

A hand in a white lab coat points at a digital interface. The interface features a grid of white dots and lines, with a blue line curving across the bottom. The background is a light gray with white wavy lines.

THOMPSON

Utilizing geographic information systems
(GIS) in wildfire mitigation

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Source: Adobe Stock Photo

THE SCIENCE

In an extreme wildfire event, the protection capabilities of any community depend on its wildfire preparedness planning, mitigation initiatives and wildfire management practices. Utilizing geographic information systems (GIS) in wildfire mitigation can significantly increase the effectiveness of the strategies being used in wildfire preparedness and response. GIS allows for wildfire pre-response and mitigation data, such as values at risk and sprinkler deployment plans, to be conceptualized and analyzed through computer-based tools to create plans for wildfire preparedness, response and recovery. Implementing GIS with any Community Wildfire Preparedness Plan will increase the community's resilience and chance of survival against wildfires.

THE TRIGGER

The City of Thompson (population 13,678) is located 760 kilometers north of Winnipeg along the Burntwood River within Canada's Boreal forest. This region has experienced many human and lightning caused wildfires. Data from Manitoba Conservation and Climate and the City of Thompson report over 230 wildfires in forest, timber, brush, or grass within an eight-kilometer radius of the community between 2007 and 2017. In addition, in May 2003, the City of Thompson experienced a near catastrophic event when a fire was started by a train five kilometers east of the city and burned approximately 3,200 hectares of boreal spruce. Fortunately, winds pushed the fire north, diverting it from the city. In 2017, after numerous similar close calls and with the example of the devastating effects of the Fort McMurray wildfire, Thompson's former Deputy Fire Chief and the Province's Regional Forester participated in a Canada Local FireSmart Representative course as part of FireSmart Canada's Community Recognition Program initiative. The course was intended to promote, support and recognize local communities taking the initiative in identifying local wildfire hazards and risks and in developing a self-organized approach to preparedness and mitigation planning. The initiative was the inspiration for many Thompson wildfire mitigation and preparedness efforts, including the City's decision to establish a Community Wildfire Protection Plan.

THE APPROACH

With Thompson's decision to develop a Plan, specific actions were taken by the City of Thompson Fire and Emergency Services, Manitoba Conservation and Climate and Manitoba's Office of the Fire Commissioner to ensure the success and prosperity of their wildfire mitigation efforts. Implementing a full and comprehensive Plan, rather than simply a pre-response plan, was paramount for the City of Thompson because the Plan takes into account not only the roles and responsibilities of first responders in wildfire management, but also the needs of the community. This is because the Plan is comprised of two sub-plans: 1) The Wildfire Preparedness Plan, which identifies the values in the community and guides the first responders; and 2) The Wildfire



Figure 6: The City of Thompson was influenced to improve the frequency of municipal risk reduction initiatives, including brush removal, pruning and the thinning of trees in high hazard areas. (Source: City of Thompson - Facebook Page)

Mitigation Strategy Plan, which analyzes the hazards in and around the community and develops strategies to help reduce the risk of high hazard areas by using vegetation management, structural options and infrastructure.

One of the many response challenges the City of Thompson wanted to overcome with its plan was to increase the efficiency and speed of deploying equipment and ensuring clear communications and responsibilities of first responders in the WUI environment. A solution was found by using GIS to create sprinkler deployment plans that detailed value locations, priorities, water sources, equipment requirements and deployment layout. GeoManitoba, a team of GIS specialists that provide support to all departments of the Manitoba government, helped in GIS application development, management of data and wildfire mapping, mitigation, and preparedness components. For example, GeoManitoba designed a unique app in ArcGIS Online (an online mapping software) to design sprinkler deployment plans for the community. The province was divided into gridded Zones (100kmx100km), Subzones (10kmx10km) and Areas (1kmx1km) to organize and coordinate provincial sprinkler deployment plans. The City of Thompson used its gridded 1kmx1km Area and the World Imagery base map, an extremely accurate view of the Earth's surface, to draw in key features such as hoses, sprinklers and pumps onto the map and to determine how much supplementary firefighting equipment would be needed in each area if a fire occurred. Pre-response plans, such as sprinkler deployment plans, are

proactive planning tools that permit response agencies to effectively and efficiently identify equipment requirements and personnel assignments. Digital mapbooks of sprinkler deployment plans were created for Thompson's Protection Plan to ensure information is readily accessible and shareable during an incident.

THE OUTCOME

With the completion of Thompson's Protection Plan, the city is not only better prepared for wildfires but is also able to note numerous additional positive outcomes as the result of a more fire-conscious community. The City of Thompson was influenced to improve the frequency of municipal risk reduction initiatives, including brush removal, pruning and the thinning of trees in high hazard areas. GIS mapping software and World Imagery played an important part in improving city-provided fire management by indicating to fire officials where the high hazard areas are located. In addition, Thompson implemented a "Fuel Wood Program", which gives participating members with permits access to free firewood retrieved from mitigation efforts. The City of Thomson is working towards becoming a recognized FireSmart Community, while simultaneously pursuing other wildfire mitigation efforts.

A WORD FROM THOMPSON

When asked what advice the City of Thompson would like to share with other communities interested in implementing a similar Plan utilizing GIS, Shauna Kortz, Fire Control Officer for Manitoba Conservation & Climate, said that "it starts with the community wanting to see a change and improvement in wildfire mitigation and preparedness. The progress begins when the local fire chiefs, foresters and the community come together and take local leadership and initiatives in wildfire mitigation and preparedness." In addition, she mentioned the greatest challenge in implementing GIS into any plan is access and funding. Communities are encouraged to seek and apply for municipal, provincial/territorial and federal government grants that help to address climate change, FireSmart, emergency management and public safety issues.