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Sediment and Nutrient Science in the Great Lakes Basin

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Overview

- *Major Tributary Monitoring*
- *Edge of Field Monitoring*
- *Applied Science*

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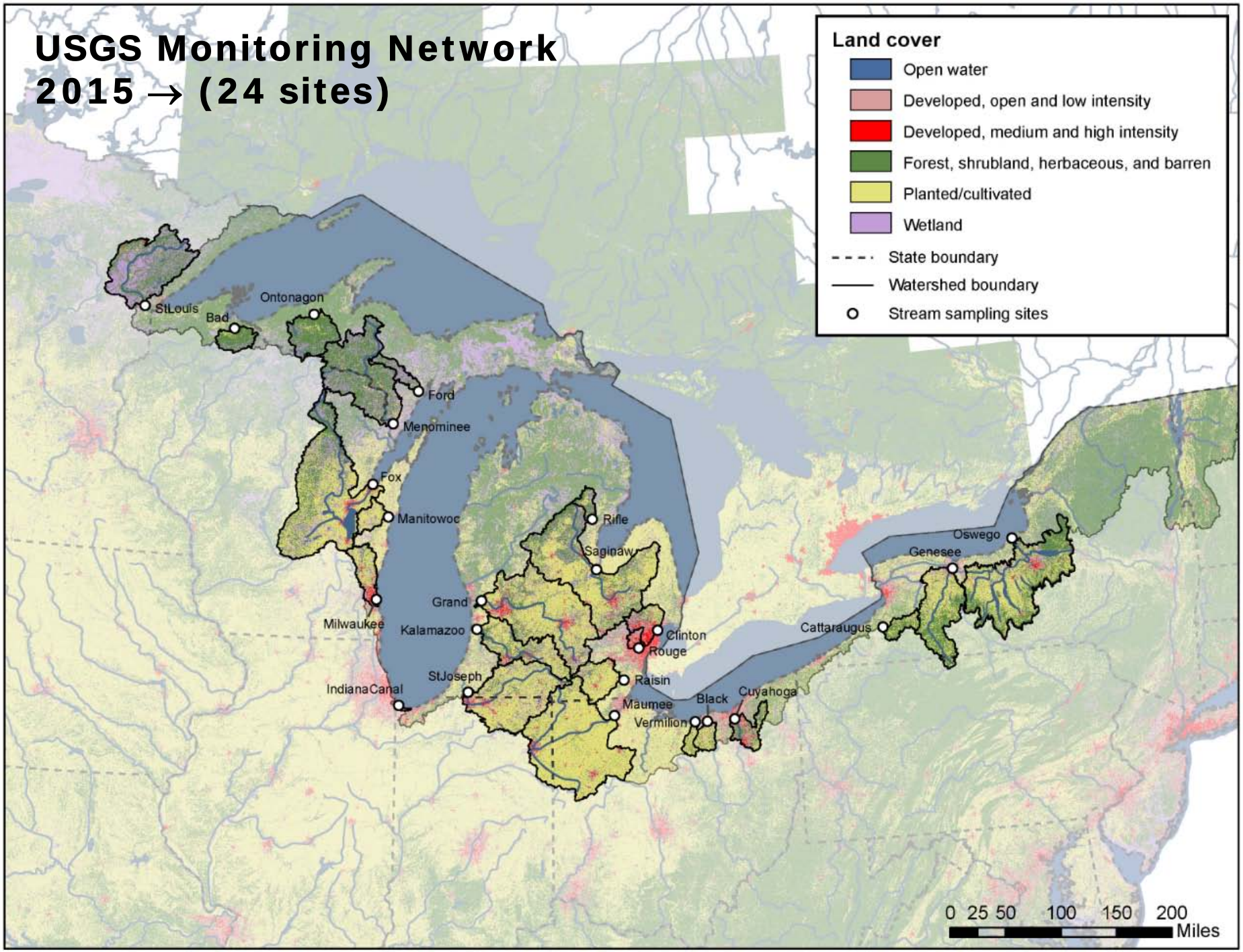
USGS Monitoring Network
2015 → (24 sites)
Land cover
Open water
Developed, open and low intensity
Developed, medium and high intensity
Forest, shrubland, herbaceous, and barren
Planted/cultivated
Wetland
State boundary
Watershed boundary
Stream sampling sites
StLouis
Bad
Ontonagon
Ford
Menominee
Fox
Manitowoc
Milwaukee
Rifle
Saginaw
Grand
Kalamazoo
StJoseph
IndianaCanal
Clinton
Rouge
Raisin
Maumee
Vermilion
Black
Cuyahoga
Cattaraugus
Genesee
Oswego
0 25 50 100 150 200
Miles

Analytes

- Sample analyses (monthly)
  - Nutrients:
    - Total Phosphorus, Ortho-phosphorus
    - Ammonia, nitrite, nitrite + nitrate, total nitrogen
  - Suspended Sediment
  - Chlorides
- Multi-parameter sondes (continuous)
  - Dissolved oxygen
  - SC
  - pH
  - Temperature
  - Turbidity

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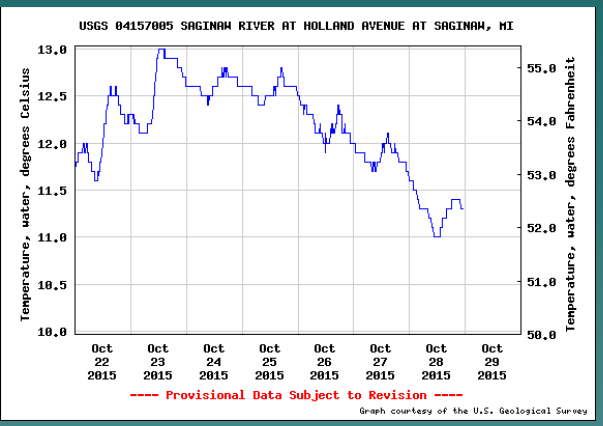
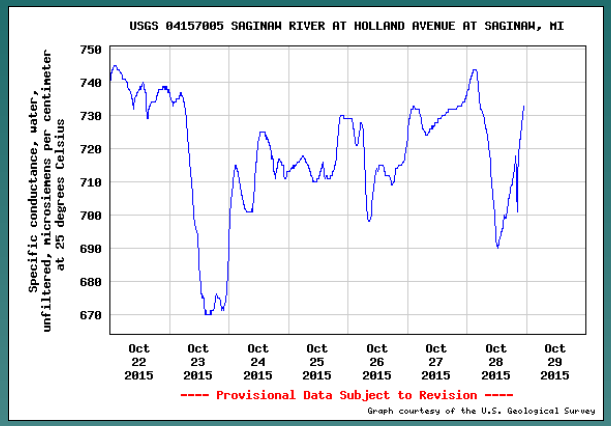
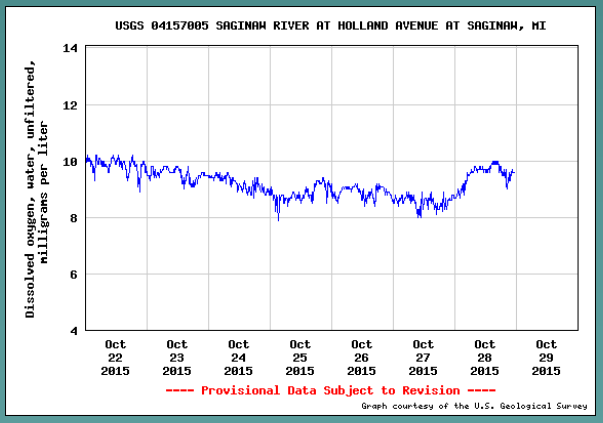
Continuous Data

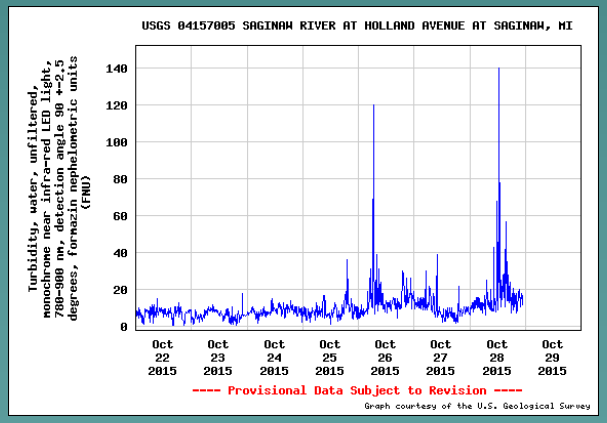


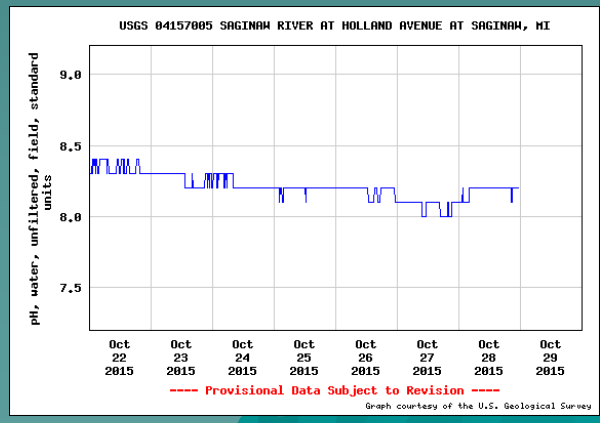


Available Parameters

- ☐ All 8 Available Parameters for this site
- ☑ 00010 Temperature, water
- ☑ 00300 Dissolved oxygen
- ☑ 00095 Specific cond at 25C
- ☑ 63680 Turbidity, Form Neph
- ☑ 00400 pH







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Network Design

- Emphasis on quantifying inputs to the Lakes
  - Major drainages
  - Major contributors
- Document overall restoration success (GLRI)

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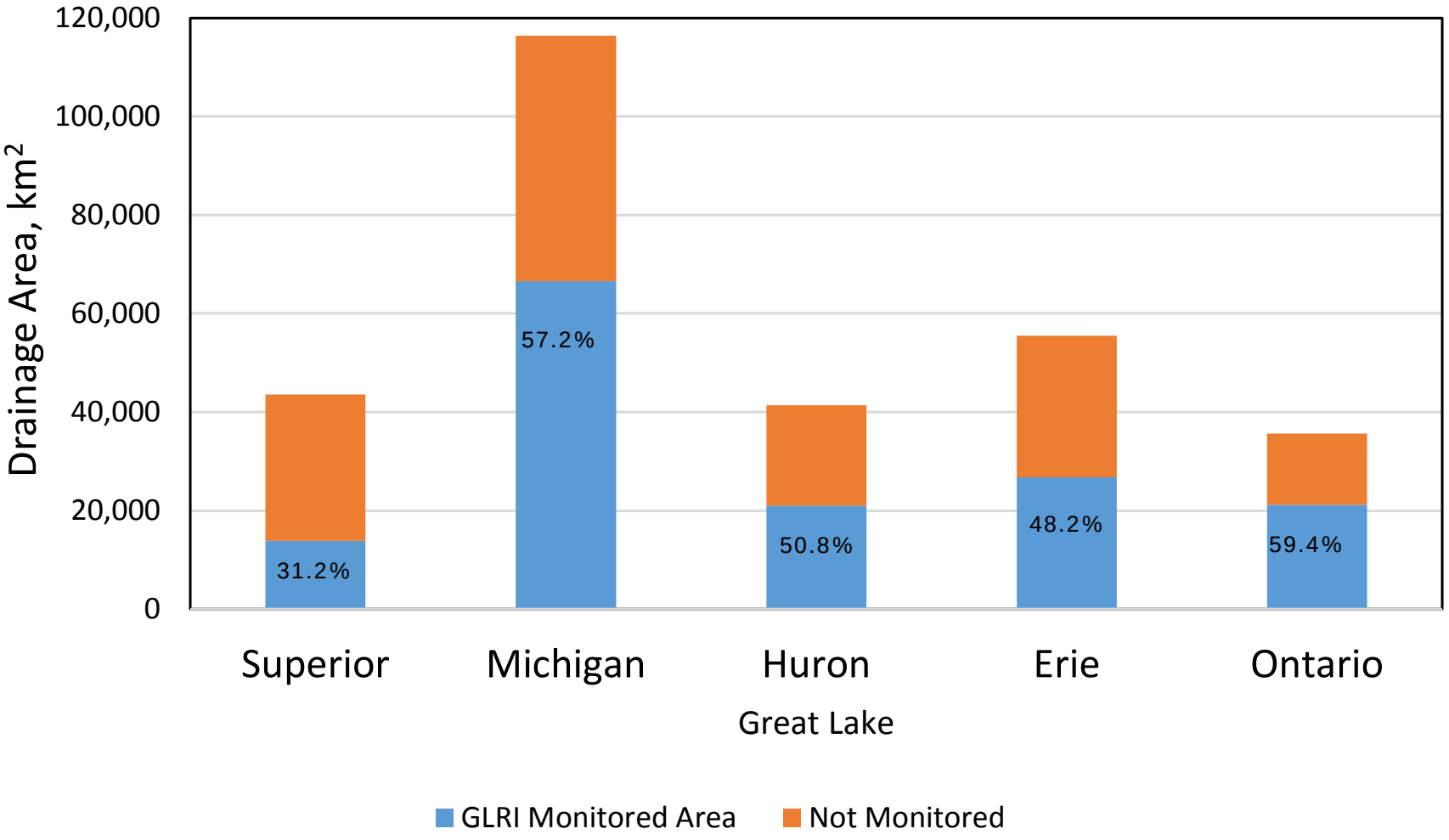
U.S. Area Monitored By Lake



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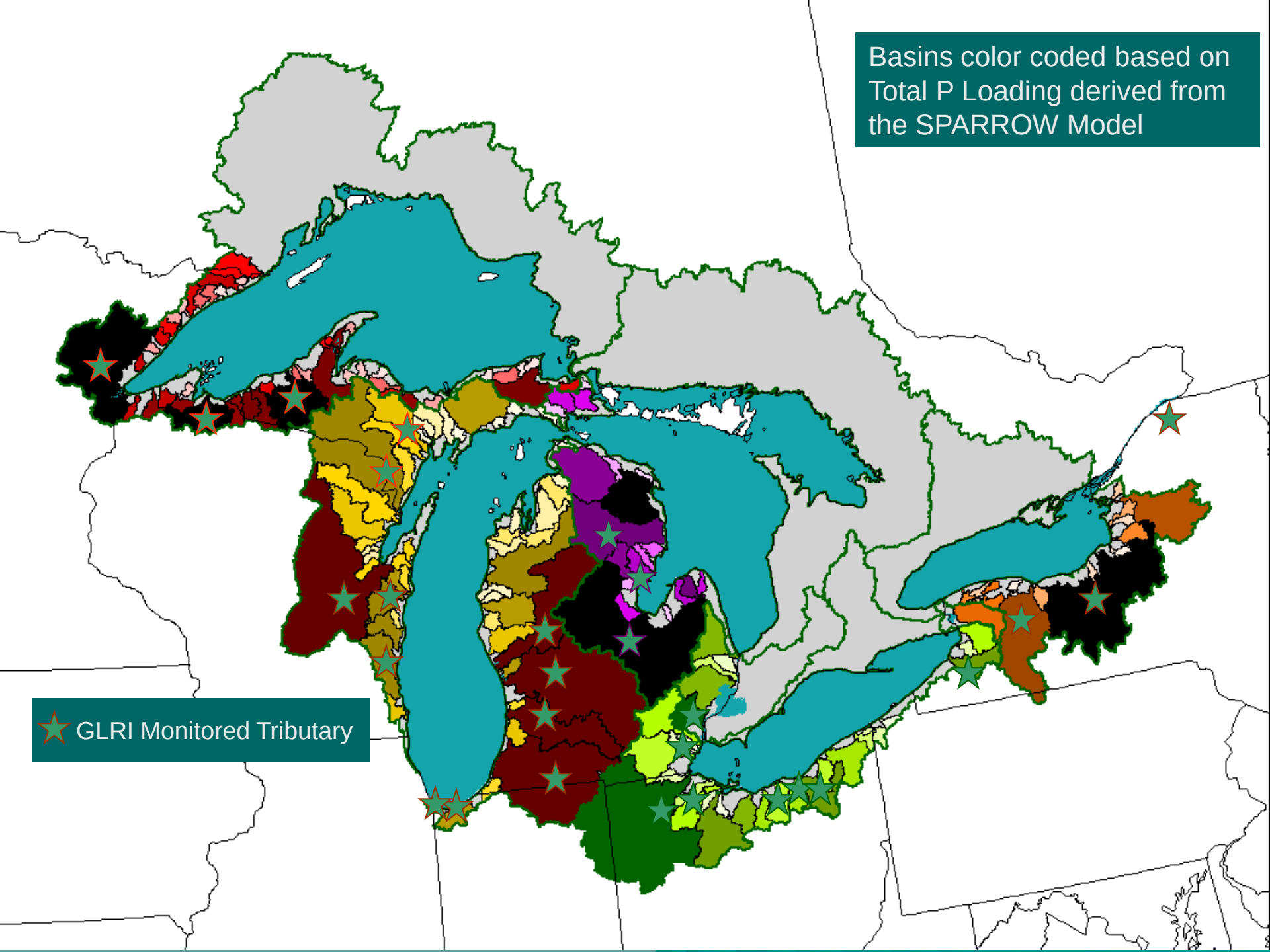
Basins color coded based on Total P Loading derived from the SPARROW Model
GLRI Monitored Tributary

Loads Computations

- Currently finalizing loads for 2011-13
- Use of surrogate methods: loads computed every 15 minutes
  - Relate continuous parameters to concentrations from samples
  - Use relationships to compute concentrations during periods with no samples
  - Periodic samples (monthly) will still be used for model verification

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Edge of Field Monitoring

- Focused in Priority Watersheds
  - Fox River, Saginaw River, Maumee River, Genesee River
- 22 EOF sites
  - Surface runoff and tile drains
- 6 small watershed (HUC-12) sites

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Why Edge-of-Field Monitoring?

- Get out of the stream and on the landscape where runoff is directly affected by field practices
- Remove the influence of “in-stream” processes
- Track impacts of restoration activities on a shorter time-scale

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Future Loads Computations

- Goal: 2017 and beyond
- Use surrogate relationships to present loads in real-time
  - Include error analyses (error bars)
- Investigate other load computation methods
  - Lower cost/higher quality
  - Include use of in-situ phosphate and nitrate sensors
  - USEPA “Sensor Challenge”

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Indiana Real-time Water Quality

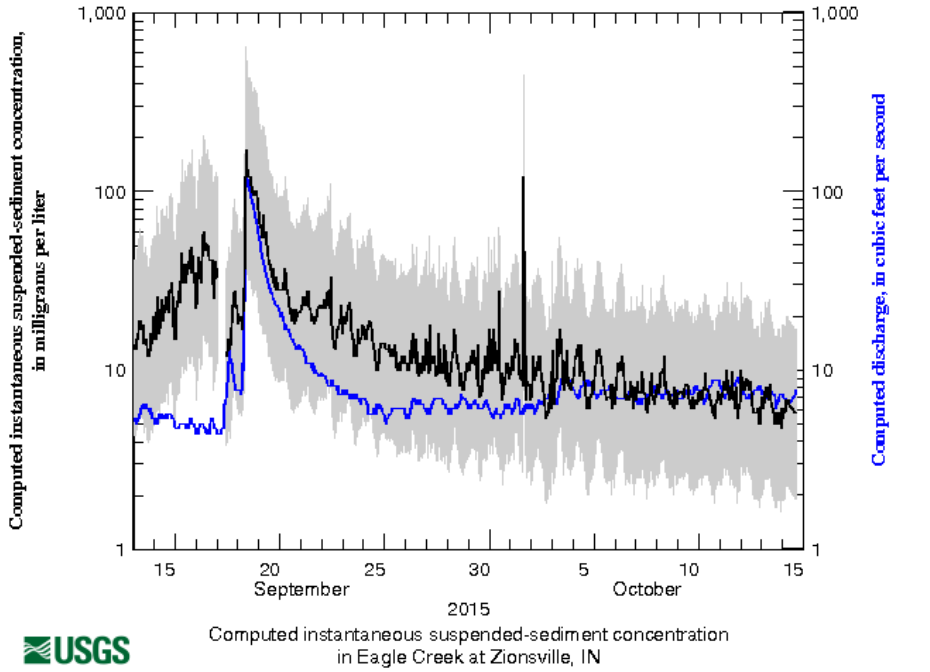
USGS station: 03353200 Eagle Creek at Zionsville, IN

Go to NWISWeb

Constituent: Computed suspended sediment | concentration | hourly | < | Go | >

Time period: Last 31 days

The data used to produce this plot are provisional and have not been reviewed or edited. They may be subject to change.



Future Data Collection

- How to deal with soluble phosphorus?
- Surrogate methods generally do very well with predicting particulate phosphorus
- Typical water quality parameters don't relate well to soluble forms

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Applied Science

- Trends in nutrient flux to Western Lake Erie
  - Improve understanding of linkages between nutrient flux and ag practices, hydrology, and climate
- Nutrient “cycling” in streams
  - Identify areas of nutrient cycling in streams and determine factors that affect cycling
  - Improve the understanding of nutrient cycling under natural processes – can it help with management decisions?

*** Link to Phosphorus Optimal Wetlands!!!

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Applied Science – continued

- Determine impacts of BMPs at beaches
  - Improve understanding of BMP impacts to inform future restoration actions
- Monitor reductions of untreated urban runoff
  - Monitor the impacts of urban BMPs on urban runoff
  - Improve the understanding of different BMPs to help inform future management decisions

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Applied Science – continued

- Assessing watershed scale restoration success
  - integrated, science-based assessment tool capable of evaluating ecosystem-level responses to remediation and restoration projects
- Characterize the spatio-temporal life cycle of HABs and associated toxins
  - Improve understanding of HABs and factors that may result in cyanotoxin production

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Western Lake Erie Basin

- Additional monitoring with supplemental funds
- Funds will be spent by end of FY16
  - actively looking for partners to continue monitoring at all/some of the sites
- Fact Sheet --- *lakeerie.ohio.gov*

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Questions?

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