

Nathan S. Bosch

Director, Lilly Center for Lakes & Streams, lakes.grace.edu

Professor, Environmental Science, Grace College, grace.edu/major/environmental-science

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Education:

2002 – 2007 University of Michigan Ann Arbor, MI

Ph.D.: School of Natural Resources & Environment

Program of study: Resource Ecology & Management - Aquatics

1998 – 2002 Trinity Christian College (TCC) Palos Heights, IL

Bachelor of Arts: Biology and Chemistry, highest honors

Graduated from Honors Program

Summer, 2000 Au Sable Environmental Institute Mancelona, MI

Courses: Environmental Chemistry and Limnology

Teaching experience:

2009 - Present Environmental Science, Grace College Winona Lake, IN

Full Professor – Aquatic Ecology, BioScience Survey, Environmental Ethics, General Ecology, Introduction to Chemistry

Winter, 2006 Program in the Environment Ann Arbor, MI

Graduate Student Instructor - Introduction to Environmental Analysis

Fall, 2005 University of Michigan Ann Arbor, MI

Graduate Student Instructor - Global Change 1

Winter, 2005 Program in the Environment Ann Arbor, MI

Graduate Student Instructor - Introduction to Environmental Analysis

Other related work experience:

2008-Present Lilly Center for Lakes & Streams, Grace College Winona Lake, IN

Director – Community-based water research and education center

2008-2009 Cooperative Institute for Limnology and Ecosystems Research

Ann Arbor, MI

Research Investigator – Watershed modeling for Lake Erie catchments

2007-2008 Cooperative Institute for Limnology and Ecosystems Research

Ann Arbor, MI

Research Fellow – Watershed modeling for Lake Erie catchments

2006 Stantec Inc. Ann Arbor, MI

Modeling consultant – SWAT modeling for watershed management plan

2002-2004 Great Lakes Environmental Research Laboratory Ann Arbor, MI

Research Assistant - Aquatic nutrient chemistry analyses

1999-2002 Argonne National Laboratory Argonne, IL

Laboratory Technician - Chromatographic analyses for phytoremediation project

Summer, 2001 Environmental Resources Management Holland, MI

Aquatic Toxicology Laboratory Intern - Whole Effluent Toxicity testing using aquatic organisms

Summer, 2001 Macatawa Area Coordinating Council Holland, MI

Macatawa Watershed Community Education Intern – Watershed public education tasks

Leadership and service:

Promotion committee member for Grace College faculty promotions, 2021-Present.
Science committee member for Science Assessment project to support Indiana Nutrient Reduction Strategy, 2020-Present.
Board Member of Lakeland Christian Academy, 2018-Present.
Steering committee and technical committee member for Clean Waters Partnership, 2015-Present.
Science faculty representative on Teacher Education committee at Grace College, 2010-2020.
Strategic Planning Stewardship Committee at Grace College, 2016-2019.
Faculty member on Communitas planning committee at Grace College, 2010-2015.
Faculty member on Internal Review Board at Grace College, 2010-2012.
Board Member of the Indiana Lake Management Society, 2010-2012.
Chair of Curriculum Vision Task Force at Grace College, 2011.
Faculty committee member on Academic Affairs committee at Grace College, 2009-2010.
Volunteer with Huron River Watershed Council as part of their Stream Monitoring Program, 2003-2007.
Au Sable Graduate Fellow as designated by the Au Sable Environmental Institute, 2003-2007.
Board Member of the International Association for Great Lakes Research Board of Directors. Elected by Association membership as the student member from the U.S., 2004-2006.

Selected awards and grants:

K21 Health Foundation research grants - \$230,000 (2020-2023), \$200,000 (2018-2020), \$90,000 (2017-2018), \$200,000 (2015-2016), \$200,000 (2012-2014), \$150,000 (2010-2012).
Indiana DNR Lake and River Enhancement grants - \$44,200 (2019-2020), \$7,000 (2017), \$8,800 (2017), \$37,500 (2013-2014), \$42,400 (2012-2013).
The Dekko Foundation grants - \$55,000 (2019-2021), \$20,000 (2012-2014), \$25,000 (2010-2012).
Steel Dynamics Foundation grant supporting Lilly Center building spaces - \$75,000, 2018.
K21 Health Foundation grant supporting Lilly Center building spaces - \$1,000,000, 2016.
Lilly Endowment grant supporting Lilly Center endowment - \$2,500,00, 2016.
Chandler-Misener Awards (Journal of Great Lakes Research most notable paper), 2013, 2015.
Kosciusko County Community Foundation grants - \$40,000 (2014-2015), \$15,000 (2010-2012).
Toyota Environmental Education grants - \$15,000 (2015), \$15,000 (2014), \$15,000 (2013), \$25,000 (2012-2013).
National Oceanic and Atmospheric Administration grant - \$27,400, 2013-2015.
International Joint Commission grant - \$10,000, 2012.
National Science Foundation grant - \$75,000, 2010-2015.
Indiana American Water Environmental Education grants - \$8,500, 2010-2011.
Army Corp of Engineers grant - \$100,000, 2008-2009.
Karl F. Lagler (UM School of Natural Resources) award - 2007.

Peer-reviewed publications:

Bosch, N., Buller, E., Linn, M. Exploring water quality trends in Kosciusko County lakes over the last 100 years. [in prep]

- Daeger, A., Bosch, N., Johnson, R. 2022. Impacts on sediment resuspension by various watercraft across multiple substrates, depths and operating speeds in a large northern Indiana lake. *Proceedings of the Indiana Academy of Science* 130 (2): 112-122.
- Bosch, N., Bingham, S., Farwell, K. 2019. Blue-green algae (Cyanobacteria) patterns and prediction in 12 lakes in Kosciusko County, Indiana. *Proceedings of the Indiana Academy of Science* 128: 1-12.
- Del Giudice, D., Muenich, R., Kalcic, M., Bosch, N., Scavia, D., Michalak, A. 2018. On the practical usefulness of least squares for assessing uncertainty in hydrologic and water quality predictions. *Environmental Modelling and Software* 105: 286-295.
- Kalcic, M., Kirchhoff, C., Bosch, N., Muenich, R., Murray, M., Gardner, J., Scavia, D. 2016. Engaging Stakeholders to Define Feasible and Desirable Agricultural Conservation in Western Lake Erie Watersheds. *Environmental Science & Technology* 50(15): 8135-8145.
- Verma, S., Bhattarai, R., Bosch, N.S., Cooke, R.C., Kalita, P.K., and Markus, M. 2015. Climate Change Impacts on Flow, Sediment and Nutrient Export in a Great Lakes Watershed Using SWAT. *CLEAN – Soil, Air, Water* 43(11): 1464-1474.
- Bosch, N.S., Evans, M.A., Scavia, D., and J.D. Allan. 2014. Influence of climate change on the effectiveness of agricultural best management practices. *Journal of Great Lakes Research* 40: 581-589.
- Gebremariam, S.Y., Martin, J., Demarchi, C., Bosch, N.S., Confesor, R., and Ludsin, S.A. 2014. Comprehensive Evaluation of Three Watershed Models to Predict Maumee River Flow Regime and Discharge. *Environmental Modeling and Software* 61: 121-134.
- Scavia, D., Allan, J.D., Arend, K.K., Bartell, S., Beletsky, D., Bosch, N.S., Brandt, S.B., Briland, R.D., Dalaglu, I., DePinto, J.V., Dolan, D.M., Evans, M.A., Farmer, T.M., Goto, D., Han, H., Hook, T.O., Knight, R., Ludsin, S.A., Mason, D., Michalak, A.M., Richards, R.P., Roberts, J.J., Rucinski, D.K., Rutherford, E., Scwab, D.J., Sesterhenn, T.M., Zhang, H., Zhou, Y. 2014. Assessing and addressing the re-eutrophication of Lake Erie: Center Basin Hypoxia. *Journal of Great Lakes Research* 40: 226-246.
- Michalak, A.M., Anderson, E., Beletsky, D., Boland, S., Bosch, N.S., Bridgeman, T.B., Chaffin, J.D., Cho, K.H., Confesor, R., Daloglu, I., DePinto, J., Evans, M.A., Fahnenstiel, G.L., He, L., Ho, J.C., Jenkins, L., Johengen, T., Kuo, K.C., Laporte, E., Liu, X., McWilliams, M., Moore, M.R., Posselt, D.J., Richards, R.P., Scavia, D., Steiner, A.L., Verhamme, E., Wright, D.M., and M.A. Zagorski. 2013. Record-setting algal bloom in Lake Erie caused by agricultural and meteorological trends consistent with expected future conditions. *Proceedings of the National Academy of Science* 110:6448-6452.
- Bhattarai, R. and N.S. Bosch. 2013. Chapter 12: Analysis of climate change impact on runoff and sediment delivery in a Great Lake watershed using SWAT. In *Sediment Transport: Monitoring, Modeling and Management*, Editors: Abdul A. Khan and Weiming Wu, Nova Science Publishers, Inc., NY.
- Bosch, N.S., Allan, J.D., Selegean, J.P., and D. Scavia. 2013. Scenario-testing of agricultural best management practices in Lake Erie watersheds. *Journal of Great Lakes Research* 39: 429-436.
- Richards, R.P., Alameddine, I., Allan, J.D., Baker, D.B., Bosch, N.S., Confesor, R., DePinto, J.V., Dolan, D.M., Reutter, J.M., and D. Scavia. 2013. Discussion: Nutrient inputs to the Laurentian Great Lakes by source and watershed estimated using SPARROW watershed models. *Journal of the American Water Resources Association* 49: 715-724.
- Han, H., Allan, J.D., and N.S Bosch. 2012. Historical pattern of phosphorus loading to Lake Erie watersheds. *Journal of Great Lakes Research* 38: 289-298.

- Bosch, N.S., Allan, J.D., Dolan, D.M., Han, H., and R.P. Richards. 2011. Application of the Soil and Water Assessment Tool for six watersheds of Lake Erie: Model parameterization and calibration. *Journal of Great Lakes Research* 37: 263-271.
- Han, H., Bosch, N.S., and J.D. Allan. 2011. Spatial and temporal variation in phosphorus budgets for 24 watersheds in the Lake Erie and Lake Michigan basins. *Biogeochemistry* 102:45-58.
- Bosch, N. S., Johengen, T. H., Allan, J. D., and G. W. Kling. 2009. The Influence of River Impoundment on Nutrient Transport. *Lake and Reservoir Management* 25:389–400.
- Bosch, N. S. 2008. The influence of impoundments on riverine nutrient transport: An evaluation using the Soil and Water Assessment Tool. *Journal of Hydrology* 355:131-147.
- Bosch, N. S., and J. D. Allan. 2008. The influence of impoundments on nutrient budgets in two catchments of Southeastern Michigan. *Biogeochemistry* 87:325-338.
- Judd, K.E., H.E. Adams, N.S. Bosch, J.M. Kostrzewski, C.E. Scott, B.M. Schultz, D.H. Wang and G.W. Kling. 2005. A case history: Effects of mixing regime on nutrient dynamics and community structure in Third Sister Lake, Michigan during late winter and early spring 2003. *Lake and Reservoir Management* 21(3):316-329.

Professional presentations:

- Bosch, N., Daeger, A., Smith, S., Fan, X. 2021. Why collect water quality data when all you need is flow? Xylem Global Webinar Series. San Diego, California.
- Bosch, N.S. 2020. Current challenges to Indiana lakes. IU McKinney School of Law Environmental Symposium. Indianapolis, Indiana.
- Bosch, N.S., Funderburg, A.C., Bingham, S.A. 2019. Annual Conference of the Indiana Lakes Management Society. Syracuse, Indiana.
- Bosch, N.S. 2019. The value, quality, and quantity of water in northern Indiana lakes. American Water Works Association Annual Conference. Indianapolis, Indiana.
- Bosch, N.S., Bingham, S.A., Farwell, K. 2019. Blue-green algae patterns and prediction in 12 lakes in Kosciusko County, Indiana. Annual Conference of the Indiana Water Resources Association. Syracuse, Indiana.
- Bosch, N.S., Prater, L.E., Moine, J.B., Johnson, R.T., Popielski, M.E., Hershberger, M.J. 2016. Exploring water quality trends in Kosciusko County lakes over the last 100 years. Annual Conference of the Indiana Lakes Management Society. Plymouth, Indiana.
- Bosch, N.S., Burke, A.D., Barber, M. 2015. Identifying causes of high E. coli concentrations at public beaches on Pike and Center lakes in Kosciusko County, Ind. Annual Conference of the Indiana Lakes Management Society. Syracuse, Indiana.
- Kalcic, M., Scavia, D., and N. Bosch. Bringing SWAT to stakeholders for conservation scenario development. 21st Century Watershed Technology Conference and Workshop: Improving Water Quality and the Environment. The University of Waikato, New Zealand, November 3 - 6, 2014.
- Bosch, N.S., Burke, A.D., Verma, N. 2014. Lake impacts on property taxes and values in Kosciusko County. Annual Conference of the Indiana Lakes Management Society. Bloomington, Indiana.
- Kalcic, M. M., Bosch, N. S., and D. Scavia. Using SWAT to estimate watershed-scale BMP performance in the Western Lake Erie Basin. International Association for Great Lakes Research, 57th Annual Conference on Great Lakes Research. McMaster University, Hamilton, Ontario, Canada, May 26-30, 2014.

- Bosch, N.S., Evans, M.A., Scavia, D., and J.D. Allan. 2013. Interacting effects of climate change and agricultural BMPs on nutrient runoff. 56th Annual Conference of the International Association for Great Lakes Research. West Lafayette, Indiana.
- Bosch, N.S., A.D. Burke, and A.L. Stout. 2013. Blue-green algae toxins in northern Indiana lakes. Annual Conference of the Indiana Lakes Management Society. Angola, Indiana.
- Allan, J.D., H. Han, and N.B. Bosch. 2012. Century-scale trends in nutrient loading to watersheds of the Great Lakes. Annual Meeting of the Society for Freshwater Science. Louisville, Kentucky.
- Bosch, N.S., A.D. Burke, and A.L. Stout. 2012. Blue-green algae toxins in northern Indiana lakes. Annual Conference of the Indiana Lakes Management Society. Nashville, Indiana.
- Bosch, N.S., and J.D. Allan. 2011. Using the Soil and Water Assessment Tool (SWAT) to Evaluate the Impact of Nutrient Source Reduction and Agricultural BMP Implementation on Riverine Loads to Lake Erie. 54th Annual Conference of the International Association for Great Lakes Research. Duluth, Minnesota.
- Bosch, N.S., J.D. Allan, H. Han, and R.P. Richards. 2010. Using the Soil and Water Assessment Tool (SWAT) to Evaluate the Impact of Agricultural BMPs on Riverine Nutrient Export to Lake Erie. 53rd Annual Conference of the International Association for Great Lakes Research. Toronto, Ontario.
- Bosch, N.S., H. Han, R.P. Richards, and J.D. Allan. 2009. Evaluating the impact of agricultural BMPs on riverine nutrient export to Lake Erie. 57th Annual Meeting of the North American Benthological Society. Grand Rapids, Michigan.
- Bosch, N.S., Allan, J.D., Johengen, T.H., and H.J. Han. 2007. The Influence of Natural Lakes and Artificial Impoundments on the Transport and Fate of Nitrogen and Phosphorus in two Southeastern Michigan River Catchments. North American Benthological Society 55th Annual Meeting. Columbia, South Carolina.
- Bosch, N.S., Han, H.J., Allan, J.D., and T.H. Johengen. 2006. The Influence of Natural Lakes and Artificial Impoundments on the Transport and Fate of Nitrogen and Phosphorus in two Southeastern Michigan River Catchments. 49th Annual Conference of the International Association for Great Lakes Research. Windsor, Ontario.
- Han, H. and N.S. Bosch. 2005. Spatial and Temporal Trends in River Nutrient Export to Lake Michigan. 2005 Gordon Research Conference on Catchment Science: Interactions of Hydrology, Biology and Geochemistry. Waterville, Maine.
- Bosch, N.S. and H. Han. 2005. Nutrient Budgets for Two Lake Erie Watersheds. 48th Annual Conference of the International Association for Great Lakes Research. Ann Arbor, Michigan.

Professional memberships:

- International Association of Great Lakes Research, 2004-2006, 2010 - Present.
- Indiana Water Resources Association, 2013 - Present.
- Indiana Lake Management Society, 2009 – Present.
- Indiana Academy of Science, 2009 – Present.
- Indiana Water Monitoring Council, 2009 - Present.
- National Science Teachers Association, 2013 - 2023.
- North American Benthological Society, 2003-2004 and 2007-2009.
- American Association of Science, 2007-2009.
- American Fisheries Society, 2007-2008.

Journal peer-reviewing service:

Journal of Environmental Quality, 2010 - Present.

Lake and Reservoir Management, 2010 - Present.

Biogeochemistry, 2008-Present.

Journal of Great Lakes Research, 2008-Present.

Science of the Total Environment, 2008.