Human Health, Land Use, Resource Utilization and Climate Change

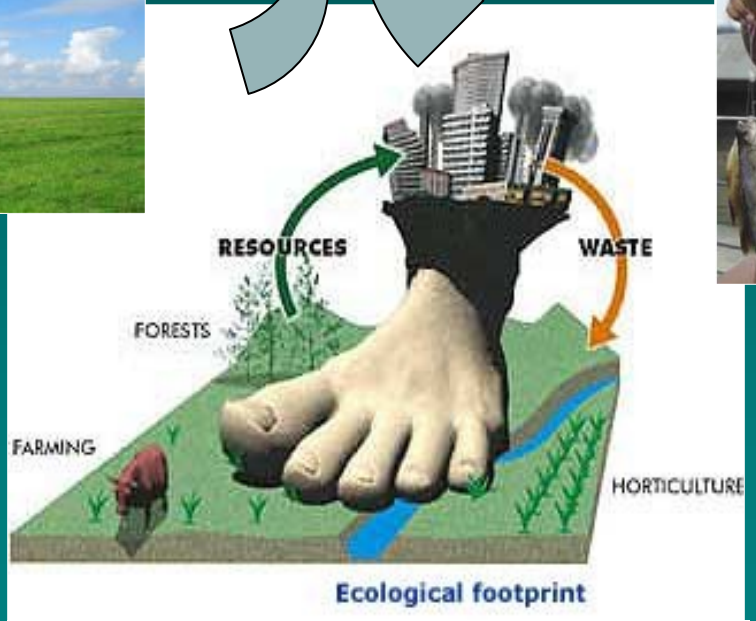
Mary Thorburn
Ontario Ministry of the Environment

Introduction

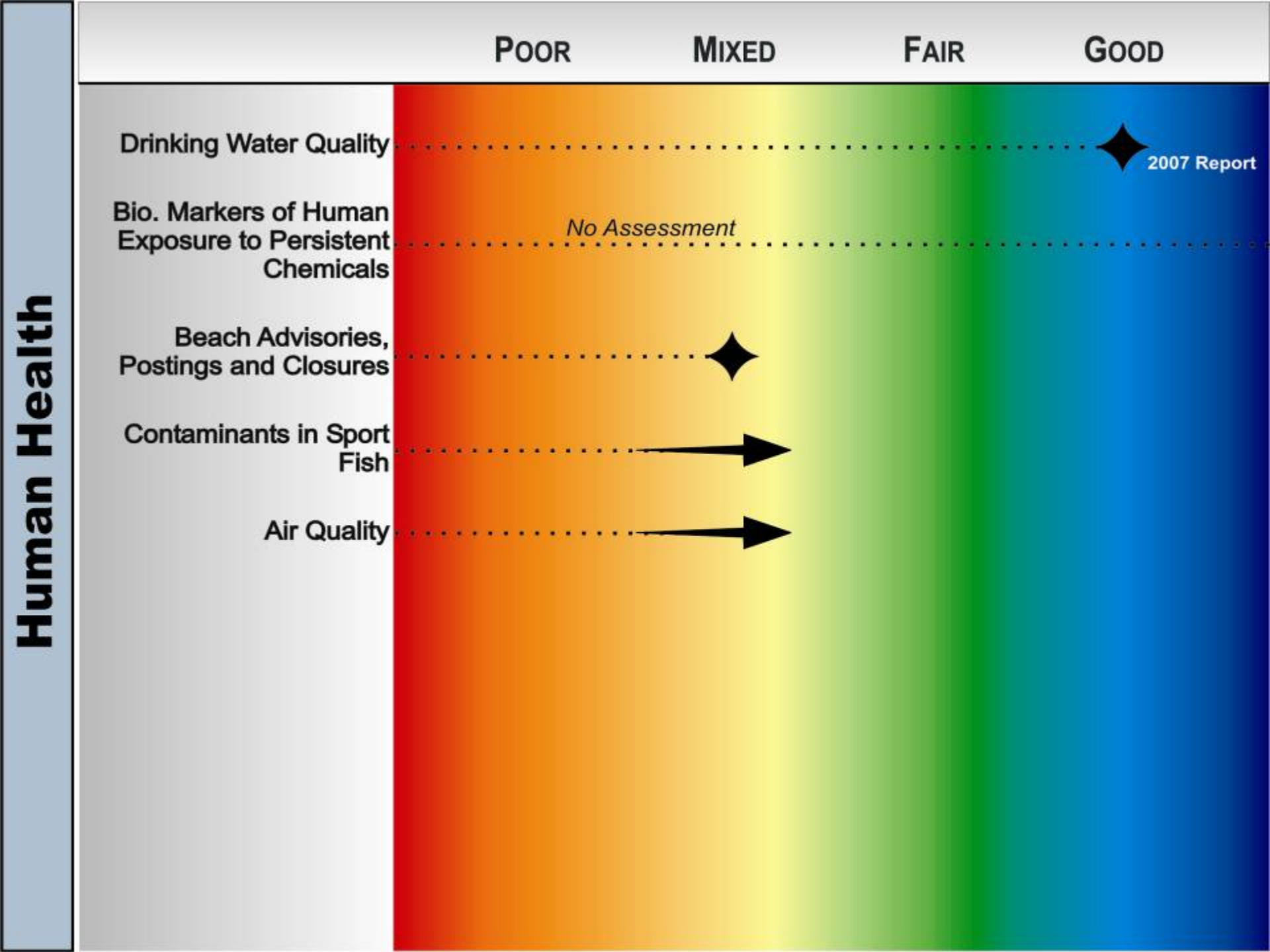
Climate Change

Human Health

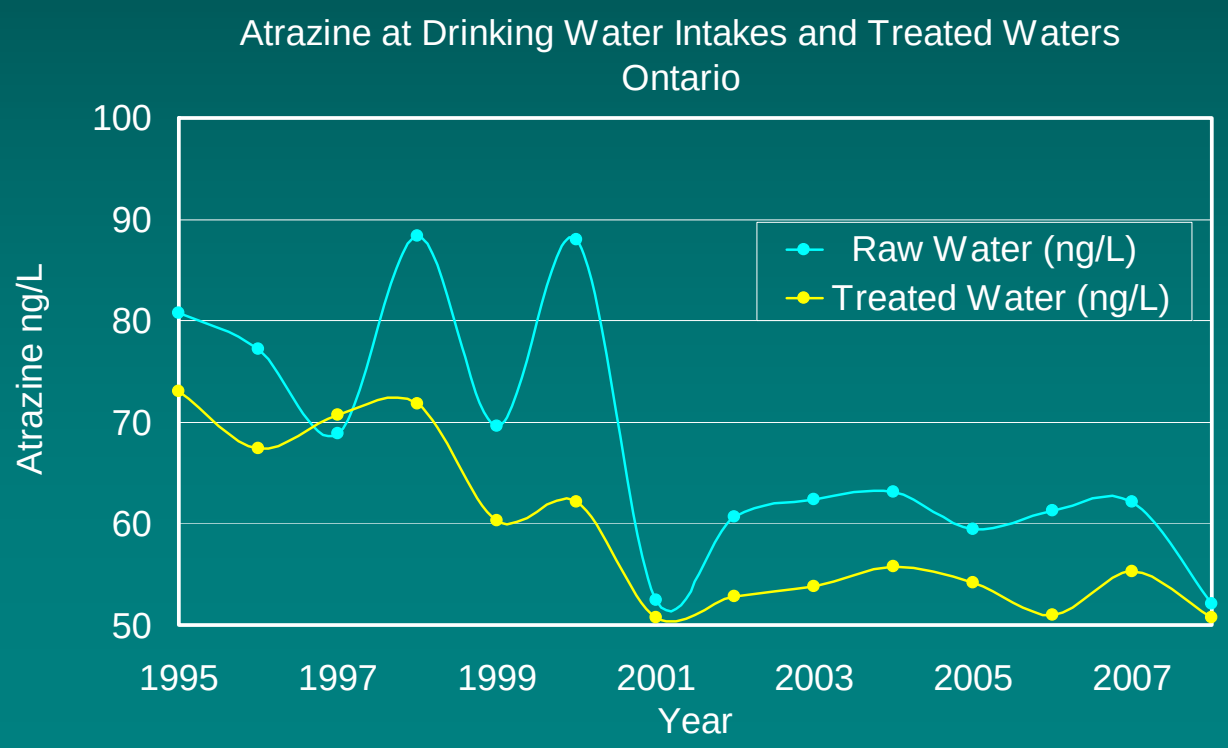
Land Use and Resource Utilization



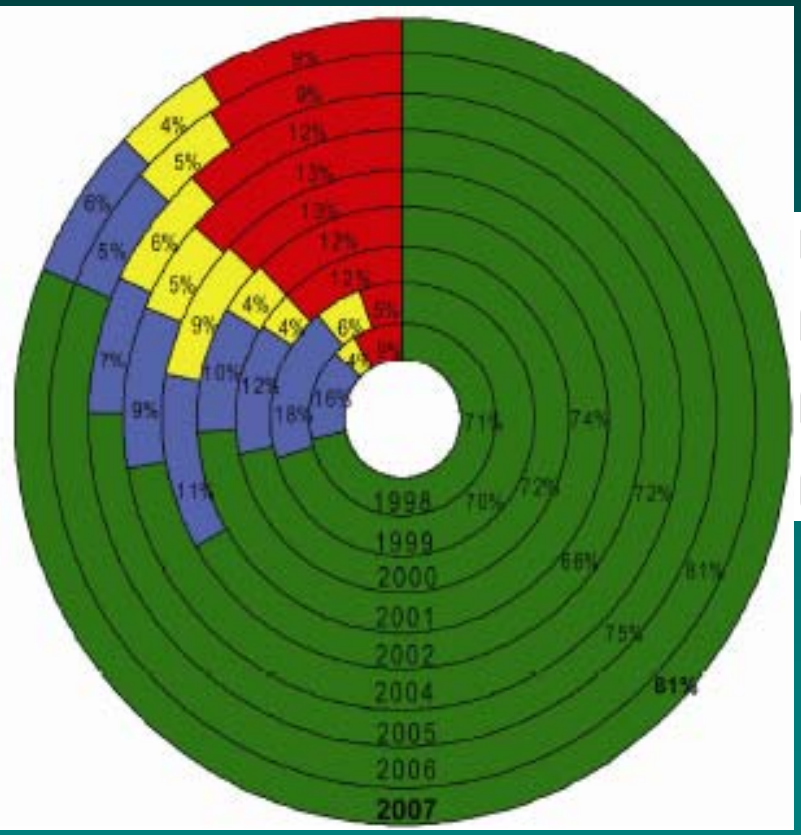
Source: Waikato Regional Council, 2007


Human Health
POOR
MIXED
FAIR
GOOD
Drinking Water Quality
2007 Report
Bio. Markers of Human Exposure to Persistent Chemicals
No Assessment
Beach Advisories, Postings and Closures
Contaminants in Sport Fish
Air Quality

Drinking Water Quality



Beach Advisories, Postings and Closings



0% posted

1% - 4% posted

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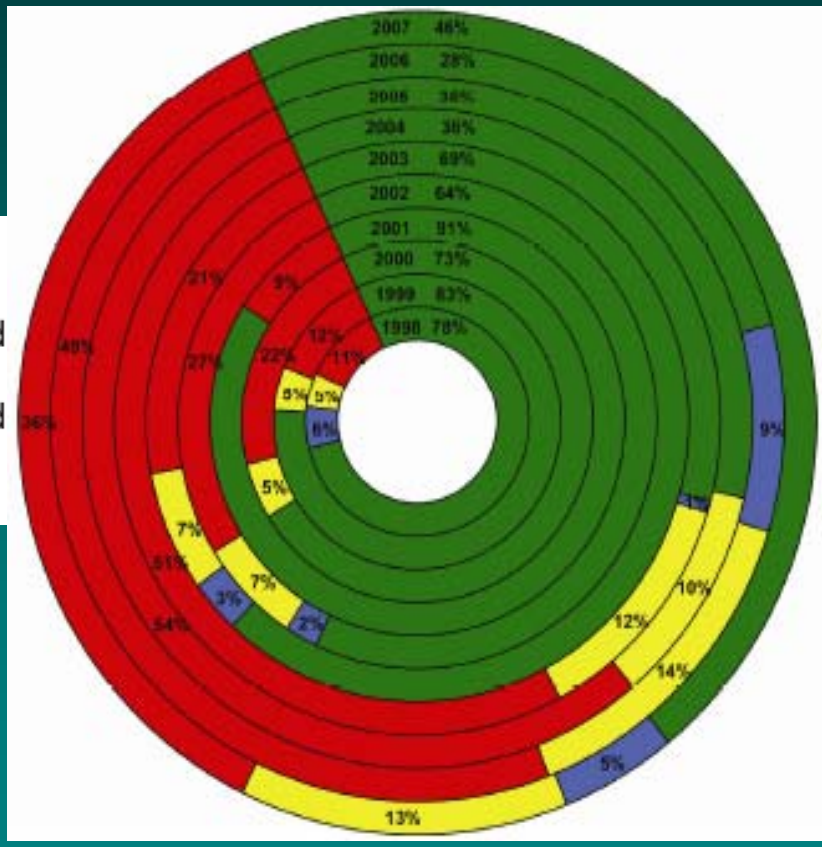
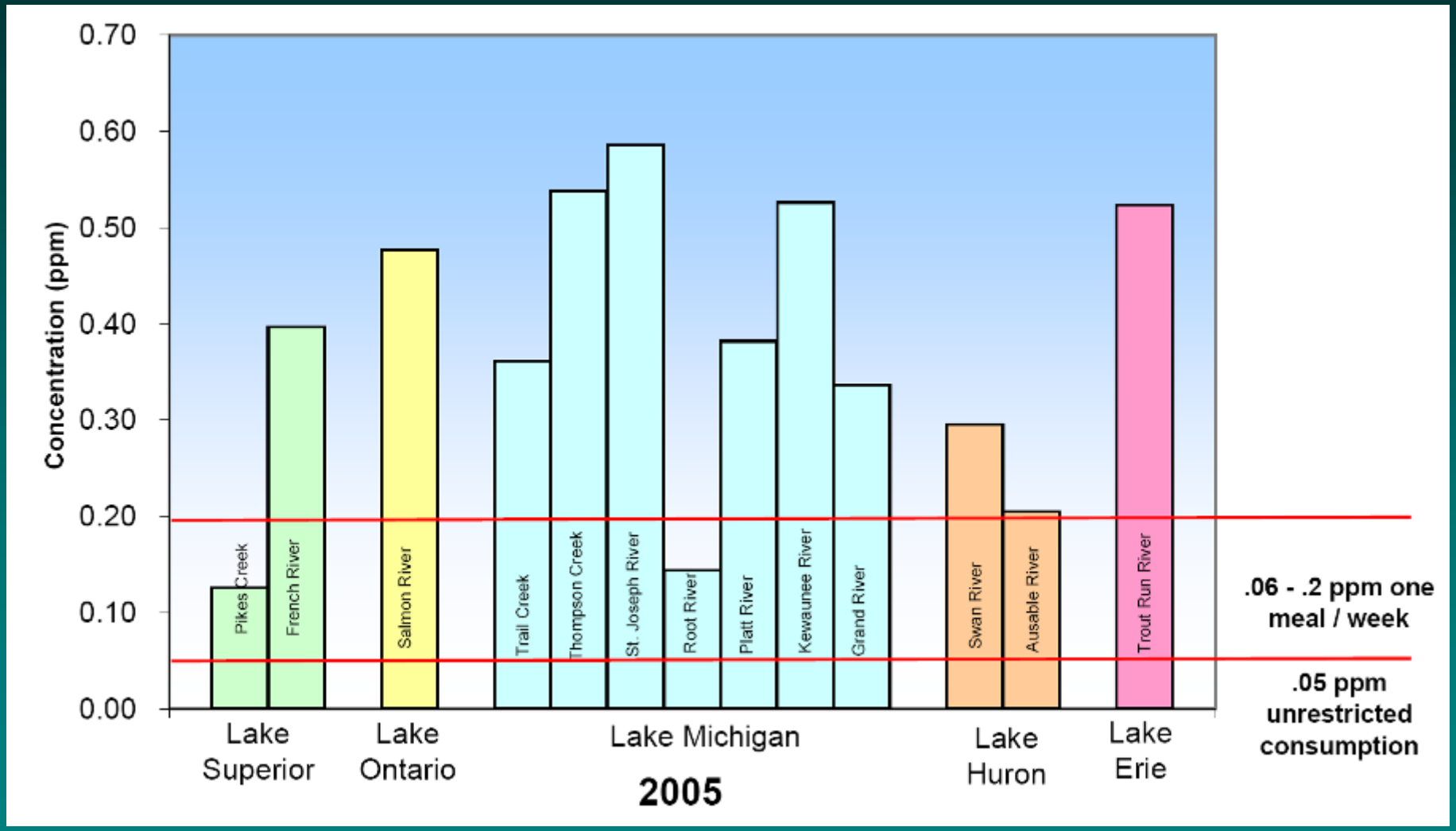


United States

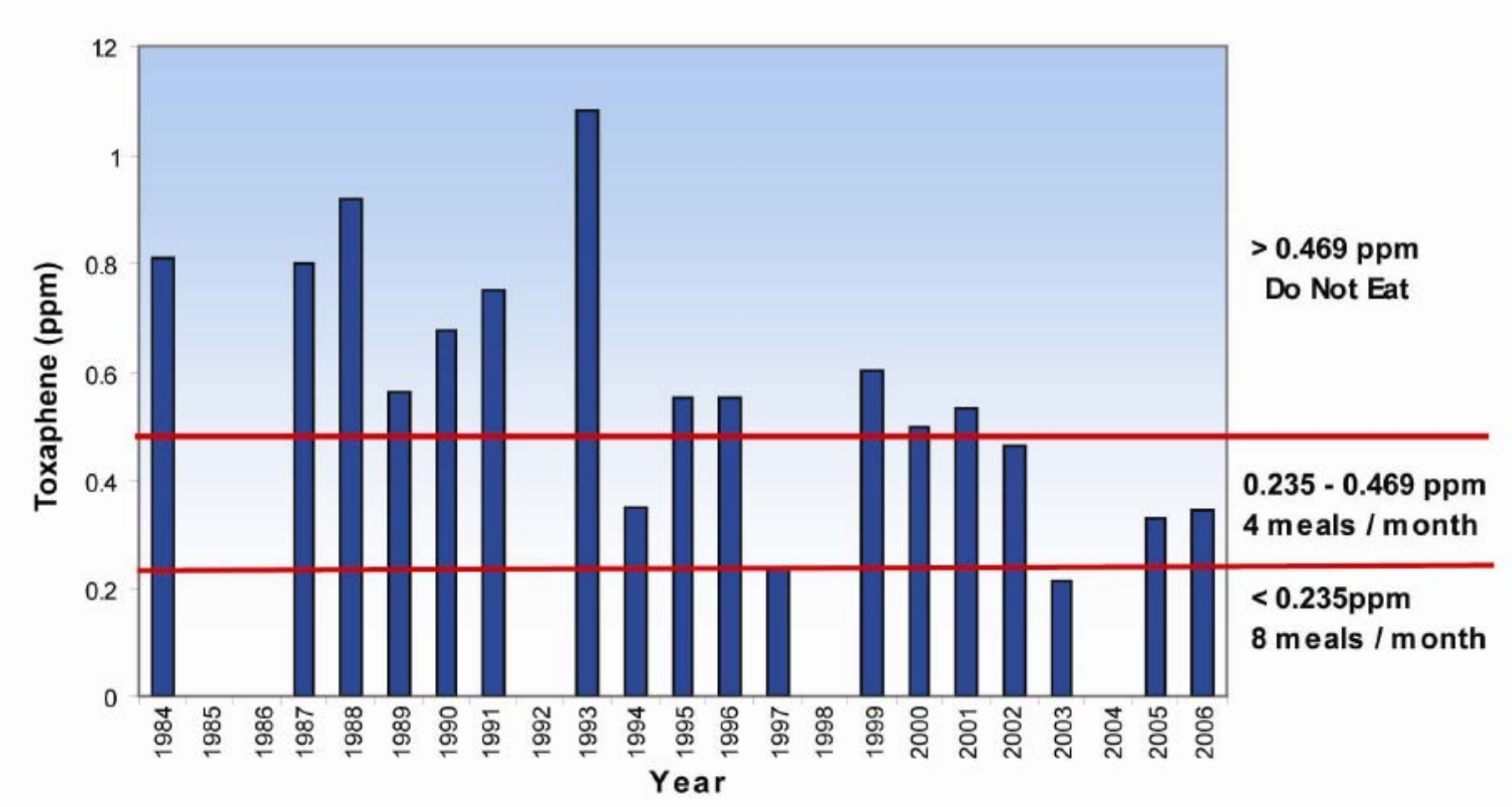
Canada

Beach Advisories, Postings and Closings

Contaminants in Sportfish

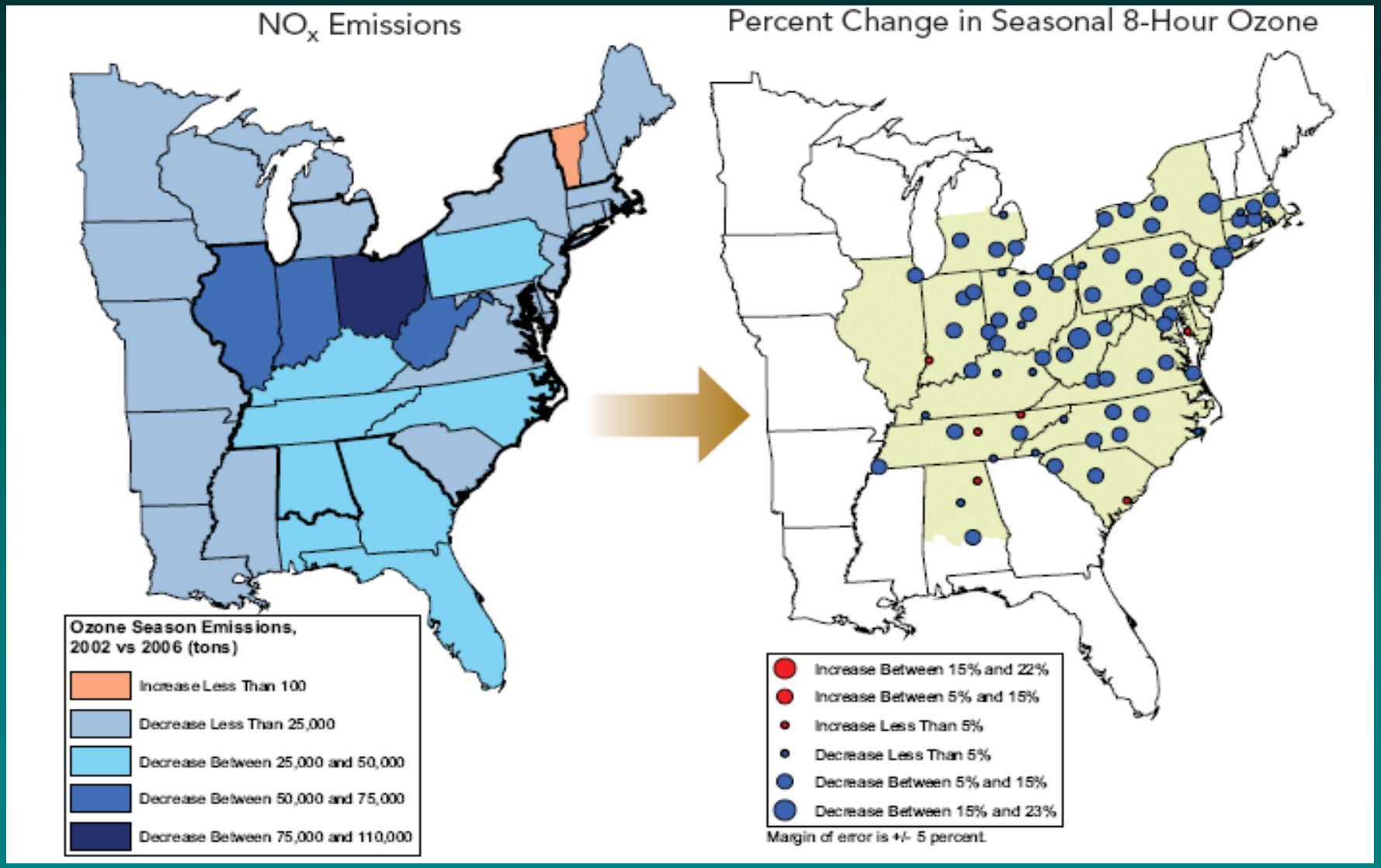


Contaminants in Sportfish

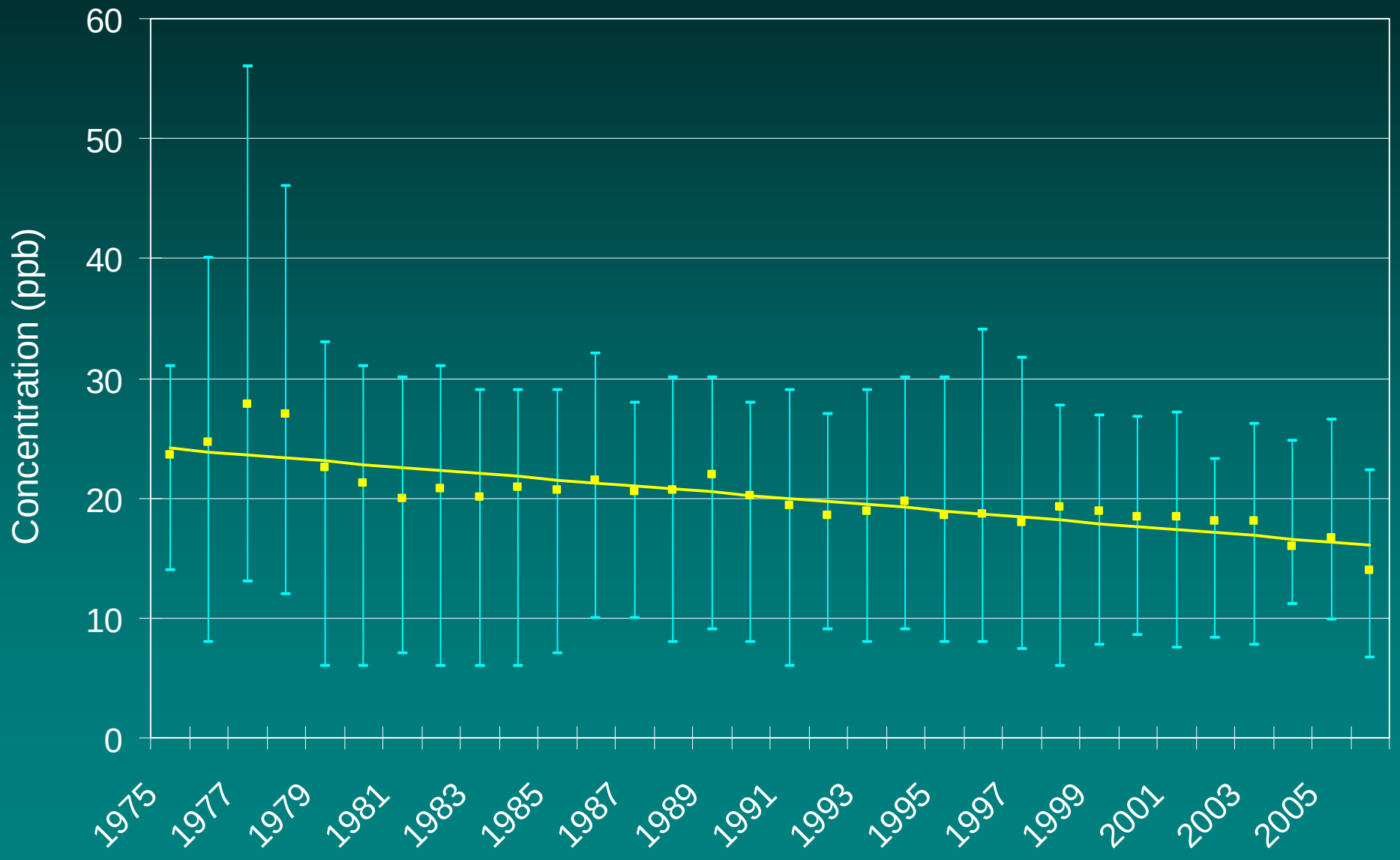


Air Quality

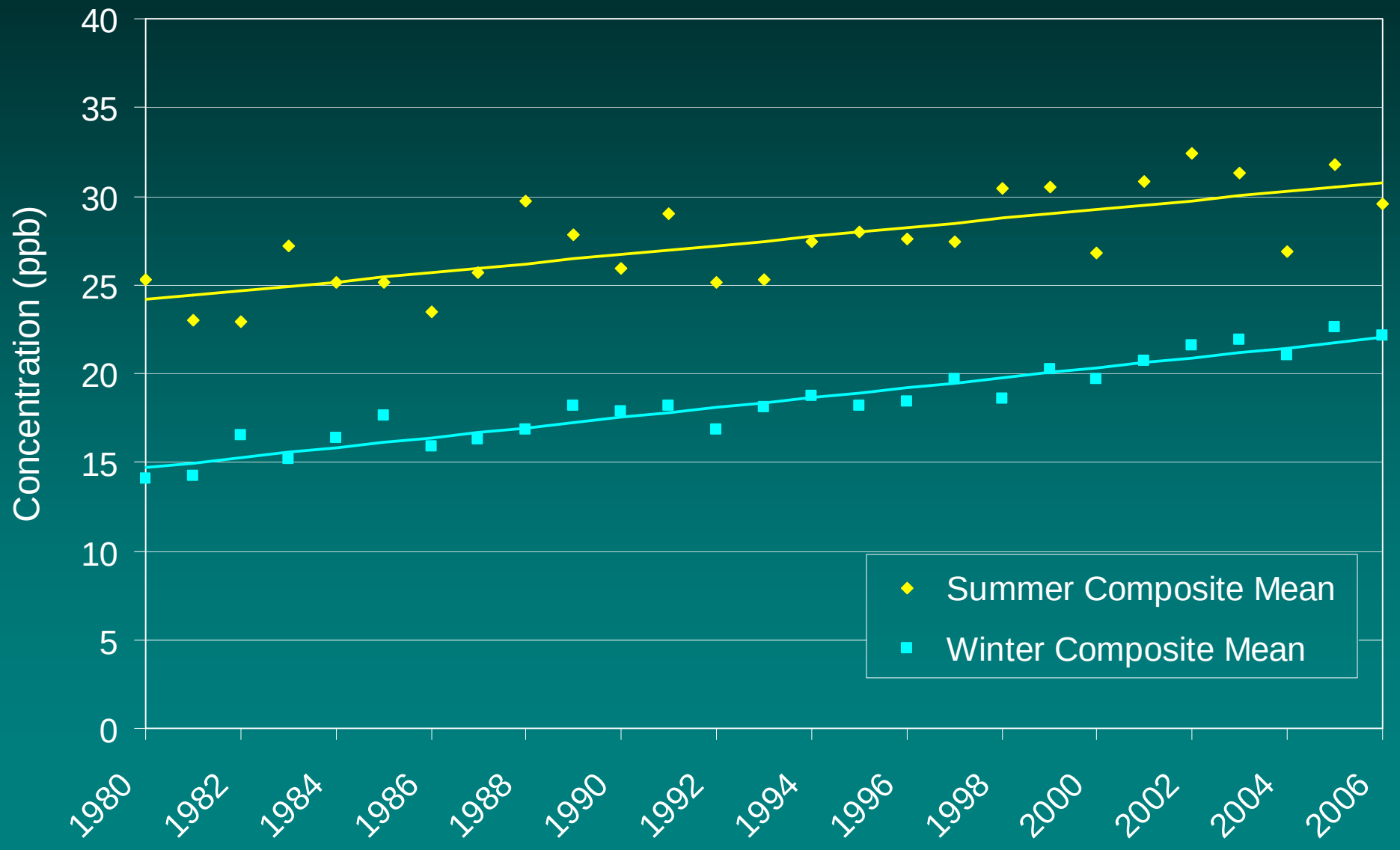
Air Quality


NOx Emissions
Percent Change in Seasonal 8-Hour Ozone
Ozone Season Emissions, 2002 vs 2006 (tons)
Increase Less Than 100
Decrease Less Than 25,000
Decrease Between 25,000 and 50,000
Decrease Between 50,000 and 75,000
Decrease Between 75,000 and 110,000
Increase Between 15% and 22%
Increase Between 5% and 15%
Increase Less Than 5%
Decrease Less Than 5%
Decrease Between 5% and 15%
Decrease Between 15% and 23%
Margin of error is +/- 5 percent.

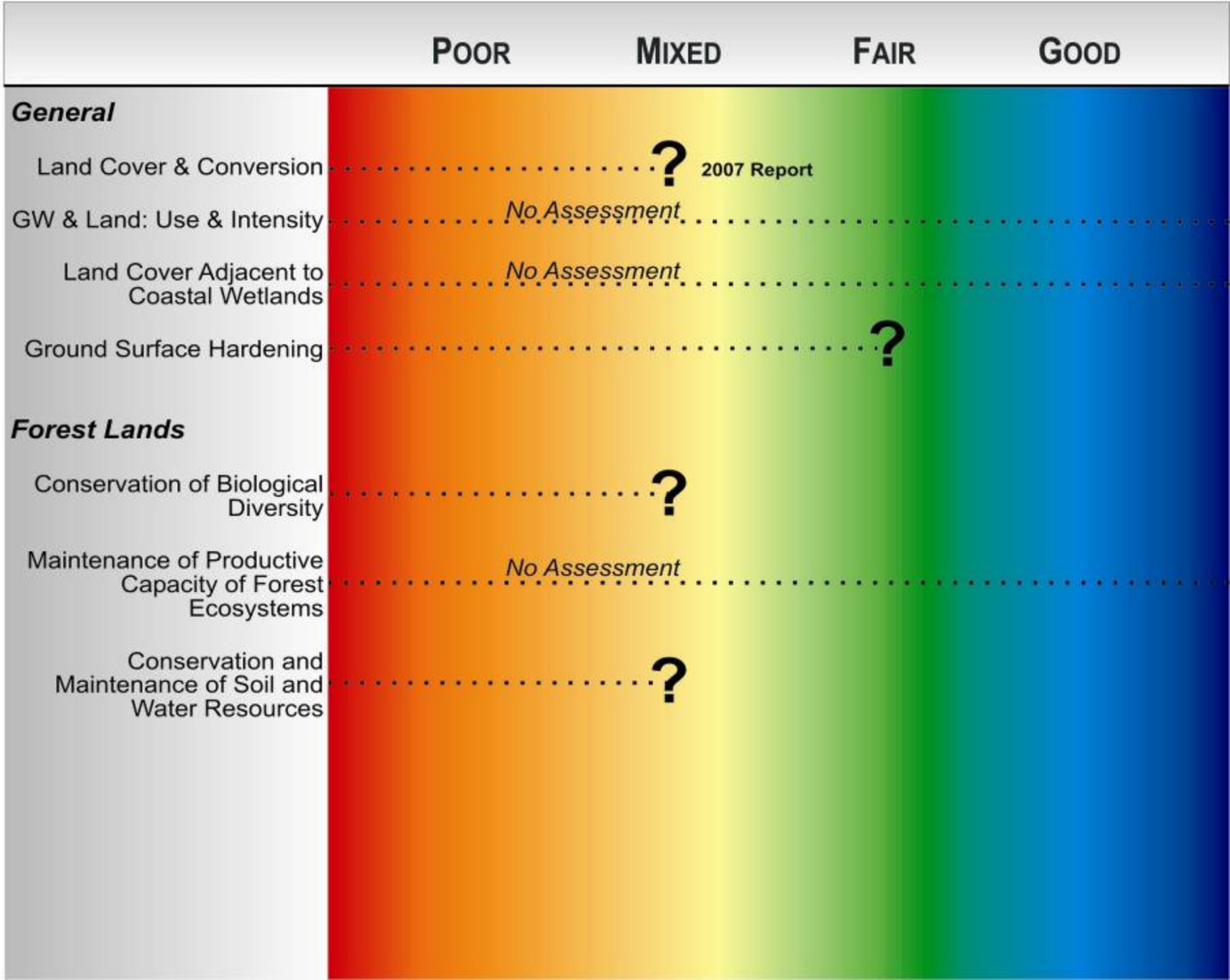
Range of Nitrogen Dioxide Annual Means in Ontario (1975 - 2006)

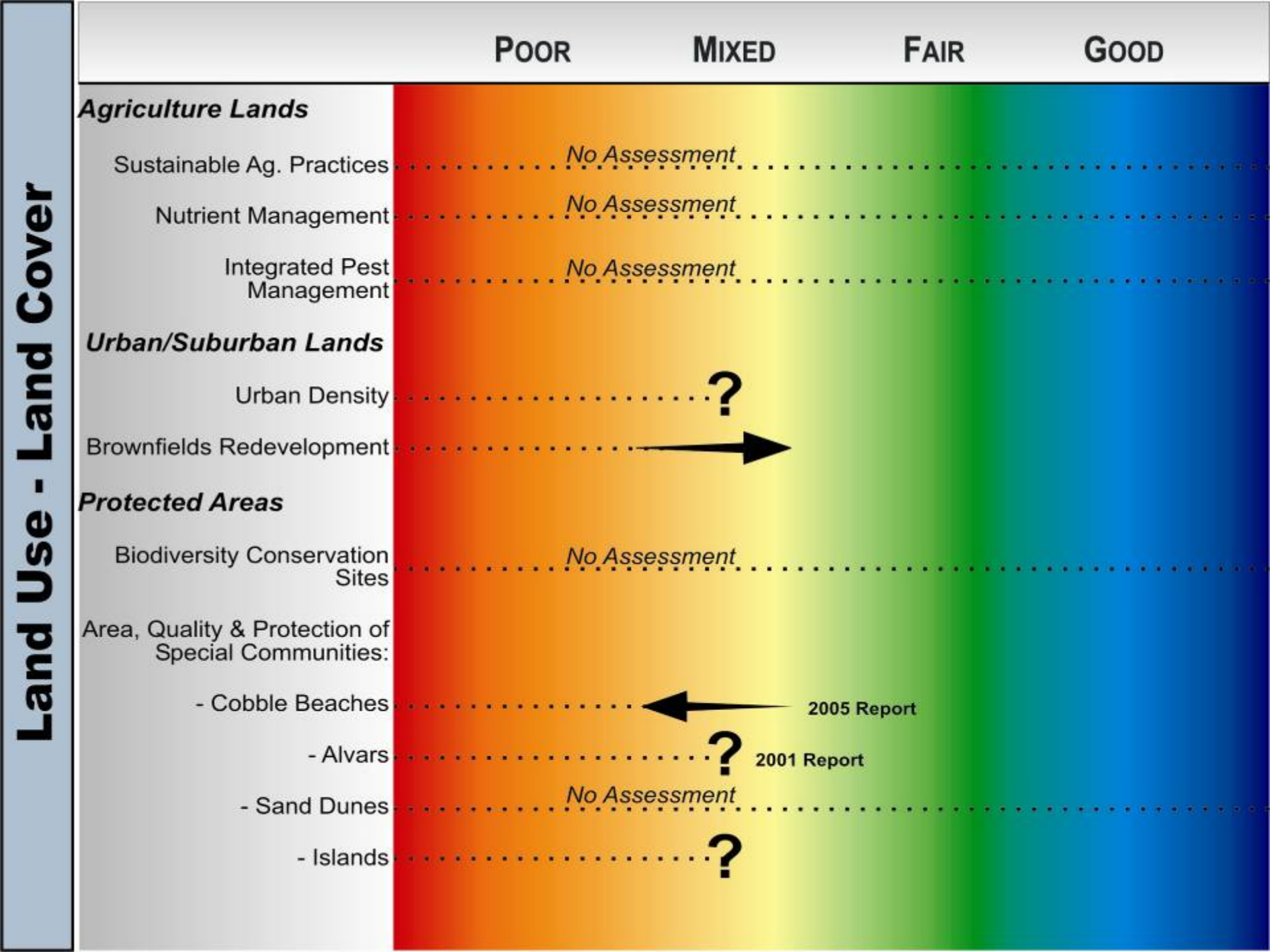


Trend of Ozone Seasonal Composite Means at Sites Across Ontario (1980 - 2006)

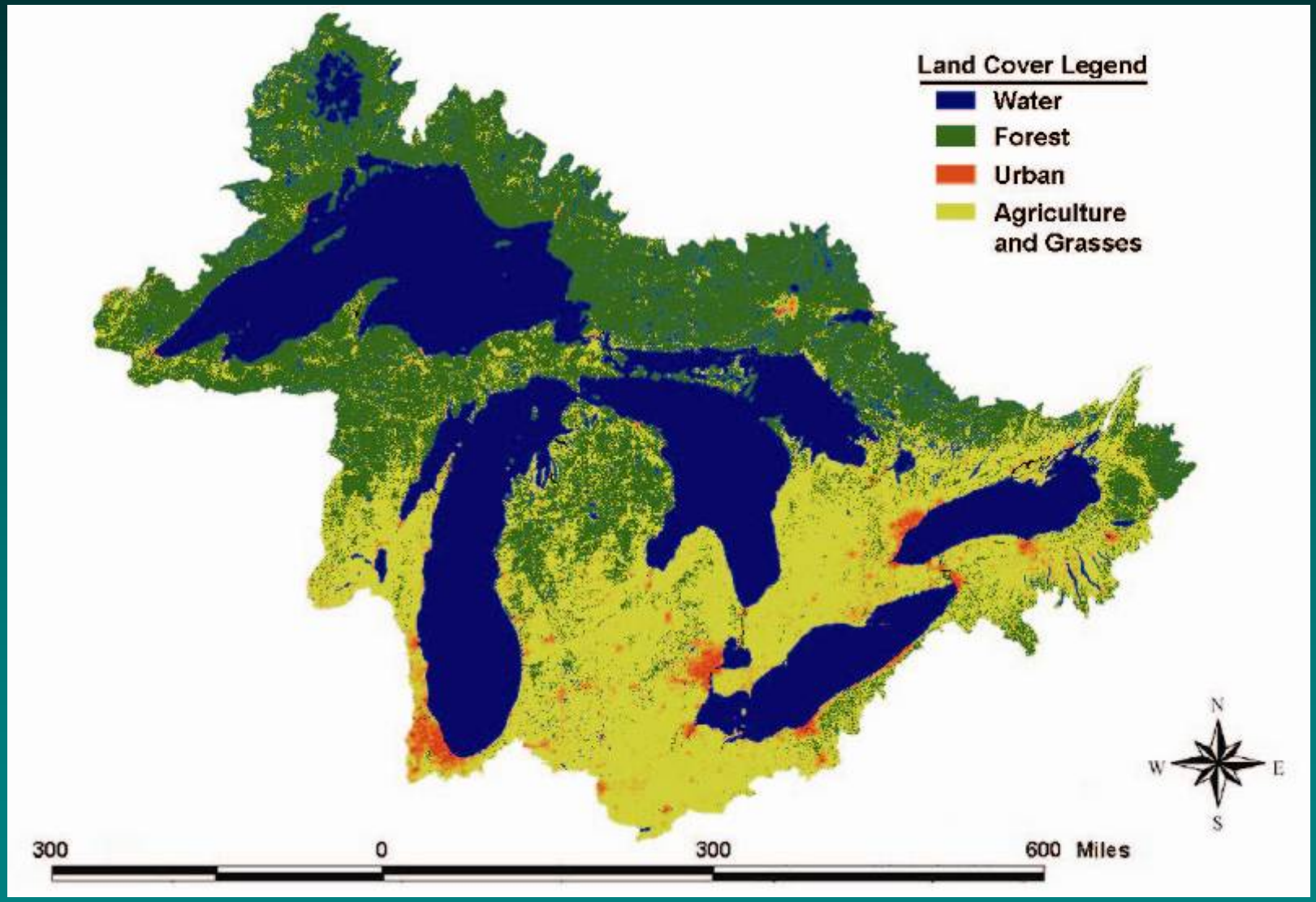


Land Use - Land Cover

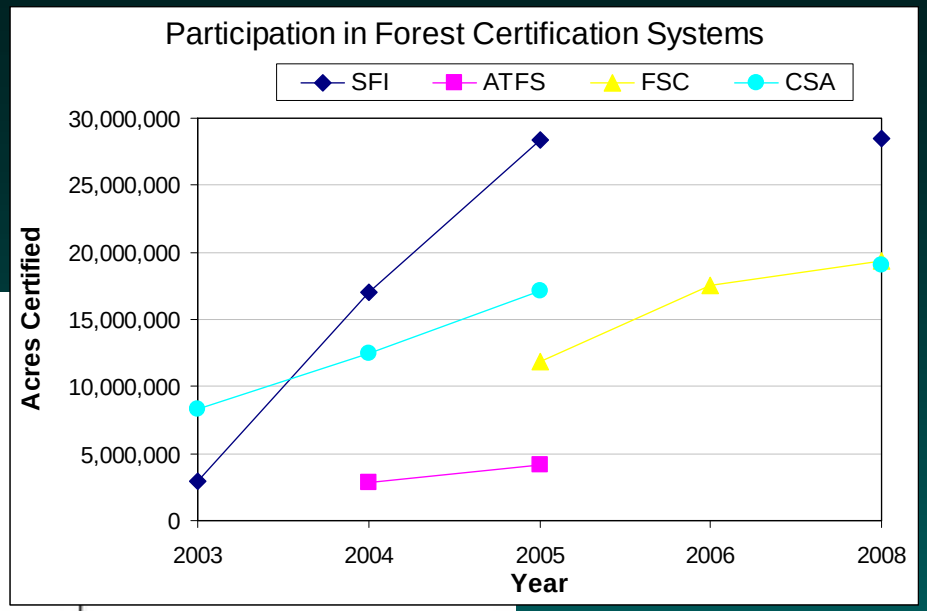


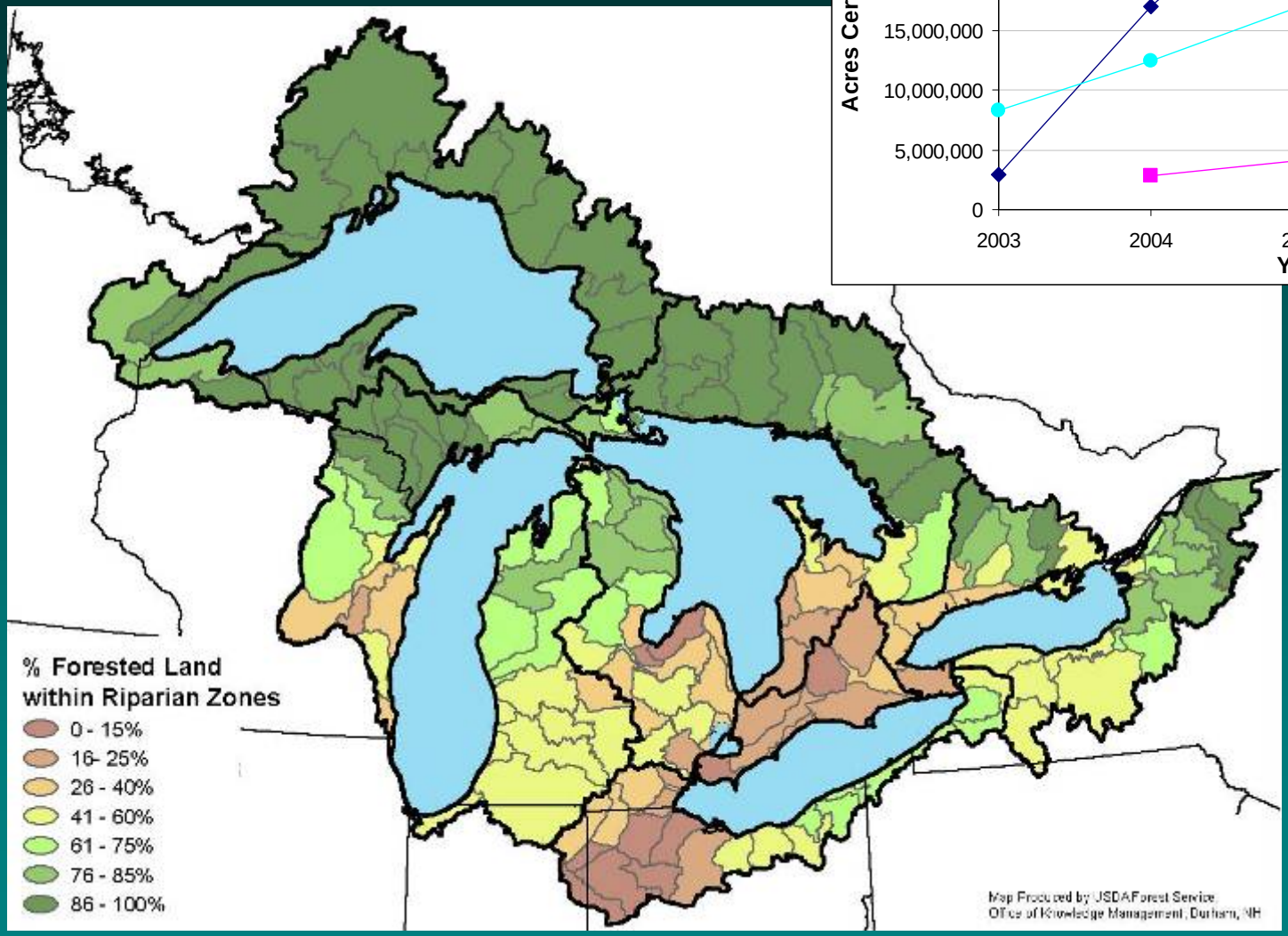

Land Use - Land Cover
POOR
MIXED
FAIR
GOOD
Agriculture Lands
Sustainable Ag. Practices
No Assessment
Nutrient Management
No Assessment
Integrated Pest Management
No Assessment
Urban/Suburban Lands
Urban Density
?
Brownfields Redevelopment
Protected Areas
Biodiversity Conservation Sites
No Assessment
Area, Quality & Protection of Special Communities:
- Cobble Beaches
2005 Report
- Alvars
?
2001 Report
- Sand Dunes
No Assessment
- Islands
?

Land Cover


Land Cover Legend
Water
Forest
Urban
Agriculture and Grasses
N
W
E
S
300
0
300
600 Miles

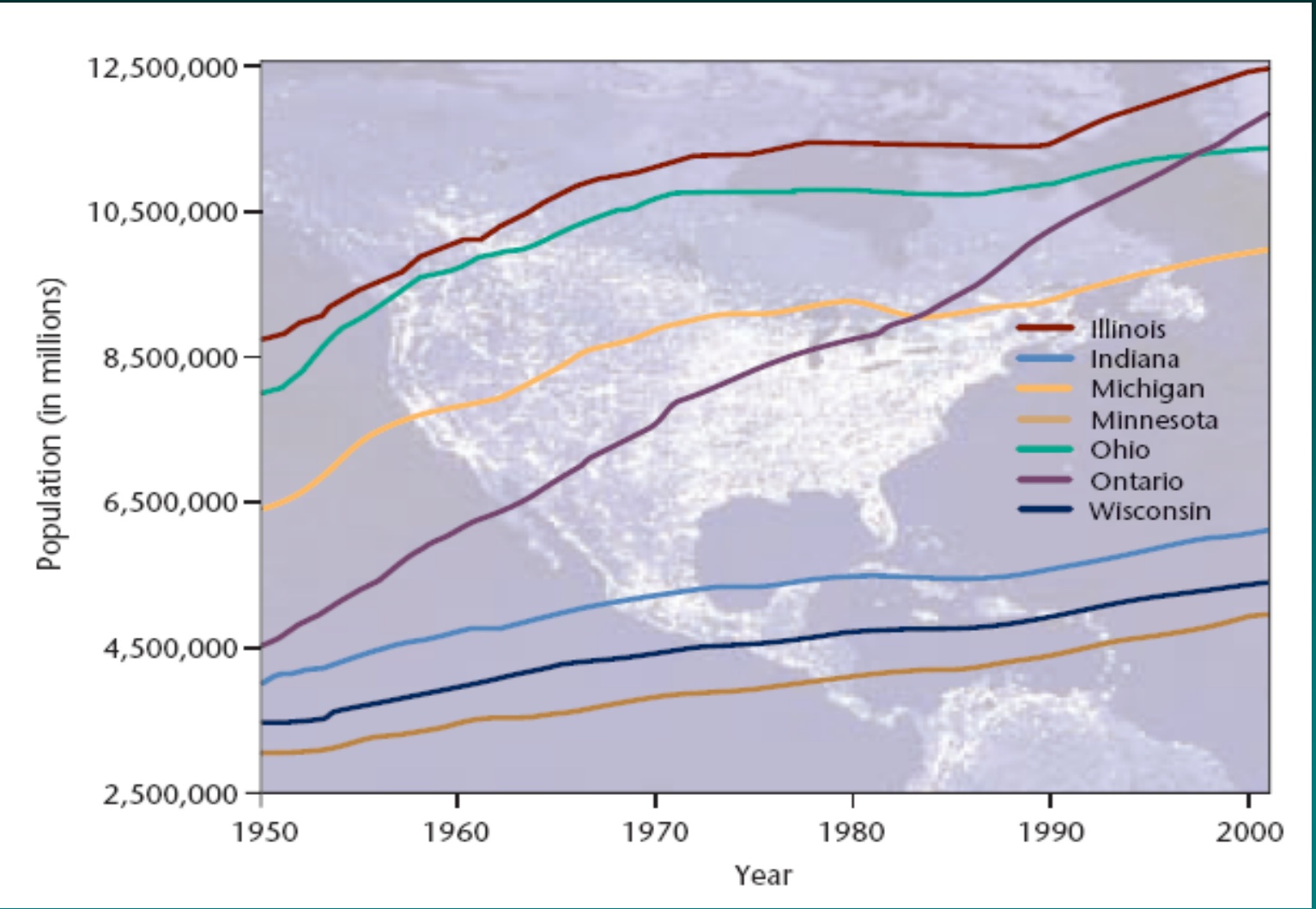
Forest Lands





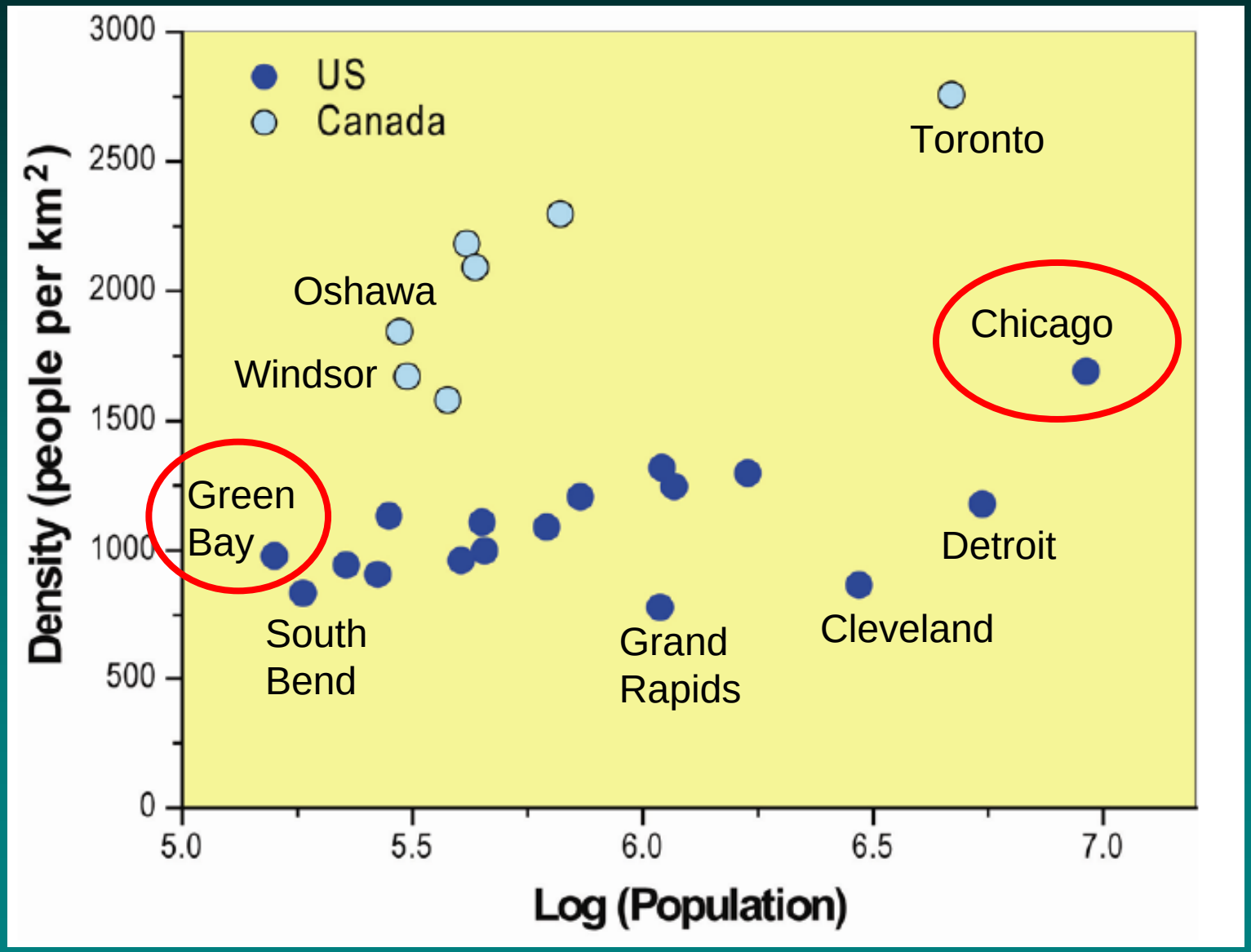
Percent Forested Land within Riparian Zones by Watershed

Population Growth

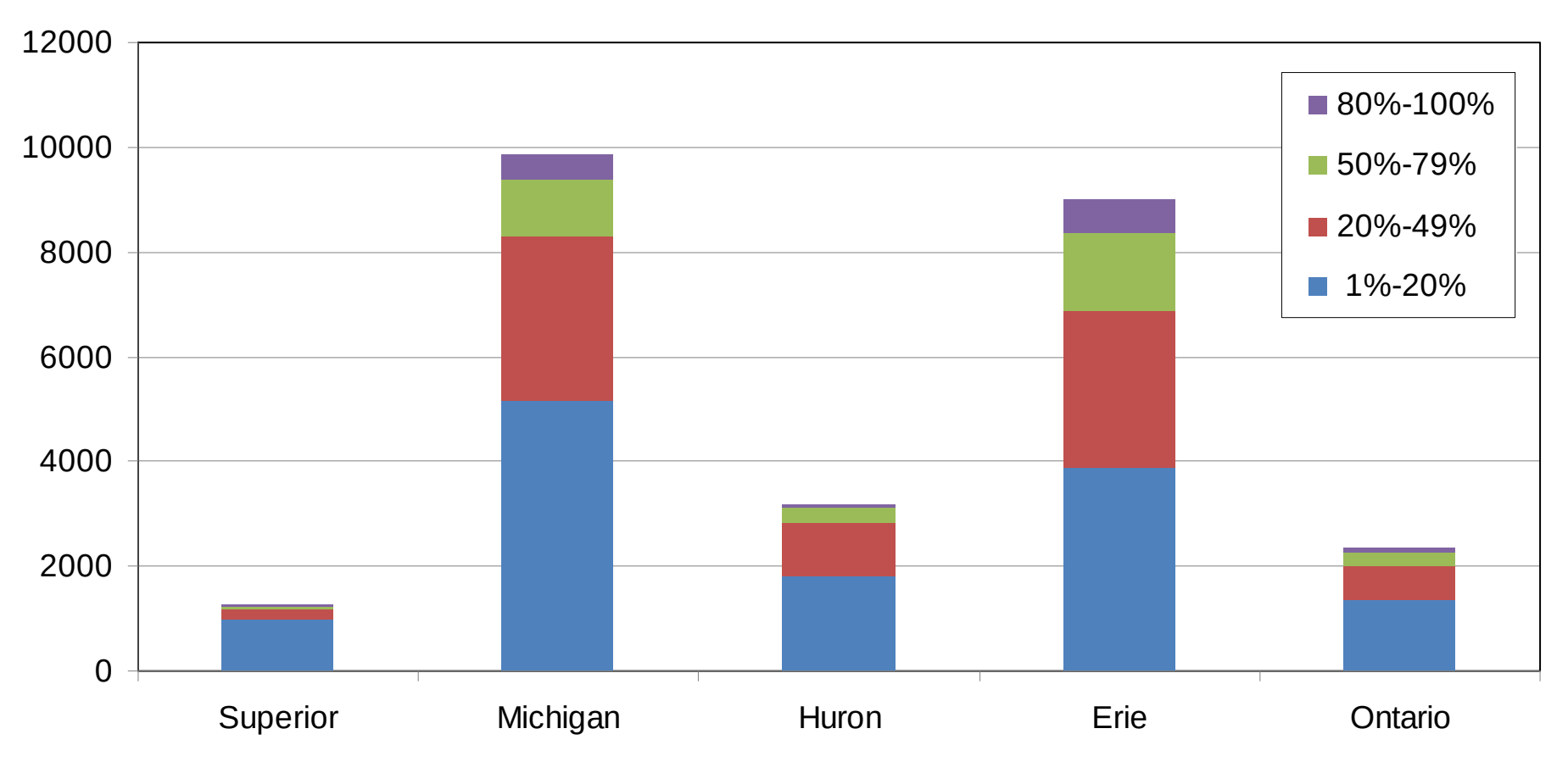


Source: *Confronting Climate Change in the Great Lakes Region*, A Report By The Union of Concerned Scientists and The Ecological Society of America, 2003

Urban Density



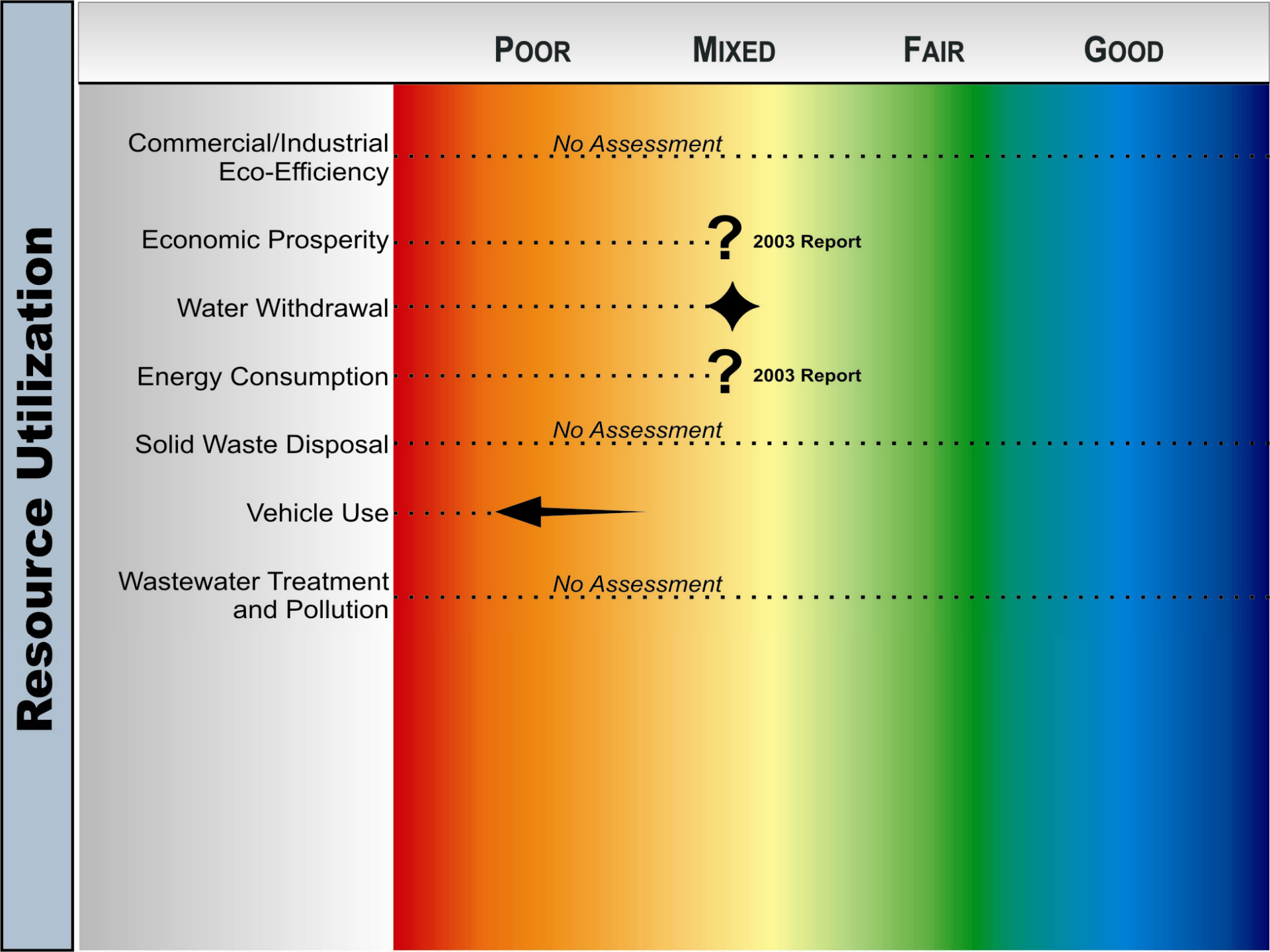
Ground Surface Hardening



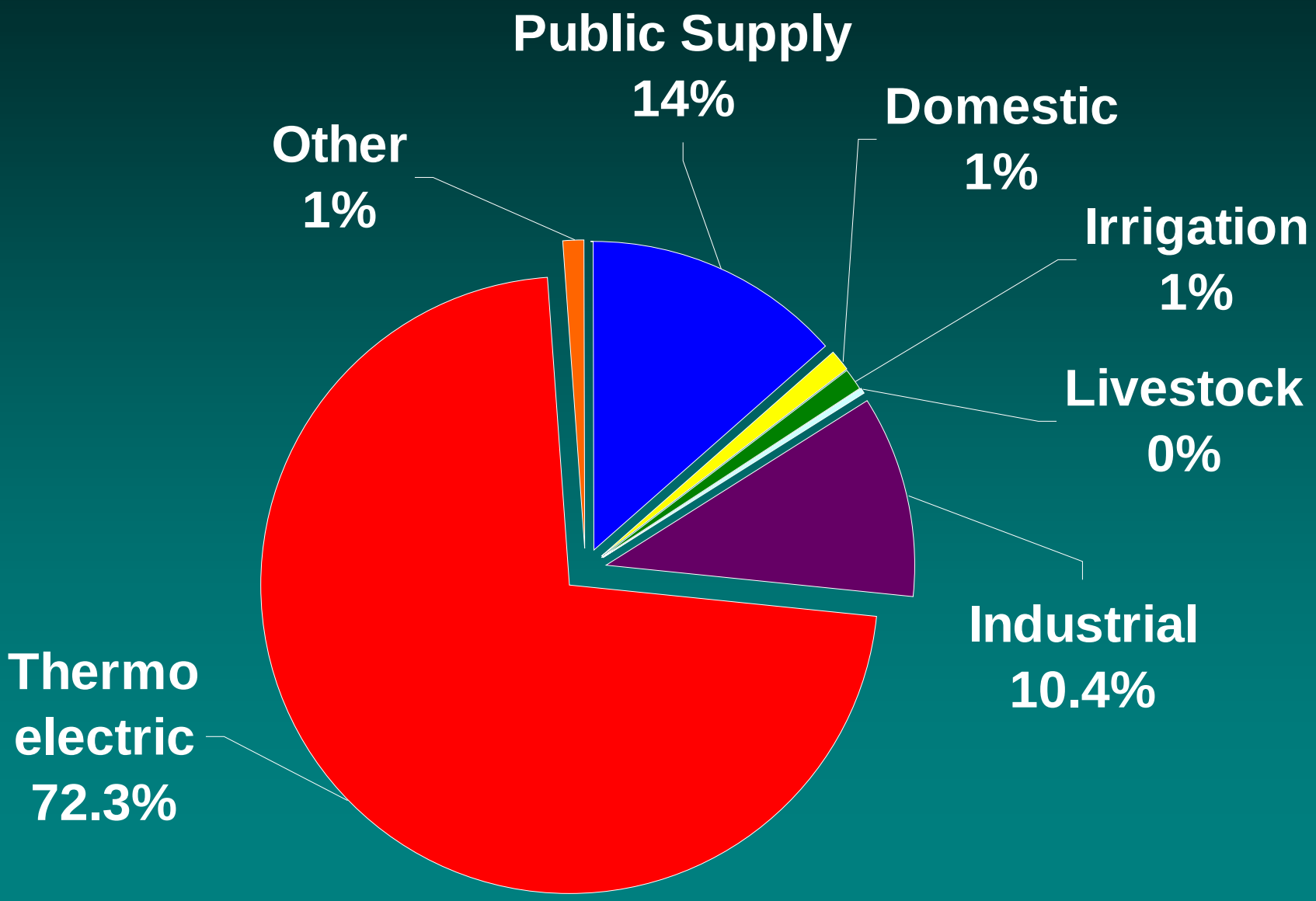
Lake by Lake amounts of impervious surface area (sq. km.) categorized by percent for their respective watershed areas in the US

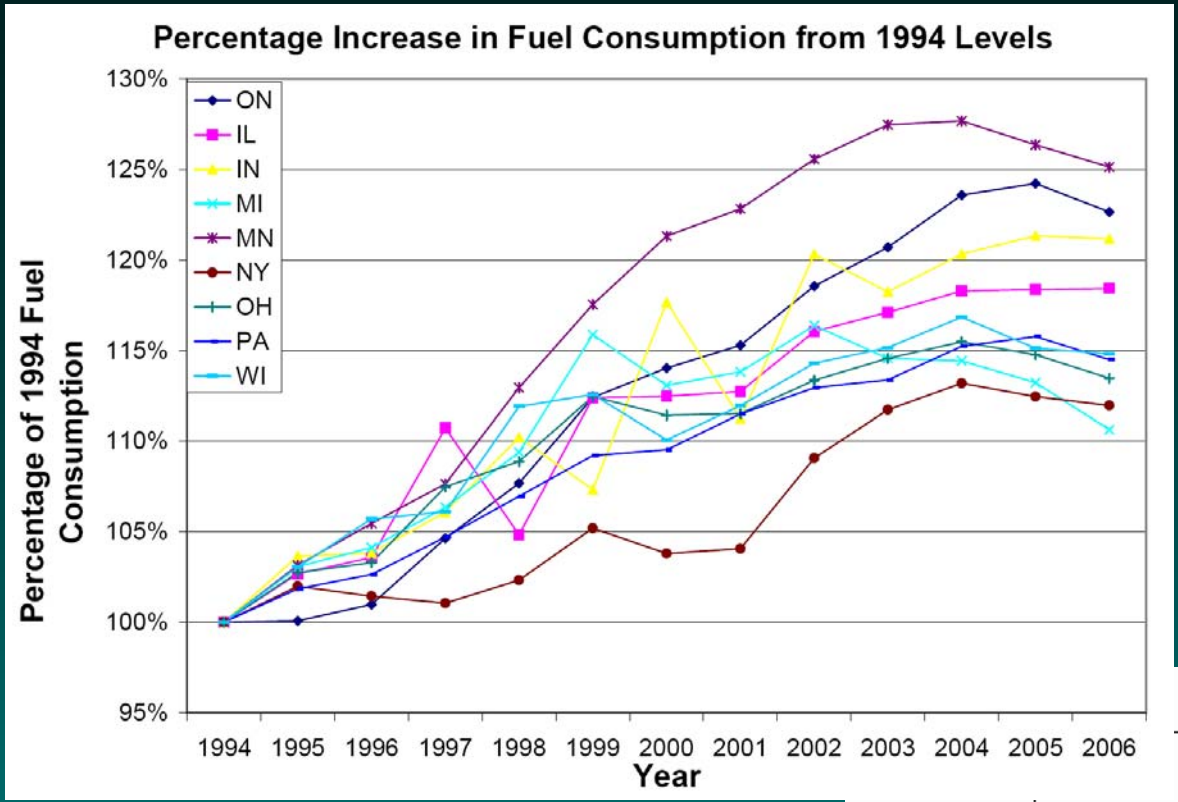
Brownfield Redevelopment

Monroe, MI - 2005


Resource Utilization
POOR
MIXED
FAIR
GOOD
Commercial/Industrial Eco-Efficiency
No Assessment
Economic Prosperity
?
2003 Report
Water Withdrawal
Energy Consumption
?
2003 Report
Solid Waste Disposal
No Assessment
Vehicle Use
Wastewater Treatment and Pollution
No Assessment

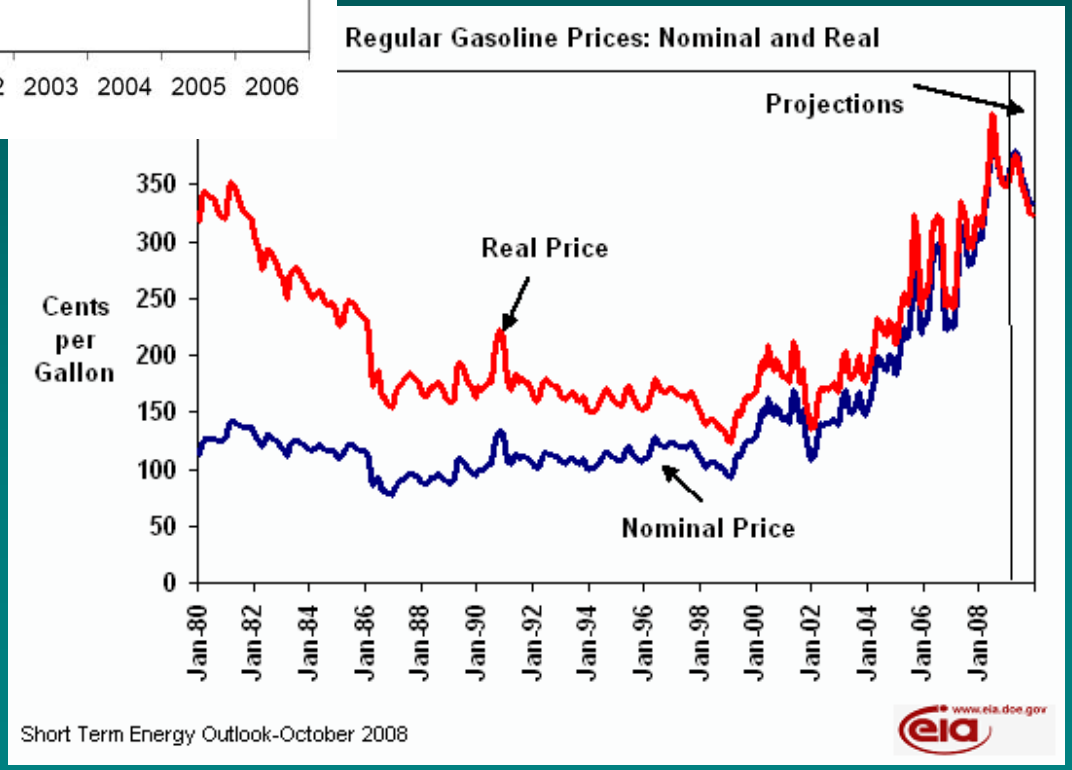
Water Withdrawal





Vehicle Use

Energy Consumption



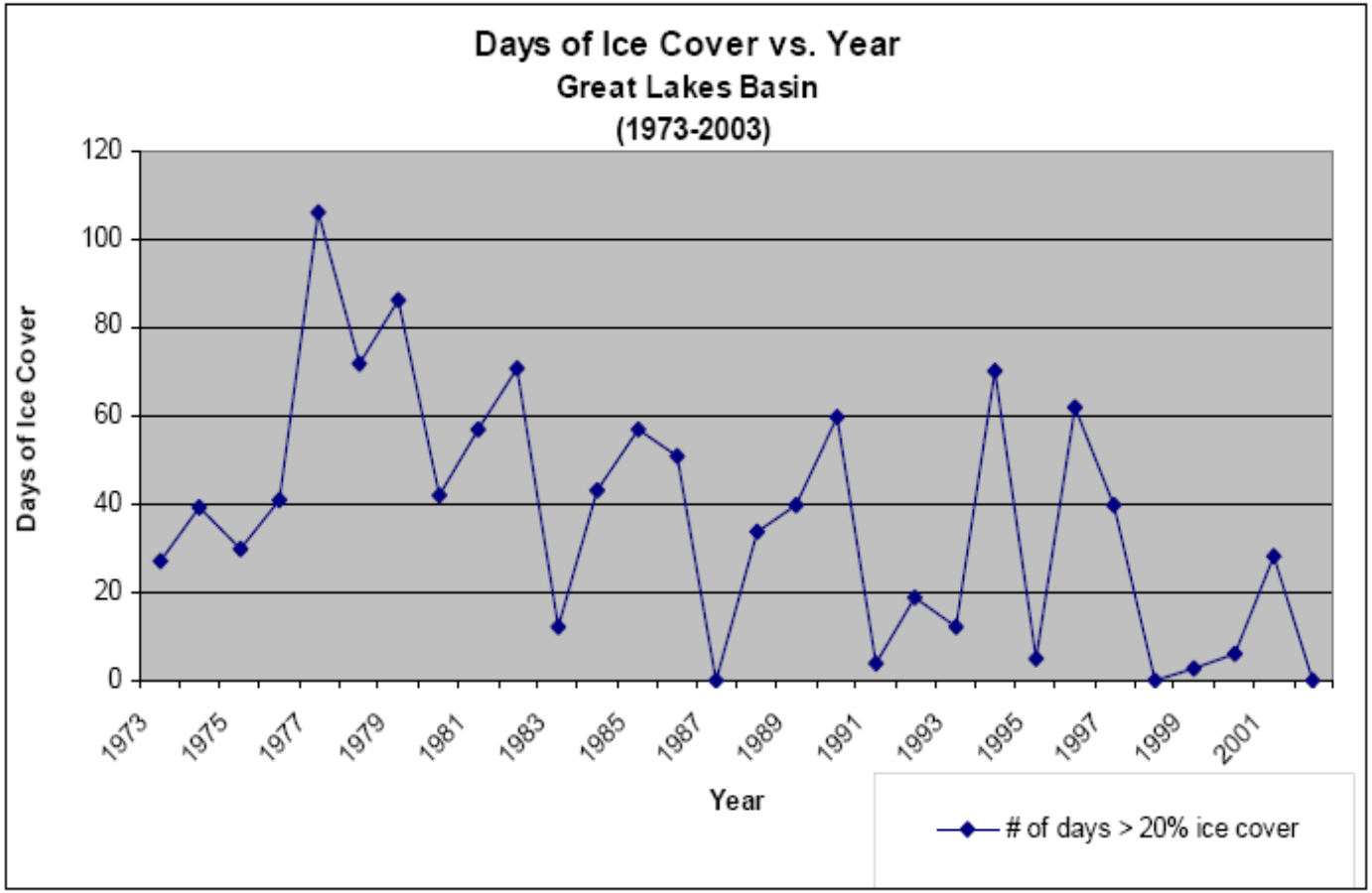
Economic Prosperity

Climate Change

POOR MIXED FAIR GOOD

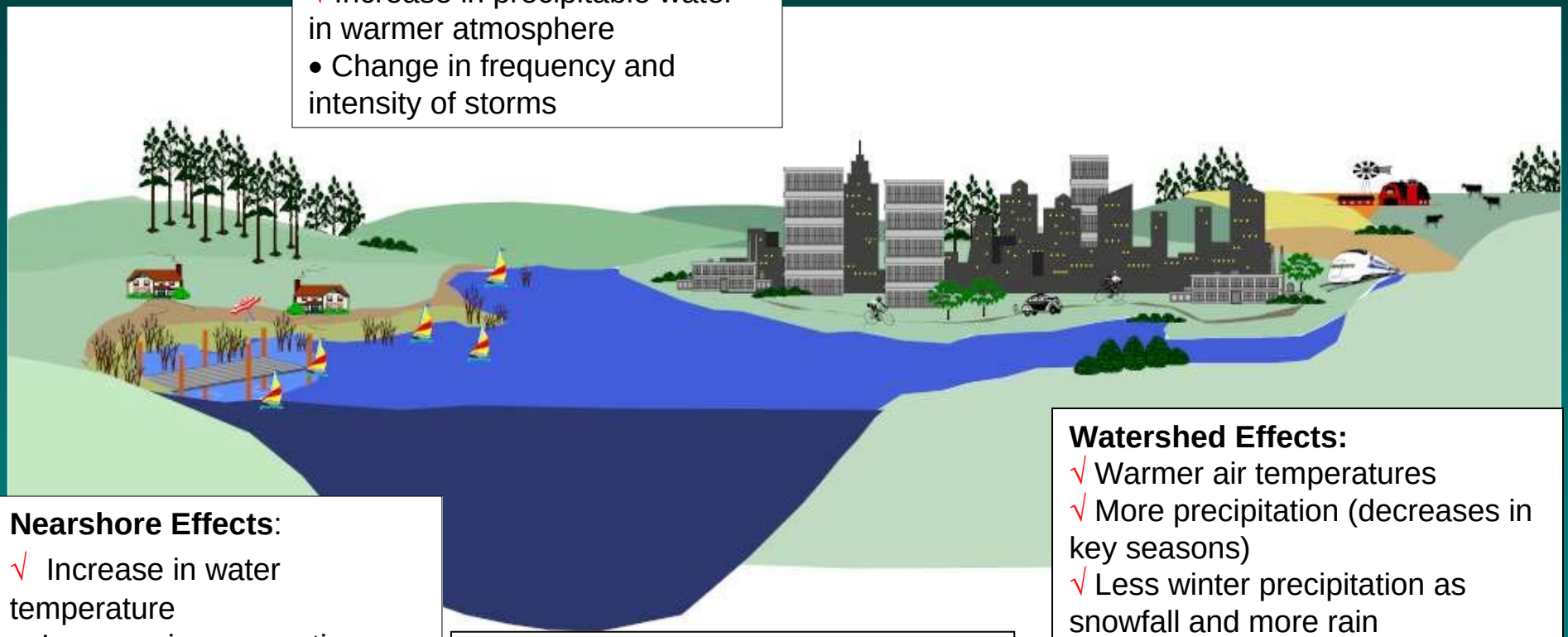
Ice Duration on the Great Lakes

2007 Report



Projected Effects of Climate Change (√ observed)

Airshed Effects:
√ Increase in air temperatures
√ Increase in precipitable water in warmer atmosphere
• Change in frequency and intensity of storms



Nearshore Effects:
√ Increase in water temperature
• Increase in evaporation

Inlake Effects:
√ Increase in water temperature
• Higher evaporative losses from lakes
√ Less ice cover (shorter duration)

Watershed Effects:
√ Warmer air temperatures
√ More precipitation (decreases in key seasons)
√ Less winter precipitation as snowfall and more rain
√ Less snowpack
√ More intense precipitation events
• Increase in evapotranspiration

Our Changing Climate

Management Challenges for the Great Lakes Basin

- Our ability to detect the occurrence of chemicals in environmental media continues to improve. With this in mind, how do we balance actual risks to the environment/ human health with perceived risks?
- Quantitative prediction of tributary/nearshore water quality improvements resulting from urban/rural non-point source Best Management Practices

Acknowledgments

- MOE colleagues in EMRB and the Great Lakes Office especially Nadine Benoit and Paul Helm
- Stacey Cherwaty-Pergentile and Nancy Stadler-Salt
- Stephanie Ross, Jackie Adams, Paul Bertram and Karen Rodriguez