

Cameron B. Williams

Biology Department • Franklin & Marshall College
cameron.williams@fandm.edu

EDUCATION

- PhD (summer 2017) University of California, Berkeley; Integrative Biology: “Water dynamics in giant trees”.
- MS (2006) Humboldt State University; Biology: “Epiphyte communities on redwood (*Sequoia sempervirens*) in northwestern California”.
- BS (1999) Humboldt State University; Biology (Natural History) & Botany; cum laude honors.

RESEARCH INTERESTS

- 1) Tree hydraulic architecture, xylem anatomy, and water use dynamics.
- 2) Forest structure and 3-dimensional tree architecture.
- 3) Epiphyte community ecology.

CURRENT RESEARCH

For my PhD, I am quantifying the importance of water retention, movement, and use in trees using a combination of physiological and anatomical approaches. Pertinent questions include: In their abundant foliage and massive stems, do giant trees maintain a substantial reservoir of readily available water for transpiration? How are the conduits of tall trees constructed to maximize flow efficiency with tree height growth?

With lichenologist Rikke Reese Naesborg, we are describing epiphyte diversity, abundance, and distribution on tall *Sequoia sempervirens* (coast redwood) from Sonoma County to Big Sur. We have quantified host tree architecture and estimated abundance of each epiphyte taxon to understand the drivers of community structure, and to compare with epiphyte communities in the northern range of coast redwood.

WORK EXPERIENCE: BOTANICAL

- 2007-2008: Botanist, Duck Creek Associates, Corvallis, OR.
- 2002-2008: Research Associate, Humboldt State University, Arcata, CA.
- 2006: Botanist, LBJ Enterprises, Eureka, CA.
- 2006-2007: Botanist, Redwood Coast Associates, Willits, CA.
- 2002: Botanist, Mad River Biologists, McKinleyville, CA.
- 2001: Botanist, Southern Oregon Ecologic, Grants Pass, OR.
- 2001: Research Assistant, Humboldt State University, Arcata, CA.
- 1999: Botanist, Hamer Environmental, Mount Vernon, WA.
- 1999: Biological Technician, Umpqua NF, Diamond Lake Ranger District, OR.
- 1998: Biological Technician, Deschutes NF, Crescent Ranger District, OR.

WORK EXPERIENCE: ZOOLOGICAL

- 2000-2007: Forest Canopy Biologist, Eco-ascension Research and Consulting, Arcata, CA.
- 2006: Research Associate, Simon Fraser University, Victoria, BC, Canada.
- 2001-2002: Research Associate, Humboldt State University, Arcata, CA.

2001: Research Assistant, Humboldt State University, Arcata, CA.
2000: Biological Technician, Umpqua NF, Diamond Lake Ranger District, OR.
2000: Wildlife Biologist, On-track Consulting and Research, Ridgecrest, CA.

TEACHING: UNIVERSITY LABORATORY COURSES

2015: Ecosystems of California, UC Berkeley.
2015: Plant Physiological Ecology, UC Berkeley.
2014: Course development, General Biology, UC Berkeley.
2013: Training in Stable Isotope Methods and Mass Spectrometry.
2013: Plant Physiological Ecology, UC Berkeley.
2011: Medical Ethnobotany, UC Berkeley.
2010, 2011: General Biology, UC Berkeley.
2001, 2002: General Botany, Humboldt State University.

TEACHING: FIELD COURSES

2016, 2015, 2014: Redwood Ecology via Guided Climbs, Tree Climbing Planet.
2015: Tree Climbing for Researchers, University of Maryland & USDA.
2015: Redwood Ecology via Guided Climbs, Tree Climbing Planet.
2014: Tree Climbing for Researchers, University of Maryland & University of Hawaii.
2012: Tree Climbing for Researchers, Stanford University.
2012: Redwood Ecology via Guided Climbs, Tree Climbing Planet.
2012: Tree Climbing for Researchers, UC Berkeley.
2011: Tree Climbing for Filming, Broadreach Images.
2011: Tree Climbing for Researchers, University of Maryland & University of Hawaii.
2010: Tree Climbing for Researchers, Northern Arizona University.
2009: Tree Climbing for Researchers, Stanford University, University of Hawaii, & USDA.
2008: Tree Climbing for Researchers, Stanford University.
2007: Tree Climbing for Researchers, Bureau of Land Management, Arcata.
2007: Tree Climbing for Researchers, UC Davis.
2006, 2010: Exploring the Forest Canopy, Siskiyou Field Institute.
2005: Tree Climbing for Researchers, Stanford University.
2004: Tree Climbing for Researchers, Humboldt State University.
2004, 2002: Lichen Identification, Campbell Timberland Management.
2001: Tree Climbing for Researchers, Umpqua National Forest.

CLIMBING FOR RESEARCH & OUTREACH

Since 1999 I have offered my climbing expertise to research in forest canopies. This research has carried me aloft into some of the tallest and most massive trees on earth, and included investigations into tree height growth, crown architecture, conduit structure, dendrochronology, water movement, isotope signatures, and epiphyte community ecology.

I believe that providing people with a personal and unique experience of a forest canopy not only facilitates research inquiries, but also fosters awareness about the conservation values of

natural ecosystems. In pursuit of this belief, I have taught many tree climbing courses for universities, federal agencies, and not-for-profit organizations.

And since tree climbing is not accessible to everyone, I also help provide visual experiences by installing access rigging for film crews and photographers to capture images from “bird’s-eye point-of-views”, featuring high-angle shots from ropes fixed in forest canopies. The captured media, including old-growth forests as well as deep limestone caves, has been featured by BBC, National Geographic, USDA Forest Service, and Wild Horizons.

TECHNICAL SCIENTIFIC EQUIPMENT

Campbell Scientific weather stations
Campbell Scientific “Hydrosense” soil moisture probes
Decagon Leaf porometers
Hemispherical photography
ICT Stem psychrometers
ICT Sapflow (heat ratio method)
Increment borers
LiCor 1600 Null balance porometers
LiCor 6400 Portable photosynthesis systems
LiCor Leaf area meters
Light microscopes (dissecting, compound)
Natkon dendrometers
Pressure chambers

GRANTS & AWARDS

2013: UC Berkeley Summer Graduate Research Award.
2012: UC Berkeley Graduate Division Summer Grant.
2012: UC Berkeley Summer Graduate Research Award.
2012: UC Berkeley Outstanding Graduate Student Instructor Award.
2011: Research Grant, Save-The-Redwoods League.
2008: Integrative Graduate Education Research Traineeship (IGERT), Northern Arizona University and National Science Foundation.
2003: Humboldt State University, Department of Biological Sciences, Master’s Grant Award.
2000: Umpqua National Forest Safety Award.
1998: F.R. Meredith Botany Scholarship, Humboldt State University.

PAPERS IN PROGRESS

Williams CB, Anfodillo T, Crivellaro A, Lazzarin M, Dawson T, & Koch GW (in review) Constraints on hydraulic compensation in the Earth’s tallest trees. Submitted to *New Phytologist*.
Williams CB, Naesborg RR, Dawson TE (in review) Coping with gravity: the foliar water relations of giant sequoia. Submitted to *Tree Physiology*.
Naesborg RR, Lau MK, Williams CB, & Whitham T (in prep) Energy independent saxicolous lichen and bryophyte communities are influenced by genetically based susceptibility to herbivory in a foundation tree species.

PUBLISHED PAPERS

- Ambrose AA, Sillett SS, Burgess SSO, Baxter WL, Wong C, Williams CB, Næsborg RR, Koch GW, & Dawson TE (2016) Hydraulic constraints on optimal resource utilization in giant sequoia trees. *Oecologia* 182: 713–730.
- Lazzarin M, Crivellaro A, Mozzi G, Williams C, Dawson T, & Anfodillo T (2016) Tracheid and pit anatomy vary in tandem in a tall giant sequoia. *IAWA Journal* 37: 172–185.
- Ambrose AR, Baxter WL, Wong CS, Næsborg RR, Williams CB, & Dawson TE (2015) Contrasting drought response strategies in California redwoods. *Tree Physiology* 35: 453–69.
- Næsborg RR, Williams CB (2015) Lichen diversity in Muir Woods National Monument. *Bulletin of the California Lichen Society* 22: 13–18.
- Koch GW, Sillett SC, Antoine ME, Williams CB (2014) Growth optimization trumps hydraulic constraints in the tallest angiosperm, *Eucalyptus regnans*. *Oecologia* 177: 321–331
- Næsborg RR, Williams CB (2014) What’s in the trees at Muir Woods? *Bulletin of the California Lichen Society* 21: 20–25.
- Williams CB & Tibell L (2008) *Calicium sequoiae*, a new lichen species from northwestern California, U.S.A. *Lichenologist*: 40: 185–194.
- Williams CB & Sillett SC (2007) Epiphyte communities on redwood (*Sequoia sempervirens*) in northwestern California. *Bryologist* 110: 420–452.
- Tønsberg T & Williams CB (2006) *Arthothelium norvegicum* in North America. *Evansia* 23: 80–81.

SELECTED PRESENTATIONS

- 2015: Forest Unlimited Annual Gathering, Camp Meeker, CA. “Water dynamic in giant trees.”
- 2015: Stan Acton’s Annual Redwood Shindig, CA. “How do redwoods stay hydrated?”
- 2015: Science for Parks, Parks for Science, CA. “Do giant trees wilt? Turgor loss in giant sequoia (*Sequoiadendron giganteum*)”.
- 2015: California Academy of Sciences. “Tiny pipes in giant trees: a small change in plumbing could make a big difference”.
- 2014: California Academy of Sciences. “Remember to look up... What can we learn by climbing giant trees?”
- 2014: Ecological Society of America, Sacramento, CA. “Turgor loss in large trees: Foliar water relations in *Sequoiadendron giganteum*”.
- 2013: Tree Climber’s International, Norcross, GA. “Water dynamics in giant trees”.
- 2006: Siskiyou Field Institute’s Evening Slideshow, Cave Junction, OR. “Forest canopies: exploration and research”.
- 2005: Hawaii Ecosystems Project, Hilo, HI. “Tree climbing as a research tool”.
- 2003: International Association of Lichenology, Tartu, Estonia. “Epiphyte microhabitat and substrate preferences on *Sequoia sempervirens* (redwood) in northwestern California, USA”.