

# DISASTER DEBRIS ASSESSMENT

Session 2



# Introduction

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- Determining the amount and type of debris after a disaster event is difficult
- Various organizations, such as FEMA in the US, have developed simple methods to estimate debris volumes
- More sophisticated computer models have been developed for hurricanes and tornados.
- Pre-disaster scenarios can be developed to estimate debris volumes which can help prepare debris management plans

# Think Big

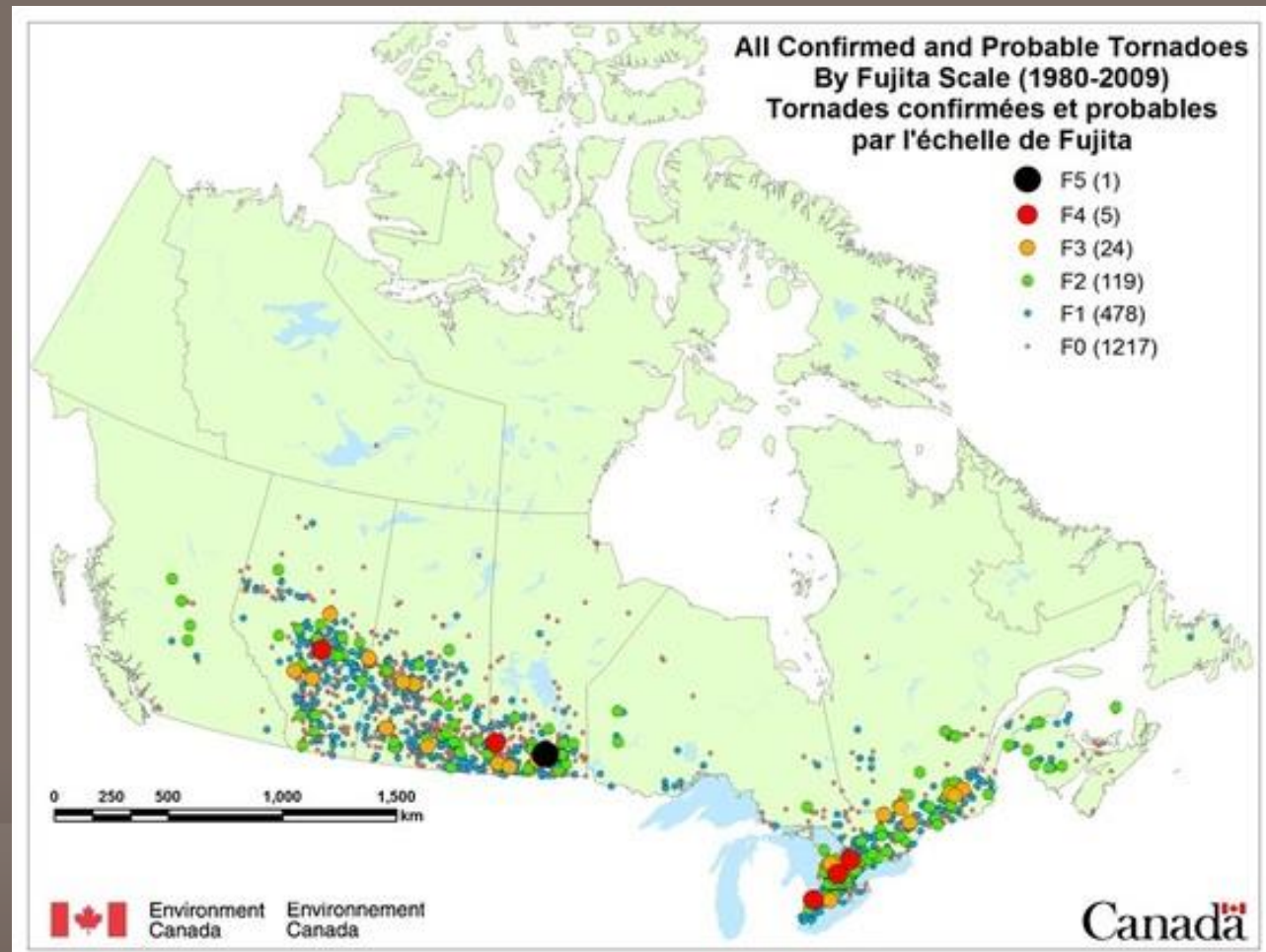
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- Potential risk & type of disasters
- Nature of debris
  - Debris differs with type of disaster
- Consider
  - a neighbourhood impacted
  - 1/3 or 1/2 of the community impacted
  - Worst case scenario

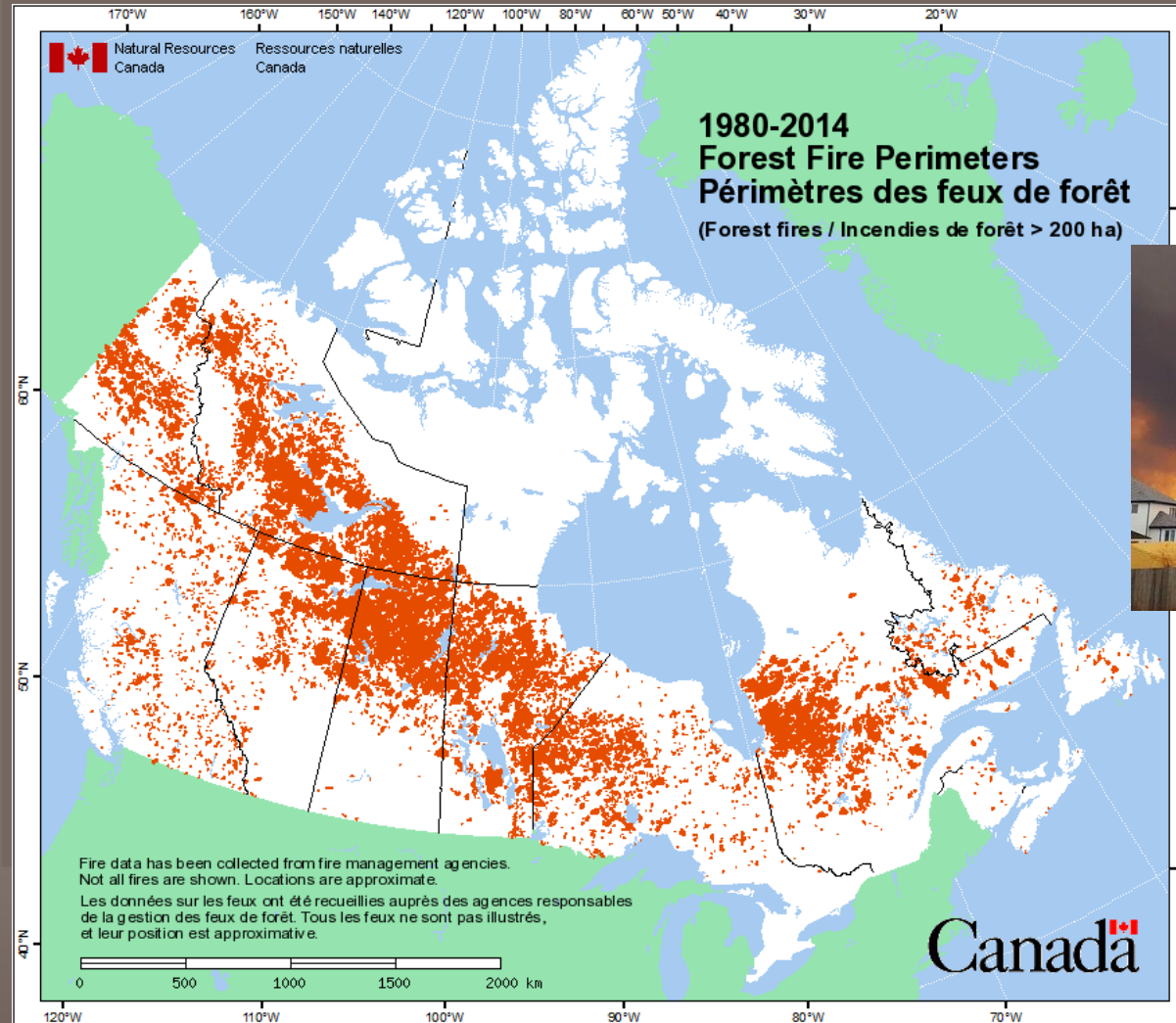


High River Flood 2013  
(Photo: High River RCMP)

# Tornado Risk

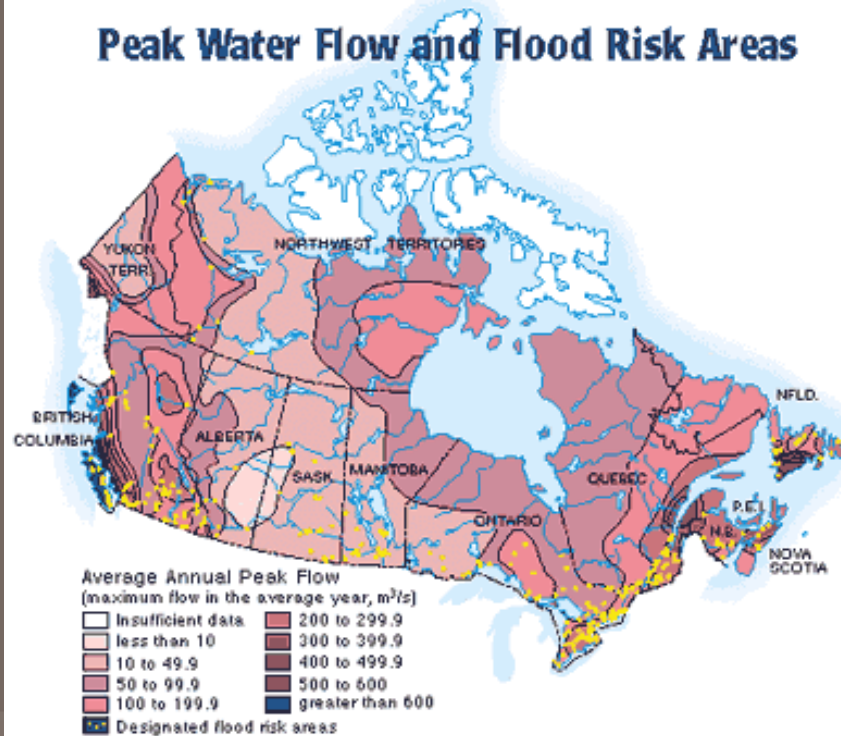


# Wild Fire Risk

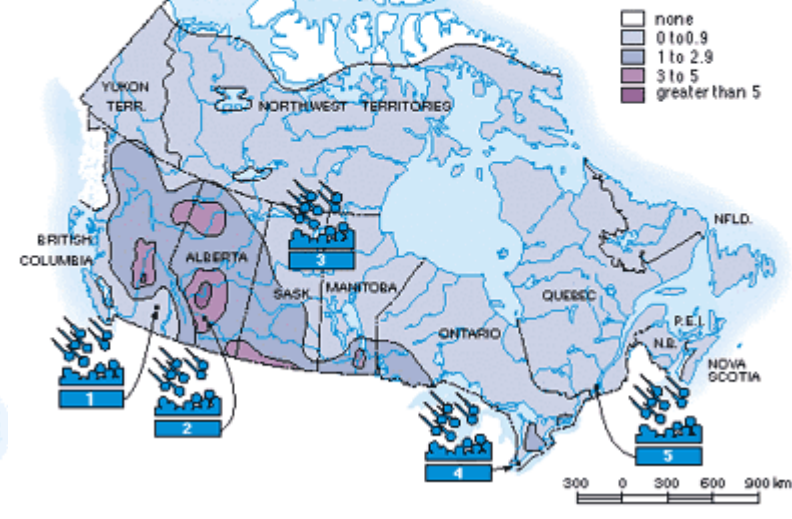


# Hail & Flood Risk

## Peak Water Flow and Flood Risk Areas



## Average annual number of days with hail



# Debris Recovery Phases

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- Phase 1:
  - Preliminary damage assessment
  - Clear roads for emergency vehicles
- Phase 2:
  - Debris assessment and estimation
  - Clear debris impacting public safety
- Phase 3:
  - Debris removal from public property
  - Hauling and disposal of debris
- Phase 4:
  - C&D management from re-construction



Alberta Environment and Sustainable Resources

# Debris Assessment

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- Identify environmental and safety risks
- Evaluate types of debris and where it sits
- Estimate volumes of debris



# Debris Clearance and Collection Strategy

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## Curb-side Collection

- Floods
- Wind storms




## Coordinated Debris Removal

- Wildfire
- - Earthquake

# Prioritize Debris Management Options

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- Harmful material identification & handling
  - Recycling options
  - Waste to energy options
  - Disposal options
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# Debris Removal Resources

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- Identify resources & capacity to manage the debris
- Identify needed manpower
  - Local, contractors, other communities
  - Specialized services (e.g. CFC recovery, hazardous waste management)
- Identify needed equipment
  - Loaders, track hoes, trucks, bin trucks, vacuum trucks
  - Local, contractors, other municipalities



From: The Guardian, Charlottetown, PEI

# Identify where debris will go

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- Location, routes, capacity
- Landfills
- Transfer stations
- C&D facilities
- Hazardous waste facilities
- Recycling facilities
- Temporary debris sites



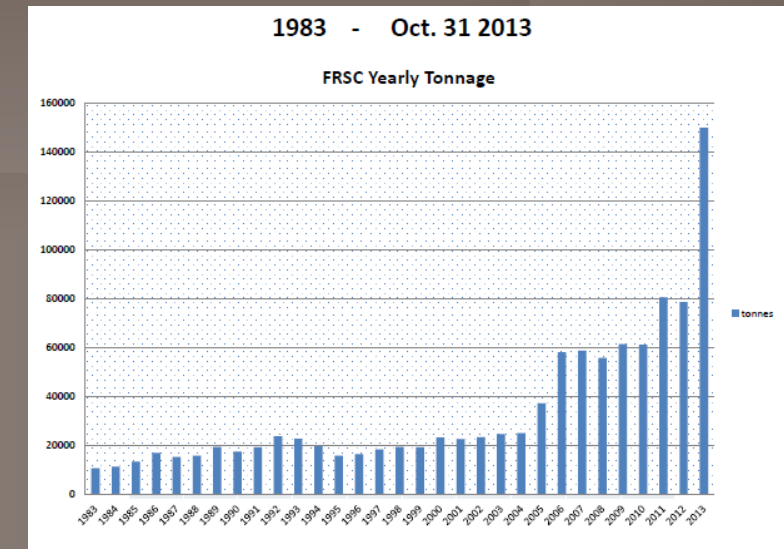
# Debris Monitoring Plan

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- Monitor debris hauling and disposal
  - Need to verify for disaster assistance
  - Requires auditable records
- Records
  - Truck scales at waste facilities
  - Truck load counts
  - Volume measurements
- Records of materials (metals recycled, CFC recovery, hazardous waste, debris disposed,

# Case Example 1 - High River Flood, 2013

- Period of June 22 to October, 2013
  - Total waste scaled at landfill - 114,300 mt
  - Same period 2012 - 33,400 mt
  - Loads scaled - 55,405
  - Same period 2012 - 36,018
  - High River Flood Debris - 70,500 mt
  - High River Flood Debris loads - 19,993
- Fridges Freezers received - 7,324
- Freon removed from all
- Metals recycled - 1,319 mt
- Silt and sludge - over 14,200 mt



# Case Example 2 – Fort McMurray Wildfire

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- Landfill evacuated to escape fire
- Staff returned immediately after fire
  - Fight a fire on the landfill
  - Restore site and re-open within 10
- Prior to return of residents to the evacuated City
  - Collection staff cleared all remaining residential and commercial waste in the City
- Landfill received more than double annual volume in 8 months after the fire
  - 424,099 mt
- 74.24% of debris received was re-purposed or recycled
  - Concrete/asphalt
  - Fridges /freezers
  - Metals
  - Wood

Municipality of Wood Buffalo Landfill  
Photo: Getty



# Disaster assignment

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- Each group will be assigned a disaster scenario for their example community
- Each scenario will describe scale of damage
- Your group challenge is to describe the type of debris that might be encountered and to estimate the volume of debris
- Worksheets with formulae for calculating the debris quantity are provided.
- Group 1: Tornado
- Group 2: Wildfire
- Group 3: Flood