Great Lakes Biodiversity Conservation Strategies: OVERVIEW AND APPLICATION TO WATERSHED MANAGEMENT

Image NOAA CoastWatch 14 March 2013

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Overview of Presentation

• Project description
• CAP process
  • Conservation Targets
  • Biodiversity status (viability)
  • Threats
  • Strategies
• Ag NPS
• Priority Areas
• Ecosystem Services assessment
• Recommendations for Implementation
“…working with a **broad network**…developing strategies for the **restoration and conservation** of the **native biodiversity** and **ecosystem function**…”

“primary output… **biodiversity conservation strategies** that will **complement** and **be incorporated into** the **Lakewide (Action) and Management Plans (LAMPS)**
Thanks to support and funding from:

- U.S. Environmental Protection Agency
  - Great Lakes National Program Office and
  - Region 2
- Environment Canada
- Canada – Ontario Agreement Respecting the Great Lakes
- Erb Foundation
- Chrysler Foundation
- Mott Foundation
Biodiversity Conservation Strategies: Four are completed
Conservation Action Planning (CAP)

**Defining Your Project**
- Project people
- Project scope & focal targets

**Using Results to Adapt & Improve**
- Analyze actions & data
- Learn from results
- Adapt project
- Share findings

**Developing Strategies & Measures**
- Target viability
- Critical threats
- Situation analysis
- Objectives & actions
- Measures

**Implementing Strategies & Measures**
- Develop workplans
- Implement actions
- Implement measures
Scope of Biodiversity Conservation Strategies: Lake Erie

Lake Erie - Project Scope

Lake Erie Drainage Boundary

Base Data: Esri (2011)
Providing greater resolution:
Lake Erie Stratification Units
Aquatic Biodiversity Targets

– Open Water Benthic and Pelagic Ecosystem
– Nearshore Zone
– Native Migratory Fish
– Coastal Wetlands
– Connecting Channels
– Tributaries, Watersheds
Terrestrial Biodiversity Targets

– Islands
– Coastal Terrestrial Systems
– Aerial Migrants

North Bass Island Photo ©TNC
# Biodiversity Conservation Targets in Four Great Lakes

<table>
<thead>
<tr>
<th>Target</th>
<th>Lake Ontario</th>
<th>Lake Huron</th>
<th>Lake Erie</th>
<th>Lake Michigan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Open Water/Offshore</strong></td>
<td>&gt;20m</td>
<td>&gt;30m</td>
<td>&gt;15m</td>
<td>&gt;30m</td>
</tr>
<tr>
<td><strong>Nearshore Zone</strong></td>
<td>&lt;20m</td>
<td>&lt;30m</td>
<td>&lt;15m</td>
<td>&lt;30m</td>
</tr>
<tr>
<td><strong>Native Migratory Fish</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Islands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Coastal Wetlands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Aerial Migrants</strong></td>
<td>NA</td>
<td>Birds (landbirds, waterfowl, shorebirds, waterbirds) that use open waters of and adjacent shorelines, during spring and fall migration</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Coastal Terrestrial Systems</strong></td>
<td></td>
<td></td>
<td>Natural communities extending from the shoreline up to 2 km inland or to the extent of the (delineated) Great Lake coastal communities</td>
<td></td>
</tr>
<tr>
<td><strong>Rivers, Estuaries, &amp; Connecting Channels</strong></td>
<td>Tributaries</td>
<td>NA</td>
<td>Connecting Channels</td>
<td>NA</td>
</tr>
</tbody>
</table>
Example Goals and Viability Status: Lake Erie Nearshore Zone

By 2030, to assure adequate water quality for sustaining native plants, fish, and invertebrates:

- Based on multi-year averages, reduce the load of dissolved phosphorus by 50% by 2030 in at least the priority watersheds.
- HAB toxin measures will be reduced to the point that no HAB advisories at public beaches will be recorded and issued.
- The native fish community will have moderately abundant populations of, smallmouth bass, walleye, yellow perch, northern pike, muskellunge, rock bass, emerald shiners, white sucker and cyprinids.
## Viability Status of Conservation Targets in Four Great Lakes

<table>
<thead>
<tr>
<th>Target</th>
<th>Lake Ontario</th>
<th>Lake Huron</th>
<th>Lake Erie</th>
<th>Lake Michigan</th>
<th>Average Viability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Water/Offshore</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>Nearshore Zone</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>Native Migratory Fish</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>Islands</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Coastal Wetlands</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Aerial Migrants</td>
<td>NA</td>
<td>Fair</td>
<td>Good</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>Coastal Terrestrial Systems</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>Rivers, Estuaries, &amp; Connecting Channels</td>
<td>Fair</td>
<td>NA</td>
<td>Fair</td>
<td>NA</td>
<td>Fair</td>
</tr>
<tr>
<td>Overall Biodiversity Viability Rank</td>
<td>FAIR</td>
<td>FAIR</td>
<td>FAIR</td>
<td>FAIR</td>
<td>FAIR</td>
</tr>
</tbody>
</table>
Spatial variability in overall viability of Lake Michigan Migratory Fish
## Threat assessment results: Lakewide Summary

<table>
<thead>
<tr>
<th>Threat</th>
<th>Lake Ontario</th>
<th>Lake Huron</th>
<th>Lake Erie</th>
<th>Lake Michigan</th>
<th>Average rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic invasive species</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1.25</td>
</tr>
<tr>
<td>Incompatible development</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>2.75</td>
</tr>
<tr>
<td>Climate change</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3.25</td>
</tr>
<tr>
<td>Terrestrial invasive species</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>4.25</td>
</tr>
<tr>
<td>Dams and other barriers</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>5</td>
<td>5.25</td>
</tr>
<tr>
<td>Non-point source pollutants</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>5.50</td>
</tr>
</tbody>
</table>
Maps of Specific Threats: Dams in Lake Huron Basin
Strategies: Common Themes

• Nearshore water quality:
  • Reduce Agricultural Non-Point Source Pollutants
  • Reduce Urban Non-Point and Point Source Pollutants
• Prevent, Detect, and Control Invasive Species (aquatic and terrestrial)
• Coastal Conservation:
  • Compatible Housing & Urban Development
  • Shoreline Restoration
  • Green Infrastructure
Strategies: Common Themes

• Remove and Mitigate Dams and Barriers
  • Focus on first barriers

• Restore Fisheries
  • Cisco restoration

• Climate Change
  • Promote adaptation
  • Improve connectivity
Strategy 1: Target and intensify nutrient management BMPs to reduce Soluble Reactive Phosphorus loadings to Lake Erie

Strategy 2: Promote in-field management of drainage AND management of surface drainage channels to moderate discharge extremes and limit nutrient export
Strategic Actions for Lake Erie Ag NPS reduction

1. Determine with whom and where to target the implementation of practices
2. Determine the most appropriate BMPs for implementation at each site
3. Assess the likely response to implementing the BMPs
4. Develop a coordinated program of education, promotion and support to encourage adoption of appropriate BMPs in targeted areas
5. Identify barriers to adoption of the BMPs, so that resources are not wasted promoting practices that will fail because of lack of support
6. Assess the rate of adoption
7. Assess amount of nutrient runoff and agricultural non-point pollutants and stressor-response
Two strategies developed:

- Increase Connectivity to Lake Michigan through Development and Use of a Comprehensive Lowest Barrier Decision Tool
- Increase Connectivity at Road-Stream Crossings at a Large Scale
Comprehensive Lowest Barrier Decision Tool

- Bring together data and information on pressures to keep barriers and pressures to remove barriers into one decision tool.
- A means for informed decision making balancing costs and benefits
- Shared regional priorities
- Facilitate restoration, while minimizing risks
Strategic Actions for Lake Michigan Dams and Barriers

- Select prioritization criteria with input from stakeholders.
- Develop new datasets & tools and combine with existing datasets & tools for comprehensive barrier decision tool.
- Rate barriers/rivers based on metrics of ecological significance, economics, risks, and opportunity.
- High ecological benefit, low cost barrier projects are identified for immediate action.
- Update watershed plans with recommendations to repair, replace or prevent barriers.
Benefits to People: Ecosystem Services

Our Approach: Use the Ecosystem Services Concept/Framework to evaluate the impacts of conservation strategies on human well-being.
What are the most important ecosystem services provided by Lake Erie/Michigan and its coastal areas?

What would be the perceived effect of implementing the biodiversity conservation strategies on the most important ecosystem services?
# Top ten most important ecosystem services in Lake Erie and Lake Michigan

<table>
<thead>
<tr>
<th>Lake Michigan Rank</th>
<th>Lake Erie Rank</th>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>Cultural Services - Recreation and tourism (Lake recreation, wild game, song birds, other wildlife)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Supporting Services - Provision of habitat (Biodiversity support, habitat diversity)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>Provisioning Services - Fresh Water (Water supply)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Supporting Services - Primary production (Energy capture, food chain support, energy flow for fish, benthic food chain)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>Cultural Services - Aesthetic values (Aesthetics)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td>Supporting Services - Nutrient cycling (Nutrient storage)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>Regulating Services - Water purification and waste treatment (Water quality, waste assimilation, groundwater quality)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>Cultural Services - Sense of place</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>9</td>
<td>Supporting Services - Water cycling (Soil moisture storage)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>Regulating Services - Climate regulation (Carbon storage, moderation of weather extremes)</td>
<td></td>
</tr>
</tbody>
</table>
Near future:

- LAMP adopts (and adapts) blueprint recommendations
- Promote and facilitate integration of strategies and measures into other lakewide initiatives (GLFC, SOLEC, others...)
- Tier to regional conservation planning:
  - WLE Coastal Conservation Planning
  - HECI: considering a CAP
- Expanding geographic scope and depth/breadth of content in the Great Lakes IMDS
Products of Great Lakes Biodiversity Conservation Planning

- Shared definition of biodiversity (i.e., conservation targets and scope)
- Initial set of goals and measures for biodiversity conservation targets
- Assessment of current status of biodiversity
- Assessment of threats to biodiversity
- Strategies for conserving biodiversity
  - Spatial priorities established for some strategies
- General assessment of benefits to people (Lake Erie and Lake Michigan only)
Questions?

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UNTIL LATE MARCH:
http://conserveonline.org/workspaces/greatlakesblueprint
s/documents/all.html

MOVING SOON TO: http://www.conservationgateway.org