

IMPACTS OF MUNICIPAL WASTEWATER EFFLUENT ON SEED BANKS,
CHEMISTRY, AND MICROORGANISMS OF SOILS EXCAVATED FROM
WETLAND IMPOUNDMENTS DESIGNATED FOR WILDLIFE

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ABSTRACT

To evaluate the effects of municipal wastewater effluent (WWE) and Missouri River water (MOR) as irrigation sources on soil chemistry, seed banks, and microorganisms, a field study was conducted in conjunction with a set of greenhouse studies and microbial assays. Samples of soils from WWE-irrigated and MOR-irrigated impoundments at Eagle Bluffs Conservation Area indicated that soil electrical conductivity was significantly greater and pH significantly less in WWE-impoundments. Results of greenhouse studies show that irrigation with WWE decreased vegetative taxa richness, stem densities, and biomass relative to other irrigation sources. Increases in electrical conductivity and exchangeable sodium resulted from irrigation with WWE, which altered edaphic conditions and inhibited germination of the seed banks. Additionally, microbial activity was decreased in soil materials irrigated with WWE although microbial abundance was similar among treatments. Increased salinity and sodicity in the soil materials irrigated with WWE were concluded to be responsible for the depressed soil microbial activity. Wastewater irrigated wetlands may develop elevated levels of salinity and sodicity that alters edaphic conditions and ecological processes. This may be particularly pertinent to wetland managers that employ moist-soil practices to stimulate germination of selective taxa from freshwater seed banks.