## SCANFI: Improved Mapping of Canada's Forests

Accurate data on Canada's 362 million hectares of forests is crucial for developing climate change mitigation measures for forest ecosystems, and for managing these forests in a sustainable manner. Since forest management falls under the jurisdiction of the provinces and territories, with differing methods and standards, it is difficult to have uniform forest inventory data across Canada. To overcome this lack of information, a Canadian Forest Service research team developed SCANFI (Spatialized CAnadian National Forest Inventory) to spatialize Canada's forest inventory.

How the Project Began

In the early 2000s, the Government of Canada, in partnership with the provinces and territories, launched the National Forest Inventory (NFI), which established a grid of nearly 20,000 photo-interpreted plots across Canada's non-arctic territory. In 2014, these plots were used to produce the first consistent and statistically reliable national mapping of forest attributes such as tree canopy density and species composition. However, this first version had its limitations, notably the lack of plots in Canada's northern territories and this inventory's low spatial resolution (250 m), which was insufficient for many applications. The latest version of the NFI and SCANFI have filled these two gaps.

How SCANFI Works

SCANFI enables the simultaneous and consistent mapping of several attributes related to vegetation structure and composition, such as land cover type, canopy height, crown closure, aboveground tree biomass, and major species composition, at a resolution of 30 m across Canada. It also allows estimates to be included for areas of the country where few forest inventories have been carried out before, such as
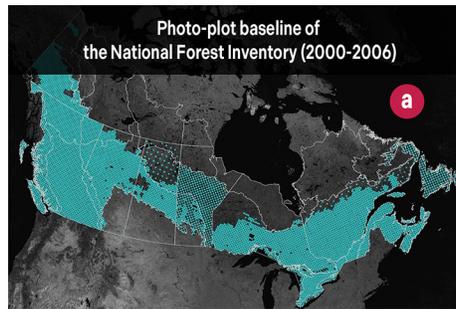
The National Forest Inventory (NFI) photo-plot baseline dataset used for the first national imputation (a) and new photo-plot remeasurement (b). The area in purple is led by the Canadian Forest Service.
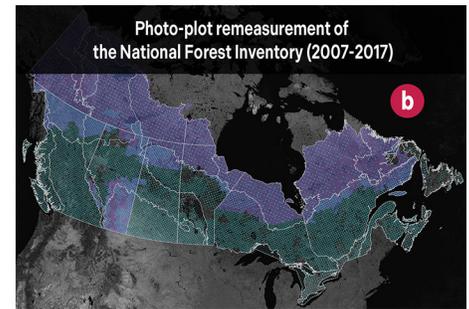
the northern boreal forests and the forests of the Prairies.

The maps generated by SCANFI are based on the latest NFI plot dataset, temporally harmonized summer and winter Landsat spectral imagery, and hundreds of regional models. SCANFI's pixel size (30 m) is comparable to that of traditional 400 m² forest inventory plots, and smaller than forest inventory polygons, whose size is generally measured in hectares. SCANFI's resolution facilitates validation and comparative studies with standard forest inventory data. SCANFI makes it possible to produce maps from 1985 to the present day, and with the continued use of the Landsat sensor,

SCANFI can be produced for years to come, offering a portrait beyond the current 40 years. SCANFI's historical maps provide a better understanding of current forest changes, pre-fire stand composition, and landscape changes related to various disturbances.

A Valuable Tool for Forest Fires Management

Most provincial and territorial agencies aim to use predictive fuel consumption maps for fire behavior at 100 m resolution to generate forest fire growth models. As the first map of the structure and composition of Canada's forests at 30 m resolution, SCANFI meets this need.

For example, a national map of fuel types in Canada was developed using SCANFI, data from Canada's ecozones, and the National Burned Area Composite. This dataset can be used to characterize Canada's forests in terms of fuel types, for use in fire behavior prediction calculations, and to better understand fire risk on a national scale.

SCANFI has also enabled large-scale studies of more intense and longer forest fire seasons in recent decades. A recent study showed that fuel aridity was the most influential factor in fire severity, that summer months were more conducive to serious fires, and that northern regions were the most affected by climate change.
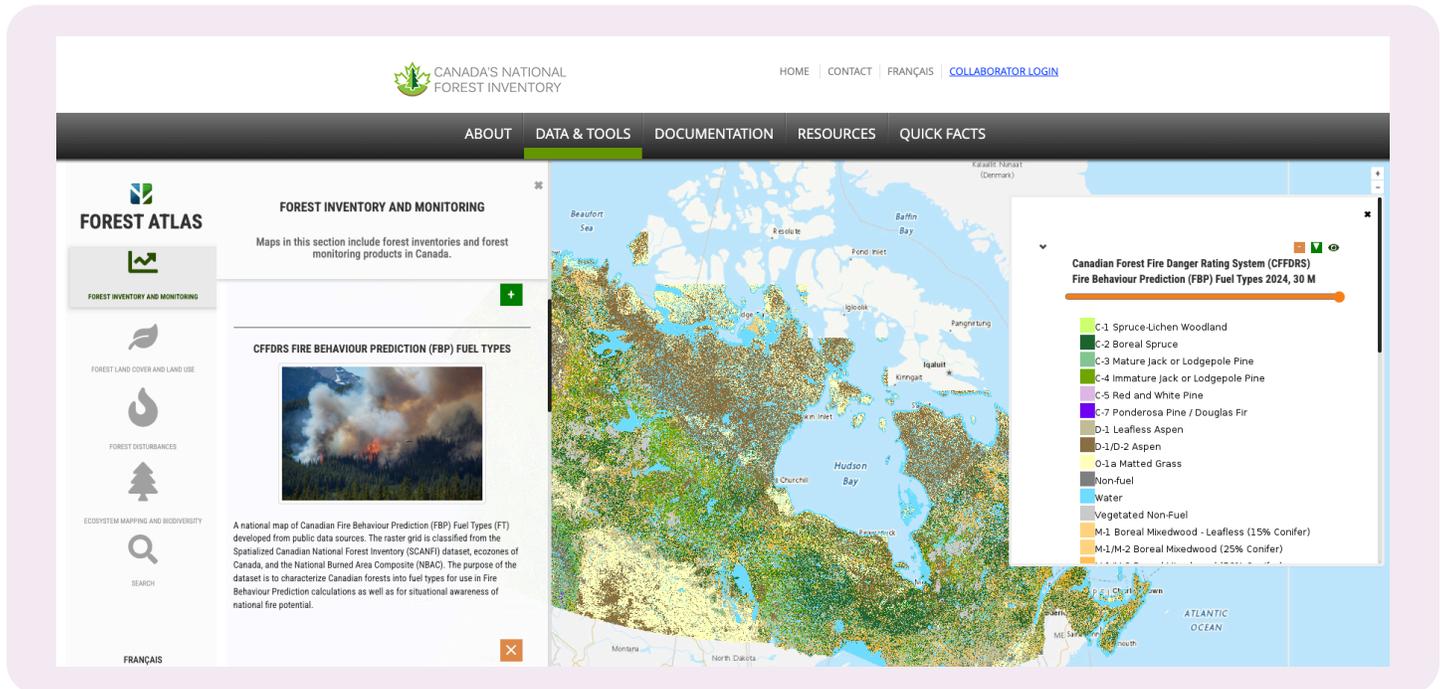
A national fuel type map developed from SCANFI and other data sources (a screenshot from the Canada's National Forest Inventory webpage www.nfi.nfis.org/en/maps)

Useful Links

The National Forest Inventory:
www.nfi.nfis.org/en/maps

The scientific paper :
www.cdnsciencepub.com/doi/10.1139/cjfr-2023-0118

For more information, please contact:

Luc Guindon
luc.guindon@nrcan-rncan.gc.ca

Laurentian Forestry Centre
1055 du P.E.P.S.
Quebec, QC G1V 4C7

Natural Resources Canada, Canadian Forest Service
www.natural-resources.canada.ca/forests-forestry

Aussi disponible en français sous le titre: *SCANFI : une cartographie améliorée des forêts canadiennes*