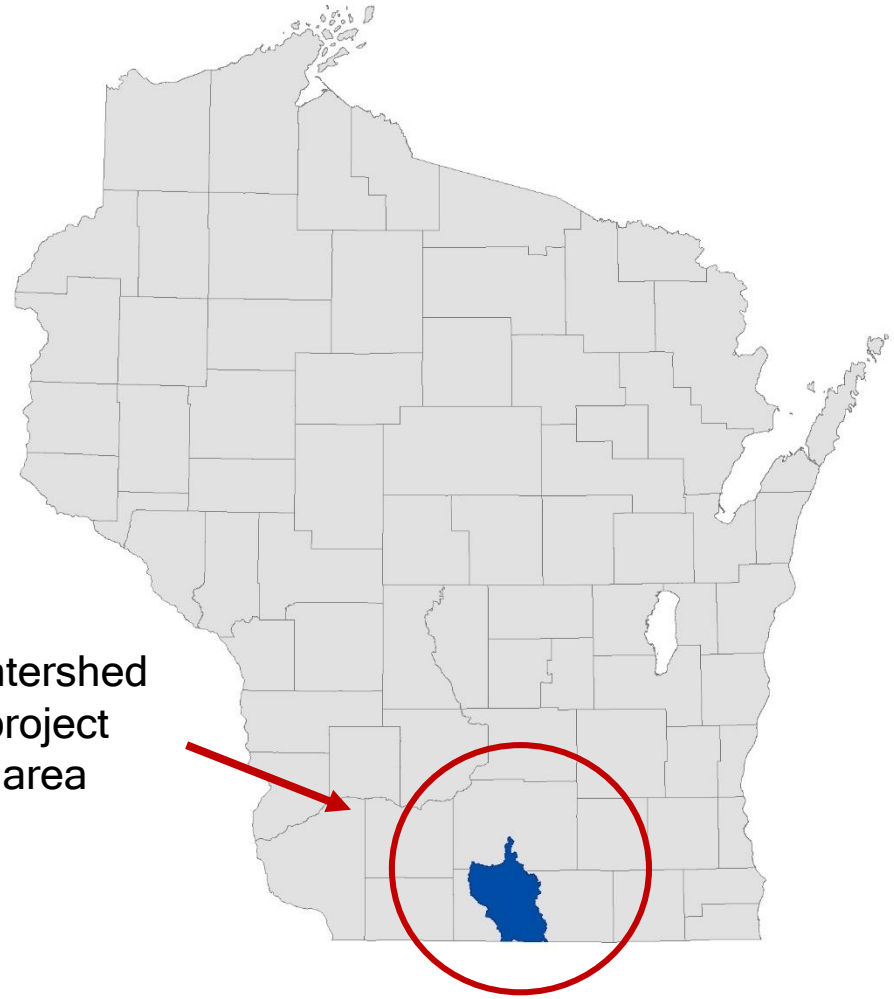
Producer-Led Watershed
Protection Grant Program

2019 SOIL AND WATER CONSERVATION BENEFITS REPORT

Farmers of the Sugar River

TABLE OF CONTENTS

The Farmers of the Sugar River are committed to showing the profitability of conservation cropping practices and strives to teach local farmers how to make conservation systems work on their farms to be part of the solution for cleaner water and sustainable farms.



2019 Farmer to Farmer Learning:

- Annual Meeting: "Improving your Soil to Improve Your Bottom Line"
- Shop Talks
- Summer field day to demonstrate planting green and other practices
- Cover Crop Successes Roundtable Discussion

11,800 acres Of cropland involved via participating farms in 2019

1,231 acres Of cover crops planted across 13 farms through the group's cost-share incentive program.

Farmers in the group are also excited about learning more about composting manure as a way for dairy farmers to better manage the challenges associated with manure handling.

SOIL & WATER QUALITY TRACKING EXPLAINED

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 implemented by the Farmers for the Sugar River.

→ These practices include primarily cover crops, reduced tillage, and nutrient management.

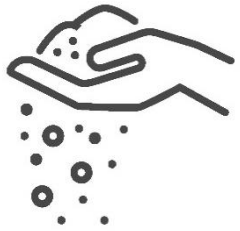
→ Crop rotations with varying levels of conservation integration were modeled to estimate the potential phosphorus and sediment reductions, and soil organic matter building potential that can occur from adopting different practices.

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

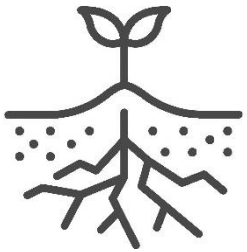
→ These estimations do not consider other conservation practices that may be present in a field such as a grassed waterway, water and sediment control basin, or buffers.

ESTIMATING SOIL & WATER QUALITY BENEFITS | Model Inputs

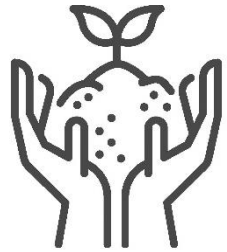
Dominant soil types of watershed + corresponding organic matter percentages (NRCS Web Soil Survey)



County average yields

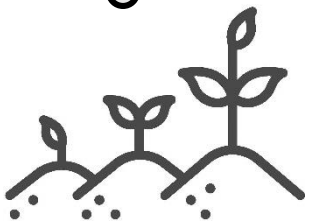


Average plant and harvest dates of crops for Wisconsin (NASS)



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

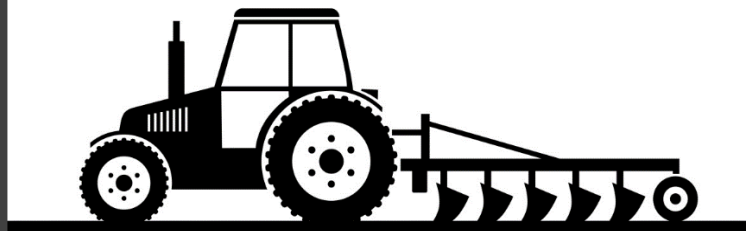
Key takeaway points:

+ **Reducing tillage** and **planting rye as a cover crop** during corn silage years in a typical dairy rotation in this area can be a good first step towards reducing soil erosion and phosphorus loss in this watershed.

+ There is a greater **risk of phosphorus loss** in "Conventional" modeled systems that rely on spring chisel plowing.

+ There is greater potential to build **soil carbon** in modeled Intermediate and Conservation rotations for Grain and Dairy Systems

Modeling Results:
DAIRY
OPERATIONS



CROP ROTATIONS: Dairy

Conventional Rotation[1]

Corn silage- Corn grain- Alfalfa Hay (3 years)
Spring chisel and disk
15,000 gallons/acre spring manure application, Incorporated; No cover crop

Intermediate Rotation[2]

Corn silage- Corn grain- Alfalfa Hay (3 years)
Spring chisel and disk
Corn silage year: no-till and rye cover crop
15,000 gallons/acre spring manure application, Incorporated

Conservation Rotation[3]

Corn silage- Corn grain- Alfalfa Hay (3 years)
No till
Split manure applications, surface applied
Rye crop after corn silage and grain

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.

Higher risk of phosphorus loss from fields in dairy rotations spring chisel plowing, 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 slopes and soil phosphorus concentrations.

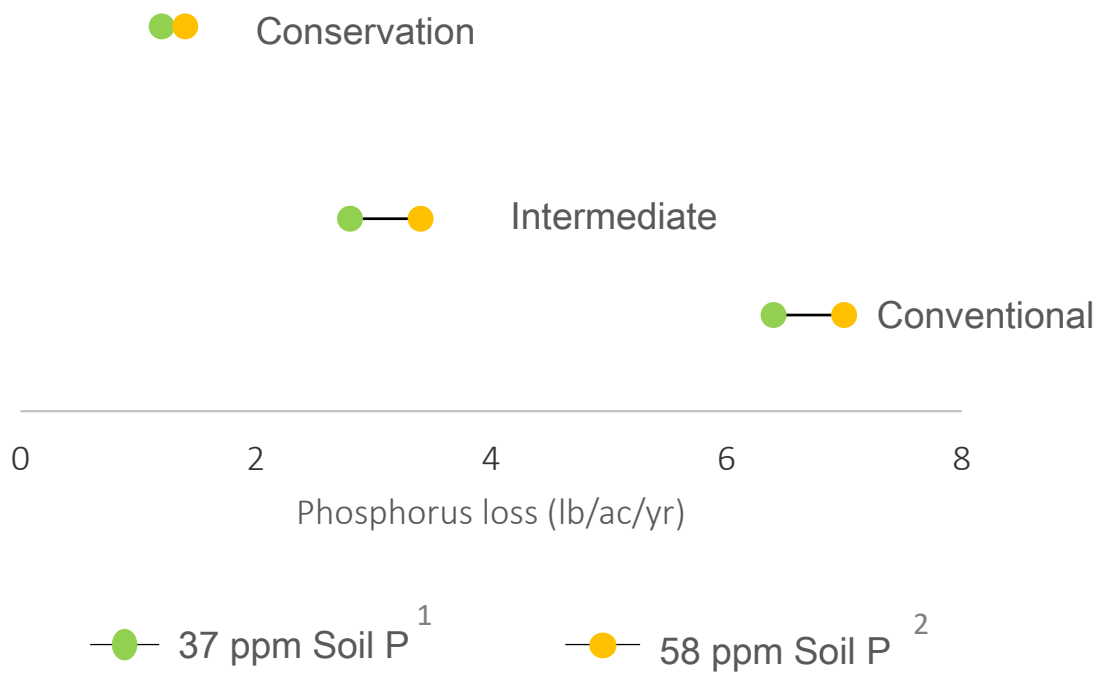
Start with changes in corn silage year to decrease P losses from fields in dairy rotations

3.6 lb/ac/ yr

At a soil test level of 58 ppm P no-tilling corn silage and following it with a rye cover crop instead of conventional tillage to prep soil for planting can reduce phosphorus loading from 7 to 3.4 lb/ac /yr on soils in the Sugar River watershed.

2.0 lb/ac/ yr

Using more no-till and rye cover crops in dairy rotations can decrease phosphorus loss even more, from **3.4 -1.4 lb/ac/yr**

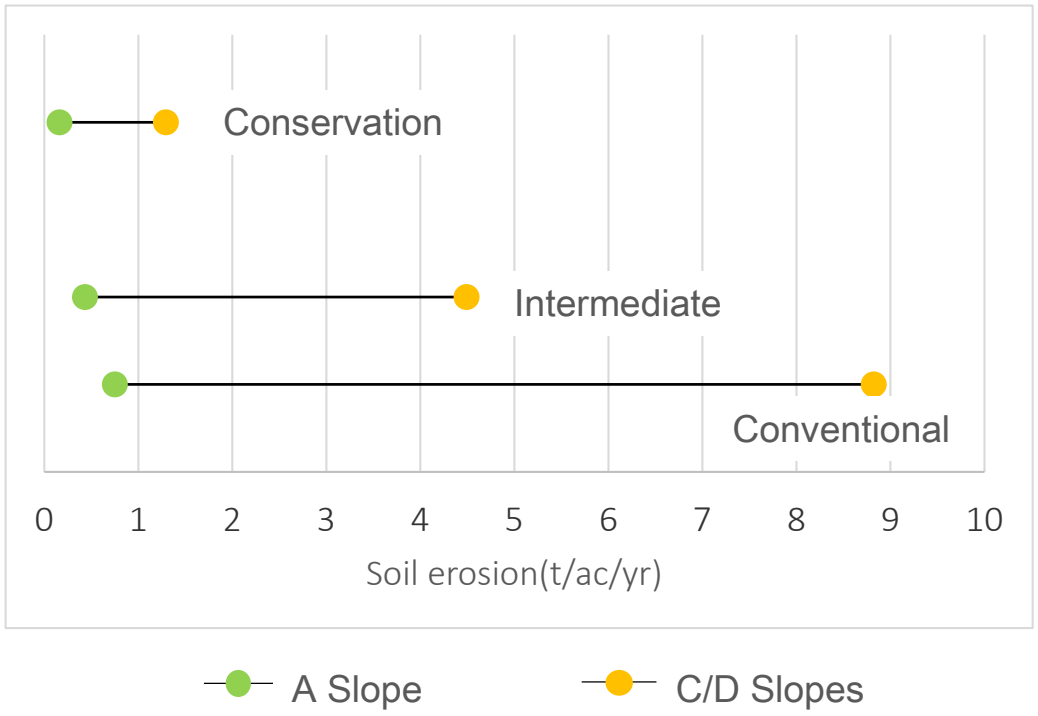


The Wisconsin Phosphorus Index (PI) estimates the average annual runoff P from a farm field based on: manure application rate and timing, P fertilizer additions, soil test P, crop rotation and field operations.

1 Median of the Green County soil test P soil data summary

2 Upper quartile of the Green County soil test P soil data summary

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



When dairy farmers:

+ Practice no-till
+ Plant rye after corn crops
+ Surface apply manure in split applications

1.1 t/ac/yr

is the range in soil loss between the dominant C/D-slope soils and A- slope soils in this watershed

COMPARED TO

When dairy farmers:

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

8.1 t/ac/yr

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

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
Combination of Spring Vertical tillage and Fall chisel, spring disk
No cover crops

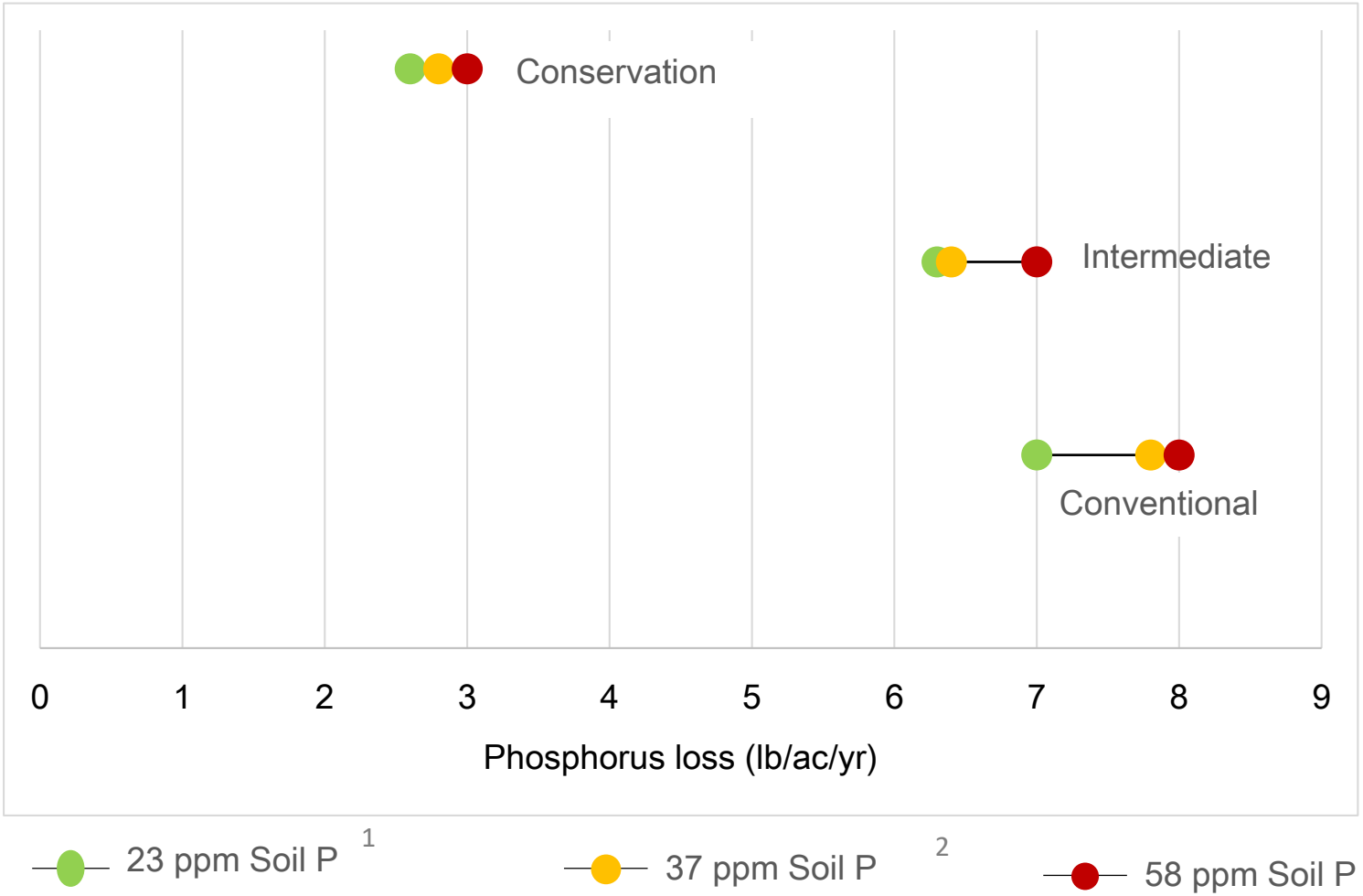
Intermediate Rotation

Corn grain- Soybeans- Winter wheat
Vertical till corn grain year, no-till in soybean and wheat years

Conservation Rotation

Corn grain- Soybeans- Winter wheat
No-till; A cover crop mix is planted after wheat harvest and corn is planted into living cover

Adding winter wheat and cover crops to corn-soybean systems reduces phosphorus loss from fields:



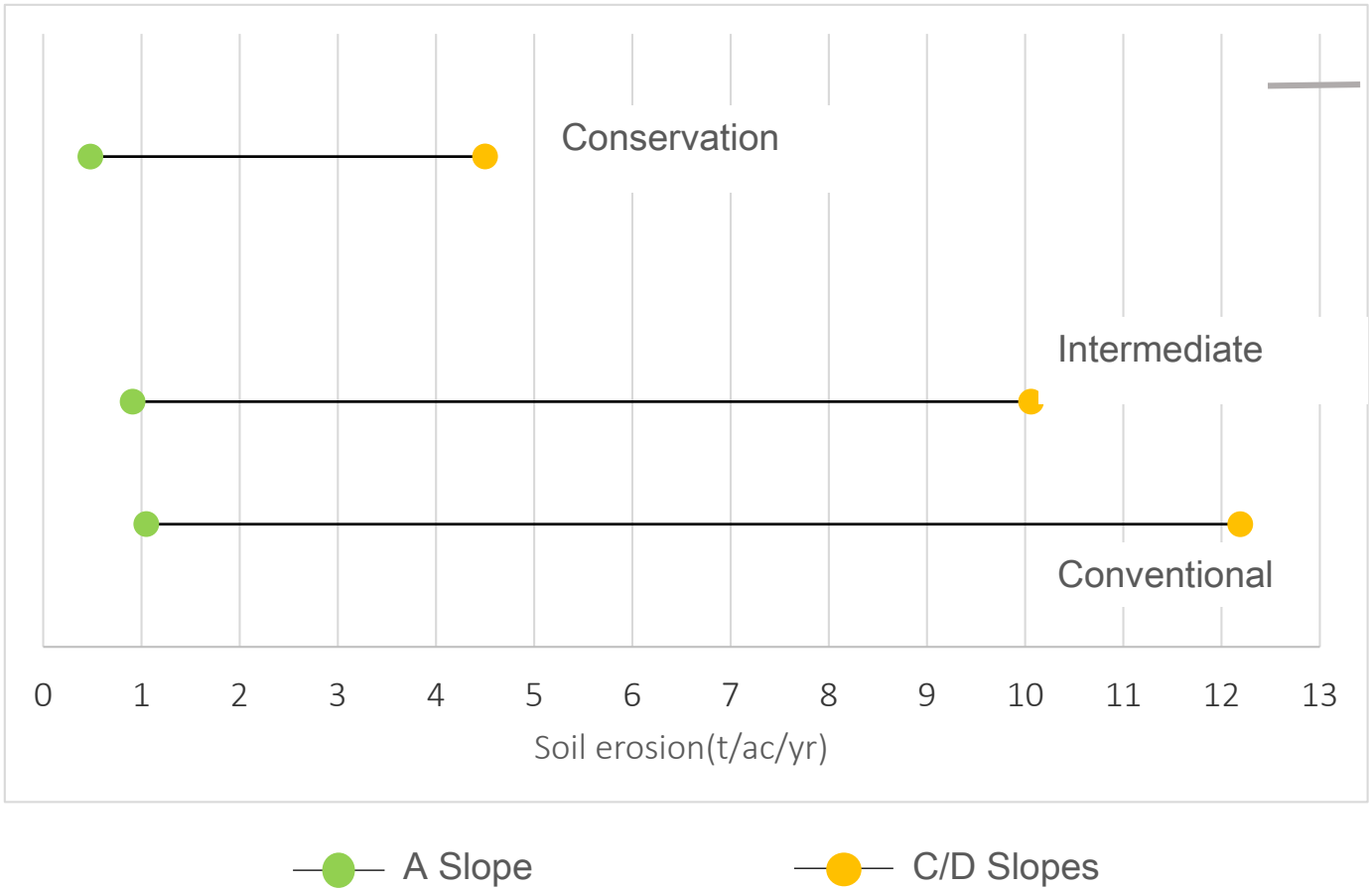
The Wisconsin Phosphorus Index (PI) estimates the average annual runoff P from a farm field based on: manure application rate and timing, P fertilizer additions, soil test P, crop rotation and field operations.

1 Lower quartile of the Green County soil test P soil data summary

2 Median of the Green County soil test P soil data summary

3 Upper quartile of the Green County soil test P soil data summary

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



4 t/ac/yr

Difference in soil loss from the dominant C-slope soils in this watershed compared to A-slope soils when farmers **in a corn-soybean- wheat no-till system.**

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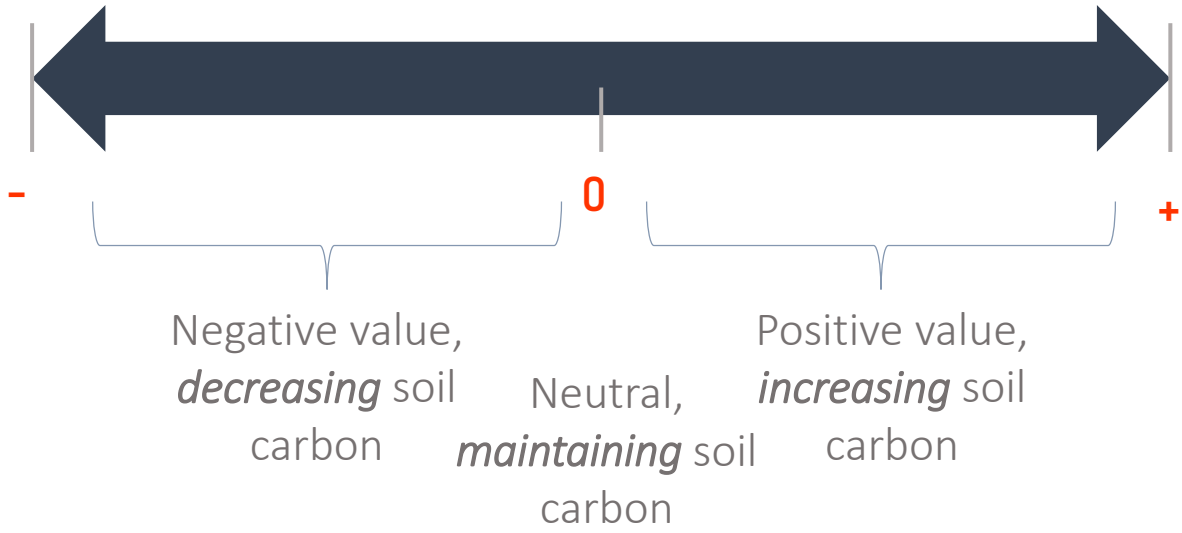
11.1 t/ac/yr

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

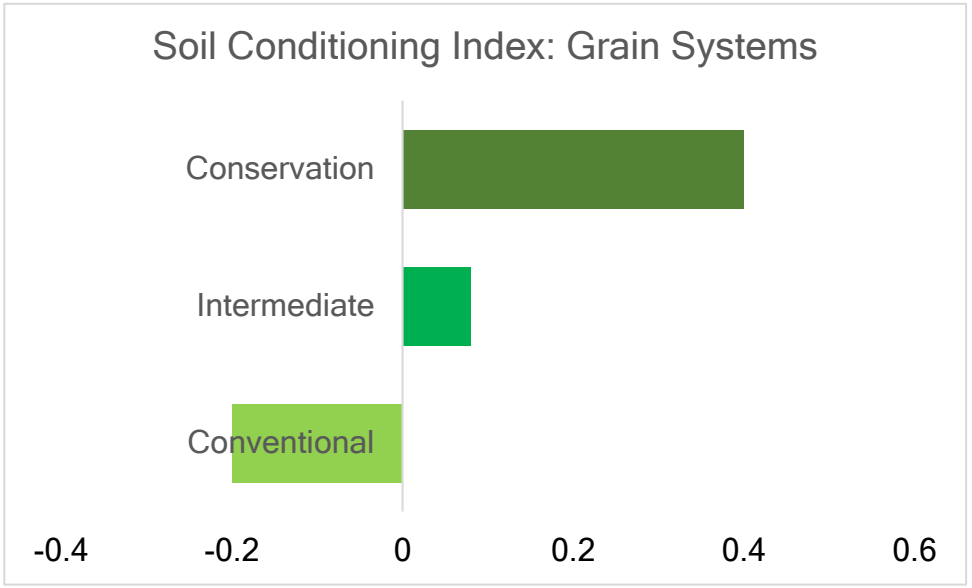
Soil Loss in this publication refers to the amount of soil lost from a field in t/ac/year over a set rotation as calculated by RUSLE2[1]. This value takes into account factors including field slope, soil type, climate, and ground cover.

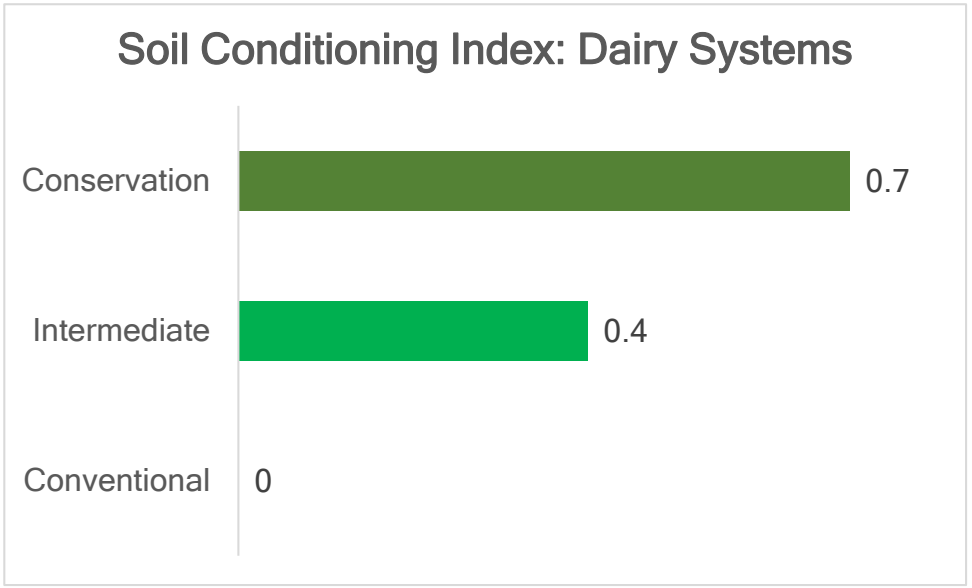
1 'A slope' refers to the soil types in the this watershed with slope of 0-2%
2 'B slope' refers to the soil types in this watershed with slope of 2-6%
3 'C slope' refers to the soil types in this watershed with slope of 6-12%

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.





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

will often raise the SCI

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Potential Sediment + Nutrient Reductions

Conservation efforts can reduce sediment and phosphorus from reaching waterways.

If we apply the reductions we've modeled for the different scenarios on the **11,800 acres** of cropland covered by the participating farmers, which is about **3.5% of the total watershed project area**, we can get an idea of potential impacts to conservation metrics for this farmer-led group's efforts.

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Potential Sediment + Nutrient Reductions

11,800 acres of farmland managed under a **dairy system** could experience the following reductions* when switching from **all spring chisel plowing and no cover crops** to:

No-till and rye cover crop in corn silage year → 3,764 Tons Sediment; 40,120 Pounds of P

Full no-till rotation, split manure applications, rye after corn grain and silage years → 6,964 Tons Sediment; 61,360 Pounds of P

*Estimates based on numbers averaged across rotation years, all dominant soil types in watershed, slope classes and soil test P values. Actual reductions will vary based on practice particulars and placement on landscape.

FARMERS OF THE SUGAR RIVER CONSERVATION PROGRESS

Potential Sediment + Nutrient Reductions

11,800 acres of farmland managed under a **corn grain- soybean system** could experience the following reductions* when switching from **chisel plowing and no cover crops to:**

Vertical till, adding winter wheat into rotation →

- 1,698 Tons Sediment
- 7,080 Pounds of P

No-till, winter wheat into rotation followed by cover crop mix →

- 6,800 Tons Sediment
- 51,920 Pounds of P

*Estimates for P based on numbers from LQ soil test values, averaged across rotation years, all dominant soil types in watershed, slope classes. **Estimates for sediment based on numbers from all soil test P values, A slope classes, and all dominant soil types.**. Actual reductions will vary based on practice particulars and placement on landscape

Looking ahead, the Farmers of the Sugar River

will continue to educate and help area farmers through regular meetings and outreach events, when possible.

They plan to place an emphasis on soil testing in 2020 as many farmers are curious about soil health tests. They hope to coordinate an effort to facilitate that with incentive payments.

"I continue to be excited about the opportunity to learn from others within the group, and for the opportunity to help others test and adapt new ideas that will surely help improve water quality and farm profitability."

- Group member

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

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