Phosphorus Task Force-Phase II Meeting
May 31, 2012 (10:00 AM -3:00 PM)
Vern Riffe Tower 1960

Attendance:

Gail Hesse, Julie Weatherington-Rice, Joe Logan, Rick Wilson, Mark Scarpitti, David Baker, Chris Wible, Terry McClure, Chris Henney (for Doug Busdecker), Ron Wyss, Kevin Elder, Amy Jo Klei, Kevin King, Dan Button, Tina Lust, Peter Richards, Karl Gebhardt, Jeff Reutter, Steve Davis, Yvonne Lesicko (for Larry Antosch), Harold Watters (for Greg LaBarge).

**Introduction**

After a review of the agenda and introductions, Gail provided an overview of expectations for the Task Force process. Key points made during this overview:

- In Phase II, we will build on the conclusions (and success) of Phase I, not revisit the analysis or conclusions from Phase 1
- We will identify what topics and issues we need to learn as a group. Information will come to us via presentations, discussions and resource materials including peer-reviewed publications.
- Overall, we will learn about a topic together, discuss and deliberate the implications before making recommendations. All of these phases will not happen at the same meeting on any given topic. Some topics may take several meetings. We all have something to learn and we all have something to teach.
- Consistent participation is requested because it is the collective learning that will make a difference in our deliberations. We can make the most progress where we have the collective "aha" insights. The knowledge that is shared with the Task Force needs to accrue for the benefit of the group, not any of us individually.
- We all want to be part of the story to improve Lake Erie and protect agricultural production and economy. A member pointed out that there are other economies to be protected as well
- We all get asked frequently about how best to get involved in this issue. Gail described 3 approaches in addressing the issue of algal blooms and all 3 are critical to moving forward: 1) Monitoring and research to track trends and answer key science questions about phosphorus movement and impact of practices, 2) Implementation actions to reduce phosphorus loadings, and 3) Task forces, work groups, forums and the like. These processes are critical to bringing people together to educate on the issues and build consensus on what we need to do differently to solve the problem. We need all three approaches to make a difference.
- The Task Force will be science-based and we will seek to develop consensus. We can best build momentum for change where we have consensus.

- Task Force meeting materials, agendas and meeting summaries will be posted to the Ohio EPA website on the P Task Force
- The Task Force will wrap up in spring 2013
- Director Nally has asked that the Task Force address tile drainage

Gail then described the distinctions between fact, opinion and guess. All have pros and cons in terms of what they add to meaningful dialogue. Facts can be proven and replicated but the pursuit of only facts can lead a group into analysis-paralysis. Opinions are often strongly held beliefs that are important, but also important are the underlying tenets behind those opinions. Consultants say one has to keeping asking "why" to get to those underlying tenets (often up to 4 layers which is one reason meaningful dialogue can take time). Guess is speculation, but has the potential to be the richest source of innovation. One key is to listen for phrases of "what if… or how about…"

Expected outcomes for the Task Force include:

- Some form of reduction goal or target for dissolved phosphorus
- Build further on recommendations for management actions
- An informed constituency that can serve to inform and educate other stakeholders and interested parties

**Conclusions of the Phase I P Task Force**

Kevin then distributed a portion of the P Task Force Phase I report. Copies of Section 8, Discussion and Section 9, Recommendations (See attached Documents). Kevin briefly reviewed the Relative Contributions section covering the Point Source information, the Lawn and Garden products, invasive species, and agriculture contributions as well as even though fertilizer inputs have decreased the dissolved portion moving of the land is increasing. He also reviewed some of the other related issues including increasing storm events, loss of stream corridors and wetlands, increasing DRP from other predominately non-ag watersheds also and how quickly reductions may impact change in the lake. He also reviewed the Recommendations section of the Task Force Report.

Kevin also provided the Recommendations of the Directors Ag Nutrient and Water Quality Working Group that was drawn together by the Directors of ODA, OEPA and ODNR to inform, educate and receive input from the agricultural commodity groups, Agricultural organizations and others about agricultural BMP's, research needed and incentives/regulatory alternatives. (see attached summary.)

Even though this group is looking mainly at agricultural contributions OEPA has created another group that is looking at the point source dischargers and additional reductions in what they might achieve.

This group's decisions will also assist the state in meeting the next regulatory requirement of USEPA for setting Nutrient Standards for Water Quality and Nutrient Reduction strategy to achieve those standards.

Need to develop uniform monitoring to understand the switch to dissolved P from particulate P

Need to evaluate precision nutrient management and other BMPs. However, there is no single agricultural practice that addresses nutrient movement or treatment. Multiple BMPs have to be considered, not only nutrient testing, timing placement and application, but treatment such as stream restoration, filter areas, wetlands, drainage control and treatment practices before discharges move to lakes and rivers.

Gail then facilitated a discussion about what is new since 2010 when the first Task Force report was released. The following table captures the input into this discussion.

**What Is New Since 2010 ?**

| Science/Research | Programmatic | Other |
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| **Millenium Network**-<br>Ruetter ; Report June 2011 (Heidelberg) P is higher is central basin sediments | ODNR Authority to designate distressed watersheds | UT legal analysis - Ken Kilbert et al. |
| **LaGrangian Study**-<br>(Bowling Green University) Strong current from Detroit River to the Maumee. Investigated % of P bioavailability in sediments has not changed much. But loading of dissolved P is up and total bioavailable P has increased. Hardly any correlation of total P in soils at the soil test level. But the dissolved P levels correlated to the soil test levels.<br><br>Storm front information used for model calibration. | NRCS 590 revised in January (nationally); emphasis on nutrient management plans (NMPs), cover crops, system of conservation practices; training of CCAs to write NMPs<br><br>Now revising Ohio 590; working draft by end of June 2012. Zone adjustment of fertilizer application based on GPS and get fertilizer in contact with the soil. Includes ALL nutrient sources. Precision and adaptive nutrient management. Promotes a systems BMP approach to address SRP. | Debra George, winter OSU Landscape Architecture studio project on GLSM - Analysis with Landscape Architect point of view-Summary slide show |

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| **Bloom Trigger Study-**<br>(The Ohio State University-<br>Dave Culver and Joe Conroy )<br>Bloom triggers in Maumee and Sandusky rivers-blooms forming earlier and more upstream in March and April-*Microcystis* | NRCS: P-Index workgroup decided research needed before change. Current index is centered around sediment.<br><br>National and Ohio 590 Standard relies heavily on P-risk index. | Evolving farming practices-cover crops increasing in the last 2 years, no till, moving to corn/soybean rotations. |
| **Satellite imagery** -<br>(NOAA)<br>Satellite calibration-Report will be out in July<br><br>NOAA project, modeling what is coming from Maumee to the lake. | **More money being spent:**<br><br>-NRCS more money to western basin LE, shift money into EQIP<br><br>-GLRI funds from USEPA to Ohio<br><br>-Pending State mid-budget Review-May be more money coming<br>- Proposal to fund outreach pending 4 Rs, nutrient mgmt. | Phosphate prices are high-looking for alternatives |
| **DNA Fingerprinting-**<br>(Bowling Green University)<br>(Bridgeman and Chaffin have preliminary results)<br>See if the blooms in the lake are an extension of blooms in the river or different group of algae. | **Outreach/Education:**<br><br>-Effort to raise awareness, policy debate.<br>- OSU Extension gives updates on nutrient management awareness.<br>- OABA education<br>- Industry support-small plot, research, outreach and education<br>- Turf management-professional and consumer re: phosphorus application (OPARR) | Continuing growth of size of farms |

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| **Limno Tech** –<br>In-lake model shows development and movement of blooms in western basin. (small part of the larger NOAA project) Now NSF giving funding. Lead by Don Scavia. Limno Tech also getting funding from Corps of Engineers. | All professional applicators. Lowes, Home Depot and Scotts by January 13 to remove P. Scotts has 60% market share. Already 90% of fertilizer currently is P-free. | When profitable-easier to do the right thing. There is more innovation. |
| **Libby Dayton research-**<br>Field edge research on different farming projects to see how farming has changed. Looks like incorporation into the soil is beneficial at reducing DRP runoff. | ODA will better track fertilizer use. It will be more accurate in who is applying it. | Concern about dichotomy with perhaps more sediment runoff associated with a change in BMPs to address SRP. |
| **Larry Brown research-**<br>Work on bioreactors-Some are in the ground last fall. Built with pre-treatment to remove P. Close to 100% for phosphorus and nitrate removal. | Should we shift to fall applications? Don't know. | Need to look closer at runoff data in last couple years. Why the Maumee river had a record but not the Sandusky river? |
| **Kevin King research**-<br>35-40% of dissolved P transmitted through tiles in a 1000 acre watershed (78% agriculture land use)<br><br>Dr. King has 100 manuscripts with tile drainage info-summarizing data. | Advent of vertical tillage is a game changer lately. | Evaluate new equipment needs to address SRP. |

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| **Grand Lake watershed study-** 1 ppm concentration of dissolved P coming out of tiles. (chicken litter had not been applied for the last 5 years) | Training of CCAs (12 at each one) to write nutrient management plans. Emphasis on nutrient management plans, conservation systems, cover crops | Director's working group recommendations. |
| **Gypsum research** – (Univ. of Pennsylvania) | | ODNR Program Delivery Task Force-Soil and Water and Conservation Districts: program delivery and redesign |
| **NRCS-new Technical Team to advise Director of NRCS**- (Steve Davis) science of conservation practices Purdue, Maryland; total P | | Social and market drivers |
| **USGS -** SPARROW Total P from small tribs to 14 digit HUC. Urban sources may be higher than expected (Michigan)<br><br>**CAP -** Report looked at total P, not dissolved. Related conservation practices to levels of total P. | | Work on digesters |

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| **Kleinman and Sharpley**-<br>Managing agricultural phosphorus for water quality protectionPrinciples for progress-subsurface P transport (published last summer)<br><br>**Lemke et al.-**<br>Evaluating Agricultural Best Management Practices in Tile Drained Subwatershed of the Mackinaw River, Illinois<br><br>**Tan and Zhang**-<br>surface Runioff and sub-surface drainage phosphorus losses under regular free discharge and controlled drainage with sub-irrigation systems in southern Ohio | | PWS-Identify corrosion substitutes without P. |
| **NUGIS Model**-<br>Nutrient Use GIS – January 2012; from International Plant Nutrition Institute | | Mike MCay and George Bulleran doing sampling for algae in winter. |
| **OSU, TNC, NRCS**-<br>biological endpoints in streams | | Intensification of tile installation (we don't know how much) |
| **NSF project**- (OSU, Case Western<br>Million dollar grant for surveying | | Kelly Island-symposium in September-looking for speakers |

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| **Univ. of Wisconsin**-Berman and Horgan (Univ. of Minnesota) | | Crop insurance and cover crops issues are being changed. Now insurance allows growing cover crops |
| Dr. Doug Kane is looking at cyanobacteria in ditches. | | Work on algae as a product |
| OEC: Ag economics work; home prices related to lake water quality | | Runoff data from last 2 to 3 years |
| Weather pattern issues (not specific project) | | Lake Erie Improvement Association formed |
| Producer attitudes toward change; NSF funded; OSU/Case | | |
| Satellite imagery work by NOAA | | |
| Soil lab analysis (author McMillan) | | |
| Soil Test results for Ohio (OLEC project) | | |
| Ohio Academy of Science March 2012 symposium; many presenters on topics; summary of current state of science | | |
| Wisconsin Discovery Farms; recent publications | | |

**<u>Concentration vs. Loading –Greg Koltun (USGS)</u>**

The Powerpoint presentation will be posted to the Ohio EPA website. Key points from the presentation include:

**Concentration**-Mass weight or volume of a constituent (doesn't tell how much material in the receiving stream)

**Discharge** – Rate of mass, weight or volume transport of some constituent

**Load**-The cumulative mass, weights or volume of a constituent delivered to some location

If the stream flow doubles, this doubles the loading.

**Flow-weighted mean concentration**-load for a given period divided by the product of the volume of stream flow for the period and a units conversion factor. USGS usually reports in flow -weighted mean concentrations

Is concentration or load more important?

-Concentration-important consideration for toxicity, nuisance concentrations

-Load-determines concentration in receiving water

We can calculate phosphorus loading from tributaries. But in the lake, we are concerned about concentrations which trigger the algae blooms.

Load from Detroit River is higher than the Maumee River, but concentration from the Detroit River is less because of the larger stream flow.

The goal is to reduce loading which will reduce concentration and minimize algae.

**Discussion**

Gail discussed the draft Syllabus and asked for topics to be added based upon the information generated in the previous discussion. This led into a broader discussion on the following topics.

Residence time for all of Lake Erie is 2.5 years. Western basin residence time is 20-50 days. So the lake should improve quickly when loads or concentrations reduced. How quickly will we get a response? Heidelberg is trying to figure this out. This year we had 14% of the SRP between March and May as we did last year during the same time.

Monitoring for loading is different from ambient monitoring. Monitoring has to be designed for the questions we want answered.

May not get high concentrations of dissolved P from re-suspension as compared from what is the coming from the watershed.

Don't expect to find SRP in lake because algae take it up.

Concentrations and loading were high last fall to Lake Erie. But there were no significant runoff events until well into the winter. Broadcast fertilizer had already been worked into soil.

2011 loads were the highest in Maumee River (record) but not Sandusky River
NOAA documented March and June for peak discharges (not April and June)

Loads and concentrations were lower in 2012.

Concern about "Packer Disease"- Farmers compacting soil so there is no structure left in soil for infiltration. Becoming more widespread. Some disagreement about whether there are a lot of compaction problems.

Overworked soils translate to higher sedimentation and high total P. Overworked soils also result in oxidizes organic matter that holds the soils together.

If a large bloom happens this year we can infer this is likely due to high runoff events yet to happen this spring and/or a resuspension of what is already in the system (in the lake sediments)

Reference was made to Dr. Bridgeman's findings that the phosphorus loading that occurs 4-8 weeks prior to the bloom is key to triggering algal blooms. NOAA modeling shows loading March-June is what drives the size of HABs.

Load last fall was a large loading but diatoms and greens would bloom in the winter because of cooler water temperature. So this summer, the bloom may not be as dense because earlier blooms (diatoms and green algae)utilized the SRP runoff. But if we get a lot of rain in the next few weeks, then 8 weeks from now there may be a bad bloom.

Because of the timing issue from delivery of load to expression of HABs, one might consider encouraging fall fertilizer application. If nutrients are applied in the fall when there are fewer storms, then P runoff might drive green and diatom blooms instead of HABs. If fertilizer is applied in the spring when there are more storms, this might result in HABs instead of green algae blooms.

Hypoxia impacts should also be considered. How will this affect management of blooms?

This year's prediction is that hypoxia may be the worst we've ever seen because of the blooms from last year are decaying, and there was a warmer spring with a deeper and earlier thermocline. Release of P will be in the Central basin since it stratifies. No so much in the western basin. However, Ohio Sea Grant is doing research in the western basin to study short-term thermoclines that may cause short periods of hypoxia and some P release.

Two blooms each year are possible with a spring bloom from P runoff, and then in the fall when hypoxia releases P from the sediments. Type of bloom may be dependent on water temperature. Last October timing of the bloom was close to the timing of the thermocline.

Winter application brings other problems. To maximize P-uptake, cover crops should be grown over the winter and the fertilizer should be injected.

**Syllabus- Items To Include**

As part of the wrap up of the discussion captured above, the following items were identified for possible future meeting topics:

Tile drainage contribution to SRP. Need to hear about output data, intensification. Tile and soil profile drainage .

Monitoring. Ask Kevin O'Donnell (member representing Great Lakes National Program Office) to report on what's being monitored by all federal agencies in Lake Erie. Also, Ohio EPA nearshore monitoring. Request to review MODIS satellite imagery to see Detroit River flow (time lapse).

Modeling of Lake Erie. NSF projects –Joe DePinto (modeler) Stu, Jay Martin, TNC; land-to-lake modeling. -Agricultural economist, social science

Detroit. Presentation by someone from Detroit's WTP-Bloom last year started by Detroit instead of in Maumee Bay where it usually starts. Did temperature or Detroit influence last year's bloom?
Targets. How have existing targets been expressed? – LAMP, Great lake water quality agreement, nutrient water quality standards, reduce by 2/3. Determine relevance. Who is monitoring for what? Do we have the mechanisms in place to track this? Are we targeting loading or concentration reduction? Then our quantity of reduction will require additional discussion.

Get better idea of what's going on on-the-ground with ag practices. NRCS findings of 2006-2010 western basin tillage surveys. Design a survey for farmers. What work is being done to evaluate ag BMPs, 4Rs, soil health? Can BMPs be ranked on their ability to address change in loading or concentration? (Libby Dayton is working on this). Bundling of practices to increase soil health. What is soil health? Think about ditch design, not just upland practices. Think of it in a watershed context; cascading practices. Have GMOs changed the biology since the 1990s? Go over the SRP data since2007.

Need to identify what 4-Rs mean for Ohio. Need a better definition for these practices.

Need to consider climate change and impact on relative nutrient contributions, invasive species, internal cycling, multiple loadings, non-agricultural loading is increasing because of storm frequency