Phosphorus Reduction:
Highlights of Actions in North American Jurisdictions and Potential Early Action in Ontario

March 10, 2016

Context

- Algal blooms and excessive phosphorus are increasing problems on a global scale, and many jurisdictions are taking action – a few are finding success.
- The Great Lakes Water Quality Agreement commits Canada and the U.S. to address nutrient issues in the Great Lakes. The LENT report provides some guidance on where to start. (see slide 5)
- Eight U.S. states (Michigan, Ohio, Indiana, Wisconsin, Pennsylvania, New York, Illinois and Minnesota) are facing the same challenge as Ontario in trying to identify effective solutions to reduce phosphorus contributions to the Great Lakes from agricultural sources.

Great Lakes Commission - Joint Action Plan

- The Great Lakes Commission's Joint Action Plan for Lake Erie outlines 9 key actions to address urban and rural sources of phosphorus.
  - **Reduce nutrient applications on frozen or snow covered ground**
  - **Adopt "4Rs Nutrient Stewardship Certification program" or other comprehensive nutrient management programs**
  - Reduce total phosphorus from seven key municipal dischargers
  - **Encourage and accelerate investments for green infrastructure for urban storm water and agricultural runoff, including ecological buffers for rivers, streams and wetlands**
  - Reduce the open-water disposal of dredged material
  - **Pilot innovative performance-based and/or market-based nutrient reduction projects**
  - Phase out residential phosphorus fertilizer
  - **Targeted Conservation at the Watershed Scale**
  - Within five years, validate or refine the reduction targets and timelines using an adaptive management approach

Overview of Phosphorus Reduction Actions in Other Jurisdictions

	Nutrient Management Plans	Restrictions on Timing of Nutrient Application	4Rs	Information Sharing	Stewardship /Funding Programs	Cross Compliance	Erosion Control/ Drainage
Ohio	x	x	x	x	x		
Michigan	x	Generally discouraged	x		x		x
Wisconsin	x	x		x	x		
Indiana	x	x	x	x	x		
Vermont	x	x			x		
Quebec	x	x			x	x	x
Maryland	x	x	x	x	x		
Minnesota	x	Generally discouraged			x		x
Manitoba	x	x	x		x		

Nutrient Management Plans

US federal regulations

- Require large concentrated animal feeding operations and certain medium operations (e.g., 300-999 cattle) to prepare nutrient management plans and are prohibited from discharging into U.S. waters without a pollutant discharge elimination permit.
- Plans must be based on the nutrient management technical standard in the permitting state, which commonly requires a 5 year plan for all nutrients.

Quebec

- Operators whose animals produce more than 1600kg of phosphorus annually or spreading sites that are greater than 15 ha must have a nutrient management plan.

Restrictions on Timing of Nutrient Application

Ohio: No person in the western Lake Erie basin may surface apply **manure** or **commercial fertilizer** on frozen or snow-covered ground, or when top two inches of soil are saturated or when weather forecast is greater than 50% chance of precipitation exceeding one inch in a 12 hour period.

- Exceptions to above if manure or fertilizer is injected, incorporated within 24 hours, applied to a living crop; or, in an emergency, director provides written consent and application is in accordance with technical standard.
- Any person, including farmers and commercial applicators, that apply manure and fertilizer must be certified by the state.

Wisconsin, Indiana, Vermont, Quebec and Manitoba all have restrictions on winter spreading in regulation

- No application on frozen or snow covered ground without injection or incorporation.
- In some jurisdictions, the restriction only applies to large livestock operations.
- Some have restricted dates for application, within the range of October – April.

Voluntary Initiatives

4Rs – nutrient application at the right time, right place, right source, right rate.

- An industry-led initiative to address several environmental concerns, including excessive phosphorus loading, nitrate levels in drinking water, soil conservation, salinity, and greenhouse gas (GHG) emissions.
- 4Rs has been introduced in Alberta, Manitoba, Ontario, New Brunswick and Prince Edward Island, as well as some states.
  - In Alberta, focus is on GHG emission reduction
  - In Manitoba, Ohio, Indiana, Illinois, Pennsylvania and Michigan, focus is on P reduction

Regulatory Certainty – Maryland and Minnesota

- Farmers implement a set of BMPs and in return receive exemption from any new water quality legislation for 10 years.
- Goal is to accelerate the adoption of BMPs in the short term to improve water quality.

Information-sharing

Wisconsin Manure Management Advisory System

- 2 sets of nutrient management restriction maps to help farmers identify suitable lands for spreading, one for longer-term application planning and one for short term runoff risk assessment.
- The short term mapping tool shows daily risk of runoff, on a watershed basis using data from the National Weather Service. Three levels of risk denoted by colour in the map – low (white), moderate (orange), and high (red).
- Minnesota is developing its own runoff risk tool and North Central River Forecast Center is working with the Great Lakes Restoration Initiative to expand the model into Michigan and Ohio.

On-farm Networks in Iowa, Chesapeake Bay, Ohio, North Carolina and Indiana

- Industry led program where participating farmers conduct trials on their own farms, evaluating the effectiveness of management practices and comparing with other local farmers.
- Major benefit is feedback loop for information that helps farmers make informed farming decisions, as processes, results and guidance are shared within peer-to-peer groups across the state.

Stewardship Funding Programs

Tri state (Michigan, Ohio and Indiana) Western Lake Erie Basin Phosphorus Reduction Initiative: 5 year project with $17.5M from federal government and over $28 M from the 40+ partners including government and non-profit organizations. Goal of program is to increase farmer access to public and private technical assistance, including innovative demonstrations of practices to reduce phosphorus runoff.

Conservation Reserve Enhancement Program: Federal-state cost share program focused on removing land from production and implementing conversation practices.

U.S. Soil Conservation and Water Quality Plan: Provides cost share funding to encourage producers to work with government specialists to develop a set of BMPs tailored to individual farms.

Cover Crop Program: Chesapeake Bay farmers are funded to plant cereal grains after summer/fall harvest as cover crops.

Manure Transport: A Chesapeake Bay initiative provides financial assistance to farmers who have excess manure or high soil phosphorus to move manure to other sites or alternate uses. Cost share assistance of up to $20 per ton, with higher rates for farms in high risk areas. Programs can be found in Maryland, Delaware, Pennsylvania, West Virginia and Virginia.

Cross-Compliance

Quebec

- Under the Agricultural Operations Regulation, operators whose sites produce more than 1600kg of phosphorus or whose spreading sites are larger than 15 ha must prepare a nutrient management plan.
- Operators must also prepare an annual Phosphorus Report, which identifies phosphorus (from all sources) usage and production/import on the farm.
- Eligibility for the agricultural property tax credit program is linked to compliance with submitting a balanced Phosphorus Report by May 15th.
  - Non-compliant report results in a 25% reduction in compensation, indemnity or participation in the first year of having to provide a report.
  - Non-compliance in the second year results in 100% reduction.
- Most operators meet the requirement to submit the Phosphorus Report by May 15 of each year.

Erosion Control/Drainage

- **Manitoba:** Developing a new regulatory approach to drainage that will streamline approvals of minor projects while maintaining detailed plans and thorough approvals for more complex projects. Aim is to shift focus of regulation onto projects with potential major impact on the environment to better protect wetlands.
- **Michigan:** Van Buren Conservation District introduced a pilot program that integrates a land management factor into the methodology for calculating the cost of drain assessments
  - Assessments against a property could be cut significantly based on the way the property owner manages the land
  - Provides an incentive to do such things as managing land cover (e.g. grassland, wetland) to reducing runoff reduction (i.e. reduce sediment loading)
- **Minnesota:** The 2015 Buffer Initiative will require vegetation buffers of up to 50 feet along public waters, including public water wetlands, and 16.5 feet along drainage ditches to help filter out phosphorus, nitrogen and sediment. Implementation is expected to be complete by November 2018.
- **Quebec:** A number of agri-environmental initiatives, both regulations and incentives. Many of the regulatory requirements are placed on farms, particularly livestock operations, targeted to reduce non-point source nutrients and cyanobacteria blooms (i.e. reg. requirement for a 3 metre buffer along streams and 1 metre strip along drainage ditches – cost-share funding is made available for implementation)

Watershed Approaches

Many jurisdictions are taking a watershed approach to address water quality issues related to excessive algae growth.

Chesapeake Bay:

- Six US states have been working for over 30 years to improve the health of the Chesapeake Bay watershed.
- In 2010, the Environmental Protection Agency set a total maximum daily load (TMDL) phosphorus limit for each river basin.
- State-level Watershed Implementation Plans have been developed to achieve the TMDL, with commitments to reduce watershed pollutant loads.
- In recent years some improvement in fish stocks and water quality has been measured.

Lake Winnipeg

- Lake Winnipeg Action Plan developed in 2003 to reduce nitrogen and phosphorus loads to the Lake.
- In 2014, Manitoba announced a $320 million 5 year surface water management strategy to reduce algae in Lake Winnipeg by dealing with drainage, wetlands management and improving flood protection.

Watershed Approaches (cont'd)

Lake Simcoe Protection Plan

- Goal is to protect and restore the ecological health of the Lake Simcoe watershed
- Plan builds upon existing stewardship actions and regulations.
- Plan caps phosphorus loading from sewage treatment plants and established a long term Phosphorus Reduction Strategy to meet specific targets .
- As part of the Strategy, Ontario has worked to reduce phosphorus loading from agriculture, including the Holland Marsh, by
  - Testing and demonstrating new technologies to improve farm field runoff and vegetable processing in the watershed
  - Collaborating with universities, conservation authorities and industry to research application rates, develop soil testing methods, understand motivation for BMP uptake and more.
  - Environmental cost-share funding for farmers to implement BMPs.
- Five year progress report indicates concentration of total phosphorus has decreased to the point that certain fish populations are starting to increase.
- Continued monitoring and research is required to assess watershed health.

Targeted Approaches to Nutrient Management

Ohio's Geographically Targeted Approach – "Watershed in Distress"

- Ohio designated Grand Lake St. Marys as a "watershed in distress" requiring all livestock operations and manure applicators within the watershed that handle more than 350 tons and/or 100,000 gallons of manure per year must prepare a nutrient management plan that addresses methods, amount, form, placement, cropping system and timing of all nutrient applications.
  - Plan includes soil testing, manure analysis, field information

Maryland's Risk-based Approach

- In 2015, Maryland began transitioning farms to using a new phosphorus risk assessment tool that uses best available science to identify most critical areas for potential phosphorus losses.
- Three tier system, based on risk of phosphorus loss, dictates different nutrient application requirements.
- Effective immediately, farms with a Fertility Index Value of 500 or greater are banned from applying any phosphorus

Conclusions

- Nutrient planning, cost-share programming and specific nutrient application restrictions are common with some variations, and industry-led 4Rs programs are spreading.
- Existing efforts in other locations demonstrate that lake recovery requires support and investment from multiple stakeholders - all levels of government, other interested partners and individual businesses - that cross state and provincial borders.
- Results are only seen after several years of action.
  - Concerted and targeted efforts in Chesapeake Bay and Lake Simcoe are just starting to show some signs of improvement after many years of action.