Michael France Nelson

michaelfrancenelson@gmail.com
1-651-308-5430
https://michaelfrancenelson.github.io/

Education

Doctor of Philosophy: **2014**
Plant Biological Sciences, **University of Minnesota**
Advised by Dr. Neil O. Anderson, Department of Horticulture, ander044@umn.edu
Dissertation title: Experimental and simulation studies of the population genetics, water relations, and vegetative growth of *Phalaris arundinacea* L.

Bachelor of Science   **2006**
General Biology, **Bowling Green State University**

Professional Experience

Lecturer at the University of Massachusetts, Amherst   **2019 - 2023**
Department of Environmental Conservation

Teaching
- Analysis of Environmental Data and Lab: ECO 602/634
- Spatial Data Analysis in R: ECO 697DR
- Introduction to Quantitative Ecology: NRC 240
- Introduction to GIS: NRC 585

Service
- Quantitative Sciences Group (QSG):
  - Manage the QSG website, organize the schedule.
  - Contribute to consultations between participating faculty and students on all aspects of study design, analytical methodology and interpretation of results.
  - https://sites.google.com/umass.edu/qsg/home
- Northeast Regional Invasive Species and Climate Change Network (RISCC)
  - Member of the RISCC leadership team.
  - Contribute to and help coordinate RISCC's translational outreach (research summaries, management challenges, webinars, and symposia) and research products (original research papers).
  - https://www.risccnetwork.org/northeast

Advising: Graduate and Undergraduate Students

- Amanda Suzzi – Ph.D. Primary advisor, Environmental Conservation. Successful dissertation defense: July 2023.
- Served on numerous Ph.D. and Master's degree student committees.
- Served as chair of multiple undergraduate student independent studies, practica, and honors theses.

Other Advising and Mentoring Activities

- Member of the new student orientation team for the Environmental Science program: Summer orientation program for incoming undergraduate students.
- Committee member for multiple graduate students in the Environmental Conservation (ECo) and Organismal and Evolutionary Biology (OEB) programs.
- Frequent informal mentoring and consulting with graduate and undergraduate students on topics including statistics/data analysis, programming, and spatial analysis.

Publications:

Journal Articles

Nelson MF, Klein RW, Koeser AK, Landry SM & Kane B. (2022). The Impact of Visual Defects and Neighboring Trees on Wind-Related Tree Failures. *Forests*, *13*(7), 978. https://doi.org/10.3390/f13070978

Abrams J, Huber-Stearns H, Steen-Adams M, Davis EJ, Bone CE, **Nelson MF** & Moseley C. (2021). Adaptive governance in a complex social-ecological context: Emergent responses to a native forest insect outbreak. *Sustainability Science*, *16*(1), 53–68. https://doi.org/10.1007/s11625-020-00843-5

Bone CE & **Nelson MF.** (2019). Improving Mountain Pine Beetle Survival Predictions Using Multi-Year Temperatures Across the Western USA. *Forests*, *10*(10), 866. https://doi.org/10.3390/f10100866

Nelson MF, Murphy JT, Bone CE & Altaweel M. (2018). Cyclic epidemics, population crashes, and irregular eruptions in simulated populations of the mountain pine beetle, Dendroctonus ponderosae. *Ecological Complexity*, *36*, 218–229. https://doi.org/10.1016/j.ecocom.2018.08.006

Abrams J, Huber-Stearns H, Palmerin ML, Bone CE, **Nelson, MF**, Bixler RP & Moseley C. (2018). Does policy respond to environmental change events? An analysis of Mountain Pine Beetle outbreaks in the Western United States. *Environmental Science & Policy*, *90*, 102–109. https://doi.org/10.1016/j.envsci.2018.09.019

Nelson MF & Anderson NO. (2016). Adaptive responses to water stress in *Phalaris arundinace*a, an invasive wetland grass. In *Invasive Species: Ecology, Management Strategies & Conservation* (pp. 1–20). Nova Science Publishers, Inc.

Nelson MF, Ciochina M & Bone CE. (2016). Assessing spatiotemporal relationships between wildfire and mountain pine beetle disturbances across multiple time lags. *Ecosphere*, *7* (10), e01482. https://doi.org/10.1002/ecs2.1482

Nelson MF & Bone CE. (2015). Effectiveness of dynamic quarantines against pathogen spread in models of the horticultural trade network. *Ecological Complexity*, *24*, 14–28. https://doi.org/10.1016/j.ecocom.2015.07.002

Nelson MF & Anderson NO. (2015). Variation Among Genotypes and Source Habitats in Growth and Fecundity of the Wetland Invasive Plant Phalaris arundinacea L. *Wetlands*, *35*(6), 1175–1184. https://doi.org/10.1007/s13157-015-0704-9

Nelson MF, Anderson NO, Casler MD & Jakubowski AR. (2014). Population genetic structure of N. American and European Phalaris arundinacea L. as inferred from inter-simple sequence repeat markers. *Biological Invasions*, *16*(2), 353–363. https://doi.org/10.1007/s10530-013-0525-9

Nelson MF & Anderson NO. (2013). How many marker loci are necessary? Analysis of dominant marker data sets using two popular population genetic algorithms. *Ecology and Evolution*, *3*(10), 3455–3470. https://doi.org/10.1002/ece3.725

Outreach and Technical Reports

Allen J, Beaury E, Mazzuchi J, **Nelson MF**, O'Uhuru A & Bradley B. (2022). Regional Invasive Species & Climate Change Management Challenge: Do Not Sell! Ornamental Invasive Plants to Avoid with Climate Change. https://doi.org/10.7275/avq3-ma30.

Putnam A, **Nelson MF**, Pfadenhauer W, Fertakos M & Suzzi A (2022) Regional Invasive Species & Climate Change Management Challenge: Marine Mischief: Salt marshes, climate change, and invasive species, oh my! https://doi.org/10.7275/b5c2-np62

Laginhas BB, Morelli TL, Barker-Plotkin A, Beaury EM, Cousins E, Joubran S, **Nelson MF**, Talbot S & Bradley BA (2020) Nuisance Neonatives: Guidelines for assessing range-shifting species Northeast RISCC Management Challenge, University of Massachusetts, Amherst, https://doi.org/10.7275/8n20-kk32

Collaborations with Students

Moheb Z, **Nelson MF**, Ostrowski S, Zahler PI, Bowlick FJ & Fuller TK. (2023). Factors influencing the diurnal spring distribution of sympatric urial and Siberian ibex in the Hindu Kush Mountains of Wakhan National Park, Afghanistan. *Global Ecology and Conservation*, *43*, e02423. https://doi.org/10.1016/j.gecco.2023.e02423

Pfadenhauer WG, **Nelson MF**, Laginhas BB & Bradley BA. (2023). Remember your roots: Biogeographic properties of plants' native habitats can inform invasive plant risk assessments. *Diversity and Distributions*, *29*(1), 4–18. https://doi.org/10.1111/ddi.13639

Grants

National Resource Conservation Service Conservation Innovation Grants

Cape Cod Cranberry Growers Association: 2021 - 2023
Improving Cranberry Fruit Quality by Understanding the Microclimate of the Bog.
Leela Uppsala, Principal Investigator; Michael France Nelson, Key Personnel.
Amounts: **$66,000 federal; $100,700 match/cost-share**

SARE LNE21-433R-35383 2021 - 2023
Identifying Critical Criteria to Develop a Decision-making Model for Implementing Late Water Floods in Cranberry Production.
Leela Uppsala, Principal Investigator; Michael France Nelson, Key Personnel.
Amount: **$189,340**

UMass Open Education Initiative Seed Grant 2021
PIs: Michael France Nelson and Meg Grahm McLean
Amount: **$2,000**

Additional Professional Experience

Postdoctoral Research Associate 2017 - 2019
University of Oregon Institute for Sustainable Environment, Ecosystem Workforce Program
Supervised by Dr. Jesse Abrams, jesse.abrams@uga.edu

Research focus: Mountain Pine Beetles (MPB), in support of National Science Foundation grant # 141404
- Continued development of agent-based models of bark beetles and pine forest succession.

- Developed an agent-based model of Forest District Rangers' management of national forest resources.
- Conducted spatial analyses of spatiotemporal relationships between climate and the spread of MPB epidemics in Western North America.

Mentoring
- Served as an informal mentor to several Ph.D. and Master students in areas including technical aspects of research tools and statistical analyses, refining research questions and methods, writing, and navigating graduate coursework.

Postdoctoral Research Associate   2014 - 2017
University of Oregon, Department of Geography, Shed and S3C Labs
Mentored by Dr. Chris Bone, chrisbone@uvic.ca
2014-2017

Research focus: Sudden Oak Death Pathogen (SOD)
- Analyzed the spread of the invasive SOD pathogen, *Phythophthora ramorum*, in its introduced ranges in California and Great Britain using network models, cellular automata, and climate space analysis.
- Studied the effectiveness of quarantines in the horticultural trade network to curb the spread of SOD.

Research focus: Mountain Pine Beetles (MPB), in support of National Science Foundation grant # 141404
- Studied the relationships of time-lagged bark beetle and fire disturbances in pine forests of Western North America.
- Developed a spatially-explicit agent-based model of coupled pine and bark beetle populations.
- Built gap and state/transition models of pine forest succession based on data from the LANDFIRE Biophysical Settings models.

Teaching
- Instructor: Spatial Modeling, GEOG 490   Spring 2016
- Instructor: Spatial Analysis, GEOG 494/594   Fall 2017
- Course Assistant: Spatial Modeling, GEOG 494/594   Fall 2014

Mentoring
- Served as an informal mentor to several Ph.D. and Master students in areas including technical aspects of research tools and statistical analyses, refining research questions and methods, writing, and navigating graduate coursework.

Graduate Research and Teaching Assistant   **2008 – 2014**

University of Minnesota Plant Biological Sciences Program, Department of Horticulture

Dissertation Research Focus: Reed Canarygrass, *Phalaris arundinacea* L.
- Conducted a molecular population genetics study of relationships within and among populations of *P. arundinacea* in North America and Europe using dominant genetic markers.
- Created a simulation model of dominant markers in populations and evaluated the effects of sample size, within/among population variability, number of markers, and unbalanced sampling on the results from population clustering analyses.
- Conducted greenhouse and field studies to examine the relative drought tolerance of *Phalaris* genotypes collected in contrasting upland and wetland environments. Analyzed responses using a variety of physical and ecophysiological techniques.
- Created an interacting particle system model of *P. arundinacea* clonal spread using growth data from the greenhouse and field experiments to examine the population-level genetic diversity responses to differing levels of disturbance.

Teaching Experience graduate teaching assistant
- General Botany Laboratory, BIOL 2022
- Foundations of Biology Research Lab, BIOL 2002
- Plant Function Lab, BIOL 3005W
- Applied Biostatistics, BIOL 3272/5272

Technical and Software Skills

R: Extensive experience in using the R programming language for statistical analysis, data visualization, network analysis, and as a Geographic Information System (GIS). Experience teaching students to use R for coursework in spatial and general statistics.

ESRI ArcGIS: Used ArcGIS Pro (and previously ArcMap) as the software platform for laboratory assignments for teaching the Introduction to Geographic Information Science (GIS) courses at UMass Amherst. Used ArcGIS Pro and ArcMap for research collaborations with students and other faculty at UMass.

Java: Used the Java language to build agent-based models of bark beetles, forest growth and succession, forest management, and for processing large climate data sets.

NetLogo: Utilized NetLogo as a teaching tool, both in coursework and informal mentoring of graduate students, and as a tool for creating prototype agent-based models for later implementation in Java.

Research, Outreach, and Technical Presentations

Uppala LS, **Nelson MF**, Sulley S (2022). Late Water Demonstration of a Decision Making Model. Bogside Workshop. Carver MA, September 12, 2022.

Nelson MF. (2022). Improving Cranberry Fruit Quality by Understanding the Microclimate of the Bog. Presentation at the annual American Cranberry Growers Association summer meeting. Chatsworth NJ, August 18, 2022.

Nelson MF. (2022). Working With Spatial Data in R! A brief Introduction. Presentation at the University of Massachusetts, Amherst. Amherst MA, April 13, 2022.

Nelson MF. (2022). Implications of climate change for invasive species. Presentation to the Pennsylvania Department of Conservation and Natural Resources. February 22, 2022.

Nelson MF. (2021). Invaders for Sale – Buyer beware. Presentation to the Town of Gardiner NY. November 4, 2021.

Nelson MF. (2018). Linking weather and recent mountain pine beetle epidemics using physiological and agent-based models. Ecological Society of America annual meeting. New Orleans LA. August 7, 2018.

Nelson MF. (2017). Mountain pine beetle: breakpoints and equilibria in simulated forest stands. Ecological Society of America annual meeting. Portland OR, August 8, 2017.

Nelson MF, Schworer, C. (2015). Postdocs Talk Trees. Presentation at the University of Oregon Department of Geography seminar series. Eugene OR, May 7, 2015.

Nelson MF. (2013). Midwest Genotypes of Reed Canarygrass Harbor Significant Drought Tolerance Diversity. Oral Presentation at the 2013 Society of Wetland Scientists Annual Meeting. Duluth MN, June 2-6, 2013.

Nelson MF. (2013). Genetic Structure and Diversity of Drought Tolerance Traits in Reed Canarygrass. Guest lecture at Gustavus Adolphus College. Saint Peter MN, March 22, 2013.

Nelson, MF. (2012). Diversity in Drought Tolerance Traits of Midwest Genotypes of Reed Canarygrass. Oral Presentation at the Upper Midwest Invasive Species Conference. La Crosse WI, October 29-31, 2012.

Nelson, MF. (2012). Determining the Population Genetic Structure of *Phalaris arundinacea* L. Using ISSR Markers. Oral presentation at the University of South Bohemia. February 13, 2012.

Nelson, MF & Anderson, NO. (2012). Genetic Differentiation of *Phalaris arundinacea* Using ISSR Markers and Simulations to Model Dispersal. Poster

presentation at the Molecular Ecology 2012 Conference. Vienna, Austria, February 4 – 7, 2012.

Nelson MF & Anderson NO. (2012). Modeling *Phalaris* Population Growth, Migration, Selection, and Unbalanced Sampling Using Simulated Dominant Marker Data. Poster presentation at Plant and Animal Genomics 2012. San Diego CA, January 14-18, 2012.

Nelson MF, Anderson NO, Casler MD & Jakubowski AR. (2010). Population Structure as Inferred by ISSR Variation in Reed Canarygrass (*Phalaris arundinacea* L.). Poster presentation at the Minnesota-Wisconsin Invasive Species Conference. Saint Paul MN, November 8 – 10, 2010.

Honors and Awards

William H. Alderman Memorial Graduate Award, Department of Horticultural Science, University of Minnesota, academic year 2013/14.

Integrative Graduate Education and Research Traineeship in Risk Analysis for Introduced Species and Genotypes (ISG-IGERT), University of Minnesota, academic years 2009/2010, 2011/2012.

Department of Horticultural Science Fellowship, University of Minnesota, academic year 2010/11.

Graduate School Fellowship, University of Minnesota, academic year 2008/09.