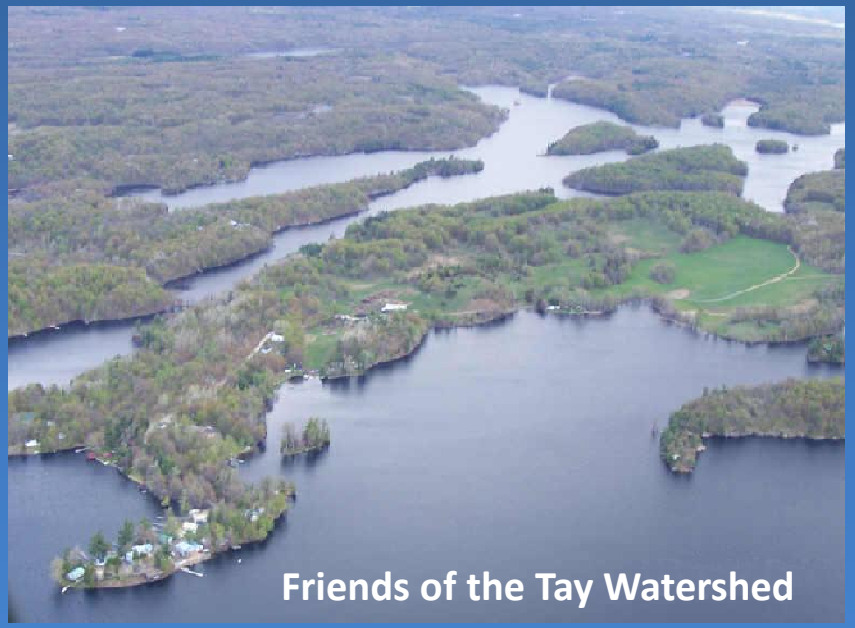
# Projected Developmental Pressures on Eastern Ontario Lakes

*What's in store and what will this mean for our lake communities?*


**Bridget Dilauro and Matt Goodchild**
**Centre for Sustainable Watersheds**

# Overview

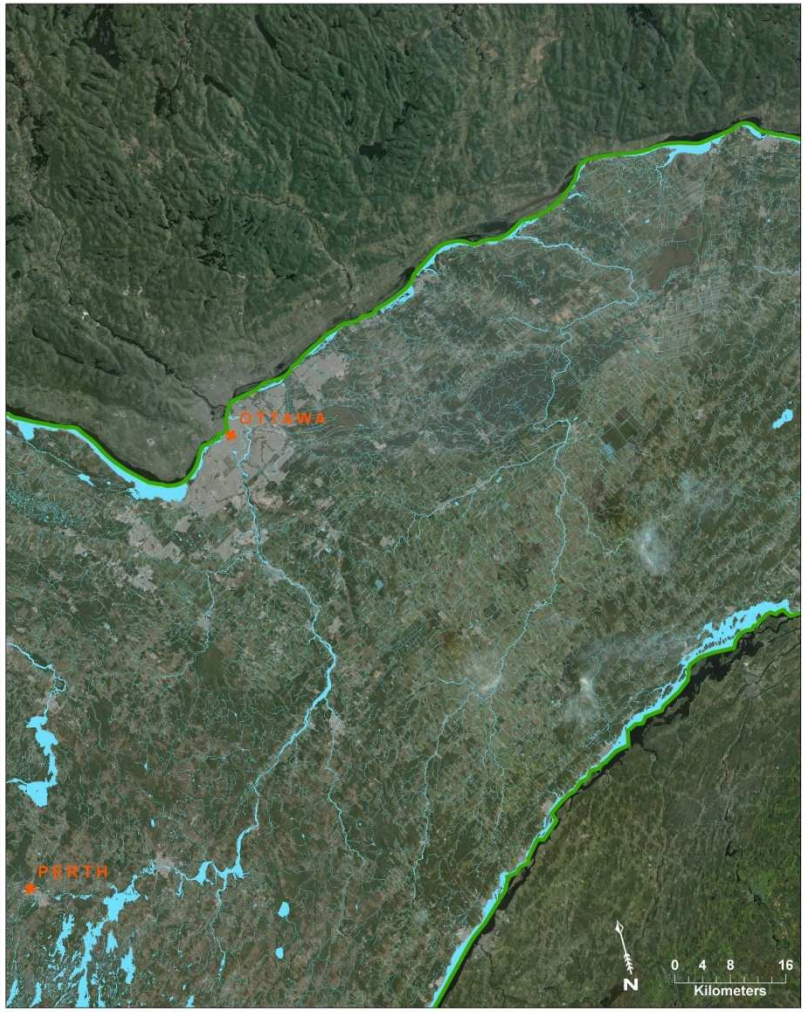
- Why Eastern Ontario?
- Demographics
  - Projections
  - Limitations of Projections
  - Growth in Eastern Ontario
- Lake Impacts
  - Chemical
  - Biodiversity
  - Economic
- Recovery
- The Good News

# Why Eastern Ontario?


**Map Courtesy of Ministry of Natural Resources, Kemptville District**

# Why Eastern Ontario?


**Toronto**



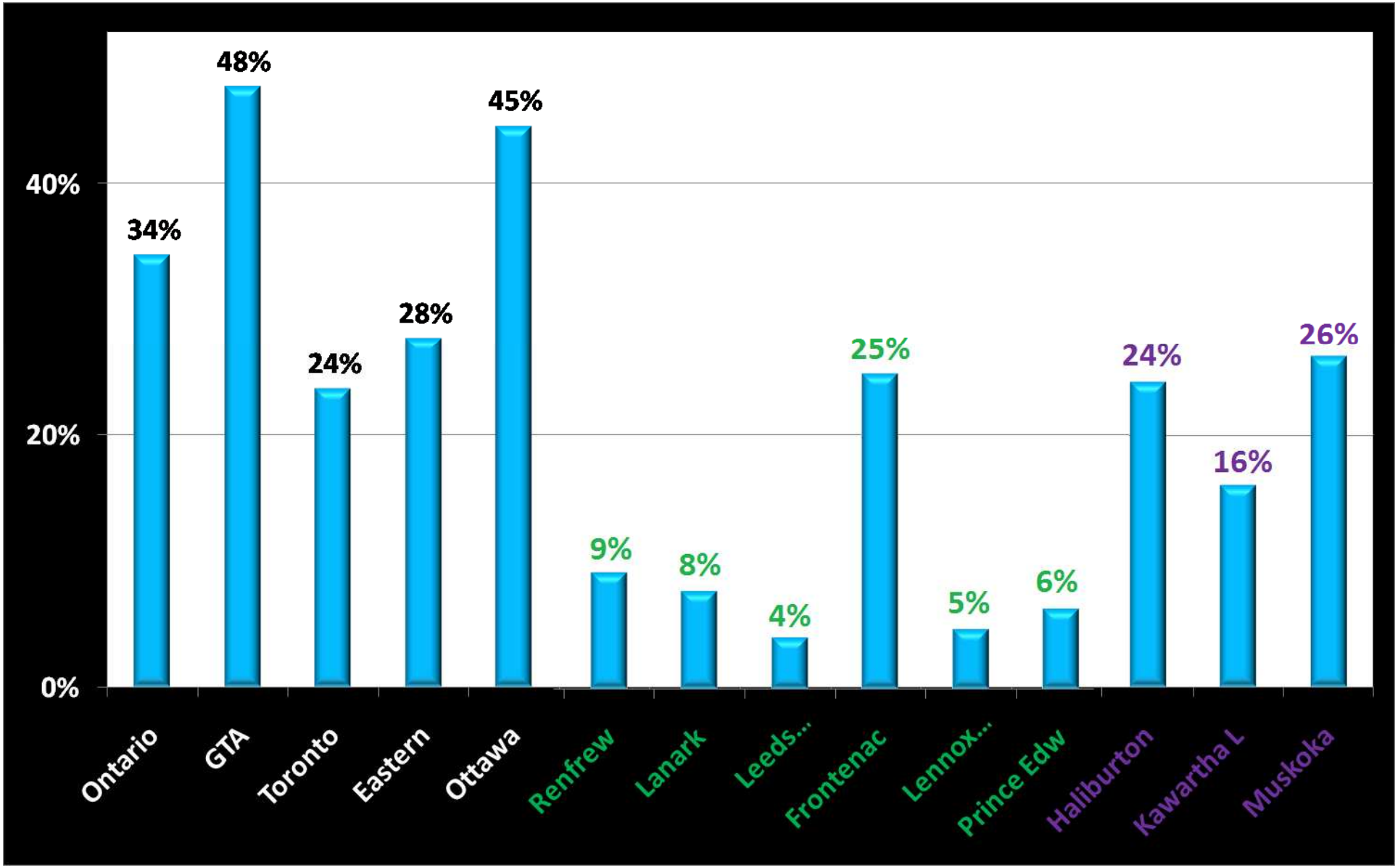

**Ottawa**

**Maps courtesy of Ministry of Natural Resources, Kemptville District**

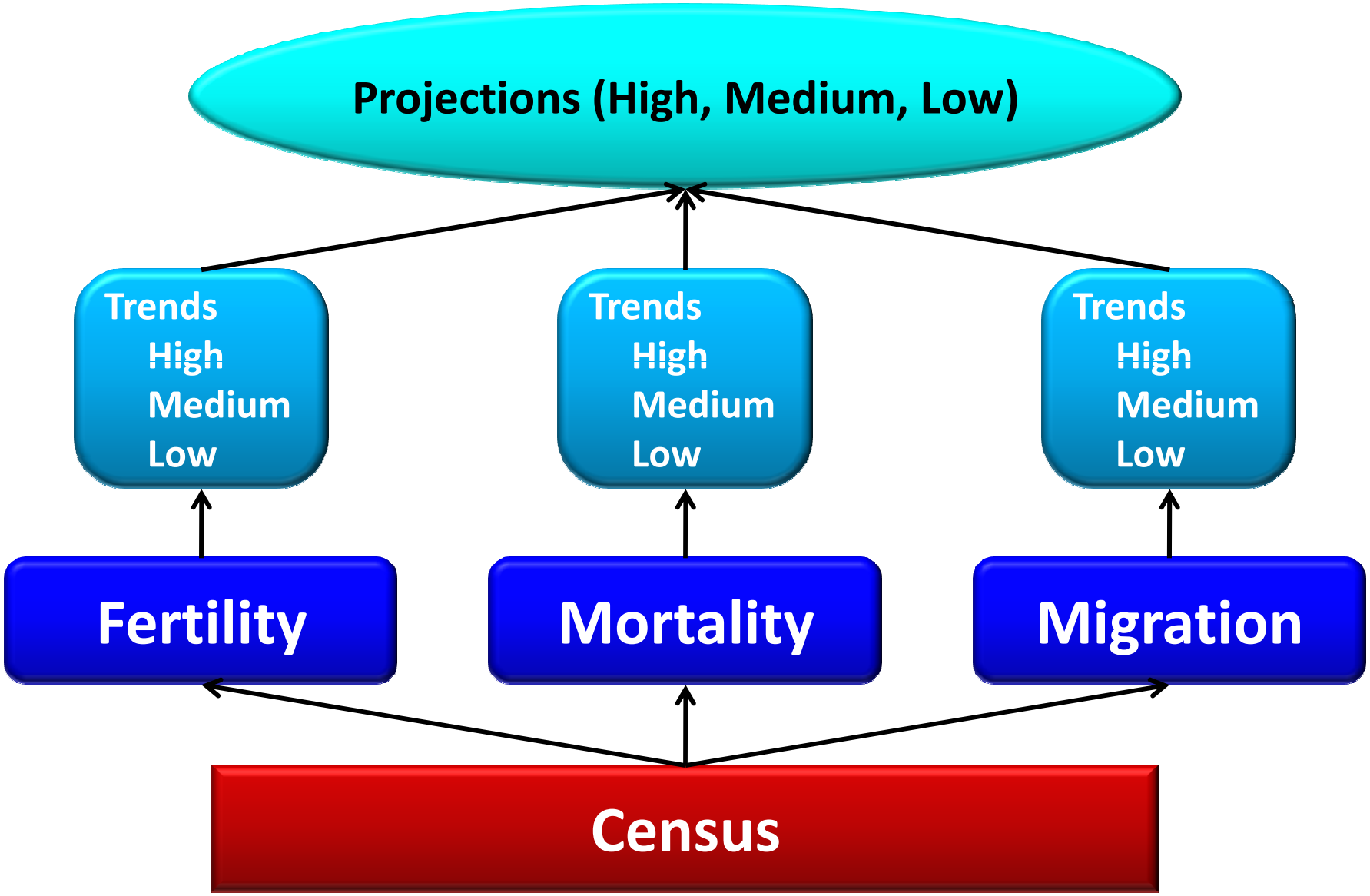
# Demographics

- Population Projections 2010-2036
  - Ontario Ministry of Finance Spring 2011
- Limitations

# Projected % Population Growth 2010-2036



# Limitations of Projections



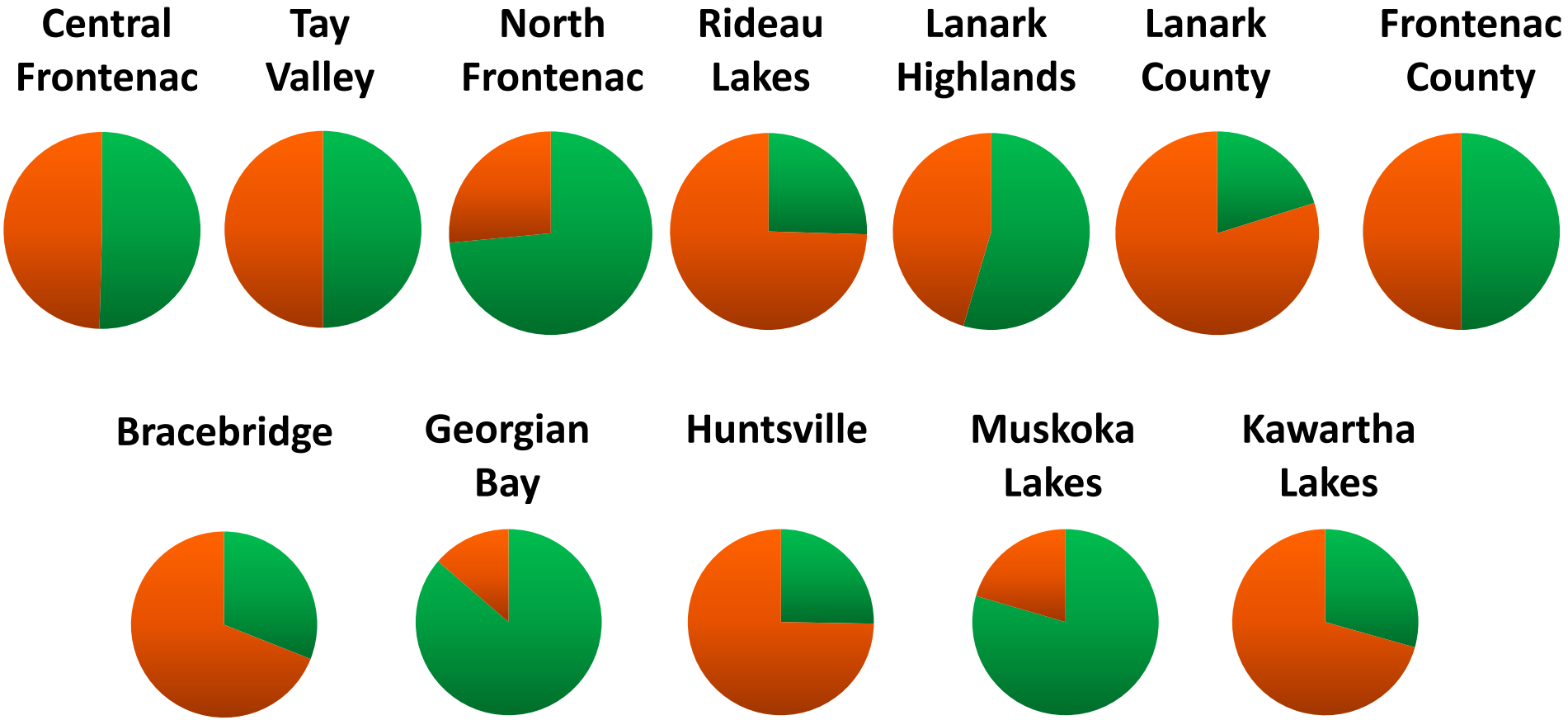
# Limitations of Projections

- Seasonal
- Baby Boomers
- Migration to our region

**Could Eastern ON exceed projections?**

# Limitations of Projections

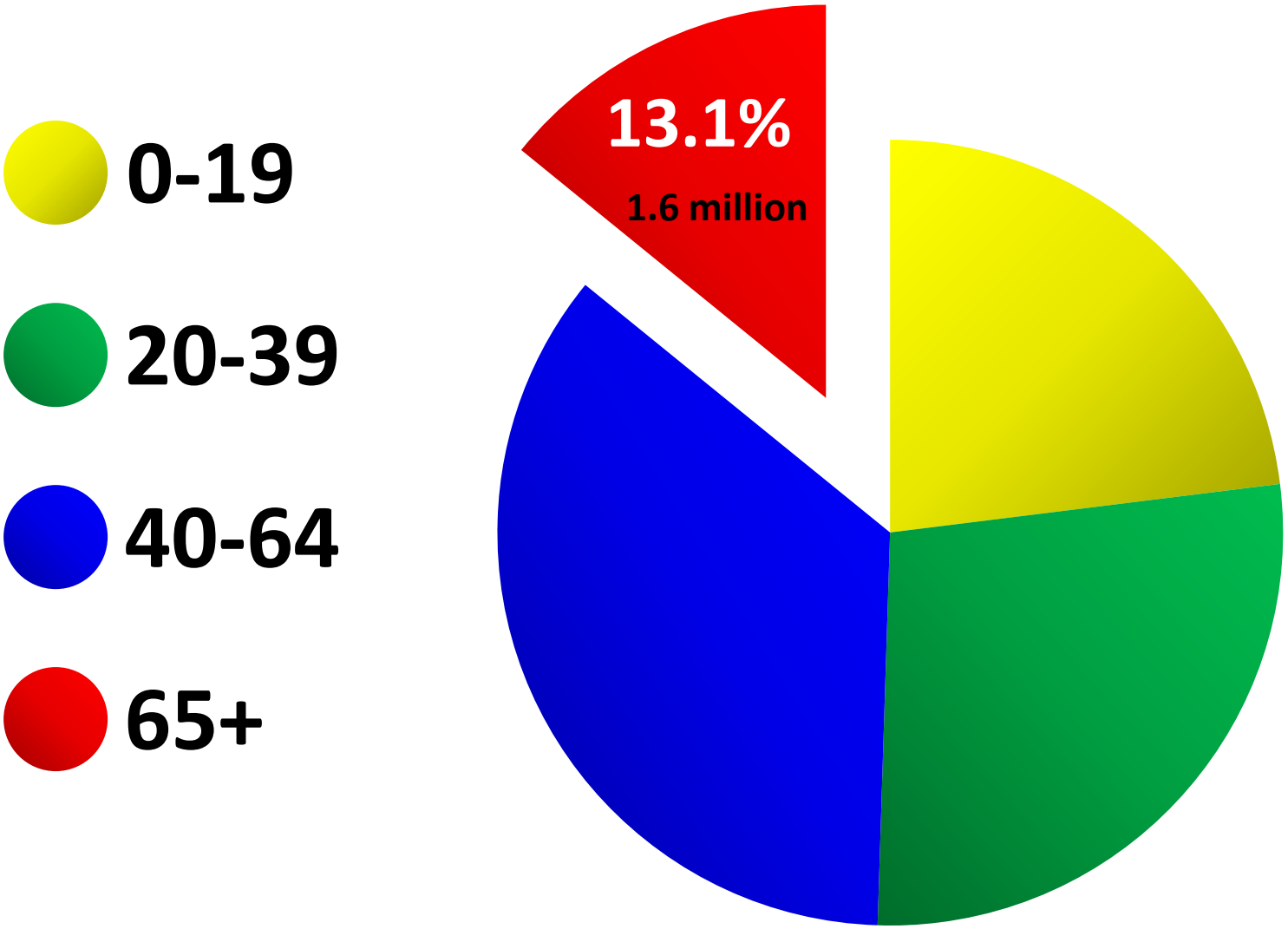
## Permanent vs. Seasonal Population Estimates




(2001, 2006) From Official Plans, Background Reports, etc.

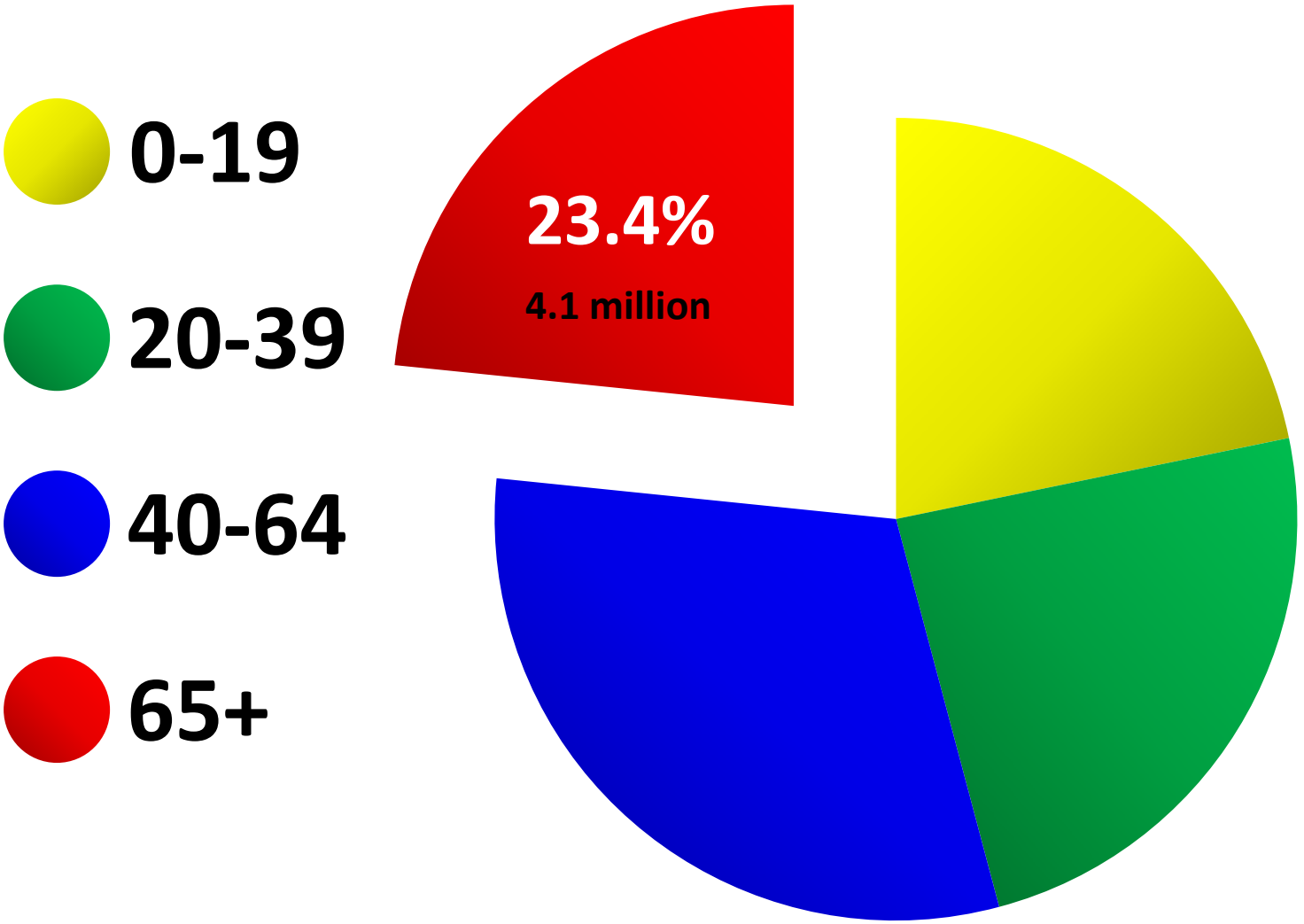
# Limitations of Projections

**Projected Share of Population by Age, Ontario 2011**



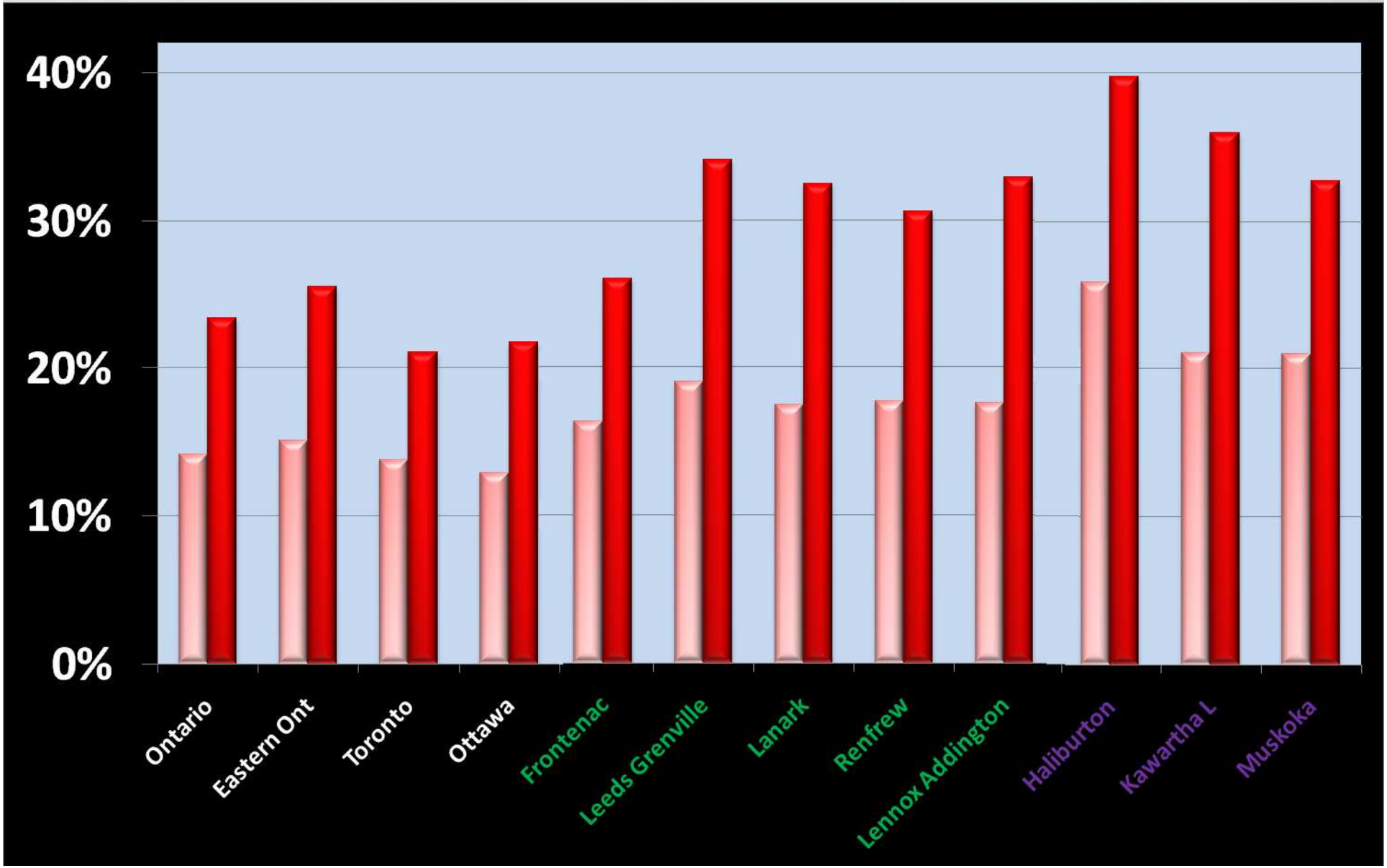
# Limitations of Projections

**Projected Share of Population by Age, Ontario 2036**

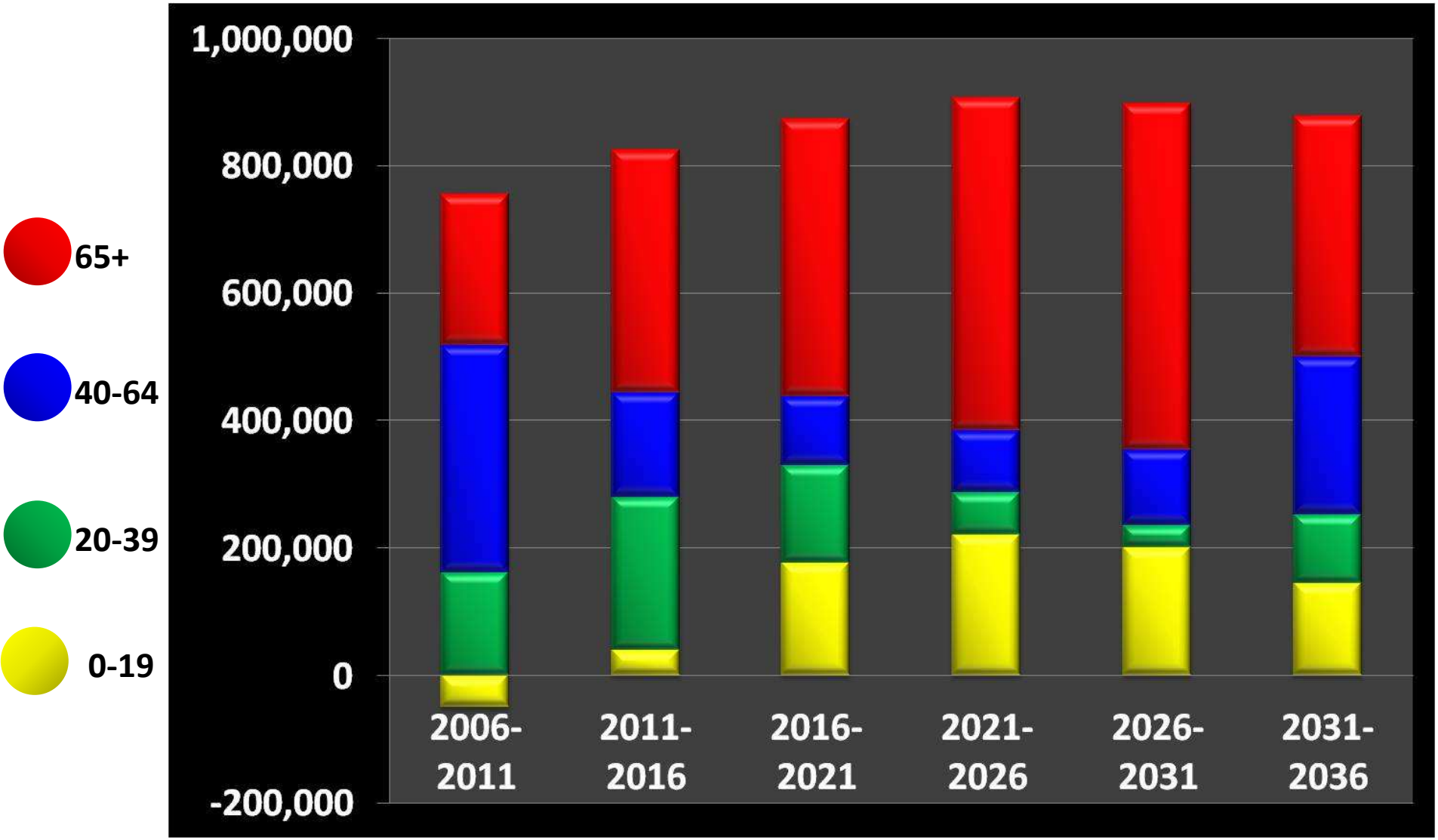


# % Share of Population Age 65+

2011 - 2036



# Ontario Ministry of Finance Spring 2011
# 5-year Projected Change in population



# Migration

# Reasons for Migration

## U.S. Retiree Priorities


The role of natural resource amenities in attracting retirees: Implications for economic growth policy 2008 Neelam C. Poudyala, Donald G. Hodgesa, H. Ken Cordell Ecological Economics 68 p240-248

# Migration

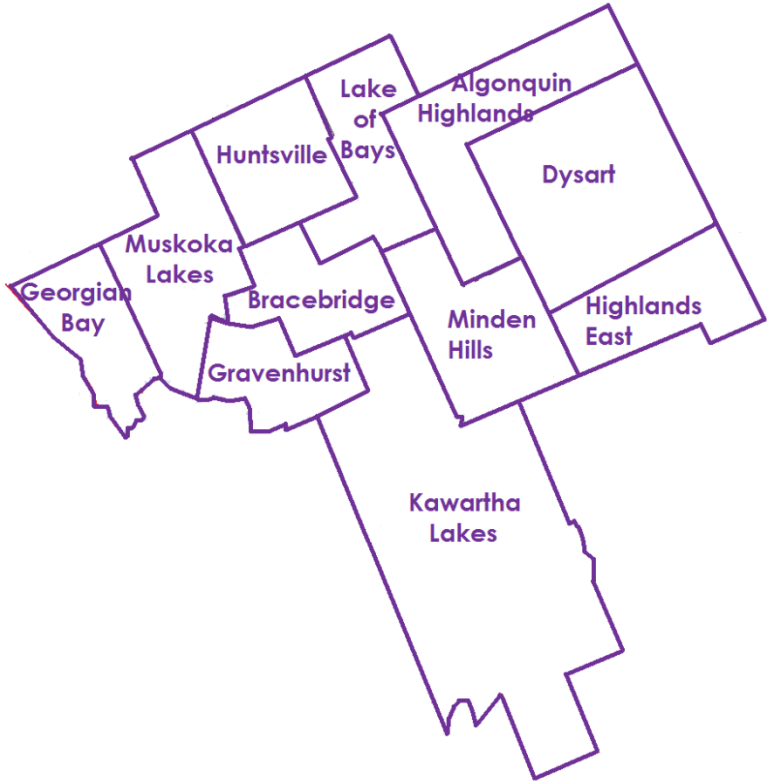
## Why Eastern Ontario?

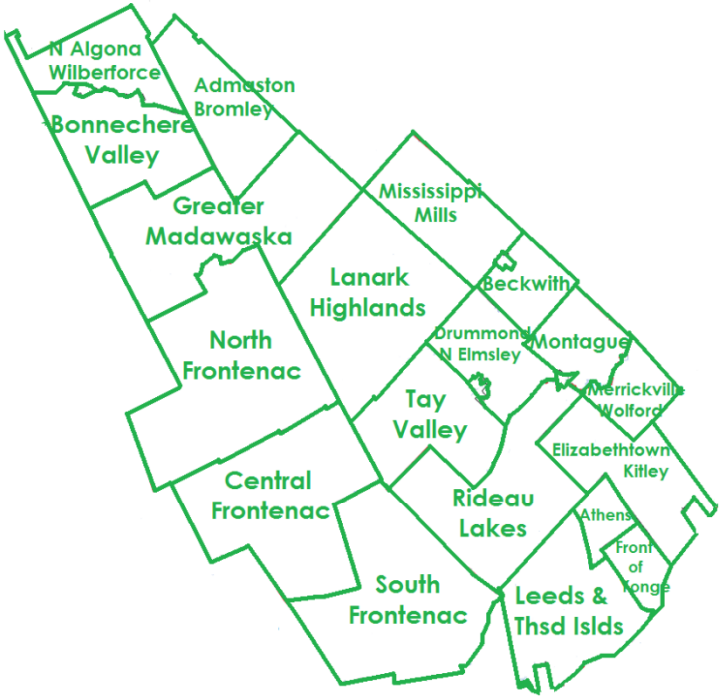
## Eastern Ontario vs. Muskoka

- Population Density
- Dwelling Density
- Cost

# Why Eastern Ontario?

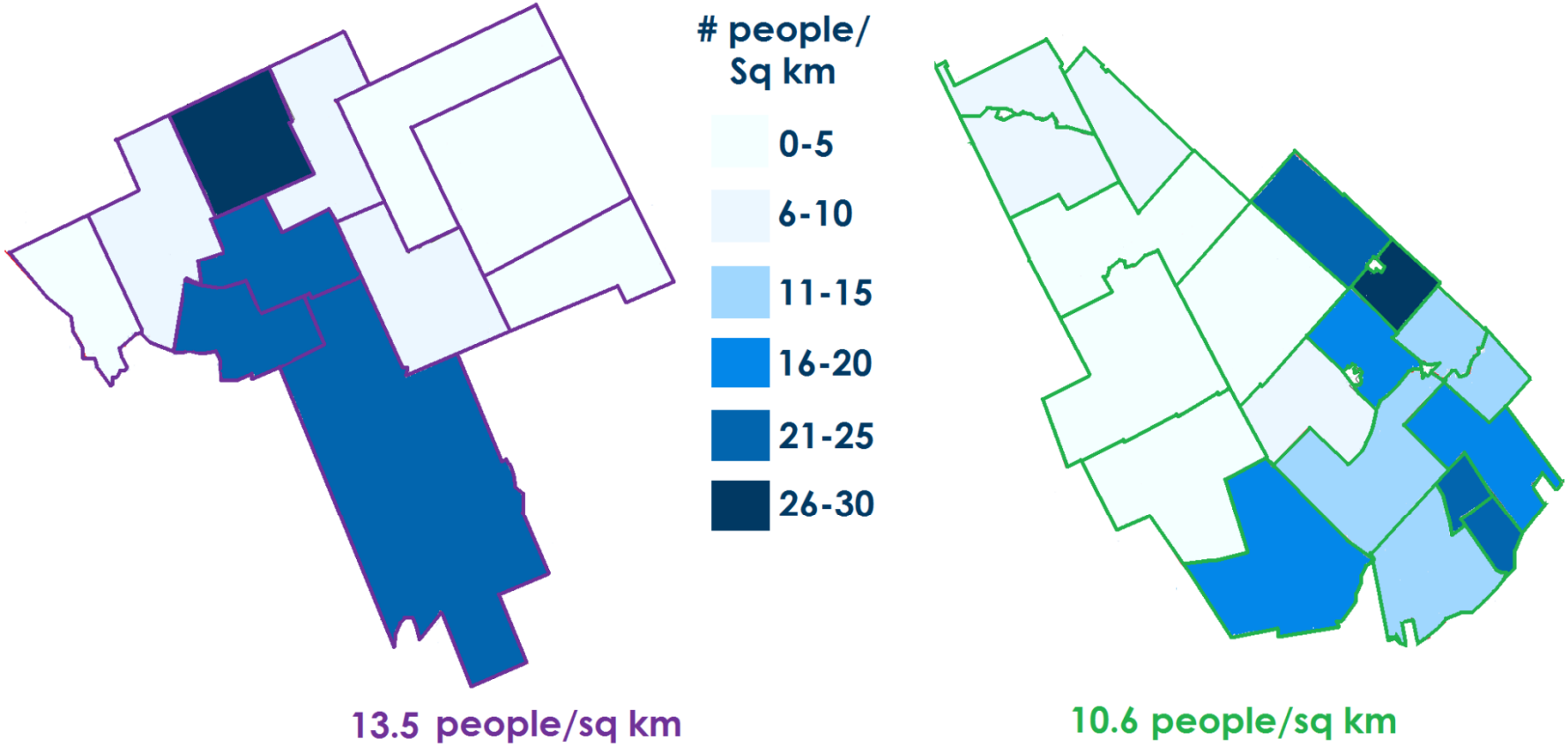
## Muskoka vs. Eastern Ontario



# Why Eastern Ontario?

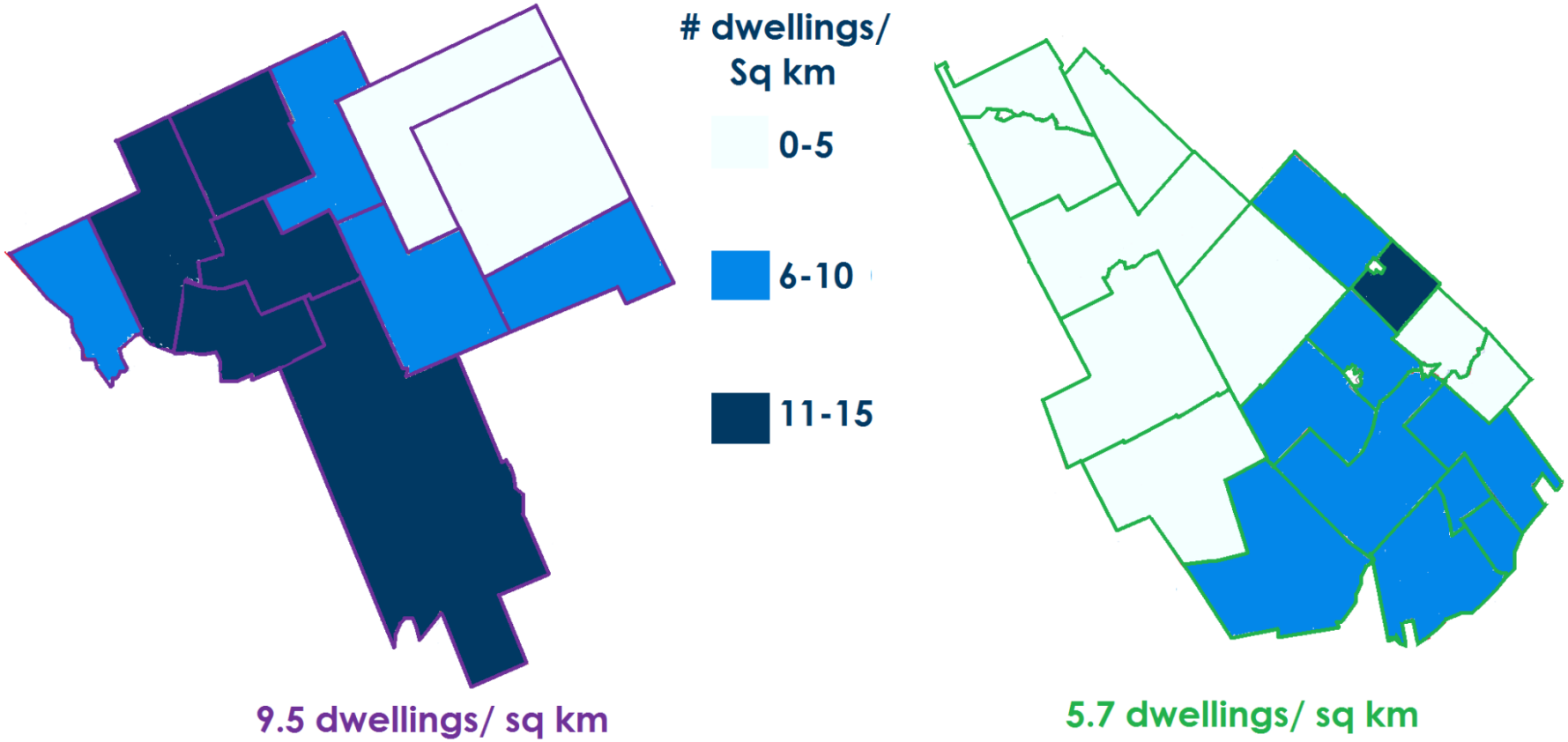
## Population density




Based on 2006 Census

# Why Eastern Ontario?

## Total dwelling density (permanent & seasonal)




Based on 2006 Census

# Why Eastern Ontario?

## Cost of Waterfront Real Estate


2011 Royal Lepage Recreational Property Report: for 1,000 sq ft, 3 bedrooms, 100 ft of frontage

# Limitations of Projections

1) Development may exceed projections

2) Increased development will impact lakes

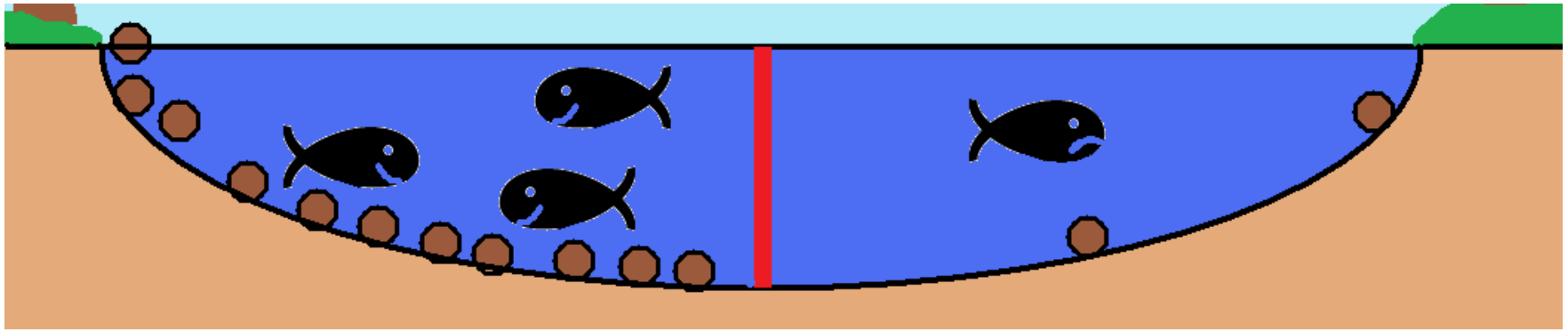
# Impact on Lakes

- Habitat
- Phosphorous
- Erosion
- Health
- Economic

A note on the use of studies: We have chosen these studies to demonstrate that development impacts lakes and rivers. For example, removing habitat has been shown to harm fish populations. But our purpose here is not to estimate the quantitative impact that humans are having, rather it is to demonstrate that human actions are impacting lakes and rivers. References to the studies used are provided to encourage further reading.

# Development & Habitat

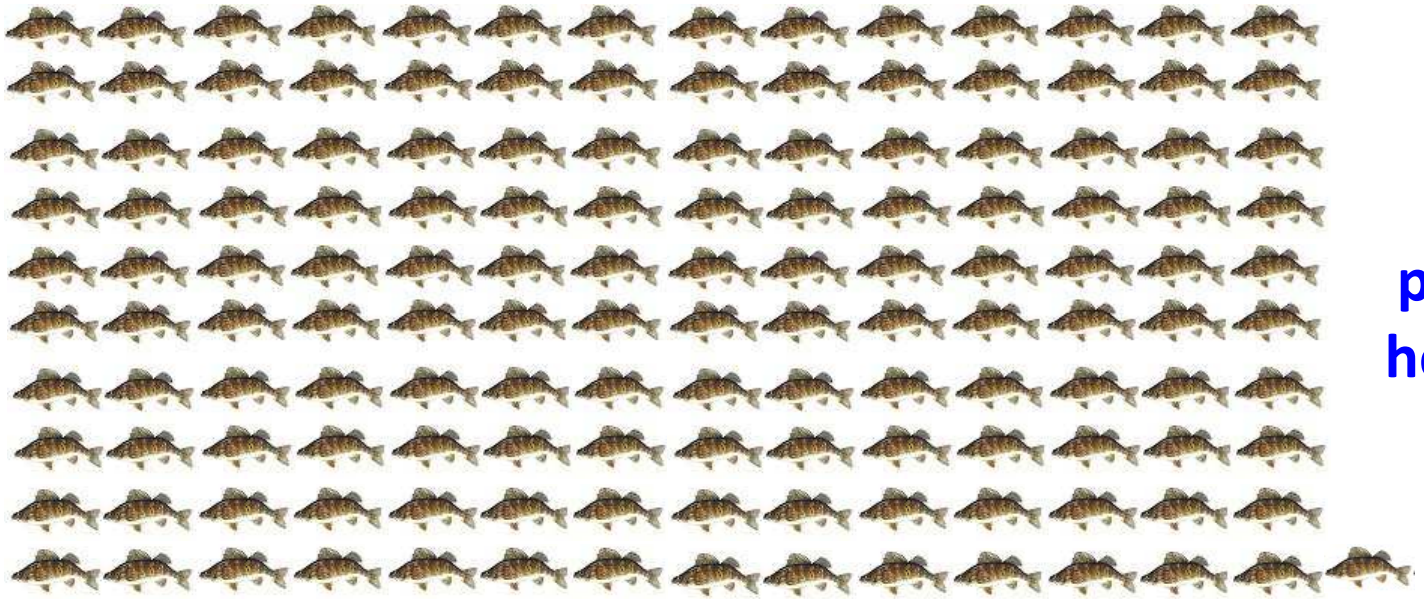
## Logs/ Fallen Trees & Yellow Perch

Sass, G. G., Kitchell, J.F., Carpenter, S.R., Hrabik, T.R., Marburg, A.E., and Turner, M.G. 2006. Fish Community and Food Web Responses to a Whole-lake Removal of Coarse Woody Habitat. *Fisheries* 31:7, 321-330

# Development & Habitat

Start



**141 perch/ hectare**

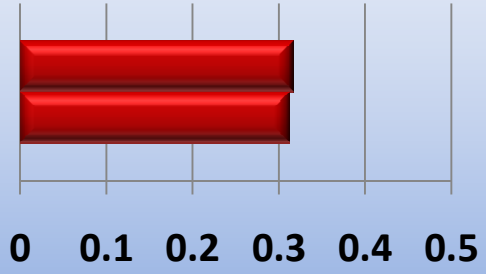
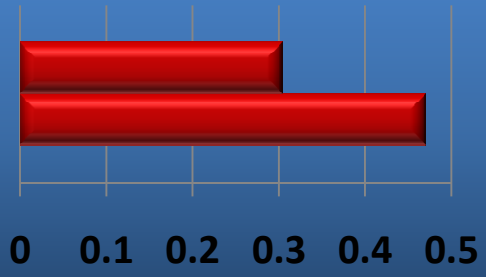
1 Year

**5 perch/ hectare**

2 Years

**0**

# Boating & Phosphorous

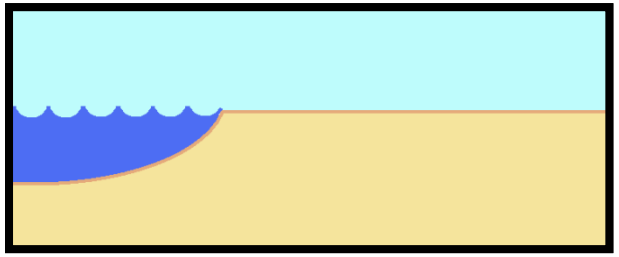
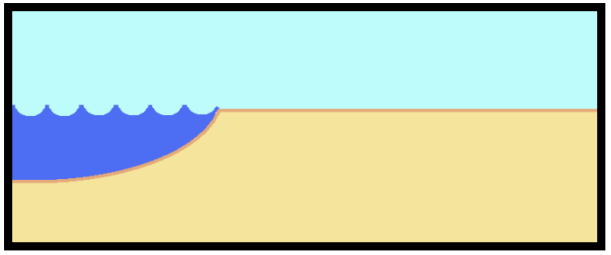
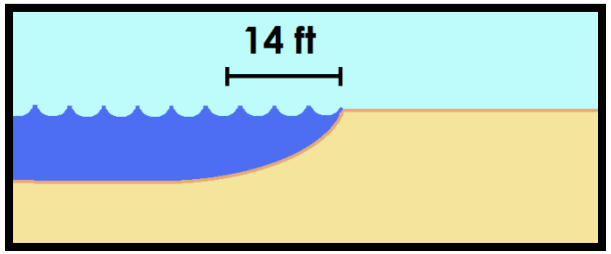
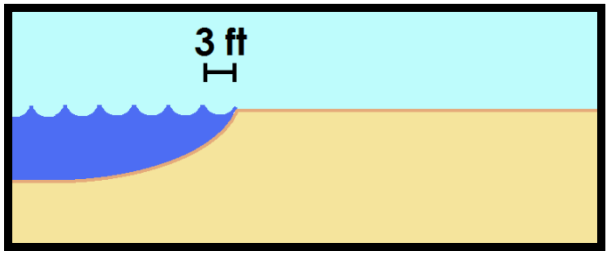
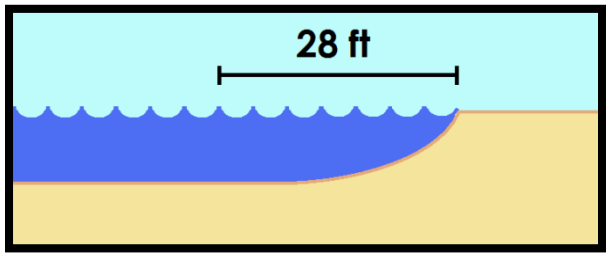
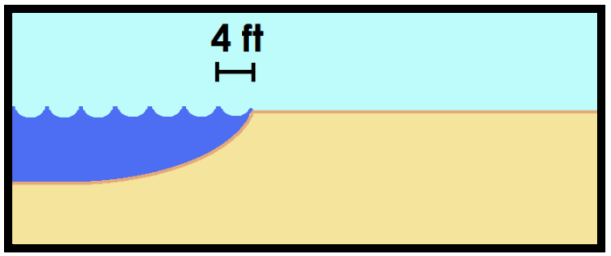
| | Avg TP (mg/L) Before & After |
|---|---|
| Control |   |
|  28 hp |   |

Time it took to reach maximum TP: <2 hours

Time it took to return to original TP: >20 hours

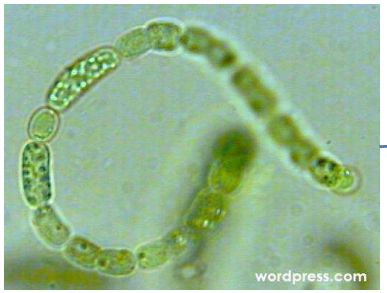
Yousef, Y. A., W. M. McLellon, and H. H. Zebuth. 1980. Changes in phosphorus concentrations due to mixing by motor boats in shallow lakes. Water Research 14:841-852.

# Boating & Erosion

| | High Boat Traffic | Low Boat Traffic |
|---|---|---|
| |  |  |
| Feet of Eroded Shoreline After 3 Yrs |   |   |
| Feet of Eroded Shoreline After 8 Yrs |   |   |

Johnson, S. 1994. Recreational boating impact investigations - Upper Mississippi River System, Pool 4, Red Wing, Minnesota. Report by the Minnesota Department of Natural Resources, Lake City, Minnesota, for the National Biological Survey, Environmental Management Technical Center, Onalaska, Wisconsin, February 1994 AND Asplund, TR 2000 The Effects of Motorized Watercraft on Aquatic Ecosystems, Wisconsin Department of Natural Resources, Bureau of Integrated Science Services and University of Wisconsin – Madison, Water Chemistry Program

# Algal Blooms






EPA
2003


Nutrient
Pollution
Promotes

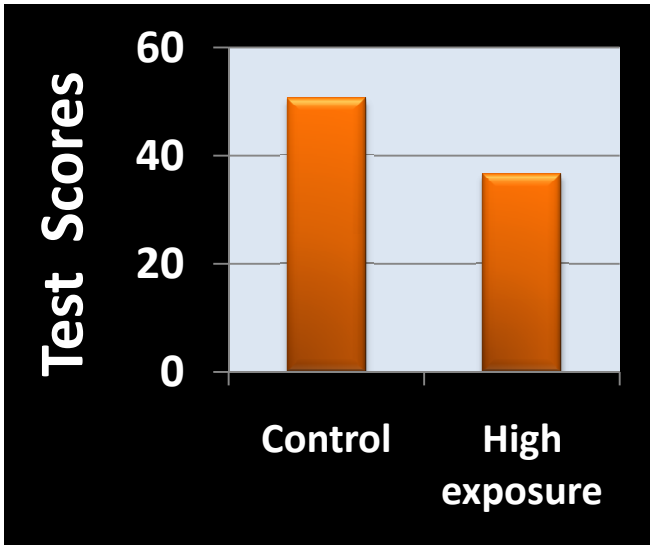
Managing
Nutrients
Reduces

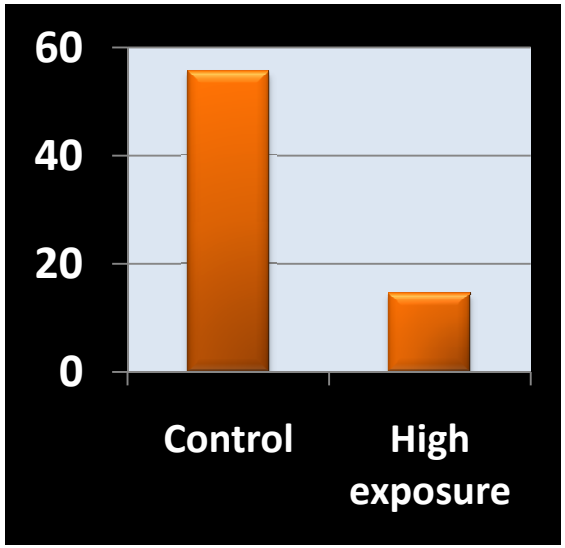
J. Heisler, P.M. Glibert, J.M. Burkholder, D.M. Anderson, W. Cochlan, W.C. Dennison, Q. Dortch, C.J. Gobler, C.A. Heil, E. Humphries, A. Lewitus, R. Magnien, H.G. Marshallm, K. Sellner, D.A. Stockwell, D.K. Stoecker, M. Suddleson Eutrophication and harmful algal blooms: A scientific consensus Harmful Algae 8 (2008) 3–13

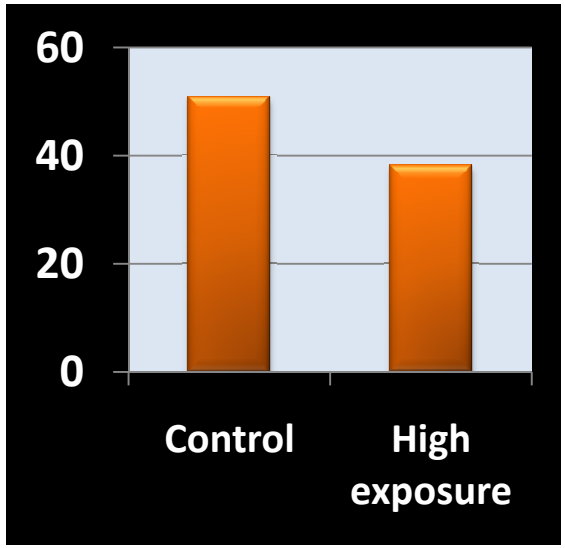
# Algal Blooms & Health



Green
Blue
Red



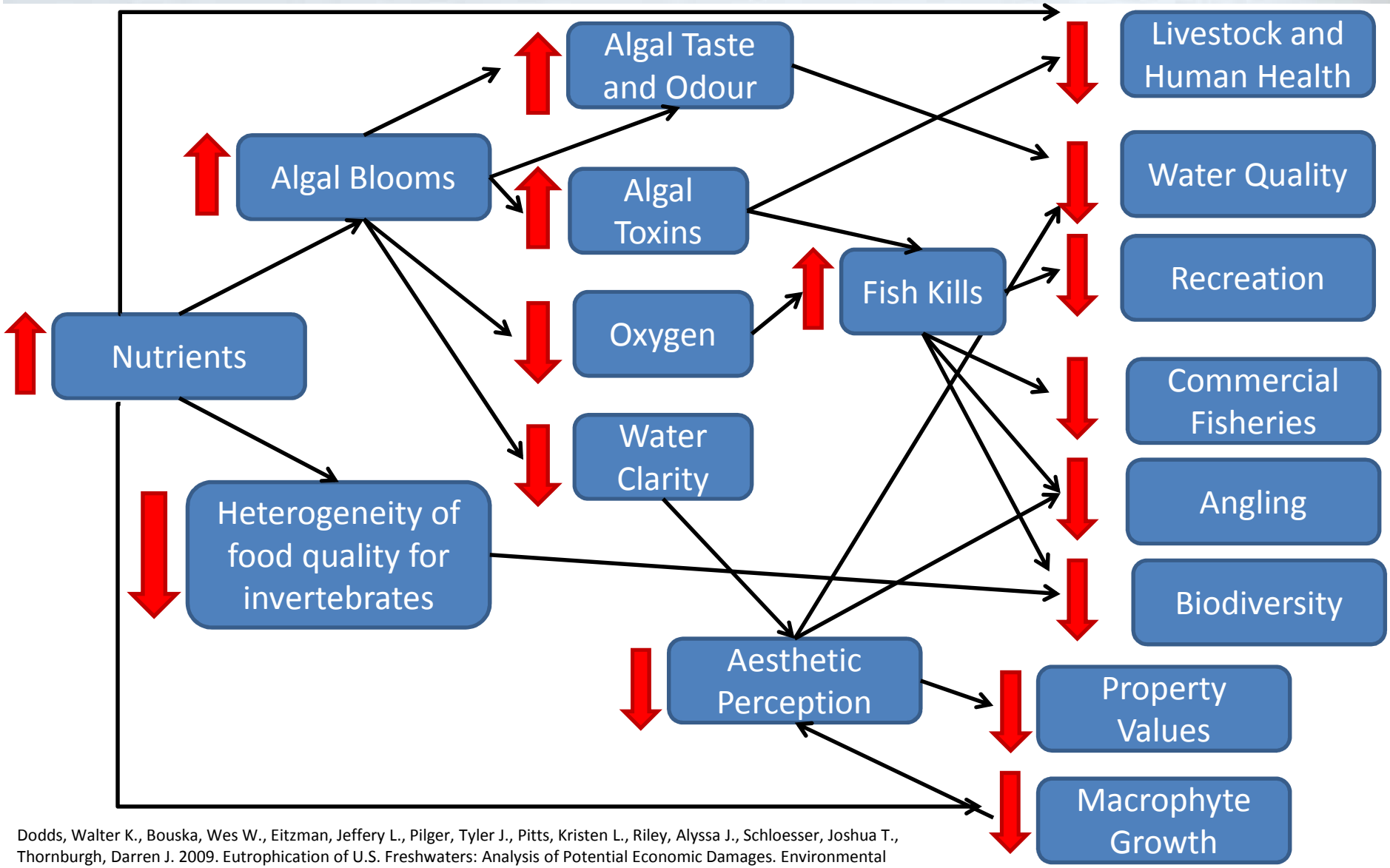




**Note: this study examined toxins from a coastal algal bloom – these toxins would not be present in an inland lake**

Lynn M Grattan, David Oldach, Trish M Perl, Mark H Lowitt, Diane L Matuszak, Curtis Dickson, Colleen Parrott, Ritchie C Shoemaker, C Lisa Kauffman, Martin P Wasserman, J Richard Hebel, Patricia Charache, J Glenn Morris Jr Learning and memory difficulties after environmental exposure to waterways containing toxin-producing Pfiesteria or Pfiesteria-like dinoflagellates THE LANCET • Vol 352 • August 15, 1998

# Environment and $$$




Dodds, Walter K., Bouska, Wes W., Eitzman, Jeffery L., Pilger, Tyler J., Pitts, Kristen L., Riley, Alyssa J., Schloesser, Joshua T., Thornburgh, Darren J. 2009. Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages. Environmental Science and Technology, Vol. 43, No. 1: 12 – 19.

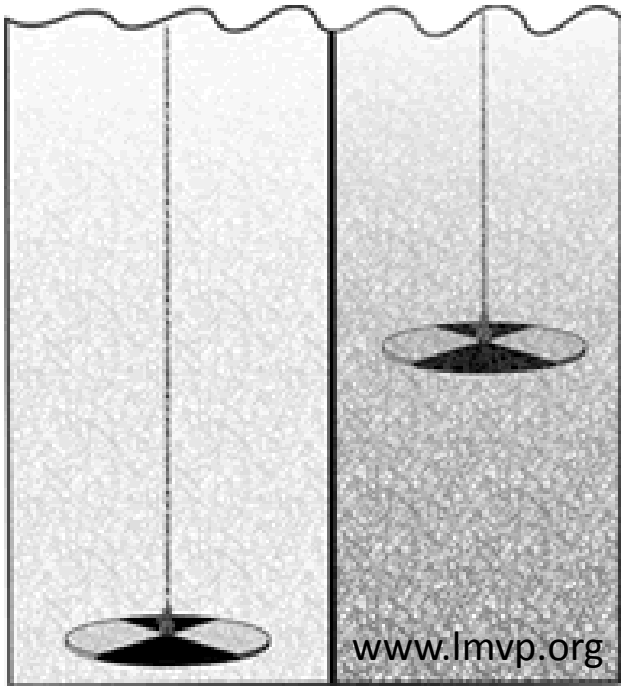
# Water Clarity and Property Values

Examined properties with average property values ranging from $35,000 - $96,000

**1 m** improvement

=

**$11 - $200/foot** of **frontage**!




Michael, Holly J., Boyle, Kevin J., Bouchard, Roy. 1996. Water Quality Affects Property Prices: A Case Study of Selected Maine Lakes. *Maine Agricultural and Forest Experiment Station Miscellaneous Report* 398: 1 – 18.

# Property Values (Cont.)

## Eurasian Watermilfoil:

Presence = ↓ <1% - 16%

(Zhang and Boyle, 2010)

## Fecal Coliforms:

100 fecal coliform count/ 100 mL = ↓ 1.5%

(Leggett and Bockstael , 2000)

Zhang, Congwen, Boyle, Kevin J. In Press. The effect of an aquatic invasive species (Eurasian watermilfoil) on lakefront property values. *Ecological Economics*: 1 – 11.

Leggett, C. G. and Bockstael, N. E. 2000. Evidence of the Effects of Water Quality on Residential Land Prices. *Journal of Environmental Economics and Management, Volume 39:2, 121–44.*

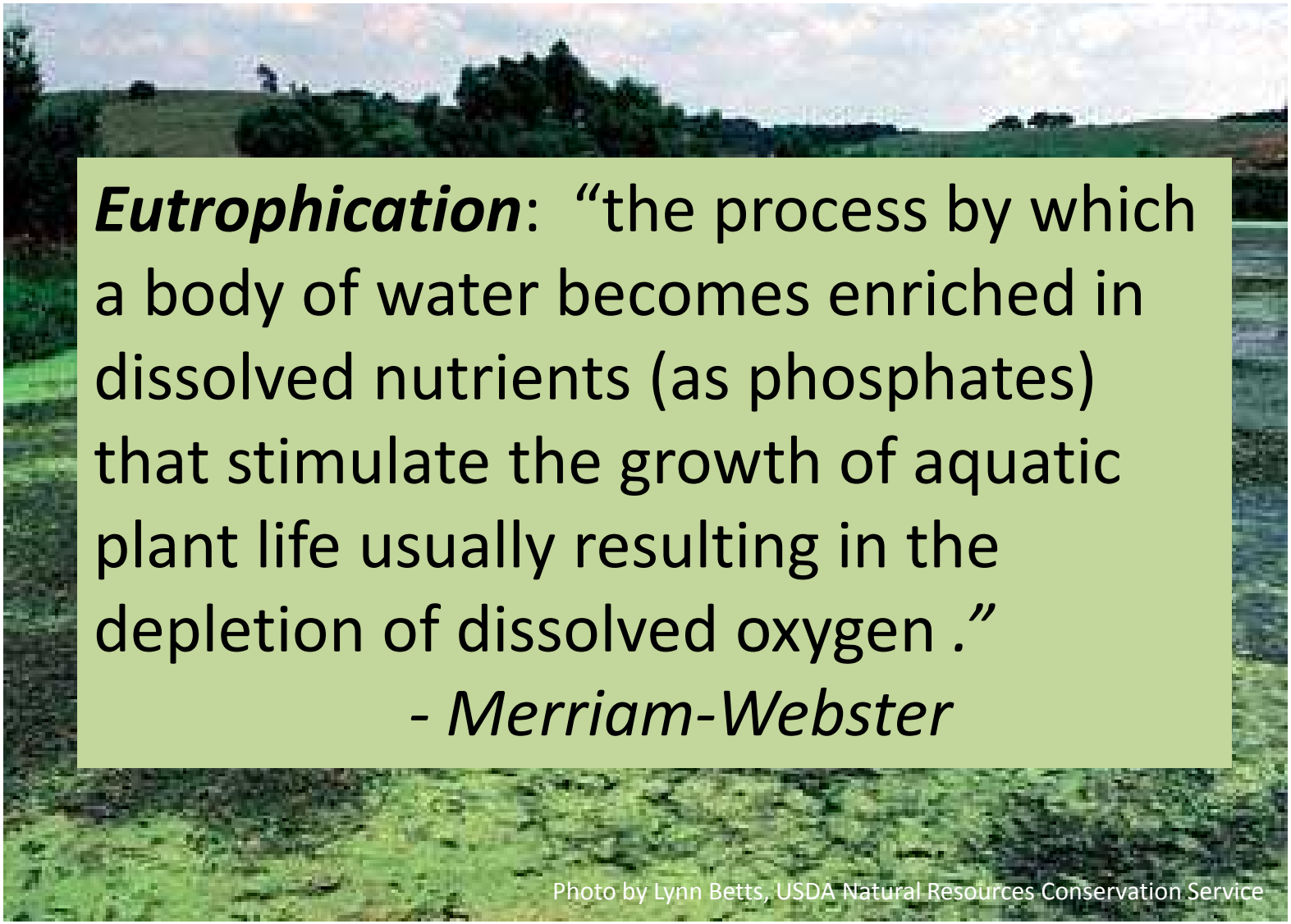
# Zebra and Quagga Mussels



Ontario cottagers **$52.7 Million**

Colautti, Robert I., Bailey, Sarah A., van Overdijk, Colin D.A., Amundsen, Keri, MacIsaac, Hugh J. 2006. Characterised and projected costs of nonindigenous species in Canada. *Biologic Invasions*, Volume. 8: 45 – 59.

# Lake Eutrophication in the US



***Eutrophication***: "the process by which a body of water becomes enriched in dissolved nutrients (as phosphates) that stimulate the growth of aquatic plant life usually resulting in the depletion of dissolved oxygen ."

*- Merriam-Webster*

Photo by Lynn Betts, USDA Natural Resources Conservation Service

# Lake Eutrophication in the US

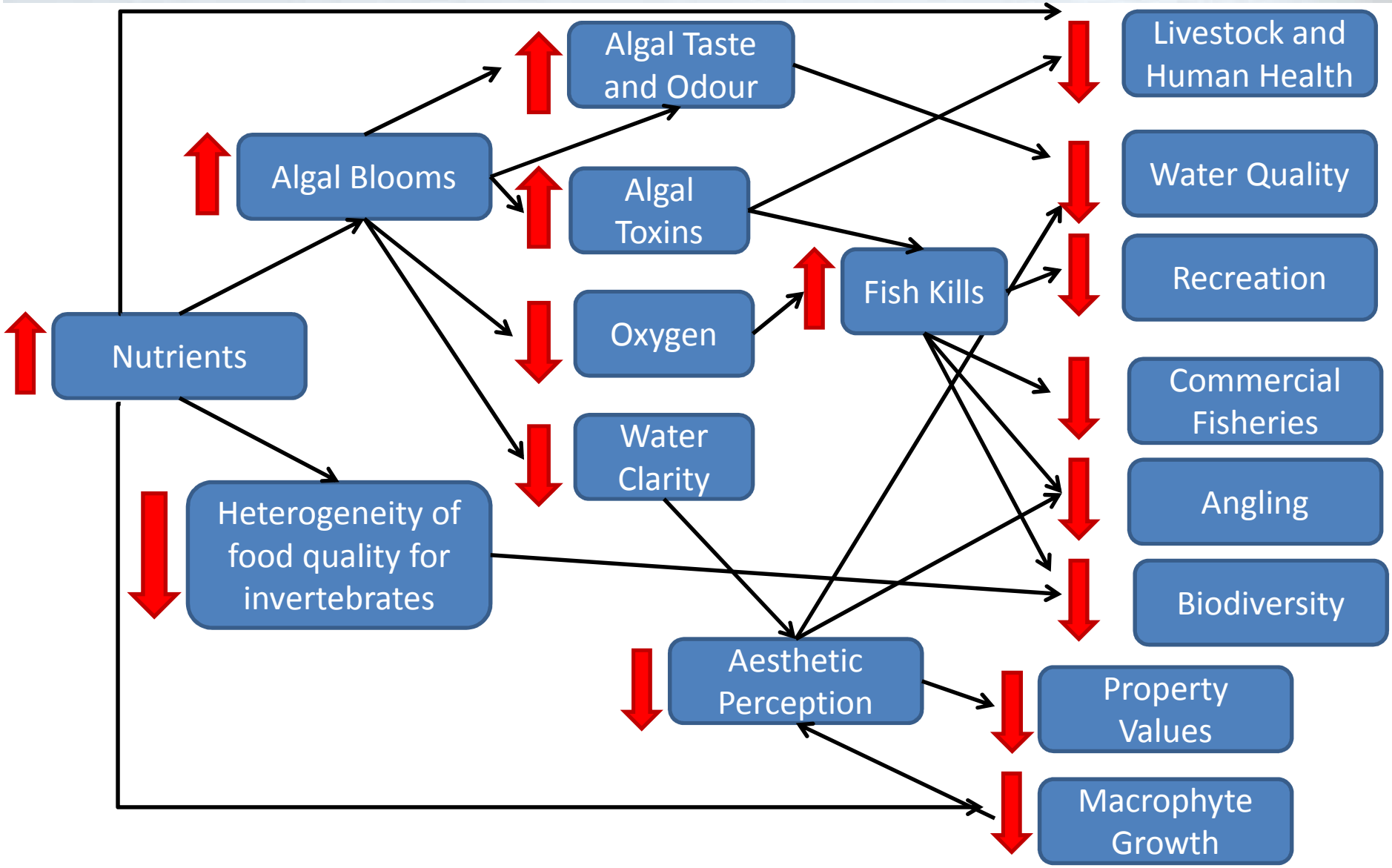
**Annual Costs:**

| | |
|---|---|
| Prevention of loss of **Biodiversity**: | **$44 Million** |
| Lost **Fishing**: | **$189 – 589 million** |
| Lost **Boating**: | **$182 – 567 million** |
| **Drinking Water** (Bottled): | **$813 Million** |
| Lost **Property Values**: | **$4.5 Billion** |

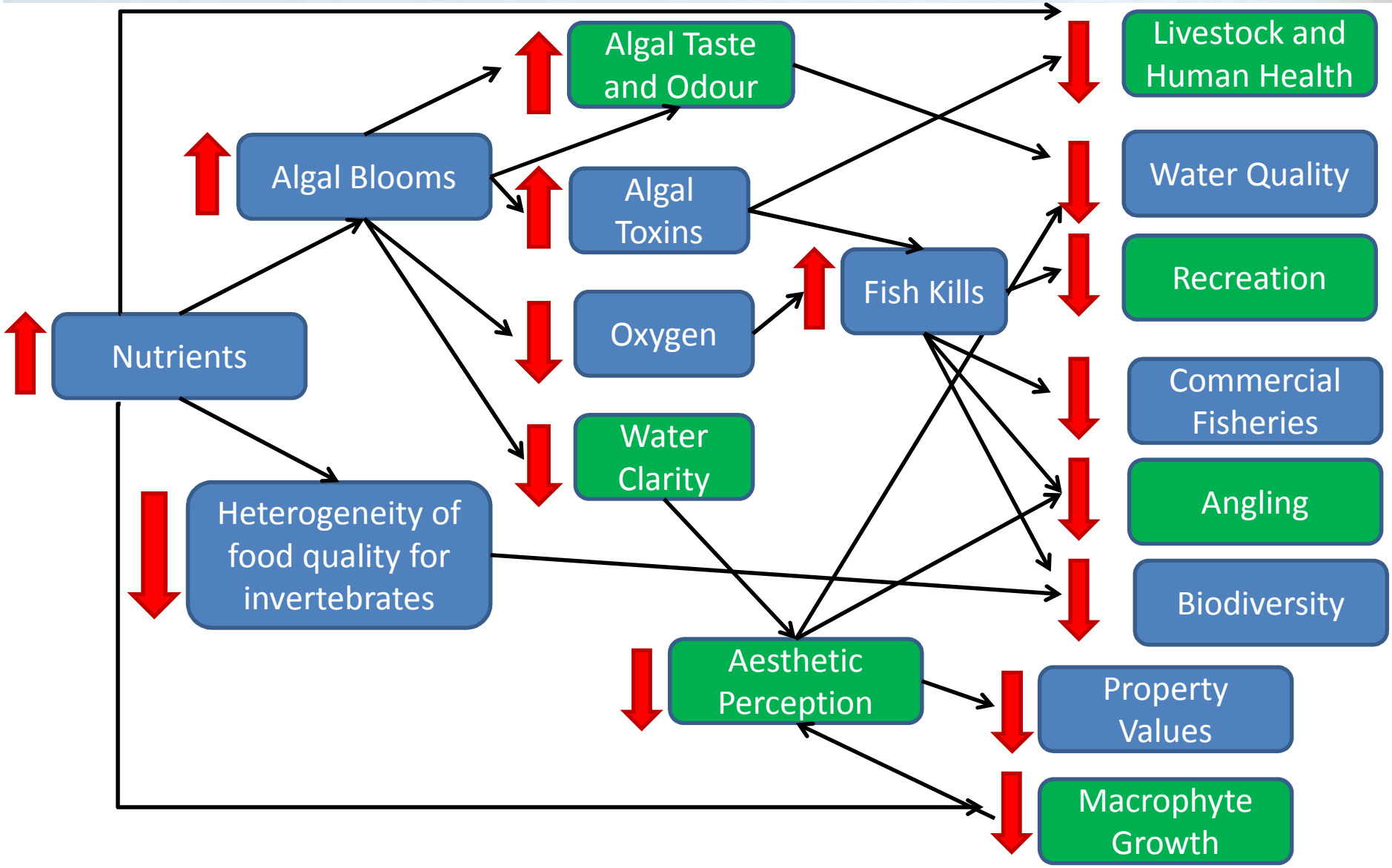
**Total: $5.7 - 6.5 Billion**

Dodds, Walter K., Bouska, Wes W., Eitzman, Jeffery L., Pilger, Tyler J., Pitts, Kristen L., Riley, Alyssa J., Schloesser, Joshua T., Thornburgh, Darren J. 2009. Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages. Environmental Science and Technology, Volume43:1,12 – 19.

# Tourism


Nutrients
Algal Blooms
Algal Taste and Odour
Algal Toxins
Oxygen
Water Clarity
Fish Kills
Heterogeneity of food quality for invertebrates
Aesthetic Perception
Livestock and Human Health
Water Quality
Recreation
Commercial Fisheries
Angling
Biodiversity
Property Values
Macrophyte Growth

# Tourism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Macrophyte Growth

# Recovery

*It's easier to beg for forgiveness than it is to ask for permission!*

# Recovery

- Complex systems with complex relationships
- Can take long periods of time
- Expensive
- Not always possible

**Prevention!**

# The Good News

1) Population growth
2) Common values
3) Impacts are individual
4) Lessons learned
5) Tools to protect
6) Strong partnerships

# Thank You!

Participants

Lake Links Planning Committee

Centre for Sustainable Watersheds

# Questions?

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