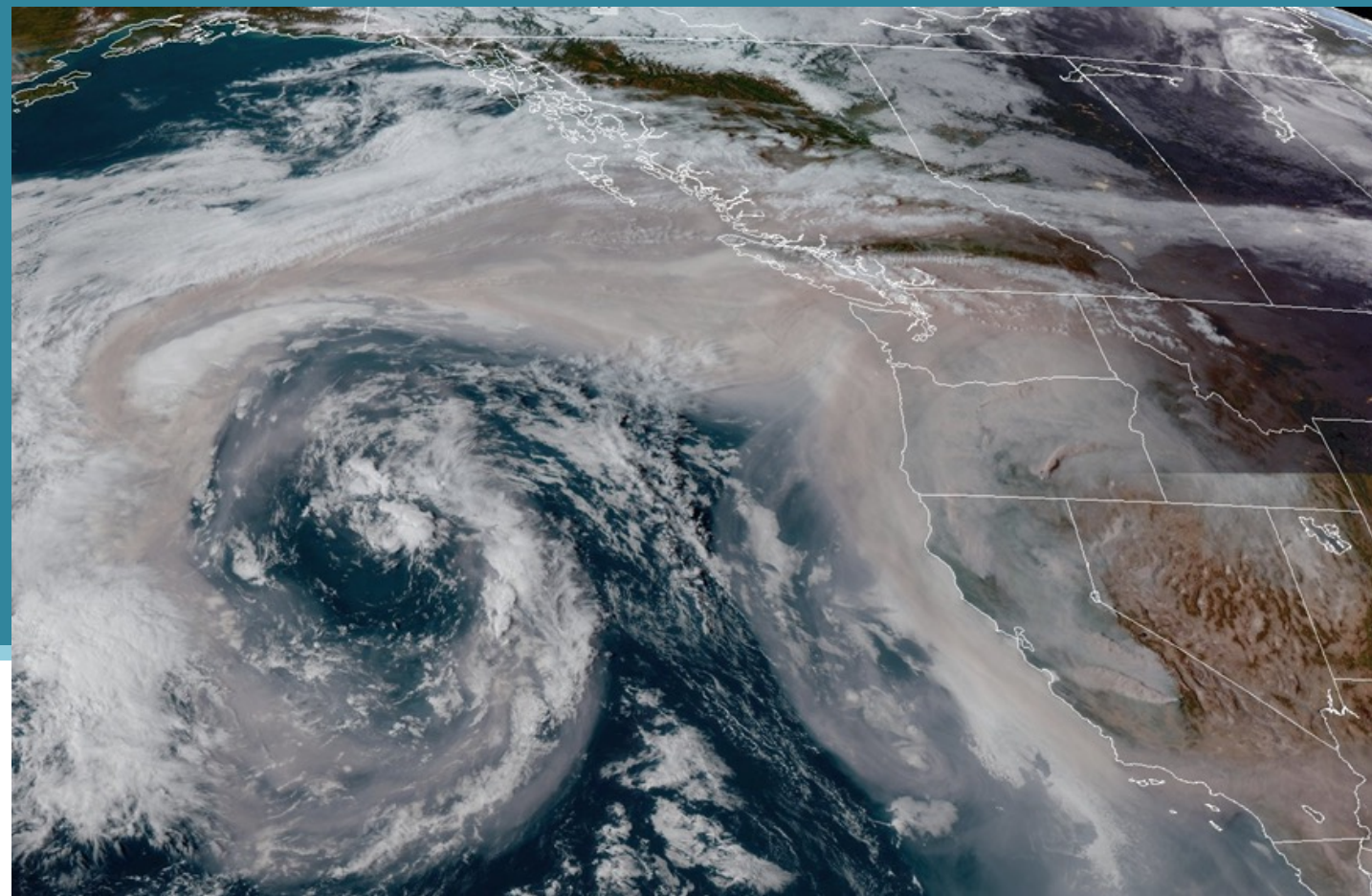




ECCC



UBCM CONVENTION

September 19th, 2023

Armel Castellan Warning Preparedness Meteorologist

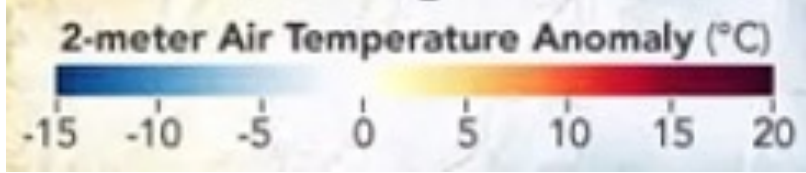
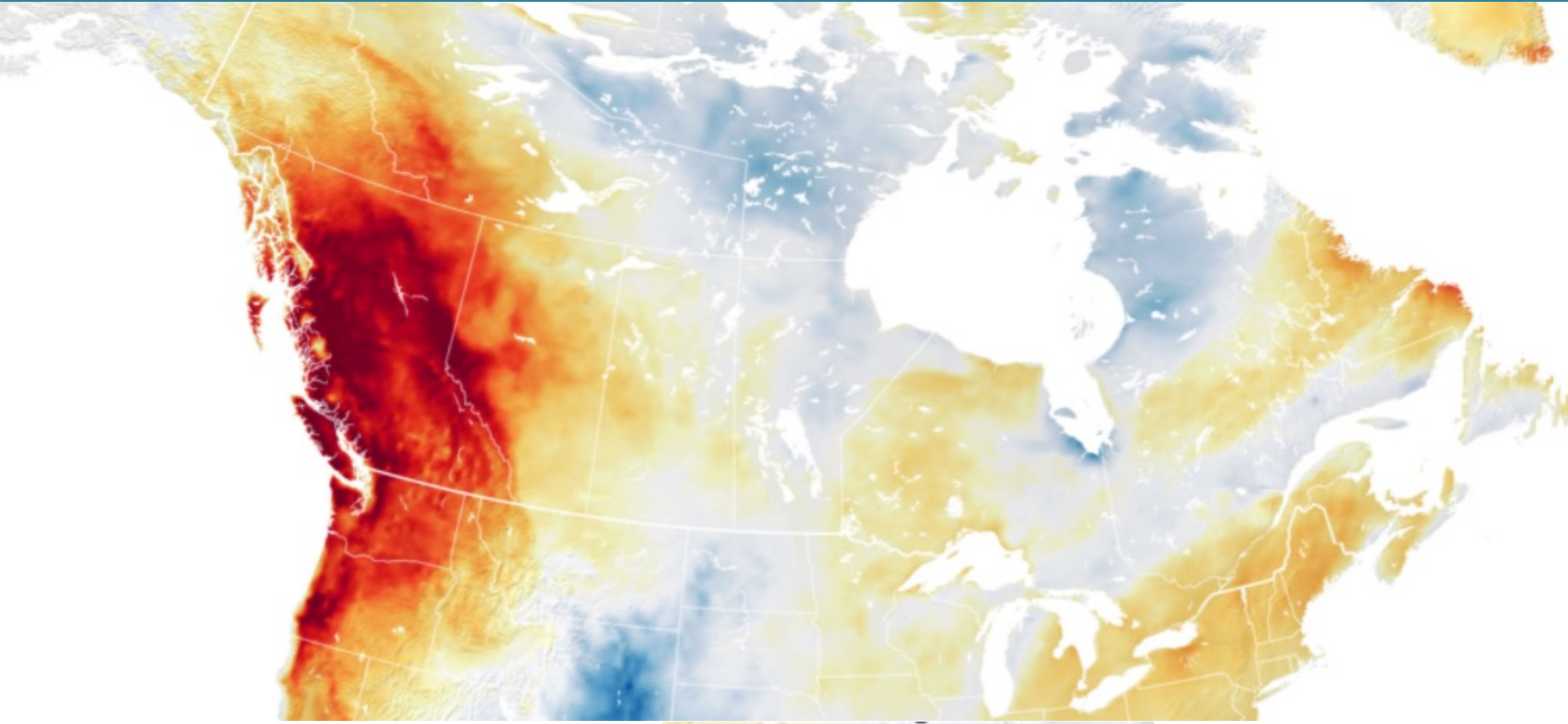


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Canada

Extreme weather meets a changed climate



June 30 – Lytton, BC “The whole city is on fire”

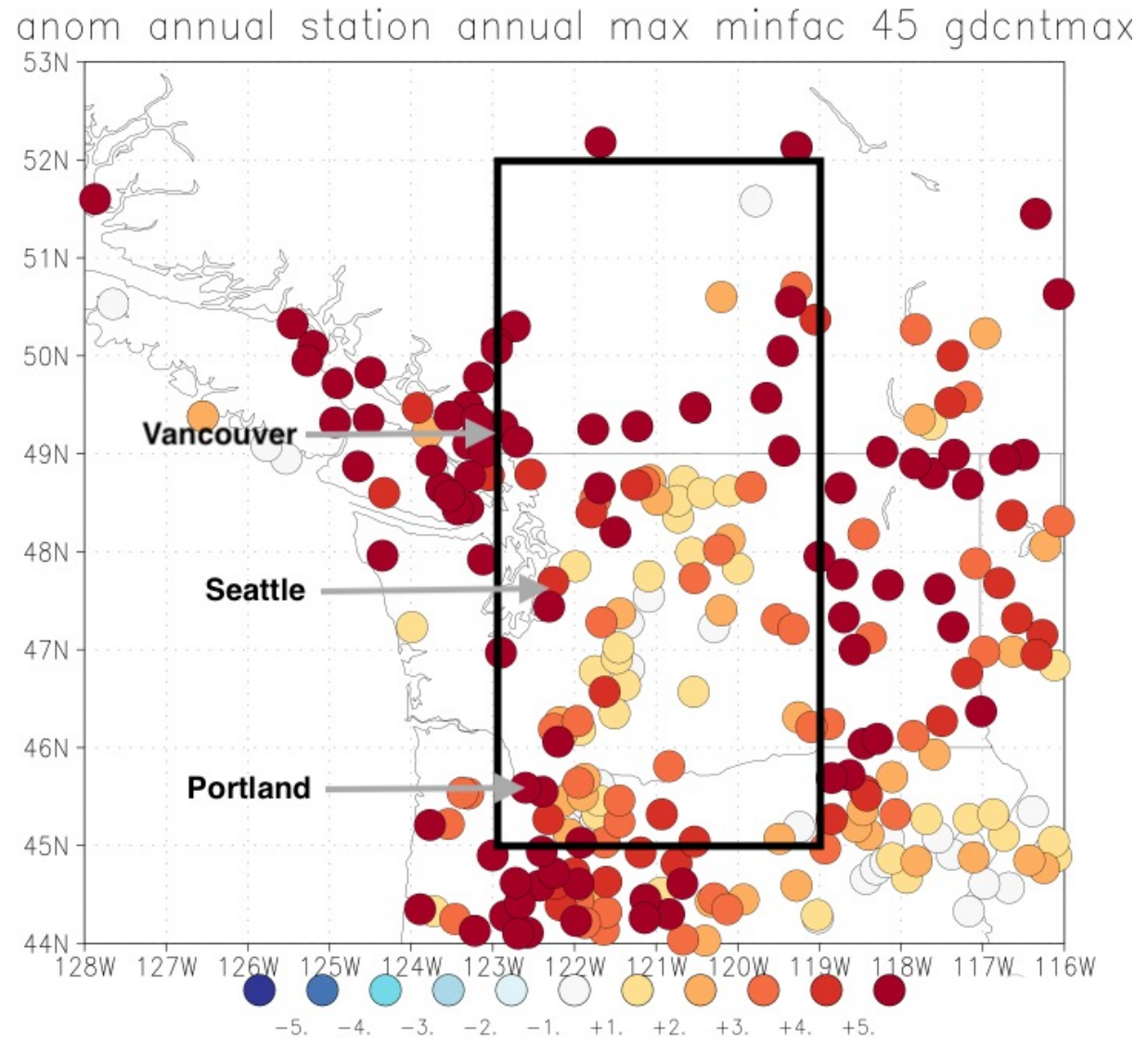
- Mayor, Jan Polderma, Lytton, BC

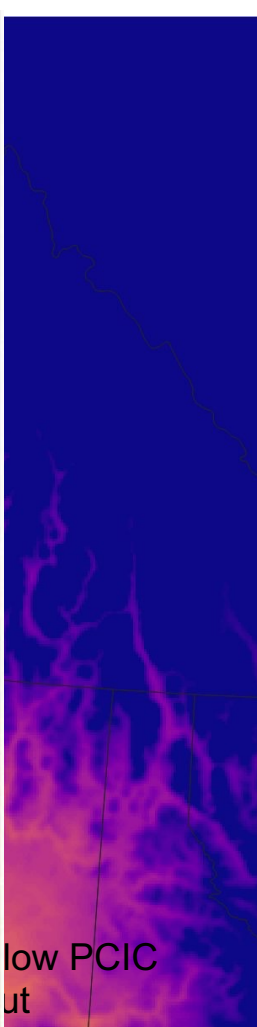
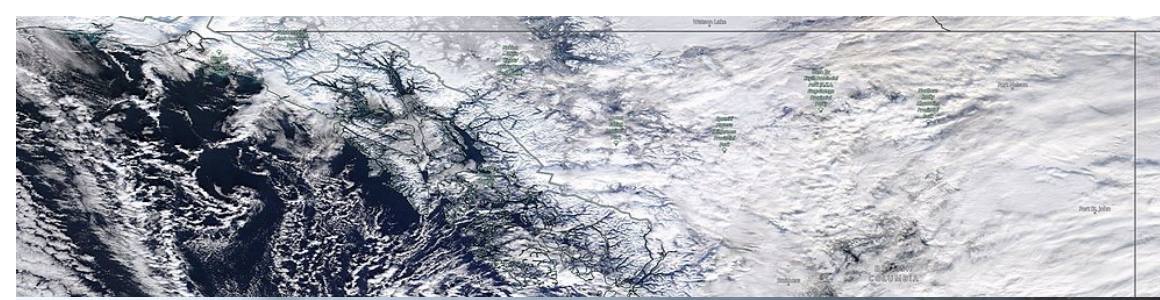
Credit – Alec Woods, CA News Ottawa



JUNE 2021 HEAT DOME

- ~150x more likely with climate change
- some all-time max temperature records were broken by as much as 5 °C
- Under a global 2 °C warmed climate, it's likely similar events could occur as often every 5 to 10 yrs





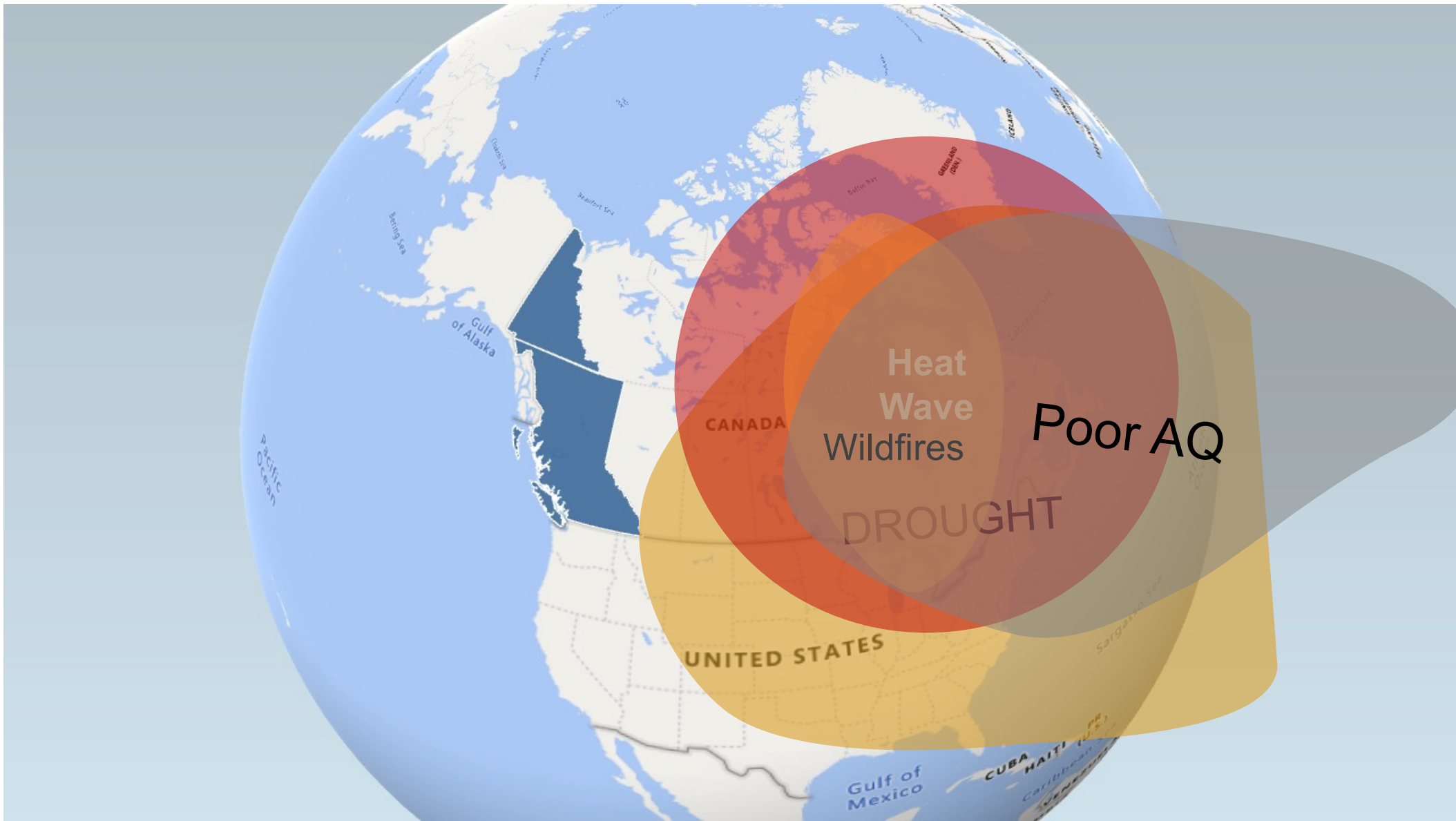
4.5 months after the **deadliest** Canadian weather event, came the **costliest!**



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Canada



Climate projections in BC



Warmer winters
fewer days below freezing



More hot summer days
longer dry spells in summer



More precipitation in the fall,
winter and spring



Increased frequency and intensity
of precipitation and storm events



“I didn't think it was possible, not in my lifetime anyway, this moment will be talked about for centuries.” – Operational meteorologist

“It won't be talked about for centuries; these records will fall as climate change accelerates! This is just a **mild version** of what we can expect in the future.” – Robert Brulle, Brown University (Climatology Perspective)



River Forecast Centre: Historical Drought Scale (GREEN; no drought, RED; max drought)

2015 DROUGHT LEVELS AT A GLANCE

Drought Levels:	1	Normal	2	Dry	3	Very Dry	4	Extremely Dry						
BASINS	15-May	28-May	25-Jun	03-Jul	09-Jul	15-Jul	21-Jul	23-Jul	05-Aug	06-Aug	20-Aug	03-Sep	17-Sep	01-Oct
Northwest	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Stikine	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Northwest	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Peace	2	1	1	1	1	1	1	1	1	1	1	1	1	1
East Peace	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Skeena-Nass	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Nechako	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Upper Fraser	1	1	1	1	1	1	1	2	2	2	2	2	2	1
Upper Columbia	1	1	1	1	1	1	1	2	2	2	2	2	2	1
Lower Columbia	1	1	2	2	2	2	2	2	2	3	3	3	3	2
West Kootenay	1	1	2	2	2	2	2	2	2	3	3	3	3	2
East Kootenay	2	1	2	2	2	2	2	2	2	3	3	3	3	1
Middle Fraser	2	1	1	1	1	1	1	1	1	1	1	1	1	1
North Thompson	1	1	1	1	1	1	1	1	1	1	1	1	1	1
South Thompson	1	1	2	1	3	3	3	4	4	4	4	4	4	3
Okanagan-Kettle	2	2	2	2	3	3	3	4	4	4	4	4	4	3
Kettle (separated July 23)	2	2	2	2	3	3	3	4	4	4	4	4	4	3
Nicola	2	2	2	2	3	3	3	4	4	4	4	4	4	3
Similkameen	2	2	2	2	3	3	3	4	4	4	4	4	4	3
Skagit	2	2	2	2	3	3	3	4	4	4	4	4	4	3
Lower Fraser	2	2	3	3	3	3	4	4	4	4	4	4	4	3
South Coast	2	2	3	3	3	3	4	4	4	4	4	4	4	3
Vancouver Island	2	2	3	3	3	3	4	4	4	4	4	4	4	3
Haida Gwaii	1	3	3	3	3	3	3	3	3	3	2	1	1	1
Central Coast	1	1	1	1	1	1	1	1	1	1	1	1	1	1

2016 DROUGHT LEVELS AT A GLANCE

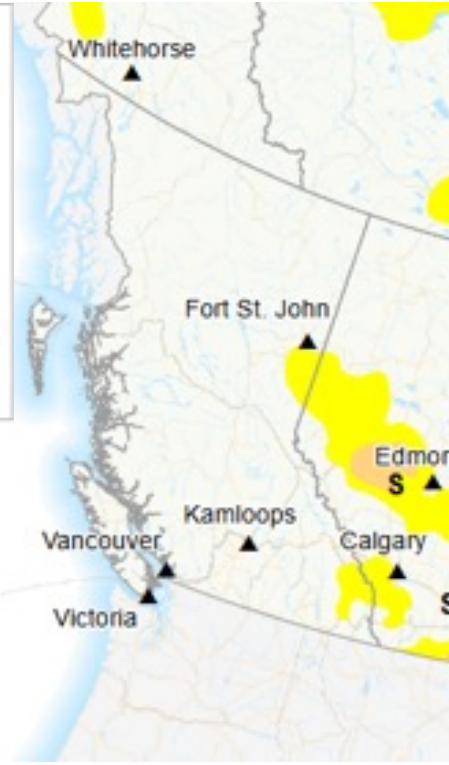
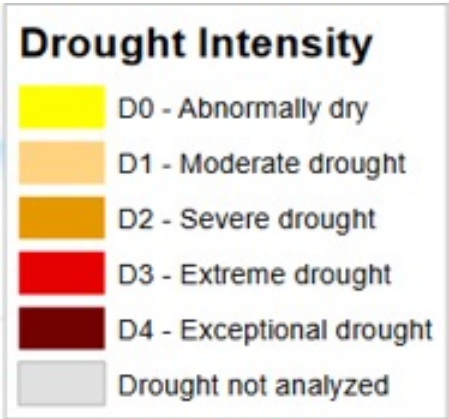
Drought Levels:	1	Normal	2	Dry	3	Very Dry	4	Extremely Dry														
BASINS	27-Apr	19-May	27-May	02-Jun	16-Jun	28-Jun	30-Jun	14-Jul	28-Jul	03-Aug	11-Aug	18-Aug	25-Aug	30-Aug	01-Sep	02-Sep	08-Sep	13-Sep	22-Sep	23-Sep	05-Oct	
Northwest	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Stikine	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Northwest	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Peace	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
East Peace	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Skeena-Nass	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Nechako	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Upper Fraser West	1	1	1	2	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2
Upper Fraser East	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Upper Columbia	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Lower Columbia	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
East Kootenay	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
West Kootenay	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Middle Fraser	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
North Thompson	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
South Thompson	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nicola	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
- Coldwater River Basin	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
- Salmon River Basin	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Similkameen	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Okanagan	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Kettle	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Skagit	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Lower Fraser	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
South Coast	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Central Coast	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
West Vancouver Island	1	2	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
East Vancouver Island	1	2	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
Haida Gwaii	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

2017 DROUGHT LEVELS AT A GLANCE

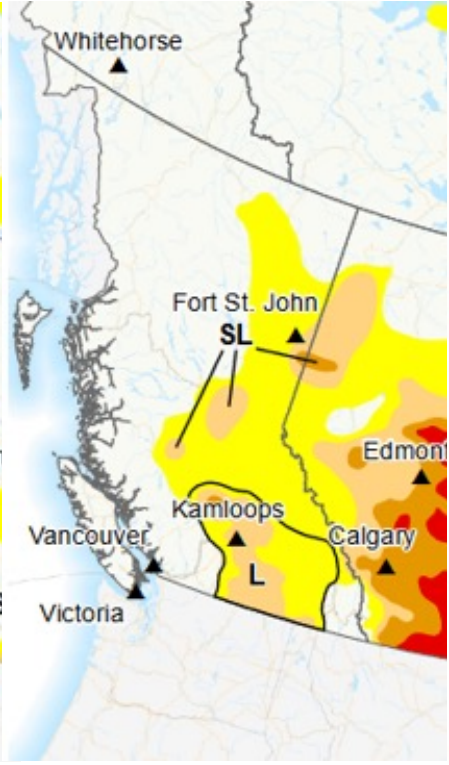
Drought Levels:	1	Normal	2	Dry	3	Very Dry	4	Extremely Dry											
BASINS	31-May	03-Jun	22-Jun	06-Jul	20-Jul	03-Aug	10-Aug	14-Aug	17-Aug	23-Aug	28-Aug	31-Aug	08-Sep	14-Sep	28-Sep	12-Oct	18-Oct	28-Oct	
Northwest	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Stikine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Northwest	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Peace	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
East Peace	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Skeena-Nass	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nechako	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Upper Fraser West	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Upper Fraser East	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Upper Columbia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lower Columbia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
East Kootenay	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
West Kootenay	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Middle Fraser	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
North Thompson	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
South Thompson	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nicola	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
- Coldwater River Basin	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
- Salmon River Basin	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Similkameen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Okanagan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kettle	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Skagit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lower Fraser	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
South Coast	1	1	1																



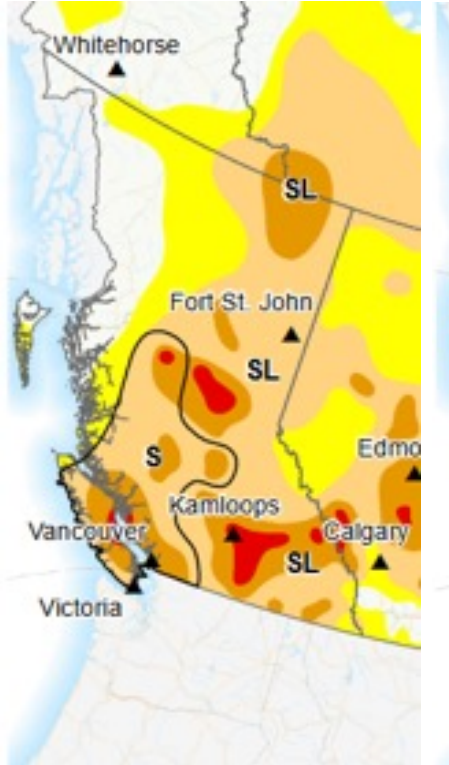
Canadian Drought Monitor



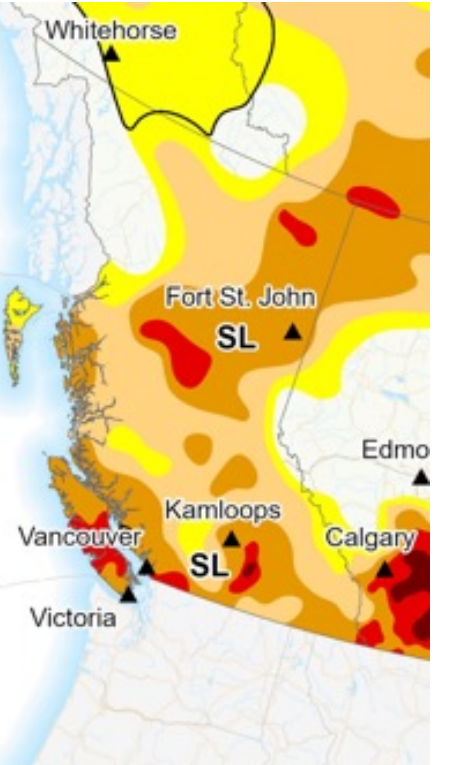
Jan 31 2021



Dec 31 2021



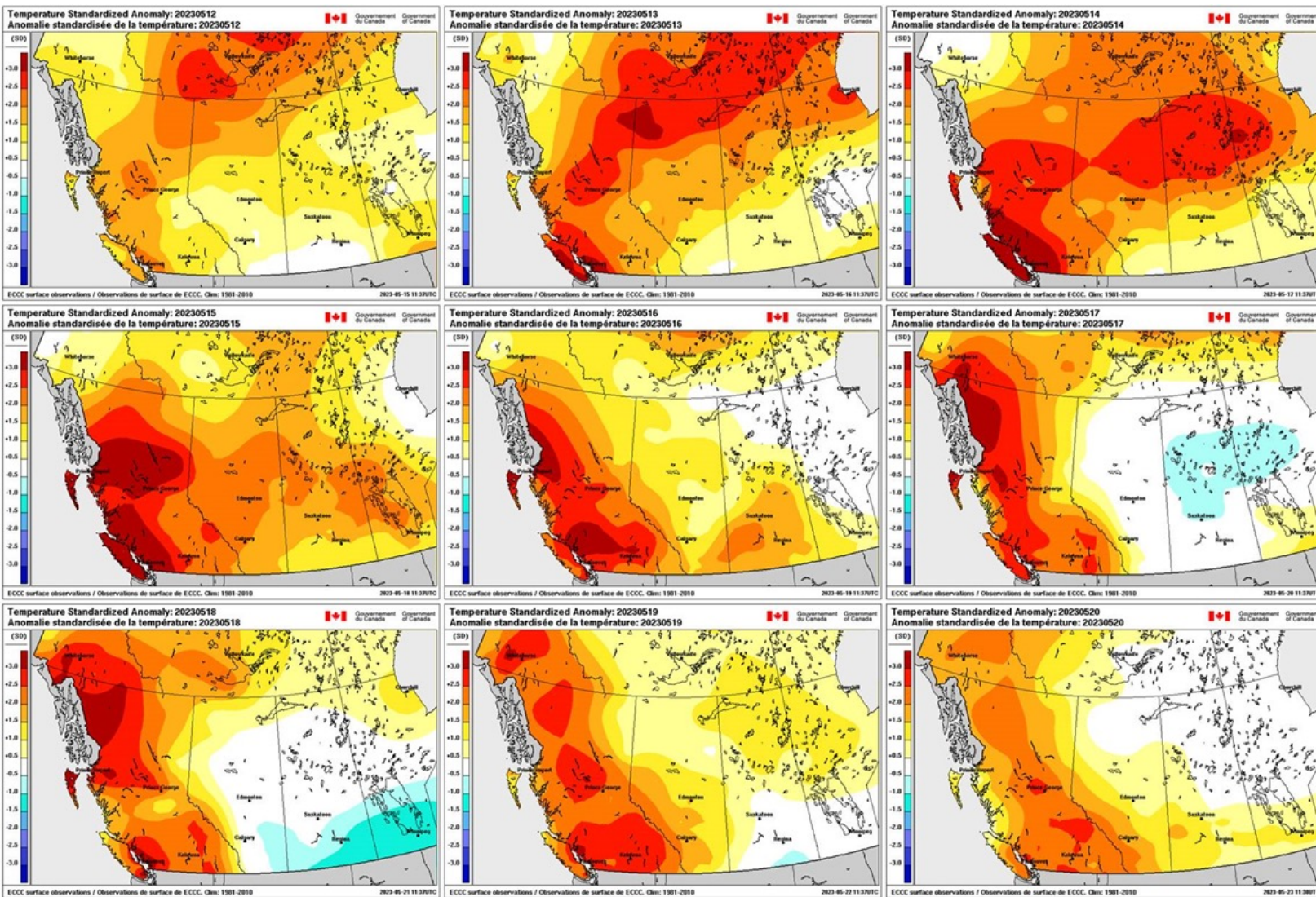
Oct 31 2022



Aug 31 2023



We didn't have to wait long for *another "heat dome"

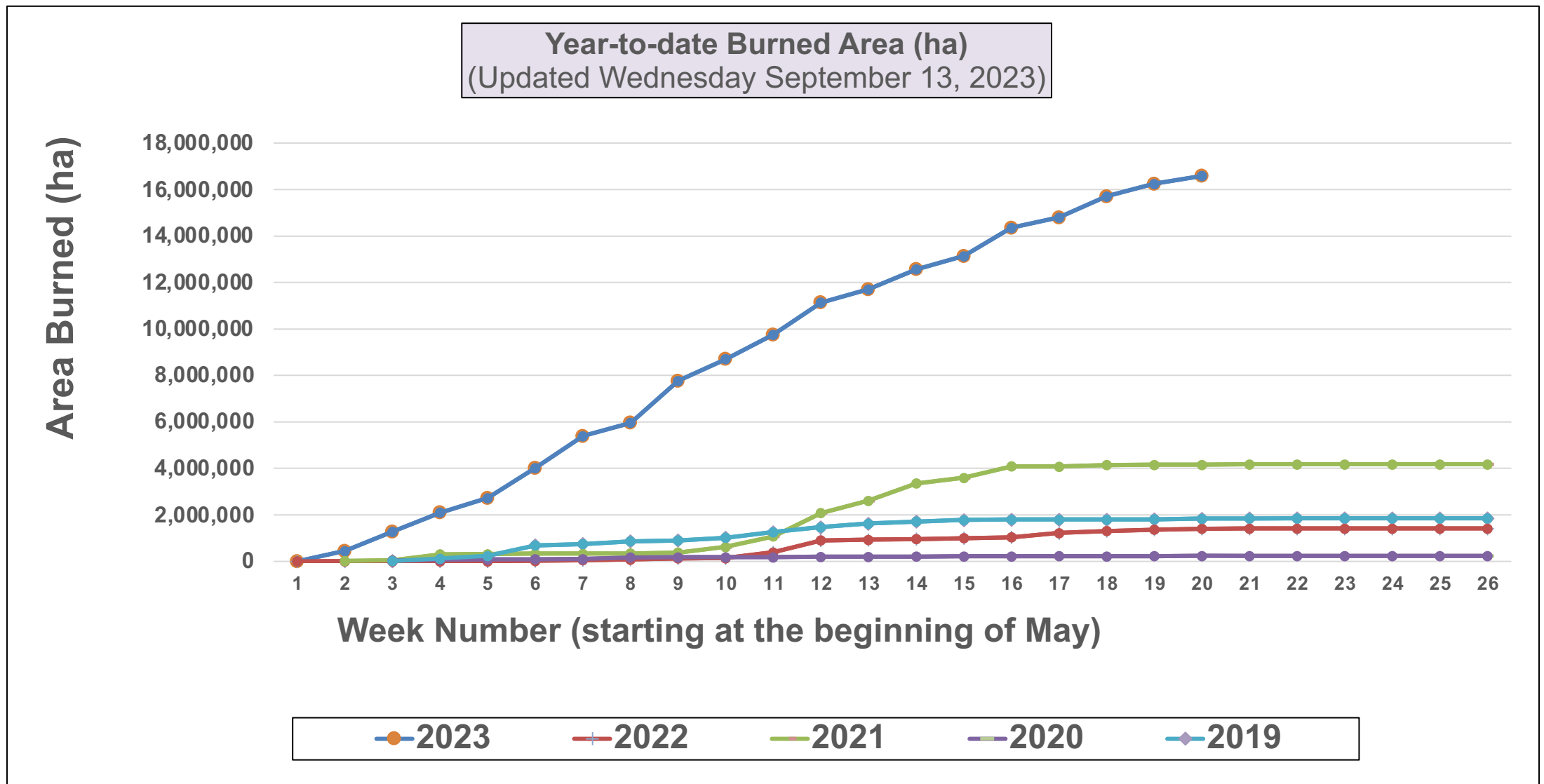


Mid-May July 2023
Early summer heat.
Long nights prevent a
large-scale human health
catastrophe.
Environment reacts
dramatically with
extremely early wildfires
across Canada.

*Attribution study yet
to be released



NRCan; National Year-to-Date Area Burned in Hectares



Beyond Drought, Heat, Human and Lightning caused wildfires: SMOKE

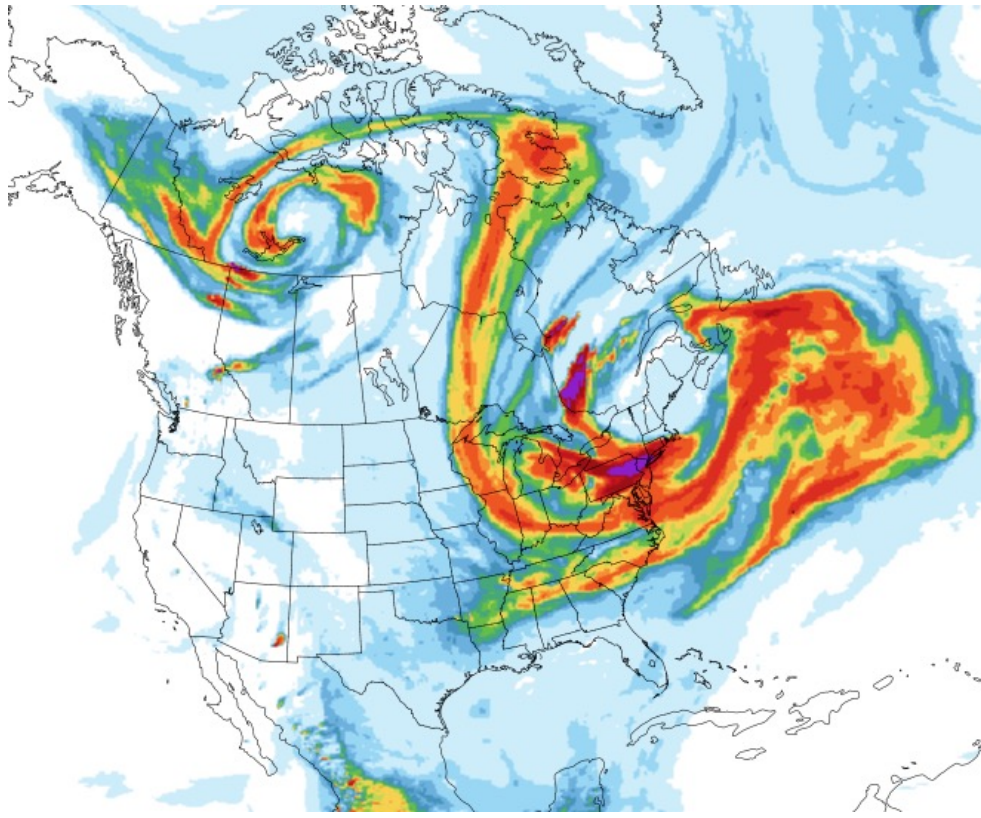


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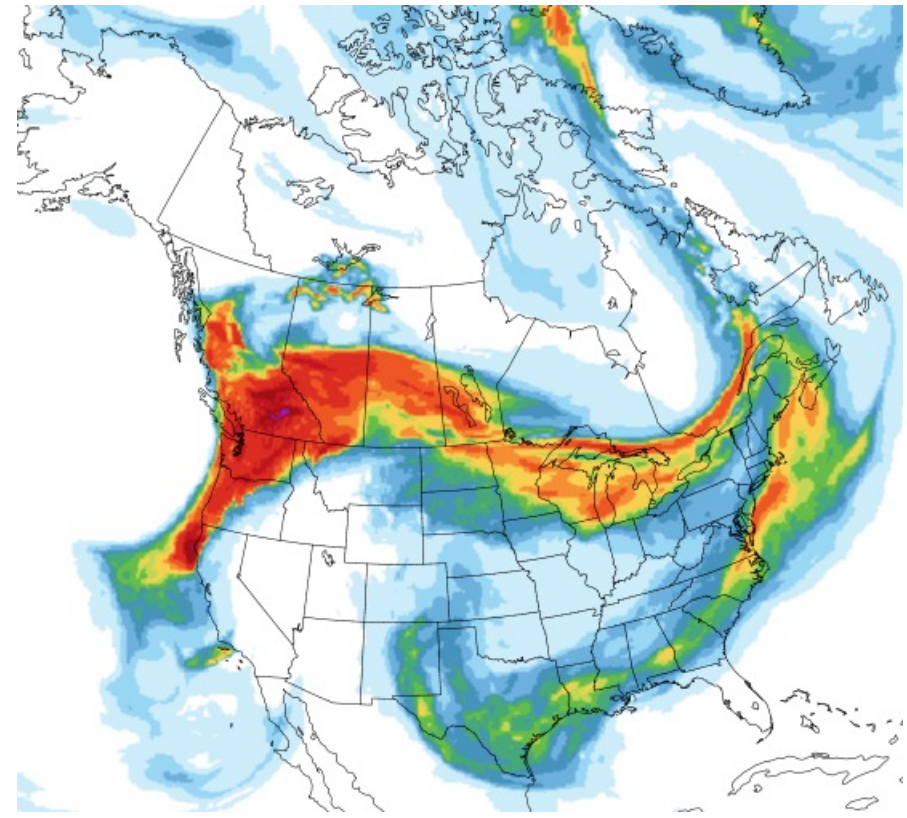
Environnement et
Changement climatique Canada

Canada 

Beyond Drought, Heat, Human and Lightning caused wildfires: **SMOKE**

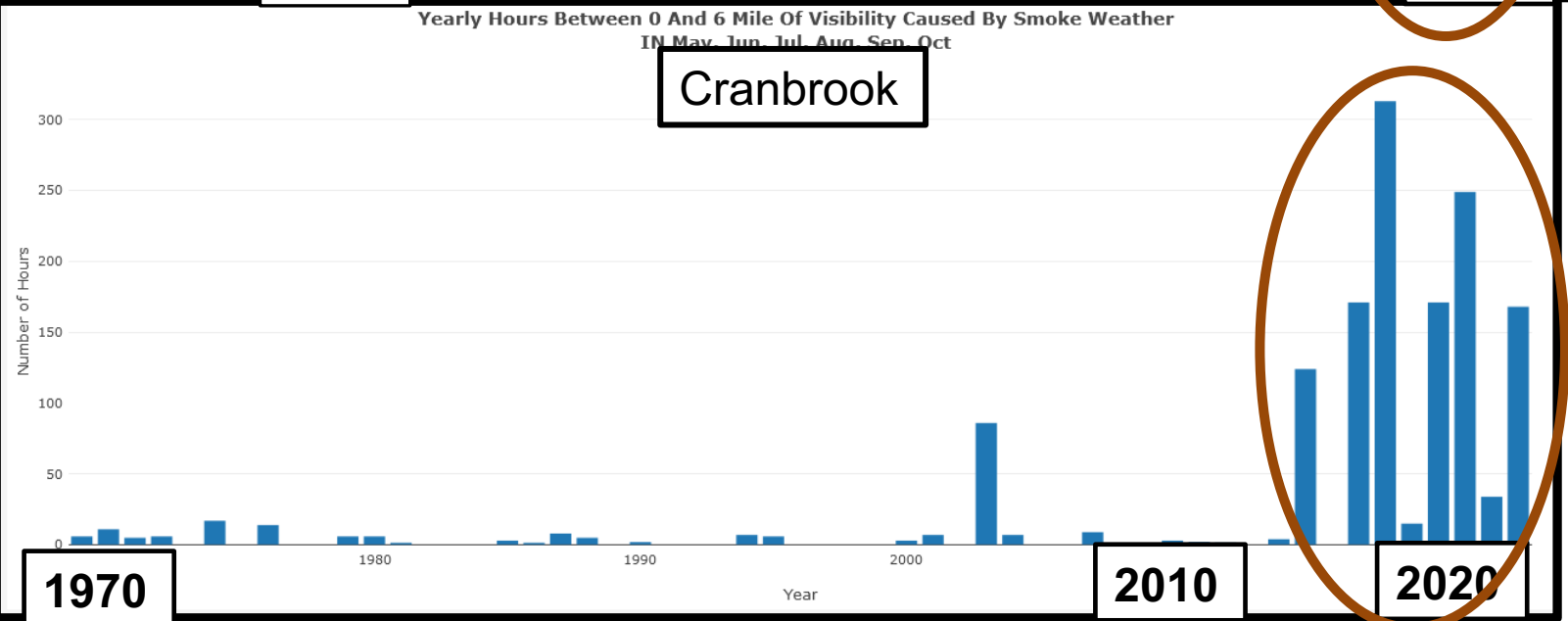
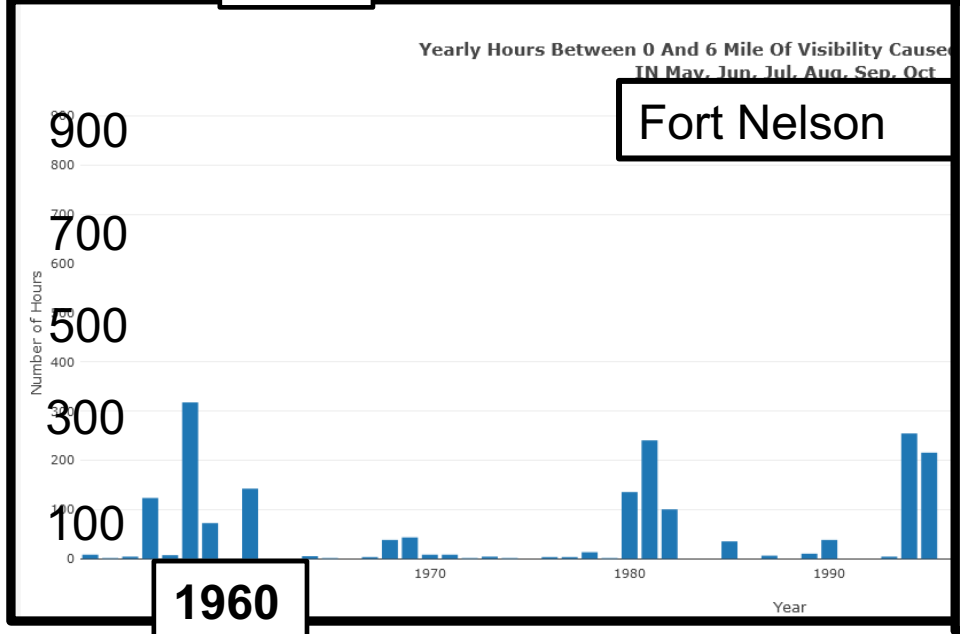
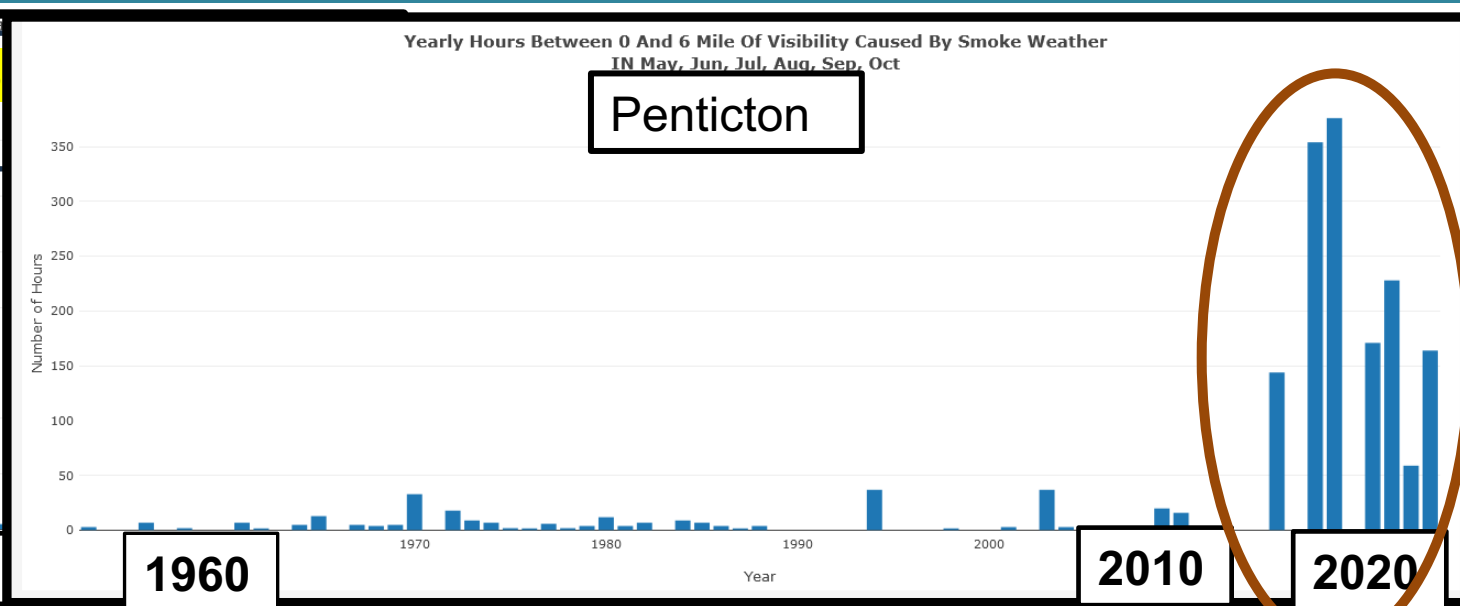
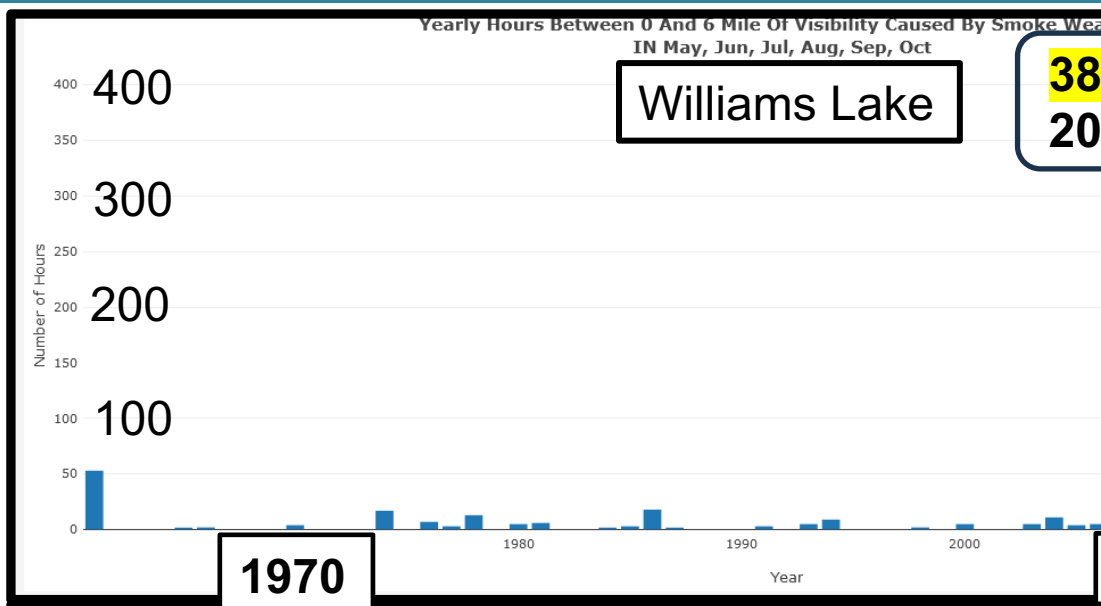


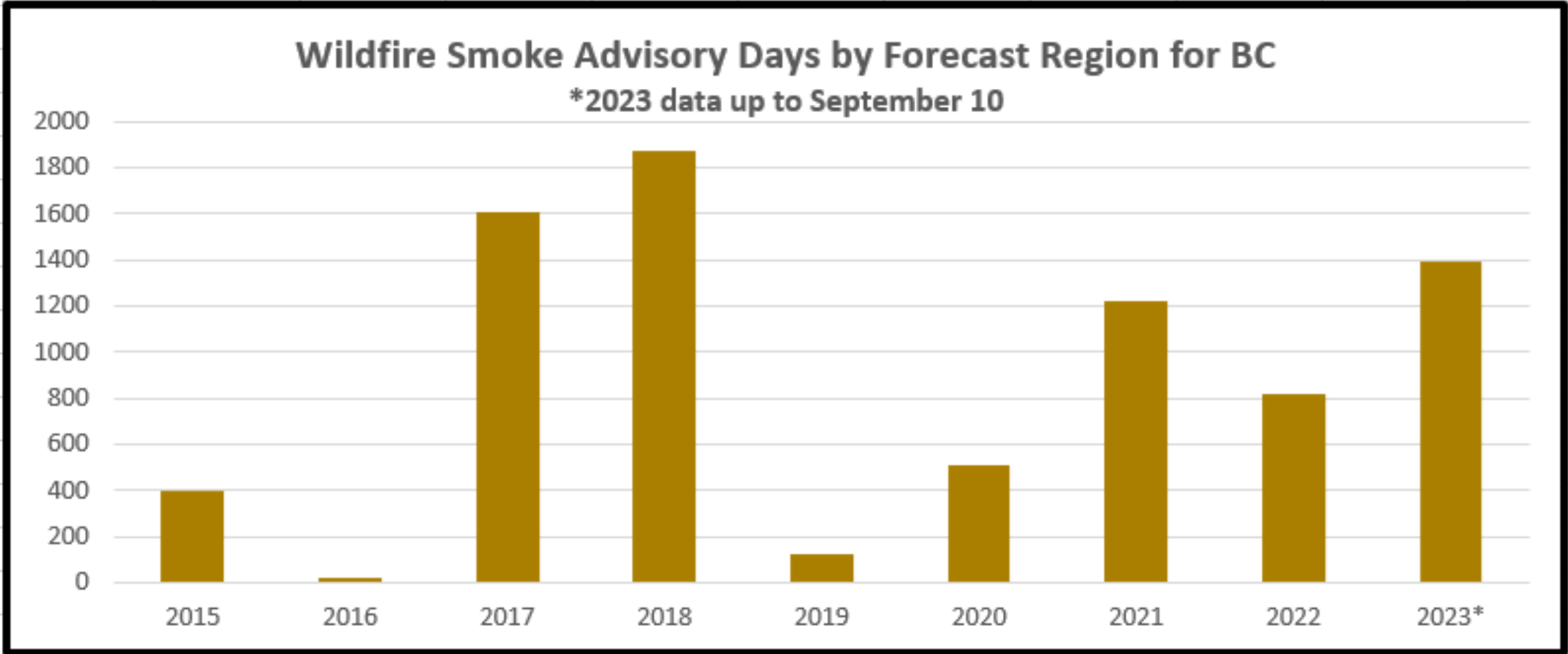
June 7: New York City



**August 21: Peak concentrations
Southern Interior**

Smoke Hours Analysis = Smoke in observation (Human observer) AND Visibility below 10kms



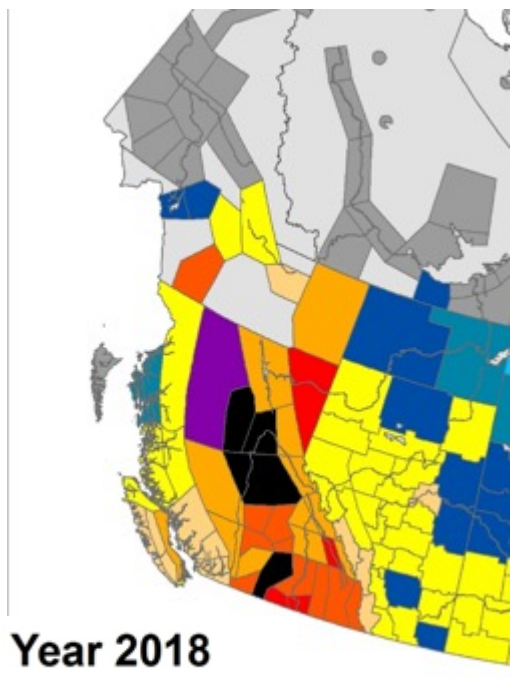


Total Number of Days of Air Quality Alerts

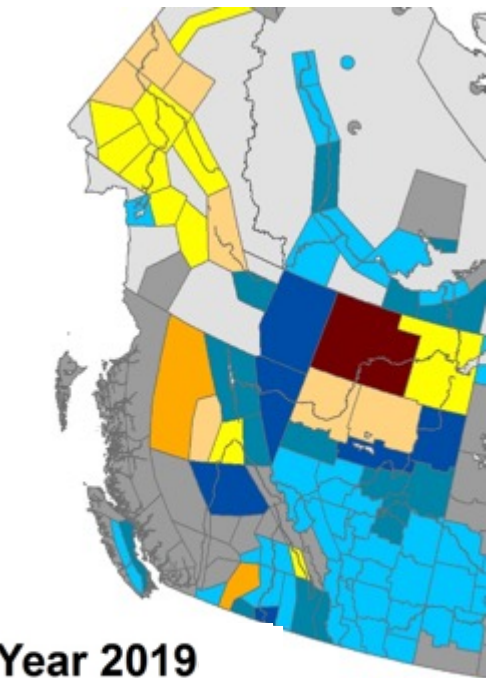


Environment and
Climate Change Canada

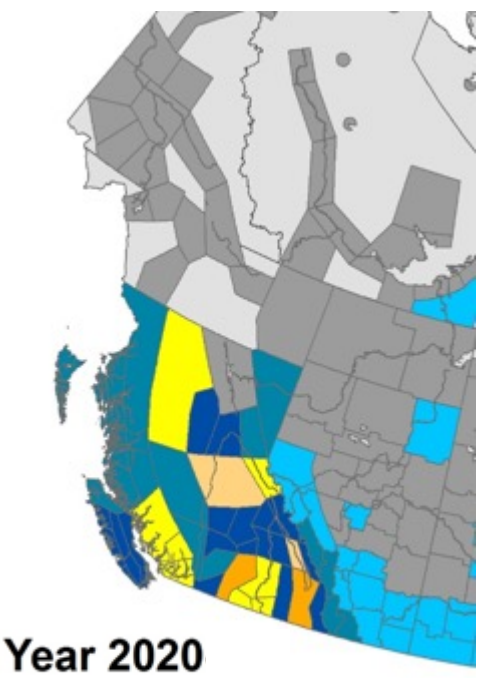
Environnement et
Changement climatique Canada



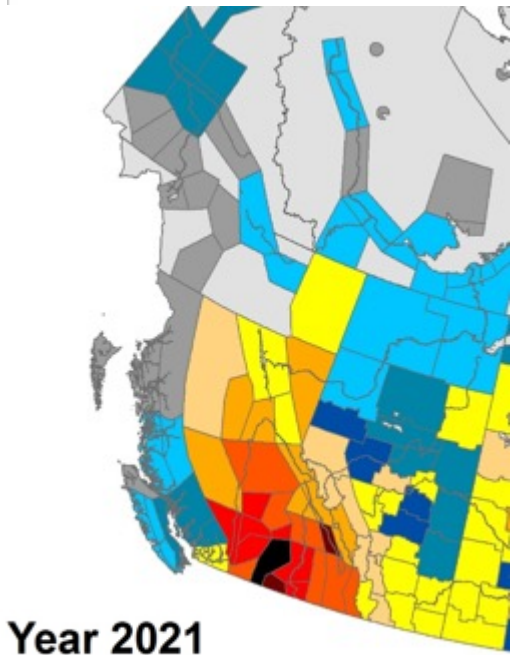
Year 2018



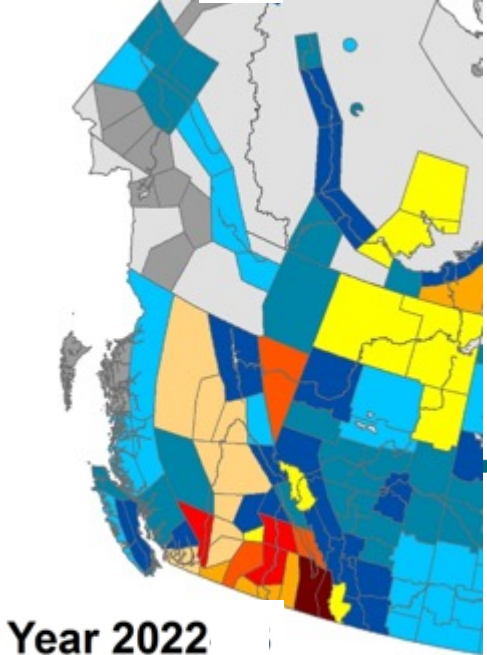
Year 2019



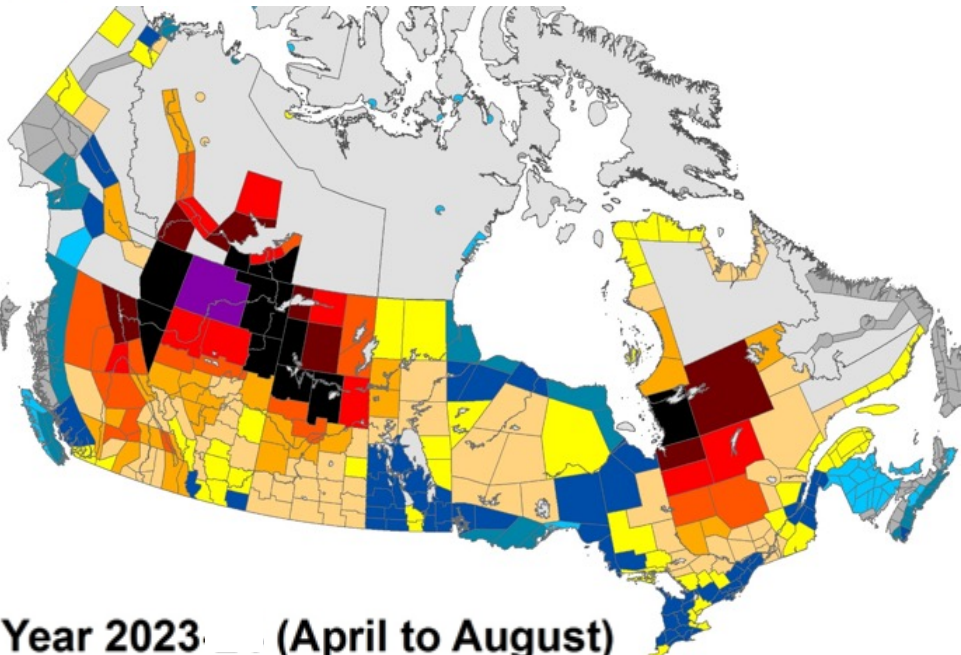
Year 2020



Year 2021

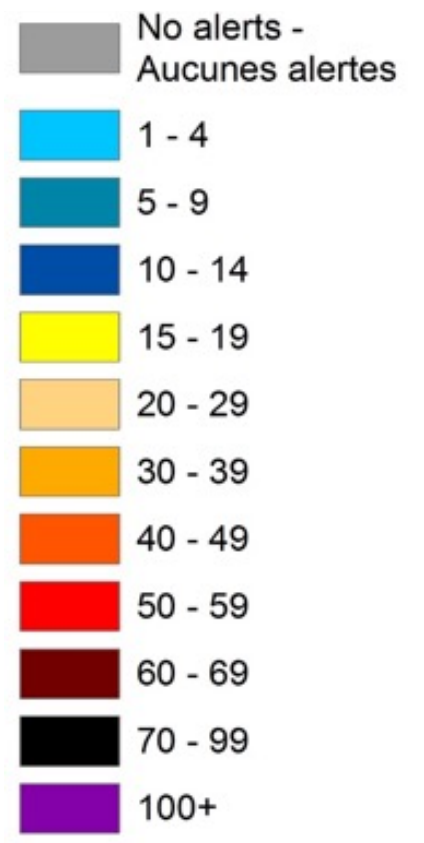


Year 2022



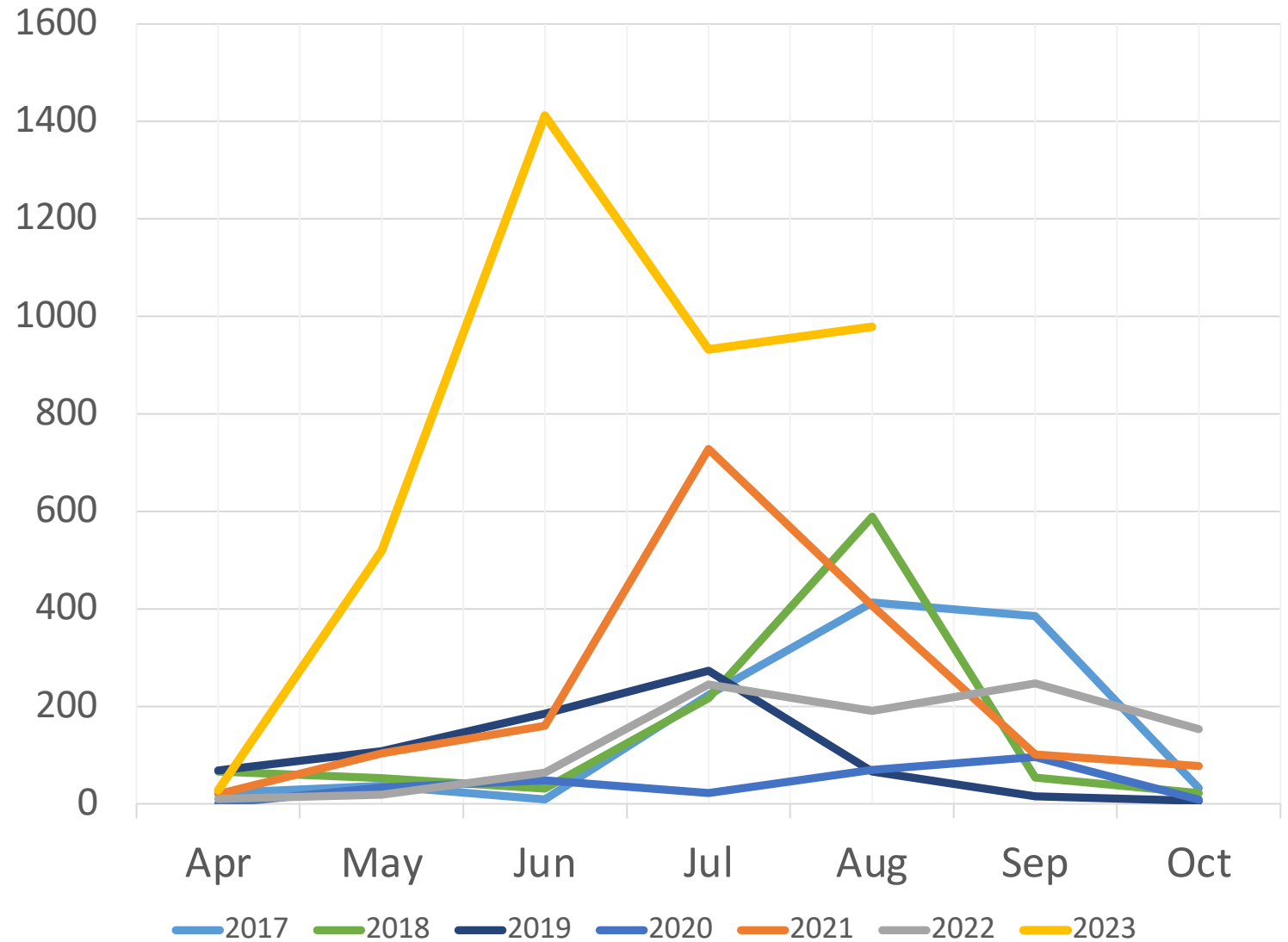
Year 2023 (April to August)

Total number of Days of AQ alerts

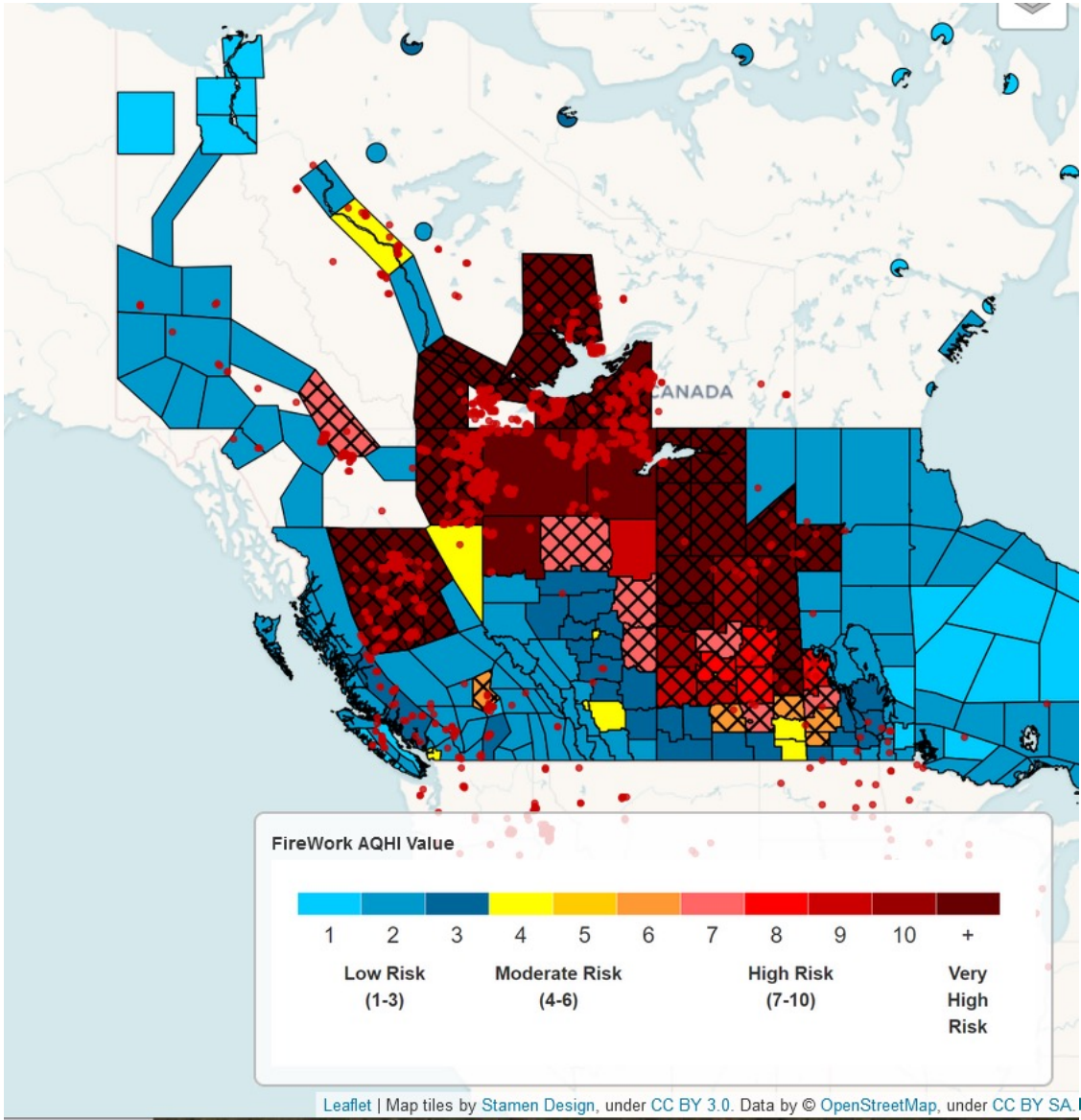


National Air Quality Bulletin Totals by month

Wildfire Season (April - October) AQ bulletins



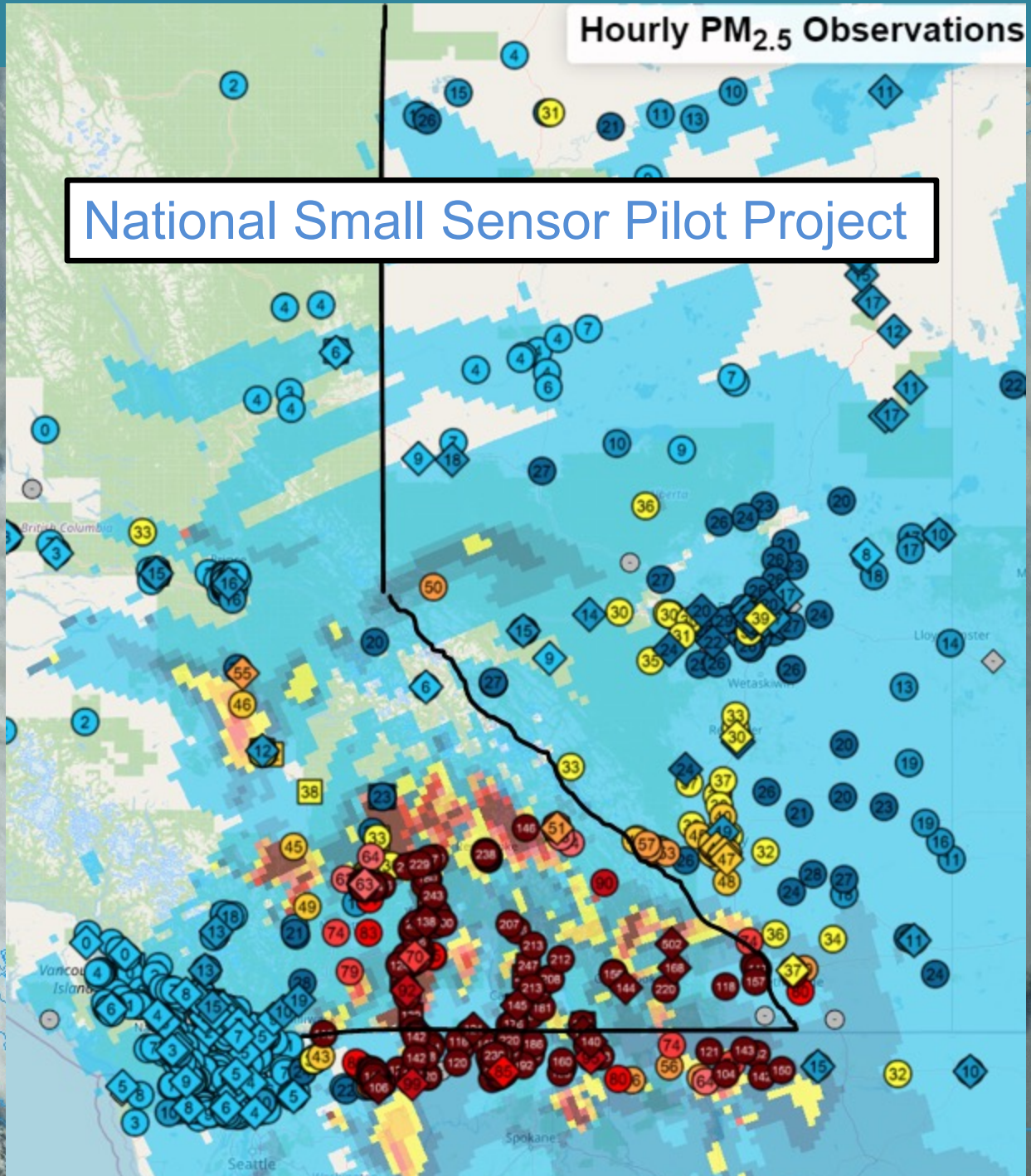
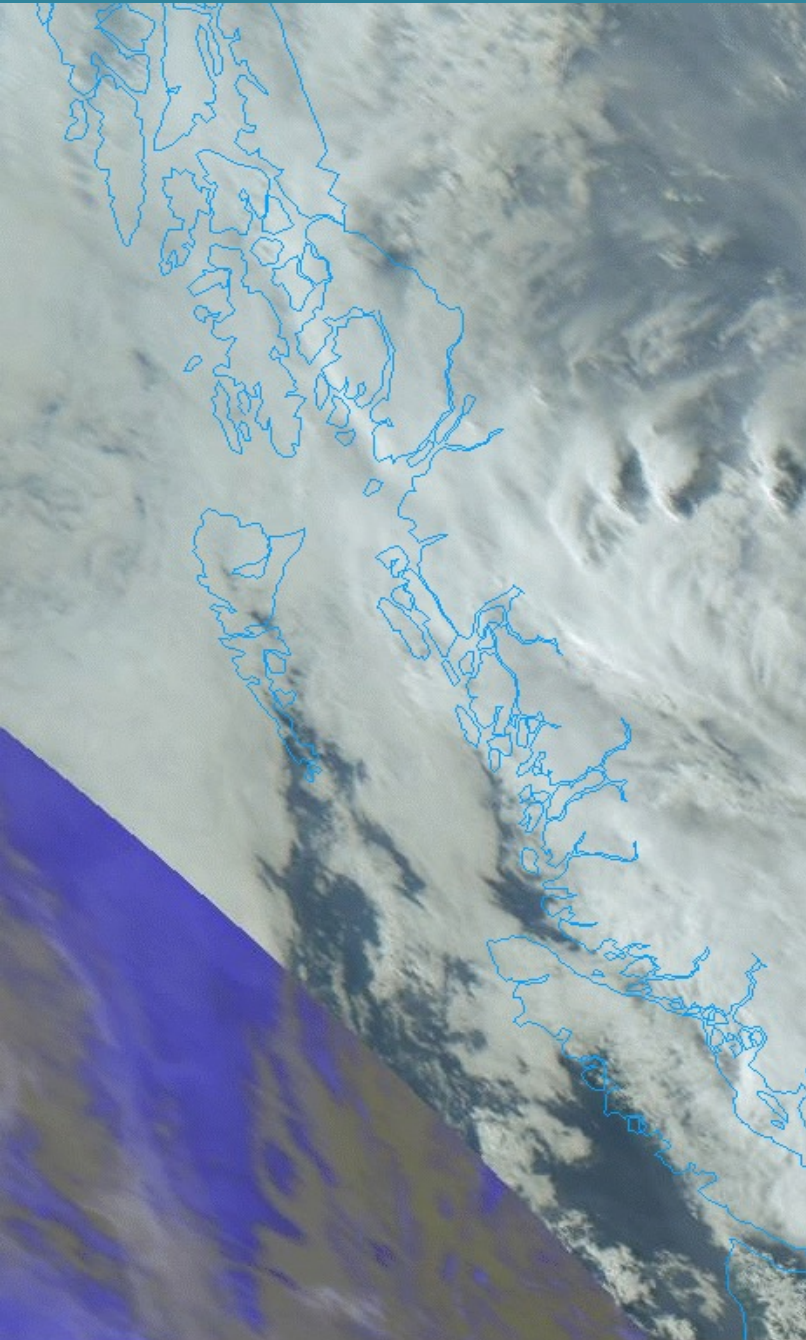
Mid September and we're not even close to saying farewell to the smoke (and evacuations)...



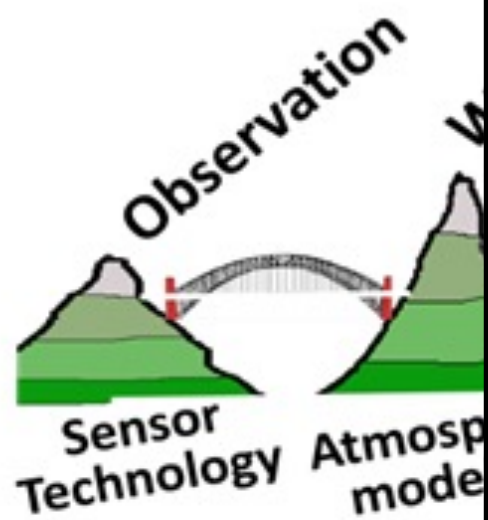
Poor AQ knows no boundaries

Hourly PM_{2.5} Observations

National Small Sensor Pilot Project



Conceptual Wa

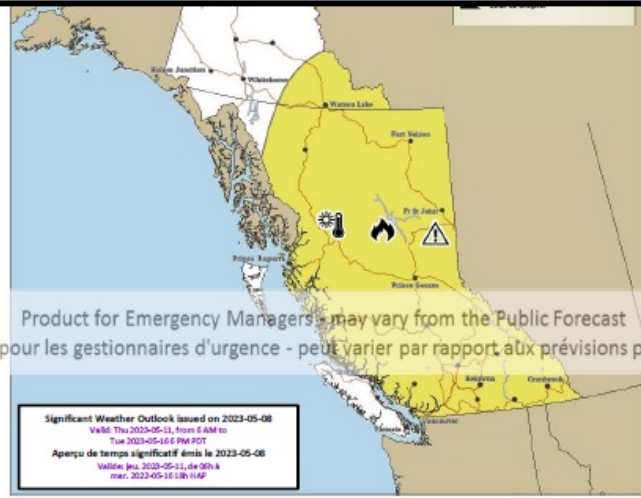


Mountains represent
Bridges

Extended Period of Hot and Dry Weather
Event Duration: Thu May 11 to Tue May 16, 2023



meteopac@ec.gc.ca

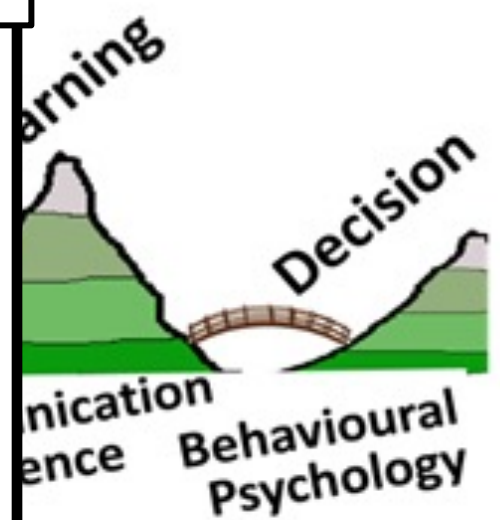


Product for Emergency Managers - may vary from the Public Forecast
Produit pour les gestionnaires d'urgence - peut varier par rapport aux prévisions publiques

		Risk			
Likelihood	High	Grey	Yellow	Orange	Red
	Moderate	Grey	Yellow with checkmark	Orange	Orange
	Low	White	Grey	Yellow	Orange
	Very Low	White	White	Grey	Yellow
		Impact (Known Vulnerability & Exposure)			

Impacts

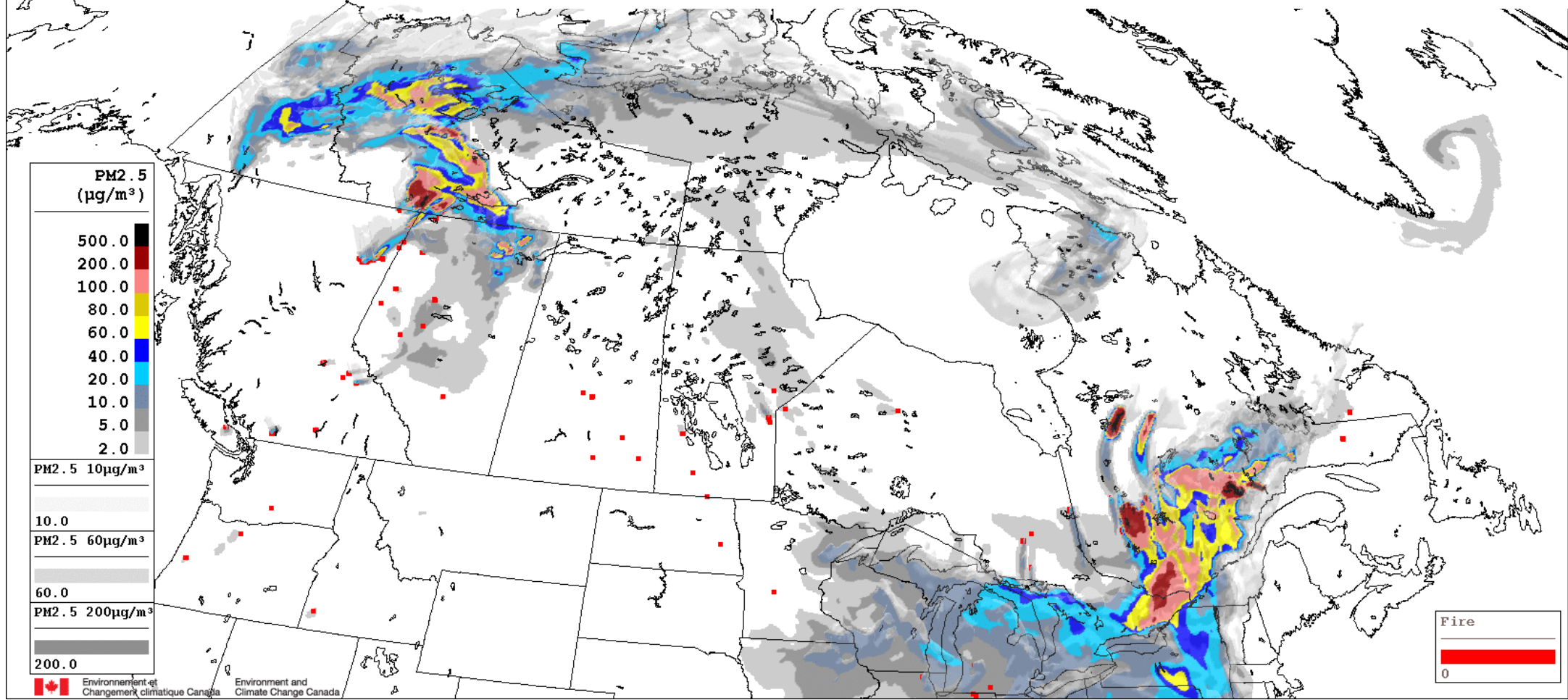
- A prolonged period of hot weather will once again enhance mid to high elevation snow melt leading to a response in river systems
- Potential increase in fire danger from a period of hot temperatures and dry conditions
- Localized areas of poor air quality from wildfire smoke under a hot and stagnant air mass
- Potential health impacts from early season heat



most in each valley;
partnership

ECCC RAQDPSFW Forecast Fire PM2.5
06/06/2023 00:00 UTC
05/06/2023 18:00 MDT

SMOKE FORECAST, JUNE 06, 2023



FireWork 3-day forecast provided early indications of significant AQ degradation over Southern Canada and NE USA.

AIR QUALITY HEALTH INDEX: AQHI

Developed and implemented in a collaboration between ECCC and HC/BCCDC

WILDLAND FIRE → SMOKE → AIR QUALITY HEALTH RISKS

- higher exposures both near and far
- Wildfire are leading cause of air pollution
- Health Canada estimates annual health impacts of air pollution from all sources (including PM_{2.5}, NO₂, and ozone) as:
 - 15,300** premature deaths
 - 2.7 million** days of asthma symptoms
 - 35 million** days of acute respiratory symptoms
- Evidence suggests a **doubling of wildfire smoke** this century due to climate change



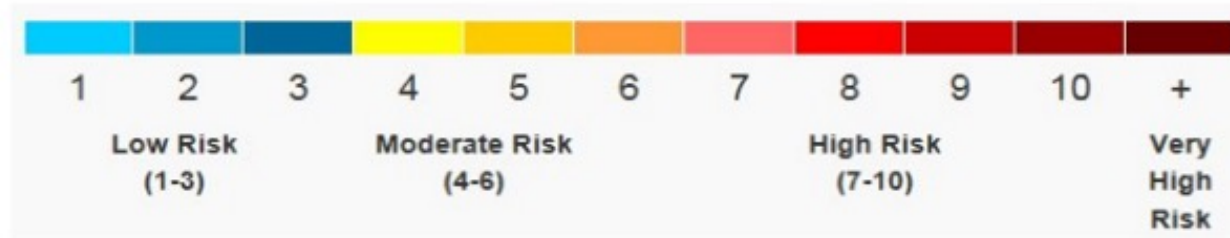
The Air Quality Health Index (1 – 10+)

Canadian innovation to communicate air quality with level of health risks for at-risk and general population.

↑ higher index = ↑ risk to health

What is the scale of the AQHI?

The AQHI is calculated and reported on a scale ranging from 1-10+. The AQHI index values are grouped into health risk categories as shown below. These categories help you to easily and quickly identify your level of risk.



Available on weather.gc.ca and [WeatherCan](#) app



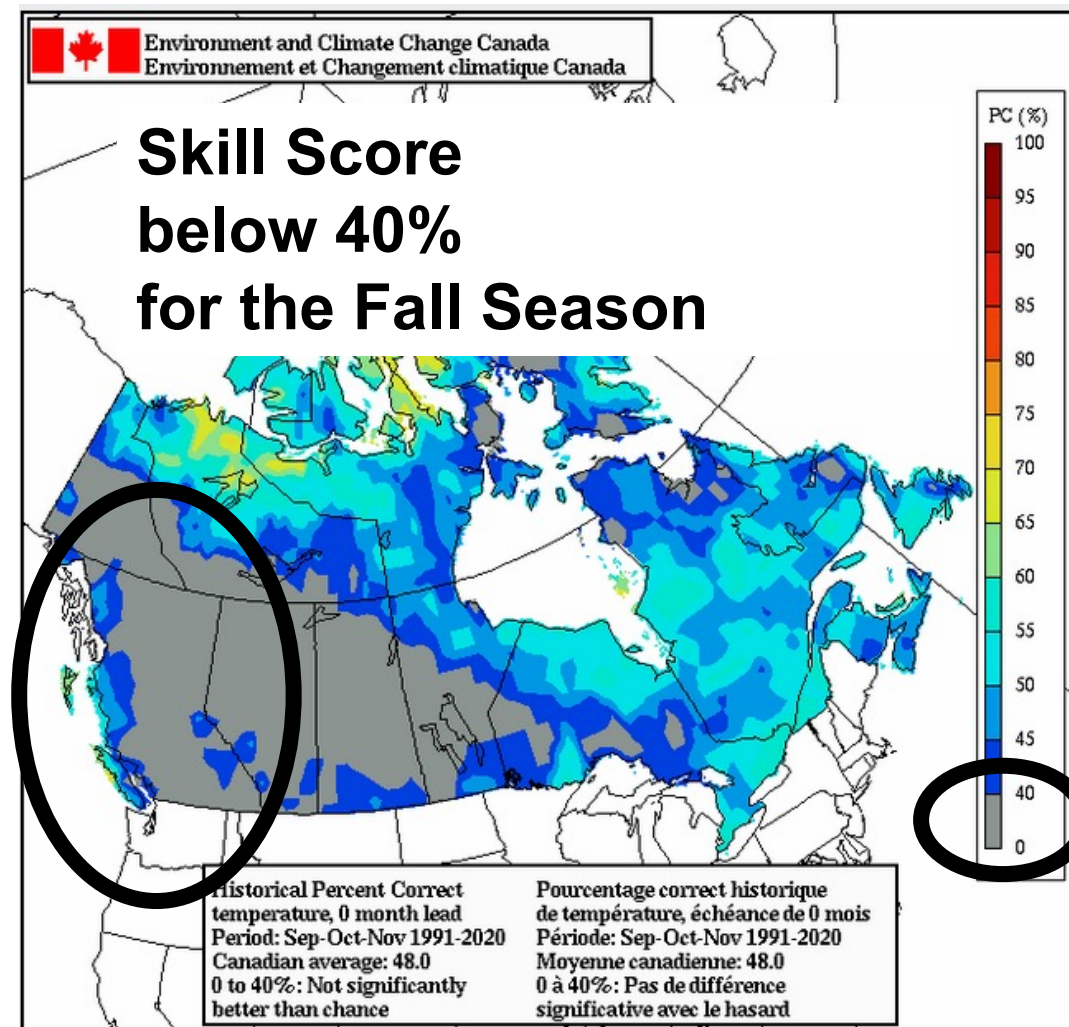
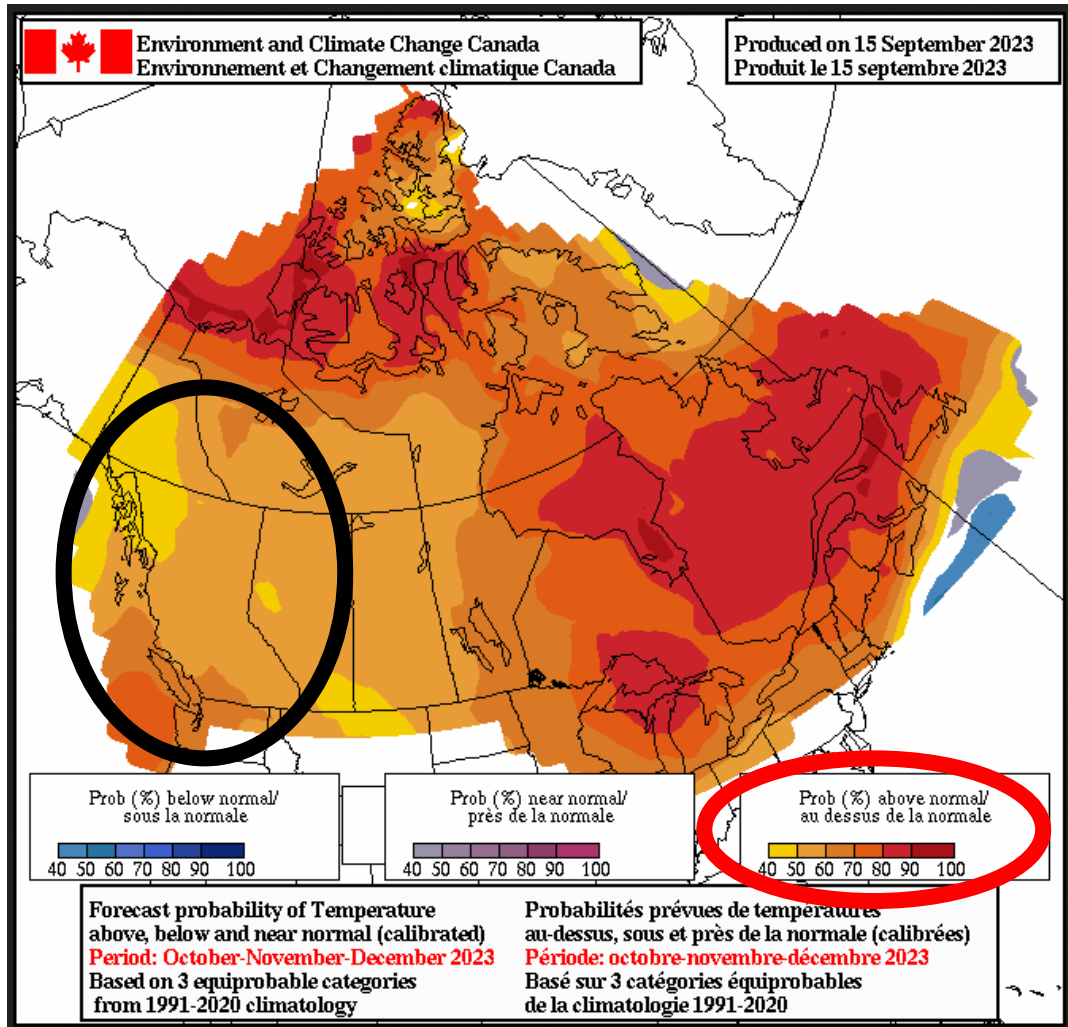


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Canada 

October – November – December Temperature Probabilities.



ENSO Alert System Status: El Niño Advisory 95% favoured Jan – March period

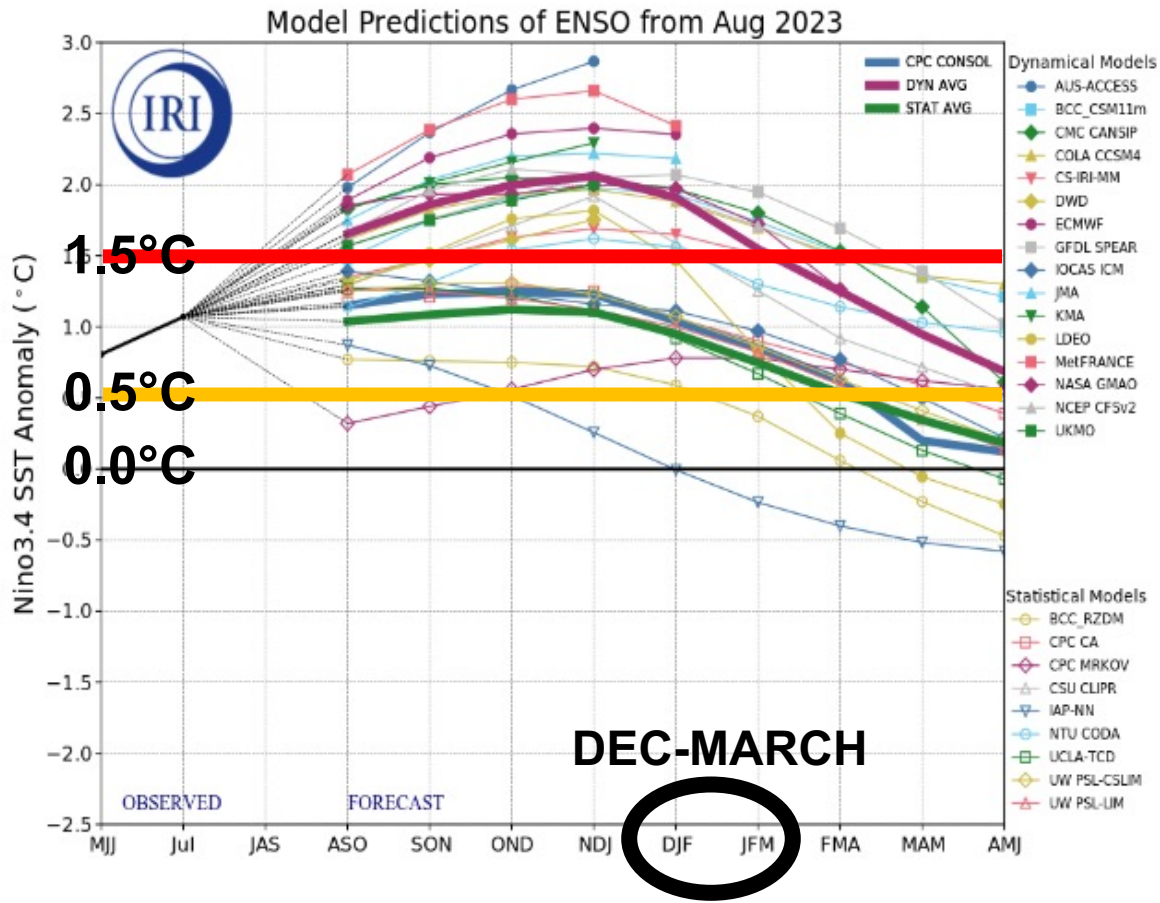
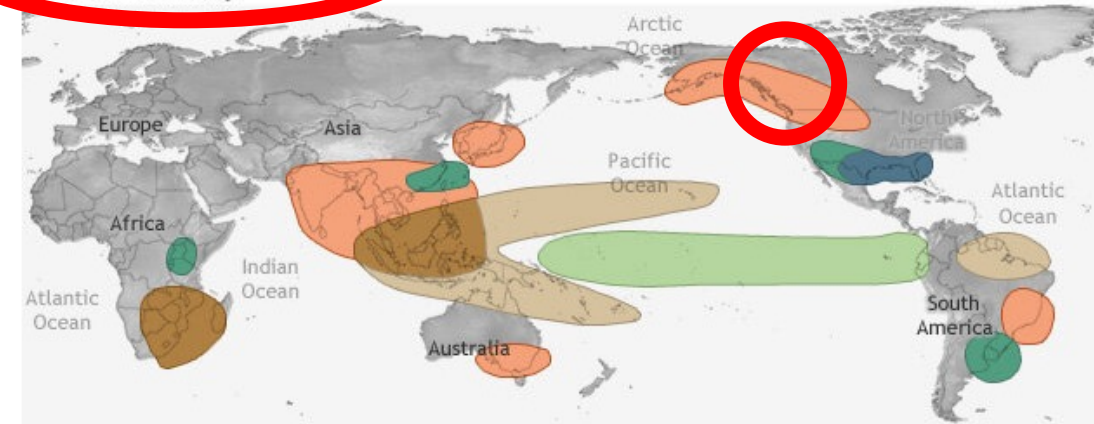
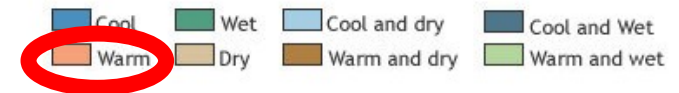
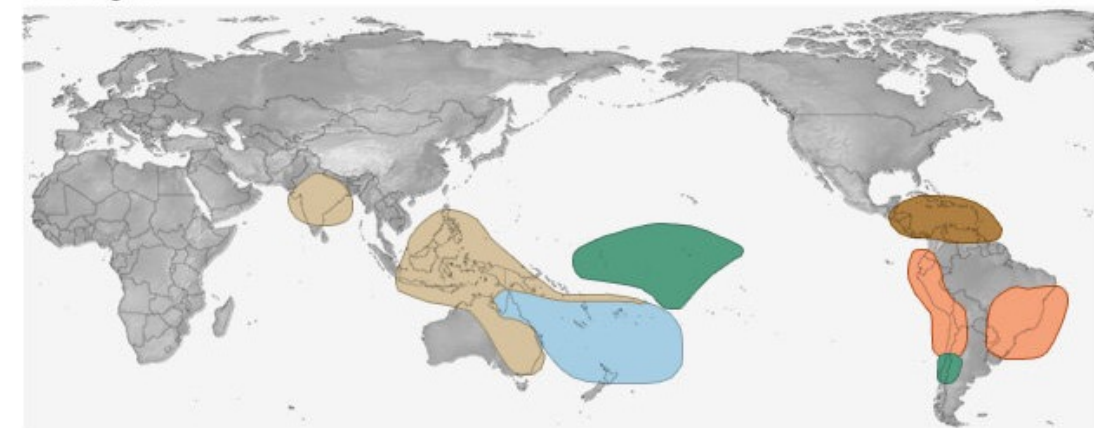


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 19 August 2023).

EL NIÑO CLIMATE IMPACTS



June-August



These maps show winter and summer global ENSO impacts.

Merci Thank you

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**Weather Notification
Distribution list for
EMO**

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