

**DANIEL MATTHEW JOHNSON**  
Assistant Professor  
Forest, Rangeland and Fire Sciences  
University of Idaho  
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## **EDUCATION**

Ph.D. Plant Physiological Ecology (Biology Department), 2006, Wake Forest University,  
Advisor: William K. Smith  
M.S. Biochemistry/Molecular Biology (Forestry Department), 1999, North Carolina State University,  
Advisor: Ross S. Whetten  
B.S. Biochemistry, 1996, North Carolina State University

## **APPOINTMENTS**

Assistant Professor, 2014 – Present, University of Idaho, Moscow ID  
Research Scientist, 2011-2014, Duke University, Durham NC  
Assistant Professor, 2010 – 2011, Ohio University, Athens OH  
Postdoctoral Research Associate, 2007-2010, US Forest Service, Corvallis OR  
Courtesy Faculty Appointment, Department of Forest Ecosystems and Society, Oregon State  
University  
Visiting Assistant Professor, 2006-2007, Lenoir-Rhyne College, Hickory, NC

## **PUBLICATIONS**

Sparks AM, Kolden CA, Johnson DM, Talhelm AF, Yedinak KM, Smith AMS. 2017. Impacts of fire radiative flux on mature *Pinus ponderosa* growth and vulnerability to secondary mortality agents. *International Journal of Wildland Fire* (in press)

Smith AMS, Talhelm AF, Johnson DM, Sparks AM, Kolden CA, Yedinak KM, Apostol KG, Tinkham WT, Abatzoglou JT, Lutz JA, Davis AS, Pregitzer KS, Adams HD, Kremens RL. 2017. Effects of fire radiative energy density doses on *Pinus contorta* and *Larix occidentalis* seedling physiology and mortality *International Journal of Wildland Fire* (in press)

Sparks AM, Kolden CA, Talhelm AF, Smith A, Apostol K, Johnson DM, Boschetti L. 2016. Spectral indices accurately quantify changes in seedling physiology following fire: towards mechanistic assessments of carbon dynamics following wildfire. *Remote Sensing* 8:572, doi:10.3390/rs8070572.

Johnson DM, Wortemann R, McCulloh KA, Jordan-Meille L, Ward E, Warren JM, Palmroth S, Domec J-C. 2016. A test of the hydraulic vulnerability segmentation hypothesis in conifer and angiosperm tree species. *Tree Physiology* 36:983-993.

Polley HW, Johnson DM, Jackson RB. 2016. Canopy foliation and area as predictors of mortality risk from episodic drought for individual trees of Ashe juniper. *Plant Ecology* 217:1105-1114.

Gleason SM, Westoby M, Jansen S, Choat B, Brodribb TJ, Cochard H, Delzon S, Hacke UG, Jacobsen AL, Johnson DM, Lens F, Maherali H, Martínez-Vilalta J, Mayr S, McCulloh KA, Morris H, Nardini A, Plavcová L, Pratt RB, Schreiber SG, Zanne AE. 2016. Research priorities concerning the importance and evolution of a safety-efficiency tradeoff in xylem. *New Phytologist* 211:1156-1158.

Gleason SM, Westoby M, Jansen S, Choat B, Hacke UG, Pratt RB, Bhaskar R, Brodribb TJ, Bucci SJ, Cao K-F, Cochard H, Delzon S, Domec J-C, Fan Z-X, Field TS, Jacobsen AL, Johnson DM, Lens F, Maherali H, Martínez-Vilalta J, Mayr S, McCulloh KA, Mencuccini M, Mitchell PJ, Morris H, Nardini A, Pittermann J, Plavcova L, Schreiber SG, Sperry JS, Wright IJ, Zanne

- AE. 2016. Weak tradeoff between xylem safety and xylem-specific hydraulic efficiency across the world's woody plant species. *New Phytologist* 209:123-136.
- Sack L, Ball MC, Brodersen C, Davis SD, Des Marais DL, Donovan LA, Givnish TJ, Hacke UG, Huxman T, Jansen S, Jacobsen AL, Johnson DM, Koch GW, Maurel C, McCulloh KA, McDowell NG, McElrone A, Meinzer FC, Melcher PJ, North G, Pellegrini M, Pockman WT, Pratt RB, Sala A, Santiago LS, Savage JA, Scoffoni C, Sevanto S, Sperry J, Tyerman SD, Way D, Holbrook NM. 2016. Plant hydraulic transport as a central hub integrating plant and ecosystem function: meeting report for "Emerging Frontiers in Plant Hydraulics" (Washington, DC, May 2015). *Plant, Cell and Environment* 39:2085-2094.
- Smith AMS, Sparks AM, Kolden CA, Abatzaglou JT, Talhelm AF, Johnson DM, Boschetti L, Lutz JA, Apostol KG, Yedinak KM, Tinkham WT, Kremens RJ. 2016. Towards a new paradigm in fire severity research using dose-response experiments. *International Journal of Wildland Fire* 25:158-166.
- Berry ZC, Johnson DM, 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.
- Domec J-C, King JS, Ward E, Oishi AC, Palmroth S, Radecki A, Bell DM, Miao G, Gavazzi M, Johnson DM, McNulty SH, Sun G, Noormets A. 2015. Conversion of natural forests to managed forest plantations decreases tree resistance to prolonged droughts. *Forest Ecology and Management* 355:58-71.
- McCulloh KA, Johnson DM, Petitmermet J, McNellis B, Meinzer FC, Lachebruch B. 2015. A comparison of hydraulic architecture in three similarly-sized woody species differing in their maximum potential height. *Tree Physiology* 35:723-731.
- Johnson DM, Sherrard ME, Domec J-C and RB Jackson. 2014. Role of aquaporin activity in regulating deep and shallow root hydraulic conductance during extreme drought. *Trees* 28:1323-1331.
- Johnson DM, Brodersen CR, Reed M, Domec J-C and RB Jackson. 2014. Contrasting hydraulic architecture and function in deep and shallow roots of two co-occurring tree species from an arid habitat. *Annals of Botany* 113: 617-627.
- McCulloh KA, Johnson DM, Meinzer FC and DR Woodruff. 2014. The dynamic pipeline: Hydraulic capacitance and xylem hydraulic safety in four tall conifer species. *Plant, Cell and Environment* 37:1171-1183.
- Johnson DM, Domec J-C, Woodruff, DR, McCulloh KA and FC Meinzer. 2013. Contrasting hydraulic strategies in two tropical lianas and their host trees. *American Journal of Botany* 100:374-383.
- Meinzer, FC, Domec J-C, Johnson DM, McCulloh KA, and DR Woodruff. 2013. The dynamic pipeline: homeostatic mechanisms that maintain the integrity of xylem water transport from roots to leaves. *Acta Horticulturae*. 991: 1235-131.
- Johnson DM, McCulloh KA, Woodruff DR and FC Meinzer. 2012. Hydraulic safety margins and embolism reversal in stems and leaves: why are conifers and angiosperms so different? *Plant Science* 195:48-53.
- Johnson DM, McCulloh KA, Meinzer FC and Woodruff DR. 2012. Evidence for leaf xylem embolism as a primary factor in dehydration-induced declines in leaf hydraulic conductance. *Plant, Cell and Environment* 35:760-769.
- Domec J-C and Johnson DM. 2012. Homeostasis or disturbance of homeostasis in minimum leaf water potential explains the isohydric vs. anisohydric behavior of *Vitis vinifera* L. cultivars? *Tree Physiology* 32:245-248.
- McCulloh KA, Johnson DM, Meinzer FC, Voelker SL, Lachenbruch B, and J-C Domec. 2012. Hydraulic architecture of two species differing in wood density: opposing strategies in co-occurring tropical pioneer trees. *Plant, Cell and Environment* 35:116-125.
- Johnson DM, McCulloh KA, Meinzer FC, Woodruff DR, and DM Eissenstat. 2011. Hydraulic patterns and safety margins, from stem to stomata, in three eastern US tree species. *Tree Physiology* 31:659-668.

- McCulloh KA, Johnson DM, Meinzer FC and Lachenbruch B. 2011. An annual pattern of native embolism in small diameter branches of four tall conifer species. *American Journal of Botany* 98:1-9.
- Barnard, D, Meinzer FC, Lachenbruch B, McCulloh KA, Johnson DM and Woodruff DR. 2011. Climate-related trends in sapwood biophysical properties in two conifers: avoidance of hydraulic dysfunction through coordinated adjustments in xylem efficiency, safety and capacitance. *Plant, Cell and Environment* 34:643-654.
- Meinzer FC, Lachenbruch B, McCulloh KA, Woodruff DW and Johnson DM. 2010. Response to commentary by Petit and Anfodillo. *Oecologia* 165:275.
- Meinzer FC, Lachenbruch B, McCulloh KA, Woodruff DW and Johnson DM. 2010. The blind men and the elephant: the impact of context and scale in evaluating conflicts between plant hydraulic safety and efficiency. *Oecologia* 164:287-296.
- Johnson DM, Meinzer FC, Woodruff D and McCulloh KA. 2009. Leaf xylem embolism, detected acoustically and by cryo-SEM, corresponds to decreases in leaf hydraulic conductance in four evergreen species. *Plant, Cell and Environment* 32:828-836.
- Johnson DM, McCulloh KA, Woodruff D and Meinzer FC. 2009. Leaf hydraulic conductance, measured *in situ*, declines and recovers daily: leaf hydraulics, water potential and gas exchange in four temperate and three tropical tree species. *Tree Physiology* 29:879-887.
- Meinzer FC, Johnson DM, Lachenbruch B, McCulloh KA and Woodruff DW. 2009. Xylem hydraulic safety margins in woody plants: coordination of stomatal control of xylem tension with hydraulic capacitance. *Functional Ecology* 23:922-30.
- Smith WK, Germino MJ, Johnson DM and Reinhart KS. 2009. Effects of global climate change on high-altitude forests. *Botanical Review* 75:163-190.
- Reinhardt KS, Johnson DM and Smith WK. 2009. Age-class differences in Fraser fir (*Abies fraseri*) photosynthesis and water relations. *Canadian Journal of Forest Research* 39: 1-5.
- Hughes NM, Johnson DM, Akhalkatsi M, Abdaladze O, Reinhardt KS. 2009. Microsite and community characterization of *Betula litwinowii* seedling facilitation in the Caucasus Mountains, Republic of Georgia. *Arctic, Antarctic and Alpine Research* 41:112-118.
- Woodruff, D, Meinzer FC, Lachenbruch B and Johnson DM. 2009. Coordination of leaf structure and gas exchange along a height gradient in a tall conifer. *Tree Physiology* 29:261-272.
- Johnson DM and Smith WK. 2008. Cloud immersion alters microclimate, photosynthesis and water relations in *Rhododendron* and *Abies* seedlings, southern Appalachian Mountains, USA. *Tree Physiology* 28:385-392.
- Johnson DM and Smith WK. 2007. Stomatal versus non-stomatal limitations to carbon gain in timberline *Abies lasiocarpa* seedlings during prolonged drought. *Canadian Journal of Forest Research* 37:568-579.
- Johnson DM and Smith WK. 2006. Low clouds and cloud immersion enhance photosynthesis in understory species of a southern Appalachian spruce-fir forest. *American Journal of Botany* 93: 1625-1632.
- Johnson DM, Smith WK, Vogelmann TC and Brodersen CR. 2005. Leaf architecture, incident light direction, and mesophyll fluorescence profiles inside a broadleaf, conifer needle and cotyledon. *American Journal of Botany* 92:1425-1431.
- Johnson DM and Smith WK. 2005. Refugial forests of the Southern Appalachians: photosynthesis and survival in high altitude, current-year *Abies fraseri* seedlings. *Tree Physiology* 25:1379-1387.
- Johnson DM, Smith WK and Silman MR. 2005. Climate-independent paleoaltimetry using stomatal density in fossil leaves as a proxy for CO<sub>2</sub> partial pressure: COMMENT. *Geology* 33:e82.
- Johnson DM, Germino MJ and Smith WK. 2004. Abiotic factors limiting photosynthesis in seedlings of *Abies lasiocarpa* and *Picea engelmannii* at alpine timberline. *Tree Physiology* 24:377-386.
- Smith WK, Brodersen CR, Hancock TE and Johnson DM. 2004. Evaluating the effects of complex plant architecture on temperature and gas exchange using heat-sensitive liquid crystals and image analysis. *Functional Ecology* 18:148-153.
- Smith WK, Germino MJ, Hancock TE and Johnson DM. 2003. Another perspective for interpreting altitudinal limits of alpine timberlines. *Tree Physiology* 23:1101-1112.

### ***Book Chapters***

- Sack L, Scoffoni C, Johnson DM, Buckley TN and TJ Brodribb. 2015. The anatomical determinants of leaf hydraulic function. *In* U. Hacke [ed.] *Functional and Ecological Xylem Anatomy*, Springer.
- Johnson DM, KA McCulloh and Reinhardt KS. 2011. Physiological and structural changes during the earliest phases of tree growth. *In* Dawson TE, Meinzer FC and B Lachenbruch [eds.] *Size- and Age-Related Changes in Tree Structure and Function*, Springer.
- Smith WK and Johnson DM. 2009. Biophysical Effects of Altitude on Plant Gas Exchange. *In* *Biophysical Plant Ecology: Perspectives and Trends*. Academic Press, Springer, NY.
- Smith WK, Johnson DM and Reinhart KS. 2008. Alpine Forests. *In* *Encyclopedia of Ecology*. Elsevier Press, Amsterdam.

### ***Grants awarded***

- National Science Foundation, Division of Integrative Organismal Systems, 2017-2020, DM Johnson, CR Brodersen, TN Buckley “Conifer leaf anatomy determines hydraulic functioning.” \$775,327.
- National Science Foundation, Division of Integrative Organismal Systems 2016-2017, Meeting: “Reconciling methodological discrepancies in the measurement of hydraulic vulnerability to embolism.” DM Johnson. \$38,385. The Ecological Society of America Physiological Ecology section contributed an additional \$1,700 to the meeting.
- National Science Foundation, Division of Integrative Organismal Systems 2015-2016. DM Johnson, K McCulloh, J-C Domec. “RAPID: Collaborative Research: What are the Mechanisms of Tree Recovery after an Extreme Episodic Drought?” \$193,427.
- National Science Foundation, Division of Integrative and Organismal Systems 2012-2015. DM Johnson, K McCulloh, F Meinzer, D Woodruff and J-C Domec. “Collaborative Research: How do seedlings survive? Hydraulics, carbon acquisition and drought tolerance in the earliest phases of tree growth” \$762,657.
- U.S. Department of Agriculture, AFRI-Climate Change. 2012-2016. “Drought-induced mortality of trees: ecosystem changes under climate change.” RB Jackson, DM Johnson, J-C Domec, J Swenson and W Polley. \$749,385.
- National Science Foundation, Division of Integrative Systems, 2009-2013. K. McCulloh, DM Johnson F Meinzer and B Lachenbruch. “The plant hydraulic continuum from root to leaf: avoidance of catastrophic xylem failure under dynamic conditions.” \$549,000.
- Ohio University Research Council. 2011. “Measurement of hydraulic parameters in tree seedlings.” \$7,800.
- Ohio University Research Challenge Grant. 2011. \$5,000.
- National Science Foundation, Doctoral Dissertation Enhancement Award, Office of International Science and Engineering, 2005-2006. “Ecological facilitation by *Rhododendron caucasicum* extends the *Betula litwinowii* alpine treeline, Caucasus Mountains of Georgia.” \$26,000.
- Vecellio Research Grant, Wake Forest University, 2004: “Light absorption and chlorophyll distribution in different leaf types measured using chlorophyll fluorescence.” \$1,500.
- Richter Grant, Wake Forest University, 2003: “Carbon limitation in high-elevation conifer seedlings: implications for treeline stability with global climate change” \$2,000.

### **TEACHING**

#### ***Courses taught (Asterisk indicates a new course developed)***

Woody Plant Physiology (FOR 404/504) University of Idaho, Spring 2016

\*Treeline: Structure and Function (FOR502), Spring 2016, Co-taught with Lee Vierling, Jan Eitel, Kevin Griffin (Columbia U.) and Natalie Boelman (Columbia U.)

\*Dendrology (FOR 320) University of Idaho, Spring 2015, Fall 2015, Fall 2016

\*Current Literature in Plant Physiology and Ecology (FOR 551), University of Idaho (Fall 2014, Spring 2015, Fall 2015, Spring 2016, Fall 2016)

\*Plant Physiological Ecology (PBIO 426/526) Ohio University, Spring 2011

\*Issues of Scale in Ecology (PBIO 691) Ohio University, Winter 2010

Plant Ecology (PBIO209) Ohio University, Fall 2010

Woody Plant Physiology (co-taught with 3 other instructors; FES561) Oregon St. Univ – Fall 2009

\*Plant Hydraulic Architecture (FES/WSE 599) Oregon State University – Fall 2008

Environmental Science (SCI300), Lenoir-Rhyne College - Fall 2006, Spring 2007

Concepts of Biology (BIO110), Lenoir-Rhyne College - Fall 2006, Spring 2007

### ***Teaching training:***

NSF/Michigan State University FIRST (Faculty Institutes for Reforming Science Teaching) IV

Teaching Fellow 2009-2010 – Workshops on how to incorporate active learning methods into scientific courses.

### ***Laboratory courses taught:***

Dendrology (NCSU, FOR212)

Plant Physiological Ecology Lab (WFU, BIO328L)

Introductory Biology Lab (WFU, BIO111L)

Biology and the Human Condition Lab (WFU, BIO101L)

## **RECENT INVITED PRESENTATIONS**

Emerging Frontiers in Plant Hydraulics, Washington D.C., May 2015

U Idaho, FRFS Seminar Series, May 2015

University of Idaho, CNR, Water Resources Seminar, also broadcast to Pocatello, Boise, and Idaho Falls, October 7, 2014

The DeVlieg Signature Lecture Series – MOSS Visiting Scientist Program October 29-31 2014

University of Idaho, Student Section Society of American Foresters November 20, 2014

University of Idaho, College of Natural Resources. February 2014.

USDA-ARS, Water Management Research Unit. Fort Collins, Colorado. February 2014.

University of North Carolina – Wilmington, Department of Biology and Marine Biology. January 2014.

Idaho State University, Biology Department Seminar Series, September, 2013.

American Society of Plant Biology, Xylem Physiology Symposium, Providence, Rhode Island. July, 2013.

International Working Group on Plant Mortality, Bordeaux, France. June 2013.

Wake Forest University, Department of Biology, April 2013.

Washington State University, Department of Biological Sciences. January 2013.

Smithsonian Museum of Natural History, Washington D.C. April 2012.

University of Pittsburgh, Pymatuning Seminar Series. 2011.

## **SERVICE**

Co-Secretary of ESA Physiological Ecology Section (2016-2018)

Editorial Review Board member for Tree Physiology (2013-2016)

College of Natural Resources Committee Service – CNR Lab Space Committee – 2014 - 2015

College of Natural Resources Committee Service – Silviculture faculty position search – Fall 2014

Moscow ID, Community Committee Service – UI Arboretum Associates Board Member – 2014 – 2016

University of Idaho Scholarly and Creative Activity Committee - Spring 2016

College of Natural Resources Committee Service - Administrative Assistant II Job Search Committee - Spring 2016

Reviewer for multiple scientific journals including: Agricultural and Forest Meteorology, American Journal of Botany, Canadian Journal of Forest Research, Ecological Monographs, Ecology, Forest Ecology and Management, Functional Ecology, Functional Plant Biology, Journal of the Torrey Botanical Society, Journal of Visualized Experiments, New Phytologist, Oecologia, Plant, Cell and Environment, Plant Ecology and Diversity, Plant Physiology, Plant Physiology and Biochemistry, Plant Signaling and Behavior, Tree Physiology and Trees-Structure and Function.

Reviewer for DOE Terrestrial Ecosystem Science Program, NSF- Integrative and Organismal Systems (IOS) and Centers for Research Excellence in Science and Technology (CREST) Programs

Botanical Society of America, Graduate Awards Committee (2010-2013)

Contributor to PromethiusWiki: an online resource for methods in ecology and plant physiology