6-1-2017

New Hampshire WRRC Information Transfer 2016

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Information Transfer Program Introduction

The NH WRRC supported one information transfer project with its 2016 104b

funding: 1. New Hampshire WRRC Information Transfer

New Hampshire WRRC Information Transfer

Basic Information

Title:	New Hampshire WRRC Information Transfer
Project Number:	2008NH97B
Start Date:	3/1/2016
End Date:	2/28/2017
Funding Source:	104B
Congressional District:	01
Research Category:	Not Applicable
Focus Categories:	Management and Planning, Education, Non Point Pollution
Descriptors:	None
Principal Investigators:	William H. McDowell, Michelle Daley Shattuck

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.
8. Heffernan, J.B., P.A. Soranno, M.J. Angilletta, L.B. Buckley, D.S. Gruner, T.H. Keitt, J.R. Kellner, J.S. Kominoski, A.V. Rocha, J. Xiao, T.K. Harms, S.J. Goring, L.E. Koenig, W.H.

McDowell, H. Powell, A.D. Richardson, C.A. Stow, R. Vargas, K.C. Weathers. 2014. Macrosystems ecology: understanding ecological patterns and processes at continental scales. Frontiers in Ecology and the Environment 12: 5-14.
9. Kaushal, S.S., W.H. McDowell, and W.M. Wollheim. 2014. Tracking evolution of urban biogeochemical cycles: past, present, and future. Biogeochemistry 121:1-21.
10. Koenig, L.E., A.J. Baumann, and W.H. McDowell. 2014. Improving automated phosphorus measurements in freshwater: an analytical approach to eliminating silica interference. Limnology and Oceanography: Methods. Limnology and Oceanography: Methods. 12:223–231. DOI: 10.4319/lom.2014.12.223. March 2014.
11. McDowell, W.H. 2014. NEON and STREON: opportunities and challenges for the aquatic sciences. Freshwater Science 34:386-391.

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12. Meyer, A. 2014. Response of ammonium uptake to carbon availability in an agriculturally influenced first order stream. M.S. Dissertation, Department of Natural Resources & the Environment, College of Life Science and Agriculture, University of New Hampshire, Durham, NH, 50 pages.
13. Shonka, N. 2014. Water quality sensors provide insight into the suspended solids dynamics of high flow storm events in the Lamprey River. M.S. Dissertation, Department of Natural Resources & the Environment, College of Life Science and Agriculture, University of New Hampshire, Durham, NH, 93 pages.
14. Sullivan, M. 2014. Groundwater nitrogen attenuation in suburban and urban riparian zones. M.S. Dissertation, Department of Natural Resources & the Environment, College of Life Science and Agriculture, University of New Hampshire, Durham, NH, 94 pages.
15. Appling, A. Leon, M. and McDowell, W.H. 2014. Reducing bias and quantifying uncertainty in watershed flux estimates: The R package loadflex. Submitted December 2014 to Ecosphere.
16. Appling, A.P., Leon, M.C. and McDowell, W.H. 2015. Reducing bias and quantifying uncertainty in watershed flux estimates: The R package loadflex. Ecosphere. 6(12): Article 269. DOI: 10.1890/ES14-00517.1 .
17. Kaushal, S.S., McDowell, W.H., Wollheim, W.M., Newcomer Johnson, T.A., Mayer, P.M., Belt, K.T. and Pennino, M.J. 2015. Urban Evolution: The Role of Water. Water. 7:4063-4087. doi: 10.3390/w7084063.
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19. Pellissier, P.A., S.V. Ollinger, L.C. Lepine, M.W. Palace, and W.H. McDowell. 2015. Remote sensing of foliar nitrogen in cultivated grasslands of human dominated landscapes. Remote Sensing of Environment. 167:88-97.
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21. Rodriguez-Cardona, B., Wymore, A.S. and McDowell, W.H. 2016. DOC:NO3 ratios and NO3 uptake in forested headwater streams. Journal of Geophysical Research: Biogeosciences . 121(1):205-217. doi:10.1002/2015JG003146.
22. Wymore A.S., Rodriguez-Cardona B. and McDowell, W.H. 2015. Direct response of dissolved organic nitrogen to nitrate availability in headwater streams. Biogeochemistry . 126:1-10. DOI 10.1007/s10533-015-0153-9.
23. Contosta , A. R., Adolph, A., Burchsted, D., Burakowski, E., Green, M., Guerra, D., Albert, M., Dibb, K., Martin, M., McDowell, W.H., Routhier, M., Wake, C., Whitaker, R., and Wollheim, W. 2016. A longer vernal window: the role of winter coldness and snowpack in driving spring transitions and lags. Global Change Biology. DOI: 10.1111/gcb.13517.
24. Hunt , C. W., Snyder, L., Salisbury, J.E., Vandemark, D., McDowell, W.H. 2017. SIPCO2: A simple, inexpensive surface water pCO2 sensor. Limnology and Oceanography Methods. doi: 10.1002/lom3.10157.
25. Koenig, L.E., Shattuck, M.D., Snyder, L.E., Potter, J.D. and McDowell, W.H. 2017. Deconstructing the effects of flow on stream solute interactions using a high-frequency aquatic sensor network. In review for Water Resources Research. Special issue "Continuous nutrient sensing in research and management: applications and lessons learned across aquatic environments and watersheds".
26. Snyder, L.E., Potter, J.D. and McDowell, W.H. 2017. An Evaluation of Nitrate, fDOM, and Turbidity Sensors in New Hampshire Streams. In review Water Resources Research. Special issue "Continuous nutrient sensing in research and management: applications and lessons learned across aquatic environments and watersheds".
27. Wymore, A.S., Coble, A.A. Rodríguez-Cardona, B., McDowell, W.H. 2016. Nitrate uptake across biomes and the influence of elemental stoichiometry: A new look at LINX II. Global Biogeochemical Cycles, 30, doi:10.1002/2016GB005468.

Publications

28. Wymore, AS, B Rodríguez-Cardona, and WH McDowell. 2016. Understanding dissolved organic matter biogeochemistry through in situ nutrient manipulations in stream ecosystems. Journal of Visualized Experiments. 116: doi: 10.3791/54704 , http://www.jove.com/video/54704.
29. Wymore, AS, J Potter, L Snyder, B Rodríguez-Cardona, and WH McDowell. 2017. Using in-situ optical sensors to understand the coupled biogeochemistry of carbon and nitrogen across a stream network. In review Water Resources Research. Special issue "Continuous nutrient sensing in research and management: applications and lessons learned across aquatic environments and watersheds".

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, land use change and climate variability. Over the past year, the NH WRRC meet with the following groups to discuss water resource issues: NH Fish and Game, Natural Resources Conservation Service (NRCS), Trout Unlimited (TU), Southeast Watershed Alliance, The Nature Conservancy, Piscataqua Region Estuaries Partnership (PREP), NH Department of Environmental Services (DES), the US Geological Survey and the US Environmental Protection Agency (EPA). 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 Director and Associate Director dedicate time 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". On January 9, 2017 the NH WRRC funded and organized the **Tenth Annual Lamprey River Symposium** (see also below). Presentations focused on nutrients and other solutes, bacteria, sediment, hydrology, groundwater, climate and land use change, water quality indicators and monitoring programs in coastal New Hampshire. The symposium attracted approximately 90 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.

2016 Information Transfer Activities Supported by Section 104b Funding and Matching Funds

Data sharing with Lamprey River watershed local advisory committee

The Lamprey River Advisory Committee (LRAC) is undergoing a long-term analysis of Lamprey River water quality data collected by both the Lamprey River Watershed Association's (LRWA) volunteer monitoring program and the NH WRRC 104B project "Water Quality and the Landscape: Long-term monitoring of a rapidly developing suburban watershed". The NH WRRC associate director serves on the LRAC and is a member of the water quality subcommittee which is advising a LRAC funded intern who is conducting the long-term water

quality analysis. Temporal and spatial trends in dissolved oxygen, pH and nitrate have been examined thus far and further analysis is underway.

Nitrogen Data in New Hampshire's Great Bay watershed

Over the last eight 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 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 16+ 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 DES, PREP, EPA and other municipal, regional, state and federal agents. Many of the presentations listed below and meetings attended focused on transferring information on nutrient cycling to stakeholders throughout NH's coastal watershed and beyond. The NH WRRC has received several phone calls and meeting requests to discuss the Great Bay nitrogen issue. The NH WRRC has also been asked by PREP to help update the nutrient loading indicator for the 2017 State of Our Estuaries report.

Water quality monitoring advice for wood restoration projects in NH streams

The Natural Resources Conservation Service and TU have selected 23 Wetlands Reserve Program (WRP) properties in NH for wood loading restoration work. The project involves adding wood into small segments of 1st and 2nd order stream channels (averaging about 1,000 feet) with a primary goal of recreating and increasing fish spawning and rearing habitat as well as preventing bank erosion and improving stream geomorphology. A supplemental goal of this work is to study the changes in water quality and nutrient uptake which may be enhanced by adding carbon (in the form of wood) to streams. The NH WRRC Director, Associate Director and the WQAL manager have been advising the NRCS and TU on how to best understand changes in water quality and nutrient dynamics with existing financial resources. With collaboration between the NRCS, TU and the NH WRRC, baseline water quality monitoring began in 2014. Wood installations occurred in 2015 and 2016 and a few remaining properties have been scheduled for restoration in 2017.

Drinking water quality in New Hampshire

The recent Perfluorooctanoic Acid (PFOA) and lead contamination of southern NH drinking water has prompted several inquiries to the NH WRRC and the Water Quality Analysis

Laboratory (WQAL) from residents and local media concerned with drinking water quality in the state.

Symposia, Conferences and Seminars Organized and Funded

The NH WRRC funded and organized the "**Tenth Annual Lamprey River Symposium**" held January 9, 2017 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 90 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 poster session during and after lunch where 4 posters displays were exhibited. The day ended with an open discussion on research priorities in the Lamprey watershed and southeast NH. This event was funded and organized by the NH WRRC. NH EPSCoR assisted with registration and printing. Survey results indicate that most of the attendees found the topics covered to be either helpful or very helpful.

The NH WRRC sponsored the "**NH Water and Watershed Conference**" which was held on March 18, 2016 in Plymouth, NH. 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 2016 conference was "Managing New Hampshire's Water for a More Resilient Environment". 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 and a few others. The conference contained 5 concurrent sessions including stormwater management and MS4 Permits, floods and flood hazards, water and infrastructure, modeling New Hampshire's water and watersheds and measuring and modeling New Hampshire's water and watersheds. The conference drew approximately 250 people, including researchers, legislators, water system operators, land use planners, and government officials. The Center's Associate Director also serves on the planning committee for the annual NH Water and Watershed Conference.

Publications

Contosta, A. R., Adolph, A., Burchsted, D., Burakowski, E., Green, M., Guerra, D., Albert, M., Dibb, K., Martin, M., McDowell, W.H., Routhier, M., Wake, C., Whitaker, R., and Wollheim, W. 2016. A longer vernal window: the role of winter coldness and snowpack in driving spring transitions and lags. Global Change Biology. DOI: 10.1111/gcb.13517. Hunt, C. W., Snyder, L.,

Salisbury, J.E., Vandemark, D., McDowell, W.H. 2017. SIPCO2: A simple, inexpensive surface water pCO2 sensor. Limnology and Oceanography Methods. doi: 10.1002/lom3.10157.

Koenig, L.E., Shattuck, M.D., Snyder, L.E., Potter, J.D. and McDowell, W.H. 2017. Deconstructing the effects of flow on stream solute interactions using a high-frequency aquatic sensor network. In review for Water Resources Research. Special issue "Continuous nutrient sensing in research and management: applications and lessons learned across aquatic environments and watersheds".

Snyder, L.E., Potter, J.D. and McDowell, W.H. 2017. An Evaluation of Nitrate, fDOM, and Turbidity Sensors in New Hampshire Streams. In review Water Resources Research. Special issue "Continuous nutrient sensing in research and management: applications and lessons learned across aquatic environments and watersheds".

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Wymore, AS, B Rodríguez-Cardona, and WH McDowell. 2016. Understanding dissolved organic matter biogeochemistry through in situ nutrient manipulations in stream ecosystems. Journal of Visualized Experiments. 116: doi: 10.3791/54704, http://www.jove.com/video/54704.

Wymore, AS**,** J Potter, L Snyder, B Rodríguez-Cardona, and WH McDowell. 2017. Using *in-situ* optical sensors to understand the coupled biogeochemistry of carbon and nitrogen across a stream network. *In review Water Resources Research.* Special issue "Continuous nutrient sensing in research and management: applications and lessons learned across aquatic environments and watersheds".

Conference Proceedings & Abstracts:

Coble, A.A., Koenig LE, Potter, J.D., Parham, L.M. and McDowell, W.H. 2017. Dissolved organic matter composition in the Lamprey Watershed: headwaters to mouth. Lamprey River Science Symposium. January 9, 2017. Durham, NH.

Inamdar, S., McDowell, W.H., Shanley, J., Minor, E. and Park, J.H. 2017. Convened the AGU Chapman Conference on Extreme Climate Event Impacts on Aquatic Biogeochemical Cycles and Fluxes. San Juan Puerto Rico, USA. 22-27 January 2017.

Koenig, L. 2016. Dissolved organic matter dynamics in a suburbanizing watershed: the importance of wetlands, people, and flowpaths. Graduate Research Conference. University of New Hampshire. Durham, NH. April 12, 2016.

Koenig, L., Hunt, C., Synder, L., Potter, J.D. and McDowell, W.H. 2017. Response of metabolism and fluvial carbon flux to anomalous low flows in New Hampshire streams. Poster Presentation. AGU Chapman Conference on Extreme Climate Event Impacts on Aquatic Biogeochemical Cycles and Fluxes. San Juan Puerto Rico, USA. 22-27 January 2017.

McDowell, W.H. 2016. Unraveling the mystery of DON. Technical University of Dresden, Dresden, Germany May 4, 2016.

McDowell, W.H. and Shanley, J. 2017. Convened Long Term Impacts and Recovery of Ecosystems; Lessons from Past Extreme Events Session. AGU Chapman Conference on

McDowell, W.H. and Shattuck, M.D. 2017. Lamprey River Hydrologic Observatory Past and Present: What have we learned, where are we headed? Lamprey River Science Symposium. January 9, 2017. Durham, NH.

McDowell, W.H., Goodale, C. and Ohte, N. 2017. Organizing a nitrogen session at BIOGEOMON 2017, the 9th International Symposium on Ecosystem Behavior. Litomyšl Chateau, Czech Republic, August 20-24, 2017.

McDowell, William H. Linking ILTER and Critical Zone Science: Opportunities to build a global understanding of land-water linkages. International LTER First Open Science Meeting. Kruger National Park, South Africa. 10 October 2016.

McDowell, William H. Plenary talk, International LTER First Open Science Meeting. Kruger National Park, South Africa. 12 October 2016. Brothers in earth systems research: Convergence of Critical Zone and ecosystem science as used in LTER.

Minor, E. and McDowell, W.H. 2017. Convened Changes in Aquatic Ecosystem Structure, Functions, and Services session. AGU Chapman Conference on Extreme Climate Event Impacts on Aquatic Biogeochemical Cycles and Fluxes. San Juan Puerto Rico, USA. 2227 January 2017.

Potter, J.D., Wymore, A.S., Rodríguez-Cardona, B., Coble, A.A., López Lloreda, C., Pérez Rivera, K., De Jesús Román, A., Bernal, S., Martí, E., Krám, P., Hruška, J., Prokushkin, A. and McDowell, W.H. 2017. Examining the role of dissolved organic nitrogen in stream ecosystems across biomes and Critical Zone gradients. Lamprey River Science Symposium. January 9, 2017. Durham, NH.

Shanley, J. and McDowell W.H. 2016. Making sense of in-stream sensors. Annual Hubbard Brook Cooperators' Meeting. Woodstock, NH. July 13-14, 2016.

Shanley, J.B. and McDowell, W.H. 2017. Biogeochemical response to extreme events at the five USGS WEBB watersheds. Poster. AGU Chapman Conference on Extreme Climate Event Impacts on Aquatic Biogeochemical Cycles and Fluxes. San Juan Puerto Rico, USA. 2227 January 2017.

Shattuck, M.D., J.D. Potter, A. Kobylinski, C. French, S. Miller, C. Keely, J. Bucci and W.H. McDowell 2016. Non-Point Nitrogen Sources and Transport in the Great Bay Watershed. NH Water and Watershed Conference. Plymouth, NH. March 18, 2016.

Shattuck, M.D., Koenig, L. Potter, J.D., Snyder, L.E. and McDowell, W.H. 2017. Regional coherence in solute interactions during stormflow in a statewide aquatic sensor network. Lamprey River Science Symposium. January 9, 2017. Durham, NH.

Sullivan, B.N., Wymore, A., Schade, J.D. and McDowell, W.H. 2016. Dissolved Organic Carbon: Nitrate Ratios as a Driver of Methane Fluxes in Stream Ecosystems. American Geophysical Union Fall Meeting. San Francisco, CA. December 2016.

Wymore, A., Rodriguez-Cardona, B., Coble, A.A., Potter, J.D., Lopez Lloreda, C., Perez Rivera,
K., De Jesus Roman, A. Bernal, S., Martí Roca, E., Kram, P., Hruska, J., Stanislavovich Prokishkin, A. and McDowell, W.H. 2016. Examining the role of dissolved organic nitrogen in stream ecosystems across biomes and Critical Zone gradients. American Geophysical Union Fall Meeting. San Francisco, CA. December 2016.

Wymore, A., Rodriguez-Cardona, B., Kram, P., Hruska, J. and McDowell, W.H. 2016. Examining the role of dissolved organic nitrogen in stream ecosystems across biomes. Society for Freshwater Science Annual Meeting. Sacramento, CA. May 24, 2016.

Presentations/Information Transfer

Shattuck, M.D. 2016. Shared Wednesday Hill Brook and organic dairy farm data with Katie Slebodnik for use in Aqueous Geochemistry class project and directed her to the NH EPSCoR DDC. September 2016.

Koenig, L. 2016. For the fourth consecutive year, Koenig served as the instructor for the STEM mini-course offered August 22-26th, 2016 through the CONNECT program at UNH (http://www.unh.edu/connect/). The objective of the course is to provide an opportunity for incoming freshmen that come from groups with historically low retention in STEM majors (e.g. low-income, multicultural, first-generation college students) to build community, discover college resources, and bolster skills that are needed to succeed in their academic programs (e.g. writing of lab/research reports, basic math and statistics for
analyzing scientific data). There were 12 students in the class, but the broader CONNECT program serves approximately 100 students.

McDowell, W.H. 2016. "Research Opportunities at the Critical Zone Observatories", presented at "Research Priorities to Incorporate Terrestrial-aquatic interfaces in Earth System Models" workshop. Department of Energy, Rockville, MD. September 8, 2016.

McDowell, W.H. 2016. Dissolved Organic Carbon (DOC) over the Decades. Departmental Seminar, Technical University of Dresden, 25 October 2016.

Shattuck, M.D, W.H. McDowell, J. Potter, and R. Brereton. 2016. Organic dairy groundwater and stream water chemistry. Organic Dairy Research Farm Symposium. Durham, NH. August 25, 2016.

Shattuck, M.D. 2016. Water Quality Research in the Lamprey River Hydrologic Observatory. Presentation to University of New Hampshire undergraduate class: Studio Soils. October 28, 2016.

Shattuck, M.D. 2016. Shared water quality information on the Lamprey River, Oyster River and

Great Bay watersheds with Todd Piskovitz from the town of Exeter, NH. December 7, 2016.

Press Releases

McDowell, W.H. 2016. Spoke with reporter from the Manchester Union Leader on chemical perfluorooctanoic acid, or PFOA, which has been found in water sources in Merrimack and Litchfield. Article: "Bedford water samples detect low levels of PFOA contamination" by KIMBERLY HOUGHTON. March 25, 2016.

- http://www.unionleader.com/Bedford-water-samples-detect-low-levels-of-PFOAcontamination

McDowell, W.H. 2016. WMUR interview. "Water contamination in NH towns by a local business -- a water expert weighs in". Apr 10, 2016. http://www.wmur.com/money/water-contamination-in-nh-towns-by-a-local-business-awater-expert-weighs-in/38955394.

McDowell, W.H. 2016. Spoke with a reporter from the Portsmouth Herald on the presence of lead in water in schools. Article: "Concerns grow over lead in drinking water" By Jeff McMenemy. May 1, 2016. http://www.fosters.com/article/20160501/NEWS/160509957

McDowell, W.H. and Potter, J.D. 2016. Interviewed for UNH Today article "Parched - Drought leaves some researchers thirsty for data." Written by Beth Potier. University of New Hampshire. September 7, 2016. https://www.unh.edu/unhtoday/2016/09/parched

Shattuck, M.D. 2016. Interviewed by Max Sullivan from seacoast online for article: Going dry: Drought threatens homeowners' wells. July 31, 2016. http://www.seacoastonline.com/article/20160731/NEWS/160739950

Shattuck, M.D. 2016. Interviewed on Great Bay by UNH Sustainable Engineering Class. October 31, 2016.

USGS Summer Intern Program

Basic Information

Start Date:	6/1/2015
End Date:	5/31/2016
Sponsor:	U.S. Geological Survey
Mentors:	
Students:	Ursula Jongebloed

Internship Evaluation

Question	Score
Utilization of your knowledge and experience	Very Good
Technical interaction with USGS scientists	Very Good
Treatment by USGS as member of a team	Very Good
Exposure and access to scientific equipment	Very Good
Learning Experience	Very Good
Travel	About Right
Field Experience Provided	About Right
Overall Rating	A+

Additional Remarks

This internship has been an incredibly enjoyable and educational experience for me. Working at USGS has taught me more about how scientists collect, analyze, and present data in the past year than I have learned in years of school education. I learned safe and effective lab techniques, the functionality of numerous machines, and techniques for the organization, analysis, and presentation of data. I have also learned how bureaucratic, legal, and technical problems can roadblock science, which, although frustrating at times, has been nonetheless valuable. I loved going out into the field to collect samples and carrying those samples through the process of analysis. It has been fulfilling to understand the importance of my project and learn about other scientists' projects and their cumulative conclusions.Other scientists were more than happy to teach me about their problems and findings. Robin Stewart has been an incredible mentor for me -- she is a superb scientist and a wonderful person.

USGS Summer Intern Program

Student Support					
Category	**Section 104 Base Grant**	**Section 104 NCGP Award**	**NIWR-USGS Internship**	**Supplemental Awards**	**Total**
Undergraduate	12	1	1	4	18
Masters	2	0	0	4	6
Ph.D.	3	0	0	1	4
Post-Doc.	2	0	0	1	3
Total	19	1	1	10	31

Notable Awards and Achievements

Ursula Jongebloed served as an USGS intern on the project "Investigations into the bioavailability and bioaccumulation of selenium (Se) and mercury (Hg) in the San Francisco Bay Estuary". Ursula began the internship at the USGS National Research Program office in Menlo Park, California in June 2015 after completing her sophomore year at Dartmouth College (located in Hanover, New Hampshire). The internship experience was very rewarding for both Ursula and her USGS mentor Robin Stewart. The internship experience was so successful that Ursula is preparing a manuscript along with co-authors Robin Stewart and Amy Kleckner on the trends in dissolved and particulate selenium concentrations with respect to bivalve Se concentrations and water year in the San Francisco Estuary. This manuscript is in preparation for a special issue "Undergraduate Research in Water – Training the Next Generation of Water Scientists" in the Journal of Contemporary Water Research and Education which is scheduled for publication in 2017.

Director Dr. William H. McDowell received the 2017 Distinguished Professor Award. The purpose of this award is to identify and honor longstanding members of the University of New Hampshire faculty. This singular university-wide award will be given each year to the faculty member whose overall record of excellent teaching, caring about students, devotion to the university community and substantial record of scholarly achievement exemplifies what we would call a 'distinguished career'.

Currently NH has numerous watersheds listed as impaired due to elevated chloride levels resulting from salt use in winter road maintenance with most those watersheds located in the southern part of the state. College Brook is one of the impaired watersheds and the impairment listing was based on data produced from the 2003NH21B project.

Paul Vickers is a sophomore at Dartmouth College and has become an integral part of the research team for the 104G project "Effects of dissolved organic carbon on methylmercury bioavailability in stream ecosystems" (2016NH205G). The grant has allowed him to learn how to collect and process trace-metal clean water samples, use multiple types of spectroscopy to measure dissolved organic carbon in the water he collected, maintain algal cultures, and put his interest in engineering to use designing better tanks for growing periphyton. It is unusual for an undergraduate to take on as large a role as Paul has in carrying out the goals of a research grant, but he has stepped up to the task with enthusiasm. As part of our team, Paul is learning skills that will help him become more competitive as he finishes college and begins his career. Paul Vickers states that "Being part of the Dartmouth WRRC team has given me invaluable experience studying the characteristics of organic carbon in a lake environment, which provides me with a critical base of knowledge as I hope to work on minimizing the degradation of marine ecosystems in the Pacific Northwest after graduation."