

GAIUS R. SHAVER

The Ecosystems Center
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Education

Ph.D., Botany, Duke University, 1976. Thesis: Ecology of roots and rhizomes in graminoid plants of the Alaskan coastal tundra.

M.A., Biological Sciences, Stanford University, 1972 (B.S. and M.A. awarded coterminally). Thesis: The significance of leaf angle and absorptance in the distribution of selected species of Arctostaphylos (Ericaceae).

B.S. with departmental honors, Biological Sciences, Stanford University, 1972

Professional Positions

San Diego State University, San Diego, California

Research Associate, June 1976 - January 1979, Instructor in Ecology, 1977-1978

University of Alaska, Fairbanks

Research Associate to Principal Research Associate, 1976 - present

The Ecosystems Center, Marine Biological Laboratory, Woods Hole, Massachusetts

Assistant Scientist, 1979-1984, Associate Scientist, 1984-1990, Senior Scientist, 1990-present

National Science Foundation, Washington, DC (on leave from The Ecosystems Center)

Program Director, Division of Environmental Biology, 1996-1998

Brown University, Providence, Rhode Island

Professor (MBL), Department of Ecology and Evolutionary Biology, 2004-present

Honors and Awards

ISI "Highly Cited" researcher in Ecology and Environment, 2003-present

Ecological Society of America, Vice President for Science, 2004-2007

National Science Foundation, Director's Award for Collaborative Integration, 1997

Fellow, Ecological Society of America, 2012

Service on National Committees and Institutional Boards (past 5 years)

2008-present International Study of Arctic Change, Scientific Steering Group

2011-present NAS Polar Research Board

2012-present DOE Biological and Environmental Research Advisory Committee

Service on MBL Committees

1989-1991 Year-Round Scientists' Council, Marine Biological Laboratory

1991-1992 Audit Committee, Marine Biological Laboratory

Editorial Boards

1992-1995 Editorial Board, Ecology and Ecological Monographs

1999-2014 Editorial Board, ECOSYSTEMS

2000-2002 Editorial Board, Plant and Soil

Teaching

San Diego State University: Ecology, Physiological Ecology

Marine Biological Laboratory: Ecology, Ecology and Management of Resources, Interns in Science,
Semester in Environmental Sciences

Brown University: Ecosystem Ecology

Advisory Committee/External Examiner for graduate students at Boston Univ., Duke Univ., Univ. of Toronto, Univ. of Göteborg, Australian National Univ., Umeå Univ., Uppsala Univ., Lund Univ., Univ. of Durham, Univ. of British Columbia, and Brown Univ.

Research Experiences for Undergraduates: Summer research mentor for 1-4 students per year since 1993.

Funding (past 5 Years)

NSF-OPP-0856853, "Fire in the Arctic Landscape: Impacts, Interactions and Links to Global and Regional Environmental Change"; 1 month/year; \$872,715 (Principal Investigator)

NSF-OPP-0807639, "Canopy Structure and CO₂ Exchange of Arctic Vegetation: Key Constraints on Change and Predictability of the Arctic System"; 3 months/year; \$997,782 (Principal Investigator)

NSF-OPP-0096523: "Primary production in arctic ecosystems: Interacting mechanisms of adjustment to climate change". April 2001-March 2004; 3 months/yr; \$520,000 (Principal Investigator)

NSF-DEB-0087046: "LTER Cross Site 2000: Interactions between climate and nutrient cycling in arctic and subarctic tundras" January 2001-June 2003; 1,1, 0 Month/yr; \$300,000 (Principal Investigator)

NSF-EF-1065587, Fire in Northern Alaska: Effect of a changing disturbance regime on a regional macrosystem"; 5/15/2011-4/30/2014; \$1,969,640 (Principal Investigator)

NSF-DEB-1026843, "Arctic LTER: Climate Change and Changing Disturbance Regimes in Arctic Landscapes"; 3/1/2011-11/30/2016; 2 months/year; \$5,960,000 (Principal Investigator)

NSF-OPP-1107707, "Collaborative Research on Carbon, Water, and Energy Balance of the Arctic Landscape at Flagship Observatories in Alaska and Siberia," 9/1/2011-8/31/2014; \$838,234 (Principal Investigator)

Publications (Last 5 years; 198 total published since 1975)

Euskirchen, E.S., M.S. Bret-Harte, G.J. Scott, C. Edgar and **G.R. Shaver**. 2012. Seasonal patterns of carbon and water fluxes in three representative ecosystems in the northern foothills of the Brooks Range, Alaska. *Ecosphere* 3(1):4, <http://dx.doi.org/10.1890/ES11-00202.1>.

Elmendorf, S.C., **G.R. Shaver**, et al. 2012. Plot-scale evidence of tundra vegetation change and links to recent summer warming. *Nature Climate Change* 2:453-457, doi:10.1038/nclimate1465.

Knapp, A.K., M.D. Smith, S.E. Hobbie, S.L. Collins, T.J. Fahey, G.J.A. Hansen, D.A. Landis, K.J. La Pierre, J.M. Melillo, T.R. Seastedt, **G.R. Shaver** and J.R. Webster. 2012. Past, present and future roles of long-term experiments in the LTER Network. *BioScience* 62:377-389.

Barrett, K., A.V. Rocha, M.J. van de Weg and **G.R. Shaver**. 2012. Vegetation shifts observed in arctic tundra 17 years after fire. *Remote Sensing Letters* 8:729-736, doi:10.1080/2150704X.2012.676741.

Lang, S., H. Cornelissen, G. **Shaver**, M. Ahrens, T. Callaghan, U. Molau, C. ter Braak, A. Hölzer and R. Aerts. 2012. Arctic warming on two continents has consistent negative effects on lichen diversity and mixed effects on bryophyte diversity. *Global Change Biology* 18:1096-1107.

Bennington, C., N. Fetcher, M.C. Vavrek, **G.R. Shaver**, K. Cummings and J.B. McGraw. 2012. Home Site advantage in two long-lived arctic plant species: Results from two thirty-year reciprocal transplant studies. *Journal of Ecology* 100:841-851.

Cahoon, S.M.P., P.F. Sullivan, **G.R. Shaver**, J.M. Welker and E. Post. 2012. Interactions among shrub cover and the soil microclimate may determine future arctic carbon budgets. *Ecology Letters*, doi:10.1111/j.12461-0248.2012.01865.x.

Street, L., **G.R. Shaver**, E. Rastetter, M.T. van Wijk, B. Kaye and M. Williams. 2012. Incident radiation and the allocation of nitrogen within Arctic plant canopies: implications for predicting gross primary productivity. *Global Change Biology* 18:2838-2852.

Gough, L., J.C. Moore, **G.R. Shaver**, R.T. Simpson and D.R. Johnson. 2012. Above- and belowground responses of arctic tundra ecosystems to altered soil nutrients and mammalian herbivory. *Ecology* 93:1683-1694.

- Rocha, A.V., M.M. Loranty, P.E. Higuera, M.C. Mack, F.-S. Hu, B.M. Jones, A.L. Breen, E.B. Rastetter, S.J. Goetz and **G.R. Shaver**. 2012. The footprint of Alaskan tundra fires during the past half-century: implications for surface properties and radiative forcing. *Environmental Research Letters* 7:044039, doi:10.1088/1748-9326/7/4/044039.
- Brzostek, E.R., J.M. Blair, J.S. Dukes, S.D. Frey, S.E. Hobbie, J.M. Melillo, R.J. Mitchell, E. Pendall, P.B. Reich, **G.R. Shaver**, A. Stefanski, M.G. Tjoekler and A.C. Finzi. 2012. The response of amino acid cycling to global change across multiple biomes: Feedbacks on soil nitrogen availability. *Global Change Biology* 18(8):2617-2625.
- van de Weg, M.J., N. Fetcher and **G. Shaver**. 2012. Response of dark respiration to temperature in *Eriophorum vaginatum* from a 30-year-old transplant experiment in Alaska. *Plant Ecology and Diversity*, doi:10.1080/17550874.2012.72961.
- Heskel, M., H. Greaves, A. Kornfeld, L. Gough, O.K. Atkin, M.H. Turnbull, **G. Shaver** and K.L. Griffin. 2013. Differential physiological responses to environmental change promote woody shrub expansion. *Ecology and Evolution*, doi: 10.1002/ece3.525.
- Sistla, S.A., J.C. Moore, R. Simpson, L. Gough, **G.R. Shaver** and J.P. Schimel. 2013. Twenty years of Arctic tundra warming restructures plant and soil communities without changing soil carbon storage. *Nature* 497:615-618.
- Shaver, G.R.**, E.B. Rastetter, V. Salmon, L.E. Street, M.J. van de Weg, A. Rocha, M.T. van Wijk and M. Williams. 2013. Pan-Arctic modeling of net ecosystem exchange of CO₂. *Philosophical Transactions of the Royal Society B* 368:20120485, doi:10.1098/rstb.2012.0485.
- Bret-Harte, M.S., M.C. Mack, **G.R. Shaver**, D.C. Huebner, M. Johnston, C.A. Mojica, M.C. Pizano and J.A. Reiskind. 2013. The response of arctic vegetation and soils following the Anaktuvuk River fire of 2007. *Philosophical Transactions of the Royal Society B* 368:20120490, doi:10.1098/rstb.2012.0490.
- Oberbauer, S.F. S.C. Elmendorf, T. Troxler, **G. Shaver**, et al. 2013. Phenological responses of tundra plants to background climate warming tested using the International Tundra Experiment (ITEX). *Philosophical Transactions of the Royal Society B* 368:20120481, doi:10.1098/rstb.2012.0481.
- Van de Weg, M.J., **G.R. Shaver** and V.G. Salmon. 2013. The contrasting effects of long term vs short term N addition on foliar CO₂ exchange parameters of two common Arctic species. *Plant Ecology* doi: 10.1007/s11258-013-0250-6.
- Yano, Y, **G.R. Shaver**, E.B. Rastetter, A.E. Giblin and J.A. Laundre. 2013. Nitrogen pool distribution in arctic tundra soils: effects of soil age, fertilization, and warming. *Oecologia* 173:1575-1586.
- Hobara, S., K. Koba, A.E. Noriharu, A.E. Giblin, K. Kushida and **G.R. Shaver**. 2013. Geochemical influences of substrate histories and phosphorus fertilization on solubility of soil organic carbon in arctic tundra ecosystems. *Soil Science Society of America Journal* 77:473-481, doi:10.2136/sssaj2012.0199.
- Schaedel, C., E.A.G. Schuur, R. Bracho, B. Eberling, C. Knoblauch, H. Lee, Y. Luo, **G.R. Shaver** and M.R. Turetsky. 2013. Circumpolar assessment of permafrost C quality and its vulnerability over time using long-term incubation data with deconvolution analysis. *Global Change Biology* 20:641-652, doi:10.1111/gcb.12417.
- Williams, M., E.B. Rastetter, L. van der Pol and G.R. Shaver. 2014. Arctic canopy photosynthetic efficiency enhanced under diffuse light, linked to a reduction in the fraction of the canopy in deep shade. *New Phytologist*, doi:10.1111/nph.12750.
- Heskel, M.A., H.E. Greaves, M.H. Turnbull, O.S. O'Sullivan, **G.R. Shaver**, K.L. Griffin and O.K. Atkin. 2014. Thermal acclimation of shoot respiration in an Arctic woody plant species subjected to 22 years of warming and altered nutrient supply. *Global Change Biology* 20:2618-2630, doi:10.1111/gcb.12544.
- DeMarco, J., M.C. Mack, M.S. Bret-Harte, M. Burton and **G.R. Shaver**. 2014. Plant and ecosystem response to long term experimental warming and nutrient additions in tall deciduous shrub tundra. *Ecosphere* 5(6):72, <http://dx.doi.org/10.1890/ES13-00281.1>.

- Souther, S., N. Fetcher, Z. Fowler, **G.R. Shaver** and J.B. McGraw. 2014. Ecotypic variation in photosynthesis and growth of *Eriophorum vaginatum* L. along a latitudinal gradient in the Arctic tundra. *Botany* 92:551-561, <http://dx.doi.org/10.1139/cjb-2013-0320>.
- Chandler, J.L., J.B. McGraw, C. Bennington, **G.R. Shaver**, M.C. Vavrek and N. Fetcher. 2014. Tiller population dynamics of reciprocally-transplanted *Eriophorum vaginatum* L. ecotypes in a changing climate. *Population Ecology*, doi:10.1007/s10144-014-0459-9.
- Shaver, G.**, J. Laundre, M.S. Bret-Harte, F.S. Chapin, III, A. Giblin, L. Gough, S. Hobbie, G. Kling, M.C. Mack, J. Moore, K. Nadelhoffer, E. Rastetter and J. Schimel. 2014. Terrestrial ecosystems. Pages 90-142. In: J.E. Hobbie and G.W. Kling, (eds.), *A Changing Arctic: Ecological Consequences of Climate Change for Tundra, Streams, and Lakes*. Oxford University Press, Oxford.
- McGraw, J. B., J.B. Turner, S. Souther, C. C. Bennington, M. C. Vavrek, **G. R. Shaver**, and N. Fetcher. 2014. Northward displacement of optimal climate conditions for ecotypes of *Eriophorum*. *Global Change Biology* 21: 3827-3835.
- Jiang, Y., A.V. Rocha, J.A. O'Donnell, J.A. Drysdale, E.B. Rastetter, **G.R. Shaver** and Q. Zhuang. 2015. Contrasting soil thermal responses to fire in Alaskan tundra and boreal forest. *Journal of Geophysical Research-Earth Surface*, doi:10.1002/2014JF003180.
- Kushida, K., S. Hobara, S. Tsuyuzaki, Y. Kim, M. Watanabe, Y. Setiawan, K. Harada, G. R. Shaver, and M. Fukuda. 2015. Spectral indices for remote sensing of phytomass, deciduous shrubs, and productivity in Alaskan arctic tundra. *International Journal of Remote Sensing* 36:4344-4362.
- Jiang, Y, EB Rastetter, AV Rocha, AR Pearce, BL Kwiatkowski, and **GR Shaver**. 2015. Carbon-Nutrient interactions during the early recovery of tundra after fire. *Ecological Applications* 25:1640-1652.
- De Baets, S., Lewis, R., Steinberg, N., van de Weg, M. J. , Meersmans, J., Quine, T.A., **Shaver, G.R.**, Hartley, I.P. 2016. Fire, nutrient and temperature sensitivity of soil organic carbon decomposition in permafrost. *Soil Biology and Biochemistry* 99:108-116
- Schädel, Christina, Martin Bader, Edward Schuur, Christina Biasi, Rosvel Bracho, Petr Capek, Sarah De Baets, Katerina Diakova, Jessica Ernakovich, Cristian Estop-Aragones, David Graham, Iain Hartley, Colleen Iversen, Evan Kane, Christian Knoblauch, Massimo Lupascu, Pertti Martikainen, Susan Natali, Richard Norby, Jonathan O'Donnell, Taniya Roy Chowdhury, Hana Santruckova, **Gaius Shaver**, Victoria Sloan, Claire Treat, Merritt Turetsky, Mark Waldrop, and Kimberly Wickland. 2016. Potential carbon emissions dominated by carbon dioxide from thawed permafrost soils. *Nature Climate Change*, accepted. [Paper #NCLIM-15060842C]
- Shaver, G.R.** 2014. LTER on Ice: My life with the ARC LTER. In: M. Willig and L. Walker, Eds. *Long Term Ecological Research: Changing the Nature of Scientists*. Oxford Univ Press, Oxford. In press.
- Hobbie, J.E., **G.R. Shaver**, E.B. Rastetter, J.E. Cherry, S.J. Goetz, K.C. Guay, W.A. Gould, G.W. Kling. 2016. Multiple ecosystem responses to climate change at a long-term research site in Arctic Alaska. *Ambio*, accepted.
- Jiang, Y., E. B. Rastetter, **G.R. Shaver**, A.V. Rocha, Q. Zhuang, B. L. Kwiatkowski. 2015 Long-term changes in tundra C balance following wildfire and climate change. *Ecological Applications*, accepted
- Gough, Laura, Neil D. Bettez, Karie A. Slavik, William B. Bowden, Anne E. Giblin, George W. Kling, James A. Laundre, **Gaius R. Shaver**. 2016. Effects of Long-Term Nutrient Additions on Arctic Tundra, Stream, and Lake Ecosystems: Beyond NPP. *Oecologia*, accepted.