

# ANTHONY CARAVAGGI

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## **CURRENT POSITION**

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2017-present Visiting Research Fellow, Queen's University Belfast

Studies on movement ecology and invasive species

## **EDUCATION**

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**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, Prof. Paulo Prodöhl

- Ecological niche modelling and identification of ecological distances
- Population density estimation via Distance Sampling and the Random Encounter Model
- Mapped temporal change in range and abundance
- Habitat association modelling across multiple scales
- Social science study to investigate attitudes towards wildlife management
- Extensive work and communication with residents, academics, land owners, and NGOs
- Trained and managed three Master's students and one undergraduate student
- Trained and managed a total of 14 field assistants
- Radio and press appearances, and talks to local and school groups

**2010 – 2011** MRes Biodiversity and Conservation, University of Leeds

Research projects:

1. *Patrilineal inheritance of parasite resistance in leaf-cutter ants (Acromyrmex sp.)*
2. *Factors influencing passerine productivity in managed reed beds*

**2006 – 2009** BSc Zoology with Conservation (Hons), Bangor University **Grade:** 1<sup>st</sup>

Research project: *Dietary and faecal iron levels in captive black-and-white ruffed lemurs*

## **RESEARCH INTERESTS**

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Conservation biology

Ecology (urban, invasive, community, population, movement, spatial)

Rare and endangered species

Citizen science

## **PEER-REVIEWED PUBLICATIONS**

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9 **Caravaggi A**, Montgomery WI, Reid N (*in review*) Management and control of invasive species: contrasting attitudes of environmental stakeholders and the wider rural community. *Proceedings of the Royal Irish Academy: Biology & Environment*

8 **Caravaggi A**, Plowman A, Wright D, Bishop C (\*in review\*) 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*

7 **Caravaggi A**, Banks P, Burton C, Finlay CMV, Hayward M, Haswell, PM, Rowcliffe JM, Wood M (*in review*) A review of camera trapping for conservation behaviour research. *Remote Sensing in Ecology and Conservation*

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

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

4 **Caravaggi A** (2017) remBoot: Random Encounter Modelling and bootstrapping for variance in R. *The Journal of Open Source Software*. 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 (2016) 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: 655-674

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 Data DOI: 10.6084/m9.figshare.1422040.v1

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: 687-698

## **GRANTS AND SCHOLARSHIPS**

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- 2015 **Emily Sarah Montgomery Travel Scholarship**. £200, Queen's University Belfast. 7th European Congress of Mammalogy
- 2015 **Training and Travel grant**. £500, British Ecological Society. 7th European Congress of Mammalogy
- 2012 **Research grant**. £2,000, People's Trust for Endangered Species
- 2012 **Northern Ireland Environmental Agency funded PhD studentship**. Queen's University Belfast
- 2010 **Natural Environment Research Council (NERC) scholarship**. £5,000, University of Leeds.

## **CONFERENCE PRESENTATIONS**

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- 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 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

## **INVITED SPEAKER**

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2017 **Keynote**. The changing face of UK conservation. **Mammal Society Student Conference (scheduled)**

2016 **Keynote**. UK mammals. **Mammal Society Student Conference**, Yarnfield. 8th April

2014 **Guest lecture**. Distribution and differential habitat associations of invasive European and endemic Irish hares. **Bangor University**. 17th October

## **POSTER PRESENTATIONS**

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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

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

## **TEACHING EXPERIENCE**

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### *As Supervisor*

- 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

### *As Instructor*

- 2016 - present Course tutor: ornithology, camera traps, social media. Eco-Explore, Cardiff
- 2016 Lecturer and field ornithologist. Operation Wallacea, Ecuador
- 2015 Otter surveys, MSc, Queen's University Belfast
- 2014 Bird surveys, undergraduate module. Queen's University Belfast

### *As Demonstrator*

- 2015 GIS, undergraduate module. Queen's University Belfast
- 2014 Animal biology, undergraduate module. Queen's University Belfast

## **ADDITIONAL EXPERIENCE**

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- 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

## **PERSONAL DEVELOPMENT**

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- 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 **Women in Ecology mentor training.** British Ecological Society
- 2016 **Acoustic analysis workshop.** North Wales Mammal Symposium
- 2014 **Introduction to R.** Queen's University Belfast
- 2012 **Lagomorph systematics workshop.** 4th World Lagomorph Conference, Vienna

## **MEMBERSHIPS**

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(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

## **LICENSES AND CERTIFICATIONS**

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- 2014 ASPA laboratory animal handling license
- 2014 Emergency first aid; field first aid
- 2009 Bird ringing license holder, British Trust for Ornithology 'C' license. 2,000 birds
- 2008 Marine mammal medic. British Divers Marine Life Rescue. (-2011)
- 2002 Full manual UK driving license, held without incident or penalty

## **SERVICE**

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- 2017 **Conference volunteer**, The Mammal Society Spring Conference
- 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-present British Ecological Society Women in Ecology (WIE) **mentor**
- 2016-present **Review College member**, British Ecological Society
- 2016-present **Student Engagement Officer**, The Mammal Society Council
- 2015 **Student committee advisor**, Mammal Society Student Conference
- 2014 **Coordinator**, Mammal Society Student Conference
- 2013-present **Peer reviewer**: Zoo Biology; Mammal Research; Remote Sensing in Ecology and Conservation
- 2013-present **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
- 2007-09 **Founding committee & publicity officer**, Bangor University Zoological Society.
- 2008-08 **Volunteer**, Treborth Botanic Gardens, Bangor
- 2006-09 **Undergraduate student representative**, Bangor University Biological Sciences

## **OUTREACH**

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- 2017 Contributed photo to CBS News article
- 2017 **Enquiry Zone scientist**, I'm a Scientist, Get Me Out of Here!
- 2017 **Partner scientist**, Student Science Partnerships
- 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 **Remote project group mentor**, Beaumont Middle School, Kentucky
- 2016 **Mammal (hares) consultant** for The Mammal Society
- 2016 **Project development and advisor**, class conservation project, Ysgol Rhydywaun, Wales
- 2015 **Featured curator**, Biotweeps (~6.5k followers)
- 2015 **Interactive presentation**, Natives and non-natives, St. Pius X. College, Magherafelt
- 2015 **School presentation**, The Irish hare, Rathlin Island School
- 2014 **Created Biotweeps**, a science communication Twitter project
- 2014 **Invited expert**, Multi-school careers advice and speed-networking event
- 2014 **Presentation**, Hares in Northern Ireland, An Carn
- 2014 **Presentation**, Island biodiversity, with a focus on hares, Magherafelt bird group
- 2014 **Presentation**, Hares in Northern Ireland, Toome local RSPB group
- 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 The Ringing Planet**, a bird-ringing Twitter project
- 2013 **Presentation**, Hares in Northern Ireland, Maghera Naturalists
- 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**

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### *Written*

- 2017 Rejected by the Rainforest, I F-ing Love Conservation
- 2017 Introducing the University Mammal Challenge, The Mammal Society
- 2017 365 papers. Personal blog, ongoing
- 2016 Is there intelligent life on Earth? Save our Souls magazine
- 2016 A chat with Dr. Anthony Caravaggi. Biotechn.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 toupée. QUBio

### *Radio*

- 2017 BBC Coventry & Warwickshire
- 2017 Invited guest, The Edgar Ortega Radio Show
- 2016 SciComm podcast, Episodes 7 & 8, with Dr. Mike
- 2015 BBC Radio Ulster
- 2015 BBC News School Report for St. Pius X, Magherafelt's Biodiversity Club
- 2015 BBC Radio Ulster, Good Morning Ulster
- 2013 RTÉ Radio 1, Mooney Goes Wild,

### *Television*

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

## **COMPUTER SKILLS**

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### *Statistics*

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

### *GIS*

R, ArcGIS; QGIS

### *Others*

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

## **STATISTICAL SKILLS**

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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 SKILLS**

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Off-road driving (4x4)  
Multi-taxa surveys and identification  
Habitat surveys  
Animal handling (amphibians, reptiles, invertebrates, and small-to-large birds and mammals)  
Bird ringing (British Trust for Ornithology C license)  
Orienteering

## **LABORATORY SKILLS**

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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

## **REFERENCES**

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**Dr. Neil Reid.** School of Biological Sciences, MBC, 97 Lisburn Road, Belfast BT9 7BL  
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