


US EPA ARCHIVE DOCUMENT

A scenic view of Niagara Falls, showing the water cascading over the rocky cliffs into the pool below. The sky is overcast, and the surrounding landscape is lush with green trees and vegetation. The text is overlaid on a dark, semi-transparent rectangular box in the center of the image.

# **Human Health, Land Use, Resource Utilization and Climate Change**

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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

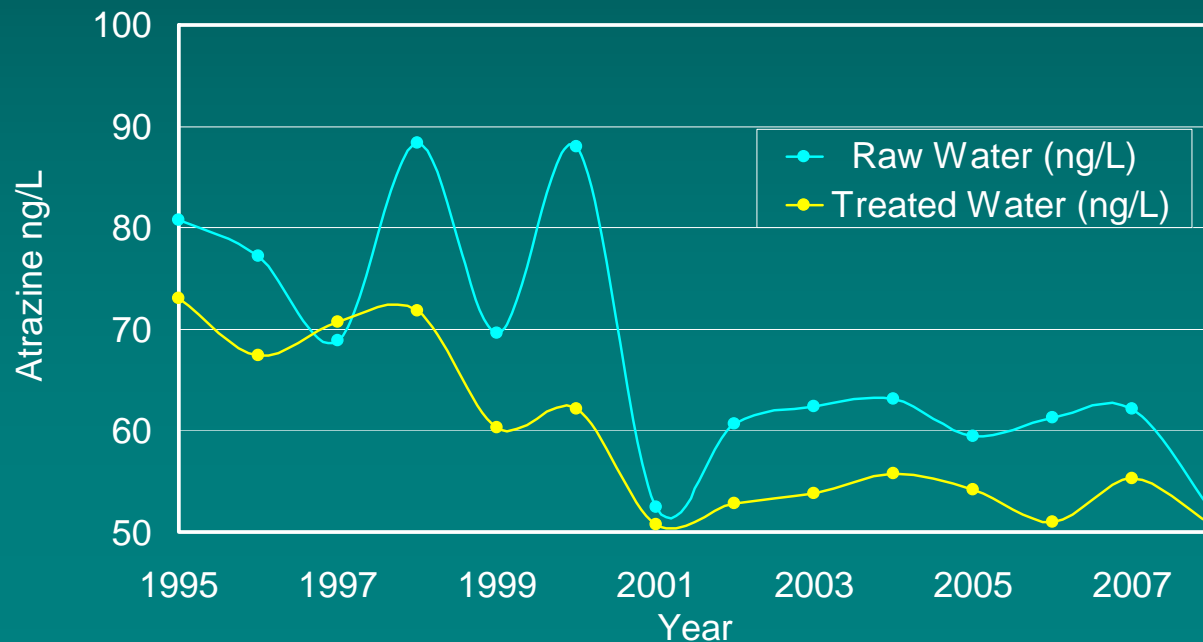
Contaminants in Sport  
Fish

Air Quality

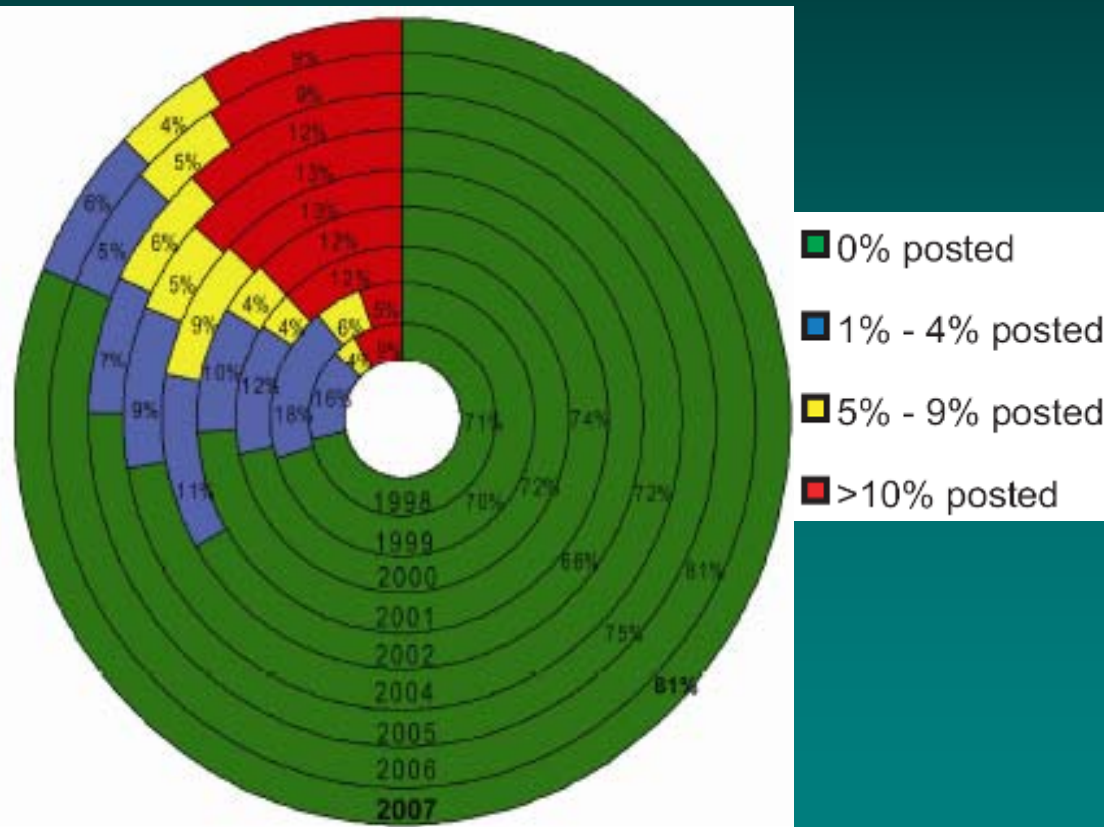
# Drinking Water Quality



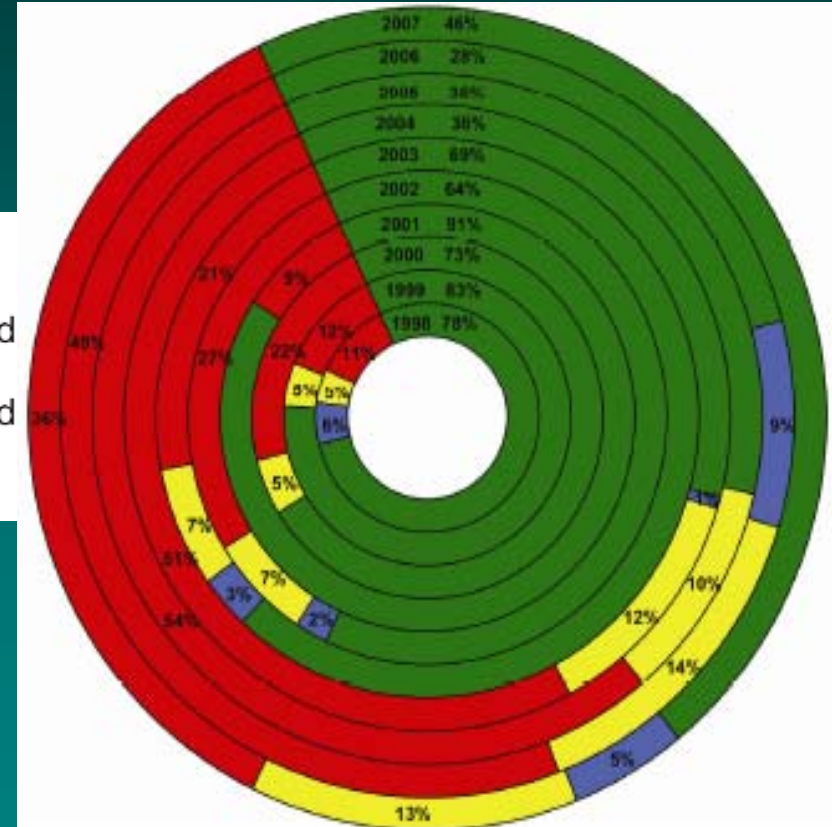
Atrazine at Drinking Water Intakes and Treated Waters  
Ontario



# Beach Advisories, Postings and Closings



United States



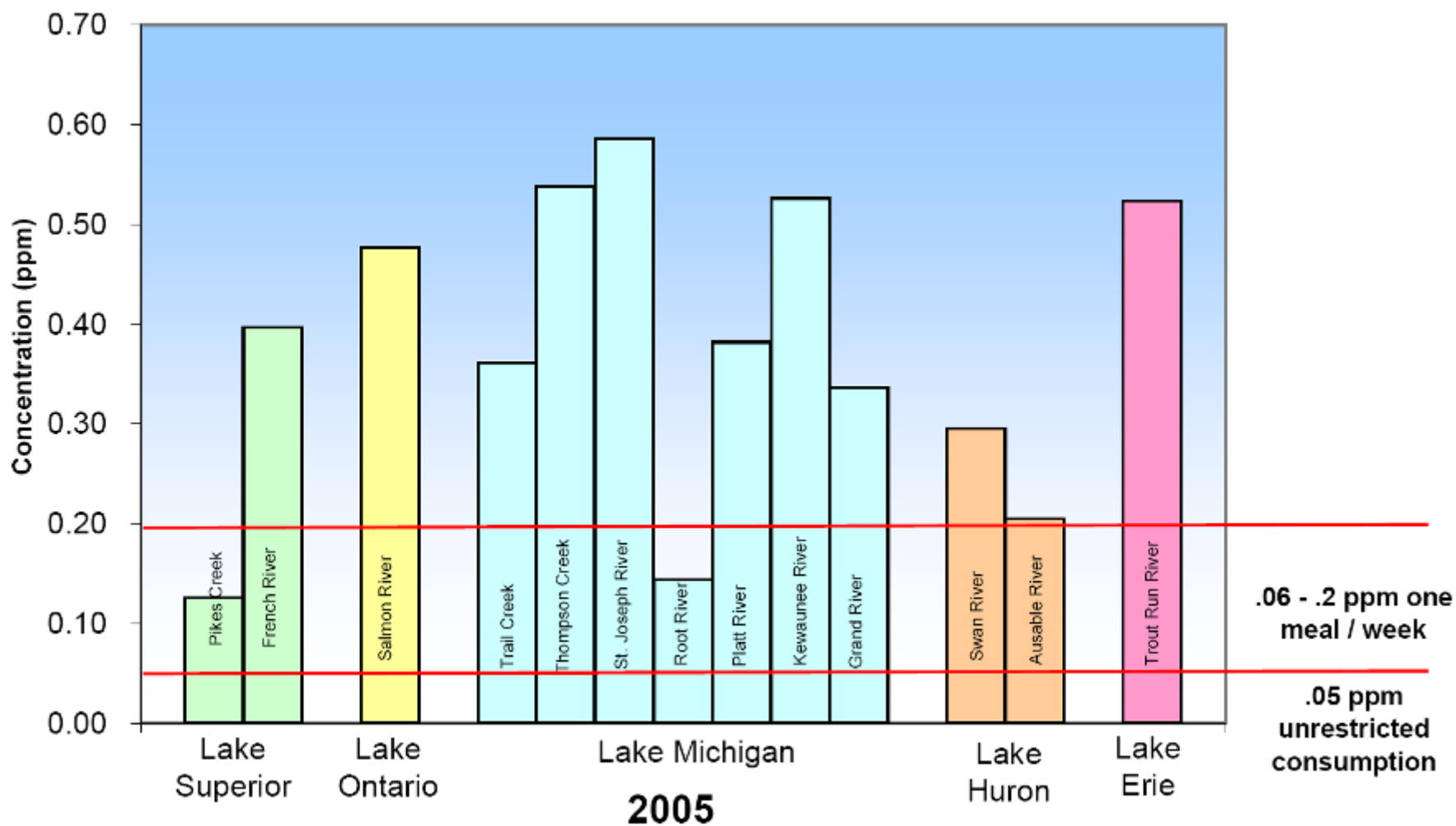
Canada

# Beach Advisories, Postings and Closings



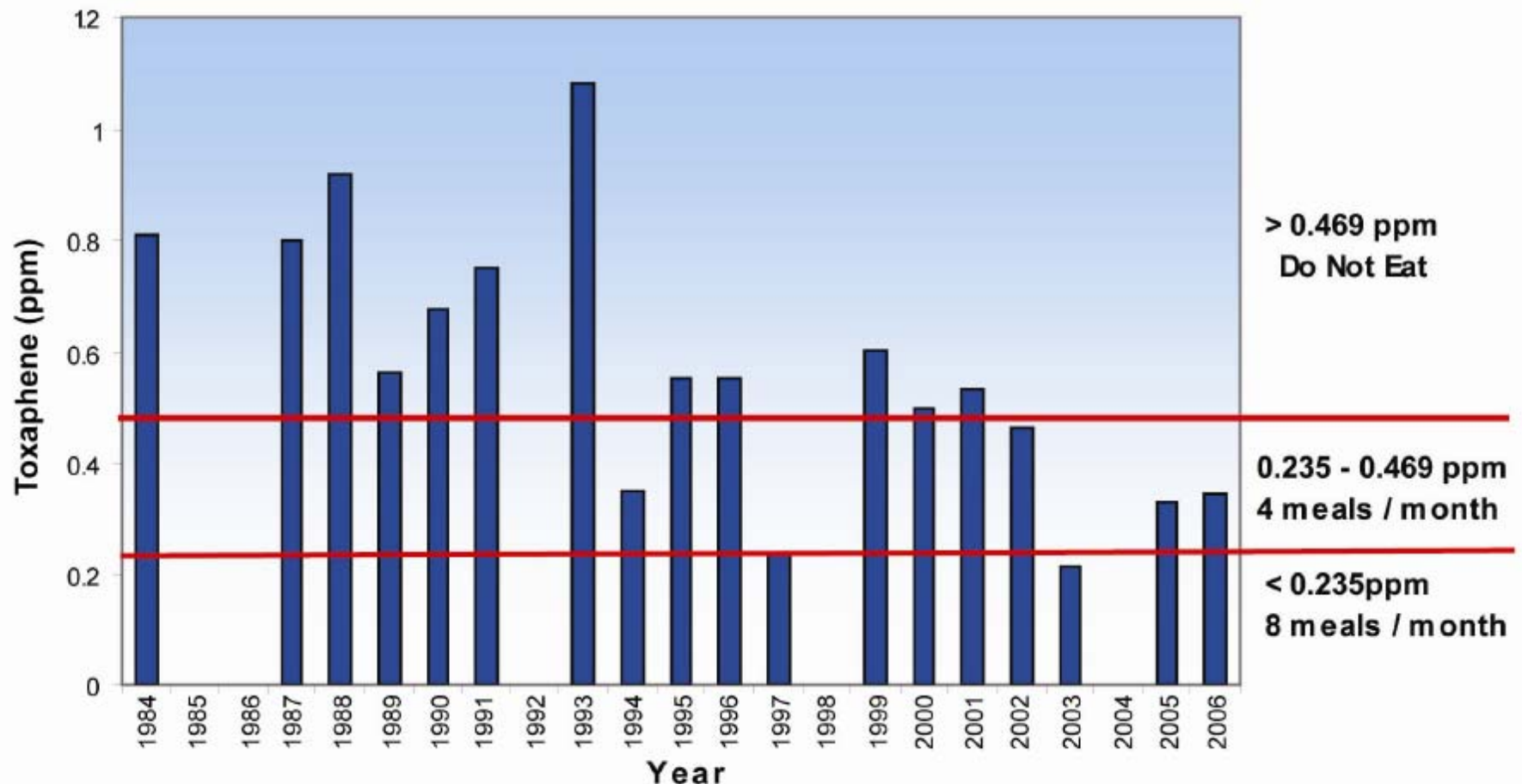


# Contaminants in Sportfish





# Contaminants in Sportfish

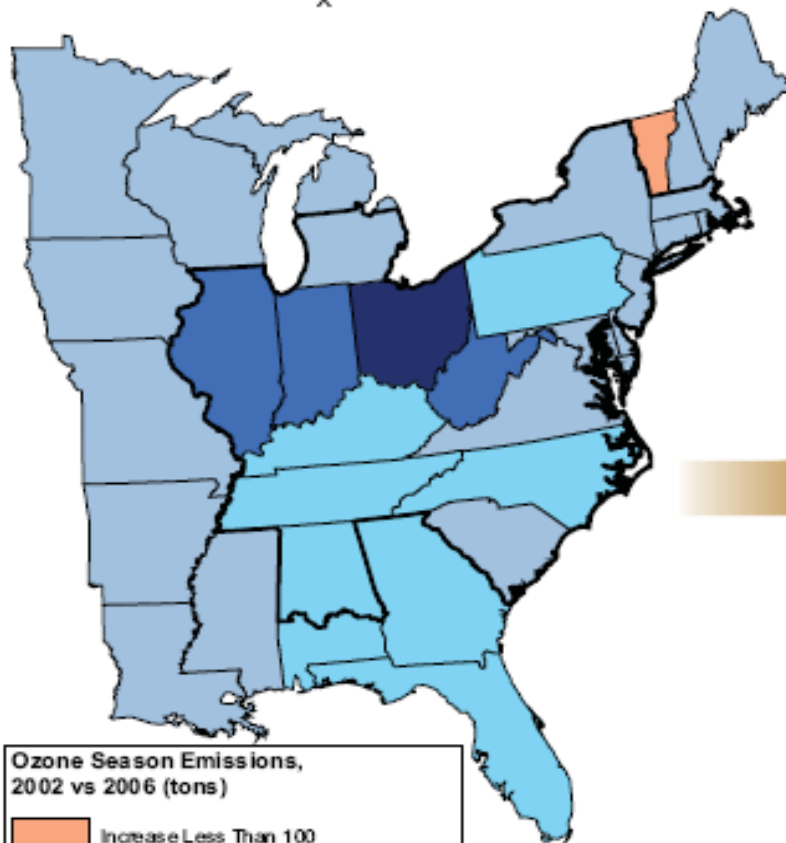


# Air Quality

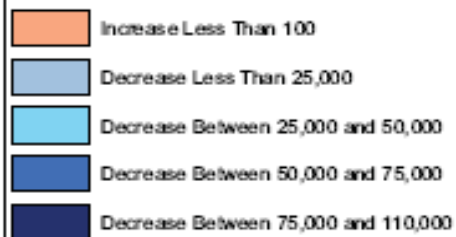


# Air Quality

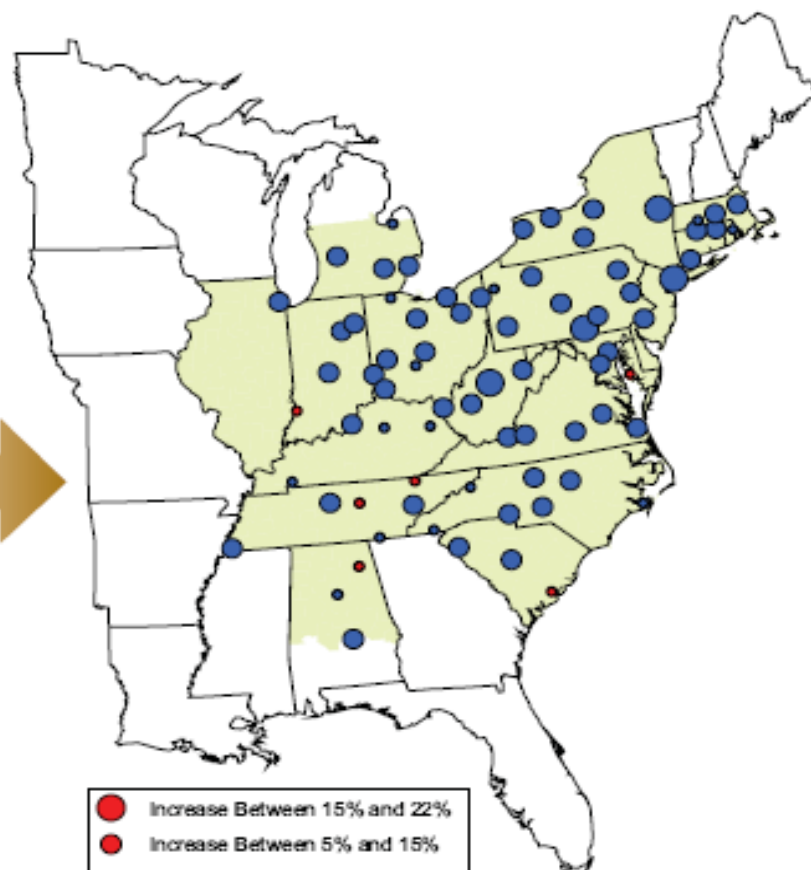
NO<sub>x</sub> Emissions



Ozone Season Emissions,  
2002 vs 2006 (tons)

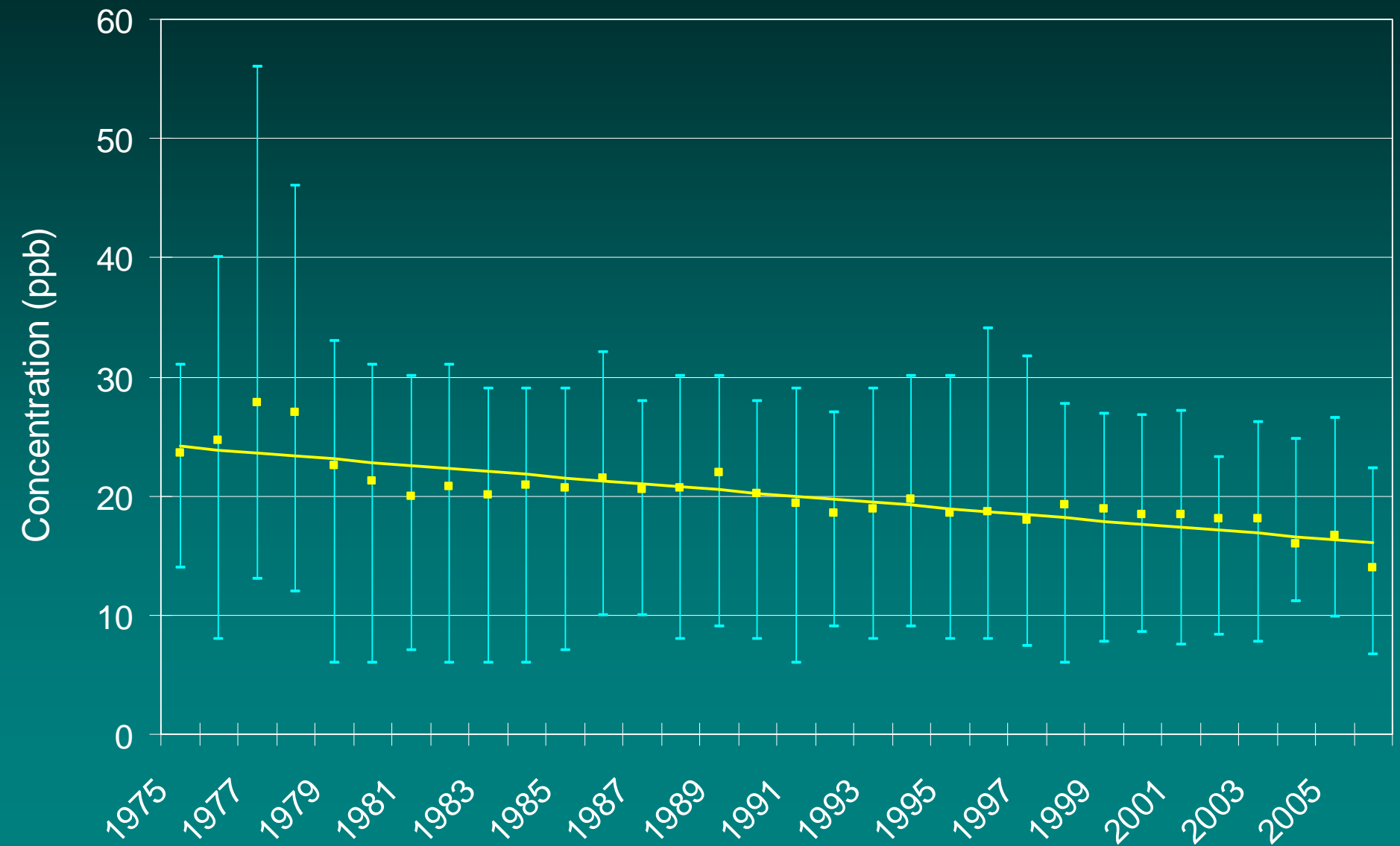


Percent Change in Seasonal 8-Hour Ozone



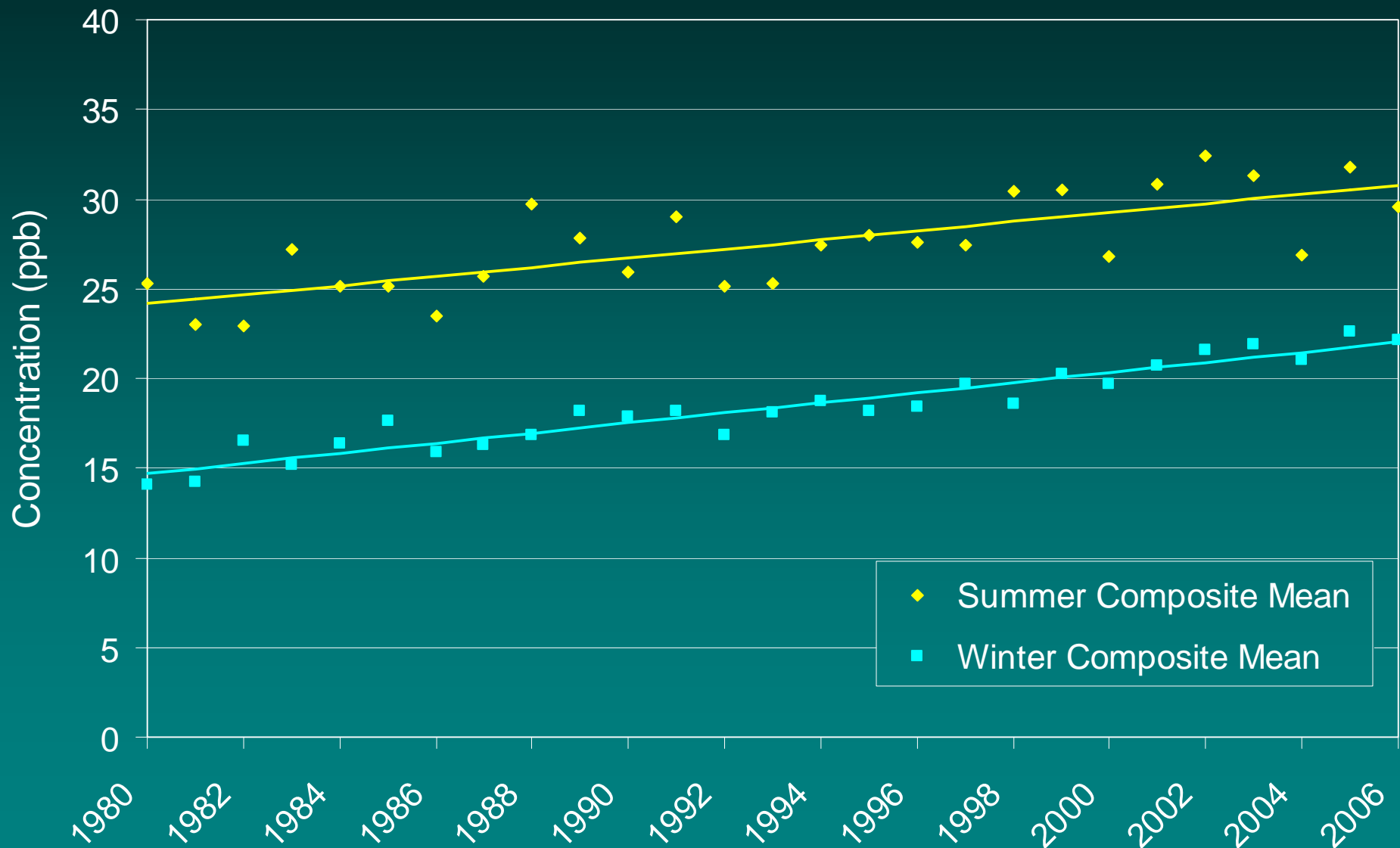
Margin of error is +/- 5 percent.

# 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

POOR

MIXED

FAIR

GOOD

## General

Land Cover & Conversion

?

2007 Report

GW & Land: Use & Intensity

No Assessment

Land Cover Adjacent to  
Coastal Wetlands

No Assessment

Ground Surface Hardening

?

## Forest Lands

Conservation of Biological  
Diversity

?

Maintenance of Productive  
Capacity of Forest  
Ecosystems

No Assessment

Conservation and  
Maintenance of Soil and  
Water Resources

?

# 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

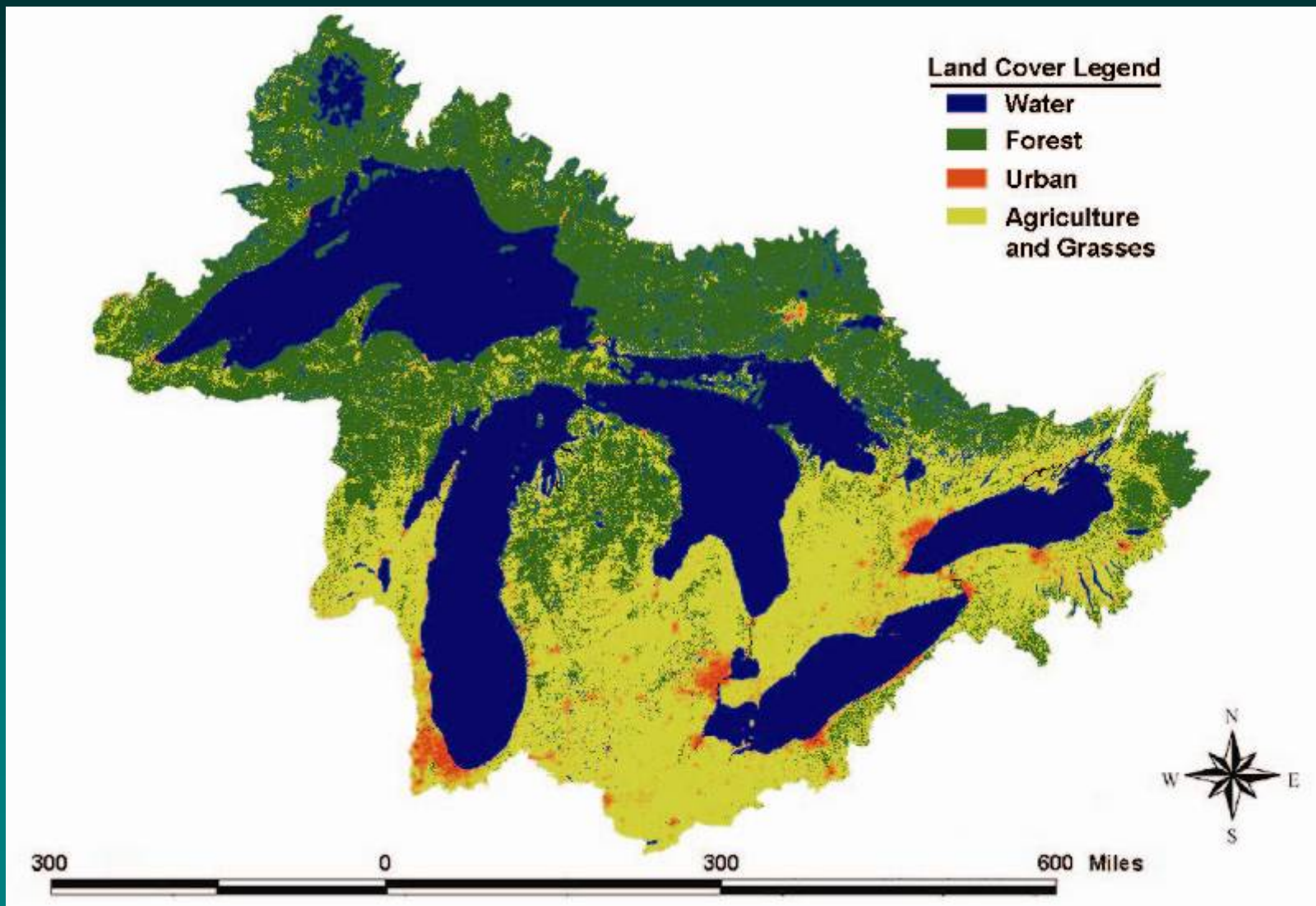
- Sand Dunes

No Assessment

- Islands

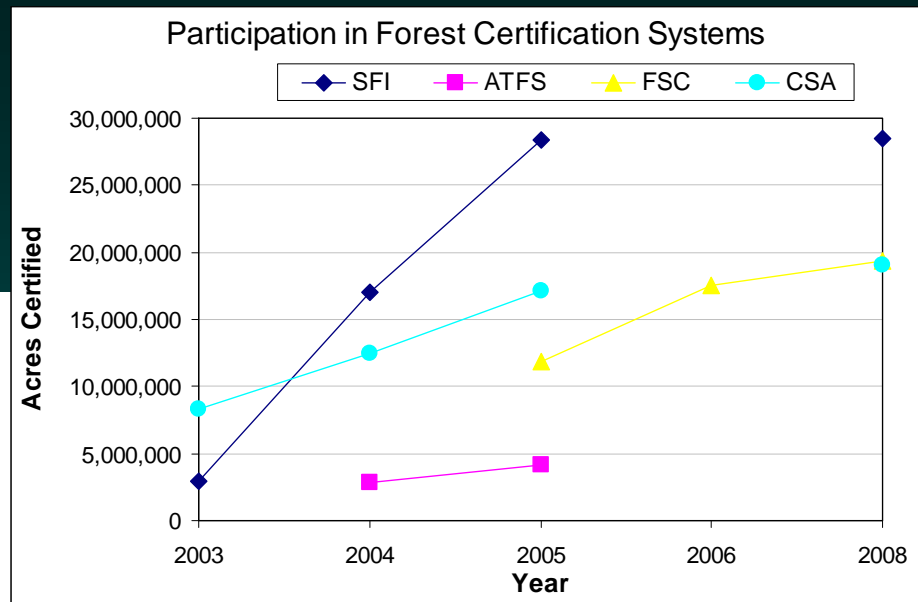
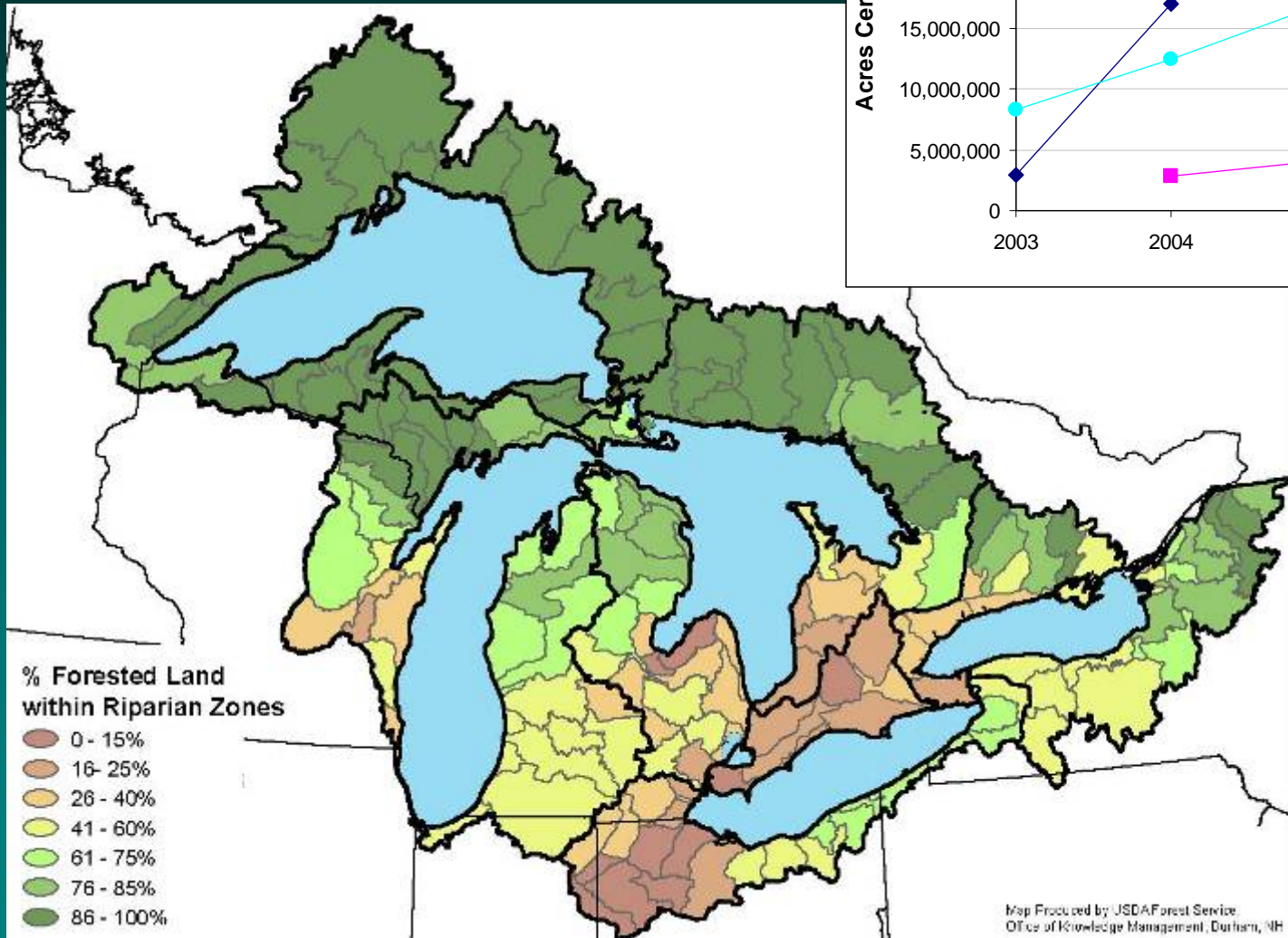
?

# Land Cover



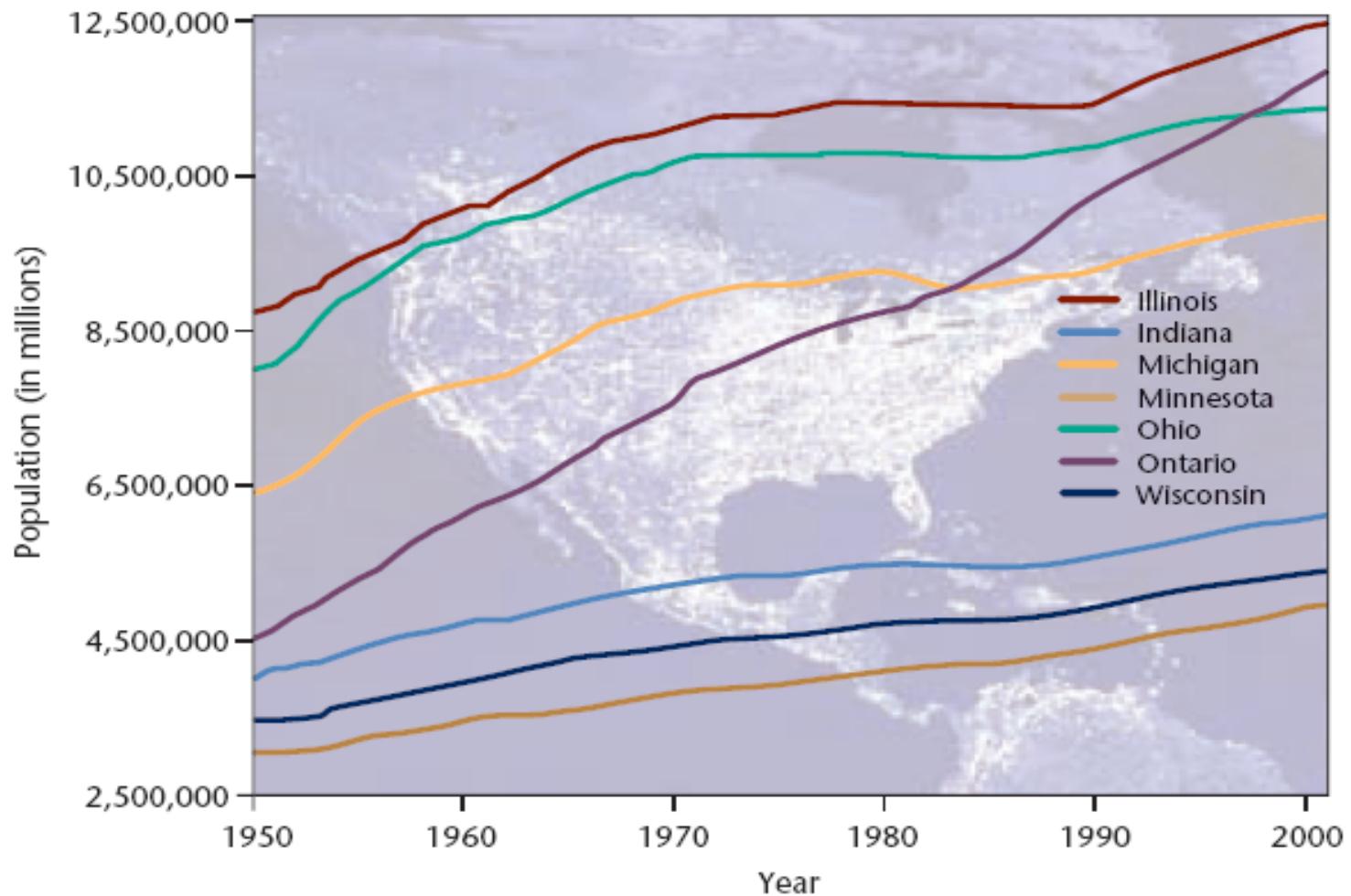


# Forest Lands



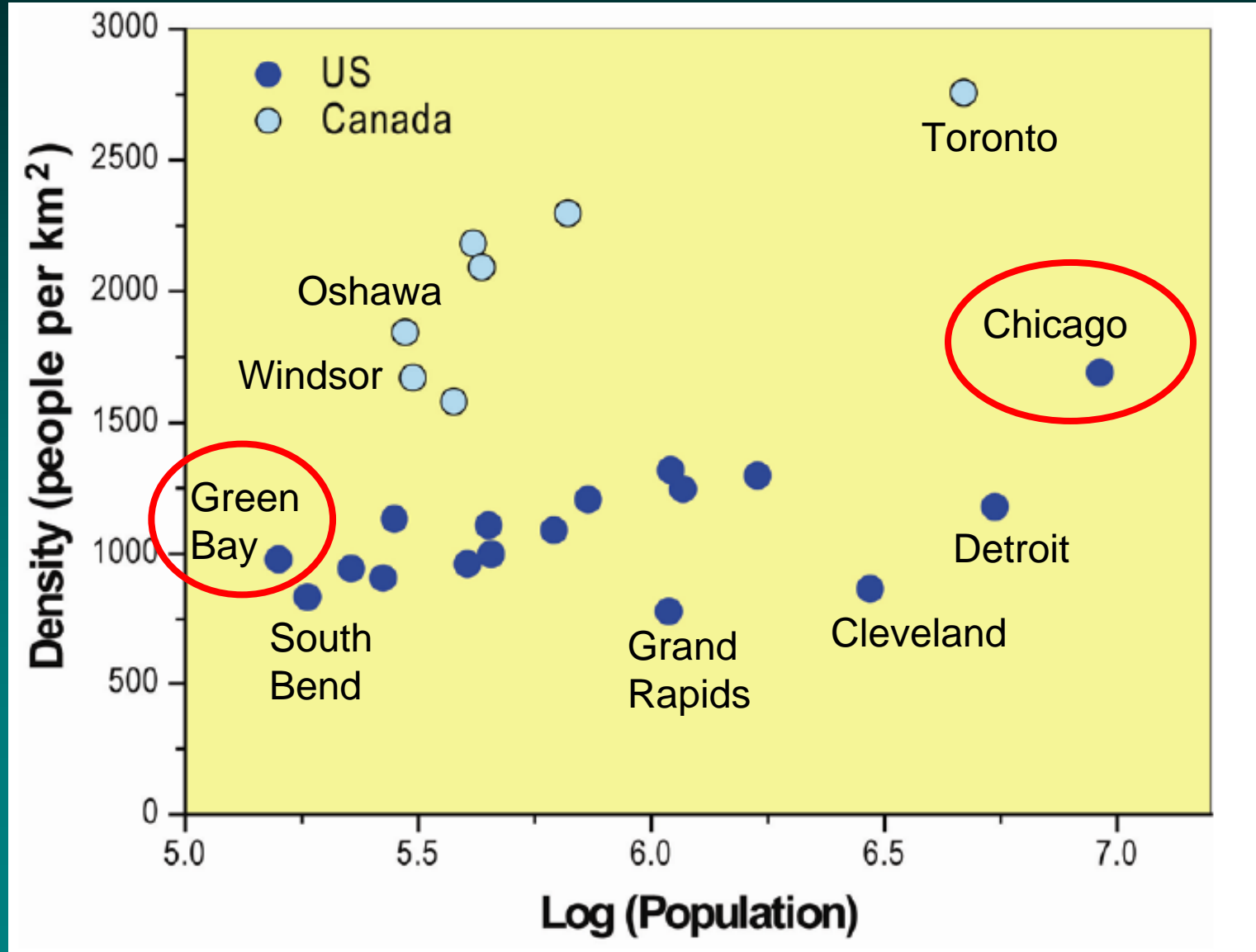
Percent Forested Land within Riparian Zones by Watershed

# Population Growth

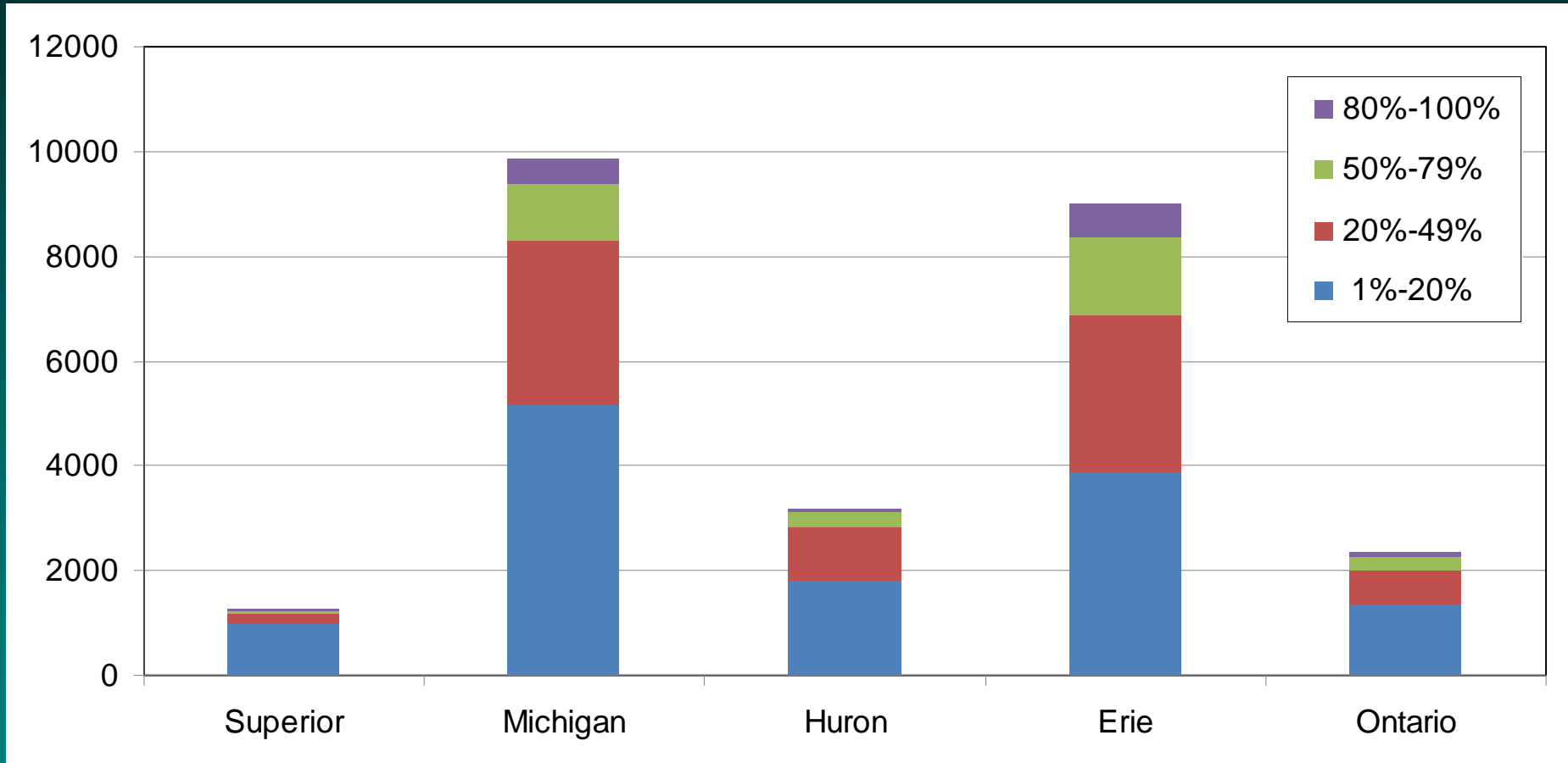


Source: *Confronting Climate Change in the Great Lakes Region*, A Report By The Union of Concerned Scientists and The Ecological Society of America, 2003

# 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



Before

Monroe, MI - 2005



After

# 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*

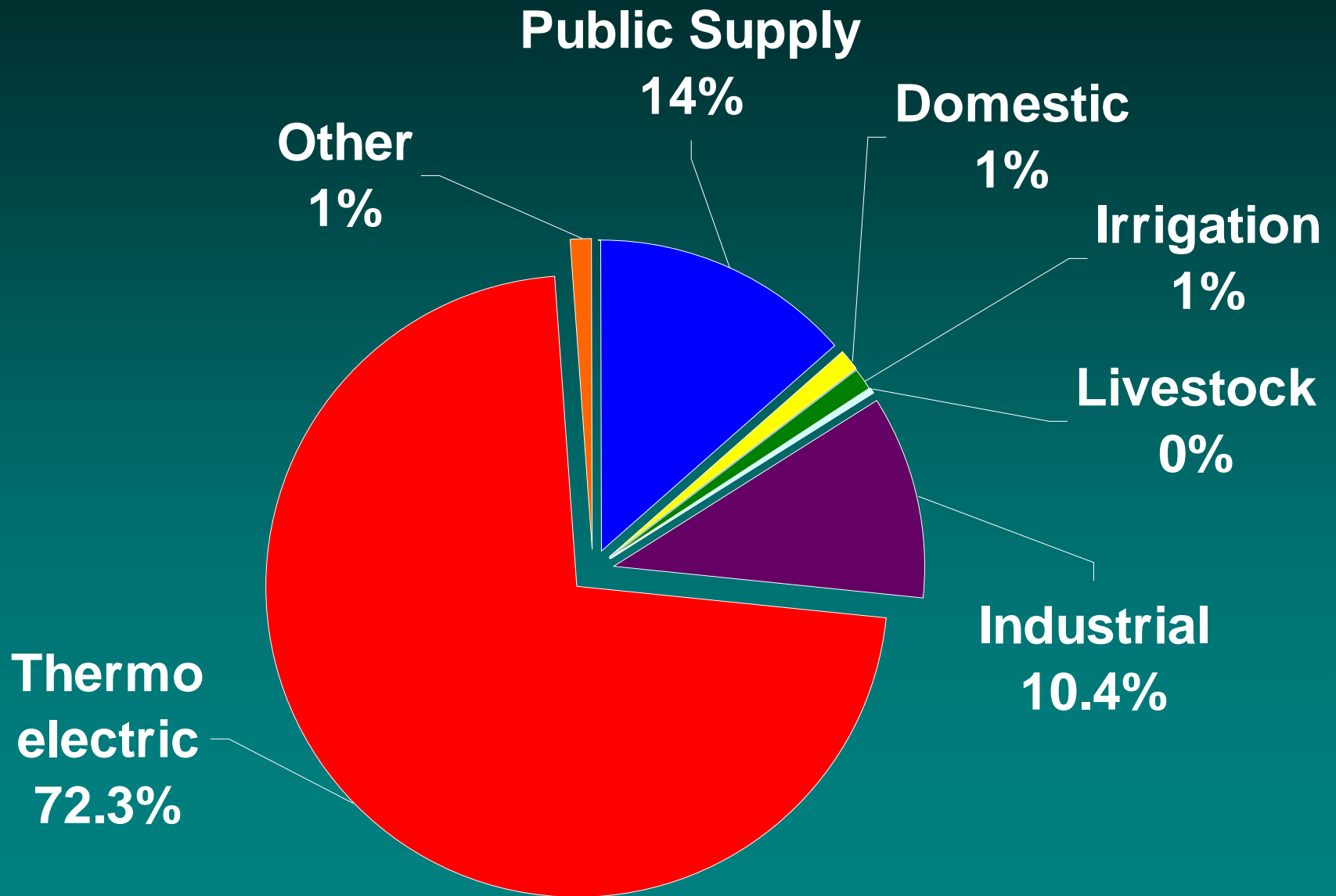
Vehicle Use



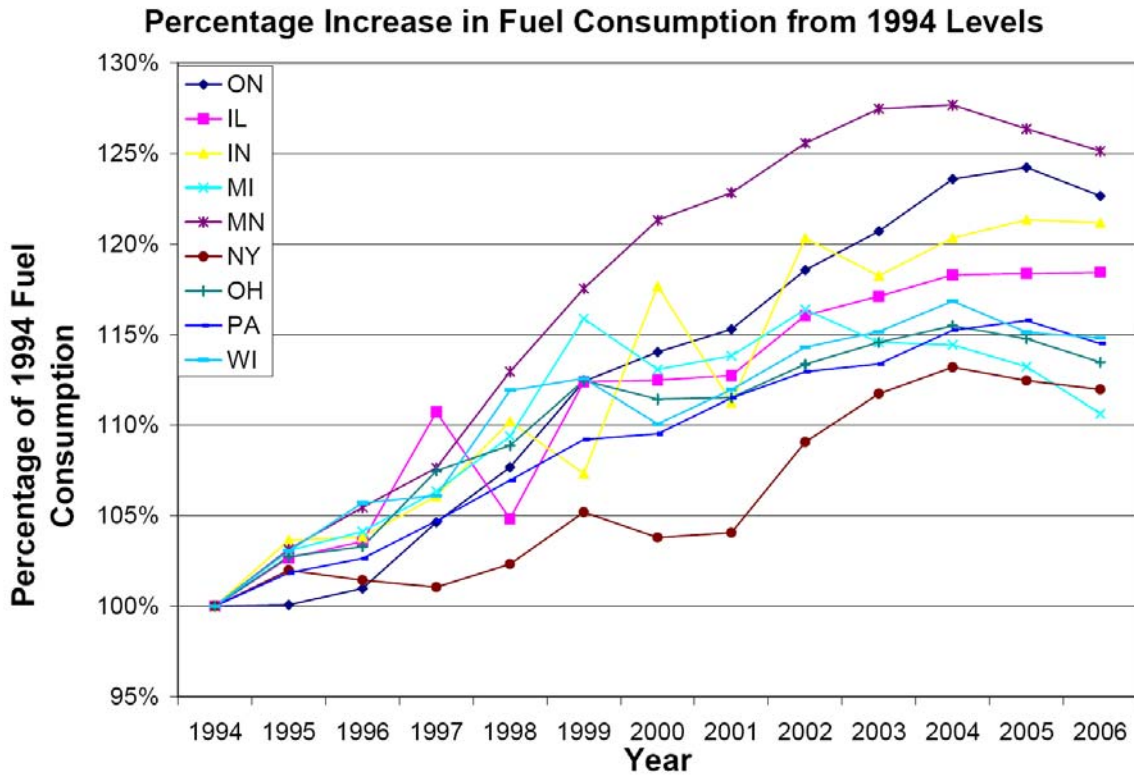
Wastewater Treatment  
and Pollution

*No Assessment*

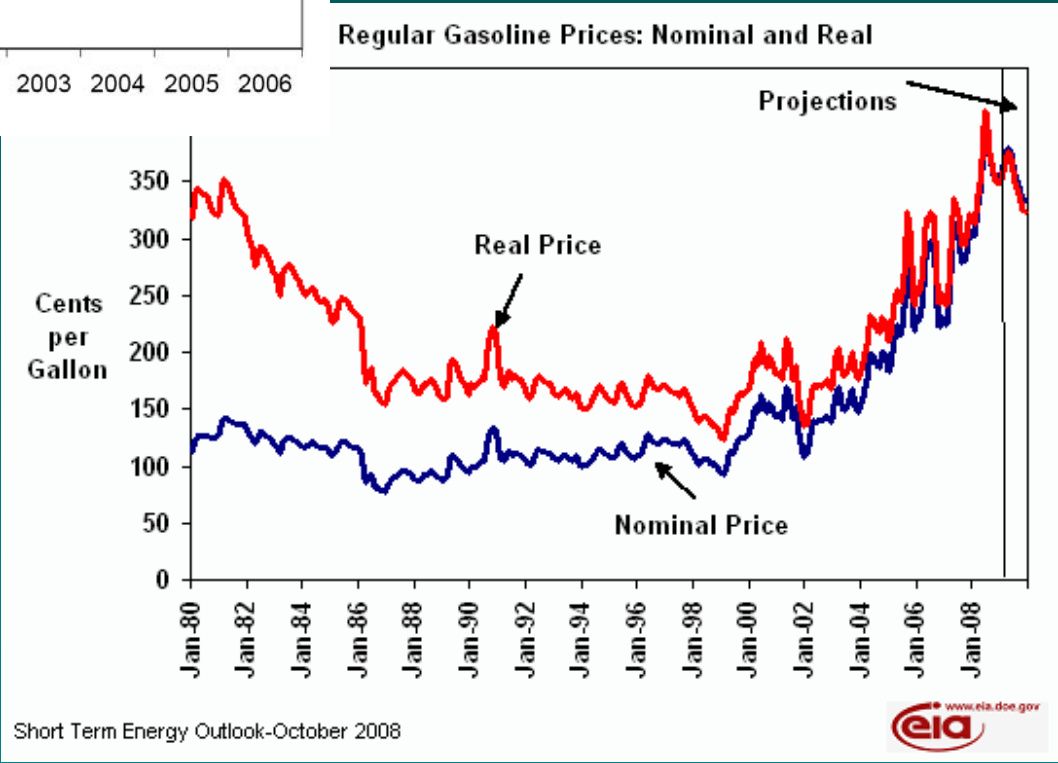
# Water Withdrawal



# Vehicle Use



# Energy Consumption





# Economic Prosperity



POOR

MIXED

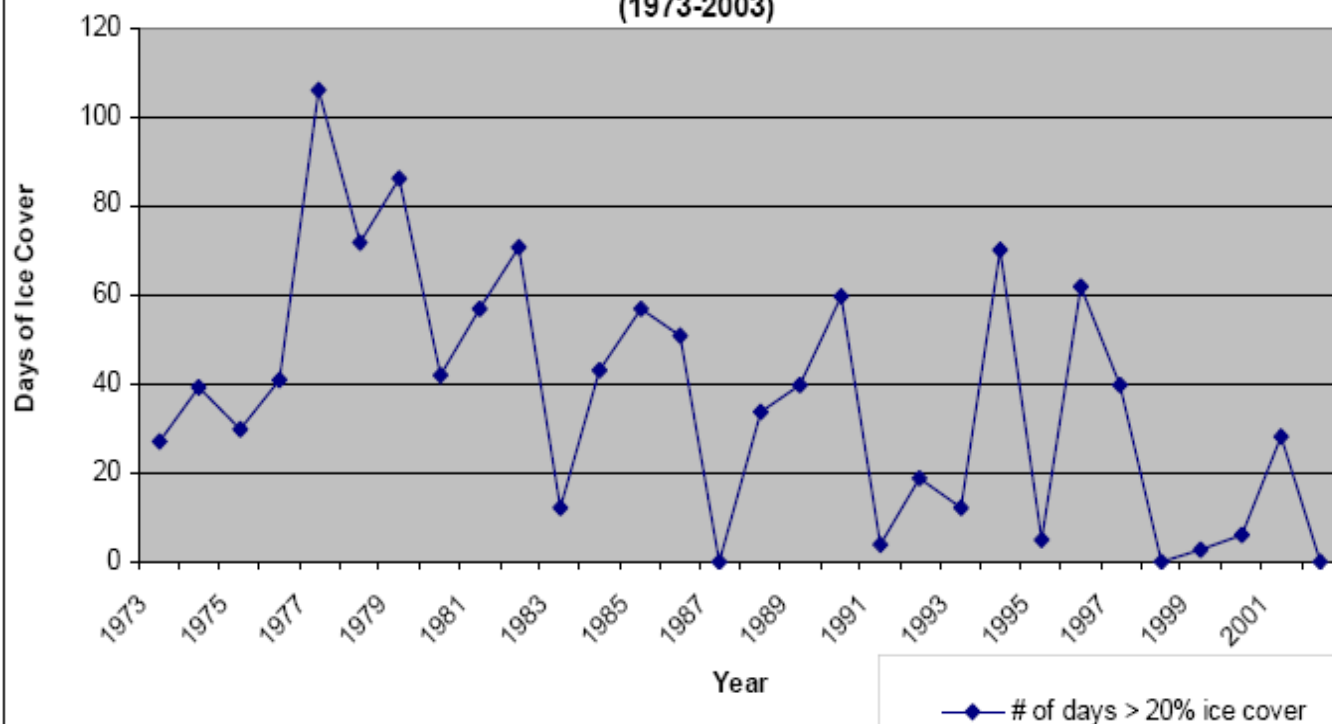
FAIR

GOOD

Ice Duration on the Great Lakes

2007 Report

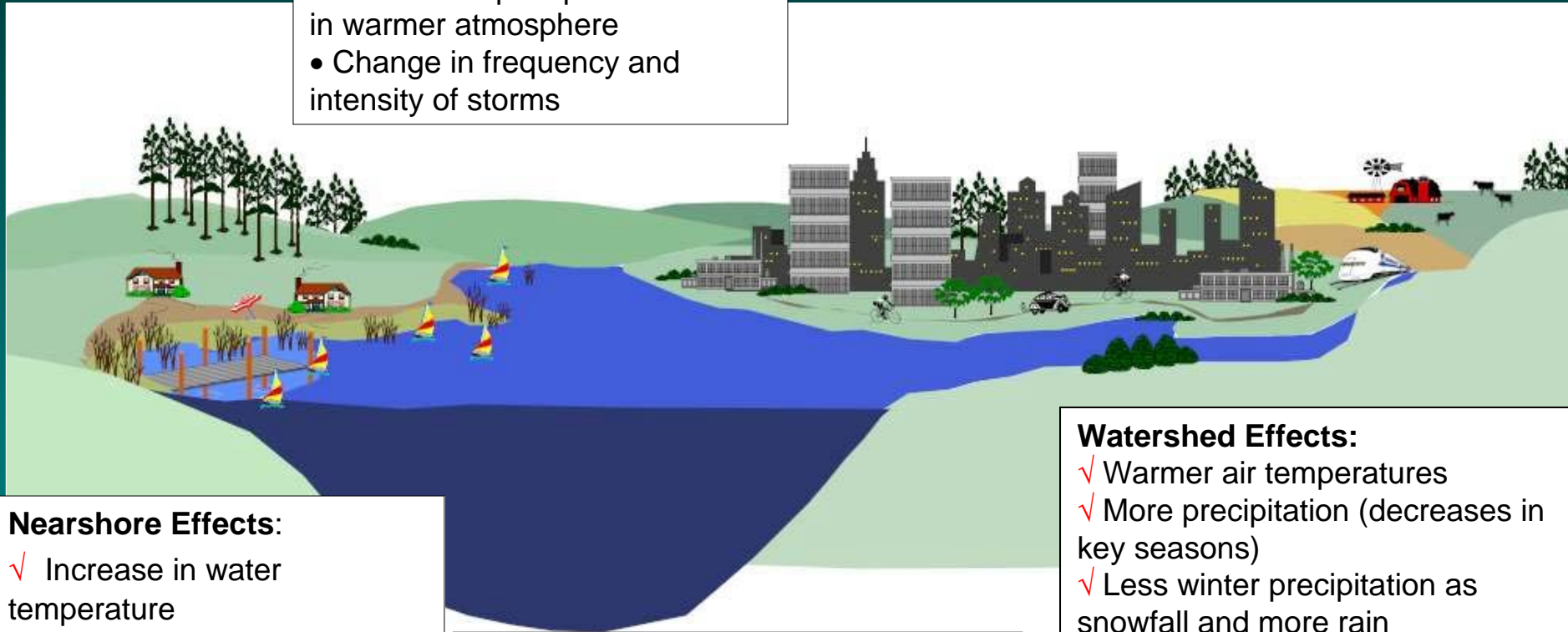
Days of Ice Cover vs. Year  
Great Lakes Basin  
(1973-2003)



# 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
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- Stephanie Ross, Jackie Adams, Paul Bertram and Karen Rodriguez