

Controlling Plants In Wisconsin's Wastewater Treatment Lagoons



Impacts And Controls For Excess Vegetation In Municipal Lagoons

Problematic Plants For Wastewater Lagoons

Aquatic Vegetation

Algae, duckweed, floating plants and submerged aquatic plants (e.g., coontail) are common in slow-moving water and grow fastest in warm weather. While in some cases these plants can help control excess nitrogen and phosphorus, they can also interfere with treatment in wastewater lagoons. Excess vegetation in lagoons can prevent biological treatment, block pipes and valves, limit flow, impact measurements and invite unwanted insects.

PLANTS DISCUSSED

- Aquatic Plants
- Algae
- Duckweed
- Coontail
- Cattail
- Shoreline Vegetation
- Shade Plants
- Smartweed



Algae

Photo Credit: Mike Beck, ERG



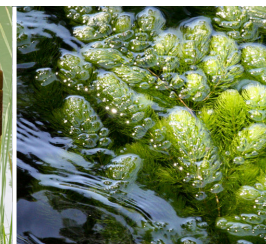
Duckweed

Photo Credit: iStock



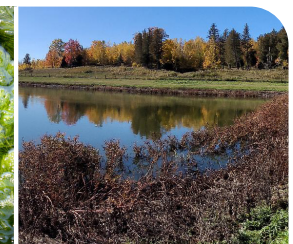
Cattail

Photo Credit: iStock



Coontail

Photo Credit: Patricia Simpson/
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Smartweed

Photo Credit: Wisconsin DNR

Excessive algae and duckweed growing in wastewater lagoons can cause these issues:

1. Reduced dissolved oxygen (DO)
2. Increased total suspended solids (TSS) and biochemical oxygen demand (BOD)
3. Increased pH, increasing the form of ammonia (NH₃) that is more toxic to aquatic life
4. Reduced mixing by wind/wave action

Excessive algae and duckweed decomposing in wastewater lagoons can cause these issues:

1. Increased sludge accumulation
2. Unwanted nutrient release into the water column
3. Increased BOD
4. Strong, unpleasant odors
5. Reduced sunlight, impacting parameters like temperature and DO

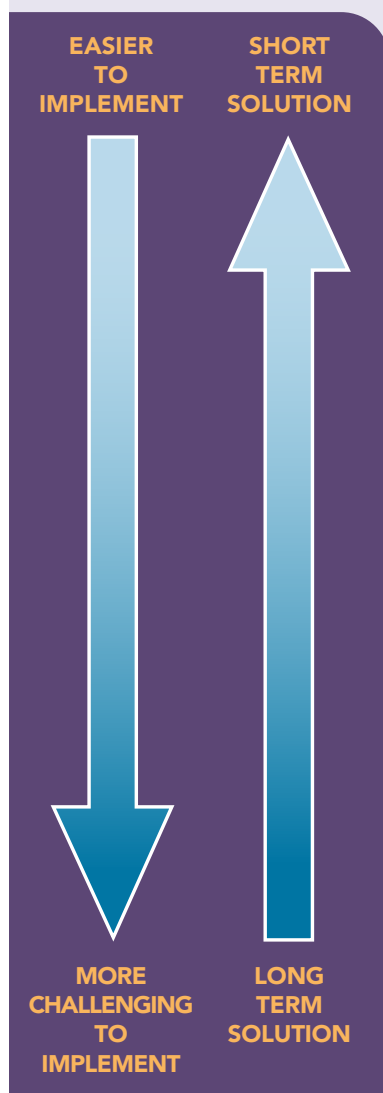
Shoreline Vegetation

Large plants and trees can damage lagoon foundations, berms, dikes or liners, causing untreated sewage to leak into the environment. Leaf deposition and shoreline vegetation can clog systems, add to accumulated solids or attract animals that can damage lagoon banks and liners. Shade plants that cast shade on a large area impact lagoon parameters like temperature and DO.



Photo Credit: Mike Beck, ERG

While large shoreline plants can cause damage, 3–6 inches of grass on lagoon banks is important for stabilization.



Actions for Controlling Problematic Plants

- ① **Add barley straw bales.** Decomposing barley inhibits algae growth but will contribute to sludge accumulation.
- ② **Remove plants physically** using filtration or harvesting techniques (mechanical removal). Weed masses removed from a lagoon must be treated as sludge, and sludge management requirements apply.
- ③ **Add riprap** for vegetation control, using designs that minimize opportunities for seeds to germinate.
- ④ **Remove excess sludge** according to sludge management requirements and best practices.
- ⑤ **Add partial shade using physical covers.** Contact the DNR before use as covers require prior approval.
- ⑥ **Utilize aerators, mixing and other algae inhibition practices,** which also decrease sludge buildup rates.
- ⑦ **Use physical baffles** to compartmentalize treatment processes (i.e., create sections within a lagoon cell).
- ⑧ **Change from parallel operation to series (single path)** operation of pond primary cells. Series operation tends to minimize algae amount in the last cell prior to discharge.
- ⑨ **Control hydraulic retention time (HRT)** with baffles or outflow reduction.
 - Shorter retention times decrease algae growth.
 - HRT must be balanced to allow for proper treatment. Mechanical mixing and aeration shorten the HRT needed for treatment.
- ⑩ **Control algae by installing ultrasonic cavitation.** Ultrasonic cavitation breaks algae cell walls.

Important Considerations:

While some aquatic plants in lagoons are normal and often beneficial for treatment, large quantities of these plants can cause problems and disturb treatment.



USING CHEMICAL ADDITIVES:



Chemical additives (i.e., herbicides) used to control aquatic vegetation may require coverage under the Wisconsin general permit for Aquatic Plants, Algae, and Pathogens. If facilities are considering using chemical additives, they should contact their assigned DNR compliance engineer prior to any action.

Wisconsin General Permit: Aquatic Plants, Algae, and Pathogens, permit no. WI-0064556-2-1

ADDITIONAL RESOURCES:

Compliance Tips for Small Wastewater Treatment Lagoons with Clean Water Act Discharge Permits (See "Overgrown Vegetation"): <https://www.epa.gov/system/files/documents/2022-03/lagoon-complianceadvisory.pdf>

Troubleshooting Manual for Small, Facultative, Partial-Mix Aerated, and Complete-Mix Aerated Wastewater Lagoons (See "Algae Overgrowth" and "Overgrowth Vegetation Other Than Algae"): <https://www.epa.gov/system/files/documents/2024-02/lagoon-troubleshooting-manual.pdf>

Wisconsin DNR Ponds, Lagoons, and Natural Systems Study Guide: <https://dnr.wisconsin.gov/sites/default/files/topic/OpCert/StudyGuidePonds.pdf>

WPDES Permits for Controlling Nuisance or Invasive Aquatic Plants, Algae, and Pathogens: <https://dnr.wisconsin.gov/sites/default/files/topic/Wastewater/WI0064556.pdf>

This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

This resource was developed in collaboration with EPA's Office of Wastewater Management. Find more resources at www.epa.gov/lagoons.