SnapPlus
Wisconsin's Nutrient Management Software

Nutrient Management Training Manual Contents - Farmer

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Your Farm

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Your Nutrient Management Plan:

- ☑ SnapPlus Compliance Check Report
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Emergency Response Contacts

Fill out form completely prior to an emergency!

Farm Name and Address: (any special directions, landmarks, or locations of lagoons, pumps, etc.)		
	Phone Number	**Cell Number**
Owner/Operator		
Owner/Operator		
Emergency Contacts	**Contact Person (or Company)**	**Phone Number**
Fire/Rescue		911 or
County Sheriff		911 or
Farm Emergency Coordinator		
DNR Hazardous Spill Line		1-800-943-0003
DNR Permit Contact/Warden		
Veterinarian		
Equipment/Supplies	**Contact Person (or Company)**	**Phone Number**
On-Farm Equipment Operator		
Excavation Contractor		
Manure Hauler		
Septic Tank Pumping Truck		
Mortality Disposal Contractor		
Local Government Contacts	**Contact Person (or Company)**	**Phone Number**
Town Chairman		
LCD County Conservationist		
NRCS District Conservationist		

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Emergency Response Plan

Be prepared to provide the following information:

1. Your name and contact information
2. Farm address, location and other pertinent identification information
3. Nature of emergency (employee injury, fire, discharge of manure or hazardous materials).
4. Emergency equipment and personnel that are needed.
5. Potential for manure or hazardous materials to reach surface waters or major field drains.
6. Current status of containment efforts.
7. Location of hazardous/flammable materials, fire suppression equipment, emergency cut off switches or valves.

In Case of Injury, Fire, or Rescue Emergency, immediately implement the following

1. Assess the condition of the victim, extent of the emergency (fire, rescue) and call for help.
2. Stabilize the victim, use on-site rescue equipment, evacuate buildings, or begin fire suppression as necessary.
3. Brief emergency responders upon arrival on current status of situation.

In Case of a Spill, Leak, or Failure at the Storage Facility, During Transport, or Land Application, immediately implement the following:

1. Stop the source of the leak or spill.
   - ✓ For example: Turn off all pumps/valves and clamp hoses or park tractor on hoses to stop the flow of manure.
2. Assess the situation and make appropriate calls for people, equipment, and materials. See contacts below.
   - ✓ Notify DNR spill hotline (Spill reporting is mandatory by state law.)
   - ✓ Call sheriff's office if spilled on public roads or other right-of-ways for traffic control.
   - ✓ Clear the road and roadside of spilled material immediately.
3. Contain the spill and prevent spillage from entering surface waters, tile intakes, or waterways.
   - ✓ Use a skid loader or tractor with a blade to build dikes to contain or divert the spill or leak.
   - ✓ Insert sleeves around tile intakes (or plug/cap intakes) and block down slope culverts.
   - ✓ Use tillage implements to work up the ground ahead of the spill or use absorptive materials.
4. Begin cleanup.
   - ✓ Use pumps to recover liquids.
   - ✓ Land apply on approved cropland at appropriate rates.
5. Document your actions.

What Is A Farm Nutrient Management Plan?

A farm nutrient management plan is a strategy for obtaining the maximum economic return from both on- and off-farm fertilizer resources in a manner that optimizes soil conservation and protects the quality of nearby water resources. A successful plan makes sense agronomically, economically and environmentally. Developing a plan requires some basic information and thoughtful consideration during the planning process. Although plans can range from simple to complex, all plans include the following five basic components:

1. Soil test results

Complete and accurate soil tests are the starting point of any farm nutrient management plan. All cropland fields must be tested or have been tested within the last four years. From the soil test results, the base fertilizer recommendations for each field are given.

2. On-farm nutrient resources inventory and nutrient credits

The amount of crop nutrients supplied to fields from on-farm nutrient resources such as manure, legumes and organic wastes need to be determined so those nutrients can be deducted from the base fertilizer recommendations. Legume crops, such as alfalfa and clover, supply nitrogen to the crops that follow them. Manure applications to fields supply crops with nitrogen, phosphorus, and potassium—as well as sulfur and organic matter.

On farms with livestock, a key step in the planning process is developing a manure inventory. This involves estimating the annual manure volume produced on the farm. This applies to both stored liquid and solid manure, as well as any pastured animals. If the farm uses any biosolids or other organic wastes, these nutrients should also be included in the inventory. To properly credit nutrients supplied from manure, both the crop- available nutrient content of the manure and application rate are required. The most accurate method to determine application rate is by calibrating the manure spreader. This is done by weighing the spreader, spreading, measuring area and calculating the tons/acre rate. Assistance and portable axle scales are available from county Extension or Land Conservation offices.

Legume credits are determined by assessing previous stands based on regrowth height, stand density and soil texture. Once all on-farm nutrient resources are inventoried and manure spreaders calibrated, then nutrient credits can be determined.

3. Cropping plan

A cropping plan for each field (full rotations) along with yield goals and planned tillage is an important part of developing a nutrient management plan. Pre-planning rotations can optimize legume credits and manure applications, as well as identify areas where management practices for soil and nutrient loss can be improved.

4. On-farm conservation practices inventory

A nutrient management plan should be consistent with the farm's soil farm conservation plan, which includes information used to determine the soil erosion rate. The slope and critical soil map symbol for each field determines how vulnerable that field is to soil loss and is an important tool for planning future nutrient applications and tillage.

Other practices that limit soil erosion and phosphorus runoff, such as filter strips and fields farmed on-contour, are important to inventory during the planning process to ensure your plan accurately estimates the soil erosion and phosphorus losses resulting from crop management activities.

5. Nutrient application plan

The nutrient application plan is the culmination of all of the other parts of the plan. The goal is to have planned nutrient application rates for both commercial fertilizer and manure that makes sense agronomically, economically and environmentally. A good plan does not exceed crop nutrient needs as identified in the soil test report. If the farm has manure, the plan prioritizes those fields that would benefit the most from the manure-supplied nutrients (while posing little threat to water quality) and also clearly identifies fields that have spreading restrictions—fields adjacent to lakes and streams, sloping fields where the threat of spring runoff prohibits manure applications in the winter, and fields in the vicinity of wells, sinkholes, or fractured bedrock.

A note about the 590 Nutrient Management Standard

You may have heard or read about something called the "590 standard" and wonder what it has to do with nutrient management planning. The 590 standard is a USDA-Natural Resources Conservation Service document that defines the minimum requirements and components of an acceptable nutrient management plan—a nutrient management plan that is compliant with the 590 standard is a requirement for participation in some federal and state farm programs.

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Things you may have heard about the University of Wisconsin nutrient recommendations .....are they true?

True/false, fact/fiction, myth/true story…we live in a time when we are constantly bombarded with information, and we have to evaluate what is valid and what is not. In some areas, like science, it can be easy to identify a fact; water freezes at 32 degrees F.

Outside the lab, things get more complicated; yet we have to keep sorting through the information to separate fact from fiction. In this publication, we are going to pull some of the facts from the fiction that you may have heard about the UW nutrient recommendations.

All the data comes from research done on the Arlington research farm..... .....is this true?

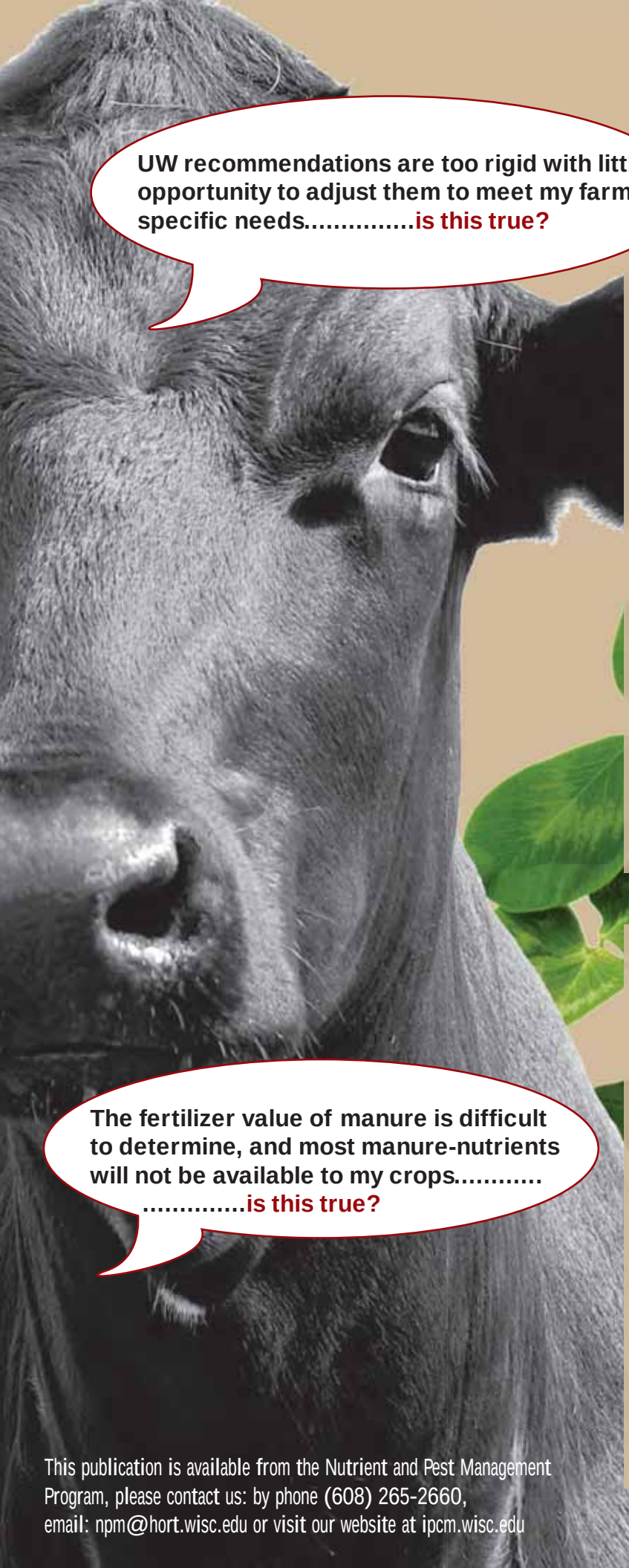
*A lot of research data is collected at the the Arlington Research Station, **but not all the data**. Data is also collected from other agricultural research stations throughout the state—Lancaster, Marshfield, Hancock, Spooner, Rhinelander, Hancock and West Madison.*

Research is also conducted with local farmers, agriculture agents and university specialists on working farms across the state each year to collect data and find solutions to Wisconsin crop fertility questions. Plots are placed across the state to represent different landscapes, soil types and varying climatic conditions.

The research hasn't kept up with changing crop needs as crop hybrids change every year.....is this true?

In recent years there are so many new traits being introduced that UW soil fertility research trials cannot include all of the hybrid varieties.

***However, the fertility research that is conducted year after year throughout the state does utilize an array of different corn, soybean and other crop varieties.** Also, farmers that welcome research on their farms have different preferences in seed companies and traits and often use them for their on-farm research plots.*



UW recommendations are too rigid with little opportunity to adjust them to meet my farm's specific needs.....is this true?

There is flexibility built into the recommendations to fit your specific field needs. *For example, the nitrogen recommendations for corn and wheat are given with a range to accommodate varying scenarios such as high or low organic matter content, over 50% crop residue in the field at planting and others. UW nitrogen recommendations also consider the economics of applying nitrogen fertilizer depending on the crop market price and cost of fertilizer. Adjustments can also be made according to a preplant or pre-sidedress soil nitrate test if tests are taken on your farm.*

The UW phosphorus and potassium recommendations also provide flexibility in conjunction with Wisconsin's nutrient management rule, the 590 Standard. If the soil phosphorus levels test as excessively high, up to 20 lbs per acre of phosphorus can still be applied as a starter on corn. If soil test levels are low, the recommendations include a build-up of nutrients over a 4-8 year period to reach optimum levels.

The fertilizer value of manure is difficult to determine, and most manure-nutrients will not be available to my crops..... .....is this true?

Not all the nutrients contained in manure are immediately available to crops grown on fields that receive manure, ***but decades of Wisconsin research has shown that a large percentage of manure nutrients are available to crops.*** *The exact amount varies with animal species, rate, time and method of application. If you sample the manure on your farm and have a laboratory analysis done, you will have the best estimate of manure-nutrient content to work with when crediting the nutrients for your crops. However if you choose not to sample, you can use the UW book values for manure nutrient credits, which are based on the averages of samples submitted to Wisconsin DATCP's* certified soil testing labs. Over a five-year period (1998 to 2012), over 10,000 solid dairy manure and 19,000 liquid dairy manure samples were submitted to certified soil testing labs in Wisconsin.*

** Department of Agriculture, Trade and Consumer Protection*

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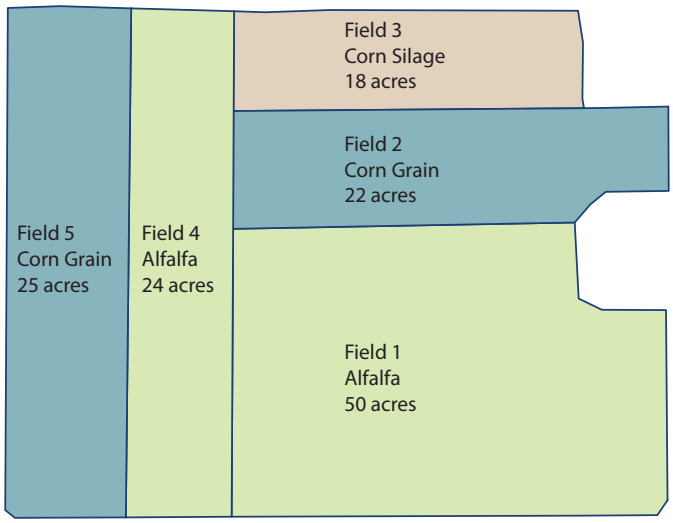
Why Soil Sample?

Accurate soil sampling on your farm can provide you with information that can be used when making important input decisions. Making an informed lime and fertilizer recommendation for fields based on the field's actual soil analysis might even **save you money!** In the examples below shows a direct comparison of fertilizer recommendations based on two application rate scenarios—one based on crop removal of nutrients and the other based on actual soil test results—which one would you rather use?

Application Rates According to:

(Crop Yield Goals: Corn Grain 200 bu/a, Corn Silage 28 tons/a, Alfalfa 6 tons/a)

Crop Removal of Nutrients



Fertilizer Applications

Corn grain fields
DAP @ 175 lb/a, Potash @ 100 lb/a on 47 acres, Urea @ 410 lb/a

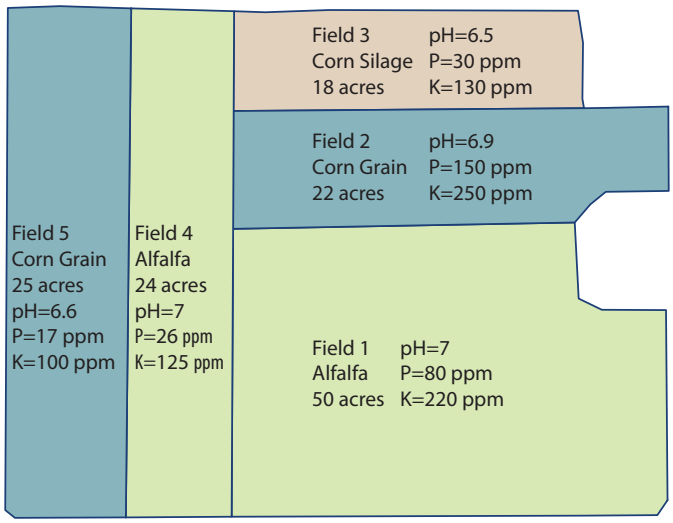
Corn silage field
DAP @ 225 lb/a, Potash @ 400 lb/a on 18 acres, Urea @ 410 lb/a

Alfalfa fields
DAP @ 175 lb/a, Potash @ 600 lb/a on 74 acres

Total Costs for Crop Removal Method

Soil tests		**$0**
Total DAP	12.6 tons @ $525/ton	**$6,615**
Total Potash	28.2 tons @ $440/ton	**$12,408**
Total Urea	13.3 tons @ $490/ton	**$6,517**
Total Cost		**$25,540**

Soil Test Results



Fertilizer Applications

Rates may vary depending on application method and number of fertilizer blends ordered.

Field 1 Potash @ 150 lb/a

Field 2 Urea @ 410 lb/a

Field 3 DAP @ 100 lb/a, Potash @ 100 lb/a, Urea @ 410 lb/a

Field 4 DAP @ 100 lb/a, Potash @ 600 lb/a

Field 5 DAP @ 250 lb/a, Potash @ 150 lb/a, Urea 410 lb/a

Total Costs for Soil Test Results Method

Soil tests	29 samples @ $8 analysis, labor to collect not included	**$232**
Total DAP	5.2 tons @ $525/ton	**$2,730**
Total Potash	13.7 tons @ $440/ton	**$6,028**
Total Urea	13.3 tons @ $490/ton	**$6,517**
Total Cost		**$15,507**

SEE OTHER SIDE FOR MORE INFORMATION

Not soil testing cost $10,033 in this situation! **How much is not testing costing you?**

For more information, go to visit our website

ipcm.wisc.edu

to view the video

Basic Soil Sampling for Wisconsin Agriculture

or the http://learningstore.uwex.edu/ to view or print the
University of Wisconsin Extension publication, A2100 *Sampling Soils for Testing*

Some real world examples:

Dan Holland and Brett Newman

Dan and his son-in-law Brett farm 310 acres and milk 85 cows, raise young stock, and feed out steers on their Green County farm. In 2009 they decided to write a nutrient management plan for their farm, which included taking updated soil samples for their farm. **Immediately, they experienced a savings in annual fertilizer expenses.** With their soil test analysis as the basis to their nutrient management plan, they discovered they were applying fertilizer on fields that didn't need it and were applying at rates too low on fields that did. By adjusting their manure and fertilizer applications to meet the crop needs, they saw an increase in yields on low fertility fields.

John and Jake Wedeberg

Brothers Jake and John Wedeberg run an organic dairy and cash grain operation in Crawford County. They have 50 milking cows, young stock, and approximately 425 acres of tillable land. Jake heard about a nutrient management workshop in Seneca and decided to attend. "Knowing what nutrients you have and what nutrients you need is the number one benefit of nutrient management." With soil test analysis as the basis of a nutrient management plan, Jake found the soil analysis most helpful. **Once they found out what fertility levels they were working with on their farm, they could better plan their manure applications and were able to reduce the amount of lime that they applied to their fields.**

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Runoff Risk Advisory Forecast

Wisconsin Manure Management Advisory System

I need to spread manure...but am not sure about runoff.

Is the local weather the best source for information?

No, there is a better source. The Runoff Risk Advisory Forecast (RRAF) is a tool built by the National Weather Service, the Wisconsin Department of Agriculture, Trade and Consumer Protection and UW-Madison to predict manure runoff potential and present it in a user-friendly map. The RRAF shows day-to-day risk of runoff occurring across Wisconsin using data that includes not only the precipitation and temperature forecast, but also soil moisture, snow cover, predicted snowmelt and individual basin characteristics (216 across the state). Updated 3x per day, it captures the most current data possible and adjusts the predictions based on actual runoff data.

The purpose of this tool is to help manage risk. While the predictions are as accurate as possible, local field conditions still need to be considered. ***The RRAF is simply another tool to help you make the most informed nutrient application decision possible.***

How to Use the Map (www.manureadvisorysystem.wi.gov)

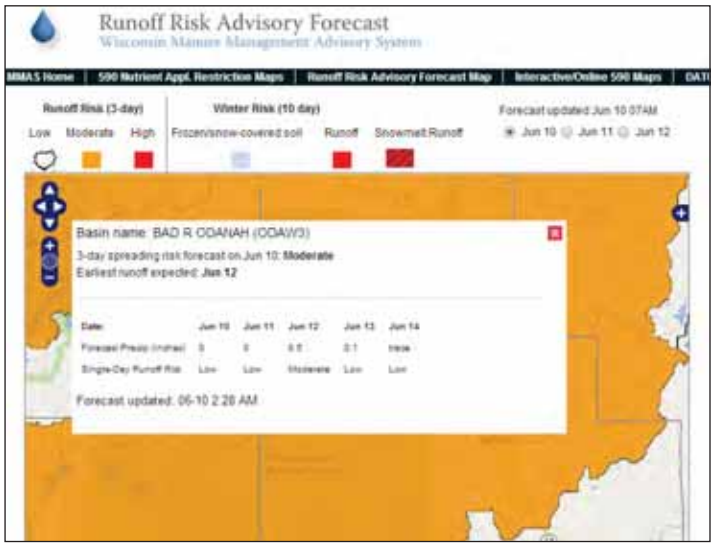
1. Zoom into your area by using the plus sign on the left side of the map. Move around the map by using the navigation tools in the upper left corner or by clicking and dragging directly on the map.

   HINT: If you have a hard time locating your farm or field area, click on the plus sign in the upper right corner of the map, and choose "Google hybrid" to turn on an aerial photo with roads marked.

2. Click on your location, a pop-up box will appear showing the name of your basin along with risk potential for each day listed.

3. The RRAF forecasts multiple risks not just for today but up to 10 days in the future. You can plan the days you spread to minimize the risk of runoff from your fields.

   TIP: You can view future maps (up to 2 days) using the radio buttons above the the map on the far right. However, the same information is also viewable in the pop-up box.



What the Colors Mean

Runoff Risk (3-day)

- **Low** - no runoff predicted within the basin.
- **Moderate** - low volumes of runoff predicted for some areas within the basin.
- **High** - runoff very likely to occur within the basin.

Winter Runoff Risk (10-day)

- **Frozen/snow covered soil** - runoff is not yet in the forecast but applications should be made with caution due to limited soil contact and infiltration.
- **Runoff** - runoff is in the forecast within the next 10 days (most likely because of rain), with no snowmelt alert.
- **Snowmelt runoff** - snowmelt is predicted within 10 days leading to runoff within the basin. Rain may also be in the forecast. Consult the pop-up box for the basin for more details.

What to do if spreading is necessary when conditions are not favorable?

First consider

- ☑ **Use neighboring or other available manure storage facilities.**
- ☑ **Create in-field stacking sites in areas that pose the least environmental runoff risk.**

  Contact your local land conservation office for assistance in locating a safe stacking area.

Additional factors to consider before spreading:

- ☑ Increased soil moisture = increased risk of runoff.

  Maps are based off of the entire basin condition, if your farm received more rain than the rest of the basin, your fields may be at an increased risk for runoff even if the map does not show this.

- ☑ Even if the map shows low risk for runoff, your fields may not be dry enough to spread.

  Make sure your fields are dry enough to accept additional moisture without leading to runoff.

- ☑ Liquid manure applications increase the soil moisture.

  An application of 13,500 gallons of liquid manure is equivalent to adding half an inch of water to your fields.

- ☑ Snow-covered and frozen fields are high risk.

  If you have snow cover on your fields but the majority of the basin does not, your fields may be at a greater risk for runoff even if the map does not show this.

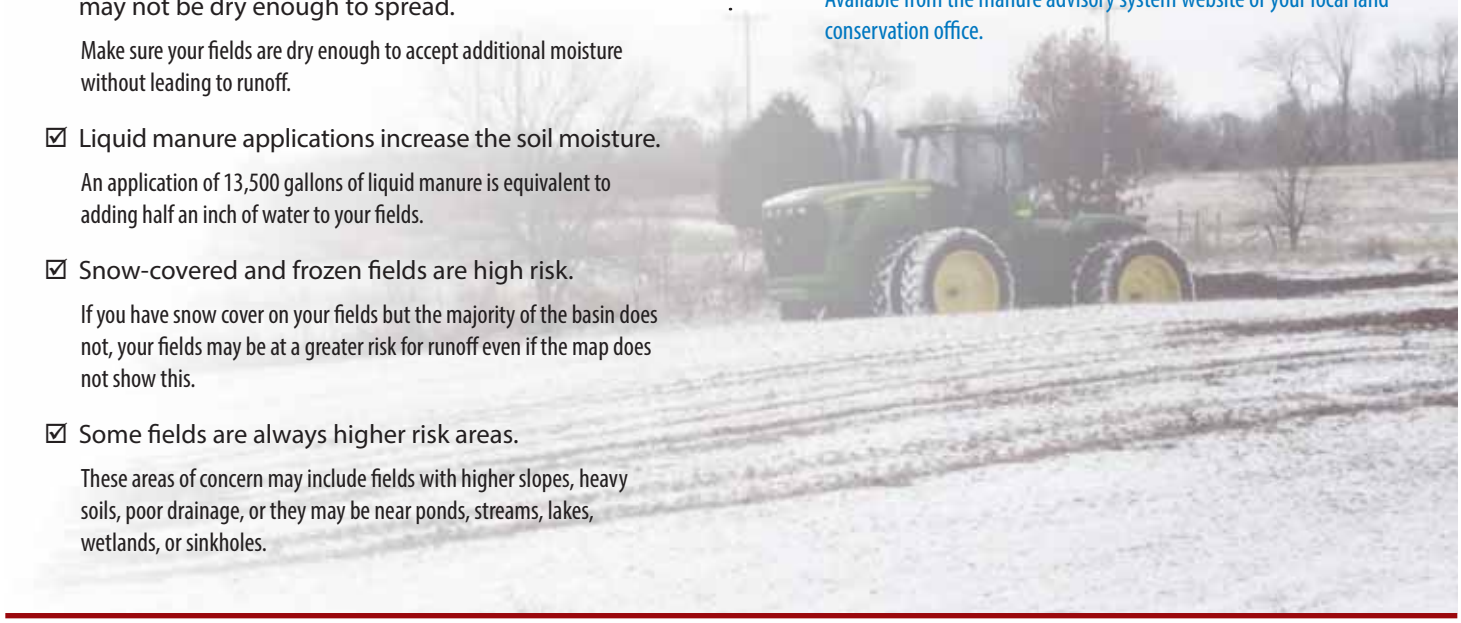
- ☑ Some fields are always higher risk areas.

  These areas of concern may include fields with higher slopes, heavy soils, poor drainage, or they may be near ponds, streams, lakes, wetlands, or sinkholes.

If spreading is unavoidable

- ☑ Apply to your driest fields.
- ☑ Apply to fields with the most surface roughness.
- ☑ Use your nutrient management plan or conservation plan to find fields with:
  - Low slope, low erosion, and low nutrient delivery potential.
  - Apply to flatter fields that do not have channelized flow.
- ☑ Apply to fields farthest from surface water, conduits to groundwater, and areas of concentrated flow.
- ☑ Use the 590 restriction maps to identify lower risk areas.

  Available from the manure advisory system website or your local land conservation office.



The Runoff Risk Advisory Forecast is available as a mobile app!

www.manureadvisorysystem.wi.gov/app/runoffrisk

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Nutrient Management Planning

IS IT WORTH IT?

A nutrient management plan can take some time, but when you do the math, it can have real value. A nutrient management plan can identify areas where more or less fertilizer is needed, possibly saving you money.

LEGUME CREDITS

Bob takes 20 acres out of alfalfa and plants them to corn. The alfalfa stand is in poor condition and was terminated with less than 8 inches of regrowth, which provides 90 lbs/a of nitrogen as a legume credit.

The nitrogen recommendation for Bob's corn is 190 lbs/a. So after taking the legume credit, he only needs 100 more lbs of nitrogen per acre, cutting his fertilizer needs nearly in half!

At 50¢/lb, the savings of nitrogen fertilizer by crediting legumes equals $900!

Bonus: If the poor alfalfa stand had more than 8 inches of regrowth before terminating, Bob would have received an even higher legume credit, resulting in more savings!

ROTATIONAL BENEFITS

Sharon is growing corn after wheat on 30 acres. From the rotational benefit of her wheat, the nitrogen recommendation of corn on a high yield potential soil of 190 lbs/a is reduced to 140 lbs/ac.

At 50¢/lb of N, this reduction in fertilizer equals $750!

MANURE CREDITS

Joe spreads manure on 50 acres that is corn ground going back into corn. He spreads 20 tons/a of solid dairy manure with an analysis of 2-3-5 (N-P-K). In 20 tons of manure, he gets a credit of 40-60-100 (N-P-K).

The fertility recommendation for 200 bushels of corn on a high yield potential soil with optimal P and K soil test levels is 190-75-60 (N-P-K).

Taking credit for the manure leaves a remaining fertilizer need of 150-15-0 (N-P-K).

At 50¢/lb of N, 42¢/lb of P, and 35¢/lb of K, the manure credits equals a fertilizer savings of $3,310!

Ask your agronomist or county land conservation department about cost share options available to further assist with nutrient management planning.

REDUCTION IN SOIL LOSS

When you lose soil, you lose fertility!

Through the planning process Tom reduced his soil loss on average by 1 ton of soil per acre across his 160 acre farm.

If one ton of soil has 2 lbs of nitrogen, 9 lbs of phosphorus and 31 lbs of potassium, and fertilizer prices are 50¢/lb of N, 42¢/lb of P, and 35¢/lb of K.

Tom saved $2,500 in fertilizer replacement costs!

What would it cost to write your own plan?

On a 160 acre farm:

10 hours of soil sampling @ $15 per hour* = $150

Soil sampling analysis @ $8 per sample for 32 samples = $256

12 hours of class @ $15 per hour* = $180

SnapPlus program for nutrient management planning = Free!

Total cost to create a nutrient management plan for your farm = $586

If you are in a certified farmland preservation zoning district, a nutrient management plan is a requirement for you to claim the farmland preservation tax credit. The farmland preservation tax credit provides $7.50 per acre.

Farmland preservation tax credit on 160 acres for 4 years @ $1,200 per year= $4,800!

$4,800 - $568 = $4,232 in your pocket*, not to mention all of the other potential savings!*

Soil sampling is done every 4 years

*$15/hr charge is to cover your own time.

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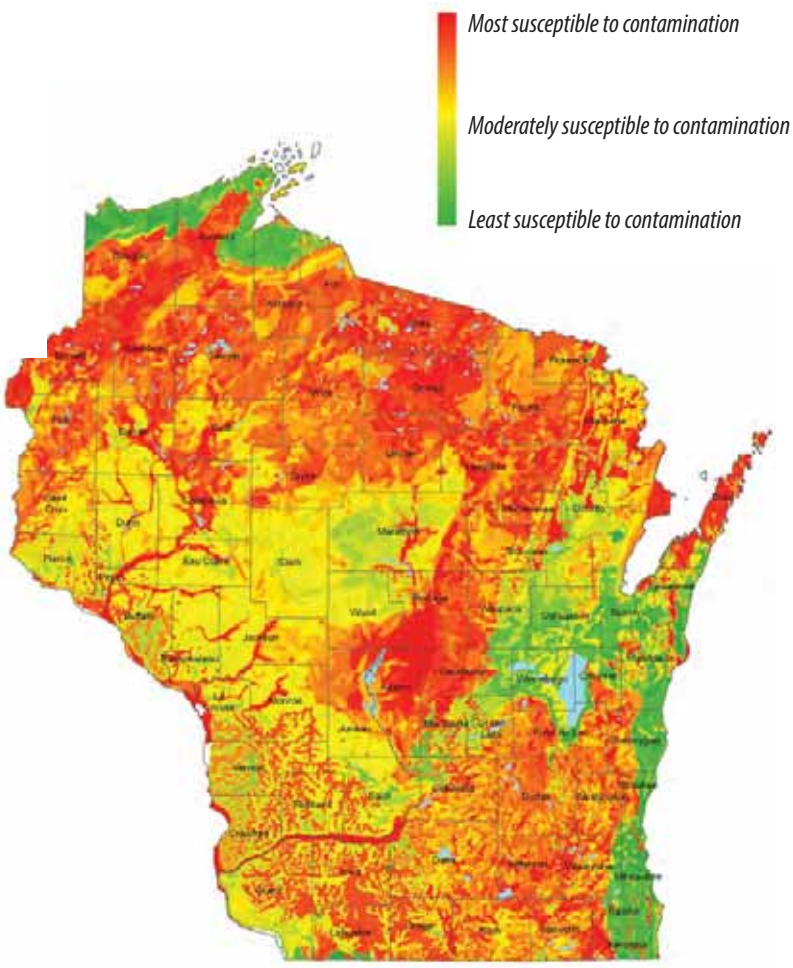
Nutrient Management Planning's Role in

Groundwater Protection

Preserving and enhancing the quality of Wisconsin's water resources is a high priority of the citizens of Wisconsin and the Department of Agriculture, Trade and Consumer Protection. DATCP's rule (ATCP 50) includes the provisions of the NRCS 590 Nutrient Management standard which contains significant requirements for the protection of both surface and groundwater.

Survey work conducted in Wisconsin presents convincing evidence that "nutrient management plans can influence N and P application rates and reduce the threat of non-point sources of pollution" (Shepard, 2005). A Wisconsin study on silt loam soils showed that applying N only to the crop's need, as required by the 590 standard, resulted in N concentrations that complied with the health standard (Norman, 2003). Increasing the cropland acreage following a nutrient management plan is therefore expected to significantly reduce negative impacts to the state's valuable water resources.

Groundwater Contamination Susceptibility of Soils in Wisconsin



"590" Groundwater Protection Features

UW Soil Fertility Recommendations:

- ☑ Nutrient recommendations are designed for maximum economic return, not maximum yield.
- ☑ Following the nitrogen recommendations reduces groundwater impacts resulting from over-application.

Nutrient Application Prohibitions:

- ☑ Nutrient application is prohibited within 50 feet of wells.
- ☑ Nutrients must be incorporated within 200 feet upslope of sinkholes, gravel and sand pits, wells, tile inlets, bedrock at the surface and between 50-200 feet upslope of wells.

Sensitive Soils Restrictions:

- ☑ Sensitive soils include highly permeable soils, soils with < 20 inches to apparent bedrock, and soils with < 12 inches to apparent water table.
- ☑ No fall application of commercial nitrogen (N).

On irrigated fields:

- ☑ Split N applications, applying the majority of N after crop establishment, or
- ☑ Use a nitrification inhibitor with ammonium forms of N.

Manure-N restrictions:

- ☑ When manure is fall applied and soil temperatures are >50° F:

  Use a nitrification inhibitor with liquid manure and limit rate to 120 lb N/acre, **or**

  Apply after Sept. 15 and limit rate to 90 lb N/acre, **or**

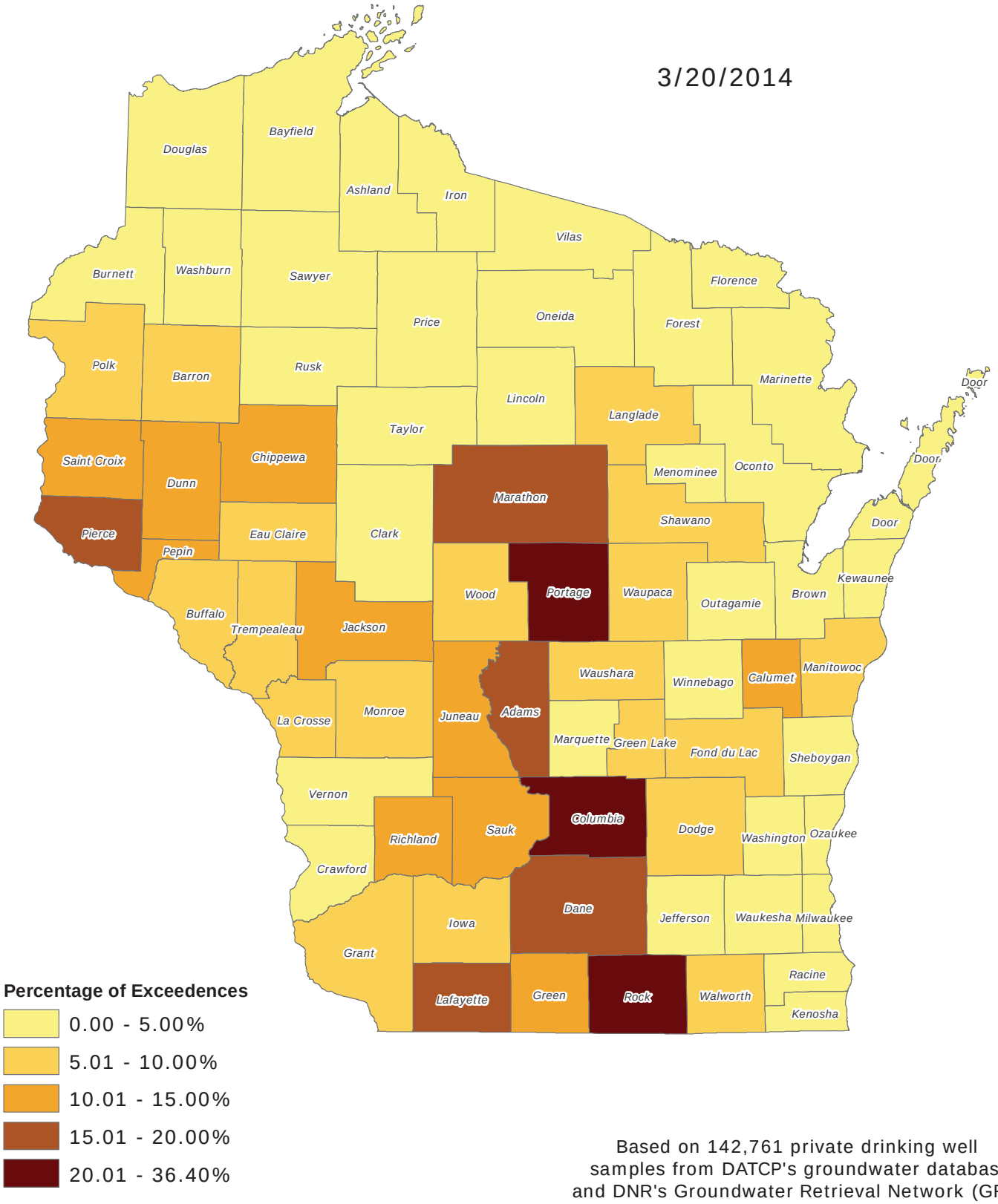
  Apply to perennial or fall-seeded crops and limit rate to 120 lb N/acre or crop N need, whichever is less.
- ☑ When manure is fall applied and soil temperatures are <50° F, limit application rate to 120 lb N/acre or the crop's N need, whichever is less.

Norman, J. M. (2003). "Agrochemical Leaching from Sub-Optimal, Optimal and Excessive Manure-N Fertilization of Corn Agroecosystems." Final Report to the WI Dept of Agriculture, Trade and Consumer Protection.

Shepard, R. (2005). Nutrient management planning: Is it the answer to better management? J. Soil Water Conserv. 60:171-176.

Wisconsin Department of Natural Resources Drinking Water & Groundwater Quality Standards/Advisory Levels = 10 mg/L for Nitrate (as N).

Percentage of Nitrate Samples Exceeding the Health Standard



Percentage of Exceedences

- 0.00 - 5.00%
- 5.01 - 10.00%
- 10.01 - 15.00%
- 15.01 - 20.00%
- 20.01 - 36.40%

Based on 142,761 private drinking well samples from DATCP's groundwater database and DNR's Groundwater Retrieval Network (GRN)

NPM

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August 2014

SnapPlus

Wisconsin's Nutrient Management Software

Basic Concepts

Do I submit my soil samples differently if I am using SnapPlus?

When sampling soils for testing with the intention of creating a nutrient management plan in SnapPlus, ***you do not have to complete the entire Soil Submission sheet for the soil testing lab***. Only minimal information is needed—**all contact information** (including email so you receive results in a format that can be uploaded into SnapPlus), **field name** and **soil sample number**. You will enter the rest of the information needed to get your recommendations directly into SnapPlus .

If you want recommendations as soon as you receive your soil sample results prior to uploading into SnapPlus, then you should fill out the entire submission form.

When should you take soil samples?

Fall sampling is ideal, as you will get the results back in time to plan for the next cropping season. Whether you complete sampling in the spring or fall, be sure to resample at a maximum of four years later during the same season (if you sample in the fall, resample in the fall, etc).

What do soil test results tells you?

Routine analysis of soil samples includes plant-available phosphorus (P) and potassium (K) levels, organic matter content (%), and soil pH. Once uploaded into SnapPlus, the information is used to make crop-specific fertilizer and lime recommendations.

Interpreting the Results

If you do not plan your nutrient applications in SnapPlus to the Univesity of Wisconsin's recommendation level, the program will show you if you are over (as a postive number) or under (as a negative number). To learn more, see Chapter 7 of A2809 *Nutrient Application Guidelines for Wisconsin*.
http://learningstore.uwex.edu/Assets/pdfs/A2809.pdf

Helpful resources

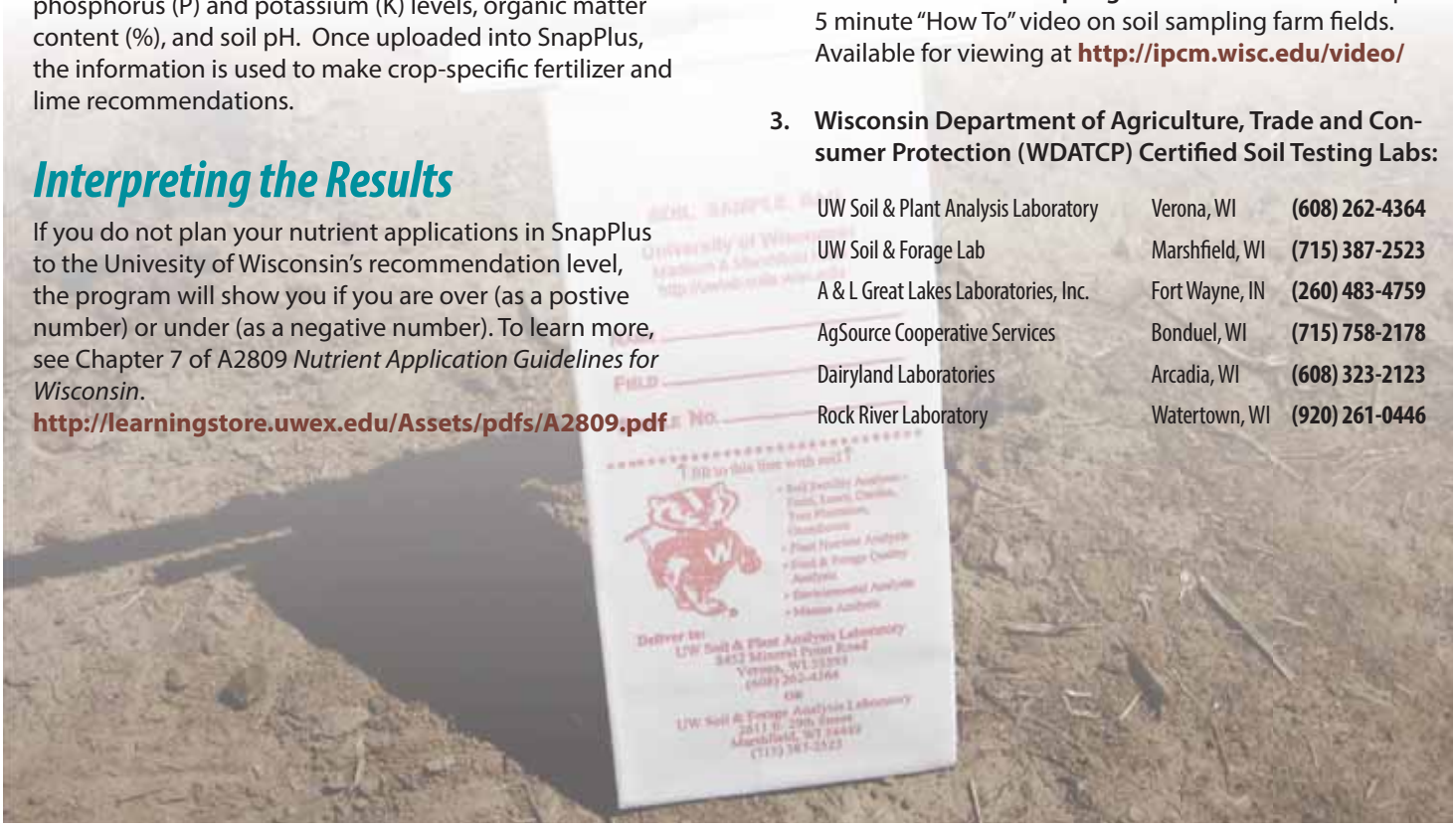
Now that you have decided to test the soils on your farm, here are some quick references you may find helpful if you plan to complete the soil sampling on your own:

1. **A2100 Sampling Soils for Testing** provides guidance for accurate soil sampling. Available for viewing at **http://learningstore.uwex.edu/Assets/pdfs/A2100.pdf**

2. **VIDEO: Basic Soil Sampling for Wisconsin Soils** is a quick 5 minute "How To" video on soil sampling farm fields. Available for viewing at **http://ipcm.wisc.edu/video/**

3. **Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) Certified Soil Testing Labs:**

UW Soil & Plant Analysis Laboratory	Verona, WI	**(608) 262-4364**
UW Soil & Forage Lab	Marshfield, WI	**(715) 387-2523**
A & L Great Lakes Laboratories, Inc.	Fort Wayne, IN	**(260) 483-4759**
AgSource Cooperative Services	Bonduel, WI	**(715) 758-2178**
Dairyland Laboratories	Arcadia, WI	**(608) 323-2123**
Rock River Laboratory	Watertown, WI	**(920) 261-0446**



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June 2014

Department of Soil Science
College of Agricultural and Life Sciences
Univ. of Wisconsin – Madison/Extension

Soil & Plant Analysis Lab, 8452 Mineral Point Rd, Verona, WI 53593
Soil & Forage Analysis Lab, 2611 Yellowstone Dr, Marshfield, WI 54449
http://uwlab.soils.wisc.edu

Soil Submission Sheet for Field, Vegetable and Fruit Crops

For Lab Use Only:
Date:
Lab No:

Please check how you would like to receive your results:
❒ U.S. Mail ❒ Email :
Name:
Address:
City: State: Zip: Phone:

Method of Payment:
Account ID
OR Amount Paid $
❒Cash
❒Check No.
❒Credit Card
We'll call for number.

TOTAL # SAMPLES: **PLOW DEPTH:** **COUNTY OF SOIL ORIGIN (required):**

FIELD ID	SAMPLE NO(S)	Check if Irrigated	Check if tiled	Check if 0-2" pH Samples	SOIL NAME (**required**)	Acres in Field	Slope %	4-YEAR CROP ROTATION: Sequence to be Grown (crop code)	4-YEAR CROP ROTATION: Yield Goal	FERTILIZER CREDIT INFORMATION – Previous Legume Crop: Legume Crop (crop code)	Previous Legume Crop: Legume Forage % stand (circle)	Previous Legume Crop: Check if more than 8" regrowth in fall	Manure Applied to Field Since Last Crop: Manure Code (See below)	Manure Applied to Field Since Last Crop: Application Rate T/a gal/a	Manure Applied to Field Since Last Crop: Time to Incorp (Circle one)	Manure Applied to Field Since Last Crop: Consec. Years of Application (circle)
											< 30 30-70 > 70				>72 hrs 1 -72 hrs < 1 hr	1 2 3+
											< 30 30-70 > 70				>72 hrs 1 -72 hrs < 1 hr	1 2 3+
											< 30 30-70 > 70				>72 hrs 1 -72 hrs < 1 hr	1 2 3+
											< 30 30-70 > 70				>72 hrs 1 -72 hrs < 1 hr	1 2 3+
											< 30 30-70 > 70				>72 hrs 1 -72 hrs < 1 hr	1 2 3+
											< 30 30-70 > 70				>72 hrs 1 -72 hrs < 1 hr	1 2 3+
											< 30 30-70 > 70				>72 hrs 1 -72 hrs < 1 hr	1 2 3+
											< 30 30-70 > 70				>72 hrs 1 -72 hrs < 1 hr	1 2 3+
											< 30 30-70 > 70				>72 hrs 1 -72 hrs < 1 hr	1 2 3+
											< 30 30-70 > 70				>72 hrs 1 -72 hrs < 1 hr	1 2 3+

Tests include: pH, lime requirement, organic matter, available phosphorus (P) and available potassium (K).

Special Soil Tests (for an additional fee)
(List field or sample number)

Calcium/Magnesium	Zinc
Boron	Sulfate
Manganese	Other

Soil tests recommended if:

growing corn (field or sweet) **Zn and SO_4-S**
growing legume forage **B and SO_4-S**
growing small grain or soybean (with soil pH >7.0) **Mn**
growing potato or apple (with pH < 5.5) **Ca/Mg**
growing specialty or vegetable crops **B, Zn, and Mn**
acid or sandy soil with high amounts of applied K **Ca/Mg**

Manure Code List

Solid	Liquid
1 Dairy: semi	11 Dairy: liquid
2 Dairy: solid	12 Dairy: slurry
3 Beef	13 Veal calf
4 Swine	14 Beef
5 Duck	15 Swine, indoor pit
6 Chicken	16 Swine, outdoor pit
7 Turkey	17 Swine, farrow-nursery indoor pit
8 Sheep	18 Poultry
9 Horse	19 Goat
10 Goat	

A2100

Sampling soils for testing

John B. Peters and Carrie A.M. Laboski

A soil test is the only practical way of determining whether lime and fertilizer are needed for a specific crop. However, if a soil sample does not represent the general soil conditions of the field, the recommendations based on the sample may be misleading. An acre of soil to a 6-inch depth weighs about 1,000 tons, yet less than 1 ounce of soil is used for each test in the laboratory. Therefore, it is very important that the soil sample be representative of the entire field.

Before collecting soil samples, you should determine the overall approach of the nutrient management program. This will affect the number of samples needed and method by which samples will be taken. Specifically, will nutrient and lime applications be made at a single uniform rate for the whole field being tested or will applications be made at variable rates to field areas that have been identified as having different soil test levels?

Goals of a soil sampling program

When sampling soils for testing and obtaining fertilizer and lime recommendations, the most common objectives are to:

1. Obtain samples that accurately represent the field from which they were taken.
2. Estimate the amount of nutrients that should be applied to provide the greatest economic return to the grower.
3. Estimate the variation that exists within the field and how the nutrients are distributed spatially.
4. Monitor the changes in nutrient status of the field over time.

Selecting a soil sampling strategy

Before selecting a sampling strategy, consider analytical costs, time and equipment available, field fertilization history, and the likelihood of a response to applied nutrients.

Sampling fields for a single whole field (uniform) recommendation

With conventional sampling, you will receive a single set of nutrient and lime application guidelines that are based on sample averages. The sampling guidelines in Table 1 are based on when a field was last tested (more or less than 4 years ago) and whether the field was responsive or nonresponsive the last time it was tested. The field is considered to be in the responsive range if either soil test phosphorus (P) or potassium (K) levels are in the high (H) category or lower. A nonresponsive field is one where both soil test P and K levels are in the very high (VH) or excessively high (EH) categories.

Table 1. Recommended sample intensity for uniform fields.

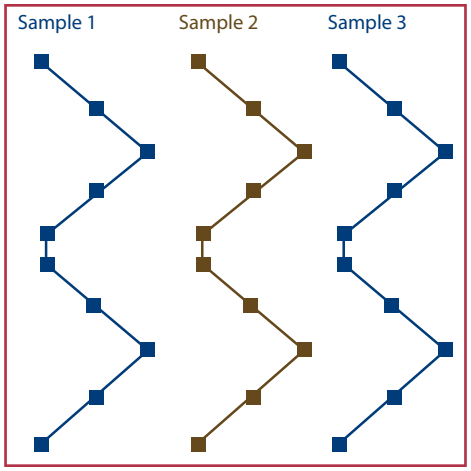
Field characteristics	Field size (acres)	Suggested number of samples[a]
Fields tested more than 4 years ago **OR** fields testing in the responsive range	All fields	1 sample/5 acres
Nonresponsive fields tested within past 4 years	5–10	2
	11–25	3
	26–40	4
	41–60	5
	61–80	6
	81–100	7

[a] Collect a minimum of 10 cores per sample.

Each sample should be made up of a minimum of 10 cores to ensure accurate representation of the nutrient needs of the field. Research has shown that taking 10 to 20 cores provides a more representative sample of the area than when samples are made up of fewer cores. When gathering soil cores to make a composite sample, use a W-shaped sampling pattern (as shown in Figure 1) over the whole area the sample represents. Be sure to thoroughly mix the cores before placing approximately 2 cups in the sample bag.

For best results, submit multiple samples for all fields. When at least three samples are provided for a field, samples that are significantly higher than the field average may be discarded and an adjusted average calculated. Using an adjusted

Figure1. Recommended W-shaped sampling pattern for a 15-acre field. Each sample should be composed of at least 10 cores.



average helps ensure that no part of the field is under-fertilized.

Where only one or two samples are taken in a field, no sample will be discarded, whereas one sample can be discarded if three or four samples are taken, and up to two samples may be discarded from fields having five or more samples. The criteria that determine if soil samples should be omitted from the field average include:

- If the average soil test P for a field is 35 parts per million (ppm) or less, samples that exceed the field average by more than 5 ppm may be removed and the field average recalculated.
- If the field average is greater than 35 ppm P, no samples will be discarded.
- If the average soil test K for a field is 175 ppm or less, samples that exceed the field average by more than 20 ppm may be discarded and the field average recalculated.
- If the field average is greater than 175 ppm K, no samples will be discarded.

It is not appropriate to vary nutrient application rates across sampling areas when using the whole field (uniform) soil sampling scheme.

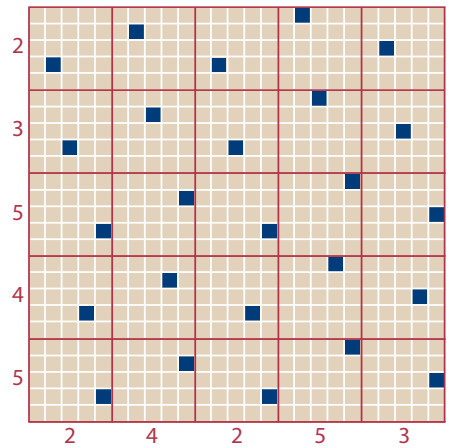
Sampling fields for site-specific management

Site-specific management requires a distinct picture of the magnitude and location of soil test variability. Sampling soils for site-specific management usually involves taking many more composite samples than sampling for a single recommendation. A global positioning system (GPS) is used to record the geographical coordinates of each sample. This information is used to generate an application map by using various mathematical techniques to interpolate the nutrient application rate between sampling points. Using variable rate application technology, these fields can be managed more intensively than the conventional approach of one fertilizer and lime rate per field. A careful evaluation of the economics of this intensive of a sampling system needs to be done before proceeding.

When using a site-specific approach to soil sampling, sample handling and testing are similar to the traditional system, but recommendations may vary from one part of the field to another, and these areas must be managed separately to realize the potential advantages of intensive soil sampling.

Several sampling strategies can be used to guide variable-rate fertilizer and lime applications. Grid sampling uses a systematic approach that divides the field into squares of approximately equal size (grid cells). The sampling technique used is known as **grid-point sampling**. A grid-point sample consists of at least 10 cores collected from a small area (10-foot radius) around a geo-referenced point. When using a grid sampling approach, Wisconsin research recommends a sampling strategy based on an unaligned systematic grid (Figure 2). Sampling points should be unaligned because sampling in a uniform grid arrangement may lead to biased results if aligned with row patterns. Fields that have soil test P and K levels in the nonresponsive categories should be grid-point sampled on a 300-foot grid. This is equivalent to one soil sample for every 2 to 2.5 acres. Where there is no information about the P or K status of the field or where previous tests were in the responsive range, a 200-foot grid size should be used. This is equivalent to approximately one soil sample per acre. Wisconsin research indicates these small grid cell sizes are needed to adequately characterize the variability in soil fertility. A larger grid cell size (such as 5 acres) may not adequately describe the field variability and may limit the potential economic benefits of site-specific management.

Figure 2. An example of an unaligned grid pattern for grid sampling fields.



Other considerations in selecting a sampling strategy

Select the sampling strategy appropriate for the field size and topography.

Contour strips. On contour strip fields, sample each strip separately if it is approximately 5 acres or more in size, following the sampling intensity guidelines provided in Table 1. Cores from two or three small strips that have identical cropping and management histories may be combined following these same recommended sampling intensity guidelines. Using a grid-point sampling approach on contour strips or small fields is not appropriate, regardless of grid cell size. This is because a grid technique may result in many soil samples being collected from one contour strip but none in other strips; additionally, grid-point samples may be on the edge of the strips and not adequately represent the strip.

Five-acre grid-point sampling. The 5-acre grid point sampling system for whole field management recommendations has recently become popular with soil samplers because it takes less time to collect cores, compared to the traditional W pattern. Another advantage of this approach is its ability to track changes in soil test levels over time, because soil samples are collected from the same geo-referenced point each time the field is sampled. Five-acre grid-point sampling can likely be used in some situations and not in others. For example, in fields that were soil sampled within the past 4 years and tested in the nonresponsive range, averaging the soil test results from 5-acre grid-point sampling is reasonable. This is because there previously had not been a fertilizer recommendation on these fields and some variability at excessively high soil test levels does not change the fact that no fertilizer was recommended. For fields that were sampled more than 4 years ago or where past soil test results were in the responsive range, 5-acre grid-point sampling may not be the best choice of sampling techniques. This is because 5-acre grid-point sampling may not adequately represent the variability within a field, and a comparatively small change in soil test level of 5 to 10 ppm could mean a large change in the amount of nutrients recommended. For

small fields and contour strips, taking a few 5-acre grid-point samples in each field and averaging them likely does not provide a representative sample of the field. Additionally, the total number of samples may be so few that none of them can be eliminated from the field average if it appears one is an outlier.

Smart (zone or directed) sampling. Another approach gaining support among researchers is smart sampling, also known as directed or management zone sampling. This approach uses information that has been collected using other precision agricultural technologies such as yield maps, aerial photographs of bare soil or crop canopy, or soil electrical conductivity measurements. Directed sampling evaluates the spatial distribution of several factors that may influence nutrient availability and crop productivity to help define sampling areas with similar characteristics. With previous comments in mind, either the W pattern or grid-point method can be used to collect samples within management zones. If the results of grid or management zone sampling do not warrant variable-rate application (for example, relatively little between-sample variation), average them to determine the appropriate single-rate treatment.

Procedures for taking soil samples

When to take soil samples

Take soil samples at any convenient time. Studies examining the effect of sampling time on soil test results suggest that test values for pH and phosphorus (P) are typically slightly higher in early spring samples than in fall samples. The effect of time of sampling on soil test potassium (K) results is dependent upon clay mineralogy and soil test level. Soil test K results may be higher in spring compared to fall on lower testing soils, but on higher testing soils, soil test K may be lower in spring compared to fall. To receive your recommendations early enough to enable you to apply the lime and fertilizer needed, it may be best to sample in the fall. Another benefit of fall testing is that fertilizer prices are more likely to be discounted then. Hayfields can be sampled after any cutting. Regardless of when you sample, it is best to be consistent from one year to the next.

Winter sampling, or sampling when the soil is frozen, is permissible only when it is possible to take a uniform boring or core of soil to the appropriate depth. This may require using a portable power boring tool. Using a pick or spade to remove a few chunks of frozen soil from the surface will give inaccurate results.

How to take soil samples

Certain government agency programs require nutrient management plans prepared according to the current USDA-NRCS nutrient management standard (590). Soil sampling and testing procedures and nutrient application rates based on these soil tests must be consistent with the provisions of the 590 standard to be eligible for many cost-sharing programs. These provisions currently include: following the soil sampling techniques outlined above, soil testing by a Wisconsin certified laboratory, and use of nutrient application rates consistent with the guidelines contained in the University of Wisconsin-Extension publication *Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin* (A2809).

When ready to sample, use a sampling probe or auger. You can obtain these tools on loan from most county Extension offices (counties.uwex.edu) or fertilizer dealers. Avoid sampling the following areas:

- Dead furrows or back furrows
- Lime, sludge, or manure piles
- Animal droppings
- Near fences or roads
- Rows where fertilizer has been banded
- Eroded knolls
- Low spots
- Where stalks or large bales were stacked
- Headlands

In addition, avoid sampling areas that vary widely from the rest of the field in color, fertility, slope, texture (sandy, clayey, etc.), drainage, or productivity. If the distinctive area is large enough to receive lime or fertilizer treatments different from the rest of the field, sample it separately.

These steps will help you take full advantage of the Wisconsin nutrient application guidelines and must be followed to be consistent with the 590 standard.

1. If manure or crop residues are on the surface, push them aside to keep from including them in the soil sample.
2. Insert the probe or auger into the soil to plow depth or at least 6 inches. The sampling depth should be consistent. To aid year-to-year comparisons, it is important to take repeated samplings from the same field to exactly the same depth.
3. Take at least 10 soil cores or borings for each composite sample and, preferably, at least two composite samples for every field. For nonresponsive fields greater than 5 acres in size, obtain, at a minimum, the number of samples specified in Table 1. For responsive fields, as well as all fields that have not been sampled in the past 4 years, take one composite sample for every 5 acres.
4. Thoroughly mix the sample, then place about 2 cups of soil in a sample bag.
5. Identify the bag with your name, field identification, and sample number.
6. Record the field and sample location on an aerial photo or sketch of the farm and retain for your reference. Record the GPS coordinates, if available.
7. Fill out the soil information sheet. A completely and carefully filled out information sheet will provide the most accurate nutrient recommendations.

Always include a soil test information sheet when submitting soil samples to a laboratory for testing. The soil test information sheet used by the UW Soil Testing Laboratories can be found at: http://uwlab.soils.wisc.edu/files/forms/rfs_front.pdf.

Provide the soil name and field history whenever possible for more accurate recommendations. Information about legume crops previously grown on the soil and manure application history is essential for proper nutrient crediting from these sources. Include soil names and/or map unit symbols from county soil

survey reports, web soil survey (http://websoilsurvey.nrcs.usda.gov/app/), or individual farm conservation plans. To obtain this information, contact your county Extension agent, NRCS district conservationist, or the County Land Conservation Department (LCD).

How often to sample

Most fields should be retested at least every 4 years to monitor soil fertility levels of immobile nutrients and pH to prevent nutrient deficiencies and avoid excess nutrient accumulation. Crop nutrient removals over a 4-year period in most cropping systems will not change soil test levels enough to affect recommended nutrient application rates. Exceptions include sands and loamy sands, which should be tested every 2 years. Also, depending on the initial soil test P and K levels, cropping systems such as high-yielding corn silage or alfalfa may require more frequent testing to adequately monitor changes in soil test levels.

What to do with soil samples

The soil samples and a completed soil information sheet can be taken to your county Extension office for forwarding to a certified soil testing laboratory, sent directly to the soil testing laboratory, or delivered in person.

To receive nutrient application rate guidelines consistent with those found in A2809, submit your soil samples to one of the Wisconsin certified laboratories. The College of Agricultural and Life Sciences, University of Wisconsin–Madison and the University of Wisconsin-Extension, through the Department of Soil Science, operate soil testing laboratories at Madison and Marshfield. Several private laboratories are also certified, and are listed at http://uwlab.soils.wisc.edu/wdatcp/. To become certified, laboratories must use the soil testing methods and nutrient application rate guidelines specified by WDATCP and must also meet quality control standards through periodic analysis of quality control soil samples.

To have your soil tested by the University of Wisconsin, send your samples to either of the listed laboratories. Find a sample submission form at https://uwlab.soils.wisc.edu/farm-soil/.

Tillage system considerations when sampling

Moldboard plowing. Sample to the depth of tillage.

Chisel plowing and offset disking. Take soil samples to ¾ of the tillage depth. When possible, take soil samples before spring or fall tillage. Sampling before tillage lets you determine the sampling depth more accurately and avoid fertilizer bands applied for the previous crop.

Till-plant and ridge tillage. Sample ridges to a 6-inch depth and furrows (between rows) to a depth of 4 inches. Combine equal numbers of soil cores from ridges and furrows to make up the composite sample.

No-till. Fields that have not been tilled for 5 or more years may develop an acid layer on the surface from the use of nitrogen fertilizer. This acid layer could reduce the effectiveness of triazine herbicides. Unincorporated phosphorus (P) and potassium (K) are also likely to build up in the surface soil. If an acid layer is suspected, take a separate sample to a depth of only 2 inches. When sending the soil to the lab, indicate that the sampling depth was only 2 inches. This sample will be tested for pH only, unless P and K are specifically requested. For fertilizer recommendations, take a separate sample to a depth of 6 to 7 inches. Fertilizer recommendations require this sampling depth because fertilizer calibration studies are based on plow-depth sampling. Sample between rows to avoid fertilizer bands.

Soil and Plant Analysis Laboratory
8452 Mineral Point Road
Verona, WI 53593-8696
(608) 262-4364

Soil and Forage Analysis Laboratory
2611 Yellowstone Drive
Marshfield, WI 54449-8401
(715) 387-2523

UW Extension
Cooperative Extension

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This publication is available from your county UW-Extension office (www.uwex.edu/ces/cty) or from Cooperative Extension Publishing. To order, call toll-free 1-877-947-7827 or visit our website at learningstore.uwex.edu.

Know How Much You Haul !

NPM

To use manure as a quality, dependable fertilizer, you must accurately determine your spreading rate and calculate your manure nutrient credits. This whole process can take less than a hour! All you need to get started is this sheet, a calculator and portable axle scales. Contact your land conservation department, county extension agent or the Nutrient and Pest Management Program (see other side for NPM contact information) for assistance with scales.

STEP 1. DETERMINE LOAD WEIGHT

TOOLS NEEDED: CALCULATOR, PORTABLE AXLE SCALES

Using a typical load size, the tractor with spreader is weighed empty and full, axle by axle.

What is typical? If you normally haul one load every day at about the same time, weigh a load with 24 hours worth of manure. Or if you normally wait until the spreader is filled to capacity, weigh the spreader filled.

STEP 2. DETERMINE SPREADING RATE

TOOLS NEEDED: CALCULATOR AND FIELD RECORDS OR MEASURING WHEEL*

You can now calculate your tons per acre spreading rate using field records on how many loads you put on a particular field of known acreage (see equations on other side). This rate can be considered the "standard" for the farm. Make sure you use typical ground speed, PTO speed and spreader settings.

To develop variable rates (such as high, medium and low) experiment with different speeds and spreader settings. These rates could be useful when dealing with fields that have special fertilizer, tillage or environmental considerations.

*You can get an estimate of a per acre rate right away by using a measuring wheel on the area just spread. Use caution with this method since it does not take into account overlap or load tapering.

STEP 3. DETERMINE MANURE NUTRIENT CREDITS

TOOLS NEEDED: CALCULATOR

Using University of WI guidelines (table on other side) you can estimate the available nutrient content per ton of the manure you are spreading. You can also have your manure analyzed for its specific nutrient content. From either of those numbers, you can figure your manure nutrient credits per acre. (If you develop variable rates, use additional sheets to determine their manure nutrient credits.) Now you have the information you need to accurately use manure as a fertilizer!

It's a good idea to repeat this process for any different types of spreaders or manure you routinely apply on your farm. For more copies of this publication or information on developing a nutrient management plan for your farm, contact your land conservation department, county extension agent or the NPM program.

Spreader Information | Manufacturer / Manure Type / Ground Speed / PTO Speed / Spreader Settings

STEP 1. DETERMINE LOAD WEIGHT

FULL	Left wheel		Right wheel		
Rear tractor axle					
Front spreader axle					
Rear spreader axle					full total lb
		+		=	

EMPTY					
Rear tractor axle					
Front spreader axle					
Rear spreader axle					empty total lb
		+		=	

full total - empty total [ ] ÷ 2000 = [ ] tons manure/load

STEP 2. DETERMINE SPREADING RATE

Method 1: Using field records, enter the number of loads applied on a known acreage.

# of loads		# of acres		loads /acre		tons manure/load		tons / acre
	÷		=		x		=	

Method 2: Estimation only. Using a measuring wheel, measure the area covered by a single load.

tons manure/load				ft wide		ft length		tons / acre estimate
[ ]	x	43,560 ft²/acre	÷	[ ]	x	[ ]	=	

STEP 3. DETERMINE MANURE NUTRIENT CREDITS

Enter the available nutrient content of manure

	lb/ton		tons / acre		lb/acre
N		x		=	
P_2O_5		x		=	
K_2O		x		=	

Multiply the nutrient content by the spreading rate to get the pounds per acre of each nutrient.

Estimated Available Manure Nutrient Content for crop use in the first year after spreading solid manure.

(Manure nutrient content can vary greatly, manure analysis is encouraged.)

Animal	N more than 3 days*	N 1 hour to 3 days	N less than 1 hour	P_2O_5	K_2O
	----------lb/ton----------				
(>20% dry matter) Dairy	2	3	3	3	6
(11-20% dry matter) Dairy	2	2	3	3	5
Beef	3	4	5	6	10
Swine	7	9	12	10	8
Chicken	24	27	29	35	26

*Time to incorporation

For assistance with scales, information about nutrient management, or more copies of this publication,contact the Nutrient and Pest Management Program at our UW-Madison office by phone at **(608) 265-2660**, or email us at **npm@hort.wisc.edu** or visit our website at **ipcm.wisc.edu**

NPM July 2014

SAMPLING MANURE FOR ANALYSIS

Why Test Manure?

No two farming systems are exactly alike, neither is the manure produced on them. Nutrient content of manure varies from farm to farm due to a number of factors—including animal type, bedding, ration, storage/handling, and other herd management practices.

Nutrient values can be assigned by using University of Wisconsin "book "nutrient values for manure; however, testing manure for your farm will better indicate how animal management and other factors affect nutrient content. Ultimately, the goal is to identify the most accurate estimate of nutrient content of the manure to ensure accurate crediting of the manure when applied to cropland.

Manure sampling techniques can greatly influence the results. Following the recommended sampling procedures outlined in this publication will improve the accuracy of the manure nutrient analysis results from the testing lab.

However, variability can exist among different samplings even when they are taken by the same individual under ideal conditions. Due to these variations over time, manure nutrient concentration values used to determine field nutrient credits should ideally be based on long-term farm averages, assuming herd and manure management practices have not changed significantly. If an established baseline level does not exist for a farm, manure testing needs to be done frequently and consistently to develop a historic record that spans at least 2-3 years. Preferably, manure sampling and analysis should be done just prior to land application, with the time of year noted to monitor potential seasonal variability.

Note about submitting samples: Keep manure sample frozen until shipped or delivered to a laboratory. Ship early in the week (Mon-Wed) and avoid holidays and weekends.

This publication is available from the Nutrient and Pest Management Program, please contact us:
by phone (608) 265-2660,
email: npm@hort.wisc.edu or
visit our website at ipcm.wisc.edu

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June 2014

Recommended Sampling Procedures

For all samples, identify the sample container with information regarding the farm, animal species and date. This information should also be included on the Manure Analysis Information sheet (see back of page example sheet along with a list of testing labs).

Solid Manure – dairy, beef, swine

While Loading

Take a pitchfork and grab multiple samples (at least 5) while loading several spreader loads and mix them in a bucket to create one composite sample. After thoroughly mixing, fill a one gallon plastic bag half full, squeeze out excess air, close and seal. Store sample in a freezer if not immediately delivered to a lab.

Daily Haul

Place a 5 gallon bucket under the barn cleaner 4-5 times while loading a spreader. Thoroughly mix the 4-5 samples together to create one composite sample. After thoroughly mixing, fill a one gallon plastic bag half full, squeeze out excess air, close and seal. Store sample in a freezer if not immediately delivered to a lab.

Stack or Bedded Pack

Sampling from a stack or bedded pack is not recommended. If sampling is necessary, use one of the other listed methods.

Solid Manure –poultry

Commonly 5-6 batches of birds are grown out before litter is removed. Poultry houses are normally sampled when the last batch of birds is removed from the house, since the nutrient content in poultry litter will change over time. Therefore, sampling earlier is not recommended.

Collect approximately 10 samples from throughout the house, sampling to the depth the litter will be removed. Avoid feeding and watering areas. Thoroughly mix the samples together to create one composite sample. After thoroughly mixing, fill a one gallon plastic bag half full, squeeze out excess air, close and seal. Store sample in a freezer if not immediately delivered to a lab.

Liquid Manure – dairy, beef, swine

From Storage

Agitate storage facility thoroughly before sampling. Collect several samples (at least five) from the storage facility or during loading using a bucket. Combine samples in a 5 gallon pail and thoroughly mix them together to create one composite sample. After mixing, fill a one quart plastic bottle ¾ full and tightly screw on lid. Store sample in a freezer if not immediately delivered to a lab.

During Application-Irrigated manure

Place several buckets around field to catch manure from irrigation equipment. Combine samples in a 5 gallon pail and thoroughly mix them together to create one composite sample. After mixing, fill a one quart plastic bottle ¾ full and tightly screw on lid. Store sample in a freezer if not immediately delivered to a lab.

Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) Certified Soil Testing Labs that offer manure analysis:

UW Soil & Forage Lab	Marshfield, WI	**(715) 387-2523**
A & L Great Lakes Laboratories, Inc.	Fort Wayne, IN	**(260) 483-4759**
AgSource Cooperative Services	Bonduel, WI	**(715) 758-2178**
Dairyland Laboratories	Arcadia, WI	**(608) 323-2123**
Rock River Laboratory	Watertown, WI	**(920) 261-0446**

Department of Soil Science
College of Agricultural and Life Sciences
University of Wisconsin – Madison/Extension

Soil & Forage Analysis Laboratory
2611 Yellowstone Drive
Marshfield WI 54449-5501
Phone 715-387-2523 Fax 715-387-1723
website: http://uwlab.soils.wisc.edu

Lab Use nly
Date Rec'd

Report #

Manure nalysis nformation heet

Please check how you would like to receive your results:	Method of Payment:
☐ U.S. Mail ☐ Fax ☐ Email	Account ID
ounty here sample as ta en:	Amount Paid $
ame:	☐Cash
ddress:	☐Check No.
ity: tate: ip:	☐VISA/MC
Phone: Fax:	*We will call for the number.*
Email ddress:	

outine nalysis includes dry matter/ moisture, total nitrogen, phosphorus, potassium, and sulfur. $22.00*

	1st ample	2nd ample	rd ample	th ample
ample dentification:				
olid Manure (results reported in lbs/ton)	☐	☐	☐	☐
Li uid Manure (results reported lbs/1000 gal)	☐	☐	☐	☐
pecies:				
Treatment:				
Type of tora e:				
Type of eddin :				

1) Dairy
2) Veal/Dairy Calf
3) Beef
4) Swine-finish(indoor pit)
5) Swine-finish(outdoor pit)
6) Swine-farrow/nursery
7) Chicken-broiler
8) Chicken-layer
9) Turkey
10) Duck
11) Horse 13) Goat
12) Sheep 14) Other

a) None
b) Solid-liquid separation
c) Anaerobic digestion
d) Composting
e) Chemical additive (flocculants or coagulants)
f) Other (list)

1) daily haul
2) earthen pit
3) concrete pit
4) pit under barn
5) above ground tank
6) stacked pile-outside
7) stacked pile-inside
8) bedded pack
9) under cages
10) other (list)

1) sawdust/shavings/bark
2) shredded paper
3) hay/straw
4) sand
5) mattresses
6) other (list)

dditional Tests: (Price in addition to routine package. More if separate; call lab for quote.)

		1st ample	2nd ample	rd ample	th ample
Ammonium-Nitrogen (NH4-N)	$8.00	☐	☐	☐	☐
Ash	$5.00	☐	☐	☐	☐
C:N Ratio (est. from ash:TN)	$5.00	☐	☐	☐	☐
Total Minerals without chloride**	$16.00	☐	☐	☐	☐
Total Minerals with chloride**	$24.00	☐	☐	☐	☐
Other (please call for specifics)					

*Prices effective 3/1/12, subject to change. ** Samples forwarded to Madison lab for analysis, extra time required.

SnapPlus

Wisconsin's Nutrient Management Software

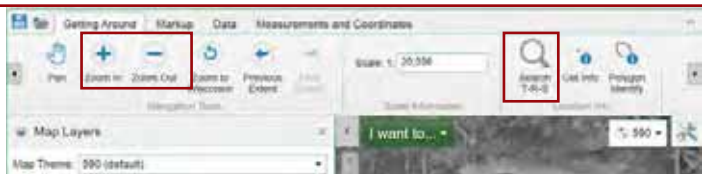
Basic Concepts

590 Restriction Maps: How to Customize Them

The Manure Advisory System's interactive online maps allow users to select areas of interest and create maps that span multiple sections. This publication is a step-by-step guide to creating, customizing and printing your maps. To make a map of your farm, go to **www.ManureAdvisorySystem.wi.gov** and select the Interactive Online 590 Restrictions map. Follow the prompts to get to the "Wisconsin 590 Nutrient Management Restrictions" GIS web-mapping application.

If you have any questions or problems, contact Stephanie Schneider at 715-456-3168 ext. 113 or **Stephanie.Schneider@wi.gov**

Step 1. In the Getting Around tab, zoom to your area of interest by either using the zoom tools or the "Search T-R-S" tool. On the left side of the screen, turn Monochrome Air photo on by checking the box and add any other layers that you want to view.

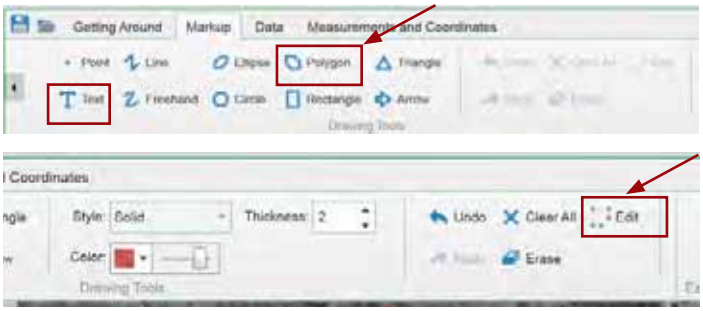


Step 2. In the Markup tab, add field boundaries. Zoom to each of your fields and draw in your field boundaries (recommended) or add shapefiles from the Data tab.

It is also advised that field boundaries are drawn with the polygon and not line tool. To end your polygon, just double-click on the last point.

Drawings are what you draw or markup inside this mapping program. Preset the appearance before drawing. To **edit** a field boundary after drawing: Click the "Edit Drawing" button; select (click on) the boundary you want to change; adjust the Border, Fill or Thickness parameters and click back on the polygon (field) to keep changes.

Shapefiles are imported from an outside source like an in-field GPS unit, GEO PDF, or another source (.shp, .dbg, .prj). Shapefiles cannot be edited after they are brought into the program. For this reason, it is recommended that you work with drawings instead of shapefiles when possible.



Appearance can be adjusted after drawing using these tools.

Step 3. Label your fields using the "Text" tool in the Markup tab (see image above for location of tool). Acreage can be calculated using the "Area" tool under the Measurements & Coordinates tab (be sure to set the area to acres).

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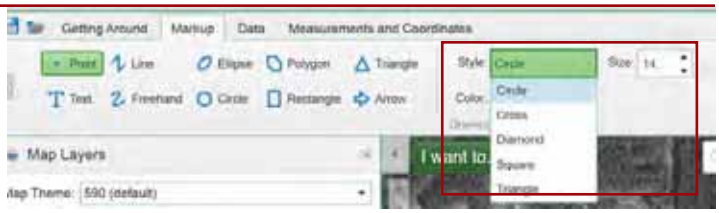
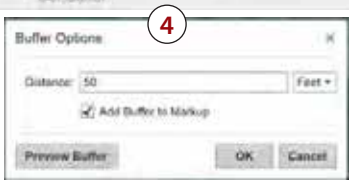
Step 4. Add field-level features (wells, direct conduits to groundwater)



Set appearance prior to drawing these features.

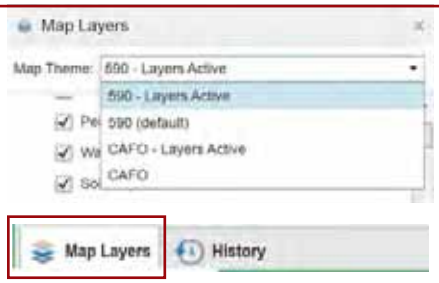
Step 5. In the Markup tab, add buffers around your farm's unique features (for example, wells need a 50 foot buffer).

1. Click the "Results for" dropdown and click "Select None" to uncheck all the boxes.
2. Check the "Buffer Shape" box in the Markup toolbar.
3. Click the "Point Identify" tool ("Polygon Identify" for polygon buffers) and click the center of the point you want to buffer.
4. In the "Buffer Options" pop-up set the desired buffer distance and units and check the "Add Buffer to Markup" box. Click preview to see the buffer on the map and Click "OK".



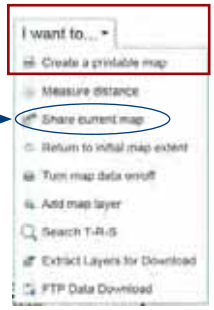
Buffer color cannot be changed at this time.

Step 6. You are almost ready to print. Make sure Map Layers is selected on the lower left hand side of the screen and then select "590-Layers Active" Map theme. This will add several useful layers to your map.



Step 7. In the Data tab, you can print your map using the "Print Map" tool, or you can use the "I want to" pulldown menu to "Create a printable map."

To make an image file (jpg), use the "Export Map as Image File" tool.

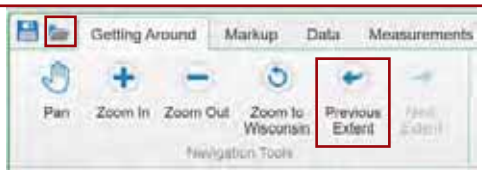


"Share current map" can be used to send a link of your map with all the markups in an email. The link will open a new mapping project completely separate from the original which can then be saved on the recipient's computer.

"Add Map Layer" can bring in data from other map servers, such as hillshade and topographic maps. Enter the URL in the pop-up. For example: dnrmaps.wi.gov

Step 8. Save all your work as a "project" by clicking the disc icon in the upper left hand corner of the screen. Saving a project allows for future editing and all drawings, buffers, and text will be saved. Your project will be saved as a .gvsp file to the location you designate on your computer. ***It is not saved onto the internet.***

Opening a saved project. First you must open the interactive website and then click on the folder icon in the upper left hand corner of the screen. Browse to the location of your saved file (from Step 8). Once opened, it should zoom to your drawings and/or shapefiles. If it doesn't, click on a layer and then click the "Zoom to Extent" tool.



Click on the "Map Layers" button if layers are not displaying.

SnapPlus

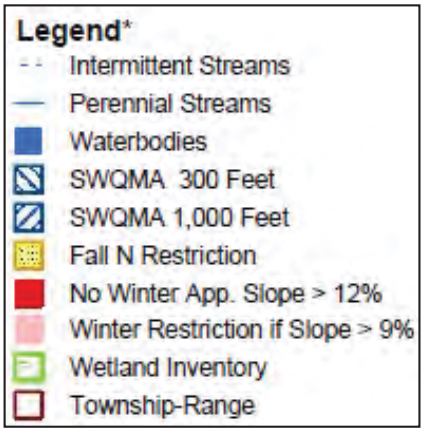
Wisconsin's Nutrient Management Software

Basic Concepts

590 Restriction Maps:
What the Legend Colors Mean

The Manure Advisory System maps are color and pattern coded to indicate specific areas on your fields. This publication explains what the defined areas of the map mean in terms of nutrient management using Wisconsin's 590 Nutrient Management Standard. To make a map of your farm, go to **www.ManureAdvisorySystem.wi.gov**

For more information about nutrient management, please visit the Department of Agriculture, Trade and Consumer Protection's website: **datcp.wi.gov/Farms/Nutrient_Management** or email their nutrient management specialists at **datcpnutrientmanagement@wi.gov**



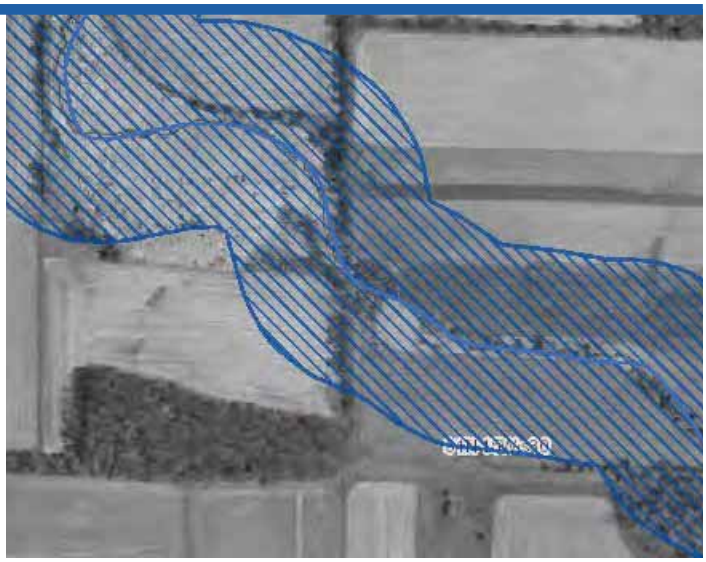
Blue-lined areas: SWQMAs

What is a SWQMA? An area that is 300 feet from a stream/river or 1000 feet from lakes/ponds; the acronym stands for Surface Water Quality Management Area.
Note: SWQMA is often pronounced as swik-muh.

In the winter, nutrient applications are <u>prohibited</u> in SWQMAs
(Winter is defined as being unable to effectively incorporate due to frozen soil or snow cover).

In non-winter conditions, nutrient applications are <u>restricted</u> in SWQMAs. Any nutrient applications must also be accompanied by one of the following:

- ✓ Establishment of permanent vegetative buffers **<u>OR</u>**
- ✓ Maintenance of greater than 30% residue or vegetative cover **<u>OR</u>**
- ✓ Incorporation of nutrient within 3 days **<u>OR</u>**
- ✓ Establishment of cover crops after application **<u>OR</u>**
- ✓ Unincorporated liquid manure application rates are restricted to those in the table.
  Note: Your soil texture can be found by using the Get Info button on the soils layer in the interactive map website.



Max. Unincorporated Liquid Manure Application Rate within a SWQMA on Unsaturated soils		
Percent crop residue or vegetative cover on surface after manure application	***< 30%***	***≥ 30%***
Fine soil texture *clay, silty clay, silty clay loam, clay loam*	*3,000*	*5,000*
Medium soil texture *sandy clay, sandy clay loam, loam, silt loam, silt*	*5,000*	*7,500*
Coarse soil texture *loamy sand, sandy loam, sand, peat, muck*	*7,000*	*10,000*

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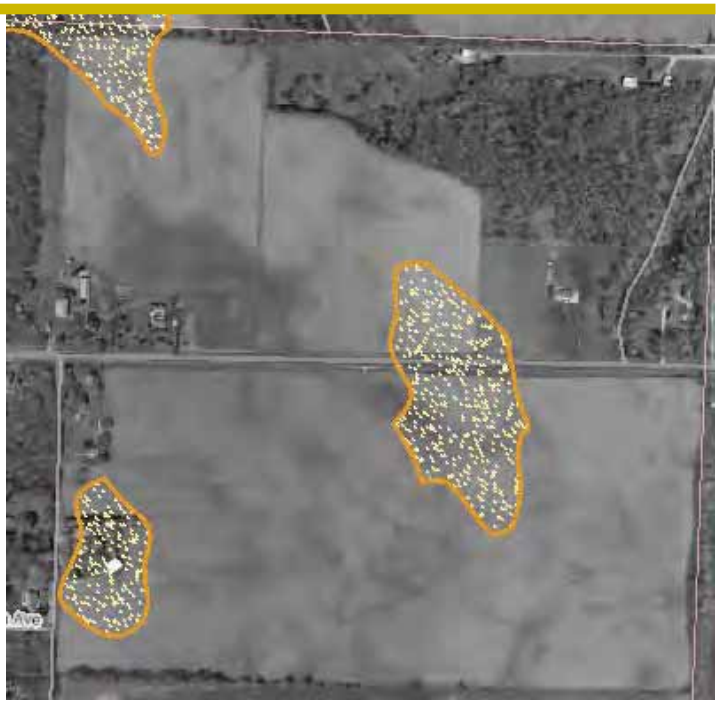
Yellow dotted areas:
Fall nitrogen (N) restricted soils



What are N restricted soils? These soils are considered risky because of the strong possibility that they are direct conduits to groundwater. N Restricted soils fall into one of three categories: 1) highly permeable, 2) less than 20 inches to bedrock, or 3) less than 12 inches to groundwater.

In general, these soils should have N put on as close to crop uptake as possible; in other words, **applications should be made in the spring and avoided in the fall.**

Commercial N restrictions:

Fall application of commercial N is prohibited, except for establishment of fall-seeded crops (maximum 30 lbs N/ac).

Manure N restrictions:

When manure is applied in the fall and soil temperatures are above 50° F:

- ✓ Use a nitrification inhibitor with liquid manure and limit rate to 120 lb N/ac, **OR**
- ✓ Apply after Sept. 15 and limit rate to 90 lb N/ac **OR**
- ✓ Apply to perennial or fall-seeded crops and limit rate to 120 lb N/ac or crop N need, whichever is less.

When manure is fall-applied and soil temperatures are below 50° F, limit the application rate to 120 lb N/ac or the crop's N need, whichever is less.

On irrigated fields:

- ✓ Split N applications, applying the majority of N after crop establishment **OR**
- ✓ Use a nitrification inhibitor with ammonium forms of N.

Legend*

- Intermittent Streams
- Perennial Streams
- Waterbodies
- SWQMA 300 Feet
- SWQMA 1,000 Feet
- Fall N Restriction
- No Winter App. Slope > 12%
- Winter Restriction if Slope > 9%
- Wetland Inventory
- Township-Range

Red and pink areas:
Winter restricted soils

When is winter? Winter conditions are defined as having frozen or snow-covered soils that prevent effective incorporation at the time of application.

Red area on map (soils have slopes over 12%)**:**

- ✓ Applications of nutrients are prohibited on slopes greater than 12%.

Pink area on map (soils have slopes between 6 and 12%)**:**

- ✓ If the actual slope of the field is less than 9%, then there are no restrictions.
- ✓ If the actual slope is between 9 and 12% then applications are prohibited **unless** the cropland is contoured or contour strip cropped, then there are no restrictions.

A4034

Soil Fertility Guidelines for Pastures in Wisconsin

Carrie A.M. Laboski and Kevin B. Shelley

The objective of University of Wisconsin-Extension soil fertility guidelines is to help farmers maintain an adequate supply of soil nutrients that support economically optimal yield and quality of the crops grown, while minimizing nutrient losses to the environment (figure 1).

Nutrient application guidelines for pastures for the primary nutrients—nitrogen(N), phosphorus (P), and potassium (K)—and lime are:

- ✓ Based on soil sampling and lab analysis (soil testing);
- ✓ Specific to the forage species in the pasture and estimated yield goal along with the texture of the soil in the pasture;
- ✓ Reduced according to the amount of nutrients estimated to come from manure (feces and urine) deposited by the grazing livestock. If grazing is managed to allow for good distribution of the manure across the pastures, supplemental nutrient additions from fertilizer or other sources may be minimal.

Figure 1. Pasture nutrient balance.

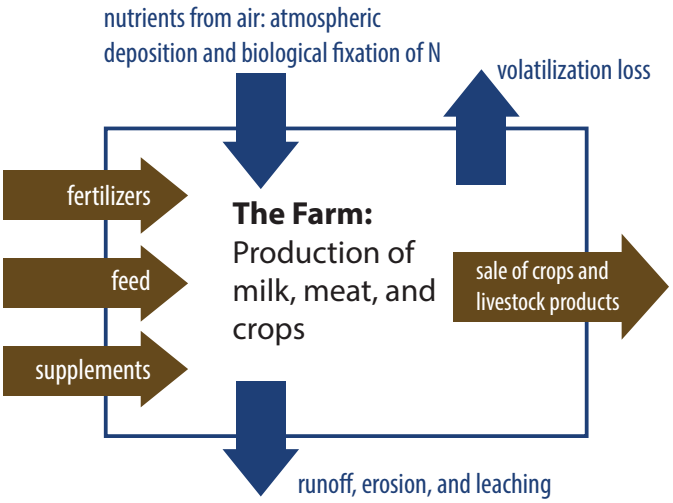
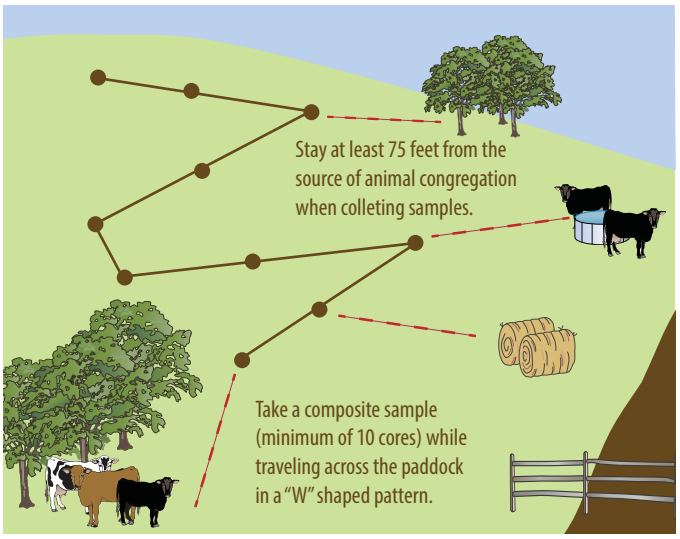


Figure 2. Soil sampling guidelines for pasture.



Soil sampling and testing

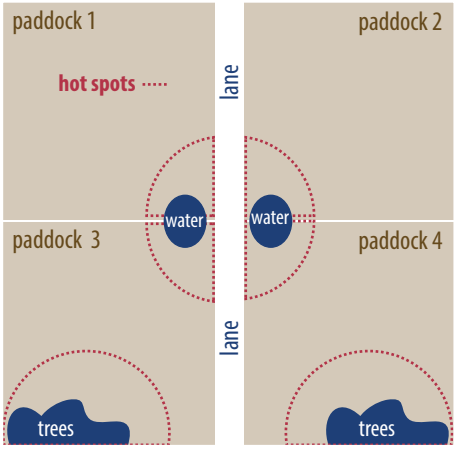
Soil fertility guidelines for crops grown in Wisconsin, including pasture forages, are based on soil testing. Soil testing measures plant-available nutrients as well as acidity levels (pH). If soil testing determines that P or K levels are potentially limiting, nutrient applications will be recommended. These nutrients can be supplied with fertilizer applications or may be met by deposition, or application, of manure. Agricultural lime applications will be recommended if soil acidity is greater than optimal (low soil pH), especially when legumes are included in the pasture mix.

Care must be taken to collect representative soil samples so that test results accurately portray the soil fertility of the pasture. Generally, one composite sample should be taken per five acres of field or paddock (management unit). If paddocks are smaller than five acres, then two or more paddocks with similar management history can be combined into one management unit for sampling. A composite sample is made up of a minimum of 10 soil cores taken to a depth of 6 inches with a soil probe. The ten cores should be collected in a "W" shaped pattern across the management unit (figure 2). Cores should be collected in a bucket, thoroughly mixed, and then placed in a labeled bag for delivery to the lab.

UW Extension
University of Wisconsin-Extension

Figure 3. Soil sampling guidelines for pasture hotspots.

If you have hot spots in pastures that are similarly managed, then you can sample these areas separately and combine them into a composite sample, as long as sample density does not exceed one composite sample per five acres.



Research measuring manure distribution across pastures often shows soil nutrient gradients with higher concentrations (hot spots) near places where livestock congregate and loaf, such as near water sources, lanes, supplemental feed bunks, and trees or shade. Meanwhile, less manure deposition in other areas may result in zones of net nutrient removal and possible nutrient shortages. When sampling, avoid the hot spot areas so that overall results are not biased toward higher fertility than really exists for most of the paddock. As a general rule, stay at least 75 feet from sources of animal congregation when collecting samples. In addition, congregation areas may be sampled separately, combining similar hot spot areas into a management unit. When sampling hot spots separately from the main paddock, sample density should not exceed one composite sample per five acres (figure 3) for the hot spots or main paddock management units.

For complete information on soil sampling and submitting samples to a state-certified lab, see *Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin* (A2809), pages 3–8. Only soil test results from Wisconsin DATCP-certified laboratories may be used for nutrient management plans being developed with cost-share dollars. A list certified laboratories is provided at http://uwlab.soils.wisc.edu/wdatcp/.

Nutrient application guidelines

Soil pH and lime requirement

Managing soil pH is a critical component to a soil fertility program because soil pH regulates nutrient availability and influences microbial reactions in the soil. In addition, legumes have symbiotic relationships with N-fixing bacteria that are pH -dependent. Grass-based pastures that contain less than 30% of any legume species should have soil pH maintained at a target pH of 6.0. Pastures with legume-grass mixtures where the legume is more than 30% of the species, as well as red clover pastures, should have soil pH maintained at 6.3. The soil pH for alfalfa should be maintained at 6.8.

Soil testing quick tips

1. Collect soil samples so that soil test results accurately represent the soil fertility of the pasture. **Generally, one composite sample should be taken per five acres of field or paddock (management unit).**
2. A composite sample is made up of a minimum of 10 soil cores taken to a depth of 6 inches with a soil probe. The ten cores should be collected in a "W" shaped pattern across the management unit (figure 2).
3. Samples should be collected 75 feet away from congregation areas (hot spots).
4. Hot spots may be combined into a management unit and sampled separately.
5. Soil cores for a composite sample should be collected in a bucket, thoroughly mixed, and then placed in a labeled bag for delivery to the laboratory.
6. Fill out the soil information sheet. A completely and carefully filled out information sheet will provide the most accurate nutrient recommendations.

A pasture should be limed if the soil pH is more than 0.2 units below the target pH. Lime recommendations are based on soil pH as well as the buffer pH. Table 1 provides the lime recommendations for pastures with a target pH of 6.0 and 6.3, respectively. Lime recommendations are capped at 4 tons per acre (t/a) of 60-69 grade lime even though more lime may be needed to reach the target pH. This is because there is limited incorporation of the lime by bioturbation (e.g. hoof action, soil biota movement) in the pasture. Soil sampling every four years is a good way to monitor soil pH. Soil pH and lime requirement for both 60-69 neutralizing index (NI) and 80-89 NI limes will be given on a soil test report from most labs.

To adjust the lime recommendation for limes other than 60-69 grade, use the following formula:

Lime requirement (t/a) of lime being used = (t/a of 60-69 lime recommended) x (65 ÷ NI* of lime being used)

*When a range is given, use the midpoint (e.g., for 80-89 grade lime, use 85 in the calculation).

Table 1. Lime recommendations for pasture.

	Buffer pH*					
	6.3	6.4	6.5	6.6	6.7	6.8
	---------- tons/a of 60-69 grade lime to apply ----------					
Soil pH	Target pH = 6.0					
5.0	4.0	4.0	4.0	3.5	3.0	2.0
5.1	4.0	4.0	4.0	3.5	2.5	2.0
5.2	4.0	4.0	3.5	3.0	2.0	1.5
5.3	4.0	4.0	3.5	2.5	2.0	1.0
5.4	4.0	3.5	3.0	2.0	1.5	1.0
5.6	3.5	3.0	2.0	1.5	1.0	1.0
5.7	3.5	2.5	2.0	1.0	1.0	1.0
5.8	3.0	2.0	1.5	1.0	1.0	1.0
	Target pH = 6.3					
5.0	4.0	4.0	4.0	4.0	2.5	1.5
5.1	4.0	4.0	4.0	3.5	2.5	1.0
5.2	4.0	4.0	4.0	3.5	2.0	1.0
5.3	4.0	4.0	4.0	3.0	1.5	1.0
5.4	4.0	4.0	4.0	2.5	1.5	1.0
5.6	4.0	4.0	3.5	2.0	1.0	1.0
5.7	4.0	4.0	3.0	1.5	1.0	1.0
5.8	4.0	4.0	2.5	1.5	1.0	1.0
6.0	4.0	3.5	2.0	1.0	1.0	1.0
6.1	4.0	3.0	1.5	1.0	1.0	1.0

* If buffer pH is <6.3, apply 4.0 t/a of 60-69 lime for any soil pH if lime is needed. If buffer pH is >6.8, apply 1.0 t/a of 60-69 lime for any soil pH, if lime is needed.

Note about crops

This publication addresses the main pasture crop categories from *Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin* (A2809). Information on additional forage crop categories, such as red clover, alfalfa, birdsfoot trefoil, or reed canarygrass can be found in A2809.

Nitrogen

When a pasture sward contains a significant percentage of legumes such as alfalfa or clovers, nitrogen additions are not recommended. The legume species biologically fix N for their own use and provide some N to companion grasses as legume plant roots, crowns, and leaves decompose and regenerate. The grasses will generally benefit from added N, but to the detriment of the desired legumes which will not compete with the N-fed grasses. When a pasture sward is composed entirely of grass, manure and urine deposition often do not supply enough available N for optimal forage production. The guidelines in table 2 are based on the pasture's soil organic matter content (as determined by the soil test) and whether the pasture is being seeded or is already established. For legume-grass pastures, a small amount of N is recommended only at seeding.

Nitrogen applications should be split into two or three applications through the growing season. Nitrogen application will stimulate growth. Therefore split N applications in early- to mid-June and early- to mid-August will promote more even pasture production through the season. Ideally application of urea-based fertilizers should be applied ahead of rainfall to limit ammonia volitilization.

Table 2. Nitrogen fertilization guidelines for pastures.

Crop	Yield range per acre	Soil organic matter content (%) < 2.0	2.0–9.9	10.0–20.0	> 20.0
		----------lb N/a to apply ----------			
Pasture, grass[a,b]	0.5–5 ton	160	130	100	50
Pasture, ≤ 30% legume-grass, seeding	0.5–1.9 ton	40	20	0	0
Pasture, ≤ 30% legume-grass, established	2–5 ton	0	0	0	0
Pasture, > 30% legume-grass, seeding	0.5–1.9 ton	30	10	0	0
Pasture, > 30% legume-grass, established	2–5 ton	0	0	0	0
Pasture, unimproved[a]	1–4 ton	120	100	70	30

[a]Split N applications into two to three applications per year.
[b]Grass = bromegrass, orchardgrass, fescue, ryegrass, timothy (any combination).

Table 3. Soil test phosphorus (P) and potassium (K) interpretation levels for pastures.

		Soil test category					
		Very low (VL)	Low (L)	Optimum (O)	High (H)	Very high (VH)	Excessively high (EH)
	Soil group[a]	soil test K ppm					
Soil Test P	Loamy	< 10	10–15	16–20	21–30	—	> 30
	Sandy, Organic	< 12	12–22	23–32	33–42	—	> 42
Soil Test K	Loamy	< 70	70–100	101–130	131–160	161–190	> 190
	Sandy, Organic	< 45	45–65	66–90	91–130	—	> 130

[a]For more details on soil groups see *Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin* (A2809), Chapter 4.

Table 4. Phosphorus (P) and potassium (K) nutrient application guidelines for pastures.

		P_2O_5 rate guidelines					K_2O rate guidelines					
Crop name	Yield goal (per acre)	VL	L	O	H	EH	VL	L	O	H	VH	EH
		lb P_2O_5/a to apply					lb K_2O/a to apply					
Pasture, grass[a, b]	0.5–1.9 ton	60	50	20	10	0	115	100	70	35	20	0
	2–3 ton	80	70	40	20	0	185	170	140	70	35	0
	3.1–4 ton	95	85	55	30	0	240	225	195	100	50	0
	4.1–5 ton	110	100	70	35	0	295	280	250	125	65	0
Pasture, ≤ 30% legume-grass[b]	0.5–1.9 ton	55	45	15	10	0	110	95	65	35	15	0
	2–3 ton	75	65	35	20	0	175	160	130	65	35	0
	3.1–4 ton	85	75	45	25	0	225	210	180	90	45	0
	4.1–5 ton	100	90	60	30	0	275	260	230	115	60	0
Pasture, > 30% legume-grass[b]	0.5–1.9 ton	55	45	15	10	0	120	105	75	40	20	0
	2–3 ton	75	65	35	20	0	195	180	150	75	40	0
	3.1–4 ton	85	75	45	25	0	255	240	210	105	55	0
	4.1–5 ton	100	90	60	30	0	315	300	270	135	70	0
Pasture, unimproved[b]	1–2 ton	65	55	25	15	0	100	85	55	30	15	0
	2.1–3 ton	80	70	40	20	0	135	120	90	45	25	0
	3.1–4 ton	95	85	55	30	0	170	155	125	65	30	0

[a]Includes bromegrass, fescue, orchardgrass, ryegrass, and timothy.

[b]P_2O_5 and K_2O guidelines for pasture make no assumptions about manure/urine deposition. Nutrient credits for manure/urine deposition should be subtracted from these rates.

Phosphorous and potassium

Management intensive grazing systems with good manure distribution often result in efficient cycling of phosphorous and potassium between grazing livestock and forage production. The need for supplemental P and K inputs may be minimal, particularly when grazing livestock are supplemented with other feeds. The need for P and K additions is best determined by soil testing every four years (see *Sampling Soils for Testing* chapter in A2809 for guidelines). Applications guidelines for P and K (table 4) for each of the four pasture crop categories are based on the soil test interpretation level (table 3) and pasture forage yield goal.

Yield goals should be based on historic yields from the pasture and reasonable goals for improvement based on forage need and management level. Several methods can be employed for estimating and tracking pasture yields, including hand clipping from sampling squares, keeping records of grazing days and livestock gains, using pasture sticks (USDA-NRCS) or a pasture plate. See *Pastures for Profit* (A3529) for guidance on estimating pasture productivity.

Nutrient crediting

Nutrients deposited on pastures in manure and urine should be credited against the suggested N, P_2O_5, and K_2O application rates. Nutrient credits are based on the amount of manure deposited (t/a) and the nutrient content of the manure. Table 5 provides nutrient contents for manures from livestock species commonly grazed in Wisconsin. For these species, 40% of the total N and 80% of the total P_2O_5 and K_2O deposited should be credited each year. The N credits assume that 30% of the total N deposited is available in the year of deposition (1st year credit) and an additional 10% of total N is available in the year after deposition (2nd year credit). For P and K, 80% of the P_2O_5 and K_2O deposited are available as 1st year credits.

The availability of manure and urine nutrients will not total 100% for a several reasons:

- ✓ The deposited nutrient amounts are an estimation, not an exact amount.
- ✓ Some of the nutrients are incorporated into soil organic matter and microbial pools.
- ✓ Nutrient losses—such as ammonia volatilization, leaching and denitrification of nitrate, and surface runoff of all nutrients—can occur.

The amount of manure deposited on a pasture can be estimated according to the number of animals of a given species, their size, and the amount of time spent grazing the pasture. Daily manure production estimates for the major livestock species have been developed and are published by the Midwest Plan Service (table 6). They can also be obtained from your UW-Extension county office, county land

Table 5. Estimated total and available nutrient contents in deposited manure/urine in pasture systems.

		Total Nutrients			Available Nutrients		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O
	Dry Matter %	lb/ton			lb/ton		
Beef	8	14	4	9	6	3	7
Dairy	13	10	4	7	4	3	6
Sheep	25	19	10	19	8	8	15
Goat	32	22	5	15	9	4	12
Horse	14	7	2	2	3	2	2

P and K note

Application guidelines for P and K are given in their oxide forms, P_2O_5 (phosphate) and K_2O (potash), which is how fertilizer nutrients are expressed.

and water conservation department, or from the Wisconsin Department of Agriculture Trade and Consumer Protection (WDATCP) on their farm nutrient management planning web page at http://datcp.wi.gov/Farms/Nutrient_Management/index.aspx. These manure production values, and the associated nutrient contents, are also used within the SnapPlus software for farm nutrient management planning. SnapPlus contains a Grazing Herd Setup where total daily manure production can be calculated and a Grazing Application Rate Estimator where manure deposition on a paddock-by-paddock basis can be determined (see back page).

Nutrient credits should also be taken when manure is collected from other places on the farm such as milking centers and feedlots, and then mechanically applied to pastures. In this case, the nutrient composition and availability of the collected manure will be different than feces and urine that are directly deposited on pastures; the estimated available nutrients in table 5 should not be used. To obtain more appropriate nutrient credits for mechanically applied manure, see *Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin* (A2809), pages 73–77.

Nutrient crediting example

	N	P_2O_5	K_2O
	---------- (lb/acre) ----------		
Soil test recommendation for a managed/rotation grass pasture (soil test = optimum for P and K, 3% OM, yield goal = 3.5 tons/acre) →	130	55	195
Credit for estimated beef cattle manure deposited in the pasture = 4.5 tons/acre @ 6-3-7 →	27	14	32
	103	41	163

Subtract the nutrient credits from the suggested nutrient application rates to get fertilizer/supplemental nutrients to apply.

Tips for good manure and urine distribution

The ability of a grazier to depend on nutrient credits from manure deposition will depend on relatively even manure distribution across the pastures and within paddocks. Practices shown to improve manure and urine distribution by grazing livestock include:

- ✓ Maintaining uniform grazing pressure in small areas for short periods of time, then rotating livestock to the next paddock. This reduces the potential for livestock to graze selectively, feeding more in some areas than in others;
- ✓ Providing water sources throughout the pasture so that livestock do not need to leave the rotated grazing areas to drink. Cattle oilers, scratchers, and supplemental feed bunks are best moved out to grazing areas for nutrient distribution purposes as well;
- ✓ Limit access to areas where livestock routinely congregate and lay when not grazing, such as shade or shelter, when these areas are not essential.

Table 6. Grazing manure application rate estimator worksheet. Source: *Livestock Waste Facilities Handbook, Midwest Plan Sevice Technical Bulletin #18.*

Animal type-weight (lbs)	Number of animals	Daily manure production (lbs/day)	Days on pasture	Percent of each day spent grazing	Total pasture manure production (tons)
Dairy					
Calf-150	( ) x	13) x	( ) x	( ) ÷ 2,000 =	( )
Calf-250	( ) x	21) x	( ) x	( ) ÷ 2,000 =	( )
Heifer-750	( ) x	65) x	( ) x	( ) ÷ 2,000 =	( )
Heifer-1,000	( ) x	82) x	( ) x	( ) ÷ 2,000 =	( )
Lact. cow-1,000	( ) x	106) x	( ) x	( ) ÷ 2,000 =	( )
Lact. cow-1,200	( ) x	127) x	( ) x	( ) ÷ 2,000 =	( )
Lact. cow-1,400	( ) x	148) x	( ) x	( ) ÷ 2,000 =	( )
Dry cow-1,000	( ) x	82) x	( ) x	( ) ÷ 2,000 =	( )
Dry cow-1,200	( ) x	99) x	( ) x	( ) ÷ 2,000 =	( )
Dry cow-1,400	( ) x	115) x	( ) x	( ) ÷ 2,000 =	( )
Beef					
Calf-450	( ) x	26) x	( ) x	( ) ÷ 2,000 =	( )
High forage-750	( ) x	62) x	( ) x	( ) ÷ 2,000 =	( )
High forage-1,100	( ) x	92) x	( ) x	( ) ÷ 2,000 =	( )
High energy-750	( ) x	54) x	( ) x	( ) ÷ 2,000 =	( )
High energy-1,100	( ) x	80) x	( ) x	( ) ÷ 2,000 =	( )
Cow-1,000	( ) x	63) x	( ) x	( ) ÷ 2,000 =	( )
Bull-1,400	( ) x	115) x	( ) x	( ) ÷ 2,000 =	( )
Other					
Sheep-100	( ) x	4) x	( ) x	( ) ÷ 2,000 =	( )
Horse-1,000	( ) x	5) x	( ) x	( ) ÷ 2,000 =	( )
Goat-170	( ) x	7) x	( ) x	( ) ÷ 2,000 =	( )

Total pasture manure (tons) ( )

÷ Total pasture size (acres) ( )

= Pasture manure application rate (tons/acre) ( )

Additional information

Midwest Plan Service, 2000. *Livestock Waste Facilities Handbook*. Publication 18, 112 pp. ISBN 0-89373-089-0. https://www-mwps.sws.iastate.edu/catalog/manure-management/livestock-waste-facilities-handbook

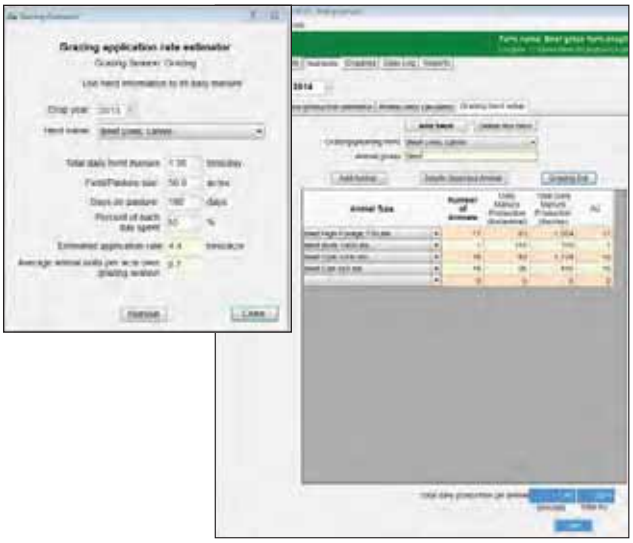
UW-Extension Team Forage website and *Grazier's Notebook Fact Sheets*. http://www.uwex.edu/ces/crops/teamforage/index.html

UW-Extension publications

Nutrient Application Guidelines for Field, Vegetable and Fruit Crops in Wisconsin (A2809). http://learningstore.uwex.edu/Nutrient-Application-Guidelines-for-Field-Vegetable-and-Fruit-Crops-in-Wisconsin-P185.aspx

Pastures for Profit (A3529). http://learningstore.uwex.edu/Pastures-for-Profit-A-Guide-to-Rotational-Grazing-P96.aspx

SnapPlus has grazing tools that estimate pasture manure amounts and application rates.



SnapPlus Software: snapplus.wisc.edu

Important note for SnapPlus users: The terminology for pastures in A2809 does not exactly match those used in SnapPlus. Use the table below to cross-reference the pasture names.

A2809 crop name	SnapPlus crop name
Pasture, grass	Pasture seeding, grass
	Pasture, rotational stocking, grass
	Pasture, variable stocking, managed continuous
Pasture, < 30% legume-grass, seeding	Pasture seeding, grass/legume
Pasture, < 30% legume-grass, established	Pasture, rotational stocking, grass/legume
	Pasture, variable stocking, managed continuous, grass/legume
Pasture, > 30% legume-grass, seeding	Pasture seeding, legume more than 30%
Pasture, > 30% legume-grass, established	Pasture, rotational stocking, legume more than 30%
	Pasture, variable stocking, managed continuous, legume more than 30%
Pasture, unimproved	Pasture, continuous stocking, high density
	Pasture, continuous stocking, low density
Idle land (no recommendations)	Pasture, dry lot, exercise area

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SnapPlus Prep

Understanding the information you need to write a nutrient management plan using SnapPlus software

NPM Nov. 2013

This publication is available from the Nutrient and Pest Management (NPM) Program. For more copies, contact us: email (npm@hort.wisc.edu), phone (608) 265-2660, website (ipcm.wisc.edu)

Developing a nutrient management plan using SnapPlus software can be easy when you understand and have compiled all the information you need before sitting down in front of a computer.

This publication is designed to help you understand what steps are involved in developing a new plan and what information you will need for each step. Words ***in this font*** are defined in the glossary on the back page. Note that if you are a ***WPDES***-permitted farm, some of the things you will need are not covered in this publication. There is also a checklist to help you keep track of what information you have or will need to obtain (helpful resources are included). The good part is once you have your farm set-up in SnapPlus, updating it in future years is a Snap! This publication is going to focus on the information you will need to gather for steps 2-6 in the eight basic steps.

The Eight Basic Steps

1. Install SnapPlus software (available at snapplus.wisc.edu)
2. **Create a new farm file**
3. **Import your farm's soil tests**
4. **Enter field information**
5. **Enter nutrient sources information**
6. **Enter crop & nutrient application information**
7. Run SnapPlus reports
8. Back up your files

Quick Overview

Starting with step 2, the information you will need to for this step is fairly straight-forward. You will need to enter the farm name along with some contact information and choose if you want to use 2nd or 3rd year ***Manure nutrient credits***. You will need to select from lists both the county (or counties) that your farm is in and what crops you grow.

In step two, there are two text boxes, the Farm narrative and the ***Concentrated flow channel*** protection, where you can type a short description. The Farm narrative gives you a chance to explain any unique aspects of your farm or components of the plan that you need to highlight. If you have any channelized flow areas on your farm, you can explain how they are protected. You can return to these text boxes at any time to add details.

For step 3, you will need your farm's soil test results. You can enter them by hand in SnapPlus, but it is much easier to import them from a ***DATCP***-certified lab's electronic file. If you haven't soil sampled yet, then be sure to check out the University of Wisconsin resources listed under Step 3 on the next page.

In step 4, you will enter or select information about your fields. Some items will automatically fill-in based on the soil test results entered in step three. To complete the information for some of the columns, you will need spreading restriction maps for your farm (see the checklist for how to obtain these). These maps will help you determine the ***Soil map symbol*** for the ***Dominant critical soil type*** and the ***Predominant soil type*** for each field. The maps will also indicate if you have any spreading restrictions that need to be indicated in SnapPlus.

For each field, the ***Below field slope to water*** and ***Distance to perennial water*** need to be selected. These are both used to calculate the ***P index***. To estimate the distance to perennial water, you can use the scale on the map. The below field slope to water should describe the average slope percentage from the edge of the field to perennial water. You can use the ***Slope class*** for guidance. Use the dominant slope class of the area between the field and perennial water.

Step 5 is where you enter all the manure and fertilizers that you use on the farm. There are a few calculators available to help you estimate manure volumes by entering the number of animals per size class or by grazing animal numbers. You should also enter manure storage volumes and manure spreader calibrations on this screen.

For step 6, you will enter both crop and nutrient application information for all of your fields over an entire rotation. This is often the most challenging step in the SnapPlus process. For each field, you will need crop, yield goal, tillage, and nutrient applications for each year in the rotation.

During this step, you will be able to see if you are currently over or under the University of Wisconsin recommendations for nutrient applications on your fields. You will also be able to calculate the P Index and ***Soil loss*** for your fields. These are important calculations if you are submitting a plan that needs to meet the ***590 standard***. You will also have the opportunity to adjust future nutrient applications and run different crop rotation scenarios on your farm.

SnapPlus Prep Checklist

video, publication and website links listed on the back page

Step 2. Create a new farm file

SnapPlus: Starting a SnapPlus Farm and Completing the Farm Screen

- ❑ **Farm name and contact information.**
- ❑ **County (or counties) that your farm is in.** There is a list that you can select from.
- ❑ **Crops grown on your farm.** There is a list that you can select from.
- ❑ **What manure credits to use.** There are three choices: 1) Do not use 2nd and 3rd year credits. 2) Use 2nd year manure credits. 3) Use 2nd and 3rd year credits. A basic 590 plan is not required to use 2nd and 3rd manure credits. No second-or third-year credit is given for manure P or K. Any manure P or K applied but not credited in the first year, is best accounted for by subsequent soil testing.

  NPM Credit What You Spread
- ❑ **Farm narrative.** This is where you can explain components of the plan, manure handling, unique aspects of your farm, and any compliance concerns.
- ❑ **Concentrated flow channel explanation.** The 590 standard requires that these areas within fields need to be protected with perennial cover (i.e., establishing a grassed waterway).

Step 3. Import your farm's soil tests:

NPM Basic Soil Sampling for Wisconsin Agriculture

NPM Soil Testing Basics

UWEX Sampling Soils for Testing, A2100

UWEX Nutrient Management Guidlelines for Field, Vegetable and Fruit Crops in Wisconsin, A2809

- ❑ **Electronic soil test results.** The easiest way to do this step is to obtain your soil test results in electronic form from a DATCP certified soil testing laboratory. If you haven't sampled yet, make sure your sample bags are clearly marked with a sample number and field number that matches your farm's map. The combination of these numbers must be unique for the farms samples. Be sure to take 10 cores for every 5 acre soil sample and sample at least every 4 years.

  SnapPlus: Importing Soil Samples into an Existing SnapPlus Database
- ❑ **Paper soil test results.** You can also enter the information by hand. If you do, you should skip to Step 4 and get your field information entered first. Enter soil test results for each field. However, it is highly recommended that you import the data electronically.

Step 4. Enter field information:

- ❑ **Field names and size in acres.** If you imported your soil test results in Step 2, then your field names and acreages will automatically be filled in. If you are starting a database prior to receiving soil sample results, you will have to enter each field manually (be sure to double-check the data for errors).
- ❑ **Sub-farm.** If you are operating more than one farm, the use of the sub-farm feature may be helpful to you.

  SnapPlus: Completing the Field Screen–Part 1
- ❑ **Dominant critical soil map symbol for each field.** For this step, you will need a soil map for your fields. The dominant critical soil is the most erodible, usually the steepest, soil that occupies at least 10% of the field. This soil is used to determine the soil loss for the field and is used in determining the P Index. As an example if you have two soils in a field, DuC2 and DsD2, the second capitalized letter in the soil symbol represents the field slope. The slopes follow alphabetical order, A being no to low slope, F being a steep slope. Note: in SnapPlus, Dominant critical soil map symbol is written as Soil Map Symbol (Critical).

  Nutrient Applications Restrictions maps

  DATCP Choosing the Critical Soil Type

  SnapPlus: Completing the Field Screen–Part 2
- ❑ **Predominant soil map symbol for each field.** For this step, you will also need soil maps for your fields. The predominant soil is the ***Soil series (name)*** that occupies the majority of the field and is used when determining the N-P-K recommendation for the field.

  Nutrient Applications Restrictions maps

  SnapPlus: Completing the Field Screen–Part 2
- ❑ **Below Field Slope to Water.** You will need to estimate the average slope from the edge of the field to any perennial water.

  SnapPlus: Completing the Field Screen–Part 2

  Nutrient Applications Restrictions maps
- ❑ **Distance to the nearest surface water.** For this step, you will need maps that show perennial waters. It is important to note that the distance to the nearest surface water is a linear measurement along the route as the water flows, not as the crow flies.

  Nutrient Applications Restrictions maps

  SnapPlus: Completing the Field Screen–Part 2
- ❑ **590 Restrictions.** Location of soils and landscape features with seasonal or other application restrictions. For this step, you will need maps with the ***590 Restrictions***.

  Nutrient Applications Restrictions maps

  SnapPlus: Completing the Field Screen–Part 3
- ❑ **Tiled.** Check the box for any field that is ***Tile drained***.

Step 5. Enter nutrient source information:

- ❑ **Annual manure volume produced by species on the farm.** If you do not have this information, then you can calculate it in SnapPlus with the information below.
  - ❑ **Number of animals, sizes and % collected.** You will need to name each source by selecting the nutrient type from a list (dairy liquid, beef solid). Then you can use the manure production estimator to calculate the annual volume produced. You will need to have the number of animals and their respective sizes and what % of the manure is collected and available for spreading

  And/Or

  - ❑ **Manure storage volume(s) and/or loads spread.** For the most accurate estimation, your manure spreader should be calibrated.

    NPM Know How Much You Haul

    NPM Calibrating a Manure Spreader

- ❑ **If you have a manure N-P-K and dry matter content analysis, you can enter it in this step.** If not, then book values will automatically fill-in.
- ❑ **Fertilizers used on your farm.** You can select these from a list of either dry or liquid fertilizers. You can also add a fertilizer and analysis if it is not on the list.

Step 6. Enter crop & nutrient application information:

Special Note. SnapPlus calculations are based on ***cropping years***, not calendar years. When entering tillage, manure and fertilizer applications on a field, be sure to enter them in the same cropping year they were perfomed in. For example, if you fall-chisel a field in 2013 following harvest and then plant corn in spring 2014, you would enter the fall chisel tillage in the 2014 cropping year.

SnapPlus: Cropping Screen Basics

- ❑ **Current & planned crops, yield goals, and tillage.** For each field, you will need the entire crop rotation, yield goal for each crop and tillage used or planned for the current plan year. It is also recommended that you enter at least one year's prior data for each field.
- ❑ **Current & planned manure applications.** For each field, you will need the application rate, season of application, and application method (unincorporated, incorporated, injected, or directly by animals). Before planning applications, be sure to check whether planned manure applications align with the 590 Restrictions, specifically the winter spreading restrictions on slopes and near surface water. Also, verify that the fields chosen are the best options for optimizing manure with upcoming crop and current soil test levels in mind.
- ❑ **Prior year legume & forage stand condition.** For each field with a prior legume crop, you will need to know the stand condition and amount of regrowth. These criteria are used to calculate ***legume credits.***

  NPM Credit Legume Nitrogen and Reap the Profits

- ❑ **Current & planned fertilizer applications.** For each field, you will need to have the fertilizer type, application rate, season of application, and application method (unincorporated, incorporated, subsurface). It is recommended that you wait to add additional fertilizer applications after accounting for all manure and legume credits and adjusted field recommendations are shown.
- ❑ **Lime applications.** For each field that has been limed, you will need the neutralizing index, such as 60-69, and rate of the liming material applied.
- ❑ **Rotational settings.** You can adjust the settings to reflect what year your rotation starts and how many years the rotation lasts before repeating.
- ❑ **Contour farming and filter areas.** For each field, you will need to select whether the whole field is farmed ***on-contour*** or ***contour strip-cropped*** and whether the field has ***filter areas*** at the field edge or within the field.

Once you collect and understand all of the information from the checklist, you are ready to sit down and get started with SnapPlus.

SnapPlus has tools that can make data entry easier. The ***Rotation wizard*** can be used to enter multiple fields and years, instead of entering them field by field and year by year.

SnapPlus: Using the Rotation Wizard–Part 1

SnapPlus: Using the Rotation Wizard–Part 2

One suggestion for making your fertilizer plan easier to implement is to enter all necessary information, including crop rotations, legume credits and manure applications <u>before</u> entering any fertilizer applications. Once the on-farm nutrients are entered, you will be able to view the adjusted UW recommendations.

The NM Sorted by Crop Report is useful for viewing the adjusted UW recommendations by crop type. Often when determining fertilizer recommendations, fields are grouped so the number of fertilizer rates can be minimized. Fewer fertilizer rates can make implementation of the nutrient management plan easier, especially if the fertilizer is applied with a minimal amount of spreader mixes. Once fertilizer plans are determined, enter them into SnapPlus field by field using the nutrient application planner from the cropping screen, or enter many at one time by using the rotation wizard.

Step 7 Tip: To verify that all applications meet 590 requirements, run the *Compliance Check* report and make adjustments to your plan if necessary. Make reasonable adjustments to future rotations, tillage, or application rates /timing if any conservation compliance issues (i.e. ***Field "T"*** or P Index) arise.

SnapPrep Inventory Worksheet

Step 2. Create a new farm file

What manure credits to use.

❑ **Do not use 2nd and 3rd year credits.** ❑ **Use 2nd year manure credits.** ❑ **Use 2nd and 3rd year credits.**

Farm narrative. Explain components of the plan, manure handling, and unique aspects of your farm.

Concentrated flow channel explanation. Describe areas within fields that need to be or are protected with perennial cover.

Step 4. Enter field information:

If you imported your soil test results in Step 2, then your field names and sizes will automatically be filled in, along with soil series. You will need to consult spreading restriction and soil maps for your farm to determine the remaining information. The Below field slope to water and Distance to nearest surface water are selected from a list of ranges:
Below Field Slope % ranges (0-2, 2.1-6, 6.1-12, >12), Distance to nearest surface water ranges (0-300, 300-1000, 1001-5000, 5001-10000, 10001-20000, >20000).

Field :	Size:	Dominant Critical Soil Map Symbol:	Predominant Soil Map Symbol:	Below field slope to water (%):	Distance to perennial water (ft):	Application restrictions?	Tiled?

Step 5. Enter nutrient source information:

- ❑ **Number of animals, sizes and % collected.** You will need to name each source by selecting the nutrient type from a list (dairy liquid, beef solid). Then you can use the Manure Production Estimator to calcuate the annual volume produced. You will need to have the number of animals and their respective sizes and what % of the manure is collected and available for spreading.

Type:	Size:	Quantity:	*% Manure Collected:

*If animals are pastured, 100% of the manure is not collected. The percent of manure going to pastures can be estimated by the percent of time the animals spend on the pasture.

- ❑ **Manure storage volume(s) and/or loads spread.** For the most accurate estimation, your spreader should be calibrated.

Manure storage or spreader name	Storage or spreader capacity	Loads spread per year

Step 6. Enter crop & nutrient application information:

Current & planned crops, yield goals, and tillage. For each field, you will need the entire crop rotation, yield goal for each crop and tillage used or planned.

Crop grown:	Tillage:	Yield goal:

Step 6. Continued:

Group fields by crop rotation. Crop rotations can sometimes vary depending on field location, soil type and slopes. Grouping these fields will make SnapPlus planning easier,.

Typical rotation:	Field(s) or Farm(s):

Current & planned manure applications. For each field, you will need the application rate, season of application, and application method (unincorporated, incorporated, injected, or directly by animals).

Field(s):	Manure source:	Manure application rate:	Season of application:	Application method:

- ❑ **Did you account for manure spreading plans year-round?** Include the winter months as well as the summer months.

Step 6. Continued:

Current & planned fertilizer applications. For each field, you will need to identify the fertilizer type, application rate, season of application, and application method (unincorporated, incorporated, subsurface). Each field or crop sequence may require more than one line to identify all fertilizer applications.

Field(s) or Crop Sequence:	Fertilizer Source:	Fertilizer application rate:	Season of application:	Application method:

- ❑ **Did you account for starter fertilizer?**

- ❑ **Lime applications.** For each field that has been limed, identify the neutralizing index and rate of the liming material applied.

Field(s) or Farms(s):	Neutralizing index and material:	Lime application rate:

Rotational Settings. For each field, you will need to select whether or not the field is farmed on-contour or strip cropped, or if the field has filter areas.

Field(s) or Farm(s):	**Contouring** (None, Field on-contour or Contour strip-crop)	**Filter areas** (None, Edge of Field or In Field)

Links to resources:

All NPM ☰ & ▶ can be viewed at ipcm.wisc.edu

All SnapPlus ▶ can be viewed at snapplus.wisc.edu

☰ NPM Credit What You Spread (http://ipcm.wisc.edu/download/pubsNM/Manurecredit.pdf)

▶ SnapPlus: Starting a SnapPlus Farm and Completing the Farm Screen (https://www.youtube.com/watch?v=fL2V16K2dvs)

☰ NPM Soil Testing Basics (http://ipcm.wisc.edu/download/pubsNM/SoilTestBasix_2007.pdf)

▶ Basic Soil Sampling for Wisconsin Agriculture (http://www.youtube.com/watch?v=SwBZp_AXy0Y)

☰ UWEX Sampling Soils for Testing A2100 (http://learningstore.uwex.edu/assets/pdfs/A2100.pdf)

☰ UWEX Nutrient Management Guidlelines for Field, Vegetable and Fruit Crops in Wisconsin, A2809 (http://learningstore.uwex.edu/assets/pdfs/A2809.pdf)

▶ SnapPlus: Completing the Field Screen–Part 1 (https://www.youtube.com/watch?v=v2HFdetY-JY)

☰ DATCP Choosing the Critical Soil Type (http://datcp.wi.gov/uploads/Farms/pdf/ChoosingCriticalSoilType.pdf)

W Nutrient Applications Restrictions maps (www.manureadvisorysystem.wi.gov)

▶ SnapPlus: Completing the Field Screen–Part 2 (https://www.youtube.com/watch?v=c4bNxMWsuVQ)

▶ SnapPlus: Completing the Field Screen–Part 3 (https://www.youtube.com/watch?v=z-YhwxnA8mg)

☰ *NPM Know How Much You Haul* (http://ipcm.wisc.edu/download/pubsNM/KnowHowMuchYouHaul.pdf)

▶ NPM Calibrating a Manure Spreader (http://www.youtube.com/watch?v=m9LAsOgVN-g)

▶ SnapPlus: Cropping Screen Basics (https://www.youtube.com/watch?v=ChZ3Od2SU8Q)

☰ NPM Credit Legume Nitrogen and Reap the Profits (http://ipcm.wisc.edu/download/pubsNM/Legume_Credits_1008.pdf)

▶ SnapPlus: Using the Rotation Wizard Part 1 (https://www.youtube.com/watch?v=1b3FeN4iYbA)

▶ SnapPlus: Using the Rotation Wizard Part 2 (https://www.youtube.com/watch?v=0V_rxwyzaJ0)

SnapPlus Glossary:

590 standard: The USDA-NRCS technical guide standard that lists the required components and considerations for a nutrient management plan that complies with local, state and federal government agricultural programs.

590 restrictions: Nutrient application restrictions from the 590 standard, which include winter spreading, surface water quality management area (SWQMA), fall nitrogen application, set-backs from conduits to groundwater, and other restrictions.

Adjusted UW recommendations: P_2O_5 and K_2O recommended by University of Wisconsin for that crop and soil test, minus carryover P_2O_5 and K_2O banked since the last soil test.

Below field slope to water: The field slope percentage range on the route water flows from the edge of the field to perennial water (anything that holds or flows water year-round).

Concentrated flow channel: Areas within or on field edges where water flow comes together and can make small channels or gullies.

Cropping year: For a field, the new cropping year starts after the previous crop has been harvested and spans the time to the next harvest. For example, if a winter wheat field is harvested in July 2013 and manure is applied following the harvest, then the manure application would be included in the 2014 cropping year (same for any fertilizer applications or tillage following harvest).

DATCP: The acronym for the Wisconsin Department of Agriculture, Trade and Consumer Protection.

Distance to perennial water: The distance (ft) from the edge of the field to perennial water (anything that holds or flows water year-round). Indicated by solid blue lines or areas on restriction maps.

Dominant critical soil: The most erodible soil type that covers at least 10% of the field. Used to determine soil loss and the P Index in SnapPlus.

Field "T": Tolerable soil loss (the amount the field can lose in t/a/yr) as determined by soil type.

Filter areas: A grass strip within a field or an area on the edge of a field designed to capture sediment in runoff. These selections assume there are no concentrated flow channels through the grass filters.

Legume credits: The fertilizer value of legumes that is used to reduce nitrogen fertilizer application rates to account for the nutrients supplied by the legume.

Manure nutrient credits: The fertilizer value of appied manure.

On-contour: A field that is consistently planted and tilled on the contour across the slope.

P Index: The Wisconsin Phosphorus Index, a planning tool used to rank fields by runoff P loss potential. Annual total PI is calculated by estimating the average annual runoff P delivery from a field to surface water. Particulate PI is an estimate of P delivered with eroded sediment and Soluble PI is an estimated of dissolved P delivered from soil and nutrient applications.

Predominant soil type: The soil that makes up the largest portion of the field. Used to determine nutrient recommnedations in SnapPlus.

Rotation wizard: A tool in SnapPlus that greatly reduces the time and effort required for data entry and information maintenance by allowing you to add crop and application information, or change existing crop and application information for multiple fields and years in one operation.

Soil map symbol: On soil maps, the small letters or numbers that are within the same polygon, i.e. SmB, DpD2.

Soil loss: The general loss of soil due to erosion.

Soil series (name): A specific soil type that has distinct identifying physical properties such as texture, organic matter, erodibility and underlying parent material.

Slope class: indicated by the letter following the soil series abbreviation. For example, in the soil map symbol WoB, the soil series name Wo is followed by the slope class B. Slope classes (%) are A=0-2, B=2-6, C=6-12, D/E=>12)

Strip-cropped: When contour strips have been installed and maintained on a field. In SnapPlus, a minimum of 2 contour strips placed across the field's planning slope length (L) is required.

Tile drained: A field that has drainage tile in place under the surface to reduce the moisture content of cropland fields.

WPDES: An acronym for Wisconsin Pollutant Discharge Elimination System. WPDES-permited farms are also know as CAFOs. Any livestock or poultry operation with 1,000 or more animal units is a concentrated animal feeding operation (CAFO) under current regulations and is required to apply for and operate under a DNR-issued water quality protection permit.

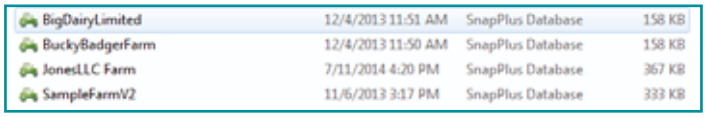
SnapPlus

Wisconsin's Nutrient Management Software

Basic Concepts

SnapPlus File Management

SnapPlus files are no different than any other file type on your computer. They can be copied, pasted, moved, renamed and deleted. All SnapPlus files have the file extension ***.snapDb** and are displayed on the computer with a small tractor icon.

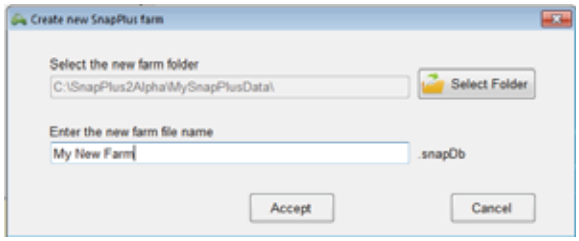


BigDairyLimited	12/4/2013 11:51 AM	SnapPlus Database	158 KB
BuckyBadgerFarm	12/4/2013 11:50 AM	SnapPlus Database	158 KB
JonesLLC Farm	7/11/2014 4:20 PM	SnapPlus Database	367 KB
SampleFarmV2	11/6/2013 3:17 PM	SnapPlus Database	333 KB

Creating a New Farm

1. Open the SnapPlus program

2. Go to **File** menu, and select **New SnapPlus Farm**



3. The default location for saving your new farm is **C:\SnapPlus2\MySnapPlusData**. Type in a unique identifying name for the file and click **Accept**.

Attaching your SnapPlus file in an email

1. Open your email program and compose a new email

2. To attach the file, click on the paperclip icon or other method your email account uses to attach documents

3. Navigate to **C:\SnapPlus2\MySnapPlusData** by double left clicking on the **C** drive, the **SnapPlus2** folder, then the **MySnapPlusData** folder

4. Double left click on the file name to attach it

5. The file you just attached should be visible somewhere in the email window, either in a new line near the subject line, or with an icon near the bottom of the email.

Opening an existing file in SnapPlus

There are four ways to open a SnapPlus file:

1. **Open the SnapPlus program.** Go to the **File** menu and select **Open SnapPlus Farm**. A dialog box will open to the default location of the SnapPlus database directory (**C:\SnapPlus2\MySnapPlusData**). Select the file you would like to work on (*opening a new file using this method will close the current file you are working on*).

2. **Open the SnapPlus program.** Go to the **File** menu and select **Recent**. A list of the ten most recently opened farms, most recent on top, will appear to the right. Select the one you would like to work on (*opening a new file using this method will close the current file you are working on*).

3. **Using standard Windows navigation**, you can also navigate directly to the folder where your SnapPlus files are stored and double-click on the file. *Using this method, you can open more than one SnapPlus file at a time. To switch between files, hover over the SnapPlus icon on the task bar at the bottom of monitor.*

4. **Using the Windows Start Menu** and if SnapPlus is pinned to your Start Menu, you can open any database that is listed by clicking on it. *Using this method, you can open more than one SnapPlus file at a time. To switch between files, hover over the SnapPlus icon on the task bar at the bottom of monitor.*

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June 2014

Moving aSnapPlus file from a USB flash drive to a computer by copying/pasting method

Note: Before moving the database to a different computer, be sure that the current version of SnapPlus V2 is installed on the computer, or you will not have the folders available that are included in these instructions.

1. Insert your USB flash drive into your computer.

2. Open up a new Explorer Window. Simultaneously press the windows button (⊞) on your keyboard and the **E** key to open windows explorer (⊞+ E).

3. **Double left click** on the USB flash drive on the left side of the windows explorer box (usually labeled the **E** or **F** drive) and locate the desired SnapPlus file.

4. **Right click** on the file name and choose **Copy** from the menu that appears.

5. Naviagate to **C:\SnapPlus2\MySnapPlusData** by **double left clicking** on the **C** drive, then the **SnapPlus2** folder, then the **MySnapPlusData** folder.

6. With the **MySnapPlusData** folder open, **right click** in the blank area in the folder window, choose **Paste** from the menu that appears. The green tractor icon along with the file name should appear in the **MySnapPlusData** folder.

How to search for SnapPlus files on your computer

You can use Windows Search to find your SnapPlus V2 files.

1. Open up a new Explorer Window. Simultaneously press the windows button (⊞) on your keyboard and the **E** key to open windows explorer (⊞+ E).

2. **Left click** on C: drive to select it.

3. In the far upper right hand corner, type ***.snapDb**

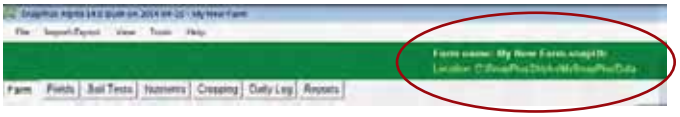
4. Your computer will display the files. To open a file, **double left click** on it. To view it's locations, single **right click** and scroll down to **Open file location** on the menu.

5. If you have multiple drives, select them as in Step 3 and continue searching.

Moving a SnapPlus file to a USB flash drive by copying/pasting method

1. Insert your USB flash drive into your computer.

2. With SnapPlus open, take note of the location of your SnapPlus file by looking at the green bar at the top of the SnapPlus screen, close SnapPlus.



3. Open up a new Explorer Window. Simultaneously press the windows button (⊞) on your keyboard and the **E** key to open windows explorer (⊞+ E).

4. Navigate to your file's location from Step 2. To get to the default setting **C:\SnapPlus2\MySnapPlusData, double left click** on the **C** drive, then the **SnapPlus2** folder, then the **MySnapPlus-Data** folder.

5. Within the **MySnapPlusData** folder (or other folder you selected), locate the file you want to move to the flashdrive.

6. **Right click** on the file name and choose **Copy** from the menu that appears.

7. **Double left click** on the USB flash drive on the left side of the windows explorer box (usually labeled the **E** or **F** drive).

8. With the USB flash drive open, **right click** in the blank area in the folder window, choose **Paste** from the menu that appears. The green tractor icon along with the file name should appear in the USB flash drive.

For more ways to manage SnapPlus files, view these helpful videos:

SnapPlus: Saving a File from your Computer to a Flashdrive

SnapPlus: Moving a File from a Flashdrive to a Computer

snapplus.wisc.edu/news-help/how-to-videos

SnapPlus

Wisconsin's Nutrient Management Software

Basic Concepts

Critical and Predominant Soils

When working with SnapPlus to create a nutrient management plan, you are required to choose both a critical and a predominant soil for each field on your farm. Both are needed to do calculations in SnapPlus.

How does SnapPlus use the **critical soil?**

The critical soil is used for the conservation portion of the nutrient management plan, including calculation of the soil loss for the field, as well as the phosphorus index.

When entered into SnapPlus for a field, the critical soil is used in the Revised Universal Soil Loss Equation, Version 2 (RUSLE2). The calculation provides an estimated soil loss for a particular field based on various attributes of the critical soil chosen—slope, length of slope, tillage practices, rotation, and others. Each soil is assigned a tolerable soil loss ("T"). Those operating the land are expected to farm cropland in a manner to meet "T", in order to avoid degradation of the soil over time. "T" can range from 2 tons to 5 tons per acre per year; it varies from soil to soil.

How to choose the **critical soil?**

The critical soil is defined as the most erodible soil (typically the steepest soil) that covers at least 10% of the field.

To determine the most erodible soil, use the soil map and locate the soil with the steepest slope. Each soil type will have a letter abbreviation to identify the slope of that soil; the higher the letter at the end of the symbol, the steeper the slope and typically the most erodible. For example, DgD2 is a Dodgeville silt loam (Dg) with a slope (D) ranging from 12-18% . In the example, DgD2 is the critical soil for the field.

Letters represent slope ranges as follows: A = <2%, B = 2-6%, C = 6-12%, D = 12-18%, E = >18%. If there is no capital letter at the end of the symbol, the slope is 0.

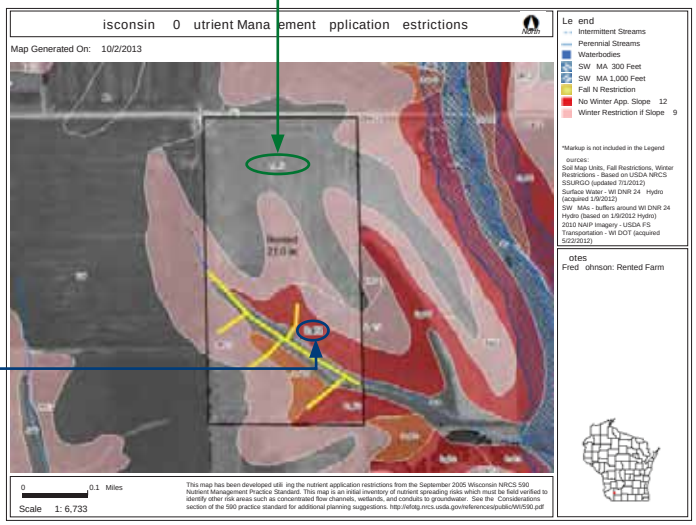
How does SnapPlus use the **predominant soil?**

The predominant soil is used to determine the field's nitrogen recommendations based on the soil's yield potential.

If a high yield potential soil is the predominant soil in a field, the maximum nitrogen recommendation for the chosen crop will be provided. Any field with a medium yield potential or sandy soil as the predominant soil will have a lower nitrogen recommendation when compared to the high yield potential soil.

How to choose the **predominant soil?**

The predominant soil is defined as the soil that makes up the largest portion of the field. Use the soil map to determine which soil makes up the majority of the field. In the example below, TaB2 is the predominant soil for the field.



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June 2014

SnapPlus

Wisconsin's Nutrient Management Software

Basic Concepts

What is the Wisconsin Phosphorus Index?

The Wisconsin Phosphorus Index (P Index) is a planning and assessment tool for managing phosphorus runoff from cropland and pastures.

- ✓ **The P Index** uses general cropping, soil test and long-term weather information to estimate a field's annual phosphorus runoff to nearby surface waters.
- ✓ **The P Index** is reported as a whole number—the higher the number, the greater the potential for that field to contribute phosphorus to nearby lakes and streams; even very low additions of phosphorus in water can grow an abundance of algae and degrade water quality! Another way of thinking about it is *the P Index estimates how well phosphorus is kept in the field*.

What does the P Index have to do with nutrient management planning?

The P Index is one of the two phosphorus management strategies used to meet Wisconsin's Nutrient Management Planning Standard (the other strategy uses the field's soil tests phosphorus levels to determine nutrient applications). To calculate the Wisconsin P Index, you must use the nutrient management software SnapPlus—free download at **snapplus.wisc.edu**.

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May 2014

Can a field's P index value be reduced?

Yes! The following management strategies can be used to reduce a field's P Index value.

1. Use in-field practices that reduce erosion/runoff

- ☑ Use crop rotations that maximize crop residues (i.e. grasses, alfalfa, cornstalks left in the field)
- ☑ Add a nurse crop to alfalfa seedings
- ☑ Work the field on the contour
- ☑ Reduce tillage intensity
- ☑ Strip-crop
- ☑ Install in-field grass contour buffer strips

2. Plan manure and fertilizer applications carefully

- ☑ Avoid or reduce winter applications of manure when possible
- ☑ Apply high solid content manure to fields that have little residue at the time of application

3. Reduce soil test phosphorus to optimum level

- ☑ Apply manure to fields where much of the phosphorus will be removed over the rotation (i.e. fields in rotation with alfalfa)
- ☑ Reduce or eliminate applications of manure to fields that do not have a recommendation for phosphorus.

4. Use below-field grass filter areas or buffers on critical slopes

- ☑ Install grassed filter strips following design specifications set by the Natural Resource Conservation Service

Does the P Index work on pastures?

Yes, the P Index is calculated for pastures with the same equations as for cropland. Manure rates are estimated according to the number, type, and time of animals present and an average excretion rate for each type of animal.

- ☑ Managed pastures that have a stocking density low enough to maintain sod cover generally have very low soil loss and rainfall runoff, and therefore have low P Index values compared to most cropland.
- ☑ Exercise-area type pastures where sod cover is not maintained can have high soil erosion rates and also can have comparatively high manure rates, resulting in higher P Index values.
- ☑ Pastures used for over-wintering, especially those on medium to heavy textured soils, can have high P Index values in snowmelt or winter rain.

Below are some scenarios that illustrate how the P Index value can be reduced using different management strategies in SnapPlus. Keep in mind these examples are only for illustration, **you must run your own data to verify if these strategies will work in your situation**. To meet Wisconsin's Nutrient Management Planning Standard, the P Index must be at 6 or below.

Rotation Average P Index values

1	2	3	4	5	6	7	8	9	10

← acceptable — not acceptable →

Reduce tillage intensity

On a McHenry silt loam field with 9% slope, 150 ppm soil test phosphorus, 2.5% organic matter, with a corn/soybean rotation.

Fall chisel-plowed and disked	9
No-till	3

Avoid winter manure applications

On a McHenry silt loam field with 4% slope, 200 ppm soil test phosphorus, 2.5% organic matter, with a winter application of 7,000 gallons per acre of liquid dairy manure before corn in a spring chisel-plowed corn grain, baled stalks/soybean rotation.

Winter manure application	7
Spring manure application	6

Eliminate applications of phosphorus

On a McHenry silt loam field with 4% slope, 250 ppm soil test, 2.5% organic matter in a strip till system with continuous corn silage.

14,000 gallons per acre dairy manure	7
No manure applications and no additional phosphorus for 4 years	6

Installing a down-slope grass filter

On a McHenry silt loam field with 4% slope, 200 ppm soil test phosphorus, 2.5% organic matter, with a winter application of 7,000 gallons per acre of liquid dairy manure before corn in a spring chisel-plowed and disked corn grain, baled stalks/soybean rotation.

No designed edge of field filter area	8
30 ft. cool season grass filter strip installed at the edge of the field	3

A note about the forms of phosphorus in runoff

The total runoff phosphorus concentration is made up of two forms of phosphorus: soluble (dissolves in water) and insoluble (particles that don't dissolve in water). The P Index accounts for both forms.

Soluble phosphorus can come from the soil, manure and fertilizer. Insoluble or particulate phosphorus comes from the soil in the form of eroded sediment. Since most phosphorus is bound to the soil, reducing soil loss from fields and pastures is a key strategy for reducing the P Index value.

SnapPlus

Wisconsin's Nutrient Management Software

Basic Concepts

Entering Data using the Rotation Wizard:

The Rotation Wizard is a tool in SnapPlus that can help you save time by entering data for multiple years and crops. Before working with the wizard, go to **File** and click on **Save Snapshot**. Then if you make a mistake using the wizard, you can click on **Revert to Last Snapshot** to return to your original file.

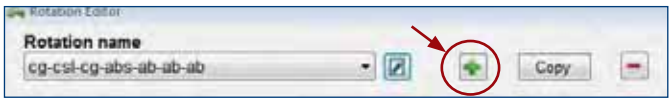
1. Open the **Rotation Wizard** either from the Cropping Screen or from the Tools menu.

2. You are in Step1 of the Rotation Wizard.
   Use the default selection-Add crop or application data to fields. Click **Next**.

3. You are in Step 2 of the Rotation Wizard.
   Select **Edit Rotation.**
   You are now in the Rotation Editor.

   Quick Note: A good method for naming is to use crop abbreviations, for example cg-csl-cg-abs-ab-ab-ab. Using the correct abbreviations will automatically fill-in the crop names in the next step. To access the abbreviations list, click on **Crop Abbreviations** and make note of the crops in your rotation.

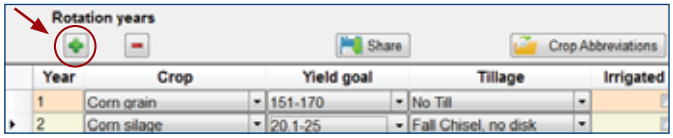
4. Click on the **plus sign icon** to create a new rotation.



   A naming dialog box will open where you can type the name of the new rotation. Once named, it can be edited, copied, renamed or deleted.

5. If you used the crop abbreviations, the table will be filled in (go to the step 6).

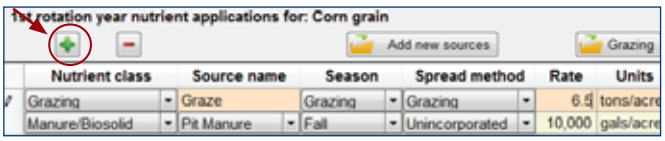
   If not, just click on the **plus sign icon** under Rotation Years to add a line to the table, then select the crop from the dropdown menu. Continue until all the years of the rotation are completed. If the desired crops aren't listed, then you must go back to the Farm Screen to select them for your farm.



6. Use the dropdown menus to fill in Yield Goal and Tillage for each year of the rotation. Also, check the Irrigated box if appropriate.

   Tillage explanations can be found in the SnapPlus Help by clicking on the [?] and searching for tillage. Or consult the ***SnapPlus Fast Facts*** publications available from the information at the bottom of the page.

7. To add nutrient applications, select a year in the top table, then click on the **plus sign icon** below and use the dropdown menus to fill in each cells of that row. Repeat for each year of the rotation. Click **Close**.



   One suggestion for making your fertilizer plan easier to implement is to enter only manure applications during this step. Once the on-farm nutrients are entered, you will be able to view the adjusted UW recommendations and add Fertilizer applications accordingly.

8. You are back in Step 2 of the Rotation Wizard.
   Choose the fields (or groups or subfarms) that will use the new rotation and move them to the box on the right. Click **Next**.

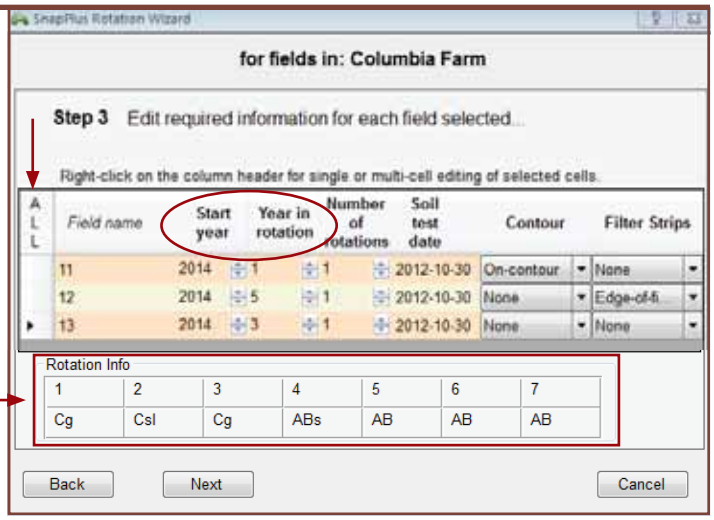
9. You are now in Step 3 of the Rotation Wizard

Your goal in this step is to tell the program where each field is in the rotation in the given year. You also have the opportunity to identify fields that are farmed on the contour, strip-cropped or have filter strips.

Use the dropdown menus along with the **Rotation Info** at the bottom of the dialog box. Fill in the information for each field row, making sure to set the Start Year and Year in Rotation. When completed, click **Next**.

To change multiple rows within a column at one time, select ALL until the grid is blue. Then left click on the column header and select value to change all rows.

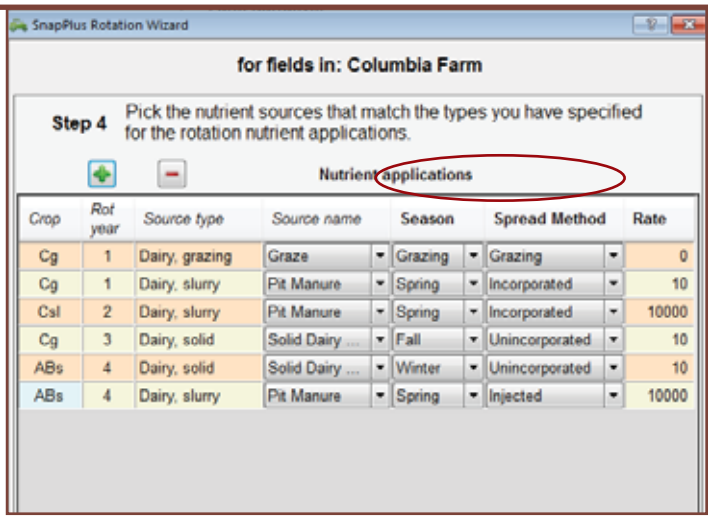
For rotations with alfalfa, we recommend that the start year goes back two growing seasons for carry-over legume credits. So if you are planning for 2015, then start your rotation in 2013 to account for any legumes grown two years prior. For rotations with soybean, go back one year to account for the legume credit.



10. You are in Step 4 of the Rotation Wizard

This step allows you to make adjustments to applications pre-assigned to each cropping year, or you can delete them as needed.

Use the dropdown menus to select the Season and Spread Method for the nutrient applications listed. Use the **plus sign or minus icon to add or delete applications.** When completed, click **Next**.



11. You are in the Confirm step of the Rotation Wizard

Review the information listed to confirm if it's correct. If so, Click on **Apply & Continue** if you want to stay in the Wizard or **Apply & Exit** to return to the main screen. If you would like to make edits, click on **Back**.

To learn more about the Rotation Wizard or view other SnapPlus videos, go to:

snapplus.wisc.edu/news-help/how-to-videos

SnapPlus

Wisconsin's Nutrient Management Software

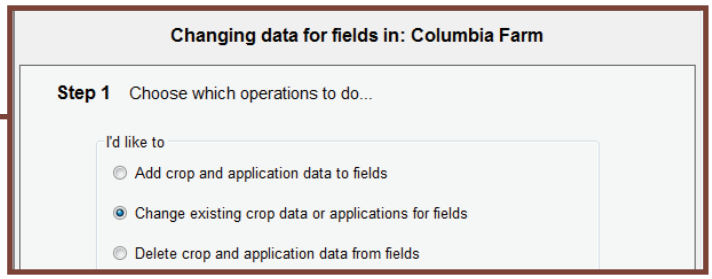
Basic Concepts

Changing Data using the Rotation Wizard:

You can use the Rotation Wizard to save time if you want to make changes to any cropping data or applications to fields. Before working with the wizard, go to **File** and click on **Save Snapshot**. Then if you make a mistake using the wizard, you can click on **Revert to Last Snapshot** to return to your original file.

1. Open the **Rotation Wizard** either from the Cropping Screen or from the Tools menu.

2. You are in Step1 of the Rotation Wizard. Select the second option: Change existing crop data or applications to fields. Be sure that **Yes** is chosen to **Overwrite existing crop data**, then click **Next**.

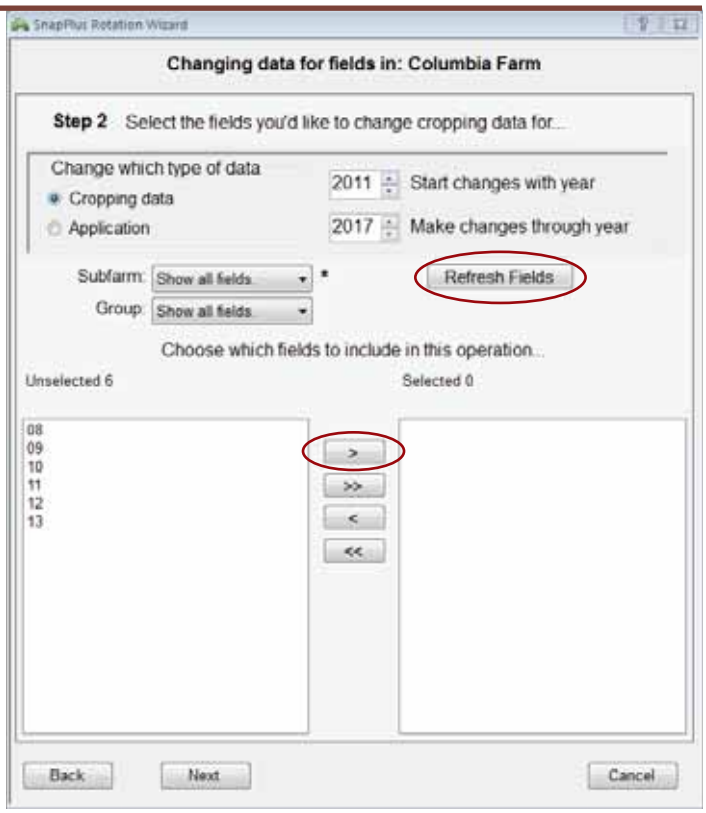


3. You are in Step 2 of the Rotation Wizard. At the top of the screen, you need to choose the type of data you wish to change. Choose **Cropping data** if you want to change things such as tillage, yield, or legume credits. If you want to change manure or fertilizer applications, choose **Application**.

   Select the year that that you want to **Start changes with** and then select the year you want to **Make changes through**.

   Next, choose if you would like to limit the changes to just fields within a subfarm, group or to show all fields. Click **Refresh Fields** to update the fields.

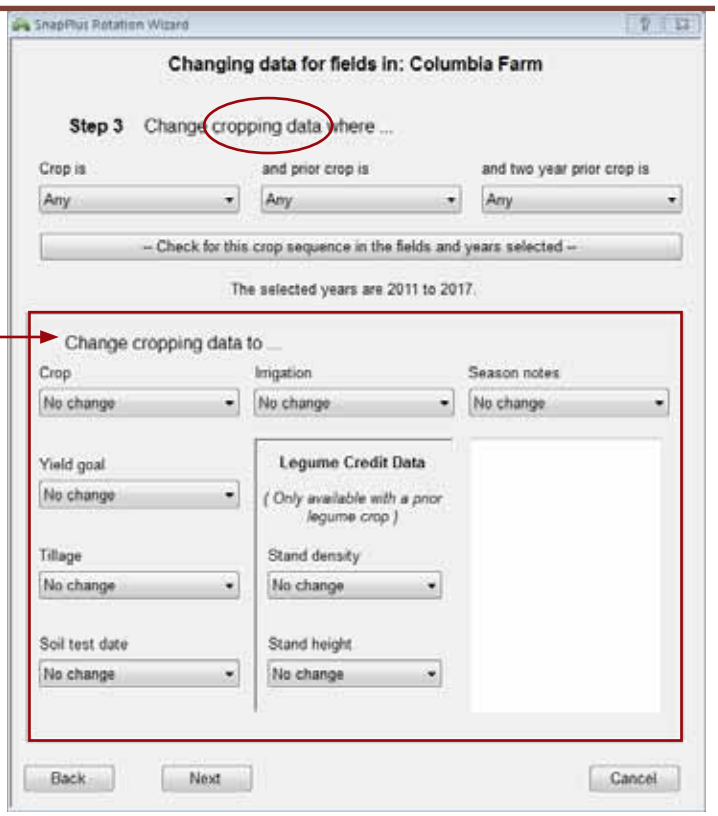
   Then, choose the fields on the left and move them over to the right by clicking on the single arrow button. You can choose a single field or multiple fields depending on your needs, click **Next**.



4. You are now in Step 3 of the Rotation Wizard

In this step, you need to tell SnapPlus what changes you want to make. The screen will look different depending on if you chose **croppping data** (top screen) or **application data** (bottom screen).

In both cases, the first step is to the select crop or cropping sequence you want to make changes to.



Change **cropping data** to

You can select from any of the pull-down menus to make changes. You can also change any Season notes by selecting **Add to existing** or **Replace existing** and then typing in the white box. When you are done, click **Next**.

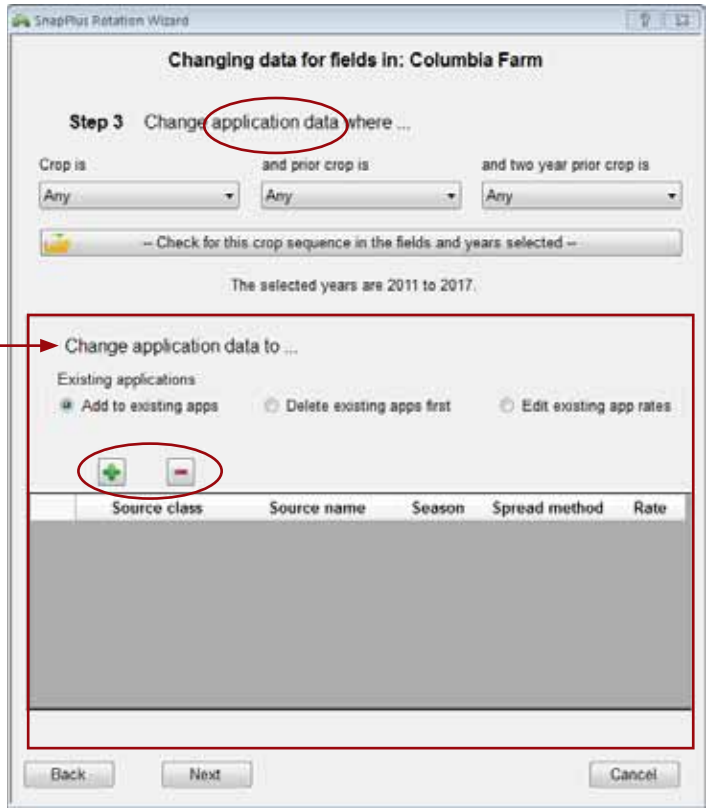
Change **application data** to

Before you change any application data, you need to choose if you would like to

1) Add to existing apps
2) Delete existing apps first
3) Edit existing app rates

*Note that if you chose to Delete apps first, it will delete **all applications** from the chosen field for the chosen year, this includes any manure or fertilizer.*

Next, use the **plus sign icon** to add the new application data. The row will fill-in and you can use the pull-down menus to select the changes to Source class, Source name, Season, Spread method and Rate of the application. Use the **negative sign icon** to delete an application that you have added. When you are done, click **Next**.



5. You are now in the Confirm step of the Rotation Wizard.

Review the information listed to confirm if it's correct. If so, Click on **Apply & Continue** if you want to stay in the Wizard or **Apply & Exit** to return to the main screen. If you would like to make edits, click on **Back**.

To learn more, watch the video

SnapPlus: Using the Rotation Wizard 2 - Making Changes

snapplus.wisc.edu/news-help/how-to-videos

How to Videos

You can also view SnapPlus How-to videos at http://youtube.com/snapplusUW

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SnapPlus: Importing Soil Samples into an Existing SnapPlus Database
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SnapPlus: Moving a SnapPlus Database (Version 1) from your Computer to a Flashdrive
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All videos are available for viewing at
snapplus.wisc.edu

Check back often, we are always adding new SnapPlus help videos!

ARM-LWR-480 (06/10)

Wisconsin Department of Agriculture, Trade & Consumer Protection
Division of Agricultural Resource Management
Bureau of Land and Water Resources
PO Box 8911, Madison WI 53708-8911, Phone: 608-224-4605

Nutrient Management Plan Checklist

Sec. 92.05(3)(k), Wis. Stats.
ATCP 50.04(3) Wis. Admin. Code

Use this form to check nutrient management (NM) plans for compliance with the WI NRCS 590 Standard (Sept. 2005).

County name:_____ Date Plan Submitted:_____ Growing season year NM plan is written for _____
Township (T.__N., S.) – (R.__E., W.) Initial Plan or Updated Plan (circle one) (from harvest to harvest)

Name of qualified nutrient management planner		Planner's business name, address, phone:
Circle the planner's qualification: 1. NAICC-CPCC 2. ASA-CCA 3. ASA-Professional Agronomist 4. SSSA-Soil Scientist 5. DATCP approved training course 6. Other credentials approved by DATCP	Cropland Acres (owned & rented)	Name of farm operator receiving nutrient management plan:
	Rented farm(s) landowner name(s) and acreage:	
Circle relevant program requirement or regulation the plan was developed for: Ordinance, USDA, DATCP, DNR, NR 243 – NOD or WPDES		

		Yes	No	NA
1.	**Are the following field features identified on maps or aerial photos in the plan?**			
a.	Field location, soil survey map unit(s), field boundary, acres and field identification number			
b.	Areas prohibited from receiving nutrient applications: Surface water, established concentrated flow channels with perennial cover, permanent non-harvested vegetative buffer, non-farmed wetlands, sinkholes, lands where established vegetation is not removed, nonmetallic mines, and fields eroding at a rate exceeding tolerable soil loss (T)			
c.	Areas within 50 feet of a potable drinking water well where mechanically-applied manure is prohibited			
d.	Areas prohibited from receiving winter nutrient applications: Slopes > 9% (12% if contour-cropped); Surface Water Quality Management Area (SWQMA) defined as land within 1,000 ft of lakes and ponds or within 300 ft of perennial streams draining to these waters, unless manure is deposited through winter gleaning/pasturing of plant residue and not exceeding the N and P requirements of this standard; Additional areas identified within a conservation plan as contributing runoff to surface or groundwater			
e.	Areas where winter applications are restricted unless effectively incorporated within 72 hours: Land contributing runoff within 200 feet upslope of direct conduits to groundwater such as a well, sinkhole, fractured bedrock at the surface, tile inlet, or nonmetallic mine			
f.	Sites vulnerable to N leaching: Areas within 1,000 feet of a municipal well, and soils listed in Appendix 1 of the Conservation Planning Technical Note WI-1			
2.	**Are erosion controls implemented so the crop rotation will not exceed T on fields that receive nutrients according to the conservation plan or WI P Index model?**			
3.	**Were soil samples collected and analyzed within the last 4 years according to UW Publication A2100 recommendations?**			
4.	**Using the field's predominant soil series and realistic yield goals, are planned nutrient application rates, timing, and methods of all forms of N, P, and K listed in the plan and consistent with UW Publication A 2809**, *Soil Test Recommendations for Field, Vegetable and Fruit Crops,* **and the 590 standard?**			
5.	**Do manure production and collection estimates correspond to the acreage needed in the plan? Are manure application rates realistic for the calibrated equipment used?**			
6.	**Is a single phosphorus (P) assessment of either the P Index or soil test P management strategy uniformly applied to all fields within a tract?**			
7.	**Are areas of concentrated flow, resulting in reoccurring gullies, planned to be protected with perennial vegetative cover?**			
8.	**Will nutrient applications on non-frozen soil within the SWQMA comply with the following?**			
a.	Unincorporated liquid manure on unsaturated soils will be applied according to Table 1 of the 590 standard to minimize runoff			
b.	One or more of the following practices will be used: 1) Install/maintain permanent vegetative buffers, or 2) Maintain greater than 30% crop residue or vegetative coverage on the surface after nutrient application, or 3) Incorporate nutrients leaving adequate residue to meet tolerable soil loss, or 4) Establish fall cover crops promptly following application			

I certify that the nutrient management plan represented by this checklist complies with Wisconsin's NRCS 590 nutrient management standard.
Signature of qualified nutrient management planner

SnapPlus

Wisconsin's Nutrient Management Software

Advanced Concepts

Reviewing a SnapPlus Nutrient Management Plan for Compliance

Using the information found in your SnapPlus farm and restriction maps, answer the following questions, making comments as necessary—especially those specific to any compliance issues with the 590 Nutrient Management Standard.

Numbers shown in parentheses at the end of some questions refer to additional information shown in the table on pages 4 & 5 (in the interactive PDF, you can access the note by rolling over the button to the left of the question). Abbreviations in the parentheses can also refer to SnapPlus reports that may be helpful in answering those questions (report abbreviations are shown on page 5).

Reviewer's Overall Comments

General Plan Information			
1. Review date:			
2. Reviewed by:			
3. Reviewed in SnapPlus Version:			
4. Farm name:			
5. County:			
6. Farm contact:			
7. Plan written by **(1)** :			
8. Plan writer contact:			
	Y	**N**	**NA**
9. Complete checklist included **(2)**?			
10. Electronic SnapPlus file received?			
11. Is there a schedule of compliance for any known non-compliance issues **(3)**?			
12. If yes, explain:			

The purpose of the following section is to understand the farm and how they manage their resources. This section can be skipped if you are already familiar with how the farm operates.

13. Type of farm and current animal numbers **(4)** :
14. Typical crop rotations **(5)** :
15. Type of fertilizers & typical rates **(6)** :
16. Type of manure, percent collected and hauling methods **(7)** **(8)** :
17. Manure hauling seasons **(8)** (check all that apply) : No manure Daily Fall Winter Spring Summer Other:

Farm name: **Review date:**

Maps	Y	N	NA	Comments
18. Are nutrient restriction & soil maps included? If **No**, a thorough review cannot be completed until these are included.				
19. Are the following restriction features correctly identified on the restriction maps **(9)**:				
a. Surface water/SWQMAs				
b. Wells (private and community)				
c. N restricted soils				
d. Slopes with winter spreading restrictions				
e. Direct conduits to groundwater (wells, sinkholes, fractured bedrock at the surface, tile inlets, nonmetallic mines)				
f. Concentrated flow channels (vegetated or cropped through)				
g. Non-harvested permanent vegetative buffers				
h. Fields exceeding "T"				
i. Non-farmed wetlands				
j. Land where vegetation is not being removed (e.g. CRP land)				
k. Local winter prohibitions				
l. Area within 50 ft of a drinking water well				

Soil Sampling	Y	N	Comments
20. Were soil tests processed by a DATCP-certified lab **(10)**?			
21. Are all fields within1 soil sample per 5 acres **(11)** ?			
22. Are soil tests less than 4 years old **(NM2)**?			

Field Information	Y	N	NA	Comments
23. Are rotations complete **(12)**?				
24. Are all fields in SnapPlus also shown on the restriction maps and soil maps with consistent acreages **(13)**?				
25. Are the correct dominant and predominant critical soils chosen **(14)**?				
26. Have the following been correctly chosen for each field in SnapPlus **(15)**:				
a. SWQMA present				
b. Drinking well within 50 feet				
c. N soils present				
d. Winter slope restrictions				
e. Local winter prohibitions				
f. Conduits to groundwater within 200 ft				
g. Field slope				
h. Slope length				
i. Below field slope to water				
j. Distance to perennial water				
27. Do future years use realistic yield goals **(16)**?				
28. Is the current state of concentrated flow channels shown on the maps or discussed in the narrative **(17)**?				
29. Have all past years been updated with actual crops, yields, manure applications, fertilizer applications, tillages, legume credits and rotation lengths **(18)**?				
30. Do all fields meet "T" **(19)**?				

Farm name: **Review date:**

Manure	Y	N	NA	Comments
31. Is all manure allocated over the rotation **(20)**?				
32. Are calibrated manure spreader rates being used in the plan **(21)**?				
33. Are manure application seasons (spring, summer, fall, winter) in the plan consistent with the farm's actual manure hauling timeline **(22)**?				
34. Are manure applications correctly applied around wells **(23)**?				
35. If fields contain N restricted soils and receive manure applications in the summer/fall is at least one of the following strategies identified to minimize N losses **(24)** **if the soil is over 50°:** 1) Nitrification inhibitor with liquid manure and a maximum N rate of 120 lbs of N/acre 2) Applications of manure occurred after Sept 15 and a maximum N rate of 90 lbs/acre 3) Fields with perennial crops or fall-seeded crops & a maximum N application rate of 120 lbs/acre or the crop N requirements, whichever is less **OR if the soil is less than 50°:** Fields will receive less than 120 lbs/acre or the following year's crop requirement, whichever is less				
36. Are appropriate conservation practices applied when manure is applied in spring, summer or fall in SWQMA areas (stabilized vegetative buffers, 30% or more residue, nutrients are incorporated within 72 hours, cover crop applied) **(NM2)**?				
37. Are surface applications of liquid manure in SWQMAs planned according to Table 1 of the 590 Standard **(NM2)**?				
38. Will any of the fields receive manure applications in the winter **(25)**?				
a. **If Yes,** are fields free of prohibitions due to slope, SWQMA, or drainage **(26)**?				
b. **If Yes,** do fields receiving winter applications of manure limit application rates to the P removal of the following growing season's crop or 7,000 gal/acre?				

Nitrogen	Y	N	NA	Comments
39. Is all N fertilizer allocated for the planned crop year **(FM8) (27)**?				
40. Is N applied without over-application **(28)**? Over-applications based on a soil (pre-sidedress, PSNT) or a tissue test showing a deficiency may be allowed **(29)**.				
41. Are appropriate legume credits being applied **(30)**?				
42. Are N applications on N restricted soils in the summer/fall limited to 30 lbs N/acre to establish fall-seeded crops **(NM2)**?				
43. If fields containing N restricted soils are being irrigated, is a strategy identified to minimize N loses: Split or delay N application until after crop establishment OR use of a nitrification inhibitor **(31)**?				

Phosphorus	Y	N	NA	Comments
44. Is all P fertilizer allocated over the rotation **(FM2) (32)**?				
45. Does the plan indicate a P strategy across the farm (soil test P or PI) **(NM2)**?				
46. Is P applied without over applications based on the strategy chosen **(33)**?				

Note #	Reference
1	Farmers can sign off on their own plan if they receive training every 4 years. Note that not all CCA's are listed on the CCA website but all certifications can be verified through the certifier. All allowable credentials can be found in ATCP 50.48.
2	Verify that all information on the checklist is filled out and complete. Note if the plan is an initial plan (and therefore all years of the rotation are future), or if the plan is an update and some of the crop years are actual.
3	NM1, NM2 or information received from the plan writer, farmer or county during conversations. Known non-compliance issues should include a schedule to come into compliance.
4	Dairy, Grain, Grazing, CAFO, etc. Figuring out the type of farm you are reviewing will frame the rest of the questions. If the farm has no manure, skip the manure section on page 3. Use NM4,NM1 or Narrative for animal numbers.
5	NM3. Review the report and Narrative to understand general rotations, tillages,etc. the farm uses. Note that eventually all years of the rotation are actual with only the current year planned or unknown (therefore it's important to know if the plan is an update and when it was started).
6	NM1, FM8, NM5. Note FM8 can be opened in Excel and sorted by fertilizer to easily see the groupings and if applications seem to be missing leave open to use later in the N & P sections.
7	NM4 shows percent of manure collected, if not 100% it should be explained where the rest is going. The estimated manure calculator should only be used in the initial plan, after that actual manure numbers should be known (from the annually updated plan with manure logs from calibrated spreaders). Grazing manure and pastures need to be included if >1 AU/acre (effective 2016) or if the pasture receives any mechanical applications (effective 2005).
8	NM1, NM4, FM8
9	These restricted features should be identified: Surface water/SWQMAs Wells N restricted soils Slopes with winter spreading restrictions Direct conduits to groundwater These features should be identified as prohibited: Concentrated flow channels Non-harvested permanent vegetative buffers Fields exceeding "T" Non-farmed wetlands Land where vegetation is not being removed Local winter prohibitions Area within 50 ft of a drinking water well If the plan uses Manure Management Advisory System maps, then only the layers that are turned on will show up in the legend when the map is printed (this way you can see if the features are not present or are simply not turned on). If the plan uses SnapMaps, all layers display in the legend. Note that direct conduits to groundwater, including wells, need to be added manually to the MMAS maps. Direct conduits to groundwater should be marked in the restriction feature box on the field screen (or NM3) as being present and the area 200 feet upslope of these features should not receive manure applications in the winter and non-winter applications should be incorporated. All direct conduits (including wells) need to be identified, regardless of ownership. If the plan uses SnapMaps, then verify on the SnapMap Field and Restriction tabs that features have been imported back to the SnapPlus Field's page.

Reference notes are intended to provide additional information but are not considered exhaustive; if you need more information or clarification, please contact Stephanie Schneider, Stephanie.schneider@wi.gov

Note #	Reference
10	DATCP certified labs: A & L Great Lakes Laboratories (Fort Wayne, IN), AgSource Soil & Forage Lab (Bonduel, WI), Dairyland Laboratories (Arcadia, WI), Rock River Laboratory (Watertown, WI), UW Soil & Forage Lab (Marshfield, WI).
11	NM2. Verify that the original soil test reports correlate to the sampled field only (note that fields managed the same (e.g. strips) can be grouped to meet the 5 acre maximum but still need to be less than 5 acres per sample; also note, that field names and acreages may not correlate exactly to the information on the soil test report). A quick check can be done by opening FM6 in Excel and then sorting by P or K levels to verify that tests are unique. If pastures do not receive mechanical applications of nutrients and are stocked at >1 AU/ac then soil tests can be assumed to be at 150 ppm P and 6% OM. Note that non-responsive fields can have more than 5 acres per sample, see A2809 for specifics.
12	NM3. Rotations can be 1 year if it is a continuous crop with the same tillage, though it's recommended to use a min of 4 years to capture the time between soil testing and manure applications. Rotations can't exceed a max of 8 years. Check that seeding years are captured for perennial crops. It's important to know if the plan was an update or an initial plan in order to check that the rotations are set to start in the appropriate year (for rotations longer than 1 year the rotation eventually is all historical except the current planned year, in other words, the rotation window should not re-start every year with the current planning year the first year of the rotation).
13	Tip: print NM3 from Excel with Field Name, Acreage, Critical Soil, N/Fld Res, Contour (if have any), Rotation, Tillage, Report Period; then check these off on the paper report as you verify the information in SnapPlus and on the maps. Verify that field sizes in SnapPlus and on the maps are consistent, as well as the checklist acreage total and the SnapPlus acreage total (NM3). Also, verify that pastures are included (do not need to be included if stocked at an average rate of ≤1 AU/ac during the grazing season AND does not receive mechanical nutrient applications). Note that Farmland Preservation participants have until 2016 to comply with the new pasture requirements.
14	NM5, FM9 show predominant soil; NM3 shows dominant critical soil; compare these to the Soils Map. Tip: Use the printed report from Note 13.
15	Run NM3 ("N/Fld Res" column) and compare to maps. This question is verifying that the information on the maps is correctly entered into SnapPlus. Field slope and slope length should be left at the default unless in-field measurements have been taken. Tip: Use the printed report from Note 13. If the plan uses SnapMaps, verify on the SnapMap Field and Restriction tabs that the necessary features have been imported back to the SnapPlus Field's page (if data is bold and italicized, then it has not been imported yet).
16	NM5, 3-5 year yield average for the farm or county plus 15% is allowable.
17	NM1 or check air photos/maps. Fields containing active gully erosion are assumed to be over T and cannot receive nutrients until after they are established in perennial vegetation.
18	If the SnapPlus database is not submitted, NM5 will need to be submitted for every year of the rotation. If it is not otherwise indicated, actual hauling logs, or other documentation, can be used to verify the SnapPlus info has been updated.

Note #	Reference
19	NM3 or NM2. Soil loss can only be checked if the above questions have been answered and are correct (rotations, tillages, soil types). If any of the components that feed into soil loss are incorrect they will need to be changed in the database, or, if you don't have the database, the planner will need to fix and resubmit. See Note 12 regarding rotation settings.
20	NM4. All manure needs to be allocated before a complete review can be done. This includes manure deposited by grazing. The manure estimator should only be used for the first year of the plan, after which the farm will have manure spreading logs and a calibrated spreader which will give a more accurate number for the farm to use when planning. If manure amounts were estimated verify the correct animal sizes were used
21	NM4 shows calibration notes that have been entered into SnapPlus, but the information may also be in NM1 or in supplemental documentation. It's important to know the minimum spreading rate and increments for the liquid manure hauling equipment. Compare FM8 or NM5 to the calibration information provided. Verify that rates less than the minimum achievable are not being used or over-applications will be unavoidable.
22	FM8 shows total amounts by season, this will need to be run for each year of the rotation and should be in-line with the General Farm Information section on pg 1. Tip: Open the report in excel to more efficiently manage the data.
23	The area 50 feet around a drinking water well is prohibited from manure applications. The area 50 feet to 200 feet upslope from a well requires incorporation within 72 hours or is also considered prohibited for surface applications of manure.
24	Maps or NM3 will show the fields that contain N soils (previously verified these were identified in SnapPlus correctly), FM8 will show the fields that received manure and when the applications occurred, as will spreading logs. Information regarding the temperature and use of a nitrification inhibitor with actual applications may be in supplemental documentation outside of SnapPlus. NM2 will show N exceedances.

Note #	Reference
25	NM2 will show any winter overapplications of nutrients. FM8 will show the fields that had manure applied to them in the winter. If all the fields are farmed on the contour then the 9-12% slopes (pink on the MMAS maps) can be turned off. Note if the farm is not winter spreading the 590 checklist should have "NA" marked under 1.d and 1.e.
26	Examples of drainage that would prohibit winter manure applications include: areas delineated in a conservation plan as contributing nutrients to direct conduits to groundwater or surface water, drainage to Outstanding/Exceptional/nutrient impaired water bodies.
27	All sources of N fertilizer (including manure if applicable) need to be applied for the crop year before question 40 can be accurately determined.
28	NM2; see the Help menu in SnapPlus for a more detailed explanation of N flags: The Cropping Screen>Restriction Flagging>Identifying Excessive Nitrogen Applications
29	FM3 shows Legume Credits. Run previous year's NM5 to see yields.
30	Should be explained in the comments NM2 and lab analyses should be included with the plan.
31	NM3 shows fields marked as "Irrigated", FM8 will show if and when manure applications are being made to those fields.
32	All sources of P fertilizer (including manure if applicable) need to be applied over the rotation before question 46 can be accurately determined.
33	NM2 or NM3 shows PI and soil test P targets and balances. PI Strategy: The planned average PI values for up to an 8-year rotation in each field shall be 6 or lower and may not exceed a PI of 12 in any individual year. Soil test P: 50-100 ppm soil test P: P application shall not exceed the total crop P removal for crops to be grown over a maximum rotation length of 8 years; >100 ppm soil test P: eliminate P applications, if possible, unless required by the highest P demanding crop in the rotation. If applications are necessary, applications shall be 25% less than the cumulative annual crop removal over a maximum rotation length of 8 years.

Report Abbreviations Used in Note's References

NM1: Narrative & Crops Report (this would also refer to a separate standalone narrative outside of SnapPlus)

NM2: Compliance Check

NM3: Field Data & 590 Assessment

NM4: Manure Tracking

NM5: Spreading & NM Sorted By Crop

NM6: DNR CAFO Annual Spreading

NM7: Animal Units

NM8: DNR Daily Log

NM9: DNR CAFO Nutrient Mass Balance

NM10: CAFO Emergency Spreading

FM1: Annual Manure Production

FM2: Applications Summary

FM3: Producers Plan

FM4: Crop Production Trends

FM5: Lime Report

FM6: Soil Test Summary

FM7: Soil Test – Sample Log

FM8: $Spreading Plan

FM9: Nutrient Management Plan

FM10: Annual PI

SL1: Soil Conservation

SL2: Annual Soil Loss

SL3: Transect Survey

WQ1: P Trade

DD1: Annual Cropping Data

DD2: Applications Data

DD3: Precision Recommendations

Wisconsin's Nutrient Management Standard 590

- Summary -

September 2005 Revision

Criteria for All Sites

1. General Cases

A. Annual field-specific nutrient application plan consistent with UWEX soil fertility recs. (A2809).
B. Plan shall be based on realistic yield goals – no higher than 15% above the previous 3-5 year average.
C. Routine soil testing shall be conducted at least once every four years.
   1) Sample soils according to UWEX recs (A2100).
   2) Analysis by a WDATCP-certified lab.
D. Annual phosphorus (P) and potassium (K) recommendations may be combined into a single application to meet the total nutrient needs over the crop rotation.
   1) Combined annual application not allowed on frozen or snow-covered ground.
   2) Commercial P fertilizer shall not be applied to fields with soil test P in the excessively high (non-responsive) range.
      - Exception of up to 20 lb/a of P_2O_5 starter for corn.
   3) Credit all P and K starter fertilizer against crop needs.
E. Soil pH should be adjusted to optimum ranges.
F. Nitrogen (N) applications shall not exceed annual crop need (or uptake).
   1) Exception: If legumes, manures, and/or organic byproducts are the only sources of N, N rate may exceed crop need by 20%.
   2) Credit any starter N fertilizer in excess of 20 lbs/a.
G. First- and second-year legume-N credits shall be accounted and utilized.
H. First-year available manure nutrient credits shall be accounted and utilized using either:
   1) Laboratory manure-nutrient analysis.
   2) UW estimates of first-year available nutrient content of manure.
I. Other organic byproducts applied to fields need to be analyzed for nutrient content and applied according to existing regulations.
J. Nutrients shall not run off fields during or immediately after application.
K. Nutrient applications based on plant tissue analysis shall be done in accordance with UW sampling, testing, and interpretation guidelines.
L. Where gleaming/pasturing occurs, do not allow the N and P manure additions to exceed the requirements of this standard.

2. Nutrient Application Prohibitions

A. Nutrients shall not be spread on:
   1) Surface water, concentrated flow channels, vegetative buffers, non-farmed wetlands, sinkholes, gravel/sand pits, wells.
   2) Non-cropland and/or non-pastured land.
      - Exception: Establishment and maintenance nutrient requirements are allowed.
   3) Areas within 50 feet of a well - - applies to manure only.
   4) Areas contributing runoff 200 feet upslope of direct conduits to groundwater (wells, sinkholes, surface fractured bedrock, tile inlets, or gravel/sand mines) unless nutrients are incorporated within 3 days.
   5) Fields exceeding tolerable soil loss (T).
B. Frozen or snow-covered soil nutrient application prohibitions:
   1) 1,000 feet of a lake, pond, flowage or within 300 feet of a river/perennial stream (SWQMAs),
   2) Areas identified as direct conduits to groundwater or surface water,
   3) P removal of the following growing season's crop is not to be exceeded when applying manure. Liquid manure applications limited to 7,000 gallons/acre,
   4) Slopes greater than 9%.
      - Exception: Up to 12% for manure applications on contoured or contour stripped fields.
   5) No commercial N or P fertilizer.
      - Exception: Grass pastures and winter grains not contained in above prohibition areas.

3. Nutrient Application Restrictions

A. Application rates for unincorporated liquid manure on non-frozen soils within a SWQMA are not to exceed Table 1 values.
   1) No applications allowed on saturated soils.
   2) Subsequent manure applications possible (as standard allows) after 7 days or after soil evaluation (Table 1).
B. All nutrient applications on non-frozen soil within a SWQMA shall be in conjunction with one or more of the following practices:
   1) Permanent vegetative buffers,
   2) Greater than 30% crop residue or vegetative cover after nutrient application,
   3) Incorporation within 3 days of application leaving adequate residue to meet "T",
   4) Cover crops established promptly following application.

Criteria for Groundwater Protection

Applies to high permeability soils (sands, etc.), soils with less than 20 inches to bedrock, or soils with less than 12 inches to apparent water table. Also fields within 1,000 feet of a municipal well

1. N Application Restrictions:

A. No fall applications of commercial N.
- Exception: Establishment of fall-seeded crops
  - 30 lb N/acre maximum.

B. Apply one of the following practices on irrigated fields, includes irrigated manure:
   1) Apply majority of N after crop establishment (sidedress or split), *or*
   2) Utilize a nitrification inhibitor with ammonium forms of N.

2. Manure-N Application Restrictions:

A. When manure is applied in late summer/fall when soil temperatures are greater than 50° F, meet one of the following:
   1) Use a nitrification inhibitor with liquid manure and limit rate to 120 lbs N/acre,
   2) Apply after Sept. 15 and limit rate to 90 lbs N/acre,
   3) Apply to perennial or fall-seeded crops and limit rate to 120 lbs N/acre *or* the crop's N requirement – whichever is less.

B. When manure is applied in fall and soil temperatures are 50° F or lower, limit rate to 120 lbs N/acre *or* the crop's N requirement – whichever is less.

3. P Leaching Restrictions:

A. Where P additions to groundwater are identified, implement practices to reduce P delivery.

Criteria for Surface Water Protection

1. Where manure, fertilizers, or organic byproducts are applied:

A. Avoid building soil test P values beyond the excessively high range for the most demanding crop in the rotation (30 to 50 ppm for most agronomic crops).

B. Establish perennial vegetative cover in all areas of concentrated flow where gullies occur.

2. Develop a plan for managing P when manure or organic byproducts are applied using one of the following strategies. Selected strategy must be applied uniformly to all fields within a farm or tract.

A. Phosphorus Index (PI) Strategy:
   1) The PI assesses P delivery to surface waters from fields. See http://wpindex.soils.wisc.edu,
   2) The planned PI value for up to an 8-year rotation of each field shall be 6 or lower.
   3) P applications on fields with a PI > 6 are allowed only if needed according to UWEX soil fertility recs.

B. Soil Test P Strategy:
   1) P applications from all sources must be based on the following soil test P values:
      a) < 50 ppm P - Nutrient applications allowed up to crop N need/removal,
      b) 50 – 100 ppm P - Applications of P shall not exceed crop removal of P over a rotation (8 year max),
      c) > 100 ppm P - Eliminate P applications, unless required by highest P-demanding crop in the rotation.
      - Exception: If P (i.e. manure-P) must be applied, applications shall be 25% less than the cumulative annual crop P removal over the rotation (8 year max).
      - Exception: For potatoes, P applications shall not exceed rotational crop removal (8 year max) if soil tests are optimum, high, or excessively high for potatoes.

Criteria for Air Quality Protection

Where air quality is identified as a concern, a management plan that minimizes N volatilization and particulate emissions while maintaining "T" shall be applied.

Criteria for Soil Quality Protection

1. Nutrients shall be applied in a manner that does not permanently degrade the soil's physical, chemical, or biological conditions.

2. To the extent practical, nutrients shall not be applied to flooded or saturated soils when the potential for soil compaction is high.

Table 1. Maximum unincorporated liquid manure application rate within a SWQMA.

Soil Texture Class[1]	Maximum Application Rate < 30%[2]	Maximum Application Rate > 30%[2]	Allowable Soil Moisture Description for Applications
	- - - - - gal/acre - - - - -		
Fine	3,000	5,000	Easily ribbons out between fingers, slick feel.
Medium	5,000	7,500	Forms a ball, very pliable, slicks readily with clay.
Coarse	7,000	10,000	Forms a weak ball, breaks easily.

[1] Fine – clay, silty clay, silty clay loam, clay loam; Medium – sandy clay, sandy clay loam, loam, silt loam, silt; Coarse – loamy sand, sandy loam, sand. The coarse category also includes peat and muck.

[2] Crop residue or vegetative cover on the soil surface after manure application.

SnapPlus

Wisconsin's Nutrient Management Software

Conservation Standards

ATCP 50 Farm Conservation Standards (ARM Pub 242, 03/14)

ATCP 50 was revised to implement new and modified soil and water conservation standards adopted by the Department of Natural Resources (DNR) in 2011. This document presents a summary of the ATCP 50 farm conservation practice requirements, including updates to the soil erosion standard, modifications to the nutrient management (NM) standard to implement the phosphorous index, provisions to address the tillage setback and process wastewater requirements. The location of the actual rule language associated with the conservation standards listed below is included in brackets.

Wisconsin Department of Agriculture, Trade and Consumer Protection, Land and Water Resources Bureau http://datcp.wi.gov/ATCP50

NUTRIENT MANAGEMENT

- ✓ A NM plan that meets the NRCS 590 Nutrient Management Standard is required on all fields receiving mechanical and all other applications of nutrients, including pastures. See *Nutrient Management on Pastures*, DATCP ARM Pub.244 for more details. [ATCP 50.04(3)(a)]
- ✓ Pastures are exempt from NM plan requirements if the pasture is really a feedlot, or when the pasture's average stocking rate is 1 AU/acre or less during grazing season and no nutrients are mechanically applied. [ATCP 50.04(3)(b)]
- ✓ Pastures must be included in a NM plan if they have mechanically applied nutrients or the pasture's average stocking rate is more than 1 AU/acre over the grazing season. Soil testing is required for pastures with mechanically applied nutrients. For other required pastures, a planner may assume soil test values of 150 ppm P and 6% organic matter content. [ATCP 50.04(3)(d) and (de)]
- ✓ NM plans are required to be reviewed annually and updated to reflect changes to any planned activities, such as cropping, nutrient application rates, and/or application methods. [ATCP 50.04(3)(gm)]
- ✓ DATCP may set minimum requirements for a DATCP certified training course for farmers who write their own nutrient management plans. [ATCP 50.48(2)4. Note]

SOIL EROSION

- ✓ All cropland and pastures must meet tolerable soil loss ("T") levels. [ATCP 50.04(2)]
- ✓ Soil erosion rates should be estimated using the latest prediction models: RUSLE 2 and Wind Erosion Prediction System. [ATCP 50.04(2)Note]

PHOSPHORUS INDEX (PI)

- ✓ All cropland and pastures must comply with the Phosphorus Index (PI) standard [NR 151.04] including where the PI applies, the methods for calculating the PI, and acceptable PI (an average of 6 or less over the accounting period, and 12 or less in any one year of the rotation). [ATCP 50.04(1)]
- ✓ A NM plan meeting the standard in ATCP 50.04(3) may be used to demonstrate compliance with DNR's PI standard. [ATCP 50.04(3) Note]

TILLAGE SETBACK

- ✓ Cropland must be managed to include a minimum setback of 5 feet from the top of the channel of surface waters. No tillage can occur and adequate vegetation (70% coverage) must be maintained in that tillage setback zone to ensure bank integrity. [ATCP 50.04(4)(a); NR 151.03]

- ✓ When establishing the setback width, start with 5 feet. If it is determined that 5 feet may not be adequate to maintain bank stability, county land conservation staff should [ATCP 50.04(4)(b)]:

  - ☑ Use best professional judgment to increase setback width based on factors including bank materials, height, slope, cause of bank erosion, and soil type.

  - ☑ Increase the tillage setback width by the smallest increment necessary to maintain bank stability.

  - ☑ Follow a consistent approach when making setback width determinations by consulting with NRCS or DATCP engineers or technicians.

- ✓ Enrolling riparian areas in the Conservation Reserve Enhancement Program (CREP) can achieve compliance with the tillage setback standard. [ATCP 50.04(4)(b) Note]

  - ☑ Cost-sharing is not required to implement this practice.

PROCESS WASTEWATER

- ✓ Livestock operators must prevent a "significant" discharge of feed storage runoff, milkhouse wastewater, or other process wastewater. As defined by NR 151.055, a "significant" discharge is based on factors such as volume, frequency, receiving waters, and slope. DATCP grant funds may now be used to provide cost-sharing for a feed storage runoff control system as long as the system meets applicable standards including NRCS technical guide waste treatment standard 629. [ATCP 50.705]

  - ☑ Livestock operators may pursue less costly approaches to reduce feed storage discharges to a non-significant level.

ADDITIONAL STATE SOIL & WATER CONSERVATION STANDARDS FOR WI FARMS

ATCP 50 now includes all performance standards and prohibitions in NR 151. Farmers must comply with DNR standards added in 2011, as well as the 2002 standards and prohibitions listed below. Cost-share funding may be available to assist with compliance. Some state and local programs may require compliance whether or not cost-share funds are available, but provisions in the Farmland Preservation Program allow a farmer to comply with the 2011 standards over time.

2002 Performance Standards and Prohibitions

- ✓ Prevent direct runoff from feedlots or stored manure to waters of the state

- ✓ Limit livestock access along waterways to maintain vegetative cover

- ✓ Maintain manure storage structures to prevent leaking and overflow

- ✓ Follow manure storage technical standards for construction and abandonment

- ✓ For areas near surface water or susceptible to groundwater contamination:

  - ☑ Do not stack manure in an unconfined pile

  - ☑ Divert clean water away from feedlots, manure storage, and barnyards

NPM April 2015

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Conservation Standards

Nutrient Management on Pastures (ARM Pub 244, 03/14)

ATCP 50 implements soil and water conservation standards adopted by the Department of Natural Resources (DNR), which includes the requirement that pastures comply with the soil loss and Phosphorus Index (PI) standards. This document explains the conditions under which ATCP 50 pasture requirements apply and the flexibility allowed in ATCP 50 when developing a nutrient management (NM) plan for pastures to demonstrate compliance with the soil loss and PI standards. Farmers may continue to claim Farmland Preservation tax credits while planning pastures with a performance scheduled developed by the county land conservation department.

SnapPlus (v2 or later) can be used to determine soil loss and PI values under a number of pasture and dry lot management scenarios. If a pasture is included in a NM plan developed using SnapPlus that meets the PI limits in NR 151.04, the plan can be used to demonstrate compliance with DNR's standards.

Wisconsin Department of Agriculture, Trade and Consumer Protection, Land and Water Resources Bureau http://datcp.wi.gov/ATCP50

WHEN MUST A PASTURE BE INCLUDED IN A NM PLAN?

Italicized words are defined on the following page.

INCLUDE A PASTURE IF ANY APPLIES:

- ✓ It receives mechanical applications of nutrients. Develop a NM plan for this ***pasture*** using soil samples collected at the frequency of 1 sample per 5 acres every four years and analyzed by a DATCP certified soil testing laboratory [ATCP 50.04(3)].
- ✓ It is stocked at an average of MORE than 1 ***animal unit*** (AU) per acre*. Develop a NM for this pasture either using soil tests according to ATCP 50.04(3) or 'assumed soil test values' of 150 ppm P and 6% OM.
- ✓ It has a herd present in the winter and is not a ***feedlot***. Develop a NM for this pasture either using soil tests according to ATCP 50.04(3) or 'assumed soil test values' of 150 ppm P and 6% OM.

DO NOT INCLUDE A PASTURE IF EITHER APPLIES:

- ✓ It is a ***feedlot***, **OR**
- ✓ It is stocked at an average rate of 1 AU per acre or LESS* at all times during the ***grazing season***,

AND

- ✓ It does not received mechanical nutrient applications.

* Flip the page to see how to calculate the average stocking rate of your pastures and an example scenario!

HOW TO CALCULATE THE GRAZING SEASON'S AVERAGE STOCKING RATE OF YOUR PASTURE (AU/ACRE)

There are two methods available to calculate a pasture's average stocking rate. The first method is to use the **Grazing Application Estimator** in SnapPlus (available for free at http://snapplus.wisc.edu/). The second method is to calculate it manually using the equation below along with the DNR's publication for calculating animal units, Form 3400-025A (http://dnr.wi.gov/topic/agbusiness/documents/3400025a_wt.pdf).

$$\left[\frac{\text{(Animal Units in herd} \times \text{Days pastured} \times \text{Percent of day grazed)}}{\text{Acres of pasture}}\right] \div \text{244 grazing season days} = \text{AVERAGE STOCKING RATE during the grazing season (AU/acre)}$$

Represents the average grazing season from April through November

Example scenario

Does this pasture need to be included in a NM plan?

A 15 dry cow herd grazes on a 5 acre pasture for 100 days during the summer. The herd spends 50% of the day on the pasture.

15 current number in herd x 1.43 equiv. factor = 21 AU

21 AU in herd x 100 days pastured x .50 (50% of day) = 1050 AU/day

1050 AU/day ÷ 5 acre pasture = 210 AU/day/acre

210 AU/day/acre ÷ 244 days = 0.9 AU/acre

The average stocking rate for this pasture is LESS than 1 AU/acre; ***it does not need to be included*** *in the NM Plan.*

DEFINITIONS

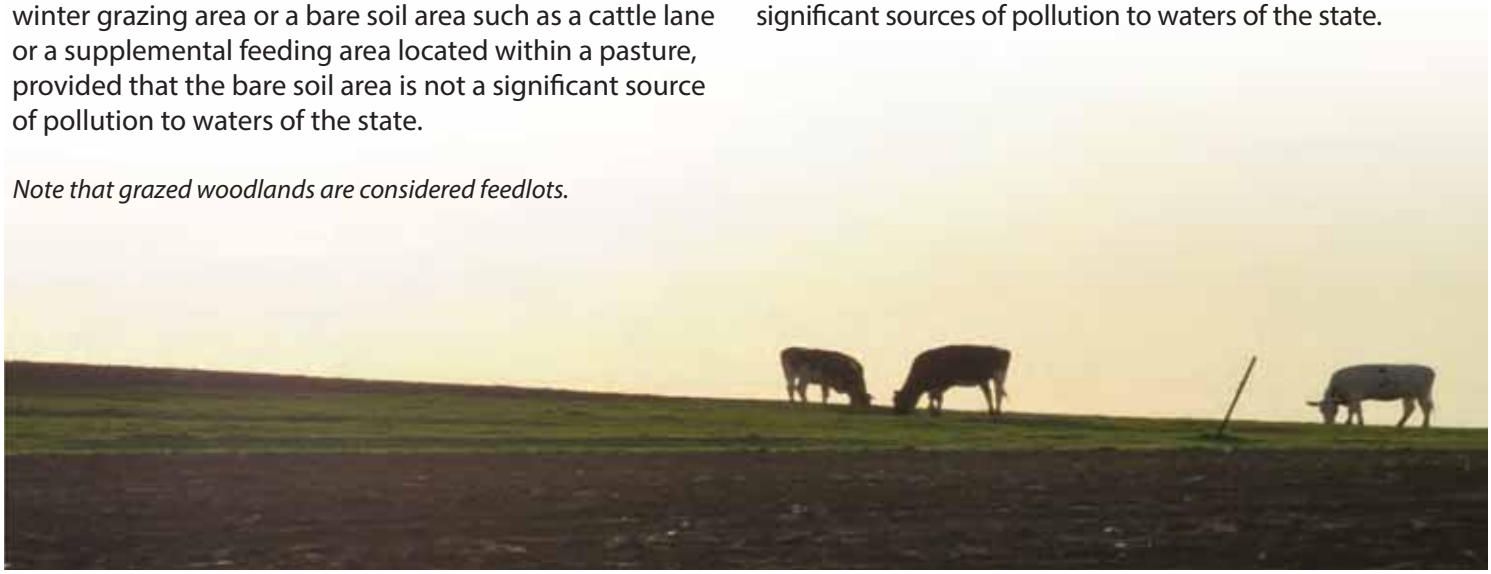
Animal unit [NR 243.03 (5)]: a unit of measure used to determine the total number of single animal types or combination of animal types, as specified in s. NR 243.11, that are at an animal feeding operation.

Feedlot [NR 151.015 (8)]: a barnyard, exercise area, or other outdoor area where livestock are concentrated for feeding or other purposes and self–sustaining vegetative cover is not maintained. "Feedlot" does not include a winter grazing area or a bare soil area such as a cattle lane or a supplemental feeding area located within a pasture, provided that the bare soil area is not a significant source of pollution to waters of the state.

Note that grazed woodlands are considered feedlots.

Grazing Season [ATCP 50.04 (3) b. Note]: Includes the months of the year when pasture vegetation is actively growing.

Pasture [NR 151.015 (15m)]: Land on which livestock graze or otherwise seek feed in a manner that maintains the vegetative cover over the grazing area. Pasture may include limited areas of bare soil such as cattle lanes and supplemental feeding areas provided the bare soil areas are not significant sources of pollution to waters of the state.



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Wisconsin's Runoff Rules

what farmers need to know

January 2013 DNR Pub. No. WT 756 REV 1/13

Farms, like all major industries, must follow environmental requirements to control runoff from fields, pastures and livestock facilities. Otherwise this pollution can harm our lakes, streams, wetlands and groundwater.

Wisconsin adopted administrative rules in 2002 (NR 151), with revisions effective in 2011 that set statewide performance standards and prohibitions for all Wisconsin farms. All farmers must comply with these standards and prohibitions. Cost-share funding may be available to assist with compliance. Some state and local programs may require compliance whether or not cost-share funds are available.

This fact sheet explains the basic information that farmers need to know about these rules and how to comply with them. It is recommended that farmers contact their county land conservation staff for further details on these rules and their impact on farm operations.

► Agricultural Standards and Prohibitions:

ALL FARMERS MUST:

- *Meet tolerable soil loss ("T") on cropped fields and pastures.*
- *Annually develop and follow a Nutrient Management Plan (NMP) designed to keep nutrients and sediment from entering lakes, streams, wetlands and groundwater. Farmers may hire a certified crop advisor or prepare their own NMP if they have received proper training.*
- *Use the phosphorous index (PI) standard to ensure that their NMP adequately controls phosphorous runoff over the accounting period.*
- *Avoid tilling within 5 feet of the edge of the bank of surface waters. This setback may be extended up to 20 feet to ensure bank integrity and prevent soil deposition.*

► Additional Standards:

FARMERS WITH LIVESTOCK MUST:

- *Prevent direct runoff from feedlots or stored manure from entering lakes, streams, wetlands and groundwater.*
- *Limit access or otherwise manage livestock along lakes, streams and wetlands to maintain vegetative cover and prevent erosion.*
- *Prevent significant discharges of process wastewater (milkhouse waste, feed leachate, etc.) into lakes, streams, wetlands, or groundwater.*

FARMERS WHO HAVE, OR PLAN TO BUILD, MANURE STORAGE STRUCTURES MUST:

- *Maintain structures to prevent overflow and maintain contents at or below the specified margin of safety.*
- *Repair or upgrade any failing or leaking structures to prevent negative impacts to public health, aquatic life and groundwater.*
- *Close idle structures according to accepted standards.*
- *Meet technical standards for newly constructed or significantly altered structures.*

FARMERS WITH LAND IN A WATER QUALITY MANAGEMENT AREA *(300 feet from streams, 1,000 feet from a lake, or in areas susceptible to groundwater contamination)* **MUST:**

- *Avoid stacking manure in unconfined piles.*
- *Divert clean water away from feedlots, manure storage areas, and barnyards located within this area.*

Photos: Jeffrey J. Strobel, Duane Popple and Lynda Schweikert

► Farmland Preservation Tax Credit:

A farmer must comply with applicable state standards to receive the Farmland Preservation Tax Credit, even if cost sharing is not available. Farmers may be considered in compliance by entering into a schedule of compliance.

This requirement applies to farmers whose land is located in a certified farmland preservation zoning district (i.e. exclusive agriculture), or for farmers who signed a farmland preservation agreement after standards were in effect for that county. Farmers should contact their county land conservation staff for more information regarding applicable standards and compliance documentation.

► Implementation and Financial Assistance:

Under DNR rules, a landowner is normally entitled to cost sharing if the landowner is required to implement best management practices on "existing cropland" or an "existing" livestock facility or operation in order to comply with a DNR performance standard. Cropland or livestock facilities brought into service after the effective date of the standard are considered "new" and must meet standards and prohibitions without cost-share funding. Farmers with existing cropland or livestock facilities may be eligible for state or federal cost sharing and are encouraged to contact their county land conservation staff or USDA Natural Resources Conservation Service (NRCS) office for information about current funding sources, rates and practices eligible for cost sharing.

Farmers also should work with their land conservation staff to determine how these performance standards and prohibitions may affect their participation in various federal, state and local programs, such as Farmland Preservation. You can find a directory of land conservation offices and related agencies at http://datcp.wi.gov/Environment under "Land and Water Conservation."

► Permits and Licensing:

Farmers may be required to meet NR 151 Standards in order to obtain local and state permits. For livestock siting and manure storage ordinance permits, for example, nutrient management plans and other requirements may be imposed on livestock operations without providing cost sharing. Contact your local officials for additional information.

Farmers with 1,000 or more animal units must operate under a Wisconsin Pollutant Discharge Elimination System (WPDES) permit and do not qualify for state cost sharing to meet permit requirements. Contact your DNR Service Center for more information about WPDES permits.

For more information about runoff management in Wisconsin and topics found in this brochure please visit:
runoffinfo.uwex.edu

USDA NRCS United States Department of Agriculture Natural Resources Conservation Service
UW Extension Cooperative Extension
Wisconsin Dept. of Natural Resources
Department of Agriculture, Trade & Consumer Protection · Wisconsin
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