Rangeley Lakes Heritage Trust

CONSERVE | RESTORE | STEWARD

2026 Water Quality Report

Mooselookmeguntic (Cupsuptic) Lake



Survey History:

Mooselookmeguntic Lake, located in Rangeley, ME is a developed water body in the area. It has a mean depth of 18.2m (60ft) and a maximum depth of 40.2m (132ft). The maximum depth is represented by station 1 (*Figure 1).* Mooselookmeguntic has 5 monitoring stations spanning across the water body with station 5 being the shallowest, reaching a maximum depth of 10.7m (35ft). Monitoring on Mooselookmeguntic began in 1981 and has continued since with multiple gaps in the data. These stations provide important information about water clarity, water temperature, dissolved oxygen, and water chemistry parameters, including phosphorus. Collecting and studying this data helps with understanding not only the current state of Mooselookmeguntic, but also how it has been changing in recent years due to rising temperatures, shorter winters, and increased runoff from developments.

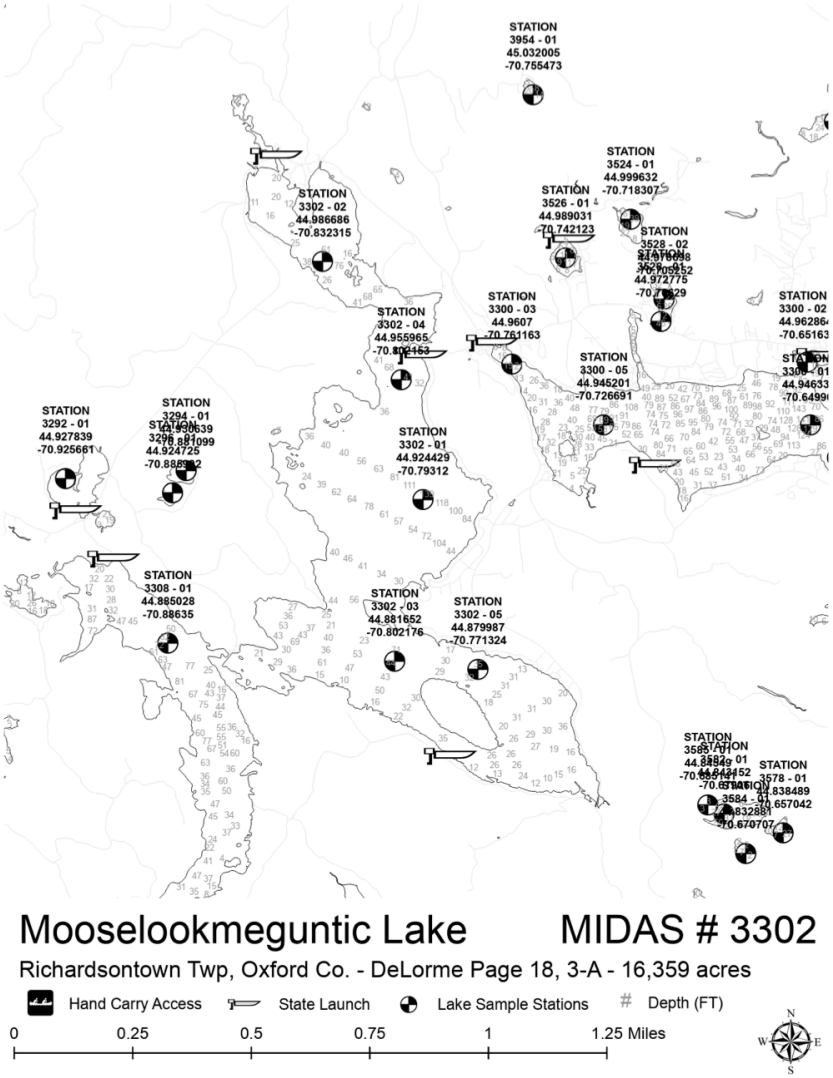


Figure 1. Map of Mooselookmeguntic Lake and its sample stations. Via Lakes Stewards of Maine

At each lake and pond monitored, annual readings of water transparency, dissolved oxygen, and water temperature are recorded, as well as one phosphorus sample that is collected in late summer. In recent years, these readings have been taken by RLHT's Headwaters Coordinator twice a month between May and October. In the past, some years had a lack of volunteers or the resources to monitor the water body biweekly as suggested by the state and Lake Stewards of Maine. Therefore, the data has some gaps which could account for minor inconsistencies in the data. Due to warming air temperatures and increased lakefront development, most lakes in Maine have been warming and have a greater chance of change.

While there are 5 survey stations on Mooselookmeguntic, station 5 only has a few years of water transparency readings and no dissolved oxygen or water temperature readings. There is a reasonable amount of secchi data but not enough to determine water transparency trends at this station. Due to the lack of information, no significant temperature, DO, or phosphorus trends were able to be distinguished from this station. Therefore, stations 1, 2, 3, and 4 will be the primary stations used in this report as sufficient data is available from these stations for all parameters.

Current Trends:

Common trends occurring on lakes and ponds in Maine is the tendency to become warmer and more polluted due to climate change and lake front development. Warmer waters are not capable of holding as much oxygen compared to colder waters. When oxygen levels drop too low, lakes are unable to support fish, plants, and other aquatic organisms. When pollutants increase, such as runoff from fertilizers, herbicides, human and pet waste, and other man-made materials, it creates a viable environment for increased algae growth and decreased oxygen and water transparencies. Although these trends are common statewide, they are not necessarily the same trends that are being observed on Mooselookmeguntic.

Mooselookmeguntic is currently experiencing different trends depending on which station is observed. Factors that affect each station include proximity to streams and rivers, development of the surrounding shoreline, and inconsistencies with the data that has been collected. While some of the stations have been monitored for over 40 years, others are new to monitoring and only have data for around 20 years.

<u>Water Transparency:</u>

Water transparency readings are taken with a Secchi disk and an Aquascope to determine the depth at which light can penetrate through the water. This reading tells us how clear or turbid the water is at any given time. Taking readings with the secchi disk also suggests how abundant pollutants are in the water. Turbid water typically indicates the lake has more runoff. It is important to note, however, that natural factors like rain, seasonal changes, and proximity to the shore can influence secchi readings to be lower due to increased sediments in the water. A higher secchi reading is preferred as it indicates that the water is clear, unpolluted, and contains little to no runoff. A lower secchi reading indicates increased pollution and runoff. Deeper secchi

readings suggest clearer waters which expand the littoral zone allowing more plants to grow and improve the health of fish and loons by allowing more light penetration and visibility.

At Stations 1 and 2, Mooselookmeguntic is experiencing stable water transparency trends. Since 1981, a weakly correlated trend shows that water transparency has remained relatively stable (*Figures 2 & 3*). This implies that there is a limited amount of runoff and pollution entering the water. This could be because of their locations on the water body. Stations 1 and 2 are the two deepest parts of Mooselookmeguntic and are most likely not experiencing as much runoff from the shore.

At station 3, Mooselookmeguntic is experiencing increased water transparency. Since 1996, a weakly correlated trend shows that water transparency has increased by about 0.5mg/L since monitoring began (*Figure 4*). Increasing transparency is ideal as it suggests a healthier lake with less polluted water. Station 3 is further away from the shore compared to the other stations which could explain the increase in water transparency. It is most likely experiencing little to no runoff from the shore.

At Station 4, Mooselookmeguntic is experiencing decreased water transparency. Since 2002, a weakly correlated trend shows that water transparency has decreased by less than 0.5mg/L (*Figure 5*). This decrease could be due to the location of station 4. It is the second shallowest station and is located close to shore by a popular boat launch which could be contributing to this decreasing trend. Overall, the trends observed across all four stations suggest healthy and relatively unpolluted waters on Mooselookmeguntic Lake.

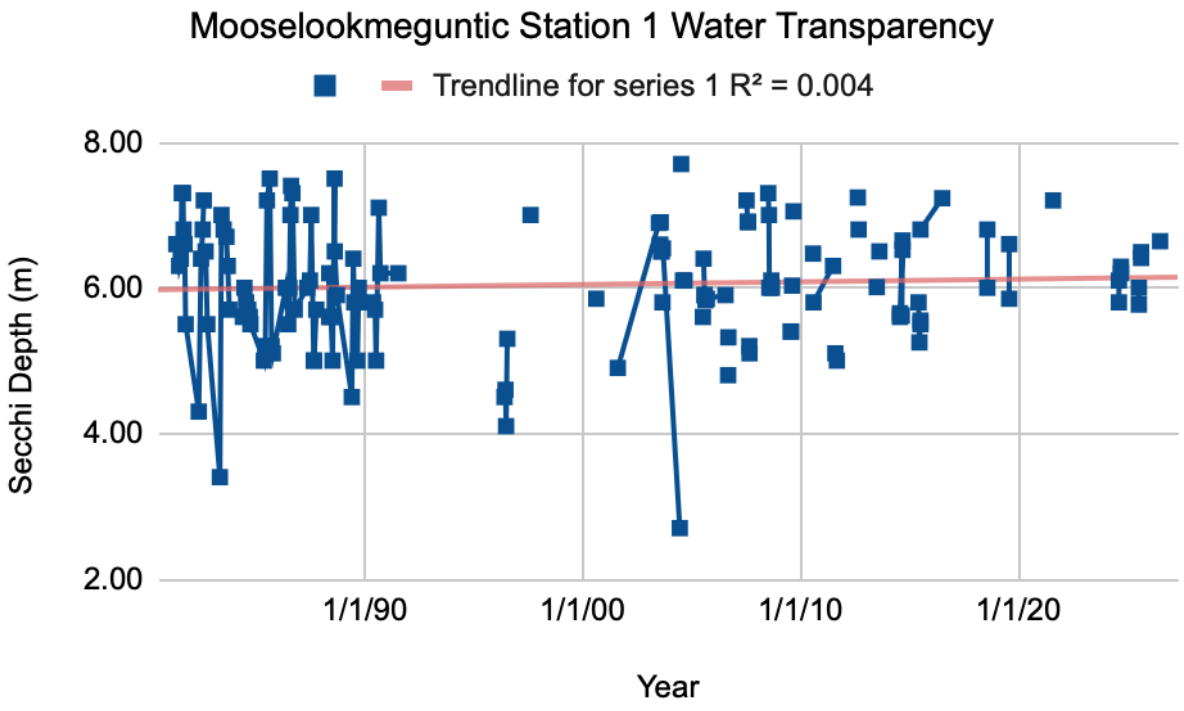


Figure 2: Water transparency readings at station 1 on Mooselookmeguntic since 1981 showing a stable trend with a minimal increase.

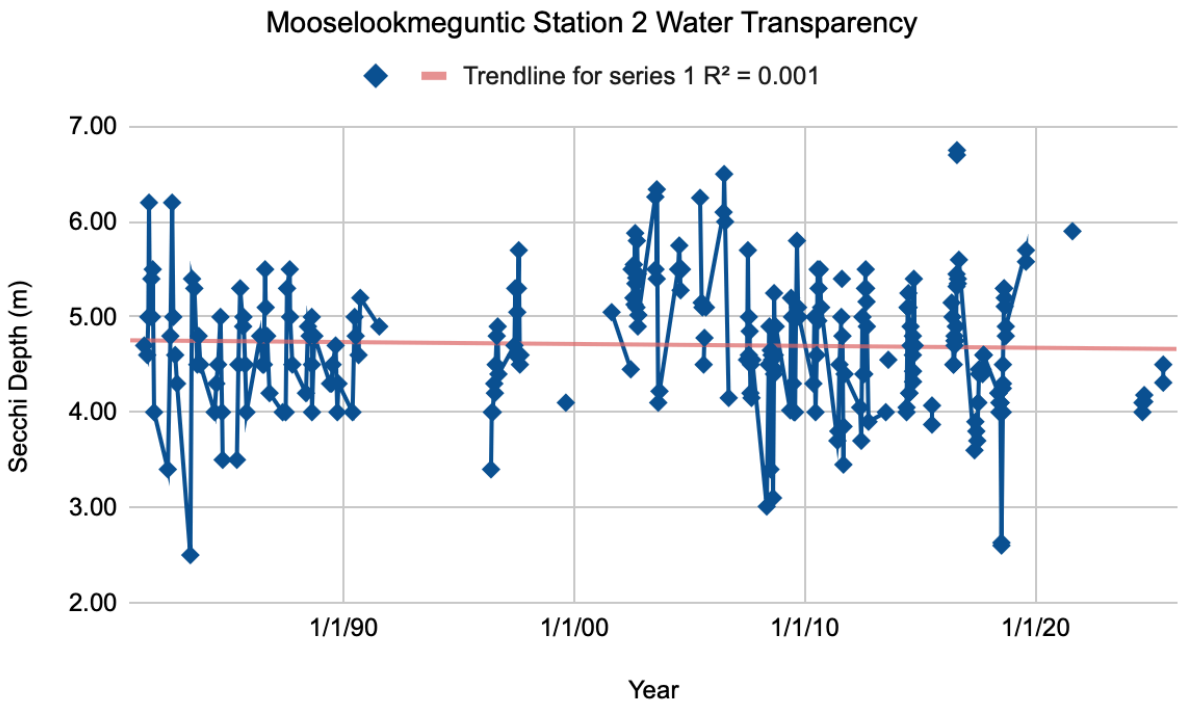


Figure 3. Water transparency readings at station 2 on Mooselookmeguntic since 1981 showing a relatively stable trend.

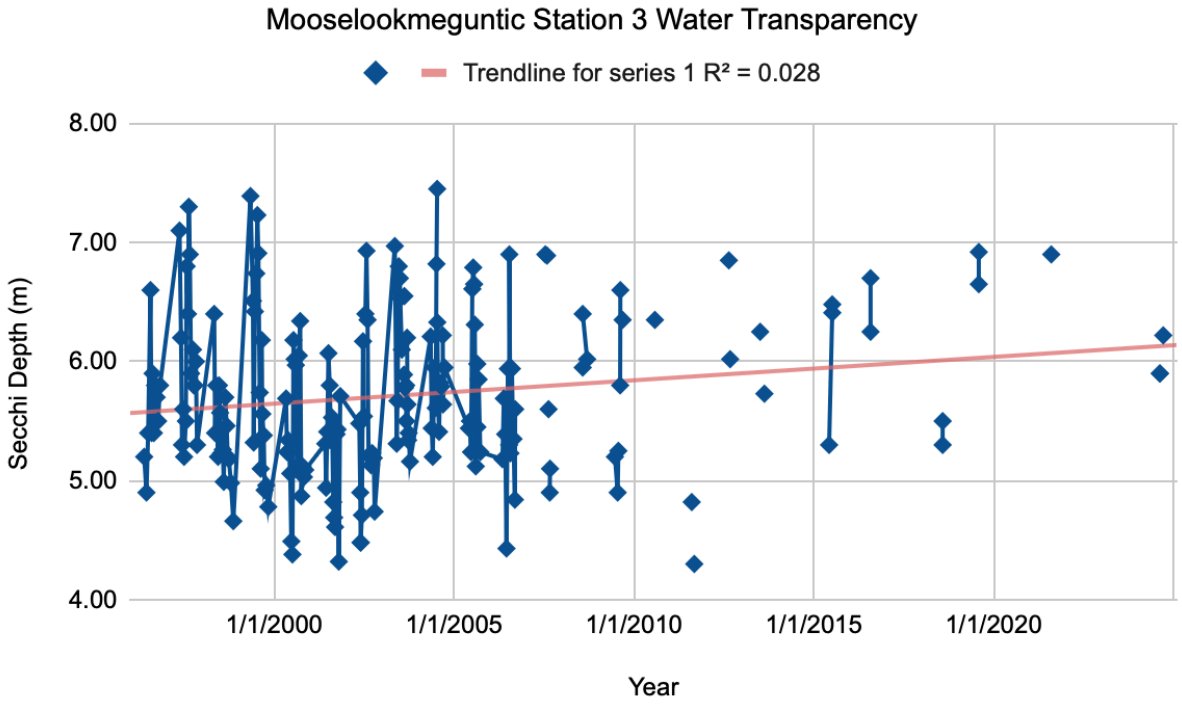


Figure 4. Water transparency readings at station 3 on Mooselookmeguntic since 1996 showing a slight increase.

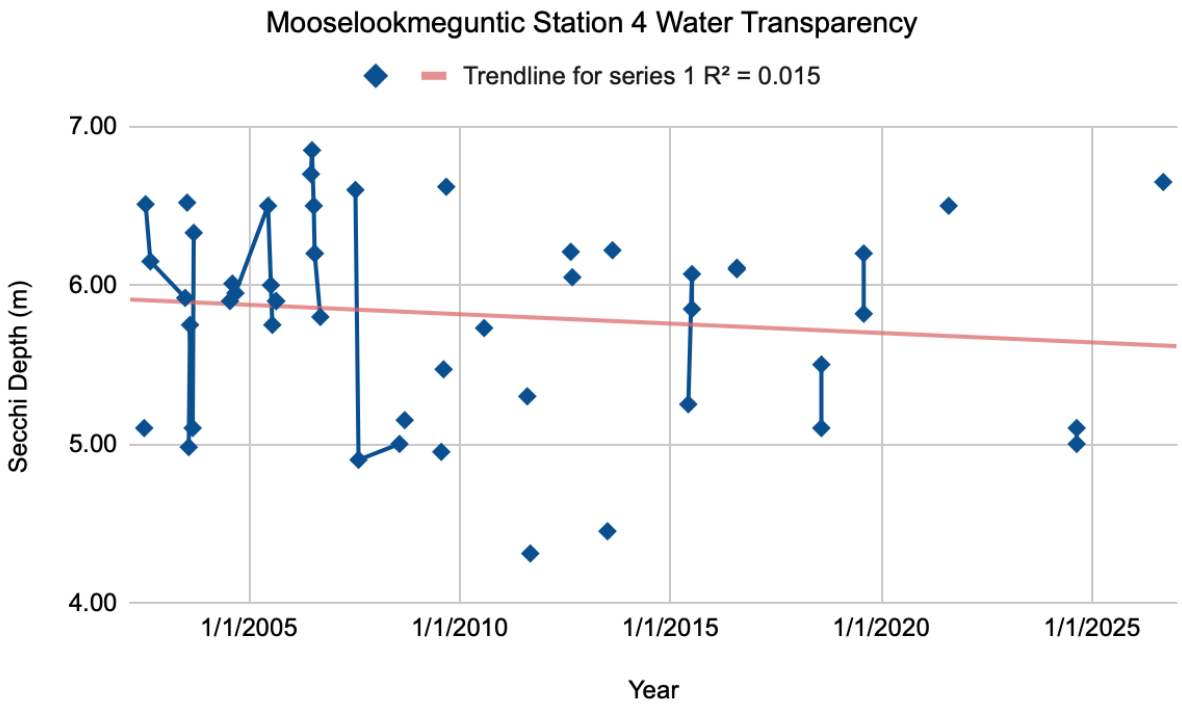


Figure 5. Water transparency readings at station 4 on Mooselookmeguntic since 2002 showing a slight decrease.

Dissolved Oxygen:

Dissolved Oxygen (DO) readings are taken with a dissolved oxygen meter that is slowly lowered from the surface of the lake to the bottom in 1m increments. DO levels can fluctuate greatly from the surface to the bottom for a host of reasons, including water temperatures, decomposing matter, light penetration, and photosynthesis abilities. In the summer, it is expected that DO will be lower at the bottom of a water body. However, if DO levels are too low throughout the entire column for long periods of time, aquatic life will not be able to thrive. According to the US EPA, when dissolved oxygen levels drop below 5mg/L, the waters become stressful to fish and other aquatic life. When levels drop below 3mg/L, they can no longer support fish. Anything below 1mg/L is considered a hypoxic dead zone where nothing can survive. When temperatures rise, or excess nutrients such as phosphorus and nitrogen enter the water, DO levels will decrease.

At stations 1 and 2, Mooselookmeguntic is experiencing a decrease in DO. Since 1981, a moderate correlation shows that DO has slightly decreased by about 1mg/L (*Figures 6 & 7*). This is a negative trend that suggests less oxygen is in the water which could harm aquatic life. This trend is common as the station is also experiencing slightly increasing temperatures which usually results in lowered dissolved oxygen readings. At station 2, DO has reached the stressful threshold of 5mg/L once in 2002. This is slightly concerning, however, since then, DO has not dropped below 5mg/L again. Station 3 is experiencing a minimal decrease, however, it is mainly stable. It is important to note that, although stations 1 and 3 are experiencing declines, neither have reached the stressful threshold.

At station 4, Mooselookmeguntic is experiencing an increase in DO. This is a positive trend that suggests that more oxygen is in the water allowing aquatic life to thrive. However, this trend is not common as the station is also experiencing increasing temperatures which usually results in lowered dissolved oxygen. This station has also been monitored for the least amount of time, which could also suggest that in more recent years, DO has been increasing.

The trends across all four stations suggest that across the majority of Mooselookmeguntic, DO levels have been decreasing. However, in recent years, these readings have leveled out which suggests that they are not decreasing dramatically. It is also important to note that these levels are not low enough to cause stress for aquatic life.

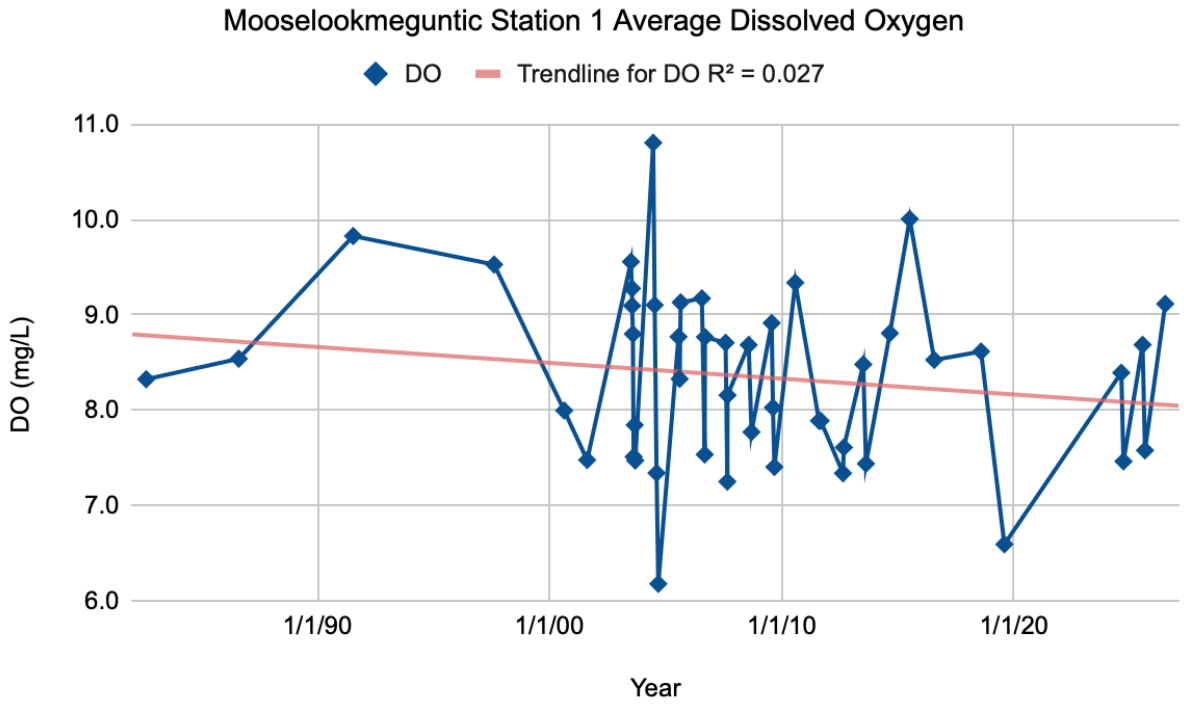


Figure 6. Average summer DO readings on Mooselookmeguntic taken between May and October since 1981 showing a significant increase.

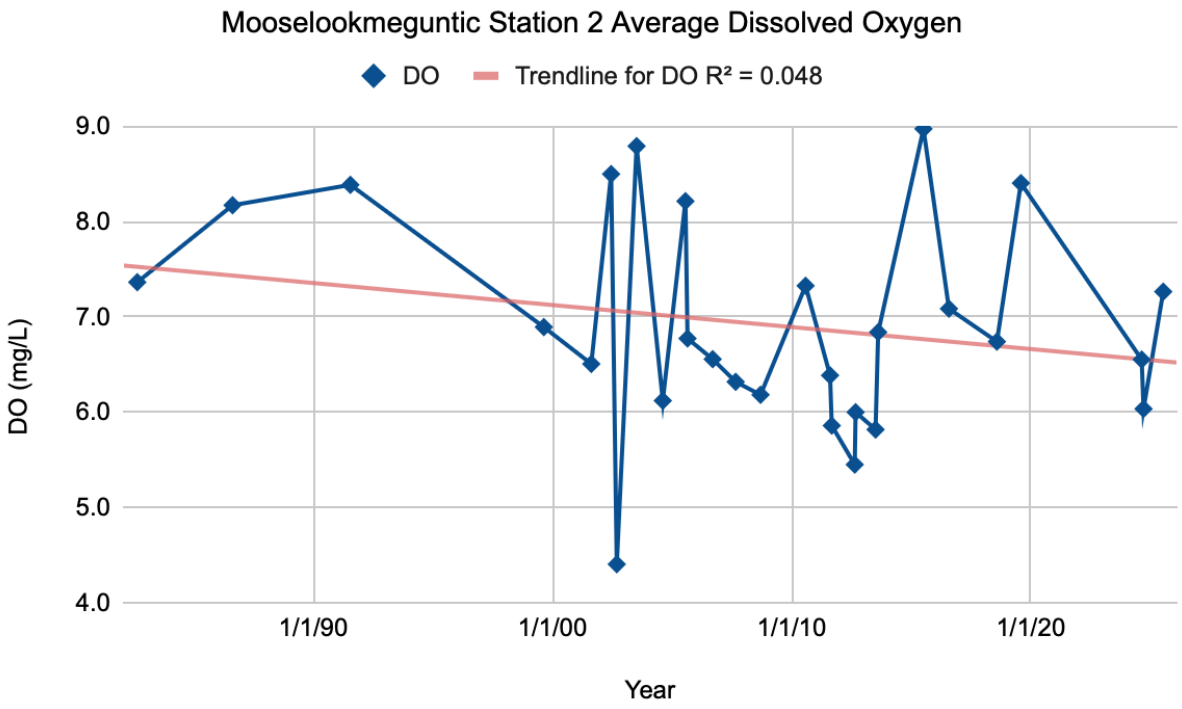


Figure 7. Average Summer DO readings on Mooselookmeguntic taken between May and October since 1981 showing a slight decrease.

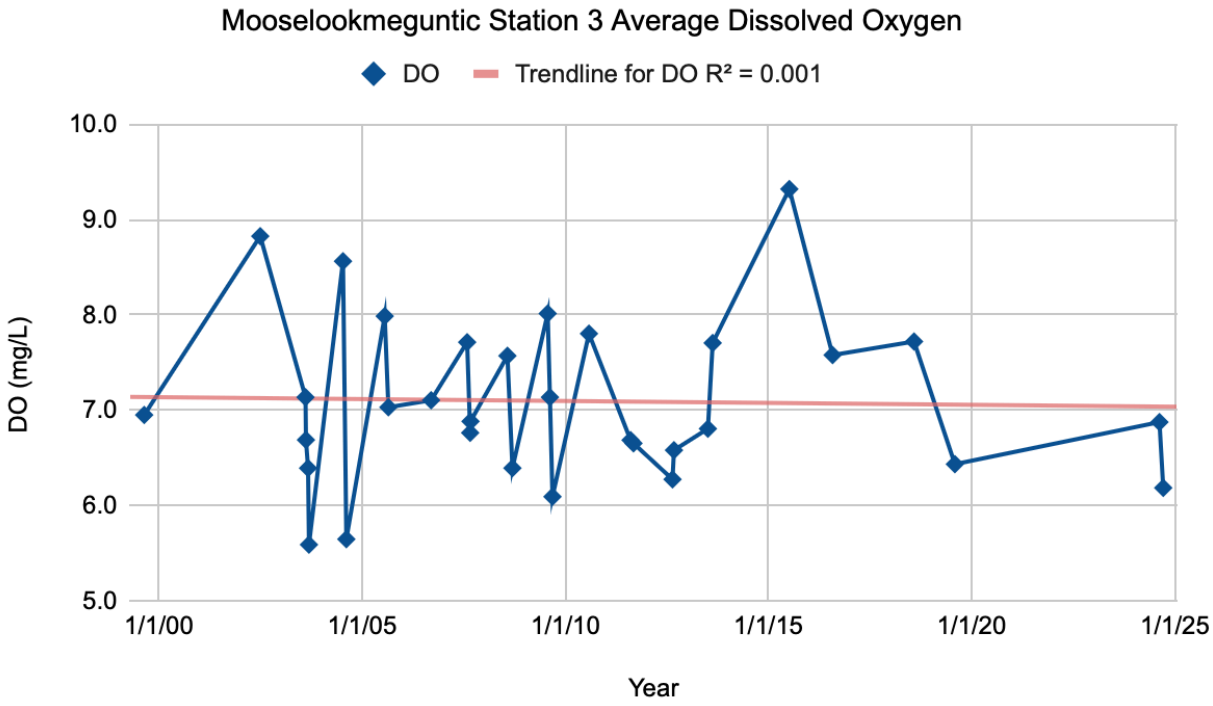


Figure 8. Average Summer DO readings on Mooselookmeguntic taken between May and October since 1996 showing stable conditions with a minimal decrease.

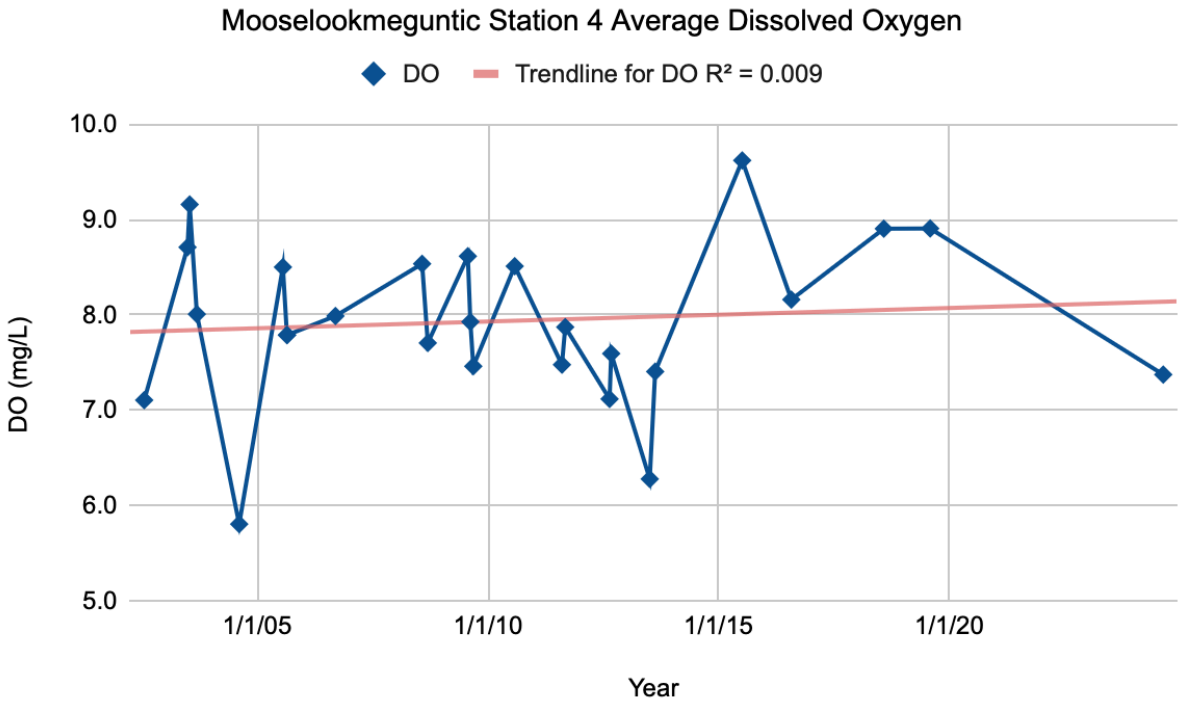


Figure 9. Average Summer DO readings on Mooselookmeguntic taken between May and October since 2002 showing a slight increase.

Water Temperature:

Water temperature readings are taken with the same meter as DO and are measured in 1m increments from the surface to the bottom of the lake. In the summer, temperatures are typically higher closer to the surface while they are much cooler closer to the bottom. Rising temperatures in a lake can directly affect fish and other aquatic life, as well as increasing algal blooms, decreasing DO levels, and in extreme cases, lead to hypoxic dead zones. Lake temperatures have been increasing across New England for decades, and Mooselookmeguntic is experiencing similar trends.

At stations 1 and 2, Mooselookmeguntic is experiencing a slight decrease in water temperatures. Since monitoring began in 1981, trends show temperatures have decreased by about 1°F (*Figures 10 & 11*). Station 1 could be experiencing cooler water temperatures due to it being the deepest station on the lake. Station 2 could be experiencing decreased water temperatures because it is located between the Cupsuptic River, Kennebago River, and Toothaker Brook. It is possible that these three lotic systems are depositing cold water into the lake and contributing to the decrease in water temperature.

At stations 3 and 4, Mooselookmeguntic is experiencing increased water temperatures. They are shallower than stations 1 and 2 which could contribute to this increasing trend. However, it is common for water temperature to be increasing in the region due to climate change and increasing air temperatures. Overall, water temperatures seem relatively stable.

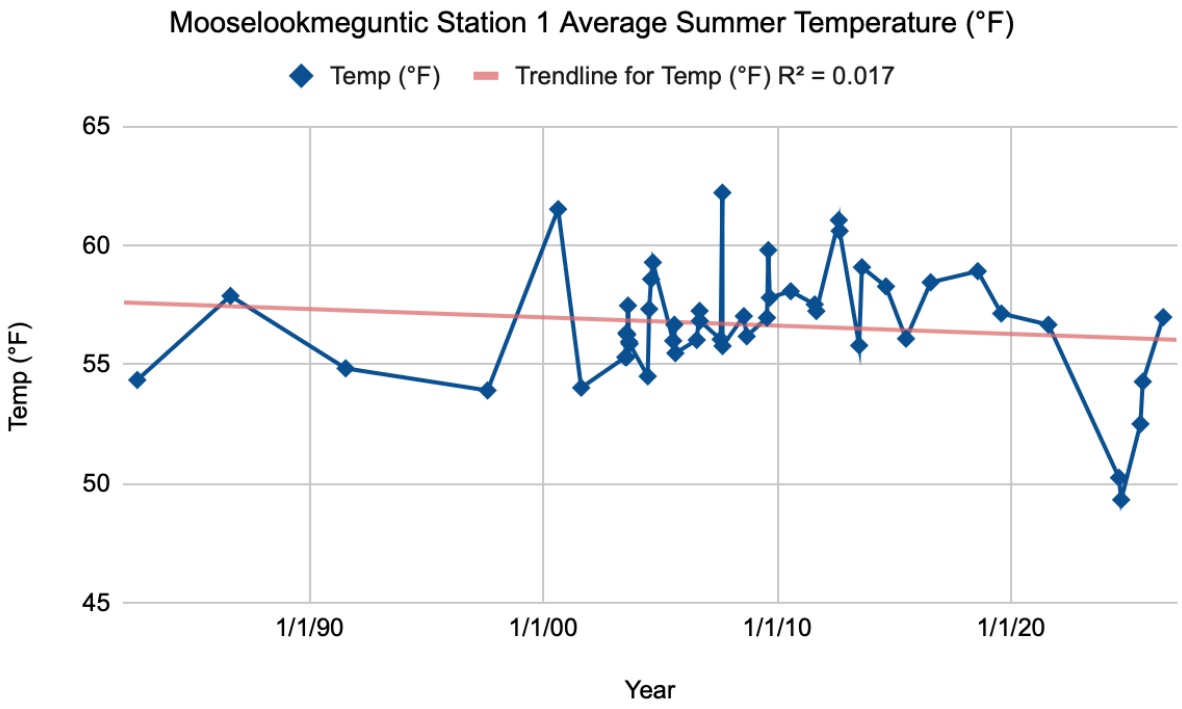


Figure 10. Average summer water temperature readings on Mooselookmeguntic taken between May and October since 1981 showing a slight decrease.

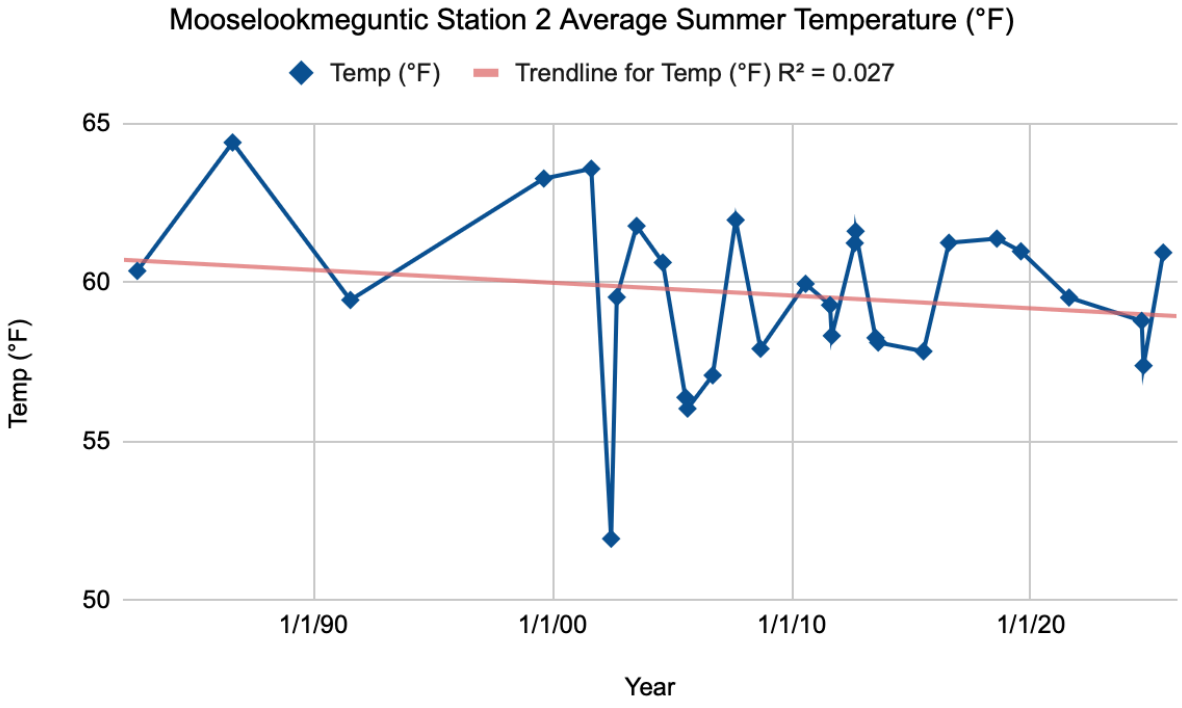


Figure 11. Average summer water temperature readings on Mooselookmeguntic between May and October since 1981 showing a slight decrease.

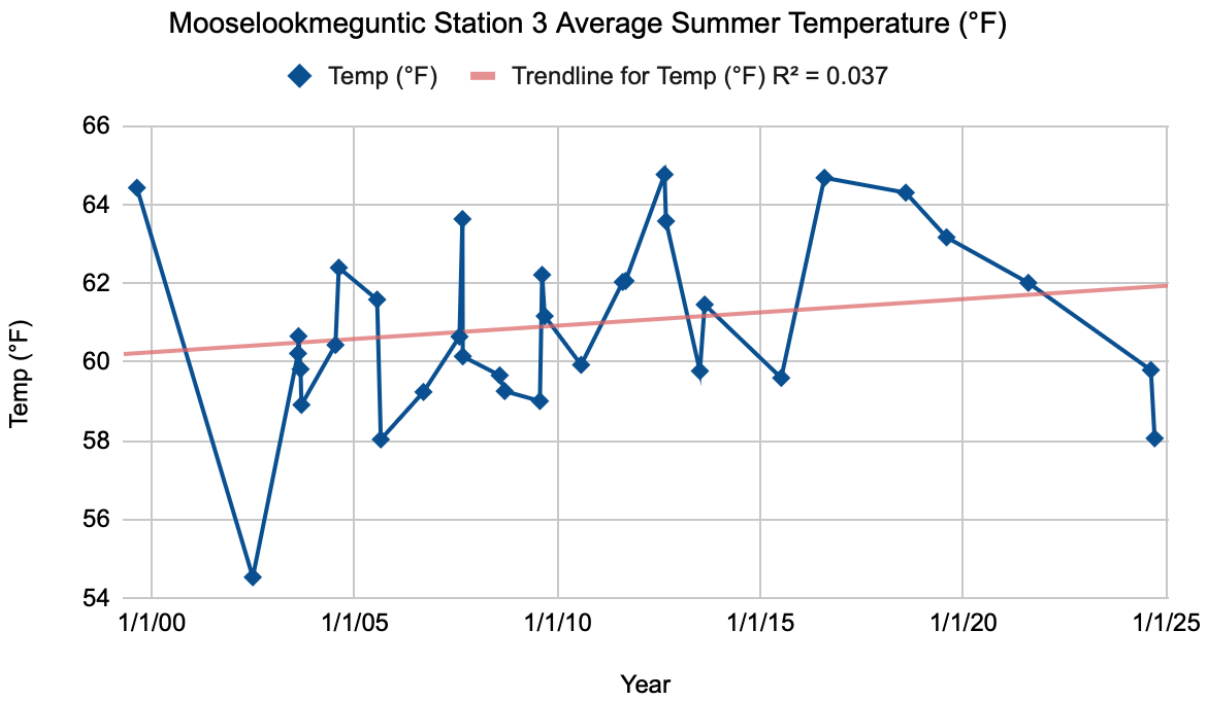


Figure 12. Average summer water temperature readings on Mooselookmeguntic between May and October since 1999 showing a slight increase.

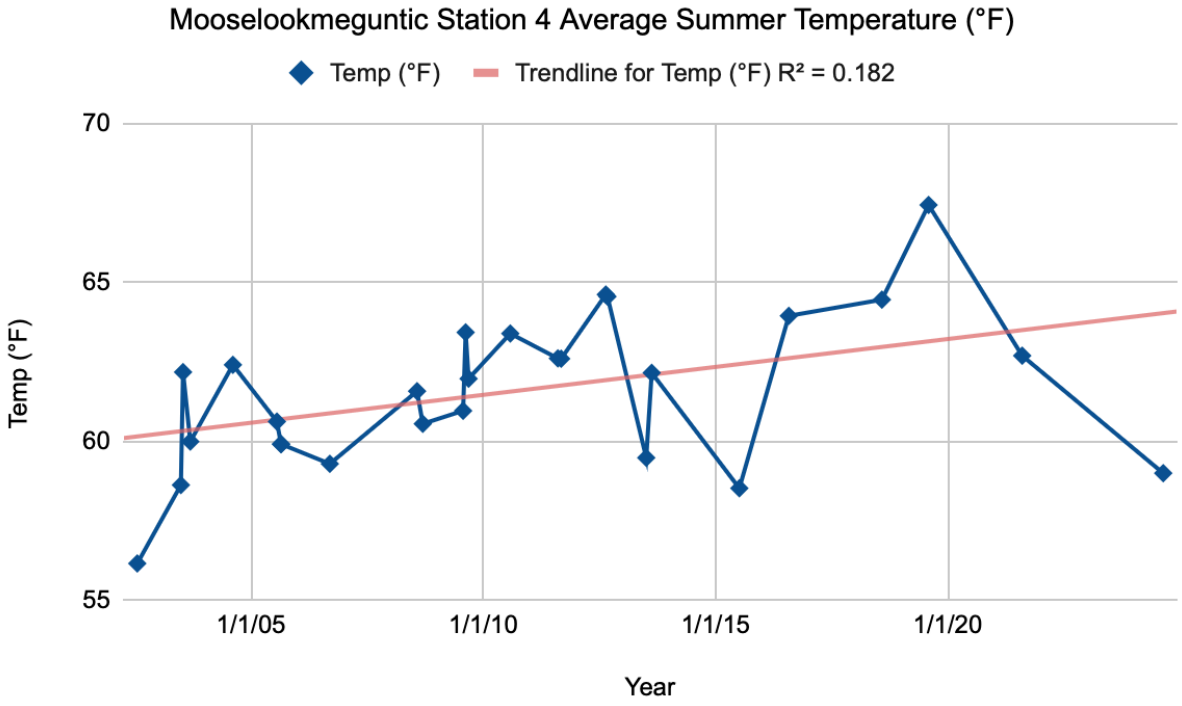


Figure 13. Average summer water temperature readings on Mooselookmeguntic between May and October since 2002 showing a slight increase.

Phosphorus:

Phosphorus tests are taken during the summer at the surface of the lake. A small sample of water is collected and sent to the Maine Health and Environmental Testing Laboratory. Phosphorus is a naturally occurring nutrient found in soils and sediments which is vital for plant growth. However, if too much phosphorus accumulates in a water body, it increases the chances of excessive bacterial and algae growth, also known as an algal bloom. These blooms can decrease water clarity and even produce harmful toxins for humans and animals. Phosphorus is commonly found in fertilizers and sewage which can easily find its way into a water body from lakefront gardens, yards, or faulty septic systems. The USEPA suggests that levels of phosphorus in a water body should stay below 0.05mg/L to maintain a healthy lake, however, other sources suggest maintaining levels below 0.03mg/L is best. We test for this nutrient in the water to understand how much runoff is entering the lake and if there is any potential for harmful algal blooms and decreased lake health.

Total phosphorus levels of Mooselookmeguntic are showing relatively stable conditions. Phosphorus levels have remained below the 0.03mg/L threshold at all four stations. Stations 1 and 3 are experiencing very slight increases in phosphorus, however, because the increase is so small, it is not concerning (*Figures 14 & 16*). Station 2 is experiencing relatively no change which is a positive trend (*Figure 15*). Station 4 is experiencing a slight decrease in phosphorus levels which is a positive trend (*Figure 17*). These trends suggest that phosphorus levels are remaining at healthy levels and that the lake is not experiencing large runoff events.

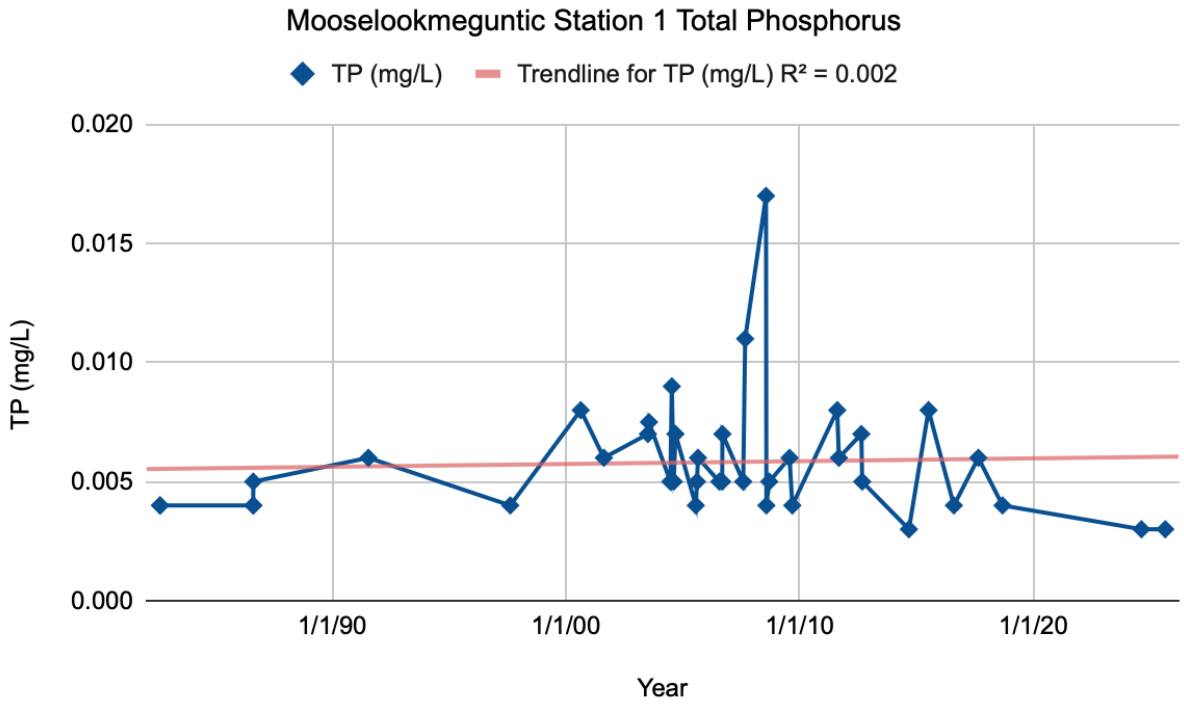


Figure 14. Phosphorus readings on Mooselookmeguntic from 1982-2025 showing a slight increase.

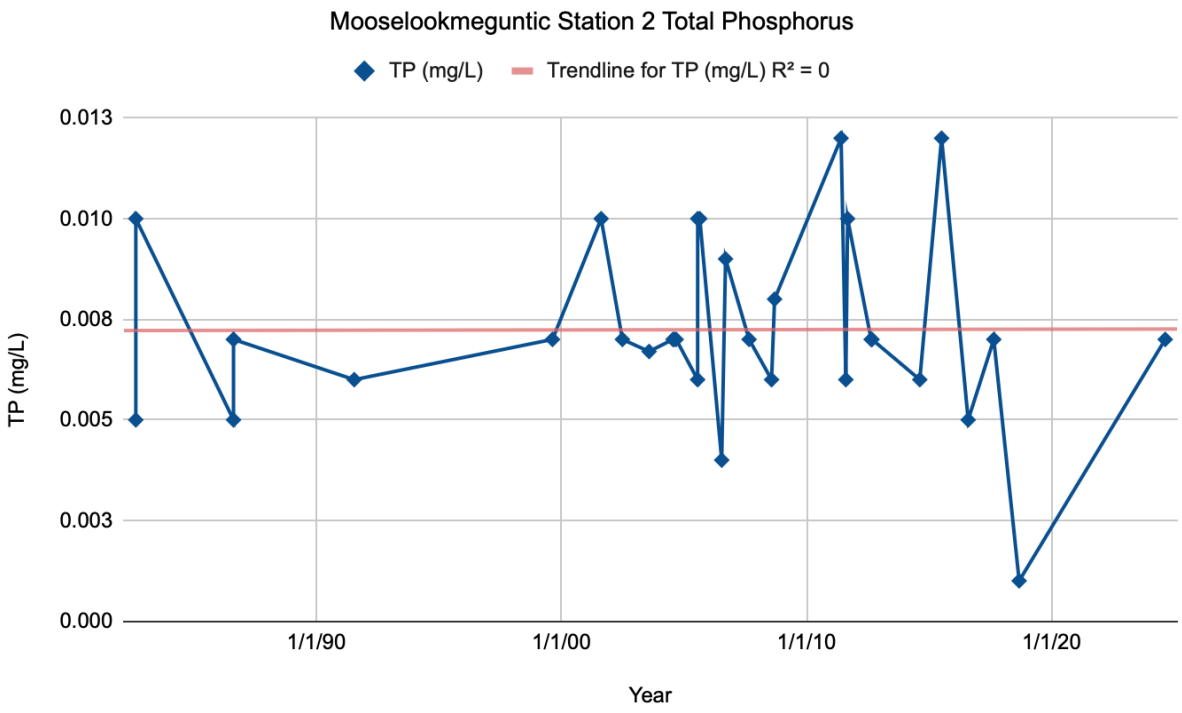


Figure 15. Phosphorus readings on Mooselookmeguntic from 1982-2024 showing stable conditions.

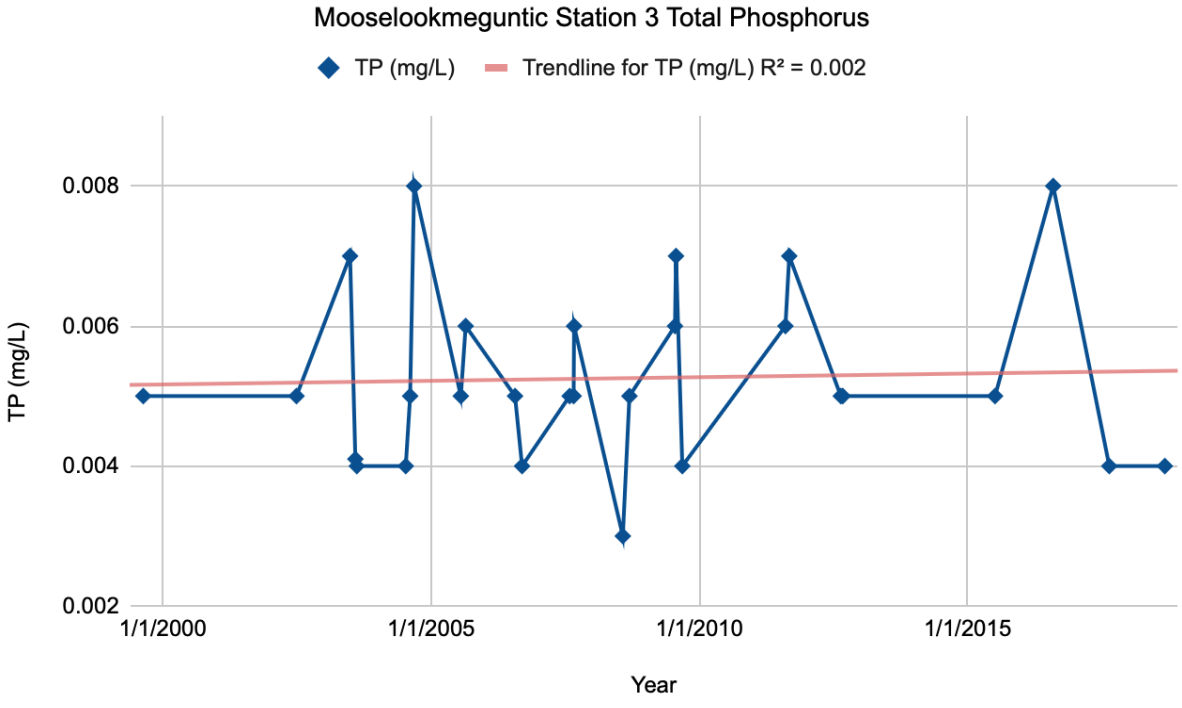


Figure 16. Phosphorus readings on Mooselookmeguntic from 1999-2018 showing a slight increase.

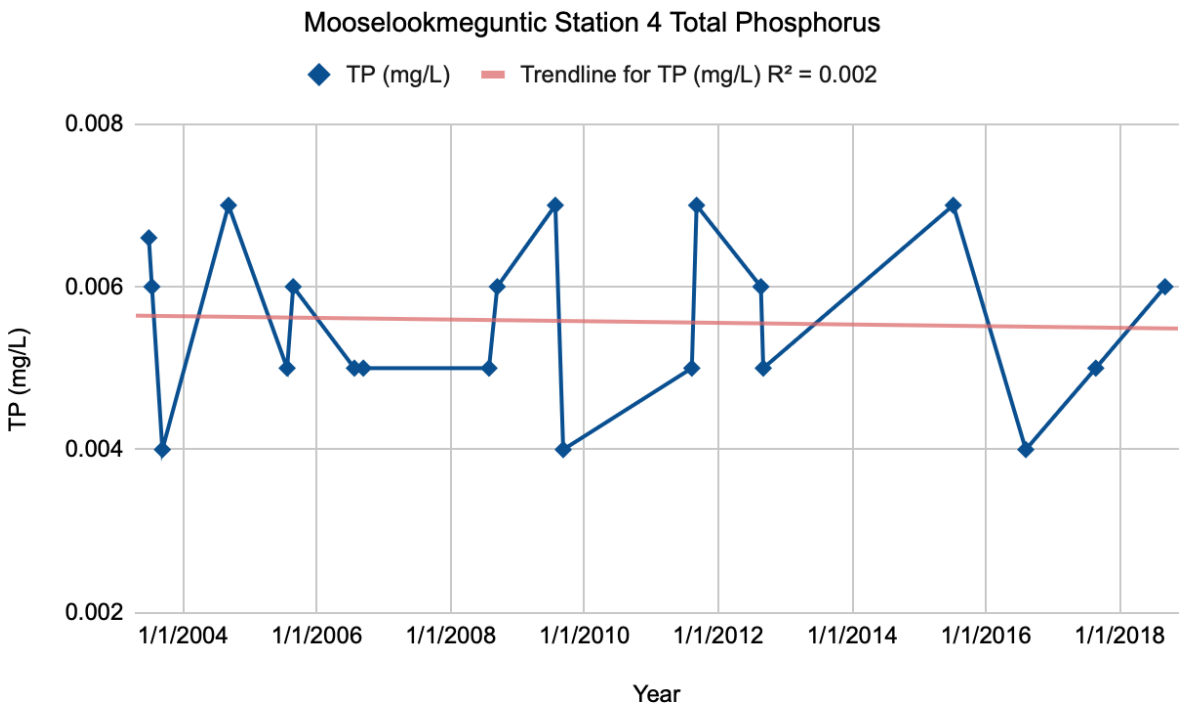


Figure 17. Phosphorus readings on Mooselookmeguntic from 2003-2018 showing a slight decrease.

Suggestions:

Possible actions to decrease lake temperatures:

Actions	Benefit	Location
Implement rain gardens and infiltration steps	-Allows stormwater to enter underground aquifers to cool instead of entering directly into the lake -Reduces the risk of erosion	Lakefront homes and properties
Maintain a native vegetative buffer at the shoreline	-Reduces the flow of stormwater directly into the lake -Reduces the risk of erosion	-Lakefront homes and properties -Shoreline around the entire lake
Plant mature trees along lake edge	-Directly shades and cools shallow waters along the lake -Helps reduce the flow of stormwater into the lake	-Lakefront homes and properties -Shoreline around the entire lake
Maintain narrow, shaded roadways	-Shades and cools the land around lake	Large and small roads surrounding the lake
Continuous monitoring of potential invasive plants	-Reduces the possibility of invasive plants entering the water body, disrupting the ecosystem, and contributing to warming temperatures.	-Boat Launches -Littoral zone surrounding the lake
Maintain healthy and shaded tributaries	-Deposits cold water directly into lake	-Haley Brook -Geneva Bog Brook -Rock Pond Stream

	-Improves fish habitat and movement	

Possible actions to limit decreasing DO:

Actions	Benefits	Locations
Maintain a vegetative buffer and native forests surrounding the lake	-Intercepts stormwater and prevents large amounts of runoff from entering the lake -Reduces soil erosion	Lakefront homes and properties
Implement highly permeable soils	-Sandy and permeable soils increase filtration of stormwater before entering the lake	-Lakefront gardens -Lakefront lawns
Care for septic systems	-Reduces the risk of chemicals, bacteria, and viruses from entering the water	Lakefront homes and properties
Limit use of herbicides, pesticides, and fertilizers	-Prevents toxic chemicals from getting the chance to enter the water	-Lakefront homes and properties -Nearby farms
Maintain driveways and roads with less impervious surfaces	-Minimizes road chemicals entering the lake directly	-Lakefront homes and properties -Roads surrounding the lake
Consider becoming LakeSmart certified	-Allows waterfront properties to be individually analyzed -Provides feedback on how to improve your home lake impact	Lakefront homes

While any of these actions could be beneficial to the health of Rangeley's water bodies, there is no way for us to understand our impact without continued monitoring. The volunteer water quality monitoring program needs volunteers to continue taking annual readings at the sampling stations on the lakes. Individuals can become certified to take Secchi and DO readings through Lake Stewards of Maine. With the information gathered, we can observe current trends and take immediate action if concerning trends are observed. For more information on joining the volunteer effort, or with any other questions, please reach out to headwaters@rlht.org.

Sources:

Lakes Environmental Association

United States Environmental Protection Agency-Climate Change Workbook

United States Environmental Protection Agency-Dissolved Oxygen

USGS-EPA Phosphorus levels

Maine Lakes

Lake Stewards of Maine