

NATALIE M. HOWE

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Summary: I seek a position through which I can support a wide variety of types of research and can share my excitement about botany with the public to inspire people to protect natural lands and biodiversity.

Education

2016	Ph.D. in Ecology and Evolution	Rutgers University, New Brunswick, NJ
2006	Master of Environmental Studies	University of Pennsylvania, Philadelphia, PA.
2001	B.S., Molecular Biophysics and Biochemistry	Yale University, New Haven, CT

Experience In Plant Science Research & Communication

Agriculturalist, USDA Animal and Plant Health Inspection Service (2021-present)

I share plant health information with international governments to facilitate agricultural trade and protect plant health

- **Change Management:** I made plant inspections at the border more transparent and reliable by helping importers switch to electronic documentation of plant health protection measures.
- **Leadership:** I served as correspondence manager, coordinating for our team of 27 people to report our accomplishments so that everyone can stay up to date about which issues are most important for each of us.
- **Training:** As the International Technical and Regulatory Capacity Building liaison, I helped coordinate events at which U.S. or international teams learn about a wide array of plant health issues.

Biological Scientist, USDA Animal and Plant Health Inspection Service (2017 – 2021)

I synthesize botanical and ecological information and communicate my findings to USDA leaders and the public

- **Plant Science Research:** I used plant physiology literature and use specimen data from herbaria worldwide to create models showing which areas of the U.S. are climatically suitable for a range of different genetically engineered plants; I used this information for science-based risk assessments.
- **Project Management:** Led a team of 8 scientists to develop a new system for environmental risk assessment for genetically engineered plants, clearly communicating limitations and goals of the project, creating timelines, managing conflict and building a sense of ownership in the team. This system was the backbone of an innovative new regulation on the importation, interstate movement, and environmental release of certain organisms developed using genetic engineering that may pose a pest risk to plants.
- **Grant Review:** I reviewed grant applications for over 100 entities competing for \$75 million of funding for education and outreach about plant pests.
- **Communication:** I led a Toastmasters group that trains people to be more engaging and inspiring public speakers, organizing outreach and speaking events, managing the website, facilitating the group's transition to online members, and recruiting more than 10 new members.
- **Strategic Planning:** As a member of the Working group on Promoting Equity at the USDA, I worked with managers and employees to analyze and close gaps in practices that lead to discrimination or marginalization in the workplace; we made our office award practices more transparent and more fair.
- **Supervising Interns:** I trained 4 interns on botanical topics, habitat mapping, reference management, and science communication at the USDA and ,have worked with professionals across the USDA to coordinate intern seminars about diverse career paths in the government.
- **Networking:** I interact with a national and international network of botanists, agronomists, biotechnologists and plant pathologists to help inform our processes so that we use the best science to inform USDA decision-making.
- **Maintaining Records and Databases:** As part of our data management strategy at the USDA, training others in reference management, organizing records in shared spaces, and maintaining documentation for decisions.

Research Assistant, Rutgers University (2012-2016)

- **Publications:** I co-authored the following publications in addition to my dissertation research:
 - Coxson, D. and N. Howe, 2016. Lichens in Natural Ecosystems. In: The Fungal Community: Its organization and role in the ecosystem, Fourth Edition, CRC Press, London.
 - Allen, J.L. and N.M. Howe, 2016. Landfill Lichens: A checklist for Freshkills Park, Staten Island, NY *Opuscula Philolechenum* 15:82-91
- **Oral Communication:** I communicated my scientific results through presentations in professional conferences, including: International Association of Lichenology, Ecological Society of America, Botanical Society of America, Soil Science Society of America, and Mycological Society of America. I also led several public workshops to educate

people on lichen I.D. I also created a YouTube video on my research:
<https://www.youtube.com/watch?v=SOiU59jrfqQ>

- Managing herbarium collections: I was the Honorary Curator of Cryptogams at the Chrysler Herbarium and assisted with maintenance of the lichen and moss collections following standard protocols in the curation of various fungal species. As part of the NYBG's Mid-Atlantic Megalopolis program, I digitized hundreds of historical collections of plants and fungi, I validated and updated names on lichen specimens.
- Specimen-based research: Organized and participated in collecting trips throughout the northeastern U.S. including the Southern Appalachians, the Great Lakes, New England the Mid-Atlantic Region, with a special focus on the Coastal Plain of New Jersey. I donated the over 400 lichen specimens I collected to the fungal collection at CHR.B.
- Mentorship/Training: I supervised and trained 2 interns over two summers, ensuring that the interns' goals for the summer were well-aligned with the researchers' goals for summer.

Biological Science Technician, National Park Service

Point Reyes National Seashore Inventory and Monitoring Program (2009-2010)

- Plant Science Research: I organized a Weed Watchers program for early detection and rapid response to invasive species, collecting geospatial information on emerging populations of invasive plants across over 400 miles of roads and trails in the park, managing the database, and creating communication products to inform the public about our work.
- Program Management: I administered a 20-person volunteer program, building a network of multiple stakeholders to recruit diverse volunteers, training volunteers in plant ID, organizing work trips, and preparing budgets and annual reports.
- Networking: I collaborated with botanists and land managers from this other parks on invasive plant management, rare species conservation, and research on the effects of fire in the landscape.

Center for Resilient Landscapes Science and Society Fellow

US Forest Service Philadelphia Field Station (2015-2016)

- Plant Science Research: I planned and implemented a study of the effects of emerald ash borer invasion on urban forest vegetation that informs the management of these urban forests.
- Mentoring: I trained an intern on survey protocols and plant ID.
- Networking: I collaborated with the Philadelphia Parks and Recreation Department to understand approaches to pest suppression.

Rare Plant Surveyor, NJ DEP, Office of Natural Lands Management (2014-2015)

- Plant Science Research: I surveyed threatened and endangered plant populations in NJ, collecting geospatial information and plant population data, contributing to the Natural Heritage Program database.

Experience in Herbaria

Teaching Assistant (Plant Diversity and Evolution), Rutgers University, (2012-2013)

- Collections: I taught students how to collect herbarium specimens in a field environment. I then taught them to identify unknown plant material using dichotomous keys, and verified their identifications, and coordinated donation of select specimens to the Chrysler Herbarium (CHR.B). I also helped develop their appreciation for botanical diversity, and won a University-Wide Teaching Award for my work.
- Databases: I helped to coordinate an i-naturalist project to consolidate the observations associated with the class, teaching students to collect data in this interface, and to use the crowdsourced data it provides.
- Networking: I coordinated with managers of the Chrysler Herbarium, a botanical garden, and greenhouse to obtain specimens to use in the lab for training students in botany.
- Organizing Programs: This position involved coordinating lab activities (equivalent to botanical workshops) and leading trainings in plant identification to foster interest in plant systematics and taxonomy.
- Publications: I co-authored several scientific papers on our innovative educational activities:
 - Struwe, L., LS Poster, N Howe, CB Zambell, and PW Sweeney, 2014. The making of a student driven online campus flora: an example from Rutgers University. *Plant Science Bulletin*, 60(3), pp.159-169.
 - Pollock, NB, N Howe, I Irizarry, N Lorusso, A Kruger, K Himmler, and L Struwe, 2015. Personal BioBlitz: A new way to encourage biodiversity discovery and knowledge in K-99 education and outreach. *BioScience*, 65(12), pp.1154-1164.

Lichen Curation Volunteer, University and Jepson Herbarium at the University of California, Berkeley (2008-2009)

- Coordinating Public Education: Assisted with botanical workshop setup, including classroom arrangement of plants, mushrooms or mosses we were studying, preparing handouts and signs, and conducted assessments of botanical programs in order to facilitate program improvement.

- **Collections:** I also curated thousands of fungal and plant specimens in an herbarium: I digitized herbarium specimens; validated and updated nomenclature for herbarium specimens, repackaged and relabeled damaged specimens, and reorganized specimen folders.

Lichen Curation Volunteer, Academy of Natural Sciences of Drexel University (2004-2006)

- **Collections:** I curated specimens at the herbarium, and used the collection to learn lichen ID
- **Publications:** I published my masters thesis in collaboration with an ANSP scientist mentor: Howe, N.M., and J. C. Lendemer, 2010. The recovery of a simplified lichen community at the Palmerton Zinc Smelter after 34 years. In: A Lichenological Legacy – Festschrift T. H. Nash III. S.T. Bates, F. Bungartz, R. Lücking, M.A. Herrera-Campos & A. Zambrano (eds.). *Bibliotheca Lichenologica* **106**: 120–136.

Volunteer Scientist, Patuxent Lichen Team at US Fish & Wildlife Service Patuxent Research Refuge (2019 – present)

- **Collections:** I advised a volunteer group on developing specimen collection and data documentation protocols integrating the lichen collection with the pre-existing plant collection at the refuge (PRR: Patuxent Research Refuge)
- **Outreach:** I provided training on lichen ID specimen identification for 6 volunteers, I lead 2 lichen hikes for the public, I spoke about this project in a public lecture to the Natural History Society of Maryland and I created a website to help build interest in the Lichens of Patuxent Project
<https://storymaps.arcgis.com/stories/36d04a975479446c9a37d0eb20552406>

Experience in Education

George Mason University

2020-present

Professor of hybrid course in **Mushrooms, Molds, and Society**

- Moved class online in spring 2020, using interactive online tools including google slides, discussion boards, i-naturalist, and Wikipedia editing to facilitate student collaboration.
- Led an online science communication project, in which students used diverse modes of media, including soundcloud, esty, and Instagram to share their knowledge of mycology.

University of Maryland

2020-present

Volunteer Online Tutor for **College Bridge Writing Program**

- Assisted an incarcerated student in navigating technical and logistical hurdles to complete a rhetorical analysis, an argumentative essay, and a writing philosophy statement as part of a college writing course

University of the District of Columbia

2018-2019

Volunteer teacher of D.C. Master Naturalists.

- Led 3 in-person lectures/discussions for a diverse group of 20 adult learners about Urban Ecology, Soils and Fungi, and Plants

Southern New Hampshire University

2016-present

Professor of Online courses in **Natural Resources, Ecology, and Conservation Biology**

- Used videos and readings on natural lands to engage students in current issues in ecology and biodiversity conservation.

The College of New Jersey

2017

Instructor in **Field Ecology**

- Used field trips in Mercer County to help students understand ecological patterns used field experiments to teach students methods in data collection and analysis.
- Taught students ecological theory using local phenomena as examples

Rutgers University

2014-2016

TA for **Plant Ecology, Plant Diversity and Evolution, General Biology, and Mycology**

- Organized and taught active learning labs on plant and mushroom diversity and evolution
- Facilitated a campus-wide online competition in nature documentation on inaturalist phone app
- Brought students on hikes through forests, wetlands, and urban lands, and shorelines of NJ

New Jersey Scholarship and Transformative Education in Prisons

2013-2016

Volunteer Co-Teacher for **Woody Plants, Human Biology, Environmental Studies**

- In collaboration with other volunteer teachers from Princeton and Rutgers, I taught several science courses and I designed and implemented a Woody Plants course as part of a community college program for students in NJ State Prisons to earn associates' degrees while incarcerated

King's Academy
Chemistry Teaching Fellow

2006-2008

- I designed the curriculum and disability accommodations process for a new international boarding school in Jordan. I led students with a wide variety of backgrounds in science and in English, through lab activities to teach them principles of introductory chemistry, with an emphasis on inquiry and data analysis.

Field Teacher / Naturalist, U. of Rhode Island WAJ Environmental Ed. Center

2003

- I designed and implemented innovative educational experiences including nature walks, wildlife observation activities, water monitoring, team building adventures, and living history events for middle school students from over 100 public schools across the region.

Working with Diverse Public Stakeholders to Increase Awareness of Botanical Resources

Nature Walks and BioBlitz Leadership: I lead diverse teams of adults and children in informational hikes to document biodiversity (plants and fungi) at nature reserves from 2013-present including:

- Edwin B Forsythe NWR, NJ
- Mt. Moriah Cemetery, PA
- Sandy Hook National Rec. Area, NJ
- Watchung Reservation, NJ
- Freshkills Park, NY
- Ernest L. Oros Preserve, NJ
- Rutgers Newark, NJ
- UPenn Kaskey Memorial Park, PA

Public Information Display Tables at Festivals

- Patuxent Wildlife Refuge Birthday Fest, MD
- National Cherry Blossom Festival, DC
- Tinicum National Wildlife Refuge, PA
- Rutgers Day, NJ

STEM Education in Secondary Schools

- McKinley Technical High School Career Day, Volunteer Mentor, DC
- National Ocean Sciences Bowl, Volunteer Shore Bowl Official, NJ
- Mastery Charter High School Science Club, Volunteer Teacher, PA
- Bucks County Learning Cooperative Marine Biology, Volunteer Teacher, PA

Natural History Workshops

- Northeast Mycology Foray, PA
- Andrews Foray, Mt. Misery Center, NJ
- NJ Mycological Society
- Mycological Association of Washington

Public Lectures

- Pinelands Short Course
- NJ Forestry Association
- Torrey Botanical Society, NY
- Philadelphia Botanical Club
- NJ Mycological Society
- Natural History Society of MD

Land Management Experience

Potomac Appalachian Trail Club Volunteer, Rock Creek National Park (2019-Present)

- I coordinate with volunteers to perform trail maintenance, including clearing trails after storms, managing trail drainage by installing waterbars and maintaining turnpikes, maintaining stream crossings, removing invasive species and other plants overgrowing trails.

Rare Plant Surveyor, NJ DEP, Office of Natural Lands Management (2014-2015)

- Surveyed threatened and endangered plant populations in NJ Natural lands, surveying habitats in difficult terrain including wetlands, steep slopes, and shrubby areas.

Horticulture Intern, American Horticulture Society Headquarters at River Farm (2003)

- Responsible for seed stock management, planting and plant maintenance at a historical botanical garden

Volunteer, John Heinz National Wildlife Refuge at Tinicum (2004-2006)

- Maintained trails, restored habitat, and monitored wildlife (including frogs, deer and birds) in a Philadelphia urban forest and marsh.

Habitat Volunteer and Docent, Edgewood State Park and Preserve, CA

2009-2010

- Protected habitat by removing invasive species and led botany programs for adults walks in a county park

- Assisted in managing a family farm including: planting crops, harvest, pest management and sales.

Grants and awards

Awards

2020 – APHIS Administrator award for comprehensive revision of APHIS' biotechnology regulations
 2016 - Graduate School New Brunswick Excellence in Undergraduate Teaching Award

Grants

2016 - Tuckerman Award: American Bryological and Lichenological Society (\$500)
 2015 - Caroline Thorne Kissel Award For Environmental Studies: Garden Club of America (\$2000)
 2014 - James C. Rutherford Jr. Scholarship: Pinelands Preservation Alliance (\$200)
 2013 - Charlie Kontos Award: Rutgers Graduate Program in Ecology and Evolution (\$1500)
 2011 - Bayard Long Award for Botanical Research: Philadelphia Botanical Club (\$500)
 2006 – Binns/Williams Grant for Research in Ecology and Evolution at UPenn (\$500)

Publications

Book Chapters

Coxson, D. and **N. Howe**, 2016. Lichens in Natural Ecosystems. In: The Fungal Community: Its organization and role in the ecosystem, Fourth Edition, CRC Press, London.

Journal Articles

England, J.K., C.J. Hansen, J.L. Allen, S.Q. Beeching, W.R. Buck, V. Charny, J.G. Guccion, R.C. Harris, M. Hodges, **N.M. Howe** and J. C. Lendemer. 2019. Checklist of the lichens and allied fungi of Kathy Stiles Freeland Bibb County Glades Preserve, Alabama, USA. *Opuscula Philolichenum*, 18:420-434.

Franck A.R., D. Barrios, K.C. Campbell, J. Lange, B. Peguero, E. Santiago-Valentin, Z. Rigerszki, J. Haakonsson, G.D. Gann, W. Cinea and **N.M. Howe**. 2019. Revision of Pilosocereus (Cactaceae) in the Caribbean and northern Andean region. *Phytotaxa* 411(3):129-82.

Allen, J.L. and **N.M. Howe**, 2016. Landfill Lichens: A checklist for Freshkills Park, Staten Island, NY *Opuscula Philolichenum* 15:82-91.

Pollock, N., **N. Howe**, I. Irizarry, N. Lorusso, A. Kruger, K. Himmler, & L. Struwe, 2015. Personal BioBlitz: A new way to encourage biodiversity knowledge in K-99 education and outreach. *BioScience* 65(10):1083-1091.

Struwe, L., L.S. Poster, **N. Howe**, P. Sweeney, and C.B. Zambell, 2014. The Making of a Student-Driven Online Campus Flora: an example from Rutgers University. *Plant Science Bulletin*, **60(3)**: 159-169.

Howe, N.M., and J. C. Lendemer, 2010. The recovery of a simplified lichen community at the Palmerton Zinc Smelter after 34 years. In: A Lichenological Legacy – Festschrift T. H. Nash III. S.T. Bates, F. Bungartz, R. Lücking, M.A. Herrera-Campos & A. Zambrano (eds.). *Bibliotheca Lichenologica* **106**: 120–136.

Fryday, A.M., J.C. Lendemer & **N.M. Howe**, 2007. Porpidia soledizodes (lichenized ascomycota) in North America. *Opuscula Philolichenum*, 4:1-4.

Scientific Reports

Allen, J., Yahr, R., Lymbery, C., Batallas-Molina, R., Bungartz, F., Dal Forno, M., **Howe, N.**, Lendemer, J., McMullin, T., Mertens, A., Petix, M., Reese Næsborg, R., Roberts, F., Sharrett, S. & Villella, J.: 2021. *Canoparmelia caroliniana*. *The IUCN Red List of Threatened Species* 2021: e.T194662208A194678189. <https://dx.doi.org/10.2305/IUCN.UK.2021-2.RLTS.T194662208A194678189.en>

Conroy, M. **Howe, N.**, Klodnicki, T., and Ward, K. 2021. Environmental Risk in Crop Insurance. Society of Actuaries Research Report: <https://www.soa.org/globalassets/assets/files/resources/research-report/2021/crp116-environmental-risk-in-crop-insurance.pdf>

Conroy, M. **Howe, N.**, Klodnicki, T., and Baig, A., 2020. Climate change and Environmental Risk. Society of Actuaries Research Report: <https://www.soa.org/globalassets/assets/files/resources/research-report/2020/climate-change-environmental-risks.pdf>

Conroy, M., N.M. Howe, T. Klodnicki, A. Baig, K. Ward. 2020. Introduction to Environmental Risk. A Primer on Environmental Risks to the Insurance Industry. Society of Actuaries Research Report <https://www.soa.org/globalassets/assets/files/resources/research-report/2020/intro-environmental-risk.pdf>

Steers, R., E. Wrubel, A. Williams, **N. Howe**, and J. Jordan, 2011. Invasive plant species early detection in the San Francisco Bay Area Network: 2010 annual report. Natural Resource Technical Report NPS/SFAN/NRTR—2011/494. NPS, Fort Collins, CO. <https://irma.nps.gov/DataStore/DownloadFile/436986>

Williams, A., J. Rogers, **N. Howe**, R. Steers, and C. Wrubel. 2011. Invasive plant species early detection in the San Francisco Bay Area Network: 2009 annual report. Natural Resource Technical Report NPS/SFAN/NRTR—2011/493. National Park Service, Fort Collins, CO. <https://irma.nps.gov/DataStore/DownloadFile/436985>

Selected Published Abstracts for Presentations

- Struwe, L. and **Howe, N.M.**, 2017. Discovery and learning of everyday biodiversity using iNaturalist-driven bioblitzes and campus inventories. Life Discovery Biology Education Conference. October 19th-21st 2017.
- Howe, N.M.**, 2016. Lichens of Philadelphia. Student Conference on Conservation Science at American Museum of Natural History. October 21st-23rd 2016.
- Howe, N. M.**, J. Dighton, and D. Grey. 2016. Nutrient interception by soil lichens. Lichens in Deep Time: 8th International Association of Lichenology Symposium, Helsinki, Finland, August 1-5 2016.
- Howe, N.M.** and S. Low. 2016. Monitoring the effects of emerald ash borer in the Philadelphia Urban Forest. Novel Ecosystems, Novel Management: Annual Meeting of the Mid-Atlantic Chapter of the Ecological Society of America, Kutztown, PA, April 8-10 2016.
- Ray, J. R. Artigues, J. Azzolini, R. Buczynski, V. Cusimano, R. Fastige, G. Hess, **N. Howe**, M. King, T. Lin, C. Olivares, R. Rodriguez, A. Sun, & L. Struwe. 2016. The undergraduate Herbarium Army at Rutgers University: Promoting interaction between students and scientific collections in teaching, research, and outreach. Botany 2016, Savannah, GA, July 30-Aug 3, 2016.
- Howe, N.M.** A. Trierweiler, S. A. Batterman, M. Schumer, J. Knapp, K. Volzing, K. Uyehara, Carey, J. and B. Jonsson. 2015. Woody Plants class as an introduction to lab science for incarcerated students. Ecological Science at the Frontier: Ecological Society of America Annual Meeting, Baltimore, MD, August 9-14 2015.
- Struwe, L., **N. Howe**, I. Irizarry, N. Lorusso, A. Kruger, N. Pollock, and S.R. Loarie. 2015. Personal BioBlitzing increases biodiversity awareness, excitement of science, and engages people at all educational and age levels. Botany 2015, Edmonton, Canada, July 25-29, 2015.
- Howe, N.M.**, J. Dighton, and D. Grey. 2014. Influence of lichens on NJ Pinelands soils. Ecological Society of America Annual Meeting. Sacramento, CA, August 10-14, 2014.
- Howe, N.M.** and J. Dighton, 2012. Lichen Communities of the NJ Pinelands. Biodiversity, From Evolutionary Origins to Ecosystem Function: Academy of Natural Sciences of Drexel Bicentennial Symposium, Philadelphia, PA, October 11-12, 2012.
- Howe, N.M.**, 2010. The recovery of a simplified lichen community at the Palmerton Zinc Smelter? Northwest Lichenologists Annual Meeting. Centralia WA, March 24-27, 2010

Publicity and Media Coverage

- [Friends of Patuxent Newsletter](#) about a lichen hike I led
- [Youtube video](#) for Mycological Association of Washington
- [Youtube video](#) on Rutgers University Pinelands Field Station Student Research
- [Scientific American blog](#) of Lichens on Skyscrapers collaboration with artist Elizabeth Demaray:
- Lichens of Philadelphia summary from University of Pennsylvania Alumni magazine

Technical Skills and Languages

Spatial analysis: ArcGIS, CLIMEX

Statistical programs: R, SAS, SQL

Website development: HTML/CSS/JavaScript

MS Office: Excel, Word, PowerPoint, Outlook

Languages: English, French

Professional Affiliations

ESA: Ecological Society of America

BSA: Botanical Society of America

IPRRG: International Pest Risk Research Group

ABLS: American Bryological & Lichenological Society