

Enhancing the Design of Constructed Wetlands Along the Missouri River to Improve Nutrient Removal

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The U.S. Army Corps of Engineers (USACE) and local partners build and maintain a vast network of levees on U.S. rivers, including the lower Missouri. When levees are repaired, maintained, or realigned, significant amounts of fill material are collected locally from “borrow pits”. In some cases, these borrow pits have been converted to wetlands to provide habitat for wetland plants and animals. At one site, an agricultural drainage ditch was re-routed through a created wetland to improve water quality (primarily through nutrient removal) before the ditch discharges into the Missouri River. Currently, however, these wetlands are not being designed specifically for nutrient retention, and their water quality benefits have not been quantified. The goal of this research is to determine the potential water quality benefits of routing agricultural drainage through constructed wetlands in the lower Missouri River basin and help improve the design of these nature-based solutions. We monitored one year of water levels and water quality in the constructed wetland receiving agricultural runoff to quantify nutrient removal. We are using these data to develop watershed and wetland models to quantify long term performance, test different design alternatives, and provide recommendations for optimizing nutrient removal in these wetlands. Preliminary results show that the wetland is effectively retaining nitrogen and phosphorus, but wetland hydrology and nutrient removal are highly affected by Missouri River water level. The results of this work will help USACE prioritize locations for constructed wetlands and inform their design to enhance water quality benefits.