

Fire: Rescuing White Pine

20 years of prescribed fire in La Mauricie National Park

La Mauricie National Park (LMNP), located in the Mauricie region of Quebec, has been using prescribed fire to promote white pine regeneration for the last twenty years. The park ecosystems, as all ecosystems of the St. Lawrence Valley, have been affected by intense logging activities throughout the past two centuries. These activities have reduced white pine density, modified forest structure and supported the establishment of white pine competitive species such as balsam fir.

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Protect and restore ecological integrity, a wonderful challenge for Parks Canada

As part of its mandate, LMNP must maintain and restore ecological integrity. This means not only protecting wildlife and wildlife habitat, but also **using ecological processes to influence the evolution of its ecosystems**. White pine is a fire adapted species and its survival through the ages is linked to frequent fire events. In this context, prescribed fire is a technique, which under certain conditions, is effective in the promotion of white pine regeneration.

Prescribed fire is defined as “The knowledgeable application of fire to a specific land area to accomplish predetermined forest management or other land use objectives” (CIFFC, 2003).

Fire, an effective tool to promote white pine regeneration

The primary role of fire in white pine ecosystem management is to **modify stand structure in order to promote the establishment and survival of pine seedlings**. This is achieved by:

- Promoting sunlight penetration to the ground by removing part of the upper canopy as well as the majority of the middle cohort.
- Reducing shrub competition for young pines.
- Promoting a more suitable seedbed for pine seeds by reducing forest litter.



Structure of a typical pine stand before burning

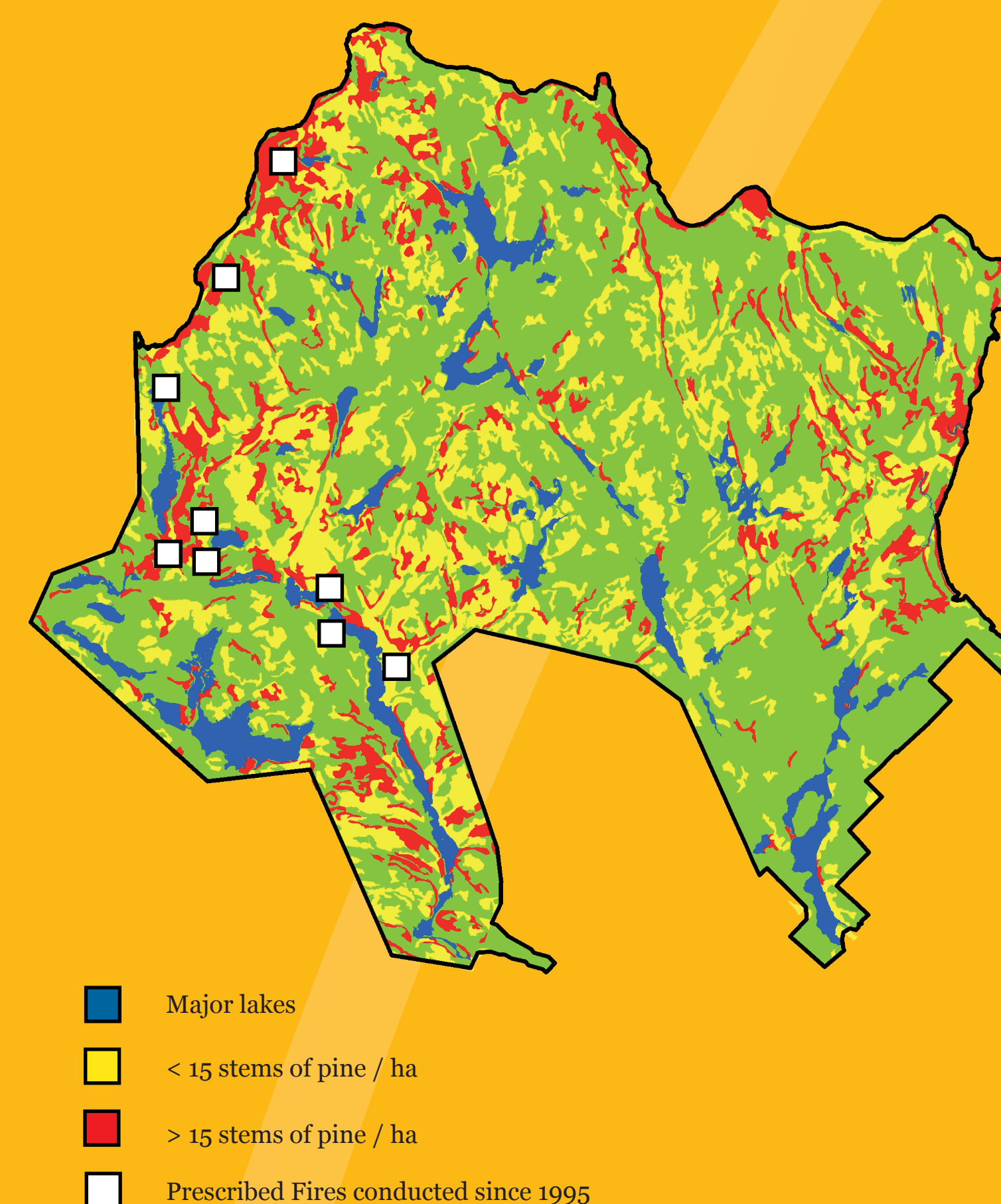


Desired structure of pine stand after burning

Current status of white pine in LMNP

Palynological analysis indicates that white pine was more prevalent 2,000 years ago where it may have represented 12% of timber volume in the original forest. Current data indicates a representation of only 0.5% (Pelletier, 1998). Recent analysis of first land survey logbooks came to the same conclusion: **white pine relative abundance in the Mauricie forest landscape decreased from 47% in pre-colonial forest to 12% today** (Mauri Ortuno, 2009). This is far from the pine forests described by explorers and loggers of the past centuries.

The current white pine distribution in the park reflects this conclusion (see map). Areas with less than 15 pine stems per hectare are spread throughout the park and cover almost 7700 ha in total. The highest densities of pines are concentrated in the valleys of Wapizagonke Lake, Matawin River and St-Maurice River. Within these stands, 83 sites with varying densities of pine stems (15 to 50 stems per hectare), were selected for restoration purposes. **They cover a total of 1,101 ha, representing 2% of the forest area of the park.**



Report on 20 years of prescribed fire in white pine ecosystems

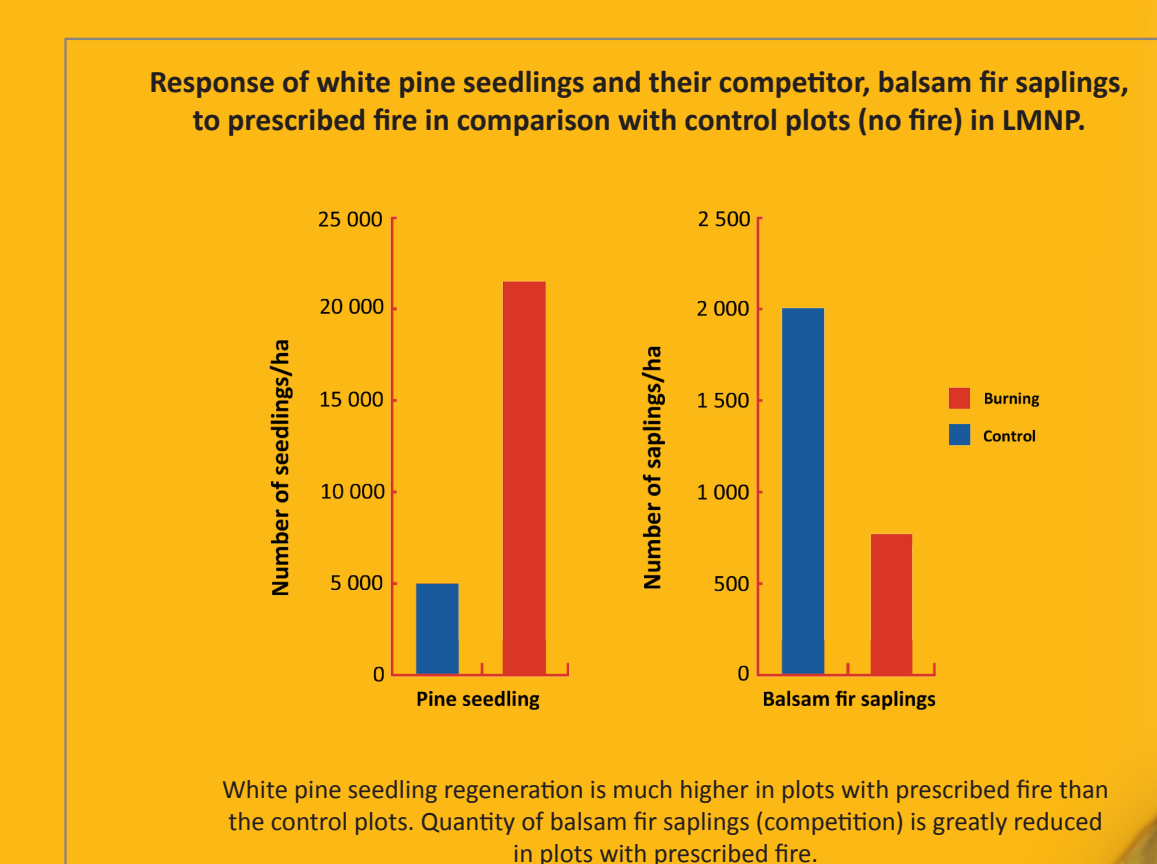
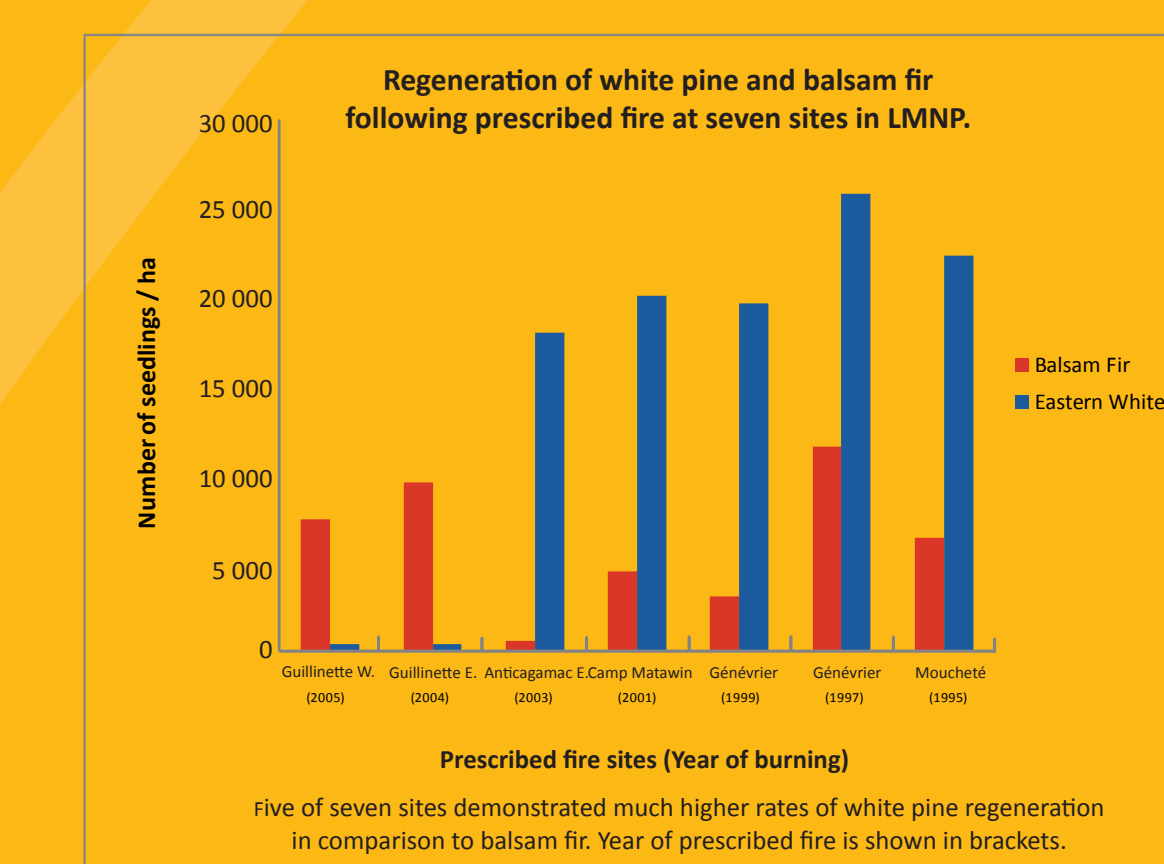
In 20 years, LMNP has become a leader on prescribed fire in white pine ecosystems. The first prescribed fire was conducted in 1995 in the area of “Lac Mouchet”. Since then, more than 10 prescribed fire operations have been conducted in LMNP (see map).

Periodic monitoring of pine regeneration at each burned site shows that these prescribed fires have had the desired result. On sites with prescribed fire there has been a decrease in competitors and an increase in pine seedlings. **Regenerating white pine has taken advantage of conditions created by the prescribed fire.**

The following long-term goals have been defined to ensure the return and maintenance of white pine in LMNP (Thériault, M. & R. Quenneville, 1998):

- Increase white pine presence so that white pine dominated stands (> 100 stems / ha) cover between 3 and 4% of the park forested area. - Currently they cover less than 1%
- For a minimum of 8% of the park forested area, increase or maintain the white pine density to 15 stems per hectare. Currently only 3 to 4% has 15 stems / ha or more of white pine.

In the long term, LMNP wishes to focus efforts on the areas where white pine has a low density. A 2,000 ha project in the “Lac des Cinq” area is currently underway to rejuvenate the forest (pioneer stage) and to create conditions conducive to the initiation, development and long term survival of white pine seedlings.



Fire helps increase biodiversity

Recent research in white pine forests further supports the use of fire for restoration. Domaine (2009) found that fire plays a key role in insect communities by increasing the abundance and richness of fire adapted species.

Fire remains the tool of choice for the restoration of LMNP fire-dependent ecosystems.

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