

Nathan M. Tarr

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Education

Master of Science in Fisheries and Wildlife Sciences, Minor: Statistics

North Carolina State University, Raleigh, NC | December 2008

Advisor: Theodore R. Simons

Thesis: Fall migration and vehicle disturbance of shorebirds at South Core Banks, North Carolina

Bachelor of Arts, Majors: Life Sciences and Environmental Studies

Guilford College, Greensboro, NC | May 2000

Skills

- Programming languages: Python, R, SQL
- GIS & spatial analysis: ArcGIS, QGIS, Python, R, Spatialite
- Database management: Microsoft Access, SQLite, SQL Server, MongoDB (basic familiarity)
- Software development & collaboration: Git, Conda, Jupyter Notebook, RStudio
- Communication: Oral and written communication of complex scientific and technical topics.

Professional Experience

Research Scholar, March 2019 - present

North Carolina Cooperative Fish and Wildlife Research Unit, Department of Applied Ecology

North Carolina State University

- Led the strategic integration of community science and museum collection data into habitat models for the U.S. Geological Survey's (USGS) National Gap Analysis Project, a critical national biodiversity conservation initiative. By identifying and overcoming data integration barriers and developing efficient, well-documented, and automated tools compliant with USGS standards, the revised modeling framework significantly improved the accuracy, transparency, and repeatability of data used for national, state, and regional conservation assessments and land management decisions.
- Addressed critical challenges in species range map maintenance by researching and developing a novel framework ensuring transparency, repeatability, and efficiency. This framework was implemented through an open-source data infrastructure (Python, SQL, SQLite with parallel processing), demonstrably improving processing speed, documentation, and collaborative workflows.
- Designed and developed the "Wildlife Wrangler" scientific software (Python, R, Jupyter Notebook, SQL) to automate and streamline the curation of species occurrence datasets from sources like the GBIF API, significantly improving the efficiency and documentation of data preparation for species distribution models.
- Contributed critical biological and technical expertise to the North Carolina Wildlife Resources Commission's Scientific Council for Birds and the North Carolina Bird Atlas, directly supporting the monitoring, conservation, and management strategies for bird populations in the state.
- Enhanced data exploration and analysis capabilities for avian research by developing a comprehensive git repository of R code to support the review, analysis, and visualization of North Carolina Bird Atlas and eBird data.

Research Associate, November 2009 – March 2019

North Carolina Cooperative Fish and Wildlife Research Unit, Department of Applied Ecology

North Carolina State University

- Developed a multispecies landscape pattern metric to quantify and visualize biodiversity patterns, expanding options for landscape conservation assessment and planning.

- Established and fostered international research collaboration with European scientists to investigate the broader impacts of European bioenergy demand on biodiversity in the southeastern U.S., linking species richness estimates with landscape change projections to quantify biodiversity impacts under various demand scenarios.
- Quantified the potential impacts of bioenergy production on wildlife habitat availability in North Carolina through a heuristic study, collaborating with natural resource economists to integrate bioenergy demand scenarios with landscape change and habitat models, providing insights for sustainable energy development.
- Enhanced foundational data to the USGS's National Gap Analysis Project by contributing to the development and maintenance of wildlife-habitat relationship and range databases and associated software. Generated 236 habitat distribution models for bird and mammal species across the conterminous U.S., leveraging literature review, data synthesis, and spatial modeling techniques in Microsoft Access, SQL Server, and Python, directly informing national biodiversity assessments.
- Improved team efficiency and analytical capabilities by developing and managing private Python packages that facilitated the streamlined development and analysis of wildlife habitat and range maps.

Research Technician, August 2019

U.S. Army Corps of Engineers Construction Engineering Research Laboratory

- Conducted avian point count surveys at Fort Bragg, NC for a project characterizing *Lindera subcoriacea* ecology and metapopulation dynamics.
- Followed explicit sampling protocols to collect spatial data on species occurrence and abundance in the field.

Conservation Recommendations Research Technician, January – November 2009

North Carolina Wildlife Resources Commission

- Synthesized scientific literature on the habitat needs of priority species for conservation in North Carolina.
- Drafted conservation recommendations for land use planners and developers.
- Conducted an exhaustive literature review on the habitat requirements of species of conservation need.
- Designed and maintained a relational database of information on species' habitat requirements.
- Synthesized foundational information for the NC Wildlife Resource Commissions' Green Growth Toolbox, which aids local governments and city planners in identifying ways to accommodate wildlife populations.

Research Assistant, January – November 2009

North Carolina Cooperative Fish and Wildlife Research Unit

- Reviewed scientific literature on the habitat relationships of Swainson's Warblers for use in spatially-explicit habitat models and entered relevant information into a Microsoft Access relational database of species traits and habitat requirements.
- Hired field assistants for secretive marsh bird surveys in wildlife refuges by writing and promoting a job description, reviewing applications, conducting interviews, and evaluating candidates.

Graduate Teaching Assistant, August – December 2008

Department of Plant Biology, North Carolina State University

- Instructed two lab sections of "Introduction to Ecology."
- Prepared and delivered introductory lectures for educational lab exercises on topics including statistical analyses and survey designs, population estimation, ecological concepts, and scientific writing.
- Guided students in the development and execution of independent research projects involving the collection and analysis of ecological data.
- Graded lab reports, quizzes, and scientific writing exercises.

Graduate Research Assistant, August 2005 – August 2008

North Carolina Cooperative Fish and Wildlife Research Unit

- Designed, performed, analyzed, and published a novel experimental field study on the effects of vehicle disturbance on shorebirds' habitat use and behavior at Cape Lookout National Seashore, NC.
- Performed extensive surveys of shorebird abundance, distributions, and behavior at South Core Banks, NC during three fall seasons.
- Designed and implemented a relational database to store survey data that included customized forms to support efficient data entry and evaluation.
- Recruited, trained, and supervised five field assistants.
- Assisted with a raccoon population management study by maintaining camera traps.
- Presented preliminary study results at scientific and professional meetings and wrote a thesis detailing my research.

Research Technician, May - June 2008

North Carolina Cooperative Fish and Wildlife Research Unit

- Participated in field research that assessed methods for estimating detection probabilities during avian point count surveys.
- Performed modified point counts along 12 Breeding Bird Survey routes in central North Carolina.
- Navigated to study sites along remote stretches of road in the piedmont and coastal plains of North Carolina using maps and GPS units.

Graduate Teaching Assistant, January - May 2006

Department of Zoology, North Carolina State University

- Instructed two lab sections of "Evolution, Behavior, and Ecology".
- Prepared and delivered introductory lectures for educational lab exercises on topics including statistical analyses and survey designs, population estimation, ecological concepts, and scientific writing.
- Guided students in the development and execution of independent research projects involving the collection and analysis of ecological data.
- Graded lab reports, quizzes, and scientific writing exercises.

Research Technician, February - June 2005

North Carolina Cooperative Fish and Wildlife Research Unit

- Manually processed Nexrad WSR-88D imagery from the National Climatic Data Center for the identification of migratory bird stopover sites in North Carolina and Virginia.
- Screened radar imagery to identify images with sufficient clarity for the production of maps.

Research Technician, May - July 2004

North Carolina Cooperative Fish and Wildlife Research Unit

- Collected field data on spatial and temporal variations in Black-throated Blue Warbler and Ovenbird singing rates, Pisgah National Forest, NC.
- Located and monitored nests, sampled singing rates, and sampled vegetation at study sites.

Research Technician, April 2004

Department of Forestry, North Carolina State University

- Conducted songbird surveys along transects in Raleigh and Cary, NC to investigate use of urban greenways by migrating songbirds.
- Navigated to study sites and recording sampling locations with GPS.

Assistant Produce Team Leader, February 2003 - March 2004

Whole Foods Market, Pittsburgh, PA and Durham, NC

- Ordered and inventoried produce in accordance with department's target profit margin and implemented regional standards and performance goals.
- Oversaw product merchandising and quality control.

- Supervised and trained 25 team members.

Research Technician, April 2002 - June 2002

Department of Forestry, North Carolina State University

- Performed point count surveys of songbirds in Raleigh and Cary, NC for a study of avian responses to urban greenway characteristics.
- Navigated to study sites and recording sampling locations with GPS.

Research Technician, June 2000 - July 2002

Mears Fork Corridor Project, Summerfield, NC

- Created and implemented an annual bird survey protocol for assessing the effectiveness of habitat conservation efforts along Mears Fork Creek in North Carolina.

Software (github.com/nmtarr)

Tarr, N.M., Anderson, S., Pearson, S., Carpenter, J., and Chen, E. 2024. NC Bird Atlas Data Exploration Code. R software repository. <https://github.com/ncbirdconservation/NCBA>.

Tarr, N.M., McKerrow, A.J., and M.J. Rubino. 2021. The Wildlife Wrangler. U.S. Geological Survey software release. <https://doi.org/10.5066/P98K7E93>.

Datasets

U.S. Geological Survey (USGS) Gap Analysis Project (GAP). 2018. U.S. Geological Survey - Gap Analysis Project Species Range Maps CONUS_2001: U.S. Geological Survey data release, <https://doi.org/10.5066/F7Q81B3R>.

U.S. Geological Survey (USGS) - Gap Analysis Project (GAP). 2018. U.S. Geological Survey - Gap Analysis Project Species Habitat Maps CONUS_2001: U.S. Geological Survey data release, <https://doi.org/10.5066/F7V122T2>.

U.S. Geological Survey - Gap Analysis Project. 2018. U.S. Geological Survey - Gap Analysis Project Reptile Species Habitat Richness: U.S. Geological Survey, <https://doi.org/10.3133/sir20195034>, <https://doi.org/10.5066/P9YW3ZQ2>.

U.S. Geological Survey - Gap Analysis Project. 2018. U.S. Geological Survey - Gap Analysis Project Bird Species Habitat Richness: U.S. Geological Survey, <https://doi.org/10.3133/sir20195034>, <https://doi.org/10.5066/P9YW3ZQ2>.

U.S. Geological Survey - Gap Analysis Project. 2018. U.S. Geological Survey - Gap Analysis Project Mammal Species Habitat Richness: U.S. Geological Survey, <https://doi.org/10.3133/sir20195034>, <https://doi.org/10.5066/P9YW3ZQ2>.

U.S. Geological Survey - Gap Analysis Project. 2018. U.S. Geological Survey - Gap Analysis Project Amphibian Species Habitat Richness: U.S. Geological Survey, <https://doi.org/10.3133/sir20195034>, <https://doi.org/10.5066/P9YW3ZQ2>.

Publications (orcid.org/0000-0003-2925-8948)

Tarr, N.M. 2025. A framework for transparent and repeatable species range maps. *Journal of Fish and Wildlife Management*. *In review*.

Rubino, M.J., McKerrow, A.J., **Tarr, N.M.**, and S.G. Williams. 2022. Methods for evaluating Gap Analysis Project habitat distribution maps with species occurrence data: U.S. Geological Survey Techniques and Methods 2-A19. <https://doi.org/10.3133/tm2A19>.

Tarr, N.M., Benson, A., and M.J. Rubino. 2022. Wildlife Wrangler: A high-level data processing framework that supports the utilization of species occurrence data for biogeographical analyses. *Biodiversity Information Science and Standards* 6:e93823. <https://doi.org/10.3897/biss.6.93823>.

Tarr, N.M. 2019. Demonstrating a conceptual model for multispecies landscape pattern indices in landscape conservation. *Landscape Ecology*. <https://doi.org/10.1007/s10980-019-00888-7>.*

Gergely, K.J., Boykin, K.G., McKerrow, A.J., Rubino, M.J., **Tarr, N.M.**, and Williams, S.G. 2019. Gap Analysis Project (GAP) terrestrial vertebrate species richness maps for the conterminous U.S.: U.S. Geological Survey Scientific Investigations Report 2019–5034, 99 p. <https://doi.org/10.3133/sir20195034>.

Duden, A.S., Rubino, M.J., **Tarr, N.M.**, Verweij, P.A., Faaij, A.P.C., and F. van der Hilst. 2018. Impact of increased wood pellet demand on biodiversity in the southeastern US. *GCB Bioenergy*. <https://doi.org/10.1111/gcbb.12554>.

McKerrow, A.J., **Tarr, N.M.**, Rubino, M.J., and S.G. Williams. 2018. Patterns of species richness hotspots and estimates of their protection are sensitive to spatial resolution. *Diversity and Distributions*. <https://doi.org/10.1111/ddi.12779>.

Tarr, N.M., Rubino, M.J., Costanza, J., McKerrow, A., Collazo, J., and R. Abt. 2016. Projected gains and losses of wildlife habitat from bioenergy-induced landscape change. *GCB Bioenergy*. <https://doi.org/10.1111/gcbb.12383>.

North Carolina Wildlife Resources Commission. 2012. Conservation recommendations for priority terrestrial wildlife species and habitats in North Carolina.

Tarr, N.M., Simons, T.R., and K. H. Pollock. 2010. An experimental assessment of vehicle disturbance effects on migratory shorebirds. *Journal of Wildlife Management* 74(8):1776-1783. <https://doi.org/10.2193/2009-105>.

Presentations

Tarr, N.M. 2025. A framework for transparent and repeatable species range maps. Southeast Conservation Adaptation Strategy Third Thursday Forum Webinar.

Tarr, N.M. 2025. A framework for transparent and reproducible species range maps. IALE-North America Annual Meeting. Raleigh, NC.

Emily Nastase, E., Hostetter, N., **Tarr, N.**, Anderson, S., Kelly, C., Schweitzer, S., and J. Collazo. 2025. Integrated regional dynamic occupancy models inform local predictions of songbird occupancy following landscape-scale disturbance. IALE-North America Annual Meeting. Raleigh, NC. Poster.

Tarr, N.M., and M.J. Rubino. 2022. Transparent, semi-automated screening of species occurrence records for distribution models. IALE-North America Annual Meeting. Virtual Remote Conference.

Tarr, N.M., Benson, A., and M. Rubino. 2022. Wildlife Wrangler: A high-level data processing framework that supports the utilization of species occurrence data for biogeographical analyses. Biodiversity Information Standards Annual Meeting. Sophia, Bulgaria.

Tarr, N. M., Rubino, M. J., and A. McKerrow. 2021. The Wildlife Wrangler: An open-source framework for ensuring transparency and repeatability when curating species occurrence record datasets. USGS Open-source Software Group.

Tarr, N.M., Rubino, M.J., and S.J. Williams. 2020. Building transparency into species range maps. IALE-North America Annual Meeting. Virtual Remote Conference.

Tarr, N.M., Rubino, M.J., and S.J. Williams. 2019. Transparent, automated screening of species occurrence records for distribution models. The Wildlife Society. Reno, NV.

- Tarr, N.M.** 2019. Updates and applications of Gap Analysis Project data. South Atlantic Landscape Conservation Cooperative Third Thursday Forum Webinar.
- Tarr, N.M.** 2019. Diverse effects of biomass production on landscapes and wildlife habitat amount in North Carolina. North Carolina Sandhills Conservation Partnership Meeting, Southern Pines, NC.
- Tarr, N.M.** and M. Rubino. 2018. USGS Gap Analysis Project habitat maps: Prospects for multi-species, multi-scale assessments of habitat fragmentation. US Regional Association of the International Association for Landscape Ecology, Chicago, IL.
- Duden, A., Rubino, M., **Tarr, N.M.**, Verweij, P.A., Faaij, A., and F. van der Hilst. 2018. The impact of wood pellet demand on biodiversity in the southeastern US. US Regional Association of the International Association for Landscape Ecology, Chicago, IL.
- Duden, A., Rubino, M., **Tarr, N.M.**, Verweij, P.A., and F. van der Hilst. 2017. Impacts of wood pellet demand on biodiversity in the southeastern US. Ecosystem Services Partnership 9 World Conference, Shenzhen, China.
- Tarr, N.**, J. Costanza, M. Rubino, R. Abt, A. McKerrow, and J. Collazo. 2016. Modeling the effects of biomass production on landscapes and wildlife habitat. US Regional Association of the International Association for Landscape Ecology, Asheville, NC.
- Terando, A., Costanza, J., **Tarr, N.**, Abt, R. and M. Rubino. 2015. Modeling the local ecological response to regional landscape and global change forcings: A case study of bioenergy in North Carolina. Poster presentation. American Geophysical Union, San Francisco, CA.
- Tarr, N.M.** and T.R. Simons. 2015. Vehicle disturbance of nonbreeding shorebirds at South Core Banks, North Carolina. Burlington Bird Club, Greensboro, NC.
- Costanza, J., **N. M., Tarr**, M. J. Rubino, A.C. Drew, R. Abt, A. McKerrow, J. Collazo. 2014. Assessing habitat impacts of potential biofuels production scenarios in North Carolina. North American Congress for Conservation Biology, Missoula, MT.
- Rubino, M. J., J. Aycrigg, A. McKerrow, **N. M. Tarr**, K. Boykin, and J. Lonneker. 2013. Habitat modeling efforts of the Gap Analysis Program. Poster presentation. North American Congress for Conservation Biology, Missoula, MT.
- Tarr, N.M.**, J. Aycrigg, A. McKerrow, M. J. Rubino, K. Boykin, and J. Lonneker. 2013. Habitat modeling efforts of the Gap Analysis Program. Poster presentation. American Ornithologists' Union and Cooper Ornithological Society, Chicago, IL.
- Tarr, N.M.**, J. Aycrigg, A. McKerrow, M. J. Rubino, K. Boykin, and J. Lonneker. 2012. The Gap Analysis Program: National databases for enhancing bird conservation. North American Ornithological Conference, Vancouver, BC, Canada.
- Tarr, N.M.** and T.R. Simons. 2009. Vehicle disturbance of nonbreeding shorebirds at South Core Banks, North Carolina. Piedmont Bird Club, Greensboro, NC.
- Tarr, N.M.** and T.R. Simons. 2008. Vehicle disturbance of nonbreeding shorebirds at South Core Banks, North Carolina. North Carolina Partners in Flight, Conover, NC.
- Tarr, N. M.**, T. R. Simons, and K. H. Pollock. 2008. The effects of off-road vehicle disturbance on nonbreeding shorebird behavior and habitat use. Poster presentation. American Ornithologists' Union and Cooper Ornithological Society, Portland, OR.

Tarr, N. M. and T. R. Simons. 2008. ORV disturbance and fall waterbird migration at Cape Lookout National Seashore, North Carolina. North Carolina Colonial Waterbird Working Group, Swansboro, NC.

O'Connell, A. F., T. R. Simons, A. Waldstein, S. Schulte, and **N. M. Tarr**. 2008. Raccoon ecology and protected species management at Cape Lookout National Seashore, North Carolina. US Geological Survey's New England Disciplines Management Council (NEDMAC) Science Forum Troy, NY.

Tarr, N. M. and T. R. Simons. 2007. ORV disturbance and wintering shorebirds. North Carolina Colonial Waterbird Working Group, Swansboro, NC.

Tarr, N. M. 2001. Surveying the birds of Mears Fork Creek. Piedmont Bird Club, Greensboro, NC.

Peer-reviews

The Wildlife Society Bulletin, 2019

The Journal of Wildlife Management, 2015

Biological Conservation, 2010

Awards

*Best Article Award in Landscape Ecology - Honorable Mention, 2019

Cooper Ornithological Society student membership award, 2007

Best presentation by an M.S. student, Zoology Department of Zoology Graduate Student Symposium, 2008, \$200

American Ornithologists' Union Marcia Brady Tucker Student Travel Award, 2008, \$350

Professional Activities

The North Carolina Chapter of the Wildlife Society member, 2006 - present

The Wildlife Society member, 2006 – present

North Carolina Bird Atlas Science Subcommittee cochairman, 2020 - present

North Carolina Bird Atlas Steering Committee member, 2020 - present

International Association of Landscape Ecologists – North America member, 2018 - 2022

Wilson Ornithological Society member, 2006 - 2020

TWS National Meeting Field Trip Subcommittee member, 2015 - 2016

NCSU Zoology Graduate Student Association library liaison, 2006 - 2008