UC RIVERSIDE UNIVERSITY OF CALIFORNIA

NICOLE E. RAFFERTY

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FACULTY APPOINTMENTS

Assistant Professor, *2017-present*
Department of Evolution, Ecology, & Organismal Biology, University of California, Riverside

Cooperating Faculty Member, *2017-present*
Department of Entomology, University of California, Riverside

EDUCATION AND TRAINING

Research Associate, *2016*
Department of Entomology, Washington State University

Postdoctoral Fellow, *2015*
Department of Ecology and Evolutionary Biology, University of Toronto
Mentor: James Thomson

National Institutes of Health Fellow, *2011-2014*
Postdoctoral Excellence in Research and Teaching Program
Department of Ecology and Evolutionary Biology; Center for Insect Science, University of Arizona
Mentor: Judith Bronstein

Ph.D., Zoology, *2011*
University of Wisconsin-Madison
Advisor: Anthony Ives

M.S., Zoology, *2006*
University of Wisconsin-Madison
Advisor: Janette Boughman

B.S., Ecology, Evolution, and Conservation Biology, *2003*
magna cum laude, Distinction in Biology, Phi Beta Kappa
University of Washington
Advisor: Dee Boersma

PUBLICATIONS

* indicates mentored student

18. Ollerton, J., and 74 others, including **N.E. Rafferty**. 2019. The diversity and evolution of pollination systems in large plant clades: Apocynaceae as a case study. Annals of Botany 123:311-325.

17. **Rafferty, N.E.** 2017. Effects of global change on insect pollinators: multiple drivers lead to novel communities. Current Opinion in Insect Science 23:22-27.

16. Morton*, E.M., and **N.E. Rafferty**. 2017. Plant-pollinator interactions under climate change: the use of spatial and temporal transplants. Applications in Plant Sciences 5:1600133.

15. **Rafferty, N.E.**, and P.D. Nabity. 2017. A global test for phylogenetic signal in shifts in flowering time under climate change. Journal of Ecology 105:627-633. (authors contributed equally)

⇒ *Editor's Choice article*

⇒ *Journal cover photo*

14. de Keyzer, C.W., **N.E. Rafferty**, D.W. Inouye, and J.D. Thomson. 2017. Confounding effects of spatial variation on shifts in phenology. Global Change Biology 23:1783-1791.

13. **Rafferty, N.E.**, C.D. Bertelsen, and J.L. Bronstein. 2016. Later flowering is associated with a compressed flowering season and reduced reproductive output in an early season floral resource. Oikos 125:821-828.

12. de Keyzer, C.W., S.R. Colla, C.F. Kent, **N.E. Rafferty**, L.L. Richardson, and J.D. Thomson. 2016. Delving deeper: questioning the decline of long-tongued bumble bees, long-tubed flowers and their mutualisms with climate change. Journal of Pollination Ecology 18:36-42.

11. **Rafferty, N.E.**, P.J. CaraDonna, and J.L. Bronstein. 2015. Phenological shifts and the fate of mutualisms. Oikos 124:14-21.

⇒ *Recommended by Faculty of 1000*

⇒ *Journal cover photo (credit: David W. Inouye)*

10. **Rafferty, N.E.** 2013. Pollination Ecology. For Oxford Bibliographies in Ecology. Ed. D.J. Gibson. New York: Oxford University Press.

9. **Rafferty, N.E.**, and A.R. Ives. 2013. Phylogenetic trait-based analyses of ecological networks. Ecology 94:2321-2333.

8. **Rafferty, N.E.**, and N.M. Waser. 2013. Book review: *Evolution of Plant-Pollinator Relationships*, ed. S. Patiny. Quarterly Review of Biology 88:238-239.

7. **Rafferty, N.E.**, P.J. CaraDonna, L.A. Burkle, A.M. Iler, and J.L. Bronstein. 2013. Phenological overlap of interacting species in a changing climate: an assessment of available approaches. Ecology and Evolution 3:3183-3193.

6. Scaven*, V.L., and **N.E. Rafferty**. 2013. Physiological effects of climate warming on flowering plants and insect pollinators and potential consequences for their interactions. Current Zoology 59:418-426.

5. **Rafferty, N.E.**, and A.R. Ives. 2012. Pollinator effectiveness varies with experimental shifts in flowering time. Ecology 93:803-814.

⇒ *Featured on journal cover*

4. Gilman, R.T., N.S. Fabina, K.C. Abbott, and **N.E. Rafferty**. 2012. Evolution of plant-pollinator mutualisms in response to climate change. Evolutionary Applications 5:2-16.

⇒ *Journal cover photo*

⇒ *Popular press by Science Daily and Treehugger*

3. **Rafferty, N.E.**, and A.R. Ives. 2011. Effects of experimental shifts in flowering phenology on plant-pollinator interactions. Ecology Letters 14:69-74.

⇒ *Journal cover photo*

2. **Rafferty, N.E.**, and J.W. Boughman. 2006. Olfactory mate recognition in a sympatric species pair of three-spined sticklebacks. Behavioral Ecology 17:965-970.

1. **Rafferty, N.E.**, P.D. Boersma, and G.A. Rebstock. 2005. Intraclutch egg-size variation in Magellanic penguins. Condor 107:921-926.

GRANTS, FELLOWSHIPS, AND AWARDS

2018-2019	Innovative Learning Technology Initiative Grant, *University of California Office of the President*, co-PI ($227,000)
2016	Research Grant, *Washington Tree Fruit Research Commission*, PI ($76,634)
2015-2016	Research Grant, *British Ecological Society*, PI ($23,515)
2015	Ecology and Evolutionary Biology Postdoctoral Fellowship, *University of Toronto*
2011-2014	Postdoctoral Excellence in Research and Teaching Fellowship, *National Institutes of Health*
2011	John Jefferson Davis Travel Award, *University of Wisconsin* ($400)
2010	Emlen Award for Outstanding Graduate Work in Zoology, *University of Wisconsin* ($4,500)
2010	John Jefferson Davis Travel Award, *University of Wisconsin* ($400)
2009	Carl A. Bunde Graduate Research Award, *University of Wisconsin* ($4,500)
2004-2007	Graduate Research Fellowship, *National Science Foundation*
2006	Research Grant, *American Society of Primatologists* ($1,445)
2006	Graduate Research Grant, *University of Wisconsin* ($1,315)
2003	Research Apprenticeship Grant, *Friday Harbor Marine Labs* ($3,000)

PRESENTATIONS

Invited Talks at Conferences

2018 Rafferty, N.E., A.M. Keeler, and C.W. de Keyzer. Effects of joint shifts in phenology and distribution on plant-pollinator communities under climate change. Entomological Society of America Annual Meeting, Vancouver, British Columbia.

2017 Rafferty, N.E., J.M. Diez, and C.D. Bertelsen. Phenological responses to climate change differ for the upper and lower limits of plant populations along elevational gradients. Ecological Society of America Annual Meeting, Portland, Oregon. (cancelled due to illness)

2016 Rafferty, N.E. Using experiments and historical data to study temporal and spatial shifts in plant-pollinator communities under climate change. Botanical Society of America Annual Meeting, Savannah, Georgia.

2015 Rafferty, N.E., and J.D. Thomson. Climate change-induced shifts in flowering phenology: consequences for floral traits, plant-pollinator interactions, and reproductive output of plants. Entomological Society of America Pacific Branch Annual Meeting, Coeur d'Alene, Idaho.

2014 Rafferty, N.E., P.J. CaraDonna, and J.L. Bronstein. Characteristics predicted to predispose mutualisms to phenological mismatches. Ecological Society of America Annual Meeting, Sacramento, California.

2013 Rafferty, N.E., and J.L. Bronstein. The consequences of delayed flowering phenology in a sky-island plant, pointleaf manzanita. Ecological Society of America Annual Meeting, Minneapolis, Minnesota.

2012 Rafferty, N.E., P.J. CaraDonna, L.A. Burkle, A.M. Iler, and J.L. Bronstein. Phenology of species interactions in a changing climate: an assessment and illustration of approaches. Botanical Society of America Annual Meeting, Columbus, Ohio.

Departmental Seminars and Other Venues

2018 Department of Ecology and Evolutionary Biology, University of California, Irvine
Department of Biology, Harvey Mudd College (declined due to childbearing leave)

2017 Department of Biology, San Diego State University (canceled due to illness)
Department of Ecology and Evolutionary Biology, University of California-Los Angeles

2016 School of Biological Sciences, Washington State University
Department of Entomology, University of California, Riverside
Palouse Ecology, Evolution and Systematics, Washington State University/University of Idaho
Department of Biology, University of North Carolina
Department of Biology, University of California, Riverside

2015 Department of Ecology and Evolutionary Biology, University of Toronto

2014 USA National Phenology Network Headquarters, Tucson, Arizona
Department of Biology, Eastern Michigan University

2011 Department of Ecology and Evolutionary Biology, University of Arizona
Biology Colloquium, University of Wisconsin

Contributed Talks and Posters at Conferences

2018 Rafferty, N.E., A.M. Keeler, and C.W. de Keyzer. Phenology of early life stages and establishment success of wildflowers transplanted along a subalpine elevational gradient. Ecological Society of America Annual Meeting, New Orleans, Louisiana.

2016 Rafferty, N.E., C.W. de Keyzer, and J.D. Thomson. Patterns of bumble bee visitation and seed set across an elevational gradient in the context of climate change. Ecological Society of America Annual Meeting, Fort Lauderdale, Florida.

2012 Rafferty, N.E., and J.L. Bronstein. Reproduction varies with flowering time in pointleaf manzanita. Phenology Research and Observations of Southwest Ecosystems Symposium, Tucson, Arizona. (poster)

2011 Rafferty, N.E., and A.R. Ives. Pollinator effectiveness and composition vary with experimental shifts in flowering time. Ecological Society of America Annual Meeting, Austin, Texas.

2010 Rafferty, N.E. Effects of experimental shifts in flowering phenology on plant-pollinator interactions. Ecological Society of America Annual Meeting, Pittsburgh, Pennsylvania.

2009 Gilman, R.T., N.S. Fabina, K.C. Abbott, and N.E. Rafferty. Evolution and robustness of plant-pollinator mutualisms in a changing environment. Society for the Study of Evolution Annual Meeting, Moscow, Idaho.

TEACHING EXPERIENCE

University of California, Riverside

Ecological Communities Under Global Change (Biology 250, spring 2017)
Introductory Evolution and Ecology (Biology 5C, fall 2017, fall 2018)
Introduction to Graduate Study in Biology (EEOB 400, fall 2018)
Ecology and Conservation Biology (Biology 116, spring 2019)

Other Institutions

Washington State University, *Instructor*

General Entomology (writing-intensive)

Pima Community College, *Instructor*
Environmental Biology (integrated lecture and lab)

STUDENT MENTORING

Graduate Students

Advisor
Andrea Keeler (2017-present), Ph.D. student in EEOB
Christopher Cosma (2018-present), Ph.D. student in EEOB
Elijah Hall (2018-present), Ph.D. student in EEOB
Annika Rose-Person (2018-present), Ph.D. student in EEOB
Huan Liang (2018-2019), visiting Ph.D. student from Kunming Institute of Botany, China

Committee Member
Jacob Cecala (2017-present), Ph.D. student in Entomology
Kaleigh Russell (2017-present), Ph.D. student in Entomology
Natalie Fischer (2018-present), Ph.D. student in Entomology
Erica Sarro (2018-present), Ph.D. student in Entomology
William Ota (2018-present), Ph.D. student in EEOB

Undergraduate Students

Eva Morton (2017), *co-authored publication*
Skyler Kim (2017)
Samuel Cho (2017-2018)
Gayathri Chengodam (2017-2018)
Jamison Diep (2017)
Alexis Kennedy-Craig (2018)
Stephanie Aguiar (2018)

Other Lab Volunteers

Caitlin Redak (2017)
Dillon Gidcumb (2018)

PROFESSIONAL SERVICE

National and International

Associate Editor, *Journal of Ecology* (2013-present)

Vice-Chair, Plant Population Ecology Section, Ecological Society of America (August 2017-August 2019)

Co-organizer, Organized Oral Session on "Phenology in a community context", Ecological Society of America Annual Meeting, Portland, Oregon (2017)

Invited Participant, USA National Phenology Network Research Coordination Network Meeting, Milwaukee, Wisconsin (2012)

University of California, Riverside

Advisory Committee, Natural Reserve System (2018-2020)

Faculty Advisory Board, Undergraduate Research Journal (2018-2019)

Development/Fundraising/Newsletter/Student and Faculty Awards Committee, Department of Evolution, Ecology, and Organismal Biology (2017-2019)

Minigrant Proposal Review Committee, Office of Undergraduate Education (2017-2019)

Judge, 11th Annual Undergraduate Research Symposium (2017)

Faculty Participant, College of Natural and Agricultural Sciences Scholarship Breakfast (2017)

Grant Proposal Reviewer

Ad Hoc for Population and Community Ecology Program, Division of Environmental Biology, National Science Foundation (2012, 2015, 2016, 2017)

Resource Conservation and Climate Change Program Area, Strategic Environmental Research and Development Program, Department of Defense (2016)

Functioning and Adaptation of Species, Agro-ecosystems, and Marine and Continental Ecosystems Program, French National Research Agency (2015)

National Fellowship Program, Sigma Delta Epsilon/Graduate Women in Science (2015)

Other Service

Judge, Showcase for Undergraduate Research and Creative Activities, Washington State University (2016)

Judge, Ecology and Evolutionary Biology Undergraduate Poster Session, University of Arizona (2014)

Book Manuscript Reviewer jointly with J.L. Bronstein and J.L. Barker, *What Every Science Student Should Know*, University of Chicago Press (2014)

Book Proposal Reviewer, Ecology and Conservation Program, Springer (2014)

Co-organizer, Women in Natural Sciences, Panel discussions and seminars on professional issues for women in ecology and related disciplines, Department of Ecology and Evolutionary Biology, University of Arizona (2013-2014)

Participant, Pollination Ecology and Restoration Meeting, Co-organized by Hummingbird Monitoring Network and Arizona-Sonora Desert Museum, Santa Rita Experimental Range Headquarters, Arizona (2013)

Manuscript Reviewer

American Journal of Botany
American Naturalist
Annals of Botany
Applications in Plant Sciences
Biological Conservation
Current Zoology
Ecology
Ecology Letters
Ecosphere
Evolution
Functional Ecology
Global Change Biology
Global Ecology and Biogeography
Internatl Journal of Insect Science
Internatl Journal of Plant Sciences
Journal of Animal Ecology
Journal of Ecology
Journal of Torrey Botanical Society
Nature Climate Change
Nature Communications
New Phytologist
Oikos
Quarterly Review of Biology
Science

PUBLIC SERVICE AND OUTREACH

Panelist for San Diego Natural History Museum "State of Biodiversity" Symposium (2019)

Interviewed for an article on ecological effects of climate change ("Climate change is making it harder to revive damaged land") by Maya Kapoor for *High Country News* (2018)

Interviewed for an article on mutualism by Richard Conniff (2018)

Interviewed for an article on consequences of early springs ("Five plants and animals utterly confused by climate change") by Livia Albeck-Ripka for *The New York Times* (2018)

Interviewed for an article on climate change and phenological synchrony ("How climate change canceled the grizzly salmon run") by Ed Yong for *The Atlantic* (2017)

Public talk for Crested Butte Wildflower Festival, Rocky Mountain Biological Lab (2017)

Consulted on radio segment on spring flowering and plant-pollinator synchrony for *Science Friday*, National Public Radio (2017)

Volunteer for Arizona Insect Festival, University of Arizona (2013, 2014)

Judge for Flowing Wells High School Science Fair, Tucson, Arizona (2012)

Public talk for Annual Science Day, University of Wisconsin Arboretum (2009, 2010, 2011)

PROFESSIONAL DEVELOPMENT

Science Communication Workshop, University of Toronto (2015)

Pedagogy Workshop on Effective Teaching Strategies, University of Arizona (2014)

An Introduction to Evidence-Based Undergraduate STEM Teaching, Massive Open Online Course, Center for the Integration of Research, Teaching, and Learning (2014)

American Museum of Natural History Bee Course, Southwestern Research Station, Portal, Arizona (2012)

Pedagogy Workshop on Interactive Teaching, University of Arizona (2012)

Pedagogy Workshop on Writing-Intensive Courses, University of Wisconsin (2007, 2009)

PROFESSIONAL MEMBERSHIPS

American Society of Naturalists
British Ecological Society
Ecological Society of America
Entomological Society of America