Natural Heritage System (NHS): Science or science fiction?

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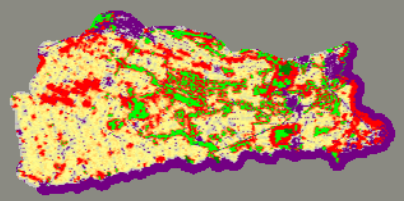
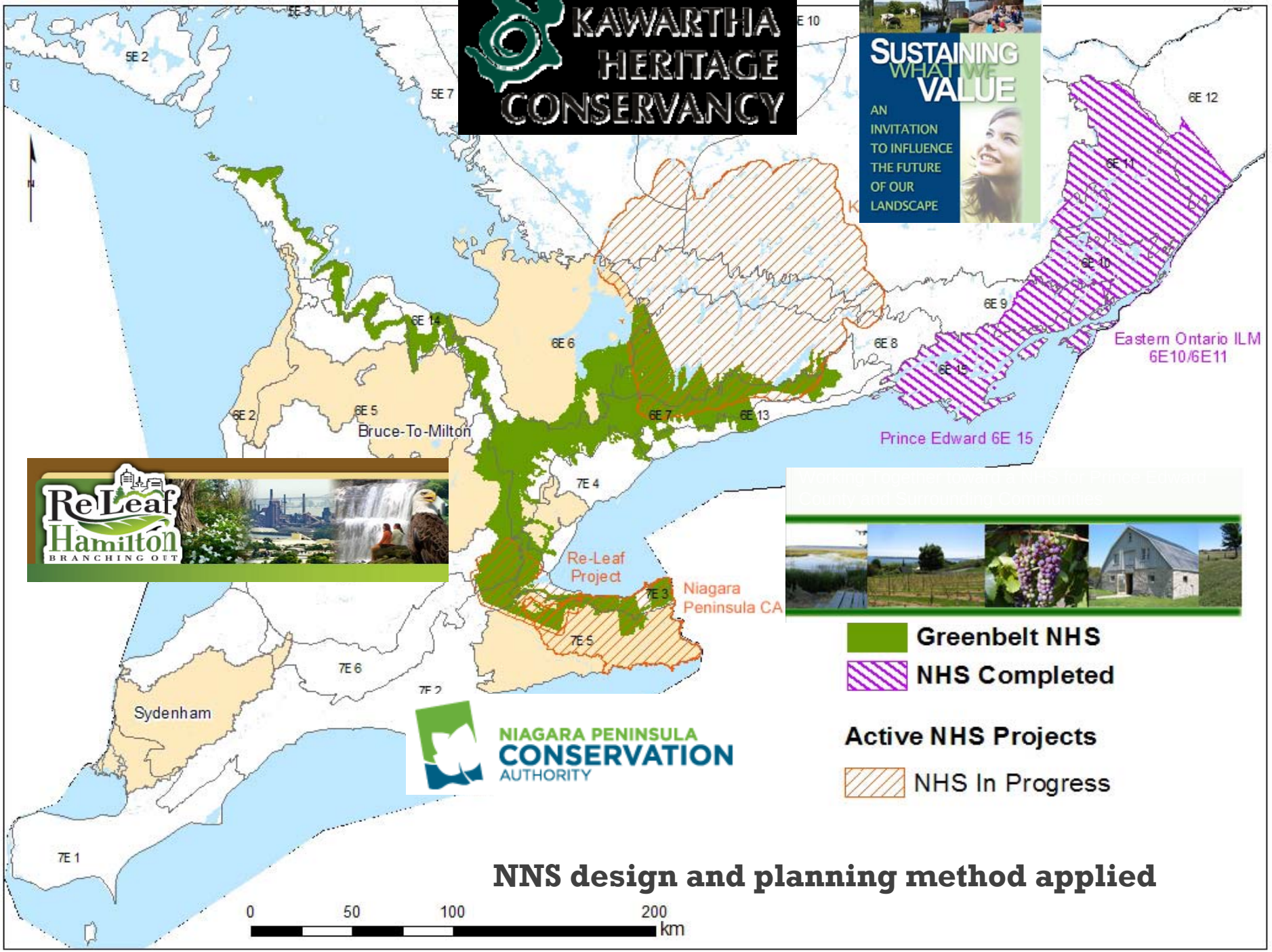
NHS background

- Natural Spaces Program (2005)
  - Methodology piloted in eco-district 6e6 and 7e5
- A guide to designing NHS



http://www.forestry.utoronto.ca/imsa/NHSGuide/index.htmlplementation

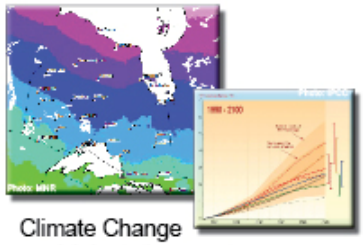


NNS design and planning method applied

Natural Heritage System Landscape Backbone

by Danijela Puric - Mladenovic

Biodiversity



Climate Change and Adaptation

Carbon Offsets and Credits

Wildlife Habitat and Species at Risk

Restoration / Tree Planting

Functioning of Ecosystems

Forest Products

Ecological Goods and Services

Sustainable Use of Natural Resources

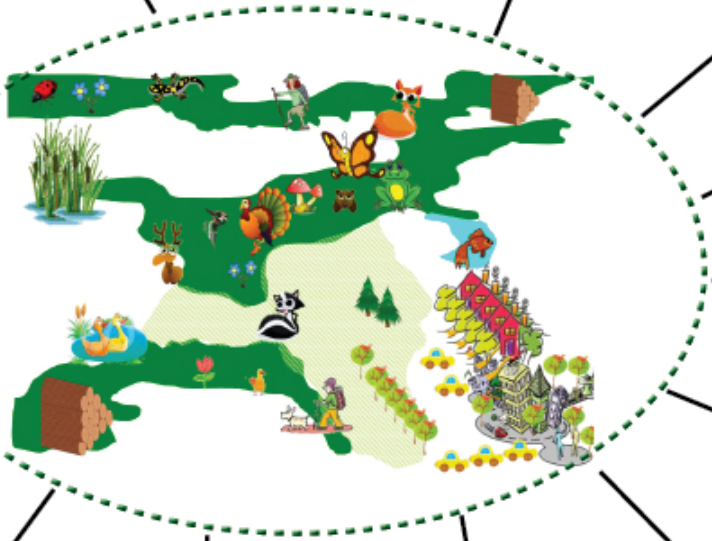
Integration with Natural Resources Programs

Hydrological Cycle

Source Water Protection

Spatial Planning

Land Use Planning

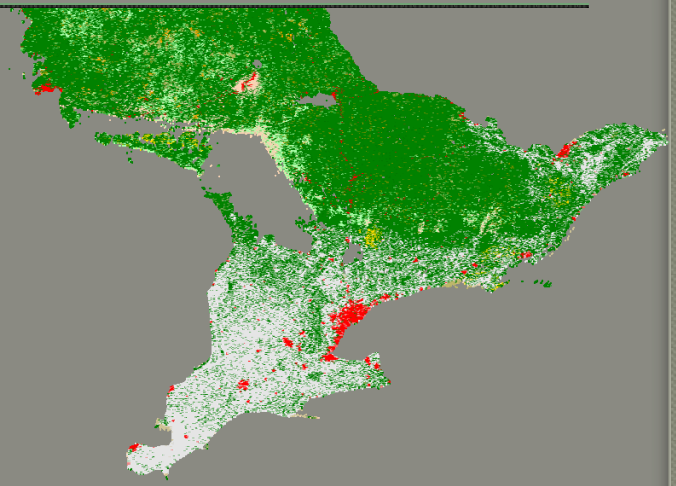


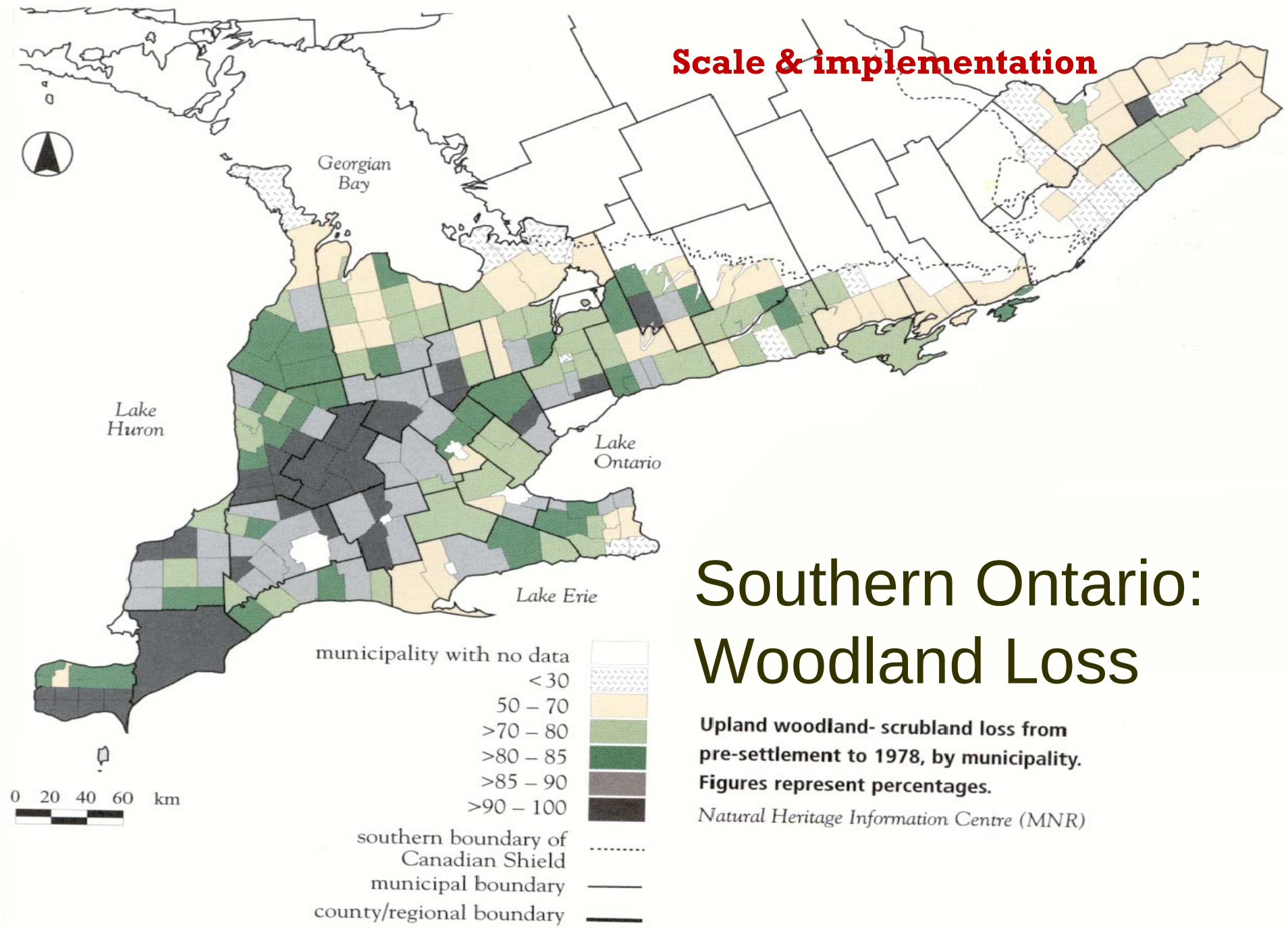
NHS method & approach

- Principles of conservation and landscape planning
- Prioritize conservation efforts over multiple biodiversity features.
- Based on measurable objectives and quantitative targets
- Require diverse spatial information
  - Standard across the area of interest
- Tools: Mathematical optimization
  - Learn from science and experiences elsewhere in the world

Do we have a system

- Yes
  - Conserve
  - Conserve + buffer
- Somewhat
  - Conserve and restore
- No
  - Some natural fragments
  - Build a system





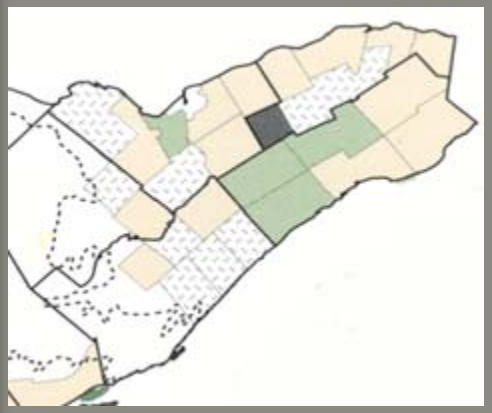
Southern Ontario: Woodland Loss

Upland woodland- scrubland loss from pre-settlement to 1978, by municipality. Figures represent percentages.

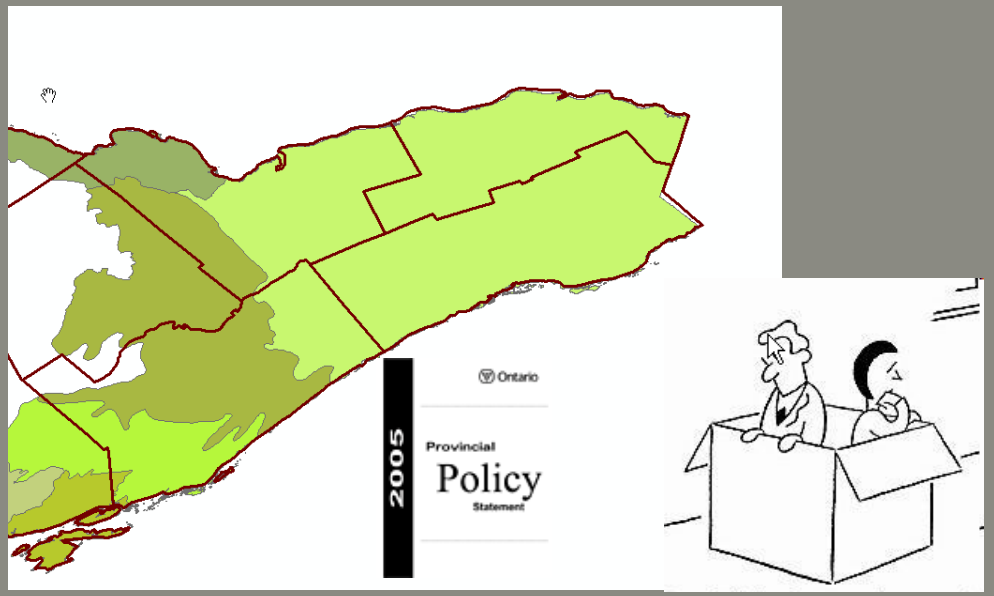
Natural Heritage Information Centre (MNR)

Scale

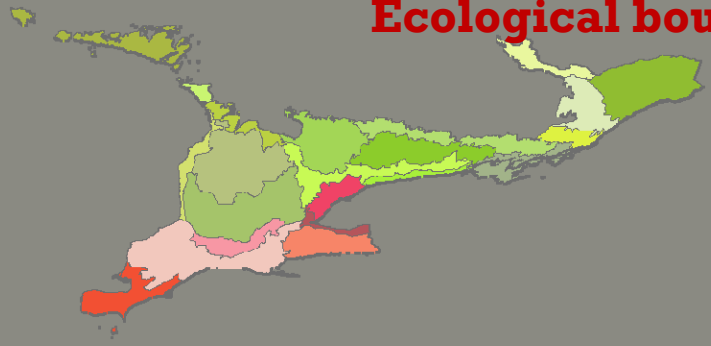
- Why- not "box"?
- There are ways to move outside of the box (if we want)
  - And yet meet both local and regional scale needs



Political boundaries

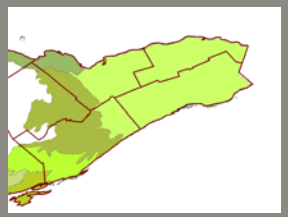


Ecological boundaries / landscape units

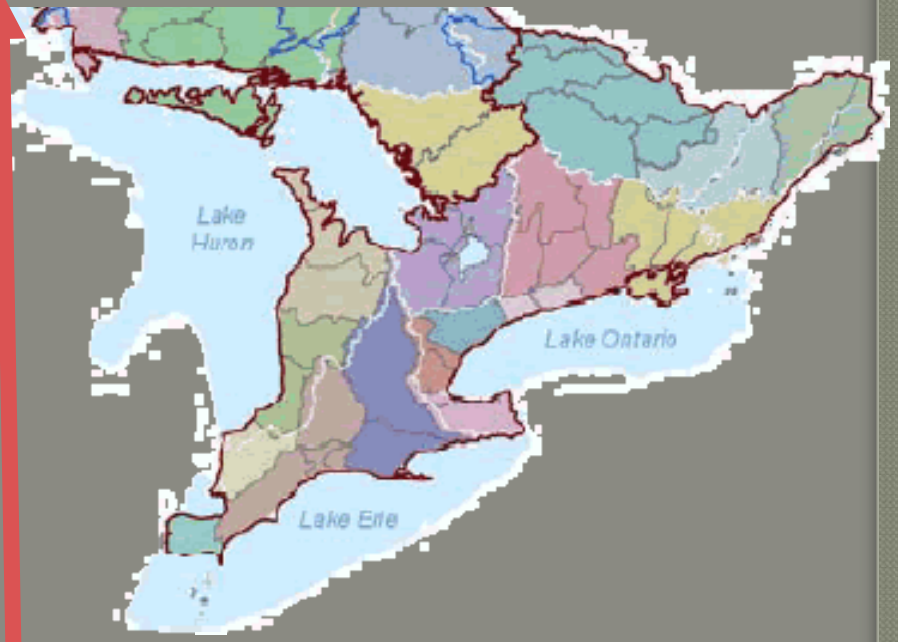


Eco-region

Eco-district

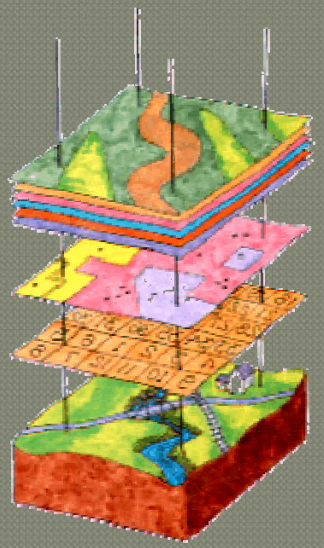


Political boundary



Watersheds and sub-watersheds

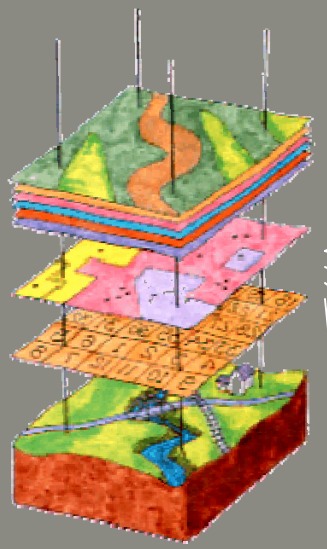
What and how much?



What?

- There are numerous conservation objectives
- There are numerous conservation features
- There are different ways to look and use data
- Necessary to define relevant conservation objectives and relevant conservation features

Conservation features



forest patches
>=200

riparian forest along
cold waters streams

vegetation diversity

species viable
populations

wetlands

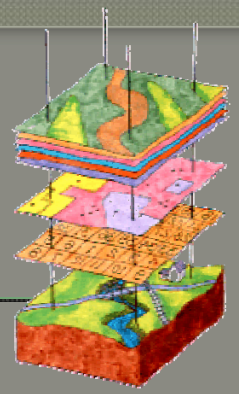
stopover habitats for
migratory birds

Bird
habitats

SAR

Number of conservation features and targets, in data reach (and science reach) regions, can exceed hundreds of conservation features and targets.

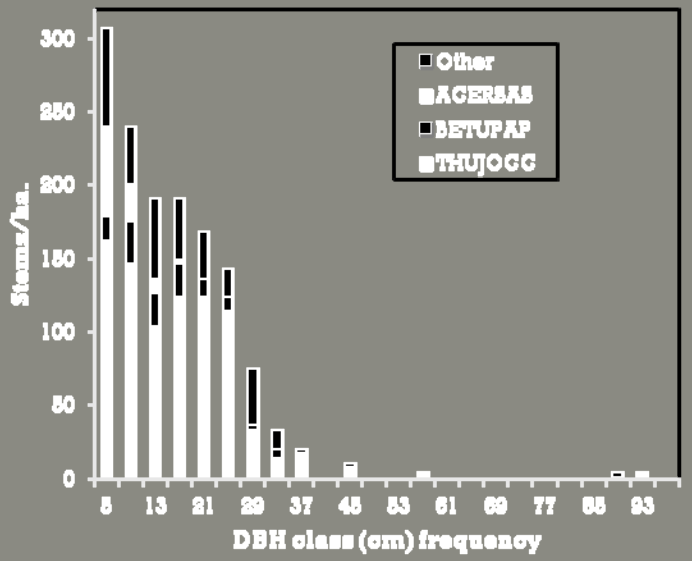
NHS and vegetation information/mapping

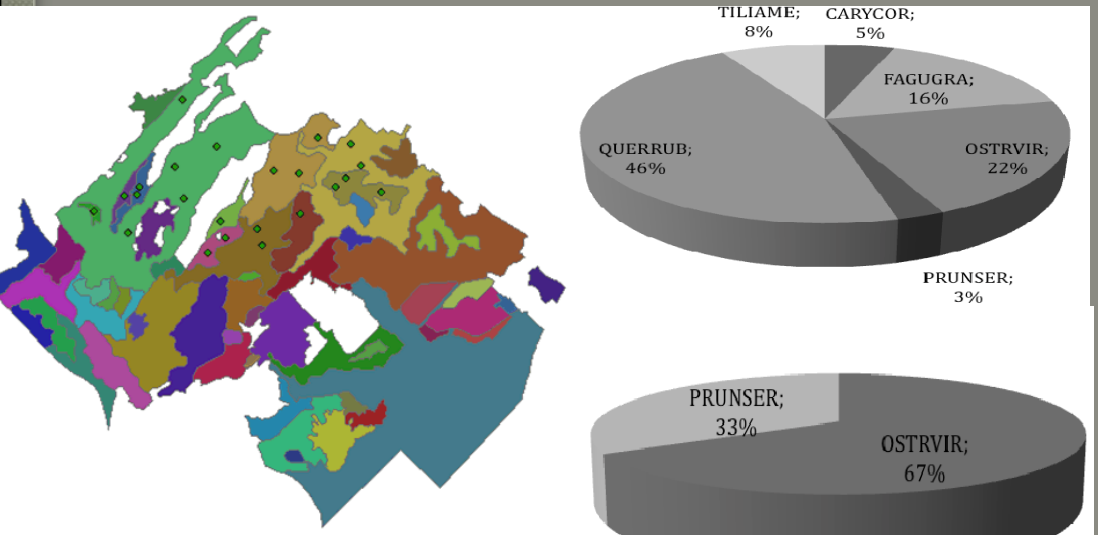


- Vegetation
  - Overall landscape diversity
  - Structure, composition
  - Successional stages
  - Plant diversity
- Vegetation as
  - Habitat
  - Food sources
  - Providing eacological function
  - Providing eacological goods and services
    - Biomass
    - Carbon

Vegetation information

- Do we have it?
  - 2d –Polygons
  - 3 d (structure / composition)
  - 4d – time / succession





Species conservation

- Species at Risk
  - We tend to sample public and easy accessible lands

- Common species
  - Ensure common stays common
  - E.g. Ash was no of interest to us a few years ago

Species conservation

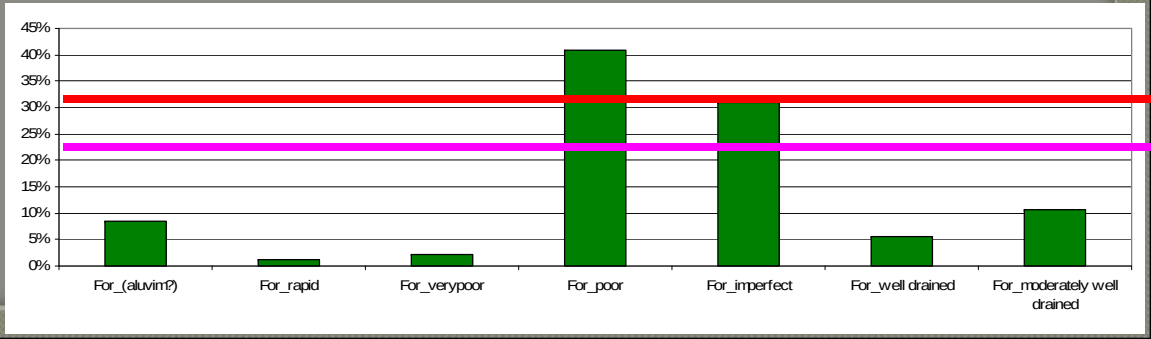
- Viable populations and habitats
- Conservation decisions would be easier if we identified and mapped
  - keystone species
  - flagship species
  - umbrella species
  - indicator species

Ecological functions

- Hydrological functions
- Landscape and patch functions

Targets

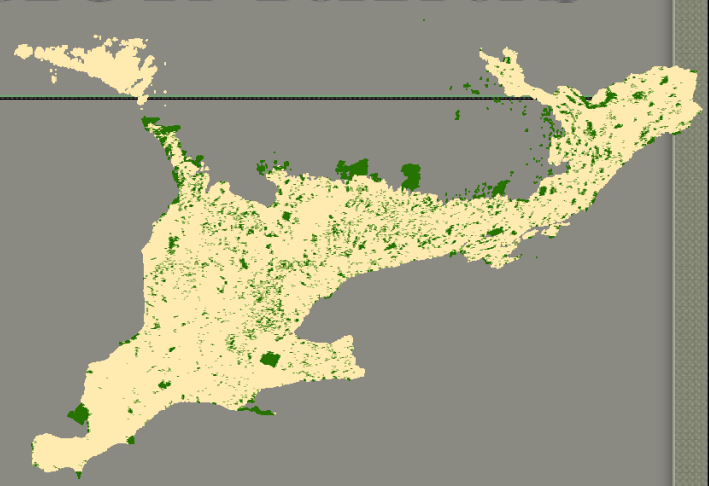
- Quantitative way to prioritize conservation efforts over multiple biodiversity features.
- Explicit and transparent (% or ha)
- Targets should be defined based on persistence
- However, they are sometimes defined by socio-political feasibility
- Often used to protect minimum amounts



Targets

- Can setting a target have bad impacts for biodiversity?
  - Protecting 30% of each vegetation type, does not mean the rest of it can be destroyed
- Is 30% protected enough to make a difference?
- Is it enough to sustain a species?
- Biodiversity outside NHS need to be protected by existing and future policies and best-management practice

Conservation lands



- Conservation lands
  - building blocks (nodes) of NHS
  - ~44 different ``conservation lands''
    - E.g. Significant wetlands, ANSI...
  - Protected areas in S. Ontario ~ 1%
    - 12% of land base protected areas (the Earth Summit 1992)
- Fiction
  - All catalogued and managed in one data base
  - Classified and grouped (IUCN)

"Cost"

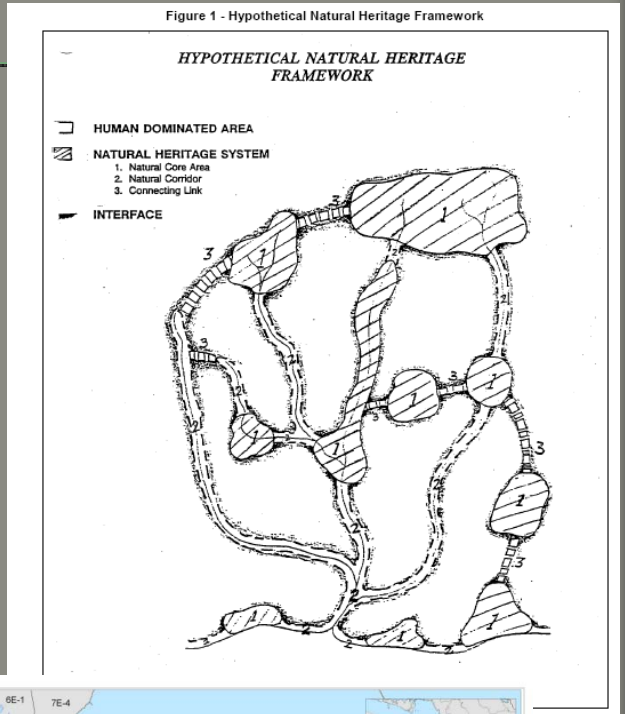
- Achieve objectives and targets at minimal "cost"
  - Minimize the amount of active agriculture lands
    - Simple but confident with it
  - Danger
    - Ecologists deriving monetary cost
    - Cost based by summing up ranks
- Fiction:
  - Standard "Cost" surface that is conservation based
  - How much money we need to ensure a certain conservation outcome
  - How about determining the budget we need to conserve and restore NHS

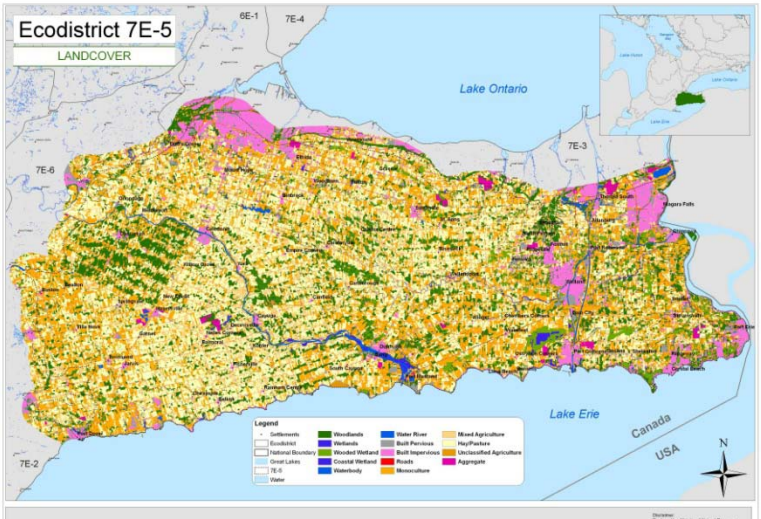
Communicating Science

- It is about the process
  - Not the tools
- Optimization
  - Not NHS modeling
- How Marxan supports PPS
- "Hexagons"
  - Hexagon size
- How the results support implementation

Core, linkages & corridors

- 90ties approach
- We should focus on making corridors and linkages by restoring, making existing patches bigger, or creating new patches (stepping stones





The good things

- There is no way back in terms of the process and methods
  - Accommodate quickly to any new tool
- The process
  - is transparent, adaptable
  - repeatable
  - forces integration
  - long-term thinking
- Information gaps, priorities and needs

The good things

- The process engages stakeholders
- It is evidence based approach
- Gives an opportunity to explore and asses different options
- Diverse conservation objectives combined
- Diverse views brought together
- Results and success measurable

Science

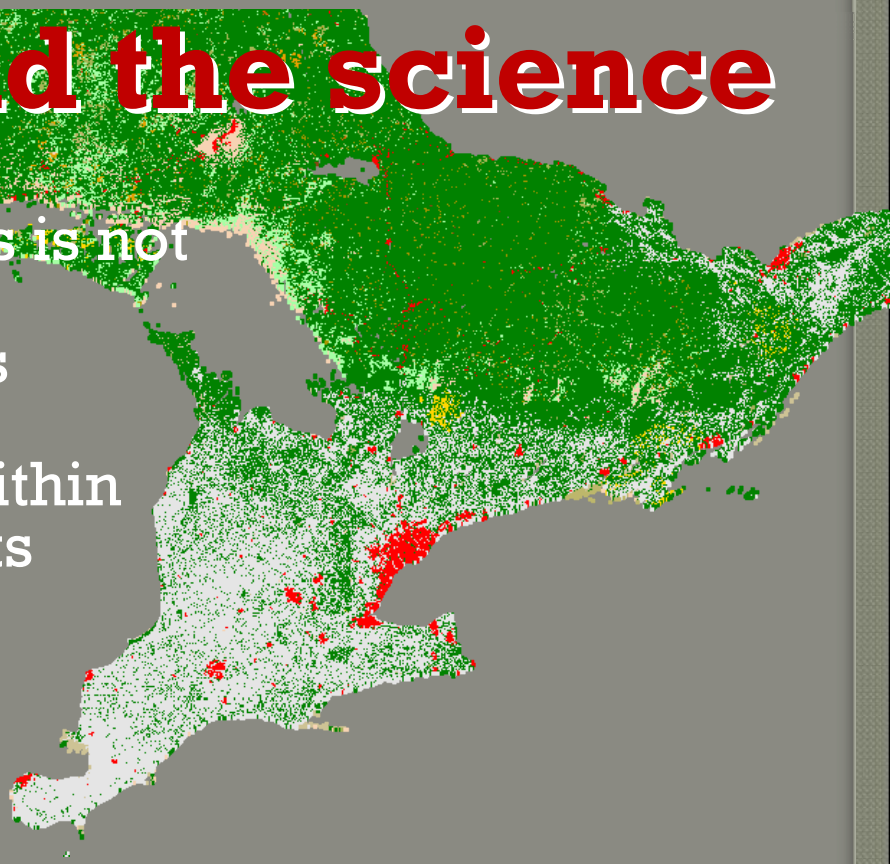
- The tools are there
  - More are coming
- Science evolves
- Research potential

Link with universities (3 questions – 3 students)

Science fiction

- Standard and integrated information
- Pulling our resources together
- Sharing the vision
- Strategically linking the scales
- Funding research strategically

Beyond the science

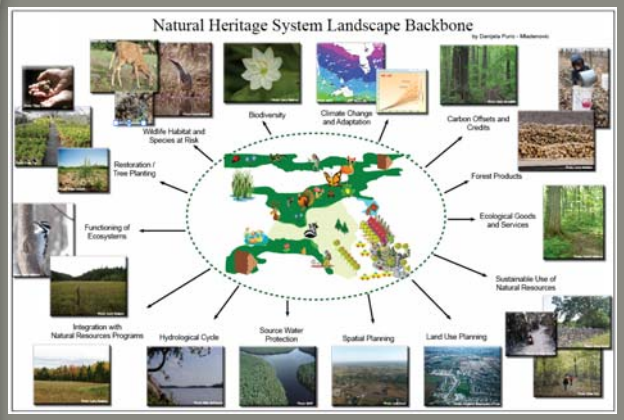


- Protecting individual elements is not sufficient.
- An effective network system is needed.
- Sustainable use of the lands within and between the NHS elements
  - Forestry and agriculture
  - Leisure and recreation
  - Urban development
  - Transportation
  - Natural resources

- Integration with natural resources management
- Integration with land use planning
- Cross-organizational integration

Beyond the science

- Fragmentation of conservation community
- Coordination and integration
- Strategic investment in inventory, and information
- Link our needs and scales
- Mobilize our forces



Decision making

Management
Adaptation
Planning
Assessment
Landscape conservation

Decision support tools (e.g. MARXAN)

Adaptation
Analysis
Classification

Evaluation
Diagnostics
monitoring

Information and knowledge base

Social and political support