

EQUIPMENT INSTALLATION

The installation of the edge-of-field surface water monitoring site occurred in 2013. The flume, wing-wall, berm, and equipment needed for automatic, routine measurement of surface water runoff were installed. Weather station equipment were also installed to measure precipitation, air temperature, relative humidity, soil temperature, and volumetric water content of the soil. Surface water runoff from this site will be monitored year round for the 5 to 7 year duration of this project.

Collected water samples are analyzed for sediment, total phosphorus, phosphate phosphorus, chloride, total kjeldahl nitrogen, ammonia nitrogen and nitrate-nitrogen. Water flow through the flume is recorded to calculate the total volume of water runoff. By combining the total volume of water runoff with the concentration of nutrients and sediment, it is possible to calculate the total amount of nutrients and sediment leaving the field.

CONCLUSION

The Discovery Farms Minnesota project at BLAC-X Farms is designed to provide information that will lead to a better understanding of how farm nutrient management practices can impact sediment and nutrient movement to surface waters. The monitoring at BLAC-X Farms will help to identify strengths and challenges of similar farming systems and landscapes.



BLAC-X FARMS Farm, Site and Study Design

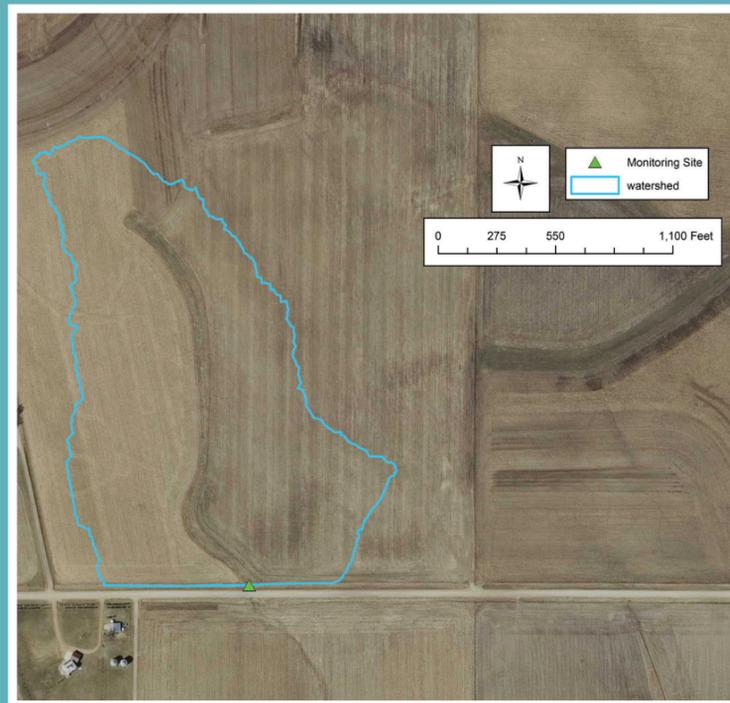
FOR MORE INFORMATION, PLEASE CONTACT

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The area outlined in blue delineates the monitored field. All surface runoff in this area moves in the same direction and flows through a water monitoring station. The triangle indicates the location of the water monitoring station.



DISCOVERY FARMS MINNESOTA

OVERVIEW OF OPERATION

BLAC-X Farms is located in the rolling hills of Rock County, Minnesota, 10 miles north of Iowa and 2 miles east of South Dakota. Prior to 2001, Pete Bakken and his father, Richard, farmed in a father-son partnership. In 2001, the family farm became incorporated with members Pete Bakken and Jay Bakken (Pete's brother).



Pete and Jay graduated from South Dakota State University. Pete earned a degree in Ag Business and Jay earned a degree in Animal Science. The farming enterprise revolves around beef cattle production which includes a cow-calf herd and active feedlots. The cattle herd is predominantly Angus with some Simmental influence. The farm consists of approximately 1,600 acres of cropland and 350 acres of pasture. The cow-calf herd is on pasture during the growing season and grazes on corn stalks during the winter months. The feedlot is a total runoff containment system with all runoff from the feedlot captured and used for crop production.

BLAC-X Farms was motivated to participate in the Discovery Farms program because they wanted to know how manure management, fertilizer applications and tillage practices were affecting nutrient and sediment movement on their cropped fields. If management changes are needed, they are willing to adjust their practices.

CROP MANAGEMENT

Corn, soybeans, alfalfa and small grains are grown on land that is not devoted to pasture. Minimizing soil erosion is a concern for the sloping landscape of southwestern Minnesota. Cover crops and rotational tillage practices are used where they fit at BLAC-X Farms to minimize soil loss. Soybeans are no-till planted into the previous year's corn residue, while a disk ripper and field cultivator are used to prepare the fields for corn. When cover crops are grown, they are planted following small grains or corn harvested for silage. The cover crop is grazed in the fall and cold winter temperatures terminate growth.

Manure from the beef cattle is applied prior to planting corn. The feedlot scrape and haul manure is surface applied and incorporated. Brown water from the feedlot runoff containment system is applied with a traveling gun during the growing season. Manure is analyzed before application to ensure proper application rates. Manure applications have virtually eliminated the need for commercial phosphorus and potassium fertilizer. Soil samples are used to guide fertilizer and manure application.

Analysis of Manure Samples		
Nutrient	Basin Manure lb./ 1,000 gallons	Feedlot Manure lb. /ton
Nitrogen	4.6	13.0
Phosphate	3.7	14.3
Potash	8.4	14.2
Sulfur	1.2	6.2
Zinc	0.02	0.24

LOCATION AND CLIMATE

BLAC-X Farms is located in the loess prairies of the western Corn Belt Plains region of Minnesota. The region is characterized by rolling topography and numerous rivers and streams. Rainfall and snowmelt that leave the farm flow to Beaver Creek, the Big Sioux River and then on to the Missouri River. A large percentage of this region is farmed due to the productive agricultural soils. Average annual precipitation is 29.5 inches, most of which occurs during the growing season, and average annual snowfall is 45 inches.

FARM AND SITE SELECTION

The initial site visit occurred in 2013 with a tour of fields to evaluate potential sites for surface water monitoring. The farm was selected for the Discovery Farms program because the management practices used for crop production were representative of practices used in the region and the field site is capable of generating a robust and reliable data set.

Soil in the monitored field is classified as a Nora silt loam. This is a moderately well drained soil with good water infiltration, especially when there is residue on the soil surface. Tile drainage is not necessary for adequate agricultural production for this soil series. This soil series has a water holding capacity of approximately 2 inches of water per foot of soil. The most recent soil sample results from the monitored field are summarized in the table below. The values for P and K are classified as very high. The very high P and K tests are attributed to the manure application history of the field.

Soil Sample Analysis of the Monitored Field	
Property	Value
Soil Texture	silt loam
pH	6.4
Organic Matter Content, %	4.8
Soil Test Phosphorus (Bray test), ppm	94
Soil Test Potassium, ppm	189