RECENT MAPPING OF GLOSSY BUCKTHORN IN THE EASTERN TOWNSHIPS : A SPATIAL ANALYSIS

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CONTEXT

Glossy buckthorn (*Rhamnus frangula* L.) is an exotic species native to Eurasia and North Africa, introduced to North America in the late nineteenth century for horticultural purposes (Catling and Porebski, 1994). This species is now invading the undergrowth of many Quebec temperate forests, including the region of the Eastern Townships.

As the species is a very competitive invader, including very effective breeding strategies and difficulty to eradicate once established on a territory, its growing presence in the Eastern Townships causes concern for forest managers (Hébert and Thiffault, 2014). In addition, this exotic species causes several environmental impacts in the areas where it is installed, including a slowdown in the regeneration of native species by reducing the growth and the survival of seedlings (Fagan and Peart, 2004; Frappier *et al.* 2004).

Glossy buckthorn *Rhamnus frangula* L.

Currently, no thorough study of glossy buckthorn distribution in temperate forest of Eastern Townships has been performed. In that sence, this research aims to fill this lack of knowledge.

OBJECTIVE

Mapping the spatial distribution of glossy buckthorn in temperate forest of Eastern Townships, using remote sensing techniques.

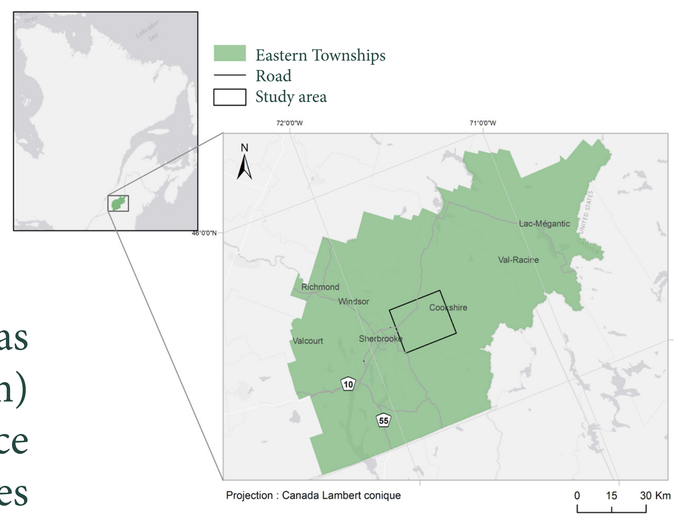
METHODOLOGY

STUDY AREA

City of Cookshire-Eaton and lands surrounding of the airport of Sherbrooke in the Eastern Townships.

FIELD WORK

Glossy buckthorn coverage was calculated on 119 plots (30x30 m) on the field. Presence and absence sites were used as training sites and validation sites.



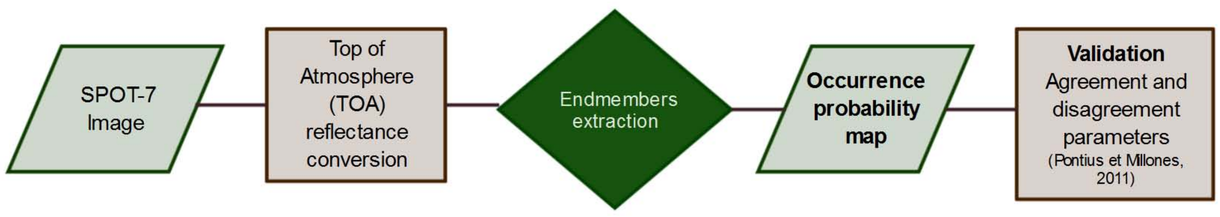
The study area located in the Eastern Townships

CARTOGRAPHY

Detection strategy : The phenology of glossy buckthorn differs from the indigenous tree species found in this area, because its leaves fall later in autumn. This characteristic allowed to map the species distribution.

Two types of satellite imagery were tested : Landsat 8 and SPOT-7.

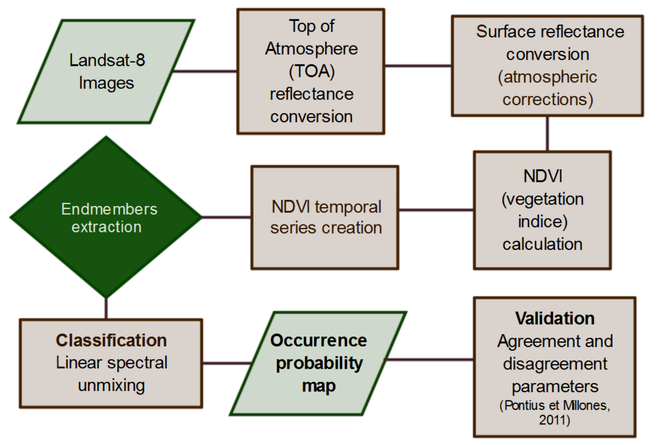
SPOT-7



Classification method by spectral unmixing of a SPOT -7 image acquired October 13, 2014

Landsat 8 (L8)

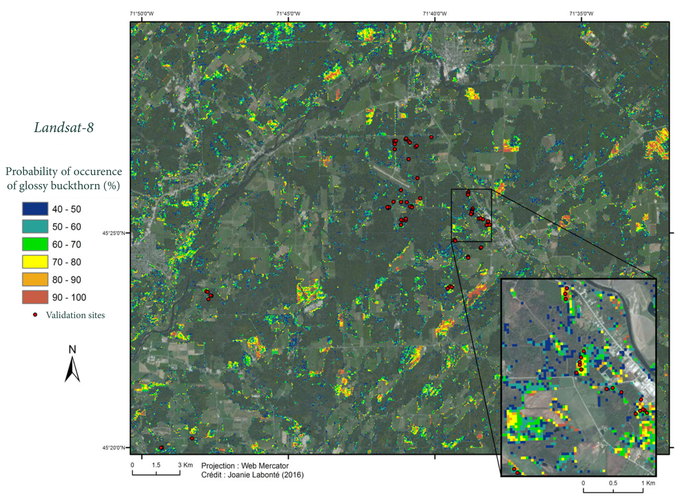
Classification on a NDVI time series of six L-8 images from April to November for the years 2013 to 2015



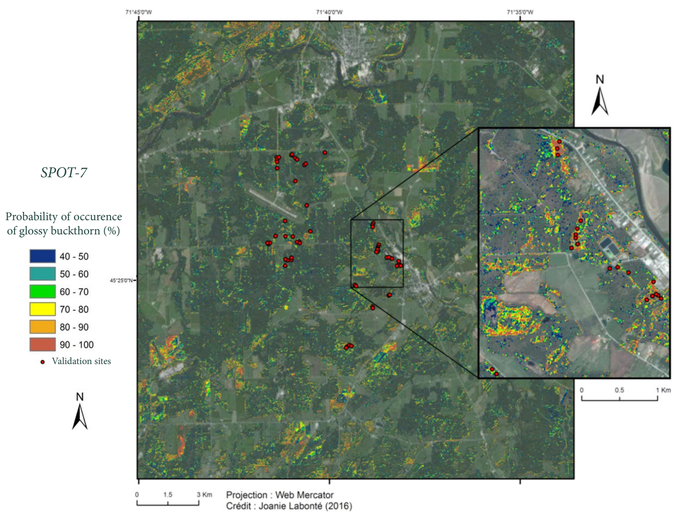
RESULTS

CARTOGRAPHY

Probability of occurrence of glossy buckthorn (%) between 2013 and 2015 in Cookshire-Eaton area and airport of Sherbrooke lands, obtained by linear spectral unmixing method on a time series of normalized difference vegetation index (NDVI) Landsat 8 images.



Probability of occurrence of glossy buckthorn (%) in Cookshire-Eaton area and airport of Sherbrooke lands, obtained by linear spectral unmixing method on a SPOT-7 image (October 13, 2014).



VALIDATION

	Landsat-8	SPOT-7
Agreement (%)	75	62
Disagrement (%)	25	38
Total (%)	100	100

The classification produced is intended as a mapping representation of the areas heavily invaded by glossy buckthorn.

It allows the classification on the scale of an invaded stand, according to forest types, rather than the scale of the species studied. The resolution of Landsat 8 sensor is a limit when attempting to map entities smaller than the size of one pixel.

For the classification with the SPOT-7 image, the acquisition date was not optimal, and the use of a single image to perform the detection of the species, whose discrimination is based on its particular phenology, was less effective than multi-temporal analysis.

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