

How Healthy Are Our Lakes:

30 Years of Research at the Dorset Environmental Science Centre

2008 Environmental Lecture Series

Bracebridge, ON – July 31, 2008

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¹ Ontario Ministry of Environment, Dorset and ² York University



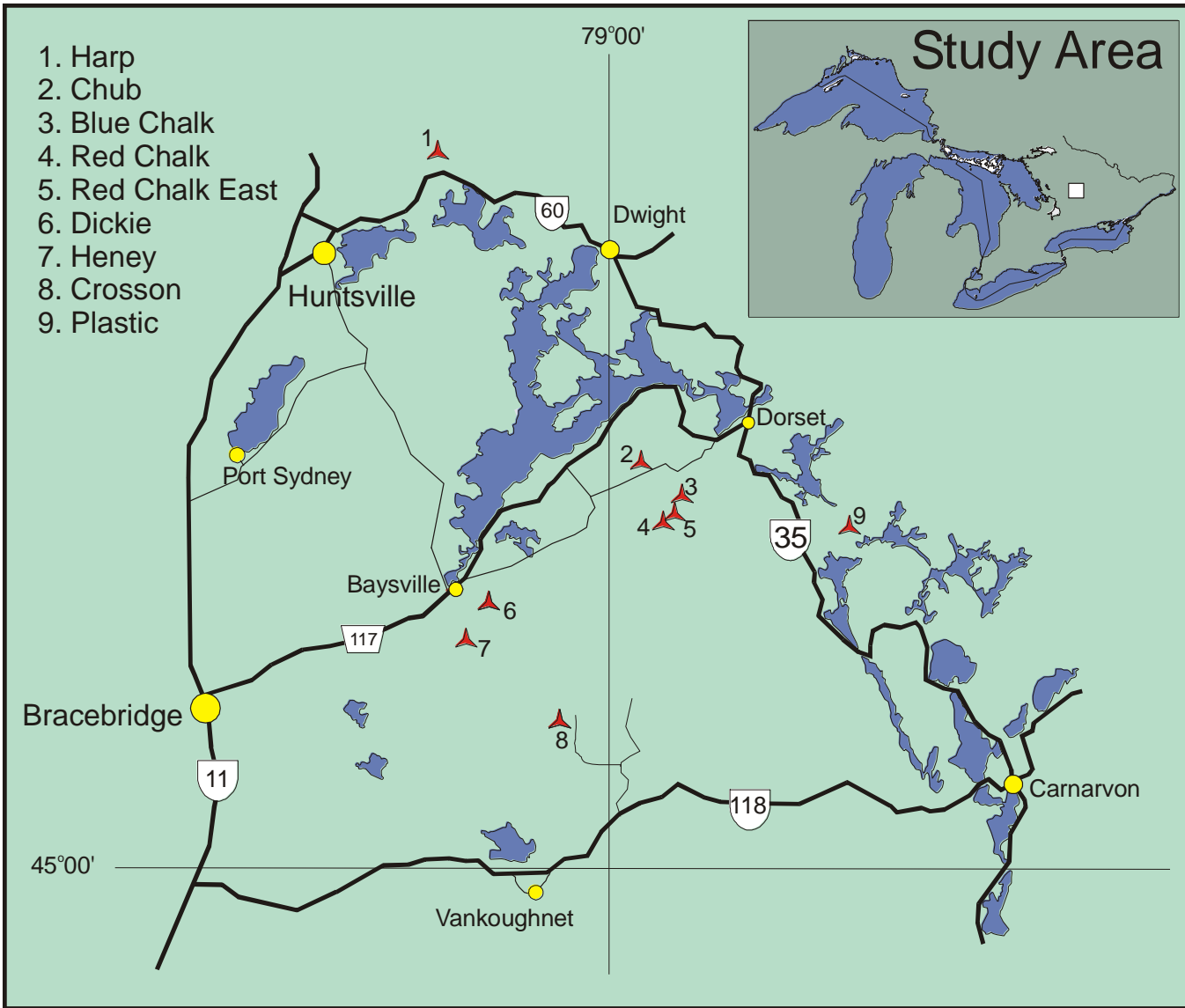
Overview

- **Keith Somers**
 - **Introduction and Background**
- **Norm Yan**
 - **The Acid Rain Story**
- **Andrew Paterson**
 - **The Phosphorus (Nutrient) Story**



Dorset Environmental Science Centre (DESC)





DESC – A Brief History

- established ~1975 to develop Lakeshore Capacity Model with monitoring of stream hydrology, meteorology, nutrient chemistry, algae & zooplankton
- discovery of acid rain ~1979 led to the Acid Precipitation in Ontario Study (APIOS Program) and a focus on pH, alkalinity and sulfate

DESC – A Brief History

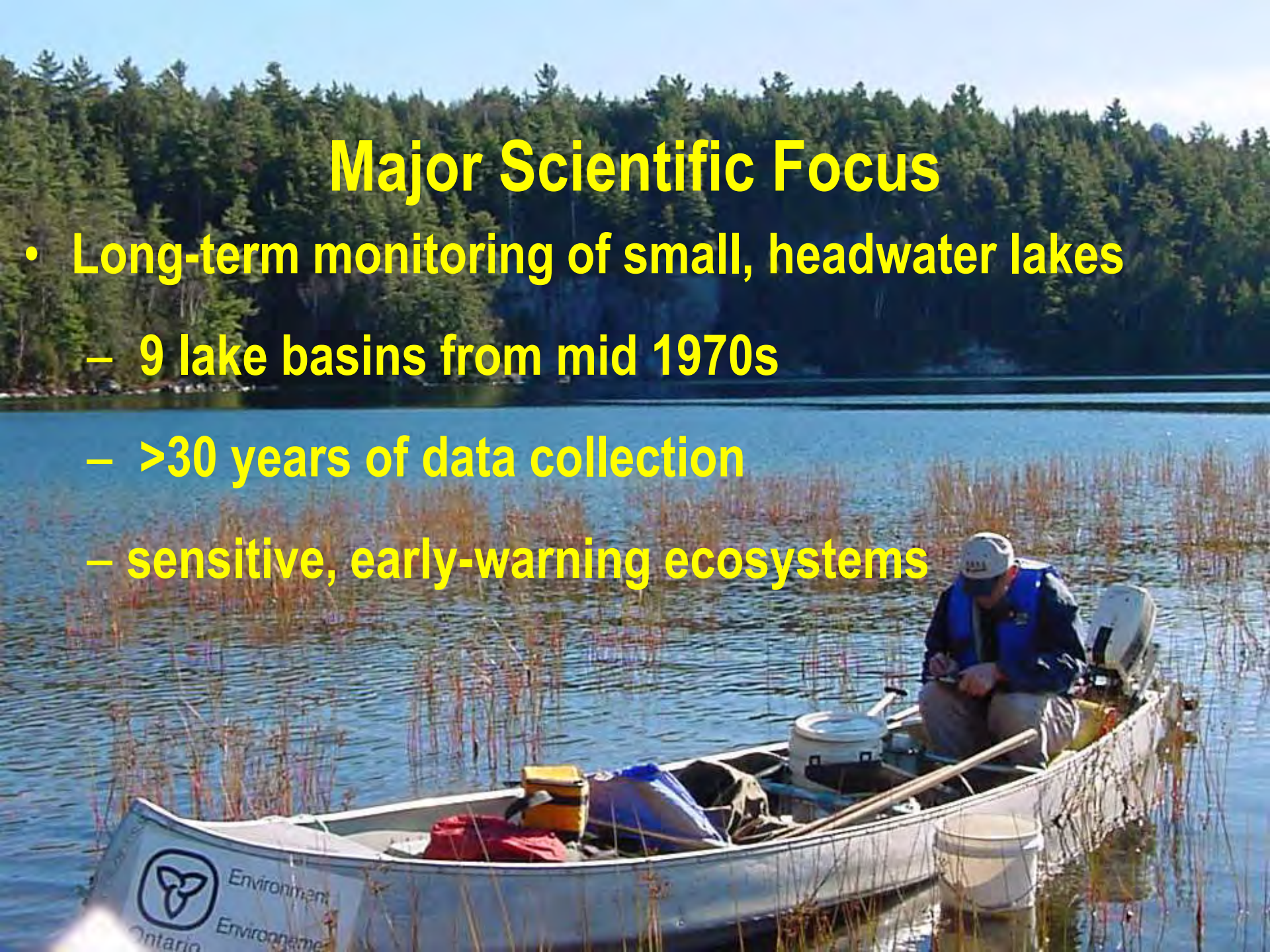
- in 1988 expanded biomonitoring efforts to include benthos and crayfish to assess biological recovery
- early 1990s assisted with monitoring and modeling nutrient budgets for Lake Simcoe
- in late 1990s initiated partnerships with universities and other organizations to enhance science capacity





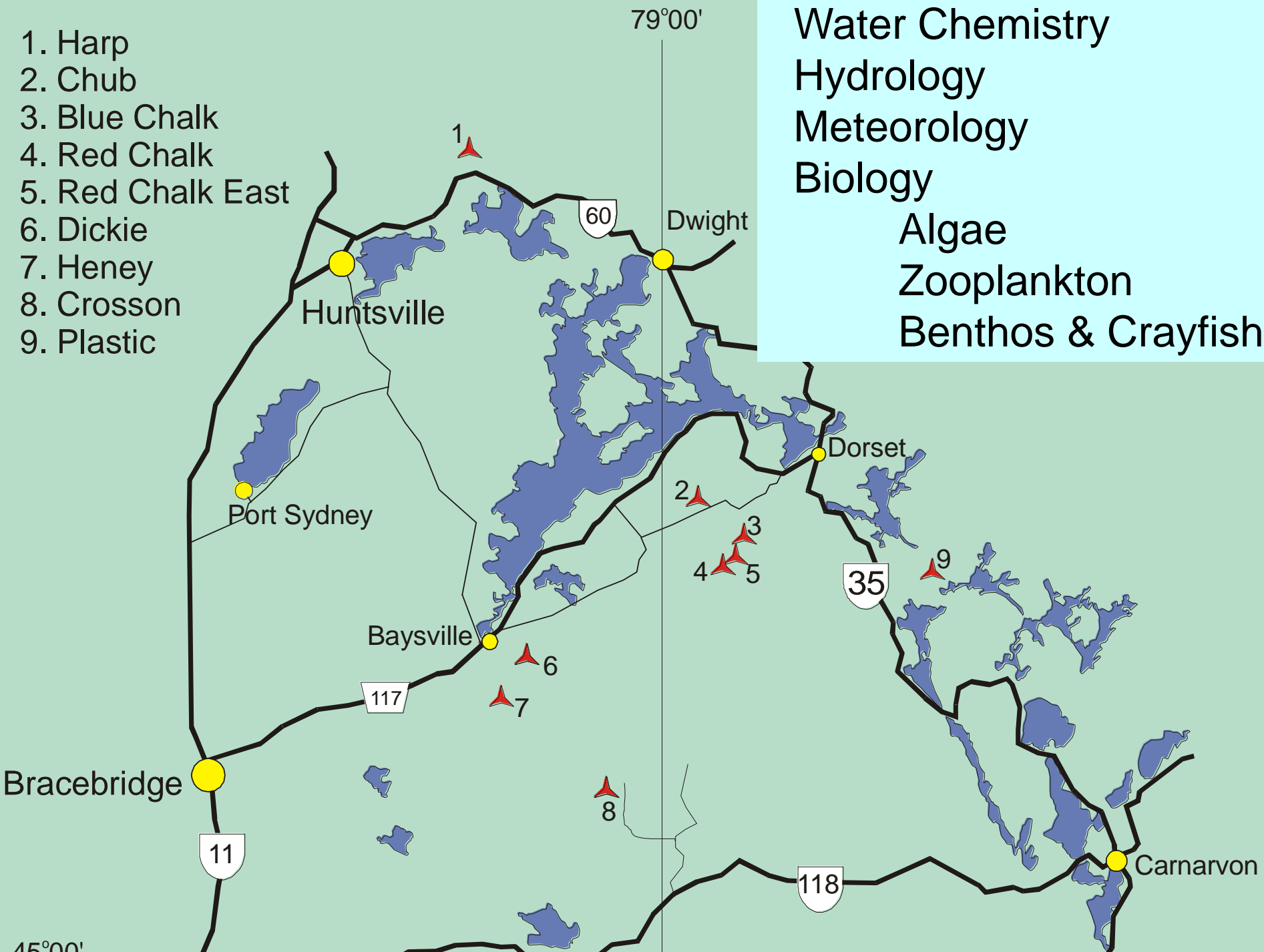
Major Scientific Focus

- Long-term monitoring of small, headwater lakes
 - 9 lake basins from mid 1970s
 - >30 years of data collection
 - sensitive, early-warning ecosystems



1. Harp
2. Chub
3. Blue Chalk
4. Red Chalk
5. Red Chalk East
6. Dickie
7. Heney
8. Crosson
9. Plastic

- Water Chemistry
Hydrology
Meteorology
Biology
Algae
Zooplankton
Benthos & Crayfish



A photograph of a forest stream flowing over mossy rocks. The water is clear and cascades over several large, rounded boulders covered in green moss. The surrounding forest is dense with green foliage and trees, creating a lush, natural setting. The stream flows from the upper right towards the lower left of the frame.

Major Scientific Focus

- Long-term monitoring of Precambrian Shield streams associated with the 9 lake basins
 - began in mid 1970s
 - 23 lake inflows and outflows
 - includes hydrology and water chemistry





Partners in Science



- **Universities: Trent, York, Laurentian, Queen's, Ottawa, Waterloo, Toronto, and McGill**
- **District of Muskoka**
- **Federation of Ontario Cottagers Associations**
- **Lake of the Woods District Property Owners Assoc'n.**
- **Lake Simcoe Regional Conservation Authority**
- **Saugeen Valley Conservation Authority**

Trent University Partnership

- Peter Dillon - NSERC Industrial Chair in Watershed Biogeochemistry
 - modeling trends in water & precipitation chemistry
 - assessing chemical and biological effects of changing SO_4 , NO_x and Hg deposition rates
 - resolving the role of climate – especially drought on anticipated recovery from acid loading

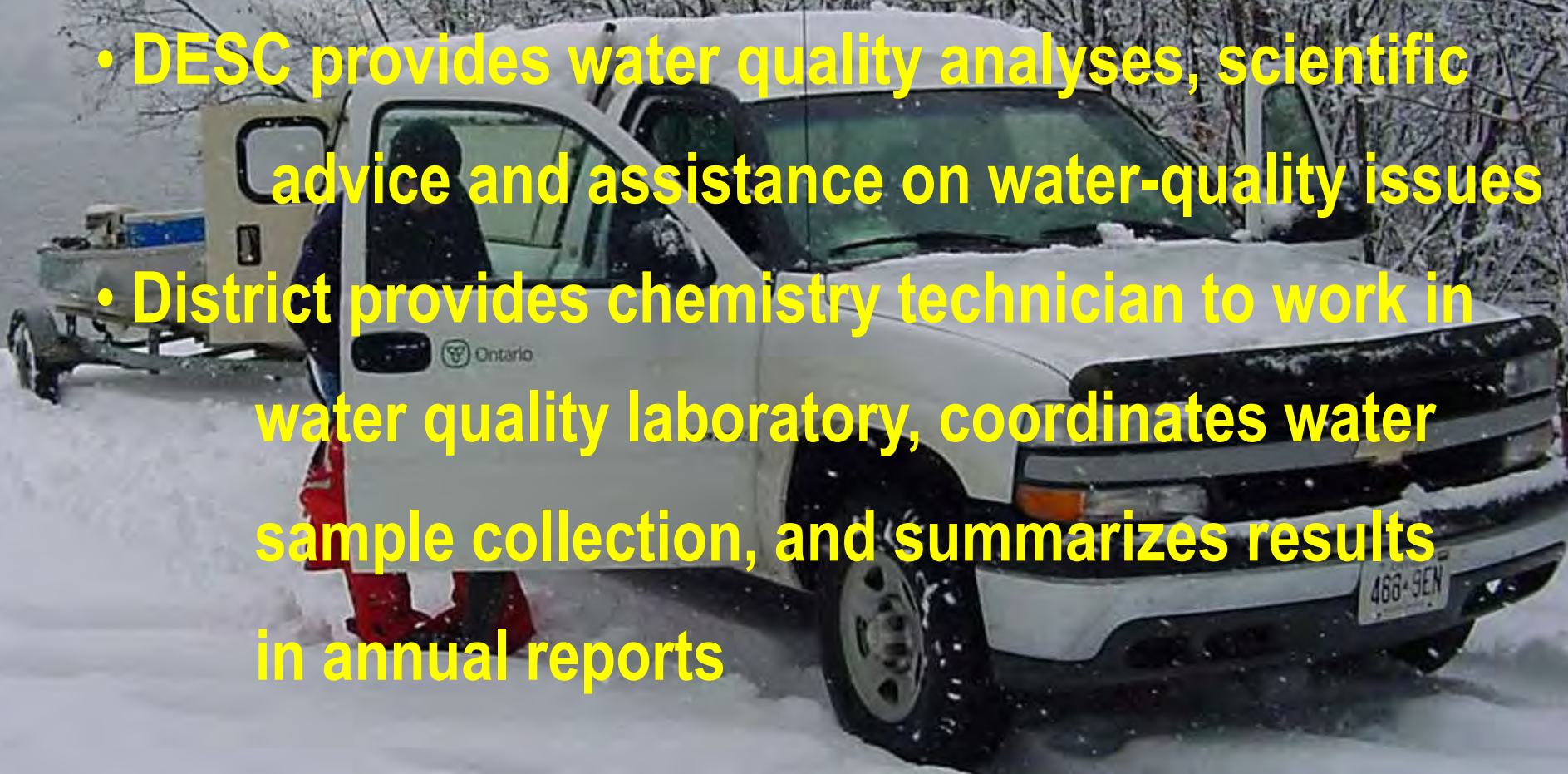
York University Partnership

- **Norm Yan – Biology Professor**
 - **evaluating impacts of multiple environmental stressors on inland lakes (i.e., climate change, UVB, metals, acids and introduced species)**
 - **experimentally evaluate zooplankton populations in controlled laboratory conditions**



District of Muskoka Partnership

- collaborate on issues affecting inland lakes in Muskoka
- DESC provides water quality analyses, scientific advice and assistance on water-quality issues
- District provides chemistry technician to work in water quality laboratory, coordinates water sample collection, and summarizes results in annual reports

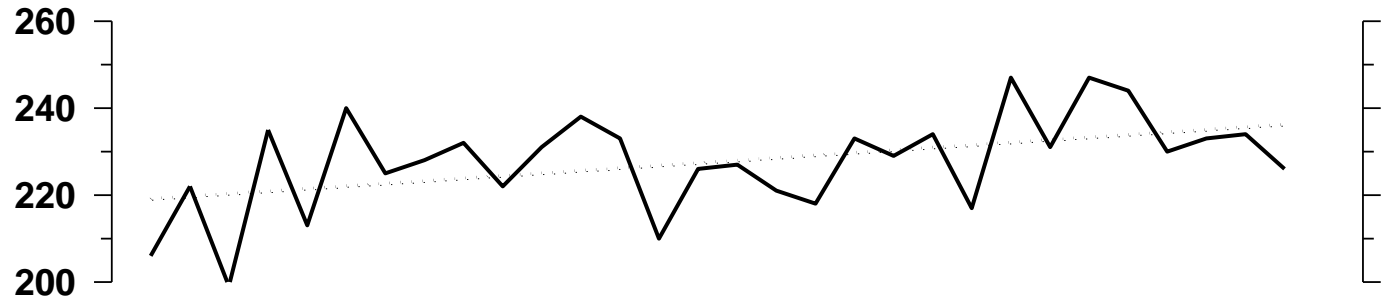


Some Historical Background

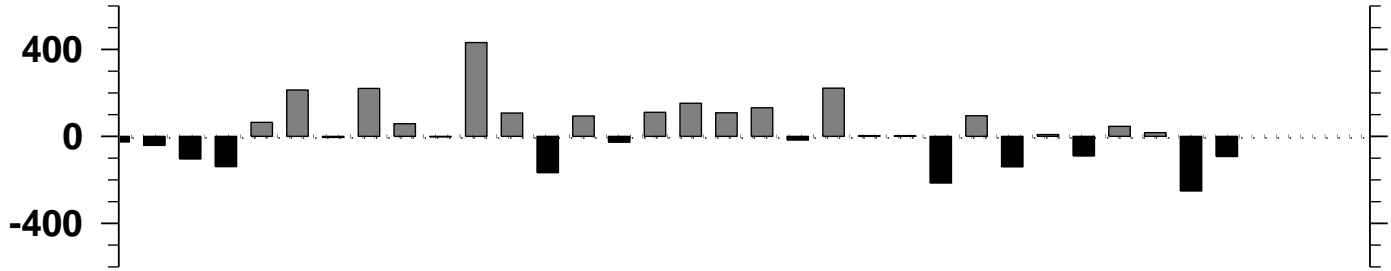
- **1858 – first major access road to the region**
- **1862 – first sawmill established**
- **1870 – first resorts open in Muskoka**
- **1875 – railway reaches Gravenhurst**
- **1893 – Algonquin Park established**
- **1972 – Ontario Ministry of Environment created**
- **1976 – Dorset Research Centre established**



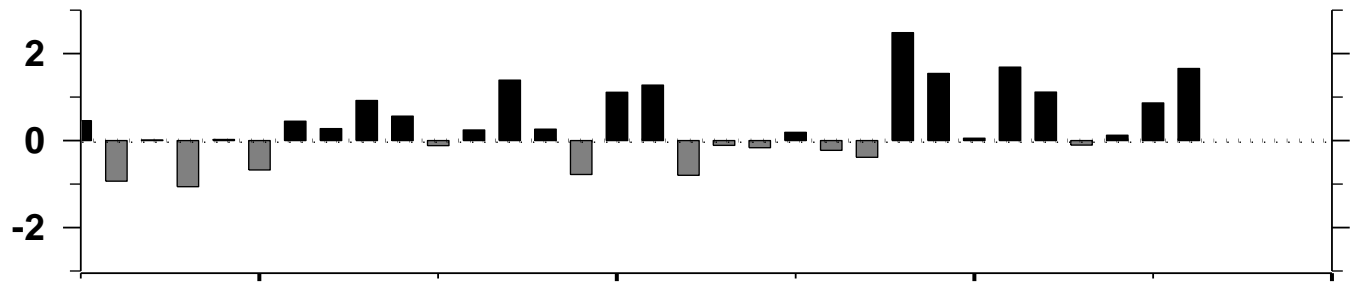
ice-free days



Total precip
(anomalies in mm)

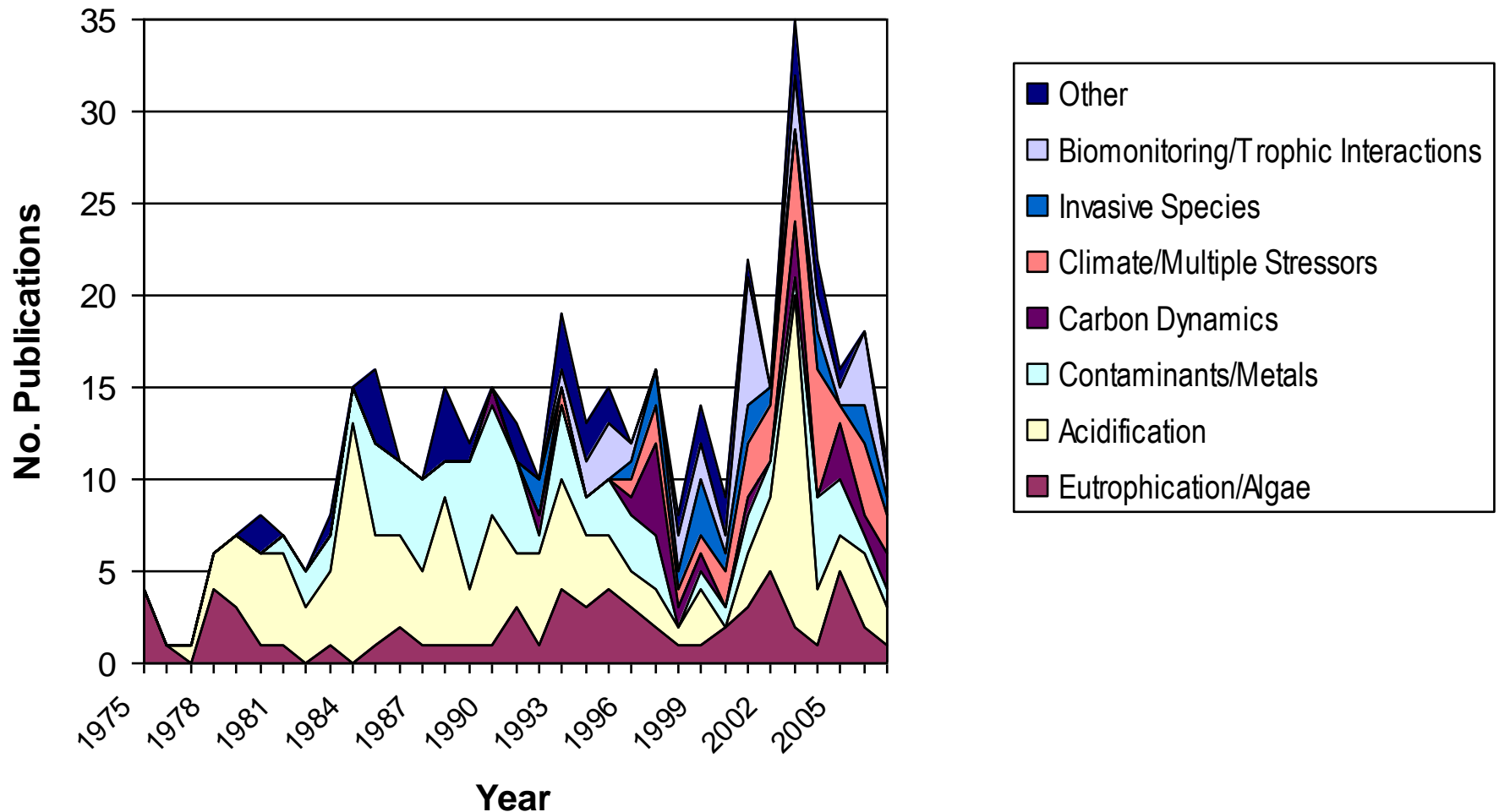


Mean annual T
(anomalies in °C)

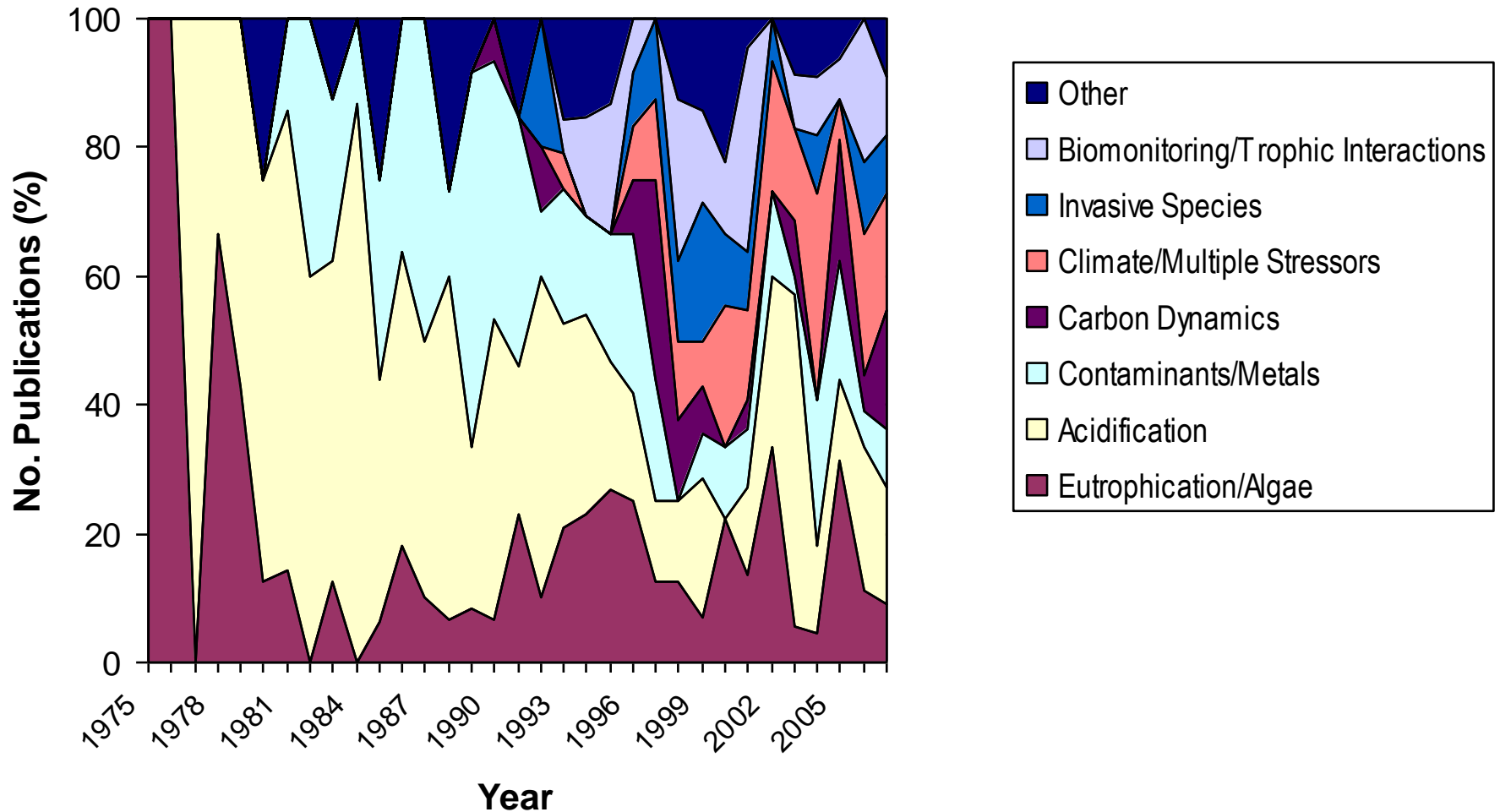


Year

DESC Reporting by Major Issue



DESC Reporting by Major Issue





“Thirty Years of Aquatic Science at the Dorset Environmental Science Centre: Transforming our Understanding of Factors That Regulate Aquatic Ecosystems on the Southern Canadian Shield”

Special issue with 12 papers summarizing results from our long-term monitoring programs.