rotherfield	R14	<i>Crataegus monogyna</i>	4
Rotherfield	R14	<i>Heracleum sphondylium</i>	3
Rotherfield	R14	<i>Lamium purpureum</i>	2
Rotherfield	R14	<i>Matricaria discoidea</i>	7
Rotherfield	R14	<i>Myosotis arvensis</i>	2
Rotherfield	R14	<i>Ranunculus acris</i>	2
Rotherfield	R14	<i>Rubus fruticosus</i>	2
Rotherfield	R14	<i>Sambucus nigra</i>	2
Rotherfield	R14	<i>Silene latifolia</i>	2
Rotherfield	R14	<i>Taraxacum officinale</i>	3
Rotherfield	R14	<i>Trifolium pratense</i>	2
Rotherfield	R14	<i>Trifolium repens</i>	6
Rotherfield	R14	<i>Tripleurospermum inodorum</i>	2
Rotherfield	R15	<i>Ranunculus acris</i>	3
Rotherfield	R15	<i>Anthriscus sylvestris</i>	3
Rotherfield	R15	<i>Lamium album</i>	6
Rotherfield	R15	<i>Ranunculus repens</i>	1
Rotherfield	R15	<i>Sambucus nigra</i>	8
Rotherfield	R15	<i>Silene dioica</i>	3
Rotherfield	R15	<i>Silene latifolia</i>	3
Rotherfield	R15	<i>Stellaria media</i>	3
Stepstones	SS1	<i>Anthriscus sylvestris</i>	2
Stepstones	SS1	<i>Calystegia sepium</i>	2
Stepstones	SS1	<i>Calystegia silvatica</i>	3
Stepstones	SS1	<i>Cirsium arvense</i>	2
Stepstones	SS1	<i>Crataegus monogyna</i>	2
Stepstones	SS1	<i>Epilobium hirsutum</i>	3
Stepstones	SS1	<i>Lamium album</i>	1
Stepstones	SS1	<i>Sambucus nigra</i>	1
Stepstones	SS1	<i>Thlaspi arvense</i>	2
Stepstones	SS2	<i>Anthriscus sylvestris</i>	1
Stepstones	SS2	<i>Calystegia sepium</i>	3
Stepstones	SS2	<i>Calystegia silvatica</i>	3
Stepstones	SS2	<i>Cirsium arvense</i>	4
Stepstones	SS2	<i>Crataegus monogyna</i>	1
Stepstones	SS2	<i>Dipsacus fullonum</i>	1

Stepstones	SS2	<i>Epilobium hirsutum</i>	4
Stepstones	SS2	<i>Lamium album</i>	2
Stepstones	SS2	<i>Rubus fruticosus</i>	7
Stepstones	SS2	<i>Silene latifolia</i>	1
Stepstones	SS2	<i>Sonchus arvensis</i>	2
Stepstones	SS3	<i>Silene dioica</i>	1
Stepstones	SS3	<i>Anthriscus sylvestris</i>	2
Stepstones	SS3	<i>Calystegia sepium</i>	3
Stepstones	SS3	<i>Calystegia silvatica</i>	4
Stepstones	SS3	<i>Crataegus monogyna</i>	2
Stepstones	SS3	<i>Dipsacus fullonum</i>	1
Stepstones	SS3	<i>Epilobium hirsutum</i>	4
Stepstones	SS3	<i>Lamium album</i>	1
Stepstones	SS3	<i>Myosotis arvensis</i>	1
Stepstones	SS3	<i>Rubus fruticosus</i>	7
Stepstones	SS3	<i>Sinapsis arvensis</i>	2
Stepstones	SS3	<i>Solanum dulcamara</i>	2
Stepstones	SS3	<i>Sonchus arvensis</i>	2
Stepstones	SS4	<i>Ranunculus acris</i>	1
Stepstones	SS4	<i>Anthriscus sylvestris</i>	2
Stepstones	SS4	<i>Calystegia sepium</i>	3
Stepstones	SS4	<i>Calystegia silvatica</i>	2
Stepstones	SS4	<i>Crataegus monogyna</i>	2
Stepstones	SS4	<i>Epilobium hirsutum</i>	3
Stepstones	SS4	<i>Rubus fruticosus</i>	6
Stepstones	SS4	<i>Sambucus nigra</i>	3
Stepstones	SS4	<i>Sinapsis arvensis</i>	4
Stepstones	SS5	<i>Sambucus nigra</i>	3
Stepstones	SS5	<i>Calystegia sepium</i>	3
Stepstones	SS5	<i>Calystegia silvatica</i>	2
Stepstones	SS5	<i>Crataegus monogyna</i>	2
Stepstones	SS5	<i>Epilobium hirsutum</i>	3
Stepstones	SS5	<i>Filipendula ulmaria</i>	1
Stepstones	SS5	<i>Lamium album</i>	1
Stepstones	SS5	<i>Rubus fruticosus</i>	6
Stepstones	SS5	<i>Sinapsis arvensis</i>	4
Stepstones	SS6	<i>Rubus fruticosus</i>	7
Stepstones	SS6	<i>Anthriscus sylvestris</i>	2
Stepstones	SS6	<i>Calystegia sepium</i>	2
Stepstones	SS6	<i>Epilobium hirsutum</i>	3
Stepstones	SS6	<i>Jacobaea vulgaris</i>	3
Stepstones	SS6	<i>Sinapsis arvensis</i>	1
Stepstones	SS6	<i>Sonchus arvensis</i>	2

Stepstones	SS6	<i>Taraxacum officinale</i>	1
Stepstones	SS7	<i>Anthriscus sylvestris</i>	2
Stepstones	SS7	<i>Calystegia sepium</i>	2
Stepstones	SS7	<i>Cirsium arvense</i>	1
Stepstones	SS7	<i>Cirsium palustre</i>	1
Stepstones	SS7	<i>Epilobium hirsutum</i>	3
Stepstones	SS7	<i>Jacobaea vulgaris</i>	3
Stepstones	SS7	<i>Rubus fruticosus</i>	4
Stepstones	SS7	<i>Sonchus arvensis</i>	1
Stepstones	SS7	<i>Taraxacum officinale</i>	1
Stepstones	SS8	<i>Anthriscus sylvestris</i>	3
Stepstones	SS8	<i>Convolvulus arvensis</i>	4
Stepstones	SS8	<i>Lamium album</i>	2
Stepstones	SS8	<i>Rubus fruticosus</i>	5
Stepstones	SS8	<i>Sinapsis arvensis</i>	2
Stepstones	SS8	<i>Trifolium repens</i>	2
Stepstones	SS9	<i>Sambucus nigra</i>	2
Stepstones	SS9	<i>Anthriscus sylvestris</i>	2
Stepstones	SS9	<i>Calystegia sepium</i>	1
Stepstones	SS9	<i>Calystegia silvatica</i>	2
Stepstones	SS9	<i>Cirsium arvense</i>	2
Stepstones	SS9	<i>Convolvulus arvensis</i>	2
Stepstones	SS9	<i>Crataegus monogyna</i>	3
Stepstones	SS9	<i>Epilobium hirsutum</i>	3
Stepstones	SS9	<i>Geranium molle</i>	2
Stepstones	SS9	<i>Lamium album</i>	1
Stepstones	SS9	<i>Ranunculus acris</i>	1
Stepstones	SS9	<i>Rubus fruticosus</i>	7
Stepstones	SS9	<i>Taraxacum officinale</i>	2
Stepstones	SS9	<i>Trifolium pratense</i>	2
Stepstones	SS9	<i>Trifolium repens</i>	2
Stepstones	SS10	<i>Sambucus nigra</i>	2
Stepstones	SS10	<i>Anthriscus sylvestris</i>	2
Stepstones	SS11	<i>Calystegia silvatica</i>	1
Stepstones	SS10	<i>Crataegus monogyna</i>	3
Stepstones	SS10	<i>Geranium molle</i>	2
Stepstones	SS10	<i>Ranunculus acris</i>	1
Stepstones	SS10	<i>Taraxacum officinale</i>	2
Stepstones	SS10	<i>Trifolium pratense</i>	6
Stepstones	SS10	<i>Trifolium repens</i>	7
Stepstones	SS11	<i>Ranunculus acris</i>	1
Stepstones	SS11	<i>Brassica napus</i>	5
Stepstones	SS11	<i>Calystegia sepium</i>	2

Stepstones	SS11	<i>Cirsium arvense</i>	1
Stepstones	SS11	<i>Cirsium palustre</i>	2
Stepstones	SS11	<i>Convolvulus arvensis</i>	2
Stepstones	SS11	<i>Sonchus arvensis</i>	3
Stepstones	SS12	<i>Geranium molle</i>	3
Stepstones	SS12	<i>Anthriscus sylvestris</i>	2
Stepstones	SS12	<i>Convolvulus arvensis</i>	1
Stepstones	SS12	<i>Crataegus monogyna</i>	2
Stepstones	SS12	<i>Dipsacus fullonum</i>	2
Stepstones	SS12	<i>Heracleum sphondylium</i>	1
Stepstones	SS12	<i>Lamium album</i>	4
Stepstones	SS12	<i>Rubus fruticosus</i>	6
Stepstones	SS12	<i>Sambucus nigra</i>	2
Stepstones	SS12	<i>Silene latifolia</i>	4
Stepstones	SS12	<i>Sinapsis arvensis</i>	2
Stepstones	SS12	<i>Sonchus arvensis</i>	2
Stepstones	SS13	<i>Sinapsis arvensis</i>	1
Stepstones	SS13	<i>Anthriscus sylvestris</i>	1
Stepstones	SS13	<i>Calystegia sepium</i>	2
Stepstones	SS13	<i>Cirsium arvense</i>	3
Stepstones	SS13	<i>Cirsium palustre</i>	2
Stepstones	SS13	<i>Convolvulus arvensis</i>	2
Stepstones	SS13	<i>Lamium album</i>	1
Stepstones	SS13	<i>Rubus fruticosus</i>	4
Stepstones	SS13	<i>Sambucus nigra</i>	4
Stepstones	SS13	<i>Sinapsis arvensis</i>	1
Stepstones	SS13	<i>Sonchus arvensis</i>	2
Stepstones	SS13	<i>Veronica persica</i>	1
Stepstones	SS14	<i>Brassica napus</i>	5
Stepstones	SS14	<i>Anthriscus sylvestris</i>	5
Stepstones	SS14	<i>Pentaglottis sempervirens</i>	2
Stepstones	SS14	<i>Calystegia sepium</i>	3
Stepstones	SS14	<i>Calystegia silvatica</i>	4
Stepstones	SS14	<i>Cirsium arvense</i>	2
Stepstones	SS14	<i>Geranium molle</i>	4
Stepstones	SS14	<i>Hieracium sp.</i>	2
Stepstones	SS14	<i>Lamium album</i>	3
Stepstones	SS14	<i>Papaver rhoeas</i>	2
Stepstones	SS14	<i>Ranunculus acris</i>	2
Stepstones	SS14	<i>Senecio vulgaris</i>	2
Stepstones	SS14	<i>Sonchus arvensis</i>	3
Stepstones	SS14	<i>Symphytum officinale</i>	2
Stepstones	SS14	<i>Taraxacum officinale</i>	2

Stepstones	SS14	<i>Veronica persica</i>	2
Stepstones	SS15	<i>Geranium molle</i>	2
Stepstones	SS15	<i>Anthriscus sylvestris</i>	2
Stepstones	SS15	<i>Brassica napus</i>	5
Stepstones	SS15	<i>Calystegia sepium</i>	3
Stepstones	SS15	<i>Calystegia silvatica</i>	2
Stepstones	SS15	<i>Cirsium arvense</i>	2
Stepstones	SS15	<i>Convolvulus arvensis</i>	1
Stepstones	SS15	<i>Lamium album</i>	2
Stepstones	SS15	<i>Rubus fruticosus</i>	5
Stepstones	SS15	<i>Silene latifolia</i>	2
Stepstones	SS15	<i>Sinapsis arvensis</i>	1
Stepstones	SS15	<i>Symphytum officinale</i>	4
Whitchurch	WT1	<i>Crataegus monogyna</i>	1
Whitchurch	WT1	<i>Cirsium arvense</i>	1
Whitchurch	WT1	<i>Cirsium palustre</i>	1
Whitchurch	WT1	<i>Lamium album</i>	2
Whitchurch	WT1	<i>Lamium purpureum</i>	1
Whitchurch	WT1	<i>Sambucus nigra</i>	1
Whitchurch	WT1	<i>Taraxacum officinale</i>	1
Whitchurch	WT2	<i>Crataegus monogyna</i>	2
Whitchurch	WT2	<i>Anthriscus sylvestris</i>	1
Whitchurch	WT2	<i>Convolvulus arvensis</i>	1
Whitchurch	WT2	<i>Lamium album</i>	1
Whitchurch	WT2	<i>Lamium purpureum</i>	2
Whitchurch	WT2	<i>Rubus fruticosus</i>	2
Whitchurch	WT2	<i>Sambucus nigra</i>	1
Whitchurch	WT2	<i>Silene latifolia</i>	1
Whitchurch	WT3	<i>Crataegus monogyna</i>	2
Whitchurch	WT3	<i>Anthriscus sylvestris</i>	1
Whitchurch	WT3	<i>Calystegia sepium</i>	1
Whitchurch	WT3	<i>Convolvulus arvensis</i>	1
Whitchurch	WT3	<i>Lamium purpureum</i>	2
Whitchurch	WT3	<i>Rubus fruticosus</i>	2
Whitchurch	WT3	<i>Sambucus nigra</i>	1
Whitchurch	WT4	<i>Geranium molle</i>	1
Whitchurch	WT4	<i>Taraxacum officinale</i>	1
Whitchurch	WT4	<i>Ranunculus acris</i>	2
Whitchurch	WT4	<i>Cirsium palustre</i>	1
Whitchurch	WT5	<i>Bellis perennis</i>	1
Whitchurch	WT5	<i>Cirsium palustre</i>	1
Whitchurch	WT5	<i>Geranium molle</i>	1
Whitchurch	WT5	<i>Ranunculus acris</i>	1

Whitchurch	WT6	<i>Silene dioica</i>	1
Whitchurch	WT6	<i>Anthriscus sylvestris</i>	2
Whitchurch	WT6	<i>Calystegia sepium</i>	2
Whitchurch	WT6	<i>Cirsium arvense</i>	1
Whitchurch	WT6	<i>Crataegus monogyna</i>	3
Whitchurch	WT6	<i>Lamium album</i>	1
Whitchurch	WT6	<i>Linum usitatissimum</i>	5
Whitchurch	WT6	<i>Rubus fruticosus</i>	2
Whitchurch	WT7	<i>Anthriscus sylvestris</i>	2
Whitchurch	WT7	<i>Arctium minus</i>	1
Whitchurch	WT7	<i>Convolvulus arvensis</i>	2
Whitchurch	WT7	<i>Crataegus monogyna</i>	1
Whitchurch	WT7	<i>Geranium molle</i>	1
Whitchurch	WT7	<i>Lamium album</i>	1
Whitchurch	WT7	<i>Linum usitatissimum</i>	5
Whitchurch	WT7	<i>Sambucus nigra</i>	1
Whitchurch	WT7	<i>Veronica persica</i>	2
Whitchurch	WT8	<i>Anthriscus sylvestris</i>	1
Whitchurch	WT8	<i>Cirsium arvense</i>	2
Whitchurch	WT8	<i>Cirsium palustre</i>	3
Whitchurch	WT8	<i>Linum usitatissimum</i>	5
Whitchurch	WT8	<i>Matricaria discoidea</i>	4
Whitchurch	WT9	<i>Crataegus monogyna</i>	3
Whitchurch	WT9	<i>Anthriscus sylvestris</i>	1
Whitchurch	WT9	<i>Cirsium palustre</i>	2
Whitchurch	WT9	<i>Convolvulus arvensis</i>	4
Whitchurch	WT9	<i>Lamium album</i>	2
Whitchurch	WT9	<i>Linum usitatissimum</i>	5
Whitchurch	WT9	<i>Matricaria discoidea</i>	2
Whitchurch	WT9	<i>Rubus fruticosus</i>	4
Whitchurch	WT9	<i>Veronica persica</i>	1
Whitchurch	WT10	<i>Crataegus monogyna</i>	2
Whitchurch	WT10	<i>Arctium minus</i>	1
Whitchurch	WT10	<i>Cirsium arvense</i>	2
Whitchurch	WT10	<i>Cirsium palustre</i>	2
Whitchurch	WT10	<i>Conopodium majus</i>	1
Whitchurch	WT10	<i>Ranunculus acris</i>	1
Whitchurch	WT10	<i>Sinapsis arvensis</i>	1
Whitchurch	WT10	<i>Sinapsis arvensis</i>	1
Whitchurch	WT10	<i>Stellaria media</i>	1
Whitchurch	WT11	<i>Crataegus monogyna</i>	3
Whitchurch	WT11	<i>Anthriscus sylvestris</i>	2
Whitchurch	WT11	<i>Calystegia sepium</i>	2

Whitchurch	WT11	<i>Cirsium arvense</i>	1
Whitchurch	WT11	<i>Linum usitatissimum</i>	5
Whitchurch	WT11	<i>Rubus fruticosus</i>	4
Whitchurch	WT11	<i>Sinapsis arvensis</i>	3
Whitchurch	WT11	<i>Veronica persica</i>	1
Whitchurch	WT12	<i>Crataegus monogyna</i>	4
Whitchurch	WT12	<i>Anthriscus sylvestris</i>	2
Whitchurch	WT12	<i>Geranium molle</i>	2
Whitchurch	WT12	<i>Linum usitatissimum</i>	5
Whitchurch	WT12	<i>Sambucus nigra</i>	3
Whitchurch	WT12	<i>Sinapsis arvensis</i>	1
Whitchurch	WT12	<i>Veronica persica</i>	1
Whitchurch	WT13	<i>Sambucus nigra</i>	2
Whitchurch	WT13	<i>Anthriscus sylvestris</i>	2
Whitchurch	WT13	<i>Cirsium arvense</i>	2
Whitchurch	WT13	<i>Matricaria discoidea</i>	2
Whitchurch	WT13	<i>Papaver rhoeas</i>	1
Whitchurch	WT13	<i>Rubus fruticosus</i>	3
Whitchurch	WT13	<i>Sinapsis arvensis</i>	2
Whitchurch	WT13	<i>Taraxacum officinale</i>	1
Whitchurch	WT14	<i>Brassica napus</i>	5
Whitchurch	WT14	<i>Anthriscus sylvestris</i>	2
Whitchurch	WT14	<i>Capsella bursa-pastoris</i>	3
Whitchurch	WT14	<i>Cirsium palustre</i>	1
Whitchurch	WT14	<i>Geranium molle</i>	3
Whitchurch	WT14	<i>Lamium album</i>	2
Whitchurch	WT14	<i>Papaver rhoeas</i>	1
Whitchurch	WT14	<i>Taraxacum officinale</i>	1
Whitchurch	WT15	<i>Brassica napus</i>	5
Whitchurch	WT15	<i>Anthriscus sylvestris</i>	2
Whitchurch	WT15	<i>Capsella bursa-pastoris</i>	3
Whitchurch	WT15	<i>Convolvulus arvensis</i>	2
Whitchurch	WT15	<i>Epilobium hirsutum</i>	3
Whitchurch	WT15	<i>Geranium molle</i>	3
Whitchurch	WT15	<i>Lamium album</i>	2
Whitchurch	WT15	<i>Papaver rhoeas</i>	1
Whitchurch	WT15	<i>Taraxacum officinale</i>	1
Wincott	WN1	<i>Crataegus monogyna</i>	2
Wincott	WN1	<i>Cirsium arvense</i>	1
Wincott	WN1	<i>Trifolium repens</i>	1
Wincott	WN1	<i>Rubus fruticosus</i>	1
Wincott	WN2	<i>Crataegus monogyna</i>	2
Wincott	WN2	<i>Cirsium arvense</i>	1

Wincott	WN2	<i>Rubus fruticosus</i>	1
Wincott	WN2	<i>Trifolium repens</i>	1
Wincott	WN3	<i>Crataegus monogyna</i>	2
Wincott	WN3	<i>Cirsium arvense</i>	2
Wincott	WN3	<i>Cirsium palustre</i>	2
Wincott	WN3	<i>Rubus fruticosus</i>	3
Wincott	WN3	<i>Sonchus arvensis</i>	2
Wincott	WN3	<i>Trifolium repens</i>	2
Wincott	WN3	<i>Vicia faba</i>	3
Wincott	WN4	<i>Vicia faba</i>	5
Wincott	WN4	<i>Anthriscus sylvestris</i>	3
Wincott	WN4	<i>Cirsium arvense</i>	2
Wincott	WN4	<i>Convolvulus arvensis</i>	2
Wincott	WN4	<i>Conopodium majus</i>	1
Wincott	WN4	<i>Lamium album</i>	3
Wincott	WN4	<i>Rubus fruticosus</i>	2
Wincott	WN4	<i>Sinapsis arvensis</i>	3
Wincott	WN4	<i>Sonchus arvensis</i>	1
Wincott	WN4	<i>Trifolium repens</i>	2
Wincott	WN4	<i>Vicia faba</i>	5
Wincott	WN5	<i>Vicia faba</i>	5
Wincott	WN5	<i>Anthriscus sylvestris</i>	3
Wincott	WN5	<i>Cirsium arvense</i>	2
Wincott	WN5	<i>Convolvulus arvensis</i>	2
Wincott	WN5	<i>Conopodium majus</i>	1
Wincott	WN5	<i>Rubus fruticosus</i>	2
Wincott	WN5	<i>Senecio vulgaris</i>	1
Wincott	WN5	<i>Sinapsis arvensis</i>	2
Wincott	WN5	<i>Sonchus arvensis</i>	1
Wincott	WN5	<i>Trifolium repens</i>	2
Wincott	WN5	<i>Vicia faba</i>	5
Wincott	WN6	<i>Anthriscus sylvestris</i>	3
Wincott	WN6	<i>Arctium minus</i>	1
Wincott	WN6	<i>Calystegia sepium</i>	2
Wincott	WN6	<i>Cirsium arvense</i>	2
Wincott	WN6	<i>Convolvulus arvensis</i>	2
Wincott	WN6	<i>Sinapsis arvensis</i>	3
Wincott	WN6	<i>Vicia faba</i>	10
Wincott	WN7	<i>Anthriscus sylvestris</i>	3
Wincott	WN7	<i>Arctium minus</i>	1
Wincott	WN7	<i>Cirsium palustre</i>	2
Wincott	WN7	<i>Sinapsis arvensis</i>	2
Wincott	WN7	<i>Sonchus arvensis</i>	1

Wincott	WN7	<i>Vicia faba</i>	5
Wincott	WN8	<i>Anthriscus sylvestris</i>	3
Wincott	WN8	<i>Arctium minus</i>	2
Wincott	WN8	<i>Cirsium arvense</i>	4
Wincott	WN8	<i>Cirsium palustre</i>	2
Wincott	WN8	<i>Conopodium majus</i>	2
Wincott	WN8	<i>Epilobium hirsutum</i>	2
Wincott	WN8	<i>Geranium molle</i>	3
Wincott	WN8	<i>Lamium album</i>	5
Wincott	WN8	<i>Matricaria discoidea</i>	2
Wincott	WN8	<i>Myosotis arvensis</i>	2
Wincott	WN8	<i>Ranunculus acris</i>	3
Wincott	WN8	<i>Silene dioica</i>	2
Wincott	WN8	<i>Sinapsis arvensis</i>	2
Wincott	WN8	<i>Sonchus arvensis</i>	2
Wincott	WN8	<i>Veronica persica</i>	2
Wincott	WN9	<i>Sinapsis arvensis</i>	5
Wincott	WN9	<i>Anthriscus sylvestris</i>	2
Wincott	WN9	<i>Cirsium arvense</i>	4
Wincott	WN9	<i>Cirsium palustre</i>	2
Wincott	WN9	<i>Convolvulus arvensis</i>	3
Wincott	WN9	<i>Conopodium majus</i>	5
Wincott	WN9	<i>Lamium album</i>	1
Wincott	WN9	<i>Rubus fruticosus</i>	4
Wincott	WN9	<i>Sonchus arvensis</i>	3
Wincott	WN10	<i>Ranunculus acris</i>	2
Wincott	WN10	<i>Cirsium arvense</i>	2
Wincott	WN10	<i>Taraxacum officinale</i>	1
Wincott	WN10	<i>Rubus fruticosus</i>	4
Wincott	WN11	<i>Anthriscus sylvestris</i>	2
Wincott	WN11	<i>Centaurea nigra</i>	3
Wincott	WN11	<i>Convolvulus arvensis</i>	2
Wincott	WN11	<i>Crataegus monogyna</i>	2
Wincott	WN11	<i>Ranunculus acris</i>	2
Wincott	WN11	<i>Rubus fruticosus</i>	4
Wincott	WN11	<i>Sinapsis arvensis</i>	2
Wincott	WN11	<i>Taraxacum officinale</i>	2
Wincott	WN12	<i>Ranunculus acris</i>	1
Wincott	WN12	<i>Cirsium arvense</i>	1
Wincott	WN12	<i>Trifolium repens</i>	1
Wincott	WN12	<i>Rubus fruticosus</i>	1
Wincott	WN13	<i>Ranunculus acris</i>	2
Wincott	WN13	<i>Anthriscus sylvestris</i>	2

Wincott	WN13	<i>Calystegia silvatica</i>	2
Wincott	WN13	<i>Convolvulus arvensis</i>	1
Wincott	WN13	<i>Epilobium hirsutum</i>	3
Wincott	WN13	<i>Rubus fruticosus</i>	2
Wincott	WN13	<i>Trifolium repens</i>	2
Wincott	WN13	<i>Vicia sativa</i>	2
Wincott	WN14	<i>Bellis perennis</i>	2
Wincott	WN14	<i>Arctium minus</i>	1
Wincott	WN14	<i>Brassica napus</i>	5
Wincott	WN14	<i>Crataegus monogyna</i>	3
Wincott	WN14	<i>Ranunculus acris</i>	2
Wincott	WN14	<i>Rosa acicularis</i>	1
Wincott	WN14	<i>Trifolium repens</i>	2
Wincott	WN15	<i>Anthriscus sylvestris</i>	2
Wincott	WN15	<i>Cirsium palustre</i>	1
Wincott	WN15	<i>Crataegus monogyna</i>	3
Wincott	WN15	<i>Epilobium hirsutum</i>	3
Wincott	WN15	<i>Ranunculus acris</i>	2
Wincott	WN15	<i>Rubus fruticosus</i>	3
Wincott	WN15	<i>Stachys sylvatica</i>	1
Fai Farms - Wytham	O1	<i>Lamium album</i>	3
Fai Farms - Wytham	O1	<i>Calystegia sepium</i>	3
Fai Farms - Wytham	O1	<i>Cirsium arvense</i>	2
Fai Farms - Wytham	O1	<i>Epilobium hirsutum</i>	2
Fai Farms - Wytham	O1	<i>Geranium molle</i>	1
Fai Farms - Wytham	O1	<i>Glechoma hederacea</i>	1
Fai Farms - Wytham	O1	<i>Heracleum sphondylium</i>	2
Fai Farms - Wytham	O1	<i>Ranunculus acris</i>	2
Fai Farms - Wytham	O1	<i>Rubus fruticosus</i>	8
Fai Farms - Wytham	O1	<i>Taraxacum officinale</i>	3
Fai Farms - Wytham	O1	<i>Trifolium repens</i>	2
Fai Farms - Wytham	O2	<i>Crataegus monogyna</i>	5
Fai Farms - Wytham	O2	<i>Calystegia sepium</i>	1
Fai Farms - Wytham	O2	<i>Calystegia silvatica</i>	3
Fai Farms - Wytham	O2	<i>Cirsium arvense</i>	1
Fai Farms - Wytham	O2	<i>Convolvulus arvensis</i>	2
Fai Farms - Wytham	O2	<i>Geranium molle</i>	2
Fai Farms - Wytham	O2	<i>Lamium album</i>	2
Fai Farms - Wytham	O2	<i>Leucanthemum vulgare</i>	4
Fai Farms - Wytham	O2	<i>Medicago lupulina</i>	3
Fai Farms - Wytham	O2	<i>Ranunculus acris</i>	2
Fai Farms - Wytham	O2	<i>Stellaria holostea</i>	3
Fai Farms - Wytham	O3	<i>Glechoma hederacea</i>	1

Fai Farms - Wytham	O3	<i>Anthriscus sylvestris</i>	2
Fai Farms - Wytham	O3	<i>Calystegia sepium</i>	3
Fai Farms - Wytham	O3	<i>Crataegus monogyna</i>	2
Fai Farms - Wytham	O3	<i>Geranium molle</i>	2
Fai Farms - Wytham	O3	<i>Ranunculus acris</i>	1
Fai Farms - Wytham	O3	<i>Rosa acicularis</i>	2
Fai Farms - Wytham	O3	<i>Rubus fruticosus</i>	4
Fai Farms - Wytham	O3	<i>Sambucus nigra</i>	2
Fai Farms - Wytham	O3	<i>Torilis japonica</i>	2
Fai Farms - Wytham	O4	<i>Anthriscus sylvestris</i>	2
Fai Farms - Wytham	O4	<i>Cirsium arvense</i>	1
Fai Farms - Wytham	O4	<i>Epilobium hirsutum</i>	2
Fai Farms - Wytham	O4	<i>Geranium molle</i>	2
Fai Farms - Wytham	O4	<i>Jacobaea vulgaris</i>	2
Fai Farms - Wytham	O4	<i>Ranunculus acris</i>	3
Fai Farms - Wytham	O4	<i>Rosa acicularis</i>	2
Fai Farms - Wytham	O4	<i>Rubus fruticosus</i>	5
Fai Farms - Wytham	O5	<i>Crataegus monogyna</i>	5
Fai Farms - Wytham	O5	<i>Anthriscus sylvestris</i>	2
Fai Farms - Wytham	O5	<i>Arctium minus</i>	2
Fai Farms - Wytham	O5	<i>Ballota nigra</i>	2
Fai Farms - Wytham	O5	<i>Calystegia silvatica</i>	2
Fai Farms - Wytham	O5	<i>Convolvulus arvensis</i>	2
Fai Farms - Wytham	O5	<i>Geranium molle</i>	2
Fai Farms - Wytham	O5	<i>Hieracium sp.</i>	1
Fai Farms - Wytham	O5	<i>Lamium album</i>	4
Fai Farms - Wytham	O5	<i>Ranunculus acris</i>	2
Fai Farms - Wytham	O5	<i>Rosa acicularis</i>	3
Fai Farms - Wytham	O5	<i>Rubus fruticosus</i>	3
Fai Farms - Wytham	O5	<i>Taraxacum officinale</i>	1
Fai Farms - Wytham	O5	<i>Veronica persica</i>	1
Fai Farms - Wytham	O6	<i>Lamium album</i>	4
Fai Farms - Wytham	O6	<i>Anthriscus sylvestris</i>	3
Fai Farms - Wytham	O6	<i>Calystegia sepium</i>	2
Fai Farms - Wytham	O6	<i>Cardamine hirsuta</i>	1
Fai Farms - Wytham	O6	<i>Carduus nutans</i>	2
Fai Farms - Wytham	O6	<i>Cirsium arvense</i>	3
Fai Farms - Wytham	O6	<i>Geranium molle</i>	2
Fai Farms - Wytham	O6	<i>Hieracium sp.</i>	2
Fai Farms - Wytham	O6	<i>Jacobaea vulgaris</i>	2
Fai Farms - Wytham	O6	<i>Lamium purpureum</i>	2
Fai Farms - Wytham	O6	<i>Malus domestica</i>	7
Fai Farms - Wytham	O6	<i>Matricaria discoidea</i>	6

Fai Farms - Wytham	O6	<i>Myosotis arvensis</i>	1
Fai Farms - Wytham	O6	<i>Prunus sp</i>	3
Fai Farms - Wytham	O6	<i>Ranunculus acris</i>	2
Fai Farms - Wytham	O6	<i>Sambucus nigra</i>	2
Fai Farms - Wytham	O6	<i>Sinapsis arvensis</i>	2
Fai Farms - Wytham	O6	<i>Taraxacum officinale</i>	2
Fai Farms - Wytham	O6	<i>Teesdalia nudicaulis</i>	1
Fai Farms - Wytham	O6	<i>Torilis japonica</i>	3
Fai Farms - Wytham	O6	<i>Veronica persica</i>	4
Fai Farms - Wytham	O6	<i>Vicia sativa</i>	2
Fai Farms - Wytham	O7	<i>Taraxacum officinale</i>	1
Fai Farms - Wytham	O7	<i>Anthriscus sylvestris</i>	2
Fai Farms - Wytham	O7	<i>Convolvulus arvensis</i>	2
Fai Farms - Wytham	O7	<i>Crataegus monogyna</i>	4
Fai Farms - Wytham	O7	<i>Geranium molle</i>	2
Fai Farms - Wytham	O7	<i>Lamium album</i>	6
Fai Farms - Wytham	O7	<i>Lamium purpureum</i>	3
Fai Farms - Wytham	O7	<i>Leucanthemum vulgare</i>	2
Fai Farms - Wytham	O7	<i>Lotus corniculatus</i>	1
Fai Farms - Wytham	O7	<i>Matricaria discoidea</i>	1
Fai Farms - Wytham	O7	<i>Rubus fruticosus</i>	2
Fai Farms - Wytham	O7	<i>Sambucus nigra</i>	3
Fai Farms - Wytham	O7	<i>Trifolium repens</i>	2
Fai Farms - Wytham	O7	<i>Veronica persica</i>	1
Fai Farms - Wytham	O7	<i>Vicia sativa</i>	3
Fai Farms - Wytham	O8	<i>Lamium album</i>	7
Fai Farms - Wytham	O8	<i>Anthriscus sylvestris</i>	2
Fai Farms - Wytham	O8	<i>Ballota nigra</i>	3
Fai Farms - Wytham	O8	<i>Convolvulus arvensis</i>	1
Fai Farms - Wytham	O8	<i>Crataegus monogyna</i>	3
Fai Farms - Wytham	O8	<i>Lamium purpureum</i>	1
Fai Farms - Wytham	O8	<i>Malva neglecta</i>	1
Fai Farms - Wytham	O8	<i>Papaver rhoeas</i>	1
Fai Farms - Wytham	O8	<i>Rubus fruticosus</i>	2
Fai Farms - Wytham	O8	<i>Sambucus nigra</i>	2
Fai Farms - Wytham	O8	<i>Silene latifolia</i>	2
Fai Farms - Wytham	O8	<i>Torilis japonica</i>	2
Fai Farms - Wytham	O8	<i>Trifolium repens</i>	2
Fai Farms - Wytham	O9	<i>Taraxacum officinale</i>	2
Fai Farms - Wytham	O9	<i>Arctium minus</i>	1
Fai Farms - Wytham	O9	<i>Calystegia sepium</i>	2
Fai Farms - Wytham	O9	<i>Centaurea nigra</i>	1
Fai Farms - Wytham	O9	<i>Cirsium arvense</i>	2

Fai Farms - Wytham	O9	<i>Crataegus monogyna</i>	3
Fai Farms - Wytham	O9	<i>Epilobium hirsutum</i>	2
Fai Farms - Wytham	O9	<i>Geranium molle</i>	2
Fai Farms - Wytham	O9	<i>Glechoma hederacea</i>	1
Fai Farms - Wytham	O9	<i>Lamium album</i>	2
Fai Farms - Wytham	O9	<i>Papaver rhoeas</i>	1
Fai Farms - Wytham	O9	<i>Geranium sp.</i>	1
Fai Farms - Wytham	O9	<i>Sinapsis arvensis</i>	1
Fai Farms - Wytham	O9	<i>Trifolium repens</i>	4
Fai Farms - Wytham	O10	<i>Taraxacum officinale</i>	1
Fai Farms - Wytham	O10	<i>Cirsium arvense</i>	3
Fai Farms - Wytham	O10	<i>Crataegus monogyna</i>	2
Fai Farms - Wytham	O10	<i>Heracleum sphondylium</i>	2
Fai Farms - Wytham	O10	<i>Ranunculus acris</i>	3
Fai Farms - Wytham	O10	<i>Stachys sylvatica</i>	2
Fai Farms - Wytham	O11	<i>Lamium album</i>	6
Fai Farms - Wytham	O11	<i>Anthriscus sylvestris</i>	3
Fai Farms - Wytham	O11	<i>Centaurea nigra</i>	2
Fai Farms - Wytham	O11	<i>Convolvulus arvensis</i>	3
Fai Farms - Wytham	O11	<i>Crataegus monogyna</i>	2
Fai Farms - Wytham	O11	<i>Knautia arvensis</i>	2
Fai Farms - Wytham	O11	<i>Lamium purpureum</i>	1
Fai Farms - Wytham	O11	<i>Leucanthemum vulgare</i>	2
Fai Farms - Wytham	O11	<i>Sambucus nigra</i>	3
Fai Farms - Wytham	O12	<i>Anthriscus sylvestris</i>	6
Fai Farms - Wytham	O12	<i>Cirsium arvense</i>	2
Fai Farms - Wytham	O12	<i>Convolvulus arvensis</i>	2
Fai Farms - Wytham	O12	<i>Crataegus monogyna</i>	4
Fai Farms - Wytham	O12	<i>Geranium molle</i>	2
Fai Farms - Wytham	O12	<i>Lamium album</i>	7
Fai Farms - Wytham	O12	<i>Matricaria discoidea</i>	1
Fai Farms - Wytham	O12	<i>Ranunculus acris</i>	2
Fai Farms - Wytham	O12	<i>Sinapsis arvensis</i>	1
Fai Farms - Wytham	O12	<i>Taraxacum officinale</i>	1
Fai Farms - Wytham	O12	<i>Torilis japonica</i>	2
Fai Farms - Wytham	O13	<i>Hyacinthoides hispanica</i>	1
Fai Farms - Wytham	O13	<i>Anthriscus sylvestris</i>	2
Fai Farms - Wytham	O13	<i>Cirsium arvense</i>	3
Fai Farms - Wytham	O13	<i>Cirsium palustre</i>	2
Fai Farms - Wytham	O13	<i>Convolvulus arvensis</i>	2
Fai Farms - Wytham	O13	<i>Crataegus monogyna</i>	3
Fai Farms - Wytham	O13	<i>Daucus carota</i>	1
Fai Farms - Wytham	O13	<i>Geranium molle</i>	3

Fai Farms - Wytham	O13	<i>Leucanthemum vulgare</i>	3
Fai Farms - Wytham	O13	<i>Geranium robertianum</i>	3
Fai Farms - Wytham	O13	<i>Matricaria discoidea</i>	4
Fai Farms - Wytham	O13	<i>Papaver rhoeas</i>	2
Fai Farms - Wytham	O13	<i>Ranunculus acris</i>	2
Fai Farms - Wytham	O13	<i>Sinapsis arvensis</i>	2
Fai Farms - Wytham	O13	<i>Torilis japonica</i>	1
Fai Farms - Wytham	O13	<i>Veronica persica</i>	2
Fai Farms - Wytham	O13	<i>Vicia sativa</i>	2
Fai Farms - Wytham	O14	<i>Tripleurospermum inodorum</i>	1
Fai Farms - Wytham	O14	<i>Arctium minus</i>	2
Fai Farms - Wytham	O14	<i>Calystegia sepium</i>	2
Fai Farms - Wytham	O14	<i>Cirsium arvense</i>	3
Fai Farms - Wytham	O14	<i>Cirsium palustre</i>	1
Fai Farms - Wytham	O14	<i>Crataegus monogyna</i>	3
Fai Farms - Wytham	O14	<i>Epilobium hirsutum</i>	4
Fai Farms - Wytham	O14	<i>Jacobaea vulgaris</i>	2
Fai Farms - Wytham	O14	<i>Lotus corniculatus</i>	1
Fai Farms - Wytham	O14	<i>Ranunculus acris</i>	2
Fai Farms - Wytham	O14	<i>Rosa sp.</i>	1
Fai Farms - Wytham	O14	<i>Stachys sylvatica</i>	2
Fai Farms - Wytham	O14	<i>Trifolium repens</i>	5
Fai Farms - Wytham	O15	<i>Taraxacum officinale</i>	1
Fai Farms - Wytham	O15	<i>Calystegia sepium</i>	2
Fai Farms - Wytham	O15	<i>Centaurea nigra</i>	1
Fai Farms - Wytham	O15	<i>Cirsium arvense</i>	4
Fai Farms - Wytham	O15	<i>Cirsium palustre</i>	2
Fai Farms - Wytham	O15	<i>Convolvulus arvensis</i>	2
Fai Farms - Wytham	O15	<i>Hieracium sp.</i>	2
Fai Farms - Wytham	O15	<i>Knautia arvensis</i>	2
Fai Farms - Wytham	O15	<i>Leucanthemum vulgare</i>	3
Fai Farms - Wytham	O15	<i>Lotus corniculatus</i>	2
Fai Farms - Wytham	O15	<i>Ranunculus acris</i>	2
Fai Farms - Wytham	O15	<i>Rubus fruticosus</i>	3
Fai Farms - Wytham	O15	<i>Sonchus arvensis</i>	4
Fai Farms - Wytham	O15	<i>Trifolium repens</i>	3
Fai Farms - Wytham	O15	<i>Veronica persica</i>	4

Table 3 Raw solitary bee, wasp and parasitoid emergence data across all occupied bamboo shoots, from all nest boxes, across all transects (this is the underlying data for Chapter 5).

Transect	Nest box	Bamboo Number	No Brood Cells	Species Emerged	Parasitized Cells	Parasitoid Species
1	1	1	9	<i>Megachile centuncularis</i>		
1	2	1	8	<i>Megachile centuncularis</i>		
1	3	1	5	<i>Megachile</i> sp.		
1	4	1	6	<i>Megachile</i> sp.	2	Gasteruptiidae sp.
2	1	1	6	<i>Megachile</i> sp.		
2	2	1	5	<i>Megachile versicolor/lignaria</i> sp.		
2	2	2	2	<i>Ancistrocerus/Symmorphus</i> sp.	3	Gasteruptiidae sp.
2	2	3	7	<i>Ancistrocerus/Symmorphus</i> sp.	3	Gasteruptiidae sp.
2	3	1	4	<i>Megachile</i> sp.		
2	3	2	7	<i>Megachile</i> sp.		
2	3	3	10	<i>Megachile versicolor</i>		
2	4	1	8	<i>Megachile lignaria</i>		
2	5	1	3	<i>Osmia</i> sp.		
2	5	2	5	<i>Megachile</i> sp.		
2	5	3	7	<i>Megachile</i> sp.		
2	6	1	8	<i>Megachile</i> sp.		
3	1	1	3	<i>Osmia</i> sp.	2	<i>Chrysid</i> sp.
3	2	1	5	<i>Megachile</i> sp.		
3	3	1	7	<i>Megachile versicolor</i>		
3	4	1	3	<i>Osmia caerulescens</i>		
3	5	1	8	<i>Ancistrocerus/Symmorphus</i> sp.	1	<i>Chrysid</i> sp.
3	6	1	1	<i>Osmia</i> sp.		
3	6	2	7	<i>Megachile</i> sp.		
3	7	1	3	<i>Osmia</i> sp.	3	<i>Sapyga quinquepunctata</i>
3	7	2	7	<i>Osmia</i> sp.	7	<i>Sapyga quinquepunctata</i>
3	8	1	7	<i>Megachile lignaria</i>		
3	9	1	9	<i>Osmia</i> sp.		
3	9	2	4	<i>Megachile</i> sp.		
4	1	1	4	<i>Osmia</i> sp.		
4	2	1	6	<i>Megachile</i> sp.		
4	2	2	2	<i>Megachile</i> sp.		
4	2	3	6	<i>Megachile</i> sp.		
4	3	1	6	<i>Megachile ligniseca</i>		
4	3	2	6	<i>Megachile versicolor/centuncularis</i> sp.		
4	4	1	6	<i>Megachile</i> sp.	1	Chalcidoidea sp.
4	4	2	7	<i>Osmia caerulescens/leiana</i> sp.	2	<i>Chrysid</i> sp.
4	5	1	15	<i>Megachile</i> sp.		

4	5	2	6	<i>Megachile</i> sp.		
4	5	3	5	<i>Megachile</i> sp.		
4	6	1	2	<i>Ancistrocerus/Symmorphus</i> sp.	2	Chalcidoidea sp.
4	6	2	7	<i>Megachile</i> sp.	1	Chalcidoidea sp.
4	7	1	8	<i>Megachile</i> sp.		
4	7	2	8	<i>Megachile</i> sp.		
4	8	1	7	<i>Megachile</i> sp.		
4	9	1	6	<i>Megachile</i> sp.	2	<i>Coeloxys</i> sp.
4	10	1	5	<i>Megachile</i> sp.		
4	11	1	8	<i>Megachile</i> sp.		
4	11	2	5	<i>Megachile</i> sp.		
4	11	3	1	<i>Osmia</i> sp.		
4	12	1	5	<i>Megachile ligniseca</i>		
4	12	2	7	<i>Megachile</i> sp.		
4	12	3	4	<i>Megachile</i> sp.		
5	1	1	4	<i>Osmia</i> sp.		
5	2	1	3	<i>Ancistrocerus/Symmorphus</i> sp.	2	<i>Chrysid</i> sp.
5	3	1	5	<i>Osmia</i> sp.	2	Gasteruptiidae sp.
5	3	2	3	<i>Osmia caerulescens</i>		
5	4	1	6	<i>Osmia</i> sp.	1	Gasteruptiidae sp.
5	4	2	1	<i>Ancistrocerus/Symmorphus</i> sp.		
5	5	1	5	<i>Ancistrocerus/Symmorphus</i> sp.		
5	6	1	14	<i>Ancistrocerus/Symmorphus</i> sp.	1	Gasteruptiidae sp.
5	7	1	5	<i>Megachile</i> sp.		
5	7	2	10	<i>Megachile versicolor</i>		
5	8	1	7	<i>Megachile</i> sp.		
5	9	1	6	<i>Megachile</i> sp.		
5	10	1	8	<i>Megachile</i> sp.		
5	11	1	3	<i>Megachile</i> sp.		
10	1	1	9	<i>Osmia</i> sp.		
10	1	2	1	<i>Osmia</i> sp.		
10	1	3	10	<i>Osmia</i> sp.		
10	1	4	11	<i>Osmia</i> sp.		
10	2	1	6	<i>Megachile</i> sp.	2	<i>Coeloxys</i> sp.
10	2	2	4	<i>Osmia</i> sp.		
7	1	1	6	<i>Osmia caerulescens/leiana</i> sp.		
7	1	2	6	<i>Osmia</i> sp.		
7	2	1	2	<i>Osmia caerulescens</i>		
7	3	1	2	<i>Ancistrocerus/Symmorphus</i> sp.		
7	3	2	2	<i>Ancistrocerus/Symmorphus</i> sp.		
7	4	1	4	<i>Megachile versicolor/centuncularis</i> sp.	1	Chalcidoidea sp.

7	4	2	4	<i>Megachile versicolor</i>		
7	4	3	4	<i>Osmia</i> sp.	2	1 Chalcidoidea sp., 1 Gasteruptiidae sp.
7	5	1	8	<i>Megachile</i> sp.		
7	5	2	7	<i>Megachile</i> sp.		
7	6	1	3	<i>Osmia</i> sp.	1	Gasteruptiidae sp.
7	7	1	1	<i>Osmia</i> sp.	1	Gasteruptiidae sp.
9	1	1	6	<i>Megachile</i> sp.		
9	1	2	9	<i>Osmia</i> sp.		
9	2	1	6	<i>Megachile</i> sp.		
9	2	2	4	<i>Megachile</i> sp.		
9	3	1	6	<i>Megachile ligniseca</i>		
9	4	1	8	<i>Osmia</i> sp.		
9	4	2	8	<i>Osmia</i> sp.		
9	5	1	7	<i>Megachile</i> sp.		
9	5	2	2	<i>Osmia</i> sp.		
11	1	1	6	<i>Osmia</i> sp.		
11	1	2	8	<i>Osmia</i> sp.	1	Gasteruptiidae sp.
11	2	1	2	<i>Osmia</i> sp.		
11	3	1	8	<i>Osmia</i> sp.		
11	4	1	9	<i>Osmia</i> sp.		
11	5	1	11	<i>Osmia</i> sp.		
11	5	2	6	<i>Osmia</i> sp.		
11	5	3	1	<i>Osmia</i> sp.		
11	6	1	3	<i>Megachile</i> sp.	1	Gasteruptiidae sp.
11	6	2	10	<i>Megachile versicolor</i>		
11	6	3	5	<i>Osmia caerulescens/leiana</i> sp.		
11	6	4	5	<i>Megachile</i> sp.	1	<i>Coeloxys</i> sp.
11	6	5	8	<i>Megachile versicolor</i>		
11	6	6	4	<i>Osmia caerulescens</i>		
11	7	1	5	<i>Megachile</i> sp.		
11	7	2	11	<i>Osmia</i> sp.		
11	7	3	1	<i>Osmia</i> sp.		
11	7	4	1	<i>Osmia</i> sp.		
11	8	1	7	<i>Megachile</i> sp.		
11	8	2	5	<i>Megachile versicolor/centuncularis</i> sp.	1	<i>Coeloxys</i> sp.
11	9	1	7	<i>Megachile</i> sp.		
11	9	2	9	<i>Megachile</i> sp.		
11	9	3	8	<i>Megachile versicolor</i>		
11	10	1	8	<i>Megachile</i> sp.	1	Gasteruptiidae sp.
11	10	2	9	<i>Megachile versicolor</i>		

11	11	1	8	<i>Osmia bicornis</i>		
11	11	2	9	<i>Osmia bicornis</i>		
11	11	3	3	<i>Osmia</i> sp.		
11	12	1	2	<i>Megachile</i> sp.		
11	13	1	10	<i>Megachile versicolor</i>		
11	13	2	7	<i>Megachile versicolor</i>		
11	13	3	8	<i>Megachile</i> sp.	2	1 Gasteruptionidae sp. 1 <i>Coeloxys</i> sp.
12	1	1	8	<i>Megachile ligniseca</i>	1	<i>Coeloxys</i> sp.
12	2	1	9	<i>Megachile versicolor</i>		
12	2	2	11	<i>Osmia</i> sp.		
12	2	3	5	<i>Osmia</i> sp.		
12	2	4	9	<i>Osmia</i> sp.		

Table 4 Raw plant species flower unit abundance data for Chapter 5 of the Thesis. The table lists the plant species recorded at each transect during each survey month and their relative abundance of flower units.

Transect	Farm	Survey Month	Plant Species	Flower unit abundance
1	Little Wittenham	April	<i>Taraxacum officinale</i>	4
1	Little Wittenham	April	<i>Prunus spinosa</i>	2
1	Little Wittenham	May	<i>Leucanthemum vulgare</i>	2
1	Little Wittenham	May	<i>Veronica chamaedrys</i>	1
1	Little Wittenham	May	<i>Ranunculus acris</i>	2
1	Little Wittenham	May	<i>Hieracium</i> sp.	1
1	Little Wittenham	May	<i>Vicia sativa</i>	1
1	Little Wittenham	May	<i>Trifolium repens</i>	2
1	Little Wittenham	May	<i>Stellaria media</i>	1
1	Little Wittenham	June	<i>Rosa canina</i>	2
1	Little Wittenham	June	<i>Hieracium</i> sp.	3
1	Little Wittenham	June	<i>Trifolium repens</i>	4
1	Little Wittenham	June	<i>Anthriscus sylvestris</i>	3
1	Little Wittenham	June	<i>Ranunculus acris</i>	3
1	Little Wittenham	June	<i>Geranium molle</i>	1
1	Little Wittenham	June	<i>Leucanthemum vulgare</i>	2
1	Little Wittenham	July	<i>Cirsium arvense</i>	4
1	Little Wittenham	July	<i>Sonchus arvensis</i>	2
1	Little Wittenham	July	<i>Trifolium repens</i>	3
1	Little Wittenham	July	<i>Tripleurospermum inodorum</i>	2
1	Little Wittenham	July	<i>Epilobium hirsutum</i>	2
1	Little Wittenham	July	<i>Arctium minus</i>	2
1	Little Wittenham	July	<i>Lotus corniculatus</i>	1
1	Little Wittenham	August	<i>Centaurea nigra</i>	2

1	Little Wittenham	August	<i>Sonchus arvensis</i>	2
1	Little Wittenham	August	<i>Epilobium hirsutum</i>	3
1	Little Wittenham	August	<i>Cirsium arvense</i>	4
1	Little Wittenham	August	<i>Trifolium repens</i>	3
1	Little Wittenham	August	<i>Hieracium sp.</i>	3
1	Little Wittenham	August	<i>Lotus corniculatus</i>	2
1	Little Wittenham	August	<i>Cichorium intybus</i>	3
1	Little Wittenham	August	<i>Jacobaea vulgaris</i>	2
1	Little Wittenham	September	<i>Taraxacum officinale</i>	4
1	Little Wittenham	September	<i>Jacobaea vulgaris</i>	2
1	Little Wittenham	September	<i>Cirsium arvense</i>	1
2	Little Wittenham	April	<i>Crataegus monogyna</i>	2
2	Little Wittenham	April	<i>Sambucus nigra</i>	2
2	Little Wittenham	April	<i>Taraxacum officinale</i>	1
2	Little Wittenham	May	<i>Lotus corniculatus</i>	3
2	Little Wittenham	May	<i>Sinapsis arvensis</i>	2
2	Little Wittenham	May	<i>Papaver rhoeas</i>	2
2	Little Wittenham	May	<i>Trifolium repens</i>	2
2	Little Wittenham	May	<i>Anthriscus sylvestris</i>	1
2	Little Wittenham	May	<i>Rosa canina</i>	2
2	Little Wittenham	May	<i>Sambucus nigra</i>	3
2	Little Wittenham	May	<i>Hydrangea sp.</i>	2
2	Little Wittenham	May	<i>Sinapsis arvensis</i>	3
2	Little Wittenham	June	<i>Rosa canina</i>	3
2	Little Wittenham	June	<i>Anthriscus sylvestris</i>	2
2	Little Wittenham	June	<i>Trifolium repens</i>	4
2	Little Wittenham	June	<i>Lotus corniculatus</i>	3
2	Little Wittenham	June	<i>Papaver rhoeas</i>	1
2	Little Wittenham	July	<i>Tripleurospermum inodorum</i>	2
2	Little Wittenham	July	<i>Centaurea nigra</i>	2
2	Little Wittenham	July	<i>Cirsium arvense</i>	3
2	Little Wittenham	July	<i>Trifolium repens</i>	2
2	Little Wittenham	July	<i>Lotus corniculatus</i>	2
2	Little Wittenham	July	<i>Rubus fruticosus</i>	3
2	Little Wittenham	July	<i>Vicia cracca</i>	3
2	Little Wittenham	July	<i>Convolvulus arvensis</i>	2
2	Little Wittenham	August	<i>Centaurea nigra</i>	2
2	Little Wittenham	August	<i>Lotus corniculatus</i>	3
2	Little Wittenham	August	<i>Hieracium sp.</i>	2
2	Little Wittenham	August	<i>Trifolium repens</i>	3
2	Little Wittenham	August	<i>Calystegia sepium</i>	2
2	Little Wittenham	August	<i>Agrimonia eupatoria</i>	1
2	Little Wittenham	August	<i>Convolvulus arvensis</i>	2

2	Little Wittenham	August	<i>Jacobaea vulgaris</i>	2
2	Little Wittenham	August	<i>Sonchus arvensis</i>	2
2	Little Wittenham	August	<i>Rubus fruticosus</i>	3
2	Little Wittenham	September	<i>Taraxacum officinale</i>	1
3	Little Wittenham	April	<i>Crataegus monogyna</i>	4
3	Little Wittenham	April	<i>Ranunculus acris</i>	1
3	Little Wittenham	April	<i>Primula veris</i>	5
3	Little Wittenham	April	<i>Taraxacum officinale</i>	1
3	Little Wittenham	April	<i>Bellis perennis</i>	1
3	Little Wittenham	May	<i>Medicago lupulina</i>	2
3	Little Wittenham	May	<i>Ranunculus acris</i>	3
3	Little Wittenham	May	<i>Geranium molle</i>	1
3	Little Wittenham	May	<i>Silene latifolia</i>	1
3	Little Wittenham	May	<i>Leucanthemum vulgare</i>	4
3	Little Wittenham	May	<i>Veronica chamaedrys</i>	3
3	Little Wittenham	May	<i>Myosotis arvensis</i>	2
3	Little Wittenham	May	<i>Trifolium repens</i>	2
3	Little Wittenham	May	<i>Lotus corniculatus</i>	3
3	Little Wittenham	June	<i>Leucanthemum vulgare</i>	5
3	Little Wittenham	June	<i>Rosa canina</i>	3
3	Little Wittenham	June	<i>Lotus corniculatus</i>	4
3	Little Wittenham	June	<i>Medicago lupulina</i>	3
3	Little Wittenham	June	<i>Hieracium sp.</i>	2
3	Little Wittenham	June	<i>Trifolium repens</i>	3
3	Little Wittenham	June	<i>Convolvulus arvensis</i>	2
3	Little Wittenham	July	<i>Centaurea nigra</i>	2
3	Little Wittenham	July	<i>Leucanthemum vulgare</i>	2
3	Little Wittenham	July	<i>Arctium minus</i>	2
3	Little Wittenham	July	<i>Galium verum</i>	2
3	Little Wittenham	July	<i>Hypericum perforatum</i>	1
3	Little Wittenham	July	<i>Rubus fruticosus</i>	3
3	Little Wittenham	July	<i>Epilobium hirsutum</i>	1
3	Little Wittenham	July	<i>Knautia arvensis</i>	2
3	Little Wittenham	July	<i>Jacobaea vulgaris</i>	3
3	Little Wittenham	July	<i>Lotus corniculatus</i>	2
3	Little Wittenham	July	<i>Convolvulus arvensis</i>	2
3	Little Wittenham	July	<i>Papaver rhoeas</i>	2
3	Little Wittenham	August	<i>Centaurea nigra</i>	3
3	Little Wittenham	August	<i>Cirsium vulgare</i>	3
3	Little Wittenham	August	<i>Clinopodium vulgare</i>	2
3	Little Wittenham	August	<i>Hieracium sp.</i>	2
3	Little Wittenham	August	<i>Jacobaea vulgaris</i>	3
3	Little Wittenham	August	<i>Leucanthemum vulgare</i>	2

3	Little Wittenham	August	<i>Malva neglecta</i>	1
3	Little Wittenham	August	<i>Veronica persica</i>	1
3	Little Wittenham	August	<i>Knautia arvensis</i>	2
3	Little Wittenham	August	<i>Lychnis flos-cuculi</i>	2
3	Little Wittenham	August	<i>Hypericum perforatum</i>	2
3	Little Wittenham	August	<i>Agrimonia eupatoria</i>	1
3	Little Wittenham	September	<i>Knautia arvensis</i>	1
3	Little Wittenham	September	<i>Jacobaea vulgaris</i>	1
3	Little Wittenham	September	<i>Malva neglecta</i>	1
3	Little Wittenham	September	<i>Ranunculus acris</i>	1
3	Little Wittenham	September	<i>Sonchus arvensis</i>	2
3	Little Wittenham	September	<i>Prunella vulgaris</i>	1
3	Little Wittenham	September	<i>Taraxacum officinale</i>	2
3	Little Wittenham	September	<i>Medicago sativa</i>	1
3	Little Wittenham	September	<i>Achillea millefolium</i>	1
3	Little Wittenham	September	<i>Lychnis flos-cuculi</i>	1
3	Little Wittenham	September	<i>Leucanthemum vulgare</i>	1
3	Little Wittenham	September	<i>Lysimachia punctata</i>	1
3	Little Wittenham	September	<i>Anagallis arvensis</i>	1
4	Little Wittenham	April	<i>Prunus spinosa</i>	3
4	Little Wittenham	April	<i>Glechoma hederacea</i>	3
4	Little Wittenham	April	<i>Ranunculus ficaria</i>	5
4	Little Wittenham	April	<i>Taraxacum officinale</i>	2
4	Little Wittenham	April	<i>Lamium album</i>	2
4	Little Wittenham	May	<i>Symphytum officinale</i>	4
4	Little Wittenham	May	<i>Ranunculus acris</i>	5
4	Little Wittenham	May	<i>Anthriscus sylvestris</i>	5
4	Little Wittenham	May	<i>Iris pseudacorus</i>	2
4	Little Wittenham	May	<i>Bellis perennis</i>	2
4	Little Wittenham	May	<i>Lamium album</i>	3
4	Little Wittenham	May	<i>Rosa canina</i>	2
4	Little Wittenham	May	<i>Vicia sativa</i>	2
4	Little Wittenham	May	<i>Hieracium sp.</i>	2
4	Little Wittenham	May	<i>Sambucus nigra</i>	2
4	Little Wittenham	June	<i>Anthriscus sylvestris</i>	5
4	Little Wittenham	June	<i>Geranium molle</i>	2
4	Little Wittenham	June	<i>Trifolium repens</i>	5
4	Little Wittenham	June	<i>Iris pseudacorus</i>	2
4	Little Wittenham	June	<i>Ranunculus acris</i>	4
4	Little Wittenham	June	<i>Symphytum officinale</i>	5
4	Little Wittenham	June	<i>Jacobaea vulgaris</i>	2
4	Little Wittenham	June	<i>Carduus nutans</i>	3
4	Little Wittenham	June	<i>Rosa canina</i>	3

4	Little Wittenham	June	<i>Hieracium sp.</i>	5
4	Little Wittenham	June	<i>Vicia cracca</i>	2
4	Little Wittenham	June	<i>Sambucus nigra</i>	2
4	Little Wittenham	June	<i>Sinapsis arvensis</i>	1
4	Little Wittenham	June	<i>Geranium pratense</i>	2
4	Little Wittenham	July	<i>Vicia cracca</i>	4
4	Little Wittenham	July	<i>Epilobium hirsutum</i>	5
4	Little Wittenham	July	<i>Symphytum officinale</i>	4
4	Little Wittenham	July	<i>Trifolium repens</i>	4
4	Little Wittenham	July	<i>Cirsium arvense</i>	5
4	Little Wittenham	July	<i>Calystegia sepium</i>	3
4	Little Wittenham	July	<i>Lotus corniculatus</i>	2
4	Little Wittenham	July	<i>Pulicaria dysenterica</i>	2
4	Little Wittenham	August	<i>Epilobium hirsutum</i>	5
4	Little Wittenham	August	<i>Cirsium vulgare</i>	2
4	Little Wittenham	August	<i>Lotus corniculatus</i>	2
4	Little Wittenham	August	<i>Calystegia sepium</i>	3
4	Little Wittenham	August	<i>Vicia cracca</i>	3
4	Little Wittenham	August	<i>Trifolium repens</i>	3
4	Little Wittenham	August	<i>Lythrum salicaria</i>	3
4	Little Wittenham	August	<i>Trifolium pratense</i>	2
4	Little Wittenham	August	<i>Lycopus europaeus</i>	2
4	Little Wittenham	August	<i>Pulicaria dysenterica</i>	3
4	Little Wittenham	August	<i>Cirsium arvense</i>	5
4	Little Wittenham	August	<i>Jacobaea vulgaris</i>	3
4	Little Wittenham	September	<i>Sonchus arvensis</i>	3
4	Little Wittenham	September	<i>Jacobaea vulgaris</i>	2
4	Little Wittenham	September	<i>Cirsium arvense</i>	3
5	Wytham	April	<i>Taraxacum officinale</i>	1
5	Wytham	May	<i>Ranunculus acris</i>	4
5	Wytham	May	<i>Crataegus monogyna</i>	4
5	Wytham	May	<i>Anthriscus sylvestris</i>	3
5	Wytham	May	<i>Sinapsis arvensis</i>	1
5	Wytham	June	<i>Trifolium repens</i>	3
5	Wytham	June	<i>Brassica napus</i>	5
5	Wytham	June	<i>Sambucus nigra</i>	4
5	Wytham	June	<i>Ranunculus acris</i>	2
5	Wytham	July	<i>Epilobium hirsutum</i>	4
5	Wytham	July	<i>Trifolium repens</i>	2
5	Wytham	July	<i>Cirsium arvense</i>	4
5	Wytham	July	<i>Leucanthemum vulgare</i>	2
5	Wytham	July	<i>Calystegia sepium</i>	2
5	Wytham	July	<i>Tripleurospermum inodorum</i>	2

5	Wytham	July	<i>Centaurea cyanus</i>	3
5	Wytham	July	<i>Veronica persica</i>	1
5	Wytham	July	<i>Lotus corniculatus</i>	2
5	Wytham	July	<i>Sinapsis arvensis</i>	1
5	Wytham	July	<i>Hieracium sp.</i>	2
5	Wytham	August	<i>Leucanthemum vulgare</i>	2
5	Wytham	August	<i>Trifolium repens</i>	3
5	Wytham	August	<i>Trifolium pratense</i>	3
5	Wytham	August	<i>Lotus corniculatus</i>	2
5	Wytham	August	<i>Epilobium hirsutum</i>	3
5	Wytham	August	<i>Jacobaea vulgaris</i>	3
5	Wytham	August	<i>Hieracium sp.</i>	2
5	Wytham	August	<i>Cirsium arvense</i>	5
5	Wytham	August	<i>Cirsium vulgare</i>	2
5	Wytham	September	<i>Sonchus arvensis</i>	2
5	Wytham	September	<i>Cirsium vulgare</i>	1
5	Wytham	September	<i>Jacobaea vulgaris</i>	1
5	Wytham	September	<i>Cirsium arvense</i>	3
5	Wytham	September	<i>Trifolium repens</i>	1
6	Wytham	April	<i>Lamium album</i>	2
6	Wytham	April	<i>Taraxacum officinale</i>	1
6	Wytham	April	<i>Glechoma hederacea</i>	1
6	Wytham	May	<i>Anthriscus sylvestris</i>	2
6	Wytham	May	<i>Crataegus monogyna</i>	3
6	Wytham	May	<i>Sinapsis arvensis</i>	2
6	Wytham	May	<i>Silene latifolia</i>	1
6	Wytham	May	<i>Silene dioica</i>	1
6	Wytham	May	<i>Taraxacum officinale</i>	1
6	Wytham	June	<i>Sambucus nigra</i>	2
6	Wytham	June	<i>Rosa canina</i>	1
6	Wytham	June	<i>Trifolium repens</i>	4
6	Wytham	June	<i>Malva sylvestris</i>	1
6	Wytham	July	<i>Arctium minus</i>	2
6	Wytham	July	<i>Cirsium arvense</i>	2
6	Wytham	July	<i>Scorzoneroidea autumnalis</i>	2
6	Wytham	July	<i>Silene latifolia</i>	1
6	Wytham	August	<i>Epilobium hirsutum</i>	2
6	Wytham	August	<i>Cirsium arvense</i>	3
6	Wytham	August	<i>Trifolium repens</i>	2
6	Wytham	August	<i>Taraxacum officinale</i>	2
6	Wytham	September	<i>Calystegia sepium</i>	1
6	Wytham	September	<i>Epilobium hirsutum</i>	1
7	Greystones	April	<i>Taraxacum officinale</i>	4

7	Greystones	April	<i>Primula veris</i>	2
7	Greystones	April	<i>Crataegus monogyna</i>	4
7	Greystones	April	<i>Ranunculus ficaria</i>	2
7	Greystones	May	<i>Taraxacum officinale</i>	1
7	Greystones	May	<i>Ranunculus acris</i>	5
7	Greystones	May	<i>Veronica chamaedrys</i>	5
7	Greystones	May	<i>Ajuga reptans</i>	5
7	Greystones	May	<i>Prunella vulgaris</i>	3
7	Greystones	May	<i>Iris pseudacorus</i>	1
7	Greystones	May	<i>Anthriscus sylvestris</i>	3
7	Greystones	May	<i>Crataegus monogyna</i>	3
7	Greystones	May	<i>Primula veris</i>	2
7	Greystones	June	<i>Ranunculus acris</i>	5
7	Greystones	June	<i>Lychnis flos-cuculi</i>	2
7	Greystones	June	<i>Lamium album</i>	1
7	Greystones	June	<i>Veronica chamaedrys</i>	2
7	Greystones	June	<i>Dactylorhiza praetermissa</i>	2
7	Greystones	June	<i>Primula veris</i>	5
7	Greystones	June	<i>Trifolium repens</i>	4
7	Greystones	June	<i>Sambucus nigra</i>	3
7	Greystones	June	<i>Trifolium pratense</i>	3
7	Greystones	June	<i>Stellaria media</i>	3
7	Greystones	July	<i>Epilobium hirsutum</i>	3
7	Greystones	July	<i>Lysimachia vulgaris</i>	4
7	Greystones	July	<i>Filipendula ulmaria</i>	3
7	Greystones	July	<i>Lotus corniculatus</i>	2
7	Greystones	July	<i>Centaurea nigra</i>	2
7	Greystones	July	<i>Vicia cracca</i>	1
7	Greystones	July	<i>Hieracium sp.</i>	1
7	Greystones	July	<i>Mentha aquatica</i>	1
7	Greystones	July	<i>Solanum dulcamara</i>	1
7	Greystones	July	<i>Cirsium arvense</i>	2
7	Greystones	August	<i>Lysimachia vulgaris</i>	3
7	Greystones	August	<i>Epilobium hirsutum</i>	3
7	Greystones	August	<i>Taraxacum officinale</i>	2
7	Greystones	August	<i>Filipendula ulmaria</i>	2
7	Greystones	August	<i>Lotus corniculatus</i>	1
7	Greystones	August	<i>Ranunculus acris</i>	1
7	Greystones	August	<i>Trifolium pratense</i>	1
7	Greystones	September	<i>Trifolium repens</i>	1
7	Greystones	September	<i>Lysimachia punctata</i>	2
7	Greystones	September	<i>Lotus corniculatus</i>	1
7	Greystones	September	<i>Cirsium arvense</i>	1

7	Greystones	September	<i>Mentha aquatica</i>	2
7	Greystones	September	<i>Ranunculus acris</i>	1
7	Greystones	September	<i>Centranthus ruber</i>	2
7	Greystones	September	<i>Taraxacum officinale</i>	1
7	Greystones	September	<i>Jacobaea vulgaris</i>	1
8	Greystones	April	<i>Prunus spinosa</i>	4
8	Greystones	April	<i>Lamium album</i>	2
8	Greystones	April	<i>Lamium purpureum</i>	2
8	Greystones	April	<i>Glechoma hederacea</i>	2
8	Greystones	April	<i>Taraxacum officinale</i>	4
8	Greystones	May	<i>Anthriscus sylvestris</i>	5
8	Greystones	May	<i>Silene dioica</i>	2
8	Greystones	May	<i>Trifolium repens</i>	2
8	Greystones	May	<i>Lamium album</i>	5
8	Greystones	May	<i>Crataegus monogyna</i>	4
8	Greystones	May	<i>Geranium molle</i>	2
8	Greystones	May	<i>Ranunculus acris</i>	5
8	Greystones	May	<i>Taraxacum officinale</i>	5
8	Greystones	May	<i>Trifolium pratense</i>	3
8	Greystones	May	<i>Veronica chamaedrys</i>	4
8	Greystones	May	<i>Stellaria media</i>	4
8	Greystones	May	<i>Bellis perennis</i>	2
8	Greystones	June	<i>Anthriscus sylvestris</i>	5
8	Greystones	June	<i>Geranium molle</i>	2
8	Greystones	June	<i>Trifolium repens</i>	4
8	Greystones	June	<i>Sambucus nigra</i>	2
8	Greystones	June	<i>Lamium album</i>	2
8	Greystones	July	<i>Convolvulus arvensis</i>	3
8	Greystones	July	<i>Anthriscus sylvestris</i>	2
8	Greystones	July	<i>Arctium minus</i>	1
8	Greystones	July	<i>Calystegia sepium</i>	3
8	Greystones	July	<i>Matricaria discoidea</i>	1
8	Greystones	July	<i>Geranium pratense</i>	2
8	Greystones	July	<i>Cirsium arvense</i>	2
8	Greystones	July	<i>Silene latifolia</i>	1
8	Greystones	July	<i>Hypericum perforatum</i>	1
8	Greystones	July	<i>Rubus fruticosus</i>	2
8	Greystones	August	<i>Convolvulus arvensis</i>	5
8	Greystones	August	<i>Calystegia sepium</i>	5
8	Greystones	August	<i>Agrimonia eupatoria</i>	2
8	Greystones	August	<i>Trifolium repens</i>	3
8	Greystones	August	<i>Lamium album</i>	1
8	Greystones	August	<i>Silene latifolia</i>	1

8	Greystones	August	<i>Geranium pratense</i>	1
8	Greystones	August	<i>Cirsium arvense</i>	2
8	Greystones	August	<i>Hypericum perforatum</i>	2
8	Greystones	August	<i>Centaurea nigra</i>	1
8	Greystones	August	<i>Hieracium sp.</i>	2
8	Greystones	September	<i>Achillea millefolium</i>	1
8	Greystones	September	<i>Cirsium arvense</i>	1
8	Greystones	September	<i>Lamium album</i>	1
8	Greystones	September	<i>Convolvulus arvensis</i>	1
8	Greystones	September	<i>Silene latifolia</i>	1
8	Greystones	September	<i>Trifolium repens</i>	3
8	Greystones	September	<i>Taraxacum officinale</i>	1
9	Lower Smite	April	<i>Taraxacum officinale</i>	3
9	Lower Smite	April	<i>Ranunculus acris</i>	1
9	Lower Smite	April	<i>Sinapsis arvensis</i>	1
9	Lower Smite	May	<i>Ranunculus acris</i>	4
9	Lower Smite	May	<i>Taraxacum officinale</i>	5
9	Lower Smite	May	<i>Trifolium repens</i>	2
9	Lower Smite	May	<i>Trifolium pratense</i>	2
9	Lower Smite	May	<i>Vicia faba</i>	5
9	Lower Smite	May	<i>Sinapsis arvensis</i>	5
9	Lower Smite	May	<i>Crataegus monogyna</i>	2
9	Lower Smite	June	<i>Ranunculus acris</i>	5
9	Lower Smite	June	<i>Trifolium repens</i>	5
9	Lower Smite	June	<i>Trifolium pratense</i>	3
9	Lower Smite	June	<i>Sinapsis arvensis</i>	2
9	Lower Smite	June	<i>Rosa canina</i>	2
9	Lower Smite	June	<i>Vicia cracca</i>	2
9	Lower Smite	June	<i>Centaurea nigra</i>	2
9	Lower Smite	June	<i>Vicia sativa</i>	2
9	Lower Smite	June	<i>Leucanthemum vulgare</i>	2
9	Lower Smite	June	<i>Anthriscus sylvestris</i>	3
9	Lower Smite	June	<i>Papaver rhoeas</i>	1
9	Lower Smite	July	<i>Trifolium pratense</i>	3
9	Lower Smite	July	<i>Cichorium intybus</i>	4
9	Lower Smite	July	<i>Trifolium repens</i>	4
9	Lower Smite	July	<i>Ranunculus repens</i>	3
9	Lower Smite	July	<i>Jacobaea vulgaris</i>	2
9	Lower Smite	July	<i>Cirsium arvense</i>	5
9	Lower Smite	July	<i>Centaurea nigra</i>	4
9	Lower Smite	July	<i>Lotus corniculatus</i>	2
9	Lower Smite	July	<i>Vicia cracca</i>	2
9	Lower Smite	July	<i>Helminthotheca echioides</i>	2

9	Lower Smite	July	<i>Calystegia sepium</i>	3
9	Lower Smite	July	<i>Achillea millefolium</i>	1
9	Lower Smite	August	<i>Cichorium intybus</i>	4
9	Lower Smite	August	<i>Trifolium repens</i>	5
9	Lower Smite	August	<i>Trifolium pratense</i>	5
9	Lower Smite	August	<i>Ranunculus repens</i>	2
9	Lower Smite	August	<i>Vicia cracca</i>	2
9	Lower Smite	August	<i>Cirsium vulgare</i>	2
9	Lower Smite	August	<i>Jacobaea vulgaris</i>	2
9	Lower Smite	August	<i>Lotus corniculatus</i>	4
9	Lower Smite	August	<i>Epilobium hirsutum</i>	3
9	Lower Smite	August	<i>Centaurea nigra</i>	3
9	Lower Smite	August	<i>Convolvulus arvensis</i>	3
9	Lower Smite	August	<i>Helminthotheca echioides</i>	3
9	Lower Smite	August	<i>Leucanthemum vulgare</i>	2
9	Lower Smite	September	<i>Ranunculus repens</i>	2
9	Lower Smite	September	<i>Cichorium intybus</i>	3
9	Lower Smite	September	<i>Trifolium pratense</i>	3
9	Lower Smite	September	<i>Taraxacum officinale</i>	2
9	Lower Smite	September	<i>Cirsium arvense</i>	2
9	Lower Smite	September	<i>Lotus corniculatus</i>	2
9	Lower Smite	September	<i>Centaurea nigra</i>	2
9	Lower Smite	September	<i>Helminthotheca echioides</i>	2
9	Lower Smite	September	<i>Jacobaea vulgaris</i>	2
9	Lower Smite	September	<i>Trifolium repens</i>	2
10	Lower Smite	April	<i>Taraxacum officinale</i>	3
10	Lower Smite	April	<i>Malus domestica</i>	4
10	Lower Smite	April	<i>Lamium album</i>	2
10	Lower Smite	April	<i>Anthriscus sylvestris</i>	2
10	Lower Smite	April	<i>Primula veris</i>	4
10	Lower Smite	April	<i>Myosotis arvensis</i>	2
10	Lower Smite	April	<i>Bellis perennis</i>	1
10	Lower Smite	April	<i>Pentaglottis sempervirens</i>	1
10	Lower Smite	April	<i>Hyacinthoides hispanica</i>	2
10	Lower Smite	April	<i>Bergenia sp</i>	1
10	Lower Smite	April	<i>Iris sp</i>	1
10	Lower Smite	April	<i>Primula vulgaris</i>	2
10	Lower Smite	April	<i>Cerintho sp</i>	1
10	Lower Smite	April	<i>Lunaria annua</i>	2
10	Lower Smite	April	<i>Prunus avium</i>	3
10	Lower Smite	April	<i>Syringa vulgaris</i>	1
10	Lower Smite	April	<i>Symphytum officinale</i>	3
10	Lower Smite	April	<i>Chaenomeles sp</i>	1

10	Lower Smite	May	<i>Anthriscus sylvestris</i>	5
10	Lower Smite	May	<i>Ranunculus acris</i>	4
10	Lower Smite	May	<i>Jacobaea vulgaris</i>	2
10	Lower Smite	May	<i>Sinapsis arvensis</i>	1
10	Lower Smite	May	<i>Vicia sativa</i>	2
10	Lower Smite	May	<i>Taraxacum officinale</i>	3
10	Lower Smite	May	<i>Pentaglottis sempervirens</i>	2
10	Lower Smite	May	<i>Myosotis arvensis</i>	2
10	Lower Smite	June	<i>Anthriscus sylvestris</i>	5
10	Lower Smite	June	<i>Lotus corniculatus</i>	5
10	Lower Smite	June	<i>Leucanthemum vulgare</i>	3
10	Lower Smite	June	<i>Medicago lupulina</i>	3
10	Lower Smite	June	<i>Sambucus nigra</i>	4
10	Lower Smite	June	<i>Trifolium pratense</i>	3
10	Lower Smite	June	<i>Rosa canina</i>	4
10	Lower Smite	June	<i>Geranium pratense</i>	3
10	Lower Smite	June	<i>Sinapsis arvensis</i>	2
10	Lower Smite	June	<i>Papaver rhoeas</i>	2
10	Lower Smite	June	<i>Valeriana officinalis</i>	2
10	Lower Smite	June	<i>Phacelia tanacetifolia</i>	3
10	Lower Smite	June	<i>Agrostemma githago</i>	2
10	Lower Smite	June	<i>Myosotis arvensis</i>	2
10	Lower Smite	June	<i>Lithospermum arvense</i>	2
10	Lower Smite	June	<i>Lamium album</i>	2
10	Lower Smite	June	<i>Veronica persica</i>	2
10	Lower Smite	June	<i>Scrophularia nodosa</i>	2
10	Lower Smite	June	<i>Rhinanthus minor</i>	3
10	Lower Smite	July	<i>Centaurea nigra</i>	3
10	Lower Smite	July	<i>Achillea millefolium</i>	2
10	Lower Smite	July	<i>Lotus corniculatus</i>	3
10	Lower Smite	July	<i>Jacobaea vulgaris</i>	2
10	Lower Smite	July	<i>Convolvulus arvensis</i>	4
10	Lower Smite	July	<i>Dipsacus sylvestris</i>	2
10	Lower Smite	July	<i>Cirsium vulgare</i>	3
10	Lower Smite	July	<i>Buddleja sp.</i>	2
10	Lower Smite	July	<i>Calystegia sepium</i>	2
10	Lower Smite	July	<i>Arctium minus</i>	2
10	Lower Smite	July	<i>Papaver rhoeas</i>	2
10	Lower Smite	July	<i>Tanacetum vulgare</i>	2
10	Lower Smite	July	<i>Lavandula sp.</i>	3
10	Lower Smite	July	<i>Knautia arvensis</i>	2
10	Lower Smite	July	<i>Rosa sp.</i>	2
10	Lower Smite	July	<i>Centaurea cyanus</i>	1

10	Lower Smite	July	<i>Phacelia tanacetifolia</i>	1
10	Lower Smite	July	<i>Agrostemma githago</i>	2
10	Lower Smite	July	<i>Medicago sativa</i>	3
10	Lower Smite	July	<i>Lathyrus latifolius</i>	2
10	Lower Smite	July	<i>Eryngium maritimum</i>	1
10	Lower Smite	July	<i>Salvia sp.</i>	2
10	Lower Smite	July	<i>Lythrum salicaria</i>	2
10	Lower Smite	July	<i>Valeriana officinalis</i>	1
10	Lower Smite	July	<i>Thymus vulgaris</i>	2
10	Lower Smite	August	<i>Chamerion angustifolium</i>	4
10	Lower Smite	August	<i>Trifolium repens</i>	5
10	Lower Smite	August	<i>Cirsium vulgare</i>	2
10	Lower Smite	August	<i>Malva neglecta</i>	1
10	Lower Smite	August	<i>Lamium album</i>	1
10	Lower Smite	August	<i>Jacobaea vulgaris</i>	2
10	Lower Smite	August	<i>Convolvulus arvensis</i>	2
10	Lower Smite	August	<i>Centaurea nigra</i>	3
10	Lower Smite	August	<i>Achillea millefolium</i>	2
10	Lower Smite	August	<i>Lotus corniculatus</i>	3
10	Lower Smite	August	<i>Dipsacus sylvestris</i>	2
10	Lower Smite	August	<i>Buddleja sp.</i>	2
10	Lower Smite	August	<i>Calystegia sepium</i>	2
10	Lower Smite	August	<i>Arctium minus</i>	2
10	Lower Smite	August	<i>Papaver rhoeas</i>	2
10	Lower Smite	August	<i>Tanacetum vulgare</i>	2
10	Lower Smite	August	<i>Lavandula sp.</i>	3
10	Lower Smite	August	<i>Knautia arvensis</i>	2
10	Lower Smite	August	<i>Rosa sp.</i>	2
10	Lower Smite	August	<i>Centaurea cyanus</i>	1
10	Lower Smite	August	<i>Agrostemma githago</i>	2
10	Lower Smite	August	<i>Medicago sativa</i>	3
10	Lower Smite	August	<i>Lathyrus latifolius</i>	2
10	Lower Smite	August	<i>Eryngium maritimum</i>	1
10	Lower Smite	August	<i>Salvia sp.</i>	2
10	Lower Smite	August	<i>Lythrum salicaria</i>	2
10	Lower Smite	August	<i>Valeriana officinalis</i>	1
10	Lower Smite	August	<i>Thymus vulgaris</i>	2
10	Lower Smite	September	<i>Achillea millefolium</i>	2
10	Lower Smite	September	<i>Ranunculus acris</i>	2
10	Lower Smite	September	<i>Helianthus annuus</i>	1
10	Lower Smite	September	<i>Taraxacum officinale</i>	2
10	Lower Smite	September	<i>Jacobaea vulgaris</i>	1
10	Lower Smite	September	<i>Geranium pratense</i>	2

10	Lower Smite	September	<i>Lythrum salicaria</i>	1
10	Lower Smite	September	<i>Knautia arvensis</i>	2
10	Lower Smite	September	<i>Lavandula sp.</i>	2
10	Lower Smite	September	<i>Bellis perennis</i>	3
10	Lower Smite	September	<i>Lamium purpureum</i>	1
11	Lower Smite	April	<i>Taraxacum officinale</i>	1
11	Lower Smite	April	<i>Anthriscus sylvestris</i>	1
11	Lower Smite	May	<i>Ranunculus acris</i>	2
11	Lower Smite	May	<i>Anthriscus sylvestris</i>	3
11	Lower Smite	June	<i>Trifolium repens</i>	5
11	Lower Smite	June	<i>Ranunculus acris</i>	4
11	Lower Smite	June	<i>Lotus corniculatus</i>	4
11	Lower Smite	June	<i>Trifolium pratense</i>	5
11	Lower Smite	June	<i>Anthriscus sylvestris</i>	2
11	Lower Smite	June	<i>Sambucus nigra</i>	2
11	Lower Smite	June	<i>Rosa canina</i>	2
11	Lower Smite	July	<i>Cichorium intybus</i>	5
11	Lower Smite	July	<i>Lotus corniculatus</i>	4
11	Lower Smite	July	<i>Trifolium pratense</i>	5
11	Lower Smite	July	<i>Epilobium hirsutum</i>	2
11	Lower Smite	July	<i>Cirsium vulgare</i>	4
11	Lower Smite	July	<i>Arctium minus</i>	2
11	Lower Smite	July	<i>Dipsacus sylvestris</i>	2
11	Lower Smite	July	<i>Cirsium arvense</i>	4
11	Lower Smite	August	<i>Cichorium intybus</i>	5
11	Lower Smite	August	<i>Trifolium pratense</i>	5
11	Lower Smite	August	<i>Lotus corniculatus</i>	4
11	Lower Smite	August	<i>Calystegia sepium</i>	4
11	Lower Smite	August	<i>Helminthotheca echioides</i>	3
11	Lower Smite	September	<i>Cichorium intybus</i>	5
11	Lower Smite	September	<i>Trifolium pratense</i>	3
11	Lower Smite	September	<i>Trifolium repens</i>	2
12	Lower Smite	April	<i>Taraxacum officinale</i>	5
12	Lower Smite	April	<i>Lamium album</i>	2
12	Lower Smite	April	<i>Fragaria virginiana</i>	2
12	Lower Smite	May	<i>Taraxacum officinale</i>	3
12	Lower Smite	May	<i>Ranunculus acris</i>	3
12	Lower Smite	May	<i>Vicia sativa</i>	2
12	Lower Smite	May	<i>Anthriscus sylvestris</i>	2
12	Lower Smite	May	<i>Crataegus monogyna</i>	2
12	Lower Smite	May	<i>Fragaria virginiana</i>	4
12	Lower Smite	May	<i>Sinapsis arvensis</i>	5
12	Lower Smite	May	<i>Lamium album</i>	2

12	Lower Smite	June	<i>Anthriscus sylvestris</i>	2
12	Lower Smite	June	<i>Rosa canina</i>	2
12	Lower Smite	June	<i>Sambucus nigra</i>	2
12	Lower Smite	June	<i>Lotus corniculatus</i>	2
12	Lower Smite	June	<i>Trifolium repens</i>	3
12	Lower Smite	June	<i>Ranunculus acris</i>	3
12	Lower Smite	June	<i>Tripleurospermum inodorum</i>	5
12	Lower Smite	June	<i>Papaver rhoeas</i>	1
12	Lower Smite	June	<i>Sinapsis arvensis</i>	2
12	Lower Smite	June	<i>Trifolium incarnatum</i>	5
12	Lower Smite	June	<i>Hieracium sp.</i>	3
12	Lower Smite	July	<i>Anthemis arvensis</i>	4
12	Lower Smite	July	<i>Sinapsis arvensis</i>	2
12	Lower Smite	July	<i>Trifolium repens</i>	5
12	Lower Smite	July	<i>Helminthotheca echioides</i>	3
12	Lower Smite	July	<i>Cirsium vulgare</i>	3
12	Lower Smite	July	<i>Medicago sativa</i>	4
12	Lower Smite	July	<i>Trifolium repens</i>	4
12	Lower Smite	July	<i>Cichorium intybus</i>	5
12	Lower Smite	July	<i>Centaurea nigra</i>	2
12	Lower Smite	July	<i>Epilobium hirsutum</i>	2
12	Lower Smite	July	<i>Lotus corniculatus</i>	4
12	Lower Smite	July	<i>Helianthus annuus</i>	1
12	Lower Smite	July	<i>Convolvulus arvensis</i>	2
12	Lower Smite	July	<i>Cirsium arvense</i>	2
12	Lower Smite	August	<i>Cichorium intybus</i>	5
12	Lower Smite	August	<i>Lotus corniculatus</i>	5
12	Lower Smite	August	<i>Trifolium pratense</i>	5
12	Lower Smite	August	<i>Trifolium repens</i>	4
12	Lower Smite	August	<i>Leucanthemum vulgare</i>	4
12	Lower Smite	August	<i>Helianthus annuus</i>	3
12	Lower Smite	August	<i>Helminthotheca echioides</i>	2
12	Lower Smite	August	<i>Cirsium vulgare</i>	1
12	Lower Smite	August	<i>Medicago sativa</i>	3
12	Lower Smite	August	<i>Medicago sativa</i>	1
12	Lower Smite	August	<i>Epilobium hirsutum</i>	1
12	Lower Smite	August	<i>Jacobaea vulgaris</i>	1
12	Lower Smite	August	<i>Ranunculus acris</i>	1
12	Lower Smite	August	<i>Vicia cracca</i>	1
12	Lower Smite	September	<i>Trifolium pratense</i>	4
12	Lower Smite	September	<i>Prunella vulgaris</i>	2
12	Lower Smite	September	<i>Ranunculus acris</i>	2
12	Lower Smite	September	<i>Cirsium vulgare</i>	2

12	Lower Smite	September	<i>Sonchus arvensis</i>	4
12	Lower Smite	September	<i>Medicago sativa</i>	3
12	Lower Smite	September	<i>Sinapsis arvensis</i>	2
12	Lower Smite	September	<i>Trifolium resupinatum</i>	3
12	Lower Smite	September	<i>Cichorium intybus</i>	4
12	Lower Smite	September	<i>Trifolium repens</i>	2
12	Lower Smite	September	<i>Lotus corniculatus</i>	1

Table 5 This table lists what constituted a flower unit for each plant species recorded within this thesis. The flower units were categorized as a single solitary flower or capitulum (e.g. *Leucanthemum vulgare*), cyme (e.g. *Myosotis arvensis*), raceme (e.g. *Lysimachia vulgaris*), umbel (e.g. *Anthriscus sylvestris*), corymb (e.g. *Jacobea vulgaris*) or panicle (e.g. *Centranthus ruber*) as appropriate, following (Clapham, Tutin & Moore, 1987; Rose, 2016; Staces, 2010). Also included are the species authorities.

Plant Species List	Species Authority	Floral Unit
<i>Achillea millefolium</i>	L.	Corymb (of capitula)
<i>Aegopodium podagraria</i>	L.	Umbel
<i>Agrimonia eupatoria</i>	L.	Raceme
<i>Agrostemma githago</i>	L.	Solitary (capitulum)
<i>Ajuga reptans</i>	L.	Spike (of contracted cymes)
<i>Alliaria petiolata</i>	(M.Bieb.) Cavara & Grande	Raceme
<i>Allium ursinum</i>	L.	Umbel
<i>Anagallis arvensis</i>	(L.) U.Manns & Anderb.	Solitary
<i>Angelica sylvestris</i>	L.	Umbel
<i>Anthemis arvensis</i>	L.	Solitary (capitulum)
<i>Anthemis austriaca</i>	Jacq.	Solitary (capitulum)
<i>Anthriscus sylvestris</i>	(L.) Hoffm.	Umbel
<i>Arctium minus</i>	(Hill) Bernh.	Solitary (capitulum)
<i>Argyranthemum frutescens</i>	(L.) Sch.Bip.	Solitary (capitulum)
<i>Arum maculatum</i>	L.	Spike (spadix)
<i>Atropa bella-donna</i>	L.	Solitary
<i>Ballota nigra</i>	L.	Spike
<i>Bellis perennis</i>	L.	Solitary (capitulum)
<i>Bergenia</i> sp.	NA	Panicle
<i>Brassica napus</i>	Burnett	Raceme
<i>Buddleja</i> sp.	NA	Spike
<i>Calystegia sepium</i>	(L.) R.Br.	Solitary
<i>Calystegia silvatica</i>	(Kit.) Griseb.	Solitary
<i>Capsella bursa-pastoris</i>	(L.) Medik.	Raceme
<i>Cardamine hirsuta</i>	L.	Raceme
<i>Cardamine pratensis</i>	L.	Raceme
<i>Carduus nutans</i>	L.	Solitary (capitulum)
<i>Centaurea cyanus</i>	L.	Solitary (capitulum)
<i>Centaurea nigra</i>	L.	Solitary (capitulum)
<i>Centaurium erythraea</i>	Rafn	Solitary (capitulum)
<i>Centranthus ruber</i>	(L.) DC.	Panicle
<i>Cerinth</i> sp.	NA	Cyme
<i>Chaenomeles</i> sp.	NA	Solitary
<i>Cichorium intybus</i>	L.	Solitary (capitulum)

<i>Cirsium arvense</i>	(L.) Scop.	Solitary (capitulum)
<i>Cirsium palustre</i>	(L.) Scop.	Solitary (capitulum)
<i>Cirsium vulgare</i>	(Savi) Ten.	Solitary (capitulum)
<i>Clinopodium vulgare</i>	L.	Cyme
<i>Conopodium majus</i>	(Gouan) Loret	Umbel
<i>Convolvulus arvensis</i>	L.	Solitary
<i>Crataegus monogyna</i>	Jacq.	Corymb
<i>Crepis capillaris</i>	(L.) Wallr.	Corymb (of capitula)
<i>Dactylorhiza fuchsii</i>	(Druce) Soó	Spike
<i>Dactylorhiza majalis</i>	(Rchb.) P.F.Hunt & Summerh.	Spike
<i>Dactylorhiza praetermissa</i>	(Druce) Soó	Spike
<i>Daucus carota</i>	L.	Umbel
<i>Digitalis purpurea</i>	L.	Raceme
<i>Dipsacus fullonum</i>	L.	Solitary (capitulum)
<i>Dipsacus fullonum</i>	L.	Solitary (capitulum)
<i>Echium vulgare</i>	L.	Panicle (of cymes)
<i>Epilobium angustifolium</i>	L.	Spike
<i>Epilobium angustifolium</i>	L.	Raceme
<i>Epilobium hirsutum</i>	L.	Raceme
<i>Epilobium montanum</i>	L.	Raceme
<i>Epilobium strictum</i>	Muhl. ex Spreng.	Raceme
<i>Eryngium maritimum</i>	L.	Solitary (capitulum)
<i>Euphorbia peplus</i>	L.	Umbel (of cymes)
<i>Euphorbia</i> sp.	L.	Umbel (of cymes)
<i>Ficaria verna</i>	Huds.	Solitary
<i>Filipendula ulmaria</i>	(L.) Maxim.	Cymose panicle
<i>Fragaria x ananassa</i>	(Duchesne ex Weston) Duchesne ex Rozier	Cyme
<i>Fragaria virginiana</i>	Mill.	Cyme
<i>Fragaria x ananassa</i>	J. Gay	Cyme
<i>Galium verum</i>	L.	Panicle
<i>Geranium molle</i>	L.	Cyme
<i>Geranium pratense</i>	L.	Cyme
<i>Geranium robertianum</i>	L.	Cyme
<i>Geranium</i> sp.	NA	Cyme
<i>Glechoma hederacea</i>	L.	Cyme
<i>Helianthus annuus</i>	L.	Solitary (capitulum)
<i>Helminthotheca echioides</i>	(L.) Holub.	Corymb
<i>Heracleum sphondylium</i>	L.	Umbel
<i>Hieracium</i> sp.	NA	Umbel
<i>Hyacinthoides hispanica</i>	(Mill.) Rothm.	Raceme
<i>Hydrangea</i> sp.	NA	Corymb
<i>Hypericum perforatum</i>	L.	Cyme
<i>Ilex aquifolium</i>	L.	Cyme
<i>Iris pseudacorus</i>	L.	Solitary
<i>Iris</i> sp.	NA	Solitary
<i>Jacobaea vulgaris</i>	P. Gaertn.	Corymb (of capitula)
<i>Knautia arvensis</i>	(L.) Coult.	Solitary (capitulum)
<i>Lamium album</i>	L.	Cyme
<i>Lamium purpureum</i>	L.	Cyme
<i>Lathyrus latifolius</i>	L.	Cyme
<i>Lavandula angustifolia</i>	Mill.	Spike
<i>Lavandula</i> sp.	NA	Spike
<i>Lepidium draba</i>	L.	Raceme

<i>Leucanthemum vulgare</i>	Lam.	Solitary
<i>Linum usitatissimum</i>	L.	Cyme
<i>Lithospermum arvense</i>	L.	Cyme
<i>Lotus corniculatus</i>	L.	Cyme
<i>Lunaria annua</i>	L.	Raceme
<i>Lychnis flos-cuculi</i>	(L.) Greuter & Burdet	Cyme
<i>Lycopus europaeus</i>	L.	Cyme
<i>Lysimachia punctata</i>	L.	Raceme
<i>Lysimachia vulgaris</i>	L.	Panicle
<i>Lythrum salicaria</i>	L.	Spike (of cymes)
<i>Malus domestica</i>	Borkh.	Corymb
<i>Malus sylvestris</i>	(L.) Mill.	Corymb
<i>Malva neglecta</i>	Wallr.	Raceme
<i>Malva sylvestris</i>	L.	Cyme
<i>Matricaria discoidea</i>	DC.	Solitary (capitulum)
<i>Medicago lupulina</i>	L.	Raceme
<i>Medicago sativa</i>	L.	Raceme
<i>Melilotus altissimus</i>	Thuill.	Raceme
<i>Mentha aquatica</i>	L.	Solitary
<i>Myosotis arvensis</i>	(L.) Hill	Cyme
<i>Onobrychis viciifolia</i>	Scop.	Raceme
<i>Origanum vulgare</i>	L.	Spike
<i>Papaver rhoeas</i>	L.	Solitary
<i>Pentaglottis sempervirens</i>	(L.) Tausch ex L.H.Bailey	Cyme
<i>Phacelia tanacetifolia</i>	Benth.	Cyme
<i>Potentilla anserina</i>	L.	Solitary
<i>Primula veris</i>	L.	Umbel
<i>Primula vulgaris</i>	Huds.	Solitary
<i>Prunella vulgaris</i>	L.	Spike
<i>Prunus avium</i>	(L.) L.	Umbel
<i>Prunus domestica</i>	L.	Cyme
<i>Prunus sp.</i>	NA	Cyme
<i>Prunus spinosa</i>	L.	Solitary
<i>Pulicaria dysenterica</i>	(L.) Bernh.	Corymb (of capitula)
<i>Pulicaria vulgaris</i>	Gaertn.	Corymb
<i>Pyrus communis</i>	L.	Corymb
<i>Ranunculus acris</i>	L.	Cyme
<i>Ranunculus repens</i>	L.	Cyme
<i>Rhinanthus minor</i>	L.	Spike
<i>Rosa acicularis</i>	Lindl.	Solitary
<i>Rosa canina</i>	L.	Corymb
<i>Rosa sp.</i>	NA	Solitary
<i>Rubus fruticosus</i>	L.	Raceme
<i>Salvia sp.</i>	NA	Spike
<i>Sambucus nigra</i>	L.	Cyme
<i>Sanicula europaea</i>	L.	Umbel
<i>Scorzonerooides autumnalis</i>	(L.) Moench.	Solitary (capitulum)
<i>Scrophularia nodosa</i>	L.	Panicle
<i>Senecio vulgaris</i>	L.	Cyme
<i>Silene dioica</i>	(L.) Clairv.	Cyme
<i>Silene latifolia</i>	Poir.	Cyme
<i>Silene vulgaris</i>	(Moench) Garcke	Cyme
<i>Sinapsis arvensis</i>	L.	Raceme

<i>Solanum dulcamara</i>	L.	Cyme
<i>Sonchus arvensis</i>	L.	Corymb
<i>Sonchus oleraceus</i>	NA	Umbel
<i>Sonchus</i> sp.	L.	Solitary
<i>Stachys sylvatica</i>	L.	Spike
<i>Stellaria graminea</i>	L.	Cyme
<i>Stellaria holostea</i>	L.	Cyme
<i>Stellaria media</i>	(L.) Vill.	Cyme
<i>Succisa pratensis</i>	Moench	Solitary (capitulum)
<i>Symphytum officinale</i>	L.	Cyme
<i>Syringa</i> sp.	NA	Panicle
<i>Syringa vulgaris</i>	L.	Panicle
<i>Tanacetum parthenium</i>	(L.) Sch. Bip.	Corymb
<i>Tanacetum vulgare</i>	L.	Corymb
<i>Taraxum officinale</i>	F. H. Wigg.	Solitary (capitulum)
<i>Teesdalia nudicaulis</i>	(L.) W. T. Aiton	Raceme
<i>Thlaspi arvense</i>	L.	Raceme
<i>Thymus vulgaris</i>	L.	Spike
<i>Tilia</i> sp.	NA	Cyme
<i>Torilis japonica</i>	(Houtt.) DC.	Umbel
<i>Trifolium incarnatum</i>	L.	Solitary (capitulum)
<i>Trifolium pratense</i>	L.	Solitary (capitulum)
<i>Trifolium repens</i>	L.	Solitary (capitulum)
<i>Trifolium resupinatum</i>	L.	Solitary (capitulum)
<i>Tripleurospermum inodorum</i>	(L.) Sch.Bip.	Solitary (capitulum)
<i>Ulex europaeus</i>	L.	Solitary
<i>Valeriana officinalis</i>	L.	Cyme
<i>Veronica arvensis</i>	L.	Raceme
<i>Veronica chamaedrys</i>	L.	Raceme
<i>Veronica persica</i>	Poir.	Solitary
<i>Viburnum</i> sp.	NA	Cyme
<i>Vicia cracca</i>	L.	Raceme
<i>Vicia faba</i>	L.	Solitary
<i>Vicia sativa</i>	L.	Solitary
<i>Vicia sepium</i>	L.	Raceme
<i>Vinca major</i>	L.	Solitary
<i>Viola arvensis</i>	Murray	Solitary
<i>Viola arvensis</i>	Murray	Solitary