

Anthony Caravaggi

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Career History

2017- Postdoctoral researcher; Supporting Hen harriers in Novel Environments (SHINE)
School of Biological, Earth and Environmental Sciences, University College Cork, Distillery Field, N Mall, Cork, Ireland
Supervisors: Prof. John O'Halloran, Dr. Sandra Irwin

2017- Visiting Research Fellow
School of Biological Sciences, Queen's University Belfast, Medical Biology Centre, 97 Lisburn Road, Belfast BT9 7BL

Education

2012 - 2016 PhD conservation biology/invasion ecology
Queen's University Belfast
Quantifying the impact of non-native European hares on the endemic Irish hare
Supervisors: Dr. Neil Reid, Prof. Ian Montgomery

2010 - 2011 MRes Biodiversity and Conservation
University of Leeds
Research projects:
1 *Patrilineal inheritance of parasite resistance in leaf-cutter ants (Acromyrmex sp.)*. Supervisor: Dr. William Hughes
2 *Factors influencing passerine productivity in managed reed beds*. Supervisor: Dr. Tom Cameron

2006 - 2009 BSc Zoology with Conservation (Hons)
Bangor University
Dietary and faecal iron levels in captive black-and-white ruffed lemurs
Supervisor: Dr. Charles Bishop

Research Interests

Conservation biology; urban ecology; invasive species; population & community ecology ; movement & spatial ecology; rare and endangered species; sustainability; rewilding; citizen science

Peer-Reviewed Publications

- 7 **Caravaggi A**, Montgomery WI, Reid N (*in press*) Management and control of invasive species: contrasting attitudes of environmental stakeholders and the wider rural community. *Proceedings of the Royal Irish Academy: Biology & Environment*
- 6 Tennant JP, Graziotin D, Jacques DC, Waldner F, Dugan JM, Mietchen D, Elkhatib Y, Collister LB, Pikas CK, Crick T, Masuzzo P, **Caravaggi A**, *et al.* (2017) A multi-disciplinary perspective on emergent and future innovations in peer review. *F1000Research*. 6:1151. doi: 10.12688/f1000research.12037.1

5 **Caravaggi A**, Banks P, Burton C, Finlay CMV, Hayward M, Haswell, PM, Rowcliffe JM, Wood M (2017) A review of camera trapping for conservation behaviour research. *Remote Sensing in Ecology and Conservation*. doi: 10.1002/rse2.48

4 **Caravaggi A** (2017) remBoot: An R package for Random Encounter Modelling. *Journal of Open Source Software*. 2(10). doi: 10.21105/joss.00176

3 **Caravaggi A**, Leach K, Santilli F, Rintala J, Helle P, Tiainen J, Bisi F, Martinoli A, Montgomery WI, Reid N (2017) 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. doi: 10.1007/s10530-016-1330-z

2 **Caravaggi A**, Zaccaroni M, Riga F, Schai-Braun SC, Dick JTA, Montgomery WI, Reid N (2016) An invasive-native mammalian species replacement process captured by camera trap survey Random Encounter Models. *Remote Sensing in Ecology and Conservation*. 2: 45-58. doi: 10.1002/rse2.11

1 **Caravaggi A**, Montgomery WI, Reid N et al. (2015) 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. doi: 10.1007/s10530-014-0759-1

In review

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 Animal Research*

Havlin P, **Caravaggi A**, Montgomery WI. The diet and abundance of an introduced insular population of Red-Necked Wallabies, *Macropus rufogriseus*. *Canadian Journal of Mammalogy*

Caravaggi A, Vallely M-C, Hogg K, Freeman M, Fadaei E, Reid N, Tosh D. Circadian activity, seasonal occurrence, and predator-prey relationships of free-ranging mammals revealed by camera traps. *Hystrix, Italian Journal of Mammalogy*

In preparation

Caravaggi A, Cuthbert RJ, Ryan RG, Cooper J, Bond AL. The cumulative impacts of introduced mice on the breeding success of nesting seabirds on Gough Island. To be submitted to *Biological conservation*

Caravaggi A, Turner D, Cameron T. I've got a bad feeling about this: a study into factors affecting reed-nesting birds. To be submitted to *F1000 Research*

Book contributions

Caravaggi A (*in prep*) Lagomorpha Life History. In: *Encyclopedia of Animal Cognition and Behavior*, Vonk J, Shackelford TK (eds.) ISBN 9783319550657

Caravaggi A (*in prep*) Lagomorpha Navigation. In: *Encyclopedia of Animal Cognition and Behavior*, Vonk J, Shackelford TK (eds.) ISBN 9783319550657

Grants and Scholarships

2015 **Emily Sarah Montgomery Travel Scholarship**. Â£200, Queen's University Belfast. 7th European Congress of Mammalogy

2015 **Training and Travel grant**. Â£500, British Ecological Society. 7th European Congress of Mammalogy

2012 **Research grant**. Â£2,000, People's Trust for Endangered Species

2012 Northern Ireland Environmental Agency (NIEA) **funded PhD studentship**. Queen's University Belfast

2010 Natural Environment Research Council (NERC) **Master's scholarship for outstanding candidates**. University of Leeds

Invited Presentations

2017 **Keynote** The changing face of UK conservation. Mammal Society Student Conference
2016 **Keynote** UK mammals. Mammal Society Student Conference
2014 **Guest lecture** Distribution and differential habitat associations of invasive European and endemic Irish hares. Bangor University

Presentations

12 **Caravaggi A**, Montgomery WI, Reid N (2017) An invasion in progress: Impacts of the non-native European hare on the native Irish hare. International Congress for Conservation Biology
11 **Caravaggi A** (2017) Predation of seabirds by mice on Gough Island. World Seabird Twitter Conference
10 **Caravaggi A** (2017) University Mammal Challenge: distributed mammal surveys with student scientists. Mammal Society Spring Conference
9 **Caravaggi A**, Montgomery WI, Reid N (2016) Invasion ecology: quantifying the impact of non-native European hares on the endemic Irish hare. British Ecological Society Annual Meeting, Liverpool
8 **Caravaggi A**, Hayward M (2016) People and hedgehogs in Wales. North Wales Mammal Symposium, Bangor
7 **Caravaggi A**, Montgomery WI, Reid N (2016) Invasion ecology: quantifying the impact of non-native European hares on the endemic Irish hare. Mammal Society Spring Conference, Yarnfield
6 **Caravaggi A** 2015 Quantifying endemic uniqueness and ecological equivalency between native and invasive leporids. 7th European Congress of Mammalogy, Stockholm, Sweden
5 **Caravaggi A**, Leach K, Santilli F, Rintala J, Helle P, Tiainen J, Bisi F, Martinoli A, Montgomery WI, Reid N (2015) Democratisation of invasive species interventions: assessing attitudes towards lethal control of mammalian invaders. Mammal Society Spring Conference, Lancaster
4 **Caravaggi A**, Zaccaroni M, Riga F, Schai-Braun SC, Dick JTA, Montgomery WI, Reid N (2015) Using the Random Encounter Model to estimate spatial patterns in invasive and native hare densities in allopatry and sympatry. Mammal Society Student Conference, Lancaster
3 **Caravaggi A**, Montgomery WI, Reid N (2014) Using the Random Encounter Model to estimate spatial patterns in invasive and native hare densities in allopatry and sympatry. Mammal Society Spring Conference, Birmingham
2 **Caravaggi A**, Montgomery WI, Reid N (2013) Distribution and differential habitat associations of invasive European and endemic Irish hares. 11th International Mammal Congress, Belfast
1 **Caravaggi A**, Montgomery WI, Reid N (2013) Invasion ecology: quantifying the impact of non-native European hares on the endemic Irish hare. Mammal Society Student Conference, Staffordshire

Posters

9 **Caravaggi A**, Vallely M-C, Hogg K, Freeman M, Fadaei E, Reid N, Tosh D (2017) Activity and temporal relationships of free-ranging mammals revealed by camera traps. Mammal Society Spring Conference
8 **Caravaggi A**, Montgomery WI, Reid N (2015) The democratisation of conservation: public attitudes towards lethal control of invasive leporids and implications for species management. 7th European Congress of Mammalogy, Stockholm, Sweden
7 **Caravaggi A**, Zaccaroni M, Riga F, Schai-Braun SC, Dick JTA, Montgomery WI, Reid N (2015) Optimising camera trap Random Encounter Model survey effort: A case study using an invasive-native species replacement process. Vth International Wildlife Management Congress, Sapporo, Japan

- 6 Beresford NA, Wood MD, Gaschack S, Gulyaichenko EA, **Caravaggi A** (2015) Use of wildlife camera traps to within the Chernobyl Exclusion Zone. Mammal Society Spring Conference, Lancaster
- 5 **Caravaggi A**, Montgomery WI, Reid N (2013) Estimating hare numbers using camera trapping and the Random Encounter Model. 11th International Mammal Congress, Belfast
- 4 **Caravaggi A**, Montgomery WI, Reid N (2012) Invasion ecology: quantifying the impact of non-native European hares on the endemic Irish hare. 2nd All Ireland Mammal Symposium (AIMS), Dublin
- 3 **Caravaggi A**, Montgomery WI, Reid N (2012) Invasion ecology: quantifying the impact of non-native European hares on the endemic Irish hare. 4th World Lagomorph Conference, BOKU, Vienna
- 2 **Caravaggi A**, Hughes W (2011) Patrilineal inheritance of grooming behaviour and parasite resistance in leaf-cutting ants (*Acromyrmex* sp.). Postgraduate Student Forum, University of Leeds pdf
- 1 **Caravaggi A**, Bishop, C (2009) Dietary and faecal iron levels in captive black-and-white ruffed lemurs (*Varecia* spp.). 11th BIAZA Research Symposium, Blackpool Zoo pdf

Teaching

Supervision

Worked with the students to develop research questions and appropriate methodologies, taught relevant statistical techniques and how to implement them in SPSS and R, monitored progress, and gave feedback and advice throughout

- 2017 BSc research project. *Comparing hen harrer growth across Europe*. University College Cork
- 2015 MSc research project. *Behaviour and stress in sympatric hare species*. Queen's University, Belfast
- 2014 MSc research project. *Activity and behaviour of hares in Mid-Ulster*. Queen's University, Belfast
- 2014 Undergraduate residential field course. Queen's University, Belfast
- 2013 MSc research project. *Estimating hare population densities*. Queen's University, Belfast
- 2013 BSc research project. *Resource and habitat partitioning of herbivores*. Queen's University, Belfast
- 2013 Undergraduate residential field course. Queen's University, Belfast

Instruction and Development

2017-18 BL6024 Quantitative skills for biologists using R. Module development and instruction. Provided 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.

2016-17 Course tutor: ornithology, camera traps, social media. Eco-Explore, Cardiff

Developed materials and taught courses on UK bird identification, the use of camera traps in ecology, and social media for scientists.

2016 Lecturer and field ornithologist. Operation Wallacea, Ecuador

Co-developed and delivered a 5-part series of lectures focussing on rainforest biodiversity and conservation, and conducted bird ringing studies including demonstrating techniques and training students in biometric data gathering. Also trained an assistant on mist nest extraction and data recording

2015 Otter surveys, MSc, Queen's University Belfast

Trained a Master's student in otter survey techniques and field signs, and advised on camera trap survey methodology

2014 Bird surveys, undergraduate module. Queen's University Belfast

Developed materials and taught a one-off field-based class, including training and supervision of students

Demonstration

2015 Introduction to GIS, undergraduate module. Queen's University Belfast

2014 Animal biology, undergraduate module. Queen's University Belfast

Professional Development

2017 **Level 3 Teaching Assistant training**. E-Training Hub
2017 **Public Outreach Training**. Science Made Simple
2016 **Conservation ecology Special Interest Group workshop**. British Ecological Society Annual Meeting
2016 **Acoustic analysis workshop**. North Wales Mammal Symposium
2016 **Women in Ecology mentor workshop**. British Ecological Society
2014 **Using R**. Queen's University Belfast
2012 **Lagomorph systematics workshop**. 4th World Lagomorph Conference

Professional Memberships

(since)

2015 **South Wales Mammal Group, Welsh Ornithological Society**
2013 **Society of Conservation Biology**
2012 **The Mammal Society, British Ecological Society**
2011 **Royal Society of Biology**
2009 **The British Trust for Ornithology**

Professional Licenses and Certifications

2014-15 ASPA laboratory animal handling license (TSA/47/14)
2014- Emergency first aid
2014- Field first aid
2009- Bird ringing 'C' license holder, British Trust for Ornithology 2008-11 Marine mammal medic. British Divers Marine Life Rescue
2002- Full manual UK driving license, held without incident or penalty

Professional Service

Peer reviewer

Journal of Zoology; Mammal Research; Remote Sensing in Ecology and Conservation; Zoo Biology; Global Change Biology; Journal of Natural History; Invasive Species Compendium

2017 SCB Participatory and Citizen Science **Working Group member**
2017 **Conference volunteer**, The Mammal Society Spring Conference 2016- **Review College member**, British Ecological Society
2016- **Student Engagement Officer**, The Mammal Society Council
2016 Session chair, **Community Ecology**, British Ecological Society Annual Meeting
2016 **Committee member**, South Wales Mammal Group
2016 **Coordinator** of The Mammal Society's University Mammal Challenge
2016-17 British Ecological Society Women in Ecology (WIE) **mentor**
2015 **Student committee advisor**, Mammal Society Student Conference
2014 **Coordinator**, Mammal Society Student Conference
2013-17 **UK STEM Ambassador**
2013 **Principal coordinator**, Mammal Society Student Conference
2013 **Volunteer**, 11th International Mammal Congress, Belfast
2012-15 EBEE **postgraduate representative**, Queen's University Belfast
2012-15 SBS **Athena SWAN committee**, Queen's University Belfast
2010-12 **Volunteer**. Royal Society for the Protection of Birds

2010-11 **Volunteer** Conservation Volunteers, Leeds University
2008-09 **Undergraduate student representative**, Bangor University Biological Sciences
2007-09 **Founding committee & publicity officer**, Bangor University Zoological Society
2008-08 **Volunteer**, Treborth Botanic Gardens, Bangor

Outreach

Community/group talks

Schools, natural history groups, student groups and local interest groups in Wales, England, Northern Ireland, Ireland, USA and Canada, in person and via video. Including remote project development, mentoring and advisement.

2017 **Co-created @SciCommGames** Environmental and science communication Twitter games
2017 **Enquiry Zone scientist**, I'm a Scientist, Get Me Out of Here!
2017 **Contributed photo** to CBS article on Twitter hashtag (#bestcarcass)
2017 **Partner scientist**, Student Science Partnerships, USA
2017 **Interview** for Washington Post on science communication
2016 **Advisor** to National Geographic on red fox ecology
2016 **Invited author**, Shropshire Mammal Group newsletter
2016 **Volunteer**, Letters to a Pre-Scientist
2016 **Mammal (hares) consultant** for The Mammal Society
2015 **Featured curator**, Biotweeps (~6.5k followers)
2014 **Created @Biotweeps**, a science communication Twitter project
2014 **Invited expert** Multi-school careers advice and speed-networking event
2013 **Volunteer science presenter, ornithology**, Techniquet, Cardiff
2013 **Wildlife consultant** for Biological records for the North East of Scotland (NESBReC)
2013 **Interview**, 'Hare' raising project in Mid-Ulster, Mid Ulster Mail
2013 **Created @RingingPlanet**, a bird-ringing Twitter project
2013 **Bird ID and ringing demonstrator**, Bridgend
2013 **Bioblitz naturalist**, Carmarthen
2013 **Conservation group participant**, I'm a Scientist, Get Me out of Here
2013 **Bird ringing demonstrator**, Wildlife Trust of South and West Wales
2012 **Bird ringing demonstrator**, Wildlife Trust of South and West Wales
2011 **Bioblitz naturalist**, Carmarthen

Media Appearances, Profiles and Mentions

Written

2017 A brief history of an Early Career Researcher, Errant Science
2017 Rejected by the Rainforest, I F-ing Love Conservation
2017 Introducing the University Mammal Challenge, The Mammal Society
2016 Is there intelligent life on Earth? Save our Souls magazine
2016 A chat with Dr. Anthony Caravaggi. Biotechnia.asia
2016 Camera traps reveal a hare-raising situation. RSEC blog, ZSL
2016 On closer inspection, it looks like a hare transplant. QUBio
2015 Living with aliens. SciLogs
2015 Communities and conservation in developing countries. QUBio
2015 Putting wildlife in the frame. QUBio
2015 Astrotweeps and Biotweeps: rotating Twitter accounts. Crastina.se
2015 Media battle highlights importance of scientific credit. ScienceNews
2015 Dear Alice, the hare might be sane after all. QUBio
2015 BBC News. Counting Irish hares at Belfast International Airport

2015 A call for beautiful prose in papers. Nature News
2014 Mountain hare and Irish hare. The Mammal Society
2014 A receding hare line and a brown toupÃ©. QUBio

Radio

2017 BBC Coventry & Warwickshire, Wallabies in the UK
2017 Invited guest, The Edgar Ortega Radio Show, Invasive species and urban wildlife
2016 SciComm podcast Episodes 7 & 8, with Dr. Mike
2015 BBC Radio Ulster, Hares at Belfast airport
2015 BBC News School Report for St. Pius X, Magherafelt's Biodiversity Club
2015 BBC Radio Ulster, Good Morning Ulster, Invasive species
2013 RTÃ Radio 1, Mooney Goes Wild, Hares in Ireland

Television

2015 Countryfile, BBC
2013 River Bann, RTE Television

Computer Skills

Data analysis

R (packages include MuMIn, lme4, ggplot, remBOOT, maptools, raster, SDMTools, StatMatch, pdist, glmmulti), SPSS, Minitab, Distance, MARK

GIS

R, ArcGIS, QGIS

Other software

MaxEnt, MAVIS NVC, Patch Analyst, GeneMapper, Microsoft office, GitHub, RMarkdown, graphics packages (e.g. Photoshop), bespoke software

Skills and knowledge

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
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); habitat) and identification
Habitat surveys
Animal handling (amphibians, reptiles, invertebrates, and small-to-large birds and mammals)

Bird ringing (BTO C license)
Orienteering

Additional professional experience: 2017 Assistant, pied flycatcher nestbox monitoring, Cardiff University
2017 Breeding Bird Survey, British Trust for Ornithology
2011-12 Small mammal surveys, field assistant, University of Leeds
2011-12 Ecologist, great crested newt and bat surveys, Haycock and Jay, Ecologists
2011-12 Habitat management, Conservation Volunteers, University of Leeds
2011 Bat survey assistant, Haycock and Jay, Ecologists
2011 Snake survey assistant, Dr. Axel Barlow
2010-11 Ornithological technician, bird territory mapping, Cardiff University
2010-11 Breeding Bird Surveys, British Trust for Ornithology
2010 Wading bird surveys, British Trust for Ornithology
2009 Data analyst, butterfly foodwebs, Bangor University
2007-09 Pine marten surveys, Snowdonia Mammal Group
2007-09 Woodland bird and invertebrate surveys, Treborth Botanic Gardens, Bangor
2006-08 Ornithological technician, bird breeding and behaviour, Dr. Geoff Gibbs

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

Dr. Neil Reid

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Prof. Ian Montgomery

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