Producer-Led Watershed
Protection Grant Program

2019 CONSERVATION BENEFITS REPORT

Horse Creek Area Farmer-Led Watershed Council

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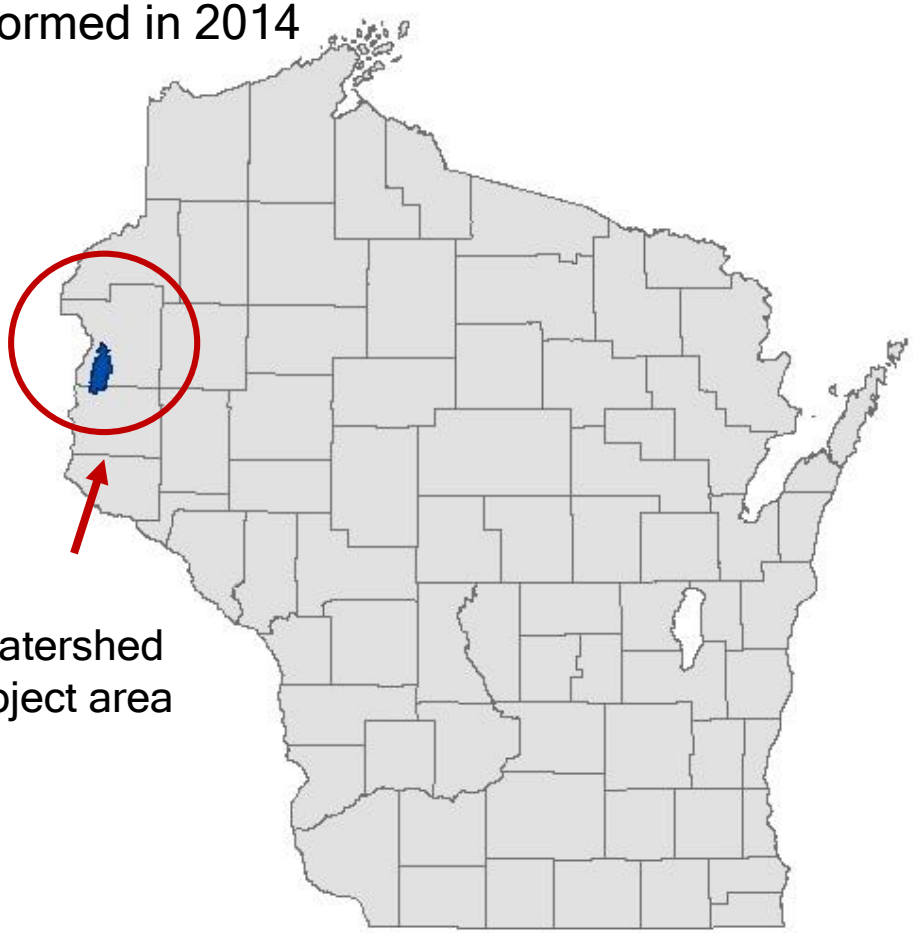
The Horse Creek Area Farmer-Led Watershed Council has been an important pioneering group since the inception of the Producer-Led Program. They have remained committed to promoting conservation practices that lead to improved water quality in the Horse Creek and Squaw Lake watersheds since the group formed in 2014



Watershed project area

Farmers in this group have played an important role in mentoring other farmer-led watershed groups *who are just starting out.*

From 2018 to 2019 cover crops planted through the Council's incentive program grew from 756 acres 964 resulting in an estimated reduction of 511 lbs of phosphorus loss to waterways.

On-farm Demonstration: The Council is in their 5th year observing their cover crop and tillage test plot. *This has helped the Council learn and demonstrate that* yields can be maintained in conservation systems and observe soil function improvements over time.

SOIL & WATER QUALITY MODELING

Farmer-led groups are demonstrating and promoting conservation practices and rotations that can help reduce soil erosion and improve soil quality.

Reducing the amount of soil lost from farm fields and improving the ability of soils to function is connected to water quality. The degree of benefits that we see from each of these farmer-led groups' conservation projects is dependent upon the unique climate conditions, soil types, and farming practices used in the particular watersheds where they farm.

→ Using SnapPlus nutrient management planning software, potential soil quality benefits were estimated for solely cropland practices implement by the Horse Creek Council.

→ These practices include primarily cover crops and reduced tillage.

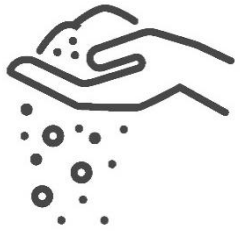
→ Crop rotations with varying levels of conservation integration were modeled to estimate the potential phosphorus and sediment reductions, and soil organic matter building potential that can occur from adopting different practices.

→ Rotations were selected that **best reflect the practices used by farmers in this watershed area,**

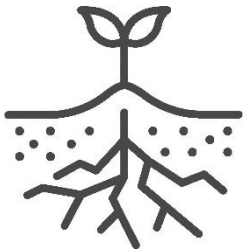
→ These estimations do not consider other conservation practices that may be present in a field such as a grassed waterway, water and sediment control basin, or buffers.

ESTIMATING SOIL & WATER QUALITY BENEFITS | Model Inputs

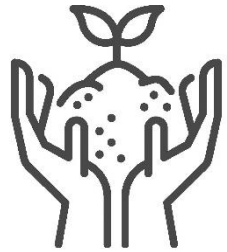
Dominant soil types of watershed + corresponding organic matter percentages (NRCS Web Soil Survey)



County average yields

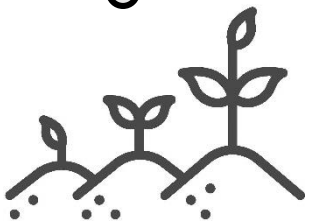


Average plant and harvest dates of crops for Wisconsin (NASS)



1 2 3 4 5

The lower quartile, median and upper quartile soil test P levels for the appropriate county as provided by DATCP soil laboratory results summaries.



Farm operation type representative of watershed and conservation crop rotation scenarios

GENERALLY SPEAKING…

+ Greater **risk of soil loss** in conventional grain and dairy systems compared to those incorporating no-till and cover crops.
+ Greater **risk of phosphorus loading** in conventional rotations.
+ Higher Soil Conditioning Index (**soil building potential**, in simple terms) in Intermediate and Conservation Rotations
+ Conservation practices can **minimize variability in soil loss** across slopes on farm fields
+ Conservation practices can **minimize variability in phosphorus loading** across farm fields with varying soil test P levels.

Let's break it down→

Modeling Results:
GRAIN OPERATIONS

CROP ROTATIONS: Grain

The majority of farm operations in this watershed project area are either dairy or cash grain operations. For each operation type, crop rotations for three different levels of conservation were identified for the purpose of modeling soil and water conservation benefits:

Conventional Rotation

Corn grain- Soybeans
Spring chisel, disk & field cultivation;
No cover crops

Intermediate Rotation

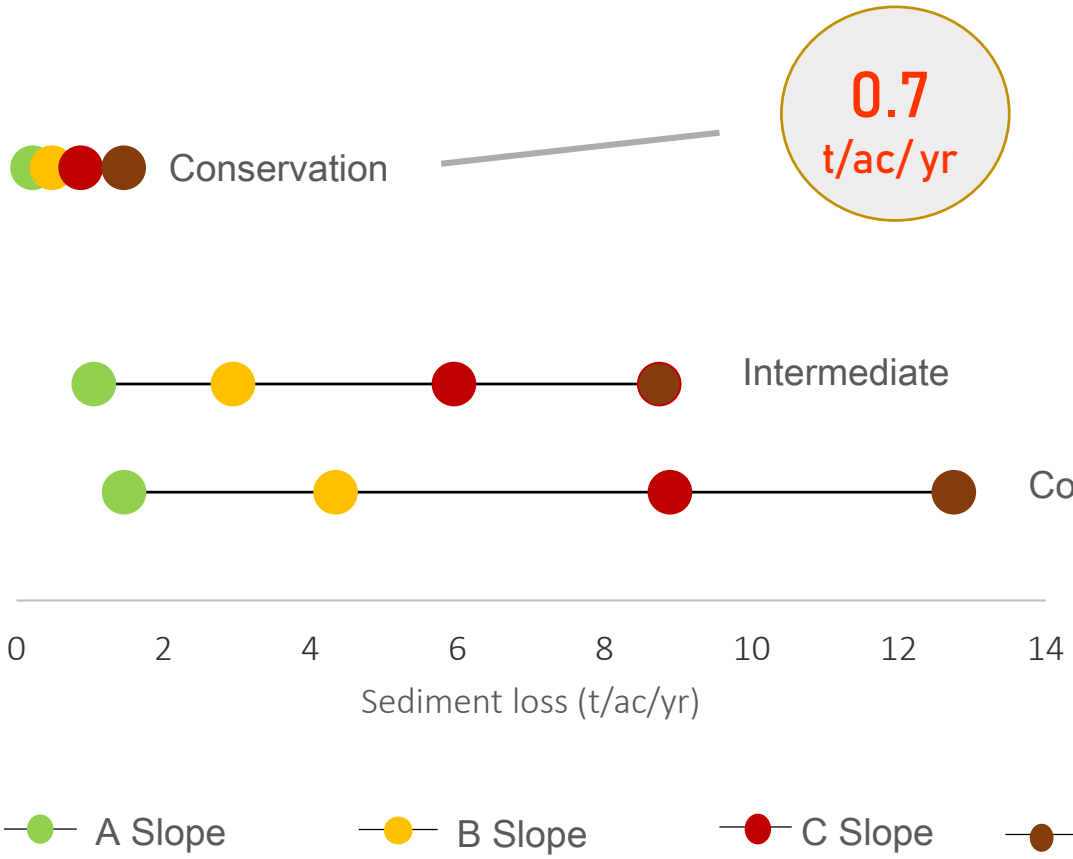
Corn grain- Soybeans
Corn is no-tilled; No cover crop

Conservation Rotation

Corn grain- Soybeans
No-till; Rye cover crop drilled after soybeans,

Less variability in soil erosion across fields with different slopes when using conservation practices-

Less variability = Greater resilience to extreme rainfall events.



0.7 t/ac/yr

Difference in soil loss from the dominant C-slope soils in this watershed compared to A-slope soils when farmers **switch to no-till and plant rye after soybeans**

COMPARED TO

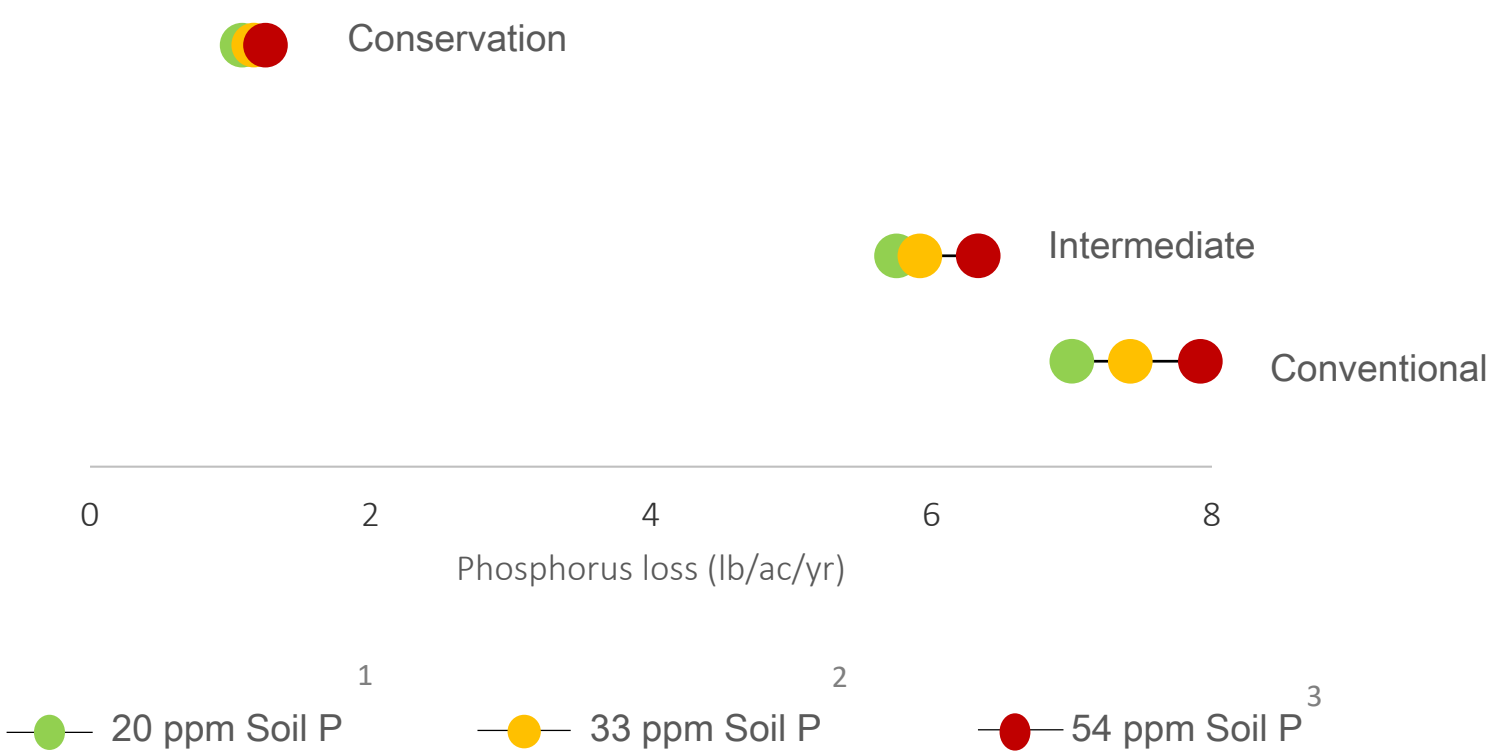
7.4 t/ac/yr

Difference in soil loss on C-slope soils compared to A-slope soils with **spring chisel plowing, disking and field cultivation.**

Soil Loss in this publication refers to the amount of soil lost from a field in t/ac/year over a set rotation as calculated by RUSLE2[1]. This value takes into account factors including field slope, soil type, climate, and ground cover.

1 'A slope' refers to the soil types in the this watershed with slope of 0-2%
2 'B slope' refers to the soil types in this watershed with slope of 2-6%
3 'C slope' refers to the soil types in this watershed with slope of 6-12%
4 'D' Slope refers to the soil types in this watershed with slope of 12-20%

Cover crops and no-till help reduce the amount of phosphorus loss from farm fields.



The Wisconsin Phosphorus Index (PI) estimates the average annual runoff P delivery to surface water from a farm field based on: manure application rate and timing, P fertilizer additions, soil test P, crop rotation and field operations.

1 Lower quartile of the Polk County soil test P soil data summary
2 Median of the Polk County soil test P soil data summary
3 Upper quartile of the Polk County soil test P soil data summary

Reducing P losses in Corn-Soybean Rotations…

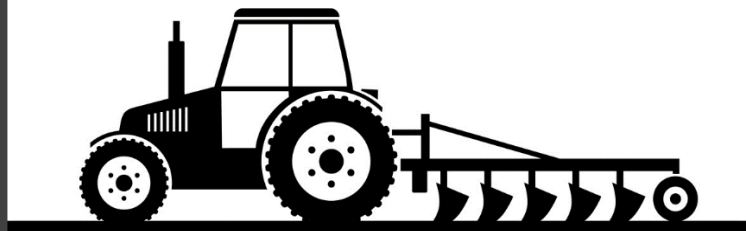
1.3
lb/ac/ yr

At a soil test level of 54 ppm P, planting the corn crop **using no-till methods** instead of conventional tillage to prep soil for planting can reduce phosphorus loading by 1.25 lb/ac/yr.

4.7
lb/ac/ yr

Planting corn and soybean crops using no-till and **planting a rye cover crop after soybeans** can reduce P losses by another 4.7 lb/ac/yr.

Modeling Results:
DAIRY
OPERATIONS



CROP ROTATIONS: Dairy

Conventional Rotation[1]

Corn silage- Corn grain- Alfalfa Hay (4 years)
Spring chisel, disk, spring field cultivation
7,500 gallons/acre fall manure application,
Incorporated; No cover crop

Intermediate Rotation[2]

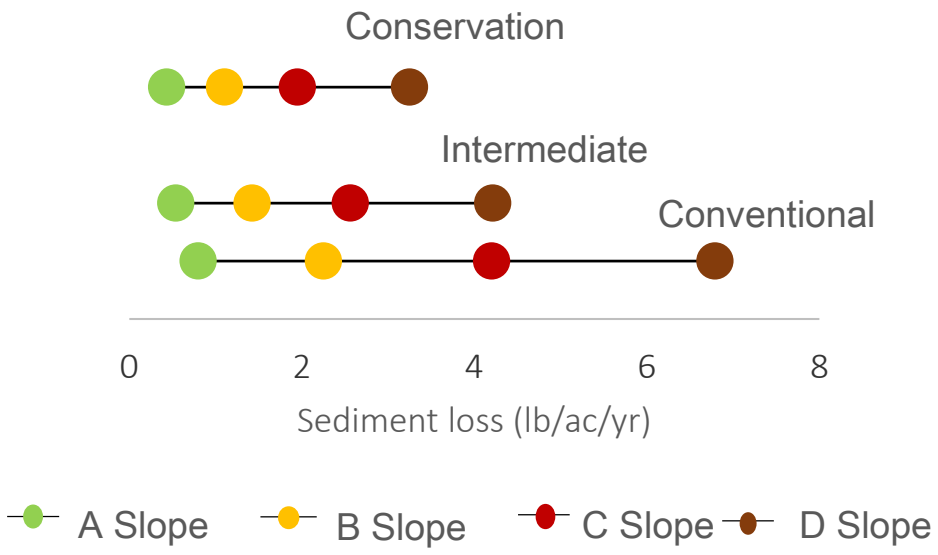
Corn silage- Corn grain- Alfalfa Hay (4 years)
Corn is no-tilled
7,500 gallons/acre manure application,
Low disturbance manure injection in spring

Conservation Rotation[3]

Corn silage- Corn grain- Alfalfa Hay (4 years)
Corn is no tilled
7,500 gallons/acre spring manure application,
Low disturbance manure injection in spring;
Rye cover crop after corn silage

1. Conventional rotations are characterized by management that has been generally practiced and accepted in an area in recent decades, with no to low levels of conservation practice integration.
2. Intermediate rotations represent the integration of 1-2 conservation practices that result in either less disturbance or greater residue or living ground cover.
3. Conservation rotations are characterized by integrating cash crops, cover crop and other management practices that afford low or minimal soil disturbance and increase residue or living ground cover throughout the length of the rotation.

Less variability in soil erosion across fields with different slopes when using conservation practices in Dairy Operations.



When dairy farmers:

+ Practice no-till
+ Plant rye after corn silage
+ Use Low-Disturbance Manure application technology

1.5 t/ac/ yr

is the range in soil loss between the C-slope soils and A- slope soils of this watershed

COMPARED TO

When dairy farmers:

+ Use conventional tillage
+ Incorporate all manure using tillage
+ Don't use cover crops

3.4 t/ac/ yr

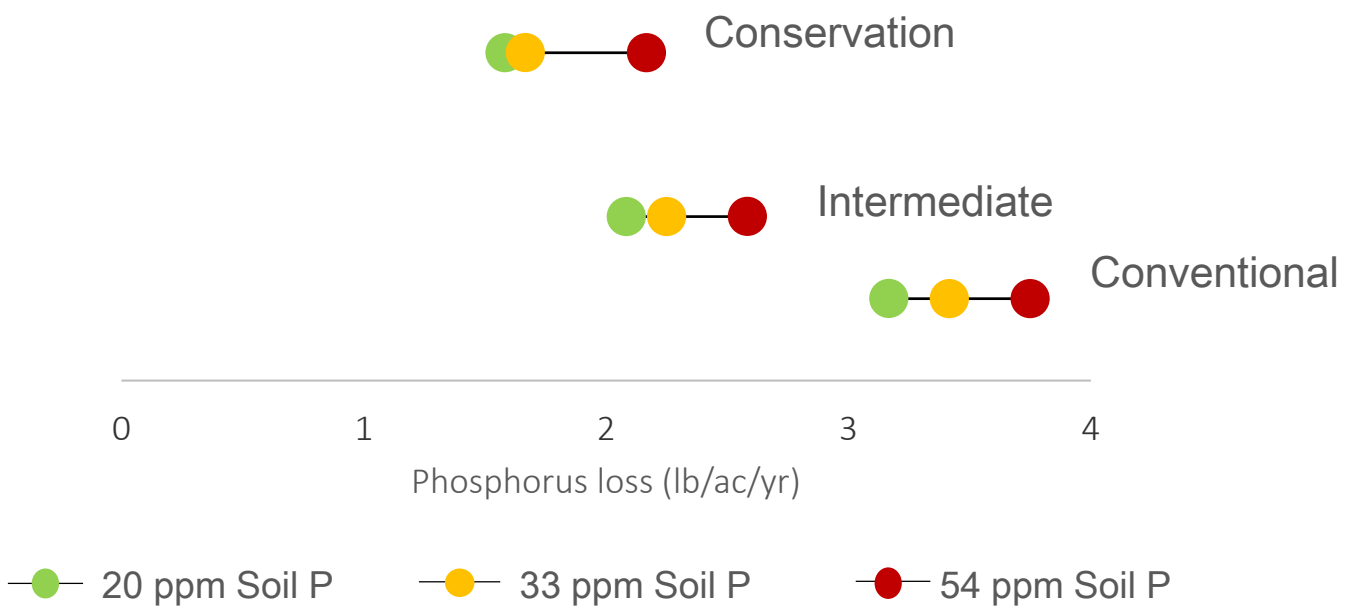
is the range in soil loss between the dominant C-slope soils and A-slope soils

Higher risk of phosphorus delivery to waterways dairy rotations using conventional tillage, no cover crops

On dairy operations, **manure is an important part of the system**. Some fields may receive more frequent or higher volume manure applications than others on a regular basis, leading to a variability in soil test P levels across the farm.

Conservation practices can not only **lower risk of P losses** from the field, but also **reduce the *variability* in phosphorus losses** across fields with different soil phosphorus concentrations.

Cover crops and no-till reduce phosphorus loss from fields in dairy systems



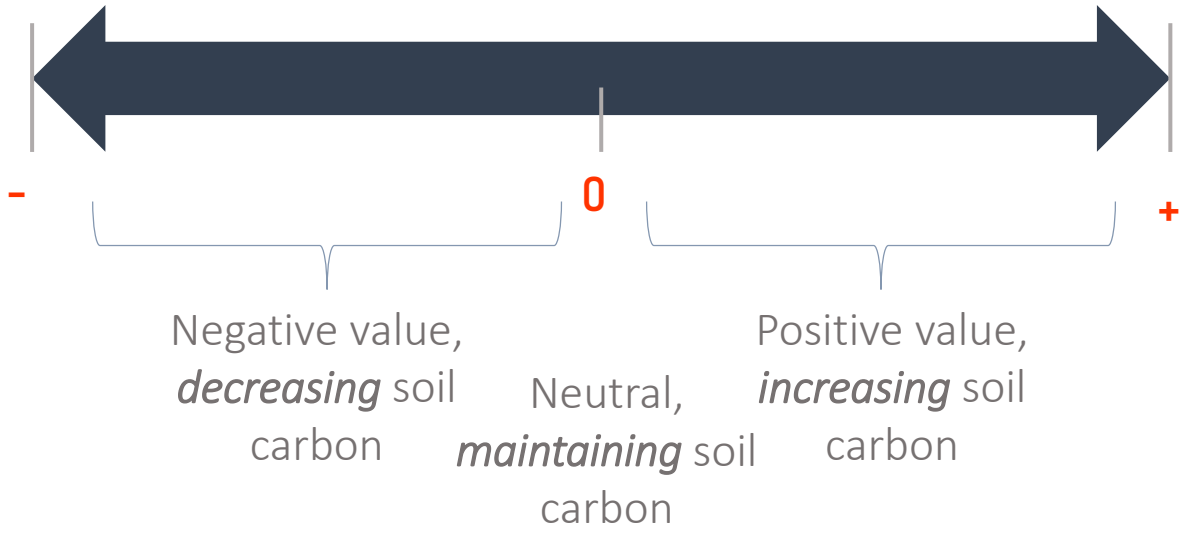
1.7 lb/ac/yr

At a soil test level of 54 ppm P, no-till planting corn crops instead of using conventional tillage and using low-disturbance manure application technology can reduce phosphorus loading by 1.7 lb/ac/yr.

0.42 lb/ac/yr

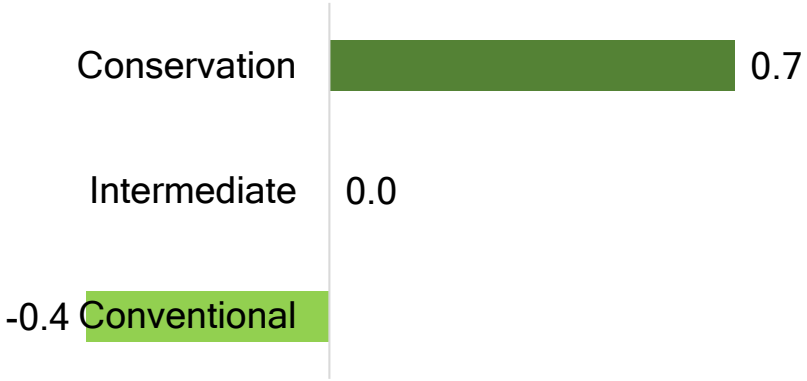
No-till planting corn crops, using LDMI to apply manure and planting a rye cover crop after corn crops can reduce P losses by an additional 0.42 lb/ac/yr.

A higher Soil Conditioning Index means farming practices are encouraging the building of soil organic matter

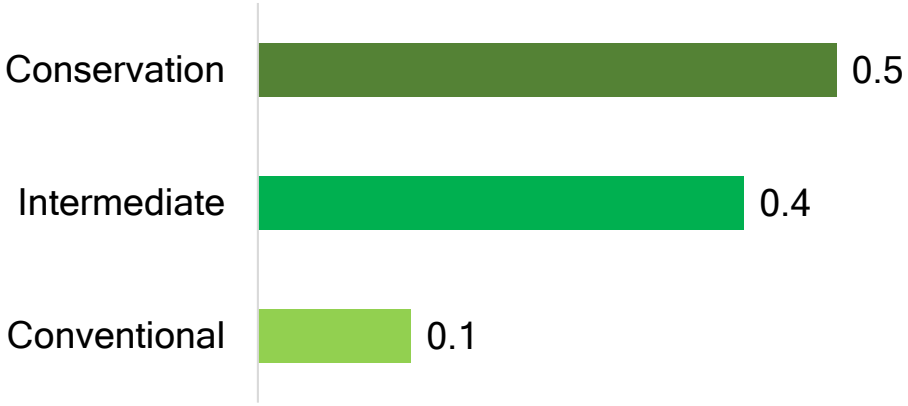


The SCI predicts whether field soil is **gaining or losing carbon.** Values indicate direction of soil carbon building based off management practices like tillage. It does not reflect the actual quantity of carbon stored in the soil and **a value near zero doesn't necessarily indicate good management** if soil carbon levels have already degraded and they are being maintained at a low level.

Soil Conditioning Index: Grain Systems



Soil Conditioning Index: Dairy Systems



+ Reducing tillage,
+ Increasing surface residues left on the field
+ Integrating cover crops into a rotation

will often raise the SCI

HORSE CREEK AREA FARMER-LED CONSERVATION COUNCIL

Conservation Dashboard

6,410 acres Of **cropland acres managed using no-till** throughout the watershed project area

1,720 acres Of **cover crops planted** facilitated through the Council's education and outreach efforts

3,236 acres Covered by **Nutrient Management Plans**

2,965 acres **of Soil Testing** supported through the group's efforts, which helps inform nutrient management practices

HORSE CREEK AREA FARMER-LED CONSERVATION COUNCIL

Potential Sediment + Nutrient Reductions

Conservation efforts can reduce sediment and phosphorus from reaching waterways.

This watershed council works with their local conservation professionals at Polk County Land Conservation Department to estimate nutrient and sediment reductions from practices. Polk County LCD uses a combination of STEPL and SnapPlus to generate reduction estimations

HORSE CREEK AREA FARMER-LED CONSERVATION COUNCIL CONSERVATION PROGRESS

Potential Sediment + Nutrient Reductions

Cost-shared practices including **Cover Crops, No-Till, Grass Buffer Strips, and Nutrient Management plans** provided the following reductions over 2018 and 2019:

912 Pounds of P

3,233 Pounds of N

86 Tons Sediment

SOIL & WATER CONSERVATION IMPACT

Horse Creek Area Farmer-Led Conservation Council| Grain Operations

SOIL EROSION T/ac/yr

CONVENTIONAL	INTERMEDIATE	CONSERVATION
8.4	5.7	0.9

Less soil loss = better productivity. **Soil loss** of 1 t/ac/year is the equivalent of **5 dump truck loads** of soil from one 35-acre field

P LOSS FROM FIELDS lb/ac/yr

CONVENTIONAL	INTERMEDIATE	CONSERVATION
7.4	6	1.2

Lower P Loading = better water quality. **Keeping soil on the field helps keep phosphorus out of waterways.**

LIVING ROOT DAYS

CONVENTIONAL	INTERMEDIATE	CONSERVATION
162	162	261

More Living root days = better soil health**. Living roots keep soil in place** and **fuel soil biology and nutrient cycling.**

SOIL CONDITIONING INDEX

CONVENTIONAL	INTERMEDIATE	CONSERVATION
-0.4	0	0.7

Higher SCI= Greater soil building. It can take years to increase **soil organic matter levels by 1%.** Farming practices that limit disturbance can help.

CONVENTIONAL	INTERMEDIATE	CONSERVATION
• Corn- soybean rotation • Conventional tillage • No cover crops	• Corn- soybean rotation • Corn crop is no-tilled	• Corn- soybean rotation • No-till • Rye cover crop after soybean crop

SOIL & WATER CONSERVATION IMPACT

Horse Creek Area Farmer-Led Conservation Council| Dairy Operations

SOIL EROSION T/ac/yr

CONVENTIONAL	INTERMEDIATE	CONSERVATION
4.3	2.7	2.1

Less soil loss = better productivity. **Soil loss** of 1 t/ac/year is the equivalent of **5 dump truck loads** of soil from one 35-acre field.

P LOSS FROM FIELDS lb/ac/yr

CONVENTIONAL	INTERMEDIATE	CONSERVATION
3.4	2.8	1.8

Lower P Loading = better water quality. **Keeping soil on the field helps keep phosphorus out of waterways.**

LIVING ROOT DAYS

CONVENTIONAL	INTERMEDIATE	CONSERVATION
244	259	309

More Living root days = better soil health**. Living roots keep soil in place** and **fuel soil biology and nutrient cycling.**

SOIL CONDITIONING INDEX

CONVENTIONAL	INTERMEDIATE	CONSERVATION
0.1	0.4	0.5

Higher SCI= Greater soil building. It can take years to increase **soil organic matter levels by 1%.** Farming practices that limit disturbance can help

CONVENTIONAL	INTERMEDIATE	CONSERVATION
• Corn silage- corn grain- Alfalfa Rotation • Conventional tillage with spring manure incorporation • No cover crops	• Corn silage- corn grain- Alfalfa Rotation • No-tilled corn crops and low-disturbance manure injection	• Corn silage- corn grain- Alfalfa Rotation • No-tilled corn crops and low-disturbance manure injection • Rye cover crops after corn silage

* All manure application rates modeled at 7,500 gal/acre

Looking ahead, the Horse Creek Area Farmer-Led Conservation Council will remain committed to promoting conservation practices through their outreach and cost-share programs.

They also plan to focus more on groundwater quality. They desire to be proactive in groundwater quality and quantity monitoring, which will help inform the past success and future directions of their conservation efforts.

If you have questions regarding this report, contact Dana Christel, Conservation Specialist:

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