

## Information Transfer

Current state regulations, planning board and zoning board decisions are being made to address the rapid population growth in New Hampshire and often these decisions are made without a real understanding of the consequences to 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, the general public and scientists to discuss the research findings from the Lamprey River Watershed Hydrologic Observatory and other issues related to water quality in New Hampshire and the region. The NH WRRC website (<http://www.wrrc.unh.edu/>) which we use heavily to disseminate information on water resources was updated and maintained by salary provided by this project. The time of the Director and Associate Director is increasingly being 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." On January 16, 2009 the NH WRRC organized and funded the **Second Annual Lamprey River Symposium** (see also below). Presentations focused on water quality, hydrology, nutrient cycling in coastal New Hampshire and also coastal Massachusetts. The symposium was well attended (over 60 total attendees) by UNH scientists (29 people), regional leaders (13 people), town officials (12 people), members of state agencies (9 people including 2 NH Representatives), and the USGS (3 people). The agenda and presentations have been posted on the NH WRRC website at: <http://www.wrrc.unh.edu/lrho/symposium.htm>. This annual symposium and other discussions that the Center's Director and Associate Director participate in all further the research and information transfer goals of the WRRC.

### Examples of Information Transferred

The NH WRRC's long-term water quality data on the rapidly developing suburban Lamprey River watershed has been shared with local towns as they investigate new potential sources for public water supply. Several towns in the watershed are investigating new water supplies to support the increased demand for water with the growing human population. Newmarket, NH has considerable pressure to do so since its surface water treatment plant was shut down in recent years. The river that feeds the water treatment plant in Newmarket has high amounts of dissolved organic carbon (DOC) which results naturally from wetlands, but when this water with high DOC is chlorinated for disinfection purposes, trihalomethanes are formed. Trihalomethanes are known carcinogens and the town of Newmarket was required to shut down the water treatment plant and rely solely on the two town wells.

Newmarket has contracted with Emery & Garrett Groundwater, Inc (EGGI) to increase their town water supply. Emery & Garrett Groundwater, Inc has suggested that the town withdraw water from the Lamprey River in Lee NH during high flow periods and artificially "recharge" their town wells to generate an underground storage supply that would meet the town water needs even during dry summer conditions. The NH WRRC provided EGGI with long-term lamprey River data to assess whether seasonality and year to year variability in water quality made it appropriate for artificial recharge. The town of Newmarket is still working towards approval for this project, but the long-term dataset provided by the NH WRRC has been instrumental in this water supply process.

In addition to providing data on surface water quality, the NH WRRC has also identified water quality impairments in private wells within southeast NH and presented the results to homeowners and local town officials. Private wells are not regulated even though they supply 40% of the NH population and therefore it is up to the individual homeowner to test and treat their water if necessary. This puts the uninformed homeowner at risk of consuming contaminated water. We sampled 188 private wells to infer linkages between land use practices and groundwater quality and to educate the general public on the importance of private well testing. One well exceeded the US EPA drinking water standard for nitrate (10 mg N/L) in public water supplies, 10 wells were greater than levels associated with increased risk of gastric cancer (4 mg N/L; Ward et al. 1996), and 28 wells were elevated above 2 mg N/L indicating anthropogenic sources of N contamination (i.e. fertilizers or septic system effluent). Nine percent of the wells exceeded the EPA secondary drinking water standard for chloride (250 mg/L) and 46% of the wells exceeded the EPA advisory level (20 mg Na/L) for persons with hypertension. It is likely that road salt application is the dominant source of such high sodium and chloride levels in groundwater. The NH WRRC has shown that even private wells often drilled deep into bedrock fractures are subject to contamination from activities on the land surface.

### **Presentations:**

Daley, M.L. 2008. Highlights from the Northeast. NSF EPSCoR Water Dynamics Workshop, Burlington, VT. November 2008.

Frades, M. M. Davis, J. Bryce, and W. H. McDowell. 2008. A pilot study of watershed flow using stable water isotopes in support of the development of the Lamprey River Watershed (southeast New Hampshire) as a Hydrologic Observatory. EPSCOR National Conference on Water Resources, Burlington, VT, November, 2008.

Daley, M.L. 2008. Salinization of suburban streams and groundwater. Lamprey River Watershed Association Annual Meeting. Epping, NH. November 2008.

Daley, M.L. 2008. Salinization of suburban streams and groundwater. Ossipee Watershed Water Quality & Source Water Protection. Chocorua, NH. November 2008.

Daley, M.L. 2009. Salinization of Suburbanizing New Hampshire Streams and Groundwater. Second Annual Lamprey River Symposium. Durham, NH. January 2009.

McDowell, W.H. 2008. Chemical, Biological and Physical Disturbance of the Suncook River Avulsion. The New Hampshire Watershed Conference, Concord, NH. November 2008.

McDowell, W.H. 2009. The Lamprey River Hydrologic Observatory. Second Annual Lamprey River Symposium. Durham, NH. January 2009.

### **Meetings Attended:**

Daley, M.L. 2009. Stakeholder meetings to update the New Hampshire Estuaries Project

(NHEP) Comprehensive Conservation Management Plan. January and February 2009.

Daley, M.L. 2009. Strategic Planning for the Gundalow Company which is a connecting-force and collaborative leader of a shared maritime heritage of the Piscataqua watershed in NH. February 2009.

McDowell, W.H. and M.L. Daley. 2008. Green Mountain Conservation Group Strategic Planning meeting. October 2008.

McDowell, W.H. 2009. Lamprey Instream Flow Public Hearing January 2009.

McDowell, W.H. 2008. Meeting with director of DES Laboratory Services to assess the need for analytical capabilities in the area of emerging contaminants. October 2008.

### **Symposia Organized and Funded:**

**Second Annual NH Water Conference**, April 2008, Concord NH (Organizing committee, provided partial funding, over 150 attendees)

The second annual New Hampshire Water Conference was held on April 16, 2007 at the Grappone Conference Center in Concord. The conference drew over 150 people, including researchers, legislators, water system operators, land use planners, and government officials. The conference theme was the Integration between Science, Policy, and Management in the State. The current knowledge of the quality, quantity and use of water was examined through talks and sessions on the current conditions of New Hampshire's water resources, water demand trends and flood forecasting, planning and response. The day closed with a panel discussion on Developing a State Water Council.

**Annual NH Watershed Conference**, November 2008, Concord NH (Organizing committee, provided partial support, over 150 attendees)

The annual NH Watershed Conference was held November 15, 2008 in Concord, NH and the NH WRRC was involved in supporting and organizing this conference. The conference drew approximately over 150 people including researchers, legislators, water system operators, land use planners, and government officials. The conference contained 6 tracks including organizational development, effecting change, tech time, managing our watersheds, ecology and the GIS track which was facilitated solely by the UNH cooperative extension and the NH WRRC.

**Second Annual Lamprey River Symposium**, January 2009, Durham, NH (totally funded and organized, over 60 attendees)

The Second Annual Lamprey River Symposium was held on January 16, 2009. The symposium drew over 60 people including researchers, legislators, water system operators, town officials, regional leaders and government officials. The symposium contained 14 presentations split up over three sessions. There was a poster session during lunch and 10 posters and displays were exhibited. The day ended with an open discussion on research priorities in the watershed and southeast NH. This event was totally funded, organized and moderated by the NH WRRC.