

M. Derek MacKenzie

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RESEARCH INTERESTS

- Ecosystem ecology of natural and anthropogenic disturbance
- Spatial patterns of above and belowground processes
- Fire ecology, black carbon, and biochar
- Stable isotopes in the environment
- Land reclamation and restoration ecology

EDUCATION

Ph.D. Forestry. April 2004, The University of Montana. Dissertation: Fire exclusion, forest dynamics and nitrogen cycling in low elevation forests of western Montana.

M.Sc. Geography. May 1999, Simon Fraser University. Thesis: The effect of mechanical site preparation on soil properties, nutrient dynamics and tree growth: Tenth year results for two sites in northern BC.

B.Sc. Environmental Geography. May 1996, Concordia University. Honors Thesis: A comparison between the growth rates of artificially and naturally regenerated tree species.

PROFESSIONAL HISTORY

2010 to present: Assistant Professor, Soil-Plant Relations, University of Alberta. Faculty position to teach and conduct research in soil-plant relations, soil mediated plant nutrient cycling, disturbance ecology, and land reclamation. Teaching assignment: RENR 210 – Introduction to Soil Science; RENR 366 – Restoration Ecology (co-taught), RENR 299 – Summer Field School.

2008 to 2010: Research Associate, Soil Biogeochemistry, University of Alberta. Supervisor: Dr. Sylvie Quideau. Research position to design and conduct experiments and field observations on land reclamation in the Athabasca oil sands focusing on inorganic plant nutrient turnover and ecosystem recovery, and to co-supervise graduate students, undergraduate students, and lab technicians.

2006 to 2008: Post-Doctoral Fellow, Soil Biogeochemistry, University of Alberta. Supervisor: Dr. Quideau. Post-doctoral research position to collect samples and perform experiments examining soil chemistry, microbial community structure, and plant dynamics in land reclamation, and supervision of graduate students, field and lab technicians.

2005 to 2006: Post-Doctoral Fellow, Soil Biogeochemistry, joint position with the University of California and the University of Alberta. Supervisors: Dr. Robert Graham and Dr. Quideau. Post-doctoral research position to collect samples and develop laboratory experiments to determine the quantity and spatial variability of charcoal, to test the quality of organic matter formed in the

presence of charcoal in different ecosystems of the Sierra Nevada, California, supervision of graduate students, field and lab technicians.

2004 - 2005: Post-Doctoral Fellow, Forest Soils, University of Montana. Supervisors: Dr. Thomas DeLuca and Dr. William Holben. Post-doctoral research position where I developed experiments to test the effect of charcoal and fire frequency on microbial dynamics, managed the soil analytical lab, supervised lab and field technicians, and collected field samples.

2000 - 2004: Research Assistant, Forest Soils, University of Montana. Supervisor: Dr. DeLuca. Collected field samples and conducted laboratory research on N cycling and plant community dynamics with increasing time since fire, managed the soil analytical lab, supervised lab and field technicians and TA Introduction to Soil Science.

1999 - 2000: Sessional instructor of Biogeography and Soil Science, Simon Fraser University. Supervisor: Dr. Ian Hutchinson. One semester appointments respectively to develop and teach the two courses listed above, supervise teaching assistants, examine and grade undergraduate students.

1996 - 1998: Research Assistant, Soil Science, Simon Fraser University. Supervisor: Dr. Margaret Schmidt. Conducted field work with assistants, monitored and collected soil samples from mechanical site preparation treatments at silvicultural sites established by the Ministry of Forests, BC, analyzed soil physical and chemical properties, and TA Introduction to Soil Science, Biogeography and Biogeochemistry.

PUBLICATIONS

Journal Articles

* underlined authors represent graduate students I supervised

30. Dietrich, S.T., and **M.D. MacKenzie**. **2018**. Biochar affects aspen seedling growth and reclaimed soil properties in the Athabasca oil sands region. Canadian Journal of Soil Science: in press.
29. Dietrich, S.T., **M.D. MacKenzie**, J. P. Battigelli, and J. R. Enterina. **2017**. Building a better soil for upland surface mine reclamation in northern Alberta: Admixing peat, subsoil, and peat biochar in a greenhouse study with aspen. Canadian Journal of Soil Science:1-14.
28. Howell, D.M. and **M.D. MacKenzie**. **2017**. Measuring ecosystem function to assess reclamation success: Nutrient and microbial profiles. Applied Soil Ecology. 116: 87-95.
27. Sorenson, P., **M.D. MacKenzie**, S.A. Quideau, and S. Landhäusser. **2017**. Spatial patterns in reclaimed stands in the Athabasca oil sands region. Ecological Engineering. 104: 57-66.
26. Das Gupta, S. and **M.D. MacKenzie**. **2016**. Spatial variability of soil respiration in pyrogenic boreal aspen ecosystems: Aboveground and belowground controls. PLOS One 11:e0165602, doi: 10.1371/journal.pone.0165602
25. Howell, D. M., S. Das Gupta, B. D. Pinno, and M. D. MacKenzie. **2016**. Reclaimed soils, fertilizer, and bioavailable nutrients: Determining similarity with natural benchmarks over time. Canadian Journal of Soil Science, 97: 149-158
24. Samrat Alam, M., M. Cossio, L. Robinson, X. Wang, J. P. L. Kenney, K. O. Konhauser, **M. D. MacKenzie**, Y. S. Ok, and D. S. Alessi. **2016**. Removal of organic acids from water using biochar and petroleum coke. Environmental Technology & Innovation 6:141-151.

23. Das Gupta, S., **M.D. MacKenzie**, and S.A. Quideau. **2015**. Using Spatial Ecology to Examine Above and Belowground Interactions on a Reclaimed Aspen Stand in Northern Alberta. *Geoderma*, 260:12-22.
22. Soucémariadin, L.N., S.A. Quideau, **M.D. MacKenzie**, A.D. Munson, Juliette Boiffin, G.M. Bernard, R.E. Wasylishen. **2015**. Total and pyrogenic carbon stocks in black spruce forest floors from eastern Canada. *Organic Geochemistry*, 82:1-11.
21. Pinno, B. D., S. M. Landhäuser, P. S. Chow, S.A. Quideau, and **M.D. MacKenzie**. **2014**. Nutrient uptake and growth of fireweed (*Chamerion angustifolium*) on reclamation soils. *Canadian Journal of Forest Research*, 44:1-7.
20. Soucémariadin, L. N., S. A. Quideau, and **M.D. MacKenzie**. **2014**. Pyrogenic carbon stocks and storage mechanisms in podzolic soils of fire-affected Quebec black spruce forests. *Geoderma* 217–218:118-128.
19. Soucémariadin, L. N., S. A. Quideau, **M.D. MacKenzie**, G. M. Bernard, and R. E. Wasylishen. **2013**. Laboratory charring conditions affect black carbon properties: A case study from Quebec black spruce forests. *Organic Geochemistry*, 62:46-55.
18. Quideau, S. A., S. D. Gupta, **M. D. MacKenzie**, and S. M. Landhäuser. **2013**. Microbial Response to Fertilization in Contrasting Soil Materials used during Oil Sands Reclamation. *Soil Sci. Soc. Am. J.* 77:145-154.
17. **MacKenzie, M.D.** and S. A. Quideau. **2012**. Laboratory Based Nitrogen Mineralization and Biogeochemistry of Two Soils Used in Oilsands Reclamation. *Canadian Journal of Soil Science*, 92: 131-142.
16. Pinno, B.D., S.M. Landhäuser, **M.D. MacKenzie**, S.A. Quideau, And P.K. Chow. **2012**. Trembling Aspen Seedling Establishment, Growth, and Response to Fertilization on Contrasting Soils used in Oilsands Reclamation. *Canadian Journal of Soil Science*, 92: 143-151.
15. Sorenson, P.T., S. A. Quideau, **M.D. MacKenzie**, S. M. Landhäuser, and S. W. Oh. **2011**. Forest floor development and biochemical properties in reconstructed boreal forest soils. *Applied Soil Ecology* 49:139-147.
14. Ball, P.N., **M.D. MacKenzie**, W.E. Holben and T.H. DeLuca. **2010**. Wildfire and charcoal enhance nitrification and ammonium oxidizing bacterial abundance in dry montane forest soils. *Journal of Environmental Quality*, 39:1243-1253.
13. **MacKenzie, M.D.** and S.A. Quideau. **2010**. Microbial Community Structure and Nutrient Availability in Oil Sands Reclaimed Boreal Soils. *Applied Soil Ecology*, 44: 32-41.
12. Swallow, M., S.A. Quideau, **M.D. MacKenzie** and B. Kischuk. **2009**. Microbial community structure and function: Effects of prescribed burning and topographic position. *Soil Biology and Biochemistry*, 41: 770-771.
11. Norris C.E., S.A. Quideau, J.S. Bhatti, R.E. Wasylishen, and **M.D. MacKenzie**. **2009**. Fire and harvest influence on jack pine soil organic carbon. *Canadian Journal of Forest Research*, 39: 642-654.
10. **MacKenzie, M.D.**, E.J.B. McIntire, S.A. Quideau and R.C. Graham. **2008**. Charcoal affect C and N contents in forest soils of Sierra Nevada, California. *Soil Science Society of America Journal*, 72: 1774-1785.
9. McMillan, R., S.A. Quideau, **M.D. MacKenzie** and O. Biryukova. **2007**. Nitrogen Mineralization and Microbial Activity in Reclaimed Boreal Forest Soils. *Journal of Environmental Quality*, 36: 1470-1478.
8. Kurth, V.J., **M.D. MacKenzie** and T.H. DeLuca. **2006**. Estimating charcoal content in forest mineral soils. *Geoderma*, 137: 135-139.
7. **MacKenzie, M.D.** and T.H. DeLuca. **2006**. Resin adsorption of carbon and nitrogen as

- influenced by season and time since fire. *Soil Science Society of America Journal*, 70: 2122-2129.
6. **MacKenzie, M.D.** and T.H. DeLuca. **2006**. Charcoal and shrubs modify soil processes in ponderosa pine forests of western Montana. *Plant and Soil*, 287: 257-266.
 5. **MacKenzie, M.D.**, T.H. DeLuca and A. Sala. **2006**. Fire exclusion and nitrogen mineralization in low elevation forests of western Montana. *Soil Biology and Biochemistry*, 38: 952-961.
 4. DeLuca, T.H., **M.D. MacKenzie** and M.J. Gundale. **2006**. Charcoal enhances nitrification in forest ecosystems. *Soil Science Society of America Journal*, 70: 448-453.
 3. **MacKenzie, M.D.**, M.G. Schmidt and L. Bedford. **2005**. Soil microclimate and N availability ten years after mechanical site preparation in northern British Columbia. *Canadian Journal of Forest Research*, 35: 1854-1866.
 2. Hart, S.C., T.H. DeLuca, G.S. Newman, **M.D. MacKenzie** and S.I. Boyle. **2005**. Post-fire vegetation dynamics as drivers of microbial community structure and function in forest soils. *Forest Ecology and Management*, 220: 166-184.
 1. **MacKenzie, M.D.**, T.H. DeLuca and A. Sala. **2004**. Forest structure and organic horizon analysis along a fire chronosequence in the low elevation forests of western Montana. *Forest Ecology and Management*, 203: 331-343.

Refereed Book Chapters

3. Deluca, T.H., M.J. Gundale, **M.D. MacKenzie**, and D.L. Jones. **2015**. Biochar effects on soil nutrient transformations. *In* J. Lehmann and S. Joseph (eds.) *Biochar for Environmental Management: Science and Technology, and Implementation*. Second Edition. Earthscan Publications Ltd, London.
2. Deluca, T.H., **M.D. MacKenzie** and M.J. Gundale. **2009**. Biochar effects on soil nutrient transformations. *In* J. Lehmann and S. Joseph (eds.) *Biochar for Environmental Management: Science, Technology*, Earthscan Publications Ltd, London.
1. **MacKenzie, M.D.** **2007**. Forest, range and wildland soils *In* *Land Use, Land Cover and Soil Sciences*, Encyclopedia of Life Support Systems, UNESCO Publications. Available on-line at: <http://portal.unesco.org>

Refereed Reports

1. **MacKenzie, M.D.**, S. Hofstetter, I. Hatam and B. Lanoil, **2014**. Carbon and Nitrogen Mineralization and Microbial Succession in Oil Sands Reclamation Soils Amended with Pyrogenic Carbon. Oil Sands Research and Information Network, University of Alberta, School of Energy and the Environment, Edmonton, Alberta. OSRIN Report No. TR-71. 29 pp.

Manuscripts in Review

- Das Gupta, S. and **M.D. MacKenzie**. Spatial variability of soil nutrients in pyrogenic boreal aspen ecosystems: Aboveground and belowground controls (submitted to *Biogeochemistry*)
- Dietrich, S and **M.D. MacKenzie**. Spatial heterogeneity of bioavailable nutrients and soil respiration in boreal sites recovering from natural and anthropogenic disturbance (submitted to *Frontiers in Environmental Science*)
- deBortoli, L., **M.D. MacKenzie**, et al. Plant community composition and trembling aspen establishment in response to seeding and weeding treatments on different reclamation coversoils (submitted to *Restoration Ecology*)

Hogberg, J., B. Pinno; MD. MacKenzie. Evaluating foliar nutrient concentration as an indicator of soil nutrients in reclaimed and natural forests in Alberta, Canada Contributing (submitted to Canadian Journal of Soil Science)

Hogberg, J., B. Pinno; MD. MacKenzie. Using a Nutrient Profile Similarity Index to Assess Reclamation Strategies in the Athabasca Oil Sands Region of Northern Alberta (submitted to Journal of Environmental Quality)

Manuscripts in Preparation

Martin, J. and M.D. MacKenzie. Comparing wildfire to land reclamation in the Athabasca oil sands region: Plant and microbial communities (80% complete)

Hemsley, T., S.A. Quideau and M.D. MacKenzie. Atmospheric nitrogen deposition on reconstructed boreal forest soils in the Athabasca oil sands region. (Environmental Pollution)

Hatam, I., M.D. MacKenzie, S. Hofstetter, and B. Lanoil. Microbial activity and succession in oil sands reclamation soils amended with pyrogenic carbon (80% complete)

Taghavimehr, J. and M.D. MacKenzie. Biochar application in a short rotation coppice system: Effects on microbes, nutrients, and greenhouse gases (70% complete)

RESEARCH GRANTS AND PROPOSALS

Lanoil, B., and **M.D. MacKenzie**, et al. 2017. Salvaged soils and stockpiles: The good, the bad, and the ugly. CNRL Research Contract. **\$438 000**

Okine, E., **M.D. MacKenzie**, et al. 2017. Examining the effect of biochar in the diet of cows for reducing greenhouse gas emissions. Agriculture and Agri-Food Canada, AGGP. **\$696 247**

MacKenzie, M.D. 2017. Quantifying Pyrogenic Carbon in Forest Soils of Western Canada. NSERC GREF administered by the University of Alberta. **\$24 000**

MacKenzie, M.D. 2014. Biochar is a Legacy Substrate that Modifies C and N Mineralization: Evaluating its Use in Land Reclamation. School of Energy and the Environment – Oil Sands Research and Information Network. **\$22 500**

MacKenzie, M.D. 2012. Re-establishment of forest ecosystem plants, microbes, and soil processes at Syncrude Canada Ltd. Aurora North Mine operation. Syncrude Canada Ltd. **\$762 099**

MacKenzie, M.D. 2011. NSERC Discovery. Examining black carbon in forested ecosystems of western Canada. **\$125 000**

MacKenzie, M.D. 2011. Start-up funds for the Pyrogenic Ecosystem and Restoration Ecology Lab (PEREL). Canada Foundation for Innovation-Leaders Opportunity Fund. **\$624 000**

Landhäusser, S., M. Dyck, **M.D. MacKenzie**, and E. Macdonald. 2010. The Efficacy of Subsoil Ripping to Improve Soil Conditions and Vegetation Establishment on Reclaimed Mine Sites: Establishing Resilient and Diverse Ecosystems in the Parkland Ecoregion. Helmholtz Alberta Initiative – Theme 6. **\$2.4 M**

Quideau, S.A., S. Landhäusser, **M.D. MacKenzie**, S. Grayston, R. Grant and C. Prescott. 2010. Carbon and Nitrogen Fluxes in Reconstructed Oil Sands Soils. NSERC CRD. **\$696 247**

Landhäusser, S., **M.D. MacKenzie**, and S.A. Quideau. 2009. Selectively salvaged B/C horizons and phosphorus availability: Greenhouse Experiment. CONRAD ERRG. **\$265 627**

Munson, A.D., S. Gauthier, D. Pare, S.A. Quideau, R.E. Wasylishen and **M.D. MacKenzie**. 2008. Fire severity and resilience: Impacts of climate change in boreal black spruce forests. NSERC Strategic proposal. **\$479 800**

Quideau, S.A., S. Landhäusser, and **M.D. MacKenzie**. 2008. Nutrient Biogeochemistry Phase II

Research Program in the Athabasca Oil Sands Region. CONRAD ERRG. **\$2.2 M**
MacKenzie, M.D., R.C. Graham, and S.A. Quideau. 2006. Charcoal in Sierra Nevada soils:
Quantification and spatial variability. Kearney Foundation, University of California.
\$ 40 000

DeLuca, T.H. and **M.D. MacKenzie**. 2004. Nitrogen fixation in *Ponderosa pinus* forest of
western Montana. McIntire-Stennis Grant, The University of Montana. **\$47 704**

DeLuca, T.H., W.E. Holben, **M.D. MacKenzie** and P.N. Ball. 2003. Soil charcoal and nitrogen
cycling in *Pinus ponderosa* ecosystems of western Montana. NSF-Ecosystems. **\$450 000**

HONORS, AWARDS AND SOCIETIES

2004 National Science Foundation Bursary, College of Forestry, University of Montana
2003 Student Presentation Award, Canadian Soil Science Society Annual Meeting, Montreal, QC
2003 Author Presentation Award, Soil Science Society of America Annual Meeting, Denver, CO
2000 National Science Foundation Bursary, College of Forestry, University of Montana
2000 McIntire-Stennis Fellowship, College of Forestry, University of Montana
1998 GREAT grant, Geography Department, Simon Fraser University
1996 Graduate Fellowship, Geography Department, Simon Fraser University
1995 Undergraduate Bursary, Geography Department, Concordia University

2002 to present Ecological Society of America
2000 to present Soil Science Society of America
1996 to present Canadian Society of Soil Science

ABSTRACTS, PROCEEDINGS AND PRESENTATIONS

deBortoli, L., **M.D. MacKenzie**, et al. **2017**. Plant and soil microbial community composition in
response to seeding and weeding treatments on different reclamation soils. Ecological
Society of America meeting. Portland, OR, Aug 14-17, 2017
Mathison, A., **M.D. MacKenzie**, et al. **2017**. Ensuring plant diversity and restoring soil function in
disturbed landscapes: Hitchhiking native forbs with white spruce. Ecological Society of
America meeting. Portland, OR, Aug 14-17, 2017
MacKenzie, M.D., et al. **2017**. Using a functional similarity index to assess reclamation strategies
in the Athabasca oil sands region of northern Alberta, Canada. Ecological Society of
America meeting. Portland, OR, Aug 14-17, 2017
Mausolf, M., **M.D. MacKenzie**, M. Flannigan. **2016**. Charcoal Stimulates Ectomycorrhizal Fungal
Association with Pine. ASA, CSSA and SSSA International Annual Meetings, Nov. 6-9,
Phoenix, Arizona
Dietrich, S. and **M.D. MacKenzie**. **2016**. Amendment of Biochar Improves Growth of
Aspen on Oil Sands Reclamation Cover Soils Due to Changes in Nutrient Availability and
SOM Stability. ASA, CSSA and SSSA International Annual Meetings, Nov. 6-9, Phoenix,
Arizona
Jeff Hogberg, Brad Pinno. **M Derek MacKenzie**. **2016**. Evaluating Foliar Nutrient Concentrations
As an Indicator of Belowground Function in Reclaimed Soils of the Athabasca Oil Sands
Region. ASA, CSSA and SSSA International Annual Meetings, Nov. 6-9, Phoenix, Arizona
Brad Pinno, Mark Howell, Sanatan Das Gupta, **M Derek MacKenzie**. **2016**. Similarity in Nutrient

- Profiles of Reclaimed and Natural Benchmark Soils in the Alberta Oil Sands. ASA, CSSA and SSSA International Annual Meetings, Nov. 6-9, Phoenix, Arizona
- M Derek MacKenzie**, Jill Martin, Sylvie Quideau. 2016. Comparing Plant and Microbial Community Recovery Between Land Reclamation and Wildfire in the Athabasca Oil Sands Region. ASA, CSSA and SSSA International Annual Meetings, Nov. 6-9, Phoenix, Arizona
- Dietrich, S.T. and **M.D. Mackenzie**. 2015. Spatial Pattern of Soil Respiration and Soil Microbial Biomass: Indicators for Reclamation Success. Oral presentation at the Soils Science Society of America conference, Minneapolis, MN.
- Mackenzie, M.D.**, Simmon Hofstetter, Ido Hatam and Brian Lanoil. 2015. Pyrogenic Carbon Is a Legacy Substrate in Wildfire Ecosystems Such As the Boreal Plains: Should It be Used in Land Reclamation? Oral presentation at the Soils Science Society of America conference, Minneapolis, MN
- Dietrich, S.T., S. Das Gupta and **M.D. MacKenzie**. 2015. Spatial variability in nutrient availability and CO₂ efflux in oil sands reclaimed and benchmark upland boreal forest ecosystems. Poster presentation at the Alberta Soil Science Workshop, Edmonton AB.
- Das Gupta, S. and **M.D. Mackenzie**. 2015. Spatial Patterns in Aboveground and Belowground Properties in Pyrogenic Boreal Aspen Ecosystems. Poster presentation at the Alberta Soil Science Workshop, Edmonton AB.
- Howell, D.M. and **M.D. MacKenzie**. 2015. Assessment of coarse-textured topsoil application depths on microbial community structure and function in oil sands reclamation. Poster presentation at the Alberta Soil Science Workshop, Edmonton AB.
- Taghavimehr, J. and **M.D. MacKenzie**. 2015. Short-Term Effect of Biochar on Soil Microbial Communities, Nutrient Availability, and Greenhouse Gases in Agroforestry Systems of Central Alberta. Oral presentation at the Alberta Soil Science Workshop, Edmonton AB.
- Taghavimehr, J. and **M.D. MacKenzie**. 2014. Can Biochar Improve Soil Function in an Agroforestry System?: Effects of Nutrient Supply, Microbial Activity, and Greenhouse Gases. Oral presentation at the Soil Science Society of America annual meeting, Long Beach CA.
- Howell D.M. and **M.D. MacKenzie**. 2014. Implications of topsoil placement depths for microbial communities in oil sands mine reclamation. Oral presentation at the Soil Science Society of America annual meeting, Long Beach CA.
- Das Gupta, S., **M.D. MacKenzie**, and S. A. Quideau. 2014. Aboveground and belowground patterns in pyrogenic boreal ecosystems: what governs nutrient availability? Oral presentation at the Soil Science Society of America Annual Meeting, Long Beach, CA.
- Filipow, N. and **M.D. MacKenzie**. 2014. Pyrogenic Carbon is a Legacy Substrate in Wildfire Ecosystems such as the Boreal Plains: Should it be used in Land Reclamation. Poster presentation at the Alberta Soil Science Workshop, Feb. 12-15, Calgary, AB.
- Howell, D.M. and **M.D. MacKenzie**. 2014. Reclamation of Coarse Textured Soils Following Oil Sands Mining: Implications of Topsoil Placement Depth to Microbial Communities. Poster presentation at the Alberta Soil Science Workshop, Feb. 12-15, Calgary, AB.
- Ikpo, N. and **M.D. MacKenzie**. 2014. Using DRIFT to Analyze Soil Biogeochemical Recovery after Natural and Anthropogenic Disturbance. Poster presentation at the Alberta Soil Science Workshop, Feb. 12-15, Calgary, AB.
- Taghavimerh J. and **M.D. MacKenzie**. 2014. Can Biochar Improve Soil Function in an Agroforestry System: Effects of Nutrient Supply, Microbial Activity, and Greenhouse Gases. Poster presentation at the Alberta Soil Science Workshop, Feb. 12-15, Calgary, AB.
- Das Gupta, S. and **M.D. MacKenzie**. 2014. Aboveground and Belowground Patterns in Pyrogenic

- Boreal Aspen Ecosystems: What Governs Nutrient Availability? Oral presentation at the Alberta Soil Science Workshop, Feb. 12-15, Calgary, AB.
- MacKenzie M. D.. 2013.** Is a charcoal a keystone substrate in Lodgepole pine ecosystems? Poster presentation at the 12th North American Forest Soils Conference, June 16-20, Whitefish, MT.
- Amini S.A. and **M.D. MacKenzie. 2013.** Restoring native grassland function in the urban environment: Implications for soil-plant relations. Oral presentation at the Alberta Soil Science Workshop, Feb. 19-21, Lethbridge AB.
- Das Gupta, S., **M.D. MacKenzie**, and S. A. Quideau. **2013.** Spatial variations in soil respiration in a Boral aspen forest fire chronosequence. Poster presentation at the Alberta Soil Science Workshop, Feb. 19-21, Lethbridge AB.
- Martin J. and **M.D. MacKenzie. 2013.** Wildfire nitrogen dynamics in the Alberta boreal forest soils: A comparison for anthropogenic disturbance. Oral presentation at the Alberta Soil Science Workshop, Feb. 19-21, Lethbridge AB.
- MacKenzie, M.D. 2013.** Nitrogen availability along a fire chronosequence in Lodgepole pine stands near Hinton, AB. Oral presentation at the Alberta Soil Science Workshop, Feb. 19-21, Lethbridge AB.
- MacKenzie, M.D. 2013.** Soil-Plant relations: A new capping study at Aurora mine. Poster presentation at the Alberta Soil Science Workshop, Feb. 19-21, Lethbridge AB.
- Das Gupta S., **M.D. MacKenzie**, and S.A. Quideau. **2013.** Spatial pattern of soil microbial properties and nutrient availability in a reclaimed aspen (*Populus tremuloides* Michx.) stand in north Alberta. Poster presentation at the North American Forest Soils Conference, June 16 - 21 Whitefish, MT
- Sorenson, P.T., **M. D. MacKenzie**, S. M. Landhäusser, and S. A. Quideau. **2012.** Ecological processes from spatial patterns of stand characteristics and soil nutrient availability in reclaimed boreal forests. Alberta Soil Science Workshop. Edmonton, Alberta, Feb. 14-16 (oral presentation).
- Sorenson, P.T., **M. D. MacKenzie**, S. M. Landhäusser, and S. A. Quideau. **2012.** Spatial patterns of stand characteristics and soil nutrient availability in reclaimed boreal forests. Ecological Society of America Annual Meetings, Portland, OR, USA, Aug 5-10 (oral presentation).
- Das Gupta, S., **M. D. MacKenzie**, and S.A. Quideau. **2012.** Spatial variability of soil biochemical properties in a 21 year old aspen stand on a oil sand reclaimed site in Northern Alberta. Alberta Soil Science Workshop. Edmonton, Alberta, Feb. 14-16 (oral presentation).
- Soucémariadin, L.N., R.E. Wasylishen, **M.D. MacKenzie**, and S.A. Quideau. **2012.** Black carbon characterization in Quebec black spruce forests. European Geosciences Union General Assembly, Vienna, Austria. April 23-27 (poster).
- Soucémariadin, L.N., R.E. Wasylishen, **M.D. MacKenzie**, and S.A. Quideau. **2012.** Where does all the pyrogenic organic matter go? Its fate in soils, water, and sediments. European Geosciences Union General Assembly, Vienna, Austria. April 23-27 (poster).
- MacKenzie, M.D., S.A. Quideau, and S. Landhäusser. 2011.** Spatial Variability in Canopy Cover, Forest Floor Mass, and Nutrient Availability in Reclaimed Oil Sands. Oral presentation at the North American Forest Ecology meeting, Roanoke, VA.
- MacKenzie, M.D. 2010.** Does Charcoal Affect the Spatial Pattern of Soil Processes in Forest Ecosystems? Paper presentation at the annual meeting of the Canadian Society of Soil Science, Saskatoon, SK.
- Sorenson, P., S.A. Quideau, S. Landhäusser, and **M.D. MacKenzie. 2009.** Influence of Stand

Type on Forest Floor Development in Reclaimed Oil Sands. Poster presentation, Soil science Society of America annual meeting, Pittsburgh, PA.

MacKenzie, M.D. and S.A. Quideau. **2009.** Forest Floor Mineral Mix vs. Peat Mineral Mix: Reclamation Soil Type Matters. Oral presentation at the AB Soil Science Workshop, Edmonton, AB.

MacKenzie, M.D. 2008. Forest Soils: Linking Disturbance with Ecosystem Function. Invited research seminar, Faculty of Forestry, University of Toronto, ON.

DeLuca, T.H., **M.D. MacKenzie**, M.J. Gundale, R. Brimmer. **2008.** Charcoal and Nitrogen Cycling in Forest Ecosystems. Paper presentation at the annual meetings of the Soil Science Society of America, Houston, TX.

UNIVERSITY INSTRUCTION

Professor

- Introduction to Soil Science. RENR 210, Fall 2011, 2012, 2013, 2014, 2015, 2016, 2017 Renewable Resources, University of Alberta
- Restoration Ecology. RENR 366, Winter 2015, 2016, 2017 Renewable Resources, University of Alberta
- Environmental Assessment. RENR 307, Winter 2013, 2014, 2015, 2017 Renewable Resources, University of Alberta
- Soil Microbiology and Biogeochemistry. SOILS 430, Winter 2010, 2011, 2012, Renewable Resources, University of Alberta

Sessional Instructor

- Environmental Soil Chemistry. SOILS 450, Winter 2008, Renewable Resources, University of Alberta
- Biogeography. GEOG 215, Winter 2000, Geography Department, Simon Fraser University
- Introduction to Soil Science. GEOG 317, Winter 1999, Geography Department, Simon Fraser University

Teaching Assistant

- Special Topic: Advanced Soil Analytical Techniques, RENR 595, Fall 2005, University of Alberta.
- Introduction to Soil Science. FOR 350, Fall 2001, 2002, 2003, The University of Montana.
- Biogeochemistry. GEOG 316, Fall 1999, Simon Fraser University.
- Introduction to Soil Science. GEOG 317, Spring 1998, Simon Fraser University.
- Introduction to Physical Geography. GEOG 111, Fall 1998, Simon Fraser University.
- Biogeography. GEOG 215, Fall 1996, Simon Fraser University.

Guest Lectures

- Fire, Soil, and Vegetation: Chemical Interactions *for* Disturbance Ecology. RENR 401, Fall 2008, 2009, 2010, 2011, 2012, 2013, Renewable Resources, University of Alberta.
- The Nitrogen Cycle *for* Environmental Microbiology and Biochemistry. SOILS 430, Spring 2006 and 2007, University of Alberta.
- Fire and Nitrogen Dynamics *for* Forest Ecology. FOR 330, Spring 2005, The University of Montana.
- The Nitrogen Cycle *for* Environmental Soil Science. FOR 415, Fall 2004, The University of Montana.

HIGHLY QUALIFIED PERSONNEL

Graduate Students Supervision	Degree	Subject
Ryan Lalonde	MSc student	Forest Ecosystem Reclamation (co-supervised)
Jessica Hudson	MSc student	Forest Ecosystem Reclamation (co-supervised)
Adam Mathison	MSc student	Forest Ecosystem Reclamation (co-supervised)
Leah DeBartoli	MSc student	Forest Ecosystem Reclamation (co-supervised)
Michelle Mausolf	MSc student	Fire Ecology (co-supervised)
Jeff Hogberg	MSc 2017	Forest Ecosystem Reclamation (co-supervised)
Sebastian Dietrich	PhD 2018	Forest Ecosystem Reclamation
Jill Martin	MSc 2015	Fire and Reclamation
Mark Howell	MSc 2015	Forest Ecosystem Reclamation
Jamal Taghavimehr	MSc 2015	Agroforestry and Biochar
Sanatan Das Gupta	PhD 2015	Pyrogenic Ecosystems (co-supervised)
Jin Hu Liu	MSc 2014	Reclamation and Biochar (co-supervised)
Arezu Amini	MSc 2013	Native Plants and Biochar
Tyrel Hemsley	MSc 2012	N Dep and Reclamation (co-supervised)
Preston Sorenson	MSc 2011	Space and Reclamation (co-supervised)
Graduate Students Mentored		
Laure Soucemarianadin	PhD 2013	Fire and Forest Soils
Matthew Swallow	PhD 2012	Harvest and Forest Soils
Aria Hahn	MSc 2012	Forest Ecosystem Reclamation
Charlotte Norris	MSc 2008	Fire and Forest Soils
Jess Leatherdale	MSc 2007	Forest Ecosystem Reclamation
Tricia Burgoyne	MSc 2007	Fire and Forest Soils
Roxanne McMillan	MSc 2005	Forest Ecosystem Reclamation
Undergraduate Student Supervision		
Molly Bannister	BSc student	Restoration Ecology – Lab Tech
Haley Quadros	BSc student	Restoration Ecology – Lab Tech
Peining Guan	BSc student	LRIGS – Lab Tech
Monica Shandal	BSc 2017	Reclamation – Lab Tech
Sylyanne Foo	BSc 2017	Reclamation – Lab Tech
Patrick Neurenberg	BSc 2016	Microbiology/Reclamation – Lab Tech
Nicole Filipow	BSc 2015	Reclamation – Field/Lab Tech
Sawyer Desaulniers	BSc 2014	Reclamation – Field/Lab Tech
Kaitlyn Scaber	BSc 2014	Reclamation – Lab Tech
Maksat Igdyrov	BSc 2013	Reclamation – Field/Lab Tech
Megan Lewis	BSc 2013	Reclamation – Field/Lab Tech
Diana Debrowa	BSc 2012	Reclamation – Lab Tech
Neil Stange	BSc 2009	Reclamation – Field/Lab Tech
Aria Hahn	BSc 2009	Reclamation – Lab Tech
Tyrel Hemsley	BSc 2009	Reclamation – Field/Lab Tech
Clarice Piña	BSc 2005	Forest Soils – Field/Lab Tech

David Grow	BA 2004	Forest Soils – Field/Lab Tech
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