



# Outstanding Nitrogen Treatment with Whitewater River Regional WWTP

2021 Average Total Nitrogen	48.9	mg/L	79,500	lb/yr
New Average Total Nitrogen	3.9	mg/L	6,300	lb/yr
<b>Reduction</b>	<b>45</b>	<b>mg/L</b>	<b>73,200</b>	<b>lb/yr</b>

## Challenge:

The Whitewater River Regional Wastewater Treatment Plant received a new nitrogen permit limit of 10 mg/L in 2022. In 2021, the plant’s average effluent total nitrogen ranged from 29 – 74 mg/L. In partnership with MnTAP at the University of Minnesota, plant manager John Brogan explored strategies to achieve biological nutrient removal within his oxidation ditches.

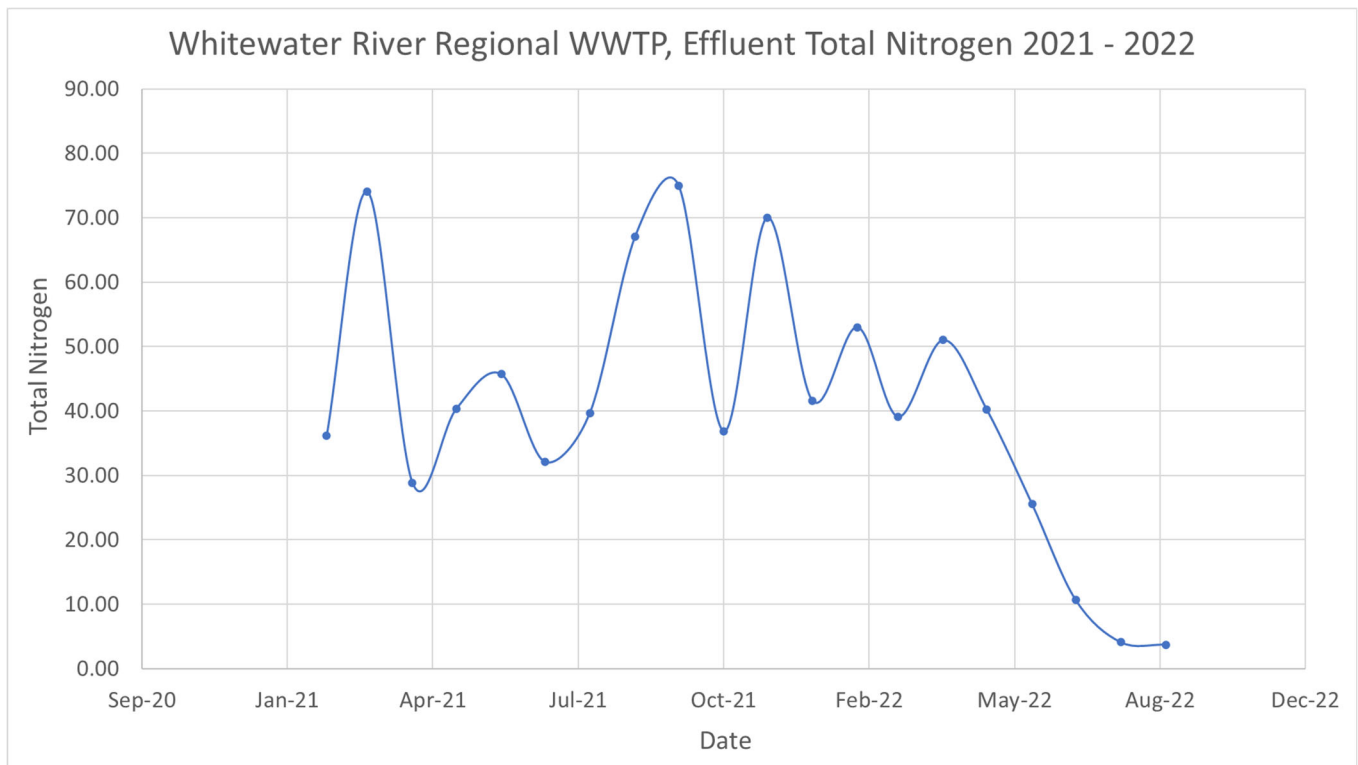
## Approach:

The project team used a wastewater simulation program, the Activated Sludge Simulation Model (ASIM) to explore various possible operational changes that could achieve the desired level of nitrogen removal. The team discovered that cycling aeration on a timer in the main oxidation ditch would

result in much better treatment for nitrogen and phosphorus. John took the results and started, slowly at first, cycling his oxidation ditches on and off. While the ditches are off, a low head high volume pump is used as a mixer to keep solids in suspension. For the summer months, John found that a time cycle of 90 minutes on – 90 minutes off achieved excellent nitrogen removal. As weather has gotten cooler into the Minnesota fall, cycle times were modified to 90 minutes on, 115 minutes off to provide additional time for denitrification. Moving into winter, the time off is likely to increase to give the anaerobic microorganisms additional time to compensate for slowed biological processes in cold weather.

## Result:

The plant is achieving the best nitrogen treatment it has ever seen. The oxidation ditch cycling started on June 1st, 2022. The following graph shows the change in effluent nitrogen as a result of this implementation.



Rotor cycling also saves energy. While the 47 kW running the rotors cycle off, an 11 kW pump provides mixing. This saves the plant 160,000 kWh per year, for cost savings of \$11,600 per year.

### Contact to discuss wastewater optimization:

Minnesota Technical Assistance Program: [MnTAP@umn.edu](mailto:MnTAP@umn.edu), 612-624-1300