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Appointments

Assistant Professor, 2006 to present

Department of Environmental Sciences
Western Washington University
Bellingham, WA

Post-Doctoral Fellow, 2004-2006

Woods Hole Research Center, Woods Hole, MA

Education

PhD, Environmental Science, 2004

Montana State University, Bozeman, MT

Advisor: Lisa J. Graumlich

Dissertation Title: Temporal and spatial patterns at alpine treeline in the Sierra Nevada USA:
Implications for global change

MEM, Resource Ecology, 2000

Duke University, Durham, NC

Advisor: Dean L. Urban

Masters Project Title: Landscape connectivity using graph theory

BS, Zoology, 1996

The Evergreen State College, Olympia, WA

Advisor: Steven G. Herman

Research Experience

Assistant Professor

Huxley College, Western Washington University
September 2006 to present

Develop and maintain an externally funded research program in global change; research projects include terrestrial carbon cycling, ecosystem response to climate variability, and paleoclimatology; advise graduate and undergraduate students on independent research projects; research, analyze, and prepare publications; develop research proposals for funding.

Post-Doctoral Fellow

Woods Hole Research Center, Woods Hole, MA
September 2004 to July 2006

Developed statistical and process models of boreal forest dynamics in relation to climate and disturbance especially in regards to carbon cycling; investigated the links between forest demography and biogeochemistry using models and field data; researched, analyzed, and prepared publications; developed research proposals for funding.

**Graduate Research Assistant and
Canon National Park Science Scholar**

Montana State University, Bozeman, MT
May 2000 to July 2004

Investigated and modeled subalpine forest dynamics, especially foxtail pine (*Pinus balfouriana*), and their relationship to climate through the last millennia and across spatial scales from trees to bioregions; developed GIS and remote sensing applications for robust field sampling; researched, analyzed, and prepared publications; developed research proposals for funding.

Stanback Conservation Intern

Duke University, Durham, NC
May to August 1999

Examined ecological connectivity in terrestrial and marine ecosystems using graph theory; modeled habitat dispersal for American mink (*Mustela vison*) and prothonotary warblers (*Protonotaria citrea*) using least-cost path algorithms; wrote code in Arc Macro Language, Avenue, and Fortran; wrote and submitted manuscripts for publication.

Research Intern

Seabird Restoration Program, National Audubon Society, Bremen, ME
April to August 1997

Participated in an on going research effort involving North Atlantic seabirds in the Gulf of Maine; conducted provisioning and growth studies for arctic tern (*Sterna paradisaea*), common tern (*S. hirundo*), and roseate tern (*S. dougallii*); conducted monitoring and breeding surveys for Atlantic puffins (*Fratercula arctica*); conducted studies in nest site fidelity for Leach's storm-petrel (*Oceanodroma leucorhoa*); assisted in studies involving the social attraction of common murrelets (*Uria aalge*), razorbills (*Alca torda*), and common terns (*S. hirundo*); banded terns, puffins, and petrels; controlled predators; lived for extended periods on remote seabird colonies.

Research Intern

Hawk Mountain Sanctuary, Kempton, PA
August to December 1994

Conducted a research project investigating temporal effects on behavior and number of non-breeding raptors; conducted road surveys; collected and analyzed data; wrote and submitted manuscript for publication; participated in official migration monitoring efforts; assisted at a raptor banding station; designed displays and publications; led in interpretive programs for visitors.

Volunteer Biologist

US Fish and Wildlife Service,
Hart Mountain National Antelope Refuge, OR
May to August 1993

Participated in study of breeding birds in eastern Oregon and northern Nevada: identified passerine species by sight and vocalization, banded birds, and sampled vegetation; assisted in evaluation of cavity nesting requirements for American kestrels (*Falco sparverius*), mountain bluebirds (*Sialia currucoides*), house wrens (*Troglodytes aedon*), tree swallows (*Tachycineta bicolor*), European starlings (*Sturnus vulgaris*), and red-naped sapsuckers (*Sphyrapicus nuchalis*); conducted surveys for sage grouse (*Centrocercus urophasianus*).

Teaching Experience

Assistant Professor

Western Washington University
2006-present

Teach upper-division classes in the Department of Environmental Sciences; full class design including developing student learning outcomes, preparation of course materials, student assessment, etc.; courses taught include ESCI 329 Energy and the Environment (Spring 2008), ESCI 392 Introduction to Global Change (Fall 2007), ESCI 423/523 Past Environments of the Pacific Northwest (Spring 2007, 2008), ESCI 492/592 Climate Change (Winter 2007, 2008), ESCI 497S: The Hockey Stick Debate (Fall 2006).

Trainer/Mentor

Woods Hole Research Center
2004-2006

Trained and mentored research assistants, research associates, and interns in research and educational activities related to the WHRC; provided programming and statistical assistance; assisted in preparation of manuscripts and other publication materials.

Instructor

Woods Hole Research Center
July 2005

Content Institute on Climate Change
Participated in a weeklong training for Massachusetts teachers; assisted in developing class; developed lecture and workshop material; followed-up with participants.

Teaching Assistant

Montana State University
Fall 2001

Remote Sensing and Image Processing
Gave lectures and ran laboratories in an introductory remote sensing class; graded papers, homework assignments and lab reports; held office hours; tutored students.

Publications

Submitted

Bunn, A.G. Submitted. The rock and ice problem in national parks: an opportunity for monitoring climate change impacts. *Park Science*.
Stephenson, N.L., P.J. van Mantgem, H. Bruner, M.E. Harmon, K.B. O'Connell, **A.G. Bunn**, D.L. Urban, and J.F. Franklin. Submitted. Causes of broad-scale patterns in tree mortality rates: comparing tropical and temperate forest. *American Naturalist*.

Published

Bunn, A.G. 2008. A dendrochronology program library in R (dplR). *Dendrochronologia*, in press.
Malanson, G.P., D.R. Butler, D.B. Fagre, S.J. Walsh, D.F. Tomback, L.D. Daniels, L.M. Resler, W.K. Smith, D.J. Weiss, D.L. Peterson, **A.G. Bunn**, C.A. Hiemstra, D. Liptzin, P.S. Bourgeron, Z. Shen, and C.I. Millar. 2007. Alpine treeline of western North America: Linking organism-to-landscape dynamics. *Physical Geography* 28, 378–396.
Houghton, R.A., D. Butman, **A.G. Bunn**, O.N. Krankina, P. Schlesinger, T.A. Stone. 2007. Mapping Russian forest biomass with data from satellites and forest inventories. *Environmental Research Letters* 2, 045032 (7pp): doi:10.1088/1748-9326/2/4/045032.

- Lloyd, A.H. and **A.G. Bunn**. 2007. Responses of the circumpolar boreal forest to 20th century climate variability. *Environmental Research Letters* 2, 045013 (13pp): doi:10.1088/1748-9326/2/4/045013.
- Schrag, A.M., **A.G. Bunn**, and L.J. Graumlich. 2007. Influence of bioclimatic variables on treeline conifer distribution in the Greater Yellowstone Ecosystem: implications for species of special concern. *Journal of Biogeography* doi:10.1111/j.1365-2699.2007.01815.x.
- Bunn, A.G.**, S.J. Goetz, J.S. Kimball, and K. Zhang. 2007. Northern high latitude ecosystems respond to recent climate change. *Eos* 88:333-335.
- Bunn, A.G.** and S.J. Goetz. 2006. Trends in satellite observed circumpolar photosynthetic activity from 1982-2003: The influence of seasonality, cover type and vegetation density. *Earth Interactions* 10:1-19.
- Goetz, S.J., G.J., Fiske, and **A.G. Bunn**. 2006. Using satellite time-series data sets to analyze fire disturbance and recovery in the Canadian boreal forest. *Remote Sensing of Environment* 101:352-365.
- Zambon, M., R.L. Lawrence, **A.G. Bunn**, and S. Powell. 2006. Effect of alternative splitting rules on image processing using classification tree analysis. *Photogrammetric Engineering & Remote Sensing* 72 (1): 25-30.
- Bunn, A.G.**, S.J. Goetz, and G.J. Fiske. 2005. Observed and predicted responses of plant growth to climate across Canada. *Geophysical Research Letters* 32:L16710.
- Goetz, S.J., **A.G. Bunn**, and G.J. Fiske. 2005. Satellite observed photosynthetic trends across boreal North America associated with climate and fire disturbance. *Proceedings of the National Academy of Sciences* 103(38): 13521-13525.
- Bunn, A.G.**, L.J. Graumlich, and D.L. Urban. 2005. Interpreting the climatic significance of trends in twentieth-century tree growth at high elevations. *The Holocene* 15(4): 481-488.
- Graumlich, L.G., Waggoner, L.A., and **A.G. Bunn**, 2005. Detecting change at alpine treeline: coupling paleoecology with contemporary studies. In *Global Change and Mountain Regions: An Overview of Current Knowledge. Series: Advances in Global Change Research, Vol. 23* (ed. by U. Huber, H. Bugmann, and M. Reasoner), pp 405-412. Springer, Dordrecht, the Netherlands. ISBN: 1-4020-3506-3, 650 p.
- Bunn, A.G.**, L.A. Waggoner, and L.J. Graumlich. 2005. Topographic mediation of growth in high elevation foxtail pine (*Pinus balfouriana* Grev. et Balf.) forests in Sierra Nevada, USA. *Global Ecology and Biogeography* 14: 103-114.
- Bunn, A.G.**, T.J. Sharac, and L.J. Graumlich. 2004. Using a simulation model to compare methods of tree-ring detrending and to investigate the detectability of low-frequency signals. *Journal of Tree-Ring Research* 60(2): 77-90.
- Lawrence, R.L., **A.G. Bunn**, S. Powell, and M. Zambon. 2004. Classification of remotely sensed imagery using stochastic gradient boosting as a refinement of classification tree analysis. *Remote Sensing of Environment* 90:331-336.
- Bunn, A. G.**, R.L. Lawrence, G.J. Bellante, L.A. Waggoner, and L.J. Graumlich. 2003. Spatial variation in distribution and growth patterns of old growth strip-bark pines. *Arctic, Antarctic and Alpine Research* 35:323-330.
- Bunn A.G.**, D.L. Urban, and T. Keitt. 2000. Landscape connectivity: a conservation application of graph theory. *Journal of Environmental Management* 59: 265-278.
- Bunn A.G.**, W. Klien, and K.L. Bildstein. 1995. Time-of-day effects on the numbers and behavior of non-breeding raptors in Eastern Pennsylvania. *Journal of Field Ornithology*, 66(4): 544-552.

Grants

- National Science Foundation**, Office of Polar Programs/Division of Arctic Sciences/Course, Curriculum and Laboratory Improvement/International Polar Year: The Polaris project: rising stars in the Arctic, 2008-2010, Award 0732477
- National Science Foundation**, Arctic System Science, Past, present and future productivity of arctic woody vegetation in a warming climate, 2006-2009, Award 0612341
- National Science Foundation**, Paleoclimate, A geospatial approach to dendro-climatology of multi-millennial bristlecone pine, 2006-2009, Award 0629172
- U. S. Geological Survey**, The role of demography in forest carbon dynamics, 2005-2006, Cooperative Agreement 05WRAG0015
- Canon National Parks Science Scholarship**, Forecasting global climate change at alpine treeline: integration across space and time, 2001-2004
- Montana Space Grant Consortium**, Assessing sensitivity of alpine treeline, 2001-2002

Selected Presentations

- Biotic response of the northern high latitudes to climate change. Biology Seminar, Western Washington University. Bellingham, Washington. February 2008.
- Whither dendroclimatology? Fall meeting of the American Geophysical Union. San Francisco, California (Eos Trans. AGU, 88(52), Fall Meet. Suppl., Abstract PP54A-01). December 2007. Invited talk.
- An overview of climate change in the high latitudes. Presidio of San Francisco, National Park Service. San Francisco, California. December 2007. Invited talk.
- A geospatial approach to dendroclimatology. Geology Seminar, Western Washington University. Bellingham, Washington. May 2007.
- Northern high latitude ecosystems respond to climate variability. Earth and Space Sciences Seminar, University of Washington. Seattle, Washington. April 2007.
- Associations between tree growth, NDVI, and climate in boreal forests. Fall meeting of the American Geophysical Union. San Francisco, California (Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract B24A-02). December 2006.
- Space-based photosynthetic trends in high latitude mountains: Greening or browning? MTNCLIM 2006, Mt. Hood, Oregon, September 2006. Invited talk.
- High latitude global change: Coupling paleoecology, contemporary studies, and modelling. Acadia University, Wolfville, Nova Scotia, Canada. January 2006.
- Are the high latitudes greening or browning? Evidence for nonlinear responses in tree growth and the satellite record. Fall meeting of the American Geophysical Union. San Francisco, California (Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract B42A-03). December 2005
- Photosynthetic trends in the high latitudes: Is the boreal forest greening or browning? Botany Seminar, University of Wyoming. Laramie, Wyoming. December 2005.
- Backpacking for science: Undergraduate-led research in Sequoia National Park. Biology Seminar, Middlebury College. Middlebury, Vermont. April 2005.
- Mountain carbon sheds. Woods Hole Research Center Ecopresentation. Woods Hole, MA. May 2004.
- Global warming in the Gallatin Valley and beyond. The Northern Rockies Bioneers Conference. Bozeman, Montana. October 2003.
- A decade Sierran treeline research. Sierra Nevada and Western Mountain Global Change Workshop. Sequoia National Park, California. March 2003.

Merging time and space: Variability in tree-ring widths and the physical template. Annual meeting of the International Association of Landscape Ecologists. Banff, Alberta, Canada. April 2003.

Global change in alpine environments. Museum of the Rockies. Bozeman, MT. March 2003.

Comparison of topographic correction algorithms for use with Landsat ETM+ in mountainous landscapes. ACSM-ASPRS Conference and Technology Exhibition. Washington, DC. April 2002.

Interpreting the climatic significance of trends in twentieth-century tree growth at high elevations. Fall meeting of the American Geophysical Union. San Francisco, California. December 2001 (Eos Trans. AGU, 82(47), Fall Meet. Supplement, Abstract GC22B-01, 2001).

A multivariate analysis of tree growth at high elevations. Annual meeting of the Ecological Society of America. Madison, Wisconsin. August 2001.

Variability in the physical and biotic templates of alpine treeline. Annual meeting of the International Association of Landscape Ecologists. Tempe, Arizona. April 2001.

Landscape connectivity: A conservation application of graph theory. Fourth International Conference on GIS and Environmental Modeling. Banff, Alberta, Canada. September 2000.

Using GIS to compute a least-cost distance matrix: A comparison of terrestrial and marine ecological applications. Annual meeting of the Society for Conservation GIS. Borego Springs, California. June 2000. Invited talk.

Conservation and metapopulation applications of graph theory. Annual meeting of the International Association of Landscape Ecologists. Ft. Lauderdale, Florida. April 2000.

Landscape connectivity. Graduate Afternoon Seminar. Duke University, Durham, North Carolina. January 2000.