Calculating Water Quality Indicator Scores for Ecosystem Health Report Cards

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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**
   - Calculate indicator scores and combine into index grades.

5. **Communicate results**
   - Communicate results using visual elements, such as photos, maps, and conceptual diagrams.
Management objectives are reflected in several aspects of the report card process:
- Indicator selection
- Thresholds for scoring
- Communication strategy
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
Indicator selection: Mississippi River

Mississippi River Report Card

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

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

Dissolved oxygen (mg·L$^{-1}$)

**Binary**
- Score = 100%
- **5.0**

**Linear**
- Score = 50%
- **8.0**
- **6.0**
- **4.0**
- **2.0**

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Defining thresholds – Rookery Bay

• Water quality indicators
  – Dissolved oxygen, total nitrogen, total phosphorus, and chlorophyll \( a \)
  – Criteria determined by Florida DEP
  – Pass/fail thresholds

• 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

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