

Forest Climate Change Resiliency

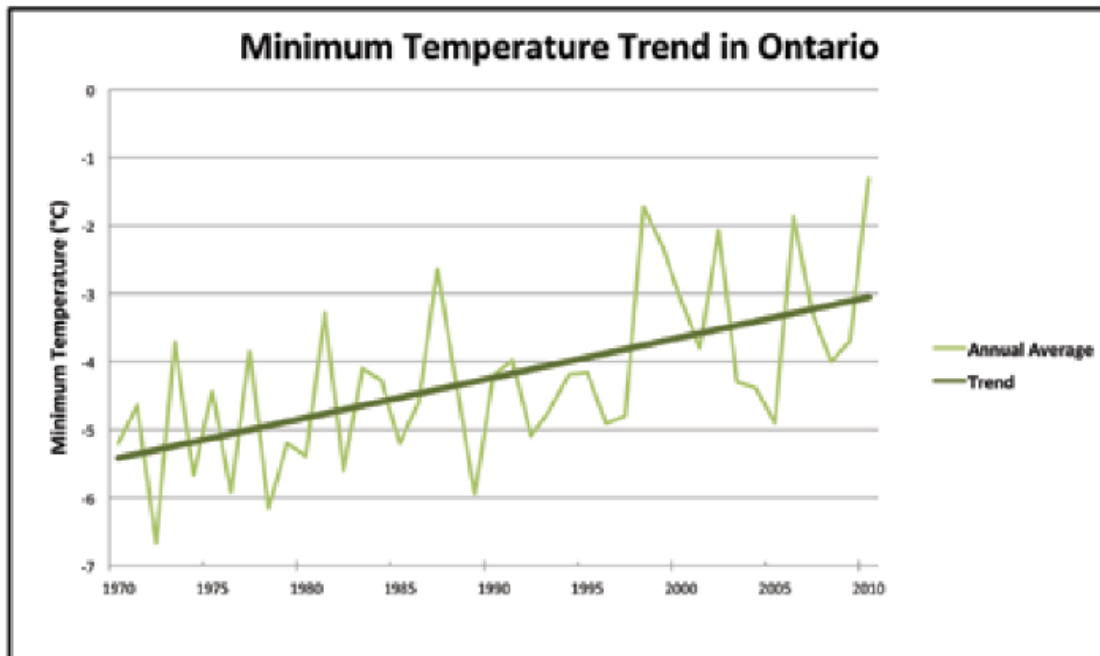
Strategies for managing your woodlot for long term health

The intention of this document is to outline some of the potential changes that will affect the forest of Ontario in the coming decades as our climate shifts. Some links to resources and websites will be provided to help landowners make informed decisions regarding the management of their forested woodlots.

Landowners can consider registering for the Ontario Woodlot Association's Forest Climate Resiliency course from which some of the resources herein were drawn. This course provides landowners with the tools to understand the scope of change and steps that can be taken to help protect their forest from the adverse effects of climate change.

A Shifting Climate

Within the last 40 years, Ontario has experienced changes in temperature, rainfall patterns, and extreme weather events that can have pronounced environmental and economic effects on forests and wetlands.



40 years of data show that Ontario is getting warmer. Minimum temperatures have increased in northern Ontario between 1.4 and 3.8°C. By comparison, temperature increases experienced in southern Ontario have been less: between 0.7 and 2.1°C. Concurrently, an earlier start to the vegetative growing season has

increased the overall duration of the growing season. This could lead to increased agricultural and forestry opportunities.

These temperature changes have led to several collateral effects that impact the health of our local ecosystems. Rainfall patterns are changing. Some areas of Ontario are slightly wetter others are experiencing drought on a more regular basis. Rising temperatures increases the rate of evapotranspiration in trees leading to more moisture stress and may increase the risk of wildfires in some forest cover types.

Ontario is experiencing more frequent extreme rain and storm events, and more flooding and drought. Locally, drought and ice storms have had significant impact to our local environments with spring floods being an annual concern in the Gull River watershed. Woodlands affected by extreme events such as tornadoes, windstorms, ice storms, summer heat waves, droughts, floods, and wildfires can take decades to recover after disturbance, and forest ecosystem structure and productivity may change as a result

As a Partner in Conservation and a forest steward, your property is aiding in the fight against climate change. Forests naturally capture carbon dioxide from the atmosphere, which is then stored as carbon in live trees, downed woody debris, and in the soil. This carbon can be stored for decades and centuries in living trees or in durable wood products like furniture or building frames until it is released when vegetation either decays or is burned. Maintaining or increasing the amount of carbon that can be stored by your woodlot is crucial to help reduce atmospheric carbon dioxide emissions and the effects of climate change in the future.

Observable Changes

Many changes to the timing, distribution, and interaction between species are already being observed in Ontario. These changes may affect the biodiversity in your woodlot as well as effect both forest and human health.

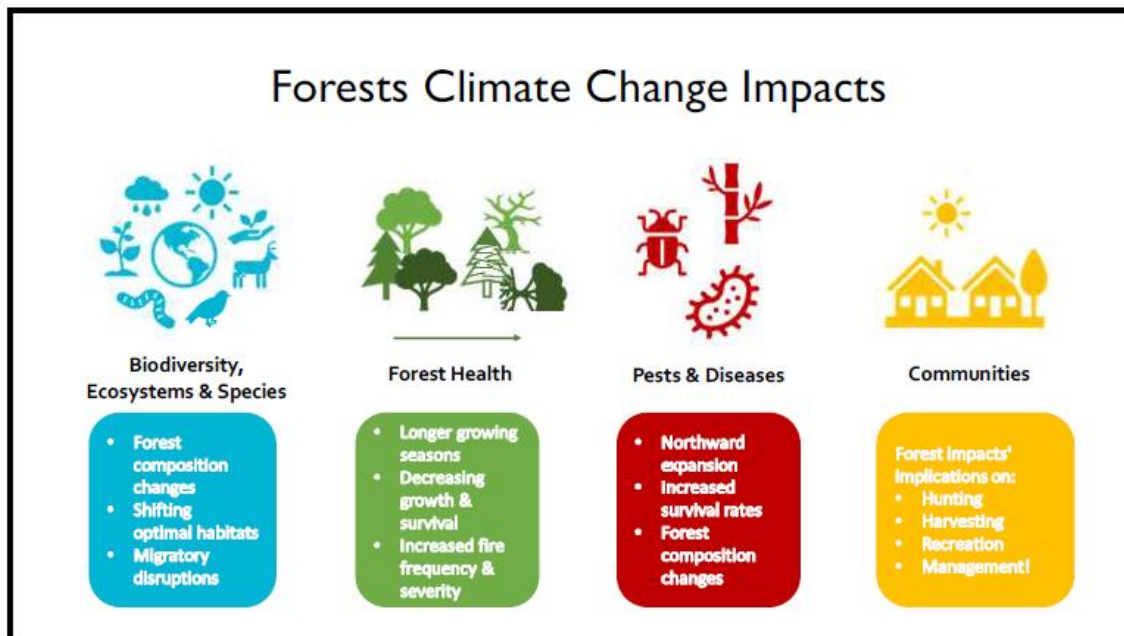
Some examples of observed changes in nature include:

- The southern flying squirrel has expanded its range northward
- Several frog and toad species have altered their spring mating call timing
- The changing climate has affected the connection between the emerging prey species and the arrival of predator species as seen with the timing being off for certain bird migration and the emergence of prey insects.

- The spread of Lyme Disease from some tick species. Once restricted to localized areas of the north shores of Lake Erie, Lake Ontario and the St. Lawrence River, Lyme Disease is now a serious health risk in many parts of Ontario.

Forest Impacts and Vulnerabilities

The image below summarizes some of the impacts expected to the forests of Ontario. Getting a better understanding of these impacts will help you to make informed decisions regarding your forested woodlot.



Biodiversity, Ecosystems and Species

- Some trees species will migrate north, some east/west, some will not be able to adjust at the pace the climate is changing
- Some northern species like balsam fir & white spruce may see their range contract
- Deer range will likely increase, moose will decrease due to heat stress and winter tick populations and other parasites
- Changing population dynamics will impact forest composition
- Seasonal migration patterns will change – bird species synchronized arrival to Ontario might miss the window of opportunity for preferred food (e.g. insects)

Impacts on Forest Health

- Longer growing season may increase carbon sequestering and more evapotranspiration could lead to soil moisture deficits
- More freeze/thaw events could lead to an increase in tree damage especially for thin-barked species
- High impact precipitation events could lead to more flooding/soil saturation – erosion and nutrient loss
- Rain on snow events could drive frost deeper into the ground affecting root biomass and impact transpiration rates
- Drought frequency could reduce growth rates, increase susceptibility to pest and disease outbreaks and increase fuel loads and wildfire risks

Pests and Disease Impacts

- It is expected that forest pests and disease will experience enhanced survival rates and will become more widespread
- Potential decline in native species and changes in competition and interrelationships
- Northward expansion of native and invasive species

Influences on Community

- Hunting- food insecurity and cultural practices will be impacted by changing migratory patterns resulting from a change in climate
- Harvesting- forestry operations may experience timber losses due to extreme conditions, traditional plant harvesting impacted by loss/change in plant survival
- Recreation and tourism – winters shorter, summers longer, unsafe conditions to be outdoors during extreme weather both during and after events

Vulnerability of Tree Species to Climate Change

Projected changes in climate conditions over the next century will vary widely but not all species will react equally in the face of rapid environmental change. As part of the Forest Change project of Natural Resources Canada, a series of comparative indices of sensitivity and ability to adapt were developed for 26 species found in Ontario and Eastern Canada to better understand how species respond to climate stress and how local management decisions can be taken to mitigate impacts.

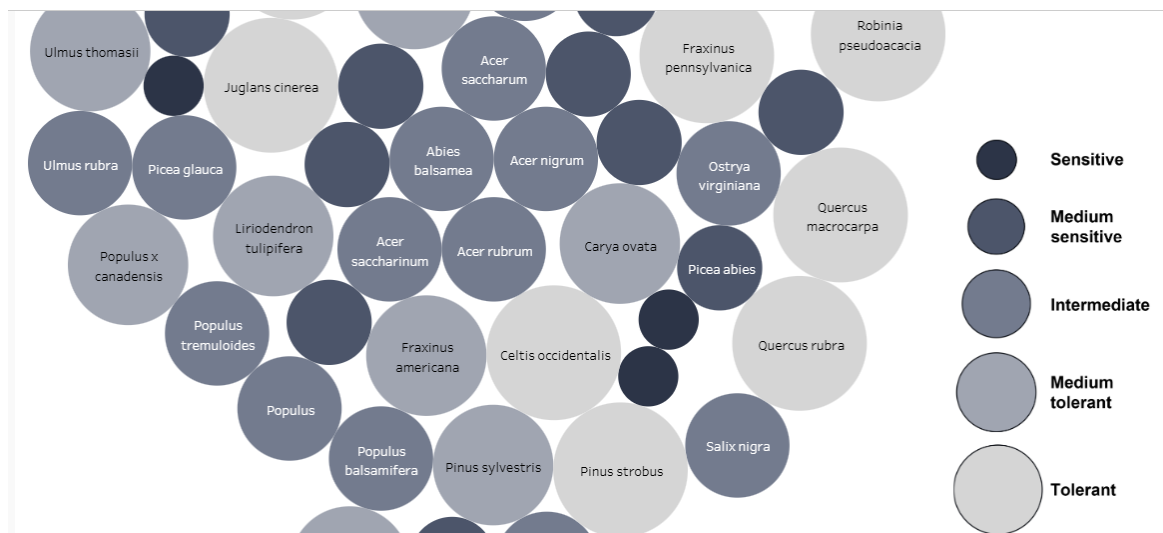
To assess individual tree species capacity to survive and adapt to environmental changes including stressors like draught and fire, a tool has been developed which looks at three components for 26 tree species: the degree of **exposure** to change, **sensitivity** to the change and **adaptive capacity** to the change.

The link to this page is as follows:

[Vulnerability of Tree Species to Climate Change](https://sites.google.com/fgca.net/tree-climate-vulnerability/home)

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Navigating on the page, if you scroll down to Tools to Assess Forest Sensitivity open the **Sensitivity** tab and you will be able to see a range of tolerances to drought for a 26 species commonly found in Ontario and eastern Canada. Knowing the Latin name of the species that might interest you will help you move quicker through the species. See below screen shot of how the page will look. By clicking on each tree circle, you will get more information specific to that species.



There is a tremendous amount of information on this page including indices on draught resistance, ability of tree to migrate and species fire sensitivity. You will need to move around this page and try different drop-down menus to find great resources by which you can start to consider how to maintain tree diversity during a changing climatic time.

For a video summary of some of the content on this webpage and further information on climate change impacts on Ontario forests, watch the video at the following link:

Creating Resilient Forests in the Face of Climate Change

https://www.youtube.com/watch?v=wK4El33_TBY&t=54s

I am often asked questions about wildfire mitigation on my property tours. The following video covers some of the ways the woodlot owners can reduce their wildfire risks through proactive planning and practical on-the-ground forest management. Presenter is Ken Cox, Ontario's Southern Region Fire Advisor and includes Fire-Smart Canada principles in reducing landowner risk to wildfires in Ontario.

[Wildfire Mitigation Strategies](#)

Check the [Ontario Woodlot Associations](#) (OWA) website for resources on forest management. They produce an excellent magazine called The Woodlander. Check under the Member Resources tab for workshops and courses offered. They offer a Forest Climate Change Resiliency course once or twice a year and the *Ask Anything Forum* allows you to ask questions specifically about your forest and get answers from experts.

Consider becoming a member of the OWA.