The Sampler

March 30, 2015

The Sampler is a monthly e-newsletter produced by the Volunteer Lake Assessment Program.

Subscribe to *The Sampler*

Web Highlights

This month's featured lake website is Canaan Lake Association, Canaan, N.H.

Climate-Warmed Leaves Change Lakes Ecosystems

Trip to Haunted Pond in Hillsboro

River Algae Affecting Mercury Pollution at Superfund Site

Nutrient Pollution Damages Streams in Ways Previously Unknown

Road Salt Nearly Triples Lakes George Salinity in 30 Years

Upcoming Events

Landscaping for Water Quality
April 8-9, 2015
Urban Forestry Center
Portsmouth, NH 03801

Vernal Pool Project Trainings
Indoor: April 15 and 16, 2015
Outdoor: April 18, 2015
Peterborough and Keene, NH

Acid Rain Effects on New Hampshire Precipitation and Waterbodies

By: Kirsten Nelson, NHDES Biologist

Acid rain is caused primarily by gaseous sulfur dioxide (SO2) and nitrogen oxides (NOx). Once released into the atmosphere, these chemicals react with water molecules to produce acids. During precipitation events, the acidifying compounds return to the earth's surface and modify waterbodies by reducing diversity and abundance of aquatic life, enhancing mercury bioaccumulation in fishes, and increasing exposure of fish to toxic inorganic aluminum. For New Hampshire, natural buffers against acidifying compounds are scarce due to natural geology, making waterbodies especially vulnerable to acid rain effects.

In 1970 the U.S. Congress established the Clean Air Act (CAA) and amended it in 1990 to reduce air pollutants using a wide range of control mechanisms, and in 1987 New Hampshire established the Air Toxics Control Program to further protect citizens from air pollution. Additionally, in 2006, the New Hampshire General Court determined it was in the public interest to reduce mercury emissions at Public Service of New Hampshire's, now Eversource, Merrimack Station power plant. Scrubbers were installed that reduced mercury emissions, but also effectively reduced sulfur dioxide emissions. The combination of federal and state air quality regulations has led to large reductions in sulfur dioxide emissions (Figure 1).

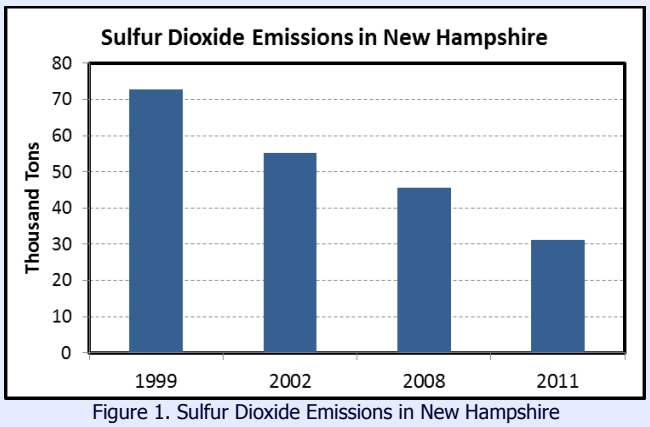

Figure 1. Sulfur Dioxide Emissions in New Hampshire

To track influences of acidifying compounds on New Hampshire

Discover Wild NH Day
Saturday, April 18, 2015
NHFG
11 Hazen Dr.
Concord, NH 03301

NHDES Drinking Water Source Protection Conference
Wednesday, May 6, 2015
Grappone Conference Center
Concord, NH 03301

2015 Lakes Congress
Friday, May 29, 2015
Church Landing at Mills Falls
Meredith, NH 03253

VLAP Annual Workshop
Saturday, June 6, 2015
NHDES
29 Hazen Dr.
Concord, NH 03301

Lakes and Rivers: Understanding Their Ecology and Water Quality
August 9-15, 2015
Eagle Hill Institute
59 Eagle Hill Rd.
Steuben, ME 04680

Grants

NHDES Aquatic Resource Mitigation Fund
2015 Grant Pre-Proposals
Deadline: April 30, 2015

Mascoma Savings Bank Foundation
Deadlines:
Wednesday, April 1, 2015
Thursday, October 1, 2015

Limno Lingo

Gloeotrichia: A filamentous cyanobacteria, formerly blue-green algae, that congregates into spherical colonies. These spherical colonies often look like fuzzy balls floating in the water column. Cyanobacteria typically populate nutrient rich lakes and can be a nuisance if they form a bloom. Gloeotrichia, however, also blooms in our more nutrient poor lakes, such as Lake Sunapee in New

waterbodies, the New Hampshire Department of Environmental Services (NHDES) initiated three monitoring projects: 1.) the Rooftop Rain Program (RRP), 2.) Remote Pond Program (RPP), and 3.) Acid Outlet Program (AOP). The RRP, initiated in 1972, monitors pH, sulfate and nitrogen concentrations of the majority of precipitation events at NHDES in Concord. The RPP, initiated in 1981, entails spring collection of water samples from ten remote, high elevation ponds stocked by New Hampshire Fish and Game. The AOP, initiated in 1983, is a biannual monitoring program for 20 relatively lower elevation waterbodies. Both the RPP and AOP monitor pH, acid neutralizing capacity (ANC), specific conductance, and sulfate concentration.

Analysis of the long term RRP monitoring data reveals a statistically significant increase in pH while simultaneously showing a significant decrease in sulfate and nitrogen concentrations, indicating that New Hampshire's precipitation has become less acidic (Figure 2). For the RPP, three out of ten waterbodies have significantly increasing (improving) pH values, while the remaining seven waterbodies have remained stable, and ANC has remained stable in nine ponds. Specific conductance and sulfate concentration have significantly decreased (improved) in all ten ponds, reflecting reductions in sulfur dioxide emissions. For the AOP, trend results differed slightly between spring and fall sampling, with spring trends generally demonstrating less recovery than in the fall. This is likely due to the deposition of airborne pollutants in snowpack, which are rapidly released into waterbodies during spring melt, causing declines in pH and ANC. However, a majority of the acid outlet waterbodies demonstrated either stability or statistically significant increases in pH and ANC. Acid Outlet waterbodies also experienced significant decreases in sulfate concentration (19 of 20 ponds).

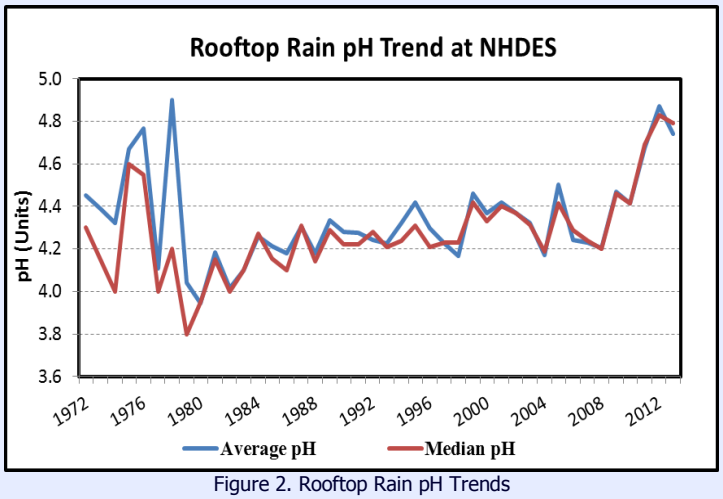

Figure 2. Rooftop Rain pH Trends

The improvements documented by these monitoring programs are encouraging and provide evidence of the success of air quality policies in protecting our environment. The results also highlight that waterbody recovery is a work in progress, as pH and ANC values from many waterbodies have remained stable despite reductions in acid rain. For sensitive ecosystems like New Hampshire's, the lag in recovery time is attributed to acid accumulation and loss of buffering capacity in soils. The reduction in sulfate concentrations indicate that water quality improvements have been achieved and may continue to improve as acidifying compounds are slowly flushed from the landscape and acid rain

Hampshire. The Lake Sunapee Protective Association (LSPA) has been studying Gloeotrichia abundance in the lake since 2005.

causing pollutants are regulated.

Spring is Here, Get Ready for Ice Out!

Spring has arrived in New Hampshire, and although it may not feel like it, our lakes will soon be ice free. When that date arrives is anyone's best guess, but we need your help to keep track of when ice out occurs on your lake. "Ice out" is the term typically used to describe when the ice has melted and broken up enough to navigate a boat from one end of the lake to the other. Many New Hampshire lakes have historical ice out records dating back to the early 1900's, Lakes Sunapee and Winnipesaukee to the 1880's. The record keepers of the past, present and future have an important job. Historical ice in and ice out records and observations tell an important story for our lakes and state. They help to answer and track climatological trends, as well as interpret summer lake conditions.

To enter ice out data for your lake, VLAP has created an easy to use on-line form. Once the data have been entered, historical records for your lake are stored electronically and available upon request for use in lake association publications, scientific research and articles. So what are you waiting for? Ask the record keeper at your lake to enter the ice in and ice out data, or if you don't have data, start collecting it.

NH Department of Environmental Services
29 Hazen Drive
PO Box 95
Concord , New Hampshire 03302