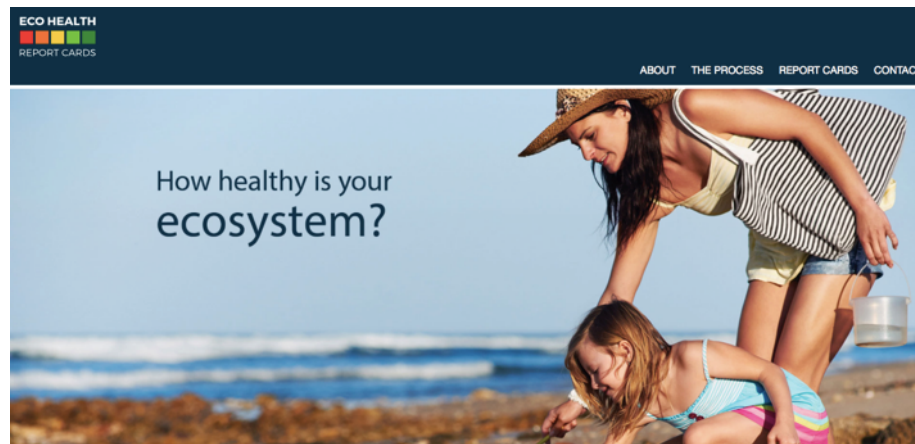


# How are we doing on invasive species?

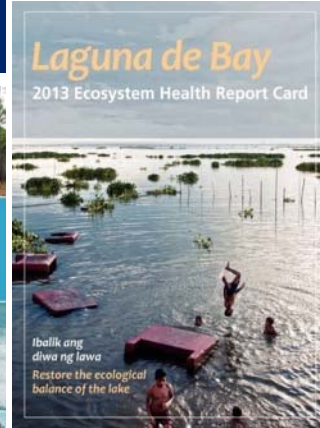
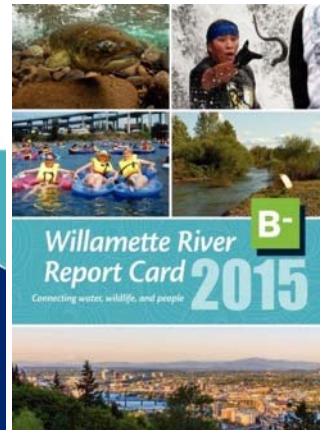
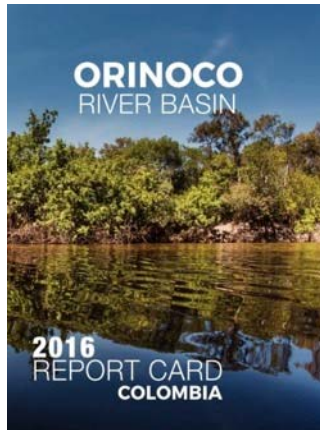
Developing scientifically based report cards



Bill Dennison

Great Lakes Panel on Aquatic Nuisance Species  
and Associated Meetings  
3 Nov 2016

# Environmental report cards

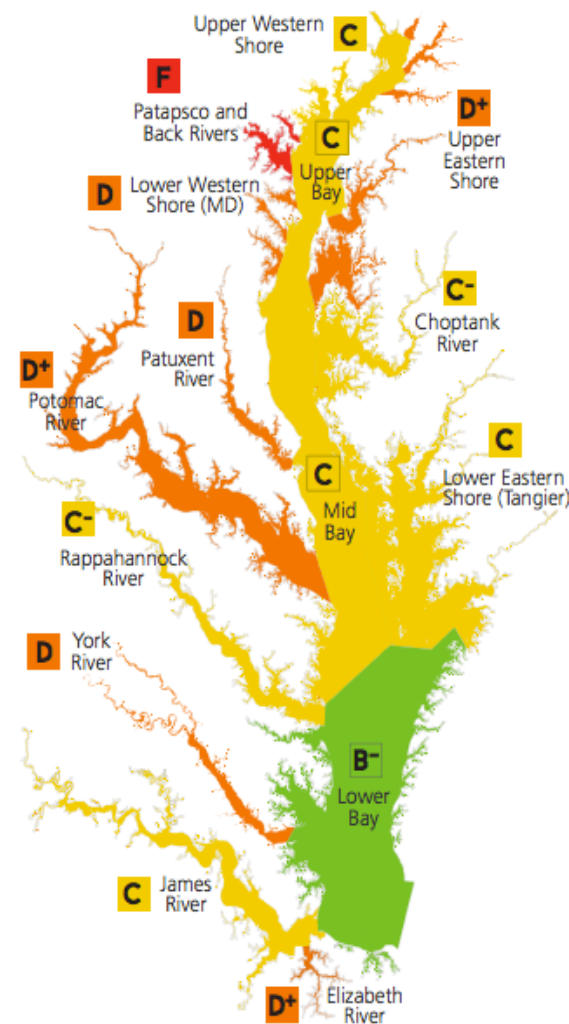


Tool to

- integrate data
- engage stakeholders
- catalyze actions

# What is a report card?

- Broad-level assessments of a region or system
- Communicate complex information
- Based on real data: transparent and defensible
- Provide accountability
- Engage communities



# The 5-step report card process

## 1 Create a conceptual framework



Create a framework defining goals and major aspects of each goal that should be evaluated over time.

## 2 Choose indicators



Select indicators that convey meaningful information and can be reliably measured.

## 3 Define thresholds



Define status categories, reporting regions, and method of measuring threshold attainment.

## 4 Calculate scores

Source	Station	Region	Date	DO Value
DNR	CCC0008		4/29/09	9.00
DNR	CCC0008		4/29/09	9.50
DNR	CCC0008		4/29/09	9.70
DNR	CCC0008		5/28/09	8.90
DNR	CCC0008		5/28/09	9.00
DNR	CCC0008		5/28/09	9.00
DNR	CCC0008		5/28/09	9.00

Calculate indicator scores and combine into index grades.

## 5 Communicate results



Communicate results using visual elements, such as photos, maps, and conceptual diagrams.



# Why do report cards work?

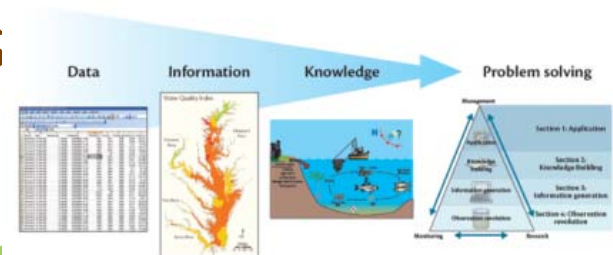
*Peer pressure* is a powerful human motivator



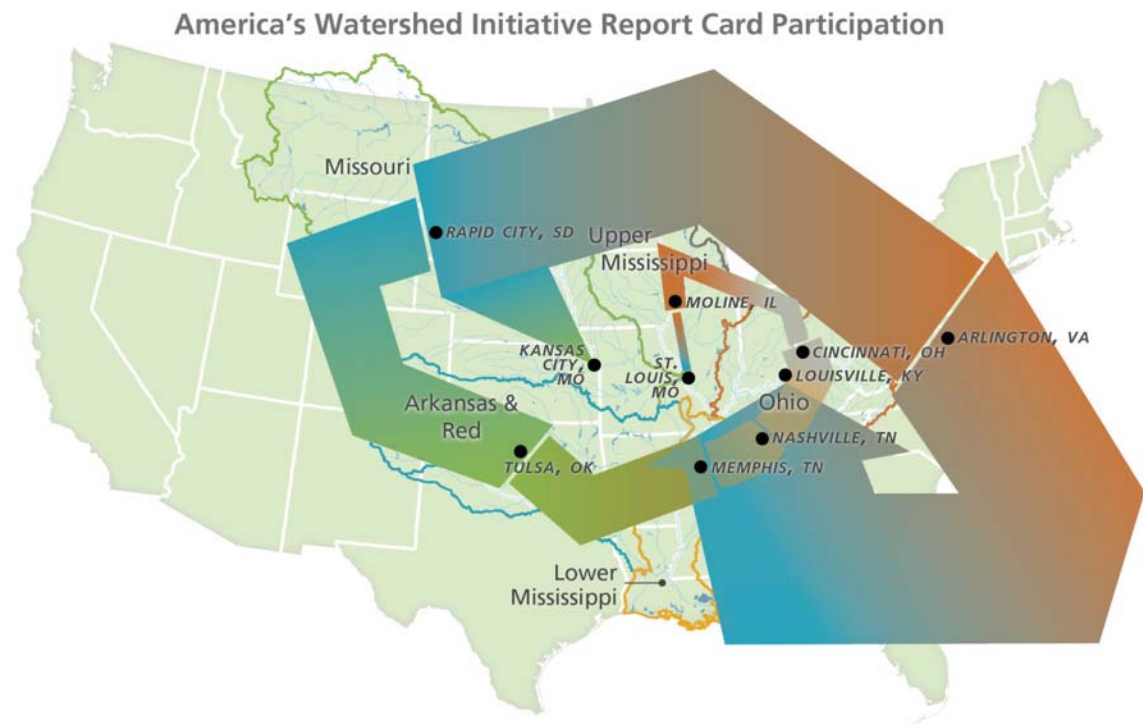
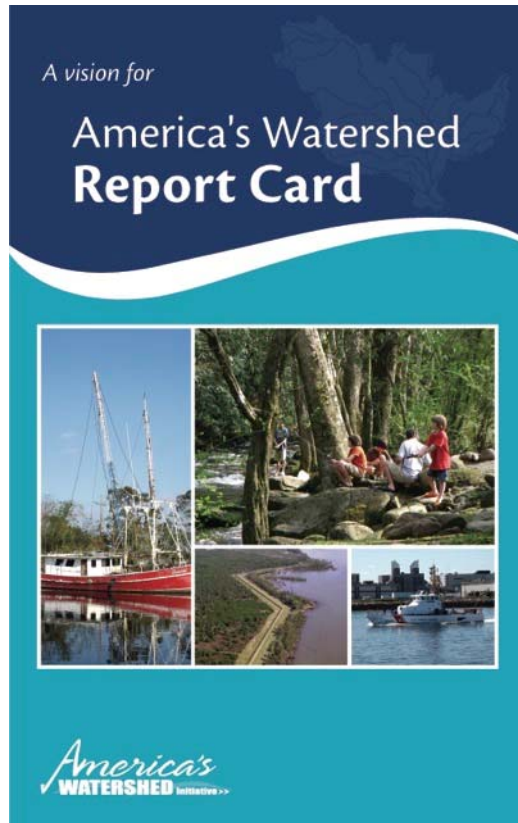
*Educational report cards* are a common experience



Report cards *synthesize* large amounts of data

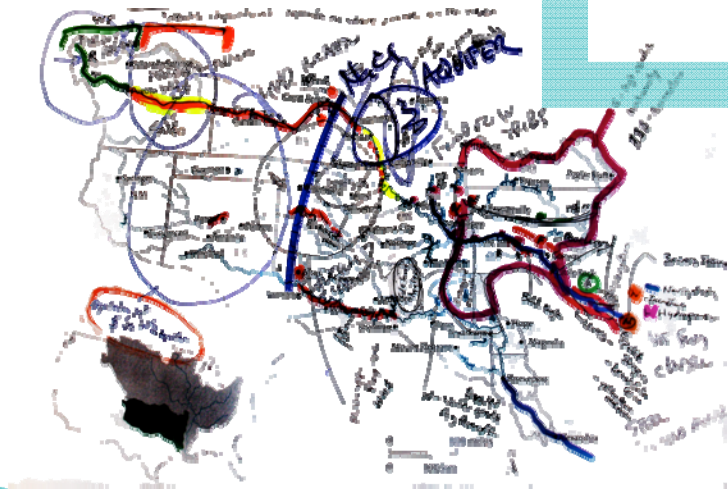
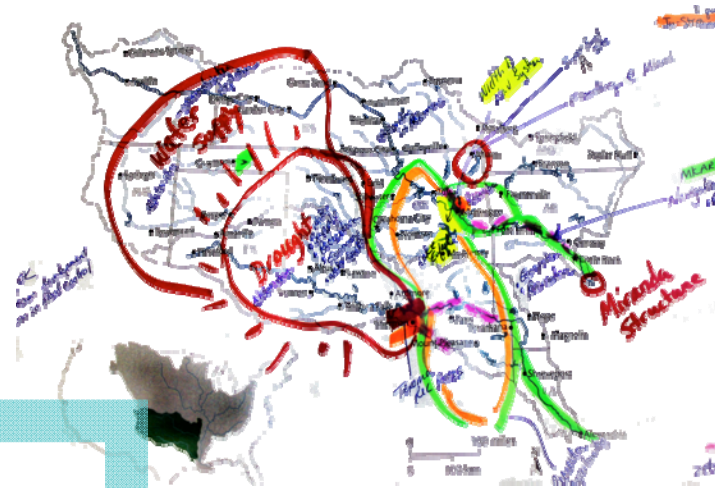


# Mississippi river: a case study in stakeholder engagement



# various regional workshops

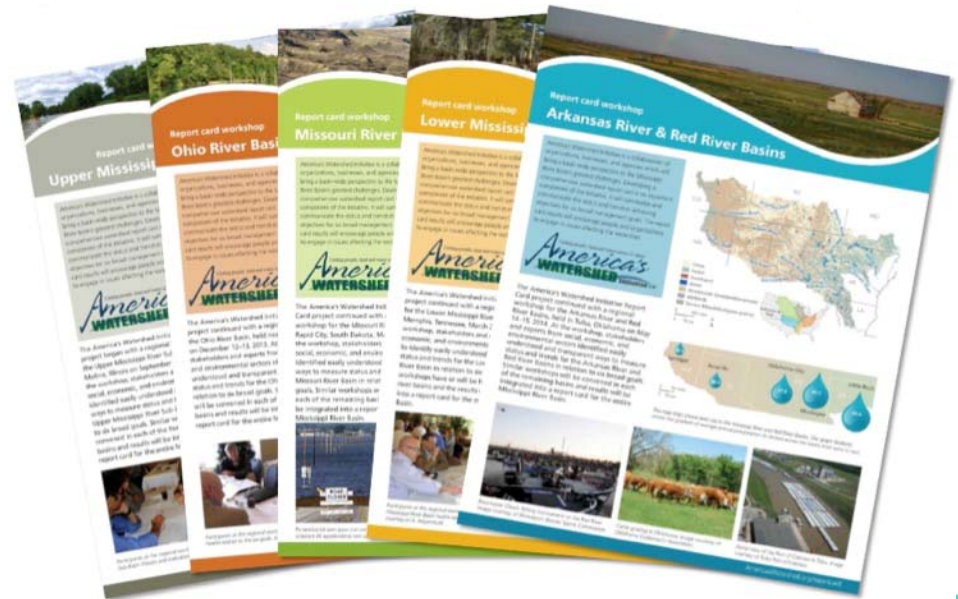
## Arkansas and red river basin



# over 700 workshop participants

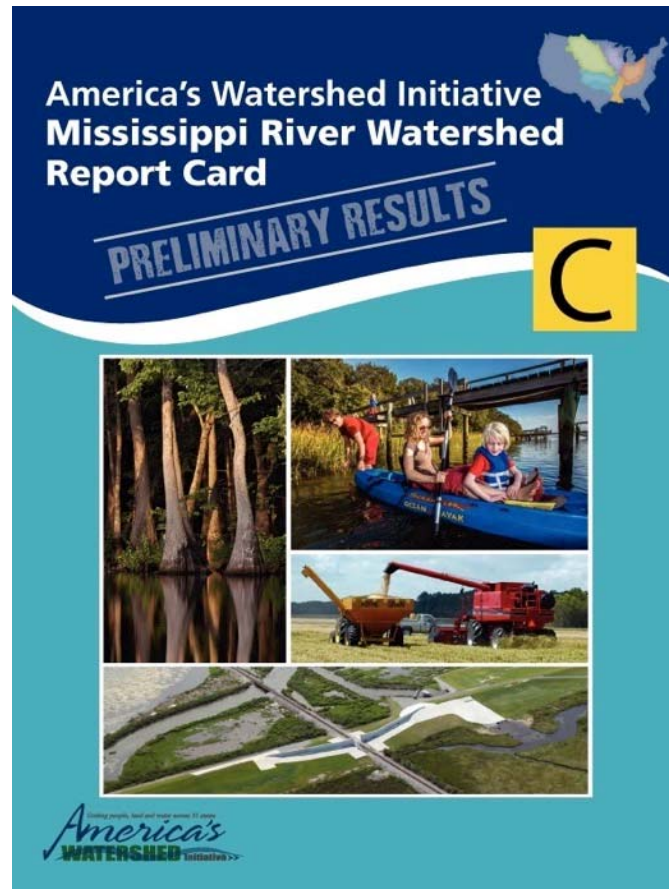
## Expertise from

- 400+ businesses and organizations
- 180+ organizations and basin groups
- 100+ state and local government agencies
- 140+ business organizations
- 145+ federal agencies
- 85+ academic institutions

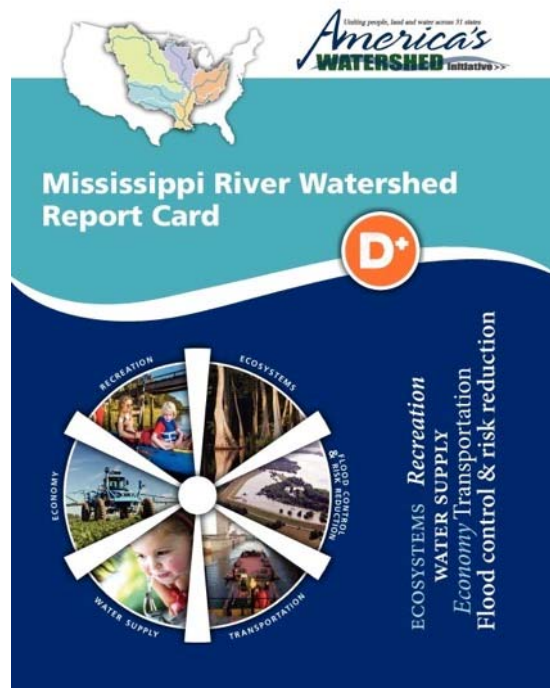




# Developed a suite of indicators



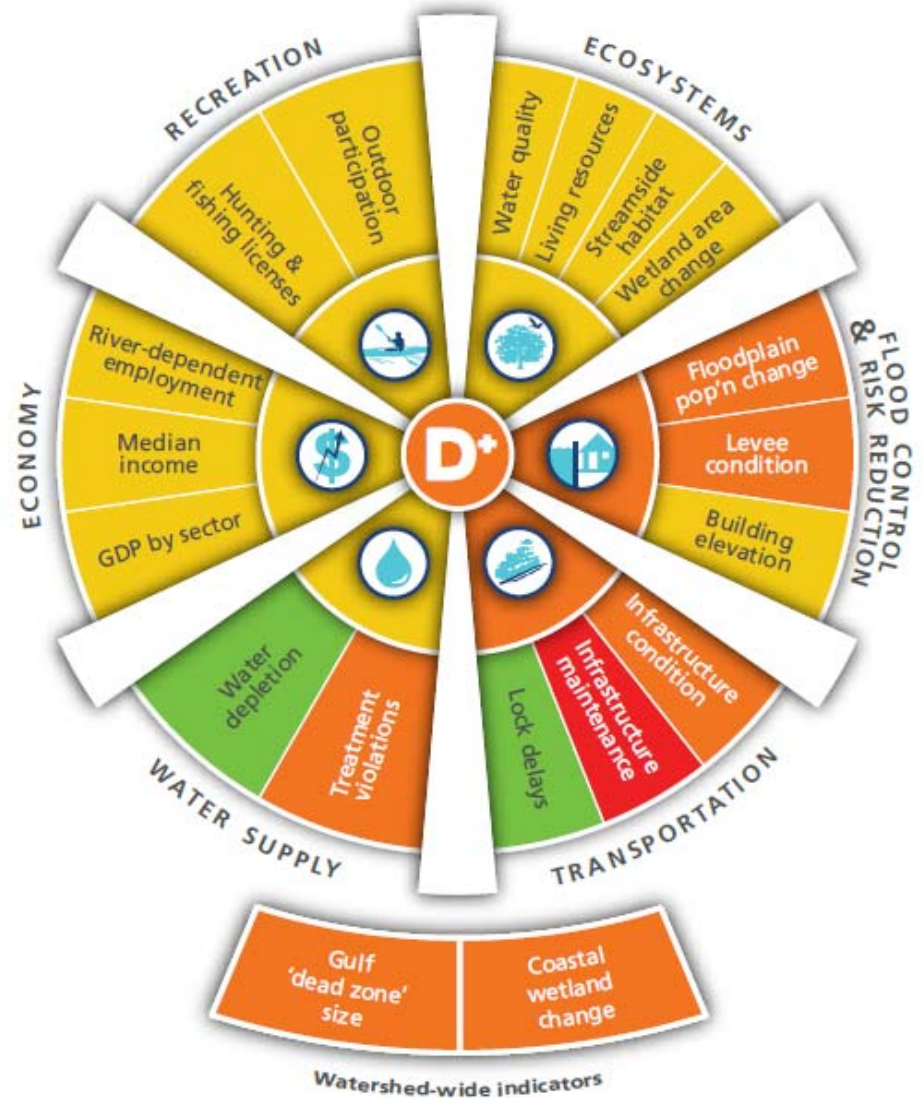
# More consultation before publishing the final report



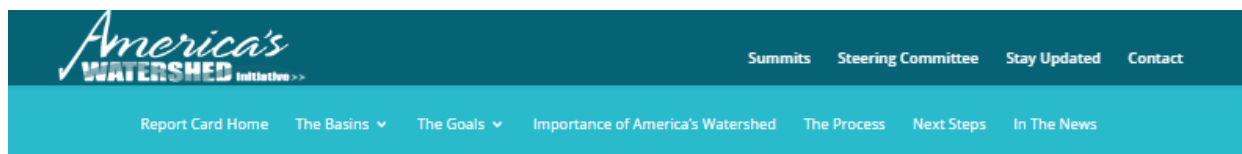
- GOALS**
- Ecosystems
  - Flood Control & Risk Reduction
  - Transportation
  - Water Supply
  - Economy
  - Recreation

- GRADES**
- A Very good
  - B Good
  - C Moderate
  - D Poor
  - F Very poor
  - No data

## Mississippi Watershed Results

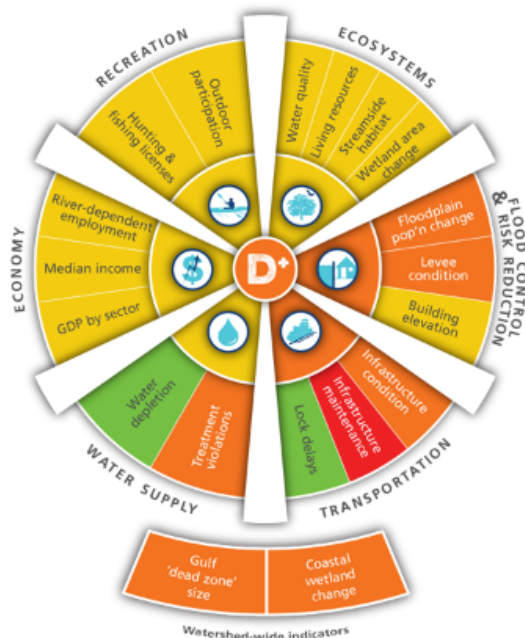


# An interactive website and printed report cards communicate the results



## Grades at a Glance

Click on the 'paddlewheel' below to explore grades for each of the six Report Card Goals.



## Explore Report Card by Basin

Click on the map below to explore grades for each of the five Sub-Basins.



### The Basins:

[Upper Mississippi River](#)  
[Ohio-Tenn. Rivers](#)  
[Lower Mississippi River](#)  
[Arkansas-Red Rivers](#)  
[Missouri River](#)

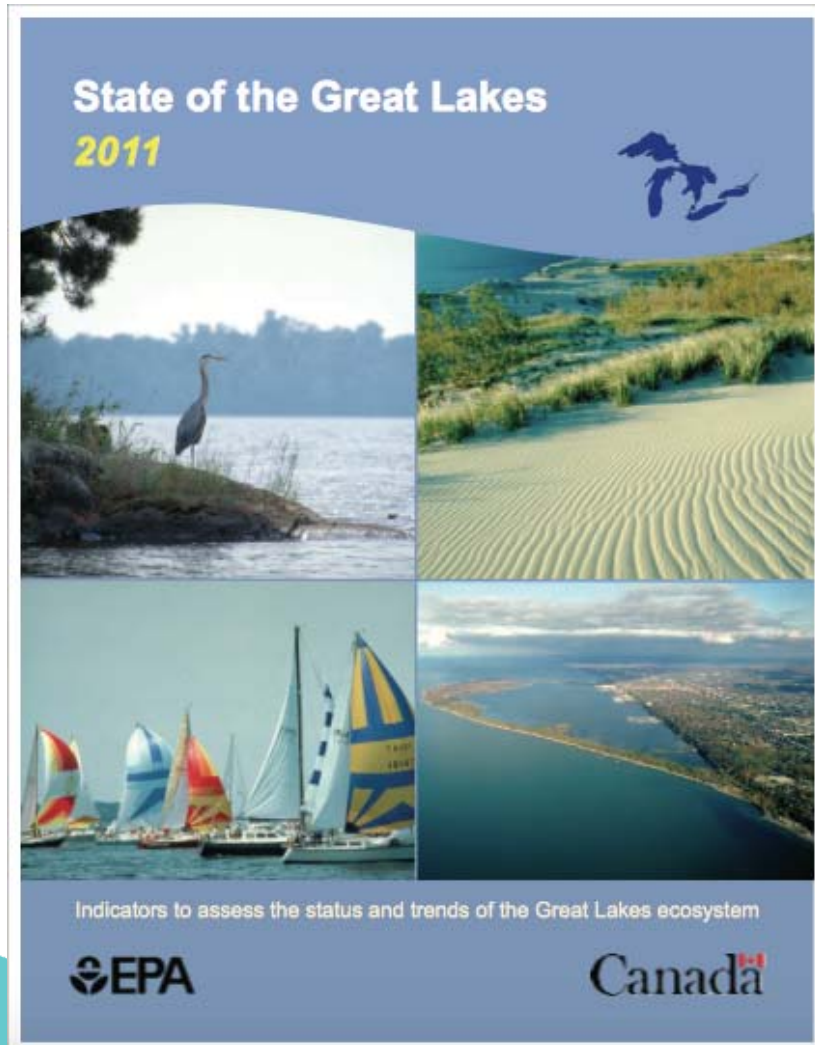
<http://americaswater.wpengine.com/>

# Report cards summarized

- Synthesize environmental and socio-economic data
- Assess ecosystem health within a socio-political context
- Engage stakeholders and community from start to finish
- Directly compare different geographic regions
- Grades incentivize political leaders to improve future grades
- Provide avenue for regular public dialog that can build community knowledge
- Community ownership empowers citizens to make changes



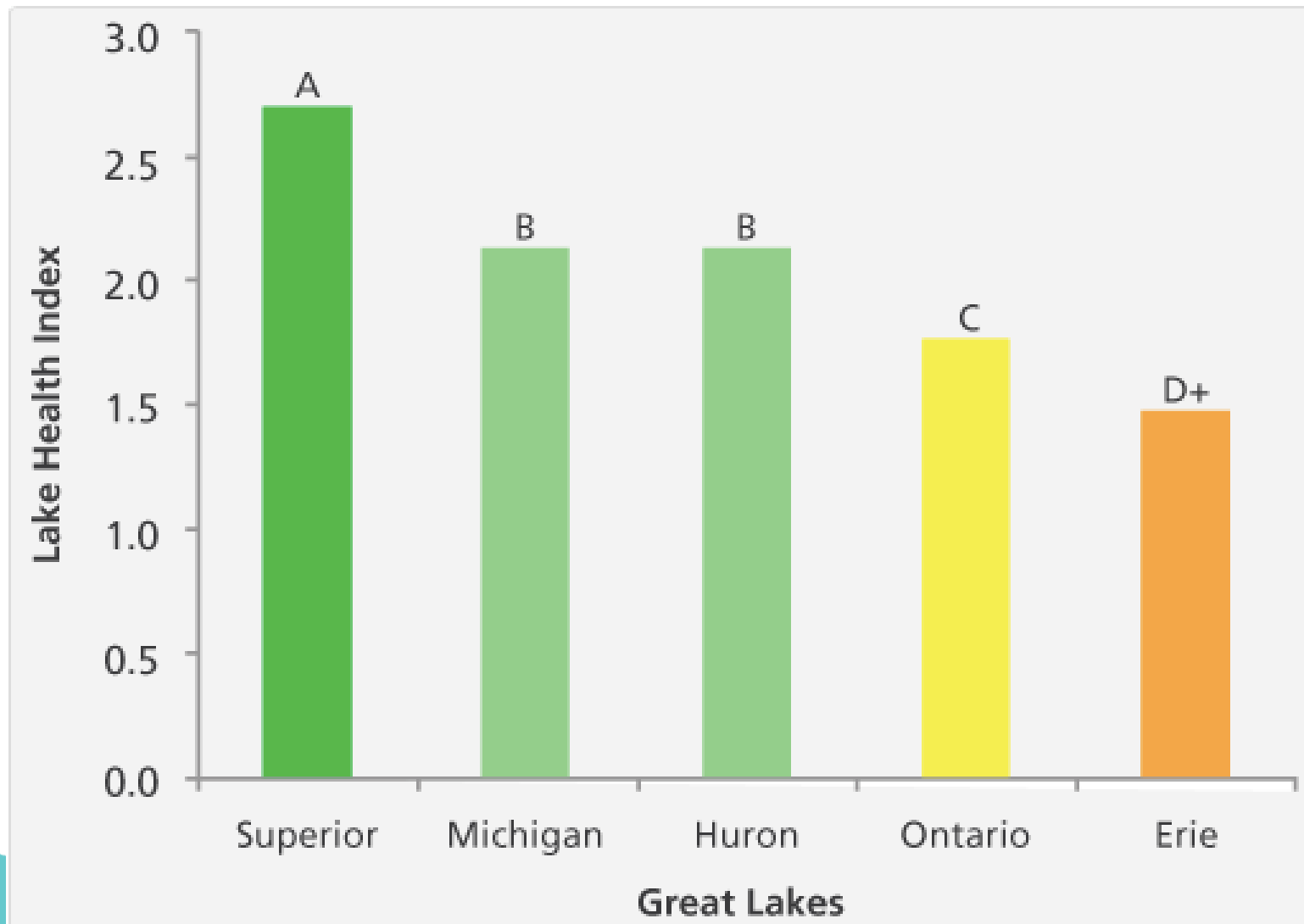
# Developing a Great Lakes Health Index



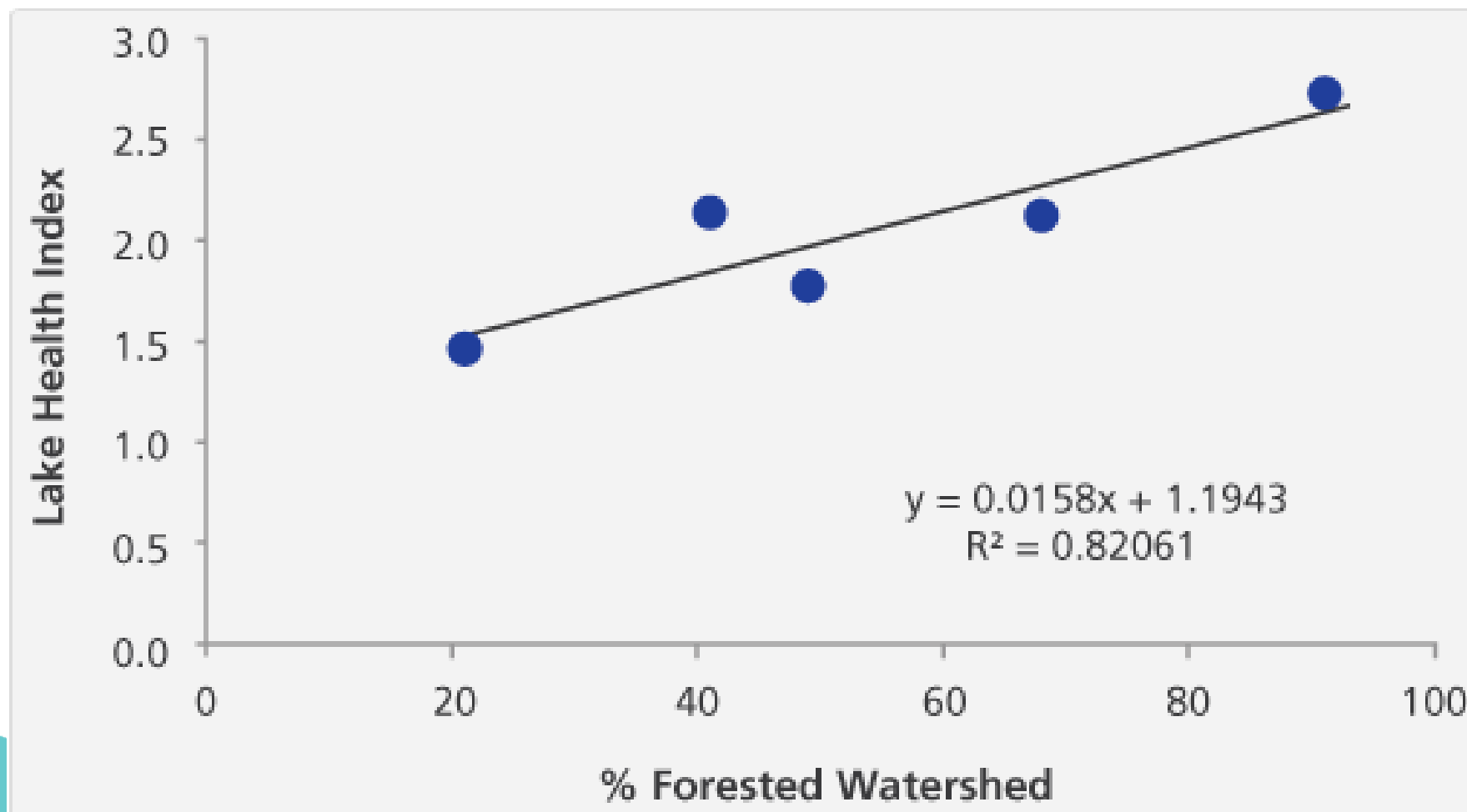
Water quality indicators  
Nutrient conc.  
Toxicants  
Fish contamination  
Bird contamination

Aquatic-dependent life indicators  
Diporeia crustaceans  
Walleye fish  
Lake sturgeon  
Lake trout  
Benthic diversity  
Prey fish  
Wetland amphipods  
Wetland plants

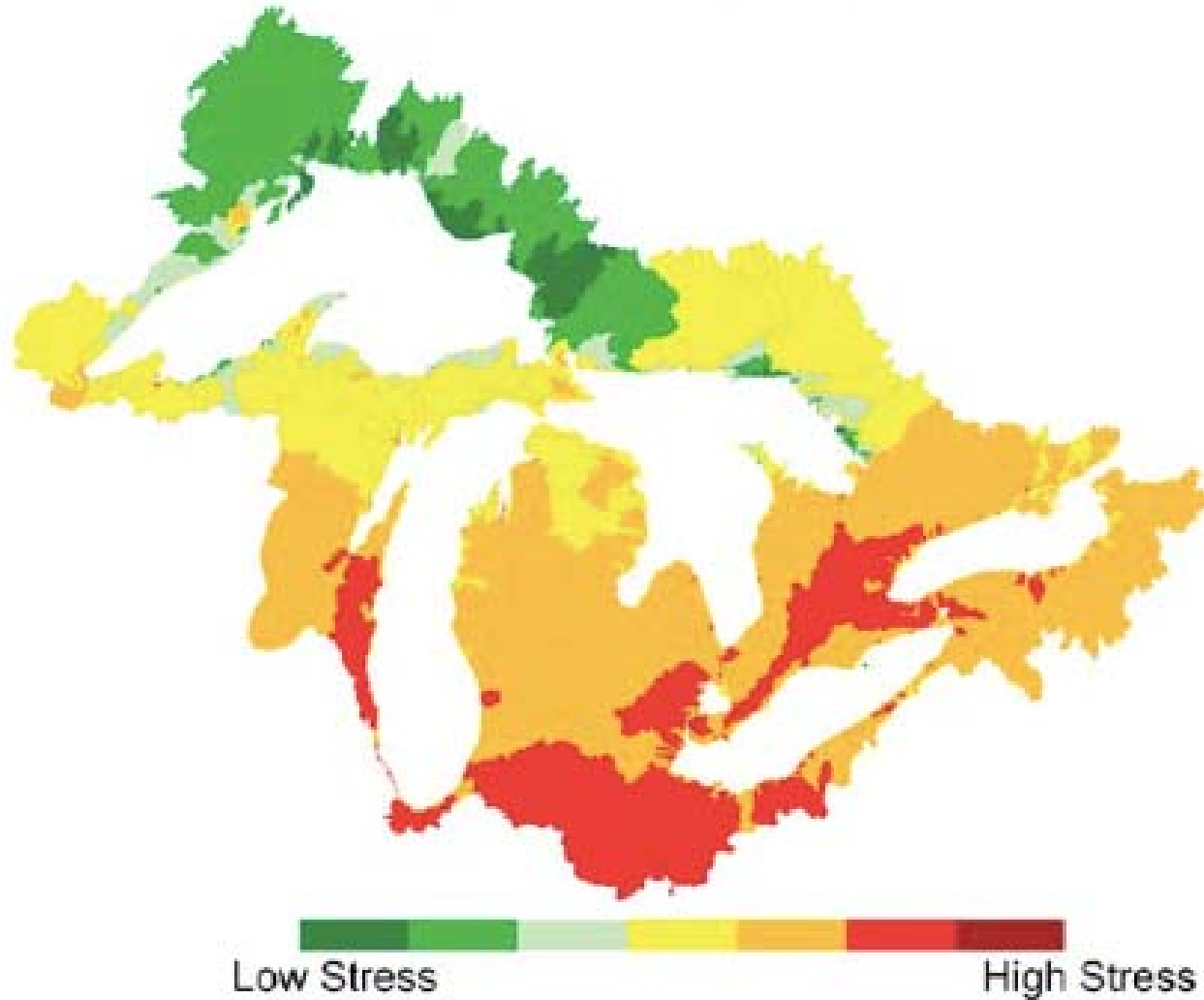
## Great Lakes report card example



# Correlation of Lake Health Index with watershed features

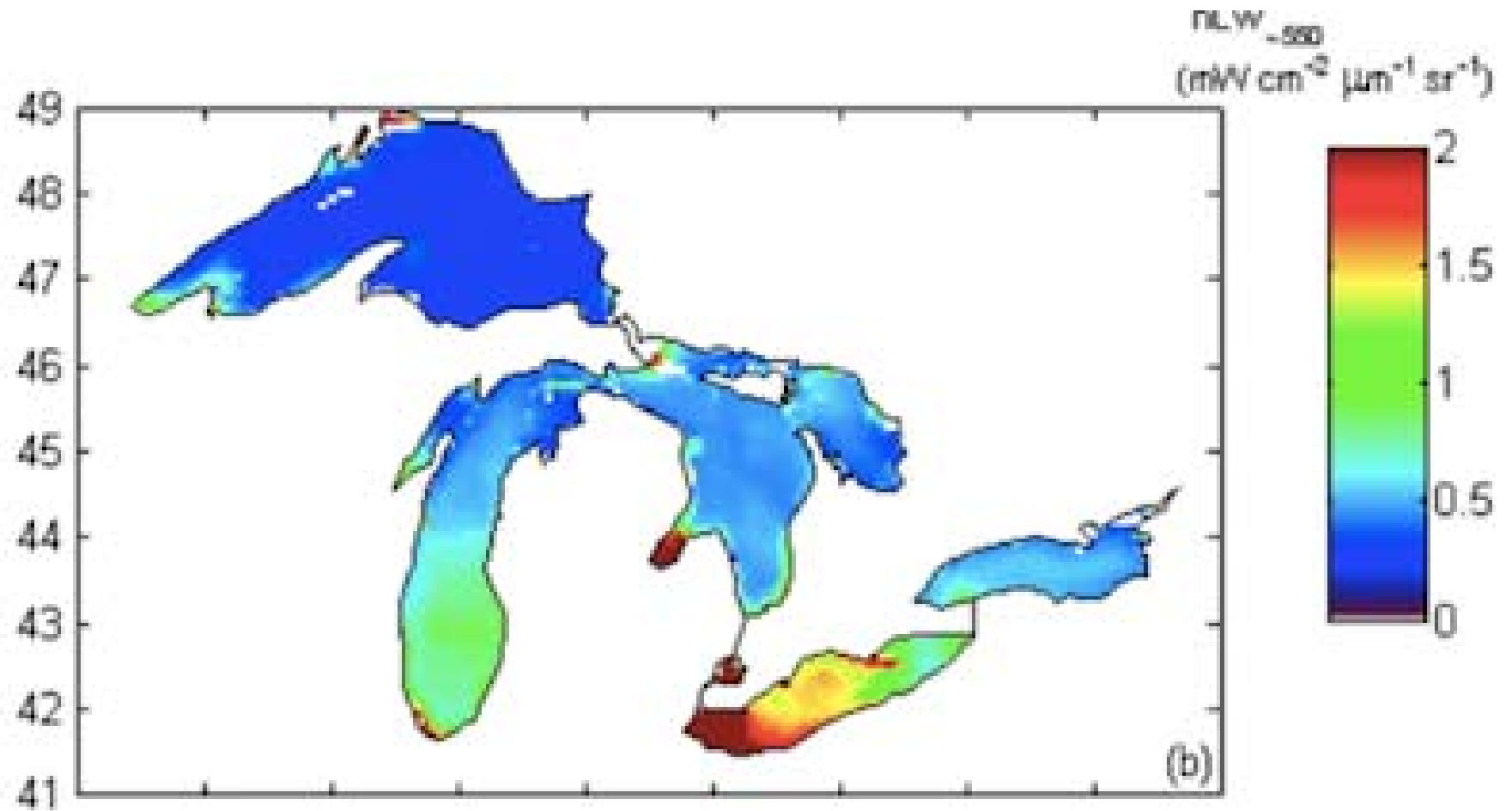


# Watershed stress index

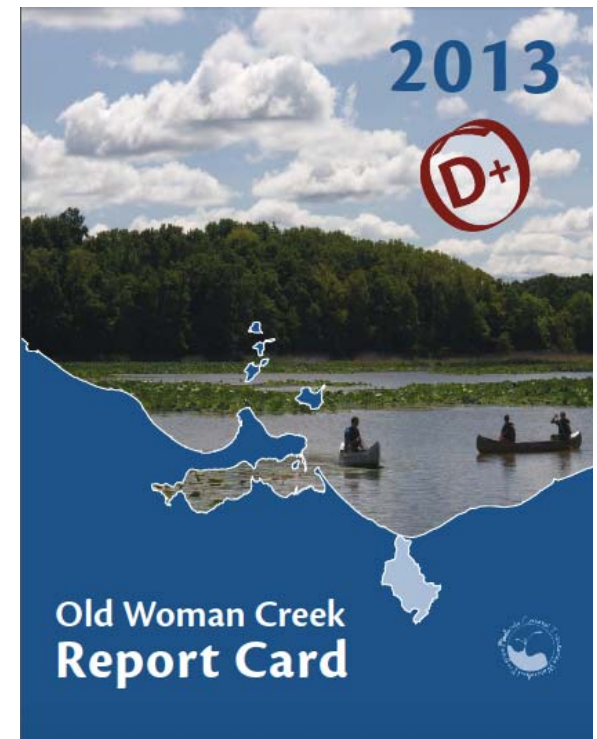
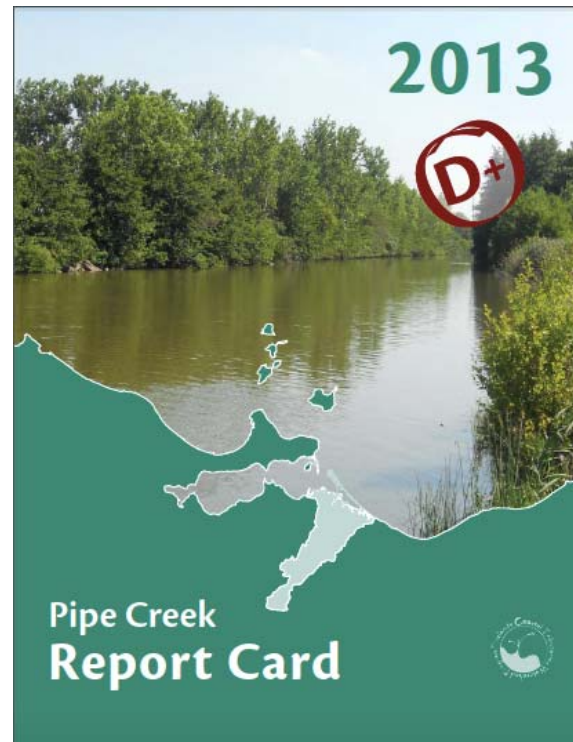
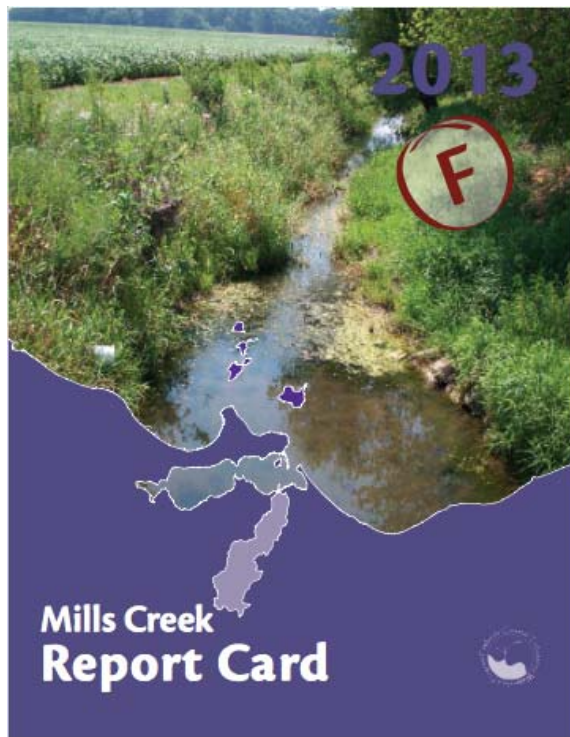




# Great Lakes water clarity (1998-2005)



# Localized report cards developed for Lake Erie tributaries



# Excess nutrients contribute to low scores

## Mills Creek 2013 Report Card

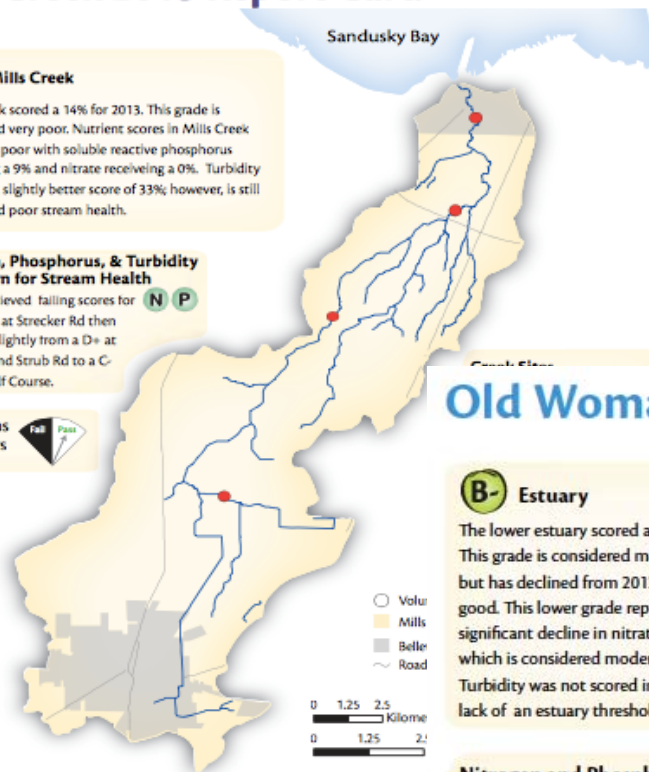
### F Mills Creek

Mills Creek scored a 14% for 2013. This grade is considered very poor. Nutrient scores in Mills Creek were very poor with soluble reactive phosphorus receiving a 9% and nitrate receiving a 0%. Turbidity received a slightly better score of 33%; however, is still considered poor stream health.

### Nitrogen, Phosphorus, & Turbidity a Concern for Stream Health

All sites received failing scores for **N** **P** failed at Srecker Rd then improved slightly from a D+ at Miller Rd and Scrub Rd to a C- at Mills Golf Course.

### Vital Signs Indicators



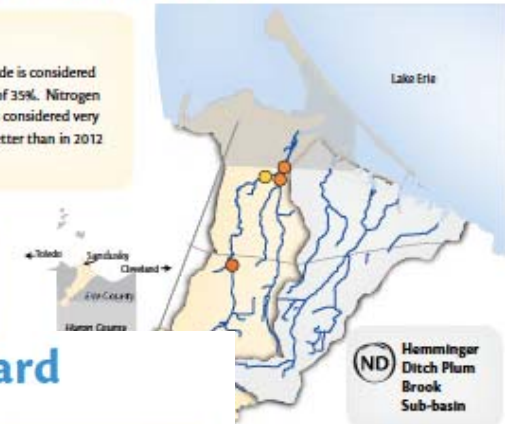
## Pipe Creek 2013 Report Card

### D+ Pipe Creek

Pipe creek scored a 35% for 2013. This grade is considered poor. Turbidity score fell to a poor grade of 35%. Nitrogen received the lowest score of 13%, which is considered very poor. The phosphorus grade was slightly better than in 2012 at 59%, a moderate score.

### Nitrogen and Turbidity a Concern for Stream Health

Overall nitrogen and turbidity scores declined 20% compared to



**ND** Hemmingar Ditch Plum Brook Sub-basin

## Old Woman Creek 2013 Report Card

### B- Estuary

The lower estuary scored a 65%, for 2013. This grade is considered moderately good, but has declined from 2012 which was very good. This lower grade represents a significant decline in nitrate score of 50% which is considered moderate health. Turbidity was not scored in 2013, for lack of an estuary threshold.

### Nitrogen and Phosphorus a Concern for Stream Health

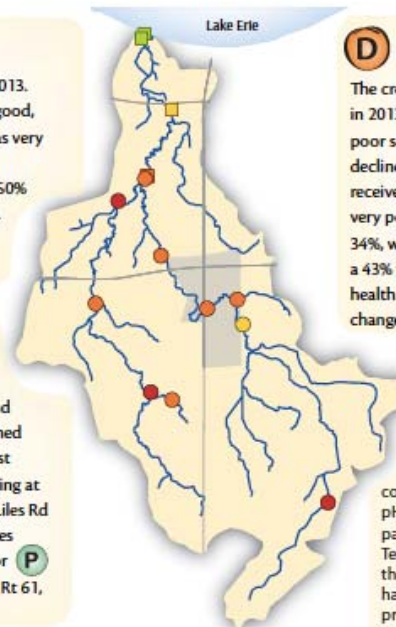
Overall nitrate and soluble reactive phosphorus scores were very poor and poor which lowered the total watershed score. **N** scores showed the greatest decline from 2012 with failures occurring at most sites except in the estuary and Liles Rd and Tennant Rd East. Nearly half of sites received moderate or better scores for **P**. However, failures occurred at Liles Rd, Rt 61, and Tennant Rd West.

### D Creek

The creek sites scored a 30% overall in 2013. This grade is considered a poor score. This score represents a decline in nutrient scores. Nitrate received a 13% which is considered very poor while phosphorus scored 34%, which is poor. Turbidity scored a 43% which is considered moderate health and did not significantly change from 2012.

### Vital Signs Indicators

The Vital Signs Indicators, consisting of dissolved oxygen, pH, and ammonia revealed passing scores in 2013. Temperature, however, failed at the Tennant Rd west site. This site has shown mixed results in the previous years and may be an indication of a serious problem affecting the health and habitat of the Creek.



### Creek Sites

Sites are listed from north to south.

- D+** Perkins Ave
- C** Oakland Cemetery
- C** Columbus Ave
- D+** Bogart Rd
- C** Patten Tract Rd
- D+** Harris Rd
- D+** Strecker Rd

Note: See more information on previous page.

# Thank you!

[ian.umces.edu](http://ian.umces.edu)