

Zebulon Carter Berry

CURRICULUM VITAE

Grand Challenges Initiative Postdoctoral Fellow
Schmid College of Science and Technology
Chapman University, Orange, California

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RESEARCH INTERESTS

Plant Physiological Ecology, Plant Water Relations and Hydraulics, Photosynthetic Acclimation, Ecohydrology, Scaling, Climate Change

EDUCATION

Wake Forest University 2009-2014
Ph.D. Biology-Advisor Dr. William K. Smith
Title: *The Importance of Fog for Carbon Gain, Water Balance, and Foliar Uptake in Southern Appalachian Cloud Forests*

University of North Carolina at Chapel Hill 2003-2007
B.S. Biology, B.A. Psychology, Minor Chemistry

ACADEMIC APPOINTMENTS

Chapman University 2017-Present
Grand Challenges Initiative Postdoctoral Fellow

University of New Hampshire 2014-2017
Postdoctoral Researcher
Funding: NSF Dynamics of Coupled Natural and Human Systems
Project: "Experimental Frameworks for Evaluating Net Effects of Hydrologic Service Payments on Coupled Social-Ecohydrological Systems"

University of Idaho 2015-2016
Postdoctoral Researcher
Project: "RAPID Collaborative Research: Drought recovery following an extreme episodic drought"

Instituto de Ecologia 2014-2016
Visiting Researcher

PEER-REVIEWED PUBLICATIONS

21 publications published or in press to date, including 11 as first author.

In Press

- Knipfer T, Reyes C, Earles JM, **Berry ZC**, Johnson DM, Brodersen CR, McElron AJ. 2019. Spatiotemporal coupling of vessel cavitation and discharge of stored xylem water in a tree sapling. *Plant Physiology*.
- Goldsmith GR, **Berry ZC**, Lehmann MM. 2019. Water Use Efficiency. *In: Methods in Ecology and Evolution – Global Change Methods* (eds: AHH Rechsteiner, H De Boeck) (In Press).
- Pischke EC, **Berry ZC**, Kolka RK, Salcone J, Cordoba D, Shinbrot X, Lopez Ramirez SM, Jones KW, Congalton RG, Manson RH, Von Thaden Ugalde JJ, Selfa T, Avila S, Asbjornsen H. 2019. Lessons Learned About Collaborating Across Coupled Human-Natural Systems Research on Mexico's Payments for Hydrological Services Program. In *Collaboration Across Boundaries for Interdisciplinary Environmental Systems Science: Experiences Around the World*. Edited by Stephen Perz. Palgrave Macmillan. (In Press).

Published

- **Berry ZC**, Emery NC, Gotsch SG, Goldsmith GR. 2018. Foliar water uptake: processes, pathways, and integration into plant water budgets. *Plant, Cell & Environment* 42: 410-423.
- **Berry ZC**, Evaristo J, McDonnell JJ, Moore GA, Poca M, Steppe K, Verrot L, Asbjornsen L, Borma L, Bretfeld M, Hervé-Fernandez P, Seyfried M, Schwendenmann L, Sinacore K, Wispelaere L. 2018. The two water worlds hypothesis: Addressing alternative hypotheses and proposing a way forward. *Ecohydrology* 11: e1843.
- Johnson DM, **Berry ZC**, Baker KV, Smith DD, McCulloh KA, Domec JC. 2018. Leaf hydraulic parameters are more plastic in species that experience a wider range of leaf water potentials. *Functional Ecology* 32: 894-903.
- Johnson DM, Domec JC, **Berry ZC**, Schwantes AM, Woodruff DR, McCulloh KA, Polley HW, Wortemann R, Swenson JJ, Mackay DS, McDowell NG, Jackson RB. 2018. Co-occurring woody species have diverse hydraulic strategies and mortality rates during an extreme drought. *Plant, Cell & Environment* 41: 576-588.
- **Berry ZC**, Holwerda F, Gómez Aguilar LR, Ortiz Colin P, González Martínez T, Asbjornsen H. 2017. Why size matters: The interactive influences of tree diameter distribution and sap flow parameters on upscaled transpiration. *Tree Physiology* 00: 1-13.
- Coble A, Vadeboncoeur MA, **Berry ZC**, Jennings KA, McIntire CD, Campbell JL, Rustad LE, Templer PH, Asbjornsen HA. 2017. Are northeastern U.S. forests vulnerable to extreme drought?. *Ecological Processes*, 6: 34.
- **Berry ZC**, Gotsch SG, Holwerda F, Muñoz-Villers LE, Asbjornsen H. 2016. Slope positions influences vegetation-atmosphere interactions in a tropical montane cloud forest. *Agricultural and Forest Meteorology*, 221: 207-218.
- Hall JS, Lebrija E, Asbjornsen H, Aguirre N, van Breugel M, **Berry ZC**, and Martinez-Ramos M. 2015. Understanding Natural Capital, Part B: Ecosystem Patterns and

Processes. In: Managing Watersheds for Ecosystem Services in the Steepland Neotropics (eds: JS Hall, V Kirn, E Yanguas-Fernández). pp. 35-46, Inter-American Development Bank, Smithsonian Tropical Research Institute Panama City, Panama.

- **Berry ZC**, Johnson DM, and Reinhardt K. 2015. Vegetation zonation patterns across a temperate mountain cloud-forest ecotone are not explained by variation in hydraulic functioning or water relations. *Tree Physiology*, 35: 925-935. *selected for highlighted commentary by the journal.
- **Berry ZC**, White JC, and Smith WK. 2014. Foliar uptake, carbon fluxes, and water status are affected by the timing of daily fog in saplings from a threatened cloud forest. *Tree Physiology*, 34, 459-470.
- **Berry ZC**, Hughes NM, and Smith WK. 2014. Cloud immersion: an important water source for spruce and fir saplings in the southern Appalachian Mountains. *Oecologia*, 174: 319-326.
- **Berry ZC** and Smith WK. 2014. Experimental cloud immersion and foliar water uptake in saplings of *Abies fraseri* and *Picea rubens*. *Trees*, 28, 115-123.
- **Berry ZC** and Smith WK. 2013. Ecophysiological importance of cloud immersion in a relic spruce-fir forest at elevational boundaries, southern Appalachian Mountains, USA. *Oecologia*, 173: 637-648.
- Smith WK and **Berry ZC**. 2013. Sunflecks? *Tree Physiology*, 33: 233-237.
- Dohn J, **Berry ZC**, and Curran TJ. 2013. A pilot project testing the effectiveness of three weed control methods on the removal of *Lantana camara* in Forty Mile Scrub National Park, Queensland, Australia. *Ecological Management and Restoration*, 14: 74-77.
- **Berry ZC**, and Smith WK. 2012. Cloud pattern and water relations in *Picea rubens* and *Abies fraseri*, southern Appalachian Mountains, USA. *Agricultural and Forest Meteorology*. 162: 27-34.
- **Berry ZC**, Wevill K, and Curran TJ. 2011. The invasive weed *Lantana camara* increases fire risk in dry rainforest by altering fuel beds. *Weed Research* 51: 525-533.
- Turner CP, Miller R, Smith C, Brown L, Blackstone K, Dunham SR, Strehlow R, Manfredi M, Slocum P, Iverson K, West M, Ringler SL, **ZC Berry**. 2007. Widespread neonatal brain damage following calcium channel blockade. *Developmental Neuroscience* 29:213-231.

GRANTS

- NSF-CBET – 1644860 (EAGER), *co-PI*: “Collaborative Research: The Role of Citizen Science in Watershed Hydrology Research: Relationships between Volunteer Motivations, Data Quantity and Quality, and Decision-Making”, June 2016, \$52,771.
- NSF-IOS -1637194, *co-PI*: “Reconciling methodological discrepancies in the measurement of hydraulic vulnerability to embolism”, May 2016, \$38,385.
- AGU Chapman Conference Travel Grant-April 2016-\$1000

TEACHING AND MENTORING

Teaching

- **Grand Challenges in Science and Technology** (2 sections)- Instructor of Record, Chapman University-Fall 2018, Spring 2018, Fall 2017
- **Coupled Natural and Human Systems: Payments for Ecosystem Services**- Co-lecturer- Fall 2015
- **Plant Physiological Ecology Laboratory**- Teaching Assistant, WFU- Spring 2014, Spring 2013, Fall 2011, Fall 2010
- **Biology and the Human Condition Laboratory**-Teaching Assistant, WFU- Spring 2011, Fall 2010, Spring 2010, Fall 2009
- **Principles of Forest Management**- Co-taught as Intern, The Centre for Rainforest Studies- Spring 2008
- Short Course “Tecnicas de diseño y fabricación de dispositivos de flujo de savia en palma de aceite” (Technical design and construction of sap flow devices in oil palm) Colegio de Postgraduados, Campus Tabasco, Cardenas, Tabasco, Mexico- January-February 2016.
- Invited Talks: Interdisciplinary Workshop on Environmental Issues, Michigan Tech University (2015), University of New Hampshire (2015), University of North Carolina Asheville (2013), Wake Forest University (2011), Society for Growing Australian Plants (2008), Malanda Environmental Center (2008).

Mentoring

- Hydraulics Methods Workshop- Co-led a workshop teaching diverse methods in plant hydraulics to 15 graduate students. August 2017
- Current Student Advisees: Alex Drivas (Chapman University)
- Former Student Advisees: Ximena Espejel (M.S., Instituto de Ecologia), Carlos Lezama (Honor’s Undergraduate Thesis, Universidad de Veracruzana).
- Directed Research Projects- Led 12 undergraduate students in developing and carrying out research questions as an intern, The Centre for Rainforest Studies- Fall 2007, Spring 2008

Professional Development

- Society for the Advancement of Biological Education Research (SABER) conference attendee- January 2018
- Institute for Excellence in Teaching and Learning Summer Academy on Teaching (2 days), Chapman University- Summer 2017
- *Additional Training*: Group Facilitation, Classroom Equity and Inclusion, Blackboard Learning Management System

AWARDS & HONORS

- **Elton C. Cocke Award for Outstanding Graduate Student in Biology**, Wake Forest University, 2014
- **Eugene Odum Award for Best Oral Presentation - Honorable Mention**, Association of Southeastern Biologists conference, 2014
- **Best Poster Presentation**, ECU Symposium for biodiversity responses to climate change-perspectives from the southeastern US, 2014
- **Vecellio Grant for Graduate Research**, Wake Forest University, 2010, 2011, 2012, 2013
- **Elton C. Cocke Travel Fund**, Wake Forest University, 2010, 2011, 2012, 2013, 2014
- **Alumni Student Travel Award**, Wake Forest University

ORAL AND POSTER PRESENTATIONS

- McCord C, Welles S, **Berry ZC**, Sonnenschein A, Gonzalez Alonso JR, Goldsmith G, Lyon A. The Grand Challenges Initiative: Inclusive and innovative inquiry-based STEM education. Society for the Advancement of Biological Education Research, Irvine, California, January 20-21, 2018.
- **Berry ZC**, Venturas MD, Albuquerque C, Brodersen C, Choat B, Cuneo I, Domec JC, Hacke UG, Knipfer T, Jacobsen AL, McCulloh K, McElrone A, Miller ML, Pratt RB, Smith DD, Johnson DM. 2017. A comparison of micro-CT imaging and excised segment methods to measure xylem embolism using a relatively long-vesseled species, *Castanea dentata*. Ecological Society of America (ESA) National Meeting, Portland, Oregon, August 6-11, 2017. (oral)
- **Berry ZC**, Looker N, Holwerda F, Gómez Aguilar LR, Ortiz Colin P, González-Martínez T, Asbjornsen H. Why size matters: The interactive influences of tree diameter distribution and sap flow parameters on upscaled transpiration. 10th International Workshop on Sap Flow, Fullerton, California, May 22-26, 2017.
- **Berry ZC**, Looker N, Holwerda F, Gómez Aguilar LR, Ortiz Colin P, González-Martínez T, Asbjornsen H. 2016. Size matters: A modeling framework for understanding relationships between tree diameter, sap velocity, and sapwood depth strongly influences tree and stand transpiration. IV Congreso Nacional: Manejo de Cuencas Hidrograficas, Xalapa, Veracruz, Mexico, October 26-28, 2016. (poster)
- **Berry ZC**, Holwerda F, Gómez Aguilar LR, Ortiz Colin P, González-Martínez T, Asbjornsen H. 2016. Scaling from Points in Tree Trunks to Stand Level Transpiration: Examining Relationships between Tree Size, Stand Characteristics, and Seasons in a Tropical Montane Cloud Forest. Ecological Society of America (ESA) National Meeting, Ft. Lauderdale, Florida, August 7-12, 2016. (oral)
- **Berry ZC**, Smith D, Domec JC, McCulloh KA, Johnson DM. 2016. What happens in the drought after “the drought”? A comparison of carbon and water maintenance strategies across multiple drought events. Gordon Conference: Multiscale Vascular Plant Biology, Sunday River, Maine, June 26-July 1, 2016. (poster)
- **Berry ZC**, Holwerda F, Gómez Aguilar LR, Ortiz Colin P, González-Martínez T, Asbjornsen H. 2016. Scaling from Points in Tree Trunks to Stand Level Transpiration: Examining Relationships between Tree Size, Stand Characteristics, and Seasons in a

Tropical Montane Cloud Forest. American Geophysical Union (AGU) Chapman Conference in Tropical Ecohydrology, Cuenca, Ecuador, June 5-9, 2016. (poster)

- **Berry ZC**, Gotsch SG, Holwerda F, Muñoz-Villers L, Asbjornsen H. 2015. Examining the influence of environmental parameters on sap flow across stand ages and slope positions in a tropical montane cloud forest. 100th Annual Ecological Society of America (ESA) National Meeting, Baltimore, Maryland, August 9-14, 2015. (poster)
- **Berry ZC**, White JC, Smith WK. 2014. The importance of the timing of fog to foliar uptake and physiological functioning in southern Appalachian cloud forests, USA. 99th Annual Ecological Society of America (ESA) National Meeting, Sacramento, California, August 10-15, 2014. (oral)
- **Berry ZC** and Smith WK. 2014. The importance of fog as a water source in southern Appalachian cloud forests. 75th Annual Meeting of the Association of Southeastern Biologists, Spartanburg, South Carolina, April 2-5, 2014. (oral)
- **Berry ZC** and Smith WK. 2013. The importance of fog as a water source in southern Appalachian cloud forests. Symposium on biodiversity responses to climate change-perspectives from the southeastern US, East Carolina University, Greenville, North Carolina, March 14-15, 2014. (poster)
- **Berry ZC** and Smith WK. 2013. Utilization of fog water through foliar water uptake: a unique strategy in southern Appalachian spruce-fir cloud forests. 74th Annual Meeting of the Association of Southeastern Biologists, Marshall University, Charleston, West Virginia, April 6-10, 2013. (oral)
- **Berry ZC** and Smith WK. 2012. Effects of cloud immersion and elevation on sapling photosynthesis and water status in relic spruce-fir (*Picea rubens* and *Abies fraseri*) forest, southern Appalachian Mountains, USA. 97th Annual Ecological Society of America (ESA) National Meeting, Portland, Oregon, August 5-10, 2012. (oral)
- **Berry ZC** and Smith WK. 2012. Quantifying the relationship between mountain cloud immersion and plant water status in Red Spruce (*Picea rubens*) and Fraser Fir (*Abies fraseri*). 73rd Annual Meeting of the Association of Southeastern Biologists, University of Georgia, Athens, Georgia, April 4-7, 2012. (poster)
- **Berry ZC** and Smith WK. 2011. Quantifying the relationship between mountain cloud immersion and plant water status in Red Spruce (*Picea rubens*) and Fraser Fir (*Abies fraseri*). 96th Annual Ecological Society of America (ESA) National Meeting, Austin, Texas, August 7-12, 2011. (poster)
- **Berry ZC**, and Smith WK. 2010. Quantifying cloud immersion and water stress in a relic Spruce-Fir community. 26th Perspectives in Biology (PIB) Symposium, Wake Forest University, Winston-Salem, North Carolina, November 12-13, 2010. (poster)
- **Berry ZC**, Wevill K, Curran TC. 2009. *Lantana camara* increases fire risk in dry rainforest through alteration of fuel loads. 25th Perspectives in Biology (PIB) Symposium, Wake Forest University, Winston-Salem, North Carolina, November 13-14, 2009. (poster)
- **Berry ZC**, Wevill K, Curran TC. 2009. *Lantana camara* increases fire risk in dry rainforest through alteration of fuel loads. The 10th International Congress of Ecology, Brisbane, Queensland, Australia, August 16-21, 2009. (poster)

- **Berry ZC**, Wevill K, Curran TC.2009. The invasive weed, *Lantana camara* increases fire risk in dry rainforest by altering fuel beds. 94th Annual Ecological Society of America (ESA) National Meeting, Albuquerque, New Mexico, August 2-7, 2009. (oral)
- Dohn J, **Berry ZC**, Curran TC.2009. Effectiveness of three weed control methods on the removal of *Lantana camara* in Australian dry rainforest. 94th Annual Ecological Society of America (ESA) National Meeting, Albuquerque, New Mexico, August 2-7, 2009. (poster)

SERVICE AND OUTREACH

- Reviewer: *New Phytologist*, *Agricultural and Forest Meteorology*, *Oecologia*, *Ecology*, *Tree Physiology*, *Hydrological Processes*, *AoB Plants*, *Remote Sensing*, *Plant and Soil*, *PLOS ONE*, *Plant Ecology*, *International Journal of Biodiversity and Conservation*, *Acta Physiologiae Plantarum*, *Castanea*
- Secretary of the Ecological Society of America Physiological Ecology Section –August 2015-December 2017
- Co-Organizer of Organized Oral Session at the 2018 Ecological Society of America meeting entitled “Interactions between leaf-level and canopy physiology” – August 2018
- Co-Organizer of Organized Oral Session at the 2015 Ecological Society of America meeting entitled “Head in the Clouds: Advancing Our Understanding of How Fog and Dew Affect Plants in Ecosystems Around the World” – August 2015
- Judge for the Buell and Braun student awards and the Physiological Ecology section best student presentation award – August 2015
- Graduate student representative to the faculty, Wake Forest University, 2013-2014
- Co-organizer Ecolunch Seminar Series at Wake Forest University – August 2013-May 2014
- Forsyth County Science Fair Judge – August 2013-May 2014

PROFESSIONAL AFFILIATIONS

- The Ecological Society of America (ESA), 2010-Present
- American Geophysical Union (AGU), 2018-Present
- CloudNet Research Coordination Network 2015-Present
- Association of Southeastern Biologists, 2012-2014
- Society of Conservation Biology, 2011, 2012, 2014

REFERENCES

Gregory R. Goldsmith

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