Phosphorus Task Force-Phase II Meeting
August 1, 2012 (10:00 AM -3:00 PM)
Vern Riffe Tower 1960

Attendance:

Larry Antosch, Doug Busdeker, Dan Button, Steve Davis, Libby Dayton, Kevin Elder, Karl Gebhardt, Gail Hesse, Todd Hesterman, Amy Klei, Greg LaBarge, Joe Logan, Tina Lust, Terry McClure, Kevin O'Donnell, Jeff Reutter, Mark Scarpitti, Julie Weatherington-Rice, Chris Wible, Rick Wilson, Ron Wyss.

Welcome and Introductions

Recap Of May Meeting

Since not everyone was able to attend the first Task Force meeting, Hesse summarized what was covered. She reminded the team that this is a collective learning experience and that the team will work through a deliberative process where new insights will help us develop recommendations that will minimize HABs in Lake Erie. She asked the group to be mindful of statements as fact, opinion, or guess and the pros and cons of each. We will maintain momentum so that we can make recommendations by spring, 2013. The meeting notes for the May meeting are available at http://epa.ohio.gov/portals/35/lakeerie/ptaskforce2/Minutes_05312012.pdf. Finally, she reminded the group to make sure to RSVP to the meeting announcements so that lunch orders are accurate.

Overview of 2011-2012 Algae Season

Hesse introduced the topic about the current algae season as a follow up to the discussion the Task Force had at the May meeting. This is an aberrant year due to the drought and several observations and suppositions can be made about expectations for a 2012 algal bloom. She opened up the discussion and the following captures comments made by many Task Force members.

According to Heidelberg and NOAA satellite data, the load of phosphorus in spring, 2011, was the highest ever with a record rainfall. There were also record phosphorus loads in fall, 2011, attributed to narrow windows of fertilizer application followed by large rain events.

Reutter discussed the press conference on July 5 at Stone Lab where NOAA announced they can predict the size of a bloom in the Lake Erie western basin based on loading in March-June. NOAA predicts that HABs on Lake Erie will be 10% the size of the bloom last year because there was less rainfall in the spring to deliver dissolved phosphorus to the western basin in time for algae uptake. Both Heidelberg and the University of Toledo indicated phosphorus loading this spring was less than 10% from last year. In 2003, there were heavy early June rains that triggered a bad bloom in Lake Erie. This year, the bloom size may be similar to the bloom size in 2007 when we had a drier year. There was heavy rain in July of 2007, but there were no major blooms in Lake Erie. This is likely due to well established vegetation in July minimizing erosion and nutrient runoff.

Due to lower levels of spring loading, any blooms that do appear in 2012 will likely be driven in part by re-suspension of sediments in the western basin, which would make phosphorus available to algae in the water column.

The retention time is 2.6-2.7 years for Lake Erie as a whole, and there is typically a 20-50 day retention time in the western basin. Due to a lack of spring rains this year, the current retention time is more likely over 50 days for the western basin, Water moves to the central basin and stays there longer since it is deeper. University of Buffalo and Case Western Reserve University researchers have data that shows phosphorus levels are higher in the central basin, even though loading occurs in the western basin. The central basin becomes a phosphorus sink as sediments settle and deposit. Not all of the sediment that deposits in the central basin releases phosphorus, simply because it gets buried over time. Other sediments move eastward out of the lake. We do not know what the thresholds are for net removal of phosphorus from either sediment burial or eastward movement. There is less re-suspension in the deeper central basin. A key question is how deep does it have to be before it no longer is subject to re-suspension and release of phosphorus?

In 2011, massive loads of phosphorus and algae moved to the central basin and sank. There likely was a massive demand for oxygen and more phosphorus was released from the sediment. In July, 2012, there was a bloom of *Anabaena* in the central basin (Lake County) that was approximately 50 mi long/20 mi wide. One potential explanation for this bloom is that phosphorus was released from the sediment that had been deposited there from the previous year's export from the western basin.

In addition, there were strong south winds that may have contributed to upwelling that lowered the thermocline on the Canadian side of the lake. This happens when surface current moves with the wind and the bottom current moves against the wind. This causes a lowering thermocline and an upwelling that brings phosphorus to the surface. Temperature has little to do with the location of the thermocline itself. Wind conditions during the spring are a key factor in determining the thermocline depth. Windy conditions force the thermocline deeper in the water column, which results in less hypolimnetic water below it. Anoxia occurs sooner with a lower thermocline. If the thermocline is higher, there is more hypolimnetic water below it and anoxia will occur later.

Anabaena is a nitrogen fixing organism which means nitrogen may have been limited in July, 2012. If nitrogen was not limited, then we would expect to see *Microcystis* instead of *Anabaena*.

Currently, we do not have enough data to confirm whether phosphorus upwelling and internal loading triggered the July 2012 Central Basin bloom.

There is less re-suspension in the deeper central basin. How deep does it have to be before it no longer is subject to re-suspension and release of phosphorus? What is the threshold for net removal?

Task Force members speculated that if we can get the right reduction in phosphorus, the response in the western basin should be immediate. Finding out what happens with 90% reduction will help us better understand triggers for the algal blooms.

Existing Targets and Goals for Lake Erie

Hesse introduced this section of the agenda as more preparation/education for the Task Force as we will develop a target or goal for dissolved phosphorus as an outcome of the Task Force. In May, we had a presentation on the distinctions between loadings and concentrations. The next 3 presentations provide an overview of existing goals in current state and binational programs. The purpose is not to look to any of these goals for the Task Force to adopt, but rather to educate ourselves on what currently exists and to assess the benefits and limitations of the different approaches. All of the presentations are available on the Task Force web page: http://epa.ohio.gov/dsw/lakeerie/ptaskforce/PTaskPhase2.aspx

Great Lakes Water Quality Agreement – Kevin O'Donnell, USEPA GLNPO

The Great Lakes Water Quality Agreement (GLWQA) is an Agreement between the federal governments of the U.S. and Canada under the authority of the Boundary Waters Treaty. The Agreement, first signed in 1972 and renewed in 1978, expresses the commitment of each country to restore and maintain the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem and includes a number of objectives and guidelines to achieve these goals. The 1987 amendments to the GLWQA included the annex that created the Remedial Action Plan and Lakewide Management Plan programs. The GLWQA is under review by the U.S. and Canadian governments. While no details have been released we are expecting that there will be a new nutrient annex.

In 1972, general ecosystem objectives were developed. A workgroup was established to develop nutrient objectives to protect beneficial uses. In-lake concentration data were developed. For Total P:

>20 micrograms/liter in spring = eutrophic
10-20 micrograms/liter = mesotrophic
<10 micrograms/liter = oligotrophic

Total P targets to prevent anoxia and harmful algae blooms were developed:

Western Basin: 15 micrograms/liter for reduction of present levels of algal growth
Central Basin: 10 micrograms/liter for year round aerobic conditions in the bottom waters
Eastern Basin: 10 micrograms/liter for upper limit of oligotrophy

During the first five-year review of the agreement, the 11,000 metric ton/year target to maintain year-round aerobic conditions in the central basin was established (reaffirming the 1972 GLWQA objective). (The target makes no mention of yearly variability.)

We first reached the 11,000-metric-ton goal in 1982. Since then, there is variability of meeting that target depending on rainfall. In high water years we exceed the target.

Reutter commented that because of shape of the Lake Erie basin, 11,000 metric tons may not be a realistic goal.

Now we need a target to minimize HABs, as these are targets for anoxia.

There is a 5 year review of progress on objectives. Target loads to meet WQ objectives are based on new data from the Corps and others.

U.S. EPA's Lake Guardian research vessel is due in Lake Erie in 2014. This Task Force may want to include recommendations about specific data needs for the Guardian.

Lake Erie LaMP: Ecological Endpoints – Amy Jo Klei, Ohio EPA

In 2007, the Lake Erie LaMP was charged with developing a Bi-National Nutrient Management Strategy. The strategy is not public yet but it should be released shortly after the GLWQA is finalized. [Post meeting note: The document *Status of Nutrients in the Lake Erie Basin* (http://www.epa.gov/lakeerie/erie_nutrient_2010.pdf) provides the basis for the strategy.]

Total P concentrations are based on best available science regarding the requirement to restore and protect the ecological conditions identified in the LaMP's vision, goals, and objectives. The Strategy addresses Total P concentrations that should reduce problem algal blooms, reduce anoxia in the western basin, and have positive impacts on the central basin. This table applies to spring concentrations:

Habitat Type	Desired Ecological Endpoint* (ug/L)
Offshore - Western Basin	15
Offshore - Central Basin	10
Offshore - Eastern Basin	10
Nearshore	20
Coastal Wetland	One recording of < 30 ug/L / year
Tributaries	32

These offshore targets are based on USEPA's GLWQA numbers. They are consistent with the 11,000 metric tons phosphorus loading.

One member commented that these concentrations are very high; we'd have blooms all the time.

Dayton asked if there is a standardized monitoring program and SOP for taking samples and about the consistency of the data collection procedures. Reutter described U.S. EPA's Great Lakes water quality monitoring operation, which uses their vessel the *Lake Guardian*, essentially a large, sophisticated floating laboratory that moves among the lakes on a regular schedule. Klei and Wilson explained that Ohio EPA sampling protocols are detailed in documents on the Ohio EPA web page (http://epa.ohio.gov/dsw/bioassess/ohstrat.aspx).

TMDLs in Lake Erie Basin – Trinka Mount, Ohio EPA

Ohio has completed phosphorus TMDLs for a majority of the Ohio tributaries to Lake Erie. Total Maximum Daily Load (TMDL) projects follow a problem-solving process. TMDLs are the "safety net" of CWA: if state permitting does not result in meeting the state Water Quality Standards (WQS), then a TMDL identifies corrective actions to take. A TMDL identifies future actions needed in individual watersheds to bring impaired waters into attainment.

TMDLs are prepared for waters determined to be impaired, as identified during integrated watershed surveys (chemistry, biology, habitat, tissue). Impairment depends primarily on meeting biological criteria; chemistry data are used mostly to indicate causes and sources of impairment. Ohio EPA's chemistry sampling has traditionally been for total phosphorus.

Ohio does not have phosphorus water quality standards for the aquatic life beneficial use, so instream targets are used in TMDLs. The TMDL targets are based on instream concentrations derived from Ohio EPA data that associates phosphorus levels with healthy aquatic communities at ecoregion reference sites, as published in the report, "Association Between Nutrients, Habitat, and the Aquatic Biota in Ohio Rivers and Streams" (http://www.epa.ohio.gov/portals/35/guidance/assoc_load.pdf).
TMDL targets in the tributaries are to meet the near-field effects in the stream (not the far-field effects in the lake). TMDLs for near-field effect are much higher than what the previous presenters showed for the lake. It is also important to consider not only the target, but also how the target is used in loading calculations.

Weatherington-Rice suggested that stream data collection should include chlorophyll *a* as a HAB predictor.

There are a couple ways to express a goal:

1) Look at loads/concentration to calculate target (numeric), or
2) Absence of HABs (or other condition) in western basin (or Lake Erie) (narrative).

The Role of Soil Health

Overview of What Is Soil Health/Soil Quality – Matt Deaton, ODNR

Deaton presented an overview of NW Ohio soils, including soil health, soil quality, and how management styles affect soil health.

Northwest Ohio has deep, somewhat poorly to very poorly drained soils. Soils contain lacustrine deposits and dense till. Common soils are Hoytville, Nappanee, Paulding and Toledo soils (all have similar characteristics).

Glacial ice retreated, blocking drainage patterns and resulting in a series of glacial lakes where heavy particles fell out first – sands first, then silts, then clays last. Clay surface soils dominate in NW Ohio because clay was last to deposit after the glacier retreated. Hoytville was influenced by wave action. Generally, there is 35-60% clay at the surface so there is decreased permeability. There are 0% slopes with depressional areas and seasonal water near the surface. Even though the land is flat, there is great runoff potential because of low permeability.

Most of soil in northwest Ohio is Hoytville (1/4 of drainage is one soil type). About 1.4 million acres of northwest Ohio are made up by four soil types: Hoytville, Paulding, Toledo, and Latty. All the common soils in this region are Group D soils with high runoff potential when thoroughly wet.

Soil quality and health is "the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation." The two primary aspects of soil quality involve properties that can't be changed (inherent) versus those that can (dynamic):

1) Inherent soil quality: Results from natural and soil forming processes

2) Dynamic soil quality: Changes due to human use and management (organic matter, bulk density, infiltration)

a) Organic matter is the single most core indicator of soil quality; usually, a soil with more organic content is higher quality with a better ability to exchange ions.

b) Bulk Density is the weight of soil for a given volume. Bulk density is used to measure level of compaction; the more compact the soil, the less ability to move water through the soil. Very compact soils have a "platy" or massive structure.

c) Infiltration is how water moves onto the soil profile from the surface. Good infiltration is better and is most important for soil health.

Soil quality is important because healthy soils enhance cropland and bring economic benefits. Damaged soils have lower productivity and result in impairments of water and air quality. Soil quality is water quality – soil is a natural water filter.

<u>NW Ohio soil management</u>

NW Ohio soil is very fragile; it should be worked when dry. One bad management decision can ruin soil quality. Soils should be managed for how they react to the different practices since they react differently. NW Ohio soil has good organic matter but bad structure. No till takes seven years to reap the benefits, but it takes just one errant pass to ruin the benefits and we have to start all over again. In no till soils, we see massive soil structure at the surface. Tilling causes sedimentation problems.

NW Ohio soils are prone to shrink and swell, forming cracks. There is no water filtering when soils are compacted. A large percentage of heavy soils in NW Ohio have compaction problems. When surface structure is compacted, then there is no matrix flow, but secondary fracture flow to the tile.

So, neither no till nor tilling is the answer; we need a toolbox of options to succeed. Cover crops and RTK (satellite navigation) to control traffic to stay off most of the field minimizes compaction are good possibilities. Strip tillage is a good management tool since it incorporates nutrients right into the seed bed.

O'Donnell says NRCS and U.S. EPA working together on outreach to encourage best practices through nutrient management plans. Gebhardt mentioned that they are working on a truncated form for grain farmers since many of the manure sections do not apply; would reduce the burden of preparing the plans.

McClure pointed out that tile drainage can help soil structure.

Hesterman explained that there is no "operator manual" for cover crops; hard to do cover crops after anything but wheat. Farmers don't see immediate return on cover crops.

Management Practices: Overview of What Has Changed and What Is New

Ohio Revisions to the 590 Standards – Mark Scarpitti, NRCS

The 590 standard revisions are available as draft now and are expected to be final in October 2012 and posted in the eFOGT. Major changes in the new 590 standard include:

- Combines 590 and 633 (waste utilization) into one state standard.
- Addresses the 4 Rs ("Right timing," "Right placement," "Right amount," and "Right sources" of nutrients like phosphorus and nitrogen.). Each "R" is subdivided by all nutrients, then manure only and chemical fertilizer.
- Increases emphasis on the risk indices (nitrogen and phosphorus index). Nutrient application rates apply to ALL nutrients, not just fertilizers. Excess nutrient application will trigger a risk assessment. Excess nutrients are to be considered a temporary situation. Will build on the Tri-State Fertility Guide (1995, http://www.extension.purdue.edu/extmedia/AY/AY-9-32.pdf).
- Lists the "tools" in the toolbox (see p. 11 of new standard).

The current language says to apply nutrients as close to the time of uptake as possible. Perhaps this language should change for NW Ohio, to apply nutrients in the fall instead of the spring.

Reutter says he is frequently asked if farmers are taking the nutrient issue seriously. He answers that he thinks so but it would help if there were some sort of metrics or tracking, e.g., monitoring farmer's nutrient application rates, to show progress. McClure assured that farmers are taking it seriously; the first P task force report was a wakeup call.

The group will need to consider how to best to show progress through a series of indicators from administrative/programmatic actions through measured environmental response. Nutrient management plans are only the beginning; implementation will be proof that actions are working.

Healthy Lake Erie Fund – Karl Gebhardt, ODNR

The Healthy Lake Erie Fund was established with $3 million in an amendment to the Mid-Biennium Review bill. This money is for the next state fiscal year (SFY 13). There is no long-term continuing funding. This funding will help implement the initiatives outlined in the Directors' Agricultural Nutrients and Water Quality Working Group Report.

The goal is to get some BMPs for total nutrient management to address the 4 Rs on the ground and include education and research. The focus will be on a five-county area: Wood, Putnam, Defiance, Henry, and Paulding counties. Featured BMPs will include controlled drainage devices (up to 300) impacting 33, 500 acres. An additional 15,000 acres may be leveraged through a GLRI grant. Other BMPs considered are VRT and cover crops. Soil testing will be critical.

These efforts will be initiated through SWCD and the NRCS. There will be field days and showcase farms. It is anticipated there will be a cost share program with federal and, local participation.

Implementation will begin as soon as possible in the fall. About $600,000 will be devoted to monitoring.

Next Steps

Hesse indicated that next steps for the Task Force will be to look at recent dissolved phosphorus loading data (the first Phosphorus Task Force looked at loading data up to 2007) for additional context as we begin to consider a reduction target or goal. We will frame different approaches to a target or goal at a future meeting. We will also begin to look into drainage management as requested by Director Nally. We will look to bring information to the Task Force on recent research and developing technologies.

The Task Force agreed to the following meeting schedule:

September 5, 2012	December 5, 2012	March 6, 2013
October 3, 2012	January 9, 2013	April 3, 2013
November 7, 2012	February 6, 2013	May 1, 2013