

North Dakota Discovery Farms

On-Farm Edge of Feedlot and Tile Drainage Monitoring

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Abstract

North Dakota Discovery Farms have been operating since late 2007. The goals of the project are to collect real-time water quality data from operating farms while incorporating the knowledge and experience of the landowner in best management practice (BMP) development. As with any in-field monitoring project, the outcomes hinge on the collection of valid data. After working through equipment and weather-related logistics, monitoring data from 2009 and 2010 show some interesting results. Nitrate loads from feedlot runoff show a temporal pattern with the majority of the load being released during the spring snowmelt. Feedlot runoff nitrate load is also decreased significantly during these events through vegetative treatment. Tile drainage monitoring has shown a significant load of nitrate exiting tile drains in a similar temporal pattern. Farmer derived BMPs are being considered and some have been implemented to address the initial monitoring findings.



Figure 1. Aerial photo of feedlot and field surface runoff monitoring stations at location 1 in Underwood, ND.

Sampling Protocol

- Sampling for nitrogen, phosphorous, chloride, total suspended solids, bacteria, conductance, and suspended sediment using ISCO automated samplers during snowmelt and rainstorm runoff events.
- Samples prepared by USGS North Dakota Water Science Center Lab and analyzed by the North Dakota Department of Health and USGS Iowa Sediment Lab.
- Also collecting stage (height of flow), discharge (amount of flow), air temperature, wind speed, wind direction, precipitation, relative humidity, soil moisture and temperatures at four depths.

Producer Response

Based on the outcomes of multiple year sampling, the producer at location 1 (Figure 1) is in the process of installing a clean water diversion around the feedlot to minimize snow melt from flowing through the feedlot area.

At location 2 (Figure 2), after learning of nitrate levels exiting tile drains, the producers have split the field in half and established perennial alfalfa over one tile drain system and will continue their annual cropping system (corn, wheat, soybeans) over the other tile system.

At both of these sites, monitoring will continue to determine the effectiveness of the producer's actions.

ND Discovery Farms Goals

- Encourage responsible livestock development while protecting our natural resources.
- Ensure a coordinated approach of regulatory practices and policies.
- Document and quantify environmental impacts of farming practices.
- Provide unbiased, reliable information on the relationship between agricultural production and natural resource management.
- Provide enhanced communication between farmers, researchers, educators, the general public and regulatory agencies.
- Establish a network of working farms to evaluate existing and new/innovative agricultural land use practices.
- Provide a platform for agricultural systems research.

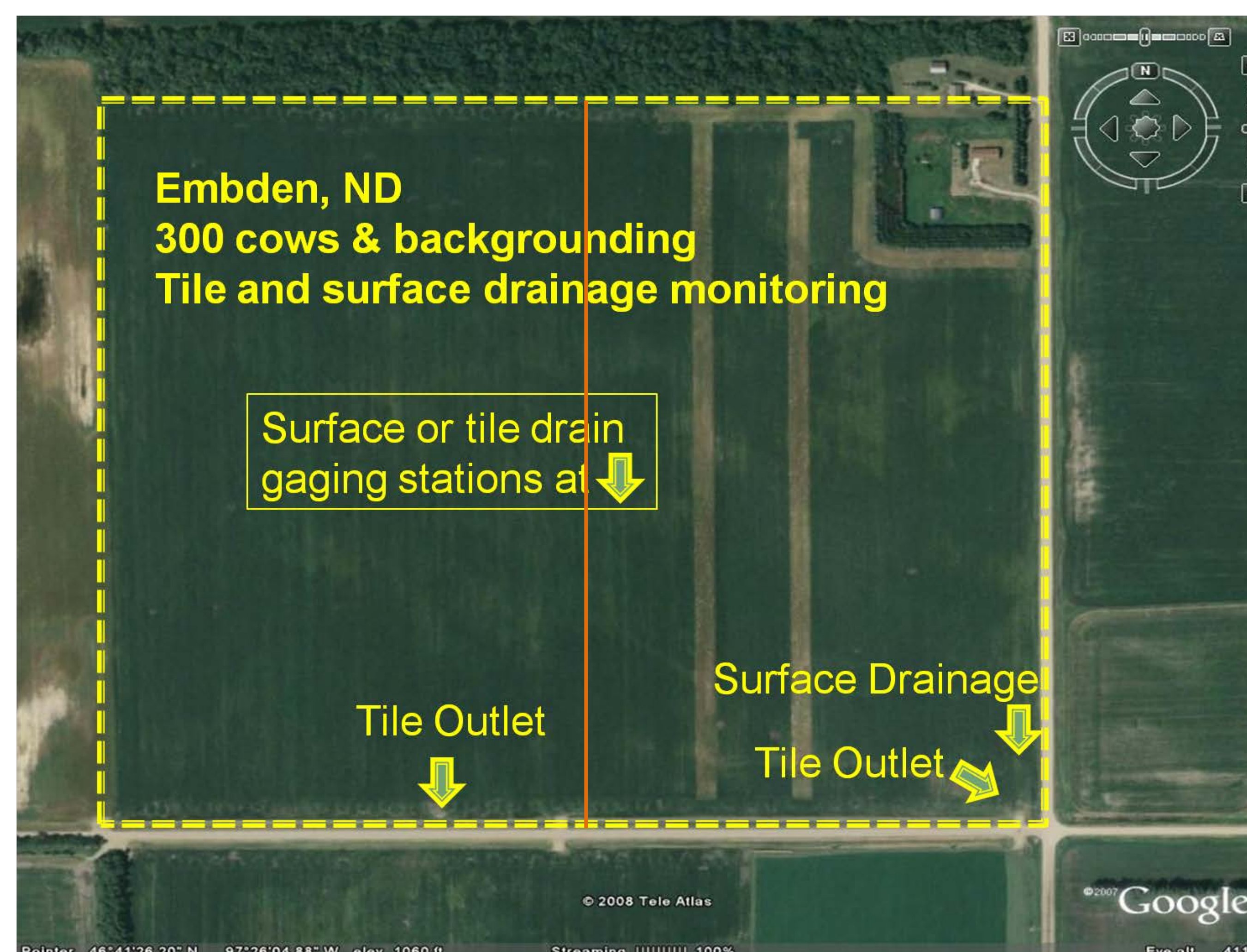


Figure 2. Aerial photo of field surface runoff and tile drainage monitoring stations at location 2, Embden, ND. Orange line depicts separation of the two separate tile systems draining the field.

Cooperators

- Kim and Denise Amann
- Doyle and Patsy Johannes
- Kent and Sandy Bartholomay
- NDSU Agricultural Experiment Station
- NDSU Extension Service
- USGS ND WSC
- North Dakota Department of Health
- North Dakota Water Commission

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