RICHARD W. SHEIBLEY
Research Hydrologist
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RESEARCH INTERESTS

Nutrient cycling in streams and rivers, stream ecology, urban stream functioning, stream restoration, dam removal as a restoration tool, restoration of floodplain-river connectivity, groundwater-surface water interactions, modeling transient storage and solute transport in streams, hyporheic zone processes, role of salmon on stream ecosystem functioning.

EDUCATION

University of California, Davis. Ph.D., Chemical Engineering with a focus on environmental modeling. June 2001. Dissertation: Nitrogen transformation kinetics in the hyporheic zone.

University of Pennsylvania. Bachelor of Science, Chemical Engineering with a minor in Environmental Engineering. May 1995.

EXPERIENCE

U.S. Geological Survey Washington Water Science Center, Tacoma, WA
Research Hydrologist October 2009 – Present
Hydrologist January 2008 – October 2009

My work at the USGS has focused primarily on nutrient cycling in aquatic environments. I currently am project chief on two projects. The first project is to determine nutrient loading from groundwater into Hood Canal, WA in order to determine inputs from anthropogenic sources to the estuary. This area of Puget Sound has been experiencing low dissolved oxygen problems over the years, and we were working with the University of Washington to study the causes and effects of increased nitrogen loading to this sensitive area. The second project I am leading is to examine the impacts of nitrogen deposition to high alpine lakes in the 3 national parks in Washington State. This project aims to determine a critical load for nitrogen deposition with respect to its impacts on lake diatom communities. In addition to these projects, I am working on determining baseline conditions of the Elwha River prior to removal of 2 large dams in 2011. My focus on this project to on river hydrology and water chemistry.

Herrera Environmental Consultants, Seattle, WA
Aquatic Scientist, September 2006 to December 2007.

I worked in the water quality group on a wide range of problems related to storm water management, water quality monitoring, low-impact development, river restoration. I have authored several reports and participated in proposal writing for contracts.

TEACHING EXPERINENCE

Part-time instructor, Edmonds Community College Jan. 2004 – present.
Instructor for introductory level classes in the engineering and environmental science departments. Classes include:

- **Introduction to Environmental Science** – An interdisciplinary environmental science course for non-majors. The course covers basic ecology with a focus on issues facing the Pacific Northwest. Since teaching this class, I have developed several new labs and started to incorporate service learning into my curriculum. *Quarters taught: Spring, Summer, Fall 2004, Spring, Fall 2006, Fall 2007.*
- **Environmental Science Laboratory** – Lab class taught in conjunction with the lecture class. The labs are a mixture of in-class and field experiments. *Quarters taught: Spring, Summer, Fall 2004, Spring, Fall 2006, Fall 2007.*
- **Online Environmental Science** –In addition to the traditional version of this class, I have been teaching the online version of the introductory environmental science class using the Blackboard Learning system. Since teaching this class, I have developed several new labs and web-based assignments and started to incorporate service learning into my curriculum. *Quarters taught: Spring, Summer, Fall 2005, Winter, Spring, Summer, Fall 2006; Winter, Spring, Summer, Fall 2007; Winter, Spring, Fall 2008; Winter, Fall 2009.*
- **Engineering Graphics and CAD** – An introductory engineering class which teaches students the basics of engineering graphics, and computer aided drafting. In addition to teaching the traditional version of this class, I developed the hybrid version of this class which included using Blackboard lectures and computer lab exercises. EdCC is currently using my class framework to develop this class as a hybrid for the future. *Quarters taught: Winter, Spring, Fall 2004, Winter 2005, Winter, Spring 2007.*

Part-time instructor, Shoreline Community College Jan. – April 2005.
Instructor in the Engineering Department during winter quarter of this year.

- **Introduction to SolidWorks** – Introductory level class on Solid Works parametric modeling software. *Quarters taught: Winter 2005*

Teaching Assistant, University of California, Davis, Jan. 1997 – Jan. 1999.
Responsible for grading of homework and exams, construction of solutions to problem sets including occasional solo lectures. Supervised laboratory groups during experiments with a high degree of independence.

- **Courses included**: Chemical Engineering Fluid Mechanics
  Chemical Engineering Thermodynamics
  Chemical Engineering Laboratory (mass transfer)

Stream Solute Workshop Instructor, Kyoto University, Japan, Sept. 2006. In 2006, I was invited to lead a 2-week workshop teaching colleagues in Japan how to conduct field studies in stream solute transport. This workshop involved several lectures followed by field experiments, data analysis, and modeling of results to examine nutrient uptake and transient storage zone modeling. Participants ended the workshop conducting their own experiments with a working knowledge of these useful techniques.

ADVISING EXPERIENCE

REU supervisor, Arizona State University, Summer 2003.
Supervised a project for the research experiences for undergraduates (REU) program in Biology funded by the National Science Foundation. This project involved examining nutrient uptake in urban streams in the Phoenix area.

Undergraduate Supervisor, University of California, Davis Jan. 1998 – June 2000.
Helped guide and supervise student research for several independent study projects. Assisted in sample analysis and data organization. Taught applicable laboratory etiquette and safety procedures to promote a fun and safe working environment.

RESEARCH EXPERIENCE

Visiting Research Scholar, Center for Ecological Research, Kyoto University, Japan, April 2005 – April 2006.
My current research project involves studying the nutrient uptake efficiency of several streams that drain into Lake Biwa, the largest lake in Japan. We are studying how land use affects the ability of streams to process nitrate and phosphorus in this region. This study is the first of its kind to be done in Japan, and our results will be a valuable contribution to what we already know about streams in other regions of the world.

Post Doctoral Research, Arizona State University, April 2002 – May 2004.
Post doctoral associate for the Lotic Intersite Nitrogen eXperiment, part 2 (LINX2). This project involves examining nitrate retention and transformation in streams across 8 different biomes in the United States. There are 14 universities and institutions working together to study nitrate (NO_3^-) retention in urban, agricultural, and reference streams within each biome using ^{15}N tracer injections. I am currently in charge of a project wide synthesis of stream transient storage zone modeling for all 72 sites in this study. My work in this project will continue until the project is completed at the end of 2006.

Post Doctoral Research, UC Davis, Feb. 2001 – April 2002.
I participated in a large interdisciplinary research group examining the Cosumnes River watershed located near Sacramento, California. Investigators from several departments in the university are working together to study the last major undammed watershed draining the Sierra Nevada Mountains. My work focused on three different projects:

1. Sampling and analysis of surface water for several key water quality parameters throughout the watershed. This data was used to develop spatial and temporal patterns of water quality for comparison to an adjacent, highly impounded, watershed.
2. Study of nutrient attenuation and transient storage in a small effluent dominated tributary of the Cosumnes River using stream tracer injections.
3. The design of experiments to investigate the role that restored floodplains in the watershed have on water quality with a focus on nitrate loss processes.

Doctoral Research, UC Davis Sept. 1995 – Feb. 2001.
For my dissertation, I investigated nitrogen transformations within the hyporheic zone of a headwater stream in Minnesota through the use of a novel perfusion core setup. Experiments incorporated the features of groundwater-surface water mixing in order to integrate the hydrology and biology of the hyporheic zone. I identified the important processes involved in N cycling within hyporheic sediments, and the experimental results were modeled using finite-difference to estimate kinetic parameters of nitrification-denitrification coupling within the streambed.

Additional research collaborations:

University of California, Davis & U.S. Geological Survey, Sept. 1999 – Sept. 2000.
I participated in preliminary research investigating NO_3^- loss within sediments along the Upper Mississippi River using perfusion core experiments.

USDA Forest Service Pacific Northwest Research Station, October 2004.
I participated in a study on the effects of salmon-derived nutrients on dissolved organic carbon uptake in Juneau, Alaska.

PUBLICATIONS

Hall Jr RO, Tank JL, Sobota DJ, Mulholland PJ, O'Brien JM, Dodds WK, Webster JR, Valett HM, Poole GC, Peterson BJ, Meyer JL, McDowell WH, Johnson SL, Hamilton SK, Grimm NB, Gregory SV, Dahm CN, Cooper LW, Ashkenas LR, Thomas SM, **Sheibley** RW, Potter JD, Niederlehner BR, Johnson LT, Helton AM, Crenshaw CM, Burgin AJ, Bernot MJ, Beaulieu JJ & Arangob CP (2009) Nitrate removal in stream ecosystems measured by 15N addition experiments: Total uptake. Limnology and Oceanography 54: 653-665

Mulholland PJ, Hall Jr RO, Sobota DJ, Dodds WK, Findlay SEG, Grimm NB, Hamilton SK, McDowell WH, O'Brien JM, Tank JL, Ashkenas LR, Cooper LW, Dahm CN, Gregory SV, Johnson SL, Meyer JL, Peterson BJ, Poole GC, Valett HM, Webster JR, Arango CP, Beaulieu JJ, Bernot MJ, Burgin AJ, Crenshaw CL, Helton AM, Johnson LT, Niederlehner BR, Potter JD, **Sheibley** RW & Thomasn SM (2009) Nitrate removal in stream ecosystems measured by 15N addition experiments: Denitrification. Limnology and Oceanography 54: 666-680

Dodds, W. K., J. J. Beaulieu, J. J. Eichmiller, J. R. Fischer, N. R. Franssen, D. A. Gudder, A. S. Makinster, M. J. McCarthy, J. N. Murdock, J. M. O'Brien, J. L. Tank, R. W. Sheibley (2008). Nitrogen cycling and metabolism in the thalweg of a prairie river. Journal of Geophysical Research Biogeosciences. 113, G04029, doi:10.1029/2008JG000696.

Tanio Y., Ohte N., Fujimoto M. & Sheibley R. (2008) Nitrate and phosphate uptake in a temperate forest stream in central Japan. In: From Headwaters to the Ocean: Hydrological Changes and Watershed Management (eds. M. Taniguchi, W. C. Burnett, Y. Fukushima, M. Haigh & Y. Umezawa) pp. 83-89. Taylor & Francis Group, London.

Mulholland P.J., Helton A.M., Poole G.C., Hall Jr R.O., Hamilton S.K., Peterson B.J., Tank J.L., Ashkenas L.R., Cooper L.W., Dahm C.N., Dodds W.K., Findlay S.E.G., Gregory S.V., Grimm N.B., Johnson S.L., McDowell W.H., Meyer J.L., Valett H.M., Webster J.R., Arango C.P., Beaulieu J.J., Bernot M.J., Burgin A.J., Crenshaw C.L., Johnson L.T., Niederlehner B.R., O'Brien J.M., Potter J.D., **Sheibley** R.W., Sobota D.J. & Thomas S.M. (2008) Stream denitrification across biomes and its response to anthropogenic nitrate loading. Nature 452: 202-205.

Duff, J. H., Jackman, A.P., F.J. Triska, R.W. **Sheibley**, and R.J. Avanzino. (2007) Inorganic nitrogen transport and processing in hillslope and near-surface groundwater adjacent to the Shingobee River, Minnesota USA. Journal of Environmental Quality 36:343-353.

Triska, F.J., J.H. Duff, R.W. **Sheibley**, A.P. Jackman and R.J. Avanzino. (2007) DIN retention-transport through four hydrologically connected zones in a headwater catchment of the upper Mississippi River. Journal of the American Water Resources Association. 43(1):60-71.

Sheibley R.W., D.S. Ahearn, R.A. Dahlgren (2006) Nitrate loss from a restored floodplain in the lower Cosumnes River, California. Hydrobiologia. 571:261-272.

Sheibley, R.W., Duff, J.H., A.P. Jackman, F.J. Triska, E. Warren, and E.M. Godsy (2006) Nitrate reduction in sediment perfusion cores from Pool 8, Upper Mississippi River, La Crosse, Wisconsin, USA. Verh. Internat. Verein. Limnol. 29: 1289-1295.

Warren E., Godsy E.M., Duff J.H., Triska F.J., Jackman A.P., and Sheibley R.W. (2006) Nitrate reduction and microbial numbers in Upper Mississippi River Sediments, Verh. Internat. Verein. Limnol. 29: 1578-1582.

Ahearn, D.S., R.W. **Sheibley**, R.A. Dahlgren. (2005) Effects of river regulation on water quality in the lower Mokelumne River, California. River Research and Applications. 21: 651-670.

Grimm, N.B., R.W. **Sheibley**, C.L. Crenshaw, C.N. Dahm, W.J. Roach, L.H. Zeglin (2005) Nitrogen retention and transformation in urban streams. Journal of the North American Benthological Society. 24(3): 626-642.

Ahearn, D.S., R.W. **Sheibley**, R.A. Dahlgren, M. Anderson, J. Johnson. (2005) Land use and land cover influence on water quality in the last free-flowing river draining the western Sierra Nevada, California. Journal of Hydrology. 313: 234-247.

Ahearn, D.S., R.W. **Sheibley**, R.A. Dahlgren, K.E. Keller. (2004) Temporal dynamics of stream chemistry in the last free-flowing river draining the Sierra Nevada, CA. Journal of Hydrology. 295: 47-63.

Sheibley, R.W., J.H. Duff, A.P. Jackman, and F.J. Triska. (2003) Inorganic nitrogen transformations in the bed of the Shingobee River, MN, USA: Integrating hydrologic and biologic processes using sediment perfusion cores. Limnology and Oceanography. 48(3): 1129-1140.

Sheibley, R.W., A.P. Jackman, J.H. Duff, and F.J. Triska (2003) Numerical modeling of coupled Nitrification - Denitrification in Sediment Perfusion Cores from the Hyporheic Zone of the Shingobee River, MN. Advances in Water Resources. 26(9): 977-987.
This was the 19th most downloaded article in Advances in Water Resources in 2004.

Book Chapters

Grimm, N.B., J.R. Arrowsmith, C. Eisinger, J. Heffernan, A. MacLeod, D.B. Lewis, L. Prashad , T. Rychener, W.J. Roach, R.W. **Sheibley**. (2004) Effects of urbanization on nutrient biogeochemistry of aridland streams. In R. DeFries, G. Asner, and R. Houghton (editors). Ecosystem interactions with land use change. Geophysical Monograph. American Geophysical Union.

Valett HM & **Sheibley** RW (2009) Ground Water and Surface Water Interaction. In:

Likens GE (Ed) Encyclopedia of Inland Waters pp 691-702). Academic Press, Oxford

ABSTRACTS & PRESENTATIONS (first author list only)

Sheibley, R.W., J.F. Foreman, P.W. Moran, A.J. Paulson. Developing Critical Loads for Atmospheric Deposition of Inorganic Nitrogen to High Alpine Lakes: Preliminary Results. USGS Conference on Science in the Pacific Northwest, Portland, OR, March 3-5, 2009. PRESENTED

Sheibley, R.W., J.F. Foreman, P.W. Moran, A.J. Paulson. Developing Critical Loads for Atmospheric Deposition of Inorganic Nitrogen to High Alpine Lakes: Preliminary Results. National Atmospheric Deposition Program Annual Meeting, Sarasota Springs, NY, October 6-10, 2009.

Sheibley, R.W., T. Nagata, Y. Kobayashi and N. Ohte. Nitrate and Phosphate uptake in streams draining into Lake Biwa, Japan. Annual Meeting, North American Benthological Society, Anchorage, AK, June 4-9, 2006.

Sheibley, R.W., N.B. Grimm, C.L. Crenshaw, C.N. Dahm, L.H. Zeglin, H. Van Vleck, A.D. Pershall. Methods of measuring nutrient spiraling in urban streams. Annual Meeting, North American Benthological Society, Vancouver, B.C., June 6-10, 2004.

Sheibley, R.W., N. B. Grimm, C.L. Crenshaw, C.N. Dahm, L.H. Zeglin, H. Van Vleck, A.D. Pershall. Methods of measuring nutrient spiraling in urban streams. Central Arizona-Phoenix Long-Term Ecological Research (CAP LTER) 6th annual poster symposium. Tempe, AZ Feb. 23, 2004.

Sheibley, R.W., D.S. Ahearn, P. Santoriello, R.A. Dahlgren. Nitrate loss from a restored floodplain on the lower Cosumnes River, California. Annual Fall Meeting, American Geophysical Union, San Francisco, CA, Dec 6 -10, 2002.

Sheibley, R.W., A. P. Jackman, J. H. Duff, F. J. Triska. Estimating kinetic parameters and temperature dependence of nitrification-denitrification using perfusion cores from the Shingobee River, MN. Annual Meeting, North American Benthological Society, Pittsburgh, PA, May 28 - June 1, 2002.

Sheibley, R.W., A.P. Jackman, J.H. Duff, F.J. Triska, E.M. Godsy, and E. Warren. Kinetics of nitrate uptake in sediment perfusion cores from Pool 8, Upper Mississippi River Basin, La Crosse, WI. Annual Meeting, North American Benthological Society, La Crosse, WI, June 4 - June 8, 2001.

Sheibley, R.W., A.P. Jackman, J.H. Duff, F.J. Triska. Integrating hyporheic zone hydrology and biology with perfusion cores: Inorganic N transformations in Shingobee River sediments, MN. Annual Meeting, North American Benthological Society, La Crosse, WI, June 4 - June 8, 2001. (POSTER, presented by A.P. Jackman)

Sheibley, R.W., A.P. Jackman, J.H. Duff, F.J. Triska, E.M. Godsy, and E. Warren. Denitrification rates in sediment perfusion cores from Pool 8, Upper Mississippi River Basin,

La Crosse, WI, Annual Meeting, American Geophysical Union, Fall Meeting, San Francisco, CA, December 15-19, 2000.

Sheibley, R.W., A.P. Jackman, J.H. Duff, F.J. Triska, E.M. Godsy, and E. Warren. Acetate stimulated DIN removal in sediment perfusion cores from Pool 8, Upper Mississippi River Basin, La Crosse, WI: Denitrification potential. Annual Meeting, North American Benthological Society, Keystone, CO, May 28 - June 01, 2000.

Sheibley, R.W., A.P. Jackman, J.H. Duff, F.J. Triska. Potential nitrification-denitrification coupling in sediment perfusion cores from the hyporheic zone of the Shingobee River, Minnesota. Annual Meeting, North American Benthological Society, Duluth, MN, May 25 - May 28, 1999.

Sheibley, R.W., A.P. Jackman, J.H. Duff, F.J. Triska. Inorganic N flux in sediment perfusion cores from the hyporheic zone. Annual Meeting of the American Society of Limnology and Oceanography, Santa Fe, NM, February 1- February 5, 1999.

Co-author on over 20 other presentations since 1999

FELLOWSHIPS & AWARDS

2005 Visiting Research Scholar Fellowship - Center for Ecological Research, Kyoto University, Japan. Recipient of a one-year proposal-based research fellowship from 4/1/05 to 3/31/06.

COMMUNITY SERVICE

- Volunteer at the Seattle Aquarium March 2004-March 2005 – I was a volunteer naturalist at the aquarium for popular exhibits and gave interpretive talks to the visitors.
- Volunteer for the Adopt-A-Stream Foundation August 2006 – I helped install large woody debris into several of their field sites.
- Volunteer with King County Salmon watchers program in 2006
- Volunteer with Seattle Public Utilities stream bug monitoring program.

ACADEMIC SERVICE

- Reviewer for: *Limnology and Oceanography, Journal of the North American Benthological Society, Ecosystems, Chemoshpere, Advances in Water resources, Journal of Environmental Management*.
- President, Chemical Engineering and Materials Science Graduate Student Organization. September 1997 – June 1999.
- Graduate Student representative for Department Laboratory Safety Committee. September 1999- June 2000.

PROFESSIONAL AFFILIATIONS

North American Benthological Society
American Society of Limnology and Oceanography