

DISSERTATION DEFENSE

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Wednesday, April 23, 2025

2:30 pm | meet.google.com/mdn-cyek-uvd

DEVELOPING A WATER QUALITY SCREENING TOOL USING PUBLICLY AVAILABLE DATA AS AN ALTERNATE APPROACH TO SUPPORT MANDATING NUTRIENT ASSESSMENT REDUCTION PLANS FOR SELECT ILLINOIS WASTEWATER TREATMENT PLANTS

Nutrients from Mississippi River Basin states cause intra-basin eutrophication events. These nutrients also contribute to the hypoxic conditions in the coastal environment that is internationally recognized as the Gulf of Mexico, but is now domestically referred to as the Gulf of America. To combat the problem in the Gulf, the United States Environmental Protection Agency (US EPA) established the Mississippi River/Gulf of America Watershed Nutrient Task Force. Illinois is a part of the collaboration. Therefore, to help mitigate the hypoxia problem by decreasing nutrient loads originating from within its borders, the state created the Illinois Nutrient Loss Reduction Strategy (Illinois NLRS).

One of Illinois NLRS' chief methods to lessen nutrient loads involve managing phosphorus discharges from major Publicly Owned Treatment Works (POTWs). Major POTWs are wastewater infrastructure that have wastewater treatment facilities with a design flow capacity of at least one million gallons per day (MGD) of wastewater (US EPA, 2023a). The Illinois NLRS later recommended that the aforementioned facilities perform Nutrient Assessment Reduction Plan (NARP) studies, which the Illinois Environmental Protection Agency, an Illinois NLRS participant, later administered. Consequently, this study focused on the recommendation, as robust NARPs can be cost prohibitive, time-consuming, and inconvenient for smaller, less wealthy municipalities, particularly if results later show that their plant discharges were unlikely to cause local eutrophication events. The project therefore developed a screening tool using publicly available data that WWTP stakeholders could have used to determine which facilities to target before issuing the NARP mandate.

From the 840 POTWs that were initially evaluated, 121, regardless of discharge capacity, of which 62.8% were major POTWs, fit the criteria that would have warranted an investigation. Additionally, the study demonstrated that the magnitude of stream discharge relative to plant discharge influences the propensity for local eutrophication events. It also revealed nonpoint sources as the more likely cause of stream water quality impairment. This research is important to better target potential eutrophication sources that originate from Illinois to prevent negative ecological, economic, recreational, and water treatment implications in the state's local waters as well as help mitigate the hypoxia issue in the Gulf of America.