



Natural Resources  
Canada

Ressources naturelles  
Canada

Special Issue

Wildland Fire

4b

# Insights

Canadian  
Forest Service

Northern  
Forestry Centre

## Fire Severity in the 2014 Northwest Territories Fires

In the summer of 2014, the [Northwest Territories](#) experienced a truly exceptional fire season. More than 380 fires burned a record 3.4 million hectares — an area larger than Vancouver Island. Some fires burned so intensely that the areas resembled a lifeless desert once the fires were out (Figure 1). A team of researchers from the [Canadian Forest Service \(CFS\)](#) and the [University of Alberta](#) are investigating how the difference in burn severity in the 2014 wildfires may affect the ability of a forest to recover. They are studying vegetation species growing on the forest floor, tree species, and animals, birds and insects.



Figure 1. A patch of forest that burned at a very high intensity during a 2014 wildfire in [Wood Buffalo National Park](#). One year after fire, there is very little biomass remaining on site and few tree seedlings to ensure the re-establishment of the forest cover.

Marc-André Parisien, a research scientist with the CFS observes that “most of the 2014 wildfires burned in areas where there had not been any fires since 1980 (see Figure 2). This was likely due to the large amount of biomass that had accumulated over time. Wildfires that burned in areas that had been subjected to a more recent wildfire (i.e., a re-burn) were more likely to consume most or all of the biomass that remained from the last forest fire and produce desert-like conditions, where little to no regeneration took place.” Irrespective of where the fires burned, however, CFS researchers observed that there were sizeable areas of forest that were left partially or lightly burned, or left completely untouched. Explains Parisien, “These “islands” of forest left relatively untouched after a forest fire are referred to as fire refugia. Fire refugia play a crucial role in a heavily burned landscape because they provide critical habitat for fire-sensitive species, act as stepping stones for some others, and provide seed sources for post-fire forest recovery.”

Large wildfires, which have occurred in the northern boreal forest since the end of the last glaciation period, will undoubtedly continue to have a substantial impact—negative and positive—on the forest’s large-scale ecological processes. It is an ecosystem that is adapted to large and intense wildfires, but changes in fire regimes (i.e., crown fires versus ground fires, the amount and type of fuel burned, the amount of heat generated) lead to changes in the forests ecosystem and its ability to regenerate. In fact, wildfires are expected to accelerate the rate of climate-induced change by facilitating the transition of the current land cover to a novel vegetation type.

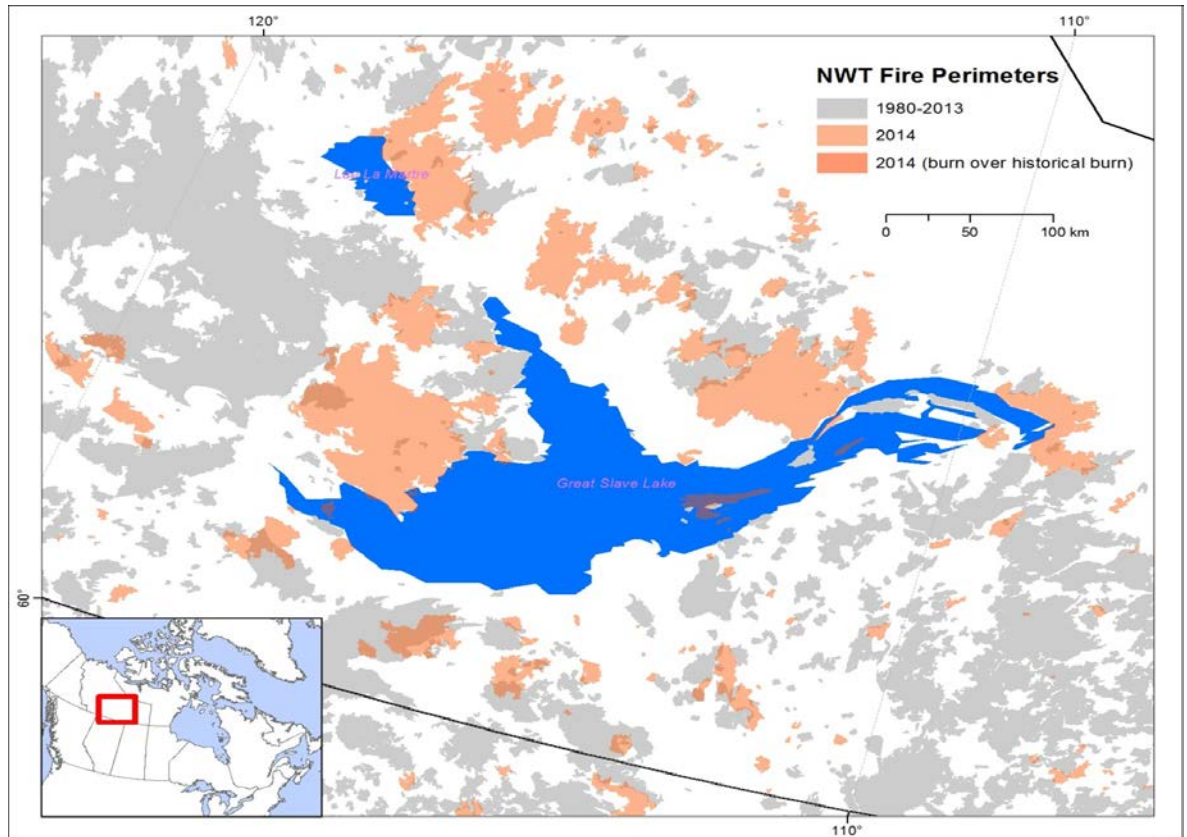


Figure 2. Map of the 2014 wildfires (in orange) in the Northwest Territories that burned 3.4 M ha. The grey areas represent the previous fires, from 1980 to 2013. Note there is minimal overlap (in dark orange) between the 2014 fires and previous fires, suggesting that the areas that had not burned recently had accumulated more biomass and were more likely to have burned.

“One of the objectives of our current research,” says Parisien, “is to examine whether the frequency of wildfires is increasing in the northern boreal forest and if high-severity patches are more widespread. We will do this by combining field observations with remote sensing and surveying technology. Once we have established how the vegetation responds to severely burned patches we will be able to estimate potential rates of vegetation change and, as such, be better equipped to predict the future of this sensitive biome.”

**Researchers:** [Dr. Marc-André Parisien \(marc-andre.parisien@canada.ca\)](mailto:marc-andre.parisien@canada.ca)  
[Ellen Whitman, MES \(ewhitman@ualberta.ca\)](mailto:ewhitman@ualberta.ca)  
[Dr. Dan Thompson \(daniel.thompson@canada.ca\)](mailto:daniel.thompson@canada.ca)

Aussi en français

To subscribe to *Insights*, please contact:

Ray Darwent  
Natural Resources Canada  
Canadian Forest Service  
Northern Forestry Centre  
Edmonton, AB, Canada

780-435-7279  
[nrcan.nofc-cfn.rncan@canada.ca](mailto:nrcan.nofc-cfn.rncan@canada.ca)  
[www.nrcan.gc.ca/forests](http://www.nrcan.gc.ca/forests)