

Request to the Betterment Fund for \$13,500

*Water Knows No Boundaries: Maine-NH Collaboration to Expand e.coli Testing in the Saco River Basin*

**PROJECT SUMMARY**

Fecal pollution from humans, pets and farm animals in storm water, wastewater and direct runoff is a growing threat to water quality and public health in the Saco River Watershed. This grant will enable GMCG, in collaboration with the Saco River Corridor Commission (SRCC), to acquire and implement the Colilert Test system manufactured in Maine by Idexx Corporation. This new, highly reliable, user-friendly, EPA-approved testing system will elevate and expand essential e. coli testing.

**GEOGRAPHIC REGION COVERED**

The Saco River Basin covers an area of approximately 1,700 square miles: 863 in eastern New Hampshire and 837 square miles in western Maine. The basin encompasses all or parts of sixty-three municipalities within the two states. Elevations in the basin range from 6,288 feet, the summit of Mount Washington to sea level. The Saco River flows for a total of 130 miles from the outlet of Saco Lake in Crawford Notch, New Hampshire until it reaches the Atlantic Ocean in Saco and Biddeford, Maine.

The three major tributaries of the Saco River are the Swift, Ossipee, and Little Ossipee Rivers. The Swift River flows from the northern side of Mount Kancamagus in Livermore, New Hampshire easterly for 21 miles before it enters the Saco River in Conway, New Hampshire. The Swift River drains an area of 114 square miles. The Ossipee River begins at the outlet of Ossipee Lake in Effingham Falls, New Hampshire and flows easterly for 18 miles before entering the Saco River in Cornish, Maine. It drains a 455 square mile area. The Little Ossipee River begins in Balch Pond which falls within Wakefield, New Hampshire, and Acton and Newfield, Maine. The Little Ossipee flows in a meandering, easterly course until it joins with the Saco River in Limington, Maine. It drains an area of 187 square miles.

Ossipee Lake is at the heart of the Ossipee Watershed, the drainage area of which is bound by the mountains of the Sandwich Range to the northwest, the Ossipee Mountains to the south, and the sandy pine-barrens of the Ossipee-Freedom-Effingham plains to the east. The watershed contains New Hampshire's largest stratified-drift aquifer. This type of aquifer recharges more rapidly than any other aquifer, but also allows pollution and contamination to be carried more rapidly into the underground water supply.

**NARRATIVE/PROJECT DESCRIPTION**

For over two decades GMCG has distinguished itself as a stalwart force for natural resource protection in the Ossipee Watershed. We describe our multi-faceted approach to natural resource protection as a braid of Research, Education, Advocacy and Land Conservation (REAL!). We take pride in the deep relationships we have formed with our watershed community and are ever mindful of how the pursuit of environmental quality is linked with issues of social justice, food security and economic sustainability. One of our most deeply held principles is that safe drinking water is a right of all people

regardless of their economic standing. Additionally, we believe the general public deserves access to safe, healthy waters for swimming, fishing, boating and other outdoor recreation.

As a catalyst for community action, we have warded off the construction of a major landfill that would have imperiled the aquifer and broken an ecologically sensitive conservation corridor at the base of Green Mountain in Effingham, NH. Our community organizing has also led to the passage or enhancement of groundwater ordinances in five watershed towns.

Our highly regarded youth environmental education programs reach over 700 students annually in twelve elementary, middle and high schools in NH and western Maine. These include the GET WET! groundwater testing curriculum; Volunteer Biological Assessment Program (macroinvertebrate sampling and identification); Trout in the Classroom; and the Less Plastics Initiative.

As a land trust, we annually protect and monitor five tracts of fee-owned land and 13 easements covering 2,500 acres across the Ossipee Watershed.

GMCG has become recognized as a guardian of the Ossipee Aquifer, the highly vulnerable, irreplaceable water supply that sustains the region's economy and serves as the sole source of drinking water for nearly 14,000 residents of East Central New Hampshire and Western Maine. Monitoring surface water quality is also a high priority. We are the only organization in New Hampshire conducting comprehensive year-round water testing of the Ossipee Lake System and the Ossipee River.

For two decades our annual water sampling has featured a close, formal collaboration with our Maine neighbor, the Saco River Corridor Commission (SRCC), with whom we manage the Regional Interstate Volunteers for the Ecosystems and Rivers of Saco (RIVERS). We have jointly established one water quality monitoring program that encompasses one watershed, two states and twenty-six towns. Prior to 2002, systematic water quality monitoring had never been conducted in the Saco River drainage, on Ossipee Lake, or on any of its tributaries. The paramount objective of the program is to provide the public with baseline water quality data, collected by volunteers, giving an overall picture of the water quality in the watershed.

SRCC launched their water quality testing program in July of 2001 to track potential trends in the Saco River and its major tributaries that pass through 20 communities within its corridor. The program tested for seven parameters: pH, turbidity, dissolved oxygen, temperature, e. coli, total Kjeldahl nitrogen, alkalinity and total phosphorus. Since then, testing parameters have grown to include conductivity and nutrients. In 2002 SRCC began a cooperative working relationship with GMCG to create a database to house water quality data for the entire Saco River Basin in Maine and the Ossipee Watershed in New Hampshire.

GMCG and SRCC appreciate this opportunity to request \$18,000 from the Betterment Foundation to launch a strategic upgrade and expansion of our 20-year water monitoring partnership focusing on the critical need to improve e.coli testing from the headwaters of the Saco River basin in New Hampshire to the Gulf of Maine.

Fecal pollution from humans, pets and farm animals in stormwater, wastewater and direct run-off represents an ever-increasing threat to lake and river water quality and public safety in the Saco River Watershed. While every parameter for which we test is important, the presence of fecal matter in public waterways (the State of Maine considers 126 colonies per 100 milliliters of water to be unsafe for swimming) represents one of the most direct and immediate threats to human health we face in our

watershed. E.coli has the ability to sicken an individual upon ingestion and can cause serious health effects such as vomiting, nausea, and in some cases - usually small children or the elderly – can result in kidney failure and death.

Accurate and frequent testing for E.coli is essential, particularly in the summer months when levels tend to be elevated and human exposure is most likely. Detection of its presence not only allows authorities to alert the public to its presence, but also can provide the data needed to identify its source, such as a failed septic system leaching into the waterway.

Yet testing for the presence of fecal bacteria is labor intensive and is constrained by the need to test samples within 18 to 24 hours of collection. Due to the high (and rising) cost of E. Coli testing, as well as the distance samples must be transported, GMCG and SRCC were only able to conduct 250 tests in 2020 at 22 different locations. This is a serious short-coming, both for public health and long-term research. To our knowledge, no other entity is currently conducting regular or systematic e.coli testing anywhere in the Saco River Basin.

By acquiring the capacity to test for E.coli in house, we can:

1. Dramatically reduce our costs for each e. coli tests from \$30/sample to approximately \$10/sample.
2. Eliminate transportation and labor costs associated with delivery of samples to commercial laboratories
3. Add e. coli testing to many of the 66 sampling sites in Maine and NH, enabling us to establish a more reliable baseline and monitor future trends.
4. We will have the ability to conduct rapid response testing when a municipality, commercial business or private landowner reports a potential problem. Detecting e. coli contamination as it is emerging is far superior to confirming its presence after it has caused myriad problems.
5. By more effectively monitoring for e. coli we can also improve our advance warning system for cyanobacteria blooms, as the presence of E.coli is often an indicator that excessive nutrients conducive to cyanobacteria outbreaks are entering the waterway.

Support from the Betterment Fund will enable us to acquire the Colilert Test system manufactured by Maine-based Idexx Corporation. This is new, highly reliable, user-friendly, EPA-approved technology. This web link: <https://www.idexx.com/en/water/water-products-services/colilert/> provides a clear, informative description of how it works. The 24-hour test results and the ease of use will be truly transformative for both GMCG and SRCC as we work to elevate and expand our e. coli testing program.

The project will be led by GMCG Water Quality Coordinator Jillian Emerson and SRCC Executive Director Dalyn Houser. Jill is project manager for the RIVERS program and oversees all GMCG's research initiatives in the Ossipee Watershed such as the lake testing program and our new microplastics survey. She holds a B.S. in Microbiology/Molecular Biology with a minor in Chemistry from Quinnipiac University ('08) and an ASCP certification in molecular biology (MB, ASCP(CM) '18). She joined GMCG in 2018 after 10 years working in academic research in the Department of Molecular and Systems Biology at the Geisel School of Medicine at Dartmouth College. As SRCC Executive Director, Dalyn works to bridge the gap between regulatory bodies, non-profit groups, organizations, municipalities and citizens. Her responsibilities include the implementation and enforcement of the Saco River Corridor Act and supervising SRCC's seasonal water quality monitoring program. Prior to joining SRCC in 2018, she served

as Chief of Staff and Public Policy Analyst at MS Global Partners in Atlanta, GA where she specialized in media and government relations. She is a 2013 graduate of Smith College where she majored in Environmental Science and Sociology.

Jill and Dalyn will oversee daily operation of the project and will arrange all equipment acquisition in coordination with GMCG Executive Director Matt Howe. Jill will train the RIVERS volunteers on all aspects of e.coli sampling and will be responsible for maintaining consistent sampling protocols with the volunteers. Jill and Dalyn will jointly manage the Quality Assurance/Quality Control process to monitor the integrity of the testing process and the accuracy of test results. After every 10 samples a replicate is performed in order to provide continued assurance that all aspects of the processing protocol are being followed. The protocol they will follow is based upon the protocol currently used by the Maine Beaches Program, and will be reviewed annually by the Maine Department of Environmental Protection.

Sampling will be conducted by RIVERS volunteers - NH and ME watershed residents who will be required to participate in a training program for the protocols in collecting E. coli samples. Quality control testing will be performed as part of the certification process after training with a follow-up field visit. Volunteers provide their own transportation to and from their designated sampling sites and will coordinate drop-off and pick-up of water testing equipment and water samples with the project directors.

The greatest challenge launching this program will be determining the specific locations to test for e.coli. Even with this expanded capacity, we will need to be judicious with our staff resources and materials. Prioritizing test sites will likely involve some trial and error. We will seek guidance from municipal officials, representatives of the recreation industry, and private landowners to identify a diverse array of test sites.

## **EVALUATION**

The core evaluation measure will be the increased number of tests we can conduct in more locations across the watershed in York, Cumberland and Oxford Counties in Maine and in the Saco's source waters in New Hampshire. With this technology in hand, we can predict our costs into the future and ensure that we can maintain a baseline level of testing activity for years to come. Over the past two years, commercial laboratory fees for e.coli testing doubled from \$15 to \$30/test. In 2020 it cost \$5,000 to test approximately 170 samples from 22 locations. In the summer of 2021 we hope to use the Colilert technology to test at least 300 samples from many more locations for totaling sampling costs of \$3,000 (\$10/test for the materials needed to operate the Colilert machine). As a result of this expanded capacity, we believe we will begin to detect hazardous e.coli levels in high-risk sections of the Saco River and connecting surface waters. We also believe we will be able to measure success by helping local authorities pinpoint longstanding sources of e.coli contamination resulting from outdated septic systems along lake and river shorelines. Long-term, the e.coli database we establish and maintain will allow us to monitor trends so that when spikes occur we can quickly discover them and help towns, business owners and landowners promptly address the problem and likely sources. We have funds available to evaluate the program and report results to stakeholders and the public.

### **Expenses**

Idexx Corporation Colilert

Equip.

\$6,000.00 Base cost testing machine

UV Lamp	\$500.00	required for testing process
Testing Materials and Supplies	\$3,000.00	\$10/sample for 300 tests 80 hours @ \$50/hour including taxes/benefits/overhead
GMCG Project Director	\$4,000.00	70 hours @ \$50/hour including taxes/benefits/overhead
SRCC Project Director	\$3,500.00	taxes/benefits/overhead
GMCG Executive Director	\$1,200.00	20 hours @\$60/hour including taxes/benefits/overhead
GMCG AmeriCorps	\$1,005.00	1 month total carrying cost = \$335 x 3 AmeriCorps
Mileage - all support staff	\$805.00	1,400 miles @ .575/mile
<b>Total Project Cost thru 12/31/21</b>	<b>\$20,010.00</b>	