



2023 Year-End Summary Report

Barefoot Lakes

Firestone, CO

Submitted to:
St. Vrain Lakes Metro District
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Project Background

Barefoot Lakes is a housing development with three home builders located in Firestone, CO. The lakes are a focal point for the development, centered around nature and designed for use by the community. On the East Lake, the public can enjoy recreational activities including paddle boarding, fishing, and non-motorized boating activities. The lakes are home to a healthy population of aquatic life including fish, birds, amphibians, and turtles. The West Lake is approximately 30 surface acres (SA) and the larger East Lake is about 50 SA. The lakes are separated by a short section of land with large equalization pipes between them. The lakes are filled from precipitation, runoff, and St. Vrain Creek.

These resources have a history of severe nuisance algae, aquatic vegetation growth, as well as cyanobacteria (blue-green algae) blooms. Water quality conditions vary significantly at different times of the year (see *2023 Water Quality Monitoring Report - Barefoot Lakes*).

SŌLitude Lake Management began managing Barefoot lakes in 2016 with the objective of enhancing aesthetics and mitigating nuisance algae and vegetation growth. Nutrient remediation, contact and systemic herbicides, beneficial bacteria, dye application and algaecide treatments have been implemented and successful at maintaining the two lakes. A bottom diffused aeration system was installed in the cove near Peninsula Park in July 2020 and has done an excellent job in circulating nutrients and preventing stagnant water.

The water quality in the lakes has been monitored for the last few years in order to establish baseline conditions and track changes over time. The monitoring report that overviews water quality from 2023 has been provided under a separate cover but will be referenced in this document.

Aquatic Resource Management

During the 2023 season, SŌLitude Lake Management visited the lakes approximately every 2 weeks from May through September with one visit per month in April and October to manage the water quality and appearance. At each visit, visual inspections were conducted on water levels, clarity, surrounding environmental conditions, as well as nuisance algae and aquatic weeds. Conditions were noted and algae and aquatic weed treatments were completed as necessary.

Throughout the season, blue and black aquatic dye was applied to both lakes to limit light penetration and reduce photosynthetic processes. Most algae species observed at the



beginning of the season were planktonic, but as temperatures increased filamentous algae patches sprouted sporadically along the shoreline of both lakes. Granular algaecide was applied directly on any algae mats observed and surrounding areas followed by beneficial bacteria to assist in degradation processes. By July, larger algaecide applications were performed each service due to increases in nutrient concentrations and phytoplankton populations identified through water quality monitoring. Along with algaecide, a phosphorus inhibiting chemical application was administered on both lakes in July to reduce bioavailable nutrients for algae growth. Phosphorus levels of both lakes decreased in August proving the effectiveness of the treatment. However, cyanobacteria have the ability to fix nitrogen as an energy source as well as phosphorus and flourished in the uncompetitive environment.

In September, the East lake suffered a shad fish kill due to impaired water quality and high phytoplankton densities. Further details on causes of the fish kill can be found under the discussion section of the *2023 Water Quality Monitoring Report - Barefoot Lakes*. SŌLitude biologists responded to the tragic event with large volume algaecide applications to combat increasing algae growth when temperatures were ideal in September and October. Equipment malfunctions occurred in October causing delays in treatments, but one of the largest algaecide/bacteriacide applications was completed on the East lake before the season ended. Over winter, the chemicals will take effect, hopefully killing any dormant algae, to start the 2024 season off strong.

During the 2023 season, no nuisance vegetation was observed. Shoreline weeds remained under control and were left untreated to keep fish habitats intact and maintain ecological balance. Maintenance on the aeration system was performed throughout the season due to overheating compressors causing the breaker to trip. In April, one compressor was not operating and SŌLitude biologists identified a dead capacitor that was replaced in May. The aerators were running properly during the first June service, but the breaker began to trip the rest of the season. SŌLitude biologists flipped the breaker switch to turn the aerators back on when necessary. All four compressors are planned to be replaced by next season.

Due to continuous algaecide treatments along with the application of beneficial bacteria and dye, Barefoot Lakes remained in safe conditions for recreational activities to presume until the fish kill caused public concern. Recreation was prohibited until water quality results confirmed it was safe to reopen the lake. Overall, the conditions of Barefoot Lakes have continued to improve since management began in 2016. The continued proactive



management that has been implemented over the last 5 years has contributed to these improvements.

Conclusions and Recommendations

During the 2024 season, SŌLitude biologists plan to use nutrient binding products and apply larger volume algaecide/bactericide treatments the entire season. Aquatic dye should continue to be added since it fades in the water column over time. SŌLitude biologists will continue to monitor any changes or cyanobacteria blooms in conjunction with water quality sampling efforts and adjust the management accordingly. This adaptive management will maintain the water quality, fishery health, and optimal aesthetics of the lakes.

Annual or bi-annual fisheries assessments, removals, or stocking is recommended to continuously mitigate Common Carp and shad overpopulation, and increase the health of the fishery. To determine if the lakes are viable for fish stocking, it is essential to analyze the water quality results of May and June. Stocking fish in poor water quality conditions can stress the fish and trigger a fish kill.

It is vital to keep the aeration system operational at all times to ensure there is sufficient dissolved oxygen to promote a healthy environment. It is highly suggested to install full-lake aeration systems in both water bodies. There is a new aeration system called OST that pumps oxygen below the thermocline to increase DO levels at depth while preserving thermal stratification and does not disturb the sediment. To oxygenate the entire East Lake, 1-2 systems will need to be installed, and due to size the West Lake would only need 1 system. This would be the best option for long-term aeration with very little maintenance required. Establishing a monthly aeration maintenance program will better ensure the system is running properly throughout the season by changing filters, cleaning any debris, and testing electrical currents to the system.

SŌLitude Lake Management will continue to monitor and implement recommendations in the annual maintenance service to help further improve the lakes. If you have any questions or would like to implement any of the suggestions, please contact us. SŌLitude Lake Management® appreciates the opportunity to work on Barefoot Lakes to maintain water quality and appearance for the community and safety of the environment.

