

# Wadeable Stream Assessment Comparability Study:

## *Interim Results*

Mark Southerland, Jon Vølstad, Ed Weber,  
Beth Franks, and Laura Gabanski

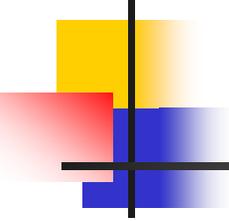
May 10, 2006

# Comparability Studies

## Associated with National WSA

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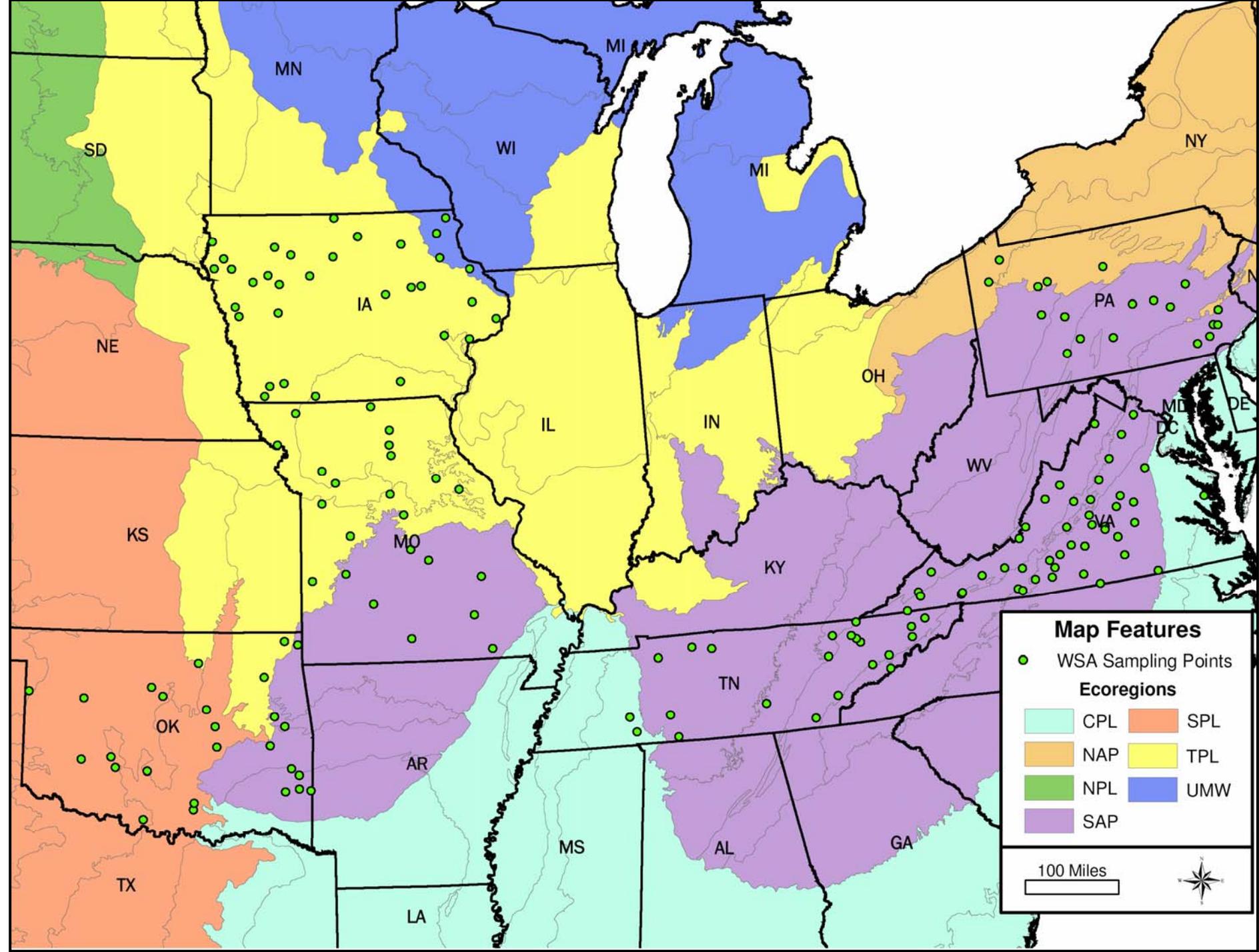
- Comparable state programs can be used to provide a consistent assessment of the Nation's waters
- Side-by-side sampling is being used to determine the comparability of benthic assessments done by WSA and existing state programs



# Cooperating States

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- Pennsylvania
- Virginia
- Tennessee
- Missouri
- Oklahoma
- Iowa
- In 2006,
  - New England Interstate Water Pollution Control Commission (NEIWPPC), Maryland, Delaware, Wisconsin, and Center for Applied Bioassessment and Biocriteria (Midwest)

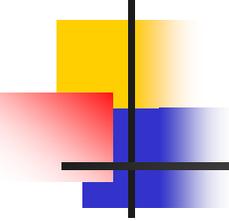




# Steps

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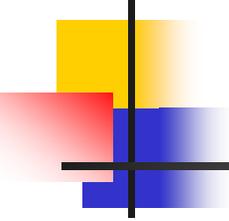
- Prepare program summary table
- Assemble analysis dataset
- Evaluate relationships of IBIs
- Evaluate relationships of condition class assessment
- Evaluate relationships of pass-fail assessment
- Investigate effects of natural slope gradient
- Investigate effects of stressor gradient
- Investigate relationships with biological condition gradient



# Levels of Comparability in Bioassessment

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- Data comparability - Each program's data produce same composition of taxa and numbers
- Assessment comparability - Stream condition is reported the same by each program
  - Depends on the indicator
  - Depends on the condition classes
  - Depends on scale of assessment



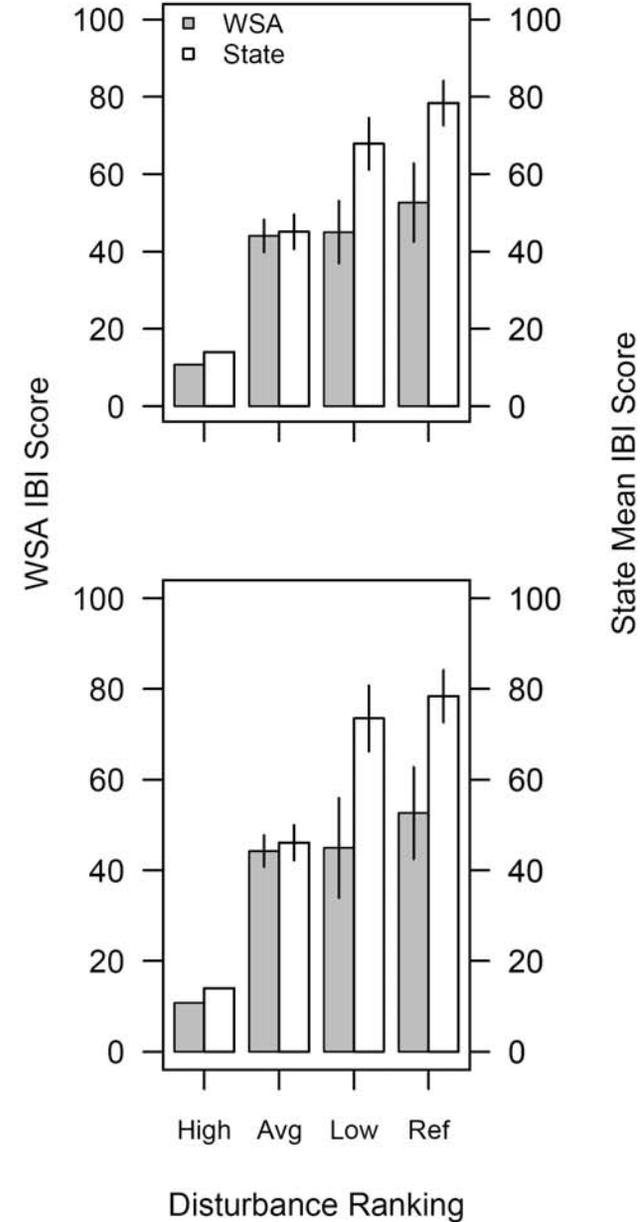
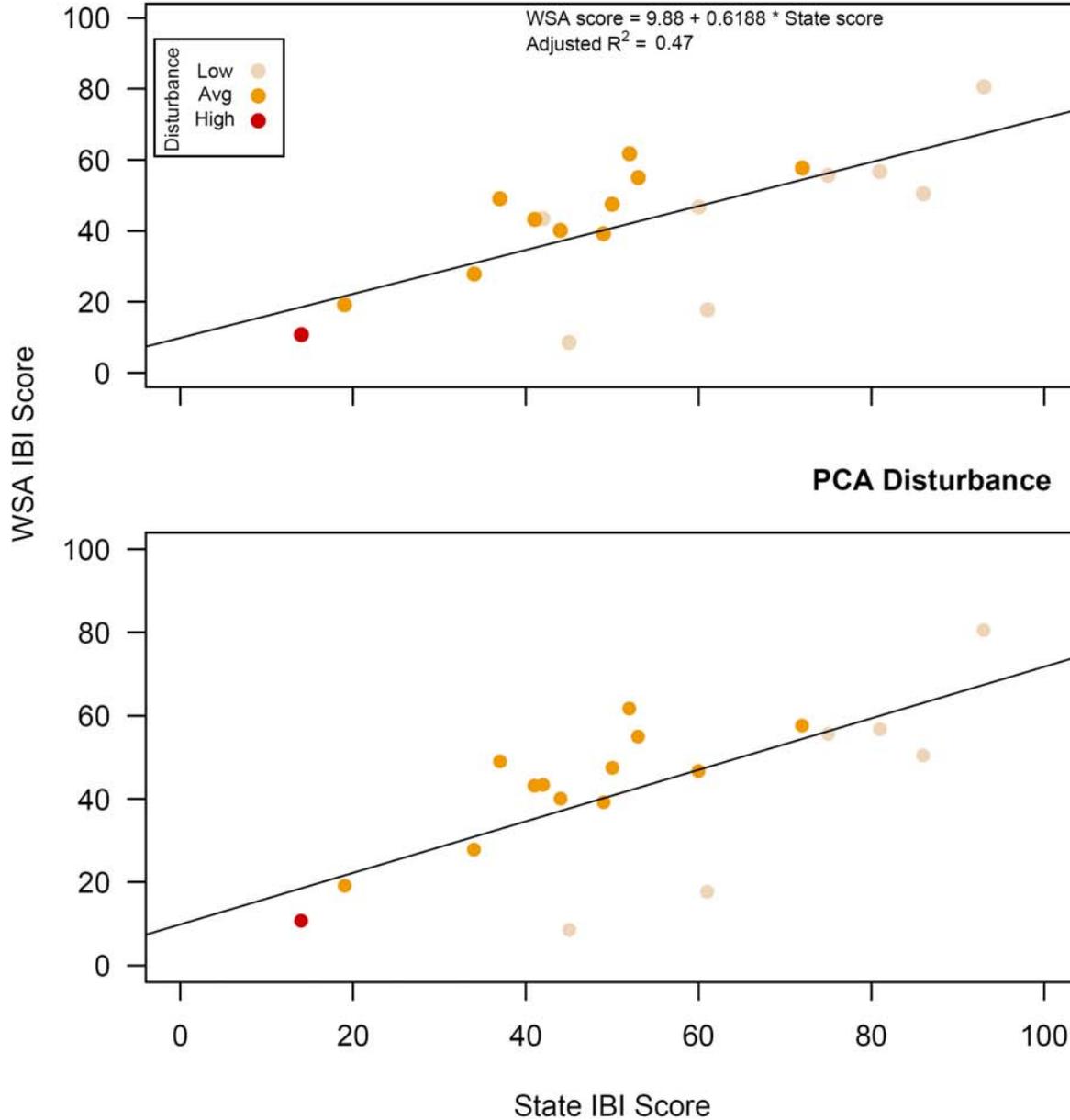
# Regressions of WSA and State IBIs – Adjusted-R<sup>2</sup>

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■ Pennsylvania	0.47
■ Virginia	0.33
■ Tennessee	0.47
■ Missouri	0.09
■ Oklahoma	0.11
■ Iowa	0.10

# PENNSYLVANIA

## RHUM300 Disturbance



# Agreement Between Condition Class Assessments

	VIRGINIA			
WSA	Stressed	Undetermined	Healthy	Total
Poor	<b>4</b>	3	3	10
Fair	1	<b>5</b>	6	12
Good	4	5	<b>14</b>	23
Total	9	13	23	45

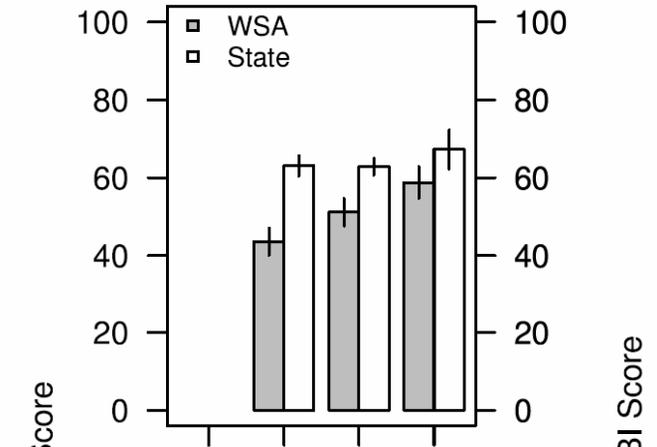
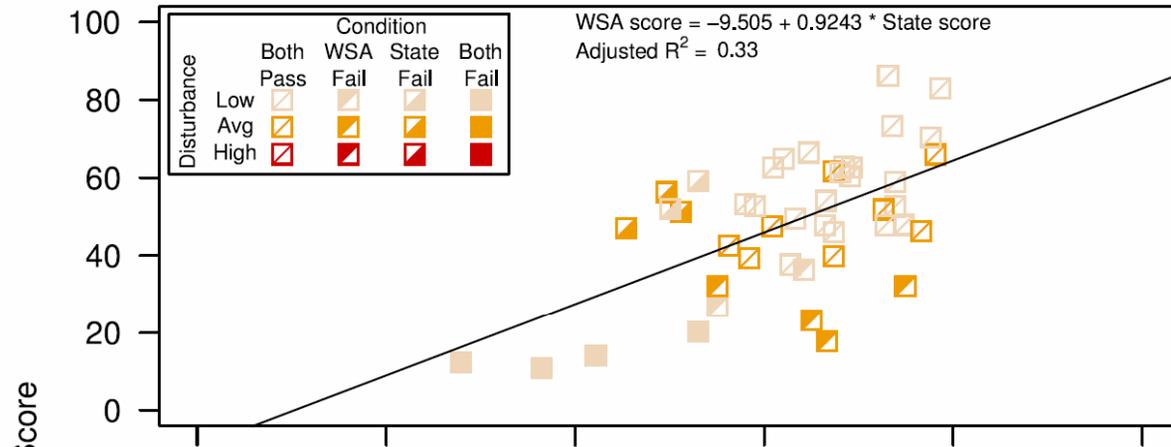
# Agreement Between Pass-Fail Assessments

	VIRGINIA		
WSA	Fail	Pass	Total
Fail	<b>4</b>	6	10
Pass	5	<b>30</b>	35
Total	9	36	45

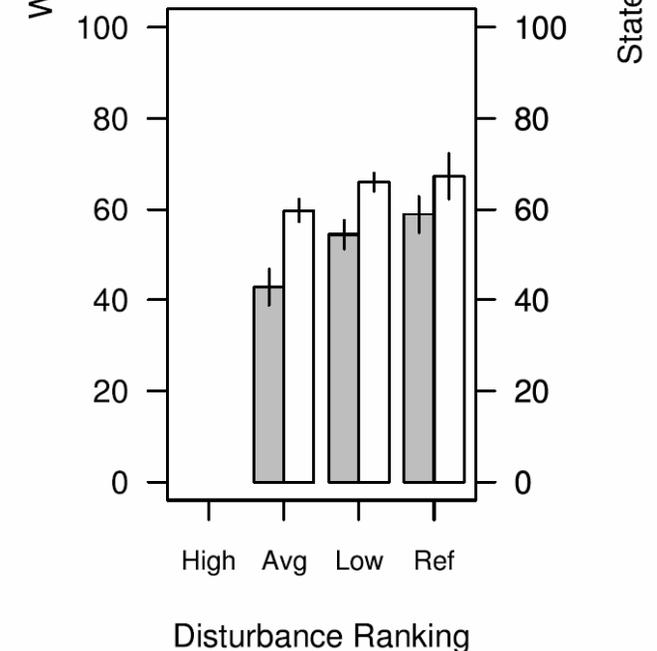
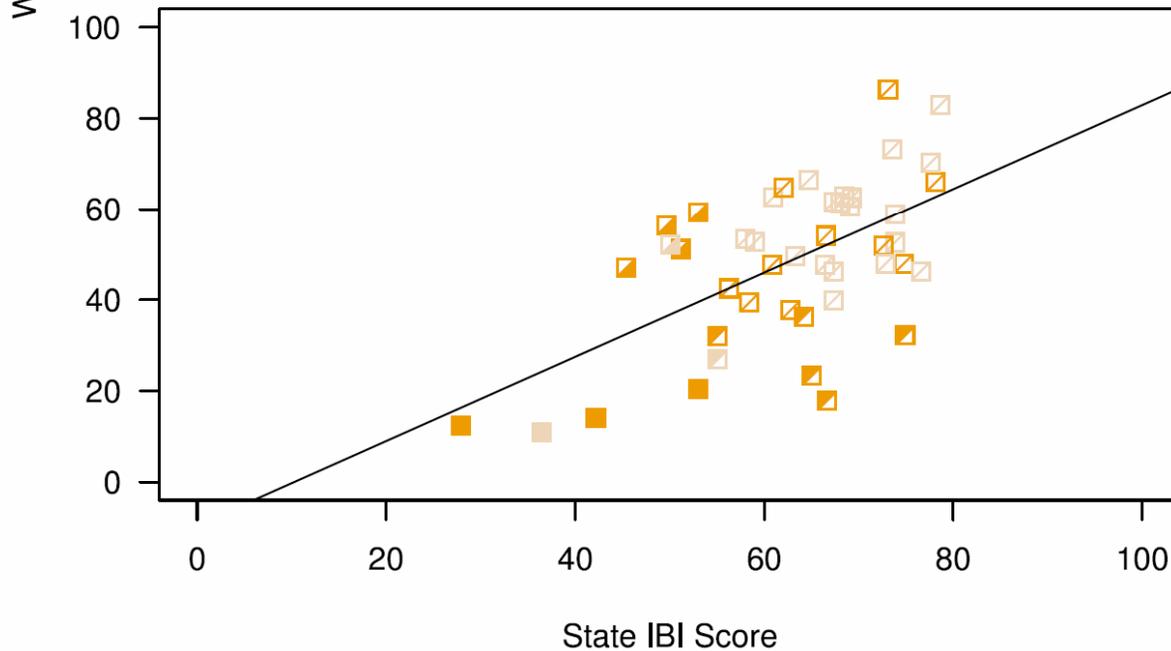
	OKLAHOMA		
WSA	Fail	Pass	Total
Fail	<b>4</b>	9	13
Pass	0	<b>13</b>	13
Total	4	22	26

# VIRGINIA

## RHUM300 Disturbance

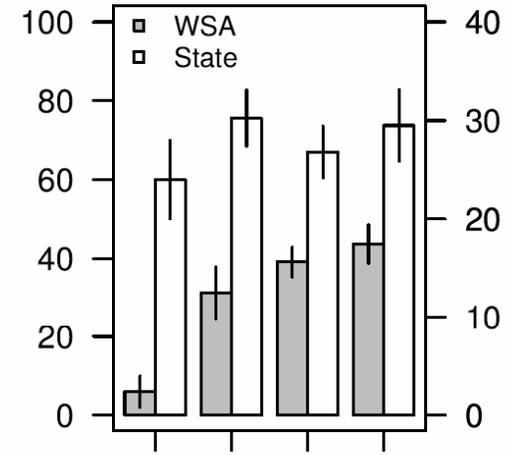
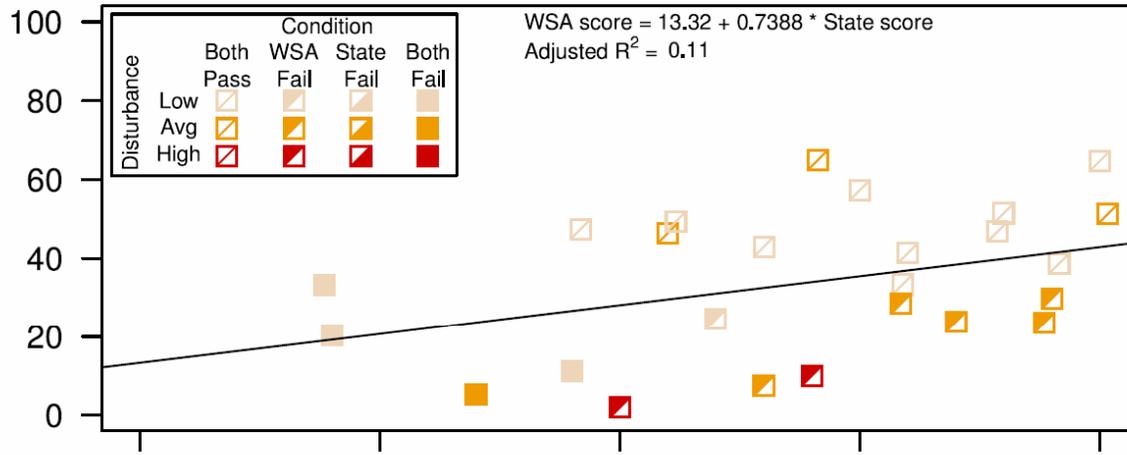


## PCA Disturbance

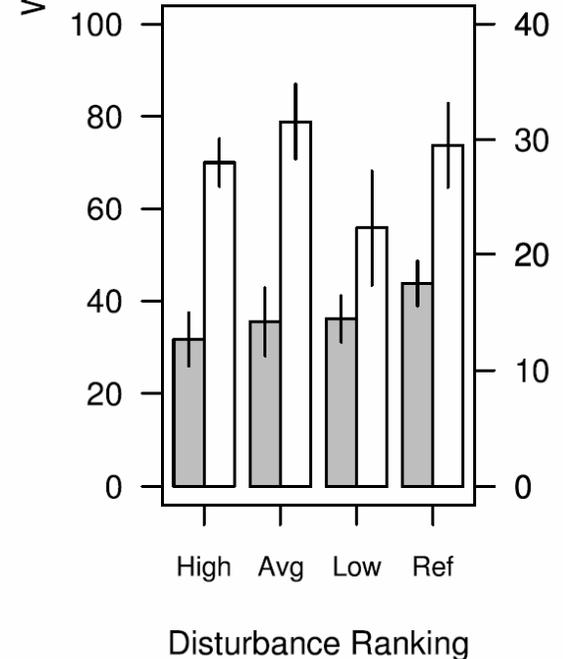
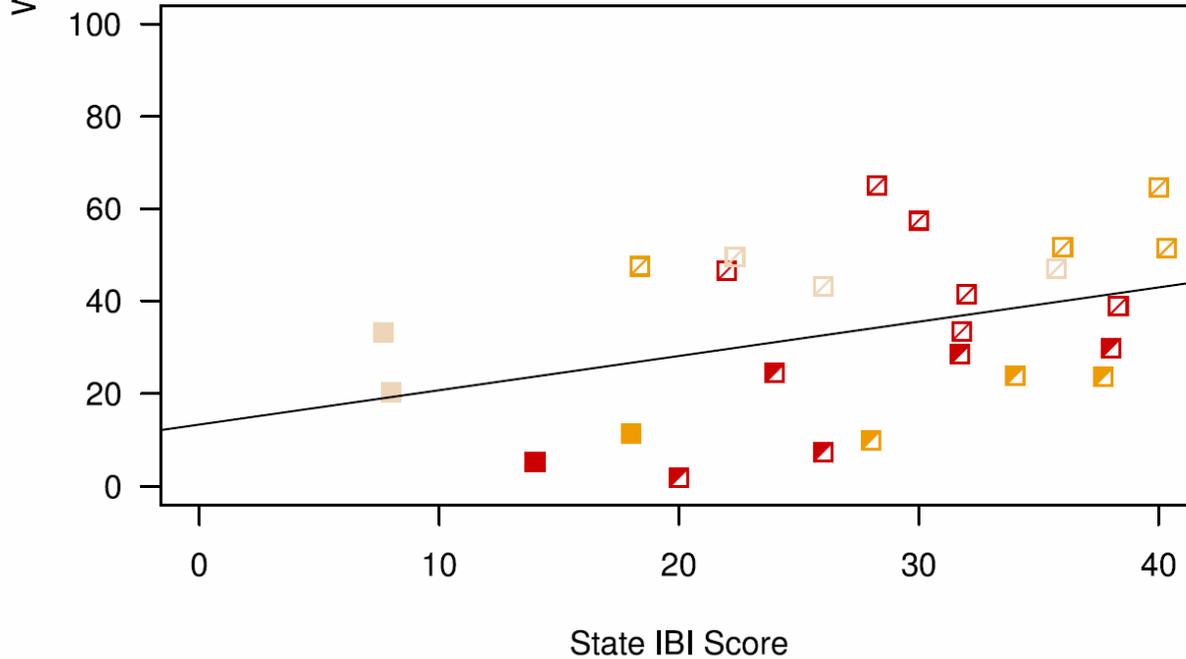


# OKLAHOMA

## RHUM300 Disturbance



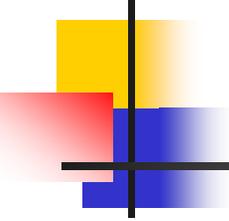
## PCA Disturbance



# Agreement of Pass-Fail Assessments

State	# of pairs	$p_{wsa}$ failing	$p_{state}$ failing	Difference $p_{wsa} - p_{state}$	SE (Diff)	Confidence Interval (95%) LCL,UCL	<i>McNemar's Test</i>	
							Chi-squared	<i>P</i>
VA	45	0.22	0.20	-0.02	0.07	-0.17, 0.12	0.09	0.76
TN	22	0.41	0.36	-0.05	0.08	-0.20, 0.11	0.34	0.56
MO	24	0.21	0.17	-0.04	0.11	-0.26 , 0.17	0.14	0.70
OK	26	0.50	0.15	-0.35	0.09	-0.53, -0.16	13.76	< 0.01
IA	30	0.40	0.43	0.03	0.11	-0.18, 0.25	0.09	0.76

\*Pennsylvania does not have condition classes and was not included in this analysis.



# Investigate effects of natural slope gradient

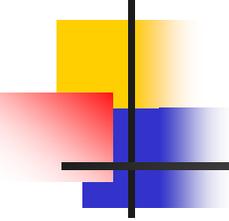
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- WSA and State methods may be comparable for certain stream types, but not for others
- To investigated effects of gradient
  - Divided into low gradient ( $\leq 1\%$  slope) and high (not low) gradient  $> 1\%$  sites

# Agreement of Pass-Fail Assessments by Slope

State	Gradient	# of pairs	$P_{wsa}$ failing	$P_{state}$ failing	Difference	SE (diff)	Confidence Interval (95%) LCL, UCL	McNemar's Test	
								Chi-squared	<i>P</i>
VA	Low	32	0.31	0.25	-0.06	0.10	-0.25, 0.13	0.41	0.52
	High	12	0.00	0.08	0.08	0.08	-0.07, 0.24	1.09	0.30
TN	Low	13	0.46	0.46	0.00	0.11	-0.21, 0.21	0.00	1.00
	High	9	0.33	0.22	-0.11	0.10	-0.32, 0.09	1.13	0.29
MO	Low	22	0.23	0.14	-0.09	0.11	-0.31, 0.12	0.69	0.41
	High	2	0.00	0.50	0.50	0.35	-0.19, 1.19	2.00	0.16
OK	Low	21	0.43	0.14	-0.29	0.10	-0.48, -0.09	8.40	0.00
	High	5	0.80	0.20	-0.60	0.22	-1.03, -0.17	7.50	0.01
IA	Low	28	0.36	0.43	0.07	0.11	-0.15, 0.29	0.41	0.52
	High	2	1.00	0.50	-0.50	0.35	-1.19, 0.19	2.00	0.16

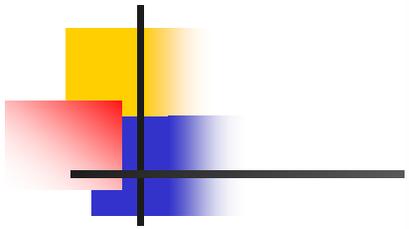
No states showed less comparability of low gradient sites than of high gradient sites.



# Effects of Stressor Gradient

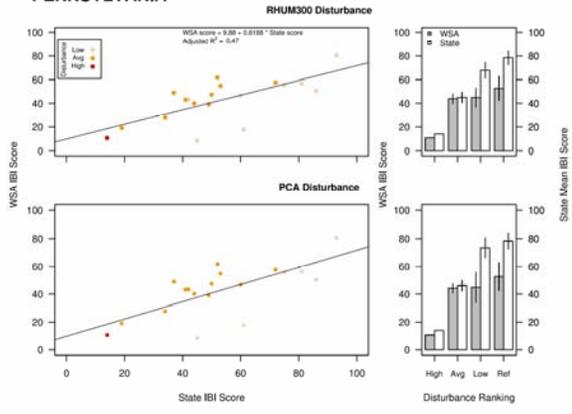
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- WSA and State methods may be comparable under certain levels of stress, but not others
- Several ways of using non-biological data to describe amount of stress at a site were evaluated
- Selected one landscape variable and one composite variable
  - RHUM300 – human land use in 300m riparian zone
  - PCA Score – aggregate of site-level water quality and physical habitat conditions

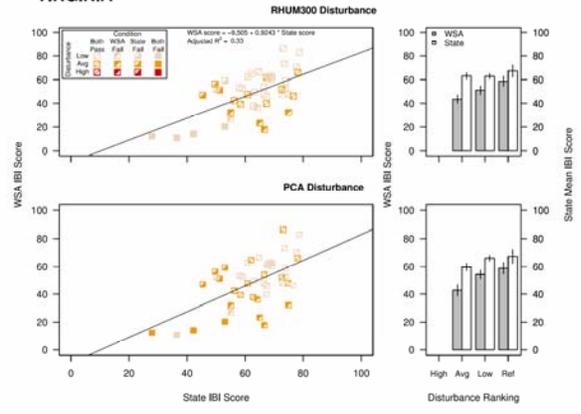


*See  
handout*

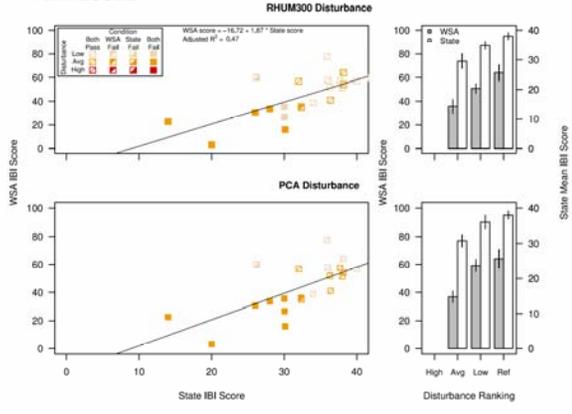
**PENNSYLVANIA**



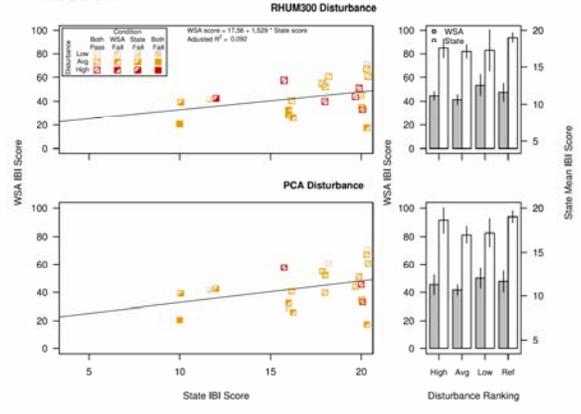
**VIRGINIA**



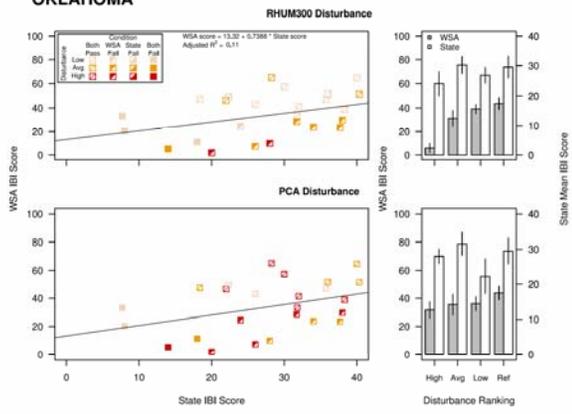
**TENNESSEE**



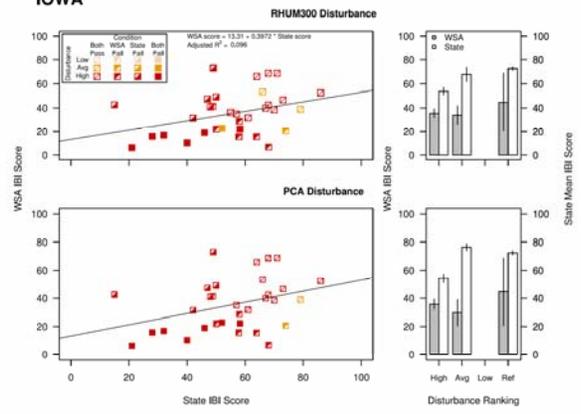
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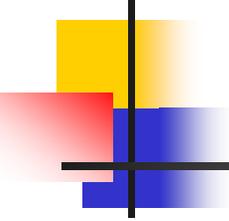


**OKLAHOMA**



**IOWA**



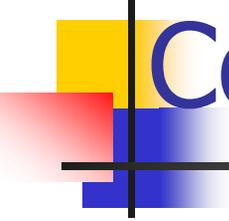


# Relationships with Biological Condition Gradient

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- Assessments depend on the assignment of thresholds of degradation
- EPA's 6-level Biological Condition Gradient (BCG) is an absolute scale for comparing across WSA and states
- Three states provided BCG designations (Tennessee, Missouri, Iowa)

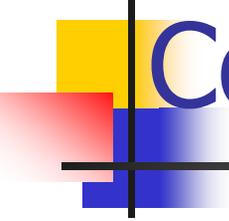




# Conclusions & Recommendations

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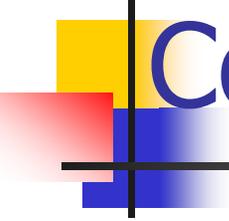
- Pass-fail assessment comparability can occur when raw IBI scores are not similar between programs
- Evaluation of additional programs from the eight remaining cooperators may or may not lend more support to this conclusion



# Conclusions & Recommendations

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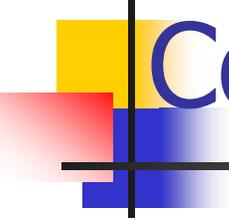
- Differences between the WSA and State IBIs and assessments may be the result of differences in the data collected or the IBIs used
- We propose running the State data through the WSA IBIs and the WSA data through the State IBIs
  - Must reconcile taxonomic levels and laboratory subsampling
  - Each State should run their own IBI calculations to ensure they accurately reflect their application



# Conclusions & Recommendations

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- There is no standard for how good an agreement is good enough
  - We propose comparing this between-program agreement with the agreement of samples within the same program
  - This will require obtaining more replicate samples (only 17 in six-state study)



# Conclusions & Recommendations

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- Study was unbalanced across natural and stressor gradients
- Design recommendations:
  - Retain the paired design for future sampling
  - Conduct future sampling using a randomized complete block design that allocates an equal number of replicates to each stress category
  - Improve the method of measuring the stressor gradient if possible