

DR. ANTHONY CARAVAGGI

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CAREER HISTORY

| Date | Job Title | Department | Organisation |
|---------|----------------------------------|---------------------|----------------------------|
| 2019- | Lecturer in Conservation Biology | Applied Sciences | University of South Wales |
| 2017-19 | Postdoctoral Researcher | School of BEES | University College Cork |
| 2017-18 | Visiting Research Fellow | Biological Sciences | Queen's University Belfast |

EDUCATION

| Date | Qualification | Topic | Organisation |
|------|---------------|-------------------------------|----------------------------|
| 2016 | PhD | Conservation biology | Queen's University Belfast |
| 2011 | MRes | Biodiversity and conservation | University of Leeds |
| 2009 | BSc (Hons) | Zoology with conservation | Bangor University |

Professional activities

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| Associate Editor | <i>Remote Sensing in Ecology and Conservation.</i> |
| Peer reviewer | <i>African Journal of Ecology; Austral Ecology; Biological Conservation; Bird Study; Canadian Journal of Zoology; Diversity and Distributions; Global Change Biology; Journal of Natural History; Journal of Zoology; Mammal Communications; Mammal Research; Mammal Review; PeerJ; PLOS One; Remote Sensing in Ecology and Conservation; Ringing and Migration; The European Zoological Journal; Zoo Biology.</i> |
| Funding review | British Ecological Society Grant Review College (2015 – present); Croatian Science Foundation. |
| Consultant | The Hen Harrier Reintroduction Project (University of Exeter and Natural England). |

RESEARCH

I employ field and laboratory-based experiments, along with archival data, to answer specific questions relating to the ecology of species and ecological communities to inform conservation, management and policy-related processes. My current work is broadly interdisciplinary, highly collaborative and includes analyses of activity patterns, landscape-scale habitat and distribution modelling, quantification of the impacts of invasive species on islands and an assessment of wildlife management practises.

Research Interests Conservation biology; urban ecology; invasive species; population & community ecology; movement & spatial ecology; rare and endangered species; sustainability; rewilding; citizen science; remote sensing.

PUBLICATIONS

Peer-reviewed journals

- 2019 Hayward M, Scanlon RJ, Callen A et al. including **Caravaggi A**. Reintroducing rewilding to restoration – Rejecting the search for novelty. *Biological Conservation*. 233:255-259.
- 2018 **Caravaggi A**, Vallely M-C, Hogg K, Freeman M, Fadaei E, Reid N, Dick JTA, Tosh D. Seasonal and predator-prey effects on circadian activity of free-ranging mammals revealed by camera traps. *PeerJ*. 6:e5827
- Caravaggi A**, Cuthbert RJ, Ryan RG, Cooper J, Bond AL. The cumulative impacts of introduced house mice on the breeding success of nesting seabirds on Gough Island. *Ibis*. doi: 10.1111/ibi.12664.
- Caravaggi A**, Plowman A, Wright D, Bishop C. The composition of captive ruffed lemur (*Varecia* spp.) diets in UK zoological collections, with reference to the problems of obesity and iron storage disease. *Journal of Zoo and Aquarium Research*. 6: 51-49.
- Havlin P, **Caravaggi A**, Montgomery WI. The diet and abundance of an introduced insular population of Red-Necked Wallabies, *Macropus rufogriseus*. *Canadian Journal of Zoology*. 96(4): 357-365.
- 2017 O'Halloran J, Kelly TC, Quinn JL, Irwin S, Fernández-Bellón D, **Caravaggi A**, Smiddy P. Current ornithological research in Ireland: seventh Ornithological Research Conference, UCC, November 2017. *Irish Birds*. 10: 598–638.
- Caravaggi A**, Montgomery WI, Reid N. Management and control of invasive brown hares (*Lepus europaeus*): contrasting attitudes of selected environmental stakeholders and the wider rural community. *Proceedings of the Royal Irish Academy: Biology & Environment*. 117B:1-11.
- Tennant JP, Graziotin D, Jacques DC, *et al.*, including **Caravaggi A**. A multi-disciplinary perspective on emergent and future innovations in peer review. *F1000Research*. 6:1151.
- Caravaggi A**, Banks P, Burton C, Finlay CMV, Hayward M, Haswell, PM, Rowcliffe JM, Wood M. A review of camera trapping for conservation behaviour research. *Remote Sensing in Ecology and Conservation*. 3(3): 109-122.
- Caravaggi A**. remBoot: An R package for Random Encounter Modelling. *Journal of Open Source Software*. 2(10).
- Caravaggi A**, Leach K, Santilli F, Rintala J, Helle P, Tiainen J, Bisi F, Martinoli A, Montgomery WI, Reid N. Niche overlap of mountain hare subspecies and the vulnerability of their ranges to invasion by the European hare; the (bad) luck of the Irish. *Biological Invasions*. 19(2): 655-674.
- 2016 **Caravaggi A**, Zaccaroni M, Riga F, Schai-Braun SC, Dick JTA, Montgomery WI, Reid N. An invasive-native mammalian species replacement process captured by camera trap survey Random Encounter Models. *Remote Sensing in Ecology and Conservation*. 2: 45-58.

- 2015 **Caravaggi A**, Montgomery WI, Reid N. Range expansion and comparative habitat use of insular, congeneric lagomorphs: invasive European hares *Lepus europaeus* and endemic Irish hares *Lepus timidus hibernicus*. *Biological Invasions*. 17(2): 687-698.

In review

Caravaggi A, Irwin S, Lusby J, Ruddock M, O'Toole L, Mee A, Nagle T, O'Neill S, Tierney D, O'Halloran J. Factors influencing Hen Harrier, *Circus cyaneus*, territory site selection and breeding success. *Bird Study*.

Caravaggi A, Irwin S, Lusby J, Ruddock M, O'Toole L, Mee A, Nagle T, O'Neill S, Tierney D, O'Halloran J. Anthropogenic pressures within the breeding range of the Hen Harrier (*Circus cyaneus*) in Ireland. *Bird Study*.

Book chapters

2018 **Caravaggi A**. Lagomorpha Life History. In: Vonk J, Shackelford TK (eds.) *Encyclopedia of Animal Cognition and Behavior*. Springer.

Caravaggi A. Lagomorpha Navigation. In: Vonk J, Shackelford TK (eds.) *Encyclopedia of Animal Cognition and Behavior*. Springer. doi: 10.1007/978-3-319-47829-6_1164-1

Technical reports

2018 McGowan N, Dingerkus K, Stone R, **Caravaggi A**, *et al.* Hare Survey of Ireland 2018/2019: Interim Report (June) 2018. Report produced for the Department of Arts, Heritage and the Gaeltacht.

Other publications

2017 **Caravaggi A**, James K. Twittersphere: Conferencing in 140 characters. *Nature*. 549: 458. (Letter)

TEACHING

As a teacher I aim to provide my students with skills, knowledge and confidence critical to their academic and personal development. I take an inclusive approach, developing strong relationships and encouraging discussion.

Qualifications

2019 Postgraduate Certificate in Teaching and Learning in Higher Education (*ongoing*).

Module development

- 2019-20 GE2S008 – *Biodiversity and Biogeography*
GE2S017 – *Research Methods in Natural History*
GE3S009 – *Mediterranean Field Expedition*
ES4S011 – *European Field Expedition*
- 2017 BL6024 - *Quantitative Skills for Biologists Using R*.
Quantitative skills required by postgraduate students to successfully conduct and publish their research, with a focus on data analysis and graphing, statistics, and basic modelling, as generally implemented by zoologists and ecologists.

Lecturing

- 2018- GE0S04 – Foundation in Natural History
GE1S008 – Observational Fieldwork
GE1S010 – Natural History
GE2S008 - Biodiversity & Biogeography
GE2S017 – Research Methods in Natural History
ES4H001 – Environmental Management and Legislation
ES4S009 – Restoration Ecology
ES4S010 - Terrestrial and Aquatic Conservation
ES4T001 - MSc Research Projects
- 2018 BL6024 - Quantitative Skills for Biologists Using R.
BL5014 - Conservation Biology.
- 2017 BL6024 - Quantitative Skills for Biologists Using R.
- 2015 Introduction to GIS (*Teaching Assistant*)
Animal Biology (*Teaching Assistant*)
Undergraduate residential field course
- 2014 Undergraduate residential field course

Field-based teaching

- 2018-19 Biotope mapping
Field skills (*Botswana*)
NVC habitat classification
Seabird surveys and identification
Phase 1 habitat survey
- 2016 South American rainforest biodiversity and conservation (*Ecuador*).
- 2015 Undergraduate residential field course, Northern Ireland
- 2014 Undergraduate residential field course, Northern Ireland
Bird survey techniques

Student supervision

| Date | Degree | Name | Organisation |
|-------------|---------------|---------------|---------------------------|
| 2019-23 | PhD | Alan McCarthy | University College Cork |
| 2018-19 | MSc | Laura Brooks | University of South Wales |
| 2018-19 | MSc | Maja Hudej | University of South Wales |

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| 2018-19 | MSc | Ayashi Majumder | University of South Wales |
| 2018-19 | MSc | Trisha Kallya | University of South Wales |
| 2018-22 | PhD | Samantha Ball | University College Cork/Dublin Airport Authority |
| 2018 | Erasmus | Enrique Da Paz | University College Cork/University of Barcelona |
| 2017-19 | MRes | Alan McCarthy | University College Cork |
| 2017 | BSc | Chloe O'Mahoney | University College Cork |
| 2015 | MSc | Ashley Irwin | Queen's University Belfast |
| | MSc | Lauren Finley | Queen's University Belfast |
| | BSc | Paige Havlin | Queen's University Belfast |
| | SWB* | Lazaro Silva | Queen's University Belfast |
| 2014 | BSc | Mengyi Liu | Queen's University Belfast |
| | BSc | Claire Molloy | Queen's University Belfast |
| 2013 | BSc | Ashley Irwin | Queen's University Belfast |

* Science Without Borders

External course delivery

I have developed materials for and delivered courses in bird identification, camera trapping and social media for ecologists.

FIELDWORK EXPERIENCE

| Date | Activity and habitat(s) |
|-------------|---|
| 2018 | Camera trapping, small mammal trapping, bird point counts. Upland habitats. |
| 2017 | Hen Harrier nest surveys. Upland areas. Breeding Bird Survey (BTO). Upland areas; windfarm-adjacent. |
| 2016 | Bird, bat and reptile surveys and camera trapping. South American rainforest. |
| 2015 | Camera trapping for otters. Rivers and riparian areas. |
| 2014 | Badger sett surveys. Broadleaved woodlands. |
| 2012-15 | Hare surveys (distance sampling, camera traps, fecal). Uplands and agricultural. |
| 2013 | Coastal biodiversity surveys. Tidal pools. |
| 2012 | Wader and gull surveys. Tidal flats. |
| 2011 | Small mammal trapping. Agricultural fields. Reptile surveys. Clearfell areas in coniferous forests. Bird point count, reptile, mammal and invertebrate surveys. Marsh and fen. Bat roost surveys (visual and detector). Urban areas. Great crested newt surveys. Agricultural areas. Bird surveys. Broadleaved woodland. |
| 2009-11 | Breeding Bird Surveys (BTO). Upland areas. |
| 2007-18 | Bird ringing (mist, whoosh and cannon nets and traps). Woodland, fen, marsh, grassland, coastal and agricultural areas. |
| 2007-09 | Pine marten surveys. Coniferous woodland. |
| 2007 | Passerine bird and invertebrate surveys. Shrub and broadleaved woodland. Moth trapping. Botanic gardens. |
| 2006-08 | Bird surveys and nestbox monitoring. Broadleaved woodland. |

FELLOWSHIPS, FUNDING AND AWARDS

| Date | Award | Value | Organisation |
|-------------|---------------------------|--------------|---------------------------------------|
| 2018 | Funded PhD programme | €96,000 | Irish Research Council |
| 2017 | Project tender | €150,000 | National Parks and Wildlife Service |
| | Postdoctoral research | €174,000 | National Parks and Wildlife Service |
| | Visiting Research Fellow | - | Queen's University Belfast |
| 2015 | Training and Travel grant | £500 | British Ecological Society |
| 2014 | Research grant | £2,000 | People's Trust for Endangered Species |
| 2012 | PhD studentship | £82,720 | Northern Ireland Environmental Agency |
| 2010 | Master's scholarship | £7,500 | Natural Environment Research Council |

PRESENTATIONS

Conferences (oral presentations)

- 2018 Invasive Species Conference, Northern Ireland
- 2017 International Congress for Conservation Biology, Cartagena.
World Seabird Twitter Conference.
The Mammal Society, Newcastle (*invited keynote*).
Mammal Society Spring Conference, Cambridge.
- 2016 British Ecological Society Annual Meeting, Liverpool.
North Wales Mammal Symposium, Bangor
The Mammal Society, Lancaster (*invited keynote*).
Mammal Society Spring Conference, Yarnfield
- 2015 7th European Congress of Mammalogy, Stockholm, Sweden.
Vth International Wildlife Management Congress, Sapporo, Japan.
Mammal Society Spring Conference, Lancaster.
- 2014 Mammal Society Spring Conference, Birmingham.
- 2013 11th International Mammal Congress, Belfast.
Mammal Society Student Conference, Staffordshire.
- 2012 2nd All Ireland Mammal Symposium (AIMS), Dublin
4th World Lagomorph Conference, BOKU, Vienna.
- 2009 11th BIAZA Research Symposium, Blackpool.

Invited seminars

- 2019 Biological Sciences, Cardiff University (*scheduled*).
School of BEES Seminar Series, University College Cork (*scheduled*).
Bangor University Zoological Society, Bangor University (*scheduled*).
- 2018 Research Group seminar on Science Communication, University College Cork.
Keynote, Mammal Society Student Conference, Worcester.
- 2014 Biological Sciences, Bangor University.

CONFERENCE ORGANISATION

- 2018 2nd Biotweeps Twitter Conference (*principal organiser*).
- 2017 7th Irish Ornithological Congress, Cork (*scientific committee*).
Biotweeps Twitter Conference (*principal organiser*).
- 2014-18 Mammal Society Student Conferences, various (*principal organiser*).

PERSONAL DEVELOPMENT

Training and workshops

- 2018-19 Postgraduate Certificate in Teaching and Learning in Higher Education (UoL)
- 2018 Better Biosecurity (University of Leeds)
Research funding (UCC)
Unconscious bias awareness (UCC)
Developing Horizon 2020 grant applications (UCC)
- 2017 Advanced Training in Systematic Review and Meta-Analysis (NERC)
Level 3 Teaching Assistant (e-learning)
Engagement and Public Outreach (BES)
Remote mammal surveying (*workshop*; Vincent Wildlife Trust)
- 2016 Mentorship for academic ecologists (BES)
Developments in conservation ecology (*workshop*; BES)
Acoustic analysis of marine mammal vocalisations (*workshop*; NWMG)
- 2012 Lagomorph systematics (*workshop*)

Licenses and certification

- 2018 LAST Ireland (animal welfare in research)
License to ring/mark wild animals (NPWS; License no: 09-2018)
- 2014 ASPA laboratory animal handling license (TSA/47/14)
Emergency first aid; field first aid
- 2012 BTO bird ringing 'C' license
- 2008 Marine mammal medic, BDMLR
- 2002 Full manual UK driving license, held without incident or penalty

Societal memberships (since)

- 2017 British Ornithologist's Union
- 2015 South Wales Mammal Group
Welsh Ornithological Society
- 2013 Society of Conservation Biology (SCB)
- 2012 The Mammal Society
British Ecological Society
- 2011 Royal Society of Biology
- 2009 The British Trust for Ornithology

Organisational and working groups (since)

- 2017 SCB Participatory and Citizen Science working group
- 2016-17 South Wales Mammal Group (*committee*)
- 2016 Mammal Society Council
- 2012 SCB Urban Ecology working group

Additional roles

- 2018- UCC BEES Education and Public Engagement Committee
- 2016- University Mammal Challenge coordinator, The Mammal Society
- 2016 Session chair, British Ecological Society Annual Meeting
British Ecological Society Women in Ecology (WIE) mentor
- 2015-17 Lagomorph consultant, The Mammal Society
- 2016 Community Ecology session chair, British Ecological Society Annual Meeting
- 2013 Wildlife consultant, Biological records for the North East of Scotland (NESBReC)
- 2012-15 EBEE postgraduate representative, Queen's University Belfast
SBS Athena SWAN committee, Queen's University Belfast
- 2007-09 Undergraduate student representative, Bangor University
Founding committee, Bangor University Zoological Society

SCIENCE COMMUNICATION

I am a strong advocate of science communication and outreach and believe that it is important to encourage an interest in science and the natural world in people of all ages. I am the creator and sole curator of the Twitter-based science communication project, Biotweeps, that hosts a different biologist every week and has a current following of > 16,000. Biotweeps has also hosted two global virtual conferences featuring dozens of scientists from around the world and with audiences numbering in the millions. I have given talks to over 20 school, local interest, community and natural history groups in the UK, USA and Canada, in-person and via video calls.

Outreach

- 2018 UCC BEES Committee for Education and Public Engagement
BBC Wildlife magazine feature on wallabies (*invited expert*)
I'm a Scientist Get Me Out of Here! Careers Zone expert
- 2017 Sanger Institute 25 Genomes (*species champion* – *St. Kilda wren*)
Culture Night, University College Cork
Blog post - A brief history of an Early Career Researcher, *Errant Science*
Conservation & ecology expert on the sub-reddit /r/AskScience
Blog post - Rejected by the Rainforest, *I F-ing Love Conservation*
Science communication article, CBS (*#bestcarcass, contributor*)
Rabaiotti D, Caruso N 2017. Quercus books, ISBN: 9781786488275 (*contributor*)
Student Science Partnerships, USA
Bird song workshop and ringing demonstration, Parc Slip Nature Reserve, Wales
- 2016-18 Skype a Scientist (*5 classrooms across the US*)
- 2016 Blog post - On closer inspection, it looks like a hare transplant, *QUBio*
Magazine article - Is there intelligent life on Earth? *Save our Souls* (*author*)
Letters to a Pre-scientist (*correspondent*)
- 2015 Blog post - Putting wildlife in the frame, *QUBio*
Blog post - Communities and conservation in developing countries, *QUBio*
Nature News (*invited comment*)
Bird ringing demonstration, Parc Slip Nature Reserve, Wales
Blog post - Dear Alice, the hare might be sane after all, *QUBio*

- Blog post - What's in a name? *QUBio*
- 2014-16 Local Mammal Group newsletters (*invited author*)
- 2014 Blog post - A receding hare line and a brown toupee. *QUBio*
Created @Biotweeps, a science communication Twitter project (>16k followers)
Multi-school careers advice and speed-networking event (*invited expert*)
- 2013-17 UK STEM Ambassador
- 2013 I'm a Scientist Get Me Out of Here! Enquiry Zone expert
Science outreach event, Techniquet, Cardiff (*presenter for RSPB*)

MEDIA ENGAGEMENTS

Radio and podcasts

- 2018 BBC Radio Wales, UK
BBC Radio Derby, UK
MostlyScience live (*podcast*)
- 2017 BBC Coventry & Warwickshire, UK
The Edgar Ortega Radio Show, North America (*podcast*)
- 2016 SciComm with Dr. Mike, UK (*podcast; 2 shows*)
- 2015 BBC Radio Ulster, Northern Ireland
BBC Radio Ulster, *Good Morning Ulster*, UK
- 2013 RTE Radio 1, *Mooney Goes Wild*, UK

Television

- 2015 Countryfile, BBC
- 2013 River Bann, RTE Television

Other media

- 2018 BBC Wildlife (*invited article*)
- 2017 The Washington Post (*interview*)
- 2016 National Geographic advisor (*mammal expert*)
Biotechn.asia (*interview*)
Featured research - Camera traps reveal a hare-raising situation, *RSEC blog*, ZSL
- 2015 ScienceNews (*interview*)
BBC News (*interview and featured article*)
Nature News (*interview*)
Crastine.se (*interview*)
- 2014 Species profiles: Mountain hare and Irish hare, The Mammal Society
- 2013 Mid-Ulster Mail (*interview*)

SKILLS

Analytical software R, SPSS, Minitab, Distance, MARK, ArcGIS, QGIS, MaxEnt, NetLogo, MAVIS NVC, Patch Analyst, GeneMapper, bespoke software.

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| Additional tools | Microsoft Office, GitHub, RMarkdown, graphics packages (e.g. Adobe creative suite), website creation. |
| Statistical | General linear and mixed-effects models, Principal Components Analysis, Species Distribution Modelling, Discriminant Function Analysis, diversity indices, Mahalanobis and Euclidean distance, cross-correlation functions, model averaging, Random Encounter Models, meta-analysis, other parametric and non-parametric tests. |
| Field | Off-road driving (4x4), multi-taxa (mammal, bird, invertebrate, reptile, amphibian; UK coastal, marine and terrestrial) surveys (e.g. mark and recapture, distance sampling, camera traps, quadrats, scan/focal sampling;) and identification, habitat surveys, animal handling (amphibians, reptiles, invertebrates, and small-to-large birds and mammals), orienteering. |
| Laboratory | Multi-taxa dissection (mammal, bird, amphibian, invertebrate), species identification via microscopy, ethological studies, tissue sampling, DNA manipulation, electrophoresis, atomic absorption and colourimetric spectroscopy, specimen preparation, soil chemical and biological analysis. |

REFEREES

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| Prof. John O'Halloran | Deputy President & Registrar's Office, University College Cork, Cork, Ireland Postdoctoral study Principal Investigator Email: j.ohalloran@ucc.ie Telephone: +353 (0)21 490 2407 |
| Dr. Sandra Irwin | School of Biological Earth and Environmental Sciences, University College Cork, Distillery Field, N Mall, Cork, Ireland Postdoctoral study Project Manager Email: s.irwin@ucc.ie Telephone: +353 (0)21 490 4595 |
| Dr. Neil Reid | School of Biological Sciences, Medical Biology Centre, 97 Lisburn Road. Belfast BT9 7BL PhD supervisor Email: neil.reid@qub.ac.uk Telephone: +44 (0)28 9097 2746 |
| Prof. Ian Montgomery | School of Biological Sciences, Medical Biology Centre, 97 Lisburn Road. Belfast BT9 7BL PhD supervisor Email: i.montgomery@qub.ac.uk Telephone: +44 (0)28 9097 2214 |