

Peter R. Leavitt FRSC, FRSB: Professional Experience

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Education:

Ph.D. 1989, Aquatic Biology, University of Notre Dame, Notre Dame, Indiana, USA.
M.Sc. 1985, Limnology, Queen's University, Kingston, Ontario, Canada.
B.Sc. 1981, Biology, Honours, 1st class, Queen's University, Kingston, Ontario, Canada.

Research Experience:

Distinguished University Professor. University of Regina, Canada (2024-present).
Director Qu'Appelle Long-term Ecological Research Program (QU-LTER), University of Regina, Canada. (1994-present)
Founding Director. Institute for Environmental Change and Society (IECS), University of Regina, Canada. (Director 2000-2025; co-Director 2021-2025).
Canada Research Chair in Environmental Change and Society (Tier I). University of Regina, Canada. (2003-2024).
Professor. Department of Biology, University of Regina, Canada. (2001-2024).
Visiting Scholar, Department of Geography, Archaeology and Palaeoecology, School of Natural and Built Environment, Queen's University Belfast, United Kingdom (2024-present).
Honorary Professor, Institute for Global Food Security, School of Biological Sciences, Queen's University Belfast, United Kingdom (2021-2024).
Professor. Institute for Global Food Security, School of Biological Sciences, Queen's University Belfast, United Kingdom (2018-2021).
Director. Canadian Institute of Ecology and Evolution (2012-2018; co-Director 2018).
Fulbright Visiting Research Chair, University of California-Santa Barbara, USA (2015).
Center Fellow. National Center for Ecological Analysis and Synthesis, University of California-Santa Barbara, USA (2007).
Visiting Scholar. Department of Zoology, University of Washington - Seattle, USA. (2000).
Associate Professor. Department of Biology, University of Regina, Canada. (1997-2001).
Assistant Professor. Department of Biology, University of Regina, Canada. (1993-1997).
NSERC Research Fellow. Department of Zoology, University of Alberta, Canada. Supervisor: D.W. Schindler (Jan. 1991-July 1993).
Visiting Fellow. Freshwater Institute, Canada. Supervisor: R. Hesslein. (Jan-July 1990).
Postdoctoral Researcher. Center for Limnology, University of Wisconsin-Madison, USA. Supervisor: S.R. Carpenter (1989-1991).

Research Interests:

Coupled Human-Natural Systems; Pathways of energy and mass transfer; Human impacts on environment; Climate change and social response; Long-term ecological research (LTER); Regulation of ecosystem structure and function; Variation as a system property; Social controls of biophysical environments; Paleolimnology and Paleoecology; Global cycles of major elements (C, N, P); Pollution ecology; Urbanization and the water cycle; Socio-economic trade-offs with ecosystem services; Centennial-scale effects of agricultural development; Regulation of primary production; Limnology and Aquatic Ecology; Environmental change; Disturbance; Regulation of food-web

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structure; Water; Lakes; wetlands, Streams; Estuaries.

Teaching Experience:

Lecturer: Biology 101 - General Biology (1994-98, 2002)
Biology 276 – Environmental Biology (2002-06, 2008-10, 2012, 2016-18, 2021-3, 2025)
Biology 335 - Limnology (1994-98, 2001-06, 2008-14, 2016-18, 2020-3, 2025)
Biology 364 - Nonvascular Plants/Biology of Algae (1995-98)
Biology 49X - Undergraduate Research Project (2012, 2022-3)
Biology 835 - Climate Change and Impacts (2003)
Biology 837 - Food-web Ecology (1996)
Biology 837 - Practical Analysis of Plant Pigments (1995)
Botany 491 - Practical Analysis of Plant Pigments (Alberta) (1989)
Co-lecturer: Biology 803 - Scientific Research Skills (2008, 2010, 2012-14, 2016-)
Guest Lecturer: Biology 455 - Developmental Endocrinology
Biology 375 - Systems Ecology
Biology 476 - Quaternary Ecology and Palynology
Biology 275 - Ecology
Geography 326 – Environment and Resource Management
Zoology 464 - Limnology (Alberta)
Zoology 322 - Community Ecology (Alberta)
Botany 333 - Aquatic and Wetland Plant Ecology (Alberta)
Archaeology/Palaeoecology 3089 - Critical Thinking (Queen's University Belfast)

Publications: (*PRL trainees, see p. 58*) (Career total 235 papers)

Strecker, A.L., H.A. Sauer, P.R. Leavitt, and M.A. Holgerson. 2025. Temporal and spatial variation in stable isotope hydrology in ponds created by the Mount St. Helen's eruption. In press. for Ecohydrol. doi.org/10.1002/eco.70103

Zhou, Y., J. Wang, L. Zhou, W. Zhi, Y. Zhang, B. Qin, F. Wu, R.I. Woolway, S.F. Jane, E. Jeppesen, D.P. Hamilton, M.A. Xenopoulos, R.G.M. Spencer, T.J. Battin, and P.R. Leavitt. 2025. Episodic flooding causes sudden deoxygenation shock in disturbed rivers. Nature Comm. 16: 6865. doi.org/10.1038/s41467-025-62236-5

Hatton, D.A., H.M. Roe, R.T. Patterson, P.R. Leavitt, E.C. McCann, D. McMullin, C.R. Walsh, S.A. Bartlett, and M. Blaauw. 2025. Assessing the impacts of land-use change and climate variability on cyanobacterial abundance and toxicity in shallow lakes. Freshwat. Biol. 70: e70066. doi.org/10.1111/fwb.70066

Lackmann A.R., R. Bryshun, I.D. Phillips, J. Sereda, M. Ferrari, P.R. Leavitt, D. Fortin, M.T. Peigan, FHQTC Lands Chiefs Committee, and T.D. Jardin. 2025. Otolith and muscle stable isotope analyses to assess food-web interactions between threatened bigmouth buffalo (*Ictiobus cyprinellus*) and invasive common carp (*Cyprinus carpio*). Can. J. Fish. Aquat. Sci. 82: doi.org/10.1139/cjfas-2024-0364

Ferrer, E., A. Pezner, Y. Eddebbar, D. Breitburg, S. Crowe, M. Grégoire, S. Jane, P.R. Leavitt, L. Levin, K. Rose, D. Wallace, and V. Garçon. 2025. Why aquatic deoxygenation belongs in the Planetary Boundary Framework. PLoS Climate 4: e0000619. doi.org/10.1371/journal.pclm.0000619

Tiegs, S.D., K.A. Capps, D.M. Costello, J.P. Schmidt, C.J. Patrick, J.J. Follstad Shah, C.J. LeRoy, and the *CELLDEX Consortium*. 2024. Human activities shape global patterns of decomposition rates in rivers. Science 384: 1191-1195. doi.org/10.1126/science.adn1262

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- Rose, K.C., E.M. Ferrer, S.R. Carpenter, S. Crowe, S.C. Donelan, V.C. Garcon, M. Grégoire, G. Hansen, T. Hughes, S.F. Jane, P.R. Leavitt, L.A. Levin, A. Oschlies, and D. Breitburg. 2024. Aquatic deoxygenation as a planetary boundary and key regulator of Earth System stability. *Nature Ecol. Evol.* 8: 1400-1406. doi.org/10.1038/s41559-024-02448-y
- Gushulak, C.A.C., A.M. Chegoonian, J. Wolfe, K. Gray, S. Mezzini, B. Wissel, B.J. Hann, H.M. Baulch, K. Finlay, and P.R. Leavitt. 2024. Impacts of hydrological management on the eutrophication of shallow lakes in an agricultural landscape (Saskatchewan, Canada). *Freshwat. Biol.* 69: 984-1000. doi.org/10.1111/fwb.14260
- Chan, C.N., C.A.C. Gushulak, P.R. Leavitt, L.A. Logozzo, K. Finlay, M.J. Bogard. 2024. Experimental ecosystem eutrophication causes offsetting effects on emissions of CO₂, CH₄, and N₂O from agricultural reservoirs. *Environ. Sci. Technol.* 58: 7045-7055. doi.org/10.1021/acs.est.3c07520. *Soc. Can. Aquat. Sci. Peter's Award, Best Student Paper.*
- Shampain, A.B., J.S. Baron, P.R. Leavitt, and S.A. Spaulding. 2024. Climatic variability as a principal driver of primary production in the southernmost subalpine Rocky Mountain lake. *Arct. Antarct. Alp. Res.* 56: 2303810. doi.org/10.1080/15230430.2024.2303810
- Burge, D.R.L., M.B. Edlund, S. Bowe, K. Bowe, J.P. Anderson, R.W. Bouchard, A.J. Heathcote, P.R. Leavitt, and D.R. Engstrom. 2024. Managing the Red Lake Nation's and Minnesota's largest lake: Monitoring and paleolimnology support a site-specific standard for Upper and Lower Red Lakes (Red Lake Nation and Minnesota, USA). *Lake Reserv. Manage.* 40:1-17. doi.org/10.1080/10402381.2023.2280181
- Soued, C., M.J. Bogard, K. Finlay, L.E. Bortolotti, P.R. Leavitt, P. Badiou, S.H., Knox, S. Jensen, P. Mueller, S.C. Lee, D. Ng, Wissel, C.N. Chan, B. Page, and P. Kowal. 2024. Salinity causes widespread restriction of methane emissions from small inland waters. *Nature Comm.* 15: 717. doi.org/10.1038/s41467-024-44715-3
- King, L., M. Devey, P.R. Leavitt, M.J. Power, S. Brothers, and J. Brahney. 2024. Anthropogenic forcing leads to an abrupt shift to phytoplankton-dominance in a shallow eutrophic lake. *Freshwat. Biol.* 69: 335-350. doi.org/10.1111/fwb.14214
- Gushulak, C.A.C., S. Mezzini, K.E. Moir, G.L. Simpson, L. Bunting, B. Wissel, D.R. Engstrom, K.R. Laird, A. St. Amand, B.F. Cumming, and P.R. Leavitt. 2024. Impacts of a century of land-use change on the eutrophication of large, shallow, prairie Lake Manitoba in relation to adjacent Lake Winnipeg (Manitoba, Canada). *Freshwat. Biol.* 69: 47-63. doi.org/10.1111/fwb.14192
- Bergbusch, N.T., A.R. Wong, J. Russell, V.J. Swarbrick, C. Freeman, J. Bergsveinson, C.T. Yost, S.C. Courtenay, and P.R. Leavitt. 2023. Impact of wastewater treatment upgrade and nitrogen removal on bacterial communities and their interactions in eutrophic prairie streams. *FEMS Microbiol. Ecol.* 99: fiad142. doi.org/10.1093/femsec/fiad142
- Zhou, J., P.R. Leavitt, K.C. Rose, X. Han, Y. Zhang, K. Shi, and B. Qin. 2023. Controls of thermal sensitivity of temperate lakes to atmospheric warming. *Nature Comm.* 14: 6503. doi.org/10.1038/s41467-023-42262-x
- Chegoonian, A.M., N. Pahlevan, K. Zolfaghari, P.R. Leavitt, J-M. Davies, H.M. Baulch, and C.R. Dugay. 2023. Comparative analysis of empirical and machine learning models for Chl extraction using Sentinel-2 and LandSat OL1 data: Opportunities, limitations and challenges. *Can. J. Remote Sens.* 49: 2215333. doi.org/10.1080/07038992.2023.2215333
- Jensen, S.A., J.R. Webb, G.L. Simpson, H.M. Baulch, P.R. Leavitt, and K. Finlay. 2023. Differential controls of greenhouse gas (CO₂, CH₄, N₂O) emissions in natural and constructed agricultural waterbodies on the Northern Great Plains. *J. Geophys. Res: Biogeosci.* e2022JG007261. doi.org/10.1029/2022JG007261
- Laird, K.R., S. Li, C.A.C. Gushulak, K.E. Moir, Y. Wang, P.R. Leavitt, and B.F. Cumming. 2023. Influence of cultural eutrophication, climate, and landscape connectivity on three Keweenaw

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- lakes (Ontario, Canada) since the early 1800s. *Lake Reserv. Manage.* 39: 120–140. doi.org/10.1080/10402381.2023.2204061
- Heathcote, A.J., Z.E. Taranu, N.Tromas, M. MacIntyre-Newell, P.R. Leavitt, and F.R. Pick. 2023. Sediment DNA and pigments show increasing abundance and toxicity of cyanoHABS during the Anthropocene. *Freshwat. Biol.* 68: 1859-1874. doi.org/10.1111/fwb.14069
- McCarthy, F.M.G., Patterson, R.T., Head, M.J., Riddick, N.L., Cumming, B.F., Hamilton, P.B., Pisaric, M.F.J., *Gushulak*, A.C., Leavitt, P.R., Lafond, K.M., Llew-Williams, B., Marshall, M., Heyde, A., Pilkington, P.M., Moraal, J., Boyce, J.I., Nasser, N.A., Walsh, C., Garvie, M., Roberts, S., Rose, N.L., Cundy, A.B., Gaca, P., Milton, J.A., Hajdas, I., Crann, C.A., Boom, A., Finkelstein, S.A., McAndrews, J.H., and other members of Team. 2023. The varved succession of Crawford Lake, Milton, Ontario, Canada as a candidate Global Boundary Stratotype Section and Point for the Anthropocene Series. *Anthrop. Rev.* 10: 146-176. doi.org/10.1177/205301962211492
- Kuwae, M., B.P. Finney, Z. Shi, A. Sakaguchi, N. Tsugeki, T. Omori, T. Agusa, Y. Suzuki, Y. Yokoyama, H. Hinata, Y. Hatada, J. Inoue, K. Matsuoka, M. Shimada, H. Takahara, S. Takahashi, D. Ueno, A. Amano, J. Tsutsumi, M. Yamamoto, K. Takemura, K. Yamada, K. Ikehara, T. Haraguchi, S. Tims, M. Froehlich, L.K. Fifield, T. Aze, K. Sasa, T. Takahashi, M. Matsumura, Y. Tani, P.R. Leavitt, H. Doi, T. Irino, K. Moriya, A. Hayashida, K. Hirose, H. Suzuki, and Y. Saito. 2023. The Beppu Bay, Japan, as a candidate Global Boundaries Stratotype Section and Point for the Anthropocene Series. *Anthrop. Rev.* 10: 49-86. doi.org/10.1177/20530196221135077
- Jensen, S.A., J.R. *Webb*, G.L. Simpson, H.M. Baulch, P.R. Leavitt, and K. *Finlay*. 2022. Seasonal variability in CO₂, CH₄, and N₂O content and fluxes in small agricultural reservoirs of the northern Great Plains. *Front. Environ. Sci.* 10: 895531. doi.org/10.3389/fenvs.2022.895531
- Zhou, J., P.R. Leavitt, Y. Zhang, and B. Qin. 2022. Anthropogenic eutrophication of shallow lakes: Is it occasional? *Water Res.* 221: 118728. doi.org/10.1016/j.watres.2022.118728
- Bjoerndahl, J.A., C.A.C. *Gushulak*, S. *Mezzini*, G.L. Simpson,, H.A. *Haig*, P.R. Leavitt, and K. *Finlay*. 2022. Abrupt changes in the physical and biological structure of endorheic upland lakes due to 8-m lake-level variation during the 20th century. *Limnol. Oceanogr.* 67: 1022-1039. doi.org/10.1002/lnoo.12054.
- Chegoonian*, A.M., P.R. Leavitt, K. Zolfaghari, J.-M. Davies, H.M. Baulch, C.R. Duguay. 2022 Regional upscaling of Chlorophyll-a retrieval from small eutrophic lakes via Sentinel-2. IGARSS 2022 / 2022 IEEE International Geoscience and Remote Sensing Symposium, 5622-5625. doi.org/10.1109/IGARSS46834.2022.988
- Costello, D.M., and 92 *others*. 2022. Global patterns and controls of nutrient immobilization on decomposing cellulose in riverine ecosystems. *Global Biogeochem. Cycles.* 36: e2021GB007163. doi.org/10.1029/2021GB007163.
- Chegoonian*, A.M., K. Zolfaghari, H.M. Baulch, P.R. Leavitt, and C.R. Duguay. 2022. Improvements of field fluorometry estimates of chlorophyll-a concentration in a cyanobacteria-dominated eutrophic lakes. *Limnol. Oceanogr. Meth.* 20: 193-209. doi.org/10.1002/lom3.10480
- Kuwae, M., N.K. Tsugeki, A. Amano, T. Agusa, Y. Suzuki, J. Tsutsumi, P.R. Leavitt, and K. Hirose. 2022. Evidence of human-induced marine degradation in anoxic coastal sediments of Beppu Bay, Japan, as an Anthropocene marker in East Asia. 2022. *Anthropocene* 37: 100318. doi.org/10.1016/j.ancene.2021.100318
- Swarbrick*, V.J., N.T. *Bergbusch*, and P.R. Leavitt. 2022. Spatial and temporal patterns of urea content in a eutrophic stream continuum on the Northern Great Plains. *Biogeochemistry* 157: 171-191. doi.org/10.1007/s10533-021-00868-7
- Haig*, H.A., A. M. *Chegoonian*, J.-M. Davies, D. *Bateson*, and P.R. Leavitt. 2022. Marked blue

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- discolouration of late winter ice and water due to exceptional autumnal blooms of cyanobacteria. *Lake Reserv. Manag.* 38: 1-15. doi.org/10.1080/10402381.2021.1992544
- Bergbusch, N.T., N.M. Hayes, G.L. Simpson, V.J. Swarbrick, Z.J. Quiñones-Rivera, and P.R. Leavitt. 2021. Effects of nitrogen removal from wastewater on phytoplankton in eutrophic prairie streams. *Freshwat. Biol.* 66: 2283–2300. doi.org/10.1111/FWB.13833
- Gushulak, C.A.C., Haig, H.A., Kingsbury, M.V., B. Wissel, B.F. Cumming, and P.R. Leavitt. 2021. Effects of spatial variation in benthic phototrophs along a depth gradient on assessments of whole-lake production and processes. *Freshwat. Biol.* 66: 2118-2132. doi.org/10.1111/fwb.13820
- Pilla, R.M., and 85 others. 2021. Global data set of long-term summertime vertical temperature profiles in 153 lakes. *Sci. Data* 8: 200. doi.org/10.1038/s41597-021-00983-y
- Gushulak, C.A.C., P.R. Leavitt, and B.F. Cumming. 2021. Fossil reconstructions of regional boreal temperature, precipitation, and lake production during the middle and late Holocene in northeastern Ontario, Canada. *Holocene* 31: 1539-1554. doi.org/10.1177/09596836211025972
- Dickey, J.W.E., N.E. Coughlan, J.T.A. Dick, V. Médoc, M. McCard, P.R. Leavitt, G. Lacroix, S. Fiorini, A. Millot and R.N. Cuthbert. 2021. Breathing space: Deoxygenation of aquatic environments can drive differential ecological impacts across biological invasion stages. *Biol. Invasions* 23: 2831–2847. doi.org/10.1007/s10530-021-02542-3
- Kraemer, B.M. R.M. Pilla, R.I. Woolway, O. Anneville, S. Ban, W. Colom-Montero, S.P. Devlin, M.T. Dokulil, E.E. Gaiser, K.D. Hambright, D.O. Hessen, S.N. Higgins, K.D. Jöhnk, W. Keller, L.B. Knoll, P.R. Leavitt, F. Lepori, M.S. Luger, S.C. Maberly, D.C. Müller-Navarra, A.M. Paterson, D.C. Pierson, D.C. Richardson, M. Rogora, J.A. Rusak, S. Sadro, N. Salmaso, M. Schmid, E.A. Silow, R. Sommaruga, J.A.A. Stelzer, D. Straile, W. Thiery, P. Verburg, G.A. Weyhenmeyer, and R. Adrian. 2021. Climate change drives widespread shifts in lake thermal habitat. *Nat. Clim. Chang.* 11: 521–529. doi.org/10.1038/s41558-021-01060-3
- Bergbusch, N.T., N.M. Hayes, G.L. Simpson, and P.R. Leavitt. 2021. Unexpected shift from phytoplankton to periphyton in eutrophic streams due to wastewater influx. *Limnol. Oceanogr.* 66: 2745-2761. doi.org/10.1002/lno.11786
- Jane, S.F., G.J.A. Hansen, B.M. Kraemer, P.R. Leavitt, J.L. Mincer, R.L. North, R.M. Pilla, J.T. Stetler, C.E. Williamson, R.I. Woolway, L. Arvola, S. Chandra, C. DeGasperi, L. Diemer, J. Dunalaska, O. Erina, G. Flaim, H.-P. Grossart, K.D. Hambright, C. Hein, J. Hejzlar, L. Janus, J.P. Jenny, J.R. Jones, L.B. Knoll, B. Leoni, E. MacKay, S.-I.S. Matsuzaki, C. McBride, D.C. Müller-Navarra, A.M. Paterson, D. Pierson, M. Rogora, J.A. Rusak, S. Sadro, E. Saulnier-Talbot, M. Schmid, R. Sommaruga, W. Thiery, P. Verburg, K.C. Weathers, G.A. Weyhenmeyer, K. Yokota, and K.C. Rose. 2021. Widespread de-oxygenation of temperate lakes. *Nature* 594: 66-70. doi.org/10.1038/s41586-021-03550-y
- Haig, H.A., N.M. Hayes, G.L. Simpson, Y. Yi, B. Wissel, K.R. Hodder, and P.R. Leavitt. 2021. Effects of seasonal and interannual variability in water isotopes ($\delta^2\text{H}$, $\delta^{18}\text{O}$) on estimates of water balance in a chain of seven prairie lakes. *J. Hydrol.* X 10: 100069. doi.org/10.1016/j.hydroa.2020.100069
- Nanayakkara, L., E. Starks, R. Cooper, P.R. Leavitt and B. Wissel. 2021. Resource-use, body condition and parasite load metrics indicate contrasting health of stocked and native game fishes in Canadian prairie lakes. *Fisheries Manage Ecol.* 28: 18-27. doi.org/10.1111/fme.12447
- Gauthier, J., I. Gregory-Eaves, L. Bunting, P.R. Leavitt, T. Tran, L. Godbout, B.P. Finney, D.E. Schindler, G. Chen, G. Holtgrieve, M. Shapley, and D.T. Selbie. 2021. Ecological dynamics of a peri-urban lake: A multi-proxy paleolimnological study of Cultus Lake (British

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- Columbia) over the past ~200 years. *J. Paleolimnol.* 65:33–51 doi.org/10.1007/s10933-020-00147-9
- Pilla, R.M., C.E. Williamson, P.R. Leavitt, and 55 *others*. 2020. Deeper waters are changing less consistently than surface waters or thermal stability in a global analysis of trends in lake thermal structure. *Sci. Rep.* 10: 20524. doi.org/10.1038/s41598-020-76873-x
- Anderson, N.J., D.R. Engstrom, A.J. Heathcote, and P.R. Leavitt. 2020. Changes in coupled carbon-nitrogen dynamics in a tundra ecosystem predate recent regional warming. *Comm. Earth Environ.* 1: 38. doi.org/10.1038/s43247-020-00036-z
- Hall, B.D., T. Cobb, M.D. Graham, R. H. Hesslein, K.A. Kidd, R.J. Vogt and P.R. Leavitt. 2020. Mercury elevator in lakes: A novel vector of methylmercury transfer to fish via migratory invertebrates. *Environ. Sci. Technol. Lett.* 7: 579–584. doi.org/10.1021/acs.estlett.0c00446
- Wurtsbaugh, W.A., P.R. Leavitt, and K. Moser. 2020. Effects of a century of mining and industrial production on metal contamination of a model saline ecosystem, Great Salt Lake, Utah. *Environ. Pollut.* 266: 115072. doi.org/10.1016/j.envpol.2020.115072
- Oleksy, I.A., J.S. Baron, P.R. Leavitt, and S.A. Spaulding. 2020. Nutrients and warming interact to force mountain lakes into unprecedented ecological state. *Proc. Roy. Soc. B.* 287: 20200304. doi.org/10.1098/rspb.2020.0304
- Swarbrick, V.J., Z. Quiñones-Rivera, and P.R. Leavitt. 2020. Seasonal variability in effects of urea and phosphorous on phytoplankton abundance and composition in a hypereutrophic hardwater lake. *Freshwat. Biol.* 65: 1765-1781. doi.org/10.1111/fwb.13580
- Hayes, N.M., H.A. Haig, G.L. Simpson, and P.R. Leavitt. 2020. Local and regional effects of lake warming on risk of toxic algal exposure. *Limnol. Oceanogr. Lett.* 5: 393-402. doi.org/10.1002/lol2.10164
- Ewing, H.A., K.C. Weathers, K.L. Cottingham, P.R. Leavitt, M.L. Greer, C.C. Carey, B.G. Steele, A.U. Fiorillo, and J.P. Sowles. 2020. “New” cyanobacterial blooms are not new: Two centuries of lake production are related to ice cover and land use. *Ecosphere* 11: e03170. doi.org/10.1002/ecs2.3170
- Bogard, M.J., R.J. Vogt, N.M. Hayes, and P.R. Leavitt. 2020. Unabated nitrogen pollution favours growth of toxic cyanobacteria over chlorophytes in most hypereutrophic lakes. *Environ. Sci. Technol.* 54: 3219-3227. doi.org/10.1021/acs.est.9b06299
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- Baustian, M.M., Y. Brooks, M. Baskaran, P.R. Leavitt, B. Liu, N. Ostrom, R.J. Stevenson, and J. Rose. 2020. Paleo-environmental evidence of ecosystem change in Lake St. Clair region of Laurentian Great Lakes basin: Contrasting responses to land-use change and invasive mussels. *J. Paleolimnol.* 63: 177–193. doi.org/10.1007/s10933-019-00108-x
- Haig, H.A., N.M. Hayes, G.L. Simpson, Y. Yi, B. Wissel, K.R. Hodder, and P.R. Leavitt. 2020. Comparison of isotopic mass balance and instrumental techniques as estimates of basin hydrology in seven connected lakes over 12 years. *J. Hydrol.* X 6: 100046. doi.org/10.1016/j.hydroa.2019.100046
- Mushet, G.R., K.R. Laird, P.R. Leavitt, S. Maricle, A. Klassen, A. Rahi, and B.F. Cumming. 2020. Bottom-up forces drive historical increases in the abundance of large daphniids in four small lakes stocked with rainbow trout (*Oncorhynchus mykiss*), interior British Columbia, Canada. *Ecosystems* 23: 873–890. doi.org/10.1007/s10021-019-00443-0
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- Lerminiaux, J., K. Finlay, P.R. Leavitt, S.G. Woodman, and M.J. Bogard. Network scale patterns and drivers of microcystin distribution in a heavily-impacted watershed. Submitted to *Harmful Algae* Sept 2025. MS HARALG-D-25-00389.
- Shi, K., R.I. Woolway, Q. Guan, W. Zhang, C. Mi, Y. Zhang, W. Zhi, J. Wang, H. Xu, Y. Zhou, L.

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- Zhou, J., C. Huang, G. Lü, K. Shi, and P.R. Leavitt. Effects of temporal and spatial variability in energy fluxes on phytoplankton in Lake Taihu. In revision for Limnol. Oceanogr. Sept 2025, MS LO-24-0663R2.
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- Gifford, S.R., P.R. Leavitt, J. Wilson, E. Stelzer, K.A. Ryan, A. St. Amand, D. Clark, M.D.W. Stouder, A. Stubbins, and J.L. Graham. Comparison of sedimentary pigment, akinete, and eDNA records of historical cyanobacterial occurrence in two oligotrophic Adirondack lakes. In revision for Freshwat. Biol., Sept 2025. MS c4c67d26-6c57-459d-9a9b-49d6069394ebR1.
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- into Chinese rivers. To be submitted to XX, Aug 2025.
- Cavazzin, B., J., Plancq, A. Garcia-Alix, M. Zwick, C. Ohlendof, P.R. Leavitt, and J. L. Toney. Unveiling 2000 years of hydrological change in the Canadian Great Plains: A multi-proxy perspective. To be submitted to *Palaeogeogr., Palaeoclimat., Palaeoecol.* July 2025.
- Numrich, L.E., C.A.C. Gushulak, and P.R. Leavitt. Lake eutrophication in response to shoreline and agricultural development of prairie-parkland catchments in western Saskatchewan. To be submitted to *Freshwat. Biol.*, 2025.
- Lueke, M. C. Gushulak, H.A. Sauer, D. Vandergucht, N.M. Hayes, D. Bateson, and P.R. Leavitt. Relative importance of sediment release, atmospheric fixation, and river influx to the nitrogen budget of a phosphorus-rich hypereutrophic lake. To be submitted to *Limnol. Oceanogr.*, 2025.
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- Gushuak, C.A.C., and P.R. Leavitt. 2023. The Qu'Appelle Long-Term Ecological Research Program: A 30-year view of prairie surface waters. *Reflections Soc. Can. Aquat. Sci. Bull.* 2: 10-11.
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Major Technical Papers: (PRL trainees)

- Harris, T.D., C. Frazier, M. Hamersky, T. Coole, D. Baker, A. Kelly, J. Kastens, B. Sturm, P.R. Leavitt, and M. Ketterer. 2024. Phytoplankton and water quality in Clinton and Cedar Bluff reservoirs: Results of paleolimnological sediment core and historical data analyses. *Kansas Biological Survey Report* 218. 55 p.

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- Harris, T.D., A. Kelly, J. Moody, D. Baker, J. Kastens, B. Sturm, P.R. Leavitt, and M. Ketterer. 2023. Phytoplankton and water quality in Tuttle Creek and Waconda reservoirs: Results of paleolimnological sediment core and historical data analyses. Kansas Biological Survey Report 211. 46 p.
- Shampain, A., J.S. Baron, P.R. Leavitt, and S. Spaulding, 2023, Paleoecological data from sediment collected in 2020 from Santa Fe Lake, New Mexico: U.S. Geological Survey Data Release. doi.org/10.5066/P9P659GU
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- Harris, T.D., J. Yun, D. Baker, J. Kastens, B. Sturm, P.R. Leavitt, M. Ketterer, and A. St. Amand. 2020. Phytoplankton and water quality in Milford Reservoir: Results of paleolimnological sediment core and historical data analyses. Kansas Biological Survey Report 197. 68p.
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- Bunting, L., P.R. Leavitt, B. Wissel, M.D. Graham, K.R. Laird, A. St. Amand, B.J. Hann, and D.R. Engstrom. 2012. Eutrophication of the north basin of Lake Winnipeg, Canada. Final report to Manitoba Conservation and Water Stewardship, and Environment Canada Lake Winnipeg Basin Stewardship Program, April 2012. 46 pp.
- Moser, K., D. Woodward, Leavitt, P.R., and W.A. Wurtsbaugh. 2012. Historical changes in aquatic invertebrates and plants of the Great Salt Lake of Utah, USA, based on analyses of sedimentary remains. Final report to Utah State Department of Environmental Quality, March 2012. 26 pp.
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- Bunting, L., P.R. Leavitt, B. Wissel, K.R. Laird, B.F. Cumming, A. St. Amand, and D.R. Engstrom. 2011. Sudden ecosystem state change in Lake Winnipeg, Canada, caused by eutrophication arising from crop and livestock production during the 20th century. Final report to Manitoba Water Stewardship, March 2011. 72 pp.
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invited)

- *Leavitt, P.R., *Limnology Laboratory*, and *Institute of Environmental Change and Society*. Water quality degradation by nutrients: Concerns for a warmer future. File Hills Qu'Appelle Tribal Council, Climate Adaptation Symposium. Treaty 4 Grounds (Reserve 77), Treaty 4, 2025.
- *Leavitt, P.R., *Limnology Laboratory*, and *Institute of Environmental Change and Society*. Water quality degradation by nitrogen: Application of 30 years of research to benefit Society. Association for the Sciences of Limnology and Oceanography, Charlotte, USA, 2025. *Plenary for 2025 Ruth Patrick Award*.
- Gushulak, C.A.C., V. Shah, K.R. Laird, B.F. Cumming, and P.R. Leavitt. Eutrophication recovery of Dauphin Lake (Manitoba) due to falling human populations in a rural, agricultural catchment. Society of Canadian Aquatic Sciences, Hamilton, Canada, 2025.
- Chan, C.N., C.A.C. Gushulak, P.R. Leavitt, L.A. Logozzo, K. Finlay, and M.J. Bogard. Experimental ecosystem eutrophication causes offsetting effects on emissions of CO₂, CH₄, and N₂O from agricultural reservoirs. Society of Canadian Aquatic Sciences, Hamilton, Canada, 2025.
- Lerminiaux, J., M.J. Bogard, P.R. Leavitt, J. Challis, and K. Finlay. Exploring natural microcystin removal pathways in wetlands. Society of Canadian Aquatic Sciences, Hamilton, Canada, 2025.
- Harris, T.D., C. Frazier, M. Hamersky, T. Coole, D. Baker, A. Kelly, J. Kastens, B. Sturm, P.R. Leavitt and M. Ketterer. 2024. Phytoplankton and water quality in Clinton and Cedar Bluff reservoirs: Results of paleolimnological sediment core and historical data analyses. Kansas Water Office webinar (virtual), 2024.
- Bogard, M.T., D.E. Butman, R.G. Striegl, K. Wickland, F.G. Tigreros, M. Dornblaser, and P.R. Leavitt. Exploring the role of lakes in the regional carbon budget in the Yukon River basin, interior Alaska. American Geophysical Union, San Francisco, USA, 2024.
- *Leavitt, P.R. Impacts of climate change and land use on Treaty 4 waters. Youth Voices in Climate Action Forum, Treaty 4 Gathering, Treaty 4 Territory No. 77, 2024
- Harris, T.D., C. Frazier, M. Hamersky, D. Baker, A. Kelly, J. Morales, J. Kastens, B. Sturm, P.R. Leavitt, and M. Ketterer. 2024. Phytoplankton and water quality in Kirwin and Wilson reservoirs: Results of paleolimnological sediment core and historical data analyses. Kansas Water Office webinar (virtual), 2024.
- Roe, H., R.T. Patterson, D.A. Hatton, C.M. Walsh, P.R. Leavitt, E.T. McCann, D.R. McMullin, and E. Reinhardt. Tropical cyclones as an emergent contributor to development of harmful algal blooms in northeastern North America. Geological Society of America, Anaheim, USA, 2024.
- Heard, A.M., J.S. Baron, A.B. Shampain, S. Sadro, P.R. Leavitt, A.P. Smits, and A. Olesky. Divergent responses of western mountain lakes to increasing nutrients and temperatures. 2024 Sierra Nevada Science Symposium.
- Moir, K.E., I.A. Armstrong, C.A.C. Gushulak, P.R. Leavitt, J.L. Ridal, and B.F. Cumming. A large-scale paleolimnological study of a fluvial lake on the St. Lawrence River: Trends in hydrology, eutrophication, and climate-change impacts. International Association of Great Lakes Res, 2024.
- Patterson, R.T., F.M.G. McCarthy, M.J. Head, C.R. Walsh, N.L. Riddick, B.F. Cumming, P.B. Hamilton, M.F.J. Pisaric, C.A.C. Gushulak, P.R. Leavitt, K.M. Lafond, B. Llew-Williams, A. Heyde, P.M. Pilkington, J. Moraal, N.A. Nasser, M. Garvie, S. Roberts, N.L. Rose, and H.M. Roe. The varved sediment succession of Crawford Lake, Ontario, Canada: GSSP for the proposed Anthropocene Epoch. European Geophysical Union, Vienna, Austria, 2024.
- Jardine, T., A. Lackmann, D. Fortin, R. Bryshunm, I. Phillips, J. Sereda, and P.R. Leavitt. A multi-tissues isotope approach to assess interactions between a native, threatened and a non-native,

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- invasive fish species in a large prairie river. 13th International Conference on the Application of Stable Isotope Techniques in Ecological Studies, Fredericton, Canada, 2024.
- Chegoonian, A.M., C. Duguay, and P.R. Leavitt.* Long-term monitoring of chlorophyll-a in small inland waters using Landsat heritage and machine learning models. 45th Canadian Symposium on Remote Sensing, Halifax, Canada, 2024.
- Finlay, K., R. Rimas, S. Jensen, M. Mensah, J. Webb, J. Chadwick, H.A. Sauer, C. Soued, M.J. Bogard, and P.R. Leavitt.* Climate warming constrains greenhouse gas emissions of agricultural reservoirs in the Northern Great Plains. Association for the Sciences of Limnology and Oceanography, Madison, USA, 2024.
- Lerminaux, J. P.R. Leavitt, M.J. Bogard, and K. Finlay.* A whole-network approach to understanding habitat-specific drivers of microcystin production and distribution. Association for the Sciences of Limnology and Oceanography, Madison, USA, 2024.
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- *Leavitt, P.R. Effects of climate and land use on Treaty 4 waters. FHQTC LRES Treaty 4 First Nations Climate Leadership Forum. Treaty 4 Reserve, 2024.
- Bogard, M.J., and 23 others.* Defining environmental impacts on effluent release to a model prairie aquatic network: An introduction to the Frank Lake-Little Bow project. Society of Canadian Aquatic Sciences, Fredericton, Canada, 2024.
- Gushulak, C.A.C., V. Shah, K.R. Laird, B.F. Cumming, and P.R. Leavitt.* Eutrophication recovery of Dauphin Lake (Manitoba) due to falling human populations in a rural agricultural catchment. Society of Canadian Aquatic Sciences, Fredericton, Canada, 2024.
- Chan, C.N., C.A.C. Gushulak, P.R. Leavitt, L.A. Logozzo, K. Finlay, and M.J. Bogard.* Experimental Ecosystems eutrophication causes offsetting effects on emissions of CO₂, CH₄, and N₂O from agricultural reservoirs. Society of Canadian Aquatic Sciences, Fredericton, Canada, 2024.
- Chegoonian, A.M., P.R. Leavitt, and C.R. Duguay.* RAWSIW: a remote sensing analysis workflow for water quality retrieval in small inland waters. 5th Space for Water Cycle and Hydrology Workshop, HYDROSPACE 2023. Lisbon, Portugal.
- Gushulak, C.A.C., D. Bateson, J. Lerminaux, C.N. Chan, M.J. Bogard, K. Finlay, and P.R. Leavitt.* Urea additions induce extreme eutrophication in agricultural wetlands: A model for Lough Neagh, Northern Ireland. British Ecological Society, Belfast, Northern Ireland, 2023.
- *Leavitt, P.R. and *UR Limnology Laboratory.* Recent trends in water quality in Saskatchewan Prairies. Annual general meeting, Provincial Association of Resort Communities of Saskatchewan (PARCS), Saskatoon, 2023.
- Lueke, M., C.A.C. Gushulak, H.A. Sauer, D. Vandergucht, N.M. Hayes, D. Bateson, and P.R. Leavitt.* Relative importance of sediment release and river influx to the nitrogen (N) budget of an N-limited hypereutrophic lakes. Association for the Sciences of Limnology and Oceanography, Palma, Spain, 2023.
- Gushulak, C.A.C., V. Shah, D. Bateson, S. Mezzini, K.E. Moir, G.L. Simpson, L. Bunting, B. Wissel, D.R. Engstrom, K.R. Laird, A. St. Amand, B.F. Cumming, and P.R. Leavitt.* Canada's forgotten Great Lakes: Coherent cultural eutrophication across hydrologically connected large, shallow, lakes in an agricultural landscape (Manitoba, Canada). Association for the

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- Finlay, K., M.J. Bogard, P.R. Leavitt, and H.A. Sauer.* Salinization trends and drivers in lakes of the Northern Great Plains. Association for the Sciences of Limnology and Oceanography, Palma, Spain, 2023.
- Rimas, R., J.R. Webb, S. Jensen, P.R. Leavitt, B. Wissel, and K. Finlay.* Climate change induced effects on the rate of methane produced in small agricultural ponds in the Northern Great Plains. Association for the Sciences of Limnology and Oceanography, Palma, Spain, 2023.
- Chan, C.N., C. Gushulak, C. Soued, P.R. Leavitt, K. Finlay, and M.J. Bogard.* How do farm pond greenhouse gas emissions respond to input of anthropogenic nitrogen? Society of Canadian Aquatic Sciences, Montreal, 2023.
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- Taranu, Z.E., S.R. Carpenter, P.R. Leavitt, and G.L. Simpson.* Detecting critical transitions from paleo-ecological records: A Multivariate approach. Society of Canadian Aquatic Sciences, Montreal, 2023.
- Dickey, J.W.E., N.E. Coughlan, J.T.A. Dick, V. Medoc, M. McCard, P.R. Leavitt, G. Lacroix, S. Fiorini, A. Millot, and R.N. Cuthbert.* Deoxygenation may drive differential ecological impacts over invasion stages. 22nd International Conference on Aquatic Invasive Species. Oostende, Belgium, 2023.
- Hatton, D.A., H. Roe, R.T. Patterson, P.R. Leavitt, E.G. Reinhardt, E.T. McCann, D.R. McMullin, N.A. Nasser, and M.G. Marshall.* Understanding the role of palaeoclimatic drivers on cyanobacteria bloom development in shallow lakes. International Union for Quaternary Research (INQUA XXI), Rome, Italy, 2023.
- Patterson, R.T., F.M.G. McCarthy, M.J. Head, N. Riddick, B.F. Cumming, P. Hamilton, M. Pisaric, C.A.C. Gushulak, P.R. Leavitt, K.M. Lafond, and other team members.* The Anthropocene record preserved in the annually laminated sediment succession of Crawford Lake, Ontario, Canada. International Union for Quaternary Research (INQUA XXI), Rome, Italy, 2023.
- Hatton, D.A., H.M. Roe, R.T. Patterson, P.R. Leavitt, E.T. McCann, D.R. McMullin, E.G. Reinhardt, N.A. Nasser, and M.G. Marshall.* Elucidating the drivers of shallow lake cyanobacteria bloom events from sediment core records. Interdisciplinary Freshwater Harmful Algal Blooms (IFHAB) Workshop, Montreal, Canada, 2023.
- *McCarthy, F.M.G., and 19 others.* Signature of the Great Acceleration in the varved succession at Crawford Lake, Milton, Ontario, Canada: Implications for the Anthropocene as a series/epoch. International Congress of Stratigraphy, Lille, France, 2023.
- Chegoonian, A.M., P.R. Leavitt, and C. Duguay.* Satellite retrieval of Chl a in small inland waters via locally-trained machine learning models: Recommendations based on a prairie lake workflow. Canadian Geophysical Union, Banff, 2023.
- Kuwae, M., and 39 others.* Rapid increase in anthropogenic fingerprints in the Beppu Bay stratigraphy as a potential marker of the onset of the Anthropocene. Japan Geoscience Union, Chiba, Japan, 2023.
- Kuwae, M., and 39 others.* Cumulative numbers of anthropogenic fingerprints as a potential marker of the onset of the Anthropocene - an example of the Beppu Bay stratigraphy. International Union for Quaternary Research (INQUA XXI), Rome, Italy, 2023.
- *Leavitt, P.R., and UR Limnology Laboratory.* Water quality in Saskatchewan lakes. Provincial

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Annual general meeting, Association of Resort Communities of Saskatchewan (PARCS), virtual, Regina, 2022.
- Patterson, R.T., F.M.G. McCarthy, C.A.C. Gushulak, P.R. Leavitt and 24 others. Great Acceleration record preserved in the annually laminated sediment succession of Crawford Lake, Ontario, Canada as a candidate locality for the Anthropocene Global Boundary Stratotype Section and Point (GSSP). International Paleolimnology Association, Bariloche, Argentina, 2022.
- Chegoonian*, A.M., N. Pahlevan, K. Zolfaghari, P.R. Leavitt, J.-M. Davies, H.M. Baulch, C.R. Duguay. Quantification of chlorophyll-a concentration in small eutrophic lakes using Sentinel-2 and Landsat-8 imagery and locally tuned machine learning models. Canadian Remote Sensing Symposium, Quebec City, Canada, 2022.
- Shampain A., J.S. Baron, P.R. Leavitt, S. Spaulding C. Charlton, T. Weinmann. Centennial to decadal-scale changes in algal production and community composition in Santa Fe Lake, NM. Canadian Society of Ecology and Evolution/Ecological Society of America, Montreal, 2022.
- Baron, J.S., S. Shampain, C. Charlton, B. Oleksy, S. Spaulding, and P.R. Leavitt. Divergent responses of alpine lakes to regional and global change drivers since 1800. Canadian Society of Ecology and Evolution/Ecological Society of America, Montreal, 2022.
- Straile, D., N.M. Hayes, J.A. Rusak, P.R. Leavitt, and 20 others. Zooplankton dynamics in lakes of different trophic state, depth and climatic region. A test of the PEG model. 100th congress of the International Society of Theoretical and Applied Limnology (SIL), Berlin, 2022.
- Gushulak*, C.A.C., D. Bateson, and P.R. Leavitt. Experimental eutrophication of agricultural wetlands through direct additions of nitrogenous fertilizer urea: Implications for future agriculture. Association for the Sciences of Limnology and Oceanography, Joint Aquatic Sciences Meeting, Grand Rapids, USA, 2022.
- Edlund, M., D. Burge, S. Bowe, J. Anderson, A. Heathcote, P.R. Leavitt, D.R. Engstrom. Managing the Red Lake Nation's and Minnesota's largest lake: Monitoring and paleolimnology support a site-specific standard for the Red Lakes. Association for the Sciences of Limnology and Oceanography, Joint Aquatic Sciences Meeting, Grand Rapids, USA, 2022.
- Brown, M.S., N. Pahlevan, G. Zhao, J. Baron, P.R. Leavitt, A.M. Michalak. Long-term trends in western North American mountain lake temperature and color assessed via Landsat. Association for the Sciences of Limnology and Oceanography, Joint Aquatic Sciences Meeting, Grand Rapids, USA, 2022.
- Bergbusch*, N.T., M.D. Graham, N.M. Hayes, E. Bledsoe, K. Finlay, and P.R. Leavitt. *Daphnia* feeding selectivity under a changing climate: Analyses of 22-years of zooplankton gut and water-column pigments in seven productive lakes. Society of Canadian Limnologists, Vancouver, Canada, 2022.
- Gushulak*, C.A.C., D. Bateson, S. Mezzini, and P.R. Leavitt. Eutrophication of agricultural wetlands through direct additions of nitrogenous fertilizer urea: Implications for regional water quality. Society of Canadian Limnologists, Vancouver, Canada, 2022.
- Shampain, S, J.S. Baron, P.R. Leavitt, S. Spaulding, C. Charlton, and T. Weinmann. Centennial to decadal-scale changes in algal production and community composition in Santa Fe Lake, NM. American Geophysical Union, San Francisco, 2021.
- *Leavitt, P.R. What controls water quality in Saskatchewan lakes? Provincial Association of Resort Communities of Saskatchewan (PARCS), virtual, Regina, 2021.
- *Leavitt, P.R. Effects of sequential wastewater treatment upgrades on downstream water quality in the Qu'Appelle River catchment. Saskatchewan Water and Wastewater Association conference, virtual, Saskatoon, 2021.
- Zwick, M., L. Wörmer, P.R. Leavitt, J. Wendt, B.F. Cumming, B. Wissel, K. Hinrichs, J.L. Toney.

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Abrupt mid-Holocene cooling – insights from sub-annually resolved reconstructions of alkenone lake temperature. International Meeting on Organic Geochemistry. France, 2021. doi.org/10.3997/2214-4609.202134122
- Gushulak, C.A.C., L. Bunting, S. Mezzini, G.L. Simpson, B. Wissel, D.R. Engstrom, K.R. Laird, B.F. Cumming, and P.R. Leavitt. Local catchment alterations drive eutrophication in prairie Great Lakes (Manitoba, Canada): Evidence from lakes with and without large river inputs. Association for the Sciences of Limnology and Oceanography, virtual, Spain, 2021.
- Strecker, A., H. A. Haig, M. Holgersson and P. R. Leavitt. Hydrological function of ponds formed by the eruption of Mount St. Helens. Association for the Sciences of Limnology and Oceanography, virtual, Spain, 2021.
- Soued, C., K. Finlay, L. Bortolotti, P.R. Leavitt, B. Wissel, S. Jensen, and M.J. Bogard. Linking sulphate and methane concentrations in sulphate-rich aquatic networks of the Northern Great Plains of Canada. Association for the Sciences of Limnology and Oceanography, virtual, Spain, 2021.
- Rimas, R., K. Finlay, S. Jensen, P.R. Leavitt, B.D. Hall, and G.L. Simpson. Controls of carbon burial in agricultural reservoirs in the northern Great Plains. Society of Canadian Limnologists, virtual, Wolfville, Canada, 2021.
- Jensen, S., J.R. Webb, R. Rimas, P.R. Leavitt, G.L. Simpson, and K. Finlay. Controls of greenhouse gases in artificial reservoirs and natural wetland ponds in the northern Great Plains. Society of Canadian Limnologists, virtual, Wolfville, Canada, 2021.
- Bergbusch, N.T., N.M. Hayes, G.L. Simpson, and P.R. Leavitt. Unexpected shift from phytoplankton to periphyton in small eutrophic streams due to urban wastewater influx. British Phycological Society, virtual, Nottingham, UK, 2021.
- *Leavitt, P.R. Western scientific approach to studying water. 2020 mâci miyo wâhkôhtowin Gathering. Regina, Canada 2020.
- Harris, T.D., J. Yun, D. Baker, J. Kastens, B. Sturm, P.R. Leavitt, M. Ketterer, and A. St. Amand. Phytoplankton and water quality in Milford, Marion, and Keith Sebelius Reservoirs: Results of paleolimnological sediment core and historical data analyses. Kansas Water Office webinar. Topeka, USA, 2020.
- *Harris, T.D., J. Yun, D. Baker, J. Kastens, B. Sturm, P.R. Leavitt, M. Ketterer, A. St. Amand. Harmful algal bloom KBS research update: Are HABs increasing? Kansas Water Authority annual meeting. Topeka, USA, 2020.
- Bogard, M.J., K. Finlay, H.A. Haig, S.E. Johnston, and P.R. Leavitt. Exploring salinization trends and drivers in prairie aquatic ecosystems. Society of Canadian Limnologists. Halifax, Canada, 2020.
- Bergbusch, N.T., Z.J. Quiñones-Rivera, H.A. Haig, V.J. Swarbrick, N.M. Hayes, and P.R. Leavitt. Urban wastewater induced shift from suspended to benthic primary production in small eutrophic streams of the Northern Great Plains. Society of Canadian Limnologists. Halifax, Canada, 2020.
- Emmons, S., P.R. Leavitt, G.L. Simpson, H.M. Baulch, J.R. Webb, and K. Finlay. Seasonal variation in CO₂, CH₄, and N₂O emissions from small farm reservoirs in the northern Great Plains. Society of Canadian Limnologists. Halifax, Canada, 2020.
- Leavitt, P.R. The Energy-mass flux framework: A novel paradigm for analyzing human and climate effects on lake ecosystems. British Ecological Society. Belfast, UK, 2019.
- Leavitt, P.R. Effects of climate and humans on lakes of continental interiors: Applications of the Energy-mass flux framework from seasons to millennia. 20th Congress of the International Union for Quaternary Research (INQUA). Dublin, Ireland, 2019.
- Leiva-Dueñas, C., P.R. Leavitt, T. Buchaca, A. Martínez Cortizas P.-J. Nerea, P.S. Lavery, and M.A.

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Mateo. 2000 years of changes in primary producers communities using *Posidonia oceanica* (L. Delile) mat sediments: chronology and driving factors. 20th Congress of the International Union for Quaternary Research (INQUA). Dublin, Ireland, 2019.
- *Leavitt, P.R., and *members of Limnology Laboratory*. Factors regulating the role of phytoplankton as vectors of carbon sequestration in lake sediments. PALS Quebec-Ontario Paleolimnology Symposium, Waterloo, Canada, 2019. *Plenary speaker*.
- Mushet, G.R., K.R. Laird, P.R. Leavitt and B.F. Cumming. Paleolimnological assessment of nutrient and predation controls on cladoceran abundance and composition in four small fisheries lakes, Interior British Columbia. PALS Quebec-Ontario Paleolimnology Symposium, Waterloo, Canada, 2019.
- Zwick, M., L. Mermer, J. Wendt, P.R. Leavitt, H. Haig, B. Cumming, K-U. Hinrichs and J. Toney. Exploring alkenone calibration and micrometer scale molecular stratigraphy in the Northern Great Plains. British Organic Geochemical Society. Manchester, UK, 2019.
- *Glibert, P.M., F.P. Wilkerson, R.C. Dugdale, J.A. Raven, C. Dupont, P.R. Leavitt, A.E. Parker, J.M. Burkholder, and T.M. Kana. 2016. Pluses and minuses of ammonium and nitrate uptake and assimilation by phytoplankton and implications for productivity and community composition, with emphasis on nitrogen-enriched conditions. Association for the Sciences of Limnology and Oceanography, San Juan, USA, 2019.
- Bergbusch, N., Z. Quiñones-Rivera, H.A. Haig, V.M. Swarbrick, N.M. Hayes, and P.R. Leavitt. Unintended effects of nitrogen-rich discharge from a tertiary wastewater treatment plant on primary producers in phosphorus-rich streams of the Northern Great Plains. Association for the Sciences of Limnology and Oceanography, San Juan, USA, 2019.
- Wissel, B., Z. Quinones-Rivera, L. Nanayakkara, P.R. Leavitt, and D. Bateson. Seasonal and interannual patterns across Canadian hardwater lakes: An isotope perspective. Association for the Sciences of Limnology and Oceanography, San Juan, USA, 2019.
- *Webb, J.R., K. Finlay, P.R. Leavitt, H. Baulch, G.L. Simpson, H.A. Haig, and K. Hodder. Greenhouse gas dynamics in a small agricultural water bodies in the Northern Green Plains. Association for the Sciences of Limnology and Oceanography, San Juan, USA, 2019.
- *Leavitt, P.R., and *members of Limnology Laboratory*. Factors regulating the role of phytoplankton as vectors of carbon sequestration in lake sediments. British Phycological Society, Oban, Scotland, 2019. *Keynote speaker*.
- Finlay, K., J.R. Webb, B. Wissel, P.R. Leavitt, H.M. Baulch, G.L. Simpson, H.A. Haig, and K.R. Hodder. Landscape-scale drivers of nutrient concentrations in natural and artificial water bodies of the Northern Great Plains. Society of Canadian Limnologists, London, Canada, 2019.
- Mushet, G.R., K. R. Laird, P.R. Leavitt, and B.F. Cumming, Paleolimnological assessment of nutrient and predation controls on cladoceran abundance and composition in four small fisheries lakes, interior British Columbia. Society of Canadian Limnologists, London, Canada, 2019.
- Plancq, J., B. Cavazzin, S. Juggins, H.A. Haig, P.R. Leavitt, H. Araie, H. Nakamura, Y. Shiraiwa, J.M. Couto, and J.L. Toney. Alkenone distribution and producers in Canadian Lakes: Implications for palaeotemperature reconstructions. American Geophysical Union, Washington, USA, 2018.
- Plancq, J., J.L. Toney, B. Cavazzin, S. Juggins, H.A. Haig, P.R. Leavitt, H. Araie, H. Nakamura, Y. Shiraiwa, and J.M. Couto. Alkenone distribution and producers: Insights from Canadian lakes. British Organic Geochemistry Society, Bristol, United Kingdom, 2018.
- Plancq, J., J.L. Toney, B. Cavazzin, S. Juggins, H.A. Haig, P.R. Leavitt, H. Araie, H. Nakamura, Y. Shiraiwa, and J.M. Couto. Distribution et producteurs d'alcénones lacustres: Apports de l'étude de lacs canadiens. Quatrième Réunion des Géochimistes Organiciens Français, Lyon,

Peter R. Leavitt FRSC, FRSB: Professional Experience

- France, 2018.
- Baron, J.S., I. Oleksky, and P.R. Leavitt. A tale of two lakes: Alpine and subalpine lake responses to a warmer greener world. Ecological Society of America, New Orleans, USA, 2018.
- Leiva-Dueñas, C., T. Buchacea, P.R. Leavitt, N. Piñeiro-Juncal, O. Serrano, P.S. Lavery, A. Milani, A. Thoran, and M.A. Mateo. Primary producer pigments in *Posidonia oceanica* (L. Delile) sedimentary archives: Long-term temporal trends in a coastal area. VI International Symposium on Marine Sciences (ISMS), Vigo, Spain, 2018.
- Nanayakarra, L, P.R. Leavitt and B. Wissel. Reconciling societal values and ecosystem services: Managing hardwater prairie lakes beyond fish. Association for the Sciences of Limnology and Oceanography, Victoria, Canada, 2018.
- Olesky, I., J. Baron, and P.R. Leavitt. A warmer and greener world – Evidence of algal assemblage shifts from lake sediment cores in Rocky Mountain National Park, Colorado. Association for the Sciences of Limnology and Oceanography, Victoria, Canada, 2018.
- Kehoe, M., K. Joenk, A. Nazemi, P.R. Leavitt, and H. Baulch. Sensitivity of lakes to climate change: A case study of declining water quality. Association for the Sciences of Limnology and Oceanography, Victoria, Canada, 2018.
- Leavitt, P.R., H. Baulch, N. Bergbusch, M.J. Bogard, L. Bunting, D.B. Donald, K. Finlay, H. Haig, N.M. Hayes, Z. Quiñones-Rivera, V. Swarbrick, G.L. Simpson, R.J. Vogt, J.R. Webb, B. Wissel, and Limnology Field Team members. Coupled carbon and nitrogen biogeochemistry in productive hardwater lakes: Insights from mass fluxes of gases, solutes and particles over 25 years. Association for the Sciences of Limnology and Oceanography, Victoria, Canada, 2018.
- Webb, J.R., P.R. Leavitt, G.L. Simpson, I. Santos, D. Mayer, and K. Finlay. Aquatic carbon fluxes from underrepresented agricultural reservoirs: Potentially important sources or sinks at the catchment scale. Association for the Sciences of Limnology and Oceanography, Victoria, Canada, 2018.
- Hayes, N.M., R.J. Vogt, K. Finlay, G.L. Simpson, and P.R. Leavitt. Phytoplankton periodicity provides insights into seasonal and catchment-specific drivers of environmental change. Association for the Sciences of Limnology and Oceanography, Victoria, Canada, 2018.
- Bergbusch, N., V. Swarbrick, N.M. Hayes, and P.R. Leavitt. Effects of nitrogen from a tertiary wastewater treatment plant on primary producers in phosphorus-rich streams of the Northern Great Plains. Association for the Sciences of Limnology and Oceanography, Victoria, Canada, 2018.
- Webb, J.R., P.R. Leavitt, H.M. Baulch, G.L. Simpson, and K. Finlay. Agricultural dugouts as sources or sinks for greenhouse gases: A spatial assessment in southern Saskatchewan. Society of Canadian Limnologists, Edmonton, 2018.
- Bjorndahl, J., P.R. Leavitt, and K. Finlay. Impact of climate-induced water level declines on water quality in closed basin lakes of the Northern Great Plains. Society of Canadian Limnologists, Edmonton, 2018.
- Rogalski, M.A., P. R. Leavitt, D.K. Skelly. Shifts in daphniid zooplankton assemblages in pollution impacted lakes during the Anthropocene. Ecological Society of America, Portland, Oregon, 2017.
- Plancq, J.P., B. Cavazzin, H.A. Haig, P.R. Leavitt, J. Couto, J.L. Toney. Environmental controls on the distribution of long - chain alkenones in the Canadian Prairies: Insights for the development of the lacustrine alkenone-based temperature proxy. European Association of Geochemistry Goldschmidt Conference, Paris, France, 2017.
- Tiegs, S. and CELLDEx Consortium. Global-scale patterns and drivers of organic-matter decomposition in streams and riparian zones. Society for Freshwater Science, Raleigh, North

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Carolina, 2017.
- Hall, B., R.J. Vogt, R. Hesslein, K. Kidd, and P.R. Leavitt. A “mercury elevator” – A novel vector of methylmercury transfer from sites of methylation to fish. International Conference on Mercury as a Global Pollutant, Providence, Rhode Island, 2017.
- Leavitt, P.R., and *Members of the University of Regina Limnology Laboratory*. Regulation of lake production and phytoplankton community composition by fluxes of nitrogen: A synthesis of 25 years of ecosystem ecology. Association for the Sciences of Limnology and Oceanography, Honolulu, Hawai’i, 2017.
- Hayes, N.M., H.A. Haig, G.L. Simpson, and P.R. Leavitt. Climatic and urban control of the timing and magnitude of microcystin peaks in hardwater eutrophic lakes. Association for the Sciences of Limnology and Oceanography, Honolulu, Hawai’i, 2017.
- Swarbrick, V.J., Z. Quiñones-Rivera, and P.R. Leavitt. Seasonal impacts of urea and P inputs in phytoplankton abundance and community composition in a hyper-eutrophic lake: The importance of timing and nutrient form. Association for the Sciences of Limnology and Oceanography, Honolulu, Hawai’i, 2017.
- Finlay, K., P.R. Leavitt, and G.L. Simpson. Seasonal variation in the CO₂ flux of hardwater lakes in the Northern Great Plains. Association for the Sciences of Limnology and Oceanography, Honolulu, Hawai’i, 2017.
- Haig, H.A., N.M. Hayes, G.L. Simpson, K.R. Hodder, and P.R. Leavitt. Quantifying the relative effects of climate and catchment controls upon isotopic mass balances in lakes of the North American Great Plains. Association for the Sciences of Limnology and Oceanography, Honolulu, Hawai’i, 2017.
- Filstrup, C.T., P.R. Leavitt, and J.A. Downing. Cyanobacteria physiological responses to resource imbalance in eutrophic lakes as revealed by cellular pigment content. Association for the Sciences of Limnology and Oceanography, Honolulu, Hawai’i, 2017.
- Gauthier, J., D.T. Selbie, L. Bunting, P.R. Leavitt, T. Tran, L. Godbout, B.P. Finlay, D.E. Schindler, G. Chen, and I. Gregory-Eaves. Quantifying long-term trophic state dynamics and drivers of change in Cultus Lake, British Columbia: A multi-proxy paleolimnological study. Society of Canadian Limnologists, Montreal, 2017.
- Barouillet, C., K.R. Laird, D.T. Selbie, C.J. Perrin, P.R. Leavitt, and B.F. Cumming. Investigating the long-term influence of the Bridge-River Diversion on sockeye salmon nursery ecosystem production in Seton Lake, British Columbia, Canada: A Comparative paleolimnological study. Society of Canadian Limnologists, Montreal, 2017.
- Moir, K.E., M.B.C. Hickey, P.R. Leavitt, and B.F. Cumming. Recent river recovery or nearshore nutrient nightmare? A paleolimnological assessment of eutrophication in Lake St. Francis (St. Lawrence River) over the last 70 years. Society of Canadian Limnologists, Montreal, 2017.
- *Leavitt, P.R., L. Bunting, G.L. Simpson, B. Wissel, K.R. Laird, B.F. Cumming, A. St. Amand, and D.R. Engstrom. Testing ecosystem state change theory using paleolimnology: the case of Lake Winnipeg, Canada. International Society of Limnology (SIL), Torino, Italy, 2016.
- Wissel, B., P.R. Leavitt, R. Cooper, E. Starks, D. Bateson, and L. Nanayakkara. Climate v. land-use: Diverging food-web effects on fish and invertebrate communities in shallow prairie lakes. International Society of Limnology (SIL), Torino, Italy, 2016.
- Hiro, S., H. Nakamura, K. Sawada, H.A. Haig, J. Toney, P.R. Leavitt, S. Ishine and Y. Shiraiwa. Discovery and isolation of alkenone-synthesizing algal species from Canadian inland lakes. Japanese Society of Marine Biotechnology, 2016.
- Mushet, G. R., K.R. Laird, B. Hesjedal, P.R. Leavitt, K.A. Scott, G.L. Simpson, B. Wissel, J.D. Wolfe, and B.F. Cumming. Investigating the roles of nitrogen deposition and climate change

Peter R. Leavitt FRSC, FRSB: Professional Experience

- on chrysophytes and diatoms in lake sediment cores downwind of the Athabasca Oil Sands. Association for the Sciences of Limnology and Oceanography, Santa Fe, New Mexico, 2016.
- Wolfe*, J. D., B. Hesjedal, B.F. Cumming, B. Das, K.R. Laird, P.R. Leavitt, G. Mushet, K.A. Scott, G.L. Simpson, and B. Wissel. Differential changes in boreal lake phytoplankton communities resulting from climate change and Athabasca Oil Sands emissions. Association for the Sciences of Limnology and Oceanography, Santa Fe, New Mexico, 2016.
- *Leavitt, P. R., H.A. *Haig*, E. *Wiik*, K. *Finlay*, S.V. *Pham*, G.L. Simpson, B. Wissel, B.F. Cumming, K.R. Laird, J.P. Smol, and K.R. Hodder. Spatial and temporal analysis of the role of hardwater and saline lakes in atmospheric CO₂ exchange. Association for the Sciences of Limnology and Oceanography, Santa Fe, New Mexico, 2016.
- Nanayakkara*, L., R. Jurdi, P.R. Leavitt, and B. Wissel. Human dimensions of complex socio-ecological systems: insights for scientists and managers from prairie lakes. Association for the Sciences of Limnology and Oceanography, Santa Fe, New Mexico, 2016.
- **Hayes*, N. M., A. *Patoine*, and P.R. Leavitt. Evaluation of the role of nitrogen fixation in meeting the nitrogen demands of phytoplankton communities in eutrophic lakes. Association for the Sciences of Limnology and Oceanography, Santa Fe, New Mexico, 2016.
- Ewing, H. A., K.C. Weathers, K.L. Cottingham, P.R. Leavitt, A.U. Fiorillo, J.P. Sowles, J.E. MacKenzie, C.C. Carey, and M.L. Greer. Asynchrony in the expansion of the cyanobacterium *Gloeotrichia echinulata* revealed in sediment records from lakes in the northeastern USA. Association for the Sciences of Limnology and Oceanography, Santa Fe, New Mexico, 2016.
- Hesjedal, B. L., J.D. *Wolfe*, B.F. Cumming, B. Das, K.R. Laird, P.R. Leavitt, G. Mushet, K.A. Scott, G.L. Simpson, and B. Wissel. The roles of nitrogen deposition and climate change on zooplankton assemblages in lake sediments downwind of the Athabasca Oil Sands region. Association for the Sciences of Limnology and Oceanography, Santa Fe, New Mexico, 2016.
- Wiik*, E., K. *Finlay*, G.L. Simpson, R.J., *Vogt*, P.R. Leavitt, and H.M. Baulch. Temporal variation in the relative importance of pH and lake metabolism on atmospheric CO₂ exchange in hardwater lakes. Association for the Sciences of Limnology and Oceanography, Santa Fe, New Mexico, 2016.
- Haig*, H. A., G.L. Simpson, B. Wissel, N.M. *Hayes*, and P.R. Leavitt. Quantification of hydrological variability in riverine lakes using stable isotopes of water. Association for the Sciences of Limnology and Oceanography, Santa Fe, New Mexico, 2016.
- Perga, M-E., Z. Taranu, I. Gregory-Eaves, V. Frossard, Z. Thomas, P. Legendre, J. Anderson, P. Leavitt and P. Gell. Can we detect ecosystem critical transitions and early warning signals of catastrophic shifts from palaeo-ecological records. American Geophysical Union, San Francisco, 2015.
- Moorhouse, H.L., S. *McGowan*, M.D. Jones, Z. Taranu, P. Barker, P.R. Leavitt, I. Gregory-Eaves, S. Bradshaw, and E.Y. Haworth. Landscape-scale palaeolimnology in lakes of the Windermere catchment to identify the drivers of recent limnological change. International Paleolimnology Symposium, Lanzhou, China, 2015. *Awarded best student presentation.*
- Barouillet, C., K.R. Laird, B.F. Cumming, D.T. Selbie, P.R. Leavitt and C.J. Perrin. Paleolimnological investigation of the impact of the Bridge-River diversion on primary and secondary producers in Seton Lake, a sockeye salmon lake in British Columbia (Canada). International Paleolimnology Symposium, Lanzhou, China, 2015.
- Mushet, G., B. Das, B. Hesjedal, K.R. Laird, P.R. Leavitt, K.A. Scott, G.L. Simpson, B. Wissel, J.D. *Wolfe*, and B.F. Cumming. Investigating the relative roles of nitrogen deposition and climate change on scaled chrysophytes and chlorophyll *a* in lake sediment cores downwind of the Athabasca Oil Sands. International Paleolimnology Symposium, Lanzhou, China,

Peter R. Leavitt FRSC, FRSB: Professional Experience

- 2015.
- Wolfe, J.D., B.F. Cumming, B. Das, B. Hesjedal, K.R. Laird, P.R. Leavitt, G. Mushet, K.A. Scott, G.L. Simpson, and B. Wissel. Impacts of climate change and oil-sands nitrogen emissions on phytoplankton production of Boreal lakes. International Limnogeology Congress, Neno, USA, 2015.
- Leavitt, P.R., *Members of University of Regina Limnology Laboratory*, and members of 2008 Chapman Conference Working Group on Lakes as Integrators. Unique and interactive effects of climate on lakes of the northern Great Plains on scales from seasons to millennia. Canadian Society of Ecology and Evolution, Saskatoon, Canada, 2015.
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- Hall, R.I., P.R. Leavitt, J.P. Smol, A. Dixit, and R. Quinlan. Effects of agriculture and sewage treatment on the Qu'Appelle Valley lakes: A paleoecological perspective. Workshop on Lakeshore Management in Saskatchewan. Canadian Water Resources Association. Saskatoon, SK, 1996.
- Leavitt, P.R., D. Sherbot, A. Dixit, R. Quinlan, and J.P. Smol. Water quality changes in prairie lakes and reservoirs: Paleolimnological tools to assist lake managers. North American Lake Management Society. Toronto, ON, 1995.
- Leavitt, P.R., D. Sherbot, A. Dixit, R. Quinlan, and J.P. Smol. Water quality changes in prairie lakes and reservoirs: Paleolimnological tools to assist lake managers. Canadian Society of Environmental Biologists. Regina, SK, 1995.
- Stager, J.C., R.I. Hall, and P.R. Leavitt. Paleolimnology and the study of eutrophication in Upper Saranac Lake, New York. North American Lake Management Society. Toronto, ON, 1995.
- Leavitt, P.R., R.D. Vinebrooke, B.F. Cumming, and J.P. Smol. Evaluation of pigments as paleoclimatic indicators in saline lakes. Ecological Society of America. Snowbird, UT, 1995.
- Leavitt, P.R., R.D. Vinebrooke, M.A. Reasoner, M. Hickman, R. Pienitz, and J.P. Smol. Regulation of primary production in alpine lakes by climatic change and forest development. American Society of Limnology and Oceanography. Reno, NV, 1995.
- Graham, M.D., and P.R. Leavitt. Variation in trophic position of aquatic invertebrates across a lake productivity gradient: testing the trophic continuum hypothesis. American Society of Limnology and Oceanography. Reno, NV, 1995.
- Cumming, B., S.E. Wilson, J.P. Smol, P.R. Leavitt, I. Walker, and M. Heinrichs. Paleolimnological reconstructions of climatic and other environmental changes in closed-basin lakes from western Canada: The PISCES II Project. Canadian Quaternary Association (CANQUA). St. John's, NFLD, 1995.
- Vinebrooke, R.D., and P.R. Leavitt. Effects of UV radiation and macrograzers on periphyton in an alpine lake. ASLO. Reno, NV, 1995.

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Verschuren, D., C. Cocquyt, and P.R. Leavitt. Patterns and mechanisms of biotic change in a fluctuating tropical soda lake: Lake Sonachi (Kenya), ca. 1815 to present. American Society of Limnology and Oceanography. Reno, NV, 1995.
- Vinebrooke, R.D., and P.R. Leavitt. Can high ambient UV radiation levels directly affect phototrophs in alpine lakes? Society of Canadian Limnologists. Ottawa, ON, 1995.
- Cumming, B.F., S.E. Wilson, R. Pienitz, J.P. Smol, B.A. Zeeb, P.R. Leavitt, and M. Heinrichs. Tracking climatic and other environmental changes in closed-basin lakes from Western Canada: the PISCES-II project. American Society of Limnology and Oceanography (ASLO) / North American Benthological Society (NABS) joint symposium on climatic change. Leesburg, VA, 1994.
- Cumming, B.F., S.E. Wilson, R. Pienitz, J.P. Smol, B.A. Zeeb, P.R. Leavitt, and M. Heinrichs. Paleolimnological investigations of salinity, climatic, and environmental shifts - II (PISCES II): tracking environmental changes in closed-basin lakes from Western and Northern Canada. American Quaternary Association (AMQUA). Minneapolis, MN, 1994.
- Leavitt, P.R., D.E. Schindler, and D.W. Schindler. Effects of trout introduction on primary production in a fishless alpine lake. American Society of Limnology and Oceanography. Miami, FL, 1994.
- *Dibble, K.M., and P.R. Leavitt. Regulation of pigment deposition by photo-oxidation and zooplankton grazing: an individual-based model. American Society of Limnology and Oceanography. Miami, FL, 1994.
- *Leavitt, P.R., B.F. Cumming, and J.P. Smol. Evaluation of pigments as paleoclimatic indicators in saline lakes. Society of Canadian Limnologists. Saskatoon, SK, 1994.
- Leavitt, P.R., B.J. Hann, B.L. Zeeb, D.L. Findlay, and D.W. Schindler. Calibration of fossil pigments, diatoms, and Cladocera with 20 years of plankton data from eutrophic Lake 227, Experimental Lakes Area, Ontario, Canada. Sixth International Palaeolimnology Symposium. Canberra, Australia, 1993.
- Smol, J.P., B.F. Cumming, S.E. Wilson, I.R. Walker, and P.R. Leavitt. Paleolimnological investigations of salinity, climatic and environmental shifts (the PISCES project): Reconstructing environmental trends from western Canada. Sixth International Palaeolimnology Symposium, Canberra, 1993.
- *Leavitt, P.R., A.J. Paul, A.K. Hardie, K. Kidd, and D.W. Schindler. Selective herbivory by zooplankton in two alpine lakes: Results from HPLC analysis of body pigments. ASLO. Edmonton, AB, 1993.
- Paul, A.J., P.R. Leavitt, D.W. Schindler, and A.K. Hardie. Trophic interactions in fishless alpine lakes: Direct and indirect effects of predation by copepods. American Society of Limnology and Oceanography. Edmonton, AB, 1993.
- Leavitt, P.R. Comparison of 20 years of whole-lake eutrophication and annual fossil pigment records as indicators of ecosystem variability. American Society of Limnology and Oceanography. Santa Fe, NM, 1992.
- *Leavitt, P.R. and S.R. Sanford. Multiple effects of piscivory on food-web structure: Evidence from paleolimnology. American Society of Limnology and Oceanography. Halifax, NS, 1991.
- *Leavitt, P.R. Use of fossil pigments for interpretation of whole-lake experiments. IV International Phycological Congress Workshop, Durham, NC, 1991.
- Leavitt, P.R. Herbivore and nutrient regulation of algal blooms in eutrophic Lake Mendota. American Society of Limnology and Oceanography. Williamsburg, VA, 1990.
- Smol, J.P., I.R. Walker and P.R. Leavitt. Paleolimnology and hindcasting climatic trends. Soc. Internat. Limnol., Munich, 1989.
- Leavitt, P.R., P. Sanford and J.F. Kitchell. Road-building, hypolimnetic aeration, liming and food-

Peter R. Leavitt FRSC, FRSB: Professional Experience

- web manipulation: The annual record of fossil pigments. Vth International Symposium on Paleolimnology, Ambleside, England, 1989.
- Leavitt, P.R. and S.R. Carpenter. Sedimentary pigment concentrations record changes in fish community composition. American Society of Limnology and Oceanography. Boulder, CO, 1988.
- Leavitt, P.R. and S.R. Carpenter. Whole-lake experiments: The sedimentary record of algal pigments. Ecological Society of America. Davis, CA, 1988.
- Leavitt, P.R. and S.R. Carpenter. Pigment budgets: Comparisons of select carotenoids. American Society of Limnology and Oceanography. Madison, WI, 1987.
- Leavitt, P.R. and S.R. Brown. Effects of *Daphnia* grazing on the carotenoids of *Oscillatoria utermöhl*i. American Society of Limnology and Oceanography. Vancouver, B.C., 1984.

Other Invited Presentations:

- 2025 File Hills Qu'Appelle Tribal Council, Lands and Resources (FHQTC LRES) Chiefs Engagement Session, Queen's University Belfast.
- 2024 FHQTC LRES Chiefs Council; City of Regina, Moosomin Cree First Nation; University of Regina *A Taste of Research* Public presentation.
- 2023 City of Regina; FHQTC LRES Chiefs Council; Chief and Council, Moosomin Cree First Nation/SK Water Security Agency.
- 2022 Chief and Council, Moosomin Cree First Nation.
- 2021 University of Calgary.
- 2020 University of Nottingham.
- 2019 Regina Alumni Association, Queen's University Belfast (Geog), UK.
- 2018 Treaty 4 Gathering, Fort Qu'Appelle, SK; Queen's University Belfast, UK; Centre D'Estudis Avançats de Blanes, Spanish National Research Council.
- 2016 Prairie Provinces Water Board, University of Regina.
- 2015 University of California-Santa Barbara (3).
- 2012 File Hills Qu'Appelle Tribal Council, Sakimay First Nations Chief's Council, National Vice-Presidents Academic Association.
- 2011 Premier of Manitoba.
- 2010 University of Minnesota, University of Regina, Manitoba Water Stewardship.
- 2009 Last Mountain Lake Stewardship Association.
- 2008 Raincoast Conservation Foundation/Fisheries and Oceans Canada, Manitoba Clean Environment Commission.
- 2007 National Center for Ecological Analysis and Synthesis (NCEAS).
- 2006 NOAA (Seattle), McGill University, University of Lethbridge, Last Mountain Lake Watershed Advisory Committee.
- 2005 SK Watershed Authority.
- 2004 University of Victoria, Alberta Environment Prairie Drought Workshop, US Long Term Ecological Research (LTER) Network Variability-Disturbance Workshop, University of Regina.
- 2003 Danish National Environmental Research Institute (LIMPACS, 2), Norlakes Symposium, (1), University of Minnesota (4), University of Alberta (2). Semi-Arid Network Workshop (PARC).
- 2002 Cornell University (2), University of Saskatchewan (2), University of Stockholm, Lund University.
- 2001 SaskPower Corporation, University of Arizona, Institute for Ecosystems Studies, Great Lakes Environmental Research Lab., University of Montreal, US-Geological Survey.

Peter R. Leavitt FRSC, FRSB: Professional Experience

- 2000 University of Washington (5), University of Umeå, Sweden (4), University of Stockholm.
- 1999 BIOCAP Canada, Duke University, National Aeronautics and Space Administration, North Dakota State University, University of Montreal (in french), US Environmental Protection Agency, Government of Saskatchewan.
- 1998 University of Montana.
- 1997 British Antarctic Survey, Danish National Environmental Research Institute, University of Saskatchewan, University of Copenhagen-Hillerød.
- 1996 Loyola University of Chicago, Université Laval (in french), University of Minnesota (2), University of Wisconsin-Madison.

Grants Awarded: (Principal Investigator (PI) total - \$16,054,371 CAD; Co-PI total - \$17,509,406 CAD)

- 2025 Research Contract. “Sediment core analyses in Treaty 4 lakes”. File Hills Qu’Appelle Tribal Council, PI, \$40,000.
- 2025 Research Contract. “Water quality analyses in Treaty 4 lakes”. File Hills Qu’Appelle Tribal Council, PI, \$45,000.
- 2024 NSERC Discovery Grant. “Landscape Effects of Nitrogen on Aquatic Ecosystems: Applying a New Paradigm for Freshwater Eutrophication”, NSERC, PI, \$510,000.
- 2024 Research Contract. “Water quality change and monitoring in Qu’Appelle Valley aquatic ecosystems”. File Hills Qu’Appelle Tribal Council, PI, \$50,000.
- 2024 Research Contract. “Fossil pigment analyses for MacDonald and St Mary’s Lakes, Montana”. University of Montana, PI, \$20,898.
- 2024 Research Contract. “Fossil pigment analyses of cyanobacterial blooms in Kansas reservoirs”, Kansas Biological Survey. PI, \$25,000.
- 2024 Research Grant. “Lakes Across Canada from Space (LACS) –Stage I”. Canada Space Agency, co-PI, \$50,000.
- 2023 NSERC Alliance Development Grant. “Grasslands as medicine: Restoration and conservation of native prairie grasslands for climate action”, NSERC, Co-PI, \$34,816
- 2022 Research Contract. “Fossil pigment analyses in Minnesota Lakes”. Science Museum of Minnesota, PI, \$5,500.
- 2021 NSERC Alliance Grant. “Water quality in Canada: Validation, interpretation, and mobilization of community-based water monitoring”, NSERC, Co-PI, \$206,130
- 2021 Research Contract. “Fossil pigment analyses of cyanobacterial blooms in Kansas reservoirs”, Kansas Biological Survey. PI, \$39,667.
- 2021 Research Contract. “Fossil pigment analyses of cyanobacterial blooms in Utah Lake”, Utah State University. PI, \$46,667.
- 2021 Research Contract. “Evidence of ecosystem state change in alpine lakes”. Colorado State University. PI, \$20,853.
- 2021 Research Contract. “Crawford Lake fossil pigments”. Queen’s University. PI, \$6,000.
- 2021 Research Contract. “Water column pigments from inland lakes”. PI, \$3,725.
- 2020 Research Contract. “Fossil pigment analyses of cyanobacterial blooms in Kansas reservoirs”, Kansas Biological Survey. PI, \$25,000.
- 2019 Research Contract. “Fossil pigment analyses of cyanobacterial blooms in Kansas reservoirs”, Kansas Biological Survey. PI, \$25,000.
- 2018 Research Grant, “Dugout management for improved water quality”, Saskatchewan Cattlemen’s Association, Co-PI, \$45,043.
- 2018 NSERC Discovery Grant. “Landscape Effects of Nitrogen on Aquatic Ecosystems: Achieving a New Paradigm for Freshwater Eutrophication”. NSERC. PI \$702,000.
- 2017 Canada Research Chair (Tier I third term). “Canada Research Chair in Environmental

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Change and Society". Canada Research Chairs Program. PI, \$1,400,000.
- 2017 Canada Foundation for Innovation. "Limnology Laboratory to Study Climate and Human Effects on Lakes". John R. Evans Leaders Fund. PI, \$99,996.
- 2017 Agricultural Development Grant. "Tools for carbon neutral farming: The role of dugouts in greenhouse gas capture". Saskatchewan Ministry of Agriculture, (Co-PI, \$255,030)
- 2017 Research Contract. "Core Collection and Analyses on Southern Indian Lake, Manitoba, Canada". Manitoba Hydro. Co-PI with 5 others, \$70,172.
- 2016 Research Grant. "Tools for Carbon Neutral Farming: the Role of Dugouts in Greenhouse Gas Capture". Saskatchewan Ministry of Agriculture. Agricultural Development Fund. Co-PI with 3 others, \$255,030.
- 2016 Research Contract. "Analysis of Sedimentary Pigments from Roche, Peter Hope, Blackwell, Bulman, and Heffley lakes, British Columbia". British Columbia Ministry of Forests, Lands & Natural Resource Operations. PI \$24,000.
- 2016 NSERC Strategic Network Grant. "NSERC Canadian Lake Pulse Network". NSERC Strategic Partnership Grants for Networks. Co-PI with 9 others, \$5,499,999.
- 2015 Fulbright Canada. "A New Scientific Framework to Quantify the Direct, Coupled, and Reciprocal Effects of Climate and Humans on Aquatic Ecosystems". Visiting Research Chair at University of California, Santa Barbara. PI, \$31,250.
- 2014 Research Contract. "Investigating the Long-term Influence of the Bridge-River Diversion on Sockeye Salmon Nursery Ecosystem Productivity in Seton Lake, British Columbia". Fisheries and Oceans Canada. PI, \$20,000.
- 2013 Research Sub-contract. "Pigment Analysis of Iowa Lake Plankton Communities". Iowa State University. PI, \$15,100.
- 2013 Research Contract. "North Saskatchewan Regional Plan: Lake Paleolimnology Survey". Alberta Environment and Sustainable Resource Development. Co-PI with 4 others, \$100,000.
- 2013 NSERC Strategic Grant. "Understanding Lake Metabolism and Nuisance Algal Metabolites: New Tools for Management of Potable Water Sources". Strategic Partnership Grants for Projects. Co-PI with 4 others, \$618,614.
- 2013 NSERC Strategic Grant. "Assessment of the Importance of Nitrogen Deposition and Climate on Aquatic Production in Boreal Lakes Downwind of the Athabasca Oil Sands Region". Strategic Partnership Grants for Projects. Co-PI with 2 others, \$217,740.
- 2013 NSERC Discovery Grant. "Landscape Effects of Nitrogen on Lake Ecosystems: Accelerating a New Paradigm for Freshwater Eutrophication". NSERC. PI, \$300,000.
- 2013 NSERC Discovery Accelerator. "Landscape Effects of Nitrogen on Lake Ecosystems: Accelerating a New Paradigm for Freshwater Eutrophication". NSERC. PI, \$120,000.
- 2013 Research Grant. "Western Canada Integrated Environmental Simulation and Risk Assessment Associated with Climate Modelling". Saskatchewan Advanced Education and Employment. Co-PI with 9 others, \$662,873.
- 2013 Canada Foundation for Innovation. "Western Canada Integrated Environmental Simulation and Risk Assessment Associated with Climate Modelling". Leading Edge Fund. Co-PI with 9 others, \$662,873.
- 2012 Research Grant. "Paleolimnological Analysis of Lake Manitoba Sediments to Determine Historic Production Regimes". Manitoba Ministry of Conservation and Water Stewardship. PI, \$50,000.
- 2012 NSERC Discovery Grant. "Degradation and Destabilization of Lake Ecosystems by Organic and Inorganic Nitrogen: Advancing a New Paradigm for Eutrophication". NSERC. PI, \$165,000; yr 2-5 declined.
- 2012 Research Contract. "Analysis of Fossil Pigments and Isotopes in Lake Sediments from Lake

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Michigan". Science Museum of Minnesota. PI, \$12,500.
- 2011 Canada Research Chair (Tier 1 second term). "Canada Research Chair in Environmental Change and Society". Canada Research Chairs Program. PI, \$1,400,000.
- 2011 Canada Foundation for Innovation. "Laboratory of Environmental Change and Society". John R. Evans Leaders Fund. PI, \$252,532.
- 2011 Research Grant. "Laboratory of Environmental Change and Society". Saskatchewan Advanced Education and Employment. PI, \$252,532.
- 2010 Research Contract. "Paleolimnological Evaluation of Eutrophication and Metal Deposition in Bays of the Great Salt Lake Using Multi-proxy Sediment Records". State of Utah. Co-PI with 4 others, \$198,637.
- 2010 Research Contract. "Linking Watershed Land Use and Surface Water Quality in Southern Saskatchewan". Saskatchewan Environment. PI, \$9,000.
- 2010 Research Grant. "Paleolimnological Determination of Water-Quality Change in Lake Winnipeg for Use as Management and Remediation Goals". Environment Canada, Lake Winnipeg Basin Stewardship Fund. PI, \$126,500.
- 2010 Research Grant. "Paleolimnological Analysis of Lake Winnipeg Sediments to Determine Historic Nutrient Regimes". Manitoba Ministry of Water Stewardship. PI, \$100,000.
- 2010 Research Grant. "Planetary Pollution with Organic Nitrogen and other Biomolecules: The Emerging Threat to Sustainable Water Quality". Province of Saskatchewan, Advanced Education and Employment, Innovation and Science Fund. PI, \$2,799,999.
- 2009 Canada Foundation for Innovation. "Planetary Pollution with Organic Nitrogen and other Biomolecules: The Emerging Threat to Sustainable Water Quality". CFI Leading Edge Fund. PI, \$2,799,999.
- 2009 Research Grant. "Paleolimnology of Lake Winnipeg". Manitoba Ministry of Water Stewardship. PI, \$75,000.
- 2008 NSERC Special Research Grant. "Canadian Participation in Potrok Aike Lake Sediment Archive Drilling Project". NSERC Special Research Opportunity Program. Co-PI with 8 others, \$794,356.
- 2007 NSERC Discovery Grant. "Degradation and Destabilization of Lake Ecosystems by Anthropogenic Nitrogen: A New Paradigm for Future Lake Eutrophication. NSERC. PI, \$313,750.
- 2007 Sabbatical Fellowship Grant. "Ecological Variability of Lakes in Time: Integrated Insights from Paleolimnology and Long-Term Ecological Research". National Center for Ecological Analysis and Synthesis, Sabbatical Fellowship Program. PI, \$49,167.
- 2005 Research Sub-contract. "Trophic Status of Lake Champlain over 400 years of Changing Land Use". US Geological Survey and University of Vermont. PI, \$44,250.
- 2005 Research Grant. "A Long-term Perspective on Salmon Populations Throughout the North Pacific Ocean". Betty and Gordon Moore Foundation. Co-PI with 3 others, \$2,983,500.
- 2004 Research Grant. "Sources and Sinks of Potentially Toxic Metals in Wascana Creek and the Qu'Appelle Valley". Environment Canada, Science Horizons Youth Internship Program. PI, \$9,000.
- 2004 Canada Foundation for Innovation. "Trace Analytical Facility (TAF) for Environmental Process and Impact Research". Innovation Fund. Co-PI with 5 others, \$750,601.
- 2004 Research Grant. "Trace Analytical Facility (TAF) for Environmental Process and Impact Research". Saskatchewan Economic and Cooperative Development Strategic Initiative Fund. Co-PI with 5 others, \$750,601.
- 2004 Research Grant. "Multidecadal to Millennial-Scale Shifts in Extreme Drought on the Canadian Prairies over the Past 6 Millennia". Canadian Foundation for Climate and

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Atmospheric Sciences. Co-PI with 3 others, \$301,650.
- 2003 Canada Research Chair. “Canada Research Chair in Environmental Change and Society”. Canada Research Chair Program. PI, \$1,400,000.
- 2003 Research Grant. “Past Climate Variability of the Canadian Prairies Saskatchewan Economic and Co-operative”. Province of Saskatchewan, Science and Innovation Fund. PI, \$400,000.
- 2003 Canada Foundation for Innovation. “Laboratory of Environmental Change and Society”. Canada Research Chairs Program. PI, \$228,111.
2003. Research Grant. “Laboratory of Environmental Change and Society”. Saskatchewan Economic and Cooperative Development Strategic Initiative. PI, \$228,111.
- 2003 Research Grant. “Transportation and Accumulation of Potentially Toxic Metals in Pasqua and Echo Lakes”. Environment Canada, Science Horizons Youth Internship Program. PI, \$12,000.
- 2003 Research Grant. “Identification of Pesticides in Aquatic Systems of Wascana Lake”. University of Regina, Centre for Sustainable Communities. Co-PI, \$9,000.
- 2002 Research Grant. “Variability of Alaskan Salmon During the Past 500 Years”. US National Science Foundation, Biological Oceanography. Co-PI with 4 others, \$817,950.
- 2002 NSERC Discovery Grant. “Impacts of Climate and Humans on Prairie Lakes”. NSERC. PI, \$307,500.
- 2001 Research Sub-contract. “Columbia River Estuary Core Analysis”. US Geological Survey and Portland State University. PI, \$28,319.
- 2001 Research Contract. “A Multi-century Flood Record of Northern Alberta”. BC Hydro. Co-PI with 5 others, \$1,914,791.
- 2001 Research Contract. “Historical Change in Cyanobacterial Abundance in Nalstby Lake, BC”. British Columbia Environment. PI, \$7,500.
- 2001 Research Sub-contract. “Reconstructing Salmonid Populations in Quinault Lake”. University of Washington. PI, \$29,600.
- 2001 Research Contract. “Historical Trends in Water Quality of Big Shell Lake”. Saskatchewan Environment. PI, \$9,900.
- 2000 Research Grant. “Agricultural Adaptation to Climatic Change: Carbon Storage in Prairie Lakes”. BIOCAP Canada. PI, \$49,000.
- 1999 Canada Foundation for Innovation. “Environmental Quality of the Canadian Prairies”. Research Development Fund. PI, \$307,588.
- 1999 Research Grant. “Environmental Quality of the Canadian Prairies”. Saskatchewan Economic and Cooperative Development Strategic Initiative. PI, \$307,588.
- 1998 Research Contract. “Fossil Pigments in Coastal Estuaries of North Carolina”. University of North Carolina. PI, \$3,900.
- 1998 NSERC (Discovery) Research Grant. “Past and Present Effects of UV Radiation on Lakes”. NSERC. PI, \$140,077.
- 1998 NSERC Equipment Grant. “A Profiling Radiometer to Measure UV Radiation in Lakes and Experiments”. NSERC. PI, \$33,943.
- 1997 Research Grant. “Lake Level Manipulation to Reduce Aquatic Plants in Urban Wascana Lake”. Saskatchewan Water Corporation. PI, \$63,400.
- 1997 Research Grant. “Recent Environmental Change in Shallow Freshwater Lakes: Calibration of New Environmental Indicator Technology”. Association of Universities and Colleges of Canada, STEP Program. PI, \$6,000.
- 1997 Research Contract. “Impacts of Forestry on British Columbia Lakes”. British Columbia Ministry of Environment. PI, \$23,000.
- 1997 NSERC Strategic Grant. “Sustainable Agriculture in Western Canada: Planning for Droughts

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Using the Past". NSERC Strategic Grant Program. PI, \$278,104.
- 1997 Research Grant. "Sustainable Agriculture in Western Canada: Planning for Droughts Using the Past". Agriculture and Agri-food Canada, Agri-food Innovation Fund. PI, \$31,000.
- 1996 Research Contract. "Fossil Evidence of Macrophyte Loss in Shallow Danish Lakes". Danish Geological Survey Grant. PI, \$7,500.
- 1995 NSERC Strategic Grant. "Water Quality Changes in the Qu'Appelle Valley (Saskatchewan) Lakes and Reservoirs: Paleolimnological Tools to Assist Lake Managers". NSERC Strategic Grant Program. Co-PI with 1 other, \$310,000.
- 1995 NSERC Equipment Grant. "A Freeze-drier System for High-resolution Paleolimnology". NSERC Equipment Grant Program. PI, \$28,903.
- 1995 Research Grant. "Estimation of Metal Contamination of Aquatic Food Webs Following Reservoir Formation ". University of Regina, Natural and Applied Sciences Grant. PI, \$1,500.
- 1995 Research Grant. "Effects of UV-radiation and Herbivores on Primary Producers in Alpine Lakes". University of Regina, President's Fund. PI, \$2,100.
- 1995 Research Grant. "Variability of Plant Pigments within Historic Period Lake Cores, Palliser Triangle Project". Department of Energy, Mines and Resources Research Grant Program. PI, \$11,000.
- 1995 Research Contract. "Past Algal Changes in Northern US Bog Lakes". University of Minnesota. PI, \$5,000.
- 1995 Research Contract. "Fossil Pigment Analysis of Mirror Lake". University of Louisville. PI, \$5,500.
- 1994 NSERC (Discovery) Research Grant. "Lake Ecosystems and Their Paleoecological Histories". NSERC. PI, \$108,000.
- 1994 NSERC Equipment Grant. "Photo-diode Array Detector, Software and Uninterruptible Power Supply for High Performance Liquid Chromatography". NSERC Equipment Grant Program. PI, \$28,903.
- 1994 Research Grant. "Pigments in Invertebrates: A New Method for Analysis of Trophic Position in Lakes ". NSERC - DFO Collaborative Research and Development Grant. PI, \$20,000.
- 1994 Research Grant. "A Model of Lake Ecosystems for Paleoecological Studies". President's NSERC General Research Grant . PI, \$2,826.
- 1994 Research Grant. "Inverted Microscope". University of Regina, Dean's Equipment Fund. PI, \$17,500.
- 1993 Research Grant. "HPLC Equipment for Lake Research". University of Regina, Dean's Equipment Fund. PI, \$25,000.
- 1993 Research Grant. "A Fluorescence Detector for Measuring Pigments ". President's NSERC General Research Grant. PI, \$5,000.

Awards and Recognition:

- 2025 Starblanket, File Hills Qu'Appelle Tribal Council Youth Advisory Committee.
- 2025 Rick Battarbee Lifetime Achievement Award, International Paleolimnology Association (IPA).
- 2025 Ruth Patrick Award, Association for the Sciences of Limnology and Oceanography (ASLO), for outstanding research in the application of basic aquatic science principles to the identification, analysis, and solution of important environmental problems.
- 2024 President's Award for Service Excellence – Advancing Indigenization.
- 2024 Eagle Feather (pin) and Starblanket, File Hills Qu'Appelle Tribal Council, Lands Resources

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Environment and Stewardship.
- 2020 Fellow of the Royal Society of Biology (UK).
- 2018 Fellow of the Royal Society of Canada.
- 2017 Canada Research Chair in Environmental Change and Society (Tier I) (third term).
- 2016 Sustaining Fellow of the Association for the Sciences of Limnology and Oceanography.
- 2015 Fulbright Visiting Research Chair, University of California-Santa Barbara, Santa Barbara, California.
- 2010 Canada Research Chair in Environmental Change and Society (Tier I) (second term).
- 2009 Selected for inclusion into Who's Who Canada.
- 2008 Co-recipient Zayed International Prize for the Environment (2008) for the Millennium Ecosystem Assessment (chapter co-author).
- 2007 Frank H. Rigler Memorial Award, Society of Canadian Limnologists. (Highest society honour in recognition of importance and influence of contributions to Canadian limnology).
- 2004 University of Regina Alumni Association Award for Excellence in Research.
- 2003 Canada Research Chair in Environmental Change and Society (Tier I).
- 1995 Kalium Professor of Natural Science and Engineering.
- 1991-2 NSERC Postdoctoral Fellowship.
- 1989 Visiting Fellowship in Canadian Government Laboratory.
- 1985-9 Notre Dame Tuition Scholarship.
- 1983 Senator F. Carrel Scholarship.
- 1983 Ontario Graduate Scholarship.
- 1982 Ontario Graduate Scholarship.
- 1981 Senator F. Carrel Scholarship.

Professional Societies:

Association for the Sciences of Limnology and Oceanography (formerly American Society of Limnology and Oceanography)(ASLO), British Ecological Society (BES), British Phycological Society (BPS), Canadian Society of Aquatic Sciences (CSAS), Canadian Society of Ecology and Evolution (CSEE), Canadian Society of Environmental Biologists (CSEB), Ecological Society of America (ESA), Geological Society of America (GSA), International Association for Great Lakes Research (IAGLR), International Palaeolimnology Association (IPA), International Quaternary Association (INQUA), International Society of Limnology (SIL), Royal Society of Biology (RSB), Royal Society of Canada (RSC), Sigma Xi (SX), Society of Canadian Limnologists (SCL).

Professional Activities:

Leadership

- Co-Chair, Royal Society of Canada Prairies North Regional Network (RSC PN) (2019-2022).
- Director, Canadian Institute of Ecology and Evolution (CIEE) (2012-2018).
- Founding Director, Qu'Appelle Long-Term Ecological Research Program (1994-present).
- Founding Director, Institute of Environmental Change and Society (2011-2020; co-Director 2021-25).
- Founding Director, Environmental Quality Analysis Laboratory (2000-2010).
- Board of Directors, Association for the Sciences of Limnology and Oceanography (ASLO) (formerly American Society of Limnology and Oceanography) (2012-2015).
- Past-President (2006), President (2003-2005), and Vice-President (1999-2002), Society of Canadian Limnologists (SCL).
- Director, Limnology Laboratory, University of Regina (1993-present).

Peter R. Leavitt FRSC, FRSB: Professional Experience

Outreach

- Scientific consultant to Prime Minister of Canada (2005), Leader of Official Opposition (2007), Premier of Manitoba (2010-11), Secretary to Manitoba Cabinet (2010-11), Environment Canada (2010), Chinese Environmental Protection Agency (2008), MB Clean Environment Commission (2008-10), Manitoba Water Stewardship (2008-), SK Watershed Authority (2005), Utah State Dept Environmental Quality (2011-12), Saskatchewan Environmental Resource Management (1999, 2002), Buffalo Pound Water Treatment Plant (2010), Alberta Minister of Environment (2001), Northern Alberta Development Council (2002), Last Mountain Lake Stewardship Association (2009), Mayor of Regina (2008), City of Regina (2003, 2008, 2012), Wascana Centre Authority (1997-98, 2002), Royal Saskatchewan Museum (2006), J.D. Mollard and Associates (2004), Clifton Associates (1999), Stantec Consulting (2003, 2011), Agricultural Producers Association (2001-03), National Crop Insurance Managers Association (2001), Vice-Presidents, Saskatchewan Water Corporation (1995), Manitoba Agriculture and Resource Development (2020-22), City of Regina (2021), Zagime Anishinabek First Nation Chief's Council (2012, 2019), Standing Buffalo Dakota First Nation Chief Council (2012, 2022), Cowessess First Nation Chief's Council (2020), Federation of Sovereign Indigenous Nations (2021-), Pasqua First Nations (2021), File Hill Qu'Appelle Tribal Council (2012, 2021-), FSIN Technical Table (2021-22), Moosomin Cree First Nation (2022-), Battle River Indigenous Relations Council (2022). SK Water Security Agency (2022), Kahkewistahaw First Nation (2024).
- Media Liaison, Society of Canadian Limnologists (2001, 2002).
- 108 media interviews since 2019, including CBC *The National*, CBC *As it Happens*, *National Post*, *Globe and Mail*, Canadian Press, *National Geographic*, *Canadian Geographic*, *Macleans*, *Newsweek*, *Science*, CBC *This Morning*, CBC *News at Six*, CBC *The National*, *Asian Scientist*, Radio Canada International, Radio Netherlands International, Reuters, Al Jazeera, *Science News* and diverse regional news outlets (CBC, CTV, Global, *Leader-Post*). Career total: 445 unique media interviews.
- Roundtable panellist, Bill C-69 discussion, Federal deputy minister of Environment Climate Change Canada (2019).
- Technical Table, Federation of Sovereign Indigenous Nations (FSIN), Lake Diefenbaker Irrigation Project advisory group (2021-2022).
- Expert testimony to Saskatchewan Court in matter of aquatic resource use and environmental assessment (2017).
- Expert testimony to Canadian Federal Court in matter of potash mining and aquatic resource use (2012).
- Scientific Presentation on Saskatchewan water quality at Treaty 4 Gathering, Fort Qu'Appelle, Saskatchewan (2018).
- Scientific participant, "Prairie Water Summit", Regina Saskatchewan (2019), Prairie Land and Water Strategy workshop (2020), Canada Water Agency Prairie Freshwater Forum (2021).
- Scientific participant, Saskatchewan Environment Cumulative Effects Workshop (2020).
- Expert vetting of national monument citation, Parks Canada Agency (2020).
- Expert consultant, Office of Treaty Commissioner of Saskatchewan (2021).
- Expert evaluation of SK Water Security Agency's draft Made-in-Saskatchewan Agricultural Water Management and Mitigation Policy (2022)

Scientific Service

- Division Committee for the Selection of New Fellows (DCSNF), Royal Society of Canada, Academy of Science, Earth Ocean and Atmospheric Science Division (2020-23).

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Board of Directors, Association for the Sciences of Limnology and Oceanography (2012-2015)
- Conference Co-Chair, American Society of Limnology and Oceanography (2006).
- Conference Chair, Society of Canadian Limnologists (2001, 2002).
- National Organizing Committee, 2007 Congress of International Association of Theoretical and Applied Limnology (SIL).
- National Organizing Committee and Working Group Chair, 2008 Chapman Conference on Lakes and Reservoirs as Sentinels, Integrators, and Regulators of Climate Change, (ASLO, AGU).
- Conference Organizing Committee, 2024 Turtle Island Indigenous Science Conference (2024).
- Conference Organizing Committee, Federation of Sovereign Indigenous Nations (FSIN) – File Hills Qu'Appelle Tribal Council (FHQTC) Youth Empowerment Water Symposium (YEWS) (2022).
- Editorial Board: *Ecology*, *Ecosphere* and *Ecological Monographs* (2002-2014); *Inland Waters* (2010-present); University of California Press, *Freshwater Ecology Series* (2007-2014), *Limnology and Oceanography Letters* (2016-present).
- *Ad hoc* Editor-in-Chief, *Limnology and Oceanography Letters* (2019, 2022, 2024-5)
- Guest Editor, *Proceedings of the National Academy of Science* (2011).
- US National Science Foundation (NSF) Committee of Visitors, Division of Environmental Biology (DEB) review (2015).
- US National Science Foundation (NSF) Grant Selection Panel, *Dynamics of Coupled Natural and Human Systems* (2009 and 2010).
- Committee Member, American Society of Limnology and Oceanography: Redfield Lifetime Award Committee (2007-2010; Chair 2010-2012); Nominating Committee (2008-2010); Awards Committee (2010-2012; Chair 2012-2015); Hutchinson Committee (Chair 2012-2015); Endowment Committee (1997-1999).
- Scientific Committee, NSERC Lake Pulse Strategic Network (2016-18).
- Society of Canadian Limnologists Visioning Committee (2012-2013).
- Invited Panellist, *The Future of Limnology in Canada*, Society of Canadian Limnologists.
- Canada Research Chair, College of Reviewers (2002-present).
- Manuscript reviewer: *Advances in Limnology*, *Alpine Research*, *Ambio*, *Anthropocene*, *Applied and Environmental Microbiology*, *Applied Geochemistry*, *Aquatic Microbial Ecology*, *Aquatic Sciences*, *Archiv für Limnologie*, *Arctic Antarctic and Biogeochemistry*, *Biogeosciences*, *Biology Letters*, *Canadian Journal of Fisheries and Aquatic Sciences*, *Canadian Journal of Microbiology*, *Canadian Water Resources Journal*, *Catena*, *Chemosphere*, *Ecohydrology and Hydrobiology*, *Ecology*, *Ecology Letters*, *Ecological Applications*, *Ecological Monographs*, *Ecosystems*, *Environmental DNA*, *Environmental Management*, *Environmental Monitoring and Assessment*, *Environmental Research Letters*, *Environmental Science and Technology*, *Estuaries*, *Estuaries and Coasts*, *Estuarine, Coastal and Shelf Science*, *FACETS*, *Freshwater Biology*, *Fundamental and Applied Limnology*, *Geobiology*, *Geological Survey of Canada Bulletin*, *Geophysical Research Letters*, *Global Biogeochemical Cycles*, *Global Change Biology*, *Global Ecology and Conservation*, *Harmful Algae*, *Hydrobiologia*, *Inland Waters*, *Journal of Environmental Management*, *Journal of Environmental Monitoring and Assessment*, *Journal of Geophysical Research: Biogeosciences*, *Journal of Global Planetary Change*, *Journal of Global Planetary Change*, *Journal of Great Lakes Research*, *Journal of Hydrology*, *Journal of Hydrology: Regional Studies*, *Journal of Limnology*, *Journal of the North American Benthological Society*, *Journal of Paleolimnology*, *Journal of Phycology*, *Journal of Sea Research*, *Lake and Reservoir Management*, *Lakes & Reservoirs: Research and Management*, *Land Degradation & Development*, *Limnologica*, *Limnology and Oceanography*, *Marine Ecology Progress Series*, *Marine Environmental Research*, *Mem. Ist.*

Peter R. Leavitt FRSC, FRSB: Professional Experience

Ital. Idrobiol., Mlife, Nature, Nature Communications, Nature Ecology and Evolution, Nature Geosciences, Nature Sustainability, Oceanologia, Organic Geochemistry, Palaeogeography Palaeoclimatology Palaeoecology, Paleooceanography and Paleoclimatology, PLoS One, PLoS Water, Proceedings of the National Academy of Science, Proceedings of the Royal Society B, Quaternary Science Reviews, River, Science of the Total Environment, NPG Scientific Reports, Technology in Society, Theoretical and Applied Climatology, Transactions of the American Fisheries Society, Trends in Ecology and Evolution, Water Air and Soil Pollution, Water Research, Water Resources Research, Wetlands.

- Grant reviewer Alberta Challenge Grants in Biodiversity, American Chemical Society, Canada Research Chairs, Canada Council for the Arts, European Research Council, Exxon Valdez Trustee Council, Fond de recherche sur la nature et les technologies (QC), Fonds sur Föderung (Austria), Geological Survey of Canada, Israel Ministry of Science Technology and Space, Israel Science Foundation, Maryland Seagrant Program, MITACS, National Geographic Society, UK Natural Environmental Research Council (NERC), Natural Science and Engineering Research Council of Canada (NSERC), Netherlands Organization for Scientific Research, Science Foundation Ireland, US Geological Survey.
- Session Chair: Annual Meetings of American Society of Limnology and Oceanography; Ecological Society of America; Society of Canadian Limnologists, Canadian Society of Ecology and Evolution.
 - Student Presentation Award Judge, Annual Meeting of Ecological Society of America.

Indices of Academic Achievement

- Web of Science H-index = 61 (67 in ResearchGate, 75 in Google Scholar) with more than 19,000 citations. In 2017, University of Regina was ranked in the top 1% of global “Environment and Ecology” academic institutions by Clarivate Analytics (ISI Web of Science). Clarivate also ranked Regina’s Biology Department in the top 1% of global institutions in “Plant and Animal Science” during 2006. Since 2018, my career research output is ranked within the top 1% of all scientists globally (<https://doi.org/10.1371/journal.pbio.3000384>)
- One of world’s most highly published limnologists in *Limnology and Oceanography* (37 papers; source ASLO Board of Directors). *Limnology and Oceanography* is historically the top-ranked journal in freshwater and marine sciences (source: Clarivate Analytics ISI).
- Drought risk assessments used by 20 Federal, Provincial and local organizations to evaluate their vulnerability to future droughts, including MB Hydro Corp, SK Crop Insurance Corp, and MB Crop Insurance Corp, and Agriculture and Agri-Food Canada (formerly, Prairie Farm Rehabilitation Administration).
- Water quality research used as the basis for the *Save Lake Winnipeg Act*, passed into law unanimously by Manitoba Legislature in June 2011. Legislative transcript is available on request. Research also established nutrient reduction targets for revision of Manitoba’s *Water Protection Act* in 2021.
- Certificate of Excellence in Reviewing, *Journal of Paleolimnology* (2016)
- Outstanding Reviewer Citation, *Limnology and Oceanography* (2003).
- Outstanding Reviewer Citation, *Limnology and Oceanography* (2021).

University Service:

Inter-University

- NSERC grant pre-submission reviewer (2002-)
- Canada Research Chair pre-submission reviewer (2020-UdM; 2010 UQAM, 2009 UNB-SJ).
- National Science Foundation (NSF) pre-submission reviewer (2010 MSU).

Peter R. Leavitt FRSC, FRSB: Professional Experience

- Reviewer Tenure packages: Regina (2021), Auburn (2019), McGill (2015), UQAM (2014), Maine (2012), Michigan State (2011), Western Ontario (2006), Lancaster UK (2005), Franklin and Marshall College (2005), Michigan State (2001), Queen's (1999, 2001).
- Professor review: Montreal (2020), Michigan State (2018), Mississippi (2011).
- Reviewer: Kilham Fellowship (2011).
- PhD Examiner: U. Copenhagen (2005).

University

- Academic Misconduct Committee (2023)
- Executive of Council (1994-2005, 2009-13, 2014-).
- CRC evaluation panel (2021-)
- Review panel, Dean of Science (2021)
- Council Task Force on Executive Format and Operations (2010).
- Council Committee on Research (2011-13, 2020-).
- Committee to Review Strategic Research Plan (2012).
- Internal reviewer for pre-submission grants to NSERC (2009-), Canada Foundation for Innovation (2009-), Canada Research Chair (2011-) grant programs.
- Chair, Search Committee, Assistant Director of Canadian Institute of Ecology and Evolution.
- Chair, Search Committee, Canada 150 Research Chair program (2017-18).
- Chair, Search Committee, Canada Research Chair (2019-20)
- Presentation on behalf of University to NATVAC (2012), Canadian Senate Committee on Energy, the Environment and Natural Resources (2011), President Chengdu University, China (2011), Industry Canada (2011), U. Regina Senate (2009), NSERC Indirect Costs Committee (2009), Communities of Tomorrow (2006), Government of Saskatchewan Cabinet (2006, 2001), President Canada Foundation for Innovation (2004), NSERC Site Visit (2003), SK Minister of Learning (2003), Drainage Research Institute Egypt (2003), SK Environmental Protection Branch (2003), Provincial Laboratories (2002), Sask Minister of Finance (2001), Deputy Minister Post-Secondary Education (1999), Minister of Post-Secondary Education (1995), Vice-President, Saskatchewan Water Corporation (1995).
- Local Steering Committee, Pacific Institute of Mathematics Sciences (2009-10).
- Public Debater: *Unscripted: A Harvest of Cultural Ideas* (Regina Public Library Series) (2009).
- Nominator, Regina Alumni Award for Excellence in Teaching (M. Brigham, 2006).
- Photography Judge, Canadian Water Resources.
- University Scholarship Committee (1997-98).
- Risk Assessment Program Committee (1995).

Faculty of Science

- Director (founding), Institute of Environmental Change and Society (IECS), formerly Environmental Quality Analysis Laboratory (EQAL) (2000-2021; co-Director 2021-).
- Dean's Advisory Committee on Truth and Reconciliation (2018-).
- Faculty Review Committee (2003, 2011, 2012).
- Faculty Search Committees (2) for IECS staff scientists (2012, 2022).
- Canada Research Chair Search Committee (2003, 2006, 2022)
- Chair, Search Committee, Manager Environmental Quality Analysis Laboratory (1999, 2003, 2004).
- Faculty Scholarship Committee (1996-98).

Department of Biology

- Supervisory committees:

Peter R. Leavitt FRSC, FRSB: Professional Experience

PhD -Keerthi Krutha (2022-23), Ryan Rimas (2019-), Mohamed Anas (2013-18), Joe Poissant (2010-14), Suzanne Lapp (2009-12), Heather Boyd (Calgary)(2010-12), Todd Rodenbaugh (1997-2003), Duane Peltzer (1997-2000), Martin Kőecky (1996-99), Xiaping Xue (1993-97), Ning Xie (1993-97), Narjes Dashti (1993-94).

MSc – Buddhine Meegahage (2021-23), Anna Shampain MS (Colorado State; 2020-22), Sydney Jensen (2018-2021), Mohamed Anas (2010-13), Elizabeth Stark (2010-13), Lara Bates (2010-11), Ryan Cooper (2008-10), Ray Poulin (1994-97), Janice Christian (1994-96), Alistair Hardie (Alberta, 1993-94), Andrew Paul (Alberta, 1993-94).

- Acting Head (2011, 2020).
- Research Seminar Co-ordinator (2010, 2005, 2003, 1998).
- Faculty Search Committee; Plant Ecology (2014), Nursing Microbiology (2011), Microbiology (2009), Animal Physiology (2004), Environmental Microbiology (2003), Ecology (2003), Plant Biology (1999), Ecology (1998), Botany (1997), Molecular Biology (1996).
- NSERC University Research Fellow Search Committee (2005).
- Sessional Instructor Search Committee (1995, 1994).
- Biology Space Committee (2004-06).
- Public Relations Committee (2003).
- Computing Facilities Committee (1998-2003).
- First Year Laboratory Committee (1994-2003).
- Reviewer, Graduate Day of Seminars (1995-2003).
- Plant Growth Facilities Committee (1993-2002).
- Curriculum Committee (1997-2002).
- Equipment Committee (1994-97).
- Graduate Studies and Honours Committee (1996-97).

Highly Qualified Personnel trained:

Research Associates

Ryan Rimas (2023-)	Stefano Mezzini (2020-21)
Deirdre Bateson (2015-23)	Jared Wolfe (2017)
Brittany Hesjedal (2018)	Amy Morrison-Hennessy (2015)
Tyler Boa (2014-2015)	Vincent Ignatiuk (2008-14)
Zoraida Quiñones-Rivera (2006-2014)	Samantha Dietrich (2003-05)
Martin Callahan (2005-07)	Richard Hughes (2003-04)
Dunling Wang (2005-06)	Mark Graham (1999-02)
Nicole Knezacek (2001-03)	Jeff Hovdebo (1998-2001)
Curtis Brock (2000-01)	Tyler Cobb (1996)
Chris Teichreb (1997)	Daren Sherbot (1995)
Laura Ambrose (1995)	Alistair Hardie (1993)
Kim Cuddington (1993-94)	

Post-Doctoral Researchers

Amir Chegoonian (2022-)	Heather Sauer (ne Haig) (2018-20)
Cale Gushulak (2020-23)	Jackie Webb (2018-2019)
Nicole Hayes (2015-18)	Lynda Bunting (2004-15)
Emma Wiik (2015-2016)	Kerri Finlay (2006-09)
Richard Vogt (2010-14)	Blake Matthews (2006)
Alain Patoine (2003-2008)	James Rusak (1999-2002)
Suzanne McGowan (2001-2005)	Norman Scully (1999)
Sybille Wunsam (1999-2001)	

Peter R. Leavitt FRSC, FRSB: Professional Experience

Olaf Olson (1998-99)

Roland Hall (1996-97)

PhD students

David Hatton (QUB; 2020-)

Anjal Mariya (QUB; 2024-)

Heather Haig (2012-18)

Lushani Nanayakkara (2011-18)

Vanessa Swarbrick (2010-17)

Iris Droscher (2006-08)

Lynda Bunting (2001-04)

Rolf Vinebrooke (1994-98)

MSc students

Nathanael Bergbusch (2017-20)

Jared Wolfe (2014-16)

Derek Donald (2007-11)

Matthew Bogard (2008-11)

Samantha Pham (Dietrich) (2004-08)

Melanie Ness (2003-07)

Kurt Samways (2006-08)

Curtis Brock (2003-06)

Mark Graham (1994-96)

Kari Muir (1996)

BSc students

Petra Ottenbreit-Born (2025-)

J'Lynn Pratt (2025-)

Laurissa Francis (2024-)

Olayinka Olumuyi (2024)

Shubham Rai (2024-)

Emily Wagner (2023-24)

Alejandro Sich (2023-)

Devtanay Sharma (2023-24)

Liam Numrich (2023-)

Masan Lueke (2022-23)

Jay Vavadia (2022-24)

Viraj Shah (2022-24)

Rebecca Forseth (2022)

Nathan McCarville (2022-23)

Rachael Garratt (2021)

Michelle Fischer (2021-22)

Katharina Krams (2021)

Alex Donald (2021-22)

Breeann Phillips (2021)

Ashley Sahulka (2020)

Heather Josephson (2019-21)

Omoyeme (Sylvia) Okonofua (2019-20) Daniel Wasylshyn (2019)

McKenzie Van Eton (Hons. 2018-19)

Xing Zi (Jackie) Zhou (2018, 2020) Jess Lermniaux (2019-20, 22)

Shyla Christie (2018-19)

Katie Allison (2018)

Allison Walker (2018)

McKenzie Metz (2017)

Ryan Rimas (2017)

Nathanael Bergbusch (2017)

Dudley Phillips (2017)

Michelle Lang (2014-17)

Justin Odynski (2015-19)

Terry Mattern (2015-2016)

Ethan Cobb (2016)

Grayson Wihlsdal (2016)

Brady O'Connor (Hons. 2014-16)

Kristen Grey (2015- 2016)

Derek Johnson (2016)

Tiera McLeod (2014)

Gregory Owens (2014-15)

Justine Kerr (2015)

Erin Hillis (Hons 2012-13)

Jared Wolfe (2013)

Eric Armit (2013)

Leanne Trembley (2013)

Kyleen Pangracs (2012-13)

Chase Morell (2012-13)

Julia Hart (2012)

Katherine Miller (2012-13)

Morgan Ollinger (2011-12)

Jacob Ziegler (Hons. 2011-12)

Jenna Toraruk (Hagen) (2008-11) Ryan Schnell (2011)

Taylor Mason (2011)

Liam Donnelly (2011)

Garricks Elechi (2008-10)

Ashley Walchuk (2010)

Braden Schmidt (2010)

Cameron Hoggrath (2009)

Anthony Freywald (2008-09)

Jason Unruh (2009)

Vincent Ingatiuk (2006-08)

Shelley Wellman (2008)

Paul Humenchuk (2008)

Derek Donald (Hons. 2006-07)

Kelsie Dale (2006-07)

Jennifer Rumancik (2007)

Christian Rufolfo Lott (2007)

Adam Mitichuk (2006)

Rachel Magnus (2005-06)

Martin Callahan (2006)

Brianna Wyn (Dopson) (Hons. 2002-05)

Jonas Fenn (2005)

Nathan Hazell (2005)

Courtney Ebel (Hons. 2003-04)

Laura Pfeifer (Hons. 2003-05)

Twlya Jesse (2004)

Michael Christensen (2003)

Samantha Dietrich (2002)

Shannon Smith (2002)

Brian Gordon (2001)

Rebecca Jane Schuler (2002)

Curtis Brock (Hons. 1999-2000)

Jarret Romanow (1999)

Ryan Suri (1999)

Jeff Hovdebo (Hons. 1997-98)

Brent Smith (1998)

Chris Teichreb (Hons 1995-97)

Jon Sweetman (1996-97)

Mark Zurowski (1997)

Tyler Cobb (1995-96)

Kerry Hecker (1996)

Jon Nachtigall (1995)

Tara Ivanochko (1994)

Peter R. Leavitt FRSC, FRSB: Professional Experience

Teaching Evaluations

Year		Course Evaluation (out of 4.0)			mean	SD
	<i>Biol 101</i>	<i>Biol 276</i>	<i>Biol 335</i>	<i>Biol 364</i>		
1994	3.04, 3.33		3.09		3.15	
1995	3.43		3.31	3.38	3.37	0.06
1996	(72/166)		3.11	3.08		
1997	(19/150)		3.64			
1998	3.43		3.37	3.39	3.40	0.03
1999						
2000	<i>Sabbatical leave - University of Washington Seattle</i>					
2001	3.05		3.32		3.53	0.11
2002		3.61	3.45		3.30	0.01
2003		3.30	3.29		3.42	0.05
2004		3.38	3.45		3.57	0.09
2005		3.63	3.50		3.57	0.09
2006		3.63	3.50		3.61	0.01
2007	<i>Sabbatical leave- NCEAS</i>					
2008		3.62	3.60		3.61	0.01
2009		3.45	3.43		3.44	0.01
2010		3.31	3.57		3.44	0.18
2011			3.53		3.53	
2012*		3.40	3.10		3.25	0.21
2013*			3.70		3.70	
2014*			3.40		3.40	
2015	<i>Sabbatical leave - University of California Santa Barbara</i>					
2016*		3.50	3.50		3.50	0.00
2017*		3.60	3.90		3.75	0.20
2018*		3.60	3.40		3.50	0.10
2019	<i>Sabbatical leave - Queen's University Belfast</i>					
2020**			3.77		3.77	
2021**		3.80	3.60		3.70	0.10
2022**		3.74	3.77		3.76	0.10
2023**		3.73	3.41		3.57	0.23
2024	<i>Sabbatical leave - Queen's University Belfast</i>					
Mean	3.30	3.54	3.47	3.28	3.51	
SD	0.21	0.15	0.21	0.18	0.17	

* = voluntary electronic participation by students (~20 % uptake); prior participation mandatory

** = administrators changed questions on evaluation with no backwards compatibility. This means is an average of Q1.1 to Q4.2 and Q6.1-Q6.2, questions which are the closest compatibility to earlier versions.