

MICHAEL G. RYAN

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RESEARCH TOPICS

Carbon cycling in forest ecosystems, including 1) changes in tree physiology and ecosystem processes with tree age; 2) carbon allocation and the effects of climate change on carbon allocation and productivity; 3) plant respiration and the link between plant respiration and productivity; and 4) ecosystem respiration, soil carbon and nitrogen interactions, decomposition of soil carbon. Whole tree physiology, including the coordination of water loss and carbon uptake.

POSITIONS

Rocky Mountain Research Station, USDA, Fort Collins, CO. *Research Forest Ecologist*, 1990-present.
Department of Forest Sciences and Graduate Degree Program in Ecology, Colorado State University, Fort Collins, CO. *Affiliate Faculty*, 1990-present.

The Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA. *Postdoctoral Research Associate*, 1988-1990.

Rocky Mountain Forest and Range Experiment Station. *Biometrician*, 1979-1986.

EDUCATION

Oregon State University	PhD	1988	Department of Forest Science.
Northern Arizona University	MS	1978	School of Forestry
University of Pittsburgh	BS	1975	Department of Biology.

SELECTED RESEARCH GRANTS

Understanding interannual NEE variability in a tropical rain forest using constrained estimates of carbon exchange (Oberbauer, DB Clark, Ryan, DA Clark). **National Science Foundation**, \$707,000, 2003-2007.

Why does forest growth decline with stand age? An experimental test of carbon acquisition and allocation over stand development (Fownes, Binkley, Ryan). **National Science Foundation**, \$1,390,000, 1993-2001.

Is Productivity of old forests limited by tree hydraulic conductance (Yoder and Ryan), **USDA NRICGP**, \$590,000, 1997-2001.

Identifying the mechanism for reduced photosynthetic performance in old trees (Ryan and Yoder), **USDA NRICGP**, \$100,000, 1994-1997.

Autotrophic Respiration in Boreal Ecosystems, **NASA**, \$250,000, 1993-1997.

HONORS

South Santiam Fellowship, OSU, 1986; Hoener Fellowship, OSU, 1986-1987; Northern Arizona University Distinguished Alumni Award, 1996; Graduate Degree Program in Ecology, Outstanding Faculty Contribution to Ecology, 1997; Hayward Fellowship, Landcare Research (New Zealand), 1998.

STUDENT COMMITTEES

PhD co-advisor: Neal Scott, Robert M. Hubbard, Jose-Luis Stape; PhD committee: Sigrid Resh, Jason Kaye; MS advisor: Holly Barnard; MS committee: Ute Reisenkonig Olson, Michael Bashkin; Post-doctoral fellows: Emil Cienciala, Christian Giardina and Randy Senock (with Binkley, Fownes), and Nathan Phillips (with Bond).

PROFESSIONAL SERVICE

Chair, IUFRO Canopy Processes Working Group; Editor for *Tree Physiology* and *Canadian Journal of Forest Research*, Editorial Review Board, *Plant, Cell and Environment*; Panel Member for USDA NRI, DOE; Terrestrial Ecology Team Leader, US-Canada BOREAS Project, (1993-1997).

SELECTED PUBLICATIONS (80 total, 68 refereed journal articles, 4 refereed book chapters)

- Ryan MG**, D Binkley, JH Fownes, CP Giardina, RS Senock. An experimental test of the causes of forest growth decline with stand age. *Ecological Monographs*, In Press (12/03).
- Litton CM, **MG Ryan**, and DH Knight. Effects of tree density and stand age on carbon allocation patterns in a postfire lodgepole pine ecosystem. In Press. *Ecological Applications* (6/03).
- Giardina CP **MG Ryan**, D Binkley JH Fownes. Primary production and carbon allocation in relation to nutrient supply in an experimental tropical forest. 2003. *Global Change Biology* 9:1438-1450.
- Barnard HR, and **MG Ryan**. 2003. A test of the hydraulic limitation hypothesis in fast-growing *Eucalyptus saligna*. *Plant, Cell and Environment* 26:1235-1245.
- Litton CM, **MG Ryan**, DH Knight, and PD Stahl. 2003. Soil-surface CO₂ efflux and microbial biomass in relation to tree density thirteen years after a stand replacing fire in a lodgepole pine ecosystem. 2003. *Global Change Biology* 9:680-696.
- Phillips NG, **MG Ryan**, BJ Bond, NG McDowell, TM Hinckley, and J. Čermák. 2003. Reliance on stored water increases with tree size in three species in the Pacific Northwest. *Tree Physiology* 23: 237-245.
- Ryan MG**. 2002. Canopy processes research. *Tree Physiology* 22: 1035-1043.
- McDowell NG, N Phillips, C Lurch, BJ Bond, **MG Ryan**. 2002. An investigation of hydraulic limitation and compensation in large, old Douglas-fir trees. *Tree Physiology* 22:763-774.
- Giardina CP and **MG Ryan**. 2002. Total belowground carbon allocation in a fast growing Eucalyptus plantation estimated using a carbon balance approach. *Ecosystems* 5: 487-499.
- Hubbard RM, BJ Bond, RS Senock, and **MG Ryan**. 2002. The effect of branch height on leaf gas exchange, branch hydraulic conductance and branch sap flux in open grown ponderosa pine. *Tree Physiology* 22: 575-581.
- Vose JM and **MG Ryan**. 2002. Seasonal respiration of foliage, fine roots, and woody tissues in relation to growth, tissue N content, and photosynthesis. *Global Change Biology* 8:182-193.
- Binkley D, JL Stape, **MG Ryan**, HR Barnard, and JH Fownes. 2002. Age-related decline in forest ecosystem growth: an individual-tree, stand-structure hypothesis. *Ecosystems*. 5: 58-67.
- Phillips N, BJ Bond, NG McDowell, and **MG Ryan**. 2002. Canopy and hydraulic conductance in young, mature and old Douglas-fir trees. *Tree Physiology* 22: 205–211.
- Williams M, BJ Bond, and **MG Ryan**. 2001. Evaluating different soil and plant hydraulic constraints on tree function using a model and water flux data from ponderosa pine. *Plant, Cell and Environment* 24: 679-690.
- Giardina CP, **MG Ryan**, RM Hubbard, and D Binkley. 2001. Tree species and soil textural controls on carbon and nitrogen mineralization rates. *Soil Science Society of America Journal* 65:1272-1279.
- Hubbard, RM, **MG Ryan**, V Stiller, and JS Sperry. 2001. Stomatal conductance and photosynthesis vary linearly with plant hydraulic conductance in ponderosa pine. *Plant, Cell and Environment*, 24: 113-121.
- Giardina, CP and **MG Ryan**. 2000. Evidence that temperature does not influence the decomposition of organic carbon in forest mineral soils. *Nature* 404: 858-861.
- Ryan, MG**, BJ Bond, BE Law, RM Hubbard, D Woodruff, E Cienciala, and J Kucera. 2000. Transpiration and whole-tree conductance in ponderosa pine trees of different heights. *Oecologia*. 124: 553-560.
- Hubbard, RM, BJ Bond, and **MG Ryan**. 1999. Evidence that hydraulic conductance limits photosynthesis in old *Pinus ponderosa* trees. *Tree Physiology* 19: 165-172.
- Law, BE, **MG Ryan**, and PM Anthoni. 1999. Seasonal and annual respiration of a ponderosa pine ecosystem. *Global Change Biology* 5: 169-182.

- Ryan, MG**, D Binkley, and JH Fownes. 1997. Age-related decline in forest productivity: pattern and process. *Advances in Ecological Research* 27: 213-262.
- Ryan, MG** and BJ Yoder 1997. Hydraulic limits to tree height and tree growth. *Bioscience* 47: 235-242.
- Margolis, HA, and **MG Ryan**. 1997. A physiological basis for biosphere—atmosphere interactions in the boreal forest: an overview. *Tree Physiology* 17:491-499.
- Ryan, MG**, MB Lavigne, and ST Gower. 1997. Annual carbon cost of autotrophic respiration in boreal forest ecosystems in relation to species and climate. *Journal of Geophysical Research* 102(D24): 28871-28884.
- Lavigne, MB, **MG Ryan** et al. 1997. Comparing nocturnal eddy covariance measurements to estimates of ecosystem respiration made by scaling chamber measurements. *Journal of Geophysical Research* 102(D24): 28977-28986.
- Lavigne, MB and **MG Ryan**. 1997. Growth and maintenance respiration rates of aspen, black spruce and jack pine stems at northern and southern BOREAS sites. *Tree Physiology* 17:543-551.
- Ryan, MG**, RM Hubbard, S Pongracic, RJ Raison, and RE McMurtrie. 1996. Foliage, fine-root, woody-tissue and stand respiration in *Pinus radiata* in relation to nutrient content. *Tree Physiology* 16: 33-343.
- Ryan, MG**, RE McMurtrie, GI Ågren, Hunt, ER, Jr., JD Aber, AD Friend, EB Rastetter, and WJ Pulliam. 1996. Comparing models of ecosystem function for coniferous forests. II. Predictions of response to changes in atmospheric CO₂ and climate. Pages 363-387 in AI Breymeyer, DO Hall, GI Ågren, and JM Melillo, editors, *Global Change: Effects on Coniferous Forests and Grasslands* (SCOPE), John Wiley and Sons.
- Ryan, MG**. 1995. Foliar maintenance respiration of subalpine and boreal trees and shrubs in relation to nitrogen content. *Plant, Cell and Environment* 18: 765-772.
- Ryan, MG**, ST Gower, RM Hubbard, RH Waring, HL Gholz, WP Cropper, and SW Running. 1995. Stem maintenance respiration of four conifers in contrasting climates. *Oecologia* 101: 133-140.
- Ryan, MG**, RM Hubbard, DL Clark, and RL Sanford, Jr. 1994. Woody tissue respiration for *Simarouba amara* and *Minquartia guianensis*, two tropical wet forest trees with different growth habits. *Oecologia* 100: 213-220.
- Ryan, MG**, S Linder, J Vose, and RM Hubbard. 1994. Dark respiration in pines. *Ecological Bulletins* (Stockholm), 43: 50-63.
- Ryan, MG**, and RH Waring. 1992. Stem maintenance and stand development in a subalpine lodgepole pine forest. *Ecology* 73: 2100-2108.
- Ryan, MG**. 1991. A simple method for estimating gross carbon budgets for vegetation in forest ecosystems. *Tree Physiology* 9: 255-266.
- Ryan, MG**. 1991. The effects of climate change on plant respiration. *Ecological Applications* 1: 157-167.