

CURRICULUM VITAE

DONALD FRANKLIN CHARLES

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Born 10/9/49

EDUCATION

- Ph.D. 1982 Indiana University. Major: Ecology and Evolutionary Biology (Limnology);
Minor: Public and Environmental Affairs
- M.S. 1974 Cornell University. Major: General Ecology (Aquatic Sciences);
Minor: Environmental Quality
- B.S. 1971 SUNY College of Environmental Science and Forestry: Biological Sciences
Cum Laude
- B.S. 1971 Syracuse University
Cum Laude

POSITIONS AND EXPERIENCE

- 1/05-Present Ruth Patrick Chair in Environmental Science
- 1/92-Present Leader, Phycology Section, Patrick Center for Environmental Research, The Academy
of Natural Sciences
- 10/95-11/96 Acting Director, Patrick Center for Environmental Research, ANSP.
- 1/92-4/93 Director, Patrick Center for Environmental Research, ANSP. Scientific and
administrative leader for staff of 35 (9 Ph.D. scientists) doing wide range of basic and
applied research on rivers, streams and lakes throughout the U.S.
- 10/90-2/92 Courtesy appointment as Associate Professor, Department of Geosciences, Oregon
State University.
- 5/90-5/91 Leader, ERL-C Project 94, Ecological Indicators. Responsible for completion of a
strategy for development of ecological indicators for the EPA-initiated Environmental
Monitoring and Assessment Program.
- 3/90-8/90 Ecological Statistics Team Senior Technical Consultant (acting team leader), U.S. EPA
ERL-C. Responsibilities similar to those for Aquatic Team Technical Director, but for
a Team of 12.

- 5/89-3/90 Aquatic Team Technical Director (team leader), EPA Environmental Research Laboratory-Corvallis. Coordinated efforts of a 40 person team to complete several ongoing research projects and to seek funding for new projects. Worked with NSI personnel (on-site contractors) and University co-operators to coordinate research tasks; held team meetings and otherwise promoted communication within team; The team annual budget was about \$5 million; responsible for insuring adequate review of team publications.
- 10/87-Present Co-Project Coordinator, with Dr. John Smol, of the PIRLA II project funded 1987-1990 by the U.S. EPA (about \$800K). The primary purposes of this project were to make population estimates of the number of Adirondack NY lakes that had become more acidic since 1850, to infer the nature and magnitude of changes in pH, ANC, DOC and Al, and to detect acidification trends since 1970. Shared responsibilities included development of project design, organization and schedule; arrangement of funding mechanisms; providing direction for research efforts and setting of priorities; coordination of Corvallis laboratory support staff; and analysis and presentation of results.
- 1/87-6/91 Project Coordinator, Regional Case Studies (RCS) Project, funded by the U.S. EPA (about \$750K). The purpose of this project was to prepare a scientific book and supporting papers on the effects of acidic deposition on aquatic ecosystems in 10 regions of the U.S. plus southeastern Canada. Case study chapters were written by experts working in the regions and included considerable new research results. Responsibilities included overall project coordination, development of project design, organization and schedule, assembly of project investigators and arrangement of funding mechanisms, writing, editing, supervision of computer programmer, designing data analyses and figures, arranging peer review and project meetings, and preparation of progress reports.
- 8/82-1988 Co-Project Coordinator, with Dr. Donald R. Whitehead, of the PIRLA project (Paleoecological Investigation of Recent Lake Acidification), which was funded 1983-1986 through contract with the Electric Power Research Institute (\$2.7 million), and later by NSF. The purpose of the project was to reconstruct recent acidification trends of acid-sensitive lakes in four regions of North America. Involved project administration, including coordination of research activities among investigators at the six participating institutions, and supervision of a Research Associate, computer programmer, half-time administrative assistant/secretary, and several student workers. My primary scientific research was analysis of sediment diatom assemblages, inferring past lakewater pH trends, and interpreting these and other results to assess the effects of acidic deposition on study lakes.
- 8/87-12/91 Limnologist, USEPA Environmental Research Laboratory - Corvallis, through Cooperative Agreement between EPA and Indiana University (IU)
- 12/91-6/92 Visiting Scientist, I.U.
- 9/86-12/91 Associate Scientist, I.U.

- 7/84-9/86 Assistant Scientist, I.U.
- 8/82-6/84 Research Associate, I.U.
- 6/82-7/82 Associate Instructor, I.U., "Advanced Field Biology" (L465). Course taught in the Adirondack Mountains, New York. Presented some lectures, led field trips, taught limnological techniques.
- 1/82-5/82 Instructor, I.U., "Ecology" (L473). Taught (lecture, exams) one-half of the course.
- 9/81/12-81
1/81-5/81 Associate Instructor, I.U., "Man and the Biological World" (L100). Taught laboratory sections covering a wide variety of topics in basic biology.
- 9/80-12/80 Associate Instructor, I.U., "Field Biology" (Z265). Assisted with field trips to a variety of ecosystems in southern Indiana.
- 9/77-9/80 Research Assistant, I.U. Conducted Ph.D. related research on 50 Adirondack lakes, including planning and responsibility for two full summers of field work. Supervised several work/study students. Analyzed lake water, sediment, and watershed characteristics. Performed data analysis.
- 1/77-9/77 Senior Adirondack Park Project Analyst G-23, Adirondack Park Agency, Ray Brook, New York.
- 9/73-1/77 Adirondack Park Project Analyst G-18, Adirondack Park Agency, Ray Brook, New York. Primary member of the staff responsible for aquatic ecology. Directly responsible for conducting reviews of project applications and local land use plans to assess potential impacts on aquatic ecosystems. Performed limnological investigations and laboratory analyses. Presented reviews and recommendations to Agency commissioners. Provided scientific testimony at quasi-judicial public hearings. Prepared and reviewed model local ordinances, handbooks for development planning, and reports and legislation dealing with park-wide water resource issues such as acid precipitation and the State Land Master Plan. Made presentations to, and worked with, lakeshore property owners' associations. Supervised work of other staff members and student interns.
- 6/72-9/73 Research Assistant, Cornell University. Conducted Master's thesis research on the assessment of environmental impacts on aquatic ecosystems in the Susquehanna River Basin.
- 1/72-5/72 Teaching Assistant, Cornell University. Instructor for two laboratory sections in "Limnology" (Bio. Sci. 462). Taught laboratory techniques (water chemistry, lake models, phytoplankton and zooplankton sampling and counting, pigment analysis, C¹⁴ measurement of production, etc.), and supervised field trips.
- 6/71-9/71 Instructor, Department of Biology, Eastern Connecticut State College. Taught two five-week sessions of "Field Biology." Eighty percent of class time was spent in the field in areas of New York and New England, and was complemented by classroom sessions on basic ecological theory.

HONORS

Alpha Xi Sigma, Forestry Honorary Society

Included in Who's Who Among Students in American Universities and Colleges (1971)

Award for Excellence in Project Development, ANSP Environmental Research Division (1994)

Patrick Center Exceptional Leadership Award, ANSP (1996)

Program Development award to PCER Phycology Section, ANSP (1999)

Award for Research Excellence, ANSP Patrick Center (2006)

EXTRAMURAL AWARDS (Selected)

"Reconstruction of pH Histories of 10 Regional Integrated Lake-Watershed Acidification Study (RILWAS) Lakes," Electric Power Research Institute (RP2174-9), August 1, 1982-December 31, 1983, \$65,914. Co-Principal Investigator with Dr. Donald R. Whitehead.

"Paleoecological Reconstruction of Recent Lake Acidification in Acid-Sensitive Areas of North America," Electric Power Research Institute (RP2174-10), April 1, 1983-June 31, 1987, \$2,737,000. Co-Project Director with Dr. Donald R. Whitehead. Involved subcontracts with Universities of Maine, Minnesota, and Florida, SUNY College of Environmental Science and Forestry, and Queen's University.

"Paleoecological Investigation of Recent Lake Acidification Trends in the Sierra Nevada", Southern California Edison, January 1, 1986-December 31, 1986, \$209,105. Co-Project Director with Dr. Donald R. Whitehead.

"Preparation of a Report on Use of Diatoms and Chrysophytes for Long-Term Monitoring of Lake Acidification Trends", U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR, \$6,000.

"Paleoecological Investigation of Lake/Watershed Ecosystem Response to Atmospheric Deposition of Strong Acids", National Science Foundation, January 1, 1987-December 31, 1989, \$240,000. Co-Principal Investigator with Donald R. Whitehead and Mark C. Whiting.

"Regional Case Studies of Low-Alkalinity Surface Waters Potentially Affected by or Currently Receiving Acidic Atmospheric Deposition", U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR, January 1-April 1, 1987, \$9,9998; April 1, 1987-March 31, 1989, \$401,230.

"Paleoecological assessment of changes in Adirondack lake pH and alkalinity pre-1850 to the present", U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR, October 1, 1987-September 30, 1989. \$130,000. Dr. John P. Smol and Dr. John C. Kingston, Queen's University, are co-principal investigators.

"Paleolimnological reconstruction of past lakewater organic content relative to geochemical modelling of lake acidification", U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR, \$50,000. Dr. John P. Smol and Dr. John C. Kingston of Queen's University are co-principal investigators.

- "Development of Ecological Indicators for Assessing Environmental Condition, Trends, and Effects of Ecosystem Stress", U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR, October 12, 1990 - October 13, 1991, \$107,500.
- "Improving Records of Diatom Inferred Long-term Trends in Acidity and Trophic State of Pocono Lakes: A Critical Step", Lehigh University's Pocono Comparative Lakes Program, Bethlehem, PA, May 1992-May 1993, \$3,400.
- "Feasibility of a NOAA Paleolimnology Paleoclimate Data Cooperative", National Oceanographic and Atmospheric Administration, Boulder, CO, April-August 1993, \$25,000.
- "Use of sedimentary diatom assemblages to monitor present and past conditions of lakes in the Environmental Monitoring and Assessment Program - Surface Waters (EMAP-SW)", U.S. Environmental Protection Agency, Office of Research and Development; Subcontract with Queen's University, Kingston, Ontario; Five year cooperative agreement, starting July, 1993; \$19,759 for first year.
- "Diatoms as indicators of biological integrity in streams and rivers: development and evaluation using advanced quantitative techniques", U.S. Environmental Protection Agency, Exploratory Grants Program; October 1993 - October 1995; \$261,238. With David Hart and Frank Acker.
- "Evaluation of land use impacts on acid/base chemistry of lakewaters, and incorporation of land use into mathematical models of catchment responses to acidic deposition", U.S. Department of Energy; \$11,400; Subcontract with E&S Environmental Chemistry.
- "Use of sediment diatom assemblages to infer major increases in nitrogen concentrations in low- alkalinity lakes", U.S. Department of Energy; Office of Energy Research, April 1994 - May 1995; \$23,597.
- "Diatom counting for state of Montana", Montana Department of Health and Environmental Sciences; April 1994 - June 1994; \$19,085. With Frank Acker and Noma Ann Roberts.
- "Development of Periphyton Biocriteria and Periphyton Bioassessment Protocols for Montana Lakes and Wetlands", Montana Department of Health and Environmental Sciences; April, 1994 - March 1995; \$39,858. With Frank Acker and Noma Ann Roberts.
- "Analysis of Water and Sediment of Mt. Airy Lake", Mt. Pocono Municipal Authority (Pennsylvania), February - May, 1994; \$13,280. With Mark Hermanson.
- "Algae Sample Processing for the USGS National Water Quality Assessment Program (NAWQA), US Geological Survey, \$350,000+.
- "Creation of a Diatom Paleolimnology Data Cooperative", NOAA, Office of Global Programs, Paleoclimate Program". With Roger Sweets (Indiana University) and Tim Sullivan (E&S Environmental Chemistry); \$90,000 over three year period.
- "Paleolimnological reconstruction of pre-industrial acid-base characteristics of surface waters in an area receiving high Acidic deposition", subcontract on proposal submitted by Jakub Hruška, Eva Břizová, Martin Novák, and Josef Veselý; Czech Geological Survey, 1996-98, \$16,000.

“Analysis of Sediment and Periphyton Diatom Assemblages from Montana wetlands and Assessment of Ecological Conditions”, Montana Department of Environmental Quality. 1997. \$15,000.

“Jackson River Algal Biomass / Aquatic Biology Survey - October, 1997”, Westvaco Corp, Covington, VA, 1997, \$20,000.

Several projects to study Jackson River algal biomass, Westvaco Corp, Covington, VA, 1998 - 2001, more than \$200,000.

“A Diatom Paleolimnology Data Cooperative for Paleoclimate Research”, National Science Foundation, Earth System History, 1998 - 2001, \$134,000; 2004 - 2007, \$156,000.

“Algal Research and Ecological Synthesis for the U.S.G.S. National Water Quality Assessment Program (NAWQA)”, U.S. Geological Survey, Two four-year Co-operative Agreement, 1999 - 2002, \$2 million; 2003 - 2007, \$2 million; 2007-2008, \$380,000.

“Understanding the Relationships Between Natural Conditions and Nutrient Loading on Eutrophication: Algal Indicators of Eutrophication for New Jersey Streams”, New Jersey Department of Environmental Protection, 2000 - 2001, \$75,000; 2002 - 2003, \$100,000; 2003 - 2004, \$60,000; 2004 - 2005, \$90,000.

“Analysis of Periphyton Samples for an Acid Mine Drainage Study of the West Branch Susquehanna River,” U.S.G.S. Northern Appalachian Research Laboratory, Wellsboro, PA, 2003-2004, \$25, 979.

“Analysis of Algal Samples and Data Interpretation,” Montana Department of Environmental Quality, 2005-2006, \$250,000.

Other Phycology Section projects include algal sample analysis for states of Maine, Virginia, New Mexico and Idaho. 2005-2007.

MEETING ORGANIZATION

Planned and organized, with D.R. Whitehead and others, meetings of PIRLA project investigators, advisors, and invited participants (usually 40-50 total).

- (1) University of Maine, Orono, Maine, April 10-12, 1983.
- (2) Indiana University, Bloomington, Indiana, March 19-24, 1984.
- (3) Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania, November 12-16, 1984.
- (4) University of Florida, Gainesville, Florida, March 18-22, 1985.
- (5) University of Michigan Biological Station, Douglas Lake, Pellston, Michigan, September 29 to October 5, 1985.

Planned and organized, with administrative assistants, meetings of EPA Regional Case Studies Project (usually 20-30 scientific investigators). Presided over meetings.

- (1) Indiana University, Bloomington, Indiana, March 10-11, 1987
- (2) Corvallis, Oregon, June 4-5, 1987
- (3) Gainesville, Florida, March 24-25, 1988
- (4) Boulder, Colorado, June 16-17, 1988

Directed planning and organization of workshop on "EMAP Indicator Development Strategy", attended by about 35 participants in EMAP (Environmental Monitoring and Assessment Program). Las Vegas, NV June 27-29, 1990

Planned and organized a "Workshop on Taxonomy of Pocono Diatoms", attended by 8 participants, The Academy of Natural Sciences of Philadelphia, July 13-14, 1992.

Planned, organized and directed a "Workshop on Paleolimnology Paleoclimate Databases", attended by 17 participants, The Academy of Natural Sciences of Philadelphia, May 12-13, 1993.

Overall responsibility for, and supervision of planning and organization of, 17 NAWQA Workshops on Harmonization of Algal Taxonomy, attended by 10 - 15 participants; May 1999 to December 2006. Also an organizer of the NAWQA / ANSP Algal Data Analysis Workshop, ANSP, March 15-17, 2005.

PROFESSIONAL ACTIVITIES

Certified Senior Ecologist, Ecological Society of America. January 2001 to present.

Associate Editor, Journal of Paleolimnology, January 1988 to January 1998.

Member, National Research Council Committee on Monitoring and Assessment in Trends of Acid Deposition, September 1983-March 1986.

Invited by Royal Society to provide oral review and discussion of the SWAP Paleolimnology Programme at the Final Conference of the Surface Water Acidification Project, London, March 1990

Participation in Management Meetings of EPA's Aquatic Effects Research Program, 1987-1990.

Participation in Management Meetings of the Environmental Monitoring and Assessment Program (EMAP) 1990.

Member, U.S. EPA Office of Water's Lake Bioassessment Work Group

Participant, Dahlem Workshop on Acidification of Freshwater Ecosystems, Berlin, Germany, October 1992.

Reviewer of Manuscripts for Journals: Science; Nature; Ecology; Limnology and Oceanography; Journal of Paleolimnology; Canadian Journal of Botany; Environmental Science and Technology; Water, Air and Soil Pollution; Biogeochemistry; Aquatic Living Resources; Philosophic Transactions of the Royal Society of London, Diatom Research, Journal of Phycology, Canadian Journal of Fisheries and Aquatic Sciences, Environmental Pollution, Hydrobiologia, Ecological Applications, Frontiers in Ecology and the Environment.

Reviewer of Proposals: National Science Foundation, U.S. Environmental Protection Agency, National Oceanic and Atmospheric Administration, U.S. Department of Energy, National Park Service.

Served as external examiner for Ph.D. Thesis defense of Sushil Dixit (November 7, 1986), Marianne Douglas (September 17, 1993), and Brian Ginn (April 10, 2006) Department of Biology, Queen's University, Kingston, Ontario; Heuichan Roh (Sept 22, 2000), Drexel University, Philadelphia, PA.

ADDITIONAL TRAINING

Advanced SCUBA certification
 National Outdoor Leadership School--East
 Seminar/Workshop on Project Management, 11/89
 Seminar/Workshop on Managing Multiple Projects, Priorities, and Deadlines 10/90

PROFESSIONAL ORGANIZATIONS

American Society of Limnology and Oceanography
 Ecological Society of America
 International Association of Theoretical and Applied Limnology
 International Society for Diatom Research
 North American Benthological Society
 North American Lake Management Society
 Phycological Society of America
 Sigma Xi

PUBLICATIONS * = peer reviewed

- Callen, J.Z. and D.F. Charles. 1974. A guide for evaluating environmental impacts on aquatic ecosystems in the Susquehanna River Basin. Susquehanna River Basin Commission. 414 pp.
- * Charles, D.F. and M.G. DiNunzio, eds. 1977. Development in the Adirondack Park: objectives and guidelines for planning and review. Adirondack Park Agency, Ray Brook, N.Y. 176 pp.
- * Smol, J.P., D.F. Charles, and D.R. Whitehead. 1984. Mallomonadacean (Chrysophyceae) assemblages and their relationships with limnological characteristics in 38 Adirondack (New York) lakes. Canadian Journal of Botany 62:911-923.
- * Smol, J.P., D.F. Charles, and D.R. Whitehead. 1984. Mallomonadacean microfossils provide evidence of recent lake acidification. Nature 307:628-630.
- Charles, D.F. 1984. Recent pH history of Big Moose Lake (Adirondack Mountains, New York, USA) inferred from sediment diatom assemblages. Internationale Vereinigung fur Theoretische und Angewandte Limnologie Verhandlungen 22:559-566.
- * Charles, D.F. 1985. Relationships between surface sediment diatom assemblages and lake water characteristics in Adirondack Mountain (N.Y.) lakes. Ecology 66:994-1011.

Supplemental tables in the Ecological Society of America's Ecological Archives:
<http://www.esapubs.org/archive/ecol/E066/004/default.htm>

- * Charles, D.F. 1986. A new diatom species, *Fragilaria acidobiontica*, from acidic lakes in northeastern North America. Pages 35-44 in J.P. Smol, R.W. Battarbee, R.B. Davis, and J. Meriläinen, eds. *Diatoms and Lake Acidity*. W. Junk, Dordrecht, Netherlands.
- * Whitehead, D.R., D.F. Charles, S.E. Reed, S.T. Jackson, and M.C. Sheehan. 1986. Late-glacial and Holocene acidity changes in Adirondack (N.Y.) lakes. Pages 251-274 in J.P. Smol, R.W. Battarbee, R.B. Davis, and J. Meriläinen, eds. *Diatoms and Lake Acidity*. Developments in Hydrobiology, W. Junk, Dordrecht, Netherlands.
- * Charles, D.F. and S.A. Norton. 1986. Paleolimnological evidence for trends in atmospheric deposition of acids and metals. Pages 335-431 (Chapter 9) in *Acid Deposition: Long-Term Trends*. Report of The National Research Council Committee on Monitoring and Assessment of Trends in Acid Deposition. National Academy Press, Washington, D.C. Translated into Russian, 1990.
- Charles, D.F. and D.R. Whitehead, (eds.). 1986. *Paleoecological Reconstruction of Recent Lake Acidification (PIRLA): Methods and project description* EPRI EA-4906. Electric Power Research Institute, Palo Alto, CA. 228 pp.
- Charles, D.F. and D.R. Whitehead. 1986. The PIRLA project: Paleoecological Investigation of Recent Lake Acidification. *Hydrobiologia* 143:13-20.
- * Charles, D.F., D.R. Whitehead, D.S. Anderson, R. Bienert, K.E. Camburn, R.B. Cook, T.L. Crisman, R.B. Davis, B.D. Fry, R.A. Hites, J.S. Kahl, J.C. Kingston, R.G. Kreis, Jr., M.J. Mitchell, S.A. Norton, L.A. Roll, J.P. Smol, P.R. Sweets, A.J. Uutala, J.R. White, M.C. Whiting, and R.J. Wise. 1986. The PIRLA project (Paleoecological Investigation of Recent Lake Acidification): Preliminary results for the Adirondacks, New England, N. Great Lakes States, and N. Florida. *Water, Air, and Soil Pollution* 30:355-365.
- * Battarbee, R.W. and D.F. Charles. 1986. Diatom-based pH reconstruction studies of acidic lakes in Europe and North America: A synthesis. *Water, Air, and Soil Pollution* 30:347-354.
- Charles, D.F. 1986. Assessing the effects of acidic deposition on lakes using diatom and chrysophyte algal remains. *Physics and Society* 16(1):12-14.
- * Charles, D.F., D.R. Whitehead, D.R. Engstrom, B.D. Fry, R.A. Hites, S.A. Norton, J.S. Owen, L.A. Roll, S.C. Schindler, J.P. Smol, A.J. Uutala, J.R. White, and R.J. Wise. 1987. Paleolimnological evidence for recent acidification of Big Moose L., Adirondack Mountains, N.Y. (USA). *Biogeochemistry* 3:267-296.
- * Battarbee, R.W. and D.F. Charles. 1987. The use of diatom assemblages in lake sediments as a means of assessing the timing, trends and causes of lake acidification. *Progress in Physical Geography* 11:552-580.

- Johnson, A.H., D.F. Charles, and S.B. Anderson. 1987. Commentary: Lake acidification--The authors reply. (Subject: Acidification of Adirondack lakes is not caused by forest blowdown). *Environment* 29:4-5.
- Charles, D.F. and D.R. Whitehead, (eds.). 1989. *Paleoecological Investigation of Recent Lake Acidification (PIRLA): 1983-1985 EPRI EN-6526*. Electric Power Research Institute, Palo Alto, CA. 415 pp.
- * Davis, R.B., D.S. Anderson, D.F. Charles, and J.N. Galloway. 1988. Two-hundred year pH history of Woods, Sagamore and Panther Lakes in the Adirondack Mountains, New York State, U.S.A. Pages 89-111 *in* W.J. Adams, G.A. Chapman, and W.G. Landis, eds. *Aquatic Toxicology and Hazard Assessment: 10th Volume, ASTM STP 971*. American Society for Testing and Materials, Philadelphia.
- * Jackson, S.T. and D.F. Charles. 1988. Aquatic macrophytes in Adirondack (N.Y.) lakes: patterns of species composition in relation to environment. *Canadian Journal of Botany* 66:1449-1460.
- * Charles, D.F. and J.P. Smol. 1988. New methods for using diatoms and chrysophytes to infer past pH of low-alkalinity lakes. *Limnology and Oceanography* 33:1451-1462.
- * Charles, D.F., R.W. Battarbee, I. Renberg, H. van Dam, and J.P. Smol. 1989. Paleoecological analysis of lake acidification trends in North America and Europe using diatoms and chrysophytes. 1989. Pages 207-276 *in* S.A. Norton, S.E. Lindberg, and A.L. Page, eds. *Acid Precipitation Vol. 4. Soils, Aquatic Processes and Lake Acidification*. Springer-Verlag, New York.
- * Whitehead, D.R., D.F. Charles, S.T. Jackson, J.P. Smol and D.R. Engstrom. 1989. The developmental history of Adirondack (N.Y.) lakes. *Journal of Paleolimnology* 2:185-206.
- * Charles, D.F. 1990. A checklist for describing and documenting diatom and chrysophyte calibration data sets and equations for inferring water chemistry. *Journal of Paleolimnology* 3:175-178.
- * Charles, D.F. 1990. Effects of acidic deposition on North American lakes: paleolimnological evidence from diatoms and chrysophytes. Included in special volume, "Paleolimnology and Lake Acidification." *Philosophical Transactions of the Royal Society, B*. 327:403-412.
- Charles, D.F. and J.P. Smol. 1990. The PIRLA II Project: Regional assessment of lake acidification trends. *Internationale Vereinigung fur Theoretische und Angewandte Limnologie Verhandlungen* 22:559-566.
- * Charles, D.F., M.W. Binford, E.T. Furlong, R.A. Hites, M.J. Mitchell, S.A. Norton, F. Oldfield, M.J. Paterson, J.P. Smol, A.J. Uutala, J.R. White, D.R. Whitehead, and R.J. Wise. 1990. Paleoecological investigation of recent lake acidification in the Adirondack Mountains, NY. *Journal of Paleolimnology* 3:195-241.
- * Sullivan, T.J., D.F. Charles, J.P. Smol, B.F. Cumming, A.R. Selle, D.R. Thomas, J.A. Bernert, and S.S. Dixit. 1990. Quantification of changes in lakewater chemistry in response to acidic deposition. *Nature* 345:54-58.

- Whitehead, D.R., D.F. Charles and R.A. Goldstein. 1990. The PIRLA Project (Paleoecological Investigation of Recent Lake Acidification): An introduction to the synthesis of the project. *Journal of Paleolimnology* 3:187-194.
- * Charles, D.F. 1991. Introduction. Pages 3-7 in D.F. Charles, ed. *Acidic Deposition and Aquatic Ecosystems: Regional Case Studies*. Springer-Verlag, N.Y., N.Y.
- * Husar, R.B., T.J. Sullivan and D.F. Charles. 1991. Historical trends in atmospheric sulfur deposition and methods for assessing long-term trends in surface water chemistry. Pages 65-82 in D.F. Charles, ed. *Acidic Deposition and Aquatic Ecosystems: Regional Case Studies*. Springer-Verlag, N.Y., N.Y.
- * Charles, D.F. (ed). 1991. *Acidic deposition and aquatic ecosystems: regional case studies*. Springer-Verlag, N.Y., N.Y., 747 pages.
- * Charles, D.F., S.S. Dixit, J.P. Smol and B.F. Cumming. 1991. Variability in diatom and chrysophyte assemblages and inferred pH: paleolimnological studies of Big Moose Lake, N.Y. *Journal of Paleolimnology* 5:267-284.
- * Charles, D.F., J.P. Baker, J.M. Klopatek, C.M. Knapp, D.R. Marmorek, and K.W. Thornton. 1992. A research strategy to develop ecological indicators for the Environmental Monitoring and Assessment Program (EMAP). Pages 1526-1528 in D.H. McKenzie, D.E. Hyatt, and V.J. McDonald. *Ecological Indicators*, Vol. 2, Elsevier, London.
- * Kingston, J.C., B.F. Cumming, A.J. Uutala, J.P. Smol, K.E. Camburn, D.F. Charles, S.S. Dixit, and R.G. Kreis, Jr. 1992. Biological quality control and quality assurance: a case study in paleolimnological biomonitoring. Pages 1542-1544 in D.H. McKenzie, D.E. Hyatt, and V.J. McDonald. *Ecological Indicators*, Vol. 2, Elsevier, London.
- * Sullivan, T.J., R.S. Turner, D.F. Charles, B.F. Cumming, J.P. Smol, C.L. Schofield, C.T. Driscoll, B.J. Cosby, H.J.B. Birks, A.J. Uutala, J.C. Kingston, S.S. Dixit, J.A. Bernert, P.F. Ryan, and D.R. Marmorek. 1992. Use of historical assessment for evaluation of process-based model projections of future environmental change: Lake acidification in the Adirondack Mountains, New York, USA. *Environmental Pollution* 77:253-262.
- * Cumming, B.F., J.P. Smol, J.C. Kingston, D.F. Charles, H.J.B. Birks, K.E. Camburn, S.S. Dixit, A.J. Uutala, and A.R. Selle. 1992. How much acidification has occurred in Adirondack region lakes (New York, USA) since pre-industrial times? *Canadian Journal of Fisheries and Aquatic Sciences* 49:128-141.
- * Dixit, S.S., J.P. Smol, J.C. Kingston, and D.F. Charles. 1992. Diatoms: Powerful indicators of environmental change. *Environmental Science and Technology* 26:22-33.
- * Hamilton, P.B., M. Poulin, D.F. Charles, and M. Angell. 1992. *Americanarum diatomarum exsiccata*: CANA, voucher slides from eight acidic lakes in northeastern North America. *Diatom Research* 7:25-36.
- * Dixit, S.S., B.F. Cumming, H.J.B. Birks, J.P. Smol, J.C. Kingston, A.J. Uutala, D.F. Charles, and K.E. Camburn. 1993. Diatom assemblages from Adirondack lakes (New York, U.S.A.) and

the development of inference models for retrospective environmental assessment. *Journal of Paleolimnology* 8:27-47.

- Charles, D.F. 1993. Acid rain not only to blame. *Nature* 362: 794. News and Views article written at request of Nature on a paper I reviewed for them [Nature created title for my article], "Prehistoric increases in the pH of acid sensitive Swedish lakes caused by land-use changes" by I. Renberg, T. Korsman, and H.J.B. Birks. 1993. *Nature* 362: 824-827.
- * Charles, D.F., J.P. Smol, and D.R. Engstrom. 1994. Paleolimnological approaches to biological monitoring. Pages 233-293 *in* S. Loeb and A. Spacie, eds. *Biological Monitoring of Aquatic Systems*. CRC Press, Boca Raton, FL.
- * Charles, D.F. and J.P. Smol. 1994. Long-term chemical changes in lakes: Quantitative inferences from biotic remains in the sediment record. Pages 3-31 *in* L. Baker, ed. *Environmental Chemistry of Lakes and Reservoirs*. Advances in Chemistry Series 237, American Chemical Society, Washington, D.C.
- * Battarbee, R.W. and D.F. Charles. 1994. Lake acidification and the role of paleolimnology. Pages 51-65 *in* C. Steinberg and R. Wright, eds. *Acidification of Freshwater Ecosystems: Implications for the Future*. Dahlem Workshop Environmental Sciences Research Report 14. Wiley, Chichester.
- Emmett, B., D.F. Charles, K.H. Feger, R. Harriman, H.F. Hemond, H. Hultberg, D. Lessmann, A. Ovalle, H. Van Miegroet, and H.W. Zoetl. 1994. Group Report: Can we differentiate between natural and anthropogenic acidification? Pages 118-140 *in* C. Steinberg, and R. Wright, eds. *Acidification of Freshwater Ecosystems: Implications for the Future*. Dahlem Workshop Environmental Sciences Research Report 14. Wiley, Chichester.
- Sullivan, T.J. and D.F. Charles. 1994. The feasibility and utility of a paleolimnology/paleoclimate data cooperative for North America: Report on a NOAA paleoclimate Workshop. *Journal of Paleolimnology* 10: 265-273.
- * Charles, D.F. and P. Kociolek. 1995. Freshwater diatoms: Indicators of ecosystem change. Pages 256-258 *in* E.T. LaRoe, G.S. Ferris, C.E. Puckett, P.D. Doran, and M.J. Mac, eds. *Our living resources: A report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems*. U.S. Department of the Interior, National Biological Service, Washington, D.C. Electronic version at: <http://biology.usgs.gov/s+t/frame/idx-m2fr.htm>
- * Charles, D.F. 1996. Use of algae for monitoring rivers in the United States: Some examples. Pages 109-118 *in* B.A. Whitton and E. Rott, eds. *Use of Algae for Monitoring Rivers II*. Institut für Botanik, Universität Innsbruck, Innsbruck, Austria
- * Sullivan, T.J., B.J. Cosby, C.T. Driscoll, D.F. Charles, and H. Hemond. 1996. Influence of organic acids on model projections of lake acidification. *Water, Air, and Soil Pollution* 91: 271-282.
- * Sullivan, T.J., B. McMartin, and D.F. Charles. 1996. Re-examination of the role of landscape change in the acidification of lakes in the Adirondack Mountains, New York. *The Science of the Total Environment* 183: 231-248.

- * Eilers, J.M., J.A. Bernert, C.P. Gubala, M.C. Whiting, D.R. Engstrom, and D.F. Charles. 1996. Recent paleolimnology of Devils Lake, Oregon. *Northwest Science* 70:13-27.
- * Battarbee, R.W., D.F. Charles, S.S. Dixit, and I. Renberg. 1999. Diatoms as indicators of surface water acidity. Pages 85-127. *In* *The diatoms: Applications for the environmental and earth sciences*. Stoermer, E.F. and J.P. Smol, eds. Cambridge University Press, Cambridge.
- * Dixit, S.S., J.P. Smol, D.F. Charles, R.M. Hughes, S.G. Paulsen, and G.B. Collins. 1999. Assessing water quality changes in the lakes of the northeastern United States using sediment diatoms. *Canadian Journal of Fisheries and Aquatic Sciences* 56: 131-152.
- * Sullivan, T.J., D.F. Charles, J.A. Bernert, B.McMartin, K.B. Vaché, and J. Zehr. 1999. Relationship between landscape characteristics, history, and lakewater acidification in the Adirondack Mountains, New York. *Water, Air and Soil Pollution* 112: 407-427.

- Camburn, K.E. and D.F. Charles. 2000. Diatoms of low-alkalinity lakes in the Northeastern United States. (A Photographic Iconograph illustrating nearly 1000 specimens). Special Publication 18, The Academy of Natural Sciences of Philadelphia, Philadelphia, PA. 152 pp.
- * Hession, W.C., T.E. Johnson, D.F. Charles, D.D. Hart, R.J. Horwitz, D.A. Kreeger, J.E. Pizzuto, D.J. Velinsky, J.D. Newbold, C. Cianfrani, T. Clason, A.M. Compton, N. Coulter, L. Fuselier, B.D. Marshall, and J. Reed. 2000. Ecological benefits of riparian reforestation in urban watersheds: Study design and preliminary results. *Environmental Monitoring and Assessment* 63 (1):211-222.
- * Potapova, M.G. and D.F. Charles. 2002. Benthic diatoms in USA rivers: distributions along spatial and environmental gradients. *Journal of Biogeography* 29: 167-187.
- * K.L. Bushaw-Newton, D.D. Hart, J.E. Pizzuto, J.R. Thomson, J. Egan, J.T. Ashley, T.E. Johnson, R.J. Horwitz, M. Keeley, J. Lawrence, D.F. Charles, C. Gatenby, D.A. Kreeger, T. Nightengale, R.L. Thomas, and D.J. Velinsky. 2002. An integrative approach towards understanding ecological responses to dam removal: The Manatawny Creek Study. *Journal of the American Water Resources Association* 38(6): 1581-1599.
- * Hart, D.D., T.E. Johnson, K.L. Bushaw-Newton, R.J. Horwitz, A.T. Bednarek, D.F. Charles, D.A. Kreeger and D.J. Velinsky. 2002. Dam removal: Challenges and opportunities for ecological research and river restoration. *BioScience* 52: 669- 681.
- * Hession, W.C., T.E. Johnson, D.F. Charles, R.J. Horwitz, D.A. Kreeger, D.J. Velinsky, J.E. Pizzuto, B.D. Marshall, and J.D. Newbold. 2003. Ecological benefits of riparian reforestation in urban watersheds. *Proceedings of the ASCE-EWRI World Water & Environmental Congress, Protection & Restoration of Urban & Rural Streams, Philadelphia, PA, June 2003*. 10 pp.
- * Potapova, M., and D.F. Charles. 2003. Distribution of benthic diatoms in U.S. rivers in relation to conductivity and ionic composition. *Freshwater Biology* 48: 1311-1328.

- Ector L., J.C. Kingston, D.F. Charles, L. Denys, M.S.V. Douglas, K. Manoylov, N. Michelutti, F. Rimet, J.P. Smol, R.J. Stevenson and J. G. Winter. 2004. Workshop report. Freshwater diatoms and their role as ecological indicators. Pages 469-480 in Proceedings of the 17th International Diatom Symposium, Ottawa, Canada, 2002. M. Poulin, ed., Biopress Limited, Bristol.
- * Potapova, M.G. and D.F. Charles. 2004. Potential use of rare diatoms as environmental indicators in USA rivers. Pages 281-295, In Proceedings of the 17th International Diatom Symposium. Ottawa, Canada, 2002. M. Poulin, editor. Biopress Limited, Bristol.
- * Potapova, M., D.F. Charles, K.C. Ponader and D.M. Winter. 2004. Quantifying species indicator values for trophic diatom indices: a comparison of approaches. *Hydrobiologia* 517: 25-41.
- * Thomson, J.R., D.D. Hart, D.F. Charles, T.L. Nightengale, and D.M. Winter. 2005. Effects of removal of a small dam on downstream macroinvertebrate and algal assemblages in a Pennsylvania stream. *Journal of the North American Benthological Society* 24: 192-207.
- * Potapova, M.G. and D.F. Charles. 2005. Choice of substrate in algae-based water quality assessment. *Journal of the North American Benthological Society* 24: 415-427.
- Belton, T.J., K.C. Ponader, and D.F. Charles. 2005. Trophic diatom indices (TDI) and the development of site-specific nutrient criteria. Pages 1042 - 1056 in TMDL 2005 Specialty Conference, Water Environment Federation, Alexandria, VA.
- * Sprouffske, K., D.F. Charles, E.A. Morales, M. Potapova, K.C. Ponader, D.M. Winter, C. Bell, P. Cotter, R. McCourt, D. Mellott, C. Ratnayaka, and D. Waterman. 2006. Academy of Natural Sciences online algae image resources. Proceedings of the 18th International Diatom Symposium. Miedzyzdroje, Poland, 2004. A. Witkowski, editor. Biopress Limited, Bristol.
- Charles, D.F., R.J. Stevenson, M. Kelly, and L. Ector. 2006. Workshop report. Diatoms and environmental assessment. In Proceedings of the 18th International Diatom Symposium. Miedzyzdroje, Poland, 2004. A. Witkowski, editor. Biopress Limited, Bristol.
- * Cardinale, B.J., H. Hillebrand, and D.F. Charles. 2006. Geographic patterns of diversity in streams predicted by a multivariate model of disturbance and productivity. *Journal of Ecology* 94: 609-618.
- * Charles, D.F., F.W. Acker, D.D. Hart, C.W. Reimer, and P.B. Cotter. 2006. Large-scale regional variation in diatom-water chemistry relationships: rivers of the eastern United States. *Hydrobiologia* 561:27-57.
- * Ponader, K.C., D.F. Charles, and T.J. Belton. 2007. Diatom-based TP and TN inference models and indices for monitoring nutrient enrichment of New Jersey streams. *Ecological Indicators* 7: 79-93.
- * Potapova, M. and D.F. Charles. 2007. Diatom metrics for monitoring eutrophication in rivers of the United States. *Ecological Indicators* 7: 48-70.

TECHNICAL REPORTS

- Charles, D.F., R. Booth, R. Craig, and R. Curran. 1975. Acid rain in the Adirondacks: Position of the Adirondack Park Agency on acid precipitation and its effects on the Adirondack Park, Draft. 51 pp. Adirondack Park Agency, Ray Brook, N.Y.
- Charles, D.F. 1976. Peck's Lake, Fulton County, New York: An ecological assessment and an evaluation of potential impacts due to additional second home development. Adirondack Park Agency, Ray Brook, N.Y. 26 pp. and appendices.
- Charles, D.F. 1976. Justification of minimum separation distances between bottom of sewage disposal systems and bedrock and groundwater in the Adirondack Park. Adirondack Park Agency, Ray Brook, N.Y. 25 pp.
- Charles, D.F. 1977. Preliminary Adirondack Park water and related resources reference list (about 450 entries). 53 pp. Adirondack Park Agency, Ray Brook, N.Y.
- Charles, D.F. Aquatic macrophytes in Adirondack Mountain (N.Y.) lakes. Unpublished MS.
- Charles, D.F. and D.R. Whitehead, eds. 1983. Paleocological Reconstruction of Recent Lake Acidification in Acid Sensitive Areas of North America: Status of Field Work and Characteristics of Study Lakes, October 1983. 203 pp.
- Charles, D.F. and D.R. Whitehead (editors). 1984. Paleocological Investigation of Recent Lake Acidification (PIRLA): Project Status--December 1983. 277 pp.
- Camburn, K.E., J.C. Kingston, and D.F. Charles (eds.). 1986. PIRLA Diatom Iconograph. PIRLA Unpublished Report Series, Report number 3. Includes 53 photographic plates depicting 1059 diatom specimens, plus figure legends and index. Distributed to over 65 diatomists throughout the world.
- Charles, D.F. and R.J. Wise. 1987. Adirondack lake morphometric maps and sediment coring field notes (PIRLA). PIRLA Unpublished Report Series No. 10, Department of Biology, Indiana University, 68 pp.
- Charles, D.F. 1987. Diatom counts of Adirondack lake surface sediment samples. PIRLA Unpublished Report Series, No. 11. Department of Biology, Indiana University, Bloomington, IN.
- Charles, D.F. 1987. Diatom counts for Adirondack lake sediment core intervals. PIRLA Unpublished Report Series, No. 12, Department of Biology, Indiana University, Bloomington, IN, 393 pp.
- Ahmad, H. and D.F. Charles. 1988. PIRLA Data Base Management System User's Manual. Second edition. PIRLA Unpublished Report Series, Report Number 32, Department of Biology, Indiana University. 256 pp.
- Vong, R., S. Cline, G. Reams, J. Bernert, D. Charles, J. Gibson, T. Haas, J. Moore, R. Husar, T. Olsen, J. Simpson, and S. Seilkop. Regional Analysis of wet deposition for effects research. Synthesis and Integration Project Report, Forest Response Program. U.S. Environmental Research Laboratory, Corvallis, OR 97333. October 14, 1988.

- * Sullivan, T.J., J.A. Bernert, E.A. Jenne, J.M. Eilers, B.J. Cosby, D.F. Charles, and A.R. Selle. 1991. Comparison of MAGIC and DIATOM paleolimnological model hindcasts of lakewater acidification in the Adirondack region of New York. Report PNL-7487 UC-603, Battelle Pacific Northwest Laboratory, Richland, Washington.
- * Knapp, C.M., D.R. Marmorek, J.P. Baker, K.W. Thornton, J.M. Klopatek, and D.F. Charles. 1991. The indicator development strategy for the Environmental Monitoring and Assessment Program. EPA/ORD 600/3-91/023, USEPA Environmental Research Laboratory, Corvallis, OR, 85 pp.
- Charles, D.F., M. Hermanson, P. Kiry, and J. Scarpa. 1992. Chemical, physical and biological water quality studies of Franklin D. Roosevelt Park Ponds (South Philadelphia, PA) for Pennoni Associates. Rept. No. 92-31. ANSP, Philadelphia, PA. 25 pp.
- Selle, A.R. and D.F. Charles. 1992. North American lakes investigated as part of diatom and chrysophyte paleolimnological studies of recent lake acidification trends. US EPA Environmental Research Laboratory, Corvallis, OR. 32 pp.
- * Sullivan, T.J., B.J. Cosby, C.T. Driscoll, H.F. Hemond, D.F. Charles, S.A. Norton, and J.M. Eilers. 1993. The influence of naturally-occurring organic acids on model estimates of lakewater acidification using the model of acidification of groundwater in catchments (MAGIC). Report No. DOE/ER/30196-3, U.S. Department of Energy. 163 pp.
- * Sullivan, T.J., B.J. Cosby, C.T. Driscoll, H.F. Hemond, D.F. Charles, S.A. Norton, H.M. Seip, and G. Taugbo. 1994. Confirmation of the MAGIC Model using independent data: Influence of organic acids on model estimates of lakewater acidification. Report No. DOE/ER/30196-4, U.S. Department of Energy. 129 pp plus appendices.
- Charles, D.F. 1994. Opportunities for museums in diatom research in the "90's": Notes from a workshop discussion. Pages 107-108 in P.B. Hamilton, editor, Proceedings of The Fourth Arctic-Antarctic Diatom Symposium (Workshop), Canadian Museum of Nature, Ottawa, Ontario, Canada, September 18-21, 1993. Canadian Technical Report of Fisheries and Aquatic Sciences No. 1957, 139 pp.
- Charles, D.F., B. Vance, and M. Hermanson. 1994. Analysis of water and sediment of Mt. Airy Lake, March and April, 1994. Report to Mt. Pocono Municipal Authority. PCER, ANSP, Philadelphia, PA.
- Charles, D.F. and R. Horwitz. 1994. Analysis of water chemistry and assessment of fish mortality, Mt. Airy Lake, July 1994. Report to the Mt. Pocono Municipal Authority. ANSP DER Report No. 94-18. PCER, ANSP, Philadelphia, PA. 24 pp plus appendices.
- Sullivan, T.J. and D.F. Charles. 1995. The role of landscape change in surface water acidification. Report No. DOE/ER/30196-6. Prepared for the U.S. Department of Energy by E&S Environmental Chemistry, Corvallis, OR. 65 pp.
- Charles, D.F., F. Acker, and N.A. Roberts. 1996. Diatom periphyton in Montana lakes and wetlands: Ecology and potential as bioassessment indicators. Report to the Montana Department of Environmental Quality, Helena, MT. 67 pp. plus appendices.

- Charles, D.F. 1997. Report on a biological reconnaissance survey of the Jackson River in the vicinity of the Westvāco Mill, Covington, VA on Sept. 4, 1997. Report No. 97-15. PCER, ANSP, Philadelphia, PA. 8 pp.
- Horwitz, R.J., D.H. Hart, P. Brusilovskiy, P. Petraitis, M.J. Bernstein and D.F. Charles. 1997. Analysis of a long-term biological database and implications for trend monitoring in the NAWQA Program. Final Report. PCER, ANSP, Philadelphia, PA. 197 pp.
- Eilers, J.M., P.R. Sweets, D.F. Charles, and K.B. Vache. 1998. A diatom calibration set for the Cascade Mountain Ecoregion. Prepared for PACIFICORP, Centralia, WA. E&S Environmental Chemistry, Inc. Corvallis, OR. 78 pp. plus Appendices.
- Charles, D.F. 1998. Use of sediment diatom assemblages to infer major increases in nitrogen concentrations in low-alkalinity lakes. Final Technical Report to the U.S. Department of Energy. DE-FG02-94ER30224. PCER Report 98-12. PCER, ANSP, Philadelphia, PA. 11 pp.
- Charles, D.F. 1999. An evaluation of diatom periphyton as indicators of cultivation and grazing impairment in Montana wetlands. Report 99-1F. PCER, ANSP, Philadelphia, PA. 43 pp.
- Clason, T.A. and D.F. Charles. 1999. First NAWQA diatom taxonomy harmonization workshop. Report No. 00-7, PCER, ANSP, Philadelphia, PA. 21 pp.
- Charles, D.F., 2000. Observations on Jackson River Canoe trip, August 25-26, 1999 for Westvāco Corp. Report No. 00-1, PCER, ANSP, Philadelphia, PA.
- Charles, D., D. Winter, and M. Hoffman. 2000. Field Sampling procedures for the New Jersey Algae Indicators project. PCER Procedure P-13-64. PCER, ANSP, Philadelphia, PA. 18 Pages.
- Clason, T.A. and D.F. Charles. 2000. Second NAWQA diatom taxonomy harmonization workshop. Report No. 00-7, PCER, ANSP, Philadelphia, PA. 36 pp.
- Charles, D.F. 2000. Further evaluation of diatom periphyton as indicators of cultivation and grazing impairment in Montana wetlands. Report No. 00-10R. PCER, ANSP, Philadelphia, PA. 39 pp.
- Bouchard, R., F. Acker, D. Charles, T. Nightengale, R. Horwitz, D. Velinsky, R. Davis, R. Thomas and J. McNair. 2001. 2000 Sabine River studies for the Eastman Chemical Company, Texas Operations. Rept. No. 01-8F. PCER, ANSP, Philadelphia, PA. 249 pp.
- Bouchard, R., F. Acker, D. Charles, T. Nightengale, R. Horwitz, D. Velinsky, R. Davis & R. Thomas. 2001. Biological and chemical studies of the Guadalupe River, 2000. Rept. No. 01-10F. PCER, ANSP, Philadelphia, PA. 136 pp.
- Charles, D.F. 2001. Distribution of riffles, runs, pools and aquatic macrophytes in the Jackson River from Covington to Clifton Forge, VA: Observations made during a canoe trip, 12-13 October 2000. Report No. 00-22, PCER, ANSP, Philadelphia, PA. 13pp.

- Cotter, P., K. Sprouffske, D. F. Charles, F. Acker, C. Knowles & E. A. Morales. 2001. Procedure for entry of 1991- and 1994-Start NAWQA algae data into ANSP databases and transfer to the Bio-TDB in August 2001. PCER, ANSP, Philadelphia, PA. 66 pp.
- Ponader, K. and D. Charles. 2001. Understanding the relationship between natural conditions and loadings on eutrophication: Algal indicators of eutrophication for New Jersey streams. Final Report Year 1. Submitted to the New Jersey Department of Environmental Protection Division of Science, Research and Technology. PCER, ANSP, Philadelphia, PA. 23 pp.
- Sprouffske, K., F. Acker, D. F. Charles & M. Schadler. 2001. Reconciliation of University of Louisville and ANSP cell density calculations. Addendum to: Procedure of entry of 1991- and 1994-Start NAWQA algae data into ANSP databases and transfer to the Bio-TDB in August 2001. PCER, ANSP, Philadelphia, PA. 32 pp.
- Charles, D.F., C.A. Knowles, and R.S. Davis, eds. 2002. Protocols for the analysis of algal samples collected as part of the U.S. Geological Survey National Water-Quality Assessment Program. Report No. 02-06, PCER, ANSP, Philadelphia, PA. 124 pp. Also at <http://diatom.acnatsci.org/nawqa/>
- Sprouffske, K. and D. Charles. 2002. Requirements for Algal Data Aggregation and Analysis (ADAA), Version 1. PCER, ANSP, Philadelphia, PA. 13 pp.
- Sprouffske, K., D. Winter, and D. F. Charles. 2002. DPDC Data Entry Instruction Manual. PCER, ANSP, Philadelphia, PA. 32 pp.
- Charles, D.F., K. Sprouffske, E. Morales, F. Acker, and M. Schadler. 2003. Documentation for algal data submitted by The Academy of Natural Sciences to the NAWQA Bio-TDB in April 2003, Report No. 03-06. PCER, ANSP, Philadelphia, PA. 15 pp.
- Ponader, K. and D.F. Charles. 2003. Understanding the relationship between natural conditions and loadings on eutrophication: Algal indicators of eutrophication for New Jersey streams. Final Report Year 2. Report No. 03-04. PCER, ANSP, Philadelphia, PA. 23 pp.
- Ponader, K., D. Winter and D.F. Charles. 2003. Field sampling procedure for the New Jersey Algae Indicators Project: Use of diatometer artificial substrates. PCER Procedure No. P-16-66. PCER, ANSP, Philadelphia, PA. 32 pp.
- Ponader, K. and D. F. Charles. 2004. Understanding the relationship between natural conditions and loadings on eutrophication: Algal indicators of eutrophication for New Jersey streams. Final Report Year 3. PCER, ANSP, Philadelphia, PA. 56 pp.
- Ponader, K. and D. F. Charles. 2004. Understanding the relationship between natural conditions and loadings on eutrophication: Algal indicators of eutrophication for New Jersey streams. Final Report Year 4. PCER, ANSP, Philadelphia, PA. 46 pp.
- Ponader, K. and D. F. Charles. 2004. Relationships between periphyton and chemical-physical characteristics of the West Branch Susquehanna River and the influence of acid mine drainage. Analysis of periphyton samples from AMD study of West Branch Susquehanna river. Final Report. PCER, ANSP, Philadelphia, PA. 35 pp.

Ponader, K.C., C. Flinders, and D.F. Charles. 2005. The development of an algae-based water quality monitoring tool for Virginia streams. Final Report submitted to the Virginia Department of Environmental Quality, Roanoke, VA. PCER, ANSP, Philadelphia, PA. 18 pp. Plus appendices.

Keller, D.H., J.M. Walls, E.A. Morales, D.F. Charles, K.M. Sprouffske, D.T. Mellott and J.A. Collins. 2005. Procedures for making additions to the Academy of Natural Sciences of Philadelphia Diatom Herbarium's New Species File and Bibliography File. Protocol No. 13-67. PCER, ANSP, Philadelphia, PA. 44 pp.

MANUSCRIPTS SUBMITTED AND IN PREPARATION

Huvane, J.K., D.F. Charles, J.W. Sherman, and E.W.B. Russell. Factors influencing diatom distributions in Pocono Mountain lakes and comparisons to other regions in the northeastern U.S.A. (Being revised for resubmission)

PRESENTATIONS 1981-2006

Charles, D.F. 1981. Alkalinity, pH, and ion chemistry in six Adirondack Mt. (N.Y.) lakes. American Society of Limnology and Oceanography. Milwaukee, Wisconsin.

Charles, D.F. 1981. Diatoms in Adirondack lake sediments: indicators of lake acidity. VIth Diatom Symposium. Central Michigan University Biological Station, St. James, Michigan.

Jackson, S.T. and D.F. Charles. 1981. Ecological aspects of aquatic macrophyte floras of small lakes in the Adirondack Mountains of New York. American Society of Limnology and Oceanography. Milwaukee, Wisconsin.

Whitehead, D.R., D.F. Charles, and S.E. Reed. 1981. Use of diatom assemblages to reconstruct late-glacial and Holocene changes in water chemistry in two Adirondack (N.Y.) lakes. American Society of Limnology and Oceanography. Milwaukee, Wisconsin.

Charles, D.F. 1981. Trophic status of Adirondack Mountain lakes. AIBS Meeting, Bloomington, Indiana. Bulletin of the Ecological Society of America 62:177.

Whitehead, D.R., S.E. Reed, and D.F. Charles. 1981. Late-glacial and postglacial pH changes in Adirondack (N.Y.) lakes. Invited paper for Symposium on "Paleolimnological Studies of Lake Acidification." AIBS Meeting, Bloomington, Indiana. Bulletin of the Ecological Society of America 62:154.

Whitehead, D.R., D.F. Charles, S.T. Jackson, M.C. Sheehan, S. Reed, and N. Landekic. 1982. Limnological and paleolimnological studies of Adirondack lakes. Pages 91-92 in J.S. Jacobson, and L.S. Raymond, Jr., eds. Proceedings of the New York State Symposium on Atmospheric Deposition, . Center for Environmental Research, Cornell University, Ithaca, N.Y., January 7-8, 1982. Presentation made by D. Charles.

- Charles, D.F. 1982. Relationships between surface sediment diatom assemblages and lakewater pH in Adirondack, N.Y. (U.S.A.) lakes. Seventh International Symposium on Living and Fossil Diatoms, Academy of Natural Sciences of Philadelphia, August 22-27.
- Charles, D.F. 1983. Use of sediment diatom assemblages to reconstruct pH histories of Adirondack lakes. University of Maine at Orono, April 13. Department of Botany and Plant Pathology Seminar, Invited speaker.
- Charles, D.F. 1983. Recent pH history of Big Moose Lake (Adirondack Mountains, New York, USA) inferred from sediment diatom assemblages. Twenty-second Congress of the International Association of Theoretical and Applied Ecology, Lyon, France, August 21-28, 1983.
- Charles, D.F. and D.R. Whitehead. 1983. Paleoecological reconstruction of recent lake acidification in acid-sensitive areas of North America: research plan and some preliminary results. Seventh North American Diatom Symposium, Barneby Center, The Ohio State University, September 21-October 1, 1983.
- Charles, D.F. 1984. Lake acidification; diatoms as paleolimnological indicators of past pH. Seminar in Environmental Science and Policy, The School of Public and Environmental Affairs, Indiana University, January 18, 1984.
- Whitehead, D.R. and D.F. Charles. 1984. Recent acidity changes in Adirondack Mountain (N.Y.) lakes: paleoecological reconstruction. AIBS/Ecological Society of America meeting, Fort Collins, Colorado, August 5-9, 1984. Abstract in Bulletin of the Ecological Society of America 65:174.
- Charles, D.F. and D.R. Whitehead. 1985. Paleolimnological evidence for recent acidification of Big Moose L., Adirondack Region (U.S.A.). Symposium on Studies of the North Branch of the Moose River, March 11-13, 1985. Colgate University, Hamilton, NY.
- Charles, D.F. and D.R. Whitehead. 1985. Paleolimnological reconstruction of recent acidification of Adirondack lakes. Invited paper for symposium on "Recent human impacts on lakes as revealed by paleolimnological methods." Joint meeting of the American Society of Limnology and Oceanography and the Ecological Society of America at the University of Minnesota, Minneapolis, June 17-21, 1985.
- Whitehead, D.R. and D.F. Charles. 1985. Paleoecological reconstruction of recent lake acidification: preliminary results from the PIRLA project. (Same symposium and meeting as above).
- Charles, D.F. and D.R. Whitehead. 1985. The "Paleoecological Investigation of Recent Lake Acidification (PIRLA)" project: description and preliminary results. 4th International Symposium on Paleolimnology, September 2-7, 1985, Ossiach, Carinthia, Austria.
- Charles, D.F. and D.R. Whitehead for the PIRLA investigators. 1985. Preliminary results of the PIRLA project: Adirondacks, New England, N. Great Lakes States, N. Florida. Invited presentation for session on "Historical Perspectives of Acidification," International Symposium on Acidic Precipitation, September 15-20, 1985, Muskoka, Ontario.

- Battarbee, R.W. and D.F. Charles. 1985. The use of diatom assemblages in lake sediments as a means of assessing the timing, trends, and causes of lake acidification. Invited presentation, same symposium as above.
- Charles, D.F. 1985. Reconstruction of lake acidification based on diatoms: A regional comparison. Invited speaker. National Atmospheric Deposition Program Annual Meeting, Fort Collins, CO, October 7-10, 1985.
- Charles, D.F., J.C. Kingston, K.E. Camburn, R.G. Kreis, Jr., P.R. Sweets, D.S. Anderson, M.C. Whiting, J. Ford, and others. 1985. Paleocological Investigation of Recent Lake Acidification: Progress and scope of the diatom work. VIIIth North American Diatom Symposium, Hancock Biological Station, KY, October 1985.
- Charles, D.F. 1985. Spatial variability of diatom assemblages in Big Moose L. surface sediments: taxonomic composition and diatom-inferred pH. VIIIth North American Diatom Symposium, Hancock Biological Station, KY, October, 1985.
- Charles, D.F. 1986. Paleocological Reconstruction of Lake Water Acidification using Diatom Assemblages. Quaternary Research Group Colloquium. Department of Geology, Indiana University, January 20, 1986.
- Charles, D.F. 1986. Paleolimnological studies of recent lake acidification: an overview. Invited speaker. Eastern Brook Lakes Watershed Meeting. University of California at Riverside, CA, April 2, 1986.
- Charles, D.F. 1986. Acidification of Adirondack aquatic ecosystems. Ecology Program Seminar. Indiana University, Bloomington, IN, April 25, 1986.
- Charles, D.F. 1986. Historical trends in lakewater acidity: evidence from paleocological studies. Invited speaker. Illinois State Water Survey, Champaign, IL, May 27, 1986.
- Charles, D.F. 1986. Acid Deposition: Long-Term Trends (National Research Council) - Evidence from aquatic ecosystems. Invited presentation for Plenary Session. "Acidic Deposition: Policy, Politics, and Science", Air Pollution Control Association annual meeting, Minneapolis, MN, June 23, 1986.
- Charles, D.F. 1986. Paleocological investigation of trends in lakewater acidity. U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR, July 15, 1986.
- Charles, D.F. 1986. Paleolimnological evidence for acidification of Adirondack lakes: Results from the PIRLA project. Adirondack Park Agency/N.Y.S. Department of Environmental Conservation, Ray Brook, N.Y., August 4, 1986.
- Charles, D.F. 1986. Recent trends in diatom inferred pH of Adirondack lakes (N.Y., U.S.A.). IV International Congress of Ecology/Ecological Society of America, Syracuse, N.Y. August 10-16, 1986. Poster session.

- Charles, D.F. 1986. Recent acidification of Adirondack lakes (N.Y., U.S.A.) based on trends in diatom inferred pH. Ninth International Symposium on Living and Fossil Diatoms, Bristol, England. August 24-29, 1986.
- Kingston, J.C., D.F. Charles, K.E. Camburn, R.G. Kreis, Jr., P.R. Sweets, D.S. Anderson, M.C. Whiting, J. Ford, and others. 1986. Paleocological Investigation of Recent Lake Acidification: Progress and Scope of the Diatom Work. Ninth International Symposium on Living and Fossil Diatoms, Bristol, England. August 24-29, 1986.
- Charles, D.F. 1986. Paleocological analysis of lake acidification trends: Results of the PIRLA Project. The Ecosystems Center, Woods Hole Marine Biological Station, Woods Hole, MA, September 8, 1986.
- Charles, D.F. The PIRLA Project: Paleocological Investigation of Recent Lake Acidification. Biology Department Seminar, invited speaker. Queens University at Kingston, Ontario, November 1986.
- Charles, D.F. 1986. Acid deposition: Long-term trends. Seminar in Environmental Science and Policy. I.U. School of Public and Environmental Affairs, December 10, 1986.
- Charles, D.F. 1987. Acid precipitation and aquatic ecosystems: regional case studies. Aquatic Effects Research Review Meeting of the National Acid Precipitation Assessment Program, New Orleans, LA, May, 1987.
- Charles, D.F. and D.R. Whitehead. 1987. Paleocological reconstruction of recent acidification trends in Adirondack (N.Y.) lakes. American Society of Limnology and Oceanography, June, 1987, Madison, WI.
- Smol, J.P. and D.F. Charles. 1987. New methods for using chrysophytes to infer past lakewater pH. American Society of Limnology and Oceanography, June, 1987, Madison, WI.
- Whitehead, D.R. and D.F. Charles. 1987. Paleocological Investigation of Recent Lake Acidification (PIRLA): Regional comparisons. American Society of Limnology and Oceanography, June, 1987, Madison, WI.
- Charles, D.F., D.R. Whitehead, M.W. Binford, R.A. Hites, M.J. Mitchell, S.A. Norton, and J.P. Smol. 1987. Paleocological evidence for acidification of Adirondack lakes. AIBS/ESA/International Society for Ecological Modelling, Columbus, OH, August 10, 1987.
- Whitehead, D.R., D.F. Charles, M.C. Whiting, and R.W. Holmes. 1987. Acidification trends in remote North American lakes: The evidence from paleoecology. Fourth World Wilderness Conference, Estes Park, CO, Sept. 14, 1987.
- Charles, D.F. 1987. Acidification trends in Adirondack lakes based on diatom analysis. 9th North American Diatom Symposium, Treehaven Field Station, Tomahawk, WI, October 7-10, 1987.

- Charles, D.F. 1988. Effects of acid deposition on Adirondack lakes. Issues in Northeastern Mountain Stewardship. Sponsored by the Appalachian Mountain Club, Jackson, New Hampshire, May 1988. Invited speaker.
- Charles, D.F. 1988. Lake acidification trends in low-alkalinity regions of the U.S. based on paleoecological analyses of diatoms and chrysophytes. American Society of Limnology and Oceanography. June, 1988, Boulder, CO.
- Cumming, B.F., J.C. Kingston, K. Camburn, J.P. Smol, and D.F. Charles. 1988. Quality assurance and quality control in paleolimnological research. American Society of Limnology and Oceanography. June, 1988, Boulder, CO.
- Whitehead, D.R., D.F. Charles, and M.C. Whiting. 1988. Long-term studies of watershed-lake systems: the contribution of paleoecology. American Society of Limnology and Oceanography. June, 1988, boulder, CO.
- Charles, D.F., K.E. Camburn, B. Cumming, J.C. Kingston, and J.P. Smol. 1988. Regional estimates of acidification of low-alkalinity adirondack lakes based on paleolimnological analysis of diatoms and chrysophytes. Ecological Society of America. Davis, CA, August, 1988.
- Charles, D.F., D.S. Anderson, K.E. Camburn, R.B. Davis, J. Ford, J.C. Kingston, R.G. Kreis, Jr., J.P. Smol, P.R. Sweets, and M.C. Whiting. 1988. Diatom and chrysophyte inferred lake acidification trends in the Eastern U.S.: results from the PIRLA project. 10th International Symposium on Living and Fossil Diatoms. Joensuu, Finland, August, 1988.
- Smol, J.P. and D.F. Charles. 1988. Potential for using diatoms in a long-term monitoring program (LTMP). (Poster) 10th International Symposium on Living and Fossil Diatoms. Joensuu, Finland, August, 1988.
- Charles, D.F., 1988. Use of diatoms and chrysophytes in paleoecological studies of lake acidification and Paleoecological investigations of recent lake acidification in North America. Humboldt State University, Arcata, CA November 10, 1988
- Charles, D.F., K.E. Camburn, B.F. Cumming, S.S. Dixit, J.C. Kingston, J.P. Smol, and A.J. Uutala. 1989. Regional estimates of pH change using paleolimnological methods: the approaches used in PIRLA II. American Society of Limnology and Oceanography, Fairbanks, Alaska, June 18-22, 1989.
- Cumming, B.F., S.S. Dixit, D.F. Charles and J.P. Smol. 1989. Variability in diatom and chrysophyte assemblages and inferred pH: Paleolimnological studies of Big Moose Lake, N.Y. American Society of Limnology and Oceanography, Fairbanks, Alaska, June 18-22, 1989.
- Smol, J.P., K.E. Camburn, D.F. Charles, B.F. Cumming, S.S. Dixit, J.C. Kingston, and A.J. Uutala. 1989. Regional estimates of pH change using paleolimnological methods: preliminary data from PIRLA II. American Society of Limnology and Oceanography, Fairbanks, Alaska, June 18-22, 1989.

- Charles, D.F. 1989. The PIRLA II Project: Recent and long-term acidification of Adirondack lakes. U.S. EPA Corvallis Environmental Research Laboratory, July 18, 1989.
- Charles, D.F. and J.P. Smol. 1989. Population based assessment of regional lake acidification (Adirondacks, N.Y.) using paleolimnology. 24th Congress of the International Association of Theoretical and Applied Limnology, Munich, West German, August 13-19, 1989. Also, co-chairperson for session topic on Atmospheric deposition - surface water interaction.
- Smol, J.P., D.F. Charles, K.E. Camburn, B.F. Cumming, S.S. Dixit, K.E. Duff, J.C. Kingston, and A.J. Uutala. 1989. The PIRLA II Project: Paleoecological Investigation of Recent Lake Acidification II. (Poster) 24th Congress of the International Association of Theoretical and Applied Limnology, Munich, West Germany, August 13-19, 1989.
- Charles, D.F. 1989. Effects of acidic deposition on North American lakes: paleoecological evidence from diatoms and chrysophytes. Paleolimnology and Lake Acidification. The Royal Society, London, UK, August 25, 1989.
- Charles, D.F. The PIRLA project: Results after five years. Vth International Symposium on Paleolimnology. Ambleside, Cumbria, UK, 31 August - 6 September 1989.
- Uutala, A.J. and D.F. Charles. 1989. The PIRLA data base: the structure and use of a large paleolimnological data base. Vth International Symposium on Paleolimnology. Ambleside, Cumbria, UK, 31 August - 6 September 1989.
- Charles, D.F. and K.E. Camburn. 1989. Regional estimate of change in abundance of *Fragilariforma acidobiontica* in Adirondack lakes due to acidic deposition. 10th North American Diatom Symposium, University of Minnesota Biology Station, Lake Itasca, MN, October 11-14, 1989.
- Charles, D.F. 1989. Acid deposition effects on Adirondack lakes: new population estimates of change. Department of Biology, Indiana University, October 18, 1989.
- Charles, D.F., J.P. Smol and S.S. Dixit. 1990. EPA funded paleoecological studies of recent lake acidification (PIRLA II). Presentations at EPA Office of Research and Development and the National Acid Precipitation Assessment Program, Washington, D.C., January 23, 1990.
- Smol, J.P., D.F. Charles, B.F. Cumming, J.C. Kingston, S.S. Dixit and A.J. Uutala. 1990. Paleoecological assessment of lake acidification: PIRLA II. (Poster) NAPAP International Conference on "Acidic Deposition: State of Science and Technology." Hilton Head, SC, February 11-16, 1990.
- Sullivan, T.J., B.J. Cosby, J.A. Bernert, E.A. Jenne, J.M. Eilers, D.F. Charles and A.R. Selle. 1990. Comparison of paleolimnological and MAGIC Model estimates of lakewater acidification in the Adirondack Region (Poster). NAPAP International Conference on "Acidic Deposition: State of Science and Technology," Hilton Head, SC, February 11-16, 1990.

- Charles, D.F., 1990. Paleolimnology: New approaches for assessing trends in lake water quality and biota. Conference on Protection and Management of High Quality Lakes, sponsored primarily by the Michigan Chapter of NALMS, Bellaire, MI, June 11-12, 1990.
- Cumming, B.F., J.P. Smol, S.S. Dixit, J.C. Kingston, A.J. Uutala and D.F. Charles, 1990. Paleoeological assessment of recent lake-water chemistry from Adirondack lakes as inferred from chrysophyte and diatom assemblages. New York State Natural History Conference, Albany, N.Y., June 1990.
- Dixit, S.S., J.C. Kingston, B.F. Cumming, J.P. Smol, D.F. Charles, and A.J. Uutala. 1990. Diatom based predictive models to infer lakewater pH, Al, and DOC for Adirondack (N.Y.) lakes. 11th International Symposium on Living and Fossil Diatoms, San Francisco, CA August 13-17, 1990.
- Smol, J.P., B.F. Cumming, J.C. Kingston, S.S. Dixit, D.F. Charles, and A.J. Uutala. 1990. Regional assessments of lake acidification in the Adirondacks based on algal microfossils -- The PIRLA II Project. 11th International Symposium on Living and Fossil Diatoms, San Francisco, CA August 13-17, 1990.
- Charles, D.F., J.P. Smol, B.F. Cumming, S.S. Dixit, J.C. Kingston, A.J. Uutala, and K.E. Camburn. 1990. Paleoeological assessment of recent lake acidification: PIRLA II. (Poster presentation) International Conference on Acidic Deposition: Its Nature and Impacts, Glasgow, Scotland, September 16-20, 1990.
- Cumming, B.F., J.P. Smol, S.S. Dixit, J.C. Kingston, A.J. Uutala, and D.F. Charles. 1990. Paleolimnological assessment of post-1970 trends in Adirondack (N.Y.) lakes, as interpreted by chrysophyte and diatom assemblages. International Conference on Acidic Deposition: Its Nature and Impacts, Glasgow, Scotland, September 16-20, 1990.
- Landers, D.H., L. Baker, D.F. Charles, and P.J. Wigington. 1990. Aquatic effects of acidic deposition in the U.S. - A regional integrated assessment. International Conference on Acidic Deposition: Its Nature and Impacts, Glasgow, Scotland, September 16-20, 1990.
- Sullivan, T.J., D.F. Charles, J.P. Smol, B.F. Cumming, and J.A. Bernert. 1990. Use of historical assessment for evaluation of process-based model prediction of future environmental change: Lakewater acidification in the northeastern United States. International Conference on Acidic Deposition: Its Nature and Impacts, Glasgow, Scotland, September 16-20, 1990.
- Charles, D.F., J.P. Baker, J.M. Klopatek, C.M. Knapp, D.R. Marmorek, and K.W. Thornton. 1990. A research strategy to develop ecological indicators for the Environmental Monitoring and Assessment Program (EMAP). Poster presentation at the International Symposium on Ecological Indicators, Fort Lauderdale, Florida, October 16-19, 1990.
- Kingston, J.C., B.F. Cumming, A.J. Uutala, J.P. Smol, K.E. Camburn, D.F. Charles, S.S. Dixit, and R.G. Kreis, Jr. Biological quality control and quality assurance: A case study in paleolimnological biomonitoring. International Symposium on Ecological Indicators, Ft. Lauderdale, FL, October 16-19, 1990.

- Charles, D.F., J.P. Smol and D.R. Engstrom. 1990. Paleoreconstruction of the environmental status of aquatic systems. *Biological Monitoring of Freshwater Ecosystems*, Workshop sponsored by the Societas Internationalis Limnologiae, Purdue University, West Lafayette, IN, November 29-30, and December 1, 1990.
- Charles, D.F. 1991. Paleocological investigations of environmental change: effects of acidic deposition on lakes and other examples. *Geology Department Seminar*, Oregon State University, May 2, 1991.
- Charles, D.F. 1991. Diatoms as indicators of lake condition in regional monitoring programs. *North American Benthological Society*, Santa Fe, NM, May 21-24, 1991. Invited speaker for special session: Use of benthic organisms as regional ecosystem health indicators.
- Charles, D.F. and J.P. Smol. 1991. Long-term perspective on chemical changes in lakes and reservoirs: interpreting the biological record in lakes and sediments. *American Chemical Society*, Atlanta, GA, April 14-19, 1991. Invited speaker for Symposium on Environmental Chemistry of Lakes and Reservoirs.
- Charles, D.F., J.P. Smol, B.F. Cumming, S.S. Dixit, J.C. Kingston, A.J. Uutala, K.E. Camburn, T.J. Sullivan, and H. Berard. 1991. Paleocological assessment of recent lake acidification: PIRLA II. (Poster) *American Society of Limnology and Oceanography*, Halifax, Nova Scotia, June, 1991.
- Charles, D.F. 1991. Diatoms as paleolimnological indicators of environmental change: Lake acidification and other examples. Invited seminar, *Academy of Natural Sciences of Philadelphia*, Philadelphia, PA, Oct. 21, 1991.
- Charles, D.F. 1991. Diatoms as paleolimnological indicators of climate change: Current approaches. *11th North American Diatom Symposium*, Clemson, SC, Oct. 24-25, 1991.
- Charles, D.F., J.P. Smol, S.S. Dixit, B.F. Cumming, J.C. Kingston, H.J.B. Birks, A.J. Uutala, T. Sullivan, and K.E. Camburn. 1992. Regional estimates of lake acidification using sediment core diatom and chrysophyte assemblages: PIRLA II results for Adirondack Lakes (NY, USA). *XXV International Congress, International Society of Theoretical and Applied Limnology (SIL)*, Barcelona, Spain, August 21-27, 1992.
- Charles, D.F., J.P. Smol, S.S. Dixit, B.F. Cumming, J.C. Cumming, J.C. Kingston, H.J.B. Birks, A.J. Uutala, T.J. Sullivan, and K.E. Camburn. 1992. Regional estimates of lake acidification using sediment core diatom and chrysophyte assemblages: PIRLA II results for Adirondack lakes (NY, USA), *12th International Diatom Symposium*, Renesse, The Netherlands, August 30 September 5, 1992. Also chairperson for two sessions.
- Charles, D.F. 1992. Status of ANSP paleolimnological studies of sediment diatom assemblages. *Pocono Comparative Lakes Program Annual Meeting*, Lacawac Lake, NE PA, October 8-9, 1992.
- Charles, D.F. Paleocological studies of Adirondack lake acidification. *RPI-EPA Acid Deposition Workshop*, Rensselaer Polytechnic Institute, Troy, NY, January 18-20, 1993.

Summary of presentation is printed in the "Adirondack Effects Assessment Program Workshop Summary".

- Charles, D.F. A diatom paleolimnology data-cooperative for study of past climate: results of a workshop. 12th North American Diatom Symposium, University Field Station (Delta Marsh; L. Manitoba), Manitoba, Canada, September 23-25, 1993.
- Acker, F.W., D.M. Walter, N.A. Roberts and D.F. Charles. Microwave digestion of diatom samples. 12th North American Diatom Symposium, University Field Station (Delta Marsh; L. Manitoba), Manitoba, Canada, September 23-25, 1993.
- Huvane, J.H., D.F. Charles and J.W. Sherman. The relationship between surface sediment diatom assemblages and pH and alkalinity in 38 Pocono lakes. 12th North American Diatom Symposium, University Field Station (Delta Marsh; L. Manitoba), Manitoba, Canada, September 23-25, 1993.
- Charles, D. F. 1993. Diatoms as ecological indicators (subject). Department of Bioscience and Biotechnology, Drexel University, Philadelphia, December 9, 1993.
- Charles, D.F. 1994. Inferring paleoenvironmental conditions from diatom assemblages in lake sediments: Recent advances. University of Pennsylvania-Bryn-Mawr Geology Colloquium Series, U. of Penn., Philadelphia, PA, February 1, 1994.
- Charles, D.F. 1994. Perspectives on ecological assessment. Mid-Atlantic Highlands Assessment Conference, Hershey, Pennsylvania, February 23-25, 1994. Keynote address. Meeting sponsored by U.S. Environmental Protection Agency, Region III.
- Charles, D.F. 1994. Long-term trends in biogeochemical processes: Interpreting the biological record in lake sediments. Biogeochemistry Seminar Series, Cornell University, Ithaca, NY, April 22, 1994.
- Charles, D.F. 1994. Long-term trends in biological indicators: Interpreting the sediment record. American Society of Limnology and Oceanography, University of Miami, FL, June 12-16, 1994.
- Charles, D.F. 1994. Medical archives of ecosystem health: Interpreting the biological record in lake sediments. First International Symposium on Ecosystem Health and Medicine, Ottawa, Ontario, Canada, June 19-23, 1994.
- Charles, D.F. and F. W. Acker. 1994. Design for a North American Diatom Ecological Database (NADED). 13th International Diatom Symposium, Acquafredda di Maratea (PZ), Italy, September 1-7, 1994.
- Charles, D.F. Consistent diatom taxonomy as a means to an end: Towards a Diatom Data Cooperative. Workshop on Diatom Taxonomy for Paleoclimate Research, Sponsored by the NOAA Paleoclimate Program, California Academy of Sciences, San Francisco, CA, December 9-10, 1994.

- Davis, R.B., D.S. Anderson, T.E. Rhodes, S.A. Norton, D.F. Charles and M.C. Whiting. 1995. Catchment and atmospheric effects on acidity of lakes in the northeastern United States. Ecological Society of America, Snowbird, Utah, July 30-August 3, 1995.
- Charles, D.F. 1995. Use of algae for monitoring rivers in the United States: Some examples. Second European Workshop on Use of Algae for Monitoring Rivers. University of Innsbruck, Austria, September 17-19, 1995.
- Charles, D.F. 1995. Use of periphyton as a bioassessment tool. U.S. EPA Region VIII Bioassessment Workshop: Analysis of Biological Data, Boulder, Colorado, September 20-22, 1995.
- Charles, D.F., F.W. Acker, N.A. Roberts, L.L. Bahls, R.S. Apfelbeck, J. Gerritsen, and P. Grace. Diatom assemblages in Montana lakes and wetlands: Distributions and ecological characteristics. 13th North American Diatom Symposium, Iowa Lakeside Lab, Milford, Iowa, September 27-30, 1995.
- Dixit, S.S., D.F. Charles, and J.P. Smol. 1995. Paleolimnological assessment of post-industrial lake water quality changes in the Northeastern U.S.A. 15th International Symposium on Lake, Reservoir and Watershed Management, Sponsored by the North American Lake Management Society, Toronto, Ontario, November 6-11, 1995.
- Charles, D.F. 1996. Understanding the effects of acidic deposition on aquatic ecosystems: The contributions of paleolimnology. Invited participant for Paleocology Symposium: The paleoecological record of land, water, atmosphere processes and ecosystem dynamics. Ecological Society of America Annual Meeting, Providence, RI, August 10-14, 1996.
- Hart, D., P. Brusilovskiy, D. Charles, and F. Acker. Time series analysis of long-term changes in Savannah River diatom assemblages. Same ESA meeting as above.
- Charles, D.F. 1996. Keeping track of river habitats: Current use of diatoms as indicators of water quality. Sigma Xi seminar, ANSP, Philadelphia, November 11, 1996.
- Charles, D.F. 1997. Use of paleolimnology to help quantify uncertainty of hindcasts and forecasts of watershed biogeochemistry. Gordon Conference on Hydrobiogeochemistry of Forested Watersheds, August 3-8, 1997, Colby-Sawyer College, New London, NH. Invited Speaker.
- Charles, D.F., F.W. Acker, D.D. Hart, C.W. Reimer, and P.B. Cotter. 1997. Diatom-water chemistry relationships in Eastern U.S. rivers. 14th North American Diatom Symposium, The University of Michigan Biological Station, Pellston, MI, September 24-27, 1997.
- Charles, D.F. 1997. Paleolimnological studies of lake acidification in the Adirondack Mountains, New York, USA: Assessing the role of atmospheric deposition. Czech Geological Survey, Prague, Czech Republic, November 3, 1997. Invited Speaker.
- Charles, D.F. 1998. Temporal trends in watershed biogeochemistry: inferences from diatom assemblages in lake sediments. Botany Seminar, University of Wyoming, Laramie, WY. February 13, 1998.

- Charles, D.F., F.W. Acker, D. D. Hart, C.W. Reimer and P. B. Cotter. 1998. Large-scale regional variation in diatom-water chemistry relationships: Rivers of the Eastern USA. 15th International Diatom Symposium, Curtin University of Technology, Perth, Australia, September 28 - October 2 1998.
- Charles, D.F. 1999. Algae as water-quality indicators in the Eastern USA. Part of symposium on Algae as Environmental Indicators: Past, Present and Future, XVI International Botanical Congress, Saint Louis, MO, August 6, 1999. Invited speaker.
- Charles, D.F. 1999. Large-scale variation in diatom assemblages in Eastern US Rivers and implications for water quality monitoring. Department of Geology, University of Delaware, Newark, DE. September 9, 1999.
- Charles, D.F. 1999. Diatom periphyton as indicators of cultivation and grazing impairment in Montana wetlands. 15th North American Diatom Symposium, Pingree Park Campus of Colorado State University, September 23-25, 1999
- Charles, D.F., P. R. Sweets, T.J. Sullivan, P. B. Cotter and K. B. Vaché. 1999. A Diatom Paleolimnology Data Cooperative (DPDC) for paleoclimate research. 15th North American Diatom Symposium, Pingree Park Campus of Colorado State University, September 23-25, 1999.
- Clason, T.A., D.F. Charles, W.C. Hession, D.J. Velinski, and T.E. Johnson. 1999. Ecological benefits of riparian reforestation in urban watersheds: Evidence from diatom community analysis. 15th North American Diatom Symposium, Pingree Park Campus of Colorado State University, September 23-25, 1999.
- Charles, D.F. 1999. Large-scale variation in distribution of diatom algae in Eastern U.S. rivers: Implications for water quality monitoring. Sigma Xi sponsored seminar, November 5, 1999, Academy of Natural Sciences, Philadelphia, PA.
- Hruška, J., D.F. Charles, E. Bízová, and J. Veselý. 2000. How much acidification has occurred in Prášílské Lake since preindustrial times? Conference on Acidified Lakes in the Bohemian/Bavarian Forest - History, Present and Future, Ceske Budejovice, Czech Republic, March 2000.
- Potapova, M.G. and D.F. Charles. 2000. Benthic diatoms in USA rivers: distribution patterns and use as indicators of eutrophication. 4th International Symposium on Use of Algae for Monitoring Rivers, Durham, UK, July 17-20.
- Charles, D.F., P.B. Cotter, P.R. Sweets, T.J. Sullivan, and K.B. Vaché. 2000. A Diatom Paleolimnology Data Cooperative (DPDC) for paleoclimate research. Poster. 8th International Paleolimnology Symposium, Queen's University (Kingston, Ontario), August 20-24, 2000.
- Charles, D.F. and M.G. Potapova. 2000. Inferring phosphorus concentrations in United States rivers from diatom assemblages: Initial results. 16th International Diatom Symposium, Athens, Greece, August 25 -September 1, 2000. Also served as Co-Chair for workshop on "Diatoms as bioindicators of water quality".

- Cotter, P.B., D.F. Charles, P.R. Sweets, T.J. Sullivan, and K.B. Vaché. 2000. A Diatom Paleolimnology Data Cooperative (DPDC) for paleoclimate research. Poster. Same meeting as above.
- Potapova, M.G. and D.F. Charles. 2000. Patterns of diatom species distribution in USA rivers. Same meeting as above.
- Charles, D.F. 2000. Use of diatom algae to monitor river and stream water quality. Pennsylvania Department of Environmental Protection Biologists meeting, Stroud Water Research Center, November 2, 2000.
- Charles, D.F. and K. Ponader. 2001. Biomonitoring with algae to measure nutrient loads to streams. Watershed Research Seminar, New Jersey Department of Environmental Protection, Trenton, NJ, March 1, 2001.
- Charles, D.F. and M.G. Potapova. 2001. Influence of spatial and temporal scale on models for inferring nutrients in U.S. rivers from benthic diatom assemblages. 49th North American Benthological Society Annual Meeting, LaCrosse, WI, June 3 - 8, 2001. Also invited to serve as moderator for session on "Periphyton and Primary Production I".
- Potapova, M.G. and D.F. Charles. 2001. Patterns of benthic diatom distributions in U.S. rivers. Same meeting as above.
- Hart, D.D., K.L. Bushaw-Newton, S. Carney, D.F. Charles and 8 others. 2001. Manatawny Creek dam removal: species and community characteristics. Same meeting as above.
- Flinders, C.A., D.D. Hart, D.F. Charles, D.J. Velinsky, and R.L. Thomas. 2001. River restoration via pulsed flows: effects of increased water velocity on benthic algae. Same meeting as above.
- Charles, D.F. and M.G. Potapova. 2001. Analysis of diatom assemblages for the USGS NAWQA program. 16th North American Diatom Symposium, Ely, MN, September 19-22, 2001.
- Potapova, M.G. and D.F. Charles. 2001. Nutrient optima of diatom species in U.S. rivers. Same meeting as above.
- Ponader, K., and D.F. Charles. 2001. Diatoms as indicators of nutrient levels in New Jersey streams. Same meeting as above.
- Charles, D.F. and F.W. Acker. 2002. Phytoplankton assemblages in lakes studied by the Adirondack Effects Assessment Program. Northeast Natural History Conference VII., April 25-26, 2002.
- Charles, D. F., and F. W. Acker. 2002. Phytoplankton assemblages in lakes studied by the Adirondack Effects Assessment Program. 9th Annual Conference on the Adirondacks, Saranac Lake, NY, May 2002.

- Charles, D.F., and M. Potapova. 2002. Calibration sets for quantifying ecological characteristics of river algae: habitat variability and spatial scale. 50th Annual Meeting of the North American Benthological Society, Pittsburgh, Pennsylvania, June 2002.
- Ponader, K.C., D.F. Charles, and T.J. Belton.. 2002. Development of algal indicators for monitoring eutrophication in New Jersey streams. Same meeting as above.
- Potapova, M. & D.F. Charles. 2002. Choice of substrate type for water quality assessment using benthic algae. Same meeting as above.
- Charles, D.F. and F.W. Acker. 2002. Phytoplankton. Adirondack Effects Assessment Program Workshop, Sagamore Hotel and Darrin Fresh Water Institute, Boulton Landing, N.Y., June 18-20, 2002.
- Charles, D.F., Potapova, M., Ponader, K., and Winter, D. 2002. Diatom-based methods for assessing nutrient enrichment in rivers of the Northern Piedmont Ecoregion (USA). 17th International Diatom Symposium, Ottawa, Canada, August 2002.
- Ponader, K.C., D.F. Charles & T.J. Belton. 2002. Benthic diatoms as indicators of nutrient levels in New Jersey streams. Same meeting as above.
- Potapova, M. & D.F. Charles. 2002. Potential use of rare diatoms as environmental indicators in USA rivers. Same meeting as above.
- Winter, D.M., Charles, D.F. & Potapova, M. 2002. Benthic diatoms in Manatawny Creek, southeastern Pennsylvania; Temporal variability and the effects of dam removal. Same meeting as above.
- Morales, E.A., M. Potapova & D.F. Charles. 2002. Development of diatom-based water quality indicators in the NAWQA program. VI Latin American Phycological Congress, September 2002, Ponce, Puerto Rico.
- Charles, D.F., M. Potapova, K.C. Ponader, and D.M. Winter. 2003. Diatom-based methods for assessing nutrient enrichment in Northern Piedmont rivers. North American Benthological Society, Athens, GA, May 27-31, 2003.
- Hagan E., C.A. Flinders, N.E. Saxe, D.J. Velinsky, D.F. Charles, and R.L. Thomas. 2003. Ecological studies of algal communities in the Jackson River (Covington, VA): An assessment of stream health through multi-year nutrient and biomass monitoring. Same meeting as above.
- Sachen, K., C.A. Firth, N.E. Saxe, C.A. Flinders, F. Acker, D.F. Charles. An ecological study of algal communities in the Jackson River (Covington, VA): Spatial and temporal trends in the taxonomic composition of algal assemblages. Same meeting as above.
- Charles, D.F., K. Sprouffske, P.R. Sweets, T.J. Sullivan, and D. Winter. 2003. The Diatom Paleolimnology Data Cooperative (DPDC). (Poster presentation) 9th International Paleolimnology Symposium, Espoo, Finland, August 24-28, 2003.

- Charles, D.F. 2003. Environment: Managing Natural Resources (panel presentation). Looking Forward 30 Years: Celebrating the 30th Anniversary of the Adirondack Park Agency Act and Examining the Private Land Use and Development Plan. October 2-3, 2003, Lake Placid, NY.
- Charles, D.F., M. Potapova, K. Ponader, and D.M. Winter. Quantifying diatom autecological characteristics using the USGS NAWQA dataset. 2003. 17th North American Diatom Symposium, Islamorada, Florida, October 21-26, 2003.
- Sprouffske, K., D.F. Charles, P.R. Sweets, T.J. Sullivan, and D.M. Winter. 2003. The Diatom Paleolimnology Data Cooperative (DPDC). (Poster presentation). Same meeting as above.
- Winter, D.M. and D.F. Charles. 2003. Influence of dams and impoundments on diatom assemblages at 16 sites in Southeastern Pennsylvania, Northern Maryland and Northern Delaware. Same meeting as above.
- Charles, D.F. and K. Ponader. 2003. Implementation of an algae indicator monitoring program for New Jersey streams. New Jersey Department of Environmental Protection, Trenton, NJ, November 5, 2003.
- Charles, D.F. 2004. The growing use of diatoms for water quality assessment: Academy ecological research and the Diatom Herbarium. ANSP Science Seminar Series, ANSP, Philadelphia, PA, April 5, 2004.
- Charles, D.F., F.W. Acker, D.D. Hart, and C.W. Reimer. 2004. Regional-scale variation in diatom-water chemistry relationships in the eastern U.S. North American Benthological Society, Vancouver, BC, June 6-10, 2004.
- Ponader, K.C., D.F. Charles, and T.J. Belton. 2004. Trophic diatom indices and biomass metrics as tools for monitoring nutrients in New Jersey streams and rivers. Same meeting as above.
- Boylen, C.W., J.W. Sutherland, D.A. Winkler, D.F. Charles, F.W. Acker, J.A. Bloomfield, S.O. Quinn, and S.A. Nierzwicki-Bauer. 2004. Changing nutrient chemistries in Adirondack lakes prompt changes in phytoplankton. American Society of Limnology and Oceanography, Savannah, GA, June 13-18, 2004.
- Brown, R.L., D. Hart, D. Velinsky, J. Pizzuto, D. Charles, R. Horwitz, T. Johnson, K. Skalak, D. Winter, T. Nightengale, J. Carr and J. McNair. 2004. Prioritizing sites for dam removal: how dam size translates to ecological impact. Ecological Society of America, Portland OR, August 1-6, 2004.
- Morales, E. A., D. F. Charles, K. Sprouffske, M. Potapova, K. Ponader, D. Winter, C. Bell, P. Cotter, R. Mc Court, D. Mellott, C. Ratnayaka, and D. Waterman. 2004. Bases de datos en línea conteniendo fotografías electrónicas pertenecientes a la Academia de Ciencias Naturales de Filadelfia [On line databases containing electronic images from The Academy of Natural Sciences of Philadelphia]. First Peruvian Phycological Congress/First South American Phycological Congress. Lima, Peru.

- Morales, E. A., M. Potapova, and D.F. Charles. 2004. Las diatomeas benticas como indicadores de la calidad del agua [Benthic diatoms as indicators of water quality]. Universidad Mayor de San Simón, Facultad de Ciencias y Tecnología, Cochabamba, Bolivia.
- Charles, D. F., K. Sprouffske, E. A. Morales, M. Potapova, K. C. Ponader, D. M. Winter, C. Bell, P. Cotter, R. McCourt, D. Mellott, C. Ratnayaka, and D. Waterman. 2004. Academy of Natural Sciences online algae image resources. 18th International Diatom Symposium, Miedzzydroje, Poland, 2-7 September, 2004.
- Charles, D. F. 2005. Diatom indicators of acid mine drainage impairment in the West Branch Susquehanna River Basin. Patrick Center Seminar, PCER, ANSP, February 2, 2005.
- Potapova, M.G. and D.F. Charles. 2005. Diatom metrics for monitoring eutrophication in US rivers. American Society of Limnology and Oceanography 2005 Aquatic Sciences Meeting, Salt Lake City, Utah, February 20-25, 2005.
- Charles, D.F., K. C. Ponader, and T. J. Belton. 2005. A Diatom Total Phosphorus Index for New Jersey streams and rivers. Freshwater Nutrient Criteria Workshop. Held in conjunction with the 2005 Association of Mid-Atlantic Aquatic Biologists Workshop, Cacapon State Park, Berkeley Springs, WV, March 23, 2005.
- Belton, T.J., K.C. Ponader and D.F. Charles. 2005. Trophic diatom indices and the development of site-specific nutrient criteria. TMDL 2005 Specialty Conference, Water Environment Federation, Philadelphia, PA, 29, June, 2005.
- Charles, D.F. and K.C. Ponader. 2005. Diatom indicators of acid mine drainage impairment in the West Branch Susquehanna River Basin. 18th North American Diatom Symposium, Mobile, AL, 1-4 November, 2005.
- Charles, D.F. 2005. Using diatoms to monitor stream water quality: Some recent advances. Earth and Environmental Sciences Department seminar, University of Pennsylvania, December 2, 2005.
- Charles, D.F. and M.G. Potapova. 2006. Review of NAWQA algal studies by the Academy of Natural Sciences. USGS NAWQA Nutrient Enrichment Effects Team (NEET) annual meeting. Denver Federal Training Center, CO, March 14-16, 2006.
- Charles, D.F., M.G. Potapova, K.C. Ponader, C.A. Flinders, and Tom Belton. 2006. New approaches for using benthic algae as indicators of nutrient conditions. Association of Mid-Atlantic Aquatic Biologists, Cacapon State Park, Berkeley Springs, WV, March 26, 2006.
- Charles, D.F., K.C. Ponader, and T.J. Belton. 2006. Diatom-based models and indices for monitoring nutrient enrichment in New Jersey streams. New Jersey Water Monitoring Technical Workshop, Rutgers EcoComplex, Columbus, NJ, April 20, 2006
- Charles, D.F. 2006. Diatom communities past and present – and their relevance to a national lake assessment program. Planning a Survey of the Nation's Lakes - A National Conference. Co-sponsored by U.S. EPA, Chicago Botanical Garden, and NALMS. Chicago, IL, April 25-28, 2006.

Charles, D.F., M. Potapova, and K.C. Ponader. 2006. Multiple-scale comparisons of new and established diatom-based nutrient enrichment indicators. North American Benthological Society, Anchorage, AK, June 4-9, 2006.

Charles, D.F., K.M. Sprouffske, T.J. Sullivan, D.M. Winter, D.T. Mellott, and S.H. Hamsher. 2006. The Diatom Paleolimnology Data Cooperative (DPDC). 10th International Paleolimnology Symposium, Duluth, MN, June 25-29, 2006.

Charles, D.F. and S. Hamsher. 2006. Diatom nutrient indicators for Mid-Atlantic Piedmont streams. U.S. EPA Regions 2 and 3 Joint Nutrient RTAG meeting. EPA Region 3 Regional Office, Philadelphia, PA. 18-20 September 2006.

Charles, D.F. 2006. Use of diatoms for water quality assessment: Patrick Center research and the Diatom Herbarium. ANSP Environmental Associates meeting, ANSP, 27 September, 2006.

WORKSHOPS AND SPECIAL MEETINGS

Acid Diatom Conference, April 10-12, 1981, Bell Museum, University of Minnesota, Minneapolis. Review and discussion of taxonomy and ecological characteristics of diatoms found in acid lakes. Invited participant.

Reconstructing pH from Sedimentary Diatom Remains--Recent Insights and Update on Methods, August 23, 1983, Universite Claude-Bernard, Lyon, France. Invited to discuss techniques used to reconstruct pH histories of Adirondack lakes.

Acidification: Natural or Anthropogenic, September 15-16, 1983, at the RPI Freshwater Institute, Lake George, New York. Sponsored by the Upstate Freshwater Institute, SUNY College of Environmental Science and Forestry, and Syracuse University. Discussion of the relative roles of atmospheric deposition, natural processes, and land use changes in causing soil and water acidification. Invited participant.

Workshop on Paleolimnological Studies of the History and Effects of Acidic Precipitation, May 23-25, 1984, Rockland, Maine. Sponsored by the U.S. Environmental Protection Agency.

Paleolimnological Workshop on Lake Acidification, September 3-4, 1985, Ossiach, Austria. Invited Participant.

An Introduction to Theory and Application of Modeling for Ecologists, August 9-10, 1986. Sponsored by the International Society for Ecological Modeling. Held in conjunction with the Fourth International Congress of Ecology, Syracuse, N.Y.

Paleolimnology Workshop, March 27, 1987, University of Toronto, Toronto, Canada. Invited speaker.

- Diatoms and acidification workshop, August 29, 1988, Huhmari, Joensuu, Finland. Invited speaker.
- Scientific Perspectives in Theoretical and Applied Limnology, CNR Instituto Italiano di Idrobiologia, Verbania Pallanza, Italy, September 5-8, 1988.
- Environmental Monitoring and Assessment Program Lake and Reservoir Workshop, 7-8 May 1990, New Orleans, LA.
- Diatoms as Ecological Indicators: How they can be used in surface water monitoring programs. Workshop at the 11th International Symposium on Living and Fossil Diatoms, San Francisco, CA, August 12-17, 1990. Workshop organized and presented by D.F. Charles, and S.S. Dixit.
- International symposium on past and present climate dynamics: Reconstruction of Rates of Change, Locarno, Switzerland, September 24-28, 1990.
- Third International Chrysophyte Symposium, Queen's University, Kingston, Ontario, August 14-17, 1991.
- Workshop on Organic Acid Modeling and Model Validation, July 17-18, 1992, University of Maine at Orono. Sponsored by the U.S. Department of Energy for special project. Invited participant.
- EMAP-Surface Waters Stream Design Workshop, February 26-28, 1992, US EPA Laboratory, Cincinnati, OH. Invited participant.
- ILWAS/PALEO Model Comparison Workshop, March 5, 1992, Corvallis, OR. Sponsored by US DOE, Organized by Battelle Northwest Laboratories. Invited participant.
- MAGIC/PALEO Model Comparison Workshop, April 9-10, 1992, Corvallis, OR. Sponsored by US DOE, Organized by E & S Environmental Chemistry. Invited participant.
- EMAP Diatom Indicator Meeting, September 24-25, 1992, Center for Great Lakes and Aquatic Sciences, Ann Arbor, MI. Invited participant.
- Dahlem Conference on Acidification of Freshwaters, September 28 to October 2, 1992, Berlin, Germany. Invited participant and moderator for one of the four discussion groups.
- Lakes & Reservoirs Technical Guidance Meeting-Biosurvey/Biocriteria, organized by the USEPA Office of Water. Held in Annapolis, MD, March 29-30, 1993. Invited participant.
- RPI-EPA Acid Deposition Workshop, Rensselaer Polytechnic Institute, Troy, NY, January 18-20, 1993.
- 4th Arctic-Antarctic Diatom Symposium (Workshop), Canadian Museum of Nature, Ottawa, Ontario; September 18-21, 1993. Leader of a discussion session, " The relevance of museums [to diatom research] in the nineties".

Lakes and Reservoirs Biocriteria/Monitoring Workshop, Organized by the U.S. Environmental Protection Agency, Office of Water, Baltimore, Maryland, January 27-28, 1994. Invited participant.

Pennsylvania Lake Management Society, April 29, 1994, Valley Forge, PA

Water Environmental Indicators Workshop, sponsored by the U.S. EPA and other Federal Agencies, Alexandria, Virginia, June 22-23, 1995.

Second European Workshop on Use of Algae for Monitoring Rivers. University of Innsbruck, Austria, September 17-19, 1995. Invited participant. Made presentation, chaired discussion session on standardization of diatom methods, and was panel member in final discussion.

BIOGEMON Third International Symposium on Ecosystem Behavior. Villanova University, PA. June 23-24, 1997.

Second Workshop on Paleoenvironmental Data: Meeting the Data Management Needs of PAGES Science Activities and Tasks. Sponsored by IGBP PAGES, NSF and NOAA. Boulder, CO, February 9-12, 1998. Invited participant.

European Diatom Database Initiative (EDDI): First workshop. Environmental Change Research Center (ECRC), University College London, May 21-22, 1998. Invited as an Advisor to EDDI

European Diatom Database Initiative: Final Workshop. ECRC, University College London, July 23 - 24, 2001; Invited as an Advisor to EDDI and made presentation on DPDC project.

NAWQA / ANSP Algal Data Analysis Workshop. ANSP, Philadelphia, PA. March 15-17, 2005. Workshop organizer and presenter.

Freshwater Nutrient Criteria Workshop. Cacapon State Park, Berkeley Springs, WV, March 23, 2005. Held in conjunction with the 2005 Association of Mid-Atlantic Aquatic Biologists Workshop. Invited speaker.

EMAP-West Periphyton Indicator Development Workshop. U.S. EPA Environmental Research Laboratory, Corvallis, OR, May 2-4, 2006.