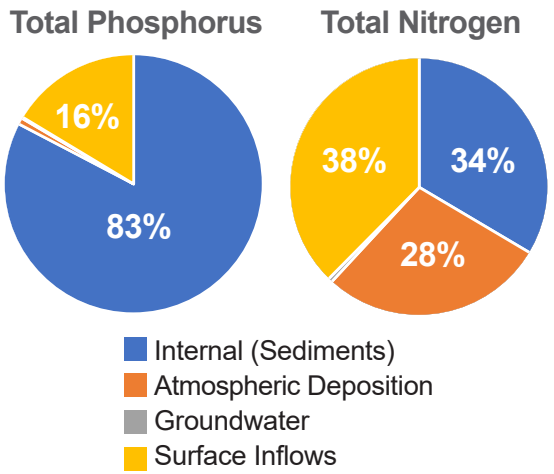
## TECHNICAL FINDINGS
## Nutrient Loading

**All Loading**




The majority of surface inflows are from Monponsett Pond.

## Internal vs. External Loading of Nutrients

- Excessive nutrients cause water quality problems.
- Internal loading from the sediments was the largest source of phosphorus to Silver Lake (>80%) because of accumulation over time from watershed and diversion sources.
- External loading accounted for a larger share of nitrogen loading, mostly through surface inflows and atmospheric deposition.
- Diversion from East Monponsett Pond was the largest source of external phosphorus and nitrogen loading.

## Key Takeaways

Silver Lake still supports some uses but is facing multiple management challenges: invasive plants, low dissolved oxygen, excessive phosphorus, and harmful algal blooms. These issues are affecting Silver Lake's suitability as aquatic habitat and a community resource.

## Next Steps

Develop and implement an appropriate management response plan to address current impairments and future risks.

A large-scale approach will be needed to fully address the observed issues on a broader basis.

1. Ongoing monitoring is recommended to track water quality, water quantity, and ecological trends.
2. Additional modeling to evaluate the effectiveness of alternative management scenarios.
3. Ultimately need to develop a comprehensive management plan for Silver Lake.
4. Participate in Old Colony Planning Commission Regional "Economic Resilience and Sustainable Water Supply Study."

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# Silver Lake Water Quality Monitoring Program

## Halifax, Plympton, Pembroke, and Kingston, Massachusetts

September 2021 – October 2022

## Purpose

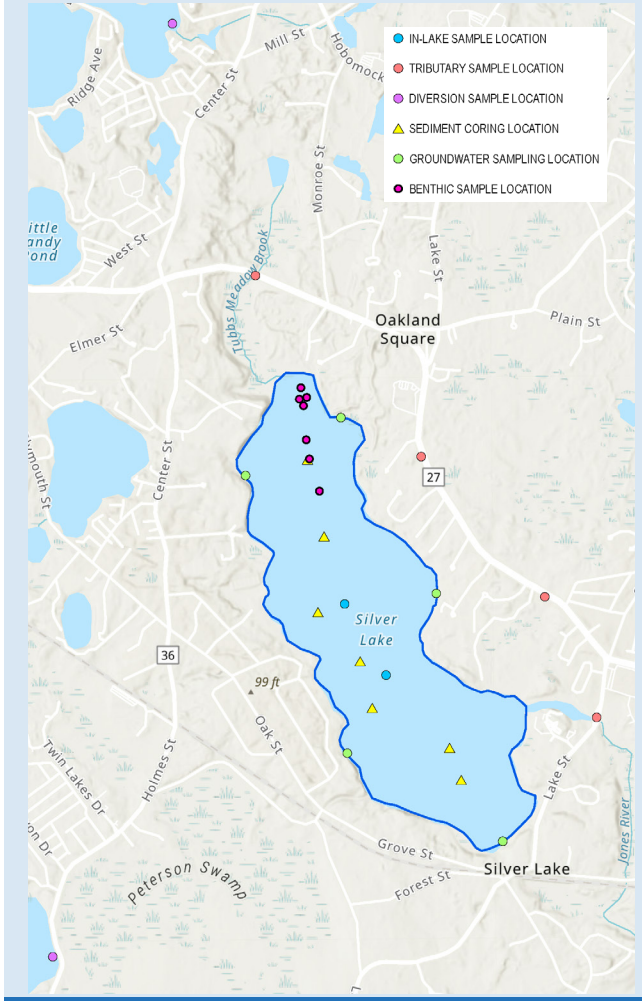
The Silver Lake Water Quality Monitoring Program was initiated to investigate and document water quality conditions within Silver Lake, its watershed, and interbasin diversion sources (Monponsett Pond and Furnace Pond).

The overall goals of this Monitoring Program were as follows:

1. Collect water quality data to help inform community management decisions.
2. Develop a baseline understanding of current water quality conditions.

## Water Quality Monitoring

**TECHNICAL APPROACH** – In-lake, watershed, and diversion source data was collected between September 2021 and October 2022. Each month, discrete samples were collected for laboratory analysis and field measurements were obtained. Data loggers also continuously recorded temperature and water depth from multiple sample locations over the course of the Water Quality Monitoring Program.




## TECHNICAL FINDINGS:

### Aquatic Invasive Plants Present

Three invasive aquatic plants (fanwort, Eurasian milfoil, and variable-leaf milfoil) were present and widely distributed in Silver Lake. These fast-spreading plants produce dense growth, which may impact water quality and aquatic life.

### Cyanobacteria and Cyanotoxins Present

- Undesirable cyanobacteria were common members of the algal community much of the year.
- Toxins produced by cyanobacteria were detectable in the lake, sometimes higher than state and federal health advisory levels.

### Sediment Phosphorus Levels High

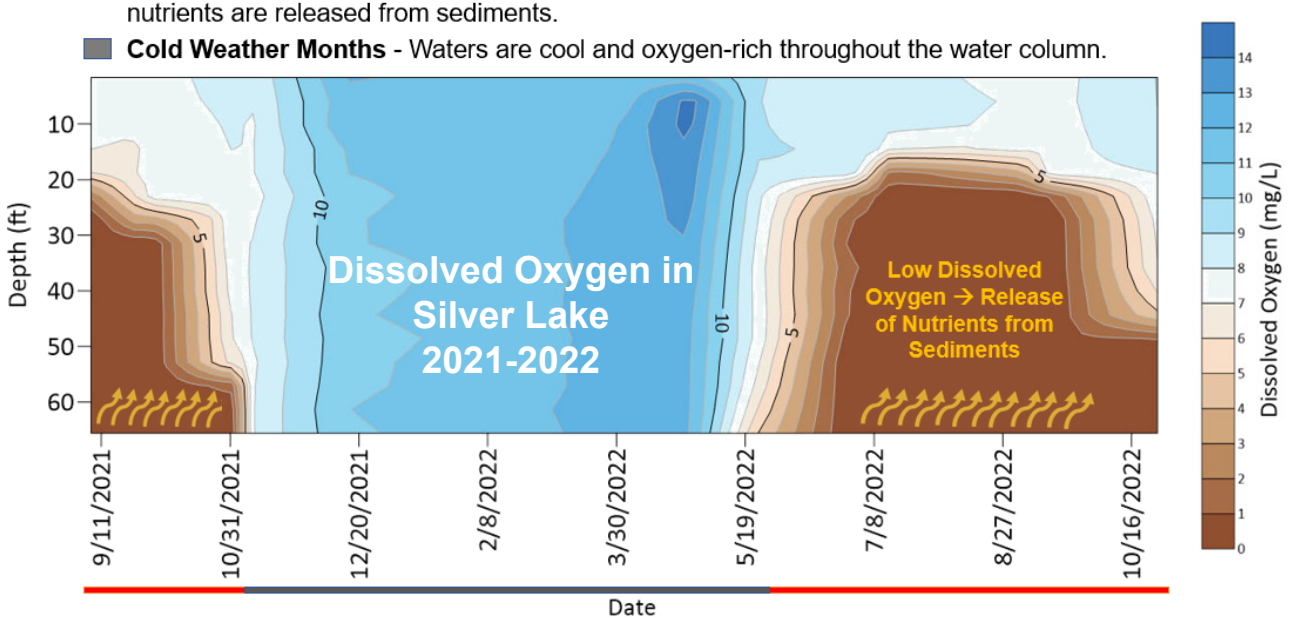
Sediment coring indicated a high potential for phosphorus release when dissolved oxygen is low, which occurs in bottom waters of the lake for several months over the course of the year.

### Other Water Quality Issues

- Dissolved Oxygen – Low or absent from bottom waters. Needed to support aquatic life.
- Total Phosphorus – Levels were excessive. This creates a higher risk of harmful cyanobacteria blooms.

**Warm Weather Months** - Waters are warm and oxygen-rich at the surface and cool and oxygen-depleted at greater depths. When dissolved oxygen concentrations are low, nutrients are released from sediments.

**Cold Weather Months** - Waters are cool and oxygen-rich throughout the water column.





Fanwort

Eurasian Milfoil


Variable-leaf Milfoil