

# Wildfire Smoke Forecasting Systems

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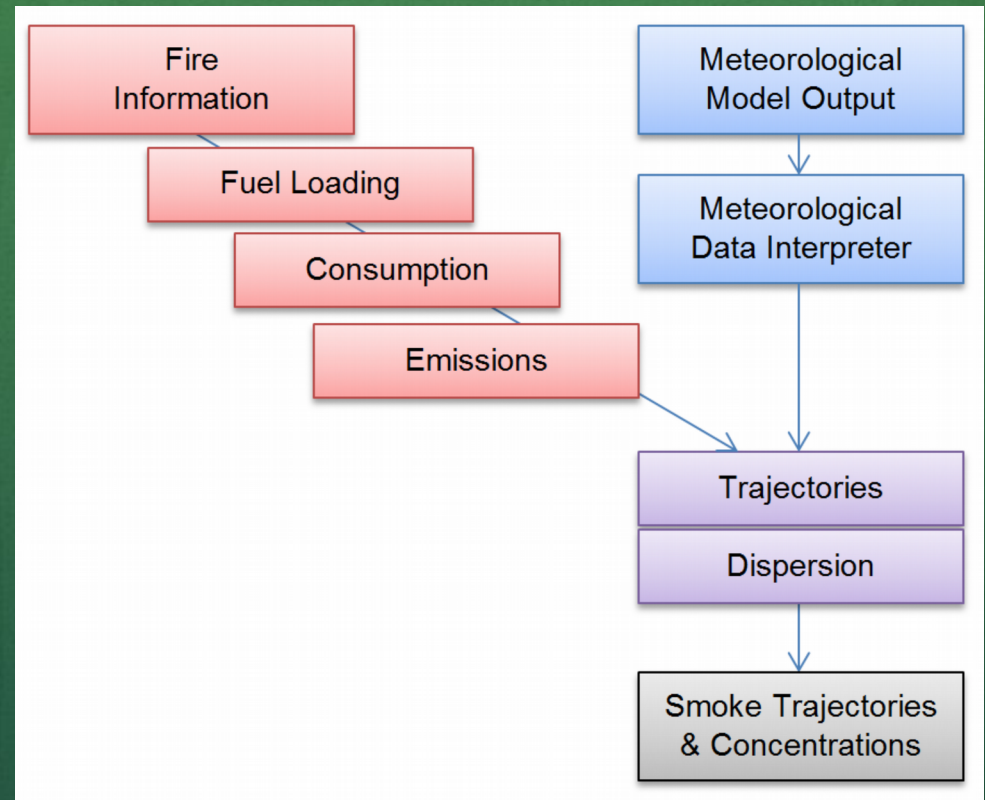
# Smoke Forecasts

- Ground level forecast of particulate matter 2.5 microns and smaller (PM2.5)
- Useful for predicting relative risk levels and areas of effect
- Accuracy depends on fire detection and weather forecasts
- Does not include air quality components



# Modeling System

- Satellite detection of hotspots
  - GOES (NOAA)
  - MODIS (NASA)
- Fire information added to hotspots (CWFIS)
  - Fuel type
  - Moisture codes
  - Drought code
  - Slope & aspect
- Meteorological forecasts
  - WRF (UBC)
  - RDPS (EC)





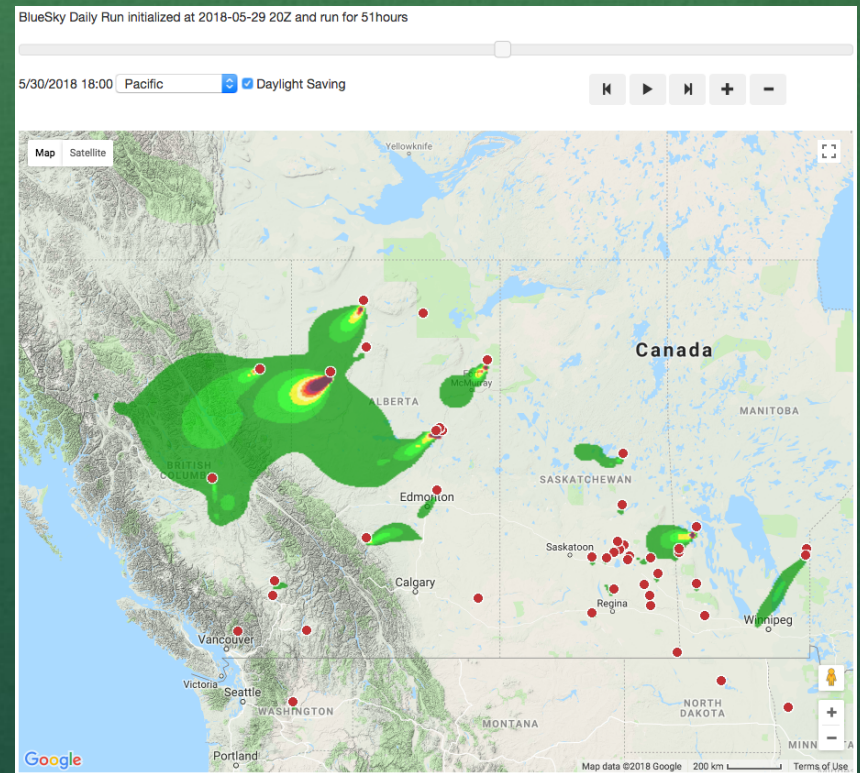
# BlueSky Canada (BSC)

Partnership between the Canadian Safety & Security Program (CSSP),

multiple provincial agencies, and the University of British Columbia

# BlueSky Canada (BSC)

- Canada-wide forecasts four times a day
- Interactive web forecast viewer
- Also consume forecasts via:
  - KMZ download
  - GeoServer WMS
  - Raw NetCDF
- [www.firesmoke.ca](http://www.firesmoke.ca)



# BlueSky Playground

- Ad hoc smoke modeling tool
- Prescribed burns
- Pile burns
- Wildfires

Canadian Playground

Home | My Emissions | My Dispersions | Feedback | Help

Logged in as blueop | Log Out

Home » My Emissions » demo1806 (Wildfire)

Models have executed successfully!

**Emissions** | Notes

**Inputs**

Latitude: .233460666237

Longitude: -122.76855468;

Target Size: 1000 ha

Map: Prince George, BC, Canada

Click here to query the [CWFIS Fuels Database](#) and determine the fuel parameters for this location (will open in a new tab/window).

Fuels: C2 - Boreal spruce

**Fire Weather Index**

Fine Fuel Moisture Code	89.0902
Duff Moisture Code	80.9986
Drought Code	252.6618
Initial Spread Index	5.81
Buildup Index	89.93
Fire Weather Index	20.47

**Fire Behavior Prediction**

Rate of Spread	7.09	m/min
Surface Fuel Consumption	3.22	kg/m <sup>2</sup>
Total Fuel Consumption	3.83	kg/m <sup>2</sup>
Head Fire Intensity	8146.62	kW/m

**Emissions**

PM <sub>2.5</sub>	204.31	tonnes
PM <sub>10</sub>	241.08	tonnes
CO	2409	tonnes
CO <sub>2</sub>	25998	tonnes
NO <sub>x</sub>	28.43	tonnes
GHGs	31330	tonnes CO <sub>2e</sub>

Buttons: Discard Changes, Apply, Create Dispersion, Fire Timing Info

- [www.firesmoke.ca/playground](http://www.firesmoke.ca/playground)

[Français](#)

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[Access city](#) | [Weather Topics](#)

## Canada's Wildfire Smoke Prediction System (FireWork)

### Daily smoke forecast maps from early April to late October

Smoke from wildfires in forests and grasslands can be a major source of air pollution for Canadians. The fine particles in the smoke can be a serious risk to health, particularly for children, seniors and those with heart or lung disease. Because smoke may be carried thousands of kilometres downwind, distant locations can be affected almost as severely as areas close to the fire. To help Canadians be better prepared, wildfire smoke forecast maps are available through the Government of Canada's FireWork system. FireWork is an air quality prediction system that indicates how smoke from wildfires is expected to move across North America over the next 48 hours.

- [Evening forecast](#): a computer-generated smoke animation that indicates how wildfire smoke is expected to spread hour by hour, for the next 48 hours (starting at 00:00 UTC<sup>†</sup> and updated at 05:30 UTC). One-hour steps in the animation can be viewed separately.
- [Morning forecast](#): a computer-generated smoke animation that indicates how wildfire smoke is expected to spread hour by hour, for the next 48 hours (starting at 12:00 UTC<sup>†</sup> and updated at 17:00 UTC). One-hour steps in the animation can be viewed separately.
- [Wildfire smoke and Air Quality](#): Effects of wildfire smoke on your health, actions you can take to protect yourself, and more about the FireWork prediction system.

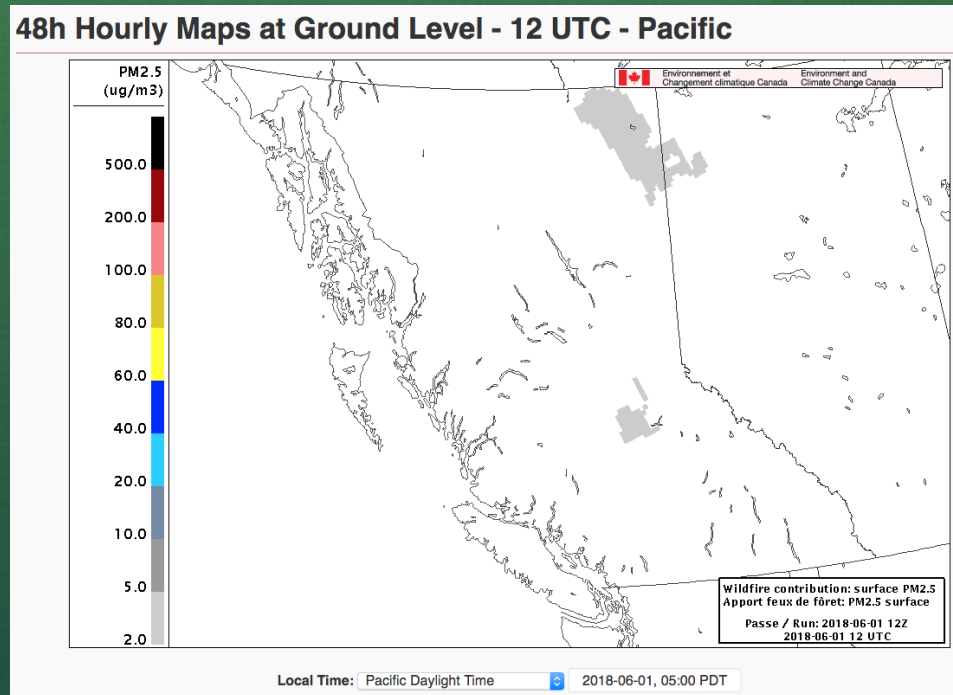
As fire and smoke conditions can change quickly, always check with your local health and emergency officials for the latest developments.

# FireWork

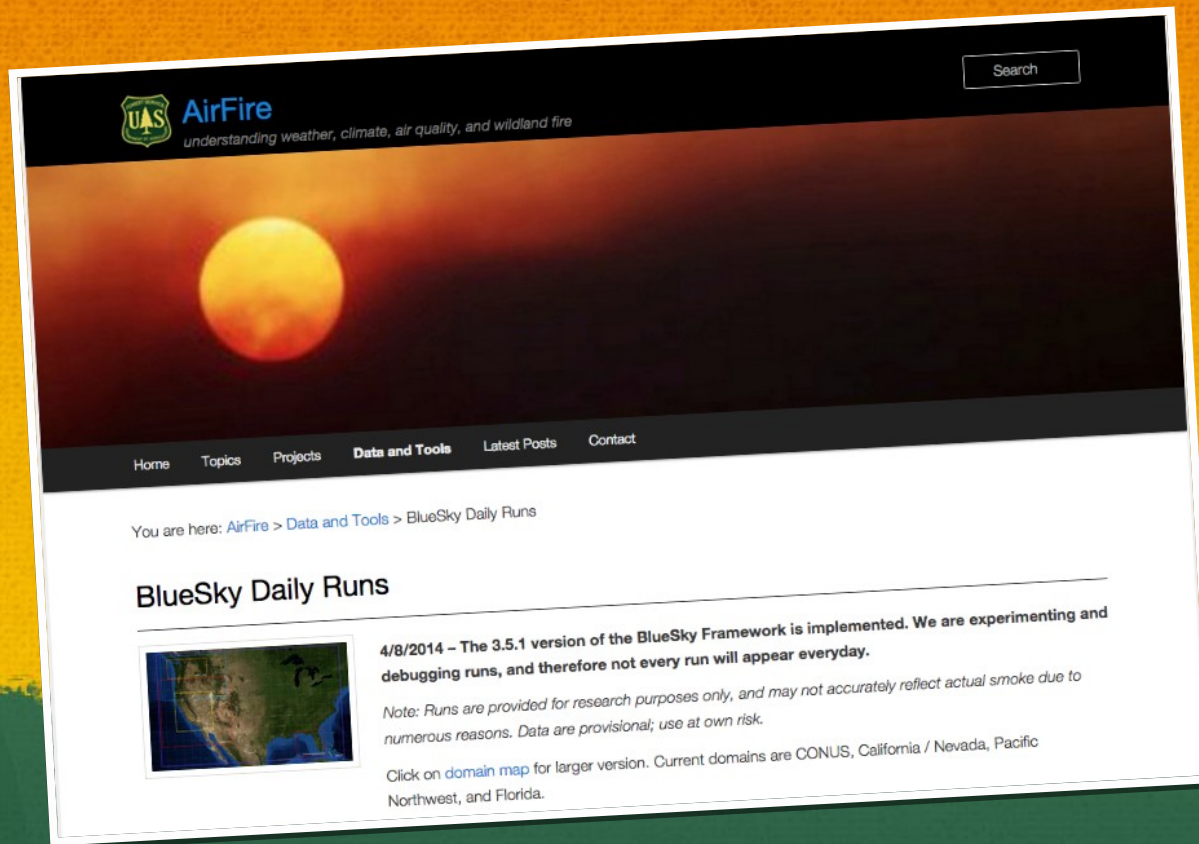
Environment Canada

# FireWork

- Canada-wide forecasts twice a day
- Forecast WMS
- Incident forecasting service
- [www.weather.gc.ca/firework](http://www.weather.gc.ca/firework)







# AirFire

AirFire Research Team  
U.S. Forest Service (USFS)

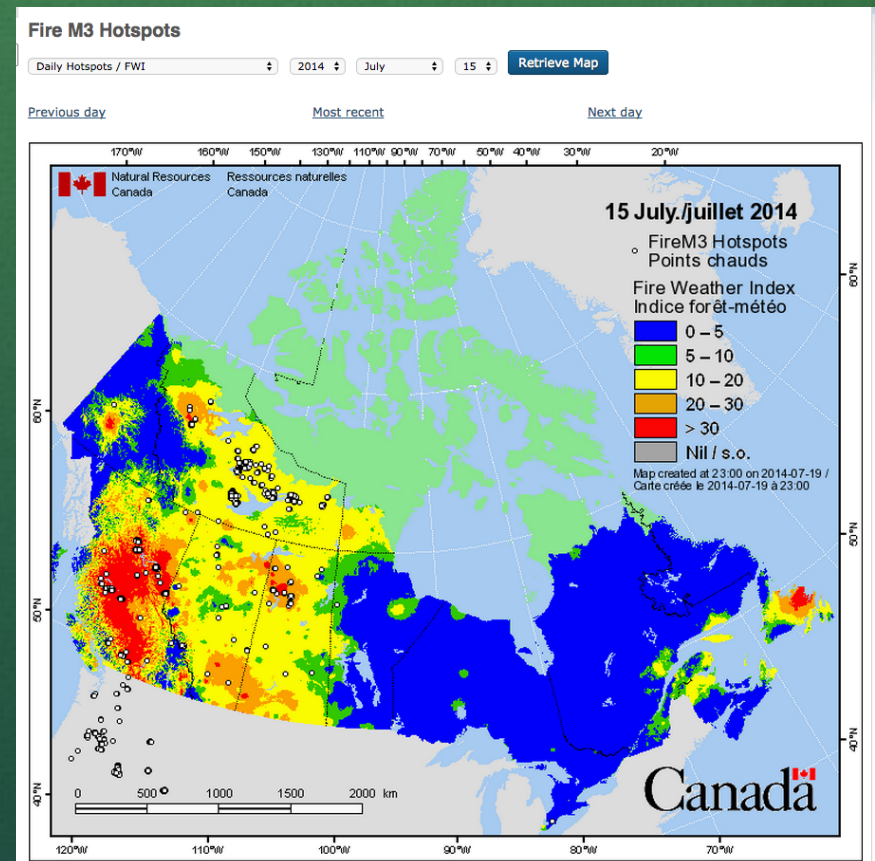
# AirFire

- Air Resource Advisors
- Smoke forecasts (BlueSky framework)
  - Point & regional
  - Trajectories
- Air quality tools
- Playground – smoke simulations
- [airfire.org](http://airfire.org) (team site, smoke forecasts)
- [firesmoke.us](http://firesmoke.us) (tools portal)

The screenshot shows the 'Wildland Fire Air Quality Tools' portal. At the top, it says 'WFDSS Integrated Tools v0.9 (Beta Test)' and includes a status update from 2/6/13. The main content is divided into two steps: 'STEP 1: Set your fire location:' which features a Google Map of the Pacific Northwest with a red pin and input fields for latitude (47.50) and longitude (-115.00); and 'STEP 2: Select Your Tool:' which lists various tools like 'Smoke Guidance Point Forecast', 'Smoke Guidance Regional Maps', and 'Diurnal Surface Wind Pattern Analysis'. Below this is a 'Tool List' section with a filter sidebar on the left. The selected tool is 'Smoke Guidance Point Forecast', which provides a localized text summary of atmospheric conditions and a table of predicted conditions at the user's location. The table includes metrics like Forecast duration, Mixing height, and Haines Index. A sidebar on the right lists attributes such as 'INSTANT ACCESS', 'EASY TO USE', 'LOCALIZED', 'TEXT', and 'ATMOSPHERIC CONDITIONS'.

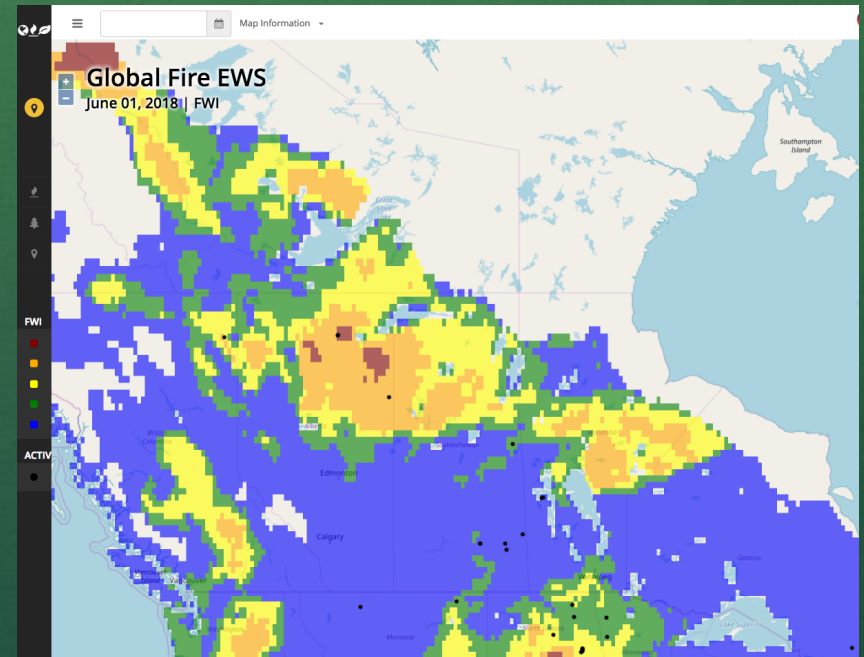
# Canadian Wildland Fire Information System (CWFIS)

- Daily maps
  - Fire weather & fire behavior (year-round)
  - Hot spot maps (during forest fire season)
- Datamart
  - National Fire Database (polygon & point data)
  - Hot spots & ground reports (daily download)
- [cwfis.cfs.nrcan.gc.ca](http://cwfis.cfs.nrcan.gc.ca)



# Global Fire Early Warning System

- 1-10 day fire weather index (FWI) forecast
- Displays FWI with hotspots
- Collaboration between University of Alberta, NRCan, CMC
- [canadawildfire.ualberta.ca](http://canadawildfire.ualberta.ca)



# NOAA Hazard Mapping System (HMS)

- Analysis
  - Interactive GIS tool
  - Maps & Google Earth files
- Satellite imagery
  - GOES & active fires (NOAA)
  - MODIS (NASA)
- [www.ospo.noaa.gov/Products/land/hms.html](http://www.ospo.noaa.gov/Products/land/hms.html)



# Recap

Organization	aka	URL
BlueSky Canada	BSC	<a href="http://www.firesmoke.ca">www.firesmoke.ca</a>
EC Firework	FireWork	<a href="http://www.weather.gc.ca/firework">www.weather.gc.ca/firework</a>
USFS AirFire Lab	AirFire	<a href="http://www.airfire.org">www.airfire.org</a>
Canadian Wildland Fire Information System	CWFIS	<a href="http://cwfis.cfs.nrcan.gc.ca">cwfis.cfs.nrcan.gc.ca</a>
Global Fire Early Warning System	EWS	<a href="http://canadawildfire.ualberta.ca">canadawildfire.ualberta.ca</a>
NOAA Hazard Mapping System	HMS	<a href="http://www.ospo.noaa.gov/Products/land/hms.html">www.ospo.noaa.gov/Products/land/hms.html</a>

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