

Anna W. Schoettle

Research Plant Ecophysiologicalist
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Educational background

Ph.D., University of Wyoming, 1990, Botany/Ecophysiology
M.S., Cornell University, 1982, Agronomy/Plant Physiology
B.S., Cornell University, 1978, Biology/Botany

Professional Experience

1985 to present	Research Plant Ecophysiologicalist, Forest and Woodland Ecosystems (FWE) Program, RM-4157, Ft Collins, CO
1991 to present	Faculty member - Graduate Degree Program in Ecology, Colorado State University, Ft. Collins, CO.
2010 to present	Affiliate faculty member - Department of Bioagricultural Sciences and Pest Management, Colorado State University, Ft. Collins, CO.
1990 to 2010	Affiliate faculty member - Department of Forest, Rangeland and Watershed Stewardship, Colorado State University, Ft. Collins, CO.
1990	Instructor in Forestry, Colorado State University, Ft. Collins, CO.
1982 to 1984	Environmental Biology Research Specialist, The Boyce Thompson Institute for Plant Research, Ithaca, NY.

Select Honors and Awards

National Forest Systems 2011 Invasive Species Award Winner for Innovative Control and Management. " *Dr. Anna Schoettle in recognition of her leadership of a program to integrate research, strategic planning, and management activities to sustain Rocky Mountain bristlecone and limber pine populations and mitigate the impact of invasion by the invasive pathogen that causes the lethal disease white pine blister rust. Dr. Schoettle has worked in close collaboration with Kelly S. Burns (Rocky Mountain Region Forest Health Protection) and Dr. Richard Sniezko (National Forest System, Dorena Genetic Resource Center) on this innovative approach to address this deadly invasive forest pathogen, with the objective of saving these keystone native species.* " March 1, 2012.

Best Scientific Publication Award for 1999, Rocky Mountain Research Station, for the publication Interrelationships among light, photosynthesis and nitrogen in the crown of mature *Pinus contorta ssp. latifolia*. *Tree Physiology* 19:13-22

Certificate of Merit and cash award, 1999, Rocky Mountain Research Station, for "extra effort in synthesizing the impacts of human-caused air pollution on resources within the Interior Columbia River Basin"

Certificate of Merit and cash award, 1988, Rocky Mountain Forest and Range Experiment Station, for "development of a screening method to identify sensitive vegetation" to atmospheric deposition

Sigma Xi, 1987, for research achievements. Elected to full membership.

Select Publications (101 career total)

Schoettle, AW, JG Klutsch and RA Sniezko. *In press*. Integrating regeneration, genetic resistance and timing of intervention for the long-term sustainability of ecosystems challenged by non-native pests – A novel proactive approach. In: Disease and Insect Resistance in Forest Trees: Proceedings of the 4th International Workshop on the Genetics of Host-Parasite Interactions in Forestry. August 2011, Eugene OR. Techn cords. Sniezko, RA, AD Yanchuk, JT Kliejunas, KM Palmieri, JM Alexander, and SJ Frankel. USDA FS. Gen. Tech. Rep. PSW-GTR-xx.

- Keane, RE, DF Tomback, C Aubry, A Bower, E Campbell, M Jenkins, M Manning, S McKinney, M Murray, D Perkins, D Reinhart, C Ryan, AW Schoettle, CM Smith. *In press*. A Range-Wide Restoration Strategy for Whitebark Pine (*Pinus albicaulis*). USDA For. Serv. Gen Tech Rep RMRS-GTR-xx.
- Schoettle, AW, BA Goodrich, V Hipkins, C Richards, J Kray. 2012. Geographic patterns of genetic variation and population structure in *Pinus aristata*, Rocky Mountain bristlecone pine. *Can. J. For. Res.* 42:23-37.
- Field, SG, AW Schoettle, JG Klutsch, SJ Tavener, MF Antolin. 2012. Demographic projection of high-elevation white pines infected with white pine blister rust: a nonlinear disease model. *Ecological Applications* 22:166-183.
- Schoettle, AW, BA Goodrich, V Hipkins, C Richards, J Kray. 2011. Geographic Patterns of Genetic Variation, Population Structure and Adaptive Traits in *Pinus aristata*, Rocky Mountain Bristlecone Pine. In *The future of high-elevation, five-needle white pines in Western North America: Proc High Five Symposium*. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS RMRS-P-63. p153
- Schoettle, AW, RA Sniezko, A Kegley, KS Burns. 2011. Preliminary Overview of the First Extensive Rust Resistance Screening Tests of *Pinus flexilis* and *Pinus aristata*. In *The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium*. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS RMRS-P-63. pp 265-269.
- Schoettle, AW, BA Goodrich, JG Klutsch, KS Burns, S Costello, RA Sniezko, J Connor. 2011. The Proactive Strategy for Sustaining Five-Needle Pine Populations: An Example of its Implementation in the Southern Rocky Mountains. In *The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium*. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS RMRS-P-63. pp 323-334. http://www.fs.fed.us/rm/pubs/rmrs_p063/rmrs_p063_323_334.pdf
- Keane, RE and AW Schoettle. 2011. Plenary paper: Strategies, Tools, and Challenges for Sustaining and Restoring High Elevation Five-Needle White Pine Forests in Western North America. In *The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium*. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS RMRS-P-63. pp 276-294
- Tomback, DF, AW Schoettle, MJ Perez, KM Grompone, S Mellmann-Brown. 2011. Regeneration and Survival of Whitebark Pine after the 1988 Yellowstone Fires. In *The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium*. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS. RMRS-P-63. pp 66-68.
- Tomback, DF, P Achuff, AW Schoettle, JW Schwandt, RJ Mastrogiuseppe. 2011. Plenary Paper: The Magnificent High-Elevation Five-Needle White Pines: Ecological Roles and Future Outlook. In *The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium*. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS RMRS-P-63. Pp 2-28.
- Stone, J, AW Schoettle, RA Sniezko, A Kegley. 2011. Histological Observations on Needle Colonization by *Cronartium ribicola* in Susceptible and Resistant Seedlings of Whitebark Pine and Limber Pine. In *The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium*. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS RMRS-P-63. p 243
- Sniezko, RA, MF Mahalovich, AW Schoettle, DR Vogler. 2011. Plenary Paper: Past and Current Investigations of the Genetic Resistance to *Cronartium ribicola* in High-elevation Five-needle Pines. In *The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium*. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS. RMRS-P-63. pp 246-264
- Sniezko, RA, AW Schoettle, J Dunlap, D Vogler, D Conklin, A Bower, C Jensen, R Mangold, D Daoust, G Man. 2011. *Ex Situ* Gene Conservation in High Elevation White Pine Species in the United States-A Beginning. In *The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium*. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS. RMRS-P-63. pp 147-149
- Coop, JD and AW Schoettle. 2011. Fire and High-Elevation, Five-Needle Pine (*Pinus aristata* & *P. flexilis*) Ecosystems in the Southern Rocky Mountains: What Do We Know? In *The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium*. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS. RMRS-P-63. pp 164-175.
- Campbell, EM, RE Keane, ER Larson, MP Murray, AW Schoettle, C Wong. 2011. Plenary Paper: Disturbance Ecology of High-Elevation Five-Needle Pine Ecosystems in Western North America. In *The future of high-elevation, five-*

- needle white pines in Western North America: Proceedings of the High Five Symposium. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS. RMRS-P-63. pp.154-163
- Bower, AD, SC McLane, A Eckert, S Jorgensen, AW Schoettle, S Aitken. 2011. Plenary Paper: Conservation Genetics of High Elevation Five-Needle White Pines. In The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS. RMRS-P-63. pp 98-117.
- Bond, CA, P Champ, J Meldrum, AW Schoettle. 2011. Investigating the Optimality of Proactive Management of an Invasive Forest Pest. In The future of high-elevation, five-needle white pines in Western North America: Proceedings of the High Five Symposium. 28-30 June 2010 Missoula, MT. Edited by RE Keane, DF Tomback, MP Murray, CM Smith. USDA FS. RMRS-P-63. pp 295-302
- Coop, JD, RT Massatti, AW Schoettle. 2010. Subalpine vegetation pattern three decades after stand-replacing fire: effects of landscape context and topography on plant community composition, tree regeneration, and diversity. *Journal of Vegetation Science* 21: 472-487
- Schoettle, AW, RA Sniezko, A Kegley, J Hill, and KS Burns. 2010. Resistance to white pine blister rust in *Pinus flexilis* and *P. aristata* of the Southern Rockies – Initial findings. In: Adams, J. comp. 2010. Proceedings of the 57th Western International Forest Disease Work Conference; 2009 July 20-24; Durango, CO. Forest Health Technology Enterprise Team, Ft Collins, CO. Pp 109-110.
- Bond, CA, PA Champ, J Meldrum, AW Schoettle. 2010. Proactive vs. Reactive? Optimal management of an invasive forest pest in a spatial framework. Proceedings of the Annual Meeting of the Agricultural and Applied Economics Association. 25027 July 2010 Denver, CO. 25 pp.
- Coop, JD, Massatti, RT and Schoettle, AW. 2010. Subalpine vegetation pattern three decades after stand-replacing fire: effects of landscape context and topography on plant community composition, tree regeneration, and diversity. *Journal of Vegetation Science* 21: 472-487
- Schoettle, AW; Sniezko, RA; Burns, KS. 2009. Sustaining *Pinus flexilis* ecosystems of the Southern Rocky Mountains (USA) in the presence of *Cronartium ribicola* and *Dendroctonus ponderosae* in a changing climate. In: Breeding and Genetic Resources of Five-Needle Pines Conference, IUFRO Working Party 2.02.15, Yangyang, Republic of Korea, 2008 September 22-26. Ed. By Noshad, D.; Noh, E.; King, J.; Sniezko, R. Yangyang: Korea Forest Research Institute. Pp. 63-65.
- Coop, JC and AW Schoettle. 2009. Regeneration of Rocky Mountain bristlecone pine (*Pinus aristata*) and limber pine (*Pinus flexilis*) three decades after stand-replacing fires. *Forest Ecology and Management* 257:893-903
- Brown, P. M.; Schoettle, A. W. 2008. Fire and stand history in two limber pine (*Pinus flexilis*) and Rocky Mountain bristlecone pine (*Pinus aristata*) stands in Colorado. *International Journal of Wildland Fire*. 17: 339-347.
- Burns, KS, AW Schoettle, WR Jacobi and MF Mahalovich. 2008. White pine blister rust in the Rocky Mountain Region and options for management. USDA Forest Service, RMRS-GTR-206. 26p.
- Schoettle, AW and RA Sniezko. 2007. Preparing the landscape for invasion – Proactive intervention to mitigate impacts of a non-native pathogen. *Journal of Forest Research* 12:327-336.
- Vogler, D, A Delfino-Mix and AW Schoettle. 2006. White pine blister rust in high elevation white pines: screening for simply inherited hypersensitive resistance. In: Guyon, JC, compiler. Proceedings of the 53rd Western International Forest Disease Work Conference; 2005 September 26-30; Jackson, WY. US Department of Agriculture, Forest Service, Intermountain Region, Ogden UT. Pp73-82.
- Tomback, DF, AW Schoettle, K Chevalier and C Jones. 2005. Life on the edge for limber pine: seed dispersal within a peripheral population. *Ecoscience* 12 (4): 519-529.
- Schoettle, AW. 2004. Ecological roles of five-needle pine in Colorado: Potential consequences of their loss. In: Sniezko, Richard; S Samman; S Schlarbaum; H Kriebel; Eds. Breeding and genetic resources of five-needle pines: growth adaptability and pest resistance. 2001 July 24-25; Medford, OR. IUFRO Working Party 2.02.15. USDA FS, RMRS-P-32. Pp. 124-135.
- Schoettle, AW. 2004. Developing proactive management options to sustain bristlecone and limber pine ecosystems in the presence of a non-native pathogen. In: Shepperd, WD; LG Eskew, compilers. 2004. Silviculture in special places: Proceedings of the National Silviculture Workshop ; 2003 September 8-11; Granby, CO. USDA FS RMRS-P-34. Pp. 46-155.
- Schauer, AJ, AW Schoettle and RL Boyce. 2001. Partial cambial mortality in high-elevation *Pinus aristata* (Pinaceae). *American Journal of Botany* 88:646-652.

- Schoettle, AW and SG Rochelle. 2000. Morphological variation of *Pinus flexilis* (Pinaceae), a bird-dispersed pine, across a range of elevations. *American Journal of Botany* 87:1797-1806.
- Moir, WH, SG Rochelle, and AW Schoettle. 2000. Microscale variation in tree establishment near upper treeline, Snow Range, Wyoming, USA. *Arctic, Antarctic and Alpine Research* 31:379-388.
- Schoettle, AW, K Tonnessen, J Turk, J Vimont, and R Amundson. 1999. An assessment of effects of human-caused air pollution on resources within the Interior Columbia River Basin. Technical Editors: Acheson, A and J Peterson. USDA FS. PNW-GTR-447.
- Schoettle, AW and WK Smith. 1999. Interrelationships among light, photosynthesis, and nitrogen in the crown of mature *Pinus contorta* Dougl. ssp. *latifolia* Engelm. *Tree Physiology*: 19:13-22.
- Barrick, KA and AW Schoettle. 1996. A comparison of the foliar nutrient status of elfinwood and symmetrically formed tall trees, Colorado Front Range, USA. *Can. J. Bot.* 74:1461-1475.
- Stenberg, P, EH DeLucia, AW Schoettle, and H Smolander. 1995. Photosynthetic light capture and processing from the cell to canopy. In: Smith, WK and TM Hinckley, eds. *Resource physiology of conifers*. Academic Press, San Diego. p 3-38.
- Nikolov, NT, WJ Massman, and AW Schoettle. 1995. Coupling biochemical and biophysical processes at the leaf level: an equilibrium photosynthesis model for leaves of C₃ plants. *Ecological Modelling* 80:205-235.
- Schoettle, AW and T Fahey. 1994. Foliage and fine root longevity in *Pinus*. *Ecological Bulletins (Copenhagen)* 43:136-153.
- Schoettle, AW. 1994. Influence of tree size on shoot structure and physiology of *Pinus contorta* and *Pinus aristata*. *Tree Physiology* 14:1055-1068.
- Yoder, BJ, MG Ryan, RH Waring, AW Schoettle, and MR Kaufmann. 1994. Evidence of reduced photosynthetic rates in old trees. *Forest Science* 40:513-527.
- Monson, RK, MC Grant, CH Jaeger, AW Schoettle. 1992. The retention of wet precipitation in the crowns of alpine plants: Implications for screening for susceptibility to acid rain. *Environ. and Experimental Botany* 32:319-327.
- Smith, WK, AW Schoettle, & M Cui. 1991. Importance of the method of leaf area measurement to the interpretation of gas exchange of complex shoots. *Tree Physiology* 8:121-127.
- Schoettle, AW and WK Smith. 1991. Interrelation between shoot characteristics and solar irradiance in the crown of *Pinus contorta* ssp. *latifolia*. *Tree Physiology* 9:245-254.
- Schoettle, AW. 1990. The interaction between leaf longevity and shoot growth and foliar biomass per shoot in *Pinus contorta* at two elevations. *Tree Physiology* 7:209-214.
- Schoettle, AW. 1989. Potential effect of premature needle loss on the foliar biomass and nutrient retention of *Pinus contorta* ssp. *latifolia*. In: Olson, RK and AS Lefohn, eds. *Effects of Air Pollution on Western Forests*. Air and Waste Management Association, Pitts. Pa. 1989. p 443-454.
- Reich, PB, AW Schoettle, HF Stroo, & RG Amundson. 1988. Effects of ozone and simulated acid rain on white pine (*Pinus strobus*L.) seedlings grown in five soils. III. Nutrient relations. *Can. J. Bot.* 66:1517-1531.
- Reich, PB & AW Schoettle. 1988. Role of phosphorus and nitrogen in photosynthetic and whole plant carbon gain and nutrient use efficiency in Eastern White Pine. *Oecologia* 77:25-33.
- Reich, PB, AW Schoettle, HF Stroo, J Troiano, and RG Amundson. 1987. Effects of ozone and simulated acid rain on white pine (*Pinus strobus*L.) seedlings grown in five soils. I. Net photosynthesis and growth. *Can. J. Bot.* 65:977-987.

Select Invited Presentations (44 career total)

- Schoettle, AW. 2012. White Pine Blister Rust in High Mountain Ecosystems: Managing Forest in Colorado for Resilience. Colorado Native Plant Society Seminar Series. Boulder, CO. Jan 12, 2012.
- PA Champ, AW Schoettle, CA Bond, J Meldrum. 2011. Measuring economics and ecological trade-offs: a tale of 'ologists and 'ists working together. *Interactions of Society and the Environment Seminar Series – Integrating human dimensions and biological data*. USGS, RMRS, CSU sponsored series. April 21, 2011.
- Schoettle, AW. 2011. Managing Populations and Genetic Resistance for Sustained Ecosystem Function: A Population Genetic Model for High-Elevation White Pines. Special presentation to the Forest Genetics Department, University of British Columbia and BC Ministry of Forestry. Vancouver, BC. March 25 2011.
- Schoettle, AW. 2011. Keynote Address - Managing for Resilience: Sustaining Alpine Forest Ecosystems in Colorado. Colorado League of Women Voters Annual Convention. May 21, 2011. Ft Collins, CO.

- Schoettle, AW, KS Burns, RA Sniezko. 2009. Limitations to Rapid Adaptation to Changing Selective Pressures in High Elevation White Pine Populations – the need for proactive intervention. Western International Forest Disease Work Conference (WIFDWC). Durango, CO. July 20-24, 2009.
- Schoettle, AW, RA Sniezko, A Kegley, KS Burns, J Hill. 2009. Resistance to white pine blister rust in *Pinus flexilis* and *Pinus aristata* of the Southern Rockies – initial findings. Western International Forest Disease Work Conference. Durango, CO. July 20-24, 2009.
- Schoettle, AW. 2009. Sustaining high elevation ecosystems – relevance to wilderness management. Aldo Leopold Wilderness Research Institute – RMRS Workshop on Wilderness. Missoula MT 4/28/09.
- Schoettle, AW. 2008. Sustaining *Pinus flexilis* and *Pinus aristata* ecosystems of the Southern Rocky Mountains in the presence of *Cronartium ribicola* in a changing climate - A Cooperative Program in the Southern Rockies. Session on “Cross Linkages among agencies – how can we get cross boundary projects done?” at the RM-Cooperative Ecosystems Studies Unit (RM-CESU) Executive Committee and Managers of the Federal Agencies Meeting; Estes Park, CO. October 16, 2008.
- Schoettle, AW, RA Sniezko and KS Burns. 2008. Sustaining *Pinus flexilis* ecosystems of the Southern Rocky Mountains (USA) in the presence of *Cronartium ribicola* in a changing climate. IUFRO Breeding and Genetic Resources of Five-Needle Pines Conference. Yangyang, S. Korea 21-26 September 2008. Invited plenary.
- Schoettle, AW. 2008. *Ex situ* and *In situ* Conservation of Genetic Resources: Gene conservation of high elevation white pines of the Southern Rockies. USFS Regional Geneticists' Meeting. Ft. Collins, CO. 13 May 2008.
- Schoettle, AW, KS Burns, F Freeman. 2008. Rust resistance in Colorado and Southern Wyoming: Silvicultural applications. Region 2 Renewable Resources Silviculturist Annual Meeting. Ft. Collins, 28 February 2008.
- Schoettle, AW and F. Freeman. 2007. Preparing the landscape for invasion – Early intervention approaches for threatened high elevation white pine ecosystems. Rocky Mountain Region Forest Management Workshop, Fort Collins, CO. Jan. 23-25, 2007.
- Schoettle, AW, RA Sniezko, KS Burns, F Freeman. 2007. Intervention to sustain 5-needle pine populations threatened by white pine blister rust – accelerating the evolution of resistance. Alberta and British Columbia Forest Health Workshop, Hinton, AB. April 17-18, 2007.
- Schoettle, AW. 2005. No place to hide – invasion of a non-native pathogen. Alien Pests Threatening Biodiversity of Forest Ecosystems Symposium at the IUFRO World Congress, Brisbane, Australia. 8/12/05.
- Schoettle, AW. 2003. White pine blister rust - A case study. Proactive management for the high-elevation white pine species. The Ecological Impact of Exotic Pests and Pathogens in an Age of Global Trade Symposium at the Soc. of American Foresters 2003 National Convention. Buffalo, NY. (10/28/03)
- Schoettle, AW. 2003. Ecological research related to white pine ecosystems in the Central Rockies. Parks Canada Whitebark/limber pine Workshop, Calgary, Alberta, Canada. Feb 18-19, 2003.
- Schoettle, AW and A Sala. 2002. Stress Tolerance of Subalpine White Pines: Potential consequences of selection by blister rust. Symposium *Rapid Decline of white pine Ecosystems of the West: Causes, Consequences and Restoration Strategies* at the Annual Meeting of the Ecol. Soc. Am. Tucson AZ. (8/9/02).
- Schoettle, AW. 2002. Stress tolerance of Rocky Mountain pines – defining treelines. Biology Seminar Series, University of Oulu, Oulu, Finland (12/02).
- Schoettle, AW. 2000. Morphological and physiological plasticity in mature conifers: spatial and temporal variation. Workshop on Challenges and Limitations of Optimality Approach in Plant Ecology, hosted by Dept of Forest Ecology, University of Helsinki. April 9-12, 2000. Hyytiälä, Finland.

Select Offered Presentations (61 career total)

- Schoettle, AW, RA Sniezko, JG Klutsch, MF Antolin, S Field. 2011. Proactive use of genetic resistance to pathogens to sustain ecological function of threatened ecosystems. Fourth International Workshop on the Genetics of Host-parasite Interactions in Forestry. Eugene OR. July 31-Aug 5, 2011.
- Schoettle, AW, JG Klutsch, MF Antolin, S Field. 2011. Projecting population demography and resistance gene frequencies in pines in the presence of white pine blister rust: A population genetic model for high-elevation five-needle pines. Fourth International Workshop on the Genetics of Host-parasite Interactions in Forestry. Eugene OR. July 31-Aug 5, 2011.
- Schoettle, AW, RA Sniezko, A Kegley, R. Danchok, KS Burns. 2011. Patterns of resistance to *Cronartium ribicola* in *Pinus aristata*, Rocky Mountain bristlecone pine. Fourth International Workshop on the Genetics of Host -

- parasite Interactions in Forestry. Eugene OR. July 31-Aug 5, 2011.
- Meldrum, J, P Champ, AW Schoettle, C Bond. 2011. The Social Context of Managing High Elevation Pine Forests for Ecological Resilience. Resilience 2011: Resilience, Innovation, and Sustainability: Navigating the Complexities of Global Change. Second International Science and Policy Conference. March 11-16, 2011 Tempe, AZ.
- Schoettle, AW, BA Goodrich, V Hipkins, J Kray. 2010. Patterns of variation in *Pinus aristata*, Rocky Mountain bristlecone pine. The Future of High-Elevation, Five-Needle White Pines in Western North America: High Five Symposium. Missoula, MT. 28-30 June 2010.
- Schoettle, AW, RA Sniezko, A Kegley, KS Burns. 2010. Family variation in cankering frequency following inoculation with *Cronartium ribicola* in *Pinus flexilis* from the Southern Rockies. The Future of High-Elevation, Five-Needle White Pines in Western North America : High Five Symposium. Missoula, MT. 28-30 June 2010.
- Schoettle, AW, JG Klutsch, MF Antolin, S Field. 2010. A Population Genetic Model for High-Elevation White Pines: Projecting Ecological Outcomes of Restoration Options. The Future of High-Elevation, Five-Needle White Pines in Western North America: High Five Symposium. Missoula, MT. 28-30 June 2010.
- Schoettle, AW. 2010. Providing the science foundation for proactive restoration. Rocky Mountain National Park Research Conference. Estes Park. March 30, 2010.
- Schoettle, AW, BA Goodrich, V Hipkins, C Richards. 2010. Genetic variation, population structure and adaptive traits in *Pinus aristata*: Implications for resiliency under multiple stresses. IUFRO Breeding and Genetic Resources of Five-Needle Pines Conference. Tomsk, Russia. August 2010.
- Schoettle, AW, RA Sniezko, A Kegley. 2009. Family variation in response to inoculation with *Cronartium ribicola* in limber pine. Western Forest Genetics Association Meeting (WFGA). August 10-13, 2009. Asilomar, CA.
- Schoettle, AW, F Freeman. 2009. Preparing the landscape for invasion: accelerating the evolution of resistance. North American Forest Biology Workshop. June 2009. Logan UT.
- Schoettle, AW, KS Burns, B Howell, W Jacobi, HSJ Kearns, MF Mahalovich, RA Sniezko, DF Tomback, DR Vogler. 2006. Threats, status and management options for bristlecone and limber pine ecosystems of the Southern Rockies. Forest Environmental Threats - Advances in Threat Assessment and Their Application to Forest and Rangeland Management Conference, Boulder CO July 18-20 2006
- Schoettle, AW, Sniezko, RA, Burns, KS, Freeman, F. 2006. Preparing the landscape for invasion – early intervention approaches for threatened high elevation high elevation white pine ecosystems. Whitebark Pine – A Pacific Coast Perspective, Ashland, OR. August 27-31 2006.
- Schoettle, AW. 2004. Working toward facilitating the establishment of proactive management options to sustain high elevation white pine forests in the presence of white pine blister rust. Central Rockies White Pine Health Meeting, Ft. Collins, CO (2/19/04)
- Schoettle, AW, CA Berger, V Bonnet. 2003. Potential use of fire in the effort to sustain bristlecone and limber pine forests in the presence of an exotic pathogen. Annual Meeting of the Ecol. Soc. Am. Savannah, GA. (8/6/03).
- Schoettle, AW, KF Sullivan, W Jacobi. 2003. Sustaining our high-elevation pine ecosystems – a need for proactive intervention. USFS National Silvicultural Workshop, Granby, CO (9/7/03).
- Schoettle, AW. 2003. Developing proactive management options to sustain bristlecone and limber pine forests in the presence of an exotic pathogen. USFS National Silvicultural Workshop, Granby, CO (9/10/03).

Electronic and Audiovisual Products

- Schoettle, AW and M Laskowski. 2006. High Elevation White Pines Website. Constructed to increase the awareness of high elevation white pine species, their ecologies and the threats that face them. <http://www.fs.fed.us/rm/higherelevationwhitepines>.

Funding Awards as a PI or Co-PI

- 2012-2014. Schoettle, AW, A Angert, KS Burns. Optimizing deployment of planting stock for multigenerational management of white pine blister rust and mountain pine beetle in limber pine stands. USFS Forest Health Protection Special Technology Development Program Grant. \$54,921. (*Competitive*)
- 2012-2017. Burns, KS, AW Schoettle, S Alberts, T Douville, WR Jacobi. Southern Rockies Limber Pine Restoration - Field verification of rust resistance in limber and bristlecone pine. USFS Forest Health Protection Suppression Project. 2012: \$10,000. Funding will come in annually.

- 2010-2012. Schoettle, AW and P Champ. High elevation pine forests under multiple stresses: Managing for ecological resilience with consideration of manager and public preferences. USFS R&D Climate Change Program. \$185,000. \$50K received in 2010; out year funded withdrawn due to budget cuts. *(Competitive)*
2011. Schoettle, AW and J Popp. Updating data entry into the Whitebark and Limber Pine Information System (WLIS) Database. USDA Forest Health Protection – Northern Region. \$13,000.
- 2010-2016. Schoettle, AW. Great Basin Bristlecone Pine (*Pinus longaeva*) Conservation. Great Basin National Park. \$16,000. Additional proposal is pending.
- 2009-2012. Schoettle, AW, RA Sniezko, KS Burns. Mapping the frequency of white pine blister rust resistance and other adaptive traits to improve efficacy of conservation and restoration efforts in limber pine in the Southern Rockies. USFS Forest Health Protection Special Technology Development Program Grant. \$62,962. *(Competitive)*
- 2008-2014. Schoettle, AW. Limber pine (*Pinus flexilis*) Conservation Program. Rocky Mountain National Park. \$128,000.
- 2008-2013. Schoettle, AW. Qualitative resistance to white pine blister rust in Limber pine (*Pinus flexilis*). Great Sand Dunes National Park and Preserve. \$50,000.
- 2008-2011. Bond, C, P Champ, AW Schoettle, WR Jacobi, C Nelson, RA Sniezko. Efficient management of white pine blister rust in high elevation ecosystems: A dynamic modeling approach. Competitive PREISM Grant awarded by USDA Economic Research Service. \$178,000. *(Competitive)*
2008. Schoettle, AW, J Stone, RA Sniezko. Characterizations of resistance mechanism to white pine blister rust in high elevation white pines through histological investigations. Rocky Mountain Research Station Small Grants Program. \$16,000. *(Competitive)*
- 2007-2012. Schoettle, AW. Range-wide Gene Conservation of *Pinus aristata* and Rocky Mountain populations of *Pinus flexilis*. Forest Health Protection Gene Conservation Program – WO. \$138,000. *(Competitive)*
- 2006-2008. Schoettle AW, R Sniezko, KS Burns. Guidelines for limber pine restoration projects. USFS Forest Health Protection Special Technology Development Program Grant. \$48,605. *(Competitive)*
- 2004-2011. Schoettle AW, R Sniezko, KS Burns and JL Harris. Geographic distribution of rust resistance in RM Bristlecone pine (*Pinus aristata*). \$100,000 Over the full study from Region 2 -Forest Health Management and Rocky Mountain Research Station.
- 2004-2005. Schoettle, AW. Increase the awareness of bristlecone pine ecology and threats to its sustainability – construction and application of a website. RMRS Conservation Education Program. \$10,000. *(Competitive)* <http://www.fs.fed.us/rm/higherelevationwhitepines>
- 2001-2004. Schoettle, AW. Patterns of white pine regeneration after fire and its implications for forest establishment in the presence of white pine blister rust. National Fire Plan (01.RMS.B.6). \$450,000 over four years. *(Competitive)*
- 2001-2003. Schoettle, AW. Regeneration of *Pinus ponderosa* within the Jasper Fire: Spatial patterns and environmental factors. Black Hills National Forest. \$101,000.
- 1998-2001. Chubarova, NY, NG Prilepsky, AW Schoettle and AR Riebau. Solar radiation and weather variability influences on Russian sub-boreal vegetation phenology. USDA Forest Service – International Programs. \$60,000 over 3 years. *(Competitive)*
1998. Schoettle, AW and SG Rochelle. Ecology of limber pine (*Pinus flexilis*): Evaluation of variation across a range of elevations II. Physiological acclimation. Colorado Natural History Small Grants Program, State of Colorado. \$1,950. *(Competitive)*
1997. Schoettle, AW and SG Rochelle. Ecology of limber pine (*Pinus flexilis*): Evaluation of variation across a range of elevations I. Site and growth characteristics. Colorado Natural History Small Grants Program, State of Colorado. \$2,000. *(Competitive)*
- 1996-1997. Schoettle, AW, W Shepperd, C Edminster, S Mata, B Olson and SG Rochelle. Microenvironmental influences on ponderosa pine seedling establishment. Front Range Ecosystem Project, Rocky Mountain Research Station. \$8,500. *(Competitive)*
- 1993-1996. Smith, FW, JN Long and AW Schoettle. Controls on the allocation of production in coniferous forest ecosystems. USDA National Research Initiative Competitive Grants Program, Forest/Rangeland/Crop Ecosystems section. \$175,000. *(Competitive)*
(my research samples were damaged in the flood of 1997).

1992. Schoettle, AW. Application of monitoring shoot characteristics of bristlecone pine for the detection of response to atmospheric change: Mt. Goliath Research Natural Area. Research Natural Area Program. 1992. \$7,500. (*Competitive*)

Select Media Interviews

- 2011 [Alaska Airlines Magazine](#), December 2011 cover story for in-flight magazine – “Ancient Wonders – Bristlecone pines are living records of the distant past” by Eric Lucus.
- 2011 [The Long Now Foundation Newsletter](#), March, “Bristlecones in the Anthropocene” by Alex Mensing
- 2011 [Al Jazeera English](#), August interview and filming request from Rob Reynolds, rescheduled for 2012 due to schedule conflicts
- 2010 [Coloradoan](#) October, “Double assault could fell ancient pine trees” by Bobby Magill
- 2010 [The Week](#), October, “Pining for Pines”
- 2010 [New York Times – Science Times](#). September 28, “Thriving in harsh settings, old trees may soon meet their match” by Jim Robbins. (served as launch for NY Times Education Section; picked up by [The Week](#) as a science highlight of the week)
- 2010 [Denver Post](#). “Venerable trees get new enemy”. 7/23/10 (distributed nationally on AP)
- 2010 [Coloradoan](#). “Invasive fungus threatens Colorado’s oldest trees”. 7/24/10
- 2009 [Colorado Public Radio](#), Colorado Matters, “High altitude trees threatened”, Radio interview. 1/27/09.
- 2009 [Mountain Studies Institute Newsletter – The Benchmark](#) – “Conservation of genetic diversity of threatened bristlecone and limber pine populations in the southern Rockies – A partnership between MSI and the USFS RMRS”. Summer 2009 issue.
- 2009 [The Forestry Source](#) July 2009 issue, Society of American Forester’s newsletter. Joe Smith’s interview with Anna Schoettle, “Researchers race against the clock to manage high-elevation pines threatened by white pine blister rust”

Select Participation in Technical Conferences and Workshops

- [IUFRO Working Group 2.02.15 Breeding and Genetic Resources of Five-Needle Pines Conference](#). Program Director and Lead Organizer for 2014 meeting in Colorado.
- [Central Rockies White Pine Health Working Group Meetings](#). 1999-present. Fort Collins, CO. Co-organizer of the Central Rockies White Pine Annual Meeting
- [Disease and Insect Resistance in Forest Trees – 4th International Workshop on the Genetics of Host-Parasite Interactions in Forestry](#), July 31 - August 5, 2011. Eugene, OR. Invited Technical Committee member and session moderator.
- [IUFRO Working Group 2.02.15 Breeding and Genetic Resources of Five-Needle Pines Conference](#), August 9-19, 2011. Tomsk (Siberia), Russian Federation. Served as invited Scientific Program Committee member but did not attend the meeting.
- [High-Five Symposium: The Future of High-Elevation Five-Needle White Pines in Western North America](#), June 28 - 30, 2010, Missoula MT. Whitebark Pine Ecosystem Foundation. Invited member of the Steering Committee for the High-Five meeting. Organized special session “Ecology and Economics of Restoration”
- [IUFRO Working Group 2.02.15 Breeding and Genetic Resources of Five-Needle Pines Conference: Ecophysiology, disease resistance and developmental biology](#), Sept 22-26, 2008, Yangyang, Republic of South Korea. I served on the Scientific Committee, as a session moderator, was an invite speaker and a sponsored attendee.

Graduate and Undergraduate Student Advising

- Advisor of MS student E. Meier, 2011-2014 with Prof. Amy Angert. Graduate Degree Program in Ecology, Colorado State University. Thesis title: Defining maternal effects and refining seed transfer guidelines for *Pinus flexilis*.
- Co-Advised MS student AM Casper, 2008–2011, with Prof. William Jacobi. Graduate Degree Program in Ecology, Colorado State University. Thesis title: Restoration planting options for *Pinus flexilis* James in the Southern Rocky Mountains.
- Co-Advised K Richards, 2006-2007, with Prof. William Fitch. Senior Honors Thesis, Hamilton College. Project title: Spatial distribution and response to drought stress in *Pinus aristata* and *Pinus flexilis*.
- Co-advised A. Buchholz, 2004-2005, with Prof. William Romme. Senior Honors Thesis, Colorado State University.

Project title: Competition among limber pine seedlings – the cost of a mutualism.
Co-advised B. Gee, 2004, with Dr. Laura Perry (post -doc in my lab). Undergraduate student independent study (NR 495), Colorado State University. Project title: Establishment and growth of first year *Pinus aristata* seedlings: Influence of phosphorus availability, competition and soil types.
Committee member for MS student A. Schauer, 1996-99, with Major Professor Richard Boyce. Biology Department, Denver University. Thesis title: Partial cambial mortality of Rocky Mountain bristlecone pine.

Invited International External Examiner for Doctoral Defenses

University of British Columbia, Vancouver, BC, Canada. March, 2011.

Invited by Prof. Sally Aitkin and UBC Graduate School Dean to serve as the External Examiner for the PhD dissertation "Establishment and growth responses of whitebark and lodgepole pine populations in a changing climate defense" by Sierra Curtis-McLane.

University of Oulu, Oulu, Finland. December, 2002.

Invited by Prof. Satu Huttunen to serve as the international "Official Opponent" for the PhD dissertation "Scots pine needle longevity and other shoot characteristics along pollution gradients" by Jukka Lamppu.

University of Marseille, France. October, 2001

Invited by Prof. Thierry Taton to serve as the international External Examiner for the PhD dissertation "Spatial and functional analysis of post -fire plant community response in lower calcareous Provence" by Veronique Bonnet.