How can macroinvertebrates help us make decisions about water quality ?

- Why are they useful?
- What do they look like?
- Where are they found?
- How are they sampled?
- How can we use information on their community structure to make decisions?

Why Use Macroinvertebrates?

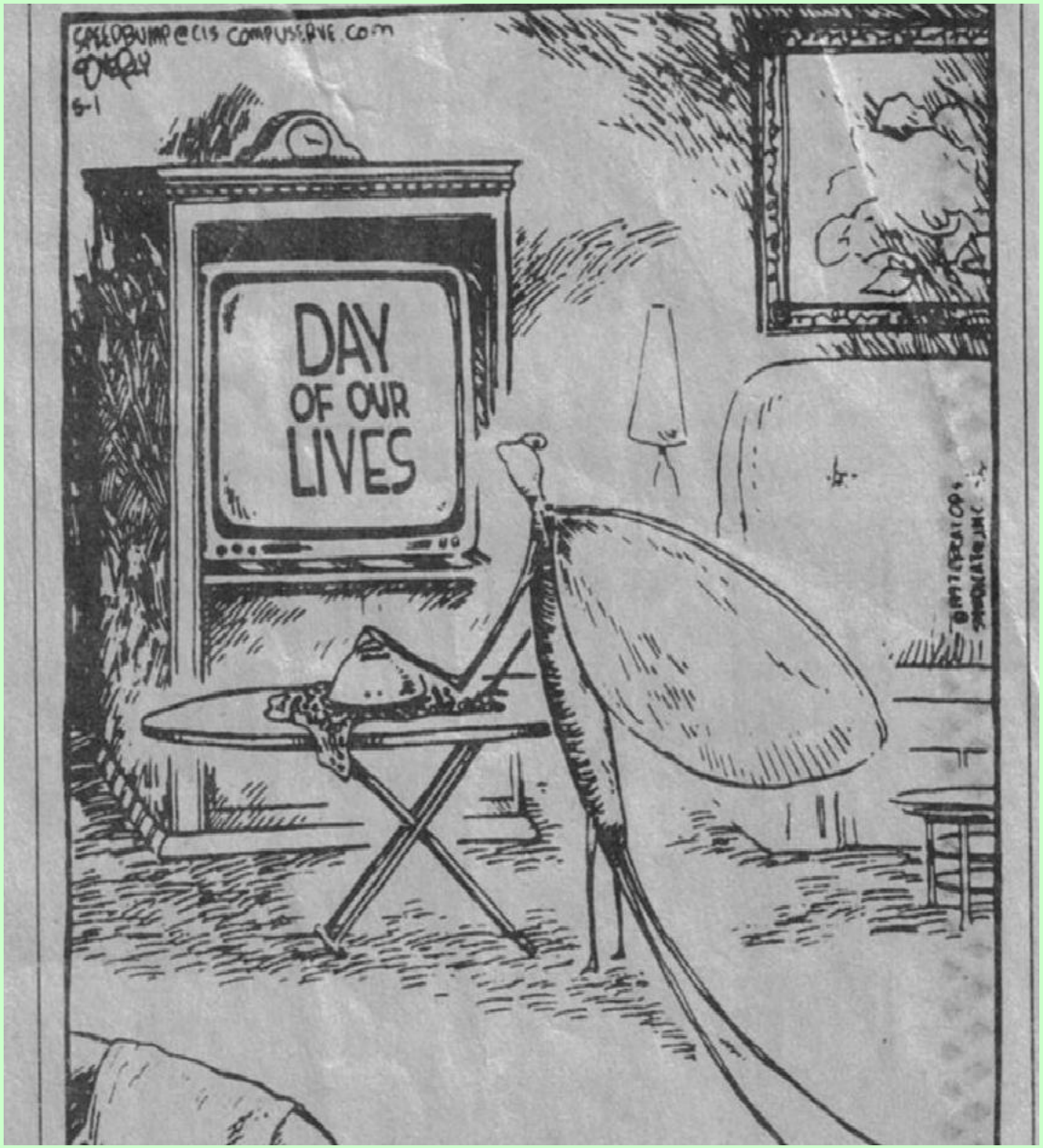
Practical Reasons

- They are easily sampled
- They don't require a special license
- They can be found in all types of waterbodies
- They are very abundant

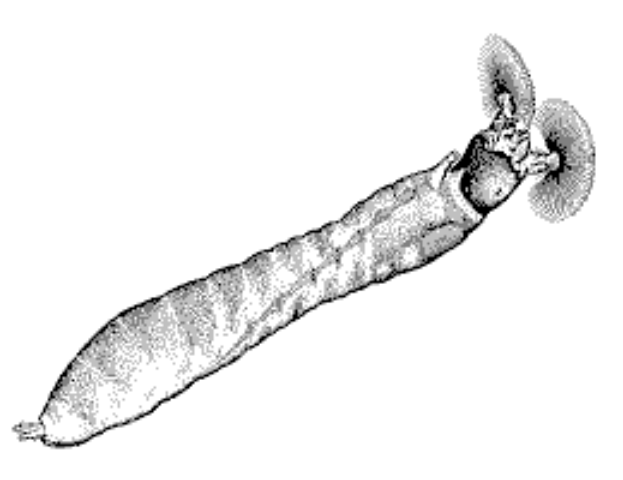
Technical Reasons

- They are very important in aquatic food webs
- They are very useful for ***identifying*** and ***diagnosing*** water resource problems
- They are quick to react to environmental change

They live most of their lives only in water



What do they look like?



1/8 inch (blackfly larvae)

INSECTS

8 inch “washboard” mussel

OTHERS

What is a “benthic” invertebrate?

On a hard substrate (like a rock)

Not free-swimming

Methods of Collecting

Good old D-net

Artificial Substrates

Places to Collect

riffles

woody debris

How to Separate “Macro” from “Micro” Invertebrates

How to Sort
(random is the keyword)

What Does a Data Sheet Look Like?

			1	2	3	4	5
Orthocladius obumbratus			2				1
Eukiefferiella pseudomontana				6	3		
Cricotopus bicinctus					3		
Brillia flavifrons				1	1		
Rheocricotopus robacki			2	2	2	7	3
Thienemanniella xena			1				
Dicrotendipes nervosus							1
Polypedilum convictum			2				
Stenochironomus spp.					6		
Rheotanytarsus spp.							1
Tanytarsus spp.							1
Thienemannimyia spp.					1		2
Tipula						1	1
Antocha						2	
Simulium			3	33	3	11	3
Ameletus				5			
Stenacron					1		1
Stenonema pulchellum							1
S. terminatum					17	4	
Baetis fkavistriga							2
B. intercalaris			1		8	22	
Heterocloeon						1	
Tricorythodes					1		
Ceratopsyche bifida			2	4	5	15	26
C. sparna			4	6		3	3
Hydropsyche betteni			12	6		2	3
H. simulans							1
Cheumatopsyche			67	35	41	15	38
Polycentropus							1
Brachycentrus				1		1	5
Macronychus				1		5	1
Stenelmis					7	11	4
Argia					1		
Hetaerina			2				
Ferrissia			1				
Sphaerium			1				
Dugesia							1
Total			100	100	100	100	100

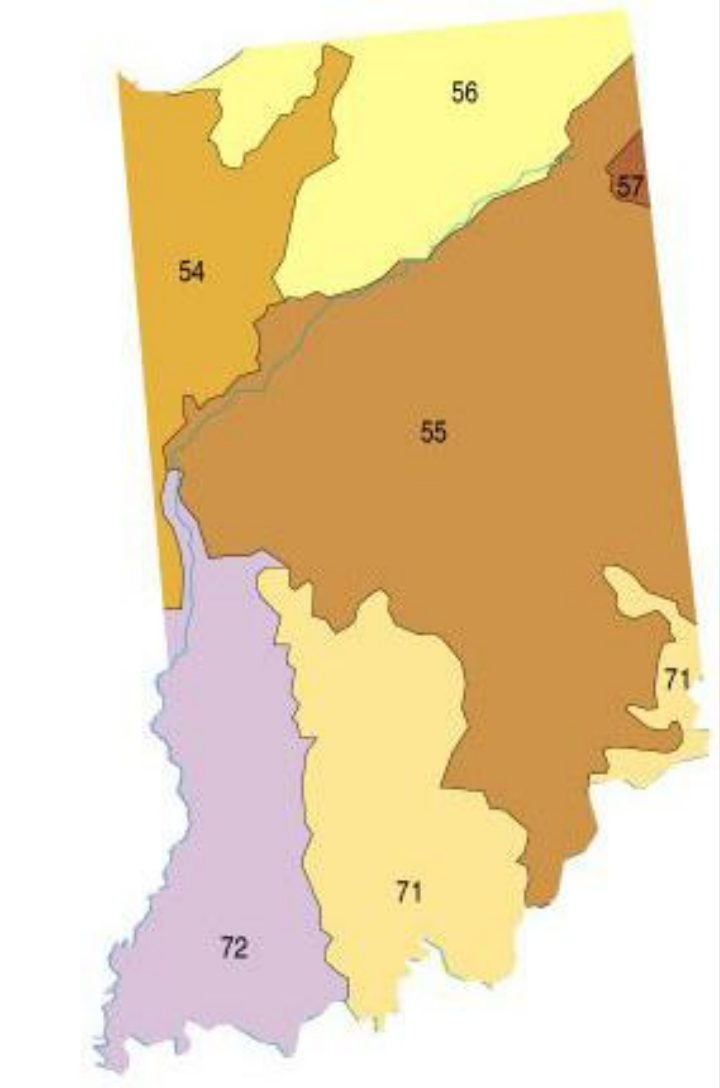
Levels of Taxonomy Used

- None. Use only common names (low level of training needed)
- Family-Level Identifications (intermediate level of training needed)
- Genus-Level Identifications (high level of training needed)
- Species-Level Identifications (specialized training needed)

Interpreting Results

- Measurements based only on “tolerance” (Hoosier Riverwatch, HBI)
- Measurements based on diversity (Shannon Weaver Index)
- Multi-metric measurements (tolerance, diversity, trophic levels, habitat use, dominance, abundance, etc.)

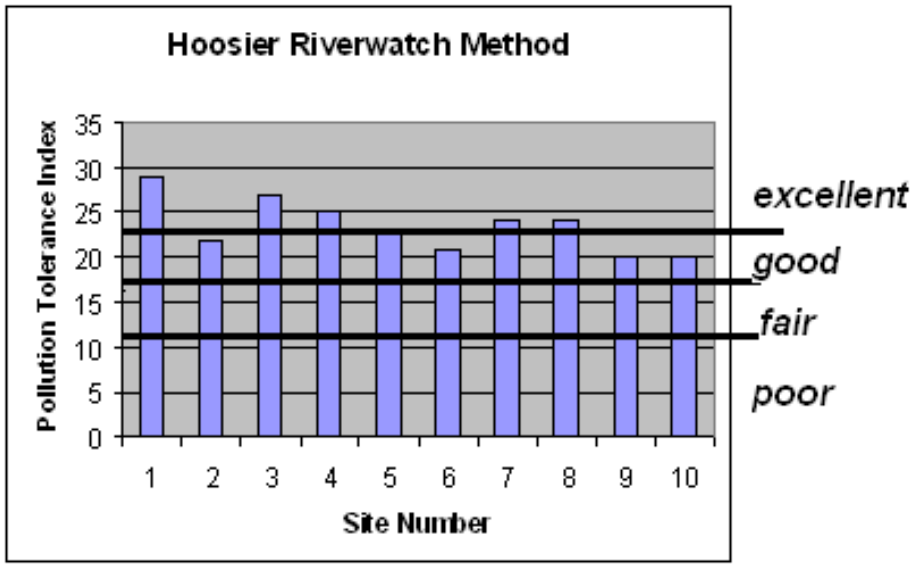
Ecoregion Differences

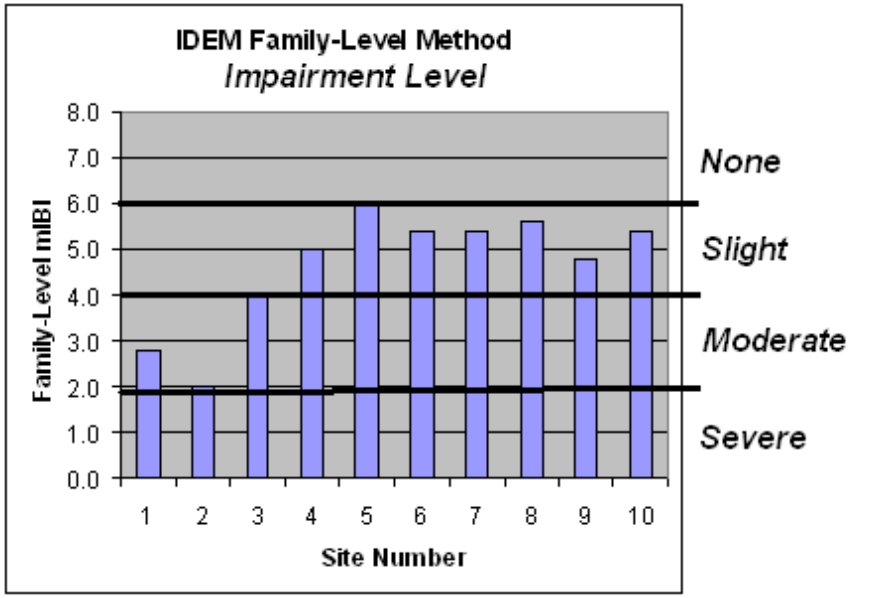


Various Biotic Indices Used

- Pollution Tolerance Index (Hoosier Riverwatch)
- Hilsenhoff Biotic Index
- Family Level mIBI (IDEM)
- EPA Rapid Bioassessment (Level II and III)
- Species Level mIBI (IDEM)

Does it Matter Which Method is Used?

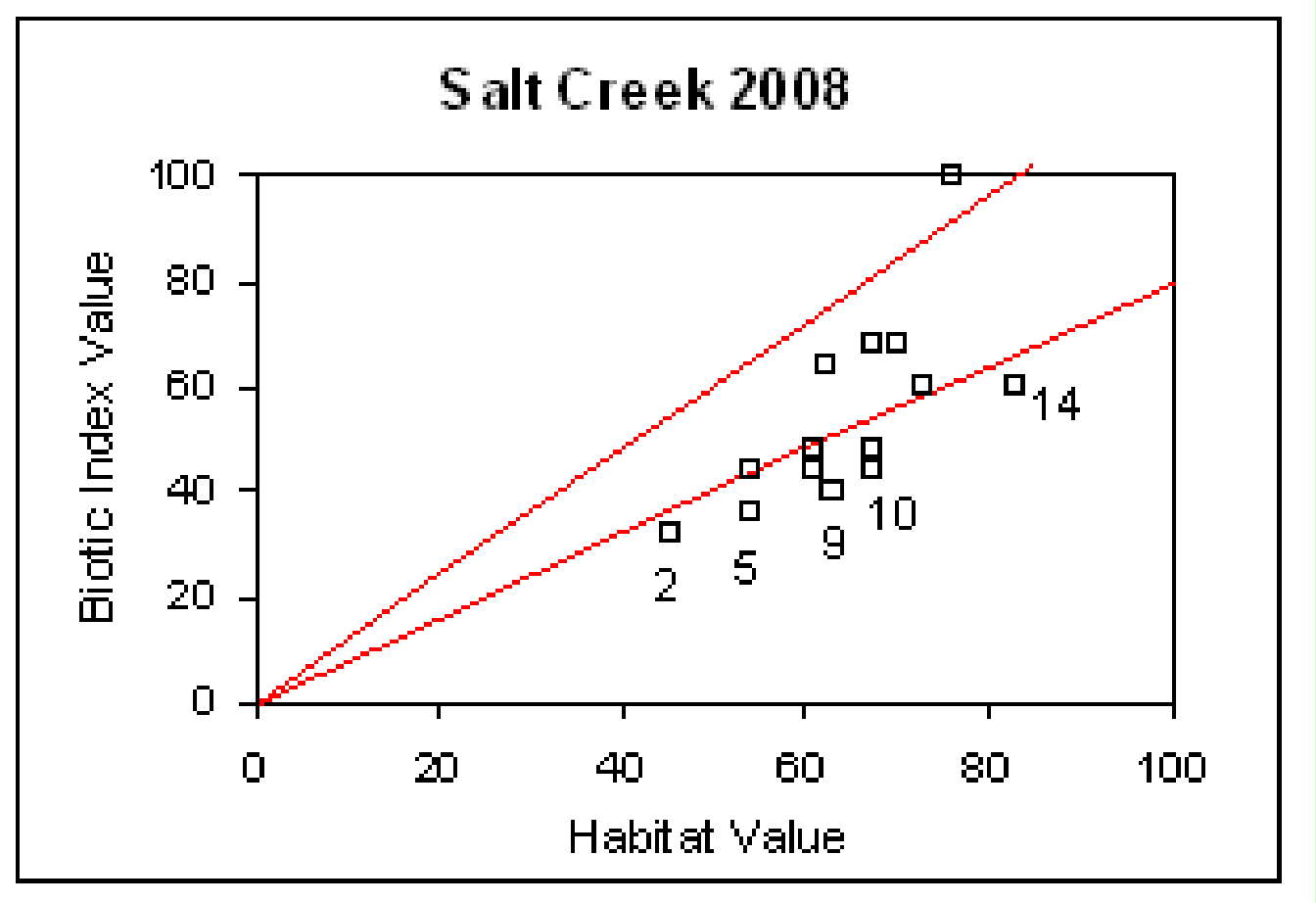




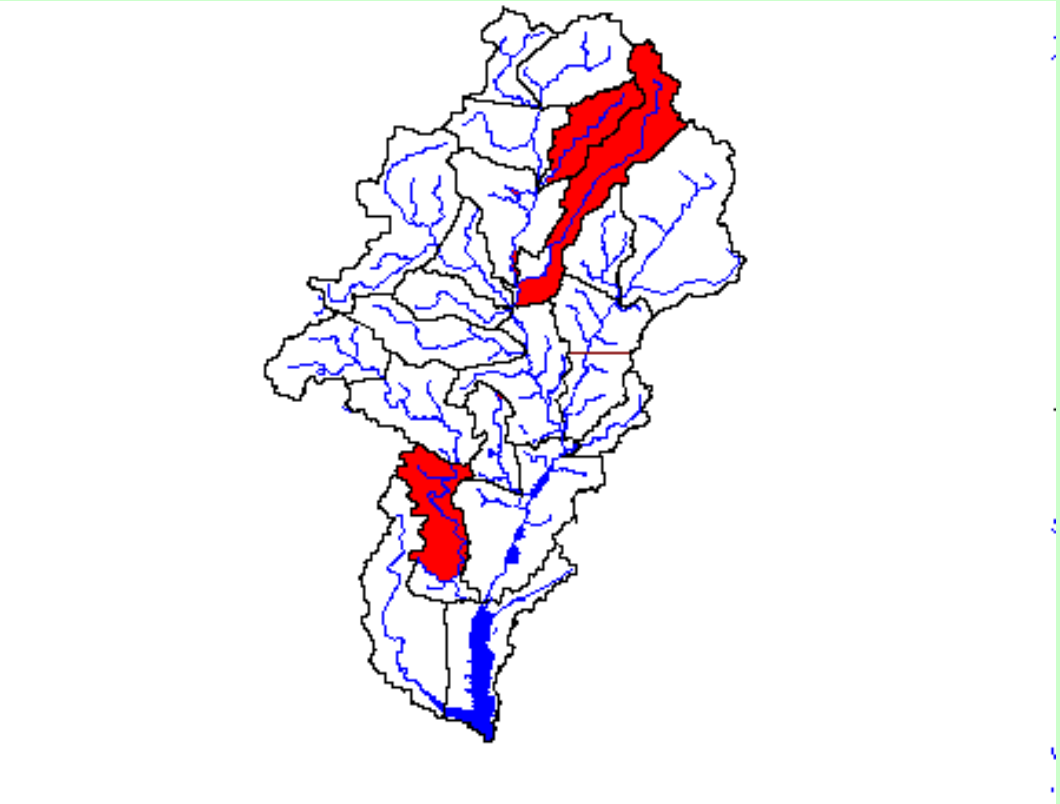
Why does it help to identify species?

Habitat Assessment Helps Too!

How to Separate Habitat Problems from Water Quality Problems



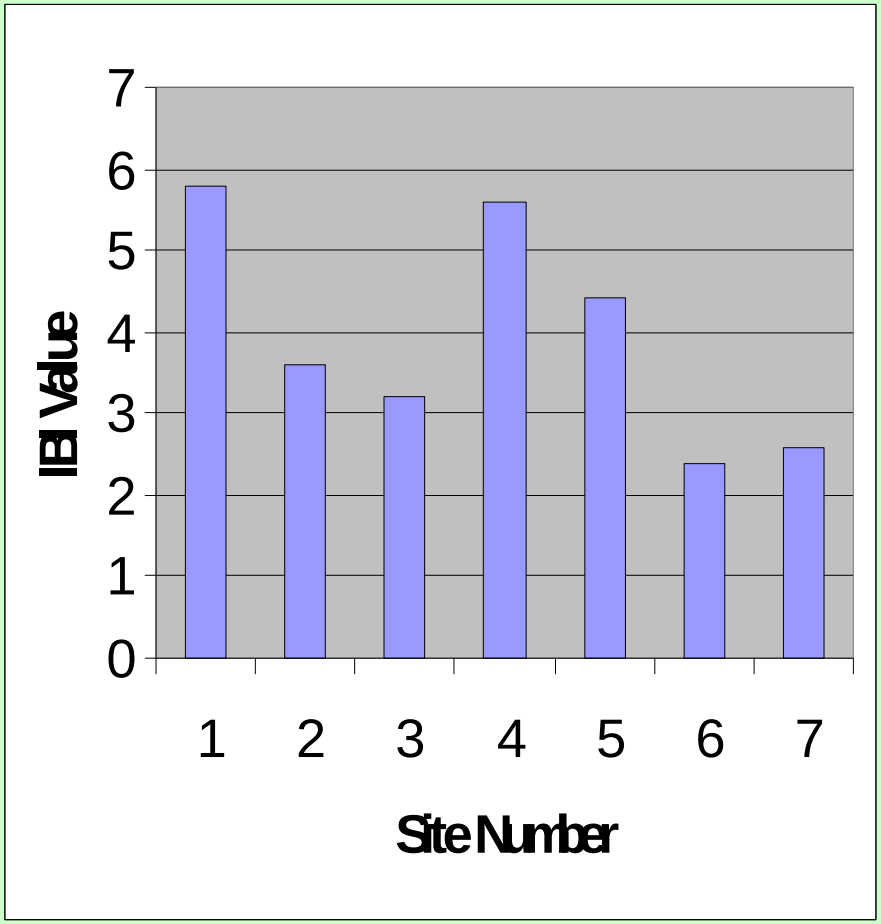
Using Data to Diagnose Problems



In areas where algae-eating bugs are abnormally abundant, nutrient enrichment is probably occurring

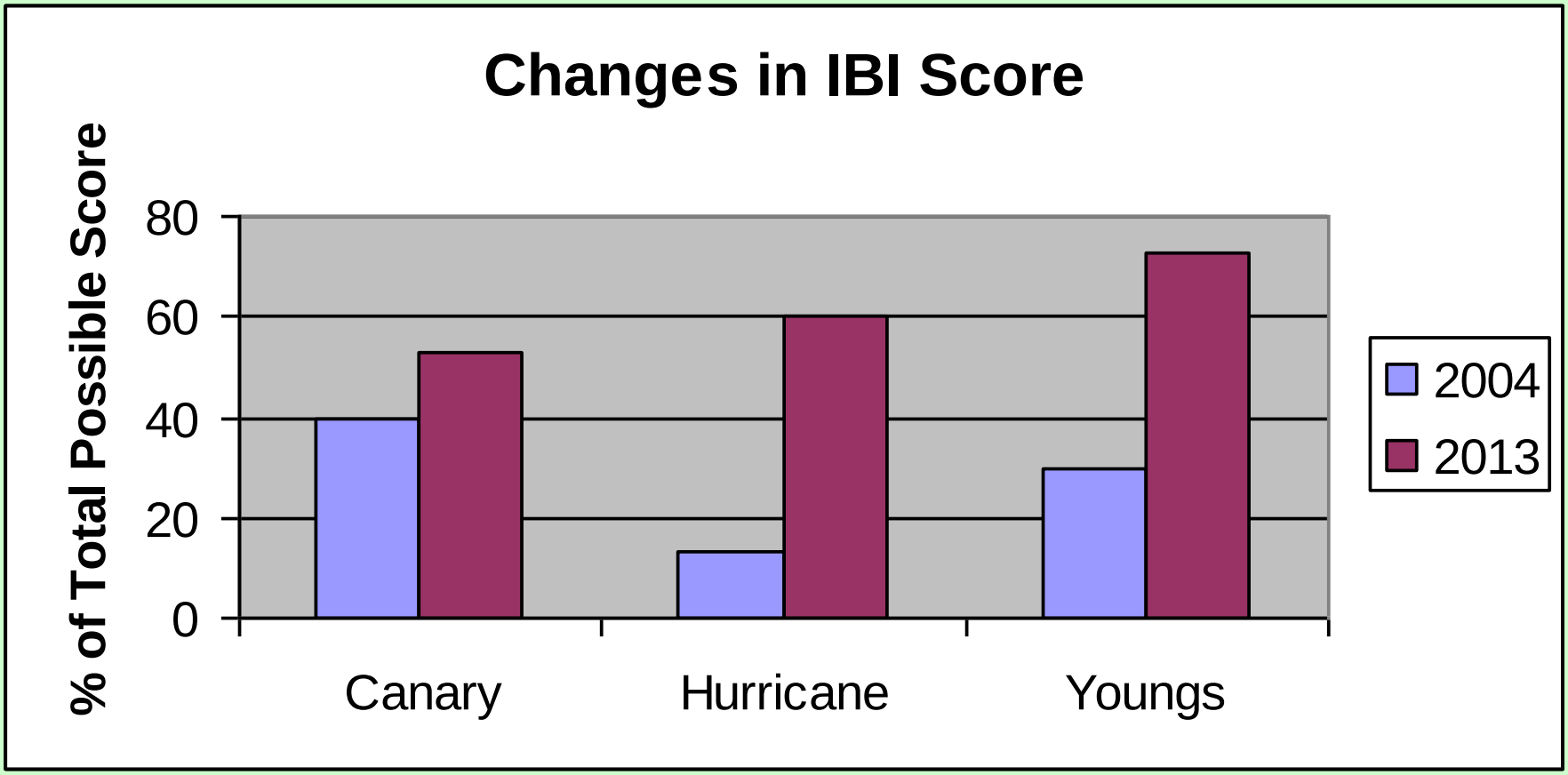
Excess nutrient inputs create ideal conditions for algae-eating bugs

Using Data to Prioritize



Which area do you think needs the most improvement?

Using Data to Document Changes



Most short-term changes are going to be subtle rather than dramatic