

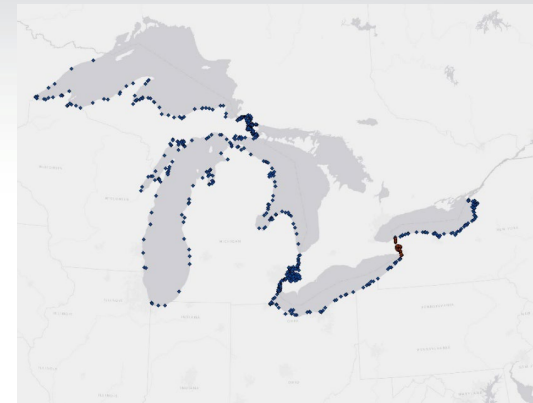


Applying Great Lakes Coastal Condition Assessment (NCCA) Approaches to Connecting River Systems: Context, Compromise, and Completeness

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and**

**Molly Wick, Matt Pawlowski, Ted
Angradi, Hugh Sullivan, Mari Nord,
Jon Launspach, Beth Hinchey**





Great Lakes Environmental Management Model

- **Time-tested**
- **Cooperative & stakeholder responsive**
- **Science-driven**
- **Ecosystem view providing context for local conditions**
- **Adaptive survey designs**
- **Assessment-ready indicators**

These are the same attributes as NARS/NCCA!





GL NCCA surveys completed in 2010, 2015, 2020/2021. On-going research on spatial and indicators enhancements

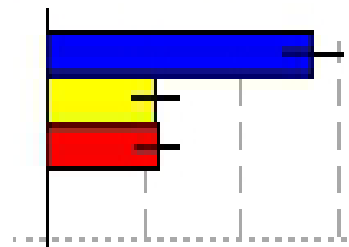


- Probabilistic & targeted
- All lakes & each lake
- Connecting River Systems
- Other (Pawlowski)

+

Indicators ➔ **Assessments**

**Conventional
& enhanced
w/
assessment
thresholds**



**x ($\pm$ y)% area of
[spatial unit] in GL
was in [good, fair,
poor] condition based
on this indicator.**

Context

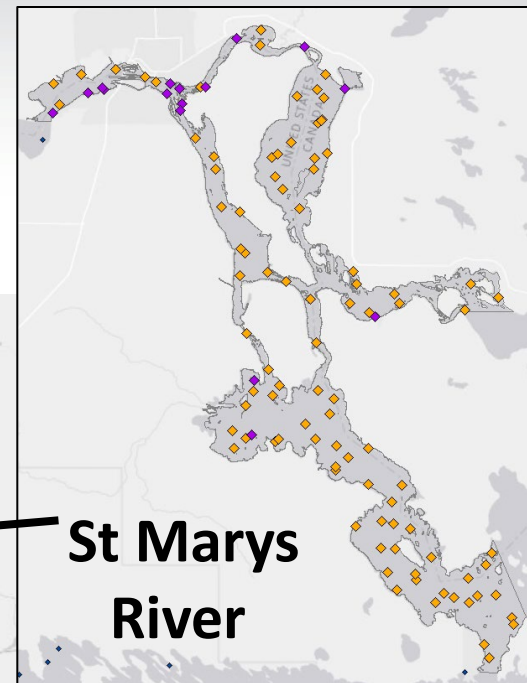
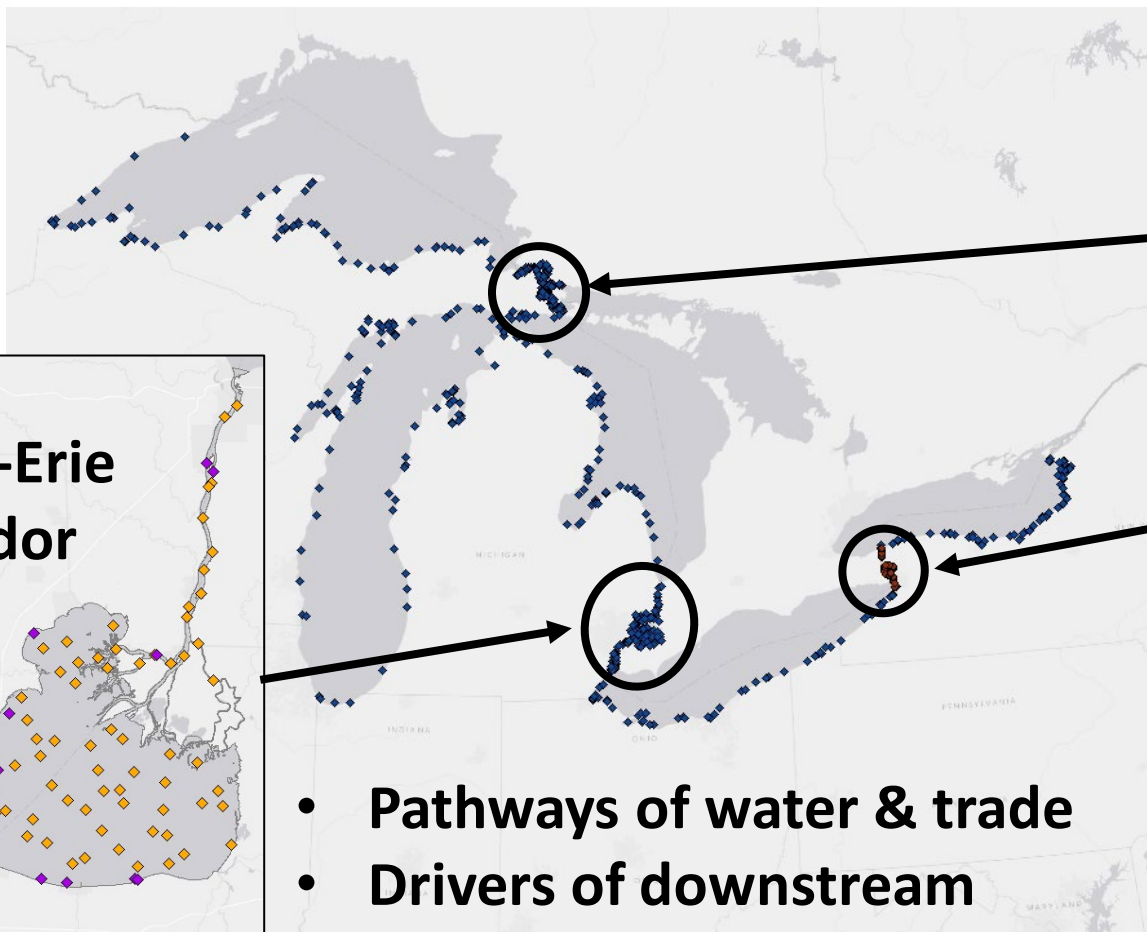
Compromise

Completeness

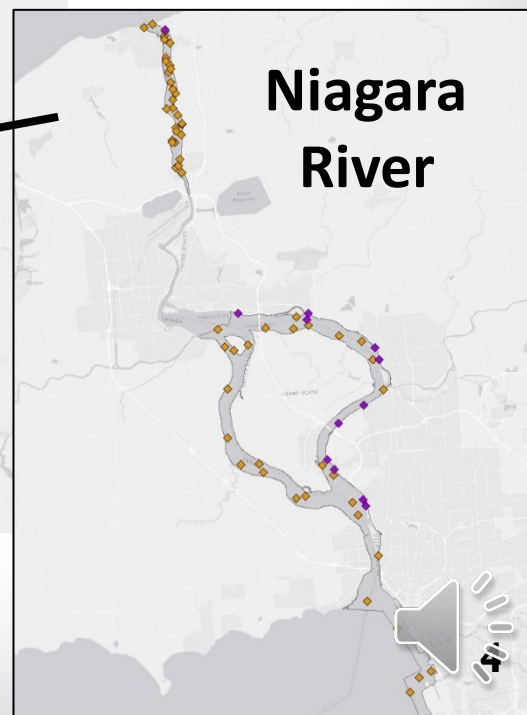




What are Great Lakes Connecting River Systems?



**St Marys
River**

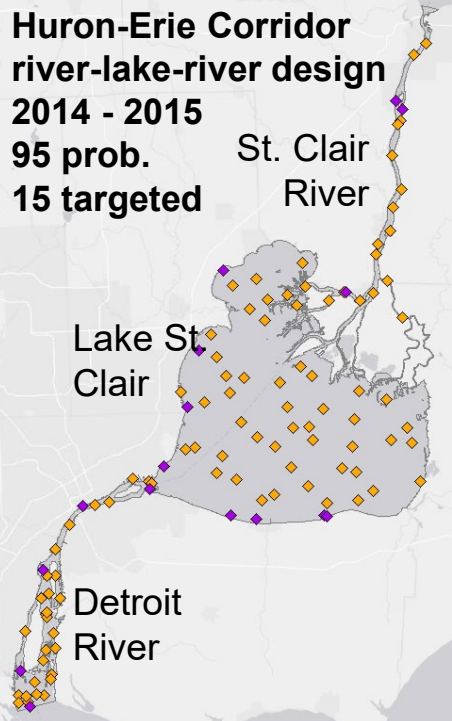
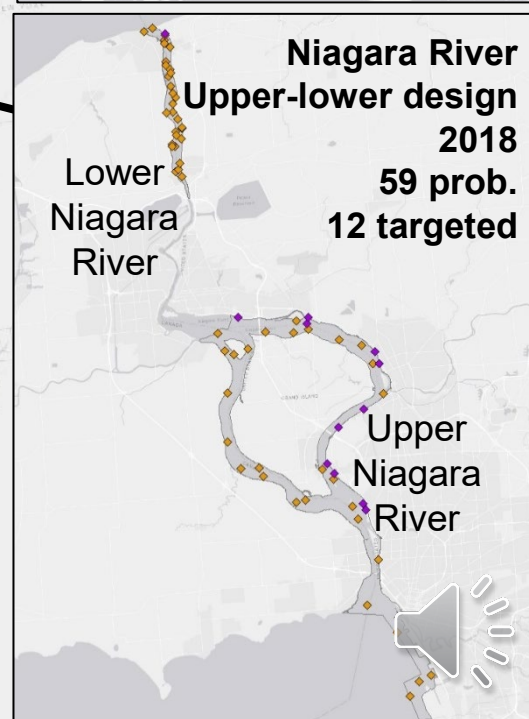
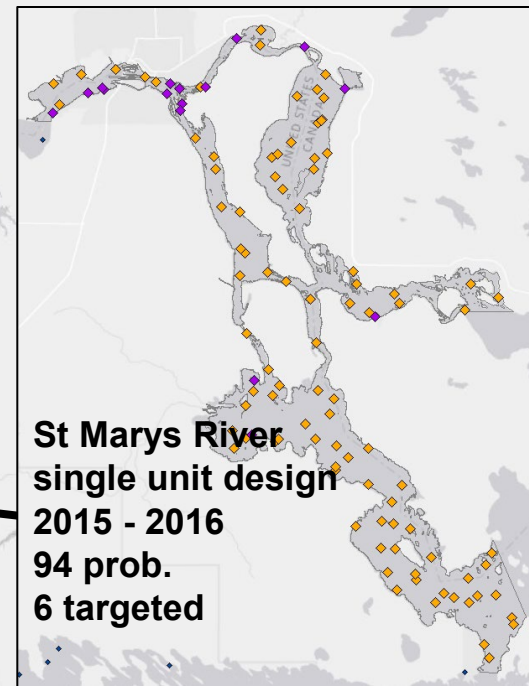
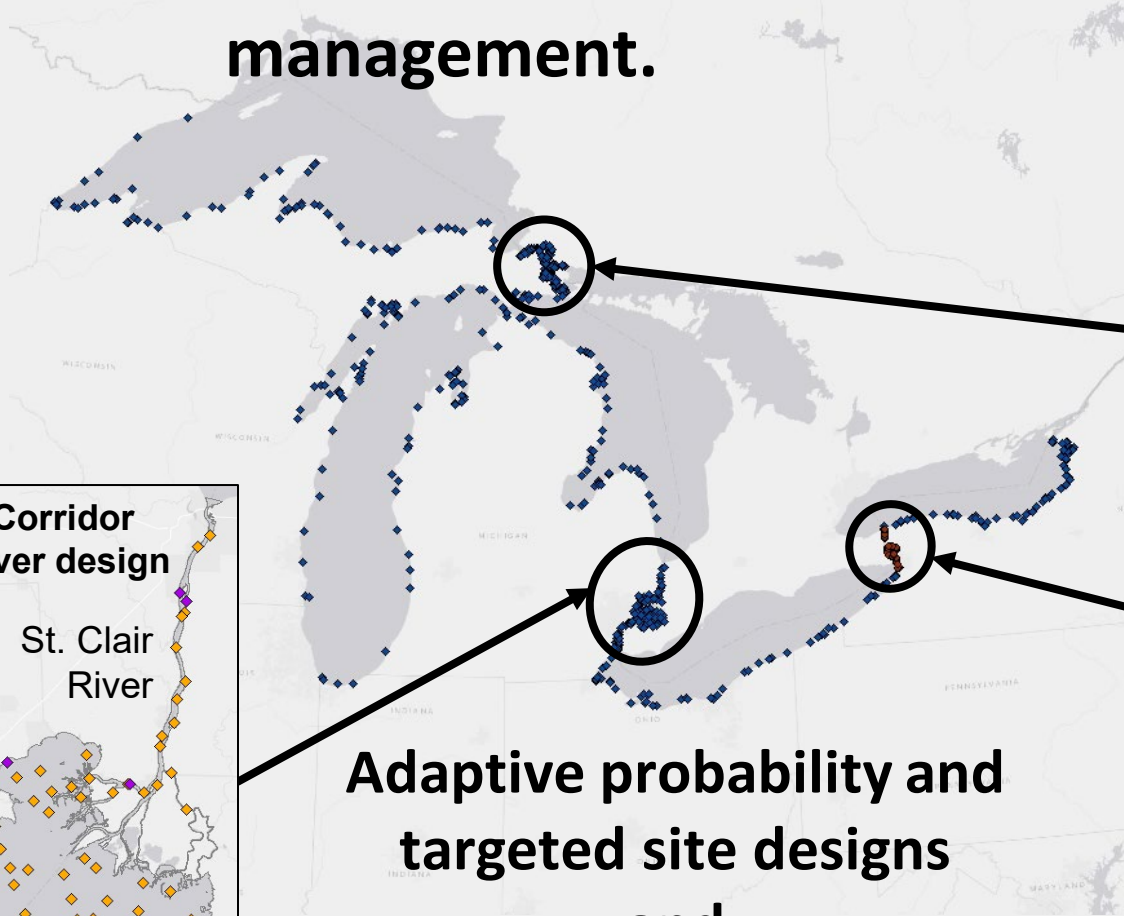


**Niagara
River**

**Huron-Erie
Corridor**

- Pathways of water & trade
- Drivers of downstream conditions
- Novel ecosystems

NCCA approaches can be used to assess connecting river systems for science and management.



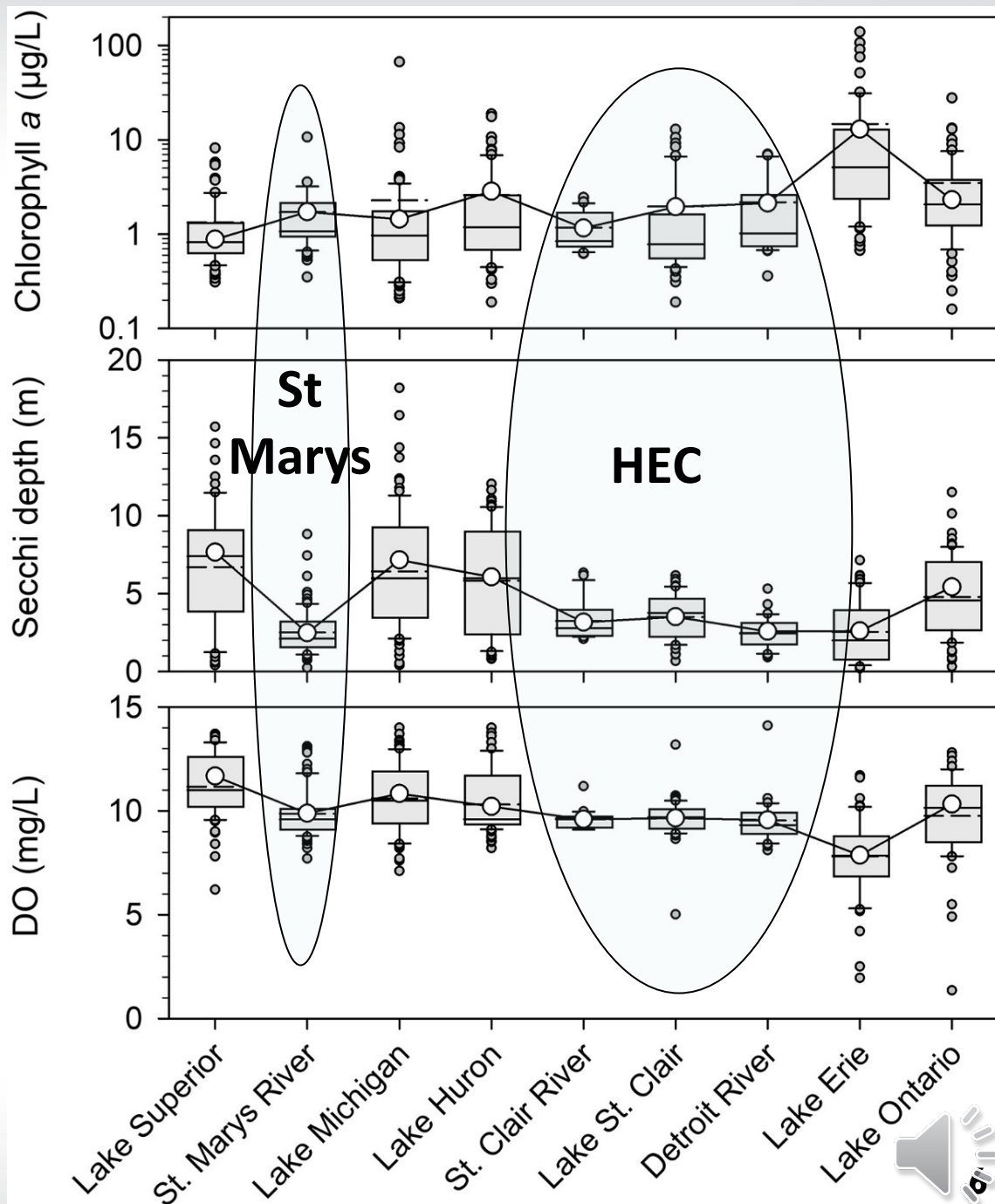
**Adaptive probability and
targeted site designs
and
Assessment-ready
management-relevant
indicators**



Site-based water quality metric values are similar to adjoining lakes. Vary less.

Boxes – sample means
Circles – area-weighted means

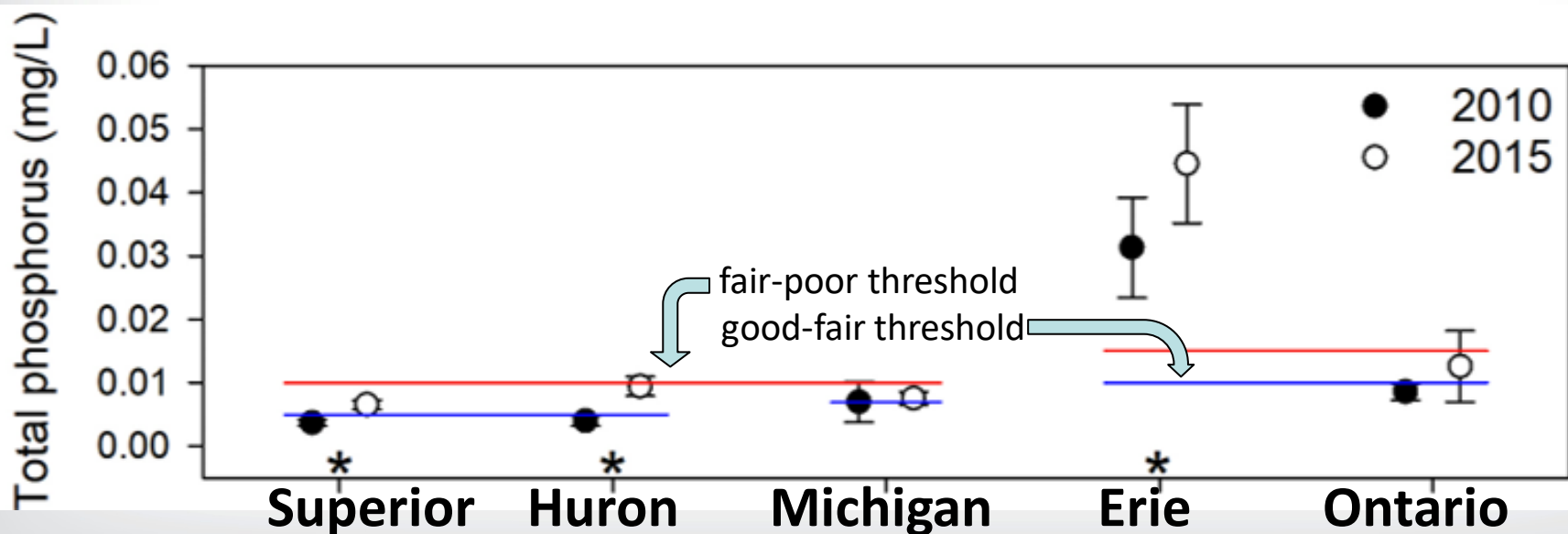
An assessment of water quality in two Great Lakes connecting channels
Wick et al (JGLR 2019)





But population-based (lake or CRS scale) assessments need indicator thresholds that are management- and ecologically-relevant to each resource.

10 ug/L total P is “poor” in upper lakes but “good” in lower lakes.

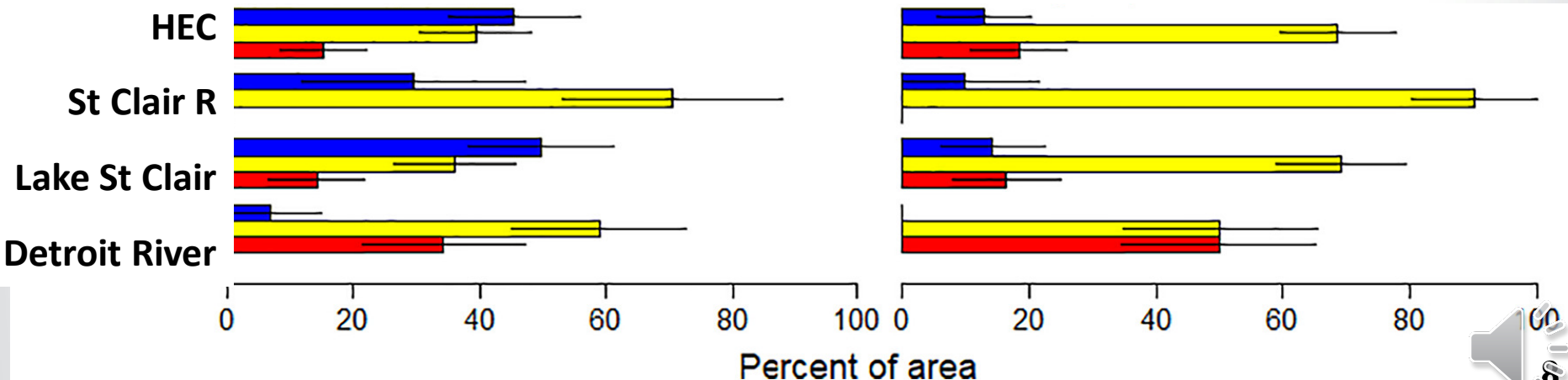




The lack or compromise of thresholds impact assessment outcomes, especially for connecting river systems.

Water quality in HEC looks good (45% good) using central Lake Erie thresholds.

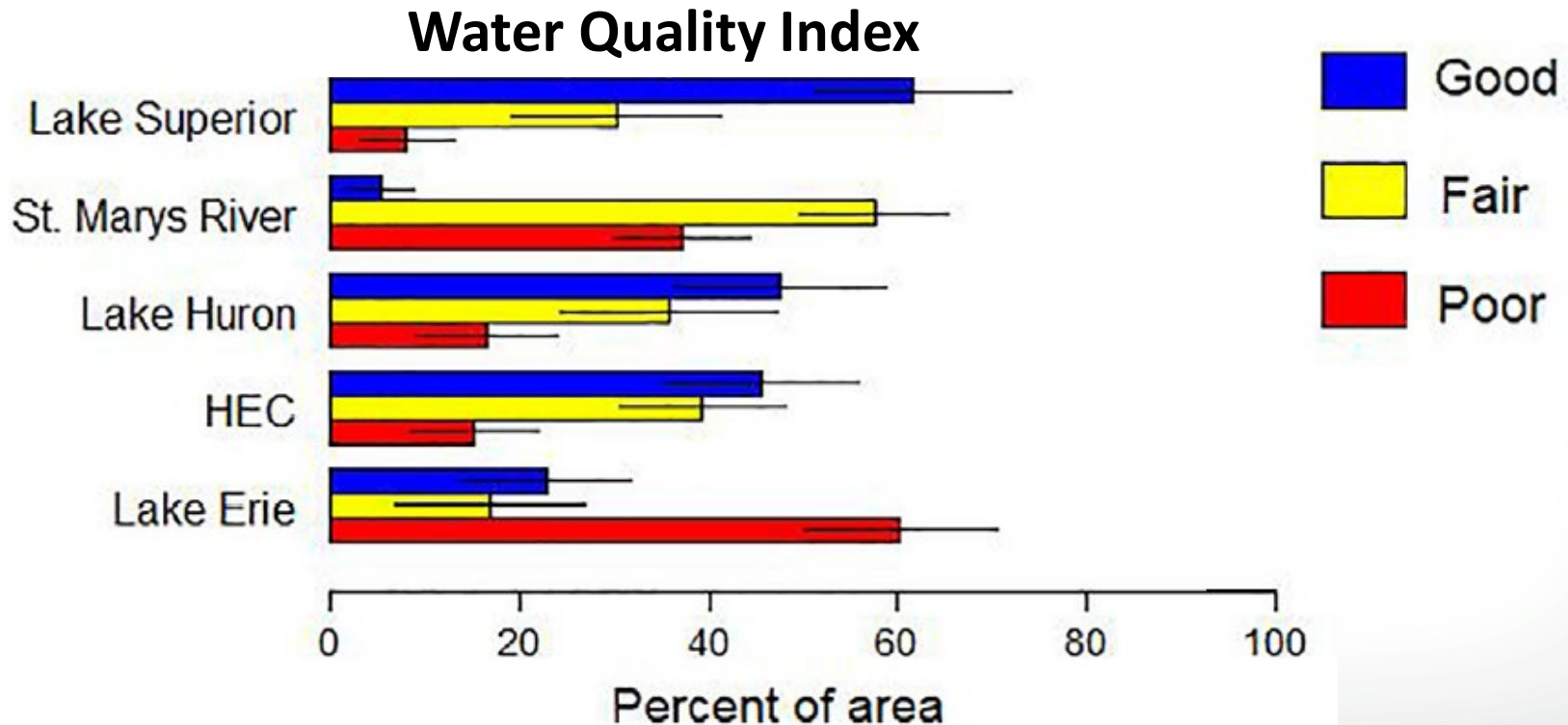
Water quality in HEC looks fair (15% good) using Lake Huron thresholds.





But including Connecting River Systems in GL Assessments helps completeness

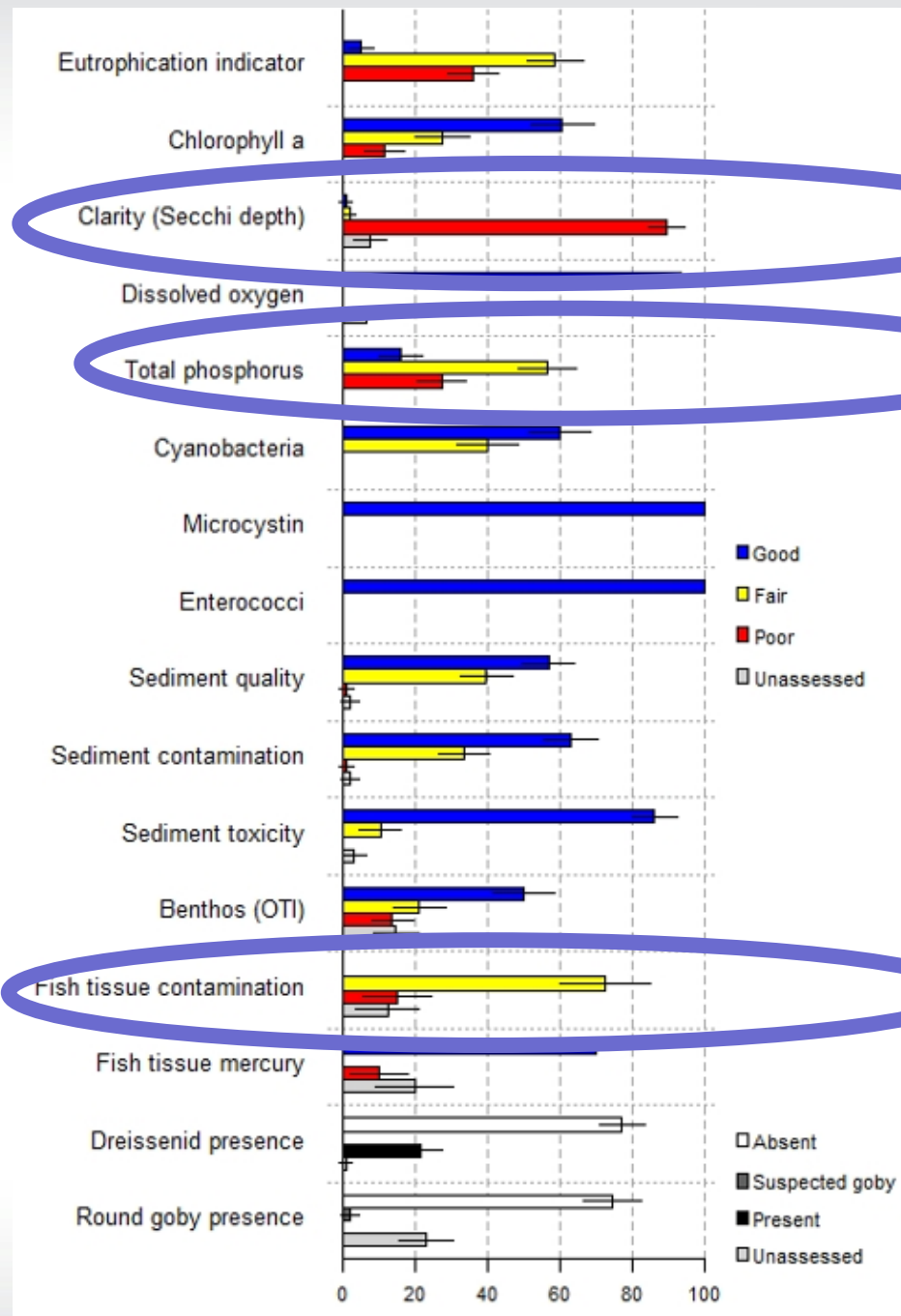
CRS using downstream thresholds; considered most protective.





**St Marys River
Assessment
(using Lake Huron &
Lake Superior
thresholds) suggests
clarity, fish contaminant,
and phosphorus
concerns.**

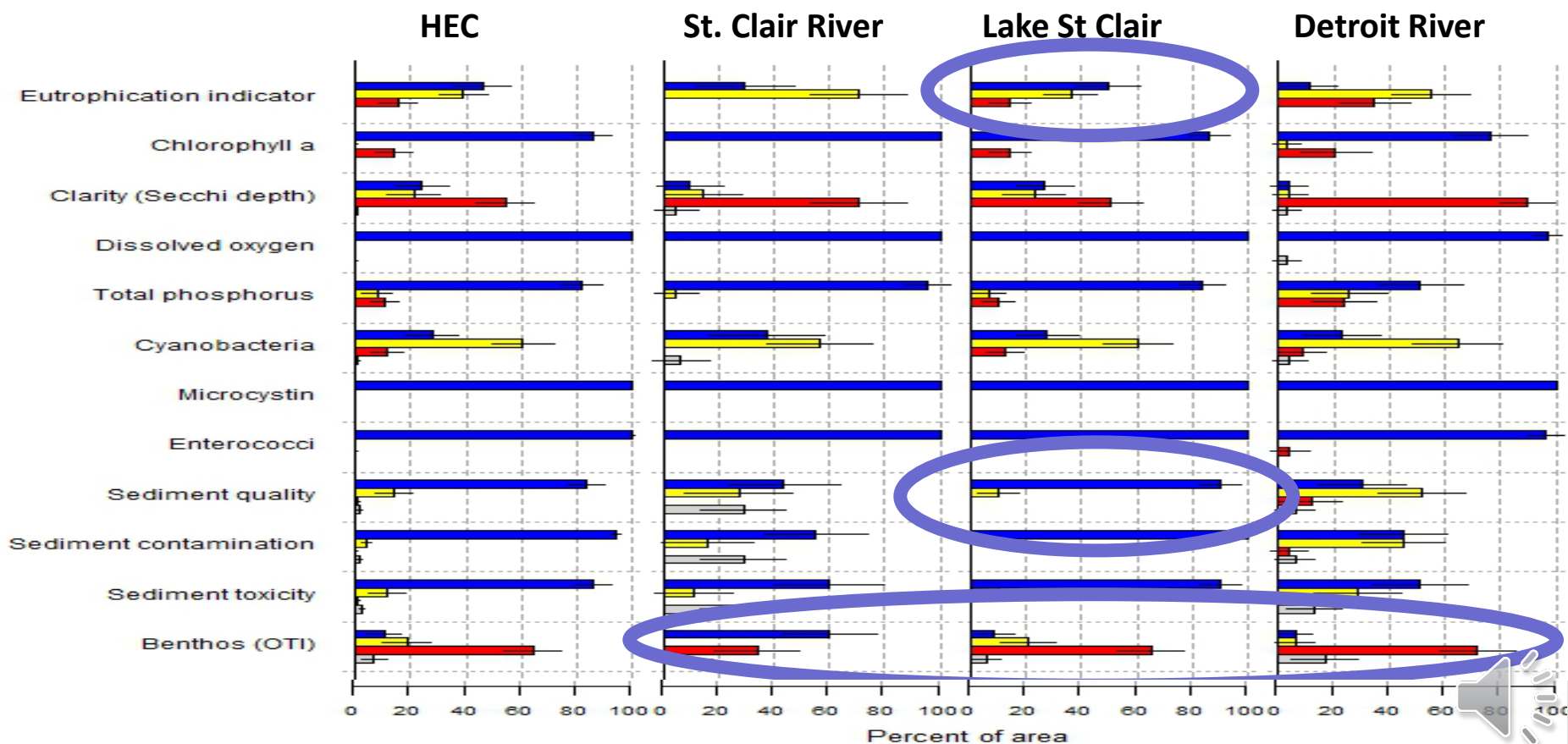
**Are these thresholds,
therefore, assessment
useful for managing the
CRS?**





Huron-Erie Corridor Assessment (based on central Lake Erie thresholds)

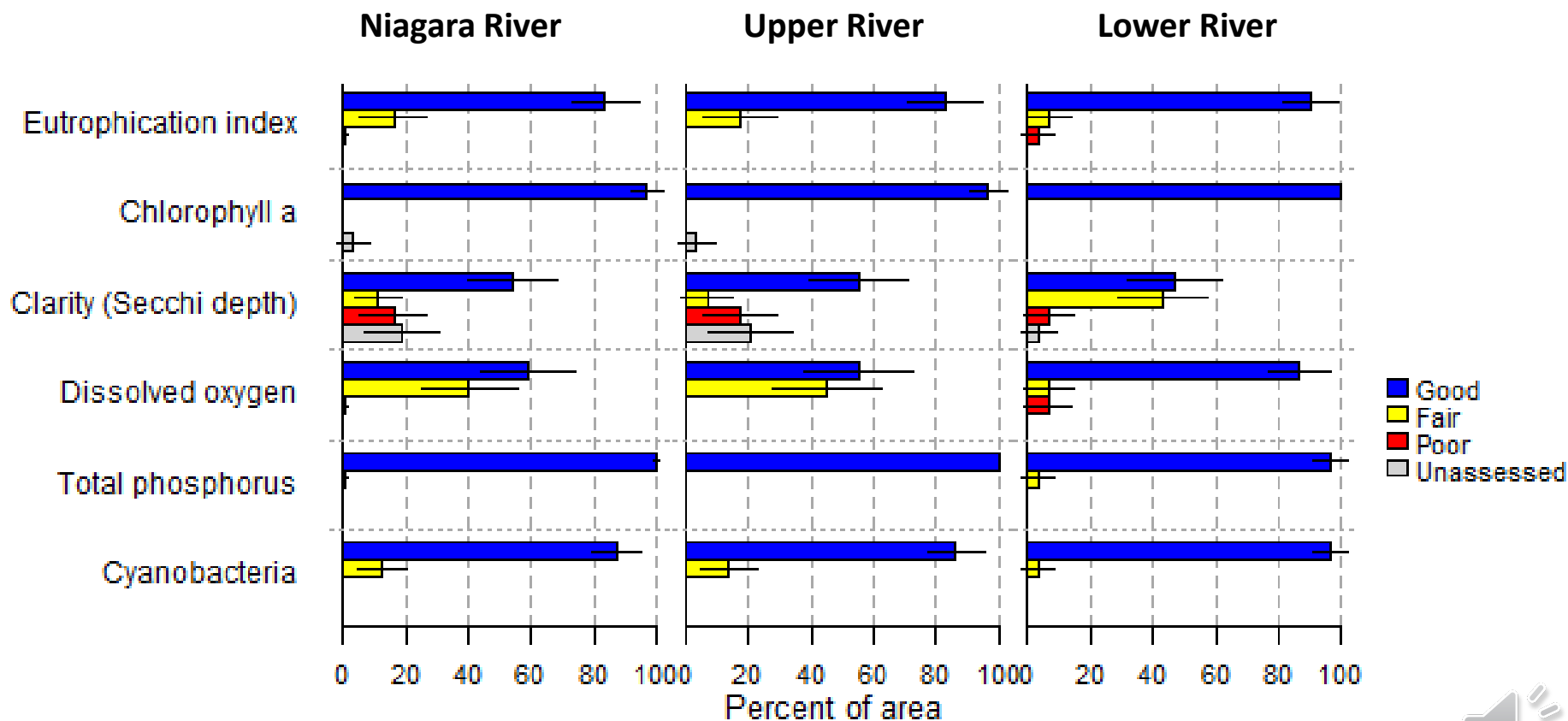
Large area of Lake St Clair drives HEC's good WQ and sediment quality. Not much "credit" for good OTI in St Clair River given small area and poor conditions in rest of HEC.





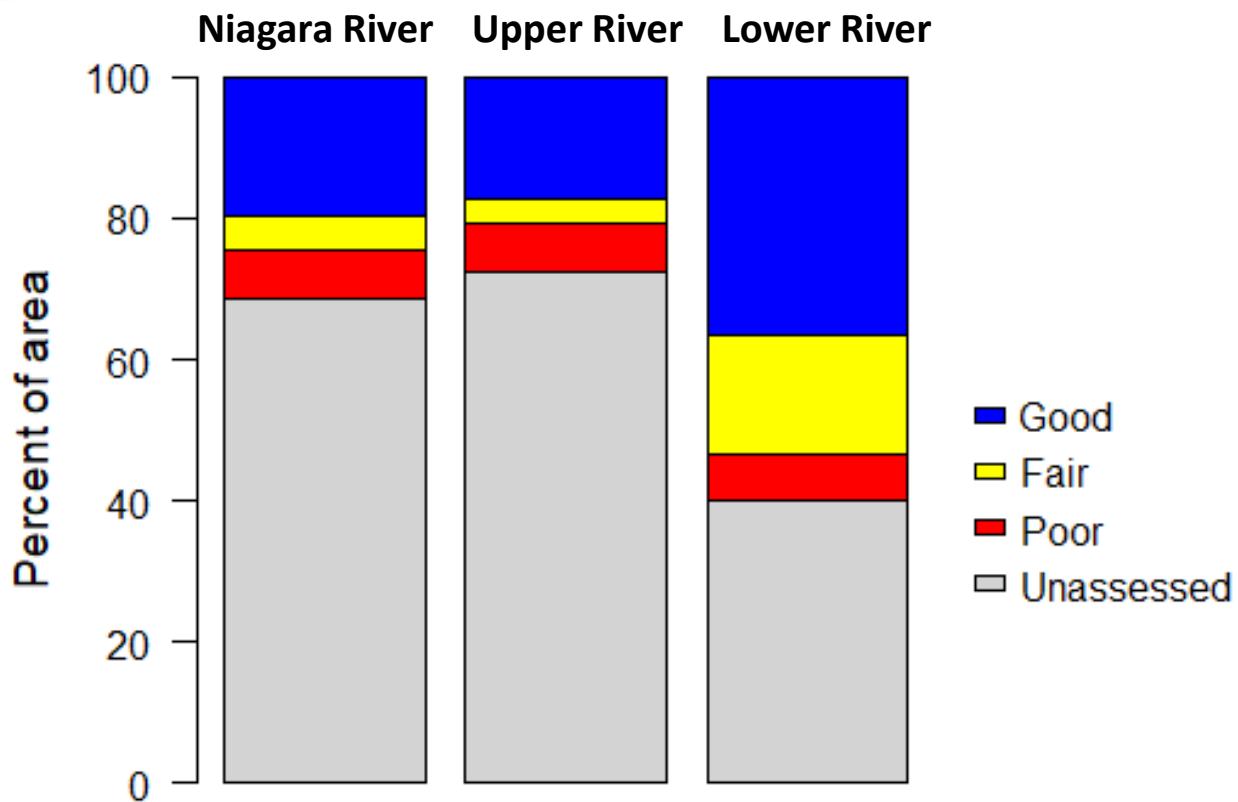
Niagara River Water Quality Assessment (based on Lake Ontario thresholds)

Lower river assessment gives whole river context. But do thresholds support upper river management? protect Lake Ontario?





Niagara River Sediment Toxicity Assessment (based on Lake Ontario thresholds)



**Finally,
thresholds
matter but so
does sampling
success.**

**High % area
unassessed
because hard &
rocky sediments**





Wrap-up

- ✓ **NCCA approaches give local-scale CRS conditions system-scale context.**
- ✓ **Assessment indicator thresholds for connecting river systems are compromises from adjacent lakes or other sources. Research continues to find management- and ecologically-relevant assessment thresholds for Great Lakes & CRS.**
- ✓ **Including CRS in NCCA would be a big step towards completeness in managing the Great Lakes.**



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