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ERAMMP Report-41: Short Report – Pollinator and Insect Trends in Wales

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UK Centre for Ecology & Hydrology

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Abbreviations Used in this Report

ERAMMP	Environment and Rural Affairs Monitoring & Modelling Programme
GMEP	Glastir Monitoring & Evaluation Programme
PoMS	Pollinator Monitoring Scheme
UKBMS	UK Butterfly Monitoring Scheme
UKCEH	UK Centre for Ecology & Hydrology

Abbreviations and some of the technical terms used in this report are expanded on in the programme glossaries: https://erammp.wales/en/glossary (English) and https://erammp.cymru/geirfa (Welsh)

Contents

1 Pollinator Trends: Wales

Data on insect abundance in Wales are limited, with trends established for just 30 butterfly species. Abundance of those species declined since 1970, with some recovery since 2002 (Hayhow et al. 2016). Further analysis under GMEP[1] attributed declines to habitat specialists, while wider countryside butterflies remained stable (Emmett et al., 2015).

Wild bees, hoverflies and other insects are also important pollinators (Breeze et al., 2011). Wales-level trends for bees and hoverflies are still in development[2], although one recent report hints at declines in most of Wales' threatened bees (Olds et al., 2018).

Honeybees: A managed species

Unlike other pollinators, honeybees are a managed species in the UK. They are valued for their honey, but also their role as crop pollinators (Breeze et al., 2011).

The number of managed honeybee colonies recorded in Wales declined by 23% from 1985-2005 (Potts et al., 2010).

Published trends use data from voluntary recording schemes, e.g. the UK Butterfly Monitoring Scheme (UKBMS)[3]. Complementary wider-countryside data are now being collected under ERAMMP (Fig. 1.1)[1,4] and the UK Pollinator Monitoring Scheme (PoMS)[2].

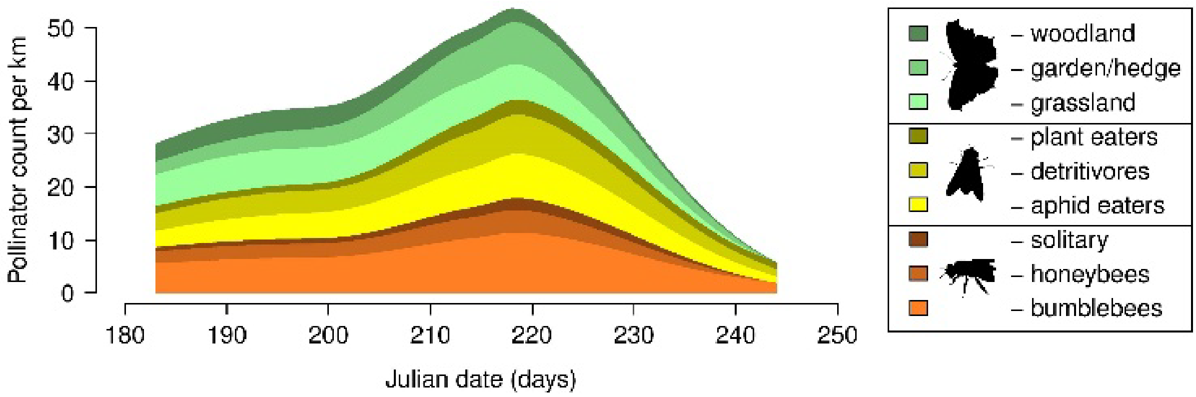

Figure 1.1 Pollinator activity through July and August in Wales. *GMEP recorded pollinator counts in 2013-2016. Bumblebees, aphid-eating hoverflies and grassland butterflies were dominant*

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[1] Glastir Monitoring and Evaluation Programme, https://gmep.wales

[2] UK Pollinator Monitoring and Research Partnership, https://www.ceh.ac.uk/our-science/projects/pollinator-monitoring

[3] UK Butterfly Monitoring Scheme: https://www.ukbms.org/

[4] Environment and Rural Affairs Monitoring and Monitoring Programme: https://erammp.wales

2 Pollinator Trends: Great Britain

GB-wide trends derived from volunteer-submitted records show that since 1970, more bee & hoverfly (Powney et al., 2019), butterfly (Thomas et al., 2004) and moth (Fox et al., 2014) species are declining than increasing. Habitat and flower specialists are vulnerable (Thomas, 2005) as are the flowers they pollinate (Biesmeijer et al., 2006).

Systematic surveys are key to verify declines in abundance (Thomas et al., 2004) and biomass (Shortall et al., 2009) of pollinators and other insects. The UK Butterfly Monitoring Scheme and Wider Countryside Butterfly Survey show negative population trends for most species from 1995-2014 (Dennis et al., 2017). The Rothamsted Insect Survey shows a steady 31% decline in total abundance of moths from 1968-2002 (Conrad et al., 2006).

Abundance, diversity and pollination

Abundance and diversity tend to decline in tandem.

Abundance affects frequency of flower visits. Crop pollination is often provided by a few dominant groups e.g. bumblebees (Kleijn et al., 2015).

However, diversity aids pollination of a variety of wild plants, and provides redundancy in case dominant pollinators decline.

Pollinator communities and pressures upon them vary between countries. Wales is dominated by upland grassland terrain and a wet climate; only 14% of Welsh farmland is “croppable”, compared to 54% in England (Wiseall, 2018). UK/GB trends may not represent Wales-level trends; a breakdown of GB moth trends found that declines were steepest in the Southeast (Conrad et al. 2004).

3 Drivers of Trends

Four key threats either impair or kill pollinators, reduce availability of forage, or reduce nest/egg-laying sites (Vanbergen & The Insect Pollinators Initiative, 2013).

3.1 Habitat loss and intensive farming

A greater number of butterfly larval food plants decreased than increased along Wales' linear features since 1990 (Smart et al., 2017). Furthermore, butterfly declines in the UK are steeper in urban than rural areas (Dennis et al,. 2017). Intensive farming has driven increases in fertility of many GB habitats (Smart et al., 2003). This contributes to declines in bumblebee forage plants, which prefer less fertile conditions (Carvell et al., 2006). Badly timed grazing or cutting also impacts pollinators.

Habitats for pollinators

Semi-natural grasslands, e.g. calcareous grasslands, provide an abundance of nest sites and forage for pollinators. Since 1930, these grasslands have dramatically declined in Wales[5].

After calcareous grasslands, broadleaved woodlands are thought to provide the greatest amount of nectar per unit area (*Baude et al., 2016) DNA analysis of Welsh honey suggests that honeybees prefer flowers of woody trees and shrubs* (*De Vere et al., 2017).*

[5] https://naturalresources.wales/evidence-and-data/research-and-reports/the-state-of-natural-resources-report-assessment-of-the-sustainable-management-of-natural-resources/?lang=en

3.2 Pesticides

The total weight of pesticides applied in Wales decreased since 1990, but the area treated with pesticide doubled[6]. Experiments in England and Scotland showed that exposure of bumblebees to insecticides caused reductions in worker efficiency (Gill et al., 2012) and queen production (Whitehorn et al., 2012). Field-realistic experiments found that neonicotinoids reduced reproduction of bumblebees and solitary bees, with mixed effects on honeybees (Woodcock et al., 2017). It is difficult to fully implicate pesticides in pollinator declines, but wild bee (Woodcock et al., 2016) and butterfly (Gilburn et al., 2015) declines correlate with neonicotinoid use in England.

3.3 Disease, pests, predators and competitors

Honeybee colony declines in Wales may be linked to invasive *Varroa* parasites and associated viruses (Potts et al., 2010). It is unclear how natural enemies or invasive species contribute to wild pollinator declines in Wales (Goulson et al., 2015).

3.4 Climate change

Some butterflies and moths are extending their ranges as the climate warms, increasing in abundance, but not all species are mobile enough (Warren et al., 2001). Emergence dates of pollinators and plants could desynchronise (Goulson et al., 2015).

[6] https://pusstats.fera.co.uk/home

4 Targeted Solutions

Interventions, such as sown flower strips, can increase forage availability on arable land (Pywell et al., 2006) or grassland (Potts et al., 2009) and benefit insects (Alison et al., 2017). Some interventions are better than others (Carvell et al., 2007) and spatial location matters (Alison et al., 2016). ERAMMP aims to help target interventions to optimise outcomes.

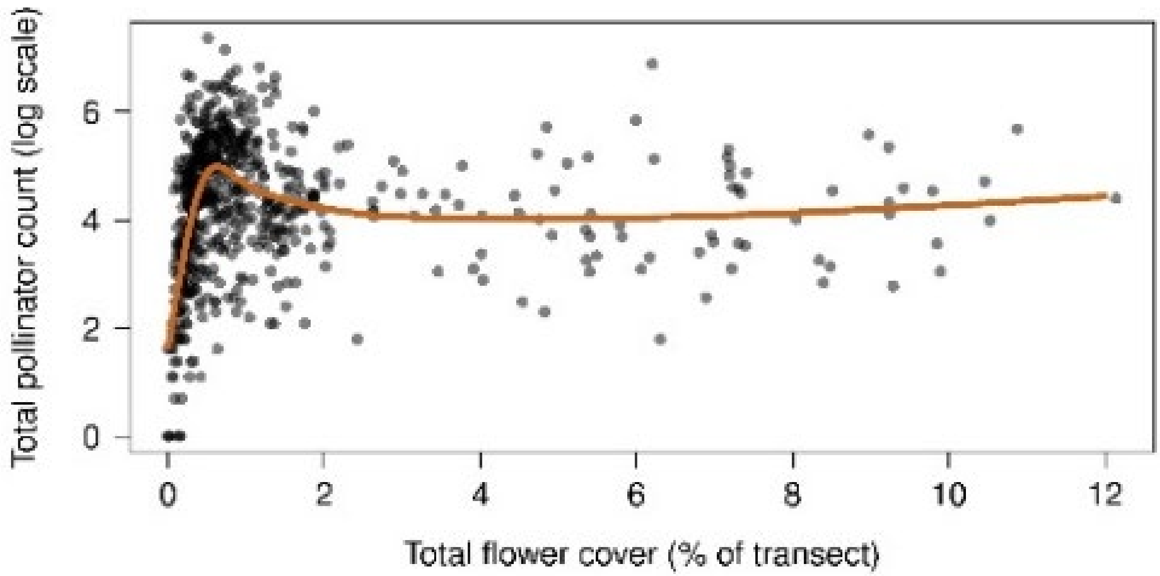

Figure 4.1 GMEP data: *Pollinators become abundant as total cover of flowers increases from 0-1%. Threshold effects can be used to target actions and maximise outcomes (Dicks et al., 2015).*

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