Biological Water Quality

2014 Subcommittee Report

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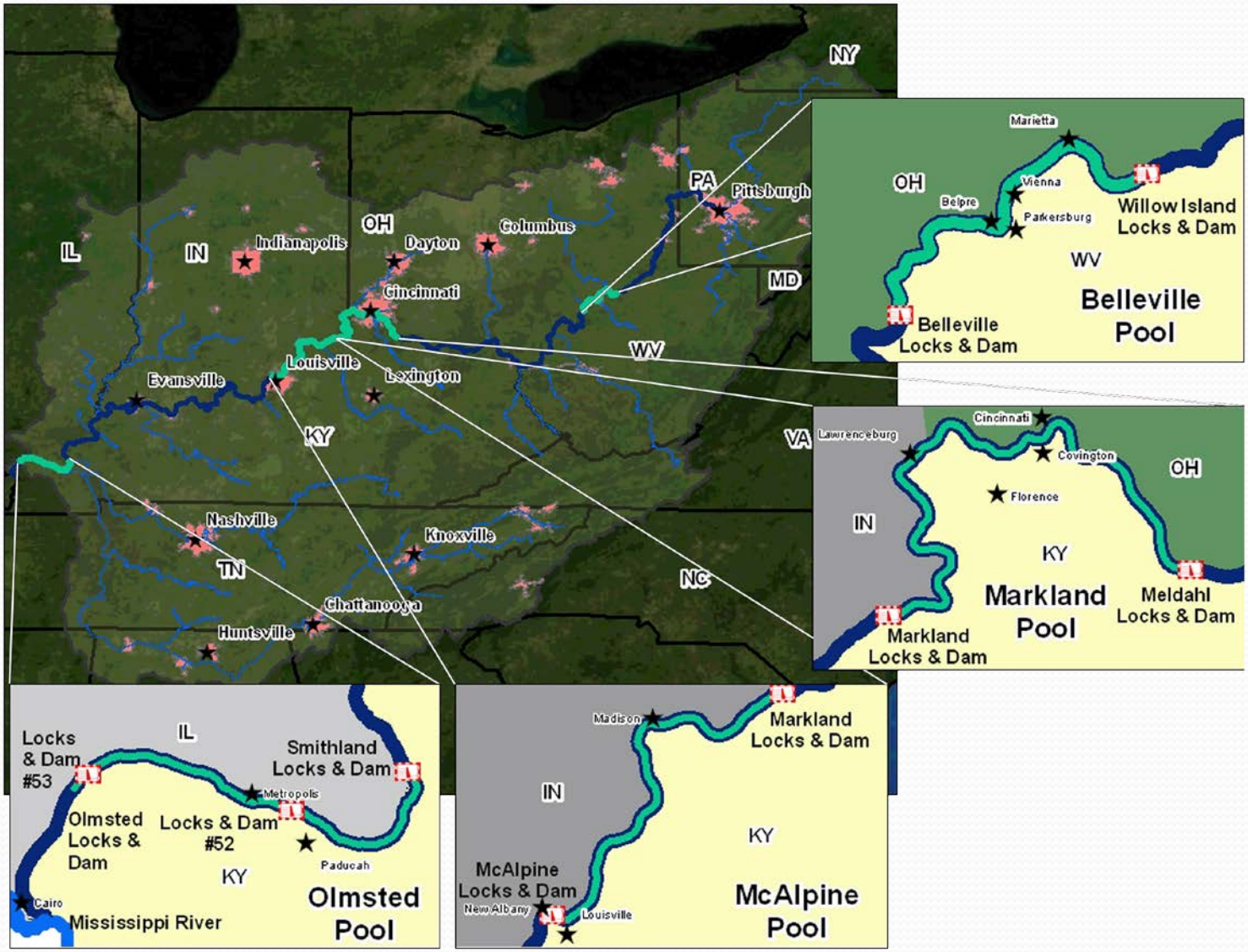
2014 Field Season

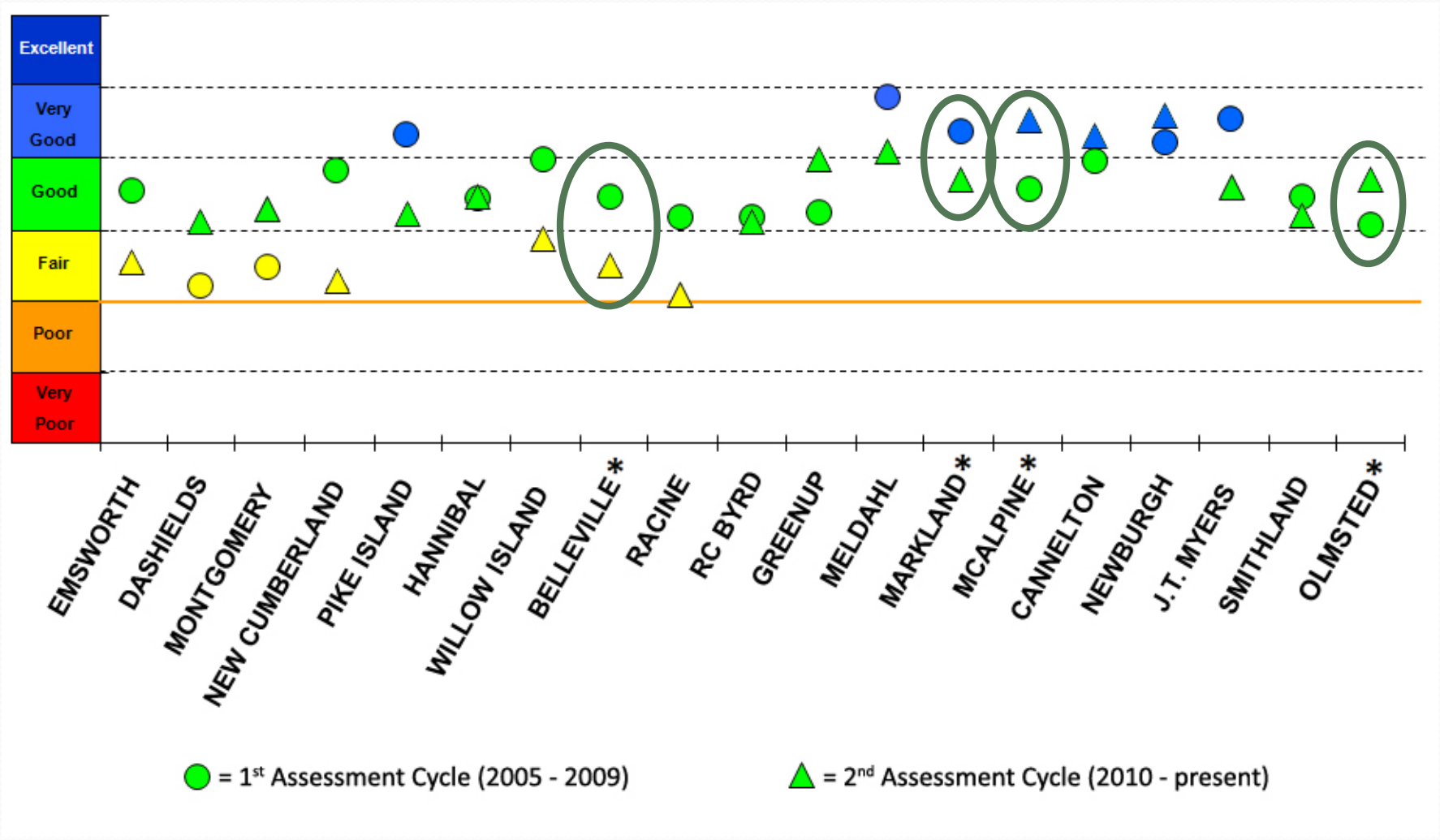


2014 Fish Survey Results

- 4 pools surveyed each year
- 15 random sites per pool (*m*ORFIn scores averaged)
  - Collectively represent the condition of the pool
  - Biological criterion = avg. score of 20.0

Pool	Avg. *m*ORFIn score	Condition Rating	ALU Designation
Belleville	24.5	Fair	Met
Markland	37.7	Good	Met
McAlpine	43.9	Very Good	Met
Olmsted	37.1	Good	Met

Past vs. Present Surveys



Understanding the Variation

- **Flows**
  - Issue: Can disrupt recruitment, habitat use, and sampling efficiency
  - Address: Calculate julian day & seasonal flows as % of 25 yr avg at each EF event
    - use Cascade model (to be replaced by HEC-RAS)
  - Ex: JD flows were elevated during 2014 Belleville survey vs. normal in 2009
- **Invasives**
  - Issue: *Hydrilla* continues to proliferate (above Meldahl L&D)
    - ↓Functional habitat
    - ↑Hypoxic conditions and dissolved oxygen range
  - Address: Record densities within each zone
    - Quantify the effect: Measure DO levels around beds, targeted EF sampling
    - Possibly adjust expectations? List a pool for habitat
  - Ex: ↑ Sunfish and Carp, ↓ Pelagic species, Basses, and *m*ORFIn scores in infested pools
- **River-wide Species Trends**
  - Issue: ↑ &↓ river wide trends in several key *m*ORFIn species (1991 – Present)
  - Address: Cause Determination, Data mining
    - Seasonality? Shifted to early summer samples to ↓ variability & ↑ limited staff resources
    - Unaccounted Abiotic and/or Biotic stressors?
  - Ex: Temporal *m*ORFIn variation under similar measured abiotic conditions

Macroinvertebrate Program

- Sampled at all Fish sites in each pool using two methods
  - Macro Index (ORMIn) completed in 2012
  - Index scores averaged as with fish
  - 2014 retrieval rates (92%)
  - Recorded DO during colonization period
    - *60 continuous DO loggers*
  - 90 day return (End of February)
    - *Implications for 305(b)*
- 2013 Oversampling Study (USACE)
  - 30 total sites in Smithland
    - Oversampling study (30 sites in Smithland)
      - Confirm # of Sites required to assess each pool
    - Additional paired abiotic data allowed for continued index validation

Smithland Oversampling

- We assumed the 15 sites for fish was sufficient for bugs
  - Data mining of pools with 15 sites or less supported this
- Sampled an additional 15 random sites (30 total)
- Conducted bootstrap analyses using all data from Smithland
  - 1000 simulated sampling events
- Looked at the number of sites required to…
  - Obtain 80% and 90% of total taxa richness
  - Achieve a consistent median ORMIn score with a tight 95% confidence interval
- Exact analyses conducted to justify number of sites required to assess a pool using the *m*ORFIn

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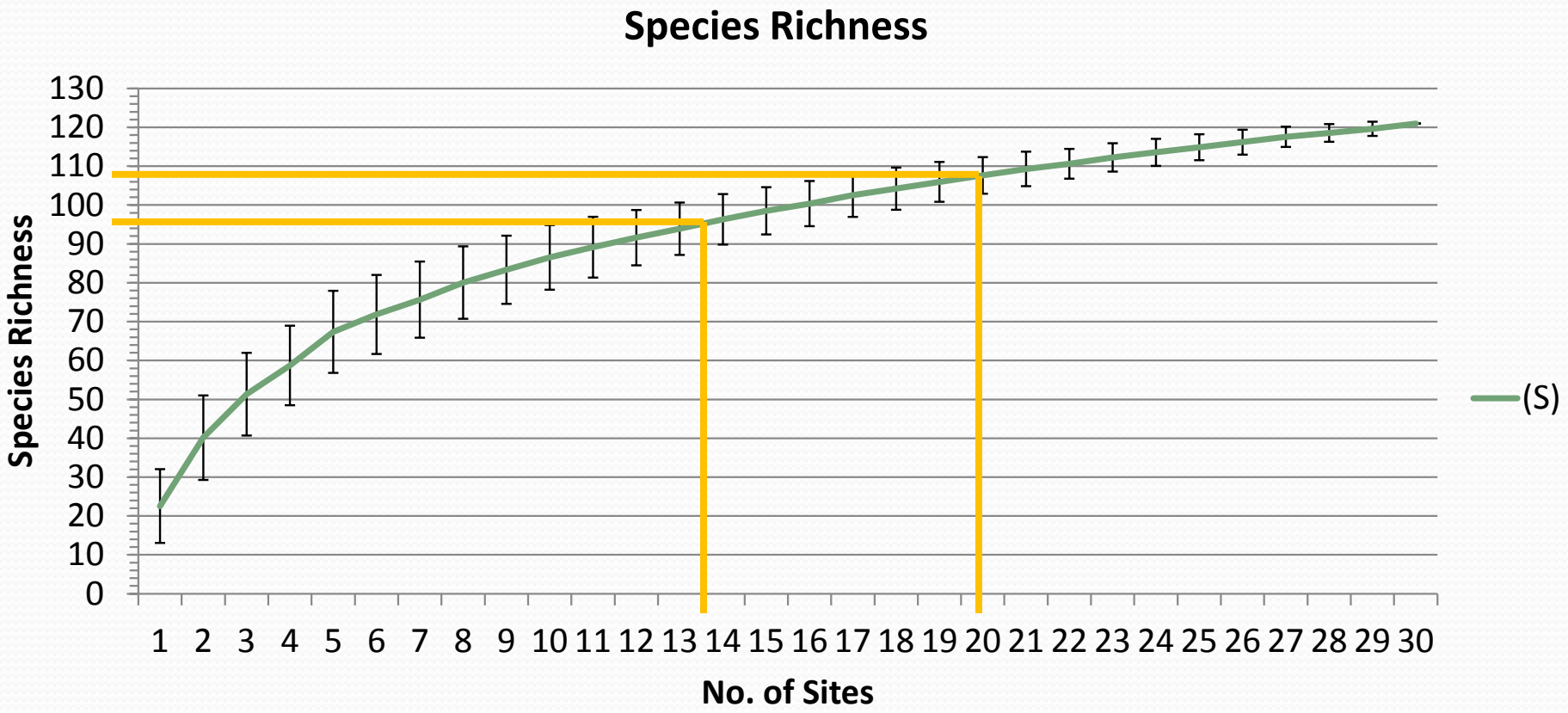
2013 Oversampling Results



Orange lines represent 80% & 90% total taxa obs.

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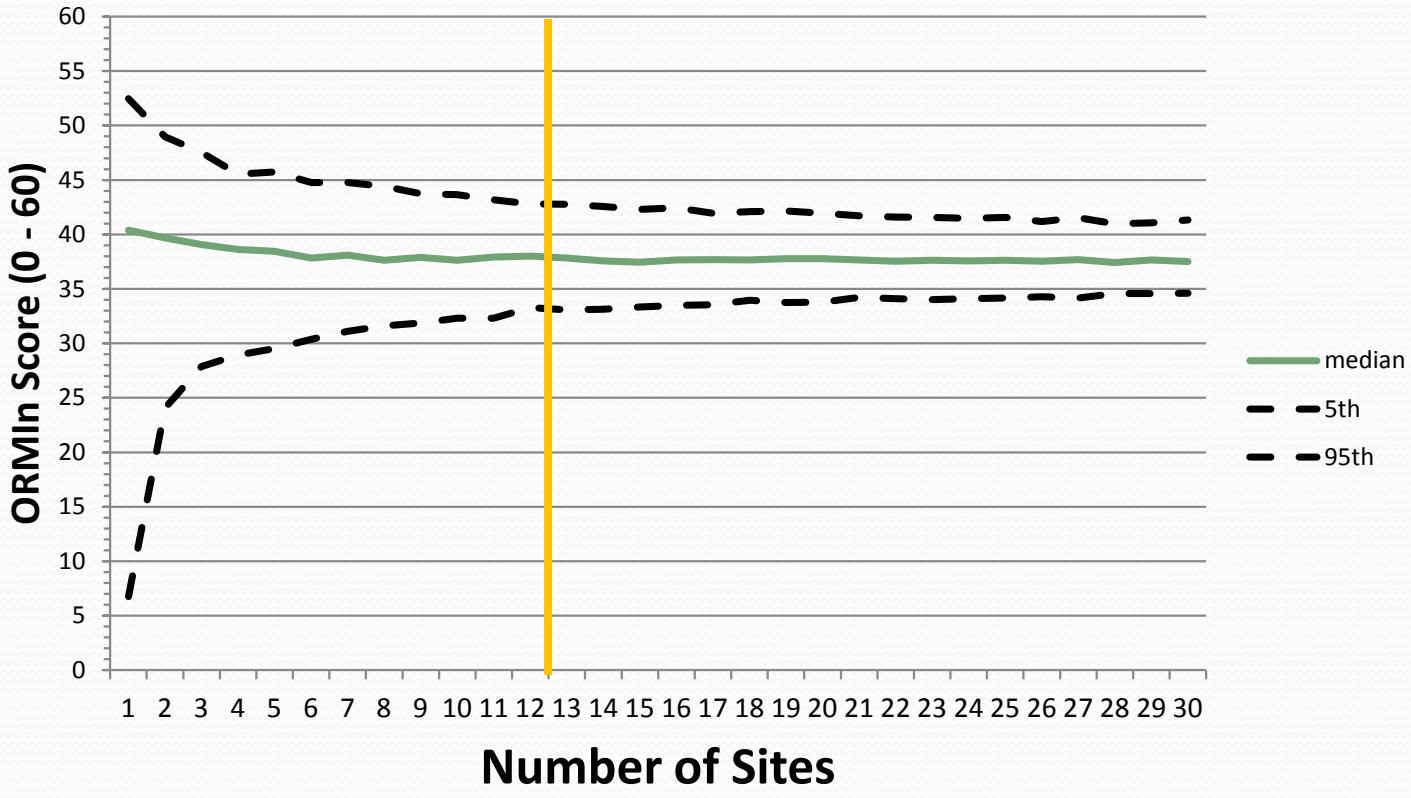
2013 Oversampling Results



Data Suggest 15 sites should be sufficient to assess with ORMIn

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BWQSC Recommendations

1. Accept all 4 pool assessments from 2014 as meeting their designated Aquatic Life Use

2. For 2016 305(b) Report:
   a. Inclusion of Ohio River Macroinvertebrate Index in annual assessments

   b. Exclude 2015 fish & macro data from the 2016 305(b) report
      - due to lag time of not receiving 2015 macro data until early 2016

   a. Assess any pool with an average index score below the 20 point criterion as impaired given the following criteria are met:
      I. No qualifications are assigned to either index
      II. Any appropriate abiotic and biotic data are considered prior to final assessment

BWQSC Recommendations

3. Random draw methods are sufficient, no need to augment. Maintain ability to incorporate targeted sites to mitigate " site clumping" within a pool

4. Considered and declined interest in conducting Lock Chamber surveys in 2015

5. Target 3 pools for 2015 fish and macroinvertebrate surveys (Montgomery, Racine, and John T. Myers)
    a. *As time allows* - Conduct in-season revisit (an entire pool) to investigate index precision
    b. Use available DO loggers to investigate *Hydrilla* and tributary influences

- Thanks to Jeff DeShon (OEPA) for his many years of service
- Thanks to Daniel Cleves, contractual employment term ended Dec.