Elizabeth M Wolkovich

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Education

Dartmouth College, Ph.D. *2009*

Thesis: Linking community and ecosystem dynamics in invasion biology: An experimental approach in coastal sage scrub.
Advisors: Douglas T. Bolger & Kathryn L. Cottingham
Committee: Matthew P. Ayres, Ross A. Virginia, John C. Moore (outside member from NREL)

Wellesley College, B. A. *2002*

Major in Biological Sciences. Minor in Russian. Study-abroad in Oaxaca, Mexico

Appointments

Associate Professor, Forest & Conservation Sciences, University of British Columbia *2018-present*

Assistant Professor, Organismic & Evolutionary Biology, Harvard University 2014-2017

Biodiversity Research Centre Fellow, University of British Columbia *2012-2013*

NSF Postdoctoral Fellow in Bioinformatics, University of California - San Diego *2010 - 2011*

Postdoctoral Associate (6-mo), National Center for Ecological Analysis & Synthesis *2009*

Lecturer, Dartmouth College, Environmental Studies Program *winter term - 2009*

Grants & Fellowships

NSERC Discovery ($200,000) *2018-2022*

Milton Fund (Harvard University, $39,766) *2015*
Phenological responses to climate change: Plasticity, local adaptation and the diversity of species' responses

Radcliffe Institute Exploratory Seminar ($20,930, Ailene Ettinger co-PI) *2015-2016*
Predicting future springs: Reconciling experimental and observational approaches for climate change impacts

Biodiversity Postdoctoral Fellowship (UBC, $100,000) *2012 - 2013*

NCEAS Working Group (co-PI with Benjamin I. Cook, $70,250 plus extension) *2010 - 2012*
Forecasting phenology: Integrating ecology, climatology, and phylogeny to understand plant responses to climate change

NSF Postdoctoral Research Fellowship in Biology (**Bioinformatics,** $123,000) *2010 - 2011*
Phenology of plant invasions: How changing seasons and temporal niches assemble plant communities

EPA Science to Achieve Results (STAR) Fellowship ($111,000) *2006 - 2009*
Impact of invasive plants on detrital food webs

SERDP & Southwest Chapter Travel Awards, ESA *August 2009*

ESA Applied Section Student Travel Grant *June 2008*

Jenks Prize, Dartmouth College ($2,000) *June 2008*
Funding to attend UC-Davis Advanced Entomology (Taxonomy & Field Ecology) course

Gilman Fellowship, Dartmouth College ($1,500) *July 2007*

Funding to participate in global collaborative fertilization/exclosure study (Nutrient Network)

Exotic/Invasive Pests and Diseases Research (**UC-IPM,** $23,990) *September 2006 - August 2008*

Title: Impact of exotic Mediterranean annual grasses on detrital food webs

Parkinson Travel Award, Soil Ecology Society *April 2007*

GAANN Fellowship, Dartmouth College ($30,000) *September 2005 - August 2006*

Center for Invasive Plant Management Seed Money Grant ($4,939) *April 2005 - May 2006*

Awards & honors

Early Career Fellow, Ecological Society of America (ESA) *2016-2020*

Tansley Medal Runner-up, *New Phytologist* *2013*

Murray F. Buell Award for best student oral presentation (ESA) *August 2009*

Graduate Student Filene Teaching Award, Dartmouth College *May 2009*

Publications

36. Flynn, D. F. B. & **E.M. Wolkovich**. *In press.* Temperature and photoperiod drive spring phenology across all species in a temperate forest community. *New Phytologist.*

35. Kharouba, H. M., Ehrlen, J., Gelman, A., Bolmgren, K., Allen, J. M., Travers, S. & **E. M. Wolkovich**. Global shifts in the phenological synchrony of species interactions over recent decades. *PNAS: Apr 2018, ; DOI: 10.1073/pnas.1714511115*

34. **Wolkovich, E. M.**, I. García de Cortázar-Atauri, Morales-Castilla, I., K. A. Nicholas & T. Lacombe. 2018. From Pinot to Xinomavro in the world's future winegrowing regions. *Nature Climate Change:* 8:29-37.

33. **Wolkovich**, **E. M.,** D. O. Burge, M. A. Walker & K. A. Nicholas. 2017. Phenological diversity provides opportunities for climate change adaptation in winegrapes. *Journal of Ecology* 105:905-912.

32. **Wolkovich, E. M.** 2016. Reticulated channels in soil food webs. *Soil Biology and Biochemistry:* 102:18-21.

31. Cook, B. I. & **E. M. Wolkovich**. 2016. Climate change decouples drought from early winegrape harvests in France. *Nature Climate Change* 6:715-719.

30. Seabloom, E. W. & 66 co-authors (**Wolkovich, E. M.** co-author). 2015. Plant species' origin predicts dominance and response to nutrient enrichment and herbivores in global grasslands. *Nature Communications* 6: 7710, doi:10.1038/ncomms8710. (Publication from Nutrient Network.)

29. **Wolkovich, E. M.**, Cook, B. I., McLauchlan, K. K. & T. J. Davies. 2014. Temporal ecology in the Anthropocene. *Ecology Letters* 17(11): 1365–1379.

28. **Wolkovich, E. M.**, Allesina, S., Cottingham, K. L., Moore, J. C. & C. de Mazancourt. 2014. Linking the green and brown worlds: The prevalence and effect of multi-channel feeding in food webs. *Ecology* 95(12), 2014, pp. 3376–3386.

27. Francis, T. B., **Wolkovich, E. M.**, Scheuerell, M. D., Katz, S. L., Elizabeth E. E., & S. E. Hampton. 2014. Shifting regimes and changing interactions in the Lake Washington, U.S.A., plankton community from 1962-1992. *PLoS ONE* 9(10): e110363. doi:10.1371/journal.pone.0110363

26. **Wolkovich, E. M.** & A. K. Ettinger. 2014. Back to the future for plant phenology research. *New Phytologist* 203: 1021–1023. (Commentary)

25. **Wolkovich, E. M.** , B. I. Cook & T. J. Davies. 2014. Progress towards an interdisciplinary science of plant phenology: Building predictions across space, time and species diversity. *New Phytologist* 201: 1156–1162.

24. **Wolkovich, E. M.** & E. E. Cleland. 2014. Phenological niches and the future of invaded ecosystems with climate change. *AoB Plants* doi:10.1093/aobpla/plu013.

23. Davies, T. J., **E. M. Wolkovich** & 16 other co-authors. 2013. Phylogenetic conservatism in plant phenology. *Journal of Ecology* 101: 1520–1530.

22. **Wolkovich, E. M.,** Davies, T. J., Schaefer, H., Cleland, E. E., Cook, B. I., Travers, S. E. , Willis, C. G. & C. C. Davis. 2013. Phenology and plant invasions: Climate change contributes to exotic species' success in temperature-limited systems. *American Journal of Botany* 100(7): 1407-1421.

21. Pau, S., **Wolkovich, E. M.**, Cook, B. I., Nytch, C., Regetz, J., Zimmerman, J. K. & S. J. Wright. 2013. Clouds and temperature drive dynamic changes in tropical flower production. *Nature Climate Change* 3: 838-842.

20. **Wolkovich, E. M.** & 18 co-authors. 2012. Warming experiments underpredict plant phenological responses to climate change. *Nature* 485 (7399): 494-497. (Recommended by Faculty of 1000)

19. **Wolkovich, E. M.,** Regetz, J. & M. I. O'Connor. 2012. Advances in global change research require open science by individual researchers. *Global Change Biology* 18(7): 2102-2110.

18. Cook, B. I., **Wolkovich, E. M.** & C. Parmesan. 2012. Divergent responses to spring and winter warming explain community level flowering trends. *Proceedings of the National Academy of Sciences* 109(3): 9000-9005.

17. Cleland, E. E., J. M. Allen, T. M. Crimmins, J. A. Dunne, S. Pau, S. E. Travers, E. S. Zavaleta & **E. M. Wolkovich.** 2012. Phenological tracking enables positive species responses to climate change. *Ecology* 93(8): 1765-1771.

16. Davies, T.J., Kraft, N.B.J., Salamin, N. & **E. M. Wolkovich**. 2012. Incompletely resolved phylogenetic trees inflate estimates of phylogenetic conservatism. *Ecology* 93(2): 242-247.

15. Pau, S, Gillespie, T. W., & **E. M. Wolkovich**. 2012. Dissecting NDVI-species richness relationships in Hawaiian dry forests. *Journal of Biogeography* 39(9): 1678-1686.

14. Wainwright, C. E., **E. M. Wolkovich** & E. E. Cleland. 2012. Seasonal priority effects: implications for invasion and restoration in a semi-arid system. *Journal of Applied Ecology* 49(1): 234-241. (Recommended by Faculty of 1000)

13. Craine, J. M., **E. M. Wolkovich** & E. G. Towne. 2012. The roles of shifting and filtering in generating community-level flowering phenology. *Ecography* 35(11): 1033-1038.

12. Cook, B. I., **E. M. Wolkovich** & 17 co-authors. 2012. Sensitivity of spring phenology to warming across temporal and spatial climate gradients in two independent databases. *Ecosystems* 15(8): 1283-1294.

11. Craine, J. M., **E. M. Wolkovich**, E. G. Towne & S. W. Kembel. 2011. Flowering phenology as a functional trait. *New Phytologist* 193: 673-682.

10. **Wolkovich, E. M.** & E. E. Cleland. 2011. The phenology of plant invasions: A community ecology perspective. *Frontiers in Ecology & the Environment* 9(5): 287-294. (Recommended by Faculty of 1000)

9. *Pau, S., ***Wolkovich, E.M.**, Cook, B. I., Davies, T.J., Kraft, N.J.B., Bolmgren, K., Betancourt, J. & E.E. Cleland. 2011. Predicting phenology by integrating ecology, evolution and climate science. *Global Change Biology* 17: 3633–3643. *Both authors contributed equally to work.

8. *Wilson, E. E. & & ***E. M. Wolkovich.** 2011. Scavenging: How carnivores and carrion structure communities. *Trends in Ecology & Evolution* 26(3): 129-135. *Both authors contributed equally to work.

7. Firn, J. & 32 co-authors (**Wolkovich, E. M.** co-author) 2011. Abundance of introduced species at home predicts abundance away in herbaceous communities. *Ecology Letters* 14(3): 274-281. (Publication from Nutrient Network. Assisted with writing, editing and statistical analyses.)

6. **Wolkovich E. M.**, Lipson, D. A., Virginia, R. A., Bolger, D. T., & K. L. Cottingham. 2010. Grass invasion

causes rapid increases in ecosystem carbon and nitrogen storage in a semi-arid shrubland. *Global Change Biology* 16(4): 1352-1365.

5. **Wolkovich E. M.** 2010. Non-native plant litter enhances grazing arthropod assemblages by increasing native shrub growth. *Ecology* 91(3): 756-766.

4. **Wolkovich, E. M.** 2010. Defining and re-defining invasion biology. *Journal of Vegetation Science* 21(4): 804-806. (Book review)

3. **Wolkovich E. M.**, D. T. Bolger & D. A. Holway. 2009. Complex responses to invasive grass litter by ground arthropods in a Mediterranean shrub ecosystem. *Oecologia* 161(4): 697-708.

2. **Wolkovich, E. M.**, D. T. Bolger & K. L. Cottingham. 2009. Invasive grass litter facilitates native shrubs through abiotic effects. *Journal of Vegetation Science* 20(6): 1121-1132.

1. Buchholtz, E. A., **E. M. Wolkovich** & R. J. Cleary. 2005. Vertebral osteology and complexity in *Lagenorhynchus acutus* (Delphinidae) with comparison to other Delphinoid genera. *Marine Mammal Science* 21:411-428.

Publications – in review or revision*

*All avaiable upon request.

37. Ettinger, A., S. Gee & **E. M. Wolkovich**. *(Accepted pending revisions)* Phenological sequences: how early-season events define those that. *American Journal of Botany.*

38. Davies, T. J., J. Regetz, **E. M. Wolkovich** & B. J. McGill. *Global Ecology & Biogeography.* Phylogenetically weighted regression: a method for modeling non-stationarity on evolutionary trees.

39. Joly, S, D. F. B. Flynn & **E. M. Wolkovich**. *Methods in Ecology & Evolution.* On the importance of accounting for intraspecific genetic correlations in multi-species studies. (https://www.biorxiv.org/content/early/2018/05/14/321927.1)

40. Ettinger, A. K., Chuine I., Cook, B. I., Dukes, J. S., Ellison, A. M., Johnston, M. R., Panetta, A. M., C.R. Rollinson, C.R., Vitasse, Y., & **E.M. Wolkovich**. *(Revision requested) Ecology Letters.* How do climate change experiments actually change climate?

Teaching

Assistant Professor, Harvard University *Fall 2014-2017*

Modern Conservation Biology (OEB 216; seminar course)
Introduction to Biological Statistics (OEB 153; co-taught with John Wakeley)
Introduction to Experimental Design and Model Building (OEB 201)

Lecturer, with full course responsibilities, Dartmouth College *Winter 2009*

Wilderness & Society, Environmental Studies 7

Teaching Assistant, Dartmouth College *Fall 2003-2007*

Ecological Research in the Tropics I & II (study abroad in Costa Rica)
Ecological Research on Coral Reefs (study abroad, two years: Jamaica and Little Cayman)
Methods in Ecology (2006, Guest-taught Nutrient Network section in 2007-2009)
Introduction to Ecology & Evolution
Vertebrate Biology
Conservation Biology (Environmental Studies Program)
Introduction to Environmental Studies (Environmental Studies Program)

Mentoring, Harvard University *2014-onward*

Daniel Buonaiuto (2016-onward), Graduate student, studies how shifting plant communities affect the composition and function of North American ecosystems.

Catherine Chamberlain (2016-onward), Graduate student, studies how anthropogenic climate change impacts plant communities, especially North American forest regeneration.
Ailene K. Ettinger (2014-onward), Putnam & NSF Postdoctoral Fellow. Future predictions from current plant collections: Exploiting the novel climates of arboreta to understand tree responses to climate change.
Dan Flynn (2014-2016), Research Associate. Trait-based approaches to understanding adaptation with global change.
Ignacio Morales-Castilla (2016-2017), Research Associate. Predicting the world's future winegrowing regions and varieties.
Undergraduate Honors Thesis Students: Harold Eyster (2016), Sally Gee (2016), Alice Linder (2017)
Undergraduate Research Assistants (2014-2017): Ryan Antolick, Johan-Arango, Terilyn Chen, Nakoa Farrant, Magaly Gutierrez, Robert Hogg, Ari Korotkin (HUCE), Zhi Li (2017-2018), Alice Linder (Harvard Forest REU), Nicole Merrill, Cara O'Connor (HUCE), Asa Peters (DaRin Butz Intern), Christine Parkent (2017), Cat Principe, Liz Stebbins, Harry Stone, (Harvard Forest REU), Emma Borjigin Wang.

Mentoring, University of California - San Diego *2010-2011*

Worked with one student on phenology bioinformatics and field bird exclosure project.

Mentoring, Dartmouth College *2006-2008*

Worked with 10 undergraduate students in the lab and field, especially with two women for two years: both are now in graduate school for ecology.

Selected Presentations

Wolkovich, E. M. & D. F. B. Flynn. Phenological assembly in plant communities. Ecological Society of America Annual Meeting. 2017. (Invited)

Wolkovich, E. M. & D. F. B. Flynn. The role of phenological assembly in plant communities. Canadian Society for Ecology & Evolution Meeting. 2017. (Invited)

Wolkovich, E. M. The race for spring: How climate change alters plant communities. University of Toronto Atwood Colloqium. 2017. (Invited)

Wolkovich, E. M. From Pinot to Xinomavro: The world's future winegrowing regions. Harvard University FOOD+ Symposium. 2017. (Invited)

Wolkovich, E. M. Consumer communities in green, brown and non-stationary systems. 15 Years of the Jena Experiment (Jena, Germany). 2017. (Invited)

Wolkovich, E. M. The race for spring: How climate change alters forest plant communities. Montreal Botanical Garden. 2016. (Invited)

Wolkovich, E. M. From Pinot to Cabernet: The future of good wine with climate change. Harvard University FOOD+ Symposium. 2015. (Invited)

Wolkovich, E. M. World Wildlife Fund's Kathryn Fuller Science for Nature Seminar Series. Speaker and panelist for: A Blooming Problem: The Disruptive Impacts of Climate Change on Nature's Calendar. 2015. (Invited)

Wolkovich, E. M. & B. I. Cook. Historical phenological records & applications to global change ecology. European Geophysical Meeting 2014. (Invited)

Wolkovich, E. M., & M. D. Donahue. Climate change & coexistence: The role of temporal variability in structuring communities. American Society of Naturalists 2014 meeting.

Wolkovich, E. M., Cook, B. I. & T. J. Davies. The race for spring: Understanding the diversity of phenological responses. ClimTree 2013. (Invited)

Wolkovich, E. M., Cleland, E. E., Davies, T. J., Schaefer, H., Cook, B. I., Travers, S., Willis, C. & C. Da-

vis. Phenology & plant invasions: Do invaders occupy novel temporal niches? Ecological Society of America (ESA) annual meeting 2012.

Wolkovich, E. M. & Forecasting Phenology working group. 2011-2012. Warming experiments underpredict plant phenological responses to climate change. Talks at American & European Geophysical Union's annual meetings.

Wolkovich, E. M., Cleland, E. E. 2010. Future questions in citizen science: Including phenology in community ecology theory. Invited talk at symposium at ESA annual meeting.

Wolkovich, E. M., Cleland, E. E. 2009. The phenology of plant invasions: How temporal niches assemble plant communities. Phenology 2010 (Dublin).

Wolkovich, E. M. 2008. Invasive annual grasses enhance native shrubs and their arthropod communities through abiotic soil effects. ESA annual meeting. *Won Buell award for best student talk.

Invited Talks & Panels

2018: Napa Vintage Report (California), University of North Carolina (Chapel Hill), Dartmouth Cramer Series

2017: Jena Experiment (Germany), University of Toronto (Atwood Colloqium, Rising Star in Ecology)

2016: Columbia University (E3B), Montreal Botanical Garden, Wellesley College, Arnold Arboretum Botany Blast (public).

2015: Rice University, Weatherhead Center for International Affairs, Arnold Arboretum Tree Mob (public).

2014: Brown University Open Science (panelist); Woods Hole Marine Biological Lab, University of Massachusetts, Boston; Acadia Science Symposium (public); California Academy of Sciences; Dartmouth; Arnold Arboretum Adult Education Series (public)

2012-2013: Simon Fraser University; University of Victoria

University & Other Professional Service

Graduate Committee member, Harvard University	*2014-2017*
Editorial Advisory Board member for *Global Change Biology*	*2014 - 2017*
Ecological Systems in the Anthropocene seminar series (HUCE) leader	*2015 - onward*
Stan (probabilistic programming language) non-profit board member	*2016 - onward*
Founder and organizer of Boston Stan (probabilistic programming language) meetup group	*2015 - onward*
Linda Loring Nature Foundation Research Advisory Board member	*2015 - onward*
Biodiversity Discussion Group organizer, University of British Columbia	*2012 - 2013*
Tri-University Ecology & Evolution Retreat organizer, University of British Columbia	*2012 - 2013*
Graduate student Journal Club organizer (and started club), Dartmouth	*January 2004 - 2008*

Reviewer for: *Agricultural & Forest Entomology, Agricultural & Forest Meterology, American Naturalist, Annals of Botany, Applied Vegetation Science, Biogeochemistry, Biological Invasions, Biosicence, Climate Research, Diversity & Distributions, Ecological Applications, Ecology, Ecology Letters, Environmental Research, Functional Ecology, Global Change Biology, Intergovernmental Panel on Climate Change (IPCC): WG IV, International Journal of Biometeorology, International Journal of Climatology, Journal of Animal Ecology, Journal of Applied Ecology, Journal of Ecology, Journal of Vegetation Science, Marine Ecology Progress Series, National Science Foundation, Nature, Nature Climate Change, Nature Ecology & Evolution, New Phytologist, Oecologia, Oikos, Philosophical Transactions of the Royal Society, Proceedings of the National Academy, Proceedings of the Royal Society B-Biological Sciences, Science, Soil Biology & Biogeochemistry, Strategic Environmental Research and Development Program, Tree Physiology, Trends in Ecology & Evolution*

Professional Activities & Affiliations

StanCon 2018 - conference organizer *2018*

StanCon 2017 - conference organizer *2017*

15 Years of the Jena Experiment: The Past, Present and Future *2017*
Invited speaker for symposium and working group participant

National Center for Ecological Analysis & Synthesis working group participant *2013*
Working group title: ABI Development: A toolbox for analysis of long-term ecological dynamics

USA National Phenology Network RCN participant *2009 - 2013*

Nutrient Network RCN participant (global collaborative experiment) *2007 - 2011*
Site Organizer for Etna, New Hampshire site, with K. L. Cottingham

American Geophysical Union 2011 fall meeting session: Beyond Earlier Spring: Diverse Phenological Responses to Climate Across Species and Ecosystems, co-organizer with B. I. Cook *December 2011*

Cyberinfrastucture for Collaborative Science, workshop participant *May 2011*

National Center for Ecological Analysis & Synthesis working group participant *Fall 2008*
Working group title: Detritus and dynamics of populations, food webs and communities

NCEAS 'Trophic structure across ecosystems' working group participant *Fall 2005 - Fall 2008*
Working group title: Trophic structure across ecosystems

Society Memberships: American Geophysical Union, American Society of Naturalists, Ecological Society of America.

Published Data

*All on Knowledge Network for Biocomplexity (http://knb.ecoinformatics.org/) unless otherwise noted.

11. A. Ettinger & E. Wolkovich. 2018. MicroClimate from Climate Change Experiments. Knowledge Network for Biocomplexity. (doi:10.5063/F1QV3JQR)

10. Savas, T. D. F. B. Flynn, and E M. Wolkovich. A standardized photographic guide to woody plant spring phenology (doi: doi:10.5063/F1M906MP)

9. Gee, S, A. Ettinger & E. Wolkovich. Phenological sequences: a dataset of tree phenology from 25 species throughout one growing season (doi:10.5063/F19K48BD)

8. Wolkovich E. Variety phenology (doi:10.5063/F1RF5S05)

7. Wolkovich E. Flowering phenology of native and exotic species across five sites (wolkovich.41.6)

6. Wolkovich E. Mikesell phenological data from Wauseon, Ohio, USA, 1883-1912 (wolkovich.33.3)

5. National Center for Ecological Analysis and Synthesis and Wolkovich E. 2012. NECTAR: Network of Ecological and Climatological Timings Across Regions (nceas.988.17)

4. Wolkovich E. 2012. STONE: Synthesis of Timings Observed in iNcrease Experiments (doi:10.5063/AA/nceas.982.3)

3. National Center for Ecological Analysis and Synthesis , NCEAS 12574: Cook: Forecasting phenology: Integrating ecology, climatology, and phylogeny to understand plant responses to climate change, and Wolkovich E. Phenology Literature Review (doi:10.5063/AA/wolkovich.24.7)

2. Wolkovich E. Non-native grass litter manipulation, San Diego, CA USA 2005-2007 (doi:10.5063/AA/wolkovich.3.16)

1. Wilson EE, Wolkovich EM (2011) Data from: Scavenging: how carnivores and carrion structure communi-

ties. Dryad Digital Repository. doi:10.5061/dryad.8612 (http://datadryad.org/)

Skills

Quantitative techniques: Mixed-effects including Bayesian approaches, structural equations, time-series methods (multivariate autoregressive, wavelets, breakpoints), meta-analysis statistics

Computer languages: Git, LaTeX, Maxima, R, Stan, Subversion, Sweave.

Languages: Spanish, French (B1), basic knowledge of Russian

Miscellaneous: NAUI Advanced, Rescue and Nitrox diver. Vertebrate exclosures.