



THE MUNICIPAL ADAPTATION AND RESILIENCY SERVICE (MARS)

WEBINAR 6

VULNERABLE POPULATIONS



MARS TRAINING SERIES OVERVIEW



9 webinars

- Webinar 1: Introduction to Municipal Climate Adaptation and Climate Projections for Great Lakes Region
- Webinar 2: Portal tour
- Webinar 3: Financial and Legal Implications of Climate Change for Municipalities
- Webinar 4: Transportation Infrastructure
- Webinar 5: Building Infrastructure and Land Use Planning

Webinar recordings stored on MARS Community of Practice (CoP) Portal:
<https://www.ccadaptation.ca/en/mars>

SECTOR SPECIFIC WEBINARS (5-8) OVERVIEW



- Webinar 6 – Vulnerable Populations, **Today**
Guest Speaker: Karina Richters, City of Windsor
- Webinar 7 – Urban Natural Systems, **March 20th**
Guest Speaker: TBD
- Webinar 8 – Water / waste water / storm water, **March 27th**
Guest Speaker: John Nemeth, Region of Peel
- Webinar 9- (Not sector specific), Communication and Collaboration, **April 10th**
Guest Speaker: Dr. David Pearson, Laurentian University

WEBINAR 7 OVERVIEW



1. MARS Training Series Overview
2. Vulnerable populations: Health and social impacts of climate change
3. Recent municipal efforts to adapt vulnerable populations to climate change
4. Heat Alert and Response System, City of Windsor

Karina Richters, Environmental Coordinator, City of Windsor

5. Resources

2 VULNERABLE POPULATIONS: HEALTH & SOCIAL IMPACTS OF CLIMATE CHANGE

CLIMATE CHANGE & SOCIAL INEQUITIES



Climate change, extreme weather events and associated impacts disproportionately affect:

- Individuals and groups lacking social support, education, or economic resources
- Residents of substandard housing, those who are homeless or under-housed



MORE EXTREME HEAT EVENTS



Associated increase in severity and frequency of:

- Heat-related illness (i.e.: heat stroke), dehydration
- Degraded air quality leading to illness, premature mortality from cardiovascular and respiratory causes, increased risk of cancer
- Vector borne infectious diseases



Vulnerable Populations:

- Infants
- Seniors
- Chronically ill
- Those with existing cardiovascular and respiratory illness
- Those working outdoors for extended periods of time
- Individuals without access to adequate shelter or cooling mechanisms
- Those living in areas with poor air quality



W.H.O. DISEASE CLASSIFICATION



T67 – Effects of heat and light

T67.0 – Heatstroke and sunstroke

T67.1 – Heat syncope

T67.2 – Heat cramp

T67.3 – Heat exhaustion, anhydrotic

T67.4 – Heat exhaustion due to salt depletion

T67.5 – Heat exhaustion, unspecified

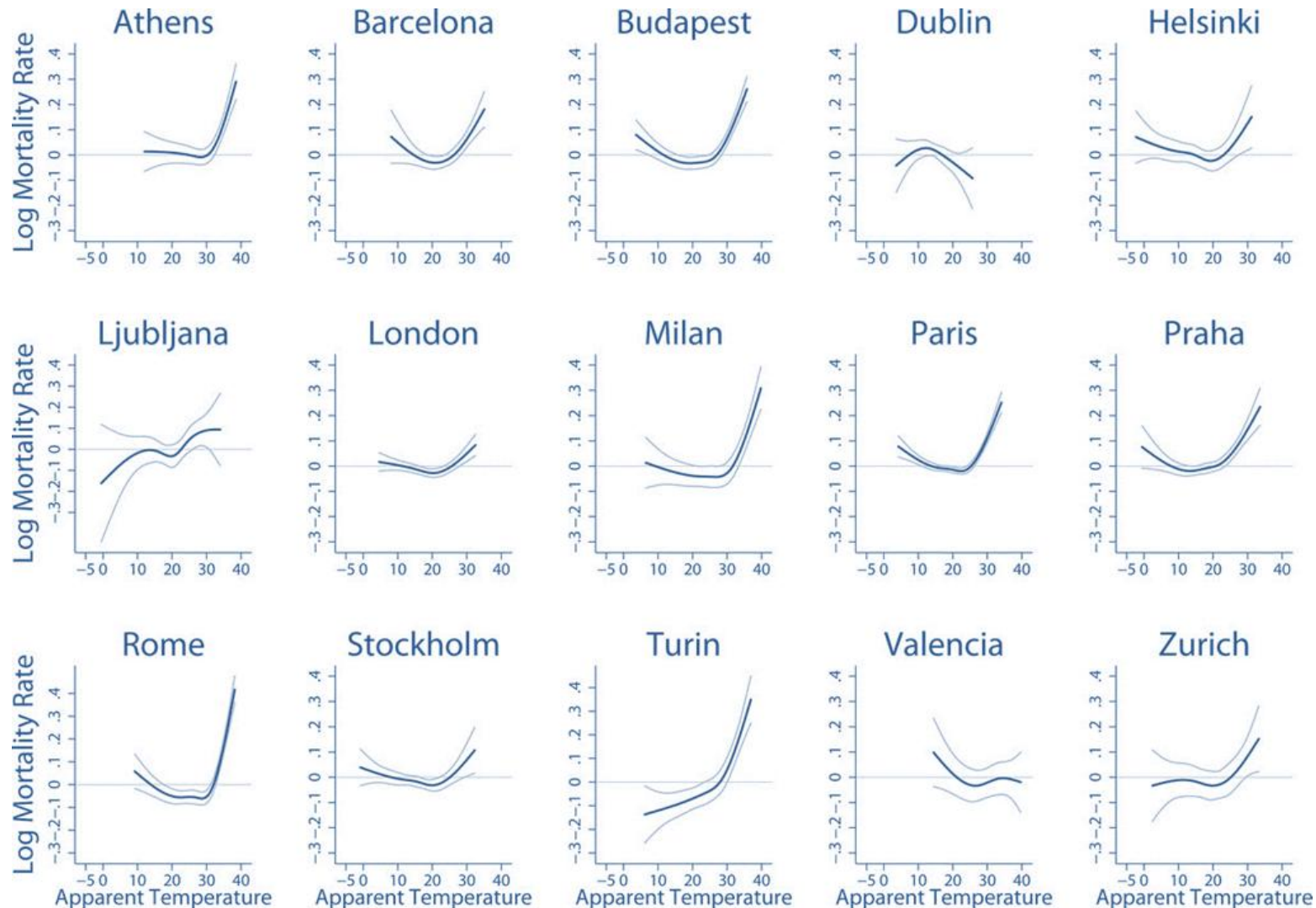
T67.6 – Heat fatigue, transient

T67.7 – Heat edema

T67.8 – Other ...

Indirect effects like MI not classified here

DAILY MAX TEMP V MORTALITY (LOG)



MORE RAINFALL/ FLOODING EVENTS



Associated increase in severity and frequency of:

- Lake bacterial contamination, increase in waterborne disease
- Residential /commercial building structures contaminated by floodwater/ sewage
- Mould development in built structures, leading to respiratory illness

Vulnerable Populations:

- Infants
- Seniors
- Residents of low-lying areas or flood plains
- Chronically ill or those with impaired immune systems, compromised health status
- Individuals with existing allergies, cardiovascular disease or respiratory illnesses
- Individuals and groups lacking social support, education, or economic resources
- Residents of substandard housing, those who are homeless or under-housed

Associated increase in severity and frequency of:

- Disease carrying insects with longer survival periods in milder winters
- Vector borne disease transmission
- Introduction of new local infectious diseases



Vulnerable Populations:

- Seniors
- Chronically ill or those with impaired immune systems, compromised health status
- Communities dependent on natural resources



Associated increase in severity and frequency of:

- Electricity failure, leading to food borne illness, hypothermia and other forms of thermal discomfort
- Knock on effects of displacement and crowding in emergency shelters
- Food or water shortages
- Physical injury, drowning, electrocution, death
- Health impacts from infrastructure damage and interruptions to health services
- Indirect psychological health effects, including mental health and stress related illness

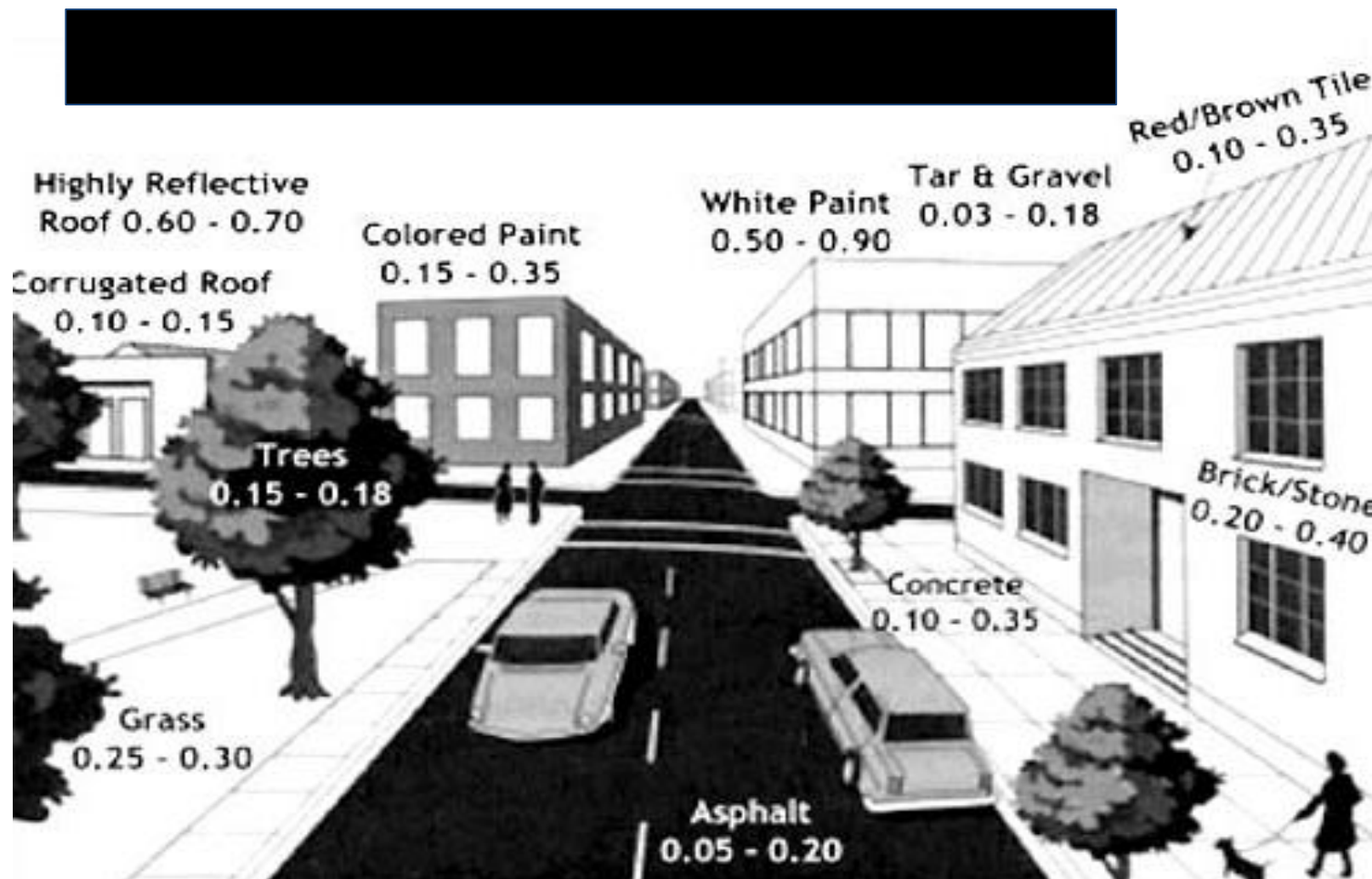
Vulnerable Populations:

- Individuals and groups lacking social support, education, or economic resources
- Residents of substandard housing, those who are homeless or under-housed
- Residents of areas subject to environmental degradation (i.e.: Brownfield)
- Chronically ill
- Seniors
- Infants

3 RECENT MUNICIPAL EFFORTS TO ADAPT VULNERABLE POPULATIONS TO CLIMATE CHANGE

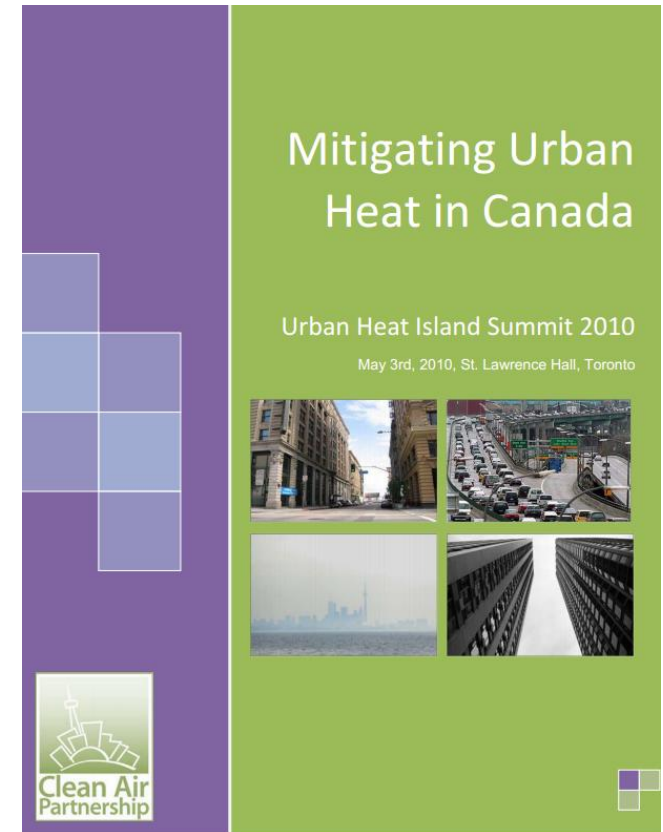
HEAT ISLAND REDUCTION

Albedo = coefficient of reflection (0-1)



Scope and Community Selection

- national scope
- large urban population
- already experience July mean daily temp. >25C
- likely to see increase in number of days >30C
- 36 reviewed and/or interviewed
- planning, environment/works and parks/rec staff



HEAT ISLAND AND VULNERABLE POPULATION IDENTIFICATION

MARKHAM RD/STEELES AVE

- 2002



UMAP - Urban Heat Mapping & Analysis Program

City of Toronto Maps
Toronto Demographics derived from 2006 census data [Disclaimer](#)

Legend

- City of Toronto
 - Thermals
 - 20050603_cal_list
 - 20080903_cal_list
 - 19940711_cal_list
 - 19900902_cal_list
 - 2009_cal_list
 - Toronto Demographics
 - People_without_official_languages
 - %_without_official_languages
 - %_Lower_Income
 - Total_Population
 - %_Seniors_by_Census_Tract
 - _Seniors_by_Census_Tract
 - %_Seniors_with_no_official_language
 - _Seniors_with_no_official_language
 - %_Seniors_Living_Alone
 - _Seniors_Living_Alone
 - %_Low_Income_Seniors_(2005_and_2006)
 - %_Rented_housing
 - Low_Education_Seniors
 - Imagery
 - Toronto_mtm_n27_74_50cm_2005
 - Toronto_overall_50_2002
 - swimming_pools
 - seniors_and_nursing_homes
 - recreation
 - police_station
 - hospitals
 - cooling_centres
 - air_conditioned_public_buildings
 - waterways
 - tor_centrelines
 - parks
 - vacant_from_landuse_data
 - residential_from_landuse_data
 - institutional_from_landuse_data
 - commercial_from_landuse_data
 - agricultural_from_landuse_data

Maps Save Help

Query

Select by Point Save (.csv)

No Selection

1: 4692.7931 -1708.49 x -1274.74 (m)

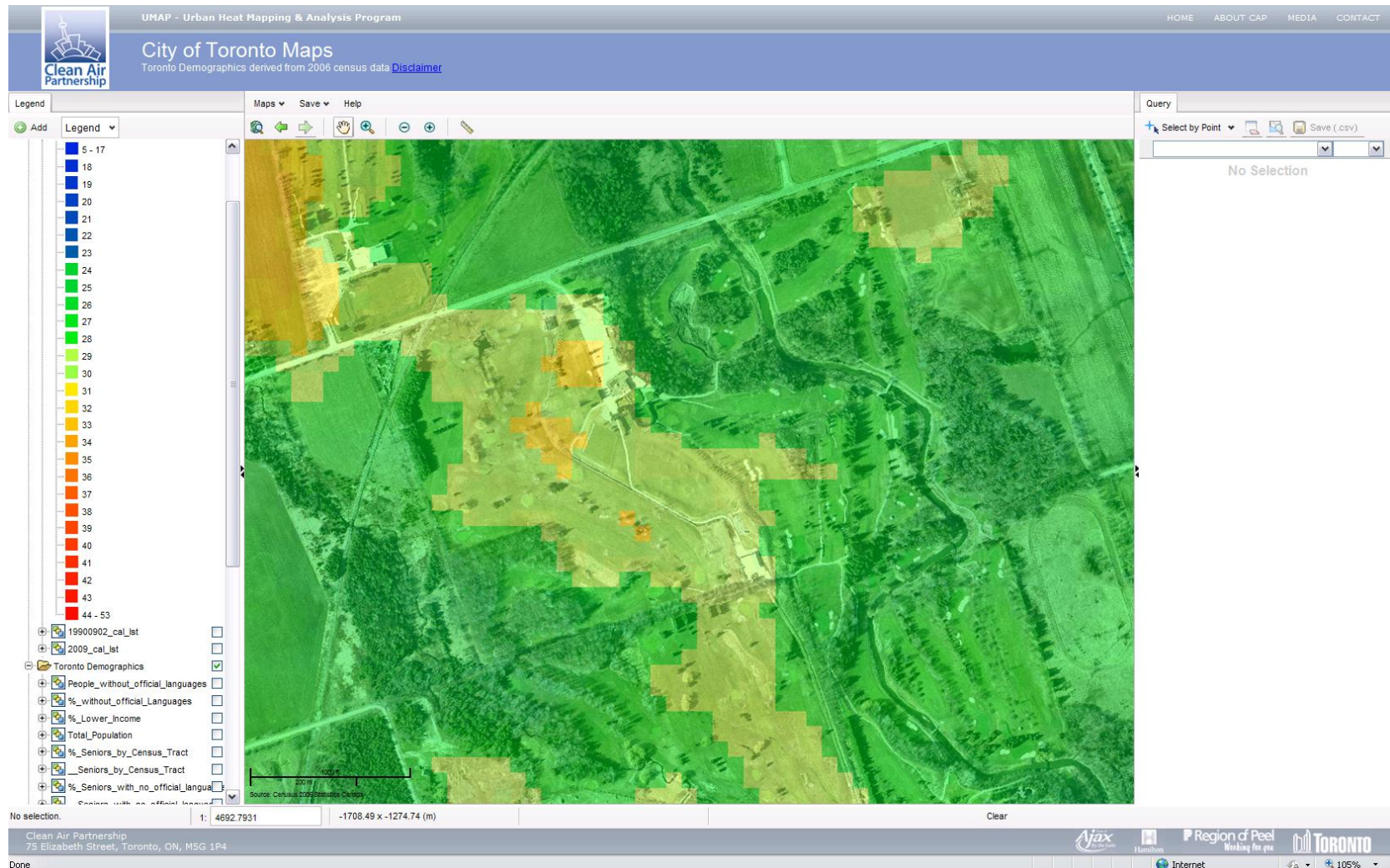
Clear

Clean Air Partnership
75 Elizabeth Street, Toronto, ON, M5G 1P4

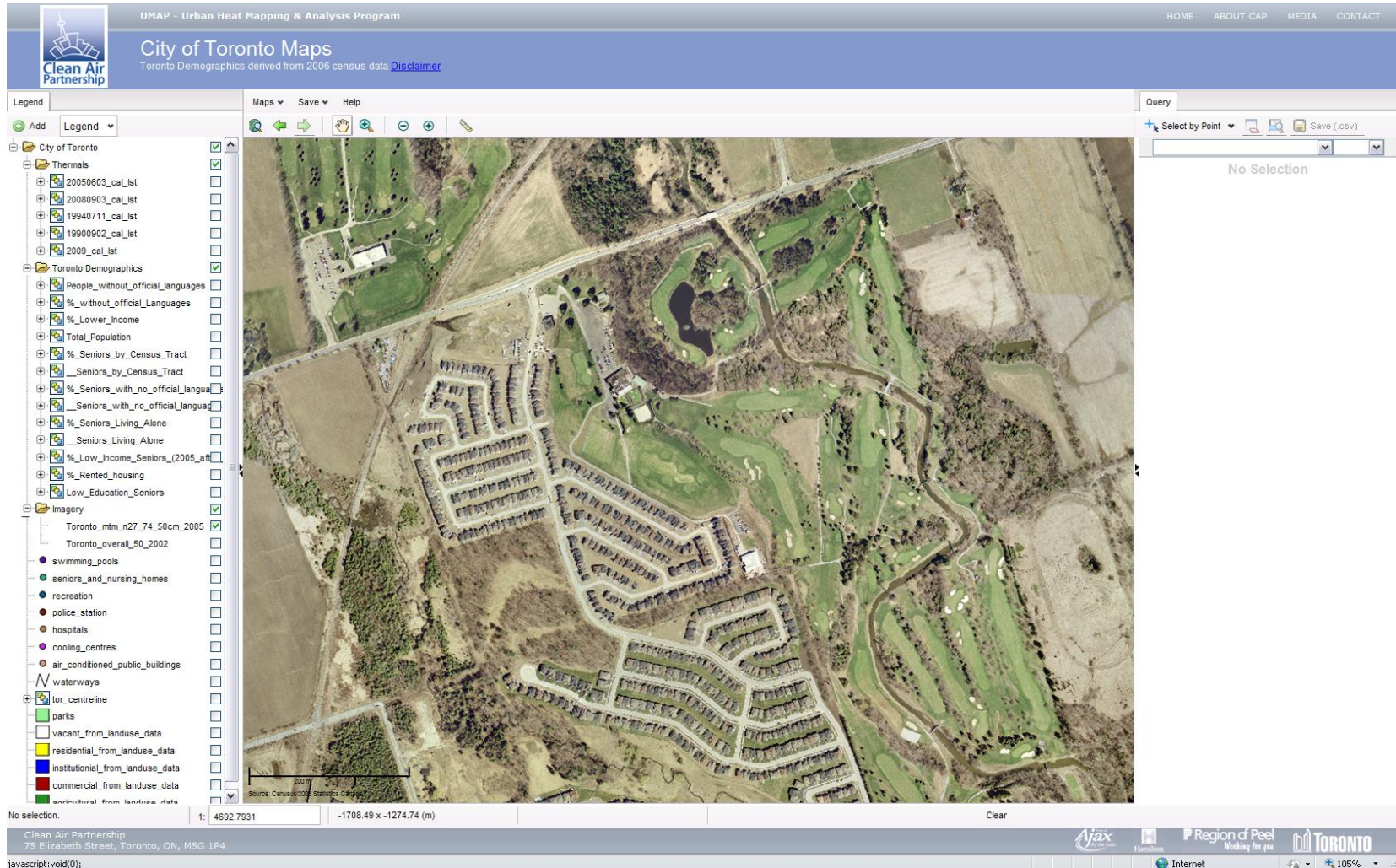
Ajax Region of Peel Working for you TORONTO

Internet 105%

MARKHAM RD/STEELES AVE - 2002



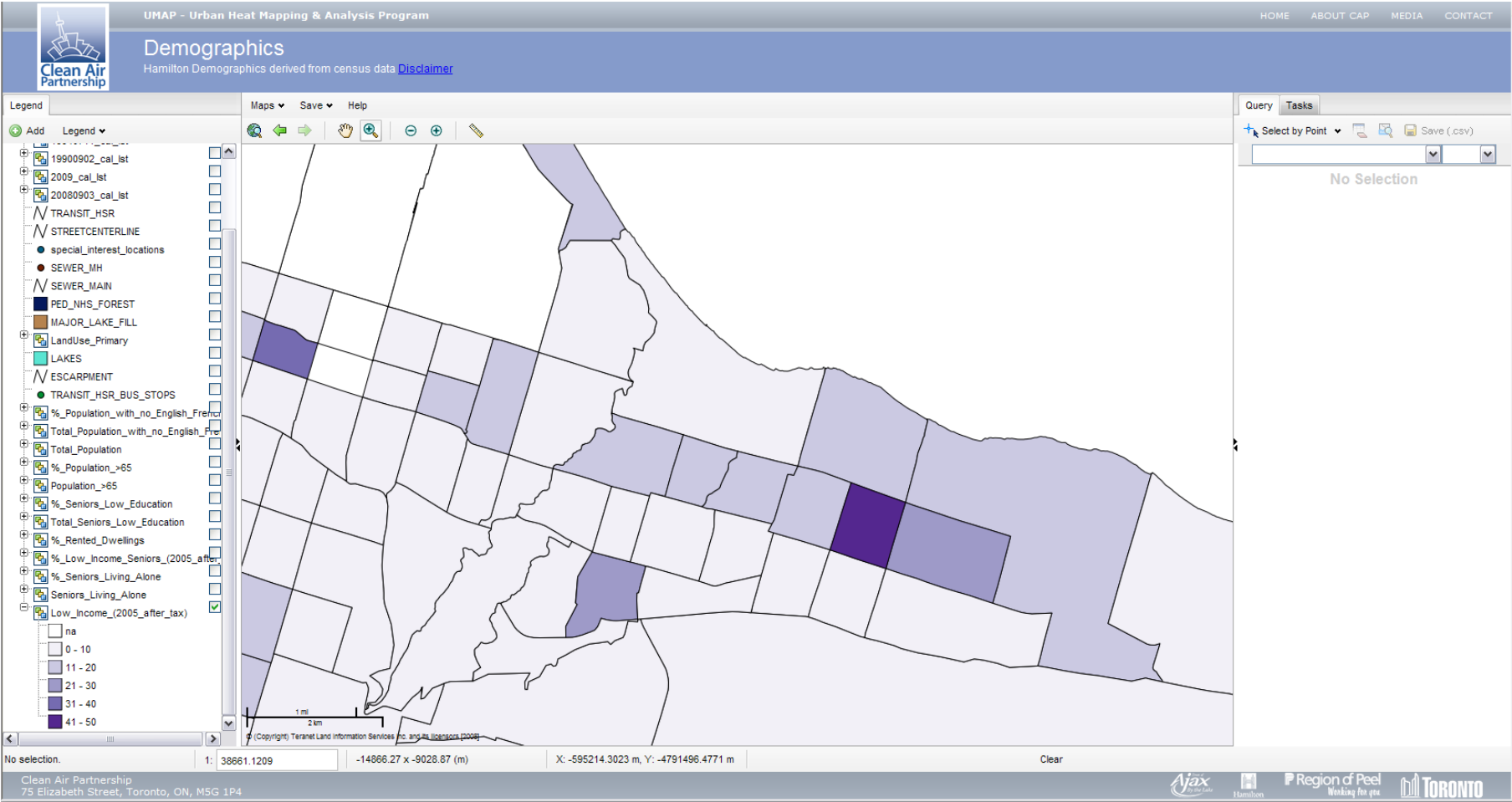
MARKHAM RD/STEELES AVE - 2005



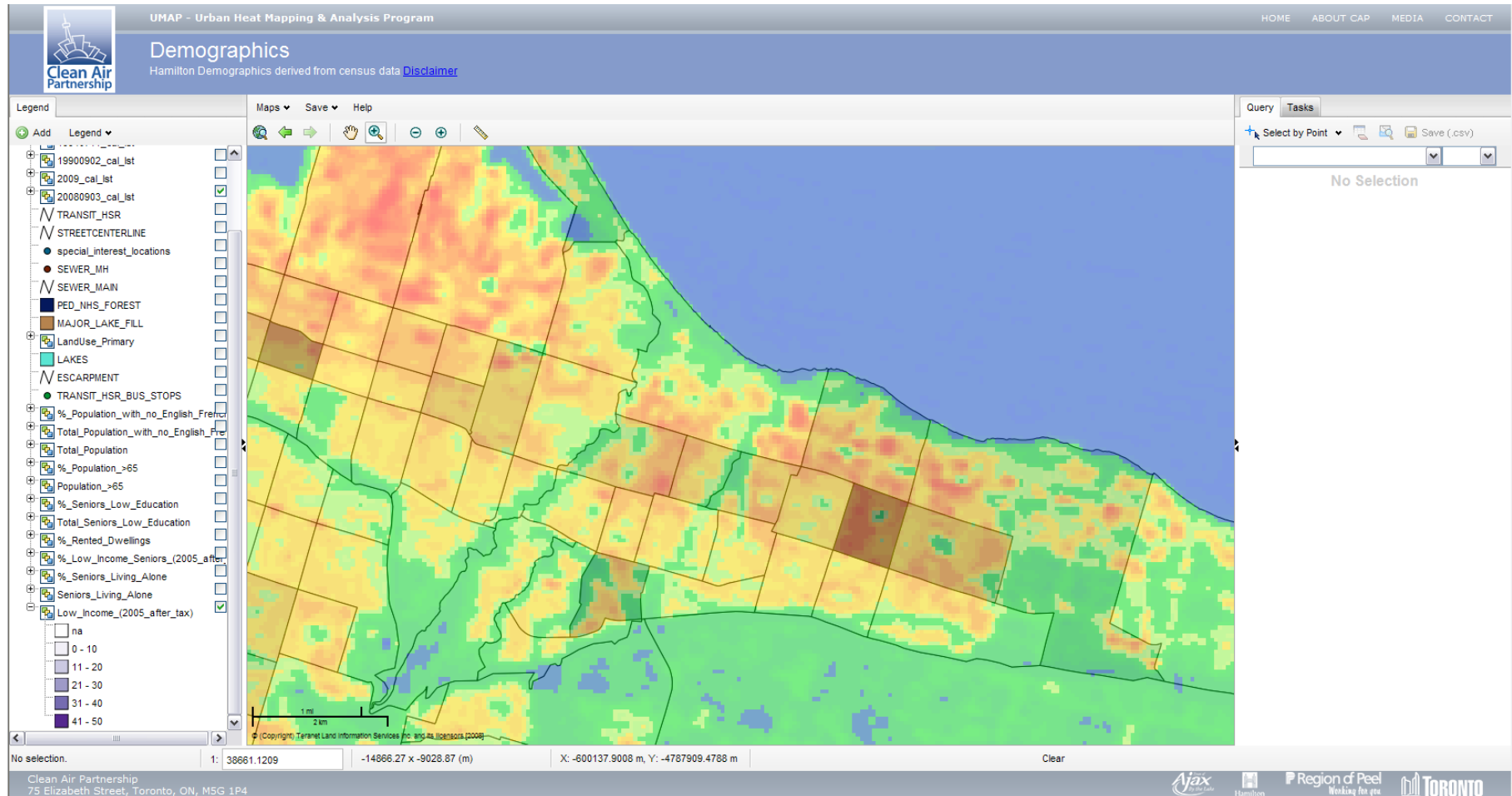
MARKHAM RD/STEELES AVE - 2005



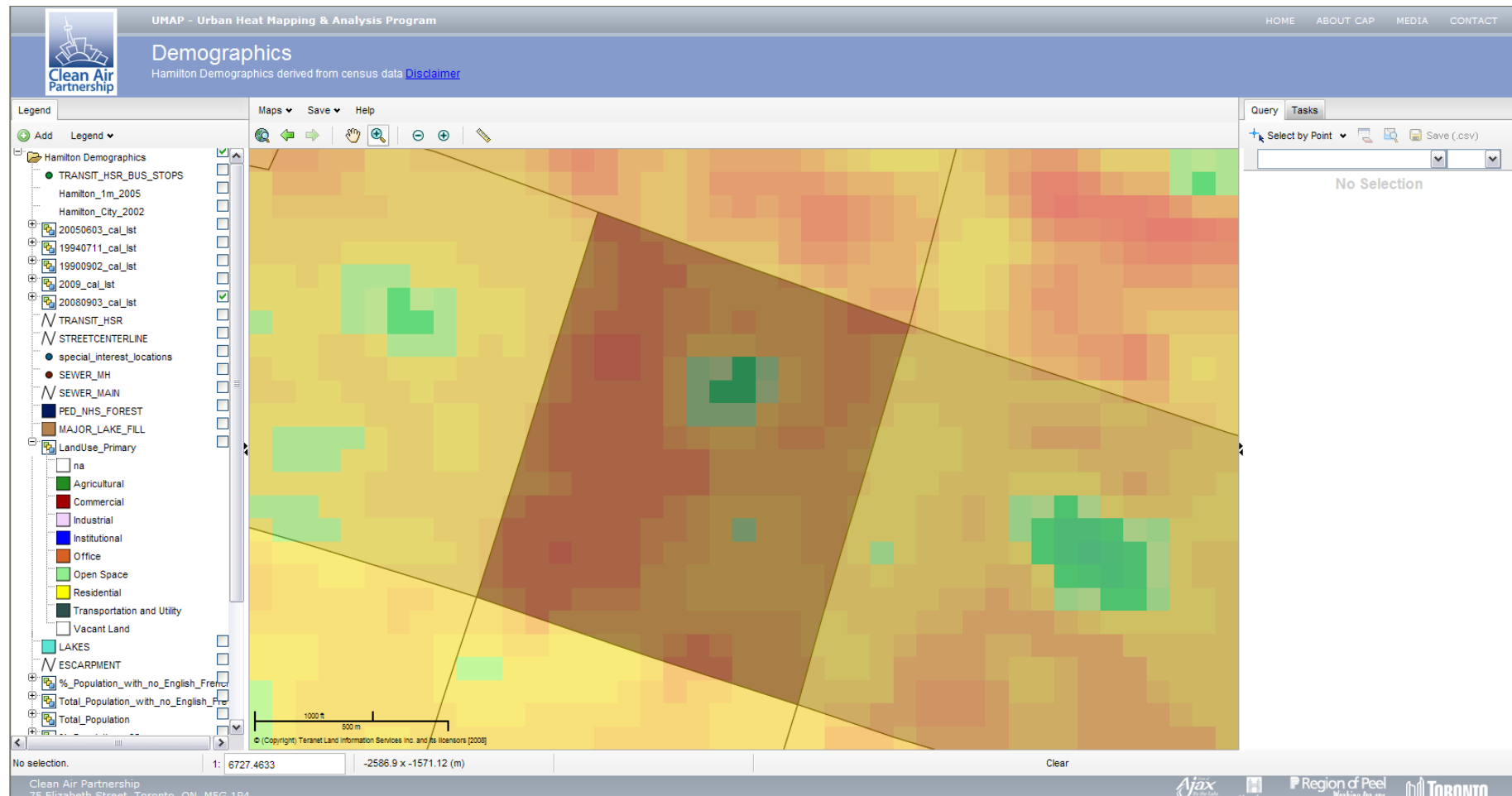
% LOW INCOME (2005 NET)



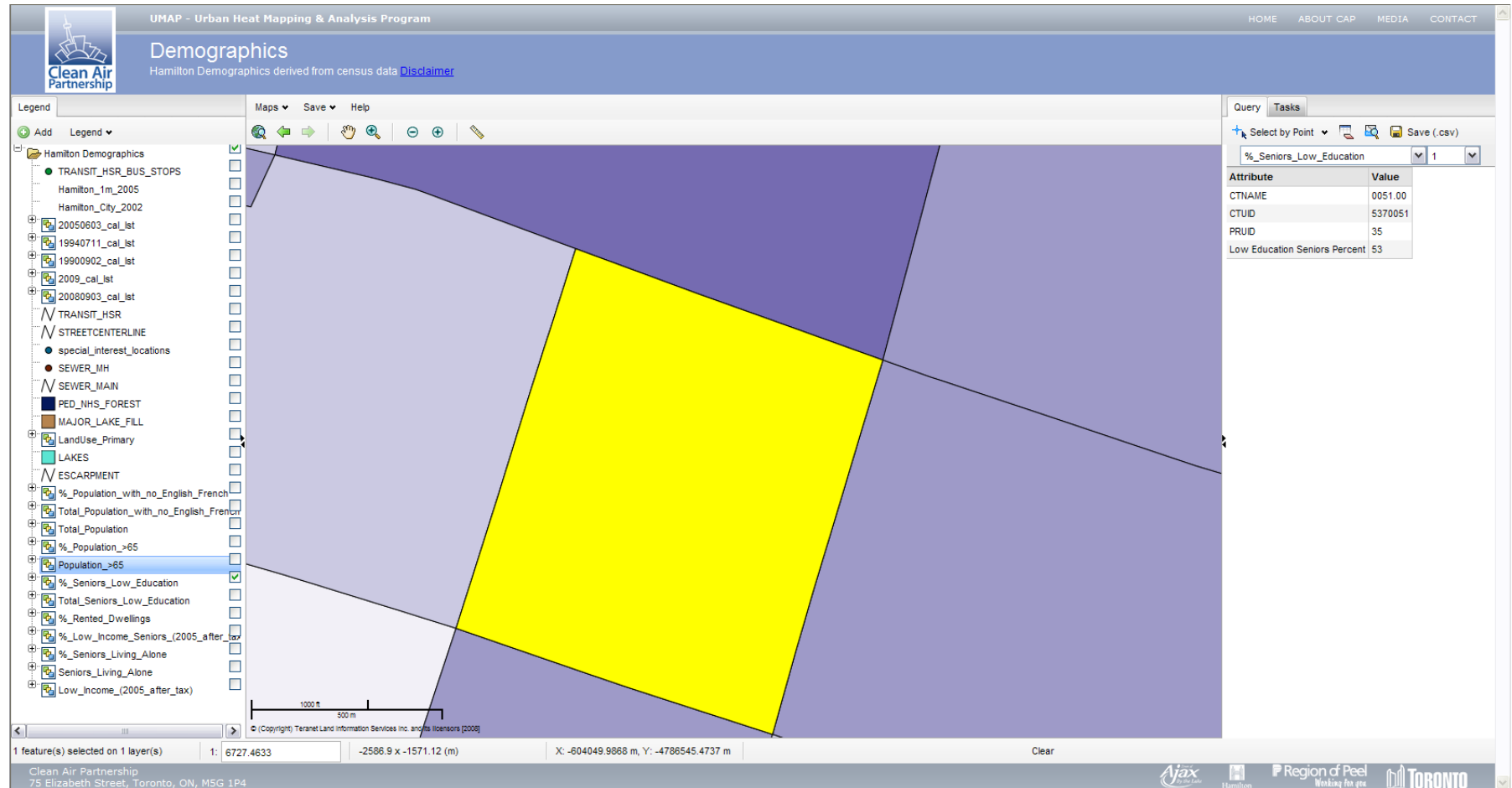
% LOW INCOME W/ THERMAL



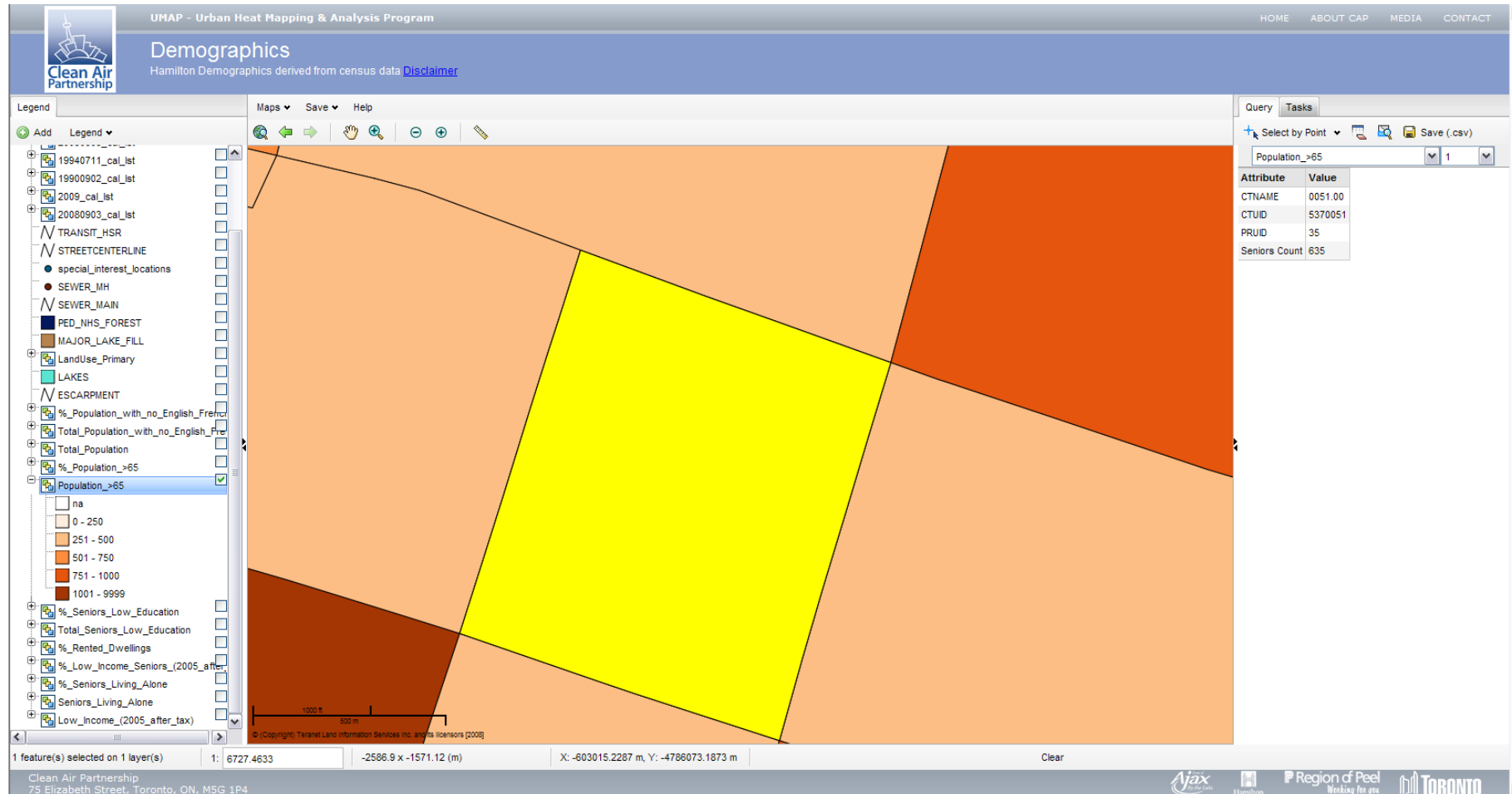
% LOW INCOME W/ THERMAL



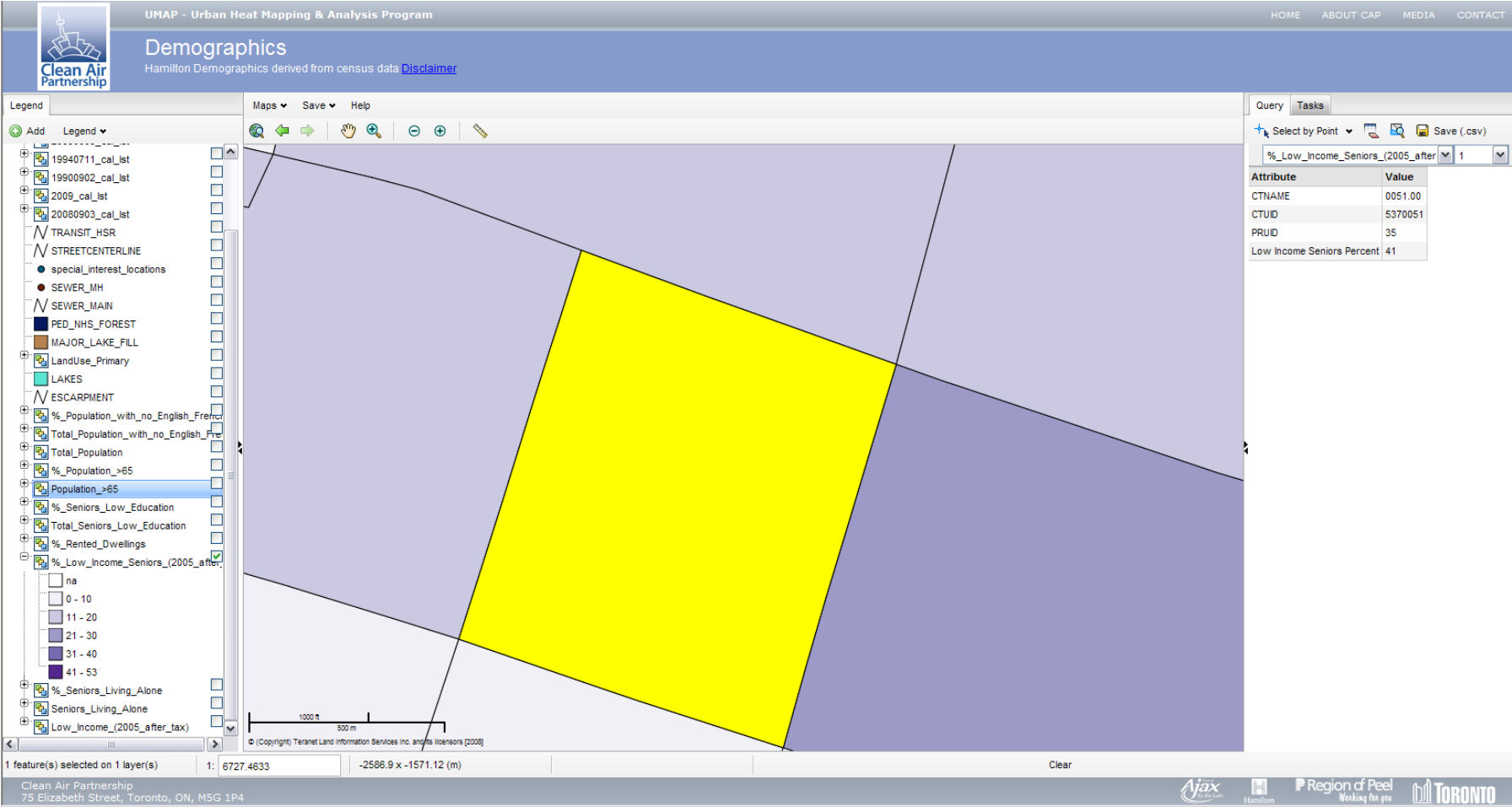
% LOW EDUCATION SENIORS = 53



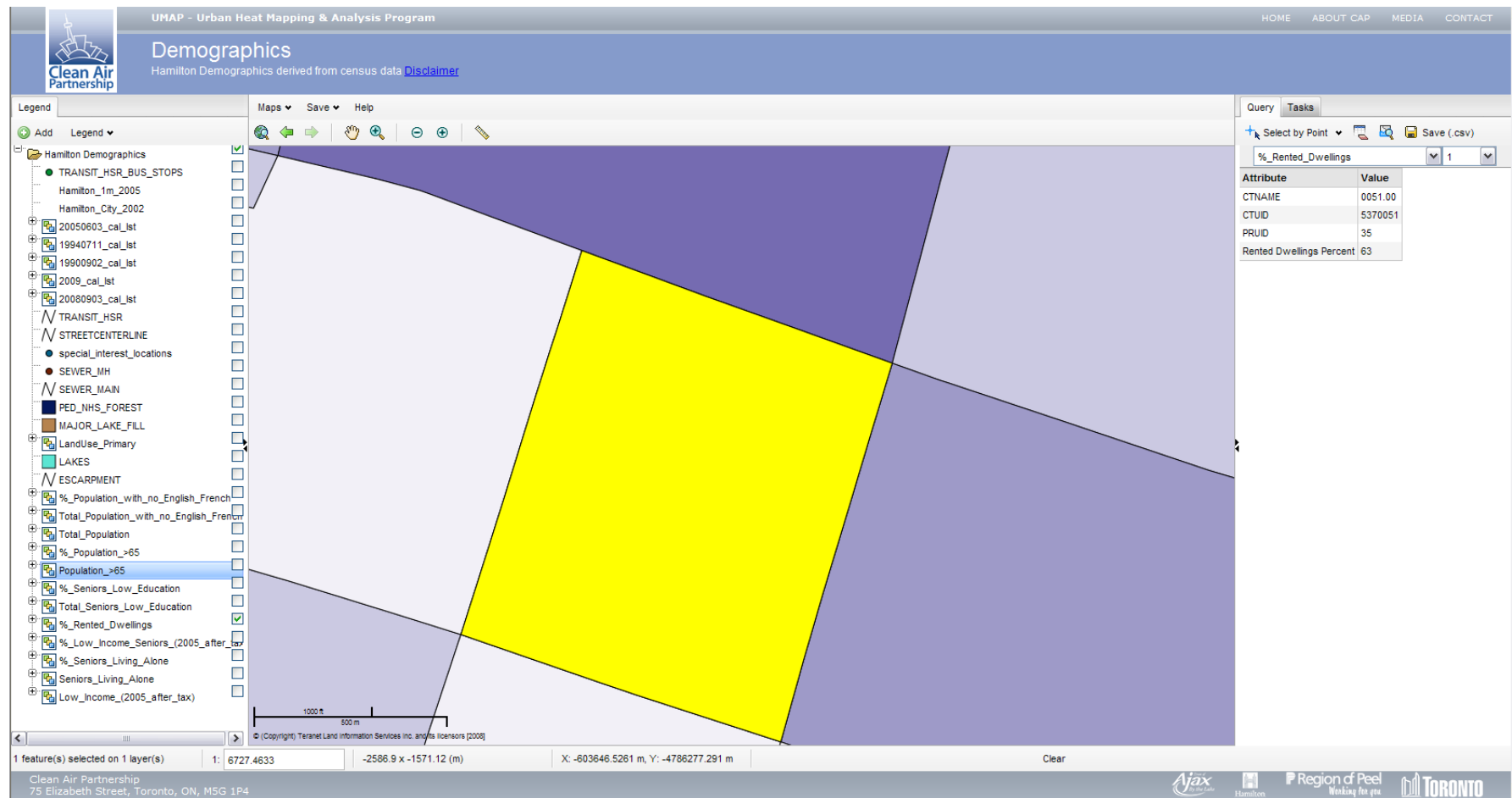
SENIORS = 635



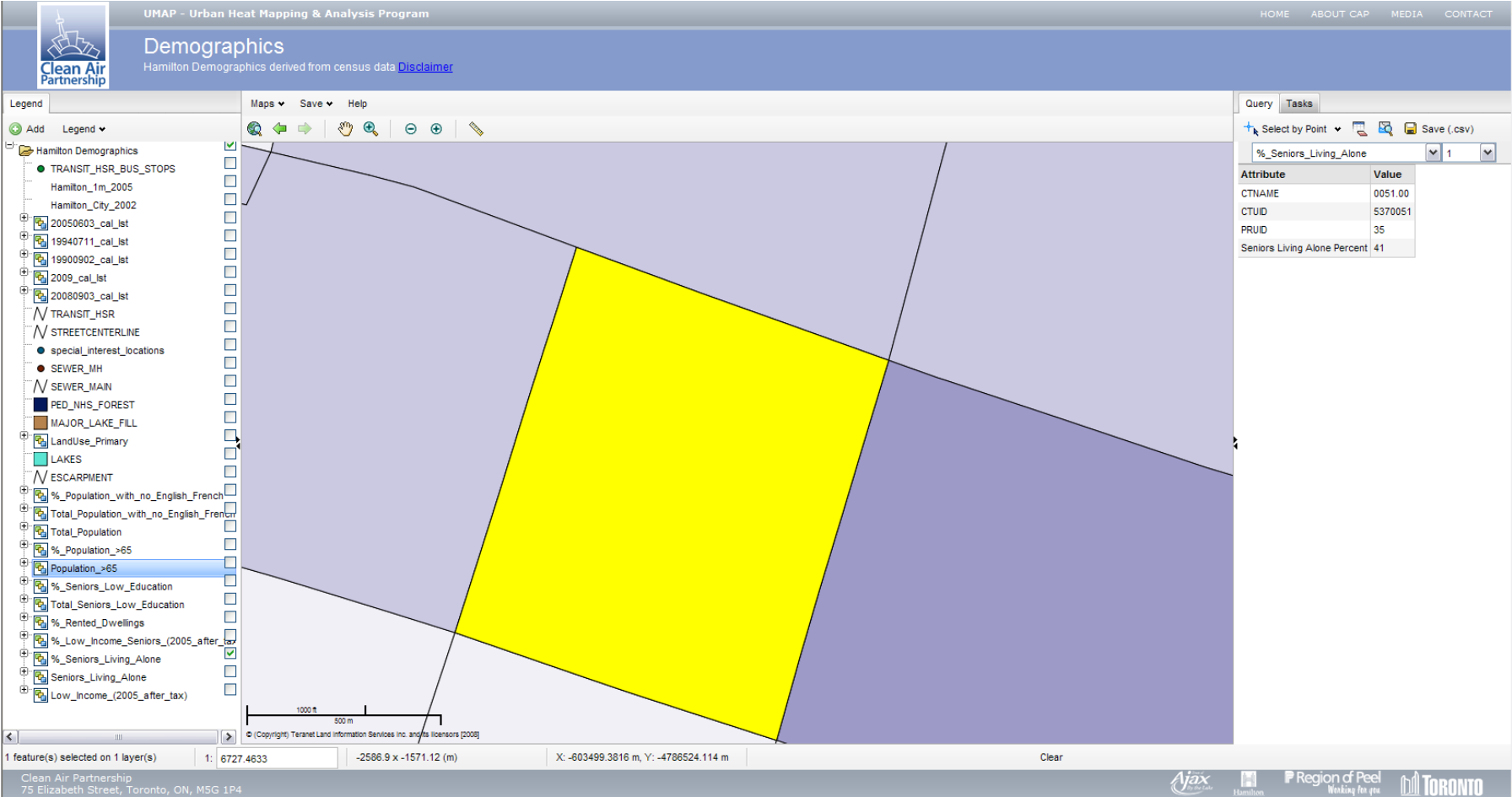
% LOW INCOME SENIORS = 41



% RENTED DWELLINGS = 63



% SENIORS LIVING ALONE = 41



CONSTRAINTS

- Data holdings varied

- Time

- Technology

- Budget



SYNRDROMIC SURVEILLANCE FOR HEAT RELATED ILLNESS

Objective:

- Reduce morbidity and mortality due to extreme heat in four eastern Ontario health units

Context:

- EHEs expected to be more common and intense
- Large geography (24,000km²) limits response
- Low population density limits response (27/km² – Toronto's is about 4000/km²)
- Institutional capacity to handle these events is a concern

OBJECTIVE ACHIEVED IN 4 WAYS



1. Monitor populations for heat-related illness (HRI)
(Syndromic surveillance of ER visits)
2. Monitor environmental heat
3. Map occurrence of HRIs
4. Develop intervention strategies to integrate with the heat sensors and health data streams



Health
Canada

Santé
Canada

SYNDROMIC SURVEILLANCE OF ER VISITS



- Builds on existing syndromic surveillance technologies (eg SARS)
- Real-time monitoring of visits to Emergency Departments
- Chief complaint of triage records used
 - Chief complaint = sunburn, sun stroke, heat stroke, exhaustion
- Over 70 hospitals monitored across Ontario in 18 Health Units
- Average feed is 7,000 Emergency Department visits per day with 600 admissions
- Analysis centre in Kingston, Ontario

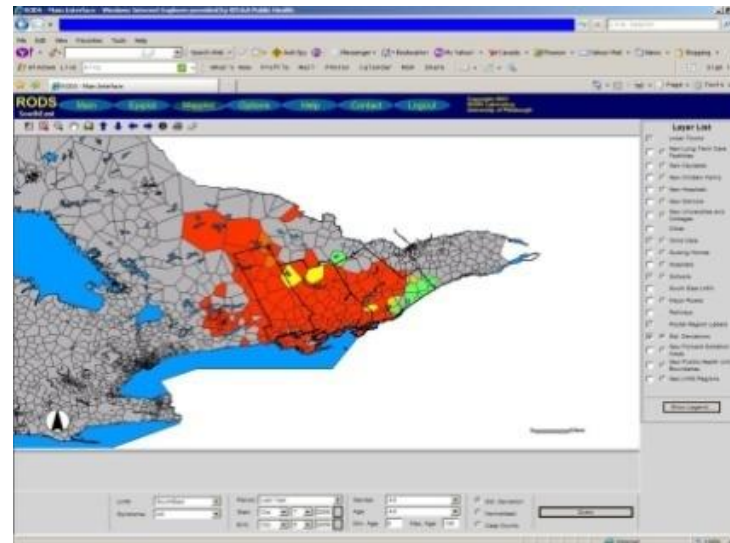
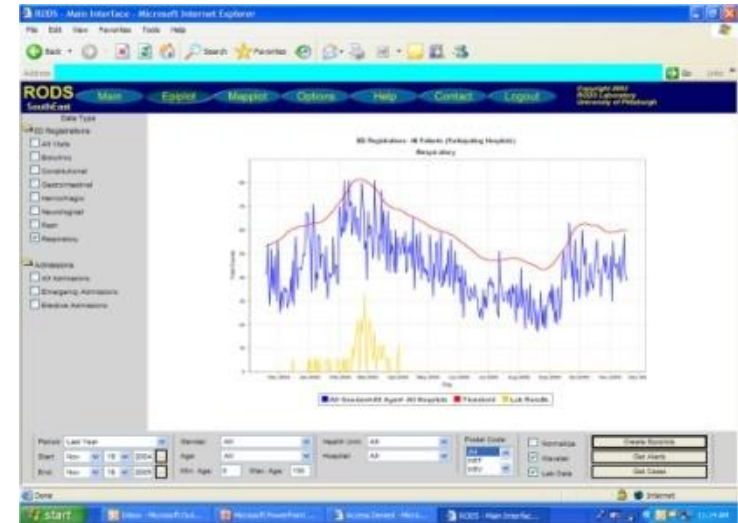
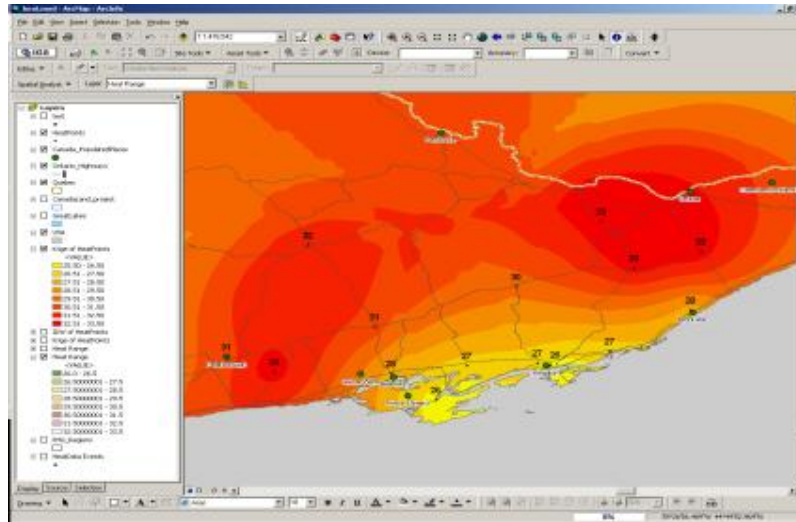
MONITOR ENVIRONMENTAL HEAT



- Collect important parameters of heat
 - Dry bulb temperature
 - Globe temperature
 - Relative humidity
 - Wind speed
 - Wet bulb temperature
- Combined to create an outdoor WBGT
- 13 sensors in place



MAP OCCURRENCE OF HRIS



- **Long term financing**

currently HC are funding it as a pilot

- **Community capacity**

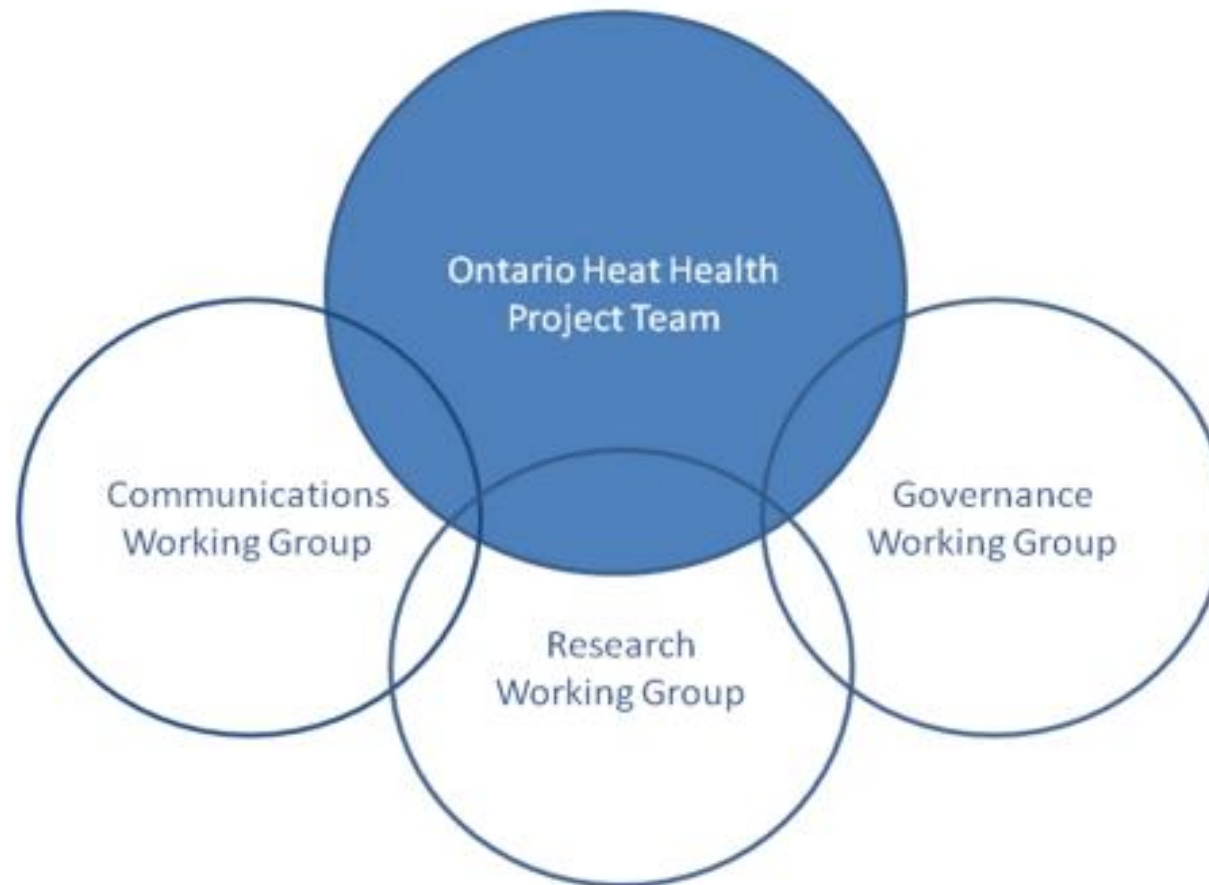
identifying is one thing, acting is another – will take longer to implement

- **Symptom limitations**

does not account for co-morbidity eg: MI etc

SOME ADDITIONAL ADAPTATION EXAMPLES IN PUBLIC HEALTH

ONTARIO HEAT HEALTH PROJECT TEAM



VECTOR/WATER-BORNE DISEASE PROGRAMS



- Enhanced Surveillance
- Enhanced Research and Development
- Enhanced Public and health Professional Awareness
- Integrated and Adaptive Policy Development

Source: OMNR



VECTOR/WATER-BORNE DISEASE PROGRAMS



Vector-Borne Disease Prevention Plan 2013

March 2013

Table of Contents

Executive Summary	1
Introduction	4
West Nile Virus	5
West Nile Virus Plan 2013	7
Public Education and Community Outreach	7
Human Surveillance	9
Mosquito Surveillance	10
Pesticide Effects Surveillance	12
Larval Mosquito Reduction	13
Adult Mosquito Reduction	18
Eastern Equine Encephalitis	21
Eastern Equine Encephalitis Surveillance Plan 2013	22
Lyme Disease	24
Lyme Disease Surveillance Plan 2013	25
Acknowledgements	27

MOULD AND BACTERIA AWARENESS



Increased basement flooding means increased exposure to dampness leading to mould and bacterial growth;

- respiratory distress
- eye and nasal irritations
- laryngitis
- flu-like symptoms
- asthma and allergy aggravation

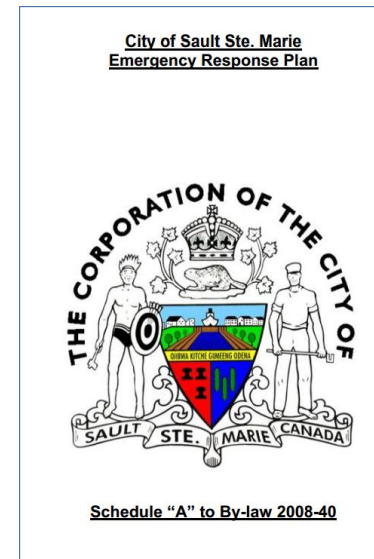
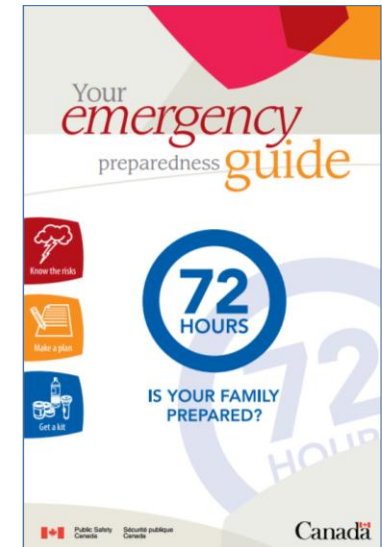


COMMUNITY RESILIENCE AS ADAPTATION



Needs to occur at 3 levels

1. Municipal/public level
2. Neighbourhood/community level
3. Individual level



4 HEAT ALERT AND RESPONSE SYSTEM, CITY OF WINDSOR

Karina Richters, Environmental Coordinator, City of Windsor

5- RESOURCES



- Climate Change Adaptation and Health Equity
http://www.cleanairpartnership.org/files/Climate_Change_Adaptation_and_Health_Equity_Backgrounder.pdf
- Developing Evidence-based health policy in a changing climate
<http://src-online.ca/index.php/src/article/view/134/276>
- Exploring Health and Social Impacts of Climate Change in Toronto
<http://www.toronto.ca/legdocs/mmis/2013/hl/bgrd/backgroundfile-62786.pdf>
- Climate Change Adaptation: Linkages with Social Policy
<http://www.horizons.gc.ca/sites/default/files/Publication-alt-format/2010-0036-eng.pdf>
- Impacts of Climate Change on Public Health
<http://glisaclimate.org/media/HRWC%20Public%20Health.pdf>
- Syndromic Surveillance System for Health-related Illnesses
<http://www.cleanairpartnership.org/files/4%20Case%20Study.pdf>
- Adaptation to Climate Change in the Ontario Public Health Sector
<http://pubmedcentralcanada.ca/pmcc/articles/PMC3418204/>

Webinar 7

Urban Natural Systems

March 20th 2014

For more information, please visit:

<https://www.ccadaptation.ca/en/mars>