



State of the Lakes Ecosystem Conference '96

INTEGRATION PAPER

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SOLEC '96



Integration Paper

Bench Marking the Great Lakes



SOLEC '94

- State of Aquatic Community Health and Human Health
- Condition of Habitat and Biodiversity
- Trends in Contaminants and Nutrients
- Trends in the Economy



Contaminants

SOLEC '94 Findings

- Declining contaminant trends in fish, wildlife, and sediments
- Contaminants continue to be present and problematic
- Global contaminant problem emerging



Contaminants

SOLEC '94 Findings

- Food chain composition reflected in contaminant movement
- Hormone mimicry issue requires research and monitoring
- Phosphorus targets in Lakes being met



Biodiversity

SOLEC '94 Findings

- Significant loss of native species
- Loss of biodiversity among remaining species



Exotic Species

SOLEC '94 Findings

- Non-native species impacting ecosystem integrity
- Zebra mussels impacting nutrient cycling in Lakes



Habitat

SOLEC '94 Findings

- Catastrophic loss of aquatic habitat



Human Health

SOLEC '94 Findings

- Human health no worse in Great Lakes Basin compared to other industrialized nations



Economy

SOLEC '94 Findings

- Healthy economy essential to restoration of the Great Lakes
- Economics must be assessed along with other ecosystem stressors



Changes since 1994 in the State of the Great Lakes

Since SOLEC '94

- Overall evaluation of individual Lakes has not changed





Exotic Species

Since SOLEC '94

■ Exotic Species

- ▶ Range extension of zebra and quagga mussel continuing
- ▶ Ruffe extended range from Lake Superior to Lake Huron
- ▶ Round goby expanding range, except in Lake Ontario
- ▶ Sea Lamprey abundance in northern Lake Huron increasing





Community Structure

Since SOLEC '94

■ Community Structure

- ▶ Natural reproduction of lake trout occurring in Lake Ontario
- ▶ “Extirpated” deep water sculpin sighted in Lake Ontario



Changes in Individual Lakes

Since SOLEC '94

- Lake Erie highly stressed
 - ▶ Smelt and perch populations declining
 - ▶ Summer blooms of blue-green algae
- Lake Ontario declining in productivity
 - ▶ Decreasing nutrient loadings
 - ▶ Collapse of alewife population
 - ▶ Resulting reduction in fish stocking



Habitat and Wetlands

Since SOLEC '94

- Recovery negligible
- Inventories and assessments NOT completed
- Gaining much needed support for habitat protection





Human Health

Since SOLEC '94

No shifts of kind or level of bioaccumulating contaminants

Beach closings continue due to contamination

Cryptosporidiosis outbreaks continue

Fish consumption advisories remain in effect





Contaminant Trends

Since SOLEC '94

- Decreases continue in fish body burden concentrations
- Toxaphene continues to increase in Lake Superior





Ecological Integrity and Benefits

Ecological Health

Human Health & Welfare

Stressors

Physical

Biological

Chemical

Sources

Filling

Dams

Dredging

Navigation

Exotics

Stocking

Erosion

Emission

Point Source

Sediments

Economics

Behavior

Institutions

Laws

Programs

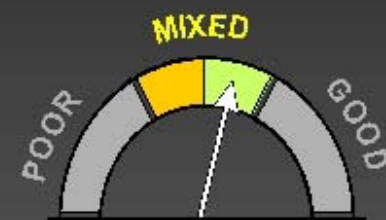
**Factors
Limiting
Stressors**



STATE OF NEARSHORE ECOSYSTEM HEALTH

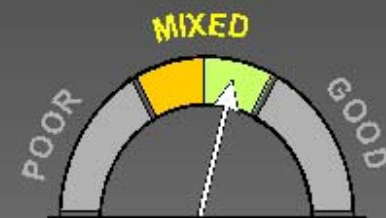
Nearshore Waters - Human Health

Fish consumption advisories

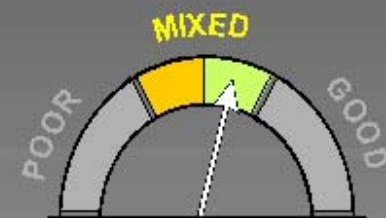


Nearshore Waters - Ecological Health

Native fish and wildlife species and their habitats



Algae problems: blooms and nuisance species





Stressors of the Nearshore Waters

Exotic Species



Concentrations of Persistent Toxic Substances



Concentrations of Phosphorus





Challenges

- **Protection of Wildlife**
 - ▶ Genetic diversity of native species
 - ▶ Habitat for aquatic birds and raptors, and feeding sites for migrant wildlife
- **Protection of Fish**
 - ▶ Genetic diversity of remaining fish stocks
 - ▶ Power plant impacts
- **Control of sewage**
 - ▶ Treatment must improve as population grows
 - ▶ Combined sewer overflows



Ecosystem Health

State of Coastal Wetlands

- Coastal wetland quantity and rate of loss

Unknown

- Coastal wetland quality and rate of loss in quality

Unknown

- Location of threatened wetlands

Unknown

- Wetland size and abundance



- Status of plant species and communities





Stressors and Sources

State of Coastal Wetlands

- Exotic Species
- Land use change
- Shoreline modification





Stressors and Sources

State of Coastal Wetlands

■ Lake level modification

▶ Lake Ontario



▶ Lake Superior



▶ Others





Challenges

State of Coastal Wetlands

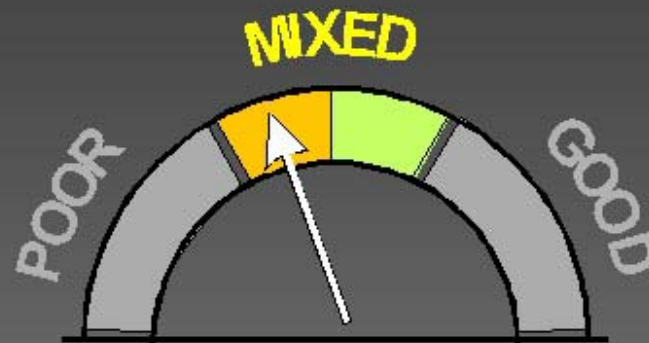
- A consistent system of coastal wetland classification to allow comparable inventories
- A consistent inventory to provide managers with quantity, quality, location and loss information
- Indicators of wetland health to track state of coastal wetlands



Ecosystem Health

Land By the Lakes

- Overall health

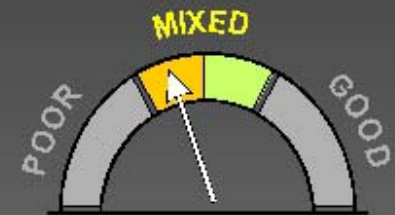
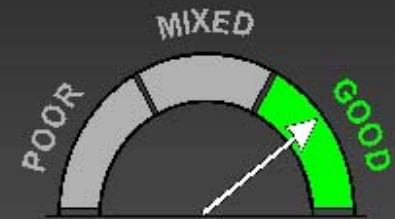




Loss of Shoreline Species and Communities

Land by the Lakes

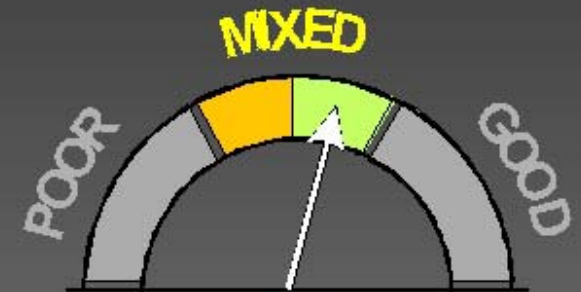
- Lake Superior
- Other Lakes





Representation of Biodiversity in Lakeshore Areas

- Lake Superior
- Lake Huron
- Other Lakes





Challenges

Land By the Lakes

- Establish high quality biodiversity investment areas to protect a full range of coastal landscapes and biological communities
- Develop coordinated shoreline management to ensure ecological processes are sustained
- Involve private land owners and establish management agreement that protect ecosystems
- Provide public education and involvement

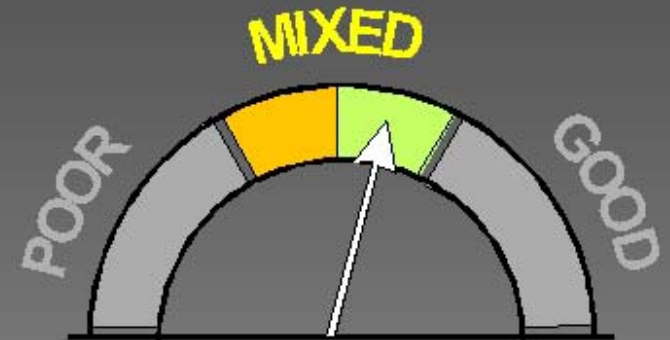


Stressors on Ecosystem Health

Landuse

■ Indicators

- ▶ Suburban land conversion
- ▶ Traffic congestion
- ▶ Transit use
- ▶ Cottage and second home development
- ▶ Agricultural and natural land loss
- ▶ Conservation tillage





Challenges

Landuse

- Make environmental protection a priority for urban development
- Limit urban sprawl
- Protect against farmland development
- Clarify the cost of urban sprawl and remove incentives that support it
- Remove economic barriers to urban brownfields redevelopment
- Use conservation easements for natural areas



State of Information Management

- Overall evaluation
- Data coverage
- Data time frame
- Data applicability
- Data useability





State of Information Management

Challenges

- Adopt a set of common indicators and protocols for assessing the state of nearshore ecosystems
- Identify target areas for collection of data to optimize use of limited funds
- Identify custodians for long-term maintenance of data
- Make information and data available on the world wide web and set up a consortium of nearshore partners



Major Management Challenges

- Develop geo-referenced near shore ecosystem information
- Integrate biodiversity and habitat into traditional programs
- Integrate lakewide management plans, remedial action plans, fisheries management plans resulting in viable management tools
- Develop a complete set of ecosystem indicators for the Great Lakes