

Welland River Eutrophication Study

Josh Diamond

Niagara River Remedial Action Plan (RAP)

Implementation Committee Workshop

November 10th 2010



Outline

- Background
- Study Overview
- Preliminary Results
- Next Steps



Background

Niagara River RAP Stage 1 Report (1993) + Update (1995)

Niagara River RAP Stage 2 Report (1995)

Niagara River RAP Implementation Annex (2000)



Technical Review of Impairments and Delisting Criteria 2004-2006

&

The Niagara River RAP Monitoring (2007)

Eutrophication and Undesirable Algae BUI

Eutrophication & Undesirable Algae

Nutrient Sources Identified:

- NPS-Agricultural Landuse
- Welland STP
- CSOs and Stormwater



Data Gaps Identified

- Response of Welland River to high nutrient inputs
- Turbidity and flow measurement
- Nutrient loadings from tributaries
- The existing Delisting Criteria was recognized as unrealistic

Background

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Technical Review of Impairments and Delisting Criteria 2004-2006

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The Niagara River RAP Monitoring Plan 2007

BUI Eutrophication and Undesirable Algae



Welland River Eutrophication Study (2008-2010)

The Technical Working Group



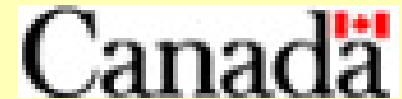
Drew Semple

Sarah Day

Mike Spencer

Tanya Labencki

Mary Ellen Scanlon



Veronique Hiriart-Baer

Martha Guy

Dan McDonell



Fayaz Klan



Valerie Cromie

Josh Diamond

Annie Michaud (now with Niagara College)

Welland River Eutrophication Study

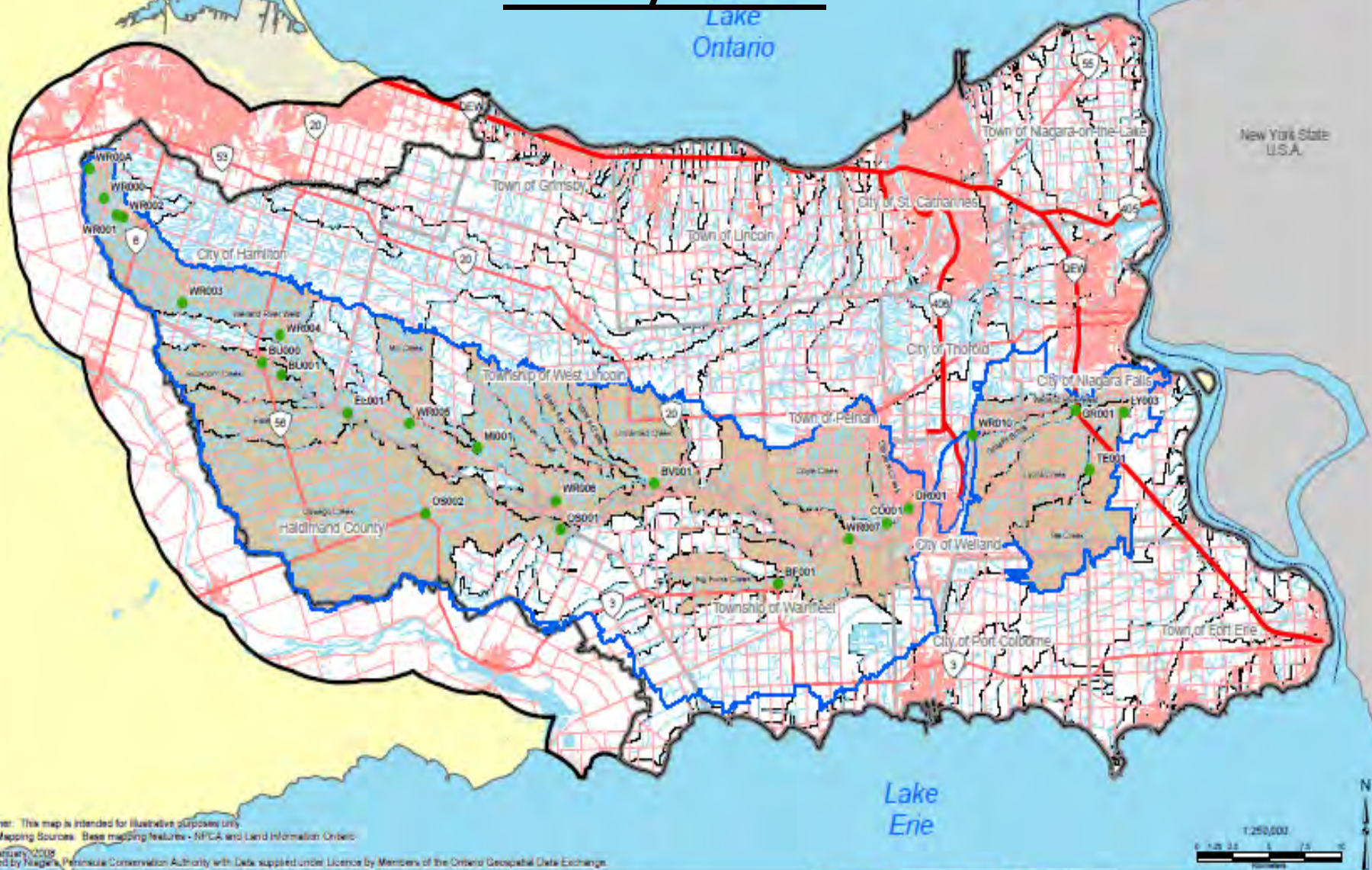
Study Objectives:

1. Characterize the biological response of the Welland River to high phosphorus inputs.
2. Characterize concentrations of plant-available phosphorus versus sediment-bound phosphorus along the length of the Welland River.
3. Develop delisting criteria for the Welland River upstream of the Old Welland Canal which identify the desired conditions in the river with regard to dissolved oxygen and abundance of algae/aquatic plants.
4. Develop phosphorus loading targets for different subwatersheds of the Welland River upstream of the Old Welland Canal to meet delisting criteria.
5. Monitor success in meeting ambient targets for the Welland River through alterations to the existing AOC Tributary Monitoring Program.

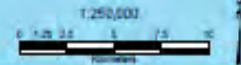
Study Overview



Study Area



Disclaimer: This map is intended for illustrative purposes only.
 Digital Mapping Sources: Base mapping features - NPCA and Land Information Ontario.
 Date: January 2008
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- Legend**
- Extended Context Area
 - NPCA Watershed Jurisdiction
 - Municipal Boundaries
 - International Boundary
 - Major Highways
 - Highways
 - Roads
 - Rivers, Streams, Creeks
 - Ponds, Reservoirs, Lakes
 - NPCA Surface Water Quality Monitoring Stations
 - Sampled Subwatersheds
 - Welland River Watershed



NIAGARA PENINSULA CONSERVATION AUTHORITY
Water Quality Monitoring Program

Welland River Watershed Monitoring Stations 2008

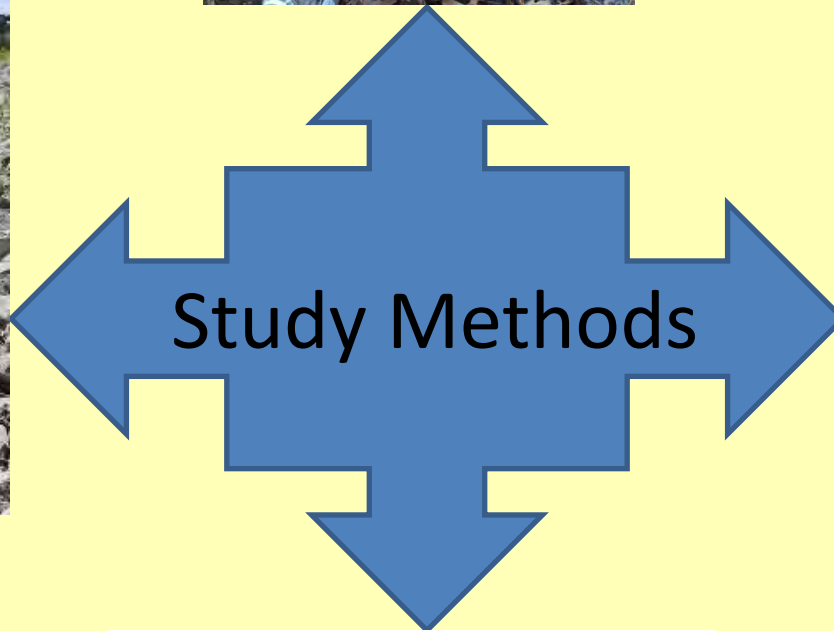
All Frames: North American Datum 1983, Universal Transverse Mercator 0° Projection, Zone 17N, Central Meridian 81° West.



Grab Samples



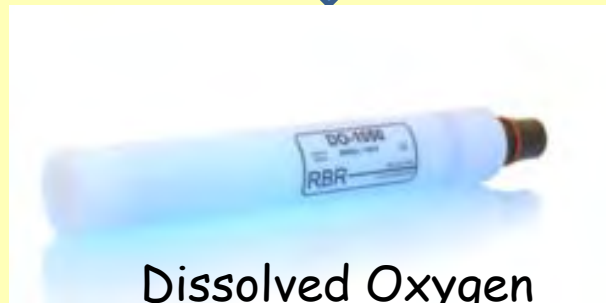
Sediment Samples



Study Methods



Flow Monitoring

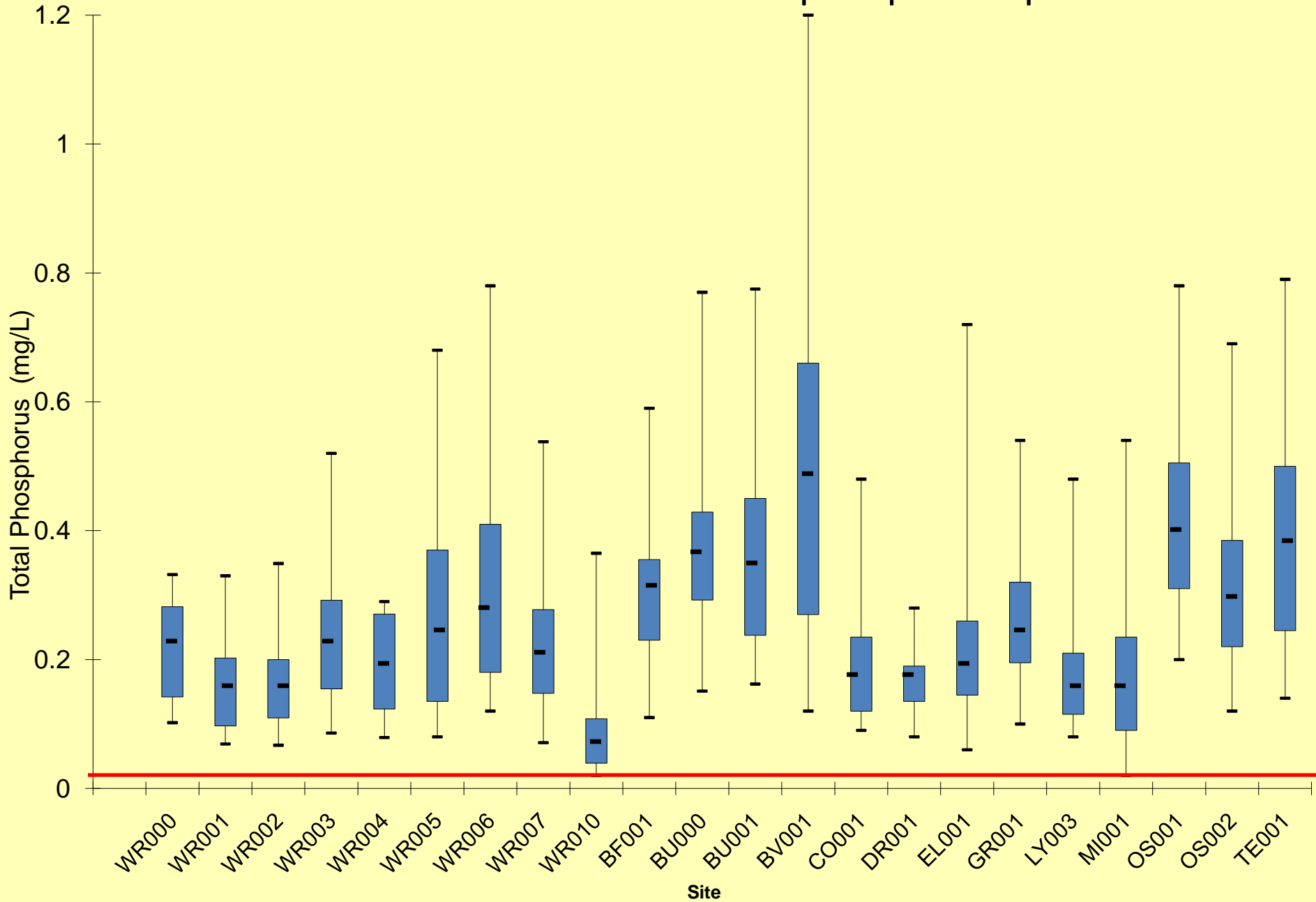


Dissolved Oxygen

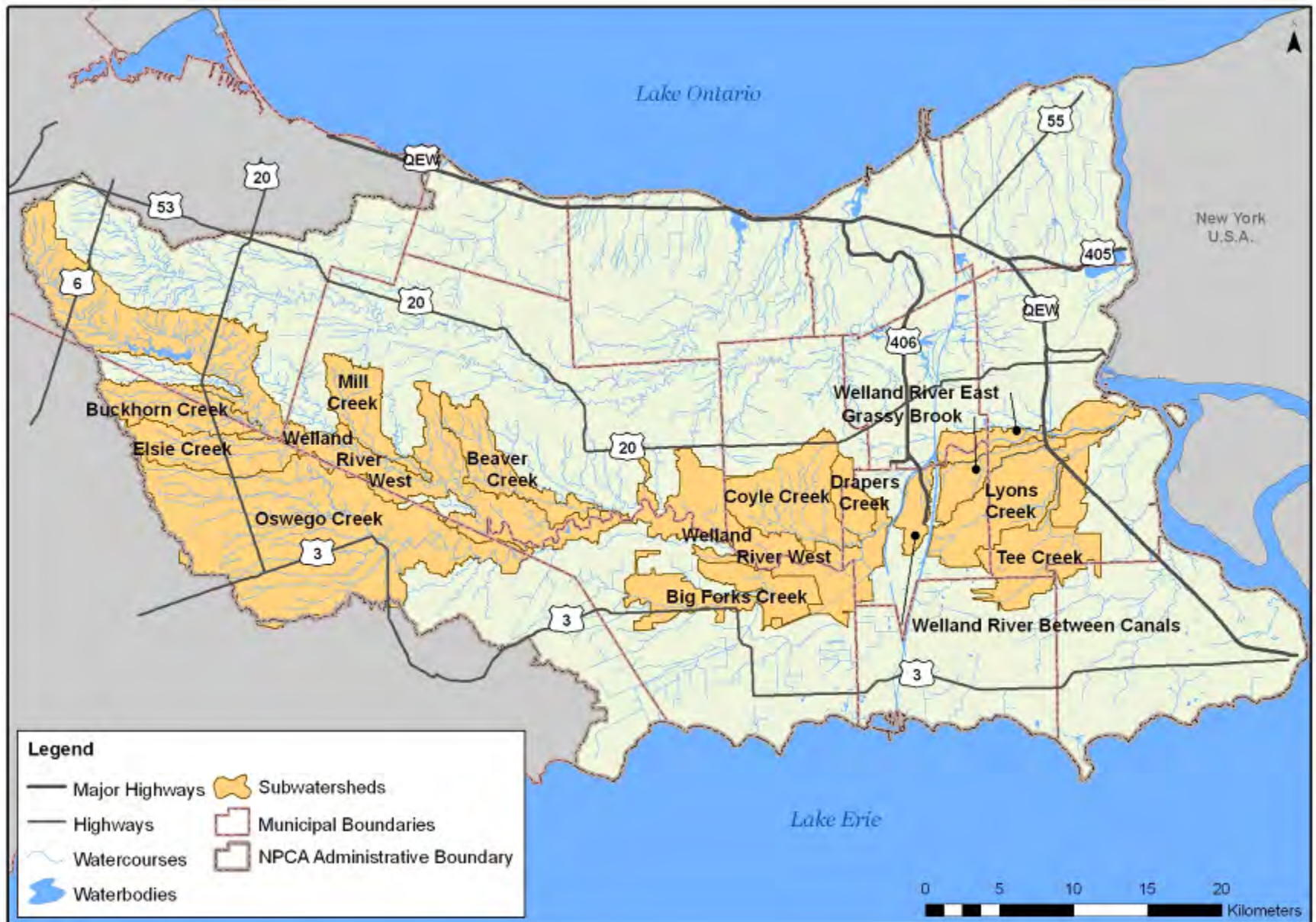
Preliminary Results 2008-2009

Water Chemistry

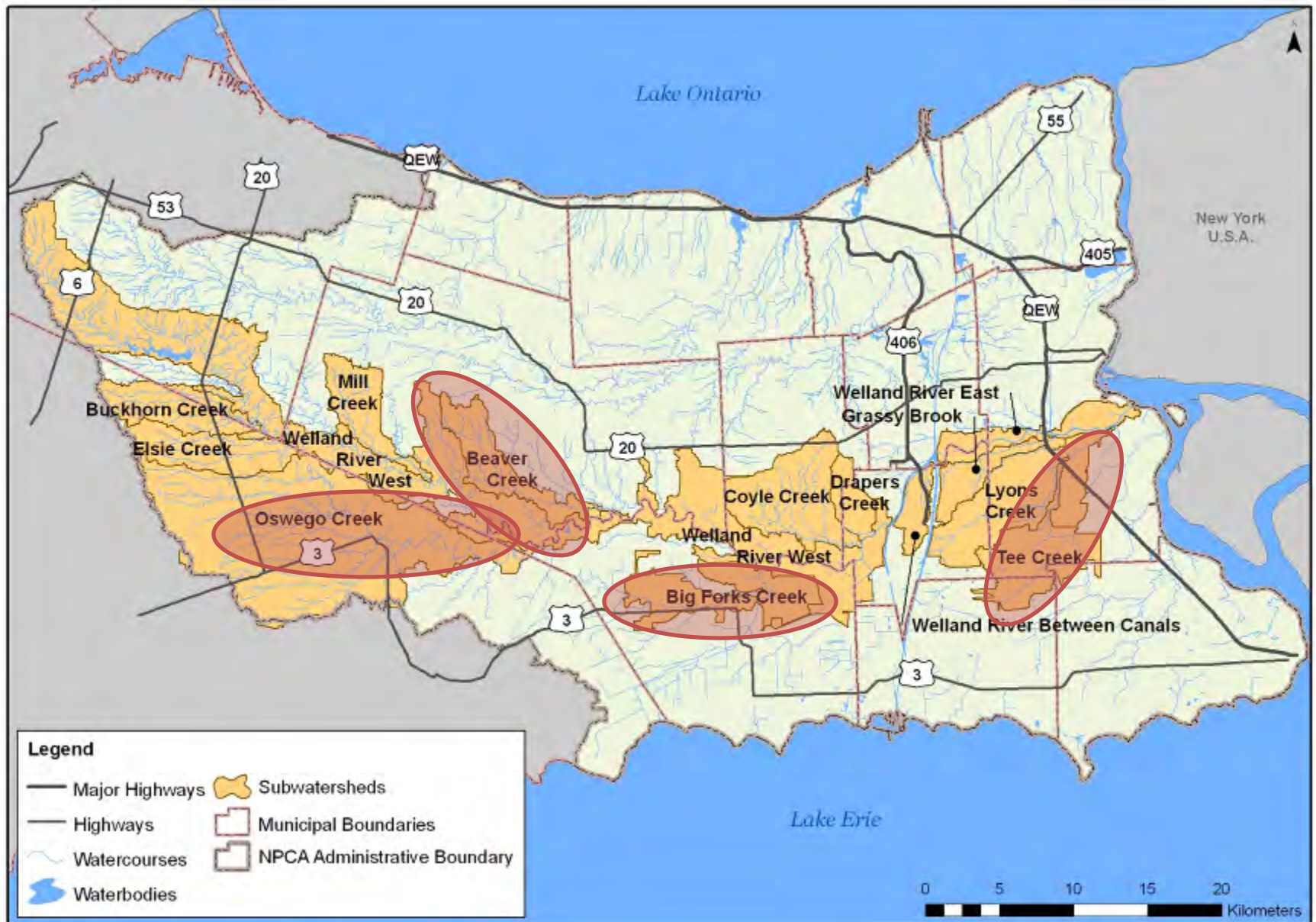
The Welland River watershed has a phosphorus problem.



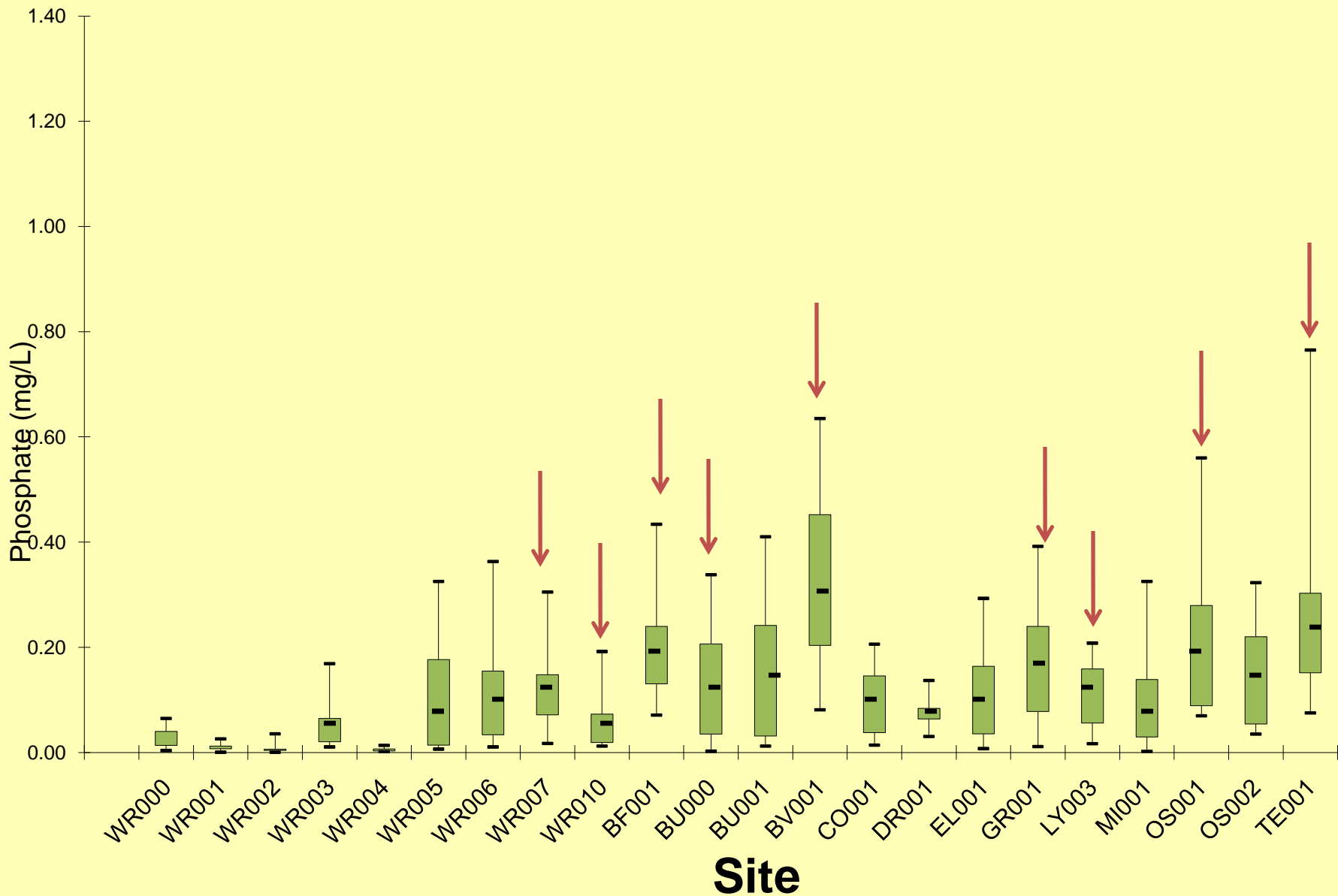
Phosphorus Loadings



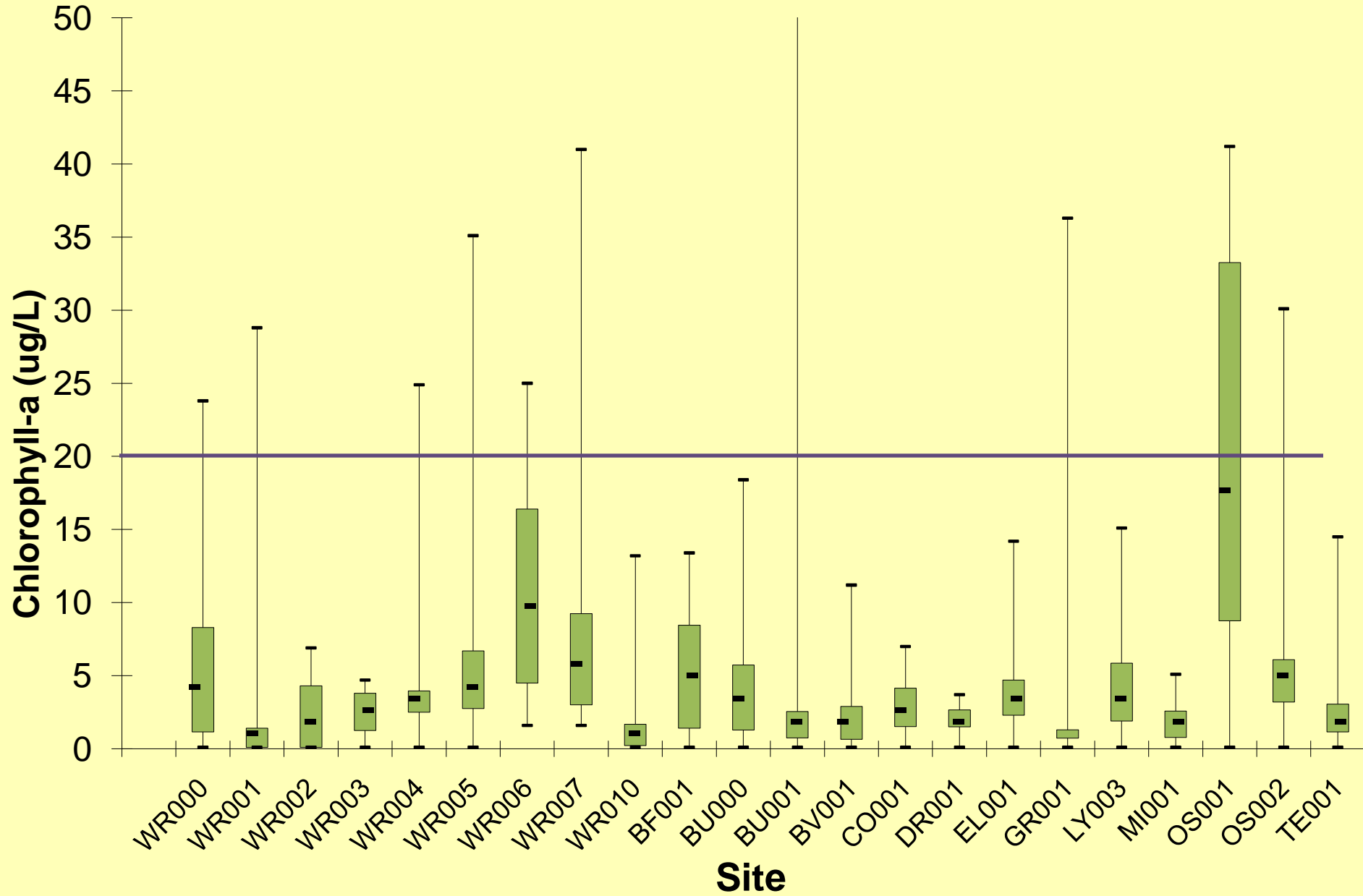
Phosphorus Loadings



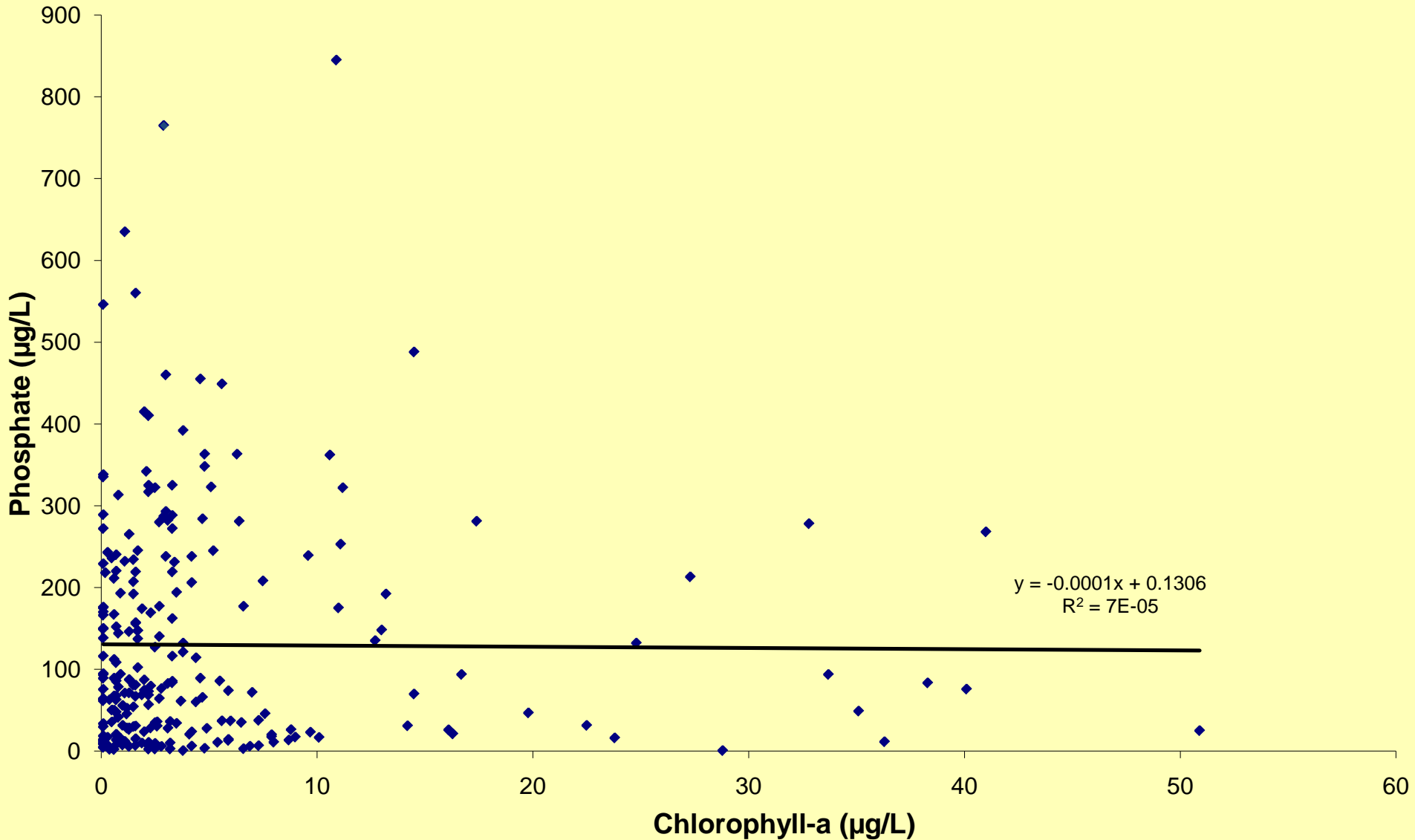
High concentrations of biologically available phosphorus observed in central/lower Welland River Watershed



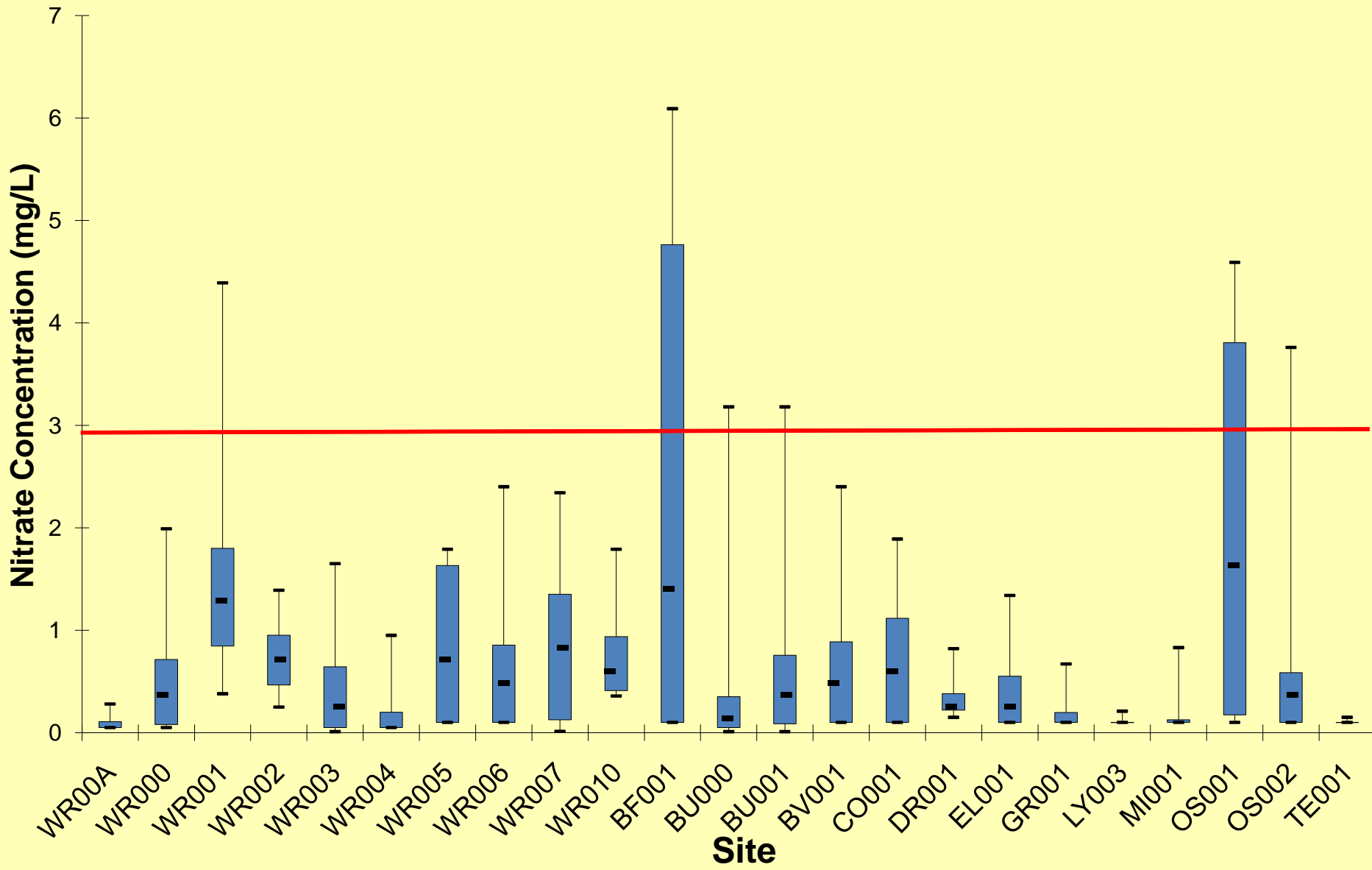
Low chlorophyll-a concentrations observed throughout the Welland River Watershed



No relationship between biologically available phosphorus and chlorophyll-a concentrations



Low nitrate concentrations observed throughout the Welland River watershed

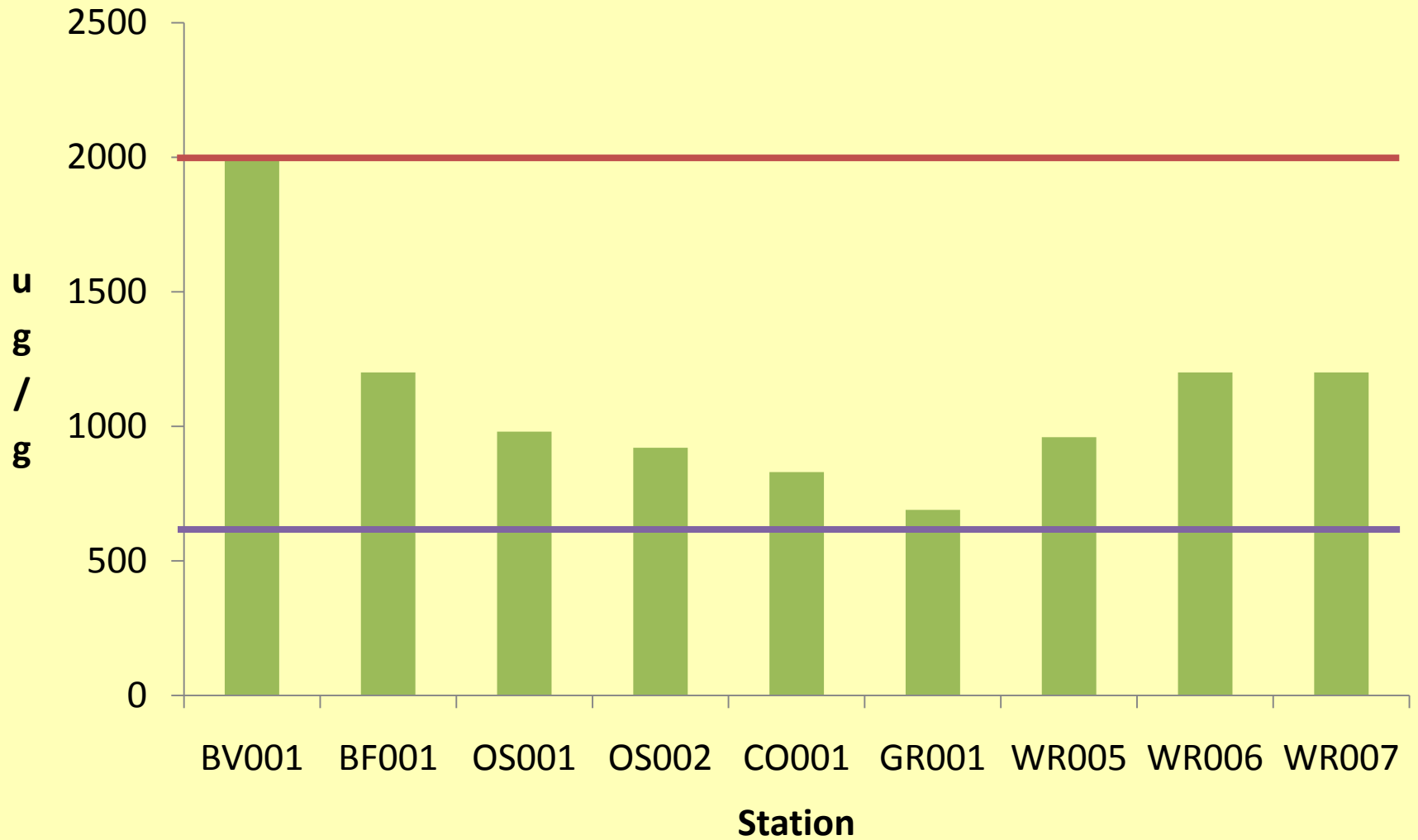


Preliminary Results 2008-2009

Sediment



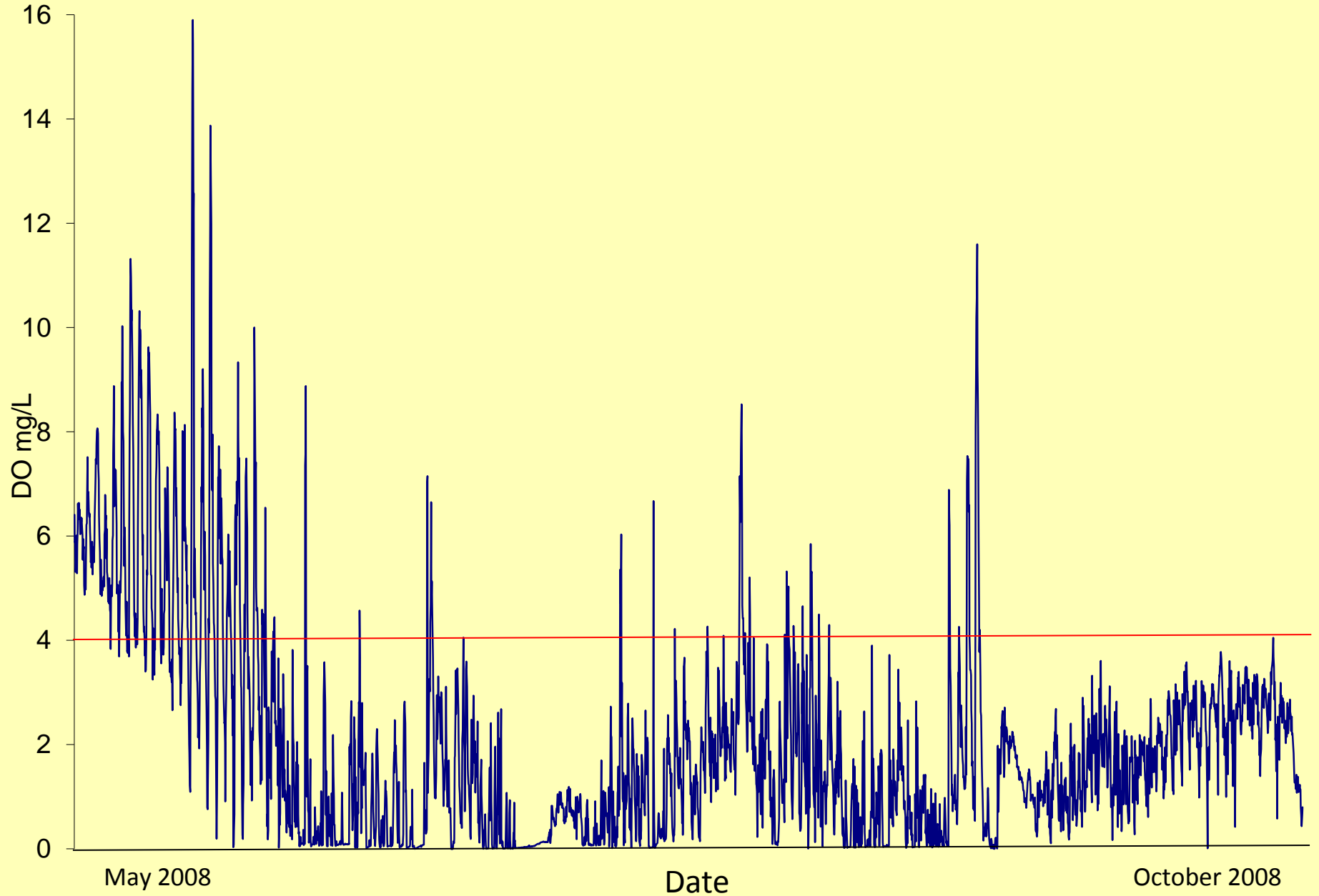
Sediment Phosphorus



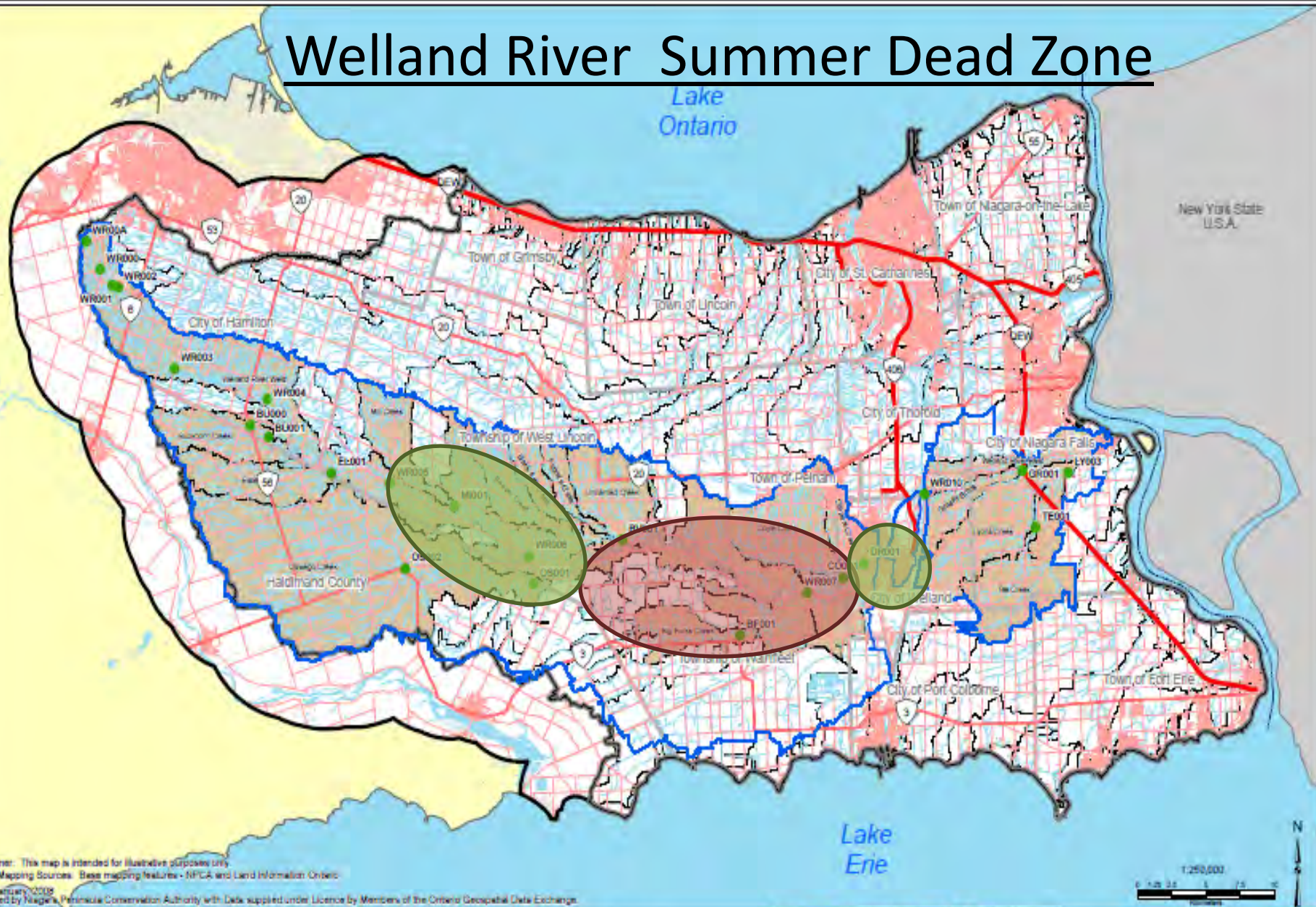
Preliminary Results 2008-2009

Dissolved Oxygen

Central Welland River Watershed characterized by low dissolved oxygen in summer



Welland River Summer Dead Zone



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 Water Quality Monitoring Program

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Where should this all lead us??



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Next Steps

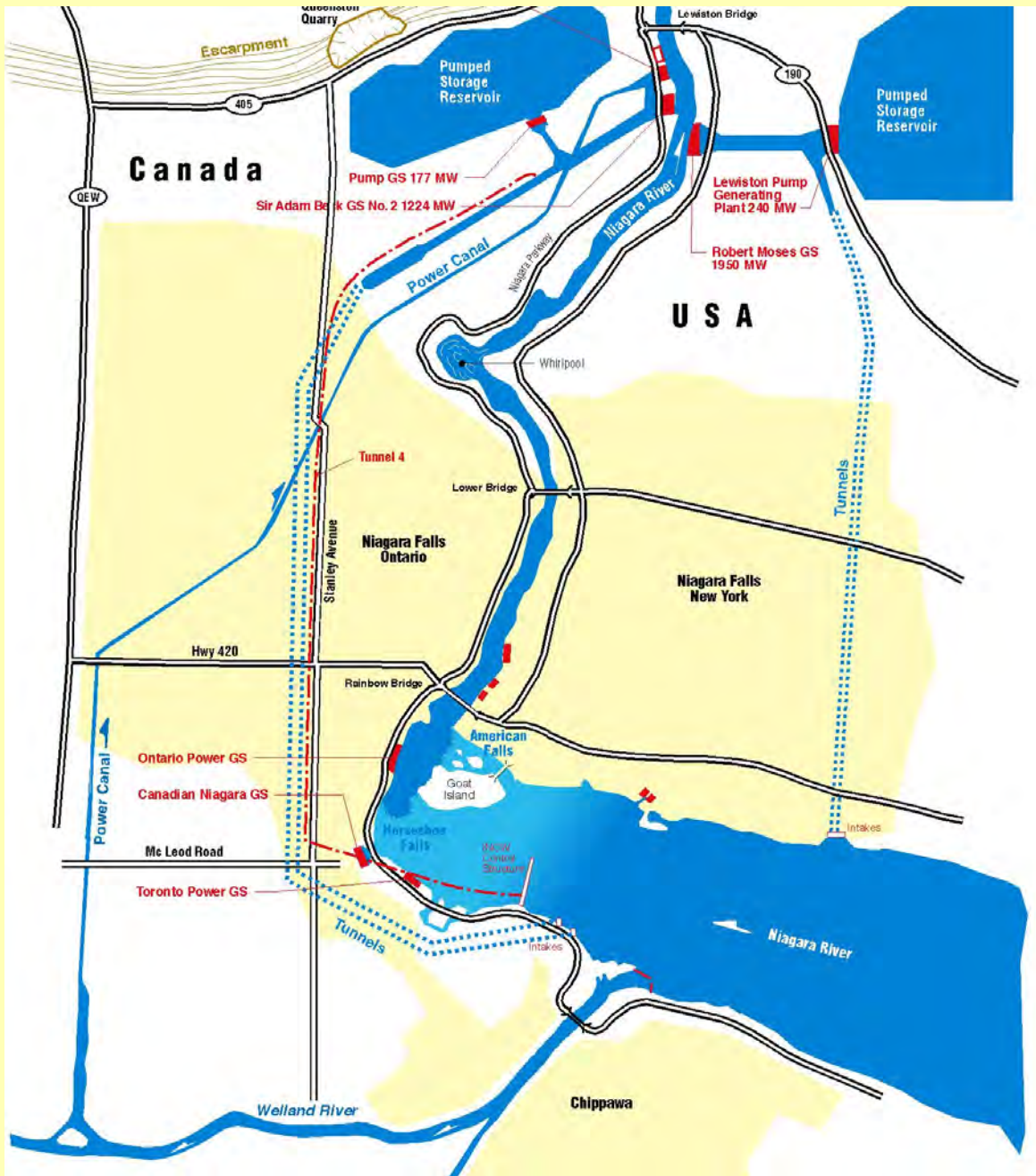


- Currently finishing 2010 field season
- January 2011 - Technical Working Group will analyze data and determine delisting criteria
- Final Report is March 2011

Acknowledgements

NPCA: Lisa Moreira, Ryan Kitchen and Jayme Campbell

MOE: Brian Thorburn, Jenny Winter

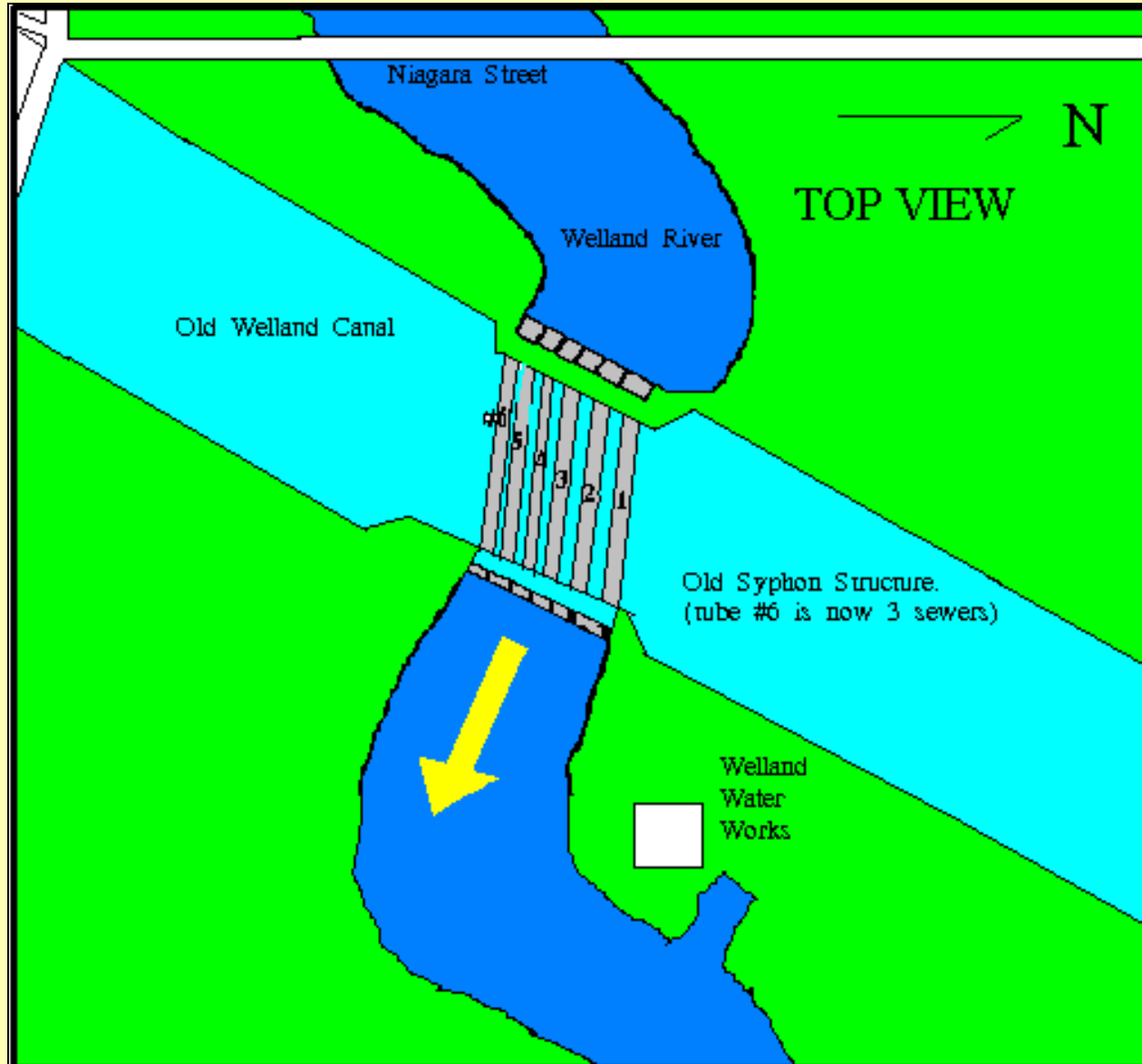


OPG
Control
Structure -

Effect on
Welland River
Flow



OLD WELLAND CANAL SIPHON



OLD WELLAND CANAL SIPHON CROSS-SECTION

