Weather and Climate Readiness

PRAC, MCCAC Workshop Mar. 5, 2015, Leduc

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CITY OF Leduc

Outline

- Background
- Why do a plan?
- Process to develop the plan
- The plan itself

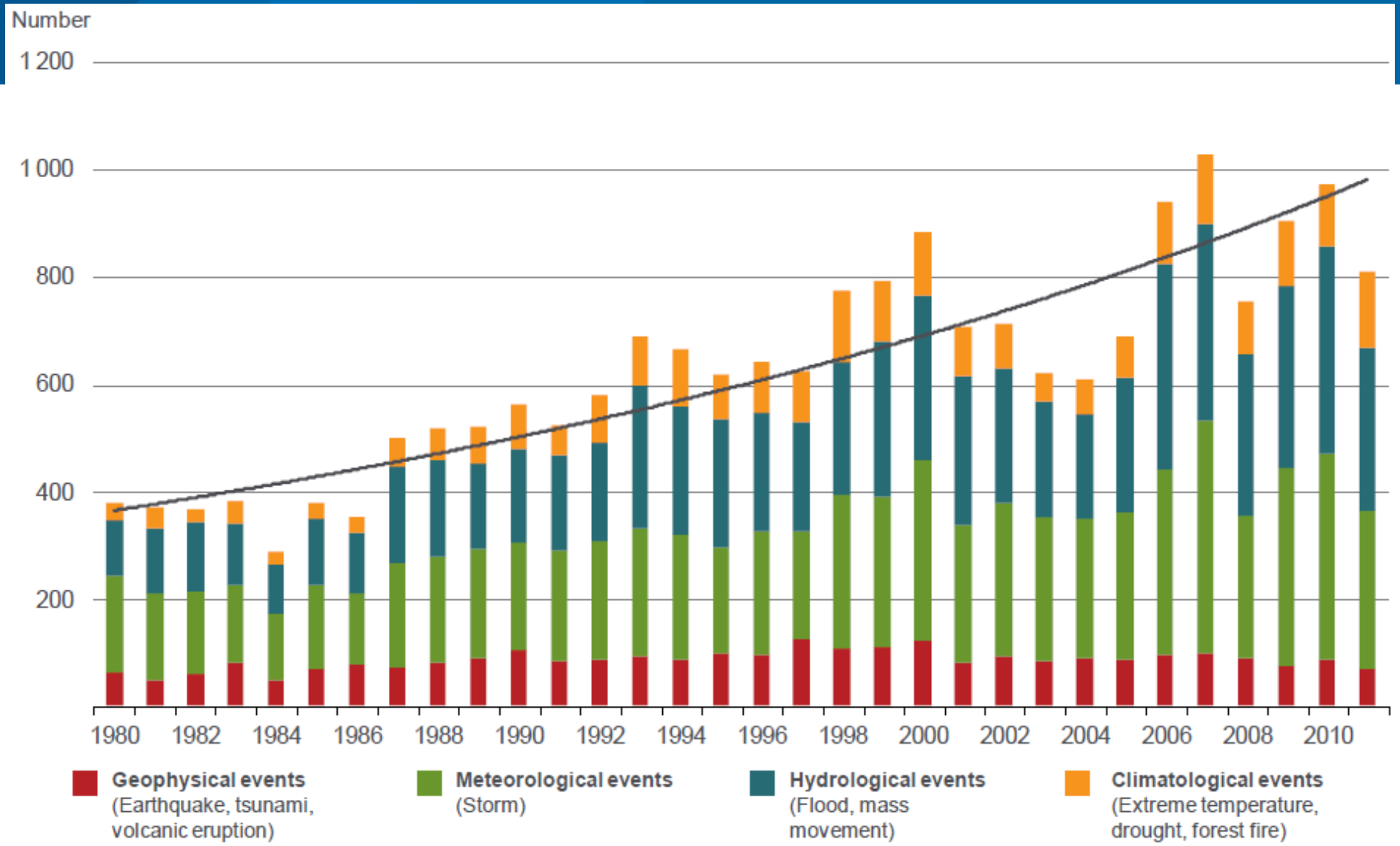
Background

- Environmental Plan 2012 –
  priority action under City Leadership
- Step 1. Readiness planning = adaptation
- Step 2. Greenhouse gas reductions, tracking, reporting

Why do Weather and Climate Readiness Planning?

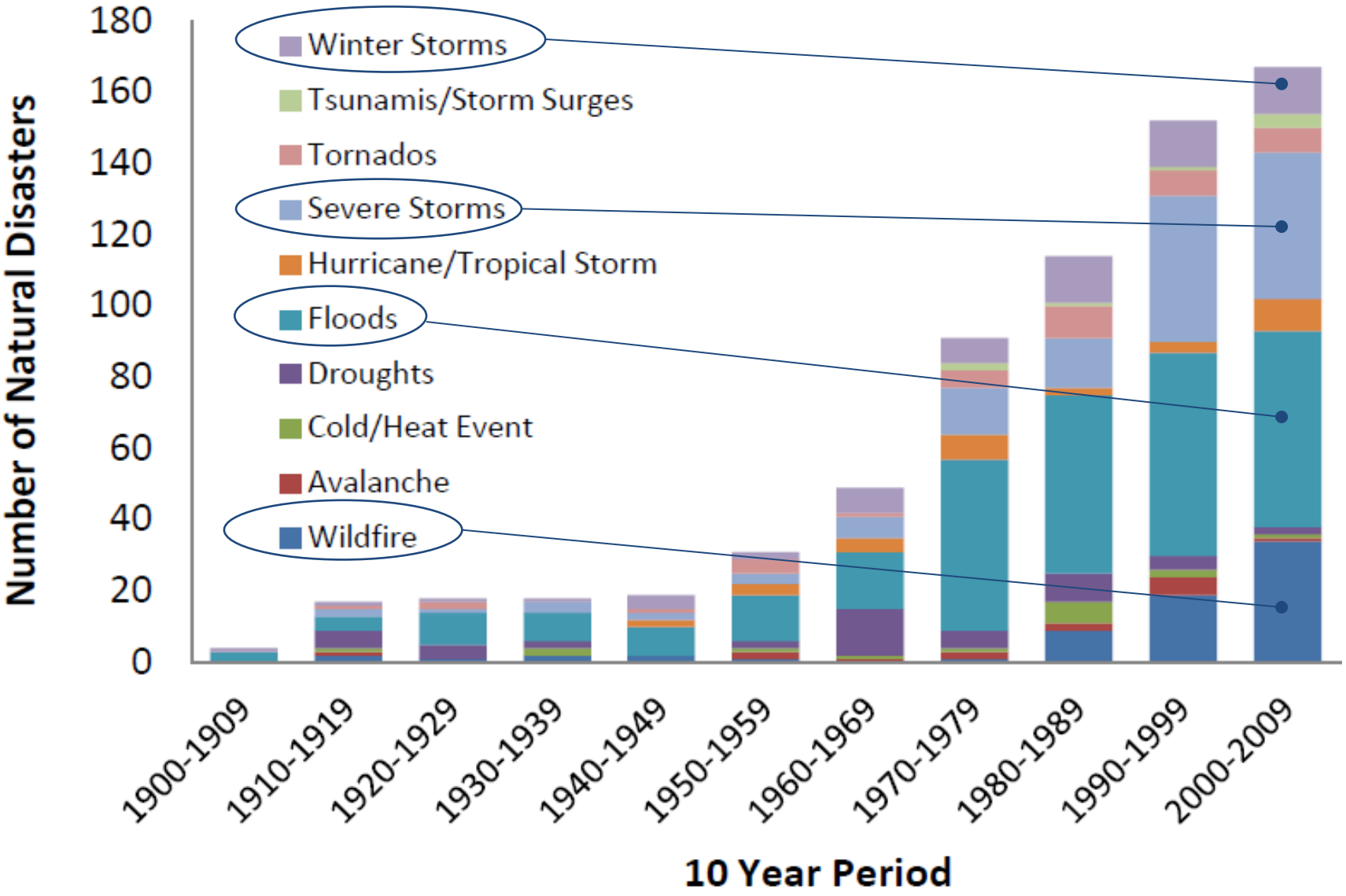
- Changes are certain
- Global emissions vs. local effects – *What are they?*
- To answer:
  What about climate change is important to Leduc?
- Prudent long-term preparedness planning

Trend in natural disasters worldwide 1980 – 2011



Source: 2012 Münchener Rückversicherungs-Gesellschaft, Geo Risks Research, NatCatSERVICE – As at January 2012

Trend in natural disasters in Canada 1900 – 2011



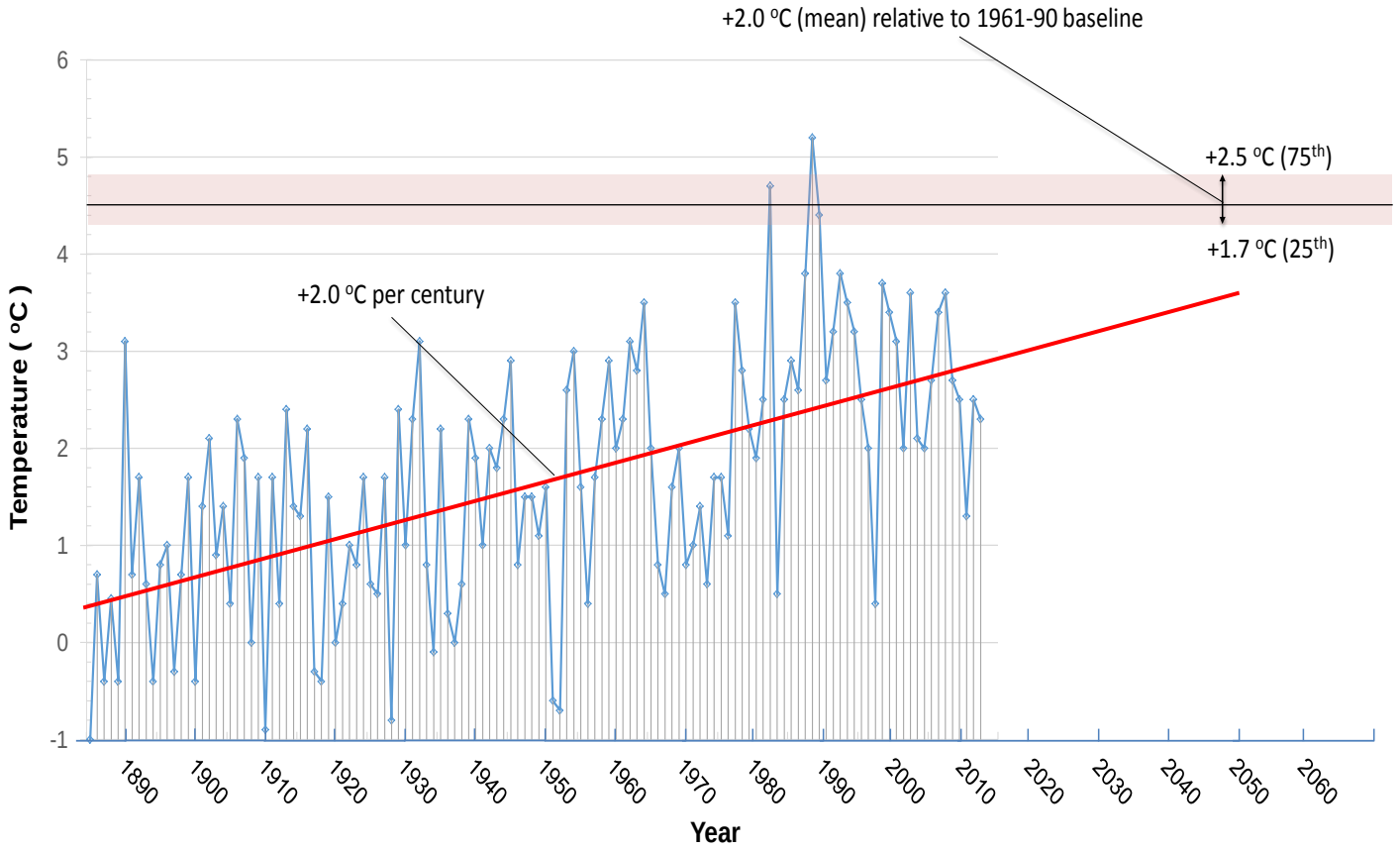
Source: Canadian Disasters Database, Public Safety Canada for events 1, and 3-7. We have inserted the 2013 floods in Southern Alberta at 2.

How does Alberta fare?

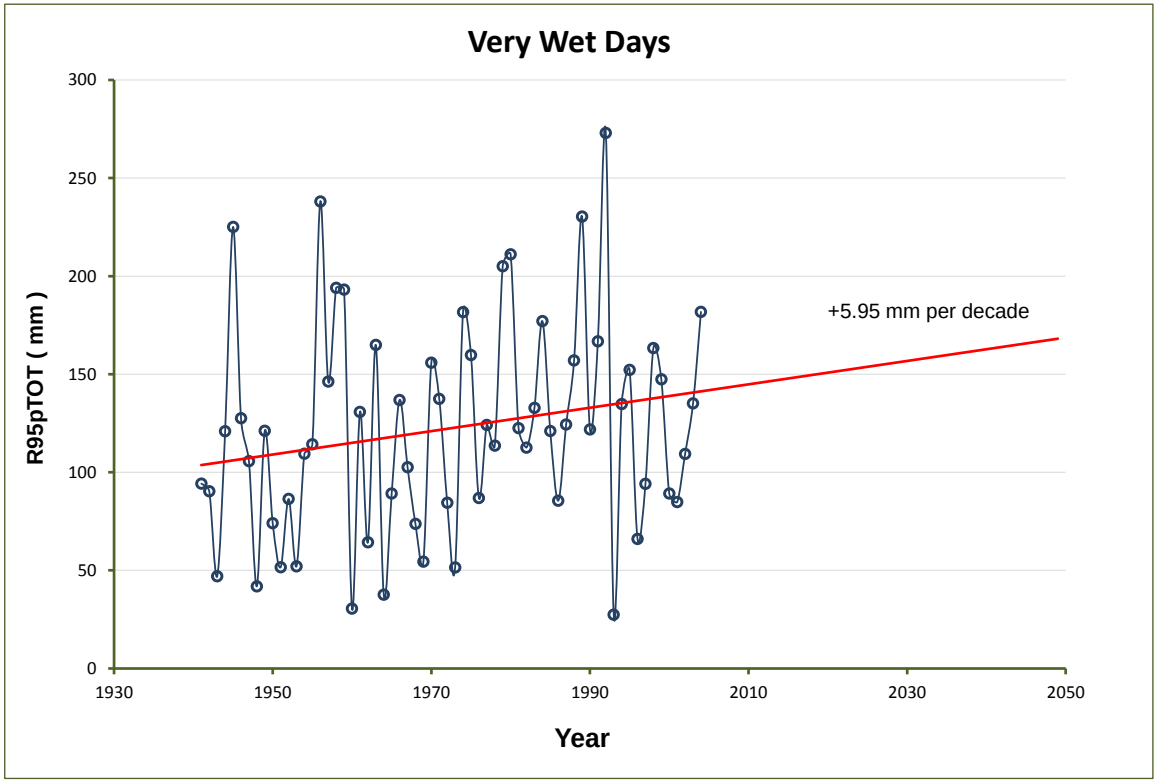
Rank	Event type	Affected area	Year	Cost ($2011)
1	Storm	Ontario to New Brunswick	1998	$6 billion
2	Flood	Calgary and Southern Alberta	2013	$3-6 billion
3	Storm	Calgary	1991	$1.2b billion
4	Flood	Southern Alberta and Saskatchewan	2010	$900 million
5	Drought	Prairie provinces	1990	$890 million
6	Drought	Prairie provinces	1992	$830 million
7	Wildfire	Slave Lake and area	2011	$700 million

Source: Canadian Disasters Database, Public Safety Canada for events 1, and 3-7. We have inserted the 2013 floods in Southern Alberta at 2.

Mean Annual Temperature Trend and Projection for Leduc Area



Trend in Very Wet Days for Edmonton Area



Source:
Based on data downloaded from CLIMDEX (www.climdex.org)

Extreme Weather Events in Leduc Region

Extreme weather phenomenon	Historical frequency	Projection
Severe hail events	2.5 events per year	No quantitative projection. Emerging consensus that frequency and intensity of most extreme weather events is *likely* to *very likely* to increase.
Freezing rain	7 days per year	
Blizzards	4 hours per year	
Extreme snowfall event	36 cm in one day	
Thunderstorms	25 days with storms per year	
Strong winds*	2 days per year	
Tornados (F0-F5)	9 tornados per decade	
Lightning strikes	0.8 strikes per km^2 per year	
Hot days (max temp > 30 ^oC)	3 days per year	
Wildfire	3.0 to 4.0 severity rating	4.0 to 5.0 severity rating

Risks?

Weather and Climate Risk Scenarios for Leduc

- High wind events
- Snow loading
- Extreme precipitation
- Drought
- Water quality
- Tornados
- Thunderstorms
- Freezing rain storms
- Heat waves
- Freeze-thaw cycles
- Winter storms
- Hail storms
- Grass fires

Figure 4: Risk Rating Matrix Summary (post risk evaluation)

Consequence	Rare	Very unlikely	Unlikely	Probable	Likely	Almos certai
Catastrophic		• Tornado				
Very severe				• Freezing rain storms		
Severe		• Grass fire	• High wind events • Heat wave	• Drought • Thunderstorms and lightning • Hail storms	• Extreme precipitation flooding	
Moderate		• Water quality	• Snow loading		• Winter storms	
Slight					• Freeze-thaw cycles	
Minor						

Likelihood


WEATHER AND CLIMATE READINESS
ACTIONS

Approach to Formulating Readiness Actions

- What is the City of Leduc currently doing to address the risk event?
- Should current actions be improved given what you learned about projected climate change? If so, how?
- What additional action(s) is needed to provide an acceptable level of risk mitigation?

Risk Events: Ice and Snow Storms and Hail Storms

Actions	Resource	Timeframe
1. Ensure 'critical' community facilities have a back-up power source for at least 72 hours in the case of extended power outage caused, if not already in place.	High, however exploring potential to out-source.	Short-term (2-5 years)
2. Develop a travel-to-work policy for City staff during extreme events, including rules and procedures governing travel bans	Low ($10,000-$50,000)	Near-term (<2 years)
3. Continue to enhance public awareness of the Emergency Preparedness Guide	Very low (under $10,000)	Ongoing
4. Examine feasibility of a flexible working policy for City staff	Low ($10,000-$50,000)	Near-term (<2 years)
5. Hire a Municipal Emergency Coordinator	Medium ($50,000-$100,000) Annually	Near-term (<2 years)

Risk Events: Severe Tornados and Wind Storms

Actions	Resource	Timeframe
6. Investigate the requirements and feasibility of applying 'post-disaster' construction standards to new critical infrastructure development	Low ($10,000-$50,000)	Near-term (<2 years)
7. Conduct gap analysis and evaluation to determine the need for tornado-safe spaces within existing civic facilities and buildings	Very low (under $10,000)	Near-term (<2 years)
8. Retrofit existing civic facilities and buildings with tornado-safe spaces	Very high (over $500,000)	Medium-term (6-10 years)
9. Ensure tornado-safe spaces are incorporated within design and development of new civic facilities and buildings	Medium ($50,000-$100,000)	Ongoing
10. Raise public awareness of precautions in event of a tornado (warning), and shelter-in-place information	Very low (under $10,000)	Ongoing
11. Disseminate information on tornado preparedness to City staff, ensuring awareness of tornado-safe spaces and protocols.	Very low (under $10,000)	Ongoing

Risk Event: Heat Waves, Lightning Storms

Actions	Resource	Timeframe
12. Conduct a heat wave vulnerability study to determine the number, location, and exposure of those at risk from heat waves	Low ($10,000-$50,000)	Short-term (2-5 years)
13. Embed requirement for hydration / cooling stations within guide for event planning applications.	Very low (under $10,000)	Near-term (<2 years)

Action	Resource	Timeframe
14. Work with utility provider(s) to explore the option for future transmission lines to be buried underground in the City of Leduc	Very low (under $10,000)	Near-tem (<2 years)

Risk Event: Extreme Precipitation and Overland Flooding

Actions	Resource	Timeframe
15. Enhance the maintenance regime for the storm water collection and maintenance system	High ($100,000-$500,000)	Medium-term (6-10 years)
16. Develop an educational program targeting households to minimize adverse effects of storm run-off from private properties	Very low (under $10,000)	Near-term (<2 years)
17. Update Intensity-Duration-Frequency (IDF) curves to reflect current and projected precipitation patterns	Very low (under $10,000)	Short-term (2-5 years)
18. Conduct a detailed engineering vulnerability assessment to characterize and prioritize risks posed to the stormwater system from projected future climate	Medium ($50,000-$100,000)	Short-term (2-5 years)

Risk Event: Water Scarcity, Lightning Storms

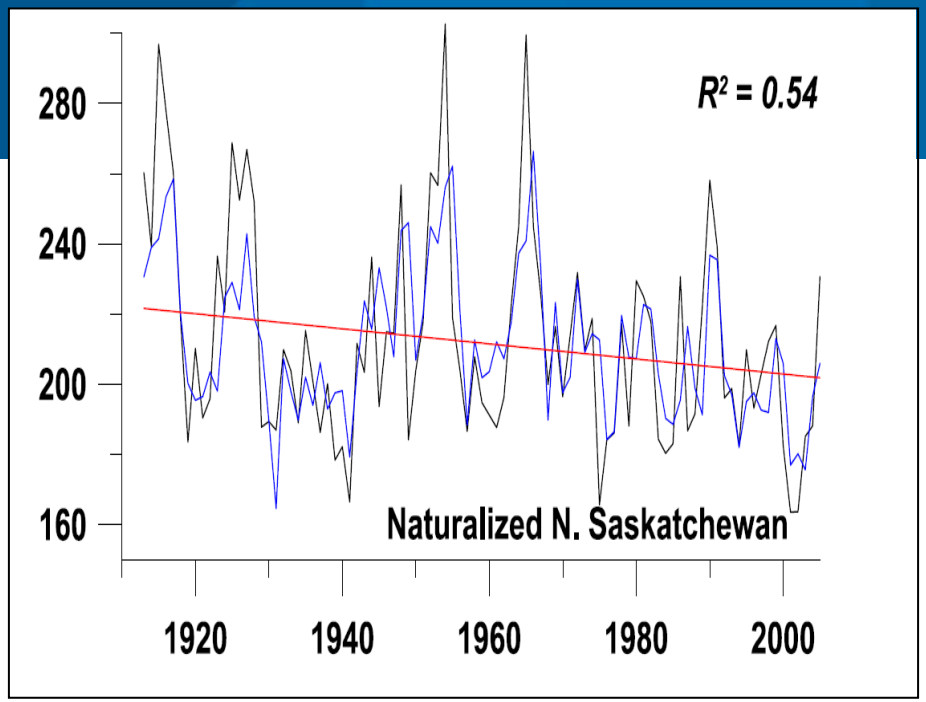
Actions	Resource	Timeframe
19. Monitor projected water supply and water demand in Leduc	Very low (under $10,000)	Ongoing
20. Increase tree and green space watering capability in the event of drought or dry spells	Medium ($50,000-$100,000)	Short-term (2-5 years)

Conclusions

- Get adaptation on the radar if its not already
- Integrate with your emergency planning process
- Tailor the plan to your municipality
- Take implementation step-by-step

Questions?

Stream flow trend and projection for Leduc region



Recorded (naturalized) flows declining at 0.14% (0.10%) per year over 1912-2007

Decline attributed primarily to loss of glacier mass resulting in significant declines in summer and fall season flows

Alberta glaciers will lose 80-90% of their volume by 2100

Glacier contributions to stream flow reduced by similar amount