

CURRICULUM VITAE

Brennan T. Smith

EDUCATION AND PROFESSIONAL PREPARATION

Vanderbilt University <i>College of Engineering</i>	<i>Civil & Environmental Engineering</i>	B.E. 1990
University of Iowa <i>Institute of Hydraulic Research</i>	<i>Civil & Environmental Engineering</i>	M.S. 1992
University of Iowa <i>Institute of Hydraulic Research</i>	<i>Civil & Environmental Engineering</i>	Ph.D. 1995 <i>Thesis: Ice-cover influence on flow and bedload transport in dune-bed channels</i>
State of Tennessee	<i>Professional Engineer License No. 00105293</i>	P.E. 1999-present

PROFESSIONAL APPOINTMENTS

Oak Ridge National Laboratory

- 2013-present:* Joint Faculty, University of Tennessee-Knoxville Bredesen Center for Interdisciplinary Research and Graduate Education
- 2011-present:* Program Manager, Water Power Technologies, Energy Efficiency and Electricity Technologies Program, Energy and Environmental Sciences Directorate
- 2010-present:* Group Leader and Senior Research Staff, Energy-Water Resource Systems Group, Environmental Sciences Division
- 2010:* Team Leader, Energy-Water-Ecosystem Engineering Team, Energy Analysis Group, Environmental Sciences Division
- 2008-2011:* Program Manager, Wind and Water Power Technologies, Energy Efficiency & Renewable Energy Program
- 2005-2009:* Research Staff, Water Resources Team, Earth and Atmospheric Sciences Group, Environmental Sciences Division

Tennessee Valley Authority

- 2001-2005:* Technical Specialist, Hydraulic Modeling and Analysis Group, River Operations, Knoxville and Norris, Tennessee
- 1995-2001:* Water Resources Engineer, Hydraulic Engineering and Modeling Group, TVA Engineering Laboratory, Norris, Tennessee

Iowa Institute of Hydraulic Research, University of Iowa

- 1990-1995:* Graduate Research Assistant and Dean's Scholarship Fellow

SYNERGISTIC ACTIVITIES

- DOE/ORNL Small Hydropower Manufacturing Workshop, August 2015 at the DOE/ORNL Manufacturing Demonstration Facility, co-organizer and convener
- DOE and National Hydropower Association Joint Hydropower Vision (slated for publication in 2016), Operations, Maintenance, and Performance Task Force Leader
- DOE [2014 Hydropower Market Report](#), supervising program manager

DOE-facilitated Joint FERC/Corps of Engineers Working Group for Regulatory Efficiency of Non-Powered Dam Development, 2014-15, supervising program manager

DOE-DOI-Corps of Engineers [*Memorandum of Understanding for Hydropower Research and Development \(2 year Action Plan Update\)*](#)—co-editor

Electric Utility Cost Group, [Hydroelectric Productivity Committee](#), DOE and ORNL representative, 2014-present (*ORNL is the only non-utility entity invited to join this industry cost-benchmarking group and provides advanced data analytics*)

Operational Excellence Task Force, Hydraulic Power Committee, National Hydropower Association, 2013-present

Center for Energy Advancement through Technological Innovation (CEATI)
[Hydraulic Plant Life Interest Group](#), DOE secondary representative, 2013-present
[Hydropower Operations and Planning Interest Group](#), DOE primary representative, 2013-present
[Dam Safety Interest Group](#), DOE secondary representative, 2013-present

DOE Report to Congress, (in press), *Pumped Storage and Potential Hydropower from Conduits*, supervising program manager (with Argonne National Laboratory)

DOE Report to Congress, 2012, [Effects of Climate Change on Federal Hydropower](#), supervising program manager

Hydrovision International Conferences 2012 and 2016, Technical Steering Committee

UNESCO/International Hydropower Association GHG Research Project – GHG Status of Freshwater Reservoirs, [GHG Measurement Guidelines for Freshwater Reservoirs](#), 2011, data contributor and protocol reviewer

National Hydropower Association Conferences 2011 and 2012, Technical Steering Committee

United States Alternate Delegate to the Executive Committee, [Implementing Agreement for Hydropower Programs and Technologies](#), International Energy Agency, 2011-present

[Hydro Research Foundation](#)
Board of Directors, 2010-2013
Graduate Fellowship Selection Committee, 2012-present

DOE Report to Congress, 2009, [Potential Environmental Effects of Marine and Hydrokinetic Energy Technologies](#), supervising program manager

Energy-Water Nexus Laboratory Working Group, 2008–present

American Society of Mechanical Engineers, member

American Society of Civil Engineers, member

International Association for Hydraulic Research, member

COLLABORATIONS & AFFILIATIONS

UT-K/ORNL Bredesen Center for Interdisciplinary Research and Graduate Education

Ph.D. thesis advisor (with research funding):
Mark H. Christian, 2013-present, *Uncertainty and Value of Hydropower Flow Measurement*
Stephen Signore, 2014-present, *A Physical-Statistical Model of Hydroelectric Powertrain Component Failure*

Ph.D. thesis co-advisor (with research funding):
Esther Parish, 2014-present, *Development and Application of Hydropower Sustainability Indicators* (with Ben Preston and Virginia Dale)

Ph.D. thesis co-advisor:
Susannah Sutherland, 2014-present, *Urban Energy-Water Sustainability* (with Budhendra Bhaduri)

ORNL/ORAU Postdoctoral Mentor

Adam Witt, 2014-present, co-mentor Boualem Hadjerioua

Kyutae Lee, 2014-present

Budi Gunawan, 2013 (now at Sandia National Laboratory), co-mentor Vincent Neary

M. Fayzul K. Pasha, 2011-2013 (now at California State University-Fresno), co-mentor Boualem Hadjerioua

ORAU Postmaster, Postbachelor, and Undergraduate Intern Mentor

Marisol Bonnet-Acosta, post-bachelor, 2013-present

Jayden Morrison, undergraduate intern (Northwestern University), Summer 2015

David Hubble, undergraduate intern (Virginia Tech), Summer 2006

Andrew Hansen, undergraduate intern (Carson-Newman), Summer 2007 and 2008

PUBLICATIONS

Bishop, N., D. Linke, **B. T. Smith**, D. Youlen, C. Alsberg, J. Anders, A. Grovue, S. Hill-Nelson, K. Johnson, S. Atkin, B. Bauer, K. Bennett, D. H. Brown Kinlock, J. Gordon, J. Hilsinger, H. Linke, B. Murtha, M. Puskamp, P. Roos, B. Vaughn, C. Vansant and M. Miller (2015). *New Pathways for Hydropower: Getting Hydropower Built - What Does it Take?* ORNL/TM-2015/48

Hadjerioua, B., S.-C. Kao, R. A. McManamay, M. F. K. Pasha, D. Yeasmin, A. A. Oubeidillah, N. M. Samu, K. M. Stewart, M. S. Bevelhimer, S. L. Hetrick, Y. Wei and **B. T. Smith** (2013). An Assessment of Energy Potential from New Stream-reach Development in the United States: Initial Report on Methodology. ORNL/TM-2012/298

Hadjerioua, B., S.-C. Kao, M. J. Sale, Y. Wei, I. Shanafield, Harold A., D. P. Kaiser, S. SanthanaVannan, R. Devarakonda, G. Palanisamy and **B. T. Smith** (2011). *National Hydropower Asset Assessment Project: An Integrated Water-Infrastructure Research Platform*.

Hadjerioua, B., S.-C. Kao, Y. Wei, H. Battey and **B. T. Smith** (2012). "Non-powered Dams: An untapped source of renewable electricity in the USA." *The International Journal on Hydropower and Dams* **19**(4): 45-48.

Jager, Y., B. L. Elrod, N. M. Samu, R. A. McManamay and **B. T. Smith** (2013). *ESA Protection for the American Eel: Implications for US Hydropower*. ORNL/TM-2013/361

Jager, Y. and **B. T. Smith** (2008). "Sustainable Reservoir Operation: Can we Generate Hydropower and Preserve Ecosystem Values?" *River Research and Applications* **24**(3): 340-352.

Kaiser, D. P., G. Palanisamy, S. SanthanaVannan, M. R. Starke, **B. T. Smith**, Y. Wei and B. E. Wilson (2010). *The Wind ENergy Data and Information (WENDI) Gateway*.

Kao, S.-C., R. A. McManamay, K. M. Stewart, N. M. Samu, B. Hadjerioua, S. T. DeNeale, D. Yeasmin, M. F. K. Pasha, A. A. Oubeidillah and **B. T. Smith** (2014). *New Stream-reach Development: A Comprehensive Assessment of Hydropower Energy Potential in the United States*. ORNL/TM-2013/514

March, P., D. P. Wolff, **B. T. Smith**, Q. F. Zhang and R. Dham (2012). *Data-Based Performance Assessments for the DOE Hydropower Advancement Project*.

- McManamay, R. A., P. Bosnall, S. L. Hetrick and **B. T. Smith** (2013). *Digital Mapping and Environmental Characterization of National Wild and Scenic River Systems*. ORNL/TM-2013/356
- Mosher, J. J., P. J. Mulholland, A. M. Fortner and **B. T. Smith** (2010). *Greenhouse Gas Emissions From a Temperate U.S. Hydropower Reservoir*.
- Mosher, J. J., P. J. Mulholland, A. M. Fortner, **B. T. Smith** and J. R. Phillips (2010). *Greenhouse Gas Emissions from a Temperate U.S. Hydropower Reservoir*.
- Mulholland, P. J., **B. T. Smith**, M. S. Bevelhimer, A. M. Fortner and J. Mosher (2010). *The Role of Hydropower Reservoirs in Greenhouse Gas Emissions*.
- Pasha, M. F. K., M. Yang, D. Yeasmin, F. Amin, S.-C. Kao and **B. T. Smith** (2014). *Sensitivity of Spatial Resolution in Hydropower Resource Assessment*.
- Pasha, M. F. K., D. Yeasmin, S.-C. Kao, B. Hadjerioua, Y. Wei and **B. T. Smith** (2014). "Stream-reach Identification for New Run-of-River Hydropower Development through a Merit Matrix-Based Geospatial Algorithm." Journal of Water Resources Planning and Management **140**(8): 04014016.
- Smith, B. T.**, Y. Jager and P. March (2007). *Sustainable reservoir operation*. Kansas City, Missouri USA, HCI Publishers.
- Smith, B. T.**, V. S. Neary and K. M. Stewart (2012). "National Geodatabase of Tidal Stream Power Resource in USA." Renewable & Sustainable Energy Reviews **16**(5): 3326-3338.
- Smith, B. T.** and M. R. Starke (2011). *Whitepaper on the Research Needed to Enable Regional and National Modeling of Water Availability and Policy Impacts on Water Power Grid Services*. ORNL/TM-2011/429
- Smith, B. T.**, Q. F. Zhang, P. March, M. Cones, R. Dham and M. Spray (2012). *Best Practices Implementation for Hydropower Efficiency and Utilization Improvement*.
- Snyder, I. B., **B. T. Smith** and M. R. Starke (2012). Case Study: *Hydropower Constraints on Osage and Taum Sauk Facilities*. ORNL/TM-2012/232
- Willingham, M., G. P. Zimmerman, B. L. Shumpert, **B. T. Smith**, E. D. Smith, G. F. Cada, D. B. Watson, H. D. Quarles III, B. Saulsbury, K. F. Eckerman, K. S. Gant, S. B. Ludwig, K. A. Williams, F. J. Peretz, D. J. Bjornstad, W. S. Koncinski, P. P. Henson, T. Gitnick, S. Dillard, S. Duda, K. King, A. Zeitoun, M. Goodwin, S. Provenzano, R. Dover, B. Mrowca and K. Taylor (2011). *Environmental Impact Statement for Combined Licenses (COLs) for Comanche Peak Nuclear Power Plant Units 3 and 4; Final Report (Volume 1, Chapters 1 - 10)*.
- Willingham, M., G. P. Zimmerman, B. L. Shumpert, **B. T. Smith**, E. D. Smith, G. F. Cada, D. B. Watson, H. D. Quarles III, B. Saulsbury, K. F. Eckerman, K. S. Gant, S. B. Ludwig, K. A. Williams, F. J. Peretz, D. J. Bjornstad, W. S. Koncinski, P. P. Henson, T. Gitnick, S. Dillard, S. Duda, K. King, A. Zeitoun, M. Goodwin, S. Provenzano, R. Dover, B. Mrowca and K. Taylor (2011). *Environmental Impact Statement for Combined Licenses (COLs) for Comanche Peak Nuclear Power Plant Units 3 and 4; Final Report (Volume 2, Appendices A - J)*.

- Willingham, M., G. P. Zimmerman, B. L. Shumpert, **B. T. Smith**, E. D. Smith, G. F. Cada, D. B. Watson, H. D. Quarles III, B. Saulsbury, K. F. Eckerman, K. S. Gant, S. B. Ludwig, K. A. Williams, F. J. Peretz, D. J. Bjornstad, W. S. Koncinski, P. P. Henson, T. Gitnick, S. Dillard, M. Goodwin, R. Dover, B. Mrowca and K. Taylor (2010). *Environmental Impact Statement for Combined Licenses (COLs) for Comanche Peak Nuclear Power Plant Units 3 and 4; Draft Report for Comment (Volume 1, Chapters 1 - 10)*.
- Willingham, M., G. P. Zimmerman, B. L. Shumpert, **B. T. Smith**, E. D. Smith, G. F. Cada, D. B. Watson, H. D. Quarles III, B. Saulsbury, K. F. Eckerman, K. S. Gant, S. B. Ludwig, K. A. Williams, F. J. Peretz, D. J. Bjornstad, W. S. Koncinski, P. P. Henson, T. Gitnick, S. Dillard, M. Goodwin, R. Dover, B. Mrowca and K. Taylor (2010). *Environmental Impact Statement for Combined Licenses (COLs) for Comanche Peak Nuclear Power Plant Units 3 and 4; Draft Report for Comment (Volume 2, Appendices A - J)*.
- Zhang, Q. F. and **B. T. Smith** (2013). "Developing a Quantitative Method for Assessing Plant Condition." *Hydro Review N/A(N/A): 30-38*.
- Zhang, Q. F., **B. T. Smith**, M. Cones, P. March, R. Dham and M. Spray (2012). *Methodology and Process for Condition Assessment at Existing Hydropower Plants*.
- Zhang, Q. F., **B. T. Smith** and W. Zhang (2012). Small Hydro Reference Model Project.
- Zhang, Q. F., R. Uria Martinez, B. Hadjerioua and **B. T. Smith** (2013). *Cost Performance and Comparisons for New Small Hydropower Technologies*.
- Zhang, Q. F., R. Uria Martinez and **B. T. Smith** (2013). *Hydropower Initial Capital Cost Modeling*.
- Smith, B. T.**, and R. Ettema. 1997. *Ice-cover influence on flow structure over dunes*. *Journal of Hydraulic Research* 35(5): 707-19.
- Smith, B. T.**, and R. Ettema. 1997. *Flow resistance in ice-covered alluvial channels*. *Journal of Hydraulic Engineering* 123(7): 592-599.
- Lin, F., G. E. Hecker, P. N. Hopping, and **B. T. Smith**. 2003. *Innovative 3-D numerical simulation of thermal discharge from Browns Ferry multi-port diffusers*. Proceedings of the International Joint Power Generation Conference, June 16-19, 2003, Atlanta, GA.
- Smith, B. T.**, D. T. Darby, R. L. Dinkins, and P. B. Loiseau. 2002. *Use of acoustic-Doppler velocimeters to measure hydroturbine draft tube and tailrace turbulence*. Proceedings of the ASCE/IAHR International Conference on Hydraulic Measurements and Experimental Methods, July 28-August 1, 2002, Estes Park, Colorado.
- Hopping, P. N. and **B. T. Smith**. 2002. *Measurement of flow patterns using GPS drogues*. Proceedings of the ASCE/IAHR International Conference on Hydraulic Measurements and Experimental Methods, July 28-August 1, 2002, Estes Park, Colorado.
- Smith, B. T.**, and R. Ettema. 1994. *Floating cover influence on sediment transport in dune-bed channels*. Proceedings of the ASCE National Conference on Hydraulic Engineering, Buffalo, New York, August 1994.
- Wolff, P. J., **B. T. Smith**, and P. N. Hopping. 1997. *Aeration performance tests for the new auto-venting turbines at Norris Dam*, TVA Report WR97-1-2-120.
- Smith, B. T.** 2000. *Shawnee Fossil Plant intake channel improvement study final report*. TVA Report WR2000-1-35-119.
- Kerley, B. L., **B. T. Smith**, and G. Brodie. 1997. *Zebra mussel control options at Sequoyah Nuclear Plant, TVA Technology Advancements Closure Report*.

Kyutae Lee, 2014-present

Budi Gunawan, 2013 (now at Sandia National Laboratory), co-mentor Vincent Neary

M. Fayzul K. Pasha, 2011-2013 (now at California State University-Fresno), co-mentor Boualem Hadjerioua