

PhD Studentship

Title: Understanding bumblebee wildflower meadow habitat preferences using multi-scale remote sensing data

Closing date: Monday 4th May 2020

Interview date: Wednesday 3rd June 2020

Supervisory team:

Director of Studies:

Dr Kate Ashbrook, School of Science and the Environment, University of Worcester

Supervisors:

Dr Fleur Visser, School of Science and the Environment, University of Worcester

Dr Richard Comont, Bumblebee Conservation Trust

The Project:

Over the last couple of decades it has been recognised that pollinator species globally are experiencing declines (Goulson *et al.* 2005; Potts *et al.* 2010, 2015). Improvements in vegetative diversity have been found to both boost pollinator species richness and abundance (Haaland *et al.* 2011); however, more tools are needed to enable landowners and conservation practitioners to select those areas that would most benefit from habitat restoration and creation at a landscape level. This project aims to investigate the use of multi-scale remote sensing data to help improve our understanding of wildflower meadow habitat preferences of bumblebees to aid targeted conservation practices.

Conventional bumblebee monitoring methods rely on point observations on the ground; however, ongoing developments in Remote Sensing technology show promising means of collecting data on the relative importance of different habitat conditions over larger areas. The image data types and collection techniques that are now available provide data on habitat factors on a range of scales from ultra-high resolution imagery (< 0.3 m) from pole aerial and drone photography, very high resolution imagery (0.3 – 10 m) from satellites and aerial platforms, including LiDAR, to high resolution satellite imagery (> 10 m) from Sentinel satellites. The studentship will investigate how habitat factors, such as temperature, topography and vegetation composition, can be quantified at 3 to 4 scale levels and how they relate to observations of bumblebee populations. The student will test if the results from finer

scales can be translated to coarser scales, and they will consider whether the more integrated nature of coarse scale data can potentially provide a better representation of the complex nature of bumblebee habitat preferences. This data will be used in combination with bumblebee occurrence records to construct species distribution models for UK bumblebee species. This in turn will be used to validate this method for assessing habitat quality for bumblebees for conservation management.

Qualifications needed:

Essential:

Applicants should have or be able to evidence:

- Education to Master's Degree level in remote sensing, geomatics, ecology, environmental science, physical geography or other relevant discipline. Students with a physical or computing science background with an interest in applying their skills to environmental issues are strongly encouraged to apply.
- A First or Upper Second (2.1) Honours Degree;
- Experience of GIS, image processing and field surveys;
- Computer literacy;
- Proficiency in oral and written English;
- Ability to organise and meet deadlines;
- Good interpersonal skills;
- Ability to work independently and contribute to a team;
- Commitment and an enthusiastic approach to completing a higher research degree;

Desirable:

- Programming skills such as R, Python, or Matlab
- Full UK Driving Licence

Details of the studentship:

During the period of your studentship you will receive the following:

- a tax free bursary of £15,009 for a period of 3 years
- a fee-waiver for 4 years
- a budget to support your project costs for the first 3 years of the project
- a laptop
- use of the Research Student Study Space in the Research School

You will be expected to play an active role in the life of both the Research School and of the School. You will be given opportunities to gain experience in learning and teaching within the School under the guidance of your Director of Studies.

Application Process:

To begin the application process for this studentship please go to our webpage www.worcester.ac.uk/researchstudentships and click apply now next to the project you wish to apply for.

The Interview:

The interview will provisionally be held on Wednesday 3rd June 2020. All successful, shortlisted applicants will be interviewed. The interview process normally lasts around one and a half hours in total and includes a meeting with the project supervisors, and an opportunity to view the campus and the Research School.

As part of the interview you will be asked to give a 10-minute presentation based on a piece of research you have previously undertaken (normally a MSc dissertation). There is also an opportunity to present the supervisory team with an example of your written work (e.g. a dissertation/independent study/assignment) at the interview.

References

- Goulson, D., Hanley, M.E., Darvill, B., Ellis, J.S. & Knight, M.E. (2005). Causes of rarity in bumblebees. *Biological Conservation*, 122, 1–8.
- Haaland, C., Naisbit, R.E. & Bersier, L.-F. (2011). Sown wildflower strips for insect conservation: a review. *Insect Conservation and Diversity*, 4, 60–80.
- Potts, S., Biesmeijer, K., Bommarco, R., Breeze, T., Carvalheiro, L., Franzén, *et al.* (2015). *Status and trends of European pollinators: key findings of the STEP project.*
- Potts, S.G., Biesmeijer, J.C., Kremen, C., Neumann, P., Schweiger, O. & Kunin, W.E. (2010). Global pollinator declines: trends, impacts and drivers. *Trends in Ecology & Evolution*, 25, 345–353.

Research at the University of Worcester:

Research at the University of Worcester has grown significantly over the last 10 years. This growth is reflected in the outcomes of the Research Excellence Framework (REF 2014). Worcester was the most improved University in the UK based on Research Fortnight's "Research Power" measure, reflecting a more than four-fold increase in the number of staff submitted compared to RAE 2008 and a commensurate increase in the quality of the research. The University will submit 50% more staff to REF 2021 than in 2014 and is expecting significant further improvements in its outcomes. It is also reflected in the increase in Research & Knowledge Exchange funding over this period. The University has been successful in winning funding from a wide range of major funders: Research Councils such as AHRC, BBSRC, ESRC and NERC; major charities such as the Leverhulme Trust, the Alzheimer's Society and the British Academy; health-research funders such as the NIHR, the Department of Health and local NHS Trusts; European funding through Horizon 2020 and Erasmus+; and funding from local, national and global businesses.

The University is focused on research which addresses real world challenges and provides solutions to these challenges:

- **Human Health and Wellbeing** with research groups looking, for example, at mood disorders, dementia care, biomedical research, and violence prevention
- **Sustainable Futures** with research groups looking, for example, at crop protection, eco-system services, aerobiology and sustainability education

- **Professional Education** with research groups looking, for example, at the social psychology of education and the philosophy and ethics of professional practice)
- **Identity and Inclusion** with research groups looking, for example, at social justice, inclusive approaches to sport, religion & society, and Early Modern culture & society

The University continues to provide a robust infrastructure for research. It has a well-established Research School which houses its growing research student body and which provides a comprehensive programme of researcher development for staff and students. It established a Research Office in 2013, responsible for research funding, governance and strategy. The University is committed to further developing its research profile, through a strategic approach to its support for and investment in research. Its fully-funded studentships are part of this investment.

Research School

The Research School is a focal point for all our research students. It provides:

- day-to-day support for our students, both administrative and practical, through our dedicated team
- a Research Student Study Space with both PCs and laptop docking station
- a comprehensive Researcher Development Programme for students and their supervisors
- a programme of student-led conferences and seminars

School of Science and the Environment

The School of Science and the Environment offers top quality degrees in a friendly and supportive environment, using modern approaches to learning and teaching. The School is unique in providing research across a range of disciplines, including Archaeology, Biochemistry, Biology (including Animal Biology and Human Biology), Biomedical Science, Forensic and Applied Biology, Geography (including Human Geography and Physical Geography), Human Nutrition and Pharmacology. Through working in collaboration with different disciplines and with other universities, private industry and the public sector, our research outputs achieve real-life benefits.

There are currently over 15 PhD students studying in the School, who have access to excellent research facilities, such as laboratory and a computing equipment. For the described project the student can make use of a fully-equipped GIS, Mapping and Visualization Suite, including high-end computers, industry-standard image analysis (ENVI, Photoscan Pro), GIS (ArcGIS) and statistical analysis software (Matlab, R). They will also have access to a range of survey equipment, including fixed wing and rotary wing UAV-s, Trimble survey grade GPS, a Leica Terrestrial Laser Scanner, total stations, a number of Panasonic Toughbook field ruggedized laptop and tablet PCs.

Widening Participation:

As part of its mission statement the University is committed to widening participation for its higher degrees. Although most candidates will have an undergraduate and/or a Master's degree, the University is happy to accept applications from candidates with relevant professional qualifications and work related experience.

For further information or an informal discussion on this project, please contact Dr Ashbrook (Director of Studies) via email at k.ashbrook@worc.ac.uk

Applications can be online made at:
www.worcester.ac.uk/researchstudentships