

## EQUIPMENT INSTALLATION

Installation of the combined surface and sub-surface monitoring equipment occurred in December of 2011. An 8 foot Agri Drain structure and equipment needed for automatic, routine measurement of combined surface water runoff and sub-surface drainage was installed. Water samples are collected automatically, whenever runoff occurs. Weather station equipment to record precipitation, temperature and other climatic variables was also installed at this time. The monitoring site at the Simonsen Farm was fully operational for snowmelt and spring runoff beginning in 2012. Combined surface water runoff and subsurface drainage from the edge-of-field site will be monitored year round for the 5 to 7 year duration of this project.

Samples collected are analyzed for sediment, total phosphorus, phosphate phosphorus, chloride, total kjeldahl nitrogen, ammonia nitrogen and nitrate nitrogen. By combining a measure of water flow and sediment and nutrient concentrations, it will be possible to calculate total nutrient and sediment movement.



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## SIMONSEN FARM Farm, Site and Study Design



The area outlined in blue delineates the monitored field. The red dashed lines represent the location of subsurface drainage tiles. All surface and subsurface runoff in the blue area moves in the same direction and flows through a water monitoring station. The triangle indicates the location of the water monitoring station and X indicates the location of surface intakes.

## CONCLUSION

The Discovery Farms Minnesota project at the Simonsen Farm is designed to provide information to better understand how farm management practices can impact sediment and nutrient loss to surface waters. Throughout the 5 to 7 year duration of this project, the site will provide information on surface and sub-surface water runoff on a tiled field with multiple surface inlets (open intakes). Work at the Simonsen Farm will help to identify some of the strengths and challenges of similar farming systems and landscapes.

## FOR MORE INFORMATION, PLEASE CONTACT

Tim Radatz (608) 443-6587 radatz@mawrc.org	George Rehm (507) 263-9127 rehmx001@umn.edu	Scott Matteson (507) 344-5261 Scott.Matteson@state.mn.us
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## OVERVIEW OF OPERATION



The Simonsen Farm is a crop farm located in southeastern Renville County in central Minnesota. The farm, which is owned and operated by Paul and his wife Janet, produces corn, soybeans, sweet corn and peas on approximately 375 acres. Janet works off of the farm as a Community Nutrition Educator for the University of Minnesota-Extension. Paul earned a B.S. degree in agricultural education from the University of Minnesota. Following graduation, Paul taught vocational agriculture at Olivia High School and helped his dad, Bernard, on the farm.

Bernard retired in 1984 and Paul then took over the family farm. Hogs were once a vital part of the farm enterprise; but, have not been a part of the farming operation for the past several years. There is no recent history of manure use. Commercial fertilizer is used on all acres.

Paul is active on the Minnesota Soybean Research and Promotion Council and very engaged in Minnesota's agricultural community. He is committed to balancing conservation and production on his second generation farm. Paul has always been interested in the impact of farming practices on water quality and believes his participation will be a learning process for himself, his neighbors and all farmers located in central Minnesota.

### Cropping System

A corn-soybean rotation is used on the majority of acres at the Simonsen Farm. On the remaining acres, a sweet corn-peas rotation is used. About 2/3 of the field corn is sold to the ethanol plant at Winthrop and soybeans are frequently contracted for seed production. Sweet corn and peas are grown using contracts with various canning companies.

The Simonsen Farm uses conventional tillage practices. After corn, fields are moldboard plowed in the fall. After soybeans, there is usually no fall tillage. With field corn, sweet corn, soybeans and field peas, fields are worked with a soil finisher in the spring to prepare the seedbed.

As might be expected, the fertilizer program varies with the type of crop planned, the previous crop and soil test results. For both sweet corn and field corn, nitrogen rates are based on the previous crop and yield expectations. The majority of the phosphate and potash needed is broadcast and incorporated before planting. The rates of phosphate and potash applications are determined by soil test results. Liquid starter fertilizer is placed in contact with the seed at planting for field corn production.

### Location and Climate

The Simonsen Farm is located in the Western Corn Belt Plains region of south central Minnesota. The region is characterized by small streams that drain directly into the Minnesota River. Row crop agriculture is the main land use in the area, with corn and soybean production accounting for approximately 90% of cropped lands. Water from the farm drains into County Ditch No. 106A, then into Fort Ridgely Creek and finally into the Minnesota River, which is approximately 5 miles to the south. Average annual precipitation including snowfall is 27.5 inches, most of which occurs during the growing season. Mean daily temperatures are 17° F and 70° F for winter and summer months, respectively.



## FARM AND MONITORING SITE SELECTION

The initial visit to the Simonsen Farm occurred in late August of 2011 with a tour of the fields to evaluate potential sites for surface water and sub-surface drainage monitoring. The farm was selected for the Discovery Farms Minnesota Program because the cropping practices and landscape are typical for the region and there was a field site capable of generating a robust and reliable dataset.

The site selected for monitoring provides an edge-of-field water quality evaluation of fields with a corn-soybean rotation, conventional tillage and commercial fertilizer application. The field selected for monitoring has cement sub-surface tile, which was installed in the 1960's, in a "turkey foot" configuration with numerous open intakes or surface inlets. There is no surface water outlet from the field; all surface water runoff enters the sub-surface tile system through open intakes. This is the first Discovery Farm site that has surface tile inlets and will provide valuable data about a practice that is typical in the region.

The monitoring site captures water from an 81 acre area. The field has an average slope of 2.8%. In any year, approximately 1/2 of the monitored area will be split for two of the four crops grown.

Soils on the Simonsen Farm are representative of the highly productive soils of central Minnesota. There are three major soil associations in the field where monitoring occurs, Canisteo-Glencoe, Webster and Nicollet. These soils have a clay loam texture in the surface horizon and throughout the profile and are poorly drained having an available water holding capacity of 9.9 inches to a depth of 5 feet.

Soil samples (0 to 6 inches), routinely collected from the Simonsen Farm, are used to guide the application of fertilizer. The most recent results from the monitored field are summarized in the table below.

Soil Sample Analysis of the Monitored Field	
SOIL PROPERTY	VALUE
pH	7.7
Organic Matter, %	4.1
Soil Test P (Olsen), ppm	5
Soil Test K, ppm	106
Soil Test Zn, ppm	1.4

The high soil pH and organic matter content values are typical for area soils, which were formed on Wisconsin age glacial till under prairie vegetation. The phosphorus value is classified as low with the potassium test being classified in the medium range. These P and K values are typical for soils in this area and indicate the need for phosphate and potash fertilizer. Soil test zinc levels are sufficient for crop production at this time.

