

Organic Sediment (Muck)

Progressive AE Water Resources Group

Muck is a naturally occurring material found on the bottom of lakes and ponds. It is composed primarily of organic matter, giving it a distinct and often unpleasant odor and texture. High concentrations of muck are most common in productive (i.e. nutrient rich) lakes. Sources of muck can be both internal and external. Internal sources include decomposing aquatic organisms and plant biomass. Common external sources of organic material include leaf litter, lawn clippings, ashes from lakeside bonfires, and runoff from the watershed.

While muck has a grim reputation among those who recreate on Michigan's inland lakes, it plays a vital role within a lake's ecosystem. Muck provides valuable habitat to small aquatic organisms (i.e. macroinvertebrates). These macroinvertebrates include midge and mayfly larvae and are a primary food source for fish.

Because muck can be uncomfortable to walk in and releases an unpleasant smell when disturbed, many lakefront owners want to remove the muck in front of their home to have a more enjoyable wading and swimming experience. Physical removal, bioaugmentation (i.e. muck-digesting pellets), and aeration are strategies that have been attempted by many lake residents to rid their lake frontage of muck.

Physical removal of muck can be accomplished either manually or mechanically. Both approaches require a permit from the Michigan Department of Environment, Great Lakes, Energy (ELGE). If the area of impact is relatively small and the muck isn't very thick, homeowners may attempt to manually rake or shovel the muck out of their swim areas. While this is a physically demanding strategy, it is typically the cheapest way to remove muck.

Mechanical removal of muck can be accomplished through a variety of techniques. Traditional dredging using a back hoe may be practical where a thick layer of muck has accumulated near shore or in a channel. Hydraulic dredging requires more sophisticated equipment and is typically the most expensive route to remove muck. However, it allows for sediment removal further from shore, outside the reach of a back hoe. Hydraulic dredging is the process of pumping a slurry of water and bottom sediments into a geotextile dewatering bag. Once dry, the sediments can be hauled away for disposal. Both forms of dredging require EGLE permits and technical drawings outlining the disposal site and a dewatering plan to ensure the dredging spoils do not run back into the lake or an adjacent body of water.

Electrical blowers and lake bottom rollers are two small-scale solutions to displace localized muck buildup. Blowers create water currents to move sediments while lake bottom rollers displace muck by agitating the bottom sediment. The goal of these approaches is to move nearshore muck to a deep-water location.¹ However, when used in heavily developed areas, both of these strategies may cause the displaced muck to settle in front of nearby properties, compounding the muck issues for their neighbors.

Bioaugmentation (i.e. muck-digesting pellets) has been applied to many lakes and ponds in an attempt to reduce organic sediments. Positive results from applying muck-digesting pellets are so far anecdotal as these products have not been validated by peer-reviewed



Core sample of nutrient rich lake sediment



Hydraulic dredging geotextile dewatering bag

scientific literature. A recent laboratory study conducted by Grand Valley State University's Annis Water Resources Institute determined that "there was no statistically significant differences in changes of organic matter between treatments with pellets and those without pellets."²

Aeration has been attempted as another mode of muck removal. The concept is that by supplying additional oxygen through aeration, the naturally occurring bacteria or bacteria added via pellets that decompose or "eat" muck will be able to do so more efficiently. Measuring muck reduced by aeration has proven difficult as it is likely that locally reduced muck can be attributed to the aerators agitating the sediments, moving them away from the aerated areas. It is of note that aeration may also have unintended negative consequences. Because the aerators can resuspend nutrient rich sediments, it is possible that increased algal growth will be observed.

Although most riparians would prefer a sandy lake bottom in front of their home, this is not possible around many of Michigan's inland lakes. Prior to purchasing a lake home, evaluating the sediment composition is an important step in selecting a property that will suit your recreational needs.



Aerator on a lake bottom



Weed roller clearing a swim area

1 Hoyer, M. V., Canfield, D. E., Brenner, M. (2017, January). A Beginner's Guide to Water Management - Muck: Causes and Corrective Actions. Florida LAKEWATCH.

2 Steinman, A. D., Partridge, C. G., Hassett, M., Oudsema, M., Kindervater, E. (2021, April). Assessment of the Effectiveness of Muck-Digesting Bacterial Pellets.

For more information regarding Michigan's inland lakes, please visit:
michiganlakeinfo.com

