

TANIA SCHOENNAGEL

Department of Geography
260 UCB, University of Colorado
Boulder, Colorado 80309-0260 USA
Phone: 303.818.5166 Fax: 303.492.7501, Email: tschoe@colorado.edu
<http://spot.colorado.edu/~schoenna>

My research addresses the causes and consequences of western forest disturbances, primarily wildfire and insect outbreaks, through an integration of field studies, dendrochronology, GIS and modeling. As a forest landscape ecologist, I conduct research at multiple spatial and temporal scales to examine: (1) disturbance dynamics and successional patterns, (2) ecological effects of past climate variability and future climate change, and (3) implications of forest management policy and changing land use on ecological patterns and processes.

EDUCATION

- University of Wisconsin-Madison.** Madison, Wisconsin.
2003 Ph.D. Botany and Zoology, Advisors: Monica G. Turner and Donald M. Waller.
1997 M.S. Conservation Biology and Sustainable Development, an interdisciplinary program within the Institute for Environmental Studies.
1995 M.S. Geography.
- Dartmouth College.** Hanover, New Hampshire.
1990 B.A. History.

POSITIONS

- 2009- **Research Scientist and Adjunct Assistant Professor.** Institute of Arctic and Alpine Research (INSTAAR) and Dept. of Geography, University of Colorado-Boulder.
- 2006-2008 **David H. Smith Postdoctoral Fellow.** Dept. of Geography, University of Colorado-Boulder.
Fire Risk and Forest Restoration in the Wildland-Urban Interface of the Colorado Front Range.
Spatial assessment of fuel treatments across the western US.
- 2005-2006 **Research Associate.** Dept. of Geography, University of Colorado-Boulder.
Climatic variation and disturbance interactions in subalpine Rocky Mountain forests.
- 2003-2005 **NSF Postdoctoral Fellow.** Dept. of Geography, University of Colorado-Boulder.
Regional and local influences on climatically sensitive disturbance in the Rocky Mountains.

- 2001 **Instructor.** Dept. of Botany, University of Wisconsin-Madison.
Landscape Interpretation: a field course in historical ecology.
- 1998-2002 **Graduate Research Environmental Fellow.** Depts. of Botany, Zoology, University of Wisconsin-Madison.
The influence of fire interval and climate on successional patterns in Yellowstone National Park.
- 1993-1999 **Teaching Assistant.** Dept. of Botany, University of Wisconsin-Madison.
Ten semesters of introductory and upper-level lab and field classes: General Botany, Principles of Plant Structure, Dendrology, Physical Systems of the Environment, Environmental Conservation.
- 1997 **Research Ecologist.** USDA Rocky Mountain Fire Sciences Research Lab.
Evaluated effects of thinning and prescribed fire on forest structure and understory composition.
- 1996 **Research Ecologist.** USDA Forest Service, Leavenworth, WA.
Assessed the effect of post-fire aerial seeding of non-native grasses on native understory communities.

RESEARCH GRANTS and FELLOWSHIPS

- 2010-2011 **Wilburforce Foundation**, Conservation Science Program. *Fire-mitigation treatments and wildfire.* Co-PI, \$45,000.
- 2008-2011 **National Science Foundation**, Ecological Biology Program, *Collaborative Research: Wildfire and Mountain Pine Beetle Outbreaks in Subalpine Forests: Cross-scale Interactions Under Varying Climate.* Co-PI, \$352,000.
- 2007-2008 **Wilburforce Foundation**, Conservation Science Program, *Spatial assessment of fuel treatments across the western US.* PI, \$54,000.
- 2006-2009 **National Science Foundation**, Geography Program, *Fire Risk and Forest Restoration in the Wildland-Urban Interface of the Colorado Front Range.* Co-PI, \$235,000.
- 2006-2008 **David H. Smith Conservation Research Fellowship**, Society for Conservation Biology, *Fire Mitigation and Forest Restoration Opportunities in the Wildland-Urban Interface of the Colorado Front Range.* PI, \$140,000.
- 2003-2006 **National Science Foundation**, *Climatic variation and disturbance interactions in subalpine Rocky Mountain forests.* Co-Investigator, \$300,000.

- 2003-2005 **National Science Foundation**, Biological Informatics Postdoctoral Research Program, *Regional and local influences on climatically sensitive disturbance in the Rocky Mountains*. PI, \$100,000.
- 1999-2002 **DOE Global Change Education Program**, Graduate Research Environmental Fellowship, *Climatically altered fire regimes on successional patterns in Yellowstone National Park*. \$54,000.

AWARDS

- 2000 **Excellence in Teaching Award**, University of Wisconsin Graduate School.
- 1997 **Distinguished Master's Thesis Award**, University of Wisconsin-Madison. Divisional Winner in the Biological Sciences and Institutional Nominee for the Midwestern Association of Graduate Schools.
- 1990 **International Research Award**, Dartmouth College Dickey Endowment.

PUBLICATIONS

In review

Schoennagel, T., C.R. Nelson. *In review*. Restoration relevance of recent National Fire Plan treatments in forests of the Western US. *Frontiers in Ecology and Environment*.

Peer-reviewed

Keith, R.P., T.T. Veblen, T. Schoennagel, R.L. Sherriff. 2009. Understory vegetation indicates historic fire regimes in ponderosa pine-dominated ecosystems in the Colorado Front Range. *Journal of Vegetation Science*. In press.

Schoennagel, T., C.R. Nelson, D.M. Theobald, G. Carnwath, T.B. Chapman. 2009. Implementation of National Fire Plan fuel treatments near the wildland-urban interface in the western U.S. *Proceedings of the National Academy of Sciences*. 106 (26): 10706-10711.

Platt, R.V., T. Schoennagel. 2009. An object-oriented approach to assessing changes in tree cover in the Colorado Front Range 1938-1999. *Forest Ecology and Management*. 258: 1342-1349.

Krasnow, K., T. Schoennagel, T.T. Veblen. 2009. Forest fuel mapping and validation of LANDFIRE fuel maps in Boulder County, Colorado. *Forest Ecology and Management*. 257: 1603-1612.

- Schoennagel, T., E.A. Smithwick, M.G. Turner. 2008. Landscape heterogeneity following large fires: Insights from Yellowstone National Park, USA. Invited Paper for Special Issue on Large Fires. *International Journal of Wildland Fire*. 17: 742-753.
- Nelson, C.R., T. Schoennagel, and E. Gregory. 2008. Opportunities for academic training in the science and practice of restoration within the United States and Canada. *Restoration Ecology*. 16(2): 125-230.
- Schoennagel, T., T.T. Veblen, D. Kulakowski, and A. Holz. 2007. Multidecadal climate variability and interactions among Pacific and Atlantic sea surface temperature anomalies affect subalpine fire occurrence, western Colorado (USA). *Ecology* 88(11): 2891-2902.
- DellaSala, D., J. Karr, T. Schoennagel, D. Perry, R. Noss, D. Lindenmayer, R. Beschta, R. Hutto, M. Swanson, and J. Evans. 2006. Post-disturbance logging debate ignores many issues. *Science* 314: 51-52.
- Noss, R. F., J. F. Franklin, W. L. Baker, T. Schoennagel, and P. B. Moyle. 2006. Managing fire-prone forests in the western United States. *Frontiers in Ecology and the Environment* 8(3): 481-487.
- Schoennagel, T., M.G. Turner, D. M. Kashian, and A. Fall. 2006. Influence of fire regimes on lodgepole pine stand age and density across the Yellowstone National Park (USA) landscape. *Landscape Ecology* 21:1281–1296.
- Schoennagel, T., T.T. Veblen, W.H. Romme, J.S. Sibold, E.R. Cook. 2005. Annual (ENSO) and decadal (PDO) climatic teleconnections affecting drought-induced fire occurrence in Rocky Mountain subalpine forests. *Ecological Applications* 15(6): 2000-2014.
- Schoennagel, T., T.T. Veblen, W.H. Romme. 2004. The interaction of fire, fuels and climate across Rocky Mountain forests. *BioScience* 54(7) 661-676.
- Schoennagel, T., D.M. Waller, M.G. Turner, W.H. Romme. 2004. The influence of fire interval on postfire plant communities in Yellowstone National Park (USA). *Journal of Vegetation Science* 15: 797-806.
- Schoennagel, T., M.G. Turner, W.H. Romme. 2003. The influence of fire interval and serotiny on postfire lodgepole pine density in Yellowstone National Park. *Ecology* 8: 2967-2978.
- Maxwell, T., J. Berkson, T. Schoennagel, K. Poiani, R. Constanza. 2003. Educational investments in environmental science and management. In V.D. Dale (ed), *Ecological modeling for resource management*. Springer-Verlag: New York.
- Schoennagel, T. and D.M. Waller. 1999. Understory responses to fire and artificial seeding in an eastern Cascades *Abies grandis* forest, USA. *Canadian Journal of Forest Research* 29: 1393-1401.

Other

Schoennagel, T., C.R. Nelson, D.M. Theobald, G. Carnwath, T.B. Chapman. 2009. Reply to Fitzsimmons: Transparency needed in defining fire-mitigation effort near the wildland–urban interface. *Proceedings of the National Academy of Sciences*. vol. 106 no. 33 E88

Kaufmann M.R., G.H. Aplet, M. Babler, W.L. Baker, B. Bentz, M. Harrington, B.C. Hawkes, L. Stroh Huckaby, M.J. Jenkins, D.M. Kashian, R.E. Keane, D. Kulakowski, C. McHugh, J. Negron, J. Popp, W.H. Romme, T. Schoennagel, W. Shepperd, F.W. Smith, E. Kennedy Sutherland, D. Tinker, and T.T. Veblen. 2008. The status of our scientific understanding of lodgepole pine and mountain pine beetles – a focus on forest ecology and fire behavior. The Nature Conservancy, Arlington, VA. GFI technical report 2008-2.

Platt, R. T. Schoennagel. 2008. Have forests become denser? An object-oriented case study of a key premise in wildfire policy. *GEOBIA conference proceedings. Pixels, Objects, Intelligence: Geographic Object Based Image Analysis for the 21st Century*.

Noss, R. (ed.), J. Franklin, W. Baker, T. Schoennagel, and P. Moyle. 2006. Ecological science relevant to management policies for fire-prone forests of the western United States. *Society for Conservation Biology Scientific Panel on Fire in Western U.S. Forests*.

Romme, W. H., J. Clement, J. Hicke, D. Kulakowski, L. H. MacDonald, T. Schoennagel, and T. T. Veblen. 2006. Recent forest insect outbreaks and fire risk in Colorado forests: a brief synthesis of relevant research. *Colorado Forest Restoration Institute*, Fort Collins, CO.

Schoennagel T., Veblen T.T., Romme W.H. 2004. Evaluation of the efficacy of forest manipulations still needed - Response from Schoennagel and colleagues. *BioScience* 54 (11): 980-981.

Schoennagel, T. 2004. Integrating landscape ecology into natural resource management (book review). *Landscape Ecology* 19: 911-912.

Schoennagel, T. 2003. Landscape ecology and resource management (book review). *Conservation Ecology* 7(2): 3. [online] URL: <http://consecol.org/vol7/iss2/art3>.

OUTREACH

2009 **Invited participant.** Making connections: pine beetles, water, climate, fire, and the future forest. Western Water Assessment and the Colorado Forest Restoration Institute. NOAA. Boulder, CO.

2009 **Scientific expert.** Interviewed by numerous regional and national news outlets on research about the location of National Fire Plan fire-mitigation treatments near the western US wildland-urban interface: New York Times, USA Today, Wall

- St. Journal, Scripps News, LA Times, Denver Post, Oregonian, Seattle Times, Missoulian, Salt Lake Tribune, Arizona Republic, Science Daily, etc.
- 2008 **Scientific expert.** Interviewed on KGNU about FIREWISE practices in the Wildland-Urban Interface. Boulder, CO.
- 2008 **Invited participant.** State Forest Resource Assessment Working Group, US Forest Service and The Nature Conservancy. Assist with the identification of priority landscapes needing forest treatment in support of a comprehensive forest resource assessment throughout CO. Boulder, CO.
- 2008 **Scientific expert.** Advances in Fire Practice for the Wildland Fire Lessons Learned Center, a “one-stop shop” website for fire science and practice. Interviewed for article about fire risk and the CO beetle outbreak.
- 2008 **Invited participant.** Lodgepole Pine Science Team, The Nature Conservancy. Assess the status of scientific knowledge of lodgepole pine ecology and fire behavior in relation to the mountain pine beetle epidemic. Produce report for managers and public. Boulder, CO.
- 2007 **Invited speaker.** Colorado Bark Beetle Cooperative, US Forest Service. Presented talks to forest managers (May) and the public (Sept.) about bark beetle outbreaks and fire risk in subalpine forests. Snow Mountain Ranch, CO.
- 2007 **Scientific expert.** Interviewed on KGNU’s “How on Earth” program, about forest fires and people in the Wildland-Urban Interface. Boulder, CO.
- 2007 **Invited speaker.** Denver Water. Presented information to water managers on potential impacts of insect outbreaks and fires on water resources.
- 2007 **Invited participant.** Roundtable on Climate Change and Conservation in the Greater Yellowstone Ecosystem. Bozeman, MT.
- 2007 **Invited speaker.** Colorado State Foresters Training Academy. Presented talk to State foresters on insect outbreaks and fire risk. Facilitated discussion on forest management responses to Mountain Pine Beetle outbreak in lodgepole pine forests. Ft. Collins, CO.
- 2006 **Invited speaker.** Summit County Bark Beetle Taskforce. Presented talk on current scientific understanding of why the insects are irrupting in Colorado, what can be done to stop them, what are the subsequent fire risks and how these risks can be effectively mitigated. Dillon, CO.
- 2006 **Expert witness.** U.S. House of Representatives, Subcommittee on Forests and Forest Health. Science forum on post-disturbance ecology and logging. Washington, DC.
- 2005 **Invited speaker and panelist.** Presented talk on integrating science into forest policy at workshop on *Conservation, collaboration and community*. Santa Fe, NM.
- 2004 **Scientific expert.** Forest Health Roundtable, Front Range Fuel Treatment Partnership. Contributed to development of forest restoration and fire risk reduction policy on public and private lands in the Colorado Front Range. Lakewood, CO.
- 2004 **Scientific expert.** Colorado Public Radio (KUNC). Provided expert opinion about fire and forest management in the West. Ft. Collins, CO.
- 2004 **Invited speaker and panelist.** Boulder County Fire Education Forum. Provided expert opinion about forest restoration and fire mitigation in the wildland-urban interface of Boulder County. City Council Chambers, Boulder, CO.

- 2003 **Scientific expert.** TIME Magazine (August 18, 2003). Interviewed for article on western wildland fire and forest management strategies.
- 2003 **Invited participant.** Wildland Fire Workshop. Bridging the worlds of fire managers and applied fire researchers. April 16-17, 2003. Ft. Collins, CO.

INVITED PRESENTATIONS

2009. *Bugs and bugaboos: Mountain pine beetles, fire and ecological restoration.* Environmental Studies Colloquium Series, Sept. 30, 2009. University of Colorado-Boulder, CO.
2009. *Causes and consequences of Mountain Pine Beetle outbreaks in Rocky Mountain forests: implications for management and climate change.* Dept. of Biology, Western State College, Gunnison, CO.
2009. *Mixed-severity fire regimes in the Rocky Mountains.* Session organizer: Tom Spies. North American Forest Ecology Workshop. Logan Utah. June 22-26. Logan, Utah.
2008. *A spatial assessment of fire mitigation and forest restoration treatments in the western US.* Dept. of Geography, University of Colorado-Boulder, CO.
2007. *Recent forest insect outbreaks and fire risk in Colorado forests: a brief synthesis of relevant research.* National Seasonal Assessment Workshop: Weather, climate, fuels outlooks for the Western U.S. and Alaska. NOAA Climate Diagnostics Center. Boulder, CO.
2007. *A review of forest ecology research relevant to climate change in the Greater Yellowstone Ecosystem (GYE).* The Greater Yellowstone Ecosystem Climate Change and Conservation Roundtable, Bozeman MT.
2006. *Landscape heterogeneity following large fires: insights from Yellowstone National Park, USA.* Symposium: Large fires in landscapes: diversity or disaster? Introduction and overview. 3rd International Fire Ecology and Management Congress. Nov. 13-17, 2006. San Diego, CA.
2005. *Integrating science into forest policy.* Conservation, collaboration and community: Responding to the Healthy Forests Initiative. Santa Fe, NM.
2004. *Climatic teleconnections affecting drought-induced fire occurrence in Rocky Mountain subalpine forests.* Environmental and Societal Impacts Group, National Center for Atmospheric Research. Boulder, CO.

CONTRIBUTED PRESENTATIONS

- Schoennagel, T., R. Sherriff, T.T. Veblen. *Current tree densities linked to late-19th century high-severity fires in Colorado Front Range upper montane forests.* 94th Annual Meeting of the Ecological Society of America. August 2-7, 2009. Albuquerque, NM.

Schoennagel, T., C.R. Nelson, T.B. Chapman, G. Carnwath, D.M. Theobald. *A spatial assessment of fire mitigation and forest restoration treatments in the western US*. 93rd Annual Meeting of the Ecological Society of America. August 3-8, 2008. Milwaukee, WI.

Schoennagel, T., T.T. Veblen, D. Kulakowski, and A. Holz. *Multidecadal climate variability and interactions among Pacific and Atlantic sea surface temperature anomalies affect subalpine fire occurrence, western Colorado (USA)*. 92nd Annual Meeting of the Ecological Society of America. August 5-10, 2007. San Jose, CA.

Schoennagel, T., T.T. Veblen, W.H. Romme, J.S. Sibold, E.R Cook. *ENSO and PDO interactions affect drought-induced fire occurrence in Rocky Mountain subalpine forests*. Fire History and Climate Synthesis in Western North America. April 30-May 3, 2005. Flagstaff, AZ.

Schoennagel, T., T.T. Veblen, W.H. Romme. *Appropriate forest restoration and effective fuel treatments in Rocky Mountain forests: where and how?* Colorado Forest Restoration Workshop. November 8-10, 2004. Glenwood Springs, CO.

Schoennagel, T., T.T. Veblen, W.H. Romme, J.S. Sibold, E.R Cook. *Climatic teleconnections affecting drought-induced fire occurrence in Rocky Mountain subalpine forests*. 89th Annual Meeting of the Ecological Society of America. August 1-6, 2004. Portland, OR.

Schoennagel, T., M.G. Turner, A. Fall, D.M. Kashian. *The influence of climatically altered fire regimes on successional patterns across the Yellowstone landscape*. 88th Annual Meeting of the Ecological Society of America. August 3-8, 2003. Savannah, GA.

Schoennagel, T., M.G. Turner, A. Fall, D.M. Kashian. *Altered fire regimes and successional patterns across the Yellowstone landscape*. 18th Annual Meeting of the US Regional Chapter of the International Association of Landscape Ecology, April 2-6, 2003. Banff, Alberta.

Schoennagel, T., D.M. Waller, M.G. Turner, W.H. Romme. *The influence of fire interval, elevation and soil fertility on postfire plant communities in Yellowstone National Park*. 17th Annual Symposium of the International Association for Landscape Ecology. April 23-27, 2002. Lincoln, Nebraska.

Schoennagel, T., M.G. Turner, W.H. Romme, D.M. Waller. *Temporal and spatial effects of fire on initial pathways of succession across the Yellowstone landscape*. The 86th Annual Meeting of the Ecological Society of America, August 5-10, 2001. Madison, WI.

Schoennagel, T., M.G. Turner, W.H. Romme, D.M. Waller. *Spatial and temporal influences of fire regimes on initial pathways of succession across the Yellowstone Landscape*. The 16th Annual Symposium of the US Regional Chapter of the International Association of Landscape Ecology, April 25-27, 2001. Tempe, Arizona.

Schoennagel, T., M.G. Turner, W.H. Romme, D.M. Waller. *The effect of fire interval on successional patterns in Yellowstone National Park*. The 85th Annual Meeting of the Ecological Society of America, August 6-10, 2000. Snowbird, Utah.

ADVISING

Actively serve(d) on graduate committees of the following University of Colorado Geography students: Kevin Krasnow (MS, 2007), Robin Keith (MS, 2007), Meredith Albright (MS, 2008; PhD, *pending*), Teresa Chapman (MS, 2009; PhD *pending*), Kerry Malm (MS, 2009), Jeremy Smith (PhD, *pending*). Undergraduate advising of research assistants: Sarah Drinkwater (2004), Dan Jarvis (2005-6), Larissa Meyers (2006), Jennifer Perry (2007), Paul Sitzmann (2008).

TEACHING EXPERIENCE

Invited lectures

2009. *Fire Regimes, Forest Restoration and Fire Risk across Rocky Mountain Landscapes* GEOG 1001: Environmental Systems: Climate and Vegetation. Dept. of Geography. University of Colorado-Boulder, CO.

2009. *Subalpine Forests in Rocky Mountain Landscapes: Fire Regimes and Forest Restoration.* GEOG 4371: Forest Geography. Dept. of Geography. University of Colorado-Boulder, CO.

2009. *Bugs and bugaboos: Mountain pine beetles, fire and ecological restoration.* EBIO 4800/5800-002: Critical Thinking: Understanding local manifestations of global environmental change. Ecology and Evolutionary Biology Dept., University of Colorado-Boulder, CO.

2008. *An introduction to disturbance ecology of Colorado forests: implications for forest management.* GEOG 3351. Dept. of Geography. University of Colorado-Boulder, CO.

2007. *The ecology and management of bark beetles in subalpine forests.* EBIO 4800: Disease Ecology. Ecology and Evolutionary Biology Dept., University of Colorado-Boulder, CO.

2005. *A field course in fire ecology of the Rocky Mountains.* Iowa State University, Department of Forestry, Forestry Camp. Rocky Mountain National Park, CO.

2005. *Conservation issues in the Greater Yellowstone Ecosystem.* GEOG 4430: Conservation Trends. University of Colorado-Boulder, CO.

2004. *The interaction of fire, fuels and climate across Rocky Mountain forests.* EBIO 5310: Landscape Ecology. Ecology and Evolutionary Biology Dept., University of Colorado-Boulder, CO.

2003. *The influence of fire regimes on successional patterns in Yellowstone National Park.* Department of Forest, Rangeland, and Watershed Stewardship, Colorado State University. Fort Collins, CO.

Courses

2002 **Instructor.** *Landscape Interpretation and Historical Ecology.* Designed a unique curriculum and co-taught a new interdisciplinary field course on historical

ecology. Focused on field techniques for assessing the influence of geology, soils, climate, disturbance and land use on particular landscapes. Dept. of Botany. University of Wisconsin-Madison.

- 1998-1999 **Teaching Assistant.** *General Botany.* Lab instructor for introductory plant biology class focused on the basic principles and concepts in botany including: respiration, photosynthesis, cell function, reproduction, physiology, an evolutionary survey of the plant kingdom and plant ecology. Dept. of Botany. University of Wisconsin-Madison.
- 1997,1998 **Teaching Assistant.** *Principles of Plant Structure.* Assisted and assessed students in understanding morphological aspects of root, stem and leaf development using relevant examples from algae, mosses, ferns, conifers and flowering plants. Dept. of Botany. University of Wisconsin-Madison.
- 1996 **Teaching Assistant.** *Dendrology.* Promoted understanding and identification of taxonomic characters for the classification of over 200 woody plant species in the field. Extensive keying, winter twig identification and specimen collection. Dept. of Botany. University of Wisconsin-Madison.
- 1994-1995 **Teaching Assistant.** *Physical Systems of the Environment.* Led weekly exercises in the field and the lab on basic physical systems of the environment including biogeography, soils, climate and geomorphology. Dept. of Geography. University of Wisconsin-Madison.
- 1993-1994 **Teaching Assistant.** *Environmental Conservation.* Directed discussion sections for an upper-level conservation class. Promoted critical thinking and clear writing about current environmental issues. Dept. of Geography. University of Wisconsin-Madison.

MANUSCRIPT and PROPOSAL REVIEWS

BioScience

Conservation Biology

Ecology

Ecology and Society

Ecological Applications

Ecological Restoration

Ecosystems

Forest Ecology and Management

Geophysical Research Letters

Journal of Applied Ecology

J. of Applied Meteorology and Climatology

Journal of Biogeography

Landscape Ecology

National Science Foundation

AFFILIATIONS

The Ecological Society of America

The International Association of Landscape Ecology

The Society for Conservation Biology