JOHN ASHLEY DOWNING
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Born: Iowa City, Iowa, USA. Grew up in the Twin Cities of Minnesota and Grand Rapids, MN.

Citizenship: USA.

Languages: I speak English and French fluently. I read these plus limited German, Italian, Portugese, and Spanish.

Academic and Research Experience

Position	Dates	Department	Institution
Director	December 2015+	Minnesota Sea Grant College Program	University of Minnesota Duluth
Professor	December 2015+	Large Lakes Observatory	University of Minnesota Duluth
Professor	December 2015+	Department of Biology	University of Minnesota Duluth
Chair, Environmental Science Graduate Program	January 2010-December 2015	Inter-departmental	Iowa State University
Sabbatical leave	September 2007-May 2008	Institut Mediterrani d'Estudis Avançats. (Mediterranean Institute for Advanced Studies)	Universitat de las Illes Balears; Consejo Superior de Investigaciones Cientificas
Professor	July 2003-December 2016	Ecology, Evolution, and Organismal Biology	Iowa State University
Adjunct Professor[1]	October 2007-2015	Science	Itasca Community College
Professor	July 2002-2003	Botany	Iowa State University
Professor	July 2002	Natural Resources Ecology and Management	Iowa State University
Professor (courtesy	January	Agricultural &	Iowa State University

[1] Adjunct status accepted in order to help build a water quality technology training program for students in an economically disadvantaged area

appointment)	2002+	Biosystems Engineering	
Professor	January 1995-2002	Animal Ecology	Iowa State University
Research Associate	July 1994-96	Ecology, Evolution & Behavior	University of Minnesota
Adjunct Professor	April 1994-97	Biology	Macalester College
Director, Laurentian Biological Station	April 90-Dec 95	Biological Sci.	University of Montréal
Professor	June 93-95	Biological Sci.	University of Montréal
Associate Professor	June 88-May 93	Biological Sci.	University of Montréal
Adjunct Professor	Jan. 81+	Dept. Biology	McGill University
Assistant Professor	June 87-May 88	Biological Sci.	University of Montréal
Univ. Research Fellow[2]	June 82-May 87	Biological Sci.	University of Montréal
Postdoctoral Fellow	Apr.81-June 82	Biological Sci.	University of Montréal
Postdoctoral Fellow	Apr.80-Apr. 81	Dept. Biology	McGill University
Lecturer	Dec.79-Apr.80	Dept. Biology	McGill University

Education

Degree/Position	Institution	Dates
Postdoctoral Fellow	University of Montréal, Canada	April 1981-June 1982
Postdoctoral Fellow	McGill University, Montréal, Can.	April 1980-March 1981
Ph.D.(Biol.) with Honors	McGill University, Montréal,Can.	September 1975-Dec. 1979
M.S.(Zool.)	North Dakota State Univ., Fargo, ND	June 1973-July 1975
B.S.(Biol.) with Honors.	Hamline University, St. Paul, MN	September 1969-May 1973

Honors & Distinctions

Year	Organization	Award/Honor
2025	*Association for the Sciences of Limnology and Oceanography*	John H. Martin Award for a publication lleading to fundamental shifts in research focus and

[2]The University Research Fellowship program of NSERC funded "a select number of very promising researchers" and carried the beginning rank of assistant professor.

		interpretation of a large body of previous observations
2021	*Council of Scientific Society Presidents*	Visionary Leader Award
2020	*American Association for the Advancement of Science (AAAS)*	Elected to be a AAAS Fellow, and member of the Atmospheric and Hydrospheric Sciences Section
2020	*Council of Scientific Society Presidents (CSSP)*	Elected to Executive Board
2018	*Association for the Sciences of Limnology and Oceanography*	John Martin Award for a most impactful publication (with Bob Howarth)
2017	*Association for the Sciences of Limnology and Oceanography*	Elected Sustaining Fellow
2014	*Hamline University*	Outstanding Alumni Acheivement Award
2013	*Council of Scientific Society Presidents*	Elected chair (function of President, but President of Presidents sounds awkward)
2013	*Iowa State University College of Agriculture*	Research Excellence Award
2013	*International Society of Limnology (SIL)*	Thieneman-Naumann Medal for excellence in limnological research
2012	*Council of Scientific Society Presidents*	Elected Secretary and member of the Executive Board
2012	*Agricultural and Applied Economics Association (AAEA)*	Bruce Gardner Memorial Prize for Applied Policy Analysis
2012	*Association for the Sciences of Limnology and Oceanography*	Elected President
2012	*International Oceanographic Commission (UNESCO)*	Invited member of the US National Committee
2012	*Society for Freshwater Science*	Invited plenary speaker for 2012 annual meeting
2012	*Center for Limnology, University of Wisconsin, Madison*	Designated *Kaeser Visiting Scholar*
2011	*Council of Scientific Society Presidents*	Elected Board Member At-Large
2011	*Iowa State University – Iowa Board of Regent's*	Regent's Faculty Excellence Award
2011	*American Society of Limnology and Oceanography*	Ruth Patrick Award; "for outstanding research by a scientist in the application of basic aquatic science principles to the identification, analysis and/or solution of important environmental problems"
2010	*Canada's HydroNet System; a national*	Invited member, Technical

	network of aquatic scientists and hydrologists	Advisory Board
2010	*International Society of Limnology (SIL)*	Invited member of the Editorial Board for the flagship journal, *Inland Waters*
2010	*American Society of Limnology and Oceanography*	Elected President-elect by the membership at large (2y as President Elect, 2y as President, 2y as Past President)
2009	*Iowa State University*	Elected Chair, Environmental Science Graduate Major
2008	*International Prize for Biology*	Invited speaker in honor of David Tilman, 24th annual IPB recipient
2008	*North American Lake Management Society*	Invited plenary speaker; 2008 meeting in Lake Louise, Alberta
2007	*Itasca Water Legacy Partnership*	Invited member of the Permanent Board
2007	*SIL (Societas Internationalis Limnologiae)*	Invited plenary speaker; 2007 Meeting in Montréal, Québec, Canada
2006	*Blandin Foundation*	Invited member of Itasca Water Legacy Partnership Working Board
2006	*American Society of Limnology and Oceanography*	Elected member of the Board of Directors
2005	*Elsevier Publishers*	Invited co-editor for the *Water Encylopedia*
2005	*American Society of Limnology and Oceanography*	Invited Chair of the Hutchinson Award Committee and the ASLO Awards Committee
2004	*North American Nitrogen Center, Cornell Univ.*	Invited member of Board of Directors
2004	*Natural Sciences and Engineering Research Council of Canada*	Invited panel member for the EWR Steacie Award, Canada's highest scientific honor
2004	*International Association of Great Lakes Research*	Invited plenary speaker for 2004 annual meeting.
2003	*Iowa Governor's Office*	Appointed by Governor to represent him on the Water Quality working group, preparing for the 2003 Iowa Water Summit
2002	*Natural Sciences and Engineering Research Council of Canada*	President of the Ecology and Evolution Panel (GSC 18); 2002-2003); only foreign president
2001	*North American Benthological Society*	Invited Plenary Speaker, Annual Meeting, LaCrosse, Wisconsin

2001	*Great Plains Limnologists*	Invited Plenary Speaker, Annual Meeting, Iowa Lakeside Lab
2001	*Iowa State Water Resources Research Insititute*	Annual Award for Excellence in Water Research
2000	*Sierra Club, Iowa Chapter*	Grass Roots Conservationist Award
1997	*American Society of Limnology and Oceanography*	Invited Co-Chair of ASLO 1999 Aquatic Sciences Meeting
1997	*Council on Agricultural Science and Technology*	Invited Gulf of Mexico hypoxia Task-Force Chair.
1996	*National Center for Ecological Synthesis*	Invited Participant; Workshop on Meta-analysis
1996	*Canadian Journal of Fisheries and Aquatic Sciences*	Invited Editorial Board Member
1995	*Hamline University*	Elected to the Hamline University "Science Alumni Gallery of Achievement"; one of only 17 such awards in 150 year history of HU
1993	*American Fisheries Society*	Designated best article in 1992 volume of *Trans. Am. Fish. Soc.*
1993	*NSERC, Ecology panel*	Designated one of Canada's best ecologists (top 15%)
1990	*University of Montréal*	Appointed Director of the Laurentian Biological Station
1990-92	*FCAR, granting agency, Ecology panel.*	Elected President
1985	*Rawson Academy of Aquatic Science.*	Invited Fellow
1982	*NSERC (Canada's "NSF")*	University Research Fellow
1980	*NSERC*	Postdoctoral Fellowship
1980	*FCAR, Min. Educ. Québec.*	Postdoctoral Fellowship
1980	*McGill University*	Dean's Honour List (Ph.D.)
1976	*McGill University*	Carpenter Fellow
1973	*Hamline University*	Special Dept. Honors for Research
1971	*Hamline University*	Walter Kenyon Scholar

Refereed Publications

41,300 citations, h-index=89, i-index=151
(my current administrative duties have slowed my publication output)

Downing, J.A. (2024), What's hot and what's not in the aquatic sciences—Understanding and improving news coverage. Limnol. Oceanogr. Lett. https://doi.org/10.1002/lol2.10425

Jones, J. R., Pope-Cole, K., Obrecht, D. V., Harlan, J. D., Knoll, L. B., & Downing, J. A. (2023). Carbon and nutrient sequestration in small impoundments: a regional

study with global implications. *Inland Waters*, *13*(3), 374–387. https://doi.org/10.1080/20442041.2023.2265799

Hodapp, D., Armonies, W., Dannheim, J., Downing, J. A., Filstrup, C. T., & Hillebrand, H. (2023). Individual species and site dynamics are the main drivers of spatial scaling of stability in aquatic communities. *Frontiers in Ecology and Evolution*, *11*, 864534.

Bramburger, A. J., Filstrup, C. T., Reavie, E. D., Sheik, C. S., Haffner, G. D., Depew, D. C., & Downing, J. A. (2023). Paradox versus paradigm: A disconnect between understanding and management of freshwater cyanobacterial harmful algae blooms. *Freshwater Biology*, 68, 191-201. https://doi.org/10.1111/fwb.14019

Downing, J.A., S. Polasky, S.M. Olmstead and S.C. Newbold. (2021) Protecting local water quality has global benefits. Nature Communications **12:** 2709 (2021). https://doi.org/10.1038/s41467-021-22836-3

Morales-Williams, A. M., A. D. Wanamaker, C. J. Williams, and J. A. Downing. (2021) Eutrophication Drives Extreme Seasonal CO_2 Flux in Lake Ecosystems. Ecosystems **24**:434-450.

Soranno, P.A., Downing, J.A. and Curto, T.L. (2021), Founding *Limnology & Oceanography Letters*: The challenges, risks, and rewards of launching a new scientific journal. Limnol. Oceanogr. https://doi.org/10.1002/lol2.10182

Downing, J.A. (2020), Science Societies, Publication and Open Access Mandates. Limnology and Oceanography Bulletin, 29: 78-80. https://doi.org/10.1002/lob.10397

Beaulieu, J.J., T. DelSontro & J.A. Downing. (2019) Eutrophication will increase methane emissions from lakes and impoundments during the 21st century. Nature Comm. doi.org/10.1038/s41467-019-09100-5

Downing, J.A. & R.G. Striegl (2018) Size, age, renewal, and discharge of groundwater carbon, Inland Waters, 8:1, 122-127, DOI: 10.1080/20442041.2017.1412918

DelSontro, T. , Beaulieu, J. J. and Downing, J. A. (2018), Greenhouse gas emissions from lakes and impoundments: Upscaling in the face of global change. Limnol. Oceanogr., 3: 64-75. doi:10.1002/lol2.10073

Filstrup, CT, T Wagner, SK Oliver, CA Stow, KE Webster, EH Stanley, & JA Downing. 2018. Evidence for regional nitrogen stress on chlorophyll *a* in lakes across large landscape and climate gradients. *Limnology and Oceanography* 63: S324-S339. doi: 10.1002/lno.10742

Hillebrand, H, B Blasius, ET Borer, JM Chase, JA Downing, BK Eriksson, CT Filstrup, WS Harpole, D Hodapp, S Larsen, AM Lewandowska, EW Seabloom, DB Van de Waal, & AB Ryabov. 2018. Biodiversity change is uncoupled from species richness trends: consequences for conservation and monitoring. *Journal of Applied Ecology* 55:169-184. doi: 10.1111/1365-2664.12959

Soranno, Patricia A, Linda C Bacon, Michael Beauchene, Karen E Bednar, Edward G Bissell, Claire K Boudreau, Marvin G Boyer, John A Downing et al. 2017. "LAGOS-NE: A Multi-Scaled Geospatial and Temporal Database of Lake Ecological Context and Water Quality for Thousands of U.S. Lakes." *GigaScience*, October, gix101-gix101. http://dx.doi.org/10.1093/gigascience/gix101.

Xenopoulos, M.A., J.A. Downing, M.D. Kumar, S. Menden-Deuer, and M. Voss. 2017. Headwaters to oceans: ecological and biogeochemical contrasts across the aquatic continuum. Limnology and Oceanography.

Filstrup, C.T. and J.A. Downing. 2017. Relationship of chlorophyll to phosphorus and nitrogen in nutrient-rich lakes. Inland Waters

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Morales-Williams A, Wanamaker, A. D., Jr, Downing J.A. 2017. Cyanobacterial carbon concentrating mechanisms facilitate sustained CO_2 depletion in eutrophic lakes. Biogeosciences. 14(11):2865-75.

Downing, J.A., C.T. Cherrier and R.W. Fulweiler. 2016. Low ratios of silica to dissolved nitrogen supplied to rivers arise from agriculture not reservoirs. Ecology Letters (2016) doi: 10.1111/ele.12689

Kalff, J. and J.A. Downing. 2016. Limnology: inland waters ecosystems. Bibliogenica, edition 2.0 (e-book).

Downing, J.A. 2016. Val Houston Smith: empiricism in the service of theory. Inland Waters. 6(2):123 10.5268/IW-6.2

Oliver, S.K., P.A. Soranno, C.E. Fergus, T. Wagner, L.A. Winslow, C.E. Scott, K.E. Webster, J.A. Downing, and E.H. Stanley. 2016. Prediction of lake depth across a 17-state region in the U.S. Inland Waters. 6(3): 314-324 10.5268/IW-6.3.957

Filstrup, C.T., A.J. Heathcote, D.L. Kendall, and J.A. Downing. 2016. Phytoplankton taxonomic compositional shifts across nutrient and light gradients in temperate lakes. Inland Waters. 6:2, 234-249.

Jones, J.R., D.V. Obrecht, J.L. Graham, M.B. Balmer, C.T. Filstrup, and J.A. Downing. 2016. Seasonal patterns in carbon dioxide in 15 mid-continent (USA) reservoirs. Inland Waters. (in press)

Heathcote, A.J., C.T. Filstrup, D.L. Kendall and J.A. Downing. 2016. Biomass pyramids in lake plankton: influence of Cyanobacteria size and abundance. Inland Waters. 6: 250-257

Bale, N. J., Hopmans, E. C., Schoon, P. L., de Kluijver, A., Downing, J. A., Middelburg, J. J., Sinninghe Damsté, J. S. and Schouten, S. (2016), Impact of trophic state on the distribution of intact polar lipids in surface waters of lakes. Limnol. Oceanogr., 61: 1065–1077. doi:10.1002/lno.10274

Soranno, P. A., E. G. Bissell, K. S. Cheruvelil, S. T. Christel, S. M. Collins, C. E. Fergus, C. T. Filstrup, J. F. Lapierre, N. R. Lottig, S. K. Oliver, C. E. Scott, N. J. Smith, S. Stopyak, S. Yuan, M. T. Bremigan, J. A. Downing, C. Gries, E. N. Henry, N. K. Skaff, E. H. Stanley, C. A. Stow, P. N. Tan, T. Wagner, and K. E. Webster. 2015. "Building a multi-scaled geospatial temporal ecology database from disparate data sources: fostering open science and data reuse." *Gigascience* 4:15. doi: 10.1186/s13742-015-0067-4

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Heathcote AJ, Ramstack Hobbs JM, Anderson NJ, Frings P, Engstrom DR, and Downing JA. 2015. Diatom floristic change and lake paleoproduction as evidence of recent eutrophication in shallow lakes of the midwestern USA. Journal of Paleolimnology 53 (1): 17-34.

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de Kluijver, A., Schoon, P. L., Downing, J. A., Schouten, S., and Middelburg, J. J.: Stable carbon isotope biogeochemistry of lakes along a trophic gradient, Biogeosciences, 11, 6265-6276, 10.5194/bg-11-6265-2014, 2014.

Lottig, N. R., Wagner, T., Henry, E. N., Cheruvelil, K. S., Webster, K. E., Downing, J. A., and Stow, C. A.: Long-Term Citizen-Collected Data Reveal Geographical Patterns and Temporal Trends in Lake Water Clarity, Plos One, 9, 10.1371/journal.pone.0095769, 2014.

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Pacheco, F., F. Roland, and J.A. Downing. 2013. Eutrophication reverses whole-lake carbon budgets. *Inland Waters* 4(1):41-48.

Schoon, P.L., A. de Kluijver, J.J. Middelburg, J.A. Downing, J.S. Sinninghe Damsté and S. Schouten. 2013. Influence of lake water pH and alkalinity on the distribution of core and intact polar branched dialkyl glycerol tetraethers (GDGTs) in lakes. Organic Geochemistry 60: 72-82.

Heathcote, A.J., C.T. Filstrup and J.A. Downing. 2013. Watershed sediment losses to lakes accelerating despite agricultural soil conservation efforts. *PLOS ONE* 8:e53554

Pittman, B. J.R. Jones, J.J. Millspaugh, R.J. Kremer and J.A. Downing. 2013. Sediment organic carbon distribution in 4 small northern Missouri impoundments: implications for sampling and carbon sequestration. Inland Waters 3: 39-46 DOI: 10.5268/IW-3.1.507

Downing, J.A., J.J. Cole, C.M. Duarte, J.J. Middelburg, J.M. Melack, Y.T. Prairie, P. Kortelainen, W.H. McDowell, R.G. Striegl, and L.J. Tranvik. 2012. Global abundance and size distribution of streams and rivers. *Inland Waters* 2:4, 229-236, DOI: 10.5268/IW-2.4.502

Heathcote, A.J. and J.A. Downing. 2012. Impacts of Landscape Change and Eutrophication on Carbon Burial in Freshwater Lakes. *Ecosystems* DOI: 10.1007/s10021-011-9488-9

Balmer, M.B. and J.A. Downing. 2011. Carbon dioxide concentrations in eutrophic lakes: undersaturation implies atmospheric uptake. *Inland Waters* 1(2): 125-132.

Bastviken,D, L.J. Tranvik, J.A. Downing, P.M. Crill, A. Enrich-Prast. 2011. Carbon and greenhouse gas balances of reservoirs. *Science online letters*. http://www.sciencemag.org/content/331/6013/50/reply

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Egan, K.J., J.A. Herriges, C.L. Kling, and J.A. Downing. 2011. The value of lake water quality improvements: qualitative information from quantitative studies. In: Wheeler, W. and C. Griffiths, eds., *Using Qualitative Methods to Understand Economic Valuation for Water Quality*. Edgar Elgar.

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Downing, J.A., VanMeter, P. and D.A. Woolnough. 2010. Suspects and evidence: a review of the causes of decline and exterpation in freshwater mussels. *Animal Biodiversity and Conservation* 33.2: 151–185

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Likens, G.E., J.A. Downing, and many others (eds). 2009. *Encyclopedia of Inland Waters*. Elsevier.

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Jones, J.R. and J.A. Downing. 2009. Inland waters and agriculture. Pages 225-233, In: Likens, G.E. (ed.), *Encyclopedia of Inland Waters.* Elsevier (invited chapter)

Corrigan, J.R., K.J. Egan, and J.A. Downing. 2009. Aesthetic values of lakes and rivers. Pages 14-24, In: Likens, G.E. (ed.), *Encyclopedia of Inland Waters.* Elsevier (invited chapter)

Woolnough, D.A., J.A. Downing, and T.J. Newton. 2009. Fish movement and habitat use depend on water body size and shape. *Ecology of Freshwater Fish* 18: 83–91.

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Stewart, T.W. and J.A. Downing. 2008. Composition of macroinvertebrate communities and relationships to environmental features in recently constructed wetlands. *Wetlands* 28 (1): 141–150.

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Articles in revision

Downing, J.A., D.C. Adams, B.J. Danielson and S. Forget. Global patterns in mammalian biomass production: implications for conservation, exploitation and climate change. *Ecological Monographs*

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Balmer, M.B. and J.A. Downing. Stream carbon flux and fractionation: influence of discharge, land use, and climate. *Limnology and Oceanography Fluids and Environments*
Blake, T.W. and J.A. Downing. Interannual atmospheric nutrient deposition rates in the agricultural Midwestern United States. *Water, Air, and Soil Pollution*

Downing, J.A. Biodiversity and stability in lakes.
Duarte, C.M., Y.T. Prairie, J.A. Downing, P. Kortelainen, R. Striegl, J. Middelburg, and J.J. Cole. Hidden role of rivers and lakes in global carbon cycling.
Lalonde, S., J.A. Downing and H. Harvey. The influence of isolation and environmental conditions on sexual allocation in seven populations of *Elliptio complanata*.
Mousseau, B. and J.A. Downing. A global analysis of reproductive allometry in mammal populations.
Steinweg, C., K.E. Poole, and J.A. Downing. Dissolved organic carbon in eutrophic lakes is related to phytoplankton, not watershed land use.
Woolnough, D.A., J.A. Downing, and T.J. Newton. Spatial patterns of freshwater mussels and their host fish. Freshwater Biology.

Laboratory Manuals and Pedagogical Resources

Downing, J.A. 1995-2015. Field and laboratory exercises in aquatic ecology. Autopublished. ca. 240 p. (was revised annually)

Recent Unrefereed Publications

I am responsible for the team creating and editing our institute's website at https://seagrant.umn.edu/ The content on this website is the result of my management activities and my dedication to the task of bringing water science to the people who need it. It is the most accessible website at the University of Minnesota.
I publish water science information and resources each month in the Minnesota Sea Grant "Highlights" publication.
Downing, J.A. 2024. Minnesota Lakes Ice-out clock. [video]
Downing, J.A. 2024. Minnesota lakes ice-out clock.
Downing, J.A. 2023. Supernatural lakes: mummies, monsters, ghosts, witches, fairies and aliens. [video]
Downing, J.A. 2023. Supernatural lakes: monsters, ghosts, witches, fairies, and aliens. [video]
Downing, J.A. 2023. Water Purification in the Wild.
Downing, J.A. 2023. Forecasting Ice-Out on Minnesota Lakes.
Downing, J.A. 2022. Clear Information on Murky Lakes: How to Keep Them Minnesota Nice.
Downing, J.A. 2021. Sounds of Ice. My lake ice recordings are part of a new CD by some well-known musicians.
Downing, J.A. 2021. Getting the Lead Out.
Downing, J.A. 2021. Viral Transport, Survival, and Transmission via Freshwater Ecosystems: Relevance to the Social Cost of Water Pollution. [video]
Downing, J.A. 2021. Protecting Local Water Quality Has Global Benefits [video]
Downing, J.A. 2021. Fire, Water, and Ash: Are Wood Fires Harmful to Lakes?
Downing, J.A. 2021. Minnesota: Land of How Many Lakes?
Downing, J.A. 2021. Social Costs of Poor Water Quality.
Downing, J.A. 2021. Lake and River Ice: Formation and Classification.

Downing, J.A. 2020. Hypothermia: Understanding and Prevention. [This has been the most frequently accessed page on seagrant.umn.edu several years in a row. It also gets me interviewed by news outlets like the Wallstreet Journal with some frequency]

2012-2014- When I was ASLO President, I wrote 8 articles for the *Association for the Sciences of Limnology and Oceanography* Bulletin, that are not listed here.

Williams, C.J., C.T. Filstrup, and J.A. Downing. 2013. Maximizing ecosystem benefits of the Storm Lake dredging program: an evaluation of dredging and potential management scenarios on wind-driven sediment resuspension and water quality of Storm Lake. Iowa State University Limnology Laboratory and the Iowa Department of Natural Resources. Available at: http://limnology.eeob.iastate.edu/Publications.aspx.

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Downing, J.A. and G. Antoniou. 2006. 2005 Rathbun Report. Iowa State University Limnology Laboratory. 42 p.

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Downing, J.A. and J. Ramstack. 2002. The limnology of Iowa lakes: 2001. Iowa Geological Services Bureau, Iowa City, IA. 435 p.
Downing, J.A. and J. Ramstack. 2001. The limnology of Iowa lakes: 2000. Iowa Geological Services Bureau, Iowa City, IA. 310 p.
Downing, J. Kopaska et al. 2001 Diagnostic study of Clear Lake and its watershed: recommendations for remediation. Iowa Department of Natural Resources, Des Moines, IA.
Downing, J.A. and J. Kopaska. 2000. Diagnostic study of Crystal Lake and its watershed: recommendations for remediation. Iowa Department of Natural Resources, Des Moines, IA. 232 p.
Arbuckle, K.E. and J.A. Downing. 2000. Iowa's inland freshwater mussels. Iowa Department of Natural Resources, Des Moines, IA. 145 p.
Downing, J.A. and J. Kopaska. 2000. Diagnostic study of Rock Creek Lake and its watershed: recommendations for remediation. Iowa Department of Natural Resources, Des Moines, IA. 241 p.

Books in preparation (I clearly need to finish some of these but the direction of a Sea Grant program does not work well with book-writing)

Kalff, J. and J.A. Downing. *Limnology: inland water ecosystems*. Fully revised version. Bibliogenica or other publisher
Downing, W.L. (J.A. Downing, ed.) (ready, seeking publisher) Letters Home: Messages from a twenty-something Iowa boy who saw D-day, Saipan, Nagasaki and post-war Japan.
Simmons, T.H. (J.A. Downing, ed.) (written in 1931 but preparing for publication) Wealth redistribution: financing public welfare.
Downing, J.A. and W.L. Downing. *Terminology for the biosciences* (book and e-course).
Downing, J.A. *Global budgeting: an introduction to resource ecology.*
Downing, J.A. *Mapping aquatic habitats.*
Silva, M. and J.A. Downing, *Handbook of Mammalian Body Masses.* 2nd Edition.

Recent web video presentations of note
December 2014. Presentation of the CSSP "Support of Science" award to Barack H. Obama, President of the United States of America https://www.youtube.com/watch?v=CtYq7L5vbG0
August 2013. Limnology and Oceanography: estranged twins reunited by global change. Plenary presentation to the meeting of the International Society of

Limnology (SIL), Budapest, Hungary.
https://www.youtube.com/watch?v=PZSoRMQqozo

Theses and dissertations from my lab

Morales-Williams, M. 2016. The effects of disturbance on phytoplankton community assembly and carbon cycling in eutrophic lakes.

Heathcote, A.J. 2013. Anthropogenic eutrophication and ecosystem functioning in freshwater lakes. PhD Dissertation, Iowa State Unversity. 169 p.

Balmer, M. 2012. Carbon flux and eutrophication in agricultural inland waters. M.S. Thesis.

Gemesi, Z. 2007. Plumbing agricultural landscapes for water quality improvement: coexistence of intensive agriculture and good water quality. M.S. Thesis, Iowa State University. 106 p.

Woolnough, D.A. 2006. The Importance of Host Fish in Long Range Transport of Unionids: A Metapopulation Perspective. PhD Dissertation, Iowa State University

Blake, T. 2006. Atmospheric deposition : testing methods of measurement and measuring rates in Iowa, U.S.A. M.S. Thesis, Iowa State University.

Goewert, A. 2005. Isotope sclerochronology of *Lampsilis cardium* (Unionidae): deciphering ontogenetic history. M.S. Thesis, Iowa State University.

Leopold, R. 2005. Ecological considerations of transgenic plants used in open field production. Non-thesis M.S., co-directed with James Pease.

Anderson, K. 2004. Spatial and temporal patterns in precipitation and dryfall deposition of nutrients in Iowa, U.S.A. M.S. Thesis, Iowa State University.

Cherrier, C.T. 2003. The control of Cyanobacteria dominance in Iowa lakes. M.Sc. Thesis, Iowa State University.

Egertson, C. 2003. The impact of fish and wind on the ecology of lakes in an agricultural landscape. M.Sc. Thesis, Iowa State University.

Schrage, L.J. 2001. The role of trophic cascading in the degradation of water quality by benthivorous fish. M.Sc. Thesis, Iowa State University.

Arbuckle, K.E. 2000. Statewide assessment of freshwater mussels in Iowa streams. M.Sc. Thesis, Iowa State University.

Anthony, J.L. 2000. Growth and longevity of freshwater mussels (Bivalvia: Unionidae) with application to their commercial fisheries. M.Sc. Thesis, Iowa State University. (winner 2001 Distinguished Master's Thesis Award, Midwestern Association of Graduate Schools).

Amyot, J.-P. 1998. Locomotion and spatial distribution of the freshwater bivalve *Elliptio complanata* (Locomotion et répartition spatiale chez le bivalve d'eau douce *Elliptio complanata*). Ph.D. Thesis, Université de Montréal.

Di Paolo, A. L. 1997. Factors contributing to the local extinction of mussels: a comparative analysis of population density, recruitment and mortality. M.Sc. Thesis, Iowa State University.

Tuxbury, K.A. 1997. Development of DNA markers and the genetic analysis of seven populations of the freshwater mussel Lampsilis radiata siliquoidea (Bivalvia: Unionidae) in north central Minnesota. M.Sc. Thesis, Iowa State University.

Wissing-Taunt, K.D. 1997. Freshwater mussel filter feeding: unionid and zebra mussel particle selectivity. M.Sc. Thesis, Iowa State University.

Straka, J. 1997. Effects of slope, depth, fetch and sediment organic matter content on the distribution and abundance of mussels (Bivalvia: Unionidae) in a reservoir lake in Central Iowa. M.Sc. Thesis, Iowa State University.

Silva, M. 1996. Patterns of variation in the population density of terrestrial mammals. Ph.D. thesis, Université de Montréal.

Aboul-Hosn, W. 1993. The influence of cover on the spatial distribution of littoral zone fishes. M.Sc. thesis, University of Montréal.

Mousseau, B. 1992. Analyse globale de l'allométrie reproductive chez les populations de mammifères. M.Sc. thesis, University of Montréal.

Forget, S. 1992. L'effet de divers facteurs écologiques sur la productivité des populations de mammifères. M.Sc. thesis, University of Montréal.

Ménard, C. 1991. Utilisation de la vidéo pour mésurer les poissons *in situ*. M.Sc. thesis, University of Montréal, 92 + xi p.

Lalonde, S. 1988. Influence des producteurs primaires sur la biomasse des invertébrés phytophiles en divers milieux lacustres. M.Sc. thesis, University of Montréal, 164 p.

Plante, C. 1987. Prédiction de la production secondaire en milieu aquatique. M.Sc. thesis, University of Montréal, 119 p.

Cyr, H. 1987. Facteurs reliés à l'abondance des invertébrés phytophiles dans les herbiers submergés lacustres. M.Sc. thesis, University of Montréal, 165 p.

Rath, L.R. 1986. Le rapport entre l'hétérogénéité du benthos et les sédiments lacustres dans les zones profondes et sublittorales. M.Sc. thesis, University of Montréal, 131 p.

Postdocs and International Scientists Trained

Joseph Rabaey. 2022-2025. Postdoc working on GHG dynamics in lakes infested with invasive fish.

Clayton Williams. 2012. Postdoc working on lake physics and carbon cycling.

Minghua Chen. 2012. Visiting scientist from Nanchang University, Nanchang, China.

Christopher Filstrup. 2010. Postdoc working in the limnology and ecology of eutrophic lakes.

Felipe Pacheco. 2009. Universidade Federal de Juiz de Fora, Brazil

Anna de Kluijver. 2009. Utrecht, Netherlands.

Petra Schoon. 2009. Utrecht, Netherlands.

Jennifer Fraterrigo. 2005-2008. Influence of landscape-weather interactions on biological water quality in agricultural watersheds.

Yvonne Vadeboncoeur. 2003-2004. Postdoc in lake classification.

Miriam Perozo Mur. 2003. Catalonia, Spain. GIS of Iowa lake basins.

Ricard Cots. 2002. Catalonia, Spain. GIS of Iowa lake watersheds.

Jordi Morell. 2001. Catalonia, Spain. Predicting the impacts of wind exposure on sediment mixing and nutrient regeneration in shallow lakes.

Raquel Canet. 2001. Catalonia, Spain. Recreational park design for watershed change and nutrient retention.

Jean-Pierre Amyot. 1995. Montreal, Quebec. Mussel behavior and growth comparisons.

Maria Linda Tumbiolo. 1993. Palermo, Italy. Secondary production in marine ecosystems.

Current Research Projects and Approaches

Some research approaches

Comparative ecology: I enjoy looking for patterns in nature and good patterns beg for explanation. I grew up first in North Dakota and then in Minnesota. Contrasts between the saline, eutrophic systems of the Dakotas and the fresh, oligotrophic systems of northern Minnesota, as well as the steep productivity gradient across Minnesota, suggested ecosystem comparison as an efficient means to understanding. I often use multi-dimensional analyses of large data sets to seek patterns and then seek understanding through finer-scale studies. Secondary analysis and meta-analysis are important tools as are large-scale monitoring efforts in multiple dimensions.

Understanding ecosystem function through perturbation: I feel that understanding emerges most readily from perturbed ecosystems so have not hesitated to work on them. After all, when do you learn about your car? When it is working or when it is broken? My mother used to joke that by the age of 12, I had taken apart every appliance in our house. I have a long history of diagnosis and repair of systems ranging from toasters to whole ecosystems. The process includes socio-economic valuation, understanding normal function by finding broken parts, and testing functional hypotheses through restoration and maintenance. My long-term monitoring is beginning to permit watch-and-wait experiments for understanding whole ecosystem function via analyzing responses to different sizes of inter-annual change in ecosystem drivers.

Global ecology: Each ecologist sees their particular ecosystem or organism of interest as a key to understanding larger problems. The large environmental problems demanding responses are now global in scale. Therefore, I try to see my studies and analyses in a global context and think that we should do much more of this. The two important elements in global ecology are the measurement and understanding of variables and processes of global interest and inventories and scaling rules needed to see these in a global context. An important part of my research now involves scaling-up ecosystem processes to the regional or global scale.

Major research problems

Integration of Terrestrial and Aquatic Carbon Cycles: The traditional compartmentalized approaches to the inventories of carbons pools and fluxes in the biosphere have generated gaps in the form of key components, particularly freshwater and wetland ecosystems. These key components are critical for a reliable estimation of carbon movements. This research, catalyzed by NSF-NCEAS funding, aims at synthesizing existing information on carbon fluxes and pools in both terrestrial and aquatic systems to yield an improved representation of carbon cycling in the biosphere, explicitly considering the exchanges and interactions between components, conducive to a more realistic assessment of the global carbon budget. On a more local scale, I am

examining the role of eutrophic lakes and impoundments in carbon evasion and sequestration. These ecosystems are turning out to be some of the most carbon-active systems in the world. Integrating to the global scale requires the derivation of global measurements of variables of interest and their relationships to key variables as well as scaling rules, composed of global assessments of the water resources of the planet. The importance of this task has made me a strong proponent of global ecology and limnology.

Understanding nutrient and carbon biogeochemistry of disturbed landscapes: Over the past two decade, I have been working with several scientists around the US to determine how run-off from terrestrial systems influences the nutrient stoichiometry of freshwater systems and the sea. This biogeochemical research is of special interest for three reasons, (1) because the Midwest is the source of a large fraction of the elements that become nutrients in the sea, (2) because landscape disturbance can have large impacts on aquatic ecosystems through nutrient flux, and (3) because lakes and their nutrient supplies may play a disproportionate role in the global carbon budget. I have examined the nutrient and carbon biogeochemistry of several of Iowa's watersheds. These large, full-watershed studies are among the most intense biogeochemical studies made on lake watersheds in agriculturally dominated landscapes and have lent insights into the impacts of agriculture on the biota of freshwater and marine ecosystems. Further, as a service to the state of Iowa, I have performed routine monitoring of 132 of Iowa's most important lakes. This is yielding an unprecedented level of information on some of the most "non-point" impacted lakes in the world. These studies are helping to better manage eutrophic water resources. Because this research is intrinsically multidisciplinary, it is now bridging the gap between traditional studies of water quality and human valuation of the environment. Such studies have been broadened into a full-scale analyses of the economics of water quality. Amongst the more important result of this work is a growing understanding that landscape configuration (i.e., plumbing or engineering) may have more effect on nutrient and carbon transport than the land uses composing a watershed. I enjoy linking biogeochemistry and public policy. This work has recently expanded to a more pristine set of 187 lakes in northern Minnesota where the biogeochemical and socio-economic questions are different but nonetheless intriguing.

The causes and consequences of aquatic biodiversity: Long-term monitoring of the nutrient and physical conditions in a large suite of lakes has yielded insights into how aquatic biodiversity (i.e., plankton, fish, benthos, macrophytes) declines as perturbation grows. Further, because our lakes and watersheds amount to multi-million dollar manipulation experiments, and each watershed receives different treatments (weather, land use, erosion, nutrient application) each year, inter-annual differences in water quality and the biota show how whole ecosystems respond to major alterations in environmental conditions. Some of the most basic outcomes of this work have been to show how risks of dominance of certain groups of organisms, typical of perturbed ecosystems (e.g., Cyanobacteria) are related to nutrient concentrations and stoichiometry. Other forthcoming work involves the integration of biodiversity and biointegrity data from plankton to fish, and determines how patterns in the biota reflect changes in landscapes and biogeochemistry. We have also completed paleo-

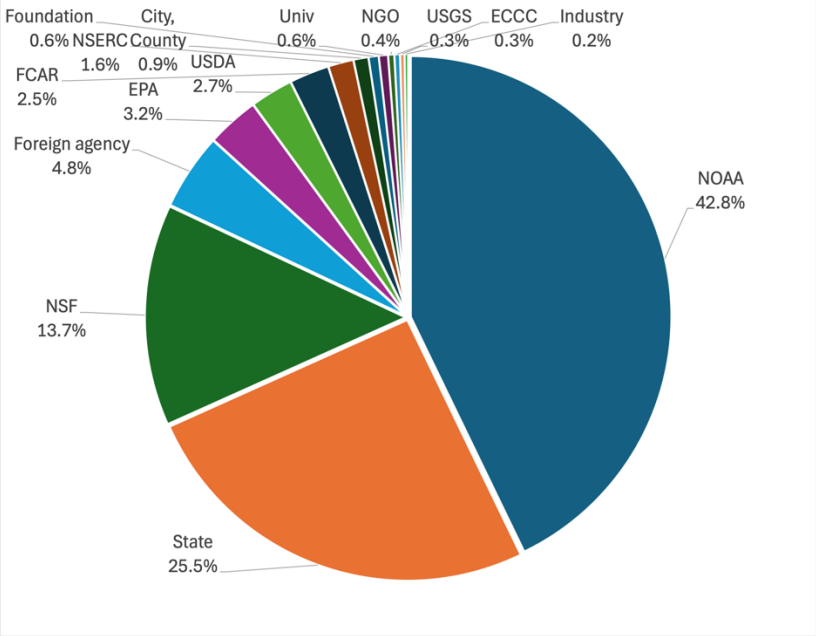
reconstruction of the historical process of landscape change and hyper-eutrophication through analyses of cores taken from natural lakes in this most agriculturally impacted landscape in the world. Because landscape change has been so draconian, we are also beginning work on paleo-reconstruction of aquatic biodiversity changes throughout the history of now extinct lakes. Among the more exciting outcomes of this work is evidence from whole ecosystem manipulations that aquatic biodiversity stabilizes responses to severe nutrient perturbations.

Conservation ecology of terrestrial and aquatic organisms: I am an academic grandchild of the International Biological Program (IBP), which sought to sustain the health of aquatic populations and communities through a tropho-dynamic understanding of ecosystems. Production is amongst the most basic characteristics of populations and communities that influences their survival in the face of exploitation or other sources of mortality (e.g., due to climate change, habitat loss and destruction, etc.). At the most basic, one cannot destroy more of a population per unit time than is produced or the population will decline. I therefore continue to seek patterns in the rate of production and reproductive allometry of terrestrial and aquatic organisms. A particular group of aquatic organisms, the freshwater mussels, has been the focus of detailed analysis in my laboratory. My long-term research program on freshwater mussels has turned from studying lacustrine populations in Quebec, Rhode Island and Minnesota toward: (1) the evaluation of the condition of Iowa's "inland" mussel populations, (2) the examination of the age and growth of mussels in lakes, rivers and streams, (3) determination of the factors linked to local extinction and mass die-offs of mussels, and (4) the analysis of mussel populations in large rivers (i.e., the Mississippi) using GIS and historical data. Mussels are the second most endangered group of animals on Earth so lessons learned from their decline and extinction may find application in avoiding extinction and declining biodiversity in other groups.

Four smaller research concerns I am somewhat obsessed with. (1) Forecasting ice-out on lakes. Decades ago, ice-out was quite predictable and happened in this region on May 1, plus or minus a week. Due to climate change, ice-out on these same lakes now varies over about 70 days. I am creating and applying forecasting methods to help tourism industries and others plan when the open-water season is likely to start. (2) Getting on the right track concerning the drivers of HABs. I find it incredible that we have made so little progress in this area. People have been working on this for over a century. I think limnologists are on the wrong track because they are barking up the wrong evolutionary tree. (3) Supplying freshwater to arid islands. Many arid islands are in a precarious state because, even though they may receive a lot of rainfall, their ability to capture, store and distribute it endangers the health of whole populations. I am working with Puerto Rico Sea Grant and others to use that nation as a pilot project. (4) Non-market valuation of water quality. Water resources are sometimes not protected because cost-benefit analyses show higher costs of protection or remediation than the benefits of good surface water. The reason is that methods for calculating the non-market value of good water are scarce or incomplete.

Grants and Research Support

Over my career, I and my collaborators have received the benefit of around $54M in grant funding ($2024). At the time of awarding, these funds had a numerical dollar value of about $40M but I have converted them to present value to be fair to the impact of early funders. My grant support has derived from a diversity of sources (see figure below). Current grants total about $10M and are from NOAA and the State of Minnesota.



Teaching History

Course	Institution	Dates
I have not taught full courses at the University of Minnesota but have contributed to teaching some classes	University of Minnesota	2016-present
Peer review standards, methods, and approaches	Iowa State University	2015
Meta-analysis and Secondary Analysis in Ecology	University of the Balearic Islands, Palma de Mallorca, Spain; AZTI San Sebastian, Spain	2008-2009
Identification of Freshwater Organisms (On-line e-course)	Iowa State University	2004 to present
Publication in the Biosciences	Iowa State University	2006 to present

Aquatic Ecology (on-line e-course)	Iowa State University	2007 to present
Aquatic Ecology	Iowa State University	1995 to present
Aquatic Ecology Lab & Field Course	Iowa State University	1995 to present
Aquatic Ecology Lab & Field Course (+on-line e-course)		
EEB Extended Field Course	Iowa State University	1998, 2006
Ecological Resource Management	Iowa State University	1996 to present
Design of monitoring systems for soil & water conservation (one of several faculty contributors)	Iowa State University	2007 to present
Natural Resouces and Agriculture (one of several faculty contributors)	Iowa State University	2004 to 2007
Ecological Terminology (self guided)	Iowa State University	1998 to 2004
Freshwater Invertebrate Ecology	Iowa State University	1997-2003
Precision Agriculture (team taught)	Iowa State University	1996
Vertebrate Biology (team taught)	Iowa State University	1996
Fisheries and Limnological Techniques	Iowa State University	1995
The history of ecology.	University of Montréal	1985-1994
Natural resource ecology.	University of Montréal	1984-1994
Limnology/freshwater ecology.	University of Montréal	1983-1985
Limnology field course.	University of Montréal	1983-1984
Environmental impact assessment	University of Montréal	1983-1984
Resource biology (fisheries)	McGill University	1979-1980
Limnology (2-3 lectures)	McGill University	1977-1979
Ecology field course	McGill University	1975-1977
General ecology (lab)	McGill University	1975-1976
Ichthyology (lab)	McGill University	1975-1976
Physiological ecology	McGill University	1977-1979
Physiological ecology (lab)	McGill University	1976-1979
Fisheries management (lab)	North Dakota State Univ.	1973-1975
Ichthyology laboratory	North Dakota State Univ.	1973-1975

Current Teaching (I have not taught regularly since Fall 2015)

Below are descriptions of the principal courses that I taught regularly at Iowa State University. I use modern techniques, including specific outcomes assessment (including identified knowledge, understanding, and skills), learner-centered educational methods, course web-pages, WebCT testing and information, PowerPoint

presentations, and a variety of ongoing assessment tools. My teaching evaluations are always among the best in the department. I have been a long-time member of the College of Agriculture's Outcomes Assessment Committee, and have involved myself in learning new techniques for educating students with diverse learning styles and for the changing employment landscape they face.

Use of these approaches has had many benefits, including:

- Making my courses more interesting, enjoyable, efficient, and enriching for students.
- Making my courses more interesting for me and efficient of my time.
- Creating a "learning" rather than a "teaching" atmosphere.

AQUATIC ECOLOGY (Taught "live" and on-line)

Course description: Structure and function of aquatic ecosystems with application to fishery and pollution problems. Emphasis on the comparative analysis of aquatic ecosystems, examining lakes, ponds, wetlands, streams, rivers, and estuaries. Lectures will acquaint students with the current state of knowledge in the aquatic sciences.

Intended outcomes

Students will:

- learn the major types of water bodies and water courses, know how they are formed and evolved, and understand their place in the hydrologic and geochemical cycles.
- learn to quantify, model and predict the physical aspects of aquatic environments (e.g., movement, heat, light).
- understand the importance, measurement, dynamics and cycling of major chemical species in aquatic environments (e.g., alkalinity, phosphorus, nitrogen, oxygen).
- learn how the functioning of aquatic ecosystems is influenced by the geologic and geographic setting of its watershed.
- know the major organisms present in aquatic ecosystems and understand the basics of their ecology.
- learn to quantify, model and predict the biological cycling of energy in aquatic environments and the relationship of biological production to management goals.
- recognize the factors responsible for the zonation of aquatic environments and organisms.
- understand the major aquatic ecosystem management methods and models.

AQUATIC ECOLOGY LABORATORY (Taught "live" and on-line)

Course description: Field trips and laboratory exercises to accompany Aquatic Ecology. Field trips and laboratory exercises will give students hands-on experience with aquatic research and monitoring techniques and concepts.

Intended outcomes

Students will:

- learn to quantify, model and predict the physical aspects of aquatic environments (e.g., movement, heat, light).
- understand the importance, measurement, dynamics and cycling of major chemical species in aquatic environments (e.g., alkalinity, phosphorus, nitrogen, oxygen).
- learn to quantify, model and predict the biological cycling of energy in aquatic environments and the relationship of biological production to management goals.
- recognize the factors responsible for the zonation of aquatic environments and organisms.
- understand the major aquatic ecosystem management methods and models.
- learn to recognize the principal plants and animals inhabiting aquatic ecosystems and understand their trophic relationships.
- be familiar with the principal tools of aquatic ecology and how they are applied, including field and laboratory methods.
- obtain practical experience in solving complex ecological problems.

ECOLOGICAL RESOURCE MANAGEMENT (Graduate Course)

Ecological and economical management of sustainable biological resources. Unifying current management concepts and models in wildlife, fisheries, water quality, forestry, recreation and agriculture. Research problem.

Course Plan: Two one-hour lectures or discussions each week. Students prepare for class discussion by assigned reading. The balance of class time each week will be a laboratory used for individual analysis. Students present their results orally during the last class periods. A written research report will be prepared by each student.

Intended outcomes

Students will:

- learn mass balance concepts as they apply to resource management goals
- identify components of mass balance equations in diverse management models
- understand the role of population dynamic concepts in resource management
- learn the concepts of equilibrium yield, sustainable yield, and optimal yield
- identify population characteristics impinging upon resource yields
- learn the role of models in resource management
- understand strengths and weaknesses of resource management model types
- explore models used in the management of fisheries, wildlife, forests, recreational areas, water quality and agriculture, and learn to apply them
- learn a global approach to resource management
- learn to use ecological theories and models to resolve resource management issues
- get hands-on experience in using comparative data to solve resource management problems
- understand the role of economics in altering management scenarios

IDENTIFICATION OF FRESHWATER ORGANISMS (Taught on-line only)

Course description: On-line taxonomic and identification exercises to accompany "Aquatic Ecology". Instruction and practice in the identification of algae, aquatic macrophytes, zooplankton and benthos.

General course approach: Students will guide their own learning through the use of taxonomic keys, on-line lessons and self-paced assessments. Readings and practice will be provided by the recommended keys. These keys are meant to provide the learner with concrete learning tools as well as useful reference volumes for future use. Learning modules and lessons will cover the taxa considered to be the most important or common. Although students will be expected to learn to use the keys and understand the terms used in identification, students will only be expected to identify the taxa presented in the on-line lessons.

Intended outcomes

Students will:

- learn to recognize and distinguish the major groups of organisms inhabiting fresh waters
- learn the key characteristics used to differentiate the organisms of fresh waters
- be able to recognize the most important genera of aquatic organisms by sight

Administrative and Management Experience

Director of the Minnesota Sea Grant College Program (2016-present). The Sea Grant College Program is a group of 34 programs on marine and freshwater coasts, the Pacific and the Caribbean, that find the water science people need and brings it to them in a way they can use it, and, if the science does not exist, funds the water science research they need and brings it to people in a way they can use it. It is funded by the National Oceanic and Atmospheric Administration with a manadatory state match via the university. I took on the challenge of directing the Minnesota Sea Grant Program in January 2016. As with any organization, there was substantial "deferred maintenance" in the program and a need for a renewed, shared vision, embracing high standards of excellence. The Minnesota program consists of about 20+ staff, about 45% of whom work in extension and outreach. One of the joys of such a program is figuring out exactly what water science people need that doesn't exist and supplying it. Therefore, we usually are funding 5-8 research projects (and grad students) at a time through an open RFP process. About 30-50% of our base funding creates new science in diverse areas. Change has been tough but we now give a direct 35:1 return on federal investment to Minnesotans and serve 10s of thousands who need water science with a renewed and vibrant staff of scientists and outreach specialists.

Chair of the Council of Scientific Society Presidents (2015-2016). This is a complex not-for-profit whose members are scientific societies. The position of "chair" is tantamount to a presidency because it is odd to have a "president of presidents". I took over the leadership at a point in its development that funding was declining and staff had moved to other jobs. Under my leadership, we hired and retained new staff and built a new business model that was successful for a decade after my tenure as

president. In this position I helped to create science leadership training because science needs strong leaders.

***President of the Association for the Sciences of Limnology and Oceanography (2012-2014*).** When I became President, ASLO was a healthy association facing the winds of change in non-profits, non-profit law, publication, membership fidelity, meeting revenue, and economic pressures. ASLO had begun to run at a substantial deficit with shrinking revenues from publications and putting increased pressure on membership fees and meeting revenues. By the time I'd left office I had led the association to changed goverance, assured positive revenues for many years to come, and a renewed publication profile and business model. I saw the organization accomplish 95% of my stated objectives, found 5% untenable, and helped create a sustainable and financially vibrant association. My final "Message from the President" in the ASLO Bulletin outlines the improvements made in my administration.

Chair of the Environmental Science Interdepartmental Graduate Program (2010-2015). My first tasks were to develop an identity for the program, increase the quality of the pool of applicants, and find ways of helping this program train an increasing number of graduate students of outstanding quality. We developed the first-ever mission statement, revamped the seminar series, adopted graduate admissions standards, created a graduate student organization, and began the discussions and negotiations needed to launch a professional off-on campus degree program and an internship program. Under my leadership, the program became a nationally ranked graduate program with plans in place to move to the top third of such programs nationally.

Leader of the Iowa State University Limnology Lab (1995-2016). I built and administered a large research group in the environmental sciences at ISU. I directed 4-7 full-time employees, 2-5 graduate students, and 3-4 part-time employees in the winter, increasing by another 10 or more full-time employees in the summer. This team worked all over the State of Iowa, running several trucks, several boats and a small plane to >130 field sites, performing a broad spectrum of analyses. In addition to these, I helped to coordinate interdisciplinary team research that involves several other laboratories in geology, agronomy, economics, agricultural biosystems engineering, the National Swine Center, and sociology and landscape architecture. We expanded this research to work on >400 lakes and watersheds in northern Minnesota and created another certified laboratory at Itasca Community College.

Director of the Laurentian Biological Station (1990-1995). When I accepted the directorship of the Station de Biologie des Laurentides (Laurentian Biological Station), one of Canada's largest and oldest field research and teaching institutions, it was at the point of closure due to decreased productivity and activity. Within two years, I had turned decay to growth, and brought this research and teaching resource to a level of productivity and activity that had never before been seen. I did this by revamping budgeting and accounting, dealing with long-standing personnel issues, rebuilding infrastructure, streamlining procedures, adopting a forward-looking strategic plan, seeking outside funding sources for some improvements, creating a motivating

environment that was open to innovation and initiative, and advocating strongly and substantially for the Station and its scientists at all levels of the university administration. I lowered user fees, yet turned previously constant budget over-runs to near profit-making cash flows within my tenure as Director. I directed five full-time staff, a large physical plant, and coordinated the research needs of dozens of scientists and students, as well as a large technical staff (especially in summer). Most of my work in this capacity was in French, which is my second language.

Helped Create and Start Up GRIL (1988-1989). The Groupe de Recherche Interuniversitaire en Limnologie (GRIL) was an idea hatched by several of us, notably Montreal limnologists who had worked across universities. I had moved from McGill to l'Université de Montréal so was working in both cultures and was instrumental in helping to create and help operate one of Canada's greatest collaborative limnological research groups. Although I am mentioned as one of the young scientists added to the group, I was one of the few who worked relatively easily across linguistic divides to help unify the great scientists across four universities. In those early days, we forged a major rule. That is, "whatever language you are comfortable in, use it and somebody will help tell others what you are saying." I organized the first major meeting of GRIL at the Pavillon Marie Victorin at the l'Université de Montréal. The recordings of this meeting I have in my office are almost comical as we all worked out how to work together instead of competing. The number of wonderful limnologists present at the birth of this organization still amazes me and all could claim a slice of responsibility for this great collaboration.

Owner and Director of Environmetrix, Enr., of Montreal, Canada (1985-1995). I ran this small consulting firm for a decade. Its principal product was submarine cartography. My daughters and I started this small business again in 2005, principally as a means of supporting their graduate and undergraduate studies. It operates under the dba of Digital Bathymetrics. In this capacity, we have been instrumental in designing new lakes and mapping many existing ones.

Recent scientific conferences (Not updated since 2014 – I give lots of these and can't keep up)

*I have only listed scientific meetings or invited presentations here (invitation marked with a *).*

*Downing, J.A. Limnology and Oceanography: two estranged twins reunited by global change. Congreso Nacional de Limnología, DF Mexico, November 2014.

*Downing, J.A. Notes from the upper edge of the nutrient spectrum: the limnology and management of lakes in agricultural watersheds. Congreso Nacional de Limnología, DF Mexico, November 2014.

*Downing, J.A. Global limnology: upscaling limnology to the planet Earth. Congreso Nacional de Limnología, DF Mexico, November 2014.

*Downing, J.A. and R. Striegl. The size, age, and exchange of the global groundwater carbon pool. ASLO, SFS, SWS, PSA – Joint Aquatic Science Meeting, May 2014, Portland, Oregon.

Williams, C.J., E. Bach, K.S. Hofmockel, M.J. Helmers, and J.A. Downing. Effects of cropping system and soil-water interactions on dissolved organic matter characteristics in agricultural watersheds. ASLO, SFS, SWS, PSA – Joint Aquatic Science Meeting, May 2014, Portland, Oregon.

Morales-Williams, A.M., A.D. Wanamaker, Jr., and J.A. Downing. Bicarbonate uptake could maintain microcystis dominance in eutrophic lakes. ASLO, SFS, SWS, PSA – Joint Aquatic Science Meeting, May 2014, Portland, Oregon.

Belyaeva, A. and J.A. Downing. Are macroinvertebrates useful indicators of the ecological integrity of eutrophic lakes? ASLO, SFS, SWS, PSA – Joint Aquatic Science Meeting, May 2014, Portland, Oregon.

Oliver, S.K., K.S. Cheruvelil, J.A. Downing, C.E. Fergus, P. Soranno, T. Wagner, K. Webster, and L. Winslow. Prediction and patterns of lake depth across a 17-state region in the U.S. ASLO, SFS, SWS, PSA – Joint Aquatic Science Meeting, May 2014, Portland, Oregon.

Carroll, H. and J.A. Downing. Two-hundred years of landscape change; consequences for east Okoboji Lake, Iowa. ASLO, SFS, SWS, PSA – Joint Aquatic Science Meeting, May 2014, Portland, Oregon.

Filstrup, C.T., S.K. Oliver, E.H. Stanley, C.A. Stow, T. Wagner, K.E. Webster, and J.A. Downing. Subsidy-stress effects of nitrogen on phytoplankton biomass. ASLO, SFS, SWS, PSA – Joint Aquatic Science Meeting, May 2014, Portland, Oregon.

*Filstrup, C.T., A.J. Heathcote, and J.A. *Downing. 2014. Are current soil erosion control efforts effective? Insights from sediment accumulation rates in Iowa lakes. 2014 Iowa Water Conference, March 2014, Ames, Iowa. Invited.

*Downing, J.A. 2013. The role of stratification, fetch, and sediment-water interaction in the “impairment” of undeveloped lakes. Association for the Sciences of Limnology and Oceanography 2013 Aquatic Sciences Meeting, February 2013, New Orleans, Louisiana.

Julich, H. and J.A. Downing. 2013. “Use of palynological techniques to reconstruct macrophyte loss and multiple stable states in a eutrophic lake.” Association for the Sciences of Limnology and Oceanography Meeting in New Orleans, LA.

Belyaeva, A.M. and Downing, A.J. May 19–23, 2013. Benthos and epifauna macroinvertebrate communities across a sharp nutrient gradient. Oral presentation at Society for Fresh Water Science Meeting “Energy Production and Aquatic Biodiversity: Understanding the Threats, Planning for Ecosystem Management”, Jacksonville, FL, USA.

Belyaeva, A.M. and Downing, A.J. 17-22 February, 2013. Getting to the bottom of eutrophic lakes. Oral presentation at Association for the Sciences of Limnology and Oceanography Aquatic Sciences Meeting "Learning for the Future", New Orleans, LA, US.

Soranno, P.A., K.S. Cheruvelil, E. Bissel, M.T. Bremigan, J.A. Downing, C.E. Fergus, C.T. Filstrup, N.R. Lottig, E.N. Henry, E.H. Stanley, C. Stow, P.N. Tan, T. Wagner, and K. Webster. 2013. A conceptual framework for understanding multi-scaled cause-effect relationships between terrestrial and aquatic ecosystems. Ecological Society of America 98th Annual Meeting, August 2013, Minneapolis, Minnesota.

Filstrup, C.T., T. Wagner, P.A. Soranno, E.H. Stanley, C.A. Stow, K.E. Webster, and J.A. Downing. 2013. Regional variability in non-linear chlorophyll response to

total phosphorus enrichment in lakes. Association for the Sciences of Limnology and Oceanography 2013 Aquatic Sciences Meeting, February 2013, New Orleans, Louisiana.

*Heathcote AJ, Filstrup CT, *Downing JA. 2013. *Watershed sediment losses to lakes accelerating despite agricultural soil conservation efforts*. Invited talk presented at the ESA Meeting, Minneapolis, MN

Heathcote AJ, Filstrup CT, Downing JA. 2013. *Lake sediments show acceleration of agricultural soil erosion, despite subsidies*. Talk presented at the ASLO Aquatic Sciences Meeting, New Orleans, LA

Morales-Williams, A.M., A.D. Wanamaker, Jr., and J.A. Downing. 2013. Stable isotopic evidence of phytoplankton bicarbonate uptake in eutrophic lakes. Association for the Sciences of Limnology and Oceanography Aquatic Sciences Meeting, New Orleans, U.S.A.

*Downing, J.A. 2012. Biodiversity and stability in lakes. Aquatic Sciences summer meeting, Association for the Sciences of Limnology and Oceanography , Lake Biwa, Otsu, Japan.

Morales-Williams, A.M. and J.A. Downing. 2012. Sustained atmospheric CO_2 uptake in anthropogenically eutrophic lakes. Aquatic Sciences summer meeting, Association for the Sciences of Limnology and Oceanography , Lake Biwa, Otsu, Japan.

*Downing, J.A. 2012. Global Limnology and the Global Carbon Cycle; & Notes from the Upper Edge of the Nutrient Spectrum – The Limnology and Management of Lake in Agricultural Watersheds. Center for Limnology, University of Wisconsin, Madison. Kaeser Visiting Scholar presentations.

*Heathcote A.J. and J.A. *Downing. 2012. Discovering the history of Iowa's natural lakes by coring and paleolimnology. Iowa Water Conference,Ames, IA

Bastviken, D., L.J. Tranvik, J.A. Downing, P. Crill, and A. Enrich-Prast. 2011. Freshwater methane emissions versus the continental carbon sink. AGU Annual Meeting, San Francisco.

Heathcote, A.J., C.T. Filstrup, D.L. Kendall and J.A. Downing. 2011. Examining the role of Cyanobacteria size and abundance on limiting heterotroph:autotroph biomass ratios in eutrophic lakes. ESA, Austin, TX (poster) http://eco.confex.com/eco/2011/preliminaryprogram/abstract_31216.htm

*Heathcote, A.J., J.A. *Downing, and MB Balmer. 2011. The effects of eutrophication on carbon burial and atmospheric carbon exchange in shallow lakes. GSA, Minneapolis, MN http://gsa.confex.com/gsa/2011AM/finalprogram/abstract_197066.htm

*Downing, J.A. 2011. Agriculture, water quality, and eutrophication. Mini-symposium on Agriculture and Water Quality. University of Kansas, Lawrence, Kansas.

*Downing, J.A. 2011. Global limnology & the global carbon cycle. Annual Dunmire Memorial Lecture, University of Missouri, Columbia.

*Downing, J.A. 2011. Understanding and managing the world's most eutrophic lakes. Invited Ruth Patrick Award Lecture, American Society of Limnology and Oceanography Aquatic Sciences Meeting, San Juan, Puerto Rico.

*Downing, J.A., A.J. Heathcote, M.B. Balmer, and C.T. Filstrup. 2011. Eutrophication is inverting the carbon-role of lakes in the biosphere. American Society of Limnology and Oceanography Aquatic Sciences Meeting, San Juan, Puerto Rico.

De Kluijver, A., P. Schoon, S. Schouten, J.A. Downing, and J.J. Middelburg. 2011. Compound-specific isotope constrains on carbon flows in fresh-water plankton communities under different pCO_2 levels. American Society of Limnology and Oceanography Aquatic Sciences Meeting, San Juan, Puerto Rico.

Filstrup, C.T. and J.A. Downing. 2011. The influence of eutrophication on phytoplankton community composition: Is there a monotonic increase in Cyanobacteria? American Society of Limnology and Oceanography Aquatic Sciences Meeting, San Juan, Puerto Rico.

Heathcote, A.J. and J.A. Downing. 2011. Examining the role of phytoplankton size and community composition in determining crustacean zooplankton biomass in eutrophic lakes. American Society of Limnology and Oceanography Aquatic Sciences Meeting, San Juan, Puerto Rico.

*Downing, J.A. 2011. Notes from the upper edge of the nutrient spectrum: the ecology of waters in agricultural watersheds. Kellogg Biological Station, Hickory Corners, Michigan.

*Downing, J.A. 2011. Global limnology & global climate change. Michigan State University, Ecology and Evolutionary Biology Program. East Lansing, Michigan.

*Downing, J.A. and R.G. Striegl. 2010. Carbon burial in inland waters. American Geophysical Union Annual Meeting, San Francisco, California.

*Downing, J.A. 2010. Continent-scale models of aquatic systems: a three-step key to accurate global budgets. American Society of Limnology and Oceanography – North American Benthological Society, Aquatic Science Meeting, Santa Fe, New Mexico.

Heathcote, A. and J.A. Downing. 2010. Impacts of landscape change on carbon burial in freshwater lakes. American Society of Limnology and Oceanography – North American Benthological Society, Aquatic Science Meeting, Santa Fe, New Mexico.

Steinweg, C., K.E. Poole, J.A. Downing. Dissolved organic carbon in eutrophic lakes is related to phytoplankton, not watershed land use. American Society of Limnology and Oceanography – North American Benthological Society, Aquatic Science Meeting, Santa Fe, New Mexico.

*Downing, J.A. 2010. Deposizione di sedimenti in invasi ed implicazioni per il bilancio globale del carbonio (Sediment deposition in impoundments and implications for the global carbon cycle). Istituto Nazionale di economia Agraria (Italian equivalent of the USDA-ERS), Rome.

*Downing, J.A. 2010. Shallow lake management in Iowa. Minnesota Annual Shallow Lakes Conference, Chaska, MN

*Downing, J.A. 2010. Global limnology: progress and prospects. Quebec Interuniversity Limnology Research Group, Annual Meeting. Montreal, Quebec, Canada.

*Downing, J.A. 2010. Limitation of aquatic production: right answer, wrong question? American Geophysical Union – American Society of Limnology and Oceanography Ocean Sciences Meeting. Portland Oregon.

*Downing, J.A. 2009. Agriculture and eutrophication: a report from the front lines. Virginia Institute of Marine Scienc. Yorktown, VA.

*Downing, J.A. 2009. Global limnology: up-scaling aquatic services and processes to the planet Earth. University of Uppsala, Sweden.

*Downing, J.A. 2008. Biodiversity and stability in lakes. International Prize for Biology, Memorial Symposium for David Tilman. Sendai, Japan.

*Downing, J.A. 2008. Limnology, society, policy, restoration, and global change: lessons from Earth's ost eutrophic lakes. North American Lake Management Society Annual Meeting (plenary presentation). Lake Louise, Alberta, Canada.

*Downing, J.A. 2008. Lake bottom mapping – what does it tell us? Lake Sunapee Protective Association, Sunapee, NH.

*Downing, J.A. 2008. Organism and ecosystem size in the up-scaling of specific rates to global processes. American Society of Limnology and Oceanography Aquatic Sciences Meeting. St. John, Newfoundland, Canada.

*Downing, J.A. 2008. Global limnology: up-scaling aquatic services and processes to the planet Earth. University of Granada, Department of Ecology, Granada, Spain.

*Downing, J.A. 2007. Global limnology: up-scaling aquatic services and processes to the planet Earth. Institut Mediterrani d'Estudis Avançats. (Mediterranean Institute for Advanced Studies). Esporles, Spain.

*Downing, J.A. 2008. The role of ponds and small lakes in the global carbon cycle. European Pond Conservation Network Annual Meeting. Valencia, Spain.

*Downing, J.A. 2008. Little things mean a lot: the emerging role of small lakes and ponds in the global carbon cycle. European Pond Conservation Network Lecture. University College of Londdon, UK

*Downing, J.A. 2008. Notes from the upper edge of the nutrient spectrum: the ecology of waters in agricultural watersheds. University of Minnesota Water Resources, Distinguished Lecture Series. St. Paul, MN.

*Downing, J.A. 2008. Global water resources: up-scaling aquatic ecosystem services and processes to the planet Earth. University of Minnesota Water Resources, Distinguished Lecture Series. St. Paul, MN.

*Downing, J.A. 2007. Fish and eutrophication. Great Lakes Fishery Commission Workshop, Nutrient Management for Ecosystem Health and Healthy Ecosystems. Gault Estate, Ste-Hilaire, QC, Canada.

*Downing, J.A. 2007. Global limnology: up-scaling aquatic services and processes to the planet Earth. SIL Plenary. Montreal, Quebec, Canada.

*Downing, J.A. 2007. Tapas from the upper edge of the nutrient spectrum: the ecology of waters in agricultural watersheds. Institut Mediterrani d'Estudis Avançats. (Mediterranean Institute for Advanced Studies). Esporles, Spain.

*K. Poole and J.A. Downing. Influence of stream reach characteristics on freshwater mussel populations in a predominantly agricultural landscape SIL 2007, Montreal, Quebec, Canada.

Downing, J.A., J.A. Herriges, C.L. Kling, K.J. Egan, and J.R. Corrigan. 2007. The economic value of water quality: Do limnologists think like humans? American Society of Limnology and Oceanography, Sante Fe, NM.

*Woolnough, D.A., J.A. Downing, and T.J. Newton. 2007. Habitat requirements for host fish of freshwater mussels. Habitat workshop invited speaker. 5th biennial symposium of the Freshwater Mollusk Conservation Society. Little Rock, AR.

Woolnough, D.A., T.J. Newton, and J.A. Downing. 2007. Functional connectivity of host fish among freshwater mussel communities. 5th biennial symposium of the Freshwater Mollusk Conservation Society. Little Rock, AR.

*Herriges, J.A., C.L. Kling, and J.A. Downing. 2006. Valuing water quality through recreational uses in Iowa. Soil and Water Conservation District Commissioners Conference, Washington, DC.

*Downing, J.A., J. Middelburg, J.J. Cole, C.M. Duarte, P. Kortelainen, Y.T. Prairie and K. Laube. 2006. Global carbon burial in agricultural impoundments. American Society of Limnology and Oceanography, Victoria, BC, Canada.

*Prairie, Y.T., J.J. Cole, C.M. Duarte, J.A. Downing, S. Sobek, L.J. Tranvik and J. Melack. 2006. Tools for the upscaling of carbon dioxide flux from lakes to a global scale. American Society of Limnology and Oceanography, Victoria, BC, Canada.

*Webster, K.E., P.A. Soranno, M.T. Bremigan, K.S. Chruvelil, T. Asplund, L.C. Bacon, K.P. Bell, J. Connor, J.A. Downing and W.H. Renwick. 2006. Landscape patterns in the trophic status of north-temperate lakes (USA): relationships with anthropogenic and hydrogeomorphic features. American Society of Limnology and Oceanography, Victoria, BC, Canada.

*Downing, J.A. 2005. The global size distribution and abundance of lakes, ponds, and impoundments. American Society of Limnology and Oceanography, Santiago de Compostella, Spain.

*Downing, J.A. 2005. Notes from the upper edge of the nutrient spectrum: The ecology of waters in agricultural watershed. *Kremer Memorial Water Lecture*, University of Nebraska, Lincoln.

*Daelyn A. Woolnough, J. A. Downing and Teresa Newton. 2005. Fish Mediated Movement of Unionids: Neutral Model of Fish Communities in the Upper Mississippi River. Freshwater Mussel Conservation Society Annual Meeting, St. Paul, MN.

*Daelyn A. Woolnough, J. A. Downing and Teresa Newton. 2005. Metapopulation models of unionid fish hosts: Landscape ecology theory applied in the Upper Mississippi River. North American Benthological Society, New Orleans, LA.

Downing, J.A. 2005. Role of agriculture and impoundment in altering coastal Si:DIN stoichiometry. American Society of Limnology and Oceanography, Salt Lake City, Utah.

*Downing, J.A. 2005. Plumbing agricultural landscapes for water quality improvement: coexistence of intensive agriculture and good water quality. EPA Region 7 and Iowa State University College of Agriculture joint conference.

*Downing, J.A. 2005. Iowa lake water quality: value, risk and emerging issues. Iowa State Water Monitoring Conference.

*Downing, J.A. 2005. CLEAR project update. Iowa State University Crop Advantage Program.

*Downing, J.A. 2005. Phosphorus as a pollutant. Iowa State University Crop Advantage Program.

*Downing, J.A. 2004. Water quality and restoration in agricultural watersheds. Department of Civil and Environmental Engineering, University of Iowa.

*Downing, J.A. and L. Schrage. 2004. Water quality and habitat restoration in Ventura Marsh following benthivorous fish removal. American Fisheries Society Annual Meeting, Madison, Wisconsin.

*Egertson, C. and J.A. Downing. 2004. Relationship of fish catch and composition to water quality in a suite of shallow, agriculturally eutrophic lakes. American Fisheries Society Annual Meeting, Madison, Wisconsin.

Bonneau, D. and J.A. Downing. Iowa State lake habitat classification system. American Fisheries Society Annual Meeting, Madison, Wisconsin.

*Downing, J.A. 2004. Notes from the upper edge of the nutrient spectrum: the ecology of waters in agricultural watersheds. International Association of Great Lakes Research, Annual Meeting Plenary Talk. Waterloo, Ontario.

*Egan, K., J. Herriges, C. Kling, and J.A. Downing. 2004. Valuing water quality in Midwestern lake ecosystems (invited poster). US Environmental Protection Agency Science Forum, Washington, DC. This poster won the first place award in its division and was named best poster of the entire forum.

Woolnough, D.A., J.A. Downing, and T. Newton. 2004. Metapopulation characteristics of unionid communities in the upper Mississippi River. Annual Meeting of the North American Benthological Society, Vancouver, BC.

*Downing, J.A. 2004. Notes from the upper edge of the nutrient spectrum: the ecology of waters in agricultural watersheds. Institute of Ecosystem Studies, Millbrook, NY.

Graham, J. L., J. R. Jones, S. B. Jones, J. A. Downing and T. E. Clevenger. 2004. Nonlinear relationships between environmental variables and microcystin concentration. Sixth International Conference on Toxic Cyanobacteria, Bergen, Norway.

*Downing, J.A. 2003. Global carbon flux through groundwater. NCEAS Workshop on Integrating Terrestrial and Aquatic Carbon Budgets. Santa Barbara, CA.

*Downing, J.A. 2003. Phosphorus dynamics in the Clear Lake watershed: a case study. Agriculture and the Environment Conference: 2003. Ames, IA.

*Downing, J.A. and J. Ramstack. 2003. The water quality of Iowa lakes: 2002. Iowa water quality monitoring conference, Ames, IA.

Woolnough, D., J.A. Downing and T. Newton. 2003. Demographic characteristics of fish hosts and unionid communities at multiple spatial scales in the upper Mississippi River. Freshwater Mussel Conservation Society Annual Meeting.

Graham, J. L., J. R. Jones, S. B. Jones, J. A. Downing and T. E. Clevenger. Environmental factors influencing microcystin distribution and concentration in four midwestern states in the U.S.A. American Society of Limnology and Oceanography Annual Meeting, Salt Lake City, UT.

Cherrier, C. and J.A. Downing. 2003. Predicting Cyanobacteria abundance in nutrient-rich lakes. American Society of Limnology and Oceanography Annual Meeting, Salt Lake City, Utah.

*Downing, J.A. 2002. A slow and lingering death? Notes on a century of decline in North America's mussel fauna. Invited seminar. University of Calgary, Alberta, Canada.

*Downing, J.A. 2002. Lake management in agriculturally impacted landscapes. Invited seminar. Alberta Lake Management Society. Red Deer, Alberta, Canada.

*Downing, J.A. 2002. Key problems in mussel ecology. Invited seminar. United States Geological Survey, Upper Mississippi Environmental Sciences Center. Lacrosse, WI.

*Downing, J.A. 2002. A slow and lingering death? Notes on a century of decline in North America's mussel fauna. Invited seminar. University of Minnesota, Duluth, MN.

*Downing, J.A. 2003. Phosphorus dynamics in the Clear Lake watershed: a case study. Agriculture and the Environment Conference: 2003. Ames, IA.

*Downing, J.A. and J. Ramstack. 2003. The water quality of Iowa lakes: 2002. Iowa water quality monitoring conference, Ames, IA.

Woolnough, D., J.A. Downing and T. Newton. 2003. Demographic characteristics of fish hosts and unionid communities at multiple spatial scales in the upper Mississippi River. Freshwater Mussel Conservation Society Annual Meeting.

Cherrier, C. and J.A. Downing. 2003. Predicting Cyanobacteria abundance in nutrient-rich lakes. American Society of Limnology and Oceanography Annual Meeting, Salt Lake City, Utah.

*Downing, J.A. 2001. Limnology of Clear Lake, Iowa. Midwest Fish and Wildlife Conference. Des Moines, IA.

*Kopaska, J., D. Knoll, and J.A. Downing. 2001. The Use of GIS-Linked AGNPS Watershed Modeling to Taget Watershed Management for Water Quality Restoration. Midwest Fish and Wildlife Conference. Des Moines, IA.

*Egertson, C.J., J.A. Kopaska, and J.A. Downing. 2001. Historical Changes in Aquatic Macrophyte Species Composition and Water Clarity in a Shallow Prairie Lake. Midwest Fish and Wildlife Conference. Des Moines, IA.

*Knoll, D., J.A. Kopaska, and J.A. Downing. 2001. Watershed Influences and Nutrient Loading to Clear Lake, Iowa. Midwest Fish and Wildlife Conference. Des Moines, IA.

*Downing, J.A. 2001. Geographical distribution of non-point source pollution in agricultural watersheds. Summit for Finding Common Ground in Controlling Agricultural Nonpoint Sources of Nutrients, *University of Maryland, Center for Environmental Science.*

Schrage, L. and J.A. Downing. 2001. Pathways leading to increased water clarity following benthivorous fish removal from a shallow wetland in an agricultural basin. North American Lake Management Society, Madison WI.

Kopaska, J., D. Knoll, and J.A. Downing. 2001. The Use of GIS-Linked AGNPS Watershed Modeling To Target Watershed Management for Water Quality Restoration. North American Lake Management Society, Madison WI.

Downing, J.A. and J. Kopaska. 2001. Sources of Impact and Watershed Remediation in Clear Lake, Iowa, USA, Annual Meeting, North American Lake Management Society, Madison WI.

Azevedo, C., J. Herriges, C. Kling and J.A. Downing. 2001. Valuing Preservation and Improvements of Water Quality in Clear Lake, Iowa (USA). Annual Meeting, North American Lake Management Society, Madison WI.

Anthony, J.L., J. Morrell Farré and J.A. Downing. 2001. Physical Impacts of Wind and Boat Traffic on Clear Lake (Iowa, USA), a Shallow, Eutrophic Lake in an Intensively Agricultural Region. Annual Meeting, North American Lake Management Society, Madison WI.

Klatt, J.G., A.P. Mallarino, J.A. Downing and J.A. Kopaska. 2001. Soil P, management practices and P delivery to water bodies: Iowa Clear Lake watershed. American Society of Agronomy Annual Meeting. (Poster Presentation).

Mallarino, A.P., B.M. Stewart, J.L. Baker, J.A. Downing, T.E. Fenton, J.E. Sawyer, G.A. Miller, J.L. Kovar, T.J. Sauer, and R.D. Voss. 2001. Phosphorus indexing in cropland: the Iowa P Index., Soil and Water Conservation Society Annual Meeting, South Carolina (Poster Presentation)

*Downing, J.A. 2001. Landscapes' reflections in the water: agricultural land use changes from biogeochemistry to conservation. Annual Meeting of the North American Benthological Society. LaCrosse, WI. Invited Plenary Presentation.

Egertson, C.J., J.A. Kopaska, J.A. Downing. 2001. A century of change in aquatic macrophyte species composition and water clarity in a eutrophic prairie lake. Annual Meeting of the North American Benthological Society. LaCrosse, WI.

Kopaska, J.A. B.W. Menzel, J.A. Downing. 2001. Land use effects on nutrient export from midwestern US agricultural watersheds. Annual Meeting of the North American Benthological Society. LaCrosse, WI

*Downing, J.A. 2001. Statewide status of Iowa lakes and linkages to agriculture. Great Plains Limnology, 28th Annual Meeting, Iowa Lakeside Laboratory. Invited Plenary Seminar.

*Downing, J.A. 2000. *A Slow and Lingering Death? Notes on a Century of Decline in North America's Mussel Fauna*. Invited Seminar, McMaster University, Hamilton, Ontario, Canada.

*Downing, J.A. 2000. *A Slow and Lingering Death? National and Midwestern Decline of North America's Mussel Fauna*. Invited Seminar, Great Plains Limnology Meeting, Lawrence, KS.

*Downing, J.A. 2000. L'Écologie et la Conservation des Moules d'Eau Douce dans le Mid Ouest Américain. Invited Seminar, Université de Montréal, Montréal, Québec, Canada. In French.

*Downing, J.A., C.W. Osenberg and O. Sarnelle. 1999. Marine phytoplankton growth limitation varies with N:P stoichiometry: a meta-analysis of nutrient enrichment experiments. Invited presentation in the Special Session on Ecological stoichiometry in aquatic ecosystems: New directions for navigating the food web in the next century. ASLO 50th Anniversary Conference.

Kopaska, J.A., B.W. Menzel and J.A. Downing. 1999. Land use effects on nutrient export from Midwestern U.S. Agricultural Watersheds. Contributed presentation at the ASLO 50th Anniversary Conference.

Arbuckle, K.E. and J.A. Downing. 1999. The influence of landuse on lake N:P in a predominantly agricultural landscape. Contributed presentation at the ASLO 50th Anniversary Conference.

Anthony, J.L. and J.A. Downing. 1999. Extreme longevity in freshwater mussels (family Unionidae) inferred from mark-recapture growth data. Contributed presentation at the ASLO 50th Anniversary Conference.

*Downing, J.A. 1999. N and P dynamics in agricultural landscapes: potential impacts on marine nutrient limitation. Invited Seminar at McGill University.

*Downing, J.A. 1999. Phosphorus mobility and control in agricultural landscapes. Invited presentation at EPA Region 7, 7th Annual Nonpoint Source Conference & Iowa State University Conference on Global Water Issues (Conference title: From the Heartland to the World: The Importance of Clean Water).

Bowen, B.S., J.A. Downing and K.A. Tuxbury. 1999. Genetic variation in lake populations of *Lampsilis radiata siliquoidea* in Minnesota. Presentation at the Chattanooga Mussel Meeting, Chattanooga, TN. This is the largest national meeting on mussel ecology and biology.

*Downing, J.A. 1999. Lakes in agricultural watersheds. Invited presentation at the Iowa Lakeside Laboratory, Lake Okoboji.

*Downing, J.A. 1999. Deposition on the Mississippi Watershed and Transportation to the Gulf. Invited presentation at a joint EPA / ESA conference on atmospheric deposition.

Downing, J.A. 1999. Recruitment in Minnesota lacustrine mussel populations. Presentation at the ISU "Clam Jam", Ames, IA.

*Downing, J.A. 1999. Rediscovering Midwestern Lakes: Observations by a Prodigal Limnologist. Invited Plenary Speaker at the Great Plains Limnology meeting in Columbia, MO.

*Downing, J.A. 1999. Lakes in Agricultural Landscapes. Invited presentation to Sigma Xi at the University of Northern Iowa.

*Downing, J.A. 1998. Lake LaVerne and Iowa Lake Management. Invited talk at AFS-NC 1998 Meeting in Ames IA.

*Downing, J.A. 1997. Science and Limnology: Rob Peters' Quest for the Soluble. Invited seminar at ASLO 1997 Aquatic Sciences Meeting.

*Downing, J.A. 1994. The ecological importance of biodiversity. Keynote address, Association of Quebec Biologists, Quebec City, Quebec, Canada.

Downing, J.A. 1994. The global N:P cycle. American Society of Limnology and Oceanography, Miami, Florida.

*Downing, J.A. 1994. Nutrient losses from Canadian landscapes. SCOPE Workshop, Block Island, Rhode Island.

Aboul-Hosn, W. and J.A. Downing. 1992. The influence of cover on the spatial distribution of littoral fishes. American Fisheries Society, Rapid City, South Dakota.

Downing, J.A. and W.L. Downing. 1992. Non-annual external annuli in the freshwater mussels *Anodonta grandis grandis* and *Lampsilis radiata siliquoidea*. North American Bentological Society, Louisville, Kentucky.

Downing, J.A. 1990. The use of normative variance functions in the planning of benthos sampling surveys. North American Benthological Society, Blacksburg, Virginia.

Amyot, J.-P. and J.A. Downing. 1990. The endo- and epibenthic distribution of the unionid mollusc Elliptio complanata. North American Benthological Society, Blacksburg, Virginia.

Forget, S. and J.A. Downing. 1990. The relationship between P/B, body size, climate, trophic level, and mode of reproduction in 84 natural mammal populations. American Society of Mammalogists, Frostburg, Maryland.

Silva, M. and J.A. Downing. 1990. Prediction of the spatial density of terrestrial mammal populations. American Society of Mammalogists, Frostburg, Maryland.

Extension Activities

I direct one of 34 Sea Grant programs across the US, Pacific and the Caribbean. The role of a Sea Grant program is to find the kind of water science people need (business, industry, government, NGOs, individuals – virtually anyone who asks) and, via a professional extension team, bring that science to the public in a way they can use it. If the needed science does not exist, we engage and fund the research community to create the needed water science and bring it back to the public. Fuller information is available on the Minnesota Sea Grant website. I also sustain my own extension program, helping communities with lake water quality and lake management problems.

At Iowa State University, I had no true extension appointment but believed that a natural part of the land grant mission is for all scientists to teach in the broadest sense and use

their expertise to the benefit of the society in which they live. It was exciting to use basic knowledge for practical goals. I enjoy this a great deal.

- I presented regular programs to citizens across the state on the ecology and management of aquatic ecosystems.
- I presented regular programs on the impact of agricultural phosphorus on aquatic systems.
- I gave regular presentations and advice on lake water quality to citizens, clubs, and government boards.
- I sat on several water-related citizen boards and gave advice to lake associations, especially in northern Minnesota but also across the US.

OTHER EXTENSION ACCOMPLISHMENTS:

A major extension time-commitment was helping to develop the *Iowa Phosphorus Index*. This was a collaborative effort across many units within the College of Agriculture. This work was unique in the nation, raised the standard for these indices, and differed from other states' efforts in several important ways:

1. It was the first P index in the nation that created the index levels from scientifically based calculations that were closely correlated with actual levels of P loss from fields. Thus, the index values roughly approximate loss rates in kg/ha or lbs/acre. This was my idea, a prerequisite to my working on the index, and allowed us to make sure the index was performing its intended function.
2. The Iowa P index correctly predicts that P loss will be more closely correlated with sediment transport than fertilizer application. Therefore the index encourages farmers to engage in better land use management while allowing reasonable levels of fertilization. This "innovation" (not rocket science!) came, in part, from my research on Rock Creek Lake watershed.
3. The Iowa P index correctly calculates that around 80% of ALL erosional and run-off P will become available to aquatic organisms. This was another contribution that I made to this index.

Although the Iowa Phosphorus Index had national impact as others used it as a starting point in state-by-state P index creation, its prime importance is the fact that it will be applied to all lands in the state receiving any form of federal subsidy. I am very happy to have been involved in this effort.

Recent Public Presentations and Other Programs Presented
(partial list-not updated since 2015- I now do many of these annually in my role as Minnesota Sea Grant Director)

January 2015. Twin Lakes Local Steering Committee Meeting. Rockwell City, Iowa.

August 2014. Twin Lakes Local Steering Committee Meeting. Rockwell City, Iowa.

July 2014. Silver Lake (Palo Alto County) DFS Public Meeting. Ayrshire, Iowa.

June 2014. Whiterock Bioblitz. Coon Rapids, Iowa.

June 2014. Storm Lake Association Meeting. Storm Lake, Iowa.

May 2014. Biological Integrity Project Meeting with Iowa Department of Natural Resources. Ames, Iowa.

March 2014. Are current soil erosion control efforts effective? Insights from sediment accumulation rates in Iowa lakes. Iowa Water Conference, Ames, Iowa.

January 2014. Lake Survey Project update for Environmental Protection Commission Meeting. Windsor Heights, Iowa.

December 2013. Waterloo CSD Mussel Workshop. Ames, Iowa.

November 2013. Twin Lakes DFS Public Meeting. Rockwell City, Iowa.

November 2013. Storm Lake Project Meeting. Storm Lake, Iowa.

July 2013. Biological Integrity Project Meeting with Iowa Department of Natural Resources and other stakeholders. Ames, Iowa.

January 2013. Paleolimnology Project Meeting with Iowa Department of Natural Resources and other stakeholders. Ames, Iowa.

April 2012. Lake Survey Project update for Environmental Protection Commission Meeting. Des Moines, Iowa.

August 2011. Easter Lake DFS Meeting with Polk County officials. Des Moines, Iowa.

August 2011. Easter Lake DFS Public Meeting. Des Moines, Iowa.

July 2011. Easter Lake DFS Meeting with Des Moines City Council. Des Moines, Iowa.

April 2011. Easter Lake Technical Advisory Team Meeting. Des Moines, Iowa.

November 2010. Iowa lake monitoring – innovation, science, and education. Iowa Environmental Protection Commission. Des Moines, IA.

October 2010. Iowa lake monitoring –innovation, science, and education. Iowa Natural Resources Commission. Des Moines, IA.

July 2010. Diagnostic – feasibility study: Easter Lake. Des Moines, IA.

June 2010. Diagnostic – feasibility study results: Lower Gar Chain. Milford, IA.

March 2010. Diagnostic – feasibility study results: Black Hawk Lake. Lakeview, IA.

December 2009. Results of the Lower Gar Chain Diagnostic Study. Iowa State University, Ames, IA.

October 2009. Results of the Black Hawk Lake Diagnostic Study. Iowa State University, Ames, IA.

June 2009. The diagnosis and restoration of water quality in the Lower Gar chain of lakes, Iowa Lakeside Laboratory.

March 2009. The diagnosis and restoration of water quality in Black Hawk Lake. Lakeview, IA

August 2008. Special lake management issues for Iowa lakes. Iowa DNR Statewide meeting, Iowa Lakeside Laboratory, Lake Okoboji, IA.

January 2008. The diagnosis and restoration of water quality in Green Valley Lake. Creston, IA.

February 2008. The diagnosis and restoration of water quality in Prairie Rose Lake. Harlan, IA.

February 2008. The diagnosis and restoration of water quality in Lake Darling. Richland, IA.

May 2008. The diagnosis and restoration of water quality in Lizard Lake. Gilmore City, IA

August 2008. Water quality in the Ada Hayden Lakes and watershed 2000-2007. Report to Ames, IA, City Council.

March 2007: Rathbun Lake: Report on lake and tributary water quality during 2005. Rathbun Land and Water Association, Centerville, IA.

October 2007: Green Valley Lake Diagnostic – Feasibility analysis. Creston, IA.

October 2007: Lake Darling Diagnostic – Feasibility analysis. Richland, IA.

February 2007: Lizard Lake Diagnostic – Feasibility analysis. Gilmore City, IA.

February 2007: Prairie Rose Lake Diagnostic – Feasibility analysis. Harlan, IA.

March 2007: Advances in lake reporting. DNR Statewide Fisheries Meeting, Guthrie Center, IA.

October 2006: The influence of eutrophic freshwaters on marine ecosystems. Marine

Biology Club Meeting Seminar, Iowa State University.

September 2006: Mammalian Biomass Production:Ecological v Evolutionary Interpretation. EEOB/EEB Seminar, Iowa State University

August 2006: The current state and future water quality of Clear Lake. Clear Lake Association and Project CLEAR Annual Picnic.

November 2005: Report on lake classification. DNR Statewide Fisheries Meeting, Lakeside Laboratory.

October 2005: Report on lake classification in Iowa. EPA NLAPP Committee, Madison, Wisconsin.

July 2005: Lake water quality, value and land use in the rural regions of Iowa. Agricultural Policy – Farm Bill Forum. Sponsored by Iowa State University Extension and College of Agriculture. (Invited speaker)

March 2005: Iowa's draft lake classification system. DNR, NRCS, IGSB, IDALS lake classification committee.

March 2005: Notes from the upper edge of the nutrient spectrum: the ecology of waters in agricultural watersheds.

February 2005: Rathbun lake water quality: 2003-2004. Rathbun Land and Water Alliance, Cenerville, Iowa.

January 2005: Lake water quality monitoring in Iowa. Iowa DNR Water Quality Conference.

January 2005: Phosphorus as a Pollutant. Iowa Crop Advantage Program, ISU Extension, Mason City, Iowa.

January 2005: Clear Lake update. Iowa Crop Advantage Program, ISU Extension, Mason City, Iowa.

January 2005: Update on Iowa lake water quality and classification. DNR, NRCS, IGSB, IDALS lake classification committee.

January 2005: Water quality in the tributaries of Lake Rathbun. Rathbun Land and Water Association, Centerville, Iowa.

September 2004: Water quality in Lake Rathbun. Rathbun Land and Water Alliance Annual Meeting, Millerton, IA.

July 2004: Water Quality in Itasca County Lakes. John Latimer's "Phenologies" program, KAXE Radio, Grand Rapids, MN.

March 2004: Phosphorus and the aquatic environment. Butler County Soil and Water Conservation program, Allison, Iowa.

May 2004: At the request of the City of Ames, I gave Governor Vilsack a tour of the water quality enhancing features of the Ada Hayden Heritage Park.

November 2003: Water quality in Lake Rathbun, 2002. Rathbun Land and Water Alliance, Rathbun Regional Water Authority. Centerville, IA.

October 2003: Summary of Iowa lake remediation needs and approaches. Public meeting preparing for the 2003 Iowa Water Summit, Mason City, IA.

October 2003: Summary of Iowa lake remediation needs and approaches. Public meeting preparing for the 2003 Iowa Water Summit, Ankeny, IA.

September 2003: Summary of Iowa lake remediation needs and approaches. Governor's Working Group on Water Quality Remediation.

July 2003: Discussion leader on environmental initiatives in agriculturally impacted ecosystems. ISU discussion of NSF-ERE program.

April 2003: Lake restoration options for agriculturally impacted watersheds. Iowa Natural Heritage Foundation Annual Meeting, Clear Lake, IA.

March 2003: The Iowa Lake Information System. Iowa DNR Statewide annual meeting.

January 2003: The Iowa Lake Information System. Iowa Lakeshore Owners' Association (first meeting).

March 2002: Agricultural phosphorus: impacts on aquatic systems. Northeast Iowa Research Farm Annual Meeting. Nashua, Iowa.

April 2002: What's happening with nutrients in Iowa waters?. National Water Summit, Waterkeeper Alliance. Held in Clear Lake, IA.

April 2002: Impacts of agriculture on the coastal marine environment. Marine Biology Club, ISU.

June 2002: Lake of Three Fires draft diagnostic / feasibility study. Lake of Three Fires, Iowa.

September 2002: Lake restoration options. IDNR Environmental Protection Commission. Program offered at Clear Lake, IA.

October 2002: Iowa lake water quality. Ames, Iowa, Noon Rotary Club.

November 2002: Lake of Three Fires Restoration Implementation. Bedford, IA.

February 2001: Presented information to Clear Lake Chamber of Commerce on water quality restoration in the Clear Lake Watershed.

March 2001: Presented three seminars on water quality issues at the ISU Water Quality Conference.

- Iowa lake monitoring program.
- Relieving water quality problems in Iowa lakes.
- The Iowa Phosphorus Index.

March 2001: Public presentation on the Iowa Lake Water Quality Monitoring Program at IDNR's annual water quality conference.

April 2001: Presented preliminary results of Clear Lake Diagnostic/Feasibility study to two COA deans (Wintersteen & Miller).

April 2001: Presented an assembly for all grade 7 science classes at Clear Lake Middle School on *Water Quality in Clear Lake: Questions and Answers*.

April 2001: Organized a press conference and granted numerous media interviews on the Clear Lake Project.

April 2001: Presented draft "Clear Lake Diagnostic Study" to a public meeting in Clear Lake Iowa.

April 2001: Presented a lunch-time seminar on water quality in commemoration of Earth Day, Clear Lake, IA.

May 2001: Presentation to Clear Lake Association on potential remedial measures in the Clear Lake Feasibility study.

May 2001: Joint presentation, with DNR, of remedial measures to community leaders from the Clear Lake area.

July 2001: Presentation of Feasibility options to DNR and others from the Clear Lake area.

August 2001: Presented a keynote talk at the annual picnic of Clear Lake Preservation, an amalgam of environmental organizations working on the protection and improvement of Clear Lake.

August 2001: Gave numerous media interviews on the imperilment of Iowa's freshwater mussels, following a COA and DNR press release.

August 2001: Assisted IDNR at public meeting on Feasibility of Restoration of Clear Lake, Clear Lake, IA.

August 2001: At request of Assoc. Dean Wintersteen, met with NHEERL of EPA and gave a brief presentation on water quality questions and ISU/EPA joint ventures.

September 2001: Gave a presentation at the Lake Rathbun Regional Water Authority on water quality in the Rathbun watershed.

September 2001: Presented preliminary water quality report to the City of Ames concerning water quality in the Hallett's Quarry lakes.

October 2001: Presented water quality information on the Hallett's Quarry lakes to the Ames *Tribune* Editorial Board.

October 2001: Gave public, televised program on water quality in the Hallett's Quarry lakes to the Ames League of Women Voters.

February 2000: Collaborated in the production of a "web adventure" called "Rolling Down the River" with Evergreen Productions (www.evergreenproject.com). This educational tool explains the connections between nutrients and Gulf of Mexico Hypoxia. This is geared toward education at the K-12 audience.

March 2000: Presented overview of the ecology of Mississippi River mussels to the DNR / NRCS Iowa Musel Committee.

March 2000: Presented an overview of the conclusions of the Rock Creek Lake watershed study to scientists at the Iowa Cattlemen's Association.

March 2000: Presented information on lake water quality in Iowa to EPA task force on nutrient standards.

April 2000: Presented an assembly for all grade 7 science classes at Clear Lake Middle School on *Water Quality in Clear Lake: Questions and Answers*. As a preamble to this talk, I received questions from dozens of students by e-mail.

April 2000: Presented a public talk on *Clear Lake Water Quality* to a citywide "lunch and learn" session for Earth Day.

May 2000: Presentation to Ames City Council on Maintenance of Water Quality in Hallett's Quarry Lakes.

June 2000: Gave numerous media interviews on the fish manipulation of Ventura Marsh.

July 2000: Co-wrote a "Nutrient Management Minute" with John Cresswell for the Agriculture Extension Service.

August 2000: Presented a keynote talk at the annual picnic of Clear Lake Preservation, an amalgam of environmental organizations working on the protection and improvement of Clear Lake.

August 2000: Presentation on Iowa's Inland Mussels to the Iowa Mussel Committee in Cedar Rapids.

September 2000: Presentation of Iowa's Phosphorus Index to the Iowa Phosphorus Stakeholders group.

September 2000: Agricultural P and Water Quality presentation to Iowa Field Crop Specialists through the Agricultural Extension Service.

October 2000: Presented the Iowa Phosphorus Index to a state-wide stakeholders meeting sponsored by NRCS.

November 2000: Presented Agricultural Phosphorus and Water Quality to the 2000 Integrated Crop Management Conference at ISU, sponsored by ISU Extension.

November 2000: Water Quality and Restoration of Crystal Lake, Iowa. Crystal Lake High School, Crystal Lake, Iowa.

February 1999: Presented an overview of Clear Lake Limnology, general water quality issues, and the components of diagnostic / feasibility studies to a group of Iowa Legislators.

February 1999: Overview of Clear Lake Study and components of diagnostic / feasibility study to a Clear Lake City town meeting.

March 1999: Presented a program on phosphorus losses from agriculture at the joint EPA/ISU 7th annual Nonpoint Source Conference/Global Water Issues conference (March 24-26, 1999).

April 1999: Presented a water quality program at the Clear Lake Community Building.

June 1999: Invited presentation at the Iowa Lakeside Lab. *Lakes in agricultural watersheds.*

August 1999: Presented a program on Clear Lake water quality at the Clear Lake Associations' joint annual picnic.

December 1999: Presentation to the City of Ames Planning and Zoning Commission on the limnology of the Hallett's Quarry lakes in the context of proposed dense residential development.

December 1999: Presentation to the Ames City Council on the limnology of the Hallett's Quarry lakes in the context of proposed dense residential development.

Recent Technical Assistance to Business, Industry, Government Agencies or Individuals (past 8 years).

- I am assisting a sustainable energy company (verterraenergy.com) with the testing of wave and seiche generation in Lake Superior
- I am assisting two AI companies (anno.ai and spear.ai) in the testing of marine tech equipment in Lake Superior
- I am a member of the Duluth-Superior Harbor Technical Advisory Committee and the Dredging subcommittee of that organization. Duluth-Superior is the largest port by tonnage in the Great Lakes and the 12th largest port in the United States.
- I am a founding member and advisor to the Itasca Water Legacy Partnership aka Itasca Waters, of Grand Rapids, Minnesota
- I advise lake associations around the US about water quality and climate change issues.
- I have collaborated with Manure Works, Inc., on software to help producers manage manure applications on agricultural lands
- I was an invited member of the stream nutrient standards committee for the state of Iowa
- I was an appointed member of the Iowa DNR's Lake Nutrient Standards Technical Advisory Committee
- I was invited by former Director Jeff Vonk to participate in the Iowa DNR's Comprehensive Fish and Wildlife Planning.
- I was appointed as former Governor Vilsack's representative on the Iowa Working Group for Water Quality Remediation, in preparation for the 2003 Iowa Water Summit.
- I have been an invited member of the Technical Advisory Committee to help IDNR create former Governor Vilsack's Water Quality Monitoring Program.
- Participated in the IDNR's workshop on Endangered Species
- Attended the "Clear Lake Association's Past President's" meeting multiple times to discuss water quality issues with Clear Lake region and Iowa State leaders.
- I have served as a volunteer to help the City of Ames, Iowa, assess the water quality issues surrounding the potential development of Hallett's Quarry.
- I have advised the City of Clear Lake concerning their storm drain system and helped them to find professional engineers to improve this system.
- I have worked with Story County conservation on assessing water quality problems in McFarland Lake.
- Advised the IDNR on the means of developing TMDL protocols for Iowa waters.
- Invited member of the EPA Region 7 advisory committee on nutrient standards.
- I was an invited member of Iowa's Phosphorus task force.

- Worked with representatives of the City of Clear Lake to help them understand bacteria flux and improve storm water transport systems.
- Collaborated with Advanced Analytical Technologies, Inc. (AATI; a PappaJohn Center company at the research park) to test their rapid methodology for determining fecal coliform and other specific bacteria abundance in freshwater.
- I have worked with Story County conservation on assessing water quality problems in Dakins Lake and McFarland Lake.

Recent Committees and Other Services

I have accepted little external service since 2018 due to the stresses of federal funding, program reorientation, and the COVID-19 pandemic.

Departmental
EEOB Social Committee
EEOB Facilities Committee
EEOB Post Tenure Review Committee (Chair and co-Chair)
EEOB Executive Committee (Chair)
EEOB Executive Committee (Member)
EEOB Governance Document Committee (Chair)
EEOB Outcomes Assessment Committee (Chair)
Computer Facilities Committee (A Ecl)
Strategic Planning Steering Committee (A Ecl)
Strategic Planning Learning Subcommittee (A Ecl) (Chair)
Aquaculture Option Subcommittee (A Ecl)
Ecology Option Subcommittee (A Ecl)
Outcomes Assessment Committee (A Ecl) (Chair)
Awards Committee (A Ecl) (Chair)

College
Environmental Science Interdepartmental Graduate Major, steering committee member.
NCT-167 (now NCR 195) Committee on Hypoxia in the Gulf of Mexico (invited to Chair, declined).
Dean's Faculty Research Advisory Committee
Outcomes assessment standing committee
College of Agriculture Special Research Initiation Grant Faculty Review Committee
College of Agriculture Awards Committee (Chair)
College of Agriculture Phosphorus Task Force
College of Agriculture NRCS Phosphorus Index Committee
Precision Agriculture Education Working Group

University
Minnesota Aquatic Invasive Species Research Center, Advisory Board member.
St. Louis River Estuary, National Estuarine Research Reserved Board member.
Natural Resources Research Institute, University of Minnesota, Advisory Board member
Research and Innovation Office, University of Minnesota, Academic Cabinet member

Council of Deans and Directors member, University of Minnesota Duluth
Environmental Science Graduate Program (Chair)
Environmental Science Graduate Program Executive Committee (Chair)
Biological Reorganization Committee.
Ecology and Evolutionary Biology Graduate Program, Supervisory Committee
Ecology and Evolutionary Biology Curriculum Committee (Chair)
W. Robert Parks and Ellen Sorge Parks Senior Scholarship and President's Leadership Awards Committees.
Ad Hoc Lake Laverne restoration committee.
Iowa State University delegate to the Universities Council on Water Resources

Outside the University
Lobbying the US Congress for increased and sustained funding for basic and applied research.
North American Lake Management Society annual meeting 2022, Member of meeting committee.
Universities Council on Water Research meeting 2020. Member of meeting committee.
Association for the Sciences of Limnology and Oceanography. Co-chair of meeting committee for Puerto Rico 2019
Association for the Sciences of Limnology and Oceanography. Member of Publications Committee.
Association for the Sciences of Limnology and Oceanography. Chair of Nominations Committee.
Association for the Sciences of Limnology and Oceanography. Member of ASLO Comprehensive Evaluation Committee.
Association for the Sciences of Limnology and Oceanography. Chair, Search Committee for Executive Director.
Association for the Sciences of Limnology and Oceanography. Chair, Search Committee for Editor in Chief of Limnology and Oceanography.
Council of Scientific Society Presidents, Chair of the Diversity Committee.
Council of Scientific Society Presidents, Chair of the Publications Committee.
Council of Scientific Society Presidents, Chair of the Cyber Security Committee.
Council of Scientific Society Presidents, elected chair and member of the Executive Committee
Council of Scientific Society Presidents, elected Secretary and member of the Executive Committee
Association for the Sciences of Limnology and Oceanography. Elected President.
American Society of Limnology and Oceanography. Finance Committee (Chair), Strategic Planning Committee (Chair)
American Society of Limnology and Oceanography. Elected Board Member.
Minnesota Sea Grant, University of Minnesota, Duluth, MN. Invited Panel Member.
North American Nitrogen Center, Cornell University, Invited Board Member.
American Society of Limnology and Oceanography, Nominations Committee member. Chair of Awards Committee. Chair of Hutchinson Award Committee.
EPA Region 7 invited member of the Nutrient Standards Working Committee.
State of Iowa invited member of the TMDL advisory committee and stakeholders group.
State of Iowa invited member of the Water Quality Monitoring committee.

American Society of Limnology and Oceanography, 1999 Annual Meeting Committee member and co-Chair

International Perspectives and Programs

Canada: I collaborated with Dr. Daniel Boisclair of Université de Montréal on fish energetics. I have also helped Dr. Jaap Kalff of McGill University in the production of a new limnology text. Although he is now deceased, I am continuing to revise this important textbook. I have continued collaboration with Drs. McCauley and Watson of the University of Calgary on nutrient determination of algal community structure although Dr. McCauley is now President of the University of Calgary so has little time for this.

European Union: I have on-going collaborations all over the European Union on the global carbon budget and the role of small aquatic ecosystems in climate and climate change. My work on pond carbon sequestration has given rise to the UK's "Million Ponds Initiative" in which they plan to increase the number of constructed ponds to sustain aquatic biodiversity.

Brazil: I assisted a group of oceanographers from the University of Florianapolis to develop methods to create mussel aquaculture along the coasts of Brazil. This was under funding from CNpQ.

Personal Commitment to Conservation

My family and I own and maintain a 59 acre parcel of unspoiled forest land adjacent to Chippewa National Forest in northern Minnesota as a wildlife and forestry conservation area. This land includes nearly a full mile of undeveloped shoreline on an oligotrophic lake that is of unique ecological importance. We currently manage this land for hardwood production, water quality conservation, and wildlife enhancement. Our conserved forestland includes several wetlands and some very old growth hardwood forest. We have monitored a network of permanent forest plots since 1982. We have preserved this land and shoreline for over a century, and do so at great personal cost and without government subsidy or support. My family and I believe that commitment to conservation must start at home. Please see our website at wabanalake.org.

Hobbies and Other Activities

- Snorkeling and SCUBA diving (certified diver since age 9y)
- Canoeing and camping
- Anything having to do with boats
- Wood-canvas canoe restoration
- Cooking
- Cross-country skiing
- Reading French novels (I like Simenon; renews my vocabulary)
- Music (I was a professional musician for years; I played the Surf Ballroom in Clear Lake, IA twice; once as a percussionist, once as a limnologist)
- Keeping old lake cottages from falling down

- Archaeology (an interest ever since I excavated a pre-Columbian pot from our land at age 10 with help from the late Prof. Leland Cooper)
- History of the North American fur trade.
- I run a start-up publishing company

Names and Addresses of Referees

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Please let me know if you need other referees in particular areas.