

# **Lisa A. McCauley**

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## **Education/Research Experience**

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### **2015 – present Spatial Scientist, The Nature Conservancy, Tucson, AZ**

Center for Science and Public Policy

**Responsibilities:** Serves as the spatial analysis lead on science projects within the Arizona Chapter. This includes using science-based tools, information, and analyses to assist in protecting natural systems and ensuring natural systems adapt to changing land use and climate. Projects include using landscape simulation models to estimate the effects of forest restoration on carbon stocks under climate change in the Four Forests Restoration Initiative in northern Arizona, evaluating the influence of forest densities on growth and mortality of Ponderosa Pine, and evaluating the use of forest restoration as a natural climate solution to stabilize carbon in western U.S. forests. Projects also include hydrological data management and analyses for the water program, urban heat analyses for the cities program, serving on the TNC-wide GIS Leadership council, managing the Enterprise GeoCloud for the Chapter, and maintaining and updating the Chapter science website.

**Related Publications** (see below):

McCauley et al, 2019

Bradford et al., 2020

Bradford et al., 2022

McCauley et al., 2022

### **2013 – 2015 Postdoctoral Research Associate, University of Wisconsin, Madison**

Department of Forest and Wildlife Ecology, Madison, WI

**Research:** *Fitting the climate lens to grassland bird conservation:* Assessing climate change vulnerability using demographically-informed species distribution models. This research uses species demographics to evaluate climate change vulnerability for grassland birds. We conducted a meta-analysis of grassland bird nest success studies and the effect of climate on the demographic parameter. We are using this relationship to create demographically informed species distribution models to evaluate a species' demographic response to climate change. We are using this to create spatially and temporally explicit population models throughout their range and into future climates. This project also involves coordinating a team of scientists and managers from multiple agencies and universities to assist in parameterizing the models with biologically accurate information. This team is helping us in building management scenarios to assist managers in evaluating the efficacy of current grassland bird management and conservation planning in the future. We produced spatially explicit projections of

population dynamics and identified regions where the climate is more or less suitable for grassland birds in the future. Supervisor: Dr. Benjamin Zuckerberg

***Related publications*** (see below):

McCauley et al. 2017, Landscape Ecology

Zuckerburg et al. 2018, Conservation Biology

**2011 – 2013      Postdoctoral Research Ecologist, South Dakota State University/US Geological Survey**

Northern Prairie Wildlife Research Center, Jamestown, ND

***Research:*** *Interactions of consolidation drainage and climate on water-level dynamics, wetland productivity, and waterbirds.* This project analyzed the effects of land use, climate, and agricultural drainage on wetland hydrology and productivity in the Prairie Pothole Region. I supervised two staff in the collection and digitization of historic aerial photography for use in the analyses. I conducted hydrological modeling using high resolution LiDAR-derived DEM data to model water flow and connectivity and to delineate wetland catchments. We used a drought index to model climate in the region and its effect on wetland hydrology. This project showed that, due to drainage, remaining wetlands in this region are now nearly 3 times larger than they were historically and, because of their large size, rarely dry down enough to maintain the same ecological function. Many wetlands have been converted from dynamic to permanently flooded and now have lower ecological value for many species. Additionally, the wetland loss has altered connectivity between wetlands and other waters and has altered the connection with groundwater. This data was also used to show the loss of Piping Plover habitat in some parts of the region because drainage is leading to higher water levels and eliminating shorelines used for plover nesting.

Supervisor: Dr. Michael J. Anteau

***Related publications:***

McCauley and Anteau 2014, Wetlands

McCauley et al. 2015, Ecosphere

McCauley et al. 2016, Journal of Fish and Wildlife Management

Post van der Berg et al. 2016, Ecology and Evolution

**2004 – 2011      Ph.D. Conservation Biology, University of Central Florida**

Department of Biology, Orlando, FL

***Research:*** *The effects of urbanization on cypress wetlands in central Florida.* This work evaluated land use change and the effect on cypress tree populations in a rapidly urbanizing region. Ecological health of the cypress populations was measured by evaluating recruitment across a gradient of urbanization. Historical loss of cypress wetlands and recruitment data were combined into a spatially explicit model showing current threats and projecting future recruitment and survival of cypress wetlands. I found that there has been a substantial loss of cypress wetlands in the region due to urbanization and remaining wetlands have an altered hydrology leading to reduced cypress recruitment when the wetland is surrounded by urban development. There remain areas of high cypress recruitment in agricultural cattle ranches that could serve

as population sources in the future. I also developed a microsatellite library for *Taxodium distichum* to evaluate the population genetics of the species and how urbanization has affected the gene flow and inbreeding. Supervisor: Dr. David G. Jenkins

***Related publications:***

McCauley et al. 2013, Journal of Applied Ecology

McCauley et al. 2013, Wetlands

**2004-2011**

**GIS Analyst, University of Central Florida**

Department of Biology, Orlando, FL

***Research:*** I assisted with multiple projects, including creation of scientifically sound sampling and project designs, population models for multiple species, experimental and geospatial statistical analyses, and maps for several publications. I created an ‘Introduction to GIS’ workshop class and trained several people in using GIS. My work as a GIS Analyst in the Department also involved creating a species distribution model for an invasive species of macroalgae. We used presence of a closely related species and land use and environmental factors to predict the probability of the species invasion into Florida’s coastal waters. Supervisor: David G. Jenkins

***Related publications:***

Gardon et al. 2008, Biological Invasions

**Graduate Research Assistant, University of Central Florida**

Department of Biology, Orlando, FL

***Research:*** *Ecological studies of Carolina willow (Salix caroliniana)*. I conducted field work and all spatial analyses for a research project analyzing the factors affecting the invasion of Carolina Willow into herbaceous marsh habitat in the St. John’s River basin in central Florida. This included creating a species distribution model correlating environmental variables with species abundance to create a probability of species presence and to predict potential invasion points in the future. Supervisor: Pedro Quintana-Ascencio

**2000 – 2004**

**Project Manager, Illinois Department of Natural Resources (IDNR)**

Springfield, IL

***Job duties:*** Oversight and creation of several GIS spatial datasets, creation of metadata for use in all datasets, coordination between multiple agencies, training of staff in use of a GIS tool from multiple agencies, and writing all reports related to the project.

**GIS Analyst, Illinois Department of Natural Resources (IDNR)**

Springfield, IL

***Job duties:*** Assisted in the development and maintenance of a comprehensive spatial geodatabase of state owned, managed, and leased properties. I also provided technical assistance on creation and maintenance of a spatial database of enrollments into federal conservation programs such as CREP, CRP, and WRP.

**Wetlands Program Intern, Illinois Department of Natural Resources (IDNR)**

Springfield, IL

**Job duties:** I worked in the wetlands program at the IDNR and served as interim leader for several wetland-related projects. I developed a database/tracking system for wetland mitigation banks in Illinois, assisted with policy decisions and regulatory issues for the IDNR, and participated on an IDNR response on a Supreme Court Amicus brief.

**1999 – 2001 M.S. Biology, University of Illinois**

Springfield, IL

**Research:** *Depressional wetland loss in an agricultural landscape.* This project used hydrological modeling to overlay depressions in elevation data and hydric soils to model historical wetlands in a highly agricultural county.

**Related Publications:**

McCauley and Jenkins, 2005, Ecological Applications

Jenkins and McCauley, 2006, Proceedings of ACM symposium

**1994 – 1998 B.S. Zoology, Southern Illinois University**

Carbondale, IL

**Publications**

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Peeler, J.L., **L.A. McCauley**, K.L. Metlen, T. Woolley, K.T. Davis, M.D. Robles, R.D. Haugo, K.L. Riley, P.E. Higuera, J.E. Fargione, R.N. Addington, S. Bassett, K. Blankenship, M.J. Case, T.B. Chapman, E. Smith, R. Swaty, N. Welch. 2023. Identifying opportunity hot spots for reducing the risk of wildfire-caused carbon loss in western US conifer forests. *Environ. Res. Lett.* 18, 094040.

Davis, K.T., M.D. Robles, K. Kemp, P.E. Higuera, T. Chapman, K.L. Metlen, J.L. Peeler, K.C. Rodman, T. Woolley, R.N. Addington, B.J. Buma, C.A. Cansler, M.J. Case, B.M. Collins, J.D. Coop, S.Z. Dobrowski, N.S. Gill, C. Haffey, L.B. Harris, B.J. Harvey, R.D. Haugo, M.D. Hurteau, D. Kulakowski, C.E. Littlefield, **L.A. McCauley**, ... Campbell, J. L. 2023. Reduced fire severity offers near-term buffer to climate-driven declines in conifer resilience across the western United States. *Proceedings of the National Academy of Sciences*, 120(11), e2208120120.

**L.A. McCauley**, J.B. Bradford, M.D. Robles, R.K. Shriver, T.J. Woolley, C.A. Andrews. 2022. Landscape-scale forest restoration decreases drought mortality under climate change in Southwest US ponderosa forest. *Forest Ecology and Management* 509 (2022):120088

Bradford, J.B., R.K. Shriver, M.D. Robles, **L.A. McCauley**, T.J. Woolley, C.A. Andrews, M. Crimmins, D.M. Bell. 2022. Tree mortality response to drought-density interactions suggests opportunities to enhance drought resistance. *Journal of Applied Ecology* 59:549-559

Bradford, J.B., C.A. Andrews, M.D. Robles, **L.A. McCauley**, T.J. Woolley, R.M. Marshall. 2020. Landscape-scale restoration minimizes tree growth vulnerability to 21st century drought in a dry forest. *Ecological Applications* 31(2):e2238

- McCauley, L.A.**, M.D. Robles, T. Woolley, R.M. Marshall, A. Kretchun, D.F. Gori. 2019. Large-scale forest restoration stabilizes carbon under climate change in Southwest United States. *Ecological Applications* 29(8):e01979
- Zuckerberg, B., C.A. Ribic, **L.A. McCauley**. 2018. Effects of temperature and precipitation on grassland bird nesting success as mediated by patch size. *Conservation Biology* 32(4):872-882
- McCauley, L.A.**, B. Zuckerberg, C.A. Ribic. 2017. The future demographic niche of a declining grassland bird fails to shift poleward in response to climate change. *Landscape Ecology* 32(4):807-821
- McCauley, L.A.**, M.J. Anteau, and M. Post van der Burg. 2016. Consolidation drainage and climate change may reduce Piping Plover habitat in the Great Plains. *Journal of Fish and Wildlife Management* 7(1): 4-12.
- Post van der Burg, M., M.J. Anteau, **L.A. McCauley**, and M.T. Wiltermuth. 2016. A Bayesian approach for temporally scaling climate for modeling ecological systems. *Ecology and Evolution* 6(9):2978 – 2987
- McCauley, L.A.**, M.J. Anteau, M. Post van der Burg, and M.T. Wiltermuth. 2015. Land use and wetland drainage affect water-levels and dynamics of remaining wetlands. *Ecosphere* 6(6): 92
- McCauley, L.A.** and M.J. Anteau. 2014. Delineating wetland catchments and connectedness with high-resolution elevation data. *Wetlands* 34: (6) 1123-1132
- McCauley L.A.**, D.G. Jenkins, and P.F. Quintana-Ascencio. 2013. Land use changes cause delayed reproductive failure in a long-lived wetland tree. *Journal of Applied Ecology* 50: 25-33.
- McCauley, L.A.**, D.G. Jenkins, and P.F. Quintana-Ascencio. 2013. Cypress (*Taxodium distichum*) wetland loss and degradation in an increasingly urbanized landscape. *Wetlands* 33:117-127
- Gardon C.G., L.J. Walters, P.F. Quintana-Ascencio, **L.A. McCauley**, W.T. Stam and J.L. Olsen. 2008. Predicting risks of invasion of macroalgae in the genus *Caulerpa* in Florida. *Biological Invasions* 10: 1147-1157
- Jenkins, D.G. and **L.A. McCauley**. 2006. GIS, SINKS, FILL, and Disappearing Small Wetlands: A Case Study of Unintended Consequences in Algorithmic Development. Proceedings of the 2006 ACM Symposium on Applied Computing
- McCauley, L.A.** and D.G. Jenkins. 2005. GIS-based estimates of former and current depression wetlands in an agricultural landscape. *Ecological Applications* 15:1199-1208

## **Presentations**

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- McCauley, L.A., J.B. Bradford, M.D. Robles, R.K. Shriver, T.J. Woolley, C.A. Andrews Forest restoration can increase climate resilience in southwestern forests. Biennial Conference of Science and Management for the Colorado Plateau and Southwest Region. Flagstaff, September 2022
- McCauley, L.A., J.B. Bradford, R.K. Shriver, M.D. Robles, T.J. Woolley, C.A. Andrews, M. Crimmins, D.M. Bell. Can forest restoration reduce ponderosa pine drought mortality under climate change? Global Science Gathering. March 2021

- McCauley, L.A., M.D. Robles, T.J. Woolley, R.M. Marshall, A. Krethcub, and D.F. Gori. Large-scale forest restoration stabilizes carbon under climate change in Southwest U.S. Biennial Conference of Science and Management for the Colorado Plateau and Southwest Region. Flagstaff, AZ. September 2019.
- McCauley, L.A., M.D. Robles, T.J. Woolley, R.M. Marshall, A. Krethcub, and D.F. Gori. Large-scale forest restoration stabilizes carbon under climate change in Southwest U.S. Ecological Society of America. Louisville, KY. August 2019
- McCauley, L.A., M.D. Robles, T.J. Woolley, R.M. Marshall, A. Krethcub, and D.F. Gori. Large-scale forest restoration stabilizes carbon under climate change in Southwest U.S. North American Forest Ecology Workshop. Flagstaff, AZ. June 2019
- McCauley, L.A., M.D. Robles, T.J. Woolley, R.M. Marshall, A. Krethcub, and D.F. Gori. Carbon dynamics of large-scale forest restoration. Houston, TX. TNC Global Science Gathering 2018
- McCauley, L.A., B. Zuckerberg, C.A. Ribic, M. Robles, G. Bodner. Climate Change Vulnerability and Management of grassland species. *Invited Speaker*. Tyson Research Center, Washington University, St. Louis. July 2016.
- Zuckerberg, B. C.A. Ribic, and **L.A. McCauley**. Assessing Climate Change Vulnerability of Grassland Birds Using Demographically Informed Species Distribution Models. Central Hardwoods Joint Venture technical committee. March 2016
- Zuckerberg, B. C.A. Ribic, and **L.A. McCauley**. Assessing Climate Change Vulnerability of Grassland Birds Using Demographically Informed Species Distribution Models. NE CSC Webinar. November 2015.
- Anteau, M.J.\*, M.T. Wiltermuth, **L.A. McCauley**, and M. Post van der Burg. Conservation of wetlands in the Prairie Pothole Region in the face of changing climate and land use. *Invited speaker* Society of Wetland Scientists Annual Meeting. Providence, RI. 2015
- Wiltermuth, M.T.\*, M.J. Anteau, **L.A. McCauley**, and M. Post van der Burg. Climate-driven hydrological and biological processes in Prairie Pothole Wetlands are degraded by landscape modifications. Society of Wetland Scientists Annual Meeting. Providence, RI. 2015
- Anteau, Michael J.\*, M.W. Wiltermuth, **L.A. McCauley**, M. Post van der Burg. Conservation of PPR Wetlands in the face of past, present, and future land use and climate changes. North Dakota Chapter of The Wildlife Society Meeting. Mandan, ND. 2015
- Wiltermuth, M. T\*, M. J. Anteau, **L. A. McCauley**, M. Post van der Burg, M. E. Clark, and J. A. Walker. Consolidation drainage affects hydrology and biological communities of remaining northern prairie wetlands. North Dakota Chapter of The Wildlife Society Meeting. Mandan, ND. 2015
- McCauley, L.A.\***, B. Zuckerberg, C.A. Ribic. Assessing climate change vulnerability of grassland species using demographically informed species distribution models. Midwest Fish and Wildlife Conference. Indianapolis, IN 2015

- Wiltermuth, M. T\*, M. J. Anteau, **L. A. McCauley**, M. Post van der Burg, M. E. Clark, and J. A. Walker. Influence of climate variability and landscape modifications on water dynamics, community structure, and amphipod populations in large prairie wetlands: implications for waterbird conservation. North Dakota Game and Fish Department Office, Bismarck, ND. 2014
- McCauley, L.A.\***, B Zuckerberg, CA Ribic. Assessing climate change vulnerability of grassland species using demographically informed species distribution models. National Workshop on Large Landscape Conservation. Washington, D.C. 2014
- McCauley, L.A.\***, B Zuckerberg, CA Ribic. Using demographically informed species distribution models to assess climate change vulnerability. Plenary talk - Midwest Bird Conservation Workshop and Conference. Port Washington, WI. 2014
- McCauley, L.A.\***, M.J. Anteau, M. Post van der Burg, and M.T. Wiltermuth. Land use and climate affects wetland dynamics and productivity. Ecological Society of America. Minneapolis, MN. 2013
- McCauley, LA**, MJ Anteau, M. Post van der Burg, MT Wiltermuth. Land use and climate affects wetland dynamics and productivity. *Invited speaker via webinar*. Plains and Prairie Pothole Landscape Conservation Cooperative, Connections Conference. Bismarck, ND. 2013
- McCauley, L.A.\***, M.J. Anteau, M. Post van der Burg, and M.T. Wiltermuth. Land use and climate affects wetland dynamics and productivity. Ecology and Conservation of North American Waterfowl conference. Memphis, TN. 2013.
- Wiltermuth, M.T.\* , M.J. Anteau, M.E. Clark, **L.A. McCauley**. Climate, Landscape, and Fish have Interacting Influences on Invertebrate-Duck Foods. Ecology and Conservation of North American Waterfowl conference. Memphis, TN. 2013.
- McCauley, L.A.\*** and Michael Anteau. Interactions of consolidation drainage and climate on water-level dynamics, wetland productivity, and waterbirds. *Invited speaker*. Plains and prairies potholes Landscape Conservation Cooperative meeting. Bismarck, ND. 2012.
- McCauley, L.A.\*** Freshwater wetlands in human-altered landscapes. *Invited speaker*. Minnesota State University, Moorhead, MN. 2012.
- McCauley, L.A.\*** The effects of urbanization on cypress wetlands in central Florida. *Invited speaker*. USGS, Northern Prairie Wildlife Research Center, Jamestown. ND. 2012.
- McCauley, L.A.\***, D.G. Jenkins, and P.F Quintana-Ascencio. Range-wide urbanization effects on Cypress (*Taxodium distichum*) wetlands. International Biogeography Society, Irakleio, Crete. 2011.
- McCauley, L.A.\***, D.G. Jenkins, and P.F Quintana-Ascencio. An analysis of historical wetland loss in an urban landscape. Ecological Society of America, Pittsburgh, PA. 2010.
- McCauley, L.A.\***, D.G. Jenkins, and P.F Quintana-Ascencio. Urbanization effects on cypress domes in central Florida. Ecological Society of America, Milwaukee, WI. 2008.

**McCauley, L.A.\***, and Jenkins, D.G. Urbanization Effects on Cypress Domes. Florida Native Plant Society, Palmetto, FL. 2008.

Jenkins, D.G.\*, K. Miller, and **L.A. McCauley\***. GIS, SINKS, FILL, and Disappearing Small Wetlands: A Case Study of Unintended Consequences in Algorithmic Development. ACM Symposium on Applied Computing, Computer Ethics and Human Values track. Dijon, France. 2006

Glardon, C.\*, L. Walters, P. Quintana-Ascencio, J Weishampel, and **L.A. McCauley**. Predicting Risks of Invasion of *Caulerpa* Species in Florida. Society of Integrative and Comparative Biology conference. Orlando, FL. 2006

Glardon, C.\*, L. Walters, P. Quintana-Ascencio, J Weishampel, and **L.A. McCauley**. Predicting Risks of Invasion of *Caulerpa* Species in Florida. 2005 Estuarine Research Federation conference. Norfolk, VA. 2005.

**McCauley, L.A.\*** Wetland Impact Review Tool: A GIS Application to Aid in Wetland Planning. Speaker presentation, Assoc. of State Wetland Managers Conference, Nashua, NH. 2003.

**McCauley, L.A.\*** GIS-Based Estimates of Former Isolated Wetlands in an Agricultural Landscape. Ecological Society of America, Savannah, GA. 2003.

**McCauley, L.A.\*** Using GIS to Determine Depressional Wetland Loss in Champaign County, IL. UIS Science and Research Symposium. Springfield, IL. Award, Best Presenter. 2001

\*Presenter