

Cassandra M.V. Nuñez

Department of Biological Sciences, The University of Memphis

313 Life Sciences, Memphis, Tennessee, 38512

cmnunez@memphis.edu, <https://www.memphis.edu/biology/people/faculty/cassandra-nunez.php>

Education

Ph.D., Ecology and Evolutionary Biology, 2000

Princeton University, Princeton, NJ

Dissertation title: “Mother-infant relationships in feral horses (*Equus caballus*): Implications for the function of development in mammals”

Advisor: Dr. Daniel I. Rubenstein

B.S., Psychology, 1993

Douglass College, Rutgers University, New Brunswick, NJ

Highest honors in Psychology, Golden Key Society, American Psychology Association (1992),

Minority Undergraduate Students of Excellence Program, 1991-1993

Professional Employment

Research Assistant Professor (Aug 2019-present)

Department of Biological Sciences, The University of Memphis, Memphis, TN

Supervisor: Dr. David Freeman

Duties: My appointment is 45% teaching/advising, 45% research, and 10% institutional service. I will teach both undergraduate and graduate courses in the Department of Biological Sciences, conduct research in animal behavior and physiology as it pertains to management and conservation, and provide service to the department, university, and broader profession.

Adjunct Assistant Professor (2015-2019)

Department of Natural Resource Ecology and Management, Iowa State University, Ames, IA

Supervisor: Dr. Sue Blodgett

Duties: My appointment is 45% teaching/advising, 45% research, and 10% institutional service. I teach undergraduate courses in the Animal Ecology major, conduct research in animal behavior and physiology as it pertains to management and conservation, and provide service to the department, university, and broader profession.

Visiting Research Scholar (2012-2014)

Department of Biological Sciences, Virginia Polytechnic Institute and State University, Blacksburg, VA

Duties: I helped to mentor both graduate and undergraduate students while collecting novel data on wild horse management and publishing peer-reviewed research in the disciplines of behavioral ecology and animal physiology.

American Association for the Advancement of Science, Science and Technology Policy Fellow (2011-2012)

Applied Sciences Program, Earth Science Division, NASA, Washington, DC

Supervisor: Dr. Lawrence Friedl

Duties: I educated others about NASA's Applied Sciences Program mission, forged new partnerships, and identified innovative ways in which Earth science data can benefit society. I helped determine how NASA could best contribute to the Administration's Reducing Deforestation and Forest Degradation (REDD+) efforts, coordinated our Climate Policy Speaker Series, directed our Wildland Fires Review Panel, and encouraged interagency collaboration with the World Wildlife Fund and Conservation International.

Postdoctoral Research Associate and Lecturer (2008-2011)

Department of Ecology and Evolutionary Biology, Princeton University, NJ

Supervisor: Dr. Daniel I. Rubenstein

Duties: I performed research on the behavioral and physiological effects of contraception management in feral horses. I also helped to mentor 3 undergraduate students conducting their senior theses and taught "Comparative Physiology" for which I designed a laboratory component.

Education and Outreach Coordinator (2007-2008)

Phillip L. Boyd Deep Canyon Desert Research Center, University of California, Riverside, Palm Desert, CA

Supervisor: Dr. Allan Muth

Duties: I built and instituted an education and outreach program for a research center previously closed to the public. I worked with local and regional high schools and universities to facilitate teaching both on the reserve and in the classroom collaborating with teachers to develop curricula. I also created and lead interpretive hikes at the center, focusing on the area's natural history and archaeological significance and initiated a public lecture series that continues to draw large audiences in collaboration with the Living Desert, a local zoological park and preserve.

Lecturer and Mentor (2006)

Organization for Tropical Studies, Duke University

Supervisor: Lawrence Kruger

Duties: I taught "Conservation Biology" to students of a semester-long field course exploring the flora and fauna of South Africa. I also served as mentor to several students working on their senior projects, assisted with curricula development, and facilitated course logistics.

Postdoctoral Research Associate and Lecturer (2004-2006)

Department of Ecology and Evolutionary Biology, Princeton University, NJ

Supervisor: Dr. Daniel I. Rubenstein

Duties: I helped to mentor 3 undergraduate students conducting their senior theses and taught "Comparative Physiology". In addition, I served as consultant to the National Park Service and Foundation for Shackleford Horses regarding the behavioral effects of contraception management on feral horses.

Research Interests

My research integrates animal behavior and physiology in the wild to answer both applied and basic questions, using feral horses as a model system.

Research Activities

(* undergraduate mentee, **graduate mentee)

Manuscripts currently in Review 2022 (1)

- 1) Vaziri, G.J., M.M. Jones**, H.A. Carr*, **C.M.V. Nuñez**. Under pressure: Social disruption alters the microbiota in feral mares (*Equus caballus*). *Molecular Ecology*.

Peer-Reviewed Articles Published since UofM Appointment, August 2019-present (3)

- 1) Rabon, J.C, **C.M.V. Nuñez**, P.S. Coates, M.A. Ricca, and T.N. Johnson. 2021. Ecological correlates of fecal corticosterone metabolites in female Greater Sage-Grouse (*Centrocercus urophasianus*). *Canadian Journal of Zoology* 99(9): 812-822.
- 2) **Nuñez, C.M.V.** and D.I. Rubenstein. 2020. Communication is key: Mother-offspring signaling can affect behavioral responses and offspring survival in feral horses (*Equus caballus*). *PLOS ONE* 15(4), e0231343.
- 3) Jones, M.M.** and **C.M.V. Nuñez**. 2020. Rising up to the challenge of their rivals: Mare infidelity intensifies stallion response to opponent playback. *Applied Animal Behaviour Science* 225: 104949.

Peer-Reviewed Articles Published prior to UofM Appointment, 2002-2018 (9)

- 1) Jones, M.M.** and **C.M.V. Nuñez**. 2019. Decreased mare fidelity alters stallion behavior in a population managed with immunocontraception. *Applied Animal Behaviour Science* 214: 34-41.
- 2) **Nuñez, C.M.V.** 2018. Consequences of PZP immunocontraception to feral horses. *Human-Wildlife Interactions* 2(1):131-142. *Invited*.
- 3) **Nuñez, C.M.V.**, J.S. Adelman, H.A. Carr*, C.M. Alvarez* and D.I. Rubenstein. 2017. Lingering effects of contraception management on feral mare (*Equus caballus*) fertility and social behavior. *Conservation Physiology* 5(1): cox018.
- 4) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2015. Sociality increases juvenile survival after a catastrophic event in the feral horse (*Equus caballus*). *Behavioral Ecology* 26: 138-147.
- 5) **Nuñez, C.M.V.**, J.S. Adelman, J. Smith*, L.R. Gesquiere, and D.I. Rubenstein. 2014. Linking social environment and stress physiology in feral mares (*Equus caballus*): Group transfers elevate fecal cortisol levels. *General and Comparative Endocrinology*, 196: 26-33.

- 6) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2013. A free-ranging, feral mare (*Equus caballus*) affords similar maternal care to her genetic and adopted offspring. *American Naturalist*, 182:674-681.
- 7) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2010. Immunocontraception in wild horses (*Equus caballus*) extends reproductive cycling beyond the normal breeding season. *PLOS ONE*, 5(10): e13635.
- 8) **Nuñez, C.M.V.**, J.S. Adelman, C. Mason, and D.I. Rubenstein. 2009. Immunocontraception decreases group fidelity in a feral horse population during the non-breeding season. *Applied Animal Behaviour Science*, 117: 74-83.
- 9) **Nuñez, C.M.V.** 2002. Safety first. *Swara, East African Wildlife Society*, 25 (1): 35. Role: 100% design, 100% analysis, 100% writing.

Book Chapters Published prior to UofM Appointment, 2008-2016 (4)

- 1) **Nuñez, C.M.V.**, A. Scorolli, L. Lagos, D. Berman, and A. Kane. 2016. Management of free roaming horses in J.I. Ransom and P. Kaczensky, eds. *Wild Equids*. The Johns Hopkins University Press. *Invited*.
- 2) **Nuñez, C.M.V.** 2011. Management of wild horses with porcine zona pellucida: History, consequences, and future strategies, Pages 85-98 in J.E. Leffhalm, ed. *Horses: Biology, Domestication, and Human Interactions*. Nova Science Publishers, Inc. *Invited*.
- 3) **Nuñez, C.M.V.**, C. S. Asa, and D. I. Rubenstein. 2011. Zebra reproduction, Pages 285-312 in A. O. McKinnon, E. L. Squires, W. E. Vaala, and D. D. Varner, eds. *Equine Reproduction, Second Edition*. Ames, IA, Wiley-Blackwell. *Invited*.
- 4) Rubenstein, D.I. and **C.M.V. Nuñez**. 2008. Sociality and reproductive skew in horses and zebras, Pages 196-226 in R. Hager, C.B. Jones, eds. *Reproductive Skew in Vertebrates: Proximate and Ultimate Causes*. Cambridge University Press. *Invited*.

Miscellaneous Publications prior to UofM Appointment, 2015 (1)

- 1) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2015. Wild horse contraception not without unintended consequences. Op-ed to *The Salt Lake Tribune*.

Professional Presentations since UofM Appointment, 2019 (11)

Invited Talks and Posters

- 1) **Nuñez, C.M.V. 2022**. The best laid plans of mares and men: Some potential pitfalls of contraceptive management. Missouri State University Department of Biology.
- 2) **Nuñez, C.M.V. 2022**. The best laid plans of mares and men: Some potential pitfalls of contraceptive management. University of Arizona School of Natural Resources and the Environment.

- 3) Jones, M.M.** and **C.M.V. Nuñez**. 2020. Rising up to the challenge of their rivals: Mare infidelity intensifies stallion response to opponent playback. Animal Behavior Society.
- 4) **Nuñez, C.M.V.**, J.S. Adelman, H.A. Carr*, M.M. Jones**, and G.J. Vaziri**. 2019. Social behavior and ecology may interact to shape the gut microbiome in feral horses (*Equus caballus*). International Wild Equid Conference.
- 5) **Nuñez, C.M.V.** and M.M. Jones**. 2019. PZP-induced female infidelity increases male aggression and stress in the feral horse. International Wild Equid Conference. (Poster)
- 6) **Nuñez, C.M.V.** 2019. Mares gone wild: Immunocontraception alters female behavior and physiology in feral horses. The University of Memphis, Department of Biological Sciences, Fall Seminar Series.

Contributed Talks and Posters

- 1) **Nuñez, C.M.V.** 2022. Mean mares: linking contraception management and aggression in feral horses. Animal Behavior Society.
- 2) **Nuñez, C.M.V.** 2022. Mean mares: linking contraception management and aggression in feral horses. Society for Integrative and Comparative Biology.
- 3) Ford, T.* and **Nuñez, C.M.V.** 2021. The weaning is the hardest part; or is it? Animal Behavior Society.
- 4) Jones, M.M.** and **Nuñez, C.M.V.** 2020. Rising up to the challenge of their rivals: mare behavior alters stallion response to opponent playback. Animal Behavior Society.
- 5) Jones, M.M.** and **Nuñez, C.M.V.** 2020. Rising up to the challenge of their rivals: mare behavior alters stallion response to opponent playback. Society for Integrative and Comparative Biology.

Professional Presentations prior to UofM Appointment, 2007-2018 (44)

Invited Talks and Posters

- 1) **Nuñez, C.M.V.** 2018. Mares gone wild: Immunocontraception alters female behavior and physiology in feral horses. Iowa State University Fish and Wildlife Biology Club.
- 2) **Nuñez, C.M.V.** 2018. Mares gone wild: Immunocontraception alters female behavior and physiology in feral horses. Iowa State University Women's Group.
- 3) **Nuñez, C.M.V.** 2017. Mares gone wild: Immunocontraception alters female behavior and physiology in feral horses. Iowa State University Biological Sciences Club.
- 4) **Nuñez, C.M.V.** 2017. Horses gone wild: contraception, promiscuity, stress, and pregnancy in feral horse management. Nerd Nite Des Moines.
- 5) **Nuñez, C.M.V.** 2016. Mares gone wild: Immunocontraception alters female behavior and physiology in feral horses. Iowa State University, Department of Animal Science, Spring Seminar Series.
- 6) **Nuñez, C.M.V.** 2016. Mares gone wild: Immunocontraception alters female behavior and physiology in feral horses. Iowa State University, Department of Natural Resource Ecology and Management, Spring Seminar Series.

- 7) **Nuñez, C.M.V.** 2015. Mares gone wild: Immunocontraception alters female behavior and physiology in feral horses. Iowa State University, Department of Ecology, Evolution, and Organismal Biology, Fall Seminar Series.
- 8) **Nuñez, C.M.V.** 2014. Mares gone wild: Immunocontraception alters female behavior and physiology in feral horses. University of North Carolina, Asheville, Department of Biology, Undergraduate Seminar Series.
- 9) **Nuñez, C.M.V.** 2013. Mares gone wild: Immunocontraception alters female behavior and physiology in feral horses. Virginia Polytechnic Institute and State University, Department of Biological Sciences Ecology, Evolution, and Behavior Seminar Series.
- 10) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2012. Immunocontraception in feral horses (*Equus caballus*) extends reproductive cycling beyond the normal breeding season. International Wild Equid Conference.
- 11) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2012. Immunocontraception, social behavior, and stress in a feral horse population. International Wild Equid Conference. (Poster)
- 12) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2008. Behavioral effects of immunocontraception on wild horses (*Equus caballus*). International Society for the Preservation of Mustangs and Burros.
- 13) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2008. Behavioral effects of immunocontraception on wild horses (*Equus caballus*). Wikelski Laboratory Summit, Max Planck Institute of Ornithology.
- 14) **Nuñez, C.M.V.** 2008. The importance of safety and friends to the conservation of Grevy's zebra. The Living Desert, Grapes for Grevy's Fund Raiser.
- 15) **Nuñez, C.M.V.** 2007. Desert research topics. California Regional Environmental Educational Community Conference.

Contributed Talks and Posters

- 1) **Nuñez, C.M.V.** and D.I. Rubenstein. 2019. Mother-infant communication in feral horses (*Equus caballus*): What are they saying, why are they saying it, and what might it tell us about the mammalian juvenile stage? Society for Integrative and Comparative Biology.
- 2) **Nuñez, C.M.V.** and D.I. Rubenstein. 2018. What mother-infant communication in feral horses (*Equus caballus*) can tell us about the mammalian juvenile stage. Animal Behavior Society.
- 3) Jones, M.M.** and **C.M.V. Nuñez**. 2018. Decreased fidelity of PZP-treated females contributes to changes in male behavior in feral horses. Animal Behavior Society.
- 4) **Nuñez, C.M.V.**, James S. Adelman, Haley A. Carr*, and Maggie M. Jones**. 2018. Social behavior and ecology may interact to shape the gut microbiome in feral horses (*Equus caballus*). Midwest Fish and Wildlife Conference.
- 5) **Nuñez, C.M.V.**, James S. Adelman, Haley A. Carr*, and Maggie M. Jones**. 2018. Social behavior and ecology may interact to shape the gut microbiome in feral horses (*Equus caballus*). Society for Integrative and Comparative Biology.
- 6) Jones, M.M.** and **C.M.V. Nuñez**. 2018. Indirect effects of immunocontraception on male aggression and stress in the feral horse. Society for Integrative and Comparative Biology. (Poster)

- 7) **Nuñez, C.M.V.**, James S. Adelman, Haley A. Carr*, and Maggie M. Jones**. 2017. Social behavior and ecology may interact to shape the gut microbiome in feral horses (*Equus caballus*). Animal Behavior Society.
- 8) Jones, M.M.** and **Cassandra M.V. Nuñez**. 2017. Indirect effects of immunocontraception on male aggression and stress in the feral horse. Animal Behavior Society. (Poster)
- 9) **Nuñez, C.M.V.**, J.S. Adelman, H.A. Carr*, C.M. Knight*, and D.I. Rubenstein. 2017. Prolonged effects of contraception management on mare (*Equus caballus*) behavior and reproductive physiology. Society for Integrative and Comparative Biology.
- 10) **Nuñez, C.M.V.**, J.S. Adelman, H.A. Carr*, C.M. Knight*, and D.I. Rubenstein. 2016. Prolonged effects of contraception management on mare (*Equus caballus*) behavior and reproductive physiology. Animal Behavior Society.
- 11) **Nuñez, C.M.V.**, J.S. Adelman, J. Smith*, L.R. Gesquiere, and D.I. Rubenstein. 2016. Linking social behavior and stress physiology in feral mares (*Equus caballus*): Group transfers elevate fecal cortisol levels. Society for Integrative and Comparative Biology.
- 12) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2015. Sociality increases juvenile survival following a catastrophic event in the feral horse (*Equus caballus*). Animal Behavior Society.
- 13) **Nuñez, C.M.V.**, J.S. Adelman, J. Smith*, L.R. Gesquiere, and D.I. Rubenstein. 2014. Linking social behavior and stress physiology in feral mares (*Equus caballus*): Group transfers elevate fecal cortisol levels. Animal Behavior Society.
- 14) **Nuñez, C.M.V.**, J.S. Adelman, J. Smith*, L.R. Gesquiere, and D.I. Rubenstein. 2013. Linking social environment and stress physiology in feral mares (*Equus caballus*): Group transfers elevate fecal cortisol levels. Society for Conservation Biology, International Congress for Conservation Biology.
- 15) **Nuñez, C.M.V.** 2012. Horses gone wild! Contraception, Promiscuity, and Pregnancy... oh my! Nerd Nite.
- 16) **Nuñez, C.M.V.**, A.K. Leidner, and W. Turner. 2012. Biodiversity research and conservation biology from space: NASA's Biological Diversity and Ecological Forecasting Programs. Society for Conservation Biology, North America Congress for Conservation Biology.
- 17) **Nuñez, C.M.V.** 2012. NASA Applied Sciences Program: Providing remotely sensed data for conservation and management. Biodiversity Without Boundaries. (Poster)
- 18) **Nuñez, C.M.V.** 2012. Why contracepted mares are more 'frisky'. American Association for the Advancement of Science Research Blitz.
- 19) **Nuñez, C.M.V.** and A.K. Leidner. 2011. Engaging NASA in the definition and development of conservation applications. Society for Conservation Biology, International Congress for Conservation Biology.
- 20) **Nuñez, C.M.V.** and D.I. Rubenstein. 2011. Variation in the signaling between mares and foals (*Equus caballus*): Implications for the function of communication for mother and offspring. Acoustic Communication by Animals, Third International Symposium. (Poster)

- 21) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2010. Immunocontraception in wild horses (*Equus caballus*) extends reproductive cycling beyond the normal breeding season”, Princeton Research Symposium. Third place winner. (Poster)
- 22) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2010. Immunocontraception in mares (*Equus caballus*) extends ovulatory cycling into the non-breeding season. Princeton Chapter of Sigma Xi, the Scientific Research Society, Graduate and Post-Doctoral Poster Competition. First place winner. (Poster)
- 23) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2009. Behavioral effects of immunocontraception on wild horses (*Equus caballus*). Princeton Chapter of Sigma Xi, the Scientific Research Society, Graduate and Post-Doctoral Poster Competition. First place winner. (Poster)
- 24) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2009. Behavioral effects of immunocontraception on wild horses (*Equus caballus*). Society for Integrative and Comparative Biology. (Poster)
- 25) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2008. Behavioral effects of immunocontraception on wild horses (*Equus caballus*). Princeton Research Symposium. Received Honorable Mention. (Poster)
- 26) Bobich, E.G. and **C.M.V. Nuñez**. 2008. Mortality and recruitment of desert perennials as related to extreme drought: The loss of drought deciduous shrubs from low elevations. Ecological Society of America.
- 27) **Nuñez, C.M.V.**, J.S. Adelman, and D.I. Rubenstein. 2008. Behavioral effects of immunocontraception on wild horses (*Equus caballus*). Society for Conservation Biology, North America Congress for Conservation Biology.
- 28) **Nuñez, C.M.V.** and D.I. Rubenstein. 2002. The importance of safety in watering site choice of Grevy’s zebra (*Equus grevyi*) mothers. Society for Conservation Biology, International Congress for Conservation Biology.
- 29) **Nuñez, C.M.V.** and D.I. Rubenstein. 1998. Variation in the mother-infant relationship in wild horses; Implications for the function of the juvenile stage. Euro-American Mammal Congress: Challenges in Holarctic Mammalogy.

Funding

External Funding since UofM Appointment, (\$49,000)

Project Title	Agency	Duration	Amount
Biosurveillance for Bighorn Sheep Respiratory Disease in and near Glacier National Park	USGS	03/01/19-12/31/22	\$49,000 (0 to Nuñez lab) <i>Funds remained at ISU with summer salary and research funds for UofM MS student</i>
J.S. Adelman, C.M.V. Nuñez, R.W. Klaver			
Role: Co-PI.			

Pending external Funding since UofM Appointment

Project Title	Agency	Duration	Amount
Integrating behavior, physiology, and ecology to uncover the costs of social instability	NSF (IOS-BSC)	In revision <i>Resubmission preparation for spring 2023</i>	\$ 674,368 requested
C.M.V. Nuñez, J.S. Adelman Role: Lead-PI.			

Internal Funding since UofM Appointment, (\$25,998; \$18,498 to Nuñez lab)

Project Title	Agency	Duration	Amount
Enhancing Environmental Engagement in Urban Communities Through Course-Based Undergraduate Research Experience	Engaged Scholarship Faculty Research Grant	08/01/22-08/01/23	\$15,000 (\$7,500 to Nuñez lab) <i>Funds for course development</i>
J.S. Adelman, C.M.V. Nuñez, J.L. Sabel Role: Co-PI.			
Does contraception management increase female aggression in the feral horse (<i>Equus caballus</i>)	Center for Biodiversity Research Seed Grant	06/01/21-08/01/21	\$1000 (\$1000 to Nuñez lab)
C.M.V. Nuñez Role: Lead-PI.			
Assessing the links between contraception management and female aggression in feral horses	Faculty Research Grant	07/01/20-08/01/21	\$9,998 (\$9,998 to Nuñez lab) <i>Proposal used as model for natural sciences faculty requesting sample proposals</i>
C.M.V. Nuñez Role: Lead-PI.			

Teaching Experience

Undergraduate Courses taught at the University of Memphis (2)

- 1) International Wildlife Issues (BIOL 4099, fall semester 2022, 3 credits, role is 100%). In this upper-level course, students evaluate wildlife issues and explain the ecological, economic, and social consequences of natural resource, conservation, and/or management actions. Students assess, analyze, and communicate information and to work both individually and with others on complex, value-laden natural resource problems. This course plays an important role in the Biological Sciences curriculum as it is the only class that challenges students to consider global issues and how the attitudes and values of different cultures can affect wildlife policy.
- 2) Physiological Aspects of Animal Behavior (BIOL 4092, fall semesters 2020-2021, 3 credits, role is 100%). In this upper-level course, undergraduate students explore how animal behavior and physiology intersect. We learn not only about how different species move, eat, learn, and remember, but also about the physiological systems that facilitate

these behaviors. In addition, we discuss how both behavioral and physiological adaptations make very different lifestyles possible. Topics covered include metabolism, locomotion, digestion, the brain, learning physiology, empathy, mating systems, and animal conservation and management.

Undergraduate/Graduate Courses taught at the University of Memphis (1)

- 1) Ecology and Environmental Issues (BIOL 4055/6055, spring semesters 2020-2022, 3 credits, role is 100%). In this upper-level course, both undergraduate and graduate students identify the impacts of various environmental issues on plant and animal (including human) populations. Students evaluate the biological, ecological, economic, and social consequences of environmental issues and identify how wealth can impact the effects of environmental issues to different populations. During class, students practice important professional skills including active listening, effective communication, and critical thinking. This course plays an important role in the Biological Sciences curriculum as it is one of only a few classes that challenge students to consider global issues and how cultural attitudes and values contribute to environmental change.

Graduate Courses taught at the University of Memphis (1)

- 1) Animal Communication (BIOL 7345/8345, spring 2022, 3 credits, role is 100%). Master's and Ph.D. students in this course learn about the form and function of animal communication, how it can affect conspecific behavior, and how it varies with species' life history traits and the surrounding ecology. In addition, they practice teaching and writing techniques that are relevant to anyone entering academia. First, we will explore how animal the importance of animal communication to various species and explore how it may be affected by various factors including the animals' attributes such as age, sex, and reproductive state as well as by the surrounding habitat types. Most of the course is student-led with students choosing the bulk of the reading material (scientific papers, book chapters, etc.) discussed each week. Second, students learn several pedagogical techniques to encourage active and meaningful class discussion and are expected to employ these strategies in the discussions they lead. Third, the class includes a strong writing component in which students write about their own research in one of several different formats (blog post, lay summary, abstract, introduction, discussion, etc.) all of which have been required of me as a university professor. Students work in pairs to read, evaluate, and constructively critique each other's work, discuss their comments with their partner, and then incorporate those comments as appropriate. Fourth, students submit a final paper in the form of either a Sigma Xi proposal (7000-level) or an Animal Behavior Society Student Grant proposal (8000 level) based on their current research which they may submit in the subsequent funding cycle. This course serves our Biological Sciences graduate students as it focuses on subject matter not currently being offered and includes coursework that requires them to practice tasks relevant to the academic profession.

Undergraduate Courses taught prior to UofM Appointment (5)

- 1) International Wildlife Issues (AECL 455, alternate fall semesters, 2016-2018, 3 credits, role was 100%, total times taught: 2). In this upper-level course, students evaluate wildlife issues and explain the ecological, economic, and social consequences of natural resource, conservation, and/or management actions. Students assess, analyze, and communicate information and to work both individually and with others on complex, value-laden natural resource problems. This course plays an important role in the Animal Ecology curriculum as it is one of only a few classes that challenge students to consider global issues and how the attitudes and values of different cultures can affect wildlife policy.
- 2) Wildlife Ecology and Management (AECL 451, fall 2015-2016, spring 2017-2019, 3 credits, co-taught with Dr. James Adelman, role was 50%, total times taught: 5). In this capstone course for Animal Ecology Majors (Wildlife Option), students are challenged to hone their hands-on, analytical, and communication skills while collaborating with state agencies and private landowners on specific wildlife management issues. In 2017, I completely revised this course in collaboration with Drs. James Adelman, John Tyndall and Dick Schultz, enabling Animal Ecology students to work with Forestry students on these real-world projects, greatly enhancing the development of their professional skills.
- 3) Principles of Wildlife Conservation and Management (AECL 231X, spring 2016-2017, 3 credits, co-taught with Dr. Mary Harris, role was 50%, total times taught: 2). This course outlines general ecological principles as they relate to a) wildlife and fisheries populations and, b) the development and assessment of management and conservation strategies. I am slated to take full responsibility of this course in spring 2020.
- 4) Wildlife Behavioral Ecology (NREM 305, spring 2015, 1 credit, role was 100%, total times taught: 1). In this seminar course, students read and lead discussions on examples from the primary literature to better understand the concept of behavioral ecology and its importance to wildlife management and the methodologies used to study these topics in the field or the lab.
- 5) The Yellowstone Experience (NREM 496B, spring 2016, 3 credits, co-taught with Dr. Michael Rentz, role was 50%, total times taught: 1). In the weeks preceding this course, students learn about the history of Yellowstone National Park and work with professors to choose scientific papers investigating aspects of the different species they will see once at Yellowstone. During the 10-day spring break trip to the park, the course combines student presentations of the papers, meetings with biologists (often the authors of said papers), hikes in the park, and student-designed research projects.

Graduate Courses taught prior to UofM Appointment (3)

- 1) Behavioral Ecology (AECL 551, alternate, fall semester 2017, 3 credits, role was 100%, total times taught: 1). In this seminar course, students read and lead discussions on examples from the primary literature to better understand the importance of ecological effects to animal behavior and the methodologies used to study these topics in the field or the lab. The course includes a weekly writing workshop during which students critique

each other's work on class assignments before submitting final versions. Each of the assignments is an example of project that I have had to complete as a faculty member.

- 2) Topics in Animal Behavior (NREM 505, spring 2016, 1 credit, role was 100%, total times taught: 1). In this seminar course, students read and lead discussions on examples from the primary literature to better understand the importance of animal behavior to animal functioning and survival and the methodologies used to study these topics in the field or the lab. I taught this course to meet departmental need until I could effectively develop AECL 551. Student feedback from this course was instrumental in my development of AECL 551.
- 3) Altitudinal Ecology (EEB 585, spring 2017, 3 credits, co-taught with Dr. James Adelman, role was 50% total times taught: 1). A requirement for graduate students in the Ecology and Evolutionary Biology major, this course focused on the use of altitudinal gradients as "natural laboratories" in the study of ecology and evolution, adaptations to life at high altitude, and threats of global climate change in high-altitude ecosystems. The course included a trip exploring altitudinal gradients in Colorado's Rocky Mountains.

Other Teaching (8)

- 1) NREM 115X Explorations in NREM, faculty participant (springs 2018, 2019)
- 2) Principles of Wildlife Conservation and Management, 2 Guest Lectures (spring 2018)
- 3) BIOL 354 Animal Behavior, Guest Lecture (falls 2015, 2016, 2018)
- 4) Talent Identification Program Animal Ecology class, Guest Lecture (summer 2015)
- 5) NREM Mini-Camp, Instructor (fall 2015)
- 6) Phillip L. Boyd Deep Canyon Desert Research Center, UC Riverside, CA, Education and Outreach Coordinator (2007-2008)
- 7) Organization for Tropical Studies, Duke University, South Africa, Lecturer and Mentor (2006)
- 8) Comparative Physiology, Instructor, Princeton University (springs 2008-20011; 2004-2006)

Graduate Students Mentored

Academic Advisor at the University of Memphis (1)

- 1) Sidney Brenkus, M.S., Biological Sciences, matriculating summer 2020. Thesis title: Biosurveillance for Bighorn Sheep Respiratory Disease in and near Glacier National Park

Program of Study Committee Member at the University of Memphis (4)

- 1) Heather Clendenin, Ph.D. Biological Sciences, expected 2025
- 2) Kendra Wright, Ph. D. Biological Sciences, expected 2025
- 3) Kelly O'Neil, Ph.D. Biological Sciences, expected 2024
- 4) Cristina Aurora Rodriguez-Wagner, M.S., Biological Sciences, 2020-2021

Academic Advisor prior to UofM Appointment (2)

- 1) Ben Johnson, M.S., Ecology and Evolutionary Biology Interdisciplinary Program, Iowa State University, 2018-2020. Thesis title: The impacts of human activity on bighorn sheep: Important implications for wildlife conservation
- 2) Maggie Jones, M.S., Wildlife Ecology, 2016-2018. Thesis title: Impacts of immunocontraception and related female behaviors on male behavior and physiology in feral horses

Program of Study Committee Member prior to UofM Appointment (8)

- 1) Karri Folks, Ph.D., Natural Resource Ecology and Management, expected 2023
- 2) Andrea Rabinowitz, Ph.D., Ecology and Evolutionary Biology, completed 2021
- 3) David Delaney, Ph.D., Ecology and Evolutionary Biology, completed 2020
- 4) Kristine Micheletti, M.S., Anthropology, completed 2018
- 5) Brooke Bodensteiner, M.S., Ecology Evolutionary Biology, completed 2017
- 6) Giselle Narváez Rivera, M.S., Anthropology, completed 2017
- 7) Ann Almond, Ph.D., Sustainable Agriculture, completed 2017
- 8) Kelly Boyer Ontl, Ph.D., Anthropology, completed 2017

Undergraduate Students Mentored

While at the University of Memphis (2)

- 1) Kameron Hall, Center for Biodiversity Research-Memphis Zoo Undergraduate Research Intern, summer 2021
- 2) Mercedes Carter, Independent Study, Teaching Techniques, spring 2021

Other mentoring while at the University of Memphis (1)

- 1) Agnes Burke, School Without Walls High School, fall 2021-spring 2022

Prior to UofM Appointment (9)

- 1) Tamara Ford, Science With Practice, summer and fall 2018
- 2) Rachel Schwartzbeck, Dean's Leadership Scholar 2016-2017
- 3) Micha Fatka, Science With Practice, summer and fall 2016
- 4) Brienna Ross, Science With Practice, summer and fall 2016
- 5) Anderson Grant, Honors Research, spring 2016
- 6) Haley Carr, Science With Practice, summer and fall 2015
- 7) Jessica Smith (2009). Senior thesis title: The inoculation of porcine zona pellucida and its behavioral and physiological effects on the feral mares of Shackleford Banks
- 8) Margaret Kearns (2008). Senior thesis title: Male harassment influences female feral horse (*Equus Caballus*) movement on Shackleford Banks, NC

- 9) Stephanie Kriston (2008). Senior thesis title: The effect of life stage on bachelor feral horse social networks on Shackleford Banks, North Carolina

Service

University of Memphis

- 1) Neuroethologist Faculty Search Committee (fall 2021-spring 2022)
- 2) Faculty Adviser in the Department's NSF GRFP Bootcamp (falls 2021, 2022)
- 3) Reviewer for University of Memphis Faculty Research Grants (spring 2021)
- 4) Thursday Happy Hour organizer (2021-2022)
- 5) Co-Chair of the Center for Biodiversity Diversity, Equity, and Inclusion Committee (2020-present)
- 6) Faculty Adviser for EveryO₃NE (2020-2021)
- 7) Work-life Balance Workshop participant (spring 2020)
- 8) Sustainable/Green Fee Committee (2019-present)

Prior to UofM Appointment

Department of Natural Resource Ecology and Management, Iowa State University

- 1) NTE Renewal Process Development
- 2) Animal Ecology Curriculum Committee
- 3) Animal Ecology Curriculum Sub-Committee
- 4) NREM Outcomes Assessment Committee
- 5) Scholarship Committee
- 6) Errington Lecture Committee
- 7) Science II Prairie Committee

Department of Ecology, Evolutionary, and Organismal Biology, Iowa State University

- 1) Admissions Committee

Additional Service, Iowa State University

- 1) Society for Advancement of Chicanos/Hispanics and Native Americans in Science, ISU Chapter, faculty member (2017-2019t)
- 2) Faculty Adviser for Students Helping Rescue Animals (spring 2016-2019)
- 3) Quiz Bowl Judge for TWS North Central Section Student Conclave (spring 2018)
- 4) Animal Behavior Competition Judge for TWS North Central Section Student Conclave (spring 2018)
- 5) 3 Minute Thesis judge (fall 2017)

Professional Service

- 1) Reviewer for *American Journal of Physical Anthropology*, *Animals*, *Applied Animal Behaviour Science*, *Behaviour*, *Behavioral Ecology*, *Behavioral Ecology and Sociobiology*, *Canadian Journal of Zoology*, *Climate Change Ecology*, *Ethology*, *Ibis*, *Journal of Wildlife Management*, *PLOS ONE*
- 2) Ad-hoc Reviewer for NSF Behavioral Systems Cluster (fall 2022)
- 3) Ad-hoc Reviewer for the Bureau of Land Management (spring 2022)
- 4) Ad-hoc Reviewer for the Natural Environment Research Council (spring 2020)
- 5) Reviewer on NSF Animal Behavior Systems panel (spring 2016)
- 6) Consultant to Friends of Animals: assessed Bureau of Land Management plan to round up and remove 332 horses from eastern Nevada (2015)

Professional Affiliations

- 1) Animal Behavior Society (2014-present)
 - Charles H. Turner Program Steering Committee (2022)
 - Charles H. Turner student mentor (summer 2021, 2022)
 - Mentor for the Student Mentoring Program (summer 2020)
 - Diversity Committee member (2020-present)
 - Diversity Committee Workshop Steering Committee (2020, 2021, 2022)
 - Film Festival Committee Board Member (2017-present)
 - Behavior Conservation Workshop Steering Committee (2020, 2021, 2022)
 - Behavior Conservation Committee member (2016-present)
 - Co-organizer of Behavior Conservation Workshop (2016-2017)
 - Behavior Conservation Committee Board Member (2017-2020)
 - Reviewer for Student Research Grant applications (spring 2015)
- 2) Society for Integrative and Comparative Biology (2015-present)
- 3) International Union for Conservation of Nature's Equine Specialist Group (2020-present)

Outreach

- 1) Invited speaker for "Lunch with a Scientist" at the ScienceWriters Conference (fall 2022)
- 2) Consultant to BBC Studios regarding a documentary featuring the feral horses of Shackleford Banks, NC (summer 2021)
- 3) Research featured in *The Horse*, an online publication on horse health care
<https://thehorse.com/193395/study-mare-vocalization-associated-with-foal-survival/>
(fall 2020)
- 4) Presented at Nerd Nite! (fall 2020)
- 5) Presented at UofM's Faculty NEDTalks (fall 2019)

Outreach prior to UofM Appointment

- 1) Presented during Al Éxito visit (falls 2018, 2019)
- 2) Presented to ISU Fish and Wildlife Biology club (fall 2018)
- 3) Participated in Maize Retreat (spring 2018)
- 4) Presented to ISU Women's Group (spring 2018)
- 5) Presented at Nerd Nite! (spring 2017)
- 6) Presented to ISU Animal Behavior Club (spring 2017)
- 7) Presented to ISU Department of Animal Science (spring 2016)

Professional Development

Diversity Awareness

- 1) Office of Multicultural Student Affairs: SPARK participant (2017-2019)
- 2) CELT Workshop: Inclusive Classroom Faculty Development Workshop (2016)
- 3) Cultural Competency Lunch and Learn: White Privilege: Unpacking the Invisible Knapsack (2015)

Teaching

- 1) Selected participant in the Deep Teaching Residency (2022)
- 2) 7 Research-Based Strategies to Improve Learning (2019)
- 3) Project LEA/RN: working group participant (2015-2019)
- 4) CELT Workshop: Award-Winning Faculty Series: Information Overload: Practical Ways to Help your Students Recall Information after Graduation (2018)
- 5) CELT Live Webinar: Effective Grading - The Art of Providing Useful (and Used) Feedback (2016)
- 6) SVPP: Mentoring Graduate Students (2016)

Scholarship

- 1) Grants Hub: NSF Proposal Development (2018)
- 2) Data Management Planning, an Introduction (2017)
- 3) SVPP: Preparing for the Next Step (2017)
- 4) CALS: Women's Networking Lunch for Non-Tenure-Eligible Faculty (2016)
- 5) CALS: Women's Networking Lunch for Non-Tenure-Eligible Faculty (2015)
- 6) NSF grants conference, Washington, DC (2015)

Fellowships and Awards

- 1) Writing Productivity Workshop (NSF-IOS sponsored), selected participant (2013)
- 2) American Association for the Advancement of Science Fellowship (2011-2012)
- 3) National Science Foundation Graduate Research Fellowship (1994-1997)
- 4) Presidential Fellowship, Princeton University (1993-1999)