Climate Change Adaptation in Ontario

Climate Change Adaptation Workshop - Kingston

Ministry of the Environment
February 9, 2011

Outline

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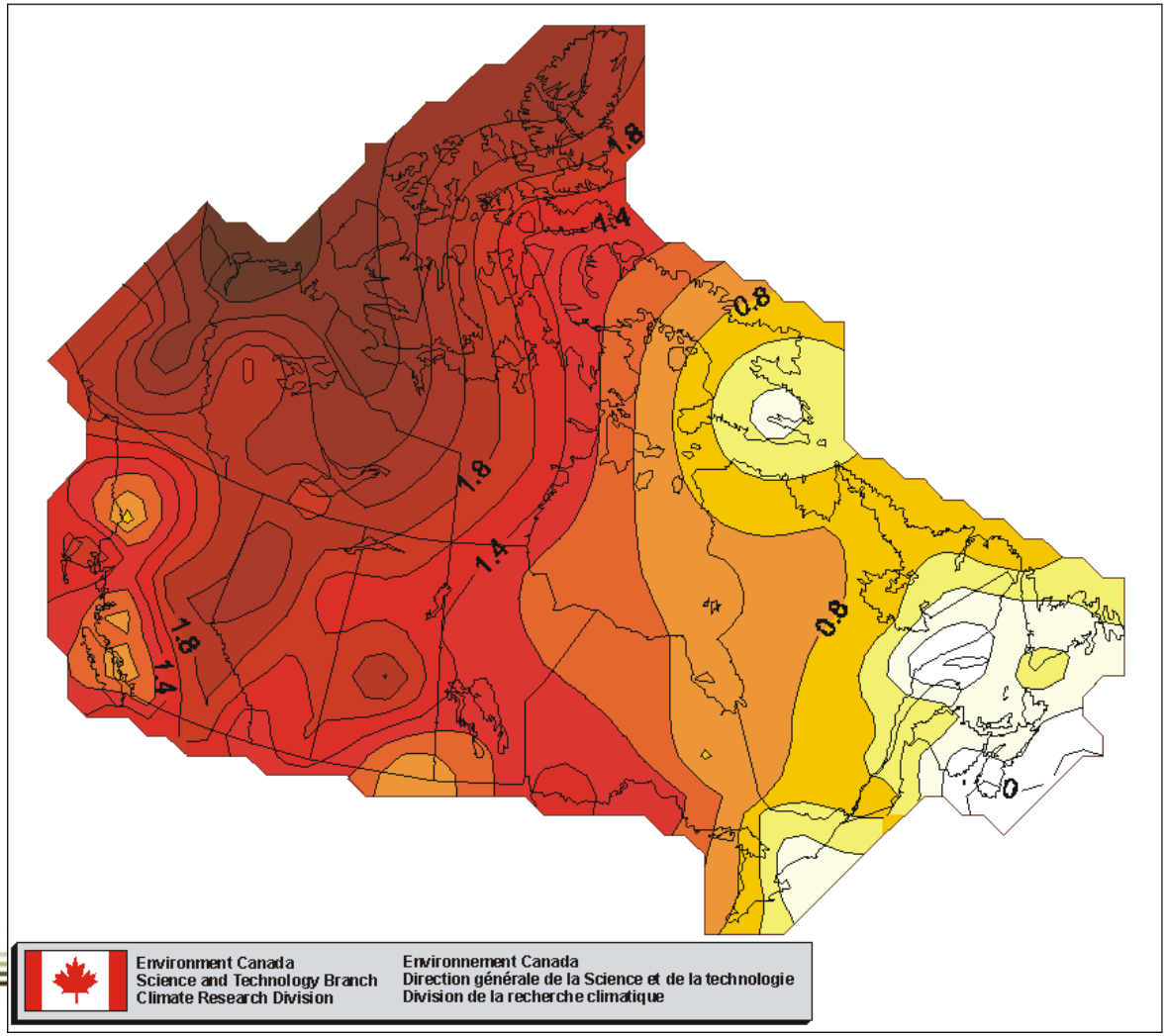
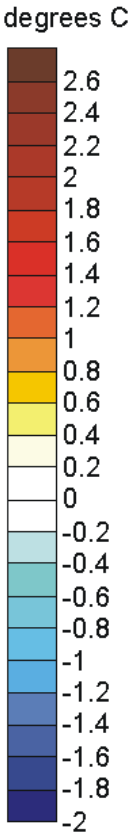
- Community Adaptation Initiative

Context – Ontario's Changing Climate

Annual Temperature Trend, 1948-2008





There has been an increase of up to 1.4° C in average temperatures in Ontario since 1948.

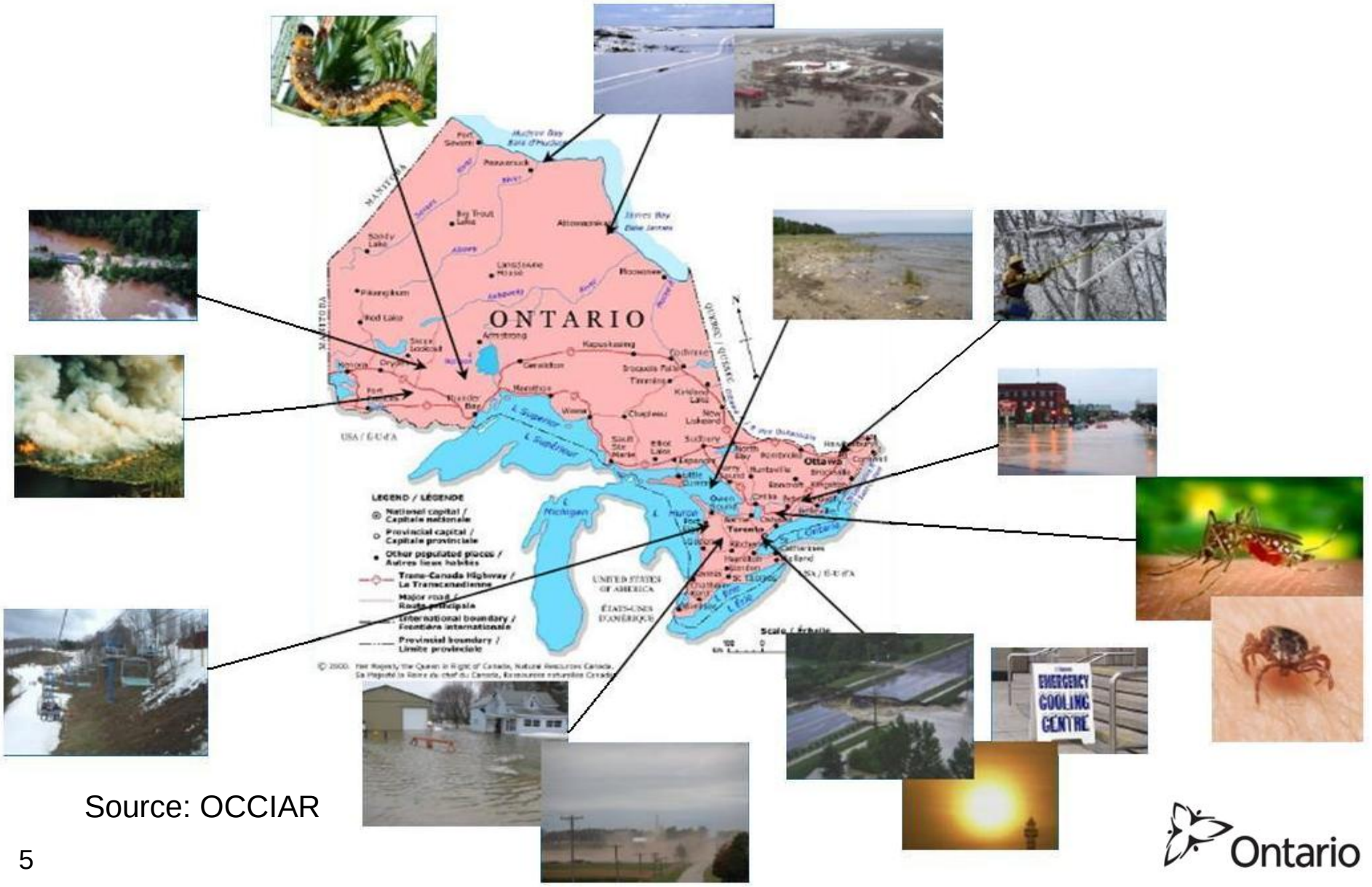
Ontario

Context – Ontario's Changing Climate

- We know that such temperature increases, though small at first glance, go along with huge changes in the patterns of wind and precipitation.
- Many of these changes are impacting our lives in a number of ways:
  - 2010 has been estimated as the hottest year on record, causing more heat alerts and health concerns;
  - According to the Insurance Bureau of Canada, flooding damages account for the highest number of household insurance claims in Ontario; and
  - Lower water levels in the Great Lakes-St. Lawrence River Basin mean potential impacts to fish spawning patterns, water availability for drinking and for power generation and pollution levels.

Ontario

Context – Climate Impacts



Source: OCCIAR

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Context – Climate Impacts

Finch Avenue Washout in Toronto in 2005 resulted in ~$500M in insurance claims.

Flooding resulting in infrastructure failure, backed up storm sewers, property damage.

Ontario

Context – Climate Impacts

Severe Winter Storm in Eastern Ontario, Québec and the Maritime Provinces in 1998 ($1.5B insurance claims in Canada).

Ontario

Context – Climate Impacts

Low water levels in the Great Lakes – Georgian Bay “Dry Docks.”

Ontario

Context – Climate Impacts

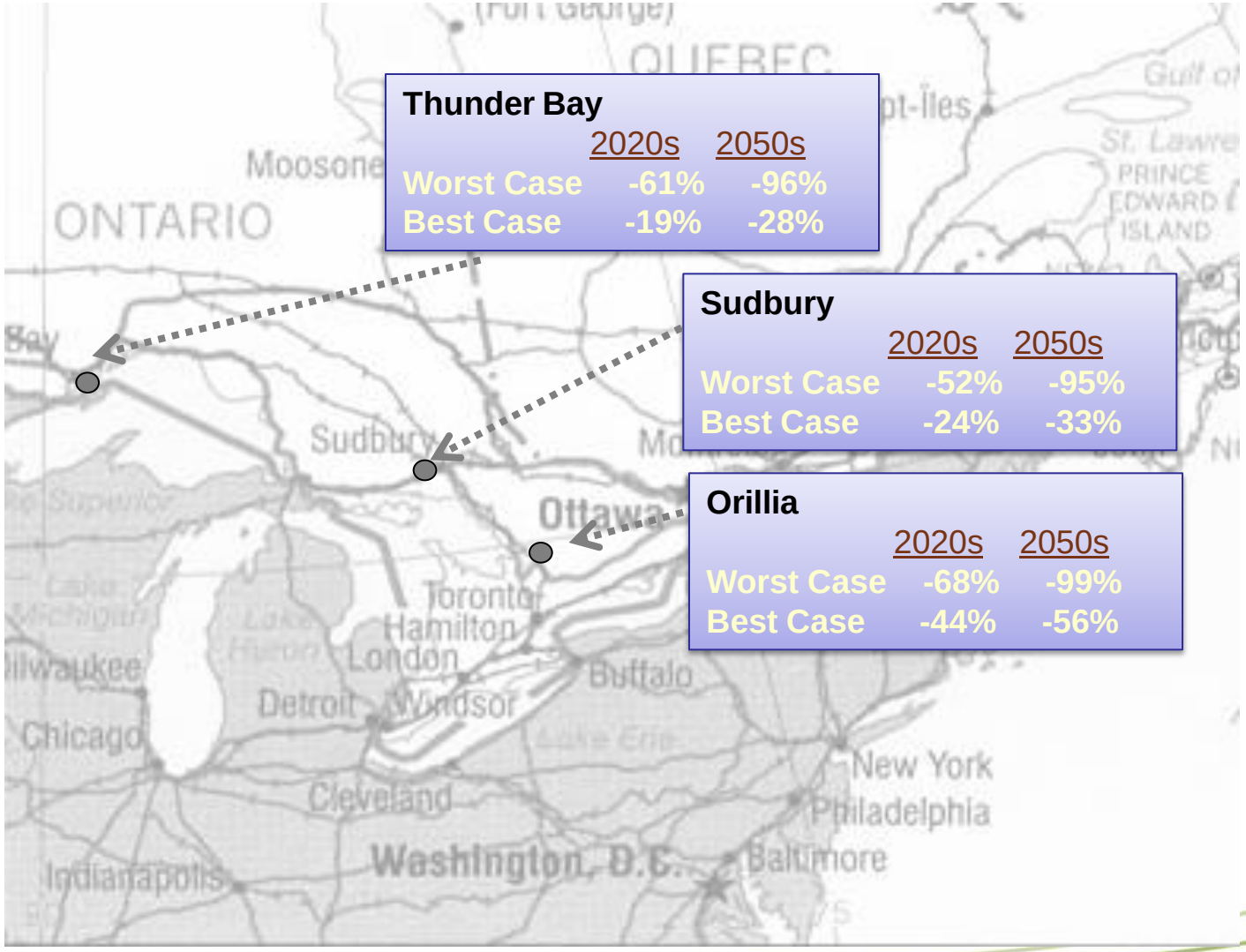
Vaughan and Grey County tornadoes in 2009 resulted in $76M in insurance claims.

Wind damage resulting in personal injury, infrastructure and property damage, and power failures.

Ontario

Context – Climate Impacts

Economic losses in the snowmobiling industry as a result of shortened season are projected to be significant.



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Context – Economic Impacts

Cost of adaptation increases when action delayed

- Cost of extreme weather may increase by **0.5 to 1% of world GDP** by mid-century (Derived from Stern, 2006 and Garnaut, 2008).
- This means that if Ontario isn't prepared for the impacts of a changing climate, the costs to our economy could be as much as ~**$5.19B,** or 1% of our GDP (Ministry of Finance 2009 GDP).

Value of early action and targeted investment

- Well-targeted, early investment to improve climate resilience is likely to be cheaper and more effective than complex disaster relief efforts after the event.
- 2005 storm/flood that washed out Finch Avenue resulted in **$500M in damages**; costs could have been **reduced through adaptation measures** such as larger road culverts, better protection for electrical and communication cabling, and back-flow valves in homes in surrounding area.

Economic Opportunities

- Adaptation measures can spark innovation (e.g. new drip irrigation **technologies** in Leamington).
- Longer growing seasons have enabled a **vineyard** to be established on Manitoulin Island.

Ontario Taking Action on Adaptation

- Ontario began to formally identify adaptation to climate change as a priority area in January 2008 when Premiers gathered at a Council of the Federation Forum on Climate Change Adaptation.
- **Premier McGuinty** subsequently hosted a national summit on climate change in March 2008.
- Just prior to the Summit, the Minister of the Environment appointed an **Expert Panel on Climate Change Adaptation** (December 2007) to provide the government with advice on how to protect our health, environment, infrastructure, and economy from climate impacts.

Expert Panel on Climate Change Adaptation

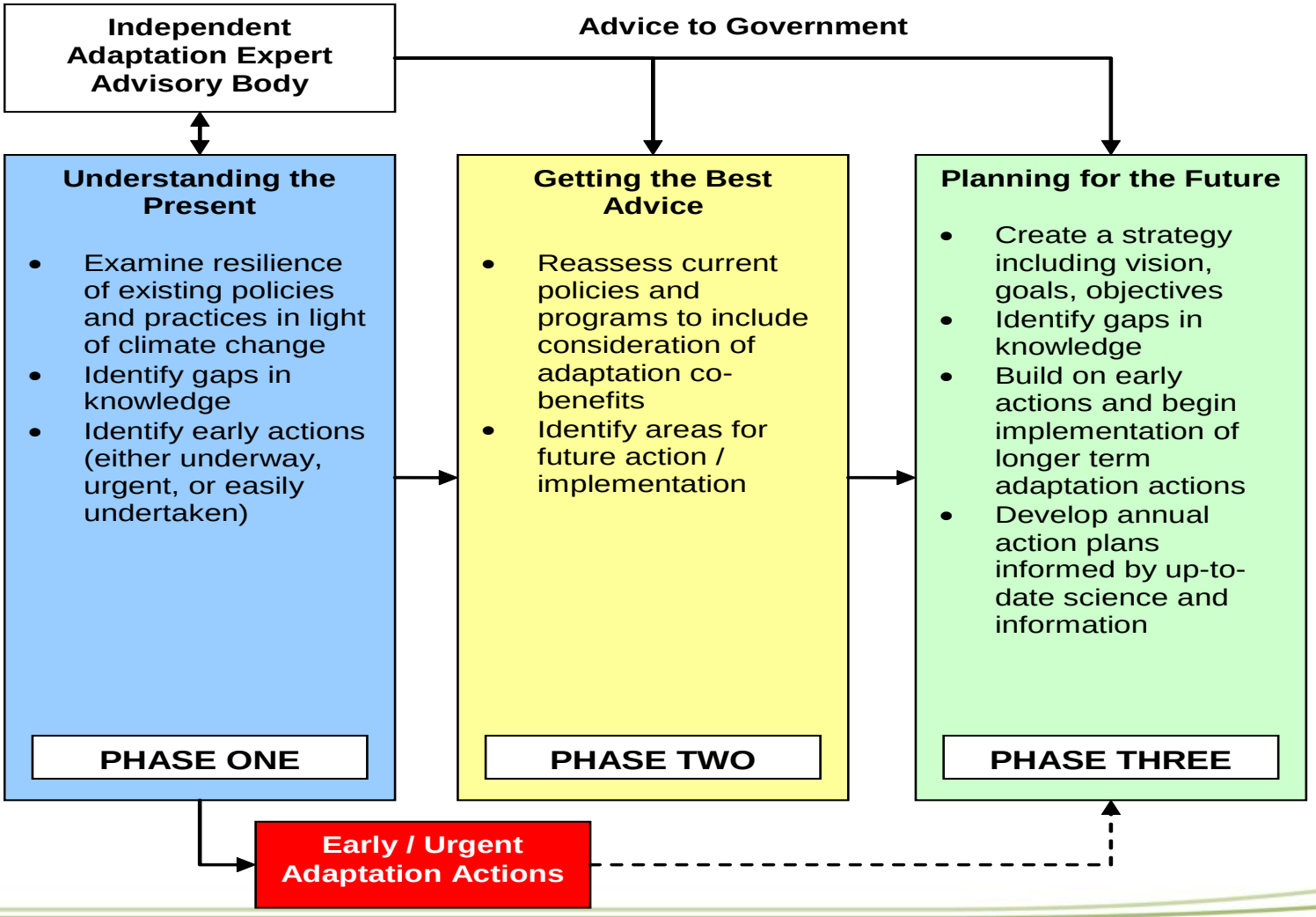
The Panel consisted of two co-chairs:

- Dr. David Pearson, Professor of Earth Sciences at Laurentian University
- Dr. Ian Burton, Emeritus Professor at the University of Toronto and Lead Author for the IPCC 4th Assessment Report.

Nine additional members from a diverse variety of backgrounds and expertise:

- Dr. John Beaucage (former Grand Council Chief of Anishinabek Nation)
- Dr. Barry Smit (University of Guelph)
- Dr. Judith Guernsey (Dalhousie University)
- Dr. Quentin Chiotti (Pollution Probe)
- Eva Ligeti (Clean Air Partnership)
- David Lapp (Canadian Council of Professional Engineers)
- Dr. Gordon McBean (University of Western Ontario)
- Alain Bourque (Impacts and Adaptation, Ouranos, Quebec)
- Jo-Ellen Parry (International Institute for Sustainable Development)

The Panel Process



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Phase One – Understanding the Present

- In Ontario, the Panel began its work with a series of meetings with senior management (i.e., Deputy Ministers/Assistant Deputy Ministers) from a wide range of government ministries/departments/agencies aimed at launching a process of mainstreaming or integrating adaptation into the government's decision-making processes.

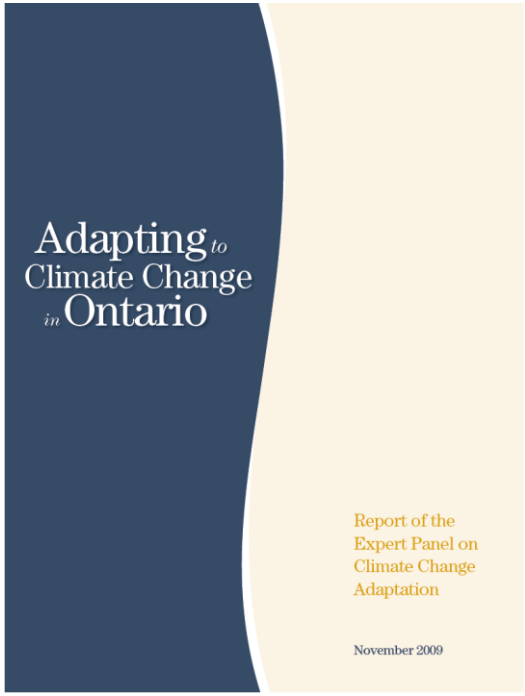
- Over a period of about a year and a half, the Panel met with 15 ministries (e.g., Health, Environment, Natural Resources, Transportation, Energy, Economic Development, Agriculture, Finance, Cabinet Office).

- Iterative process/candid discussion between Panel and senior decision-makers. Some Ministries had a much stronger understanding of how to integrate climate considerations into programs and policies and returned to the Panel on several occasions. Promoted acceptance of need to mainstream adaptation across government.

- Focusing on dialogue with high level decision-makers from the start allowed the Panel process to bring about change even before its recommendations were to be formalized in a report.

Phase Two – Getting the Best Advice

- The Panel developed recommendations culminating in the Panel's Report, "Adapting to Climate Change in Ontario", to the Minister of the Environment (submitted November 2009).
- The Report contained over 50 recommendations for adapting to climate change.
- The five key recommendations were:
  - Development of Climate Change Adaptation Action Plan guided by a Strategy
  - Capacity within government
  - Access to experts
  - Enhancement of climate change science and modelling capacity
  - Dedicated funding
- Five strategic goals to inform the development of a strategy were:
  - Enhance government leadership
  - Integrate adaptation
  - Support communities
  - Develop and disseminate tools to manage risk
  - Collaborate with other governments



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Phase Three – Planning for the Future

- Effective adaptation requires coordinated action across ministries, in different sectors of the economy and at different scales.
- Panel's recommendations provided starting point to inform the path forward and guide future actions by government ministries that can evolve with new science and information on the impacts of climate change.
- Ministries are taking steps to integrate climate change considerations into decision-making by reassessing current policies and programs and looking for opportunities to include adaptation benefits.
- While the initial planning phases focused on the interface between Panel and ministry executives and staff-to-staff dialogue, the importance of engaging key players outside government becomes increasingly important.

Stakeholder Engagement

- Stakeholder engagement began with the Panel looking internally to Ministries, and once report released, shifted focus to engage externally.
- Using the Expert Panel's report as a platform for engagement, MOE met with several stakeholders/sectors over spring 2010 to help inform a provincial policy framework (TBD) for adaptation.
- Stakeholders included representatives from the Environmental Commissioner's office, energy sector, municipalities, building sector, conservation authorities, the insurance industry, agriculture, health, and others leaders in the field.
- Feedback included need for:
  - Provincial adaptation strategy;
  - Clear, central accountability structure;
  - Dedicated funding;
  - Updated floodplain mapping, modelling, Intensity Duration Frequency curves;
  - Outreach and education to build capacity at community level; and
  - Clear and consistent risk assessments to prioritize decisions, given limited resources.

Key Panel Recommendations

The government is currently considering the panel's recommendations. Some specific examples include:

Infrastructure

Rec #14 – Update stormwater management guidance

- MOE should complete a review of stormwater management throughout province by end of 2011, which would assess effectiveness of stormwater approval process and stormwater management master plans, and update the Stormwater Management Design manual to encourage innovation in municipal stormwater management practices.

Water

Rec #30 – Water conservation

- MOE should accelerate its work to develop strong and comprehensive water conservation strategies across the province, including reduction targets for large discretionary uses like municipal water use, introducing requirements in the Building Code for water conservation amenities, and conservation incentives.

Key Panel Recommendations

Water (cont'd)

Rec #32 – Review Ontario Low Water Response program

- MNR should undertake a comprehensive review of the Ontario Low Water Response Program to adjust for projected drought conditions in areas determined to be vulnerable to extended dry periods, and should link this review to water use reporting and water conservation in the context of integrated watershed management.

Rec #33 – Great Lakes agreements should be reviewed

- Regulations, policies and programs to implement the intra-basin transfer regulation and conservation commitments of the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement prepared by MOE and MNR should be reviewed by adaptation experts to ensure the impacts of climate change are taken into account and appropriate adaptive solutions included.

Rec #34 – Use Lake Simcoe strategy as a pilot

- The climate change adaptation strategy called for in the Lake Simcoe Protection Plan should be considered as a pilot project with potential application to strategies for increasing the climate resilience of other watersheds.

Key Panel Recommendations

Science, Monitoring and Modelling

Rec #4 – Enhance climate change science and modelling capacity

- MOE should participate in Canadian Climate Change Scenarios Network's national science and modelling program, provide advice across government and analyze/review and communicate climate change science to government users.

Rec #15 – Update IDF curves and review flood plain mapping

- MNR with Conservation Authorities should review existing flood plain mapping and coordinate completion where gaps exist; and update and develop local and regional Intensity, Duration and Frequency Curves to ensure best available data and projections are accessible to local decision-makers.

Ontario

Current Actions on Climate Modelling

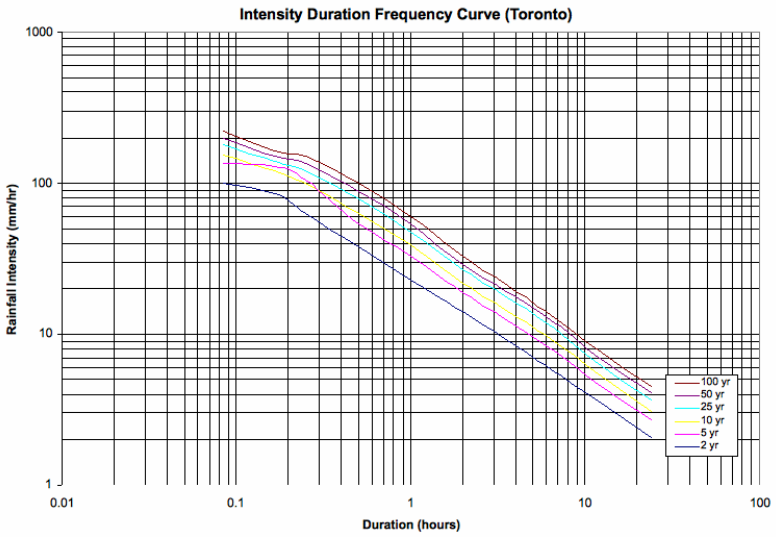
- MOE is currently collaborating with a number of partners on climate modelling.
- Early findings from OURANOS and the University of Regina, using two different climate models (CRCM & PRECIS) indicate that Ontario will experience:
  - Increases in temperature;
  - Increases in precipitation in spring, fall and winter (large variability in summer); and
  - Decrease in length of snow period.

- Several additional grant agreements are underway with University of Toronto (St. George), University of Toronto (Scarborough), University of Regina, and York University.
  - These projects will further refine climate projections to higher resolution (up to 10km x 10km). Results from these projects are expected to be available by April 2011.

- Anticipated project results could inform the development of socio-economic adaptation strategies. For example,
  - Temperature and precipitation indicators could link with water modelling currently underway by MNR and MOE;
  - Intensity, duration and frequency of precipitation and wind gust analyses could inform infrastructure investment and insurance sector policies; and
  - Heat-wave analyses could be useful for public health authorities.

Current Actions on IDF Curves

- In related work, MTO has developed a web based tool for rainfall Intensity, Duration and Frequency (IDF) curves
  - Collaborated with University of Waterloo using Environment Canada data
  - Provides IDF curves electronically for any location in the Province
  - Ensures future highway drainage infrastructure designs are based on more precise representation of recent weather patterns; can be reflective of climate change trends in the historic data
  - Easily updated when new rainfall data becomes available



http://www.mto.gov.on.ca/english/engineering/drainage/index.shtml

Ontario

Other Current Adaptation Actions

- **Lake Simcoe Protection Plan**
  - Requires the development of climate change adaptation strategy for watershed.
  - MOE currently undertaking vulnerability assessments to inform the strategy.
- **Sourcewater Protection Planning**
  - MOE undertaking assessment of emerging science needs to consider climate change impacts within the planning process.
- **Capital Planning Instructions**
  - MEI modified their Capital Planning Instructions requiring ministries to consider impacts of climate change on infrastructure when seeking funding for five year plans (e.g. highways, dams and buildings).
- **Growth Plan for Northern Ontario**
  - Climate change impacts were considered in the development of the draft plan, released for public comment in Fall 2009.

Other Current Adaptation Actions

- **Provincial Policy Statement**
  - MMAH is currently undertaking a 5-year review of the PPS.
  - Opportunity to integrate adaptation policies (e.g. related to development in floodplains, sustainable water use, stormwater management, protecting natural heritage).
- **Ontario Building Code**
  - MMAH is currently undertaking a 5-year review of the Building Code.
  - Opportunity to integrate adaptation policies that would increase resilience of buildings (e.g. hurricane straps, backflow valves).
- **Far North Land Use Strategy**
  - MNR is working with Far North First Nations to ensure that their land use planning considers the impacts of climate change.
  - Working to ensure community-based land use planning will assess the potential effects of climate change and enhance community resilience.

Ontario Regional Adaptation Collaborative

- Initiative with Natural Resources Canada to advance community level adaptation planning and actions to reduce vulnerability to climate change impacts.

- Program value is up to $6.8M from December 2009 – March 2012.

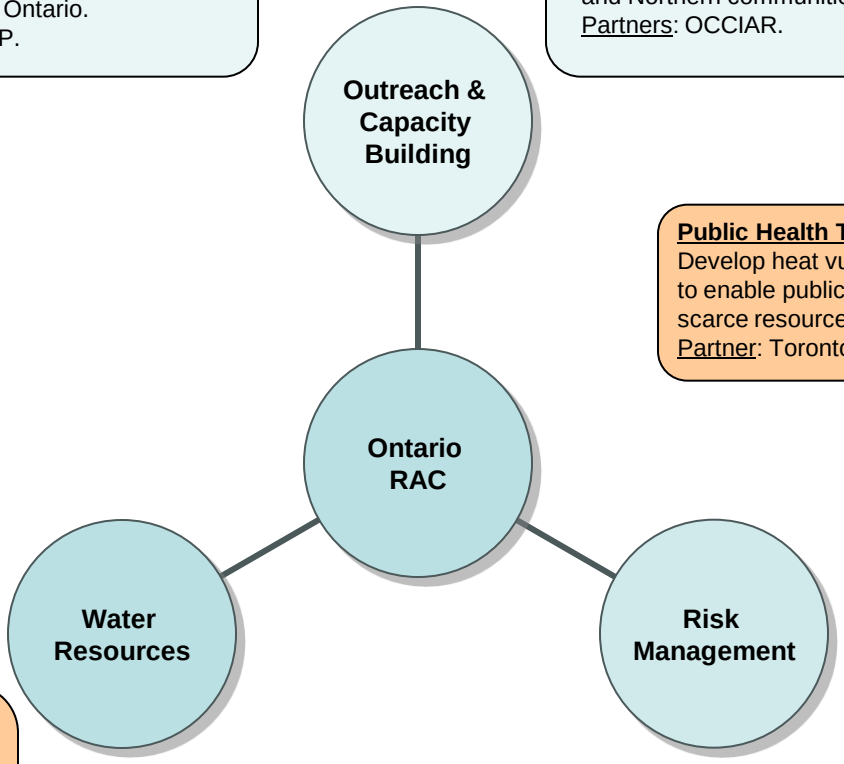
- MOE's RAC partners include:
  - The Ministry of Natural Resources;
  - The Ministry of Municipal Affairs and Housing;
  - Ontario Centre for Climate Impacts and Adaptation Resources (OCCIAR);
  - Toronto Public Health;
  - York University;
  - Toronto and Region Conservation Authority;
  - Institute for Catastrophic Loss Reduction;
  - Clean Air Partnership; and
  - Association for Canadian Educational Resources.

- Potential opportunity for local engagement (e.g. Conservation Authorities) and participation in components of the RAC (e.g., workshops and risk management tools).

Ontario Regional Adaptation Collaborative (RAC)

Urban Component
Build capacity through outreach and training with large urban communities (e.g. municipalities, public health units) across Ontario.
Partners: CAP.

Rural/Northern Component
Build capacity through outreach and training with small, rural, agricultural, resource-based and Northern communities across Ontario.
Partners: OCCIAR.



Public Health Tools
Develop heat vulnerability assessment tool to enable public health units to deliver scarce resources during a heat event.
Partner: Toronto Public Health.

Weather and Water Information Gateway:
Create a web-based integrated Provincial weather and water information discovery and access service to facilitate decision-making the community level.
Partners: MNR, ACER.

Municipal Risk Assessment Tools
Expand and update municipal guide to assist municipalities to create risk-based vulnerability assessments.
Partner: MMAH.

Source Protection
Ensure assessment reports and source protection plans for vulnerable communities in Ontario include climate change adaptation (e.g. potential water shortages) policies and data.
Partners: MOE, TRCA/CO, York University.

Resilient Buildings
Document and make available best practices to retrofit existing homes to improve resilience to climate extremes. Information could be used to update provincial building code, municipal bylaws, current constructions practices, etc.
Partner: Institute for Catastrophic Loss Reduction.

Ontario

RAC Overview

Source Protection & Water Resources Management

MOE, Toronto Region Conservation Authority (on behalf of Conservation Ontario) and York University are:

- Establishing a community of practice site (hosted by York University) in order to ensure that climate change scientists and source protection practitioners are better connected. There will also be a public facing website to house climate and source protection information for Clean Water Act stakeholders.
- Holding a series of Science Workshops intended to examine the current state of climate monitoring science, monitoring gaps, and climate change modeling and examples of adaptation and ensure knowledge is transferred.
- Providing training and technical support to Source Protection Committees to enable water budgets to integrate adaptation considerations.

RAC Overview

Weather & Water Information Gateway

- MNR and ACER are creating a single web portal that will provide standardized data that municipalities, conservation authorities and others can use to assess their adaptation vulnerabilities to make more informed decisions.

- Demonstration case studies targeting unique community vulnerabilities (i.e. stormwater, source protection, flooding, and low water response) will be used to refine the Gateway based on users experiences.

    - Will facilitate community level decision-making related to climate change impacts on water including low water and drought management, flood water and stormwater management.

    - Will provide timely access to the best available climate change impacts data and information at the local level through a web-based portal.

    - Will establish Local Adaptation Collaboratives (LACs) in five regions of the Province to lead demonstration projects to test and improve the value of the gateway in facilitating decision-making.

    - Will inform a series of regional/watershed based workshops for key decision makers that will share best practices and transfer knowledge regarding the design and implementation of effective adaptation measures.

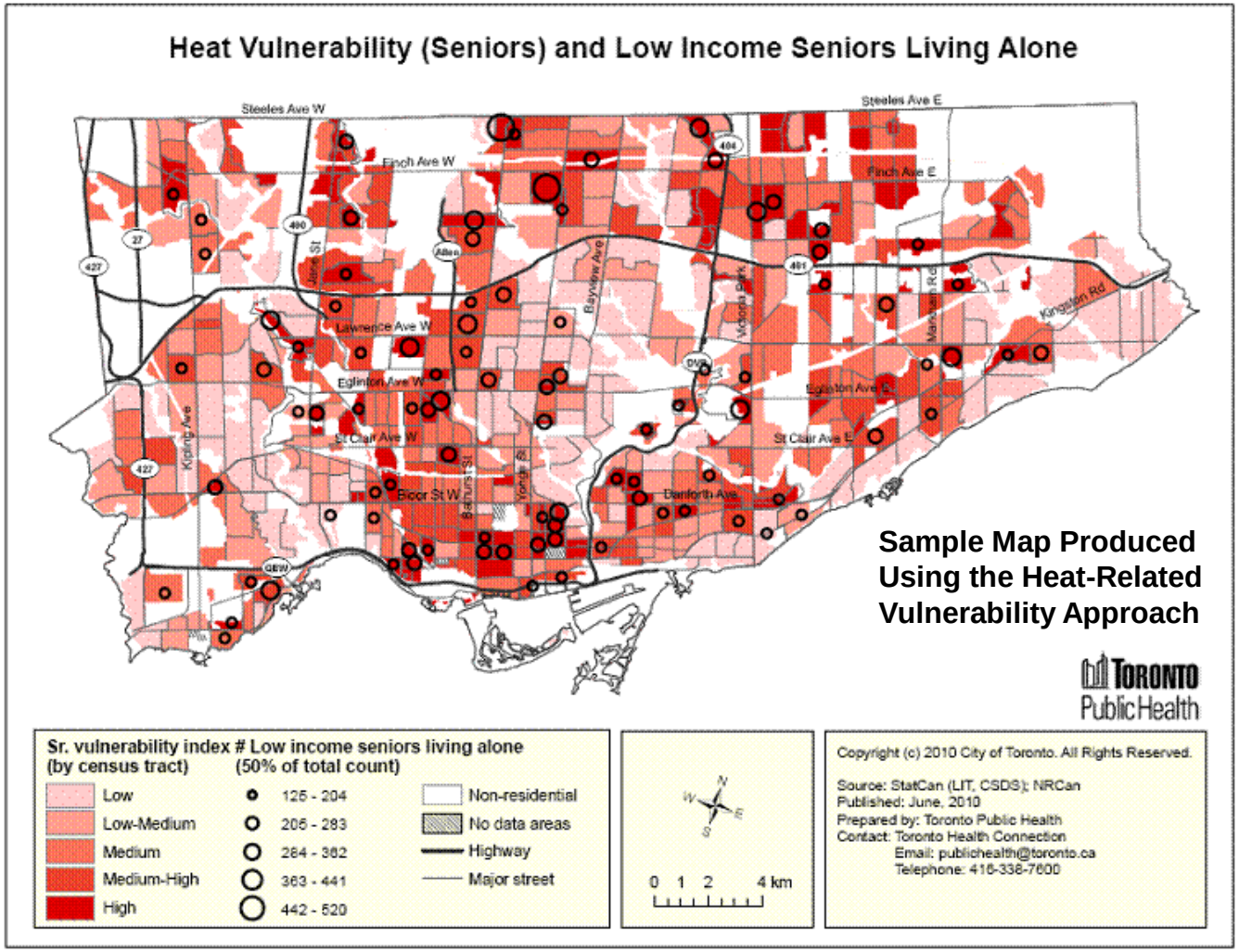
RAC Overview

Public Health—Extreme Heat Vulnerability Tool

- Toronto Public Health is exploring how to use spatial information to locate the most vulnerable populations.
- Overall project outcome is the testing and implementation of a “Heat-Related Vulnerability Assessment Approach using GIS Models and Mapping”
- The process will involve:
  - Consulting with experts in other jurisdictions about experiences with heat vulnerability assessment
  - Collecting new data about access to cooling and exposure to heat
  - Developing a validation method for the prototype tool
  - Exploring additional spatial analysis and clustering techniques to further guide hot weather response
  - Engaging hot weather response plan stakeholders about information needs
  - Exploring the feasibility of enabling Dynamic Mapping for stakeholders
  - Creating a user manual to enable Public Health staff to create maps for heat season & a maintenance guide for datasets used in vulnerability assessment
  - Providing Guidance for the application or adaptation of the vulnerability assessment tool in other jurisdictions

RAC Overview

Public Health—Extreme Heat Vulnerability Tool



- Tool is used to geographically plot areas of high heat vulnerability against areas where there are high numbers of seniors living alone.
- Allows Public Health Units to target programs like cooling centres in areas where high populations of seniors are most vulnerable to heat.

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RAC Overview

Increasing Building Resiliency

- The Institute of Catastrophic Loss Reduction's project will focus on best practice guidance for the construction of new buildings, and retrofitting of existing buildings, to improve their resilience to weather extremes (increased frequency and intensity of windstorms, precipitation & snowloads).
- The data gathered through extreme event site investigations and laboratory simulations can be used to inform updates of provincial building codes, municipal bylaws and current construction practices.
- To demonstrate best practices for adapting building techniques for new homes, ICLR has teamed with Habitat for Humanity in London, Ont to showcase ICLR's top recommendations for improving resiliency.
- The three Habitat homes will include:
  - Sewer backup valve (mainline open-port)
  - Hurricane straps on wall-roof connections
  - Nail spacing of 6" instead of 12" for roof panels
  - Steel braided (armoured) hoses for plumbing fixtures
- ICLR is also identifying actions that owners of existing homes can take to protect their properties by preparing mitigation handbooks on wild fires and floods.
  - Next steps have UWO Engineering staff documenting measures that homeowners could take to reduce risks associated with heavy snowfalls.

Community Adaptation Initiative

- MOE grant program that aims to improve the climate-resilience of the province by funding the **promotion and delivery of resources, outreach and capacity building** related to impacts and adaptation across the province.
  - Examples include: vulnerability assessment tools, brochures, workshops, and research.
  - CAI is expected to reach a wide range of community types with particular focus on vulnerable communities (e.g., rural, northern, First Nations).
  - CAI will include 1-2 **citizens conferences** this year.
    - intensive events spread over several days for groups of selected members of the public usually aimed at gathering opinions and recommendations about potential government actions and policy options.
    - also a way of stimulating debate and engaging the public in discussion of important issues involving their values, beliefs, and perceptions of risk.

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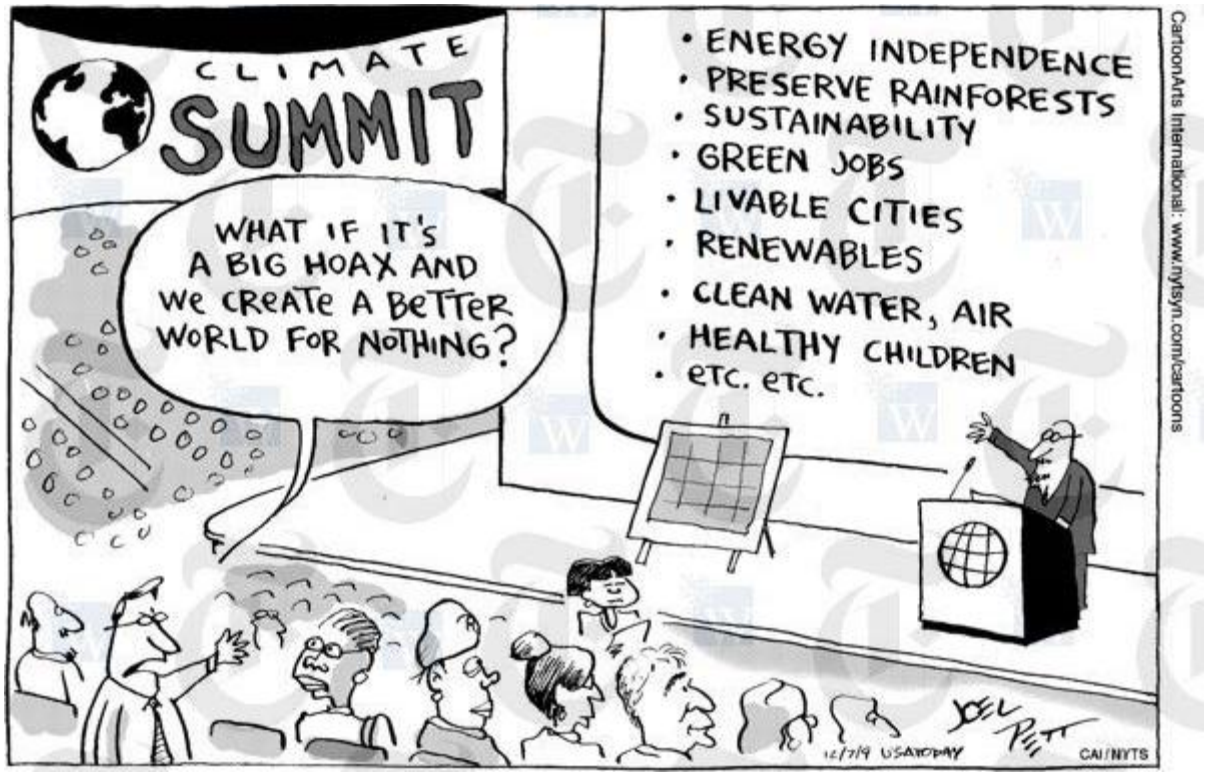
Thank you for your time!



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