**Curriculum Vitae**

**Nora Carlson**

School of Biology,

University of St Andrews,

St Andrews, Fife, KY16 9TH

Office email: Nc54@st-andrews.ac.uk

Personal email: Nora.v.Carlson@gmail.com

Personal website: http://noravcarlson.weebly.com

Mobile: 07541 967008

**Research interests**

My interests lie in animal behaviour and vocal animal communication in a social context. My PhD focused on how different Paridae species encode information about predator threat in their calls, how this information is both influenced and used by heterospecifics in the community. In my PhD I also addressed the role that learning plays in both predator recognition and the association of specific vocalizations with their level of threat. I am increasingly interested in how animals use vocalizations to coordinate group behaviours such as movement, and whether masking these vocalizations completely disrupt these coordinated behaviours or whether they are flexible in the modalities they use to achieve group coordination.

**Education**

**2013-2017 University of St Andrews**

PhD in Biology: Anti-predator behaviour in UK tit species: information encoding, predator recognition, and individual variation

For my PhD I examined how Paridae species communicate about the threat a predator poses during an anti-predator behaviour called mobbing, and the role learning plays in this behaviour. The field portion of this research took place in gardens add forests across the UK and the laboratory portions at NIOO-KNAW in the Netherlands. This research has so far resulted in two publications in *Animal Behaviour* (1 published and 1 in press) with another three in preparation for submission.

**2010-2012 The University of Montana, Montana, USA**

BSc in Wildlife Biology (High Honours)

Undergraduate Thesis: How red-breasted nuthatches communicate about danger

In this work I tested whether an eavesdropping species, red-breasted nuthatches, encode perceived threat information in their mobbing vocalizations, and if the reliability of this information (first-hand predator calls vs. second-hand heterospecific anti-predator calls) affects the information they encode. We found that nuthatches do not propagate second-hand information as they do first-hand information and are currently preparing a manuscript explaining these findings.

**2007-2008 TEFL (Teaching English as a Foreign Language) Certification**

A taught course certifying people to teach English as a second language.

**2003-2007 Kenyon College, Ohio, USA**

BA inModern Language and Literature (Japanese & Chinese; *Cum Laude*)

Undergraduate Thesis: The use of polite speech in the context of women’s language

For the work in this thesis I focused on Japanese linguistics and examined how women’s language (*nyobo kotoba*) evolved and uses polite speech (*keigo*) as a tool to mediate the social view of women themselves and influence the behaviour of others around them.

**Awards & Grants**

2017 ASAB Research Grant (declined; £5226)

ASAB travel Award to attend Behaviour2017, Estoril, Portugal (£400)

Three Minute Thesis University People’s Choice Award, St Andrews, UK (£80)

2016 Travel award to attend the International Society for Behavioral Ecology Conference in Exeter, UK (US $700)

Sir Ken Murray Award (£350)

ASAB travel Award to attend the European Conference on Behavioural Biology, Vienna, Austria (£382)

2015 2nd place student talk prize, Association of the study of Animal Behaviour Summer Conference, Lincoln University, UK (£50)

2014 ASAB travel grant to attend the Association for the Study of Animal Behaviour Easter conference, University of Sheffield, UK (£400)

2013-2016 St. Leonard’s Scholarship (£38,550)

St. Andrews 600th Year Anniversary Scholarship (£21,085)

2013 President’s Recognition Award, The University of Montana, USA

2011 Montana Integrative Learning experience for Students (MILES) Research Award, The University of Montana, USA ($2,200)

Philip L. Wright Memorial Research Award, The University of Montana, USA ($500)

Fred H. Mass Scholarship, The University of Montana, USA ($500)

Forester’s Ball Award, The University of Montana, USA ($35)

2010-2012 Dean’s List annual award for academic excellence, The University of Montana, USA

**Publications**

**Peer-reviewed**

**Carlson, N. V**., Healy, S. D., & Templeton, C.N. (in prep).Juvenile blue tits do not mob. *Journal of Avian Biology*

**Carlson, N. V**., Healy, S. D., & Templeton, C.N. (in prep).Juvenile great tits learn to avoid predators after observing adult mobbing events. *Behavioral Ecology*

**Carlson, N. V**., Healy, S. D., & Templeton, C.N. (in prep).Are Paridae information sources? Not all UK tit meet the criteria for information source species in their communities.*Behavioral Ecology*

**Carlson, N. V**., Greene, E., & Templeton, C.N. (in prep).Propagation of threat information varies with direct and indirect information about predators. *Animal Behaviour*

**Carlson, N. V.** (invited submitted). Crepuscular. J. Vonk, T. K. Shackelford (Eds.) *Encyclopaedia of Animal Cognition and Behaviour* Springer

**Carlson, N. V**., Pargeter, H., & Templeton, C.N. (2017)Sparrowhawk movement, calling, and presence of dead conspecifics differentially impact blue tit (*Cyanistes caeruleus*) vocal and behavioral responses. *Behavioural Ecology & Sociobiology,* 71:133

**Carlson, N. V**., Healy, S. D., & Templeton, C.N. (2017).Hoo are you? Tits do not recognize novel predators as threats. *Animal Behaviour,* 128: 79-84.

**Carlson, N. V**., Healy, S. D., & Templeton, C.N. (2017).A comparative study of how British tits encode predator threat in their mobbing calls.*Animal Behaviour,* 125:77-92.

**Popular media**

**Carlson, N.** (2016). Sounding the alarm: how birds communicate about danger. *St Andrews in Focus*, 79:23.

**Carlson, N.** & Templeton, C. N. (2015). It’s not all in the eyes. *Biosphere*, 7:24-29.

**Conference Presentations**

**Talks**

2017 **Carlson, N.**, Healy, S. D., & Templeton, C.N. Hoo are you? Naïve tits do not recognize novel predators. Behaviour2017, Estoril, Portugal

2016 **Carlson, N.**, Healy, S. D., & Templeton, C.N. Information encoding strategies in UK tit species (2016). International Society of Behavioural Ecology, University of Exeter, UK

**Carlson, N.**, Healy, S. D., & Templeton, C.N. Do eavesdroppers produce predator threat information? European Conference on Behavioural Biology, Vienna, Austria

**Carlson, N.**, Healy, S. D., & Templeton, C.N. Hoo are you? Do birds mob unknown predators. European Student Conference on Behaviour & Cognition, St Andrews, UK

2015 **Carlson, N.**, Healy, S. D., & Templeton, C.N. A family divided by a common language: are information encoding strategies in tit mobbing calls driven by phylogeny? Association for the Study of Animal Behaviour Summer conference, Lincoln, UK

**Carlson, N.**, Healy, S. D., & Templeton, C.N. Cracking the predator code: how British tits encode information about predator threat in alarm calls. 52nd Annual Conference of the Animal Behaviour Society, Alaska, USA

**Carlson, N.**, Healy, S. D., & Templeton, C.N. Divided by a common language: how tits communicate about danger. School of Biology Postgraduate Conference. St Andrews, UK

**Carlson, N.**, Greene, E., & Templeton, C.N. How nuthatches use and propagate information from different sources. Scottish Conference on Animal Behaviour, St Andrews, UK

**Carlson, N.**, Healy, S. D., & Templeton, C.N. How British tits encode information about predator threat. ASAB Easter conference, Durham, UK

**Carlson, N.**, Healy, S. D., & Templeton, C.N. A family divided by a common language: information encoding in tits. Institute of Behavioural and Neural Sciences Symposium, St Andrews, UK

2012 **Carlson, N.** Alumna presentation. The 75th Anniversary of Wildlife Biology Program, The University of Montana, USA

**Posters**

2014 **Carlson, N.**, Greene, E., & Templeton, C.N. How nuthatches communicate about danger (2014). Association for the Study of Animal Behaviour Easter Conference, Sheffield, UK

2012 **Carlson, N.**, Greene, E. Heads up! How nuthatches communicate about danger (2012). University of Montana Conference on Undergraduate Research, The University of Montana, USA

**Professional Experiences**

**Teaching**

After obtaining my BA I taught English to children and adults in Japan and during my PhD I demonstrated for undergraduate practical classes in the School of Biology. The classes I demonstrated ranged from hands-on practicals in the lab and field, to statistical computing and leading small independent research projects. In this capacity I supervised students, answered questions, assessed their performance, and marked their work. I have demonstrated or taught the following classes:

2017 Junior Honours Field Course

Animal Behaviour: A Quantitative Approach

2016 Biology 1 (Introduction to Molecular and Cellular Biology), Evolutionary Biology, Research Methods in Biology, Invertebrate Zoology

2015- 2017 Biology 2 (Introduction to Ecology, Evolution, and Anatomy)

2015- 2016 Research Methods in Biology, Zoology

2015 Protein Structure and Function

2014- 2015 Statistical and Quantitative Skills for Biologists

2008-2009 NEON Amity Native English Teacher (teaching English classes to ages ranging from 6 months – adults)

**Lab manager & lab/filed research assistant**

**Dr Kees van Oers**, NIOO, the Netherlands (2014): I helped with the hand rearing and feeding of the hundreds of 10 day old great tit nestlings brought into the lab. After they were old enough I also ran personality assays for the fledgling great tits before they were moved into the outbuildings and aviaries.

**Prof. Erick Greene**, The University of Montana, Montana, USA, (2011-12): I organized and supervised eight volunteers helping on a number of different projects and I organized and carried out two separate field studies.

**Prof. Dianne Brunton**, Massey University, Auckland, New Zealand (2012): I acted as a lab and field assistant to a number of different PhD students and assisted with various tasks including: blood sample prep, trap line running, follow-up field recordings, and animal husbandry.

**Prof. Isabel Castro**, Massey University, Palmerston North, New Zealand (2012): I acted as a field assistant to Isabel and one of her PhD students, assessed the feasibility of a new acoustic field study, and assisted with the setup of new recording system deployment. As a field assistant I assisted with tasks including: camera deployment and retrieval, radio tag replacement, radio telemetry, data checking, and equipment maintenance. I also organized and ran the bioacoustics portion of a filed course for Isabel’s postgraduate students.

**John Rohrer**, Wildlife Biologist, Washington, USA (2011): I volunteered with the U.S. Forest Service and conducted wildlife surveys, both visual and via. radio telemetry, and assisted with a number of tasks including: remote camera trap retrieval, video analysis, bear hair snare trap setup and removal, pit-tagging rattle snakes, and beaver capture, sexing and ear tagging.

**Outreach**

**2017 Royal Society Science Exhibition, London, UK:** Exhibit for research on tool use in New Caledonian Crows focused on all ages and backgrounds.

**The Fife Show, Fife, UK:** Stall with 3 educational activities to encourage individuals of all ages to: understand how I study sound, how animals communicate, and how anthropogenic noise disrupts vocal communication.

**The Island School (elementary school K-5), Washington, USA:** 50 minute talk to elementary school children aged 5-14 about science, vocal communication in animals, and how I became a scientist.

**2016 XX-factor as part of Explorathon, Fife, UK:** Two 3 minute talks with students and the public about my path to becoming a scientist, what I do as a scientist, and what I study, and ten 15 minute talks to individual classes explaining what I do as a scientist with a focus on answering student’s questions about scientific careers.

**Scottish Ornithology Club, Angus Branch, Dundee, UK**: 30 minute public talk about vocal communication in birds and my research specifically to local bird club.

**2014 Halloween Bright Club performance: “The headless bird girl”:** Public stand-up comedy presentation about my PhD research on tits and making my robotic raptors.

**2013-now Science Technology Engineering and Mathematics (STEM) Ambassador**: I volunteer as a resource and mentor for pre-university students to increase interest and teach alternative STEM classes.

**2013-2015** **Scottish Ornithology Club, Fife Branch, St Andrews, UK**: Annual 30 minute public talk about vocal communication in birds in general and my research in particular to a local bird group.

**2012 SpectrUM Instructor/Presenter, University of Montana, Missoula, USA:** Volunteer to engage with children of all ages explaining permanent science instillations as well as presenting my own activity based around vocal communication in animals.

**Natural History Center, Montana, USA:** Lead a sound recording & animal communication workshop for a Master Naturalist course, including teaching adults about recording equipment, recording techniques, and sound visualization and analysis software.

**2010 Flagship Youth Mentor, Missoula Montana, USA**: Volunteer as a positive role model for an after-school program for at-risk students K-12.

**Skills**

**Computing**

I am proficient with essential computer applications including: Microsoft Office, R, SPSS, StatPlus, Solomon Coder, and have taken courses in, and continue to educate myself in Python and Bash.

**Communication**

I have taken a class in public speaking and have experience speaking to a wide range of audiences from academics at conferences to adults in local birding clubs and children at local schools. I enjoy communicating both my science and my love of science in general.

**Sound recording & analysis**

I attended the University of Washington’s Beam Reach field research course in 2010 which focuses on marine bioacoustics techniques as well as Cornell University’s Natural Sound Recording Workshop Sierra Nevada Mountains, USA in 2011 to hone my sound recording skills which now include: field recording techniques across a range of habitats and species; sound recording with different types of microphones (hydrophones both singe and arrays, as well as shotgun and parabolic microphones) and recording devices (Marantz digital recorders, Sound Devices, and all in one digital recorders both hand held & automatic filed recorders); basic microphone and cable maintenance and soldering; and sound analysis using sound analysis software (Raven, Audacity, and Syrinx).

**Robotics**

For my research in mobbing behaviour I used robotic taxidermy raptors and so learned the basic taxidermy and robotics (servos & Arduino boards).

**Field/lab skills**

I have worked as a research assistant in both field and laboratory settings and have acquired a number or related skills which include: setup, maintenance, monitoring and removal of remote field sites, and camera traps; mammal, reptile, and bird survey techniques; beaver capture, ear-tagging, and sexing; radio telemetry; night-time & winter field work; dissection; blood sample prep; reptile husbandry; trap lining; office management; passerine nestling feeding, adult handling & ringing.

**Professional membership**

I am a member of the Association for the Study of Animal Behaviour, the International Society for Behavioral Ecology, and the British Ecological Society.