



Increasing Threats of Mega-fires on the WUI Communities of Canada

Nirmal Subedi, Steve Taylor and Brian Peter

Industry Trade & Economics Research Program
Natural Resources Canada/Canadian Forest Service

Wildland Fire Canada 2016
Building Resilience Conference Kelowna, BC





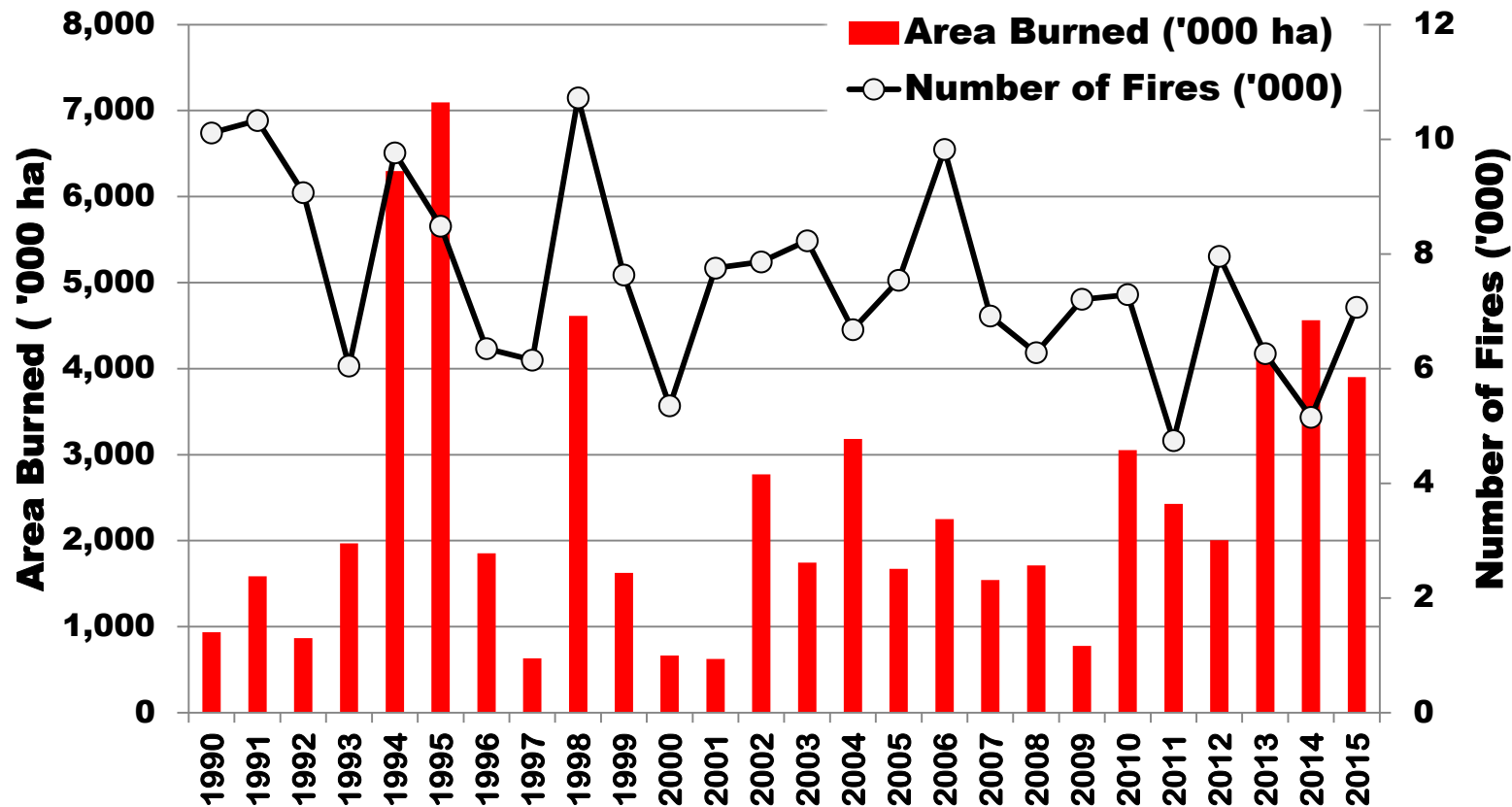
Outline

- ❖ Overview of Wildfire Disturbances
- ❖ Large Fire Events
- ❖ Catastrophic Wildfire Events
- ❖ Closer Look at a Few Mega-Fires
- ❖ A risk-based approach for wildfire management
- ❖ Challenges and Opportunities
- ❖ Wrap up





Wildland Fire - Canada

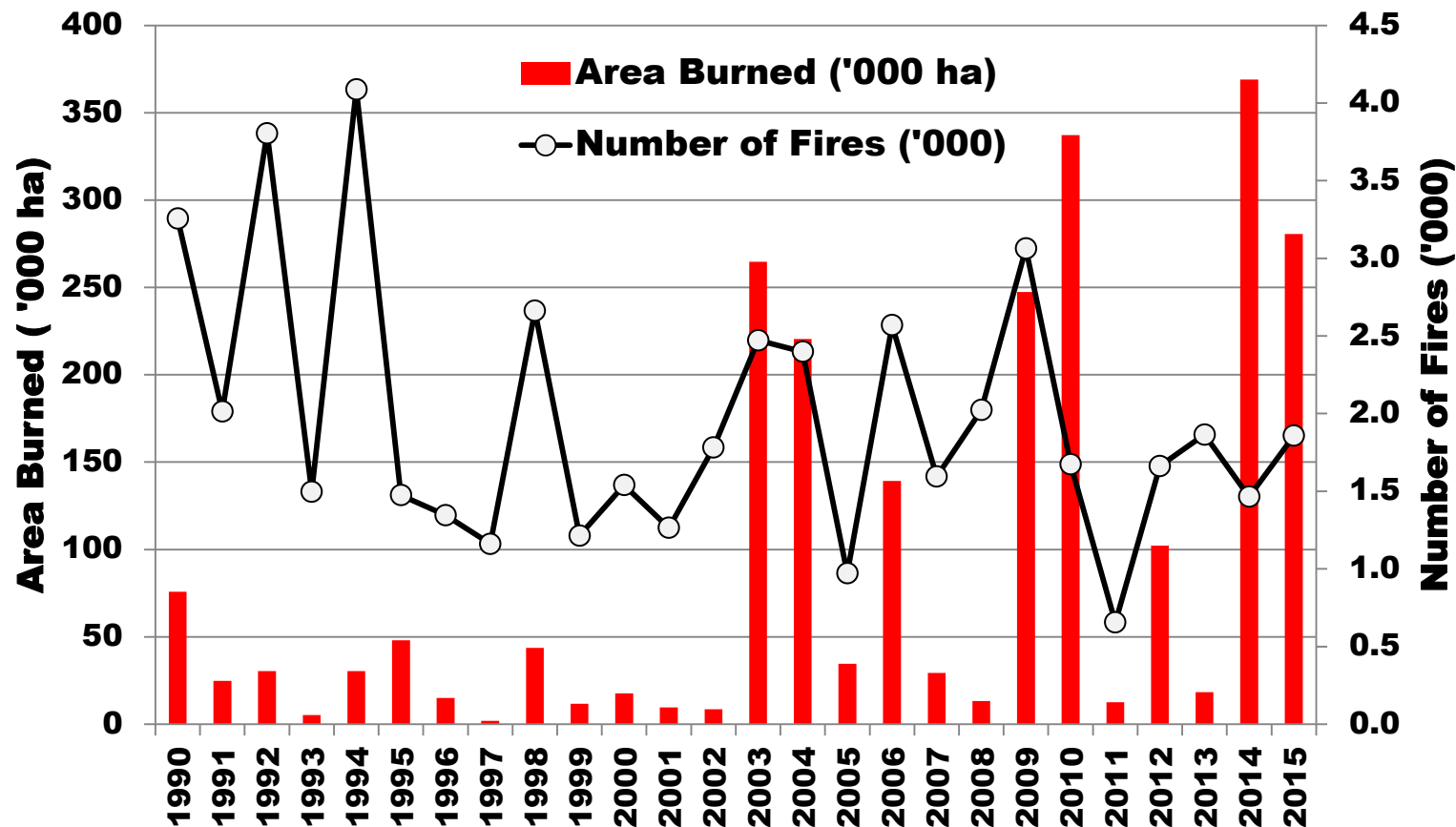


Source: Canadian National Forestry Database





Wildland Fire in BC, Canada

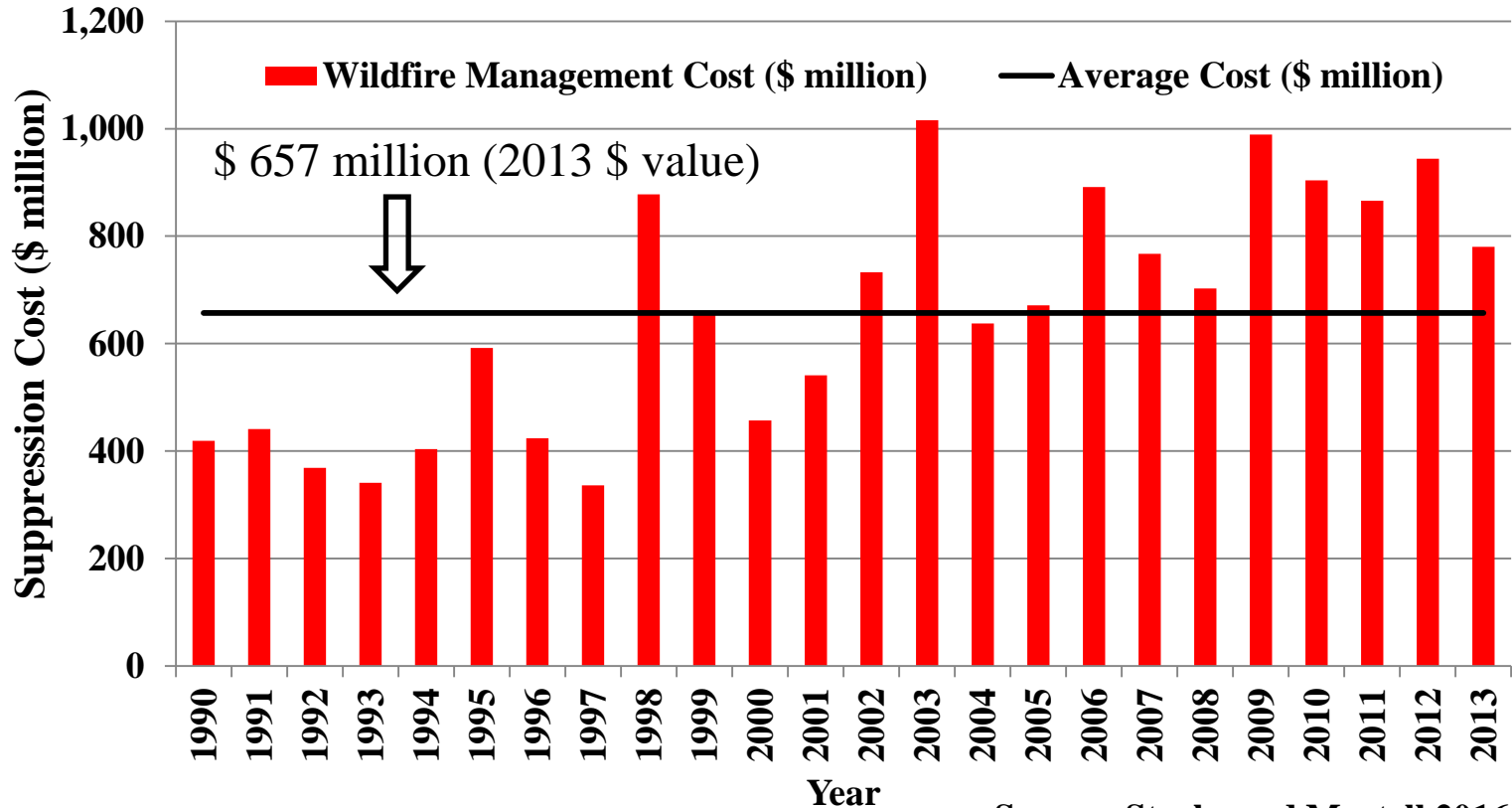


Source: Canadian National Forestry Database





Wildfire Management Cost

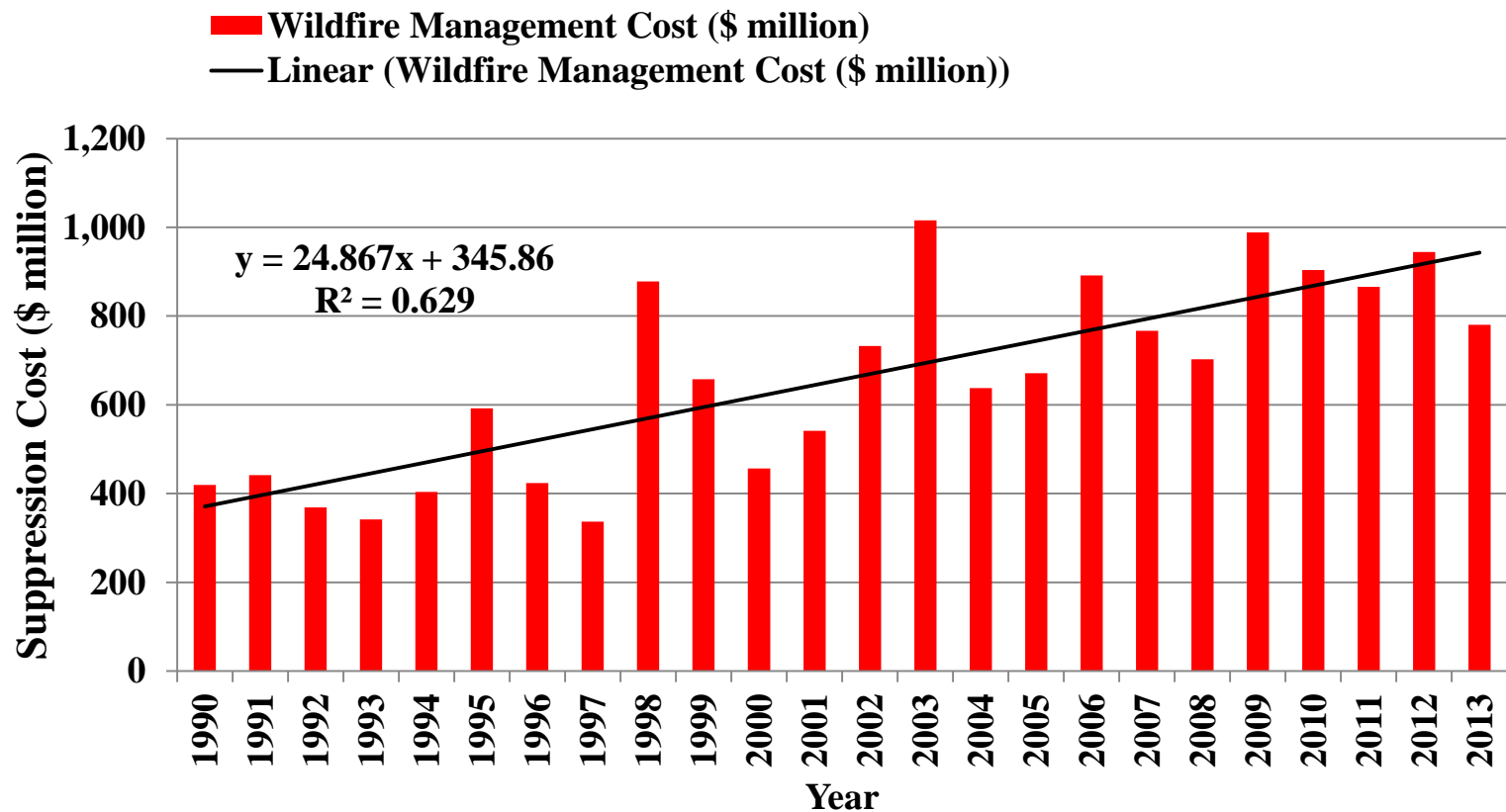


Source: Stocks and Martell 2016



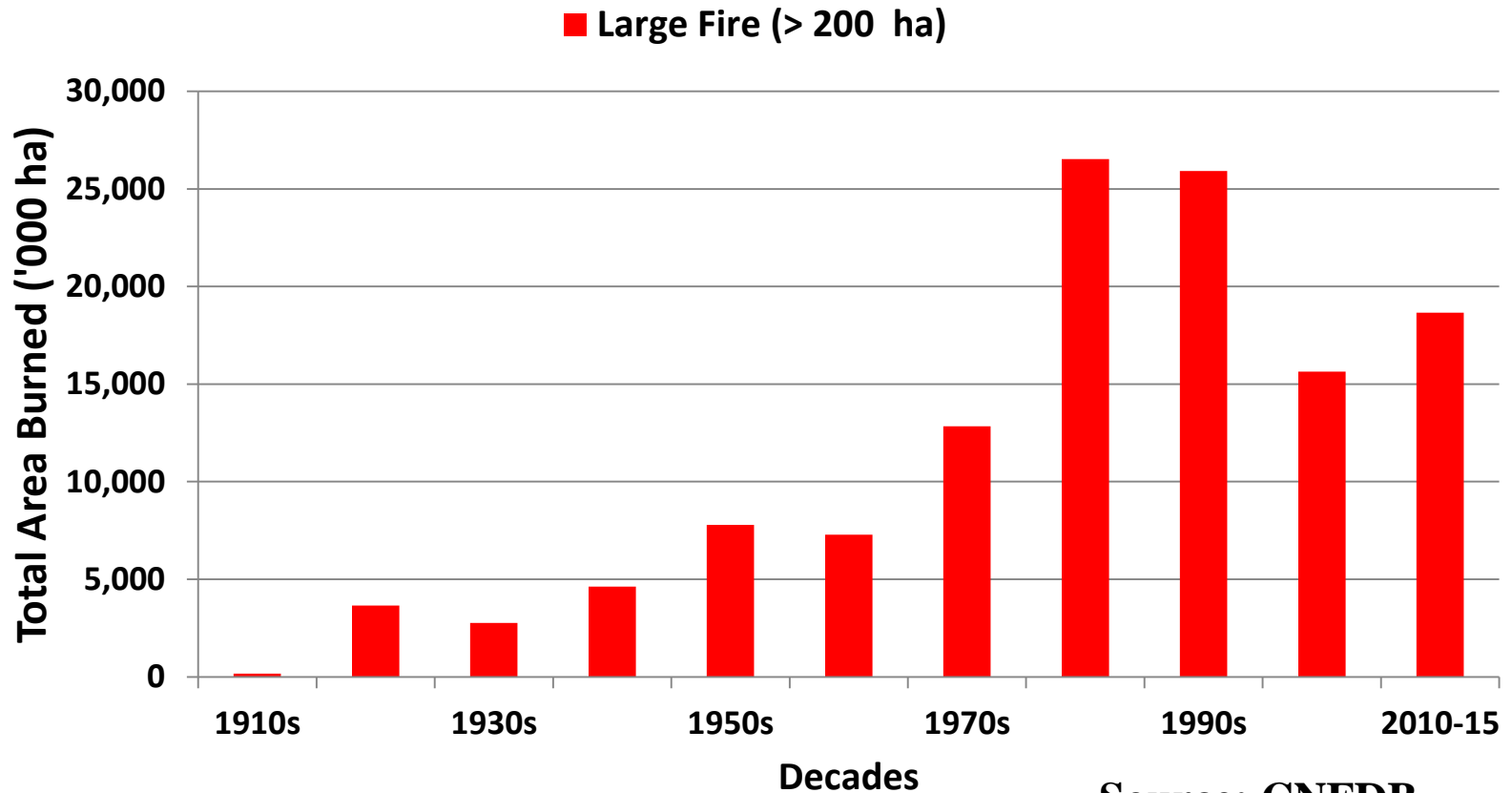


Wildfire Management Cost





Large Fires



Source: CNFDB





Canadian Wildfire Disaster

A disaster happens when a **hazard** [such as wildfire] **intersects with a vulnerable community** [e.g. WUI community] and **exceeds or overwhelms the community's capacity to cope** and may result into **serious harm to the public safety, health, property, values, assets, and well being of community.** (Public Safety Canada, 2011)

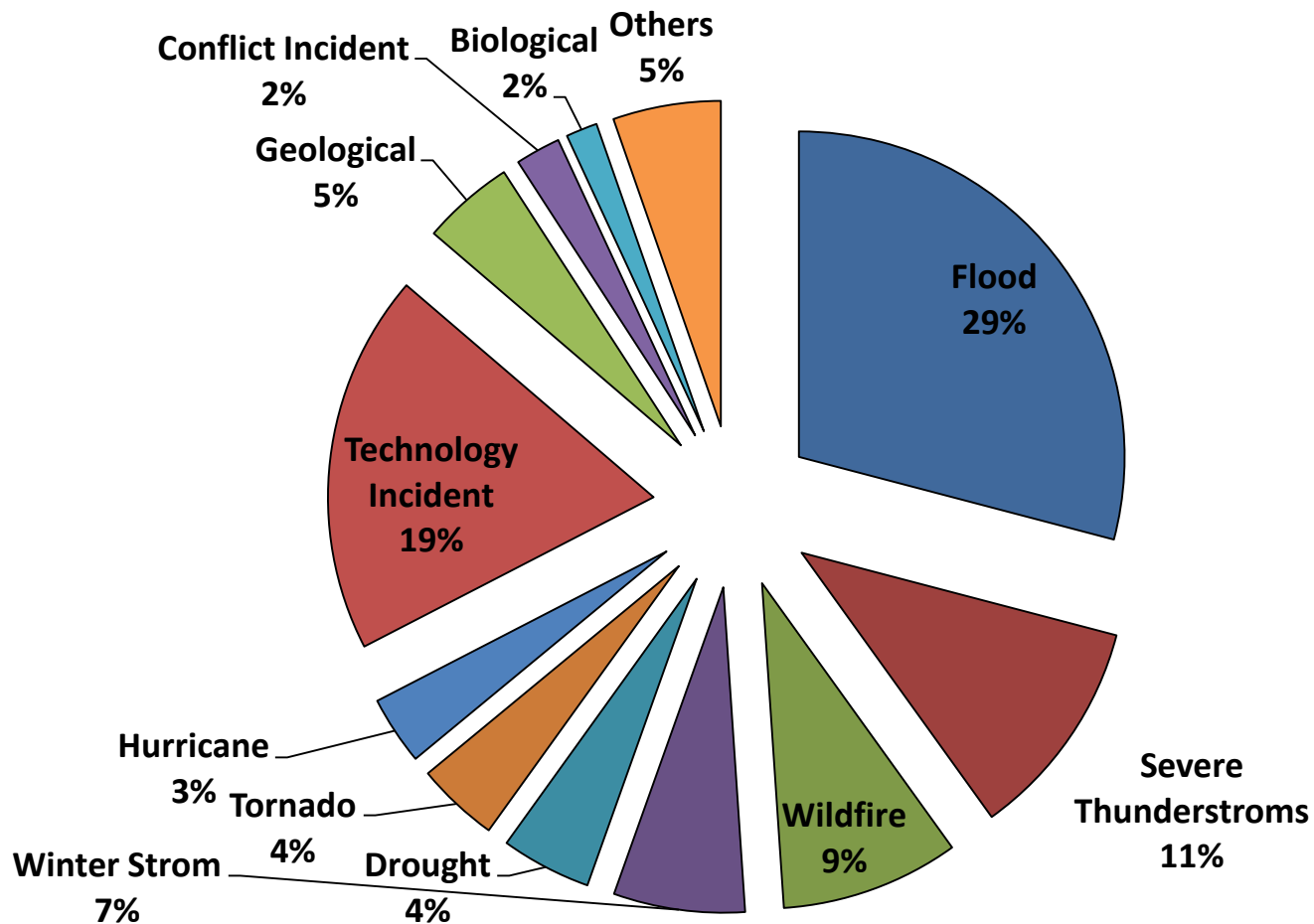
Public Safety Canada defines “**a significant disaster**” when it causes:

- ❖ 10 or more **loss of lives**
- ❖ **100 or more individuals** affected / injured / evacuated or became homeless
- ❖ A situation that lead to **appeal for national/international assistance**
- ❖ **Historical significance** (unprecedented)
- ❖ Significant **damage / interruption of normal processes beyond resilience**





Canadian Disasters Events (1900-2014)



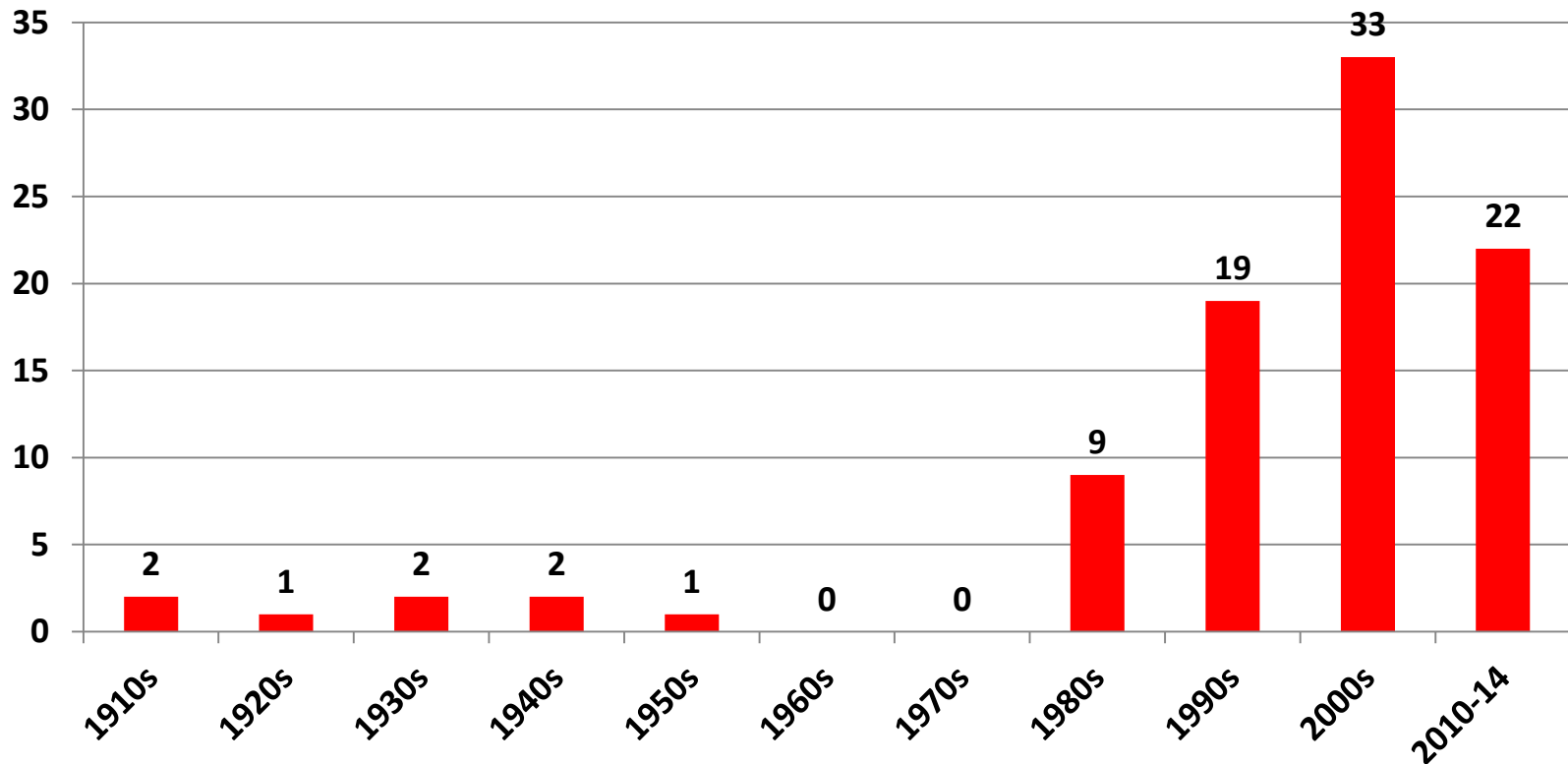
Source: Canadian Disaster Database, PSC





Trend of Wildfire Disaster

Number of Wildfire Disasters

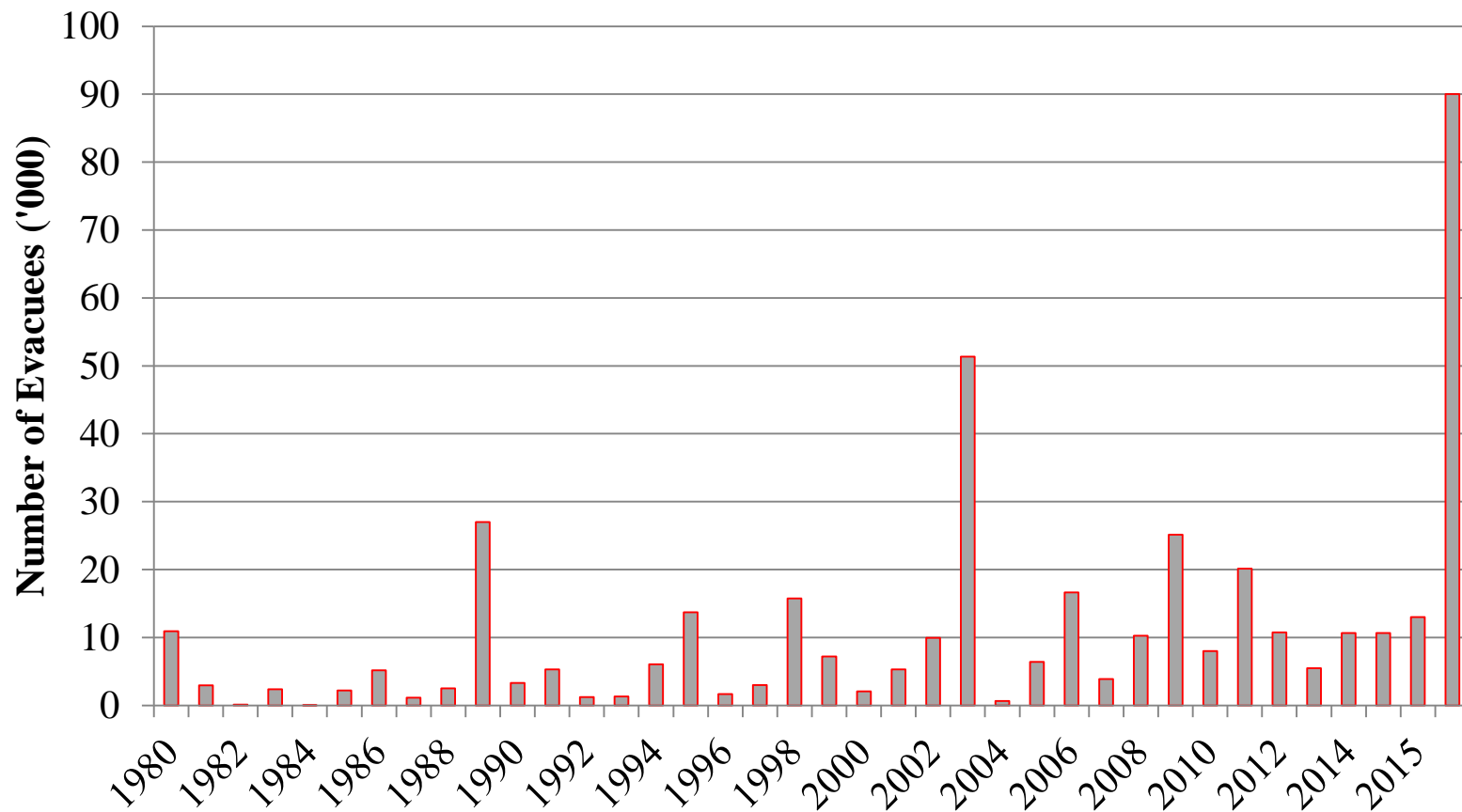


Source: PSC Canada





Evacuation- Wildfire Disasters

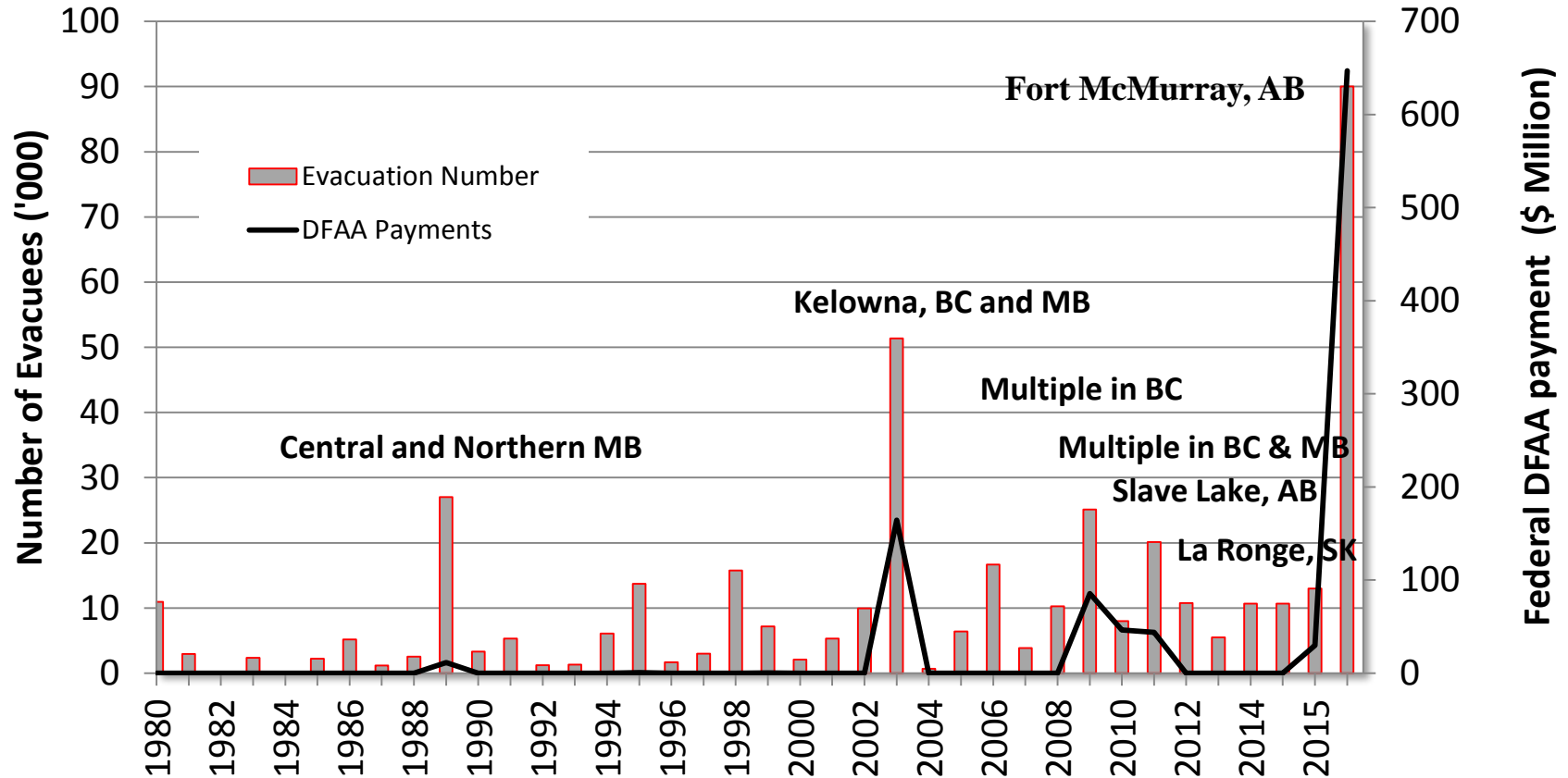


Source: (CIFFC Data, Per. Comm. Erin Naydenov Feb 2nd, 2016)





Wildfire Disasters and Federal Assistance

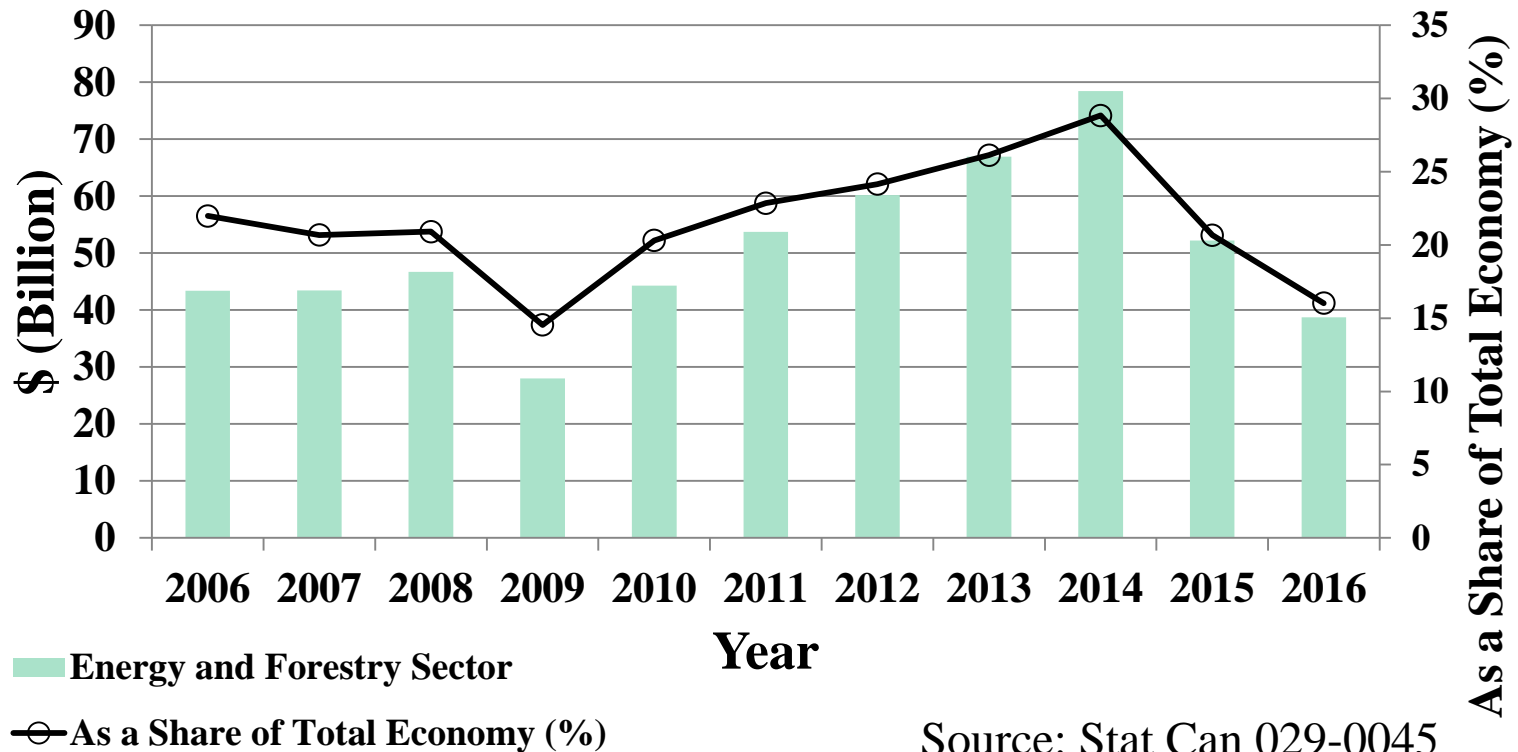


Source: (CIFFC Data, Per. Comm. Erin Naydenov Feb 2nd, 2016)
DFAA- Disaster Financial Assistance Arrangements, PSC





Energy and Forest Industry- Capital Investment





Mega-fires



Mega-fires ‘refer to those events that cause catastrophic damages in terms of human casualties, economic losses, or both’. (San-Miguel-Ayanz et al 2013)

“Mega-fire is more of a concept than a construct. What I interpret it to mean is not only is it large, but it affects a lot of people.”

Robert Keane, USDA-Forest Service

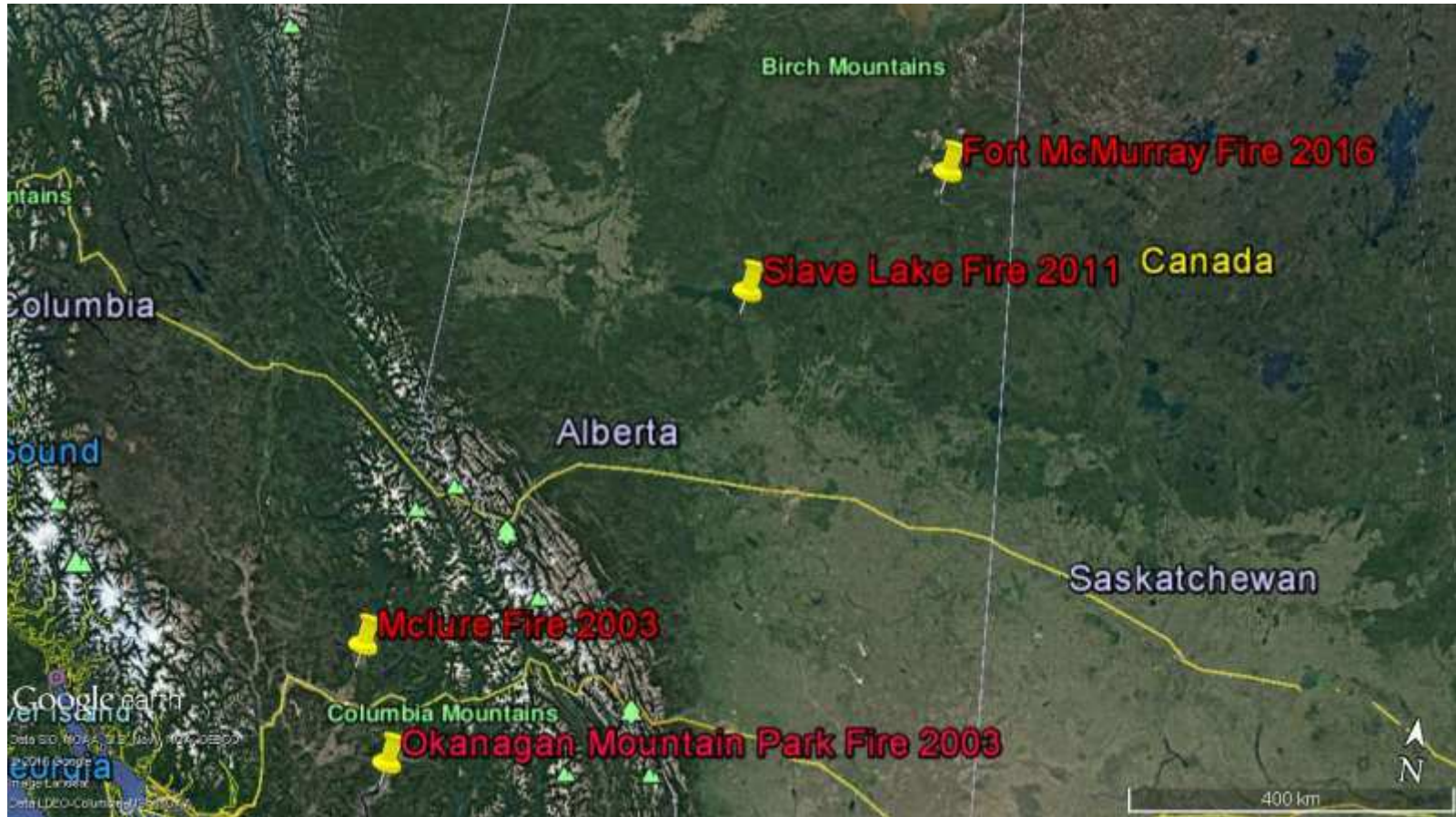
A concept to define unprecedented, high intensity and unstoppable wildfire causing threats to community and loss of assets and values.

Top Figure - Google Disaster Map- Fort McMurray





Recent- Mega fires





a) Fort McMurray Fire - 2016



2,400+

\$ 3.58 billion

Loss of Insured property, business, and auto

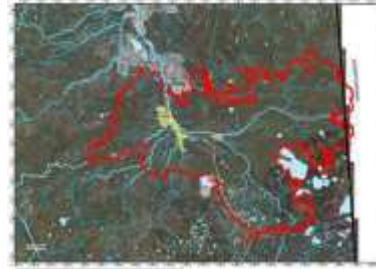
(Source: IBC, Aug 16, 2016)



90,000 people

\$ 304 million

Canadian Red Cross



589,552 ha



\$615 million

1572 firefighters,

60 helicopters, 19 tankers

37 pieces of heavy equipment

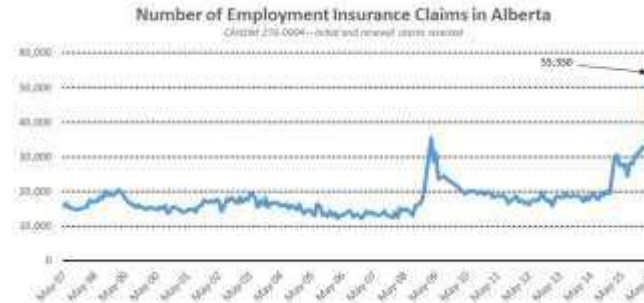
(Mack Lamoureux and Michelle Bellefontaine, CBC June 2016 news)



\$ 1.82 billion

1.2 million barrel/ day for 28 days

(Goldman Sachs report cited in Global Mail on May 12, 2016)



EI claim application
Soared by 22,800



\$ 1.5 million

20,000 cubic meters

(Dan Healing, Canadian press May 20, 2016)



Image credit: Cartoon online

b) Slave Lake Wildfire - 2011



484+

\$ 700 million

Loss of Insured property, business, and auto

(Source: Flat Top Complex Wildfire Review Committee Report 2012)



15,000 people



\$133.3 million

(Surge in operating cost of fire suppression than pre 2011 average annual cost (116.37 million); Brian Stocks, personal communication)



\$ 300 million



21,685 ha

Source: Flat Top Complex Report 2012





c) Firestorm 2003



334+

\$ 200 million
Loss of Insured property,
business, and auto
(Firestorm Report 2004)



Kelowna Wildfire, 25,600 ha
McLure Wildfire 26,420



\$317.6 million
Additional suppression cost
than pre-2003 average
annual cost (Brian Stocks
per. com.)



12 Wooden trestles and
2 other steel trestles



45,000 people



Loss of 3 lives

Source: FireStorm 2003 Report
Photo credit: myra-trestles



True Cost of Wildfire



Suppression
Cost

Evacuation
Cost

Property
Damage

Damage
to Infra-
structure

Health
Effects

Post-fire
clean up
cost

Loss of
Timber

Loss of
Outdoor
Recreation

Disruption
of Water
supply

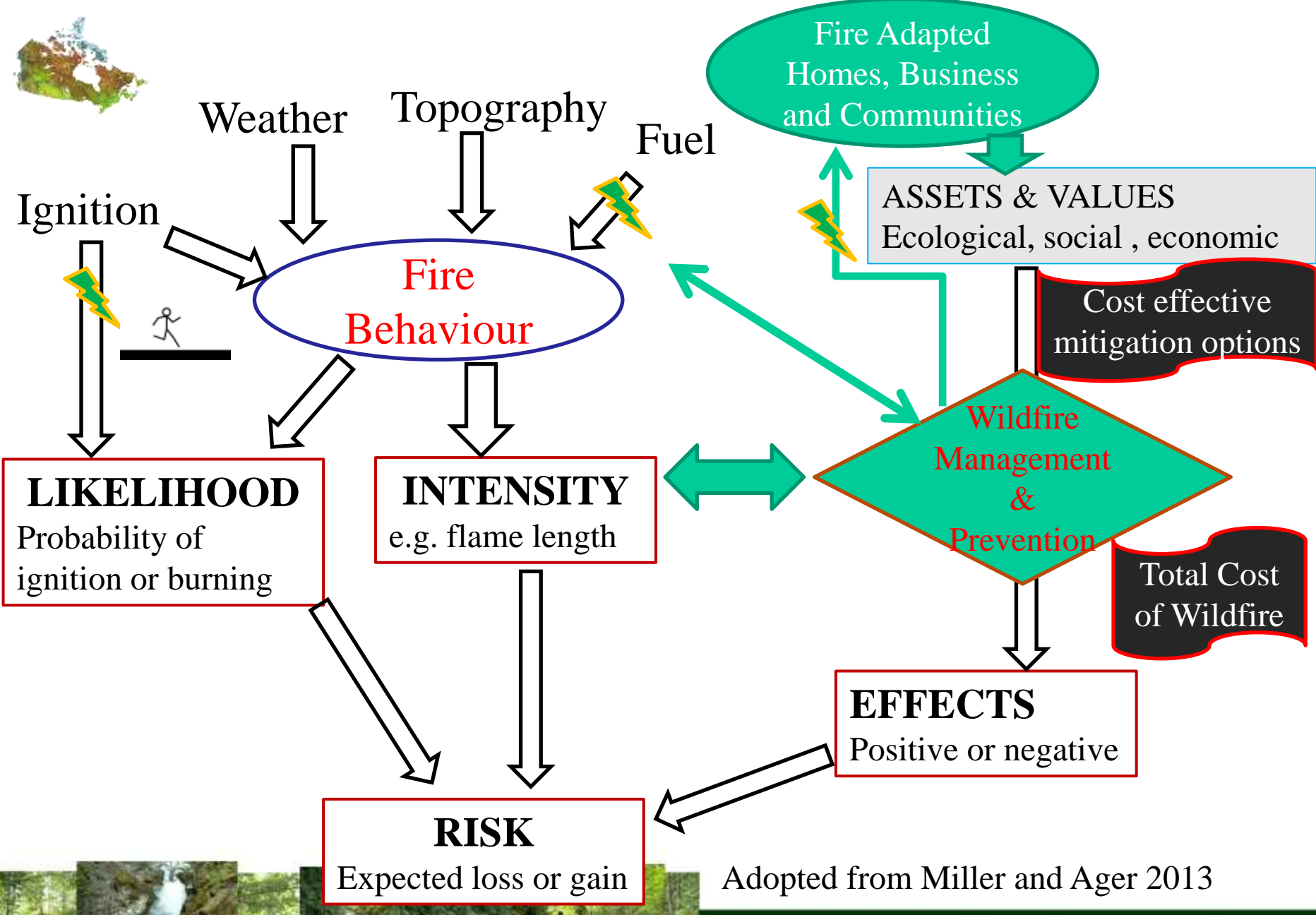
Loss of
Business
Operation

Loss of
Archeologi-
cal Heritage

Other
Ecosystem
services-
carbon,
habitat

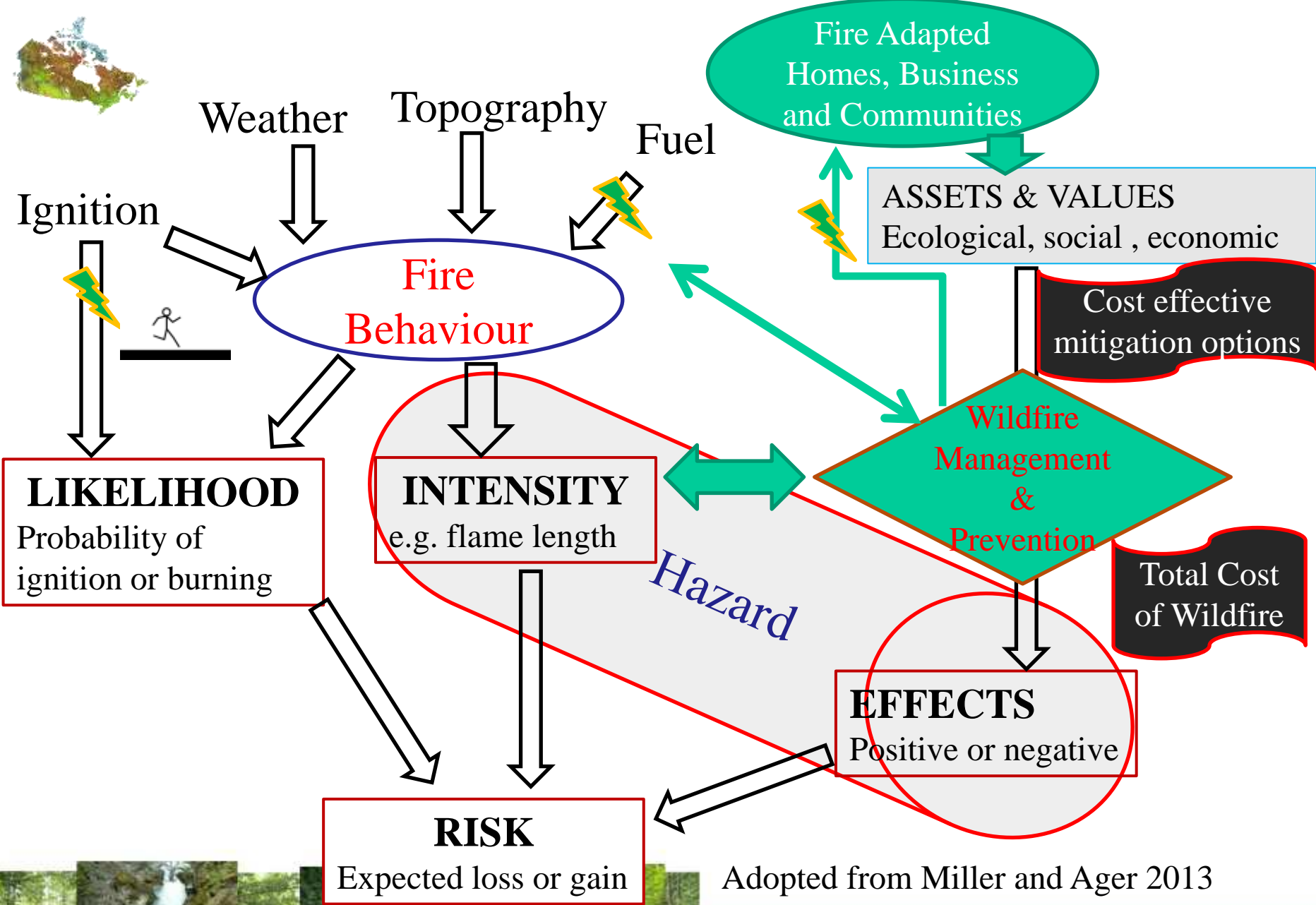
Cost of an extreme wildfire can be devastating to local communities, businesses and publics.





Adopted from Miller and Ager 2013

A risk-based wildfire management approach



Adopted from Miller and Ager 2013

A risk-based wildfire management approach



Major Challenges

- ❖ Expanding WUI Communities
- ❖ Increasing Resource industry infrastructure and activities in Western Canada
- ❖ Extreme weather conditions – longer fire season, increasing spring temperature (Flannigan et al 2009) and “hotter drought” (Allen et al 2010 and 2016)





Opportunities

- ❖ Further improvement on wildfire emergency response
- ❖ Risk-based approach - prevention and mitigation
 - Identifying high risk communities and infrastructures
 - Reducing fire hazard -fuel treatment and fire break





Opportunities

- ❖ Making communities wildfire adapted
 - Develop Community wildfire protection plan
 - Improving community land use plan, if possible
 - Using fire resistant building material for shingles and siding
 - Routinely implementing FireSmart guidelines





Conclusion

- ❖ Area burned by fire – increasing
- ❖ Wildfire management cost and total loss – soaring
- ❖ Wildfire disasters – more frequent
- ❖ More people evacuated – every year
- ❖ Wildland communities and resource industry – expanding
- ❖ More investment needed in prevention and mitigation – communities wildfire adapted

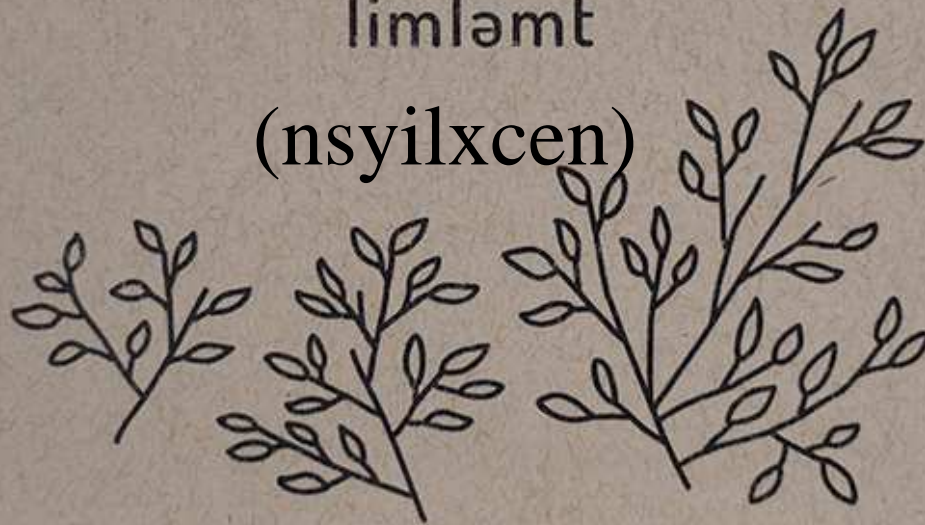




Thank you !

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(nsyilxcen)



Nirmal Subedi

Credit: Ashleigh Green, UBC Okanagan in dribbble