

WATER QUALITY AND FLOW



Scientists test the water. Photo by Breakaway Media.

Background

Clean, abundant water in the Lamprey River and its tributaries (Little, North, North Branch, Pawtuckaway, and Piscassic) is central to the LRAC's mission. In diverse ways, many of the efforts of the LRAC are intended to maintain and/or improve water in the rivers. Since 1998, the Lamprey River Watershed Association (LRWA) has conducted summer water quality monitoring along the length of the Lamprey River, often with financial support from LRAC. The data collected are then processed by the State of New Hampshire's Volunteer River Assessment Program (VRAP). Focused chemical analyses have been done by the University of New Hampshire (UNH) and the New Hampshire Department of Environmental Services (NHDES).

The Lamprey River is legislatively classified as Class B "fishable and swimmable" and managed by NHDES under the federal Clean Water Act to meet this water quality standard. Most of the tributaries are similarly classified, while the Piscassic River is classified at the higher standard of Class A. Maintaining clean water is supported by the significant amount of riparian land protection, state law and municipal zoning ordinances that protect shorelands, and good land management by property owners. The Epping Wastewater Treatment Facility upgrade in 2000 also has contributed to improving the Lamprey's water quality. Since the Lamprey River is a source of municipal water supply, clean water is critical to all who get some or all of their drinking water from the river.

River Profiles

Lamprey River water quality volunteers

When New Hampshire began a Volunteer River Assessment Program (VRAP) in 1998, the Lamprey River was one of the first watersheds to participate. Each year, volunteers have gathered data about the river from designated locations per the protocol established by NHDES. Lamprey River volunteers have collected temperature, pH, turbidity, specific conductance and *E. coli* information. It takes a patient, detailed oriented person to love this work and the instruments can be a bit temperamental. But getting watershed residents involved in the collection of valuable information about the river water quality is priceless.

One of the most common questions residents have about the river is if it is safe for swimming. Thanks to well documented water quality data, the answer is a resounding “yes.” Having good data also encouraged one of the watershed towns to reopen a beach area along the river.

Dozens of citizens have participated in data collection over the years. They have benefitted from learning how important this information is to the State of New Hampshire and the watershed has benefitted from the data collected. This is a win for everyone!

submitted by Dawn Genes

Dawn Genes

*Photo by
Paul Gasowski*



Dawn Genes is a true champion of clean water. After many years with USDA Natural Resources Conservation Service, she took on the role of executive director for the Lamprey River Watershed Association in 2004. Dawn oversees the annual summer water quality testing volunteers and equipment. She initiated a “[Stream Walk](#)” to assess issues along the main stem Lamprey, documenting invasive weeds, inadequate stream crossings, storm drain pipes, etc.. She surveyed all 38 dams along the Wild and Scenic section of the river and made [recommendations for improving fish passage](#). Through her combined loves of water and recreation, she led an initiative to [study and improve paddling conditions](#) on a particularly woody section of the river. She investigated working with towns to install [stormwater treatment retrofits](#). She leads annual litter clean-up efforts. She encourages citizens and local governments to be involved in river issues. In her spare time, she also is the director of the NH Audubon Massabesic Center.

Despite the corrective and protective water quality measures mentioned above, the Lamprey River is not immune to common human-caused water quality problems. The tidal section of the Lamprey River --which is located downstream of the Wild and Scenic section-- had more than 80 dissolved oxygen violations of federal Clean Water Act criteria in 2010 and 50 in 2011, significantly more than all other rivers of the Great Bay Estuary combined¹. In addition to the number of violations, the Lamprey River also had the lowest dissolved oxygen readings. Without sufficient dissolved oxygen, fisheries and

shellfisheries are severely strained. This impairment represents a major threat to the health of the river.

Low dissolved oxygen is often correlated with excessive nutrients and algae. In the tidal portion of the Lamprey River, the dissolved oxygen problem is partially due to discharges of treated sewage from the Newmarket wastewater treatment facility. To address these problems, Newmarket's most recent wastewater treatment permit significantly limits the amount of nitrogen that can be discharged to the Lamprey River. Reduction of nutrients from other non-point sources (fertilizers, septic systems, and stormwater runoff) throughout the Lamprey River watershed will also help improve the water quality in the Lamprey River. Addressing the causes of this non-point source pollution will take time and a concerted effort by all.

Flows in the main stem Lamprey River have been the subject of intense study by NHDES. Based on data collected and the needs of aquatic organisms, NHDES has created an Instream Flow Management Plan for the Lamprey River that seeks to mimic seasonal natural flow patterns. Active management occurs when flows are below certain rates for specified periods of time. When these thresholds are reached, registered water users are required to cease operations, communities enact voluntary water conservation measures, and NHDES releases a 48 hour "relief pulse" of water from one of two dams in the river's headwaters to ensure that critical life support needs of aquatic organisms are met.

Maintaining clean, abundant water requires vigilance: widespread and frequent monitoring; review of proposed land development; education of landowners; and a readiness to work with local, state, and federal regulators to prevent and address problems as they arise. In addition, the Lamprey River and its tributaries have several known issues, including the following:

- **Septic systems are part of the problem and part of the solution.** Most landowners along the Lamprey River and its tributaries have private septic systems to treat household wastewater, yet outreach has shown that many homeowners do not even know they have a septic system or how it works. Failed and poorly maintained septic systems potentially can result in both excess nutrients and pathogens reaching the river. While septic systems cannot remove all nutrients, septic systems that are well designed, sited, and maintained can play an important role in keeping river water clean. The LRAC was instrumental in developing successful septic system outreach programs that have been replicated regionally.

¹ [PREP, State of our Estuaries 2013; http://prep.unh.edu/resources/pdf/2013%20SOOE/SOOE_2013_FA2.pdf](http://prep.unh.edu/resources/pdf/2013%20SOOE/SOOE_2013_FA2.pdf)

- **The population of the Lamprey River watershed increased by approximately 303% between 1960 and 2000. The amount of new development and impervious surface during that time increased by approximately 310%.** These trends are expected to continue. More impervious surface means corresponding increases in the amount of road salt, sediment, nutrients, heat, and toxic chemicals that are carried to streams and rivers. The LRAC sponsored a road salt reduction workshop, sought partnerships to install stormwater retrofits, and keeps stream health in mind during all development project reviews.

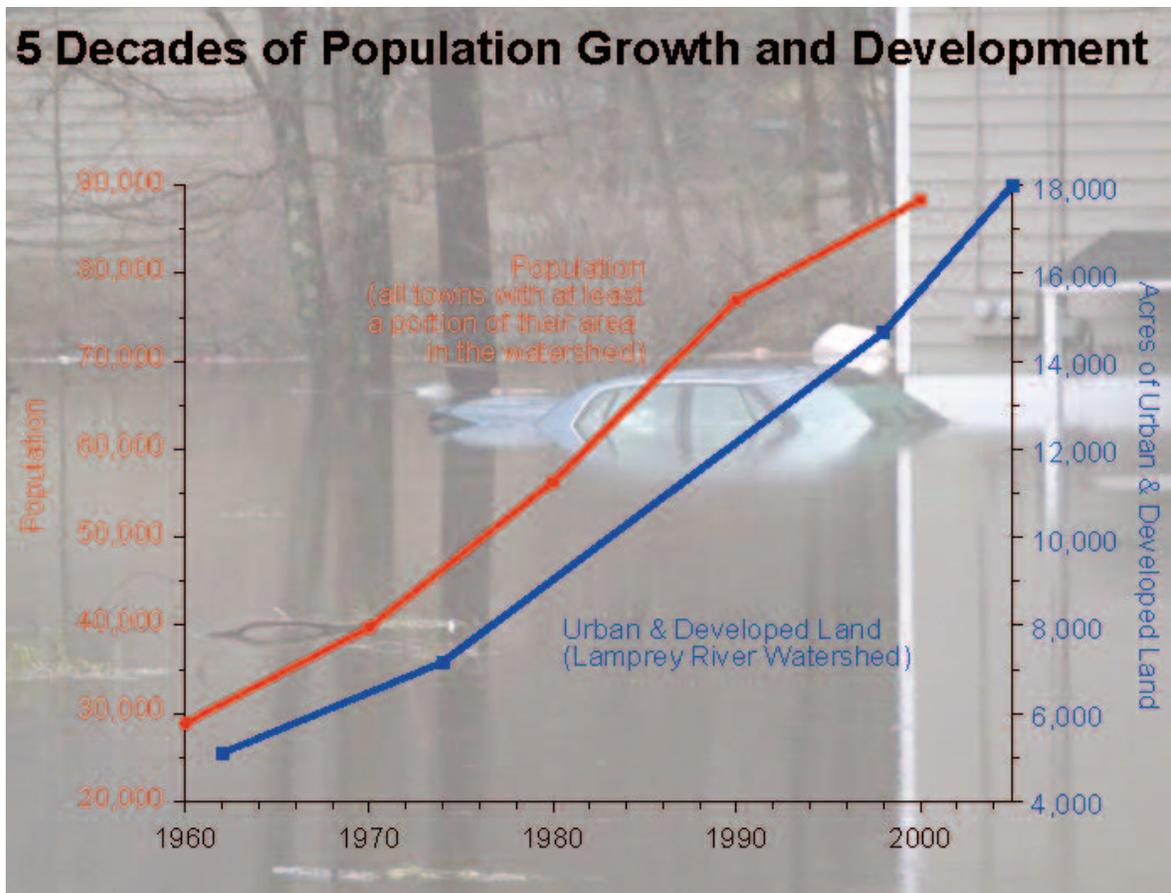


Chart by Cameron Wake, University of New Hampshire
https://www.plymouth.edu/center-for-the-environment/files/2012/02/120323_NHWaterConf_Wake-WakeMappingLegalImplications.pdf

- **An increasing population also increases the demand for water supply.** Many coastal New Hampshire towns are facing a shortage of reliable public water supply for their residential, commercial, industrial, and community needs. Adequate flows to support robust populations of aquatic organisms are also becoming less consistent. The *Lamprey River Instream Flow Management Plan* approved in 2013 affords some protection, but the full effect of these protective measures is not yet known. In the meantime, the LRAC has encouraged towns to diversify public water sources and to include water conservation in town planning.

From the local news...



Attendees from Durham, UNH, LRAC, and NHDES at the grand opening of the new Spruce Hole well in Durham.

Photo courtesy of Durham Friday Updates

Adapted from Durham Friday Updates November 13, 2015

SPRUCE HOLE WELL GRAND OPENING TOOK PLACE TODAY

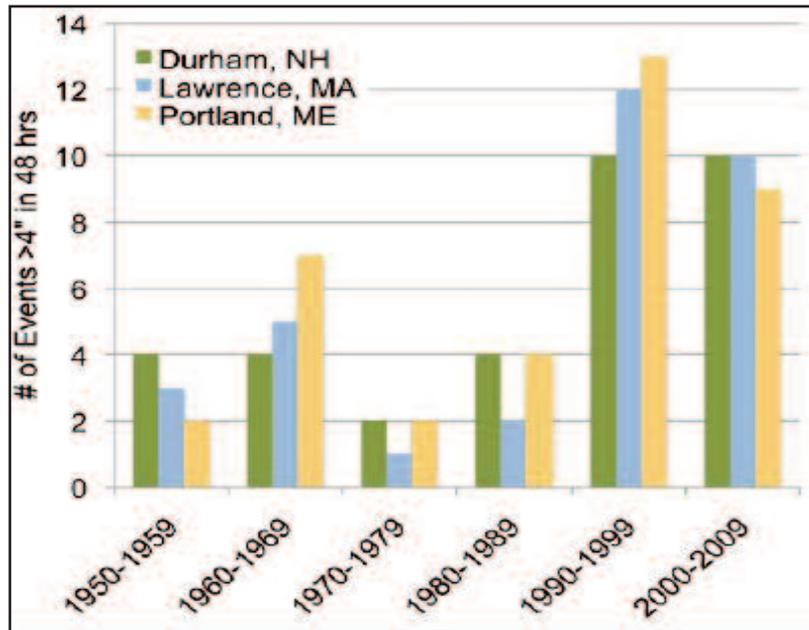
Durham, State, and University of New Hampshire (UNH) officials held a Spruce Hole Well/Artificial Recharge Basin grand opening event today at the Durham Gravel Pit. The new Spruce Hole Well is a cutting edge project involving artificial recharge of raw water from the Lamprey River during periods of plentiful flow for use by the Durham-UNH

Water System during periods of low flow which often coincide with peak water demands during the fall semester at UNH. The project will ensure that Durham and UNH have enough water for the next 75-100 years.

Two artificial recharge basins will be used to enhance the production capacity of the well and to mitigate potential adverse pumping-induced impacts to existing water resources. The Groundwater Discharge Permit approved for the use of the artificial recharge for this project was the first issued in New Hampshire.

- **Streamside vegetated buffers are being lost.** The effects are particularly dangerous and destructive when coupled with the increased number and intensity of extreme storm events. From 1950 to 1989, rain gauges in Durham, New Hampshire registered four or fewer events with greater than 4 inches of rain in 48 hours. Between 1990 and 2009, ten events were recorded each decade.

Extreme Precipitation Events (>4") 1950-2009



www.climatesolutionsne.org/sites/climatesolutionsne.org/files/greatbayreport_online.pdf

Goals

- Ensure that the Lamprey River and its tributaries meet or exceed state and federal water quality standards for the health and enjoyment of all species.
- Maintain continuously a quantity of water in the main stem Lamprey River during all seasons sufficient to support and sustain aquatic habitats and wildlife, while considering the need for agricultural and municipal use.

Key Accomplishments

- Provided financial support for volunteer water quality data collection, enabling uninterrupted data beginning in 1990.
- Created brochures to promote clean water and protect wildlife habitat along riverfront lands.
- Co-sponsored a series of workshops on maintaining vegetated buffers to protect the river.
- Held workshops that educated citizens about the connections between economics and ecological integrity.
- Sponsored [septic system outreach](#), including a pilot on-site program for riverside landowners to understand and improve their septic systems.
- Co-sponsored "Your Water, Your Wallet, Your Watershed" workshop to encourage towns to work across municipal boundaries in addressing water issues.

- Co-sponsored a road salt reduction workshop and DVD entitled “The Road Less Salted” for public and private snow plow drivers.
- Performed a [trend analysis](#) to determine whether water quality is improving or worsening over time.
- Reviewed proposed development projects within one quarter mile of the Lamprey River and its state-designated tributaries to assure that water will not be degraded during and after construction.

Key Future Actions

- Continue to study and track chemical and physical water quality parameters in a consistent manner so that towns and other partners can protect the cleanest water and improve degraded water.
 - Identify what critical data are missing and recommend steps to address the gaps.
 - Compare data to New Hampshire benchmarks and identify which issues could be improved locally.
- Work with towns to meet water quality standards consistently and improve overall water quality of the rivers.
 - Work with towns to enact [Southeast Watershed Alliance model regulations for stormwater](#) and shoreland and floodplain zoning setbacks.
 - Encourage municipalities to reduce the amount of salt they apply to town roads. Recommend that town public works departments enroll in classes such as NH SnoPros, UNH Technology Transfer Center, and Road Scholars. Encourage towns to adopt salt application standards for private snow plow drivers as part of commercial and subdivision planning.
 - Provide towns with information on septic systems that can be distributed to residents as an insert in the town’s annual report.
 - Assist towns through LRAC’s project review process to assess development proposals relative to their effects on clean, abundant water.
- Work with town residents to protect and improve the water:
 - Expand outreach efforts to landowners about septic system care and maintenance.
 - Encourage wide, naturally vegetated buffers and floodplains to minimize erosion and filter run-off.
 - Encourage residents to minimize or discontinue the use of pesticides and fertilizers.
 - Formally recognize landowner efforts along the river and elsewhere in the watershed that protect clean water.
- Promote water conservation:
 - Support town efforts to develop long-range water supply plans and encourage exploration of alternate sources or storage.
 - Encourage strategies and regulations for low-impact development or retro-fits where soil conditions allow so that water soaks *into* the soil and does not flow across it.

By the Numbers: Water Quality and Flow

Item Description	Count
volunteer monitors participating 2016	14
sampling locations 2016	10
sampling rounds per year	8
years of continuous water quality monitoring	26