

**Carl Mendoza**  
Professor Emeritus  
Hydrogeology and Hydrology

Earth & Atmospheric Sciences  
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### Academic Degrees

- 1993 Ph.D. — Hydrogeology (Department of Earth Sciences, University of Waterloo)
- 1989 M.Sc. — Hydrogeology (Department of Earth Sciences, University of Waterloo)
- 1984 B.A.Sc. (Honours) — Geological Engineering (University of British Columbia)

### Professional Positions

2017-	Professor Emeritus, Earth & Atmospheric Sciences, University of Alberta
2013-	Principal Hydrogeological Engineer, BGC Engineering, Vancouver
2018-	Adjunct Professor, Earth Sciences, Simon Fraser University
2016-2019	Adjunct Professor, Earth and Environmental Sciences, University of Waterloo
2013-2017	Professor, Earth & Atmospheric Sciences, University of Alberta
1997-2013	Associate Professor, Earth & Atmospheric Sciences, University of Alberta
2005-2008	Principal Hydrogeologist (sabbatical; casual), WorleyParsons Komex, Edmonton
1992-1997	Assistant Professor, Geology/Earth & Atmospheric Sciences, University of Alberta
1986-1992	Teaching Assistant, Earth Sciences; Lecturer and Short-course Technical Coordinator, Waterloo Centre for Groundwater Research, University of Waterloo
1984-1986	Geological Engineer, Production Division, Shell Canada Resources, Calgary

### Professional Registrations

Association of Professional Engineers and Geoscientists of Alberta (APEGA), P.Eng., P.Geo.  
Engineers and Geoscientists British Columbia (APEGBC), P.Eng.  
Professional Engineers Ontario (PEO), P.Eng.

### On-line Profiles

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## Primary Research Interests

### Surface-water/Groundwater Interactions and Reclamation in the Boreal

I use field investigations and numerical models to delineate and quantify the dominant components of the hydrologic cycle on various landscapes of the Boreal Plain in Alberta. Both natural, relatively undisturbed systems near Utikuma Lake and reconstructed, reclaimed landforms at oil-sand mines are evaluated. Field studies include monitoring and evaluating water levels, seepage fluxes, streamflow and atmospheric flux interactions. Numerical modelling involves the application of commercial and research models to quantify relationships observed in our field studies. A primary goal is to develop understanding for prediction of long-term behaviour and evolution of water cycling and landscapes within this sub-humid climatic zone. These results are crucial for design of reclaimed landscapes. We also examine the storage, transformation and transport of nutrients, salts and carbon.

### Gas Production, Transport and Reactions in the Unsaturated Zone

I have developed expertise in simulating the transport of vapours from non-aqueous-phase-liquid (NAPL) releases of hydrocarbons or chlorinated solvents through the unsaturated zone, to groundwater and into the basements of buildings. I have also examined the consumption of O<sub>2</sub> and production of CO<sub>2</sub>, through microbial and abiotic oxidation processes, in the unsaturated zone. Applications include natural environments, mine waste-rock and landfills. I am the author of the VapourT transport code.

### Simulation of Non-linear Systems

Many aspects of my work revolve around the development and application of numerical models to advanced hydrologic and contaminant transport processes. Most problems involve highly non-linear interactions. In addition to groundwater/surface-water and gas transport problems, my work includes geostatistical applications to flow and transport problems, three-phase (NAPL) flow in the unsaturated zone, density-dependent transport of brine at a potash mine and elsewhere, and dissolution of NAPLs in fractures. Study scopes range from theoretical model development to highly applied, site-specific development of conceptual models and implementation of existing models.

## Teaching Assignments

- Introduction to Hydrogeology
- Contaminant Hydrogeology
- Quantitative Hydrogeology (Numerical Modelling)
- Applied Hydrology (Faculty of Extension)
- Environmental Geology
- Environment Earth
- Geology Field School II

## Consulting Activities

With BGC Engineering, I largely work on hydrogeological applications for the mining industry. Through work at oil-sand and metal mines across Canada I have developed expertise in mine development, monitoring and operations, seepage prediction and control, and reclamation and closure options. Scopes range from field investigations, through interpretation and modelling, to design and execution.

## Publications and Presentations

### Refereed Journal Articles<sup>1</sup>

- J-68) Hokanson, K.L., C. Thompson, K. Devito and C. Mendoza, 2021. Hummock-scale controls on groundwater recharge rates and the potential for developing local groundwater flow systems in water-limited environments. *Journal of Hydrology*, Manuscript HYDROL40794R1 accepted for publication.
- J-67) van der Velde, Y., and 13 others, 2021. Emerging forest-peatland bi-stability and resilience of European peatland carbon stores. *PNAS*, Manuscript 2021-01742R accepted for publication. <https://doi.org/10.1073/pnas.2101742118>
- J-66) Hokanson, K.J., B. Rostron, K. Devito, C. Hopkinson and C. Mendoza, 2021. Landscape controls of surface water-groundwater interactions on shallow outwash lakes: Long-term groundwater signal overrides interannual variability due to evaporative effects. *Hydrogeology Journal*, Manuscript HYJO-D-21-00044R1 accepted for publication.
- J-65) Rosales-Ramirez, T.Y., D. Kirste, D.M. Allen and C.A. Mendoza, 2021. Mapping the vulnerability of groundwater to wastewater spills for source water protection in a shale gas region. *Sustainability*, 13, 3987. Special Issue "Advances in Source Water Protection and Sustainability". <https://doi.org/10.3390/su13073987>
- J-64) Kettridge, N., M.C. Lukenbach, K. Hokanson, K.J. Devito, R.M. Petrone, C. Mendoza and J.M. Waddington, 2021. Regulation of peatland evaporation following wildfire; the complex control of soil tension under dynamic evaporation demand. *Hydrological Processes*, 35, e14132. <https://doi.org/10.1002/hyp.14132>
- J-63) Leonard, R., P. Moore, S. Krause, K. Devito, R. Petrone, C. Mendoza, J. Waddington and N. Kettridge, 2021. The influence of system heterogeneity on peat-surface temperature dynamics. *Environmental Research Letters*, 16(2), 024002. <https://doi.org/10.1088/1748-9326/abd4ff>
- J-62) Hokanson, K.J., E. Peterson, K. Devito and C.A. Mendoza, 2020. Forestland-peatland hydrologic connectivity in water-limited environments: hydraulic gradients often oppose topography. *Environmental Research Letters*, 15(3), 034021. <https://doi.org/10.1088/1748-9326/ab699a>
- J-61) Little-Devito, M., C.A. Mendoza, L. Chasmer, N. Kettridge and K.J. Devito, 2019. Opportunistic wetland formation on reconstructed landforms in a sub-humid climate: influence of site and landscape-scale factors. *Wetlands Ecology and Management*, 27(5), 587-608. <https://doi.org/10.1007/s11273-019-09679-y>
- J-60) Lukenbach, M.C., C.J. Spencer, C.A. Mendoza, K.J. Devito, S.M. Landhäusser and S.K. Carey, 2019. Evaluating how landform design and soil covers influence groundwater recharge in a reclaimed soft tailings deposit. *Water Resources Research*, 55(8), 6464-6481. <https://doi.org/10.1029/2018WR024298>
- J-59) Kettridge, N., M.C. Lukenbach, K.J. Hokanson, K.J. Devito, R.M. Petrone, C.A. Mendoza and J.M. Waddington, 2019. Severe wildfire exposes remnant peat carbon stocks to increased post-fire drying. *Scientific Reports*, 9(1), 3727-3732. <https://doi.org/10.1038/s41598-019-40033-7>

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<sup>1</sup> Web of Science citations to November 2018

- J-58) Hokanson, K.J., C.A. Mendoza and K.J. Devito, 2019. Interactions between regional climate, surficial geology, and topography: Characterizing shallow groundwater systems in subhumid, low-relief landscapes. *Water Resources Research*, 55(1), 284-297.  
<https://doi.org/10.1029/2018WR023934>
- J-57) Spennato, H.M., S.J. Ketcheson, C.A. Mendoza and S.K. Carey, 2018. Water table dynamics in a constructed wetland, Fort McMurray, Alberta. *Hydrological Processes*, 32(26), 3824-3836.  
<https://doi.org/10.1002/hyp.13308>
- J-56) Thompson, C., K.J. Devito and C.A. Mendoza, 2018. Hydrologic impact of aspen harvesting within the sub-humid Boreal Plains of Alberta. *Hydrological Processes*, 32(26), 3924-3937.  
<https://doi.org/10.1002/hyp.13301>
- J-55) Depante, M., R.M. Petrone, K.J. Devito, N. Kettridge, M.L. Macrae, C. Mendoza and J.M. Waddington, 2018. Potential influence of nutrient availability along a hillslope - peatland gradient on aspen recovery following fire. *Ecohydrology*, 11(5).  
<https://doi.org/10.1002/eco.1955>
- J-54) Hokanson, K.J., P.A. Moore, M.C. Lukenbach, K.J. Devito, N. Kettridge, R.M. Petrone, C.A. Mendoza and J.M. Waddington, 2018. A hydrogeological landscape framework to identify peatland wildfire smouldering hot spots. *Ecohydrology*, 11(4). <https://doi.org/10.1002/eco.1942>
- J-53) Leonard, R.M., N. Kettridge, K.J. Devito, R.M. Petrone, C.A. Mendoza, J.M. Waddington and S. Krause, 2018. Disturbance impacts on thermal hotspots and hot moments at the peatland-atmosphere interface. *Geophysical Research Letters*, 45(1), 185-193.  
<https://doi.org/10.1002/2017GL075974>
- J-52) Kettridge, N., M.C. Lukenbach, K.J. Hokanson, C. Hopkinson, K.J. Devito, R.M. Petrone, C.A. Mendoza and J.M. Waddington, 2017. Low evapotranspiration enhances the resilience of peatland carbon stocks to fire. *Geophysical Research Letters*, 44(18), 9341-9349.  
<https://doi.org/10.1002/2017GL074186> (citations: 2)
- J-51) Dixon, S.J., N. Kettridge, P.A. Moore, K.J. Devito, A.S. Tilak, R.M. Petrone, C.A. Mendoza and J.M. Waddington, 2017. Peat depth as a control on moss water availability under evaporative stress. *Hydrological Processes*, 31(23), 4107-4121. <https://doi.org/10.1002/hyp.11307> (citations: 2)
- J-50) Devito, K.J., K.J. Hokanson, P.A. Moore, N. Kettridge, A.E. Anderson, L. Chasmer, C. Hopkinson, M.C. Lukenbach, C.A. Mendoza, J. Morissette, D.L. Peters, R.M. Petrone, U. Silins, B. Smerdon and J.M. Waddington, 2017. Landscape controls on long-term runoff in sub-humid heterogeneous Boreal Plains catchments. *Hydrological Processes*, 31(15), 2737-2751.  
<https://doi.org/10.1002/hyp.11213> (citations: 4)
- J-49) Thompson, C., C.A. Mendoza and K.J. Devito, 2017. Potential influence of climate change on ecosystems within the Boreal Plains of Alberta. *Hydrological Processes*, 31(11), 2110-2124.  
<https://doi.org/10.1002/hyp.11183> (citations: 1)
- J-48) Lukenbach, M.C., K.J. Hokanson, K.J. Devito, N. Kettridge, R.M. Petrone, C.A. Mendoza, G. Granath and J.M. Waddington, 2017. Post-fire ecohydrological conditions at peatland margins in different hydrogeological settings of the Boreal Plain. *Journal of Hydrology*, 548, 741-753.  
<https://doi.org/10.1016/j.jhydrol.2017.03.034> (citations: 5)

- J-47) Leonard, R., N. Kettridge, S. Krause, K.J. Devito, G. Granath, R. Petrone, C. Mendoza and J.M. Waddington, 2017. Peatland bryophyte responses to increased light from black spruce removal. *Ecohydrology*, 10(1). <https://doi.org/10.1002/eco.1804> (citations: 2)
- J-46) Ketcheson, S.J., J.S. Price, S.K. Carey, R.M. Petrone, C.A. Mendoza and K.J. Devito, 2016. Constructing fen peatlands in post-mining oil sands landscapes: Challenges and opportunities from a hydrological perspective. *Earth-Science Reviews*, 161, 130-139. <https://doi.org/10.1016/j.earscirev.2016.08.007> (citations: 12)
- J-45) Devito, K.J., C. Mendoza, R.M. Petrone, N. Kettridge and J.M. Waddington, 2016. Utikuma Region Study Area (URSA) – Part 1: Hydrogeological and ecohydrological studies (HEAD). *Forestry Chronicle*, 92(1), 57-61. <https://doi.org/10.5558/tfc2016-017> (citations: 5)
- J-44) Petrone, R.M., K.J. Devito and C. Mendoza, 2016. Utikuma Region Study Area (URSA) – Part 2: Aspen Harvest and Recovery Study. *Forestry Chronicle*, 92(1), 62-65. <https://doi.org/10.5558/tfc2016-018> (citations: 3)
- J-43) Donnelly, M., K.J. Devito, C. Mendoza, R.M. Petrone and M. Spafford, 2016. Al-Pac Catchment Experiment (ACE). *Forestry Chronicle*, 92(1), 23-26. <https://doi.org/10.5558/tfc2016-007>
- J-42) Plach, J.M., J.M. Ferone, Z. Gibbons, B.D. Smerdon, A. Martens, C.A. Mendoza, R.M. Petrone and K.J. Devito, 2016. Influence of glacial landform hydrology on phosphorus budgets of shallow lakes on the Boreal Plain, Canada. *Journal of Hydrology*, 535, 191-203. <https://doi.org/10.1016/j.jhydrol.2016.01.041> (citations: 5)
- J-41) Kettridge, N., A.S. Tilak, K.J. Devito, R.M. Petrone, C.A. Mendoza and J.M. Waddington, 2015. Moss and peat hydraulic properties are optimized to maximise peatland water use efficiency. *Ecohydrology*, 9(6), 1039-1051. <https://doi.org/10.1002/eco.1708> (citations: 1)
- J-40) Booterbaugh, A., L. Bentley and C. Mendoza, 2015. Geophysical Characterization of an Undrained Dyke Containing an Oil-sands Tailings Pond, Alberta, Canada. *Journal of Environmental & Engineering Geophysics*, 20(4), 303-317. <https://doi.org/10.2113/JEEG20.4.303> (citations: 2)
- J-39) Thompson, C., C.A. Mendoza, K.J. Devito and R.M. Petrone, 2015. Climatic controls on groundwater–surface water interactions within the Boreal Plains of Alberta: Field observations and numerical simulations. *Journal of Hydrology*, 527, 734-746. <https://doi.org/10.1016/j.jhydrol.2015.05.027> (citations: 12)
- J-38) Brown, S.M., R.M. Petrone, L. Chasmer, C. Mendoza, M.S. Lazerjan, S.M. Landhäusser, U. Silins, J. Leach and K.J. Devito, 2014. Atmospheric and soil moisture controls on evapotranspiration from above and within a Western Boreal Plain aspen forest. *Hydrological Processes*, 28(15), 4449-4462. <https://doi.org/10.1002/hyp.9879> (citations: 26)
- J-37) La Croix, A.D., M.K. Gingras, S.G. Pemberton, C.A. Mendoza, J.A. MacEachern and R.T. Lemiski, 2013. Biogenically enhanced reservoir properties in the Medicine Hat gas field, Alberta, Canada. *Marine and Petroleum Geology*, 43, 464-477. <https://doi.org/10.1016/j.marpetgeo.2012.12.002> (citations: 17)
- J-36) Smerdon, B.D., C.A. Mendoza and K.J. Devito, 2012. The impact of gravel extraction on groundwater dependent wetlands and lakes in the Boreal Plains, Canada. *Environmental Earth Sciences*, 67(5), 1249-1259. <https://doi.org/10.1007/s12665-012-1568-4> (citations: 8)
- J-35) Carrera-Hernández, J.J., B.D. Smerdon and C.A. Mendoza, 2012. Estimating groundwater recharge through unsaturated flow modelling: Sensitivity to boundary conditions and vertical

- discretization. *Journal of Hydrology*, 452(3-4), 90-101.  
<https://doi.org/10.1016/j.jhydrol.2012.05.039> (citations: 20)
- J-34) Carrera-Hernández, J.J., C.A. Mendoza, K. Devito, R.M. Petrone and B.D. Smerdon, 2012. Reclamation for aspen revegetation in the Athabasca oil sands: Understanding soil water dynamics through unsaturated flow modelling. *Canadian Journal of Soil Science*, 92(1), 103-116.  
<https://doi.org/10.4141/CJSS2010-035> (citations: 12)
- J-33) Hosseini, A.H., C.V. Deutsch, C.A. Mendoza and K.W. Biggar, 2011. Inverse modeling for characterization of uncertainty in transport parameters under uncertainty of source geometry in heterogeneous aquifers. *Journal of Hydrology*, 405(3-4), 402-416.  
<https://doi.org/10.1016/j.jhydrol.2011.05.039> (citations: 8)
- J-32) Carrera-Hernández, J.J., C.A. Mendoza, K.J. Devito, R.M. Petrone and B.D. Smerdon, 2011. Effects of aspen harvesting on groundwater recharge and water table dynamics in a subhumid climate. *Water Resources Research*, 47(5), W05542, 18p. <https://doi.org/10.1029/2010WR009684> (citations: 11)
- J-31) Mwale, D., T.Y. Gan, K.J. Devito, U. Silins, C. Mendoza and R. Petrone, 2011. Regionalization of runoff variability of Alberta, Canada by wavelet, independent component, empirical orthogonal function and geographical information systems analyses. *ASCE Journal of Hydrologic Engineering*, 16(2), 93-107. [https://doi.org/10.1061/\(ASCE\)HE.1943-5584.0000284](https://doi.org/10.1061/(ASCE)HE.1943-5584.0000284) (citations: 10)
- J-30) Hosseini, A.H., C.V. Deutsch, K.W. Biggar and C.A. Mendoza, 2010. Probabilistic data integration for characterization of spatial distribution of residual LNAPL. *Stochastic Environmental Research and Risk Assessment*, 24(5), 735-749. <https://doi.org/10.1007/s00477-009-0360-9> (citations: 3)
- J-29) Brown, S.M., R.M. Petrone, C.A. Mendoza and K.J. Devito, 2010. Surface vegetation controls on evapotranspiration from a sub-humid Western Boreal Plain wetland. *Hydrological Processes*, 24(8), 1072-1085. <https://doi.org/10.1002/hyp.7569> (citations: 42)
- J-28) Smerdon, B.D., and C.A. Mendoza, 2010. Hysteretic freezing characteristics of riparian peatlands in the Western Boreal Forest of Canada. *Hydrological Processes*, 24(8), 1027-1038.  
<https://doi.org/10.1002/hyp.7544> (citations: 12)
- J-27) Mwale, D., T.Y. Gan, K.J. Devito, C.A. Mendoza, U. Silins and R. Petrone, 2009. Precipitation variability and its relationship to hydrologic variability in Alberta. *Hydrological Processes*, 23(21), 3040-3056. <https://doi.org/10.1002/hyp.7415> (citations: 33)
- J-26) Petrone, R.M., K.J. Devito, U. Silins, C.A. Mendoza, S.C. Brown, S. Kaufman and J.S. Price, 2008. Transient peat properties in two pond-peatland complexes in the sub-humid Western Boreal Plain, Canada. *Mires and Peat*, 3, Article 05, 13p. <http://www.mires-and-peat.net/pages/volumes/map03/map0305.php>
- J-25) Bladon, K.D., U. Silins, M.J. Wagner, M. Stone, M.B. Emelko, C.A. Mendoza, K.J. Devito and S. Boon, 2008. Wildfire impacts on nitrogen concentration and production from headwater streams in southern Alberta's Rocky Mountains. *Canadian Journal of Forest Research*, 38, 2359-2371.  
<https://doi.org/10.1139/X08-071> (citations: 50)
- J-24) Smerdon, B.D., C.A. Mendoza and K.J. Devito, 2008. Influence of sub-humid climate and water table depth on groundwater recharge in shallow outwash aquifers. *Water Resources Research*, 44(8), W08427, 15p. <https://doi.org/10.1029/2007WR005950> (citations: 31)

- J-23) Khan, D.K., C.V. Deutsch, C.A. Mendoza and B.J. Rostron, 2007. Approximate sensitivity coefficients for integrating hydraulic head data into geological models. *Journal of Hydrology*, 347(3-4), 460-473. <https://doi.org/10.1016/j.jhydrol.2007.09.043> (citations: 2)
- J-22) Smerdon, B.D., C.A. Mendoza and K.J. Devito, 2007. Simulations of fully coupled lake-groundwater exchange in a sub-humid climate with an integrated hydrologic model. *Water Resources Research*, 43(1), W01416, 13p. <https://doi.org/10.1029/2006WR005137> (citations: 43)
- J-21) Birkham, T.K., M.J. Hendry, L.I. Wassenaar and C. Mendoza, 2007. A transient model of vadose zone reaction rates using oxygen isotopes and carbon dioxide. *Vadose Zone Journal*, 6(1), 67-76. <https://doi.org/10.2136/vzj2006.0005> (citations: 12)
- J-20) Smerdon, B.D., C.A. Mendoza and A.M. McCann, 2005. Quantitative investigations of the hydraulic connection between a large reservoir and a buried valley aquifer in southern Alberta. *Canadian Geotechnical Journal*, 42, 1461-1473. <https://doi.org/10.1139/T05-065> (citations: 1)
- J-19) Devito, K., I. Creed, T. Gan, C. Mendoza, R. Petrone, U. Silins and B. Smerdon, 2005. A framework for broad-scale classification of hydrologic response units on the Boreal Plain: Is topography the last thing to consider? Invited Commentary. *Hydrological Processes*, 19(8), 1705-1714. <https://doi.org/10.1002/hyp.5881> (citations: 152)
- J-18) Smerdon, B.D., K.J. Devito and C.A. Mendoza, 2005. Interaction of groundwater and shallow lakes on outwash sediments in the sub-humid Boreal Plains of Canada. *Journal of Hydrology*, 314(1-4), 246-262. <https://doi.org/10.1016/j.jhydrol.2005.04.001> (citations: 64)
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- J-16) Adams, J.J., B.J. Rostron and C.A. Mendoza, 2004. Coupled fluid flow, heat and mass transport, and erosion in the Alberta Basin: Implications for the origin of the Athabasca Oil Sands. *Canadian Journal of Earth Sciences*, 41, 1077-1095. <https://doi.org/10.1139/E04-052> (citations: 22)
- J-15) Gingras, M.K., C.A. Mendoza and S.G. Pemberton, 2004. Fossilized worm burrows influence the resource quality of porous media. *AAPG Bulletin*, 88(7) 875-883. <https://doi.org/10.1306/01260403065> (citations: 31)
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- J-13) Birkham, T.K., M.J. Hendry, L.I. Wassenaar, C.A. Mendoza and E.S. Lee, 2003. Characterizing geochemical reactions in unsaturated mine waste-rock piles using gaseous O<sub>2</sub>, CO<sub>2</sub>, <sup>12</sup>CO<sub>2</sub>, and <sup>13</sup>CO<sub>2</sub>. *Environmental Science & Technology*, 37(3), 496-501. <https://doi.org/10.1021/es020587c> (citations: 20)
- J-12) Hendry, M.J., C.A. Mendoza, R. Kirkland and J.R. Lawrence, 2001. An assessment of a mesocosm approach to the study of microbial respiration in a sandy unsaturated zone. *Ground Water*, 39(3), 391-400. <https://doi.org/10.1111/j.1745-6584.2001.tb02323.x> (citations: 16)
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- J-5) Shikaze, S.G., E.A. Sudicky and C.A. Mendoza, 1994. Simulation of dense vapor migration in discretely fractured geologic media. *Water Resources Research*, 30(7), 1993-2009. <https://doi.org/10.1029/94WR00066> (citations: 18)
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- J-3) Mendoza, C.A., and E.O. Frind, 1990a. Advective-dispersive transport of dense organic vapors in the unsaturated zone: 1. Model development. *Water Resources Research*, 26(3), 379-387. <https://doi.org/10.1029/WR026i003p00379> (citations: 143)
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- J-1) Mendoza, C.A., and T.A. McAlary, 1990. Modeling of ground-water contamination caused by organic solvent vapors. *Ground Water*, 28(2), 199-206. <https://doi.org/10.1111/j.1745-6584.1990.tb02247.x> (citations: 68)

### Other Refereed Contributions and Book Chapters

- O-9) Gingras, M., G. Baniak, J. Gordon, K. Konhauser, A.D. La Croix, R. Lemiski, C. Mendoza, S.G. Pemberton, C. Polo and J.P. Zonneveld, 2012. Porosity and Permeability in Bioturbated Media. Chapter 27 in, *Trace Fossils as Indicators of Sedimentary Environments*, D. Knaust and R.G. Bromley, editors. *Developments in Sedimentology*, Vol. 64, 837-868. <https://doi.org/10.1016/B978-0-444-53813-0.00027-7>
- O-8) Holden, A., T. Tompkins, S. Haque, L. Perez, H. Sutherland, M. Bowron, K.W. Biggar, R.B. Donahue, C. Mendoza, J.W. Martin, K.U. Mayer, J.F. Barker, D.C. Sego and A.C. Ulrich, 2011. Fate and transport of process-affected water in out-of-pit tailings ponds in the oil sands industry in Canada. *Geotechnical News*, 29(1), 53-57. [Cover story] (citations: 2)

- O-7) Krezek, C.C., J.M. Buttle, F.D. Beall, R.D. Moore, I.F. Creed, P.K. Sibley, U. Silins, K.J. Devito and C.A. Mendoza, 2008. HydroEcological Landscapes and Processes project: A national-scale forest hydrology initiative. *Streamline Watershed Management Bulletin*, 12(1), 33–38.
- O-6) Gingras, M.K., S.G. Pemberton, F. Henk, J.A. MacEachern, C. Mendoza, B. Rostron, R. O'Hare, M. Spila and K. Konhauser, 2006. Applications of ichnology to fluid and gas production in hydrocarbon reservoirs. *Applied Ichnology. SEPM Short Course Notes #52*, J.A. MacEachern, K.L. Bann, M.K. Gingras and S.G. Pemberton, editors, Society for Sedimentary Geology, Tulsa, 129-143.
- O-5) Mendoza, C.A., R.L. Johnson and R.W. Gillham, 1996. Vapor migration in the vadose zone. Chapter 6 in, *Dense Chlorinated Solvents and other DNAPLs in Groundwater*. J.F. Pankow and J.A. Cherry, editors, Waterloo Press, Portland, Oregon, 179-201.
- O-4) Mendoza, C.A., and E.A. Sudicky, 1992. Hierarchical scaling of constitutive relationships controlling multi-phase flow in fractured geologic media. *Reservoir Characterization III*, L. Linville, editor, PennWell Publishing, Tulsa, 505-514.
- O-3) Mendoza, C.A., B.M. Hughes and E.O. Frind, 1992. Transport of trichloroethylene vapours in the unsaturated zone: Numerical analysis of a field experiment. *Subsurface Contamination by Immiscible Fluids*, K.U. Weyer, editor, Balkema, Rotterdam, 221-227.
- O-2) Hughes, B.M., R.W. Gillham and C.A. Mendoza, 1992. Transport of trichloroethylene vapours in the unsaturated zone: A field experiment. *Subsurface Contamination by Immiscible Fluids*, K.U. Weyer, editor, Balkema, Rotterdam, 81-88.
- O-1) Johnson, R.L., K.A. McCarthy, M. Perrott and C.A. Mendoza, 1992. Density-driven vapor transport: Physical and numerical modeling. *Subsurface Contamination by Immiscible Fluids*, K.U. Weyer, editor, Balkema, Rotterdam, 19-27.

## Conference Papers and Posters

- C-34) Hokanson, K.J., C.A. Mendoza and K.J. Devito, 2018. Shallow groundwater systems in sub-humid, low-relief Boreal Plain landscapes: Interactions between glacial landforms, climate and topography. *Proceedings, GeoEdmonton, 71<sup>st</sup> Canadian Geotechnical and 13<sup>th</sup> Joint CGS/IAH-CNC Groundwater Conference*, Edmonton, September. Paper 511. 8p. (Winner, IAH Tóth Award, Best Student Paper)
- C-33) Crozier, T., D. Paszkowski, G. Parent, D. Cook, V. Mann, C. Mendoza, H. Provost, A.J. Martin, J. Helsen, J. Bain, D. Blowes, C. Gaspar and J. Russell, 2018. Permeable reactive barrier feasibility assessment at Goldcorp's Red Lake Gold Mines: Hydrogeological, geochemical and geotechnical design considerations. *Acid Mine Drainage Solutions, 11th ICARD / IMWA 2018 Annual Conference*, Pretoria, September. Paper 1363.
- C-32) Helsen, J., A.J. Martin, T. Crozier, G. Parent, V. Mann, C. Mendoza, C. Gaspar and J. Russell, 2018. Permeable reactive barrier feasibility assessment at Goldcorp's Red Lake Gold Mines: Validation of seepage flow paths through tracer testwork. *Acid Mine Drainage Solutions, 11th ICARD / IMWA 2018 Annual Conference*, Pretoria, September. Paper 1357.
- C-31) Martin, A.J., J. Helsen, T. Crozier, G. Parent, D. Paszkowski, C. Mendoza, H. Provost, C. Gaspar and J. Russell, 2018. Permeable reactive barrier feasibility assessment at Goldcorp's Red Lake Gold

- Mines: Delineation of groundwater flow paths and contaminant behaviour. *Acid Mine Drainage Solutions, 11th ICARD / IMWA 2018 Annual Conference*, Pretoria, September. Paper 1356.
- C-30) Paszkowski, D., C. Mendoza, T. Crozier and M. Holtby, 2016. Adit dewatering at a proposed gold mine: Numerical analysis of a large-scale long-term pumping test. Proceedings, *International Mine Water Association (IMWA 2016) Conference*, KUBUS Leipzig, Germany, July.
- C-29) Mendoza, C., and K. Devito, 2014. Ecohydrology applications to ecosystem reconstruction after oil-sand mining. *Geophysical Research Abstracts*. Vol: 16. European Geosciences Union. Abstract: <http://meetingorganizer.copernicus.org/EGU2014/EGU2014-9840.pdf>. Poster: [http://presentations.copernicus.org/EGU2014-9840\\_presentation.pdf](http://presentations.copernicus.org/EGU2014-9840_presentation.pdf).
- C-28) Thompson, C., C.A. Mendoza and K.J. Devito, 2013. Groundwater-surface water interactions in the Western Boreal Plain of Alberta. Proceedings, *GeoMontreal, 66<sup>th</sup> Canadian Geotechnical Conference*.
- C-27) Chasmer, L., R. Petrone, S. Brown, C. Hopkinson, C. Mendoza, J. Diiwu, W. Quinton and K. Devito, 2012. Sensitivity of modelled actual evapotranspiration to canopy characteristics within the Western Boreal Plain, Alberta. *Remote Sensing and Hydrology*, IAHS publication 352, paper 13, 337-340.
- C-26) Chasmer, L., R. Petrone, S. Brown, C. Hopkinson, N. Kljun, K. Devito and C. Mendoza, 2009. Spatial partitioning of CO<sub>2</sub> fluxes using airborne Lidar: Examples from a heterogeneous boreal wetland ecosystem. Proceedings, *30<sup>th</sup> Canadian Symposium on Remote Sensing*.
- C-25) Hosseini, A.H., C.V. Deutsch, K.W. Biggar and C.A. Mendoza, 2008a. Uncertainty in spatial distribution of residual NAPL and its downstream impacts. Proceedings, *61<sup>st</sup> Canadian Geotechnical Conference*.
- C-24) Hosseini, A.H., C.V. Deutsch, C.A. Mendoza and K.W. Biggar, 2008b. Uncertainty in measured biodegradation rate constant for heterogeneous aquifers. Proceedings, *61<sup>st</sup> Canadian Geotechnical Conference*.
- C-23) Petrone, R.M., K.J. Devito, U. Silins, C. Mendoza, S.C. Kaufman and J.S. Price, 2008. Importance of seasonal frost to peat water storage: Western Boreal Plains, Canada. *Groundwater-Surface Water Interaction: Process Understanding, Conceptualization and Modelling* IAHS publication 321, 61-66.
- C-22) Hosseini, A.H., K.W. Biggar, C.V. Deutsch and C.A. Mendoza, 2006. Geostatistical analysis of CPT-UVIF data for development of a site conceptual model. Proceedings, *NGWA Conference on Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Assessment and Remediation*.
- C-21) Smerdon, B.D., C.A. Mendoza and K.J. Devito, 2005. Sub-humid climate, glacial outwash and groundwater recharge: The case of a shifting water source to a Boreal lake in northern Alberta. Proceedings, *58<sup>th</sup> Canadian Geotechnical and 6<sup>th</sup> Joint CGS/IAH-CNC Groundwater Conference*. (Finalist, IAH Tóth Award, Best Student Paper)
- C-20) Smerdon, B.D., C.A. Mendoza and K.J. Devito, 2005. Can lakes and ponds be represented in a hydrologic model without excessive numerical intervention? *CGU Elements*, 23(2), 22-26. (D.M. Gray Award, Best Student Paper in Hydrology)

- C-19) Silins, U., I. Creed, K. Devito, T. Gan, C. Mendoza and R. Petrone, 2004. Wildfire's combination punch: A back-of-the-napkin assessment of flood risk from the 2003 Lost Creek wildfire. *Proceedings, 41<sup>st</sup> Annual Alberta Soil Science Workshop*, 155-160.
- C-18) Smerdon, B.D., C.A. Mendoza, A. McCann, C. Kraushar and A. Nilson, 2003. Assessment of leakage from an engineered reservoir using hydrogeological tools. *Proceedings, 56<sup>th</sup> Canadian Geotechnical and 4<sup>th</sup> Joint CGS/IAH-CNC Groundwater Conference*.
- C-17) Lai, V., K. Biggar, J. Foght, S. Guigard and C. Mendoza, 2001. Evaluation of intrinsic bioremediation of BTEX and chlorinated solvents at an old landfill in Cold Lake, Alberta. *Proceedings, 54<sup>th</sup> Canadian Geotechnical and 2<sup>nd</sup> Joint CGS/IAH-CNC Groundwater Conference*, 1202-1209.
- C-16) Butterfield, T., C. Mendoza and S. Lunn, 2001. Variability in the barometric efficiency of Quaternary till deposits at a site near Edmonton. *Proceedings, 54<sup>th</sup> Canadian Geotechnical and 2<sup>nd</sup> Joint CGS/IAH-CNC Groundwater Conference*, 1410-1417.
- C-15) Born, D., and C. Mendoza, 2001. Simulation of brine transport in heterogeneous media from a potash tailings pond. *Proceedings, 54<sup>th</sup> Canadian Geotechnical and 2<sup>nd</sup> Joint CGS/IAH-CNC Groundwater Conference*, 409-416.
- C-14) Haug, K., B. Rostron and C. Mendoza, 2001. Numerical modelling of a saline plume in the Mannville Group aquifer, Alberta Basin. *Proceedings, 54<sup>th</sup> Canadian Geotechnical and 2<sup>nd</sup> Joint CGS/IAH-CNC Groundwater Conference*, 1264-1271.
- C-13) Sharp, T.L.M., C.A. Mendoza and B.J. Rostron, 2001. LNAPL migration through heterogeneous media under fluctuating water table conditions. *Proceedings, 54<sup>th</sup> Canadian Geotechnical and 2<sup>nd</sup> Joint CGS/IAH-CNC Groundwater Conference*, 846-853.
- C-12) Mooder, B., and C. Mendoza, 2000. Dual-porosity methods for flow and transport simulations in extremely heterogeneous porous media. In *Volume 1 of Computational Methods in Water Resources XIII* (Bentley et al., editors), A.A. Balkema, Rotterdam, 113-119.
- C-11) Biggar, K., A. Mullick, S. Guigard, J. Foght and C. Mendoza, 2000. Natural attenuation of 1,1,1 TCA and BTEX at cold temperatures. *Proceedings, 6<sup>th</sup> Environmental Engineering Conference of the CSCE and 2<sup>nd</sup> Spring Conference of the Geoenvironmental Division of the CGS*, 105-112.
- C-10) Adams, J.J., B.J. Rostron and C.A. Mendoza, 2000. Regional fluid flow and the Athabasca oil sands: Numerical simulations using a fully-coupled heat, solute and groundwater flow model. *GeoCanada 2000 Conference CD*, paper 476.
- C-9) Birkham, T., M.J. Hendry, R. Kirkland, S.L. Barbour, C. Mendoza, L. Wassenar and P. Landine, 1999. Determining the reaction rates in uranium waste rock piles of northern Saskatchewan using O<sub>2</sub> and CO<sub>2</sub> gases. *Proceedings, 52<sup>nd</sup> Canadian Geotechnical Conference*, 195-200.
- C-8) Mendoza, C., S. Gilmour and J. Armstrong, 1998. Bioventing remediation of condensate: Field observations and numerical modelling. *Proceedings, 51<sup>st</sup> Canadian Geotechnical Conference*, 771-778.
- C-7) Biggar, K.W., C.A. Mendoza and J.M. Foght, 1998. Investigation for intrinsic bioremediation feasibility at a site in northern Alberta. *Proceedings, 51<sup>st</sup> Canadian Geotechnical Conference*, 779-786.
- C-6) Mooder, R.B., and C. Mendoza, 1998. Moisture movement, biodegradation, and carbon transport in municipal solid waste. *Proceedings, 51<sup>st</sup> Canadian Geotechnical Conference*, 851-858.

- C-5) Stahl, R.P., C.A. Mendoza and D.C. Sego, 1995. Geological factors impacting the effectiveness of site remediation through in-situ air sparging. *Proceedings, 48<sup>th</sup> Canadian Geotechnical Conference*, 269-276.
- C-4) Armstrong, J.A., C.A. Mendoza, B.J. Moore and P.E. Hardisty, 1995. A comparison of horizontal wells versus vertical wells for soil vapour extraction. *Abstracts, IAHR, Solutions'95*.
- C-3) Mendoza, C.A., 1995. Effective transport parameters for long-term vapour transport in heterogeneous unsaturated media. *Abstracts, IAHR, Solutions'95*.
- C-2) Stahl, R.P., C.A. Mendoza and D.C. Sego, 1995. Methodologies and key issues of air sparging for remediation of VOC contaminated sites. *Abstracts, IAHR, Solutions'95*.
- C-1) Mendoza, C.A., E.O. Frind and B.M. Hughes, 1990. Vapour transport of organic compounds: Simulation of field experiments and model validation. *Calibration and Reliability in Groundwater Modelling*, K. Kovar, editor, IAHS publication 195, 331-340.

## Technology Transfer and Consulting Reports<sup>2</sup>

- T-23) Lukenbach, M., P. Twerdy, T. Butterfield and C. Mendoza, 2020. *Hummock Technology Learnings to Support Water Management on Reclaimed Landforms*. Appendix B in "Composite Tailings Capping Knowledge Synthesis", Syncrude Canada Ltd., Edmonton. 94p. <https://doi.org/10.7939/r3-n048-ex41>
- T-22) Mendoza, C., and K. Devito, 2020. *Final Summary Report: Hydrogeologic Investigations of Sandhill Watershed*. Appendix C2 in "Composite Tailings Capping Knowledge Synthesis", Syncrude Canada Ltd., Edmonton. 52p. <https://doi.org/10.7939/r3-n048-ex41>
- T-21) Provost, H., V. Mann and C. Mendoza, 2015. *Sandhill Fen Numerical Groundwater Modeling – Final*. Report submitted to Environmental and Reclamation Research, Syncrude Canada Ltd., Edmonton. 55p plus 2 appendices.
- T-20) Jones, J.P., and C. Mendoza, 2015. *Groundwater Model Review for the Regional Groundwater Sustainability Project*. Review submitted to Canada's Oil Sands Innovation Alliance (COSIA). 32p.
- T-19) Longval, J.M., and C.A. Mendoza, 2014. *Initial Hydrogeological Instrumentation and Characterization of Sandhill Fen Watershed*. Hydrogeology Group, Earth & Atmospheric Sciences, University of Alberta, Edmonton, AB. 63p plus electronic appendices. REV\_1 issued 24 March 2020.
- T-18) Jones, J.P., and C.A. Mendoza, 2012. *Alberta Oil Sands Groundwater Modelling Guidelines*. Report submitted to the Cumulative Environmental Management Association (CEMA), Groundwater Working Group, Fort McMurray. 71p.
- T-17) Devito, K., C. Mendoza and C. Qualizza, 2012. *Conceptualizing Water Movement in Boreal Plain: Implications for Watershed Reconstruction*. Synthesis report prepared for the Canadian Oil Sands Network for Research and Development, Environmental and Reclamation Research Group. 164p. <https://doi.org/10.7939/R32J4H> (over 1700 downloads to March 2021)

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<sup>2</sup> Excludes numerous BGC Engineering client reports

- T-16) Carrera-Hernández, J.J., C.A. Mendoza, K.J. Devito, R.M. Petrone and B.D. Smerdon, 2011. *Effects of Aspen Harvesting on Groundwater Recharge and Water Table Dynamics in the Western Boreal Forest*. Report submitted to Alberta-Pacific Forest Products. 63p.
- T-15) Armstrong, J.A., C.A. Mendoza and A. Gorody, 2009. *Potential for Gas Migration due to Coalbed Methane Development*. Report submitted to Alberta Environment. 63p plus figures and 3 appendices. ISBN: 978-0-7785-8545-9. <http://environment.gov.ab.ca/info/library/8172.pdf>. Joint AENV/ERCB response at <http://environment.gov.ab.ca/info/library/8176.pdf>
- T-14) Blyth, A., B. Mayer, C. Mendoza and K. Muehlenbachs, 2008. *Baseline Water Well Testing (BWWT) for CBM Operations — Science Review Panel Final Report*. Report of the Science Review Panel to Alberta Environment. 11p.
- T-13) Devito, K. and C. Mendoza, 2008. *Maintenance and Dynamics of Natural Wetlands in Western Boreal Forests: Synthesis of Current Understanding from the Utikuma Research Study Area*. Appendix C-1 in: "Alberta Environment. 2008. *Guideline for wetland establishment on reclaimed oil sands leases (2<sup>nd</sup> edition)*. Prepared by Harris, M.L., of Lorax Environmental, for the Wetlands and Aquatics Subgroup of the Reclamation Working Group of the Cumulative Environmental Management Association, Fort McMurray, AB. December 2007." <http://environment.gov.ab.ca/info/library/8105.pdf>. 47p plus tables and figures.
- T-12) Devito, K., C. Mendoza, U. Silins, R. Petrone, T. Gan and I. Creed, 2008. *A framework for classifying and assessing potential water resources: Comparison with Fort McMurray*. Appendix C-2 in: "Alberta Environment. 2008. *Guideline for wetland establishment on reclaimed oil sands leases (2<sup>nd</sup> edition)*. Prepared by Harris, M.L., of Lorax Environmental for the Wetlands and Aquatics Subgroup of the Reclamation Working Group of the Cumulative Environmental Management Association, Fort McMurray, AB. December 2007." <http://environment.gov.ab.ca/info/library/8105.pdf>. 15p plus tables and figures.
- T-11) Barbour, L., D. Chanasyk, J. Hendry, L. Leskiw, T. Macyk, C. Mendoza, A. Naeth, C. Nichol, M. O’Kane, B. Purdy, C. Qualizza, S. Quideau and C. Welham, 2007. *Soil Capping Research in the Athabasca Oil Sands Region. Volume 1: Technology Synthesis and Volume 2: Fact Sheets*. Report submitted to the Canadian Oil Sands Network for Research and Development (CONRAD). Includes Phases 1 (soil moisture), 2 (salinity and sodicity), 3 (nutrients and biological response) and 4 (integration). 173p and 147p including figures.
- T-10) Mendoza, C. and M. Maccagno, 2006. *Proposed Regional Groundwater Monitoring, Imperial Oil Resources, Cold Lake Operations*. Report submitted to Imperial Oil Resources, Cold Lake Operations.
- T-9) Mendoza, C., T. Sharp and M. Maccagno, 2006. *CLO South Boundary Hydrogeology Study*. Report submitted to Imperial Oil Resources, Cold Lake Operations.
- T-8) Mendoza, C.A., 2003. *Simulations of Vapour Transport from Generic PCE Releases at Dry-cleaning Establishments, Modesto, CA*. Submitted to Komex International, Huntington Beach, CA. 18p plus figures and appendices.
- T-7) Armstrong, J. and Mendoza, C.A., 2002. *Evaluation of Potential Groundwater Contamination due to Surface Casing Vent Flow/Gas Migration*. Submitted to Canadian Association of Petroleum Producers, Surface Casing Vent Flow Subcommittee. 30p plus figures.

- T-6) Mendoza, C.A., 1999. *Alternatives for Site-Specific Remediation Standards at the Former YPL Upper Tank Farm, Whitehorse, Yukon*. Submitted to EBA Engineering Consultants. 11p.
- T-5) Mendoza, C.A., 1999. *The Potential for Vapour Intrusion into Basements at the Former YPL Upper Tank Farm, Whitehorse, Yukon*. Submitted to EBA Engineering Consultants. 37p.
- T-4) Mendoza, C.A., 1996. *Recommendations Concerning Subsurface Contamination at the CFB Cold Lake Landfill*. Submitted to Construction Engineering Unit, 4 Wing Cold Lake. 19p.
- T-3) Mendoza, C.A., 1995. *Analytical Solutions for One-dimensional Vapour Transport with Infiltration in the Unsaturated Zone*. Submitted to MITRE Corporation, McLean, Virginia. 22p.
- T-2) Mendoza, C.A., 1991. *In-situ Remediation of Organics in the Unsaturated Zone: Vacuum Extraction and Other Technologies*. Submitted to Piteau Engineering for the Canadian Petroleum Association and Environment Canada *Sour Gas Plant Remediation Technology Study*. 33p.
- T-1) Mendoza, C.A., 1991. *Design and Implementation of Vacuum Extraction Systems*. Submitted to Piteau Engineering for the Canadian Petroleum Association and Environment Canada *Sour Gas Plant Remediation Technology Study*. 21p.

## Invited Presentations

### International/National Invited Presentations

- I-21) Mendoza, C., P. Twerdy, M. Lukenbach, S. Carey, K. Devito and S. Landhäusser, 2021. Ecohydrogeological development of a reclaimed upland-wetland system constructed on oil-sand mine tailings. *Canadian Water Resources Association – World Water Day Webinar*, March. (Online lecture)
- I-20) Mendoza, C., M. Lukenbach, P. Twerdy, S. Carey, K. Devito and S. Landhäusser, 2018. Mitigation of environmental impacts through construction of a reclaimed upland-wetland system on soft tailings at an oil-sand mine, NE Alberta, Canada. *Resources for Future Generations 2018*, Abstract 2053, Vancouver, BC, June. (Session Keynote)
- I-19) Mendoza, C., and K. Devito, 2013. Hydrological challenges and opportunities for reconstructing ecosystems after oil-sand mining. *SER 2013: 5<sup>th</sup> World Conference on Ecological Restoration*, Madison, WI, October.
- I-18) Smerdon, B.D., J.J. Carrera-Hernández, C.A. Mendoza and D.A. Allen, 2010. Attempting to quantify fluxes across the water table: Gleaning some insight from modeling unsaturated flow in semi-arid and sub-humid regions. *Water across Interfaces: CUAHSI 2<sup>nd</sup> Biennial Science Meeting*, Boulder, CO, July.
- I-17) Devito, K., S. Brown, M. Hairabedian, S.M. Landhäusser, C.A. Mendoza, R. Petrone, T. Redding, J. Riddell, U. Silins, B. Smerdon and J. Snedden, 2009. Generalizing riparian hydrologic function in a heterogeneous landscape, Western Boreal Plain, Alberta, Canada. *EOS Trans. AGU*, 90(22), Abstract CG24B-04.
- I-16) Silins, U., Bladon, K.D., E. Esch, J.R. Spence, M. Stone, M.B. Emelko, M.J. Wagner, C. Williams, I. Tichkowsky, S. Boon, K.J. Devito and C.A. Mendoza, 2008. Ecohydrological response to severe disturbance by wildfire and salvage logging in oligotrophic Rocky Mountain watersheds: Nutrient loading, plant productivity, and benthic macroinvertebrate community response. *EOS Trans. AGU*, 89(53), Abstract H23G-08.

- I-15) Mendoza, C., 2007. Gas migration issues from landfills. *Vapour Intrusion — A Rapidly Developing Environmental Challenge*, sponsored by the Air & Waste Management Association, Calgary, AB, November.
- I-14) Silins, U., V.J. Lieffers, S.M. Landhäusser, C.A. Mendoza, K.J. Devito, R.M. Petrone and T.Y. Gan, 2006. Scaling hydrologic processes in boreal forest stands: New eco-hydrological perspectives or déjà vu? *EOS Trans. AGU*, 87(52), Abstract B21F-03.
- I-13) Devito, K.J., T. Gan, C. Mendoza, R. Petrone, U. Silins and B. Smerdon, 2006. A framework for broad scale definition of water resources in the Boreal forest: Consider topography last? *EOS Trans. AGU*, 87(36), Abstract H41A-03.
- I-12) Devito, K.J., I.F. Creed, T. Gan, C. Mendoza, R. Petrone and U. Silins, 2006. Defining water resources in the Boreal Forest: Consider topography last. *Joint CCFFR and Society of Canadian Limnologists (SCL) Annual Meeting*, Calgary, AB, January.
- I-11) Pemberton, S.G., M.K. Gingras and C.A. Mendoza, 2005. Bio-pipeline networks in the enhancement of fluid flow in bioturbated reservoir. *GAC Annual Convention*, p. 155. (Keynote Address, Plenary Session)
- I-10) Devito, K., I. Creed, T. Gan, C. Mendoza, R. Petrone, U. Silins and B.D. Smerdon, 2005. A framework for applying broad scale catchment classification to water research and management in the Boreal Plains Canada: Should topography be one of the last things to think of? *CGU 31<sup>st</sup> Annual Meeting*, Abstract 92.
- I-9) Devito, K.J., I. Creed, T. Gan, C. Mendoza, R. Petrone and U. Silins, 2004. Defining and instrumenting effective hydrologic landscape units in the glaciated Boreal Plain: Scale and hydrogeologic considerations. *International Instrumented Watershed Symposium*, Edmonton, AB, June.
- I-8) Hill, S.R., and C.A. Mendoza, 2004. Characterizing the role of barometric pressure in oxygen-depleted breathing water wells. *Canadian Water Well Association*, Kelowna, BC, May.
- I-7) Devito, K.J., I.F. Creed and C.A. Mendoza, 2003. Generalizing the effects of landuse on aquatic systems: Are landscape features a mirror or mirage? *Gordon Research Conference on Catchment Sciences: Interactions of Hydrology, Biology and Geochemistry, Water as a Mirror of the Landscape—How Valid and Useful is the Hypothesis?* New London, NH, July. (Keynote Address)
- I-6) Pemberton, S.G., M. Gingras, C. Mendoza, F. Henk and J.A. MacEachern, 1998. The *Glossifungites* ichnofacies and its role in delineating discontinuities and enhancing fluid flow in hydrocarbon reservoirs. *CSPG Reservoir*, 25(10), p. 10.
- I-5) Mendoza, C., J. Armstrong, S. Gilmour and D. Atkinson, 1996. Vadose-zone remediation of hydrocarbon contaminated gas plant sites in Alberta. *CSPG Pools'96 Program and Abstracts*.
- I-4) Nesbitt, B.E., K. Muehlenbachs and C.A. Mendoza, 1995. Contrasts in paleo-hydrogeology between compressional and extensional orogens. *GSA Abstracts with Programs*.
- I-3) Mendoza, C.A., and R.B. Moeder, 1994. Long-term vapour transport in the unsaturated zone. *GAC/MAC Joint Annual Meeting*.
- I-2) Conant, B.H., R.W. Gillham and C.A. Mendoza, 1992. Field experiments and modelling of vapour transport of trichloroethylene in the unsaturated zone. *EOS*, 73(14) (supplement), p. 127.
- I-1) Gillham, R.W., B.M. Hughes and C.A. Mendoza, 1990. Field investigation of trichloroethylene vapour transport in the unsaturated zone. *EOS*, 71(28), p. 870.

### **Selected Regional/Local Invited Presentations**

- Mendoza, C., M. Lukenbach, P. Twerdy, S. Carey, K. Devito and S. Landhäuser, 2018. Ecohydrological considerations for a reclaimed upland-wetland system constructed on soft tailings deposits. *IAH-CNC UBC Fall 2018 Hydrogeology Symposium*, Vancouver, BC, November.
- Devito, K., L. Barbour and others, 2017. Applying an integrative climate, geology and disturbance understanding of natural systems hydrologic processes for re-establishing and sustaining hydrologic function of constructed landscapes. *COSIA Oil Sands Innovation Summit 2017*, Calgary, March.
- Mendoza, C., and K. Devito, 2016. Designing landscapes for wetlands following oil-sand mining. *Connecting Our Waters, A World Water Day Panel Discussion*, Edmonton, March.
- Mendoza, C., 2014. Hydrology, climate and constructed geology for reclaiming oil-sand mining landscapes. *Geological Engineering Seminar Series, University of British Columbia*, Vancouver, April.
- Mendoza, C., 2013. Hydrology, constructed geology and reclamation of oil-sand mining landscapes. *Department of Earth Sciences Seminar, Simon Fraser University*, Burnaby, November.
- Mendoza, C., 2012. Wetland-forestland interactions on the Boreal Plain: Implications for reconstruction of oil-sands mine sites. *Department of Earth Sciences Seminar, Simon Fraser University*, Burnaby, February.
- Qualizza, C., K. Devito and C. Mendoza, 2012. Research synthesis and technology transfer of learnings from research into the hydrology of the Boreal Plain, implications for watershed reconstruction. *Canadian Oil Sands Network for Research and Development, Environmental and Reclamation Research Group*. Edmonton, January.
- Mendoza, C.A., and J.J. Carrera-Hernández, 2011. Modelling long-term climate and vegetation impacts on soil moisture and groundwater recharge on the Boreal Plain, developing HRAs for oil sands reclamation. *Canadian Oil Sands Network for Research and Development, Environmental and Reclamation Research Group*. Edmonton, January.
- Smerdon, B.D., J.J. Carrera-Hernández and C.A. Mendoza, 2010. Estimating groundwater recharge and the effects of landscape disturbance on the Boreal Plains. *Saskatchewan Geological Society*, Regina, July.
- Smerdon, B.D., C.A. Mendoza and C. Qualizza, 2008. Understanding groundwater recharge in a sandy landscape: Observing the effects of disturbance is a step towards reclamation in northern Alberta. *Canadian Society of Petroleum Geologists, Geofluids Division, Seminar Series*, Calgary, February.
- Price, A.C., and C.A. Mendoza, 2004. Groundwater flow and salt transport at a sand tailings dam: Field observations and modelling results. *41<sup>st</sup> Annual Alberta Soil Science Workshop*, Lethbridge, February.
- Mendoza, C.A., 1998. Bioventing as a remediation technique. *IAH, Calgary Chapter*, Calgary, December.
- Mendoza, C.A., 1996. Vadose-zone remediation of hydrocarbon-contaminated gas plant sites in Alberta. *Landscape Ecology Seminar Series, Department of Renewable Resources, University of Alberta*, Edmonton, September.
- Mendoza, C.A., 1996. Vadose-zone remediation of hydrocarbon-contaminated gas plant sites in Alberta. *Geotechnical Society of Edmonton*, Edmonton, April.

- Mendoza, C.A., 1994. Long-term vapour transport in the unsaturated zone. *Soil Remediation Summer Seminar Series*, Department of Renewable Resources, University of Alberta, Edmonton, July.
- Mendoza, C.A., 1992. Transport of trichloroethylene vapours in the unsaturated zone. *Edmonton Geological Society*, Edmonton, October.
- Mendoza, C.A., 1991. Hierarchical scaling of constitutive relationships controlling multi-phase flow in fractured geologic media. *Department of Geological Sciences, University of British Columbia*, Vancouver, May.
- Mendoza, C.A., 1989. Advective-dispersive transport of heavy organic solvent vapours in the unsaturated zone. *Department of Geological Sciences, University of British Columbia*, Vancouver, July.
- Mendoza, C.A., 1988. Advective-dispersive transport of chlorinated solvents in the gas-phase. *Department of Civil Engineering, Stanford University*, Stanford, December.
- Mendoza, C.A., 1988. Advective-dispersive transport of chlorinated solvents in the gas-phase. *Department of Environmental Science and Engineering, Oregon Graduate Institute*, Beaverton, November.

### Selected Conference Abstracts

- Lukenbach, M.C., P.A. Twerdy, C.A. Mendoza, S.K. Carey, K.J. Devito and T.R. Butterfield, 2020. Hydrological and hydrogeological performance of constructed hummocks at a reclaimed composite tailings deposit. *GeoConvention 2020*, Calgary.
- Devito et al., 2020. Perched peatlands: Insights into eco-hydrologic roles of peatlands in water limited boreal environments. *EGU General Assembly 2020*, EGU2020-22254.  
<https://doi.org/10.5194/egusphere-egu2020-22254>
- Hokanson et al., 2020. The give and take (but mostly take) of forested boreal plains hummocks: Are they hydrologic sources or sinks? *EGU General Assembly 2020*, EGU2020-107.  
<https://doi.org/10.5194/egusphere-egu2020-107>
- Leonard, R., P. Moore, S. Krause, L. Chasmer, K. Devito, R.M. Petrone, C.A. Mendoza, J.W. Waddington and N. Kettridge, 2019. Forest stand complexity controls ecosystem-scale evapotranspiration dynamics: Implications for landscape flux simulations. *AGU Fall Meeting*, Abstract H21C-01.
- Hokanson, K.J., C.A. Mendoza and K.J. Devito, 2019. Peatland hydrologic sovereignty in a water-limited world: Subverting an ecohydrologic paradigm. *IUGG General Assembly*, Presentation IUGG19-2099, Montreal, July.
- Mendoza, C., C. Thompson, R. Thompson, J. Mosquera, B. Mooder and T. Crozier, 2019. Unstructured grids bring enhanced definition to all stages of mining projects. *Modflow and More*, Golden, June.
- Devito, K., M. Little-Devito, C. Mendoza, L. Chasmer and N. Kettridge, 2019. Learning's from opportunistic wetlands: The role of substrate and landscape position on reconstructed landforms. *Geophysical Research Abstracts*, Vol. 21, EGU2019-16667. (oral)
- Landhäusser, S., S. Carey, K. Devito, F. Leishman, M. Lukenbach, C. Mendoza and M. Merlin, 2019. Early drivers of upland forest development and associated hydrology in a reconstructed landscape on a boreal oil-sands mine site. *Geophysical Research Abstracts*, Vol. 21, EGU2019-11201. (oral)

- Biagi, K., M.G. Clark, E. Humphreys, C. Mendoza and S.K. Carey, 2019. An evaluation of the hydrological functioning of a constructed wetland in the Athabasca oil sands region, Canada – six years after commission. *Geophysical Research Abstracts*, Vol. 21, EGU2019-12056. (oral)
- van der Velde, Y., M. Braakhekke, N. Kettridge, C. Mendoza and K. Devito, 2019. Resilience of peatland-forestland landscapes in the Boreal Plains of Canada. *Geophysical Research Abstracts*, Vol. 21, EGU2019-13653. (oral)
- Leonard, R., P. Moore, S. Krause, K. Devito, R. Petrone, C. Mendoza, J. Waddington and N. Kettridge, 2019. Peatland heterogeneity and its control on spatiotemporal complexities in peat surface temperature. *Geophysical Research Abstracts*, Vol. 21, EGU2019-12591. (posters)
- Hurley, H., K. Devito, K. Hokanson, C. Mendoza and N. Kettridge, 2019. Dynamic connectivity within small, forested wetlands impacts runoff generation in Aspen-dominated catchments of the sub-humid Boreal Plain (Canada). *Geophysical Research Abstracts*, Vol. 21, EGU2019-14785. (poster)
- Twerdy, P.A., M.C. Lukenbach and C.A. Mendoza, 2018. Hydrogeological considerations for landscape reclamation on soft tailings deposits in the Athabasca Oil Sands Region. Proceedings, *GeoEdmonton, 71<sup>st</sup> Canadian Geotechnical and 13<sup>th</sup> Joint CGS/IAH-CNC Groundwater Conference*, Edmonton, September.
- Lukenbach, M.C., C.J. Spencer, C.A. Mendoza, K.J. Devito, S.M. Landhäusser and S.K. Carey, 2018. Groundwater recharge in a reclaimed watershed following oil sands mining: Implications for groundwater flow in reconstructed landscapes. Proceedings, *GeoEdmonton, 71<sup>st</sup> Canadian Geotechnical and 13<sup>th</sup> Joint CGS/IAH-CNC Groundwater Conference*, Edmonton, September.
- Lukenbach, M., C. Mendoza, K. Devito, K. Hokanson, P. Twerdy and S. Landhäusser, 2018. Landform design influences groundwater recharge and local-scale flow when re-establishing Boreal ecosystems on soft tailings deposits. *Resources for Future Generations 2018*, Abstract 1641, Vancouver, June.
- Déri-Takács, J., C. Mendoza and B. Rostron, 2018. Geochemical characterization leads to a fully-integrated conceptual model of groundwater flow systems, Wood Buffalo National Park, Canada. *Resources for Future Generations 2018*, Abstract 2407, Vancouver, June. (Session Keynote)
- Hokanson, K.J., K.J. Devito and C.A. Mendoza, 2018. Shallow groundwater systems in sub-humid, low-relief Boreal Plain landscapes: Interactions between glacial landforms, climate, & topography. *Canadian Water Resources Association (CWRA) Conference*, Paper 63, Victoria, June. (Winner, Hoskin Scientific Award for Best Poster)
- Mendoza, C., M. Lukenbach, P. Twerdy, S. Carey, K. Devito and S. Landhäusser, 2018. Ecohydrological development of a reclaimed upland-wetland system constructed on soft tailings at an oil-sand mine, NE Alberta, Canada. *Geophysical Research Abstracts*, Vol. 20, EGU2018-11843. (oral)
- Kettridge, N., M. Lukenbach, K. Hokanson, C. Hopkinson, K. Devito, R. Petrone, C. Mendoza and J.M. Waddington, 2018. Extreme wildfire exposes remnant peat carbon stocks to increased post-fire drying. *Geophysical Research Abstracts*, Vol. 20, EGU2018-8399. (poster)
- Hokanson, K.J., K.J. Devito and C.A. Mendoza, 2017. Groundwater in the Boreal Plains: How climate and geology interact to control water table configurations in a sub-humid, low-relief region. Abstract H13G-1467 presented at 2017 Fall Meeting, AGU, New Orleans, LA, December. (poster)

- Little-Devito, M., N. Kettridge, L. Chasmer, M.C. Lukenbach, K. Devito and C.A. Mendoza, 2017. Learnings from opportunistic wetlands: The role of substrate and landscape position on reconstructed landforms in a sub-humid climate. *AGU Fall Meeting*, Abstract H14E-06, New Orleans, December.
- Lukenbach, M.C., C.J. Spencer, C.A. Mendoza, K.J. Devito, S.M. Landhäusser and S.K. Carey, 2017. Resolving the need for groundwater recharge versus forest productivity in a reclaimed watershed. *GSA Abstracts with Programs*, 49(6), <https://doi.org/10.1130/abs/2017AM-306440>
- Mooder, B., and C. Mendoza, 2017. Post-mining hydrogeology in Alberta's mineable Athabasca oil sands region. *IAH, 2017 Characterizing Regional Groundwater Flow System Symposium*, Calgary, June.
- Hokanson, K.J., K.J. Devito and C.A. Mendoza, 2017. Substrate layering and climate control water table configurations in sub-humid Boreal Plain landscapes. *CGU/CSAFM Joint Annual Scientific Meeting*, Vancouver, May. Abstract H14-10.
- Lukenbach, M.C., C.J. Spencer, C.A. Mendoza, K.J. Devito, S.M. Landhäusser and S.K. Carey, 2017. Variably saturated flow between constructed upland hummocks and a wetland in a reclaimed watershed following oil sands mining. *CGU/CSAFM Joint Annual Scientific Meeting*, Vancouver, May. Abstract B04-09.
- Déri-Takács, J., C. Mendoza and B. Rostron, 2016. Quantification of the effects of topography-driven groundwater flow by coupling field observations and numerical models in Wood Buffalo National Park, Canada. *IAH 43<sup>rd</sup> International Congress*, Montpellier, France, September. Abstract 2476. (Early Career Hydrogeologist Award for best oral presentation)
- Chasmer, L., K. Hokanson, K. Devito, R. Petrone, C. Mendoza and C. Hopkinson, 2016. Pulsing Wetlands: Monitoring wetland changes and feedbacks using multi-temporal LiDAR. *Canadian Symposium on Remote Sensing*, Winnipeg, June. Abstract 87. (oral)
- James, L., K. Devito, D. Alessi, C. Mendoza, R. Leonard and N. Kettridge, 2016. Perched wetland formation and maintenance on the boreal plains of Canada. *CMOS/CGU Joint Annual Meeting*, Fredericton, June. Abstract 8509.
- Spennato, H.M., S.K. Carey, E.M. Nicholls and C.A. Mendoza, 2016. An assessment of water table dynamics in a constructed wetland, Fort McMurray, Alberta. *CMOS/CGU Joint Annual Meeting*, Fredericton, June. Abstract 8557. (poster)
- Paszkowski, D., C. Mendoza, T. Crozier and M. Holtby, 2016. Adit dewatering at a proposed gold mine: Numerical analysis of a large-scale long-term pumping test. *NGWA Groundwater Summit*, Denver, April. Abstract 10943. (oral)
- Kettridge, N., A. Tilak, K. Devito, R. Petrone, C. Mendoza and M. Waddington, 2016. Moss and peat hydraulic properties are optimized to maximise peatland water use efficiency. *Geophysical Research Abstracts*, Vol. 18, EGU2016-2619. (oral)
- Kettridge, N., M. Lukenbach, K. Hokanson, K. Devito, C. Hopkinson, R. Petrone, C. Mendoza and M. Waddington, 2016. Water repellency diminishes peatland evaporation after wildfire. *Geophysical Research Abstracts*, Vol. 18, EGU2016-3110. (PICO)
- Leonard, R., N. Kettridge, S. Krause, K. Devito, G. Granath, R. Petrone, C. Mendoza and J.M. Waddington, 2016. Medium term ecohydrological response of peatland bryophytes to canopy disturbance. *Geophysical Research Abstracts*, Vol. 18, EGU2016-4465-2. (poster)

- Leonard, R., N. Kettridge, S. Krause, J.M. Waddington, K. Devito, R. Petrone and C. Mendoza, 2016. New insights from high spatio-temporal measurements at the pedosphere-atmosphere interface. *Geophysical Research Abstracts*, Vol. 18, EGU2016-4492. (oral)
- Hokanson, K., J. Carrera-Hernández, K. Devito and C. Mendoza, 2016. The interaction of climate and glacial landforms on subsurface and surface hydrology and chemistry across a heterogeneous boreal plain landscape. *Geophysical Research Abstracts*, Vol. 18, EGU2016-10368. (poster)
- Hokanson, K., J. Carrera-Hernández, K. Devito, C. Thompson and C. Mendoza, 2015. The influence of glacial landforms on subsurface and surface hydrology and chemistry across a heterogeneous Boreal Plain landscape. *AGU/CGU Joint Assembly*, Abstract H42A-07.
- Devito, K., K. Hokanson, P. Moore, A. Anderson, N. Kettridge, C. Mendoza, R. Petrone, U. Silins and J. Waddington, 2015. Threshold responses in regional runoff from a heterogeneous low relief terrain – Western Canada’s Boreal Plains. *AGU/CGU Joint Assembly*, Abstract H33A-02.
- Biagi, K., S. Carey, E. Nicholls and C. Mendoza, 2015. Understanding flow pathways, major chemical transformations and water sources using hydrochemical and hydrometric data in a constructed fen, Fort McMurray, Alberta. *AGU/CGU Joint Assembly*, Abstract H14A-0187.
- Nicholls, E., S. Carey, G. Drewitt, E. Humphreys, M.G. Clark and C. Mendoza, 2015. Multi-year water balance assessment of a constructed wetland, Fort McMurray, Alberta. *AGU/CGU Joint Assembly*, Abstract H13A-05. (CGU Best Student Paper Award)
- Mendoza, C., S. Carey, K. Devito, S. Landhäusser and J.M. Longval, 2014. Early water dynamics within a wetland complex constructed on tailings at an oil-sand mine. *GSA Abstracts with Programs*, 46(6), p. 816.
- Horton, C., C. Mendoza and K. Devito, 2014. Characterizing groundwater surface-water flow patterns at a wetland constructed on waste rock in the oil sands region. *GSA Abstracts with Programs*, 46(6), p. 816.
- Bentley, L.R., A.P. Booterbaugh and C.A. Mendoza, 2014. Geophysical characterization of an undrained oil-sand tailings pond dam, Alberta, Canada. *GSA Abstracts with Programs*, 46(6), p. 816.
- Plach, J.M., J.M. Ferone, Z. Gibbons, B. Smerdon, A. Adhikari, C. Mendoza, R.M. Petrone and K. Devito, 2014. Influence of glacial landform and landscape position on groundwater and phosphorous dynamics of shallow lakes on the Boreal Plains. *GSA Abstracts with Programs*, 46(6), p. 205.
- Thompson, C., C.A. Mendoza and K.J. Devito, 2014. Potential influence of climate change on ecosystems within the Boreal Plains of northern Alberta. *GSA Abstracts with Programs*, 46(6), p. 67.
- Déri-Takács, J., B. Rostron, J. Tóth and C. Mendoza, 2014. Integrated use of flow system analysis, karst geology, and remote sensing for hydrogeological characterization of Wood Buffalo National Park, AB-NWT, Canada. *GSA Abstracts with Programs*, 46(6), p. 42.
- Devito, K., A. Anderson, N. Kettridge, C. Mendoza, R. Petrone, U. Silins, K. Smith and M. Waddington, 2014. Threshold responses in regional runoff from a heterogeneous low relief terrain - Western Canada's Boreal Plains. *Geophysical Research Abstracts*, 16, European Geosciences Union.
- Booterbaugh, A., L. Bentley and C. Mendoza, 2014. Geophysical characterization of groundwater flow and salt transport in an oil-sand tailings pond dam, Alberta, Canada. *Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP 2014)*, Boston, MA, March.

- Price, J., K. Devito, C. Mendoza and R. Petrone, 2014. Hydrological challenges and opportunities for reconstructing wetland ecosystems after oil-sands mining. Responsible management of peatlands: Involvement of the industrial sector. *Peatland Ecology Research Group (PERG) 20<sup>th</sup> Symposium, Symposium on responsible management of peatlands: Involvement of the industrial sector*, Quebec, QC, February.
- Horton, C., C. Mendoza and K. Devito, 2012. Characterising groundwater-surface water flow patterns in two constructed wetlands in the oil sands region. *IAH 2012 International Congress*, Niagara Falls, ON, September.
- Adhikari, A., K. Devito, J.M. Ferone, Z. Gibbons, C. Mendoza and B.D. Smerdon, 2013. Influence of glacial landform and landscape position on groundwater and phosphorus dynamics of shallow lakes on the Boreal Plains. *2013 Joint Scientific Congress of the CMOS, CGU and CWRA*, Saskatoon, SK, May.
- Jones, J.P., and C. Mendoza, 2013. Groundwater Modelling Guidelines for the Alberta Oil Sands: Overview and Discussion. *WaterTech 2013*, Banff, AB, April.
- Thompson, C., K. Devito, R.M. Petrone and C. Mendoza, 2012. Isotopic fractionation of recharge waters on the Boreal Plain, Alberta. *CGU 38<sup>th</sup> Annual Meeting*.
- Devito, K., C. Mendoza, R. Petrone, C. Qualizza, D. Gignac, S.M. Landhäusser and U. Silins, 2011. Conceptualizing the regional hydrology of a complex low relief terrain: Climate and geology interactions on sink-source dynamics of Western Boreal forests. *AGU Fall Meeting*, Abstract H51F-1260.
- Brown, S.M., R.M. Petrone, L. Chasmer, C.A. Mendoza and K.J. Devito, 2011. The influence of rooting zone soil moisture and soil suction on evapotranspiration from natural and harvested aspen dominated uplands, Western Boreal Plain, Alberta, Canada. *CGU 37<sup>th</sup> Annual Meeting*.
- Devito, K.J., C.A. Mendoza, R.M. Petrone, C.V. Qualizza, D. Gignac, S.M. Landhäusser and U. Silins, 2011. Influence of aspen harvesting on the water sink-source dynamics of a complex low relief terrain. *CGU 37<sup>th</sup> Annual Meeting*.
- Petrone, R.M., S.M. Brown, C.A. Mendoza, L. Chasmer and K.J. Devito, 2011. Cutting the “rope” in the atmosphere-soil tug-of-war: forest harvesting effects on evapotranspiration in an aspen dominated Western Boreal Plain forestland. *CGU 37<sup>th</sup> Annual Meeting*.
- Mendoza, C.A., J.J. Carrera-Hernández, B.D. Smerdon, K.J. Devito and R.M. Petrone, 2011. Modeling long term climate and vegetation impacts on soil moisture and groundwater recharge on the Boreal Plain, developing hydrologic response areas for oil sands reclamation. *CGU 37<sup>th</sup> Annual Meeting*.
- Devito, K.J., C.A. Mendoza, R.M. Petrone, C.V. Qualizza, D. Gignac, S. Landhäusser and U. Silins, 2011. Interaction of Aspen forest and harvesting with climate and geology on sink-source dynamics: conceptualizing the regional hydrology of a complex low relief terrain, Western Boreal Plain, Canada. *Geophysical Research Abstracts* (European Geophysical Union).
- Petrone, R.M., L. Chasmer, S. Brown, C.A. Mendoza, J. Diiwu, W. Quinton, C. Hopkinson and K.J. Devito, 2010. Examining the sensitivity of modelled evapotranspiration to vegetation structural characteristics within boreal peatlands, riparian ecosystems and upland mixed forest. *AGU Fall Meeting*, Abstract H31B-0988.

- Mendoza, C.A. and B.J. Rostron, 2010. Impacts of urbanization on the Wagner Natural Area, Edmonton, Alberta. *GSA Abstracts with Programs*, 42(5), p. 326.
- Chasmer, L., R.M. Petrone, K.J. Devito, C.A. Mendoza and W. Quinton, 2010. Sensitivity of potential evapotranspiration to canopy characteristics within the Western Boreal Forest, Alberta. *CGU 36<sup>th</sup> Annual Meeting*.
- Cheema, T.J., C.A. Mendoza and A. Price, 2009. Hydrogeophysical modeling of spatial and temporal salt flushing of a tailings dam. *EOS Trans. AGU*, 90(52), Abstract H33B-0875.
- Mendoza, C.A., J. Riddell and K. Devito, 2009. Water fluxes across the interfaces of perched wetland basins on the Boreal Plain. *EOS Trans. AGU*, 90(22), Abstract H71D-06.
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- Hosseini, A.H., C.V. Deutsch, C.A. Mendoza and K.W. Biggar, 2008. Geostatistical inverse modeling for natural attenuation of hydrocarbons in groundwater. *EOS Trans. AGU*, 89(53), Abstract H43A-0971.
- Carrera-Hernández, J.J., C.A. Mendoza and K.J. Devito, 2008. Spatially distributed, physically based modelling through a wxPython based GUI. *EOS Trans. AGU*, 89(53), Abstract H51L-08.
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- Petrone, R.M., K.J. Devito, U. Silins, C. Mendoza, S.C. Kaufman and J.S. Price, 2007. Transient peat properties and peatland-pond interactions in the sub-humid Western Boreal Plain, Canada. *International Union of Geodesy and Geophysics and International Association of Hydrological Sciences 24<sup>th</sup> Joint Assembly*, Perugia, Italy, July.
- Gingras, M.K., S.G. Pemberton and C.A. Mendoza, 2007. The various influences of bioturbation on reservoir facies quality. *AAPG Annual Convention and Exhibition*.
- Mendoza, C.A., B. Rostron, U. Silins and K. Devito, 2006. Multi-disciplinary investigations of groundwater discharge at Wagner Natural Area and hydrologic responses in disturbed mountain forests. *AI-CWR, 3<sup>rd</sup> Annual Research Symposium*.
- Riddell, J., C. Mendoza and K. Devito, 2006. Control of soil texture on water fluxes at perched boreal wetlands in a sub-humid climate. *GSA Abstracts with Programs*, 38(7), p. 103.
- Hydeman, C., C. Mendoza, B. Rostron and E. Henkemans, 2006. Protecting the Wagner Natural Area through aquifer delineation. *GSA Abstracts with Programs*, 38(7), p. 328.
- Henkemans, E., C. Hydeman, B. Rostron and C. Mendoza, 2006. Incorporating remote sensing into a hydrogeologic investigation of a protected wetland. *GSA Abstracts with Programs*, 38(7), p. 328.
- Smerdon, B., C. Mendoza and K. Devito, 2006. Climate history and water table depth control recharge to sandy landscapes in the sub-humid Boreal Forest of Canada. *GSA Abstracts with Programs*, 38(7), p. 469.

- Smerdon, B.D., C.A. Mendoza and K.J. Devito, 2006. Quantifying water cycling processes on the Boreal Plains: It is time to move beyond steady-state. *CGU 32<sup>nd</sup> Annual Meeting*, 121-122.
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- Riddell, J., C. Mendoza and K. Devito, 2005. Physical controls on groundwater flow from perched wetlands in the Western Boreal Plain, North Central Alberta. *CGU 31<sup>st</sup> Annual Meeting*, Abstract 93.
- Smerdon, B.D., C.A. Mendoza and K.J. Devito, 2005. Can lakes and ponds be represented in a hydrologic model without excessive numerical intervention? *CGU 31<sup>st</sup> Annual Meeting*, Abstract 81. (D.M. Gray Award, Best Student Paper in Hydrology)
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- Arkadakskiy, S.V., K. Muehlenbachs, C. Mendoza and B. Szatkowski, 2004. Oxygen isotopic disequilibrium in bacteriogenic soil calcite precipitated near leaking oil and gas wells in Western Canada. *EOS Trans. AGU*, 85(47), Abstract B21B-0882.
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- Arkadakskiy, S., K. Muehlenbachs, C.A. Mendoza and B. Szatkowski, 2004. Stable isotope and SEM study of recent calcite precipitation related to microbial oxidation of natural gas in soils. *Goldschmidt Conference*, Copenhagen.
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- Mendoza, C.A., and M.J. Hendry, 1999. Comparison of CO<sub>2</sub> gas production rates in the field versus the laboratory. *EOS*, 80(46) (supplement), p. F386.
- Mooder, B., and C.A. Mendoza, 1997. Numerical simulation of moisture movement, anaerobic biodegradation, and dissolved organic carbon transport in municipal solid waste. *GSA Abstracts with Programs*, 29(6), p. 383.
- Gingras, M.K., C.A. Mendoza and S.G. Pemberton, 1997. Assessing the anisotropic bulk permeability of *Glossifungites* surfaces. *CSPG-SEPM Joint Convention, Program with Abstracts*, pp. 108.

- Gingras, M.K., S.G. Pemberton, C. Mendoza and T.D.A. Saunders, 1997. Assessing the bulk hydraulic conductivity of bioturbated horizons. *Ichnofabrics Conference #4*, San Salvador, Bahamas.
- Gingras, M.K., C. Mendoza and S.G. Pemberton, 1997. Modeling fluid flow through bioturbated horizons. *Western Inter-University Geological Conference*, Saskatoon, January. (Best Paper Award).
- Gilmour, S., and C.A. Mendoza, 1996. Numerical simulation of hydrocarbon and oxygen transport and microbial biodegradation during bioventing: Application to a field study. *EOS*, 77(46) (supplement), p. F262.
- Banack, L.C., and C.A. Mendoza, 1995. Simulation of NAPL dissolution in discrete rough-walled fractures. *EOS*, 76(17) (supplement), p. 136. (Outstanding Student Paper Award)
- Mendoza, C.A., 1994. Fractal analysis of constitutive relationships describing two-phase flow through rough-walled fractures. *AGU Chapman Conference on Aqueous Phase and Multiphase Transport in Fractured Rock*, Burlington, VT, September 12–15.
- Mendoza, C.A., and E.A. Sudicky, 1992. Capillary-pressure and relative-transmissivity functions for two-phase flow in rough-walled fracture planes. *EOS*, 73(43) (supplement), pp. 213.
- Mendoza, C.A., and E.A. Sudicky, 1992. Capillary pressure and relative permeability relationships controlling multiphase flow in single rough-walled fracture planes. *Central Canada Geological Conference*, Waterloo, February 19–21.
- Mendoza, C.A., and E.A. Sudicky, 1991. Hierarchical scaling of multiphase-flow constitutive relationships in rough-walled fracture planes. *EOS*, 72(44), p. 151.
- Mendoza, C.A., and E.O. Frind, 1988. Advective-dispersive transport of chlorinated solvents in the gas-phase. *EOS*, 69(44), p. 1201.

### **Selected Short Course and Technical Workshop Notes**

- Mendoza, C.A., 2019. Landform Design for Groundwater. Lecture, *Landform Design for Sustainable Mining* graduate-level short course, Geotechnical Engineering, University of Alberta, December
- Mendoza, C.A., 2019. Landform Design for Wetlands. Lecture, *Landform Design for Sustainable Mining* graduate-level short course, Geotechnical Engineering, University of Alberta, December
- Allen, D., T. Gleeson and C. Mendoza, 2019. *Building Resilience During Drought: A Shared Learning Opportunity*. Canadian Mountain Network workshop and field trip for First Nations and regulators on Drought in the Okanagan, Kelowna, October.
- McKenna, G., A. Cash, C. Mendoza, J. Straker, V. Shirokova and D. Shuttleworth, 2018. *Landform Design Short Course* presented to *Detour Gold Corporation*. Detour Lake Mine, May.
- Mendoza, C.A., 2016. Back to Basics: Darcy's Law and Groundwater Models. Lecture prepared for *BGC Engineering's Mentorship Program*. Vancouver, June.
- Mendoza, C.A., 2015. Groundwater Modelling. Lectures prepared for *BGC Engineering's Hydrogeology Group*. Vancouver, January.
- Mendoza, C.A., 2014. Wetland-forestland Interactions on the Boreal Plain: Implications for Oil-sand Mine Reclamation. Lecture prepared for *BGC Engineering's Oil Sands Short Course*. Vancouver, February.
- Mendoza, C.A., 2013. Hydrology of Landform Design. Lecture prepared for *BGC Engineering's Landform Design Workshop* presented to *Suncor Energy Ltd.* Calgary, October.

- Mendoza, C.A. and K. Devito, 2012. Integrated hydrology and hydrogeology of the Western Boreal Plain: Lessons learned from far more than a decade at the Utikuma Region Study Area. *Canadian Forest Service workshop on oil-sands reclamation*. Edmonton, March.
- Mendoza, C.A., 2010. Modeling philosophies and applications: Why and how we use models. *CONRAD-HEAD2 Workshop*. Edmonton, October.
- Mendoza, C.A., 2007. Groundwater, wetland and upland hydrology in the Boreal Forest. Lecture for *Edmonton Lifelong Learners Association (ELLA)*. April 30.
- Mendoza, C.A., 2007. Hydrology of tailings dams and overburden dumps. Lecture for *Edmonton Lifelong Learners Association (ELLA)*. May 1.
- Mendoza, C.A., 2007. Reclamation Theme: Water Symposium. *Cumulative Environmental Management Association (CEMA), Reclamation Working Group (RWG)*. Presentation plus panel discussion. Edmonton, May.
- Mendoza, C.A., 2006-2007. Soil Capping Technology Transfer. *Canadian Oil Sands Network for Research and Development (CONRAD)*. Fort McMurray, June and December 2006; Edmonton, April 2007.
- Mendoza, C.A., and K.J. Devito, 2006. Boreal Plains Hydrology and SAGD Knowledge Sharing Workshop. *Ducks Unlimited and Steam-Assisted Gravity Drainage (SAGD) Operators*. Edmonton, June.
- Mendoza, C.A., K.J. Devito and others, 2006-2010. Instrumented Watersheds Symposia. *Canadian Oil Sands Network for Research and Development (CONRAD)*. Edmonton. Numerous student and PI presentations and posters.
- Devito, K.J., and C.A. Mendoza, 2005. Important Hydrologic Characteristics of Alberta's Boreal Forest. *Ducks Unlimited and Alberta Pacific Forest Products Limited*. Edmonton, December.
- Devito, K., and C. Mendoza, 2005. Field Tour of the Utikuma Research Study Area – Hydrology of the Boreal Forest and Natural Analogues for Oil-sands Reclamation. Syncrude Canada Limited and Golder Associates. URSA, July.
- Devito, K., and C. Mendoza, 2005. Field Tour of the Utikuma Research Study Area – Hydrology of the Boreal Forest and the Significance for Forestry. *Ducks Unlimited, Alberta Pacific Forest Products Limited, and Alberta Geological Survey*. URSA, July.
- Devito, K., and C. Mendoza, 2005. Natural Analogues for Wetlands in the Oil-sands Area of Alberta. *Cumulative Environmental Management Association (CEMA)*. Edmonton, June.
- Mendoza, C.A., 2003. Oil Sands Modeling. *Oil Sands Environmental Research Network (OSERN)*. Edmonton, November.
- Devito, K., and C. Mendoza, 2003. Creating Wetlands in Oil Sands Reclamation. *Cumulative Environmental Management Association (CEMA)*. Fort McMurray, October.
- Mendoza, C.A., K.J. Devito and others, 2001-2005. Instrumented Watersheds Research Symposia. *Syncrude Canada Limited*, semi-annual meetings and field tours, Edmonton and Fort McMurray. Numerous student and PI presentations and posters.
- Devito, K.D., and C.A. Mendoza, 2004–2006. Hydrology of the Boreal Forest: From basics to knowledge gaps. Background information for educating research sponsors and consultants.
- Mendoza, C.A., 1999–2005. Groundwater within the hydrologic cycle. Background information for educating research sponsors, consultants and the public.
- Mendoza, C.A., 1995. Groundwater, the Hydrologic Cycle and Water Budgets. Lecture for *Wabamun Lake Level Task Force*, Edmonton.

- Mendoza, C.A., 1989–91. *Dense Immiscible Phase Liquids (DNAPLs) in Porous and Fractured Media*, Waterloo Centre for Groundwater Research (4 commercial offerings). Lectures on:
- Physics and chemistry of DNAPL vapour migration in the unsaturated zone
  - Impact of solvent vapours on groundwater quality
  - Remediation of the unsaturated zone using vacuum extraction technology

## Field Trip and User Guides

- Mendoza, C., K. Devito and others, 2008–present. *Field guides to research and operations at oil-sand mine research sites*, various trips for sponsors, students and collaborators.
- Devito, K., C. Mendoza and others, 2004–present. *Field guides to research at the Utikuma Region Study Area (URSA)*, various trips for sponsors, consultants and bureaucrats.
- Rostron, B., C. Mendoza and J. Tóth, 2008. *Field Guide: Hydrogeology of Central Alberta*, guidebook for *GeoEdmonton'08* field trip, International Association of Hydrogeologists.
- Mendoza, C.A., 2000. *VapourT User's Guide* (version 2.19), 64p.
- Parks, K., B. Rostron, C. Mendoza and J. Tóth, 1995. *Field Guide: Hydrogeology of Southwestern Alberta*. Field guide for *IAH Solutions'95 Southwestern Alberta Fieldtrip*, June 1995, 56p.
- Mendoza, C.A., 1993. *VapriPlt User's Guide*. Department of Geology, U. of Alberta, 18p.
- Mendoza, C.A., 1992. *VapourT User's Guide*. Department of Geology, U. of Alberta, 61p.
- Mendoza, C.A., R. Therrien and E.A. Sudicky, 1991. *ORTHOFEEM User's Guide*. Waterloo Centre for Groundwater Research, 14p.

## Advisory Panels and Committees

Carl Mendoza's participation in various initiatives has led to some important changes in regulatory policy and industry practise in several areas. The organizations, activities and impacts are summarized below.

### Alberta Environment

- Multiple Aquifer Completions (MAC), Regulatory Reviewer, 2009–10
  - The panel determined that changes to existing MAC regulations were unwarranted, despite assertions to the contrary by the water-well industry.
- Groundwater Use and Management in the Athabasca Oil-Sands Area of Alberta, Technical Advisor, 2008–13
- Groundwater Monitoring Network in the Athabasca Oil-Sands Area of Alberta, Technical Advisor, 2007–13
  - The above two activities are critical for the design and implementation of strategies to determine and minimize the impact of oil sands operations on groundwater resources. Dr. Mendoza provided technical expertise that Alberta Environment lacked.
- Baseline Water Well Monitoring for Coalbed Methane (CBM) Operations, Scientific Review Panel, 2006–09
  - The panel's work led to stringent new regulations for monitoring and reporting for Alberta's emerging CBM operators.
- Potential for Gas Migration due to Coalbed Methane Development, Technical Expert, 2008–09

- The relative potential for different CBM operations to impact groundwater, both within Alberta and compared to other jurisdictions was determined.
- Regional Groundwater Monitoring Program for Imperial Oil Resources' Cold Lake Operations, Technical Expert, 2005–06
  - Clear technical requirements for monitoring and reporting that were more efficient for both industry and government, yet rigorous enough to ensure that any impacted groundwater would be detected, were established.

#### **Cumulative Environmental Management Association (CEMA), Reclamation Working Group (RWG), Fort McMurray**

- Alberta Oil Sands Groundwater Modelling Guidelines, Technical Expert, 2011-12
  - Guidelines for the application of numerical models were established and accepted.
- Guideline for Wetland Establishment on Reclaimed Oil Sands Leases, Reviewer, 2013-14
- End Pit Lake (EPL) Technical Guidance, Technical Advisor and Reviewer, 2009–12
  - Review of a proposed manual for the design and implementation of EPLs, which will be a dominant feature of reclaimed oil sands landscapes. CEMA manuals are de facto standards for reclamation.
- Wetland and Marsh Creation for Oil-Sands Reclamation, Technical Expert, 2009-11.
- Guideline for Wetland Establishment on Reclaimed Oil Sands Leases, Technical Expert, 2005-07
  - Dr. Mendoza contributed to the hydrology background to this manual, which sets out how wetlands should be established and evaluated on reclaimed oil sands landscapes.

#### **Canadian Oil-sands Network for Research and Development (CONRAD), Environmental and Reclamation Research Group (ERRG), Fort McMurray**

- Soil Capping Research in the Athabasca Oil Sands Region. Scientific Synthesis Panel, 2005–07
  - Knowledge about soil caps in oil-sand reclamation were evaluated to determine the depth and characteristics necessary for successful reclamation. Results were presented to the Alberta government.

#### **Science Advisory Board on Contaminated Sites for British Columbia, Vancouver**

- Screening-level Risk Assessment 2 – Vapour Intrusion Module, Technical Advisor and Reviewer, 2004
  - Standards for soil vapour intrusion monitoring and reporting were established.

#### **Canadian Association of Petroleum Producers (CAPP) Surface Casing Vent Flow Subcommittee, and Alberta Energy Resources Conservation Board (ERCB), Calgary**

- Potential for Groundwater Contamination due to Surface Casing Vent Flow/Gas Migration, Technical Expert, 2001–02
  - The Alberta government (ERCB) accepted the detailed analysis of the magnitude of SCVF that could be accepted from petroleum wells.

#### **U.S. Environmental Protection Agency**

- Vadose Zone and Saturated Zone Modules Extracted from EPA's Composite Model for Leachate Migration with Transformation Products (EPACMTP) for Hazardous Waste Identification Rule (HWIR99), Technical Reviewer, 2000

## **Academic Awards**

- Alumni Gold Medal, University of Waterloo (1993)
- W.B. Pearson Medal in Earth Sciences, University of Waterloo (1993)
- Outstanding Achievement in Graduate Studies Honour, University of Waterloo (1993)
- Governor General's Academic Gold Medal, University of Waterloo (1989)

## Industry Recognition

I was an integral member of the design and research teams for the following industry awards.

### Sandhill Fen

#### Alberta Emerald Foundation Award (2015)

##### **“Sandhill Fen Technical Advisory Committee”**

Reclamation research is integral to Syncrude fulfilling its commitment to return land disturbed by mining to a productive, biologically self-sustaining ecosystem. In 2008, Syncrude launched the Sandhill Fen Watershed Research Project to learn how to design and incorporate peat-forming wetlands into operational scale reclamation. The Sandhill Fen is the largest reclaimed wetland in the oil sands and the first ever landform constructed on a foundation of oil sands tailings. The project brought together experts from eight universities to achieve results that are holistic and applicable in the entire context of landscape development and function. After three growing seasons, the Sandhill Fen Watershed is thriving, attracting wildlife and providing valuable information for the future.

[https://emerald.foundation.ca/aef\\_awards/sandhill-fen-technical-advisory-committee/](https://emerald.foundation.ca/aef_awards/sandhill-fen-technical-advisory-committee/)

<https://www.syncrude.ca/2015/06/04/sandhill-fen-research-project-wins-emerald-award/>

#### Towards Sustainable Mining Award for Environmental Excellence (2014)

##### **Mining Association of Canada**

##### **“Syncrude Canada: Innovating reclamation through fen wetlands in Northern Alberta”**

In the boreal forests of Northern Alberta where Syncrude has a large oil sands mining operation, fen wetlands are commonplace and, in nature, can take thousands of years to establish. This peat-forming, groundwater-fed wetland became Syncrude’s source of inspiration as it looked to transform a tailings structure into a thriving wetland in 2007.

With very little information on fen reclamation to refer to, Syncrude established the interdisciplinary Sandhill Fen Technical Advisory Panel to create something that had never been done before, and the Sandhill Fen Research Watershed Initiative was born. The watershed was developed on 52 hectares of sand-capped soft tailings on a portion of what was once a 60-metre deep mine. In all, more than 28 kinds of wetland plants were introduced and vegetation was selected to mirror those in naturally-occurring fens in the area. Construction of the watershed was completed in 2012 and will be closely monitored over the next 10 to 20 years. This project is still in its early years, but results are extremely encouraging. For example, peat studies show that it is possible to transplant live peat from a natural environment and grow it in a newly-constructed area. Additionally, a number of native plants have successfully taken seed and are growing on their own without having been planted. The information being gathered is invaluable towards improving wetland reclamation best practices for Syncrude and the oil sands industry as a whole.

<http://mining.ca/tsm-excellence-awards-2014>

<https://www.syncrude.ca/2014/05/13/sandhill-fen-recognized-for-environmental-excellence/>

## **Detour Lake Mine**

### **Tom Peters Memorial Mine Reclamation Award (2020)**

#### **Canadian Land Reclamation Association/Ontario Mining Association**

#### **“The Detour Lake Mine Research and Progressive Reclamation Program”**

With a projected life of mine to 2040 (or longer), the Detour Lake Mine initiated, in 2012, a progressive reclamation effort, supported by a long-term multidisciplinary research program. The extensive efforts of this program continue to address several aspects critical to successful mine reclamation, including ecosystem restoration with native species and the management of metal leaching and acid rock drainage from mine waste materials. The results of the ongoing studies continue to guide the evolution of the on-site reclamation research program. In turn, the research program has not only led to the development and initiation of the full-scale progressive reclamation program at Detour Lake Mine, but also contributed knowledge to industry-wide mine reclamation practices in general.