

The Lake Simcoe Climate Change Adaptation Planning Process

Adaptation Through Legislation

Pilot Project Steering Committee

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Lake Simcoe Watershed

Background – Lake Simcoe

- December 2008 – The Lake Simcoe Protection **Act** – legislative framework
- June 2009 - Science Panel release Lake Simcoe Protection **Plan**
 - Informs watershed protection and restoration
- Policy 7.11 of the Lake Simcoe Protection Plan commits the Ministry of the Environment (MOE) in collaboration with other ministries and partners, to develop a **climate change adaptation strategy** for the Lake Simcoe watershed by June 2011

Background – Lake Simcoe

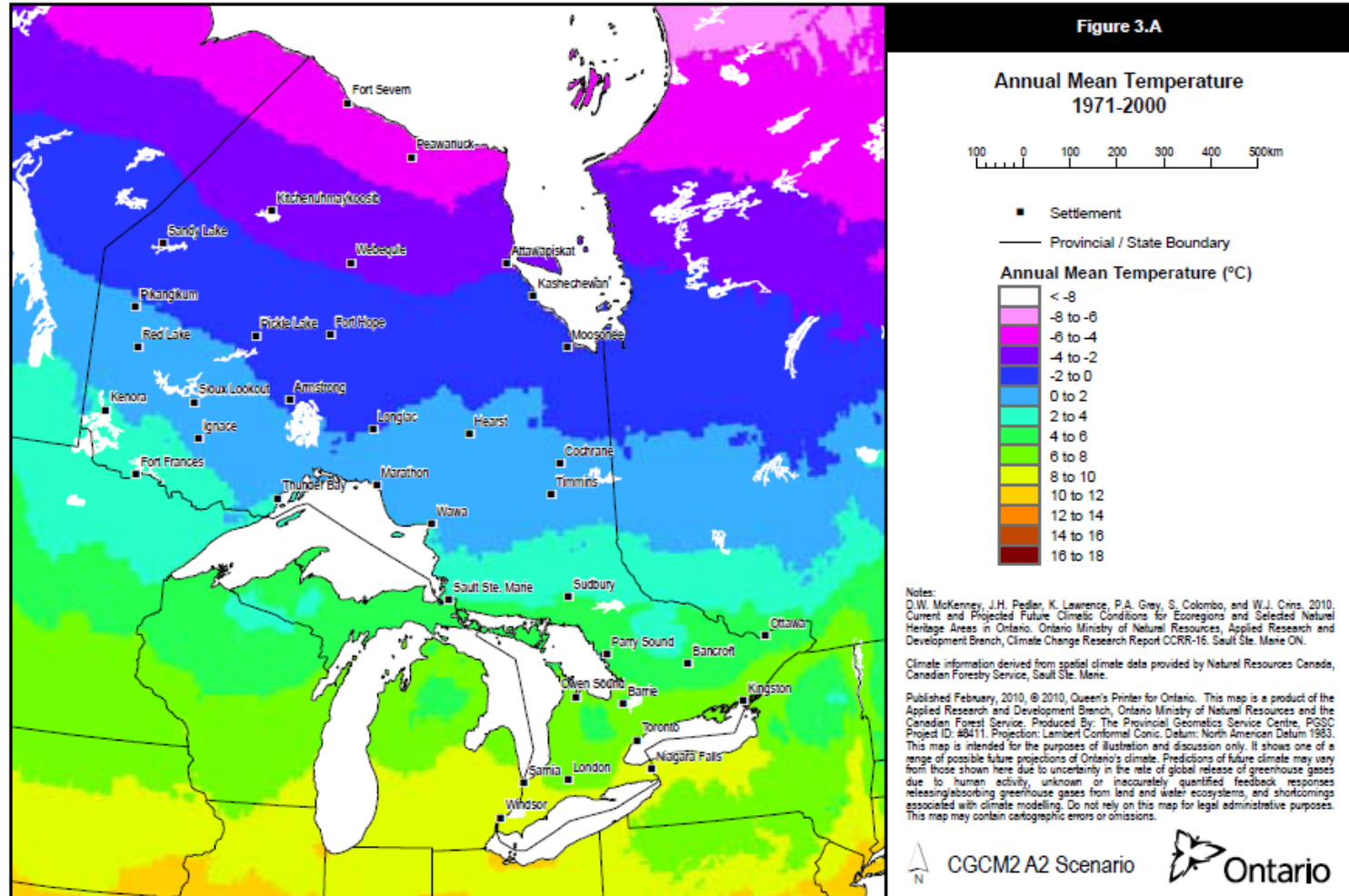
- The Plan states that in order to support the development and implementation of the climate change strategy, MOE in collaboration with other ministries and partners will:
 1. *Assess and evaluate the risk of climate change impacts on the watershed*
 2. *Conduct and support additional research to study the impacts of climate change in the watershed*
 3. *Develop an integrated climate change monitoring program to track the impacts of climate change on the watershed*
 4. *Develop climate change adaptation plans and promote the establishment of a Lake Simcoe adaptation planning Community of Practice (CoP)*
- Ontario's Expert Panel on Climate Change Adaptation ...

“Lake Simcoe strategy should be considered as a pilot project with potential application to other watersheds”
- The purpose of the CC strategy is to increase the resiliency of the Lake Simcoe watershed to the impacts of climate change

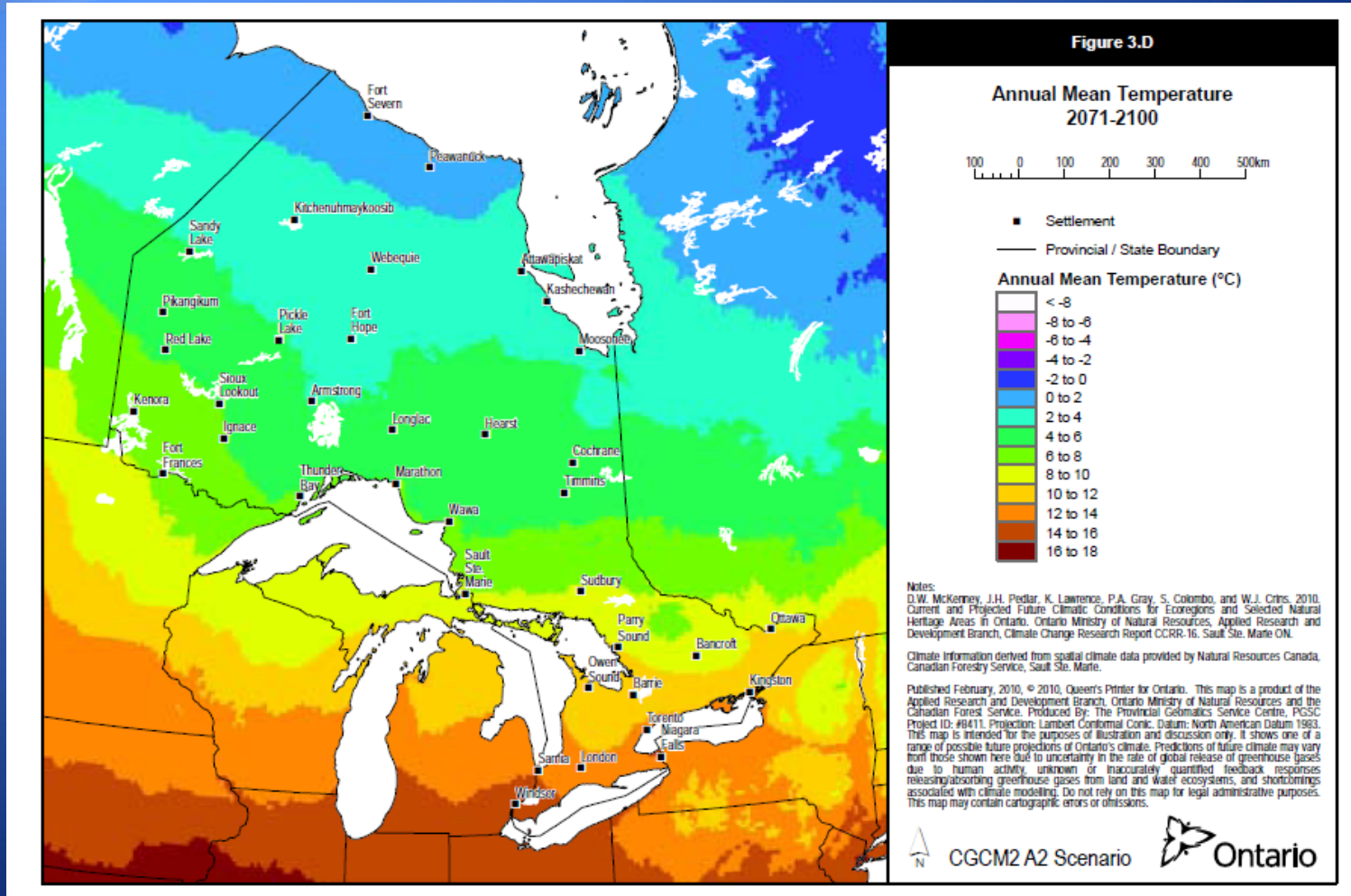
So Why the Fuss?

- ◆ Outside of the Great Lakes, largest inland lake in Southern Ontario
- ◆ Home to 350,000 people with many more seasonal cottagers, a growth area targeted for 30% increase in population
- ◆ Valuable sport fishing and recreation asset (\$200M to provincial economy)
- ◆ Half the watershed area is agricultural land (\$300M to provincial economy)
- ◆ Phosphorus, phosphorus, phosphorus!

Significant change is projected by the end of the century



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Climate Change is a Reality in the Lake Simcoe

- ◆ Average annual temperature increase of **1.7 °C** (one station, 31 years of record)
- ◆ Average winter temperature increase of **2.2 °C** (one station, 31 years)
- ◆ Little change in total average annual precipitation (one station, 31 years)
- ◆ Models (global, ensemble) suggest **2.7 °C** increases in temperature into the 2050s relative to 1971-2000 average, A2)
 - ◆ Largest increases in the winter months
- ◆ Models (global, ensemble) suggest a 6% increase in average annual precipitation
 - ◆ Largest increases in winter, no change in summer season

Potential Impacts of Climate Change for Lake Simcoe

- ◆ Shorter winter season affecting ice quality, ice cover, water temperatures/thermal regime
- ◆ a more suitable climate envelope for invasive species
- ◆ Earlier spring runoff with less flow in the summer
- ◆ Degraded fish habitat, beach closures, algae
- ◆ More frequent extreme events (wind and rain) leading to flooding affecting houses and municipal infrastructure including roads and storm water infrastructure

Climate Change Adaptation Plan Components

1. Assessment of organizational readiness and where necessary improvement to the capacity of an organization's ability to respond.
2. Establishment or reconfiguration of a baseline upon which to measure change and adaptation success.
3. Development and use of climate scenarios and socio-economic scenarios to help envision future conditions.
4. Completion of Vulnerability Analyses using the future scenarios to assess strengths and weaknesses.
5. Identification and development adaptation strategies.
6. Implementation of the adaptation strategies.
7. Monitoring of the strategies to evaluate success and the need for adjustment.
8. Adjustment of the management strategies decisions where needed.

Climate Change Adaptation Planning Process

Step 1: Build Team, Engage Experts and Identify Indicators

- Build team and engage experts
- Identify sectors that are pertinent to the assessment
- List indicators associated with each area of focus
- List metrics which provide information on the state of the indicator
- List targets to the different indicators to help set goals and determine different levels of management actions

Step 2: Assess Current Vulnerability

- Determine what the indicators suggest about the state of each area of focus/sector
- Determine how the climate has changed within the watershed
- Determine if a change in climate contributed to a change in the indicators
- Establish to what extent indicators are exposed or sensitive to climate
- Determine what adaptive measures have been introduced in the past and how effective they were
- Determine how resilient the components of the system are

Step 3: Estimate Future Scenarios for Both Climate and Non- Climate Stressors

- Determine future scenarios for non-climate stressors and review their connection to climatic factors
- Develop future climate scenarios to determine how the key climate attributes may change into the future

Step 4: Estimate Future Vulnerability

- Determine vulnerability to future climate variability/change (based on existing stressors, vulnerabilities and projections of future climate)
- Prioritize the vulnerabilities posed by climate change

Step 5: Develop a method to generate adaptation ideas using a Policy Delphi

- Develop a policy Delphi survey that will gather adaptation recommendations from available expertise
- Informed by the vulnerability assessment reports, poll experts for adaptation responses

Step 6: Evaluate adaptation recommendations

- Develop a ranking system to evaluate adaptation recommendations for priority, affordability and ease of implementation
- Evaluate the responses to highlight common themes and to remove duplication
- Undertake measures to improve adaptive capacity

Step 7: Implementation of Adaptive Measures

- Decide who is responsible for implementing adaptive measures
- Determine who will fund the adaptive measures
- Determine the timing of the launch of the measure
- Determine how the adaptive actions will be measured

Vulnerability vs. Risk

...similar but different approaches to Adaptation

Vulnerability = Sensitivity + Exposure + Adaptive Capacity

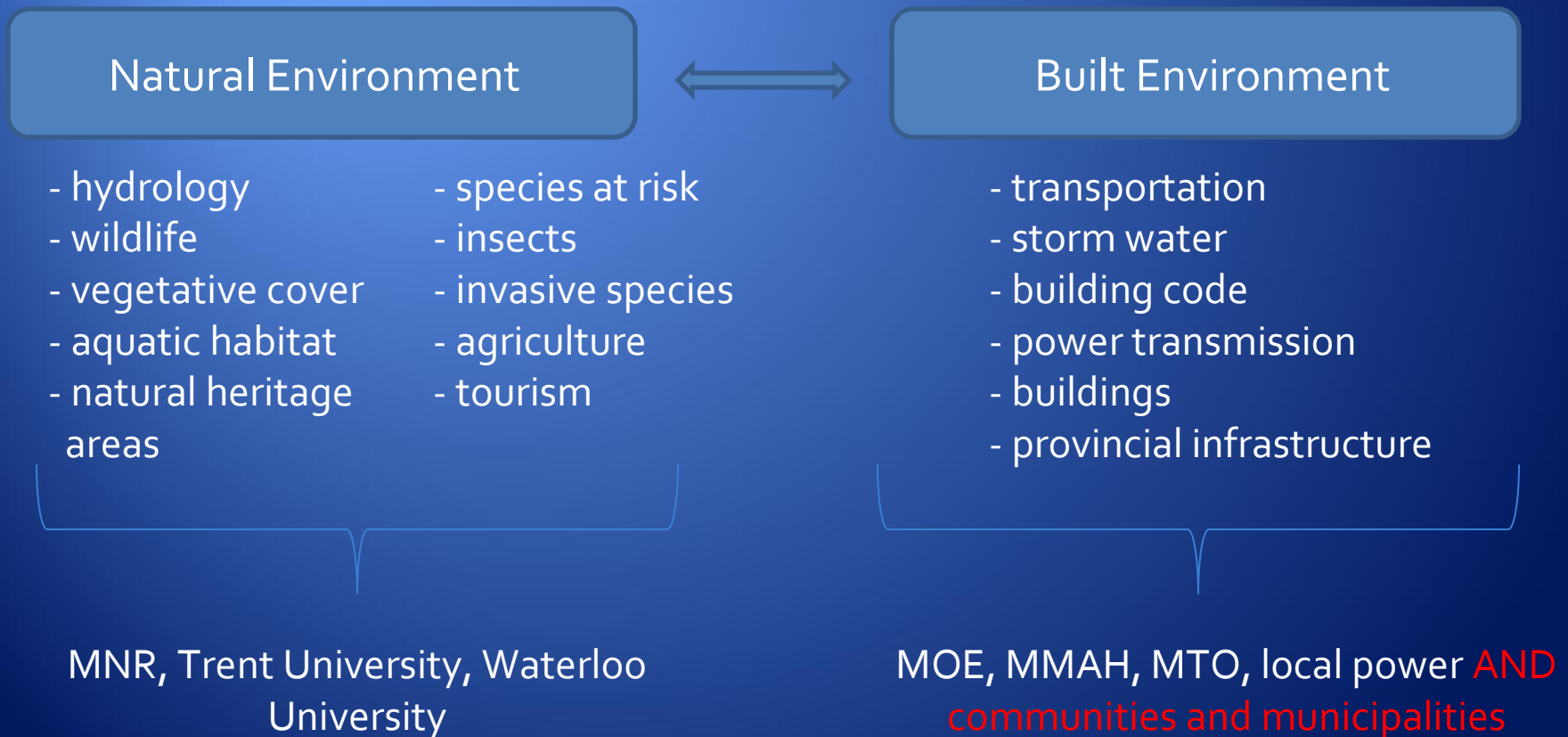
Risk = Probability of Occurrence + Severity of Impacts

Step 1. Engage Experts and Identify Indicators

- ◆ 11 themes requiring adaptation measures selected
- ◆ The availability of expertise had a significant bearing on the selection of areas of inquiry for this pilot project
- ◆ Experts in the natural sciences sector were contracted to carry out detailed vulnerability analysis based on peer reviewed research and literature reviews
- ◆ Experts in the infrastructure theme were polled and asked for responses based on their experience and knowledge

Step 2. Vulnerability Assessments

Using a guiding framework, experts assessed the vulnerability of system components (both natural and built) to the impacts of climate variability and climate change in the context of current system stresses.



Step 2. Vulnerability Assessments (cont'd)

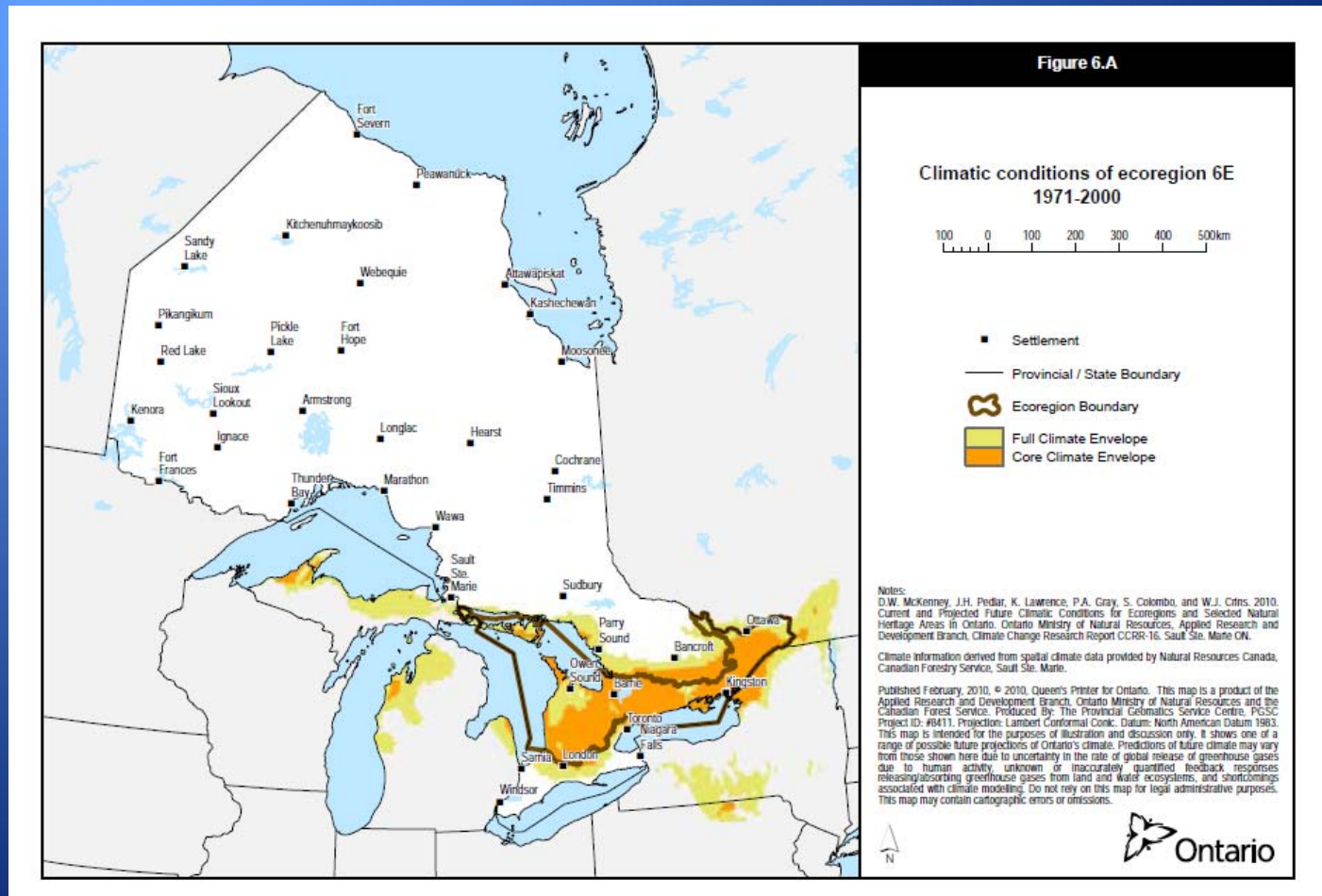
Lake Simcoe Climate Change Vulnerability Assessment Authors

Area of Study	Author	Affiliation
Hydrology	MacRitchie and Stainsby	MOE
Aquatic Habitat	Chu	Trent U
Wildlife	Walpole and Bowman	MNR/Trent U
Species at Risk	Brinker and Jones	MNR
Invasive Species	Sager and Hicks	Trent U
Vegetative Cover	Puric-Mladenovic et. Al.	MNR
Natural Heritage Areas	Lemieux et. al.	U Waterloo
Tourism and Recreation	Lemieux et. al.	U Waterloo
Insects	Beresford	Trent U
Agriculture	Jamieson	OMAFRA
Infrastructure	Douglas	Communities, Ont Ministries

Step 3. Project Future Scenarios

Changes in climate will have major implications on the composition, structure and function of ecosystems in the Lake Simcoe Watershed

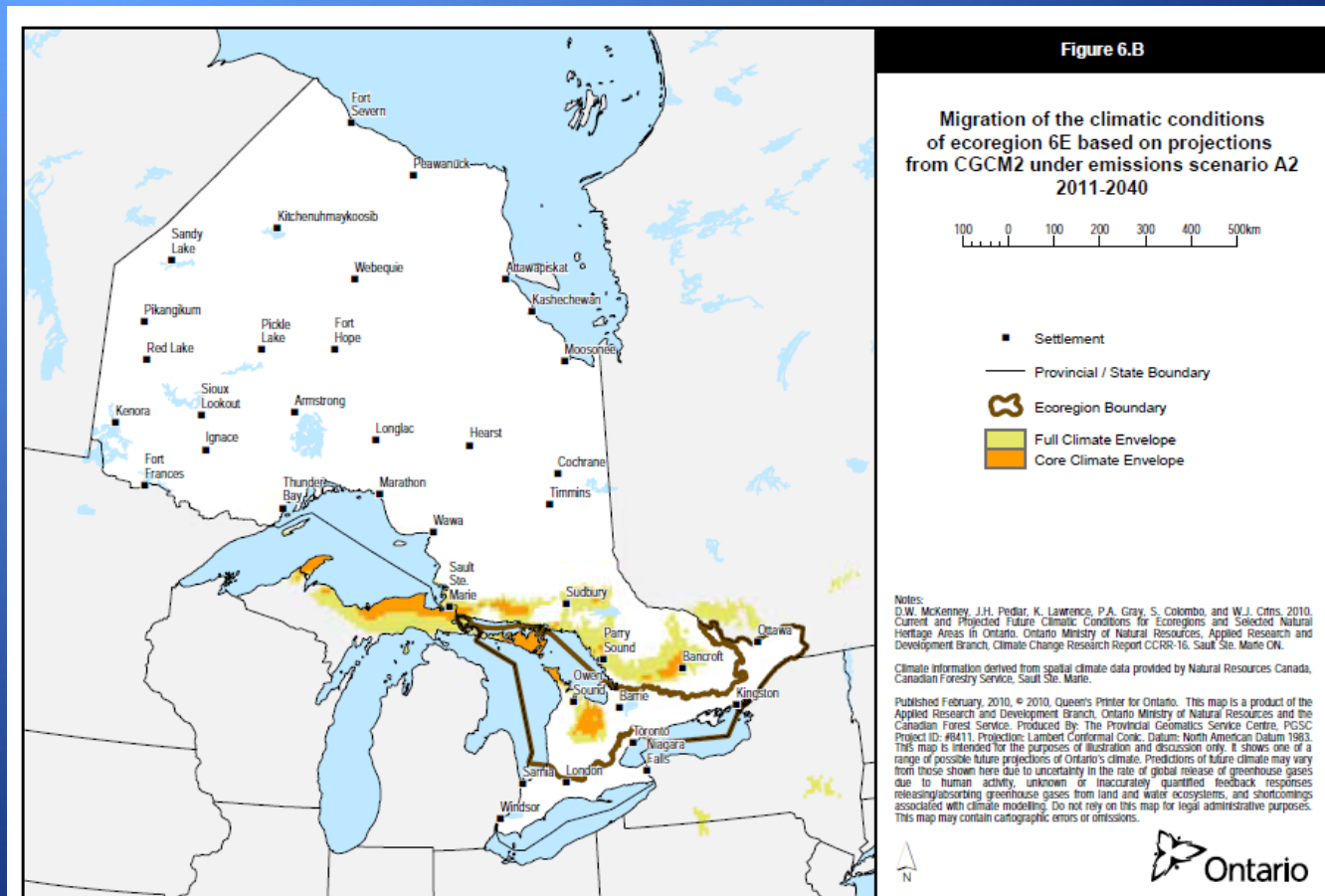
Marked increases in population will enhance non-climate stresses



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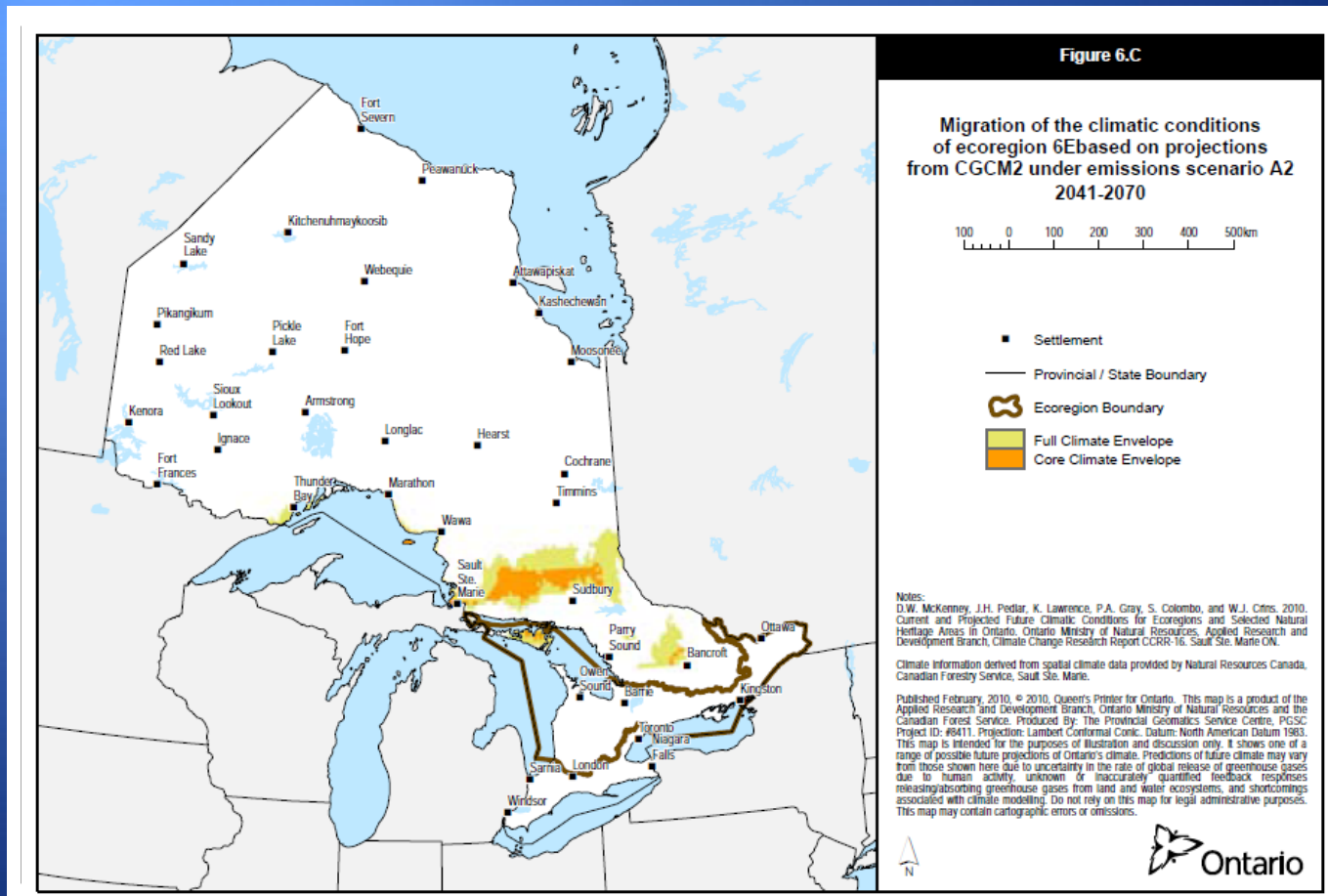
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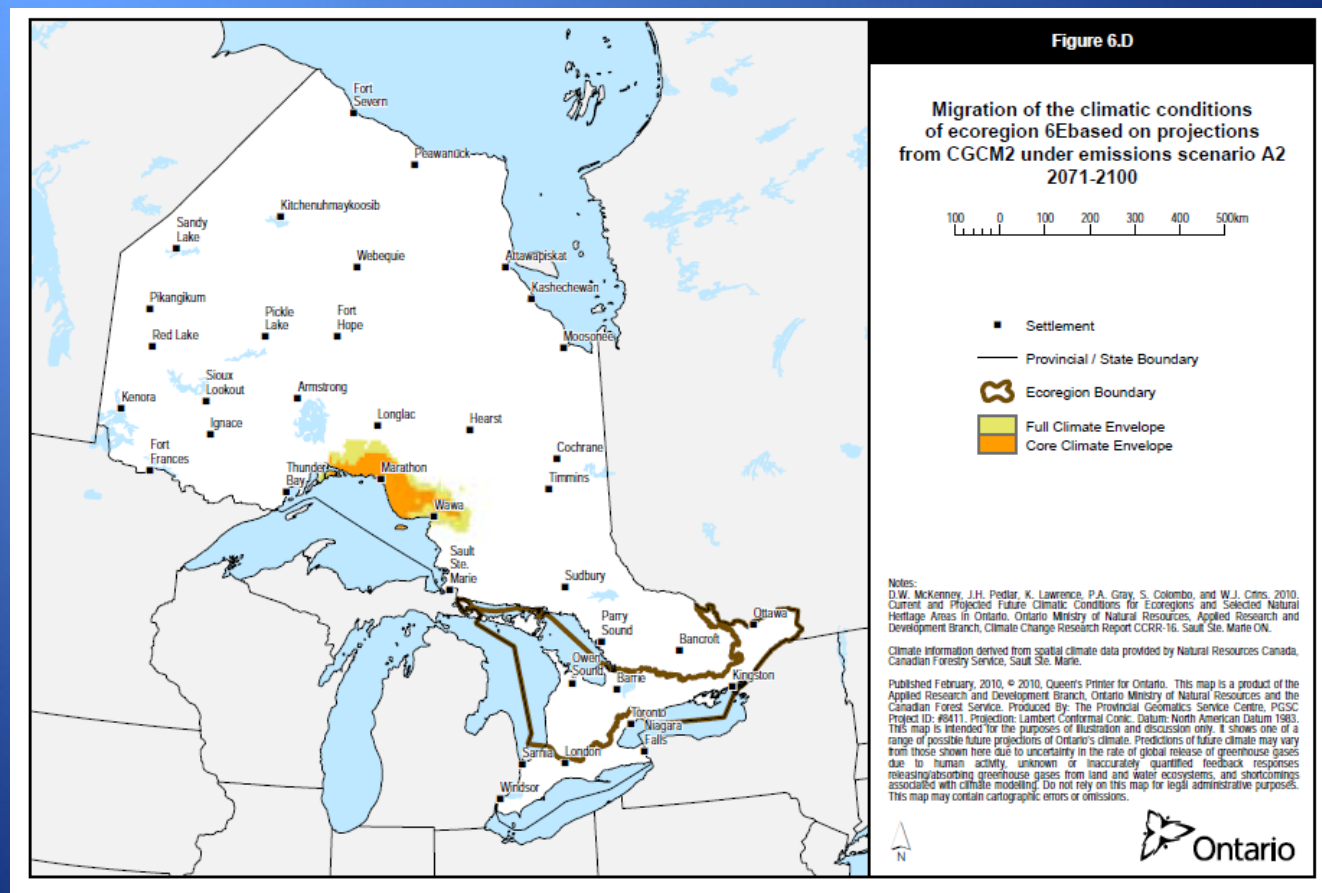
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Step 4. Project Future Vulnerability

- Authors used all the information provided to assess future vulnerability to climate change in their fields of study
- Results culminated in presentations of vulnerabilities at a forum held in November 2010
- Vulnerability assessments posted on webpage and would inform the generation of adaptive measures

Step 5. Develop a Method to generate adaptation ideas

- Policy Delphi selected for Lake Simcoe

Advantages of the Policy Delphi Method

- An iterative, group-oriented, Idea Generating Strategy (IGS) that seeks to generate the strongest possible opposing views on the potential resolutions of a major policy issue
- Overcomes limitations of other IGSs, including:
 - one or a few vocal individuals to dominate the discussion
 - **people remain silent, possibly due to shyness or fear of censure**
 - the 'rut effect' (i.e., participants getting hung-up on one thought and staying in that rut for the duration of the meeting)
 - **the power of persuasion and the 'bandwagon' effect**
 - the unwillingness to abandon 'norms'
 - geographic isolation
 - cost

Lake Simcoe Policy Delphi Process

- An electronic survey was used for two rounds of questions
- First round provided survey participants with the climate change vulnerability reports prepared by the scientists, including the list of three primary consequences of climate change
- Survey contained 11 questions organized according to seven general categories: *legislation and policy, strategic planning, resource management planning, operations, monitoring, research, and communication.*
- Sector experts all responded to the same set of questions, most responded only to their theme area or area of expertise
- These recommendations were then evaluated in the second-round survey for their perceived priority and feasibility (affordability and ease of implementation)

Sample Questions from Policy Delphi Round One

1) Legislation and Policy

What types of policies are required to provide for an adaptive approach to decision-making?

2) Strategic Planning

What short- and long-term strategic planning is required to support the vision of the *Lake Simcoe Protection Plan*?

3) Research

What types of information and forms of knowledge are required to support robust and flexible decision-making?

- ♦ 11 questions in 7 categories for each of the VA themes

Policy Delphi Round Two Evaluation Criteria

Evaluation Criteria	Rating			
	1	2	3	4
Priority	First-order priority; a most relevant point; has direct bearing on major issues; must be resolved, dealt with, or treated	Second-order priority; is relevant to the issue; significant impact but not until other items are treated; does not have to be fully resolved	Third-order priority; insignificantly relevant; has little importance; not a determining factor to major issue	No priority; no relevance; no measurable effect; should be dropped as an item to consider
Feasibility 1: Affordability	<p>Definitely affordable, can be implemented within current fiscal realities</p> <p><i>AND/OR</i></p> <p>High cost-sharing possibilities</p>	<p>Some indication adaptation is affordable; possibility that adaptation can be implemented within current fiscal realities</p> <p><i>AND/OR</i></p> <p>Some cost-sharing opportunities</p>	<p>Some indication adaptation is unaffordable; additional monetary resources, or re-allocation required to implement</p> <p><i>AND/OR</i></p> <p>Low cost-sharing opportunities</p>	<p>Definitely unaffordable; adaptation cannot be implemented within current fiscal realities</p> <p><i>AND/OR</i></p> <p>No cost-sharing opportunities</p>
Feasibility 2: Ease of Implementation	<p>No identifiable internal or external barriers (e.g., legal, political, institutional, social, etc.); <i>definitely can be implemented</i></p>	<p>Some identifiable internal or external barriers (e.g., legal, political, institutional, social, etc.); <i>barriers most likely can be overcome</i></p>	<p>Some identifiable internal or external barriers (e.g., legal, political, institutional, social, etc.); <i>barriers may be too significant to overcome</i></p>	<p>Obvious and significant internal and external barriers (e.g., legal, political, institutional, social, etc.); <i>definitely cannot be implemented</i></p>

Participant Response Rate

- 74 individuals were invited to participate in the first round of the policy Delphi survey
- 20 did not feel qualified to answer the questions.
- of the 54 participants, 43 (84%) responded
- of the 43 respondents to the first-round survey, 39 (88%) completed the second round survey
- 8 agricultural experts and practitioners provided advice to the agricultural representative who completed the first-round survey
- 16 municipal representatives completed the infrastructure survey
- 16 municipal representatives from 8 communities attended the February face-to-face meeting to further discuss community vulnerabilities.

Recommendations

All themes except infrastructure

- more than **900 recommendations** were submitted by the 43 respondents to the first-round survey
- planning team reviewed the 900 recommendations, eliminated redundancies, and redrafted 695 recommendations in a consistent format for use in the second-round survey
- with the ranking system developed for the round-two survey, first-order or high priority adaptation options were identified
- in total, 92 recommendations were identified as first-order priority and an additional 48 recommendations were identified as first- or second-order priorities

Drafting a Strategy For Adapting to Climate Change in the Lake Simcoe Watershed

- 140 priority recommendations now available for consideration
- Recommended adaptation actions are based upon the best available science and best available expert opinion
- Current suite of Recommendations were grouped under the following 7 categories
 - ***LEGISLATION and POLICY***
 - ***STRATEGIC PLANNING***
 - ***RESEARCH***
 - ***INVENTORY***
 - ***COMMUNICATION***
 - ***ENABLERS AND PRICIPLES***
 - ***INFRASTRUCTURE***



Planning Team Thoughts and Feedback

On the results

- + generated 900+ adaptation recommendations
- + common themes to the recommendations
- + many recommendations are beneficial to more than one sector
- uneven distribution of respondents (expertise)
- insufficient community responses

On the process

- too many questions, not enough time, not the right expertise in all themes, community members not yet well informed enough to contribute, etc.

Recommendations for Future Strategic Assessment (Hindsight)

- Use ensemble climate models and scenarios when possible
- Engage stakeholders and experts early and substantively
- Scope needs to be comprehensive and include regional, national and international influences
- Ensure the appropriate expertise and capacity is in place
- Allow adequate time to participate in climate change adaptation planning
- Consider providing incentives to participants
- Narrow the scope of questions and improve the capacity of the online-survey engine if a Delphi process is to be used
- Take the time to engage communities
- Include an assessment of risk in the analysis

Next Steps

1. Release of the Pilot Project report:

**Adapting to Climate Change:
Tools and Techniques for an Adaptive Approach to
Managing for Climate Change : A Case Study
and**

**Recommendations to Inform Development of a Climate Change
Adaptation Strategy for the Lake Simcoe Watershed**

2. Writing is underway for two additional products (final draft stage) :

- **Lake Simcoe Climate Change Adaptation Strategy**
- **Practitioners Guide to Climate Change Adaptation in Ontario Ecosystems**

3. Application of beta version of the process in underway in Northeastern Ontario Site Region 3E, the Clay Belt



A Practitioner's Guide to Climate Change Adaptation in Ontario's Ecosystems

Version 1.0



Practitioner's

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Thank you

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Photo taken Oct 7, 2011 Port Dover Ontario