

Nathan Lemoine

Curriculum Vitae

Department of Biology

Colorado State University

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Research Scientist I

USDA NIFA-AFRI Postdoctoral Fellow

Education

- 2015 **PhD., Biology**, *Florida International University*, Miami, FL.
- 2010 **M.S., Marine Science**, *University of South Alabama/Dauphin Island Sea Lab*, Mobile, AL.
- 2006 **B.S., Biology/Environmental Studies**, *University of Richmond*, Richmond, VA.

Professional Experience

- 2015 – present **Research Scientist/Affiliate Faculty**, *Department of Biology, Graduate Degree Program in Ecology, Colorado State University*, Ft. Collins, CO.
- 2016 – 2017 **Adjunct Faculty**, *Department of Ecology and Evolutionary Biology, University of Colorado*, Boulder, CO.
- 2017 **QUBES Making Meaning Through Modeling: Problem Solving in Biology**, *Michigan State University*, Lansing, MI.
- 2014 **NCAR Graduate Workshop on Environmental Data Analytics**, *National Center for Atmospheric Research*, Boulder, CO.
- 2014 **NIMBioS Visiting Scientist**, *University of Tennessee*, Knoxville, TN.
- 2013 – 2014 **Smithsonian Pre-Doctoral Fellow**, *Smithsonian Environmental Research Center*, Edgewater, MD.
- 2013 **Joint 2013 MBI-NIMBioS-CAMBAM Summer Graduate Workshop: Connecting Biological Data with Mathematical Models**, *University of Tennessee*, Knoxville, TN.
- 2010 – 2013 **Presidential Fellow**, *Florida International University*, Miami, FL.
- 2007 – 2010 **Graduate Research Fellow**, *Dauphin Island Sea Lab*, Mobile, AL.

Publications (Published: 28, First Authored: 17, In Press: 0)

† undergraduate author

- In Prep Stuart-Haentjens, E., H. De Boeck, **N.P. Lemoine**, P. Mänd, G. Kröel-Dulay, I.K. Schmidt, A. Jentsch, A. Stampfli, W. Anderegg, M. Bahn, J. Kreyling, T. Wohlge-muth, F. Lloret, A. Classen, C. Gough, M. Smith. Global trends in the resistance and resilience of primary production following extreme drought are predicted by mean annual precipitation. *Nature Climate Change* (manuscript available on request)

- In Prep La Pierre, K.L., M.L. Avolio, **N.P. Lemoine**, F. Isbell, E. Grman, G.R. Houseman, S.E. Koerner, D.S. Johnson, K.R. Wilcox, and 67 others. Global change manipulations alter plant communities worldwide. *Nature* (*manuscript available on request*)
- In Review **Lemoine, N.P.** Carrying capacity does not decline exponentially with warming. *Nature Climate Change* (*manuscript available on request*)
- In Revision Rehm, E.M., M.B. Balsat[†], **N.P. Lemoine**, J.A. Savidge. Spatial dynamics of habitat use informs reintroduction efforts in the presence of an invasive predator. *Journal of Applied Ecology*
- In Revision Koerner, S.E., M.D. Smith, D.E. Burkepile, N. Hanan, M.L. Avolio, S.L. Collins, A.K. Knapp, **N.P. Lemoine**, E.J. Forrestel, S. Eby, D.I. Thompson, The Grazing Consortium. Resolving variation in herbivore effects on plant biodiversity - dominance as a global mechanism. *Nature Ecology and Evolution*
- 2017 **Lemoine, N.P.**, J.D. Dietrich, M.D. Smith. Climatic and environmental constraints on three aspects of flowering in three dominant tallgrass species. *Functional Ecology* 31:1894-1902
- 2017 Wilcox, K.R., Z. Shi, L.A. Gherardi, **N.P. Lemoine**, S.E. Koerner, D.L. Hoover, E. Bork, K.M. Byrne, J. Cahill Jr., S.L. Collins, S. Evans, A.K. Gilgen, P. Holub, L. Jiang, A.K. Knapp, L. Yahdjian, D. LeCain, J. Liang, P. Garcia-Palacios, J. Penuelas, W.T. Pockman, M.D. Smith, S.R. White, K. Zhu, Y. Luo. Asymmetric responses of primary productivity to climate extremes: a synthesis of grassland precipitation manipulation experiments. *Global Change Biology* 23:4376-4386
- 2017 **Lemoine, N.P.** Predation risk reverses the potential effects of warming on plant-herbivore interactions by altering the relative strengths of trait- and density-mediated interactions. *The American Naturalist* 190:337-349
- 2017 **Lemoine, N.P.**, D. Doublet[†], J-P. Salminen, D.E. Burkepile, J.D. Parker. Responses of plant phenology, growth, defense, and reproduction to interactive effects of warming and insect herbivory. *Ecology* 98:1817-1828
- 2017 Rode, M.[†], **N.P. Lemoine***, M.D. Smith. Prospective evidence for independent nitrogen and phosphorus limitation of grasshopper (*Chorthippus curtipennis*) growth in a tallgrass prairie. *PLoS One* 12:e0177754 (**corresponding author*)
- 2017 Burkepile, D.E., R.W.S. Fynn, D.I. Thompson, **N.P. Lemoine**, S.E. Koerner, S. Eby, N. Hagenah, K.R. Wilcox, S.L. Collins, K.P. Kirkman, A.K. Knapp, M.D. Smith. Herbivore size matters for productivity-richness relationships in African savannas. *Journal of Ecology* 105:674-686
- 2017 **Lemoine, N.P.**, D.E. Burkepile, J.D. Parker. Insect herbivores increase mortality and reduce tree seedling growth of some species in temperate forest canopy gaps. *PeerJ* 5:e3102
- 2016 **Lemoine, N.P.**, J. Sheffield, J.S. Dukes, A.K. Knapp, M.D. Smith. The Terrestrial Precipitation Analysis (TPA) web tool: a resource for characterizing long-term precipitation regimes and extremes. *Methods in Ecology and Evolution* 7:1396-1401

- 2016 Burkepile, D.E., D.I. Thompson, R.W.S. Fynn, S.E. Koerner, S. Eby, N. Govender, N. Hagenah, **N.P. Lemoine**, K.J. Matchett, K.R. Wilcox, S.L. Collins, K.P. Kirkman, A.K. Knapp, M.D. Smith. Fire frequency drives habitat selection by a diverse herbivore guild impacting top-down control of plant communities in an African savanna. *Oikos* 125:1636-1646
- 2016 Hamerlinck, G., **N.P. Lemoine**, G.R. Hood, K.C. Abbott, A.A. Forbes. Meek women with powerful daughters: effects of novel host environments and small trait differences on parasitoid wasp competition. *Oikos* 125:1516-1527
- 2016 **Lemoine, N.P.**, A. Hoffman, A. Felton, L. Baur, F. Chaves, J. Gray, Q. Yu, M.D. Smith. Underappreciated problems of low statistical power in ecological field studies. *Ecology* 97:2554-2561
- 2016 Zaneveld, J.R., D.E. Burkepile, A.A. Shantz, C.E. Pritchard, R. McMinds, J. Payet, R. Welsh, A. Simoes-Correa, **N.P. Lemoine**, S. Rosales, C. Fuchs[†], J. Maynard, R. Vega-Thurber. Overfishing and nutrient pollution interact with temperature to disrupt coral reefs down to microbial scales. *Nature Communications* 7:11833
- 2016 **Lemoine, N.P.**, A.A. Shantz. Increased temperature causes protein-limitation by reducing nitrogen digestion efficiency in the ectothermic herbivore *Spodoptera exigua* (Lepidoptera: Noctuidae). *Physiological Entomology* 41:143-151
- 2016 **Lemoine, N.P.**, D.E. Burkepile, J.D. Parker. Quantifying differences between native and introduced species. *Trends in Ecology and Evolution* 31(5):372-381
- 2016 Shantz, A.A., **N.P. Lemoine**, D.E. Burkepile. Nutrient loading alters the performance of key nutrient exchange mutualisms. *Ecology Letters* 19(1):20-28 **Faculty of 1000 Recommendation**
- 2015 **Lemoine, N.P.**, J. Capdevielle[†], J.D. Parker. Effects of *in situ* climate warming on larval monarch (*Danaus plexippus*) development. *PeerJ* 3:e1293
- 2015 **Lemoine, N.P.**, J. Shue, B. Verrico[†], D. Erickson, W.J. Kress, J.D. Parker. Phylogenetic relatedness and leaf functional traits, not introduced status, influence community assembly. *Ecology* 96(10):2605-2612
- 2015 **Lemoine, N.P.** Climate change may alter monarch spring migration and summer breeding ground distributions. *PLoS One* 10:e0118614
- 2014 Cook-Patton, S.C, L. Maynard[†], **N.P. Lemoine**, J. Shue, J.D. Parker. Cascading effects of a highly specialized beech-aphid-fungus interaction on forest regeneration. *PeerJ* 2:e442
- 2014 **Lemoine, N.P.**, D.E. Burkepile, J.D. Parker. Variable effects of temperature on insect herbivory. *PeerJ* 2:e376 **Featured Article**
- 2014 **Lemoine, N.P.**, S.T. Giery, D.E. Burkepile. Differing consumer stoichiometric constraints across ecosystems. *Oecologia* 174:1367-1376
- 2013 **Lemoine, N.P.**, W.A. Drews[†], D.E. Burkepile, J.D. Parker. Temperature alters feeding behavior of a generalist herbivore. *Oikos* 122:1669-1678

- 2013 Giery, S.T., **N.P. Lemoine**, C.M. Hammerschlag-Peyer, R. Abbey-Lee, C.A. Layman. Bidirectional trophic linkages couple a canopy and understory foodweb. *Functional Ecology* 27(6):1436-1441
- 2013 Parker, J.D, M.E. Torchin, R.A. Hufbauer, **N.P. Lemoine**, C. Alba, D.M. Blumenthal, O. Bossdorf, J.E. Byers, A.M. Dunn, R.W. Heckman, M. Hejda, V. Jarosik, A. Kanarek, L.B. Martin, S.E. Perkins, P. Pysek, K. Schierenbeck, C. Schloeder, R. van Klinken, K.J. Vaughn, W. Williams, L. Wolfe. Do invasive species perform better in their new ranges? *Ecology* 94(5):985-994 **Faculty of 1000 Recommendation**
- 2013 Burkepile, D.E., J. Allgeier, A. Shantz, C.E. Pritchard, **N.P. Lemoine**, L. Bhatti, C.A. Layman. Carnivorous fishes as vectors of nutrients on coral reefs: the role of nutrient supply in facilitating seaweed abundance. *Scientific Reports* 3:1493
- 2012 **Lemoine, N.P** and D.E. Burkepile. Temperature-induced mismatches between metabolism and consumption reduce consumer fitness. *Ecology* 93(11):2483-2489
- 2012 **Lemoine, N.P.** and J.F. Valentine. Structurally complex habitats provided by *Acropora palmata* alter ecosystem processes on a patch reef in the Florida Keys National Marine Sanctuary. *Coral Reefs* 31(3):779-786
- 2007 **Lemoine N.P.**[†], N. Buell[†], A.L. Hill, M.S. Hill. Assessing the utility of sponge microbial symbiont communities as models to study global climate change: a case study with *Halichondria bowerbanki*. In: Custdio, M. R., G. Lbo-Hajdu, E. Hajdu, and G. Muricy (eds.). *Porifera Research: Biodiversity, Innovation, and Sustainability*, Srie Livros 28. Museu Nacional, Rio de Janeiro. pp:419-425

[†] undergraduate author

Grants and Fellowships (Received: \$411,604, Pending: \$2,041,550)

Pending

- 2017 **National Science Foundation**, *DEB Ecosystems*, **\$885,148**, Predicting the effects of extreme drought on insect herbivore control of grassland ecosystem function. Sole PI
- 2017 **United States Department of Agriculture**, *NIFA-AFRI*, **\$283,292**, Nearcasting forage production using machine learning methods. Lead PI
- 2017 **United States Department of Agriculture**, *NIFA-AFRI*, **\$873,110**, Drought and rangeland resilience: understanding post-drought recovery to inform sustainable management. Co-PI

Current

- 2015 **United States Department of Agriculture**, *NIFA-AFRI Postdoctoral Fellowship*, **\$149,704**, Predicting effects of increased climate variability on consumer regulation of ecosystem function in US rangelands. Sole PI

Past

- 2015 **National Institute for Mathematical and Biological Synthesis**, *Postdoctoral Fellowship*, \$107,000, A new statistical framework for assessing community assembly mechanisms. Offered but declined.
PI
- 2014 **Florida International University**, *Dissertation Year Fellowship*, \$16,600.
- 2014 **Florida International University**, *Dissertation Evidence Acquisition Grant*, \$8,300, PI.
- 2013 **Smithsonian Environmental Research Center**, *Graduate Fellowship*, \$15,500.
Will global change disrupt trophic transfer in marsh ecosystems?
- 2013 **National Science Foundation**, *Doctoral Dissertation Improvement Grant*, \$15,294,
Assessing the effects of climate change on biotic interactions structuring herbivore communities..
PI
- 2010 **Florida International University**, *Presidential Fellowship*, \$75,000.
- 2007 **University of South Alabama**, *Graduate Research Fellowship*, \$32,000.
- 2007 **Dauphin Island Sea Lab**, *Exxon-Mobile Research Fellowship*, \$2,000.
- 2006 **University of Richmond**, *Student Travel Grant*, \$1,000.
- 2005 **University of Richmond**, *Robert F. Smart Research Fellowship*, \$4,000.
- 2005 **University of Richmond**, *Research Grant*, \$500.

Teaching (Full Lecture Courses: 2, Seminars: 4, Labs: 3)

- 2016 – 2017 **EBIO 4410/5410 - Biometry**, *University of Colorado*.
- 2016 **ECOL 592 - Principles of Data Visualization Using R and ggplot2**, *Colorado State University*.
- 2016 **Ecology 600 - Community Ecology**, *Colorado State University*.
- 2015 **Introduction to Bayesian Data Analyses Workshop**, *Colorado State University*.
- 2014–2015 **Introduction to R for Ecologists Workshop**, *Florida International University*.
- 2012 – 2014 **Data Management and Introduction to Statistics**, *Smithsonian Environmental Research Center*.
- 2011 **Biology 1011L: General Biology II Lab**, *Florida International University*.
- 2011 **Biological Oceanography 3043L: Marine Biology and Oceanography Lab**, *Florida International University*.
- 2010 **Biology 3043L: Ecology Lab**, *Florida International University*.

Students and Committees

- 2017 **Madison Rode**, *Colorado State University*, Honors Thesis Committee Chair.

Software

- 2015 – present **Lead developer of EcoPy: A Python module for multivariate data analysis.**
- 2015 – present **Lead developer of the Terrestrial Precipitation Analysis package.**

Presentations (Total: 17, Invited: 8)

- 2017 **Smithsonian Environmental Research Center, Edgewater, MD.**
An integrative approach to predicting plant-insect interactions under future climates **Invited Speaker**
- 2017 **Ecological Society of America, Portland, OR.**
Warming increases the importance of plant nutritional quality to herbivore performance **Invited Speaker**
- 2017 **University of Saskatchewan, Saskatoon, Canada.**
Emergent impacts of warming on plant-herbivore interactions: connecting physiology to communities **Invited Speaker**
- 2017 **University of British Columbia, Vancouver, Canada.**
Emergent impacts of warming on plant-herbivore interactions: connecting physiology to communities **Invited Speaker**
- 2016 **International Joint Project Meeting, Erguna, China.**
Assessing the impact of invertebrate herbivores on grassland ecosystem function **Invited Speaker**
- 2015 **CSU Megalab, Fort Collins, CO.**
Phylogenetic relatedness and leaf functional traits, not introduced status, influence community assembly **Invited Speaker**
- 2015 **CSU Forest and Rangeland Stewardship, Fort Collins, CO.**
Climate warming effects on plant-insect interactions **Invited Speaker**
- 2015 **Ecological Society of America, Baltimore, MD.**
Warming alters fitness trade-offs in *Oenothera biennis* caused by herbivory
- 2015 **FIU Graduate Student Symposium, Miami, FL.**
Warming modifies tolerance to herbivory in *Oenothera biennis* **Best Presentation**
- 2014 **Evolution, Raleigh, NC.**
Evolutionary history and traits, not invasive status, influence community assembly
- 2014 **FIU Graduate Student Symposium, Miami, FL.**
Phenotypic plasticity and population subsidies reverse competitive outcomes
- 2013 **Entomological Society of America, Austin, TX.**
Climate change modifies interactions between invasive herbivores and native plants **Invited Speaker**
- 2013 **Ecological Society of America, Minneapolis, MN.**
Temperature alters feeding behavior of a generalist herbivore
- 2013 **Benthic Ecology Meeting, Savannah, GA.**
Temperature-induced mismatches between metabolism and consumption reduce consumer fitness
- 2012 **Smithsonian Environmental Research Center, Edgewater, MD.**
Effects of climate change on plant-herbivore interactions
- 2012 **FIU Graduate Student Symposium, Miami, FL.**
Deviations from the assumptions of the Metabolic Theory of Ecology lead to contrasting predictions
- 2010 **Benthic Ecology Meeting, Wilmington, NC.**
Successional trajectories of food web reorganizations on Caribbean coral reefs

Outreach

- 2013 **Family Day Public Open House**, *Smithsonian Environmental Research Center*.
- 2013 **Challenge for Elementary, Middle, and High School Students Essay Judge**, *Fairchild Tropical Botanical Garden*.
- 2011 **Partnership in Academic Communities of At-Risk High School Students in Math and Science**, *Florida International University*.

Media / Press Coverage

- 2017 **Statistical Modeling, Causal Inference, and Social Science**, *Type M errors in the wild – really the wild!*, <http://andrewgelman.com/2017/09/16/type-m-errors-wild-really-wild/>.
- 2017 **Uncommon Ground**, *Noisy data and small samples are a bad combination*, <http://darwin.eeb.uconn.edu/uncommon-ground/blog/2016/09/23/noisy-data-and-small-samples-are-a-bad-combination/>.
- 2017 **Smithsonian Shorelines**, *Scientists turn up the heat on herbivores and their food*, <https://sercblog.si.edu/?p=8368>.
- 2016 **The EEB & Flow**, *The problematic effect of small effects*, <http://evol-eco.blogspot.ca/2016/09/the-problematic-effect-of-small-effects.html>.
- 2016 **Colorado State University - SOURCE**, *Are invaders 'different'? Nope, says CSU biologist*, <http://source.colostate.edu/are-invaders-different-nope-says-csu-biologist/>.
- 2015 **Smithsonian Science News**, *Warming temperatures may mean more monarch generations in some areas of North America*, <http://smithsonianscience.si.edu/2015/08/warming-temperatures-may-mean-more-monarch-generations-in-some-areas-of-north-america/>.
- 2014 **PeerJ**, *Interview with an Author*, <http://blog.peerj.com/post/85650418408/interview-with-an-author-nathan-lemoine>.

Professional Service

Peer Review (36 total reviews)

Reviewer for the following journals, *Acta Physiologiae Plantarum (1)*, *Annals of Applied Biology (1)*, *Biological Invasions (5)*, *BMC Ecology (1)*, *Ecology (6)*, *Ecoscience (1)*, *Ecosphere (1)*, *Ecology Letters (3)*, *Journal of Animal Ecology (1)*, *Journal of Ecology (3)*, *NeoBiota (1)*, *New Phytologist (1)*, *Oecologia (4)*, *Oikos (2)*, *PeerJ (1)*, *PLoS One (1)*, *Plant Ecology (2)*, *Proceedings of the Royal Society - B (1)*.

Number of reviews in parentheses

NSF Ad Hoc Reviewer, 2017.

Invited Working Groups

- 2016 **LTER Community Responses to Resource Experiments: Communities to Ecosystems**, *Lead PIs: Kimberly LaPierre and Meghan Avolio*, Role: Quantitative Ecologist.

- 2015-2016 **Drought-Net**, *Lead PI: Melinda Smith*, Role: Data Manager / Quantitative Ecologist.
- 2015 – 2016 **Grazing Consortium**, *Lead PI: Sally Koerner*, Role: Quantitative Ecologist.
- 2015 – 2016 **ILTER Community Responses to Resource Experiments**, *Lead PIs: Kimberly LaPierre and Meghan Avolio*, Role: Quantitative Ecologist.
- 2015 – 2016 **iDiv Evolution of Stability**, *Lead PIs: Dylan Craven and Will Pearse*, Role: Quantitative Ecologist.

[Undergraduate Mentoring \(6 co-authors\)](#)

- 2017 **Abigail Lathrop-Melting**, *Colorado State University*, Undergraduate Intern.
- 2017 **Sam Rollman**, *Colorado State University*, Undergraduate Intern.
- 2017 **Holly Perretta**, *Colorado State University*, Undergraduate Intern.
- 2015 – 2017 **Abigail Lock**, *Colorado State University*, Undergraduate Intern.
- 2015 – 2017 **Megan Coyle**, *Colorado State University*, Undergraduate Intern.
- 2016 – 2017 **Tarun Multhineni**, *Colorado State University*, Web Development Intern.
- 2016 – 2017 **Kiloaulani Kaawa-Gonzalez**, *Colorado State University*, Undergraduate Intern.
- 2016 **Madison Rode**[†], *Colorado State University*, REU.
- 2016 **Jeremy Tabke**, *Colorado State University*, Undergraduate Intern.
- 2015 **Erica Duda**, *Colorado State University*, Undergraduate Intern.
- 2015 **Brianna Magbual**, *Colorado State University*, Undergraduate Intern.
- 2014 **Megan Palmer**, *Smithsonian Environmental Research Center*, REU.
- 2014 **Jillian Capdevielle**[†], *Smithsonian Environmental Research Center*, Undergraduate Intern.
- 2014 **Dejeanne Doublet**[†], *Smithsonian Environmental Research Center*, REU.
- 2013 **Lauren Maynard**[†], *Smithsonian Environmental Research Center*, REU.
- 2012 **Willem Drews**[†], *Smithsonian Environmental Research Center*, Undergraduate Intern.
- 2012 **Brittany Verrico**[†], *Smithsonian Environmental Research Center*, REU.
- 2011 **Joseph Barger**, *Florida International University*, Undergraduate Intern.
- 2011 **Amaury Marquez**, *Florida International University*, Undergraduate Intern.