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SPECIAL POINTS OF INTEREST:

- ◆ An update on Nutrient Management Training provided by UW-Discovery Farms Staff
- ◆ Recent "Discoveries" found through tile line monitoring!
- ◆ How to use weather data on the Discovery Farms Website
- ◆ And Much More!!

Director's Column-Complex Questions and Simple Answers

As I get older I think about key statements or people that have influenced my life and career. One person was an Extension farm management specialist who said "there are no simple answers to complex questions". I think about this every time I hear someone talk about the solution to non-point source pollution.

I've heard "experts" say solving nonpoint requires little effort or cost on the part of the producer. If farmers would put in buffers, adopt phosphorus-based nutrient management, switch to no-till and incorporate their manure, the problem would be solved. The producers I know have more complex problems that require more evaluation, thought, and planning. While the practices outlined above may help with nonpoint pollution, there are no cure-all solutions.

The best way to reduce nutrient and sediment in runoff is to closely evaluate the farming

system and identify the areas that have the greatest risk for significant losses. Producers can work with consultants or agency personnel to identify these sources and to suggest changes that reduce these risks. Understanding the farming system, the geographic setting, and the producer is the only way to reduce nonpoint losses.

The problem cannot be solved sitting in an office looking at maps and reading reports. It reminds me of another saying, "Anyone who has never had an animal die, has not raised many animals". It's the reason farm management people build in a "death loss component in their budgets". It happens!

Rennid R. Frame





Tile Talk with Discovery Farms

*Written by Eric Cooley,
Outreach Specialist, Eastern Wisconsin
UW-Discovery Farms Program*

Over the past few years we have provided you with a variety of information from our agricultural surface-water runoff monitoring sites that are located on private farms throughout the state. We have talked about the amount and timing of surface-water runoff as well as its chemical composition. We have related this water-quality information back to farm management practices such as spreading manure on melting snow, and have looked at differences between farms and suggested that local topography and soil type can play a big role in the quantity and quality of surface-water runoff. All of this information is critical, but there are many more pieces to the puzzle in determining how agriculture can impact the environment.

Another one of these pieces that can provide significant information to our body of knowledge is subsurface tiles.

In November of 2004, the Discovery Farm program, with cooperation from the U.S. Geological Survey, began installation of

subsurface tile monitoring sites to help determine how tiles fit into the puzzle. As of February 2006 we are monitoring five subsurface tiles on three different private farms. Two of the farms are located in northeastern Wisconsin and contain three of the subsurface tile monitoring sites. The third farm is in southeastern Wisconsin and has two subsurface tile monitoring sites. Each of these farms is located in areas where subsurface tiling of agricultural fields is a common practice.

The data collected from the subsurface tiles are relatively new and unique because they have not been monitored extensively in Wisconsin: we really don't know how much water and nutrients they can remove from agricultural settings. Even though the data we have collected so far is relatively new and we need more data to reach conclusions, we feel it is necessary to point out some of the things we are "discovering" to make everyone aware. Tile monitoring by the Discovery Farms program is providing information that many of you have suspected, but there is some information that might surprise you. Some of you may have already heard some tile information that has been presented by the Discovery Farms program as well as the smoking tile demonstrations that have occurred throughout the state. The message is not that **earthworms are ruining everything**, but that



Photo to L: UW-Discovery Farms Subsurface Tile Monitoring Equipment as installed in Eastern Wisconsin. UW-Discovery Farms presently collects data from 5 Subsurface Tile Monitors.



Tile Talk with Discovery Farms, Continued...

subsurface tiles are good at removing water from fields. If water is leaving the fields, then there is a great potential for sediment and nutrients as well. When observing the water that the subsurface tiles remove from agricultural fields, we are finding that the tiles that we are monitoring flow the majority of the year. This means that these tiles rarely stop flowing, *even when the ground is frozen!* Keep in mind that we started monitoring in late 2004 and precipitation levels have been low through 2005. We have also observed that tiles can react to surface conditions much like our surface water sites. In some cases, there does not seem to be a lag in the time when water starts to run off the field surface and when it starts flowing through the tiles. This observation leads us to believe that, in these cases, there is little filtration of the surface water by the soil column prior to entering the tile. It follows that, when looking at the water quality differences between tile runoff and surface-water runoff during these events, that there is not much of a difference in the water quality.

Tiles can have less sediment movement than the surface water sites, but during frozen ground conditions we have seen more sediment removed through a tile.

This is important because subsurface tiles bypass any surface practices that are meant to reduce sediment losses. Another observation noted is that a large amount of nutrients can be removed from the agricultural fields in subsurface tiles. Many times, concentrations of nutrients in tiles exceed those seen in our surface-water monitoring sites.

We have also observed greater amounts of nutrients removed from fields with manure applied than those that do not have manure applied.

The bottom line so far has been that tiles do their job: they remove water from fields so that they can be productive for crops. However, with this water comes sediment and nutrients, and the amounts found in tiles can be greater than those found in surface-water runoff.

We realize that subsurface tiles are a major component of agriculture in many parts of the state. The purpose of our monitoring in tiles is to determine if there are issues with sediment and nutrient runoff and, if there are problems, come up with solutions. It is still early in these studies, but these are observations that everyone should be aware of when managing around tiles.

Because subsurface tile drainage has become a hot topic in agriculture, we will be dedicating a "Tile Talk" corner to subsequent newsletters to further discuss tile issues and research findings.

Two tile monitoring sites installed by UW-Discovery Farms in November, 2004.





Multi-Agency Land and Water Education Grants Used for Nutrient Management Training

Written by Kevan Klingberg, UW-Discovery Farms

Andy Yench, UWEX-River Basin Educator

Nutrient management remains at the forefront of environmental issues facing WI livestock and crop producers. The need for producers to develop and implement nutrient management plans has grown substantially as a requirement of government agricultural programs, zoning, livestock siting ordinances, and animal feeding operation permits. Improved nutrient management practices have potential to increase farm profits and reduce detrimental impacts of N and P on water quality. A training need exists to teach farmers nutrient crediting and basic requirements of the nutrient management standard. For best on-farm impact, minimal duplication of efforts, and public fiscal accountability, WI governmental agencies have partnered to deliver this training.

A Multi-Agency Land and Water Education Grant Program (MALWEG) was started in 1997 to encourage integration of educational programming into local WI conservation efforts. Program support and funding comes from the Natural Resources Conservation Service (NRCS), the WI Dept. of Natural Resources (DNR), the WI Dept. of Agriculture, Trade and Consumer Protection (DATCP), the Farm Service Agency (FSA), and the University of WI - Extension (UWEX).

Local projects are each led by their own uniquely defined team, often including University of Wisconsin - Extension County staff, County Land Conservation Departments, County Natural Resources Conservation Service staff, University of Wisconsin - Nutrient and Pest Management staff, and Wisconsin Technical College System Agriculture staff.

Through 2000 - 2005, the MALWEG program has funded 57 projects, delivering nutrient management training to approximately 1,140 WI farmers. This practical mix of class room and on-farm activities assisted farmers to develop their own nutrient management plan based on the USDA Nutrient Manage-

ment Standard 590. Training is based on the UW / UWEX Nutrient Management Farmer Education Curriculum, utilizing UWEX soil fertility, crop nutrition, soil testing and nutrient crediting material.

The average farm size for participants is 300 acres. Through the training process, 95 % of participants follow through to develop their own nutrient management plan, resulting in around 1,083 plans on 324,900 acres. A key point in this training and delivery mechanism is that producers voluntarily participate in small group and 1:1 activities, utilizing their own farm information and management goals to actively develop their own nutrient management plan. The end product is a nutrient management plan that each participant owns, understands and is willing to implement as a result of their direct participation in the process.

Most participating farms have been dairies with crop rotations of corn grain and silage, alfalfa hay, small grains and soybeans. One north central WI project has included potato producers. In the newest round of grants, one project has focused on nutrient management for dairies that graze cattle, another new project focuses on nutrient management for crop producers that irrigate and grow field corn, soybeans, and vegetable crops.

Each farmer participant receives approximately 20 hours of instructional time, as follows:

Local nutrient management projects conduct at least 2 workshops with farmer students. One workshop focuses on crop nutrition, soil fertility and nutrient crediting associated with N. A second workshop features the same discussion for P, as well as highlights nutrient management environmental regulations. Each of these workshops consists of 4 hours of small group training, led by the local team staff.



Multi-Agency Land and Water Education Grants Used for Nutrient Management Training Continued...

After class room activities, farmers receive on-farm assistance to evaluate livestock manure management activities and current soil testing status. This is where manure spreaders are calibrated, farm specific nutrient crediting details are defined and the farm soil and water conservation plan is evaluated. This interaction can add another 8 hours of 1:1 training.

Nutrient management plans are completed either 1:1 between the trainers and farmers, or students are brought back to a third workshop where they each work on their own plan. The process of finalizing a nutrient management plan will take another 4 hours where project leaders direct participants through the plan development process.

The USDA Nutrient Management Standard (590) has been updated through the years to include renditions dated March 1999, July 2002 and September 2005. Each newer version includes more detail and requirements associated with manure management on critical landscapes, as well as a shift to focus on both N and P nutrient management.

Current WI administrative code ATCP 50 references the March 1999 Nutrient Management Standard. That rendition is often referred to as the N-based standard. WI administrative code is scheduled for updating and will likely include the 2005 version of USDA 590. To date, the Nutrient Management Farmer Education Curriculum is based on the March 1999 version of 590. The curriculum is scheduled for an update in the near future, adding more P-based and critical landscape information, as well as information relevant to an updated 590 Standard.

Through the years, many local projects have had such success with this delivery mechanism that they re-apply and have been accepted through more than one granting cycle. The 57 nutrient management training projects have been conducted in 32 counties, including: Barron, Brown, Burnett, Calumet, Clark, Dane, Dodge, Eau Claire, Fond du Lac,

Grant, Iowa, Jefferson, Lafayette, Langlade, Manitowoc, Marathon, Marinette, Oconto, Outagamie, Ozaukee, Polk, Richland, Rock, Sauk, Sawyer, Shawano, St. Croix, Vernon, Washburn, Washington, Waushara, and Winnebago.

Most recently, in 2005, MALWEG funded 16 new applications for local projects to train farmers to develop their own nutrient management plan, utilizing \$ 199,557 in grant money.

SNAP Plus & Phosphorus Index

SNAP-Plus is a Microsoft Windows® based nutrient management planning software program designed for the preparation of nutrient management plans in accordance with Wisconsin's nutrient management standard 590.

SNAP-Plus calculates crop nutrient (N, P₂O₅, K₂O) recommendations for all fields on a farm taking into account legume-nitrogen and manure nutrient credits consistent with University of Wisconsin recommendations.

SNAP-Plus calculates a RUSLE 2-based soil loss assessment that allows producers to determine whether fields which receive fertilizer or manure applications meet tolerable soil loss (T) requirements.

SNAP-Plus calculates a rotational Phosphorus Index value for all fields as required for soil phosphorus management.

SNAP-Plus calculates a four-year P balance as required for using soil test P for phosphorus management.

Additional information on both the SNAP Plus software and the phosphorus index can be found at <http://www.snapplus.net/index.php>.



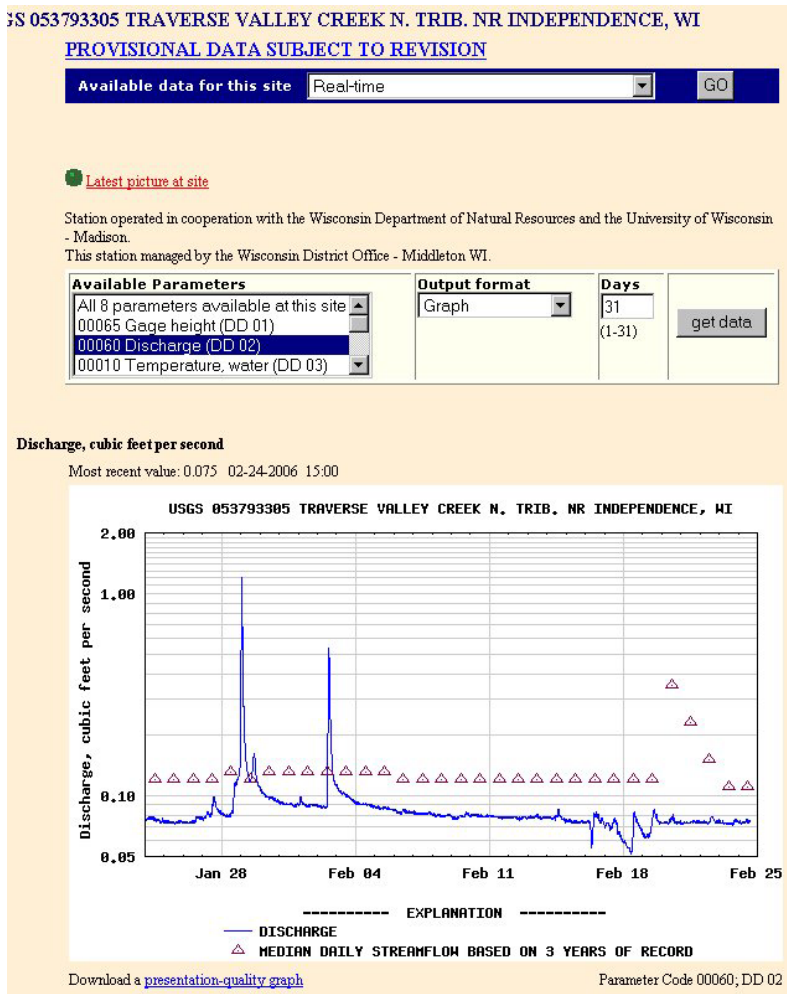
Discovery Farms Research Site Data and Conditions Available Online!

Written by Eric Cooley, Outreach Specialist, UW-Discovery Farms

The Discovery Farms partnership with the United States Geological Survey (USGS) allows research to be performed with many advances in technology. One benefit of this technology is the centralized, web-enabled database in which all of the data are stored.

Data acquired from the research stations are relayed via a combination of spread-spectrum radios and telephone or cellular modems to USGS computers where the data are stored in the National Water Information System (NWIS) database. This database has the ability to automatically display information on a web site. In general, the data on the web is updated twice per day. The “real-time” data can be viewed up to 31 days before the present date and can be presented in either graphical or tabular form in multiple formats. Selected daily values can also be viewed for the entire period of record at a site. The following link can be used to access most of the Discovery Farms research sites: <http://waterdata.usgs.gov/wi/nwis/current?type=flow>

Here is an example of 31 days of discharge for one of our research sites:



The available parameters viewable for stream, waterway, and tile sites are commonly:

- Gage height (depth of water in the water control device)
- Discharge (volume of water flowing through the water control device)

Water temperature

Other parameters that may be viewable include:

- Soil moisture content at 10, 20, 30, and 50 centimeter depths.

Soil temperature at 2, 5, 10, 20, 40, and 80 centimeter depths.

Holding the shift key down while clicking multiple available parameters allows the user to compare multiple graphs for a given time period simultaneously. The list of available parameters at each site may vary depending upon the equipment installed.

From the USGS website previously annotated, Discovery Farm weather station data installed at research sites may also be accessed. Near the top, left portion of the page, you will see a pull-

down menu labeled “Predefined displays.” Select either *Wisconsin Precipitation Table* or *Wisconsin Other Parameter Table* then click the “go” button to obtain weather station data from available locations.



Discovery Farms Research Site Data and Conditions Available Online!

The available parameters viewable for weather stations are commonly:

- Precipitation
- Air temperature
- Relative humidity
- Average, minimum, and maximum wind speed
- Wind direction
- Solar radiation.
- Soil moisture content at 10, 20, 30, and 50 centimeter depths.

Soil temperature at 2, 5, 10, 20, 40, and 80 centimeter depths.

Again, the list of available parameters at each site may vary depending upon the equipment installed.

For ease of access to Discovery Farms specific data, the Discovery Farms website will have a page to direct link research sites to their USGS parameters. This information can be found at:

<http://www.uwdiscoveryfarms.org/corefarms/datasites.htm>

An important note must be made that data obtained from these sites is only provisional because it has not been checked for accuracy, as it is published to the web by an automated program. The following USGS Provisional Data Disclaimer should be read before accessing this data.

Provisional Data Disclaimer:

Recent data provided by the USGS in Wisconsin ~ including stream discharge, water levels, precipitation, and components from water-quality monitors~are preliminary and have not received final approval.

Most data relayed by satellite or other telemetry have received little or no review. Inaccuracies in the data may be present because of instrument malfunctions or physical changes at the measurement site. Subsequent review may result in significant revisions to the data.

Data users are cautioned to consider carefully the provisional nature of the information before using it for decisions that concern personal or public safety or the conduct of business that involves substantial monetary or operational consequences.

Information concerning the accuracy and appropriate uses of these data or concerning other hydrologic data may be obtained from the station manager, whose name is shown on the single station data summary pages, or from the USGS surface-water specialist in Wisconsin care of the webmaster email alias Wisconsin NWISWeb Maintainer.





This newsletter is an information source about the Discovery Farms Program. Regarding the mailing list, call/e-mail 715-983-5668 or jgoplin@wisc.edu.

This newsletter can be found on the web at www.uwdiscoveryfarms.org.

Discovery Farms is a program from the University of Wisconsin, and is part of UW-Extension and the College of Agriculture and Life Sciences at UW-Madison. It has a relationship with WASI, as does UW-Platteville's Pioneer Farm.

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