

## **Annual Report of the Lake Massapoag Advisory Committee 2022**

Laura Henze Russell, Chair (Planning Board Appointee); Debbie Tatro, Vice Chair (Conservation Commission Appointee); Colin Barbera (Conservation Commission Appointee); Daniel Lewenberg (Planning Board Appointee); Stanley Rosen (Select Board Appointee); Kenneth Hyman (Select Board Appointee); Gary Bluestein (Recreation Advisory Committee Appointee).

The Lake Massapoag Advisory Committee (LMAC) had a busy year, with passage of Warrant Article 15 at May Town Meeting to update and expand its charge and membership, and approval of a first-time CPC grant and increased operating budget to support its activities and key initiatives, outlined below. The committee has seven members: two appointees from each of the Select Board, Planning Board and Conservation Commission, and one from the Recreation Advisory Committee.

LMAC website: <https://www.townofsharon.net/lake-massapoag-advisory-committee>

Sign up for alerts and news: <https://www.townofsharon.net/subscribe> (Board of Health, LMAC)

Lake Massapoag website: [www.lakemassapoag.net](http://www.lakemassapoag.net)

How to identify Cyanobacteria: <https://www.lakemassapoag.net/cyanobacteria.html>

Top 10 ways to protect the Lake: <https://www.lakemassapoag.net/what-can-i-do-top-10.html>

### **Education and Engagement**

In 2022, LMAC launched a new website, [www.lakemassapoag.net](http://www.lakemassapoag.net), filled the beach path kiosks with new educational posters, hosted two Lake Information Walks (and a Virtual Walk now on YouTube), organized an EPA cyanobacteria training attended by 35 people, hosted a table at Sharon Day, and reached out and engaged stakeholders such as Sustainable Sharon Coalition, Sharon Friends of Conservation, Friends of Lake Massapoag Facebook group, Camp Wonderland, Everwood Day Camp, Massapoag Yacht Club, and the Restore Our Oceans Club at SHS. Based on LMAC's request, the Select Board voted to add to its goals for 2023, "Identify and implement methods to reduce use of nutrients that feed algal blooms and bacteria in Lake Massapoag, and accelerate transition to updated septic systems."

### **Lake Testing Program**

LMAC embarked on a comprehensive lake testing program in 2022 with CPC and town support. Findings have confirmed that Lake Massapoag, as an aging lake in a developed area, is moving toward eutrophication, creating increased health risks. Concerted multiyear action is needed to mitigate high phosphorus and E. coli levels, and invasive weeds, and identify potential sites/sources of excess phosphorus inflow and septic seepage.

LMAC contracted TRC to conduct comprehensive in-lake testing at the "Deep Hole" and coves, as well as an invasive weed survey. Conservation Administrator Josh Philibert did monthly phosphorus and E. coli testing at lake inflows, NepRWA added Sucker Brook as a monthly CWMN test site and conducted a "hot spot" survey along Sucker Brook with Josh, while Vice Chair Debbie Tatro piloted source tracking of E. coli using DNA testing along Sucker Brook, and did weekly cyanobacteria monitoring in the Deep Hole. In addition, rain-event and post-rain inflow testing confirmed increased flow of excess nutrients into the lake upon heavy rain events.

LMAC developed a [Dashboard](#) to summarize key test results. The Dashboard and [detailed test results](#) are posted on LMAC's website, along with [TRC's Report](#).

### **In-Lake Nutrient Levels**

TRC's comprehensive lake water quality testing program (3 times in the Deep Hole, South Cove, Fletcher's Cove, and once in Horton's Cove) showed high levels of phosphorus in the Deep Hole, Lagoon inlet to the South Cove, and Fletcher's Cove in June before the seasonal growth of aquatic plants absorbed some of the phosphorus, resulting in acceptable levels in July. In early October, phosphorus was increased modestly at the Deep Hole bottom, and rose in South Cove (where "DASH" weed removal was conducted). Deep Hole data showed thermal stratification of the lake, with dissolved oxygen content falling deeper in the water column with summer heat, creating anoxic conditions which can facilitate phosphorus release from the lake bottom.

### **Nutrient Inflows**

Several inflows to the lake, including those emptying into the South Cove, Fletcher's Cove, Beach St., and Memorial Beach area, had repeated [high phosphorus levels](#). Because of the prolonged drought during most of the summer, stream inflow rates were lower, thus total phosphorus inflow was lower, and this may have helped reduce the incidence of cyanobacteria blooms. The highest inflow phosphorus levels occurred during a rainstorm in late August, and again after a period of extended rain in early September. With stream inflow rates higher after the rain, more phosphorus was flushed into the lake during late summer, which likely fueled the observed cyanobacteria blooms at that time. These data point to the need to determine whether older septic systems are contributing to phosphorus inflow, and also whether non-septic sources such as lawn fertilizers are a source.

### **Accumulated Phosphorus Deposits in Lake Massapoag's Deep Hole**

Aging lakes face the challenge of accumulated phosphorus deposits in the lake bottom sediment over the years, which may need to be addressed on a periodic basis to help prevent eutrophication. In order to evaluate the level of phosphorus build-up in the lake's sediment, TRC obtained a grab sample of sediment from the Deep Hole in October which showed significant levels of iron-bound phosphorus, which can be released when dissolved oxygen conditions are low, as found in the Deep Hole during July. More sediment testing is planned to assess if an alum treatment is indicated to effectively bind up phosphorus, which feeds cyanobacteria.

### **E. coli concerns at Sucker Brook and Community Center Beach**

[E. coli levels in Sucker Brook](#) were again elevated in 2022, and the adjacent Community Center Beach was closed due to repeatedly [high E. coli levels](#), occurring 44% of dates tested. As a consequence, the Recreation Advisory Committee recommended that this beach be closed to swimming in 2023. LMAC supports this action. Both residents and nonresidents will be accommodated for swimming at Veterans Memorial Park Beach. LMAC plans more targeted source testing in 2023 to learn about potential sources of the E. coli.

### **Extensive Fanwort Expansion**

LMAC used \$17,700 in Reserve Funds to clear an extensive area of dense invasive fanwort from the South Cove using Diver-Assisted Suction Harvesting (DASH) by NEAS in 2022. However, 16 days of DASH was recommended for 2021 but none was done and only 8 days were funded in 2022. 2022 appeared to be a prolific year for fanwort expansion as confirmed by other towns. NEAS estimated that 25-30 days of DASH are needed in the South Cove for 2023. TRC maps also showed dense fanwort infestation in the lagoon, and expansion in Fletcher's cove. As the South cove can be seeded by fragments of fanwort flowing from the lagoon, fanwort control in the lagoon is a priority, and expansion of fanwort in Fletcher's cove must also be addressed.

### **Cyanobacteria: Deep Hole monitoring and limited blooms**

LMAC purchased equipment to monitor cyanobacteria in lake water samples, and Vice Chair Debbie Tatro began a program of weekly monitoring of cyanobacteria in the Deep Hole. Microcystis was the dominant genus of bloom forming cyanobacteria in late July to early August. Dolichospermum became the dominant genus in late August. Benchmarks developed by the Worcester Cyanobacteria Monitoring Collaborative suggest there is low risk of toxin exposure when phycocyanin levels are low as seen in the Deep Hole. No significant cyanobacteria blooms were seen through August, likely because of the drought, and reduced phosphorus inflow into the lake. In contrast, summer 2021 was quite rainy and run-off from three intense summer storms likely fueled a cyanobacteria bloom and lake closure in July of that year. Occasional and localized cyanobacteria blooms in early September through October were associated with heavy rainfall events, which wash phosphorus into the lake through inflows and runoff. The Sept/Oct cyanobacteria blooms may also have been associated with seasonal turnover of the water column in the lake's Deep Hole, which releases phosphorus from lake sediments. In October, in consultation with the Health and Conservation Departments, LMAC issued a Cyanobacteria Alert that was released via the town's alert email system.

### **Climate Impacts and Lake Levels**

In contrast to summer 2021, which experienced high rainfall and three intense storms, 2022 was a drought year with significantly [less rain from March through August](#) (10.4 inches below historical average those months), ending the year almost 6 inches below average rainfall. Because of this, both the [lake level and flume depth](#) fell below their target levels for much of the summer. It was also a warm summer and year, with [July and August temperatures](#) each more than 5 degrees above historical averages, ending the year over 3 degrees higher. Increased rainfall this fall has enabled the lake level to recover by the end of 2022, and flume depth to increase but still below the target level.

### **Summary**

We made significant progress in 2022 with Town and CPC support. With concerted effort by LMAC, sampling by Conservation Agent Josh Philibert, and in partnership with Town departments and contractors TRC, NepRWA, NEAS, and support of many stakeholders, we began comprehensive data collection, source tracking, and outreach to community members on significant threats to lake health from excess phosphorus, E. coli, and invasive aquatic weeds. Sustained effort and investments to safeguard lake water quality, limit excess nutrients, harmful bacteria, and invasive weeds will be needed over several years to restore Lake Massapoag's health. Our committee thanks Josh Philibert for his service as Conservation Administrator to the Town of Sharon. We welcomed Debbie Tatro, Dan Lewenberg and Gary Bluestein as new members this year.

Respectfully submitted, Laura Henze Russell, Chair