

Presented at

# Great Rivers Reference Condition Workshop

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Sponsored by

The U.S. Environmental Protection Agency and The Council of State Governments



**EMAP**  
Great River Ecosystems



U.S. EPA Office of Research and Development

Environmental Monitoring and Assessment Program

# Reference Condition on Great Rivers

Will we know it when we see it?

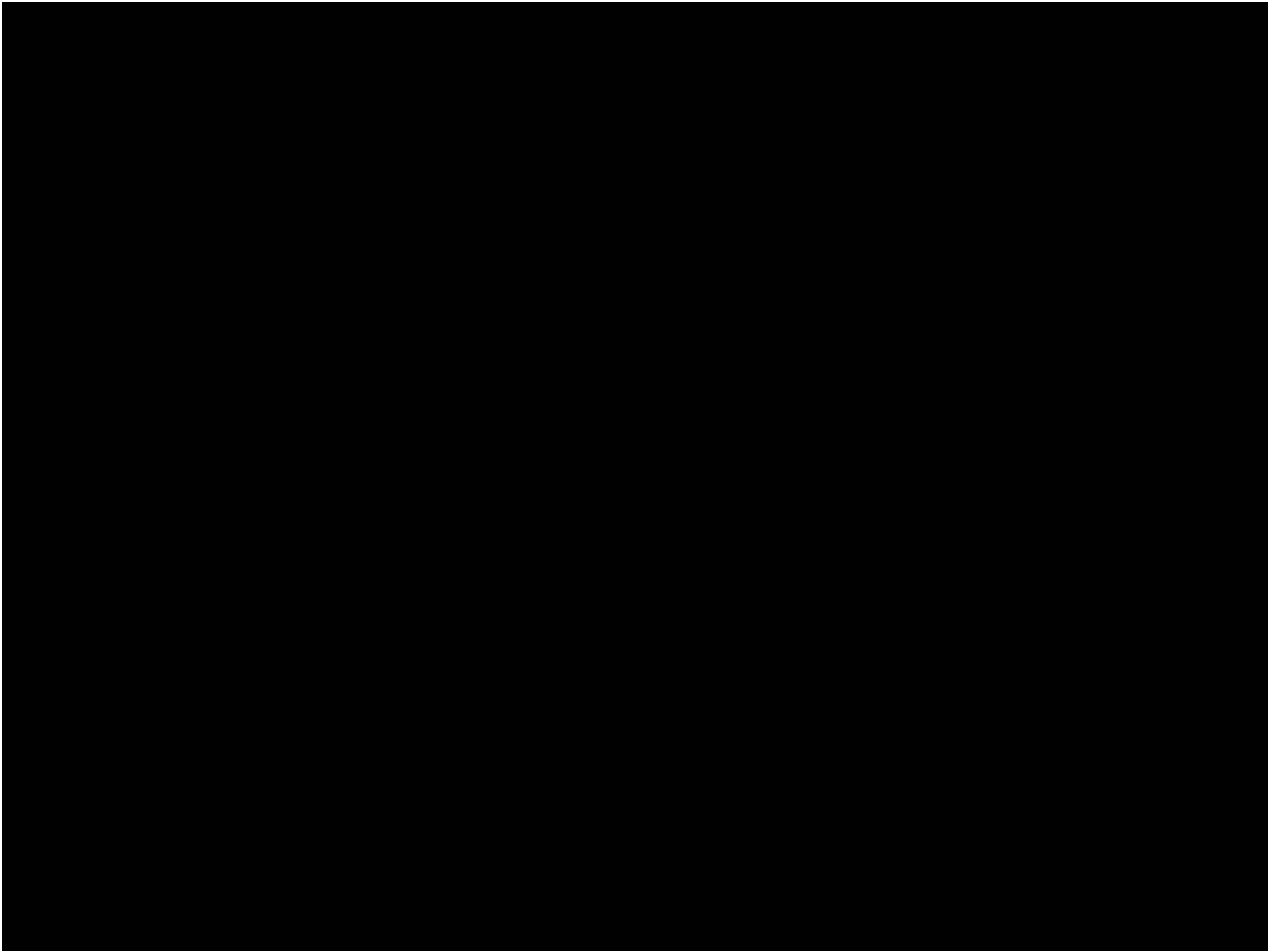


# Beginning the biocriteria development process...



# Biocriteria Development





# IBI Development

- Began in 1991
- Ohio River lacks reference sites representative of *pristine* conditions.
- Recognized that most alterations are *permanent* in nature.
  - ◆ Hydrologic and channel modifications associated with dams
- Adopted the use of least-impacted sites as a surrogate for reference
  - ◆ Lowers the ceiling a bit
  - ◆ Measure status against ‘best attainable condition’

# IBI Development

- Nighttime Electrofishing
  - ◆ 1991-2001
    - ◆ 709 sites
      - ◆ 391 sites failed to meet the criteria
      - ◆ 318 sites used for criteria development

# Least-Impacted Criteria

- Least-Impacted sites are:
  - ◆ at least 1 Km upstream or downstream from the restricted areas around navigational dams;
  - ◆ at least 1.61 Km downstream from any point source discharge;
  - ◆ at least 500m from a tributary mouth;
  - ◆ free of any other major sources of possible disturbance within the sampling zone (barges, fleeting areas, heavy shoreline modifications etc);



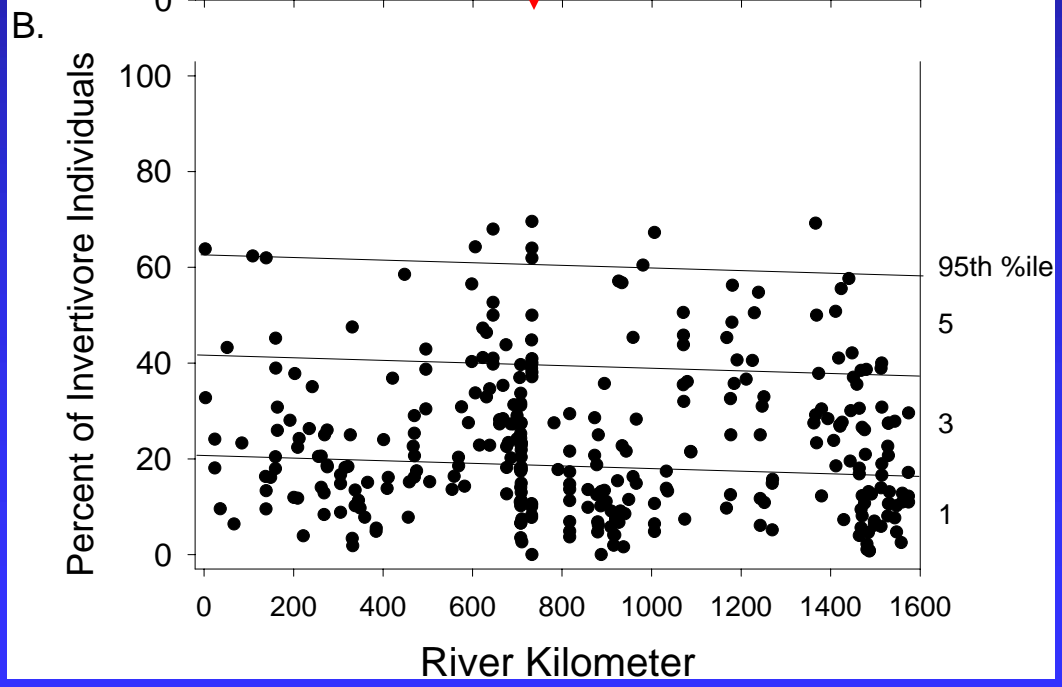
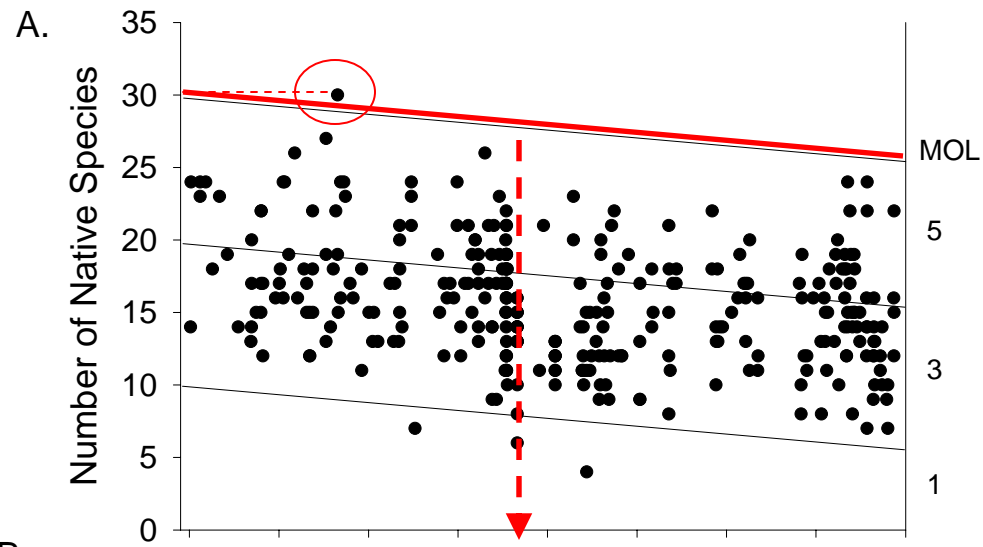
# Modifying IBI Scoring Procedures

Limited Historical Information

Lack of Reference Sites

# IBI Scoring Procedures

- First step to ‘make up for’ a lack of reference sites
  - ◆ Species richness metrics
    - ◆ Maximum Observed Value
      - Used instead of 95<sup>th</sup> percentile
        - Trisected beneath
    - ◆ Percentile Metrics
      - ◆ Standard 95<sup>th</sup> percentile procedures
        - Fausch et al (1984)



# Our use of the IBI

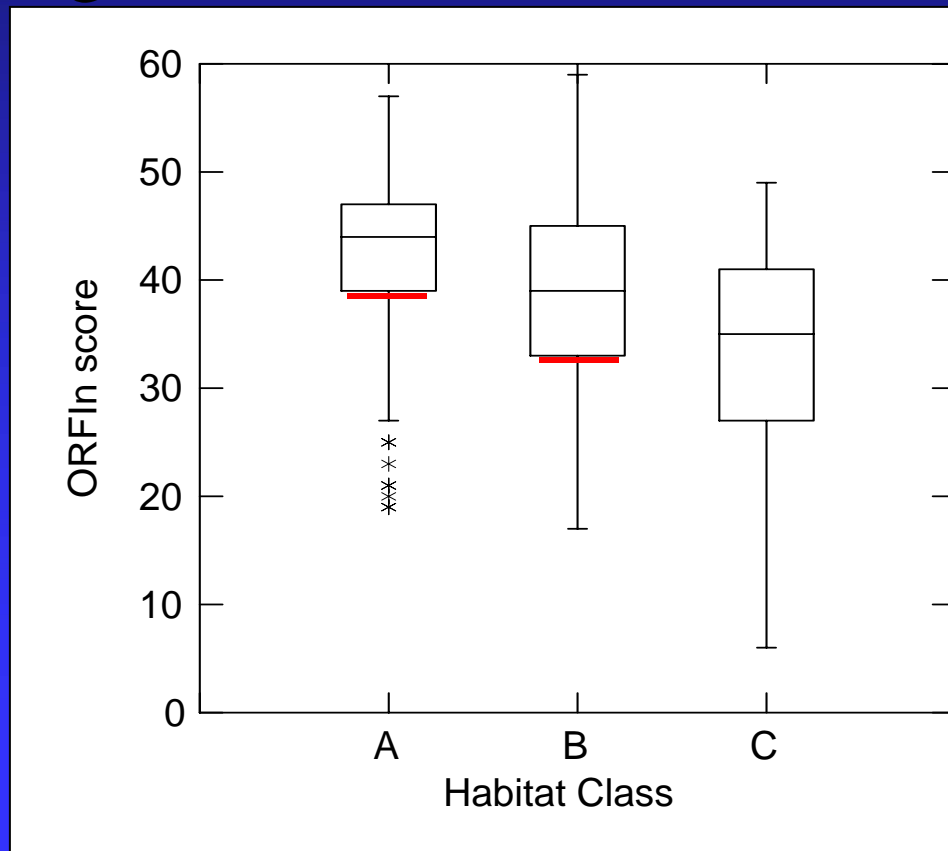
# Refining the bioassessment process...

- Criteria for Pass/Fail
- Observed –vs- Expected (reference)
  - ◆ Is there a difference?



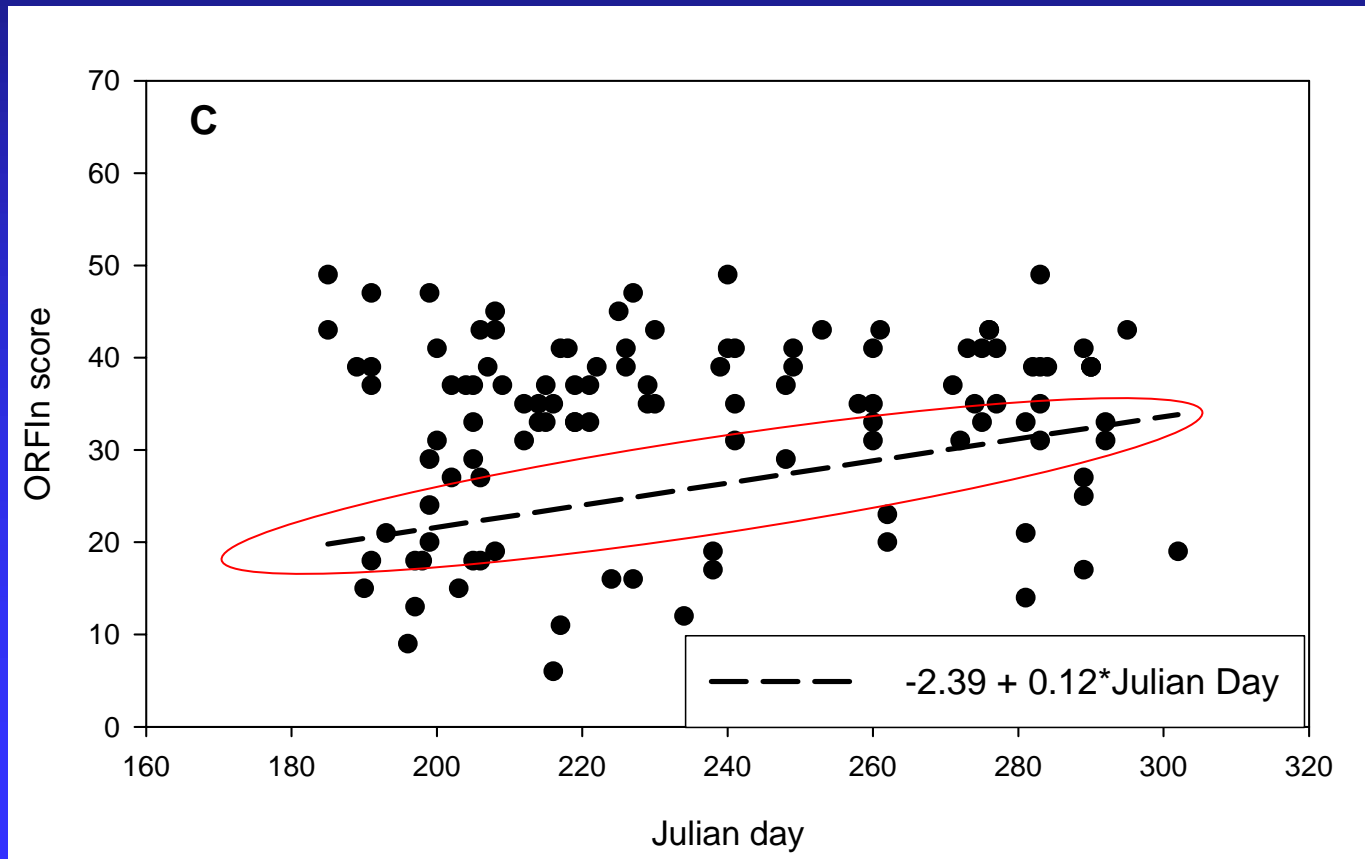
# IBI response to:

- Changes in microhabitat



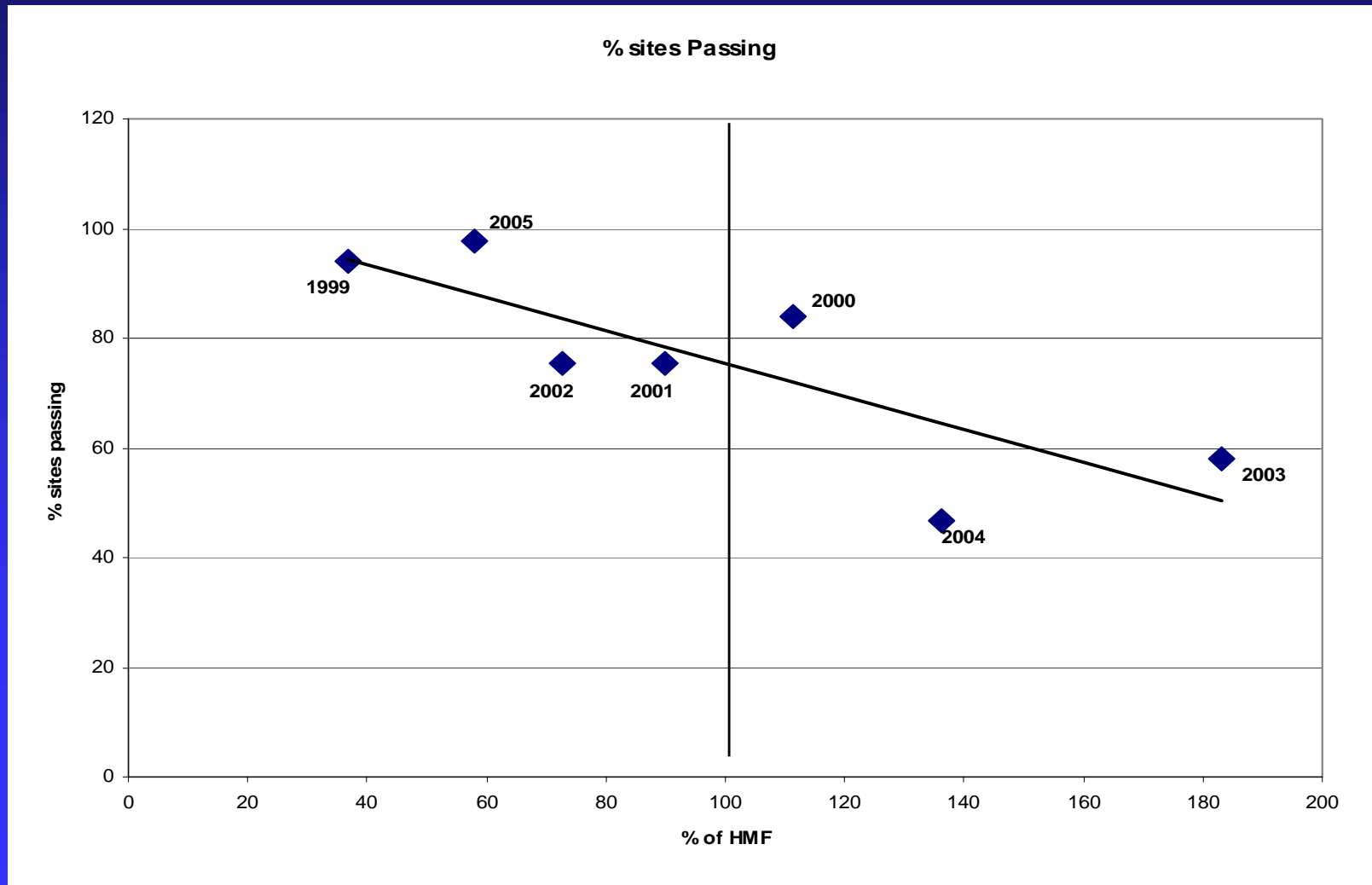
# IBI response to:

- Seasonal changes



# IBI response to:

## ■ Changing flow conditions



# Where are we now?

- We have:
  - ◆ Calibrations for microhabitat
  - ◆ Seasonal calibrations
  - ◆ Spatial calibrations
- We are:
  - ◆ Developing flow specific calibrations

# Where are we now?

- We are better positioned and equipped to detect differences between reference (least-impacted) and impaired condition.
  - But -
- We still might not be measuring the right things (abiotic factors) at the right scales.
- Need a better understanding of these abiotic factors in order to determine what is most important and what truly is a least-impacted condition.



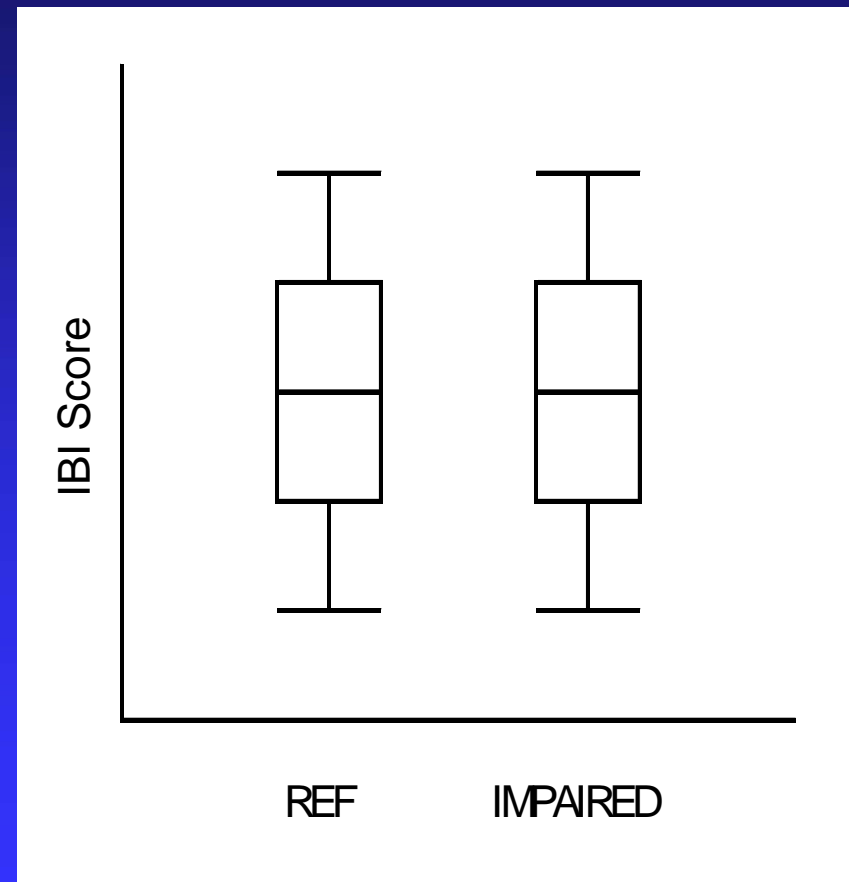
# Summary of Lessons Learned

# Increasing Resolution

- Assessment sensitivity increases as we gain a better understanding of (and incorporate into the process) all variables that potentially influence indicator variables.
  - ◆ ‘Natural’ factors
    - ◆ Habitat
    - ◆ Flow
    - ◆ Season
  - ◆ Disturbance factors

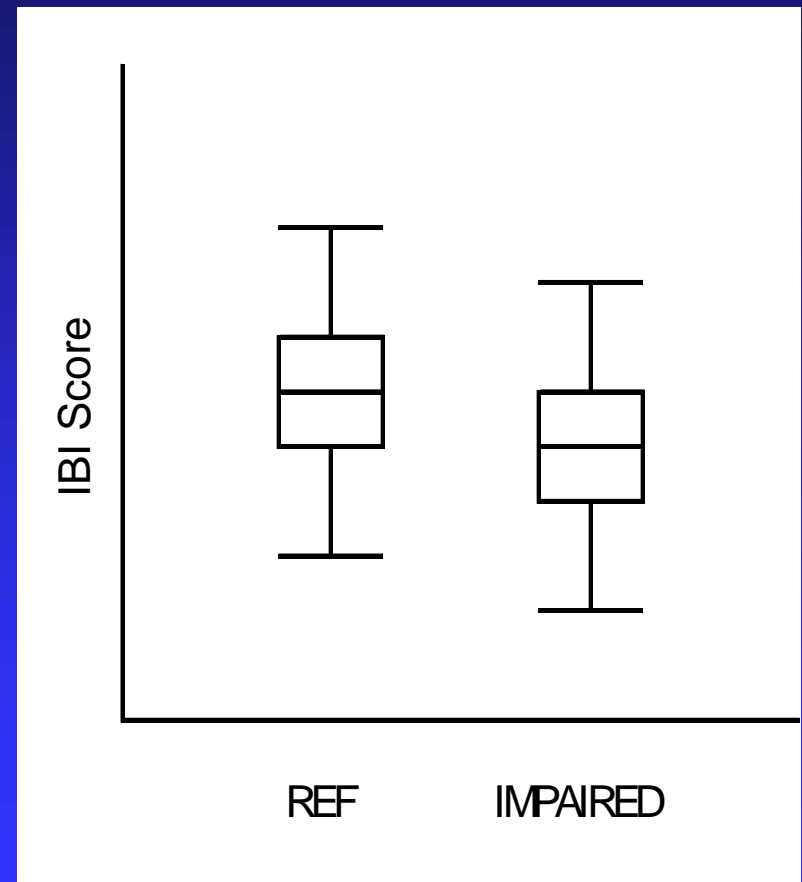
# The assessment process...

- Incapable of detecting a difference between reference and impaired communities if information is lacking.



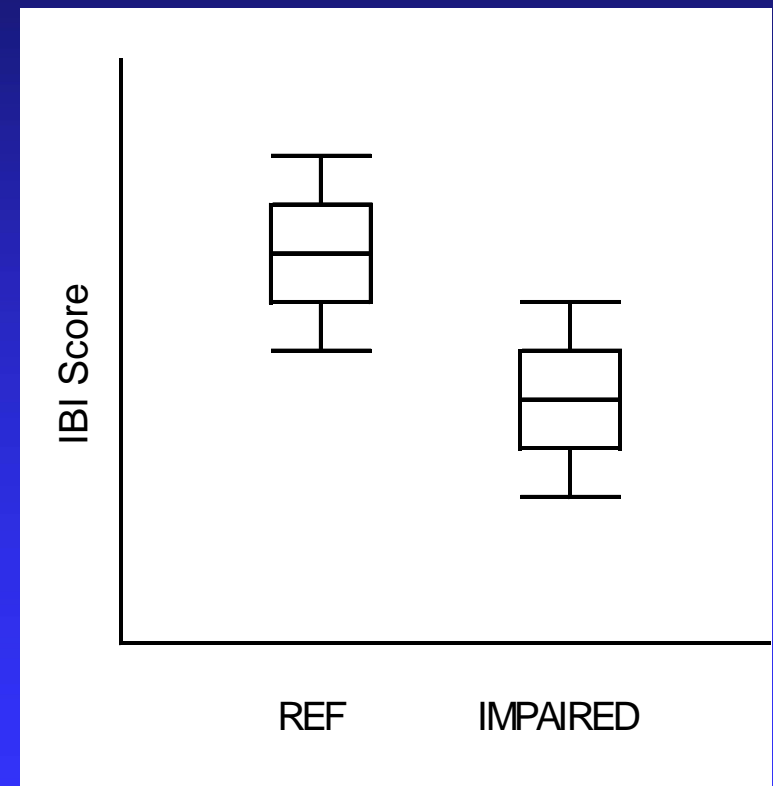
# The assessment process...

- Resolution increases as additional variance is accounted for.



# The assessment process...

- The more variance that can be accounted for, the greater the resolution and the greater our likelihood of detecting differences between reference condition and observed condition.





# Reference Condition on Great Rivers

Will we know it when we see it?

# Maybe...if we:

- measure the right things;
- at the right scales;
- have enough data to account for and remove major sources of variance;

# What does this mean to GRE?

- We may not know enough about what really matters.
  - ◆ Are we going to measure the right things at the right scales?
- We may not have enough data.
  - ◆ Enough data to really develop a picture of reference condition;
  - ◆ Enough data to fully account for and incorporate all of the variance outside of that caused by the ‘impairment’ in question.

Questions?