

# Calculating Water Quality Indicator Scores for Ecosystem Health Report Cards



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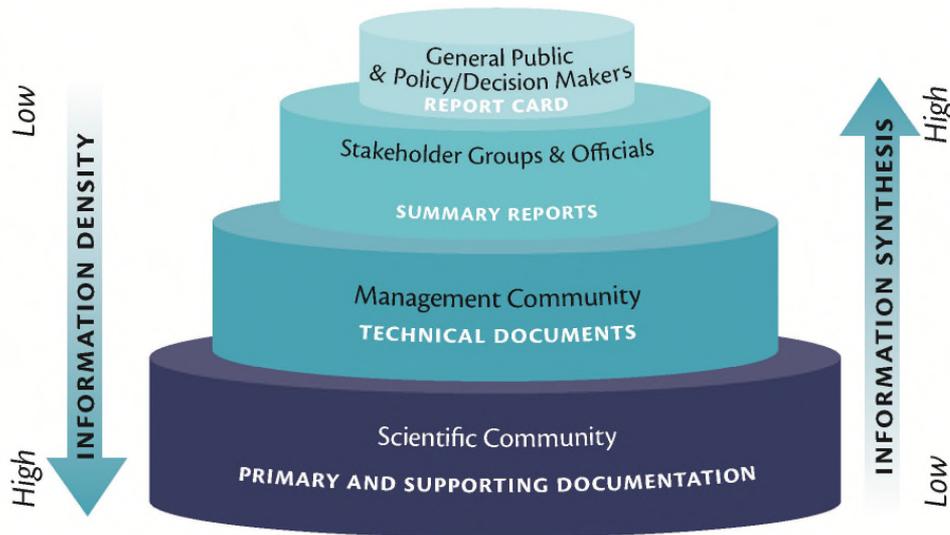
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# What is an ecosystem health report card?



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

# Report cards are effective tools

## Delivery

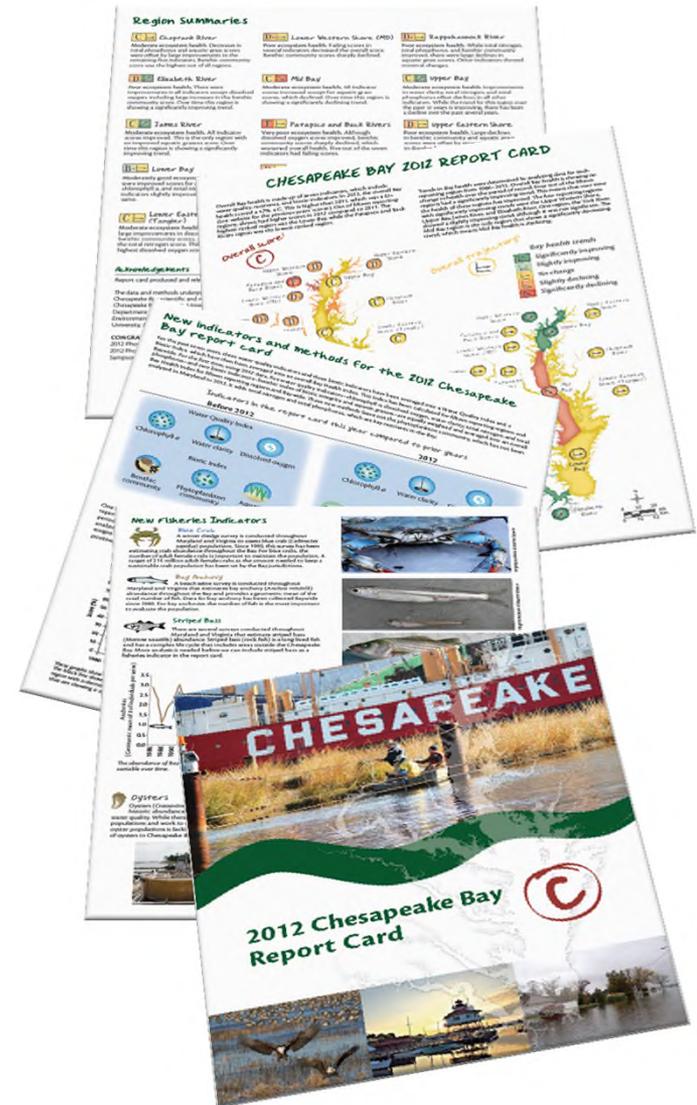
- Simple and concise
- Most people can relate to them
- Don't require instructions

## Effect

- Can identify areas needing improvement
- Results can be tracked over time

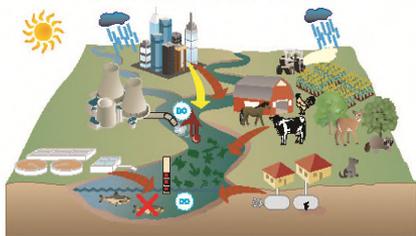
## Response

- Provides incentive
- Accountability
- Mass media love it



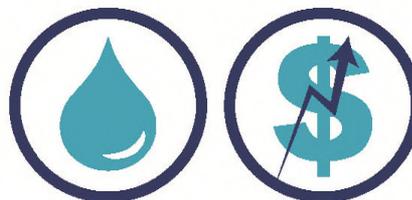
# Report cards are a five step process

## 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

Calculate indicator scores and combine into index grades.

## 5 Communicate results



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

# Report cards use robust data that link directly to management objectives

- Management objectives are reflected in several aspects of the report card process:
  - Indicator selection
  - Thresholds for scoring
  - Communication strategy

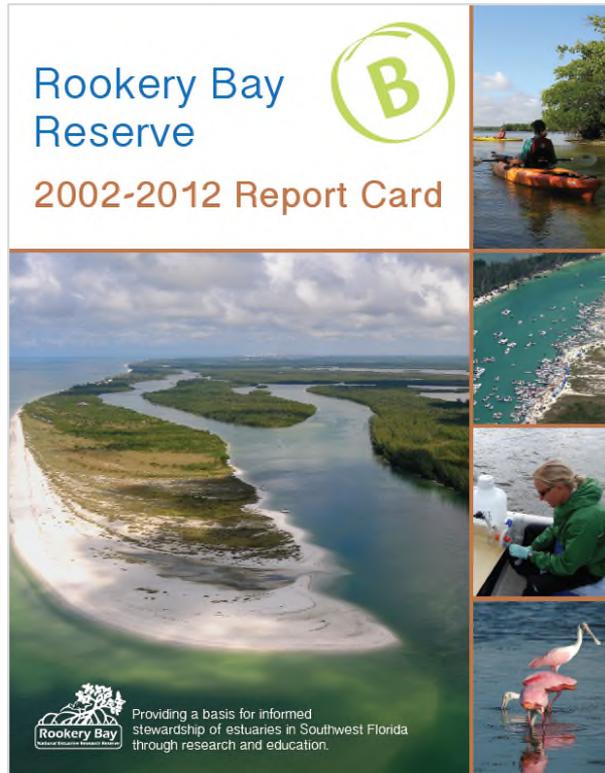
2 Choose indicators



3 Define thresholds

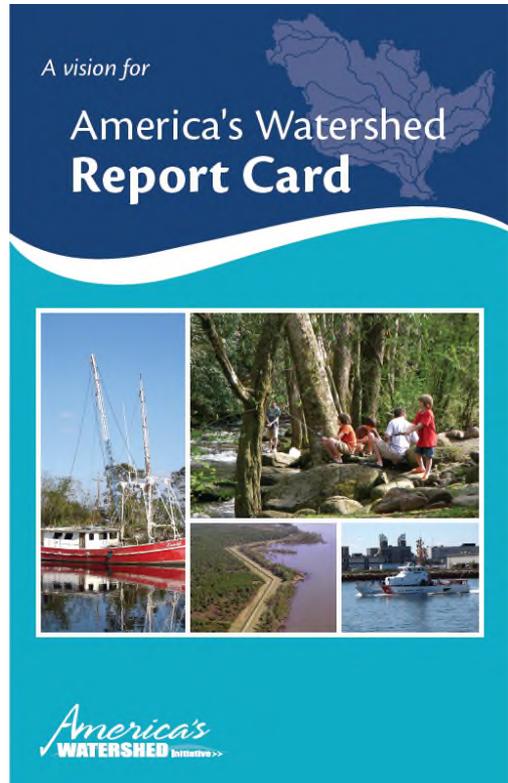


# Management objectives – Rookery Bay



- Maintain good water quality to support healthy flora and fauna
- Mitigate the impacts of altered freshwater inflow on biota

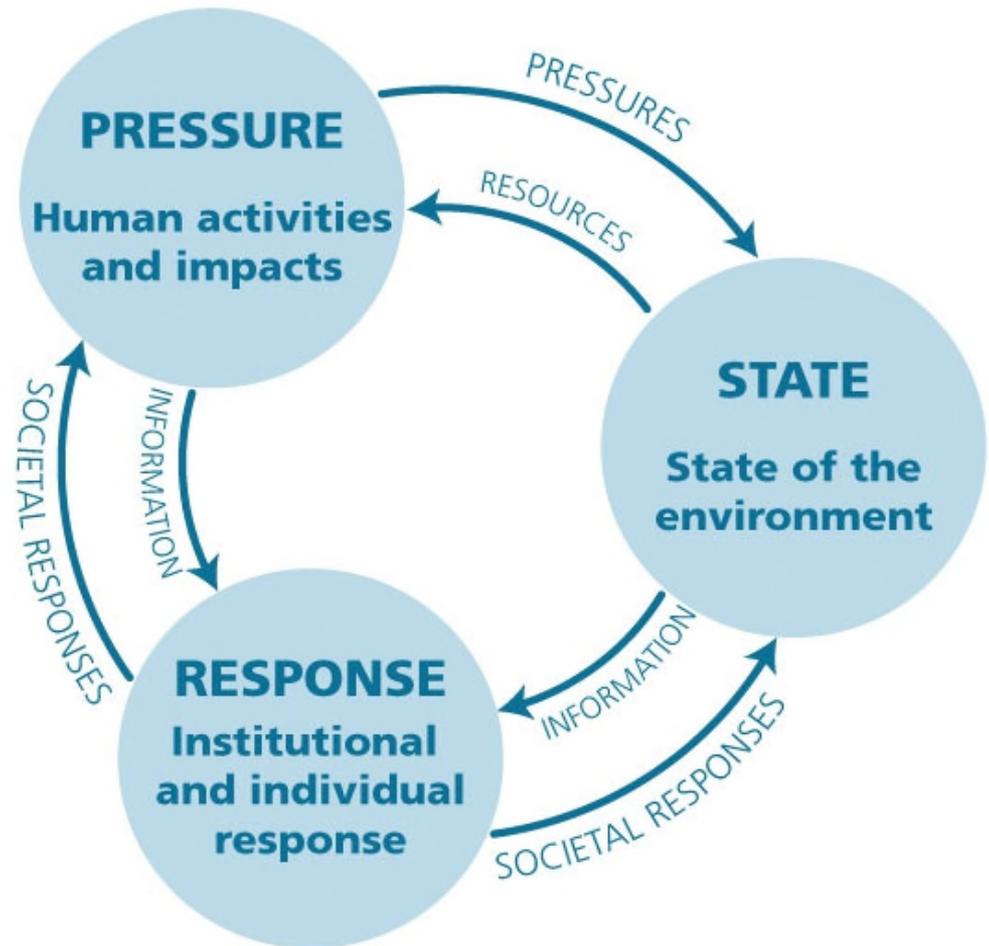
# Management objectives – Mississippi River



- Focus on six goals:
  - Ecosystem health
  - Water supply and quantity
  - Flood risk
  - Economics
  - Recreation
  - Transportation

# Indicator selection

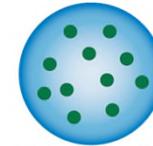
- Ecosystem health
- Human use
- Management action



# Indicator selection: Rookery Bay

## Rookery Bay Reserve Report Card

- Water quality
- Salinity
- Fisheries Diversity



Chlorophyll *a*



Total Nitrogen



Dissolved oxygen



Total Phosphorus



Salinity Extremes



Salinity Stability

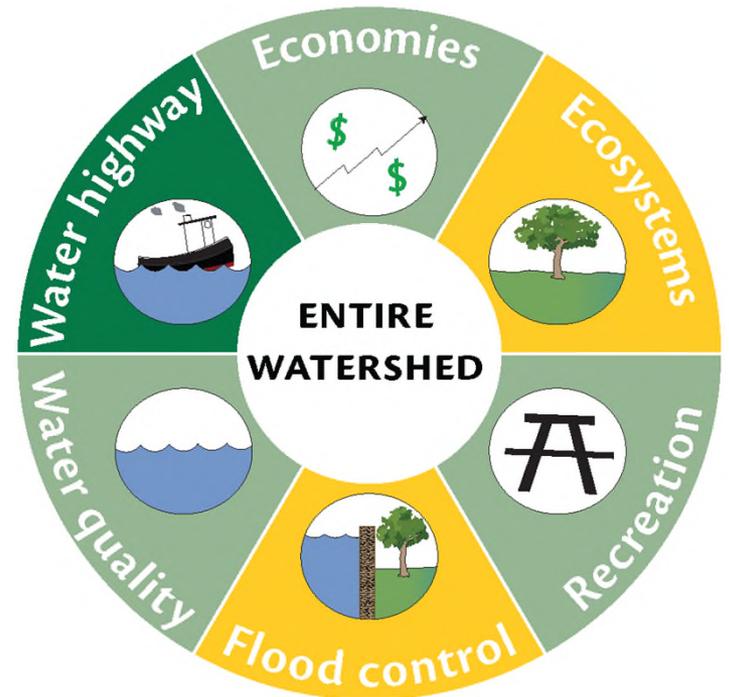


Fisheries Diversity Index

# Indicator selection: Mississippi River

## Mississippi River Report Card

- Water quality
- Flood control
- Recreation
- Water highway
- Economics
- Ecosystems



# Define thresholds and reporting regions to establish environmental benchmarks and spatial details

Dissolved oxygen ( $\text{mg} \cdot \text{L}^{-1}$ )

5.0

Binary



score = 100%

5.8

8.0

6.0

4.0

2.0

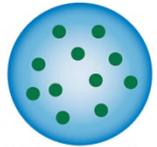
Linear



score = 50%

5.8

# Defining thresholds – Rookery Bay



Chlorophyll *a*



Total Nitrogen

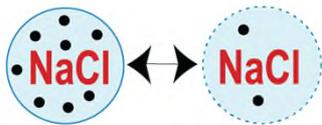


Dissolved oxygen



Total Phosphorus

- Water quality indicators
  - Dissolved oxygen, total nitrogen, total phosphorus, and chlorophyll *a*
  - Criteria determined by Florida DEP
  - Pass/fail thresholds



Salinity Stability



Salinity Extremes

- Salinity indicators
  - Salinity stability, salinity extremes
  - Criteria developed by Comprehensive Everglades Restoration Plan
  - Pass/fail thresholds

# Defining thresholds – Mississippi River



- Flood risk
  - Amount of people in flood hazard area
  - Miles of levee inspected and certified
  - Number, intensity of floods
  - Critical infrastructure



- Economy
  - % unemployment
  - Employment by sector
  - Median income
  - Productivity by sector (Transportation, Agriculture, etc)

# Report card process varies by system type and program goals

	Rookery Bay	Mississippi River
Indicators	Water quality – total nitrogen, total phosphorus, chlorophyll a, dissolved oxygen	Water supply – designated use, water availability, water scarcity, maximum contaminant level
Management Objectives	Maintain good water quality and mitigate impacts of altered freshwater inflow to support flora and fauna.	Water supply, Flood risk, Economy, Ecosystem, Recreation
Thresholds	Pass/fail thresholds based on ecosystem response to stressor	Based on percent of goal met
Product	Single report card spanning 10 years of data with accompanying technical document	Report cards for each sub-basin, plus newsletters describing methods

# Acknowledgements

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