2021 Annual Management 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 homebuilders located in Firestone, CO. The lakes are a focal point for the development, centered around nature and designed for use by the community with walking paths and options for future recreation. 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 from the St. Vrain Creek water rights are in priority. The lakes have been developed for recreational purposes including paddle boarding, fishing, and non- motorized boating activities.

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 Barefoot Lakes 2021 Water Quality Report*). The lakes are home to a healthy population of aquatic life including fish, birds, amphibians, and turtles.

The objectives of enhancing aesthetics, limiting nuisance algae and vegetation, and monitoring and treating cyanobacteria blooms have been completed using nutrient remediation, contact and systemic herbicides, beneficial bacteria applications, and algaecides as needed. During the 2021 season, aquatic dye was applied as a trial from May through July in order to determine its efficacy for future recommendations.

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 2021 has been provided under separate cover but will be referenced in this document.

Aquatic Resource Management

During the 2021 season, SOLitude Lake Management visited the lakes approximately every 2 weeks from May through September to manage the water quality and appearance with one visit per month in April and October. At every visit, a visual inspection of each resource was completed, and conditions were noted.

At the end of May, nutrient remediation was completed to reduce the excessive nutrients limiting the potential for algae and weed growth. During the season, the lakes were treated for aquatic vegetation and nuisance algae as needed. Treatments were focused to preserve aesthetics while maintaining aquatic vegetation in some areas for fish habitat. The West Lake did see some filamentous algae growth around the shoreline that was treated throughout the season. Beneficial bacteria products were applied in the East Lake in the shallow cove near Peninsula Park and in areas with high levels of organic sediments to cycle nutrients and reduce sludge accumulation. In addition, a long-term, low dose systemic herbicide was applied in this cove to proactively manage rooted aquatic vegetation.

Cyanobacteria growth was treated throughout the season in the East Lake, with full-lake treatments being completed in June and twice in September. One full-lake algae treatment was completed in the West Lake in September. The West Lake experienced far less significant cyanobacteria blooms when compared to previous years and when compared to the East Lake during the 2021 season. However, the blooms that occurred in the East Lake during the 2021 season were sustained when compared to previous years.

The bottom diffused aeration system that was installed in the cove near Penninsula Park in July 2020 was well maintained during the 2021 season. This system had multiple compressors replaced throughout the season under warranty.

East Barefoot Lake Fish Kill

In September, a minor fish kill occurred in the East Barefoot Lake. SOLitude Biologists observed the fish kill on Friday, September 17, 2021. The aeration system was being serviced and many birds were observed on the lake. The shoreline was walked, and fish were observed recently deceased and actively distressed along the farthest East shoreline near the outlet. The fish species observed consisted mostly of Green Sunfish, and a few Black Crappie, Gizzard Shad, and Common Carp. Based on the conditions during inspection and the time of year, it appears that a fall "turn-over" event occurred. These events were likely induced by the first colder temperatures which had occurred overnight and early that morning which mixed the lower temperature low dissolved oxygen water through the column leading. There were a large number of birds present on the reservoir to feed on the recently expired fish and the event seemed to resolve within a day or two as no additional fish loss was seen.

Conclusions and Recommendations

During the 2021 season, SOLitude biologists and technicians saw an increase in severity and duration of the cyanobacteria blooms in the East Lake, whereas major improvements were observed in the West Lake. The aquatic dye trial provided excellent results and produced higher transparency, lower chl-α values, and overall decreases in cyanobacteria concentrations during the months of June and July (*see Barefoot Lakes 2021 Water Quality Report – Transparency and Chlorophyll-a)*. During the 2022 season, SOLitude plans to use nutrient binding products and continue algaecide treatments as the season progresses. Aquatic dye has also been included to the contract for the West Lake and East Lake for 2022. SOLitude 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. A biological fisheries survey is recommended for the 2022 season to continuously monitor fish health and growth. In addition, removal of Common Carp, during the survey will help reduce the population and further improve water quality. Annual or bi-annual fisheries assessments, removals, or stocking is

recommended to continuously mitigate Common Carp overpopulation and increase the health of the fishery.

SŌLitude Lake Management will continue to monitor and implement recommendations in the annual maintenance service to help further improve the lakes. 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.