

## VALIDATION OF NEW HERBICIDE APPLICATION TECHNOLOGIES

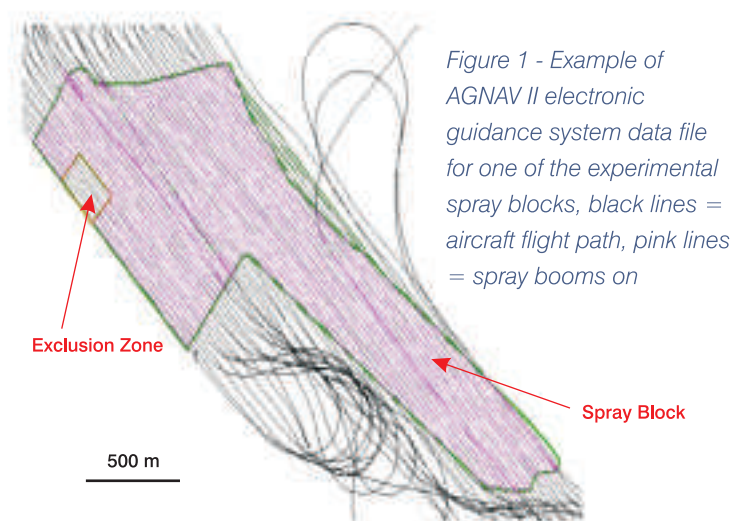
Forestry Research Partnership Project No. 160-201

### The Aim

This ongoing collaborative project evaluates the potential for using a combination of advanced technologies including: GIS, GPS, electronic aircraft guidance systems, automated booms and remote sensing to optimize and monitor aerial herbicide applications under operational forestry conditions in northern Ontario.

### The Approach

A fixed-wing aircraft was fitted with AGNAVII, GPS and automated spray booms and calibrated to establish appropriate settings for system, electronic and hydraulic lag times. Using a combination of GIS and DGPS technologies, mock exclusion zone targets were established in 11 different experimental spray blocks within the Gordon Cosens Forest near Kapuskasing, Ontario. Coordinates for the spray blocks and exclusion zones were uploaded as shape files to the electronic guidance system of the aircraft which was then used to make aerial applications of the herbicide Vision to the spray blocks with fully automated-control over the automated spray booms.



Monitoring of meteorological conditions, chemical deposition and silvicultural efficacy about the exclusion zones was conducted to allow determination of the actual silvicultural and environmental exclusion zones realized relative to the exclusion zone target. Chemical deposition data are being subjected to surface response modeling and compared to known toxicological effects thresholds to ascertain that portion of the target area within which measured deposition is below biologically significant levels. Silvicultural efficacy assessments based on ground-based DGPS tracking, digital image analysis and satellite image analysis are being used to delineate the silvicultural exclusion area relative to the target.

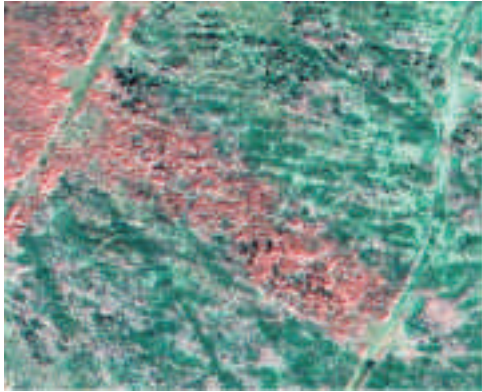


Figure 2 - Near-Infrared Satellite image of exclusion zone in an experimental spray block, pink = live competing vegetation

## The Tree Tip

Chemical deposition, ground-based DGPS tracking and remote sensing information available to date provide clear proof of concept, verifying that these advanced technologies can be used to allow for within block exclusions and to optimize herbicide applications generally enhancing both silvicultural and environmental protection objectives. The “high-tech” approach has numerous potential advantages including more effective track spacing, reduced reliance on physiographic boundaries to define spray blocks or exclusion areas, potential to group small spray blocks into larger projects and enhance operational efficiency, provision of archival data documenting aircraft location and spraying condition, reduction in the multi-tasking demand of pilots and utility of the data as a pilot and forest manager training tool. At a higher level, the research directly addresses FSC certification requirements for continuous improvement in forest herbicide applications, public demands for enhanced environmental protection and industry needs for enhanced cost-effectiveness. Although this research is still ongoing, certain technological aspects have already been incorporated into

operational programs resulting in improved application for some sites and an increase in program efficiencies. Current plans are to incorporate results from these studies into a larger optimization initiative involving the development, validation and application of models and decision support systems for aerial herbicide applications in Canadian forest management.

## The Team

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For more detailed information, please visit:  
[www.forestresearch.ca/partnership\\_projects/operational\\_implementation/160-201.htm](http://www.forestresearch.ca/partnership_projects/operational_implementation/160-201.htm)