CORY P. MCDONALD

Assistant Professor
Department of Civil and Environmental Engineering, Michigan Technological University
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EDUCATION

PhD   Environmental Engineering, Michigan Technological University, 2010
Dissertation: *Improving the reliability of aquatic biogeochemical models: Integrating information and optimizing complexity*.

MS   Environmental Engineering, Michigan Technological University, 2005
Thesis: *Historical sedimentation dynamics and a model for copper in Torch Lake, Houghton County, MI*.

BS   Civil Engineering, Michigan State University, 2003

PREVIOUS APPOINTMENTS

2016-2017   Principal Scientist and Engineer, Superior Hydroscience, Marquette, MI
2012–2016   Research Limnologist, Wisconsin Department of Natural Resources, Madison, WI
2010–2012   Postdoctoral Fellow, United States Geological Survey, Boulder, CO

AWARDS AND HONORS

2011   Mendenhall Research Fellowship recipient – United States Geological Survey
2011   Journal of Great Lakes Research/Elsevier Young Student Award - International Association for Great Lakes Research
2008   Integrative Graduate Education and Research Traineeship - National Science Foundation
2008   Outstanding Student Presentation - American Society of Limnology and Oceanography
2008   DeVlieg Foundation Research Award in Wildlife and Environmental Studies

GRANTS AND CONTRACTS

Year	Description	Amount
2019	Acquisition of a Shimadzu TOC-L to facilitate low-level carbon analysis in water at MTU. MTU Research Excellence Fund – Infrastructure Enhancement Grant	$32,799
2018	Water Purification System in Support of GLRC Research and Classes MTU VP for Research Century II Campaign Endowed Equipment Fund	$4,900
2018-2019	Torch Lake AOC Benthos Monitoring Michigan Department of Natural Resources	$39,932

2018-2019	Water Quality Improvements for Big Green Lake Green Lake Association	$32,756
2017-2018	Torch Lake AOC Project Management Torch Lake Public Action Council	$24,700
2017-2018	Little Traverse Bay Boat Traffic Survey Little Traverse Bay Band of Odawa Indians	$37,450
2016–2019	Green Lake Water Quality Diagnostic and Feasibility Study Green Lake Association/Wisconsin DNR	$194,900 ($58,970)
2014–2020	LTER: Comparative study of a suite of lakes in Wisconsin National Science Foundation (co-PI)	$7,852,700 ($0)
2013–2015	Characterizing the sources of elevated groundwater nitrate in Dane County, Wisconsin State of Wisconsin Groundwater Coordinating Council	$50,700
2014	Upper Mud Lake Phosphorus Dynamics Wisconsin DNR Lakes Program Local Needs Grant	$6,000

PUBLICATIONS

Peer-reviewed journal articles

17.   Kerfoot, W.C., Urban, N.R., **McDonald, C.P.**, Zhang, H., Rossman, R., Perlinger, J., Khan, T., Hendricks, A., Priyadarshini, M., & Bolstad, M. (2018). Mining legacy across a wetland landscape: The enigma of high mercury in Upper Peninsula (Michigan) rivers, lakes, and fish. *Environmental Science: Processes & Impacts*, doi:10.1039/c7em00521k.

16.   Stets, E.G., Butman, D., **McDonald, C.P.**, Stackpoole, S., DeGrandpre, M.D., & Striegl, R.G. (2017). Carbonate buffering and metabolic controls on carbon dioxide in rivers. *Global Biogeochemical Cycles, 31*, 663-677. doi:10.1002/2016GB005578

15.   **McDonald, C.P.**, & Lathrop, R.C. (2017). Seasonal shifts in the relative importance of local versus upstream nutrient sources to water quality of individual lakes in a chain. *Aquatic Sciences*, *79*, 385. doi:10.1007/s00027-016-0504-1

14.   Kerfoot, W.C., Urban, N.R., **McDonald, C.P.,** Rossmann, R., & Zhang, H. (2016). Legacy mercury releases during copper mining near Lake Superior. *Journal of Great Lakes Research*, *42*(1), 50-61. doi: 10.1016/j.jglr.2015.10.007

13.   Butman, D., Stackpoole, S., Stets, E., **McDonald, C.P.**, Clow, D.W., & Striegl, R.G. (2015). Aquatic carbon cycling in the conterminous United States and implications for terrestrial carbon accounting. *Proceedings of the National Academy of Sciences, 113*(1), 58-63. doi:10.1073/pnas.1512651112

12.   Watras, C.J., Morrison, K.A., Crawford, J.T., **McDonald, C.P.**, Oliver, S.K., & Hanson, P.C. (2015). Diel cycles in the fluorescence of dissolved organic matter in dystrophic Wisconsin seepage lakes: Implications for carbon turnover. *Limnology and Oceanography*, *60*(2), 482-496. doi:10.1002/lno.10026

11.   **McDonald, C.P.**, Lottig, N.R., Stoddard, J.L., Herlihy, A.T., Lehmann, S., Paulsen, S.G., Peck, D.V., Pollard, A.I., & Stevenson, R.J. (2014). Comment on Bachmann et al. (2013): A nonrepresentative sample cannot describe the extent of cultural eutrophication of natural lakes in the United States. *Limnology and Oceanography*, *59*(6), 2226-2230. doi:10.4319/lo.2014.59.6.2226

10. Raymond, P.A., Hartmann, J., Lauerwald, R., Sobek, S., **McDonald, C**., Hoover, M., Butman, D., Striegl, R., Mayorga, E., Humborg, C., Kortelainen, P., Durr, H., Meybeck, M., Ciais, P., & Guth, P. (2013). Global carbon dioxide emissions from inland waters. *Nature, 503*, 355-359. doi:10.1038/nature12760

9. **McDonald, C.P.**, Stets, E.G., Striegl, R.G., & Butman, D. (2013). Inorganic carbon loading as a primary driver of dissolved carbon dioxide concentrations in the lakes and reservoirs of the contiguous United States. *Global Biogeochemical Cycles, 27*, 285-295. doi:10.1002/gbc.20032

8. Striegl, R.G., Dornblaser, M.M., **McDonald, C.P.**, Rover, J.A., & Stets, E.G. Carbon dioxide and methane emissions from the Yukon River system. (2012). *Global Biogeochemical Cycles*, *26*(GB0E05). doi:10.1029/2012GB004306

7. **McDonald, C.P.**, Rover, J.A., Stets, E.G., & Striegl, R.G. (2012). The regional abundance and size distribution of lakes, ponds, and reservoirs in the United States and implications for estimates of global lake extent. *Limnology and Oceanography*, *57*(2), 597-606. doi:10.4319/lo.2012.57.2.0597

6. Bennington, V., McKinley, G.A., Urban, N.R., & **McDonald, C.P**. (2012). Can spatial heterogeneity explain the perceived imbalance in Lake Superior's carbon budget?: A model study. *Journal of Geophysical Research - Biogeosciences*, *117*(G02030). doi:10.1029/2011JG001895

5. **McDonald, C.P.**, Bennington, V., Urban, N.R., & McKinley, G.A. (2011). 1-D Test-bed calibration of a 3-D Lake Superior biogeochemical model. *Ecological Modelling*, *225*, 115-126. doi:10.1016/j.ecolmodel.2011.11.021

4. **McDonald, C.P.**, Urban, N.R., & Casey, C.M. (2010). Modeling historical trends in Lake Superior total nitrogen concentrations. *Journal of Great Lakes Research*, *36*(4), 715-721. doi:10.1016/j.jglr.2010.07.008

3. **McDonald, C.P.** & Urban, N.R. (2010). Using a model selection criterion to identify appropriate complexity in aquatic biogeochemical models. *Ecological Modelling*, *221*(3), 428-432. doi:10.1016/j.ecolmodel.2009.10.021

2. **McDonald, C.P.**, Urban, N.R., Barkach, J.H., & McCauley, D. (2010). Copper profiles in the sediments of a mining-impacted lake. *Journal of Soils and Sediments, 10*(3), 343-348. doi:10.1007/s11368-009-0171-0

1. **McDonald, C.P.**, & Urban, N.R. (2007). Sediment radioisotope dating across a stratigraphic discontinuity in a mining-impacted lake. *Journal of Environmental Radioactivity*, *92*(2), 80-95. doi:10.1016/j.jenvrad.2006.09.009

Manuscripts in review

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Manuscripts in preparation

1. **McDonald, C. P.**, Parsen, M.J., Lathrop, R.C., Sorsa, K.K., Bradbury, K.R., & Kakuska, M.T. Reconstructing historical nitrate loading to groundwater using recent observations and a groundwater flow model.

Reports

7.   **McDonald, C.P.** (2018). Torch Lake Area of Concern (AOC) benthos monitoring (Project #18-AOC-008), Final report. Michigan Office of the Great Lakes, Lansing, MI.

6.   **McDonald, C.P.** (2018). Survey of boat traffic on Little Traverse Bay, Lake Michigan. Final Report. Submitted to the Little Traverse Bay Bands of Odawa Indians.

5.   **McDonald, C.P.**, Parsen, M.J., Lathrop, R.C., Sorsa, K.K., Bradbury, K.R., & Kakuska, M.T. (2015). *Spatial patterns, trends, and pathways of groundwater nitrate contamination in Dane County, Wisconsin*. Final project report to the Wisconsin Groundwater Coordinating Council. Madison, WI.

4.   **McDonald, C.P.**, Baker-Muhich, B., Fitz, T., Garrison, P., Petchenik, J., Rasmussen, P., Thiboldeaux, R., Walker, W., & Watras, C. (2013). *Taconite iron mining in Wisconsin: a review*. Wisconsin Department of Natural Resources. Madison, WI.

3.   Stackpoole, S., Butman, D., Clow, D., **McDonald, C.**, Stets, E., & Striegl, R. (2014). Carbon sequestration, transport, and emission from inland aquatic ecosystems in the eastern United States In: Z. Zhu & B.C. Reed (Eds.), *Baseline and projected future carbon storage and greenhouse-gas fluxes in ecosystems of the eastern United States* (USGS Professional Paper 1804). Reston, VA: U.S. Geological Survey.

2.   Stackpoole, S.M., Butman, D., Clow, D.W., **McDonald, C.P.**, Stets, E.G., & Striegl, R.G. (2012). Baseline carbon sequestration, transport, and emission from inland aquatic ecosystems in the western United States In Z. Zhu and B.C. Reed (Eds.), *Baseline and projected future carbon storage and greenhouse-gas fluxes in ecosystems of the western United States* (USGS Professional Paper 1797). Reston, VA: U.S. Geological Survey.

1.   Zhu, Z. (Ed.), Butman, D., Hawbaker, T., Li, Z., Liu, J., Liu, S., **McDonald, C.**, Sleeter,B., Sohl, T., Stackpoole, S., & Zhu, Z. (2011). *Current and projected future carbon storage and greenhouse-gas fluxes in relation to land changes: The Great Plains region of the United States* (USGS Professional Paper 1787). Reston, VA: U.S. Geological Survey.

INVITED PRESENTATIONS

10.   McDonald, C.P. (2020). Green Lake Oxygen Study. Green Lake Association Annual Meeting (virtual).

9.   McDonald, C.P. (2019). Torch Lake: Benthic recovery to date. Torch Lake Degradation of Benthos Technical Summit. Hancock, MI, April 9, 2019.

8.   McDonald, C.P. (2018). When and where: characterizing phosphorus loading along a lake chain. Michigan Technological University Environmental Engineering Seminar. September 10, 2018.

7.   McDonald, C.P. (2018). Characterizing the sources of elevated groundwater nitrate in Dane Couny, Wisconsin. Michigan Technological University Environmental Engineering Seminar. February 5, 2018.

6.   McDonald, C.P. (2015). When and where: Seasonality in sources of phosphorus in the Yahara River watershed. Clean Lakes Alliance Yahara 101, Madison, WI, 14 May 2015.

5.   McDonald, C.P. (2014). Nitrate trends in shallow groundwater and implications for surface water quality. Wisconsin DNR Wastewater Management statewide meeting. Wisconsin Rapids, WI, 12 November, 2014.

4.	McDonald, C.P. (2014). Natural wetlands as phosphorus filters: Efficacy and effects on downstream water quality. Wisconsin DNR Watershed Management statewide meeting. Rothschild, WI, 10 April, 2014.

3.	McDonald, C.P. (2013). Nutrient dynamics in surface and ground waters of Dane County. University of Madison-Wisconsin Water Resources Engineering Seminar, Madison, WI, 10 October, 2013.

2.	McDonald, C.P. (2013). Does nitrogen play a role in the water quality of WI lakes? Wisconsin DNR annual meeting of biologists, Tomahawk, WI, 7 March, 2013.

1.	McDonald, C.P. (2012). The influence of hydrologic inorganic carbon loading on lacustrine carbon cycling. University of Wisconsin–Madison Center for Limnology Seminar, Madison, WI, 31 October, 2012.

CONTRIBUTED PRESENTATIONS

24.	Prellwitz, S., McDonald, C., Robertson, D. (co-presenters) (2020). A changing lake: Addressing low dissolved oxygen and high phosphorus in Wisconsin's deepest lake, Green Lake. Wisconsin Lakes Partnership Convention (virtual).

23.	Leach, A.C.[†] & McDonald, C.P. (2019). Assessing benthic recovery in the Torch Lake AOC. International Association for Great Lakes Research 62nd annual Conference, Brockport, NY.

22.	McDonald, C.P. (2019). The spatial relationship between nitrate and productivity in Lake Superior. International Association for Great Lakes Research 62nd annual Conference, Brockport, NY.

21.	McDonald, C.P. (2018). Have nitrate concentrations in Lake Superior reached equilibrium? International Association for Great Lakes Research State of Lake Superior Conference, Houghton, MI.*

20.	McDonald, C.P. (2016). Water quality management of lakes in series (lake chains). Wisconsin Lakes Partnership Convention, Stevens Point, WI.

19.	McDonald, C.P., Parsen, M.J., Lathrop, R.C., Sorsa, K.K., Bradbury, K.R., & Kakuska, M.T. (2016). Modeling historical nitrate loading to groundwater in Dane County, Wisconsin. American Water Resources Association-Wisconsin Section, 40th Annual meeting, Wisconsin Dells, WI.

18.	McDonald, C.P., Diebel, M., & LaLiberte, G. (2015). Exploring outliers in the chlorophyll-phosphorus relationship for shallow Wisconsin lakes. Wisconsin Lakes Partnership Convention, Stevens Point, WI.

17.	McDonald, C.P., Watras, C.J., Morrison, K.A., Crawford, J.T., Oliver, S.K., & Hanson, P.C. (2014). Diel cycles of dissolved organic matter in the aphotic zone of contrasting lakes in northern Wisconsin. 3rd Science in the Northwoods, Boulder Junction, WI.

16.	McDonald, C.P., Butman, D., Stets, E.G., & Striegl, R.G. (2013). Carbon dioxide emissions from lakes and reservoirs in the contiguous United States. Association for the Sciences of Limnology and Oceanography Aquatic Sciences Meeting, New Orleans, LA.

15.	McDonald, C.P. (2012). Using high-resolution geospatial data to advance understanding of the abundance and size distribution of lakes. North American Lake Management Society 32nd International Symposium, Madison, WI.

14. McDonald, C.P., Rover, J.A., Stets, E.G., & Striegl, R.G. (2012). Size and distribution of lakes and reservoirs in the contiguous United States, their potential for greenhouse gas emissions, and implications on a global scale. American Association of Geographers Annual Meeting, New York, NY.

13. McDonald, C.P., Stets, E.G., & Striegl, R.G. (2011). Spatial variation in the determinants of CO_2 supersaturation in inland waters. American Geophysical Union Annual Meeting, San Francisco, CA.*

12. McDonald, C.P. & Urban, N.R. (2010). Bayesian test-bed calibration of a mechanistic aquatic biogeochemical model for Lake Superior. International Association for Great Lakes Research 53rd annual conference, Toronto, ON.

11. McDonald, C.P. & Urban, N.R. (2010). Assessing optimal complexity in aquatic ecosystem modeling. EPA Symposium on Integrated Modeling and Analysis to Support the Management and Restoration of Large Aquatic Ecosystems, Washington, DC.*

10. McDonald, C.P., Urban, N.R., & Casey, C.M. (2009). Kinetic modeling of the nitrogen cycle in Lake Superior. International Association for Great Lakes Research 52nd annual conference, Toledo, OH.

9. McDonald, C.P. & Urban, N.R. (2008). An information-theoretic approach to aquatic biogeochemical modeling. American Society of Limnology and Oceanography Summer Meeting, St. John's, NL.

8. McDonald, C.P. & Urban, N.R. (2008). Using Information Theory to assess optimal model complexity in aquatic biogeochemical modeling. ASLO-AGU-TOS Ocean Sciences Meeting, Orlando, FL.

7. McDonald, C.P. & Urban, N.R. (2007). Reinventing 'reinventing the wheel': A multi-model approach to aquatic biogeochemical modeling. 30th Congress of the International Association of Theoretical and Applied Limnology, Montreal, QC.

6. McDonald, C.P. & Urban, N.R. (2007). An information-theoretic approach to aquatic biogeochemical modeling in Lake Superior, USA. 6th European Conference on Ecological Modelling, Trieste, Italy. *

5. McDonald, C.P. and Urban, N.R. (2006). Modeling the Roles of Phytoplankton and Bacteria in Nutrient Cycling in Lake Superior, USA. American Society of Limnology and Oceanography Summer Meeting, Victoria, BC.

4. McDonald, C.P. & Urban, N.R. (2006). Modeling Copper Transport in the Sediments of Torch Lake, Houghton County, MI. The 22nd Annual Conference on Soils, Sediments, and Water, Amherst, MA.*

3. McDonald, C.P., Perlinger, J.A., & Urban, N.R. (2006). Are PCB concentrations in Diporeia at Steady-state with PCB Concentrations in Lake Superior Sediment? International Association for Great Lakes Research 49th annual conference, Windsor, ON.

2. McDonald, C. P. & Urban, N.R. (2006). Modeling Copper Transport in the Sediments of Torch Lake, Houghton County, MI. International Association for Great Lakes Research 49th annual conference, Windsor, ON.

1. McDonald, C.P. & Urban, N.R. (2005). Timeline for Recovery of Torch Lake (MI) Area of Concern. International Association for Great Lakes Research 48th annual conference, Ann Arbor, MI.

*Indicates poster presentation

† Indicates student author

TEACHING EXPERIENCE

Courses Instructed
Michigan Technological University

2020	Water Quality Modeling in Natural Systems (CEE 5504), spring semester
2018–19; 2008	Surface Water Quality Engineering (CEE 4505), fall semester
2018	Environmental Engineering (CEE 3503), spring semester

Other Experience

2019 Guest lecturer, BL 4421/5421 Lake Superior Exploration, Michigan Technological University

2018 Guest lecturer, CEE 1501 Introduction to Environmental Engineering, Michigan Technological University

2017 Guest lecturer, CEE 1501 Introduction to Environmental Engineering, Michigan Technological University

2015 Guest lecturer, Limnology, University of Madison–Wisconsin

2010 Substitute instructor, Environmental Monitoring, Measurement, and Analysis (CE 3502), Michigan Technological University

2007 Substitute instructor, Environmental Engineering Chemical Processes (CE 4501), Michigan Technological University

Teaching Development

2018 Fellow, American Society of Civil Engineers ExCEEd Teaching Workshop, University of Nebraska – Lincoln, Omaha, NE.

RESEARCH EXPERIENCE

2016– Principal Scientist, Superior Hydroscience
- Coupling high-resolution buoy data and sediment data with modeling to address cause of metalimnetic oxygen minimum in Big Green Lake (WI)

2012–2016 Research Limnologist, Wisconsin Department of Natural Resources
- Characterized the interconnected roles of hydrologic setting, thermal dynamics, and wetlands in determining the timing of phosphorus loading to lakes in a chain
- Conducted a state-wide study to determine factors contributing to variability in productivity morphometrically and chemically similar lakes
- Used buoy-mounted sensors to track dissolved organic matter cycles in lakes
- Combined historical groundwater data with groundwater flow modeling to define spatiotemporal trends in shallow aquifer nitrate contamination in an agricultural region

2010–2012 Mendenhall Postdoctoral Fellow, U.S. Geological Survey National Research Program (Supervisor: Robert G. Striegl)

- Developed a national scale model of carbon metabolism in lakes
- Derived national and global scale estimates of lake abundance and size

2004–2010   Graduate Research Assistant, Department of Civil and Environmental Engineering, Michigan Technological University (Advisor: Noel R. Urban)

- Developed a novel technique for calibrating 3-D water quality models
- Developed a novel, kinetics-based approach to aquatic lower food web modeling in Lake Superior
- Analyzed long-term trends in the nitrogen cycle of Lake Superior
- Developed a novel method to apply sediment radioisotopic dating techniques to highly perturbed sediments
- Modeled the recovery time of metal-contaminated lake sediments

2003   Undergraduate Laboratory Technician, Soil Biophysics laboratory, Department of Plant and Soil Sciences (Supervisor: Alvin Smucker)

PROFESSIONAL LEADERSHIP AND SERVICE

2018   Member, IAGLR 2018 State of Lake Superior Meeting Local Planning Committee
2019   Panelist, Wisconsin Sea Grant 2020-2022 Technical Review Panel
2017   Panelist, Wisconsin Sea Grant 2018-2020 Technical Review Panel
2015   Panelist, Wisconsin Sea Grant 2016-2018 Technical Review Panel
2013–2015   Member, Wisconsin Initiative on Climate Change Impacts (WICCI) Water Resources Working Group
2013   Convener, Carbon fluxes in aquatic ecosystems at catchment, regional, and continental scales, ASLO Aquatic Sciences meeting

Journal Peer Reviewer: Nature, Global Change Biology, Atmospheric Chemistry and Physics, Global Biogeochemical Cycles, Geophysical Research Letters, Progress in Oceanography, Journal of Environmental Informatics, Biogeochemistry, Limnology and Oceanography, Journal of Geophysical Research, Journal of Geophysical Research – Biogeosciences, Ecohydrology, Ecological Modelling, Inland Waters, Applied Radiation and Isotopes, Catena, Environmental Science & Technology, Journal of Great Lakes Research

DEPARTMENTAL/UNIVERSITY SERVICE

2018–Present   Member, Civil and Environmental Engineering Safety Committee
2018–Present   Member, MTU Great Lakes Research Center Education and Research Committee
2009   Organizer, Michigan Tech Spring Graduate Colloquium in Sustainability
2006–2009   Member, Michigan Tech Environmental Sustainability Committee
2007–2008   Chair, Michigan Tech Green Operations Committee
2007   Organizer, Michigan Tech Spring Environmental Engineering Seminar Series

MENTORSHIP

| 2008–2009 | Doctoral scholar, Michigan Tech S-STEM graduate mentorship program |
| 2004 | Graduate mentor for underrepresented undergraduate students, Michigan Tech Graduate-Undergraduate Initiative for Development and Enhancement (GUIDE) program |

EDUCATIONAL/COMMUNITY OUTREACH

| 2005–Present | Instructor, K-12, Community, and Teacher Institute field trips aboard MTU's *R/V Agassiz* (Western U.P. Center for Science, Mathematics, and Environmental Education) |
| 2004 | Author, Groundwater online learning module for the Michigan Environmental Education Curriculum (MDEQ) |

MISCELLANEOUS TRAINING

2014	EPA Region 5 Numeric Nutrient Criteria workshop, Chicago, IL
2008	Orientation to Instructional Issues for New Faculty, Michigan Technological University
2007	Model selection & Multi-Model Inference Workshop, Smithsonian Environmental Research Center, Edgewater, MD
2007	Ecology of Lake Superior: Field course aboard the R/V Lake Guardian (MTU)
2006	Effective Grantsmanship, Michigan Technological University

PROFESSIONAL MEMBERSHIPS

American Society of Civil Engineers (ASCE)
American Society for Engineering Education (ASEE)
Association for the Sciences of Limnology and Oceanography (ASLO)
International Association for Great Lakes Research (IAGLR)
North American Lake Management Society (NALMS)