

Phosphorus Task Force Phase 2 Meeting
May 1, 2013
Riffe Tower, 31st Floor B & C South

Attendance

Task Force

Larry Antosch, Dave Baker, Doug Busdeker, Steve Davis, Libby Dayton, Kevin Elder, Karl Gebhardt, Gail Hesse, Todd Hesterman, Kevin King, Amy Jo Klei, Allison Kunze (for Dan Button), Greg LaBarge, Joe Logan, Terry McClure, Jeff Reutter, Pete Richards, Julie Weatherington-Rice, Chris Wible, Rick Wilson, Ron Wyss

Observers

Mike Bailey, Remegio Confesor, Jr., Tom Fontana, Chris Henney, Laura Johnson, Trinkka Mount, Robert Mullen, Beth Risley, Anthony Sasson

Handouts

Agenda

Working Table of Contents for Task Force Report

Minutes from April 3 meeting

Conservation Action Project – Phosphorus Reduction Using Variable Rate Technology

Current Nutrient Application Practices in Ohio Agriculture

Importance of Soil Health on Reducing the Risk of Nutrient Transport (revised)

Agricultural Best Management Practices for the Western Lake Erie Basin

Drainage Management

Draft Language for Policy Section in OPTF2 Report

Welcome and Updates

- Conservation Action Project – Phosphorus Reduction Using Variable Rate Technology.
 - The project originated out of original task force recommendations. Ohio EPA was awarded a 2010 GLRI grant, which was passed through to the Conservation Action Project (CAP). The grant is to be completed in mid-2013.
 - Goal: The project is a way to introduce variable rate technology (VRT) to producers via dealers and also allow dealers to see how they could make money without increasing tonnage of fertilizer.
 - The project aimed to enroll 7000 acres in VRT; project ended up with 8650 acres enrolled because some dealerships did some innovative thinking / action; many of these acres were corn.
 - There were 5300 acres that had a decrease in P applied.
 - There were 1500 acres that stayed the same (most in soybeans).
 - The remaining needed an increase; most of these were for corn crops.
 - There was a net reduction of 181,000 pounds of P₂O₅.
 - The funding covered a grant for the dealerships and then there was a rebate for the farmers.
 - The grant was only \$200,000 so this seems like a pretty good return.
 - Most of these acres were broadcast application.
 - About 45% of acres in Ohio are already using VRT.

- The trend line is going up, but note that the initial investment is tens of thousands of dollars.
- Both the dealer and the farmers save money.
- Heidelberg data on phosphorus loading in the spring of 2013 (so far).
 - As of April 15, we were at the average from 2000-2012.
 - 2013 started out fairly low but increased rapidly with early April rain events; it's increasing to above average.
 - DRP was above average slightly, but it will soon go higher when Heidelberg adds in the most recent runoff data.
 - 2013 is already higher than the total load in 2012.
 - Reutter: we chose to average 2006-2012 instead of 2000-2012 in the target recommendations because the flows/loads were generally much lower in 2000-2005. It helps to account for climate change.

Tracking Mechanisms

- Fertilizer use/trends and crop outputs (Dr. Robert Mullen)
 - Nutrient removal
 - For calculations, he used a variety of crops and nutrient removal estimates provided by OSU and IPNI.
 - Yields have continued to increase over the last 40 years, fairly dramatically.
 - Higher grain yields = higher nutrient removal
 - P₂O₅ removal increased from 27 to 45 lb/acre; this primarily reflects an increase in yield.
 - Fertilizer/manures
 - The fertilizer sales data come from the Association of American Plant Food Control Officials.
 - The manure generation data come from the Midwest Planners publication.
 - The estimates of manure generated and nutrient concentration based upon animal type.
 - Fertilizer sales have decreased since 1985 from 200,000 tons of P₂O₅ to 108,000 tons of P₂O₅ in 2011.
 - Manure has decreased by about 10,000 tons since 1985. The concentration of manure nutrients is not shown.
 - Nutrient balance
 - A straight balance has a fundamentally flawed assumption (that manure nutrients can be separated and distributed well across all agricultural fields).
 - The ERS adjusted balance uses an estimate of crop acres receiving manure application based upon a USDA-ERS report (2012).
 - In the Corn Belt:
 - 10% of corn acres receive manure
 - 2.5% of soybean acres receive manure
 - 5% of wheat acres receive manure
 - 7% of hay acres receive manure
 - Somewhere around 2005 we crossed the nutrient balance threshold (to a negative balance).
 - A positive balance means we applied more phosphorus than our crops removed.
 - A negative balance means we applied less phosphorus than our crops removed.
 - This assumes the soil test P declined.
- Cyanobacteria bloom index (Dr. Rick Stumpf / NOAA)

- The bulletin shows current bloom conditions and contains a forecast for 3 days later.
 - In 2012, there were over 500 subscribers to the bulletin.
- 2011 had the worst bloom in decades.
- The satellite had coverage every 2 days from 2002 to 2012.
- NOAA is using a substitute this year and will have a replacement in 2014.
- MERIS can see more wavelengths of light, allowing us to detect and quantify blooms.
- This information gives a cyanobacteria index (CI), which equates to concentration.
 - CI is the strength of the negative SS(681) infrared/near-infrared; allows identification of blooms without confusion by sediment.
- Next they confirm and quantify the bloom in field (role of OSU Stone Lab this summer).
- The method cannot distinguish between two cyanobacteria species.
- With 10 years of MERIS data, we can map the peak of bloom for each year. It tends to be late summer.
- The four worst years were 2008 through 2011.
- The model predicted a mild bloom in 2012, which was observed.
 - The 2000-2011 predictions matched the observed data within one CI.
- There are four publications on this; PDFs will be sent and citations made in the final PTF report.
- NOAA is using a hydrodynamic model for its trends work. It seems to work pretty well.
- Can this work identify from where blooms emanate (Maumee vs. Detroit rivers)?
 - Blooms start outside of the Detroit River plume, which does not make a strong case for the Detroit being the big issue.
- Clarifying point: This is for the western basin; internal loading becomes more important in the central basin.
- Biomass metric developed by Tom Bridgeman (Dr. Jeff Reutter)
 - This system is an easy, cheap method to quantify *Microcystis* from plankton net samples.
 - The method has been published in *Journal of Great Lakes Research*.
 - Bridgeman *et al.*
 - A novel method for tracking western Lake Erie *Microcystis* blooms, 2002-2011
 - 2013; 39: 83-89
 - The method places plankton samples into Imhoff cones.
 - This is a measurement for *Microcystis*.
 - It gives a volume of *Microcystis*.
 - The University of Toledo is sampling 6 stations every other week from May through October.
 - It takes an average of the 6 stations, which becomes an estimate of the *Microcystis* that was in the Western Basin in that particular year.
 - This method quantifies *Microcystis* (in a scaled way) in a less time-consuming way.
 - The method gives an estimate of annual variations of *Microcystis* in the Western Basin.
 - Stumpf: NOAA's estimates are consistent with the Imhoff cone method estimates.
 - The samples are in the Maumee Bay area, but they're used to represent the Western Basin.
 - Sea Grant / Stone Lab are looking at expanding to north of Huron to better represent the whole Western Basin.
 - Rick Stumpf and Tom Bridgeman are working to expand the data to evaluate how to relate them to patterns over time.
- Davis: If we're spending so much time talking about March-June, why are we worrying about winter application?

- We just need to be careful how we message this.
- Those are the months most critical to HABs, but other issues such as hypoxia may have broader important times.
- Reutter: We are seeing winter blooms; they're just not "harmful."
- Weatherington-Rice: We have a thaw in the Olentangy River prior to February 1 every or almost every year.
 - This is likely true in the Lake Erie basin too.
- There was a big diatom bloom in spring 2012 because of high loadings in fall/winter 2011; it caused a big issue for public water supplies in the western basin in 2012.

Report Status Updates

- Soil health
 - LaBarge: What's the tie-in to nutrient reduction? Are there any studies we can point to? We need some literature to give it some more strength with scientific backing.
 - Weatherington-Rice wants this to be a stand-alone PDF as well as a part of the report because it's so valuable.
 - She has made a list of graphics to add:
 - basic soil structure figure from intro soil class
 - machine injecting fertilizer
 - microbiological community in soil
 - cover crop coming up through light snow
 - map that shows where it's being done (if possible)
 - map showing where soil types are
 - cracked soil in summer
 - McClure: Please flesh out the discussion of lake bed soils and how there is a lack of soil health with them (i.e., anything inundated).
 - Baker: a lot of critical areas have been in terminal moraines instead of lake plain soils. How would a critical area map from SPARROW correspond to what this has done?
 - Davis: it would not hurt to mention the moraine areas; one is not worse than the other
 - Baker: to clarify, soil health affects Lake Plain soils
 - Weatherington-Rice: the moraines in the Lake Erie basin have higher clay content than moraines further south so they behave more like "normal" Lake Plain soils
- Drainage management
 - A couple of the maps on the end were forwarded as color. They indicate how much of Ohio has subsurface drainage and how much has potential for drainage water management for slopes. These maps confirm what we've already recorded.
 - King will comment on this one to make sure that we're clear enough about what we know and what we don't know.
 - King will craft some sentences about tile drainage & risers for this section.
 - Wilson: It made it into the agricultural practice section but should definitely be in this one too.
 - Hesse: Would we want to recommend NRCS develop a standard for tile risers?
 - Wilson: Indiana has a standard already. It slows down water and removes solid.
 - King: One Indiana study shows that replacing tile risers (surface inlets) with blind inlets can reduce DRP by 60-70%.

- King: One of the people here who is a voting member on the state tech committee should raise this as an issue to adopt Indiana's practice standard.
 - Reutter: Indiana farmers in the Maumee could adopt this.
 - King: ARS in West Lafayette did a study in the St. Joseph (Cedar Creek) that gave the above number.
 - **ACTION** for King: If there's a recommendation to adopt a standard in Ohio, please provide that language too.
 - King/LaBarge: A blind inlet is similar in cost to drainage management structures (\$1800 - \$2000 each). Tile risers are cheaper. A photo of a blind inlet was included in King's presentation a few months ago.
 - Reutter: This is very similar into a leach bed in a septic tank, but it's leaching in instead of leaching out.
 - Weatherington-Rice: Make sure we're careful to describe this so we don't end up with a class V injection well.
- Agricultural practices
 - The section is patterned after ACT (Avoid, Control, Trap).
 - The section includes high priority practices that we've talked about: concentrating maintaining erosion control and improving drainage management.
 - The revised 590 standard matches with tri-state now. The nitrogen standard in tri-state is not necessarily what's used anymore.
 - LaBarge: 590 includes 633 (manure standard), which doesn't line up with tri-state.
 - Reutter: Isn't the manure standard higher than tri-state?
 - Elder: Manure is different than fertilizer.
 - Elder: Telling producers to follow tri-stage for manure if possible. Current practice recommends closer to 50 ppm even though the cut-off is 150 ppm legally.
 - Elder: New farms are easier to do than old ones because they don't have the legacy of nitrogen-only.
 - Reutter: The finger is likely to be pointed at manure in the future.
 - Wyss: Science says there's an almost 1:1 relationship between runoff and what was applied.
 - Dayton: That's only true for surface application. When it's a long-term stable P in the soil, you don't see the correlation. It's when the stable P in the soil gets up to 100 ppm that you see the correlation again. That's where the 150 ppm came from.
 - Wyss: However, you're increasing your risk of runoff every time you apply over 40 ppm. Tri-state never recommends more than 110 or 125, even with a low soil-test level.
 - Elder: To clarify, the practice is not *recommending* 150, it's *allowing* 150.
 - Wyss: Then should we not recommend transforming the higher-P manure into a form that can be spread at lower rates?
 - Wilson: The nutrient reduction strategy recommends that manure / nutrients be applied at the minimal level needed for crops.
 - LaBarge: From a nutrient standpoint, things have changed a lot in the last 7-8 years in terms of cost. The biggest problem is low-nutrient manure, which cannot be moved as far.
 - McClure: It's becoming more common to move low-nutrient manure. Many farmers won't consider low-rate application because technology isn't very efficient yet.

- Elder: Right now we go by the standard until we have edge-of-field data to back up a change.
 - Elder: It's fine to point out areas where we need more research so we can answer some questions to which we don't yet know answers.
 - Multi-year vs. single year?
 - Surface vs. sub-surface?
 - Hesse: It might provide context to bring up the multi-year idea so we can say that it is still under study.
 - Elder/King: Are we sure we want to open the proverbial can of worms? We don't yet have anything to say.
 - LaBarge: 590 makes recommendations about nutrients regardless of source of nutrients. It makes allowances for manure because of some of the technological limitations.
 - Davis: It's not only multi-year; it's when and how you apply as well. We don't have the answers yet.
 - Elder: Most farms are probably applying some fertilizer multi-year.
 - Hesse: A paragraph or two about multi-year vs. single year, just for education, would be helpful.
 - Elder: It might be helpful for Libby to detail (1-page) the research for edge-of-field study and specifically what's covered.
 - Dayton: Make sure discussion is all in same units to minimize conversion.
 - Reutter: Make sure it's clear that the reason for the research is to provide opportunities for better policy.
- Hesse: Is there enough about nutrient linkage in the grassed waterways discussion? Add a sentence connecting erosion to nutrient management.
- Weatherington-Rice: The section should clarify that constructed wetland provide short, long and medium-term benefits for different things.
- Hesse: The section should point out limitations for nutrient management in particular (since that's the focus of the report) for all practices.
- Task Force members should send additional comments to Kevin Elder.
- **ACTION:** Gail will send a Word version of agricultural practices, drainage management and soil health sections so people can review; please use track changes feature.
- Metrics to measure progress
 - Hesse: How can we be both practical and realistic?
 - Elder: Some tracked through soil and water information management system (if it were tweaked a little).
 - Elder: How do you track NMPs? Most (95%?) will be done by CCAs/dealers.
 - Cover crops: annual transect survey
 - Reutter: We want to know loads relative to discharge. Then look at some practices, and possibly policies, that have been implemented over time.
 - Land use conversions can be done by CRP data.
 - Wetlands mostly go in with public funding.
 - Davis: Most difficult one is change in fertilizer management and NMP development.
 - Davis: if there were funding, CEAP could do its field enumerations every year.
 - King: Could do something like what Greg L. did as a survey at Ada.
 - LaBarge: Would 4R consistency program allow for some tracking?
 - Busdeker: Maybe but it's not far along enough yet.
 - Dayton: Keep tracking soil test P levels, assuming labs keep providing data.

- Hesse: What about FSA annual surveys? Could they ask a few more questions that would yield an annual dataset?
 - Reutter: Would they give us those data every year?
 - Hesse: Coverage might be best with that approach.
 - Elder: Limit it to 5 questions: 1) acres; 2) # soil tests that year; 3) nutrient application according to tri-state; 4) percent of nutrients incorporated; 5) method and timing of nutrient application
- Weatherington-Rice: Take list from first PTF and annotate it with what's been done, what's in progress, etc.
 - Hesse: We probably can't include all numbers of results and meet our deadline. We'll have to generalize to some degree.
 - Weatherington-Rice: If we just list the contact info for each one, it will help.
- Reutter: It's okay to point out weaknesses / missing information.
- Reutter: Recommends meeting quarterly but that the task force continue on.
 - Hesse: This would have to be framed as a specific recommendation to directors.
- Soil lab recommendations
 - Hesse: OLEC funded a study of soil labs that showed most were consistent (only 1 bad one).
 - Elder/Dayton: The labs didn't provide recommendations except for their users. Some recommendations aren't even close to tri-state.
 - Elder: We need to report that the labs' data are good. We need to bring to issue that the recommendations from the results are not as uniform as we'd like to see (to tri-state). The State of Iowa requires that the "standards" be printed on the recommendation form, for comparison.
 - **ACTION** for Elder: The task force can recommend that labs voluntarily put the tri-state recommendations on lab results in addition to other recommendations, if there are any.
- Other
 - Stratification (Dave Baker)
 - Heidelberg had a grant a few years ago to look at soil stratification since soils are not turned over in conservation tillage.
 - Residue breakdown releases phosphorus.
 - Broadcast of fertilizer contributes to phosphorus levels at surface.
 - Buildup goes on year-round.
 - Baker has been looking at P levels in 0-2 inches and 0-1 inch, each of which is higher than 0-8 (standard agronomic tests)
 - Stratification is real
 - At present, this is a significant contributor to what's going into Lake Erie, in part because hydrology of soils gives a lot of surface runoff. If we want to build a strong case for recommendations about soil health, we could do that by saying that under existing management practices, in which we've seen an increase in P coming off, stratification has contributed to the big runoff events delivering lots of DRP to lake.
 - Historically, stratification has been referred to extensively in literature as the source of increased DRP runoff in no-till situations. We could say all that research was off-base because of broadcast application, but we can't attribute all data to that issue.
 - We should not miss this opportunity tie what we're saying into literature in agriculture.

- This should argue for why we need to go to the measures that would greatly reduce the soil runoff measures.
- Cover crops might actually take up P from roots and increase residue, ultimately possibly increasing DRP runoff.
 - Sharpley would say that the solution is to till once and then go straight to cover.
 - Dayton: What level of P would you need before tilling? Sharpley recommends extreme levels before incorporation.
- Ohio has lower soil P test levels than many other states, and northwest Ohio is lower than most of the state. It is DRP that's high there.
- Elder: In most cases, if a farmer has a plow, it will probably be used more than it should be.
- Hesterman: It might not be a no-till issue since no-till is really not that common.
 - King: Continuous no-till is less than 10% of fields.
- Testing was done with standard soil testing by CCAs, which is done before application (probably a year after last application).
- Baker did a few woodlots to compare to.
- We are not necessarily recommending inversion tillage, but using the information to argue other points.
- Elder: Maybe include something about this in nutrient management section.
 - King: The committee recommendation table from 16-18 months ago could be noted.
 - McClure: The change from complete tillage to no-till is major; stratification is probably part of the issue.
- Policy considerations
 - The discussion of this topic was delayed until the next meeting because of time constraints. The paper will be sent to the group for review.

ACTIONS

- For Kevin King:
 - He will comment on the drainage management section to make sure that we're clear enough about what we know and what we don't know.
 - He will craft some sentences about tile drainage and risers for the drainage management section.
 - If there's a recommendation to adopt a tile riser standard in Ohio, please provide that language in the drainage management section.
- For Elder: Task force can recommend that labs voluntarily put the tri-state recommendations on lab results in addition to other recommendations, if there are any.
- For Hesse: Send a Word version of agricultural BMP, drainage management and soil health sections so people can track changes.

Next Meetings

- Meet on June 5 and June 25
 - The group needs to find a different location. Dayton will follow up about Waterman Farms at OSU. Antosch may have a possible location as well.