

award-winning model of data-to-action citizen research

Lakes Lay Monitoring Program

The UNH Lay Lakes Monitoring Program (LLMP) started in 1978 as a field limnology project for students in the biological sciences. To expand its reach and impact, in 1979 the project began recruiting local citizens who live around lakes and have a vested interest in their water quality.

Jeff Schloss, who has coordinated the LLMP since 1986, currently holds a joint appointment as a research scientist in the UNH Center for Freshwater Biology and as a water resources specialist with UNH Cooperative Extension. As one of the nation's premier citizen science/student experiential learning projects, LLMP has served as the model for similar programs in 32 states and 12 countries.



LLMP Educational Program Coordinator Bob Craycraft and volunteers collect samples and take readings in Silver Lake.

“Lakes start as pristine systems that undergo a natural aging process, gradually evolving back to wetlands. Human activities can accelerate that process,” says Schloss.

“Development may remove the protective vegetation on the slopes above a lakeshore. People plant and fertilize lakeside lawns. They construct highways and other impervious surfaces that pick up and convey pollutants and nutrients directly into the lake, Schloss says. The aging that normally takes thousands of years may now happen in just 20 to 50 years, especially within the small and steep watersheds that surround our New Hampshire lakes.”

New Hampshire’s 800-plus lakes play a starring role in the state’s number one industry – tourism, says Schloss. “Yet state and federal agencies dedicate few resources to monitoring the quality of N.H. lakes. In the late 1970s, people who’d lived around lakes for a long time started noticing water quality changes. Maybe the water didn’t look as clear as it used to, or the fishing wasn’t as good. They started asking questions that couldn’t be answered. We just didn’t have the data,” says Schloss. “To develop and document the impacts of human activities, we needed a long-term monitoring program that sampled often enough to detect changes.

LLMP Fast Stats

- Program started in 1978
- Current active volunteers: 500
- NH sites monitored since 1978: 300+
- Annual volunteer hours donated: 1500+
- UNH student interns employed by LLMP each summer: 12
- Cash contributions to LLMP from towns and lake associations for travel, student labor, lab supplies, postage: \$30,000/year
- Average savings per town: \$8000/year
- Water samples collected annually: 5000+
- Provided a model for similar programs in 35 states and 12 countries.

“With all the lakes in New Hampshire, we didn’t have enough students to do the monitoring,” he says, “so we started recruiting people who lived around the lakes to do it themselves.”

Mostly through word of mouth, the innovative citizen research program grew rapidly. Today, about 500 active volunteers conduct research at more than 300 lake sites and 370 tributary and outlet sites in any given year.

“We always work under a memorandum of understanding with a local group – a lake or road association, a town conservation commission,” says Schloss. “We teach volunteer teams where and how to collect water samples, and how to take readings for lake temperature and water clarity. We set them up with mini-labs, where they filter the samples and check

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the water's acid-buffering capacity. They mail the filters, the filtrate and an extensive data sheet to Durham, where we test the samples and analyze the results in our lab.”

Schloss says, “Many water quality professionals didn't used to trust the results of lay citizen research, but our program has convinced them otherwise. Our volunteers do great work. They're highly motivated because they live in the environments whose quality they want to protect.” In addition to training each team carefully, UNH student interns and LLMP staff visit each lake at least once during the summer to conduct more in-depth sampling. “That visit allows us to assure the quality of the volunteer work,” says Schloss.

One recent success initiated by volunteers involved organizing LLMP volunteers, students and staff to collect and analyze a vast amount of data, ultimately convincing the N.H. State Department of Transportation to install new diversion ditches and culverts to reduce the amount of highway runoff reaching Lake Chocorua. This project involved coordinating the activities of 12 different agencies. If carried out by a government agency or private consulting firm, the project would have cost between \$100,000 and \$250,000. The LLMP volunteers, students and staff delivered the results for less than \$10,000.

In November, 2002, the Chocorua project won a technical achievement award from the North American Lake Management Society. Schloss calls the project “a perfect example of data-to-action, where results get funneled directly to state or local decision makers who are empowered by this data to take immediate action.” He adds, “In this case, I'd have been happy to see a 50 percent reduction in phosphorus pollution; instead we've reduced it by 84 percent to 92 percent in the restored areas.”

True to its origins, the LLMP continues to provide first-rate experiential learning for UNH students. “This program makes our students extremely marketable in a highly competitive field,” says Schloss. “When personnel departments call and learn what our students get in terms of field research, experience in a quality-assured lab, the interaction with lay volunteers — I can tell you, it makes a big difference in helping them get the job.”

Twenty-four years of LLMP baseline data, combined with the program's well-established network of volunteer water quality monitors creates a powerful scaffold from which to launch a broad range of innovative scientific investigations. Some recent examples:

- A professor and students in the Department of Resource Economics used volunteer monitoring data to quantify that a three-foot change in water clarity translates into a \$6000 devaluation in lakeside property.
- A project with the N.H. Fish & Game Department used LLMP volunteers to catch, weigh, measure and examine fish, to help quantify citizen perceptions of changes in fish condition. The project not only brought in a surge of new citizen volunteers – anglers – but it provided data that empowered local officials to enact measures that have resulted in better bass fishing.
- Under a National Science Foundation grant, LLMP co-director Dr. Alan Baker matched UNH students with experienced lakes volunteers to collect water samples the same day a satellite passed over, enabling researchers to correlate their analyses of field samples with satellite data.
- Upcoming projects for the LLMP include a shared water quality database and Web site for lakes with the N.H. Department of Environmental Services, continued applied research into water quality trends, and further investigations, led by co-Director Dr. James Haney, into harmful algae blooms.

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