

CURRICULUM VITAE

Name: Glenn F. Cada

Position: Senior R&D Staff Member, Environmental Sciences Division, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, Tennessee, 37831-6036

Telephone: 865/574-7320 **Telefax:** 865/576-3989 **Internet:** cadagf@ornl.gov

Higher Education:

1967 - 1971 Bachelor of Science in Zoology, University of Nebraska

1971 - 1973 Master of Science in Zoology, Colorado State University

1973 - 1977 Ph.D. in Zoology, University of Nebraska

Areas of specialization: Fisheries biology and aquatic ecology

Work Experience: Research staff member since 1977 at Oak Ridge National Laboratory, involved in research and assessment of environmental effects of energy development for various Federal agencies.

2007-Present - Technical support to the U.S. Department of Energy Water Power Program. Author of a Report to the U.S. Congress on the potential environmental impacts of marine and hydrokinetic renewable energy technologies.

2005-Present - U.S. Environmental Protection Agency, Office of Water –Conducted a Nutrient Criteria Workshop, assisted in CADDIS/Flow Alteration website development, and prepared whitepaper reviews of nutrient criteria development techniques and the linkages between nutrient, sediment, and biological criteria.

2006-2007 - U.S. Department of Energy, Clean Coal Power Initiative Program – Project management of an environmental impacts statement for the proposed Gilberton Coal-to-Clean Fuels and Power Project, Gilberton, Pennsylvania.

1991-2006 - Review and analysis of environmental issues related to hydropower development (fish passage, water quality, and instream flow mitigation) for the U.S. Department of Energy Hydropower Program. Development of biological studies in support of advanced turbine designs for the Advanced Hydropower Turbine System Program. DOE representative to the U.S. Army Corps of Engineers Turbine

Working Group.

- 1984-Present - Technical support to the Federal Energy Regulatory Commission for the analysis of impacts to aquatic resources of hydropower development, including the Comprehensive Water Resources Analysis of the Upper San Joaquin River Basin, California (1984-85), cumulative impacts of multiple hydropower developments in the Owens River basin, California (1985-86), environmental effects of nationwide hydroelectric development associated with the Electric Consumers Protection Act (1987-88), cumulative impacts assessment of hydropower developments in the Nooksack and Skagit river basins (1991-1997), Snake River Anadromous Fish Review (1998-2000), environmental effects of the Warm and Clearwater Creek and North Umpqua projects (1998-2003) and environmental assessments related to the Keowee-Toxaway, Catawba-Wateree, Lake Dorothy, Willamette Falls, and Smith Mountain Hydroelectric Projects (2006-2009).
- 1996-1997 - Served on the Scientific Advisory Board for the 3rd International Conference on Reservoir Limnology and Water Quality, Ceske Budejovice, Czech Republic, August 11-15, 1997.
- 1992-1994 - Critical review of the effects of water velocity on the survival of juvenile salmon and steelhead in the Columbia River Basin for the Northwest Power Planning Council.
- 1987-1997 - Technical support to the U.S. Nuclear Regulatory Commission in the analysis of impacts to aquatic resources from license renewal of nuclear power plants.
 - Technical support to U.S. Department of Energy's Office of NEPA Oversight, including document review, development of regulatory guidance documents and facility audit protocols, and leadership of NEPA components of DOE Tiger Teams.
- 1982-1985 - Principal Investigator on a U.S. Department of Energy research project to validate biological assumptions of instream flow habitat models in southern Appalachian trout streams.
- 1981-1982 - Group Leader, Environmental Fate and Effects Studies of the H-Coal Synthetic Fuel Pilot Plant.
- 1979-1981 - Principal Investigator in charge of fish entrainment research utilizing the Power Plant Simulator.
- 1980-1981 - Consultant to the U.S. Agency for International Development to develop site selection methodologies to minimize environmental

impacts of small-scale hydroelectric development in Peru.

- 1978-1981 - Design of and participation in field and laboratory studies of ichthyoplankton in the Clinch River, Tennessee.
- 1977-1979 - Preparation of environmental impact statements for proposed nuclear power plants and uranium mining and milling operations; analysis of Clean Water Act 316(a) and (b) demonstrations; written testimony and expert witness on behalf of the Environmental Protection Agency Region II and the Chesapeake Bay Foundation.
- 1976 - 1977 - Graduate Teaching Assistant in Ichthyology and Limnology courses, University of Nebraska.
- 1973 - 1977 - Designed and conducted a field study to assess the effects of two nuclear power plants on ichthyoplankton in the Missouri River, Nebraska.
 - Collection of water samples, plankton, and benthos from man-made reservoirs in Nebraska as well as the subsequent identification and enumeration of phytoplankton.
- 1971 - 1973 - Conducted a study to determine the changes in diversity and composition of the benthic macroinvertebrate communities of the Cache la Poudre River, Colorado, resulting from changes in elevation as well as inputs of domestic sewage and agricultural runoff.
- 1969 - 1971 - Participated in field sampling and water chemistry analyses for a eutrophication study of Great Plains reservoirs.

SELECTED PUBLICATIONS

- Cada, G. F. 1973. The spatial and temporal distribution of the aquatic macroinvertebrate fauna of the Cache la Poudre River, Colorado. M.S. Thesis, Department of Zoology and Entomology, Colorado State University, Fort Collins, Colorado.
- Cada, G. F. 1977. The entrainment of larval fishes at two nuclear power plants on the Missouri River in Nebraska. Ph.D. Dissertation, School of Life Sciences, University of Nebraska, Lincoln, Nebraska.
- Cada, G. F. and G. L. Hergenrader. 1978. An assessment of sampling mortality in larval fishes. *Transactions of the American Fisheries Society* 107(2):269-274.
- Cada, G. F. and A. T. Szluha. 1979. A biological evaluation of devices used for reducing entrainment and impingement losses at thermal power plants. p. 181-214 IN *Proceedings of the International Symposium on the Environmental Effects of Hydraulic Engineering Works*. E. E. Driver and W. O. Wunderlich (eds.). Tennessee Valley Authority, Knoxville, Tennessee. 494 p.
- Cannon, J. B., G. F. Cada, K. K. Campbell, D. W. Lee, and A. T. Szluha. 1979. Fish protection at steam-electric power plants: Alternative screening devices. ORNL/TM-6472, Oak Ridge National Laboratory, Oak Ridge, Tennessee. 142 p.
- Cada, G. F., J. B. Cannon, and D. W. Lee. 1979. Alternative screening devices at Indian Point Units 2 and 3, Bowline Point, and Roseton generating stations. Joint Testimony presented before the United State Environmental Protection Agency, Region II, in the Matter of Adjudicatory Hearing Docket No. c/ii-WP-77-01. 29 p. + appendix.
- U. S. Agency for International Development (AID). 1980. Small hydroelectric development in Peru. AID Project Paper, September, 1980. 93 pp. + 2 annexes.
- Cada, G. F., J. M. Loar, and K. D. Kumar. 1980. Diel patterns of ichthyoplankton length-density relationships in upper Watts Bar Reservoir, Tennessee. p. 79-90 IN *Proceedings of the Fourth Annual Larval Fish Conference*. L. A. Fuiman (ed.). National Power Plant Team. U.S. Fish and Wildlife Service, Ann Arbor, Michigan. FWS/OBS-80/43. 179 p.
- Cada, G. F. and G. L. Hergenrader. 1980. Natural mortality rates of freshwater drum larvae in the Missouri River. *Transactions of the American Fisheries Society* 109(5):479-483.
- Cada, G. F., J. S. Suffern, K. D. Kumar, and J. A. Solomon. 1981. Investigation of entrainment mortality among larval and juvenile fishes using a power plant simulator. p. 111-122 IN *Issues Associated with Impact Assessment*. Proceeding of the Fifth National Workshop on Entrainment and Impingement. L. D. Jensen (ed.). Ecological Analysts, Inc., Sparks, Maryland. 307 p.
- Cada, G. F. and F. Zadroga. 1981. Environmental issues and site selection criteria for small hydropower projects in developing countries. ORNL/TM-7620. Oak Ridge National

Laboratory, Oak Ridge, Tennessee. 47 p.

- Cada, G. F., J. A. Solomon, and J. M. Loar. 1981. Effects of sublethal entrainment stresses on the vulnerability of juvenile bluegill sunfish to predation. ORNL/TM-7801. Oak Ridge National Laboratory, Oak Ridge, Tennessee. 34 p.
- Cada, G. F., K. D. Kumar, J. A. Solomon, and S. G. Hildebrand. 1981. Analysis of environmental issues related to small-scale hydroelectric development. VI. Dissolved oxygen concentrations below operating dams. ORNL/TM-7887. Oak Ridge National Laboratory, Oak Ridge, Tennessee. 90 p.
- Cada, G. F., J. B. Cannon, and D. W. Lee. 1982. Alternative screening devices at Indian Point Units 2 and 3, Bowline Point, and Roseton generating stations. Chapter IV IN Impingement Impact Analyses, Evaluations of Alternative Screening Devices, and Critiques of Utility Testimony Relating to Density-Dependent Growth, the Age-Composition of the Striped Bass Spawning Stock, and the LMS Real-Time Life Cycle Model. ORNL/NUREG/TM-385/V2. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Cada, G. F. and P. J. Mulholland [preparers (ORNL)]. 1982. Guidance manual for Department of Energy compliance with Corps of Engineers permits on dredging and filling activities. DOE/EP-0060. U.S. Department of Energy, Office of Environmental Compliance, Washington, D.C. 17 p.
- Hergenrader, G. L., L. G. Harrow, R. G. King, G. F. Cada, and A. B. Schlesinger. 1982. Larval fishes in the Missouri River and the effects of entrainment. Chapter 8 IN The middle Missouri River. A collection of papers on the biology with special reference to power station effects. L. W. Hesse, G. L. Hergenrader, H. S. Lewis, S. D. Reetz, and A. B. Schlesinger (eds.). The Missouri River Study Group. Norfolk, Nebraska. 301 p.
- Cada, G. F., J. A. Solomon, and K. D. Kumar. 1982. Investigation of entrainment stresses using a power plant simulator. ORNL/TM-7869. Oak Ridge National Laboratory, Oak Ridge, Tennessee. 91 p.
- Cada, G. F. and F. Zadroga. 1982. Small-scale hydroelectric power for developing countries: Methodology of site selection based on environmental issues. Environmental Conservation 9(4):329-337.
- Cada, G. F. 1982. Environmental studies of materials from the H-Coal Liquefaction Process Development Unit. ORNL/TM-8466. Oak Ridge National Laboratory, Oak Ridge, Tennessee. 43 p.
- Cada, G. F. and J. M. Loar. 1982. Relative effectiveness of two ichthyoplankton sampling techniques. Canadian Journal of Fisheries and Aquatic Sciences 39(6):811-814.
- Cada, G. F., K. D. Kumar, J. A. Solomon, and S. G. Hildebrand. 1983. An analysis of dissolved oxygen concentrations in tail waters of hydroelectric dams and the implications for small-scale hydropower development. Water Resources Research 19(4):1043-1048.

- Cada, G. F., M. J. Sale, R. M. Cushman, and J. M. Loar. 1983. Field test of a biological assumption of instream flow models. p. 1305-1313 IN Proceedings of Waterpower '83, An International Conference on Hydropower. R. G. Domer (ed.). Tennessee Valley Authority, Knoxville, Tennessee. 1590 p.
- Cada, G. F., and M. Kenna. 1985. Effectiveness of hydrotreatment in reducing the toxicity of a coal liquefaction product to juvenile channel catfish. *Bulletin of Environmental Contamination and Toxicology* 34(5):746-753.
- Cada, G. F. and R. B. McLean. 1985. An approach for assessing the impacts on fisheries of basin-wide hydropower development. p. 367-372 IN Proceedings of the Symposium on Small Hydropower and Fisheries. F. W. Olson, R. G. White, and R. H. Hamre (eds.) American Fisheries Society, Bethesda, Maryland. 497 p.
- Gatz, A. J., Jr., J. M. Loar, and G. F. Cada. 1986. Effects of repeated electroshocking on instantaneous growth of trout. *North American Journal of Fisheries Management* 6(2):176-182.
- Federal Energy Regulatory Commission. 1986. Owens River Basin: Seven hydroelectric projects. FERC/EIS-0041. Office of Hydropower Licensing, FERC, Washington, D.C.
- Cada, G. F., J. M. Loar, and D. K. Cox. 1987. Food and feeding preferences of rainbow and brown trout in southern Appalachian streams. *American Midland Naturalist* 117:374-385.
- Kondolf, G. M., G. F. Cada, and M. J. Sale. 1987. Assessing flushing-flow requirements for brown trout spawning gravels in steep streams. *Water Resources Bulletin* 23(5):927-935.
- Cada, G. F., J. M. Loar, and M. J. Sale. 1987. Evidence of food limitation of rainbow and brown trout in southern Appalachian softwater streams. *Transactions of the American Fisheries Society* 116(5):692-702.
- Cada, G. F. 1990. Assessing fish mortality rates. *Hydro Review* 9:52-60.
- Cada, G. F. 1990. A review of studies related to the effects of propeller-type turbine passage on fish early life stages. *North American Journal of Fisheries Management* 10(4):418-426.
- Cada, G. F. and C. T. Hunsaker. 1990. Cumulative impacts of hydropower development: Reaching a watershed in impact assessment. *The Environmental Professional* 12(1):2-8.
- Elwood, J. W., M. J. Sale, P. R. Kaufmann, and G. F. Cada. 1991. The Southern Blue Ridge Province. Chapter 11 IN *Acidic Deposition and Aquatic Ecosystems: Regional Case Studies*. D. F. Charles (ed.). Springer-Verlag, New York.
- Kondolf, G. M., G. F. Cada, M. J. Sale, and T. Felando. 1991. Distribution and stability of

potential salmonid spawning gravels in steep boulder-bed streams of the eastern Sierra Nevada. *Transactions of the American Fisheries Society* 120(2):177-186.

Railsback, S. F., G. F. Cada, C. H. Petrich, M. J. Sale, J. A. Shaakir-Ali, J. A. Watts, and J. W. Webb. 1991. Environmental impacts of increased hydroelectric development at existing dams. ORNL/TM-11673. Oak Ridge National Laboratory, Oak Ridge, TN. 46 p.

Cada, G. F. 1991. Effects of hydroelectric turbine passage on fish early life stages. p. 318-326 IN *Proceedings of Waterpower '91: A New View of Hydro Resources*. D. D. Darling (ed.). American Society of Civil Engineers, New York.

Sigal, L. and G. Cada. 1991. NEPA compliance auditing. *The Environmental Professional* 13:173-176.

Sale, M. J., G. F. Cada, L. H. Chang, S. W. Christensen, S. F. Railsback, J. E. Francfort, B. N. Rinehart, and G. L. Sommers. 1991. Environmental mitigation at hydroelectric projects. Volume 1. Current practices for instream flow needs, dissolved oxygen, and fish passage. DOE/ID-10360. U.S. Department of Energy Idaho Field Office, Idaho Falls, Idaho.

Adams, S. M., G. F. Cada, M. S. Greeley, Jr., L. R. Shugart, and J. F. McCarthy. 1993. Evaluating effects of environmental stress on fish communities using multi-response indicators. p. 170-177 IN *Environmental Analysis - The NEPA Experience*. S. G. Hildebrand and J. B. Cannon (eds.). Lewis Publishers, Ann Arbor, Michigan. 763 p.

Cada, G. F. and M. J. Sale. 1993. Status of fish passage facilities at nonfederal hydropower projects. *Fisheries* 18(7):4-12.

Cada, G.F. and D.W. Jones. 1993. Benefits of fish passage and protection measures at hydroelectric projects. p. 139-148 IN *Waterpower '93: Proceedings of the International Conference on Hydropower*. W.D. Hall (ed.). American Society of Civil Engineers, New York, New York. 2214 p.

Cada, G.F., M.D. Deacon, S.V. Mitz, and M.S. Bevelhimer. 1993. Review of information pertaining to the effect of water velocity on the survival of juvenile salmon and steelhead in the Columbia River basin. Report to the Northwest Power Planning Council, Portland, Oregon. 70 p.

Francfort, J.E., G.F. Cada, D.D. Dauble, R.T. Hunt, D.W. Jones, B.N. Rinehart, G.L. Sommers, and R.J. Costello. 1994. Environmental mitigation at hydroelectric projects. Volume II. Benefits and costs of fish passage and protection. DOE/ID-10360(V2). U.S. Department of Energy Idaho Operations Office, Idaho Falls, Idaho.

Cada, G.F. and J.E. Francfort. 1994. Mitigation of environmental impacts at hydroelectric power plants in the United States. Chapter 14 IN *Alternative Fuels and the Environment*. F. Sterrett (ed.). Lewis Publishers, Chelsea, Michigan. 276 p.

- Cada, G.F. and J.E. Francfort. 1995. Examining the benefits and costs of fish passage and protection measures. *Hydro Review* 14(1):47-55.
- Cada, G.F. 1996. Biological criteria defined for Advanced Turbine Program. *Hydro Review* XV(7):83-84.
- Cada, G.F., C.C. Coutant, and R.R. Whitney. 1997. Development of biological criteria for the design of advanced hydropower turbines. DOE/ID-10578. U.S. Department of Energy, Idaho Operations Office, Idaho Falls, ID. 85 p.
- Cada, G. F., M.D. Deacon, S.V. Mitz, and M.S. Bevelhimer. 1997. Effects of water velocity on the survival of downstream-migrating juvenile salmon and steelhead: A review with emphasis on the Columbia River Basin. *Reviews in Fisheries Science* 5(2):131-183.
- Cada, G.F. 1997. Shaken, not stirred: The recipe for a fish-friendly turbine. p. 374-382 IN *Waterpower '97. Proceedings of an International Conference & Exposition on Hydropower*. American Society of Civil Engineers, New York, New York. 2267 p.
- Cada, G.F. 1998. Fish passage mitigation at hydroelectric power projects in the United States. p. 208-219 IN *Fish Migration and Fish Bypasses*. M. Jungwirth, S. Schmutz, and S. Weiss (eds.). Fishing News Books, Blackwell Science, Inc. Malden, MA. 438 p.
- Cada, G.F. 1998. Better science supports fish-friendly turbine designs. *Hydro Review* XVII (6): 52-61.
- Cada, G.F. 1998. Efforts to reduce the impacts of hydroelectric power production on reservoir fisheries in the United States. *International Review of Hydrobiology* 83 (Special Issue):43-50.
- Cada, G.F., T. Carlson, J. Ferguson, M. Richmond, and M. Sale. 1999. Exploring the role of shear stress and severe turbulence in downstream fish passage. IN *Proceedings of Waterpower '99. Hydropower's Future: Technology, Markets, and Policy*. P.A. Brookshier (ed.). American Society of Civil Engineers, Reston, Virginia. 10 p.
- Cada, G.F., P.A. Brookshier, J.V. Flynn, B.N. Rinehart, G.L. Sommers, and M.J. Sale. 1999. The use of advanced hydroelectric turbines to improve water quality and fish populations. p. 545-549 IN *Proceedings of the 4th International Congress on Energy, Environment and Technological Innovation*. Rome, Italy, September 19-24, 1999.
- Cada, G.F. 2000. Anadromous fish review - Snake River basin, Idaho. Report to the Office of Hydropower Licensing, Federal Energy Regulatory Commission, Washington, DC. 55 p. + appendices.
- Neitzel, D.S., M.C. Richmond, D.D. Dauble, R.P. Mueller, R.A. Moursund, C.S. Abernethy, G.R. Guensch, and G.F. Cada. 2000. Laboratory studies of the effects of shear on fish. Report to the U.S. Dept. of Energy Idaho Operations Office, Idaho Falls, ID. 66 p. + appendices.

- Cada, G.F. and B.N. Rinehart. 2000. Recent R&D advances in turbine passage technology. DOE/ID-10753. U.S. Department of Energy Idaho Operations Office, Idaho Falls, ID. 35 p. +Appendix.
- Abernethy, C.S., B.G. Amidan, and G.F. Cada. 2001. Laboratory studies of the effects of pressure and dissolved gas supersaturation on turbine-passed fish. DOE/ID-10853. Report to the U.S. Department of Energy Hydropower Program. Idaho Falls, ID.
- Cada, G.F. and M. Odeh. 2001. Turbulence at hydroelectric power plants and its potential effects on fish. Report to the Bonneville Power Administration, Portland, OR. 31 p.
- Cada, G.F., G.L. Sommers, and M.J. Sale. 2001. What's going on in there? Efforts to describe the experiences of turbine-passed fish. Proceedings of Waterpower XII. Advancing Technology for Sustainable Energy. HCI Publications, Inc. Kansas City, MO.
- Cada, G.F. 2001. The development of advanced hydroelectric turbines to improve fish passage survival. Fisheries 26(9):14-23.
- Abernethy, C.S. B.G. Amidan, and G.F. Cada. 2002. Simulated passage through a modified Kaplan Turbine pressure regime: A supplement to Laboratory Studies of the Effects of Pressure and Dissolved Gas Supersaturation on Turbine-Passed Fish. PNNL-13470-A. Report to the U.S. Department of Energy Hydropower Program. Idaho Falls, ID.
- Odeh, M., J.F. Noreika, A. Haro, A. Maynard, T. Castro-Santos, and G.F. Cada. 2002. Evaluation of the effects of turbulence on the behavior of migratory fish. Project No. 2000-057-00. Final Test Report to the Bonneville Power Administration, Portland, OR.
- Pavlov, D. S., A. I. Lupandin, and V. V. Kostin. 2002. Downstream Migration of Fish Through Dams of Hydroelectric Power Plants. Translated by T. Albert, Translation Editor G. F. Cada. ORNL/TR-02/02. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Cada, G.F. 2002. Hydroelectric power production: Realizing the benefits by resolving the environmental issues. Chapter 18 In: Renewable Energy: Trends and Prospects. S.K. Majumdar, E.W. Miller, and A.I. Panah (eds.). The Pennsylvania Academy of Science, Easton, PA. 532 p.
- Peterson, M.J, G.F. Cada, M.J. Sale, and G.K. Eddlemon. 2003. Regulatory approaches for addressing dissolved oxygen concerns at hydropower facilities. DOE/ID-11071, Report to the U.S. Department of Energy Hydropower Program, Idaho Falls, ID. 31 p.
- Cada, G.F., M.G. Ryon, D.A Wolf, and B.T. Smith. 2003. Development of a new technique to assess susceptibility to predation resulting from sublethal stresses (indirect mortality). ORNL/TM-2003/195, Oak Ridge National Laboratory, Oak Ridge, TN. 40 p. + appendices.
- Cada, G.F., M.J. Peterson, and M.J. Sale. 2003. Concentrating on dissolved oxygen: Alternative regulatory strategies for addressing DO problems. International Water Power & Dam Construction 55(6):16-19.

- Abernethy, C.S., B.G. Amidan, and G.F. Cada. 2003. Fish passage through a simulated horizontal bulb turbine pressure regime: A supplement to laboratory studies of the effects of pressure and dissolved gas supersaturation on turbine-passed fish. PNNL-13470-B, Pacific Northwest National Laboratory, Richland, WA.
- Cada, G.F. and M.G. Ryon. 2003. Study begins on effects of sub-lethal stresses during turbine passage. *Hydro Review* XXII(3):80.
- Ryon, M.G., G.F. Cada, and J.G. Smith. 2004. Further tests of changes in fish escape behavior resulting from sublethal stresses associated with hydroelectric turbine passage. ORNL/TM-2003-288. Oak Ridge National Laboratory, Oak Ridge, TN.
- Cada, G.F., M.J. Sale, and D.D. Dauble. 2004. Hydropower, Environmental Impact of. *Encyclopedia of Energy*, Volume 3, p. 291-300. Academic Press/Elsevier Science, San Diego, CA.
- Neitzel, D.S. D.D. Dauble, G.F. Cada, M. Richmond, G. Guensch, R. Mueller, C Abernethy, and B. Amidan. 2004. Survival estimates for juvenile fish subjected to a laboratory-generated shear environment. *Transactions of the American Fisheries Society* 133: 446-453.
- Cada, G.F., J. Smith, and J. Busey. 2005. Use of pressure sensitive film to quantify sources of injury to fish. *North American Journal of Fisheries Management* 25(2):57-66.
- Coutant, C.C. and G.F. Cada. 2005. What's the future of instream hydro? *Hydro Review* XXIV(6):42-49.
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- Cada, G., M. Ryon, C. Lockett, and J. Smith. 2006. The effects of turbine passage on C-start behavior of salmon at the Wanapum Dam, Washington. ORNL/TM-2006/88. Oak Ridge National Laboratory, Oak Ridge, TN.
- Cada, G., J. Ahlgrimm, M. Bahleda, T. Bigford, S. Damiani-Stavrakas, D. Hall, R. Moursund, and M. Sale. 2007. Potential impacts of hydrokinetic and wave energy conversion technologies on aquatic environments. *Fisheries* 32(4):174-181.
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Cada, G.F. In Press. Potential environmental impacts of marine and hydrokinetic renewable energy technologies. Report to the U.S. Congress.

SELECTED PRESENTATIONS

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- Cada, G. F. and A. T. Szluha. 1979. A biological evaluation of devices used for reducing entrainment and impingement losses at thermal power plants. Presented at the International Symposium on the Environmental Effects of Hydraulic Engineering Works, Knoxville, Tennessee, September 13, 1978.
- Cada, G. F. Natural mortality rates among larval freshwater drum, *Aplodinotus grunniens*, in the Missouri River. 109th Annual Meeting of the American Fisheries Society, West Yellowstone, Montana, September, 1979.
- Cada, G. F., J. M. Loar, and K. D. Kumar. Diel patterns of ichthyoplankton length-density relationships in upper Watts Bar Reservoir, Tennessee. Fourth Annual Larval Fish Conference, Oxford, Mississippi, February 27, 1980.
- Cada, G. F., J. S. Suffern, K. D. Kumar, and J. A. Solomon. Investigation of entrainment mortality among larval and juvenile fishes using a power plant simulator. Fifth National Workshop on Entrainment and Impingement, San Francisco, California, May 6, 1980.
- Cada, G. F. (with J. M. Loar, M. J. Sale, and R. M. Cushman). Workshop on the Environmental Effects of Small Hydropower Development. Presented to U. S. Environmental Protection Agency, Region V, Chicago, Illinois, May 10-11, 1983.
- Cada, G. F. and M. Kenna. Effectiveness of product upgrading in reducing the toxicity of synthetic H-Coal oil to juvenile channel catfish. 113th Annual Meeting of the American Fisheries Society, Milwaukee, Wisconsin, August 19, 1983.
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- Cada, G. F., and R. B. McLean. An approach of assessing fisheries impacts of basin-wide hydropower development. Symposium on Small Hydropower and Fisheries, Denver, Colorado, May 2, 1985.
- Cada, G. F., J. M. Loar, D. K. Cox, and M. J. Sale. Evidence of food limitation in trout populations of southern Appalachian softwater streams. 115th Annual Meeting of the American Fisheries Society, Sun Valley, Idaho, September 10, 1985.
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- Cada, G. F., and C. T. Hunsaker. Assessment of cumulative impacts for hydropower development. 1988 Annual Conference of the National Association of Environmental Professionals, Orlando, Florida, April 21, 1988.
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- Cada, G. F. and L. L. Sigal. NEPA compliance auditing. 1990 Annual Conference of the National Association of Environmental Professionals, San Antonio, Texas, June 21, 1990.
- Cada, G. F. Effects of hydroelectric turbine passage on fish early life stages. National Meetings of (1) the Ecological Society of America, Snowbird, Utah, July 30, 1990; (2) the American Fisheries Society, Pittsburgh, Pennsylvania, August 28, 1990; and (3) Waterpower '91, Denver, Colorado, July 26, 1991.
- Cada, G. F. DOE hydropower mitigation study: A review of mitigation methods. Presented at (1) Eleventh Annual Conference of the Northwest Hydroelectric Association, Bellevue, Washington, January 30, 1992; (2) EPA/TVA Workshop on NonPoint Source Pollution, Knoxville, Tennessee, February 20, 1992; and (3) BUREC/COE Acoustical Workshop, Sacramento, California, March 17, 1992.
- Cada, G.F. and J.E. Francfort. Environmental requirements at hydroelectric power projects. Presented at the Symposium on Alternate Fuels and the Environment, 1993 National Meeting of the American Chemical Society, Denver, Colorado, March 30, 1993.
- Cada, G.F. Use of rapid bioassessment approaches to examine benthic macroinvertebrate responses to hydropower flow diversions. Presented at the Special Session on Biotic Indicators of Ecosystem Health: Perspectives towards a National Framework for Indicators Development, 41st Annual Meeting of the North American Benthological Society, Alberta, Canada, May 28, 1993.
- Cada, G.F. and D.W. Jones. Benefits of fish passage and protection measures at hydroelectric projects. Waterpower '93, Nashville, Tennessee, August 11, 1993.
- Cada, G.F. Benefits of fish passage facilities at hydroelectric projects: A case study analysis. 13th Annual Conference of the Northwest Hydroelectric Association, Seattle, Washington, February 2, 1994.
- Cada, G.F. and J.E. Francfort. Costs and benefits of fish passage and protection measures. HydroVision '94 Conference, Phoenix, Arizona, August 19, 1994.
- Cada, G.F. An examination of the benefits of fish passage mitigation at sixteen hydroelectric projects. 124th Annual Meeting of the American Fisheries Society, Halifax, Nova Scotia, August 25, 1994.
- Cada, G.F. Fish passage mitigation of impacts from hydroelectric power projects in the United

States. International Conference on Fish Migration and Fish Bypass-Channels, Vienna, Austria, September 25, 1996.

Cada, G.F., J.E. Francfort, B.N. Rinehart, M.J. Sale, and G.L. Sommers. Hydroelectric power generation: Mitigating the fish passage impacts. 17th Annual Meeting of the International Association for Impact Assessment, New Orleans, Louisiana, May 29, 1997.

Cada, G.F. Shaken, not stirred: The recipe for a fish-friendly turbine. Waterpower '97, Atlanta, Georgia, August 6, 1997.

Cada, G.F. Efforts to reduce the impacts of hydroelectric power production on reservoir fisheries in the United States. 3rd International Conference on Reservoir Limnology and Water Quality, Ceske Budejovice, Czech Republic, August 15, 1997.

Cada, G.F. Guidance and test criteria for shear and turbulence. DOE Advanced Hydropower Turbine System Program Technical Committee Meeting, Waterways Experiment Station, Vicksburg, Mississippi, February 24, 1998.

Cada, G.F. Exploring the role of shear stress and severe turbulence in downstream fish passage. Waterpower '99. Las Vegas, Nevada, July 9, 1999.

Cada, G.F. U.S. Department of Energy's Advanced Hydropower Turbine System Program. Turbine Passage Survival Workshop. Portland, Oregon, June 14, 2000.

Cada, G.F. What's going on in there? Efforts to describe the experiences of turbine-passed fish. Waterpower XII. Salt Lake City, Utah, July 11, 2001.

Cada, G.F. and J. Busey. Using pressure-sensitive film to quantify water pressures, mechanical strike, and shear stresses experienced by fish. 132nd Annual Meeting of the American Fisheries Society/Fourth Bioengineering Symposium. Baltimore, Maryland, August 18-22, 2002.

Cada, G.F. Laboratory studies to specify biological criteria for turbine design. 134th Annual Meeting of the American Fisheries Society, Madison, Wisconsin, August 22-26, 2004.

Cada, G.F., M.J. Sale, T. Carlson, F. Sotiropoulos, and B. Smith. Characterizing turbulence and its biological effects at hydroelectric power plants. 5th International Symposium on Ecohydraulics, Madrid, Spain, September 12-17, 2004.

Cada, G.F. Fish passage research by the U.S. Department of Energy. USFWS/USGS Workshop on Future Fish Passage Management and Research Needs, Hadley, Massachusetts, December 7-8, 2004.

Cada, G.F. and E. Meyer. Characterizing natural streams. Hydrokinetic and Wave Energy Technologies Technical and Environmental Issues Workshop, Washington, DC, October 26-28, 2005.

- Cada, G.F. Environmental performance of advanced turbines. Workshop on Advanced Turbine Research and Deployment. Albany, New York, November 15, 2005.
- Cada, G.F. Developing biocriteria to ensure safe fish passage. Symposium on Optimizing Dam Operations for Fish and for Power. HydroVision 2006 Conference, Portland, Oregon, July 31, 2006.
- Cada, G.F. Environmental issues associated with kinetic hydroelectric turbines in free-flowing rivers. Federal Energy Regulatory Commission Hydroelectric Technical Conference: Hydroelectric Generation from Ocean Waves, Tides, and Currents and from Free-Flowing Rivers. Washington, DC, December 6, 2006.
- Cada, G.F. Downstream fish passage: Can fish pass safely around or through turbines? Invited lecture at the International Symposium on Fishways in South America. Lavras, Brazil, July 31, 2007.
- Cada, G.F. Survival of fish through hydroelectric turbines and over dam spillways. Invited lecture at the Expert Workshop on Dams as Barriers to Fish Passage in the Mekong River, and the Possibilities of Mitigation. Mekong River Commission, Vientiane, Laos, September 22, 2008.
- Cada, G.F. Environmental issues for conventional hydropower and ocean and hydrokinetic energy projects. Invited Lecture at the EPRI Workshop on R&D Needs for Hydropower Development. Washington, DC, October 29-30, 2008.
- Cada, G.F. Report to Congress on the Potential Environmental Impacts of Marine and Hydrokinetic Renewable Energy Technologies. Invited presentation at the National Hydropower Association Annual Conference, Washington, DC, May 13, 2009.
- Cada, G.F. New Technologies: Addressing Environmental Issues. Invited presentation at Waterpower XVI conference, Spokane, WA, July 30, 2009.
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OTHER PROFESSIONAL ACTIVITIES

Member, U.S. Department of Energy Advanced Hydropower Turbine Systems Program Technical Committee (1994-present)

Member, U.S. Army Corps of Engineers Turbine Working Group (1995-present)

Member, U.S. Office of Technology Assessment Advisory Panel on Technology to Protect Fish at Dams (1995)

Member, Entrainment Review Team, Office of Hydropower Licensing, Federal Energy Regulatory Commission (1995)

Member of the Advisory Board for the 3rd International Conference on Reservoir Limnology and Water Quality. Ceske Budejovice, Czech Republic, August 11-15, 1997.

Technical Papers Session Leader, Waterpower 99, Las Vegas, NV.

Technical Papers Session Leader, HydroVision 2000, Charlotte, NC.

Chairman, Fish Passage Symposium "In Search of the Northwest Fish Passage: Resolving Mitigation Issues with Hardware, Technology, and Computer Models." HydroVision 2002, Portland, OR, July 29-August 2, 2002.

Technical Papers Session Leader, 2002 Annual Meeting of the American Fisheries Society, Baltimore, MD.

Editor, English translation of the Russian book "Downstream Migration of Fish Through Dams of Hydroelectric Power Plants," by D.S. Pavlov, A.I. Lupandin, and V.V. Kostin. (2002).

Member, HydroVision 2006 Technical Committee.

Member, Scientific Peer Review Group, Independent Scientific Review Panel for the Northwest Power and Conservation Council, Portland, OR. (2006).

Invited Lecturer, International Symposium on Fish Passages in South America, Federal University of Lavras, Lavras, Minas Gerais, Brazil. (2007)

Member, Expert Group Meeting on the topic of Dams as Barriers to Fish Passage in the Mekong River, and the Possibilities of Mitigation. Mekong River Commission, Vientiane, Laos. (2008).