

**EFFECTS OF PRAIRIE RECONSTRUCTION ON SOIL-WATER AND GROUNDWATER
NUTRIENT CONCENTRATIONS, NEAL SMITH NATIONAL WILDLIFE REFUGE**

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Abstract: Prairie reconstruction is increasingly viewed as a viable best management practice for reducing nutrient losses in agricultural regions. At the Neal Smith National Wildlife Refuge in Prairie City, IA, we are monitoring the effects of prairie reconstruction on subsurface water quality at a single site and across a chronosequence of prairie plantings. Soil-water and groundwater monitoring during six years of prairie reconstruction within a single catchment showed NO₃-N concentrations declining within five years of planting. A lagged response was observed and this response varied by landscape position. Along drainageways, non-detectable NO₃-N concentrations dominated within three years, but in upland areas, it took five years for NO₃-N concentrations to stabilize near 2 mg/l. In a study of a 13-year reconstructed prairie chronosequence, groundwater was deeper under older prairie plantings and groundwater NO₃-N and chloride concentrations significantly decreased with time since planting. The rate of NO₃-N concentration reduction measured in the basin-wide chronosequence study was less than the single field, but this attests to the variability that exists within agricultural starting points prior to reconstruction. Additional soil-water sampling beneath the chronosequence suggests that prairie reconstruction may be affecting carbon stocks in soil-water more rapidly than observed in shallow or deep soils. In contrast to NO₃-N, groundwater phosphorus concentrations showed little evidence of temporal trends and likely reflect the legacy of long-term agriculture. Overall, our study results indicate that prairie reconstruction of agricultural fields can significantly reduce NO₃-N concentrations in shallow groundwater.