

The Vermont Lay Monitoring Program (LMP) trains and equips volunteers (or Lay Monitors) to conduct periodic lake water quality sampling from their boat using quality-assured methods. Since the program's inception in 1979, the principal goals have remained the same: establish baseline water quality conditions in Vermont lakes during the summer recreation season; track long-term nutrient trends in Vermont lakes and assess monitoring data for compliance with [Vermont Water Quality Standards](#); and educate lakeshore homeowners and lake users about lake ecology and stewardship.

Lay Monitors sample a lake at an established central/deep site for total phosphorus (nutrient) concentration, chlorophyll-a (algae and cyanobacteria) concentration, and/or Secchi depth (water clarity) weekly to biweekly between Memorial Day and Labor Day (now June through August for a total of 6 samples). Since 1979, more than 100 inland lakes and 40 Lake Champlain stations have been monitored by this dedicated group of citizen scientists, with support from the Department of Environmental Conservation and Lake Champlain Sea Grant (since 2021).

The current 5-year LMP Quality Assurance Project Plan (2020-2024) is being revised in 2023 by changing the sampling methodology to biweekly surface water bottle grab sampling and optional deep water grab sampling after piloting it alongside traditional integrated-depth hose sampling in 2022 for 16 lakes. The pilot's main finding is that TP and chlorophyll-a have the highest correlation with Secchi depth when using a Secchi disk view tube/scope and when sampled by bottle grab at the surface instead of by depth-integrated hose at twice the Secchi depth. This correlation is likely because a deep hose sample can pick up additional TP from internal loading trapped in the anoxic hypolimnion of certain lakes (10 out of 16 in the study), while surface samples and Secchi depth are typically not as influenced by internal TP loading during summer thermal stratification.

Starting in 2023, in lakes with significant internal loading as well as other thermally stratified lakes of interest, a Van Dorn (horizontal) water sampler will be provided or recommended for purchase for Lay Monitors to collect deep water samples at 20 m or 1 m above the bottom, in addition to the surface water bottle grab samples at 0.5 m (see <https://lamotte.com/horizontal-water-sampler-1087>).

These changes in sampling approach will allow DEC to monitor and assess epilimnetic and hypolimnetic conditions separately at consistent discrete depths (similar to New York DEC Citizens Statewide Lake Assessment Program Sampling Protocol at https://www.dec.ny.gov/docs/water_pdf/cslapsampro.pdf). Standardizing the discrete sampling depths will also allow for better comparison of data within and between lakes because hose sampling depth varies depending on Secchi depth. The new discrete surface and deep water grab sampling data will be analyzed and assessed for trends separately from the historical depth-integrated hose data, as will Secchi depth data with and without using a view tube/scope. However, new trends in surface (epilimnetic) and deep-water (hypolimnetic) conditions can be calculated after only five years and DEC will not be able to make direct trend comparisons between data collected with the new method and data collected with the old hose (integrated-depth) method.

These revisions stem from the need for a simplified protocol for all LMP lakes to collect water quality data at consistent discrete depths to better inform assessment, while minimizing the risk of equipment contamination. The use of a Secchi disk with a view tube/scope will also be required for all Lay Monitors once supplied. Finally, new caffeine testing of lake water samples will be added as a tracer of pollution from human wastewater sources (i.e. septic systems). If the caffeine results show detectable concentrations, especially if some are higher, then we can present this data to municipalities, town health officers, lake associations and other stakeholders to take action on inspecting and improving septic systems in partnership with DEC.