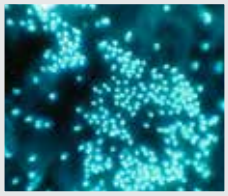
Natural Resources Canada
Ressources naturelles Canada

In Brief






from the Canadian Forest Service – Laurentian Forestry Centre

Number 38 – 2014

Anticosti Island: ecosystem recovery indicators

The use of indicator species is a recognized approach to assessing ecosystem integrity. One of the challenges facing scientists is how to determine which species or group of species will provide the most accurate picture of forest integrity.

On Anticosti Island (Quebec), the forest undergoes changes in structure and composition due to the high population density of white-tailed deer, a species introduced on the island in 1896. In order to assess the recovery capacity of these deer-ravaged forests, researchers from Université Laval, McGill University, Université de Montréal, the University of Barcelona and the Canadian Forest Service studied the potential of five groups as indicators: plants, bees, moths, songbirds and ground beetles (insects). The tests were conducted at sites where deer density and the type of vegetation cover (cut or uncut forests) varied.

Photo: Natural Resources Canada

The results show that only plants and moths provide indicators of ecosystem conditions for sites where deer density is variable. Combining these indicators could be used to assess the level of ecosystem recovery after deer populations have been reduced.

For information: Christian Hébert, christian.hebert@rncan-nrcan.gc.ca

A new land management tool: pan-Canadian forest maps

In Canada, the provinces and territories are responsible for managing their forests and performing inventories based on their specific needs. Because of this, the data collected vary from one province to another, which presents an obstacle when studying trans-border forest issues (e.g. insect outbreaks). Canada's National Forest Inventory (NFI) partially addresses this gap using systematic sampling of Canadian forests, but this is limited to 1% of the landmass. However, continuous mapping is needed to analyze many forest issues.

Based on this sampling, researchers from the Canadian Forest Service have developed pan-Canadian forest maps with a resolution of 250 x 250 m. Applying a statistical technique (*k*-nearest-neighbours or *k*NN) to data from MODIS satellite images, climate data layers and topographic data layers makes it possible to use this sampling to estimate a number of forest attributes for the remainder of the forested area (99%).

The 127 attributes mapped in this fashion include height, age, volume, forest species composition, biomass quantities and more. Standardized mapping of forest attributes for all of Canada's forests is a major technical and operational breakthrough, which improves our ability to analyze human or natural activities affecting Canada's forests. It also facilitates analysis of several forest, environmental and economic issues, particularly in relation to the impacts of climate change. Several of these maps are available on the NFI Web site at nfi.nfis.org.

For information: André Beaudoin, andre.beaudoin@rncan-nrcan.gc.ca

The potential of short-rotation intensive culture

Short-rotation intensive culture (SRIC) is an intensive method of timber production. This method calls for high-density planting of fast-growing tree species such as willow and poplar, usually planted on marginal farmland. Stem harvesting is performed every 2 to 4 years for about 20 years.

Photo: Natural Resources Canada

This method will soon be commercialized. It has the potential to be applied cost-effectively over large areas in many parts of Canada for biomass production. This study, carried out by researchers from the Canadian Forest Service through consultation of 50 SRIC experts from across Canada, examined the deployment potential of this type of culture for the next 10 years. The findings of this investigation indicate that according to three scenarios (pessimistic, realistic and optimistic), the total area of this type of culture in Canada in 10 years will be 1300, 4100 and 11,400 ha, respectively. The implementation of this method of culture over the next decade will depend on the demand for biomass, the development of production technologies and the establishment of policies and programs promoting its application.

For information: Caroline Rochon, caroline.rochon@rncan-nrcan.gc.ca

This publication is part of a series that presents popularized summaries of scientific articles written in whole or in part by Laurentian Forestry Centre researchers.

Canada

In Brief
from the Canadian Forest Service – Laurentian Forestry Centre

Biomass harvesting: how much residue should be left on the ground?

The use of logging residue (tree branches and crowns) as a source of biomass has been the subject of increasing interest over the last few years. Several studies have compared the ecological impacts of harvesting whole trees versus harvesting trunks only. However, few empirical studies have been done on what effect the quantity of residue left on the ground has on the microenvironment (soil temperature, quantity of water, competing species and nutrients). The aim of this study was to answer the following question: how much logging residue can be harvested without harming stand productivity?

To this end, researchers from Université du Québec à Montréal, Université du Québec en Abitibi-Témiscamingue, ministère des Forêts, de la Faune et des Parcs, Université du Québec en Outaouais and the Canadian Forest Service studied four sites spread out across Quebec to determine the effect of four different quantities of residue left on the ground in the first 3 years after the establishment of a stand. This study was performed for different species (hybrid poplar, jack pine, white spruce and black spruce). The researchers found that an increasing quantity of residue left on the ground lowers soil temperature and the density of competing vegetation. Managers might take these effects into consideration to improve conditions for seedling growth, especially by controlling competition. The effect of this residue on the microenvironment should also be part of the overall management strategy and thus be taken into consideration when assessing the quantity of biomass that a site can produce.

For information: Evelyne Thiffault, evelyne.thiffault@rncan-nrcan.gc.ca

Spruce budworm: does an artificial diet affect parasitism in sentinel larvae?

The spruce budworm (SBW) is a native insect pest whose outbreaks constitute the most significant natural disturbance affecting balsam fir stands in Canada. Budworm parasitoids play a vital role in maintaining SBW populations at endemic levels between outbreaks. One of these parasitoids, the wasp *Tranosema rostrale*, uses its stinger to lay an egg under the skin of SBW larvae. The wasp larva produced from this egg will feed on the internal tissues of the SBW.

To measure the levels of parasitism by *T. rostrale* in endemic SBW populations, researchers use "sentinel larvae". Reared in the laboratory, these SBW larvae are fed an artificial diet before being exposed to parasitoids in the forest.

In this study, researchers from Université Laval and the Canadian Forest Service sought to determine whether the use of this artificial food, as compared with the natural foliage of the balsam fir, affects the probability of the SBW being attacked by *T. rostrale*. In the field, the diet did not have an effect on parasitism levels. In the laboratory however, a much higher number of foliage-reared larvae were attacked by the wasp.

Despite this preference observed in the laboratory, the researchers concluded that sentinel larvae reared on the artificial diet can be used to determine levels of parasitism in the field, without the risk of biasing the results obtained.

For information: Jacques Régnière, jacques.regniere@rncan-nrcan.gc.ca

Residual biomass: identifying new indicator insects by analyzing the contents of their digestive tract

In order to monitor the long-term effect of harvesting residual biomass (wood residue from logging) on insects living in forest litter, indicators need to be developed. Researchers from Université du Québec à Montréal, the Field Museum of Natural History in Chicago and the Canadian Forest Service thus targeted 10 insect species of the rove beetle family that are found in large numbers in the boreal forest and have a significant impact on nutrient cycling.

To this end, the researchers used a novel approach to select these insects and determine their potential as reliable indicators. For the first time with this family of insects, the researchers analyzed the contents of their digestive tracts to identify their eating habits. In so doing, they were able to determine that most of these insects were feeding on fungi that grow only where wood is present (logging residue or healthy trees). The researchers were able to identify these fungi by comparing the DNA of the fungi in the insects' digestive tracts with known fungi in DNA libraries.

Using this rapid and cost-effective method, the researchers were able to determine the role of these insects in the forest ecosystem and their capacity to act as reliable indicators of the effect of biomass harvesting on soils.

For information: Jan Klimaszewski, jan.klimaszewski@rncan-nrcan.gc.ca

For more information about the series:

Natural Resources Canada
Canadian Forest Service
Laurentian Forestry Centre
1055 du P.E.P.S.
P.O. Box 10380, Stn. Sainte-Foy
Québec, QC G1V 4C7
418 648-5789

cfs.nrcan.gc.ca/publications/series/read/2

Partenariat innovation forêt
FPInnovations
Canada

 • ISSN 1925-5756