Wisconsin Nutrient Management Update

Quality Assurance Team Review of 2017's Nutrient Management Plans

November 2017

Prepared by the Wisconsin Department of Agriculture, Trade and Consumer Protection

Implementing a nutrient management (NM) plan is one of the best practices farmers can use to protect their soil and water resources and farm profitability. The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) tracks farms that develop and update their 590 NM plans when NM Checklist forms are submitted to DATCP by farmers, agronomists, and public agency staff.

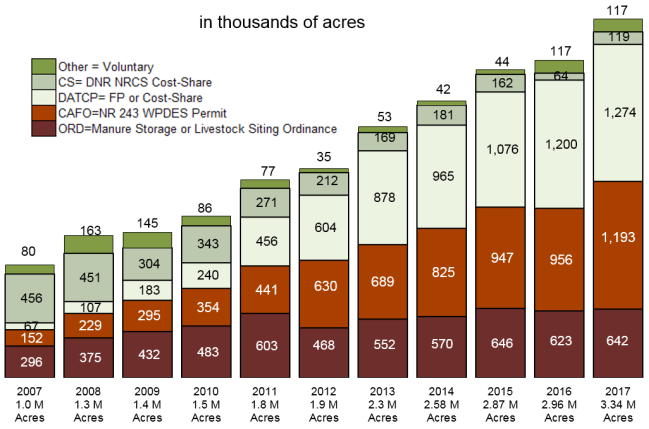
In 2017, Wisconsin farmers reported 7,774 NM plans on 3,345,174 million acres, a 13% acre increase from 2016, which means NM plans are now covering 36% of Wisconsin's 9 million cropland acres in 2017.

A NM plan is a cropping practice record that is annually reviewed, and updated when changes in crop management are made that deviate from the initial plan. Knowing where nutrients are needed and where they are not helps farmers allocate nutrients economically while also helping to ensure they are not over-applying nutrients, which could cause water quality impacts. A NM plan follows Natural Resources Conservation Service's (NRCS) WI 590 Standard and is prepared by a qualified planner, which may be the farmer or a certified crop advisor. A NM plan accounts for all N-P-K nutrients planned and applied to fields over the crop rotation.

Who wrote 2017's NM plans?

- **1,841 farmers wrote their own plans** on 536,515 acres - 40,761 more acres than last year and a 8% increase in acres from 2016. In 2017, farmer-written plans accounted for 24% of all NM plans.
- **5,933 farmers hired 93 agronomists** to assist them with NM planning on 2,808,659 acres - 346,129 more acres than last year and a 14% increase in acres from 2016. In 2017, agronomists produced 76% of all NM plans.

2007-2017 NM Plan Acres Reported by Program



NM Reported by County *Most acreage with NM plans*

Manitowoc (193k)	Dane (168k)	Marathon (164k)
Dodge (160k)	Outagamie (158k)	Fond du Lac (154k)
Brown (136k)	Kewaunee (133k)	Jefferson (118k)

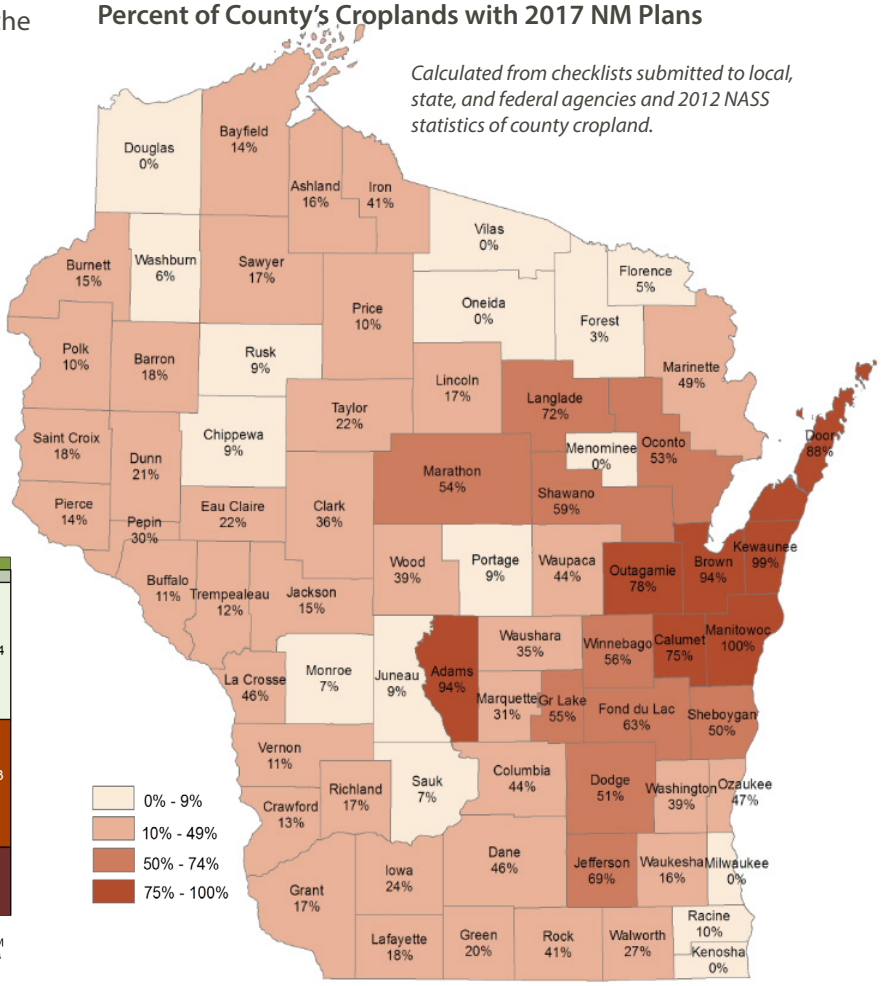
Who needs a NM plan?

All farms! But, some farms will be required before others to have and follow a NMP when applying nutrients to any field, including pastures if:

- Offered cost-share for a NM plan, or
- Accepting manure storage cost-share, or
- Participating in the Farmland Preservation Program, or
- Regulated under a local ordinance for manure storage or livestock siting, or
- Regulated under a WI Pollutant Discharge Elimination System (WPDES) permit, or
- Causing a significant discharge.

Percent of County's Croplands with 2017 NM Plans

Calculated from checklists submitted to local, state, and federal agencies and 2012 NASS statistics of county cropland.



Results: 2017 QAT Nutrient Management Plan Review

Since 1995, agency staff and private sector agronomists of the Quality Assurance Team (QAT) have conducted reviews of NM plans with the goal of improving implementation and protection of our soil and water resources. In 2017, QAT team members (listed on page 3) reviewed 65 plans covering 21,542 acres. Eighteen of these plans were farmer-written with the remainder written by Certified Crop Advisers (CCA).

As experience, education, and tools improve, we continue to see improved plans that are correctly identifying and planning nutrient applications near sensitive features or during restricted times (e.g., nitrogen-restricted soils in the fall, winter applications of manure). SnapMaps can now automatically link many of these map attributes directly to the SnapPlus database, making planning applications around these features even easier. In addition, locally identified features are also being added to SnapMaps (e.g. karst features) in an effort to help with data sharing and ease of access. Field-level data like **private wells still need to be added manually**.

Since 2009, the two **best performing components** of NM planning have been the identification of nitrogen (N) restricted soils and Surface Water Quality Management Areas (SWQMAs). We are making complete maps and using that information in SnapPlus.

Where we need to improve:

1. Soil samples: Making sure soil samples are being taken every 5 acres every 4 years (Figure 1.).

2. Manure applications: Allocating all the manure produced and applied to fields and pastures by season, including **winter** applications, for each year of the field's crop rotation to show **adequate acres** are available. Include in the plan the amount of manure that is winter stacked or stored. Remember to only use application rates the farmer can apply. SnapPlus has tools that can help allocate manure over the crop years of the rotation that include the: Manure allocator, Rotation wizard, Nutrient system editor, Grazing application rate estimator, and Daily log.

3. Soil erosion: Using complete crop rotations and the field's critical soil series to show sheet and rill erosion estimates are not exceeding **tolerable soil loss** (T) rates. Using contours; reducing tillage; adjusting the crop rotation; or implementing other practices to prevent ephemeral erosion; and maintaining perennial vegetative cover to **prevent reoccuring gullies** in areas of concentrated flow (Figure 1.).

4. Nutrient applications: Using the field's previous year's legume credit and/or applications, predominant soil series, and realistic yield goals to determine the crop's nutrient application rates are consistent with UWEX Pub. A2809 for all forms of N, P, and K.

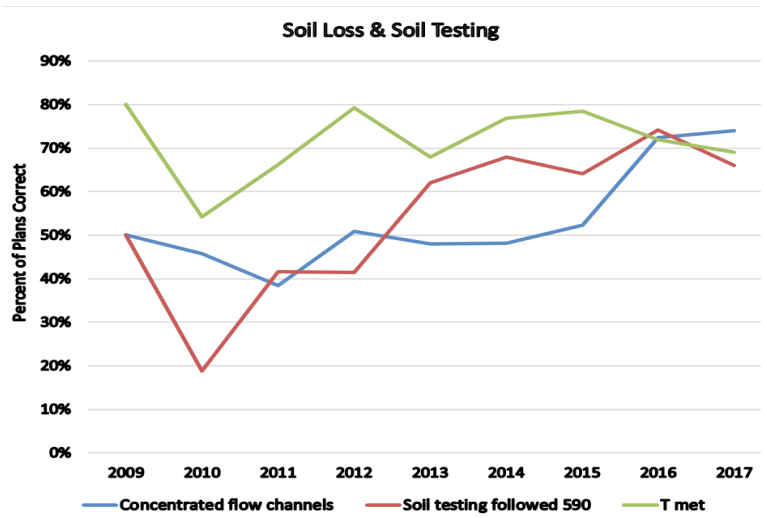


Figure 1. Steady improvements are being seen in protecting concentrated flow areas. More improvement is needed to meet soil testing and soil conservation requirements.

A NM plan allows farmers to apply the right source of nutrients at the right time, right rate, and right place to meet crop needs and minimize nutrient losses from fields. Wis. Administrative Code, **ATCP 50**, explains how nutrient management should be conducted to comply with Wisconsin's agricultural performance standards in Wis. Administrative Code, **NR 151**.

NM plans account for all N-P-K (nitrogen, phosphorus, and potassium) applied to a field and:

1. Use soil test analyses from **Wisconsin DATCP Certified Soil and Manure Testing Laboratories**.
2. Use **UWEX Pub. A2809** *Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin* to determine crop nutrient needs.
3. Follow the **WI NRCS 2015-590** *Nutrient Management Standard*.

The DATCP provides financial and training support to farmers, agronomists, and agricultural educators to develop and implement NM plans. Farmers may work with an agronomist to write their nutrient management plans, or may write their own plans by successfully completing training and producing a NM plan that meets the current WI NRCS 590 NM standard.

To learn what training is available in your area, contact your county **Land and Water Conservation department**. Visit the **SnapPlus** website to see training opportunities or to download this free software.

Useful SnapPlus Reports:

- **FM8 $Spreading Plan** - shows manure's nutrient value and fertilizer costs.
- **NM5 Nutrient Management Sorted by Crop** - shows tillage, applications, and seasonal crop notes for all fields, grouped by crop.
- **DD3 Precision Recommendations** - shows the lime, P2O5 and K2O nutrient recommendations for each soil sample. N recommendations are the same for the whole field based on the predominant soil.

Results: 2017 QAT Nutrient Management Plan Review, *continued.*

Pasture Applications need to be part of the NM plan whether nutrients are applied by grazing or gleaning animals or by mechanically applied means for all seasons.

Pasture soil testing requirements are 2015-590 NM Checklist item 1. b. and shown here:

For fields or pastures with mechanical nutrient applications, determine field nutrient levels from soil samples collected within the last 4 years according to 590 Standard and UWEX Pub. A2809, *Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin* typically collecting 1 sample per 5 acres consisting of 10 cores. Soil tests are not required on pastures that do not receive mechanical applications of nutrients if either of the following applies:

1. The pasture average stocking rate is one animal unit per acre or less at all times during the grazing season.
2. The pasture is winter grazed or stocked at an average stocking rate of more than one animal unit per acre during the grazing season, and a nutrient management plan for the pasture complies with 590 using an assumed soil test phosphorus level of 150 PPM and organic matter content of 6%.

Step 1. Pick from the pasture crop options on the **Farm** screen to get the correct pasture plant mix and seeding option.

Pasture seeding, grass/legume
Pasture seeding, grass
Pasture seeding, legume more than 30%
Pasture, continuous stocking, high density
Pasture, continuous stocking, low density
Pasture, dry lot, exercise area
Pasture, rotational stocking, grass/legume
Pasture, rotational stocking, grass
Pasture, rotational stocking, legume more than 30%
Pasture, variable stocking, managed continuous, grass/legume
Pasture, variable stocking, managed continuous, legume more than 30%
Pasture, variable stocking, managed continuous

Step 2. Add a grazing source for each animal species to the **Nutrient sources** screen. In the sub tab of the **Nutrient sources** screen, click on **Grazing Herd Setup** and enter the number of head for each species and size class. This will provide a daily rate for the herd.

Step 3. Calculate the manure rate by estimating how long a herd can graze an acre or total pasture area. Click on the **Grazing** button in the **Nutrient Application Planner** and fill the **Grazing application rate estimator**. Adjust the field/pasture size, days on pasture, and the percent of each day spent grazing to determine the tons/acre rate.

Step 4. Record the days grazing, percent of each day, rate per acre in the narrative on the **Field** screen for easy reference.

Step 5. Add grazing applications to fields from the **Cropping** screen or use the **Rotation Wizard**.

DATCP Resources

DATCP-Certified Soil Testing Labs

There are now seven DATCP-certified soil testing laboratories to serve the nutrient planning needs of Wisconsin farmers. These laboratories also participate in the Manure Analysis Proficiency program and may conduct manure analysis for Wisconsin farms.

DATCP certified soil testing labs are:

- A & L Great Lakes Laboratories (Fort Wayne, IN)
- AgSource Laboratories (Bonduel, WI)
- Dairyland Laboratories (Stratford, WI)
- Minnesota Valley Testing Laboratories, Inc. (New Ulm, MN)
- Midwest Laboratories Inc. (Omaha, NE)
- Rock River Laboratory (Watertown, WI)
- UW Soil & Forage Laboratory (Marshfield, WI)

DATCP offers a variety of in-person trainings:

- Basic SnapPlus
- Advanced SnapPlus
- How to review a NM plan
- One-on-one
- Assistance with farmer trainings
- New conservation staff training
- Others available upon request

Check the SnapPlus website for scheduled trainings or contact the DATCP NM staff to offer one in your area!
https://snapplus.wisc.edu/news-help/calendar/

DATCP NM Specialists

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Thanks to our **2017 QAT Members**

Scott Fleming, Rock River Laboratory; Mike Morton, Landmark Services Cooperative; Christina Mulder, Monroe County; David Mlostek Jr., United Cooperative; Timothy Wucherer, Buffalo County; Bryan Parr, agronomist; Brad Murry, Provision Partners Cooperative; Paige Frautschy, The Nature Conservancy; Gustav Parkhurst, Rock River Laboratory; Matthew Oehmichen & Craig Oehmichen, Short Lane Ag Supply; Michelle Komiskey, NRCS; Laura Ward Good, UW Madison; Joe Wolter, UW Madison; Jim Beaudoin, UW Madison; Rick Wayne, UW Madison; Sarah Sebrosky, UW Madison; Joe Baeten, DNR; Stephanie Schneider, DATCP; Mark Jenks, DATCP; and Sue Porter, DATCP

Using Contours & Filter Areas Within SnapPlus

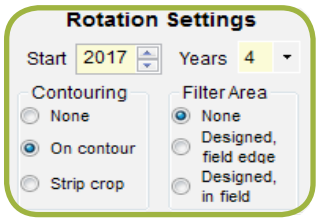


Figure 2. SnapPlus' Cropping screen allows contours and filter area options.

Working a field across the slope, rather than up and down, is an easy way to reduce soil erosion. SnapPlus includes options for selecting either contouring or strip crops in the **Cropping** screen (Figures 2. and 3.). Before selecting either of these options, however, you must make certain the field is actually being worked on the contour. SnapMaps can help with this determination. Once you've pulled up the area you are interested in, zoom in to the field. Next, in the **Map Legend**, click on the box for the **5ft contours**. This turns on the topographic lines, displaying lines of similar elevation across the landscape (Figure 4.). Compare these lines to the crop rows visible in the photo. If the crop rows line up closely with the contour lines, you may be able to take credit for field contouring. If the crop rows are not lining up with the contour lines, the contouring button on the **Cropping** screen should be left in the default position of "**None**."

Figure 3. The top group of fields shows contour strip cropping with a grain and close grown crop on the width of the conservation planning length of slope. The bottom half of the aerial photo shows field contouring allowing for wider fields following the contour of the field.

To take credit for strip crops, contour strips must be installed and maintained on a field. The key is that a minimum of two **contour strips** must be placed across the field's conservation planning slope length (Figure 3.). Slope length can be found on the **Fields** screen. For example, if a field has a slope length of 150 feet, a minimum of two, 75-foot strips would have to be placed across the slope to meet the **585 Contour Stripcropping** standard. If there are not at least two contour strips across the slope length, select the **On contour** button instead to use the **330 Contour Farming** standard.

Figure 4. Contour buffer strips of permanent grass follow the contour of the field. The five foot contours from SnapMaps are in red.

Filter area options in SnapPlus:

"None" is the default setting for filter areas on the **Cropping** screen. It should be selected whenever a field does not have a grass filter area within or below it for sediment capture.

Designed, in field should be selected to indicate grass buffer strips established on the contour within the field (Figure 4.). The infield contour buffer strip must be placed near the mid-point of the field's planning slope length identified in SnapPlus. Guidance for contour buffer strips can be found in Wisconsin NRCS Conservation Practice Standard **332 Contour Buffer Strips**.

Designed, field edge should be selected to indicate a grass filter area designed to capture sediment from that field's runoff. For RUSLE2 soil loss calculations, the model adds a 30-foot cool season grass filter strip (not harvested) to the lower edge of the field's designated slope. When a Designed, field edge filter strip is chosen, an additional sediment delivery value shows in the **Cropping** screen's **Rotation Summary**. This is an estimate of the eroded sediment from the field that will be transported in runoff through the filter strip area. Guidance for edge-of-field filter strip planning and design can be found in NRCS Conservation Practice Standard **393 Filter Strip**. Including edge-of-field grass filter strips as a management option in SnapPlus allows planners to estimate how much a properly designed grass filter area at the lower edge of a field would reduce phosphorus and sediment in overland flow from the field.

What is the cost of soil erosion ?

- University of Wisconsin-Madison soil scientist Francisco Arriaga estimates that nutrients present in 1 ton of a field's soil, with an optimum soil test level for corn, are 2 lbs. of N, 9 lbs. of P, and 31 lbs. of K.
- The fertilizer value of these nutrients would total about $12.80 per ton. If the average allowable soil loss is 4 to 5 tons per acre, that value is $51 to $64 per acre just in loss of nutrients, not the loss of future productivity.
- When soil is detaching and moving, it is like dollars floating down stream.
- It takes generations to replace what's lost. Many factors can affect how long it takes for an inch of topsoil to form, but it normally takes at least 100 years and often over 500 years. The factors that affect soil formation are parent material, topography, climate, organisms, and time.

SnapPlus 17 Brings BIG Improvements

Over the past 11 years, the SnapPlus development team in the UW Madison Soil Science Dept. has continually improved Wisconsin's software tools for NM planning. SnapPlus17 helps you meet the 2015-590 NM Standard and UWEX Pub. A2809 by showing red and orange planning flags when applications do not follow the 590 NM Standard. SnapPlus17 also provides implementation guidance messages for applications near conduits to groundwater, applications near surface water, and applications on fall N restricted soils. Farmers and agronomists will now be able to develop and update plans faster because field features related to field application restrictions, dominant critical soil for soil loss calculations, and the predominant soil for nutrient recommendations can be imported into SnapPlus17, filling the entire **Field** screen, by pulling from SnapMaps. Map information is stored inside the SnapPlus database and viewable through SnapPlus.

SnapMaps Improvements:

- Merging fields will now merge the fields' geometry too. Multiple fields can be combined into one field within the SnapPlus desktop application. This eliminates the need to redraw the boundaries of the fields after merging.
- Simplified procedures for adding shapefiles of 2-part field boundary polygons split by waterways.
- Significantly improved PDF map generation performance. PDFs now zoom-in closer to the map's center.
- Options to change the projections of shapefiles that are exported from SnapMaps.
- New delete feature that allows users to draw polygons around features they want to delete.
- Simplified shapefile backups of all shapes and points.
- Ability to dismiss inaccurate 1000' SWQMAs.
- Ability to create thematic field maps showing planned nutrient application rates, soil test levels, or other variables of your choosing; and customizable field labels.
- Map more CAFO features and calculate applications for spreadable acres.

SnapPlus17 Improvements:

Nutrient System Editor allows multiple nutrient applications to be combined as a single crop year system. Make your Nutrient System from the main tool bar or in the **Nutrient** screen. Once you make a nutrient system, you can apply it from any screen where you normally apply fertilizers and manure, including the Rotation Wizard, by selecting "Apply Nutrient System."

Easy Group Builder has more categories that can help organize your data for reporting or mapping. For example, build a group of all the fields receiving the same application rates during the same season to make a map for the applicator of just those fields.

Additional NM Planning Resources

To learn more about the tools available in SnapPlus, check out the YouTube videos and upcoming trainings at www.snapplus.wisc.edu.

New How-to videos available:

- Exporting and Importing Field Info/ Farms/ Subfarms
- How to Create an MS Excel Document Daily Log and Import it into SnapPlus
- Updating new boundaries in a field using new shapefile
- Dismissing and Restoring a SWQMA in SnapMaps
- Making your Own Customized Map Using the Snipping Tool and MS Word
- Changing Field Labels in SnapMaps

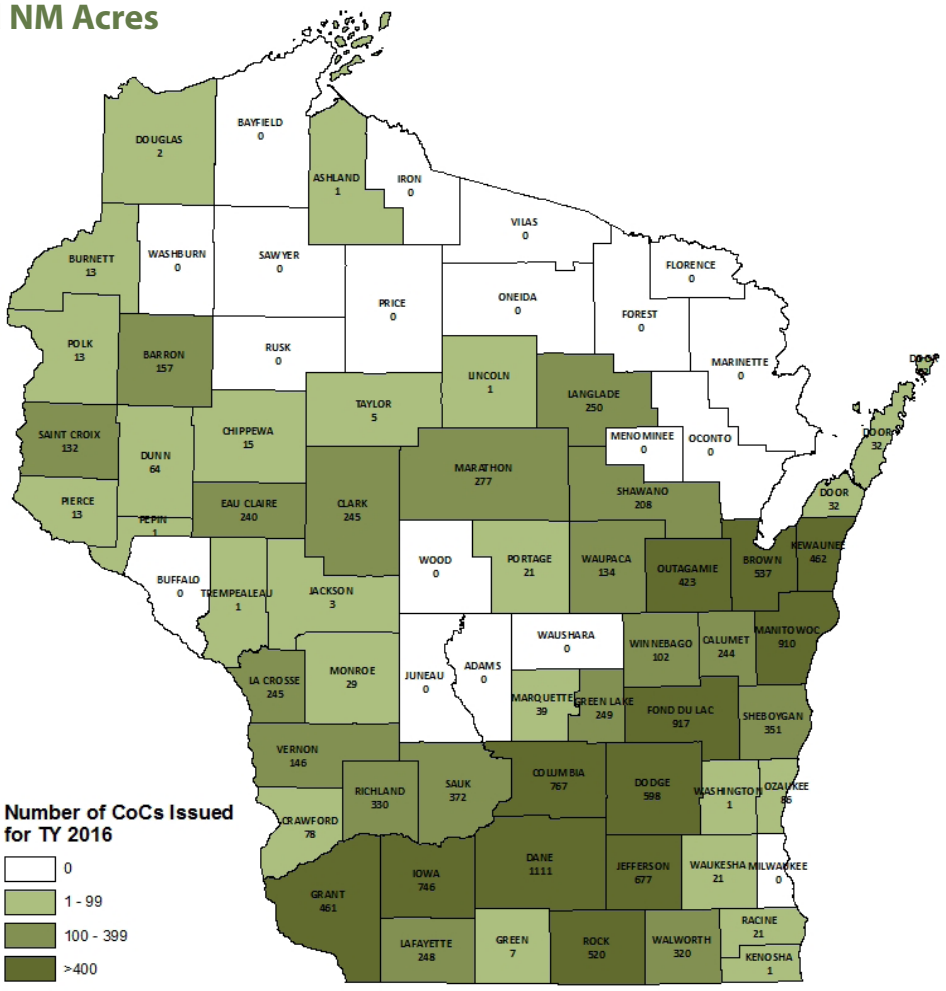
To see all the version improvements in SnapPlus desktop application, go to
Help > Help Contents > What's New in 17

DATCP Programs Have Increased NM Acres

Farmland Preservation

The Farmland Preservation (FP) program allows eligible landowners to claim a farmland preservation tax credit on their state income taxes in return for keeping their land in agricultural use and complying with Wisconsin's soil and water conservation standards. A large portion of the 3.36 million acres with nutrient management plans can be attributed to FP program participation. County land and water conservation staff are assisting almost 13,000 FP participants to maintain their eligibility for this tax credit by helping with NM plans and issuing Certificates of Compliance (COC) (Figure 5.).

We need your help to show NM plan coverage and the great work being done by our farmers, agronomists, and agencies to increase NM planning and conservation. DATCP is the only agency that tracks all progress in NM planning in Wisconsin. **Please submit your NM Checklists** to the county for the 2018 growing season as soon as you have the plan updated with what occurred in 2017 and what is to come. DATCP requests the NM Checklists from each county in June every year.



Dane 1,111 | Columbia 767 | Dodge 598
Fond du Lac 917 | Iowa 746 | Brown 537
Manitowoc 910 | Jefferson 677 | Rock 520

Figure 5. Number of COCs issued for tax year 2016 by county. More than 50% of the Farmland Preservation participants have land located in these counties listed below the map.

Nutrient Management Farmer Education (NMFE) Grants

NMFE grants provide funding to train farmers to write their own NMP for their farms. The grants are available to county, state and federal agriculture or natural resource agencies, technical colleges and universities, University of Wisconsin-Extension offices, lake associations, nonprofit organizations and producer-led groups. The goal of the program is to **provide education** to farmers on nutrient management, **help allocate on-farm nutrient sources to increase profitability**, and **improve soil and water resources**. Two funding options are available:

Tier 1 grant (Maximum of $20,000)**:** Offer incentives to participants for soil testing or other associated costs to develop NM plans compliant with the NRCS 590 Standard.

Tier 2 grant (Maximum of $2,500)**:** Offer NM training and education to farmers but do not require development of a 590 compliant NM plan.

In 2017, 17 grants were awarded totaling nearly $176,000. In 2018, grants to 16 entities will total over $206,000.

For more information: https://datcp.wi.gov/Pages/Programs_Services/NMFEGrants.aspx

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For more information:
https://datcp.wi.gov/Pages/Programs_Services/NutrientManagement.aspx