Condition of Indiana Lakes

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National Water Quality Monitoring Conference
By
Stacey Sobat, Senior Environmental Manager
Indiana Department of Environmental Management

Objectives for 2007 National Lakes Assessment

- Report on condition of nation's lakes
- Determine baseline lake condition for future trend assessment
- Develop state programs for monitoring and assessing lakes

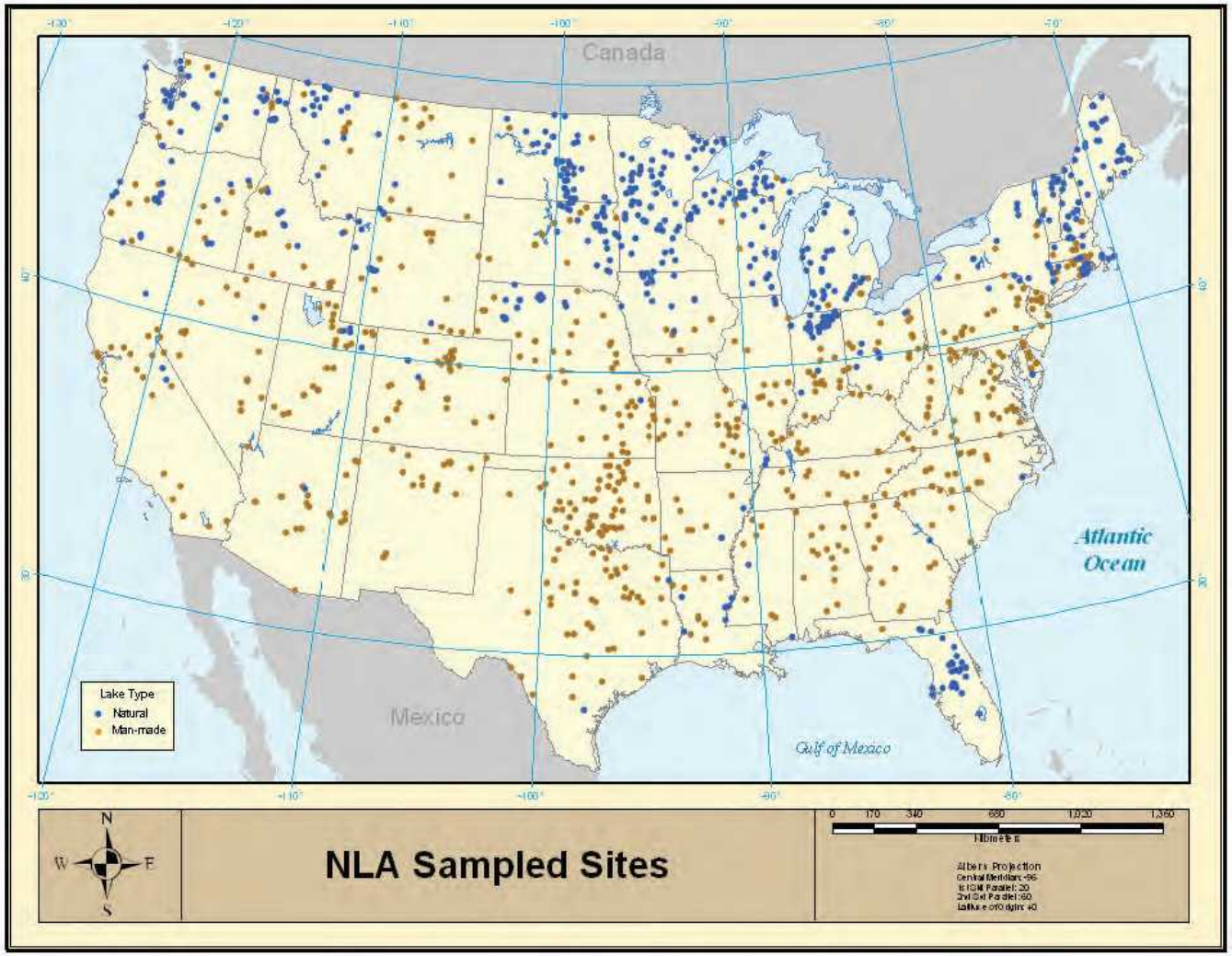
Presentation

- Target population of lakes
- Biological, chemical, and physical data
- Determining thresholds for expectations
- Comparison of results between Indiana and the nation's lakes
- Policy implications
- 2012 National Lakes Assessment

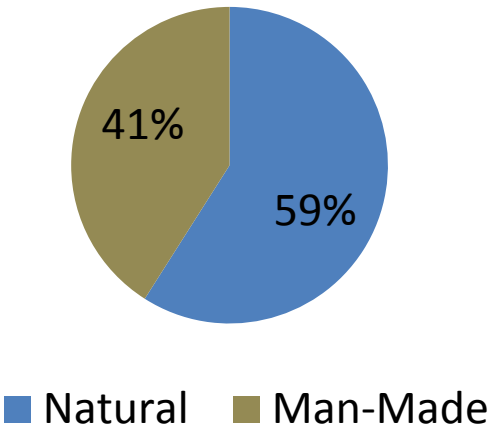
Target Population

- Natural and man-made freshwater lakes, ponds and reservoirs, greater than 10 acres with at least 0.25 acres open water, and a minimum depth of one meter
- Statistical survey design generated 1,028 lakes from 50,000 lakes in lower 48 states
- Twenty-one lakes in Indiana for National Lakes Assessment plus 29 for total of 50 lakes to perform statewide assessment

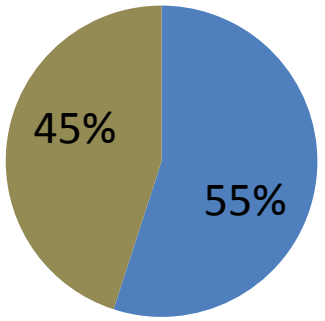
Extent of Lake Origin



National



Indiana

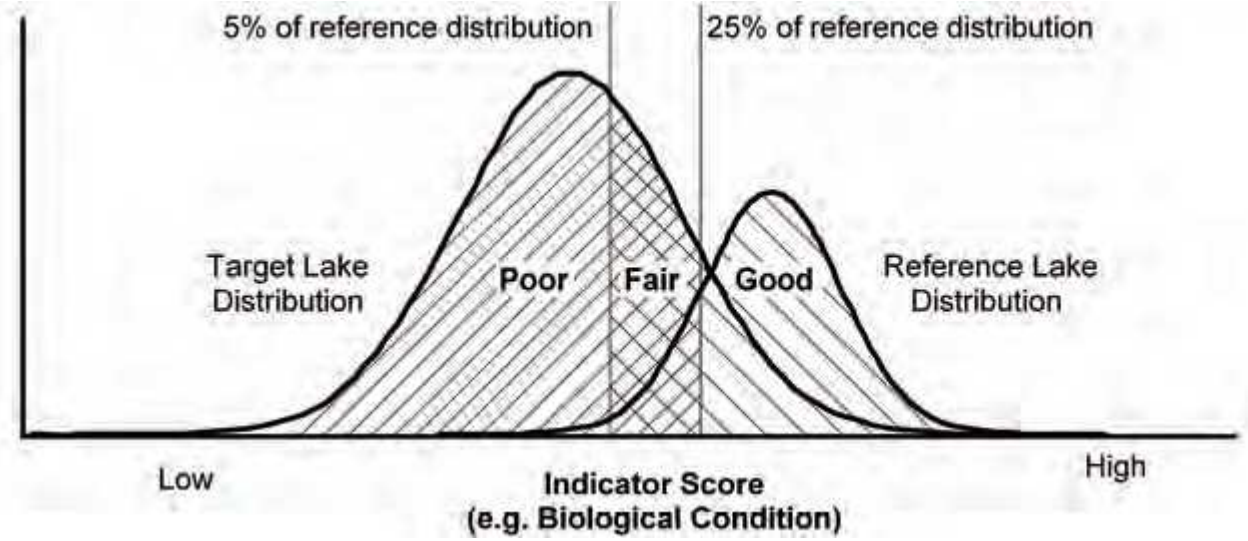


Data Collected

- Biological: phytoplankton (algae), zooplankton, sediment diatoms, algal density (chlorophyll-*a*)
- Chemical: total phosphorus, total nitrogen, turbidity, dissolved oxygen, temperature, pH, acid neutralizing capacity, salinity
- Physical: riparian zone, shallow water habitat, habitat complexity, lakeshore disturbance

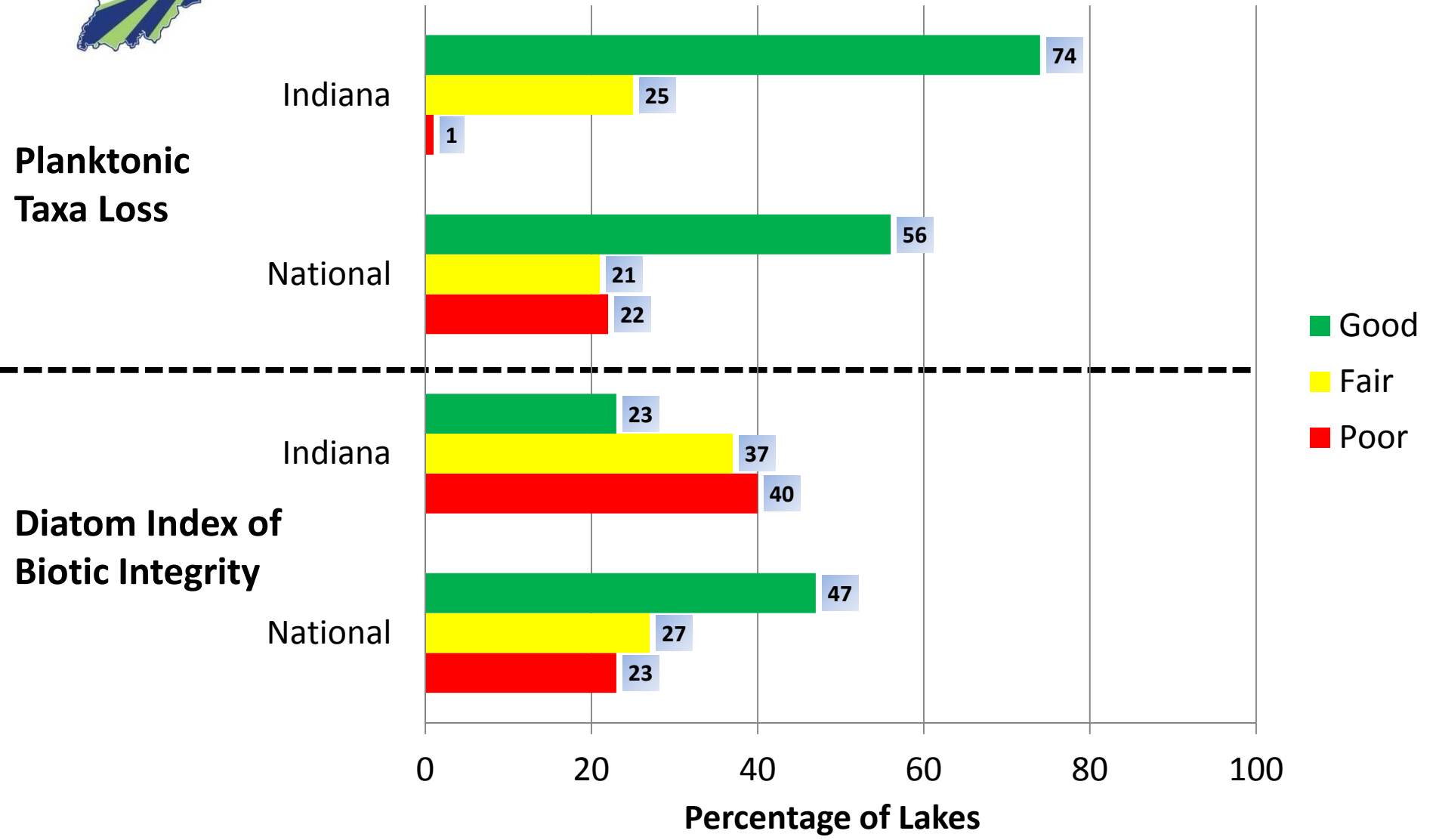
Determining Expectations

- Fixed thresholds
  - Dissolved oxygen, algal risk, lake trophic status
- Reference thresholds
  - Biological/physical data, nutrients, turbidity

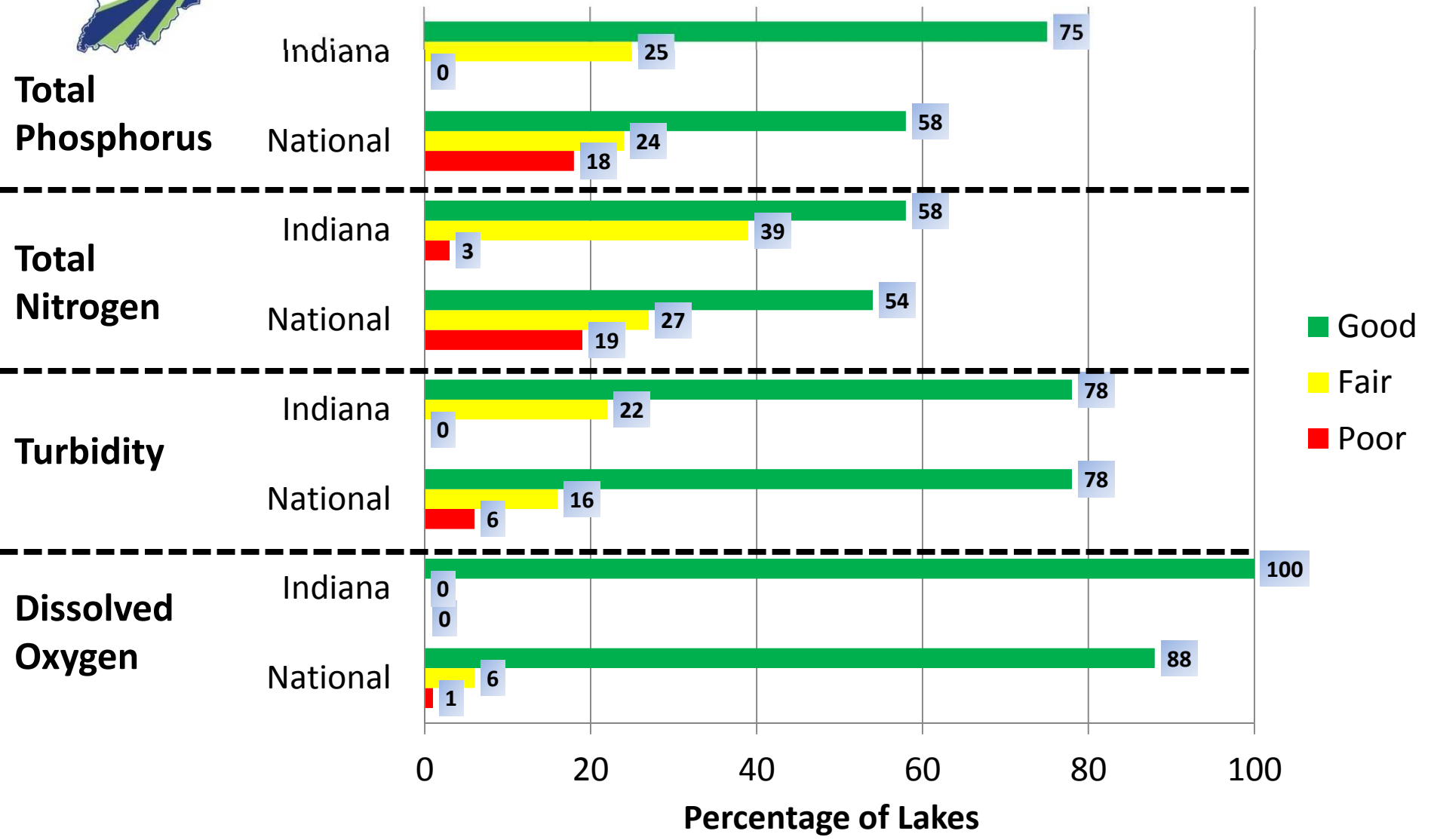


(Figure 5 from National Lakes Assessment Report)

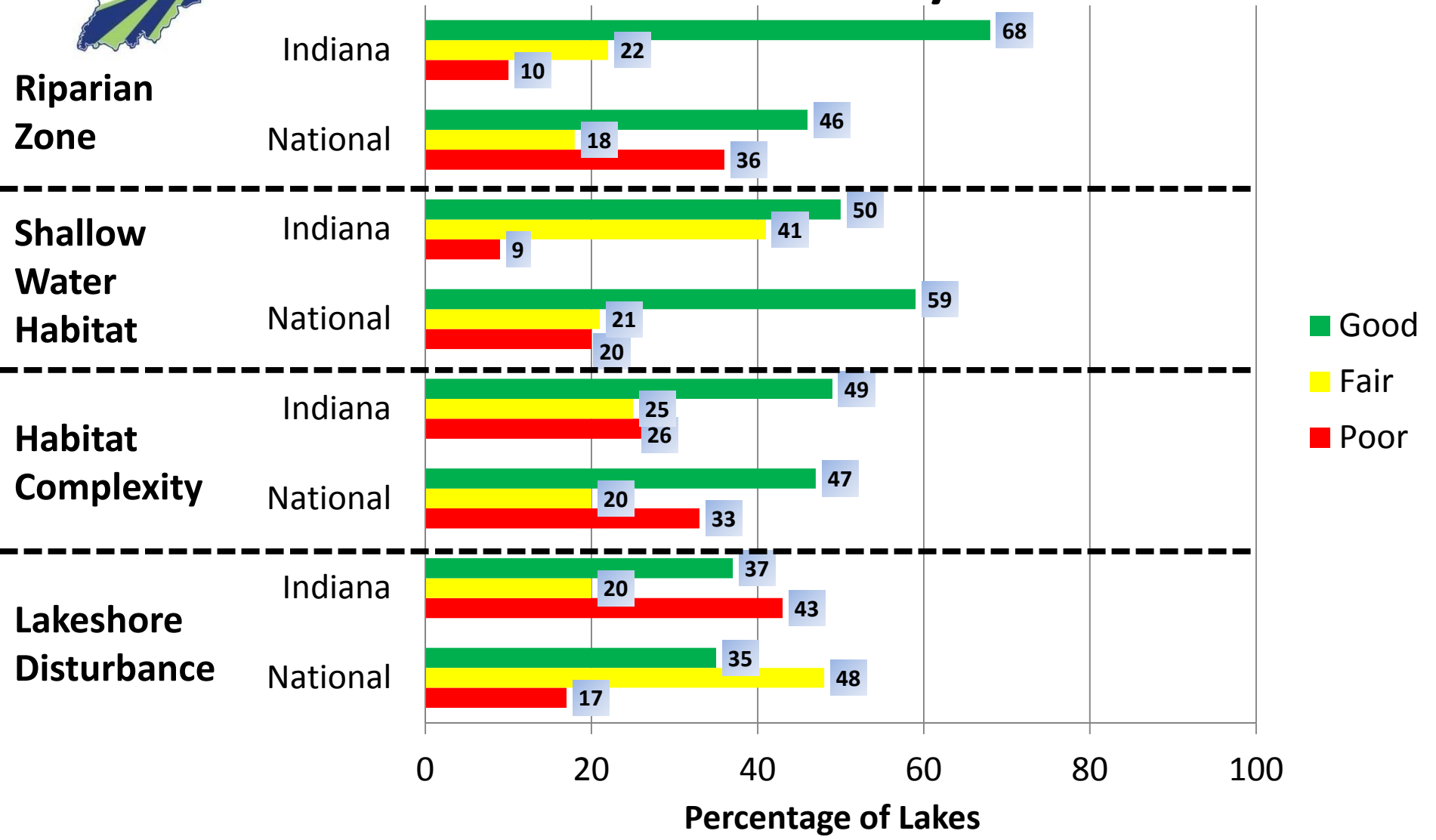
Biological Condition



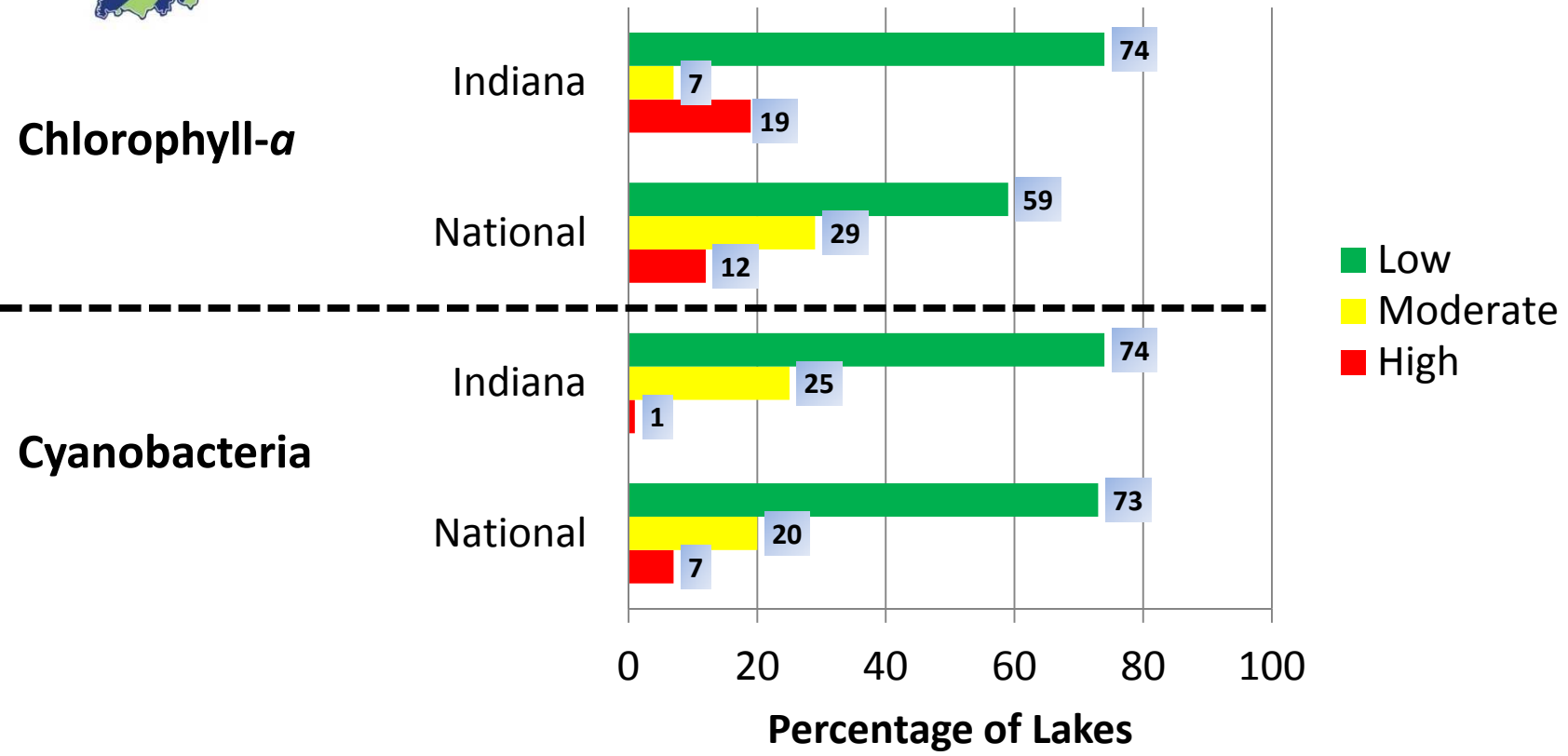
Chemical Stressors



Habitat Quality



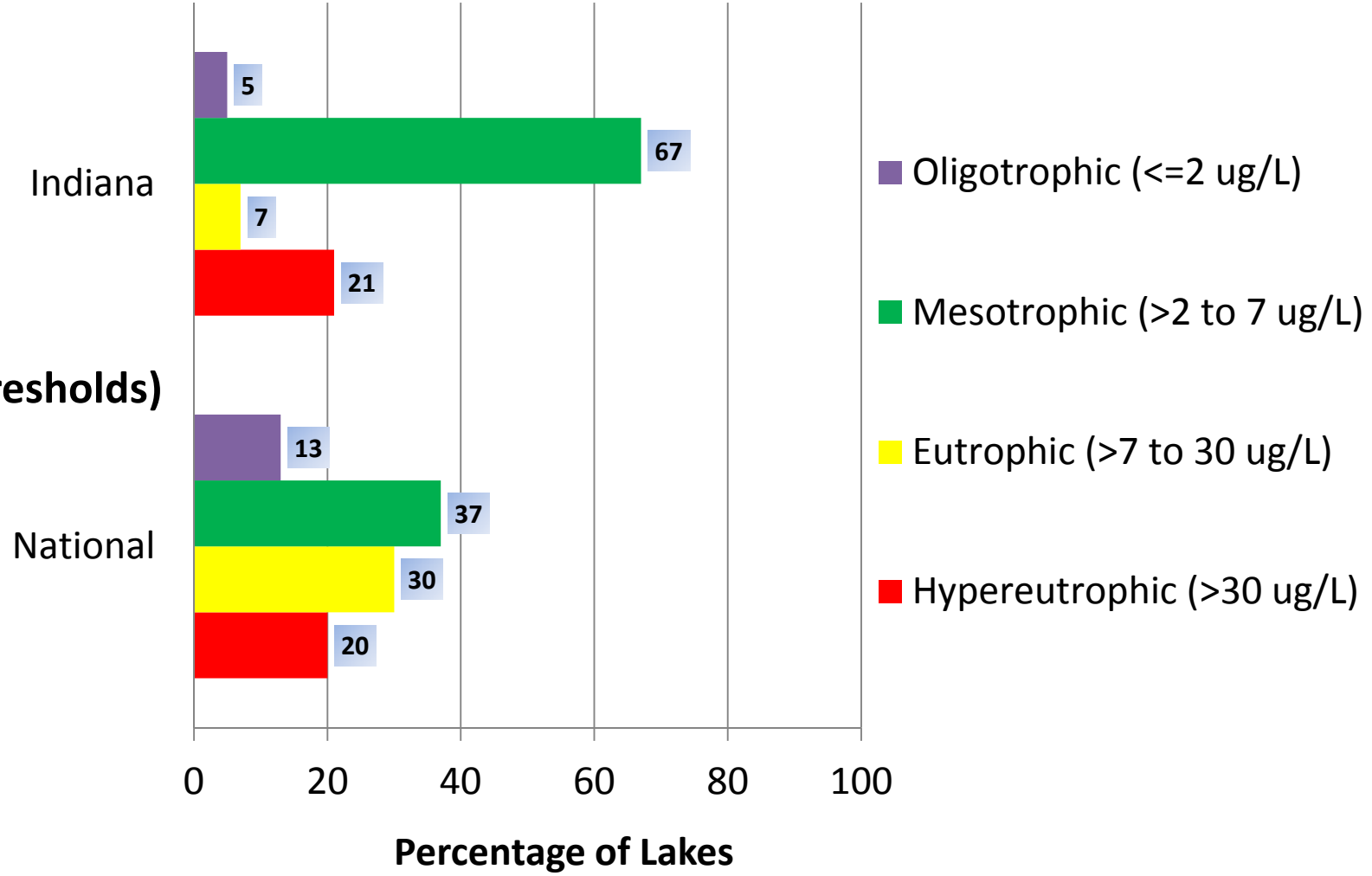
Harmful Algal Bloom Risk



- Extent of microcystin: Indiana 49% (0% level of concern) vs. 30% in nation (1% level of concern)

Trophic Status

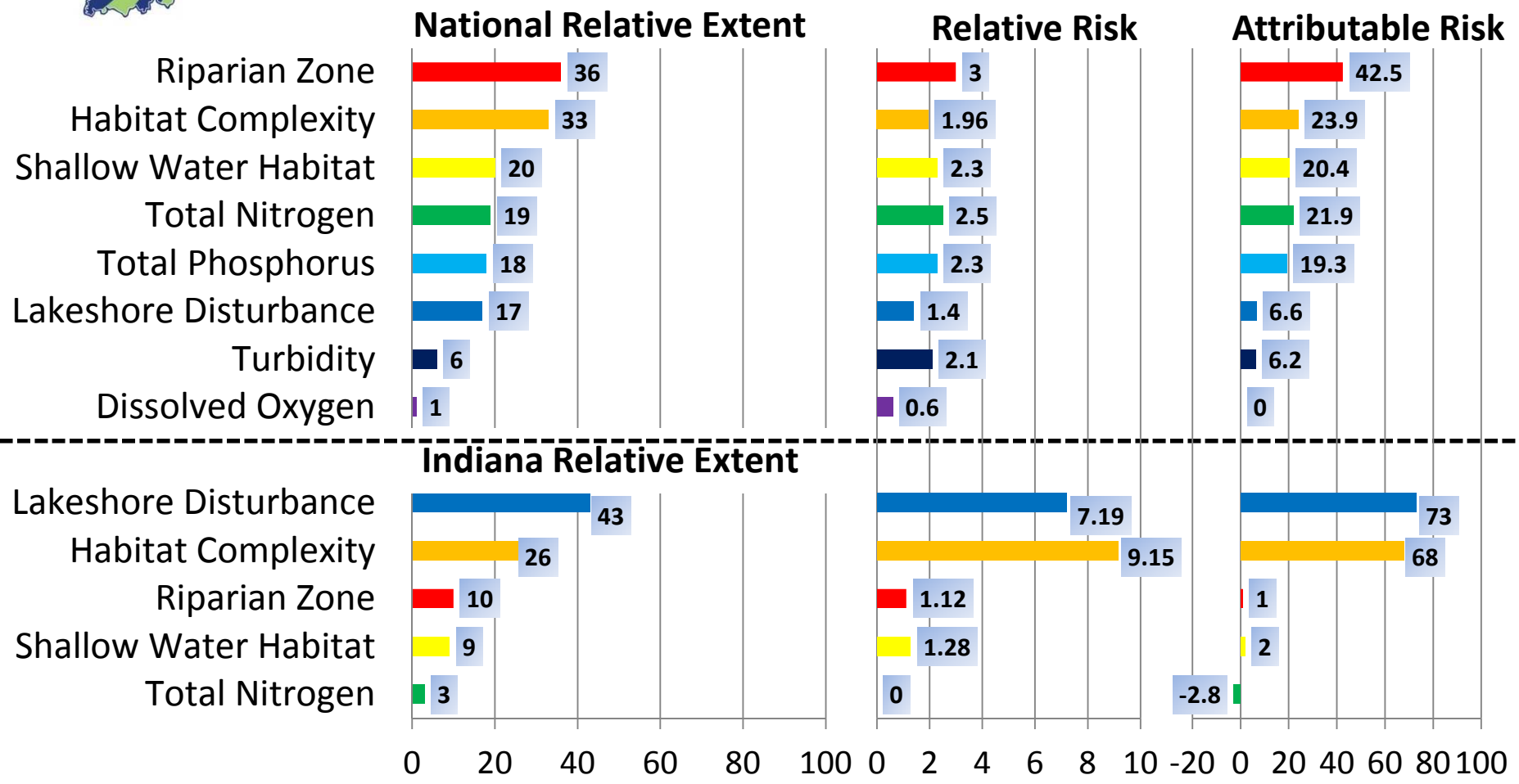
Chlorophyll-*a* ("Carlson" thresholds)



Policy Implications

- Prioritize stressors to planktonic loss with attributable risk analysis
  - Relative Extent of Stressor: percentage of Indiana lakes rated poor for each stressor
  - Relative Risk: severity of stressor's effect on planktonic taxa loss
  - Attributable Risk: combines relative risk and extent into a single measure of overall stressor impact on severe planktonic taxa loss for Indiana lakes

Stressors to Biological Condition



Policy Implications

- Severe planktonic taxa loss could be reduced by 73% if lakeshore disturbance was eliminated
- Poor habitat complexity is estimated to occur in 26% of Indiana lakes and is nine times more likely to cause severe planktonic taxa loss relative to other stressors
- Compared to other stressors, total nitrogen has no relative risk to severe planktonic taxa loss

Policy Implications

- Evaluation of management strategies by assessment of trends in biological and recreational condition as well as trophic status
  - Biological (planktonic taxa loss):

    74% good, 25% fair, 1% poor
  - Recreational (algal toxin, microcystin):

    Present in 49% of Indiana lakes, none at level of concern
  - Trophic status (Chlorophyll-*a*):

    21% hypereutrophic

    79% lower nutrient enrichment levels

2012 National Lakes Assessment

- Indiana University School of Public and Environmental Affairs (IU SPEA)
- Twenty-seven lakes in Indiana for National Lakes Assessment plus 23 for total of 50 lakes
- Evaluate 2012 results for changes in condition and stressors of Indiana lakes using 2007 baseline data
- Compare 2012 Indiana lake results to nation

Acknowledgements

- U.S. EPA 2007 National Lakes Assessment Report:

http://water.epa.gov/type/lakes/lakessurvey_index.cfm

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- U.S. EPA: David Peck and Mari Nord
- IDEM: Jim Stahl

Contact Information

Stacey Sobat

317-308-3191

ssobat@idem.IN.gov