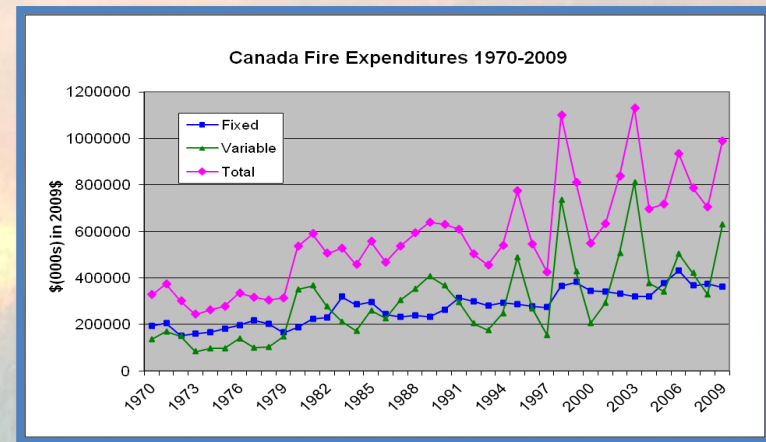


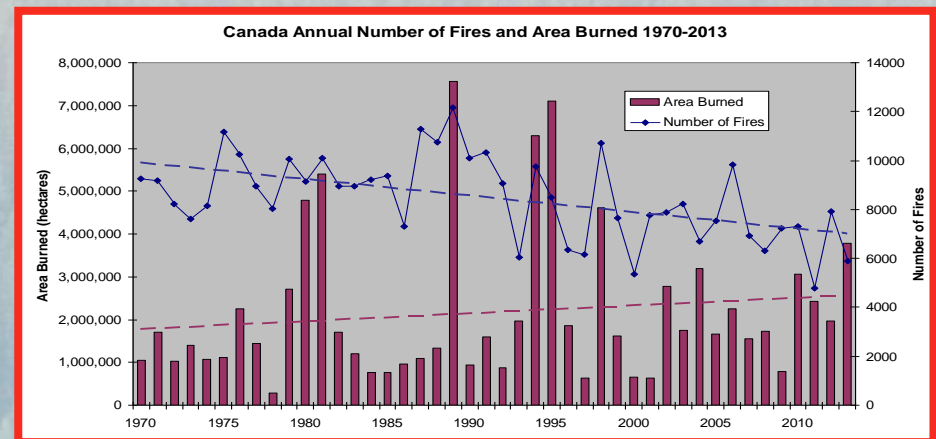
Trends in Wildland Fire Load and Fire Management Expenditures in Canada: 1970-2012*

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*Based on report to CCFM WFMWG:
"Evaluating Past, Current and Future Wildland Fire Load Trends in Canada"



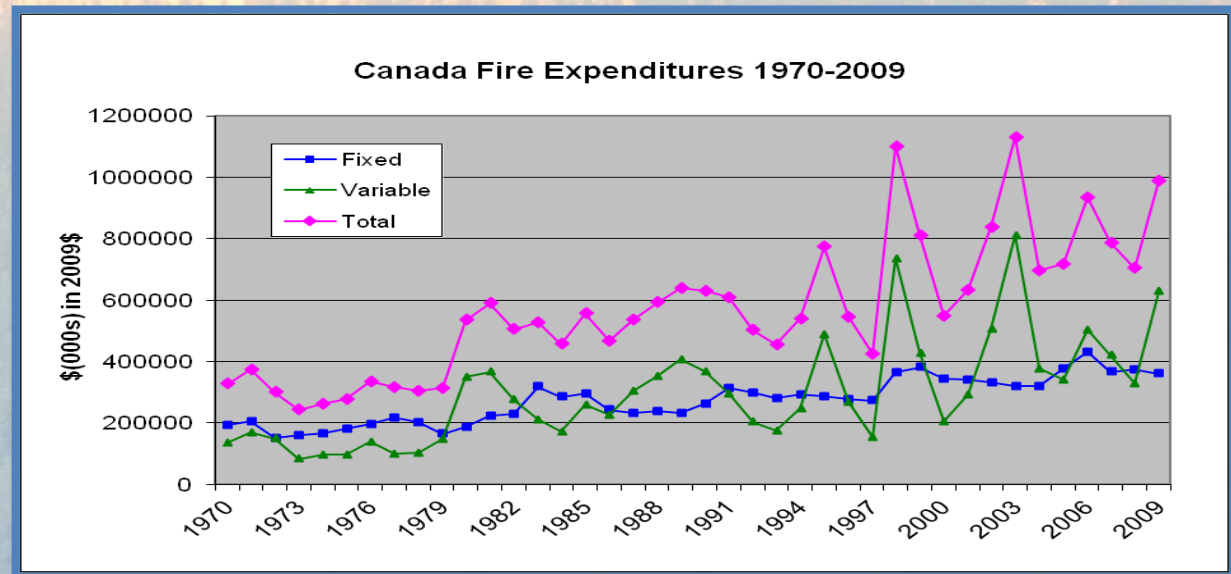
Wildland Fire Canada 2014
Halifax, Nova Scotia
October 7-9, 2014

Approach

- Review national and jurisdictional fire expenditures post-1970
- Compile available fire statistics from NFDP, agencies, CIFFC, publications
- Analyze national and jurisdictional trends in fire activity (occurrence and area burned) by cause, size, and response zone.
- Review resource-sharing costs post-2006
- Review climate change/fire activity projections
- Survey fire management agencies for input on fire load trends and possible influencing factors.

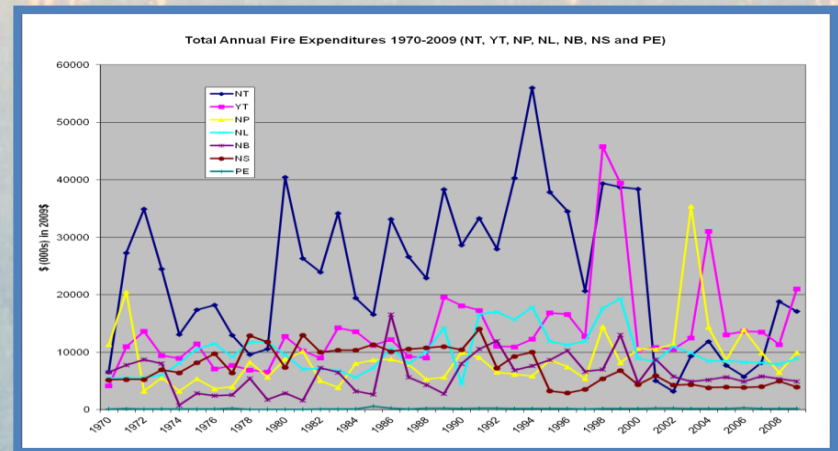
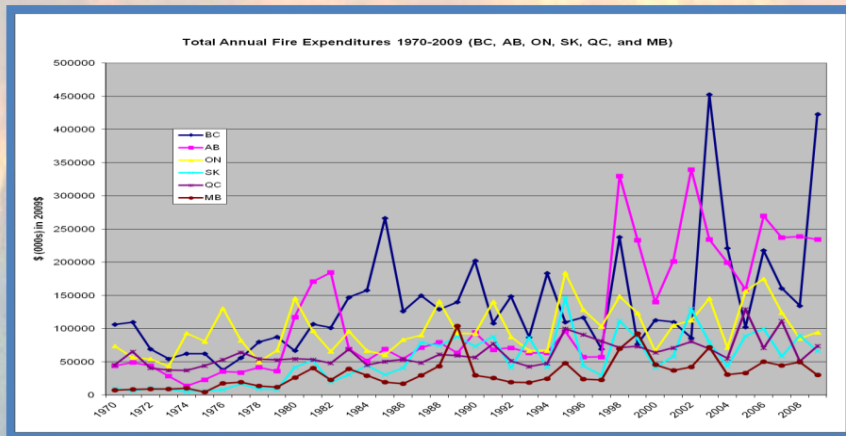
Canadian Fire Expenditures

- 1970-2009 Fixed and Variable Costs (adjusted to 2009 \$)
- Post-2009 data almost complete - trend continuing
- Data sources:
 - National Forestry Database Program (CCFM)
 - Ramsey/Higgins CFS reports (1979-1990)
 - Agency surveys and unpublished reports to WFMWG
 - CIFFC responsibility post-2009
- Fixed costs rising steadily
- Variable costs rising more quickly with increasing variability beginning in mid-1990s



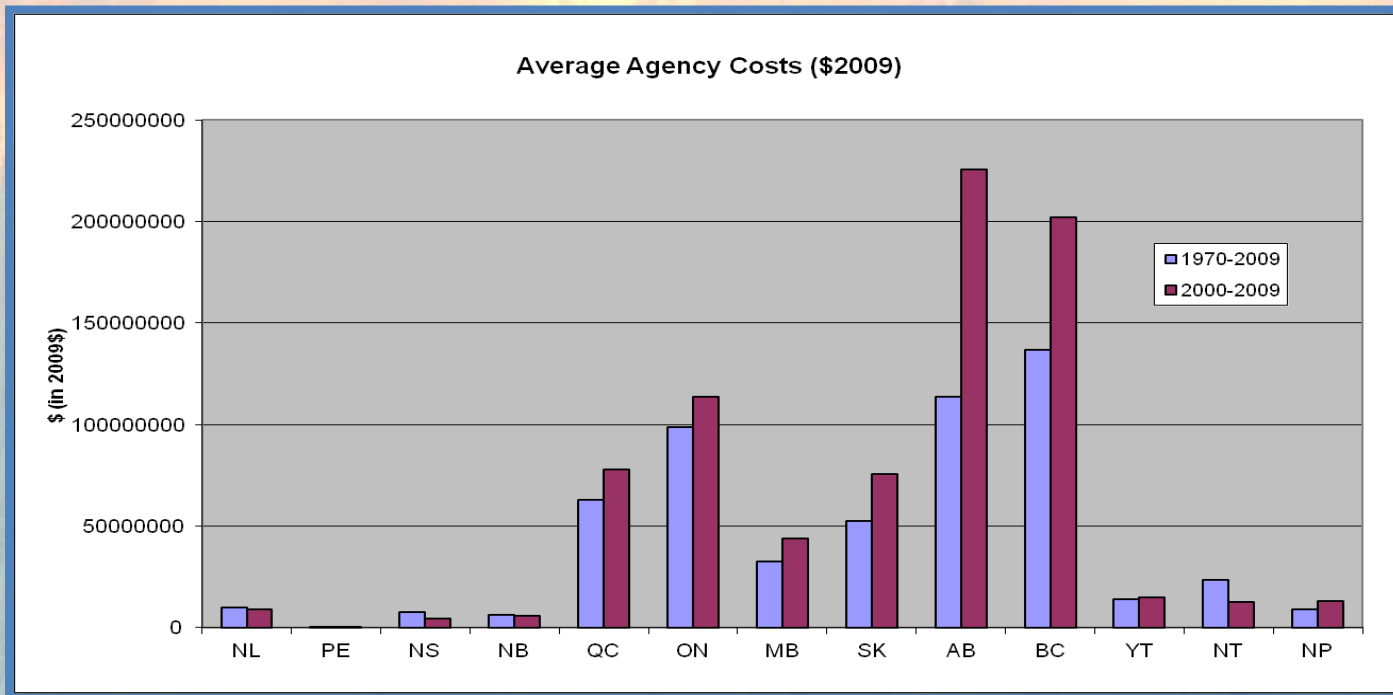
Annual Jurisdictional Fire Expenditures

- Note different scales
- Costs appear to be rising most in BC and AB, although rising in other large agencies
- Are AB, BC costs driving rising national costs?



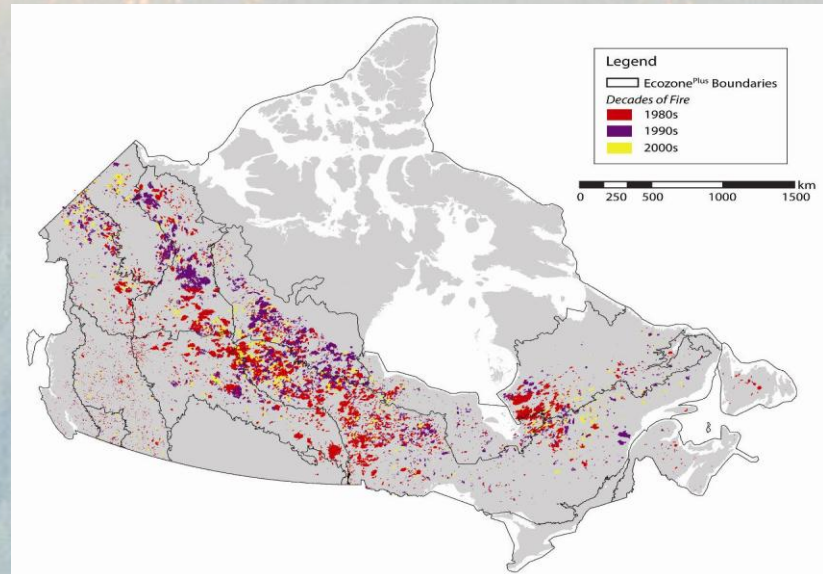
Comparing Agency Costs

- AB/BC lead in costs, followed by ON/QC and SK/MB, with other agency costs significantly less (order of magnitude)
- Large agency costs rose more post-2000, especially AB/BC
- Large agency costs driving rising costs – larger fire load?



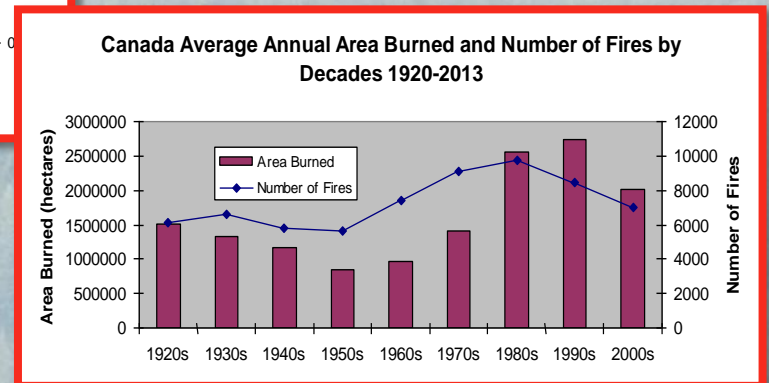
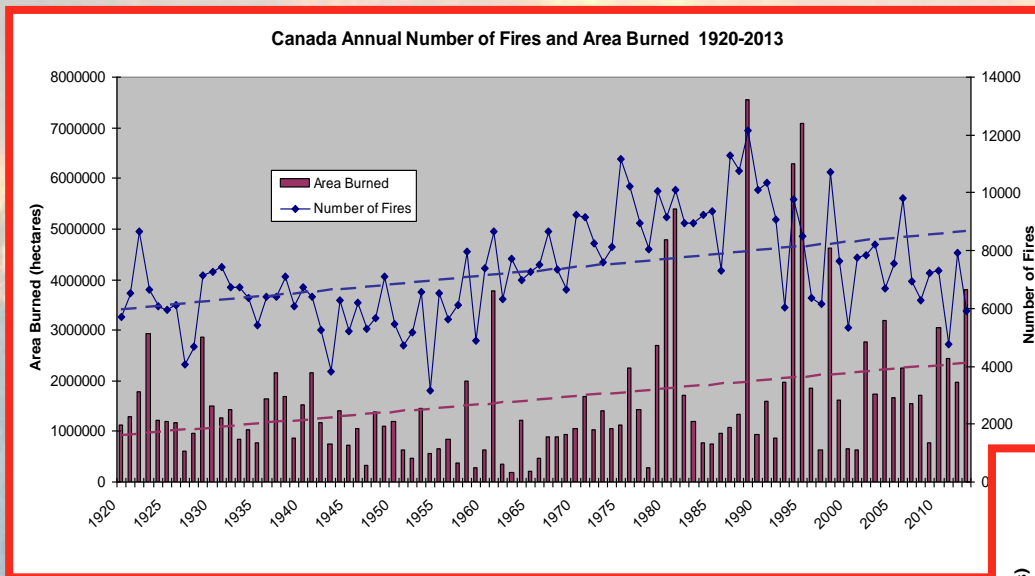
Why are Costs Rising?

- Increasing fire load?
- Climate change?
- Fire operations more expensive?
- Declining resources?
- Costs associated with more resource sharing?



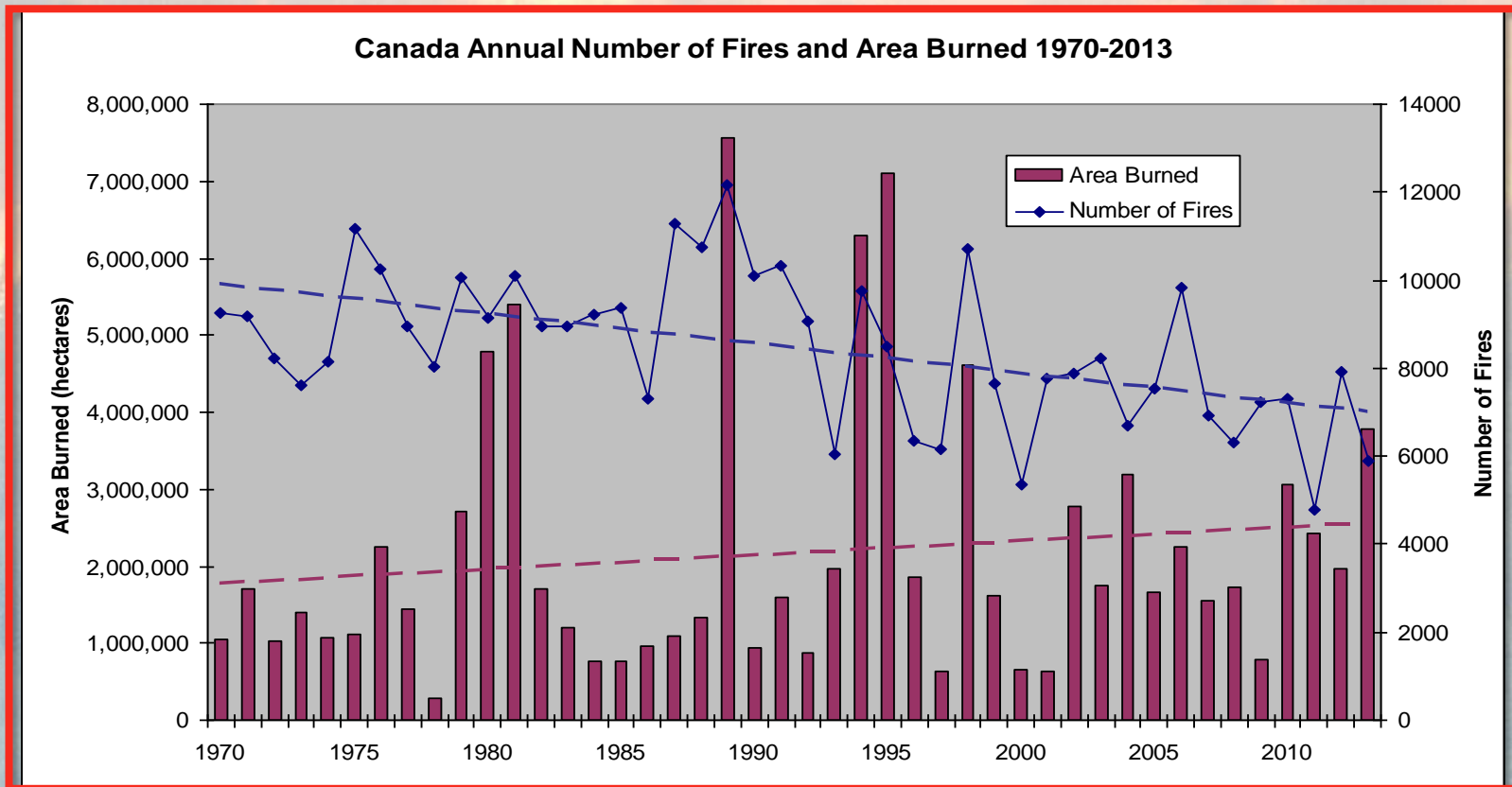
Canadian Fire Activity Trend

- Inadequate data prior to 1970s influences apparent trend in fire numbers and area burned
- Some remote fires post-1970 still not in national database
- Characteristic high interannual variability, particularly in area burned



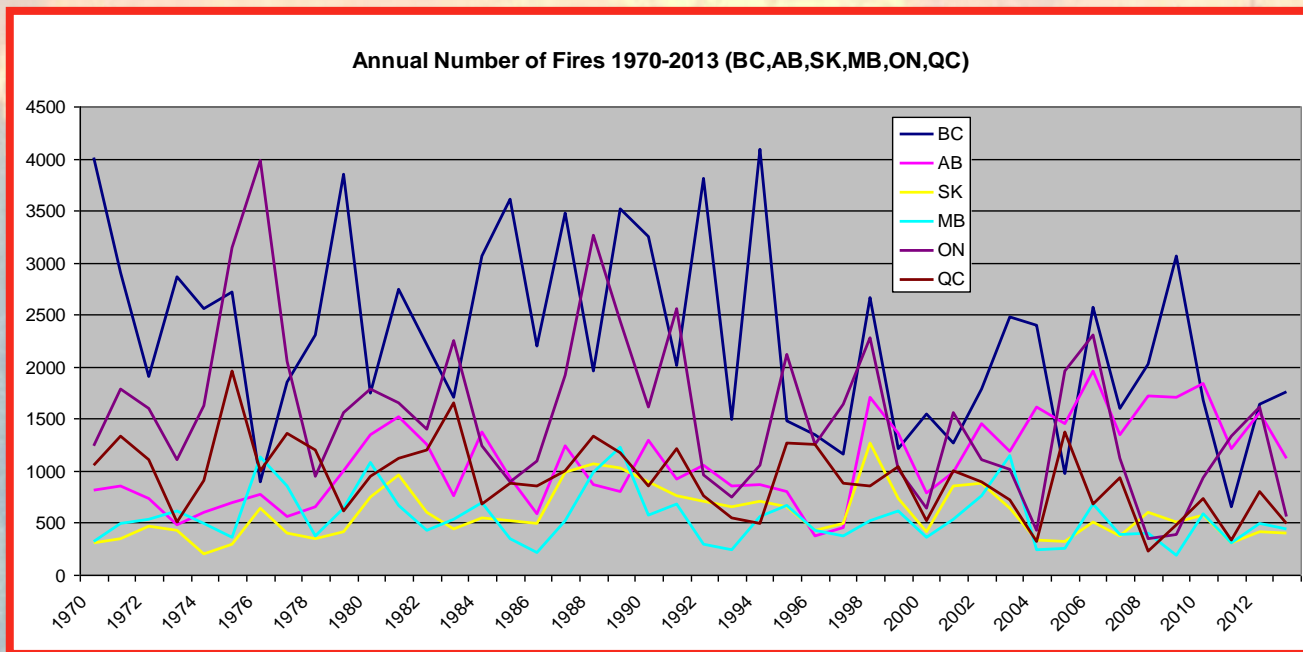
National Trend Post-1970

- Period when fire expenditures rising
- Strongly influenced by large years in early 1980s and mid-1990s



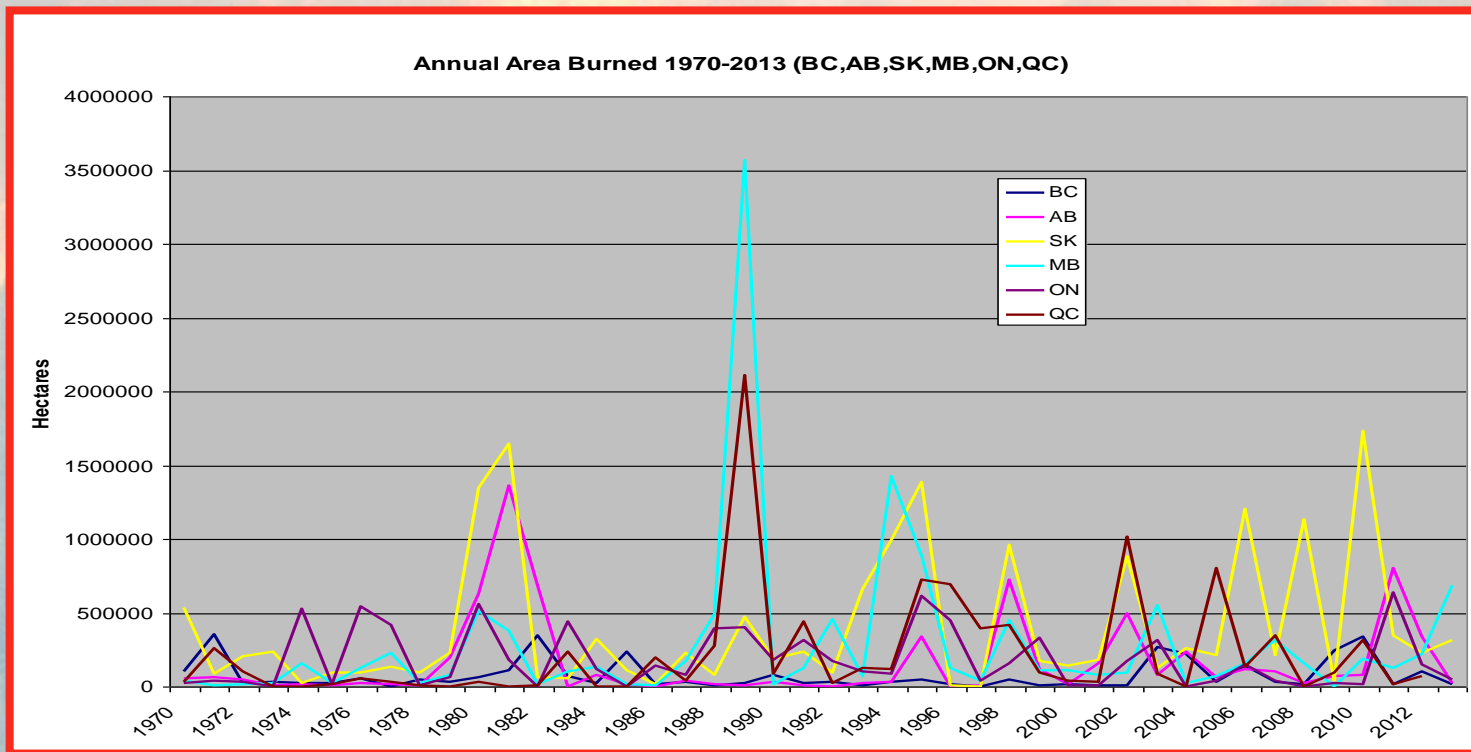
Fire Occurrence Trends – Large Agencies

- Annual numbers quite variable
- Numbers declining in BC, increasing in AB (policy change to include more fires)
- Declining fire occurrence in ON and QC
- No trend evident in SK and MB



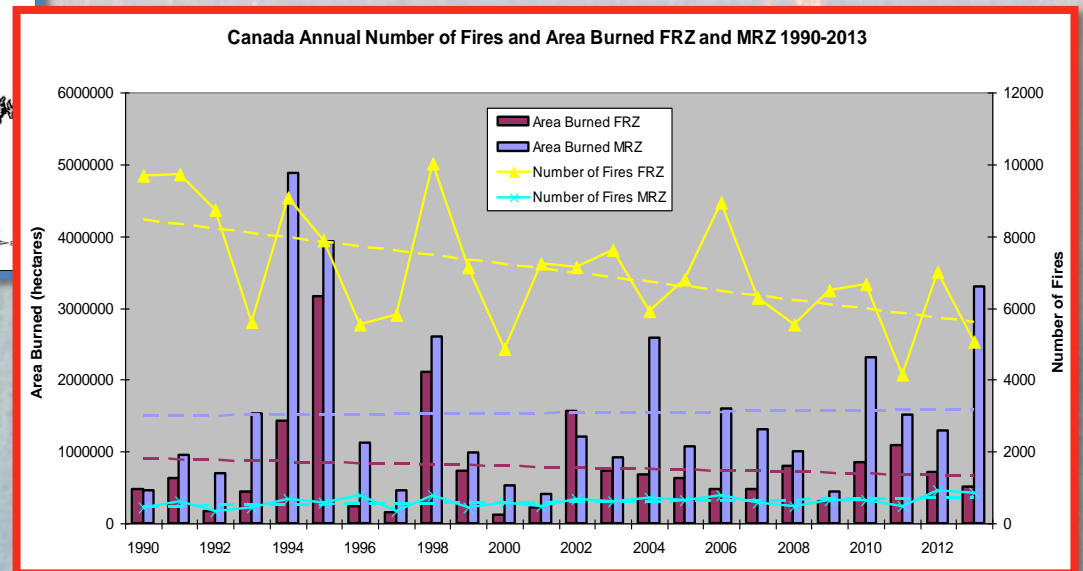
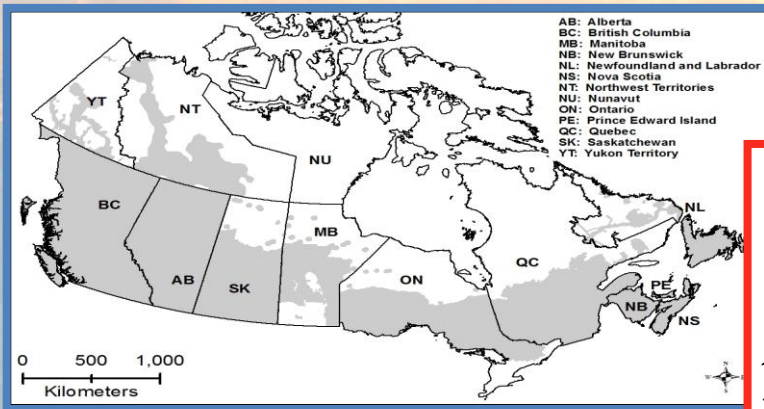
Area Burned Trends – Large Agencies

- Large interannual variability in all agencies with periodic large years
- Increasing in BC, SK in recent years



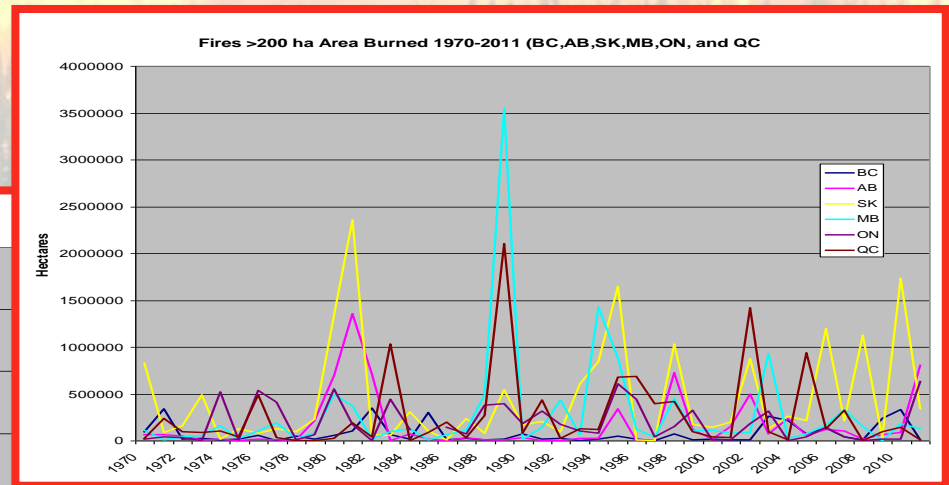
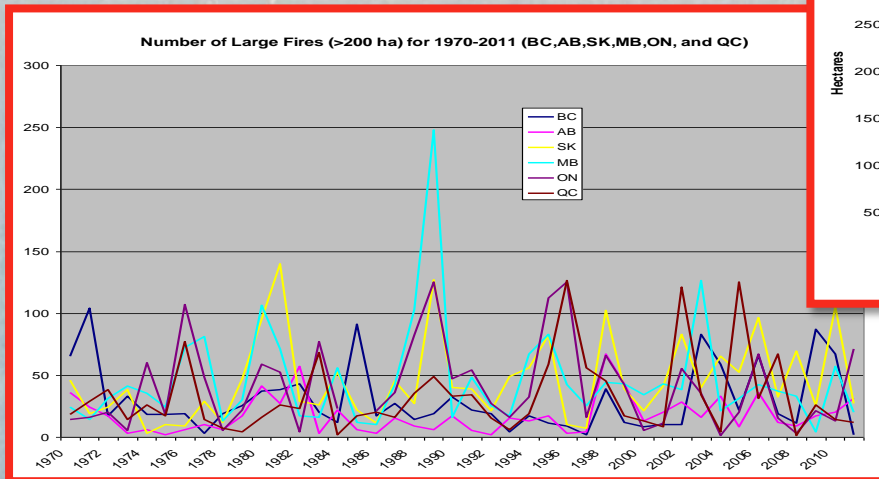
Fire Activity Trends in FRZ and MRZ

- Separated fires in Full Response Zone (FRZ) and Modified Response Zone (MRZ)
- Use CIFFC final annual sit rep numbers
- Area burned not changing in either FRZ or MRZ
- Fire occurrence generally declining in FRZ, relatively constant in MRZ
- MRZ has 6% of fires which account for 66% of area burned



National Large Fire Trend 1970-2011

- Data from National Fire Database (NFDB) maintained by CFS
- Fires > 200 ha (proxy for “project fires”) for six largest agencies
- Both fire occurrence and area burned show large interannual variability
- No trends evident except rising area burned in SK in recent years

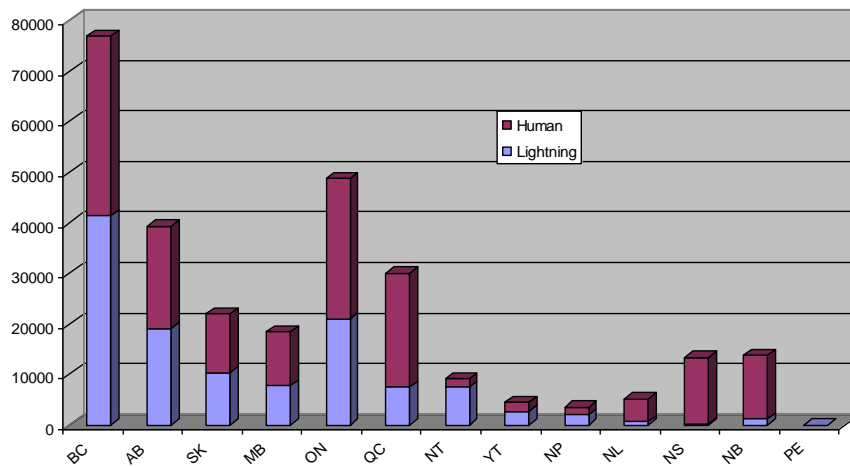


Data courtesy of John Little, NRCan-CFS

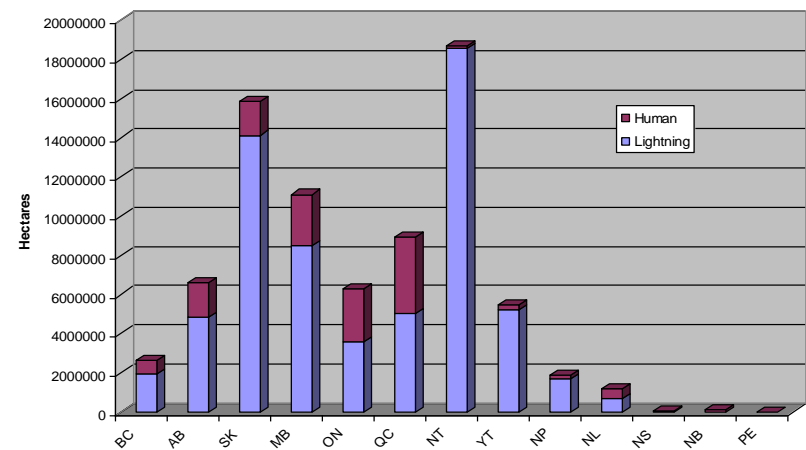
Lightning and Human-Caused Fires by Agencies

- Ratio of lightning to H-C fires roughly similar in largest agencies, with exception of QC and Maritimes, where H-C fires dominate
- Lightning fires generally account for more area burned, most noticeably in NT, YT, SK, MB and NP where more fires burn naturally in extensive MRZs

Total Number of Lightning and Human-Caused Fires by Jurisdiction (1978-2011)

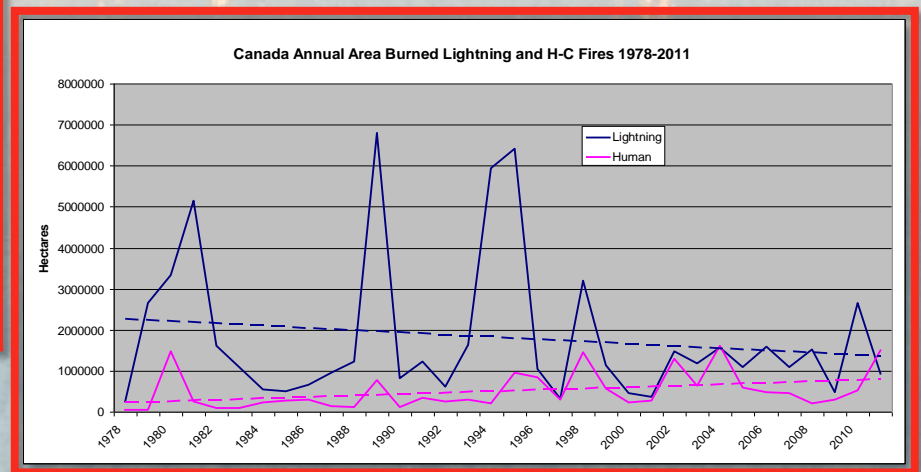
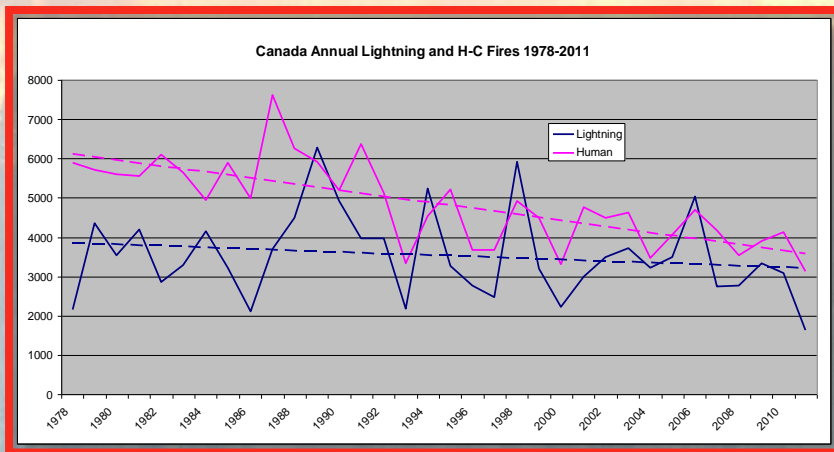


Total Area Burned by Lightning and H-C Fires by Jurisdiction (1978-2011)



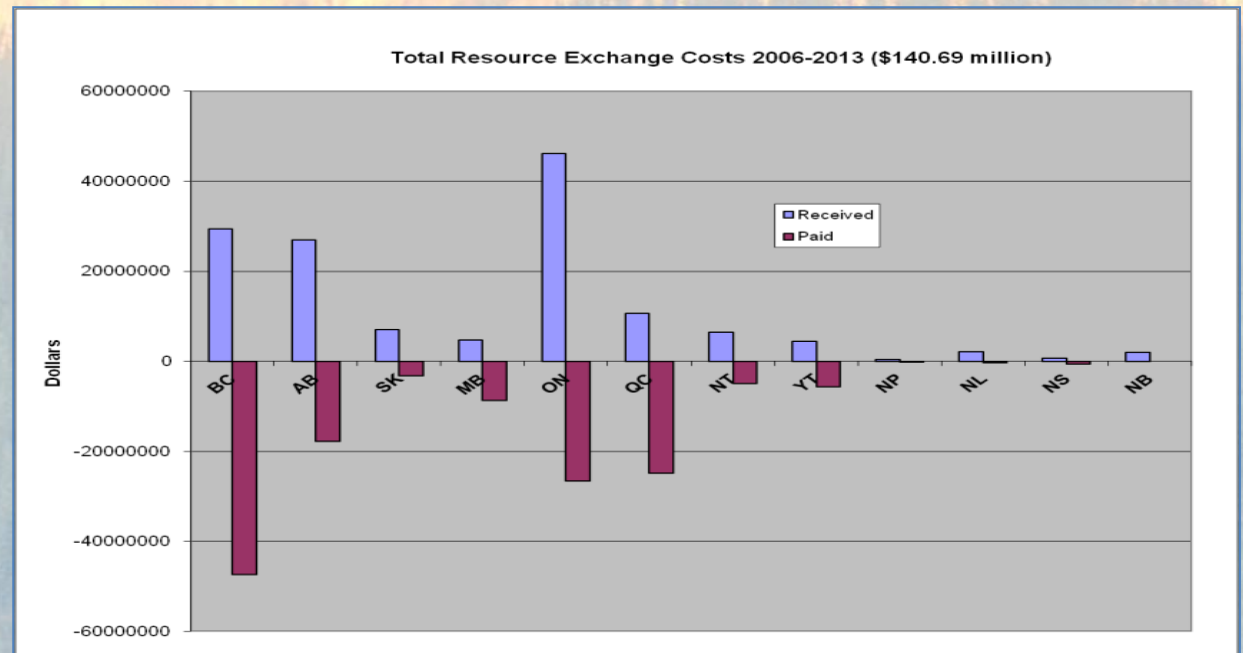
Lightning and Human-Caused Fire Trends 1978-2011

- Trends difficult to discern due to large variability, particularly in area burned
- Downward trend in fire numbers, particularly for H-C fires
- Trends in area burned are slightly downward for lightning fires and slightly upward for H-C fires



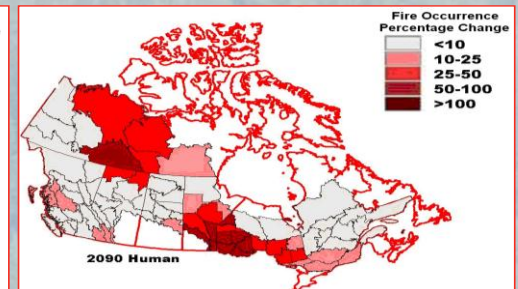
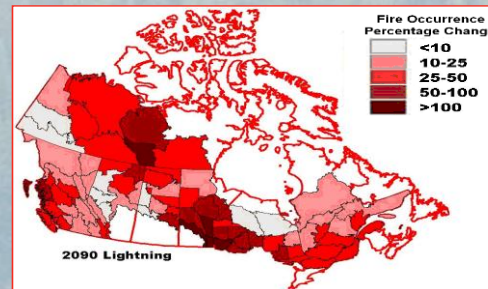
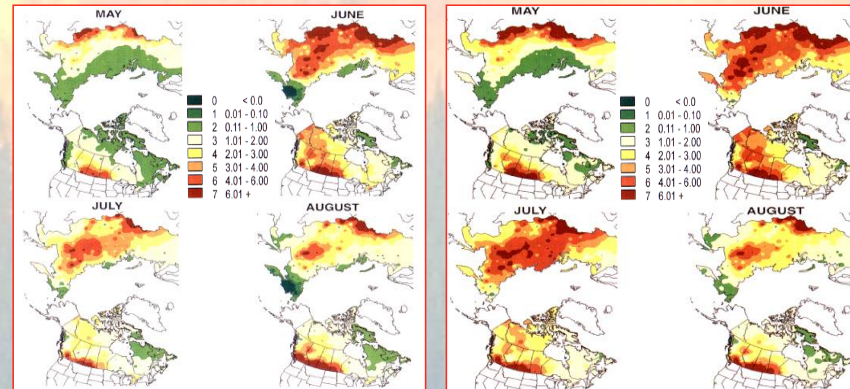
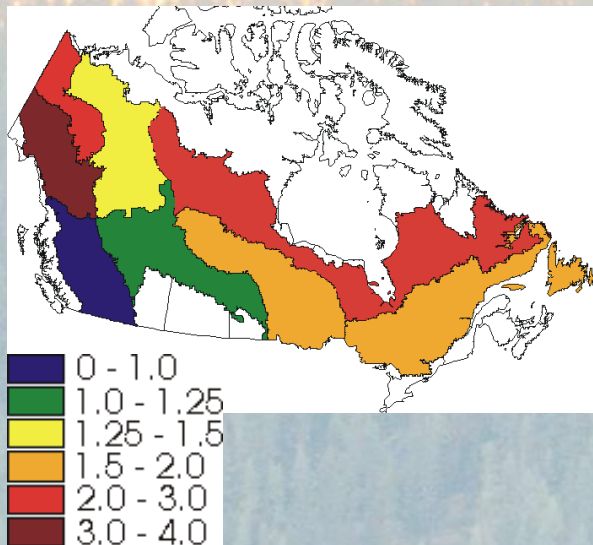
Resource Sharing Costs 2006-2013

- BC, AB, ON and QC have been most active during this period, but all agencies participate
- Annual resource sharing costs ranged from a low of \$6.55 million in 2008 to a high of \$31.46 million in 2009
- Costs averaged \$16.2 million annually for 8-year period (\$140.7 million total)
- Unlikely a major contributing factor to rising national expenditures
 - e.g. 2009: resource sharing costs \$31.5 million, national variable costs \$628 million (barely 5% of total variable costs)



Climate Change and Fire Activity

- Improving models continue to predict increasing fire danger conditions, longer fire seasons, more frequent and intense fires, and increased area burned
- Maintaining current levels of fire management effectiveness a major challenge



So?

- Costs are rising, yet:
- Fire numbers (particularly H-C) and area burned have declined recently
- Large fire numbers are steady
- FRZ and MRZ fire activity is steady
- Projected climate change impacts do not appear to be obvious to date, at least for most agencies
- What is causing costs to rise? – survey of agencies for thoughts.

Operational Perspectives on Fire Load and Rising Expenditures

- All agencies surveyed and asked for input on:
 - Causation of trends in fire occurrence and area burned
 - Changes in protection policies that may have affected number of fires tracked
 - Causation of trends in fire management expenditures
 - Additional trends in changing fire load and resource capacity
- Responses from all agencies
- Feeling that improved prevention activities reducing H-C fire numbers

Operational Perspectives

- Potential causes for rising costs:
 - Rising operational, equipment and infrastructure costs – higher than general rate of inflation
 - Additional costs and pressure from WUI fires
 - Increased accountability under public and political scrutiny
 - Increasing expansion of resource-extraction activities – remote areas, expensive suppression operations when fires occur
 - Fire programs expanding coverage without additional baseline funding
 - Fire agencies becoming more involved in all hazards (e.g. flooding)

Final Thoughts

- Climate change projections of increased fire activity/impacts across Canada not realized to date
- Rising fire management costs indicate change in the fire management environment
- To date, likely driven by:
 - Rapidly rising fire equipment, aircraft and operational costs
 - Rising WUI protection costs
 - Expanding responsibilities geographically and across hazard types
- With CC, more frequent and severe fires in an increasingly severe fire environment
- CDN fire management community must maintain both resource capacity and resource-sharing capability, and anticipate changing fire load.



Thank You

Questions?