Natural Resources Canada | Ressources naturelles Canada

In Brief

from the Canadian Forest Service – Laurentian Forestry Centre

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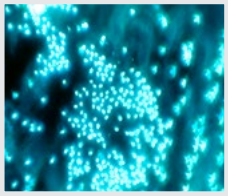


Is stand fragmentation in the boreal forest a threat to biodiversity?

Habitat fragmentation has contributed to the decline and extinction of many plant and animal species throughout the world. Fragmentation resulting from forest management can also reduce forest biodiversity. In this study, researchers from the ministère des Forêts, de la Faune et des Parcs du Québec and the Canadian Forest Service examined the impact of residual forest patch sizes on biodiversity following logging operations in the boreal forest. To do so they studied different insect communities in residual patches of various sizes (0.03 to 50 ha), in clearcuts, and within intact forest areas.

The results indicate that a few years following harvesting, the negative impact of habitat fragmentation on insect communities is largely confined to smaller-sized (between 0.03 and 0.5 ha residual patches). Researchers also pointed out that insects were more populous in clearcut areas, but those insects mainly were predatory species, which did not increase biodiversity.

Researchers expect that the negative impacts on the biodiversity of insect species living in mature forest sectors where harvesting operations are carried out will increase over time. They predict that the older unmanaged stands that still exist in the boreal forest will become scarcer as harvesting operations expand northwards, which could reduce insects' capacity to recolonize residual stands.

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Are drought conditions in the boreal forest responsible for the increase in fires?

In Northern Quebec's boreal forest, where forest management is not allowed, the forest consists mainly of lichen tundra. These forests are discontinuous with little regeneration. The cumulative effect of adverse climate conditions and the short intervals between fires have created these forests. With the anticipated climate change and the forest industry's interest in tapping into these new territories, it is important to gain a better understanding of how and why fire risks vary between from north to south, and where the transition occurs between the continuous and discontinuous forest.

In this study on the history of fires in Northern Quebec, the Université du Québec à Montréal, the Université du Québec en Abitibi-Témiscamingue, the Université du Québec à Rimouski and the Canadian Forest Service have demonstrated that drought conditions play a moderate to highly significant role in the increase in fires from the south to the north. They also observed that fire cycles were increasingly shorter from the south to the north and from the east to the west. High fire risk and low fire risk zones are separated by the boundaries between the continuous and discontinuous forest.

These results suggest that more frequent droughts and increased fire activity would cause more openings in Northern Quebec's forests. However, should the fire risk remain similar to that of the past, the current limit between the continuous and discontinuous forest would not change.

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Is there a future for bioenergy in the use of dead trees?

An increase in the use of whole dead trees for the production of wood pellets does not appear to be very likely without government financial assistance. However, the criteria for environmental governance established by the European community on issues of sustainable forest management could stimulate the use of dead trees in Canada since they are considered a source of ecological biomass for energy production.

The purpose of this study was to determine how to achieve profitability in the production of pellets from dead wood (logs or cutting debris). This assessment was performed from the perspective of a sawmill that is not affiliated with a pulp and paper mill, but that wished to export its pellets to Europe.

Researchers from Université Laval, Utrecht University and the Canadian Forest Service demonstrated that, under current conditions, producing wood pellets exclusively from dead, large-sized conifers is not profitable for an independent sawmill located in eastern Canada.

They also observed that the difference in profits between the production of sawing, shavings and pellets was minimal when using small dead conifers with a diameter at breast height of less than 15 cm. The results also indicate that using dead conifer wood in a combined production of sawing and pellets for export to the European market is almost as profitable as conventional sawing and shavings.

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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

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Taking vegetation feedback into account following forest fires

Researchers predict that climate change is likely to cause a rise in burned areas across Canada. However, vegetation feedback following a fire is rarely taken into account in prediction models. The results of this study show how important it is to take the impact of fire on the evolution of vegetation after fire into account when using fire prediction models.

Photo: NRCan

In this study, researchers from the Canadian Forest Service factored in the impact of forest fires on vegetation composition into projection models for burned forest areas. The results show that when this impact is taken into account, projections for burned areas in the most high-risk zones decreased by 50% compared with projections made without factoring in that variable. Moreover, since fire most often occurs in old conifer stands, such stands would become less available for logging.

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Is the relationship between insects and fungi an indicator of the effects of disturbances in the boreal forest?

Forest ecosystems consist of several distinct groups, ranging from the most diverse groups, such as microorganisms and invertebrates, to less diverse groups, such as plants and vertebrate animals. Insects are the most significant group of invertebrates and those that inhabit the forest litter play a leading role in decomposition processes. Several species of fungi are also found in the forest litter.

In this study, researchers of the Canadian Forest Service set out to determine whether a cooperative relationship could exist between insects and fungi. By examining the digestive tract contents of nine species of rove beetle, which belong to the order Coleoptera and inhabit boreal forest soils, they successfully identified 42 species of fungi. Researchers were able to identify these fungi by means of their DNA.

These results show that there could indeed exist a relationship between fungi and insects that would be mutually beneficial for both organisms. This relationship would accelerate the decomposition of forest residues, thereby facilitating the movement of nutrients in forest ecosystems. Rove beetles also are good indicators of the effects of forest disturbances. Studying their eating habits and relationships with fungi could lead to their use as indicators of the effects of disturbances on boreal forests.

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Spruce longhorn beetles at war!

Photo: NRCan

The brown spruce longhorn beetle is an invasive forest pest which originated from Europe and established itself in Nova Scotia in 1990, where it infests and kills mature and weakened spruce. It is slowly moving westward. There is a native species, the eastern larch borer, which is in competition with the exotic beetle.

In this study, researchers from the University of New Brunswick and the Canadian Forest Service showed that these two species of longhorn beetle exhibit similar behaviour patterns, but that ultimately, the exotic species could dominate over its native counterpart. They observed that the native species occurred in larger numbers outside the area infested by the exotic species than inside that area.

Natural control agents such as predators and parasitoids effectively limit the spread rate of these longhorned beetles, both native and exotic. This helps to control the presence of the exotic species and facilitate the maintenance of the native population.

The Canadian Food Inspection Agency applies regulatory measures in order to slow the spread of this exotic pest in Nova Scotia and elsewhere in Canada.

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