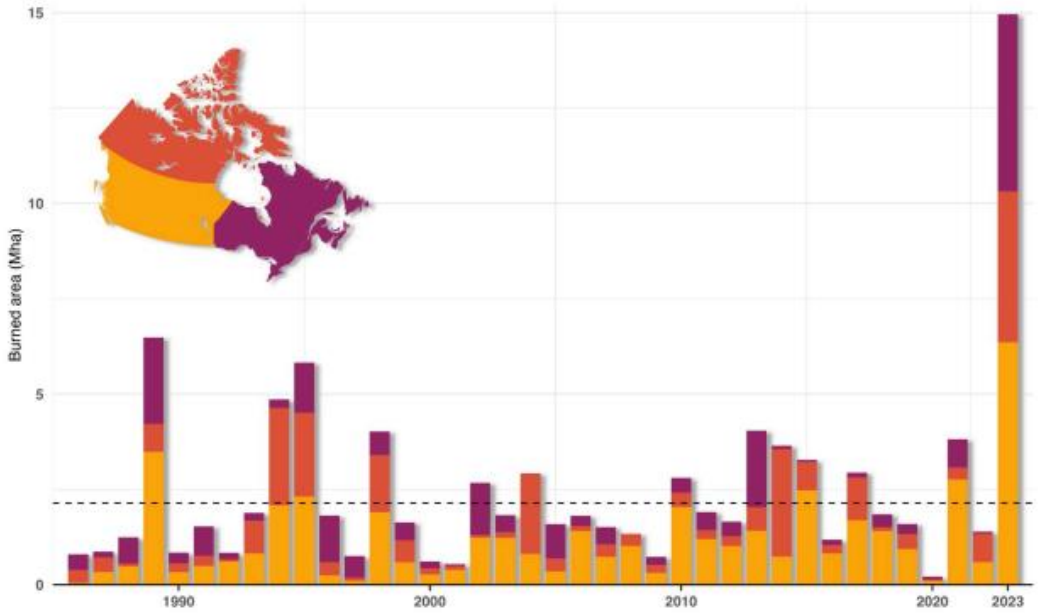
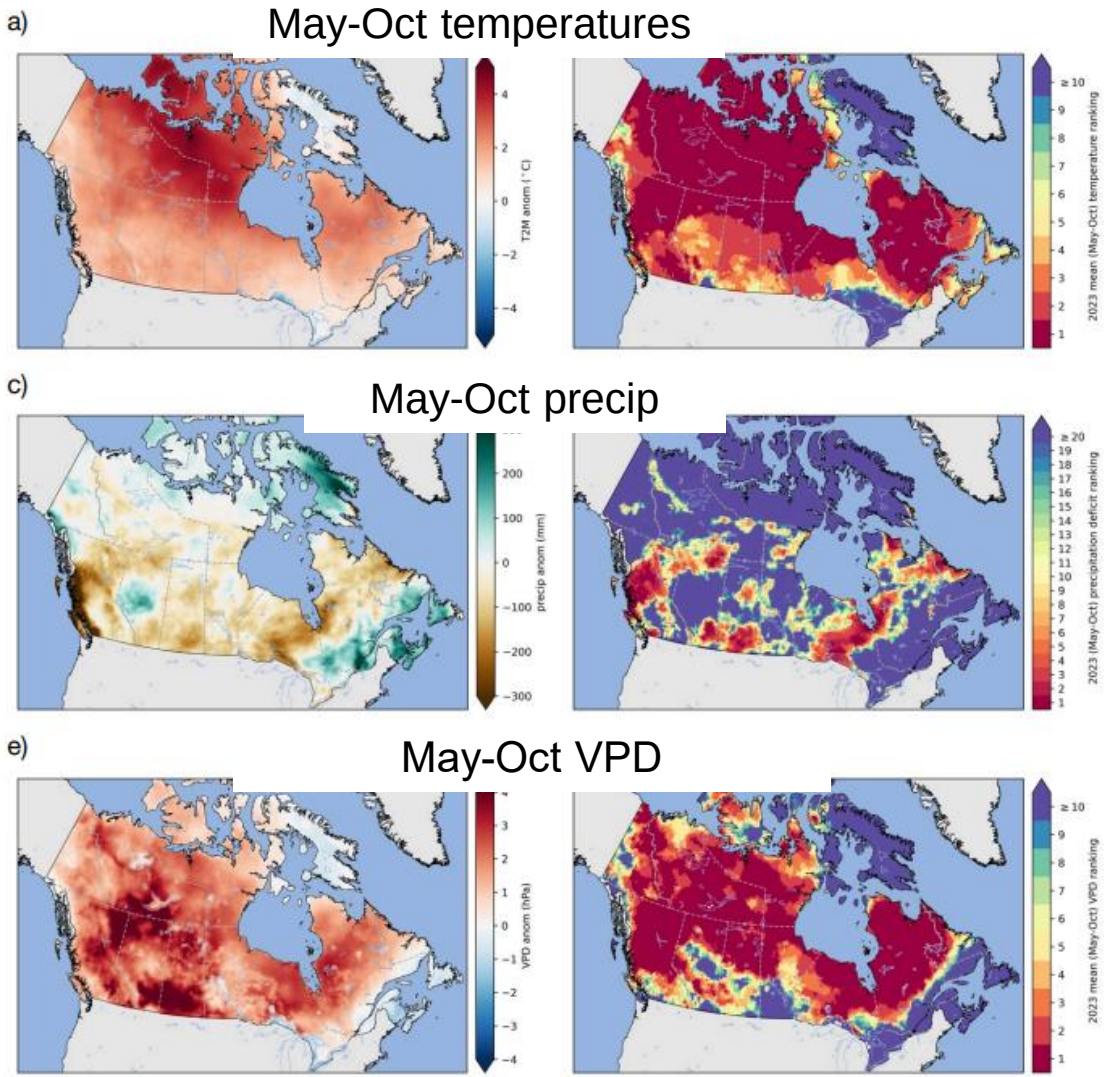
The 2023 wildfire season in Canada: an overview of extreme conditions, impacts, lessons learned and considerations for the future

Yan Boulanger, Natural Resources Canada

April 8th 2024

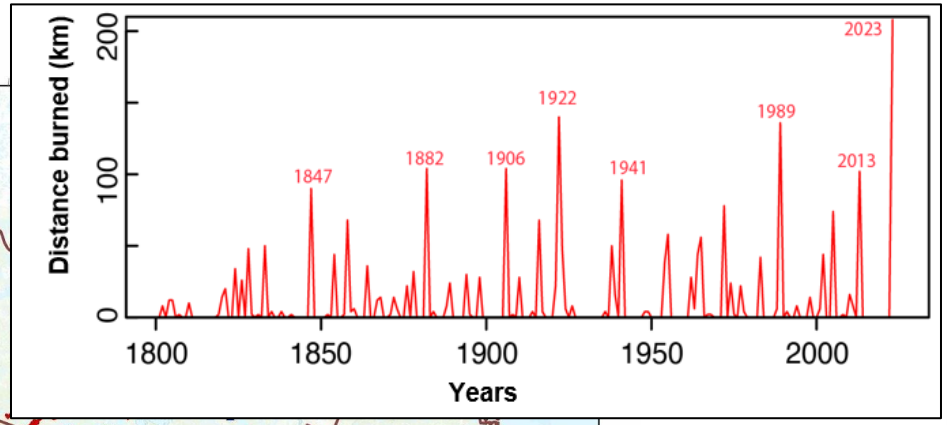
2023, the year of all extremes for forest fires in Canada

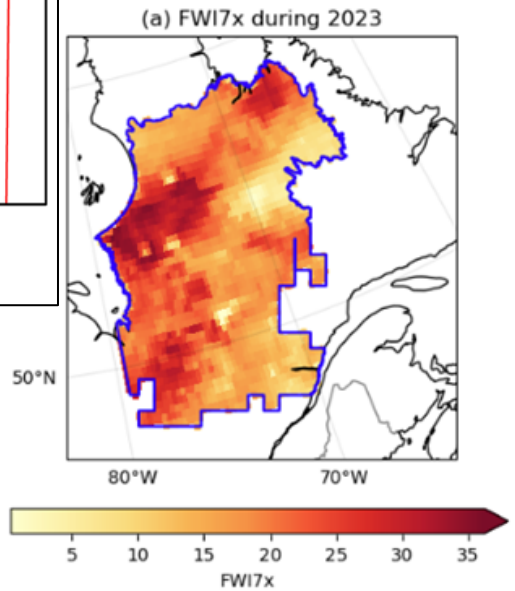


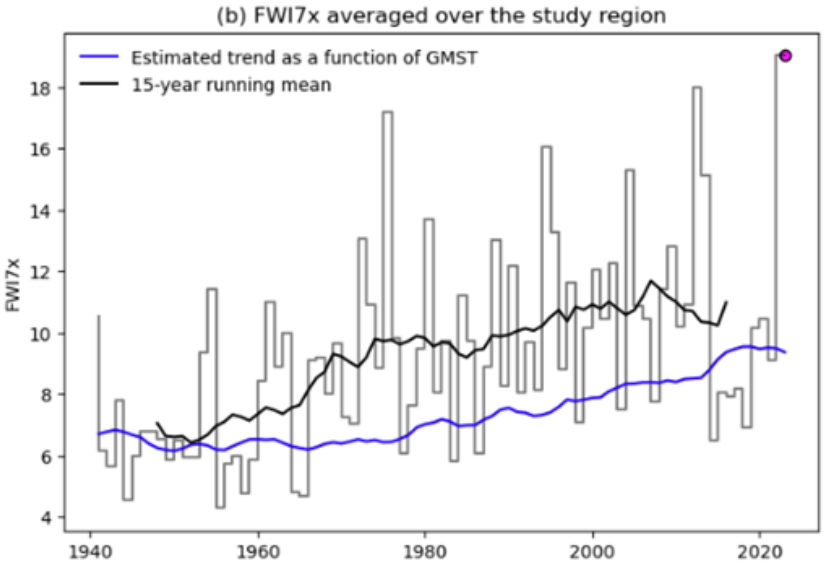


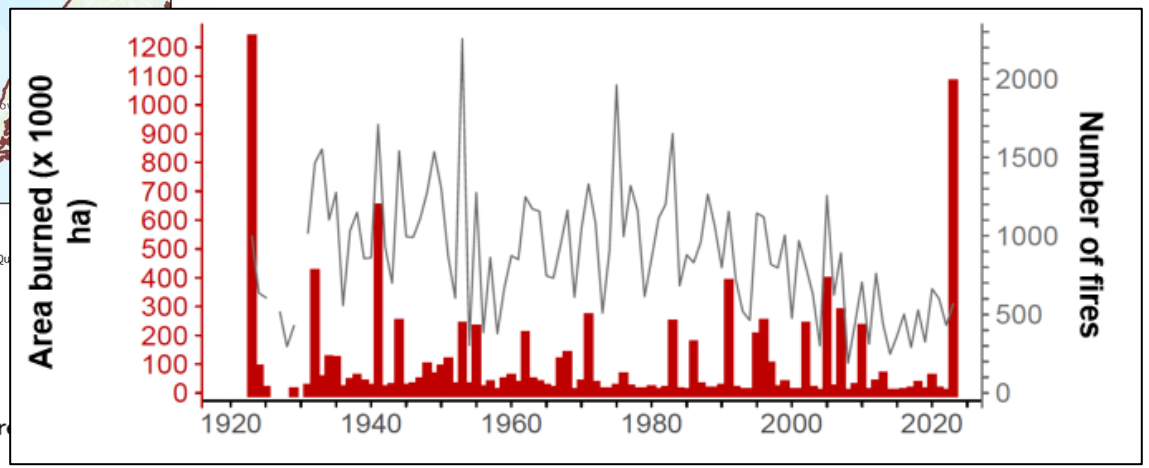
Source: Jain et al., submitted

In Quebec…









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Impacts were tremendous

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Les feux coûteront de 10,5 à 13,5G$ à l'économie québécoise

Feux de forêt : la localité de Radisson sous ordre d'évacuation

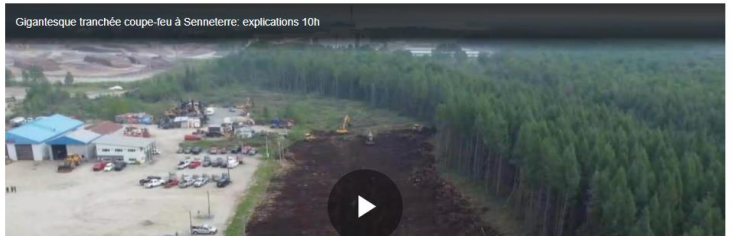
Six mois après les feux de forêt historiques, des municipalités encore bouleversées

Les feux de forêt causent de nouvelles pannes d'électricité dans la région de Montréal

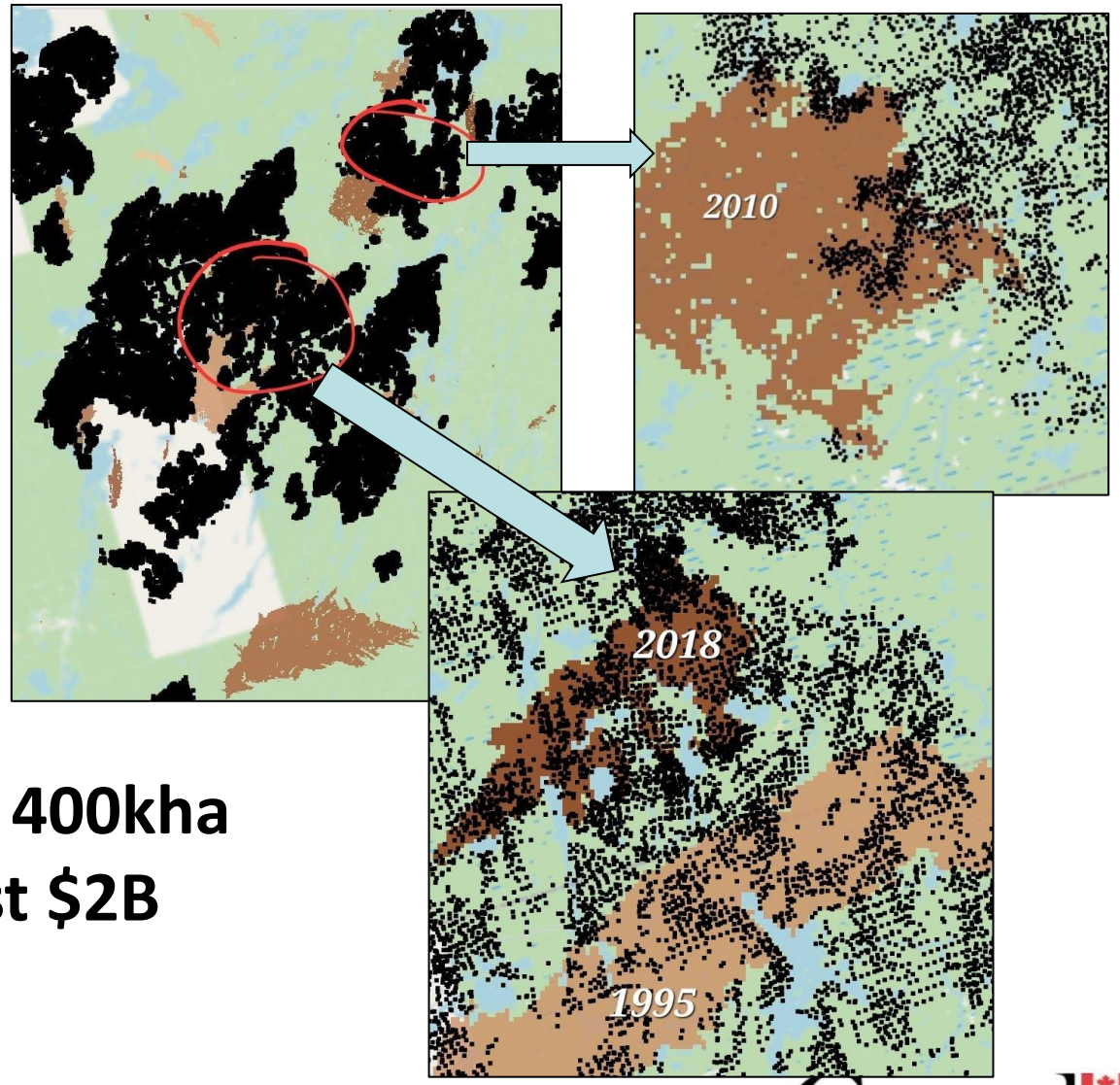
[Accueil] / [Société]

le journal de québec

EN IMAGES | Gigantesque tranchée coupe-feu à Senneterre

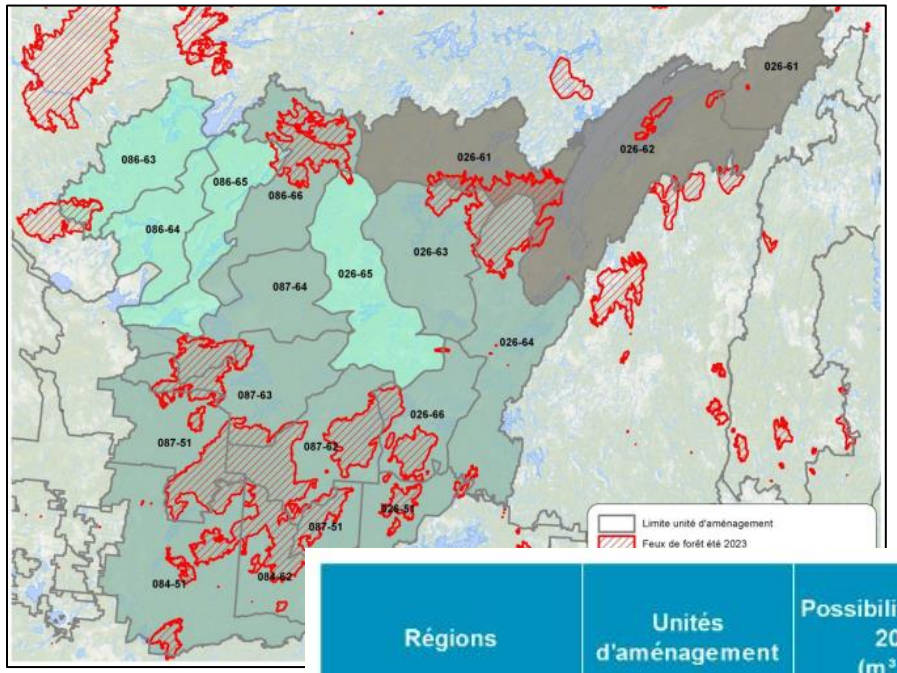


Impacts on forest sector: 1) Regeneration failures



2023: 300 – 400kha
Could cost $2B

Impacts on forest sector: 2) Sharp decrease in AAC



Régions	Unités d'aménagement	Possibilités forestières 2023-2028 (m³ bruts/an)	Effet des feux	
			%	m³ bruts/an
Nord-du-Québec	087-62	263 200	-95%	-249 200
Nord-du-Québec	087-63	347 900	-47%	-163 700
Abitibi-Témiscamingue	084-62	262 600	-31%	-82 600
Nord-du-Québec	087-64	270 600	-29%	-78 300
Nord-du-Québec	087-51	524 400	-21%	-110 500
Nord-du-Québec	026-66	178 800	-20%	-35 300
Nord-du-Québec	086-66	156 100	-19%	-29 400
Nord-du-Québec	026-61	149 000	-11%	-16 200
Nord-du-Québec	026-62	104 800	-8%	-8 000
Mauricie	026-51	193 400	-7%	-12 700
Nord-du-Québec	026-64	354 900	-6%	-22 600
Nord-du-Québec	026-63	114 300	-5%	-5 700
Abitibi-Témiscamingue	084-51	734 300	-5%	-35 700
Total		3 654 300	-23%	-849 900

Landscape productivity

−

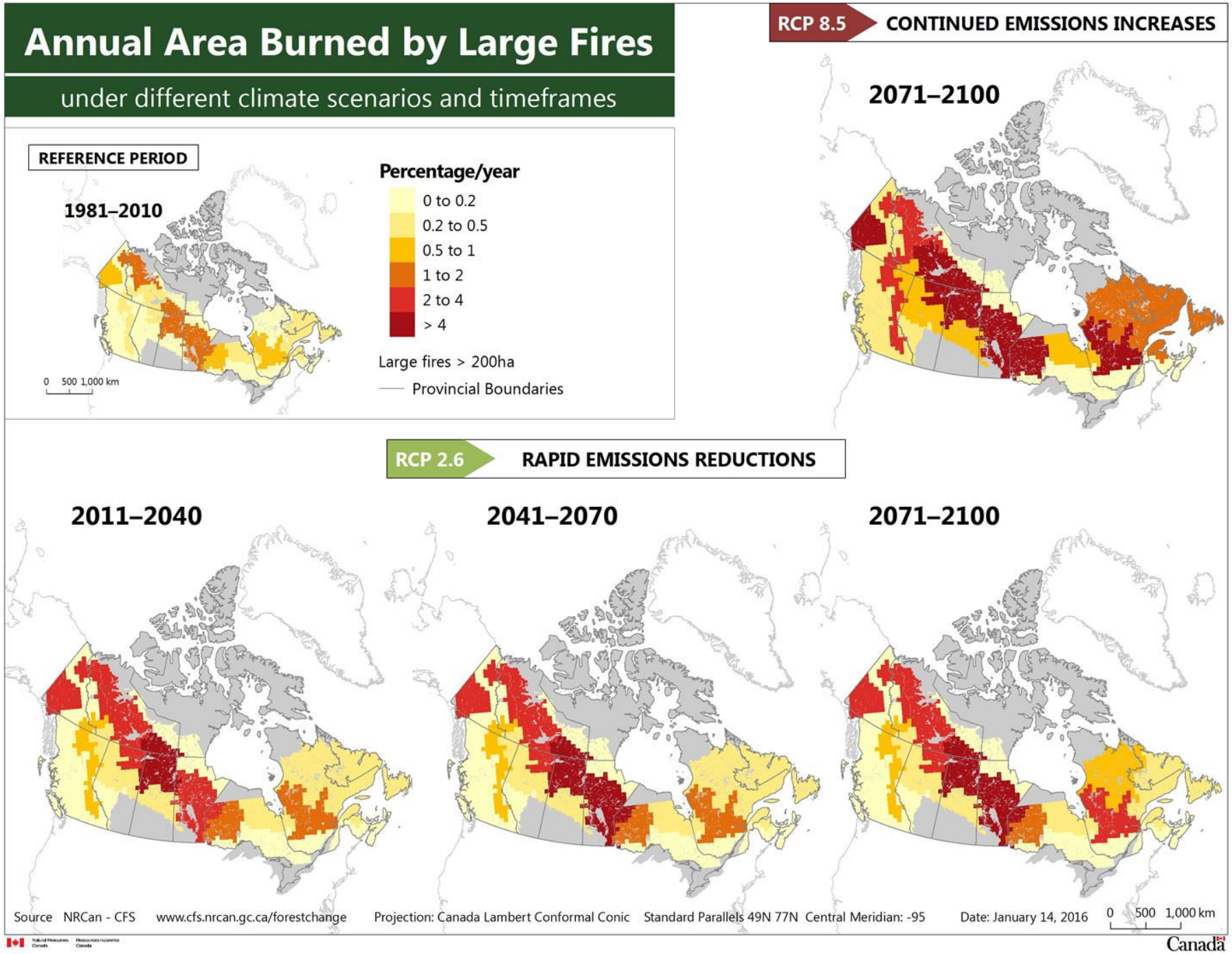
Fires

Sustainable harvest

=

Impacts on forest sector: 3) Salvage logging

- ~ 5.2M m^3 salvaged in 2023
- Only 10-15% of burned areas can be salvaged



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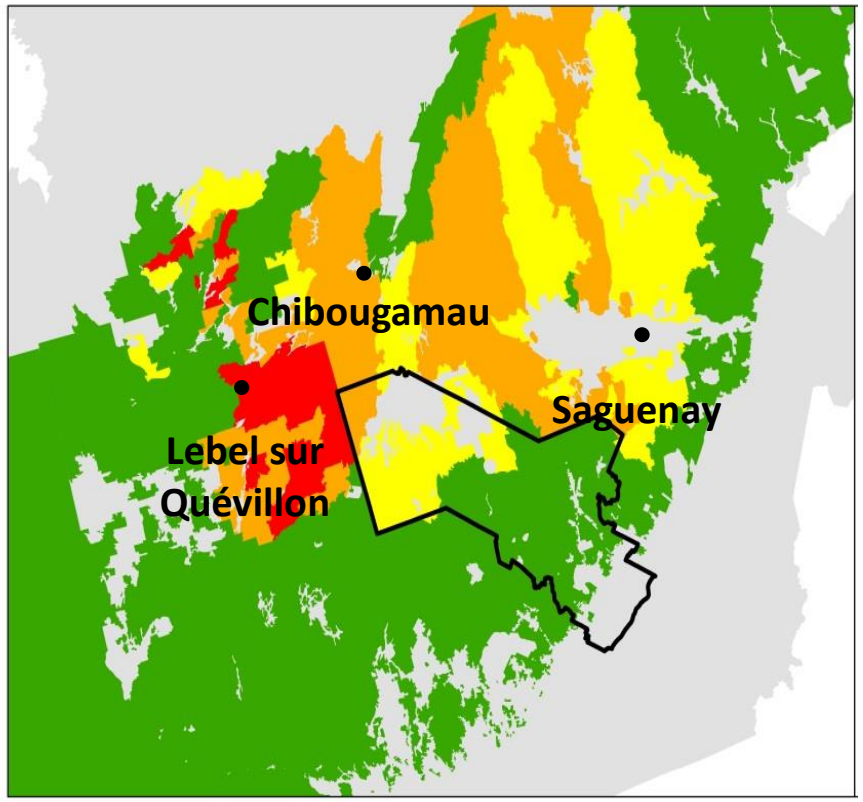
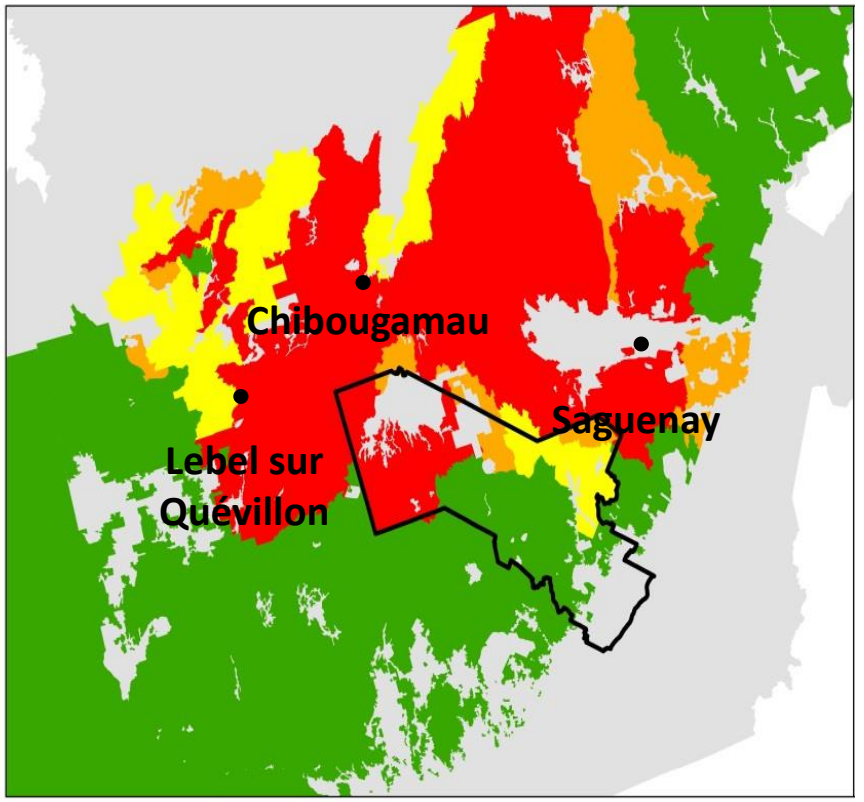
If harvesting rates remain unchanged, some regions will become much more vulnerable to increased fire
Harvesting rates too high considering forest productivity and fires

RCP 8.5

2025



2085



Vulnerability
- Low
- Moderate
- High
- Extreme

Gauthier et al. 2015

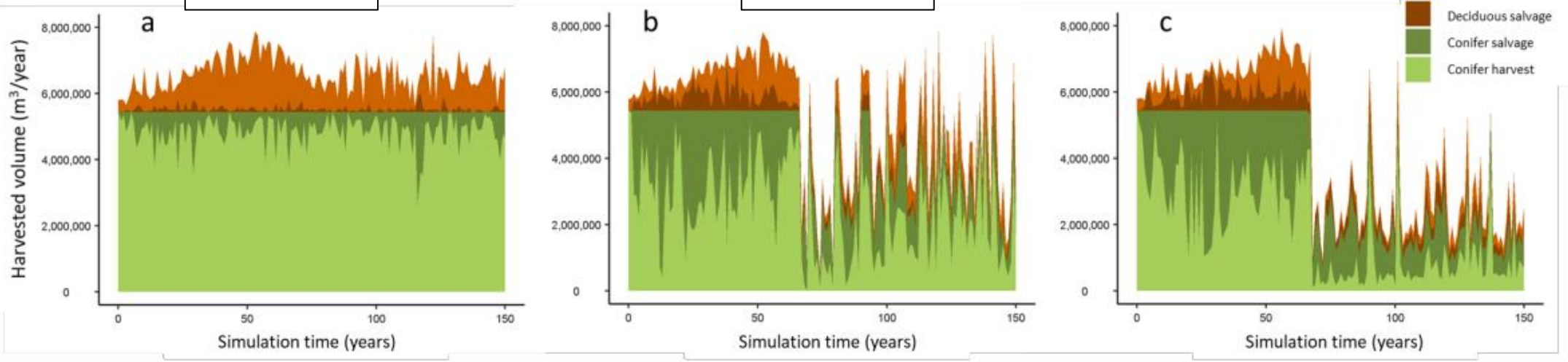
Solution 1) Lower harvesting rates to avoid frequent and prolonged shortages

Baseline

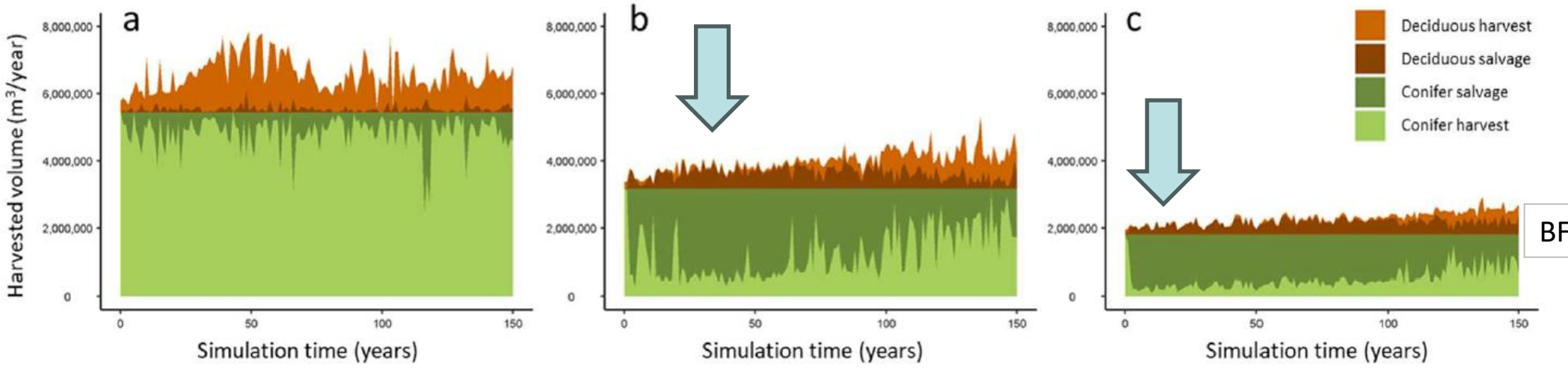
RCP 4.5

RCP 8.5

W/O adjustment



With adjustment



BFEC 2021

Solution 2) Nature-based solutions to increase forest landscape *resilience*

E.g. : Variable retention

E.g. : Pyrophilous species

Avoid i) large costs associated with postfire forest management and ii) having too young landscapes

Planting regeneration failures: at what cost?

Cyr et al. 2021

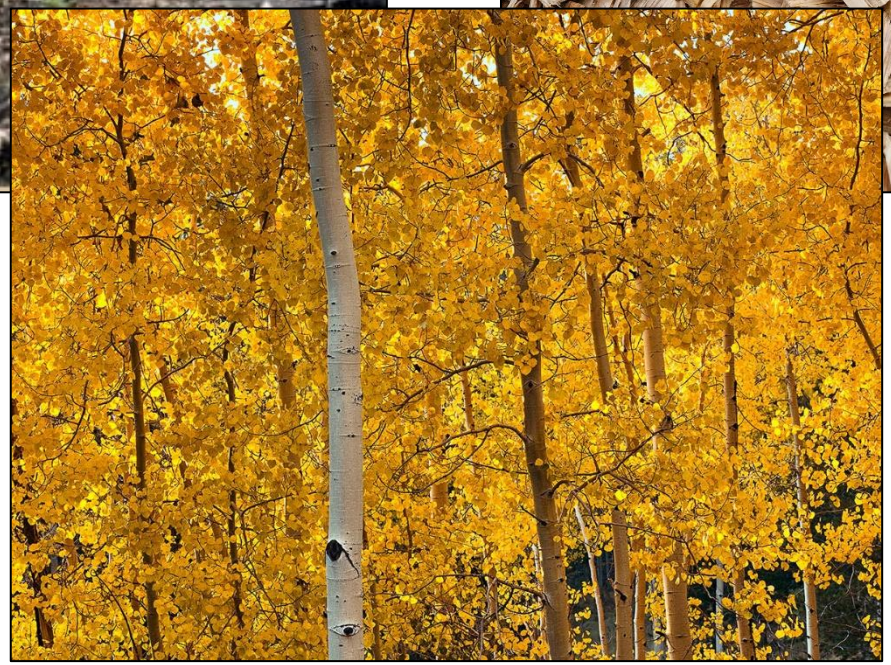
- Operational capacity limited in time
- Plantation: 50-60kha per year maximum
- Nursery capacity?
- Plantation yields to be reviewed (Barrette et al. 2024)
- 2023: 80kha of plantations burnt down
- Assisted migration?

The solution that generates the most volume may actually be less profitable under CC

Solution 3) Make forests more *resistant* to fire

- Deciduous more resistant than coniferous
- **BUT:**
  - Far from being the panacea
  - Protective abilities less important in severe weather
  - Operational capacity limited (~1% per year)
  - Cannot (and should not!) grow everywhere
  - Interesting to protect communities, infrastructures, forest investments (plantation?)

4) Make the industrial forest sector more resilient to disturbances



5) Increase wildfire suppression capacity?

- 2023: tanker capacity capped at around 3,000 hours
- Limited intervention in overflow situations
- Aging fleet, shortage of qualified pilots
- Proactive management to place resources in the right place at the right time
- Workload expected to increase with climate change

Status quo is untenable, adaptation is necessary

- **Climate change and wildfire impacts**
  - Challenges heightened by climate change and increased fire activity.
  - Integrated approach needed to maintain forest health and services.
- **Political and Resource Challenges**
  - Action implementation depends on political decisions and resources.
  - Inaction could result in higher societal and economic costs.
- **Risk Assessment and Mitigation**
  - Immediate and long-term actions necessary
  - Redefine forestry practices for better ecosystem resistance and resilience
- **Holistic Management Strategy**
  - Emphasis on integrated risk management and early-warning systems
  - Aim to improve prediction, prevention, and response to forest fires