6-1-2013

New Hampshire WRRC Information Transfer 2012

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Basic Information

Title:	New Hampshire WRRC Information Transfer
Project Number:	2008NH97B
Start Date:	3/1/2011
End Date:	2/28/2014
Funding Source:	104B
Congressional District:	01
Research Category:	Water Quality
Focus Category:	Management and Planning, Education, Non Point Pollution
Descriptors:	
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.

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 11, 2012 the NH WRRC totally funded and organized the **Sixth Annual Lamprey River Symposium** (see also below). Presentations focused on water quality, hydrology, geomorphology, 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.

2012 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 four 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 12+ 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. The NH WRRC's Associate Director also participated in the Newmarket Community Forum on the Health of the Great Bay Estuary which was intended to inform citizens of the needed wastewater treatment facility upgrades in preparation for the town vote on a warrant article for a new treatment plant.

Symposia, Conferences and Seminars Organized and Funded

The NH WRRC totally funded and organized the "**Sixth Annual Lamprey River Symposium**" held January 11, 2013 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 13 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 23, 2012. 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 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 DES, NH Fish and Game, NH Lakes Association, NH Rivers Council, US Geological Survey NH-VT Water Science Center, Weston & Sampson Engineers Inc., White Mountain National Forest, GeoInsight Inc., PP Systems, Sudbury Nurseries West, LLC, YSI, Inc. The conference contained 5 concurrent sessions in the morning and 6 in the afternoon including tropical storm Irene, wastewater and septic infrastructure, outreach, surfacewater nutrients, LID and stormwater management, invasive aquatic plants, Great Bay, drinking water, floodplains, restoration, dams and wetlands. The conference drew over 250 people, including researchers, legislators, water system operators, land use planners, and government officials.

Publications

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.

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.

Hope, A.J., W.H. McDowell, W.M. Wollheim, Submitted, Ecosystem metabolism and nutrient uptake in an urban, piped headwater stream, Biogeochemistry.

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.

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.

Conference Proceedings & Abstracts:

Argerich, A., S.L. Johnson, S.D. Sebestyen, C.C. Rhoades, E. Greathouse, M.B. Adams, D.M. Amatya, J.L. Campbell, G.G. Ice, J.B. Jones, J.D. Knoepp, G.E. Likens, W.H. McDowell, and P.M. Wohlgemuth. 2012. Temporal trends in stream N concentrations and biogeochemical responses to disturbances in long term reference watersheds. National Council for Water Quality Monitoring, Annual Meeting, Portland, Oregon April 2012.

Argerich, S., S.L. Johnson, S.D. Sebestyen, C.C. Rhoades, E.Greathouse, P.M. Wohlgemuth, F.N. Scatena, W.H. McDowell, G.E. Likens, J.D. Knoepp, J.B. Jones, G.G. Ice, J.L. Campbell, D.M. Amatya, and M.B. Adams. 2012. Effects of forest disturbances on stream nitrate concentrations. Annual Meeting of the Ecological Society of America, Portland, Oregon. August, 2012.

Argerich, A., .S.L. Johnson, S.D. Sebestyen, C.C. Rhoades, E. Greathouse, P.M. Wohlgemuth, F.N. Scatena, W.H. McDowell, G.E. Likens, J.D. Knoepp,J.B. Jones, G.G. Ice, J.L. Campbell, D.M. Amatya, and M.B. Adams. 2012. Effects of forest disturbances on stream nitrate concentrations in sites participating in StreamChemDB. LTER All Scientists Meeting, Estes Park, CO, September 2012.

Frey, S.D., R. Bowden, E. Brzostek, A. Burton, B. Caldwell, S. Crow, C. Goodale, S. Grandy, A. Finzi, M. Kramer, K. Lajtha, M. Martin, W. McDowell, R. Minocha, K. Nadelhoffer, S. Ollinger, P. Templer, and K. Wicking. 2012. Temperate forest soils sequester as much carbon as trees in response to nitrogen deposition. LTER All Scientists Meeting, Estes Park, CO, September 2012.

Greathouse, E.A., S.L. Johnson, D. Henshaw, S.D. Sebestyen, C.C. Rhoades, W.H. McDowell, J. Jones, G. Ice, and A. Argerich. Current status of StreamChemDB, a proposed web-accessible database of stream chemistry at U.S. Forest Service Experimental Forests and National Science Foundation Long-term Ecological Research sites. National Council for Water Quality Monitoring, Annual Meeting, Portland, Oregon April 2012.

Liptzin, D., M.L. Daley, and W.H. McDowell. 2012. A collector comparison for wet deposition at a coastal New Hampshire site. NADP National meeting, Portland, ME, October 2012.

Lombard, M.A., H. Mao, M. Daley, J. Bryce, W.H. McDowell, and R. Talbot. Relationships between mercury and sea salt ion concentrations in rainwater from a marine site. Northeastern Section of the Geological Society of America, Hartford, CT March 2012.

McDowell, W.H. 2012. NEON and STREON: Opportunities and challenges for the aquatic community. Annual meeting of the Society for Freshwater Sciences, Louisville, KY. May 2012.

McDowell, W.H. 2012. Consequences of climate and land use change for ecosystems and ecosystem services in New Hampshire. Invited symposium presentation, Ecosummit, Ecological Society of America, Columbus, OH, October, 2012.

McDowell, W.H. 2012. Management of urbanizing watersheds: Central tendencies, outliers, and the art of the possible. Invited presentation, AGU Annual fall meeting, San Francisco, CA. December, 2012.

Wymore, A.S., Z.G. Composn, P. Kein, C.M. Liu, W.H. McDowell, L.B. Price, T.G. Whitham, and J.C. Marks. 2012. Leaf litter phytochemistry influences stream fungi:bacterial ratios,

microbial community structure and ecosystem-level processes. Annual Meeting of the Society for Freshwater Sciences, Louisville, KY. May 2012.

Presentations/Information Transfer

Daley, M.L. and McDowell, W.H. 2012. Non-Point Nitrogen Sources and Transport Pathways in the Great Bay Watershed. NH Water and Watershed Conference. Plymouth, NH. March 2012.

Daley, M.L. and McDowell, W.H. 2012. Nitrogen in the Great Bay and Lamprey Watershed. Lamprey River Advisory Committee. Raymond, NH. March 2012.

Daley, M.L. and McDowell, W.H. 2012. Nitrogen challenges in the Great Bay watershed. Living on Great Bay lecture series: the challenges. Supported by We The People; Sponsored by the Green Sanctuary Project of the first UU Church of Exeter, NH. May 2012.

Daley, M.L. Nitrogen Drivers in the Great Bay watershed. Non-point source nitrogen pathways. Boat Tour of Great Bay. NEIWPCC Annual Nonpoint Source Pollution Conference. Portsmouth, NH. May 2012.

Daley, M.L., McDowell, W.H., Potter, J.D., French, C. and Miller, S. 2012. Nitrogen Sources Collaborative Advisory Board Water Quality Analysis Lab Tour and Field Trip to Great Bay stream sites. Durham and Lee, NH. Durham and Lee, NH. July 2012.

Daley, M.L. 2012. Urbanization and Suburbanization in NH watersheds. University of New Hampshire Watershed Water Quality Management class. Durham, NH. September 2012.

Daley, M.L. 2012. Water Quality Research in the Lamprey River Hydrologic Observatory. University of New Hampshire Approach to Research class. Durham, NH. October 2012.

Daley, M.L. and McDowell, W.H. 2012. Addressing Nitrogen Issues in Great Bay – Non-Point Nitrogen Sources. Co-sponsored by the Oyster River Local Advisory Committee and the Oyster River Watershed Association. Madbury, NH. November 8, 2012.

Daley, M.L. 2012. Ten Years of Water Quality data in the Ossipee Watershed. Green Mountain Conservation Group Community Forum – Looking at 10 Years of Data. Chocorua Village, NH. November 2012.

Daley, M.L. 2012. Watershed management in practice: Great Bay. University of New Hampshire Watershed Water Quality Management class. Durham, NH. September 2012.

Daley, M.L. 2012. Nitrogen in the Great Bay Watershed: Point and Nonpoint Sources (with specifics for the Lamprey River). Newmarket Community Forum on the Health of the Great Bay Estuary. Newmarket, NH. February 19, 2013.

Daley, M.L. shared Daley et al. 2009 "Salinization of urbanizing New Hampshire streams and groundwater: effects of road salt and hydrologic variability" paper with Mike Russo as data to support road salt reductions in the town of Nottingham, NH. December 6, 2012.

McDowell, W.H. 2012. Hydrofracking, energy, and water quality. Active retirement Association, Durham. NH. October 21, 2012.

McDowell, W.H. 2012. Groundwater and Surface Water Contamination in Suburban Basins. Active Retirement Association, Durham, NH. October 28, 2012.

McDowell, W.H. 2013. Overview of the EPSCoR aquatic sensor network. Annual Lamprey River Science Symposium. Durham, NH. January 11, 2013.

Press Releases

Daley, M.L., McDowell, W.H., French, C. and Miller, S. 2012. Scientists around Great Bay collaborate with local citizens to address pollution. Piscataqua Region Estuaries Partnership "Downstream" newsletter. July 26, 2012.

McDowell, W.H. 2012. Research Profile: Bill McDowell – Protecting Water Quality for Now and the Future. Campus Journal. University of New Hampshire. October 31, 2012.

Meetings Attended:

Daley, M.L. 2012. Meet with Durham and UNH officials to discuss possibility of installing in situ sensors in the Lamprey at Wiswall Dam. Durham, NH. March 15, 2012.

Daley, M.L. 2012. Met with NH Senator Jeanne Shaheen staffer Sarah Holmes to discuss water resources and Northern Forest issues in the state and region. Dover, NH. March 28, 2012.

Daley, M.L. 2012. Met Dave Cedarholm at Wiswall dam to discuss site location of in situ sensors. Durham, NH. March 28, 2012.

Daley, M.L. 2012. Attended PREP Technical Advisory Committee / Reserve Advisory Board (TAC/RAB) meeting focused on reviewing draft indicators for the 2012 State of Our Estuaries report. Portsmouth, NH. May 30, 2012.

Daley, M.L. 2012. Attended the Lamprey River New Floodplain Maps workshop. Raymond, NH. June 1, 2012.

Daley, M.L. 2012. Attended the Great Bay National Estuarine Research Reserve (NERR) System Wide Monitoring Program (SWMP) quarterly meeting. Durham, NH. June 14, 2012.

Daley, M.L. 2012. Attended the Water Sustainability in New Hampshire conversation for water professionals. Hosted by the Governor's Water Sustainability Commission. Concord, NH. July 9, 2012.

Daley, M.L. 2012. Attended meeting hosted by Great Bay Municipal Coalition to go over recent study results. Portsmouth, NH. July 19, 2012.

Daley, M.L. 2012. Attended PREP technical advisory committee meeting focused on the State of the Estuaries Report. Portsmouth, NH. July 19, 2012.

Daley, M.L. 2012. Attended Bacteria Source Tracking Workshop. Hosted by NH DES and FB Environmental. Portsmouth, NH. August 8, 2012.

Daley, M.L. and McDowell, W.H. 2012. Attended PREP technical advisory committee meeting focused on the State of the Estuaries Report. Lee, NH. September 26, 2012.

Daley, M.L. 2012. Attended the Stewardship Network in New Hampshire forum. Greenland, NH. September 27, 2012.

Daley, M.L. 2012. Attended the Pawtuckaway Lake Science Roundtable. NH DES. Concord, NH. September 28, 2012.

Daley, M.L. 2012. Meet with Kathy Fallon Lambert (Harvard University), Christopher Neil (MBL) and Anne Giblin (MBL) to discuss legal, advocacy and science issues for Great Bay and potential steps forward. Boston, MA. October 16, 2012.

Daley, M.L. 2012. Attended meeting to discuss Town of Durham and UNH integrated watershed management plan for the Oyster River. Durham, NH. October 17, 2012.

Daley, M.L. 2012. Attended meeting with Green Mountain Conservation Group to discuss analysis of 10 years of water quality data. October 25, 2012.

Daley, M.L. 2012. Attended the Seacoast Science Café: The Health of Great Bay: Great Big Challenges and Great Big Opportunities. Portsmouth, NH. December 5, 2012.

Daley, M.L. 2012. Attended the State of Our Estuaries Conference. Portsmouth, NH. December 7, 2012.

Daley, M.L. 2013. Joined the GMCG Research Committee Meeting via conference call. January 14, 2013.

McDowell, W.H. 2012. Met with Kathy Weathers from the Carey Institute of Ecosystem Studies and Christopher Neill from the Marine Biological Laboratory to discuss nutrient pollution in the Great Bay and how we can better link science and policy throughout the region. September 11, 2012.