



The area outlined in yellow delineates the sub-surface monitoring area on the north end. The area outlined in red delineates the sub-surface monitoring area on the south end. All runoff within each respective area moves in the same direction and flows through a water monitoring station. The triangle indicates the location of the water monitoring station.



The area outlined in blue delineates the surface monitoring area. The area outlined in green delineates the sub-surface monitoring area. All runoff within each respective area moves in the same direction and flows through a water monitoring station. The triangle indicates the location of the water monitoring station.

EQUIPMENT INSTALLATION AND SAMPLE COLLECTION

Installation of edge-of-field surface runoff and sub-surface tile drainage monitoring equipment was completed in December 2012. A wing-wall, berm and other equipment needed for monitoring surface runoff was installed in the East Field. Equipment necessary for measuring sub-surface tile flow and automated collection of samples was installed in both fields. Weather station equipment to record precipitation, temperature and other climatic variables was also installed. Monitoring of both fields will take place for 5 to 7 years.

Water samples are collected automatically whenever runoff occurs. Samples collected are analyzed for sediment, total phosphorus, inorganic phosphorus, total kjeldahl nitrogen, ammonia-nitrogen, nitrate-nitrogen and chloride. By combining a measure of water flow and sediment and nutrient concentrations, it is possible to calculate load for sediment and nutrient movement.

CONCLUSION

The Discovery Farms Minnesota project at SGF is designed to provide information to better understand how farm management practices can impact the potential for sediment and nutrient movement in northwestern Minnesota. Throughout the 5 to 7 year duration of this project, these sites will provide information on surface runoff as well as sub-surface tile drainage in this diverse agricultural region of the state. This work at SGF will help identify some of the management strengths and challenges for this area and farming system.



FOR MORE INFORMATION, PLEASE CONTACT

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Project partners include Mahnomens and Norman County Soil and Water Conservation Districts (SWCDs).

In accordance with the Americans With Disabilities Act, an alternative form of communication is available upon request. TDD: 1-800-627-3529. The MDA is an equal opportunity employer and provider.



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SKAURUD GRAIN FARMS Farm, Site and Study Design



DISCOVERY FARMS MINNESOTA

OVERVIEW OF OPERATION

Skaurud Grain Farms (SGF) is a grain operation located in northwest Minnesota, headquartered in Norman County. The land where the farm is located was purchased by the Skaurud family in 1962. Today, SGF is a farm family partnership owned by Kelly, Vicki, Perry, Kathleen and Evan Skaurud and Matt Miller. This partnership was started in 1978.

SGF has strong ties to their community. SGF employs ten full time employees and numerous seasonal employees; providing services that include growing crops, selling seeds and offering agriculture management consulting. Additionally, SGF awards a financial scholarship each year to a student pursuing a degree in the field of agriculture. They have been supporting local students for the past 15 years.



SGF is committed to producing high quality crops while also conserving natural resources. “As we all know, farmers care about the land and the environment. When it comes to Skaurud Farms, we are no exception. We utilize several conservation practices to protect the land and the environment,” says Perry. Examples of conservation practices utilized at SGF include the use of cover crops, control dikes to manage overland water flow, buffer stripes along field edges and native perennial plants to attract bees and other pollinators. SGF works in close cooperation with both the Norman and Mahnomon County Soil and Water Conservation Districts (SWCD) to help implement and maintain these conservation practices.

CROP MANAGEMENT

SGF is a diverse grain farm operation, growing sugar beets, corn, dry beans, soybeans and wheat. Fertilizer management programs are designed for optimum economic production and implemented to minimize movement of nitrogen and phosphorus to surface water and groundwater. An important component of their approach is an intense grid soil sampling program.

Fertilizer application rates vary depending on soil tests, previous crop, current crop and yield goals. Phosphorus and potassium are applied where needed in the fall in a band at a depth of about 6 inches below the soil surface. Nitrogen and sulfur are applied where needed in the spring before planting and incorporated. A starter fertilizer is used for corn, soybean, sugar beet and dry bean production.

Like the fertilizer program, tillage operations vary depending on soil types, previous crop and current crop. Typical tillage operations include a fall chisel plow and spring field cultivator or multiweeder. Pesticide programs are developed and dependent on crop type and scouting reports throughout the growing season.

LOCATION AND CLIMATE

SGF is located in the Red River Valley of northwestern Minnesota. The Red River Valley was formed approximately 10,000 years ago as Glacial Lake Agassiz receded. The receding lake deposited some of the richest and most fertile soils in the world. This area is characterized by flat topography (0-2% slope), large fields and short growing season. Agricultural crops are grown on approximately 70% of the acres in the area; major crops include corn, soybean, spring wheat and sugar beets. Soils are predominately clay based with poor internal drainage which limits crop production in wet years. As a result, field drainage is very important. Agricultural drainage in the Red River Valley is mainly accomplished with surface drainage ditches. Each year sub-surface tile drainage becomes more common.

The region’s climate is relatively stable. Winters are long and cold with soils frozen nearly six months out of the year. The mean temperature is 7°F and 66°F for winter and summer, respectively. Average annual precipitation is 24.7 inches, most of which occurs during the months of April through October. The average snowfall in this region is 43.3 inches. Frequent, intense thunderstorms are common during the summer months.

FARM AND MONITORING SITE SELECTION

The initial farm visit occurred in early spring of 2012. Sub-surface tile drainage from 570.8 acres flows through two pumps where it is possible to monitor water flow and collect water samples for sediment and nutrient measurement. Two fields were selected for monitoring; the West Field which is approximately the size of an entire section (640 acres) and the East Field which is approximately a quarter section in size (160 acres). Both fields are located in Norman County within the Wild Rice River watershed, approximately 3 miles apart.

A pump out sub-surface tile drainage system (with 60 ft tile spacing) is installed in the West Field. Sub-surface tile drainage from 570.8 acres flows through two pumps where it is possible to monitor flow and collect samples for sediment and nutrient measurement. Only sub-surface tile drainage is monitored on the West Field; monitoring surface runoff was not an option because of the flat surface with little or no slope.

In the East Field, a gravity flow sub-surface tile drainage system with 60 ft tile spacing is installed. Both sub-surface tile drainage and surface runoff are monitored at the East Field. Surface runoff from 87.2 acres and sub-surface tile drainage from 120.9 acres is being monitored.

In the West Field, soils are mostly Grimstad and Rockwell fine sandy loams. Grimstad and Rockwell soils were formed in glacial till deposits, are poorly drained and have moderate available water capacity. In the East Field, soils are mostly Barnes loam and Hamerly and Vallers silt loams. All three soils have a high available water capacity. The Barnes loam is well drained and the Hamerly and Vallers silt loams are poorly drained.

As might be expected in large fields, there is variability in soil test values. In both fields, soil pH is in the range of 7.9 to 8.2. Soil organic matter content is approximately 4%. Soil test phosphorus measured by the Olsen procedure is in the low range while the majority of the soil samples show a soil test potassium value that is classified as medium to high. Likewise, the majority of soil test values for zinc would be classified as medium.

