



Raising Reservoir Pool Levels to Manage Nitrate Loss

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Researchers (l to r: Matthew Streeter, Keith Schilling, and Tom Stoeffler) from the Iowa Geological

Researchers (l to r: Matthew Streeter, Keith Schilling, and Tom Stoeffler) from the Iowa Geological Survey collect a soil sample from the Lake Red Rock delta in central Iowa. Photo by Todd Goss- elink, Iowa Department of Natural Resources.

New conservation practices have been developed to reduce nitrate–nitrogen loads at the edge–field scale, but few strategies are available for larger scales. Flood control reservoirs are large landscape features that receive input flows from upstream agricultural watersheds. While reservoirs are known to reduce river nitrate concentrations, manipulating reservoirs to achieve nitrate reductions has not been investigated.

At Lake Red Rock in central Iowa, discharge from the Des Moines River has created a delta of sediment within the pool that is periodically inundated by changes in reservoir stage. Using a combination of sediment sampling, laboratory assays, and satellite

imagery mapping, researchers developed a rating curve to quantify the amount of nitrate lost with various amounts of land area inundation within the delta.

Results indicated that raising pool elevations to inundate more of the delta would result in greater nitrate losses. Increasing the pool stage by 0.5 m would result in potential nitrate reduction of 102 Mg, an amount equivalent to installing nearly 650 edge-of-field practices. Although more work is needed to integrate with an existing environmental pool management plan, the results indicate that reservoir management could achieve nitrate reductions at a novel landscape scale.

Adapted from

Schilling, K. E., Streeter, M. T., Anderson, E., Merryman, J., Isenhardt, T., Arenas-Amado, A., & Theiling, C. (2024). Potential for managing pool levels in a flood-control reservoir to increase nitrate-nitrogen load reductions. *Journal of Environmental Quality*, 53, 209–219. <https://doi.org/10.1002/jeq2.20539>

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