Land Indicators:
Assessing the Effects Of Land Use on The Great Lakes Basin Ecosystem

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Ecosystem Objectives

- Remove threats of contamination
  - Reduce persistent toxic substances and other Pollutants
- Non-degradation of soils, plants, water and air
- Biological community integrity and diversity

Ecosystem Objectives
(continued)

- Protection of rare and endangered species
- Healthy aquatic and terrestrial plant and animal life
- Sustainable development

SOLEC ‘96 Findings

- Current land use is inefficient
- Land use has been destructive
- The health of the land by the lakes is degrading
- Planning and incentives are the keys to sustainability

State of the Ecosystem: Land Indicators

- Urban density
- Mass transportation
- Brownfields redevelopment
- Sustainable agriculture

Land Indicators

(continued)

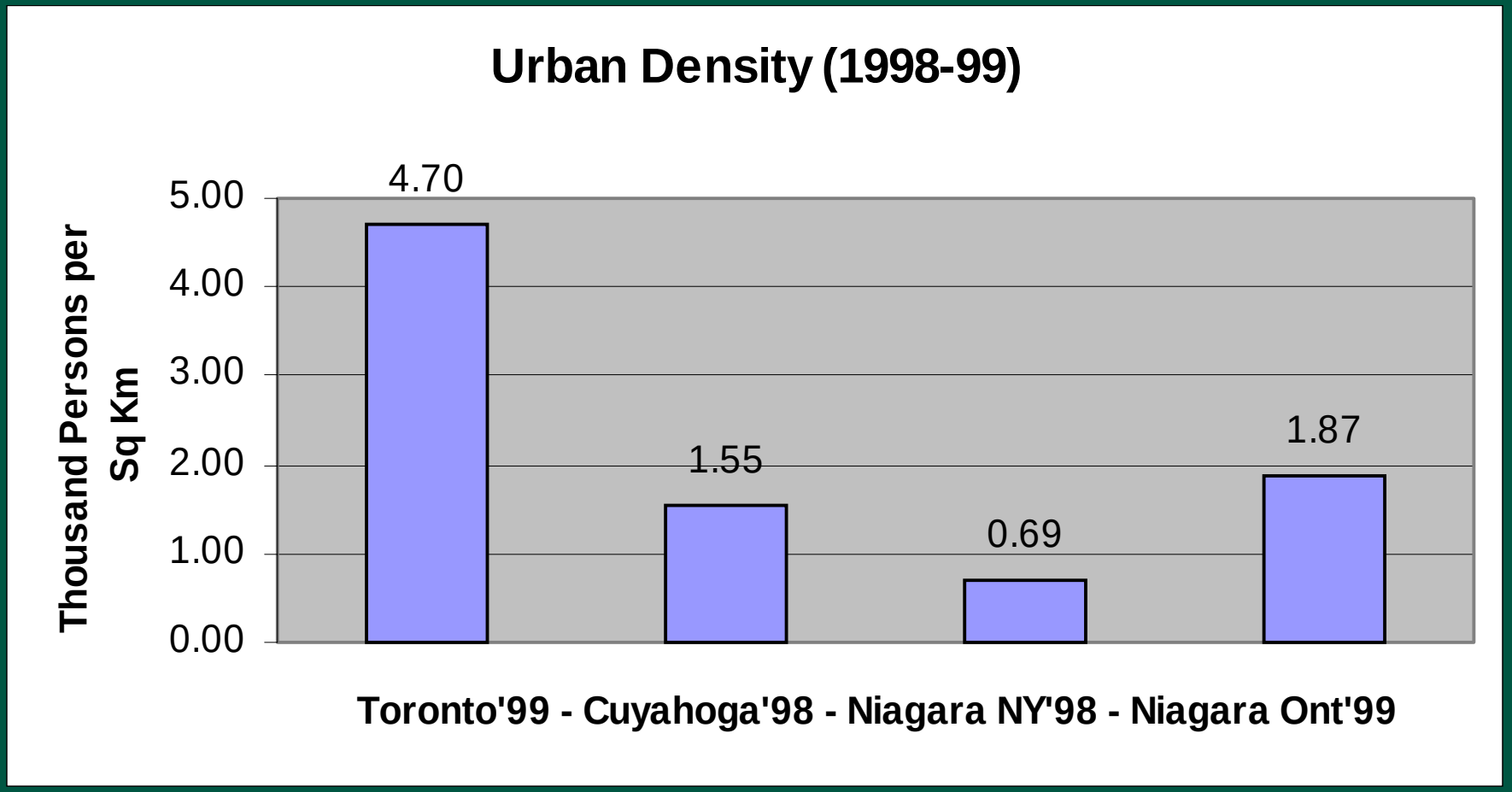
- Extent of hardened shoreline
- Area, quality & protection of alvar communities
- Contaminants affecting the productivity of bald eagles

SOLEC 2000 Findings

New and ongoing policies and programs are needed to mitigate the negative impacts of land use even as we gather more data

Urban Density

- Marked difference among Basin communities



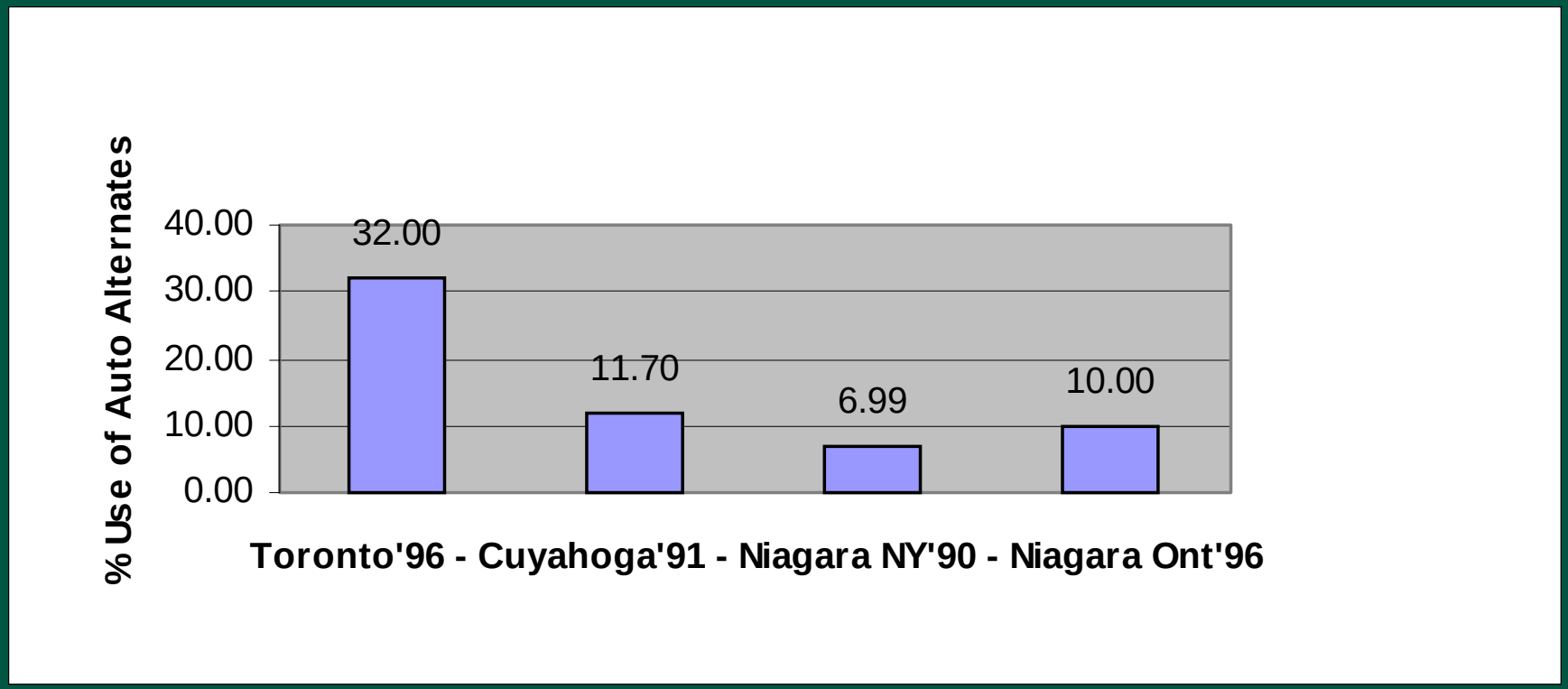
Urban Density

- Varies depending on community size, age and type of planning
- Direct relationship to
  - Population density
  - Redevelopment
  - Mass transit
- **State: inadequate data (deteriorating)**

Urban Density Conclusions

- Higher densities appear to be a more efficient urban land use
- Policies are needed to promote greater urban densities

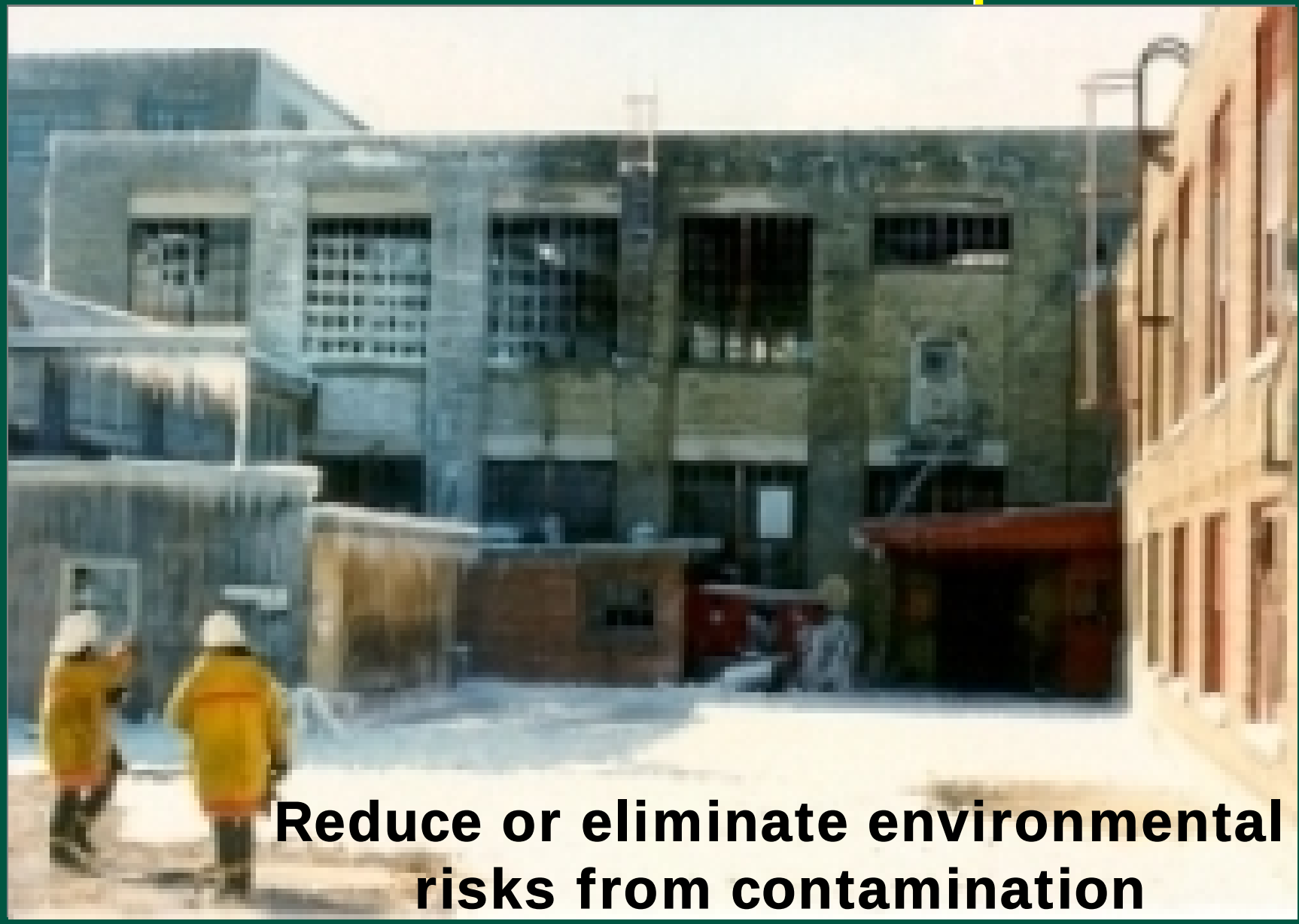
Commuters Using Alternate to Auto Transportation (1990-1996)



Mass Transportation

- Increased mass transportation depends on:
  - Urban density
  - Population density
  - Cost-effective transit
- Need better understanding of relationships among the three
- **State: inadequate data**

Brownfields Redevelopment



Reduce or eliminate environmental risks from contamination

Brownfields Redevelopment

Reduce pressure for open space conversion

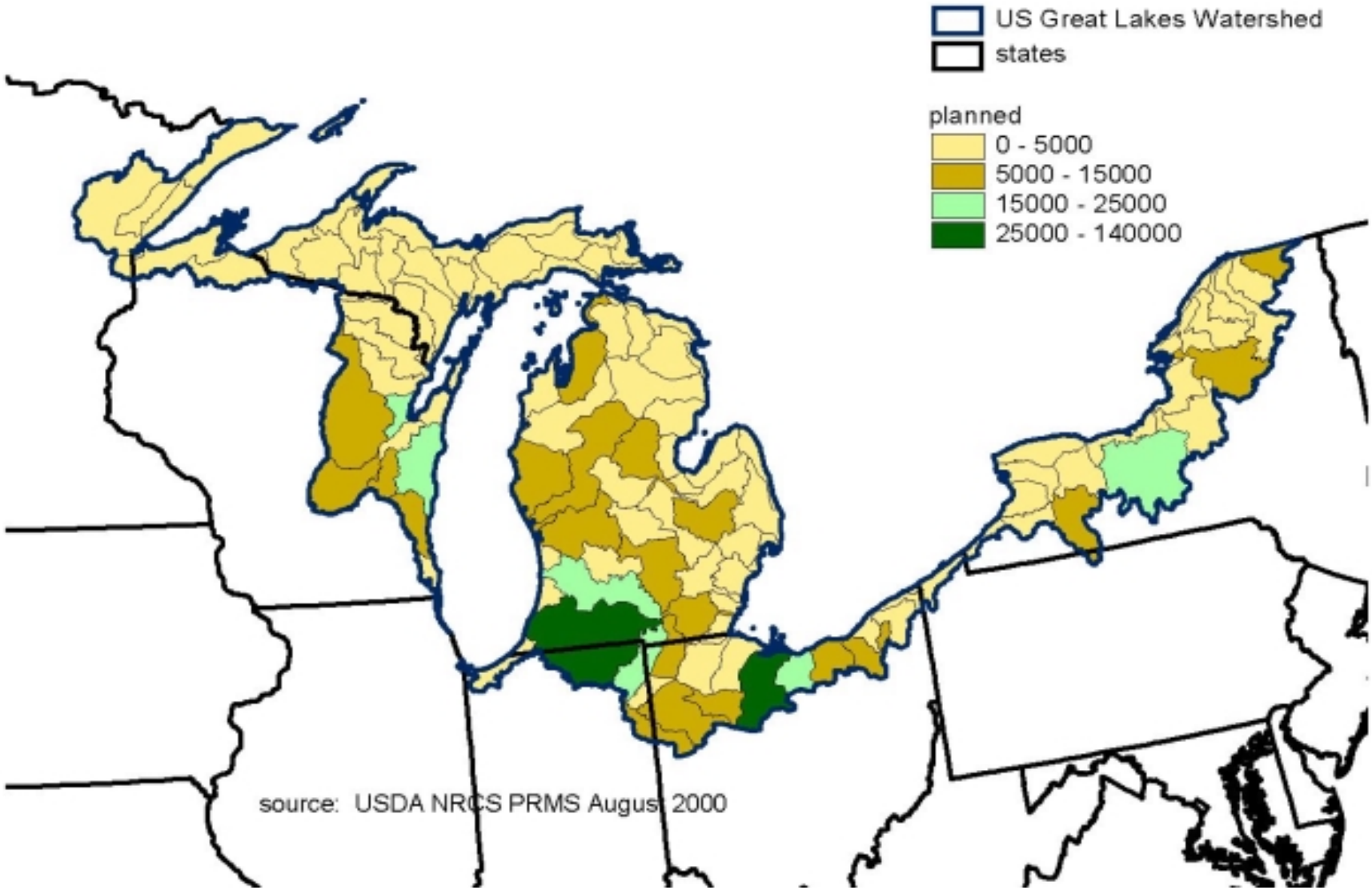
Brownfields Redevelopment

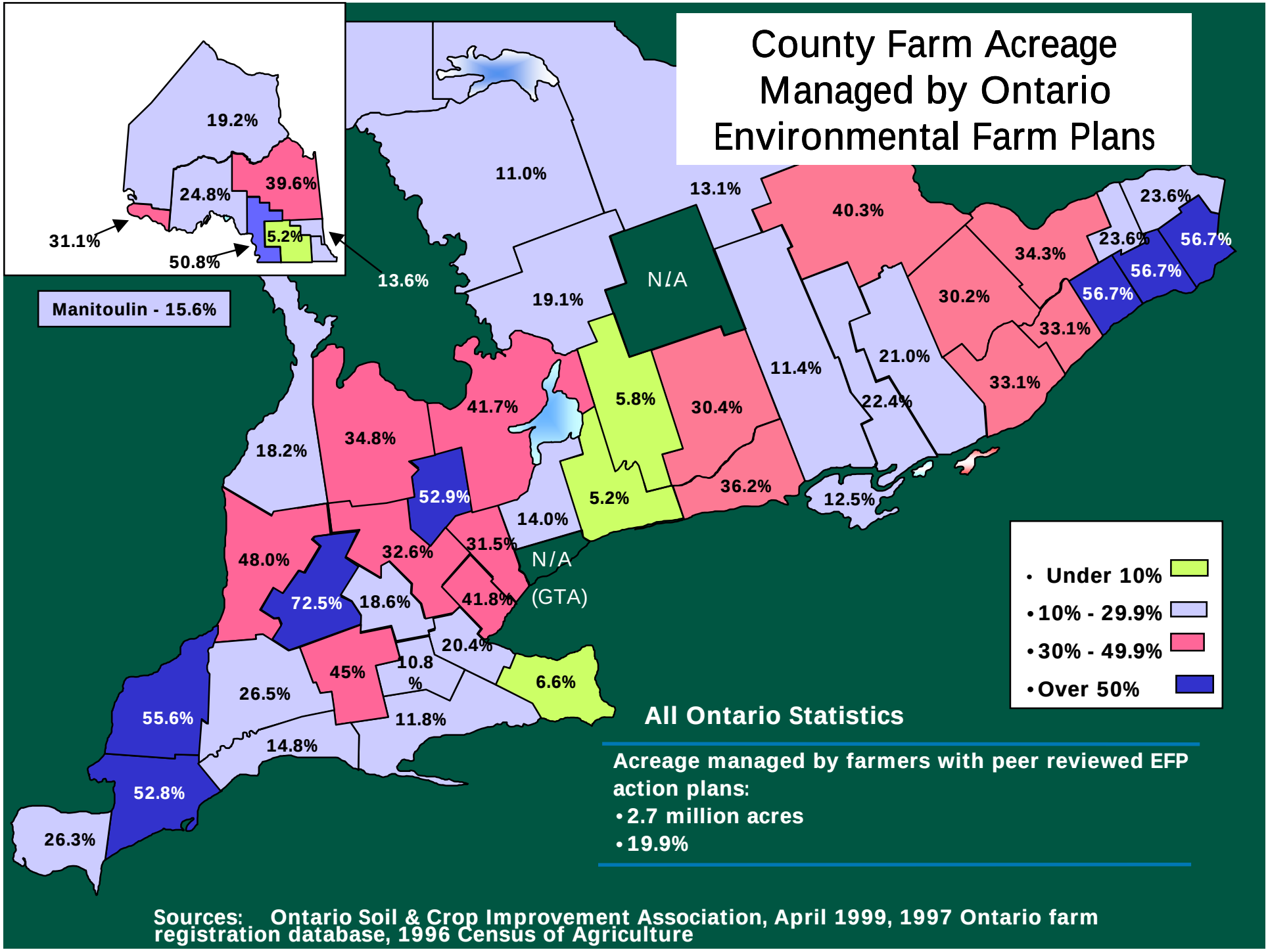
- Cleanup *and* redevelopment has risen dramatically since the mid-1990's
- **State: good**
- Offset by incentives for greenfield development
- More reliable tracking needed; requires state/local coordination

Sustainable Agricultural Practices

- 38 percent reduction in U.S. soil erosion
- Replenishment of organic content
- Increasing cooperation between farm community and water quality management programs

Conservation Systems Planned
Total Acres - All Land Uses



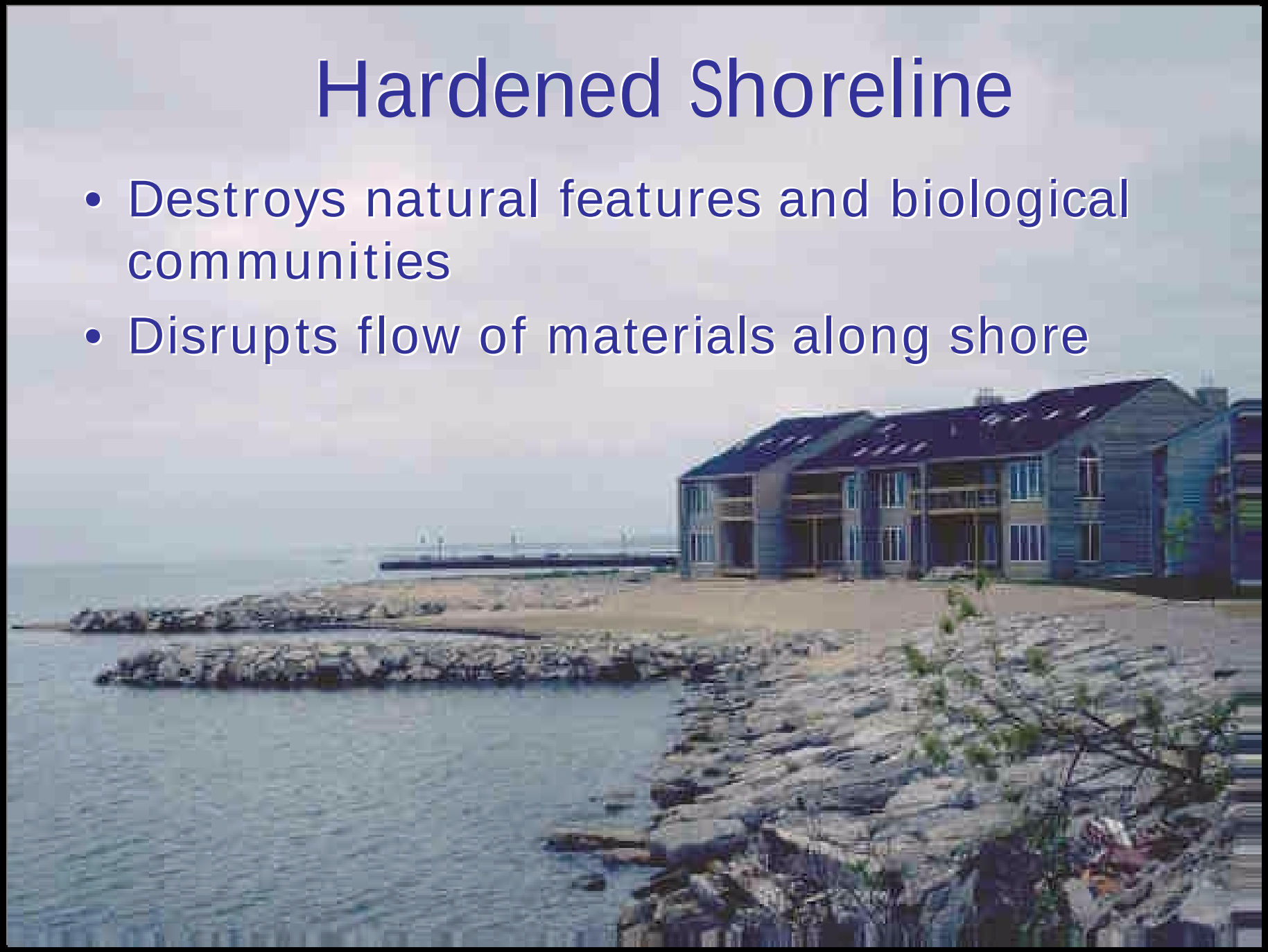

County Farm Acreage Managed by Ontario Environmental Farm Plans
19.2%
24.8%
39.6%
31.1%
5.2%
50.8%
13.6%
Manitoulin - 15.6%
11.0%
19.1%
N/A
13.1%
40.3%
23.6%
34.3%
23.6%
56.7%
56.7%
56.7%
30.2%
33.1%
21.0%
33.1%
11.4%
22.4%
5.8%
30.4%
41.7%
34.8%
18.2%
52.9%
5.2%
36.2%
12.5%
14.0%
31.5%
48.0%
32.6%
N/A
(GTA)
72.5%
18.6%
41.8%
20.4%
45%
10.8 %
6.6%
26.5%
55.6%
11.8%
14.8%
52.8%
26.3%
• Under 10%
• 10% - 29.9%
• 30% - 49.9%
• Over 50%
All Ontario Statistics
Acreage managed by farmers with peer reviewed EFP action plans:
• 2.7 million acres
• 19.9%
Sources: Ontario Soil & Crop Improvement Association, April 1999, 1997 Ontario farm registration database, 1996 Census of Agriculture

Sustainable Agriculture

- Voluntary conservation programs provide incentives
- Urbanizing farmland may limit future options for sustainable agriculture
- Difficult to track due to changes in ownership and use
- **State: mixed**

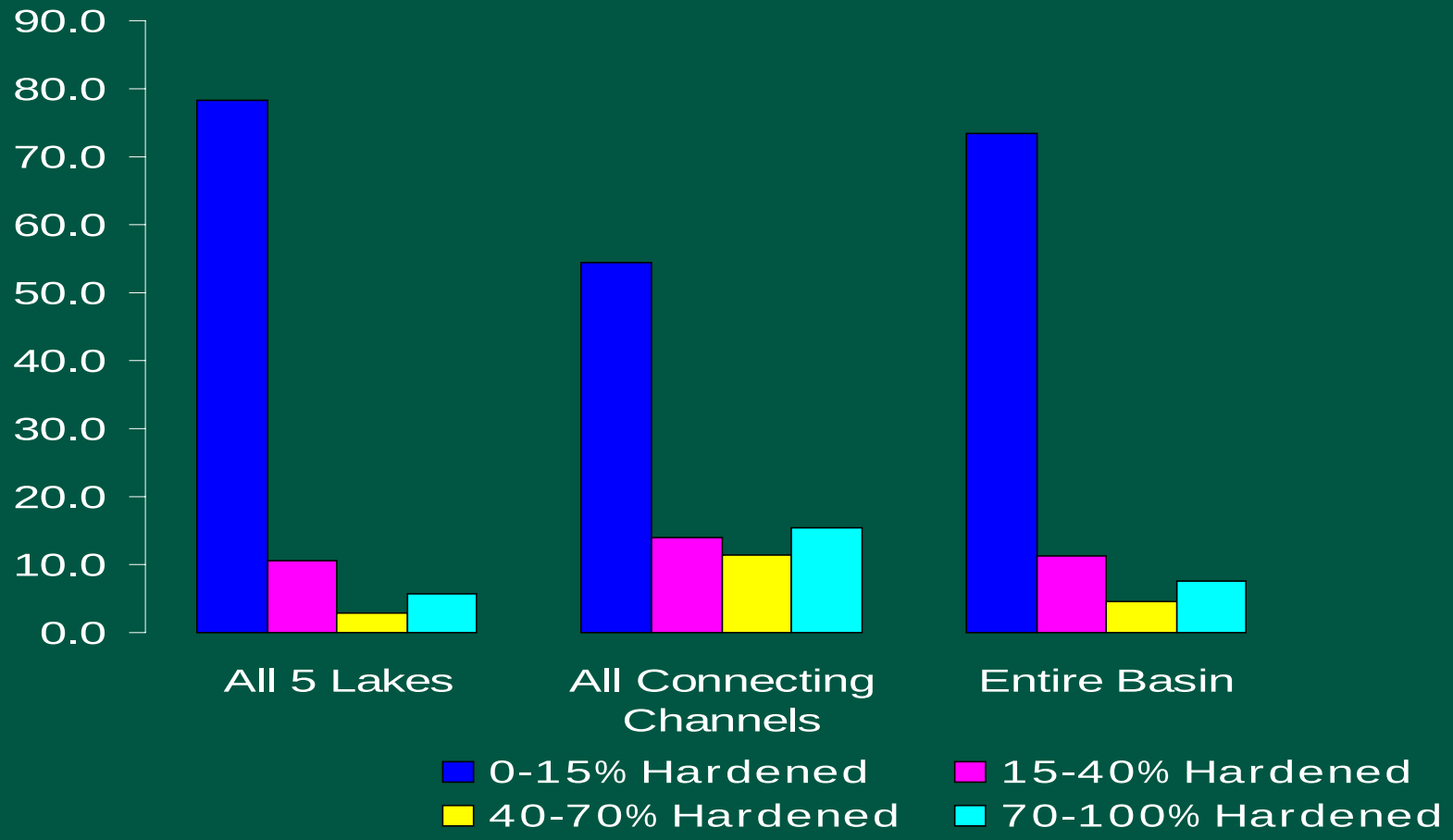
Hardened Shoreline

- Destroys natural features and biological communities
- Disrupts flow of materials along shore



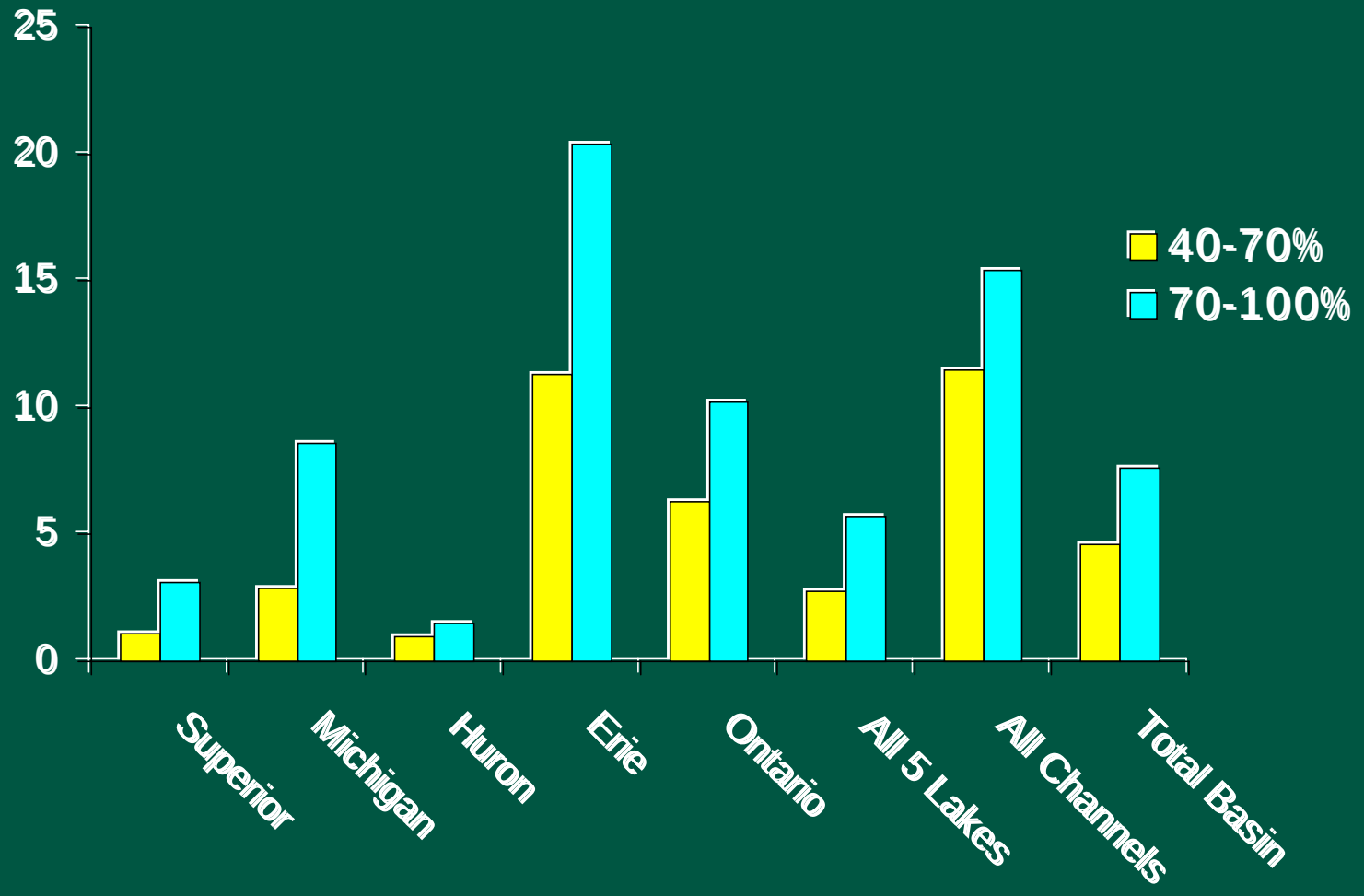
Hardened Shoreline

More hardening in connecting channels



Hardened Shoreline

Lake Erie has most hardening of the Lakes
Lakes Huron and Superior have the least hardening



Hardened Shoreline

- **State: mixed-deteriorating**
- Generally irreversible
- Soft engineering and green infrastructure offer alternatives
- Continued pressures with higher lake levels and cyclical effects
- More recent data needed

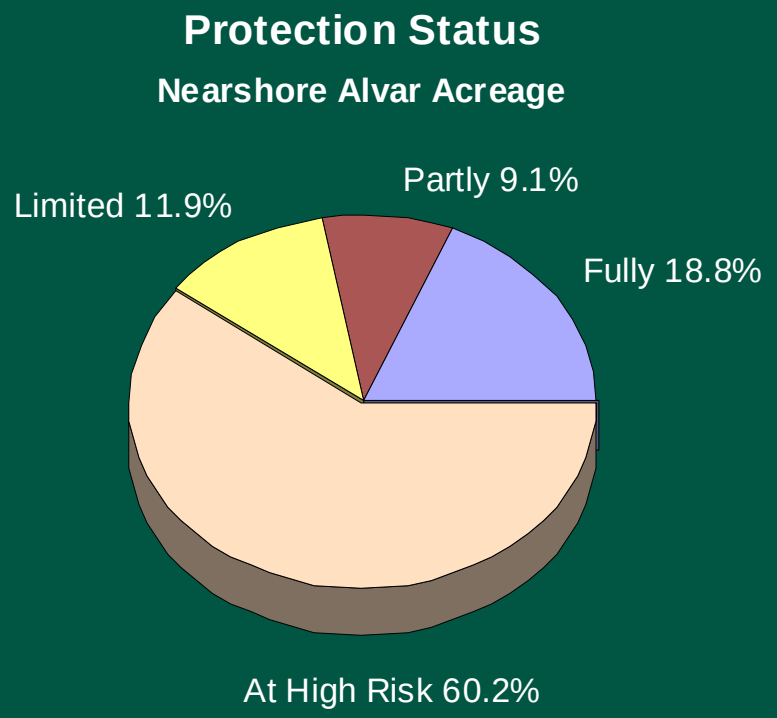
Area, Quality and Protection of Alvar Communities

- "Naturally open habitats on flat limestone bedrock"
- All 15 globally imperiled or rare
- Most remaining in Ontario
- Mostly in nearshore areas

	Total in Basin	Near-shore
# of Alvar sites	82	52
# of Community occurrences	204	138
Alvar acreage	28475	20009
Alvar acreage	28475	20009

Area, Quality and Protection of Alvar Communities

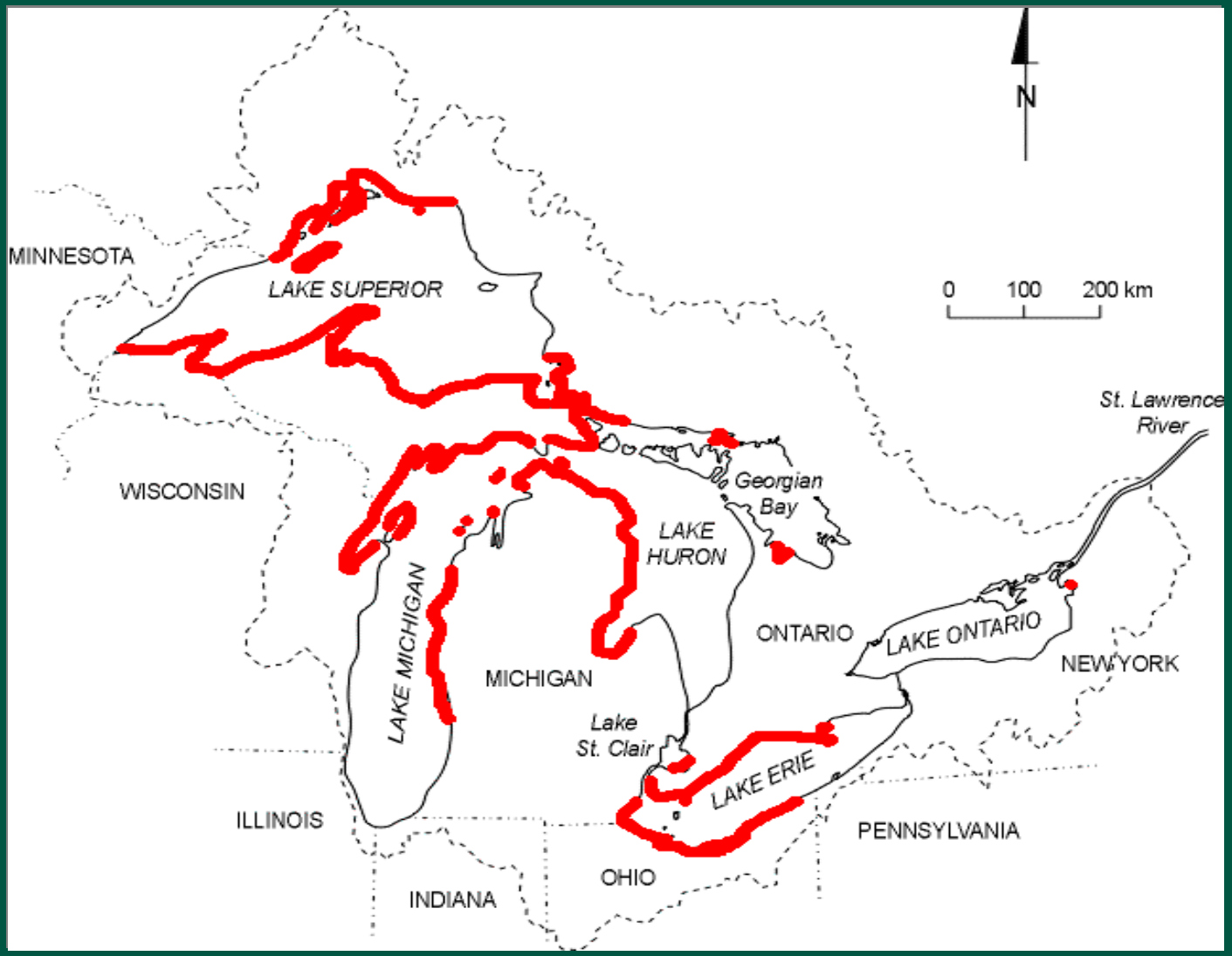
- **State: mixed**
- Less than one-fifth fully protected
- Over three-fifths at high risk
- Ongoing threats from development, recreation, and resource extraction



Contaminants Affecting Bald Eagle Productivity

- Recovery from near extinction
- Levels in Michigan eagles stable or declining since 80s and early 90s
- No apparent contaminant trends basinwide
- Increase in developmental deformities basinwide
- Increase in population of young basinwide

Approximate Nesting Locations of Bald Eagles



Contaminants Affecting Bald Eagle Productivity

- **State: mixed-improving**
- Continued threats from toxic substances, nest disturbance and shoreline development
- Need improved sampling and monitoring for nesting, contaminant levels and productivity

Summary of Future Pressures

- Low-density urban fringe/suburban development
- Open space/farmland conversion
- Road and highway development
- Intensive nearshore recreation

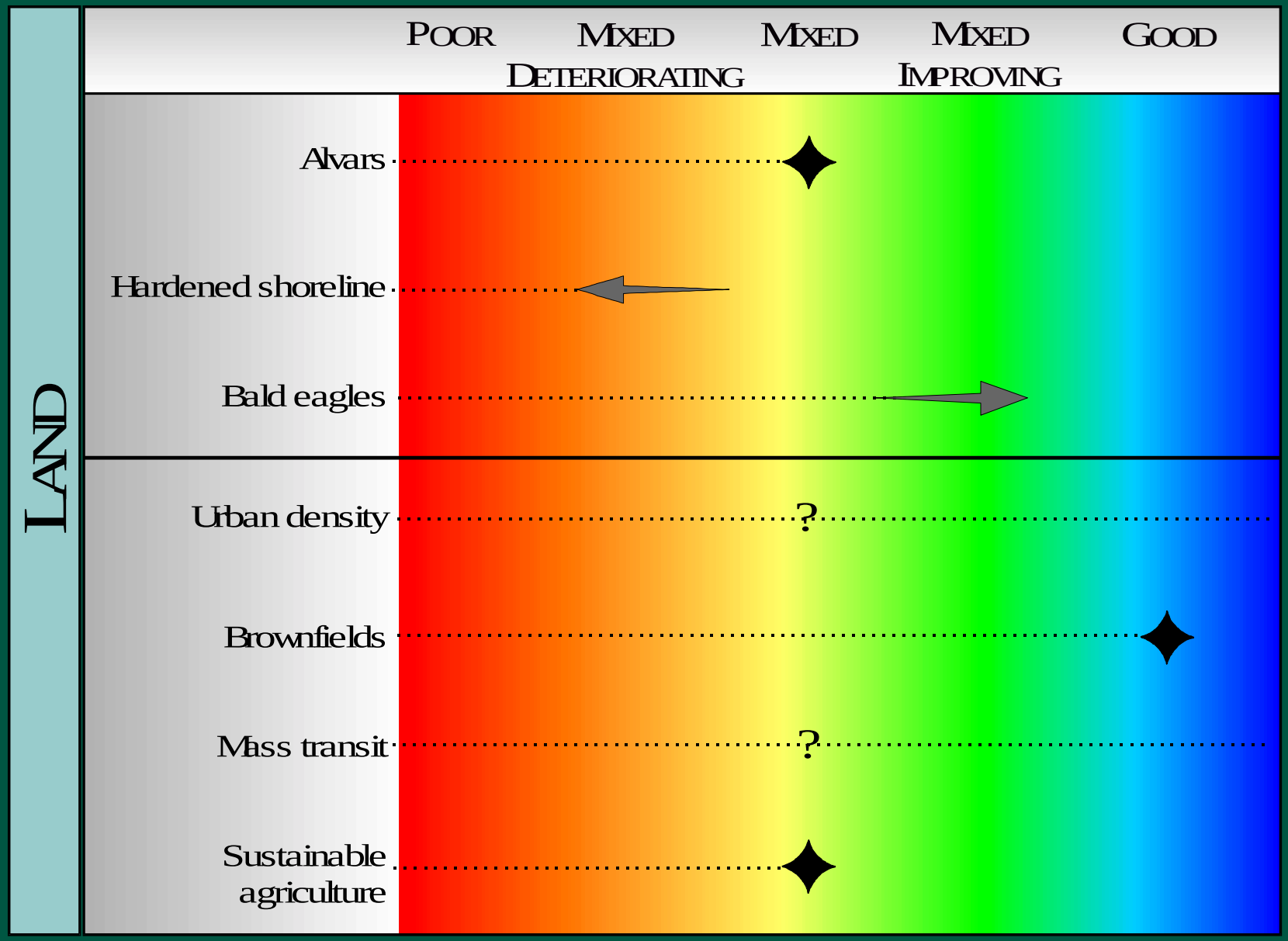
Mitigation Measures Needed

- More compact development
- Disincentives/removal of incentives for low-density sprawl
- “Livable” cities and towns (improved urban infrastructure)
- Protection of high-risk farmland and ecologically important communities
- “Soft” engineering and planning for nearshore development

Summary of Indicators

- Valuable for ecosystem assessment
- Much indicator information incomplete
- Systematic, comparable, monitoring, surveys and other data collection for each indicator
- Information needed for other land/terrestrial indicators

Conclusions



Acknowledgements

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