

## CURRICULUM VITAE

### JONATHAN J. COLE

Year of Birth: January 1953  
Place of Birth: New York, New York

Married

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Senior Scientist  
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### EMPLOYMENT:

May 2008- present	G. E. Hutchinson Chair in Ecology, Cary Institute of Ecosystem Studies
December 1994 - present	Senior Scientist, Cary Institute of Ecosystem Studies
February 1989 - November 1994	Associate Scientist, Institute of Ecosystem Studies
September 1983 –December 1997	Executive Director, Hubbard Brook Scientific Advisory Committee and Associate Site Coordinator, Hubbard Brook Ecosystem Study
September 1983 - February 1989	Assistant Scientist, Institute of Ecosystem Studies
1982 – 1983	Noyes Postdoctoral Fellow, The Ecosystems Center, Marine Biological Lab, Woods Hole, Massachusetts 02543
1981 – 1982	Postdoctoral Fellow, Department of Geology and Geophysics, Woods Hole Oceanographic Institute, Woods Hole, Massachusetts 02543
1980 – 1981	Graduate Research Assistant, Cornell University/Hubbard Brook Experimental Forest, Ithaca, New York 14853
1977 – 1980	Graduate Fellow, Section of Ecology and Systematics, Cornell University, Ithaca, New York 14853
1976 – 1977	Graduate Teaching Assistant, Department of Botany, Cornell University, Ithaca, New York 14853

### TEACHING EXPERIENCE:

Teaching Assistant in Limnology, Botany, Phycology, and Oceanography (one semester each). IES Fundamentals of Ecosystem Ecology Course (Winter 1984, 1989, 1991, 1994, 1996, 1997, 1999, 2001 (Course Leader), 2002, 2003); Yale-IES Aquatic Ecology Course (Spring 1985).

### EDUCATION:

Ph.D. 1982 Cornell University, Ithaca, New York, Aquatic Ecology  
B.A. 1976 Amherst College (*magna cum laude*), Biology

### HONORS:

2008- G.E. Hutchinson Chair, Cary Institute of Ecosystem Studies  
2007- Associate Editor, *Freshwater Reviews*  
2006- Associate Editor, *Aquatic Biology*  
2004 Outstanding Researcher, Hudson River Environmental Society  
2003 Ecology Institute (ECI) Prize, 2003.

2003- Institute for Scientific Information (ISI) Highly Cited Researcher  
2006-2008 Past-President, American Society of Limnology and Oceanography  
2004-2006 President, American Society of Limnology and Oceanography  
2002-2004 President-elect, American Society of Limnology and Oceanography  
2003- Associate Editor, *Ecosystems*  
2000 Member, International Water Academy  
2001- Fellow, American Association for the Advancement of Science (AAAS)  
1998- 2001 Associate Editor, *Limnology & Oceanography*  
1996- Editorial Board, *Hydrobiologia*  
1994-1997 Member at Large, Board of Directors, American Society of Limnology and Oceanography  
1987-1990 Editorial Board, *Limnology & Oceanography*  
1982 Noyes Fellowship Marine Biological Laboratory  
1977, 1978, 1979 Cornell University Competitive Graduate Fellowships  
1975 O. E. Schotte Scholarship, Amherst College

#### **PROFESSIONAL SOCIETIES:**

American Geophysical Union  
American Society of Limnology and Oceanography  
Ecological Society of America  
American Society for Microbiology  
American Association for the Advancement of Science  
Corporation Member -- Marine Biological Laboratory  
Estuarine Research Federation  
International Oceanographic Society  
North American Lakes Management Society  
Sigma Xi

#### **RESEARCH CRUISES:**

R/V KNORR (Woods Hole Oceanographic Institute) Cruise 94. May-June 1982. Sargasso Sea.  
R/V ARGOS (Swedish Hydrographic Office). May-June 1983. Leg from Gothenburg-Umea.  
R/V ATLANTIS II (Woods Hole Oceanographic Institute). 22 March-15 April 1984. Panama Basin. Leg Balboa - Acapulco. With ALVIN dives #1348- 1366, 3900-m deep.  
R/V ATLANTIS II (Woods Hole Oceanographic Institute), Cruise 112, Leg 23. 28 March-6 April 1985. Panama Basin. Leg Balboa - Punta Arenas. With ALVIN dives #1532-1538, 3900-m deep.

#### **PANELS/STEERING COMMITTEES:**

National Science Foundation – Ecosystem Studies Panel. Washington, D.C., October 2007  
Global Lakes Ecological Observatory Network (GLEON) – Research Coordinating Network Steering Committee. June 2007 -  
Council of Scientific Society Presidents (CSSP), Member, 2006-  
Coastal Science Institute, Manteo, North Carolina, Scientific Advisory Committee. 2006-  
National Center for Ecological Assessment and Synthesis Working group, “Integrating the aquatic with the terrestrial component of the global carbon budget (Co PI). 2003-4

Co-chair National Science Foundation – American Society of Limnology and Oceanography Workshop, “Emerging Issues in Limnology.” Boulder, Colorado, December 2003.

The Scientific and Policy Uncertainties Surrounding the Use of Ocean Fertilization to Transfer Atmospheric Carbon Dioxide to the Oceans. Workshop of the American Society of Limnology and Oceanography. Washington DC. April 2001.

Ocean Carbon Transport, Exchanges and Transformations (OCTET). Workshop. Washington DC. April 2000. National Science Foundation working group.

Member RIOMAR (River-dominated Ocean Margins) steering committee-1998- present.

Co-Chair Aquatic Sciences Meeting. American Society of Limnology and Oceanography. Santa Fe, New Mexico. February 1997.

Member, National Science Foundation Long-Term Ecological Research Grant Panel. April 1996.

National Science Foundation Grant Advisory Panel for Long Term Ecological Research (LTER). April 1996. Washington, DC.

Organizing committee Ocean Sciences Meeting (ASLO/AGU). February 1996.

Fifth International Conference on Ecosystem Health. Member steering committee of microbial section. Portugal. June 1995.

Chair, Meetings Committee. American Society of Limnology and Oceanography. 1995-1997.

Chair, Nominations Committee. American Society of Limnology and Oceanography. 1995-1997

American Society of Limnology and Oceanography DIALOG committee. 1994.

National Oceanographic and Atmospheric Administration – Sea Grant Proposal Review Team. February 1993. Narragansett, Rhode Island.

National Science Foundation Grant Advisory Panel for Land Margin Ecosystem Research (LMER). May 1991. Washington, DC.

International Conference on Land-Water interactions. Nehru University, New Delhi. December 1991. Member of steering committee.

National Science Foundation Site Review Team. NTL-LTER Program. May 1990. Boulder Junction, Wisconsin.

National Science Foundation Grant Advisory Panel for Long Term Ecological Research (LTER). March 1990. Washington, DC.

Scientific Advisory Board for nutrient work group. New York Harbor Estuary Program. 1989 - Present.

Committee for future of marine mesocosm research. May 1988. Narragansett, Rhode Island.

National Science Foundation Grant Advisory Panel for Land Margin Ecosystem Research (LMER). May 1988. Washington, DC.

### **GRADUATE STUDENTS SUPERVISED:**

External Opponent for Dr. Ingvar Sundh. University of Uppsala. (Ph.D. May 1991).

Thesis advisor for Dr. Clifford Ochs. Ecology and Systematics. Cornell University. (Ph.D. January 1990).

External examiner for Dr. Jackie Shaw. University of Edmonton, Alberta. (Ph.D. December 1986).

Extramural advisor for Dr. Peter Raymond, Ph.D. Candidate, Virginia Institute of Marine Sciences. Completed September 1999.

Extramural advisor to Dr. Hudson Roditi, Ph.D. Candidate, Marine Sciences Institute, State University of New York at Stony Brook. Completed April 2000.

External Opponent for Dr. Alexandre M. Anesio. Department of Ecology. Lund University, Lund, Sweden (Ph.D. May 2000).

Extramural advisor for Mr. David Bastviken, Ph.D. Candidate, Water Institute, Linköping University, Linköping, Sweden. (Ph.D. May 2002)

Extramural advisor for Dr. Jeffrey Houser, Ph.D. Candidate, Department of Zoology, University of Wisconsin, Madison. (Completed April 2001.)

Extramural advisor for Mr. Mike Rubbo, Ph.D. Candidate, Dept. Biology, Pennsylvania State University, Pennsylvania. (Ph. D. June 2004)

Extramural advisor for Mr. Darren Bade, Ph.D. Candidate, Department of Zoology, University of Wisconsin, Madison. (Ph. D. May 2004)

Extramural advisor for Ms. Julia Butzler, Ph.D. Candidate. Department of Biology, Dartmouth College.

### **POSTDOCS SUPERVISED:**

Dr. Fabio Roland 1996-1997

Dr. Paul del Giorgio 1995-1997

Dr. Pradeep Ram 2002-2003

### **OTHER PROFESSIONAL SERVICE:**

#### IES COMMITTEES (current)

Staff Search and Review Committee

Workplace Safety Advisory Committee (Chair)

Chair, Radiation Safety Committee

Space Utilization Committee

#### REVIEWER

GRANTS: National Science Foundation; International Science Foundation; NOAA-Sea Grant; Hudson River Foundation; US-Israeli Bi-National Science Foundation; USDA Competitive Grants. Environmental Protection Agency.

JOURNALS: Limnology and Oceanography; Ecology; Science; Nature; Nature GeoScience; Environmental Science and Technology; Canadian Journal of Fisheries and Aquatic Science; Canadian Journal of Microbiology; Hydrobiologia; Geochim. Cosmochim. Acta; Applied and Environmental Microbiology; Holarctic Ecology; Journal Plankton Research; Conservation Biology; Journal Marine Chemistry; Deep Sea Research; Ecosystems; Estuaries; Biogeochemistry; Bioscience; Aquatic Microbial Ecology;

#### OTHER PROFESSIONAL SOCIETY DUTIES

American Society of Limnology and Oceanography. Annual Meeting, June 1993. Organizer special session, "CO<sub>2</sub> dynamics in lakes, rivers, and estuaries."

American Society of Limnology and Oceanography. Annual Meeting, June 1993. Co-organizer special session, "Microbial processes in inland saline systems and the ocean."

- American Society of Limnology and Oceanography. Special Committee on DIALOG program (1992-1993).
- American Society of Limnology and Oceanography. Annual Meeting, February 1992. Co-organizer of special session, "Particulate matter degradation and flux."
- American Geophysical Union/American Society of Limnology and Oceanography. Annual meeting, December 1988. Co-organizer special session, "Comparative biogeochemistry in fresh and salt waters."
- American Geophysical Union/American Society of Limnology and Oceanography. Annual meeting, December 1986. Organizer special session, "Comparisons of phytoplankton nutrient limitation in fresh and salt water ecosystems."

**PUBLICATIONS (SECTION I - JOURNAL ARTICLES, PEER REVIEWED CHAPTERS):**

- Cole, J. J. and S. G. Fisher. 1978. Annual metabolism of a temporary pond ecosystem. *Amer. Midl. Natur.* **100**(1):15-22.
- Cole, J. J. and S. G. Fisher. 1979. Nutrient budgets of a temporary pond ecosystem. *Hydrobiologia* **63**(3):213-222.
- Cole, J. J. and G. E. Likens. 1979. Measurements of mineralization of phytoplankton detritus in an oligotrophic lake. *Limnol. Oceanogr.* **24**(3):541-547.
- Strayer, D. L., J. J. Cole, G. E. Likens and D. Buso. 1981. Biomass and annual production of the freshwater mussel *Elliptio complanata* in an oligotrophic softwater lake. *Freshwater Biol.* **11**:435-440.
- Cole, J. J. 1982. Interactions between bacteria and algae in aquatic systems. *Ann. Rev. Ecol. Sys.* **13**:291-314.
- Cole, J. J., G. E. Likens and D. L. Strayer. 1982. Photosynthetically produced dissolved organic carbon: An important carbon source for planktonic bacteria. *Limnol. Oceanogr.* **27**(6):1080-1090.
- Honjo, S., S. J. Maganini and J. J. Cole. 1982. Sedimentation of biogenic matter in the deep ocean. *Deep Sea Res.* **29**(5A):609-625.
- Cole, J. J., G. E. Likens and J. E. Hobbie. 1984. Decomposition of planktonic algae in an oligotrophic lake. *Oikos* **42**:257-266.
- Cole, J. J., W. H. McDowell and G. E. Likens. 1984. Sources and molecular weight of dissolved organic carbon in an oligotrophic lake. *Oikos* **42**:1-9.
- Hobbie, J. E. and J. J. Cole. 1984. Response of a detrital foodweb to eutrophication. *Bull. Mar. Sci.* **35**(3):357-363.
- Hobbie, J. E., J. J. Cole, J. Dungan, R. A. Houghton and B. J. Peterson. 1984. Role of biota in global CO<sub>2</sub> balance: the controversy. *BioScience* **34**:492-498.
- Cole, J. J., S. Honjo and N. Caraco. 1985. Seasonal variation in the flux of algal pigments to a deep-water site in the Panama Basin. *Hydrobiologia* **122**:193-197.
- Howarth, R. W. and J. J. Cole. 1985. Molybdenum availability, nitrogen limitation and phytoplankton growth in natural waters. *Science* **229**:653-655.
- Allredge, A., J. J. Cole and D. A. Caron. 1986. Production of heterotrophic bacteria inhabiting macroscopic organic aggregates (marine snow) from surface waters. *Limnol. and Oceanogr.* **31**(1):68-78.

- Cole, J. J. and C. Lee. 1986. Rapid microbial metabolism of non-protein amino acids in the sea. *Biogeochemistry* **2**:299-312.
- Cole, J. J., R. W. Howarth, S. S. Nolan and R. Marino. 1986. Sulfate inhibition of molybdate assimilation by planktonic algae and bacteria: some implications for the aquatic nitrogen cycle. *Biogeochemistry* **2**:179-196.
- Caraco, N. F., J. J. Cole, G. E. Likens, M. Mattson and S. Nolan. 1987. A very imbalanced nutrient budget for Mirror Lake, New Hampshire, U. S. A. *Verh. Internat. Verein. Limnol.* **23**:170-175.
- Cole, J. J., S. Honjo and J. Erez. 1987. Benthic decomposition of organic matter at a deep-water site in the Panama Basin. *Nature* **327**:703-704.
- McDowell, W. H., J. J. Cole and C. Driscoll. 1987. Simplified version of the ampoule-persulfate method for determination of dissolved organic carbon. *Can. J. Fish. Aq. Sci.* **44**(1):214-218.
- Cole, J. J., S. Findlay and M. L. Pace. 1988. Bacterial production in fresh and saltwater ecosystems: A cross-system overview. *Mar. Ecol. Prog. Ser.* **43**:1-10.
- Howarth, R. W., R. Marino and J. J. Cole. 1988. Nitrogen fixation in freshwater, estuarine and marine ecosystems. 2. Biogeochemical controls. *Limnol. Oceanogr.* **33**(4):688-701.
- Howarth, R. W., R. Marino, J. Lane and J. J. Cole. 1988. Nitrogen fixation in freshwater, estuarine and marine ecosystems. 1. Rates and importance. *Limnol. Oceanogr.* **33**(4):669-687.
- Caraco, N. F., J. J. Cole and G. E. Likens. 1989. Evidence for sulfate-controlled phosphorus release from sediments of aquatic systems. *Nature* **341**(6240):316-318.
- Caron, D. A., L. P. Madin and J. J. Cole. 1989. Composition and degradation of salp fecal pellets: Implications for vertical flux in oceanic environments. *J. Mar. Res.* **47**:829-850.
- Cole, J. J., N. F. Caraco, D. L. Strayer, C. Ochs and S. S. Nolan. 1989. A detailed organic carbon budget as an ecosystem-level calibration of bacterial respiration in an oligotrophic lake during mid-summer. *Limnol. Oceanogr.* **34**(2):286-296.
- Caraco, N. F., J. J. Cole and G. E. Likens. 1990. A comparison of phosphorus immobilization in the sediments of freshwater and coastal marine systems. *Biogeochem.* **9**:277-290.
- Cole, J. J., N. F. Caraco and G. E. Likens. 1990. Short-range atmospheric transport: a significant source of Phosphorous to an oligotrophic lake. *Limnol. Oceanogr.* **35**(6):1230-1237.
- Caraco, N. F., J. J. Cole and G. E. Likens. 1991. Phosphorus release from anoxic sediments: Lakes that break the rules. *Verh. Internat. Verein. Limnol.* **24**:2985-2988.
- Caraco, N. F., J. J. Cole and G. E. Likens. 1991. A cross-system study of phosphorous release from lake sediments. pp. 241-258 *In*: Cole, J. J., S. E. G. Findlay and G. Lovett (eds.). Comparative Analyses of Ecosystems: Patterns, Mechanisms and Theories. Springer-Verlag, New York. 375 pp.
- Cole, J. J., N. F. Caraco and B. Peierls. 1991. Phytoplankton primary production in the tidal, freshwater Hudson River, New York (USA). *Verh. Internat. Verein. Limnol.* **24**:1715-1719.
- Findlay, S., M. L. Pace, D. Lints, J. Cole, N. Caraco and B. Peierls. 1991. Weak coupling of bacterial and algal production in a heterotrophic ecosystem: The Hudson River estuary. *Limnol. Oceanogr.* **36**(2):268-278.
- Peierls, B. L., N. F. Caraco, M. L. Pace and J. J. Cole. 1991. Human influence on river nitrogen. *Nature* **350**:386-387.
- Peters, R. H., J. J. Armesto, B. Boeken, J. J. Cole, C. T. Driscoll, C. M. Duarte, T. M. Frost, J. P. Grime, J. Kolasa, E. Prepas, and W. G. Sprules. 1991. On the relevance of comparative ecology to the larger field of ecology. pp. 46-64. *In*: Cole, J. J., S. E. G. Findlay and G.

- Lovett (eds.). 1991. Comparative analyses of Ecosystems: Patterns, Mechanisms and Theories. Springer-Verlag, New York. 375 pp.
- Caraco, N. F., J. J. Cole and G. E. Likens. 1992. New and recycled primary production in an oligotrophic lake: Insights for summertime phosphorus dynamics. *Limnol. Oceanogr.* **37**(3):590-602.
- Cole, J. J., N. F. Caraco and B. Peierls. 1992. Can phytoplankton maintain a positive carbon balance in a turbid, freshwater, tidal estuary? *Limnol. Oceanogr.* **37**(8):1608-1617.
- Caraco, N. F., J. J. Cole and G. E. Likens. 1993. Sulfate control of phosphorus availability in lakes: A test and re-evaluation of Hasler and Einsele's model. *Hydrobiol.* **253**:275-280.
- Cole, J. J. and N. F. Caraco. 1993. The pelagic microbial food web of oligotrophic lakes. pp. 101-112. *In*: Ford, T. (ed.). Aquatic Microbiology. Blackwell Scientific Press. Cambridge, Massachusetts. 518 pp.
- Cole, J. J., J. Lane, R. Marino, and R. W. Howarth. 1993. Molybdenum assimilation by cyanobacteria and phytoplankton in freshwater and salt water. *Limnol. Oceanogr.* **38**:25-35.
- Cole, J. J., M. Pace, N. Caraco and G. Steinhart. 1993. Bacterial biomass and cell size distributions in lakes: more and larger cells in anoxic waters. *Limnol. Oceanogr.* **38**(8):1627-1632.
- Cole, J. J., B. L. Peierls, N. F. Caraco and M. L. Pace. 1993. Nitrogen loading of rivers as a human-driven process. pp. 141-157. *In*: McDonnell, M. and S. Pickett (eds.). Humans as components of ecosystems. Springer-Verlag, New York.
- Ashizawa, D. and J. J. Cole. 1994. Long term temperature trends of the Hudson River: A study of the historical data. *Estuaries* **17**(1B):166-171.
- Cole, J. J., N. F. Caraco, G. W. Kling and T. W. Kratz. 1994. Carbon dioxide supersaturation in the surface waters of lake. *Science* **265**:1568-1570.
- Pace, M. L. and J. J. Cole. 1994. Comparative and experimental approaches to top-down and bottom-up regulation of bacteria. *Microb. Ecol.* **28**:181-193.
- Pace, M. L. and J. J. Cole. 1994. Primary and bacterial production in lakes: are they coupled over depth? *J. Plank. Res.* **16**(6):661-672.
- Carpenter, S. R., D. L. Christensen, J. J. Cole, K. L. Cottingham, Xi He, J. R. Hodgson, J. F. Kitchell, S. E. Knight, M. L. Pace, D. M. Post, D. E. Schindler, and N. Voichick. 1995. Biological control of eutrophication in lakes. *Environ. Sci. Tech.* **29**:784-786.
- Cole, J. J. and M. L. Pace. 1995. Why measure bacterial production? A reply to the comment by Jahnke and Craven. *Limnol. Oceanogr.* **40**:441-444.
- Cole, J. J. and M. L. Pace. 1995. Bacterial secondary production in oxic and anoxic freshwaters. *Limnol. Oceanogr.* **40**:1019-1027.
- Ochs, C., J. J. Cole and G. E. Likens. 1995. Regulation of bacterioplankton in an oligotrophic lake. *J. Plank. Res.* **17**:365-391.
- Oviatt, C., P. Doering, B. Nowicki, L. Reed, J. J. Cole and J. Frithsen. 1995. An ecosystem level experiment on nutrient limitation in temperate coastal marine environments. *Mar. Ecol. Prog. Ser.* **116**:171-179.
- Christensen, D. L., S. R. Carpenter, J. J. Cole, K. L. Cottingham, J. F. Kitchell, S. E. Knight, J. P. LeBouton, M. L. Pace, D. E. Schindler and N. Voichick. 1996. Pelagic responses to changes in dissolved organic carbon following division of a seepage lake. *Limnol. Oceanogr.* **43**:553-559.
- Felip, M., M. L. Pace and J. J. Cole. 1996. Regulation of planktonic bacterial growth rates: The effects of temperature and resources. *J. Plank. Res.* **31**:15-28.

- Pace, M. L. and J. J. Cole. 1996. Regulation of bacteria by resources and predation tested in whole lake experiments. *Limnol. Oceanogr.* **41**:1448-1460.
- Roditi, H. A., N. F. Caraco, J. J. Cole and D. L. Strayer. 1996. Filtration of Hudson River water by the zebra mussel (*Dreissena polymorpha*). *Estuaries* **19**:824-832.
- Caraco, N. F., J. J. Cole, P. A. Raymond, D. L. Strayer, M. L. Pace, S. E. G. Findlay and D. T. Fischer. 1997. Zebra mussel invasion in a large turbid river: Phytoplankton response to increased grazing. *Ecology* **78**:588-602
- Cottingham, K. L., S. E. Knight, S. R. Carpenter, J. J. Cole, M. L. Pace and A. E. Wagner. 1997. Response of phytoplankton and bacteria to nutrients and zooplankton: a mesocosm experiment. *Journal of Plankton Research*: **19**:995-1010.
- del Giorgio, P. A., J. J. Cole and A. Cimlerlis. 1997. Respiration rates in bacteria exceed phytoplankton production in unproductive aquatic systems. *Nature* **385**:148-151.
- del Giorgio, P. A. and J. J. Cole. 1997. Photosynthesis or planktonic respiration: A response to the comments of R. J. Geider. *Nature* **388**:132-133.
- Raymond, P. A., N. F. Caraco and J. J. Cole. 1997. CO<sub>2</sub> concentration and atmospheric flux in the Hudson River. *Estuaries* **20**:381-390
- Schindler, D. E., S. R. Carpenter, J. J. Cole, J. F. Kitchell and M. L. Pace. 1997. Influence of food web structure on carbon exchange between lakes and the atmosphere. *Science* **277**:248-251.
- Bastviken, D. T. E., N. F. Caraco and J. J. Cole. 1998. Experimental measurements of zebra mussel (*Dreissena polymorpha*) impacts on phytoplankton community composition. *Freshwat. Biol.* **39**(2):375-386.
- Caraco, N. F., G. Lampman, J. J. Cole, K. E. Limburg, M. L. Pace and D. Fischer. 1998. Microbial assimilation of DIN in a nitrogen rich estuary: implications for food quality and isotope studies. *Mar. Ecol. Prog. Ser.* **167**:59-71.
- Carpenter, S. R., J. J. Cole, T. E. Essington, J. R. Hodgson, J. N. Houser, J. F. Kitchell and M. L. Pace. 1998. Evaluating alternative explanations in Ecosystem Experiments. *Ecosystems*. **1**:335-344.
- Carpenter, S. R., J. J. Cole, J. F. Kitchell and M. L. Pace. 1998. Variable productivity in whole-lake experiments: Roles of dissolved organic carbon, phosphorus and grazing. *Limnol. Oceanogr.* **43**:73-80.
- Cole, J. J. and N. F. Caraco. 1998. Atmospheric exchange of carbon dioxide in a low-wind oligotrophic lake. *Limnol. Oceanogr.* **43**:647-656.
- Cole, J. J. and M. L. Pace. 1998. Hydrologic variability of small, northern lakes measured by the addition of tracers. *Ecosystems* **1**:310 -320.
- del Giorgio, P. A. and J. J. Cole. 1998. Bacterial growth efficiency in natural aquatic ecosystems. *Ann. Rev. Ecol. Sys.* **29**:503-541.
- Pace, M. L., J. J. Cole and S. R. Carpenter. 1998. Trophic cascades and compensation: Differential responses of microzooplankton in whole lake experiments. *Ecology* **79**:138-152.
- Reche, I., M. L. Pace and J. J. Cole. 1998. Interactions of photobleaching and mineral nutrients in determining bacterial growth on colored dissolved organic carbon. *Microb. Ecol.* **36**:270-280 (I).
- Smith, T. E., R. J. Stevenson, N. F. Caraco and J. J. Cole. 1998. Changes in phytoplankton community structure during the zebra mussel (*Dreissena polymorpha*) invasion of the Hudson River (New York). *J. Plank. Res.* **20**:1567-1579.
- Cole, J. J. 1999. Aquatic microbiology for ecosystem scientists: New and recycled paradigms in ecological microbiology. *Ecosystems* **2**:215-225.

- Caraco, N. F. and J. J. Cole. 1999. Human impact on nitrate export: An analysis using major world rivers. *Ambio* **28**(2):167-170.
- Caraco, N. F. and J. J. Cole. 1999. Regional-scale export of C,N,P and sediment: What River data tell us about key controlling variables. pp. 239-253 *In: Tenhunen, J. D., and P. Kabat (eds.). Integrating hydrology, ecosystem dynamics and biogeochemistry in complex landscapes.* Wiley and Sons, Ltd.
- Carpenter, S. R., J. F. Kitchell, J. J. Cole and M. L. Pace. 1999. Predicting responses of chlorophyll and primary production to changes in phosphorus, grazing and dissolved organic carbon. (Reply to the comment by Nürnberg). *Limnol. Oceanogr.* **44**(4):1176-1179.
- del Giorgio, P. A., J. J. Cole, N. F. Caraco and R. H. Peters. 1999. Linking planktonic biomass structure to plankton metabolism and net gas flux in northern temperate lakes. *Ecology* **80**(4):1422-1431.
- Duarte, C., S. Agusti, P. A. del Giorgio and J. J. Cole. 1999. Regional carbon imbalances in the Oceans. ocean heterotrophic? *Science* **284**: [www.sciencemag.org](http://www.sciencemag.org) Technical comments.
- Lampman, G., N. F. Caraco, and J. J. Cole. 1999. Spatial and temporal patterns of nutrient concentration and export in the tidal Hudson River. *Estuaries* **22**:285-296.
- Pace, M. L., and J. J. Cole. 1999. Effects of whole lake manipulations of nutrient loading and food web structure on planktonic respiration. *Can J. Fish Aq. Sci.* **57**:487-496.
- Pace, M. L., J. J. Cole, S. R. Carpenter, and J. F. Kitchell. 1999. Trophic cascades revealed in diverse ecosystems. *Trends in Ecology and Evolution* **14**(12):459-503.
- Reche, I., M. L. Pace, and J. J. Cole. 1999. Relationship of trophic and chemical conditions to photobleaching of dissolved organic matter lake ecosystems. *Biogeochem.* **44**:259-280.
- Roland, F., N. F. Caraco, J. J. Cole and P. A. del Giorgio. 1999. Rapid and precise determination of dissolved oxygen by spectrophotometry: Evaluation of interference from color and turbidity. *Limnol. Oceanogr.* **44**:1148-1154.
- Roland, F. and J. J. Cole. 1999. Regulation of bacterial growth efficiency in a large turbid estuary. *Aquatic Microbial Ecology* **20**:31-38.
- Strayer, D. L., N. F. Caraco, J. J. Cole, S. Findlay, and M. L. Pace. 1999. Transformation of freshwater ecosystems by bivalves: a case study of zebra mussels in the Hudson River. *BioScience* **49**:19-27.
- Strayer, D. L., N. F. Caraco, J. J. Cole, S. Findlay, and M. L. Pace. 1999. Ecosystem responses to an invasive bivalve. *Bulletin of the North American Benthological Society.* **16**:148.
- Caraco, N. F., J. J. Cole, S. E. G. Findlay, D. T. Fischer, G. G. Lampman, M. L. Pace and D. L. Strayer. 2000. Dissolved oxygen declines in the Hudson River associated with the invasion of the zebra mussel (*Dreissena polymorpha*). *Environ. Sci & Technol.* **34**:1204-1210.
- Cole, J. J. 2000. Microbial carbon cycling in pelagic ecosystems: microbial methods for ecosystem scientists. Chapter 1.9. *In: Sala, O., R. Jackson, H. A. Mooney and R. Howarth (eds.). Methods in Ecosystem Science.* Springer-Verlag.
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- Cole, J.J. Do inland waters matter to the large-scale terrestrial carbon balance: A global perspective. Workshop: High latitude terrestrial and freshwater ecosystems: Interactions and response to environmental change. Abisko, Sweden. 11-14 September, 2007.
- Reche, I., A. Valderama, M.L. Pace, J.J. Cole and P. Verdugo. Self-assembly of dissolved organic carbon: Insights from lakes. Ocean Science Meeting (ASLO, AGU, TOS). March. 2008. P 118.
- Fram, J.P., S. MacIntyre, N.F. Caraco, J.J. Cole and W.R. McGillis. Modelling dissolved oxygen in a tidal freshwater embayment of invasive floating vegetation with a heat budget. Ocean Science Meeting (ASLO, AGU, TOS). March. 2008. P. 61.
- Bastviken, D., J.J. Cole, M.L. Pace and M. Van de Bogert. The fate of methane from different lake habitats: Connecting whole lake budgets and CH<sub>4</sub> emissions. Meeting of the American Society of Limnology and Oceanography. St. John's Newfoundland. June 2008.
- Van de Bogert, M. C., O.C. Langman, D.L. Bade, S.R. Carpenter; J.J. Cole, M.L. Pace, T.K. Kratz and P.C. Hanson. 2008. Confronting within-lake heterogeneity: How many sensors does it take to measure whole lake metabolism. Meeting of the American Society of Limnology and Oceanography, St. John's Newfoundland. 8-13 June, 2008
- Solomon, C.T., S.R. Carpenter, J.J. Cole, M.L. Pace, J.J. Coloso, M.J. Vander Zanden and B.C. Weidel. 2008. Deuterium stable isotopes indicate terrestrial subsidies to aquatic food webs. Meeting of the Ecological Society of America. Milwaukee, WI. August 5, 2008.
- Preston, N., S.R. Carpenter and L.J. Kohler. 2008. Terrestrial support of lakes across the landscape. Wednesday, Meeting of the Ecological Society of America. Milwaukee, WI. August 6, 2008.
- Reche, I., E. Ortega-Retuerta, A. Fernández-Barbero, A. P. Verdugo, M.L. Pace, and J.J. Cole. Phase transition and self-assembly of dissolved organic matter: Consequences for lake color and food webs. Aquatic Science Meeting of the American Society of Limnology. 25-30 January 2009. Nice, France.

### **INVITED SEMINARS:**

- February 1981. Boston University Marine Program. "Algal extracellular release is an important carbon source for aquatic bacteria."
- April 1981. Oak Ridge National Laboratory. "The role of photosynthetically-produced dissolved organic carbon to the organic nutrition of native, planktonic bacteria in an oligotrophic lake."
- October 1981. The Ecosystems Center, Marine Biological Laboratory, Woods Hole, Massachusetts. "Decomposition of planktonic algae in an oligotrophic lake."
- February 1982. Woods Hole Oceanographic Institute. "Production and decomposition in the water-column of an oligotrophic lake."
- July 1982. The Ecosystems Center, Marine Biological Laboratory, Woods Hole, Massachusetts. "Particulate flux at a deep-water site in the Panama Basin."
- June 1983. The Ecosystems Center, Marine Biological Laboratory, Woods Hole, Massachusetts. "Sources and molecular weight distribution of dissolved organic carbon in an oligotrophic lake."

- December 1983. Institute of Ecosystem Studies, The New York Botanical Garden, Mary Flagler Cary Arboretum. "Response of bacterioplankton to eutrophication in coastal marine ecosystems."
- February 1984. Yale School of Forestry and Environmental Studies. "The role of the molybdate/sulfate ratio in the aquatic nitrogen cycle: preliminary results."
- November 1984. Fordham University. "Interactions between bacteria and phytoplankton in aquatic ecosystems."
- June 1985. Special Symposium of Ecological Society of America. Minneapolis, Minnesota. "Why is the sea nitrogen limited?"
- June 1985. Marine Biological Laboratory, Woods Hole, Massachusetts. "The role of molybdate and sulfate in the aquatic nitrogen cycle." Summer Ecology Course.
- November 1985. University of Rhode Island, Graduate School of Oceanography. "Benthic decomposition at the bottom of the Panama Basin."
- January 1986. McGill University, Department of Biology. "Molybdate, sulfate and nitrogen limitation: a case in element cycle interaction."
- April 1986. Cornell University, Section of Ecology and Systematics. "Bacteria in pelagic ecosystems: Current perspectives."
- July 1986. Marine biological laboratory, Woods Hole Massachusetts. "Nitrogen, sulfate and molybdate: How element interactions leads to marine nitrogen limitation."
- December 1986. Special Symposium Chairman; "Comparisons of fresh and salt-water phytoplankton nutrient limitation." Joint Meeting of American Geophysical Society and American Society of Limnology and Oceanography. San Francisco, California.
- February 1987. Why Mirror Lake should be preserved: A research perspective. Town of Woodstock, New York, Town Hall.
- April 1987. Why A. C. Redfield should have studied lakes - or - the role of molybdate and sulfate in marine N limitation. University of Vermont, Burlington.
- June 1987. Bacterial production and its regulation in saltwater and freshwater ecosystems. Marine Biological Laboratory Summer Marine Ecology Course.
- October 1987. A visit to the bottom of the ocean: Research experience with ALVIN. Katonah Public Library.
- November 1987. What is the average pelagic food web? Marine Sciences Center, State University of New York at Stony Brook.
- February 1988. Molybdenum and nitrogen fixation in marine ecosystems: A plea for a mesocosm experiment. Graduate School of Oceanography, University of Rhode Island, Narragansett.
- July 1988. A cross-system view of bacterial secondary production. Marine Biological Laboratory Summer Marine Ecology Course. Woods Hole, Massachusetts.
- November 1988. Bacterial production in freshwater: An ecosystem level calibration of a physiological estimate. University of Alberta, Edmonton.
- February 1989. What limits nitrogen fixation in seawater? Rutgers University, NJ.
- February 1989. The microbial loop in aquatic ecosystems. Cornell University, Ithaca, New York.
- March 1989. How large is bacterial production and how would you know if you were right? The Ecosystems Center, Woods Hole, Massachusetts.
- October 1989. Phosphorus release from lake sediments: The controls are not what you think they are. Lake Lacawac Association, Pennsylvania.

- October 1989. A tale of two Hudson Rivers: Phytoplankton primary production in the lower estuary and in the tidal freshwater river. Hudson River Foundation Symposium, Mohonk, New York.
- April 1990. The carbon cycle and global environmental change. Cornell Cooperative Extension. Millbrook, New York.
- May 1990. The carbon cycle and global environmental change. Bard College. Annandale, New York.
- October 1990. Molybdenum and nitrogen fixation: Why is the sea N limited? Tufts University-United Nations Ecological Program. Institute of Ecosystem Studies. Millbrook, New York.
- October 1990. Understanding Nitrogen fluxes in a watershed. Hudson Valley Teachers Program. Institute of Ecosystem Studies. Millbrook, New York.
- November 1990. Human population and nitrogen export from the world's major rivers. Workshop on Nitrogen Saturation. Institute of Ecosystem Studies. Millbrook, New York.
- January 1991. Environmental change at a global scale: Warming, carbon and nitrogen. Greenwich Woman's Club Federation. Greenwich, Connecticut.
- February 1991. The microbial loop in pelagic ecosystems. Cornell University, Section of Ecology and Systematics. Ithaca, New York.
- March 1991. Nitrogen and phosphorus cycling in lakes: Possible control by sulfur. Canadian National Hydrologic Research Institute. Saskatoon, Canada.
- May 1991. Nitrogen export from rivers of the world in linked to human population pressure. Fourth Cary Conference: "Humans as Components of Ecosystems." Institute of Ecosystem Studies. Millbrook, New York.
- May 1991. A cross system study of nitrogen export from rivers of the world. Institute of Limnology. Uppsala, Sweden.
- May 1991. Assimilation of molybdenum by fresh and salt water phytoplankton. Institute of Limnology. Uppsala, Sweden.
- May 1991. Conversion factors in the measurement of bacterial production: Using an ecosystem carbon budget for validation. Institute of Limnology. Uppsala, Sweden.
- October 1991. Undiscovered public knowledge and ecological research." Institute of Ecosystem Studies. Millbrook, New York.
- November 1991. "The role of humans in coastal nitrogen pollution." United Nations Education Program Fellows - Tufts University Symposium. Institute of Ecosystem Studies. Millbrook, New York.
- December 1991. "Algal respiration and photosynthesis in the Hudson River." Rutgers University. New Brunswick, New Jersey.
- December 1991. "Why bumblebees can't fly in a turbid, tidal river." Horn Point Environmental Laboratory. Cambridge, Maryland.
- January 1992. "The global carbon controversy." Lions Club. Pine Plains, New York.
- January 1992. "Global carbon dioxide and global environmental change." Institute of Ecosystem Studies. Sunday Walk-Talk program.
- February 1992. "The global carbon cycle and its relation to global warming." Science in your life series of the Vassar Brothers Institute. Poughkeepsie, New York.
- February 1992. "Primary production in a freshwater, tidal estuary: the roles of mixing depth, light and algal respiration." Department of Earth and Environmental Sciences, Lehigh University. Bethlehem, Pennsylvania.

- May 1992. "Where is the missing CO<sub>2</sub>?" Vassar College Summer Institute. Poughkeepsie, New York.
- October 1992. "Deep sea research with the submersible ALVIN." SUNY, New Paltz, New York.
- March 1993. "Recent developments in research into the microbial loop." Cornell University. Ithaca, New York.
- January 1994. "Mirror Lake (and most others) are supersaturated in CO<sub>2</sub>." McGill University. Montreal, Canada.
- February 1994. "Direct and indirect measurements of aqueous CO<sub>2</sub>: Understanding the pH-carbonate system." LTER Workshop. Trout Lake, Wisconsin.
- April 1994. "The zebra mussel in the Hudson River: Known and potential impacts." Symposium on Zebra Mussels in the Hudson River. New York State Sea Grant. April 1994.
- April 1994. "Ecosystem effects of the zebra mussel on the Hudson River." SUNY, Stony Brook, New York. Marine Science Research Center.
- May 1994. "The great phytoplankton crash in the Hudson River." Hudson River Foundation. New York City.
- May 1994. "Carbon dioxide supersaturation in lakes and rivers." Institute of Ecosystem Studies. Millbrook, New York.
- December 1994. "Carbon dioxide dynamics in freshwaters." Marine Biological Laboratory. Woods Hole, Massachusetts.
- February 1995. "Why are lakes supersaturated in carbon dioxide?" University of Mississippi.
- March 1995. "Carbon dioxide in aquatic ecosystems: New views of old data." Fordham University.
- January 1996. "Carbon dioxide gas flux measured by whole-lake addition of sulfur hexafluoride." Université de Québec à Montréal.
- March 1996. "Carbon dioxide dynamics in lakes and rivers of the world." Institute of Limnology. Uppsala University. Uppsala, Sweden.
- March 1996. "Using whole-lake tracer additions to measure carbon dioxide gas fluxes from lakes." Department of Marine and Aquatic Biology. University of Lund. Lund, Sweden.
- April 1996. "Understanding carbon dioxide flux in freshwaters." Virginia Institute of Marine Science, Gloucester Point, Virginia.
- August 1996. Carbon dioxide efflux estimated with whole-lake tracer experiments. University of Wisconsin, Trout Lake Station, Boulder Junction, WI.
- October 1996. There are too many people in the world: Ecological evidence at several scales. Tuft's University UNEP Program. Institute of Ecosystem Studies, Millbrook, NY.
- November 1996. "Why are lakes and rivers supersaturated in carbon dioxide: results from whole-system purposeful additions." The University of Rhode Island, Kingston, Rhode Island.
- November 1996. "How ecosystem scientists use chemistry." Institute of Ecosystem Studies, Millbrook, New York.
- April 1997. Recent advances in microbial research in aquatic ecosystems. University of Connecticut (Storrs).
- April 1997. Gas flux from lake and riverine ecosystems. Inst. Marine Science, Rutgers University, New Brunswick, NJ.
- March 1998. "Net heterotrophy in aquatic ecosystems: Multiple lines of evidence." The Ecosystem Center, Marine Biological Laboratory, Woods Hole, MA.
- April 1998. "Gas flux and net heterotrophy in aquatic ecosystems." (Distinguished Visiting Speaker). Murray State University, Murray, Kentucky.

- June 1998. "The role of watershed carbon in lake metabolism: multiple lines of evidence." New York City Department of Environmental Protection.
- September 1998. Are aquatic and marine ecosystems net heterotrophic? Cornell University Biogeochemistry Program seminar.
- October 1998. Multiple lines of evidence for net heterotrophic metabolism in aquatic ecosystems. University of Maryland, Horn Point Environmental Laboratory.
- April 1999. Carbon cycling in aquatic ecosystems. University of Connecticut.
- September 1999. New developments in microbial loop in aquatic ecosystems. Cornell University.
- November 1999. Carbon in catchments: Connecting terrestrial carbon losses with aquatic metabolism. CSIRO, Canberra Australia.
- April 2000. Ancient organic C in the Hudson River? Institute of Ecosystem Studies
- May 2000. Food web control of net heterotrophy in aquatic ecosystems. Department of Ecology. University of Lund, Lund Sweden.
- September 2000. True or false: Respiration exceeds primary production in diverse aquatic ecosystems. State University of New York at Stony Brook.
- September 2000. Net heterotrophy in aquatic ecosystems: Evidence from multiple lines of investigation. University of Minnesota, Department of Ecology. St. Paul
- September 2000. True or false: Respiration exceeds primary production in diverse aquatic ecosystems. University of Minnesota. Department of Biology. Duluth.
- October 2000. Ancient terrestrial organic C: An important labile C source to the Hudson River? Lehigh University.
- October 2000. Net heterotrophy in aquatic ecosystems: Evidence from multiple lines of investigation. Invited Keynote address: Lake Lacawac Research Sanctuary meeting.
- October 2000. Does old organic C of terrestrial origin fuel metabolism in the Hudson River. Center for Limnology, University of Wisconsin, Madison
- October 2000. True or false: Respiration exceeds primary production in diverse aquatic ecosystems. Department of Zoology. University of Wisconsin, Madison.
- November 2001. The mystery of ancient terrestrial carbon in the Hudson River. Business Breakfast, Institute of Ecosystem Studies. Millbrook, New York.
- March 2002. Does terrestrial organic matter fuel the food web in lakes? Large Lakes Observatory, University of Minnesota. Duluth, Minnesota.
- March 2002. Where do fish get the carbon? Phytoplankton or maple trees. Friday Seminar, Institute of Ecosystem Studies. Millbrook, New York.
- September 2003. Terrestrial subsidies of the aquatic food web: Results from whole-lake <sup>13</sup>C additions. Miami University, Ohio.
- September 2003. Does terrestrial organic carbon fuel the food web? National Center for Ecological Assessment and Synthesis. Santa Barbara, California.
- November 2003. The multiple roles of terrestrial organic carbon in aquatic ecosystems. University of Connecticut, Avery Point.
- October 2004. From trees to fish: The role of terrestrial carbon in the aquatic food web. Arizona State University, Tempe.
- October 2004. Net heterotrophy and the aquatic food web. Dartmouth College, Hanover, NH.
- December 2004. The multiple roles of terrestrial carbon in the aquatic food web. Jones Ecological Center, Albany, Georgia. Distinguished Scientist Lecture Series.
- March 2005. Phytoplankton production in the Hudson River – Long terms results and models. Hudson River Foundation Synthesis Workshop, New York City.

- September 2005. Terrestrial subsidies of aquatic food webs – how the world really works. Institute of Marine Science, University of North Carolina, Moorehead City.
- October 2005. How terrestrial organic matter is processed in aquatic ecosystems: From the big picture to detailed models. Marine Biological Lab Distinguished Seminar Series. Woods Hole, MA.
- May 2006. Does terrestrial organic matter support that aquatic food web: Pathways revealed from a dual isotope flow model. University of California at Santa Barbara.
- January 2007. The fates of terrestrial carbon in aquatic ecosystems: Do trees subsidize the aquatic food web. Utah State University, Logan, Utah.
- September 2007. Do inland waters matter to the large-scale terrestrial carbon balance: A global perspective. Invited Plenary Talk. Workshop; High latitude terrestrial and freshwater ecosystems: Interactions and response to environmental change. Abisko, Sweden.
- September 2007. Terrestrial support of aquatic food webs. Invited LERC lecture. Umea University, Sweden.
- September 2007. Terrestrial support of aquatic food webs. Uppsala University, Sweden.
- February 2008. Are fish made of phytoplankton or maple leaves: Results from whole lake  $^{13}\text{C}$  additions, ambient organic deuterium, and faith-based models roughly agree. UQAM. Montreal, Canada.

ADD Brazil, Beacon Inst, check calendar.

- October 2008. Allochthonous support of aquatic ecosystems with special reference to hydroelectric reservoirs. Meeting of the FURNAS Reservoir Project (Furnas Centrais Elétricas). Planetário da Cidade do Rio de Janeiro, Brazil (7-10 October 2008)
- October 2008. How can we quantify terrestrial support of aquatic food webs: Stable isotopes and modeling. Universidade Federal do Rio de Janeiro, UFRJ, Brazil.
- October 2008. Are fish made of trees? How could you tell and why should you care. Presentation for the Atlanta-10 Group. Cary Institute of Ecosystem Studies.
- October 2008. How the Hudson River sees the Global Carbon Cycle. Lecture on Hudson Biogeochemistry for the New York State Department of Environmental Conservation. DEC Regional Headquarters, New Paltz, New York.
- January 2009. Some ecological consequences of the invasion of water chestnut (*Trapa natans*) in the Hudson River. Join Meeting of Beacon Institute on Rivers and Estuaries, Pace Law School and Cary Institute of Ecosystem Studies (January 23, 2009).
- January 2009. Fundamentals of Ecosystem Ecology (FEE) Lectures: 1) Primary Production in Aquatic Ecosystems; 2) The Global Carbon Cycle; 3) Stable Isotope Workshop (with T. Loecke).

## GRANTS

- Likens, G. E., F. H. Bormann and C. T. Driscoll. "Hydrologic nutrient cycle interaction in undisturbed and human-manipulated ecosystems." National Science Foundation, Ecosystem Studies. 1 November 1984 – 1 November 1988. Cole's involvement: 2 months/year. Note: Renewed through 1992; 1996.
- Honjo, S. and J. J. Cole. "The fate of biogenic particulates in the deep ocean." National Science Foundation. 1 June 1983 – 1 June 1985. #OCE-8309024 (\$209,863). (Completed).

- Howarth, R. W. and J. J. Cole. "Molybdenum: An important control of the nitrogen cycle in aquatic ecosystems. National Science Foundation. 1 July 1983 – 1 July 1986. #BSR-8305176 (\$341,283). (Completed).
- Howarth, R. W. and J. J. Cole. Molybdenum availability and control of nitrogen fixation in aquatic ecosystems. National Science Foundation. 1 October 1986 – 1 October 1989. #BSR-86044688 (\$375,000). (Completed).
- Cole, J. J., G. E. Likens, N. Caraco, and T. Winter. "Evaluation and regulation of nutrient sources for Mirror Lake." Ecosystem Studies Program- National Science Foundation. 1 March 1986 – 1 March 1988. #BSR-8516897 (\$249,944). (Completed).
- Cole, J. J., R. W. Howarth and N. F. Caraco. "Phytoplankton primary production and its controls in the tidal freshwater portion of the Hudson River Estuary." Hudson River Foundation. 1 August 1986 – 1 August 1987. (\$70,026). (Completed).
- Cole, J. J. and N. F. Caraco. Phytoplankton primary production: A major component of the lower food web of the mid-Hudson. Hudson River Foundation. 1 September 1987 – 31 March 1989. (\$61,000). (Completed).
- Cole, J. J., N. F. Caraco and M. Pace. "A nitrogen mass balance of the New York Bight Ecosystem". United States Environmental Protection Agency. Subcontract through University of Rhode Island. 1 January 1989 – 1 April 1990. (\$44,961). (Completed).
- Caraco, N. F., J. J. Cole and G. E. Likens. "Phosphorus release in aquatic ecosystems - A cross System Study." National Science Foundation, Ecosystems Studies Program. 1 April 1990 – 31 March 1992. #BRS-8917962 (\$240,000). (Completed).
- Cole, J. J. and M. L. Pace. "Microbial investigations of North Temperate Lakes, A supplement for research at LTER sites. National Science Foundation, Ecosystems Studies Program. 1 April 1990 – 31 March 1992. (\$44,846). (Completed).
- Cole, J. J. and N. F. Caraco. "The maintenance of algal biomass in the Hudson River Estuary: the roles of algal respiration, mixing and water depth." Hudson River Foundation. 23 July 1990 – 22 July 1992. #003/90A/007 (\$152,000). (Completed).
- Pace, M. L. and J. J. Cole. "Regulation of heterotrophic microbial processes in lake ecosystems." National Science Foundation, Ecosystems Studies Program. 1 February 1991 – 31 January 1996. #BSR-9019873. (\$651,742). (Completed).
- Weathers, K., G. Likens and J. Cole. "Facility improvement at the Institute of Ecosystem Studies." National Science Foundation Facilities Improvement Program. 15 November 1991 – 30 April 1993. #DIR-9115266. (\$48,000). (Completed).
- Cole, J. J., S. Findlay, N. Caraco, M. Pace and D. Strayer. "A research vessel for the tidal freshwater Hudson." Hudson River Improvement Fund. 1 June 1992 – 31 May 1993. #H16/92A. (\$45,250). (Completed).
- Cole, J. J. and N. F. Caraco. "Regulation of the spatial and temporal dynamics of phytoplankton production and biomass in the Hudson River." Hudson River Foundation. 1 June 1993 – 31 May 1996. (\$150,000). (Completed).
- Pace, M. L., N. F. Caraco and J. J. Cole. "Hudson River food web dynamics and the recruitment of striped bass." New York Sea Grant. 1 February 1994 – 31 January 1996. (\$115,119). (Completed).
- Kling, G. W., T. Kratz, J. J. Cole and N. F. Caraco. "Land-water interactions and carbon dioxide saturation of surface waters at LTER sites." National Science Foundation - LTER program. 1 September 1994 – 1 January 1996. (\$60,000). (Completed).

- Caraco, N. F., J. J. Cole and G. W. Kling. "Causes and consequences of highly variable CO<sub>2</sub> in aquatic ecosystems." National Science Foundation- Ecosystem Studies Program. 1 March 1994 – 28 February 1997. (\$450,000). (Completed).
- Giblin, A., D. Armstrong, N. F. Caraco, J. J. Cole, G. W. Kipphut and D. DiToro. "Investigating control on the fluxes of nitrogen and phosphorus from lake sediments." National Science Foundation - Ecosystems. 1 January 1994 – 31 December 1995. #DEB 94-16805. (\$75,000). (Completed).
- Strayer, D. L., N. F. Caraco, J. J. Cole, S. G. Findlay and M. L. Pace. "Response and compensation to a bivalve invasion by an aquatic ecosystem." National Science Foundation - Ecosystems Studies and Water and Watersheds Programs. 15 October 1995 – 14 October 1999. #DEB- 9508981. (\$944,853). (Completed).
- Kitchell, J. F., M. L. Pace, S. R. Carpenter, J. J. Cole and J. R. Hodgson. "Alternate states and ecosystem metabolism in lakes: Interactions of nutrients and DOC." National Science Foundation - Ecosystems Studies and Water and Watersheds Program. 1 January 1996 – 31 December 1999. #DEB-9509595. (\$1,050,000). (Completed).
- Caraco, N. F., J. J. Cole and S. Findlay. "Recent declines in dissolved oxygen in the tidal-freshwater Hudson River: An alert to the need for measurements at multiple scales and species-based ecosystem models." Hudson River Foundation. 1 March 1999 – 1 March 2002. (\$252,831). (Completed).
- Caraco, N. F., J. J. Cole and J. Bauer. "Input and metabolism of ancient terrestrial organic C in a large river: Importance to the food web and ecosystem metabolism." National Science Foundation. 1 November 1999 – 31 October 2000. (\$50,000). (Completed).
- Cole, J. J., N. F. Caraco and S. E. G. Findlay. "Predicting dissolved oxygen trends in the tidal, freshwater Hudson River: The unrecognized role of introduced species." New York Sea Grant Institute. 1 February 2000 – 31 January 2002. (\$248,356). (Completed).
- Strayer, D. L., N. F. Caraco, J. J. Cole, S. E. Findlay and M. L. Pace. "LTREB: Transient and long term response of an aquatic ecosystem to an invasive bivalve." National Science Foundation. 1 June 2000 – 31 May 2005. (\$299,999).
- Fisher, N. and J. J. Cole. "Absorption of dissolved organic matter and trace metals by the zebra mussel, *Dreissena polymorpha*." Hudson River Foundation. 1 May 2000 – 30 April 2003. (\$273,520). (Completed).
- Caraco, N. F., J. J. Cole and J. Bauer. "Input and metabolism of ancient terrestrial organic C in a large river: Importance to the food web and net ecosystem metabolism." National Science Foundation – Ecosystem Studies Program. (DEB-9973925). 1 February 2000 – 31 January 2001. (\$50,500). (Completed).
- Pace, M., J. J. Cole, S. R. Carpenter, J. F. Kitchell and J. Hodgson. "Collaborative Research: Alternative carbon sources for lake food webs." National Science Foundation – Ecosystem Studies Program. (DEB - 0075114). 1 October 2000 – 30 September 2003. (\$1,174,816). (Completed).
- Cole, J. J., N. F. Caraco, P. A. Raymond, J. E. Bauer. "Collaborative research: Delivery and fate of old terrestrial organic matter in river ecosystems." National Science Foundation – Ecosystem Studies Program (DEB 0234504). 1 Feb. 2003 – 31 January 2006. (\$847,742).
- Cole, J. J., N. F. Caraco, G. E. Likens and T. C. Winter. "The Role of Hydrologic Inputs in the Balance of Carbon Dioxide in Small Lakes". National Science Foundation- Hydrology Program. GEO-0309275. 1 Feb 2004 – 31 January 2006. (\$175,999).

- Caraco, N.F., J.J. Cole, S. MacIntyre, P.A. Raymond, W.A. McGillis. “Collaborative Research: Aquatic Plant Beds as Biogeochemical Hot Spots in a Large River Ecosystem. National Science Foundation – Ecosystem Studies Program. 15 August 2004 – 14 Aug 2007 (\$707,375).
- Bauer, J.E., J.J. Cole, N.F. Caraco, P.A. Raymond, S. Petsch. “Collaborative Research: Assessing the Variability and Modification of Age, Character and Reactivity of Organic Carbon Delivered by Rivers and Estuaries to an Ocean Margin.” National Science Foundation. Integrated Carbon Cycle Research (ICCR). 15 October 2004 – 14 October 2007. (\$1,200,000).
- Pace, M.L. J.J. Cole, S.R. Carpenter, J.F. Kitchell and J. Hodgson. “Collaborative Research: Terrestrial Subsidies of aquatic food webs”. National Science Foundation – Ecosystem Studies Program. 15 September 2004 – 14 September 2007. (\$1,377,257).
- Strayer, D. N. Caraco, M.L. Pace, S. Findlay and J. Cole. LTREB: Long-term Response of an Ecosystem to an Invasive Species. National Science Foundation – Ecosystem Studies Program DEB-0454001. 1 July 2005- 30 June 2010. \$320,000.
- Cole, J.J. and N.F. Caraco. Terrestrial subsidies of the Hudson River food web: A multiple tracer approach focusing on deuterium. Hudson River Foundation. 1 July 2007-30 June 2009 (\$182,131).
- Carpenter, S.R., M.L. Pace, J.J. Cole, J.F. Kitchell, P.C. Hanson and J.R. Hodgson. Collaborative Research: Leading Indicators of Regime Shift – an Ecosystem Experiment. National Science Foundation- Ecosystem Studies Program. 1 January 2008-31 December 2011 (\$1,284,331).
- Cole, J.J. Workshop and Principal Investigator meeting for Coupled Biogeochemical Cycles: Recent Progress and Future Directions. National Science Foundation (Jointly funded by DEB and GEO). DEB 0843161. 15 November 2008-14 November 2009. \$183,953.
- Pace, M.L., J.J. Cole, S.R. Carpenter and J.F. Kitchell. “Collaborative Research: Terrestrial Support of Lake Food Webs: A Multi-Isotope Approach”. National Science Foundation- Ecosystems Studies Program. DEB 0917719. 1 Sept. 2009- 31 August. 2012. Combined total is \$999,334. Cary portion is \$228,906.