

New Hampshire WRRRC Information Transfer

Basic Information

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Descriptors:	None
Principal Investigators:	William H. McDowell

Publications

1. Baillio, J. 2012. 2012. Controls on variability of dissolved greenhouse gas concentration and emissions from small streams in southeastern New Hampshire. M.S. Dissertation, Department of Natural Resources & the Environment, College of Life Science and Agriculture, University of New Hampshire, Durham, NH, 111 pages.
2. Daley, M.L. and W.H. McDowell, In Preparation, Human impacts on stream nitrogen chemistry and watershed N retention across a wide range of rural to urban catchments, Ecological Applications.
3. Hope, A.J., W.H. McDowell, W.M. Wollheim, Submitted, Ecosystem metabolism and nutrient uptake in an urban, piped headwater stream, Biogeochemistry.
4. Liptzin, D., M.L. Daley, and W.H. McDowell. Accepted. A comparison of wet deposition collectors at a coastal rural site. Submitted to Water, Air, & Soil Pollution. April 2013.
5. Parham, L. 2012. Spatial and temporal variation in degradation of dissolved organic carbon on the main stem of the Lamprey River. M.S. Dissertation, Department of Natural Resources & the Environment, College of Life Science and Agriculture, University of New Hampshire, Durham, NH, 66 pages.
6. Hope, A.J., W.H. McDowell, W.M. Wollheim. 2013. Ecosystem metabolism and nutrient uptake in an urban, piped headwater stream. Biogeochemistry. September 2013. DOI 10.1007/s10533-013-9900-y
7. Liptzin, D., M.L. Daley, and W.H. McDowell. 2013. A comparison of wet deposition collectors at a coastal rural site. Water, Air, & Soil Pollution. 224(5):1558. 2013.

Information Transfer

Unbridled development and population growth can have detrimental impacts to water resources and ecosystem services. Rapid population growth is occurring in New Hampshire and state regulations, planning board decisions and zoning classifications all attempt to minimize the environmental impact of this rapid population growth. Most land use planning decisions are made at the local level on a town by town basis, often by volunteers who serve on various boards, commissions and committees. Decisions by these various resource managers are often made without a full understanding of the consequences that their decisions will have on water resources or ecosystem services.

This project provided salary for the Center's Director and Associate Director to meet with state representatives, local town officials, watershed groups, school groups, the general public and scientists to discuss WRRC findings that relate to population growth and land use change. The NH WRRC website (<http://www.wrrc.unh.edu/>) is also used to disseminate information on water resources, and is updated and maintained by salary provided by this project. The time of the Director and Associate Director is increasingly spent discussing current and future research in the Lamprey River Hydrologic Observatory, which is partially funded by the longstanding 104B project "Water Quality and the Landscape: Long-term monitoring of a rapidly developing suburban watershed" and on nitrogen dynamics in New Hampshire's Great Bay watershed. On January 10, 2014 the NH WRRC totally funded and organized the **Seventh Annual Lamprey River Symposium** (see also below). Presentations focused on water quality, hydrology, stormwater, climate and landuse change, aquatic species and habitat, watershed planning and nitrogen cycling in coastal New Hampshire. The symposium attracted approximately 100 attendees, including scientists, regional leaders, town officials, members of state agencies, and federal agencies. The agenda can be found on the NH WRRC Lamprey River Hydrologic Observatory Symposium [website](#). This annual symposium and other discussions in which the Center's Director and Associate Director participate further the research and information transfer goals of the NH WRRC.

2013 Information Transfer Activities Supported by Section 104b Funding and Matching Funds

Data for Public Water Supplies

The NH WRRC's long-term water quality data on the rapidly developing suburban Lamprey River watershed is available to towns as they investigate new potential sources for public water supply. Both Newmarket and Durham, NH have investigated using the Lamprey River to artificially recharge water supply aquifers to meet the town's water supply needs. The NH WRRC has provided both towns and their consulting firm long-term water quality data on the Lamprey River to inform the water supply decision-making processes. As more towns in the future look to the Lamprey for water supply, the long-term dataset provided by the NH WRRC will become increasingly valuable.

Nitrogen Data in New Hampshire's Great Bay watershed

Over the five years, there has been significant focus on nitrogen loading to New Hampshire's largest estuary, the Great Bay estuary, and the impairment to aquatic life it has caused. In August 2009, Great Bay, Little Bay and the tidal rivers were added to the New Hampshire 2008 303d list of impaired waters rendering them in violation of the federal Clean Water Act. Based on the most recent "State of Our Estuaries Report" prepared by the Piscataqua Region Estuaries Partnership (PREP 2013), 32% of the nitrogen entering Great Bay and Little Bay is from point sources; the majority (68%) enters via non-point sources of pollution. The Lamprey River is the largest tributary to Great Bay, and thus the long-term data provided by the NH WRRC from the LRHO are of considerable value for watershed management. The NH WRRC provides the best dataset in NH for assessing the spatial and temporal variability in N concentrations and export in response to suburbanization and changes in land use. These 13+ years of data will be instrumental in assessing the success of current and future efforts to reduce non-point sources of nitrogen pollution reaching Great Bay. There is much interest in LRHO datasets from NH Department of Environmental Services (DES), PREP, the Environmental Protection Agency (EPA) and other municipal, regional, state and federal agents. Many of the presentations and meetings listed below focused on transferring information on nitrogen cycling to stakeholders throughout NH's coastal watershed and beyond. The NH WRRC has received several phone calls to discuss the Great Bay nitrogen issue and also the EPA's draft National Pollutant Discharge Elimination System (NPDES) permits that limit nitrogen in wastewater treatment plant effluent to 3 mg/L in several seacoast communities.

Symposia, Conferences and Seminars Organized and Funded

The NH WRRC funded and organized the "**Seventh Annual Lamprey River Symposium**" held January 10, 2014 in Durham, NH. The symposium is dedicated to exchanging the results of recent research on the water quality, hydrology, water resources issues, and management of the Lamprey River basin. The Symposium is a vehicle for researchers to share data and insights with other researchers, as well as those in the management and policy arena who would benefit from exposure to the latest research on the watershed. The symposium drew approximately 100 attendees, including researchers, legislators, water system operators, town officials, regional leaders and government officials. The symposium contained 12 presentations split up over three sessions. There was a break out session on sensors that collect 'real-time' water-quality data year-round and a poster session during lunch (5 posters and displays were exhibited). The day ended with an open discussion on research priorities in the Lamprey watershed and southeast NH. This event was mostly funded and organized by the NH WRRC. Staff from UNH cooperative extension and Great Bay National Estuarine Research Reserve helped moderate the open discussions and NH EPSCoR assisted with registration and printing. Survey results indicate that 94% of the attendees found the topics covered to be either helpful or very helpful.

The NH WRRC sponsored the “**NH Water and Watershed Conference**” in Plymouth, NH on March 22, 2013. This event was designed to meet the information and networking needs of lake, river, and watershed groups; environmental organizations; volunteer monitors; municipal board and staff members; elected officials; local and regional planners; policy makers; scientists; educators; consultants and students. The focus for the 2013 conference was to enhance capacity to understand, protect, and manage New Hampshire's water resources. The NH WRRC co-Sponsored this conference along with Plymouth State University and the Center for the Environment, NH EPSCoR, NH DES, US Geological Survey New England Water Science Center, Tighe & Bond Inc. and the Society for Ecological Restoration, New England Chapter. The conference contained 5 concurrent sessions including watershed planning and management, water quality and quantity data, using new sensor technology for monitoring, ecosystem services, education and outreach, climate change response and legal authority on climate adaptation. The conference drew approximately 250 people, including researchers, legislators, water system operators, land use planners, and government officials.

Publications

Daley, M.L. and W.H. McDowell. In Preparation. Human impact on N chemistry in streams visible at lowest population density in a range of suburbanizing basins. In Preparation for Ecological Applications.

Hope, A.J., W.H. McDowell, W.M. Wollheim. 2013. Ecosystem metabolism and nutrient uptake in an urban, piped headwater stream. *Biogeochemistry*. September 2013. DOI 10.1007/s10533-013-9900-y

Liptzin, D., M.L. Daley, and W.H. McDowell. 2013. A comparison of wet deposition collectors at a coastal rural site. *Water, Air, & Soil Pollution*. 224(5):1558. 2013.

Conference Proceedings & Abstracts:

Daley, M.L. and McDowell, W.H. 2013. Non-Point Nitrogen Sources and Transport Pathways in the Great Bay Watershed. *NH Water and Watershed Conference*. Plymouth, NH. March 2013.

Koenig, L. E.; Baumann, A. J.; McDowell, W. H. 2013. Improving automated phosphate analysis to eliminate silicate interference. (Abstract ID: 8116). Annual Meeting of the Society for Freshwater Science, Jacksonville, FL, May 2013

McDowell, W.H. 2013. Soils and stream chemistry: When, where and why are they linked? European Geophysical Union Annual Meeting, Vienna, Austria April 2013 (invited keynote presentation).

McDowell, W.H. 2013. Soils and stream chemistry: When, where and why are they linked? University of Amsterdam, Amsterdam, Netherlands. April 2013.

McDowell, W. G.; Rosemond, A. D.; McDowell, W. H.; Byers, J. E. 2013. Impacts, dead or alive: Effects of mass mortality of an abundant invasive species on ecosystem function. (Abstract ID: 7715). Annual Meeting of the Society for Freshwater Science, Jacksonville, FL, May 2013.

McDowell, W.H. 2013. Linkages between organic matter and carbon levels in surface waters and soils. UNESCO IHE Ecohydrology. Delft, Netherlands. June 2013.

Price, A. J.; Wollheim, W. M.; Mulukutla, G.; and McDowell, W. H. 2013. Headwater catchment nitrogen flux and storm response among land use types through seasons. (Abstract ID: 8050). Annual Meeting of the Society for Freshwater Science, Jacksonville, FL, May 2013.

Smith, Thor E., McDowell, William H., Wollheim, Wilfred M., Daley, Michelle, Mulukutla, Gopal, Baumann, Adam J., Snyder, Lisle, and Price, Allison. 2013. Sampling the Lamprey River watershed across space and time; New data collection efforts toward understanding nitrogen sources. The Geological Society of America Northeastern Section - 48th Annual Meeting. Omni-Mount Washington Hotel, Bretton Woods, New Hampshire. March 2013. *Abstract accepted but not presented due to federal employee travel restrictions.*

Presentations/Information Transfer

Cripps, M.L. and Daley, M.L. 2013. Ossipee watershed: ten years of water monitoring. Presentation to Green Mountain Conservation Group (GMCG) Research Committee, Watershed Management Plan Steering Committee, Water Quality Monitoring Volunteers and GMCG Board, Freedom Village, NH. May 15, 2013.

Daley, M.L. and McDowell, W.H. 2013. Aquatic Sensor Networks, Ecosystem Function and Management. NH EPSCoR all hands meeting. Durham, NH. March 28, 2013.

Daley, M.L. 2013. Water Quality: How do you know if it is good or bad? Kingston, NH High School presentation to 180 high school students (9 groups of 20, 20 min each). June 4, 2013.

Daley, M.L. 2013. Non-point nitrogen research in the Lamprey and Great Bay watershed. Great Bay boat tour with the NH House of Representatives Resources, Recreation and Development Committee. June 15, 2013.

Daley, M.L. 2013. Research on nitrogen in the Great Bay watershed: Learn how diffuse sources of nitrogen pollution travel from our communities to the Great Bay. Scheduled for Contemporary Coastal Issues sail on the Gundalow in Portsmouth, NH on August 28, 2013. but sail was cancelled last minute due to fog. Will reschedule.

Daley, M.L. Nitrogen Sources and Transport Update. Nitrogen Sources Collaborative Advisory Board. Lee, NH. August 29, 2013.

- Daley, M.L. 2013. Water Quality Research in the Lamprey River Hydrologic Observatory. Presentation to University of New Hampshire undergraduate class: Studio Soils. October 25, 2013.
- Daley, M.L. 2013. Presentation on “What it’s like to be a scientist and how I became a water quality scientist” to 40 6-8th graders from Epping Middle School during their visit to the University of New Hampshire. November 15, 2013.
- Daley, M.L. 2013. Presented preliminary Great Bay N Sources and Transport NERRS Science Collaborative project results to Durham-UNH Integrated Permit and Planning Technical Advisory Committee. Oct 29, 2013.
- Daley, M.L. 2014. Presented preliminary Great Bay N Sources and Transport project results to members (Allison Watts and Paul Stacey) of the Water Integration for Squamscott-Exeter (WISE) NERRS Science Collaborative project to aid the project team in designing a water quality monitoring program. January 17, 2014.
- Daley, M.L. 2014. Presented preliminary Great Bay N Sources and Transport NERRS Science Collaborative project results to Laura Byergo and Peter Wellenberger from Great Bay Stewards to discuss how this project might inform site locations chosen for the Great Bay Stewards “soak up the rain” effort. Jan 31, 2014
- Daley, M.L. 2014. Presented preliminary Great Bay N Sources and Transport NERRS Science Collaborative project results to Mark Zankel and Peter Steckler from The Nature Conservancy (TNC) to discuss how the project can inform the next version of the TNC Land Conservation Plan for New Hampshire's Coastal Watershed. February 26, 2014.
- Kobylinski, A. 2013. Gave tour of Thompson Farm AIRMAP facility and demonstrated precipitation collection form a wet-only collector on top of an 80 foot tower to 10 senior environmental chemistry students from Phillip’s Exeter Academy. Durham, NH. April 16, 2013.
- Koenig, L. 2013. Led 27 Dover High School students on a field trip to assess water quality in an urban stream draining the University of New Hampshire and to tour the UNH Water Quality Analysis Laboratory. May 30, 2013.
- McDowell, W.H. and M.L. Daley. 2013. Nonpoint nitrogen sources and transport in New Hampshire’s Great Bay watershed. Presented at Nitrogen in Stormwater: Sources and Solutions Workshop, NH DES, Portsmouth, NH May 2013.
- May 16, 2013 Shared Great Bay N stormwater presentation with Carl Delo from EPA
- Swan, K. 2013. Spoke to students from the Stream Safari program at McLaughlin Middle School in Manchester, NH on “Why I became a scientist, what I do each day for work and how scientists monitor stream quality”. November 13, 2013.

Wollheim, W.W., A. Price, R. Careyu, G. Mulukutla, and W.H. McDowell. 2013. Storm event nutrient monitoring in river networks. Presented at Nitrogen in Stormwater: Sources and Solutions Workshop, NH DES, Portsmouth, NH May 2013.

Press Releases

Daley, M.L. 2013. Clean water: It's everyone's responsibility to reduce pollution and properly manage New Hampshire's land areas to protect our water resources. Blog June 18, 2013. <http://ecosystemsandsociety.blogspot.com/2013/06/clean-water-its-everyones.html>

Forester Courtland, V. 2013. Upstream Impact: Graduate Students Inspire the Next Generation of STEM Scholars. UNH Today. May 30, 2013. http://www.unh.edu/unhtoday/2013/05/upstream-impact?utm_source=Team+Update%3A+Ecosystems+and+Society+05%2F31%2F2013&utm_campaign=Team+Update&utm_medium=email. Koenig, L. featured in article.

Gillies, J. 2014. New Hampshire stream monitoring network tracks Great Bay nutrient loading. Environmental Monitor. January 16, 2014. <http://www.fondriest.com/news/great-bay-new-hampshire-stream-monitoring.htm>. McDowell, W.H. interviewed for article.

Morrill, D. 2013. Dogs who really know their business: Trained to find human waste in waterways. Foster's. Aug 2, 2013. http://www.fosters.com/apps/pbcs.dll/article?AID=/20130802/GJNEWS_01/130809822. Daley, M.L. included in article.

Nilsen, E. 2013. New Hampshire Pubic Radio "Statewide Project Looks At Ecosystems and Climate Change." August 21, 2013. <http://nhpr.org/post/statewide-project-looks-ecosystems-and-climate-change>. Snyder, L. interviewed for article.

Potter, J.D., Godbois, A., Snyder, L. 2013. Cutting edge environmental monitoring comes to New Hampshire. Blog July 17, 2013. <http://ecosystemsandsociety.blogspot.com/2013/07/cutting-edge-environmental-monitoring.html>.

Meetings attended

Daley, M.L. 2013. Attended Integrated Watershed Management in the Great Bay Watershed workshop. Durham, NH. April 5, 2013.

Daley, M.L. 2013. NSF Becoming the Messenger Workshop. Durham, NH. April 10-11, 2013.

Daley, M.L. 2013. NH Water and Watershed Planning Meeting. Conference call. March 5, 2013.

Daley, M.L. 2013. Nitrogen in Stormwater: Sources and Solutions Workshop. Planning Meeting. April 16, 2013.

Daley, M.L. 2013. NH Water and Watershed Planning Meeting. Conference call. April 24, 2013.

Daley, M.L., McDowell, W.H. and Potter, J.D. 2013. The Future of Great Bay Public Forum. Greenland, NH. April 30, 2013.

Daley, M.L. 2013. Great Bay Nitrogen Non-Point Source Study Release & Workshop. Portsmouth, NH. May 16, 2013.

Daley, M.L. 2013. Potential Edge of Field Monitoring with Natural Resource Conservation Service. Durham, NH. May 30, 2013.

Daley, M.L. 2013. Great Bay comprehensive monitoring meeting. Durham, NH. June 14, 2013.

- Daley, M.L. 2013. Meet w Deana Aulisio to discuss nitrogen metabolism in Durham, NH. June 24, 2013.
- Daley, M.L. 2013. Canine detection in Durham, NH. August 1, 2013.
- Daley, M.L. 2013. Great Bay comprehensive monitoring meeting. Greenland, NH. August 27, 2013.
- Daley, M.L. 2013. Durham/UNH Oyster River Watershed NPS Model TAC Mtg. Durham, NH October 9, 2013.
- Daley, M.L. 2013. Met with Elizabeth Durfee, early career water resources planner, to discuss local water issues in NH and potential planning opportunities. November 8, 2013.
- Daley, M.L. 2013. Piscataqua Region Estuaries Partnership Technical Advisory Committee meeting. Durham, NH November 17, 2013.