

Hilary A Dugan

Curriculum Vitae
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Research interests

Lakes; landscape limnology; salt; polar environments; carbon cycling; watershed modeling; lake ice; geophysical surveys; long-term changes in lake function; high-frequency sensor data; data science/machine learning

Employment and education

Professional appointments

2023–	Associate Professor	Department of Integrative Biology, Center for Limnology University of Wisconsin—Madison
2018–2023	Assistant Professor	Department of Integrative Biology, Center for Limnology University of Wisconsin—Madison
2014–2017	Postdoctoral Researcher	Center for Limnology, University of Wisconsin—Madison
2014–2016	Postdoctoral Researcher	Cary Institute of Ecosystem Studies

Education

2014	Ph.D.	University of Illinois at Chicago	Earth and Environmental Sciences
2010	M.Sc	Queen's University	Geography
2008	B.Sc.(Hons)	Queen's University	Geography/Biology

Publications

Refereed first-author papers

- Dugan, H. A., Feiner, Z. S., Winder, M., Sosik, H. M., & Stanley, E. H. (2024). Advancing phenology in limnology and oceanography. *Limnology and Oceanography Letters*, 9(5), 506–511. <https://doi.org/10.1002/lol2.10432>
- Dugan, H. A., Ladwig, R., Schramm, P., & Lottig, N. R. (2024). Snow removal cools a small dystrophic lake. *Limnology and Oceanography Letters*. <https://doi.org/10.1002/lol2.10444>
- Dugan, H. A., & Arnott, S. E. (2023). The ecosystem implications of road salt as a pollutant of freshwaters. *WIREs Water*, 10(2), e1629. <https://doi.org/10.1002/wat2.1629>
- Dugan, H. A., & Rock, L. A. (2023). The slow and steady salinization of Sparkling Lake, Wisconsin. *Limnology and Oceanography Letters*, 8(1), 74–82. <https://doi.org/https://doi.org/10.1002/lol2.10191>
- Dugan, H. A., Rock, L. A., Kendall, A. D., & Mooney, R. J. (2023). Tributary chloride loading into Lake Michigan. *Limnology and Oceanography Letters*, 8(1), 83–92. <https://doi.org/10.1002/lol2.10228>
- Dugan, H. A., Doran, P. T., Grombacher, D., Auken, E., Bording, T., Foged, N., Foley, N., Mikucki, J., Virginia, R. A., & Tulaczyk, S. (2022). Brief communication: The hidden labyrinth: Deep groundwater in Wright Valley, Antarctica. *The Cryosphere*, 16(12), 4977–4983. <https://doi.org/10.5194/tc-16-4977-2022>
- Dugan, H. A. (2021). A Comparison of Ecological Memory of Lake Ice-Off in Eight North-Temperate Lakes. *Journal of Geophysical Research: Biogeosciences*, 126(6), e2020JG006232. <https://doi.org/10.1029/2020JG006232>
- Dugan, H. A., Skaff, N. K., Doubek, J. P., Bartlett, S. L., Burke, S. M., Krivak-Tetley, F. E., Summers, J. C., Hanson, P. C., & Weathers, K. C. (2020). Lakes at Risk of Chloride Contamination. *Environmental Science & Technology*, 54(11), 6639–6650. <https://doi.org/10.1021/acs.est.9b07718>
- Dugan, H. A., Helmueller, G., & Magnuson, J. J. (2017). Ice formation and the risk of chloride toxicity in shallow wetlands and lakes. *Limnology and Oceanography Letters*, 2(5), 150–158. <https://doi.org/10.1002/lol2.10045>
- Dugan, H. A., Summers, J. C., Skaff, N. K., Krivak-Tetley, F. E., Doubek, J. P., Burke, S. M., Bartlett, S. L., Arvola, L., Jarjanazi, H., Korponai, J., Kleeberg, A., Monet, G., Monteith, D., Moore, K., Rogora, M., Hanson, P. C., & Weathers, K. C. (2017). Long-term chloride concentrations in North American and European freshwater lakes. *Scientific Data*, 4(1). <https://doi.org/10.1038/sdata.2017.101>

11. Dugan, H. A., Bartlett, S. L., Burke, S. M., Doubek, J. P., Krivak-Tetley, F. E., Skaff, N. K., Summers, J. C., Farrell, K. J., McCullough, I. M., Morales-Williams, A. M., Roberts, D. C., Ouyang, Z., Scordo, F., Hanson, P. C., & Weathers, K. C. (2017). Salting our freshwater lakes. *Proceedings of the National Academy of Sciences*, 114(17), 4453–4458. <https://doi.org/10.1073/pnas.1620211114>
12. Dugan, H. A., Iestyn Woolway, R., Santoso, A. B., Corman, J., Jaimes, A., Nodine, E. R., Patil, V. P., Zwart, J., Brenttrup, J. A., Hetherington, A. L., Oliver, S. K., Read, J. S., Winters, K. M., Hanson, P. C., Read, E. K., Winslow, L., & Weathers, K. C. (2016). Consequences of gas flux model choice on the interpretation of metabolic balance across 15 lakes. *Inland Waters*, 6(4). <https://doi.org/10.5268/IW-6.4.836>
13. Dugan, H. A., Arcone, S. A., Obryk, M. K., & Doran, P. T. (2015). High-resolution ground-penetrating radar profiles of perennial lake ice in the McMurdo Dry Valleys, Antarctica: Horizon attributes, unconformities, and subbottom penetration. *Geophysics*, 81(1), WA13–WA20. <https://doi.org/10.1190/GEO2015-0159.1>
14. Dugan, H. A., Doran, P. T., Wagner, B., Kenig, F., Fritsen, C. H., Arcone, S. A., Kuhn, E., Ostrom, N. E., Warnock, J. P., & Murray, A. E. (2015). Stratigraphy of Lake Vida, Antarctica: Hydrologic implications of 27 m of ice. *The Cryosphere*, 9, 439–450.
15. Dugan, H. A., Doran, P. T., Tulaczyk, S., Mikucki, J. A., Arcone, S. A., Auken, E., Schamper, C., & Virginia, R. A. (2015). Sub-surface imaging reveals a confined aquifer beneath an ice-sealed Antarctic lake. *Geophysical Research Letters*, 42(1), 96–103. <https://doi.org/10.1002/2014GL062431>
16. Dugan, H. A., Obryk, M. O., & Doran, P. T. (2013). Lake ice ablation rates from permanently ice covered Antarctic lakes. *Journal of Glaciology*, 59(215), 491–498.
17. Dugan, H. A., Lamoureux, S. F., Lewis, T., & Lafrenière, M. J. (2012). The Impact of Permafrost Disturbances and Sediment Loading on the Limnological Characteristics of Two High Arctic Lakes. *Permafrost and Periglacial Processes*, 23(2), 119–126. <https://doi.org/10.1002/ppp.1735>
18. Dugan, H. A., Gleeson, T., Lamoureux, S. F., & Novakowski, K. (2012). Tracing groundwater discharge in a High Arctic lake using radon-222. *Environmental Earth Sciences*, 66(5), 1385–1392. <https://doi.org/10.1007/s12665-011-1348-6>
19. Dugan, H. A., & Lamoureux, S. F. (2011). The chemical development of a hypersaline coastal basin in the High Arctic. *Limnology and Oceanography*, 56(2), 495–507.
20. Dugan, H. A., Lamoureux, S. F., Lafrenière, M. J., & Lewis, T. (2009). Hydrological and sediment yield response to summer rainfall in a small high Arctic watershed. *Hydrological Processes*, 23(10), 1514–1526. <http://dx.doi.org/10.1002/hyp.7285>

All co-authored research papers

1. Stone, M. S., Salvatore, M. R., Dugan, H. A., Myers, M. E., & Doran, P. T. (2024). Measuring and modelling functional moat area in perennially ice-covered Lake Fryxell, Antarctica. *Arctic, Antarctic, and Alpine Research*, 56(1), 2406626. <https://doi.org/10.1080/15230430.2024.2406626>
2. Hampton, S. E., Powers, S. M., Dugan, H. A., Knoll, L. B., McMeans, B. C., Meyer, M. F., O'Reilly, C. M., Ozersky, T., Sharma, S., Barrett, D. C., Chandra, S., Jansen, J., McClure, R. P., Rautio, M., Weyhenmeyer, G. A., & Yang, X. (2024). Environmental and societal consequences of winter ice loss from lakes. *Science*, 386(6718), eadl3211. <https://doi.org/10.1126/science.adl3211>
3. Barrett, J. E., Adams, B. J., Doran, P. T., Dugan, H. A., Myers, K. F., Salvatore, M. R., Power, S. N., Snyder, M. D., Wright, A. T., & Gooseff, M. N. (2024). Response of a Terrestrial Polar Ecosystem to the March 2022 Antarctic Weather Anomaly. *Earth's Future*, 12(8), e2023EF004306. <https://doi.org/10.1029/2023EF004306>
4. Gorsky, A. L., Dugan, H. A., Wilkinson, G. M., & Stanley, E. H. (2024). Under-Ice Oxygen Depletion and Greenhouse Gas Supersaturation in North Temperate Urban Ponds. *Journal of Geophysical Research: Biogeosciences*, 129(6), e2024JG008120. <https://doi.org/10.1029/2024JG008120>
5. Meyer, M. F., Topp, S. N., King, T. V., Ladwig, R., Pilla, R. M., Dugan, H. A., Eggleston, J. R., Hampton, S. E., Leech, D. M., Oleksy, I. A., Ross, J. C., Ross, M. R. V., Woolway, R. I., Yang, X., Brousil, M. R., Fickas, K. C., Padowski, J. C., Pollard, A. I., Ren, J., & Zwart, J. A. (2024). National-scale remotely sensed lake trophic state from 1984 through 2020. *Scientific Data*, 11(1), 77. <https://doi.org/10.1038/s41597-024-02921-0>
6. Rohwer, R. R., Ladwig, R., Hanson, P. C., Walsh, J. R., Vander Zanden, M. J., & Dugan, H. A. (2024). Increased anoxia following species invasion of a eutrophic lake. *Limnology and Oceanography Letters*, 9(1), 33–42. <https://doi.org/10.1002/lol2.10364>
7. Gutterman, W. S., Doran, P. T., Virginia, R. A., Barrett, J. E., Myers, K. F., Tulaczyk, S. M., Foley, N. T., Mikucki, J. A., Dugan, H. A., Grombacher, D. J., Bording, T. S., & Auken, E. (2023). Causes and Characteristics of Electrical Resistivity Variability in Shallow (<4 m) Soils in Taylor Valley, East Antarctica. *Journal of Geophysical Research: Earth Surface*, 128(2), e2022JF006696. <https://doi.org/10.1029/2022JF006696>

8. Ladwig, R., Rock, L. A., & Dugan, H. A. (2023). Impact of salinization on lake stratification and spring mixing. *Limnology and Oceanography Letters*, 8(1), 93–102. <https://doi.org/10.1002/lol2.10215>
9. Rock, L. A., & Dugan, H. A. (2023). Lakes protect downstream riverine habitats from chloride toxicity. *Limnology and Oceanography*, 68(6), 1216–1231. <https://doi.org/10.1002/lno.12340>
10. Socha, E., Gorsky, A., Lottig, N. R., Gerrish, G., Whitaker, E. C., & Dugan, H. A. (2023). Under-ice plankton community response to snow removal experiment in bog lake. *Limnology and Oceanography*, 68(5), 1001–1018. <https://doi.org/10.1002/lno.12319>
11. Solomon, C. T., Dugan, H. A., Hintz, W. D., & Jones, S. E. (2023). Upper limits for road salt pollution in lakes. *Limnology and Oceanography Letters*. <https://doi.org/10.1002/lol2.10339>
12. Campbell, J. L., Driscoll, C. T., Jones, J. A., Boose, E. R., Dugan, H. A., Groffman, P. M., Jackson, C. R., Jones, J. B., Juday, G. P., Lottig, N. R., Penaluna, B. E., Ruess, R. W., Suding, K., Thompson, J. R., & Zimmerman, J. K. (2022). Forest and Freshwater Ecosystem Responses to Climate Change and Variability at US LTER Sites. *BioScience*, 72(9), 851–870. <https://doi.org/10.1093/biosci/biab124>
13. Weyhenmeyer, G. A., Obertegger, U., Rudebeck, H., Jakobsson, E., Jansen, J., Zdrovennova, G., Bansal, S., Block, B. D., Carey, C. C., Doubek, J. P., Dugan, H., Erina, O., Fedorova, I., Fischer, J. M., Grinberga, L., Grossart, H.-P., Kangur, K., Knoll, L. B., Laas, A., ... Zdrovennov, R. (2022). Towards critical white ice conditions in lakes under global warming. *Nature Communications*, 13(1), 4974. <https://doi.org/10.1038/s41467-022-32633-1>
14. Khandelwal, A., Karpatne, A., Ravirathinam, P., Ghosh, R., Wei, Z., Dugan, H. A., Hanson, P. C., & Kumar, V. (2022). Real-SAT, a global dataset of reservoir and lake surface area variations. *Scientific Data*, 9(1), 356. <https://doi.org/10.1038/s41597-022-01449-5>
15. Madsen, L. M., Bording, T., Grombacher, D., Foged, N., Foley, N., Dugan, H. A., Doran, P. T., Mikucki, J., Tulaczyk, S., & Auken, E. (2022). Comparison of ground-based and airborne transient electromagnetic methods for mapping glacial and permafrost environments: Cases from McMurdo Dry Valleys, Antarctica. *Cold Regions Science and Technology*, 199, 103578. <https://doi.org/10.1016/j.coldregions.2022.103578>
16. Feiner, Z. S., Dugan, H., Lottig, N. R., Sass, G. G., & Gerrish, G. A. (2022). A perspective on the ecological and evolutionary consequences of phenological variability in lake ice on north-temperate lakes. *Canadian Journal of Fisheries and Aquatic Sciences*. <https://doi.org/10.1139/cjfas-2021-0221>
17. Castendyk, D. N., Dugan, H. A., Gallagher, H. A., Pujara, N., Doran, P. T., Priscu, J. C., & Lyons, W. B. (2022). Barotropic seiches in a perennially ice-covered lake, East Antarctica. *Limnology and Oceanography Letters*, 7(1), 26–33. <https://doi.org/10.1002/lol2.10226>
18. Cunillera-Montcusí, D., Beklioglu, M., Cañedo-Argüelles, M., Jeppesen, E., Ptacnik, R., Amorim, C. A., Arnott, S. E., Berger, S. A., Brucet, S., Dugan, H. A., Gerhard, M., Horváth, Z., Langenheder, S., Nejstgaard, J. C., Reinikainen, M., Striebel, M., Urrutia-Cordero, P., Vad, C. F., Zadereev, E., & Matias, M. (2022). Freshwater salinisation: A research agenda for a saltier world. *Trends in Ecology & Evolution*. <https://doi.org/10.1016/j.tree.2021.12.005>
19. Ladwig, R., Appling, A. P., Delany, A., Dugan, H. A., Gao, Q., Lottig, N., Stachelek, J., & Hanson, P. C. (2022). Long-term change in metabolism phenology in north temperate lakes. *Limnology and Oceanography*. <https://doi.org/10.1002/lno.12098>
20. Cavaliere, E., Fournier, I. B., Hazuková, V., Rue, G. P., Sadro, S., Berger, S. A., Cotner, J. B., Dugan, H. A., Hampton, S. E., Lottig, N. R., McMeans, B. C., Ozersky, T., Powers, S. M., Rautio, M., & O'Reilly, C. M. (2021). The Lake Ice Continuum Concept: Influence of Winter Conditions on Energy and Ecosystem Dynamics. *Journal of Geophysical Research: Biogeosciences*, 126(11). <https://doi.org/10.1029/2020jg006165>
21. Grombacher, D., Auken, E., Foged, N., Bording, T., Foley, N., Doran, P. T., Mikucki, J., Dugan, H. A., Garza-Giron, R., Myers, K., Virginia, R. A., & Tulaczyk, S. (2021). Induced polarization effects in airborne transient electromagnetic data collected in the McMurdo Dry Valleys, Antarctica. *Geophysical Journal International*, 226(3), 1574–1583. <https://doi.org/10.1093/gji/ggab148>
22. Moore, T. N., Mesman, J. P., Ladwig, R., Feldbauer, J., Olsson, F., Pilla, R. M., Shatwell, T., Venkiteswaran, J. J., Delany, A. D., Dugan, H., Rose, K. C., & Read, J. S. (2021). LakeEnsemblR: An R package that facilitates ensemble modelling of lakes. *Environmental Modelling & Software*, 143, 105101. <https://doi.org/10.1016/j.envsoft.2021.105101>
23. Myers, K. F., Doran, P. T., Tulaczyk, S. M., Foley, N. T., Bording, T. S., Auken, E., Dugan, H. A., Mikucki, J. A., Foged, N., Grombacher, D., & Virginia, R. A. (2021). Thermal legacy of a large paleolake in Taylor Valley, East Antarctica, as evidenced by an airborne electromagnetic survey. *The Cryosphere*, 15(8), 3577–3593. <https://doi.org/10.5194/tc-15-3577-2021>
24. Topp, S. N., Pavelsky, T. M., Dugan, H. A., Yang, X., Gardner, J., & Ross, M. R. V. (2021). Shifting Patterns of Summer Lake Color Phenology in Over 26,000 US Lakes. *Water Resources Research*, 57(5). <https://doi.org/10.1029/2020wr029123>

25. Jones, J. A., Groffman, P. M., Blair, J., Davis, F. W., Dugan, H., Euskirchen, E. E., Frey, S. D., Harms, T. K., Hinckley, E., Kosmala, M., Loberg, S., Malone, S., Novick, K., Record, S., Rocha, A. V., Ruddell, B. L., Stanley, E. H., Sturtevant, C., Thorpe, A., ... Zhu, K. (2021). Synergies Among Environmental Science Research and Monitoring Networks: A Research Agenda. *Earth's Future*, 9(3). <https://doi.org/10.1029/2020ef001631>
26. Ladwig, R., Hanson, P. C., Dugan, H. A., Carey, C. C., Zhang, Y., Shu, L., Duffy, C. J., & Cobourn, K. M. (2021). Lake thermal structure drives interannual variability in summer anoxia dynamics in a eutrophic lake over 37 years. *Hydrology and Earth System Sciences*, 25(2), 1009–1032. <https://doi.org/10.5194/hess-25-1009-2021>
27. Meyer, M. F., Ladwig, R., Dugan, H. A., Anderson, A., Bah, A. R., Boehrer, B., Borre, L., Chapina, R. J., Doyle, C., Favot, E. J., Flaim, G., Forsberg, P., Hanson, P. C., Ibelings, B. W., Isles, P., Lin, F.-P., Lofton, D., Moore, T. N., Peel, S., ... Weathers, K. C. (2021). Virtual Growing Pains: Initial Lessons Learned from Organizing Virtual Workshops, Summits, Conferences, and Networking Events during a Global Pandemic. *Limnology and Oceanography Bulletin*, 30(1), 1–11. <https://doi.org/10.1002/lob.10431>
28. Gorsky, A. L., Lottig, N. R., Stoy, P. C., Desai, A. R., & Dugan, H. A. (2021). The Importance of Spring Mixing in Evaluating Carbon Dioxide and Methane Flux From a Small North-Temperate Lake in Wisconsin, United States. *Journal of Geophysical Research: Biogeosciences*, 126(12), e2021JG006537. <https://doi.org/10.1029/2021JG006537>
29. Yang, B., Wells, M. G., McMeans, B. C., Dugan, H. A., Rusak, J. A., Weyhenmeyer, G. A., Brentrup, J. A., Hrycik, A. R., Laas, A., Pilla, R. M., Austin, J. A., Blanchfield, P. J., Carey, C. C., Guzzo, M. M., Lottig, N. R., MacKay, M. D., Middel, T. A., Pierson, D. C., Wang, J., & Young, J. D. (2021). A New Thermal Categorization of Ice-Covered Lakes. *Geophysical Research Letters*, 48(3), e2020GL091374. <https://doi.org/https://doi.org/10.1029/2020GL091374>
30. Hanson, P. C., Stillman, A. B., Jia, X., Karpatne, A., Dugan, H. A., Carey, C. C., Stachelek, J., Ward, N. K., Zhang, Y., Read, J. S., & Kumar, V. (2020). Predicting lake surface water phosphorus dynamics using process-guided machine learning. *Ecological Modelling*, 430, 109136. <https://doi.org/10.1016/j.ecolmodel.2020.109136>
31. Weng, W., Boyle, K. J., Farrell, K. J., Carey, C. C., Cobourn, K. M., Dugan, H. A., Hanson, P. C., Ward, N. K., & Weathers, K. C. (2020). Coupling Natural and Human Models in the Context of a Lake Ecosystem: Lake Mendota, Wisconsin, USA. *Ecological Economics*, 169, 106556. <https://doi.org/10.1016/j.ecolecon.2019.106556>
32. Foley, N., Tulaczyk, S., Auken, E., Grombacher, D., Mikucki, J., Foged, N., Myers, K., Dugan, H., Doran, P. T., & Virginia, R. A. (2020). Mapping geothermal heat flux using permafrost thickness constrained by airborne electromagnetic surveys on the western coast of Ross Island, Antarctica. *Exploration Geophysics*, 51(1), 84–93. <https://doi.org/10.1080/08123985.2019.1651618>
33. Helmueller, G., Dugan, H. A., & Magnuson, J. J. (2020). Spatial and temporal patterns of chloride contamination in a shallow, urban marsh. *Wetlands*, 40(3), 479–490. <https://doi.org/https://doi.org/10.1007/s13157-019-01199-y>
34. Shannon, T. P., Ahler, S. J., Mathers, A., Ziter, C. D., & Dugan, H. A. (2020). Road salt impact on soil electrical conductivity across an urban landscape. *Journal of Urban Ecology*, 6(1). <https://doi.org/10.1093/jue/juaa006>
35. Foley, N., Tulaczyk, S. M., Grombacher, D., Doran, P. T., Mikucki, J., Myers, K. F., Foged, N., Dugan, H., Auken, E., & Virginia, R. (2019). Evidence for Pathways of Concentrated Submarine Groundwater Discharge in East Antarctica from Helicopter-Borne Electrical Resistivity Measurements. *Hydrology*, 6(2), 54. <https://doi.org/10.3390/hydrology6020054>
36. McCullough, I. M., Dugan, H. A., Farrell, K. J., Morales-Williams, A. M., Ouyang, Z., Roberts, D., Scordo, F., Bartlett, S. L., Burke, S. M., Doubek, J. P., Krivak-Tetley, F. E., Skaff, N. K., Summers, J. C., Weathers, K. C., & Hanson, P. C. (2018). Dynamic modeling of organic carbon fates in lake ecosystems. *Ecological Modelling*, 386, 71–82. <https://doi.org/10.1016/J.ECOLMODEL.2018.08.009>
37. Reed, D. E., Dugan, H. A., Flannery, A. L., & Desai, A. R. (2018). Carbon sink and source dynamics of a eutrophic deep lake using multiple flux observations over multiple years. *Limnology and Oceanography Letters*, 3(3), 285–292. <https://doi.org/10.1002/lol2.10075>
38. Cobourn, K. M., Carey, C. C., Boyle, K. J., Duffy, C., Dugan, H. A., Farrell, K. J., Fitchett, L., Hanson, P. C., Hart, J. A., Henson, V. R., et al. (2018). From concept to practice to policy: Modeling coupled natural and human systems in lake catchments. *Ecosphere*, 9(5), e02209. <https://doi.org/10.1002/ecs2.2209>
39. Duffy, C. J., Dugan, H. A., & Hanson, P. C. (2018). The age of water and carbon in lake-catchments: A simple dynamical model. *Limnology and Oceanography Letters*, 3(3), 236–245.
40. Engel, F., Farrell, K. J., McCullough, I. M., Scordo, F., Denfeld, B. A., Dugan, H. A., Eyto, E. de, Hanson, P. C., McClure, R. P., Nöges, P., et al. (2018). A lake classification concept for a more accurate global estimate of the dissolved inorganic carbon export from terrestrial ecosystems to inland waters. *The Science of Nature*, 105(3-4), 25. <https://doi.org/https://doi.org/10.1007/s00114-018-1547-z>
41. Mantzouki, E., Beklioglu, M., Brookes, J., Senerpont Domis, L. N. de, Dugan, H. A., Doubek, J. P., Grossart, H.-P., Nejtgaard, J. C., Pollard, A. I., Ptacnik, R., et al. (2018). Opinion: Snapshot surveys for lake monitoring, more than a shot in the dark. *Frontiers in Ecology and Evolution*, 6, 201. <https://doi.org/https://doi.org/10.3389/fevo.2018.00201>

42. Ward, N. K., Fitchett, L., Hart, J. A., Shu, L., Stachelek, J., Weng, W., Zhang, Y., Dugan, H., Hetherington, A., Boyle, K., et al. (2018). Integrating fast and slow processes is essential for simulating human–freshwater interactions. *Ambio*, 1–14. <https://doi.org/10.1007/s13280-018-1136-6>
43. Read, E. K., Carr, L., Cicco, L. D., Dugan, H. A., Hanson, P. C., Hart, J. A., Kreft, J., Read, J. S., & Winslow, L. A. (2017). Water quality data for national-scale aquatic research: The Water Quality Portal. *Water Resources Research*, 53(2), 1735–1745. <https://doi.org/10.1002/2016wr019993>
44. Lewis, T., Lamoureux, S. F., Normandeau, A., & Dugan, H. A. (2017). Hyperpycnal flows control the persistence and flushing of hypoxic high-conductivity bottom water in a High Arctic lake. *Arctic Science*, 4(1), 25–41.
45. Ruan, G., Hanson, P. C., Dugan, H. A., & Plale, B. (2017). Mining lake time series using symbolic representation. *Ecological Informatics*, 39. <https://doi.org/10.1016/j.ecoinf.2017.03.001>
46. Snortheim, C. A., Hanson, P. C., McMahon, K. D., Read, J. S., Carey, C. C., & Dugan, H. A. (2017). Meteorological drivers of hypolimnetic anoxia in a eutrophic, north temperate lake. *Ecological Modelling*, 343, 39–53. <https://doi.org/10.1016/j.ecolmodel.2016.10.014>
47. Winslow, L. A., Zwart, J. A., Batt, R. D., Dugan, H. A., Woolway, R. I., Corman, J. R., Hanson, P. C., & Read, J. S. (2016). LakeMetabolizer: An R package for estimating lake metabolism from free-water oxygen using diverse statistical models. *Inland Waters*, 6(4), 622–636.
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51. Winslow, L. A., Dugan, H. A., Buelow, H. N., Cronin, K. D., Priscu, J. C., Takacs-Vesbach, C., & Doran, P. T. (2014). Autonomous year-round sampling and sensing to explore the physical and biological habitability of permanently ice-covered antarctic lakes. *Marine Technology Society Journal*, 48(5), 8–17.

Book chapters

1. Dugan, H. A. (2023). Salinity and Ionic Composition of Inland Waters. Chapter 12. In I. Jones & J. Smol (Eds.), *Wetzel's Limnology* (4th ed., p. 1104). <https://shop.elsevier.com/books/wetzels-limnology/jones/978-0-12-822701-5>
2. Hanson, P. C., Weathers, K. C., Dugan, H. A., & Gries, C. (2018). The Global Lake Ecological Observatory Network. In F. Recknagel & W. Michener (Eds.), *Ecological informatics: Data management and knowledge discovery* (pp. 415–433). Springer.

R-packages

1. Dugan, H. (2023). Interpolate depth-discrete water quality data from NTL-LTER: Package NTLlakeloads. In *GitHub repository*. GitHub. <https://github.com/hdugan/NTLlakeloads>
2. Moore, T., Mesman, J., Ladwig, R., Feldbauer, J., Read, J. S., Pilla, R., Dugan, H., & more. (2020). Run ensemble of lake models in R: Package LakeEnsemblR. In *GitHub repository*. GitHub. <https://github.com/aemon-j/LakeEnsemblR>
3. Winslow, L., Read, J., Dugan, H., & Ladwig, R. (2019). *GLM3r: A general lake model (GLM) base package* (Version 3.1.16) [Computer software]. <https://github.com/GLEON/GLM3r>
4. Winslow, L., Zwart, J., Batt, R., Corman, J., Dugan, H., Hanson, P., Holtgrieve, G., Jaimes, A., Read, J., & Woolway, R. (2014). *LakeMetabolizer: Tools for the analysis of ecosystem metabolism* (Version 1.5) [Computer software]. <http://cran.r-project.org/web/packages/LakeMetabolizer/index.htm>

Proceedings

1. Gil, Y., Michel, F., Ratnakar, V., Read, J., Hauder, M., Duffy, C., PC Hanson, & Dugan, H. (2015). *Supporting open collaboration in science through explicit and linked semantic description of processes*.
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Grants

Award total to UW-Madison (+ total award amount)

2024-2026	Lead-PI. "Working in partnership to improve the understanding of water quality along Lake Superior's Wisconsin Coastline". <i>Funding from University of Wisconsin-Madison Wisconsin Idea Collaboration</i> . Collaborators: Kait Reinl.	\$170,000
2023-2029	Co-PI. "LTER: MCM6 - The roles of legacy and ecological connectivity in a polar desert ecosystem". <i>Funding from NSF Office of Polar Programs</i> . Collaborators: Mike Gooseff (lead PI) + 10 coPIs.	\$515,163 (\$7,650,000)
2023-2026	Co-PI. "Advancing a comprehensive model of year-round ecosystem function in seasonally frozen lakes through networked science". <i>Funding from NSF Division of Environmental Biology</i> . Collaborators: Ted Ozersky, Stephanie Hampton, Trista Vick-Majors, Steven Sadro.	\$130,123 (\$2,447,412)
2023-2025	Co-PI. "How Water Waves Can Help Us Better Predict Harmful Algal blooms and Ice Cover and Formulate New Management Practices". <i>Funding from University of Wisconsin-Madison, Research Forward</i> . Collaborators: Nimish Pujara, Jennifer Franck, Till Wagner, Luke Zoet, Grace Wilkinson, Timothy Bertram.	\$476,632
2023-2024	Lead-PI. "A community based approach to salt reduction in the Lake Wingra watershed". <i>Funding from University of Wisconsin-Madison, Water@UW</i> . Collaborators: None.	\$9,995
2022-2027	Lead-PI. "CAREER: Expanding Our Understanding of Freshwater Salinization Through Data-Driven Limnology". <i>Funding from NSF Division Of Environmental Biology</i> . Collaborators: None.	\$902,621
2021-2027	Co-PI. "LTER: Comparative Study of a Suite of Lakes in Wisconsin". <i>Funding from NSF Division Of Environmental Biology</i> . Collaborators: Emily Stanley (lead PI) + 10 coPIs.	\$7,680,000
2021-2024	Lead-PI. "Climate, Storms, and the Drivers of Cyanobacteria Blooms in Lake Superior". <i>Funding from USGS Midwest Climate Adaptation Science Center</i> . Collaborators: Bob Sterner, Kathryn Schreiner, Byron Steinman.	\$169,971 (\$475,230)
2021-2023	Co-PI. "Understanding landscape-scale patterns in winter conditions in the Upper Mississippi River System". <i>Funding from USGS CESU</i> . Collaborators: Kathi-Jo Jankowski (lead PI), Becky Kreiling, Madeline Magee.	\$99,878
2020-2021	Co-PI. "Workshop: Integrating remote sensing, in situ, and physically-based modeling approaches to understand global lake ice dynamics". <i>Funding from NSF Division of Environmental Biology</i> . Collaborators: Catherine O'Reilly (lead PI), Tamlin Pavelsky, Sapna Sharma.	\$0 (\$45,353)
2019-2023	Lead-PI. "The ecosystem ecology of lake ice loss in north-temperate lakes". <i>Funding from NSF Division Of Environmental Biology</i> . Collaborators: Noah Lottig.	\$199,945
2019-2021	Lead-PI. "Full season science in the northwoods". <i>Funding from University of Wisconsin-Madison, UW2020</i> . Collaborators: Noah Lottig.	\$188,908
2019-2021	Co-PI. "Knowledge Guided Machine Learning: A Framework for Accelerating Scientific Discovery". <i>Funding from NSF Office of Advanced Cyberinfrastructure</i> . Collaborators: Vipin Kumar (lead PI), Michael Steinbach, Aidong Zhang, Imme Ebert-Uphoff, Elizabeth Barnes, Kevin Janes, Paul Hanson, Christopher Duffy, John Nieber.	\$165,250 (\$933,890)
2019-2020	Co-PI. "Host of Northeast Climate Adaptation Science Center". <i>Funding from USGS Climate Adaptation Science Center</i> . Collaborators: Lead Institution: UMASS.	\$328,450 (\$6,383,605)
2018-2023	Lead-PI. "ABI Development: Building advanced numerical simulation technology for the lake ecology community". <i>Funding from NSF Advances in Biological Informatics, Division of Biological Infrastructure</i> . Collaborators: Paul Hanson.	\$470,000
2018-2020	Co-PI. "National-Scale Freshwater Research through Data Science". <i>Funding from University of Wisconsin-Madison, Data Science Initiative</i> . Collaborators: Paul Hanson (lead PI), AnHai Doan.	\$249,000

2017–2020 Co-PI. “ANTarctic Airborne ElectroMagnetics (ANTAEM): Revealing Subsurface Water in Coastal Antarctica”. *Funding from NSF Antarctic Research, Antarctic Integrated System Science*. Collaborators: Slawek Tulaczyk (lead PI), Jill Mikucki, Peter Doran, Ross Virginia. \$65,725 (\$959,779)

Honors and awards

Faculty Awards

2024 UW-Madison Vilas Early-Career Investigator Award
2024 ASLO Yentsch-Schindler Early Career Award
2023 UW-Madison Phillip R. Certain and Gary D. Sandefur Distinguished Faculty Award
2023 UW-Madison William H. Keikhofer Teaching Award

Fellowships and Symposia

2019 Madison Teaching and Learning Excellence fellow
2015 New Generation of Polar Researchers fellow
2013 GLEON Graduate Student fellow
2010 IPY International Polar Field School

Select Student Awards

2012 NSERC Alexander Graham Bell Canadian Graduate Scholarship (accepted PGS)
2010 Antarctic Science International Bursary
2010 ArcticNet Training Fund Award
2010 NSERC Alexander Graham Bell Canadian Graduate Scholarship
2010 XXXII SCAR Meeting Best Poster
2010 Canadian Geophysical Union Runner-up Best Student Talk
2008 Canadian Geophysical Union Campbell Scientific Best Poster Award
2008 Ontario Graduate Scholarship (declined)
2008 Nortek Student Equipment Grant
2008 NSERC Undergraduate Student Research Award
2008 Queen’s University Tri-Council Award
2008 Queen’s University Medal in Geography

Invited Academic Talks

- 2024-Nov "Episodic Salinization of US Rivers". University of Pittsburgh, Department of Geology and Environmental Science.
- 2024-Jun "Yentsch-Schindler Award Plenary Talk". ASLO Summer Meeting.
- 2024-Feb "Freshwater salinization". University of Wisconsin-Milwaukee, School of Freshwater Sciences.
- 2024-Feb "Snow removal impact". UW-Madison Center for Limnology.
- 2023-Mar "A winter's tale of a Wisconsin lake". Queen's University Dept of Biology Seminar, Kingston, ON.
- 2023-Mar "Freshwater is the best water". David Schindler Professorship Lecture, Trent University, Peterborough ON.
- 2022-Dec "Winter Limnology". University of Minnesota Duluth, Water Resources Science Seminar.
- 2021-Dec "The impact of road salt on our freshwaters". University of Minnesota Conservation Science Seminar.
- 2021-Sep "Salinization of our freshwater ecosystems". Alberta Lake Management Society (Virtual).
- 2020-Dec "Chloride pollution in freshwater lakes". Society of Canadian Limnologists (Virtual).
- 2020-Nov "Phenological Whiplash". Université du Québec à Montréal (Virtual).
- 2020-Oct "Salinization". AQUACOSMplus webinar series: Salinization of freshwater ecosystems (Virtual).
- 2020-Sep "Phenological Whiplash". Northeast Climate Adaptation Science Center Seminar Series (Virtual).
- 2020-Mar "Freshwater is the bestwater". CWEST Distinguished Speaker, University of Colorado, Boulder, CO.
- 2020-Mar "Salinization of our freshwater ecosystems". Dept of Forestry and Wildlife Ecology, University of Wisconsin-Madison.
- 2020-Mar "Chloride contamination across a 17-state area". Michigan Inland Lakes Partnership (Virtual).
- 2019-Mar "Reconsidering groundwater in Antarctic limnology". Northwestern University, Evanston, IL.
- 2019-Feb "Reconsidering groundwater in Antarctic limnology". Dept of Geosciences, University of Wisconsin-Madison.
- 2018-Oct "The ecology of lake ice loss". Wisconsin Ecology Symposium, University of Wisconsin-Madison.
- 2018-Feb "Chloride, concrete, and the state of our lakes". Dept of Geography, University of Wisconsin-Madison.
- 2017-Dec "Groundwater in Antarctica". Center for Limnology, University of Wisconsin-Madison.
- 2014-Nov "Where is the water in a Dry Valley? A geophysical investigation of groundwater in Antarctica". Queen's University, Kingston, ON.
- 2011-Apr "The formation of Lake Vida". U.S. Army Cold Regions Research and Engineering Laboratory (CRREL).
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Teaching

University of Wisconsin—Madison

- Zoology 101: Animal Biology (Ecology and Evolution: 3 weeks)
 - Spring 2024: 518 students
 - Spring 2022: 554 students
 - Fall 2020: 755 students
- Zoology 315: Conservation of Aquatic Resources Zoology and Environmental Studies
 - Fall 2024: 2 credits, 87 students
 - Fall 2023: 2 credits, 113 students
 - Fall 2022: 2 credits, 132 students
 - Fall 2021: 2 credits, 108 students
 - Fall 2020: 2 credits, 92 students
 - Fall 2019: 2 credits, 92 students
 - Fall 2018: 2 credits, 122 students
- Zoology 400: Ecological Data
 - Fall 2021: 3 credits, 15 students (undergrad + grad)
- Zoology 955:
 - Spring 2023: 1 credit, 10 students

- * Lake Metabolism
- Spring 2020: 1 credit, 7 students
 - * Aquatic sensor technology and implementation
- Fall 2019: 1 credit, 11 students
 - * An introduction to lake modeling
- Spring 2018: 1 credit, 9 students
 - * Introduction to spatial analysis and GIS in R (<https://github.com/hdugan/Zoo955>)

Guest Lectures

- 2024-November "Lake Biogeochemistry". SOIL SCI / FW ECOL 451, UW-Madison.
2024-February "Lake Mendota". ENV ST 101, UW-Madison.
2023-February "Lake Mendota, Limnology and eutrophication". ENV ST 101, UW-Madison.
2022-September "Biogeochemistry of Inland Waters". SOIL SCI / FW ECOL 451, UW-Madison.
2022-April "Lake Mendota, Limnology and eutrophication". ENV ST 101, UW-Madison.
2020-March "Lake Mendota, the best studied lake in the world". ENV ST 101, UW-Madison.

Professional Development

- Madison Teaching and Learning Excellence Program (2019-2020)
 - Two-semester program in teaching that helps early-career faculty succeed with personalized support from a cross-disciplinary community of peers and teaching and learning experts
- EDSIN workshop on Culturally Relevant Education in Environmental Data Science (2021)

Mentoring

Undergraduates supervised (graduation year):

- Charlie Dougherty (2022)
- Melissa Martin (2022)
- Sydney Widell (2021)
- Sam Ahler (2021)
- Adam Rexroade (2020)
- Alaina Eckert (2019)
- Alex Mather (2019)
- Thomas Shannon (2019, NSF GRFP recipient)

Graduate students currently supervised:

- Adrianna Gorsky (Freshwater and Marine Sciences, PhD)
- Kayla Hubbard (Geoscience, PhD)
- Lizzie Emch (Freshwater and Marine Sciences, MSc)
- Charlie Dougherty (Freshwater and Marine Sciences, MSc)

Students who have earned graduate degrees:

- Lindsay Platt (Freshwater and Marine Sciences, MSc 2024)
- Ellie Socha (Freshwater and Marine Sciences, MSc 2022)
- Adrianna Gorsky (Freshwater and Marine Sciences, MSc 2021)
- Linnea Rock (Zoology, MSc 2021)
- Emily Whitaker (Freshwater and Marine Sciences, MSc 2020)

Service on graduate student committees, PhD:

- Patricia Tran (Freshwater and Marine Sciences - MacMahon, graduated 2023)
- Holly Embke (Freshwater and Marine Sciences - Vander Zanden, graduated 2022)
- Ellen Albright (Freshwater and Marine Sciences - Wilkinson, graduated 2022)

- Vince Butitta (Freshwater and Marine Sciences - Stanley, graduated 2022)
- Marissa Kneer (Environmental Chemistry and Technology - Grinder Vogel, graduated 2021)
- Mike Spear (Freshwater and Marine Sciences - Vander Zanden, graduated 2020)
- Riley Book (Zoology - Ives)
- Jeremy Brooks (Geosciences - Marcott/Zoet)
- Krystyn Kibler (Freshwater and Marine Sciences - MacMahon)
- Jess Briggs (Freshwater and Marine Sciences - Wilkinson)
- Alia Benedict (University of Minnesota Duluth)
- Mary Campbell (Forestry and Wildlife Ecology - Hua)

Service on graduate student committees, MSc:

- Mike Smale (Water Resources and Management, graduated 2023)
- Austin Delany (Freshwater and Marine Sciences - Hanson, graduated 2022)
- Adam Rexroade (Freshwater and Marine Sciences - Stanley, graduated 2022)
- Sam Blackburn (Freshwater and Marine Sciences - Stanley, graduated 2019)

Postdocs supervised

- Robert Ladwig (2019-2023)
- Rob Mooney (2020-2022)
- Kait Reinl (2021-2022)
- Cal Buelo (2021-2022)
- Jemma Stachelek (2020-2021)

Professional service and other appointments

Service

- 2024 - Limnology and Oceanography Letters Assistant Editor
- 2023 - 2024: Limnology and Oceanography Letters Co-Editor Special Issue on Phenology
- 2023 - Present: Clean Lakes Alliance Community Board Member
- 2022 - Present: Science Advisory Board for the International Joint Commission's Great Lakes Winter Science Study
- 2019 - Present: Science Advisory Board for WICCI (Wisconsin Initiative on Climate Change Impact)
- 2019 - Present: University of Wisconsin-Madison Faculty Senate representative
- 2019 - Present: Wisconsin Salt Wise steering committee
- 2018 - 2022: Water @ UW executive committee member

Society Membership and Service

- GLEON workshop organizer 2014, 2015, 2016, 2019, 2020, 2022
- Session Chair ASLO 2024 - Limnology of polar environments
- Session Chair JASM 2022 - Winter Science Symposium
- Session Chair JASM 2022 - Phenological Change in Aquatic Ecosystems
- Session Chair ASLO 2018 - Change in lakes and rivers at regional, continental and global scales

Reviewer

- Panel reviewer:
 - National Science Foundation (NSF): GRFP
 - NASA Habitable Worlds
 - NSF Division of Environmental Biology (DEB): Ecosystem Science Cluster
 - NSF Office of Polar Programs
- Proposal reviewer:
 - NSF Office of Polar Programs
 - NSF Division of Environmental Biology
 - United States Environmental Protection Agency (EPA)

- Mitacs Accelerate Canada
- Italian Antarctic Committee
- Minnesota Environment and Natural Resources Trust Fund
- Manuscript reviewer: Annals of Glaciology, Applied Ecology, Applied Geochemistry, Bioscience, Ecosphere, Geophysical Research Letters, Great Lakes Research, Inland Waters, Journal of Geophysical Research - Biogeosciences, Journal of Geophysical Research - Earth Surface, Journal of Hydrology, Limnology and Oceanography, Limnology and Oceanography Letters, Nature Geoscience, Nature Sustainability, PNAS, Sedimentology, Water Resources Research, Water Resources Research Management
- University of Wisconsin - Hatch Proposals
- University of Wisconsin - Graduate Women in Science Ruth Dickie Scholarship
- 2015 and 2016 Hudson Data Jam Competition Judge (Grades 6-12)

Other

Analyst for the Canadian Polar Commission (2015)

- Provided analytical support to produce a Results Bulletin of long-term scientific monitoring in northern Canada

Developed workshop series on Gender, Workplace Climate, and Limnology (2015)

- Successful grant application to Women in Science and Engineering Leadership Institute at UW-Madison (\$1500)

Outreach and broader impacts

Hosted Workshops

- 2024 Winter School. Trout Lake Station, Wisconsin, USA
- 2023 Data Visualization. Trent University, Peterborough, Ontario, Canada
- 2023 Integrating Remote Sensing, In Situ, And Physically-Based Modeling Approaches To Understand Global Lake Ice Dynamics. Madison, Wisconsin, USA
- 2022 How to write a model in R. GLEON 22, Lake George, NY
- 2020 Workshop on Knowledge Guided Machine Learning. University of Minnesota, Virtual Meeting
- 2020 Process-based lake modeling in R using GLM (General Lake Model). GLEON 21.5, Virtual Meeting
- 2019 The General Lake Model: Introduction to modeling in R. GLEON 21 Meeting, Ontario, Canada
- 2018 A new paradigm in lake and reservoir research and management through global monitoring, modeling, and engaging and empowering people networks. Alexandria, Virginia
- 2017 Calibration workflows for General Lake Model users. University of Wisconsin-Madison
- 2016 Doing the most with your data: Processing, products, metadata and web applications. GLEON 18 Meeting, Gaming, Austria
- 2015 How to Build a Dynamic Model in R. GLEON 17 Meeting, Chuncheon, South Korea
- 2015 General Lake Model workshop: calibration and simulations. University of Wisconsin-Madison
- 2014 The Age of Carbon and Water in the Lake Catchment System. GLEON 16 Meeting, Orford, Quebec

Media and Public Talks

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|----------|--------------------------------------|--|
| 2024-Nov | Inside Climate News | Topic: Lake ice |
| 2024-Nov | Unsalted Podcast | Topic: Lake ice |
| 2024-Oct | Michigan Public | Topic: Lake ice |
| 2024-Mar | Urban Milwaukee | Topic: Salt use |
| 2024-Mar | Lemonadist | Topic: Salinization |
| 2024-Feb | WKOW 27 | Topic: Lake ice |
| 2024-Jan | Winter Salt Awareness Week | Topic: Trends in freshwater salinization |
| 2024-Jan | Clean Lakes Alliance Science Caf<8e> | Topic: What's under the ice |
| 2024-Jan | Overture Center | Topic: Winter Limnology |
| 2023-Mar | WPR | Topic: Great Lakes ice |
| 2023-Feb | Antarctic Sun | Topic: Antarctica |
| 2023-Jan | PBS Here and Now | Topic: Salinization |

2023-Jan	WPR Central Time	Topic: Lake ice
2023-Jan	WISC-TV	Topic: Salt awareness week
2023-Jan	Wisconsin State Journal	Topic: Oversalting
2023-Jan	CapTimes	Topic: Oversalting
2023-Jan	WORT radio	Topic: Oversalting
2022-Nov	Friends of UW Arboretum	Topic: Climate change and lakes
2022-Oct	Badger Talk: The Atkinson Club, Jefferson County	Topic: Salinization
2022-Oct	Rock River Confluence Speaker	Topic: Salinization
2022-Oct	Wisconsin State Journal, Letters and Sciences Fueling Discovery	Topic: Warming winters
2022-Oct	Wisconsin PBS	Topic: Salinization
2022-Aug	Channel 3000 / News 3 Now Interview	Topic: Droughts
2022-Aug	City of MKE - Salt Wise Environmental Impacts Video	Topic: Salinization
2022-Apr	Earth Day Water@UW: Addressing Wisconsin's water challenges panelist/presenter	Topic: Salinization
2022-Mar	UW-Madison Wednesday Nite at the Lab	Topic: Salinization
2022-Mar	Podcast Interview: Under our Feet	Topic: Lakes
2022-Feb	Interviewed: AGU EOS	Topic: Chloride Pollution
2022-Feb	Interviewed: USA Today	Topic: Chloride Pollution
2022-Feb	Interviewed: Badger Herald	Topic: Chloride Pollution
2022-Feb	Live Interview: Wisconsin Public Radio Morning Show: Discussion on road salt solutions in Wisconsin	Topic: Chloride Pollution
2021-Nov	Accuweather Segment	Topic: Salinization of freshwater
2021-Oct	Midvale Sunday Adult Forum	Topic: Salinization
2021-Oct	Wisconsin Science Festival Big Ideas for Busy People	Topic: Lakes and climate change
2021-Sep	Live Interview: WORT Public Radio	Topic: What's new in Limnology
2021-Feb	Live Interview: Wisconsin Public Radio Morning Show: Discussion on road salt solutions in Wisconsin	Topic: Chloride Pollution
2021-Jan	Wi Salt Wise: Salt Awareness Week	Topic: Salinization
2021-Jan	Interviewed: WORT Public Radio	Topic: Salinization
2021-Jan	Interviewed: WXPR	Topic: Winter Limnology
2020-Aug	Magazine article: Environmental Monitor	Topic: Salinization
2020-Jun	Podcast Interview: The Story of Nitrogen	Topic: Salinization
2020-Jan	Interviewed: WXPR	Topic: Chloride Pollution
2020-Jan	Interviewed: Channel 3000	Topic: Chloride Pollution
2020-Jan	city of MKE - Salt Wise Environmental Impacts Video	Topic: Lake ice
2019-Dec	Speaker: Badger Cafe, Milwaukee, WI	Topic: Chloride Pollution
2019-Dec	Interviewed: USA Today	Topic: Chloride Pollution
2019-Nov	Panelist and Speaker: Lake Science for Muskoka: A global perspective on problems and solutions. Canada	Topic: Chloride Pollution
2019-Nov	Speaker: Caring for Creation Lecture Series, Bethel Lutheran Church, Madison WI	Topic: Chloride Pollution
2019-Nov	Live Interview: Wisconsin Public Radio Morning Show: Discussion on road salt solutions in Wisconsin	Topic: Chloride Pollution
2019-Nov	Interviewed: Wall Street Journal: "In Effort to Avoid Rock Salt, States Look to Briny Solutions"	Topic: Chloride Pollution
2019-Oct	Speaker: WisDOT, Wisconsin Rapids, WI (207 attendees)	Topic: Chloride Pollution
2019-Jun	Speaker: Federation of Environmental Technologists, Clean Water in a Changing Wisconsin Seminar, Madison, WI (12 attendees)	Topic: Chloride Pollution
2019-Jun	Speaker: WisDOT Bureau of Highway Maintenance, Madison WI (30 attendees)	Topic: Chloride Pollution
2019-May	Speaker: Water@UW symposium: Madison, WI (200 + attendees)	Topic: Chloride Pollution
2019-Apr	Interviewed: Daily Cardinal, WI	Topic: Algal Blooms
2019-Mar	Speaker: Yahara Watershed Academy, Madison, WI	Topic: Chloride Pollution
2019-Mar	Interviewed: Channel 3000 News	Topic: Chloride Pollution
2019-Feb	Speaker: Brining Technical Advisory Committee, Jefferson, WI	Topic: Chloride Pollution
2019-Feb	Speaker: Science on Tap, Madison, WI (80 attendees)	Topic: Chloride Pollution
2019-Feb	Speaker: Central Waters - Science on Tap, Amherst, WI (15 attendees)	Topic: Chloride Pollution
2019-Feb	Live Interview: Wisconsin Public Radio Morning Show: Discussion on road salt	Topic: Chloride Pollution
2019-Feb	Speaker: Clean Lakes Alliance Breakfast, Madison, WI (60 attendees)	Topic: Chloride Pollution

2019-Feb	Interviewed: ABC27 News	Topic: Chloride Pollution
2019-Feb	Interviewed: WORT Public Radio, Madison WI	Topic: Chloride Pollution
2019-Jan	Interviewed: Chemical and Engineering News	Topic: Chloride Pollution
2018-Dec	Interviewed: Wisconsin State Journal, Know your Madisonian	Topic: Madison
2018-Aug	Interviewed: Wisconsin State Journal, Yahara Lakes Series	Topic: Yahara Lakes
2018-Jul	Interviewed: WORT radio, Madison, WI	Topic: Algal Blooms
2018-Jul	Interviewed: National Wildlife Magazine	Topic: Chloride Pollution
2018-Apr	Speaker: Nicolet college - Teaching in Retirement	Topic: Chloride Pollution
2018-Apr	Speaker: Minocqua Science on Tap	Topic: Chloride Pollution
2018-Mar	Interviewed: Yahara watershed flim	Topic: Wisconsin Lakes
2018-Mar	Interviewed: WPR Northwoods	Topic: Chloride Pollution
2018-Feb	Interviewed: CBS Milwaukee	Topic: Chloride Pollution
2018-Feb	Speaker: Minnesota Road Salt Symposium	Topic: Chloride Pollution
2018-Jan	Interviewed: Associated Press	Topic: Chloride Pollution
2018-Jan	Interviewed: CBC, The Current	Topic: Chloride Pollution
2018-Jan	Interviewed: Global News Radio 640	Topic: Chloride Pollution
2017-Oct	Speaker: WWF Great Lakes Chloride Symposium	Topic: Chloride Pollution
2017-Apr	Interviewed: CBC TV, WPR	Topic: Chloride Pollution
2017-Mar	Interviewed: Channel 3 TV	Topic: Chloride Pollution

Outreach

2024-Jun	Venue: UW-Madison CIMMS Summer Camp
2023-Oct	Venue: Dane County plow operators salt awareness
2023-Jun	Venue: Hasler Lab open house
2023-Jun	Venue: UW-Madison CIMMS Summer Camp
2023-Feb	Venue: Frozen Assets Festival
2022-Jul	Venue: Grandparent's University
2022-Jun	Venue: Lake Mendota tour, Nelson Institute environmental sensing class
2022-Jun	Venue: Hasler Lab open house
2019-Aug	Venue: Trout Lake Station open house
2019-Jun	Venue: Hasler Lab open house
2019-Jun	Venue: UW-Madison CIMMS Summer Camp (18 students)
2018-Aug	Venue: Trout Lake Station open house
2018-Jun	Venue: UW-Madison CIMMS Summer Camp (18 students)
2018-Jun	Venue: Hasler Lab open house
2017-Sep	Venue: Jumping Worm Survey Leader
2017-Jul	Venue: Museum Camp
2017-Jun	Venue: UW-Madison CIMMS Summer Camp (17 students)
2017-Jun	Venue: Clean Lakes Alliance watershed academy - Tour guide
2017-Jun	Venue: CFL Press Day - Buoy tour
2017-Jun	Venue: Hasler Lab open house
2017-May	Venue: UW People Program - Limnology Bootcamp

Select conference presentations

1. Dugan, H., Platt, L., Steele, B., Ross, M., Reinl, K., & Sterner, R. (2024). *Remote sensing the relationship between climate, sediment plumes, and algal blooms in lake superior*. ASLO Summer Meeting.
2. Dugan, H., Gooseff, M., Doran, P., Lawrence, J., Takacs-Vesbach, C., & Priscu, J. (2024). *Ice trends and heat storage dynamics in permanently ice-covered antarctic lakes: A 28 year study*. AGU Fall Meeting.
3. Dugan, H., Solomon, C., Hintz, W., & Jones, S. (2023). *Upper bounds of chloride concentrations in the laurentian great lakes watershed*. IAGLR Conference on Great Lakes Research.
4. Dugan, H., Rock, L., & Ladwig, R. (2022). *The impact of anthropogenic salinization on lake hydrodynamics and riverine salinity regimes in an urban watershed*. Joint Aquatic Sciences Meeting.
5. Dugan, H., Gorsky, A., Whitaker, E., Socha, E., & Lottig, N. (2021). *Under-ice physical and biological responses to a multi-year snow removal*. ASLO Aquatic Sciences Meeting.

6. Dugan, H. (2019). *Salting wisconsin's lakes*. Wisconsin Lakes Convention.
7. Dugan, H. (2019). *Panel discussion: Using the water quality portal for regional and national water-quality studies*. "National Water Quality Monitoring Conference."
8. Dugan, H., Whitaker, E., Gavin, Q., & Stanley, E. (2019). *Ice and light: A tale of two winters on lake mendota*. "AGU Chapman Conference on Winter Limnology."
9. Desai, A., Reed, D., Dugan, H., Loken, L., Schramm, P., Golub, M., Huerd, H., Baldocchi, A., Roberts, R., Taebel, Z., Hart, J., Hanson, P., Stanley, E., & Cartwright, E. (2018). *Advancing approaches for multi-year high-frequency monitoring of temporal and spatial variability in carbon cycle fluxes and drivers in freshwater lakes*. AGU Fall Meeting.
10. Dugan, H. (2018). *Is the loss of lake ice ecology relevant?* ASLO Summer Meeting.
11. Foley, N., Tulaczyk, S., Gooseff, M., Myers, K., Doran, P., Auken, E., Dugan, H., Mikucki, J., & Virginia, R. (2018). *Thin, conductive permafrost surrounding lake fryxell indicates salts from past lakes, McMurdo dry valleys, antarctica*. AGU Fall Meeting.
12. Lottig, N., Schramm, P., Dugan, H., Powers, S., & Stanley, E. (2018). *Lake metabolism under ice*. ASLO Summer Meeting.
13. Hanson, P., Khandelwal, A., Karpatne, A., Jia, X., Dugan, H., Read, J., & Kumar, V. (2018). *Global monitoring system leads to new insights for our changing inland waters*. ASLO Summer Meeting.
14. Doran, P., Myers, K., Foley, N., Tulaczyk, S., Dugan, H., Auken, E., Mikucki, J., & Virginia, R. (2018). *Groundwater and thaw legacy of a large paleolake in taylor valley, east antarctica as evidenced by airborne electromagnetic and sedimentological techniques*. AGU Fall Meeting.
15. Dugan, H., Bartlett, S., Burke, S., Doubek, J., Krivak-Tetley, F., Skaff, N., Summers, J., Farrell, K., McCullough, I., Morales-Williams, A., Roberts, D., Scordo, F., Yang, Z., Hanson, P., & Weathers, K. (2017). *Salting freshwater lakes*. ESA Annual Meeting.
16. Dugan, H., KC Weathers, & Hanson, P. (2016). *Outcomes from the GLEON fellowship program. Training graduate students in data driven network science*. AGU Fall Meeting.
17. Dugan, H., Bartlett, S., Burke, S., Doubek, J., Krivak-Tetley, F., Skaff, N., Summers, J., Farrell, K., McCullough, I., Morales-Williams, A., Roberts, D., Scordo, F., Yang, Z., Hanson, P., & Weathers, K. (2016). *Salting our freshwaters*. GLEON 18 Meeting.
18. Myers, K., Dugan, H., Doran, P., Foley, N., Tulaczyk, S., Auken, E., Mikucki, J., Virginia, R., Hawes, I., & Leidman, S. (2016). *Active layer hydrologic controls on the geochemistry of lake vanda, antarctica*. SCAR 2016.
19. Hanson, P., CC Cary, & Dugan, H. (2016). *Exploring the controls over carbon storage and emission in lakes through simulation models*. ASLO Summer Meeting.
20. Dugan, H., Weathers, K., Hanson, P., Hong, G., & Read, E. (2015). *Training graduate students in an era of "big ecology and team science": The GLEON fellowship program*. LTER All Scientists Meeting.
21. Dugan, H., Bartlett, S., Burke, S., Doubek, J., Krivak-Tetley, F., Skaff, N., Summers, J., Farrell, K., McCullough, I., Morales-Williams, A., Roberts, D., Scordo, F., Yang, Z., Hanson, P., Hong, G., & Weathers, K. (2015). *A macrosystems study of global chloride trends, drivers, and ecological impacts in lakes*. GLEON 17 Meeting.
22. Dugan, H., Bartlett, S., Burke, S., Doubek, J., Krivak-Tetley, F., Skaff, N., Summers, J., Farrell, K., McCullough, I., Morales-Williams, A., Roberts, D., Scordo, F., Yang, Z., Hanson, P., & Weathers, K. (2015). *Salting our freshwater: A macrosystems study of global chloride patterns and trends in lakes*. AGU Fall Meeting.
23. Hanson, P., Dugan, H., & Carey, C. (2015). *Seasonal lake metabolism and its consequences for long-term organic carbon cycling in lakes*. ESA Annual Meeting.
24. Hanson, P., Read, J., & Dugan, H. (2015). *Organic carbon cycling in lakes: Exploring the source and sink balance through process modeling*. CGU Annual Meeting.
25. Doran, P., Mikucki, J., Tulaczyk, S., Priscu, J., Obryk, M., Dugan, H., Virginia, R., & Auken, E. (2015). *New observations of hydrologic connectivity in McMurdo dry valley lakes*. Aquatic Sciences Meeting.
26. Dugan, H., Santoso, A., Corman, J., Jaimes, A., Nodine, E., Patil, V., Woolway, R., Zwart, J., Bentrup, J., Hetherington, A., Oliver, S., Read, J., Winters, K., Hanson, P., Read, E., Winslow, L., & Weathers, K. (2014). *Consequences of gas flux model choice on the interpretation of metabolic balance across 15 lakes*. Joint Aquatic Sciences Meeting.
27. Dugan, H., Hanson, P., Gil, Y., Michel, F., Duffy, C., Read, J., & Snorheim, C. (2014). *An organic collaborative approach to science in the northwoods*. 3rd Science in the Northwoods Meeting.
28. Dugan, H., Doran, P., Tulaczyk, S., Mikucki, J., Arcone, S., Acken, E., Schamper, C., & Virginia, R. (2014). *Subsurface imaging reveals aquifer beneath an ice-sealed antarctic lake*. SCAR Annual Meeting.
29. Dugan, H., Doran, P., Tulaczyk, S., Mikucki, J., Arcone, S., Aucken, E., & Schamper, C. (2014). *Geophysical imaging reveals brine beneath an ice-sealed antarctic lake*. AGU Fall Meeting.

30. Mikucki, J., Auken, E., Tulaczyk, S., Virginia, R., Schamper, C., Sørensen, K., Doran, P., Dugan, H., & Foley, N. (2014). *Aerial EM survey reveals groundwater systems beneath Taylor Valley, Antarctica*. AGU Fall Meeting.
31. Dugan, H., MK Obryk, & Doran, P. (2012). *High-resolution monitoring of long term changes in physical limnology, McMurdo dry valleys, Antarctica*. LTER All Scientists Meeting.
32. Dugan, H., MK Obryk, & Doran, P. (2012). *Ablation rates of permanently ice-covered Antarctic lakes*. XXXII SCAR Meeting.
33. Dugan, H., Doran, P., Wagner, B., Arcone, S., C Fritsen, & Murray, A. (2012). *Exposing Lake Vida, Antarctica*. NASA Astrobiology Meeting.
34. Dugan, H., Doran, P., Fritsen, C., F Kenig, & Murray, A. (2011). *The formation of a 26 m ice cover on Lake Vida, Antarctica*. 11th International Symposium on Antarctic Earth Sciences.
35. Dugan, H., Doran, P., Fritsen, C., Kenig, F., Murray, A., & Arcone, S. (2011). *A 26 m ice cover on Lake Vida, Antarctica*. AGU Fall Meeting.
36. Dugan, H., & Lamoureux, S. (2010). *The chemical evolution of a hypersaline coastal lake in the high Arctic*. Arctic Workshop.
37. Dugan, H., Lamoureux, S., M Lafrenière, & Lewis, T. (2010). *The impact of permafrost disturbances and sediment loading on the seasonal mixing of two high Arctic lakes*. Annual Meeting of the Canadian Geophysical Union.
38. Dugan, H., Lamoureux, S., M Lafrenière, & Lewis, T. (2008). *Hydrological and sediment yield response to rainfall in a high Arctic watershed*. Annual Meeting of the Canadian Geophysical Union.
39. Dugan, H., Lewis, T., S Lamoureux, & Lafrenière, M. (2008). *Investigating the formation of high conductivity bottom water in a freshwater high Arctic lake*. Arctic Change 2008.