

# MARK V. MURPHY

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## EDUCATION

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- PhD Ecology, University of Western Australia** **2016**  
*Thesis: Interactive effects of land-use change and rainfall decline on insect species networks*  
Supervisors: Prof. Raphael Didham, Dr. Rachel Standish
- MSc Biodiversity and Conservation, Trinity College Dublin** **2008**  
*Thesis: The conservation importance of turlough woodlands*  
Supervisor: Dr. Steve Waldren
- BA Zoology, Trinity College Dublin** **2005**  
*Thesis: The effects of urban wildflower meadows on insect biodiversity*  
Supervisor: Dr. Úna Fitzpatrick

## RESEARCH

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- Projects, Collaborations, and Training (incl. breaks)** **2018–2021**
- Finalise PhD analyses and write-up research for publication
  - Compilation, documentation, and publication of new [R package](#) for SEM effect analysis (arising from revised PhD statistical methods)
  - Processing and submission of hundreds of new DNA barcodes and associated metadata to the Barcode of Life Database ([BOLD](#))
  - Contribution of ecological, entomological, and statistical expertise to research collaborations (University of Western Australia, University of Leeds)
  - Ongoing training in statistics, data analysis, and programming (R)
- Research Assistant, The University of Western Australia** **2016–2018**
- Sorted and identified thousands of bees and wasps collected in Perth for a large-scale [pollinator project](#)
  - Prepared additional PhD insect specimens for DNA extraction and sequencing, processed and analysed DNA barcodes, established new species identifications and interactions for host-parasitoid networks
  - Comprehensively revised PhD analyses using new species data and updated statistical procedures, compiled new methods and results
- PhD, The University of Western Australia** **2012–2016**
- Landscape-scale [project](#) testing the interactive effects of global change drivers on insect host-parasitoid networks
  - Sampled thousands of bees, wasps and their parasitoids across 48 woodlands in the Wheatbelt region of southwest Australia
  - Reared and identified nests and insects in the lab to establish species interactions

- Analysed and wrote-up results, presented throughout PhD and at national and international conferences

#### **Research Assistant, The University of Western Australia 2011**

- Sorted and identified thousands of terrestrial invertebrates from a tree restoration [experiment](#) on the university [research farm](#)
- Assisted with ecological monitoring of trees in the restoration experiment
- Mapped all land parcel boundaries at the research farm using GPS/GIS
- Preparation for PhD: processed high volume climate and vegetation data using GIS

#### **Research Assistant, Trinity College Dublin 2009–2011**

- Mapped vegetation at 22 temporary limestone lakes (turloughs) in the west of Ireland using GPS
- Produced detailed vector maps and associated metadata using GIS
- Assisted with analysis and visualisation of vegetation data in relation to hydrological, hydrochemical, pedological, and land-use data
- Contributed data, maps, and written methodology to final report

#### **Research Assistant, Trinity College Dublin 2004**

- Processed freshwater macro- and microinvertebrate samples collected from temporary limestone lakes (turloughs) in the west of Ireland
- Identified and counted planktonic crustacean species (Cladocera)
- Contributed data and methodology to progress reports, final report, and a publication

### **TEACHING**

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#### **Demonstrator, The University of Western Australia 2016**

- Lab demonstrator for the [Animal Populations](#) module of the Zoology undergrad major
- Supervised practical classes, experiments, and final exam
- Led a discussion group critiquing an ecological paper
- Assisted on a field trip surveying lake bird populations

#### **Field Assistant, Trinity College Dublin 2010**

- Assistance on an [MSc](#) field trip to coastal and saltmarsh habitat at Bull Island, Dublin
- Demonstrated the use of GPS units to map habitat types and record locations of individual plants in the field (*Salvia verbenaca*)

### **PUBLICATIONS**

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#### **Journal Articles**

- **Murphy, M.V.**, Tylianakis, J.M., Standish, R.J., & Didham, R.K. (In Prep.). Pollinator decline and food web instability driven by long-term climate drying.
- Arnold, J.P., Tylianakis, J.M., **Murphy, M.V.**, Cawthray, G., & Didham, R.K. (In Prep.). Body-size dependent effects of landscape floral resource energetics drives bee abundance in woodland remnants.
- Gillespie, M.A.K., Baude, M., Biesmeijer, J., Boatman, N., Budge, G.E., Crowe, A., Davies, N., Evans, R., Memmott, J., Morton, R.D., Moss, E., **Murphy, M.V.**, Northing,

P., Pietravalle, S., Potts, S.G., Roberts, S., Rowland, C., Senapathi, D., Smart, S.M., Wood, C., & Kunin, W.E. (In Prep.). Landscape scale drivers of pollinator community health depend on land use configuration.

- Taylor, C.K., **Murphy, M.V.**, Hitchen, Y., & Brothers, D.J. (2019). Four new species of Australian velvet ants (Hymenoptera: Mutillidae, Aglaotilla) reared from bee and wasp nests, with a review of Australian mutillid host records. *Zootaxa*, **4609**(2), 201–224.
- Arnold, J.P., **Murphy, M.V.**, Didham, R.K., & Houston, T.F. (2019). Rediscovery of the 'extinct' bee *Hesperocolletes douglasi* Michener, 1965 (Colletidae: Colletinae: Paracolletini) in Western Australia and first description of the female. *Journal of Threatened Taxa*, **11**(3), 13310–13319.
- Reynolds, J., **Murphy, M.**, & O Connor, Á. (2004). Early season cladoceran diversity of atlantic temporary ponds (turloughs). *Archives Des Sciences*, **57**, 97–104.

## Reports

- Sharkey, N., Waldren, S., Kimberley, S., González, A., **Murphy, M.**, & O'Rourke, A. (2016). Chapter 7. Turlough Vegetation: Description, Mapping and Ecology. In S. Waldren (Ed.), *Turloughs: Hydrology, Ecology and Conservation*, Report to the National Parks and Wildlife Service, Dublin, Ireland.
- **Murphy, M.** (2005). *The Effects of Urban Wildflower Meadows on Insect Biodiversity*, Report to Dublin City and County Councils, Dublin, Ireland
- Reynolds, J.D., & **Murphy, M.** (2004). *The Cladoceran Assemblages of Turloughs: Natural and Anthropogenically Driven Variation*. Report to the National Parks and Wildlife Service, Dublin, Ireland.

## Software

- **Murphy, M.V.** (2021). semEff: Automatic Calculation of Effects for Piecewise Structural Equation Models. R package version 0.5.0.
- **Murphy, M.V.** (2021). dissCqN: Multiple Assemblage Dissimilarity for Orders  $q = 0-N$ . R package version 0.1.0.

## Datasets

- **Murphy, M.V.** (Pending). DS-HYMSWA: Trap-Nesting Hymenoptera from Southwest Australia, BOLD sequence dataset
- **Murphy, M.V.** (2019). DS-AGLSWA: New species of *Aglaotilla* (Hymenoptera: Mutillidae) from Southwest Australia, BOLD sequence dataset

## PRESENTATIONS

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### Oral Presentations (selected)

- *Rainfall decline alters food webs with contrasting outcomes for pollinators and predators*, British Ecological Society, Belfast, **2019**
- *Climate change and habitat loss interact to alter host-parasitoid network structure and function*, Ecological Society of America, Portland, **2017**.
- *Trap-nesting bees and wasps of the WA wheatbelt*, Western Australian Insect Study Society, Perth, **2016**
- *Climate and land use interact to alter insect community structure and function*, PhD completion seminar, UWA, Perth, **2016**

- *Interactive effects of land-use change and rainfall decline on bee and wasp diversity*, Ecological Society of Australia, Adelaide, **2015**
- *Model averaging as a tool for model selection*, School of Biological Sciences [R\\_group](#), UWA, Perth, **2015**
- *Global change impacts on insect diversity in Southwest Australia*, School of Biological Sciences Research Day, UWA, Perth, **2014**
- *River restoration & management and their role in sustaining diversity*, MSc desk study seminar, TCD, Dublin, **2008**
- *The effect of urban wildflower meadows on insect biodiversity*, BA thesis seminar, TCD, Dublin, **2005**

## Posters

- *Interactive effects of habitat loss and rainfall decline on insect species networks*, EcoTAS: New Zealand Ecological Society & Ecological Society of Australia, Auckland, **2013**
- *Vulnerability of tropical montane forest ecosystems to climate change: A case study of the Monteverde Cloud Forest, Costa Rica*, joint presentation for MSc, TCD, Dublin, **2008**

## MEDIA COVERAGE

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### Rediscovery of the bee *Hesperocolletes douglasi*

**2019**

- [University News](#)
- Local: [Waneroo Times](#)
- National: [Sydney Morning Herald](#)
- International: [phys.org](#)

### PhD research

**2014**

- [University News](#)
- Radio interview: [ABC – WA Country Hour](#)
- Local: Countryman, Esperance Express, Narrogin Observer

## AWARDS AND FUNDING

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### UWA International PhD Scholarship

**2012–2016**

Competitive scholarship for international postgraduate fees, comprising:

- Scholarship for International Research Fees (SIRF) ~AUD\$120K
- University International Stipend (UIS) ~AUD\$100K
- UIS Safety Net Top Up Scholarship ~AUD\$14K

## PROFESSIONAL AFFILIATIONS

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British Ecological Society	2019–2020
Ecological Society of America	2017–2018
Ecological Society of Australia	2012–2016
Society for Ecological Restoration	2010–2012
International Association for Landscape Ecology	2009–2012

**PROFESSIONAL SERVICE**

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**Journals reviewed for:**

- Oecologia 2016
- Insect Conservation and Diversity 2014

**CONFERENCES AND WORKSHOPS**

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<b>British Ecological Society</b> , Belfast	2019
<b>Ecological Society of America</b> , Portland	2017
<b>School of Biological Sciences Research Day</b> , UWA, Perth	2016
<b>R Group Workshops</b> , UWA, Perth	2016
<b>Ecological Society of Australia</b> , Adelaide	2015
<b>School of Biological Sciences Research Day</b> , UWA, Perth	2015
<b>R Group Workshops</b> , UWA, Perth	2015
<b>School of Biological Sciences Research Day</b> , UWA, Perth	2014
<b>R Group Workshops</b> , UWA, Perth	2014
<b>EcoTas: NZ Ecological Society &amp; Ecological Society of Australia</b> , Auckland	2013
<b>Ecological Society of Australia</b> , Melbourne	2012
<b>IAS Masterclass: Novel Ecosystems: Why Worry?</b> , UWA, Perth	2012
<b>Advanced Bird ID Class</b> , Birds Australia WA, Perth	2011
<b>R Workshop</b> , TCD, Dublin	2010
<b>Native Bee Workshop: Burren Bumblebee Blitz</b> , NBDC, Co. Clare	2010
<b>Conservation Field Course: SAC Watch</b> , Irish Wildlife Trust, Co. Laois/Offaly	2009
<b>Invasive Plant Workshop</b> , TCD, Dublin	2009
<b>Postgraduate Ecology Forum</b> , TCD, Dublin	2008

**VOCATIONAL TRAINING**

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<b>First Aid Course</b> , ABC Licence Training Pty Ltd, Perth	2013
<b>Quad Bike Rider Awareness Training</b> , Shawsett Training & Safety, Pingelly	2011
<b>Off Road Driving Course</b> , Bob Cooper Outback Survival Pty Ltd, Perth	2011
<b>GPS Unit Training</b> , Trimble, Dublin	2009

**OUTREACH AND VOLUNTEERING**

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<b>Western Australian Insect Study Society</b> , Perth Australia	2016
Invited talk about native bees and wasps for members of a natural history society	
<b>University of Western Australia</b> , Perth, Australia	2011
Assistance at the Entomology stand for the university open day, chatting to students	
<b>Irish Peatland Conservation Council</b> , Rathangan, Ireland	2008–2009
Assistance with conservation activities on a peatland nature reserve, including:	
<ul style="list-style-type: none"> <li>• <i>Sphagnum</i> moss restoration trials</li> <li>• Substrate and water level monitoring</li> </ul>	

- Blocking of artificial drains
- Tree and shrub clearance

**Conservation Volunteers Fingal**, Dublin, Ireland

**2008–2009**

Assistance with various conservation projects in north Dublin, including:

- Woodland thinning, management, and planting for biodiversity
- Invasive tree and shrub removal
- Fence building

**Fingal County Council**, Dublin Ireland

**2005**

Tree planting to create new native woodland for National Tree Week

## TECHNICAL SKILLS

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### Data Analysis and Programming

- Collection, management, and processing of multiple data formats and sizes
- Experience with linear and generalised linear models, mixed models, model selection and averaging, structural equation models, bootstrapping, confidence intervals, cross-validation, cluster analysis, ordination, data visualisation
- Programming of analysis routines in R for efficiency and speed
- R package development (coding, testing, documentation, version control)
- Software: R/RStudio, Git/GitHub

### GPS, GIS, and Spatial Analysis

- Extensive use of GPS/GIS technology for ecological projects, including field recording, mapping, and geoprocessing and analysis of spatial data (csv, vector, raster, etc.)
- Software: QGIS, ArcGIS, GRASS, Google Earth
- Hardware: Garmin GPSMap 62, Trimble Nomad, Trimble GeoExplorer, Spectra Precision EPOCH Base and Rover GNSS System

### Information Technology

- General proficiency in computers, file/document management, software, and IT
- Software: MS Office, LibreOffice, Adobe Reader, Zotero
- Platforms: Windows, Linux (Ubuntu)

### Species Identification and Taxonomy

- Identifying invertebrates and plants to species or morphospecies (field and lab), including use of keys, descriptions, reference collections, and photographs
- Specialist knowledge of Hymenoptera, particularly Aculeata (bees and wasps)
- Woody plant and herb identification (woodlands, wetlands, grasslands)

### Molecular Work and Bioinformatics

- Extraction and PCR of mitochondrial DNA (CO1) from insects
- Processing, editing, and analysis of DNA barcode sequences to identify species
- Submission of barcodes and metadata to online repositories (BOLD, GenBank)
- Software: Geneious, BOLD, MEGA