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Ecological Assessment, Mapping, and Prioritization at the Huron-Clinton Metroparks



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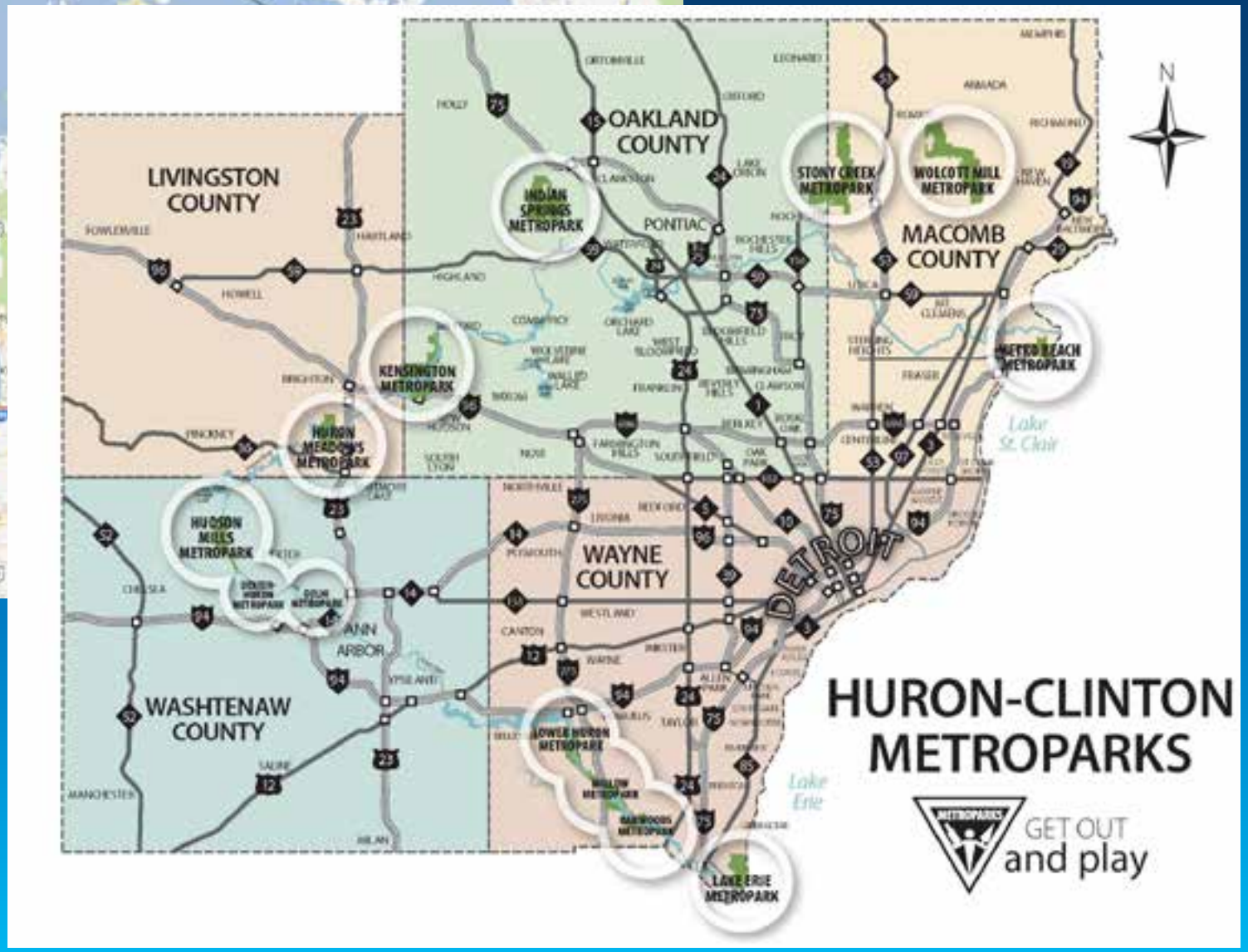
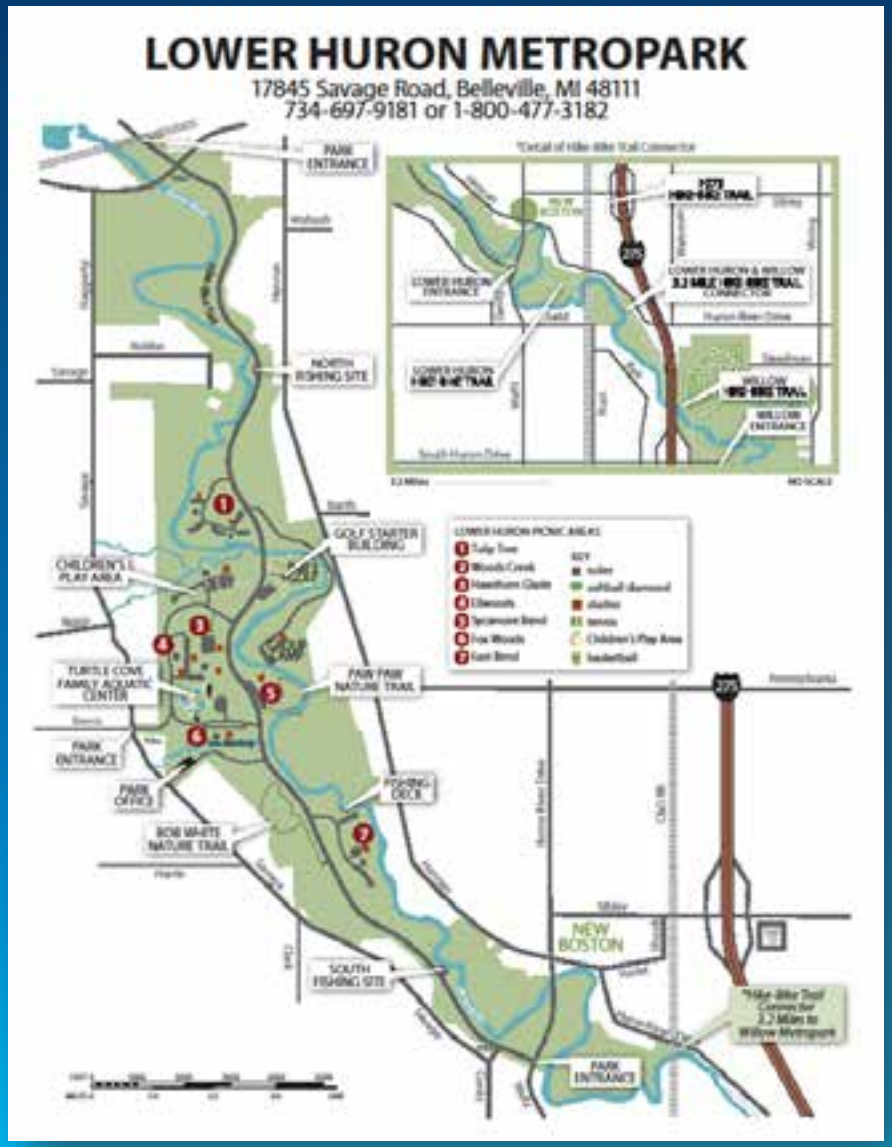
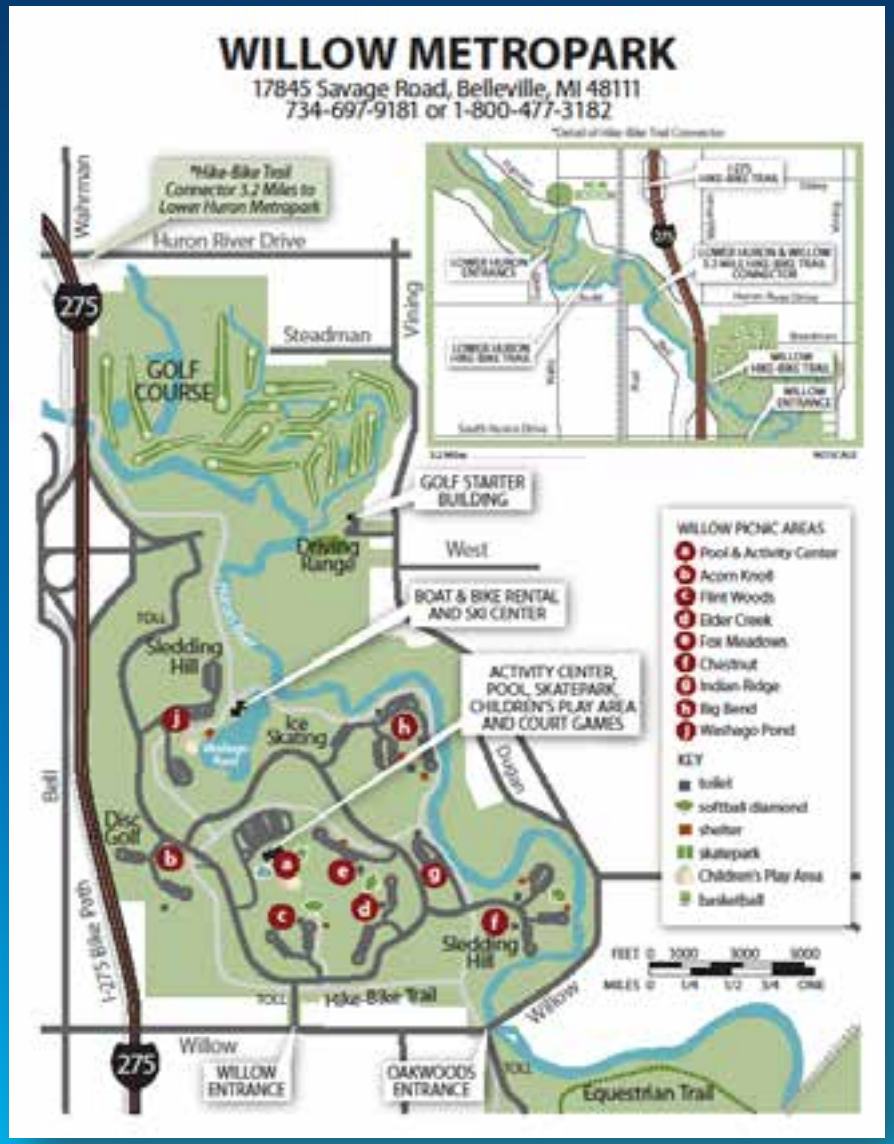
ENVIRON

Introduction



Recreational Use





Recreational Use

Source:
http://metroparks.com/parks/index_all.aspx?ID=12&r=0

Changes in Park Mission Over Time

Source:
http://metroparks.com/parks/index_all.aspx?ID=8&r=0

Problems facing the Natural Resources Department

- Lacking baseline ecological quality information
- Data collected using different methods, people, and at different times of the year
- Current ecological assessment method difficult to implement
- Staff constraints
- Budgetary constraints
- Need an ecological assessment method operable within current resource constraints that is practical for use in all parks to focus management efforts in natural areas maximizing conservation benefits

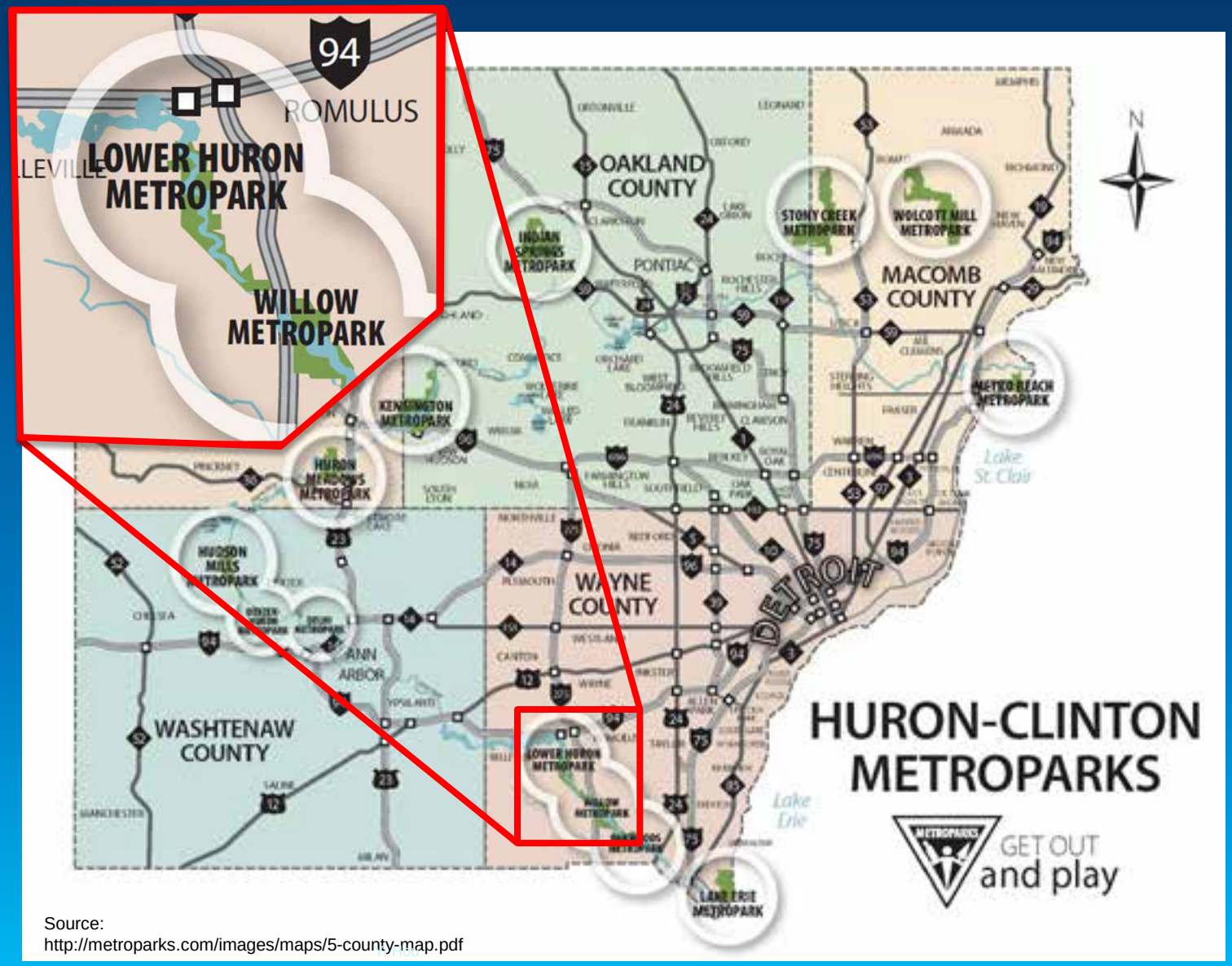
What is an Ecological Assessment?

- A method for…
  - Assessing the overall health and quality of natural areas
  - Identifying and prioritizing areas for management or restoration

Goal and Objectives

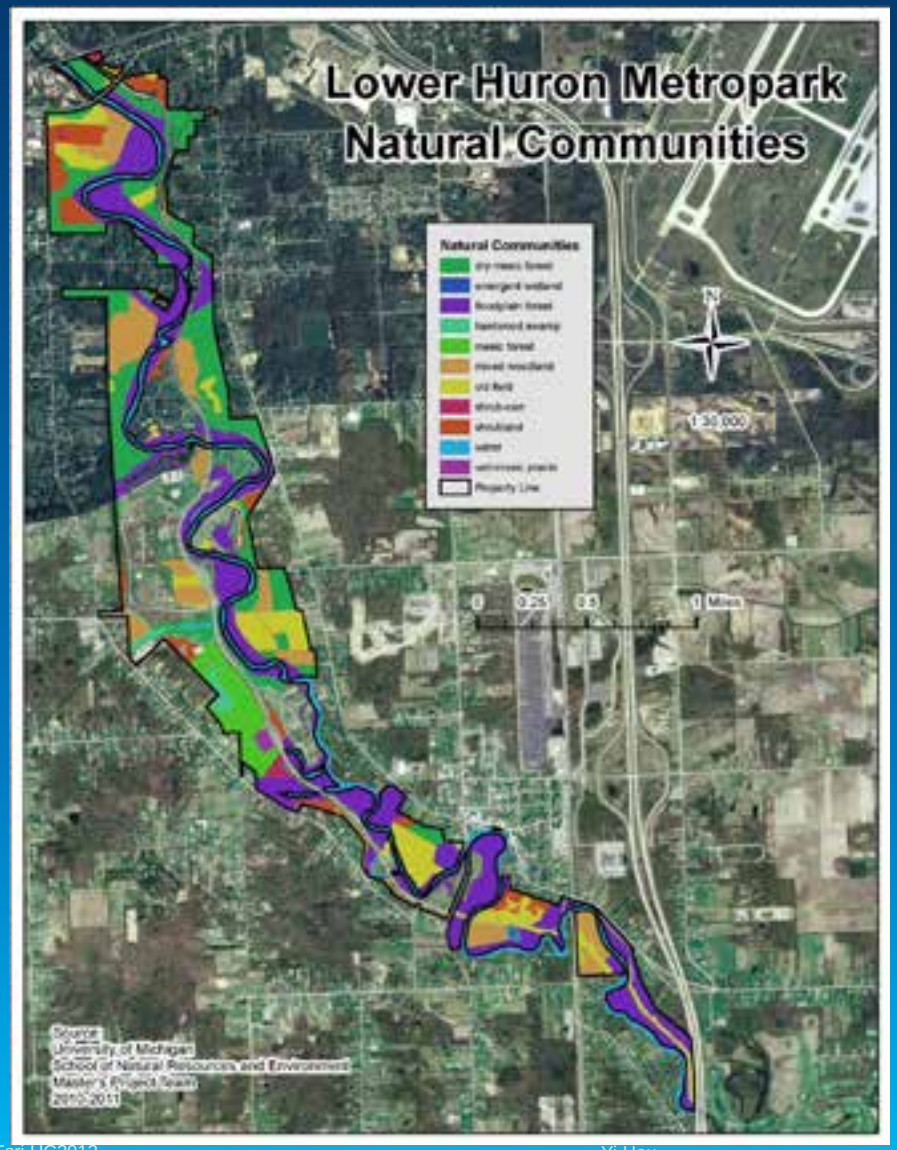
- Goal
  - Identify ecological assessment methods available and applicable for HCMA NRD use
- Objectives
  - Conduct a case study in two Metroparks (Lower Huron and Willow) to evaluate practicality and effectiveness.
  - Create maps displaying low, moderate, high, and exceptional ecological quality in both parks

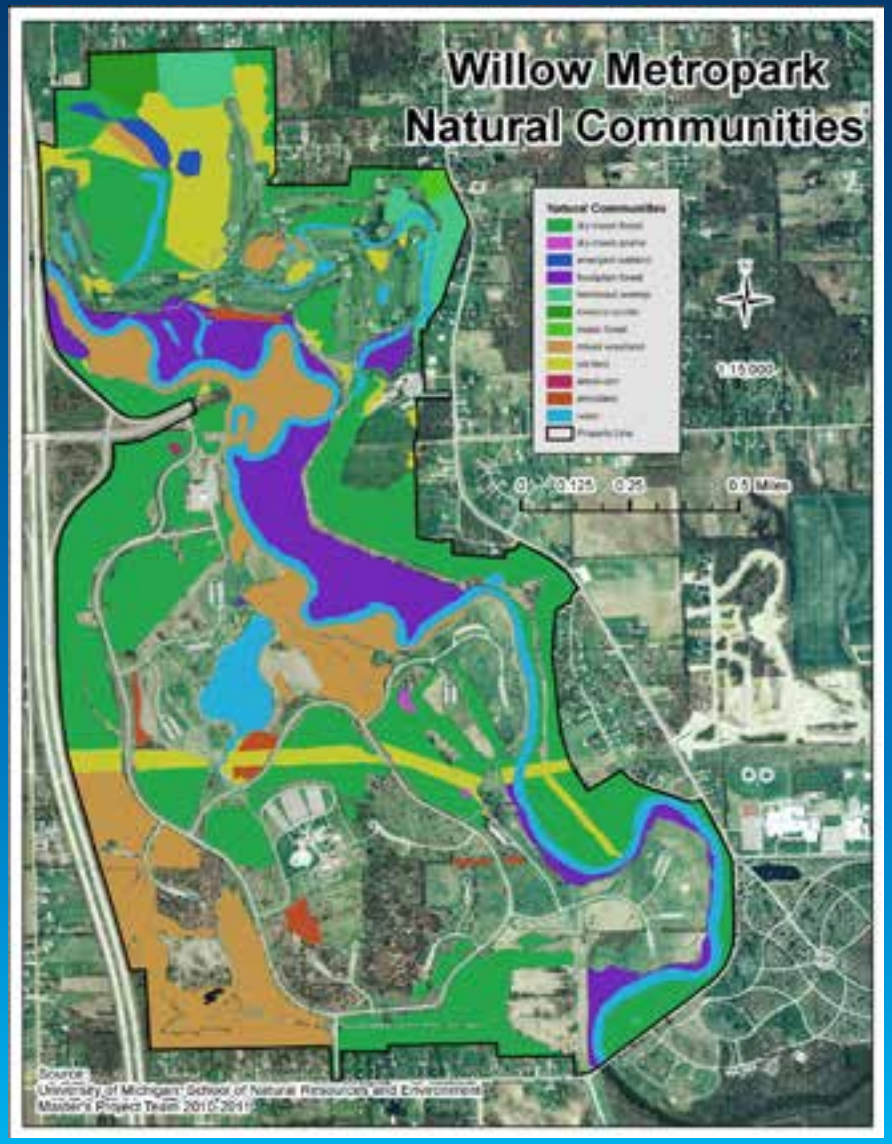
Why Study Lower Huron and Willow?



Source:
http://metroparks.com/images/maps/5-county-map.pdf

Natural Communities





Natural Communities

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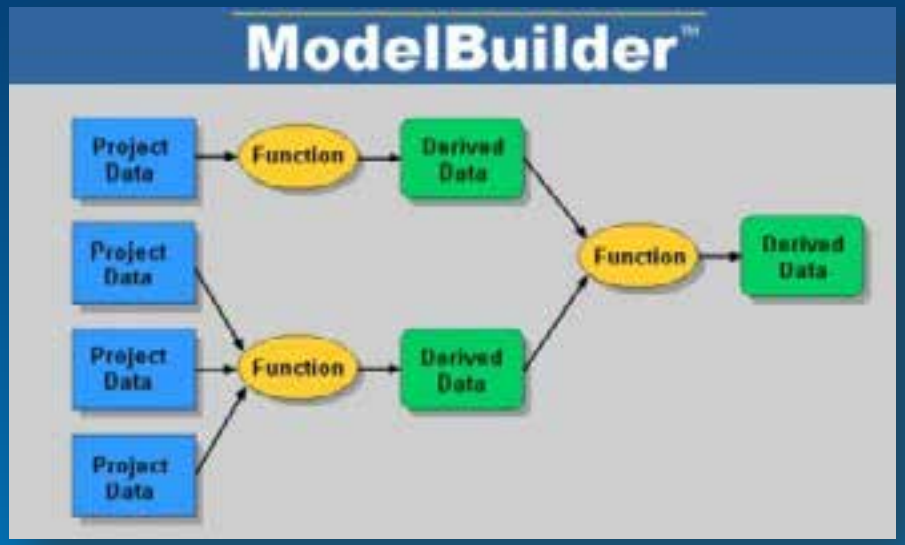
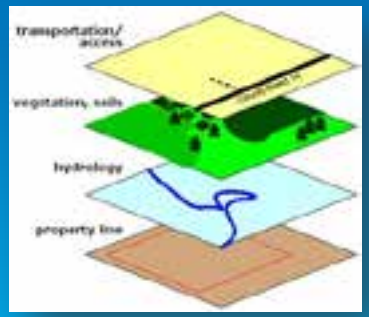
Multi-Criteria Evaluation (MCE)

- Uses ArcGIS model builder
- 8 criteria
- Criteria inspired by those traditionally used in suitability modeling and by HRWC's Bioreserve Project
- Weighted linear combination



Source: http://agungwah.wordpress.com/2008/07/10/model-builder/



source: http://www.westernlandspecialists.com/tech101.asp

SEMCOG Southeast Michigan Council of Governments

USGS science for a changing world

U.S. FISH & WILDLIFE SERVICE

8 criteria were used in the MCE

- Biological Rarity Index
- Probability Value
- Distance to Wetland
- Distance to River
- Soil
- Pre-settlement Vegetation Type
- Slope
- Distance to Road

BIOLOGICAL RARITY INDEX

- Threatened, endangered, or special concern species and high-quality natural communities
- BRI is calculated using values for of species global status, state status, and the quality ranking
- The BRI scores were broken into nine classes. Each class had a range of 12.56.

BIOLOGICAL RARITY PROBABILITY VALUE

- An occurrence value is assigned for each of the rare species observations based on the age of the record

- 80 is assigned for occurrences observed from 1982-present (the highest probability of continued existence)
- 60 for the occurrences observed between 1970 and 1982 (a moderate likelihood of still existing)
- 40 for the occurrences observed prior to 1972 (lowest probability of still existing)

DISTANCE TO WATER FEATURES

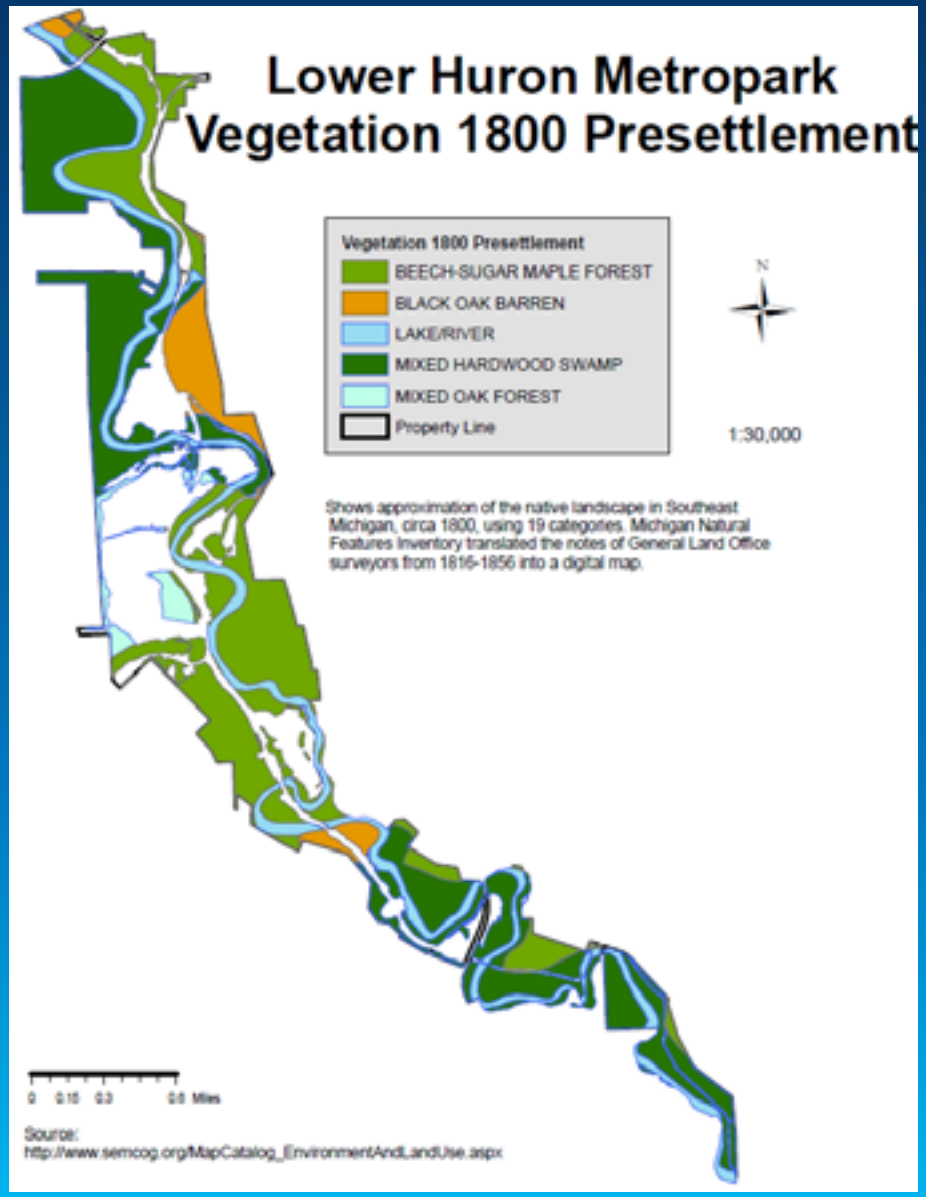
- SEMCOG Environment and Land Use GIS data catalog
- A straight-line distance
- Standardized on a common measurement scale with a range 0-100
  - 0 is farthest from the water features
  - 100 is nearest to these features

SOIL

- Soil Survey Geographic Database (SSURGO)
- Areas of unknown soil type or where soil type was not mapped were assigned a value of 0,
- Water was assigned a value of 10
- Non-hydric soils were assigned a value of 40,
- Partially hydric soils were assigned a value of 60
- Hydric soils were assigned a value of 80

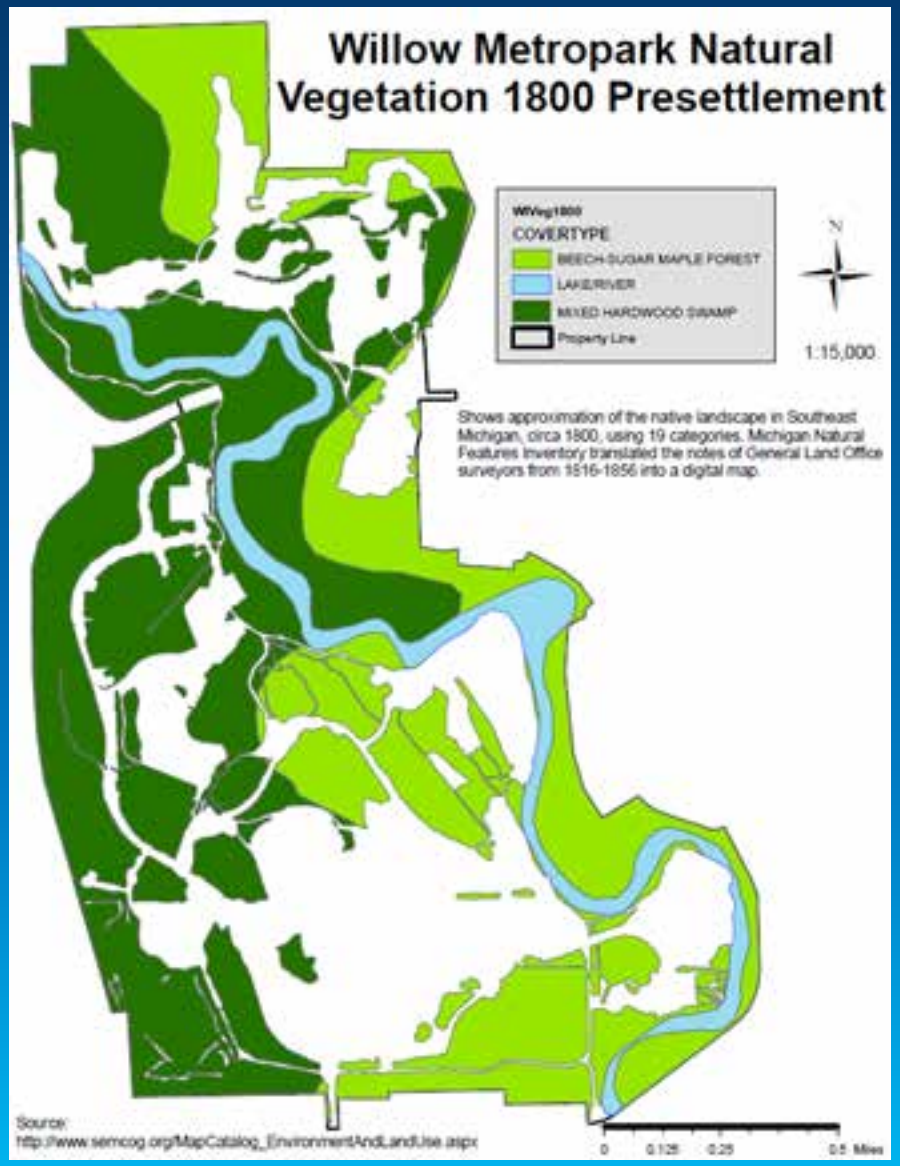
PRE-SETTLEMENT VEGETATION TYPE

- SEMCOG 1800s vegetation dataset
- Estimations of vegetation community types for Michigan circa 1800
- 12 vegetation types
- .



PRE-SETTLEMENT VEGETATION TYPE

- i.e. **Hardwood-conifer swamps are** minerotrophic forested wetlands dominated by a mixture lowland hardwoods and conifers. These ecosystems typically occur on organic soils and poorly drained mineral soils throughout Michigan
- 100 for mixed hardwood swamp, black ash swamp, wet prairie, mixed oak savanna and black oak barren
- 0 for all other types



SLOPE

- A digital elevation model (DEM) was downloaded from USGS
- Slope was calculated
- 0 is the steepest slope and 100 is the slowest

DISTANCE TO ROAD

- Roads and railroads from the Michigan Geographic Framework.
- A straight-line distance to major and minor roads
- Standardized on a common measurement scale with a range 0-100
    - 0 is nearest to roads
    - 100 is furthest
-

Multi Criteria Evaluation Model (MCE)

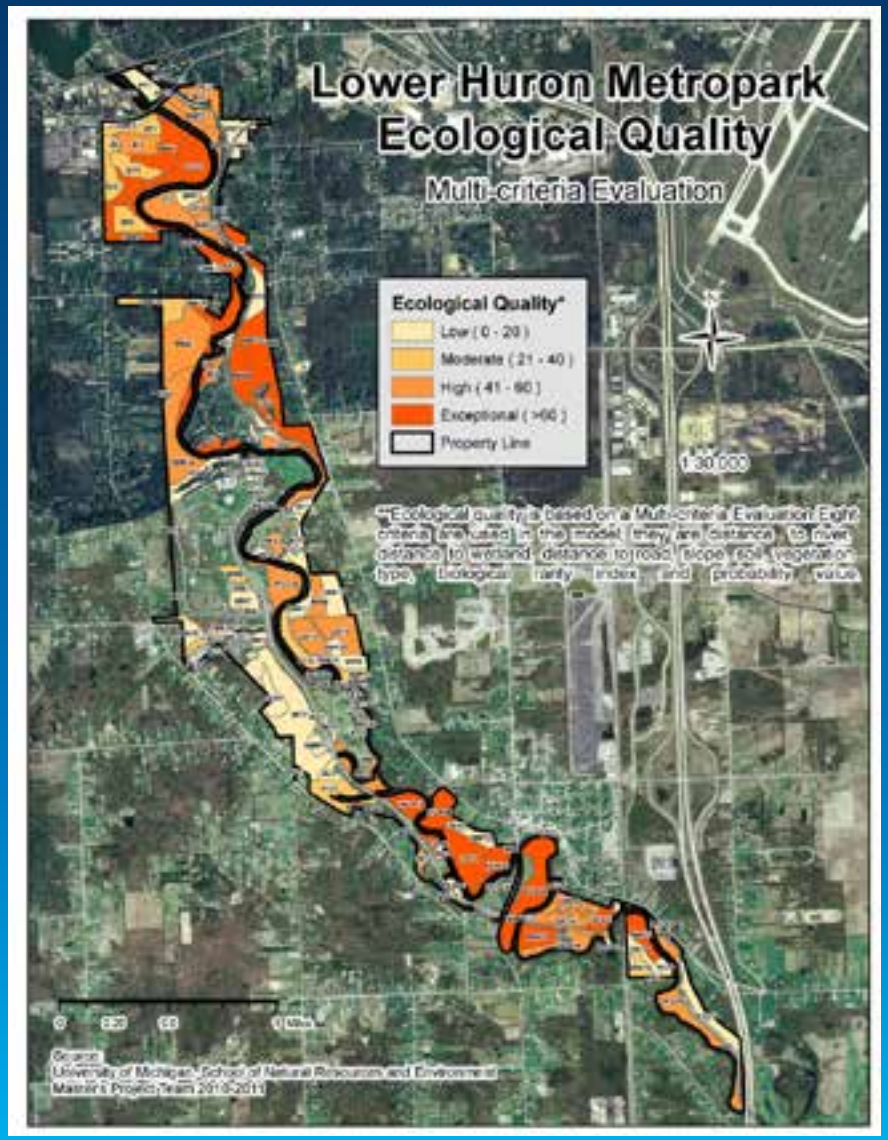
- Biorarity index
- Biorarity probability
- Distance to wetland
- Distance to river
- Soil type
- Vegetation type
- Slope
- Distance to road

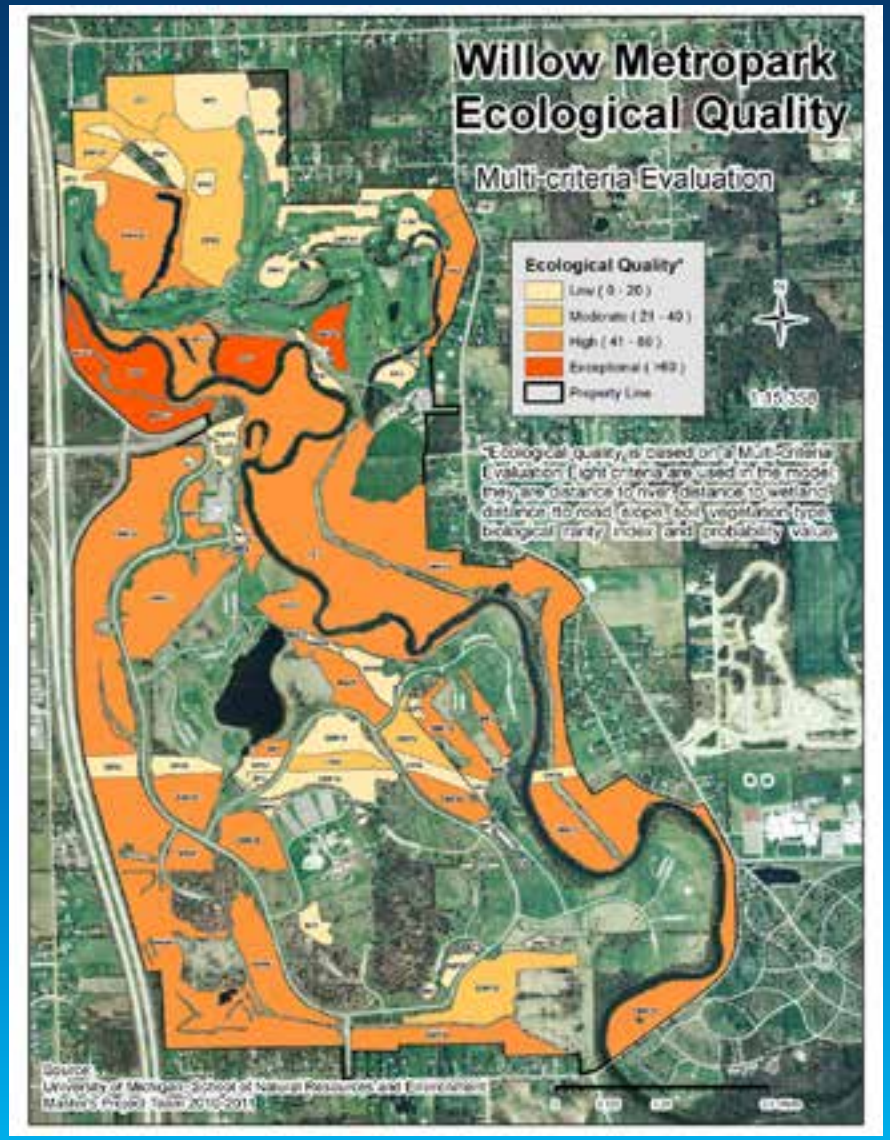
Weighting system

Sum Scores à Manually Break Into Categories

Low 0-20 → Moderate 21-40 → High 41-60 → Exceptional >60

Visual Delineation of Ecological Quality Multi-criteria Evaluation





Multi-criteria Evaluation (MCE)

Relative Accuracy

- **The public datasets used in the analysis are not frequently updated and are measured at a larger scale than is ideal for the natural community units within the Metroparks**

Comprehensiveness

- **Uses spatial data**
- Uses 8 criteria

Feasibility

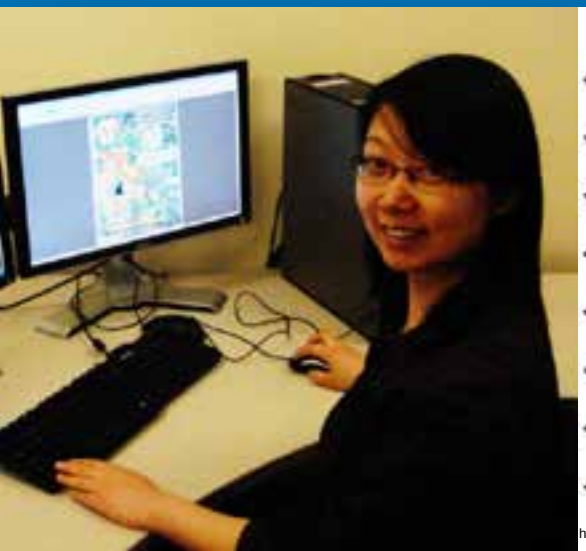
- Low financial cost
- 1 staff member required
- Relatively low time required

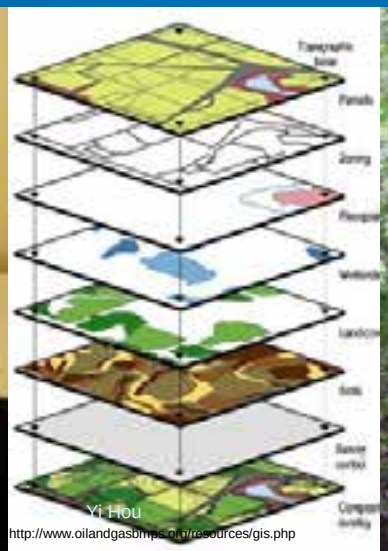
HCMA Goals and Management Plans

- Adaptable criteria and weighting system
- **Lacks ground-truthed validation**
- Useful for prioritizing across all parks
- **Less useful for prioritizing within parks**

Desktop Analysis + Field – Based Assessment

- Numerous reasons why HCMA may choose to implement this option
- Combines the advantages of each method, while addressing their disadvantages





Recommended Action Plan

Employ a **MCE** across all 13 Metroparks (with some criteria modifications) to prioritize parks for ground-truthing and to provide a complete ecological assessment in the near-term

Employ a **volunteer coordinator and pursue partnerships** with HRWC and other NGO volunteer programs to assist in implementing field assessments

Implement the **Field Based Rapid Anlysis** in all 13 Metroparks

Continue investigating possibilities for **surveying other organisms as additional criteria** for prioritizing park management and restoration practices

Questions?

Full Report can be downloaded from
http://hdl.handle.net/2027.42/83542

Thank you!

- ENVIRON International
- ESRI
- Other master project team members: Hood, Elizabeth; Peterson, Lillian; Straus, Elizabeth; Gorchow, Jessica
- Huron- Clinton Metropolitan Authority
- Paul Muelle and Becky Gajewski
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- Bunyan Bryant, Ph.D. and Sarah Lashley
- David A. Mifsud, M.S., PWS
- David Borneman
- Bob Grese, M.S.L.A.
- Buck Castillo

End