Wildfire Season Forecast 2024

Richard Carr, Wildland Fire Research Analyst, Natural Resources Canada, Canadian Forest Service
2023 in Review
Quote and Media Response: May-Sept, 2023

• “I don’t want to comment on that since the numbers are changing so fast they are quickly outdated.”
  - Richard Carr, comment on area burned during an unnamed media request

• Print media articles quoting NRCan-CFS researchers:
  • Total number of media requests: 450+
  • Total number of media articles: 5,500+
  • Daily record-high of media articles published: 545+
  • Daily average of media articles: 40
  • Number of countries with outlets: 34
  • Languages interviewed in or translated to: 22
2023 Fire Season Summary

Area burned estimates based on hotspots

Big spike in June and again Sept 22

Area burned is often small in early spring and late summer (low amplitude of colored lines in these periods)
2023 Fire Season Summary

August-Sept: Wind events in northern BC/AB/NT. Much area burned end of August/start of September and September 22

July: NT/YT

June: ON/QC

April-May: west central AB, northeast BC, central SK, NT, NS

June 27: Breaks previous national record area burned

Source: Canadian Wildland Fire Information System
Some Records set in 2023

• Record area burned: BC, NT, AB, QC, NS

• Largest fires on record: BC, NS, QC

• CIFFC National Preparedness Level (NPL) at 5 May 11 to September 7 (earliest, longest on record at 120 days)

  1  2  3  4  5

  • International crews from 11 nations over season

• Smoke alerts (ECCC)

• Evacuations (~270) and evacuees (~230,000)
2023 Lead-up/factors: Ocean/atmosphere

- Quick transition to El Niño after extended La Niña
- “Warm negative” Pacific Decadal Oscillation (PDO)?
- Warm sea surface temperatures during 2023

September 7, 2023

https://www.ncei.noaa.gov/access/monitoring/pdo/
2023 Spring start-up conditions: Snow Cover

Affects spring fire more than summer

April 26, 2023

May 10, 2023

May 17, 2023
Drought Progression

• Drought intensified in late 2022

• Widespread intensification over summer

• Some improvement over winter
2024 Season to Date
Drought and Snow Cover

• April 30 drought assessment coming in a few days
• Probable improvement since March 31 in east, southern Prairies
• Snow melt appears slower than in 2023
El Niño fading

Cold water in eastern Pacific typical of a developing La Niña

North Pacific and Atlantic started cold in 2023 but 2024 La Niña may help cool north Pacific
### Fire problems in ENSO Springs

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#### El Niño:
- Warm, windy, dry in western Canada

#### La Niña:
- Arctic surface highs bring dry air, strong wind around edges
- Temperature may be cool

Summer fire problems may depend on other influences
Pacific Decadal Oscillation


http://climate.ncsu.edu/climate/patterns/PDO.html
North Atlantic Oscillation

https://www.ncei.noaa.gov/access/monitoring/nao

Quebec Area Burned (NFDB, ha*1000)

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Early years may not include area burned in northern (unmanaged) region
2023 Activity Continues: Holdover Fires

• aka “zombie” or “carryover” fires (latter also applies to delay between lightning strikes and fire arrival)

• Prolonged smoldering in deep organic layers

Heavy equipment working on hotspots on the southwest perimeter of the Basset fire (HWF058). February 12, 2024. [https://srd.web.alberta.ca/high-level-area-update/february-12](https://srd.web.alberta.ca/high-level-area-update/february-12); accessed April 22, 2024
Holdover Fires

• Winter remediation includes searching for heat signatures, turning over soil, applying water

• As of early 2024:
  • BC: ~90
  • AB: 55-60
  • NT: 2+

• BC and AB averages are probably <10 per year
Fire numbers and area burned by region

• Some regions with more fires but less area burned than average
• Still early in the fire season! (May 1 data)
2024 Seasonal Predictions
IRI ENSO Forecast

La Niña likely developing over summer

https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-sst_table

April, 2024

Time series to January 2024
Transition to La Niña: Recent analog years

• Area burned in 2016, 2017, 2019, 2020 (red arrows)
North American Multi-model Ensemble (NMME)

June Temp

GEM-NEMO often predicts cool
North American Multi-model Ensemble

NMME

June Precip

Dry central regions?
North American Multi-model Ensemble

NMME

Precip skills

Little skill and variation
North American Multi-model Ensemble
NMME

July Temp

Good agreement for normal to above normal
North American Multi-model Ensemble
NMME

July Precip

Ambiguous predictions
North American Multi-model Ensemble

NMME

August Temp

Continues normal to above normal signal
North American Multi-model Ensemble
NMME

August Precip

Mixed result continues
2024 NRCan-CFS Seasonal Prediction
Canadian Forest Fire Weather Index (FWI) System

Seasonal forecasts use the severity rating anomaly

**Fire Weather Observations**
- Temperature
- Humidity
- Wind
- Rain

**Fuel Moisture Codes**
- FFMC: Fine Fuel Moisture Code
- DMC: Duff Moisture Code
- DC: Drought Code

**Fire Behavior Indexes**
- ISI: Initial Spread Index
- BUI: Buildup Index

**Fire Danger**
- FWI: Fire Weather Index
- DSR/MSR/SSR: Severity Rating
Climate Ensemble Data: CanSIPS

• Models developed by Canadian Centre for Climate Modeling and Analysis
  • CanCM4i
  • GEM-NEMO: Global Environmental Multiscale – Nucleus for European Modeling of the Ocean

• 10-member ensembles producing 12-month forecasts

• NRCan uses temperature and precipitation data

• Skill of climate forecasts often best in coastal areas, poorer in lee of mountain ranges
NRCan-CFS Prediction: May run, for May/June

Anomaly

Predicted values normalized against average weather
NRCan-CFS Prediction: *May run, for July-Sept*

**Anomaly**

*Predicted values normalized against average weather*
Canadian Wildland Fire Information System (CWFIS)

Note: CWFIS website will change, likely in 2024-25
Conclusions and Reminders

• 2023 was likely an outlier statistically (2020’s opposite)

• Model synthesis indicates
  • Warm summer (may be common with warming climate)
  • Rainfall uncertain but La Niña may help boost amounts
  • Possible quieter July but active late summer

• Serious fires can occur in any year

• Fire activity depends on ignitions; our forecast only predicts where potential exists
Remember to check updates ...

• Seasonal forecast: first working day each month on CWFIS

• Daily conditions: provincial and/or CWFIS web sites
Questions?

Contact:

Richard Carr
Fire Research Analyst
Natural Resources Canada – Canadian Forest Service

Richard.Carr@NRCan-RNCan.gc.ca

5320 122 Street NW
Edmonton, AB, Canada
T6H 3S5
825-510-1265