



SURFACE WATER QUALITY WORKGROUP REPORT

DATE: January 10, 2017

TO: Food, Land and Water Project Steering Committee

FROM: Surface Water Quality Workgroup
Co-Chairs: Jim Baumann, Dick Lamers and Paul Zimmerman
Facilitator: Pat Murphy

SUBJECT: *Interim Report on Workgroup Progress*

Workgroup Charter

The Steering Committee asked the Surface Water Quality Workgroup to consider surface water quality issues related to land use and management, with a focus on nitrogen and phosphorus runoff. The Workgroup was asked to consider the following (summarized) questions:

- What is the current surface water quality situation?
- Is the situation getting better or worse? Why?
- What are our “bottom-line” water quality goals? How soon, if ever, do we expect to achieve our goals?
- Will the current N and P runoff and discharge control programs achieve our water quality goals? Are we making significant progress toward our goals? If not, why not?
- What, if anything, would it take to make current programs work?
- If our current approach does not, or cannot work, what alternative approaches would work?
- What are the real incentives, if any, for landowners to adopt and maintain effective conservation practices?
- How will we know if our strategy is successful? How will we measure success?
- What will it cost to achieve our goals? What are the trade-offs?
- Where do we go from here?

Workgroup Membership

Please see the attached list of workgroup members, and their record of attendance to date. The Workgroup co-chairs believe that the Workgroup membership reasonably represents stakeholder interests. This Workgroup is quite large, owing to the breadth of the subject matter. Although there have been a significant number of absences at Workgroup meetings, there have also been a large number of attendees. The Workgroup has sometimes broken into subgroups to facilitate discussion.

Workgroup Meetings

The Workgroup has held 2 meetings to date, on August 23 and November 10, 2016. There was excellent, constructive participation by all represented stakeholders.

- On August 23, Workgroup members introduced themselves, shared basic perspectives, and began to identify and address key issues and information needs. There was some uncertainty over whether surface water quality was getting better or worse, mainly because of regional and time scale differences. The Workgroup *did* agree that surface water quality *could* and *should* be better.
- On November 10, the Workgroup heard expert presentations on phosphorus and surface water quality, farm conservation standards, and county implementation of farm conservation standards. The Workgroup then brainstormed ideas for improving conservation compliance and surface water quality (see draft minutes attached).

Problem Description

Because our assigned topic is quite large, and time is limited, we have chosen to concentrate mainly on water quality issues related to phosphorus runoff from farms. Farms are the leading overall source of phosphorus runoff to surface waters, and will be critical to achieving key water quality goals. Actions to address phosphorus runoff will also help to reduce nitrogen runoff. The Workgroup has worked to clarify its understanding of the farm phosphorus runoff problem.

Phosphorus Pollution

Phosphorus (P) is a major pollutant of surface water. Phosphorus plays a decisive role in fueling aquatic plant and algae growth, which can adversely affect recreation, property values and public health. It also contributes to coastal “dead zones” (including one in Green Bay) and the eutrophication of lakes. Hundreds of watersheds throughout Wisconsin are classified as “impaired watersheds” because of P concentrations in excess of water quality standards.

Excessive weed and algae growth can inhibit, and even preclude, our use and enjoyment of surface waters. Some phosphorus-fueled algal blooms can also be toxic to people and pets. A large toxic algal bloom caused the complete shutdown of the municipal water supply in Toledo, Ohio in 2014. Like Toledo, many Wisconsin communities such as Milwaukee, Kenosha, Green Bay, Appleton and Oshkosh get their drinking water from surface waters (including Lake Michigan and Lake Winnebago).

Phosphorus discharges come from “point sources,” such as municipal and industrial waste treatment plants, as well as from “nonpoint sources” such as farm and urban runoff. Some P also comes from natural sources, and from “legacy” concentrations in lake and stream sediments (created by past P loading). It is important to remember that today’s P loading will affect tomorrow’s “legacy” concentrations.

“Point source” dischargers (including municipal and industrial facilities, as well as concentrated animal feeding operations with more than 1,000 “animal units”) must hold pollution discharge permits from Wisconsin Department of Natural Resources (DNR). Permits limit the amount of pollution that individual “point sources” may discharge.

“Nonpoint source” runoff is different. It is, by nature, more diffuse and harder to measure than “point source” discharges. “Nonpoint sources” are *not* required to hold DNR permits; but Wisconsin has established farm conservation standards and urban runoff control programs to help limit “nonpoint source” runoff.

Most P loading now originates from “nonpoint sources.” However, P loading varies widely between watersheds, depending on land use patterns and the number of “point sources” in the watershed. In most watersheds, both “point sources” and “nonpoint sources” are important P contributors. Farms, which account for roughly 40% of the state’s land area, are the biggest overall P contributors to surface water.

Phosphorus Runoff from Farms

Phosphorus is an essential crop nutrient. Phosphorus is naturally present in the soil; but farmers also add P, in the form of fertilizer and manure, to ensure strong crop yields. In 2014, roughly 75% of the P applied to Wisconsin farms came from imported chemical fertilizer, while roughly 25% came from manure.¹ Phosphorus fertilizer applications were trending down before 2009, but have since nearly doubled (partly because of high commodity prices and related cropping shifts). Statewide manure applications increased by roughly 7% from 2004 to 2014; but, in some concentrated dairy growth areas, they have been increasing more rapidly.

In areas with heavy livestock concentrations, manure may be the predominant source of P. A 1,000 cow dairy herd produces about as much fecal waste (total solids, BOD, nitrogen and P equivalents) as a city of 25-30 thousand people (think Neenah, Stevens Point, Sun Prairie or West Bend). The need to dispose of large quantities of manure, regardless of local crop nutrient needs, can sometimes lead to excessive and inappropriate manure applications. “Spreadable” acreage may be constrained by farmland loss, increasing land costs, fragile environments, existing soil P levels, local cropping patterns, and “checkerboard” development that brings farms and non-farm residences into closer contact.

Phosphorus can build up in the soil over time, if P applications exceed crop uptake. Mean Wisconsin soil concentrations have been rising for decades. As soil concentrations rise, pollution risks grow. Phosphorus is transported to surface waters via soil erosion and runoff. When too much phosphorus enters our lakes and streams, a “good” crop nutrient becomes a “bad” water pollutant.

Phosphorus runoff can be aggravated by excessive fertilizer and manure applications, erosive cropping practices, poor soil erosion and runoff control, inadequate riparian buffers, high manure-to-land ratios, inadequate manure storage and management, and applying manure at inappropriate times and places (winter applications are especially risky). Heavy P loading can occur during spring runoff events and heavy rainfall events, especially on farms that lack adequate runoff control practices. By contrast to natural vegetation and perennial crops, annual row crops can leave bare soil exposed to erosion and runoff for much of the year unless they are produced with cover crops or conservation tillage.

¹ For background information and source citations, see Matson, “Food, Land and Water: Can Wisconsin Find Its Way?” Paper may be downloaded, free of charge, from WI Land+Water website at <http://wisconsinlandwater.org/programs/food-land-water-project>.

Wisconsin's Nutrient Reduction Strategy

Wisconsin has adopted a “nutrient reduction strategy” as part of a national effort to reduce nutrient discharges to the Mississippi River and Great Lakes. Nitrogen and P discharges from the Upper Midwest have contributed to a vast “dead zone” in the Gulf of Mexico. We also have our own local “dead zone” in Green Bay.

Since 1995, Wisconsin has reduced P discharges to the Mississippi River by about 23%, and to Lake Michigan by about 27%. We have done so mainly by reducing discharges from “point sources” such as municipal and industrial facilities. Further “point source” reductions will be increasingly difficult and costly.

We have made far less documented progress in reducing “nonpoint source” runoff from farms. There are a variety of reasons for this, including more intensive agricultural production, reduced acreage in conservation reserve programs, limited conservation staff and cost-share funding, limited farmer participation, uneven implementation and compliance monitoring, a recent pattern of intense storm activity, and the inherent difficulty of measuring and monitoring “nonpoint source” runoff.

We are still only halfway to meeting our overall P discharge goals, and most of the remaining reductions must come from “nonpoint sources” (mainly farms). At current rates of progress, Wisconsin is not likely to meet its “nonpoint source” P reduction or water quality goals any time soon, if ever.

Phosphorus Water Quality Standards

DNR has established water quality standards, including P standards, for surface waters. There are different standards for different water bodies, based on the natural characteristics and uses of those water bodies. P standards are normally expressed as numerical concentrations of P per unit volume of water.

DNR evaluates watersheds, and designates “impaired” waters that fail to meet water quality standards. Of the more than 1,000 waters on Wisconsin’s current “impaired waters” list, nearly 40% fail to meet P standards. Over half of all Wisconsin rivers and streams evaluated to date fail to meet P standards. Even if P loading to a water body is reduced, it may take time to reduce P concentrations in that water body (a % reduction in P loading is not the same as a % reduction in P concentration).

DNR typically uses “Total Maximum Daily Load” (TMDL) analyses to address excessive P concentrations in “impaired” watersheds. A TMDL analysis calculates the maximum P load that the watershed can receive without exceeding the P concentration standard for that watershed. Based on its analysis, DNR develops a TMDL implementation plan for the watershed. The plan is designed to reduce P loading, and thus P concentrations, over time.

Based on its TMDL plan, DNR sets P discharge limits for individual “point source” dischargers, in their discharge permits. The TMDL plan also sets “nonpoint source” P runoff reduction targets; however, there is no DNR permit mechanism to implement those targets. TMDL plans may promote “nonpoint source” reductions in other ways, such as by encouraging better farm conservation and urban runoff control practices.

In many watersheds, it would be more cost-effective to focus on P reductions from “nonpoint sources” like farms, rather than “point sources” like municipal sewage districts. But, for a variety of reasons, we have been less successful in reducing P loading from “nonpoint sources.” That will be a key challenge going forward.

We can make some progress by improving basic nutrient management and runoff control practices on farms. But larger discharge reductions may require more costly long-term practices, such as manure management infrastructure and extensive riparian buffers. Progress will depend on reducing soil erosion and runoff to surface water, reducing fertilizer and manure inputs in excess of crop needs, and reducing excessive P concentrations in soil.

Farm Conservation Standards

Wisconsin has adopted “nonpoint source” runoff standards and conservation requirements for farms. These include basic soil erosion controls, basic minimum tillage setbacks from water bodies, and basic manure runoff controls. Farmers must also comply with nutrient management standards. Compliance obligations are normally contingent on an offer of 70% cost-sharing (there are some important exceptions). Full compliance with these standards would significantly reduce P discharges from farms.

Nutrient management standards require farmers to have a comprehensive nutrient management plan, test their soils, evaluate crop nutrient needs, credit nutrients from all sources (including existing soil nutrients), and avoid nutrient applications in excess of UW agronomic recommendations. For many farms, compliance can be relatively easy and inexpensive. Indeed, many farms can actually save money by reducing unnecessary fertilizer applications. But compliance can be more difficult and costly for livestock operators that have a high ratio of manure to “spreadable” land, or inadequate manure management infrastructure. For those operators, it can be a challenge to dispose of excess manure without violating nutrient management standards.

Livestock confinement operations typically collect, store and apply manure in liquid form. Proper manure and nutrient management may require large investments in manure storage and handling, land acquisition or leasing, and manure hauling. An “average-sized” manure storage facility may cost over \$350,000, and a large livestock operator may spend hundreds of thousands of dollars each year for “spreadable” land and manure hauling. Hauling costs increase rapidly as hauling distances increase, and some operators may try to cut costs by applying too much manure close to manure production sites.

Implementing Farm Conservation Standards

Counties are primarily responsible for implementing state farm conservation standards. State rules spell out basic standards for county programs, but give counties wide latitude to set their own priorities. County programs vary widely, partly because of underlying differences in land use and water quality challenges between counties. Counties offer information, cost-sharing and technical assistance to farmers, and rely heavily on voluntary cooperation (compulsory compliance actions are rare). Conservation compliance is hampered by a shortage of county staff and cost-share dollars, and sometimes by a lack of voluntary farmer participation. To date, for example, only 30% of Wisconsin farmers have nutrient management plans; and there is little monitoring of plan compliance.

The State of Wisconsin currently provides under \$9 million per year in farm conservation cost-share funding to counties (an average of less than \$125,000 per county). Funding varies between counties.

- The \$9 million cost-share total includes about \$7.2 million in bond revenue funding for capital improvements such as manure storage facilities and buffer strips, and about \$1.7 million for annual practices like nutrient management and conservation tillage. Another \$800,000 is earmarked for state-contracted training and field projects, including \$250,000 for “producer led” projects.
- Under a new “adaptive management” program, metropolitan sewage districts and other “point sources” in P-impaired watersheds may also partner with counties to provide cost-share dollars for “nonpoint source” P reductions. Statewide, that could add roughly \$9 million in annual cost-share funding for qualifying watersheds, depending on participation by “point source” dischargers.
- The U.S. Department of Agriculture also provides substantial funding for cost-shared practices and conservation reserves (land “set asides”). But federal conservation projects are completely voluntary, confidential, and independently administered by USDA – with only limited county involvement. Over the last decade, when commodity prices were at historic highs, farmers removed large amounts of land from federal conservation reserve programs, and shifted them into more erodible row-crop plantings.

Certain large livestock operations must comply with farm conservation and nutrient management standards *regardless* of cost-sharing (although compliance monitoring has been limited). These include:

- Facilities with 1,000 or more “animal units” (about 700 dairy cows). These facilities are considered “point source” dischargers, and are required to hold a pollution discharge permit from DNR.
- New or expanding facilities that will have 500 or more “animal units” (about 350 dairy cows) *if* they are required to hold a county or local siting permit. To date, about 25 counties and a substantial number of towns have adopted ordinances requiring such permits (ordinances must meet state standards).

Progress Evaluation

Wisconsin is far from achieving full, statewide compliance with existing state farm conservation standards. At current rates of progress, we are not likely to achieve full compliance any time soon, if ever. Given current cost-share requirements, WI Land+Water estimates that to achieve full statewide farm conservation compliance within 20 years we would need \$100 million in additional cost-share funding *each year*.

A more limited focus on priority compliance in “impaired” watersheds would reduce the total cost. But even then, a large funding increase would be needed to attain a reasonable level of compliance within 20 years; and some locally important waters or projects would be ignored. In some areas, costly supplementary practices (such as manure treatment systems or extensive riparian buffers) may be needed to meet nutrient management and water quality standards.

Key Issues

Based on discussions to date, we anticipate that the Workgroup will focus on the following key issues in our remaining 2 meetings:

- It appears that we cannot achieve our water quality goals without increasing public and private investments. How can we mobilize the necessary investments? What level of investment are we willing to make? Who should pay?
- It appears that we cannot achieve our water quality goals within a reasonable time frame unless we “step up the pace.” Are we willing to do so? What will it take?
- Do we have a clear understanding of what is happening “on the ground” and in the water? Can we improve that understanding? Are we doing an adequate job of water quality monitoring and conservation compliance monitoring?
- Do farmers understand their compliance responsibilities and options? Can we do better? How can we increase farmer participation?
- Are we focusing on the most serious problems? Are we pursuing the most cost-effective solutions? Can we do better?
- Can we do a better job of aligning federal, state, county and local efforts to achieve our water quality goals? What would it take?
- Can we do a better job of aligning public and private efforts to achieve our water quality goals? What would it take?
- Agriculture is changing rapidly. Farms are getting bigger and more complex. Absentee ownership and lease arrangements are increasing. More conservation compliance tasks are being delegated to crop consultants, manure haulers, farm suppliers and other third parties. Does our current approach address these changes? Can we do better?
- To what extent should we focus on “nonpoint source” vs. “point source” discharge reduction? Farm vs. urban “nonpoint source” reduction? Are we pursuing a fair and cost-effective strategy? Can we do better?
- Can we provide local flexibility, while ensuring reasonably consistent statewide regulation of our agriculture and food industries? Can we be responsive to local needs and concerns, while addressing statewide priorities?
- Can we mobilize the creativity and resources of private business, including dairy and food supply chains, cooperatives, bankers, entrepreneurs, farm supply businesses, and farmers themselves, to achieve conservation goals? Can we increase public understanding and support?
- Can we ensure that taxpayers are getting good “value” for their farm conservation dollars? Can we ensure reasonable public accountability and transparency?
- Can we achieve our water quality goals, while maintaining the competitiveness of Wisconsin’s agriculture and food industries?

Next Steps

Our Workgroup plans 2 more meetings. At our next meeting, we will explore these issues in greater detail, and begin to discuss some alternative actions (our “brainstorming sessions” have already identified some preliminary ideas). We will seek consensus where possible, and will try to get a sense of priorities. At the final meeting, we hope to arrive at some final recommendations that we can share with the Steering Committee.

Surface Water Quality Workgroup Member List

First Name	Last Name	Organization	Attended Meeting 8/23/16	Attended Meeting 11/10/16
Greg	Baneck	Outagamie Co.	Yes	No
Roger	Bannerman	Wisconsin DNR	No	No
Jim	Baumann	Co-Chair, Surface Water	Yes	Yes
Eric	Birschbach	Independent Crop Consultant	Yes	Yes
Eric	Booth	UW Agronomy and Limnology	No	Yes
Kenn	Buelow	Dairy Farmer	Yes	Yes
Kevin	Connors	Dane County Land & Water Resources Department	No	No (Callis was surrogate)
Dana	Cook	Professional Nutrient Applicators Association of Wisconsin	Yes	No
Jim	Coors	Courte Oreilles Lakes Association	Yes	Yes
Paul	Dearlove	Madison Clean Lakes Alliance Rep	No	No
Judy	Derricks	NRCS	Yes	No
Randy	Eide	Menomonie Public Works Department	Yes	Yes
Jeff	Endres	Ag Producer / Private Landowner	No	No
John	Exo	UW-Extension	No	Yes
Faith	Fitzpatrick	USGS	No	No
Greg	Fries	Sanitary & Storm Sewer	No	No
Rick	Georgeson	Petewell and Castle Rock Stewards	Yes	Yes
Bill	Hafs	New Water	Yes	Yes
Jim	Hebbe	Hebbe Farms	Yes	Yes
Steve	Jacquart	Milwaukee Metropolitan Sewerage District	Yes	No
Karl	Klessig	Saxon Homestead	No	No
Matt	Krueger	Rivers Alliance	Yes	Yes
Scott	Laeser	Clean Wisconsin	No	Yes
Dick	Lamers	Co-Chair, Surface Water	Yes	Yes
Mary	Lowndes	WDNR	No	No

First Name	Last Name	Organization	Attended Meeting 8/23/16	Attended Meeting 11/10/16
Anne				
Kriss	Marion	Lafayette County Land Conservation Committee	Yes	Yes
Dave	Marshall	Underwater Habitat Investigations LLC	Yes	No
Pat	Murphy	Facilitator, Surface Water	Yes	Yes
Peter	Nowak	Nelson Institute for Environmental Studies	No	No
Amber	Radatz	UW Discovery Farms	No	Yes
Steve	Richter	The Nature Conservancy	Yes	Yes
Rachel	Rushman	DATCP	Yes	Yes
Scott	Sturgul	UW Nutrient and Pest Management Center	Yes	Yes
Dave	Taylor	Madison Metropolitan Sewerage District	Yes	No
Darin	Von Ruden	Wisconsin Farmers Union	No	Yes
Nick	Waldschmidt	City of Fond du Lac Engineering & Traffic Division	No	No
Laura	Ward Good	UW Madison	Yes	Yes
Jim	Zimmerman	National Corn Growers Association	No	No
Paul	Zimmerman	Co-Chair, Surface Water	Yes	No

Attendees Not Listed in Group

Chad Cook (for John Exo)	Amy Callis (for Kevin Connors)
Corinne Billings (for Mary Anne Lowndes)	Kurt Calkins (for Greg Baneck)
Maria Woldt (Steering Committee)	John Umhoefer (Steering Committee)
Angela James (Steering Committee)	
Jessica Schultz (Steering Committee)	