

Elizabeth R. Ellwood, PhD

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EDUCATION

Boston University

Ph.D. in Biology: Ecology, Behavior & Evolution, 2012

Dissertation: Climate change and species phenology at three trophic levels

University of Southern Maine

M.S. in Teaching and Learning and K-12 Certification, 2007

University of Rhode Island

B.S. in Marine Biology, 2000

RESEARCH AND PROFESSIONAL EXPERIENCE

- 2019 Global Communications Manager, iDigBio, Gainesville, FL
PI: Gil Nelson, PhD
- 2017 Research Fellow, La Brea Tar Pits & Museum, Los Angeles, CA
Advisor: Emily Lindsey, PhD
- 2013 Postdoctoral Researcher, Florida State University and iDigBio, Tallahassee, FL
Advisor: Austin Mast, PhD
- 2013 Postdoctoral Research Fellow, Tokyo City University, Yokohama, Japan
Japan Society for the Promotion of Science
Advisor: Hiromi Kobori, PhD
- 2012 Postdoctoral Research Associate, Boston University, Boston, MA
Advisor: Richard Primack, PhD
- 2012 Scientific consultant, Concord Museum, Concord, MA
Curator: David Wood
- 2007 Graduate Student, Boston University, Boston, MA.
Advisor: Richard Primack, PhD
- 2007 Editorial Assistant, *Biological Conservation*.

2003 Program Evaluation Assistant, Cook Inlet Tribal Council, Anchorage, AK

2001 AmeriCorps Volunteer in Service to America (VISTA), USDA-NRCS, Anchorage, AK

TEACHING EXPERIENCE

Florida State University (with online broadcast at University of Florida)

Citizen Science, graduate level. This is one of the first and only graduate-level courses in Citizen Science in the country, 2015

Emerson College

Climate Change, 2013

Massachusetts College of Art and Design

Botany, 2012

Boston University

Ecology, Plant Biology, Biology I and II, 2007-2012

York High School

Physical and Marine Science, 2005-2007

Current and Recent Collaborations

Co-PI, NSF Research Coordination Network – Undergraduate Biological Education program, *Biodiversity Literacy in Undergraduate Education* (BLUE)

Lead, Collections and the Biodiversity Crisis sessional committee. Society for the Preservation of Natural History Collections.

Co-convener, Citizen Science Interest Group. Biodiversity Information Standards-Taxonomic Database Working Group (TDWG).

Secretary and Treasurer of Participatory and Citizen Science Working Group of the Society for Conservation Biology

Co-organizer and member of Core Leadership Team of Worldwide Engagement for Digitizing Biocollections (WeDigBio). Each year, thousands of citizen scientists complete over 50,000 transcription tasks of natural history specimen labels.

HONORS, AWARDS, GRANTS

- 2015 Massachusetts Institute of Technology Climate CoLab Contest prize for proposal
“*Biodiversity collections as tools for understanding changes in the Pamir Mountains*”
- 2015 Florida State University Postdoctoral Association Travel Award
- 2011 Blake-Nuttall Ornithological Club Fund Grant
- 2008,10,11 George Bernard Jr. Travel Grant, Boston University
- 2009 Honorable Mention Graduate Research Fellowship Program, NSF
- 2005 Robert Noyce Scholarship, University of Southern Maine
- 2005 Blaine House Scholarship, University of Southern Maine
- 1996-2000 University of Rhode Island Centennial Scholarship

PUBLICATIONS

- Ellwood, E.R.**, J. A. Sessa, J. K. Abraham, A. E. Budden, N. Douglas, R. Guralnick, E. Krimmel, T. Langen, D. Linton, M. Phillips, and P. S. Soltis. 2020. Biodiversity Science and the Twenty-First Century Workforce. *BioScience* 70(2), 119-121.
- Lendemmer, J., B. Thiers, A. K. Monfils, J. Zaspel, **E. R. Ellwood**, ... and L. Lagomarsino. 2020. The Extended Specimen Network: A Strategy to Enhance US Biodiversity Collections, Promote Research and Education. *BioScience*, 70(1), 23-30.
- Ellwood, E. R.**, P. S. Soltis, and M. L. Klein. 2019. New Insights for Conservation from Expansion of Physical-Collection Digital Data. *Conservation Biology* 33: 498-499.
- Ellwood, E. R.**, K. D. Pearson, and G. Nelson. 2019. Emerging frontiers in phenological research. *Applications in Plant Sciences* 7(3).
- Ellwood, E. R.**, R. B. Primack, C. G. Willis, and J. Hille Ris Lambers. 2019. Phenology models using herbarium specimens are only slightly improved by using finer-scale stages of reproduction *Applications in Plant Sciences* 3: e01225.

- Lorieul, T., K. D. Pearson, **E. R. Ellwood**, H. Goëau, ... and A. Joly. 2019. Toward a large-scale and deep phenological stage annotation of herbarium specimens: Case studies from temperate, tropical, and equatorial floras. *Applications in Plant Sciences* 3: e1233.
- Mast, A. R. and **E. R. Ellwood**. 2018. Scaling up public engagement in botanical research. *American Journal of Botany* 105: 628-630.
- Yost, J. M., P. W. Sweeney, E. Gilbert, G. Nelson,... **E. R. Ellwood**... and S. Mazer. 2018. Digitization protocol for scoring reproductive phenology from herbarium specimens of seed plants. *Applications in Plant Sciences* 6: e1022.
- Jabłonski, P. G., S. Lee, and **E. R. Ellwood**. 2018. Vigilance responding to number of conspecifics among mixed groups of cranes in demilitarized zone. *Animal Cells and Systems* 22: 118-123.
- Ellwood, E. R.**, P. Kimberly, R. Guralnick, P. Flemons, K. Love, A. R. Mast, and 30 others. 2018. Worldwide Engagement for Digitizing Biocollections (WeDigBio)—The Biocollections Community's Citizen Science Space on the Calendar. *Bioscience* 68: 112-124.
- Kobori, H., **E. R. Ellwood**, A. Miller-Rushing, R. Sakurai. 2018. "Citizen Science", chapter in Ecological Complexity section of *Elsevier Encyclopedia of Ecology*, 2nd ed.
- Ellwood, E. R.** 2017. Determine the timing. [Review of Pearse et al. (2017)] *Nature Ecology & Evolution* 1: 1794.
- Willis, C. G., **E. R. Ellwood**, R. B. Primack, C. C. Davis, K. D. Pearson, A. S. Gallinat, J. M. Yost, G. Nelson, S. J. Mazer, N. L. Rossington, T. H. Sparks, P. S. Soltis. 2017. Old plants, new tricks: phenological research using herbarium specimens. *Trends in Ecology & Evolution* 32: 531-546.
- Lacey, E., J. Cook, R. Guralnick, M. Daly, **E. R. Ellwood**, A. R. Mast, J. McCormack, A. K. Monfils, and C. Welch. 2017. Collections, Climate Change and the Classroom: Innovative New Approaches to Undergraduate Education in Biology. *Evolution: Education and Outreach* 10: 2.
- Stegman, L., R. B. Primack, A. S. Gallinat and **E. R. Ellwood**. 2017. Reduced frequency of sampling can still detect changes in abundance and phenology of migratory landbirds. *Biological Conservation* 208: 1-4.
- Ellwood, E. R.**, H. L. Bart, Jr., M. H. Doosey, D. K. Jue, J. G. Mann, G. Nelson, N. Rios, A. R. Mast. 2016. Mapping Life—Quality Assessment of Novice and Computer Automated vs. Expert Georeferences. *Citizen Science: Theory and Practice*. 1: 1–12, doi: <http://dx.doi.org/10.5334/cstp.30>
- Ellwood, E. R.**, B. A. Dunckel, P. Flemons, R. Guralnick, G. Nelson, G. Newman, S. Newman, D. Paul, G. Riccardi, N. Rios, K. C. Seltmann, A. R. Mast. 2015. Accelerating Digitization of Biodiversity Research Specimens through Online Public Participation. *BioScience*. doi: 10.1093/biosci/biv005

- Nelson, G., P. Sweeney, L. E. Wallace, R. K. Rabeler, D. Allard, H. Brown, ...**E. R. Ellwood**, ... A. R. Mast. 2015. Digitization workflows for flat sheets and packets of plants, algae, and fungi. *Applications in Plant Sciences*, 3(9), apps.1500065. <http://doi.org/10.3732/apps.1500065>
- Ellwood, E. R.**, T. Lloyd-Evans, A. Gallinat, and R. Primack. 2015. Autumn migration of North American landbirds. Invited author – *Studies in Avian Biology*, special volume: Phenological Synchrony and Bird Migration: Changing Climate and Seasonal Resources in North America. CRC Press, USA.
- Everill, P. H., R. B. Primack, **E. R. Ellwood** and E. K. Melaas. 2014. Determining past leaf-out times of New England's deciduous forests from herbarium specimens. *American Journal of Botany* 101: 1293-1300.
- Panchen, Z., R. Primack, B. Nordt, **E. Ellwood**, A.-D. Stevens, S. Renner, C. Willis, R. Fahey, A. Whittemore, Y. Du, C. Davis. 2014. Leafing out phenology in woody plants of the Northern Hemisphere show phylogenetic, ecological and anatomical patterns. *New Phytologist*. 203: 1208-1219.
- Ellwood, E. R.**, R. B. Primack, C. Polgar and S. Playfair. 2013. Cranberry flowering times and climate change in Southern Massachusetts. *International Journal of Biometeorology*. 58: 1693-1697.
- Ellwood, E. R.**, S. Temple, R. B. Primack, and C. C. Davis. 2013. Record-breaking early flowering in the eastern United States. *PLoS ONE*. 8(1): e53788.doi:10.1371/ journal.pone.0053788.
- Ellwood, E. R.**, J. M. Diez, I. I. Ibáñez, R. B. Primack, H. Kobori, H. Higuchi, and J. Silander. 2012. Disentangling the paradox of insect phenology: are temporal trends reflecting the response to warming? *Oecologia*. 168:1161-1171.
- Primack, R. B. and **E. R. Ellwood**. Biodiversity Conservation. In: *Ecosystem Management and Sustainability*, Berkshire Encyclopedia of Sustainability, vol 5.
- Lee, S. D., **E. R. Ellwood**, S. Y. Park, and R. B. Primack. 2011. Late-arriving barn swallows linked to population declines. *Biological Conservation*. 144:2182-2187.
- Ellwood, E. R.**, R. B. Primack, M. Talmadge. 2010. Effects of climate change on spring bird arrival times in Thoreau's Concord spanning 1851 to 2007. *The Condor*. 112: 754-762
- Ibáñez, I., R. B. Primack, A. J. Miller-Rushing, **E. Ellwood**, H. Higuchi, S. D. Lee, H. Kobori and J. A. Silander. 2010. Variability in the effects of climate change on spring and autumn phenology and growing season length in East Asia. *Philosophical Transactions of the Royal Society B*. 365:3247-3260.
- Primack, R.B. and **E. Ellwood**. Evolution and biodiversity conservation. In: *Grzimek's Animal Life Encyclopedia*. Gale, Cengage Learning.

Primack, R.B., **E. Ellwood**, A.J. Miller-Rushing, R. Marrs, and A. Mulligan. 2009. Do gender, nationality, or academic age affect review decisions? An analysis of submissions to the journal *Biological Conservation*. *Biological Conservation*. 142: 2415-2418

INVITED PRESENTATIONS AND ORGANIZED SYMPOSIA

Expanding the Value of Natural Science Collections. Keynote speaker. *Digitized biocollections for advancing research and engaging communities*. Korea National Arboretum. 2019.

Digital Data in Biodiversity Research. Discussion session. *Developing a Framework of Core Biodiversity Data Literacy Skills*. New Haven, CT. 2019.

Society for the Preservation of Natural History Collections. Presentation. *Five Years of Collaboratively Digging Bio: WeDigBio 2015-2019*. Chicago, IL. 2019.

Western Society of Naturalists. Presidential Symposium speaker. *Museum-based Citizen Science Across Local and Global Scales: Examples from the Natural History Museum of Los Angeles County and WeDigBio*. Tacoma, WA. 2018.

Society for the Preservation of Natural History Collections and Biodiversity Information Standards joint meeting. Organized discussion session. *Defining 21st Century Biodiversity Data Literacy Skills: A Roundtable Discussion*. Dunedin, New Zealand. 2018.

Society for the Preservation of Natural History Collections and Biodiversity Information Standards joint meeting. Organized symposium. *Citizen Science and Biodiversity Informatics for Natural History Collections and Field Observations*. Dunedin, New Zealand. 2018.

Society for the Preservation of Natural History Collections and Biodiversity Information Standards joint meeting. Presentation. *Preparing the Next Generation of Data-Driven Scientists through the Biodiversity Literacy in Undergraduate Education – Data Initiative (BLUE Data)*. Dunedin, New Zealand. 2018.

Ecological Society of America. Presentation. *Building standards and resources for using biodiversity data in the classroom through Biodiversity Literacy in Undergraduate Education (BLUE)*. New Orleans, LA. 2018.

American Association for the Advancement of Science Pacific Division. Presentation. *Project Paleo: Citizen Curation and Community Science at the Natural History Museum of Los Angeles County*. Pomona, CA. 2018.

Society for the Preservation of Natural History Collections Conference. Presentation. *Biodiversity Literacy in Undergraduate Education (BLUE)*. Denver, CO. 2017.

Ecological Society of America. Fieldtrip. *Field-to-Collections Bioblitz*. Portland, OR. 2017.

Ecological Society of America. Presentation. *Natural history collections data and Biodiversity Literacy in Undergraduate Education (BLUE)*. Portland, OR. 2017.

International Botanical Congress. Presentation. *Worldwide Engagement for Digitizing Biocollections (WeDigBio): The Biocollection Community's Citizen Science Space on the Calendar*. Shenzhen, China. 2017.

Cheadle Center for Biodiversity and Ecological Restoration at University of California Santa Barbara. Presentation. *Does citizen science cure what ails you?* January 2017.

Biodiversity Information Standards (TDWG) Conference. Co-organizer of and presenter in symposium. *Interoperability and Data Provenance for Online Crowdsourcing of Biodiversity Specimens*. Santa Clara, Costa Rica. 2016.

Northeast Regional Phenology Network meeting. *Centuries of leaf out in New England, and Digitizing specimen data with online-accessible phenology information*. Lincoln, NH. 2016.

Ecological Society of America Annual Conference. Co-organizer of and presenter in symposium. Ft. Lauderdale, FL. *Leveraging the Power of Biodiversity Specimen Data for Ecological Research*. 2016.

Biodiversity Information Standards (TDWG) Conference. Co-organizer of session titled, *Biodiversity Data Mobilization Strategies*. Nairobi, Kenya. 2015.

Ecological Society of America Annual Conference, Co-organizer of Ignite Session. Baltimore, MA. *Enhancing Ecological Research with iDigBio Biological Specimen Data*. 2015.

Botany 2015 Conference, Citizen Science workshop. Edmonton, Canada. Presentation: *Worldwide Engagement for Digitizing Biocollections*. 2015.

Florida State University, Field Methods course. Lecture: *Introduction to climate change and phenology*. 2015.

AIM-UP! (Advancing Integration of Museums into Undergraduate Programs) Annual Meeting. Seville, NM. *Worldwide Engagement for Digitizing Biocollections*. 2015.

Leveraging Digitization Practices Across Multiple Domains Workshop, Santa Barbara, CA. Presentation: *Using the crowd to augment data entry: Biospex, public participation and citizen science*. Via Skype. 2014.

University of Colorado, Boulder. Lecture: *Citizen Science in Biodiversity Research*. Via Skype. 2014.

Society for the Preservation of Research Specimens Conference. Co-organizer of Progress in Digitization Symposium; and Presentation: *iDigBio's Biospex System for Engaging the Public in Digitization*. Cardiff, Wales. 2014.

Consortium of Northeastern Herbaria Annual Meeting. Presentation: *Engaging the Public in Biodiversity Research Specimen Digitization*. Montreal, QC. 2014.

Florida State University Geography Department Colloquium Series. Presentation: *Climate change, public engagement and the necessity of historic records*. Tallahassee, FL. 2014.

iDigBio Education & Outreach Workshop. Co-organizer and co-leader of workshop exploring the parameters of iDigBio's Education & Outreach directives. Gainesville, FL. 2014.

Tokyo City University, Freshman Seminar. Lecture: *Scientific Presentation Skills*. Yokohama, Japan. 2013.

Tufts University, Climate Change and the Life Cycle of Plants course. Lecture: *Climate change in New England*. Medford, MA. 2013.

Stonehill College, Environmental Science course. Lecture: *The effects of climate change on plants and animals in Massachusetts*. Easton, MA. 2012.

Boston University, Conservation Biology. Lecture: *Assessing climate change impacts on local organisms*. Boston, MA. 2012.

North American Ornithological Conference. Vancouver, British Columbia, Canada. Invited speaker at organized symposium (*Tracking migratory stopover phenology: Climate change and the phenological synchrony of North American bird migration with seasonal resources*). Title of talk: Migration phenology in Thoreau's Concord over 150 years. 2012.

Simmons College, Plant Biology. Lecture: *The impacts of climate change on plant phenology*. Boston, MA. 2012.

Ecological Society of America Annual Conference. Organized oral session, *Migrations in a Changing Landscape*. Albuquerque, NM. 2009.

Conference Presentations, Workshops and Seminars

Society for the Preservation of Natural History Collections. Presentation. *Good Enough? A Realistic Approach to Citizen Science Microfossil Sorting at La Brea Tar Pits and Museum*. Chicago, IL. 2019.

Citizen Science Association. Presentation. *Microfossil sorting for a "mouse's eye view" of Rancho La Brea*. Raleigh, NC. 2019.

Society of Vertebrate Paleontologists. Poster. *Microfossil sorting for a "mouse's eye view" of Rancho La Brea*. Albuquerque, NM. 2018.

Western Association of Vertebrate Paleontologists. Poster. *Microfossil sorting for a "mouse's eye view" of Rancho La Brea*. St. George, UT. 2018.

Society for the Preservation of Natural History Collections and Biodiversity Information Standards joint meeting. Presentation. *Project Paleo: Citizen Curation and Community Science at the Natural History Museum of Los Angeles County*. Dunedin, New Zealand. 2018.

Ecological Society of America. Presentation. *Herbarium specimens as a unique data source to study long-term changes in the phenology of a common eastern tree species, Acer rubrum*. Portland, OR. 2017.

Society for the Preservation of Research Specimens Conference. Presentation. *Educational opportunities for small and large collections with the Worldwide Engagement for Digitizing Biocollections Event, WeDigBio*. Berlin, Germany. 2016.

Coding Phenological Data from Herbarium Sheets. Workshop. UC Berkeley. 2016.

Biodiversity Information Standards (TDWG) Conference. Presentation: *Mapping Life: Quality assessment of novel and computer automated vs. expert georeferencers*. Nairobi, Kenya. 2015.

Botany 2015 Conference. Presentation: *Citizen science as a tool for expanding our capacity to georeference biodiversity specimens*. Edmonton, Alberta, Canada. 2015.

Society for the Preservation of Research Specimens Conference. Presentation: *Accelerating Digitization of Biodiversity Research Specimens through Online Public Participation*. Gainesville, FL. 2015.

American Association for the Advancement of Science Conference. Poster: *Accelerating Digitization of Biodiversity Specimens through Online Public Participation*. San Jose, CA. 2015.

Citizen Science Association Conference. Poster: *Public Participation in the Digitization of Biodiversity Specimens*. San Jose, CA. 2015.

Biodiversity Information Standards (TDWG) Conference. Presentation: *On-site and online public participation in the digitization of biodiversity specimens*. Jönköping, Sweden. 2014.

Geological Society of America Conference. Presentation: *Accelerating digitization of biodiversity research specimens through online public participation*. Vancouver, BC. 2014.

Botany 2014 Conference. Presentation: *Accelerating Digitization of Biodiversity Research Specimens through Online Public Participation*. Boise, ID. 2014.

Biodiversity Information Standards (TDWG). Presentation: *Crowdsourcing climate change research*. Florence, Italy. 2013.

Japanese Society of Environmental Education Conference. Presentation: *A successful example of an interdisciplinary approach to research, education and conservation in Massachusetts, USA*. Kitahira Otsu-City, Japan. 2013.

American Association for the Advancement of Science Conference. Exhibitor for Boston Area Climate Experiment at National Science Foundation sponsored booth. Boston, MA. 2013.

Ecological Society of America Conference. Presentation: *Japanese insect phenology and phenological changes among trophic levels*. Portland, OR. 2012.

Climate Culture: Art, Action, Climate Change Conference. Massachusetts College of Art and Design, Boston, MA. 2012.

Ecological Society of America Annual Meeting Conference. Presentation: *The effects of climate change on fern phenology and ecophysiology*. Austin, TX. 2011.

International Workshop on Climate Change and Phenology Conference. Presentation: *The effects of climate change on insect phenology in Japan*. Boston University, Boston, MA . 2011.

International Congress for Conservation Biology Conference. Presentation: *Changes in bird arrival times and cohort sizes in eastern Massachusetts (1970-2008)*. Edmonton, Canada. 2010.

International Workshop on Phenology and Climate Change. Presentation: *Impacts of climate change on the phenology of Japanese insects*. Jeju Island, South Korea. 2010.

Ecological Society of America Annual Conference. Presentation: *Changes in bird arrival times and cohort sizes in eastern Massachusetts (1970-2008)*. Albuquerque, NM. 2009.

-Effect of temperature on spring emergence of butterflies: Implications of climate change altering insect phenology. C. Polgar, E. Ellwood, R. B. Primack

Meteorological Research Institute. Presentation: *The effects of climate change on plants and animals in the US and Japan*. Tsukuba, Japan. 2009.

Yokohama International University. Presentation: *The effects of climate change on plants and animals in the US and Japan*. Yokohama, Japan. 2009.

University of Tokyo. Presentation: *The effects of climate change on plants and animals in the US and Japan*. Tokyo, Japan. 2009.

Fundamentals of Ecosystem Ecology. Coursework completed: Fundamentals of Ecosystem Ecology. Cary Institute of Ecosystem Studies, Millbrook, NY. 2009.

Ecological Society of America Annual Conference. Presentation: *One hundred fifty years of migration phenology: Tracking the arrival times of songbirds to Thoreau's Concord*. Milwaukee, WI. 2008.

Coverage in the Popular Press (abridged list)

Cheadle Center for Biodiversity & Ecological Restoration blog. January 25, 2017. Will Citizen Science Cure What Ails Us? <http://ccber.ucsb.edu/news-events/will-citizen-science-cure-what-ails-us>

Discover Magazine blog. October 22, 2015. Help Discovery Go Digital – The Global WeDigBio Challenge Starts Today! <http://blogs.discovermagazine.com/citizen-science-salon/2015/10/22/citizen-science-discovery-digitize-global-wedigbio-challenge-starts-today/#.Vjy6CZ1Viko>

PLOS Blogs Citizen Science Salon. Help Discovery Go Digital – The Global WeDigBio Challenge Starts Today! <http://blogs.plos.org/citizensci/2015/10/22/help-discovery-go-digital-the-global-wedigbio-challenge-starts-today/>

US News and World Report. January 17, 2013. Report: Climate Change Causes Plants to Flower Historically Early. By Jason Koebler. <http://www.usnews.com/news/articles/2013/01/17/report-climate-change-causes-plants-to-flower-historically-early>

National Public Radio: All Things Considered. January 17, 2013. Understanding Climate Change, With Help From Thoreau. By Elizabeth Shogren. <http://www.npr.org/2013/01/17/169636357/understanding-climate-change-with-help-from-thoreau>

Spiegel Online. January 17, 2013. Climate Change in the U.S.: Early Spring. <http://www.spiegel.de/wissenschaft/natur/fruehling-klimawandel-laesst-blumen-in-den-usa-frueher-bluehen-a-878103.html>

National Geographic Daily News. January 16, 2013. Earliest Blooms Recorded in U.S. Due to Global Warming. By Christine Dell'Amore. <http://news.nationalgeographic.com/news/2013/01/130116-spring-earlier-global-warming-plants-trees-blooming-science/>

LiveScience. January 16, 2013. First Flowering Affected by Climate Change. By Tia Ghose. <http://www.livescience.com/26328-global-warming-brings-earlier-spring-flowers.html>

Living on Earth: Public Radio International. May 4, 2012. Using Thoreau's Journals to Track Climate Change. By Bruce Gellerman.

Wall Street Journal. June 13, 2008. Another Thoreau Lesson; His Notes From 1850's Help Study of Climate Change. By Robert Lee Hotz.

New York Times. October 27, 2008. Thoreau is Rediscovered as a Climatologist. By Cornelia Dean.