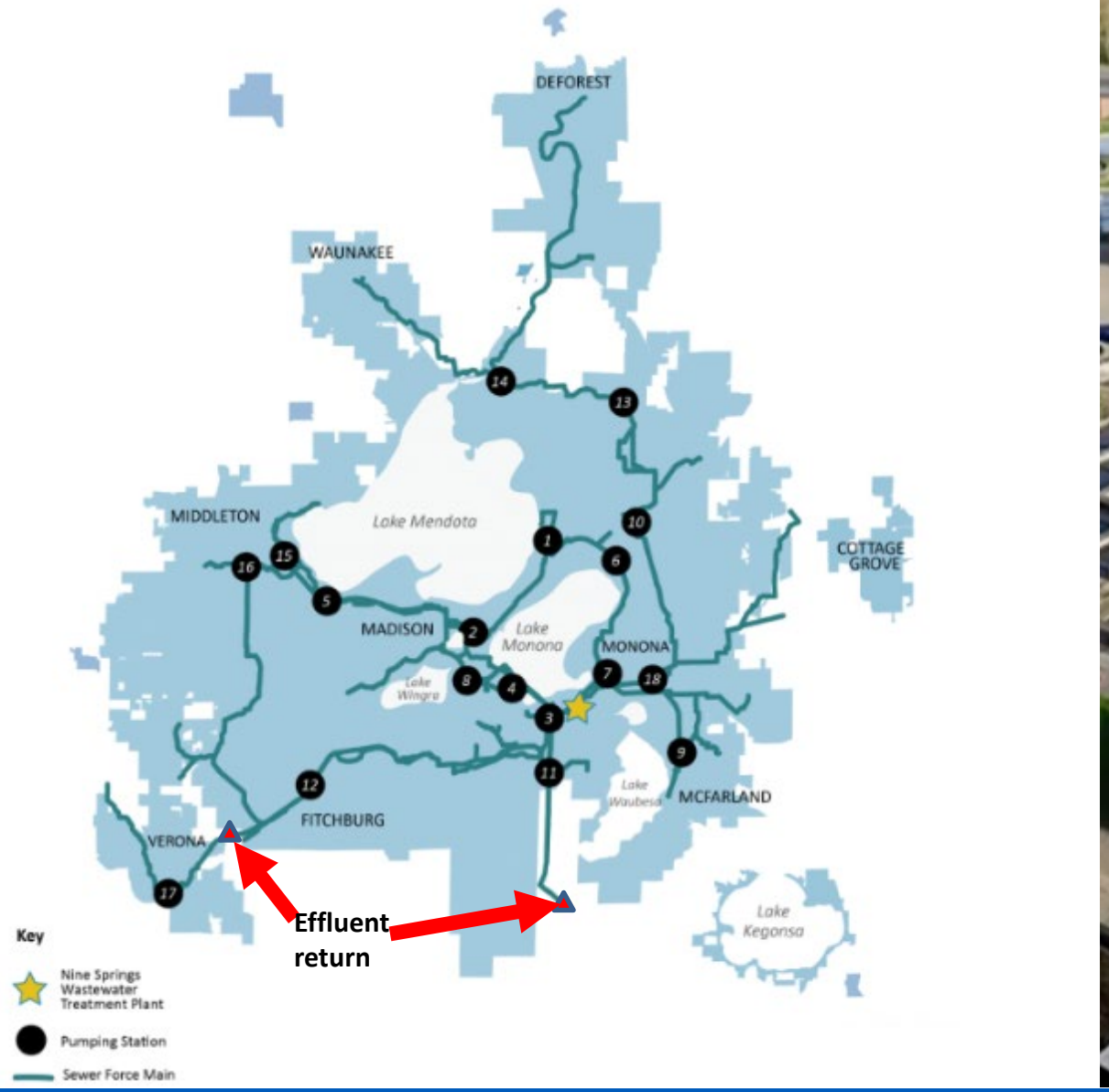
All the water we use has to go somewhere

Madison Metropolitan Sewerage District

About the District:

- Serve more than 425,000 people in 25 communities in 187 square miles
- Own & maintain over 760,000 feet of sewer pipes
- Own 18 pumping stations and maintains 46 other pumping stations
- Recover 13 billion gallons of water and 36 million gallons of biosolids yearly
- Operate around the clock, 365 days a year



Large service area, one plant, two effluent return locations

Diverse challenges:

- Compliance with permit requirements
- Aging infrastructure (some over 90 yrs)
- Operation, maintenance & preventive
- Climate change
- Expanding service area
- Constrained budgets
- New regulations
- Emerging contaminates

- Governed by Clean Water Act through a DNR (WPDES) permit.
- Treatment process removes compatible pollutants

Madison Metropolitan Sewerage District

Permit requirements are based on parameter, receiving water and time of year.

Parameters/limits in current permit:

- CBOD: Carbonaceous Biochemical Oxygen Demand
- TSS: Total Suspended Solids
- Dissolved Oxygen
- pH
- Fecal Coliform
- Ammonia
- Phosphorus
- Chloride
- Mercury
- Temperature
- Upcoming Nitrogen

Wisconsin Aquatic Use Designations (NR102.04)

LAL – Limited Aquatic Life	LFF- Limited Forage Fishery	Small Warm Water Fishery	Large warm water fishery	Coldwater community

Regulations intensify

All surface waters are considered appropriate for the protection of fish and other aquatic life. Surface waters vary naturally with respect to factors like temperature, flow, habitat and water chemistry. This variation allows different types of Aquatic Life communities to be supported.

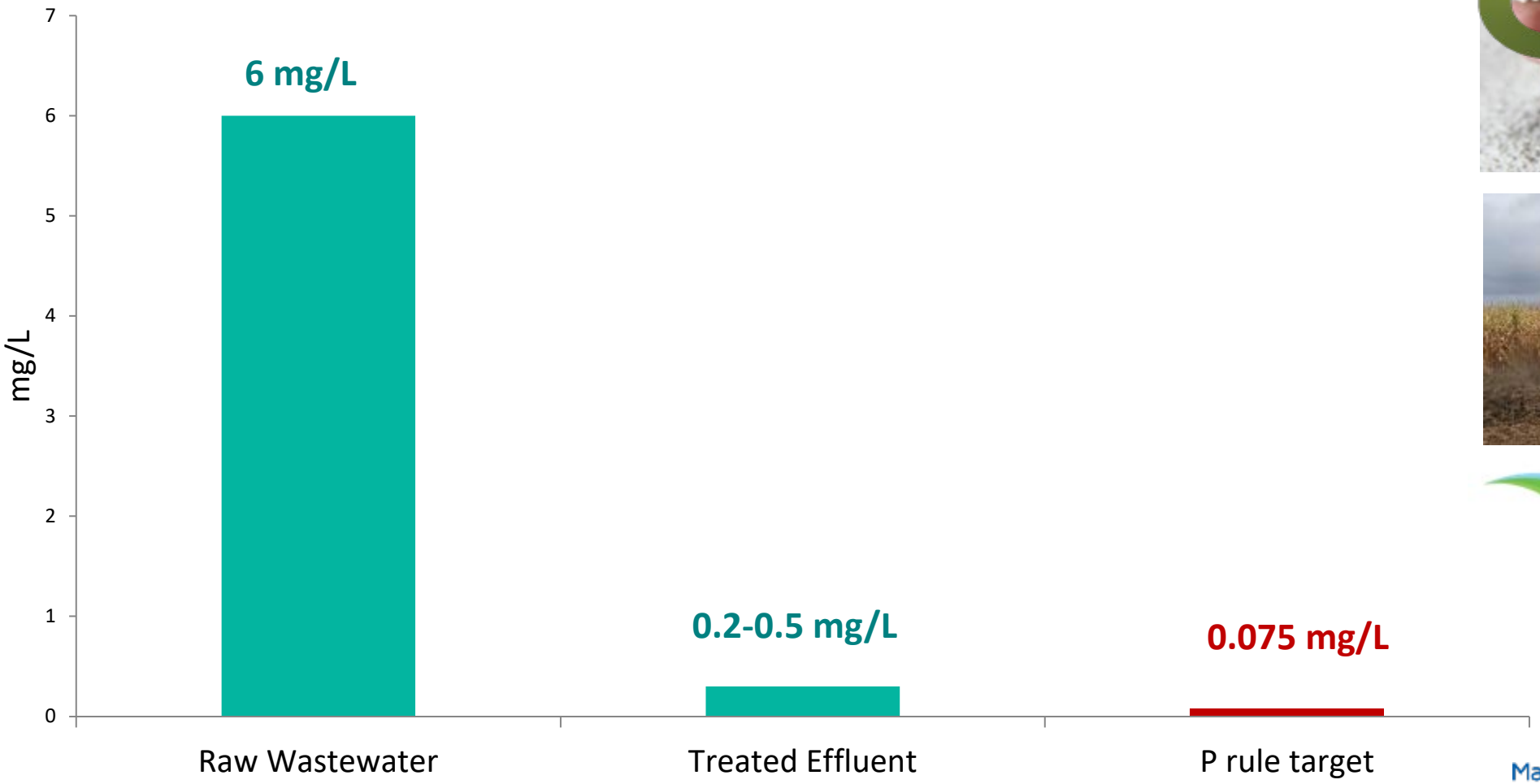
Temperature

	District effluent daily mean Maximum temperature (deg F), current permit term	WDNR Thermal Criteria LFF & *degrees effluent exceeds criteria*	WDNR Thermal Criteria for Small Warm & *degrees effluent exceeds criteria*	WDNR Thermal Criteria Cold & *degrees effluent exceeds criteria*
January	57.35	54 *(4)*	50 *(7.4)*	47 *(10.4)*
February	55.68	54 *(1.7)*	50 *(5.7)*	45 *(11.7)*
March	56.5	54 *(2.5)*	54 *(2.5)*	53 *(3.5)*
April	59.95	64	65	59 *(1)*
May	64.24	75	70	59 *(5)*
June	68.89	75	72	67 *(1.9)*
July	71.64	75	74	68 *(3.6)*
August	72.96	77	78	68 *(5)*
September	72.38	92	87	52 *(20.4)*
October	71.53	54 *(7.5)*	54 *(17.5)*	52 *(19.5)*
November	66.32	54 *(12.3)*	50 *(16.3)*	50 *(16.3)*
December	61.84	54 *(7.8)*	50 *(11.8)*	46 *(15.8)*

Table 8 - District effluent temperatures compared to various sublethal criteria

Phosphorus

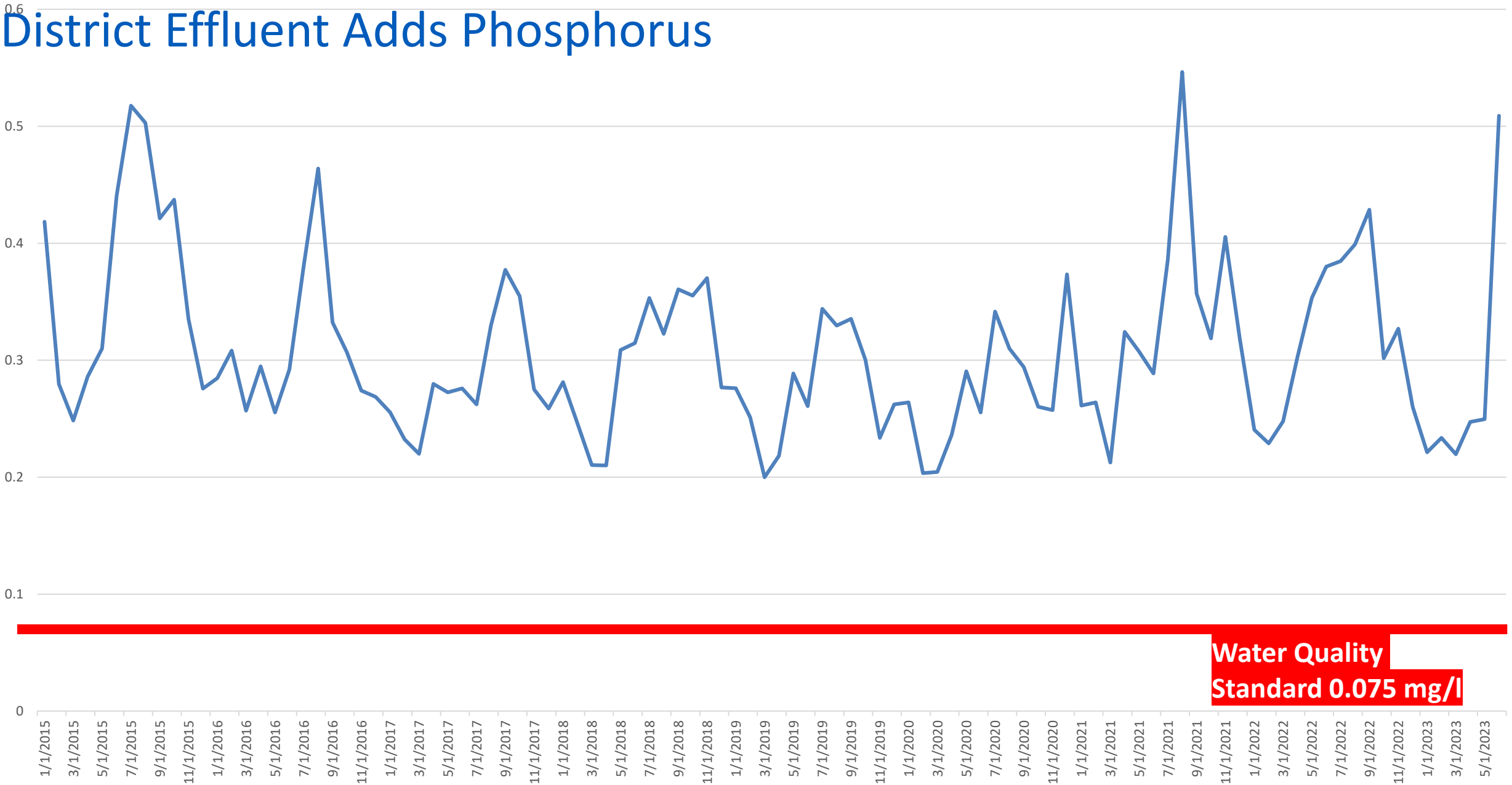
Average Phosphorus Concentrations in District Wastewater

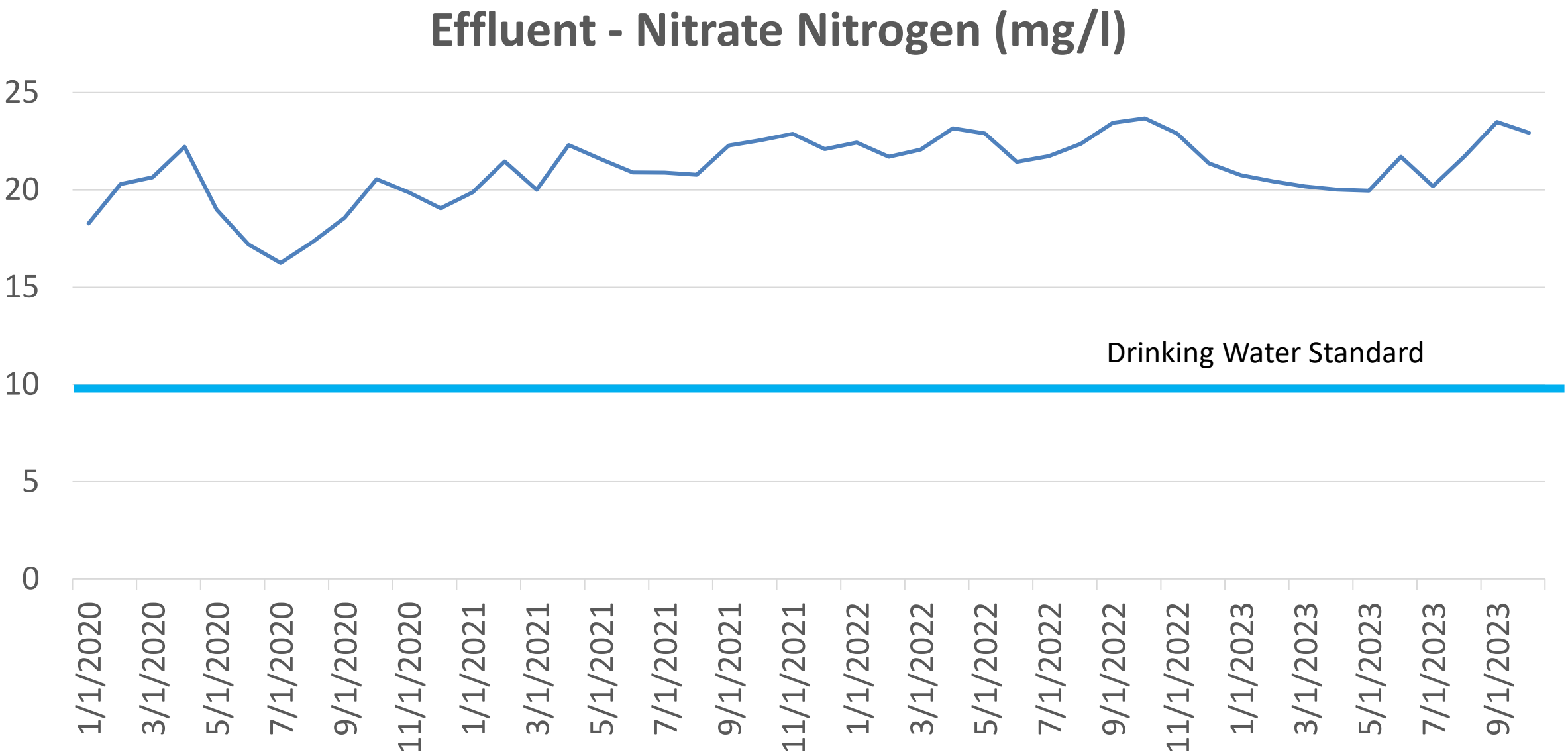


Yahara WINS

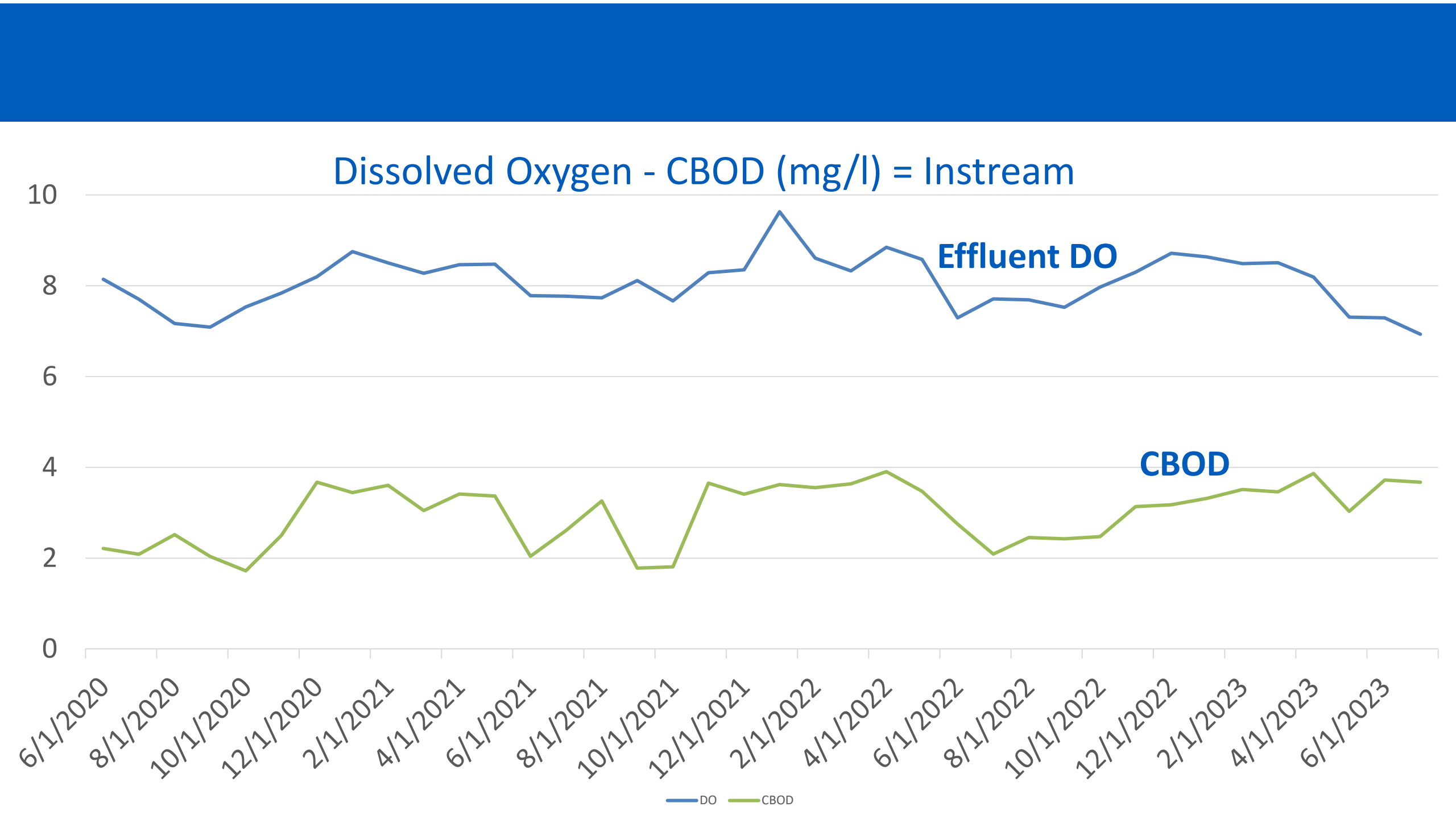
Madison Metropolitan Sewerage District

District Effluent Adds Phosphorus




Effluent - Nitrate Nitrogen (mg/l)
25
20
15
10
5
0
Drinking Water Standard
1/1/2020
3/1/2020
5/1/2020
7/1/2020
9/1/2020
11/1/2020
1/1/2021
3/1/2021
5/1/2021
7/1/2021
9/1/2021
11/1/2021
1/1/2022
3/1/2022
5/1/2022
7/1/2022
9/1/2022
11/1/2022
1/1/2023
3/1/2023
5/1/2023
7/1/2023
9/1/2023

CBOD – **Carbonaceous Biochemical Oxygen Demand** – a way to measure organic pollution in water by looking at the rate at which micro-organisms in the water use up dissolved oxygen when they metabolize the organic pollutants.


Dissolved Oxygen - CBOD (mg/l) = Instream
10
8
6
4
2
0
Effluent DO
CBOD
6/1/2020
8/1/2020
10/1/2020
12/1/2020
2/1/2021
4/1/2021
6/1/2021
8/1/2021
10/1/2021
12/1/2021
2/1/2022
4/1/2022
6/1/2022
8/1/2022
10/1/2022
12/1/2022
2/1/2023
4/1/2023
6/1/2023
DO
CBOD

Chloride

- Average Wisconsin streams <40 mg/l
- MMSD Effluent >395 mg/l
- Effluent adds chloride

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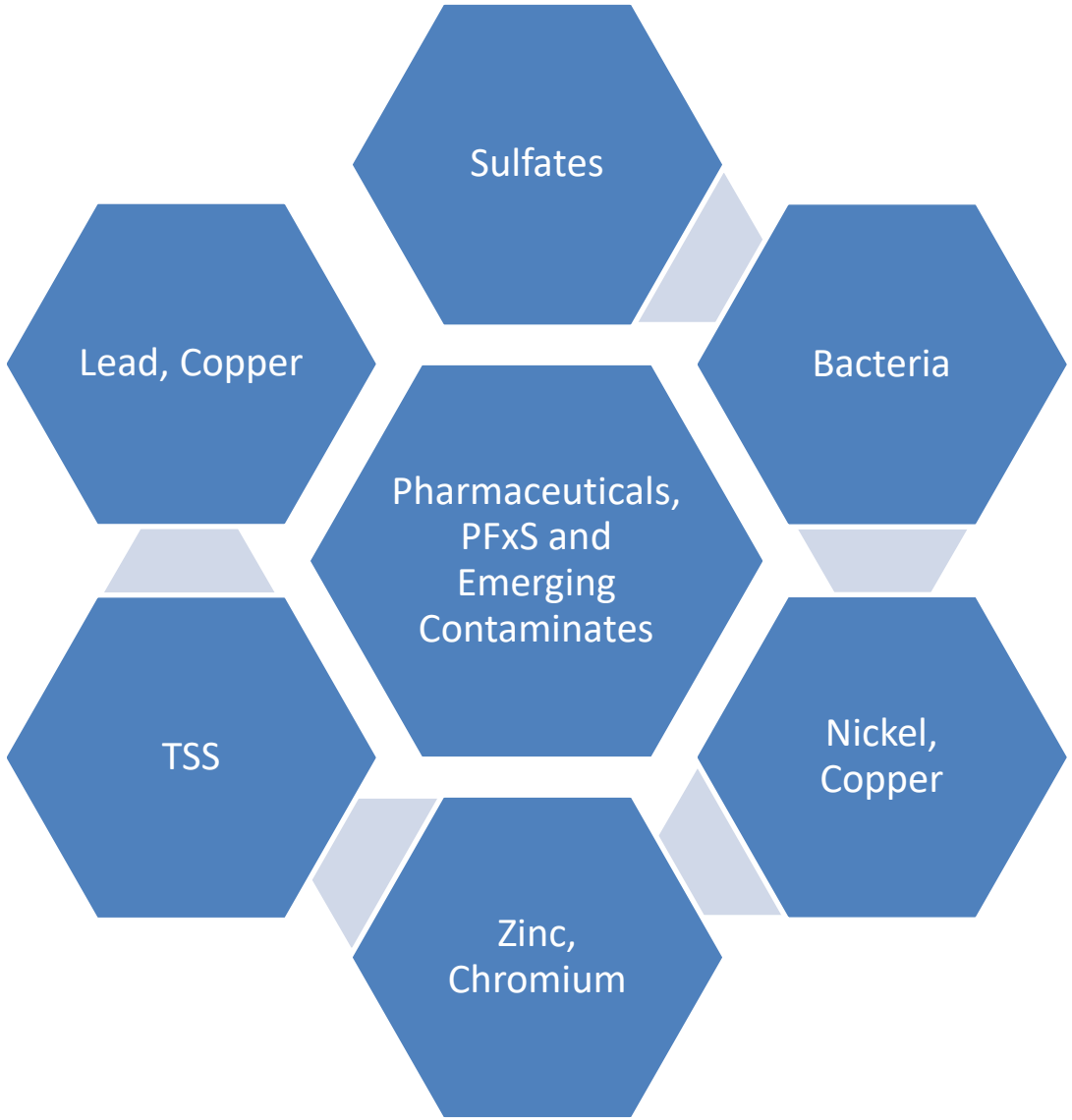
Mercury – Wisconsin Standard 1.3 ppt

- Wisconsin Standard 1.3 ppt
- MMSD variance limit 3.4 ppt
- Over past 20-years, maximum effluent mercury decreased from over 6 ppt to under 3.4 ppt.
- Effluent adds mercury

Other parameters come with effluent:



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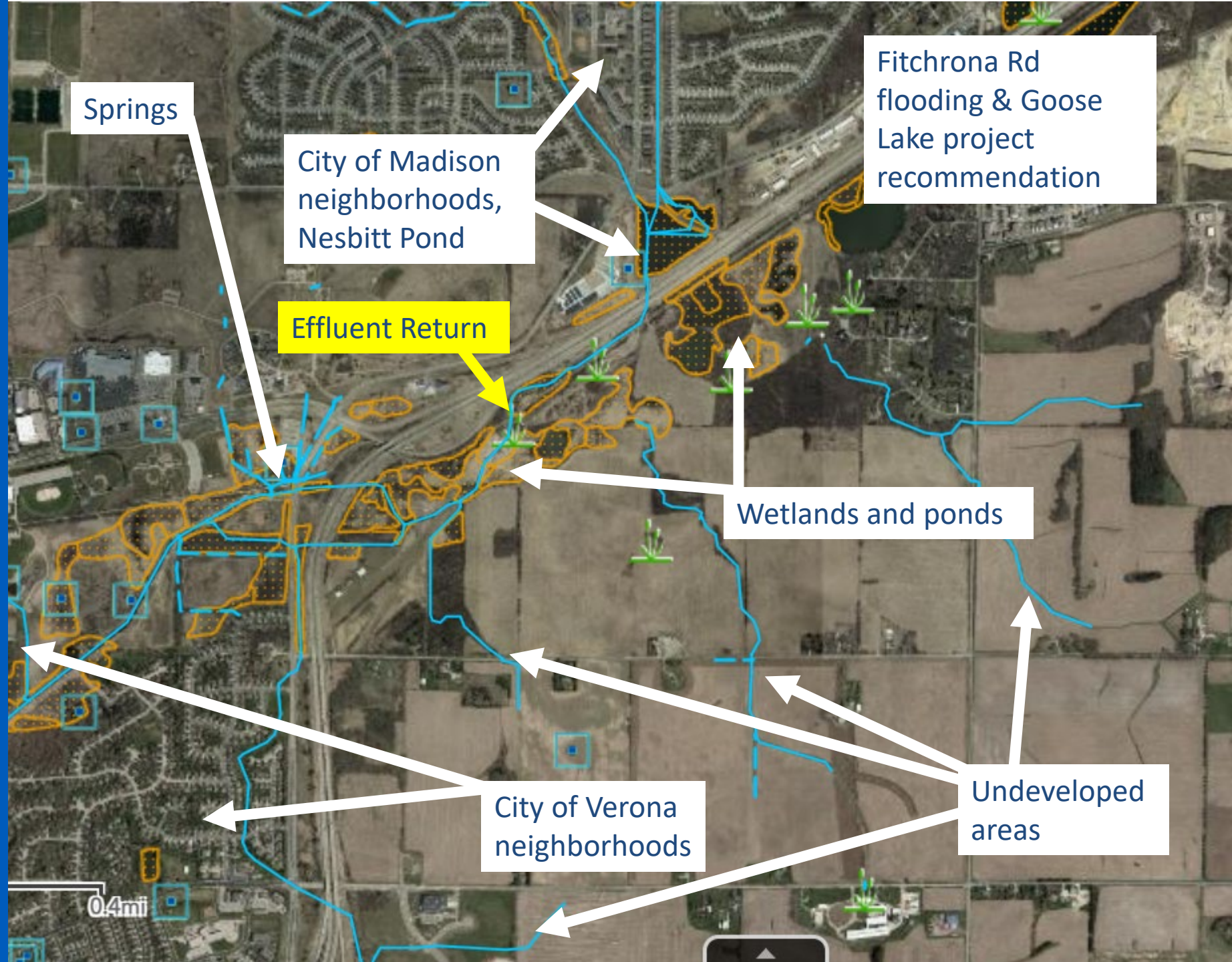
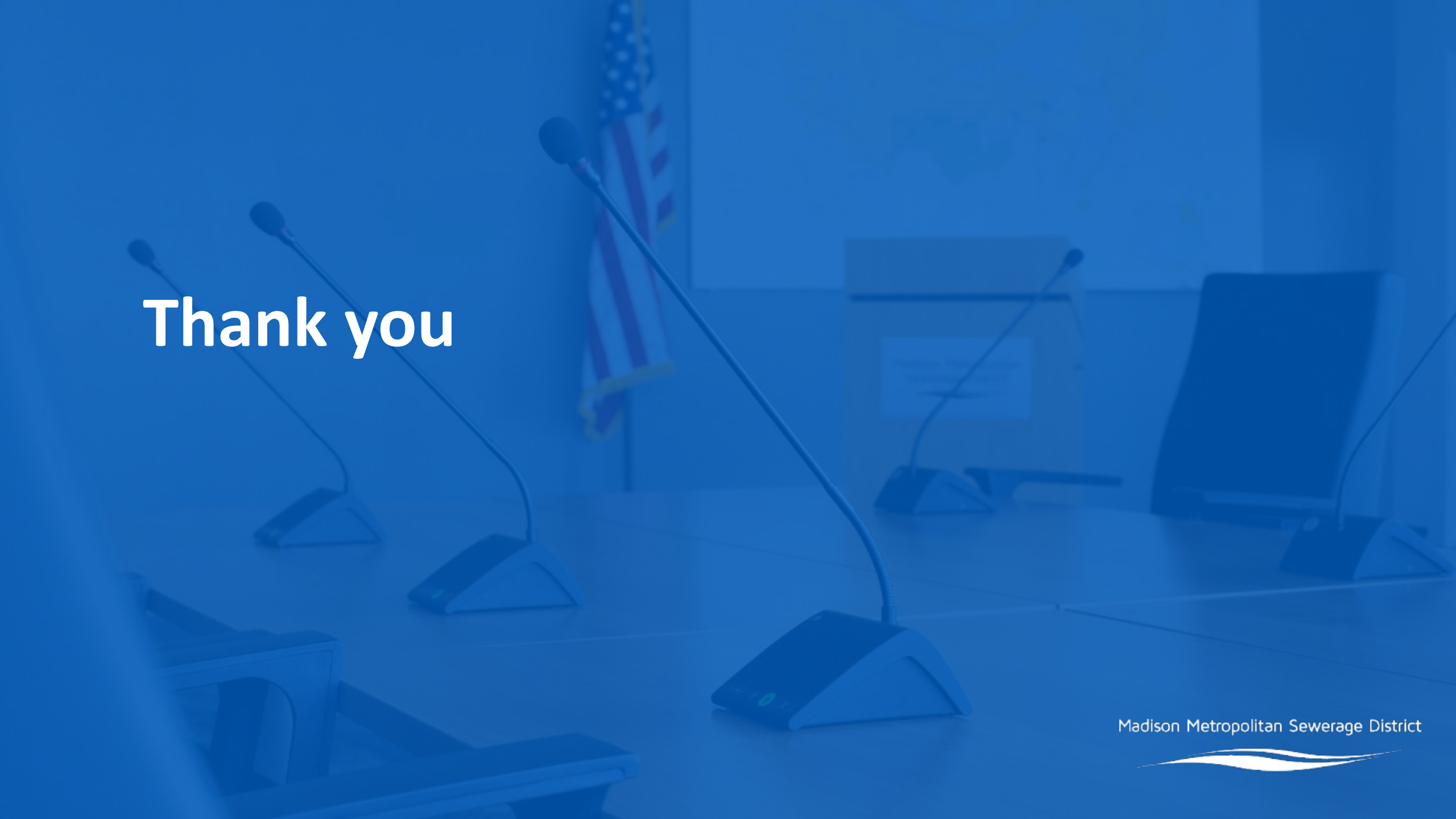
Many sources provide water to Badger Mill Creek



Thank you



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