Classifying and Mapping Great Lakes Coastal Wetlands

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Inventory Development and Classification

- Coastal Wetland Inventory
  - Agreed upon standard hydrogeomorphic classification scheme with 10 HGM types
  - Compiled existing inventories
  - Seamless binational database
  - Area baseline
Project Objectives

1. To create a single, comprehensive and classified inventory of all coastal wetlands in the Great Lakes basin

2. To create a standardized hydrogeomorphic classification criteria

3. To identify hydrological modifiers imposing on wetland system

4. To estimate an area for each identified coastal wetland
Hydrogeomorphic Classification

- Existing wetland inventories utilize different classification systems based on biological and physical components
- Coastal wetlands can be further described by their connection to the lake
  - Provide inference into wetland shape, size, organic deposition, benthic community
- Consortium agreed on a standard hydrogeomorphic (HGM) classification that includes 10 types
- Classification will allow for comparative analyses
Coastal Wetland Sampling and Classification

- C. Herdendorf: 1980s. Mapping and Classification
- D. Albert/MNFI: 1980s-present: Plant sampling/classification
- D. Wilcox: 1980s-present: Plant sampling/classification
- P. Chow-Fraser/McMaster U.: 1990s-present: Plant sampling
- M. Moffett/USEPA: 1990s-present: Plant sampling
Hydrogeomorphic Classification

Criteria outlined in:


Aquatic Systems:

1. **Lacustrine** — controlled directly by the waters of the Great Lakes

2. **Riverine** — occur in rivers and creeks that flow into or between the Great Lakes

3. **Barrier-protected** — areas separated from the lakes by a barrier with periodic breaches
Lacustrine Wetlands

- Open Lacustrine
- Open Shoreline
- Open Embayment
- Protected Lacustrine
- Protected Embayment
- Sand-Spit Embayment

Presqu’ile Bay, Lake Ontario
Riverine Wetlands

- Drowned River Mouth
  - Open
  - Barred
- Delta
- Connecting Channel

St. Clair Delta, St Clair River
Barrier-Protected

Big Sand Bay, Lake Ontario
Barrier-Protected

- Swale Complexes
- Sand-Spit Swales
- Ridge and Swales
- Tombolo

Stockton Island, Lake Superior
Hydrological Modifiers

- Dykes
- Dams
- Road Construction
- Dredging
- Jetty
- Waste Sewage
- Ditch Construction
- Marinas
- Filled
Inventory Development and Classification

Steps of Process:

• Set data and metadata standards
• Compile and build from best available existing data
• Fill in data gaps – centroid or polygon
• Wetland boundary digitization
  • Air photo interpretation stereoscope
  • Photo-scan, georeferencing
  • ArcGIS on-screen digitization
• Digitally split wetland complex to represent hydrogeomorphological entities
• Add attributes
  • expert knowledge or air photo interpretation
Information Holdings and Data Gaps

- National Wetlands Inventory
- National Wetlands Inventory - Michigan
- Ohio Wetlands Inventory
- OMNR Evaluated Wetlands
- Wisconsin DNR Wetlands
Supporting Base Data

Herdendorf Inventory – Centroids and Hardcopy Maps

Ontario Coastal Wetland Atlas – Centroids and Hardcopy Maps

OBM Unevaluated Wetland Polygons (OMNR)
Supporting Base Data

**IMAGE DATA**

1) CIR 1:10,000
   ![Image 1]

2) FRI 1:20,000
   ![Image 2]

3) IRS
   ![Image 3]

4) DRG 1:24,000
   ![Image 4]

5) 5 m panchromatic (OMNR)
   ![Image 5]
Inventory Development and Classification

The complete, seamless bi-national product is available at: http://www.glc.org/wetlands/inventory.html
Results

Maumee Area Wetlands

Wetland Types
- Barrier-Protected
- Open Embayment
- Protected Embayment
- River Delta
- Drowned River-mouth
- gl_mainlakes
- glwsheds
- gl退回land

Great Lakes Coastal Wetlands Inventory compiled by the Great Lakes Coastal Wetlands Consortium
Results

Grand River Coastal Wetlands

Wetland Types
- Barrier-Protected
- Open Embayment
- Protected Embayment
- River Delta
- Drowned River-mouth
- gl_mainlakes
- glwshds_med

James R. Allen Park

Great Lakes Coastal Wetlands Inventory compiled by the Great Lakes Coastal Wetlands Consortium
More information:
http://www.glc.org/wetlands
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Uses

- Consortium currently developing a long-term binational monitoring program for Great Lakes coastal wetland
  - Inventory critical link
- Baseline for monitoring and reporting
- Comparative Analyses
- Basinwide trends
- Indicator of stressors
- Assess impacts of water regulation plans
- Local losses due to anthropogenic impacts, shoreline changes
- Management implications
  - Current, accurate and accessible information
Limitations

Completeness

- Point-only wetlands – not yet a digital boundary (but is area estimate)
- Limited air photo coverage (areas of previously identified wetlands)
  - for large archipelagoes on Georgian Bay – missed many embayments around islands
  - Identified data gaps were extensive for Canada’s upper Great Lakes
- The number of wetlands for Lake Superior and Lake Huron is expected to be higher than what is currently captured in this dataset.
- Lower St. Lawrence River was not included (dataset ends at dam in Cornwall, Ont)
Limitations

Hydrogeomorphic Classification

- Not all wetlands fit typical schema
  - Secondary Classification

Subjectivity and scale

Anthropogenic alteration disguises original connection to lake

Wetland Lower extent

- Air photo interpretation
  - Submergent vegetation

- <2m water
  - Extensive weedbeds

Base Data

- Scales
  - e.g. NW between 1:24000 and 1:62500

- Accuracy

- Minimum mapping unit

- Currency
  - Can 1983-1997
  - CIR Photos 1994-2000
Conclusions

- Comprehensive classified and seamless inventory for entire Great Lakes shoreline
- Extensive database for lower Great Lakes and complete for all previously identified wetlands in the Upper Great Lakes
- True as to the most current source available
- Provides an estimate of total wetland area not previously attained
- Provides a standard reference
- Will be foundation for all subsequent Consortium work

- Could be further complemented with
  - Improved topographical and bathymetry data
  - Remote sensing techniques to capture overlooked data and update existing data