# Nutrient Application Planning for Pastures with SnapPlus

*and*

# The Wisconsin P Index

Laura Ward Good, UW-Madison Soil Science Department 2012

# What's ahead:

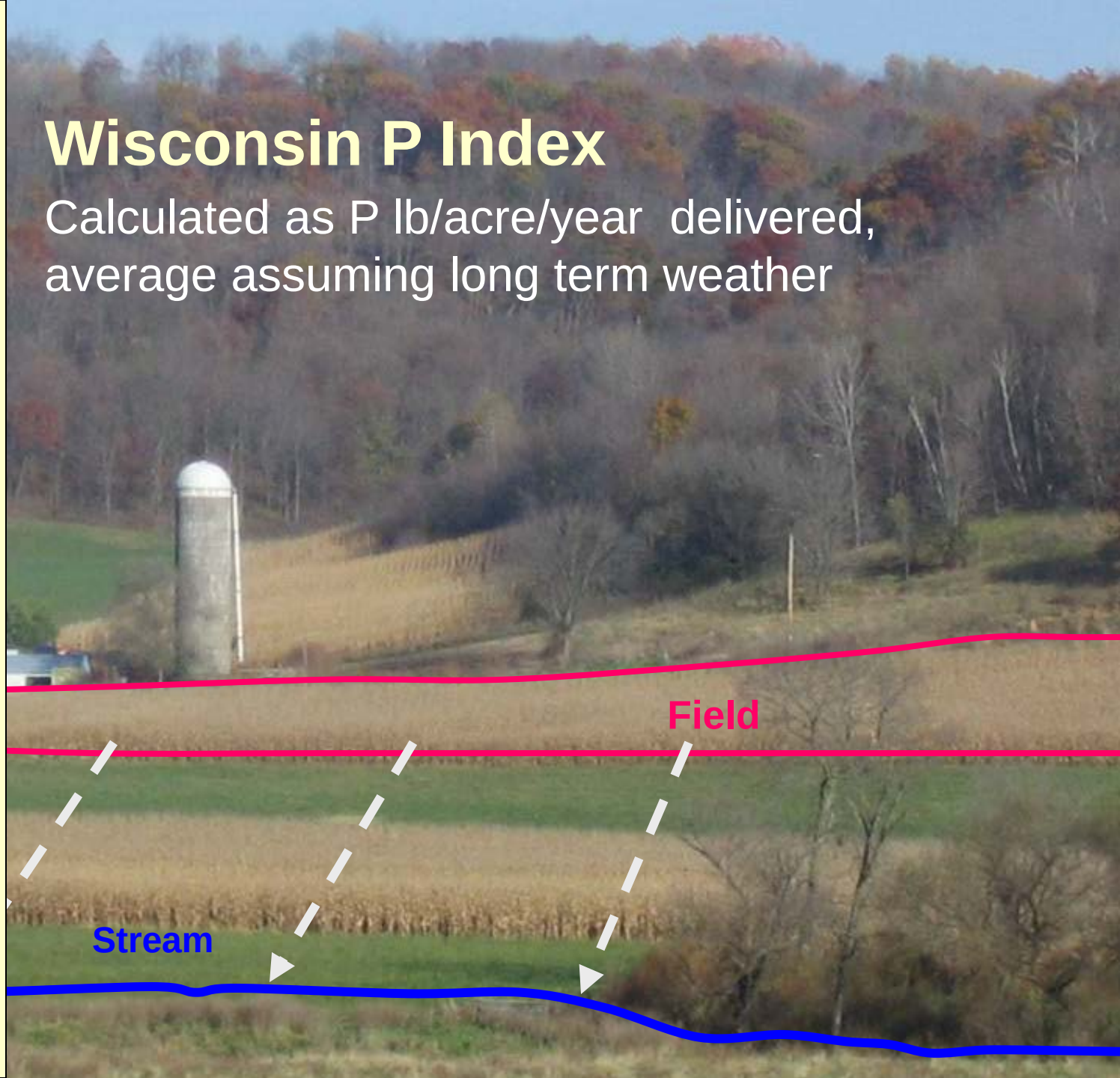
- Wisconsin P Index
- P Index for pastures
- UW-Extension pasture recommendations
- Pasture nutrients in SnapPlus
- Examples and questions

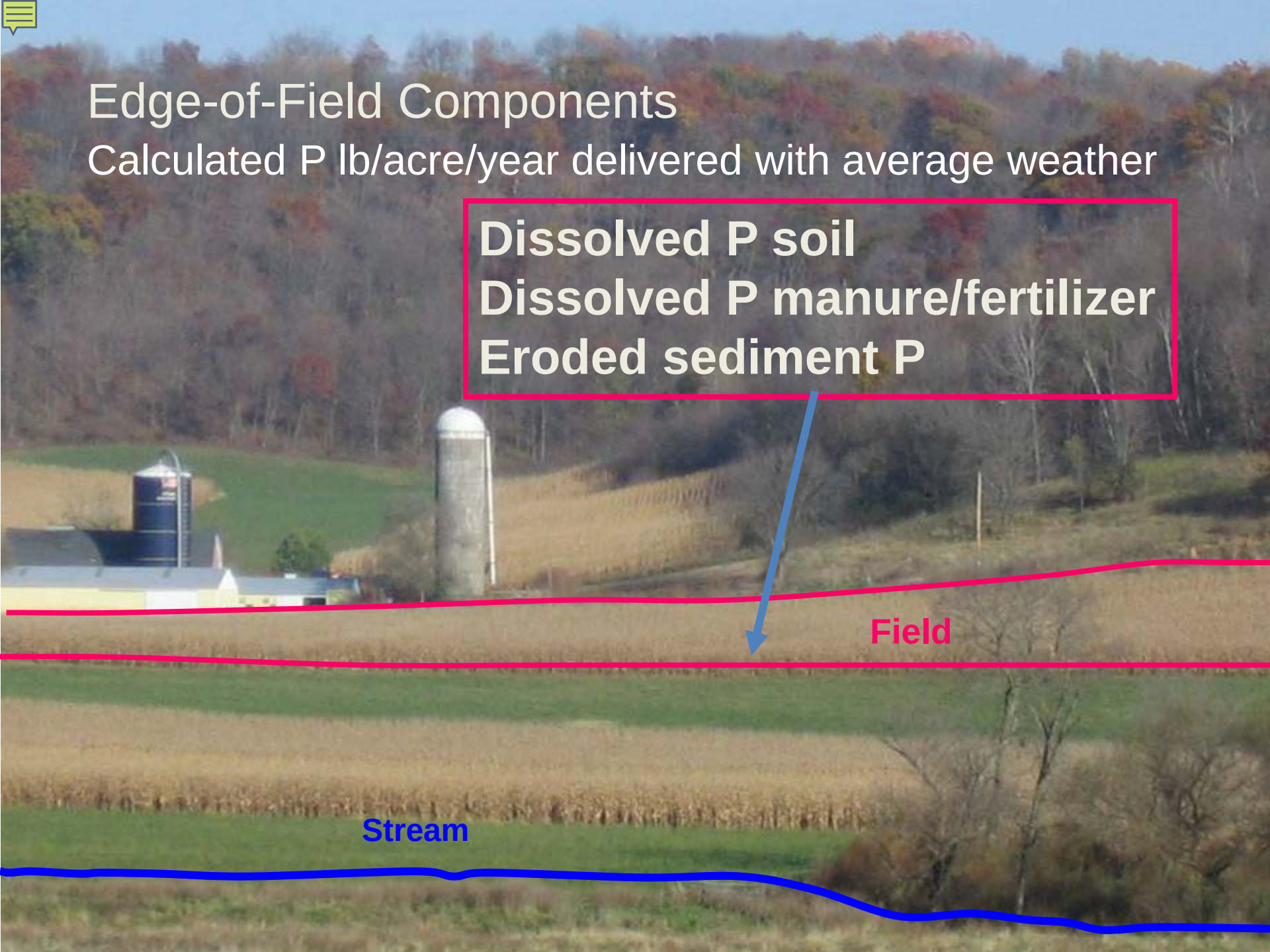
## Data Inputs

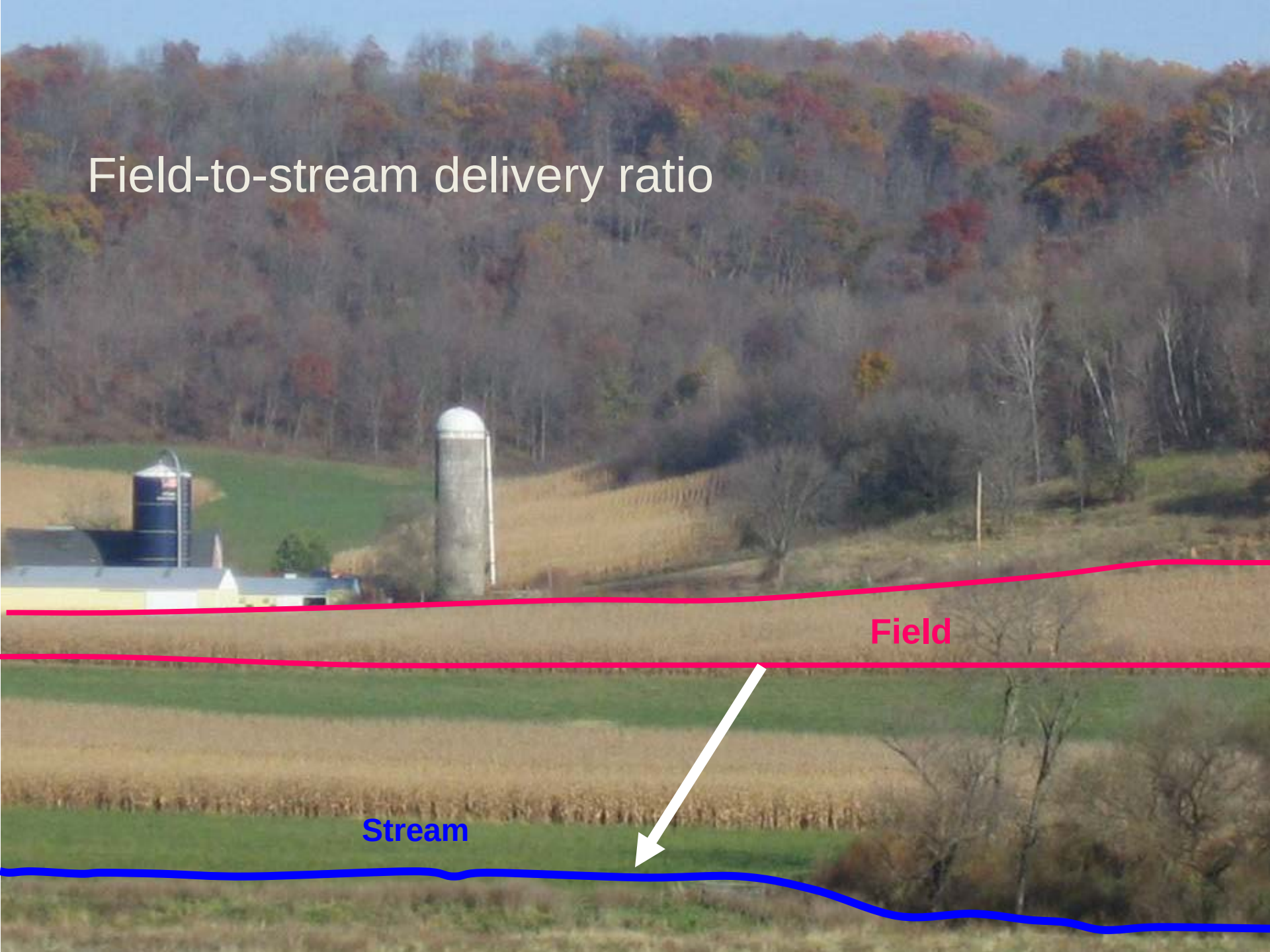
- County
- Soil Type
- Soil Test P and Organic Matter
- Field Slope
- Field Slope Length
- Tillage
- Rotation crops and yields
- Manure Applications
- P Fertilizer Applications
- Downfield Slope to Surface Water
- Distance to Surface Water

# Wisconsin P Index

Calculated as P lb/acre/year delivered, average assuming long term weather

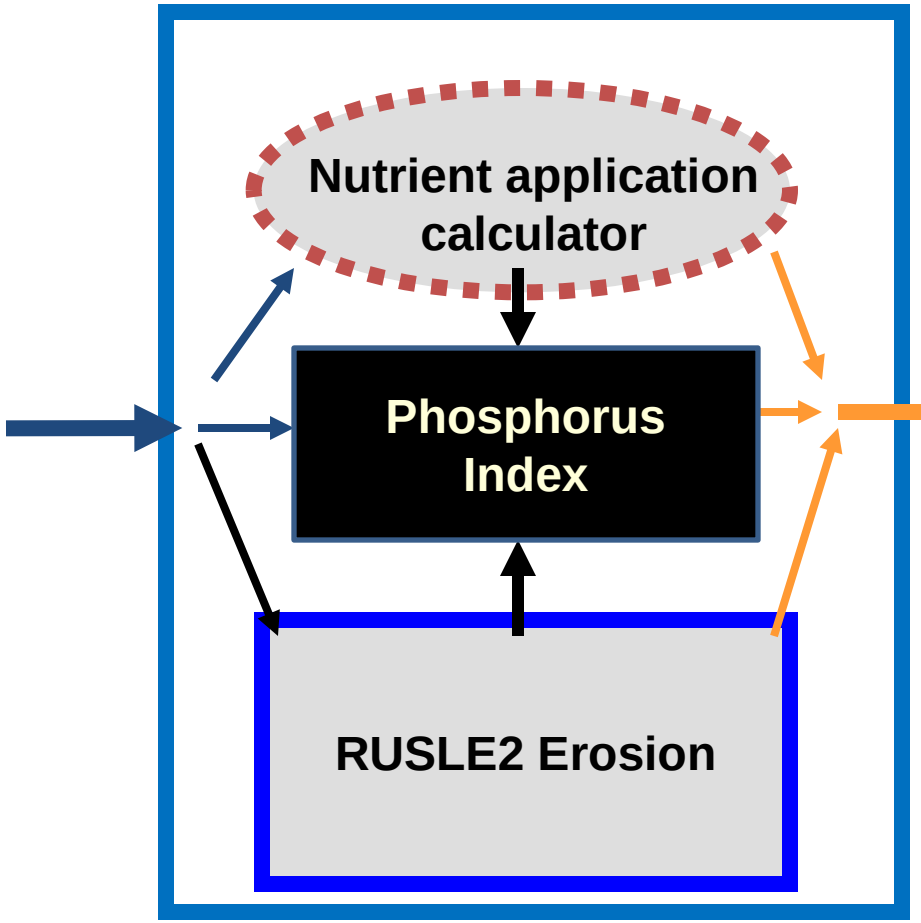



Edge-of-Field Components
Calculated P lb/acre/year delivered with average weather
Dissolved P soil
Dissolved P manure/fertilizer
Eroded sediment P
Field
Stream


Field-to-stream delivery ratio
Field
Stream

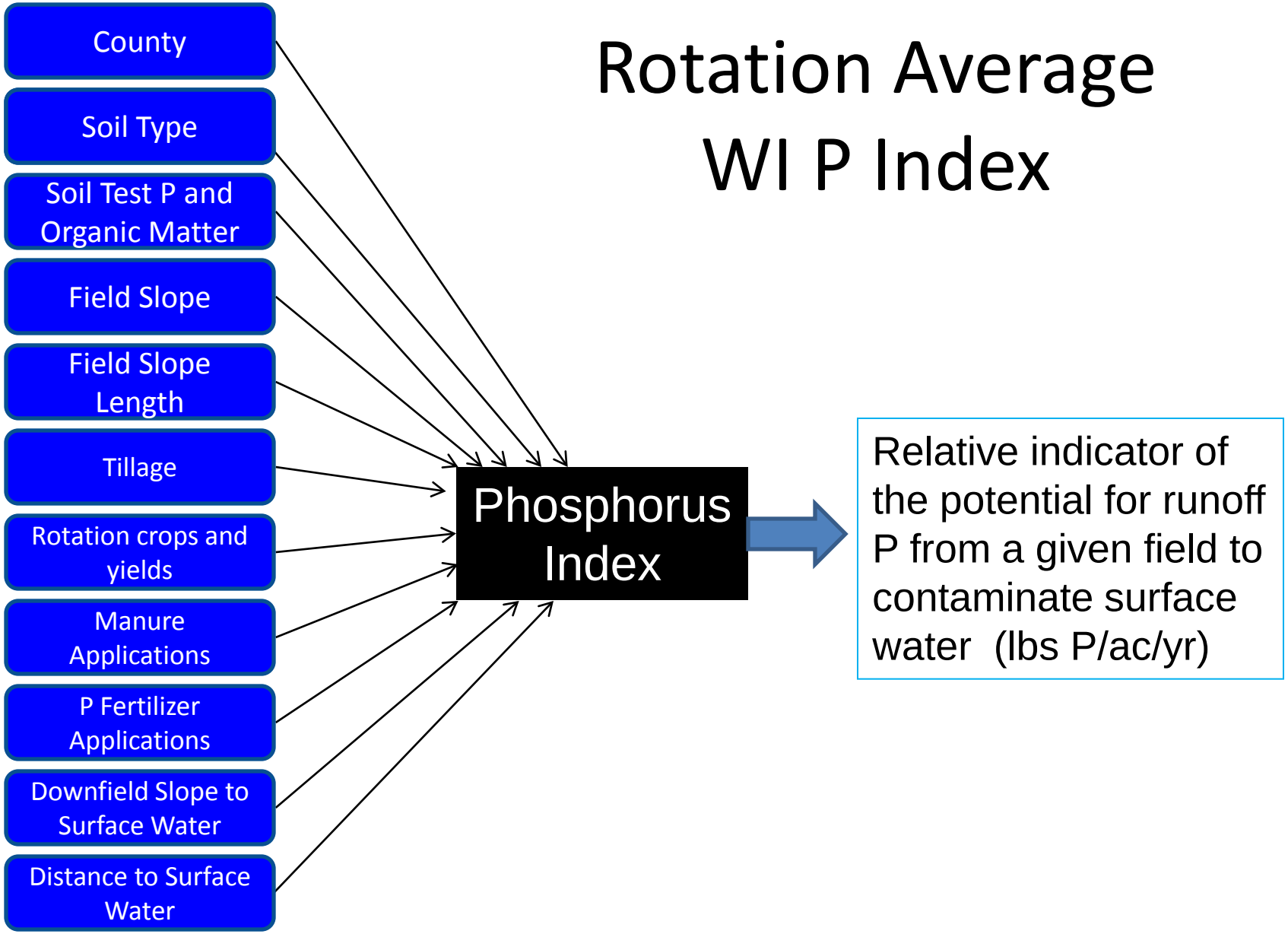
# WI P Index in NM Planning Software

- County
- Soil Type
- Soil Test P and Organic Matter
- Field Slope
- Field Slope Length
- Tillage
- Rotation crops and yields
- Manure Applications
- P Fertilizer Applications
- Downfield Slope to Surface Water
- Distance to Surface Water




Output by field:
Fertilizer and manure application plan,
Rotation soil loss assessment,
**Rotation and Annual P Index,**
**Soluble P Index**
**Particulate P Index,**
Rotation P and K balance

# Rotation Average WI P Index



# Phosphorus Index Equations

**Dissolved P from soil**
**Dissolved P from manure and fertilizer**
**Eroded sediment P**

**[P] x Transport = P delivered**

# Available P on Field Surface

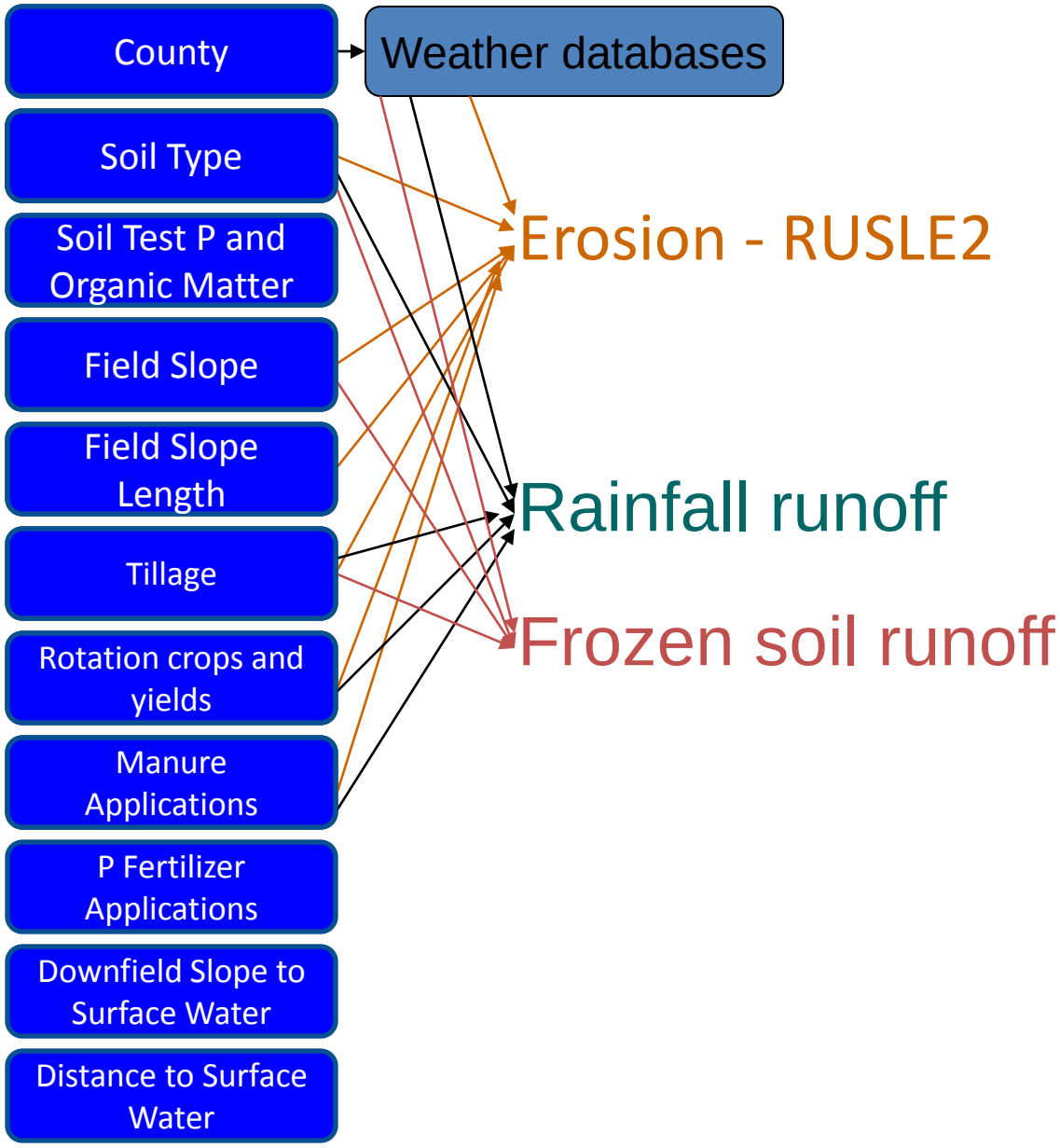
- County
- Soil Type
- Soil Test P and Organic Matter
- Field Slope
- Field Slope Length
- Tillage
- Rotation crops and yields
- Manure Applications
- P Fertilizer Applications
- Downfield Slope to Surface Water
- Distance to Surface Water

Soil total P

Soil soluble P

Manure & fertilizer soluble P

# Field Transport Potential




# What to Remember?

P Index ↑

Soil P ↑

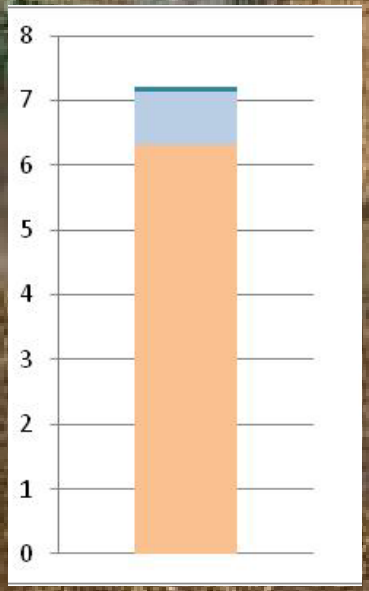
Manure on surface ↑

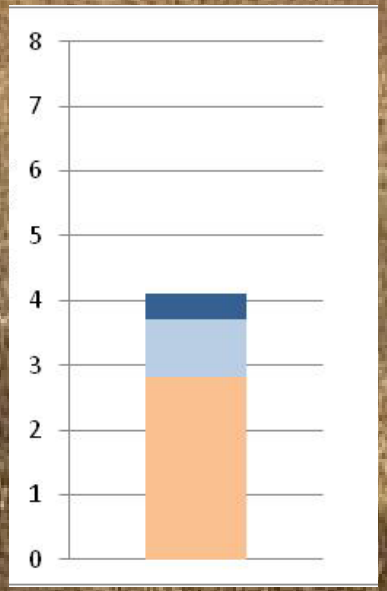
Runoff ↑

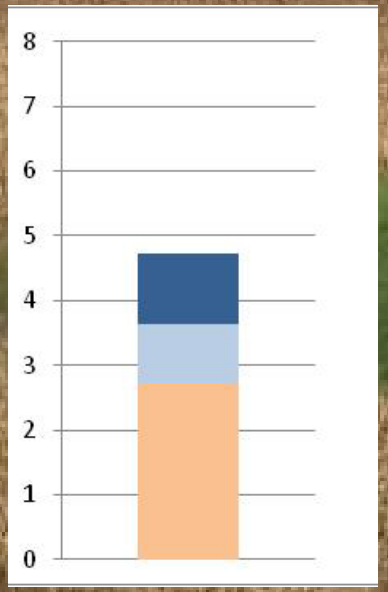
Erosion ↑

# P Index Varies with Management: Driftless Area Example


Cs-Cs-Cs-As-A-A
Soil test P = 70 ppm



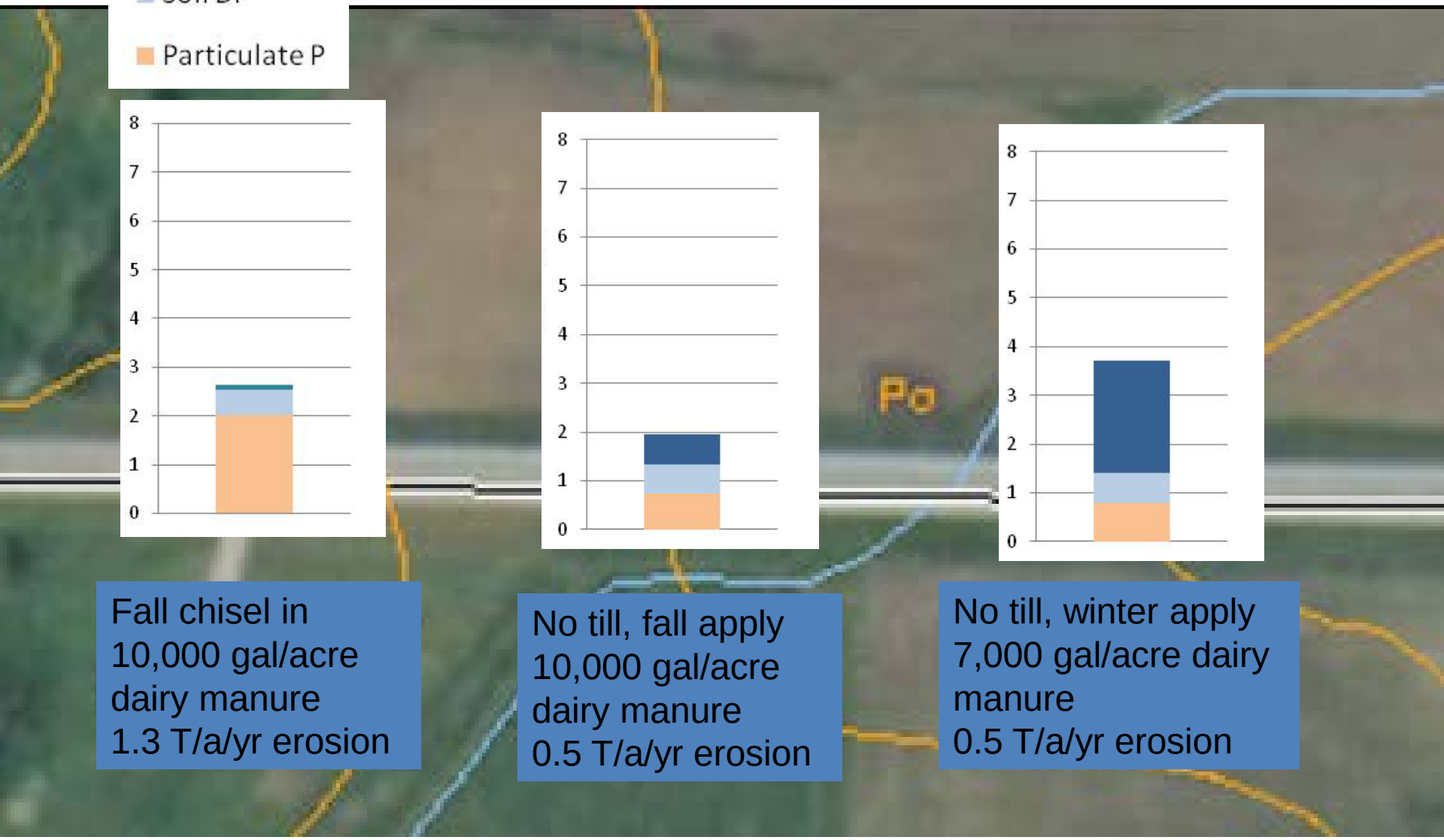

Fall chisel in
10,000 gal/acre
dairy manure
5 T/a/yr erosion

No till, fall apply
10,000 gal/acre
dairy manure
2 T/a/yr erosion

No till, winter apply
7,000 gal/acre dairy
manure
2 T/a/yr erosion

# P Index Varies with Management: Eastern Wisconsin Example

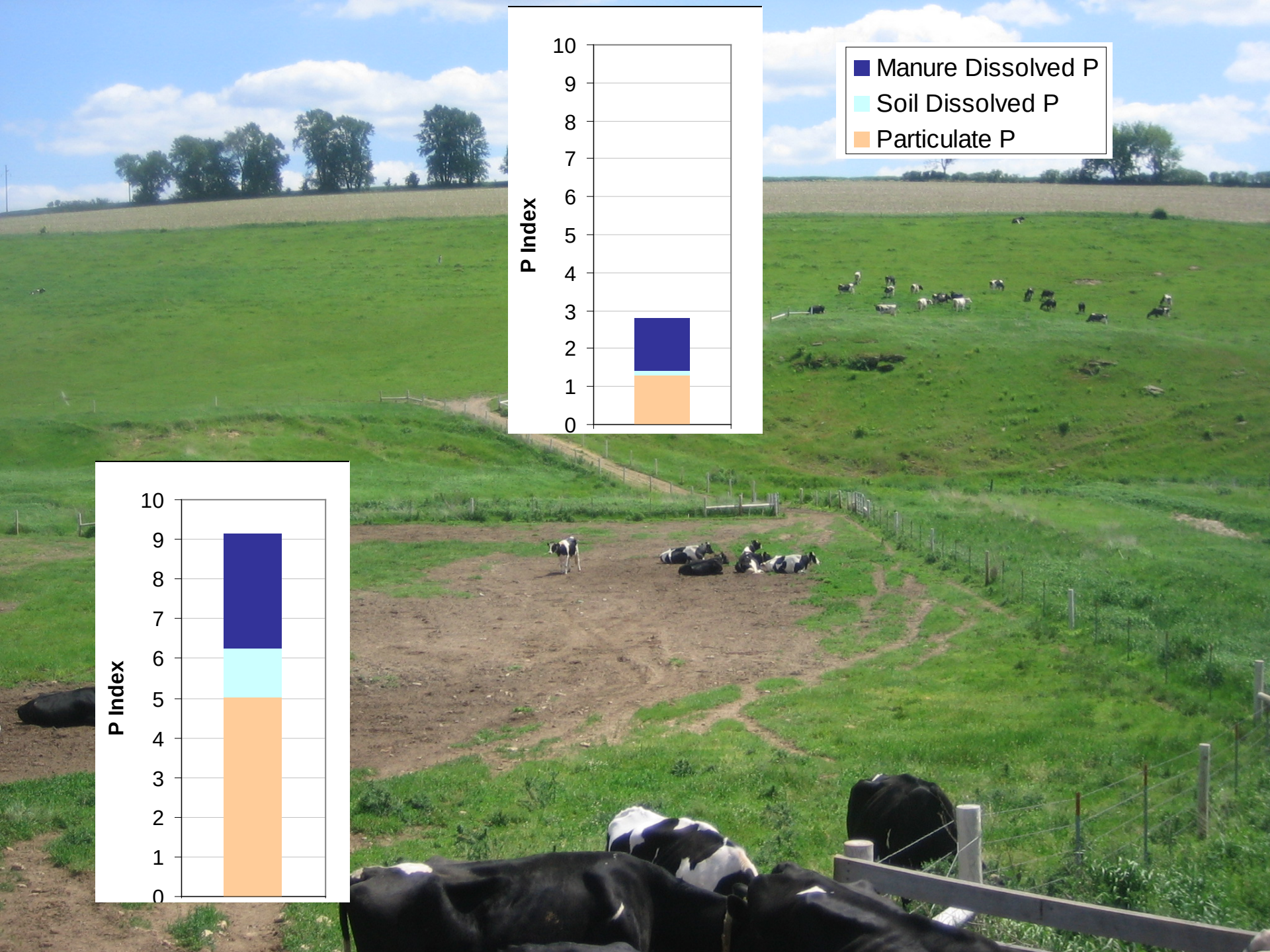
Cs-Cs-Cs-As-A-A,
Soil test P = 70 ppm



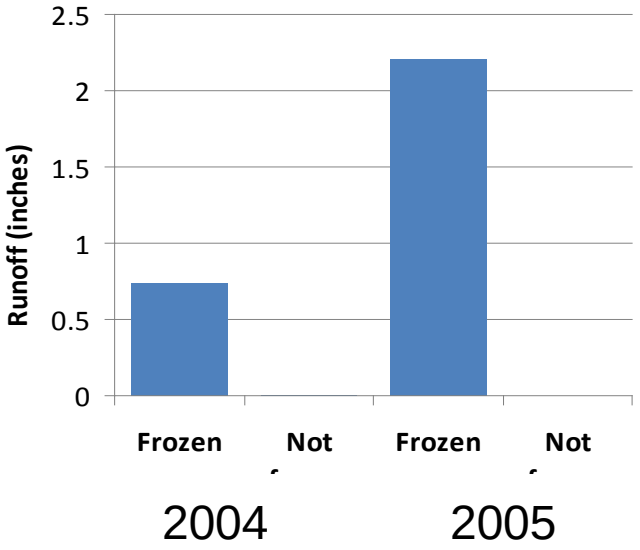

Fall chisel in 10,000 gal/acre dairy manure
1.3 T/a/yr erosion

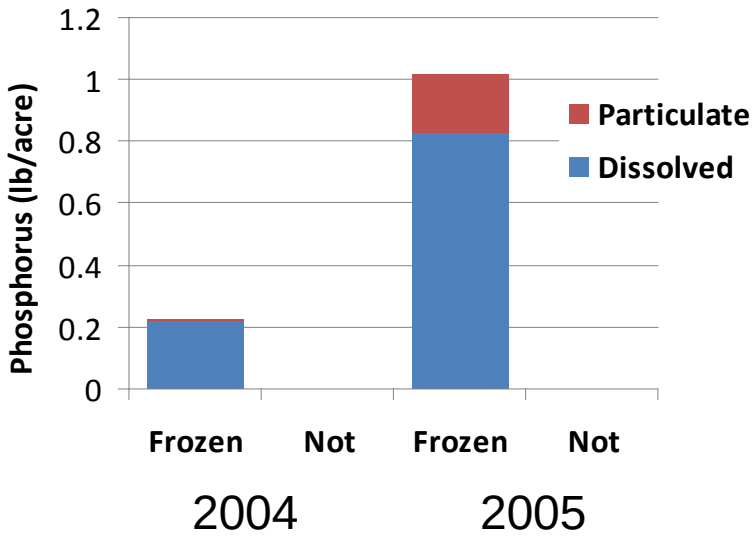
No till, fall apply 10,000 gal/acre dairy manure
0.5 T/a/yr erosion

No till, winter apply 7,000 gal/acre dairy manure
0.5 T/a/yr erosion


Manure Dissolved P
Soil Dissolved P
Particulate P
P Index
10
9
8
7
6
5
4
3
2
1
0
P Index
10
9
8
7
6
5
4
3
2
1
0

# Runoff Monitoring on Pasture at Pioneer Farm, Platteville




Majority of runoff P losses from pastures are dissolved P in snowmelt, rain on frozen soil

# UW Extension Pasture Nutrient Recommendations

- Includes ALL nutrients recommended for yield of grass or grass + legumes
- Does not assume any nutrient return from urine or feces, so have to calculate return.

# Pasture Fertility Recommendations

Soil test P is Optimum:18 ppm, Soil test K is Optimum: 110 ppm

Sandy, Silt, or Clay Loam Soil with > 2% OM, 2-3 ton removal per year

| Seeding | N seeding | N estblshd | $P_2O_5$ | $K_2O$ |
|---|---|---|---|---|
| | lb/acre | | | |
| Grass | 130 | 130 | 40 | 70 |
| Legumes < 30% | 20 | 0 | 35 | 130 |
| Legumes > 30% | 10 | 0 | 35 | 150 |
| Unimproved | -- | 100 | 40 | 140 |

# Pasture Manure Nutrients

Total N-$P_2O_5$-$K_2O$ based on as-excreted "book values"

Total modified by percent available to account for losses, uneven distribution, variation from book values to get Plant Available N- N-$P_2O_5$-$K_2O$ in lb/ton excreted

# Application rates based on estimated amount excreted for time in field

- Dairy lactating 1200 lb cow per acre for 180 days = 11 T/a = (33-50-77)

- Beef 1000 lb cow – 1 per acre for 180 days = 6 T/a = (24-40-54)

11 T/acre dairy (33-50-77)
6 T/a beef = (24-40-54)

| Seeding | N seeding | N estblshd | $P_2O_5$ | $K_2O$ |
|---|---|---|---|---|
| | lb/acre | | | |
| Grass | 130 | 130 | 40 | 70 |
| Legumes < 30% | 20 | 0 | 35 | 65 |
| Legumes > 30% | 10 | 0 | 35 | 75 |
| Unimproved | -- | 100 | 40 | 45 |

Routine soil test program will ensure adequate P and K

# SnapPlus NM Planning Software

- County
- Soil Type
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- Field Slope
- Field Slope Length
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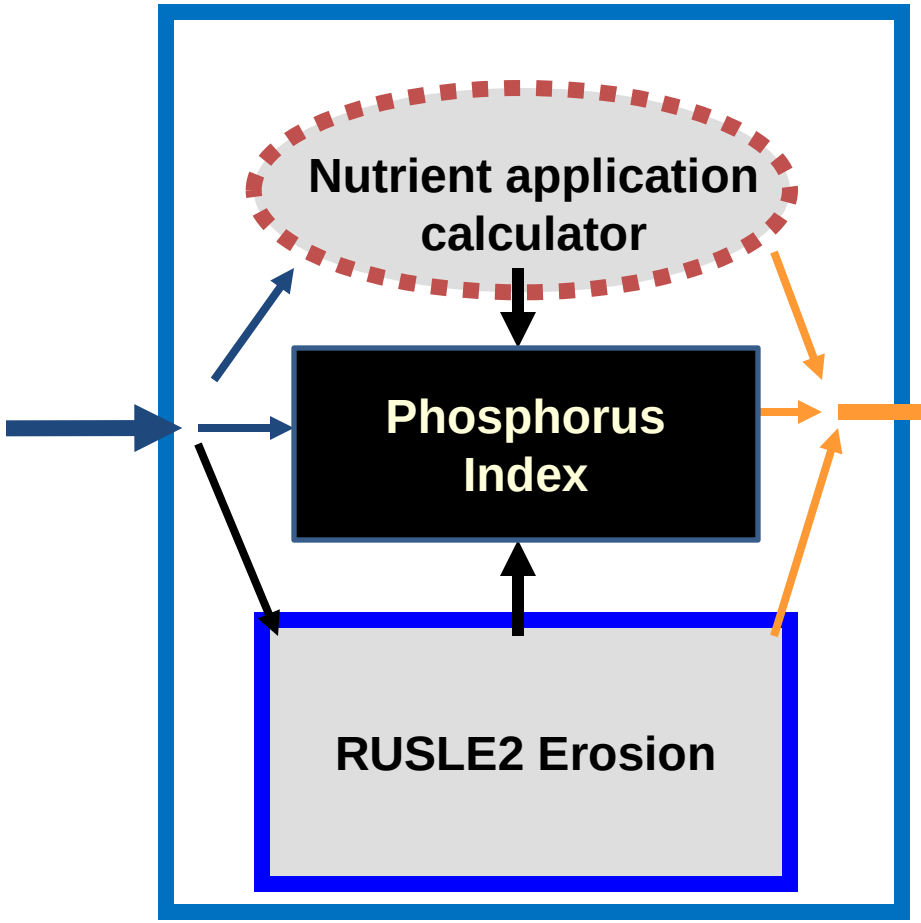
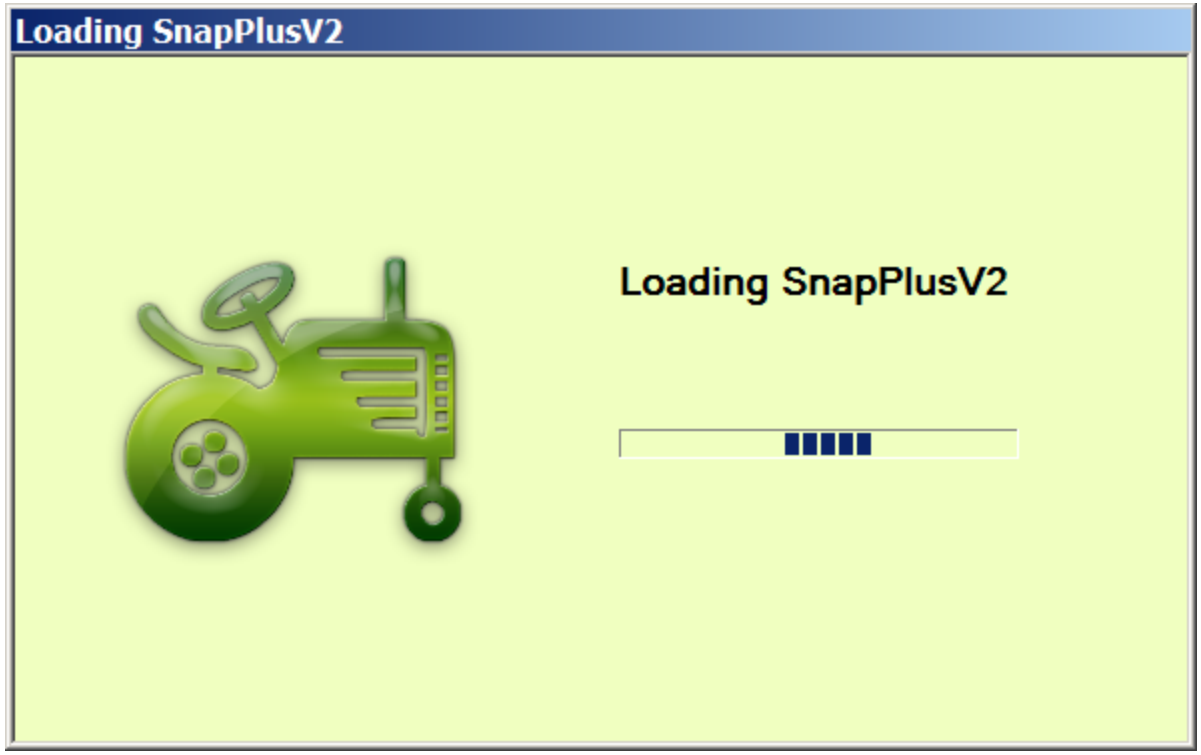
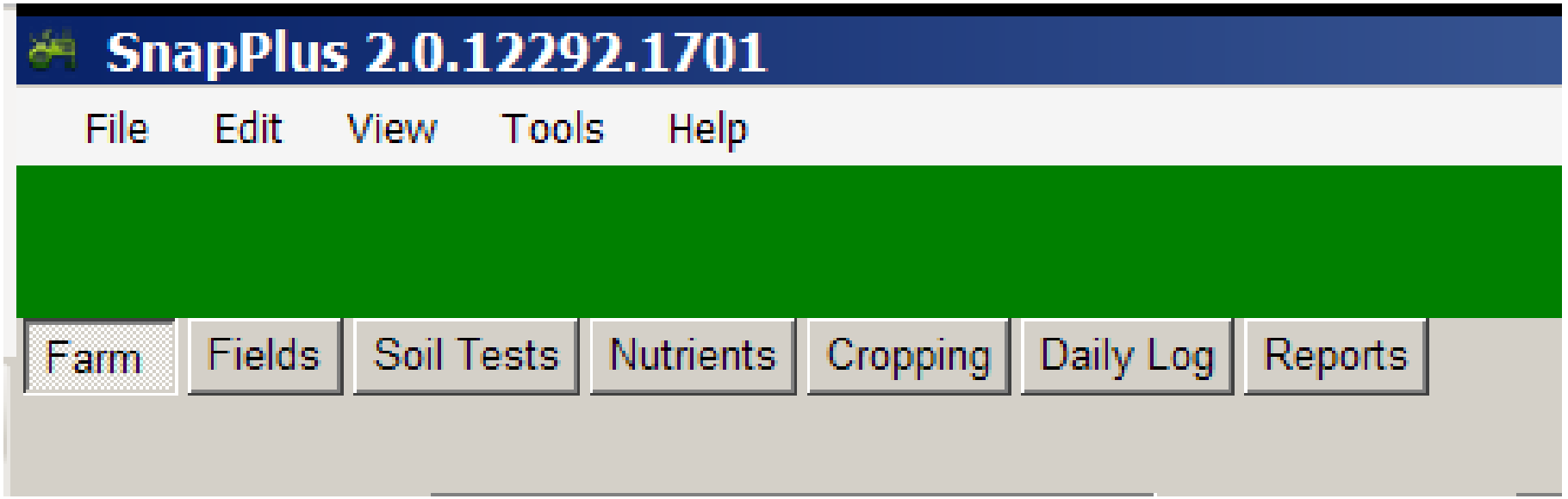
- Manure Applications
- P Fertilizer Applications
- Downfield Slope to Surface Water
- Distance to Surface Water

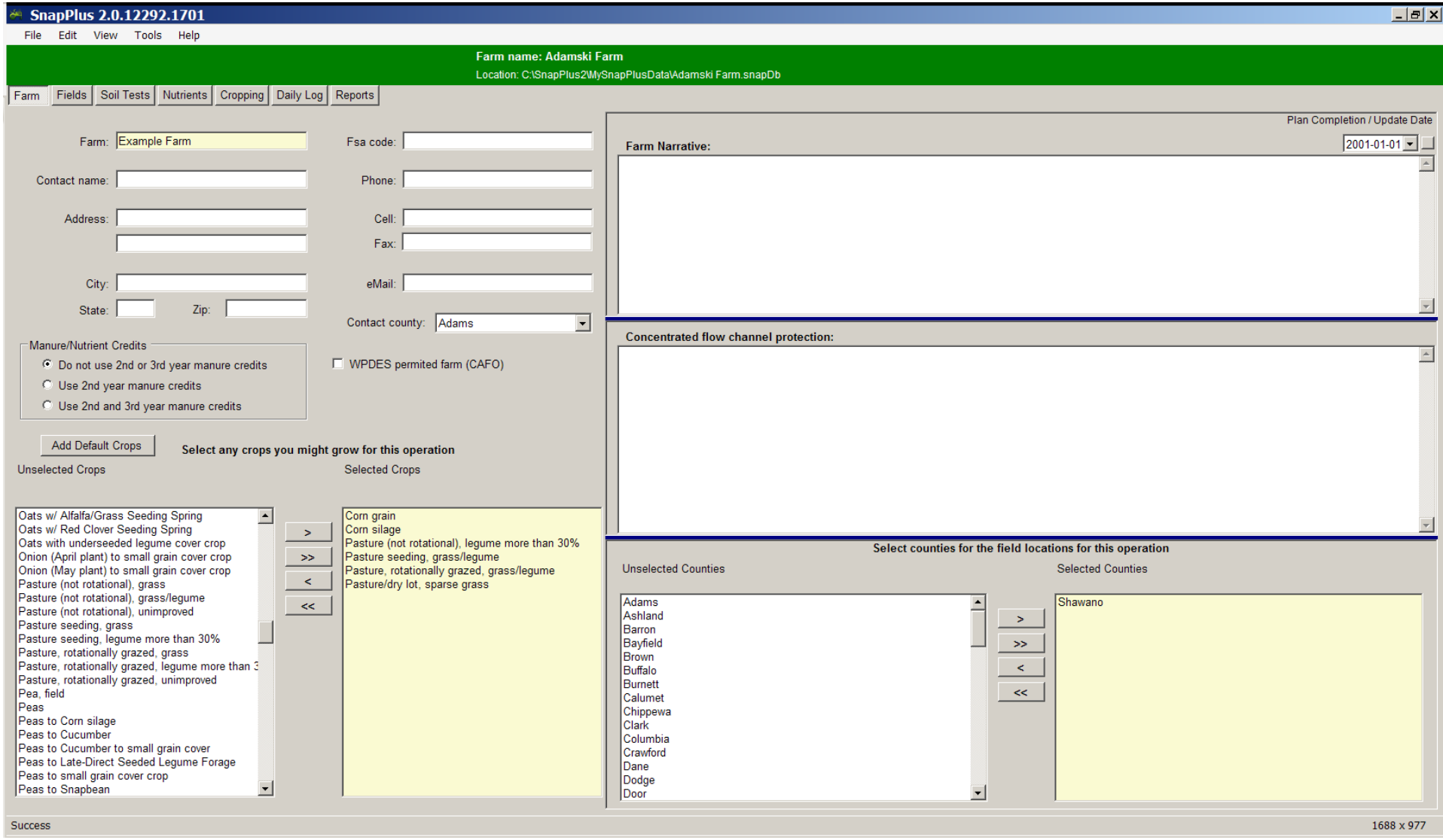



Output by field:
Fertilizer and manure application plan,
Rotation soil loss assessment,
Rotation and Annual P Index,
Rotation P2O5 and K2O balance,
Balance,
Soil Conditioning Index

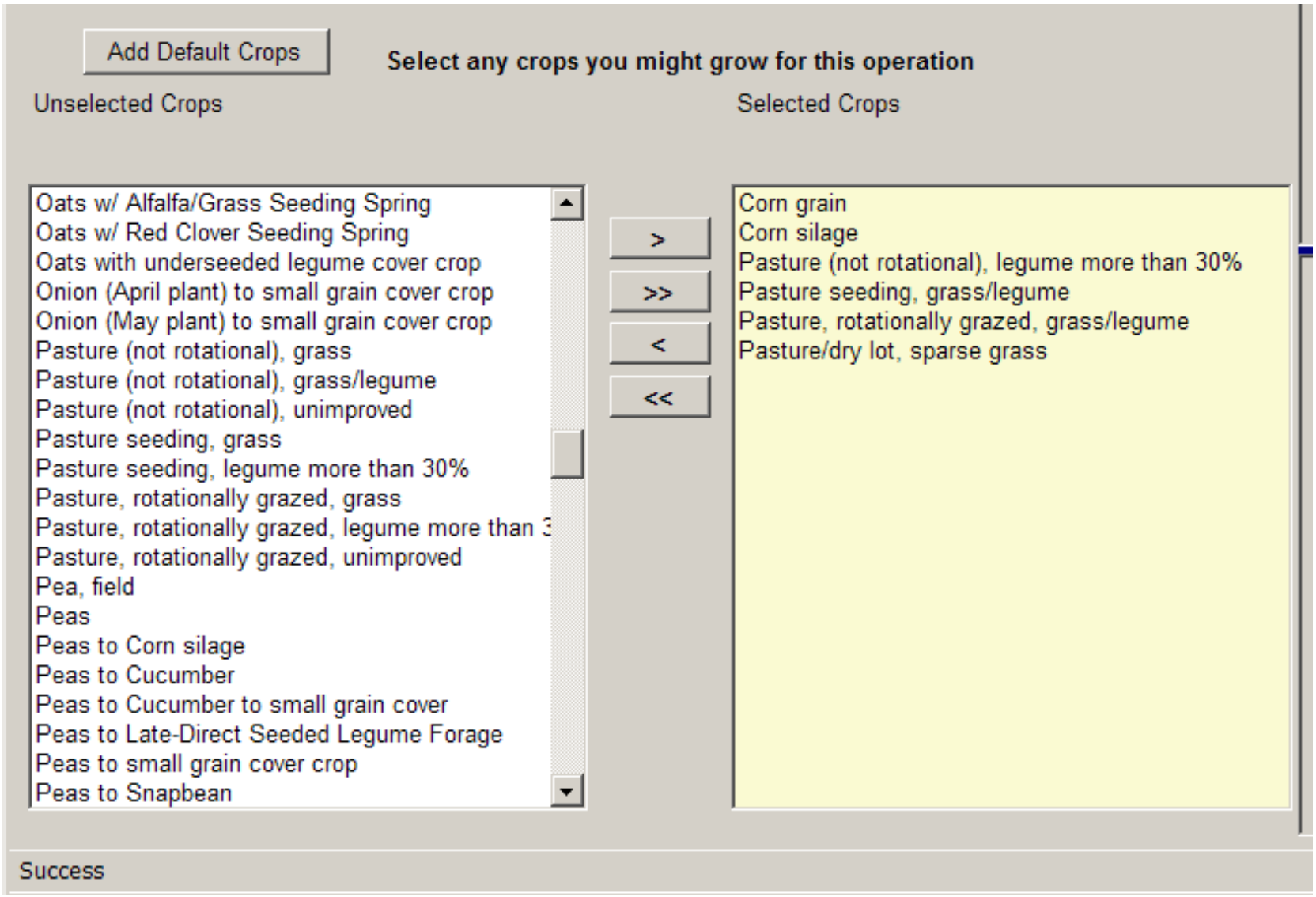

Loading SnapPlusV2
Loading SnapPlusV2


SnapPlus 2.0.12292.1701
File
Edit
View
Tools
Help
Farm
Fields
Soil Tests
Nutrients
Cropping
Daily Log
Reports

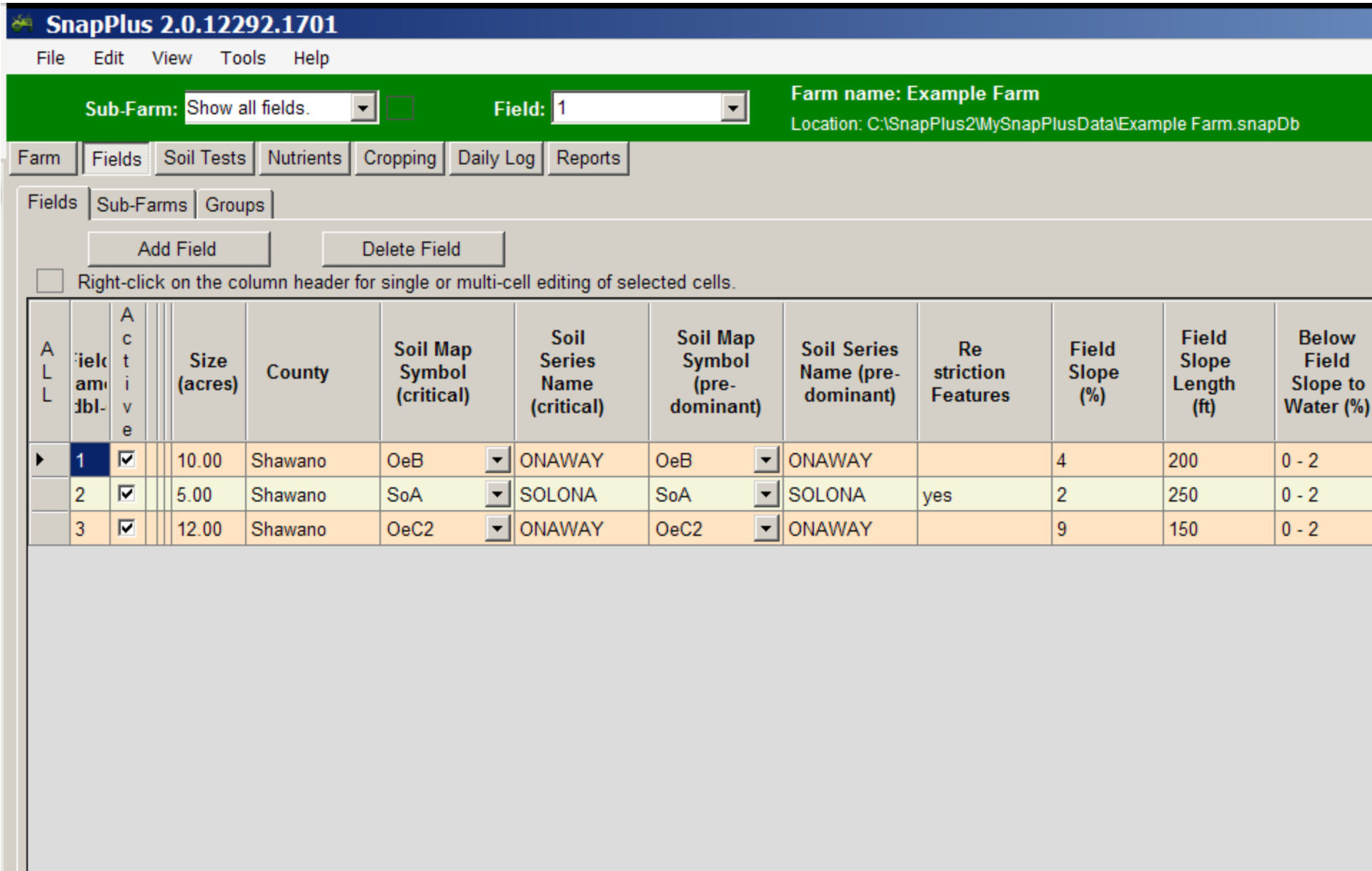
# FARM SCREEN:


SnapPlus 2.0.12292.1701
File Edit View Tools Help
Farm name: Adamski Farm
Location: C:\SnapPlus2\MySnapPlusData\Adamski Farm.snapDb
Farm Fields Soil Tests Nutrients Cropping Daily Log Reports
Farm: Example Farm
Fsa code:
Contact name:
Phone:
Address:
Cell:
Fax:
City:
eMail:
State:
Zip:
Contact county: Adams
Manure/Nutrient Credits
Do not use 2nd or 3rd year manure credits
Use 2nd year manure credits
Use 2nd and 3rd year manure credits
WPDES permited farm (CAFO)
Add Default Crops
Select any crops you might grow for this operation
Unselected Crops
Selected Crops
Oats w/ Alfalfa/Grass Seeding Spring
Oats w/ Red Clover Seeding Spring
Oats with underseeded legume cover crop
Onion (April plant) to small grain cover crop
Onion (May plant) to small grain cover crop
Pasture (not rotational), grass
Pasture (not rotational), grass/legume
Pasture (not rotational), unimproved
Pasture seeding, grass
Pasture seeding, legume more than 30%
Pasture, rotationally grazed, grass
Pasture, rotationally grazed, legume more than 3
Pasture, rotationally grazed, unimproved
Pea, field
Peas
Peas to Corn silage
Peas to Cucumber
Peas to Cucumber to small grain cover
Peas to Late-Direct Seeded Legume Forage
Peas to small grain cover crop
Peas to Snapbean
> >> < <<
Corn grain
Corn silage
Pasture (not rotational), legume more than 30%
Pasture seeding, grass/legume
Pasture, rotationally grazed, grass/legume
Pasture/dry lot, sparse grass
Plan Completion / Update Date
Farm Narrative:
2001-01-01
Concentrated flow channel protection:
Select counties for the field locations for this operation
Unselected Counties
Selected Counties
Adams
Ashland
Barron
Bayfield
Brown
Buffalo
Burnett
Calumet
Chippewa
Clark
Columbia
Crawford
Dane
Dodge
Door
> >> < <<
Shawano
Success
1688 x 977

# FARM SCREEN: SELECT CROPS



# FIELD SCREEN:



T25N R17E
Section 23
Shawano Co.

# Wisconsin 590
# Nutrient Management Application Restrictions

Fall N Restrictions

No Winter Application (slope > 12%)

Winter Restrictions (if slope > 9%)

SWQMA 300'/1000' Buffers
(No Winter Application,
Other Non-Winter Restrictions)

Perennial Streams

Intermittent Streams

PLSS Sections

N

0 750 1,500 Feet

Sources:
USDA-NRCS SSURGO
2008 NAIP Imagery
WI-DNR 24k Hydro
WI DOT Roads

This map has been developed utilizing the nutrient application restrictions from the September 2005 Wisconsin NRCS 590 Nutrient Management Practice Standard. This map is an initial inventory of nutrient spreading risks which must be field verified to identify other risk areas such as concentrated flow channels, wetlands, and conduits to groundwater. See the "Considerations" section of the 590 practice standard for additional planning suggestions.

http://efotg.nrcs.usda.gov/references/public/WI/590.pdf

May 06, 2011

# FIELD SCREEN: Select soil and distance to water

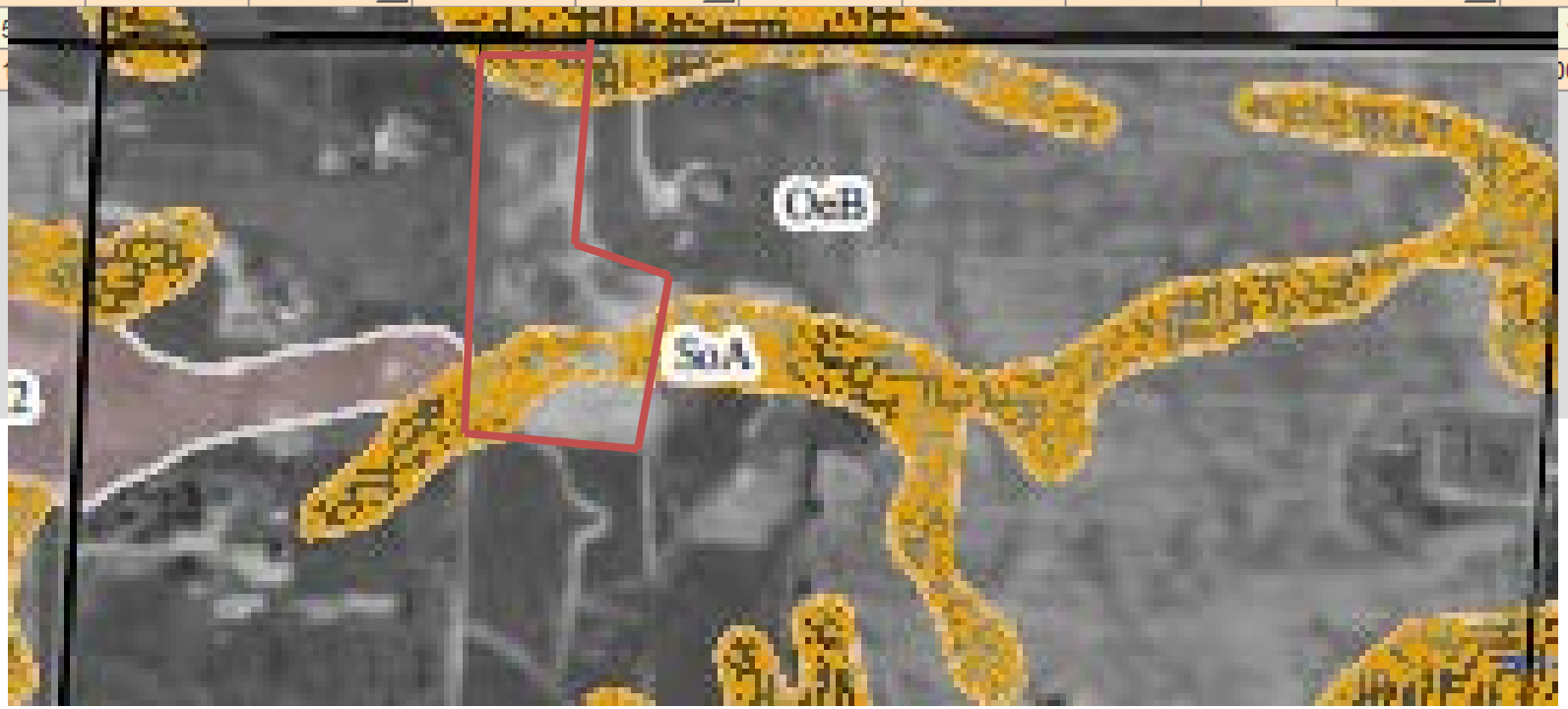
Farm | Fields | Soil Tests | Nutrients | Cropping | Daily Log | Reports

Fields | Sub-Farms | Groups

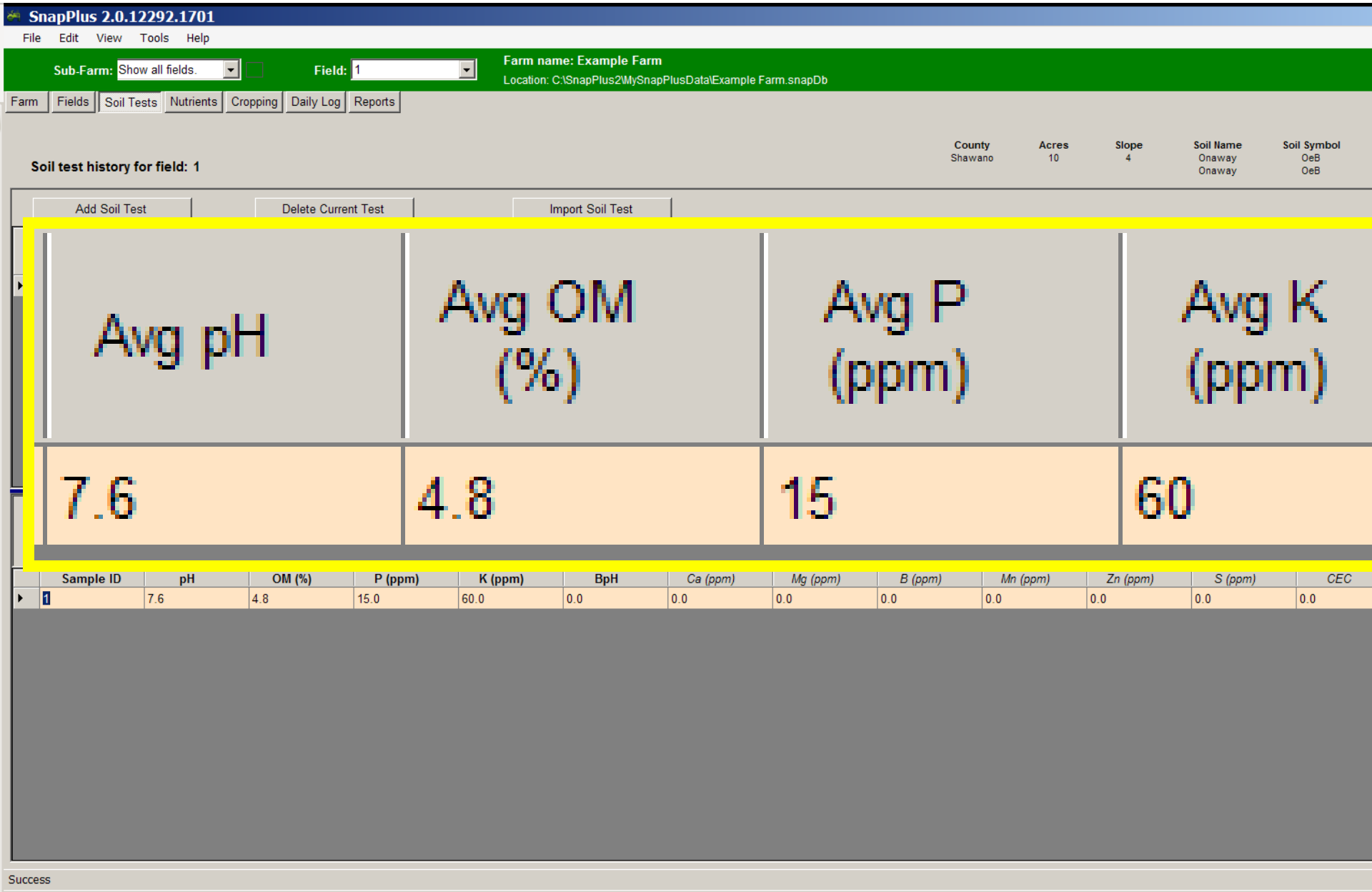
Add Field | Delete Field

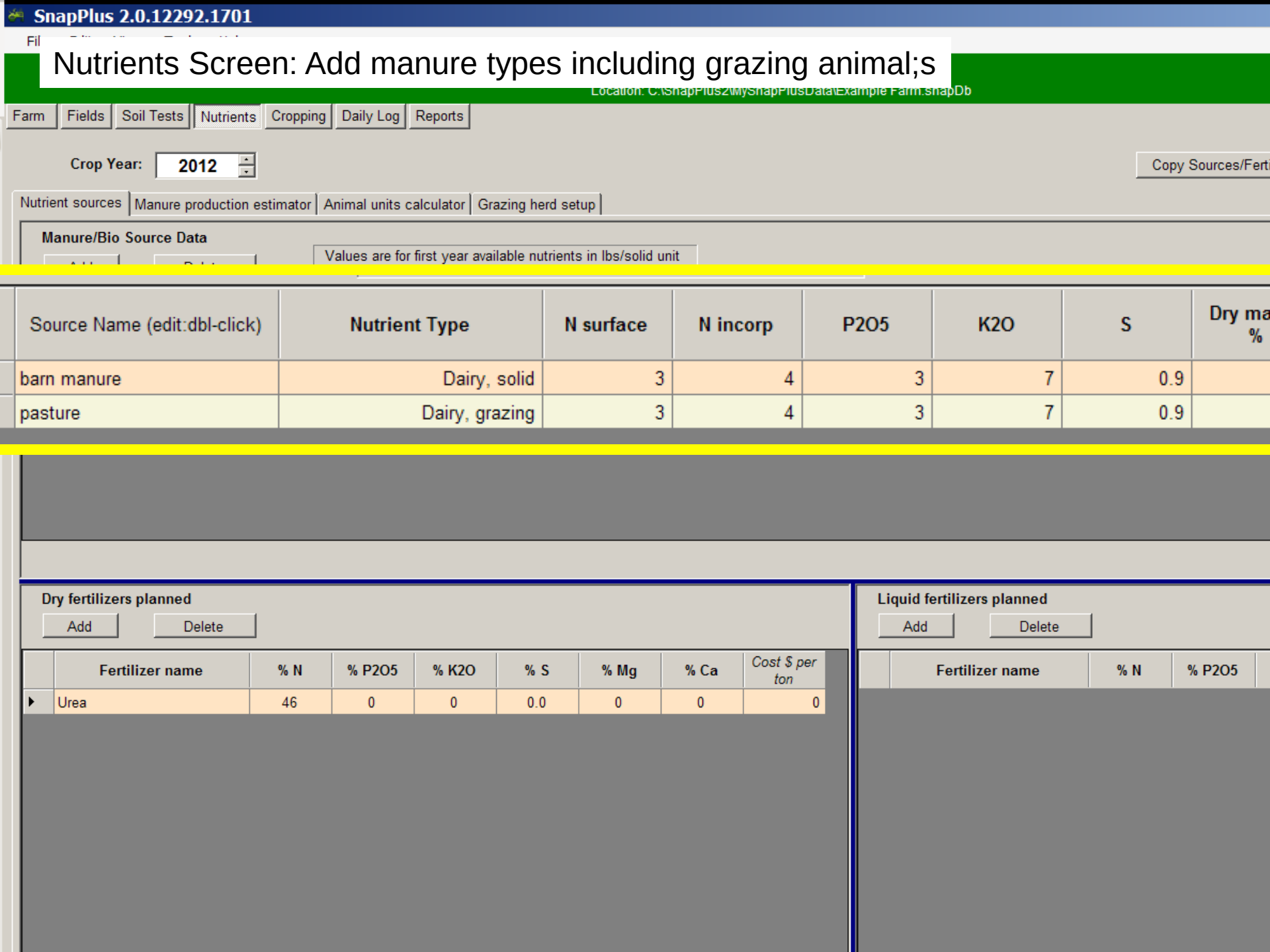
Right-click on the column header for single or multi-cell editing of selected cells.

| ALL | Field Number | Active | Size (acres) | County | Soil Map Symbol (critical) | Soil Series Name (critical) | Soil Map Symbol (pre-dominant) | Soil Series Name (pre-dominant) | Restriction Features | Field Slope (%) | Field Slope Length (ft) | Below Field Slope to Water (%) | Distance to Perennial Water (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ▶ | 1 | ☑ | 10.00 | Shawano | OeB | ONAWAY | OeB | ONAWAY | | 4 | 200 | 0 - 2 | 1001 - 5... |
| | 2 | ☑ | 5 | | | | | | | | | | 1000 |
| | 3 | ☑ | 1 | | | | | | | | | | 00 |



# SOIL TEST SCREEN




SnapPlus 2.0.12292.1701
Nutrients Screen: Add manure types including grazing animal;s
Location: C:\SnapPlus2\MySnapPlusData\Example Farm.snapDb
Farm
Fields
Soil Tests
Nutrients
Cropping
Daily Log
Reports
Crop Year:
2012
Copy Sources/Ferti
Nutrient sources
Manure production estimator
Animal units calculator
Grazing herd setup
Manure/Bio Source Data
Values are for first year available nutrients in lbs/solid unit
Source Name (edit:dbl-click)
Nutrient Type
N surface
N incorp
P2O5
K2O
S
Dry ma %
barn manure
Dairy, solid
3
4
3
7
0.9
pasture
Dairy, grazing
3
4
3
7
0.9
Dry fertilizers planned
Add
Delete
Fertilizer name
% N
% P2O5
% K2O
% S
% Mg
% Ca
Cost $ per ton
Urea
46
0
0
0.0
0
0
0
Liquid fertilizers planned
Add
Delete
Fertilizer name
% N
% P2O5

SnapPlus 2.0.12292.1701

File Edit View Tools Help

Farm name: pastures3

Location: C:\SnapPlus2\MySnapPlu

Farm | Fields | Soil Tests | Nutrients | Cropping | Daily Log | Reports

Crop Year: 2012

Nutrient sources | Manure production estimator | Animal units calculator | Grazing herd s

Add herd | Delete this herd

Grazing/gleaning herd: beef cows

Animal group: Beef

Add Animal | Delete Selected Animal

| Animal Type | Number of Animals | Daily Manure Production (lbs/animal) | Total Daily Manure Production (lbs/day) |
|---|---|---|---|
| Beef Cow 1000 lbs | 100 | 63 | 6,300 |

Total daily production (all animals) 3.2 tons/day

Calculate

## Grazing Estimator

### Grazing application rate estimator

☑ Use herd information to fill daily manure production (optional)

Crop year: 2012

Herd name: beef cows

Total daily herd manure production: 3.2 tons/day

Field/Pasture size: 100.0 acres

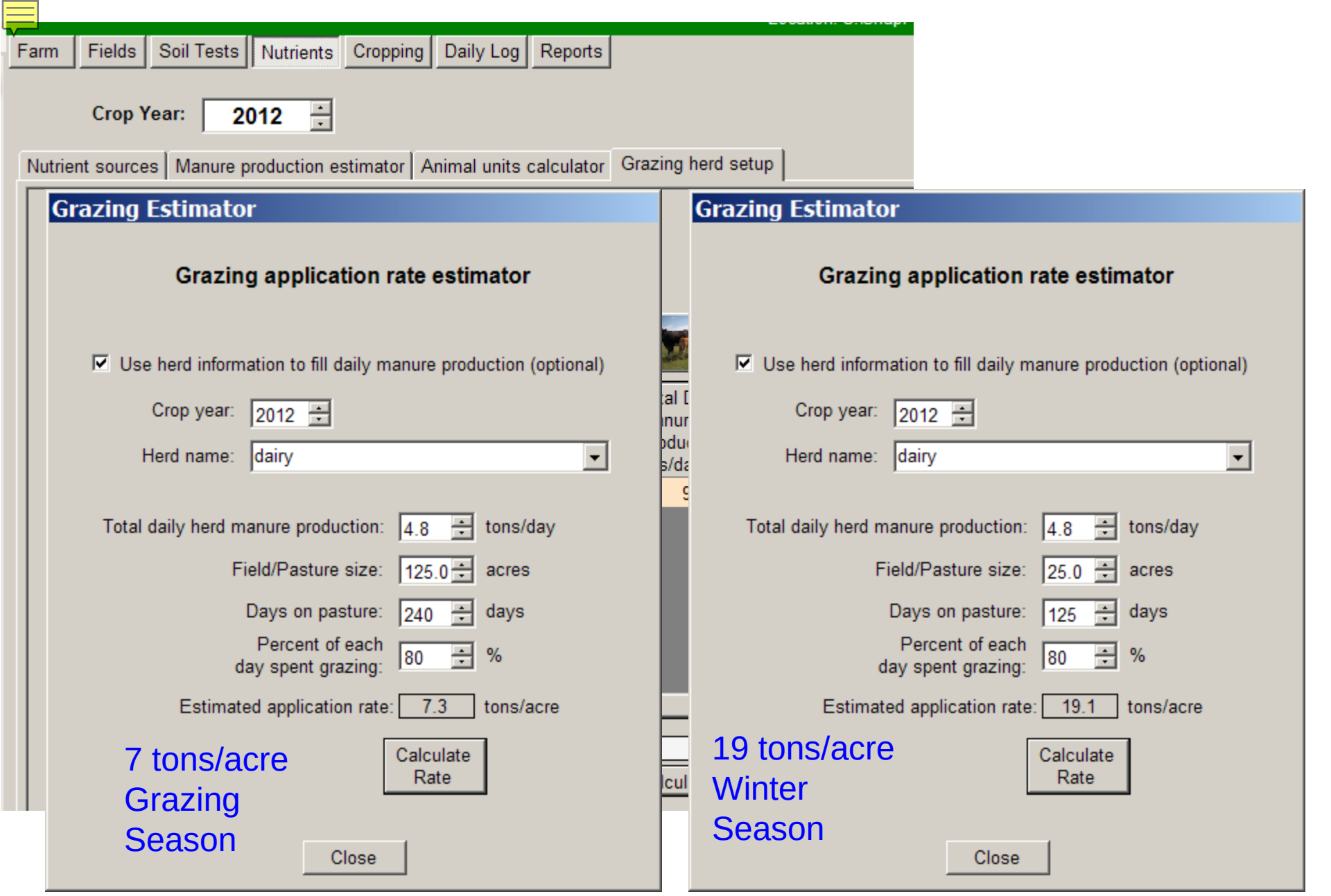
Days on pasture: 240 days

Percent of each day spent grazing: 80 %

Estimated application rate: 6 tons/acre

Calculate Rate

Close


Farm
Fields
Soil Tests
Nutrients
Cropping
Daily Log
Reports
Crop Year:
2012
Nutrient sources
Manure production estimator
Animal units calculator
Grazing herd setup
Grazing Estimator
Grazing application rate estimator
Use herd information to fill daily manure production (optional)
Crop year:
2012
Herd name:
dairy
Total daily herd manure production:
4.8
tons/day
Field/Pasture size:
125.0
acres
Days on pasture:
240
days
Percent of each day spent grazing:
80
%
Estimated application rate:
7.3
tons/acre
Calculate Rate
Close
7 tons/acre Grazing Season
Grazing Estimator
Grazing application rate estimator
Use herd information to fill daily manure production (optional)
Crop year:
2012
Herd name:
dairy
Total daily herd manure production:
4.8
tons/day
Field/Pasture size:
25.0
acres
Days on pasture:
125
days
Percent of each day spent grazing:
80
%
Estimated application rate:
19.1
tons/acre
Calculate Rate
Close
19 tons/acre Winter Season

# Setting up the rotation in Rotation Editor

**Dialog: Rotation Editor**

**Rotation name**

Ps-Pgl-Pgl-Pgl-Pgl-Cg | New | Copy | Delete

**Rotation years**

Add (after selected) | Delete selected

| | Year | Crop | Yield goal | Tillage | Irrigated |
|---|---|---|---|---|---|
| | 1 | Pasture seeding, gra | 0.5-1.9 | Spring MB Plow | ☐ |
| ▸ | 2 | Pasture, rotationally g | 3.1-4.0 | None | ☐ |
| | 3 | Pasture, rotationally ... | 3.1-4.0 | None | ☐ |
| | 4 | Pasture, rotationally ... | 3.1-4.0 | None | ☐ |
| | 5 | Pasture, rotationally ... | 3.1-4.0 | None | ☐ |
| | 6 | Corn grain | 131-150 | Spring MB Plow | ☐ |

Pasture, rotationally grazed, grass/legume

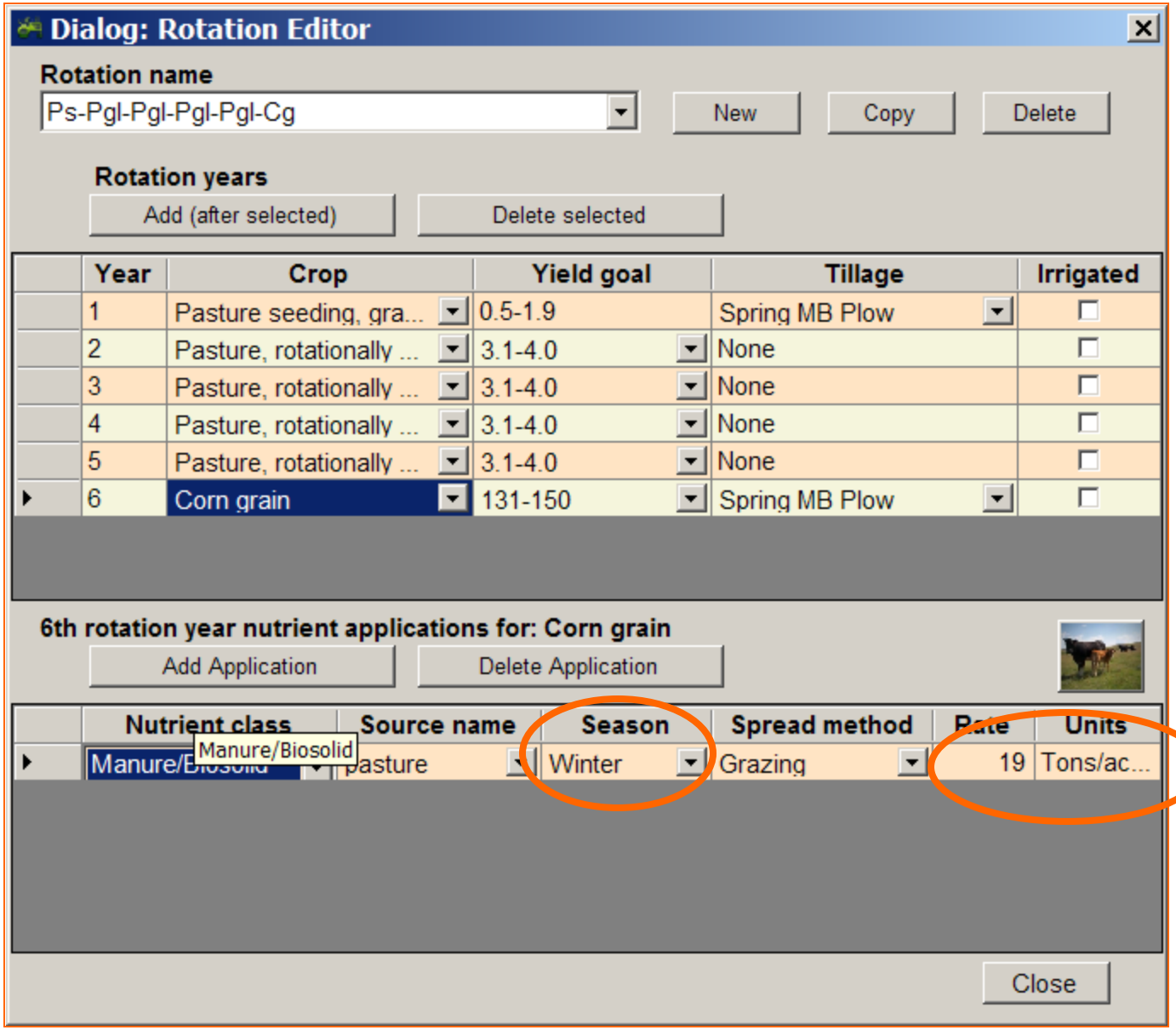
**2nd rotation year nutrient applications for: Pasture, rotationally grazed, grass/legume**

Add Application | Delete Application

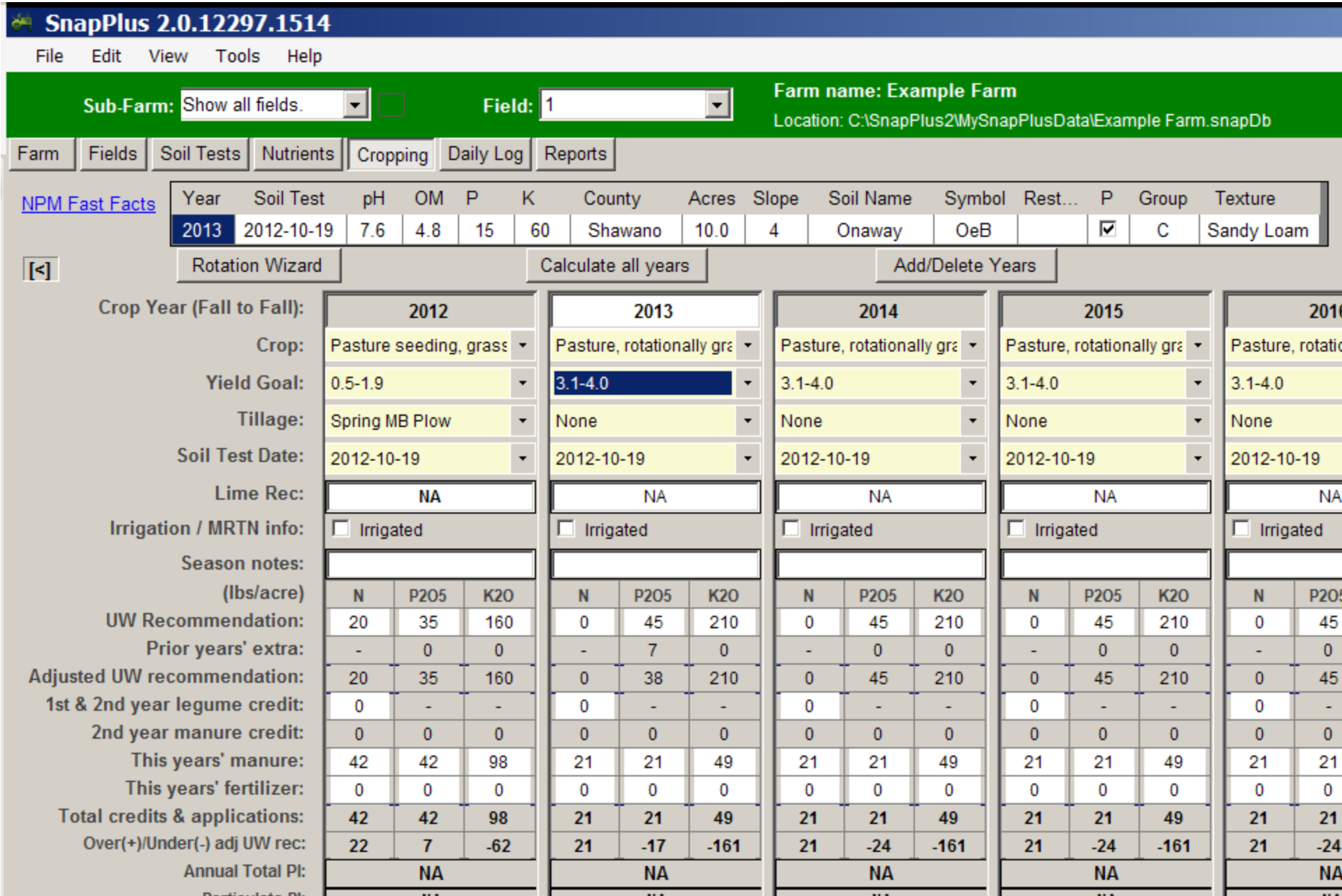
| | Nutrient class | Source name | Season | Spread method | Rate | Units |
|---|---|---|---|---|---|---|
| ▸ | Manure/Biosolid | pasture | Grazing | Grazing | 7 | Tons/ac... |

Close

# Setting up the rotation in Rotation Editor



# Cropping Screen



SnapPlus 2.0.12297.1514

File Edit View Tools Help

Sub-Farm: Show all fields. Field: 1

Farm name: Example Farm
Location: C:\SnapPlus2\MySnapPlusData\Example Farm.snapDb

Farm | Fields | Soil Tests | Nutrients | Cropping | Daily Log | Reports

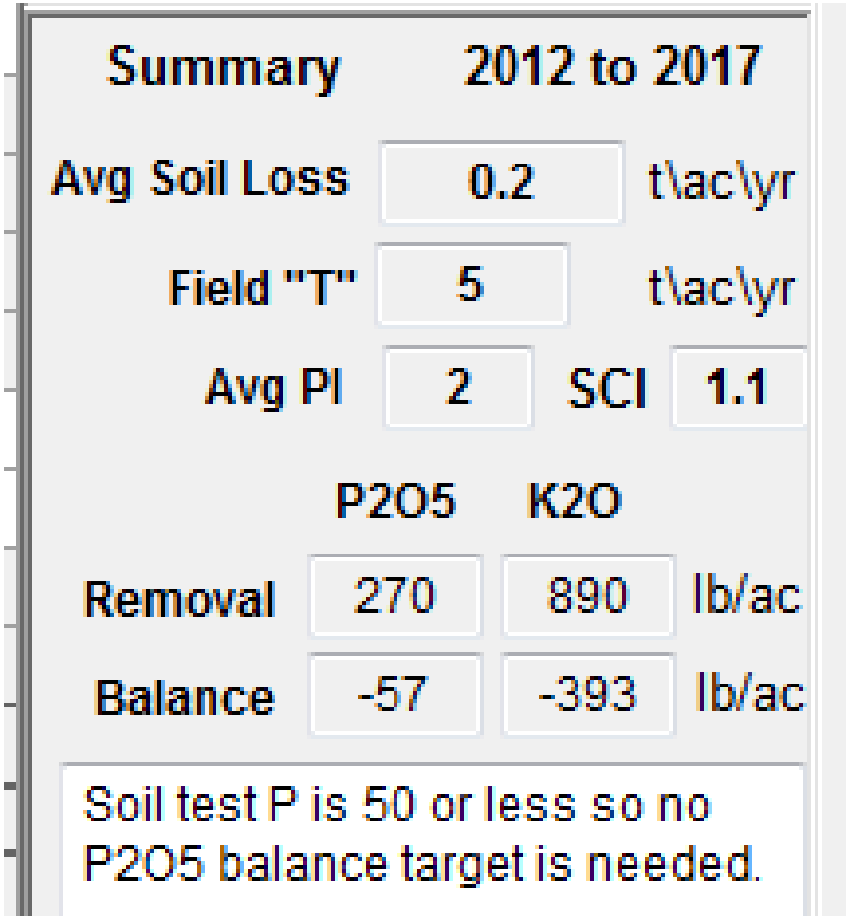
NPM Fast Facts

| Year | Soil Test | pH | OM | P | K | County | Acres | Slope | Soil Name | Symbol | Rest... | P | Group | Texture |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2012 | 2012-10-19 | 7.6 | 4.8 | 15 | 60 | Shawano | 10.0 | 2 | Onaway | OeB | | ☑ | C | Sandy Loa |

[<] Rotation Wizard | Calculate all years | Add/Delete Years

| | 2012 | 2013 | 2014 | 2015 | |
|---|---|---|---|---|---|
| Crop Year (Fall to Fall): | | | | | |
| Crop: | Pasture seeding, grass | Pasture, rotationally gra | Pasture, rotationally gra | Pasture, rotationally gra | Pasture |
| Yield Goal: | 0.5-1.9 | 3.1-4.0 | 3.1-4.0 | 3.1-4.0 | 3.1-4.0 |
| Tillage: | Spring MB Plow | None | None | None | None |
| Soil Test Date: | 2012-10-19 | 2012-10-19 | 2012-10-19 | 2012-10-19 | 2012-10 |
| Lime Rec: | NA | NA | NA | NA | |
| Irrigation / MRTN info: | ☐ Irrigated | ☐ Irrigated | ☐ Irrigated | ☐ Irrigated | ☐ Irriga |
| Season notes: | | | | | |
| (lbs/acre) | N P2O5 K2O | N P2O5 K2O | N P2O5 K2O | N P2O5 K2O | N |
| UW Recommendation: | 20 35 160 | 0 45 210 | 0 45 210 | 0 45 210 | 0 |
| Prior years' extra: | - 0 0 | - 37 8 | - 44 0 | - 64 0 | - |
| Adjusted UW recommendation: | 20 35 160 | 0 8 202 | 0 1 210 | 0 0 210 | 0 |
| 1st & 2nd year legume credit: | 0 - - | 0 - - | 0 - - | 0 - - | 0 |
| 2nd year manure credit: | 0 0 0 | 0 0 0 | 0 0 0 | 0 0 0 | 0 |
| This years' manure: | 72 72 168 | 15 15 35 | 21 21 49 | 21 21 49 | 21 |
| This years' fertilizer: | 0 0 0 | 0 0 0 | 0 0 0 | 0 0 0 | 0 |
| Total credits & applications: | **72 72 168** | **15 15 35** | **21 21 49** | **21 21 49** | **21** |
| Over(+)/Under(-) adj UW rec: | **52 37 8** | **15 7 -167** | **21 20 -161** | **21 21 -161** | **21** |
| Annual Total PI: | **3** | **0** | **0** | **0** | |
| Particulate PI: | **0.4** | **0.1** | **0.2** | **0.1** | |
| Soluble PI: | **3.0** | **0.2** | **0.2** | **0.2** | |
| Acute Winter Loss PI: | | | | | |

Done




SCI is Soil Conditioning Index:
Greater than 0 means building organic matter

# Highest annual P Index is 5 in corn year

# Effect of changing soil test P or slope on rotation P Index

| STP ppm | P Index |
|---|---|
| 15 | 2 |
| 150 | 3 |
| 300 | 4 |

| Slope | Erosion T/a/yr | P Index |
|---|---|---|
| 2% | 0.2 | 1 |
| 4% | 0.5 | 2 |
| 9% | 1.1 | 2 |

# Take home:

P Index are not likely to be high on managed pasture except for overwintering areas