

**Ohio Lake Erie Phosphorus Task Force Minutes**  
**July 30, 2008**  
**ODNR, Building H-2, Columbus, OH**

**Attendance:** *Rick Wilson, Dan Button, Larry Antosch, Kevin Elder, Gerry Matisoff, Dave Baker, Chris Riddle, Greg Nageotte, Jeff Reutter, Mark Scarpitti (NRCS), Gail Hesse, Jack Kramer, Seth Hothem, Todd Hesterman, Pete Richards, Libby Dayton, Julie Letterhos, Eric Partee, Jan Ciborowski (University of Windsor)*

**Objective:** *Discuss status of research on Lake Erie related to potential estimates or impacts of internal phosphorus loads. Discuss potential to quantify sources of phosphorus, particularly as related to soluble phosphorus. Discuss preparation of recommendations report.*

Gail Hesse welcomed Mark Scarpitti of NRCS to the meeting. He developed the Phosphorus Index for NRCS and is sitting in for Steve Davis today. Gail then welcomed Dr. Jan Ciborowski from the University of Windsor. Dr. Ciborowski has been doing research on Lake Erie and is a co-chair/founder of the Lake Erie Millennium Network which was established in 1999 to identify and coordinate research needs on Lake Erie. LEMN workshops and conferences over the last several years have focused on nutrient loadings from the land the results of research and monitoring in the Lake Erie nearshore area. Dr. Ciborowski is also working to organize a workshop later in the fall to look in more detail at efforts on the land to manage nutrient runoff.

Jeff Reutter gave an overview/summary of current research projects related to nutrients and Lake Erie. Similar to the LEMN, a Great Lakes wide network has been established to look at similar research needs across the Great Lakes. Several workshops have been held in the last several months looking at the nearshore in the Great Lakes as well as issues just focused on Lake Erie. Partnering with the IJC, a workshop was held in Toledo early spring. Main topics were loadings from the landscape and coastal margin effects including: multivariate indicators of nutrients from the land; indicator risk of N in soils; TP loadings to the Great Lakes; land-based signatures detectable in water; nearshore shunt and P demand; Microcystis and other HABs; the role of dissolved organic carbon in the Great Lakes ecosystem; CAFO effects; phosphorus indicators for Canada; the potential contribution of phosphonates as a phosphorus source; etc. Attendees listed the top priority issues in the Great Lakes as: reduction of P loading and sediment from agricultural fields; elimination of HABs and nuisance algae; beach closings; CSO; elimination of Aquatic invasive species; etc.

For Lake Erie Jeff stated that Ohio Sea Grant is currently funding projects to look at the picoplankton in the lake; turbidity plumes, nearshore mapping, winter algal blooms/productivity, and potential loads of P as phosphonates. Productivity in

the winter seems to be important to the set up of hypoxia/anoxia in the central basin. Although anoxia is still an important issue, the growing occurrence of harmful algal blooms (HABs) may be eclipsing anoxia.

The April LEMN conference in Windsor focused on developing a framework to evaluate the consequences of land management strategies, and identification of research needs for Lake Erie. The presentations are on the Lake Erie Millennium web site, but summaries of breakout sessions/discussion have not been posted yet. Breakout sessions addressed timing and intensity of nutrient delivery, nearshore trophic state, open lake trophic state. Research needs include developing a 3 dimensional model for the nearshore zone, further explore the Cladophora-zebra mussel-sediment connection, how much phosphorus becomes mineralized before Cladophora decays, adding measurements for carbon to the sampling regime, how much does P need to be reduced to decrease HABs, understand the factors influencing algal growth (temp., nutrients, nearshore currents, etc.).

## **Discussion**

What will happen with anoxia if lake levels go down? Will hypolimnion become smaller and more susceptible to anoxia? Will P concentrations go up as volume of water goes down?

About 50% of the phosphorus deposited at the bottom of the lake will be regenerated during anoxia. It will all pulse out at once. Iron will also regenerate from the bottom sediments. Iron is often a limiting nutrient in marine environments, but is not likely the case for Lake Erie.

The Lake Erie system is phosphorus driven. If we are pretty sure that phosphorus is the problem and most of the phosphorus is coming from the land, should we just focus on reducing the loads from the landscape? While it is agreed that P is coming from the land, much of the loading is storm event related and no one is working on this link.

2009 is scheduled to be a cooperative intensive monitoring year for Lake Erie. U.S. EPA and Environment Canada are leading this effort. The Lake Erie LaMP has submitted a list of monitoring needs that include many of the P Task Force issues (timing of delivery from land related to application of fertilizer, methods for measuring SRP, nearshore/offshore linkages, where are HABs and Cladophora blooms and what is causing them, better tributary monitoring particularly after storm events). Ohio EPA has had some preliminary discussions with U.S. EPA to conduct some of the nearshore monitoring since the U.S. EPA boat cannot get that close to shore. We are still working on developing a better nearshore monitoring program for Ohio's Lake Erie nearshore.

The load of total phosphorus from Lake Erie to Lake Ontario has been increasing. For the last 10 years there has been more TP leaving the lake than entering. Julie and Jan will try to get this data from Murray Charleton or someone else at Environment Canada. Murray is retired but currently under contract with EC to look at the current phosphorus status in Lake Erie.

Winter algal blooms appear to be more prevalent than they used to be. Bullerjahn and McKay at BGSU have been looking at this. Although not much winter sampling has been done, interviews with ship captains state they are seeing more "brown ice" than they used to. Brown ice is usually algae, particularly diatoms.

We are also seeing warmer water sooner. There are 22 fewer ice days on average and water temperature is up  $0.04^{\circ}\text{C}/\text{year}$ .

Suggestions to be added to the Research Agenda include:

- Obtain Murray Charleton's P export data
- Need a better understanding of internal loadings from the anoxic area
- Tributary loads seem to be connected to the HABs
- The source of P feeding Cladophora seems to fall somewhere in between
- Perhaps coordinate monitoring so samples can be taken at river mouths during storm events to account for loading in storm plumes, connect to satellite photos that have been capturing storm plumes, use conductivity to identify location of water masses then do SRP sampling in areas that appear to be river loadings (particularly for the Maumee and Sandusky)
- Build a sampling plan that uses storm events, real time wind and wave information, satellite imagery, time and space scale, first tier sampling. Coordinate with USGS, OSU-Sea Grant, Heidelberg, ODNR-Fisheries, NOAA

Dan Button said USGS is working with NEORSD to develop a hydrodynamic model of the Cuyahoga River for E. coli. Maybe the Maumee is too ambitious to tackle and we could look at the Cuyahoga first.

What species of algae are causing nuisance conditions? Do they utilize different concentrations of nutrients as the trigger? Is growth being stimulated by more or less phosphorus? For Microcystis, high P concentrations and warmer temperatures are important. Need to contact Dave Culver or Joe Conroy for more information on how different species use P and N.

We need to make a distinction between tributary loads and in-lake resuspension. The plumes from Landsat images are very impressive, but they are often against a background of in-lake resuspension. The quantification of in-lake loading will be important in determining if we can reach a lakewide target by regulating the amount of point source and tributary loading. The time lag before seeing a result from high internal loads may be very long. Need to refer to some of the old

models that were used to determine the initial loading reduction targets that are currently in place.

### **Quantification of Phosphorus Loads**

As a baseline, we are using the TP loads to the lake calculated by Dave Dolan. Dave has been calculating TP loads for many years, beginning when he was with the IJC. The method used was described under PLUARG (Pollution from Land Use Activities Reference Group), an initiative begun in the 70's to look at reducing P loading to the Great Lakes. Indirect sources include tributary loads and point sources above the monitoring station. Direct point sources are those permitted sources below the monitoring station and those that are located in a tributary that is not monitored. Approximately 15% of the load is attributed to point sources while 85% is from nonpoint sources. Of that 85%, 80% comes from Vermilion to the west. The Maumee and Sandusky watersheds comprise 25% of the land drainage to the lake. Approximately 40% of the Lake Erie drainage area is intensively monitored for TP loads.

Rick Wilson explained his efforts in calculating point source loads from Ohio from WWTPs and package plants. He was attempting to ground truth what the WWTPs are reporting with Dave Dolan's estimates. Overall, point sources have been fairly level. There are 167 WWTPs with a discharge of > 100,000 gals/day. Approximately 12 of these plants account for 2/3 of the flow. 87% of the total load came from plants > 1MGD. The contribution from smaller plants can be pretty much ignored because even if they have a high concentration, the flow is so low that the loading is small. Total WWTP load was calculated at 414MTA. Dave Dolan's estimate of all point sources to Lake Erie is 841MTA. Rick created a pie chart showing contributions from different sizes of plants.

Overall there are 703 NPDES permits for WWTPs. The total flow authorized by these permits is 1.076 billion gallons per day.

Julie Letterhos provided a summary of industrial point source loadings. A search of the permitting data base from 1990 to 2006 showed there were 216 dischargers with phosphorus requirements in their permits. 19 had a discharge > 1MGD. 86 dischargers had an average effluent concentration of >0.5mg/l. Of these, 50 had an average effluent concentration of >1.0mg/l. 11 dischargers >1MGD had average effluent concentrations >0.5mg/l, so as with the WWTP dischargers, a small number of industrial dischargers are responsible for the load. The dischargers with the higher TP loads were all food processing facilities. For many of the other dischargers, the requirements were related to discharge from their on site sewage treatment plants. All the TP requirements in the permits were for monitoring. None had limits for concentrations or loads. Total industrial load for 2002 from Ohio as calculated by Dave Dolan was 32.5 MTA. Total industrial point source load to the whole lake was 79.67 MTA.

CSOs may be another source of phosphorus, but it is difficult to get any loading data from this as wet weather overflows are not monitored. A statewide CSO Program Inventory was distributed. The current U.S.EPA goal is to have 75% of CSO communities implementing CSO control measures by 9/08. Currently, Ohio has 67% meeting that goal. The handout describes the requirements and goals of the CSO control program and the status of all Ohio CSO communities.

It is important to make the distinction of what is coming into or out of a system vs. what is going into the lake.

A brief discussion of the report that Minnesota developed as related to phosphorus loadings basically concluded that a lot of assumptions were made in their estimates, so we may not want to use the approach of this report as a model for the Task Force's recommendations report.

The potential contribution of atmospheric deposition was raised again. Dan Button offered to pull that data together.

#### **Action Items**

- **Rick Wilson will recalculate and refine the WWTP point source data and charts.**
- **Rick will also attempt to further estimate the potential contribution from CSOs**
- **Julie Letterhos will recalculate loads from industrial sources and add results to the cumulative pie chart loadings graphic**
- **Dan Button will provide land use data and potential loads from atmospheric deposition**
- **Gail Hesse, Kevin Elder and Robert Mullen will further define the loads from fertilizer application based on ag and lawn fertilizer sales and input from Scotts**
- **Rick Wilson will look at the potential impact of biosolids application**
- **Dave Baker will provide NPS load calculations from Dave Dolan's data**
- **Julie Letterhos will contact Murray Charleton (Environment Canada) to get P loading data from Lake Erie to Lake Ontario.**
- **Everyone is to have their information to Gail by August 25**
- **The Table of Contents and outline of the Recommendations Report will an agenda item for the next meeting**
- **Everyone is to think of the things that we don't know but would like to know.**
- **The next meetings were scheduled for August 28 and October 1**

**(\*Note that the August 28 meeting was cancelled)**