

ANTHONY CARAVAGGI

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CURRENT POSITION

2017-present Associate researcher, Queen's University Belfast

Studies on movement behaviour and non-native species

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, Prof. Paulo Prodöhl

- Ecological niche modelling and identification of ecological distances within and between mountain hares and the European hare in Europe
- Population density estimation via Distance Sampling and the Random Encounter Model, including statistical reduction of survey effort
- Temporal change in range and abundance
- Habitat association modelling across multiple scales
- Social science study to investigate awareness of the non-native and acceptance of lethal control
- 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.)*
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

Grade: 1st

Research project:

Dietary and faecal iron levels in captive black-and-white ruffed lemurs

Supervisor: Dr. Charles Bishop

RESEARCH INTERESTS

Conservation biology

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

Rare and endangered species

Sustainability

Citizen science

PEER-REVIEWED PUBLICATIONS

8 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*

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*. *Current Zoology*

5 **Caravaggi A** (*in review*) remBoot: Random Encounter Modelling and bootstrapping for variance in R. *The Journal of Open Source Software*

4 **Caravaggi A**, Vallely 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. *Journal of Animal Ecology*

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* 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 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

- 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 **Northern Ireland Environmental Agency (NIEA) funded PhD studentship**. Queen's University Belfast
- 2010 **Natural Environment Research Council (NERC) scholarship**. £5,000, University of Leeds. MRes Biodiversity and Conservation

R PACKAGES

- 2 Hamm C, **Caravaggi A** (2017) spaceMovie: A color palette for a movie set in space
- 1 **Caravaggi A** (2016) remBOOT: an R package for Random Encounter Modelling

CONFERENCE PRESENTATIONS

- 10 **Caravaggi A** (2017 *scheduled*) 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

- 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

- 9 **Caravaggi A**, Vallely M-C, Hogg K, Freeman M, Fadaei E, Reid N, Tosh D (2017, *scheduled*) Circadian activity, seasonal occurrence, and predator-prey 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

As Supervisor

- 2014 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 Lecturer & demonstrator, ornithology. Eco-Explore, Cardiff
- 2016 Lecturer and field ornithologist. Operation Wallacea, Ecuador
- 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

LICENSES AND CERTIFICATIONS

- 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

PERSONAL 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 **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

SERVICE

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	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

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

WRITTEN MEDIA

- 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

- 2016 SciComm podcast Episode 8, with Dr. Mike & others
- 2016 SciComm podcast Episode 7, with Dr. Mike
- 2015 BBC News School Report for St. Pius X, Magherafelt's Biodiversity Club
- 2015 Good Morning Ulster, BBC Radio Ulster. 26th January 2015
- 2013 "Hares in Ireland". Mooney Goes Wild, RTÉ Radio 1

TELEVISION

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

MEMBERSHIPS

Since...

- 2016 **Welsh Ornithological Society**
- 2015 **South Wales Mammal Group**
- 2013 **Society of Conservation Biology**
- 2012 **The Mammal Society**
- 2012 **British Ecological Society**
- 2011 **Royal Society of Biology**
- 2009 **The British Trust for Ornithology**

COMPUTER SKILLS

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

DATA ANALYSIS

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; and other parametric and non-parametric tests

FIELD SKILLS

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; use of small-to-medium mammal traps; animal handling (amphibians, reptiles, invertebrates, and small-to-large birds and mammals); bird ringing (BTO C license); biodiversity monitoring; orienteering

LABORATORY SKILLS

Multi-taxa dissection (mammal, bird, amphibian, invertebrate); species identification via microscopy; ethological studies; tissue sampling; DNA manipulation; electrophoresis; spectroscopy; specimen preparation; soil chemical and biological analysis

REFERENCES

Dr. Neil Reid. School of Biological Sciences, Medical Biology Centre, 97 Lisburn Road. Belfast BT9 7BL Telephone: +44 (0)28 9097 2746 Email: neil.reid@qub.ac.uk

Prof. Ian Montgomery. School of Biological Sciences, Medical Biology Centre, 97 Lisburn Road. Belfast BT9 7BL Telephone: +44 (0)28 9097 2214 Email: i.montgomery@qub.ac.uk

Prof. Jaimie Dick. School of Biological Sciences, Medical Biology Centre, 97 Lisburn Road. Belfast BT9 7BL Telephone: +44 (0)28 9097 2286 Email: j.dick@qub.ac.uk

Dr. Tom Cameron. School of Biological Sciences, University of Essex, Wivenhoe Park, Colchester, CO4 3SQ Telephone: +44 (0)1206 874074 Email: tcameron@essex.ac.uk