



# AHEAD OF THE STORM: Extreme Weather Resilience in the City of Toronto

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Toronto Environment Office

December 6, 2011



Change  
is in the  
Air

## AHEAD OF THE STORM:

Preparing Toronto for Climate Change - Highlights

April 2008



Disaster Recovery Information Exchange  
Toronto Chapter



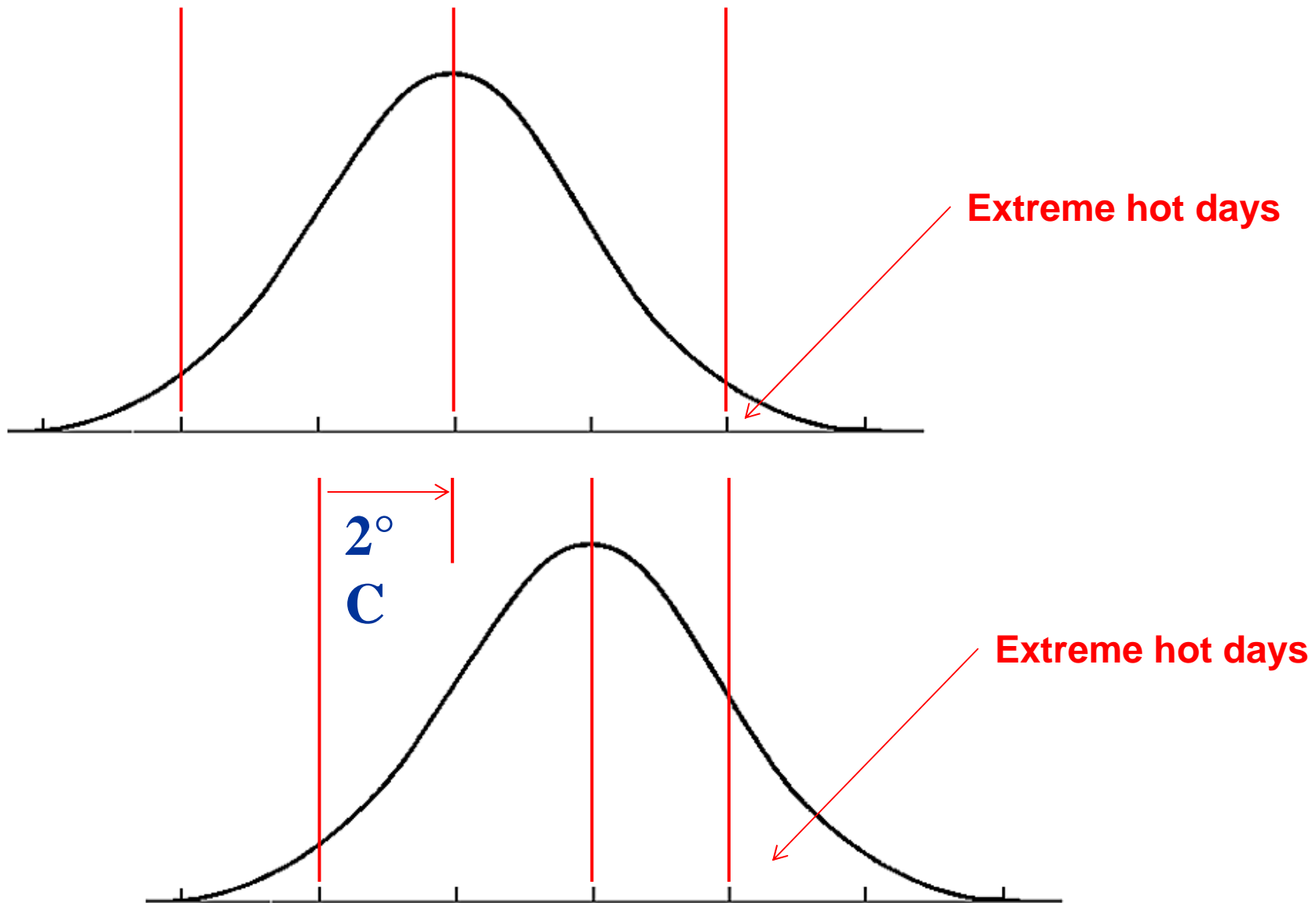




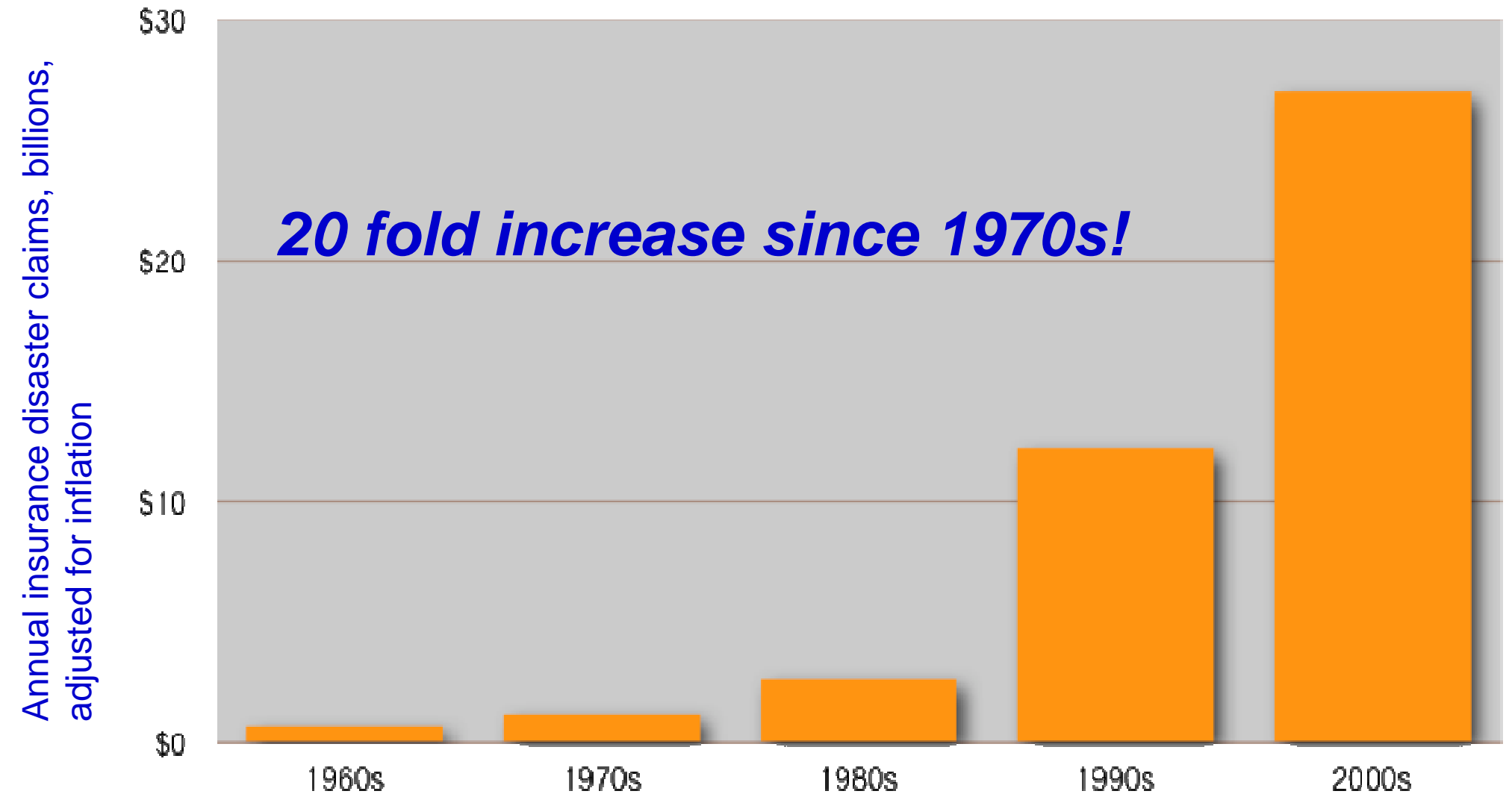


Life on the edge!

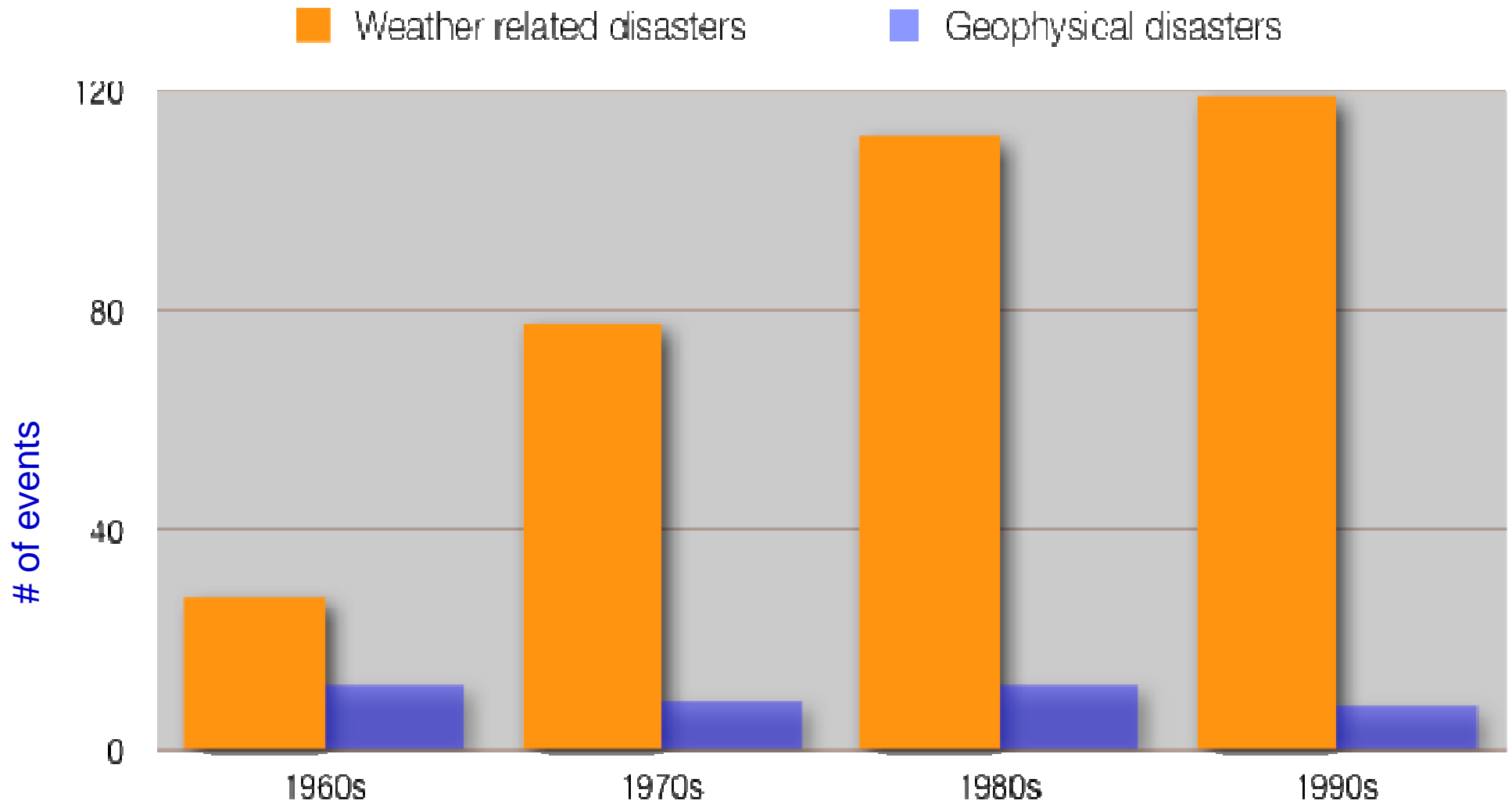
# Climate shift



# Insurance claims rising (Global)



# Extreme weather events on the rise (Canada)



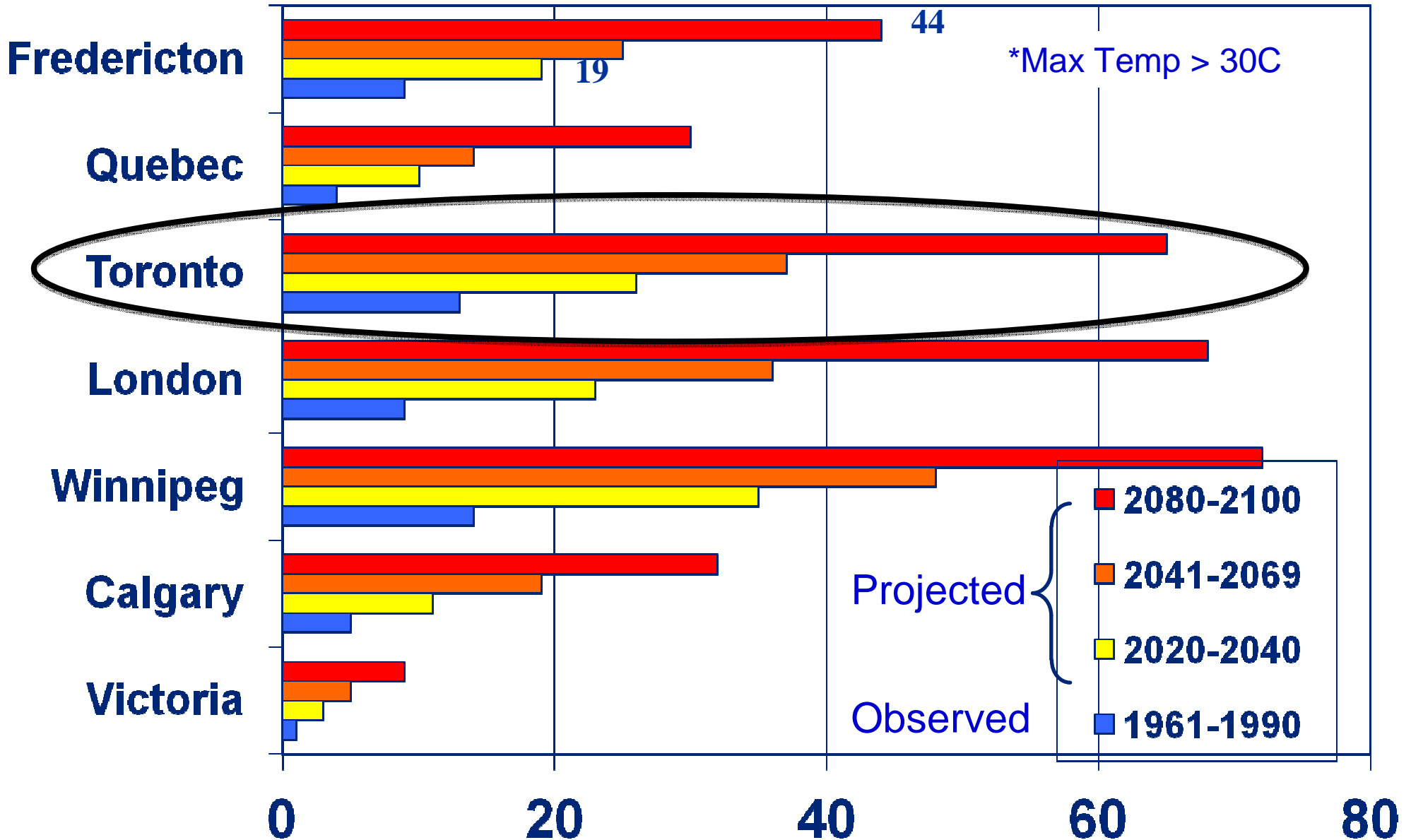
# Canadian catastrophes



# Recent Canadian cats

- Ice Storm (January 1998)
- **\$2 billion (2005 dollars)**
- Slave Lake wildfire
- **\$700 million**
- “Freaky Friday” GTA rainstorm (August 19, 2005)
- **\$590 million**
- Calgary area windstorm (July 2009)
- **\$500 million**
- Calgary hailstorm (July 2010)
- **>\$400 million**
- B.C. wildfires (Summer 2003)
- **\$200 million**
- Edmonton floods (July 2004)
- **\$170 million**
- Hurricane Juan (September 2003)
- **\$115 million**

# Number of hot days\* rising





CAR CAR  
SODAS  
78

TORONTO DAILY STAR  
 in Toronto Area...

# FEAR 30 DIE 300 MISSING

## CITY BANS ALL TRAFFIC FROM WEST

Seen Dead in  
 WOODBINE TOLL 11 TO 19  
 5 ETOP COOKS, FIREMEN LOST  
 PLACE DAMAGE IN MILLIONS

Lake That Was Holland Marsh  
 Elderly Woman Caught, Rescued by Helicopter After Chasing Through Flood



FEAR FIVE CUSTOMERS ALSO INJURED  
 Last Deal Probably Dead From Hurricane's Fury

FEAR FOR LAST BRIDGE, EVERY CAR IS HALTED

HUNDREDS ON ROOFS AT HOLLAND MARSH EXPOSURE TAKES TOLL

WIND TO STUDY'S VOLUNTEER FIREMEN  
 YELLOW ARCADES, MISSING AFTER TRIP  
 (WOMAN SAVED) IS SWEEPED INTO HOLLAND

ONTARIO HURRICANE RELIEF FUND  
 TORONTO DAILY STAR  
 Orphan of the Storm

# KNOWN DEAD: 78

## ATKINSON FUND GIFT FOR FLOOD IS \$250,000



METRO EDITION

HURRICANE'S TORONTO TOLL...  
 OF LIVES, DAMAGE, HIGHER...  
 THAN IN ENTIRE U.S. SWEEP

VERY EVIDENT AND...  
 IN ONE STREET...  
 AS WARNING...

The Globe and Mail

# DISASTER AID POURS IN

Fund Near \$1,000,000  
 Pope Donates \$100,000



Women Kill Rabbit in Attempted Break

Marion Falls, Gambler's Kingdom Land

Revised Island Route Approved  
 For \$45,000,000 City Improvements

TORONTO DAILY STAR

# RELIEF FUND NEAR \$1,000,000 MARSH MAY GIVE UP 25 BODIES

Humber Headache Feared  
 If More Fersake Tramp



ALL HEARTS ARE TOUCHED  
 CASH, GOODS, AID OFFERS  
 COME FROM WHOLE NATION

METRO EDITION  
 Holland, Mo. Is Still a Lake of Rotting Debris and Mouldering Vegetation

Women's Shot Kills Man  
 Looting Case at Windsor

WHO IS SHE?  
 CATCH 3 LOOTING  
 CALL ONE SHOT  
 DEAD BY WOMAN

SEARCHING EXPERT  
 UP ABOUT FLOOD  
 SET A RECORD


The Globe and Mail

# 800-Man Army Operation To Seek 16 Humber Bodies

West Europe Union Aids to Prevent Floods  
 To Curb Bonn Arms

Flemethowers' Job  
 To Burn Out Debris

Toronto G. I. Ford HQ  
 But Only Top Officials  
 Moving From Windsor



# Vaughan, Ont. tornadoes

August 20, 2009

Two F-2s



# Damage to infrastructure



# Health risks



# Vulnerable populations



# Impacts on Natural Systems



















Photos courtesy  
Jane-Finch.com

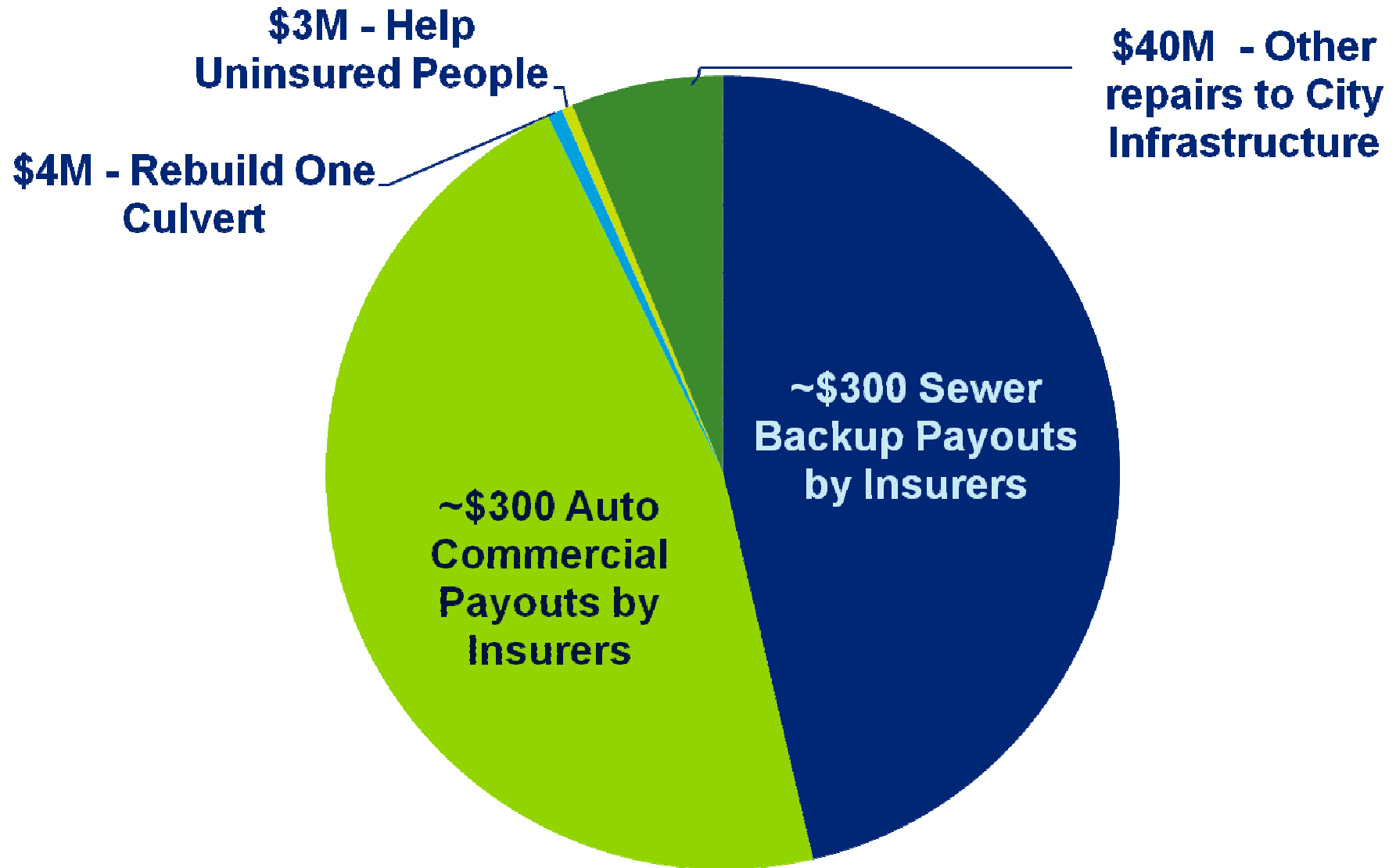




CHECK DAM

2008 7 27

# Toronto: August 2005 Storm



TOTAL  
\$647 Million



52 Lawrence West  
Yonge Subway  
Replacement Buses  
Southbound to Eglinton Station

# We are not alone



Toronto, 2005 - \$547 Million  
Calgary, 2005 - \$300 Million  
Edmonton, 2004 - \$166 Million  
Peterborough, 2004 - \$87.3 Million

# New York City

## Raised Ventilation Grates



## Raised Entrances



# Toronto is Taking Action on Adaptation



# Actions in response to climate change



**Mitigation**

The diagram consists of two overlapping circles. The left circle is blue with a fine grid pattern and contains the text 'Mitigation' and 'Reducing greenhouse gases'. The right circle is yellow with a fine grid pattern and contains the text 'Adaptation' and 'Protective action & seizing opportunities'. The overlapping area in the center is shaded with a diagonal grid pattern.

**Reducing  
greenhouse  
gases**

**Adaptation**

**Protective action  
& seizing  
opportunities**

# Climate Change Risk Assessment

## Process & Tool Developed (Deloitte)

### 2 Pilots completed:

Roads dept. & Shelter / Support

Roads dept.  **\$12.1 B** replacement value

- **7** Extreme weather types
- **2** time periods: now & 2040
- **90** Critical asset & service classes
- **15** workshops
- **1700** risk scenarios



Bea  
Utility Contra

UNIVERSITY MICROFILMS

Push pedal or flaps to open



Recycling



PEEK

PEEK

CAUTION

GALT & ROGERS

Makita



PART No: 10001100  
 SERIAL No: 0011000011  
**PEEK**  
 A Apacer Company

**CAUTION:**  
 HAZARDOUS VOLTA  
 OR ADJUSTMENTS  
 FOR PROPER AND  
 MAINTENANCE IS  
 MANUAL FOR PEE  
 PROCEDURES  
 THIS CONTROL  
 INTERLOCKED  
 CONFLICT WOR  
 CONFLICT WOR  
 CHECK PE  
 TIME OR W  
 THEREAFT

**NOTE:**  
 THIS CABINET IS  
 TS2 1998 STA  
 AND MONITOR  
 IN ACCORDANC

**WARNING**  
 UTILIZATION  
 ACCORDANC  
 WILL NOT F  
 TRANSFER  
 THEREFOR  
 SHOULD E  
 TO ASSUR  
 BEFORE

CH1314

**PEEK**  
 TRAFFIC  
 A Apacer Company

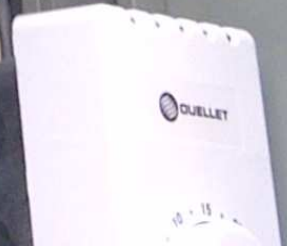
60 Hz REF

CABINET POWER

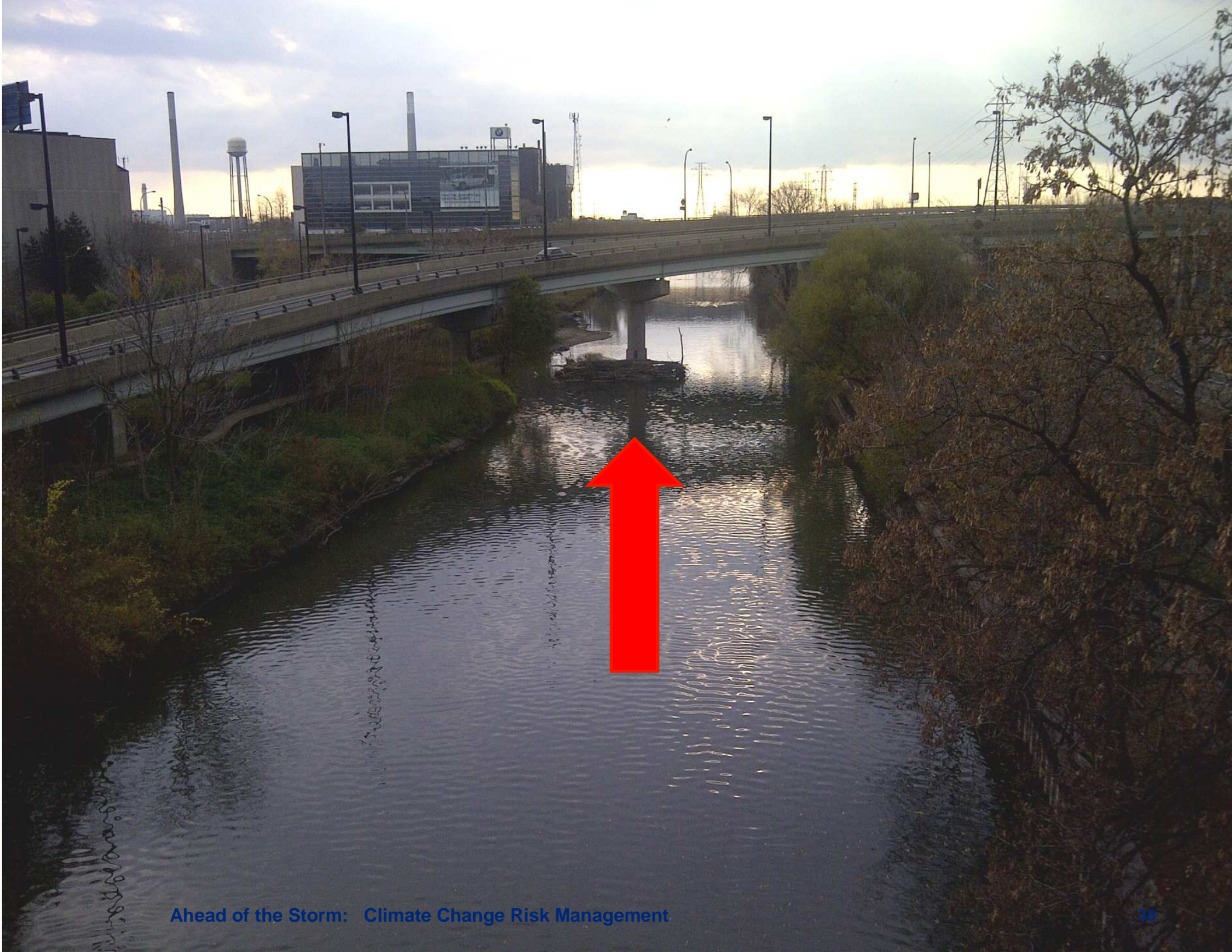
PWR COMMON

24 VDC

POWER













1889





TEREX

CAT

EST  
Gilbert Steel

E-39

# Increasing the tree canopy

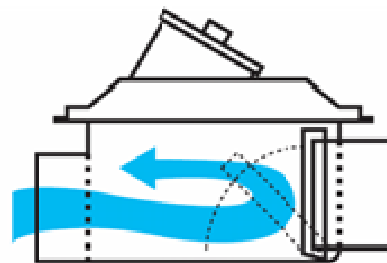
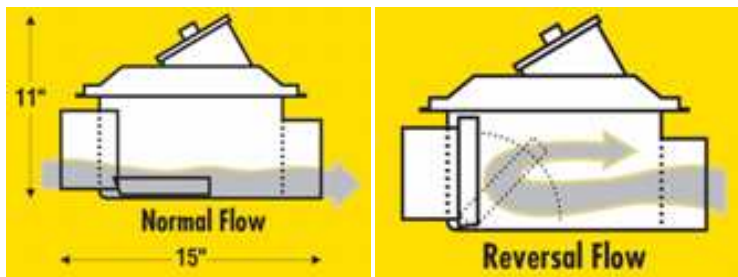


# Residential flood protection



Lot grading

Sewer backflow valve



# Green roofs



# New collaboration: WeatherWise Partnership



# WeatherWise Partnership

## 60 Membership Organizations

- Insurance, Banking, Telecom, Transportation, Electrical, Real estate, Water, 3 levels of gov't

## Purpose

- ID & manage risks due to extreme weather in Toronto region

## Focus for 2012

- Regional electrical power system risk assessment

**Thank you**

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**[www.toronto.ca/teo/adaptation/index.htm](http://www.toronto.ca/teo/adaptation/index.htm)**