

LTVCA

Harmful Algal Blooms, Agricultural Initiatives,
and Research Programs



Harmful Algae Blooms: What You Need to Know

- ▶ Threat to Aquatic Life and Water Quality
- ▶ Threat to local economy (Fisheries, Recreation, Tourism etc.)
- ▶ Sources: both Urban & Rural
- ▶ What's Agriculture's role in the Lower Thames?



Map of Lake Erie Priority Watersheds. Created by U.S. Environmental Protection Agency.

The screenshot shows a CBC News article from Windsor. The headline reads: "Blue-green algae closes nearly all Chatham-Kent beaches". The sub-headline states: "Chatham-Kent Public Health Unit says there is 'intense green water along the shores of Lake Erie and Lake St. Clair'". The article is dated July 11, 2013, at 11:45 PM ET. Below the text is a satellite-style image of a lake with a large area of green water. To the right of the image are social media sharing icons for Facebook, Twitter, and YouTube, along with a "Stay Connected with CBC News" section. At the bottom right, there is a promotional banner for "ALAMOS" with a "SAVE \$1.00" offer.

Recent Conditions Observed

Since early 2000

Mats of cladophora (filamentous green algae) fouling Erie shorelines

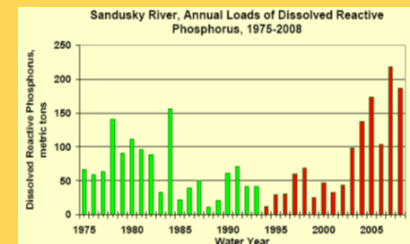
USA Tributaries: Ever rising concentrations of Soluble Reactive P (SRP) Loadings



2011

Concentration of *Mycrocystis* cyanobacteria toxin microcystin in the open waters of Western Basin of Lake Erie:

- 50X higher than WHO limit for safe body contact
- 1200X higher than safe drinking water limit



2012

Largest hypoxic (low oxygen) area observed (8800 km²) since 2000

Dead fish along 40 km of shoreline (Erieau - Port Stanley)



2014

August - Toledo, Ohio closed due to algal toxins. Incident affects water supply of more than 500,000 people



Source: Kevin McKague (OMAFRA) - 2016



Lake Erie in 2013 (approx. 25 km off shore) – Austin Pratt

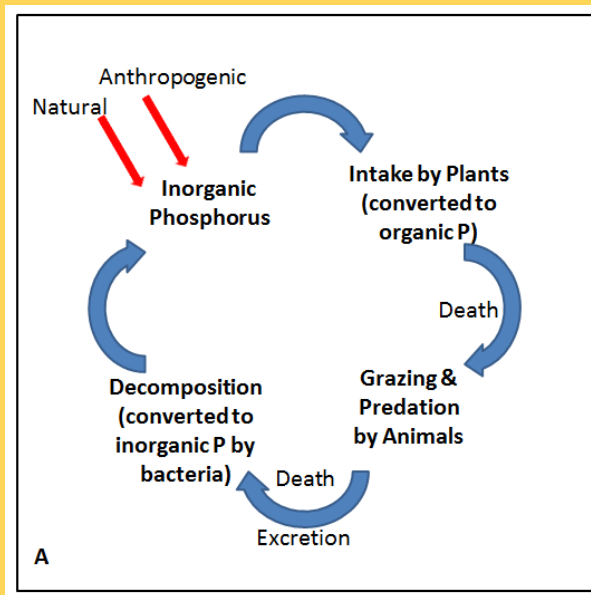
Harmful Algae Blooms – Why?

- Soluble Reactive P (SRP) levels have increased due to industrial and municipal sources as well as surface runoff from agricultural practices. (IJC Lake Erie Ecosystem Priority Report 2014)
- Recent research indicates Dreissenid mussels (Zebra and Quagga mussels) have changed the ecological processing of P in the Great Lakes. (Steinmetz 2015)
- These mussels are very efficient at removing suspended particulate matter, allowing sunlight to penetrate deeper.
- The increased sunlight along with current levels of SRP entering the waters now act as “steroids”, boosting algae, cyanobacter and littoral zone plant growth. When algae and plants die, their decay leads to large amounts of reactive P release and increased lake hypoxia.

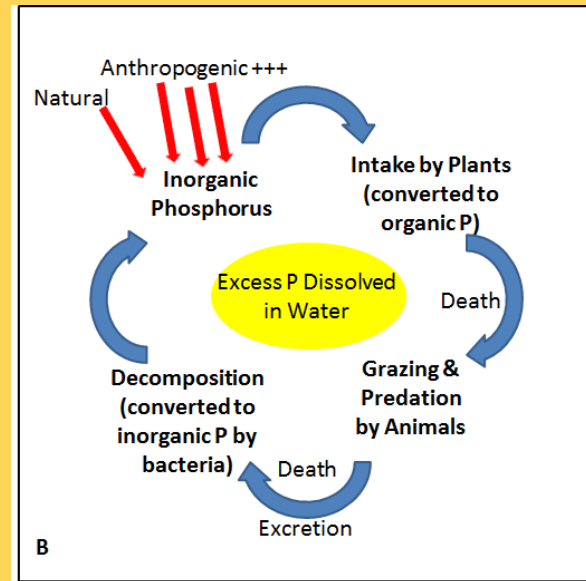


Harmful Algae Blooms – Why?

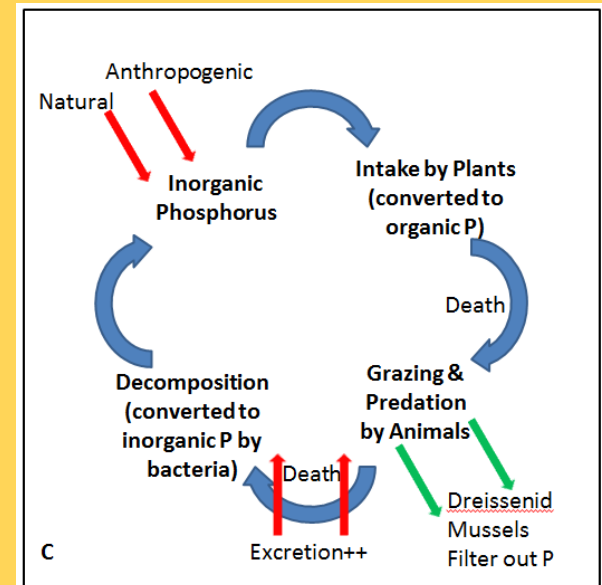
- Particulate P processing has also changed in the lakes. Formerly particulate P was left in suspension and carried to the deep waters of the limnetic zone, where it slowly became a nutrient made available by lake “turnover” events. Current research is showing Dreissenid mussels may be speeding up the process, increasing available nutrients at a faster rate.



A. Natural P Cycle



B. Increased pollution by humans, as observed during 1970's and now



C. Dreissenid mussel effect on P Cycle

Modified by Steinmetz 2015 from:
<http://www.uky.edu/WaterResources/FF/Nutrient%20Management/question01nutrient.html> The Phosphorus Cycle in Natural Waters, University of Kentucky, date retrieved: March 7, 2015

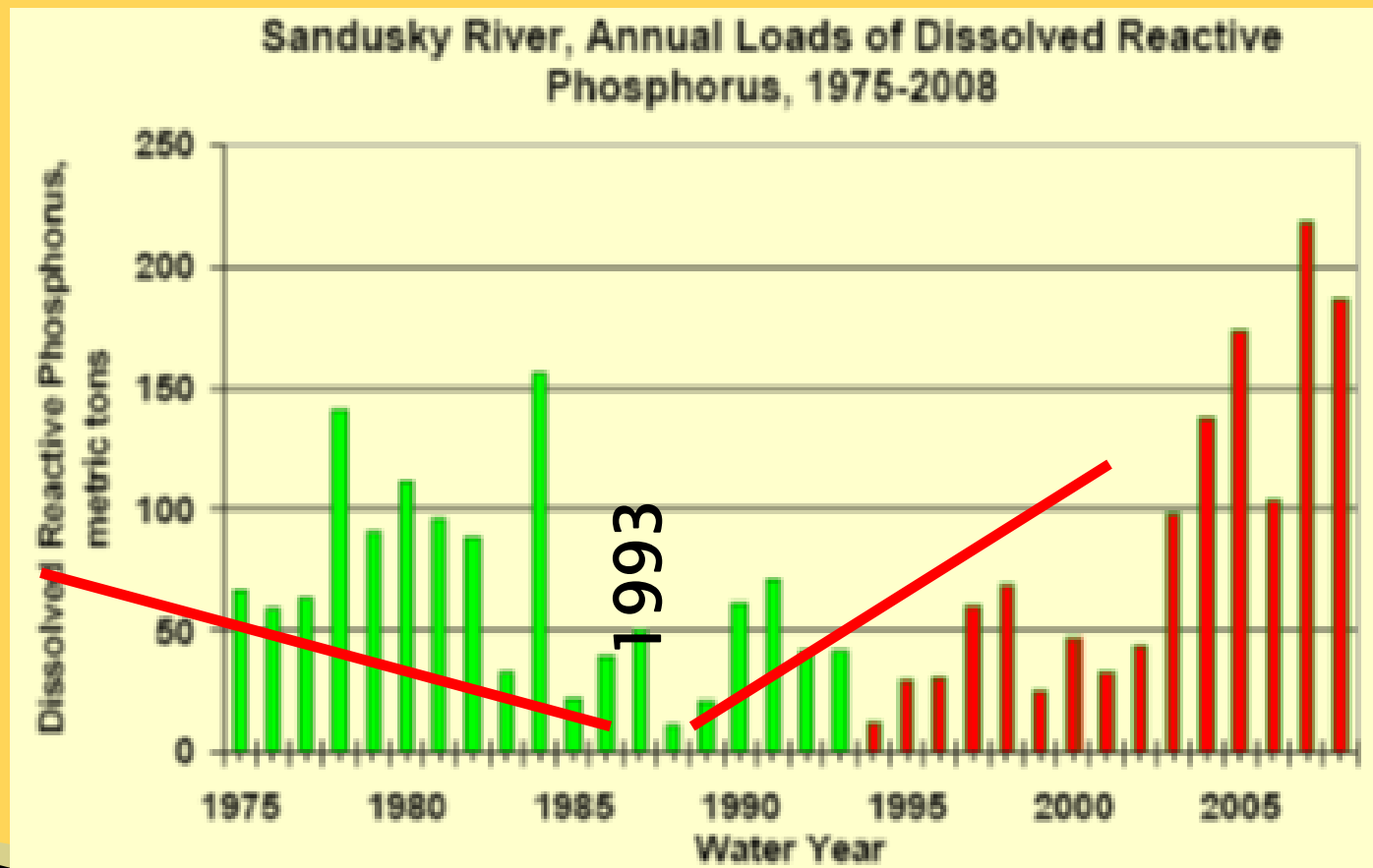
Harmful Algae Blooms – Why?

Climate Change:

- Precipitation events are increasing in volume per event, causing increased surface runoff.
- Air and water temperatures are increasing. Ice is not forming on the Great Lakes. This means lake stratification begins earlier and lasts longer, allowing upper levels to produce more algae and cyanobacteria. (IJC LEEP Report 2014)
- The lake bottom remains hypoxic for longer periods of time. Without dissolved oxygen present, release of phosphorus from sediments, known as ‘internal loading,’ can occur. (IJC LEEP Report 2014)

What Do We Know About Lake Erie P Loadings?

SRP Loading Fraction on the Rise (USA Tributaries)



Source: Kevin McKague (OMAFRA) – 2016

Government Response

USA/Canada



- Signed 2012 Great Lakes Water Quality Agreement (**GLWQA**)
- Stipulated revising binational phosphorus reduction targets by February 2016
- Recommended 40% reductions for Western Basin of Lake Erie by 2025

- Identified Thames River Watershed & Leamington Tributaries

Canada/Ontario Agreement (COA)

- Outlines how federal and provincial gov'ts will work together to address the problem

LTVCA Agricultural Initiatives

- ▶ Agricultural Specialist hired
- ▶ GLASI: Priority Subwatershed Project initiated
 - Jeannette's Creek
 - McGregor Creek subwatershed Education & Outreach
- ▶ LTVCA: Greening Partnership
- ▶ Rondeau Bay Phosphorus Monitoring Program
- ▶ Rondeau Bay Erosion Potential Mapping



GLASI Priority Subwatershed Project

LTVCA: Jeannettes Creek Agricultural Phosphorus
Reduction and Monitoring Program

What is GLASI?

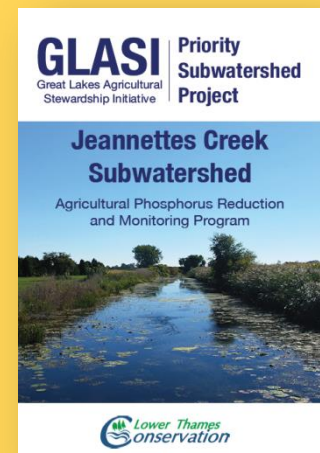
Great Lakes Agricultural Stewardship Initiative

- 3 Goals:
 - Improve Soil Health
 - Improve Great Lakes Water Quality
 - Improve Pollinator Health
- **Funding:**
 - Provided through Growing Forward 2
 - Provincial and Federal Initiative

Delivered By Ontario Soil and Crop Improvement Association (OSCIA)

GLASI: Priority Subwatershed Program

- ▶ Jeannettes Creek Agricultural Phosphorus Reduction and Monitoring Program
 - Purpose:
 - Evaluate the effectiveness of a targeted stewardship approach at achieving measurable improvements to soil health and water quality.



Key Components of the Program

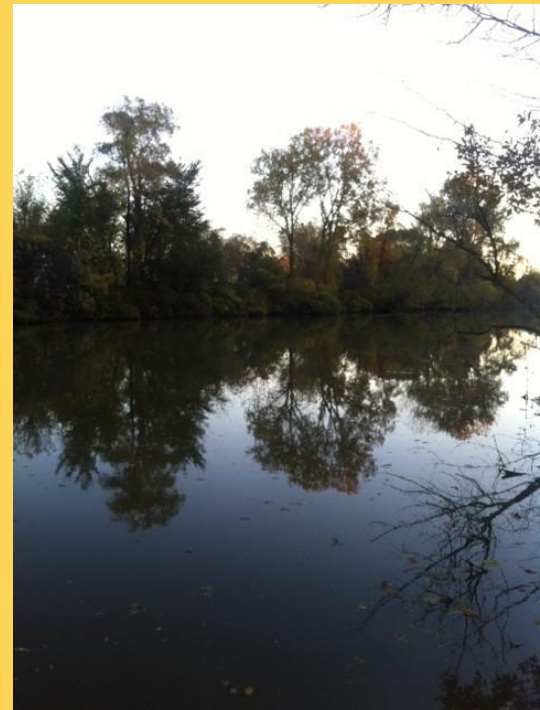
1. Implement targeted BMPs with subwatershed farmers
2. Monitor and observe the effectiveness of these BMPs at reducing P loss over a 2 year period
3. **We Want to Answer the Question:**
“What is the cost to reduce phosphorus loss from the agricultural landscape (in \$/kg of reduction) using a targeted stewardship approach?”

GLASI: Priority Subwatershed Program

- ▶ What BMPs are Supported?
 - Cover Crops
 - Alternative Phosphorus Application Practices
 - Crop and Field Nutrient Management Plans

Program Monitoring

- ▶ Edge of Field Monitoring of BMPs
 - 2 monitoring sites planned with local farmers



ISCO Auto-Sampler

- Samples during significant rain or flow events.
- 24 samples during event determine various chemical concentrations discharged into Jeannettes Creek.
- Five samplers to be operational by summer of 2016.



What will we be monitoring?

- ▶ Water Quality (Nitrates, SRP, TP, TSS)
- ▶ Water Quantity (Flow, total volume)
- ▶ Weather (Rainfall, Snowfall, Temp, Wind Speed, ect..)
- ▶ Soil Temp and Moisture
- ▶ Soil Characteristics (NPK, CEC, Organic Carbon)
- ▶ Land Use Practices (ex) Tillage vs. No-Till & P application practices, soil coverage)

GLASI: BMPs

- ▶ **Cover Crops** can be utilized to:
 - ▶ Prevent soil erosion
 - ▶ Retain nutrients
 - ▶ Combat weeds / pests
 - ▶ Improve soil health / structure
 - ▶ Promote biodiversity

Jeannettes Creek Cover Crop Cost-Share Structure		
Targeted BMP	Eligible Activities	Eligible Cost Share*
Cover Crop Planting and Establishment	1 - 2 Species Mix	60%
	3 - 7 Species Mix	70%
	8+ Species Mix	80%

GLASI: BMPs

- ▶ **Alternative Phosphorus Application Practices** can be utilized to:
 - ▶ Improve the efficiency of crop nutrient uptake
 - ▶ Reduce susceptibility to nutrient loss
 - ▶ Increase crop yields

Jeannettes Creek Alternative Phosphorus Application Practices Cost-Share Structure		
Targeted BMP	Eligible Activities	Eligible Per Acre Payment
Alternative Phosphorus Application Practices	Banding of Phosphorus at Planting	\$25 / acre
	Incorporation of Phosphorus at time of application	\$15 / acre
	Variable Rate Application of Phosphorus	\$20 / acre
	Below Canopy Application	\$20 / acre

GLASI: BMPs

Crop and Field Nutrient Management Plans

▶ A Certified Crop Advisor will make recommendations based on:

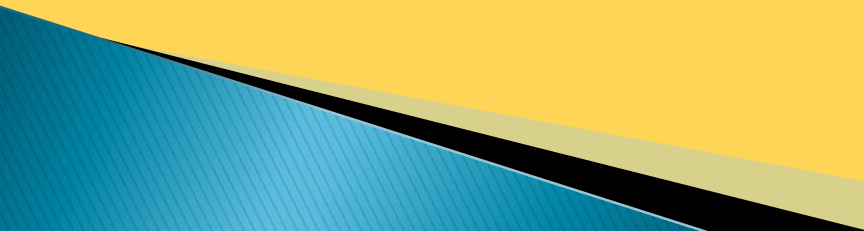
- Nutrient source
- Application rate
- Application timing
- Nutrient placement

Certified Crop Advisor consults are free of charge and available through the GLASI Farmland Health Incentive Program.

What Are the Desired Outcomes?

- ▶ Determine the effectiveness of the specific BMPs
 - Cover Crops
 - Alternative Phosphorus Application Practices
- ▶ Determine how Pump Schemes effect P loads
- ▶ Leverage the success of the program to offer similar cost-shares and BMP verification programs watershed wide

What is the value to farmers?

- ▶ Opportunity to improve local water quality and soil health.
 - ▶ Chance to implement new practices at a significantly reduced financial burden.
 - ▶ Improve long term financial and ecological sustainability of farm operations.
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Take Home Message

- ▶ Phosphorus & sediment loading is an issue that is not going away without action.
- ▶ Agriculture BMPs will be an essential part of the solution for us to achieve the 40% reduction goal by 2025.
- ▶ LTVCA is here to work with farmers to provide expertise and financial support to implement BMPs.

Questions?

LTVCA CONTACT INFORMATION

If you are interested in implementing a Best Management Practice on your farm through the Jeannettes Creek Priority Subwatershed Program please contact

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