Jackson W. Drew, Ph.D.

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Education

- Ph.D. in Biological Sciences, University of Alaska Fairbanks, Fall 2023
  Dissertation: *Alnus viridis* ssp. *fruticosa* modulates local conditions to influence intra- and interspecies growth (Advisors: Dr. M. Syndonia Bret-Harte and Dr. Roger W. Ruess)
- B.S. in Biological Sciences (Minor in Chemistry), University of Alaska Fairbanks, Spring 2016

Research Interests

- Global change ecosystem ecology; effects of air pollution (tropospheric ozone and wildfire smoke) on ecosystem phenology and carbon cycling; climate–fire–vegetation interactions and nonlinear, threshold responses to disturbance; Arctic and boreal shrub ecology, dendroecology, and plant–plant interactions; cross-scale integration of flux, remote-sensing, and tree-ring data using causal-inference, machine-learning, and process-based approaches; AI-enabled ecological synthesis, ontology, and hierarchical meta-analysis

Professional Appointments

Postdoctoral Fellow, Department of Biology, West Virginia University Jan. 2024 – Present
Advisor: Dr. Justin M. Mathias

- Lead author of a study across 100 AmeriFlux sites showing that ozone shortens the growing season and reduces productivity, and that wildfire smoke offsets some of these losses
- Modeled how much ozone leaves absorb (DO3SE model in R) to link ozone uptake to earlier autumn leaf senescence
- Built a reproducible R workflow combining climate, smoke, fire, ozone, and satellite data across the contiguous United States, using machine learning techniques to separate pollution effects from climate
- Testing whether intense fires and smoke push ecosystems past thresholds, such as converting shrublands and savannas to grasslands
- Testing whether ozone sensitivity of tree species and functional groups can be detected in global tree-ring records

Research Assistant, Institute of Arctic Biology, University of Alaska Fairbanks 2017 – 2019; Fall 2023
Supervisor: Dr. M. Syndonia Bret-Harte

- Arctic shrub field sampling, woody-sample preparation for microscopy, ring-width measurement, data management and analysis, and manuscript writing

Publications

Peer-reviewed

- **Drew, J.W.**, Bret-Harte, M.S., Buchwal, A., & Ruess, R.W. (2026). Facilitative effects of *Alnus viridis* ssp. *fruticosa* on *Betula nana* ssp. *exilis* growth in Arctic Alaska. *Ecology and Evolution*, 16(6), e73535. https://doi.org/10.1002/ece3.73535
- **Drew, J.W.**, Bret-Harte, M.S., Buchwal, A., & Heslop, C. (2023). Age matters: Older *Alnus viridis ssp. fruticosa* are more sensitive to summer temperatures in the Alaskan Arctic. *Functional Ecology*, 37(5), 1463–1475. https://doi.org/10.1111/1365-2435.14307

In review

- **Drew, J.W.**, Kannenberg, S.A., Restrepo-Acevedo, A.M., & Mathias, J.M. (In review). Wildfire smoke ameliorates ozone-induced losses in continental vegetation productivity. *Proceedings of*

the National Academy of Sciences. Revised manuscript and response to reviewers submitted September 2026.

In preparation

- **Drew, J.W.**, Bret-Harte, M.S., Buchwal, A., & Ruess, R.W. (In Prep). Secondary growth of *Salix pulchra* reduced by competition with *Alnus viridis ssp. fruticosa* in Arctic Alaska

Data Publications

- **Drew, J.W.**, Bret-Harte, M.S., Ruess, R.W., & Buchwal, A. (2026). Tree ring measures (1947–2016) and other measurements of *Betula nana* ssp. *exilis* "Near" and "Away" from *Alnus viridis* ssp. *fruticosa* to assess plant–plant interactions (Sagwon Bluffs, Alaska). Arctic Data Center. https://doi.org/10.18739/A27P8TG2F
- **Drew, J.W.**, Bret-Harte, M.S., Buchwal, A., & Heslop, C. (2023). A nearly century long (1920–2017) Siberian alder (*Alnus viridis ssp. fruticosa*) secondary growth record near Sagwon bluffs Alaska, USA. Arctic Data Center. https://doi.org/10.18739/A27M0421K

Grants & Proposals

- Submitted (pending): Mathias, J.M. (PI, West Virginia University) & Huang, H. (Co-PI, University of Virginia). *Token Informed Ecology (TIE): a shared token record that makes ecological data and model results reusable for SI-enabled synthesis.* NSF AI Datasets Program (NSF 26-512), Planning track. Co-led proposal design and writing. Submitted November 2026.

Teaching Experience

Research Mentor, West Virginia University, Spring 2026

- Mentored an undergraduate student examining whether nitrogen isotope ratios changed between ten-year sampling campaigns

Research Mentor, Institute of Arctic Biology, University of Alaska Fairbanks, 2017 - 2019

- Mentored one Research Experiences for Undergraduates (REU) student each year (three total) through independent Arctic field research projects, from design and data collection to presenting their findings

Guest Lecturer (three lectures), AEM 470: Microbes and Global Change (instructor: Dr. Edward Brzostek), West Virginia University, Fall 2025 & 2026

Teaching Assistant, F260 Principles of Genetics, University of Alaska Fairbanks (two semesters)

- Both semesters with Dr. Diana Wolf, Spring 2022 and 2023

Teaching Assistant, F481 Principles of Evolution, University of Alaska Fairbanks (six semesters)

- Three semesters with Dr. Pat Doak, Fall 2020 – 2022
- Two semesters with Dr. Devin M. Drown, Spring 2018 and 2020
- One semester with Dr. Kristen Gorman, Spring 2019

Invited Presentations

- **Drew, J.W.** (2026, April). Fire, ozone, and ecosystems: The FOE. Department of Biology Seminar, West Virginia University, Morgantown, West Virginia

Contributed Oral Presentations

- **Drew, J.W.**, Kannenberg, S.A., & Mathias, J.M. (2025, December). The effects of fire and ozone on ecosystem productivity (The FOE). AGU Fall Meeting 2025, Abstract GC11D-07, New Orleans, Louisiana, USA

- **Drew, J.W.**, & Bret-Harte, M.S. (2023). How Siberian alder (*Alnus viridis ssp. fruticosa*) influences its own and other shrub species growth. Dissertation defense, UAF, Fairbanks, Alaska
- **Drew, J.W.**, & Bret-Harte, M.S. (2020). Climate sensitivity of *Alnus viridis ssp. fruticosa* and its interactions with *Betula nana ssp. exilis* and *Salix pulchra.* Life Science Seminar (Graduate Student Sampler), UAF, Fairbanks, Alaska

Contributed Poster Presentations

- **Drew, J.W.**, & Bret-Harte, M.S. (2023). Facilitative effects of *Alnus viridis ssp. fruticosa* on *Betula nana ssp. exilis* growth in Alaska. Toolik All Scientists Meeting, Santa Barbara, California, USA
- **Drew, J.W.**, & Bret-Harte, M.S. (2019). Climate sensitivity of *Alnus viridis ssp. fruticosa* and its interactions with *Betula nana ssp. exilis* and *Salix pulchra.* The Arctic LTER Site Review, Toolik, Alaska; & Toolik All Scientists Meeting, Portland, Oregon, USA

Technical and Professional Skills

- **Process-based modeling:** DO3SE stomatal conductance and ozone-flux modeling (phytotoxic ozone dose, POD1) with literature-derived parameterization; flux-based ozone exposure–response analysis
- **Eddy covariance:** AmeriFlux/ONEFlux data processing, gap-filling, and carbon-flux phenology metrics
- **Statistics and machine learning:** linear, nonlinear, and hierarchical mixed-effects models, structural equation modeling, time-series analysis, random forest, elastic net, double/debiased machine learning
- **Geospatial and remote sensing:** continental-scale raster workflows with ERA5-Land, MODIS (MCD12Q1, MCD12Q2, MOD17A2HGF via AppEEARS), NOAA HMS smoke and fire, and ozone reanalysis products
- **Programming:** R (advanced; reproducible, parallelized pipelines with future/furrr), Python (working knowledge); batch computing on a Linux-based high-performance computing (HPC) cluster
- **Dendrochronology and wood anatomy:** serial cross-sectioning of woody shrubs, slide preparation and microscopy, cross-dating, ring-width and basal-area-increment analysis, chronology development
- **Field and laboratory methods:** led field and laboratory teams; Arctic vegetation surveys (quadrat, transect, and point sampling) and biomass harvests in natural and experimental plots; NDVI, sap-flow, and weather measurements; plant carbon and nitrogen sample preparation and stable isotope data analysis; ion-exchange resin nutrient analyses
- **Communication and leadership:** grant writing, scientific presentations, university teaching, and organizing advocacy efforts

Awards and Honors

- UAF Graduate School Degree Completion Fellowship, 04/2023 ($7,500)
- Outstanding Teaching Assistant Award, 05/2021
- GVEA Good¢ents Grant, 09/2020 ($2,400)
- IAB Summer Graduate Student Fellowship, 05/2020 ($7,500)
- Randy Howenstein Memorial Research Fund, 02/2020 ($2,300)
- C. T. Elvey Memorial Endowment, 02/2020 ($750)
- Jay Hammond Memorial Scholarship, 02/2020 ($800)
- Undergraduate Research and Scholarly Activity Fellow, University of Alaska, 12/2015 ($2,500)
- Eagle Scout, Boy Scouts of America, 07/2009

Current Collaborations

- Dr. M. Syndonia Bret-Harte (University of Alaska Fairbanks) – Harvested *Betula nana* shrubs in 2023 from the long-term nutrient fertilization and warming experiment established by Dr. Gaius R. Shaver in the 1980s at Toolik Field Station, Alaska; functional-trait analyses complete, tree-ring analyses in progress
- Dr. Jennifer Fraterrigo (University of Illinois Urbana-Champaign) – Cross-dated *Alnus*, *Betula*, and *Salix* shrub-ring samples for analyses of Arctic shrub growth
- Dr. Agata Buchwal (Laboratory of Tree-Ring Research, University of Arizona) – Collected *Juniperus* shrub samples near Sukakpak Mountain, north of Coldfoot, Alaska, for dendroecological analysis (2023 and 2024 field seasons)
- Fire and Smoke ESILL Working Group, National Ecological Observatory Network (NEON) – Wildfire and Smoke Macrosystem Ecology Expert

Service to the Profession

- Peer reviewer, *Dendrochronologia* (2026)

Professional Memberships

- American Geophysical Union (AGU) – current member

Service to the Community

Learning Inside Out Network (LION) 11/2020 – 12/2023

- Member of LION, which provides educational opportunities to incarcerated people; wrote grants advocating for the rights of incarcerated people
- Helped secure the GVEA Good¢ents Grant, which provided newspapers to people incarcerated at the Fairbanks Correctional Center to keep them connected to their community and to support distance writing workshops
- Organized a 2022 meeting with Alaska State Senator Scott Kawasaki, Representative Jonathan Kreiss-Tomkin's team, and the nonprofit Ameelio on prison education access and technology; provided input on the Tanana Chiefs Conference's plan for a re-entry program for justice-involved tribal members (2022)
- Represented LION on a working group supported by the Institute of Digital Equity of the American Association of Colleges and Universities to promote digital equity in Alaska's carceral systems; contributed comments to Alaska's Digital Equity Plan (2023)

Professional References

- Dr. Justin M. Mathias – Postdoctoral advisor and co-author
- Dr. Syndonia Bret-Harte – Main advisor and co-author
- Dr. Agata Buchwal – Committee member and co-author