

# Canadian Emissions Inventory for Forest Fires and Prescribed Burning

## National Fire Emissions and Modeling Technical Workshop

New Orleans, May 4-6, 2004

Marc Deslauriers  
Environment Canada  
Pollution Data Branch  
Air Pollution Prevention Directorate



# National Emissions Inventory

---

- Compiled by Environment Canada in collaboration with the provincial agencies
- Includes
  - Point, Area, Mobile, Open, Biogenic
  - All the Criteria Air Contaminants (CAC's)  
(SO<sub>x</sub>, NO<sub>x</sub>, VOC, CO, TPM, PM<sub>10</sub>, PM<sub>2.5</sub>, NH<sub>3</sub>)
- Historically compiled on a 5 year cycle (since the 80s)
- Currently initiating a process to compile the national emissions inventory of CAC's on an annual basis
  - Starting with the 2002 emissions inventory
  - Compilation of CAC's from the industry on an annual basis through mandatory reporting requirements (NPRI)
- First version of the 2002 NEI to be completed near the end of 2004



# National Emissions Inventory

---

- Forest fire and prescribed burning emissions
  - Annual emissions compiled by Environment Canada with some provincial collaboration
  - Prescribed burning only performed in Ontario and British Columbia



# Wildfire and Prescribed Burning Emission Estimation Methodology

---

## ■ Emission Factors

- AP-42, section 13.1 for all provinces except for British Columbia
- "Biomass Consumption and Smoke Emissions from Contemporary and Prehistoric Wildland Fires in B.C.", B.C. Ministry of Forest, March 1996
- Some emission factors were derived from average factors from FOFEM and Consume



# Activity Statistics

---

- Forest Fires
  - Area burned obtained from the Canadian Large-Fire Database
    - Compiled by the Canadian Forestry Service in collaboration with the provincial agencies and Parks Canada
  - Fuel loading
    - Averages for the whole country
    - 2.24 Kg/M<sup>2</sup> for Timber Productive Land Burned
    - 1.22 Kg/M<sup>2</sup> for Unproductive Timber Productive Land Burned and Other Areas
- Prescribed Burning
  - Area burned obtained from the Canadian department of Natural Resources
  - Fuel loading 8 Kg/M<sup>2</sup> (average for the whole country)



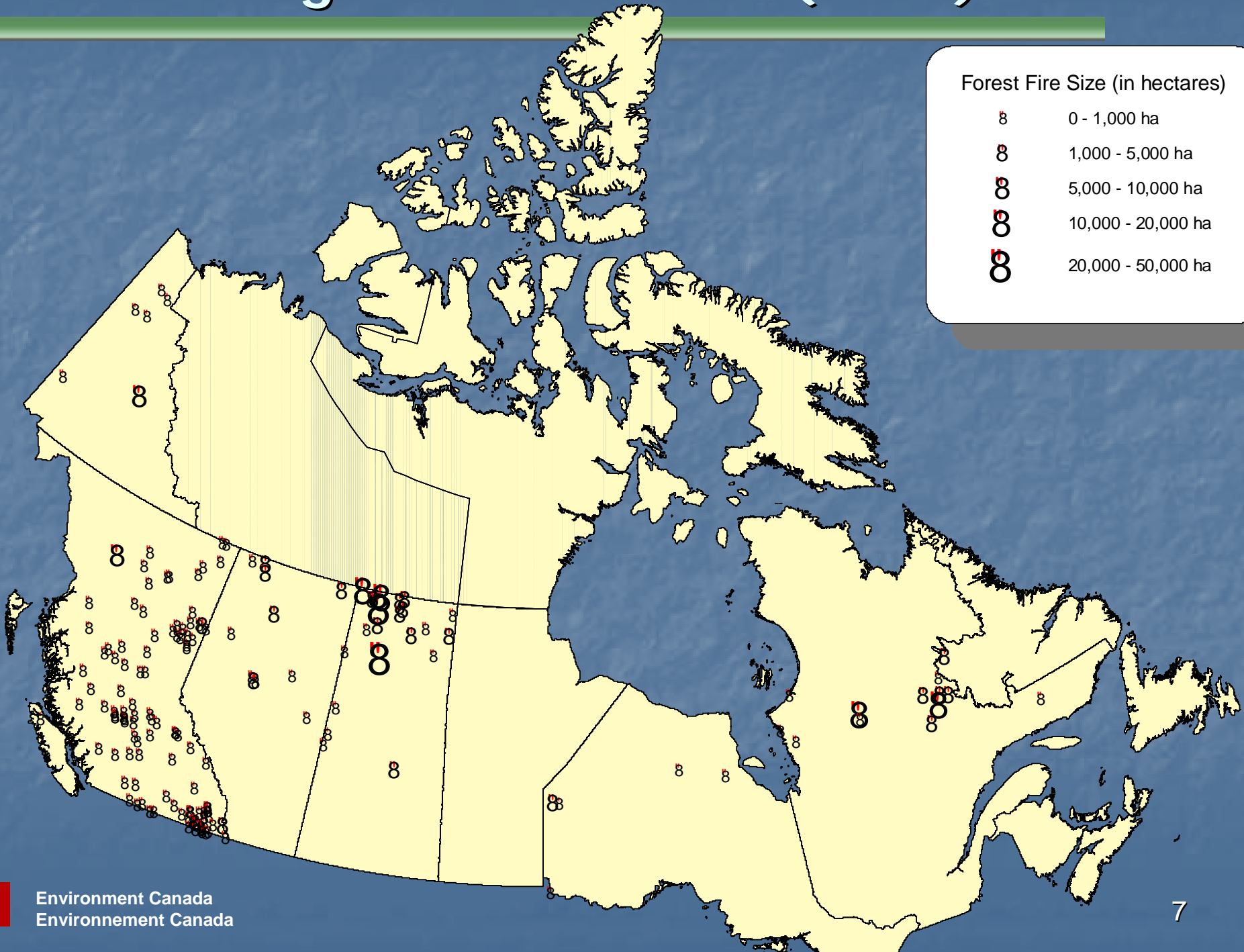
# Spatial Allocation of the Emissions

---

- Allocated using the Canadian Large-Fire Database (LFDB)
  - Includes all fires greater than or equal to 200 hectares in areas
  - Large fires represent about 2-3% of the total number of fires but account for 97-98% of the total area burned
  - Includes attributes such as point of ignition, fire start date, area burned (polygons and centroids), suppression actions, and cause of ignition
  - Statistics available from 1959 to 2000

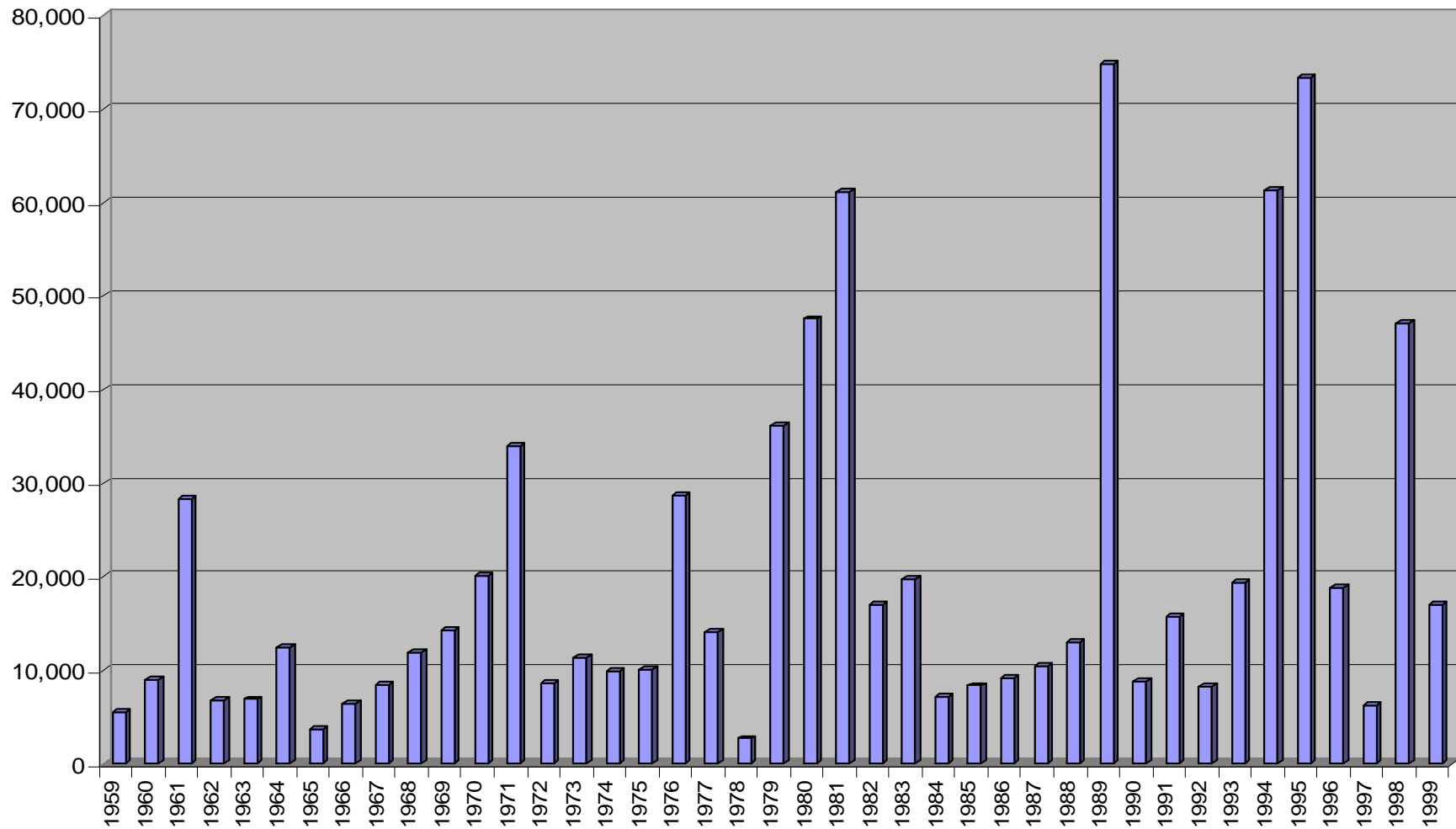


# Canadian Large-Fire Database (2000)



# Canadian Large-Fire Database

## Area burned (km<sup>2</sup>) by fires in Canada



# Current Situation

---

- Improvements to the Canadian NEI have been focused on industrial sources, on-road and non-road vehicles, and road dust during the past years
- Historical estimation methods for forest fires/prescribed burning are no longer adequate for air quality program requirements (modeling and reporting)
- Interest now to improve the emission estimates for forest fire, prescribed burning, agricultural burning (CACs and HAPs)



# Current Situation (cont'd)

---

- Important to develop estimates that are comparable to the ones developed in the United-States
  - Important for the joint air quality modeling and reporting requirements as part of the Canada-US Air Quality Agreement
- Emissions from the United-States, Mexico, and other countries are important since they can influence the local weather, air quality, and are could be used as input into the Canadian models



# Path Forward

---

- Efforts have already been initiated to improve the forest fire emission estimates in Canada, with the development of a dynamic emission estimation model, which takes or will take into account:
  - Detailed forest inventory, fuel consumption, and forest fire statistics
  - Emission factors, fuel consumption, combustion phases (FOFEM, Consume, FEPS)
- Need to investigate which of the available emission estimation models could be used for Canada
  - Some input parameters may not be available in Canada



# Path Forward (cont'd)

---

- Development of more detailed statistics to improve the emission estimates for prescribed and agricultural burning (location, time period, fuel consume)
- Plan to focus on estimating the emissions (CACs and HAPs) for the 2002 NEI
- Update the historical emission estimates to obtain comparable trends