

# Additional Options for Lake Erie Nutrient Reductions

---

*Interviews with nutrient reduction experts across North America were conducted as part of the Great Lakes Commission's Lake Erie Nutrient Targets (LENT) Working Group effort during the spring of 2015. The LENT Working Group put forth the 10 joint actions as part of the Joint Action Plan for Lake Erie in September, 2015. This document summarizes several concepts that were recommended by numerous interviewees as highly promising approaches for improving water quality in Lake Erie. These options were not included in the **Joint Action Plan for Lake Erie** as actions the parties will be taking because they require further research and exploration. The LENT Working Group reserves the possibility of considering these and additional potential actions in the future.*

*Several of these approaches are noted for being most effective when they are done in concert with other actions. Each of them is designed to be implemented at the watershed scale, although the size of the watershed may vary. They are presented here in the context of the entire Lake Erie Basin or the Western Lake Erie Basin (WLEB). They include watershed protection utilities, watershed-based permits, TMDLs, and water quality trading.*

## 1. Watershed Protection Utility

Several LENT interviewees highlighted the concept of a watershed protection utility, environmental utility, or a nutrients utility as a potential solution for nutrient-related problems in Lake Erie.

Despite the fact that a healthy environment is a widely shared value, no entity currently fully owns the challenge of excess nutrients specifically, or watershed protection more broadly, and has the mission, authority, and resources to design and/or implement a comprehensive solution strategy.<sup>1</sup> A Watershed Protection Utility is a new governing and funding organization that would raise funds and invest them in the lowest-cost opportunities to address nutrient loading and other issues on behalf of the general public.<sup>2</sup> This concept integrates three components that are increasingly believed to be critical to successful watershed protection and restoration:

- 1) effective watershed-based cooperative leadership and decision-making;
- 2) market mechanisms; and

---

<sup>1</sup> <http://www.uswateralliance.org/wp-content/uploads/2014/08/USWA-MRND-Report6.pdf>. Coming Together to Protect Mississippi River Watersheds, Agriculture and Water Sector Collaboration for Nutrient Progress: A Report of the Mississippi River Nutrient Dialogues. Convened by the U.S. Water Alliance, 2013-2014

<sup>2</sup> <http://www.uswateralliance.org/wp-content/uploads/2014/08/USWA-MRND-Report6.pdf>. Coming Together to Protect Mississippi River Watersheds, Agriculture and Water Sector Collaboration for Nutrient Progress: A Report of the Mississippi River Nutrient Dialogues. Convened by the U.S. Water Alliance, 2013-2014.

3) data, monitoring and modeling to advance a statewide or regional strategy to reduce nutrient loading.

The term “watershed protection utility” seems to first have appeared through dialogues for nutrient reduction in the Mississippi River Basin. In some circles it is called an “environmental utility<sup>3</sup>” or a “watershed trust<sup>4</sup>.” Since the concept is still relatively nascent, it is likely that this will be referred to differently by different groups and individuals. It is worth noting, however, that each of these three underlying components was also mentioned during the LENT interviews as key to successful watershed restoration. Watershed-based cooperative leadership was strongly emphasized as key in the Chesapeake Bay restoration efforts. Market mechanisms are built into the Chesapeake Bay program/TMDL implementation, the S.F. Bay Watershed Permit, and the Mississippi River Nutrient Reduction Strategy. Likewise, data, modeling and monitoring—and funding to support this science and its application—was widely referenced by LENT interviewees. The Watershed Protection Utility concept has not been formally tested, although one could argue that it is being at least partially tested in Milwaukee and San Francisco. The Milwaukee Metropolitan Sewerage District states that their main job is to help protect Lake Michigan. <sup>5</sup> The San Francisco Public Utilities Commission has a 10-year, \$50 million Watershed and Environmental Improvement Program “to proactively manage, protect and restore environmental resources affected by our system operations.”<sup>6</sup> These are two of the increasing number of public entities that have become more than just public managers of water and wastewater. Whether they are renamed a “watershed” utility is less important than the fact that they have broadened the scope of their responsibility for provisioning water services to incorporate a watershed approach.

The watershed protection utility concept is being advanced by several water and environmental industry thought leaders, including the Chicago Metropolitan Water Reclamation District and The Nature Conservancy in Ohio, who are collaborating on a white paper to illuminate some of the latest thinking on the concept. A strength of this approach is the ability to use the revenue-generating authority to finance activities (i.e., services) associated with nutrient reduction and watershed protection. In contrast to solutions that rely on direct regulation or voluntary actions, the utility concept offers a business model that can provide stable, long-term financing for priority projects that effectively provide protection of water quality and watershed health for the least possible cost.

Rates charged by water and wastewater utilities are often regulated by a public utility commission. Typically, water utilities can only charge rates to cover their costs; rates charged must be legal and fair. Historically, water utility rates are based on the costs directly associated with conveying and treating water to meet regulatory standards. However, there is increasing recognition that the most effective way to manage and improve a water utility’s water management system is to manage, protect, and restore ecological resources that affect or are affected by the operation of that utility’s water management system. This requires a watershed approach. A critical element of the traditional

---

<sup>3</sup> Ad-hoc working group coordinated by the Chicago Metropolitan Water Reclamation District and working in Illinois and Ohio is using the term “environmental utility”.

<sup>4</sup> The Nature Conservancy in Ohio is using the term “watershed trust.”

<sup>5</sup> <http://www.mmsd.com/>

<sup>6</sup> <http://www.sfwater.org/index.aspx?page=487>

water/wastewater utility approach is the authority to charge rates or collect taxes, which allows these entities to have stable long-term funding to support their services.

## 2. Watershed-Based Permits

Watershed-based permitting is a process that emphasizes addressing all stressors within a hydrologically-defined drainage basin, rather than addressing individual pollutant sources on a discharge-by-discharge basis. Watershed-based permitting can encompass a variety of activities ranging from synchronizing permits within a basin to developing water quality-based effluent limits using a multiple discharger modeling analysis. The type of permitting activity will vary depending on the unique characteristics of the watershed and the sources of pollution impacting it.<sup>7</sup> This concept is generally operated at the local watershed scale but can be scaled up to the state level where it has been called a group or general permit at the state level. Some practitioners refer to watershed-based permitting as “TMDL-Lite.”

Regional cooperation on watershed-based NPDES permits (or general permits) for WLEB was recommended by several LENT interviewees as a key solution for Lake Erie. The advantage of this approach, they noted, is that it uses existing regulatory drivers to address water quality problems across an entire watershed. Since there is no TMDL in WLEB, the approach could start with a watershed or general permit that requires all permit holders to conduct optimization studies for nutrient reduction and major dischargers to also conduct upgrade studies. The studies could be conducted by individual facilities or facilities could collaborate on the studies.

This approach is being used in the San Francisco Bay Area where a Nutrients Watershed Permit establishes regional framework to facilitate collaboration on optimization and upgrade studies. Permit holders have collaborated to hire a single consultant to conduct the studies on their behalf, an approach for maximizing options and cost-savings. The 2014-2019 permit cycle is the first phase of what is expected to be a multiple-permit effort. This first phase aims to track and evaluate treatment plant performance, fund nutrient monitoring programs, support load response modeling, and conduct treatment plant optimization and upgrade studies for nutrient removal. The results of the first phase are intended to inform future management decisions and regulatory strategies for nutrient reduction.<sup>8</sup> Funding to conduct the studies is partly paid by the state and partly paid by the facilities.

Watershed-based permitting is being used by many states and regions around the U.S. The sections below summarize how watershed-based permitting has been implemented in several Great Lakes jurisdictions.

### Michigan

The watershed-based permit in Michigan grew out of efforts by the Michigan Department of Environmental Quality (MDEQ) to test a voluntary watershed-based approach in the Rouge River in southeast Michigan. Based on that effort, in 2002 the MDEQ established a watershed-based permit. In

---

<sup>7</sup> <http://water.epa.gov/polwaste/npdes/basics/Watershed-Based-NPDES-Permitting.cfm>

<sup>8</sup> California Order R2-2014-0014

Michigan, a watershed-based National Pollutant Discharge Elimination System (NPDES) general permit is an alternative compliance option available to municipal separate storm sewer system (MS4) regulated under the U.S. Clean Water Act Phase II Stormwater rule. The MS4 watershed-based permit is a voluntary, watershed-based NPDES general stormwater permit. MS4s within a watershed that opt for a watershed-based permit are required to cooperate to develop a Watershed Management Plan (WMP) that includes short-term objectives and long-term goals for the watershed and to implement stormwater pollution controls throughout the watershed, both inside and outside urbanized areas. The cooperating MS4s in a watershed are referred to as the stakeholder communities. The WMP includes commitments from each stakeholder community to carry out the specific activities needed to achieve the objectives and goals in the WMP. Each permitted MS4 is then individually responsible for carrying out those activities in accordance with a Storm Water Pollution Prevention Initiative (SWPPI) that it develops pursuant to its NPDES permit requirements and commitments identified in the WMP.<sup>9</sup>

### Ohio

A watershed-based approach has also been used in Ohio. The Ohio Environmental Protection Agency issued a Construction General Permit which requires developers to implement control measures and best management practices that respond to recommendations in the U.S. EPA-approved Big Darby Creek TMDL.<sup>10</sup>

### Minnesota

In the example of the Rahr Malting Company in Minnesota, watershed-based permitting is tied to water quality trading—in this case for Carbonaceous Biochemical Oxygen Demand (CBOD). Rahr Malting discharges into the Minnesota River, which became subject to a TMDL for CBOD in 1988. In 1997 the Rahr Malting Company received a NPDES permit from the Minnesota Pollution Control Agency (MPCA) that allowed water quality trading between Rahr Malting, a point source, and nonpoint sources to reduce the oxygen demand in the lower Minnesota River. The water quality trading approach was successful and allowed Rahr to build its wastewater treatment plant while still meeting the previously-set CBOD wasteload allocation requirements. In 2007, the MPCA reissued Rahr's NPDES permit and continued the point source-nonpoint source trading program. Trading ratios were established and used to calculate the number of credits achieved by a reduction of pollutants other than CBOD (e.g., phosphorus, nitrogen or sediment). Other conditions were placed on the water quality trading elements of the permit to ensure actual water quality improvements.<sup>11</sup>

### Long Island Sound

Excess nitrogen in Long Island Sound during the summer causes hypoxia, or extremely low levels of dissolved oxygen. The Connecticut Department of Environmental Protection (CTDEP) and the New York State Department of Environmental Conservation (NYDEC) collaborated on developing a total maximum daily load (TMDL) to determine the nitrogen reductions necessary to achieve the states' respective

---

<sup>9</sup> Michigan Statewide Stormwater Permitting. Downloaded 7-20-15 at [http://water.epa.gov/polwaste/npdes/basics/upload/wq\\_casestudy\\_factsht3.pdf](http://water.epa.gov/polwaste/npdes/basics/upload/wq_casestudy_factsht3.pdf)

<sup>10</sup> [http://water.epa.gov/polwaste/npdes/basics/upload/wq\\_casestudy\\_factsht12.pdf](http://water.epa.gov/polwaste/npdes/basics/upload/wq_casestudy_factsht12.pdf)

<sup>11</sup> Rahr Malting Company Point to Nonpoint Trading. [http://water.epa.gov/polwaste/npdes/basics/upload/wq\\_casestudy\\_factsht5.pdf](http://water.epa.gov/polwaste/npdes/basics/upload/wq_casestudy_factsht5.pdf)

water quality standards. In 2001, Connecticut authorized a watershed-based framework for achieving the nitrogen wasteload allocations that included water quality trading and a watershed-based general permit for nitrogen, which is manifested in the state's Nitrogen Credit Exchange Program.<sup>12</sup>

### 3. TMDL

A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant. The U.S. Clean Water Act requires states to develop TMDLs for all waters listed as impaired on the state 303(d) list. In a TMDL, pollutant sources are characterized as either point sources that receive a wasteload allocation (WLA), or nonpoint sources that receive a load allocation (LA). TMDLs are not self implementing; they need other regulatory mechanisms for implementation and enforcement. Implementation and enforcement of TMDL WLAs occur through the National Pollutant Discharge Elimination System (NPDES) permit program, including wastewater treatment facilities, some stormwater discharges and concentrated animal feeding operations (CAFOs). Implementation of TMDL LAs is less concrete and occurs through "a wide variety of state, local, and federal programs (which may be regulatory, non regulatory, or incentive-based, depending on the program), as well as voluntary action by citizens."<sup>13</sup> By regulation, a TMDL must be developed for a waterbody that is impaired by one or more pollutants, which often means TMDLs are developed at relatively fine scale (i.e., for small creeks or segments of large rivers). Each of the Great Lakes states has numerous TMDLs.

#### a. Watershed and Multijurisdictional TMDLs

States are increasingly developing TMDLs on a watershed scale and several multijurisdictional TMDLs have also been developed. The largest multi-jurisdictional TMDL, for the Chesapeake Bay watershed, was developed by U.S. EPA largely because previous voluntary restoration efforts by Chesapeake Bay jurisdictions failed to attain water quality standards. (LENT interviewees noted that the previous process in the Chesapeake Bay did help to build trust and engagement among the affected states, leading to collective action and eventually the TMDL). Other multijurisdictional TMDLs have been developed for the Ohio River and the Klamath River.<sup>14</sup> U.S. EPA has developed draft guidance for developing multijurisdictional TMDLs.<sup>15</sup> The International Joint Commission's (IJC) Lake Erie Ecosystem Priorities Report recommends that the governments of Michigan and Ohio should list the waters of the western basin of Lake Erie as impaired because of nutrient pollution, thus triggering the development of a tri-state phosphorus TMDL that would necessarily engage Michigan, Ohio and Indiana, with U.S. EPA oversight.<sup>16</sup> This recommendation follows on the IJC's 16<sup>th</sup> biennial report, which recommended that the states of Ohio, Michigan and Wisconsin work with U.S. EPA to complete phosphorus TMDLs for

---

<sup>12</sup> Long Island Sound, Connecticut General Permit for Nitrogen Discharges.

[http://water.epa.gov/polwaste/npdes/basics/upload/wq\\_casestudy\\_factsht1.pdf](http://water.epa.gov/polwaste/npdes/basics/upload/wq_casestudy_factsht1.pdf)

<sup>13</sup> <http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/overviewoftmdl.cfm>

<sup>14</sup> [http://www.epa.gov/owow/tmdl/pdf/draft\\_handbook.pdf](http://www.epa.gov/owow/tmdl/pdf/draft_handbook.pdf)

<sup>15</sup> Considerations for the Development of Multijurisdictional TMDL.

[http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/Draft-MJTMDL\\_032212.pdf](http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/Draft-MJTMDL_032212.pdf)

<sup>16</sup> International Joint Commission, 2014. A Balanced Diet for Lake Erie: Reducing Phosphorus Loadings and Harmful Algal Blooms. Report of the Lake Erie Ecosystem Priority.

western Lake Erie, Saginaw Bay and Green Bay.<sup>17</sup> The IJC report clarifies that Ontario cannot be part of a TMDL process. Domestic Action Plans being developed under the GLWQA 2012 Protocol have the potential to serve a function similar to large watershed-scale TMDLs, depending on how those plans are developed. The GLWQA requires the Domestic Action Plans to apportion load allocations by country and identify priority management actions that will meet the phosphorus loading targets. The GLWQA further requires that the U.S. and Canada report on progress toward meeting those load reduction targets every three years.

#### **4. Water Quality (Nutrient) Trading**

Water quality trading (WQT) has the potential to complement regulatory and other non regulatory approaches to reduce nutrient and sediment pollution from nonpoint sources in WLEB. WQT offers a cost-effective, flexible option for meeting permitted nutrient load limits while encouraging the installation of conservation practices in agricultural, other rural areas, as well as urban areas.

Water quality trading is one of several performance-based approaches that address the critical need to show quantifiable ecological improvements. “Pay-for-performance” and precision conservation also being implemented in portions of the Lake Erie the basin and are similar performance-based approaches that incorporate ecological performance outcomes and assessment of cost effectiveness. Water quality trading allows water discharge permit-holders to explore compliance options that may be more cost-effective than traditional facility upgrades. Strict or stricter discharge limits on existing facilities, TMDL’s and other policies can help drive this “demand” for WQT. Without adequate demand, water quality trading is not a reasonable tool for addressing excessive nutrient loads. With adequate demand WQT, can offer more cost-effective approaches that offer ancillary environmental benefits from the installation of conservation practices (i.e., many conservation practices do more than just reduce phosphorus). Robust, well-vetted and agreed-upon quantification methods are needed for quantifying reductions in nutrient loadings. Time and resources are needed to develop and test these methods and protocols.

##### **A Water Quality Trading Pilot in the Western Lake Erie Basin**

Several experts interviewed for the LENT effort highlighted the desire for exploring interjurisdictional (e.g., multi-state) trading for nutrients in Lake Erie, including the ability to trade outside a subwatershed.

Piloting a multi-jurisdictional framework for WQT for nutrients in the U.S. portion of the WLEB could examine whether adequate drivers exist to support WQT or whether they might exist as related programs and policies are developed. Potential drivers include existing TMDLs and TMDLs under development and associated changes in NPDES permit requirements; general/watershed permits; and nutrient reduction targets and the Domestic Action Plans for Lake Erie being developed pursuant to the Great Lakes Water Quality Agreement. The effort should build upon lessons learned from other programs in North America to build parity among rules and processes in each jurisdiction that reflect

---

<sup>17</sup> International Joint Commission, 2013. Assessment of Progress Made Towards Restoring and Maintaining Great Lakes Water Quality Since 1987: Sixteenth Biennial Report on Great Lakes Water Quality

key trading elements, such as eligible participants, quantification of load reductions, trade areas, trade ratios, reciprocity, and other necessary checks and balances.

A pilot effort in the WLEB would take approximately three years to implement. If the results indicate that adequate demand exists and protocols have been agreed to, then a multi-jurisdictional trading program could commence shortly after completion of a pilot.