

Janna R. Willoughby

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EDUCATION

Ph.D., Genetics (August 2015), Purdue University, West Lafayette, IN
M.S., Conservation Biology, (August 2012), Central Michigan University, Mt. Pleasant, MI
B.A., Biology (May 2005), Wittenberg University, Springfield, OH

PROFESSIONAL EXPERIENCE

Postdoctoral researcher, Department of Forestry and Natural Resources, Purdue (2017-present)
Postdoctoral researcher, Department of Biological Sciences, Purdue (2015-2017)
Graduate assistant, Department of Forestry and Natural Resources, Purdue (2011-2015)
Lab manager, Applied Technology in Conservation Genetics Lab, CMU (2008-2011)
Graduate assistant, Department of Biology, CMU (2007-2011)
Marine mammal observer, ECOES Consulting, Inc., Cape Canaveral, FL (2005-2007)

PUBLICATIONS

1. Hoffman JR, **Willoughby JR**, Swanson BP, Pangle KL, Zanatta DT. Detection of barriers to dispersal is masked by long lifespans and large population sizes. *Ecology and Evolution*, *in press*.
2. **Willoughby JR**, Christie MR. Captive ancestry upwardly biases estimates of relative reproductive success. *Journal of Heredity*, 108:583-587.
3. Sattler RL, **Willoughby JR**, Swanson BJ. Decline of heterozygosity in a large but isolated population: a 45-year examination of moose genetic diversity on Isle Royale. *PeerJ* 5:e3584.
4. **Willoughby JR**, Sundaram M, Wijayawardena B, Kimble SJ, Ji Y, Fernandez NB, Antonidies J, Lamb MC, Marra NJ, DeWoody JA. Biome and migratory behaviour significantly influence vertebrate genetic diversity. *Biological Journal of the Linnean Society*, 121:446-457.
5. **Willoughby JR**, Ivy JA, Lacy RC, Doyle JM, DeWoody JA. 2017. Inbreeding and selection shape genomic diversity in captive populations: implications for the conservation of endangered species. *PLoS One*, 12:e0175996.
6. **Willoughby JR**, Wijayawardena BK, Sundaram M, Swihart RK, DeWoody JA. (2016) The importance of including imperfect detection models in eDNA experimental design. *Molecular Ecology Resources* 16:837-844.
7. Sundaram M, **Willoughby JR**, Lichti N, Swihart R. (2015) Segregating the effects of seed traits and common ancestry of hardwood trees on eastern gray squirrel foraging decisions. *PLoS One* 10:e0130942.
8. Doyle JM, Hacking CC, **Willoughby JR**, Sundaram M, DeWoody JA. (2015) Mammalian genetic diversity as a function of habitat, body size, trophic level, and conservation status. *Journal of Mammalogy* 96:564-572.
9. **Willoughby JR**, Sundaram M, Wijayawardena B, Lamb MC, Kimble SJ, Ji Y,† Fernandez NB,* Antonidies J, Marra NJ, DeWoody JA. (2015) The reduction of genetic diversity in

threatened vertebrates and new recommendations regarding IUCN conservation rankings. *Biological Conservation* 191:495-503.

10. Nowakowski AJ, DeWoody JA, Fagan M, **Willoughby JR**, Donnelly MA. (2015) Mechanistic insights into landscape genetic structure of two tropical amphibians using field-derived resistance surfaces. *Molecular Ecology* 24:580-595.
11. **Willoughby JR**, Fernandez NB, Lamb MC, Lacy RC, JA DeWoody. (2015) The impacts of inbreeding, drift and selection on genetic diversity in captive breeding populations. *Molecular Ecology* 24:98-110.
12. Nowakowski AJ, **Willoughby JR**, DeWoody JA, Donnelly MA. (2014) Polymorphic microsatellite loci for a neotropical leaf-litter frog (*Craugastor bransfordii*) characterized through Illumina sequencing. *Conservation Genetics Resources* 6:697-698.
13. **Willoughby JR**, Sundaram M, Lewis TL, Swanson BJ. (2013) Population decline in a long-lived species: the Wood Turtle in Michigan. *Herpetologica* 69:186-198.
14. Sundaram M, **Willoughby JR**, Swanson BJ. (2013) Indirect evidence of prey-switching in minks: empirical evidence, theoretical modeling, and spatial drivers. *Journal of Mammalogy* 95:1149-1160.
15. DeWoody JA, Abts, K, Fahey A, Ji Y,† Kimble SJ, Marra N, Wijayawardena B, **Willoughby JR**. (2013) Of contigs and quagmires: next-gen sequencing pitfalls associated with transcriptomic studies. *Molecular Ecology Resources* 13:551-558.

In review and revision

16. **Willoughby JR**, Christie MR. Captive breeding has long-term demographic and genetic effects on wild populations. PLoS One, *in revision*.
17. Honsey AE, **Willoughby JR**, Donabauer SB, DeWoody JA, Höök TO. Stock biology of a declining coldwater fish at its southern range limit, *in revision*.
18. **Willoughby JR**, Harder AM, Tennessen JA, Scribner KT, Christie MR. Pacific steelhead (*Oncorhynchus mykiss*) rapidly adapted to the novel, freshwater environment of Lake Michigan despite a genome-wide founder effect.

FELLOWSHIPS AND GRANTS

1. Postdoctoral Scholar Fellowship, Investments in Excellence Program, Purdue. How do species rapidly adapt to novel environmental conditions? (2017-2019) **\$135,000**
2. FNR Small Grants Program, Purdue. Viability selection in raptors: Using pooled sequencing and FST outlier tests to determine whether genome-wide or locus-specific heterozygosity confers a survival advantage (Co-PI; 2015) **\$14,690**
3. NSF Doctoral Dissertation Improvement Grant. The maintenance of genetic diversity in captive breeding programs (2014) **\$19,928**
4. Grant-in-Aid of Research, American Society of Mammalogists. Genetic diversity in captive breeding programs (2014) **\$1500**
5. Summer Institute of Statistical Genetics, University of Washington. Scholarship and travel award (2013) **\$1725**
6. Grant in Aid of Research, Sigma Xi. Inbreeding, genetic diversity, and adaptation to

captivity: the impact of breeding protocol on experimental white-footed mice (*Peromyscus leucopus*) populations (2013) **\$1000**

7. Purdue Research Foundation, Office of the Vice President for Research, Purdue (2013-2014)
8. Ross Fellowship, Purdue Graduate School (2011-2012)
9. Marion Whitney Graduate Research Award, Department of Biology, CMU. Genetic impact of demographic decline on wood turtle populations in Michigan (2010) **\$1500**
10. Presentation Travel Grant, School of Graduate Studies, CMU. Demographic declines lead to genetic signals (2009 and 2010) **\$1800**
11. Student Research Grant, School of Graduate Studies, CMU. Population delineation of wood turtles across the lower peninsula of Michigan (2008, 2009, 2010) **\$2750**
12. Student Grant, Faculty Research Fund Board, Wittenberg. Investigation of site fidelity in wood turtles in northern Michigan (2004) **\$2500**

AWARDS

Kirkpatrick Memorial Outstanding Graduate Student Award, Purdue (2016)
Anna M. Jackson Award, American Society of Mammalogists (2015)
Hamilton Award Finalist, Society for the Study of Evolution (2014)
Surf Program Graduate Mentor of the Summer, Purdue (2013)
Summer Research Fellowship, Department of Biology, CMU (2007-2010)
Conn Fellowship, Wittenberg (2004)

TEACHING

Instructor, *Genomics in Ecology and Evolution*, Purdue (2016)

- Graduate level class covering current topics in genomics, with particular attention to applications in Evolution and Ecology

Guest lectures, Purdue (2013-2017)

- *Evolution: Genomes-* alternative splicing, horizontal transfer, and epigenetics (2017)
- *Careers in Biology:* Applications of genomics to fisheries questions (2017)
- *Conservation Genetics:* Management of captive populations and reintroductions (2016)
- *Conservation Biology:* Genetic diversity in threatened and endangered species (2015)
- *Conservation Genetics:* Maintenance of genetic diversity in captive populations (2015)
- *Natural Resources Information:* Locating suitable habitat with ArcMap (2014)
- *Wildlife Investigation Techniques:* Introduction to scientific writing (2013)

Graduate teaching assistant

- *Natural Resources Information*, Purdue (2 semesters; 2014-2015).
Developed and implemented method for guiding students through question-based semester projects to promote applicability of methods to future work

- *Wildlife Investigation Techniques*, Purdue (2 semesters; 2012-2013)
Created and taught science writing lab and assignments to help students understand and better execute scientific writing principles as well as home range measurement lab designed to introduce coding principles
- Lead teaching assistant, CMU (6 semesters; 2009-2011)
Held weekly meetings (~20 TAs) covering lab protocols, safety, and teaching approaches and created teaching aids to promote efficient and effective teaching; revised labs and manual to reflect new, departmental goals for introductory courses
- *Concepts of Biology* (majors), CMU (6 semesters, ~24 students/semester; 2008-2011)
Responsible for introductory lectures, independently leading class through the weekly labs, creation of assignments and exams, and grading
- *Introductory Biology* (majors), CMU (2 semesters, ~24 students/semester; 2007-2008)
Responsible introductory lectures, independently leading class through the weekly labs, creation of assignments and exams, and grading

EXTENSION AND OUTREACH

Captive breeding informational website (www.purdue.edu/captivebreeding)

- Designed, created, and maintain extension website focused on captive breeding

Instructor, Hoosier Agriculture Science Academy, Purdue (2013)

- Program targeted high school students under-represented in STEM (18 students)
- Designed and taught activity to illustrate impact of habitat destruction on population size

Instructor and camp manager, Forensics Summer Camp, CMU (2008-2011)

- Program was aimed at senior high school students (~50 total students)
- Taught microscopy, basic conservation genetics techniques, analysis of genetic data
- Organized advertisement, enrollment, housing, and financial aspects of camp
- Supervised 3 additional instructors each session (3 total sessions)

Instructor, Neithercut Woodland Ecology, CMU (2008 and 2009)

- Designed and taught ecology field course for two local high school classes (~60 students)

PRESENTATIONS (*selected*)

1. Genomic evidence of rapid adaptation to a novel environment. Society for the Study of Evolution (2017).*
2. Captive breeding has long term demographic and genetic effects for wild populations. Society for the Study of Evolution (2016). *
3. Measurement of conservation need: demographic criteria do not capture declines in genetic diversity. Ecolunch Series, Purdue (2016). *
4. Genetic diversity in captive populations: the impact of inbreeding, drift, and selection. American Society of Mammalogists (2015). *

5. Inbreeding, genetic diversity, and domestication as measured in 20 generations of populations of deer mice. Society for the Study of Evolution (2014). *
 6. The impact of breeding protocol on inbreeding, genetic diversity, and adaptation to captivity in white-footed mice. Ecological Genomics Institute (2013).
 7. Inbreeding, genetic diversity, and adaptation to captivity as measured in experimental populations of white-footed mice. Ecolunch Series, Purdue (2013). *
 8. Inbreeding, genetic diversity, and adaptation to captivity: the impact of breeding protocol on experimental white-footed mice. Society for the Study of Evolution (2013).
 9. Genetic impact of demographic decline on wood turtle populations in Michigan. World Herpetology Congress (2012).
 10. Diet analysis of the ringtail cat (*Bassaricus astus*) in Sevilleta National Wildlife Refuge, New Mexico using scat samples. American Society of Mammalogists (2010).
 11. Isolation by distance measured by average relatedness in populations of ringed seals (*Pusa hispida*). American Society of Mammalogists (2009). *
 12. Wood turtles (*Glyptemys insculpta*) in the northern Lower Peninsula of Michigan. Ecological Society of America (2008).
 13. Movement of wood turtles (*Glyptemys insculpta*) in northern Michigan. Midwest Fish and Wildlife Conference (2005).
 14. Site fidelity of wood turtles (*Glyptemys insculpta*). National Conference on Undergraduate Research (2005).
- * oral presentation

PROFESSIONAL SERVICE

1. *Ad hoc* reviewer:
 - *Aquaculture Research, Biological Conservation, Biological Journal of the Linnean Society, Conservation Genetics, Endangered Species Research, Fisheries Research, Genetica, Heredity, Molecular Ecology, Molecular Ecology Resources, PeerJ*
 - French National Research Agency, Kentucky Science and Engineering Foundation
2. Honoraria and Travel Awards Committee member, American Society of Mammalogy
3. Animal Care and Use Committee member, American Society of Mammalogy
 - Sikes RS and Animal Care and Use Committee: Bryan JA II, Byman D, Danielson BJ, Eggleston J, Gannon MR, Gannon WL, Hale DW, Jesmer BR, Odell K, Olson LE, Stevens RD, Thompson TA, Timm RM, Trewhitt SA, **Willoughby JR**. (2016) Guidelines of the American Society of Mammalogists for the use of wild mammals in research. *Journal of Mammalogy* 97:663-688.