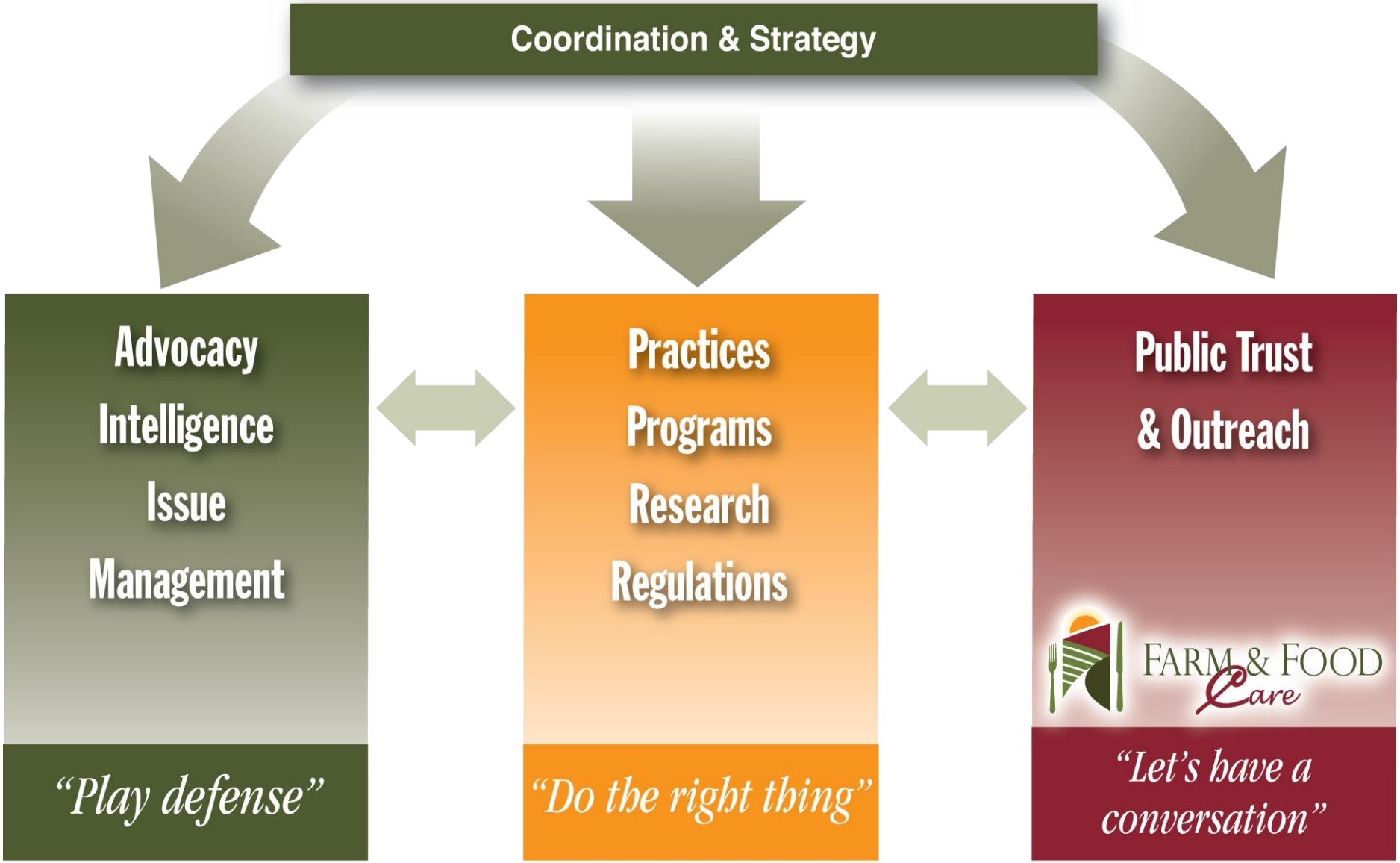
July 14 Great Lakes agriculture strategy session

Farm & Food Care Hosts:
Bruce Kelly
Micah Shearer-Kudel

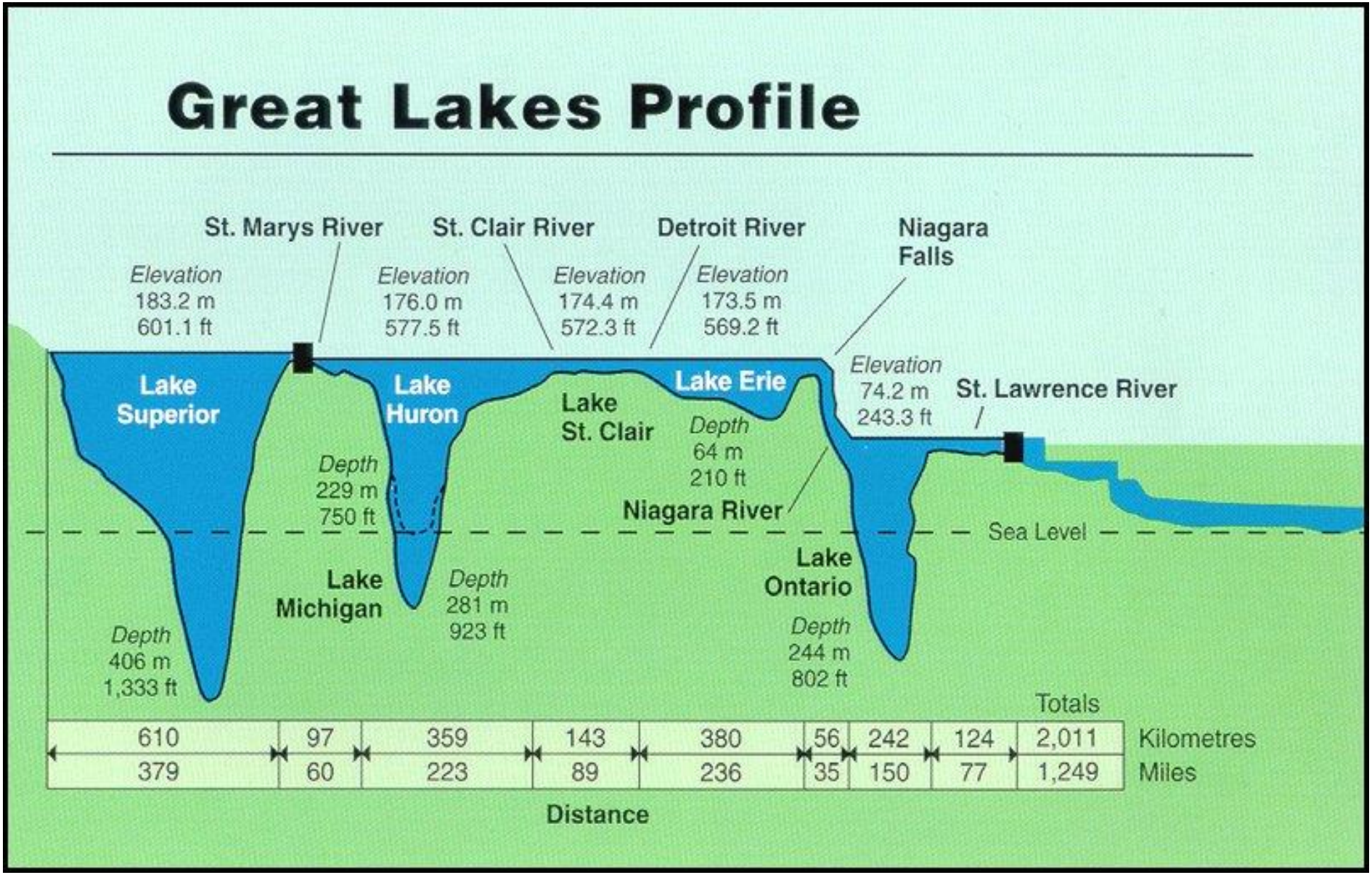
Who is Farm & Food Care Ontario?

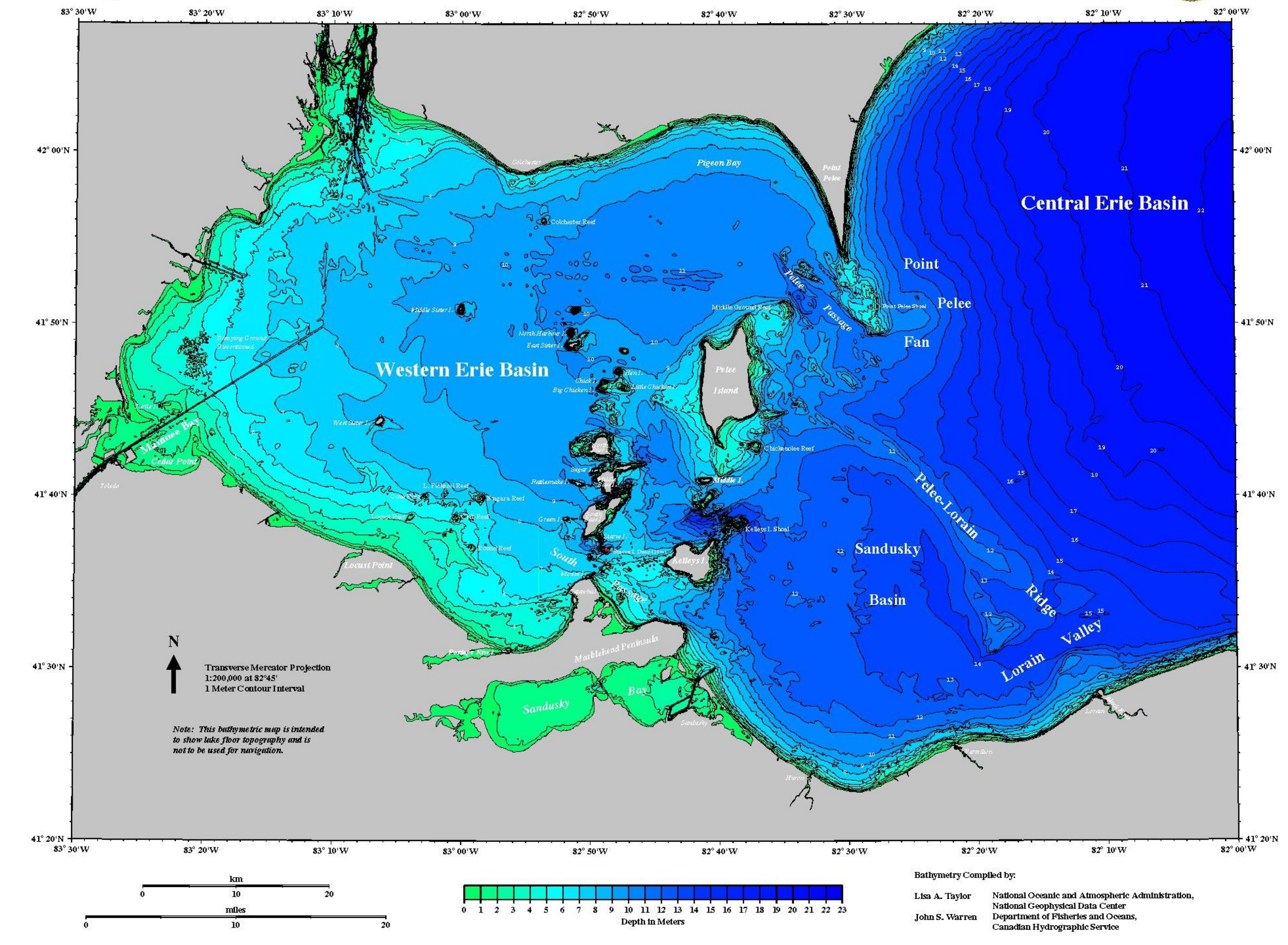
- First coalition of its kind, whole sector approach – all types of farmers and associated businesses working together.
- Funded by members, sponsors, projects.
- Common goal – building public trust in food and farming.

Building Public Trust in Food & Farming in Canada



Great Lakes Profile





Central Erie Basin
Western Erie Basin
Point Pelee Fan
Pelee Passage
Pelee-Lorain Ridge
Lorain Valley
Sandusky Basin
South Passage
Pelee Island
Kelleys I.
Middle I.
Pigeon Bay
Point Pelee
Colchester
Colchester Reef
Middle Ground Reef
Point Pelee Shoal
Middle Sister I.
North Harbour I.
East Sister I.
West Sister I.
Hen I.
Chick I.
Big Chicken I.
Little Chicken I.
Chickenolee Reef
Kelleys I. Shoal
Rattlesnake I.
Green I.
Sugar I.
L. Pickerel Reef
Niagara Reef
Locust Point
Maumee Bay
Cedar Point
Toledo
Portage River
Marblehead Peninsula
Sandusky Bay
Sandusky
Huron
Vermilion
Lorain
N
Transverse Mercator Projection
1:200,000 at 82°45'
1 Meter Contour Interval
Note: This bathymetric map is intended to show lake floor topography and is not to be used for navigation.
km
0 10 20
miles
0 10 20
Depth in Meters
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Bathymetry Compiled by:
Lisa A. Taylor National Oceanic and Atmospheric Administration, National Geophysical Data Center
John S. Warren Department of Fisheries and Oceans, Canadian Hydrographic Service
83° 30'W 83° 20'W 83° 10'W 83° 00'W 82° 50'W 82° 40'W 82° 30'W 82° 20'W 82° 10'W 82° 00'W
42° 00'N 41° 50'N 41° 40'N 41° 30'N 41° 20'N

A Toxic Algae Bloom Caused a Three-Day Ban on Water Usage for a Half-Million Residents in Toledo. Experts Say it's a 'Wake-Up Call' for Lake Erie

Tainted bloom

By Ryan Felton

click to enlarge

America has a water problem. In California, there's not enough of it, with the state's severe drought continuing unabated — even in light of torrential downpours. In Detroit, the city's water department botched an aggressive campaign to shut off service to delinquent residents, drawing international condemnation and a mad scramble by city officials to save face. In West Virginia, earlier this year, nearly 300,000 families went without water for weeks, after thousands of gallons of toxic chemicals spilled out from the facilities of a company called Freedom Industries, tainting the water supply of a nine-county region. Last month, in Flint, where residents pay about $140 per month for water, some raised alarms when their faucets started spewing discolored water. Four years after the BP Deepwater Horizon spill of 2010, which sent over 170 million gallons of oil into the Gulf of Mexico, scientists are still finding new evidence of the incident's damage. And, earlier this month, in Toledo, a toxic algae bloom managed to contaminate the water supply of nearly a half-million residents.

June rainfall sends near–record phosphorus levels into Lake Erie; toxic algae bloom prospects worsen

By James F. McCarty, The Plain Dealer
Email the author | Follow on Twitter
on July 01, 2015 at 7:00 AM, updated July 02, 2015 at 7:36 AM

Print
Email

CLEVELAND, Ohio – One of the **wettest Junes on record** has dumped some of the largest loads of phosphorus ever recorded into the Maumee River, raising the prospect of another **huge toxic algae bloom** this summer in Lake Erie's western basin.

Researchers are monitoring satellite photos of Lake Erie to predict the size and location of toxic algae blooms expected later in the summer.

NOAA/AP photo

"We're not looking at a mild event here," said Rick Stumpf,

Years will be needed to gauge efforts to cut Lake Erie algae

By The Associated Press
Sunday, July 5, 2015, 9:48 p.m.

PERRYSBURG, Ohio — State agriculture and environmental leaders have made a number of changes to attack toxic algae in western Lake Erie, most notably prohibiting farmers in northwestern Ohio from spreading manure on frozen and rain-soaked fields and requiring training before they may use commercial fertilizers.

Soon, they'll be handing out $12 million to farmers who take steps to reduce the pollutants that wash off their fields and help feed the algae, which have contaminated drinking water supplies and helped form dead zones where fish can't survive.

<u>Now the big question is, will it work?</u>

Trends in Ontario Agriculture: Crops

Crops	Percent change (1976-2011)
Pasture, unimproved (area)	-37.2%
Pasture, improved (area)	-64.7%
Hay (area)	-27.1%
Corn, grain (area)	28.6%
Soybeans (area)	552.3%
Potatoes (area)	-18.2%
Tree fruits (area)	-51.9%

From: Paul Smith OMAFRA

Trends in Ontario Agriculture: Livestock

Livestock type	Percent change (1976-2011)
Cattle (number)	-44.9%
Dairy cows (number)	-52.2%
Pigs (number)	61.4%
Chickens (number)	56.5%

From: Paul Smith OMAFRA

Trends in Ontario Agriculture: Practices

Farm practices	Time period	Time period	Percent change
No-till (area)		1991-2011	836.1%
Reduced till (area)		1991-2011	91.6%
Most of residue incorporated (area)		1991-2011	-45.9%
Fertilizer sales, Nitrogen (tonnes)	1954-1980		824.3%
Fertilizer sales, Nitrogen (tonnes)		1981-2011	3.1%
Fertilizer sales, Phosphate (tonnes)	1954-1980		159.2%
Fertilizer sales, Phosphate (tonnes)		1981-2011	-30.1%
Manure volume produced		1976-2011	-42.6%

From: Paul Smith OMAFRA

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INTERNATIONAL
PLANT NUTRITION
INSTITUTE

FARM & FOOD
Care ONTARIO

14 July 2015

4R Nutrient Stewardship: Opportunities for meeting Lake Erie targets

4 nutrient stewardship

Tom Bruulsema, Phosphorus Program Director
International Plant Nutrition Institute
Guelph, Ontario, Canada

Agrium Inc.


Arab Potash Company

Belarusian Potash Company

BHP Billiton

CF Industries Holdings, Inc.

Compass Minerals Plant Nutrition

International Raw Materials LTD.

Intrepid Potash, Inc.

K+S KALI GmbH

LUXI Fertilizer Industry Group

The Mosaic Company

OCP S.A.

PhosAgro

PotashCorp

Qatar Fertiliser Company (QAFCO)


Shell Sulphur Solutions

Simplot

Sinofert Holdings Limited

SQM

Toros Tarım

Uralchem

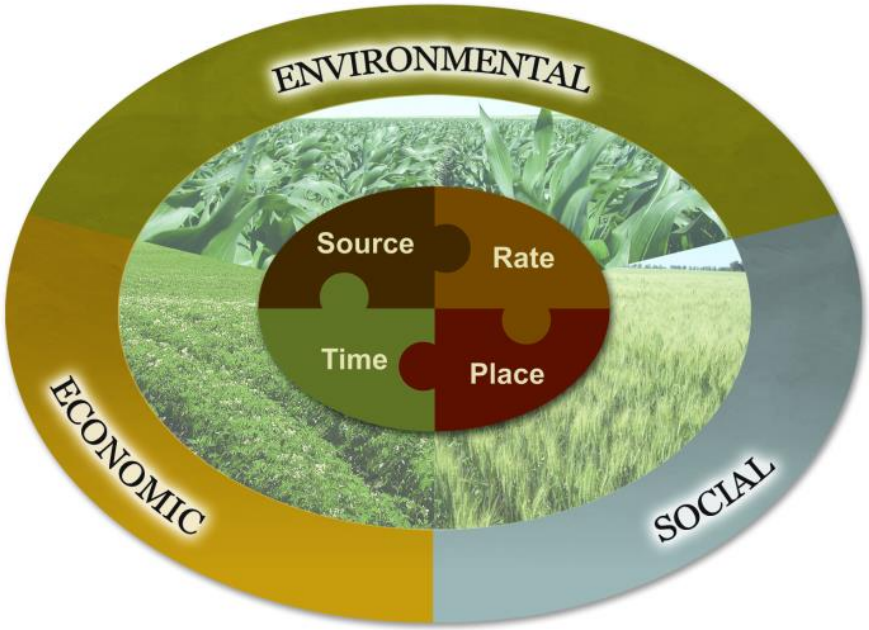
Uralkali

Formed in 2007 from the Potash & Phosphate Institute, the **International Plant Nutrition Institute** is supported by leading fertilizer manufacturers.

Its mission is to develop and promote science for responsible management of crop nutrition

IPNI

4R: “right” means sustainable



Field to Market™
The Keystone Alliance for Sustainable Agriculture

Walmart
SustainabilityHUB

Home | Our Goals | How To Make A Difference | Share What You've

Home > How To Make A Difference > Fertilizer Optimization

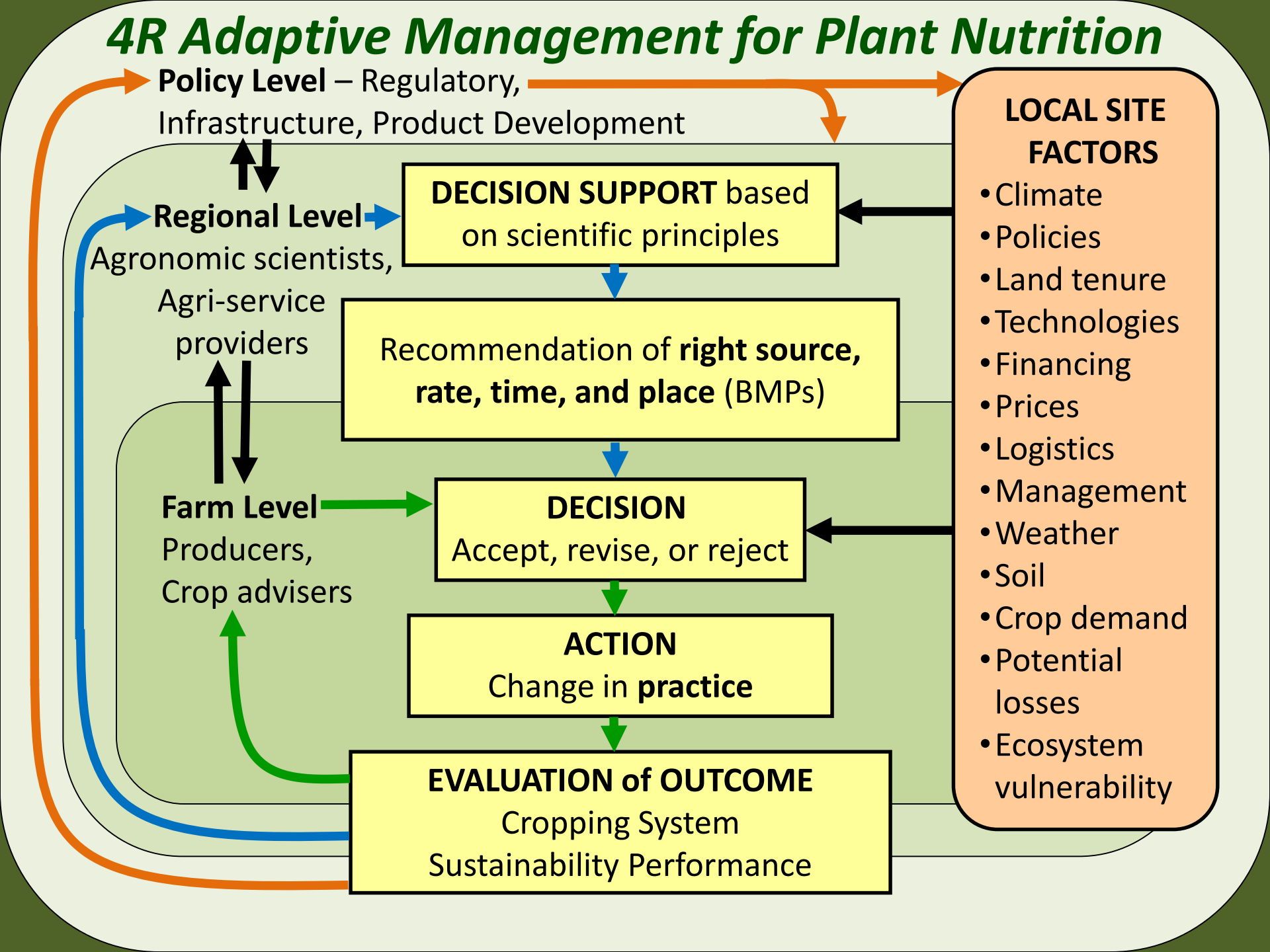
How to Make a Difference - Fertilizer optimization

4R PLANT NUTRITION

“Building public trust”

nutrient stewardship

4R Adaptive Management for Plant Nutrition



SW Ag Partners invests in zone tillage

Farmers can explore variable rate technology

BY JEFFREY CARTER
The writer is a freelance journalist based in Dresden
jcarter@ciaccess.com

A good way to deal with the regulatory challenges is to act proactively. That's a key factor behind South West Ag Partner's new Sustainable Cropping Systems program.

As part of that program SW Ag has purchased a 16-row Soil Warrior together with a 450-horsepower articulated

Innovative Farmers Association of Ontario conference in February, said he's been able to reduce his fertilizer use by about 75 per cent – likely because of improved placement – as compared to conventional systems.

While fall operation of his equipment is an option, Reints likes to use his system just a day or two before planting. He said this helps warm the soil as well as supplying nutrients within the tillage zone.

Page said Soil Warrior is an all-in-one system rather than utilizing a cart to carry the fertilizer. There are three bins from which fertilizer can be dispensed at variable rates.

This allows farmers to better utilize the field information they've accumulated from such sources as yield maps, soil tests and visual imagery.

South West Ag Partners purchased a 16-row Soil Warrior and a 460-horsepower tractor to pull it as part of their investment for their Sustainable Cropping Systems program.

There are plans to demonstrate the equipment this summer. There will also be on-farm trials or SW Ag customers may simply plant a small acreage with the machine.

"This is very much about research. We'll be able to partner with a small group of customers," Page said.

The big John Deere that was part of the equipment package was a necessary investment. "It takes about 30 horsepower per row unit to pull it. There are 16 row units. You can do the math from there," Page said.

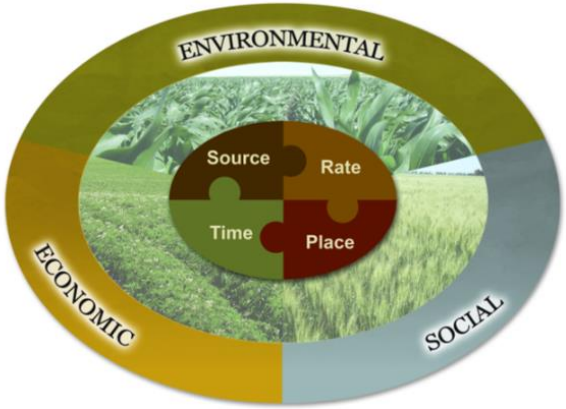
The investment in the Soil Warrior is just part of SW Ag's Sustainable Cropping Systems program, Page said. Other elements of the program will be introduced later.

SW Ag Partners is a supplier of crop input and grain marketing services in Southwestern Ontario with a heritage dating back to 1947. The head office is located in Chatham in Chatham-Kent.

Nutrient Stewardship Metrics for Sustainable Crop Nutrition

Enablers (process metrics)

- Extension & professionals
- Infrastructure
- Research & innovation
- Stakeholder engagement



Actions (adoption metrics)

[Require regional definition of 4R]

- Cropland area under 4R (at various levels)
- Participation in programs
- Equity of adoption (gender, scale, etc.)

Outcomes (impact metrics)

1. **Farmland productivity**
2. **Soil health**
3. **Nutrient use efficiency**
4. Water quality
5. Air quality
6. Greenhouse gases
7. Food & nutrition security
8. Biodiversity
9. Economic value

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Developing 4R Nutrient Stewardship Certification

The Andersons

MABA

AGRIbusiness Council of INDIANA

MORRAL COMPANIES

Michigan Corn Growers Association

CAP CONSERVATION action PROJECT

The Fertilizer Institute
Nourish, Replenish, Grow

The Nature Conservancy
Protecting nature. Preserving life.™

SOY OHIO
Ohio Soybean Council
www.soyohio.org

SOIL AND WATER RESOURCES
Ohio Department of Natural Resources

INDIANA CONSERVATION PARTNERSHIP

IPNI
INTERNATIONAL PLANT NUTRITION INSTITUTE

Ohio AgriBusiness Association

Ohio Federation of Soil and Water Conservation Districts

NRCS

Legacy
Farmers Cooperative

FB
OHIO FARM BUREAU

FARMERS ELEVATOR

WESTERN LAKE ERIE BASIN PARTNERSHIP

EDF
ENVIRONMENTAL DEFENSE FUND
Finding the ways that work

Nester Ag LLC

SANDUSKY RIVER WATERSHED COALITION

MAEAP

MICHIGAN STATE UNIVERSITY

THE OHIO STATE UNIVERSITY

OhioCorn&Wheat
Growers Association

AMERICAN SOCIETY OF AGRONOMY
CERTIFIED CROP ADVISER

4R Nutrient Stewardship Certification Standard

Requirements for Certification of Nutrient Service Providers in the Lake Erie Watershed

1 Initial Training and Ongoing Education

1.1.1 Nutrient Service Providers, sales, and application staff have undergone an initial training and are able to demonstrate knowledge about 4R Nutrient Stewardship and the 4R Certification Program.

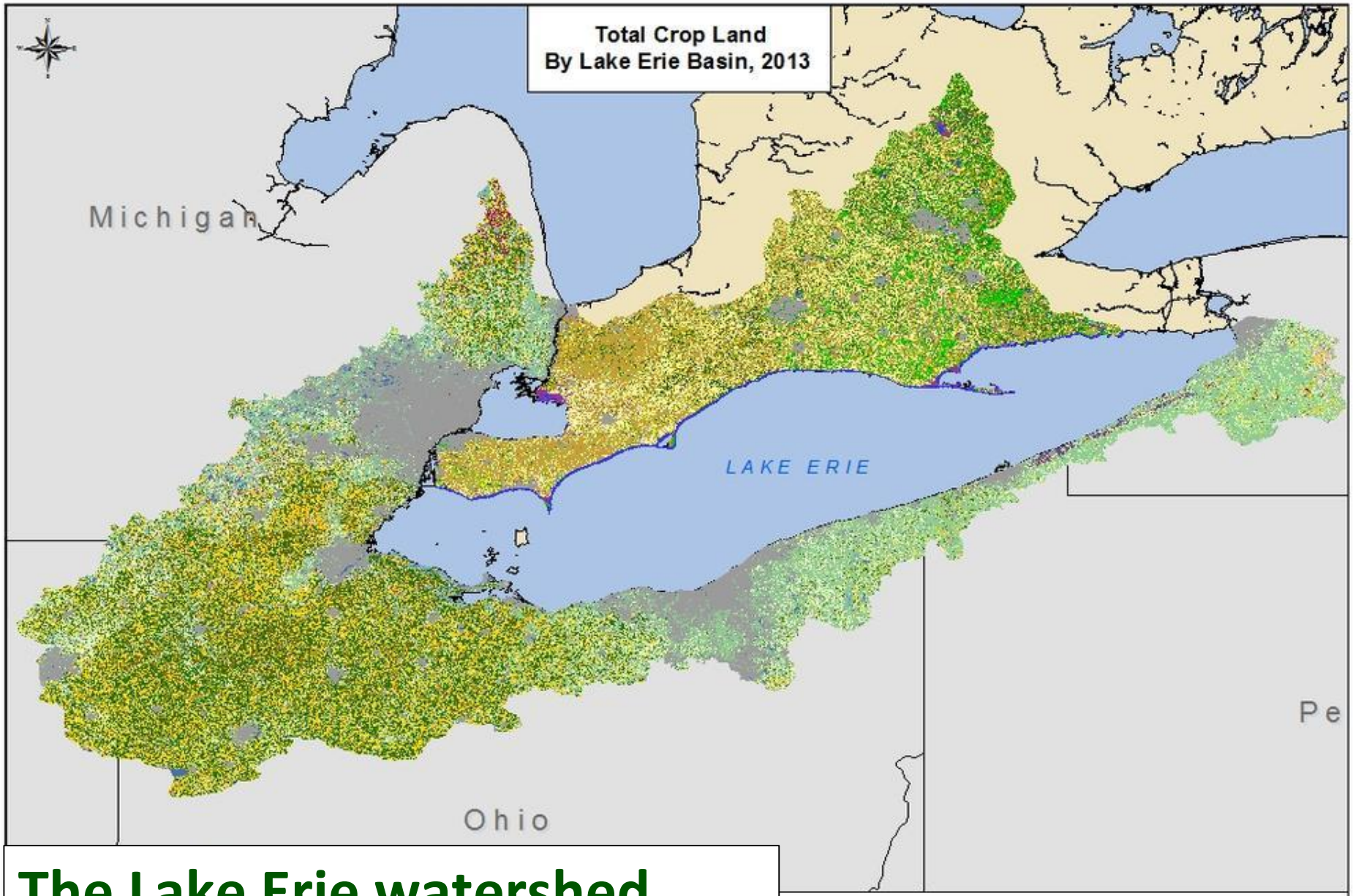
2 Monitoring of 4R implementation

2.1.1 Nutrient Service Provider records the recommendation given to the grower customer and track application with annual summary totals of fertilizer products applied on custom applied acres.

3 Nutrient Recommendations and Application

3.5.7 Broadcast applications of nitrogen and phosphorus without immediate incorporation are neither made nor recommended unless the NOAA forecast indicates less than a 50% chance of a rainfall event involving more than an inch of rain beginning in the next 12 hours.

http://4Rcertified.org/



The Lake Erie watershed includes cropland in Ontario

This map is for illustrative purposes only. Do not rely on it as being a precise indicator of routes, locations of features, or as a guide to navigation. This map may contain cartographic errors or omissions.

Map data compiled from 2013 Agriculture and Agri-Food Canada Crop Layer, Statistics Canada and 2013 National Agricultural Statistics Service, United States Department of Agriculture

Projection: WGS 84
Datum: World Geodetic System 1984

Published September 2014

Ontario

4R Nutrient Stewardship

nutrient stewardship

4R Designation in Manitoba

CANADIAN FERTILIZER INSTITUTE
INSTITUT CANADIEN DES ENGRAIS

The 4R Nutrient Stewardship Program will play a key role in meeting the sustainability challenge

nutrient stewardship

4R Nutrient Stewardship
Planning Guide

1. Introduction
2. Farm Information
3. Sustainability Goals and Indicators
4. Production Information
5. Nutrient Balance
6. Planned Nutrient Application

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Certified Crop Adviser Specialties

- 4R Nutrient Management Planning Specialist
  - Performance objectives effective May 2015, first exam August 2015
  - Anticipate 200 certified by end of 2016
  - May raise NM and SWM CEU requirement from 5 to 7
  - Additional fees; record-keeping in Madison, WI
  - Canadian version under discussion (CCA Ontario and CFI)
- Sustainability Specialty Exam
  - Performance objectives effective May 2015
  - First exam February 2016
  - References 4R Nutrient Stewardship

4R Research Fund – Lake Erie Watershed Project

- Evaluating the 4R Nutrient Stewardship Concept and Certification Program in the Western Lake Erie Basin
- GOAL: to evaluate the specific impacts of the adoption of practices associated with 4R Nutrient Stewardship, and the impact of the 4R Certification Program, on crop productivity and profitability, water quality, and perceptions of growers, nutrient service providers, and residents in the western Lake Erie watershed.
- 10 collaborators… land-river-lake continuum.

4R nutrient stewardship

4R NUTRIENT STEWARDSHIP CERTIFIED

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Interim Joint Action Plan for Lake Erie:

An Overview

Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)
Food Safety and Environment Division
Environmental Management Branch

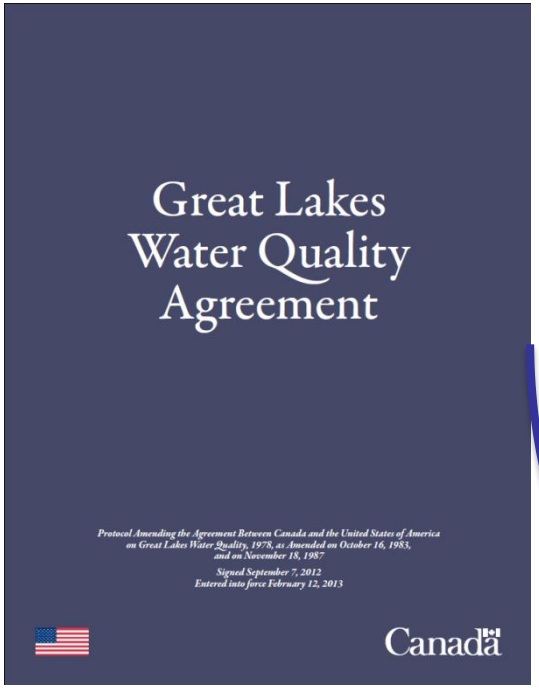
Cale Selby, Team Lead
July 14, 2015

Overview

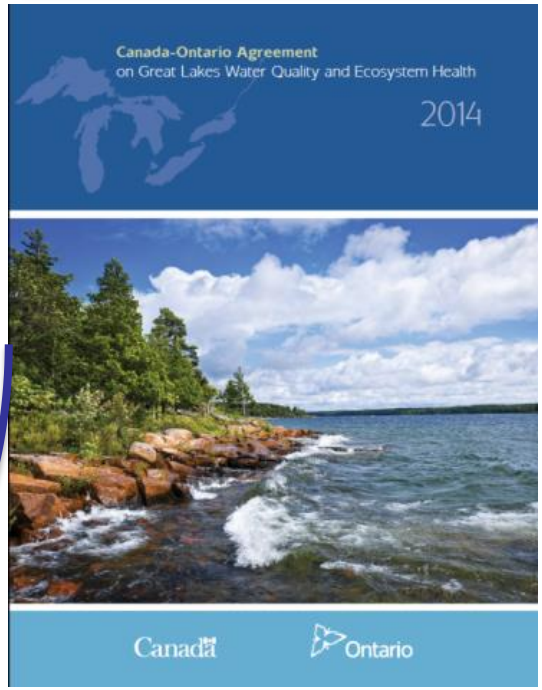
- Ontario’s Great Lakes Nutrients Commitments
- Interim Action Plan and Collaborative Agreement
- Review of key actions for agriculture
- What does it all mean for agriculture?
- Input opportunities
- Next steps

Ontario's Great Lakes Nutrient Commitments

Binational
(Canada/US)



Domestic
(Canada/Ontario)

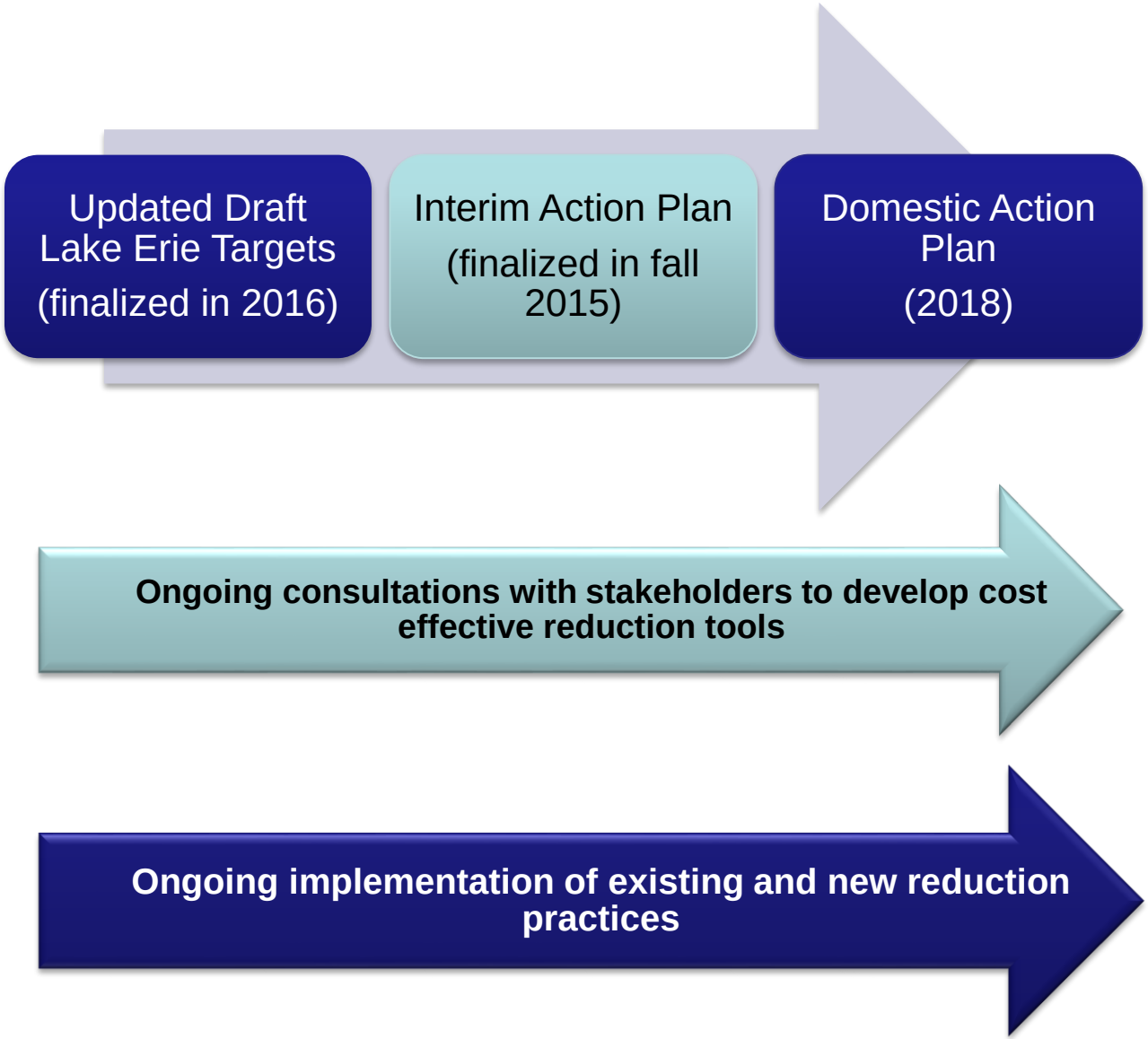


New Phosphorus Reduction Targets by 2016
and
Phosphorus Domestic Action Plans by 2018

Recent Great Lakes Activity

- The Premier of Ontario and Governors of Michigan and Ohio signed a Collaborative Agreement on June 13, 2015
  - 40% reduction of Phosphorus to western basin of Lake Erie by 2025, with an interim reduction target of 20% by 2020
- The Great Lakes Commission recently released an Interim Action Plan for Lake Erie that outlines 9 key actions that can contribute to achieving the 40% reduction target
- The actions to achieve these goals will be developed in collaboration with stakeholders and through programs that work for farmers

Process Towards Achieving Reductions



Interim Action Plan - Context for Action

- 2011 –worst algal bloom in Lake Erie's history
  - Significant impacts to fishery, recreational uses, beach access, property values
- 2014 – Harmful algal bloom impacted drinking water supply
  - Interrupted water supply for 500,000 people in Toledo, Ohio
  - Drinking water advisory for Pelee Island

- Great Lakes Commission passed a resolution to form the Lake Erie Nutrients Target Working Group (LENT)
  - Develop new and refine existing practices, programs and policies to achieve reduction targets and/or identify additional remedies to improve water quality in Lake Erie

Lake Erie Nutrient Targets Working Group

- LENT includes representatives from jurisdictions within the Lake Erie states (Michigan, Ohio, Pennsylvania, New York) and Ontario
- Purpose of the working group
  - To develop new and refine existing practices, programs and policies to achieve pollutant reduction targets and/or
  - To identify additional remedies to improve water quality in Lake Erie
- Through the Interim Action Plan, LENT aims to:
  - Offer a common roadmap for Ontario and the Lake Erie states to guide shared activities to help solve nutrient-related problems in Lake Erie

Joint Actions - LENT

The nine joint actions in the interim Joint Action Plan address:

I. **Application of fertilizer and manure on frozen and snow-covered ground**

II. **The 4Rs Nutrient Stewardship Certification program and similar comprehensive management approaches**

III. Discharges of phosphorus from seven key municipal facilities in the western and central basin

IV. Investments in green infrastructure for urban stormwater and agricultural runoff

V. Open water disposal of dredged material

VI. **Performance-based incentives to reduce nutrients**

VII. Residential phosphorus fertilizer

VIII. **Adaptive management to validate and refine reduction targets and timelines**

IX. **Collaboration toward an integrated monitoring and modeling network**.

What Does it Really Mean for Agriculture?

Does what we do HERE

- ❑ **Tile Drain**
- ❑ **Work Fields**
- ❑ **Apply Fertilizer**
- ❑ **Grow Crops**

Really matter out THERE?

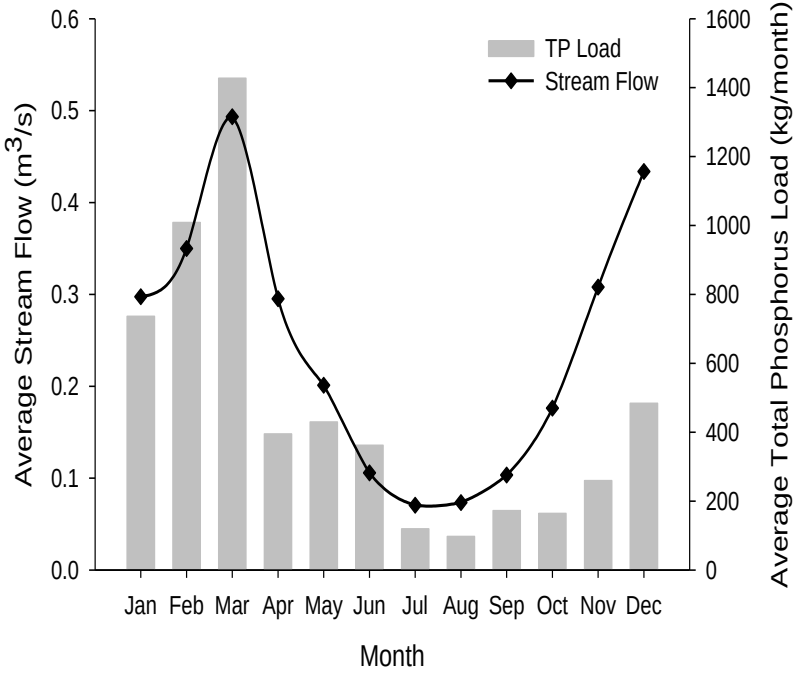
- ❑ **Nuisance Algal Blooms**
- ❑ **Intake Fouling**
- ❑ **Reduced Oxygen**
- ❑ **Mycrocystis toxin**

What has changed?

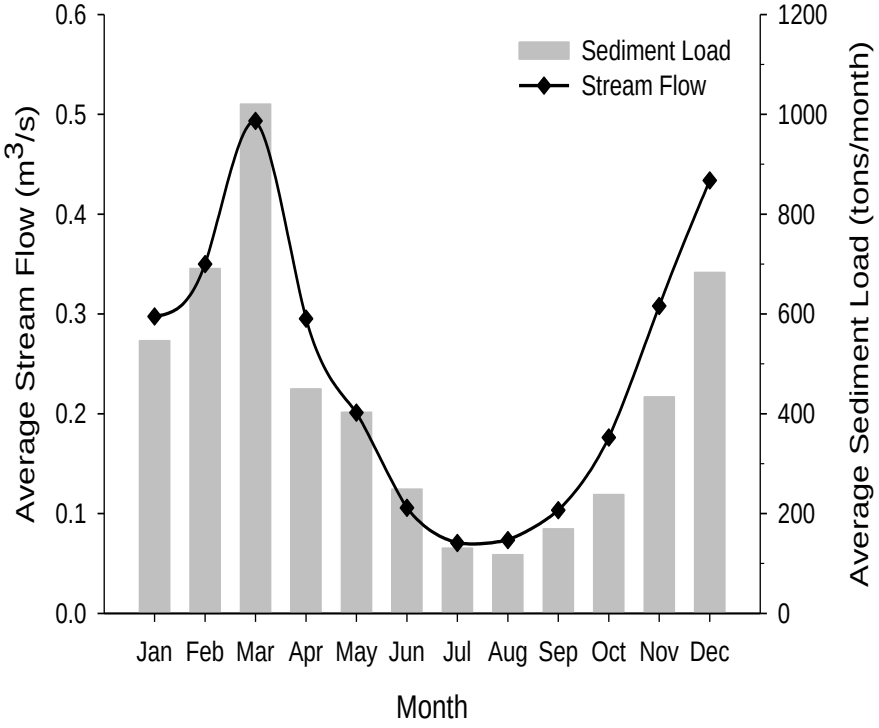
- Highest risk period for Phosphorus loss from agriculture is in the non-growing season (Nov – April)
- Intense rainfall events during this period are increasing with climate change
- Over 80% of Phosphorus loss can occur in this period

Losses During the Non-Growing Season

Sediment and P loading occurs in the non-growing period



Average Total Phosphorous loading by month (2002 to 2011)

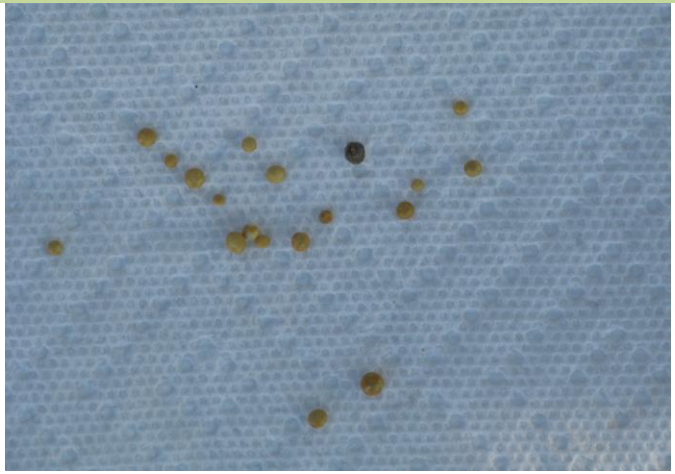


Average Total Sediment loading by month (2002 to 2011)

Solutions Are Not One Size Fits All

- Generally P is applied to meet crop uptake - studies have indicated that over-application is minimal (1 lb/acre)
- At a farm scale this is small, but with approximately 1.8 million hectares draining into Lake Erie it becomes significant
- Phosphorus loss potential varies significantly across the landscape and within fields
- Targeted action is needed with a systems approach to improving soil health and nutrient management
- Need landscape and community level solutions, and targeted action within fields

P Lost Equals Five Granules DAP Fertilizer Per Square Foot of Land



Next Steps

- It is envisioned that the draft Joint Action Plan will drive further consultation, discussions, and actions that Ontario and the Lake Erie states can advance in the near term
- The Joint Action Plan will be refined during summer 2015, and finalized fall 2015
- Longer term efforts are underway through the GLWQA Nutrients Annex (Annex 4) process including:
  - 2016: Release of final Lake Erie nutrient targets
  - 2018: Release of Domestic Action Plans
  - Ongoing consultation and input will be sought in the development of Domestic Action Plans

Mechanisms for Input

- Connect with members of the Agricultural Task Team under the GLWQA
- We will capture what we hear today
- Directly input into the binational consultation process
- Comments directly to OMAFRA – Environmental Management Branch Director, George McCaw george.mccaw@ontario.ca

Agricultural Task Team Members

Name	Organization
Anne Loeffler (Grand River Conservation Authority)	Represents Lake Erie basin conservation authorities and Conservation Ontario
Karen Maaskant (Upper Thames River Conservation Authority)	Represents Lake Erie basin conservation authorities and Conservation Ontario
Harold Rudy	Ontario Soil and Crop Improvement Association
Jenny Denhartog	Christian Farmers
Les Nichols	Chair of Farm & Food Care's Environment Council
David Armitage	Ontario Federation of Agriculture
Pam Joosse	Agriculture and Agri-Food Canada
Tom Bruulsema	International Plant Nutrition Institute
Debra Conlon	Grain Farmers of Ontario

Appendices

- **Appendix A** – Proposed Interim Actions Related to Agriculture
- **Appendix B** – Great Lakes Nutrients Governance

I. Manage nutrient application on frozen or snow covered ground

- This action calls for the management of manure, fertilizer and biosolid applications under the following conditions: on frozen or snow-covered ground, on saturated soil, or when the weather forecast calls for a severe rain event

Spreading nutrients on frozen or snow-covered ground can significantly increase the risk of runoff as fertilizer, manure and biosolids can be washed away by spring snow melt or other heavy precipitation events.

II. Adopt 4Rs Nutrient Stewardship Certification program or other comprehensive nutrient management programs

- The 4Rs Nutrient Stewardship Certification program is a voluntary agricultural retailer certification program focused on nutrient stewardship through the implementation of best management practices (BMPs) that optimize the efficiency of fertilizer use
- The objective of the 4Rs is to match nutrient supply with crop requirements and to minimize nutrient losses from fields

VI. Promote and pilot innovative nutrient reduction initiatives in the western Lake Erie basin

- Performance-based incentives – exploring the use of payments based on ecological outcomes and provide flexibility for producers to find the most appropriate and cost-effective solutions for their specific farming operation or resource concern.

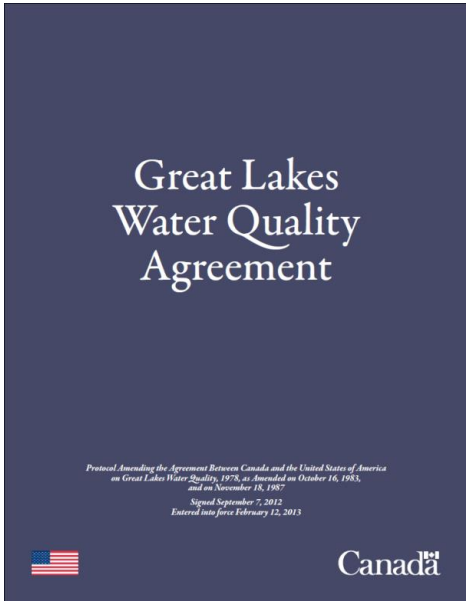
- Implementing pilot programs using innovative approaches, like “pay for performance” incentives, can help complement and promote alternatives to traditional cost-share approaches

VIII. Within 5 years, validate or refine the reduction targets and timelines using an adaptive management approach

- A long-term proposed target of reducing phosphorus loads into western and central Lake Erie by 40% (from 2008 levels) by 2025
  - An interim proposed phosphorus reduction target of 20% by 2020

➢ An adaptive management approach would be used to track the progress made under the Joint Action Plan and to adjust targets and actions based on new science and knowledge

➢ The GLWQA Annex 4 Subcommittee process will be an important source of new information and refining actions



IX. Collaborate toward an integrated monitoring and Modeling Framework

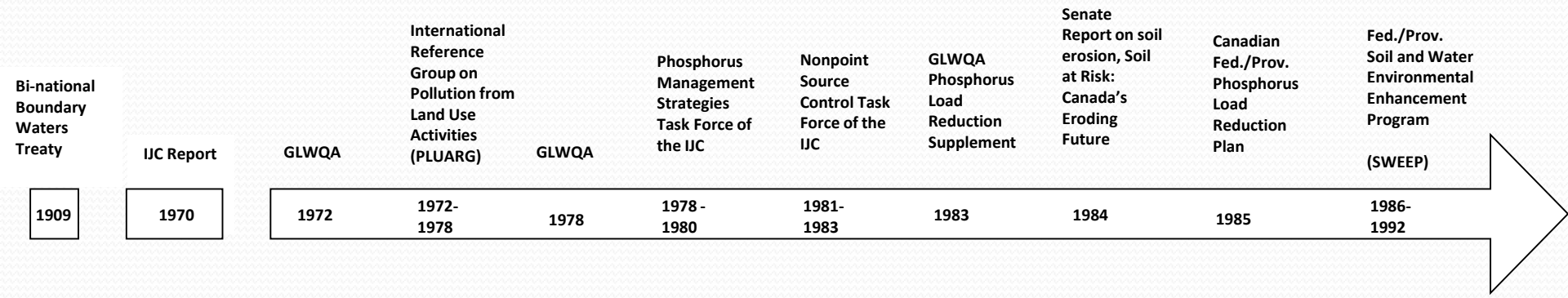
- Establishing an integrated modeling and monitoring network for Lake Erie by 2020
- System that would measure nutrient losses at edge-of field, as well as in streams and at river mouths
- Intended to measure progress towards achieving reductions and effectiveness of BMPs

Historical Lake Erie Phosphorus Management: Lessons Learned from SWEEP (1986-1992)

Farm & Food Care Ontario Strategy Session
July 14 2015

Ann Huber and Don King
The Soil Resource Group

Timeline



Mechanism to share responsibilities regarding Great Lakes

Severe eutrophication of the Great Lakes

Bi-national agreement for the remediation of the Great Lakes

Measure the impact of land use activities on the Lakes, and potential solutions

Bi-national agreement with target P loadings and country allocations

Investigate alternative strategies for managing P inputs to the Great Lakes

Evaluate post-PLUARG activities, and related issues

Agreement to further reduce P input to Lake Erie by 2000T (including 200T from Ontario agriculture)

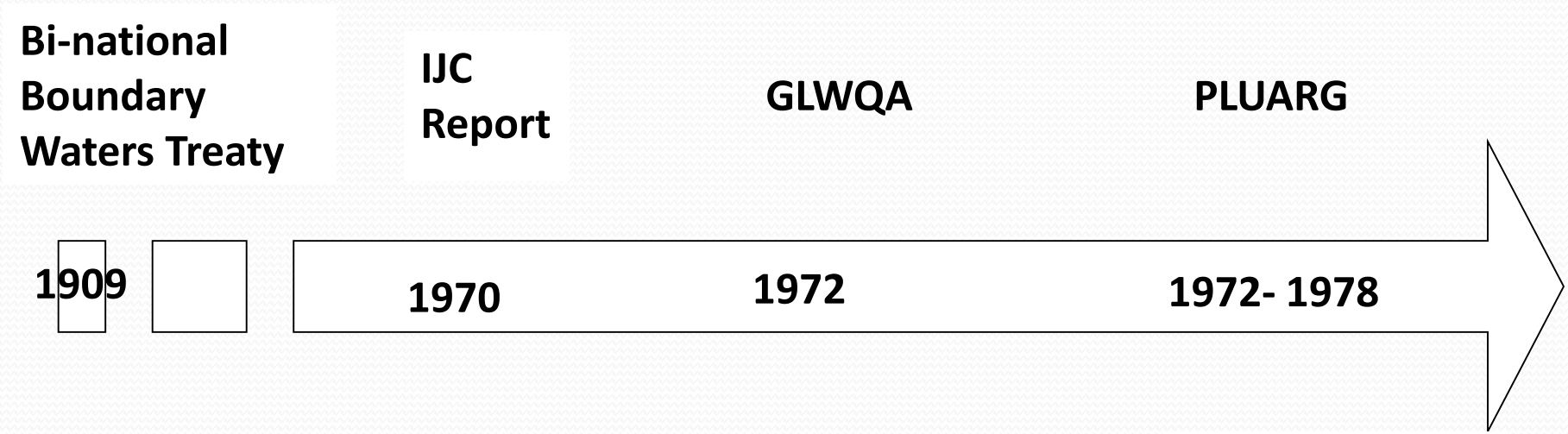
Key recommendations that supported the manner in which the SWEEP program was delivered

Required reduction of 200T/yr to be met by 400,000 ha of cropland converted to conservation tillage; $30M allocated to program

Implementation of the P Load Reduction Plan for Ontario Agriculture

Information taken from: The Soil Resource Group, 2013, *Analysis of Historical Lake Erie Phosphorus Management Processes*, Agriculture and Agri-Food Canada, Guelph, ON.

Timeline to the International Reference Group on Pollution from Land Use Activities (PLUARG)



Mechanism to share responsibilities regarding Great Lakes

Severe eutrophication of the Great Lakes

Bi-national agreement for the remediation of the Great Lakes

Measure the impact of land use activities on the Great Lakes, and potential solutions

1978-1983

GLWQA	Phosphorus Management Strategies Task Force of the IJC	Nonpoint Source Control Task Force of the IJC	GLWQA Phosphorus Load Reduction Supplement
1978	**1978 - 1980**	**1981-1983**	**1983**
Bi-national agreement with target P loadings and country allocations	Investigate alternative strategies for managing P inputs to the Great Lakes	Evaluate post-PLUARG activities, and related issues	Agreement to further reduce P input to Lake Erie by 2000T (including 200T from Ontario agriculture)

1984 to SWEEP

Senate Report on soil erosion, *Soil at Risk: Canada's Eroding Future*

1984

Key recommendations that supported the manner in which the SWEEP program was delivered

Canadian Fed./Prov. Phosphorus Load Reduction Plan

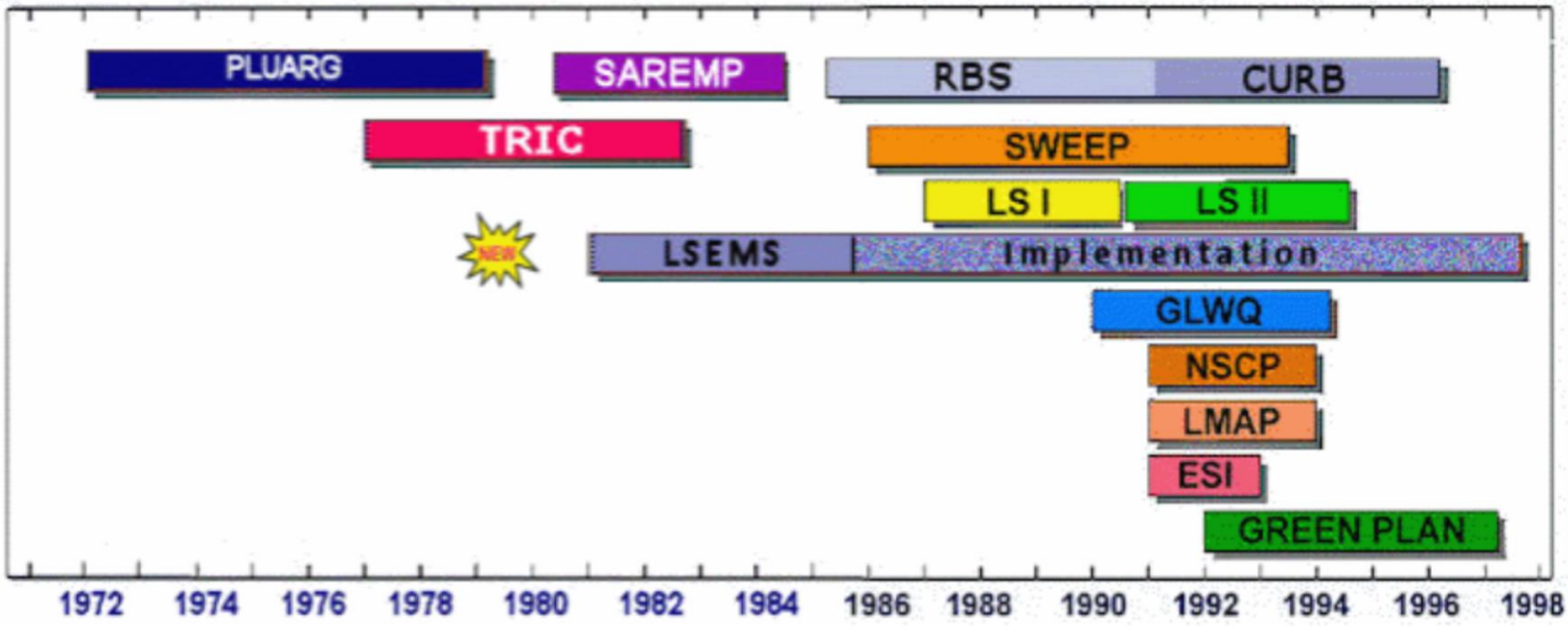
1985

Required reduction of 200T/yr to be met by 400,000 ha of vulnerable cropland converted to conservation tillage; **$30M** allocated to program

Fed./Prov. Soil and Water Environmental Enhancement Program (SWEEP)

1986-1992

Implementation of the P Load Reduction Plan for Ontario Agriculture



PLUARG	Pollution from Land Use Activities Reference Group	LS I / LS II	Land Stewardship Program
TRIC	Thames River Implementation Committee	GLWQ	Great Lakes Water Quality Program
SAREMP	Stratford - Avon River Environmental Management Project	NSCP	National Soil Conservation Program
RBS / CURB	Rural Beaches Strategy / Clean Up Rural Beaches	LMAP	Land Management Assistance Program
SWEEP	Soil & Water Environmental Enhancement Program (including Tillage 2000 & OSCEPAP II)	ESI	Environmental Sustainability Initiative
LSEMS	Lake Simcoe Environmental Management Strategy	Green Plan	Canada-Ontario Agriculture Green Plan

SWEEP ORGANIZATION CHART

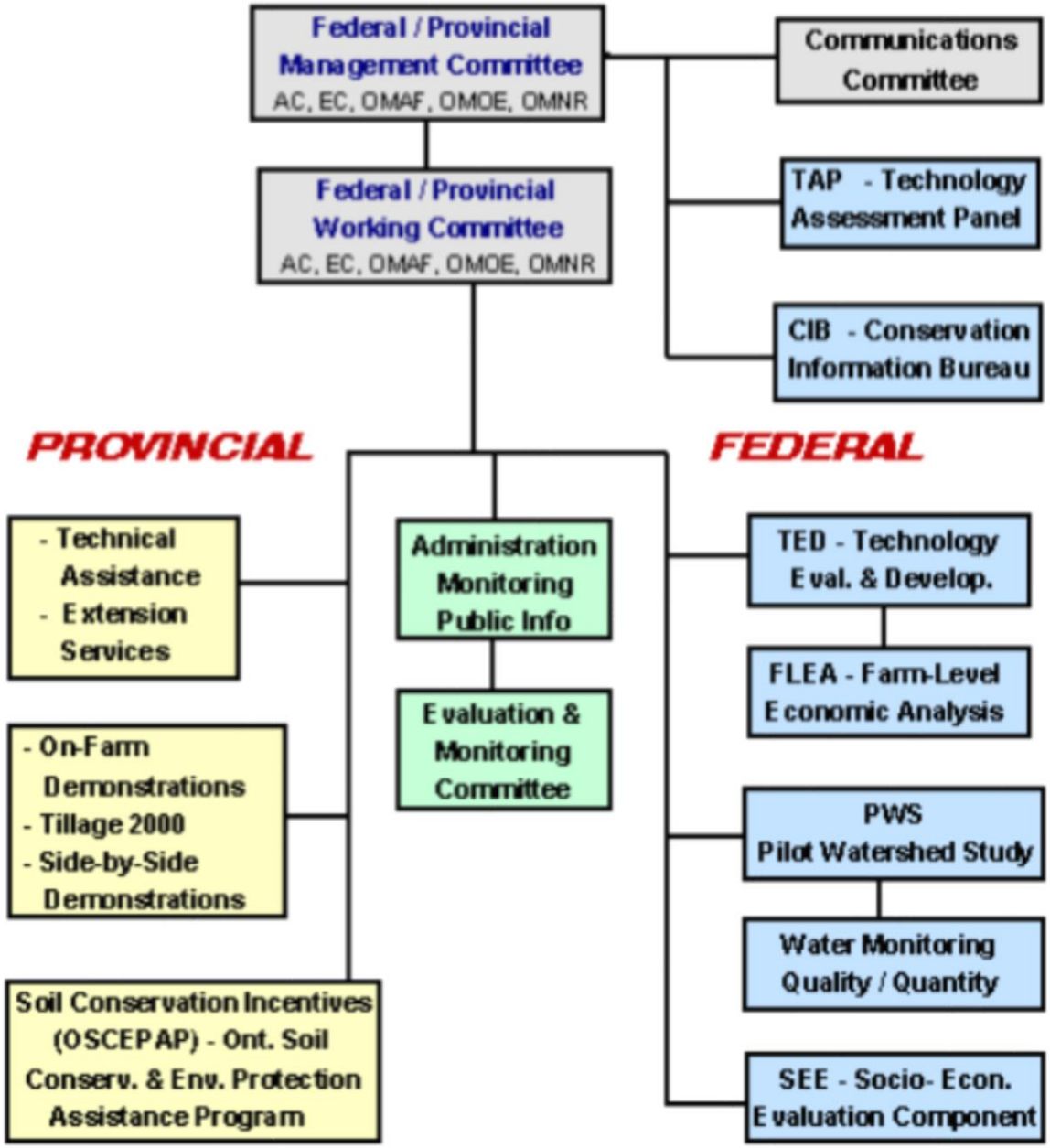


Table 2. SWEEP Sub-Program Funding Allocations and Expenditures

Sub-Program	Federal Contribution	Provincial Contribution	Expenditure
1. Technology Assessment Panel (TAP) + Socio-economic Evaluation (SEE) Conservation Information Bureau (CM) Sub-Total	$1,730,000	Nil	
2. Technology Evaluation and Development (TED)	$6,800,000	Nil	
3. Pilot Watershed Study	$5,250,000	Nil	
4. Local Demonstrations	Nil	$1,750,000	
5. Technical Assistance	Nil	$6,000,000	
6. Soil Conservation Incentives	Nil	$7,000,000	
7. Administration, Monitoring and Public Relations			
Total			$29,945,000
Total Federal SWEEP Expenditures			$14,614,700
Total Ontario SWEEP Expenditures			$15,330,300

Report: SUP-3 - An Evaluation of the Soil and Water Environmental Enhancement Program (1993)

Lessons learned

- **Setting targets**
  - Science-based, clearly defined, and achievable
- **Getting buy-in from farmers**
  - Collaborative, economically viable, identified targets
  - Present a reasonable challenge and they will try meet it
- **Establishing a program/acquiring funding**
  - Long-term planning/funding versus crisis management
- **Governance (SWEEP)**
  - 1. Define the goals
  - 2. Delegated the authority & associated funds to do the job
  - 3. Evaluate performance/success
- **Role of science/research**
  - Defines the problem and existing state
  - Identifies solutions, targets, critical areas, measures success

Lessons learned

- **Role of political/social climate**
  - International agreements, public awareness → support
  - Sometimes overrides science
- **Measuring success/environmental outcomes**
  - Evaluation design at the start of program
  - Recognize the lag-time in environmental response
- **Things that resulted in change on the ground**
  - $$ and people; extension ←→ on-farm research
- **Things not used that were limited**
  - Targeting
- **Things that have changed for today**
  - Voluntary programs may not work; monitoring (lack) extension/communications; technology
  - Political/social climate ?

Then & Now

- 1970 – IJC documented a problem
- 1972-1978 – PLUARG defined the problem in detail
- 1980 – strategy developed
- 1983 – quantify and agree to load reduction targets
- 1985 – develop a plan
- 1986-1992 – SWEEP
- **= 16 years to the beginning of SWEEP**

- 2013 – documented problem – eutrophication in Lake Erie
- 2016 – require load reduction allocations
- 2018 – require binational strategies & domestic action plans
- **= 5 years (and the science [PLUARG] piece is missing)**

The Lorax: a social barometer….

- ***"I hear things are just as bad up in Lake Erie."*** *(1971)*
- **…… PLUARG to SWEEP** (1972-1992)
- ***" ….. a body of water that is now,***

  due to great civic and scientific effort, the happy home of smiling fish" … *(1986)*

??

2015

SRG
SOIL RESOURCE GROUP

What we have learned about Agri-Environmental Management Processes

John FitzGibbon
University of Guelph
And
OFEC

Key Criteria for Successful Implementation Measures

* They must be based on "Best Available Science"
* They must be feasible technically and practically possible to implement)
* They must be affordable (economically efficient for both farmers and government)
* They must be effective
* They must be acceptable (fit in with the farm production system)

(Source: Chris Attema)

Management Approaches

* Rules based: a fixed formula for management
* Precautionary : risk management based
* Adaptive: systematic evolutionary based on lessons from implementation
* Mixed approaches using elements from each of the above

Governance Approaches

* Command and Control: linked rules based management
* Co-Regulation: linked to negotiated environmental agreements based on both adaptive and precautionary management
* Self-Regulation: linked to certification and industry based approaches including rules, adaptive and precautionary management
* Stewardship: linked to Best Practices, moral and incentive based management using any of the management approaches.

The need for Collaboration

* Phosphorous efficiency management is complex and subject to significant uncertainty and variability (no silver bullet)
* Involvement of a wide range of stakeholders brings multiple perspectives
* Involvement of both public agencies, private individuals and organizations broadens ownership of programs
* Involvement of a wide range of stakeholders in the development of programs provides an opportunity for communications and trust building
* Collaboration provides an opportunity to resolve differences before a program is implemented

Strategy

1) A strategy is a set of tactics or measures that compliment each other and are used in an adaptive fashion determined by the context in which they are applied.

2) Strategies themselves evolve as the field of action changes

3) Feedback from implementation is an essential part of strategic management

Where to From Here

* We need to agree on what management approach we are going to take.
* We need to work together to develop the initial strategies and tactics.
* They must include all of the sources of phosphorous (agricultural and non agricultural) that are a burden on the environment.
* We need to develop a clear understanding of what we know well, what we are unsure of and what we clearly do not know.
* We must be mindful of the criteria that we have set out, Best Available Science, Feasible, Affordable, Effective, and Acceptable.

Environment Canada Environnement Canada

Canada

RECOMMENDED BINATIONAL PHOSPHOROUS REDUCTION TARGETS FOR LAKE ERIE

July 14th , 2015

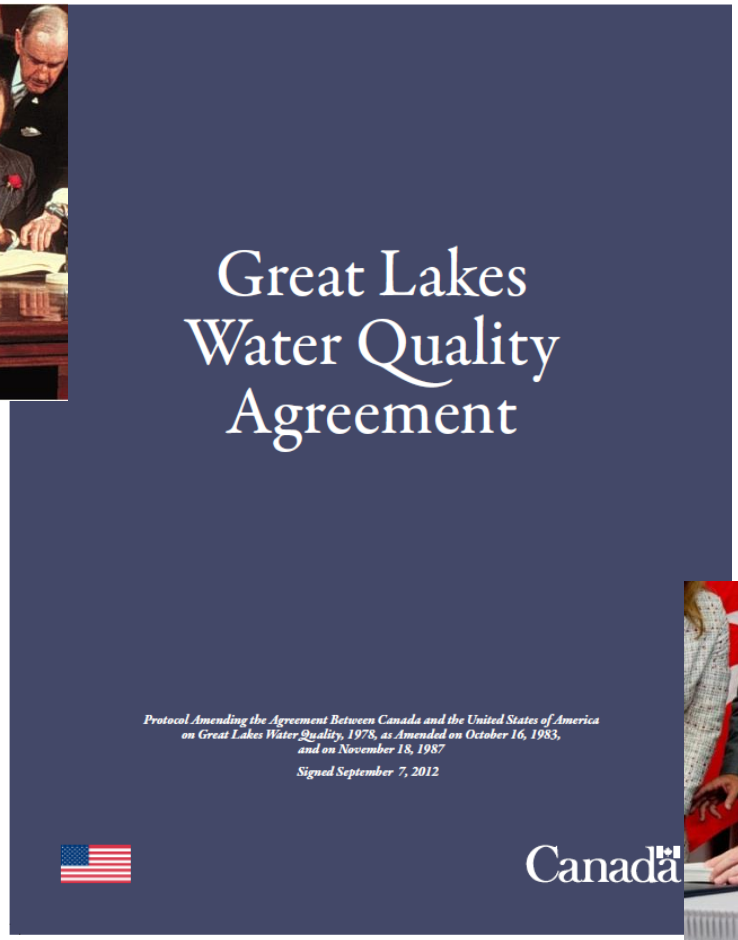
Susan Humphrey – Environment Canada
Sandra George – Environment Canada

Presentation Outline

- GLWQA
- Nutrients Annex
- About Lake Erie
- The problem
- Why phosphorus
- Approach to developing targets
- Targets
- Consultation Questions

Great Lakes Water Quality Agreement

1972



2012

Environment Canada Environnement Canada

Canada

PURPOSE: …to restore and maintain the chemical, physical and biological integrity of the Waters of the Great Lakes

General Objectives

- Free from nutrients in amounts interfere with aquatic ecosystem health or human use
- Free from invasives that adversely impact water quality
- Free from harmful impact of contaminated groundwater
- Free from substances, materials or conditions that may negatively impact chemical, physical or biological integrity

Nutrients Annex

Sets out Lake Ecosystem Objectives

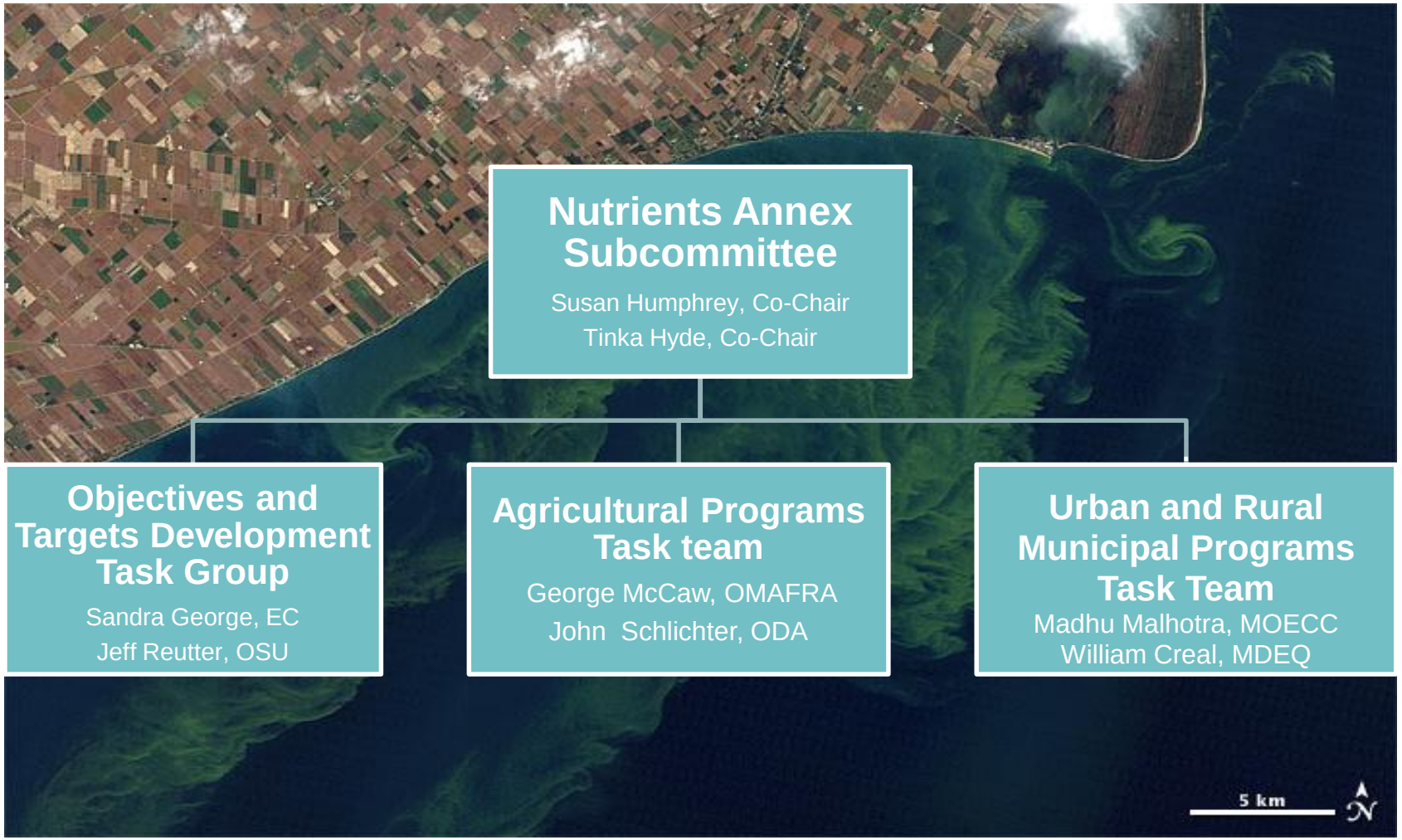
By 2016 and starting with Lake Erie

- Review, revise and/or develop concentration and loadings objectives for offshore and nearshore waters of Great Lakes
- Establish allocations by country
- Establish load reduction targets for priority watersheds that have significant or localized impact

By 2018

- Develop Domestic Action Plans
- Implement P reduction programs

GLWQA Nutrients Annex Governance



Environment Canada Environnement Canada

Canada

Nutrients Annex Subcommittee Member Agencies

Agriculture and Agri-Food Canada

Agriculture et Agroalimentaire Canada

Environment Canada

Environnement Canada

Ministry of the Environment and Climate Change

Ministry of Agriculture, Food and Rural Affairs

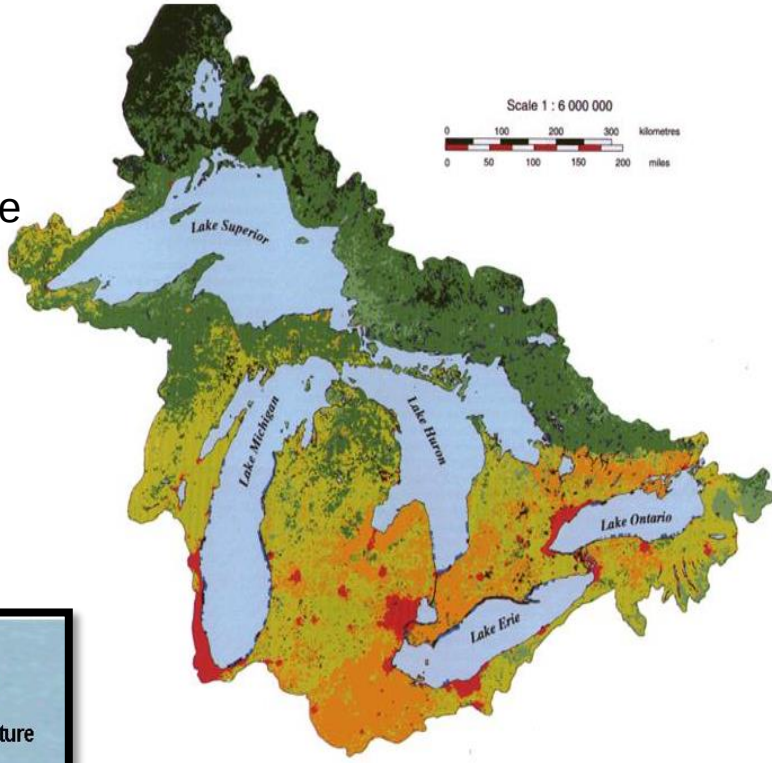
Environment Canada

Environnement Canada

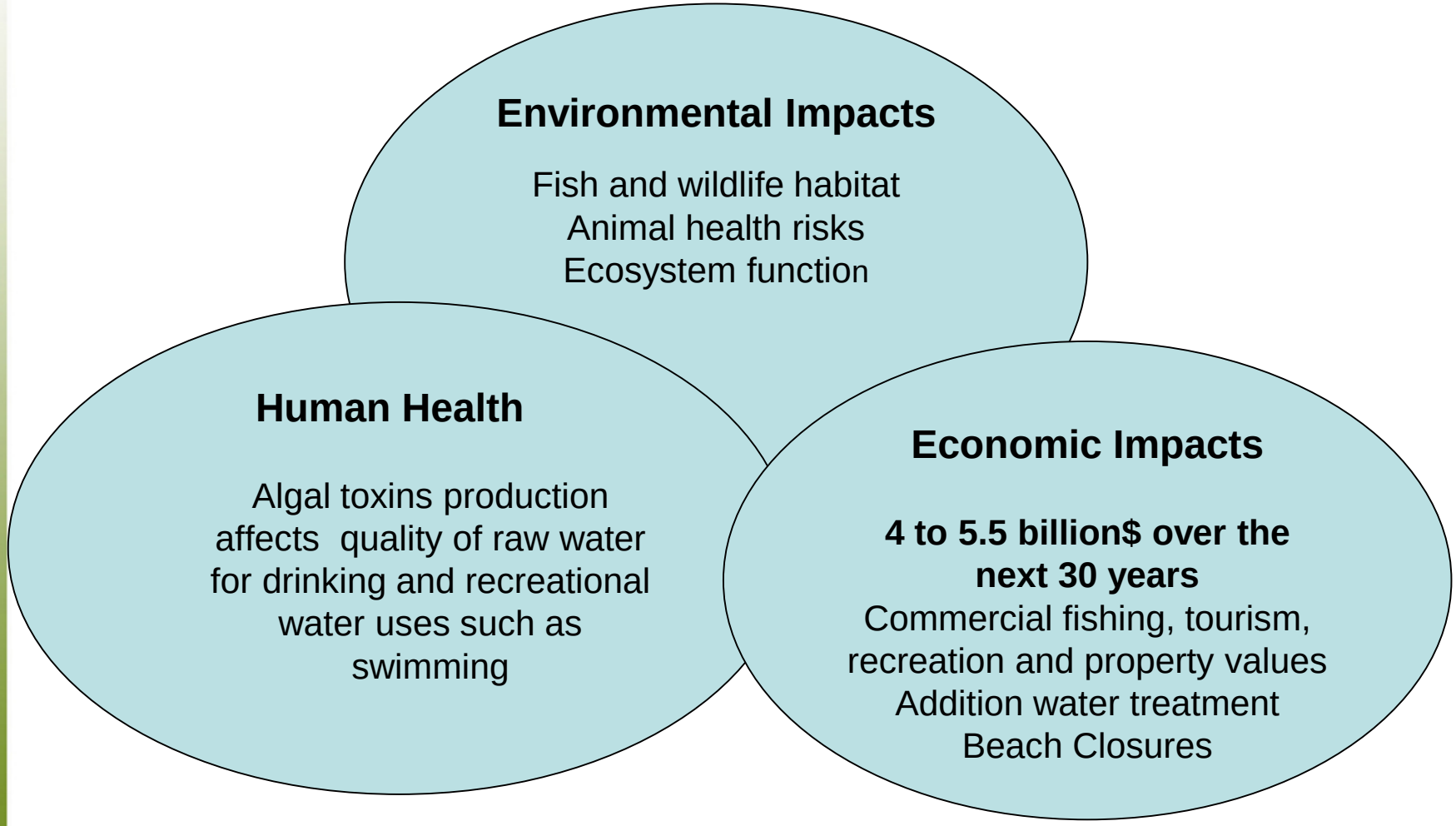
Canada

About Lake Erie

- Shallowest and warmest of the Great Lakes
- Most biologically productive
- 13.5 million people in watershed
- Intensive land use - both urban and agriculture
- Provides drinking water for over 11 million people
- 8 billion gallons/day of treated sewage into Lake Erie and waterways
- 60-80% agricultural landuse
- Many areas of significant ecological interest
- Thriving sports and commercial fishery

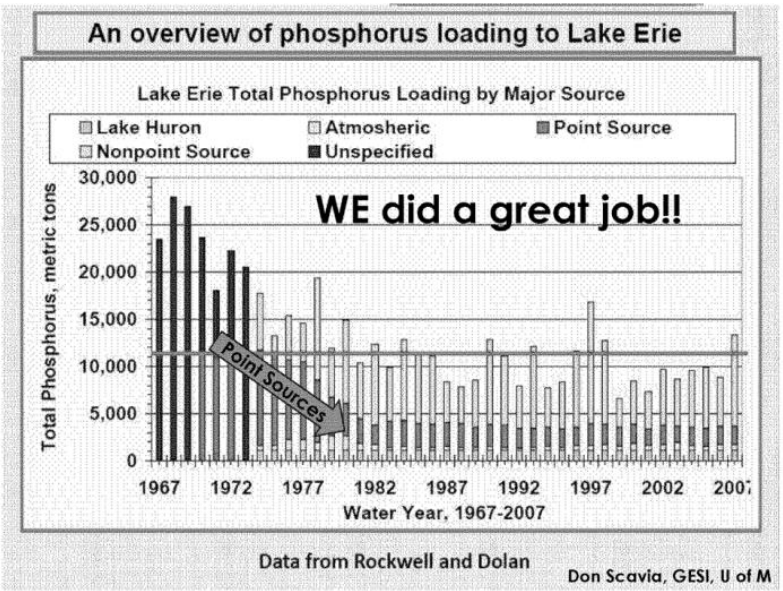


Algal and cyanobacterial blooms in Lake Erie have been increasing since the late 1990s



It's not a New Problem

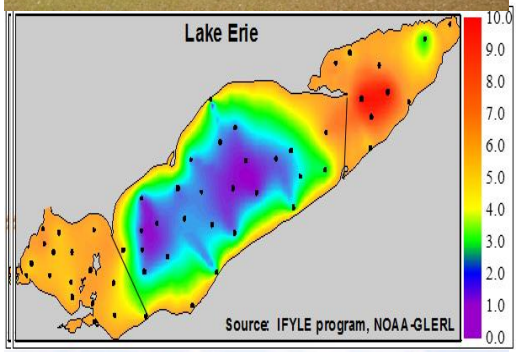
- Harmful and nuisance algal blooms were a significant problem in Lakes Erie, Ontario and Huron in the 1960s and 1970s.
- Major driver for the signing of the first Canada-United States Great Lakes Water Quality Agreement in 1972
  - The Agreement established binational targets for the reduction of phosphorus discharges to the Great Lakes
- Governments responded by:
  - Regulating phosphorus in detergents
  - Investing in sewage treatment
  - Developing and promoting best management practices for agriculture lands

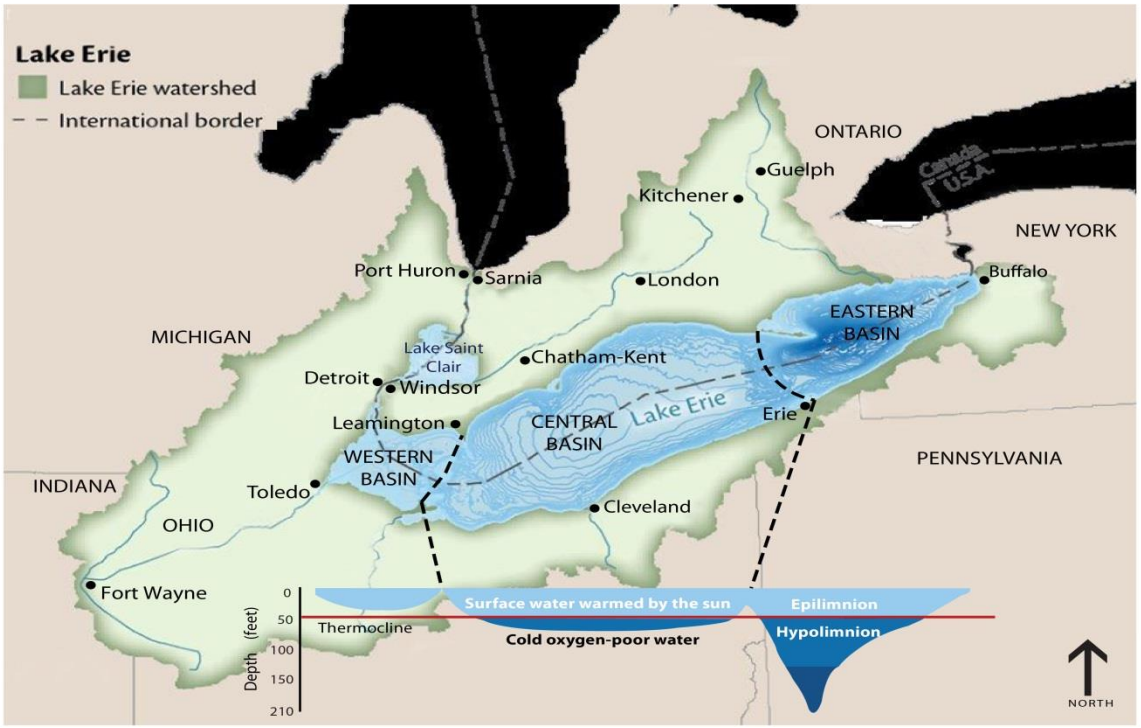


New Factors at Play

- Population growth
  - increased phosphorus discharges from urban and agricultural landscapes due to changes in land use and land management practices
- A Changing Climate
  - increased frequency of severe storms
  - increased temperatures
  - longer growing seasons
- Aquatic Invasive Species
  - changes to water clarity and nutrient flows caused by Zebra and Quagga Mussels
- Bioavailable Phosphorus increasing

Current ecosystem conditions





Recommended Phosphorus Targets

Target Development Process

The Objectives and Targets Development Task Team

- consists of 25 ++ experts from Canada and the US
- Used best available science and modelling

The process

- Evaluated conditions in the lake
- Determined what's limiting algal growth
- Established eutrophication response indicators and selected benchmarks that task groups feels meets the intent of the LEO's :
- Decided on an approach to link P loadings to eutrophication responses - multiple model approach
- Develop load response curves
- Select P loads from curves that meet eutrophication response indicator benchmarks
- Recommended loading targets

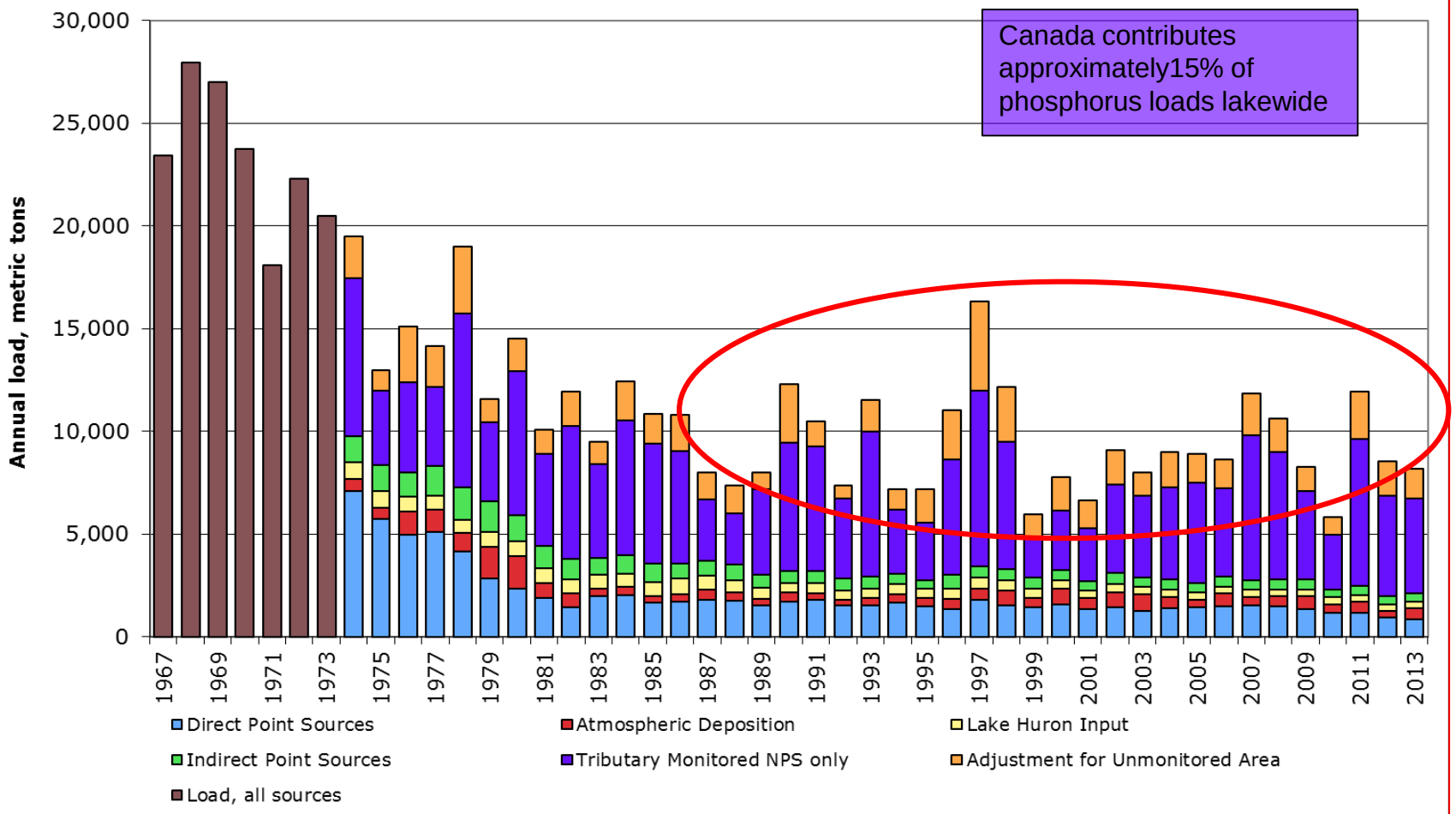
Phosphorus increases aquatic plant growth






However, too much leads to toxic and nuisance algae

Phosphorus Loadings over time



Lake Ecosystem Objectives

Location	Issue	Lake Ecosystem Objective
Central Basin	Low oxygen issues	Minimize the extent of low-oxygen zones (avg. 2mg/l oxygen late summer hypolimnion)
Eastern Basin	Benthic Algae (*Cladophora*)	Maintain the levels of algae below nuisance conditions (biomass 50g/m2 or less)
Nearshore	Blue-Green Algae (Cyanobacteria)	Maintain algal species consistent with healthy aquatic ecosystems in the near shore waters of the Great Lakes. (reduction in nearshore cyanobacteria blooms)
Western basin	Blue-Green Algae (Cyanobacteria)	Maintain cyanobacteria at levels that do not produce concentrations of toxins that pose a threat to human or ecosystem health in the waters of the Great Lakes. (reduced to non-severe levels 9 years out of 10)
Entire lake		Maintain mesotrophic conditions in the open waters of the western and central basins of Lake Erie, and oligotrophic conditions in the eastern basin of Lake Erie.

Proposed Bi-National Phosphorus Load Reduction Targets

Proposed Bi-National Phosphorus Load Reduction Targets		
Lake Ecosystem Objectives Great Lakes Water Quality Agreement Annex 4, Section B	Western Basin of Lake Erie	Central Basin of Lake Erie
Minimize the extent of hypoxic zones in the Waters of the Great Lakes associated with excessive phosphorus loading, with particular emphasis on Lake Erie	40% reduction in total phosphorus entering the Western Basin and Central Basin of Lake Erie – from the United States and from Canada - to achieve 6000 MT Central Basin load	
Maintain algal species consistent with healthy aquatic ecosystems in the nearshore Waters of the Great Lakes	40% reduction in spring total and soluble reactive phosphorus loads from the following watersheds where localized algae is a problem:	
	Thames River - Canada Maumee River - US River Raisin - US Portage River - US Toussaint Creek - US Leamington Tributaries – Canada	Sandusky River - US Huron River, OH – US
Maintain cyanobacteria biomass at levels that do not produce concentrations of toxins that pose a threat to human or ecosystem health in the Waters of the Great Lakes	40 % reduction in spring total and soluble reactive phosphorus loads from the Maumee River (U.S.)	N/A

Addressing Central Basin Hypoxia

Proposed Bi-National Phosphorus Load Reduction Targets		
Lake Ecosystem Objectives Great Lakes Water Quality Agreement Annex 4, Section B	**Western Basin of Lake Erie**	**Central Basin of Lake Erie**
Minimize the extent of hypoxic zones in the Waters of the Great Lakes associated with excessive phosphorus loading, with particular emphasis on Lake Erie	**40% reduction in total phosphorus entering the Western Basin and Central Basin of Lake Erie – from the United States and from Canada - to achieve 6000 MT Central Basin load**	
Maintain algal species consistent with healthy aquatic ecosystems in the nearshore Waters of the Great Lakes	40% reduction in spring total and soluble reactive phosphorus loads from the following watersheds where localized algae is a problem:	
	Thames River - Canada Maumee River - US River Raisin - US Portage River - US Toussaint Creek - US Leamington Tributaries – Canada	Sandusky River - US Huron River, OH – US
Maintain cyanobacteria biomass at levels that do not produce concentrations of toxins that pose a threat to human or ecosystem health in the Waters of the Great Lakes	40 % reduction in spring total and soluble reactive phosphorus loads from the Maumee River (U.S.)	N/A

Addressing Western Basin Blooms

Proposed Bi-National Phosphorus Load Reduction Targets		
Lake Ecosystem Objectives Great Lakes Water Quality Agreement Annex 4, Section B	**Western Basin of Lake Erie**	**Central Basin of Lake Erie**
Minimize the extent of hypoxic zones in the Waters of the Great Lakes associated with excessive phosphorus loading, with particular emphasis on Lake Erie	40% reduction in total phosphorus entering the Western Basin and Central Basin of Lake Erie – from the United States and from Canada - to achieve 6000 MT Central Basin load	
Maintain algal species consistent with healthy aquatic ecosystems in the nearshore Waters of the Great Lakes	40% reduction in spring total and soluble reactive phosphorus loads from the following watersheds where localized algae is a problem:	
	Thames River - Canada Maumee River - US River Raisin - US Portage River - US Toussaint Creek - US Leamington Tributaries – Canada	Sandusky River - US Huron River, OH – US
Maintain cyanobacteria biomass at levels that do not produce concentrations of toxins that pose a threat to human or ecosystem health in the Waters of the Great Lakes	40 % reduction in spring total and soluble reactive phosphorus loads from the Maumee River (U.S.)	N/A

Achieving a healthy aquatic ecosystem in the nearshore

Proposed Bi-National Phosphorus Load Reduction Targets		
Lake Ecosystem Objectives Great Lakes Water Quality Agreement Annex 4, Section B	**Western Basin of Lake Erie**	**Central Basin of Lake Erie**
Minimize the extent of hypoxic zones in the Waters of the Great Lakes associated with excessive phosphorus loading, with particular emphasis on Lake Erie	40% reduction in total phosphorus entering the Western Basin and Central Basin of Lake Erie – from the United States and from Canada - to achieve 6000 MT Central Basin load	
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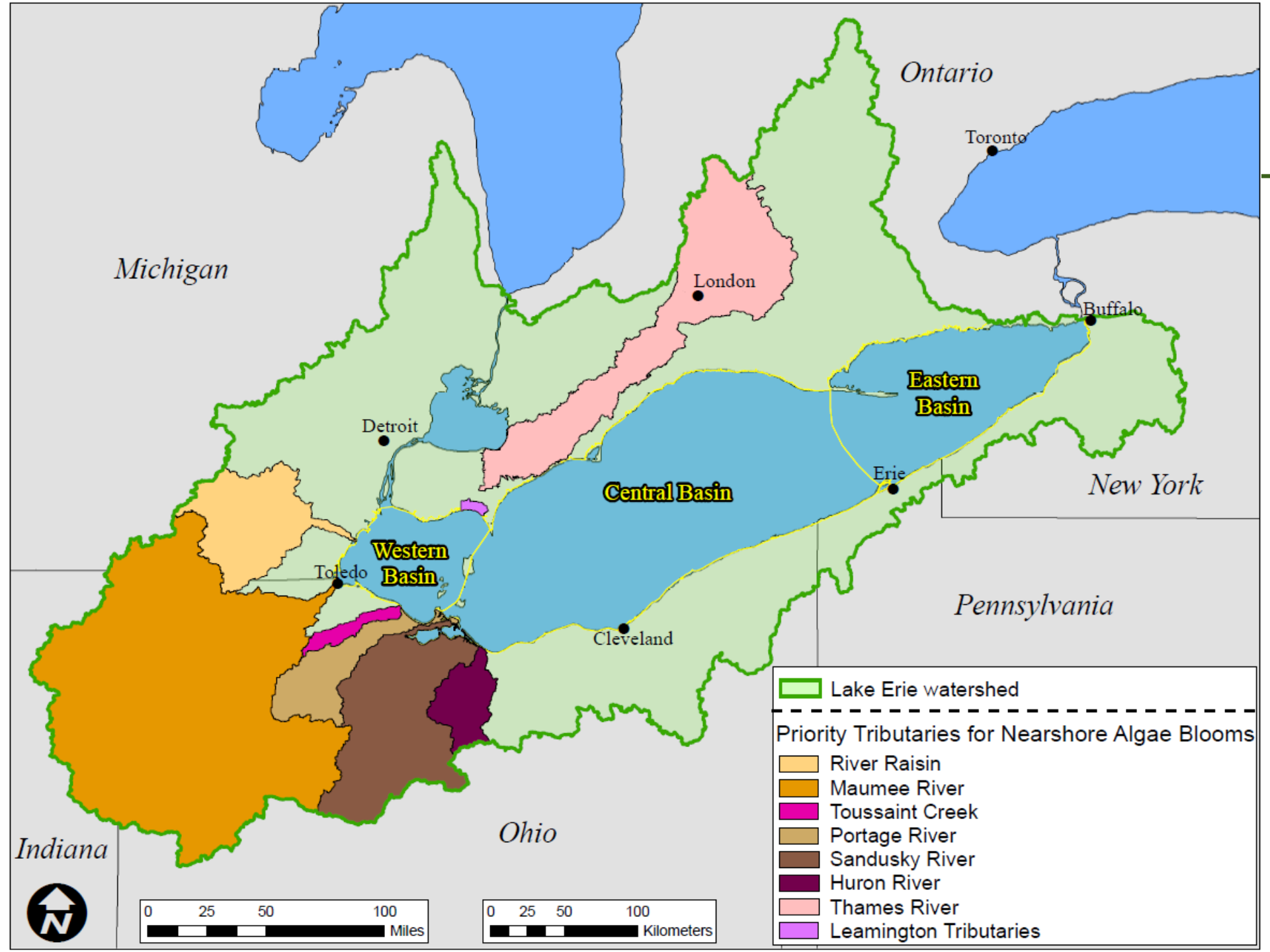
Maintain cyanobacteria biomass at levels that do not produce concentrations of toxins that pose a threat to human or ecosystem health in the Waters of the Great Lakes	40 % reduction in spring total and soluble reactive phosphorus loads from the Maumee River (U.S.)	N/A


Ontario
Michigan
Toronto
London
Buffalo
Eastern Basin
Detroit
Central Basin
Erie
New York
Western Basin
Toledo
Cleveland
Pennsylvania
Ohio
Indiana
Lake Erie watershed
Priority Tributaries for Nearshore Algae Blooms
River Raisin
Maumee River
Toussaint Creek
Portage River
Sandusky River
Huron River
Thames River
Leamington Tributaries
0 25 50 100 Miles
0 25 50 100 Kilometers

Substance Objectives for Total Phosphorus Concentration in the Open Waters of Lake Erie (ug/l)

Basin	Interim Great Lakes Water Quality Agreement Annex 4, Section C	Expected Outcome from Implementation of Proposed Load Reduction Targets
Lake Erie (western basin)	15	12
Lake Erie (central basin)	10	6
Lake Erie (eastern basin)	10	6

Adaptive Management

- Implementation
- Enhanced Monitoring
- Research & Modelling
- Evaluate
- Adjust

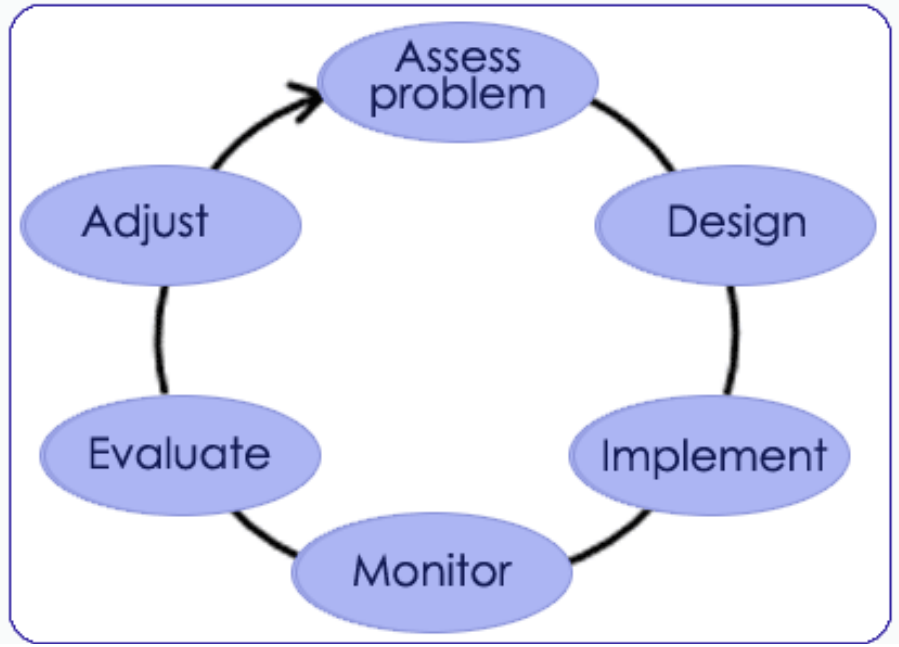


Diagram from U.S. Department of the Interior

Consultation Questions

1. What do you think about the recommended phosphorus reduction targets to reduce cyanobacteria blooms in the western basin to non-severe levels most of the time, minimize hypoxia in the central basin of Lake Erie, and reduce nearshore cyanobacterial blooms?
2. What do you think about our not recommending phosphorus reduction targets for the eastern basin of Lake Erie at this time?
3. What do you think about the watersheds we identified for phosphorus reduction?
4. Is there anything else you'd like to tell us?

For more information

http://nutrientsbinational.net/intro

Discussion

Image: Ohio Sea Grant