



Wildland – urban interface fires

INTRODUCTION

Every year an average of 8 000 forest fires occur in Canada. Many of these fires burn where human property and lives are at risk. This area, where homes or other structures meet with or are dispersed within wildland vegetation, is known as the wildland-urban interface (WUI). Fighting WUI fires is more challenging and expensive than fighting regular wildland fires. These costs are expected to rise with changes in population distribution, including increased housing development in scenic wilderness areas and the expansion of cities, which will lead to an increase in the WUI area. Research in the US indicates that protecting an additional 125 homes would cost \$1 million for one fire of average duration. An increase in wildland fire frequency and intensity is also expected due to the effects of climate change.

Fires in the WUI have profound impacts on communities. Smoke from fires near settlements can affect human health and can result in evacuations that disrupt daily life. Most importantly, homes and lives can be lost in these fires. Many tragic WUI fires have occurred, including the recent fire in Slave Lake, Alberta in May 2011, where wildfire destroyed approximately one-third of the town and caused close to \$700 million in damages. While there were no fatalities in the Slave Lake fire, the 1916 Matheson Fire in Northern Ontario destroyed several towns and was responsible for 244 fatalities. In the 2011 fire season, over 4 000 people were evacuated from Northern Ontario communities because of either direct threat from fires or health concerns due to smoke.

While fire suppression on Crown land is the responsibility of provincial and territorial governments (with the exception of the federal government’s responsibility for fire fighting in National Parks), Natural Resources Canada, Canadian Forest Service provides an important research contribution that informs and enhances fire management activities.

GREAT LAKES FORESTRY CENTRE (GLFC) ROLE

Suppressing wildland fires at the urban interface is challenging due to numerous factors, including weather, fuels, human-caused fire ignitions, and the effects of competing land management objectives. In many areas, despite the potential for extreme impacts, current information about the location, extent and composition of the WUI area is lacking. Accurate knowledge of the WUI area and the fuel types involved can help mitigate fire suppression costs. This information is crucial for fire management agencies. Lynn Gowman, forest fire research specialist at GLFC, has been working to determine the amount of developed area at risk of forest fire and has mapped the WUI area at

a first-stage coarse scale for Ontario. This mapping was completed by combining data on housing location with that on burnable forest fuels. Building location data were obtained from the Land Information Ontario (LIO) database, while those on fuels were obtained from both the Provincial Fuels Database (derived from Landsat satellite images and Forest Resource Inventory data) and the GlobCover Land Cover map (classified MERIS FR satellite images).

In addition, each fuel type was assigned a “hazard potential”, since various types of fuels pose a range of risks. This additional information provided a more realistic estimate of the WUI area surrounding each structure than assuming a constant perimeter. A variable-width buffer, based on the assigned hazard potential, was then applied to each structure to determine the amount of WUI area surrounding it. Structures surrounded by a high hazard potential fuel (e.g., a black spruce or jack pine stand), were assigned the buffer’s maximum extent of 2400 m (which represents an average long-range spotting distance for wildland fires), while structures surrounded by a lower hazard fuel (e.g., sparse vegetation) were given a decreased buffer size. Non-burnable areas, such as water and urban areas were then removed to calculate the final WUI area (Figure 1).

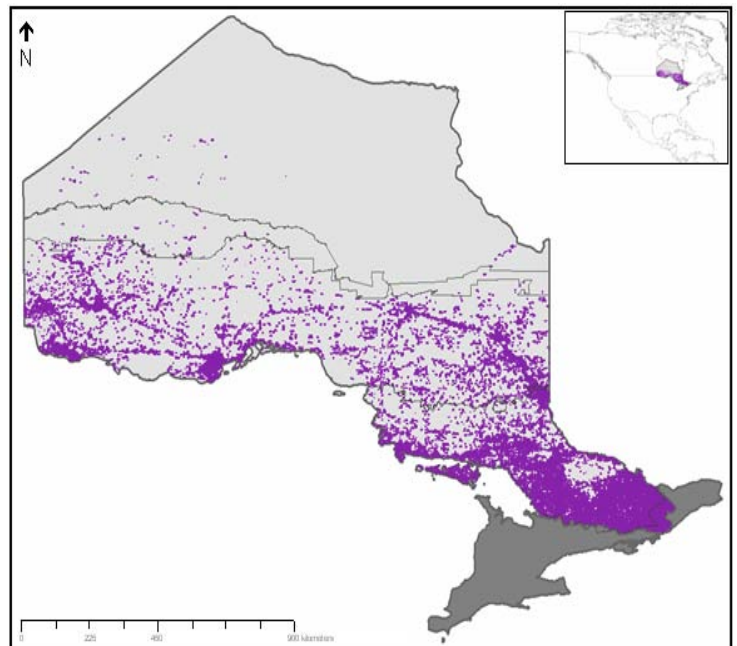


Figure 1. WUI in Ontario shown in purple. The study area is shown at top right. Southern Ontario was not included in the analysis (dark grey).

The results of this mapping exercise showed that over 9 million hectares of Ontario is WUI area, meaning that 11.5% of Ontario's burnable land has the potential for destructive interface fires. This is a significant land area, considering the potential impacts of WUI fires. Close to 80% of this WUI area was in vegetation types where it would be very difficult to suppress an intense forest fire. This was a key finding, since the majority of suppression activities in the WUI, are expected to be high intensity fires in complex fuel types.

Many agencies, municipalities and homeowners will share a common benefit from this project because it provides an estimate of the number and location of homes vulnerable to wildfires. For fire management agencies, it will provide a basis for rapid, strategic planning in an emergency fire situation. In turn this will reduce property damage and human risk. For municipalities, removing or modifying fuels is commonly used to protect communities from wildland fire. An increased understanding of the risk areas will aid in prioritizing work to suit limited budgets. For homeowners, actions such as keeping woodpiles away from homes and using fire-resistant building materials will help reduce the risk of property damage from a WUI fire. These and other prevention strategies are the basis of the FireSmart program, which provides information to help communities and homeowners to take action and protect their properties and adjacent natural resources from the risk of wildfires.

Future research will focus on improving the WUI estimates, as the map developed to-date provides only general fuel types. The map could be enhanced by providing details on fuel continuity or loads other than what is intrinsically built into the fuel type categories. It could be further improved by taking into account the effects of topography, fire suppression, landscaping features, or building characteristics, such as roof type. Upcoming research will focus on adding an element of "fire risk" by incorporating the probability of fire, vulnerability, and also the values and expected losses in the event of fire. In addition, future work at GLFC will aim to estimate future WUI area across Canada. This work is paramount when taking into account expected population growth, land use changes, and future fire activity patterns.

CONCLUSION

The WUI across Canada is expected to increase due to expansion of cities and shifts in settlement patterns. Additionally, climate change is predicted to increase fire activity and intensity. More frequent and severe WUI fires are expected, with a resulting need for increased suppression efforts. Fires in the WUI present a complex problem and involve many stakeholders, including homeowners, insurance companies, and all levels of government, an example of multifaceted solutions with multi-party involvement. While preliminary mapping of the WUI interface in Ontario has contributed to a greater understanding of this issue, more information on the WUI area in Canada is required. This will lead to enhanced community safety and also provide a baseline to detect future changes, which will allow us to prepare and adapt to new patterns emerging in wildland fire management.

COLLABORATORS

Ontario Ministry of Natural Resources

CONTACT INFORMATION

Lynn Gowman
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie, Ontario, Canada
P6A 2E5
Phone: 705-949-9461
Fax: 705-541-5700
E-mail: GLFCWeb@nrca.gc.ca
Web Site: <http://cfs.nrcan.gc.ca/centres/read/glfc>