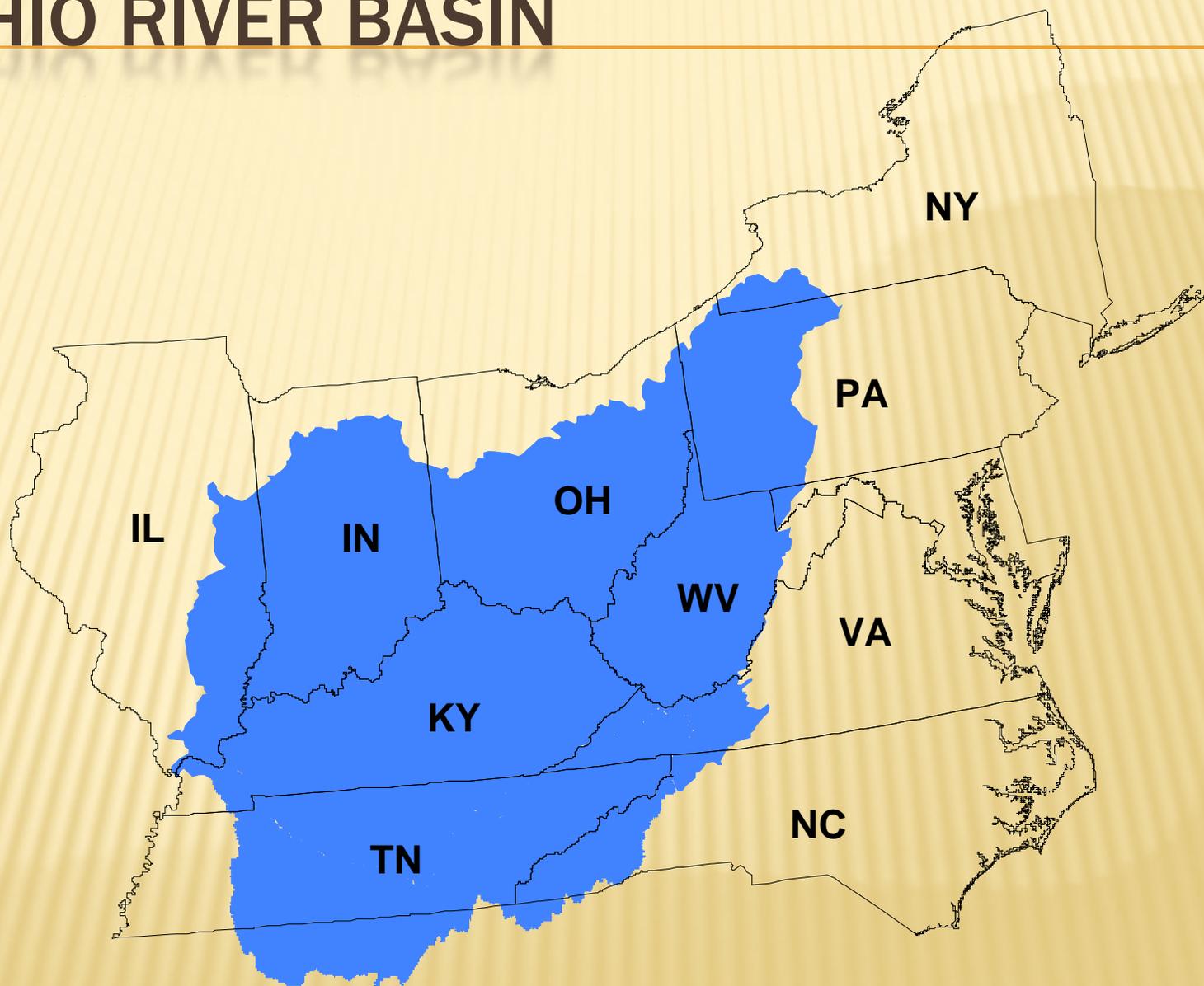


Assessing Aquatic Life Use Support on a Great River

Peter Tennant, Erich Emery, Jason Heath, Eben Hobbins

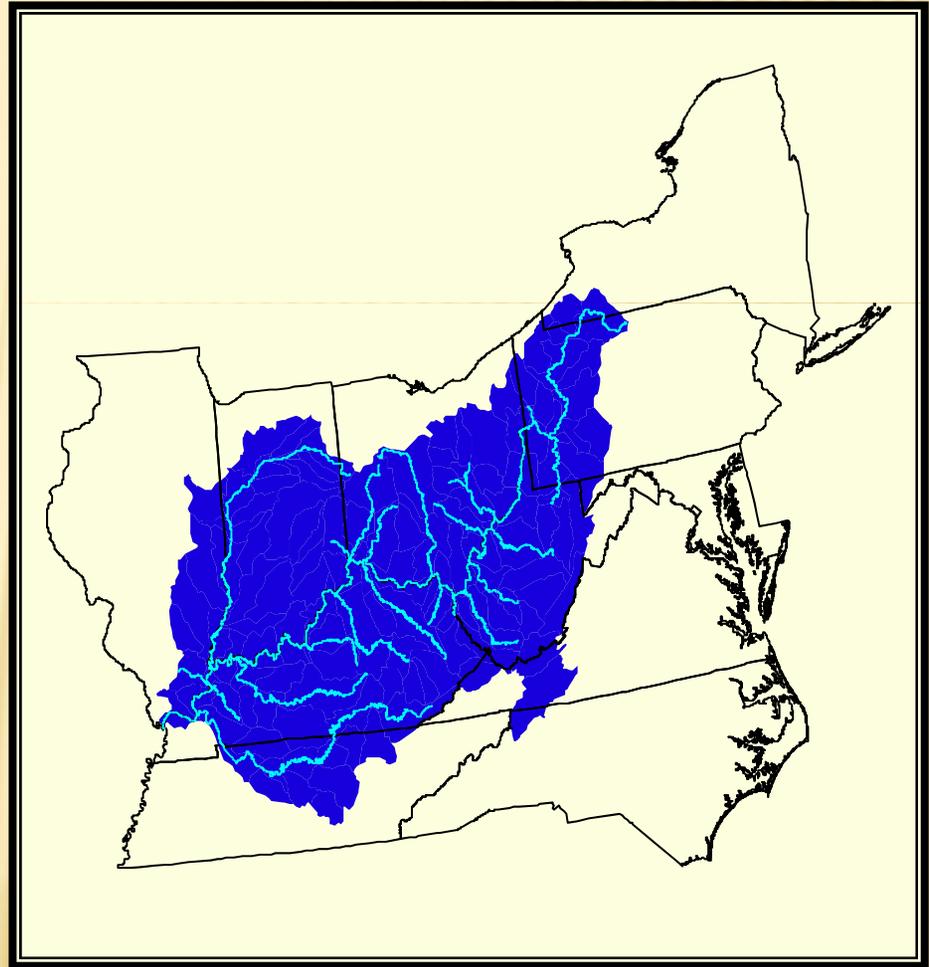


THE OHIO RIVER BASIN



OHIO RIVER/ BASIN FACTS

- ✘ 20 dams and 49 power-generating facilities
- ✘ 230 million tons of cargo transported annually
- ✘ 981 Miles long from Pittsburgh, PA, to Cairo, IL
- ✘ Drainage basin covers 204,000 sq. miles in 14 states
- ✘ Basin home to 25+ million people
- ✘ Drinking water for 3 million people
- ✘ 120+ species of fish live in the Ohio River



THE OHIO RIVER



Beaver Falls, PA



Greenup, KY

Locks and Dams on the Ohio River



US Army Corps of Engineers
Louisville District



ABOUT ORSANCO

- ✘ Interstate Compact agency
- ✘ Member states: Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Virginia, West Virginia.
- ✘ 3 Commissioners per state plus 3 federal

ORSANCO MONITORING AND ASSESSMENT

- ✘ States have assigned responsibility for monitoring the Ohio River to ORSANCO.
- ✘ ORSANCO prepares 305(b) assessment for the Ohio.
- ✘ ORSANCO activities are overseen by work groups of state and federal agency personnel.

OHIO RIVER 305(B) ASSESSMENT

- ✘ Support of four uses assessed
 - + Public Water Supply
 - + Contact Recreation
 - + Fish Consumption
 - + Aquatic Life Habitat
- ✘ Methodology for first three uses relatively consistent; Aquatic Life assessment has evolved over time.

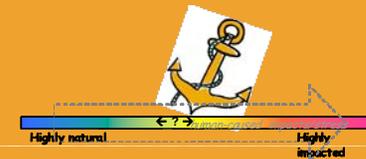
AQUATIC LIFE ASSESSMENT

- × 1972 – 1992: Assessment based on physical/chemical data.
 - + Impairments due to low dissolved oxygen, high metals concentrations.
- × 1992-2000: Development of fish-based biological criteria

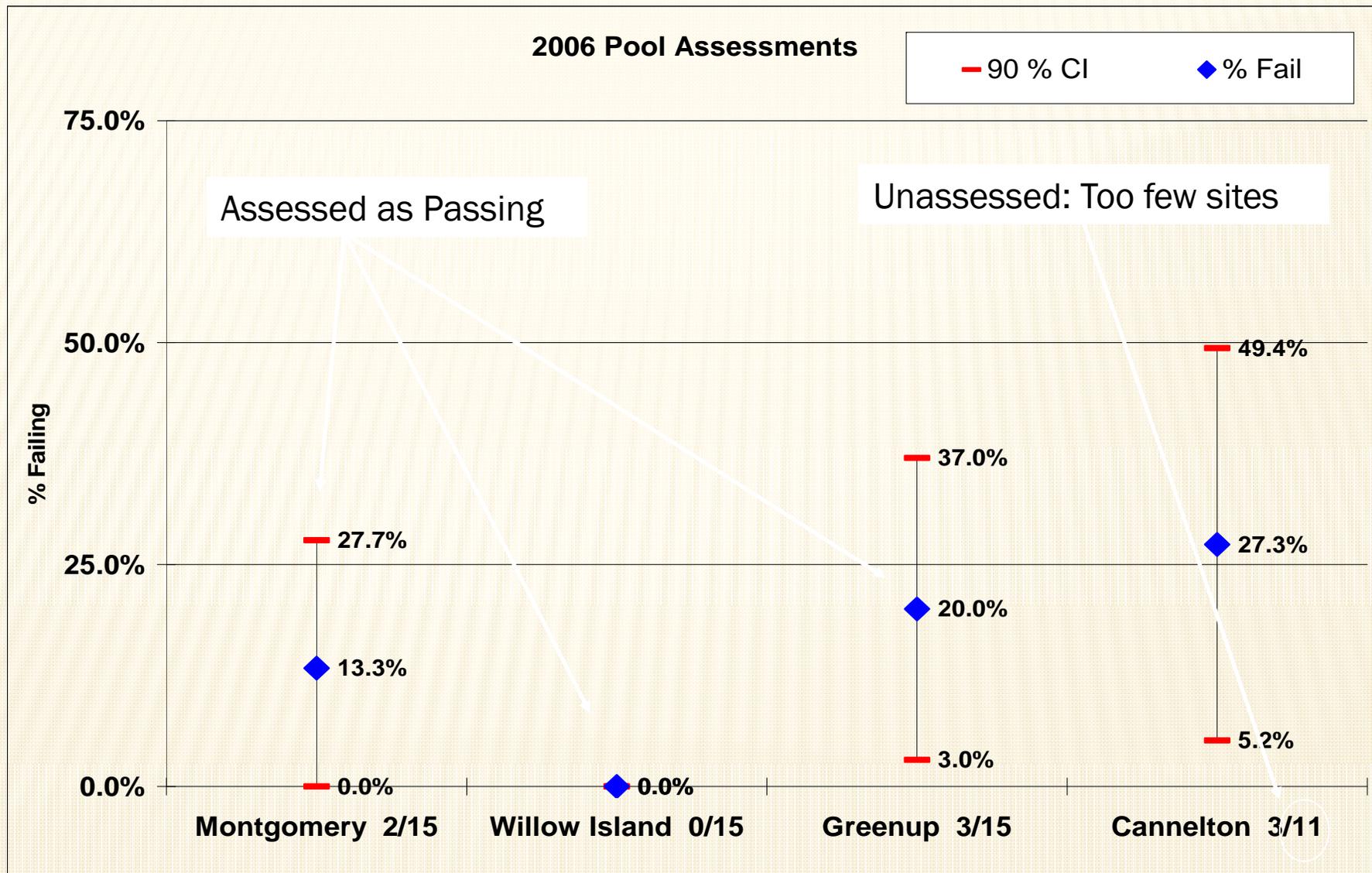


History

- Critical Steps
 - Selecting Method
 - Building Database
 - Defining Reference (least impacted) Condition
 - Developing Index
 - Testing & Calibration
 - Setting Expectations (predictive model)
 - Removing natural variability – (*signal –vs- noise*)
 - Defining Assessment Units
 - River reach; pool; segment; local; area targeted for specific restoration activity
 - Determining number of sites needed to make assessment
 - Developing strategy for determining when/where impairment exists (or how to mark significant improvements following restoration)
 - Define corrective actions necessary to improve condition
 - CWA Process
 - Restoration Process



BWQSC RECOMMENDATION



AQUATIC LIFE 2002 REPORT

- ✘ Seven Miles listed as Not Supporting
- ✘ Impairment based on ORFI scores

AQUATIC LIFE

2004 REPORT

- ✘ 2004 - 16 mi. impaired; 2002 - 7 mi. impaired
- ✘ Very few chemical criteria violations.
- ✘ Impairments based on biological – ORFin.
- ✘ ORFin used in a highly conservative manner – impairment required multiple negative scores.
- ✘ States indicated some concern for TMDL-listings based on ORFin data.

2006 ASSESSMENT

State	River Miles	Aquatic Life Impairments	Public Water Supply Impairments	Contact Recreation Impairments	Fish Consumption Impairments
PA	0-40.2	0	0	40.2	40.2
OH-WV	40.2-317.1	0	0	88.8	276.9
OH-KY	317.1-491.1	0	0	41	174
IN-KY	491.1-848.0	0	0	277	356.9
IN-IL	848.0-981.0	0	0	28	133
Total		0	0	475	981

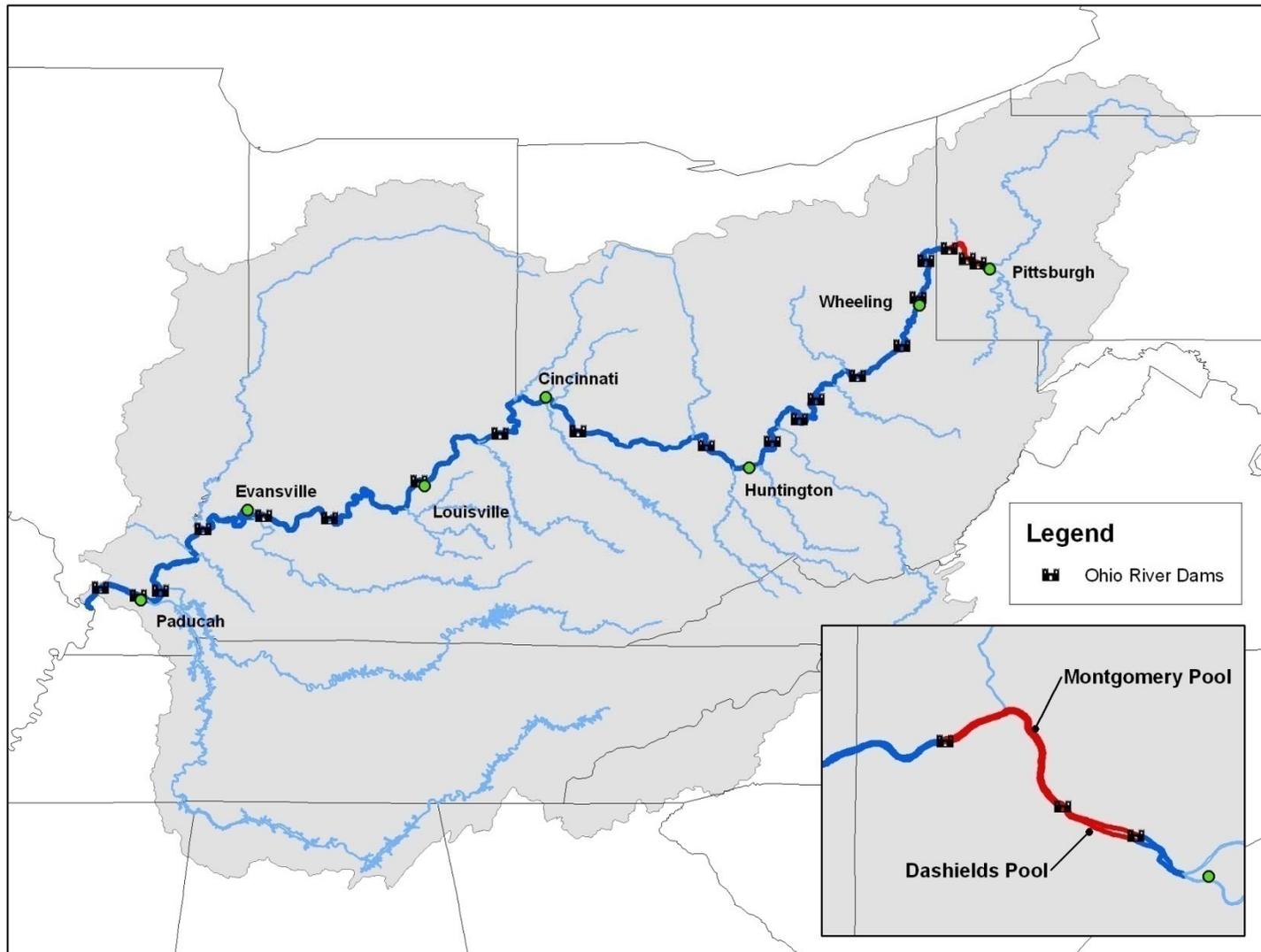
Executive Summary Table (pg. 5)

AQUATIC LIFE

2008 ASSESSMENT

- ✘ 72 miles assessed as Impaired due to High Temperatures
- ✘ 70 miles assessed as impaired due to low Dissolved Oxygen

BIOLOGICAL IMPAIRMENTS 2010 REPORT



AQUATIC LIFE ASSESSMENT 2010 REPORT

- ▶ Biological data indicates impairment for Dashields & Montgomery pools based on recommendation of the Biological Subcommittee.
- ▶ Dissolved Oxygen data at Cannelton >10 % exceedance. indicates impairment.
- ▶ States' Iron criteria >10% exceedance at 12 of 19 water quality monitoring stations.

PA – 1500 ug/L	KY – 3500 ug/L
WV -1500 ug/L	IN - 2490 ug/L
- ORSANCO has no criterion.
- Inconsistencies could not be resolved; assessment will not make conclusions on aquatic life use support.

INTEGRATED ASSESSMENT OBJECTIVES

- ✘ Provide data for evaluating water quality monitoring results from fixed stations
- ✘ Begin integration of water quality and biological monitoring



WATER QUALITY/BIOLOGICAL INTEGRATION

- ✘ Provide chemical data to support results of biological surveys

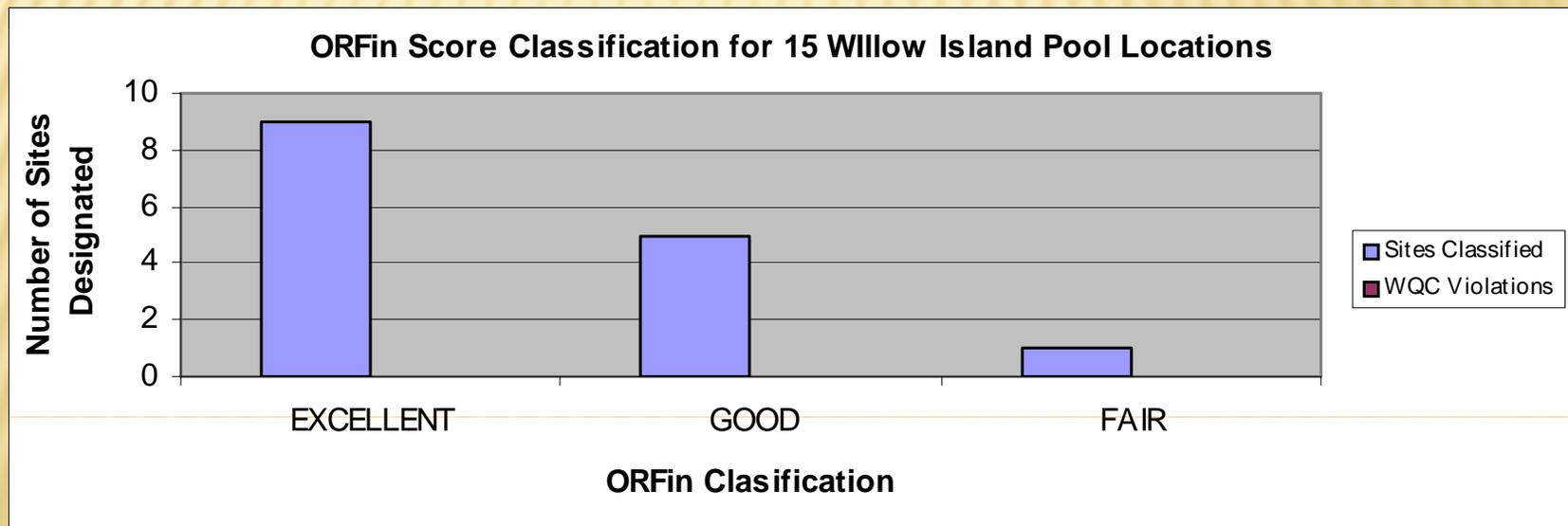


WILLOW ISLAND POOL

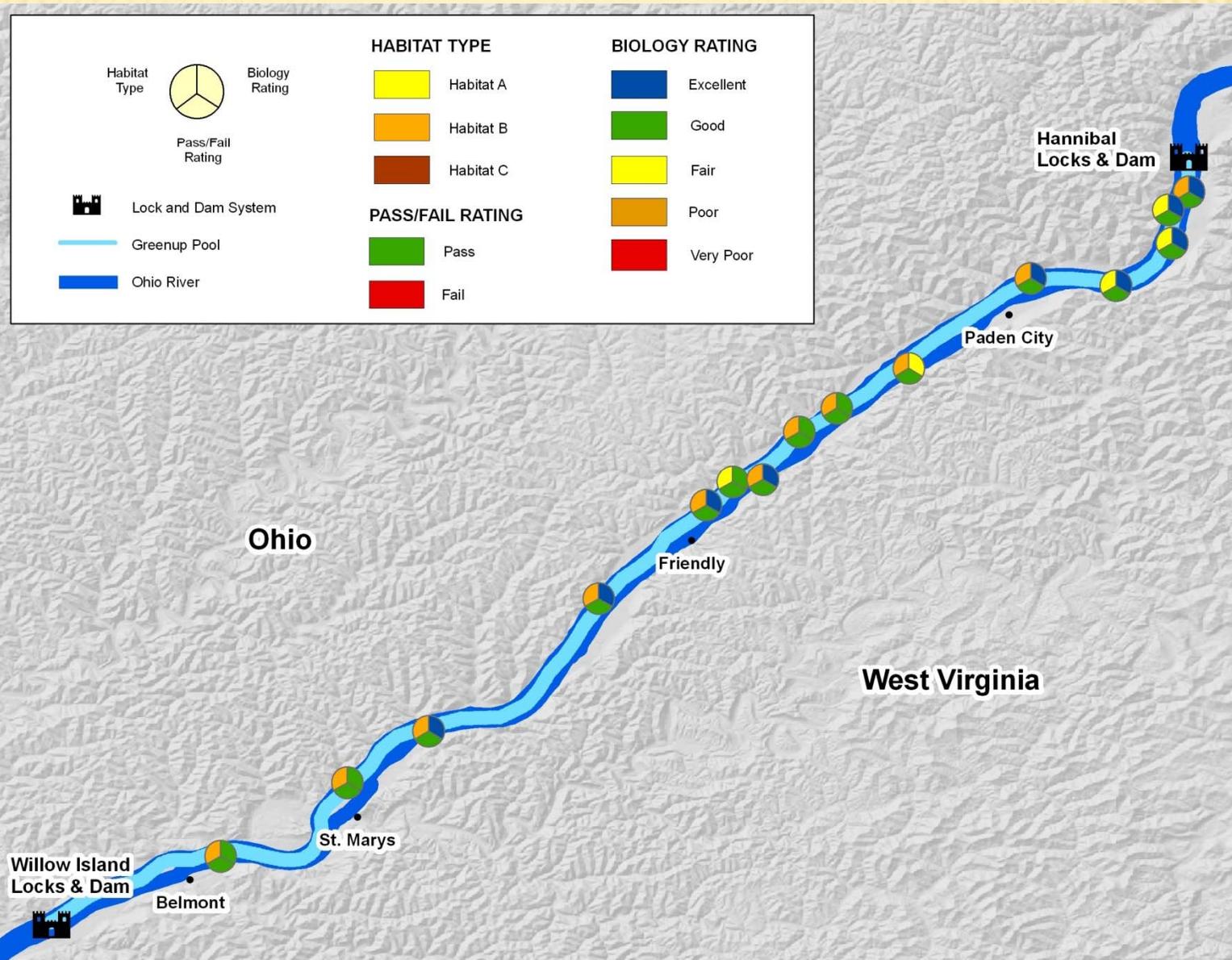
- × 35 miles long
- × New Martinsville, WV to St. Marys, WV
- × No major tributary inputs.
- × Industrial complexes at upstream and downstream ends of pool.

PRELIMINARY ASSESSMENT WILLOW ISLAND POOL

- ✘ All fish sites passed ORFin criteria with fair to excellent scores
- ✘ No violations of Water Quality Criteria were found

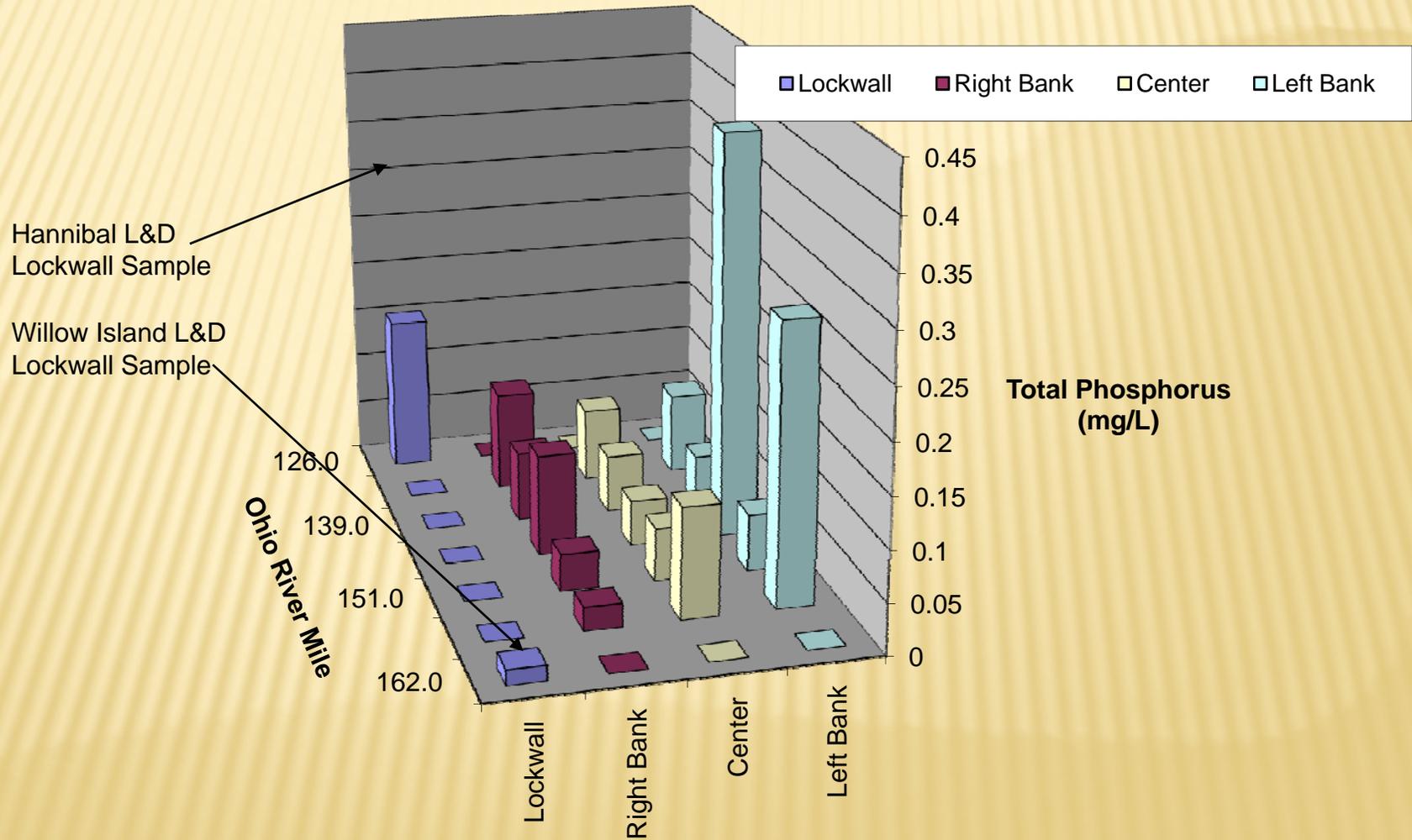


POOL SURVEYS – WILLOW ISLAND



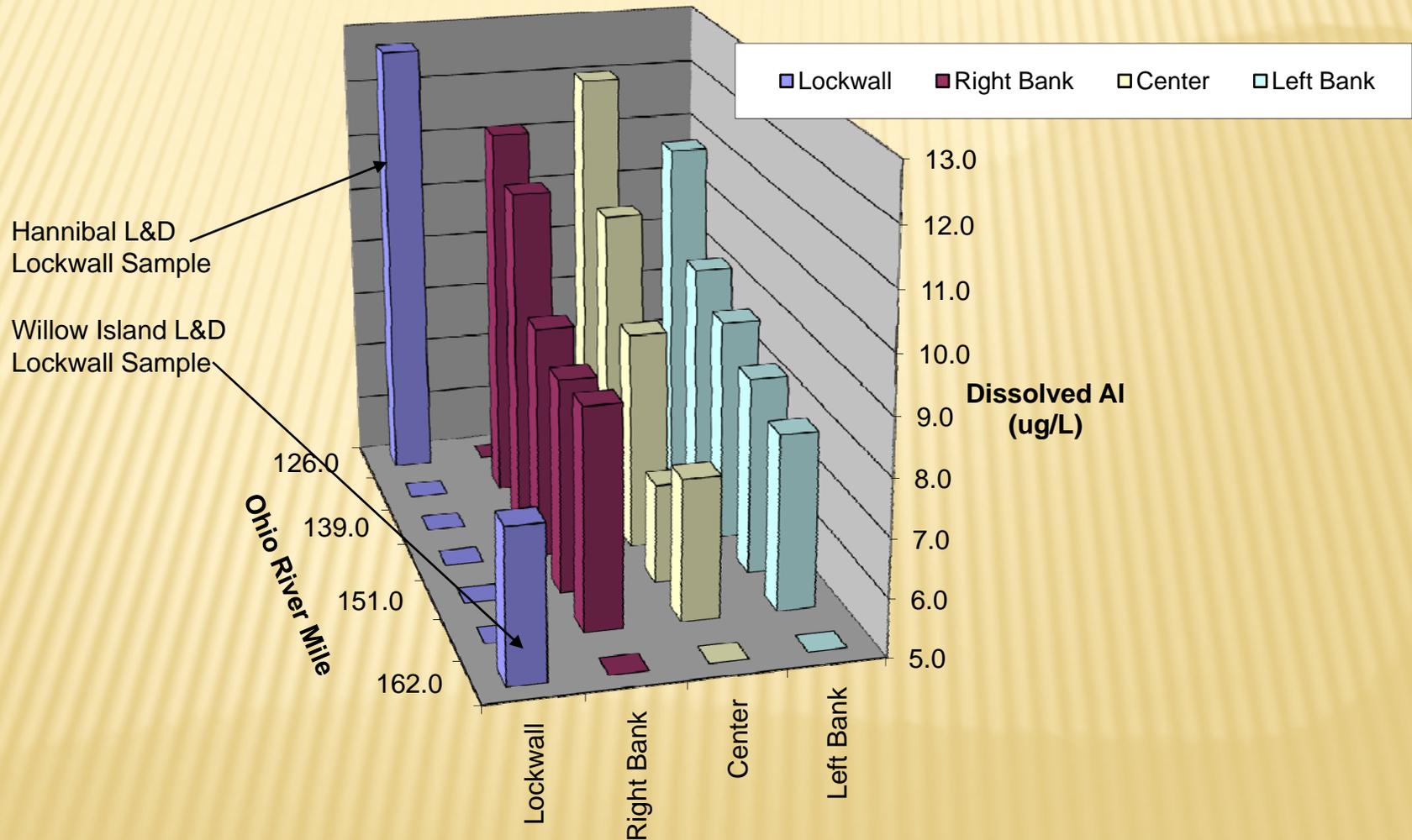
Total Phosphorus- highly variable concentrations across pool

Integrated Assessment Project
Willow Island Pool Survey September 1, 2005
Total Phosphorus(mg/L) Lockwall and Cross-section Results



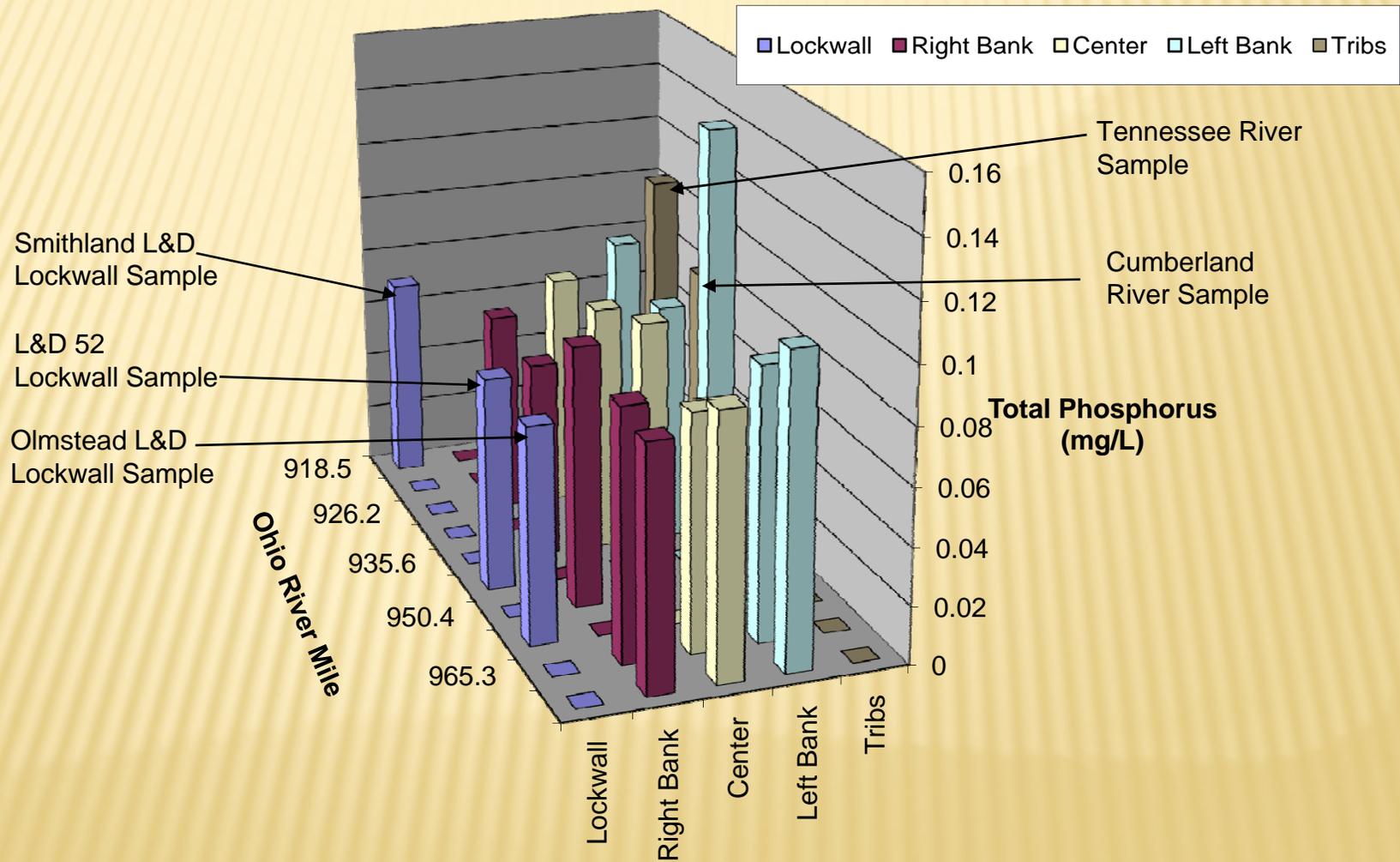
DISSOLVED ALUMINUM - UNIFORM CONCENTRATIONS ACROSS POOL

Integrated Assessment Project
Willow Island Pool Survey October 26, 2005
Dissolved Aluminum (ug/L) Lockwall and Cross-section Results



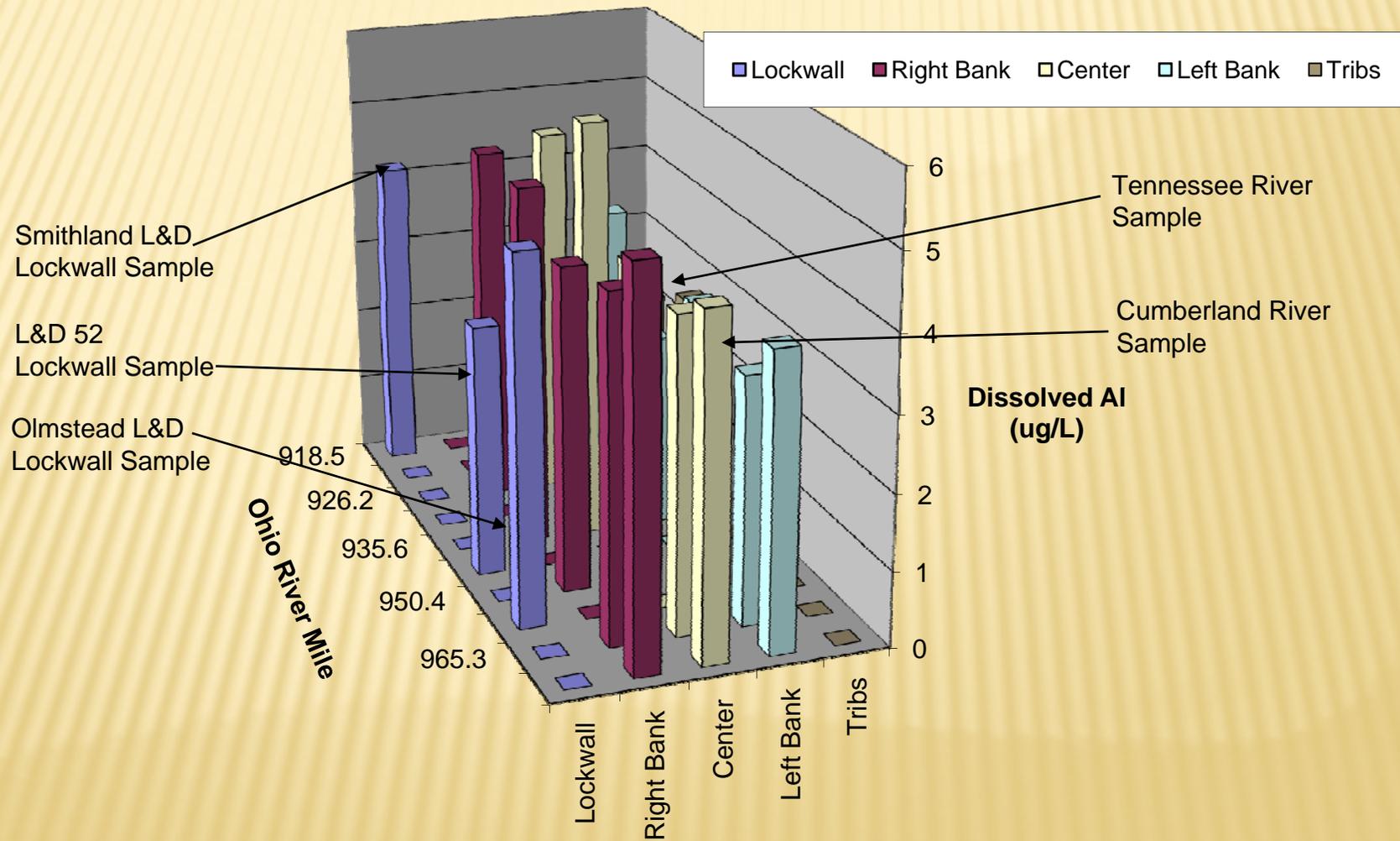
Total Phosphorus- lateral tributary influence

Integrated Assessment Project
Mississippi to Smithland L&D Survey Sept 16, 2009
Total Phosphorus(mg/L) Lockwall, Cross-section and Tributary Results



Dissolved Aluminum – lateral tributary influence

Integrated Assessment Project
Mississippi to Smithland L&D Survey May 19, 2009
Dissolved Aluminum (ug/L) Lockwall, Cross-section, and Tributary Results



OBSERVATIONS

- ✘ Single point sample appears to represent water quality conditions in pools without major tributary inputs.
- ✘ Biological criteria do not appear to respond to occasional water quality perturbations.
- ✘ Biological criteria respond to habitat, hydrologic conditions.
- ✘ Additional pool surveys are needed to draw conclusions.