



2026 Water Quality Report

Richardson Lakes



Survey History:

Richardson Lakes, located in Richardsontown Twp and Magalloway Plt, ME is a relatively wild water body in the area. It has a mean depth of 13.4m (44ft) and a maximum depth of 32.9m (108ft). The maximum depth is represented by station 2 (*Figure 1*). Station 1 reaches 25m (82ft) and is the second deepest point on the lake. Monitoring at station 1 on Richardson Lakes began in 1981 while station 2 began monitoring in 1996 and both have continued since, however, 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 Richardson Lakes, but also how it has been changing in recent years due to rising temperatures, shorter winters, and increased runoff from developments.

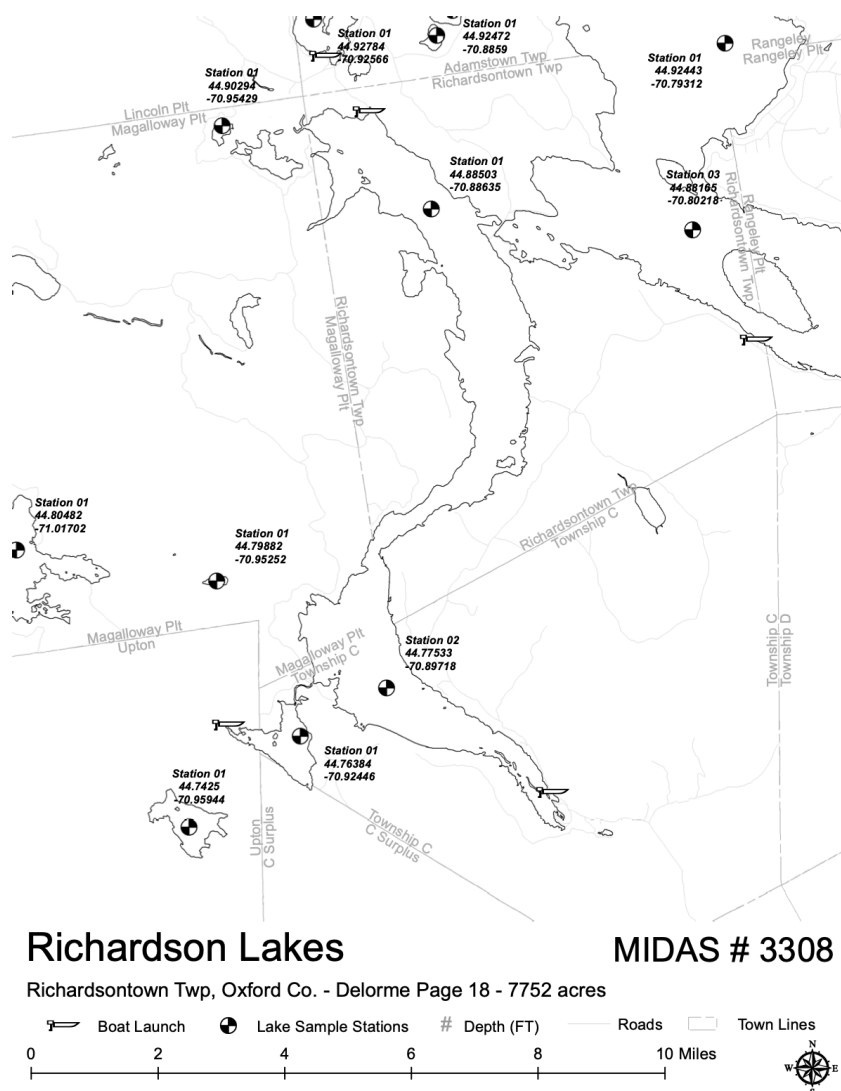


Figure 1. Map of Richardson Lakes and its sample stations. Via Lakes Stewards of Maine

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, however, because of how large and remote Richardson Lakes is, there has not been much data taken in recent years. 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.

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 Richardson Lakes.

Water Transparency:

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.

Richardson Lakes, both Upper and Lower, is experiencing negative water transparency trends. Since 1981, a weakly correlated trend shows that water transparency has decreased by about 0.5m (*Figure 2 & 3*). It is important to note there are very large gaps in the data. At station 1, there were no secchi readings recorded from 1992-2000 and 2011-2023 and at station 2, there were no readings recorded from 2010-2015 and 2018-2023. These gaps in the data could account for some of the unusual trends observed on Upper and Lower Richardson. Decreasing water transparency is a sign that there is a greater amount of runoff and pollution entering the water. Overall, the trends observed suggest relatively healthy and unpolluted waters on Richardson Lakes.

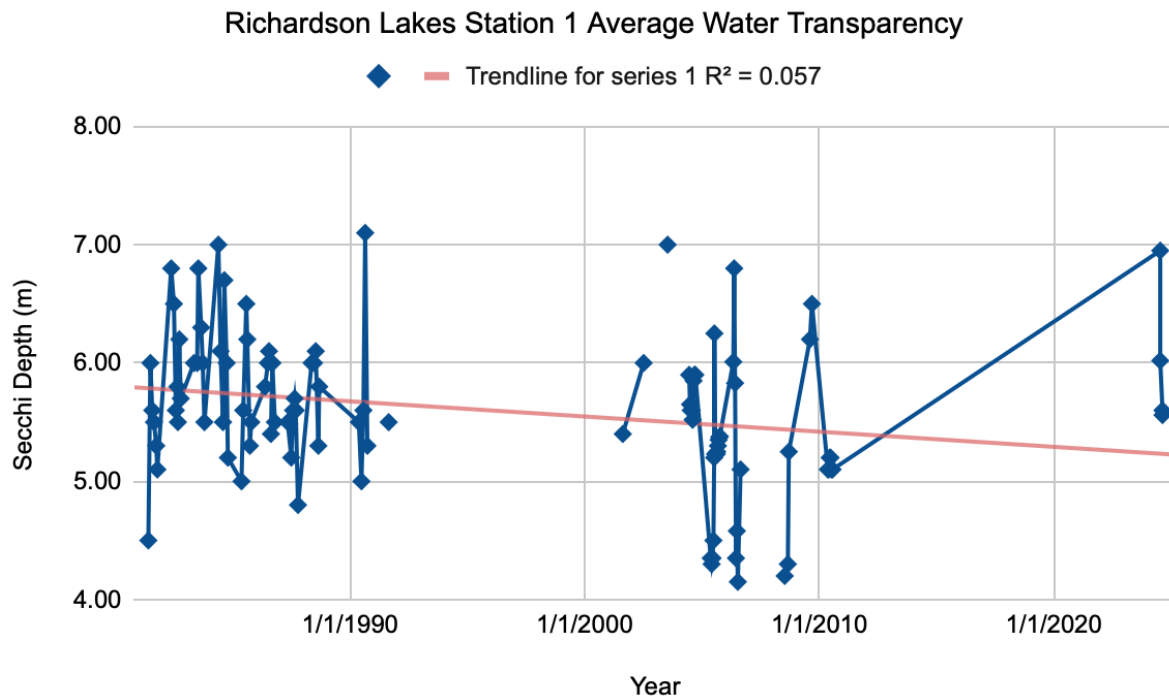


Figure 2: Water transparency readings on Richardson Lakes since 1981 showing a slight decrease of around 0.5m.

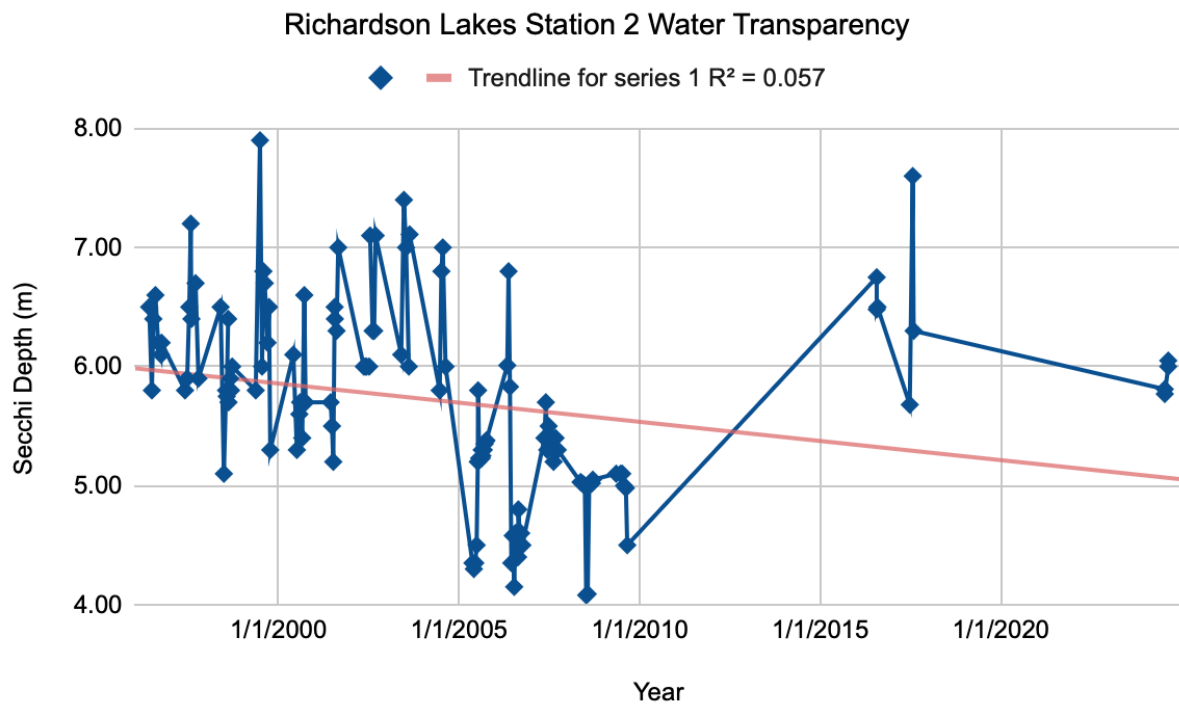


Figure 3. Water transparency readings on Richardson Lakes since 1996 showing a slight decrease of around 1m.

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.

It is important to note that there is not enough data at station 2 to determine significant DO trends. At station 1, there are multiple gaps in the data which could account for inconsistencies. The largest gap in the data is 18 years. At station 1, Richardson Lakes is experiencing a slight decrease in DO. Since 1982, a moderate correlation shows that DO has decreased by less than 0.5mg/L (*Figure 4*). Even though the decrease is small, this is a negative trend that suggests there could be less oxygen in the water which is making it difficult for aquatic life to thrive. Unfortunately, this trend is common in the region.

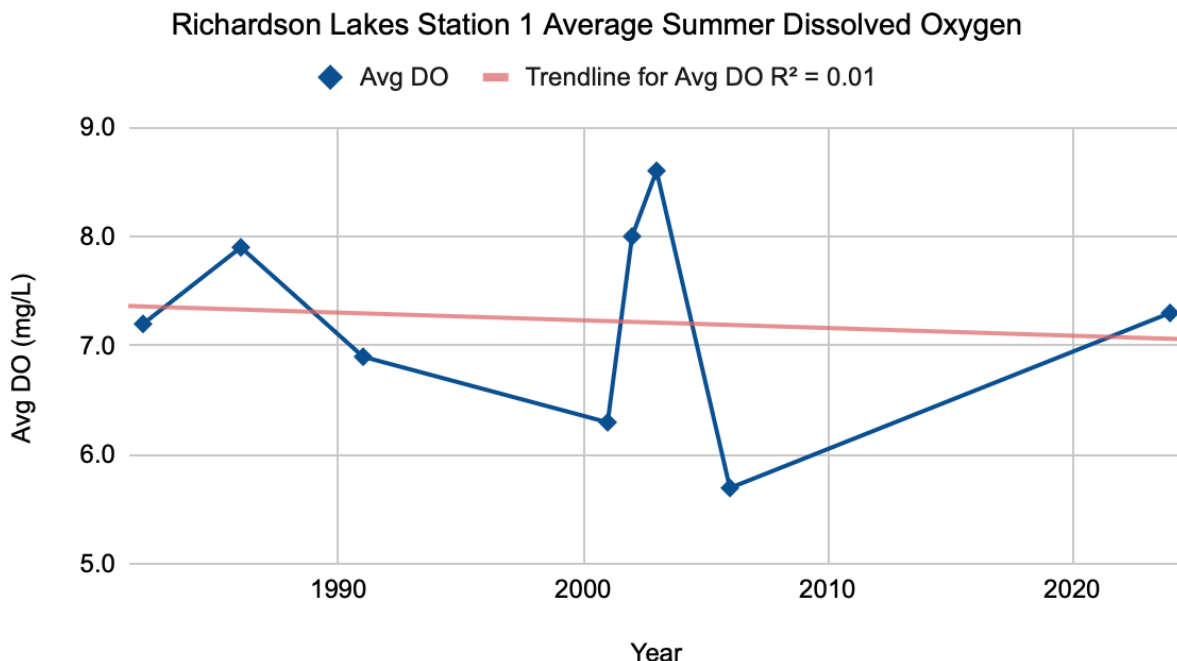


Figure 4. Average summer DO readings on Richardson Lakes taken between May and October since 1982 showing a slight decrease of around 0.5mg/L.

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 Richardson Lakes is not experiencing similar trends.

There was not enough data from station 2 to observe significant trends. Station 1 has multiple gaps in the data which could account for inconsistencies. At station 1, Richardson Lakes is experiencing a significant decrease in water temperatures. Since monitoring began in 1982, trends show temperatures have decreased by about 4°F (*Figure 5*). This is not a common trend in the region. It is observed that from 2006-2024, the average summer temperature decreased by almost 4°F. This drastic decrease in temperature is likely contributing to the rising DO levels that were also observed during this time (*Figure 4*). No temperature data was recorded between 2006-2024 making it difficult to understand how this trend occurred. These trends are not typical and do not show similarities between other lakes and ponds in the region. Richardson Lakes is relatively undeveloped creating an intact vegetative buffer with large native trees which could be shading some of the lake's water. The scarce development surrounding the lake could be maintaining lake temperatures by reducing impervious surfaces around the shoreline and allowing less stormwater from entering the lake. While these are positive trends that suggest resilience to climate change, it is also important to continue monitoring both stations on Richardson Lakes. With more consistent readings, it will be possible to understand the data and have more accurate information.

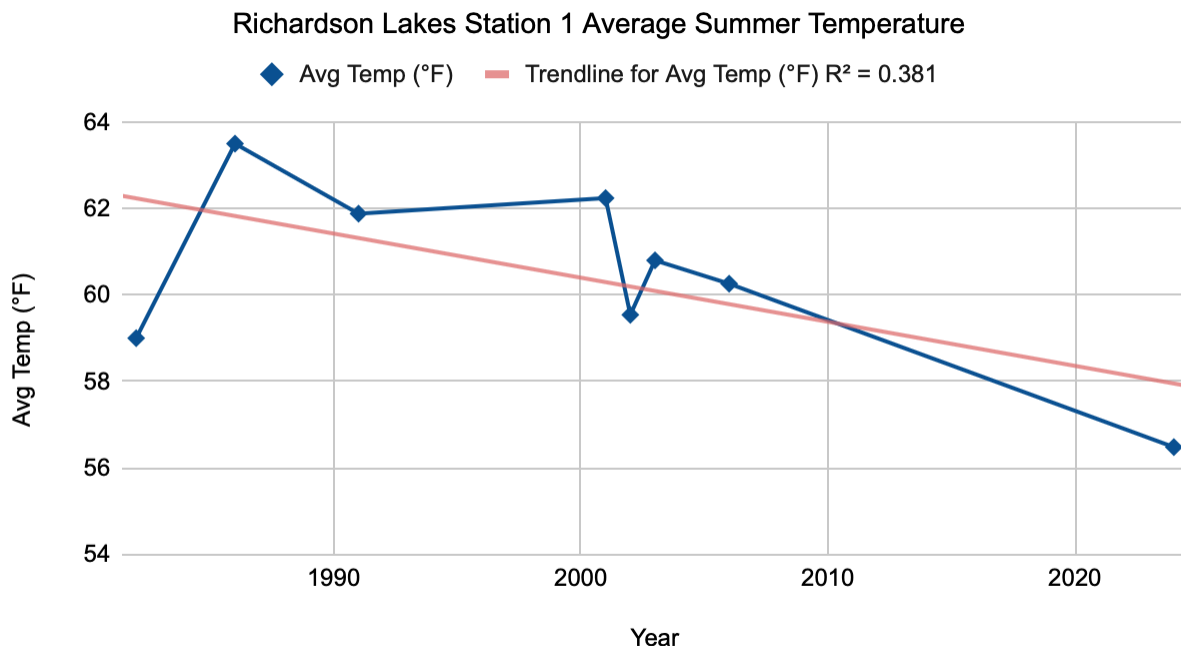


Figure 5. Average summer water temperature readings on Richardson Lakes taken between May and October since 1982 showing a decrease of about 4°F.

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 Richardson Lakes are showing relatively stable conditions. Since 1982, the pond has seen relatively no overall change in total phosphorus except for two small spikes which occurred in 1982 and 2008 (*Figure 6*). This lack of change suggests that Richardson Lakes is maintaining healthy levels of phosphorus. Richardson Lakes total phosphorus levels have remained below the 0.03mg/L threshold since monitoring began. Overall, the phosphorus levels on Richardson Lakes have remained at healthy levels.

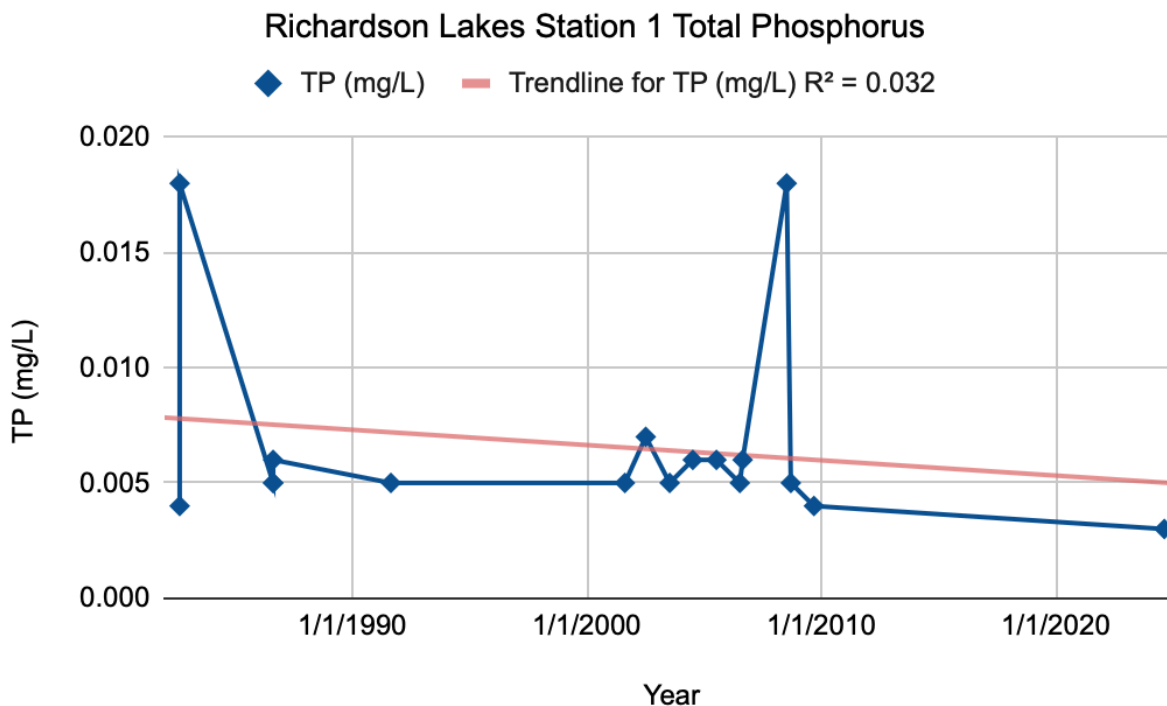


Figure 6. Total Phosphorus on Richardson Lakes with a weak correlation showing a slight decrease since 1982.

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 -Improves fish habitat and movement	-Haley Brook -Geneva Bog Brook -Rock Pond Stream

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](#)