

**Ohio Lake Erie Phosphorus Task Force Minutes**  
**October 1, 2008**  
**ODNR, Building H-2, Columbus, OH**

**Attendance:** Roger Knight, Julie Weatherington-Rice, Dave Baker, Todd Hesterman, Libby Dayton, Jack Kramer, Robert Mullen, Norm Fausey, Rick Wilson, Eugene Braig, Dan Button, Pete Richards, Seth Hothem, Chris Riddle, John Kessler, Dave Culver, Gail Hesse, Julie Letterhos, Kevin Elder, Steve Davis, Mark Scarpitti, Paul Bertram, Remegio Confessor, Joe DePinto

Chair Gail Hesse called the meeting to order at 10am. She provided an update on the status of discussion of priority projects to be funded under the Lake Erie Protection Fund. Under new fund guidelines, up to \$250,000 will be spent in support of a priority project area selected by the Ohio Lake Erie Commission. The Commission has agreed to focus on priorities recommended by the Phosphorus Task Force. These could include a soil test survey of labs and sampling/analytical methods, and several research objectives to better characterize/implement monitoring that will better determine the triggers of the algal blooms in western Lake Erie, particularly the potential connection to increasing soluble reactive phosphorus loads. An RFP will be issued shortly with projects to begin in March 2009.

Chris Riddle stated the Lake Erie Commission had formally adopted the revised Lake Erie Protection and Restoration Plan. Also, the Balanced Growth Best Management Practices document had just been completed and will be posted on the OLEO web page.

Gail stated a briefing with OEPA Director Chris Korleski and NRCS State Conservationist Terry Cosby is scheduled for November 3 concerning the progress of the Task Force to date and potential further collaboration.

Julie Weatherington-Rice reported that she and Sandy Bihn (Western Lake Erie WaterKeeper) had met with USGS to discuss who has been doing what concerning identifying and monitoring the algal species in Maumee Bay, and had contacted Representative Marcy Kaptur about potentially securing some federal funding for a closer investigation of environmental conditions in Maumee Bay. It was noted that this was the second year of no mayfly hatch in Maumee Bay. Roger Knight had circulated aerial photos of September bloom in Maumee Bay. Dave Culver confirmed it was almost all *Microcystis* and that higher concentrations of nitrogen may be causing this species of blue-green to dominate over other blue-greens.

Dave Baker provided an overview of total phosphorus point and nonpoint source loads to Lake Erie for 2004, based on information collected by Dave Dolan (see handouts). Ohio contributes about 1/3 of the point source load and 1/2 of the NPS load. Ohio drains about 40% of the land area of the watershed. This translates

into a unit area load of about 1.14 kg/ha. However, 2004 was a lower than average flow year for the Maumee and Sandusky for the period from 2000 to 2007, so this number is low. It is likely that loading from 2007 may be the highest loading we have ever seen. Using a low frequency monitoring program, it is much easier to drastically underestimate the kg/ha load. For example, using only Ohio EPA monthly monitoring data, the Portage River supplied only 0.31 kg/ha while past more intensive monitoring showed it to have a load similar to the Sandusky watershed.

The IJC considers Lake St. Clair and its tributaries to be part of the Lake Erie system. Looking at the Thames River in southwest Ontario, it has a much lower kg/ha load than the Maumee, even though both are highly agricultural. This could be related to conservation tillage practices, the amount of tile drainage or the concept of “confused drainage.” Drainage in northern watersheds is not as developed as the southern watersheds due to the longer time it was covered by glaciers, so water may not drain off it as fast. Note that in Figure 3 of Dave’s handouts that the atmospheric loading is that which falls directly on the lake itself.

Dan Button provided an evaluation of land use/land cover characteristics in the Ohio drainage to Lake Erie (see handout.) Three data sources were examined including: 1976 aerial photography based GIRAS; 1992 National Land Cover Data (NLCD) obtained from satellite Landsat 5 TM program; and 2001 NLCD Landsat 7 TM program. He highlighted the reasons why it was difficult to compare the data and use them to measure any quantifiable changes in land use on a tributary watershed basis. However, a simple evaluation can be done using the Anderson Level 1 classification on a larger area such as the entire Ohio Lake Erie drainage area. Data normalized to the area of the basin suggest an overall decrease in agricultural land and an increase in urban land.

Dan also collected available data for potential measurement of atmospheric P loading. The major programs for monitoring air deposition do not measure for phosphorus. The Lake Michigan mass balance study done in 1995 concluded the source of P in atmospheric deposition was dust from the land, and did not consider it to be a major source of TP loading. The question was asked as to whether P distribution in air deposition may be similar to N distribution. If so, overall, loads would appear to be improving.

Mark Scarpitti brought in a large plant called an oil seed radish that had a root/radish about a foot long. He said it does a good job of utilizing nutrients and loosening soil compaction. No nutrient application is needed to assist its growth. It can hold over the winter and break down in the spring to redistribute nutrients to the system. The large leaves also protect surface soil against erosion from raindrops. It is a cover crop that is not harvested. Another plant is the winter pea which fixes nitrogen from the atmosphere into the soil.

## **Final Report TOC Discussion**

A draft Table of Contents for the P Task Force Final Report was distributed for discussion (see handout). Most of the discussion focused on the Sources Chapter. A question was raised as to whether groundwater would influence the Lake Erie system more than surface water runoff. Groundwater inputs would vary around the lake based on bedrock type. A USGS report documents the largest contribution of groundwater to Lake Erie occurs between Monroe, Michigan and Toledo, Ohio. It would of interest to look at the chemistry of that groundwater.

In response to a question at the previous meeting that TP export to Lake Ontario was now higher than the input to Lake Erie, Julie Letterhos contacted Murray Charlton (now retired from Environment Canada). Murray clarified this as an observation that export from the lake had become more erratic with higher than usual levels of TP after the invasion of zebra mussels. This may have been the result of the nearshore shunt phenomenon in the eastern basin whereby the Dreissenids build up stores of material in the nearshore that are mobilized by storms and flushed into Lake Ontario. EC does monitor the Niagara River load quite well and this data might provide more long term conclusions as to whether the net retention of TP in Lake Erie is changing.

Rick Wilson presented a pie chart of the relative contributions of point source loadings from sewage treatment plant (large and small municipal plants, package plants and HSTS) and industrial discharges. Almost 50 percent of the total 1248 MTA was from WWTPs discharging more than 15 MGD. About 75 percent was from plants discharging > 1 MGD. Industrial load was about 44 MTA. See Handouts.

There was some discussion concerning the assumption that 50 percent of HSTS generated effluent reached Lake Erie. It was suggested that a better estimate may be derived from information collected by TMACOG for systems in the Maumee River watershed. It was also suggested that failing systems may be prone to contribute large loads when there is flooding.

Graphs and charts will be used as much as possible to portray relative contributions of TP and SRP.

How should we address the CSO/bypass contributions? Input would be sought from Seth Hothem. He explained that the first flush would provide the largest load. WWTPs try to capture and treat the first flush. In a previous presentation on CSOs, Seth had estimated that CSO TP load is about one percent of the total TP load to the lake.

Dave Culver said that algae like sewage delivered P, so we should keep the HSTS percentage discussed earlier fairly conservative (no less than 25 percent).

He wondered if algal blooms are born in the rivers and then become huge as they move out into the lake with high P concentrations, low flows and higher temperatures.

For the report, we need to focus on data that will indicate an area where a management action can be taken to control the source and decrease the load of SRP.

### **Internal P Loading**

Invited guest Joe DePinto, of Limnotech in Ann Arbor, provided a detailed presentation on the history of efforts to control TP input into Lake Erie, the various models that had been developed to determine the reductions needed, ongoing work to develop new models, and some insight into the amount of internal P load that was occurring. His focus was on how Lake Erie processes the P loading it receives and how the Dreissenid invasion changed things. A PDF of his presentation is included on the web page for the October 1 meeting. Highlights included:

- History of the GLWQA/Annex 3 deliberations on phosphorus
- Models developed to estimate load and needed reductions
- TP and Chl a targets were developed for Lake Erie basins under the GLWQA process
- Models were successful in predicting actual results up to 1988
- Nutrients are recycled many times once they enter the system
- Phosphorus recycles from algae decomposing in the water column
- Variations in lake loads are related to variations in tributary loads
- R-NaOH extractable P is a good surrogate of the ultimately available particulate phosphorus in tributary waters
- In the models, P released from tributary solids (particulates) must be treated differently than P released from in lake solids (algae)
- Chl a levels were high even when P loading was low, indicating that plankton had to be using P recycled in the lake
- Per the models, halving the SRP load provides a much larger response than halving the total external ultimately available P
- When the DO in overlying water reaches 2 mg/l, the flux of P from sediment back into the water column increases considerably
- The ongoing Ecofore project is looking more extensively at sediment flux of P
- Internal sediment flux in central basin was about 3000 MTA in 1985, decreased to 500 MTA in 1995 and is now back up to 2000 MTA
- This internal load happens about the same time that the algae are running out of P
- Old models can't predict current conditions because Dreissenids were not built into them, which is why new models are being developed now
- Higher P concentrations and Dreissenid densities favor Microcystis blooms

- Dreissenids pull P out of the water column in spring (love to eat diatoms). Dreissenid poop and decomposing algae settle on the sediment. Increased water clarity promotes light penetration and benthic primary productivity. Adding Dreissenids to the system shifts algal primary productivity from the pelagic to the benthic zone.
- Cladophora responds to high SRP and light
- In summer, there is lower P runoff from the land. Dreissenids continue to filter and outcompete zooplankton, trap P in the nearshore where they have cleared the water due to their filtering and support the growth of Cladophora
- In late summer, there is very little P load from runoff. High late summer temperatures cause Cladophora to die off and provide optimum conditions for growth of blue-greens. Warm temperatures stimulate the mineralization of P in feces and pseudofeces to return to the water column and fuel more algal growth. Blue-greens also increase due to selective feeding by Dreissenids (they don't like them).
- Ongoing projects that might provide more insight include: the Ecofore model looking at LE hypoxia; OSU Bio-complexity project looking at human-lake interactions and complex hydrodynamics with focus on Sandusky Bay and sub-basin; Saginaw Bay multi-stressor adaptive management model; U of Waterloo LE ecosystem modeling (nearshore shunt); Lake Ontario ecosystem study; USEPA developing better ways to monitor the nearshore.
- European systems are much more eutrophic than ours. Chl a of 5 to 8 mg is clear for them (Lake Erie target is 2.6mg).
- Whatever actions are taken to reduce P loadings won't be evident for years as there is resuspension release as well as biochemical release
- The western basin never reached target levels because of resuspension
- Will potentially be able to quantify internal load once the Ecofore model is complete, but that won't be for several years
- The supply of P and primary productivity is not a linear relationship like PCB input to fish tissue is
- Won't know what the load should be or how to achieve it until the model is done
- The internal load to Lake Erie is 20 to 25 percent of the external load. It may not be appropriate to consider it a load since it is already in the system. Perhaps just consider it the amount of P available above and beyond what comes in externally.
- Where the load comes in is just as important as how much

We may want to focus on decreasing loading to specific watersheds, such as the Sandusky and Maumee, because these are the areas where *Microcystis* is an issue.

It was suggested that we add a section to the Final Task Force Report to describe past modeling, what it showed, what happened after zebra mussels

invaded and changed everything and what may be needed (research, adaptive management, etc.) to improve the situation.

Joe DePinto would provide a copy of the report that was done for the latest Annex 3 review for the GLWQA. It includes a summary of all the modeling efforts. (See handouts for October 1)

The next meeting was scheduled for November 4.