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Education

B. A. Honors degree in Liberal Arts, University of Texas, Austin, Special honors awarded 1992.
M. A. Anglo-Irish Literature, University College Dublin 1993.
M. S. Statistics, University of Tennessee, Knoxville, Department of Statistics 2006.
Ph. D. Ecology and Evolutionary Biology, University of Tennessee, Knoxville, Department of Ecology and Evolutionary Biology 2007.

Appointments

January 2011 – present. Senior Scientist, Smithsonian Environmental Research Center Temperate Program Coordinator, Forest Global Earth Observatory.

March 2009 – 2011. Smithsonian Environmental Research Center, Center for Tropical Forest Science-Forest Global Earth Observatory. Synthetic modeling of CTFS network census data, temperate and tropical forest sites. Post-doctoral fellow.

2006-2009. Duke University. Post-doctoral researcher with James S. Clark. Nicholas School of the Environment. Individual-based simulator of forest population dynamics.

Published Articles

Ohse, Bettina, Aldo Compagnoni, Caroline E. Farrior, Sean M. McMahon, Roberto Salguero-Gomez, Nadja R'uger, and Tiffany M. Knight. "Demographic Synthesis for Global Tree Species Conservation." *Trends in Ecology & Evolution*, 2023. <https://doi.org/10.1016/j.tree.2023.01.013>.

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Books

Cadotte, M. W., McMahon, S. M., and Fukami, T. 2006. *Conceptual Ecology and Invasions Biology: reciprocal approaches to nature*. Springer-Verlag. Dordrecht, The Netherlands.

Book chapters

McMahon SM. 2017. Temperate forests: a tale of the Anthropocene. In *Living in the Anthropocene: The Earth in the Age of Humans*. Kress WJ, Stine JK, editors, Smithsonian Press.

McMahon, S. M., M. W. Cadotte, and T. Fukami, 2006. Tracking the tractable: using invasions to guide the exploration of conceptual ecology In: M.W. Cadotte, S. M. McMahon and T Fukami (eds.). *Conceptual Ecology and Invasions Biology: reciprocal approaches to nature*. Springer-Verlag Academic Academic Press. Dordrecht, The Netherlands.-

Cadotte, M. W., S. M., McMahon, and T. Fukami 2006. Linking spatially dependent processes in invasions. In: In: M.W. Cadotte, S. M. McMahon and T Fukami (eds.). *Conceptual Ecology and Invasions Biology: reciprocal approaches to nature*. Springer-Verlag. Dordrecht, The Netherlands.

Invited Presentations

McMahon, SM. The rare species problem: the challenge of complete forest demographic inference. AMAP Lab, University of Montpellier. November 2022.

McMahon, SM. The ever-changing role of biodiversity in forests: Implications for climate change projections. CEMEB Lecture Series, University of Montpellier. April 2022.

McMahon, SM. The multiple roles of inventory plots in predicting future forest dynamics. Annual meeting of EUFORYA. Prague, Czech Republic. June 2022.

McMahon, SM. Biodiversity and carbon: integrating two cultures of forest research to advance predictions of Earth's future climate. Wissenschaftskolleg zu Berlin. June 2022.

McMahon, SM., Needham, Jessica, Ordway, Elsa. Representing tropical forest diversity in vegetation models: Conceptual challenges and demographic opportunities ATBC, Madagascar. August 2019.

McMahon, SM. Introduction to the Forest Global Earth Observatory. Smithsonian Conservation Commons. 2019.

The Forest Global Earth Observatory. Pembroke College-Smithsonian UK symposium in Oxford, UK. 2019

McMahon, S. M. and Needham, J. Forms of forests: capturing ecological diversity for predictive vegetation models. Meeting of the Society of Evolutionary Demography. Miami, FL. January 2019.

McMahon, S. M. October 2016. Forest phenology from stem to system, Ecology Seminar Series. Oregon State University.

McMahon, S. M. June, 2016. Representativeness of forests from above and below. Helmholtz Alliance "Remote sensing and earth system dynamics" annual meeting. Garmisch, Germany.

McMahon, S. M. April, 2016. The implication of hidden seasons for global forest dynamics. George Mason University, Virginia.

McMahon, S. M. October, 2015 Near-term projections of long-lived forest systems. Munich Technical Institute, Freising, Germany.

McMahon, S. M. August, 2015 Between forests and trees: Building demographic models for global change research. Organized oral session at ESA Annual Meeting, Baltimore, MD.

McMahon, S. M. March, 2015. A dialogue between the forest and the trees: cross-scale demographic models for global change research. BES sponsored meeting: Demography beyond the population. Sheffield, UK.

McMahon, S. M. September, 2015. Linking scales of forest dynamics through demography. University of Kansas, US.

McMahon, S. M. July, 2015. The implication of cryptic phenology for global forest dynamics. Tupper Talk at the Smithsonian Tropical Research Institute. Panama.

McMahon, S. M. March 2014. Tree time: How temporal scale frames forest response to climate change, Department of Earth and Planetary Science, Johns Hopkins University, Maryland.

McMahon, S. M. November 2013. Modeling tree growth for projections and physiological inference. Laboratory of Tree-Ring Research, University of Arizona, Tuscon.

McMahon, S. M. March 2013. Physiological phenology: what seasons mean to trees. Indiana University, Bloomington, IA.

McMahon, S. M. May 2012. Tyson Research Center. Life of Trees: an introduction to growth and survival in forests. Washington University, St. Louis, MI.

McMahon, S. M. April 2012. Now-casting forests in a changing world. University of Arizona.

McMahon, S. M. February 2012. The physiology of phenology: what seasons mean to trees.

McMahon, S. M. February 2012. The physiology of phenology: what seasons mean to trees. University of Maryland-Baltimore County.

McMahon, S. M. June 2012. The physiology of phenology: interpreting seasons of forests. George Washington University.

McMahon, S. M. Climate change threats to forest biodiversity: from evidence to prediction. December, 2010. National Museum of Natural History.

McMahon, S. M. Transient dynamics of temperate forests: Scaling from trees to the forest and back. December, 2010. Harvard University.

McMahon, S. M. Changing forests in a changing world. June, 2010. Nicolet National Forest Breeding Bird Survey.

McMahon, S. M. Scaling from trees to the forest and back: inferring changes in temperate forests. April, 2010. Department of Biology Ecolunch speaker at the University of Pennsylvania.

McMahon, S. M. Combining chronosequence and census data shows recent accelerated growth of temperate forest stands. February 2010. Smithsonian Tropical Research Institute. Panama City, Panama.

McMahon, S. M., J. S. Clark. Movement of forest species. September, 2009. Workshop on biodiversity and climate change. Kew Gardens, London, England.

McMahon, S. M. Structured variance and the coexistence of forest tree species. December, 2008. Invited lecture at the Ecole Normale Supérieure, Paris, France.

McMahon, S. M. The future of forests: statistical and computational challenges of predicting large-scale biological systems. October, 2008. Math-Biology Series. Appalachian State University, Boone, NC.

McMahon, S. M., J. Metcalf, and J. Drake. December, 2006. The collision of systems: shifting the conceptual framework of invasion biology. Biology, Ecology and Management of World's Worst Plant Invasive Species. University of Delhi, India.

McMahon, S. M. June, 2004. Using machine learning to learn nature: Bayesian learning networks and inference in invasions biology. Conference on Computational and Mathematical Population Dynamics. Trento, Italy.

McMahon, S. M. 2003. Gaps, herbs, and insects: community structure in an old-growth southern Appalachian forest. Evolution and Behavior Seminars, Knoxville, TN.

Groups and Invited Workshops

Forest-GEO Genomics meeting. Barro Colorado Island, Panama. January, 2017.

Tropical Forest Mortality. Dept. of Energy NGEE-Tropics. Santa Fe, New Mexico. December 2015.

Calibration and validation of forest biomass monitoring

Climate Alliance, March 2016. Washington, DC.

Integral Projection Models (co-coordinator). Max Planck Institute for Demographic Research. Rostock, Germany. June 2012.

SIGEO Symposium on Forest research. Beijing Botanical Gardens. Beijing, China. July, 2012.

Forest biodiversity working group. Part of the Research Coordination Network (NSF funded) grant on ecological forecasting and data assimilation.

Research Coordination Network (NSF funded) workshop on Ecological forecasting and data assimilation. NEON, Inc. Boulder, CO, July 2010.

CTFS database workshop. February, 2010. Bradley University. Peoria Illinois.

Workshop on Biodiversity and Climate Change. Royal Botanic Gardens, Kew, UK. September 2009. Organized by [\[QUEST\]\[1\]](#).

Alpine summer school: Interaction and coevolution of climate and the biosphere. Valsavarenche, Italy. June, 2008.

Workshop on 'Advanced prediction of biome boundary shifts in regional and global dynamic vegetation models.' JAMSTEC Institute. Yokohama, Japan. March, 2008.

NSF workshop on Data-Model Assimilation. Norman, OK. October, 2007.

McMahon, S. M. and J. S. Clark. Modeling the trees for the forest: a computer simulation of a terrestrial ecosystem. A course for the Terrestrial Modeling component of the Statistical and Applied Mathematical Sciences Institute (SAMSI). Education and Outreach Program. Research Triangle, NC. March, 2007.

A brief introduction to Bayesian statistics (short course with computer lab). Max Plank Institute of Demographic Research. Rostock, Germany. October 2006.

Funding (selected)

Quantifying leaf-to-landscape predictors of tropical forest drought vulnerability through ISS observation-model integration. NASA. 1M. 5/2022 - 4/2025.

Collaborative Research: RAPID: Forest productivity and expression in a low-emissions present: A RAPID response to the COVID-19 Emissions Reduction Event. NSF. 200K. 4/2000 - 3/2001.

Collaborative Proposal: MSB-ENSA: Forest function from genes to canopies: disentangling the fine scale spatio-temporal variation in gene expression and tree growth. NSF Macrosystems. Co-PI. \$290K. 12/16 - 12/20.

How will the woody productivity of forests worldwide respond to climate change? In forests globally, are large trees more sensitive to aridity? Smithsonian Institution Competitive Research Grants. Co-PI. 1/2015 - 12/2017. 100K.

Using automated dendrometer bands to link tree growth and water use to ecosystem-atmosphere exchange at ForestGEO sites. Smithsonian Institution Grand Challenges Awards. Co-PI. 1/2015 - 12/2016. 75K.

Joint Czech Republic-American Grant for Scientific Collaboration. 1/60K

The Tyson Research Center Forest Drought Laboratory: Establishing a Long-term Resource for Linking Climate Change, Extreme Droughts, and Ecosystem Dynamics, I-Cares, Washington University in St. Louis. Funded. \$43K. 5/13-4/14.

Biotic carbon turnover: fungal influences on wood decay through space and time. George Washington University and the Smithsonian Institution. Co-PI. 50K. 03/01/13-02/28/14.

Linking Forest Community Dynamics to Ecosystem-Climate Interactions, Smithsonian Institution. Co-PI. 80K. March 2013-February 2015.

Dynamical modeling of species' responses to climate change - integrating plant distributions, demography, and traits in a Bayesian informatics framework. NSF Macrosystems. Co-PI. \$660K. 1/13 - 12/17.

Measuring the Pulse of the Forest: Assessing Adaptation and Mitigation of Tribal Sustainable Forestry and Communities to Climate Change. USDA. Co-I. \$200K. : 9/01/2012 - 8/31/2015.

REU Site: Global Change Ecology at the Smithsonian Environmental Research Center. NSF. Co-I. \$101K. 4/2012 - 3/2017.

Co-PI on the grant “Demography in a continuous world: new advances in integral projection models II” (€30K) from the Max Planck Society (2012).

NSF-CDI 0940671, Consultant. “Integrating algorithmic and stochastic modeling techniques for environmental prediction” (2009).

Science Alliance Award for Outstanding Scholarly Achievement by a Graduate Student. University of Tennessee, Knoxville. 2006.

Scholarly Activity and Research Incentive Funds (SARIF) (2005)

Summer Research Grant, Dept. of EEB, University of Tennessee (2001, 2002, 2003).

EEB Merit Award, Dept. of EEB, University of Tennessee (2002).

NSF Graduate Research Fellowship (Commended) (2002).

Ph.D. Committees

Amanda Whitehurst, University of Maryland Tyeen Taylor, University of Arizona Marielle Smith, University of Arizona Bailey McNichols, University of Nebraska Samantha Worthy, University of Maryland Krittika Petprakob, University of Maryland

Computation

Programming languages: R, C++, SQL, Unix, MatLab, Python, SAS. Maintainer of the R package, IPMpack.

Code publication

CJE Metcalf, SM McMahon, R Salguero-Gomez and E Jongejans (2012). IPMpack: Builds and analyses Integral Projection Models (IPMs). R package version 1.2. <http://CRAN.R-project.org/package=IPMpack>.

Reviews

I have reviewed articles for *Nature*, *Science*, *Ecology Letters*, *Proceedings of the National Academy of Sciences*, *Trends in Ecology and Evolution*, *Journal of Ecology*, *Ecological Applications*, *Journal of Ecology*, *Remote Sensing and the Environment*, *Nature Climate Change*, *Nature Communications*, *Oikos*, *Ecological Applications*, *Ecological Modeling*, *Ecology and Evolution*, *Ecology*, *Plant Ecology*, *Canadian Journal of Forest Research*, *New Phytologist*, *Journal of Applied Ecology*, *Diversity and Distributions*, *Limnology and Oceanography*, and *Biological Invasions*, and others. I have reviewed proposals for NSF for the DEB cluster and Macrosystems.

Supervisor

Current post-docs: Kelvin Acebron.

Former post-docs: Jessica Needham (Lawrence Berkeley National Lab), Rutuja Titra-Tarak (Los Alamos National Lab), Uzay Sezen (University of Connecticut), Cory Merow (University of Connecticut). Chia-Hao Chang-Yang, Tu (National Dong Hwa University).

Synergistic Activities:

Mentor in ForestGEO Summer Workshops (2011 - 2019).

NSF Panel member.

Co-edited a special cross journal feature for the British Ecological Society, "Demography beyond the population" published in 2016.

Handling Editor at Methods in Ecology and Evolution (2012 - 2020).

Member of Smithsonian Institution's Living in the Anthropocene Executive Committee (2015 - 2018).

Co-led a weeklong working group on Integral Projection Models with collaborators at the Max Planck Institute for Demographic Research, Rostock, Germany, June 2012.

Published an R package, 'IPMpack' that builds, tests, and projects integral projection models (IPMs) for a range of data, including forest data.

Research Coordination Network (NSF funded) workshop on Ecological forecasting and data assimilation. NEON, Inc. Boulder, CO, July 2010.