Integrating imagery with GIS for controlling wildfires

From spring to fall in Ontario, forest fires continually threaten remote communities of the far northern part of Canada's most populated province. By integrating high-resolution 60 cm imagery from DigitalGlobe into its Geographic Information System (GIS), firefighters effectively plan fire prevention, determine fire proximity during events, and implement evacuation and emergency response strategies.

Accurate, up-to-date imagery needed

In terms of total area, Ontario is the second largest province in Canada. Much of the northern part of this province boasts dense boreal forests that unfortunately are subject to high winds and thunderstorm-induced lightening strikes during the summer. Preventing and containing fires within such a large, remote territory with limited road access is difficult. Without accurate maps, it is even more challenging.

The Aviation and Forest Fire Management (AFFM) had vector maps with points indicating important assets. However, the point information was not current, reliable, or complete. This left forest firefighters unable to confidently protect man-made structures such as houses, lodges, and schools in those remote communities. Valuable natural resources such as timber were mapped only in vector format, and the maps were difficult to maintain without current imagery, as natural conditions like fire, disease, and wind often change forest stand boundaries and the amount of fuel present in the event of a fire.

Additionally, AFFM needed to determine critical features such as lakes and infrastructure including roads, airports, and landing strips to understand access and evacuation routes and react efficiently in high risk areas during fire events. Knowing exactly where people and infrastructure are located is critical to AFFM's planning and operations, and vector maps alone did not provide this information.

Company information

The Aviation and Forest Fire Management, (AFFM), Branch of the Ontario Ministry of Natural Resources (OMNR) is responsible for effectively utilizing aviation, forest fire management and emergency response expertise to protect and sustain Ontario and its natural resources; and they now use DigitalGlobe imagery to help prevent wildfires and better respond to those that occur.
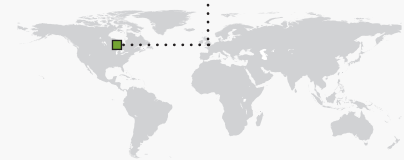
One database

OMNR determined that DigitalGlobe's satellite imagery was the most accurate, cost effective solution for the remote area coverage needed to support its emergency preparedness and planning efforts. DigitalGlobe delivered the needed OrthoReady Standard imagery and AFFM fire GIS personnel orthorectified the imagery in-house using their own ground control information so it best aligned with their GIS data. AFFM then layered these orthos with other vector data in their GIS including roads, water, forest stands, and other natural resource data layers such as fish and wildlife, geological data, soils, research plots and, utility (gas and hydroelectric) information. The result of these combined datasets was a single database enormously rich in valuable geographic information.

Increased efficiency and safety

Throughout the 2005 and 2006 fire seasons, OMNR and AFFM employed the data and maps derived from the DigitalGlobe high resolution imagery. With it, they determined areas of high fire risk potential (such as homes close to large fuel sources), tracked and predicted the spread of existing fires, planned entry points and staging areas for fire-fighting efforts, and defined emergency evacuation routes. The information was particularly helpful in planning air lift evacuations necessary in remote communities with no road access. The benefits in saved lives, property, and time are immeasurable.

"Satellite imagery and two-way satellite communication were two technology-based implementations that reduced time and distance factors in forest fire management and emergency planning for us. These solutions considerably reduce costs and enhance public and fire staff safety."

TERRY POPOWICH, PROGRAM MANAGER, FIRE MANAGEMENT PROGRAM, OMNR

INDUSTRIES

» Civil government
» Natural resources

USES

» Fire risk analysis/prevention
» Emergency response and management
» Critical infrastructure mapping

PRODUCTS USED

» 60 cm OrthoReady standard bundle (panchromatic and multispectral imagery)

Challenge	Due to Ontario's propensity for high-powered wind and thunderstorms in combination with outdated road maps, fire prevention and control can be extremely difficult.
Solution	The use of DigitalGlobe's OrthoReady Standard Imagery with OMNR ground control information to create a more accurate and comprehensive mapping system.
Results	The new system resulted in a significant increase in saved time, property, and lives.

CS-OMNR 06/13