

Nathan Glen Phillips

Professor, Boston University, Department of Earth and Environment
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- EDUCATION** PhD, Duke University, School of the Environment 1997
BS, Physics, California State University, Sacramento 1989
- APPOINTMENTS** Professor, Boston University, Dept. of Earth/Environment, 2013-present
Director, Grid Hydrogen, LLC (2022 Startup)
Director, Boston University Earth House Living Learning Community, 2015-present
Consultant, California Senate Transportation and Housing Committee, 2013-14
Associate Chair, Boston University, Dept. of Earth/Environment, 2012-present
Associate Professor, Boston University, Dept. of Geography/Envt, Fall 2006-2012
Assistant Professor, Boston University, Dept. of Geography/Envt. Fall 2000-Fall '06
Director, Center for Energy and Environmental Studies, Boston University, 2009-12
- RESEARCH** Climate Science, Physiological Ecology, Global Change Biology, Natural Gas, Grid Hydrogen, Infrastructure Ecology.
- TEACHING** **Instruction: Graduate and undergraduate courses in Plant Physiological Ecology, Physical Principles of the Environment; Biogeography; Environmental Field Methods, Sustainable Energy.**
- GRANTS** **Principal Investigator, Energy Shift Boston.** \$10k, Sasaki Foundation, 2019-21
Principal investigator, NSF Coupled Natural-Human Systems Program.
"Infrastructure Ecology" \$484K 2016-19
Principal Investigator, California Council on Science and Technology. "Planning Grant for MA Legislative Science Fellowship. \$30k 2017.
Principal Investigator, Picarro, Inc. Mobile Methane Surveyor. 2013-14 (\$60.3k)
Principal Investigator, Barr Foundation/Conservation Law Foundation. Phase II Methane Research (\$45k)
Principal Investigator, Methane Inputs from Natural Gas Infrastructure in Greater Metropolitan Boston. Phase II. Environmental Defense Fund 2012-2013.
Total Award (multi-institutional): Total Award: \$301K; BU Award: \$90k
Principal Investigator, Methane Inputs from Natural Gas Infrastructure in Greater Metropolitan Boston. Phase I. Environmental Defense Fund 2012. Total Award (multi-institutional, administered through Duke Univ.): \$70K
Principal Investigator, Natural Gas: Ecology, Environment, Economics
Barr Foundation and Conservation Law Foundation 2011-2012. BU Award: \$66k
Principal Investigator, Metabolism of Boston, Urban Long Term Research Area
Exploratory Award (ULTRA-ex), NSF 2009-13 Total Award: \$290k, BU Award: \$209k
Principal investigator, ULTRA-ex/EPA Supplement, National Science Foundation., 2012-13 Total Award: \$88k, BU Award \$44k
Co-Principal investigator, Testing climatic, physiological and hydrological assumptions underpinning water yield from montane forests. Australian Research Council, 2010-2012 Total Award: AUD \$2.5M
US Principal investigator, Productivity of Eucalyptus in past and future climates – a novel approach to understanding environmental impacts on tree growth, Australian Research Council, 2008-2010 Total Award: AUD \$300k
US Principal investigator, Eucalypts and Climate Change. International Research Initiatives Scheme, University of Western Sydney, 2007-2008, Award: AUD \$40.2k
Co-Principal investigator, NSFGK-12 Graduate STEM Fellows in K-12 Education

GLACIER-Global Change Initiative-Education & Research, NSF, 2010-2015,
BU Award: \$2.8M

Co-Principal investigator, USDA, Northeastern States Research Cooperative. Effects of winter climate change on growing season sap flow and carbon exchange in the northern hardwood forest. 2009-12. BU Award: \$131,391.

Dissertation Research, Ecohydrology of Hemlock Woolly Adelgid. NSF Fellowship, 2004-2006. Michael Daley, PI, N. Phillips nominal PI.

Dissertation Research, Palms: A Model Hydraulic System. NSF EAPSI Fellows 2008. Heidi Renninger, PI, N. Phillips nominal PI.

Principal investigator, Environmental Data Acquisition and Communications Improvements at Sargent Center, New Hampshire. National Science Foundation (NSF), 2002-06; BU Award: \$116k

Principal investigator, Vegetation control of Ecohydrologic Processes. NSF, 2003-0 BU Award: \$338k

Principal investigator, Palms: a model system for investigating hydraulic costs of height. NSF, 2005-2009 BU Award: \$291k

Co-Principal investigator, NeTS - NOSS:Semantic Internetworking of Sensor Systems for Efficient In-Network Information Processing, NSF, 2005-06 BU: \$250k

ASSOCIATIONS **Member**, American Geophysical Union, American Association for the Advancement of Science
Executive Committee Member (2014-16), Council of Environmental Deans and Directors, National Council for Science and the Environment
Editorial Board, *Tree Physiology* 2009-2018.
Advisory Board Member and Scientist-in-Residence, Climate Culture -- Art, Action, Climate Change Initiative. Massachusetts College of Art and Design. 2012.
Faculty Fellow, Pardee Center for the Study of the Longer Range Future. 2012-13.

RESEARCH IMPACT:

Hirsch Index: 52 (Google Scholar, as of Nov 2022)

To normalize research impact by career stage, a related metric (m) of research impact is the H-index divided by scientific age (the number of years since first publication; Kelly & Jenions 2006, Trends in Ecology & Evolution 21:167-170). My m value is $53/26 \text{ yr} = 2.0$, ranking among leading researchers in the fields of Ecology and Evolutionary Biology (Kelly & Jenions 2006).

PUBLISHED OR IN-PRESS PEER-REVIEWED PUBLICATIONS (*Indicates advisee)

Buckley, S., Sparks, R., Cowdery, E., Stirling, F., Marsching, J., & Phillips, N. (2022). Enhancing crop growth in rooftop farms by repurposing CO₂ from human respiration inside buildings. *Frontiers in Sustainable Food Systems* <https://doi.org/10.3389/fsufs.2022.918027>

J Wright, R Ackley, S Gopal, N Phillips (2022) The BosWash Infrastructure Biome and Energy System Succession. *Infrastructures* 7:95. <https://doi.org/10.3390/infrastructures7070095>

DR Michanowicz, A Dayalu, CL Nordgaard, JJ Buonocore, MW Fairchild, R Ackley, JE Schiff, A Liu, NG Phillips, A Schulman, Z Magavi, JD Spengler. (2022) Home is where the pipeline ends: characterization of volatile organic compounds present in natural gas at the point of the residential end user. *Environmental science & technology* 56 (14), 10258-10268

JL Harrison, AB Reinmann, AS Maloney, N Phillips, SM Juice, AJ Webster (2020) Transpiration of dominant tree species varies in response to projected changes in climate: Implications for composition and water balance of temperate forest ecosystems. *Ecosystems* 23: 1598-1613

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JL Harrison, R Sanders-DeMott, AB Reinmann, PO Sorensen, NG Phillips, P Templer (2020) Growing-season warming and winter soil freeze/thaw cycles increase transpiration in a northern hardwood forest. *Ecology* 101 (11), e03173

T Keyes, G Ridge, M Klein, N Phillips, R Ackley, Y Yang (2020) An enhanced procedure for urban mobile methane leak detection. *Heliyon* 6 (10), e04876

Seeing the invisible: From imagined to virtual urban landscapes

Y Ma, J Wright, S Gopal, N Phillips
Cities 98, 102559 22 2020

Ward EJ, Oren R, Kim H, Kim D, Torngern P, Ewers BE, McCarthy HR, Oishi AC, Pataki DE, Palmroth S, Phillips NG, Schäfer KVR (2018) Evapotranspiration and water yield of a pine-broadleaf forest are not altered by long-term atmospheric [CO₂] enrichment under native or enhanced soil fertility. *Global Change Biology* 24:4841-4856.

Yang Y*, Saatchi SS, Xu L, Yu Y, Choi S, Phillips N, Kennedy R, Keller M, Knyazikhin Y, Myneni RB (2018) Post-drought decline of the Amazon carbon sink. *Nature communications* 9:3172.

Hendrick MF, Cleveland S, Phillips NG (2016) Unleakable carbon. *Climate Policy* 1-8.

Zhang Y, Liu Y, Fu J, Phillips N, Zhang M, Zhang F (2016) Bridging the "gap" in systematic conservation planning. *Journal for Nature Conservation* 31: 43-50.

Hendrick MF, Ackley R, Sanaie-Movahed B, Tang X, Phillips NG (2016) Fugitive methane emissions from leak-prone natural gas distribution infrastructure in urban environments. *Environmental Pollution* 213:710-716.

Gopal S, Tang X, Phillips N, Nomack M, Pasquarella V, Pitts J (2016) Characterizing urban landscapes using fuzzy sets. *Computers, Environment and Urban Systems* 57:212-223.

Zhang Y, Wang Y, Phillips N, Ma K, Li J, Wang W (2016) Integrated maps of biodiversity in the Qinling Mountains of China for expanding protected areas. *Biological Conservation* 210:64-71.

M Verma, MA Friedl, A Finzi, N Phillips (2016) Multi-criteria evaluation of the suitability of growth functions for modeling remotely sensed phenology. *Ecological Modelling* 323: 123-132.

Renninger HJ, Phillips NG (2016) Palm Physiology and Distribution in Response to Global Environmental Change. In: Goldstein G., Santiago L. (eds) Tropical Tree Physiology. Tree Physiology, vol 6. Springer, Cham

Gallagher ME, Down A, Ackley RC, Zhao K, Phillips N, Jackson RB (2015) Natural Gas Pipeline Replacement Programs Reduce Methane Leaks and Improve Consumer Safety. *Environmental Science & Technology Letters* 2:286-291.

Lewis JD, Phillips NG, Logan BA, Smith RA, Aranjuelo I, Clarke S, Offord CA, Frith A, Barbour M, Huxman T, Tissue DT (2015) Rising temperature may negate the stimulatory effect of rising CO₂ on growth and physiology of Wollemi pine (*Wollemia nobilis*) *Functional Plant Biology* 42:836-850.

Juice SM, Templer P, Phillips NG, Ellison AM, Pelini S (2016) Ecosystem warming increases sap flow rates of northern red oak trees. *Ecosphere* 7:1-17.

McKain K, Down A, Raciti SM, Budney J, Hutyra LR, Floerchinger C, Herndon S, Nehrkorn T, Zahniser M, Jackson RB, Phillips N, Wofsy SC (2015) Methane Emissions from Natural Gas Infrastructure and Use in the

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Urban Region of Boston, Massachusetts. *Proceedings of the National Academy of Sciences* 112:1941-1946.

Phillips N (2014) Toward a World-Class Passenger Rail System in California: Evaluating High-Speed Rail's Potential for Success. Senate Publications and Flags, Sacramento, CA. Publication No. 1565-S.

Phillips N (2014) SB 375: From Vision to Implementation. Senate Publications and Flags, Sacramento, CA. Publication No. 1570-S.

MJB Zeppel, JD Lewis, NG Phillips, DT Tissue. (2014) Consequences of nocturnal water loss: a synthesis of regulating factors and implications for capacitance, embolism and use in models. *Tree Physiology* 34:1047-1055

D Kim, R Oren, AC Oishi, CI Hsieh, N Phillips, KA Novick, PC Stoy. (2014) Sensitivity of stand transpiration to wind velocity in a mixed broadleaved deciduous forest. *Agricultural and Forest Meteorology* 187: 62-71.

RB Jackson, A Down, NG Phillips, RC Ackley, CW Cook, DL Plata, K Zhao. (2014) Natural gas pipeline leaks across Washington, DC. *Environmental Science & Technology* 48:2051-2058.

JD Lewis, RA Smith, O Ghannoum, BA Logan, NG Phillips, DT Tissue. (2013) Industrial-age changes in atmospheric [CO₂] and temperature differentially alter responses of faster-and slower-growing Eucalyptus seedlings to short-term drought. *Tree Physiology* 33: 475-488.

Howarth R, Shindell D, Santoro R, Ingraffea A, Phillips N, Townsend-Small A (2013) Methane Emissions from Natural Gas Systems. Background Paper Prepared for the National Climate Assessment, Reference number 2011-0003. (*United States Global Change Research Program*).

*Renninger H, Phillips N (2013) Response to Commentary by Tomlinson and Quinn. *American Journal of Botany* 100:465-466.

Phillips N, Ackley B, Crosson E, Down A, Hutyrá L, Brondfield M, Karr J, Zhao K, Jackson R (2013) Mapping urban methane pipeline leaks: methane leaks across Boston. *Environmental Pollution* 173:1-4.

Phillips N (2013) Untangling the Belowground Knot. (Peer-Reviewed Commentary) *Tree Physiology* 33:1-2.

*Renninger HJ, McCulloh K, Phillips N (2013) A comparison of the hydraulic efficiency of a palm species (*Iriartea deltoidea*) with other wood types. *Tree Physiology* 33:152-160.

Miller-Rushing A*, Primack R, Phillips N, Kaufmann R (2012) Effects of Warming Temperatures on Winning Times in the Boston Marathon. *PLoS One* 2012;7(9):e43579. doi: 10.1371/journal.pone.0043579. Epub 2012 Sep 26.

Logan B, Reblin J, Zonana D, Dunlavy R, Hricko C, Hall A, Schmiede S, Butschek R, Duran K, Emery RJN, Kurepin L, Phillips N, Tissue DT (2012) Impact of eastern dwarf mistletoe (*Arceuthobium pusillum*) on host white spruce (*Picea glauca*) development, growth and performance across multiple scales. *Physiologia Plantarum* DOI: 10.1111/j.1399-3054.2012.01681.x.

*Dillen SY, Op De Beeck M, Hufkens K, *Buonanuci M, Phillips N (2012) Seasonal patterns of foliar reflectance in relation to photosynthetic capacity in two co-occurring tree species, *Quercus rubra* and *Betula papyrifera*. *Agricultural and Forest Meteorology* 160:60-68.

*Renninger HJ, Phillips N (2012) "Secondary stem lengthening" in the palm *Iriartea deltoidea* (Arecaceae) provides an efficient and novel method for height growth in a tree form. *American Journal of Botany* 99:607-613.

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Phillips N, *Attard R, Ghannoum O, Lewis JD, Logan B, Tissue DT (2011) Impact of variable [CO₂] and temperature on water transport structure-function relationships in Eucalyptus. *Tree Physiology* 31:945-952.

*Renninger HJ, Phillips N (2011) Hydraulic properties of fronds from palms of varying height growing in rainforest and subtropical environments. *Oecologia* DOI: 10.1007/s00442-011-2038-5.

Scholz FG, Phillips N, Bucci SJ, Meinzer FC, Goldstein G (2011) Hydraulic Capacitance: Biophysics and Functional Significance of Internal Water Sources in Relation to Tree Size. (Chapter 13 in Meinzer FC, Lachenbruch B, Dawson T, eds.) Size- and Age-Related Changes in Tree Structure and Function. *Tree Physiology*, Vol. 4, 341-361, Springer-Verlag DOI: 10.1007/978-94-007-1242-3_13.

Billings S, Phillips N (2011) Forest Biogeochemistry and Drought. (Chapter 29 in Levina D, Carlyle-Moses D, Tanaka T, eds.) Forest Hydrology and Biogeochemistry: Synthesis of Past Research and Future Directions. Ecological Studies, Vol. 216, Springer-Verlag (ISBN 978-94-007-1362-8).

Lewis JD, Phillips NG, Logan BA, Hricko C, Tissue DT (2011) Leaf photosynthesis, respiration and stomatal conductance in six Eucalyptus species native to mesic and xeric environments growing in a common garden. *Tree Physiology* 31: 997-1006.

Zeppel MJB, Lewis JD, Medlyn B, Barton CVM, Duursma RA, Eamus D, Adams MA Phillips N, Ellsworth DS, Forster MA, Tissue DT (2011) Interactive effects of elevated CO₂ and drought on nocturnal water fluxes in Eucalyptus saligna. *Tree Physiology* 31: 932-944.

Hutyra L, *Raciti S, Phillips N, Munger W (2011) Exploring space-time variation in urban carbon metabolism. *UGEC Viewpoints*. 6:11-14.

Ghannoum O, Phillips N, Conroy J, Smith R, Attard R, Woodfield R, Logan B, Lewis J, Tissue D (2010) Exposure to pre-industrial, current and future atmospheric [CO₂] and temperature differentially affects growth and photosynthesis in Eucalyptus. *Global Change Biology* 16:303-319.

Ghannoum O, Phillips N, Sears M, Logan B, Lewis J, Conroy JP, Tissue D. (2010) Photosynthetic responses of two eucalypts to industrial-age changes in atmospheric [CO₂] and temperature. *Plant, Cell and Environment* 33:1671-1681.

Logan B, Hricko C, Lewis JD, Ghannoum O, Phillips N, Smith R, Conroy JP, Tissue D. (2010) Examination of pre-industrial and future [CO₂] reveals the temperature-dependent CO₂ sensitivity of light energy partitioning at PSII in eucalypts. *Functional Plant Biology* 37: 1041–1049.

Phillips N, Lewis J, Logan B, Tissue D. (2010) Inter- and Intra-specific variation in nocturnal water transport in Eucalyptus. *Tree Physiology* 30: 586-596.

*Renninger HJ, Phillips N, Salvucci GD. (2010) Wet versus Dry-season Transpiration in an Amazonian Rainforest Palm, *Iriarteia deltoidea*. *Biotropica*. 42:470-478

*Renninger HJ, Phillips N. (2010) Intrinsic and extrinsic hydraulic factors in varying sizes of two Amazonian palm species (*Iriarteia deltoidea* and *Mauritia flexuosa*) differing in development and growing environment. *American Journal of Botany* 97:1926-1936.

*Renninger HJ, Phillips N, Hodel DR. (2009) Comparative hydraulic and anatomic properties in palm trees (*Washingtonia robusta*) of varying heights: Implications for hydraulic limitation to increased height growth *Trees: Structure and Function* 23:911-921.

*Pettijohn JC, Salvucci GD, Phillips NG, *Daley M. (2009) Mechanisms of moisture stress in a mid-latitude temperature forest: implications for feedforward and feedback controls from an irrigation experiment,

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Ecological Modelling 220: 968-978.

Chu CR, Hsieh CI, Wu S-Y, Phillips NG (2009) Transient response of sap flow to wind speed. *Journal of Experimental Botany* 60:249–255.

Phillips N, Buckley TN, Tissue DT (2008) Capacity of old trees to respond to environmental change. *Journal of Integrative Plant Biology* 50:1355–1364.

Phillips N, Scholz FG, Bucci SJ, Goldstein G, Meinzer FC (2009) Using branch and basal trunk sap flow measurements to estimate whole-plant water capacitance: comment on Burgess and Dawson (2008). *Plant and Soil* 315:315-324.

*Daley MJ, Phillips N, *Pettijohn JC, Hadley J (2008) Hydraulic responses to environmental perturbations in *Tsuga canadensis* and *Betula lenta*. *Tree Physiology* 28: 1341-1348.

Hadley JL, Kuzeja PS, *Daley MJ, Phillips N, Mulcahy T, Singh S (2008) Water use and carbon exchange of red oak- and eastern hemlock-dominated forests in the northeastern USA: implications for ecosystem-level effects of hemlock woolly adelgid. *Tree Physiology* 28:615-627.

Sevanto S, Nikinmaa E, Riikonen A, *Daley MJ, *Pettijohn C, Mikkelsen TN, Phillips N, Holbrook NM (2008) Linking xylem diameter variations with sap flow measurements" *Plant and Soil* 305:77-90.

*Daley MJ, Phillips N, *Pettijohn JC, Hadley J (2007) Water use by eastern hemlock (*Tsuga canadensis*) and black birch (*Betula lenta*): implications of effects of the hemlock woolly adelgid. *Canadian Journal of Forest Research* 37: 2031-2040.

Ford CR, Vose JM, *Daley MJ, Phillips N (2007) Use of Water by Eastern hemlock: implications for systemic insecticide application. *Arboriculture and Urban Forestry* 33:421-427.

Cermak J, Kucera J, Bauerle W, Phillips N, Hinckley T (2007) Tree water storage and its diurnal dynamics related to sap flow and changes in stem volume in old-growth Douglas-fir trees. *Tree Physiology* 27:181–198.

Wang Y, Anderson BT, Phillips N, Kaufmann RK, Myneni RB (2006) Feedbacks of Vegetation on Summertime Climate Variability over the North American Grasslands. Part I: Statistical Analysis. *Earth Interactions*. *Earth Interactions* 10: Art. No. 17

*Daley M, Phillips N (2006) Interspecific variation in nighttime transpiration and stomatal conductance in a mixed New England deciduous forest. *Tree Physiology* 26:411–419

Ryan M, Phillips N, Bond B (2006) The hydraulic limitation hypothesis revisited. *Plant, Cell, Env* 29:367-381

Chuang Y, Oren R, Bertozzi AL, Phillips N, Katul GG (2006). The porous media model for the hydraulic system of a tree: from sap flux data to transpiration rate. *Ecological Modeling* 191:447-468.

Phillips N, Salvucci GD, *Pettijohn JC (2005) Comments on "On the Construction and Calibration of Dual-Probe Heat Capacity Sensors". *Soil Science Society of America Journal* 69:1666.

Phillips N, Oren R, Licata J, Linder S (2004) Time series diagnosis of tree hydraulic characteristics. *Tree Physiology* 24:879–890.

Unsworth M, Phillips N, Link T, Bond B, Paw U, KT, Harmon M. (2004) Components and controls on water flux in an old growth Douglas-fir forest. *Ecosystems* 7:468-481.

Winner WE, Berry J, Bond BJ, Cooper C, Hinckley TM, Ehleringer J, Fessenden J, Lamb B, McCarthy S,

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McDowell N, Phillips N, Thomas SC, Williams M. (2004) Canopy carbon gain and water use: Analysis of old growth conifers in the Pacific Northwest. *Ecosystems*. 7:482–497.

Moore GW, Bond BJ, Jones JA, Phillips N, Meinzer FC. (2004) Structural and compositional controls on transpiration between 40- and 450- year-old riparian forests in Western Oregon, USA. *Tree Physiology* 24:481-491.

Phillips N, McDowell N, Bond B, Ryan M. (2003) Hydraulic constraints to carbon gain in Oregon White oak trees. *Functional Ecology* 17:832-840.

Phillips N, Ryan M, Bond B, McDowell N, Hinckley T, Cermak J. (2003) Reliance on stored water increases with tree size in three species in the Pacific Northwest. *Tree Physiology* 23:237-245.

Graham EA, Mulkey SS, Kitajima K, Phillips N, Wright SJ (2003) Cloud cover limits net CO₂ uptake and growth of a rainforest tree during tropical rainy seasons. *Proceedings of the National Academy of Sciences* 100:572-576.

Brooks JR, Schulte PJ, Bond BJ, Coulombe R, Domec J-C, Hinckley TM, McDowell N, Phillips N (2003) Does foliage on the same branch compete for the same water? Experiments on Douglas-fir trees. *Trees* 17: 101-108.

McDowell N, Phillips N, Lunch C, Bond BJ, Ryan MG. (2002) Hydraulic limitation and compensation in large, old Douglas-fir. *Tree Physiology* 22:763-774.

Bond, BJ, Jones J, Moore G, Phillips N, Post D, McDonnell J. (2002). The zone of vegetation influence on baseflow revealed by diel patterns of streamflow and vegetation water use in a headwater basin. *Hydrological Processes* 16:1671-1677.

McDowell N, Barnard H, Bond BJ, Hinckley TM, Hubbard R, Ishii H, Kostner B, Meinzer FC, Marshall JD, Magnani F, Phillips N, Ryan MG, Whitehead D. (2002) The relationship between tree height and leaf area: sapwood area ratio. *Oecologia* 132:12-20.

Phillips N, Bond B, Ryan M, McDowell N. (2002) Canopy and hydraulic conductance in young, mature, and old-growth Douglas-fir *Tree Physiology* 22:205-211.

Chen J, Falk M, Euskirchen E, Kyaw Tha Paw U, Suchanek T, Ustin S, Bond BJ, Phillips N, Brosofske KD. (2002) Biophysical Controls of Carbon Flows in Three Successional Douglas-fir Stands Based upon Eddy-Covariance Measurements *Tree Physiology* 22:169-177.

Oren R, Ellsworth DS, Johnsen KH, Phillips N, Ewers BE, Maier C, Schafer KVR, McCarthy H, Hendrey G, McNulty SG, Katul GG. (2001) Soil fertility limits carbon sequestration by forest ecosystems in a CO₂-enriched atmosphere. *Nature* 411:469-472.

Phillips N, Bond BJ, Ryan MG (2001) Interaction of hydraulic properties and gas exchange in tree crowns in a Panamanian moist forest. *Trees: Structure and Function*, 15(2):123-130.

Phillips N, Bergh J, Oren R, Linder S. (2001) Effects of Nutrition and Soil Water Availability on Water Use in a Norway Spruce Forest. *Tree Physiology* 21: 851-860.

Phillips N, Oren R (2001) Intra- and inter-annual variation in transpiration of a pine forest in relation to environmental variability and canopy development. *Ecological Applications* 11(2):385-396.

Ewers B, Oren R, Phillips N, Stromgren M, Linder S. (2001) Effects of water and nutrient availability on mean canopy stomatal conductance response to environmental variation in *Picea abies* and *Pinus taeda* *Tree Physiology* 21:841-850.

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Oren R, Sperry JS, Ewers BE, Pataki DE, Phillips N, Megonigal JP (2001) Sensitivity of mean stomatal conductance to vapor pressure deficit in a flooded *Taxodium distichum* L. forest: hydraulic and non-hydraulic effects. *Oecologia* 126:21-29.

Oren R., Sperry J.S., Katul G.G., Pataki D.E., Ewers B.E., Phillips N., & Schäfer K.V.R. (1999) Survey and synthesis of intra- and interspecific variation in stomatal sensitivity to vapour pressure deficit. *Plant, Cell and Environment* 22:1515-1526.

Phillips N, Oren R, Zimmermann R, Wright SJ (1999) Temporal patterns of water flux in trees and lianas in a Panamanian moist forest. *Trees: Structure and Function* 14:116-123.

Oren R, Phillips N, Ewers B, Pataki D, Megonigal J (1999) Sap flux-scaled transpiration responses to light, vapor pressure deficit, and leaf area reduction in a flooded *Taxodium distichum* forest. *Tree Physiology* 19:337-347.

Phillips N, Bond BJ (1999) A micro-power precision amplifier for converting the output of light sensors to a voltage readable by miniature data loggers. *Tree Physiology* 19:547-549.

Oren R, Phillips N, Katul G, Ewers B, Pataki D (1998) Scaling xylem sap flux and soil water balance, and calculating variance: a method for partitioning water flux in forests. *Annales des Sciences Forestières* 55: 191-216.

Phillips N, Oren R (1998) A comparison of daily representations of canopy conductance based on two conditional time averaging methods. *Annales des Sciences Forestières* 55:217-235.

Oren R, Ewers B, Phillips N, Todd P, Katul G (1998) Water balance delineates the soil layer in which moisture affects canopy conductance. *Ecological Applications* 8:990-1002.

Pataki D, Oren R, Phillips N (1998) Responses of sap flux and stomatal conductance of *Pinus taeda* L. trees to stepwise reductions in leaf area. *Journal of Experimental Botany* 49: 871-878.

Katul G, Oren R, Ellsworth D, Hsieh C, Phillips N (1997) A Lagrangian dispersion model for predicting CO₂ sources, sinks and fluxes in a uniform loblolly pine stand. *Journal of Geophysical Research* 102(D8):9309-9321.

Phillips N, Nagchaudhuri A, Oren R, Katul G (1997) Time constant for water transport in loblolly pine trees estimated from time series of evaporative demand and stem sapflow. *Trees: Structure and Function* 11(7): 412-419.

Phillips N, Oren R, Zimmermann R (1996) Radial trends in xylem sap flow in non-, diffuse- and ring-porous species. *Plant, Cell and Environment* 19:983-990.

Katul G, Hsieh C-I, Oren R, Ellsworth D, Phillips N (1996) Latent and Sensible Heat Flux Predictions from Uniform Forests using Surface Renewal and Flux Variance Methods. *Boundary Layer Meteorology* 80:249-282.

Ellsworth D, Oren R, Huang C, Phillips N, Hendry G (1995) Leaf and canopy responses to elevated CO₂ in a pine forest using a free-air CO₂ enrichment technique. *Oecologia* 104:139-146.

EDITOR OF SPECIAL JOURNAL ISSUES

Tissue D, Ryan M, Phillips N, Whitehead D, eds (2011) Canopy Processes in a Changing Climate. *Tree Physiology*, Vol. 31 (Sept. 2011).

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Whitehead D, Phillips N, Lewis JD, Hollinger D, Ryan M, eds (2008) Regional Forest Responses to Environmental Change. *Tree Physiology*, Vol. 28 (April, 2008). (Based on an IUFRO Canopy Processes Traveling Workshop organized by Phillips)

Phillips N, Barbour M, Dawson T, eds (2007) Casting light on Nocturnal Stomatal Conductance. *Tree Physiology*, Vol. 27. (April, 2007).

Meinzer FC, Goldstein G, Phillips N, eds. (2004) Water Uptake and Transport in Trees. *Tree Physiology*, Vol. 24.

OTHER PUBLICATIONS:

Phillips N, Renninger H, Tissue D, Friedl M (2009) Forest tree development, phenology, and climate change: an under-explored research intersection. *AsiaFlux Newsletter*. 28:18-22

Phillips N (2006). Regional Forest Responses to Environmental Change. Scientific Program and Abstracts for 2006 International Union of Forest Research Organizations, Canopy Processes Working Group. October 6-13, 2006. On-line at: <http://people.bu.edu/nathan/schedulea.pdf>

Phillips N Earth's Entropy (2004) *Science* (Letter to Editor) 306:1681-1683.

Pence DV, Reyes JN, Jr., Phillips N, Wu Q, Groome JT (2004). Multiscale transport apparatus and methods. United States Patent No. US 6,688,381 B2. (Awarded Feb. 10, 2004).

ORGANIZER/MODERATOR OF ORGANIZED ORAL SESSIONS AT INTERNATIONAL MEETINGS

Phillips N, Jackson R, Howarth R, Cleveland S (2012) Natural Gas: Ecology, Energy, Environment. Ecological Society of America Annual Meeting, Portland Oregon (Aug 6, 2012) Principal organizer and session moderator.

Phillips N, Friedl M, Hutryra L, Pincetl S (2011) Extending Urban Metabolism. American Geophysical Union Fall Meeting, San Francisco. Dec. 5-9. Principal organizer and session moderator.

Phillips N (2011) Natural Gas: Energy, Economics, Environment. Special Workshop at Boston University, convening national scientific, industry, policy, and legislative leaders. Trustee Ballroom, Boston University, Sept. 23, 2011. Principal organizer and moderator.

Phillips N (2009) "The Role of Canopy Ecophysiology in Sustainability Science" at the 5th International Canopy Conference, Bangalore, India, Oct 25-31, 2009. (personally recruited 7 speakers, raised support funds, and organized session)

Phillips N (2006). Regional Forest Responses to Environmental Change. Scientific Program and Abstracts for 2006 International Union of Forest Research Organizations, Canopy Processes Working Group. October 6-13, 2006. On-line at: <http://people.bu.edu/nathan/schedulea.pdf>

Phillips N, Barbour M, Dawson T. (2005) "Casting Light on Nocturnal Stomatal Conductance", Ecological Society of America, Montreal.

PUBLISHED ABSTRACTS PRESENTED AT PROFESSIONAL MEETINGS (FIRST AUTHOR ONLY)

Phillips N et al. (2012) The Boston Methane Project. American Geophysical Union. December 9, 2012.

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Phillips N et al. (2012) Natural Gas: Ecology, Environment, Economics. Principal organizer and moderator, Organized Oral Session, Ecological Society of America, Annual Meeting, Portland, Oregon Aug. 6, 2012

Phillips N et al. (2012) Urban natural gas leaks. Invited talk, 22nd V.M. Goldschmidt Conference, Oral Session on Environmental impacts of shale gas production and methane emission. Geochemical Society. June 28, 2012.

Phillips N et al. (2012) Urban natural gas leaks. American Meteorological Society. 30th AMS Conference on Agricultural and Forest Meteorology, May 31, 2012

Phillips N et al. (2012) Urban natural gas leaks. Invited talk, Duke University/National Science Foundation Workshop on Hydraulic Fracturing, Jan 9-13, 2012.

Phillips N et al. (2011) Boston's Urban Metabolism. Ecological Society of America, August, 2011, Austin TX

Phillips N (2010) Water Sustainability: Lessons from the 2010 Boston Water Emergency. American Geophysical Union, Dec. 2010, San Francisco, CA.

Phillips N, Newell J, Friedl M, Hutyra L, Gopal S (2009) Satellite-Based Estimation of Urban Vegetation Carbon Exchange. Published Abstract from the 5th International Canopy Conference, Bangalore, Oct 25-31, 2009.

Phillips N, Barbour M, Tissue D, Tyerman S, Payton P, Buckley T (April 4, 2008) Do Aquaporins Fractionate Water Isotopes?. Talk presented "Stable Isotopes as tools to explore CO₂ and water exchange of plants, soils and ecosystems" Symposium, Sydney University

Phillips N, Linder S, Oren R (October 2006) Nocturnal Transpiration in Norway Spruce Trees is Consistent with the Nutrient Supply Hypothesis. (Poster presentation at the International Union of Forest Research Organizations Canopy Processes Workshop, Oct. 6-13, 2006).

Phillips N, Barbour M (August 2005). Casting light on nocturnal stomatal and canopy conductance. Ecological Society of America 2005 meeting, Montreal, Canada. (Organized oral session organized by Phillips and Barbour).

Phillips N, Daley M (May 2005). Defining an eco-hydrograph. Invited talk at American Geophysical Union meeting, organized session entitled "Measurement and Monitoring Methods in Ecohydrology", New Orleans, LA.

Phillips N, Daley M (February 2005) Dynamic coupling of stomata and tree hydraulics. 16th Annual Long Term Ecological Research Symposium and National Institutes for Global Environmental Change Meeting at Harvard Forest, Petersham, Massachusetts.

Phillips N, Daley M, Friedl M, Salvucci GD (August, 2004). Coupling stomatal and hydraulic dynamics to predict whole tree water flux. Ecological Society of America 2004 meeting, Portland, Oregon.

Phillips N, Daley M (February 2004) Vegetation control of Ecohydrologic Processes. Long Term Ecological Research Symposium and National Institutes for Global Environmental Change Meeting at Harvard Forest, Petersham, Massachusetts.

Phillips N (June 2002) Assessment of techniques for characterizing whole-tree water use using sap flux sensors. 3rd International Canopy Conference, co-sponsored by the Smithsonian Institution and the Queensland Government, Cairns, Australia (abstract published on-line).

Phillips N, Bond B, McDowell N, Ryan MG, Schauer A (July 2001) Testing for hydraulic limitation in

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drought tolerant Oregon white oak. International Union of Forestry Research Organizations, "Linking the Complexity of Forest Canopies to Ecosystem and Landscape Function", traveling workshop.

Phillips N, Bond B, Ryan M, McDowell N, Schauer A (August 2000) Hydraulic resistance and capacitance as a function of tree size. Ecological Society of America, Annual Meeting, Snow Bird, Utah

Phillips N, Bond B, McDowell N, Schauer A, Ryan M. (Invited talk, May 2000) Can storage in tall trees overcome hydraulic limitations to forest transpiration? American Geophysical Union, Spring Meeting, Washington, DC.

Phillips, N, Bond B, Ryan M, McDowell N, Paw U, KT, Chen J (1999) Scaling water use of 20, 40 and 500 year old Douglas-fir trees to the forest level and comparison with eddy covariance estimates. American Geophysical Union, Fall Meeting, San Francisco, CA.

Phillips N, Bond B, Ryan M, McDowell N, Watrud E (1999) Do hydraulic constraints in tall trees affect crown gas exchange? Ecological Society of America, Annual Meeting, Spokane, WA.

Phillips N, Oren R (1997) A comparison of daily representations of canopy conductance based on two conditional time-averaging methods. American Geophysical Union Bulletin, Spring 1997, Baltimore, MD.

Phillips N, Oren R (1997) A comparison of daily representations of canopy conductance based on two conditional time-averaging methods, and the dependence of daily conductance on environmental factors. Ecological Society of America, Annual Meeting, Albuquerque, NM.

Phillips N, Oren R, Pataki D (1996). Effects of elevated CO₂ on transpiration and growth in a pine forest. Ecological Society of America Bulletin, Summer 1996.

Phillips N, Oren R (1995). Scaling radial sap flow measurements in loblolly pine to the stand level. American Geophysical Union Bulletin, Spring 1995, Baltimore, MD. p S126.

Phillips N, Oren R (1995). Radial trends in xylem sap flux density in loblolly pine, sweetgum and white oak. Ecological Society of America Bulletin, Summer 1995.

INVITED SEMINARS

Keynote Speaker, Salem State University, Darwin Festival, 2015 (February 12, 2015). "What can cities learn from trees?" Sponsored by the Charles Albert Read Trust.

Invited Seminar, Clark University, Geography Department Colloquim (February 5, 2015). "Beyond fossil-fueled urban metabolism".

Keynote Speaker, Newton Green Decade Coalition, Environmental Speaker Series (Jan. 30, 2012). "The Infrastructural Ecology of Natural Gas Distribution Systems".

Keynote Speaker, Customer Appreciation Night, Picarro, Inc., "Natural Gas Infrastructure Ecology" San Francisco, Dec. 5, 2011.

Keynote Speaker, International Conference on Forest Technologies to Mitigate Climate Change, Seoul National University, "Capacity of old trees and forests to sequester carbon". Oct 5, 2011.

Association of Women in Science, Massachusetts Chapter (Apr. 19, 2011). "Sustainable, Resilient Urban Infrastructure".

Fenway Environmental Forum (Apr. 13, 2011). "Boston's Urban Metabolism."

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Boston University Alumni Association, Discoveries Seminar Series (Apr. 28, 2011) "We are What We Eat: Issues of Food Supply."

University of New Hampshire, Natural Resources and Earth Systems Science Program (Dec 9, 2010) "Urban Metabolism of Boston"

Boston University Academy (Oct 7, 2010) "Building Resiliency into our Urban Metabolic and Knowledge Networks"

Hubbard Brook Long Term Ecological Research Station (July 9, 2010) "Transpiration in Ecohydrology Studies: The Breathing of Watersheds"

Tufts University (May 17, 2010) "Harmonized Knowledge and Resource Distribution Networks"

University of Massachusetts, Boston (April 7, 2010) "Urban Metabolism of Boston"

Taiwan National University (October 8, 2009). "Urban Metabolism of Boston: Integrating carbon exchanges of human and natural systems"

University of Antwerp (August 24, 2009). Nocturnal water transport in trees.

International Institute for Geo-Information Science and Earth Observation (August 17, 2009) Urban Metabolism of Boston. Enschede, Netherlands.

Boston University (September 30, 2008). Off the grid, and feeding the grid, at BU. Special Seminar for the BU Energy Club.

University of New South Wales (March 20, 2008) Do trees sleep at night? School of Biological, Earth and Environmental Sciences.

Sydney University (May 16, 2008). Nocturnal transpiration in Eucalyptus trees. School of Biological Sciences

University of Western Sydney (February 13, 2008) Nocturnal transpiration in Eucalyptus trees. UWS Staff Research Futures Forum.

Arnold Arboretum, Boston, MA (June 4, 2007). "How Tall? Trees and Their Limits."

Wind River Canopy Crane Research Facility (June 2007) "Tree to Forest Water Flux: From Observation to Manipulation".

Fordham University, Department of Biological Sciences (April 2006). "Vegetation Control of Ecohydrologic Processes"

Los Alamos National Laboratory, Environmental Earth Sciences Division (February 2006). "New Directions in Eco-Hydrology: Nano-scale Biological Control of Ecosystem Scale Water Fluxes"

Harvard University, Herbarium Seminar Series (April 2005). "Vegetation Hydrodynamics: from trees to watersheds".

Montclair State University, College of Science Seminar Series (April 2005) "Problems of and solutions to transporting water in tall trees"

Ohio University, Athens, Ohio, Biology Department Seminar Series (February 2005). "Problems of and

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solutions to transporting water in tall trees: new developments”

California State University, Sacramento, Physics Department Alumni Honors Seminar (November 2004). “What determines the maximum height of trees? Physical and Biological Factors”

University of Georgia, Athens (May, 2004). “Hydraulic consequences of tree size: recent findings and potential impacts of a changing climate”.

LandCare Research, Lincoln New Zealand (March, 2004) “From hydraulic to hydrologic control of water flux in trees and forests: a review”. Special Seminar supported by US-New Zealand Bi-lateral International Science and Technology (ISAT) funds.

Texas Tech University, Lubbock (February 2003) “Tradeoffs of water for carbon in tall trees”

Harvard University, Harvard Forest (October 2002) “Status of the Hydraulic Limitation Hypothesis after Five Years.

Third International Canopy Conference, Cairns, Australia (June, 2002; co-sponsored by the Smithsonian Institute and the Queensland Government). Methods, pitfalls and mathematical modeling of tree water transport.

Wood’s Hole Marine Biological Laboratory (January 2001) “How water controls tree size and form”

Harvard University, Harvard Forest (May 2001) “Can we predict the maximum height of trees?”

University of Massachusetts, Amherst (November 2000) “The carbon-water tradeoff in tall statured vegetation”

Boston University, Geography Dept. (February 2000) “Biophysical controls on land-atmosphere exchanges: from stomate to landscape”

Furman University, Biology Dept. (January 2000) “Investigating tradeoffs in resource use by plants, forests and the biosphere”

UNIVERSITY AND COMMUNITY SERVICE

Boston University, University Council Committee on Undergraduate Academic Programs and Policies (2014-present)

Search Committee Member (at Mayor’s request), Newton, MA Chief of Police open position (January – February, 2013).

Chair, Faculty Search Committee in Human Dimensions of Global Change Senior Position, Dept. of Earth and Environment, Boston University (November 2012 – April 2013)

Chair, Living-Learning Program, Boston University (at request of Associate Provost for Undergraduate Education). March – May, 2013, Boston University.

Faculty Advisor, Boston University Organic Gardening Club (2011-present)

Principal Organizer, First and Second Annual Boston Carbon Days, Copley Square, Sept. 15, 2011 and Sept. 15, 2010. Principal outreach of Boston Urban Metabolism and Sustainable Neighborhood Lab projects.

Boston University Smart Neighborhood Living Laboratory (SNLL), Core Member. Outreach/research in

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Boston's Back Bay Community.

Oral Presentation to the Neighborhood Association of the Back Bay (July 21, 2010) "Harmonizing knowledge and resource distribution networks"

Panel Discussion Member, Slow Food Boston, 3rd Annual Film Festival (Jan. 17, 2010), Boston, MA

Principal organizer and coordinator: International Union of Forest Research Organizations, Canopy Processes Workshop, Oct. 6-13, 2006, Northeastern USA (http://people.bu.edu/nathan/iufro_info.htm)

Upward Bound and Boston Public Schools Collaborative. Mentored four high school students who will be first in their families to attend college. 2003-2004

Boston University Academy. Mentored two high school students on senior honor's theses. 2004-2005

Boston University's Learning Resource Network (LERNet), GK12 Project STAMP (National Science Foundation Funding). Designed environmental education activities for middle-school students at Sargent Center for Outdoor Education (to be implemented Summer 2005), and Global Positioning System workshop for middle school teachers at Harvard University's Arnold Arboretum (completed spring, 2004).

Member of Boston University, Biology Department Environmental Ecologist Faculty Search Committee, 2004.

Committee Member, Boston University Energy Sustainability Committee

Vice President, BikeNewton.org, Newton, MA bike safety advocacy group

Editorial Board, Tree Physiology (International, peer-reviewed journal)

Member, Livable Streets Alliance, MassBike

HONORS, AWARDS, AND SPECIAL RECOGNITION

Green Decade Newton Environmental Leadership Award, 2014.

Clean Water Action, Massachusetts Science Hero Award, 2013

Mass Energy Consumers Alliance Energy Leadership Award, 2013

Natural Gas and Sustainable Energy Research and Outreach featured in the New York Times, Nature, NPR Morning Edition, New Scientist, Boston Magazine, Greater Boston, the Boston Globe, WBZ-TV and Fox25 News (Boston Affiliates), "Living on Earth" National Public Radio radio show, Science Daily, Boston Chronicle (Channel 5), CFRB (1010AM) Toronto news radio.

Honored Inventor, Office of Technology Transfer, Oregon State University (Award Ceremony Scheduled for June 2005). For: Multiscale transport apparatus and methods. United States Patent No. US 6,688,381 B2. (Awarded Feb. 10, 2004).

Outstanding Alumni Award, California State University, Sacramento, Physics Department 2004-2005.