

research snapshot

summarize | mobilize



Changing Forests in a Warming World

What is this research about?

Many researchers argue that global warming is having an impact on forest fires in North America. In 2004, Alaska saw one of the hottest and driest summers in over half a century. Fires raged across the interior, burning a record-setting 2.7 million hectares of land. In fact, recent findings suggest that such fires are only going to be more severe and frequent in the coming years.

Scientists often study 'ecological succession' in a forest – the changes in its structure or composition – by looking at the legacy of a forest, how the forest has changed over many years. But this approach isn't very helpful when it comes to assessing the immediate effects of a forest fire. Today's ecologists face a challenge: to predict the future dynamics of a forest under rapidly changing conditions.

What did the researchers do?

Following the record-setting summer of 2004, researchers from Saskatchewan, Alaska, and Florida looked at the recovery of black spruce forests in Alaska. (Black spruce grows throughout North America.) Study sites were set up in May 2005, once the snow had melted in

What you need to know:

Severe fires can dramatically alter the future growth of a spruce forest. A severe fire is likely to change the forest to one dominated by broadleaf deciduous trees, especially in drier places.

the Alaskan interior. Their goal? To predict the pattern of future growth by studying parts of a spruce forest immediately after a burn, when it is just starting to reorganize itself.

What did the researchers find?

Fires that are severe and frequent can break the 'lock' that spruce trees hold over drier forests. These fires alter the playing field, enabling deciduous trees to take over and dominate. Deciduous trees, in turn, could have a cooling effect on local climates. For instance, they could reduce the flammability of the forest and the ability of fire to spread.

But severe fires have less of a long-term impact on certain parts of spruce forests. Moist and cool areas favour the growth of spruce seedlings over deciduous broadleaves, as do higher

latitudes. In other words, the researchers found that spruce forests show the strongest potential to regenerate themselves in moist areas and at greater elevations.

How can you use this research?

This research advances our understanding of how spruce forests change after increasingly severe and frequent fires. New patterns of growth, established shortly after a fire, can help predict the structure of a forest two or three decades later. The research also builds on earlier work and contributes to a larger understanding of the impact of climate change on North American ecosystems.

About the Researchers

Jill Johnstone is Assistant Professor in the Department of Biology at the University of Saskatchewan.

jill.johnstone@usask.ca

Teresa N. Hollingsworth is Affiliate Assistant Professor at the Institute of Arctic Biology at the University of Alaska Fairbanks.

F. Stuart Chapin, III is Professor in the Department of Biology and Wildlife at the University of Alaska Fairbanks.

Michelle C. Mack is Associate Professor in the Department of Botany at the University of Florida.

Citation

Johnstone, J. F., Hollingsworth, T. N., Chapin III, F. S., & Mack, M. C. (2010). Changes in fire regime break the legacy lock on successional trajectories in Alaskan boreal forest. *Global Change Biology*, 16(4), 1281-1295. Available online at bit.ly/NZwubi

Keywords

Alaska, Boreal forest, Fire, Spruce tree, Broadleaf deciduous, Ecological succession

Knowledge Mobilization at York

York's Knowledge Mobilization Unit provides services for faculty, graduate students, community and government seeking to maximize the impact of academic research and expertise on public policy, social programming, and professional practice. This summary has been supported by the Office of the Vice-President Research and Innovation at York and project funding from SSHRC and CIHR.

kmbunit@yorku.ca

www.researchimpact.ca

