City Park Golf Course: A Late-Season Start on an Effluent Fed Municipal Irrigation Pond

Denver, Colorado | City and County of Denver, municipal golf | 2024 season

Starting in late July, ammonia, nitrite and phosphate fell to zero and nitrate was cut in half within 10 days on the irrigation source for one of Denver's flagship municipal golf courses, while the pond kept drawing and refilling more than 500,000 gallons a night.

1. Site overview

Water body	The irrigation pond for City Park Golf Course, a historic 18-hole municipal course reconstructed in 2017.
Size	About 0.75 surface acre and 12 feet deep in the middle.
Water source	Fed daily by treated wastewater effluent, entering on the east side. The course draws irrigation water from the west end.
Use	Irrigation source for the entire course. It pumps about 1,200 gallons a minute during roughly eight-hour watering cycles, more than 500,000 gallons a night, drawing the pond down a foot or more before it refills.
The problem	Late in the season, high nutrients and heat had loaded the pond with nuisance algae and seaweed, and dead algae piling up at the west end returned nutrients to the water. The pond had previously been managed with copper and a diatom fertilizer, and the course's soils had lost much of their biology in the 2017 reconstruction.
Site lead	The City's Director of Agronomy and Head Superintendent

2. Approach

- July 2024: Hydralife met with the Director of Agronomy and Head Superintendent, sampled the pond and removed 100 to 150 pounds of nuisance seaweed from the end nearest the irrigation inlet.
- Late July into August: administered Hydralife Compete, concentrated live beneficial phytoplankton, totaling around 100 gallons. The treatment was supported by the pond's aeration which significantly collaborates with phytoplankton to increase dissolved oxygen and consume CO2 from the water column. This process naturally supports sludge-digesting bacteria and aerobic nitrifying bacteria to draw down the muck bed that accumulates over the years.
- Through August: weekly water sampling of both the effluent inflow and the pond.

3. Results

Date	NH4	NO2	NO3	PO4	Notes
July 26 Baseline of the irrigation pond	0.25	0.25	20	0.25	Tested before the first inoculation; seaweed removed.
August 3	0	0	10	0	Ammonia, nitrite and phosphate at zero; nitrate cut in half.

Date	NH4	NO2	NO3	PO4	Notes
August 11, pond	0.25	0.25	10	low	Pond held low while the effluent kept arriving. The rise in NO2 might suggest that the reduction in nutrients destresses the aerobic nitrifying bacteria so they can begin to perform their functions effectively.
August 11, Water analysis of the effluent water refilling the pond each night.	0.5 to 1.0				Effluent entering the pond still carried ammonia.

City Park Golf Course irrigation pond, Denver, 2024

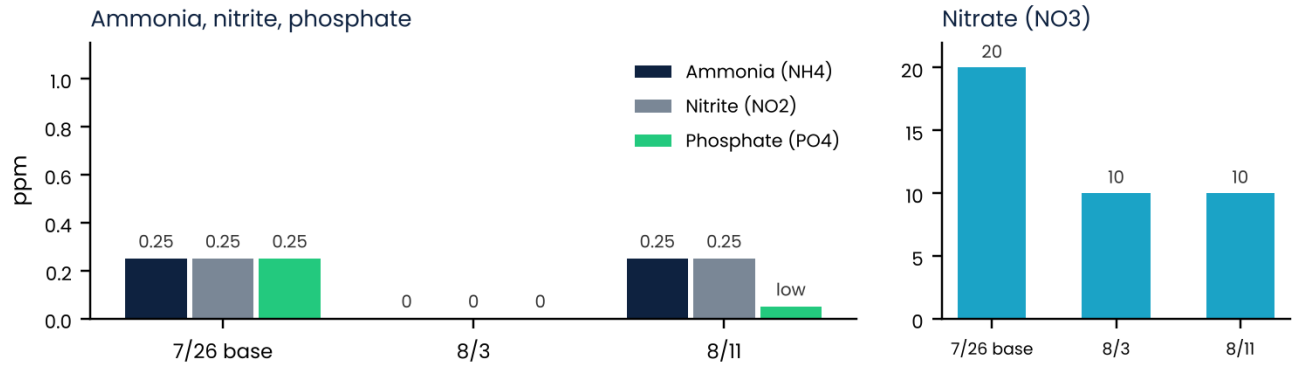


Figure 1. Nutrient readings in ppm, City Park Golf Course irrigation pond, 2024. Phosphate recorded as "low" is shown as recorded. Source: Hydralife field testing, including readings beyond those shown on the 2026 U.S. Symposium on Harmful Algae poster.

Field readings are taken on site with a color-comparison freshwater test kit and reported in parts per million (ppm). Text readings such as "under 0.25" or "almost 0" are shown as recorded; in the charts they are drawn at an approximate height and labeled with the recorded wording. Weather, water temperature and irrigation schedules influence individual readings. The trend across the season is the measure of the work.

Within 10 days, ammonia, nitrite and phosphate fell to zero and nitrate dropped from 20 ppm to 10 ppm. The contrast with the inflow is the point: effluent entering the pond in August still carried 0.5 to 1.0 ppm ammonia, while the treated pond read near zero. The phytoplankton consumed nutrients as they arrived and kept pace with a pond being drawn down and refilled every night with 500,000 gallons of effluent water. Nitrate, which is a result of aerobic nitrifying bacteria being able to function, held at 10 ppm through August 11 while ammonia and phosphate stayed low.

The Director of Agronomy and Head Superintendent reported that they learned a great deal from the work and were pleased with the improvement in water chemistry, and the Director expressed interest in extending the program to other ponds in Denver's golf portfolio. The season turned cold soon after the launch of this program, which ended the treatment window for 2024.

Beyond the water, every irrigation cycle delivered living phytoplankton to the turf, supporting the recovery of soil biology on grounds disturbed by the 2017 reconstruction.

4. Takeaways for similar sites

- Even a late-season start can turn an effluent-fed irrigation pond around in days when the culture has nutrients to work with.
- Measure the inflow. Comparing the incoming effluent with this small pond shows the phytoplankton consuming nutrients in real time and keeping up with the reduction of a significant amount of nutrients.
- Combine the program with good housekeeping: removing decaying plant material, running aeration and inoculating earlier in the season will produce both measurable and observable results that would significantly improve the course and reduce labor and resources.
- Start earlier for a full season. A spring inoculation gives the culture the whole growing season to consume and reduce nutrients.
- Hydralife Compete provides double duty to irrigation ponds. It improves water quality, hindering the development of nuisance algae while providing microalgae as an excellent soil biostimulant to deliver organics, nutrients and compounds to the turf and biome that supports it.

5. About Hydralife Solutions

Hydralife Solutions Inc. is a Denver, Colorado company that grows and ships live, multi-species beneficial phytoplankton for lakes, ponds, reservoirs and irrigation water. Hydralife Compete, concentrated phytoplankton, works by competitive exclusion: the excess nitrogen and phosphorus that feed nuisance algae and cyanobacteria become the food source for a beneficial culture that consumes them 24-7 and outcompetes bloom-forming organisms for the nutrients they need. It thrives in high-nutrient water, where most alternatives struggle, and it feeds the zooplankton and fish that depend on a healthy food web.

Hydralife was founded by Ryan Philipsborn, who brings nearly 30 years of work in aquatics, from reef keeping and coral propagation to commercial phytoplankton, copepod and macroalgae production.

To discuss a water body of your own: service@hydralifesolutions.com, 303.219.0623, hydralife.org.