

SHOW ME THE DATA!



2021 Project Highlights

JANUARY 2022

Empowering Conservation Champions with Innovative, Real-time Soil Metrics.

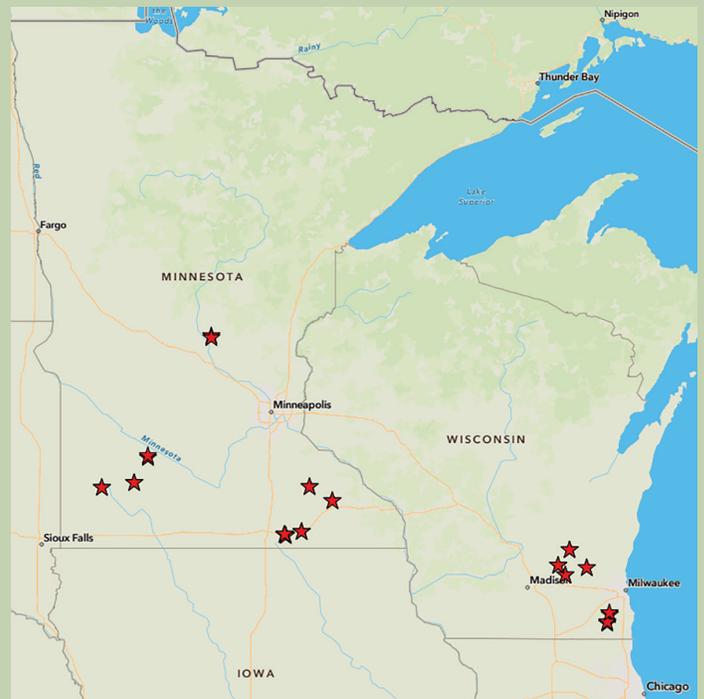


Thirty farmer collaborators across Minnesota (18) and Wisconsin (12) are partnering with Sand County Foundation on this three-year project. Each farmer is paired with a neighbor farming on a similar soil type, but with a variation in land management. Specifically, our aim was to pair a farm using a soil health management system (SHMS) with a more conventional (C) farm to quantify how infiltration, water holding capacity, soil trafficability, leaching potential, aggregate stability, and other soil properties critical to improving resiliency and reducing nutrient transport are influenced by management.

After consulting with each farmer, locations in the paired fields were chosen for the installation of *Farmers Edge™* soil sensors. Prior to sensor installation, to verify consistency in soil

characteristics between the paired sites, electrical conductivity (EC) data was mapped using an EM-38 device. Electrical conductivity is primarily influenced by soil texture, in particular clay content, soil salinity and moisture levels.

Two sensors were installed on each field (60 total) by mid-summer, providing each farmer access from their cell phone to their own real-time soil moisture and temperature data.



Distribution of the 30 site locations across Minnesota and Wisconsin



“ Within 2-4 hours following a heavy rainfall event, my sensors were showing that moisture had already reached the bottom of the soil probes. I believe this rapid infiltration is 100% because of my no-till system! ”

-Chris Schmidt, Minnesota Farmer Partner

Soil health management principles:

- 1) **Minimize soil disturbance** – Reduced or no-tillage
- 2) **Maximize soil cover** – Cover crops, perennial cropping system, or maintain crop residue
- 3) **Maximize plant diversity** – Longer rotation or incorporate the use of native plant buffers
- 4) **Maximize presence of living plants/roots** – Incorporate a perennial cropping system or cover crops
- 5) **Integrate livestock** – Graze plant residue or cover crops

Soil samples were collected at each of the probe install sites (at sensor interval depths of 4, 8, 16, 24, 32 and 40-inches) for texture, organic matter, pH, EC and gravimetric moisture. Soil health sampling began in October 2021, following harvest, with the goal to sample each paired (SHMS versus C) field the same day. Three, 0-6 inch composite soil samples were collected from three locations within 10-feet from the sensors. Samples were submitted to the University of Missouri for an expanded soil health analysis, which includes:

- Potentially Mineralizable Nitrogen
- Active Carbon
- Total Organic Carbon
- Water Stable Aggregates
- pH (salt and water)
- Effective Cation Exchange Capacity
- Exchangeable Cations
- Plant Available Phosphorus

To prevent damage, most of the sensors will be removed each winter and reinstalled in spring. Data collection will continue over two more field seasons.



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Sand County Foundation inspires and empowers a growing number of private landowners to ethically manage natural resources in their care, so future generations have clean and abundant water, healthy soil to support agriculture and forestry, plentiful habitat for wildlife and opportunities for outdoor recreation.