

## Leander D.L. Anderegg

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### RESEARCH INTERESTS:

Ecological responses to climate change; plant ecophysiology; evolutionary context and community/ecosystem consequences of plant stress responses

### POSITIONS:

Postdoctoral Fellow, University of California, Berkeley & Carnegie Institution 2017-present  
for Science. Adaptation and acclimation of California oaks to drought and CO<sub>2</sub>  
*Funded by: NSF Biological Collections Postdoctoral Fellowship; NOAA Climate and Global Change  
Postdoctoral Fellowship*

Visiting Researcher, Carnegie Institution for Science. Extracting global 2015-2017  
photosynthesis from canopy structure  
*Funded by: WRF Hall Graduate Research Fellowship, NSF Graduate Research Fellowship*

Research Technician, Carnegie Institution for Science. Ecohydrology of *Populus* 2011-2012  
*tremuloides* and Sudden Aspen Decline

### EDUCATION:

**University of Washington** - PhD in Biology, 2012 – 2017  
(GPA 3.93/4.0) Advisor: Dr. Janneke Hille Ris Lambers  
Visiting Scholar: University of Queensland (2014), UC Berkeley (2015-2017)

**Stanford University** – BA in Human Biology with Honors and Distinction, 2007 – 2011  
(GPA 4.05/4.0) Honors Thesis advisor: Dr. Joseph Berry (Carnegie Institute for Science)

### PUBLICATIONS: (underline indicates undergraduate/masters mentee)

**Anderegg LDL**, HilleRisLambers. (*accepted*) Local range boundaries versus large-scale tradeoffs: Climatic and competitive constraints on tree growth. Ecology Letters.

Brodrick P, **Anderegg LDL**, Asner GA (*accepted*). Forest drought resistance at large geographic scales. Geophysical Research Letters

**Anderegg LDL**, Berner L, Badgley G, Sethi ML, Law BE, HilleRisLambers J. (2018) Within-species patterns challenge our understanding of the Leaf Economics Spectrum. Ecology Letters. 21:734-744 doi: 10.1111/ele.12945

Fontes CG, Dawson TE, Jardine K, McDowell N, Gimenez B, **Anderegg LDL**, Negron-Juarez R, Higuchi N, Fine P, Araújo AC, Chambers JQ (2018) Dry and hot: the hydraulic consequences of a

climate change-type drought for Amazonian trees. *Proceedings of the Royal Society, Biology*. 373: 20180209. <http://dx.doi.org/10.1098/rstb.2018.0209>

Legendre-Fixx M, **Anderegg LDL**, Ettinger AK, HilleRisLambers J. (2018) Influences of climatic context and species identity on sub-alpine conifer growth. *Forests*. 9:1 doi:10.3390/f9010001

Reynolds VE, **Anderegg LDL**, Loy X, HilleRisLambers J, Mayfield MM. (2017) Unexpected drought resilience strategies of four *Brachychiton* species. *Tree Physiology*. doi: 10.1093/treephys/tpx143

Baird A, **Anderegg LDL**, Lacey M, HilleRisLambers J, Van Volkenburgh E. (2017) Comparative leaf growth strategies in response to water stress and shade: Uncovering an ecophysiological role for leaf mass per area (LMA) in *Populus tremuloides*. *Tree Physiology*. doi: 10.1093/treephys/tpx035

Adams, H.D., et al. (62 more authors including **LDL Anderegg**). (2017) A multi-species synthesis of physiological mechanisms in drought-induced tree mortality. *Nature Ecology and Evolution*. doi:10.1038/s41559-017-0248-x

**Anderegg LDL**, HilleRisLambers J. (2016) Drought stress causes range limits in two tree species via different physiological mechanisms. *Global Change Biology*. 22:1029-1045. doi: 10.1111/gcb.13148

HilleRisLambers J, **Anderegg LDL**, Breckheimer I, Burns K, Ettinger A, Franklin J, Freund J, Ford KR, Kroiss SJ. (2015) Implications of climate change for turnover in forest composition: a case study from Mt. Rainier National Park. *Northwest Science*. 89(3):201-218. doi:10.3955/046.089.0304

Anderegg WRL, **Anderegg LDL**, Berry JA, Field CB. (2014) Whole-tree hydraulic conductance and assimilation during drought-induced aspen forest die-off. *Oecologia*. 175:11-23. doi:10.1007/s00442-013-2875-5

**Anderegg LDL\***, Anderegg WRL\*, Abatzoglou J, Hausladen AM, Berry JA (2013) Drought characteristics' role in widespread aspen forest mortality across Colorado, USA. *Global Change Biology* 19:1526–1537. doi: 10.1111/gcb.12146. \* these authors contributed equally

**Anderegg LDL**, Anderegg WRL, Berry JA. (2013) Not all droughts are created equal: translating meteorological drought into woody plant mortality. *Tree physiology* 33(7): 672-683. doi:10.1093/treephys/tpx044.

Anderegg WRL, Kane JM, **Anderegg LDL**. (2013) Consequences of widespread tree mortality triggered by drought and temperature stress. *Nature Climate Change*. 3:30-37. doi:10.1038/nclimate1635

Anderegg WRL, Plavcova L, **Anderegg LDL**, Hacke U, Berry JA. (2013) Drought's legacy: Hydraulic deterioration underlies widespread aspen forest die-off and portends increased future risk. *Global Change Biology*. 19:1188-1196. doi: 10.1111/gcb.12100

Anderegg WRL, **Anderegg LDL**. (2013) Carbon and hydraulic changes in experimental drought-induced mortality of two contrasting conifer species. *Tree Physiology*. 33:252-260. doi:10.1093/treephys/tpx016.

Anderegg WRL, Berry JA, Smith DD, Sperry JS, **Anderegg LDL**, Field CB. (2012) The roles of hydraulic and carbon stress in a wide spread climate-induced forest die-off. *Proceedings of the National Academy of Science US*. 109:233-237. doi:10.1073/pnas.1107891109

Anderegg WRL, **Anderegg LDL**, Sherman C, Karpe DS. (2012) Effects of widespread drought-induced aspen mortality on understory plants. *Conservation Biology*. 26(7):1082-1090. doi: 10.1111/j.1523-1739.2012.01913.x

*In submission (manuscript available upon request):*

Badgley GM\*, **Anderegg LDL**\*, Field CB, Berry JA. An ecologically-based approach to terrestrial primary productivity. Preprinted posted to EarthArXive July 2018:

<https://doi.org/10.31223/osf.io/s6t3z> \* these authors contributed equally

Anderegg WRL, **Anderegg LDL**, Huang CY. An early warning system for drought-induced tree mortality. *In revision*. *New Phytologist*

**Anderegg LDL**, Markham IP, Loy X, Elmer C, Hovenden MJ, HilleRisLambers J, Mayfield MM. Within-species geographic trait variation shows consistent trait coordination across tissues in eight Australian tree species.

Zeng Y, Badgley GM, Kornfeld A, **Anderegg LDL**, Liu Q, Xu B, Yang B, Yan K, Berry JA. A radiative transfer model for solar induced fluorescence using spectral invariants theory

Trugman A, **Anderegg LDL**, Wolfe BT, Birmi B, Ruehr NK, Detto M, Bartlett MK, Anderegg WRL. How green with the Earth be? Tree allocation strategies mediate future forest productivity.

#### **GRANTS & AWARDS**

Thomas Jefferson Fund with endorsement from the Make Our Plant Great Again Initiative (PI with L Lamarque at U Bordeaux, \$20,000) 2018

France-Berkeley Fund collaborative grant (with R Skelton & TE Dawson, UC Berkeley and S Delzon, U Bordeaux, \$10,000) 2018

NSF Biological Collections Postdoctoral Fellowship 2017

NOAA Climate and Global Change Postdoctoral Fellowship 2017

Billings Award Honorable Mention for oral presentation at ESA Annual Meeting 2017

Decagon Harris Award (\$5,000) 2016

NSF Doctoral Dissertation Improvement Grant (\$13,000) 2015

WRF Hall Research Fellowship, University of Washington 2015

WRF Hall Research Grant, University of Washington (\$4,425) 2015

ESA Physiological Ecology Travel Award (\$500) 2015

National Geographic Society Young Explorers Grant (\$5,000) 2014

NSF Graduate Research Opportunities Worldwide (GROW - \$8,000) 2014

Dean's Visualization Prize: awarded to two top data visualization portfolios from 2014

“Beautiful Graphics in R” seminar. Figure retweeted by Edward Tufte

Charles Redd Center for Western Studies, Brigham Young University (\$1500)	2014
Edwards Award, UW Department of Biology (\$1250)	2014
American Alpine Club Research Grant (\$800)	2014
Sigma Xi Research Grant in Aid (\$600)	2014
Wingfield/Ramenofsky Research Award, UW Department of Biology: (\$700)	2013
National Science Foundation (NSF) Graduate Research Fellowship	2012
Achievement Rewards for College Scientists (ARCS) Foundation Fellowship: (\$17,500)	2012
David M. Kennedy Honors Thesis Prize: awarded to top four honors theses at Stanford University: top honors thesis in the School of Humanities and Sciences	2011
Deans' Award for Academic Accomplishment: awarded to 10 Stanford undergraduates for academic, research, or intellectual accomplishments	2011
Firestone Medal for Excellence in Undergraduate Achievement: awarded to ~top 10% of Stanford undergraduate honors theses in social science, science and engineering	2011
J.E. Wallace Sterling Award for Scholastic Achievement: awarded to top 25 Stanford undergraduate GPAs in School of Humanities and Sciences	2011

### **INVITED SEMINARS**

Anderegg, LDL (Nov 2018) Keeping pace with climate: Ecological change in the 21<sup>st</sup> century. Seminar at Duke University, Dept of Biology in ‘Biological Rates and Timescales’ seminar series

Anderegg, LDL (March 2018) Predicting tree range shifts: How will forests respond to a changing climate? Seminar at San Francisco University, Dept of Biology.

Anderegg, LDL et al. (Oct 2016) How drought characteristics interact with tree physiology to kill trees (or not): A case study from Colorado. Natural Areas Conference, UC Davis.

Anderegg, LDL, Hille Ris Lambers, J. (May 2016) When the growing gets tough, the tough stop growing: Disentangling the mechanisms of tree geographic range constraints. Seminar at Oregon State University, Forest Ecosystems and Society

Anderegg, LDL, HilleRisLambers J. (May 2016) Tree Biogeography in the 21<sup>st</sup> Century: Where and how does climate actually control tree range boundaries? Seminar at Carnegie Institute for Science, Department of Global Ecology

Anderegg, LDL, et al. (May 2016) Taking physiology on the road: What we can learn from the collision of plant physiology and biogeography. Carnegie Department of Plant Biology Post-doc round table

Anderegg, LDL, Anderegg, WRL, Berry, JA, Field, CB. (Nov 2013) From Drought to Death: The ecohydrology and physiology of sudden aspen decline. Invited presentation at the Annual California Forest Pest Council Meeting, Sacramento, CA.

## **TEACHING & MENTORING**

Honors student mentor (Australian equivalent to U.S. masters):

- Christina Elmer, University of Queensland, AU. *Investigating interspecific trade-offs between drought tolerance and competitive ability in eight Tasmanian Eucalypt species* 2015-2016
- Victoria Reynolds, University of Queensland, AU. *Assessing the prevalence of trade-offs between drought tolerance and competitive ability in six tree species of the Bunya Mountains* (see Reynolds et al. 2017) 2014-2015

Undergraduate mentor:

- Monica Lee, University of California, Berkeley. *Aging xylem and blue oak hydraulics* 2018-present
- Becca Nelson, Stanford University. *Predicting stem wood density from branch density and plant characteristics* 2016-present
- Myesa Legendre-Fixx, University of Washington. *Influences of climatic context and species identity on sub-alpine conifer growth* (see Legendre-Fixx et al. 2018) 2016-2017
- Alec Baird, University of Washington. *Uncovering an ecophysiological role for leaf mass per area (LMA) in *Populus tremuloides** (see Baird et al. 2017) Recipient of the Fry-Hoston-Rigg Research Award, Prof Franco Award, Mary Gates Research Grant, Garden Club of America Research Grant, ASPB Travel Grant 2014-2017
- Deneiges Murrey, University of Washington, *Within-species variation in resistance to freeze-thaw embolism in a montane gymnosperm and angiosperm* Recipient of the Fry-Hoston-Rigg Research Award 2014
- June Landenburger, University of Washington, *Ecotypic variation and plasticity in seedling morphology and physiology of two conifers* Recipient of Mary Gates Research Grant 2013-2014
- Kimberly Pham, Stanford University, *The aspens are coming: aspens invade meadows faster at high elevations than low elevations* Woods Institute Mentoring Undergraduates in Interdisciplinary Research (MUIR) summer project 2011
- supervised 21 undergraduate lab assistants to date 2013-present

Teaching Assistant, University of Washington, BIOL 200 Introductory Biology Winter 2013

Teaching Assistant, University of Washington, BIOL 433 Marine Ecology Spring 2013

Guest Lecturer:

- UC Berkeley, Plant Ecophysiology 2018
- Stanford Summer Institute, Environmental Studies 2017
- University of Washington, Plant Ecophysiology 2015

K-12 guest teaching: tested climate change ecology curricula at MCHS High School, 2009-present  
Cortez, CO (2009); Corbett High School, Corbett, OR (2012); Alkai Elementary School,  
Seattle, WA (2014); Stanford Pre-collegiate Summer Institute, Stanford, CA (2016)

## **SERVICE & OUTREACH**

Peer Reviewer: Proceedings of the National Academy of Sciences USA, Science Advances, Global Change Biology, Ecology Letters, New Phytologist, Geophysical Research Letters, Nature Ecology & Evolution, Ecology, Global Ecology and Biogeography, Conservation Biology, PLOS One, BioScience, Science of the Total Environment, Tree Physiology, Forest Ecology and Management, Functional Ecology, Forests, Agricultural and Forest Meteorology

Grant Reviewer: National Science Foundation (ad hoc), Hawaii SeaGrant, Chilean National Science and Technology Commission

Professional Society member: Society of American Foresters, Ecological Society of America, Sigma Xi Scientific Society, American Geophysical Union

Representative to the President, Carnegie Dept. of Global Ecology Collaborative Workplace Initiative (co-founder, 2018)

Departmental Representative, Carnegie Institution Postdoctoral Association (2018)

Member, Carnegie Global Ecology Seminar Committee (2017-2018)

Guest lecture on forestry science, East Palo Alto CANOPY highschool forestry club (2017-present)

Mentor in the Strategies for Ecology Education, Diversity and Sustainability (SEEDS) program of the Ecological Society of America (2016-present)

Mentor in the Undergraduate Mentoring Program of the American Geophysical Union (2017-present)

Educurious Biology Expert (2015-present)

Faculty meeting graduate student representative (2013-2015)

Botanical Greenhouse Docent, University of Washington (2013-2016)

Botmobile UW Botatnical Greenhouse mobile outreach member (2015)

Developed ½ day science module for 4<sup>th</sup>-5<sup>th</sup> grade titled “Trees: Nature’s time machine” (2014)

Developed ½ day science module for 10<sup>th</sup>-12<sup>th</sup> grade titled “The Ecology of Climate Change” (2016)

## **Non-scientific writing and Research In the News**

- interview about forest die-off and why I'm a biologist on Generation Anthropocene podcast (<https://www.genanthro.com/2017/06/22/telltale-signs/>)
- Writing featured on UW Biology SciPos blog (e.g. on inspiring women in science: <http://scipos.blogspot.com/2015/10/ada-lovelace-day.html>, or on recent publications: <http://scipos.blogspot.com/2015/12/grad-publication-leander-anderegg.html>)
- Paper cited in xkcd webcomic (Anderegg & Anderegg 2013 in <http://what-if.xkcd.com/103/>)
- Tree core data visualization figure retweeted by Edward Tufte (@EdwardTufte, 3/24/14)

*Coverage of Anderegg & HilleRisLambers 2016:*

- Discovery Channel: "How trees try to cope with climate change" (<http://news.discovery.com/earth/plants/how-trees-try-to-cope-with-climate-change-151214.htm>)
- Environmental Monitor: "With drought, some western trees hunker down while others give up" (<http://www.fondriest.com/news/with-drought-some-western-trees-hunker-down-while-others-give-up.htm>)
- UW Today "Trees either hunker down or press on in a drying and warming western U.S. climate" (<http://www.washington.edu/news/2015/12/10/trees-either-hunker-down-or-press-on-in-a-drying-and-warming-western-u-s-climate/>)
- Futurity: "Trees take divergent paths to beat the heat" (<http://www.futurity.org/trees-coping-climate-change-1081502/>)
- Skogr Aektin (if you read Icelandic: <http://www.skogur.is/um-skograekt-rikisins/frettir/nr/2742>)

*Coverage of Sudden Aspen Decline research (2011-2014)*

- New Scientist: "Dying aspen trees sound alarm for world's forests"
- Huffington Post: "Climate change stress killing forests, and why it matters"
- United Press International: "Drought blamed for Colorado tree die-off"
- Summit County Citizen Voice: "Colorado aspen woes linked to extreme summer heat"
- RedOrbit: "Majestic Colorado aspens devastated by hotter temperatures"
- Durango Herald: "Shrubs winning race"