The value of different habitat types within a heathland landscape mosaic at different spatial scales for hoverflies

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INTRODUCTION

Hoverflies (Diptera: Syrphidae) provide ecosystem services in the form of pollination, waste decomposition and pest control. Subsequently, maintaining abundance and species richness is complex due to varying requirements of different life stages at different spatial scales and morphological differences between species (Jauker et al. 2009; Meyer et al. 2009; Moquet et al. 2018).

Heathlands are acknowledged for providing a good source of pollen and nectar from ericaceous species, however they largely remain unstudied for hoverfly resources in comparison to agricultural landscapes and woodlands.

Moquet et al. (2018) identified the requirement for both adult and larval hoverfly resources to be available at different spatial scales across the heathland landscape mosaic. However, the study did not identify how particular habitats contribute to hoverfly abundance and richness.

- Does abundance and richness of hoverflies differ between habitat types?
- How do the habitats vary in their characteristics for hoverflies?
- Which habitat characteristics most influence hoverfly abundance and richness?
- Which land cover types influence hoverfly abundance and richness?

METHODS

Data collection

Five plots each of five different habitats were identified across Godlingston Heath NNR. Observations were used within plots between June-August 2018 to determine hoverfly abundance and richness. Habitat characteristics were measured concurrently within each plot and the surrounding 50m^2 patch, and habitat percentage cover measured at the landscape scale.

Statistical analysis

One-way analysis of variance (one-way ANOVA) determined significant differences between habitats types for habitat characteristics, hoverfly abundance and hoverfly richness.

Generalized Additive Models (GAMs) were used to determine which variables contributed most to hoverfly abundance and richness at the plot and patch scales. Akaike weighting was used to determine which GAM best fit the data.

Generalized Linear Models (GLMs) were used to determine the influence of percentage cover of different habitat types on hoverfly abundance and richness.

RESULTS

At the plot and patch scale, hoverfly abundance and richness were highest in acid grassland and woodland edge habitats (Fig 1).

Floral richness was the only measured habitat characteristic that varied significantly at the plot and patch scales (Fig.2).

Hoverfly abundance was influenced by floral cover, floral richness and bare ground cover, while hoverfly richness was influenced by floral richness alone.

At the landscape scale, increases in cover of deciduous woodland increased hoverfly abundance, while increases in wet heath cover decreased hoverfly abundance. No landscape scale characteristics measured influenced hoverfly richness.

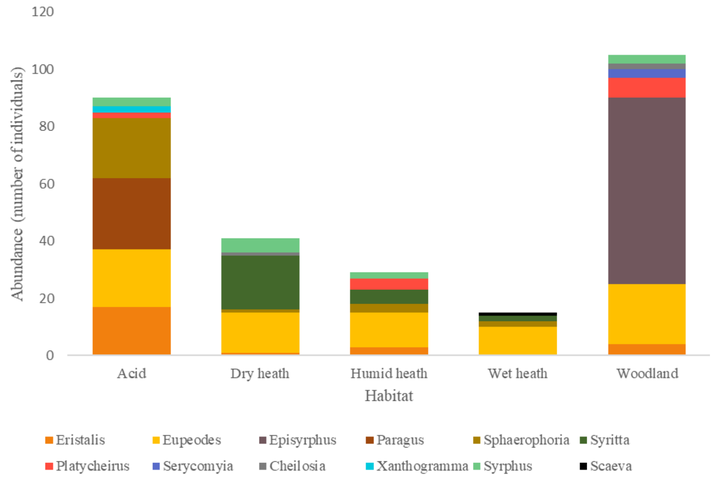

Fig. 1 Abundance of different genera of hoverflies observed in the five habitats studied across Godlingston heath; acid grassland, dry heath, humid heath, wet heath and woodland edge.

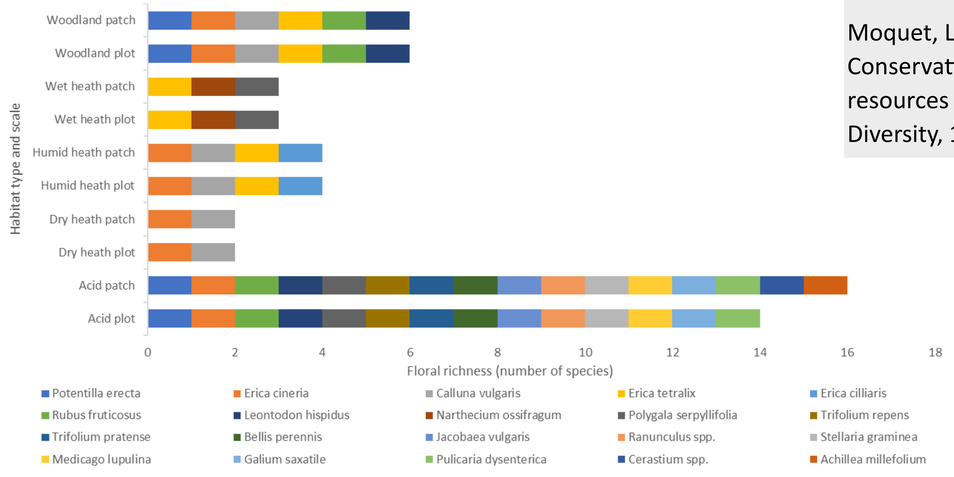

Fig.2 Floral richness within each habitat type at both the plot and patch scales.

CONCLUSIONS AND RECOMMENDATIONS

- At local scales hoverflies were found to be influenced by adult resources, whereas at the landscape scale they were found to be influenced by larval resources.
- Maintenance of hoverfly abundance and richness on Godlingston Heath NNR requires the provision of both woodland and acid grassland habitats. They are more florally diverse than the heather habitats and the woodland further provides microhabitats for larvae.
- Woodland habitats need to be available within the flight distance of floral resources due to the provision of larval microhabitats. Additionally, removing the areas of dense vegetation, such as bracken, on the edge of woodland habitats will maintain openness and provide resources for adult hoverflies through increased cover of floral species.
- Further studies are recommended on the impact of grazing on hoverflies. While grazing ensures the creation of bare ground habitat suitable for basking, it may also be impacting the ability of flora to flower and set seed.

REFERENCES

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ACKNOWLEDGEMENTS

I would like to thank my supervisor, Anita Diaz, for all her advice, support and ideas throughout the past twelve months.

I would also like to thank National Trust Purbeck for allowing me to conduct this research on their site, Godlingston heath and providing me with species lists, management plans and NVC maps of the site.