Producer-Led Watershed
Protection Grant Program

2019
CONSERVATION
BENEFITS REPORT

Watershed Protection
Committee of Racine County

Watershed Protection Committee of Racine County

Established in 2017, the Watershed Protection Committee of Racine County is committed to continued learning of soil health principles and sharing of that knowledge with farmers in their watershed project area.

The year of 2019 brought some of the wettest weather on record, yet group farmers saw little difference in planting conditions between clay and sandy soils where soil health systems had been applied.

The WPCRC has been sampling water at key locations in the watershed since 2018. In 2019 they partnered with local municipalities to advance their water quality monitoring.

They remain dedicated to performing soil health demonstrations such as the slake test at each of their outreach events to help teach other farmers about the principles of soil health and their importance to water quality.

Within their expanding farmer network they have collectively experimented more with planting into living green cover crops.

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 Watershed Protection Committee of Racine County.

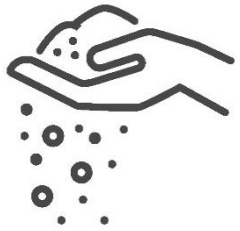
→ These practices include primarily cover crops and reduced tillage.

→ 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.

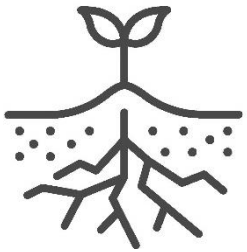
→ These estimations do not consider other conservation practices that may be present in a field such as a grassed waterway, water and sediment control basin, or buffers.

ESTIMATING SOIL & WATER QUALITY BENEFITS | Model Inputs

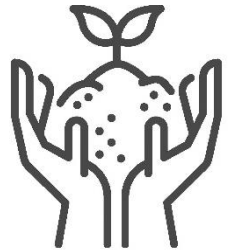
Dominant soil types of watershed + corresponding organic matter percentages (NRCS Web Soil Survey)

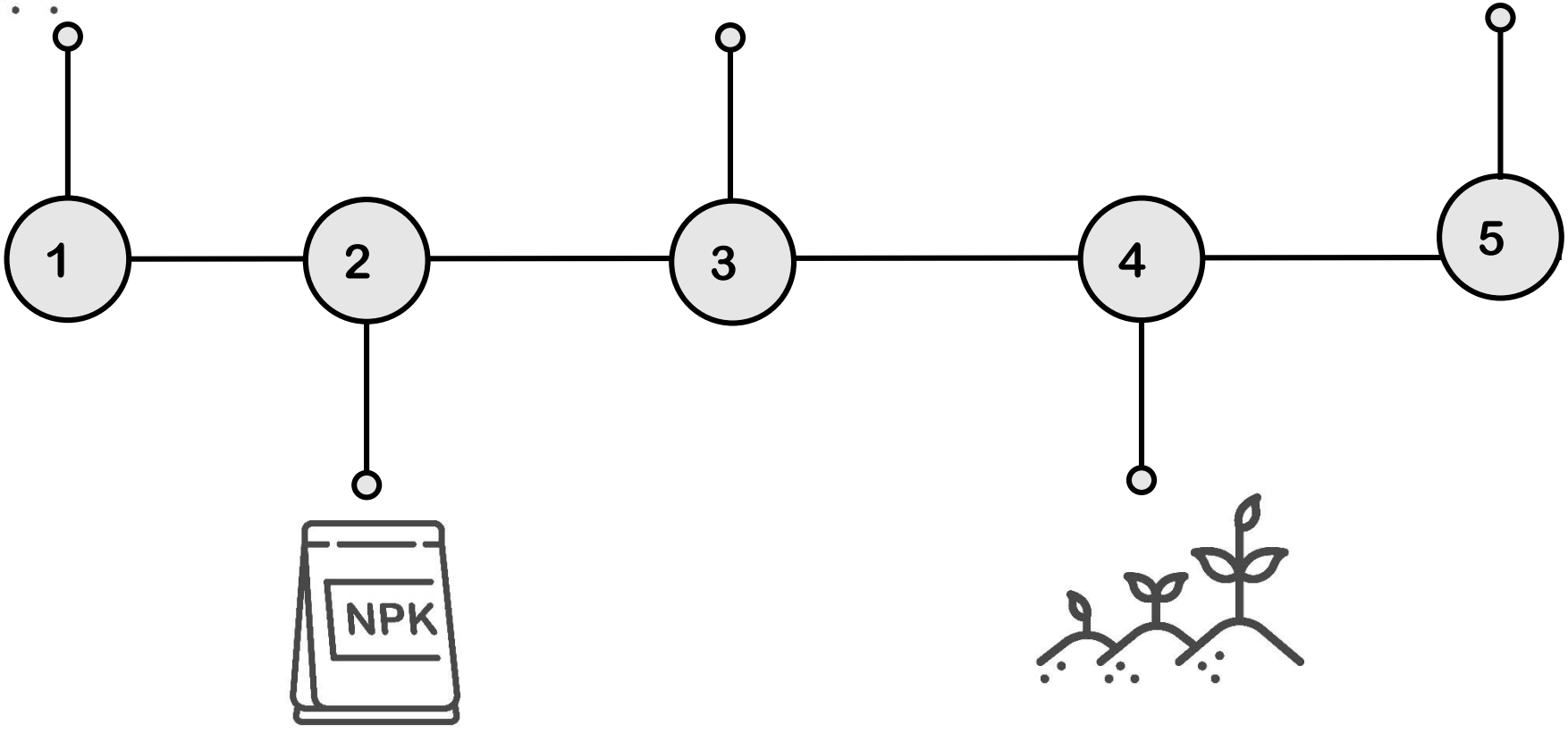


County average yields



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





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

CROP ROTATIONS

The majority of farm operations in this watershed project area are cash grain operations. Crop rotations for three different levels of conservation were identified for the purpose of modeling soil and water conservation benefits:

Conventional Rotation[1]

Corn grain- Soybeans,
Fall chisel after soybeans, spring disk before corn planting; No cover crops

Intermediate Rotation[2]

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

Conservation Rotation[3]

Corn grain- Soybeans- Winter Wheat
No-till; Multi-species cover crop with legume after wheat

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.

GENERALLY SPEAKING…

+ Greater **risk of soil loss** in conventional grain rotations
+ Greater **risk of phosphorus loading** in conventional grain 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 A (0-2%), B (2-6%), and C (6-12%) slopes on farm fields
+ Conservation practices can **minimize variability in phosphorus loading** across farm fields with varying soil phosphorus concentrations.

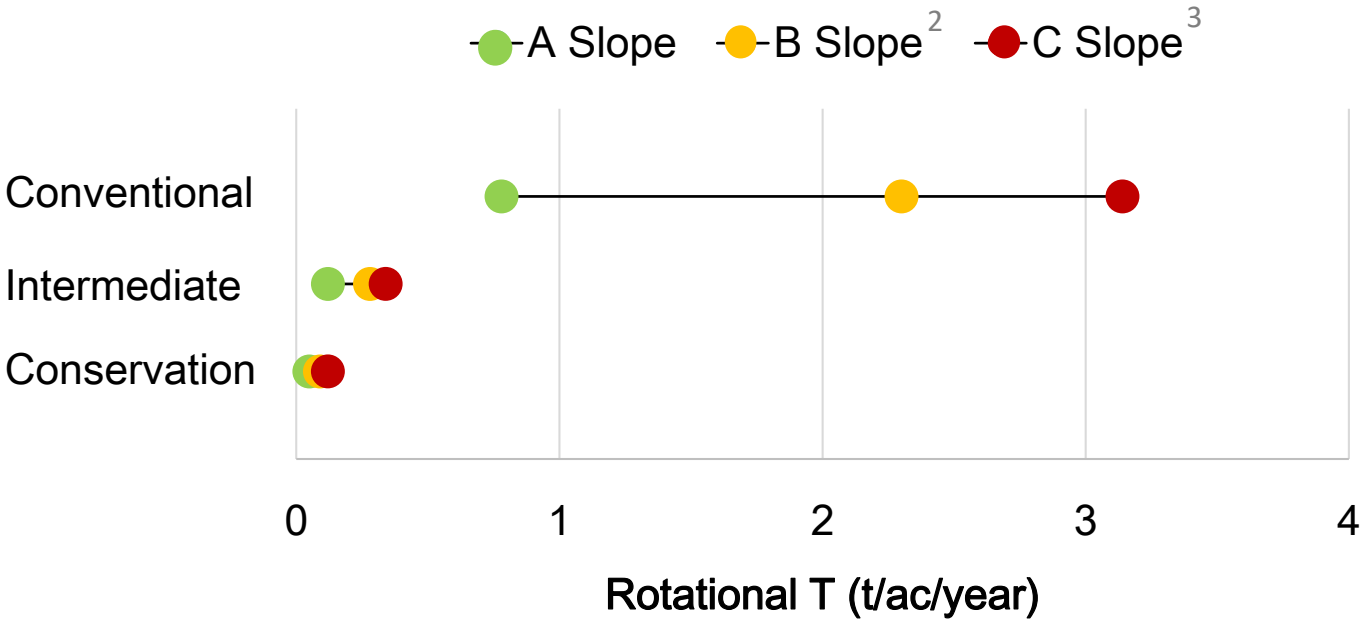
Let's break it down→

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

2.4 t/ac/ yr — Difference in "Rotational T" or amount of soil lost from a field in t/ac/yr on C-slope soils compared to A-slope soils with a conventional grain rotation with **fall chisel plowing, spring disking and field cultivation.**

0.2 t/ac/ yr — Difference in soil loss from a field with C-slope soils compared to A-slope soils when farmers **switch to no-till and plant rye after soybeans** (Intermediate).

<0.1 t/ac/ yr — Difference in soil loss in C-slope to A-slope class soils when adding **winter wheat back into rotation followed by a multi-species cover crop** (Conservation).



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%

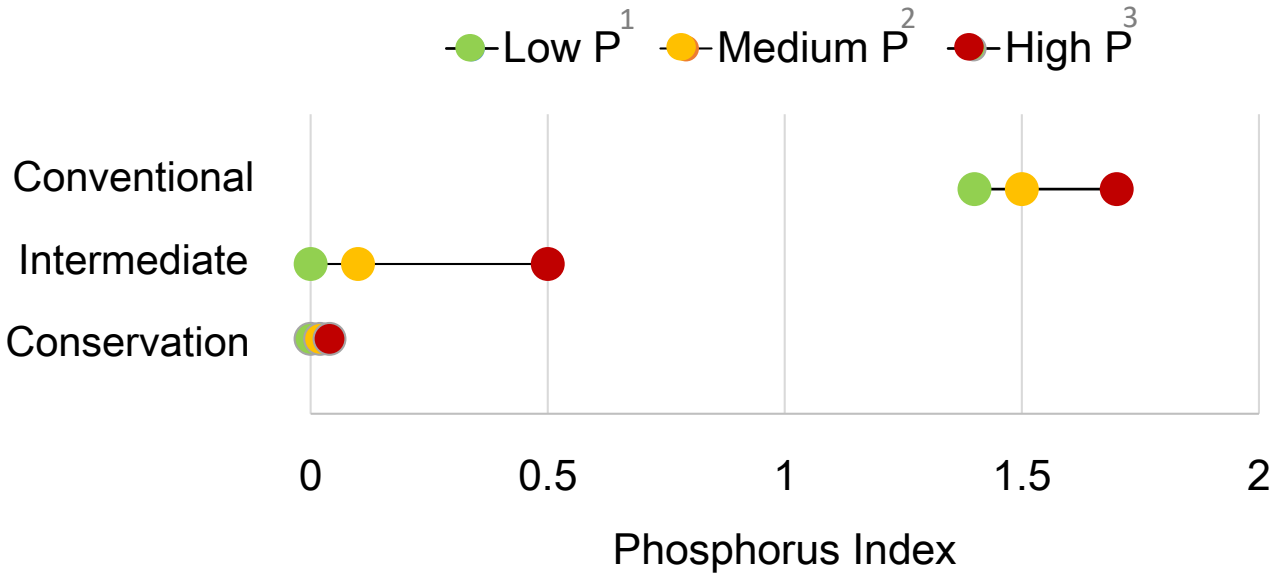
2 'B slope' refers to the soil types in this watershed with slope of 2-6%

3 'C slope' refers to the soil types in this watershed with slope of 6-12%

Higher phosphorus loss from fields in conventional rotations

1.2 lb/ac/ yr — At a soil test level of 44 ppm P (“High P”), converting to no-till in the corn-soybean rotation and adding a rye cover crop can reduce the PI from 1.7 to 0.5 **(Conventional → Intermediate)**

1.7 lb/ac/ yr — At the High P level, converting to no-till and adding winter wheat to the rotation followed by a cover crop can decrease the PI to 0 **(Conventional → Conservation)**



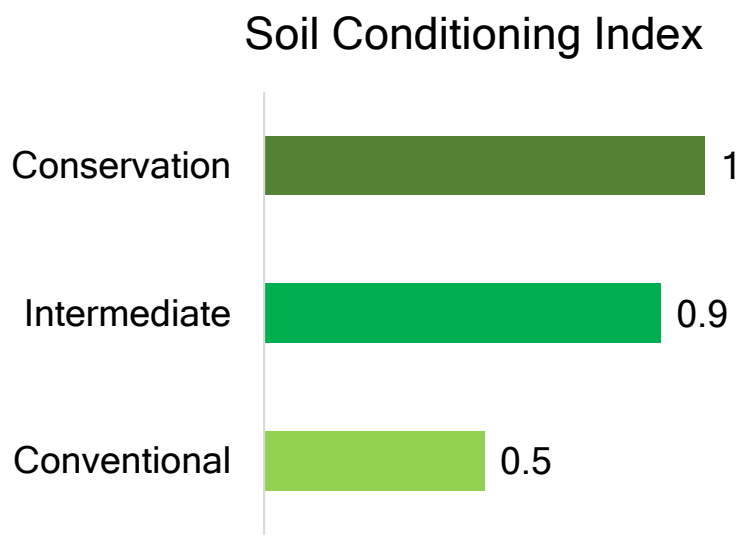
The Wisconsin Phosphorus Index (PI) estimates the average annual runoff P delivery to surface water from a farm field based on: manure application rate and timing, P fertilizer additions, soil test P, crop rotation and field operations.

1 ‘Low P’ refers to the lower quartile of the Racine County soil test P soil data summary, 17 ppm

2 ‘Medium P’ refers to the median of the Racine County soil test P soil data summary, 28 ppm

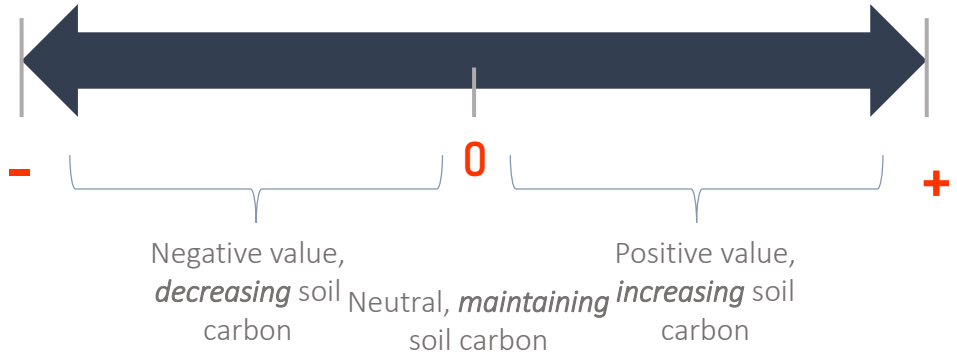
3 ‘High P’ refers to the upper quartile, 44 ppm

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



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

will often raise the SCI



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.

WPCRC CONSERVATION PROGRESS

Conservation Practice Stats

> 8,000 acres

Of conservation practices implemented in 2019 representing ~ 19% of the 42,160 acre total watershed project area.

1,185 acres

Of cover crops planted through the group's cost-share incentive program

> 3,000 acres

Are now covered by Nutrient Management Plans due to group advocacy support by local LCD

> 4,000 acres

Of no-till adoption through the group's cost-share incentive program

SOIL & WATER CONSERVATION IMPACT

Watershed Protection Committee of Racine County

SOIL EROSION T/ac/yr

CONVENTIONAL	INTERMEDIATE	CONSERVATION
1.8	0.2	0.1

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

PHOSPHORUS LOSS lb/ac/yr

CONVENTIONAL	INTERMEDIATE	CONSERVATION
1.6	0.2	0.2

Lower P Loss can mean better water quality. **Keeping soil on the field helps keep phosphorus out of waterways.**

LIVING ROOT DAYS

CONVENTIONAL	INTERMEDIATE	CONSERVATION
154	253	289

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
0.5	0.9	1.1

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
Crop Rotation: Corn Grain- Soybean Fall Chisel, Spring Disk before corn No cover crops	Crop Rotation: Corn Grain- Soybean No– till Rye cover crop after soybeans	Crop Rotation: Corn Grain- Soybean- Winter Wheat No-till Multi-species cover crop after winter wheat

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WPCRC CONSERVATION PROGRESS

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 6,800 acres of cropland covered by the participating farmers in the project area, we can get an idea of potential impacts to water quality.

Potential Sediment + Nutrient Reductions

6,800 acres of farmland managed under a **cash grain system** could experience the following reductions* when switching from **Conventional Tillage** to:

No-till + adding a cover crop after soybeans →

- 10,800 Tons Sediment
- 9,520 Pounds of P

No till + Wheat in rotation followed by multi-species cover crop →

- 11,560 Tons Sediment
- 10,200 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

Looking ahead, the Racine County Watershed Protection Committee will be:

- Working with the City of Burlington for their Adaptive Management Program
- Collaborating with other Producer-Led conservation groups on projects and programming through the Southeast Regional Support Network.
- Working to engage more producers in their efforts.
- Create videos to use as promotional materials to increase participation in their programs and at events

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

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