



## Shanti Berryman, PhD

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### ACADEMIC AND PROFESSIONAL QUALIFICATIONS

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| 2003 | Ph.D., Plant Community Ecology and Lichenology, Oregon State University, Corvallis, Oregon. |
| 1996 | B.Sc., Forest Ecology, The Evergreen State College, Olympia, Washington.                    |

Member, Ecological Society of America

Member, America Bryological and Lichenological Society

Adjunct Professor, Department of Biology, University of New Mexico.

### SUMMARY OF EXPERIENCE

Shanti Berryman is a vegetation ecologist, lichenologist, and a principal of the Integral Ecology Group in Victoria, British Columbia. She has more than ten years of research and consulting experience related to terrestrial ecology, lichenology, biodiversity, air pollution and environmental sciences. Shanti has applied her knowledge to a diversity of projects focusing on terrestrial ecosystems, biodiversity and land-use within the Alberta, and in Alaska, Oregon and Washington. Shanti brings a strong technical background in terrestrial ecology, land management, botany, and lichenology. Since 2002, Shanti has worked extensively on social-environmental issues related to impacts of air quality and industrial development on ecosystem health in the area of oil sands development of northeastern Alberta. The primary focus of her work has been:

1. Assessment of the interactions of human land use and ecosystem integrity, with a focus on biodiversity, land management, and traditional land use.
2. Research and monitoring air quality and impacts on terrestrial ecosystem health using lichens and mosses as bioindicators.
3. Designing and implementing long-term monitoring programs for evaluation of vegetation change and ecosystem health, including the development of biomonitoring programs to evaluate the effects of industrial atmospheric emissions and airborne contaminants to terrestrial ecosystems.
4. Assessing impacts of alternative forest management approaches on forest communities (vascular and non-vascular communities) through field monitoring and statistical models.

Shanti is currently an adjunct professor at University of New Mexico. She provides technical advice and research support to industry, government and stakeholder clients in Alberta, British Columbia, Saskatchewan and Alaska.

### SELECT PROFESSIONAL EXPERIENCE



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**Fort McKay Industry Relations Corporation, Fort McKay, Alberta**

2009-present

Leading a project with the ALCES Group to assess the cumulative environmental impacts of industrial development in Fort McKay's Traditional Territory. Participate in community consultation regarding new industrial development and land use initiatives in the Traditional Territory. Provide technical representation on Cumulative Environmental Management Association multi-stakeholder committees (Reclamation Working Group and Land Working Group, Linear Footprint Management Sub-group) focusing on terrestrial ecology, reclamation and land use in the Regional Municipality of Wood Buffalo. Reviewed multiple industrial project applications for environmental effects and reclamation plans. Reviewed the Lower Athabasca Regional Plan, which is being developed by the Government of Alberta, and continue to provide support for on-going review on this planning process.

**Teck Coal Limited, B.C.**

2012-present

Design and implementation of a fugitive dust and traditional plant study at Teck Highland Valley Copper Mine in BC to evaluate the presence, extent and magnitude of deposition of fugitive dusts from the mine and tailings pond, as well as evaluate the potential impacts to local traditional foods.

**Chipewyan Prairie Industry Relation Corporation**

2012-present

Reviews for multiple industrial project applications for environmental effects and reclamation plans.

**Matrix Solutions**

2012-present

Assisting in the development, design and implementation of a lichen caribou restoration project for a Statoil lease.

**Wahpeton Dakota Nation**

2012

Prepared a review of a diamond mining application for environmental effects and reclamation plans.

**Pacific Analytics**

2011

Assisted in the lichen flora survey assessment on Mauna Kea in Hawaii, at the site of a potential new telescope.

**Wood Buffalo Environmental Association, Terrestrial Environmental Effects Monitoring Committee, Fort McMurray, Alberta**



2009-present

Participate in a five-year program for the development of lichen monitoring protocols for nitrogen sensitive bog ecosystems. Projects include assessment of lichen communities, physiology and tracking nitrogen and sulphur accumulation in lichens. Results from this work will inform long-term monitoring indicators for bogs in the Athabasca Oil Sands region.

2002-2010

Co-led a study where we designed, developed and implemented a research program to map characteristics of air pollution deposition patterns in the Athabasca Oil Sands region using epiphytic lichens as bioindicators. The focus of the project was to map the spatial distribution of nitrogen and sulphur pollution from industrial operations, and to compare these to modeled nitrogen and sulphur deposition and to measured nitrogen and sulphur compounds at monitoring sites.

2009

Assisted in the development of a long-term community-based monitoring program to assess and measure quality and availability of select berry populations in northeastern Alberta, utilizing both western scientific and Traditional Ecological Knowledge related research. Responsibilities included review of approach from the scientific perspective and assistance in a community workshop in Fort McKay, Alberta, to establish approach.

February 2004 - December 2006

Provided consultation and technical review of documents related to the lichen air monitoring program and the Acidification Monitoring Program in the Athabasca Oil Sands region.

August 2002 - February 2004

Designed and directed a research pilot program using boreal forest lichens as bioindicators of air pollution near oil sands mining facilities. The pilot project evaluated deposition of nitrogen, sulphur and other trace metals near industrial operations in the oil sands of northeastern Alberta. Project responsibilities included design, coordination of all field logistics and data collection, identifying lichen specimens, data analysis and reporting.

### **Cumulative Environmental Management Association NO<sub>x</sub>-SO<sub>2</sub> Management Working Group, Fort McMurray, Alberta**

2008

Co-authored a report reviewing the potential for current vegetation monitoring datasets and programs to be used to assess the effects of nitrogen deposition on terrestrial ecosystems, and recommended design principles for such monitoring.

2009-present

Co-leading a project to design and implement a nitrogen addition experiment in the jack pine uplands of the boreal forests in northeastern Alberta. This is an ongoing multi-year experiment that is being implemented to understand the fate of atmospherically deposited nitrogen to these systems in order to determine nitrogen critical loads.



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### **Suncor Energy Inc.**

2009

Conceptual development of a coordinate wetland monitoring program for Suncor Energy Inc. Responsibilities included coordinating with technical experts, facilitating meetings and reporting to develop the plan.

### **US Department of the Interior**

2007-2009

- Western Arctic National Parklands, Kotzebue, Alaska

Conducted a lichen inventory project to describe lichen biodiversity and lichen community structure in Kobuk Valley National Park and Cape Krusenstern National Monument. This project provided a baseline for biodiversity of lichens in the national parks and will be used as a reference for long-term monitoring. Project responsibilities included design, coordination of all field logistics and data collection, identifying lichen specimens, data analysis and reporting.

Summers of 2000, 2001, and 2006

- Western Arctic National Parklands, Kotzebue, Alaska

Conducted a pilot project and a follow-up full-scale project that assessed heavy metal pollution impacts on lichen communities along the Red Dog Mine haul road in Cape Krusenstern National Monument. Results included maps of metals, follow-up monitoring and recommendations for mitigation. Coordinated all field logistics, organized field team and collected field data, and identified lichen specimens collected during the field season.

1997

- Denali National Park, Denali Park, Alaska

Volunteered to perform lichen surveys and lichen identification to develop a park inventory of the lichen flora in for Denali National Park, Alaska.

### **Oregon State University, Corvallis, Oregon**

2003- 2006

- Department of Forest Science

Coordinated the Density Management Study vegetation research program, evaluating vegetation response to alternative silviculture practices in young Douglas-fir forests of western Oregon. Supervised field crew and research assistants, developed and managed a long-term vegetation database, coordinated and participated in workshops for the Bureau of Land Management, US Forest Service, research scientists and interested public. Assistant taught in the advanced silviculture class, integrating the ecological implications of silvicultural practices. Analyzed vegetation data and prepared results for summaries to forest managers, for workshops and scientific meetings and for publication.

1998-2001



- Department of Botany and Plant Pathology

Researched epiphytic lichen communities and biomass in relation to forest management and topography in the Blue River watershed of the Willamette National Forest, Oregon. Designed protocol, implemented project, analyzed data, and prepared final manuscripts as part of my Ph.D. dissertation. Assisted with teaching of undergraduate classes: general ecology, introductory biology, human impacts on ecosystems, and ecological methods.

### US Department of Agriculture

August 2003

- Siuslaw National Forest, Corvallis, Oregon

Collected vegetation samples in Glacier National Park for the Western Airborne Contaminants Assessment Program.

1998-2003, seasonal

- Forest Health Monitoring and Forest Inventory and Analysis Program

Identified lichens collected in Oregon, Washington and Idaho. Performed quality assurance field checks on lichen community plots. Participated in a short-term project assessing lichen communities in forested urban areas of OR and WA. Conducted a lichen training class in Logan, Utah, and certification for field crew.

Summers of 1999, 1998, and October - November 1997

- Willamette National Forest, McKenzie Bridge, Oregon

Planned and implemented the field component for a study of lichen communities and lichen biomass in the Blue River watershed as part of my Ph.D. dissertation. Hired, supervised, and trained co-workers.

December 1997, May – October of 1996 and 1997, and summers of 1995 and 1994

- Gifford Pinchot National Forest, Washington, and Siuslaw National Forest, Corvallis, Oregon

Organized and implemented the Pacific Northwest Regional Air Quality Project on the Gifford Pinchot National Forest, assessing air pollution using lichens as bioindicators. Identified lichen collections. Hired, trained and supervised co-workers.

## REPORTS AND PUBLICATIONS

### PUBLICATIONS

Edgerton, E., M. Fort, K. Baumann, J. Graney, M. Landis, **S. Berryman**, AND S. Krupa. Method for Extraction and Multielement Analysis of Hypogymnia Physodes Samples from the Athabasca Oil Sands Region. Chapter 14, Alberta Oil Sands: Energy, Industry, and the Environment. Elsevier Ltd, Oxford, Uk, 11:315-341, (2012).

Ares, A., **S. D. Berryman**, and K. J. Puettmann. 2009. Understory vegetation response to thinning disturbance of varying complexity in coniferous stands. Journal of Applied Vegetation Science. 12(4):



472-487.

**Berryman, S.** and B. McCune. 2006. Epiphytic lichens along gradients in topography and stand structure in western Oregon, USA. *Pacific Northwest Fungi* 1(2): 1-38.

**Berryman, S.** and B. McCune. 2006. Estimating epiphytic macrolichen biomass from topography, stand structure and lichen community data. *Journal of Vegetation Science* 17: 157-170.

McCune, B., **S. D. Berryman**, J. H. Cissel, and A. I. Gitelman. 2003. Use of a smoother to forecast occurrence of epiphytic lichens under alternative forest management plans. *Ecological Applications* 13(4): 1110-1123.

McCune, B., J. Hutchinson, and **S. Berryman**. 2002. Concentration of rare lichens along large streams in a mountainous watershed in Oregon, USA. *The Bryologist*. 105(3): 439-450.

Hasselbach, L., J. M. Ver Hoef, J. Ford, P. Neitlich, E. A. Crecelius, **S. D. Berryman**, B. Wolk, and T. Boehle. 2005. Spatial patterns of cadmium and lead deposition on and adjacent to National Park Service lands in the vicinity of Red Dog Mine, Alaska. *Science of the Total Environment* 348: 211-230.

## REPORTS

S. Berryman, T. Behr, K. Finigan, and M. Lagimodiere. October 2012. Star-Orion South Diamond Mine Project Technical Review. Prepared for Wahpeton Dakota Nation.

Adamanche, L., **S. Berryman, S.**, R. Bothe, J. Dennis, P. Evans, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, N. Melaschenko, B. Miskimmin, and D. Spink. October 2012. Fort McKay's Review of Marathon Oil Canada Corporation Birchwood SAGD Project Environmental Protection and Enhancement Act Approval Application. Prepared for the Fort McKay Sustainability Department.

Adamanche, L., **S. Berryman, S.**, R. Bothe, J. Dennis, P. Evans, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, N. Melaschenko, B. Miskimmin, and D. Spink. September 2012. Fort McKay's Review of Sunshine Oilsands Ltd. Thickwood SAGD Project EPEA and Water Act Application. Prepared for the Fort McKay Sustainability Department.

Adamanche, L., **S. Berryman, S.**, R. Bothe, J. Dennis, P. Evans, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, N. Melaschenko, B. Miskimmin, and D. Spink. September 2012. Fort McKay's Review of Sunshine Oilsands Ltd. Legend Lake SAGD Project EPEA and Water Act Application. Prepared for the Fort McKay Sustainability Department.

Adamanche, L., **S. Berryman, S.**, R. Bothe, J. Dennis, P. Evans, K. Finigan, A. Garibaldi, D. Geller, J. Nishi, S. Stoklosar, J. Straker, and R. Stuart. August 2012. Review of Canadian Natural Resources Ltd. Kirby In Situ Oil Sands Expansion Project Integrated Application. Prepared for the Chipewyan Prairie Industry Relations Corporation.

Adamanche, L., T. Behr, **S. Berryman, S.**, R. Bothe, J. Dennis, J. Errington, P. Evans, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, N. Melaschenko, B. Miskimmin, and D. Spink. June 2012. Fort McKay's Review of Teck Resources Ltd. Frontier Oil Sands Mine Project Integrated Application. Prepared for the Fort McKay Sustainability Department.





Adamanche, L., **S. Berryman, S.**, R. Bothe, J. Dennis, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, N. Melaschenko, B. Miskimmin, B. Simonsen, and D. Spink. June 2012. Fort McKay's Review of Southern Pacific Resource Corp. Application for Approval of the STP Thermal Project – Phase 2. Prepared for the Fort McKay Sustainability Department.

Adamanche, L., **S. Berryman, S.**, R. Bothe, J. Dennis, P. Evans, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, B. Miskimmin, C. Molstad, and D. Spink. July 2012. Fort McKay's Review of Cenovus TL ULC Telephone Lake Project Approval for Application. Prepared for the Fort McKay Sustainability Department.

Adamanche, L., **S. Berryman, S.**, R. Bothe, J. Dennis, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, B. Miskimmin, and D. Spink. April 2012. Fort McKay's Review of Athabasca Oil Sands Corp. Application for Approval of the Dover West Clastics Project. Prepared for the Fort McKay Sustainability Department.

Adamanche, L., J. Baker, **S. Berryman, S.**, R. Bothe, J. Dennis, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, B. Miskimmin, and D. Spink. January 2012. Fort McKay's Review of Athabasca Oil Sands Corp. Application for Approval of the Leduc TAGD Pilot Project. Prepared for the Fort McKay Sustainability Department.

Adamanche, L., J. Baker, **S. Berryman, S.**, R. Bothe, J. Dennis, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, B. Miskimmin, and D. Spink. January 2012. Fort McKay's Review of Athabasca Oil Sands Corp. Application for Approval of the Leduc TAGD Pilot Project. Prepared for the Fort McKay Sustainability Department.

J. Baker, **S. Berryman, S.**, R. Bothe, J. Dennis, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, B. Miskimmin, and D. Spink. January 2012. Fort McKay's Review of Ledcor CMI Ltd. Clearwater Multi-User Access Road (Submitted to Transport Canada and Department of Fisheries and Oceans Canada) Environmental Assessment Screening Assessment. Prepared for the Fort McKay Sustainability Department.

**S. Berryman** and C.W. May 2011. Smith. Lichens and Bryophytes of Mauna Kea within the TMT Footprint and Impact Area, Summit of Mauna Kea. Prepared for Pacific Analytics.

**Berryman, S.**, R. Bothe, J. Dennis, A. Garibaldi, D. Geller, L. Gould, M. Lagimodiere, B. Miskimmin, D. Geller, D. Spink, and J. Straker. June 2011. Fort McKay's Review of Dover Operating Corp. Application for Approval of the Dover Commercial Project and Environmental Impact Assessment (Submitted to Energy and Resources Conservation Board and Alberta Environment). Prepared for the Fort McKay Sustainability Department.

**Berryman, S.**, R. Bothe, J. Dennis, L. Gould, M. Lagimodiere, B. Miskimmin, D. Geller, D. Spink and J. Straker. February 2011. Review of Ivanhoe Tamarack Project Application for Approval and Environmental Impact Assessment. Prepared for the Fort McKay Sustainability Department.

Vile, M. A., K. Wieder, **S. Berryman**, D. Vitt, J. Quinn, K. Scott and B. Xu. December 2010. Development of monitoring protocols for N & S sensitive bog ecosystems. 2010 Annual Report prepared for the Wood Buffalo Environmental Association.



**Berryman, S.,** A. Garibaldi, M. Lagimodiere, J. Sedley and J. Straker. November 2010. Review of Lower Athabasca Regional Advisory Council advice to the Government of Alberta regarding a vision for the Lower Athabasca Region. Prepared for the Fort McKay Industry Relations Corporation.

**Berryman, S.,** R. Bothe, J. Dennis, L. Gould, M. Lagimodiere, B. Miskimmin, D. Geller, D. Spink and J. Straker. October 2010. Review of Parsons Creek Aggregate Project Application for Approval and Environmental Impact Assessment. Prepared for the Fort McKay Industry Relations Corporation.

**Berryman, S.,** R. Bothe, J. Dennis, A. Garibaldi, L. Gould, M. Lagimodiere, B. Miskimmin, D. Geller, D. Spink and J. Straker. October 2010. Review of Sunshine West Ells SAGD Project Energy Resources Conservation Board (ERCB) and Alberta Environment (AENV) Approvals Application (March 1, 2010). Prepared for the Fort McKay Industry Relations Corporation.

Vile, M. A., K. Wieder, **S. Berryman,** D. Vitt, J. Quinn and K. Scott. June 2009. Development of monitoring protocols for nitrogen sensitive bog ecosystems, including for the development of lichen monitoring tools – 2009-2013. 2010 June Quarterly Report prepared for the Wood Buffalo Environmental Association.

Vile, M. A., K. Wieder, **S. Berryman,** D. Vitt, J. Quinn and K. Scott. June 2009. Development of monitoring protocols for nitrogen sensitive bog ecosystems, including for the development of lichen monitoring tools – 2009-2013. 2010 September Quarterly Report prepared for the Wood Buffalo Environmental Association.

Vile, M. A., K. Wieder, **S. Berryman,** D. Vitt, J. Quinn and K. Scott. December 2009. Development of monitoring protocols for nitrogen sensitive bog ecosystems, including for the development of lichen monitoring tools – 2009-2013. 2009 Annual Report prepared for the Wood Buffalo Environmental Association.

Fort McKay – Jacques Whitford AXYS Evergreen Inc. Authors included: **Berryman, S.,** C. Bryden, T. Gardner, A. Garibaldi, L. Halsey, C. Jones, D. Mason, J. Straker, S. Vincenzi, and S. Wilbur. August 2009. Suncor wetland monitoring program, proposed monitoring program in accordance with the terms and conditions of EPEA approval #94-02-00. Final Draft Report prepared for Suncor Energy Inc., Fort McMurray, Alberta.

**Berryman, S.,** J. Straker. 2008. Nitrogen loading and terrestrial vegetation – Assessment of existing regional monitoring and recommendations for future monitoring. Final report for Cumulative Environmental Management Association (CEMA), NO<sub>x</sub>-SO<sub>2</sub> Management Working Group, Eutrophication Task Group, Ft. McMurray, Alberta.

**Berryman, S.,** J. Straker and S. Krupa. 2007. Mapping the characteristics of air pollutant deposition patterns in the Athabasca Oil Sands Region using epiphytic lichens as bio-indicators. Final Design Report for the Wood Buffalo Environmental Association, Ft. McMurray, Alberta.

**Berryman, S.** 2007. Trends and variability in lichen chemistry data integrated across three studies for the Athabasca Oil Sands region in northeastern Alberta. Interim Report for the Wood Buffalo Environmental Association, Ft. McMurray, Alberta.

**Berryman, S. D.,** L. Geiser, and G. Brenner. 2004. Lichen Indicator Pilot Program, Final Report for the





Wood Buffalo Environmental Association, Ft. McMurray, Alberta.

Hasselbach, L., J. M. Ver Hoef, J. Ford, P. Neitlich, E. A. Crecelius, **S. D. Berryman**, B. Wolk, and T. Boehle. July 2004. Spatial patterns of cadmium and lead deposition on and adjacent to National Park Service lands near Red Dog Mine, Alaska: NPS Final Report. Resource Report, NPS/AR/NRTR-2004-45

McCune B. and **S. D. Berryman**. *Lichens of the Blue River Watershed and H. J. Andrews Experimental Forest Cascade Range, Oregon*. Lichen list created for the American Bryological and Lichenological Society field trip, August 2000.

#### EXTENDED ABSTRACT PAPERS

**Berryman, S.**, J. Straker, A. Garibaldi. *Supporting community-led development of ecological and socio-economic indicators in a mining region*. Proceedings of the first seminar on social responsibility in mining, Santiago Chile, October 2011. Editors: David Brereton, Dante Pesce, and Ximena Abogabir. GECAMIN.

**Berryman, S.**, J. Straker, S. Krupa, G. Brenner, J. Ver Hoef, and M. Davies. 2010. *Geospatial deposition mapping using lichens in the Athabasca Oil Sands Region*. Air & Waste Management Association extended abstract A-1002.

**Berryman, S.**, J. Straker and D. Straker. 2009. *Using lichens and mosses as bioindicators of air pollutant deposition near remote mining operations*. British Columbia Technical and Research Committee on Reclamation Mine Reclamation Symposium, Cranbrook, British Columbia, extended abstract paper.

#### DISSERTATION

**Berryman, S. D.** 2002. Epiphytic macrolichens in relation to forest management and topography in a western Oregon watershed. Ph.D. Dissertation, Oregon State University, Corvallis, OR.

### CONFERENCE PRESENTATIONS AND LECTURES

#### SCIENTIFIC MEETINGS

- August 2012 Poster presentation, Ecological Society of America, Portland, Oregon. *A community-led approach for landscape planning*
- Oct 2011 Presentation and paper, International Conference on Social Responsibility in Mining, Santiago. *Supporting community-led development of ecological and socio-economic indicators in a mining region*.
- June 2010 Air & Waste Management Association, Calgary, Alberta. Geospatial deposition mapping using lichens in the Athabasca Oil Sands Region.
- April 2010 42<sup>nd</sup> Air Pollution Workshop meeting, Asheville, North Carolina. Mapping patterns of atmospheric deposition in the Athabasca Oil Sands of Alberta using epiphytic lichens as bioindicators.
- July 2008 Botanical Society of America and Canadian Botanical Association meeting, Vancouver,



British Columbia. Mapping the characteristics of air pollutant deposition patterns using epiphytic lichens as bioindicators in the Athabasca Oil Sands region of northeastern Alberta.

- April 2007 39<sup>th</sup> Air Pollution Workshop meeting, Guadalajara, Mexico. Depositional gradients of atmospheric pollutants in the Athabasca Oil Sands region Alberta, Canada: an analysis of lichen tissue and lichen communities.
- Aug 2005 Ecological Society of America annual meeting, Montreal, Quebec. Characterizing understory vegetation response to variable density thinnings in young Douglas-fir forests of western Oregon
- April 2005 Science and the Northwest Forest Plan conference, Portland, Oregon. Characterizing vegetation response to variable density thinnings in young Douglas-fir forests of western Oregon.
- March 2005 Northwest Scientific Association meeting, Corvallis, Oregon. Depositional gradients of atmospheric pollutants in the Athabasca Oil Sands Region, Alberta, Canada. An analysis of lichen tissue and lichen communities.
- Aug 2004 Balancing Ecosystem Values: innovative experiments for sustainable forestry, Portland, Oregon. Characterizing vegetation response to variable density thinnings in young Douglas-fir forests of western Oregon.
- Aug 2004 International Association of Lichenology, fifth symposium, University of Tartu, Tartu, Estonia. Estimating epiphytic macrolichen biomass from topography, stand structure, and lichen community data in Oregon, USA.
- June 2002 Mycological Society of America annual meeting, Oregon State University, Corvallis, Oregon. Epiphytic macrolichens along gradients in topography and forest structure in a western Oregon landscape.
- March 2001 Northwest Scientific Association annual meeting, Humboldt State University, Arcata, California. Estimating epiphytic macrolichen biomass from lichen community data in the Blue River watershed, Oregon Cascades.
- Aug 2000 American Bryological and Lichenological Society annual meeting, Portland, Oregon. Variation in epiphytic lichen communities and biomass among forest stand types in the Blue River watershed of western Oregon.
- March 2000 Northwest Scientific Association annual meeting, University of Idaho, Moscow, Idaho. Differences in epiphytic lichen communities and biomass among forest stand types in the Blue River landscape.

#### ORGANIZED WORKSHOPS, SEMINARS AND LECTURES

- Nov 2009 Guest lecturer at University of New Mexico, Albuquerque, New Mexico. *Lichens as biological indicators of air quality.*



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- Oct 2009 Wood Buffalo Environmental Association Terrestrial Environmental Effects Monitoring Committee Acidification Monitoring Program planning meeting, Fort McMurray, Alberta. *Lichens as bioindicators of air pollution in the Athabasca Oil Sands: linkages with the Acidification Monitoring Program.*
- Oct 2009 The Canadian Society of Environmental Biologists, Edmonton, Alberta. *Using lichens and mosses as bioindicators of air pollutant deposition near remote mining operations.*
- Sept 2009 British Columbia Technical and Research Committee on Reclamation Mine Reclamation Symposium, Cranbrook, British Columbia. *Using lichens and mosses as bioindicators of air pollutant deposition near remote mining operations.*
- April 2009 Wood Buffalo Environmental Association Terrestrial Environmental Effects Monitoring Committee Workshop, Banff, Alberta. *Mapping the characteristics of air pollutant deposition patterns in the Athabasca Oil Sands region using epiphytic lichens as bioindicators.*
- Dec 2008 Cumulative Environmental Management Association NO<sub>x</sub>-SO<sub>2</sub> Management Working Group and Wood Buffalo Environmental Association Terrestrial Environmental Effects Monitoring Committee Nitrogen Eutrophication Workshop, Calgary, Alberta. *Lichen studies in the Regional Municipality of Wood Buffalo – implications for setting critical loads.*
- Oct 2007 Wood Buffalo Environmental Association Terrestrial Environmental Effects Monitoring Committee and Cumulative Environmental Management Association NO<sub>x</sub>-SO<sub>2</sub> Management Working Group joint workshop, Banff Park Lodge, Banff, Alberta. *Mapping the characteristics of air pollutant deposition patterns in the Athabasca Oil Sands Region using epiphytic lichens as bio-indicators.*
- Oct 2007 Guest lecturer at University of New Mexico, Albuquerque, New Mexico. *Fungi.*
- April 2005 Guest lecturer at Oregon State University, Corvallis, Oregon. *Advanced Silviculture, Lichens and Bryophytes.*
- June 2004 Density Management Study Workshop, Oregon State University, Corvallis, Oregon. *Vegetation response to alternative density management treatments.*
- Jan 2004 Seminar, Department of Forest Science, Oregon State University, Corvallis, Oregon. *Small and large scale forest structural diversity: effects on lichens.*
- Oct 2002 *Epiphytic macrolichens in relation to forest management and topography in a western Oregon watershed.* Ph.D. dissertation seminar, Department of Botany and Plant Pathology, Oregon State University, Corvallis, Oregon.
- March 2002 Central Cascades Adaptive Management Area Annual Workshop, H. J. Andrews Experimental Forest Headquarters, Blue River, Oregon. *Epiphytic macrolichens in relation to topography and forest management in the Blue River watershed.*
- March 2002 Long Term Ecological Research meeting, Oregon State University, Corvallis, Oregon. *Epiphytic macrolichen communities and biomass in the Blue River watershed.*
- April 2001 Biology Graduate Student Symposium, Hatfield Marine Science Center, Newport,



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Oregon. *Estimating epiphytic macrolichen biomass from lichen community data in the Blue River watershed, Oregon Cascades.*

- Nov 1999 Thesis proposal seminar, Department of Botany and Plant Pathology, Oregon State University, Corvallis, OR. *Differences in epiphytic lichen communities among forest stand types: from a landscape perspective.*
- May 1999 Poster for the Adaptive Management Symposium, Willamette National Forest, Eugene, Oregon. *Species composition and biomass of epiphytic lichen communities in the Blue River landscape.*
- March 2000 Northwest Scientific Association annual meeting, University of Idaho, Moscow, Idaho. *Differences in epiphytic lichen communities and biomass among forest stand types in the Blue River landscape.*
- Nov 1999 Guest lecturer at Lane Community College, Eugene, Oregon. *Lichen ecology and taxonomy.*
- Aug 1998 Guest speaker at the Central Cascade Center Nature Talks, Willamette National Forest, Blue River, Oregon. *Lichen ecology.*