Matthew A. Nieland, PhD

University of Massachusetts Amherst
Department of Microbiology

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Professional Preparation

Postdoc, Molecular Ecology
University of Massachusetts Amherst, 2026-present

Postdoc, Soil Ecology
University of Massachusetts Amherst, 2023-2026

Doctor of Philosophy, Biology
Kansas State University, 2018-2023

Bachelor of Science, Biology | Bachelor of Arts, Chemistry
Morningside University (formerly Morningside College), Summa cum laude, Honors, 2014-2018

Research Experience

Postdoctoral Research Associate 2026-present	**DeAngelis Lab | Department of Microbiology** **University of Massachusetts Amherst** My current research focuses on the top-down effects of hemlock woolly adelgid on soil prokaryotic (bacteria and archaea) and fungal communities. The goal of this project is to understand how plant stress from invasive pests alters soil rhizosphere processes and its cascading effects on forest ecosystem health. **Advisor: Kristen DeAngelis, PhD | Funding: Department of Energy – Biological and Environmental Research**
USDA Postdoctoral Fellow 2024-2026	**Stockbridge School of Agriculture** **University of Massachusetts Amherst** The research goal of this fellowship was to quantify the recovery of soil microbial communities across a tallgrass prairie restoration chronosequence. I found that the assembly of soil prokaryotic and fungal communities decouples from plant community assembly, but microbial carbon and nitrogen pools and cycling rates recover based on time. **Sponsor: Ashley Keiser, PhD | Funding: USDA – National Institute of Food and Agriculture**
Postdoctoral Research Associate 2023-2024	**Keiser Lab | Stockbridge School of Agriculture** **University of Massachusetts Amherst** In this phase of my postdoctoral research, I studied the coupling of soil carbon and nitrogen cycles from local to continental scales. My research found that soil conservation practices enhance nitrogen retention in agricultural settings, and that deposition of nitrogen pollution overrides the role of soil carbon as a gatekeeper of soil microbial N cycling. **Advisor: Ashley Keiser, PhD | Funding: University of Massachusetts Amherst**
Graduate Research & Teaching Assistant 2018-2023	**Zeglin Lab | Division of Biology** **Kansas State University** For my PhD research, I unraveled the plant and soil microbial mechanisms related to ecosystem recovery from chronic nitrogen

enrichment. My research contributed to the broader research goal of understanding the resistance and resilience of tallgrass prairies to natural and anthropogenic disturbances.
Dissertation: "Ecosystem recovery from chronic fertilization: Biotic mechanisms underpinning soil nitrogen legacies in burned and unburned grasslands."
Advisor: Lydia Zeglin, PhD | Funding: National Science Foundation – Division of Environmental Biology

Research Experience for Undergraduates (REU) Intern
2017

Zeglin Lab | Division of Biology
Kansas State University
I investigated the effects of long-term nitrogen enrichment on the physiology of tallgrass prairie soil bacteria. I isolated a diverse library of soil bacteria using different culturing approaches and measured population growth rates under laboratory conditions.
Advisor: Lydia Zeglin, PhD

Undergraduate Researcher
2016-2018

Biology Department
Morningside University
I studied the heavy metal tolerance of wetland soil and sediment bacteria using a culturing approach.
Mentor: Anni Moore, PhD

Honors and Awards

2023 **Kansas State University | Division of Biology**
Chris Edler Award for Outstanding Research on Konza

2021 **Konza Prairie Biological Station**
Graduate Student Award for the 2020 Prescribed Fire Season

2021 **Kansas State University | Division of Biology**
Ecology and Evolutionary Biology Seminar Series: Best Presentation Style

2020 **Kansas State University | Division of Biology**
Ecology and Evolutionary Biology Seminar Series: Best Overall Presentation

2019 **Kansas State University | Division of Biology**
Ecology and Evolutionary Biology Seminar Series: Best Science Presentation

Grants and Fellowships Awarded

2024-2026 **United States Department of Agriculture – National Institute of Food and Agriculture** Postdoctoral Research Fellowship
Role: Principal Investigator
Title: "Evaluating integrated land restoration to improve belowground ecosystem health of US Midwest croplands"
$225,000

2023 **Kansas State University | Biology Graduate Student Association**
Finishing Grant

2022 **Kansas State University | Graduate Student Council**
Travel Award

2022 **Kansas State University | College of Arts & Sciences**
Research Travel Award

2022 **Kansas Natural Resources Conference**
Fee Waiver

2021 **Kansas State University | Biology Graduate Student Association**
Research Grant

2019 **Sunset Zoo | Manhattan, KS** Science Communication Fellowship

2019 **Kansas State University | College of Arts & Sciences**
Travel Award

Peer-reviewed Publications

9. Zaret, M. M., Akley, E. K., Bookout, B., Broderick, C. M., Dea, H., Figge., J., Hawkins, J., Htoo, Z. W., Kailer, E., Nieland, M. A., Nieves-Otero, P., Notenbaert, N., Pandey, A., Richardson, C., Wanithunga, I., Wilson, E. J., Vega Anguino, N., and Zeglin, L. H. "Bison grazing and prairie fire shape soil microbial community diversity and assembly." *In press*: **Ecology**.

8. Nieland, M. A., Wu, A., Palmer, C. A., Siller, A., Hashemi, M., and Keiser, A. D. (2026). "Nitrogen release and retention tradeoffs diverge across cover crop management practices." ***Soil Science Society of America Journal*** https://doi.org/10.1002/saj2.70302

7. Ajowele, J. A., Darst, A. L., Baker, N. R., Brenneman, R. R., Broderick, C., Cappelli, S. L., Liang, M., Linabury, M., Nieland, M. A., Parker-Smith, M., Pehim Limbu, S., Terry, R. S., Young, M. L., Zaret, M., and Zaricor, M. (2026) "Multiple community properties drive ecosystem resistance and resilience to extreme climate events across mesic grasslands." ***Ecology Letters*** https://doi.org/10.1111/ele.70380

6. Keiser, A. D. and Nieland, M. A. (2025). "Interactions Are Key to Accurately Estimating the Impact of Photodegradation Across Grassland Ecosystems." Invited commentary. ***Global Change Biology*** https://doi.org/10.1111/gcb.70658

5. Nieland, M. A. and Keiser, A. D. (2025). "Using ecological restoration to disentangle the mechanisms and longevity of soil functional legacies. ***Functional Ecology*** https://doi.org/10.1111/1365-2435.70123

4. Nieland, M. A., Lacy, P., Allison, S. D., Bhatnagar, J. M., Doroski, D. A., Frey, S. D., Greaney, K., Hobbie, S. E., Kuebbing, S. E., Lewis, D. B., McDaniel, M. D., Perakis, S. S., Raciti, S. M., Templer, P. H., Shaw, A., Sprunger, C. D., Strickland, M. S., Vietorisz, C., Ward, E. B., and Keiser, A. D. (2024). "Nitrogen Deposition Weakens Soil Carbon Control of Nitrogen Dynamics Across the Contiguous United States." ***Global Change Biology*** https://doi.org/10.1111/gcb.70016

3. Nieland, M. A. and Zeglin, L. H. (2024). "Plant and microbial feedbacks maintain soil nitrogen legacies in burned and unburned grasslands." ***Journal of Ecology*** https://doi.org/10.1111/1365-2745.14386

2. Nieland, M. A., Carson, C. M., Floyd, V., and Zeglin, L. H. (2024). "Product-inhibition feedbacks, not microbial population level tradeoffs or soil pH, regulate decomposition potential under nutrient eutrophication." ***Soil Biology and Biochemistry*** https://doi.org/10.1016/j.soilbio.2023.109247

1. Nieland, M. A., Moley, P., Hanschu, J., and Zeglin, L. H. (2021). "Differential Resilience of Soil Microbes and Ecosystem Functions Following Cessation of Long-Term Fertilization." ***Ecosystems*** https://doi.org/10.1007/s10021-021-00633-9

Publications in review

11. Nieland, M. A., Blair, J. M., Taylor, J. H., and Zeglin, L. H. "Divergent plant and microbial community states persist after ceasing long-term nitrogen enrichment." **Journal of Ecology**, *in review*.

10. Gewirtzman, J., Keiser, A. D., Nieland, M. A., Palmer, C. A., Patel, V., and Forbes, E. S. "Low-Cost Autonomous Chambers Enable High Spatial and Temporal Resolution Monitoring of Soil CO_2 Exchange Across Landscapes." **Ecosphere**, *in review*.

Manuscripts in preparation (expected submission < 2 months)

Nieland, M. A., Baer, S. G., and Keiser, A. D. "Historical and contemporary climate impacts soil carbon and nitrogen dynamics in restored grasslands." *In prep* for **Ecology**.

Published Datasets

6. Finzi, A., Keiser, A., Giasson, M-A, and Nieland, M. (2026). "Soil Carbon in a Hemlock Stand Infected by Hemlock Wooly Adelgid at Harvard Forest since 2015" *Environmental Data Initiative* https://doi.org/10.6073/pasta/a4ebf6b3eb19d832fcf09c81ec6dfa73

5. Ajowele, J. A., Darst, A. L., Baker, N. R., Brenneman, R. R., Broderick, C., Cappelli, S. L., Liang, M., Linabury, M., Nieland, M. A., Parker-Smith, M., Pehim Limbu, S., Terry, R. S., Young, M. L., Zaret, M., and Zaricor, M. (2025). "Species diversity and plant dominance influence grassland stability in response to extreme climatic events and anthropogenic drivers across three LTER sites: Cedar Creek, Konza Prairie, and Kellogg Biological Station, 1982-2023." *Environmental Data Initiative* https://doi.org/10.6073/pasta/433a9ec43bfca734604b8c874895c991

4. Nieland, M. A., Lacy, P., Allison, S. D., Bhatnagar, J. M., Doroski, D. A., Frey, S. D., Greaney, K., Hobbie, S. E., Kuebbing, S. E., Lewis, D. B., McDaniel, M. D., Perakis, S. S., Raciti, S. M., Templer, P. H., Shaw, A., Sprunger, C. D., Strickland, M. S., Vietorisz, C., Ward, E. B., and Keiser, A. D. (2024). "Nitrogen Deposition Weakens Soil Carbon Control of Nitrogen Dynamics Across the Contiguous United States." *Dryad* https://doi.org/10.5061/dryad.g79cnp611

3. Nieland, M. A. and Zeglin, L. H. (2023). "PCN01 Plant and soil carbon and nitrogen pool data from the Belowground Plot Experiment at Konza Prairie." *Environmental Data Initiative* https://doi.org/10.6073/pasta/cb24fd55a0102723882ad33ed3f787b9

2. Nieland, M. A. and Zeglin, L. H. (2023). "SEA01 Soil extracellular enzyme activity data from the Belowground Plot Experiment." *Environmental Data Initiative* https://doi.org/10.6073/pasta/caff8cde33a6dca2b007e85b5c4a4000

1. Nieland, M. A. and Zeglin, L. H. (2023). "OMS01 Microbial and soil data in the Belowground Plot Experiment at konza prairie since 2017." *Environmental Data Initiative* https://doi.org/10.6073/pasta/41f0e5aa1781e722e7922aaaa6b57143

Teaching and Mentoring Experience

Course instruction (Teval included if record saved)

Fall 2024 **Guest Lecturer | Soil Ecology (STOCKSCH 622)**
University of Massachusetts Amherst, ~ 15 students

Fall 2023 **Guest Lecturer | Soil Ecology (STOCKSCH 622)**
University of Massachusetts Amherst, ~ 20 students

Fall 2023 **Co-Instructor | Ecology Core Course (OEB 617)**

University of Massachusetts Amherst, 16 students

Spring 2023 **Instructor of Record | Ecology Lab (BIOL 632)**
Kansas State University, 24 students

Fall 2022 **TA | Ecology (BIOL 529)**
Kansas State University, ~ 30 students

Spring 2022 **Instructor of Record | Ecology Lab (BIOL 632)**
Kansas State University, 24 students, TEVAL score: 5.0

Fall 2021 **TA | General Microbiology Lab (BIOL 455)**
Kansas State University, 32 students, TEVAL score: 4.9

Spring 2021 **TA | Ecology Lab (BIOL 632)**
Kansas State University, 25 students, TEVAL score: 4.9

Fall 2020 **TA | General Microbiology Lab (BIOL 455)**
Kansas State University, 40 students

Spring 2020 **TA | General Microbiology Lab (BIOL 455)**
Kansas State University, 40 students, In-person & online due to COVID pandemic

Fall 2019 **TA | General Microbiology Lab (BIOL 455)**
Kansas State University, 40 students

Spring 2019 **TA | General Microbiology Lab (BIOL 455)**
Kansas State University, 40 students, TEVAL score: 4.5

Fall 2018 **TA | General Microbiology Lab (BIOL 455)**
Kansas State University, 40 students, TEVAL score: 4.7

Mentoring

Graduate Students

- Megan Whiddon (Fall 2025), Keiser Lab | Plant Biology Graduate Program Rotation Student
- Sara Sadeghi (Summer 2024), Keiser Lab | Plant Biology Graduate Program

Undergraduate Students

- Henri Schuette (2024-2025), Keiser Lab | Honors student
- Aiden Martin (2024), Keiser Lab
- Rachel Shurtz (Fall 2022), Zeglin Lab
- Clara Mayfield (Summer 2020), Zeglin Lab
- Brett Nave (2018-2019), Zeglin Lab

High School Students

- Clara Mayfield (Summer 2019), Zeglin Lab

Professional Service and Outreach

2025-present **Early Career Representative,** Soil Ecology Section | Ecological Society of America

June 2024 **Guest Speaker,** Research and Extension Experiences for Undergraduate | University of Massachusetts Amherst

2023 **Research & Travel Grant Committee Member,** Biology Graduate Student Association | Kansas State University

2022 **President,** Biology Graduate Student Association | Kansas State University

2022-2023 **Reform Committee Member,** Biology Graduate Student Association | Kansas State University

2022 **Guest Speaker,** The SSTEM Project | Morningside University

2021-2024 **External Evaluator,** Independent Review Board | Morningside University

2021 **Career Panelist,** Alumni Spotlight for the Pre-Professional Health Club | Morningside University

2020 **Student Representative,** Graduate Affairs Committee | Division of Biology | Kansas State University

Feb. 2020 **Activity Leader,** Science Saturday | Sunset Zoo | Manhattan, KS

Feb. 2020 **Activity Leader,** Girls Researching Our World (GROW) | Office for the Advancement of Women in Science and Engineering | Kansas State University

2019-2020 **Sales Coordinator,** Biology Graduate Student Association | Kansas State University

Aug. 2019 **Student Participant,** Departmental Communications Workshop | Division of Biology | Kansas State University

2019-2022 **Volunteer,** Fire Crew for Konza Prairie Biological Station | Manhattan, KS

July 2017 **Activity Leader,** Science Saturday | Sunset Zoo | Manhattan, KS

Peer Review Services

Agency Proposal Reviewer

- USDA-NIFA (Spring 2026) | Soil Health

Journal Reviewer (15 total)

Applied Soil Ecology (1), Biology and Fertility of Soils (1), Catena (1), Communications Earth & Environment (1), Ecosphere (2), Ecosystems (2), Environmental Science and Pollution Research (1), Fire Ecology (1), Freshwater Biology (1), The International Society of Microbial Ecology (ISME) Journal (1), New Phytologist (2), Journal of Vegetation Science (1)

Presentations

Invited Seminar

Nieland, M. A. (2021). "Reversing global change: Can fire help prairie ecosystem recovery from increased nitrogen availability?" *Biological Sciences Department, Emporia State University*, Emporia, KS.

Contributed Oral Presentations

Nieland, M. A., Baer, S. G., and Keiser, A. D. (2026). "Microbial stoichiometry impedes soil carbon accumulation in developing grasslands." *ESA Annual Meeting*, Salt Lake City, UT.

Nieland, M. A., Baer, S. G., and Keiser, A. D. (2026). "Microbial stoichiometry impedes soil carbon accumulation in developing grasslands." *Soil Ecology Society Biennial Meeting*, Southampton Township, NJ.

Keiser, A. D., Wu, A., Hashemi, M., Siller, A., and Nieland, M. A. (2025)."Cover crop termination method impacts N release and subsequent plant uptake." *CANVAS*, Salt Lake City, UT.

Nieland, M. A., Baer, S. G., and Keiser, A. D. (2025). "Persistence of soil functional legacies across a grassland restoration chronosequence." *ESA Annual Meeting*, Baltimore, MD.

Nieland, M. A. and Zeglin, L. H. (2023). “Burning does not shape grassland soil microbial diversity recovery from chronic nitrogen fertilization.” *ESA Annual Meeting*, Portland, OR.

Nieland, M. A. and Zeglin, L. H. (2022). “Burning decreases grassland sensitivity, and increases resilience, to nitrogen fertilization.” *ESA Joint Meeting with Canadian for Ecology and Evolution*, Montréal, QC, Canada.

Nieland, M. A. and Zeglin, L. H. (2022). “Burning Decreases Tallgrass Prairie Sensitivity, and Increases Resilience, to Chronic Supplemental Nitrogen.” *Division of Biology Annual Graduate Student Research Forum*, Manhattan, KS.

Nieland, M. A., Moley, P., Hanschu, J., Freeman, K., and Zeglin, L. H. (2022). “Fire influences tallgrass prairie recovery from nitrogen fertilization.” *Kansas Natural Resources Conference*, Manhattan, KS.

Nieland, M. A., Floyd, V., Carson, C. M., and Zeglin, L. H. (2021). “Above- and belowground responses to increased N and P availability from chronic fertilization and fire suppression.” *ESA Annual Meeting*, Virtual.

Nieland, M. A., Floyd, V., Carson, C. M., and Zeglin, L. H. (2021). “Belowground Responses to Increased Nitrogen and Phosphorus Availability from Chronic Fertilization and Fire Suppression.” *Division of Biology Annual Graduate Student Research Forum*, Virtual.

Nieland, M. A., Moley, P., Allenbrand, J. H., Hanschu, J., and Zeglin, L. H. (2020). “Differential recovery of soil microbial functional groups and ecosystem functions following cessation of chronic fertilization.” *ESA Annual Meeting*, Virtual.

Burgin, A. J., Zeglin, L. H., Nieland, M. A., Kelly, M. C., and Hanschu, J. (2019). “Whole river estimates of denitrification in response to a large-scale nitrogen enrichment of the Kansas River (USA).” *Society of Freshwater Science Annual Meeting*, Salt Lake City, UT.

Zeglin, L. H., Hanschu, J., Burgin, A. J., Kelly, M. C., Overstreet, E., and Nieland, M. A. (2019). “Large river microbial community structure and function is affected by inputs of a fertilizer-enriched inoculum.” *Society of Freshwater Science Annual Meeting*, Salt Lake City, UT.

Moley, P., Hanschu, J., Nieland, M. A., and Zeglin, L. H. (2018). “Differential responses of N-cycling soil microbial functional groups to cessation of chronic fertilization.” *ESA Annual Meeting*, New Orleans, LA.

Contributed Poster Presentations

Nieland, M. A., Baer, S. G., and Keiser, A. D. “Restoration Chronosequence Experiment: Testing agricultural legacies in soil ecosystems.” *Konza Prairie LTER Annual Meeting*, Manhattan, KS. (2026).

Nave, B., Nieland, M. A., Mueller, E., and Zeglin, L. H. “Does chronic nitrogen fertilization affect soil microbial tradeoffs?”
Society for the Advancement of Chicanos/Hispanics and Native Americans in Science National Diversity in STEM Digital Conference, Virtual. (2020).
ESA Annual Meeting, Virtual (2020).

Nieland, M. A., Moley, P., Hanschu, J., and Zeglin, L. H. “Differential recovery of N-cycling soil microbial functional groups following cessation of chronic fertilization.”
EPSCoR MAPS Symposium, Lawrence, KS. (2020).
ESA Annual Meeting, Louisville, KY. (2019).

Burgin, A. J., Kelly, M. C., Hanschu, J., Nieland, M. A., and Zeglin, L. H. “Linking the Presence and Function of Denitrification Genes to Whole River Estimates of Denitrification in Response to a Large-Scale Enrichment of the Kansas River (USA).”

EPSCoR MAPS Symposium, Manhattan, KS. (2019).
American Geophysical Union, Washington, DC. (2018).

Nieland, M. A., Moley, P., Hanschu, J., and Zeglin, L. H. “Fire history causes differential recovery of N-cycling soil microbes from chronic fertilization.”
Konza Prairie LTER Annual Meeting, Manhattan, KS. (2019).
National Academies of Sciences, Engineering, and Medicine, Board on Agriculture and Natural Resources, Manhattan, KS. (2019).
LTER All Scientists’ Meeting, Pacific Grove, CA. (2018).