

ASSOCIATION OF CANADIAN MAP LIBRARIES AND ARCHIVES  
**BULLETIN**

## Geospatial Data and Software Reviews

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### Canadian Forest Fire Data

In this installment of the Software and Datasets column we review sources of Canadian forest fire data. 2018 was a particularly active year for forest fires in Canada. As of the end of August, British Columbia had set a new record for square kilometers burned, surpassing the previous record set in 2017 and burning 50% more than the 3rd most incendiary season since record keeping began<sup>1</sup>. Ontario saw almost twice as many individual fires and more than double the area burned relative to the 10-year average<sup>2</sup>. As climate change intensifies and if it does lead, as many predict it will, to a worsening of natural disasters such as forest fires, we can expect increased interest in Canadian forest fire data from various quarters.

The **Canadian Wildland Fire Information System (CWFIS)** is “a computer-based fire management information system that monitors fire danger conditions across Canada”<sup>3</sup>. The CWFIS is administered by the Canadian Forest Service (CFS), part of Natural Resources Canada (NRCAN). The CWFIS has two chief activities: monitoring current fire activity and providing historical fire data.

The CWFIS provides data on current conditions largely through remote sensing of hotspot data using the Fire M3 (Monitoring, Mapping, and Modeling System) to interpret satellite imagery, supplemented by meteorological data, local observation, and data shared by local fire agencies. The CWFIS website also provides both summary and detailed background information on the various indices and modeling systems it uses to provide current fire conditions<sup>4</sup>.

The CWFIS website provides daily, static on several topics, including Fire Weather, Fire Behavior (sic), and Fire M3 Hotspots. The combination of weather, behaviour, and hotspot data allows the CWFIS to forecast fire danger on a 6-point scale, also available as a map on the website. There is also an Interactive Map<sup>5</sup> built on the NRCAN Web Mapping Service which may be familiar to users of other Government of Canada websites. Both the static and interactive maps feature multiple layers which may be toggled and allow users to retrieve maps for specific dates. The static maps may be downloaded by right-clicking and save the image files, although this is not possible with the Interactive Map and there is no direct download for the GIS data underlying each map.

<sup>1</sup><https://www.cbc.ca/news/canada/british-columbia/state-emergency-bc-wildfires-1.4803546> All links retrieved November 14, 2018.

<sup>2</sup><https://www.ontario.ca/page/forest-fires>

<sup>3</sup><http://cwfis.cfs.nrcan.gc.ca/home>

<sup>4</sup><http://cwfis.cfs.nrcan.gc.ca/background>

<sup>5</sup><http://cwfis.cfs.nrcan.gc.ca/interactive-map>

Historical fire data takes two forms: a series of static maps and the CWFIS Datamart of downloadable GIS datasets<sup>6</sup>. The Canadian National Fire Database (CNFDB) point and polygon datasets are the most significant GIS datasets available: they consist of shapefiles aggregated and harmonized from data provided by provincial and territorial fire agencies (except Nunavut and PEI) and Parks Canada. The CNFDB does not include Fire M3 data or other observations from the CFWIS.

The most recent CNFDB polygon dataset<sup>7</sup> includes 55,094 objects dating from 1917 to 2017 harvested from a variety of sources; as one might expect, coverage for the early dates is sporadic and only data for BC is available for the first several decades. The shapefile attributes include size/area (often both calculated and reported), providing agency, date, cause, data source, and some additional information; however, not all attributes are available for all fires. The most recently point dataset<sup>8</sup> includes 386,355 objects dating from 1930 to 2017. Attributes are comparable to those for the polygon dataset except for the lack of data source information.

The CWFIS Datamart also includes the National Burned Area Composite (NBAC) database which “tracks forest fires for annual estimates of carbon emissions and to help identify National Forest Inventory plots that may have been disturbed by fire”<sup>9</sup>. NBAC shapefiles are available for each year from 1986 to 2017<sup>10</sup>; unlike the CNFDB files, the NBAC files are no cumulative. Attributes include source of detection, method of data capture, fire cause, dates of first and last detection, dates for fire start and end, and area burned. Unlike the CNFDB files, users will need the data dictionary to interpret the NBAC files; the data dictionary is available through the metadata page.

There are three types of historical, static map: outputs from the CNFDB, Fire Weather Normals, and Fire Behaviour Normals. The CNFDB maps page also includes a comparison to statistics from the Canadian Council of Forest Ministers’ National Forestry Database (NFD)<sup>11</sup>. The NFD<sup>12</sup> also collects information on area burned and number of fires from local agencies, although these statistics are reported as bottom line figures to the NFD and are not directly calculated from maps of fires, hence the discrepancy with the statistics calculated by the CNFDB from the more granular data about individual fires. Consequently, there is no GIS data corresponding to the NFD’s statistics.

While the CWFIS does provide current condition data, this data is mostly generated from remote sensing. As a result, current season CWFIS data will vary from the data generated by local fire agencies. For the most recent and detailed information about current fire conditions, users should consult with their provincial/territorial fire agencies and/or Parks Canada. There is no standard practice for generating, describing, or disseminating forest fire data. Data availability and richness will vary from agency to agency, as we will see in this brief sample of some agencies’ practices.

<sup>6</sup><http://cwfis.cfs.nrcan.gc.ca/datamart>

<sup>7</sup>Dated July 26, 2018.

<sup>8</sup>Dated September 25, 2018.

<sup>9</sup><http://cwfis.cfs.nrcan.gc.ca/datamart/metadata/nbac>

<sup>10</sup>As of November 14, 2018.

<sup>11</sup><http://cwfis.cfs.nrcan.gc.ca/ha/nfdb>

<sup>12</sup><http://nfdp.ccfm.org/en/index.php>

In Ontario, forest fires fall under the jurisdiction of the Ministry of Natural Resources and Forestry (MNR). The MNR maintains two chief resources for current season fire activity: a static web page with textual information on current fires<sup>13</sup> and an interactive Forest Fire Info Map built on the Land Information Ontario (LIO) mapping platform<sup>14</sup>. The Forest Fire Info Map draws from the internal computer program used by the MNR to track fires and updates in real time. When reports of new fires are called into the MNR, the Ministry investigates the report and, if confirmed, the fire is entered into the database. The map shows only current year fires, whether active or extinguished - as of November, 2018 the map provides information on 1372 fires. As of 2018, perimeters are provided for fires above 40 hectares in size. Current year data cannot be downloaded from the mapping tool; however, data is archived in and available in shapefile format through the LIO's data warehouse as the Fire Disturbance Area and Fire Disturbance PT datasets. The datasets available at time of writing had been updated at the end of February, 2018 to include 2017 fire data.

In other provinces, BC and Alberta follow similar practices, including static information pages as well as interactive maps of current fire activity. Alberta Wildfire<sup>15</sup>, a branch of the ministry of Agriculture and Forestry (AAF), uses an ArcGIS Online-based interactive application to map current fires<sup>16</sup> and generates daily static maps for fire danger and forecasts<sup>17</sup>. Historical Alberta wildfire data is also available as a shapefile<sup>18</sup>. The BC Wildfire Service<sup>19</sup> likewise uses an ArcGIS Online-based system for viewing current fire status<sup>20</sup> and provides access to historical data as well<sup>21</sup>.

To find out about fire management and forest fire data available for other provinces/territories and for Parks Canada, users may consult the list of links to Canada's forest fire agencies are available through the website of the the Canadian Interagency Forest Fire Centre (CIFFC, pronounced "siffs")<sup>22</sup>.

Although the CWFIS harmonizes data from provincial/territorial fire agencies and Parks Canada, there is currently no data standard for sharing forest fire data among agencies. As a result, provincial data may be altered and some additional information lost when it is harmonized and incorporated into the CNFDB; some agencies do not collect or provide some attributes included in the CNFDB. However, there is a data integration and standardization project to facilitate the exchange and dissemination of data underway through CIFFC. As a result, we may see more consistent forest fire data produced across the country in the coming years.

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<sup>13</sup><https://www.ontario.ca/page/forest-fires>

<sup>14</sup>[http://www.gisapplication.lrc.gov.on.ca/ForestFireInformationMap/index.html?site=AFES\\_ONLine&viewer=AFES\\_ONLINE](http://www.gisapplication.lrc.gov.on.ca/ForestFireInformationMap/index.html?site=AFES_ONLine&viewer=AFES_ONLINE)

<sup>15</sup><http://wildfire.alberta.ca/default.aspx>

<sup>16</sup><http://wildfire.alberta.ca/wildfire-status/status-map.aspx>

<sup>17</sup><http://wildfire.alberta.ca/wildfire-status/danger-forecast.aspx>

<sup>18</sup><http://wildfire.alberta.ca/resources/historical-data/spatial-wildfire-data.aspx>

<sup>19</sup><https://www2.gov.bc.ca/gov/content/safety/wildfire-status>

<sup>20</sup><https://governmentofbc.maps.arcgis.com/apps/MapSeries/index.html?appid=ef6f11c8c36b42c29e103f65dbcd7538>

<sup>21</sup>[https://catalogue.data.gov.bc.ca/organization/9165d2c2-37f8-4750-a980-8d735bcd091b?license\\_id=2](https://catalogue.data.gov.bc.ca/organization/9165d2c2-37f8-4750-a980-8d735bcd091b?license_id=2)

<sup>22</sup>[http://www.cifc.ca/index.php?option=com\\_content&task=view&id=42&Itemid=79](http://www.cifc.ca/index.php?option=com_content&task=view&id=42&Itemid=79)