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# On-Field Ohio

## Are Water Quality Targets Achievable?

## Management Matters

**Dr. Elizabeth (Libby) Dayton, Shane Whitacre M.S., Dr. Chris Holloman, and Dr. Kim Love**

# Agenda

- Issue
- Current P Index
- OFO upgrade
- Is There Hope

## Issue

- Ongoing Ohio Surface Water Degradation
- Increased HAB
- Some HAB Toxic


Distressed

## Recent Push to Deem WLEB as Distressed

## US/Canada Binational Agreement
## WLEB P Load Reduction
## 40% from 2008
## How about ALL of Ohio?

## Increased Emphasis on

# Ohio Phosphorus Risk Index

## which uses

## Tri-State Fertilizer Recommendations
## 4Rs, Nutrient Stewardship

## USDA-NRCS, Ohio
## Revised Conservation Practice Standard
## Nutrient Management, Code 590

http://www.oardc.ohio-state.edu/ocamm/images/OH_590_Standard_2012.pdf

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# Current Ohio P Index Worksheet

Table 1. Ohio Phosphorus Risk Index (P Index) overview of parameters with associated weighting or scores (sub-values) and interpretation. Sub-values are added together to determine P Index score

| Site Characteristic | Phosphorus Vulnerability Values | | | | |
|---|---|---|---|---|---|
| 1. Soil Erosion | Soil Loss (tons/acre/yr) x 1<br>(Revised Universal Soil Loss Equation ver. 2, RUSLE2)<br><br>Includes: Map Unit, Crop Management Zone, Climate, Farmer Management, Slope Length, Slope Steepness, | | | | |
| 2. Connectivity to Water<br>Does concentrated flow (via a defined waterway, tile inlet, or surface drain leave the site? | No, and the site is NOT adjacent to an intermittent or perennial stream | No, but the site IS adjacent to an intermittent or perennial stream. | Yes, but the site is Not adjacent to an intermittent or perennial stream | Yes, and the site IS adjacent to and/or the concentrated flow outlets into an intermittent stream or through a tile inlet. | Yes, and the site IS adjacent to and/or the concentrated flow outlets into a perennial stream or through a tile inlet; OR Outlets to a pond or lake within 1 mile. |
| | Value = 0 | Value = 4.0 | Value = 8.0 | Value = 12 | Value = 16 |
| 3. Runoff Class | "Represents the effect of the Hydrologic Soil Group (A,B,C,D) combined with the effect of slope.<br>This factor represents the sites's surface runoff vulnerability" | | | | |
| | See Runoff Class Matrix (0 to 15 points) | | | | |
| 4. Soil Test Bray-Kurtz P1 PPM | Bray-Kurtz P1 (PPM) X (0.07) | | | | |
| Application Rate<br>5. Fertilizer ($P_2O_5$)<br>7. Organic ($P_2O_5$) | Fertilizer ($P_2O_5$) Applied (Lbs/Acre X 0.05)<br>Available – Manure / Biosolids ($P_2O_5$) (lbs/Acre X 0.06 | | | | |
| Fertilizer OR Manure ($P_2O_5$) Application Method | 0 Applied | Immediate Incorporation OR Applied on 80% Cover | Incorporation < 1 Week OR Applied on 50-80% Cover | Incorporation > 1 Week & < 3 Months OR Applied on 30 – 49% Cover | No Incorporation OR Incorporation > 3 months OR Applied on <30% Cover |
| 6. Fert. App. Meth. | Value = 0 | Value = 0.75 | Value = 1.5 | Value = 3.0 | Value = 6.0 |
| 8. Man. App. Meth. | Value = 0 | Value = 0.5 | Value = 1.0 | Value = 2.0 | Value = 4.0 |
| 9. Filter Strip | Deduct 2 points if field runoff flows through a designed filter strip – minimum 33 ft. wide | | | | |

# Current P Risk Index

| Parameter | Sub-Value Points |
|---|---|
| Erosion Potential (RUSLE2) | Ton/acre/yr |
| Connectivity to water | 0 - 16 |
| Runoff Class | 0 - 15 |
| Soil Test P (M3-P, ppm) | STP X 0.05 |
| Amount Fert / Manure | $P_2O_5$ X 0.05 |
| Placement Fert / Manure | 0 - 6 |
| Total | P Index Score |

**< 15 = Lo, 5–30 = Med, 31–45 = Hi, > 45 = Very Hi**

# Sensitivity Analysis

## Statewide Simulations
## Current P Index

**Used:**

- Current P Index Regime
- RUSLE2
- SSURGO

**Assigned:**

- Crop Mngmnt Scenario
- Soil Test P Level

**STP, Random Selection**
**Thanks to Survey Data:**
**A&L Great Lakes Labs**
**Brookside Labs**
**Spectrum Analytic**

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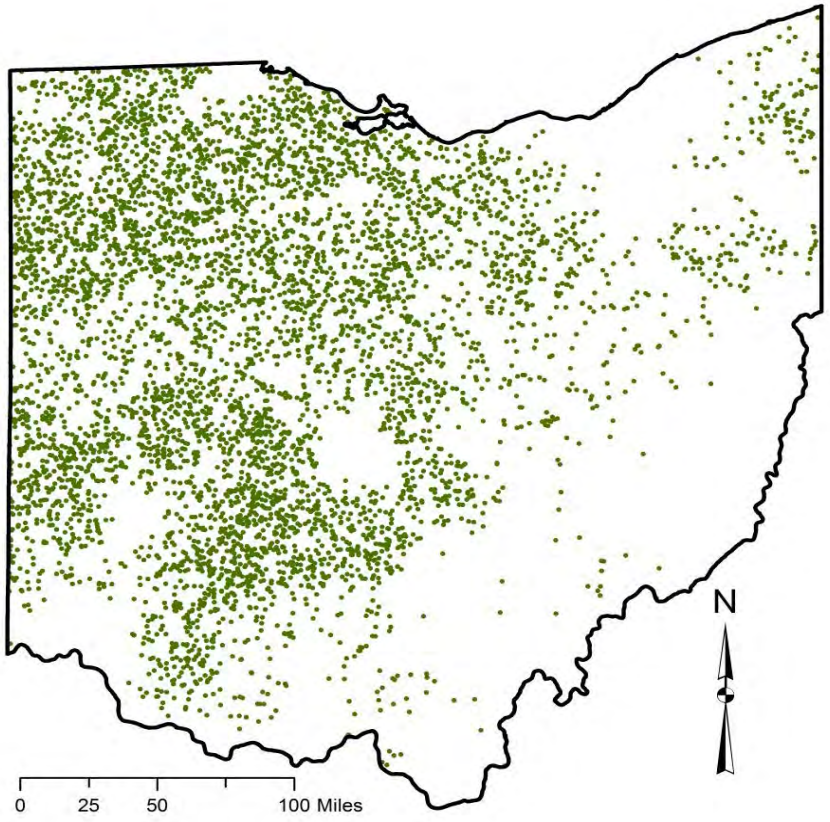
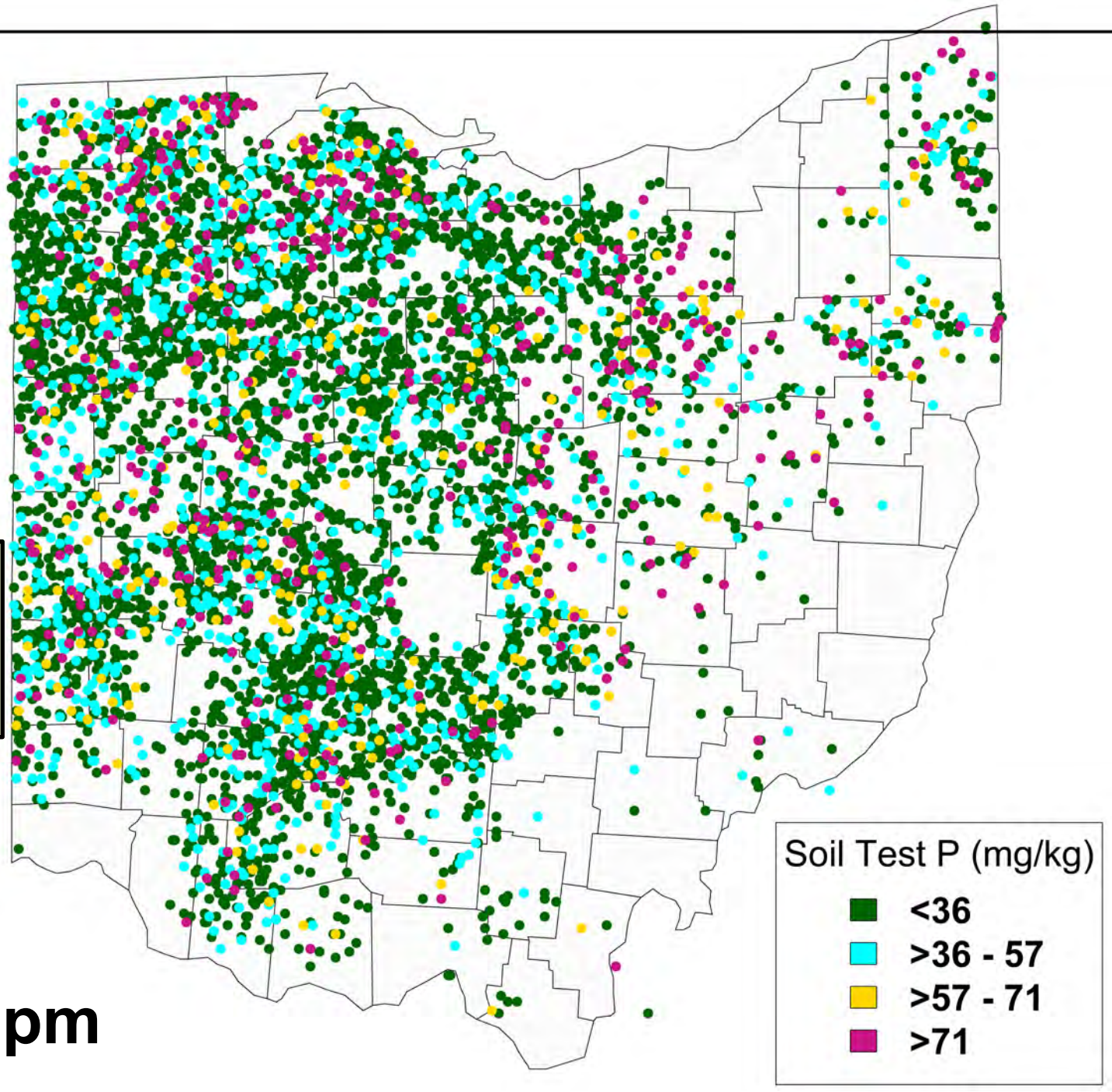



**>6000 Point Locations**

# Statewide
# M3P
# STP (ppm)

**Mirrors Ohio Soil Test Lab Data Survey**




## Range
## 3 to 1011 ppm

# Compare Crop Management Scenario (CMS)

## Soybean/Corn Rotations

## Soil Tillage Intensity Rating (STIR, 0 - 100)

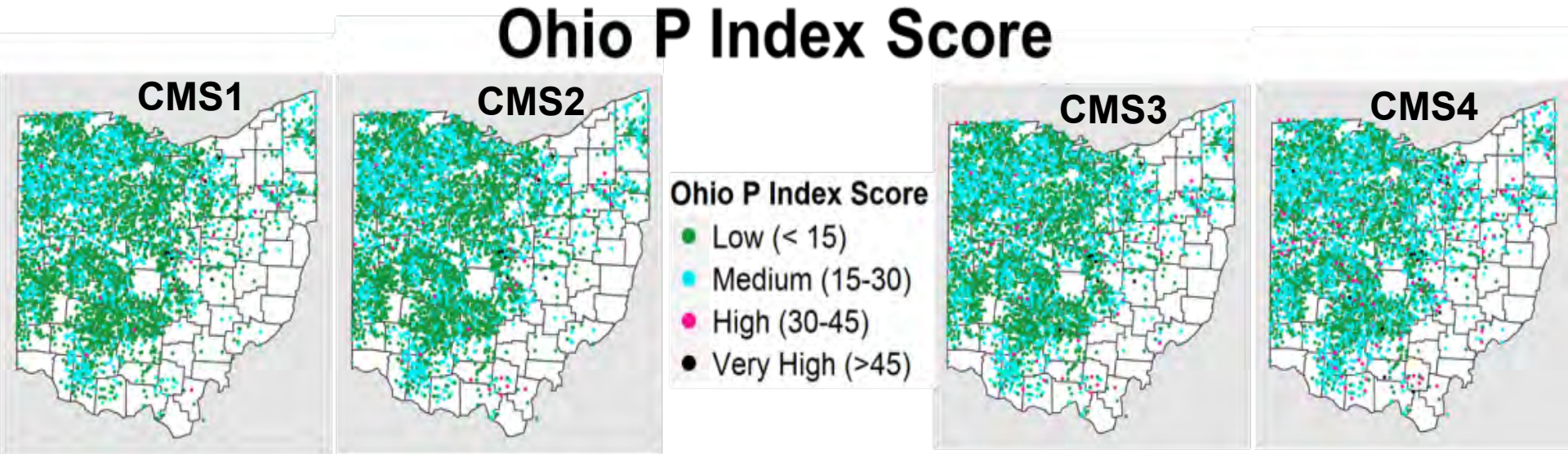
| CMS | STIR | CMS |
|---|---|---|
| 1 | 2.6 | CY1: No-Till Beans<br>CY1: No-Till Corn |
| 2 | 7.8 | CY1: No-Till Beans, Fall Vertical Till<br>CY2: No-Till Corn |
| 3 | 38 | CY1: No-Till Beans, Fall Chisel<br>CY2: Spring Cultivate, Corn |
| 4 | 94 | CY1: Spring Chisel/Cultivator, Beans, Fall Moldboard plow<br>CY2: Spring disk/cultivate, Corn |

# Current P Index Ohio Score Range

# Current P Index Score Range

## Additional Assumptions:

- Fert/man applied per Tri-State Recommendations
- Fert/man app. Method randomly assigned per P Index criteria




**MOST in the Low to Med Range**

**Despite HUGE Range in Erosion, STP, CMS, etc.**

# Management Matters Example

## Comparison: Chisel/Cultivate vs No-Till

### Issue: Not Sensitive to Changes

**Field w/: 150 mg/kg STP on 3% slope**

| Tillage | Erosion (t/a/yr) | Current P Index Score | On-Field Ohio (lb/A) |
|---|---|---|---|
| Chisel | 2.2 | 9.7 (Low) | 4.0 |
| No-Till | 0.43 | 7.9 (Low) | 1.9 |

- Neither 4.0 or 1.9 is low runoff
- Current P Index Farmer not Credited with
  - 80% reduction in erosion
  - 53% reduction in runoff P

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# Undertook To Evaluate/Revise The Ohio P Risk Index

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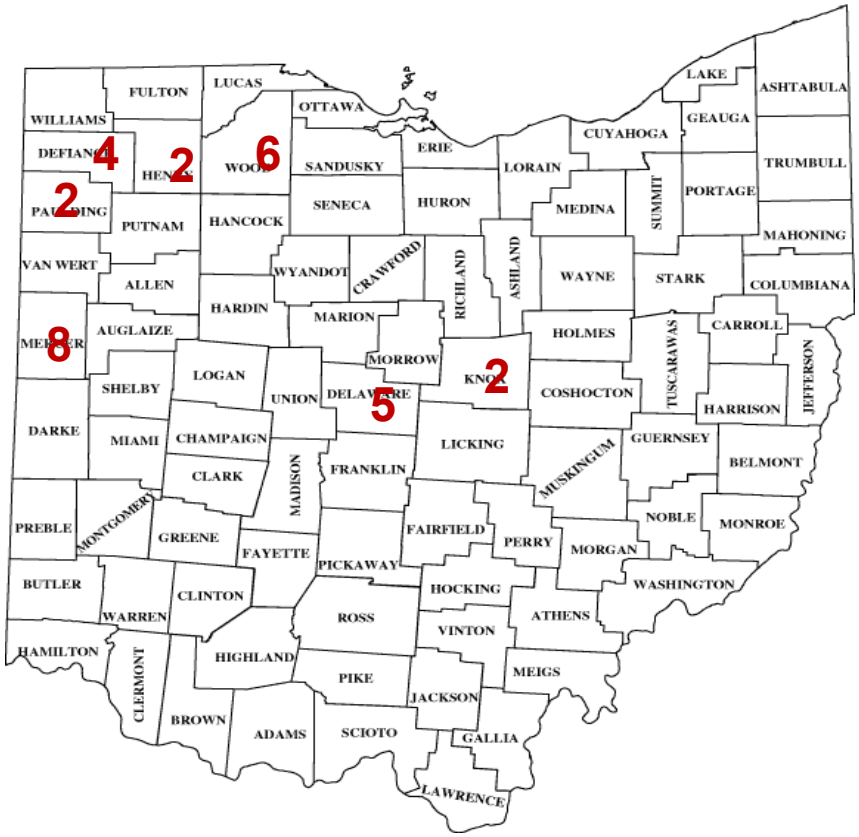
# On-Field Ohio

## Evaluate/Revise the Ohio P Risk Index using Field-Scale Edge-of-Field Monitoring Data

Dr. Elizabeth (Libby) Dayton, Shane Whitacre M.S.,
Dr. Chris Holloman, and Dr. Kim Love

# Counties with Project Fields




**29 Field sites**

- **8 in GLSM**
- **7 in Scioto**
- **14 in WLEB**

**Most with Surface and Sub-surface sampler**

*Special Thanks to Participating Farmers*

# On-Field Ohio

## T Runoff

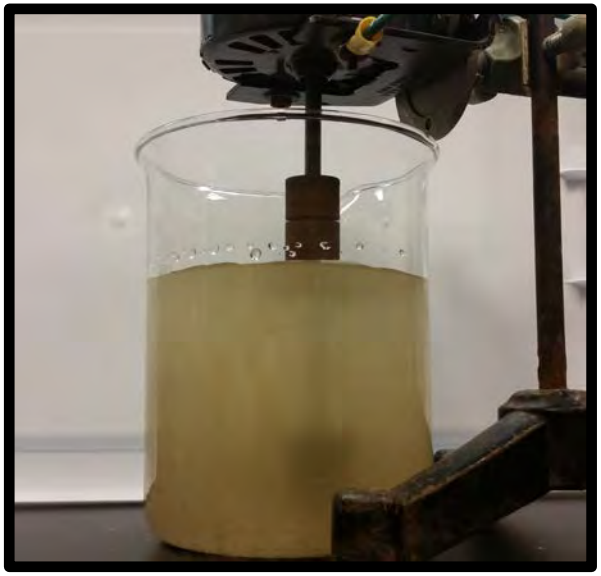



nts
mples

- Detailed Crop Management Info

# What Did We Measure?

## Runoff Concentrations Surface & Tile



−

=

**Particulate (RPP)**

**Total (RTP)**
**unfiltered/digested**

**Dissolved (DRP)**
**filtered**

**Concentration X Flow = Load (lb P/A)**

## Every Runoff Event

## Surface & Tile Runoff:

- DRP Dissolved P
- RPP Particulate P
- RTP Total P
- RSS Suspended Sediment
- Runoff Flow Volume

**On-Field Ohio!**

## Erosion Potential (RUSLE2)

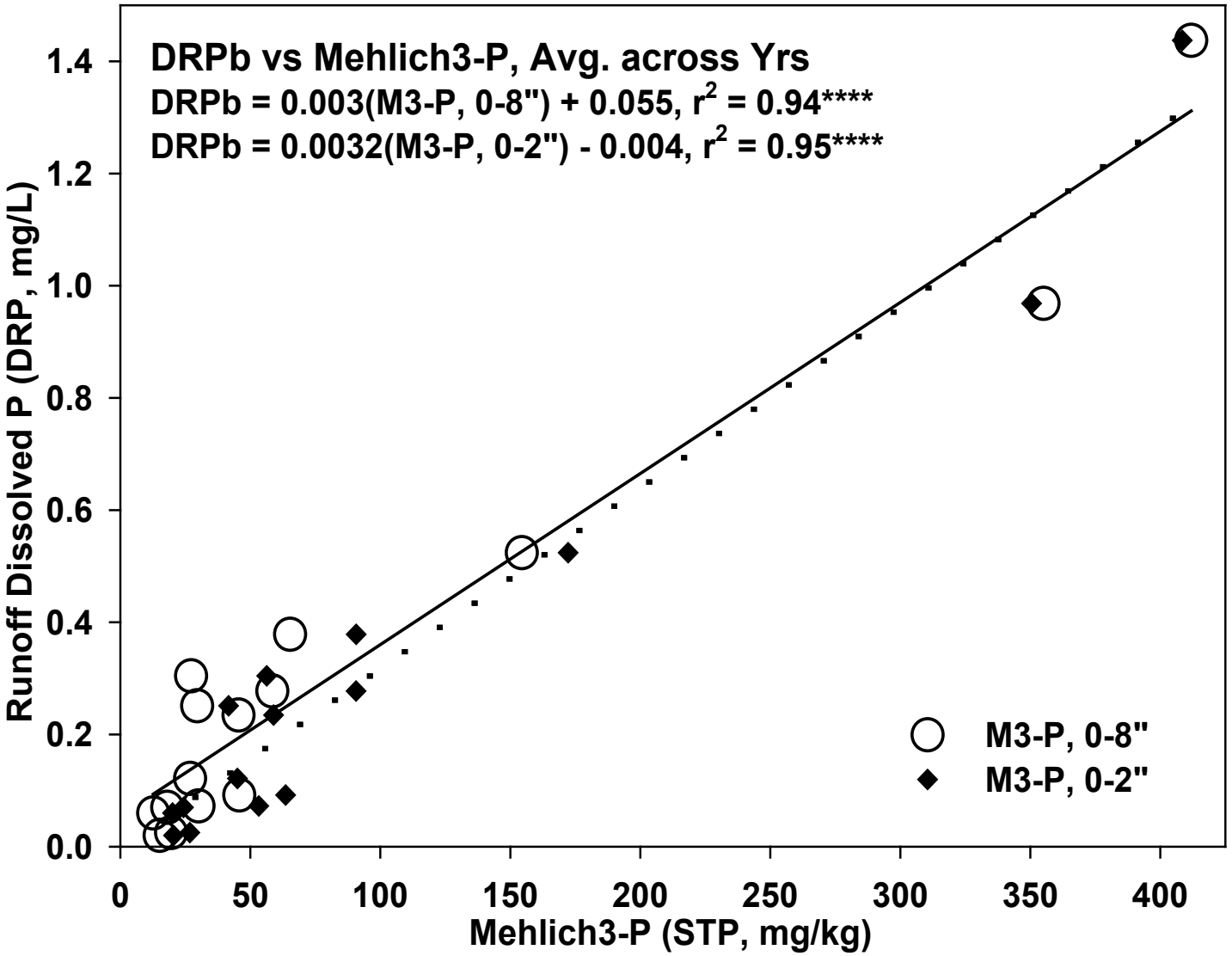
- Each crop year and average for rotation

## Annual Soil Test P (M3-P)

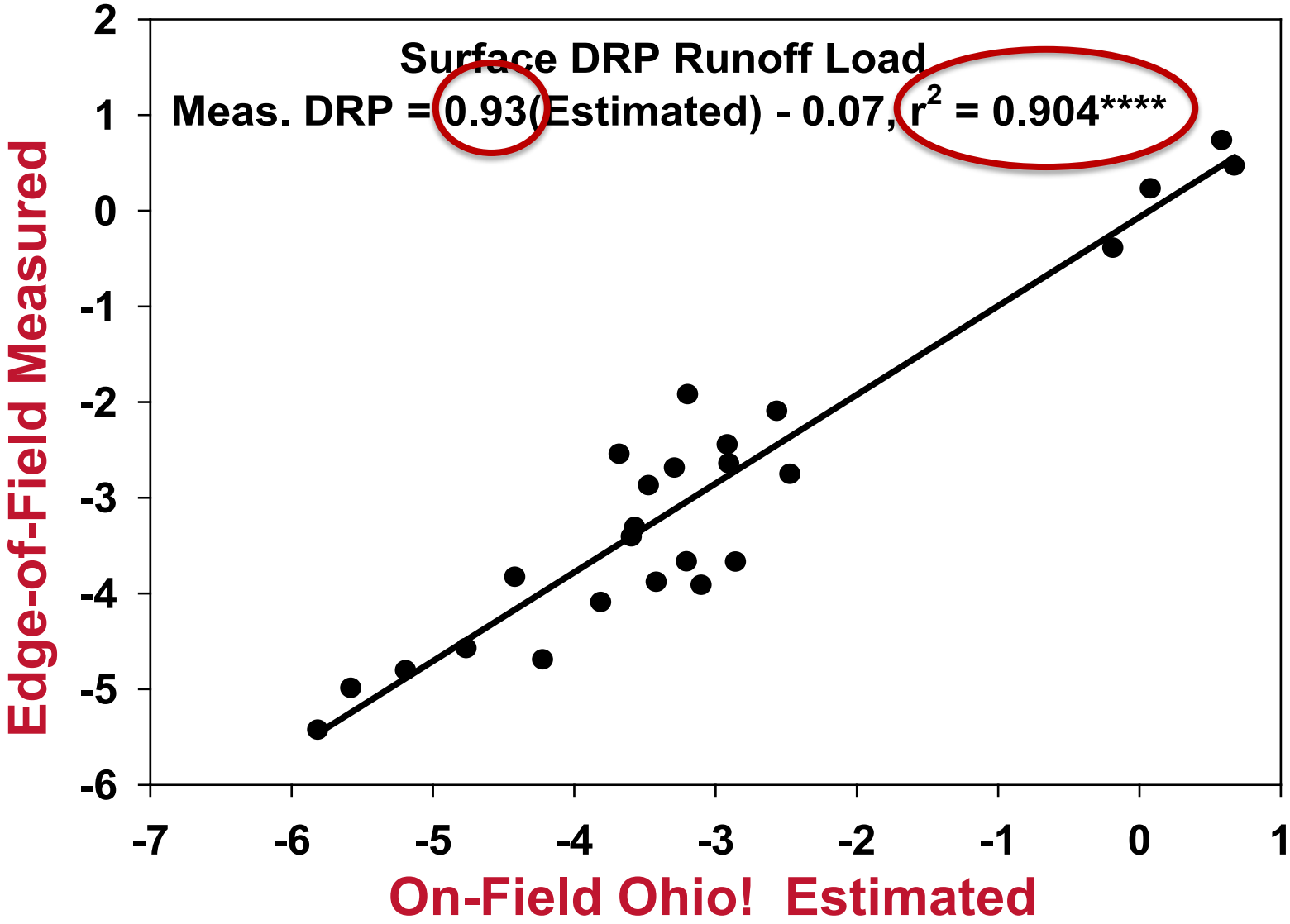
## Annual Farmer Management


On-Field Ohio
Quantitative Approach
Quantify
unoff
Field Pr
tices
Results
On-Field Ohio
BIG IMPROVEMENT

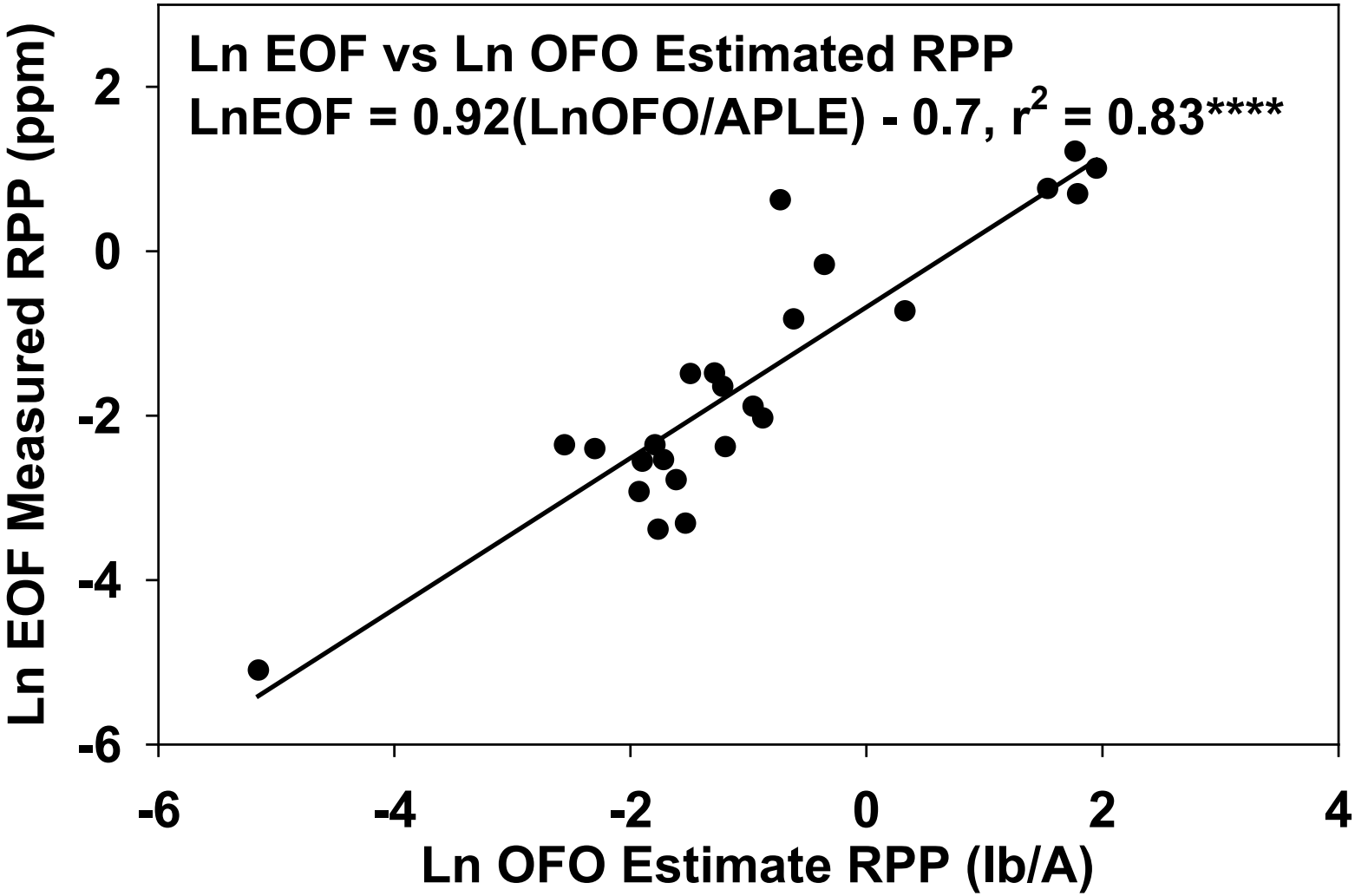
# Surface DRP vs M3-P 0-8” & 0-2” Concentration



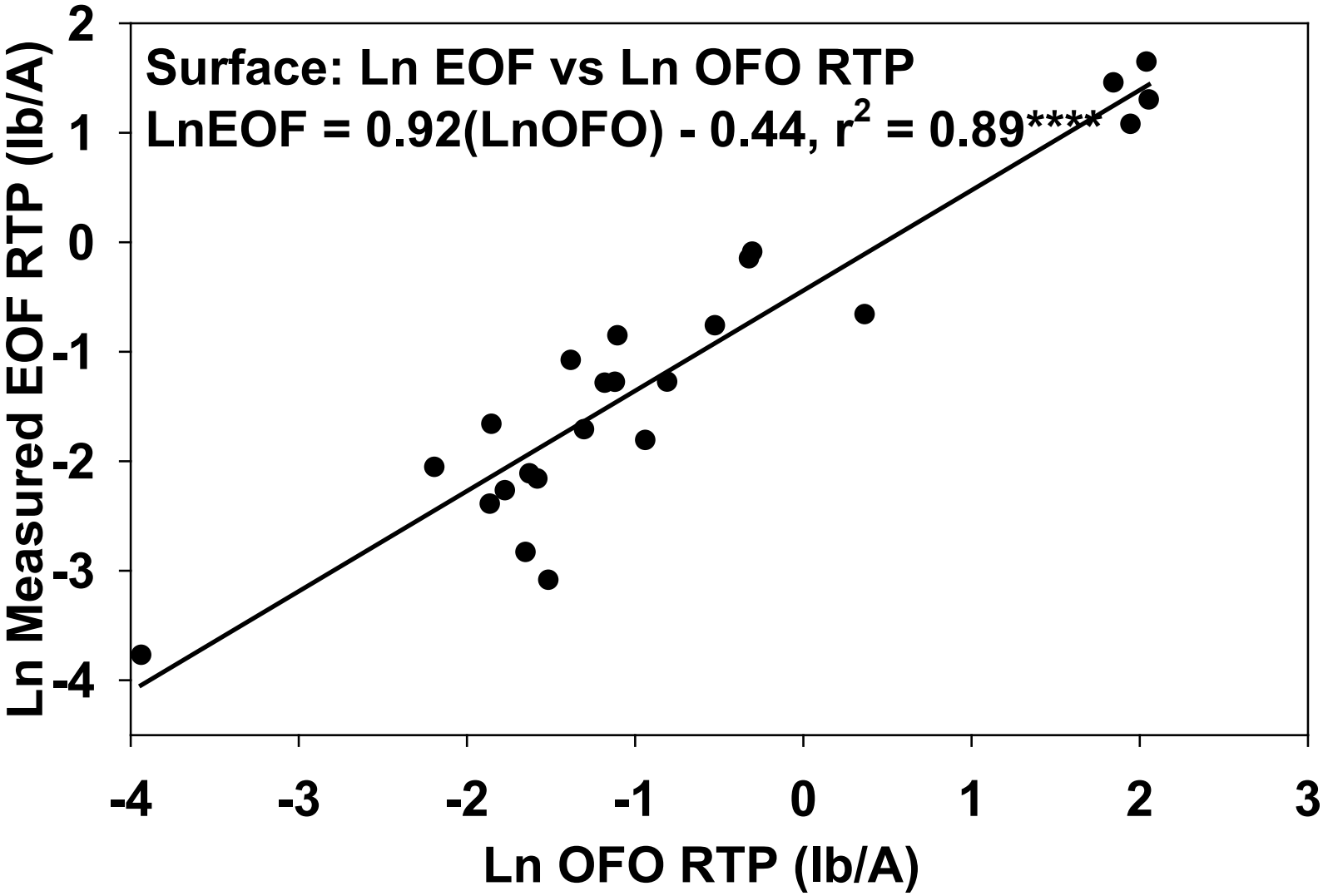
# Measured vs Estimated Surface Runoff DRP (lb/A)



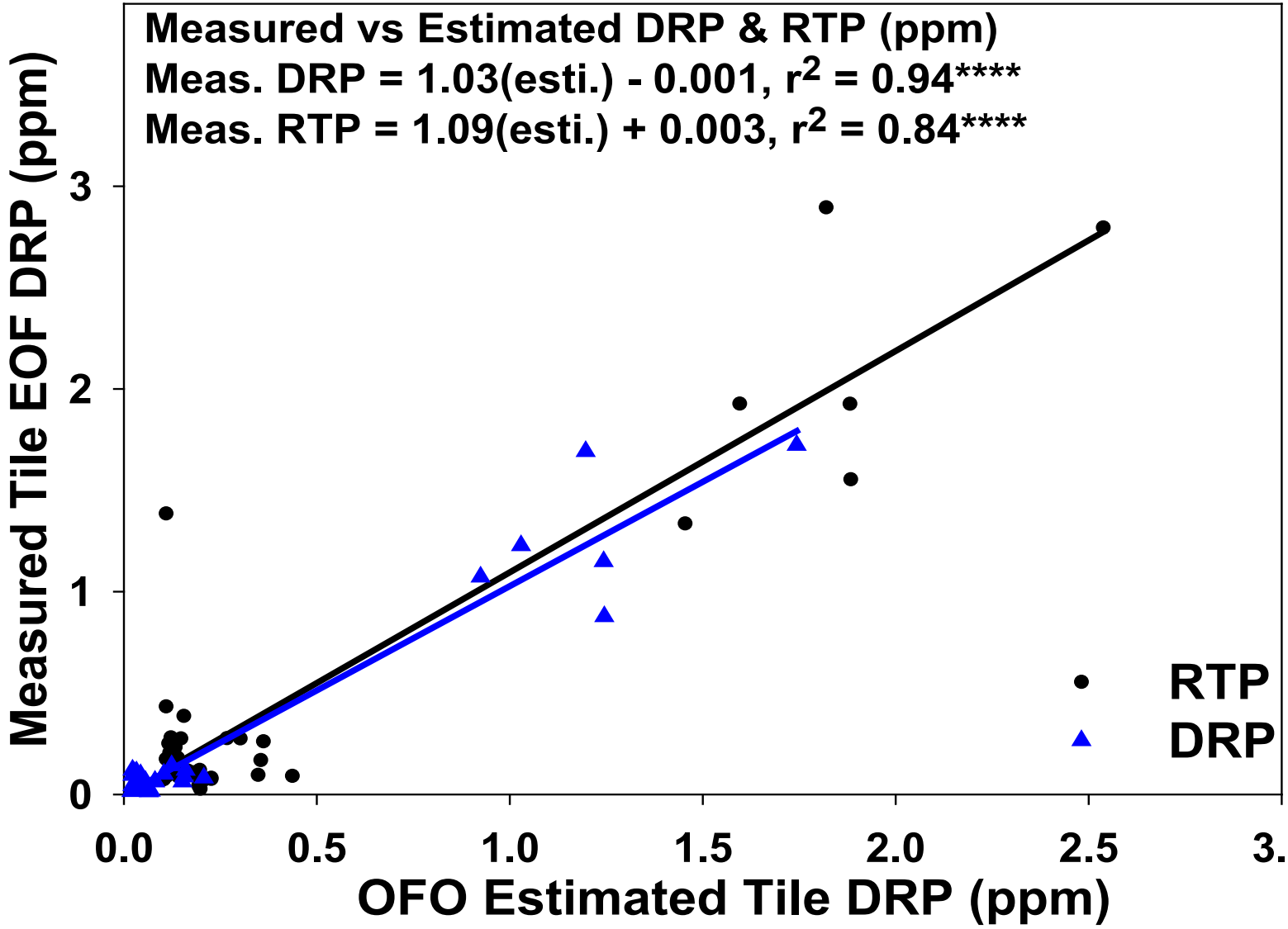
# Measured vs Estimated Surface RPP (lb/A)



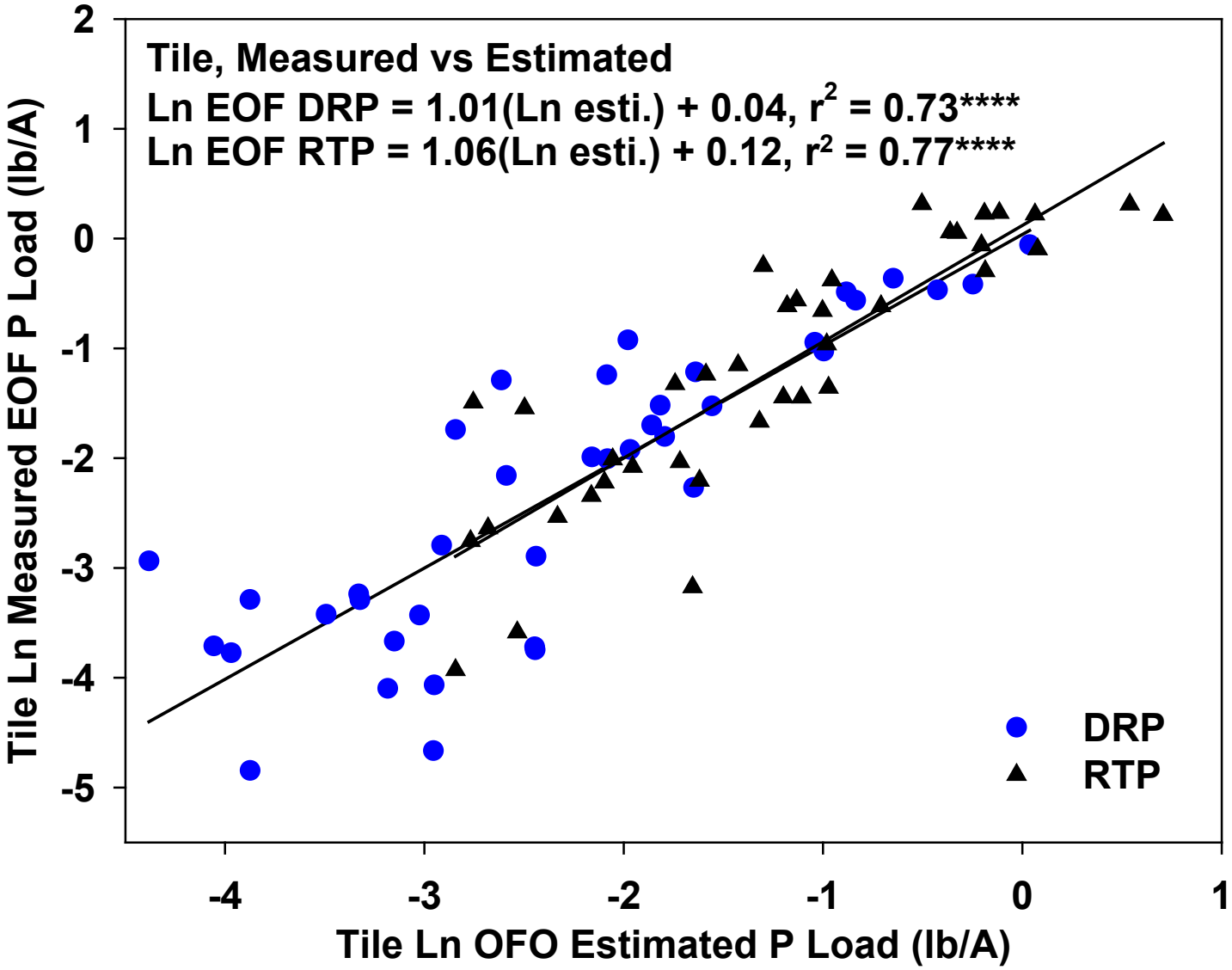
# Measured vs Estimated Surface RTP (lb/A)



# Measured vs Estimated Tile DRP & RTP (ppm)



# Measured vs Estimated Tile DRP & RPP (lb/A)




On-Field Ohio
Intended to Provide a Long-Term Average Estimate of Field-Scale Erosion and P Runoff
Not an Absolute
Increasingly Used to Judge Farmer Performance
So Important to Get it Right !

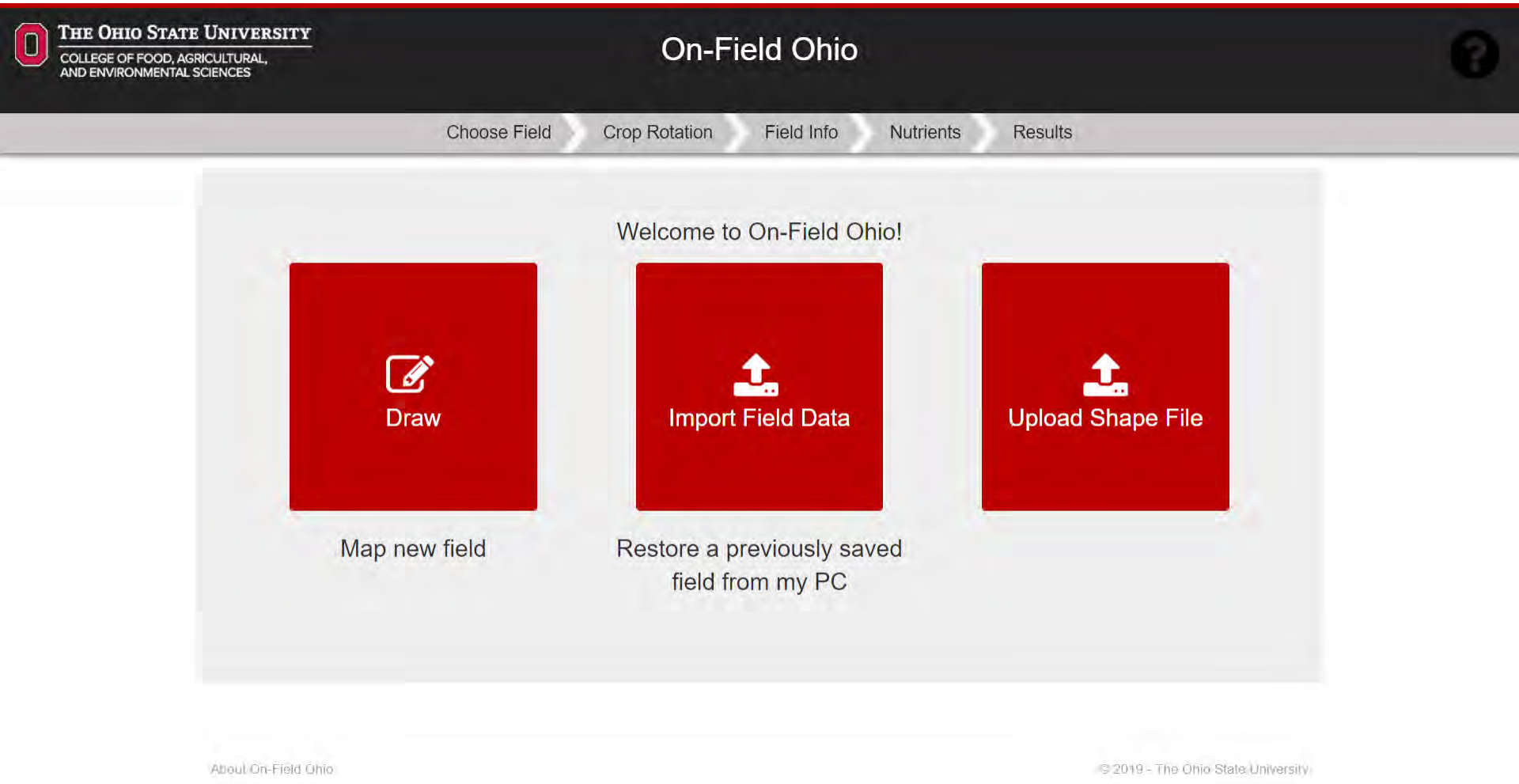
# Revising Ohio P Risk Index

- Empirica dge-of-field data
- Use RUS
- Calibrate d data
- Integrate APLE
- 4Rs! Eva tilizer/manure applicati
- Compare Estimates

**Correlating Edge-of-Field Runoff Results With On-Field Properties and Management**

*APLE = Annual Phosphorus Loss Estimator

# Result: On-Line Tool




Management Matters
Power of Comparisons
Identify problem areas/managements and possible alternatives
On-Field Ohio

# Power of Comparison

**Example Field: Blount Silt Loam with 3% Slope bean/corn rotations**

**2 crop management scenarios (CMS A & B)**

**A: No-till Beans, Fall Chisel, Spring Cultivate, Corn**
**B: No-till Beans, No-till Corn**

**3 Soil Test P levels (mg/kg):**

**Low: 15**
**Med: 50**
**High: 150**

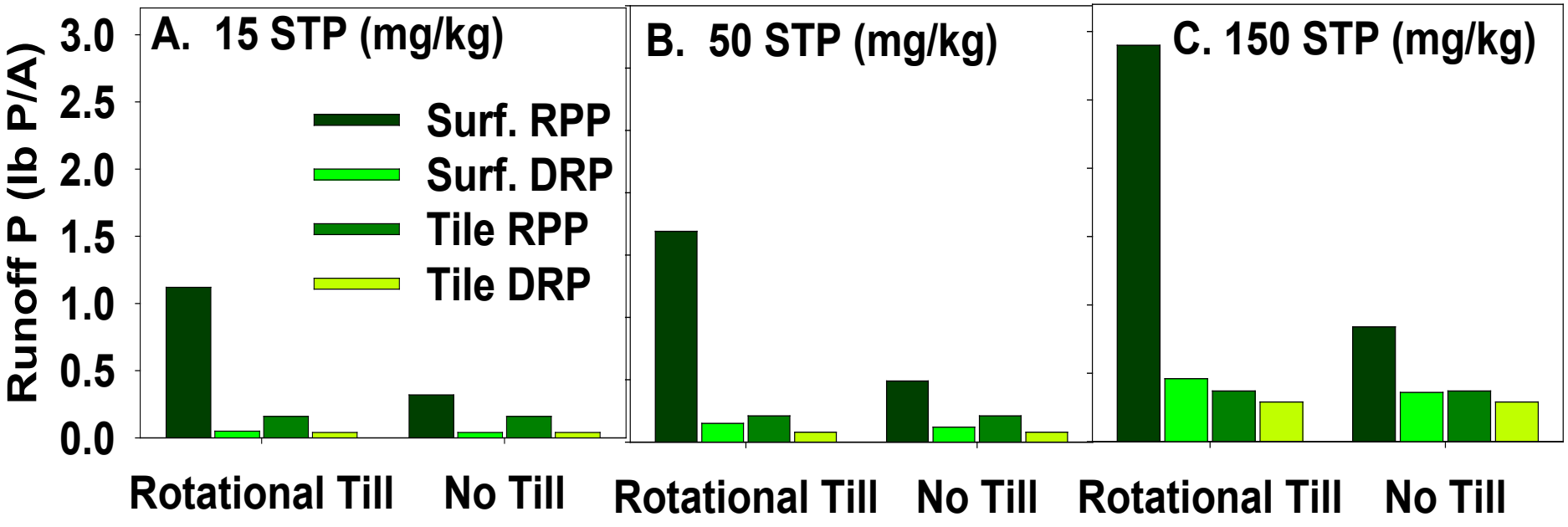
# Comparison Outputs

**Rotational Till: 2.2 t/a/yr**
**No-Till: 0.43 t/a/yr**

**Erosion: 80% reduction**
**RPP: 71% reduction**

**STP 15 to 150 (mg/kg)**

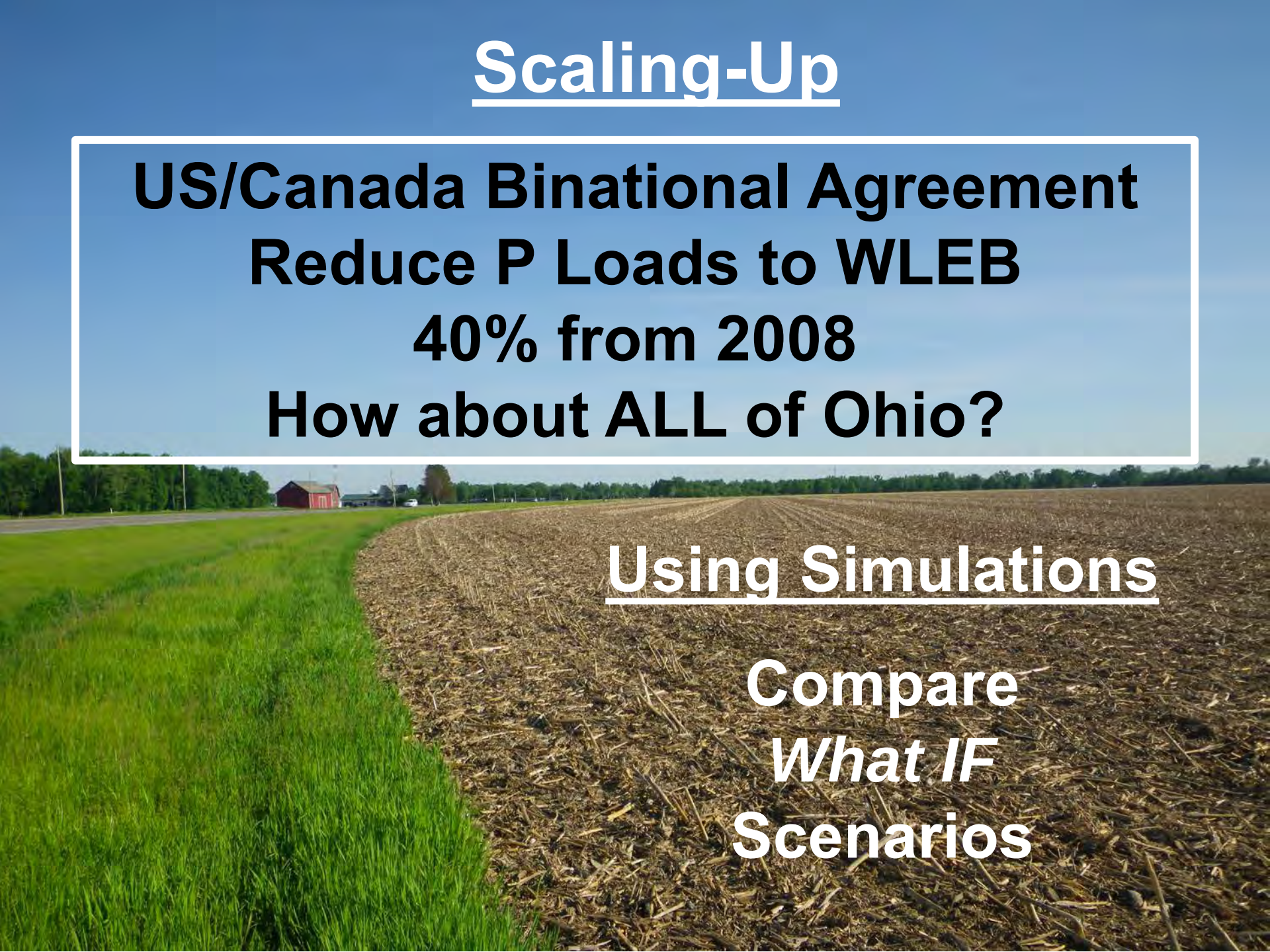
**Increases:**
**>9x Surf. DRP**
**>2x Tile RPP,**
**>7x Tile DRP**



# How's Ohio Doing

# Scaling-Up

**US/Canada Binational Agreement**
**Reduce P Loads to WLEB**
**40% from 2008**
**How about ALL of Ohio?**



## Using Simulations

**Compare**
***What IF***
**Scenarios**

# On-Field Ohio

## Statewide Simulations

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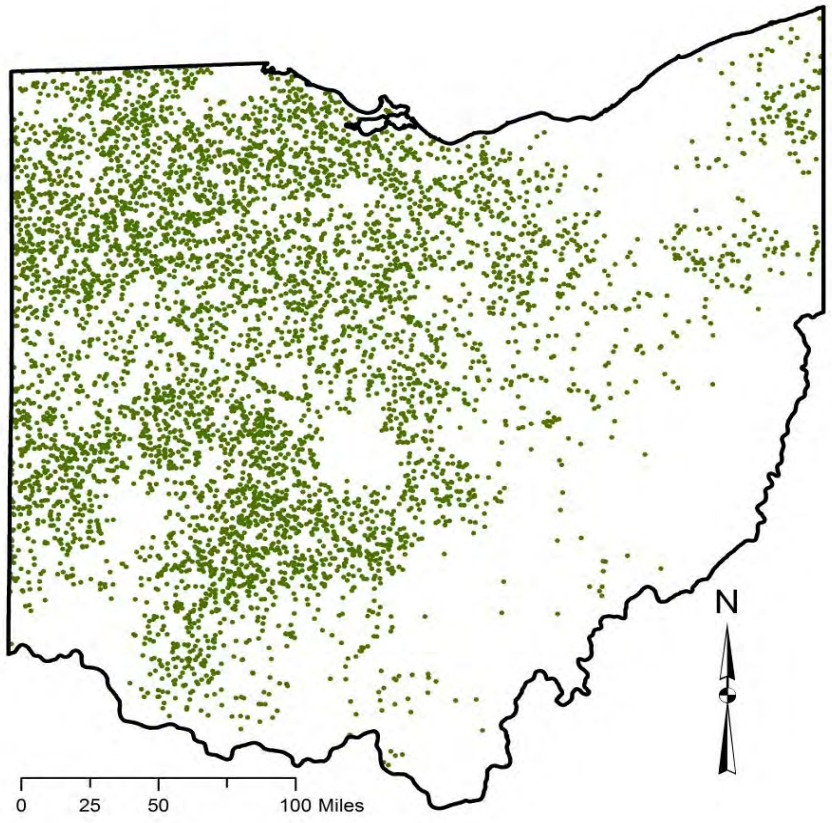
### Uses:

- On-Field Ohio Equations
- RUSLE2
- SSURGO

### Assigns:

- Crop Mngmnt Scenario
- Soil Test P Level

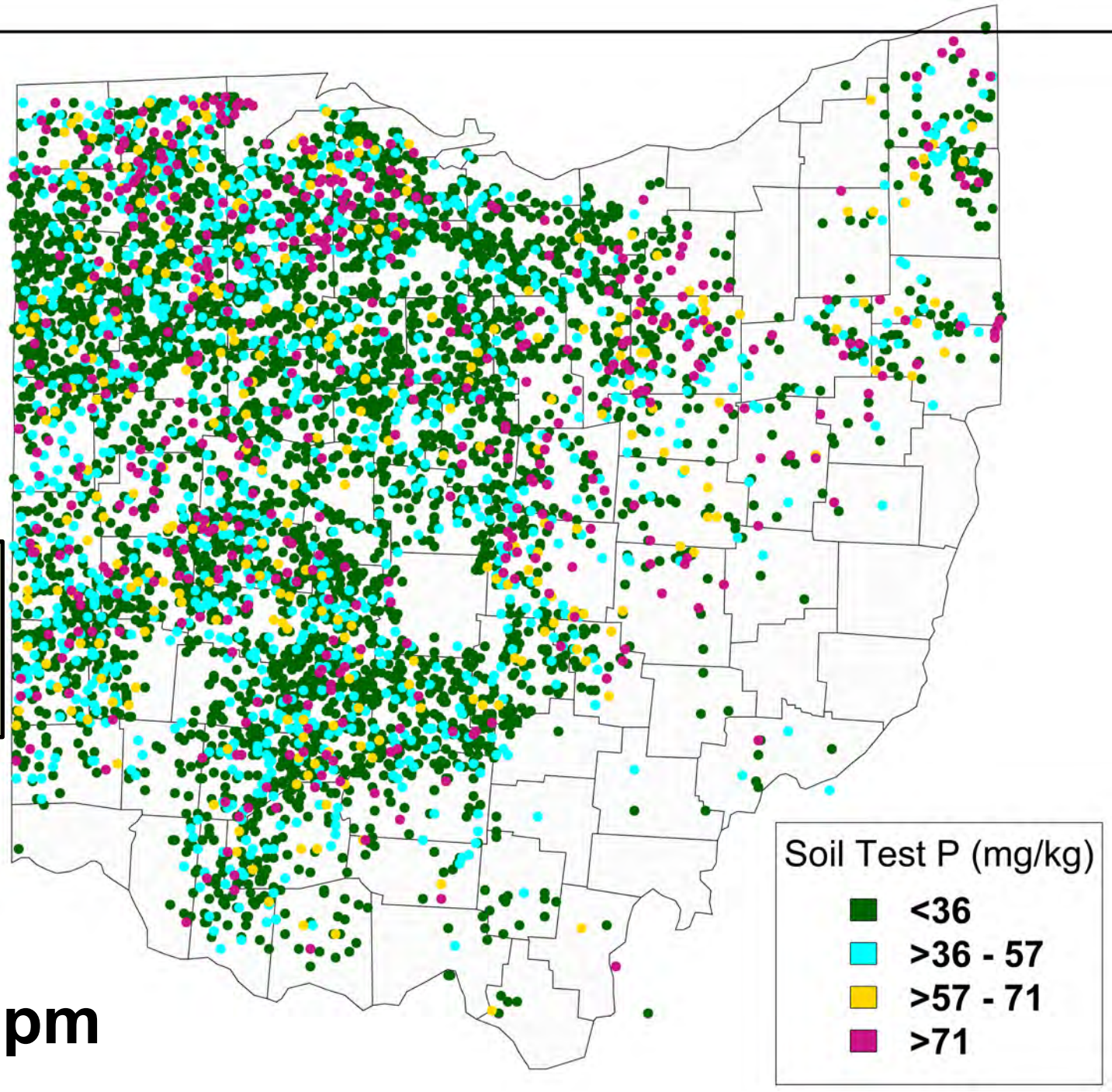
**STP, Random Selection**
**Thanks to Survey Data:**
**A&L Great Lakes Labs**
**Brookside Labs**
**Spectrum Analytic**




**>6000 Point Locations**

# Statewide
# M3P
# STP (ppm)

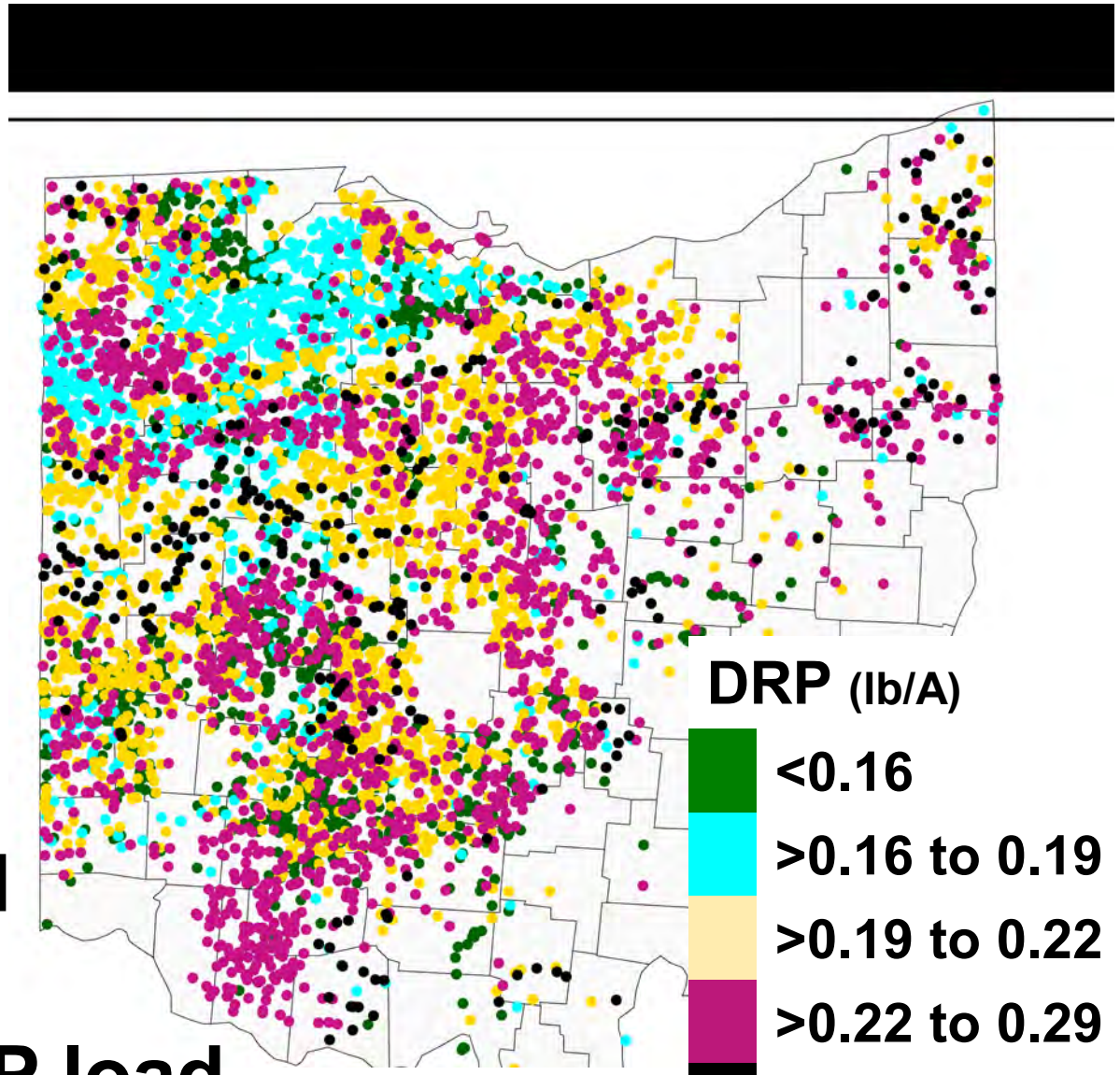
**Mirrors Ohio Soil Test Lab Data Survey**




## Range
## 3 to 1011 ppm

# On Field Ohio

## Statewide Surface DRP Load




**STP main driver**

- Surf DRP Load
  &
- Tile DRP & RPP load

# Compare Crop Management Scenario (CMS)

## Soybean/Corn Rotations

## Soil Tillage Intensity Rating (STIR, 0 - 100)

| CMS | STIR | CMS |
|---|---|---|
| 1 | 2.6 | CY1: No-Till Beans<br>CY1: No-Till Corn |
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| 3 | 38 | CY1: No-Till Beans, Fall Chisel<br>CY2: Spring Cultivate, Corn |
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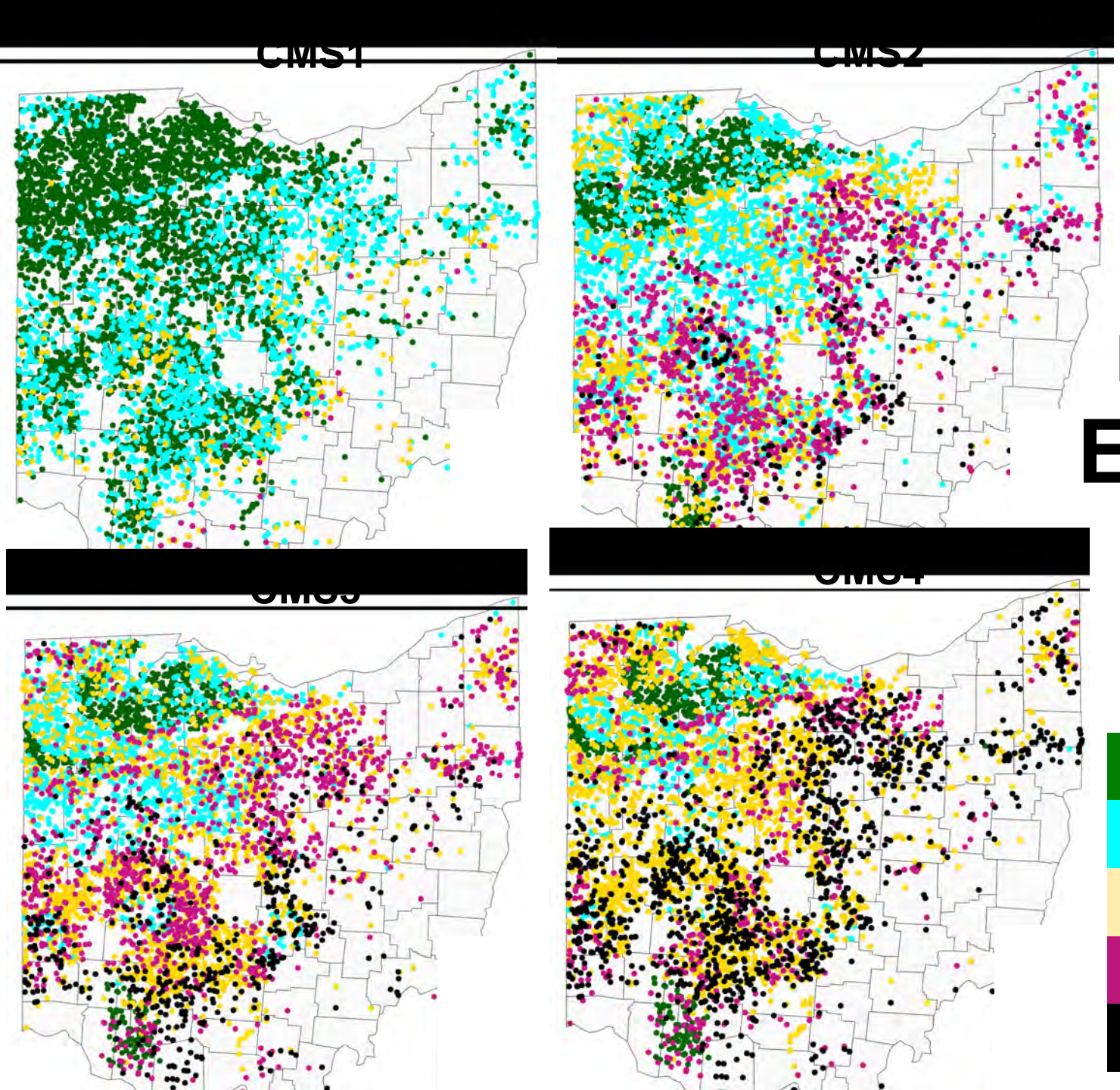
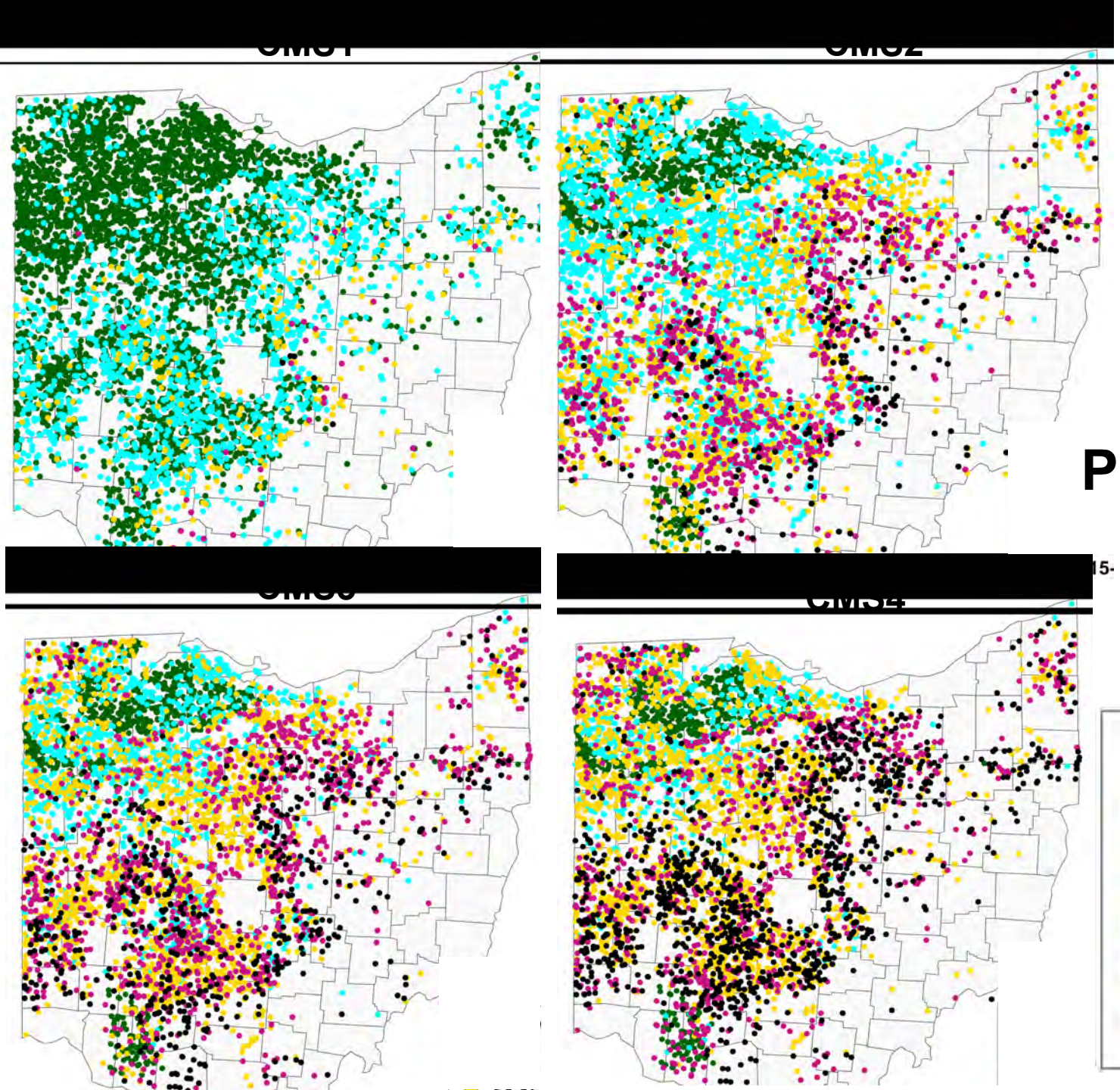
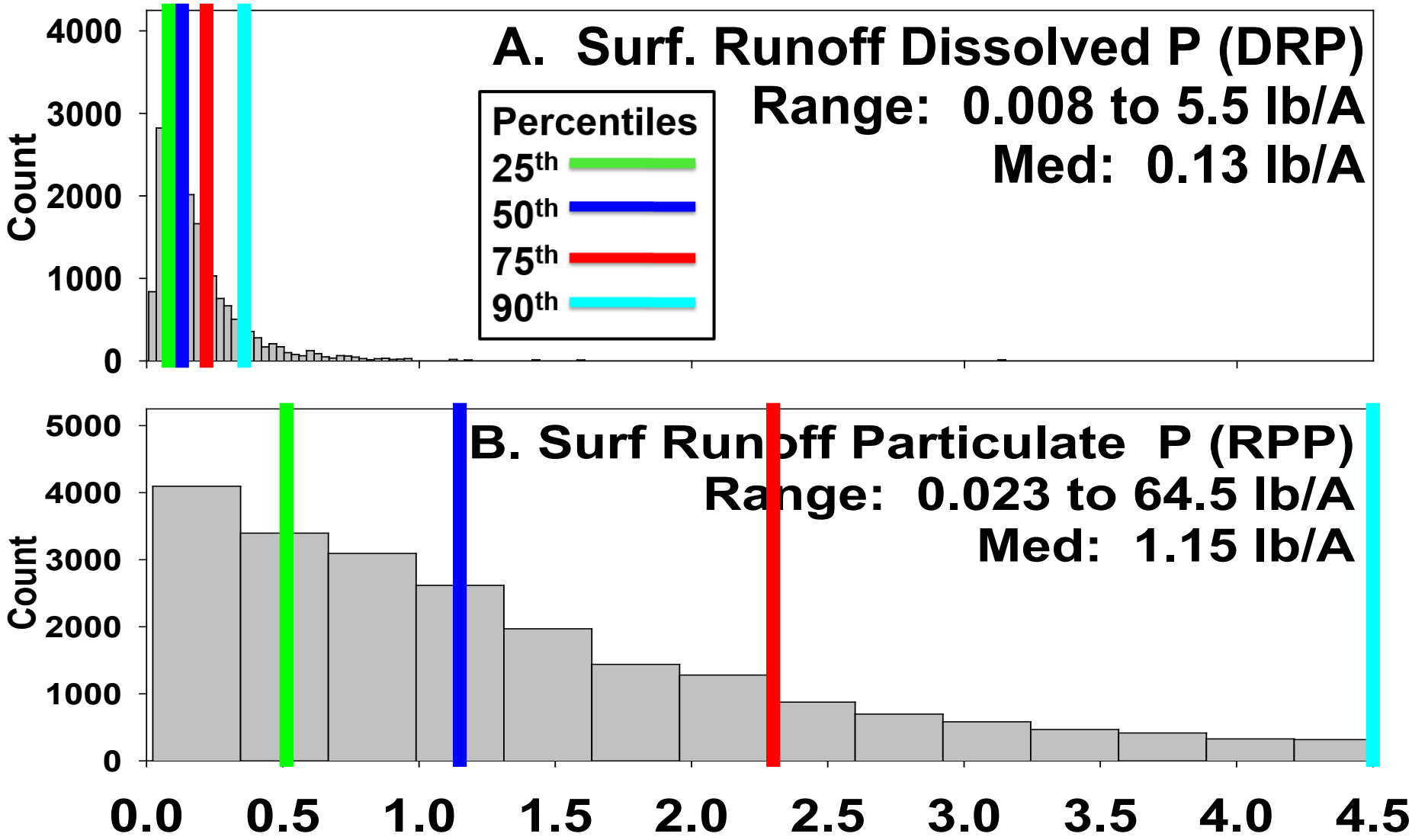

CMS1
CMS2
CMS3
CMS4
RUSLE2
Erosion
(t/a/y)
Erosion (t/a/y)
<0.25
>0.25 to 0.8
>0.8 to 2
>2 to 4
>4


Surface
Particulate P
RPP
RPP lb/A
<0.51
>0.51-1.15
>1.15-2.30
>2.30-4.5
>4.5

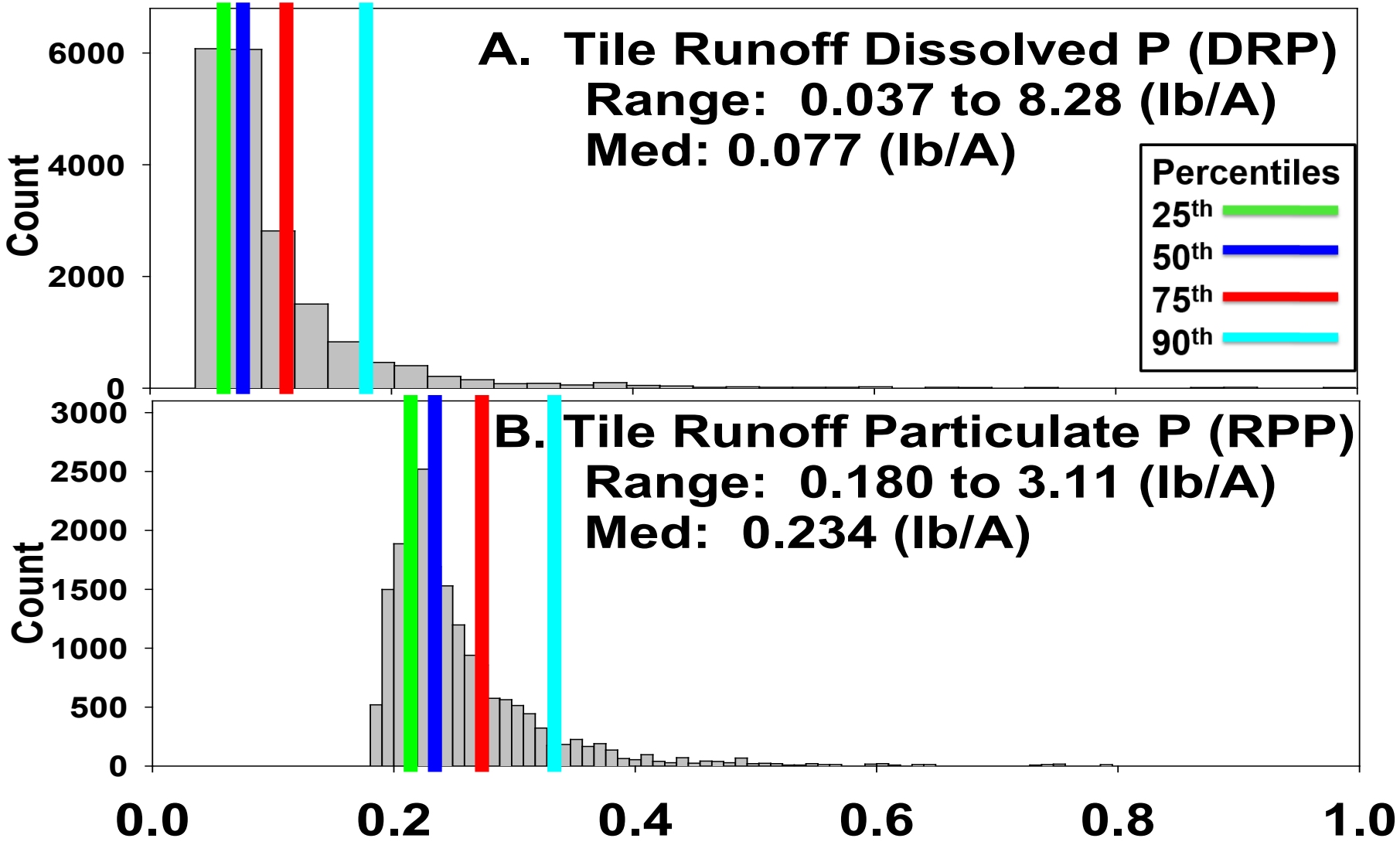
**RPP ≈ 10x > DRP**

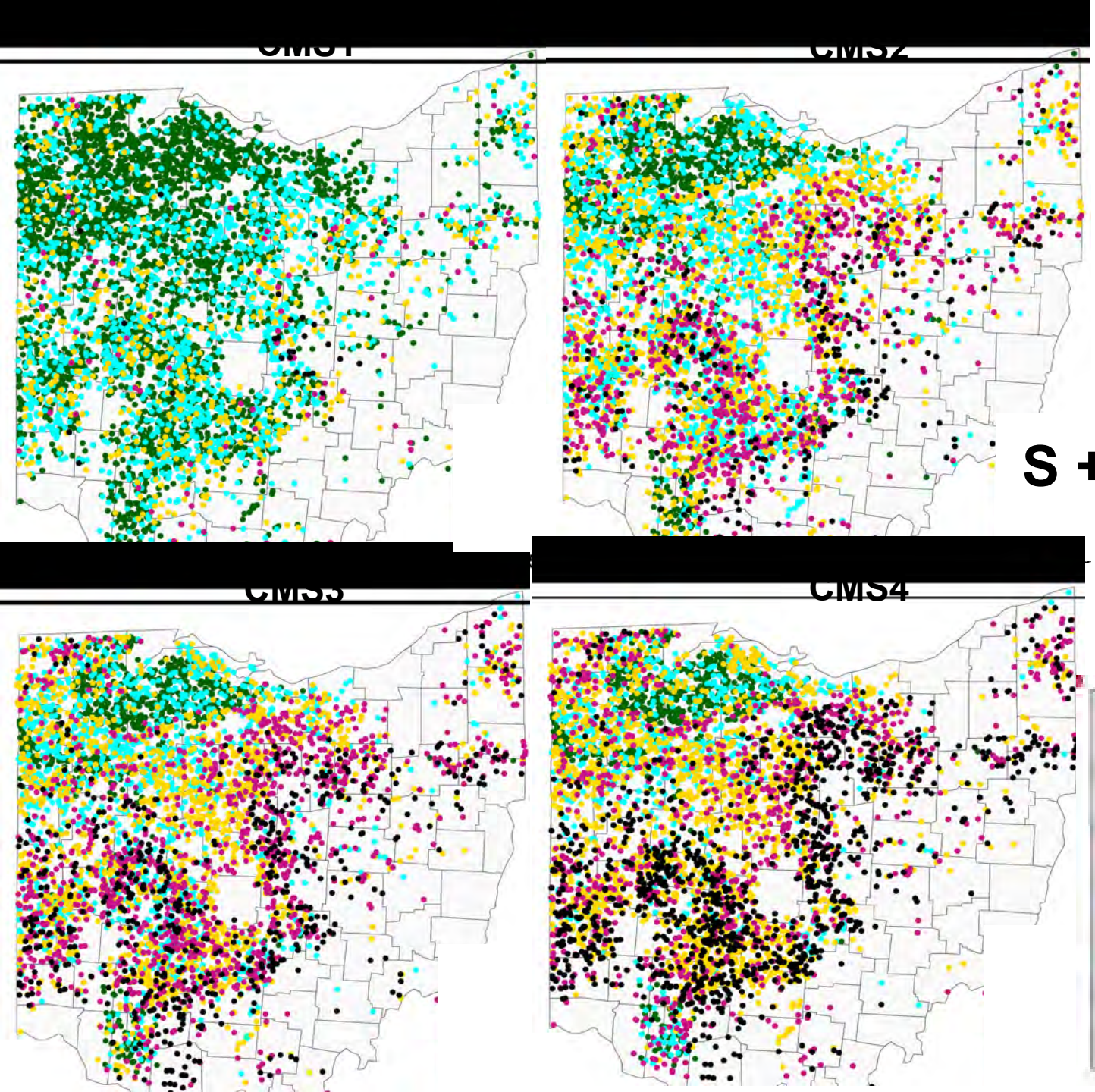
# Surface DRP and RPP Load



**RTP ≈ 3x > DRP**

# Tile DRP and RPP Load



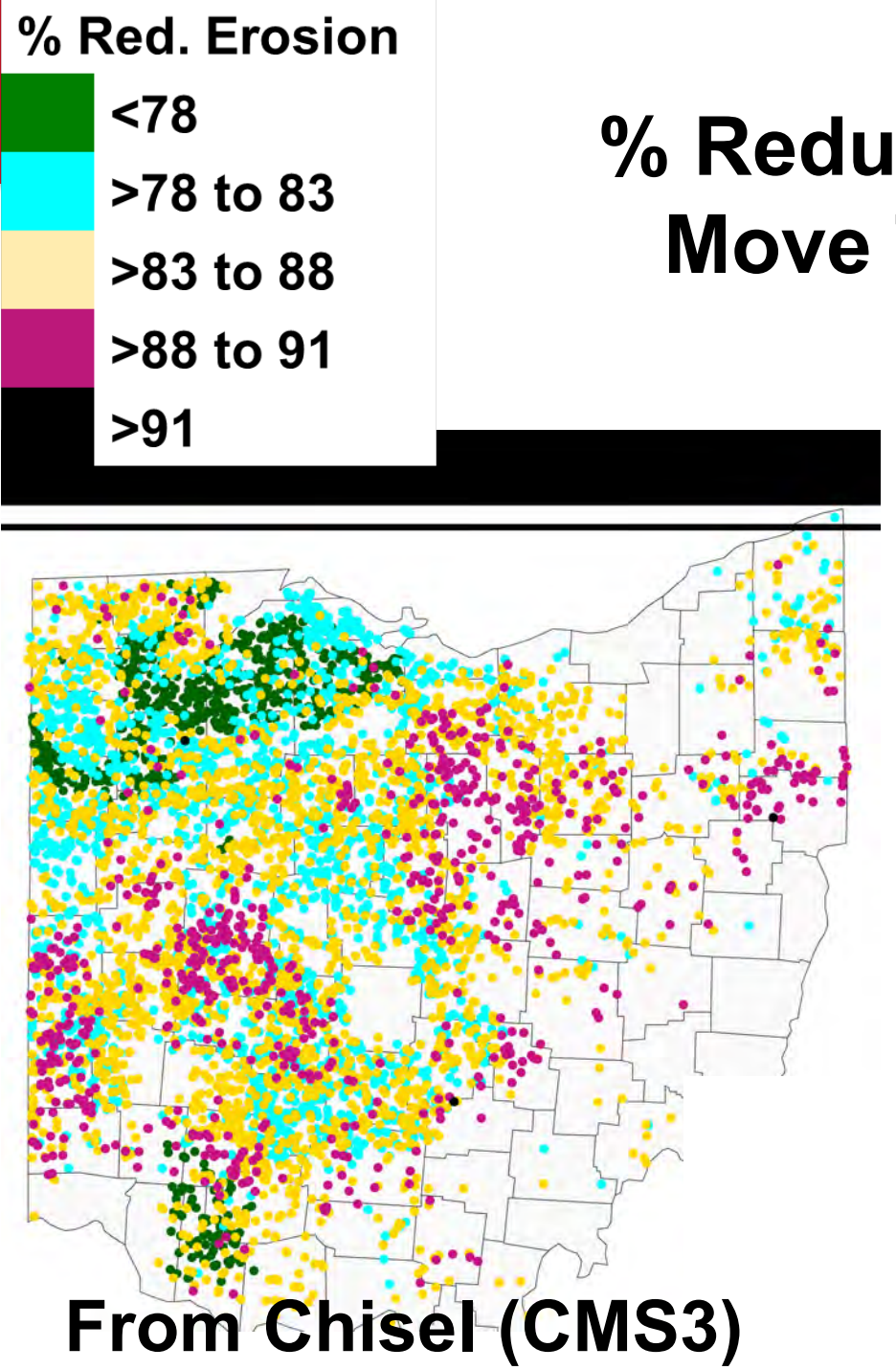

CMS1
CMS2
CMS3
CMS4
S + Tile Runoff
Total P
(RTP)
RTP lb/A
<0.93
>0.93-1.58
>1.58-2.84
>2.84-5.13
>5.13

# Is There Any Hope?

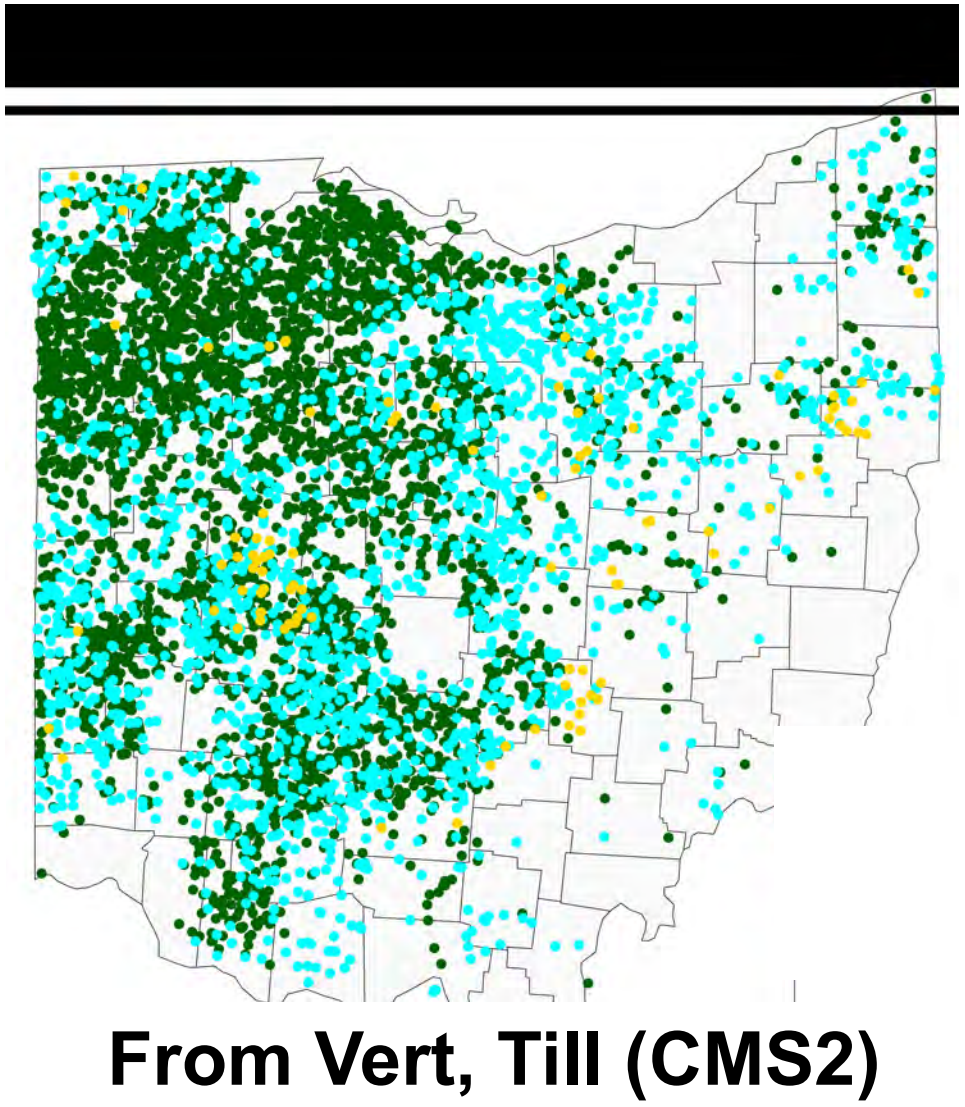

## Examples: What If?

**Ohio moved from Fall Chisel or Vertical Till To No-Till**

# % Reduction Erosion (t/a/y)
# Move To: No-Till (CMS1)

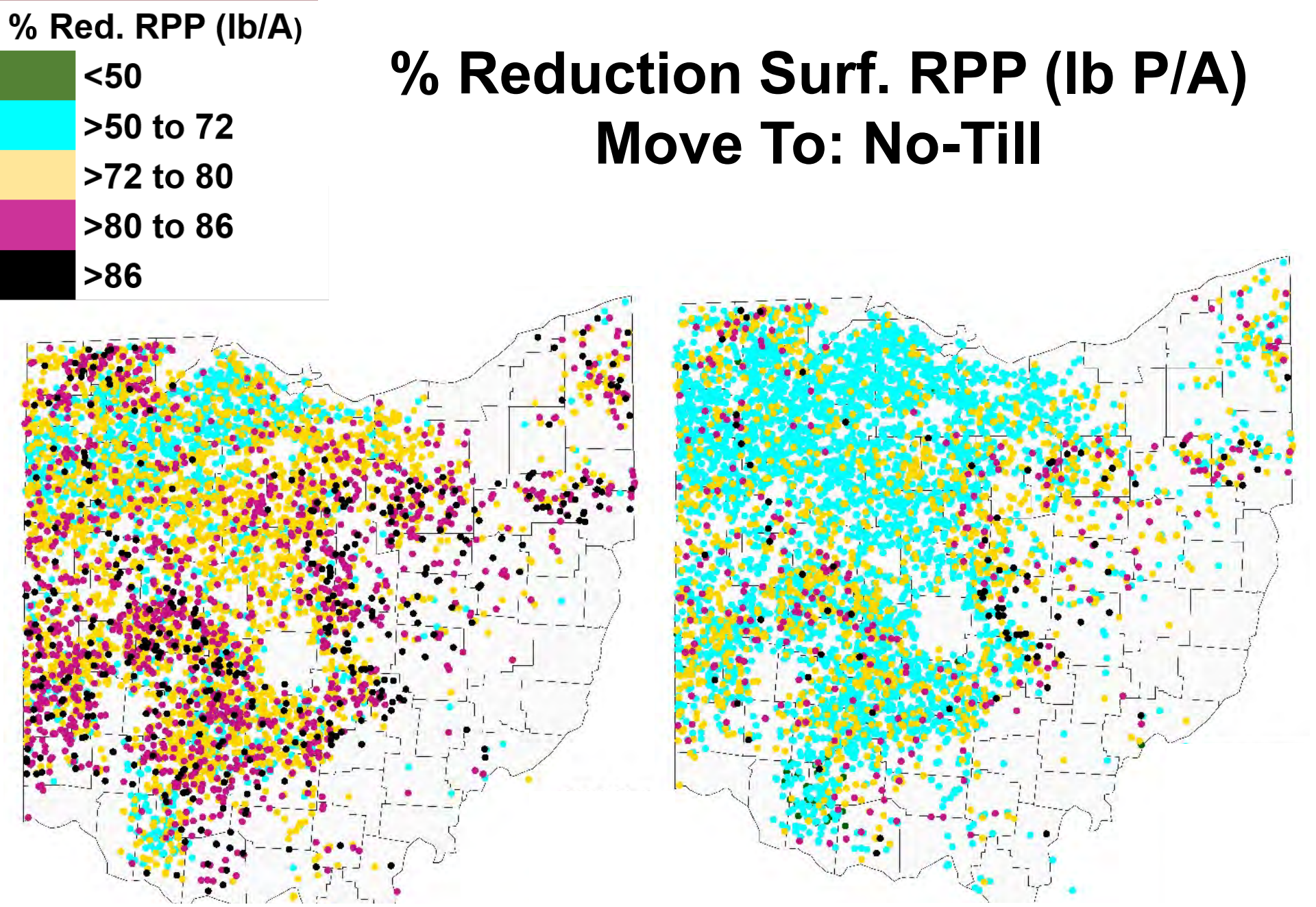



From Chisel (CMS3)



From Vert, Till (CMS2)

# % Reduction Surf. RPP (lb P/A)
# Move To: No-Till




From Chisel (CMS3)

From Vert. Till (CMS2)

% Red. S+T RTP (lb/A)

<5

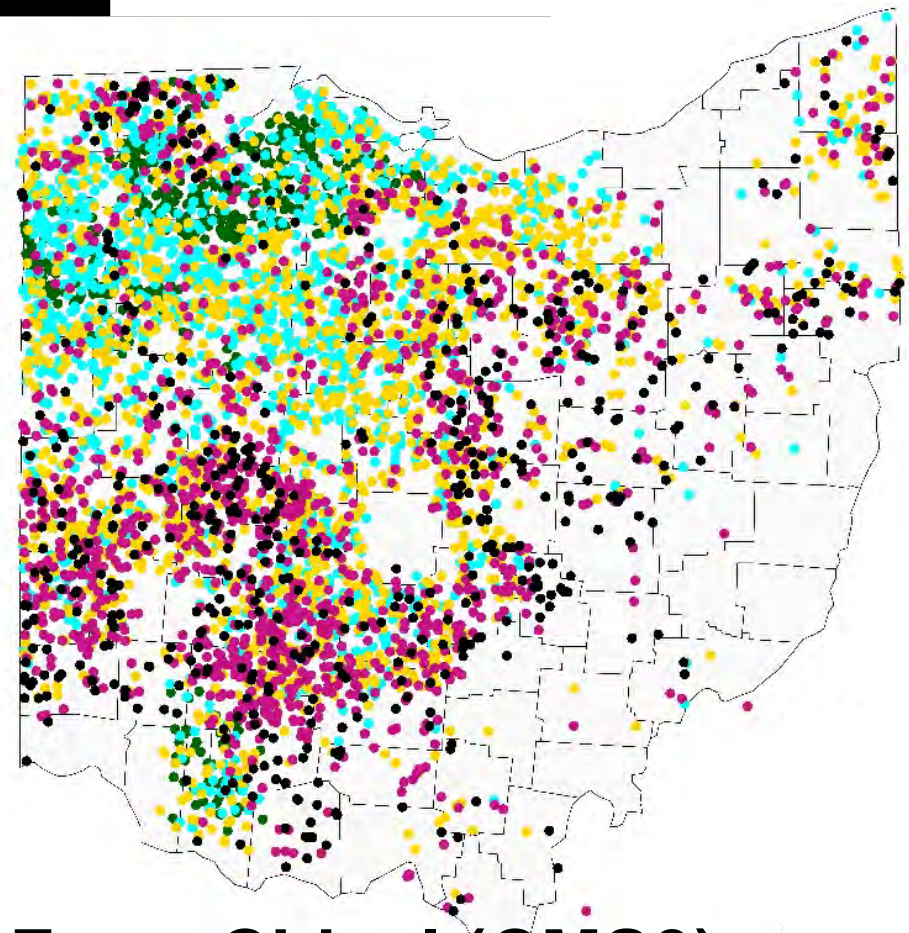
>5 to 45

>45 to 66

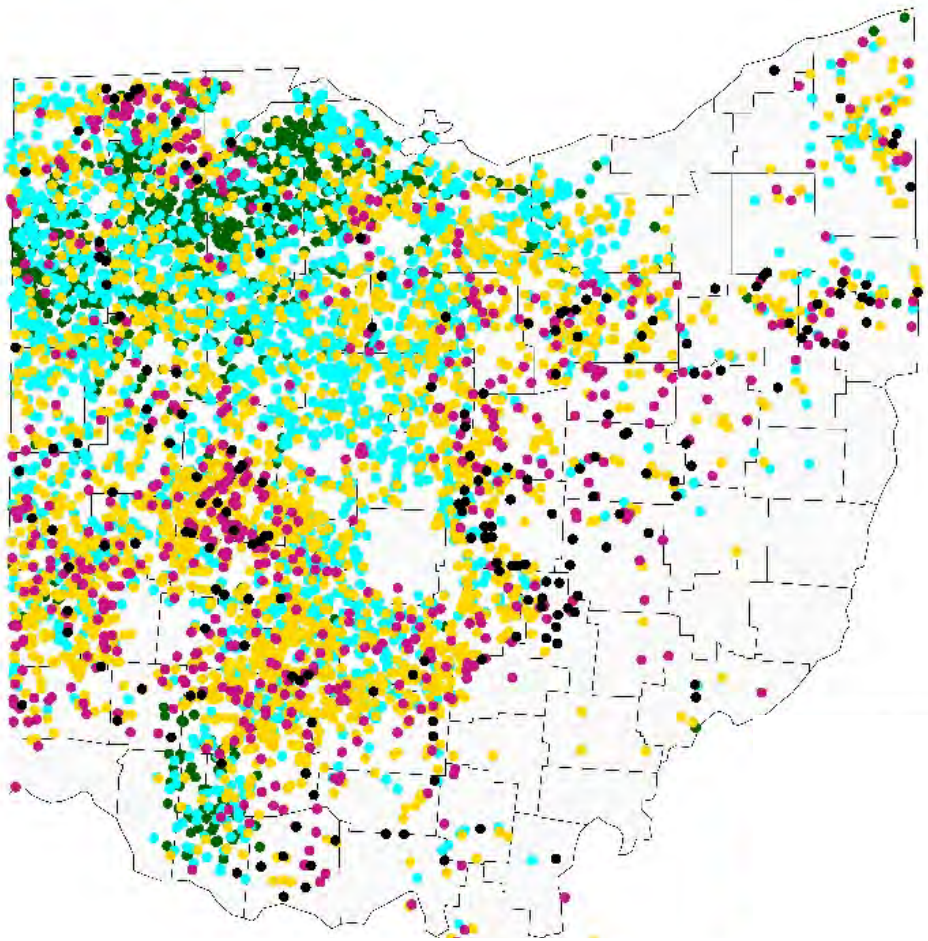
>66 to 78

>78

# % Reduction S + T RTP (lb P/A)
# Move to No-Till (CMS1)



From Chisel (CMS3)

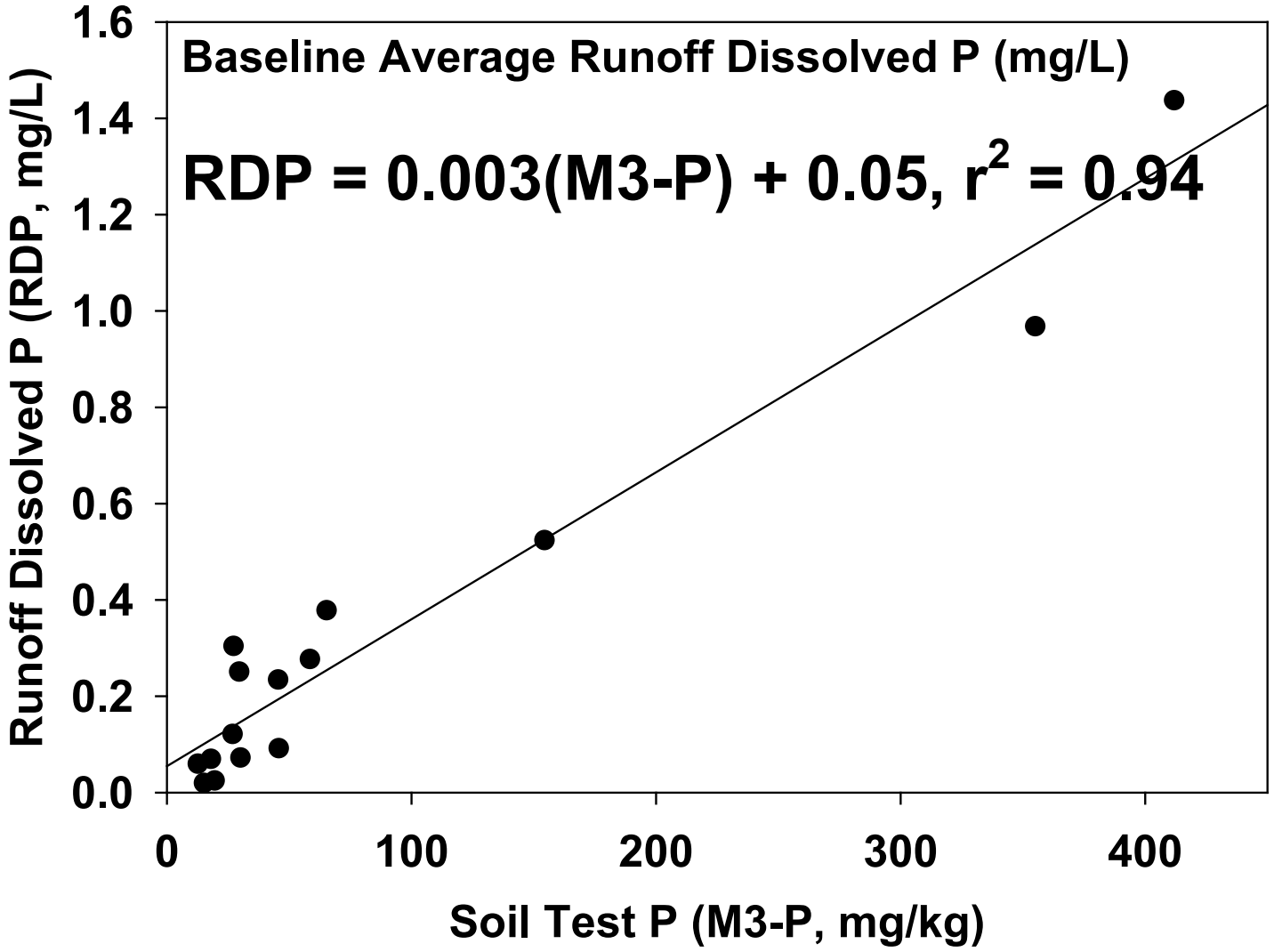


From Vert, Till (CMS2)

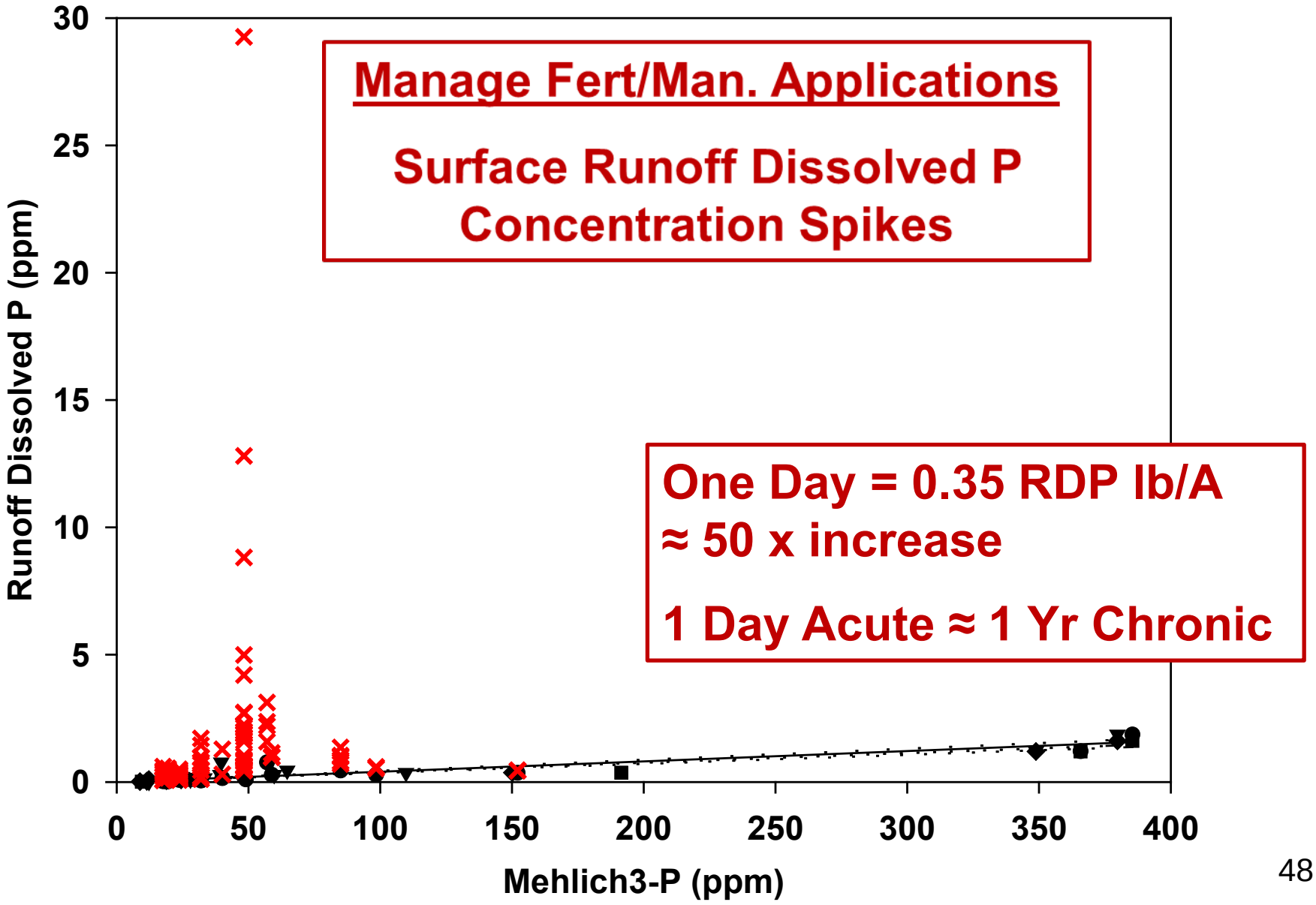
# On-Field Ohio

## A few words about 2 more Important Managements

# Manage Soil P Levels



# On-Field Ohio



# Point of Clarification

**All Farmers are not being asked for a 40% reduction**

**But Rather**

**Looking for a 40% reduction aggregated across all farms**

# Conclusions

**Ohio Agriculture is Being Targeted**

**Recent Push to Deem WLEB as "Distressed" Illustrates the Urgency to Act!**

- **On-Field Ohio shows Management Matters**
- **Allows farmers to prioritize time and resources to make effective MANAGEMENT decisions**
- **Quantifies how VOLUNTARY changes in MANAGEMENT can reduce Erosion and P Runoff**
- **Big opportunities for Erosion & Runoff Reductions**

# Thank You














# Questions?

Dayton.15@osu.edu

# Summary So Far

**Big Improvements due to:**
**Quantitative Approach, Calibration to Measured Data**
**Huge Ranges in:**
**Erosion, RDP, RPP, S+T RTP**
**Opportunities for Reductions?**

**Intermission ??**
**Discussion ??**

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# On-Field Ohio On-line Calculator

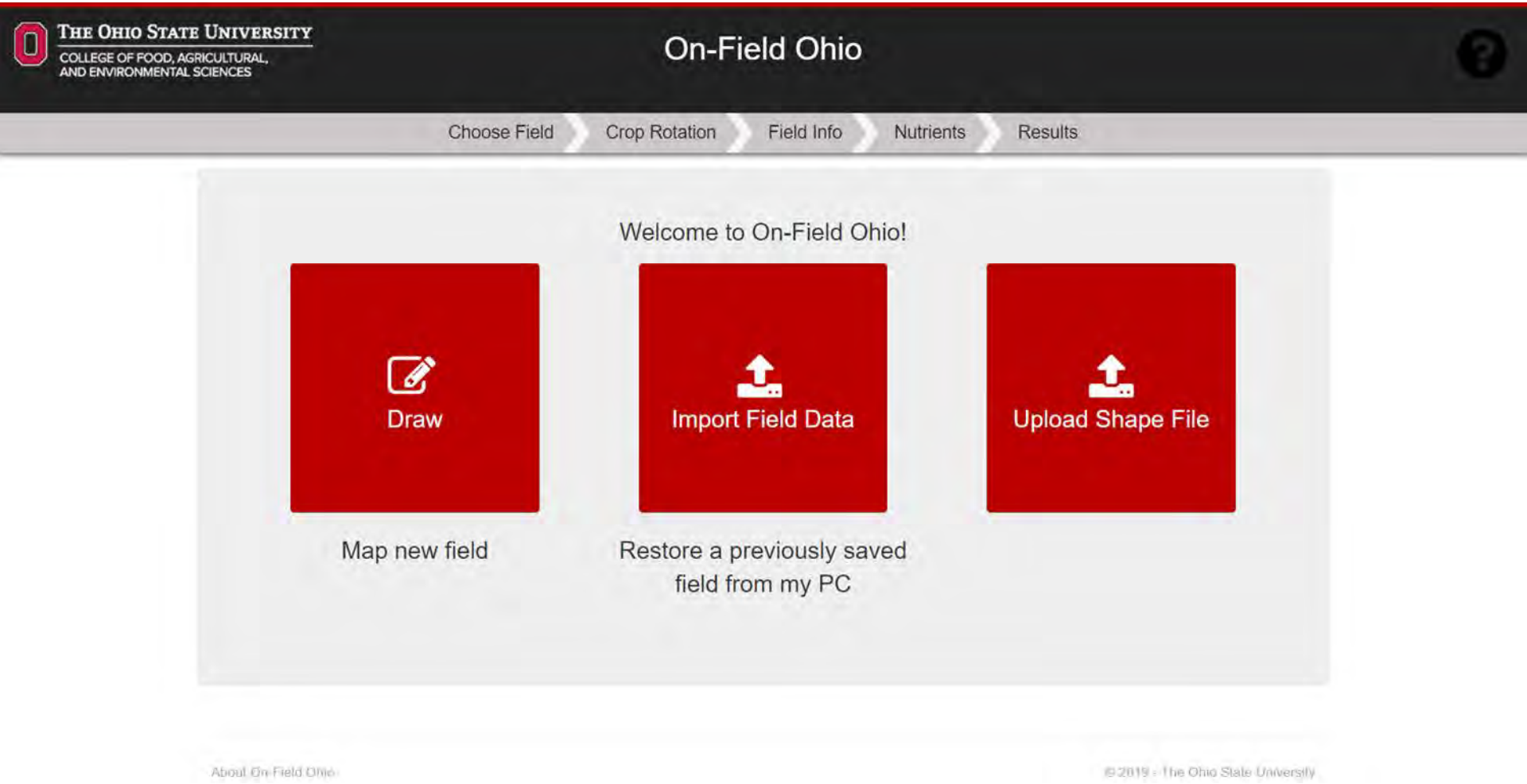
## Using: RUSLE2 plus Developed Equations

- Erosion (t/a/y)
- Surface & Tile (lb/A)
  DRP & RPP

Fertilizer/Manure
additional DRP (lb/A)

- Save, Print Report

# On-Line Tool Functions




**Find New Field, Import a Stored Session, or Upload Shape File**

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# On-Field Ohio

Choose Field | Crop Rotation | Field Info | Nutrients | Results

## Draw Your Field

Next ➔

Identify location and draw outline around field. Click "next" button and climate, soil survey and crop management zone information loads. Then click "next" button again to move to the next screen.

Search Map | Locate

Help me draw my field.

Clear

Field Name ex. My field


**Google Map Tool**
**Map or Satellite mode**


**Search by**
**GPS**
**City/Town**
**Address**
**Zip Code**
**Eyeball**

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# On-Field Ohio

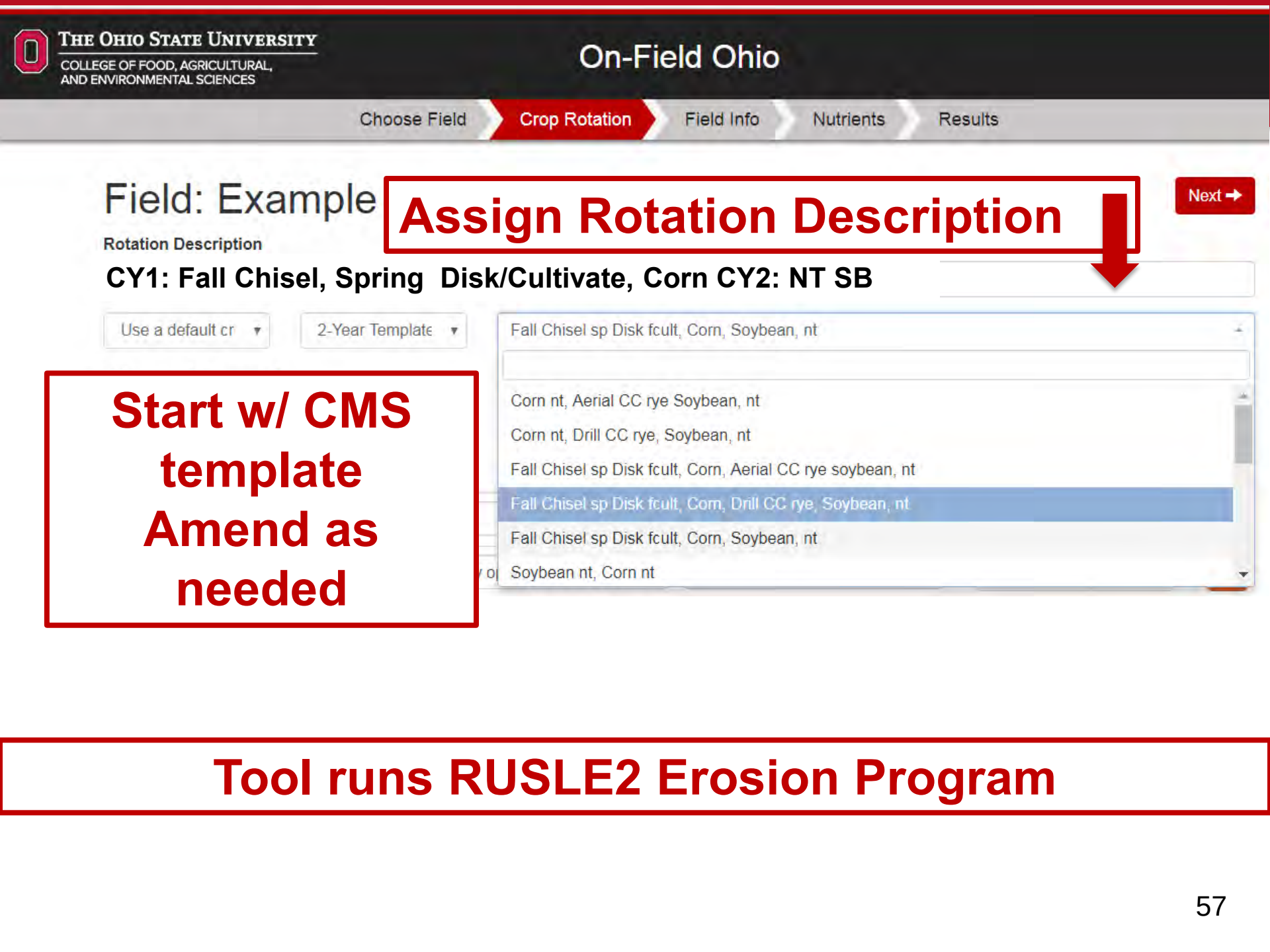
Choose Field | Crop Rotation | Field Info | Nutrients | Results


**Field Information Loads**

**Map Unit (Legend)**

**Soil Survey Data**

**Area / Climate / CMZ**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On-Field Ohio
Choose Field
Crop Rotation
Field Info
Nutrients
Results
Field: Example
Assign Rotation Description
Next
Rotation Description
CY1: Fall Chisel, Spring Disk/Cultivate, Corn CY2: NT SB
Use a default cr
2-Year Template
Fall Chisel sp Disk fcult, Corn, Soybean, nt
Corn nt, Aerial CC rye Soybean, nt
Corn nt, Drill CC rye, Soybean, nt
Fall Chisel sp Disk fcult, Corn, Aerial CC rye soybean, nt
Fall Chisel sp Disk fcult, Corn, Drill CC rye, Soybean, nt
Fall Chisel sp Disk fcult, Corn, Soybean, nt
Soybean nt, Corn nt
Start w/ CMS template Amend as needed
Tool runs RUSLE2 Erosion Program

# Crop Year Nov. 1 to Oct. 31

## Crop Year 1

11/01: Start of crop year 1

Remove Line

| Date (mm/dd) | Operation | Planned Crop | Yield Potential (Per Acre) | |
|---|---|---|---|---|
| 11/01 Edit | Chisel, st. pt. | Select a crop... | 0 | |
| 04/28 Edit | Disk, tandem secondary op. | Select a crop... | 0 | |
| 05/01 Edit | Cultivator, field 6-12 in sweeps | Select a crop... | 0 | |
| 05/01 Edit | Planter, double disk opnr | Corn, grain | 180 bushels | |
| 10/20 Edit | Harvest, killing crop 50pct standing stubble | Select a crop... | 0 | |
| 1 / 1 | Select an operation... | Select a crop... | 0 | |

10/31: End of crop year 1

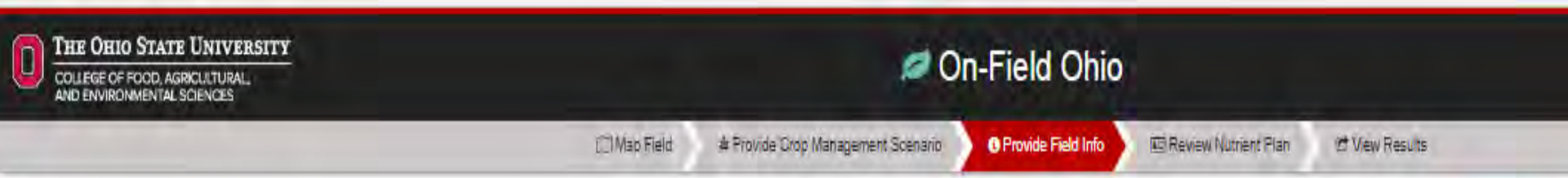
Add Line

## Crop Year 2

11/01: Start of crop year 2

| Date (mm/dd) | Operation | Planned Crop | Yield Potential (Per Acre) | |
|---|---|---|---|---|
| 05/10 Edit | Planter, double disk opnr | Soybean, mw 30 in rows | 60 bu | |
| 10/10 Edit | Harvest, killing crop 20pct standing stubble | Select a crop... | 0 | |
| 1 / 1 | Select an operation... | Select a crop... | 0 | |

10/31: End of crop year 2




**Field Drainage**

- **Yes/No**

**Soil Organic Matter**

- **Default/measured value**

**Soil Test P**

- **Mehlich3-P ppm**
  - **Tool can convert from Bray and other units**

**User Provides**
**Field Specific Information**

# Field: Example

**Assign Nutrient Description**

Nutrient Plan Description

CY1: Spring Manure 100 lbs P2O5, Surf

**Open a Line**

## Crop Year 1

### Solid Manure Applications

Add +

| Season | Manure % Solids | Manure $P_2O_5$ Applied | % WEP | % Incorporated | Incorporation Depth |
|---|---|---|---|---|---|
| SPRING | 60 % | 100 lb/A | Dairy and beef<br>50 % | None/Surf | 0 inches |

### Liquid Manure Applications

Add +

| Season | Manure Applied | Manure % Solids | Manure $P_2O_5$ Applied | Injection without Tillage? | % WEP | % Incorporated | Incorporation Depth |
|---|---|---|---|---|---|---|---|

### Fertilizer Applications

Add +

| Season | Fertilizer $P_2O_5$ Applied | % Incorporated | Incorporation Depth |
|---|---|---|---|

# 4Rs

**Planned: Solid/Liquid Manure, Fertilizer**

**When? Amount $P_2O_5$? Placement Method?**

Start a New Field

# Field: Example

**Stores entire session to user's computer** →

Save Field Info

**Nutrient description:** CY1: Spring manure 100 lb P2O5

**Total acres:** 73.42

**Average slope:** 1.03%

| Map Unit | Location | Dominant Soil Type |
|---|---|---|
| 1 | Putnam County (29.02 A, 0.5% slope) | Toledo silty clay loam |
| 2 | Putnam County (25.02 A, 1% slope) | Fulton silty clay loam, 0 to 2 percent slopes |
| 3 | Putnam County (9.52 A, 1% slope) | Del Rey silt loam, 0 to 2 percent slopes |
| 4 | Putnam County (3.31 A, 4% slope) | Lucas silty clay loam, 2 to 6 percent slopes |
| 5 | Putnam County (3.04 A, 1% slope) | Digby loam, 0 to 2 percent slopes |
| 6 | Putnam County (1.41 A, 1% slope) | Haskins loam, 0 to 2 percent slopes |
| 7 | Putnam County (0.85 A, 9% slope) | Lucas silty clay loam, 6 to 12 percent slopes, moderately eroded |
| 8 | Putnam County (0.78 A, 1% slope) | Kibbie silt loam, 0 to 2 percent slopes |

## Results Shows

- Field Name and Rotation & Nutrient Description
- Acreage and Weighted Avg. % Slope Steepness
- Map Units with % Acreage

| Parameter | Results for Each Crop Year (CY) and Average for Rotation | | |
|---|---|---|---|
| | CY 1 | CY 2 | Rotation Average |
| Erosion (t/a/yr) | 2.226 | 0.703 | 1.465 |
| Soil Tillage Intensity Rating (STIR) | 107.0 | 3.0 | 55.0 |
| Mehlich 3 P (ppm) | 15.0 | 15.0 | 15.0 |
| Runoff P (lb/A) | | | |
| Surface Particulate P | 2.389 | 1.006 | 1.698 |
| Tile Particulate P | 0.178 | 0.178 | 0.178 |
| Surface Dissolved P | 0.052 | 0.060 | 0.056 |
| Tile Dissolved P | 0.046 | 0.046 | 0.046 |
| Surface Dissolved P due to Fert. App. | 0.000 | 0.000 | 0.000 |
| Surface Dissolved P due to Man. App. | 2.339 | 0.000 | 1.169 |
| Total P Loss | 5.003 | 1.290 | 3.147 |

Download CSV Report

Download PDF Report

**Results**

- Each Parameter
- Each CY & Rotation Avg.,
- Download Report in pdf or CSV

# Export Options

## PDF

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### On-Field Ohio Results

Test field (7/14/2019)

Rotation: Spring Vert Till, Corn, Bean NT

Nutrients: No fert

County: Delaware

Total Acres: 46.28

Map unit 1 (28.6 A, 62%): Pewamo silty clay loam, 0 to 1 % slope

Map unit 2 (10.4 A, 22%): Blount silt loam, ground moraine, 2 to 4 % slope

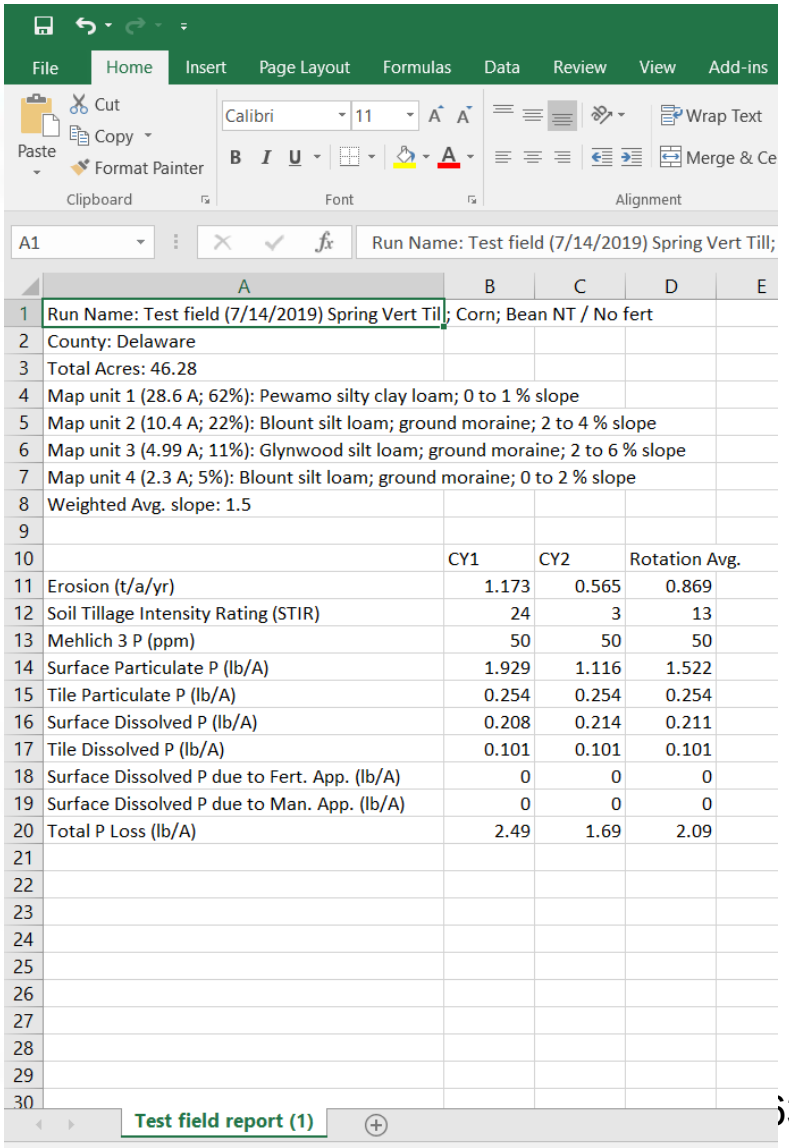
Map unit 3 (4.99 A, 11%): Glynwood silt loam, ground moraine, 2 to 6 % slope

Map unit 4 (2.3 A, 5%): Blount silt loam, ground moraine, 0 to 2 % slope

Weighted Avg. slope: 1.5

| | CY1 | CY2 | Rotation Avg. |
|---|---|---|---|
| Erosion (t/a/yr) | 1.173 | 0.565 | 0.869 |
| Soil Tillage Intensity Rating (STIR) | 24 | 3 | 13 |
| Mehlich 3 P (ppm) | 50 | 50 | 50 |
| Surface Particulate P (lb/A) | 1.929 | 1.116 | 1.522 |
| Tile Particulate P (lb/A) | 0.254 | 0.254 | 0.254 |
| Surface Dissolved P (lb/A) | 0.208 | 0.214 | 0.211 |
| Tile Dissolved P (lb/A) | 0.101 | 0.101 | 0.101 |
| Surface Dissolved P due to Fert. App. (lb/A) | 0 | 0 | 0 |
| Surface Dissolved P due to Man. App. (lb/A) | 0 | 0 | 0 |
| Total P Loss (lb/A) | 2.49 | 1.69 | 2.09 |

## CSV




| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Run Name: Test field (7/14/2019) Spring Vert Til | ; Corn; Bean NT / No fert | | | |
| 2 | County: Delaware | | | | |
| 3 | Total Acres: 46.28 | | | | |
| 4 | Map unit 1 (28.6 A; 62%): Pewamo silty clay loam; 0 to 1 % slope | | | | |
| 5 | Map unit 2 (10.4 A; 22%): Blount silt loam; ground moraine; 2 to 4 % slope | | | | |
| 6 | Map unit 3 (4.99 A; 11%): Glynwood silt loam; ground moraine; 2 to 6 % slope | | | | |
| 7 | Map unit 4 (2.3 A; 5%): Blount silt loam; ground moraine; 0 to 2 % slope | | | | |
| 8 | Weighted Avg. slope: 1.5 | | | | |
| 9 | | | | | |
| 10 | | CY1 | CY2 | Rotation Avg. | |
| 11 | Erosion (t/a/yr) | 1.173 | 0.565 | 0.869 | |
| 12 | Soil Tillage Intensity Rating (STIR) | 24 | 3 | 13 | |
| 13 | Mehlich 3 P (ppm) | 50 | 50 | 50 | |
| 14 | Surface Particulate P (lb/A) | 1.929 | 1.116 | 1.522 | |
| 15 | Tile Particulate P (lb/A) | 0.254 | 0.254 | 0.254 | |
| 16 | Surface Dissolved P (lb/A) | 0.208 | 0.214 | 0.211 | |
| 17 | Tile Dissolved P (lb/A) | 0.101 | 0.101 | 0.101 | |
| 18 | Surface Dissolved P due to Fert. App. (lb/A) | 0 | 0 | 0 | |
| 19 | Surface Dissolved P due to Man. App. (lb/A) | 0 | 0 | 0 | |
| 20 | Total P Loss (lb/A) | 2.49 | 1.69 | 2.09 | |
| 21 | | | | | |
| 22 | | | | | |
| 23 | | | | | |
| 24 | | | | | |
| 25 | | | | | |
| 26 | | | | | |
| 27 | | | | | |
| 28 | | | | | |
| 29 | | | | | |
| 30 | | | | | |

# Thank You














# Questions?

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