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# Progress Report

## 2022 South Dakota Nutrient Research and Education Council Invited Proposals

<b>Progress Report Title:</b>	Interim Report - Due July 1, 2022
<b>Applicant Name:</b>	John McMaine
<b>Application Title:</b>	Identifying Nutrient Loss Hot Spots in Tile Drainage (Year 3)
<b>Application ID:</b>	1845
<b>Review Deadline:</b>	07/1/2022 11:59 PM

## Interim Report - Due July 1, 2022

### Project

	Start Date	End Date
<b>Start and End Dates of Funding:</b>	01/1/2020	12/31/2023
<b>Title of Project:</b>	Identifying Nutrient Loss Hot Spots in Tile Drainage (Year 3)	
<b>Project Description:</b>	<p>Nutrient loss contributes to economic loss for producers and potential negative downstream water quality impacts. Nutrient loss can occur in many situations, but is influenced by many variables, including soil type, precipitation, crop growth, crop type, cropping history, and nutrient management. There has been a significant push in the last ten years to mitigate nutrient loss through tile drainage through the implementation of edge-of-field practices, such as bioeactors and saturated buffers. While research is on-going, edge-of-field practices are an effective way to reduce nutrients from tile drainage, however they do require a financial investment and funds are limited for implementation. To optimize selection of sites, it is important to know how different characteristics of soil, crops, and nutrient management influence nutrient loss. As part of this project, SDSU faculty and staff will continue to work with producers across eastern South Dakota to sample tile drain water and compare that with soil type, precipitation, crop growth, crop type, cropping history, and nutrient management. This will result in identification of "hot spots" or factors that increase risk of nutrient loss. After these risk factors are identified, areas that are at higher risk can be prioritized for mitigation of nutrient loss.</p>	

### Publications

<b>Publication Title:</b>	Thesis - Morghan Hurst
<b>Publication Date:</b>	05/6/2022
<b>Status:</b>	published on open prairie
<b>Publication Description:</b>	MS thesis

*Grant Name - Identifying Nutrient Loss Hot Spots in Tile Drainage*

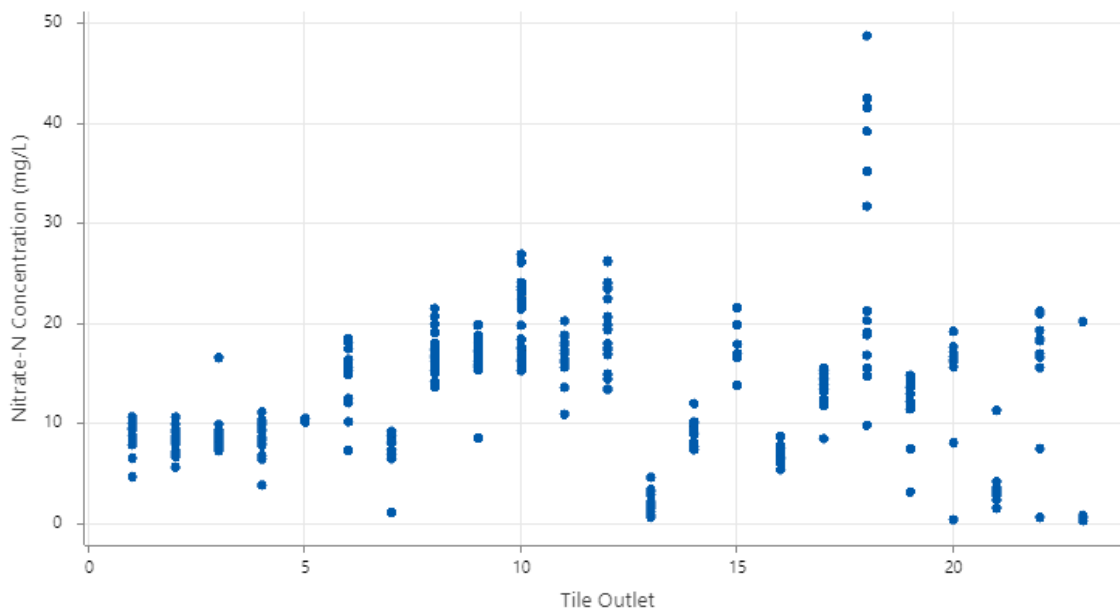
*PI – John McMaine*

*Objectives*

1. Collect and analyze bi-weekly tile drainage samples, flow rates, and nutrient load from 15-20 fields across eastern South Dakota representing a range of soil types and practices.
2. Determine what impact soil type, precipitation, crop growth, crop type, cropping history, and nutrient management has on nutrient loss.
3. Recommend prioritization of edge-of-field practices based on what variables are most likely to contribute to nutrient loss.

*Results*

Sampling paused during late winter but resumed in early spring. To date, around 500 samples have been analyzed for nitrate-N. It is also planned to analyze for ortho-phosphate. An electrical conductivity meter has been purchased and samples will also be analyzed for EC and pH in the field. Results were less variable within each site but highly variable between sites. This indicates that there are other variables that are causing risk for nutrient loss. I have a student working through all the fields this summer to compile all the variables about soils and management that we have for each outlet and then will run statistical analysis on the results to see if any variables are significant. Additional sites are also being added. The figure below shows the spread of nitrate concentration from each outlet.



*Impacts*

After the annual report was sent to each farmer participant, opportunity was given to discuss individual results. Some farmers contacted us for a better idea of what the results meant. The project was presented at the Conservation Drainage Network Annual Meeting (around 100 in-person and an additional 100 online participants, Spring, 2022) and the Western South Dakota Hydrology Conference

(in-person to around 30 participants in Spring, 2022). Funding acknowledgement was made for both presentations. The project and project implications (managing nutrient loss) will be presented at a booth at the Ag PhD Field Day in July, 2022 and Dakota Fest in August, 2022. Results were published in a MS thesis this Spring, 2022.

#### *Changes in Project Personnel*

Anthony Bly officially joined the project and is assisting with agronomy perspectives as well as continued farmer engagement. Two technicians have been hired that are partially supported by this project and partially by another project (Willow Creek Watershed Project). The three technicians assisting with the project last year are no longer at SDSU. We are working on rehiring one technician. Students have stepped up to continue taking samples. A technician with Water Resources Institute (John Maursetter) has led sample analysis.