





Water Quality and Nutrient Load Monitoring in the Great Lakes With a focus on Lake Erie

Environment Canada Water Quality Monitoring and Surveillance Division

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Lake Erie Millennium Network February 2017 Windsor, ON





I. Lake Erie water quality

II. Lake Erie TP, SRP loadings

III. Niagara River nutrient loadings



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SOLEC Lake-by-Lake Assessments



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Total Phosphorus Trends (spring, offshore)



Total Phosphorus Trends (spring, offshore)



Total Phosphorus Spatial Distribution





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Total Phosphorus Spatial Distribution





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Total Mercury in the Great Lakes





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Water Quality Monitoring -Nutrients

Core Monitoring :

 Nutrient monitoring in the Great Lakes, Connecting Channels and Precipitation

Enhanced Monitoring :

- Measure total and bioavailable phosphorus loadings from tributaries discharging to Lake Erie
 - including the Huron Erie corridor
- Assess water quality and biological conditions (*cladophora*, dreissenids) in selected Canadian nearshore waters
- Support modeling



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Nutrient Loadings from Priority Canadian Tributaries and Nearshore Water Quality



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Lake St. Clair with MOECC 2016-2019



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Tributary Loadings













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Binationally Consistent Sampling Approach

In support of Annex 4, the information is contributed to improving lake-wide loadings estimates

- Year-round, including the critical winter and early spring times
- Emphasis on rain and snow events plus low flow
- Samples taken every 8 hours around the clock
- On-site refrigeration
- Samples are collected weekly
- Retrospective analysis of the hydrograph for sample selection to target runoff events



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Grand River ON – 2012-2014





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Interlaboratory Comparison Heidelberg University & ECCC NLET



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Basin-wide TP loadings update







TP Load Regression 1967 - 2013





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Point Sources over time

Canada





Non-Point Source Loads over time



Canada



Non-Point Source Loads over time



Canada



Non-Point Source Loads over time



Canada



Basin contributions





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Point Source Loads over time





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Mean TP Loadings, 2003-2013





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Niagara River Upstream-Downstream



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Total Phosphorus Loads at Niagara-on-the-Lake



What we thought we knew

S.C. Chapra, D.M. Dolan / Journal of Great Lakes Research 38 (2012) 741-754





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Lake Erie TP corresponds to Niagara River TP but one cannot be used to calculate loads in the other



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