MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

RESEARCH SUMMARY

THE EFFECTIVENESS OF AMENDMENTS IN PROMOTING HYDRIC SOIL CONDITIONS IN MITIGATION WETLANDS

WHAT WAS THE NEED?

The Maryland Department of Environment requires 60 cubic yards per acre of organic matter soil amendments for wetland mitigations. However, the benefits are not clear. Meeting hydric soil conditions has proved challenging at some wetland mitigation sites. Could organic amendments help?

WHAT WAS THE GOAL?

There were two goals evaluated for this research. 1) Determine if organic matter amendments can help make soils hydric in mitigation wetlands, and what hydric soil test methods are the most effective. 2) Determine if organic amendments are beneficial in general, and, if so, provide a recommendation for the most effective amendments and loading rates.

WHAT DID THE RESEARCH TEAM DO?

The research was a comprehensive study of organic matter amendment use for mitigation wetlands and had three components. First, a comprehensive review of available literature was conducted, and the findings published. Second, there were controlled lab studies focusing on methane gas emissions. Third, a large-scale field study was conducted where

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the research team measured gas, plant growth, and hydric soil development.

WHAT WAS THE OUTCOME?

Hydric soil development depends strongly on saturated conditions and adding organic amendments did not increase the likelihood of soils becoming hydric. In fluctuating water conditions, redox potential hydric soil test had more favorable results than α,α'-dipyridyl.

Based on other studies, topsoil consistently performs better than other types of amendments across a range of metrics. Based on the field study, and other studies, organic amendments (other than topsoil) have little to no effect, even in soils with low background organic matter and high sand content, such as those on Maryland's Atlantic Coastal Plain.

Hydrology (hydroperiod and microtopography) impacted mitigation wetland development more consistently than organic amendments. Establishing hydroperiods that mimic natural systems, with an adequate drainage outlet and periodic water drawdown will likely reduce methane production, control cattail growth, and increase plant diversity.

Soil disturbance can create negative mitigation outcomes. The team recommended using minimal disturbance practices to establish mitigation wetlands, such as ditch plugging.

Consider 60 yd3 $acre^{-1}$ as an upper limit for organic application rates unless the amendment source is topsoil. If organic amendments are used, screen them for free N and P content and favor materials that have been composted.

Of the organic amendments evaluated, composted wood chips and biosolids (BLOOM®) performed the best.

HOW WILL MDOT SHA USE THE RESULTS?

The results of this research will assist MDOT SHA on the use of proper materials and most prudent methods for improving soil condition on ecological restoration sites. These results will also assist in efforts to achieve compliance, lead to cost savings, and reduce production of greenhouse gases.

LEARN MORE

To view the complete report, click here.

The University of Maryland Environmental Science and Technology YouTube channel has created a link to Brian Scott's presentation on this project. Click here to access.