Great Lakes
Great Responsibilities

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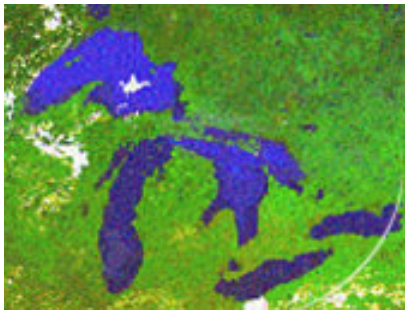
Overview of Presentation

- Great Lakes Stressors, including Lakes Ontario
- Civil Responsibilities, Policy, Action Regarding:
  - Chemicals
  - Invasive species
  - Land use and health
  - Climate change scenarios
- Q & A



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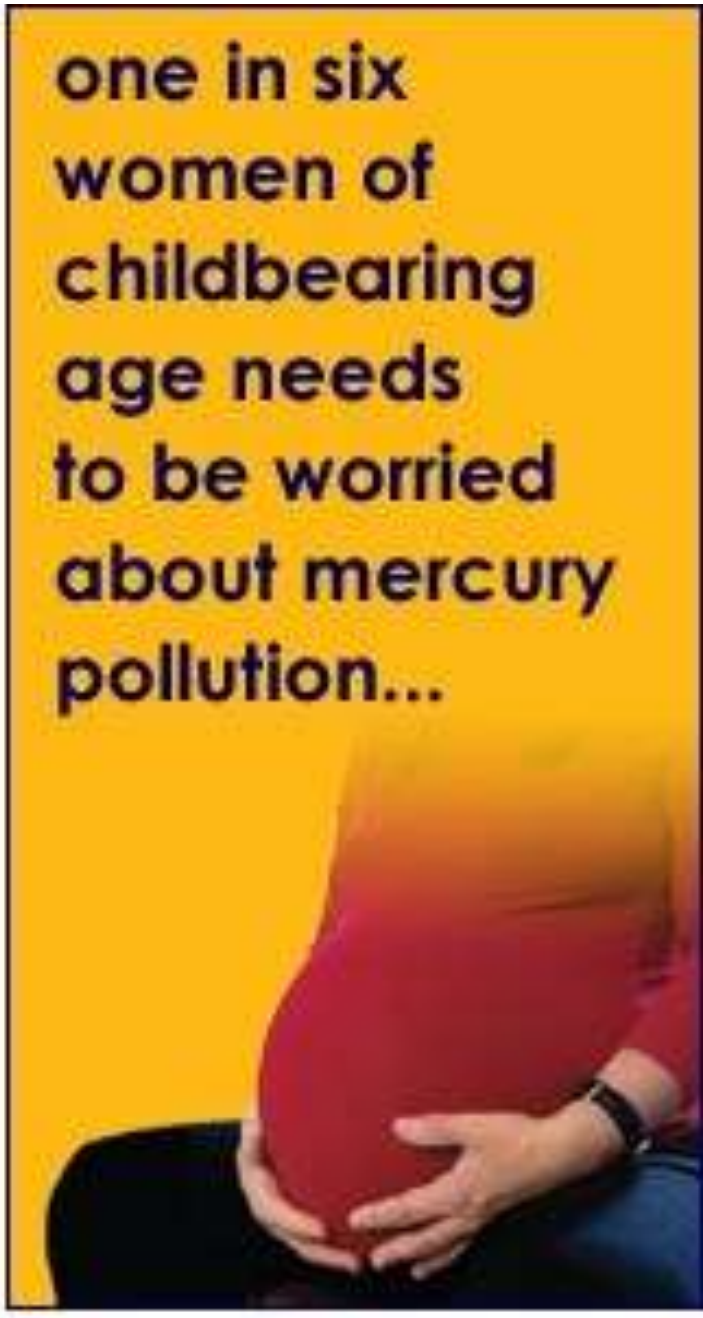
Challenges to the Integrity of the Great Lakes Basin Ecosystem

- Eutrophication
- Legacy contaminants
- **New chemical discoveries**
- **Land use and unplanned growth (sprawl)**
- Habitat destruction
- **Exotic invasive species**
- Long range transport
- **Climate change**
- Water Quantity

Mercury at lower doses

- Extremely important source of environmentally reactive Hg: Coal fired utilities
- Biomagnification in fish is a threat to human and nonhuman health
- Serious toxic effects include neurotoxicity (brain and nerve tissue damage) and nephrotoxicity (kidney damage).
- Principle exposure: uptake from fish

- more than 10% of women of reproductive age in the US have blood mercury levels that may increase the risk of impaired brain development in their children



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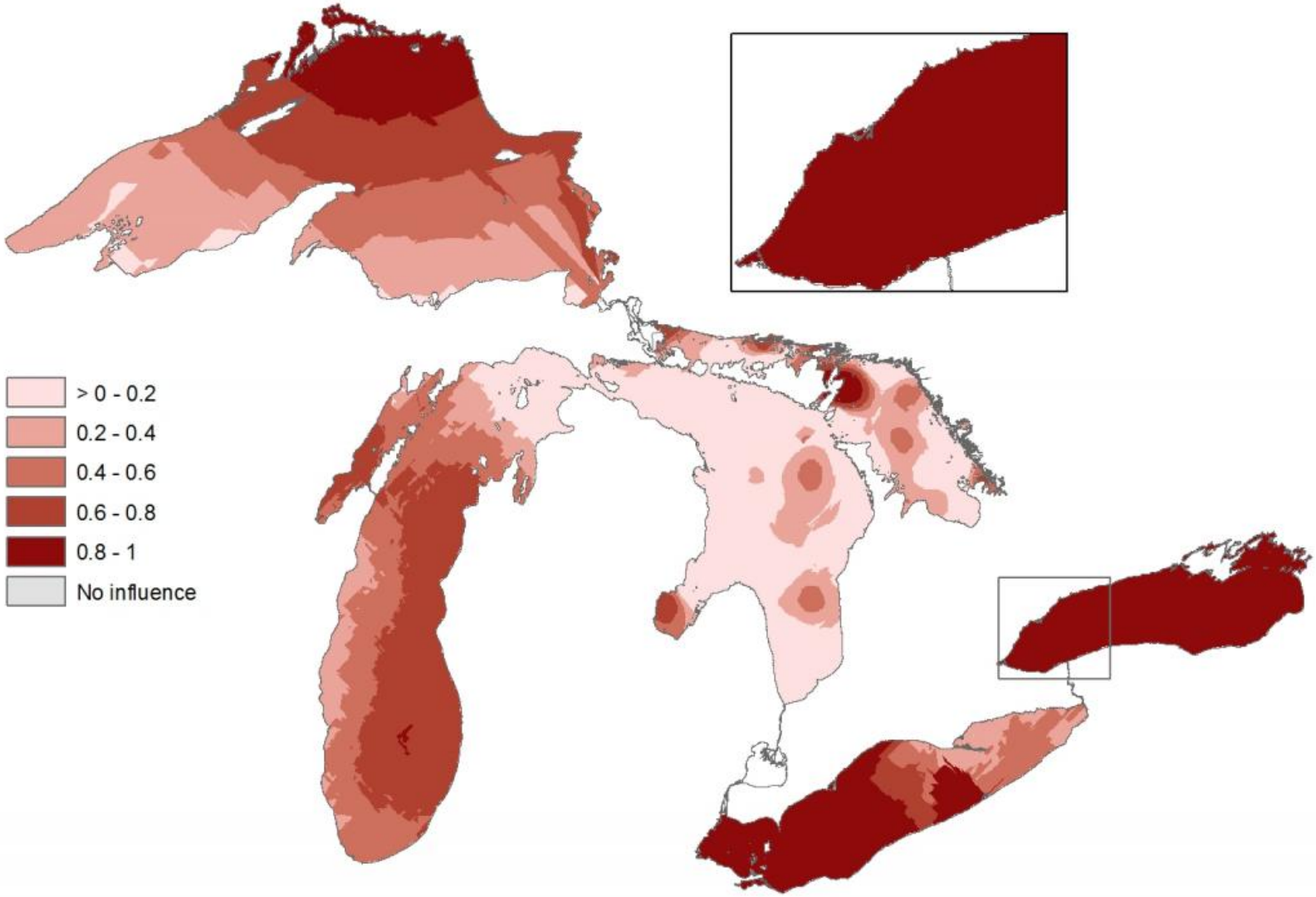
Mercury in sediment



New findings on presence of chemicals in humans

- Exposure to hundreds of toxic chemicals begins in the womb

- Pollutants include mercury, brominated fire retardants, pesticides, polyflourated chemicals such as PFOS (used in the production of Teflon)

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Pharmaceuticals

- Wastewater treatment plants are a significant source of pharmaceuticals.
- Commonly detected compounds included antimicrobial disinfectants, antibiotics, musk fragrances, antihistamines , and antiepileptic drugs
- Excreted and intentionally disposed
- Designed to be biologically reactive
- Chemical soup

Personal Care Products

- Studies with cell cultures indicate that some synthetic musks demonstrate estrogenic activity in laboratory tests.

- In Europe, musk ketone and musk xylene were effectively banned from fragrances in 2002 because of reported toxicities.

Needs

- Public Policy implementation on the precautionary principle
- Improved understanding of injury to ecosystems and humans
- Risk reduction and risk communication
- Search for product substitution
- Distruptive innovation, engineering and science

Challenges to the Integrity of the Great Lakes Basin Ecosystem

- **Exotic invasive species**


Aquatic Invasive Species

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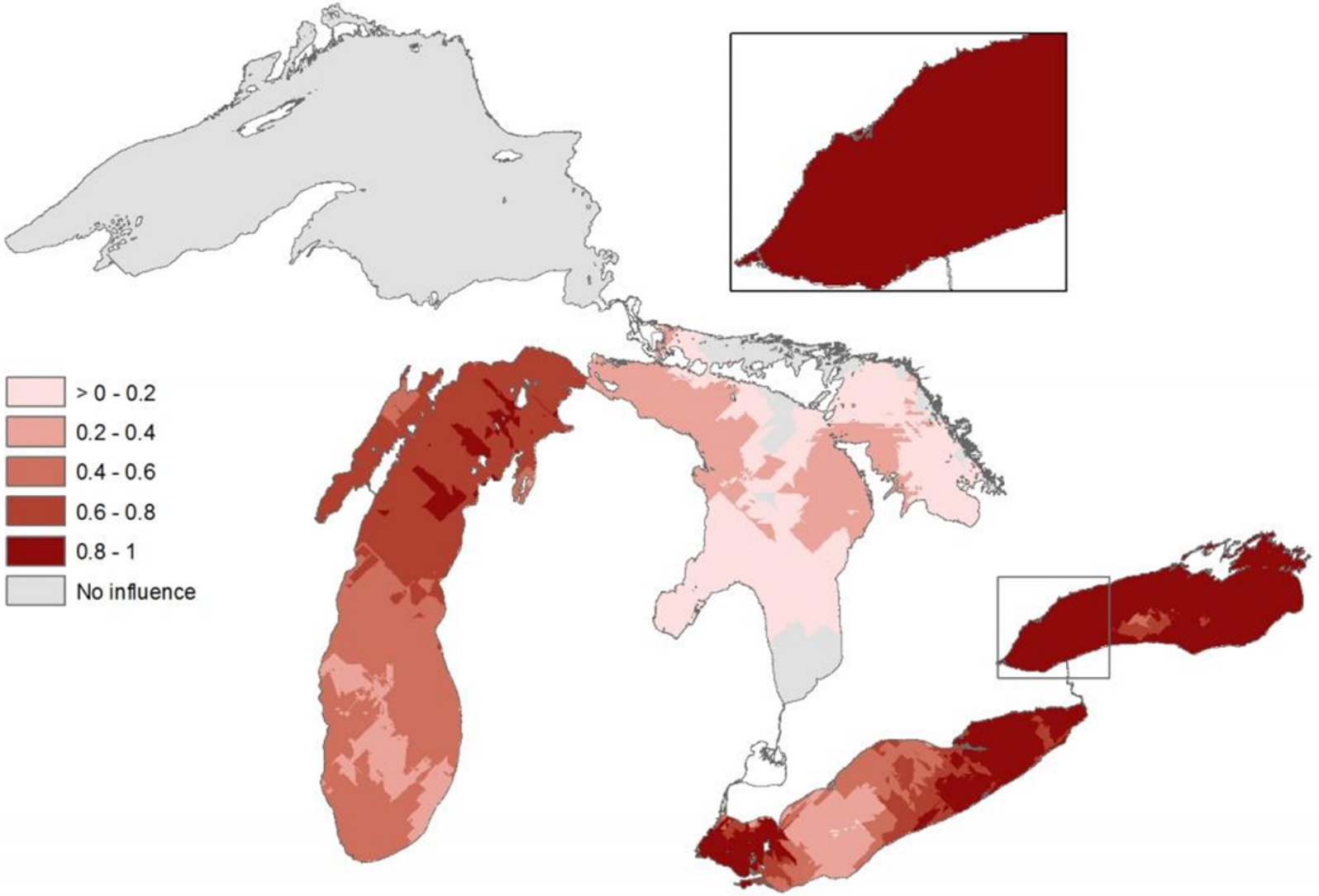
Billions of dollars in damages

Impact of zebra and mussel



Uninvited hitchhikers

Asian Longhorn Beetle

Emerald Ash Borer

Needs

- Public Policy and engineering innovations that prevent invaders
- Prevent or reduce spread
- Control what is present

- Individual action
  - Bait buckets
  - Boat transfers
  - Aquarium sources
  - Live fish sales

Challenges to the Integrity of the Great Lakes Basin Ecosystem

- Land Use and unplanned growth (sprawl)

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Effects of Sprawl

- Housing subdivisions, commercial developments, and roads divide a landscape, which results in habitat fragmentation.
- Fragmentation forces wildlife to find other habitat and compete for smaller amount of land. Why do we have coyotes in downtown Toronto?
- Threatens wetlands that improve water quality by filtering pollutants, wetlands protect shorelines of rivers and lakes from erosion, and help control and reduce flooding.

Consequence of destroying the nucleus

- Impervious surfaces increases runoff, polluting streams, lakes, and watersheds
- Sprawl results in more cars driving more frequently and for longer periods of time.

- Emissions of PAHs, corrosive chemicals, wash into surface and ground water
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Car Habitat

The increase in hardened surfaces from roads, roof tops and parking areas means more pollutants enter surface waters via untreated runoff.

More cars traveling longer distances

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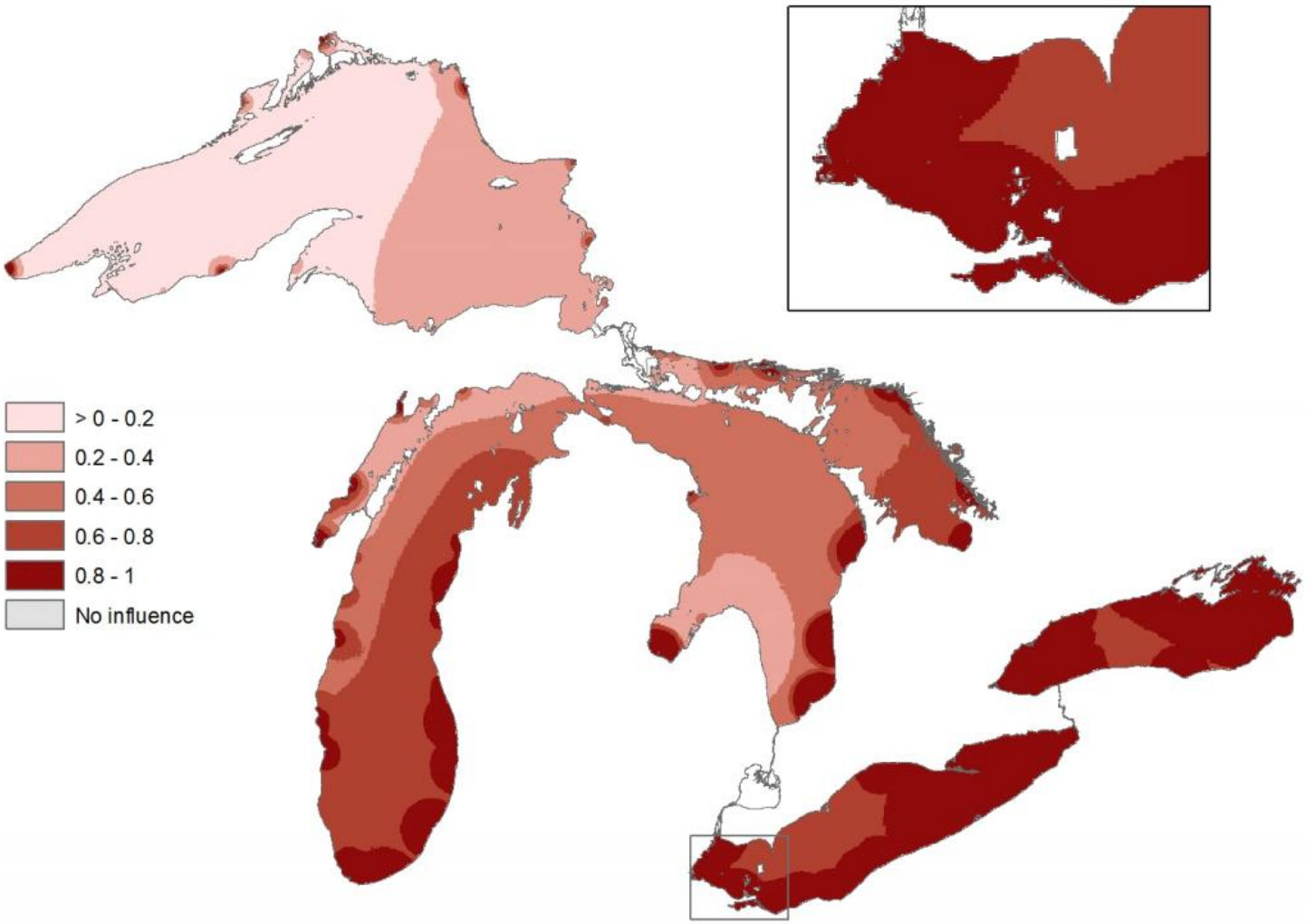
Nutrients from NPS



Searching for Solutions

- Land use decisions generally exclusive domain of local government,
  - yet local decisions cannot simply be viewed in isolation of other citizenry responsibilities.
- Wise land use decisions and effective land management are fundamental to implementing and progressing toward the ecosystem approach.

Porous Pavers

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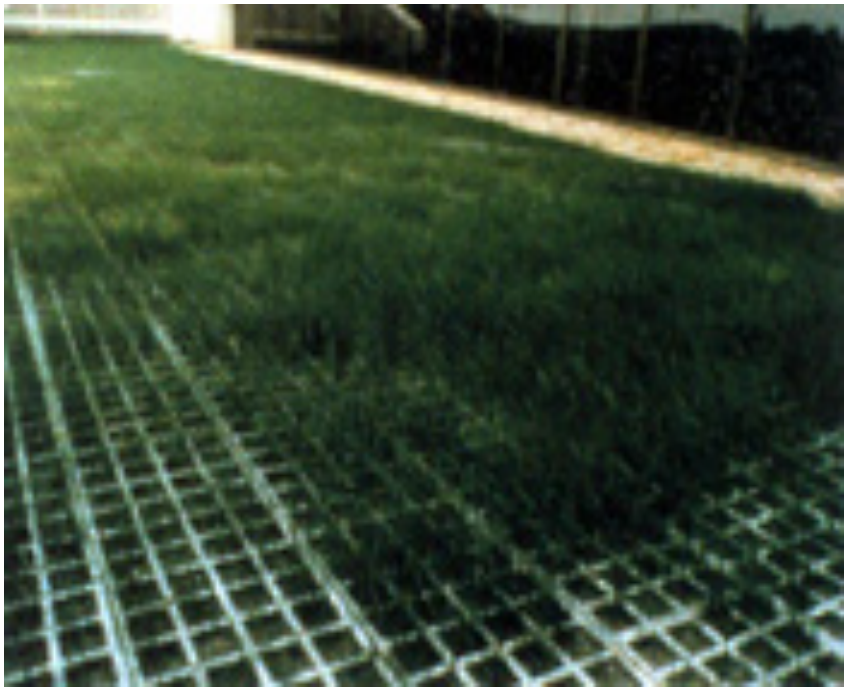
Porous Pavers

Engineering innovation



Get the water back in the ground where it belongs

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Green Roofs

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Compact cities

- population densities high enough to support public transport and make it feasible to operate.
- people can live near to their work place, schools and leisure facilities.
- greenfields are preserved, brownfields redeveloped
- compactness and mixed uses are associated with diversity, social cohesion and cultural development.
- infrastructure can be provided cost-effectively per capita

Urbanization and Climate Change

- Extreme weather would mobilize contaminants from hardened surfaces
- Increase quantity of water bypasses treatment facilities
- Need cost-effective alternatives to major new investments in urban storm water infrastructure.

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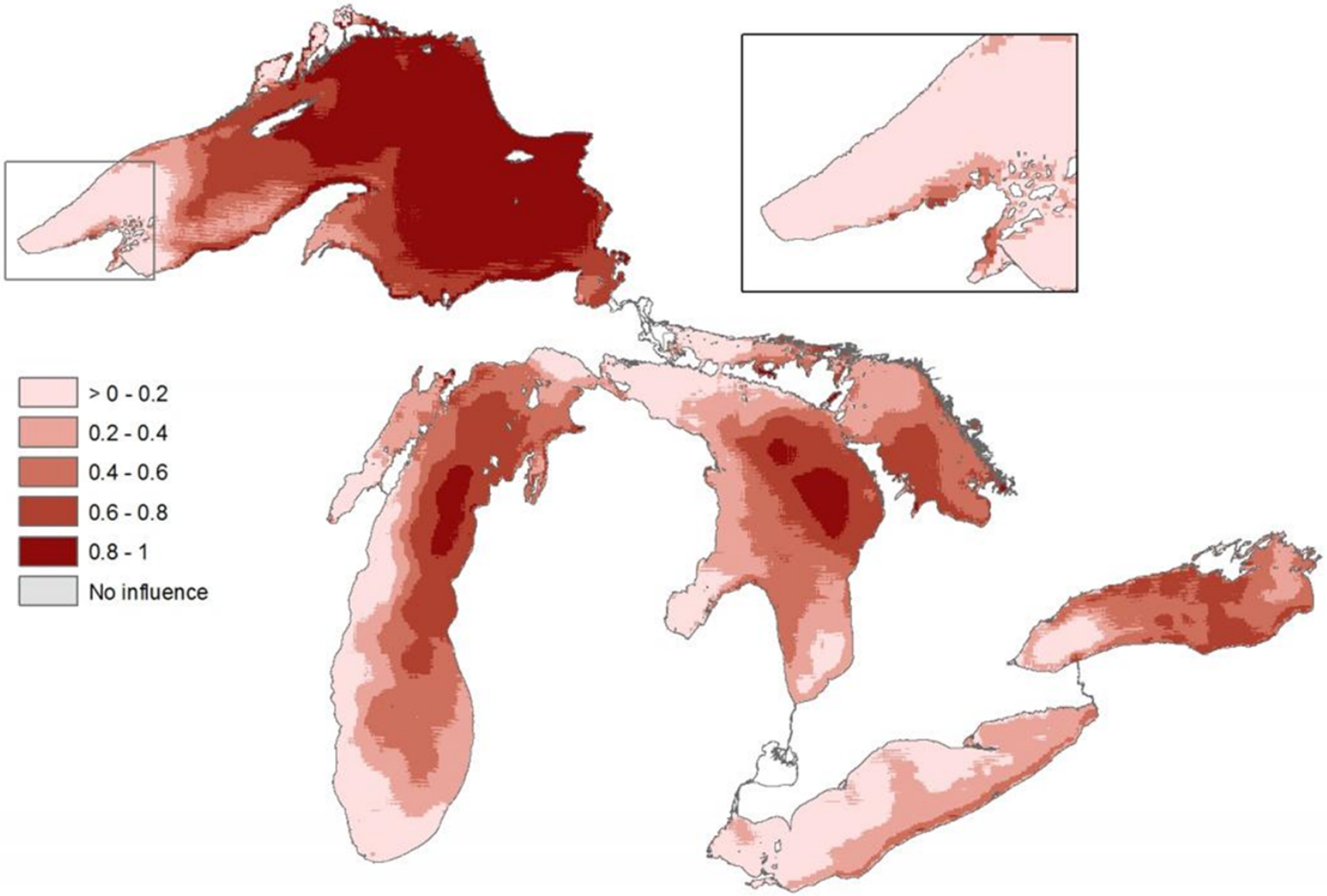
Warmer waters



The really huge challenge

Public stewardship **of our shared resource is mandatory if we are to sustain our growing population while protecting ecosystem and human health**

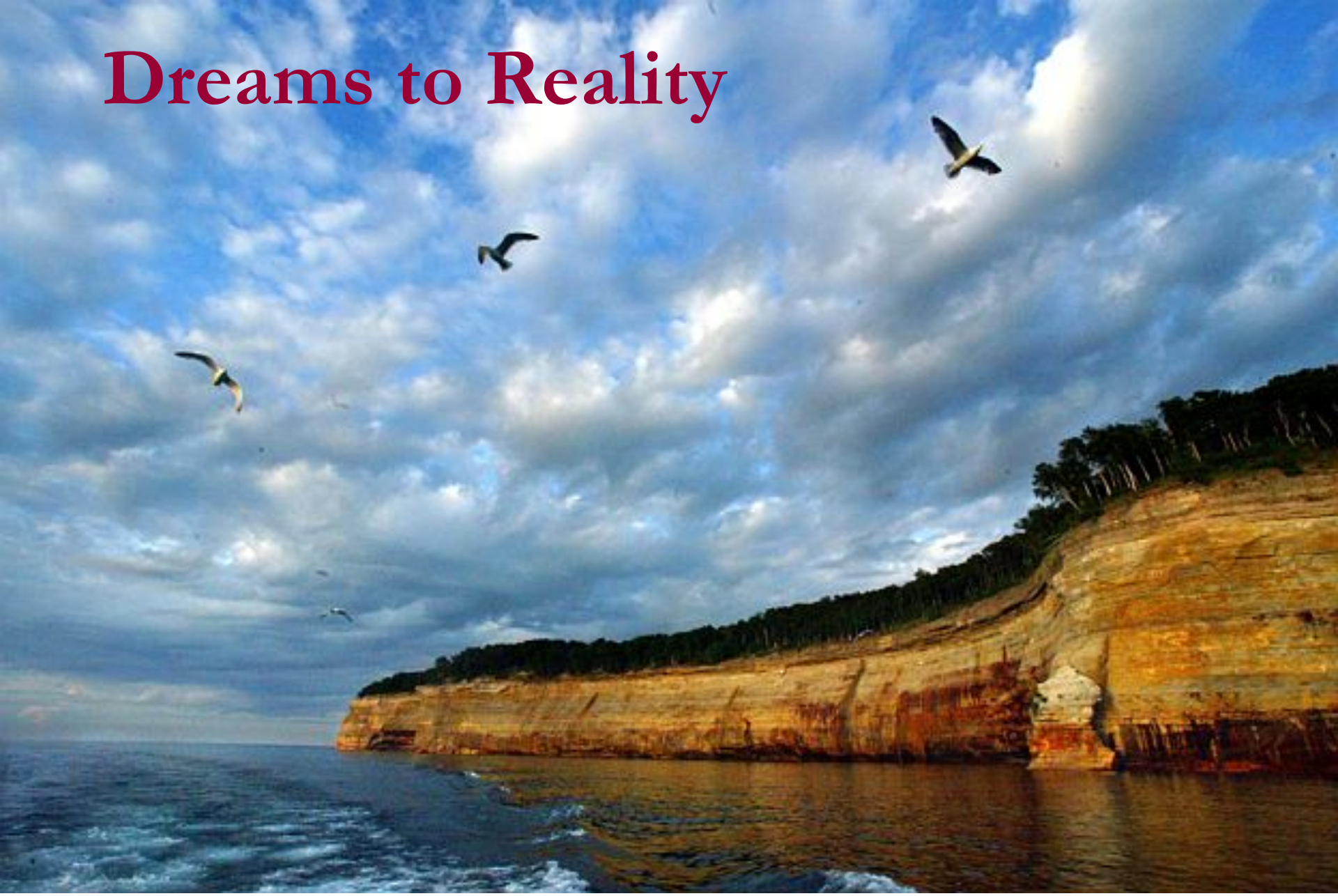
Aiming for Excellence

- All who have achieved great things have been great dreamers.

  Orison Swett Marden

Worth Protecting

Dreams to Reality



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Thanks for making the Lakes Great