



**Binational Efforts to manage nutrient inputs
to the Great Lakes**

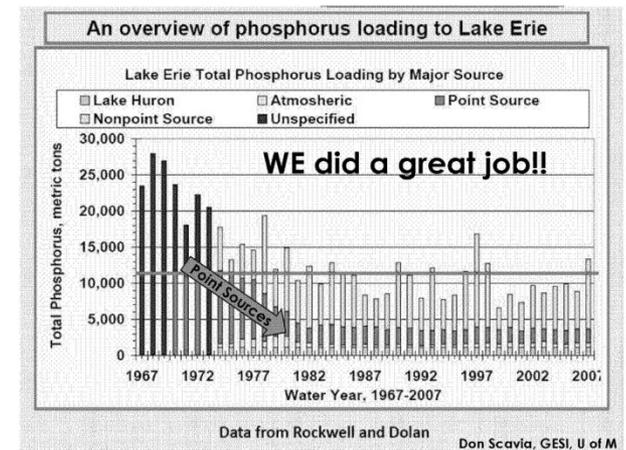
**Tinka Hyde, EPA Region 5
Nutrients Subcommittee Co-Chair**

**Presentation to EPA Science Advisory Board
December 10, 2014**

Harmful and Nuisance Algal Blooms

...it's not a new problem

- Blooms were a significant problem in Lakes Erie, Ontario and Huron in the 1960s and 1970s.
 - Environmentalists declared Lake Erie “dead”
- The algae issue was a 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, and developing and promoting best management practices for agriculture lands.



Harmful and Nuisance Algal Blooms

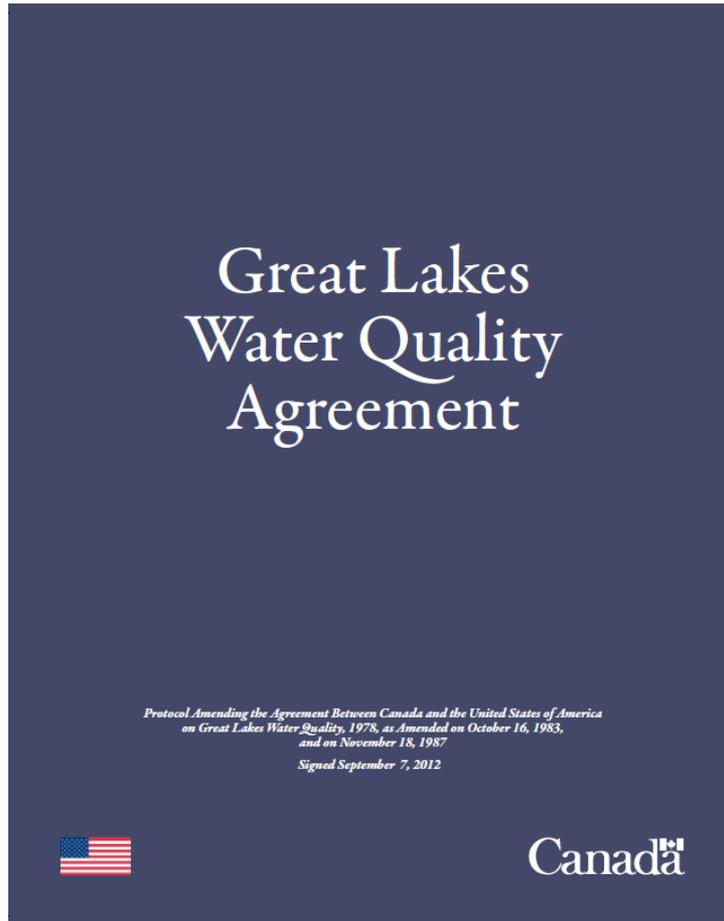
...have been increasing in Lake Erie since late 1990's

Causes and Sources:

- nutrient (especially phosphorus but also nitrogen) discharges from urban and agricultural landscapes due to changes in land use and land management practices and population growth
- increased frequency of severe storms
- changes to water clarity and nutrient flows caused by Aquatic Invasive Species (Zebra and Quagga Mussels)
- increased temperatures
- longer growing seasons



The 2012 GLWQA includes commitments to develop new phosphorus targets and action plans



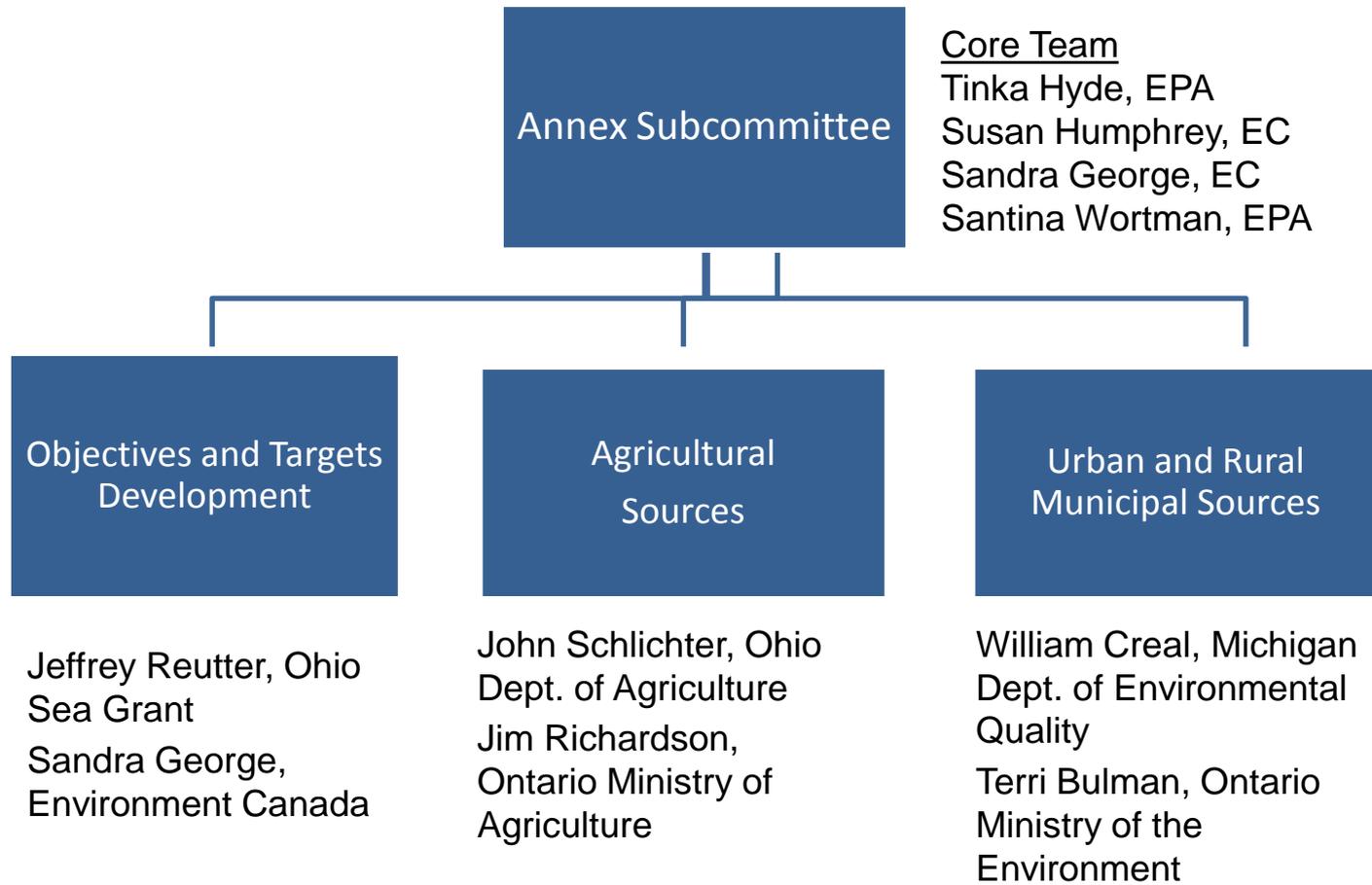
Starting with Lake Erie by 2016

- Determine phosphorus concentration objectives and loading targets for open waters and nearshore areas including embayment's and tributaries
- Determine loading allocation by country and identify priority watersheds for load reduction

Starting with Lake Erie by 2018

- Assess effectiveness of programs to achieve the Substance and Lake Ecosystem Objectives
- Develop domestic action plans and strategies to control nutrients

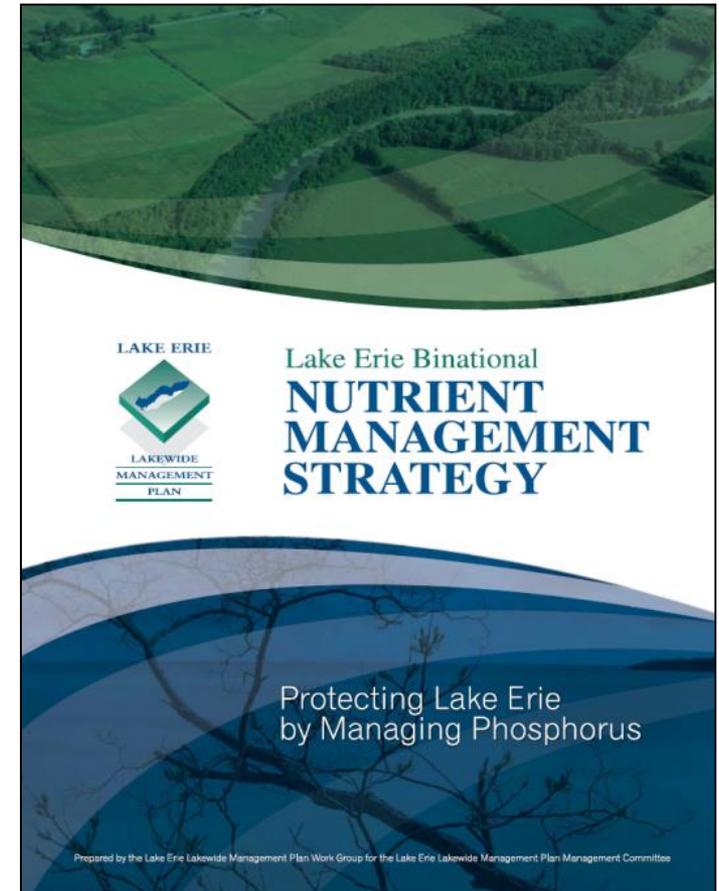
Subcommittee and Task Group Structure



Draft Phosphorus Reduction Strategy Components

Possible Components

- Context and Background
- Phosphorus Objectives and Targets
 - Loading allocations by country
 - Identification of Priority Watersheds
- Planning & Progress
 - Short-term: Interim Action Plans under discussion
 - Long-term: Domestic Action
- Adaptive Management
 - To manage uncertainty
 - Respond to new information



Targets & Objectives

- Ensemble modeling used to establish targets and objectives
- Modeling directly linked to achieving Lake Ecosystem Objectives (paraphrased from agreement)
 - Maintain **healthy** nearshore and offshore **algal communities**
 - Algal **biomass does not pose nuisance** conditions
 - **Reduce** extent of **hypoxic zones** associated with algal blooms,
 - Cyanobacteria **toxins do not pose human health risk**
 - Maintain **mesotrophic** conditions in **Western Basin and Central Basin**
 - Maintain **oligotrophic** conditions in **Eastern Basin**

**Note: The bolded terms are being defined*



Eutrophication Models

Model	Response Indicators			
	Overall phytoplankton biomass	Western Basin cyanobacteria blooms	Central Basin hypoxia	Eastern Basin Cladophora (nearshore)
NOAA Western Lake Erie HABs (Stumpf)		X		
U-M/GLERL Western Lake Erie HABs (Obenour)		X		
TP Mass Balance Model (Chapra, Dolan, and Dove)	X			
1-D Central Basin Hypoxia Model (Rucinski)	X		X	
Ecological Model of Lake Erie (EcoLE) (Zhang)	X		X	
9Box model (McCrimmon, Leon, and Yerubandi)			X	
Western Lake Erie Ecosystem Model (LimnoTech)	X	X		
ELCOM-CAEDYM (Bocaniov, Leon, and Yerubandi)	X		X	
Great Lakes Cladophora model (Auer)				X

Schedule

DRAFT P Reduction Strategy and Targets - Tasks	Timeline
USEPA Science Advisory Board Peer Review of Technical Approach (Phase 1)	in progress
Draft Targets & Objectives to GLEC Co-Chairs	April 2015
USEPA SAB Peer Review (Phase 2)	~June – August 2015
Public Engagement on the targets using the draft P Reduction Strategy, and on the draft binational program evaluation criteria	~June - August 2015
Consideration of public engagement input and adjust the targets and criteria as appropriate	~September – November 2015
Final draft Targets & Objectives to GLEC	~ December 2015
Proposed Targets & Objectives	~February 2016

USEPA Science Advisory Board (SAB) Peer Review

Phase I Consultation on the *Draft Technical Approach for Lake Erie Phosphorus Load-Response Modeling*

1. Do the Eutrophication Response Indicators proposed sufficiently address and provide scientific foundation for the Lake Ecosystem Objectives for Lake Erie?
2. Are the models chosen appropriate for representing eutrophication response in Lake Erie? Do they reflect the best available scientific knowledge?
3. Are the models sufficient to provide a scientifically grounded basis for phosphorus load targets for Lake Erie?
4. How can we ensure the P concentration and loading targets are internally consistent with respect to the eutrophication response indicators of concern?

Phase II Peer Review will occur in 2015

Acknowledgements

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Your contributions are greatly appreciated!