

# Forest sustainability in East Canada Ontario

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## **1. Introduction**

The combustion of wood for energy purpose is not considered to contribute to the augmentation of greenhouse gases concentration in the atmosphere, as long as the CO<sub>2</sub> emissions released during the combustion of wood are balanced by the growth of new trees. It is therefore essential to investigate if the forests in the region where the wood used for energy purpose are managed in a sustainable way, avoiding resources associated with overexploitation of forests, land use change, depletion of carbon stocks, etc...

In this framework, literature research was carried out to produce a summary of forest management in the eastern part of Canada and particularly in Ontario, including general state of forests, management and sustainability assessment.

## **2. Ontario forests overview**

### ***2.1. Location and distribution***

Canada is a country located in the northern part of North America. Its ten provinces and three territories extend from the Atlantic to the Pacific and northward into the Arctic Ocean. The administrative map of the country can be found in Figure 1.

Figure 1 : General map of Canada



Source: geology.com

This report will focus on one province: Ontario. It is located in the eastern part of the country. It is bordered by the provinces Manitoba in the west and Quebec in the east. It also shares a border with several northern states of the United States of America. The concerned province can be seen in Figure 2.

General information on Ontario can be found in the table below.

Table 1 : General information

| Province       | Capital        | Area in km <sup>2</sup> | Population in 2016 | Density in Pop/km <sup>2</sup> |
|----------------|----------------|-------------------------|--------------------|--------------------------------|
| <b>Ontario</b> | <b>Toronto</b> | <b>1,076,395</b>        | <b>13,448,494</b>  | <b>12.0</b>                    |
| Quebec         | Quebec city    | 1,542,056               | 8,164,361          | 5.3                            |
| Nova Scotia    | Halifax        | 55,284                  | 923,598            | 16.7                           |
| New Brunswick  | Fredericton    | 72,908                  | 747,101            | 10.2                           |
| Manitoba       | Winnipeg       | 647,797                 | 1,278,365          | 2.0                            |

| Province                  | Capital       | Area in km <sup>2</sup> | Population in 2016 | Density in Pop/km <sup>2</sup> |
|---------------------------|---------------|-------------------------|--------------------|--------------------------------|
| British Columbia          | Victoria      | 944,735                 | 4,648,055          | 4.9                            |
| Prince Edward Island      | Charlottetown | 5,660                   | 142,907            | 25.2                           |
| Saskatchewan              | Regina        | 651,036                 | 1,098,352          | 1.7                            |
| Alberta                   | Edmonton      | 661,848                 | 4,067,175          | 6.1                            |
| Newfoundland and Labrador | St. John's    | 405,212                 | 519,716            | 1.3                            |
| <b>Canada</b>             | <b>Ottawa</b> | <b>9,984,670</b>        | <b>36,048,521</b>  | <b>3.6</b>                     |

Source : wikipedia

Figure 2 : General map of Ontario



According to the national statistics, forest land in Canada accounted for 347,069,000 ha in 2017<sup>1</sup>. It is the third largest country in terms of forest area behind Brazil and the Russian Federation. Other land with tree cover accounts for 8,498,940 ha and other wooded land accounts for 40,865,660 ha for a total of 396,433,600 ha or 39,7% of the total land surface area.

Forests in Ontario occupy more than 71 million hectares of the province's territory. It accounts for 66.1% of the total area of the province and 28,8% of the forest area in Canada.

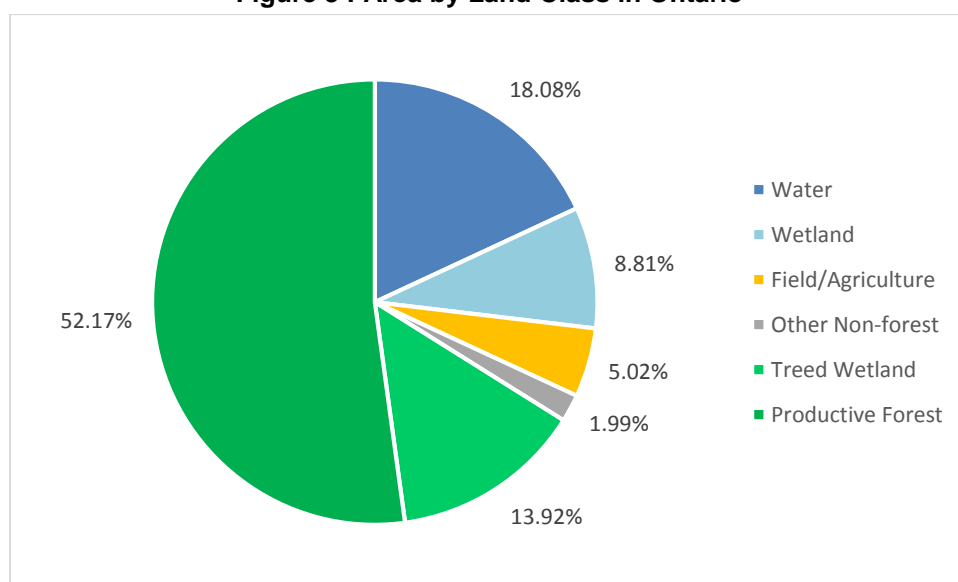
The provincial area distributed by land class can be seen in the table and the figure below:

**Table 2 : Area by Land Class in Ontario**

| Land Class        | Crown             | Parks and protected areas | Other             | Total              |
|-------------------|-------------------|---------------------------|-------------------|--------------------|
| Water             | 16,967,051        | 1,943,058                 | 525,370           | 19,435,479         |
| Wetland           | 8,137,549         | 1,100,620                 | 239,219           | 9,477,388          |
| Field/Agriculture | 34,434            | 8,172                     | 5,358,927         | 5,401,533          |
| Other Non-forest  | 698,842           | 448,111                   | 993,518           | 2,140,471          |
| Treed Wetland     | 12,685,193        | 1,202,999                 | 1,083,755         | 14,971,947         |
| Productive Forest | 44,128,288        | 5,846,953                 | 6,118,363         | 56,093,604         |
| <b>Total</b>      | <b>82,651,356</b> | <b>10,549,912</b>         | <b>14,319,153</b> | <b>107,520,421</b> |

Source : Forest Resources of Ontario 2016

**Figure 3 : Area by Land Class in Ontario**



Source : Forest Resources of Ontario 2016

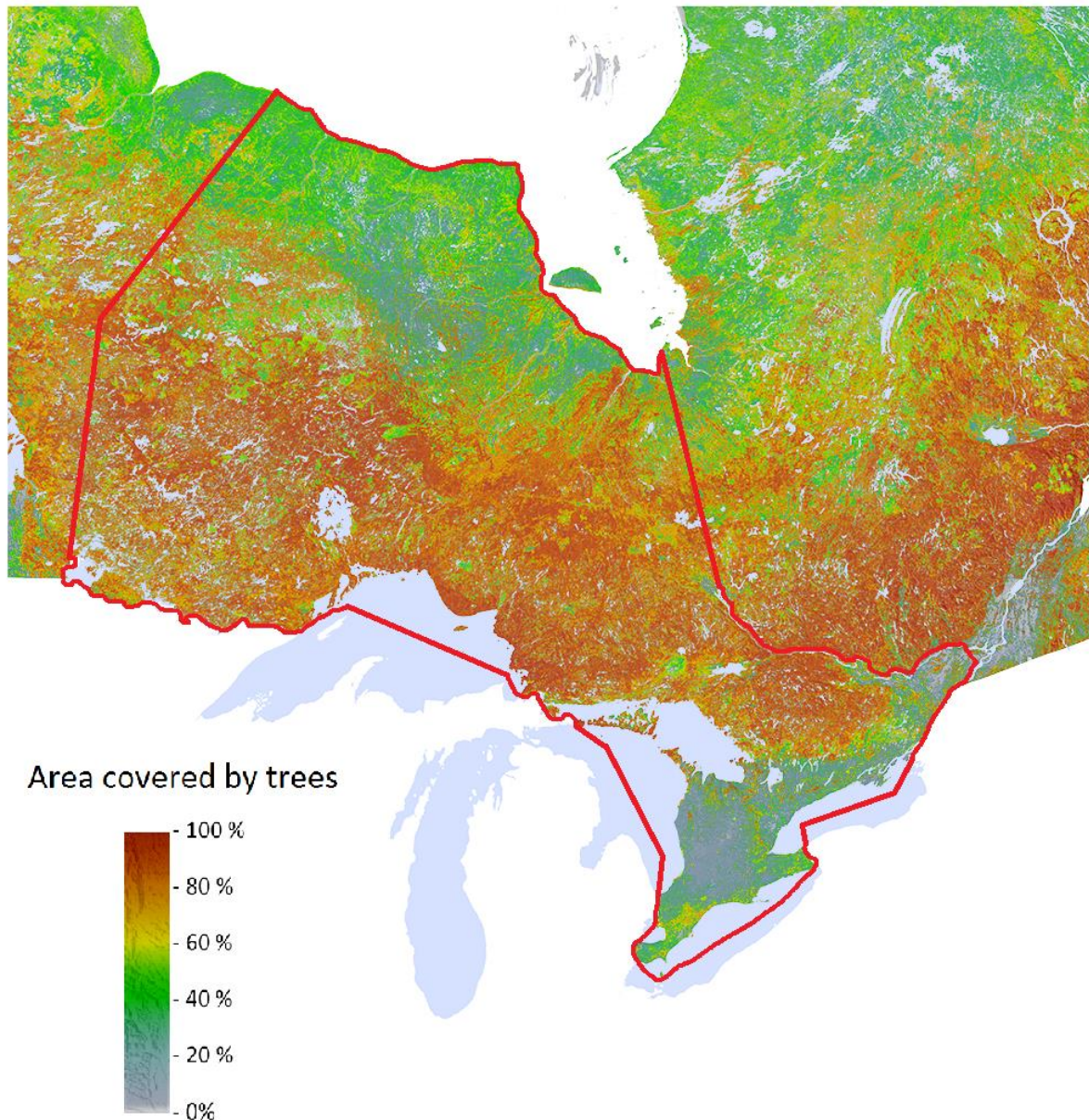
Productive Forests represent more than 50% of the province territory. The surface occupied by water is large as the province includes parts of the great lakes in its southern part.

<sup>1</sup> The state of Canada's forests – Annual report 2017



Figure 4 presents the distribution of forest cover in Ontario. As can be seen on the map, forests cover a large part of the territory and are evenly distributed in terms of surface. Areas in the south are more covered by trees except for the territory in the southernmost part of the province. It corresponds to the region around Toronto which is heavily cultivated.

**Figure 4 : Area covered by trees in Ontario**



Source: Natural Resources Canada (modified by SGS)



## 2.2. Ecological zones

Climate in Canada is very diverse. It can go from temperate to boreal and polar. It depends on the region of the country. The same applies to Ontario which is a large province. Ontario presents three Köppen climate types: Hot summer humid continental (southernmost region), Warm summer humid continental (southern part) and Subarctic (northern part). It is affected by three air sources:

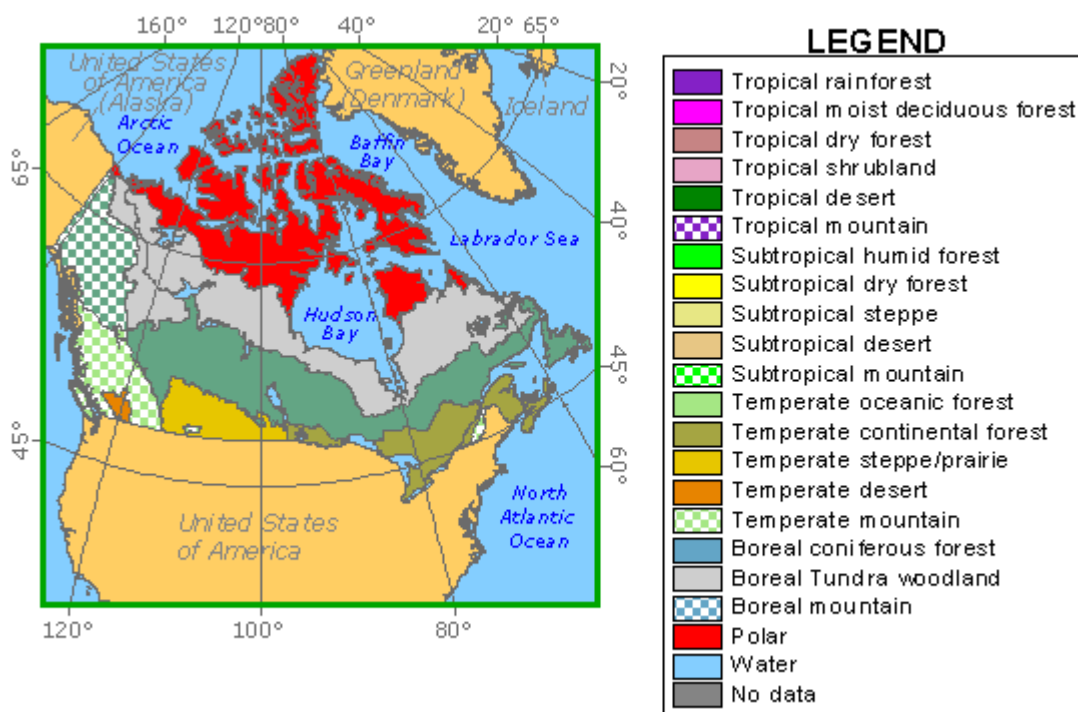
- cold, dry, arctic air from the north (dominant factor during the winter months, and for a longer part of the year in far northern Ontario);
- Pacific polar air crossing in from the western Canadian Prairies/US Northern Plains;
- warm, moist air from the Gulf of Mexico and the Atlantic Ocean.

The effects of these major air masses on temperature and precipitation depend mainly on latitude, proximity to major bodies of water and to a small extent, terrain relief. In general, most of Ontario's climate is classified as humid continental.<sup>2</sup>

According to FAO, the country presents a great variety of ecological regions. Ontario features 3 ecological regions (Figure 5):

- Temperate continental forest,
- Boreal coniferous forest,
- Boreal tundra woodland.

Figure 5 : Ecological zones in Canada



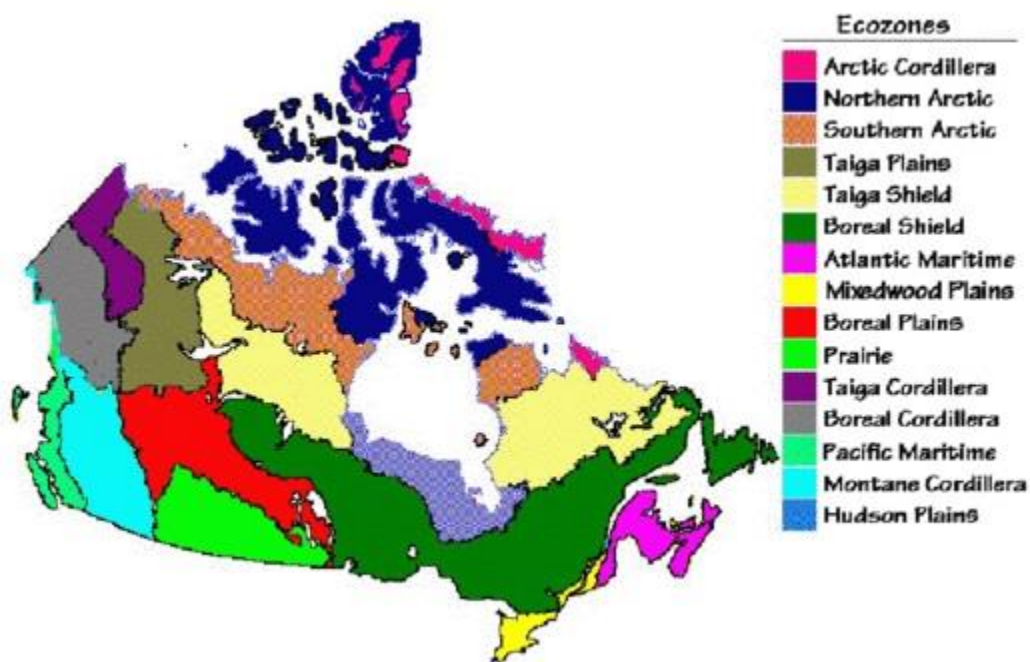
Source : <http://www.fao.org/forestry/country/19971/en/can/>

<sup>2</sup> Source: Physical geography of Ontario

Canada has its own Ecozone classification. It is presented in Figure 6. In Ontario, the following ecozones are present:

- Boreal Shield,
- Mixedwood Plains
- Hudson Plains.

**Figure 6 : Terrestrial ecozones of Canada**

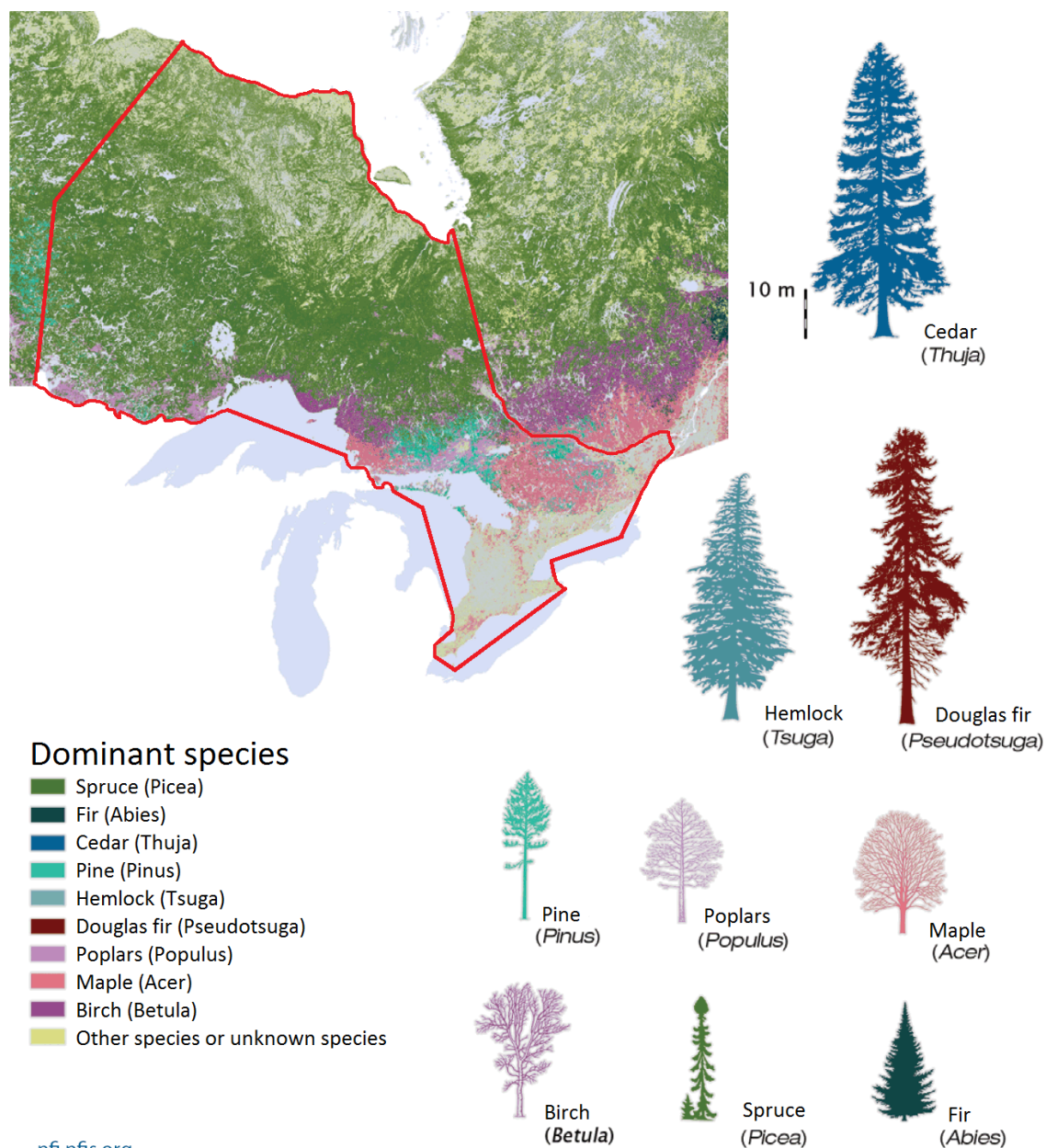


Source : <https://mrnagribianko-ecozones.wikispaces.com/1+Atlantic+Maritime>

In terms of tree species distribution, Ontario present several species that compose forests: spruce, fir, pine, maple and birch. Temperate continental forests are mainly composed by maple, birch and pine.

According to FAO in 2005, the forest was mainly composed by primary forest (53%) and modified natural forests (47%).

Figure 7 : Tree species in Ontario



[nfi.nfis.org](http://nfi.nfis.org)

[scf.rncan.gc.ca/etatdesforets](http://scf.rncan.gc.ca/etatdesforets)

Sources : Beaudoin, A., Bernier, P. Y., Guindon, L., Villemaire, P., Guo, X. J., Stinson, G., Bergeron, T., Magnussen, S., et Hall, R. J. 2014.

Mapping attributes of Canada's forests at moderate resolution through kNN and MODIS imagery. *Revue canadienne de recherche forestière*.

DOI : 10.1139/cjfr-2013-0401; Inventaire forestier national du Canada; Silhouettes reproduites de Les Arbres du Canada de J. L. Farrar, 1995.

Produit par: Andrew Dyk, Ressources naturelles Canada

© Sa Majesté la Reine du chef du Canada, représentée par le ministre de Ressources naturelles Canada, 2014

Source : Natural Resources Canada (modified by SGS)

Ontario has its own forest regions classification. There are four main forest regions, each with specific characteristics and tree species<sup>3</sup>:

**Figure 8 : Forest regions of Ontario**



Source : <https://www.ontario.ca/page/forest-regions>

- **The Hudson Bay Lowlands in the far north**

Distinguished by bogs and fens, sparse slow growing forest and tundra, the Hudson Bay Lowlands is the northernmost forest region in Ontario.

This forest has one of the largest expanses of wetland in the world. With an area of 26 million hectares, it is dominated by trees and open muskeg (over two-thirds of its area) and is dotted with thousands of small lakes and ponds.

Productive forest is generally made up of stunted tamarack and black spruce growing along river banks and other well-drained areas. White birch, dwarf birch and willow are the common deciduous trees in this forest region.

The Hudson Bay Lowlands region provides vital habitat for a variety of unique mammals and migratory birds including:

- woodland caribou, polar bear, arctic fox, and arctic hare
- Canada geese, snow geese, willow ptarmigan and various species of sea ducks

- **The boreal forest region in the northern Ontario**

Ontario's boreal forest is the largest forest region in Ontario and Canada. With an area of 50 million hectares, the boreal forest contains two-thirds of Ontario's forest. It extends from the northern limits of the Great Lakes–St. Lawrence forest to the Hudson Bay Lowlands.

Coniferous (softwood) and mixed-wood forests dominate the Boreal region. The main conifer species are black and white spruce, jack pine, balsam fir, tamarack and eastern white cedar. The predominant deciduous (hardwood) species are poplar and white birch.

Boreal forests are heavily influenced by natural disturbances. Although large, intense fires often burn across the landscape, boreal species have adapted to this. As part of their life cycle, species like jack pine and black spruce require this kind of disturbance to regenerate. New forests quickly grow after these disturbances, creating the natural pattern of even-aged, single species forests found in the boreal region.

<sup>3</sup> <https://www.ontario.ca/page/forest-regions>

The boreal forest contains hundreds of species of plants such as ferns, mosses, fungi, shrubs and herbs.

It is also home to a wide variety of wildlife, including:

- predators such as black bears, wolves and lynx
- large ungulates like moose and caribou
- a myriad of birds ranging from the great owl to the tiny winter wren
- many small mammals such as the pine marten, hare, red fox and porcupine

- **The Great Lakes-St. Lawrence forest in southern and central Ontario**

The Great Lakes–St. Lawrence forest is the second largest forest region in Ontario. It covers approximately 20 million hectares of Ontario. This forest extends along the St. Lawrence River across central Ontario to Lake Huron and west of Lake Superior along the border with Minnesota. The southern portion of the Great Lakes–St. Lawrence forest extends into the populated areas of Ontario.

The Great Lakes–St. Lawrence forest is dominated by hardwood forests, featuring species such as maple, oak, yellow birch, white and red pine. Coniferous trees such as white pine, red pine, hemlock and white cedar, commonly mix with deciduous broad-leaved species, such as yellow birch, sugar and red maples, basswood and red oak. Much of the forest in the Great Lakes–St. Lawrence forest is uneven aged, meaning that young and old trees can be found within the same group of trees.

The Great Lakes–St. Lawrence region is home to a wide variety of wildlife, including:

- predators such as black bear, wolves
- large ungulates like white-tailed deer and moose
- many small mammals such as beaver, muskrat, otter
- pileated woodpecker and various migratory birds

- **The deciduous forest in southern Ontario.**

The deciduous forest is the southernmost region in Ontario, dominated by agriculture and urban areas. Totalling almost 3 million hectares, this region has largely been cleared with scattered woodlots remaining on sites too poor for agriculture. This forest generally has the greatest diversity of tree species, while at the same time having the lowest proportion of forest.

It has most of the tree and shrubs species found in the Great Lakes–St. Lawrence forest, and also contains black walnut, butternut, tulip, magnolia, black gum, many types of oaks, hickories, sassafras and red bud — species commonly found in Ohio, Pennsylvania and the Carolinas in the USA.

The deciduous forest region has the most diverse forest life in Ontario. The region has many rare mammals, birds, plants, insects, reptiles and amphibians such as:

- sassafras and tulip tree
- southern flying squirrel and red-bellied woodpecker
- black rat snake, milk snake and gray tree frog

### 2.3. *Forest ownership*<sup>4</sup>

Most Canada's forest land, about 94%, is publicly owned (Crown Land) and managed by provincial, territorial and federal governments. Only 6% of Canada's forest lands is privately owned.

This means that all those jurisdictions – provincial, territorial and federal – together have the ability to create and enforce the laws, regulations and policies required to meet Canada's commitment to sustainable forest management across the country.

**Table 3 : Forest ownership in Canada**

| <b>Ownership</b> | <b>percentage</b> |
|------------------|-------------------|
| Provincial       | 76.6%             |
| Territorial      | 12.9%             |
| Private          | 6.2%              |
| Aboriginal       | 2.0%              |
| Federal          | 1.6               |

The provinces and territories have many responsibilities and powers. They:

- develop and enforce forest laws
- set up a license or timber supply agreement with forest companies that want to harvest timber in publicly owned forests
- specify the responsibilities of the forest companies that are given access to public forests
- monitor the activities of those forest companies to ensure that laws, lease agreements and forest management plans are complied with
- collect royalties from forest companies for the timber they harvest from public forests
- manage designated protected areas, such as provincial parks and conservation areas

The 4% of Canada's forests owned by the federal government are located mainly in national parks, on lands owned by the Department of National Defense, and on lands held in reserve for, or otherwise controlled by, Aboriginal Peoples.

The federal government departments responsible for regulating and managing forestry operations on these lands include:

- Aboriginal Affairs and Northern Development Canada
- Department of National Defense
- Natural Resources Canada
- Parks Canada

Although only 6% of Canada's forests are privately owned, they contribute substantially to the country's wood products sector.

- This category is made up of large forests owned by forest companies, notably in the provinces of New Brunswick, Nova Scotia, Ontario, Quebec and British Columbia.
- The rest of the private ownership category includes small family-owned forests and woodlots.
- One-tenth of the timber harvested in Canada comes from private lands.

<sup>4</sup> <http://www.nrcan.gc.ca/forests/canada/ownership/17495>



In Ontario, 86.6% of the province is Crown or publicly owned: 9,1% is within existing or proposed Parks and Protected areas; 77,6% is unregulated<sup>5</sup> Crown land; 13,4% is Federal, First Nations or privately owned. Out of the 71 million ha of forest in the province, 43 million hectares are managed Crown forest area.

## **2.4. Competent authorities**

### **In Canada**

Canada's provinces and territories have jurisdiction over the clear majority of the country's forests, and develop and enforce laws, regulations and policies related to forests.

Those laws, regulations and policies differ from one jurisdiction to another but they are all:

- based on sustainable forest management principles
- developed in consultation with the public, industries and other interested parties
- grounded in scientific research and analysis

Provincial and territorial forest laws, regulations and policies govern a range of economic, social and environmental matters.

Provincial and territorial governments grant forest companies rights to harvest timber on public land and stipulate the responsibilities tied to those rights. These arrangements, also known as tenures, don't automatically give companies the authority to harvest timber. By law, governments must first approve forest management plans and authorize the proposed harvesting before any trees are felled.

The provinces and territories closely monitor forestry companies operating in publicly owned forests, through several means. Government agencies responsible for monitoring and enforcement.

Provincial and territorial laws and regulations also address the requirements of over-arching federal laws that apply to forests, and of international agreements Canada has signed.

Provincial and territorial laws generally also apply to timber harvested on land owned by the federal government. This means that forest management plans are required and must address inventory, harvesting, renewal and other activities. As well, before harvesting begins, contracts or permits must be in place. They must set out clearly what areas are to be cut, how wood will be marked and how revenues will be received.

Some provinces have laws that set standards for forest management practices on private lands. In most cases, however, forestry on private lands is governed by municipal regulations and supported by provincial guidelines or voluntary programs.

### **In Ontario**

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<sup>5</sup> Unregulated Crown land here is publicly owned land not within Parks or Protected Areas

In Ontario, the Ministry of Natural Resources and Forestry (MNRF) is responsible for the long-term health of Crown forests (public land).

This responsibility is shared with forest product companies or groups of companies and communities. Through forest management planning, forest managers provide for healthy forests now and in the future and provide a range of sustainable benefits (e.g. timber and commercial products, wildlife habitat and recreational opportunities).

Forest management is based on 2 key laws that guide planning:

1. *Crown Forest Sustainability Act*

It provides for:

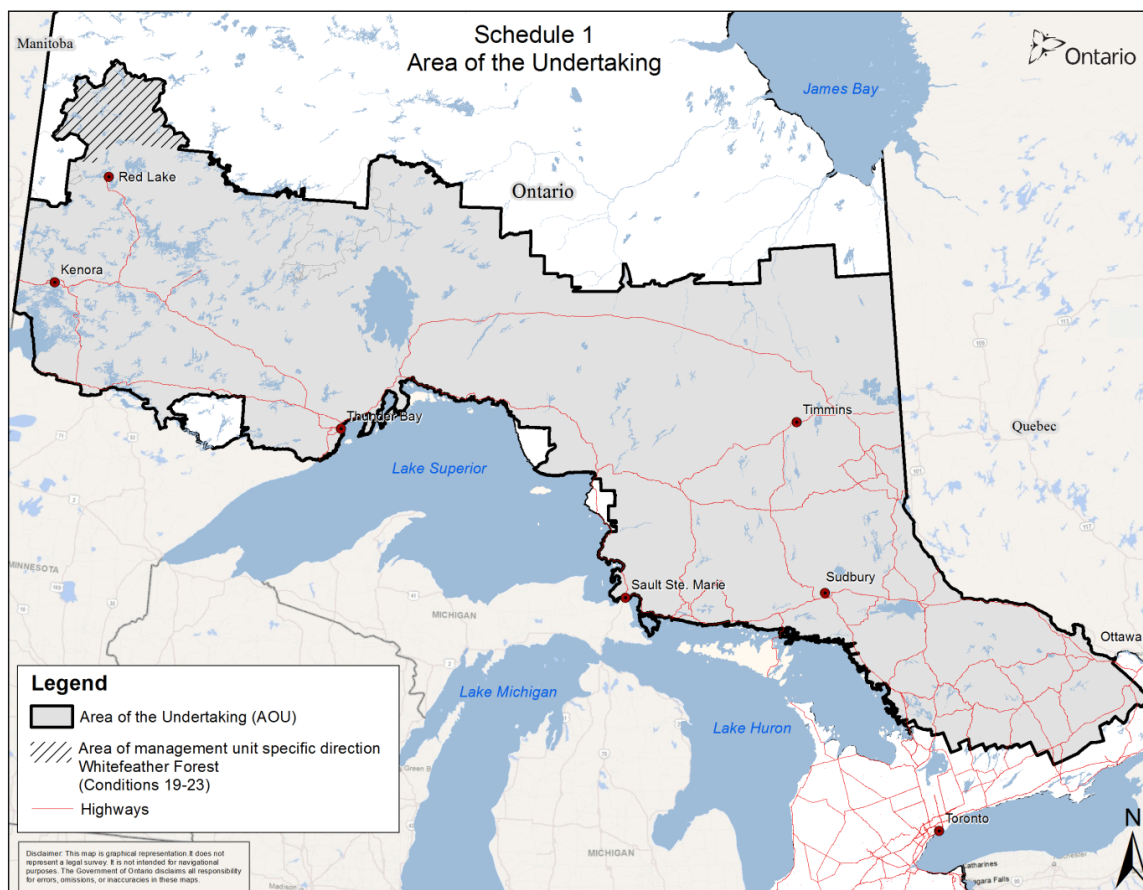
- the regulation of forest planning
- information management and exchange
- forest operations, licensing, trust funds, processing facilities, remedies and enforcement
- four manuals that outline the rules and procedures for forest management planning
- independent forest audits

2. *Environmental Assessment Act*

Provides approvals to carry out forest management on Crown lands in what is called the “Area of the Undertaking”. This is the land where Forest Management Units are in place to organize the commercial forest exploitation on Crown Land. The Area of Undertaking roughly covers the south half of Ontario (Figure 9). It means that no Crown Land forest further North (mostly Boreal Forests) can be subject to commercial exploitation for the time being.

As per 2016, the Area of Undertaking was about 35 million ha of forests, roughly the half of the forests in Ontario. But, even within the area of undertaking, not all the forest surfaces are available for commercial exploitation. Indeed, some of the forests are private, and some forest other Crown Land are protected (national parks and other protection status). Out of the 35 million ha forest in the Area of Undertaking in 2016, only 27 million ha are indeed meant to be used for commercial production.

Every 5 years, the Ministry of Natural Resources and Forestry provides an Environmental Assessment (EA) Report on Forest Management to the Ministry of the Environment and the public on how it met EA requirements.

**Figure 9: Area of the Undertaking**

## 2.5. Overview of wood-related industry

### Harvest

Forest managers report on the level of forest harvesting activities on Ontario's Crown forests annually. Harvesting levels remained consistent with recent years but still well below historic levels<sup>6</sup>.

- Total area harvested on Crown land was 124,967 ha;
- 85% was harvested under the clearcut silvicultural system (106,343 ha);
- 9% was harvested under the shelter wood silvicultural system (10,652 ha);
- 6% was harvested under the selection silvicultural system (7,972 ha); and
- Harvest levels in 2013-14 were 45% of the allowable harvest area prescribed in approved forest management plans.

MNRF tracks volumes of wood harvested annually by species and product type in its scaling and billing system. Stumpage charges and renewal contributions are also tracked through this system.

<sup>6</sup> <https://www.ontario.ca/page/annual-report-forest-management-2013-2014#section-4>

- 5 million cubic metres of wood were harvested on Crown land with the majority being spruce and jack pine;
- The 2013 volume being harvested for biomass cogeneration more than doubled from 2012 levels, from 130,365 cubic metres to 306,648 cubic metres respectively; and
- The total volume harvested is lower than the total mortality volume (15.8 million cubic metres in the AOU) caused by insects, severe weather, and fire combined.

**Table 4 : Volume harvested by species in Ontario (2013-14)**

| <b>Tree species</b>   | <b>Volume (m<sup>3</sup>)</b> |
|-----------------------|-------------------------------|
| White Pine            | 334,357                       |
| Red Pine              | 209,826                       |
| Jack Pine             | 3,374,302                     |
| Spruce                | 5,884,744                     |
| Balsam Fir            | 377,362                       |
| Other Softwood        | 83,504                        |
| <b>Softwood total</b> | <b>10,264,095</b>             |
| Poplar                | 2,016,364                     |
| White Birch           | 309,419                       |
| Maple                 | 475,043                       |
| Oak                   | 47,088                        |
| Yellow Birch          | 43,444                        |
| Other Hardwood        | 44,670                        |
| <b>Hardwood total</b> | <b>2,936,029</b>              |
| <b>Mixedwood</b>      | <b>306,648</b>                |
| <b>Total</b>          | <b>13,506,772</b>             |

Wood coming from harvesting mainly feeds sawmills, pulp and composite industries. The rest includes biomass cogeneration, fuelwood, paper, veneer and others.

**Table 5 : Volume harvested by product in Ontario (2013-14)**

| <b>Product type</b>  | <b>Volume (m<sup>3</sup>)</b> |
|----------------------|-------------------------------|
| Biomass Cogeneration | 306,648                       |
| Composite            | 1,479,099                     |
| Fuelwood             | 193,945                       |
| Paper                | 441,104                       |
| Pulp                 | 3,642,790                     |
| Sawmill              | 7,239,435                     |
| Veneer               | 195,727                       |
| Other                | 8,024                         |
| <b>Total</b>         | <b>13,506,772</b>             |

## Industry

The forest industry is one of Canada's most important manufacturing sectors. In 2016, it accounted for about 7% of Canada's total exports. It injected approximately \$23 billion into Canada's economy. 211,075 jobs were supported by the industry, including 9,700 indigenous people. In 2015, it generated more than \$1 billion in revenue for provincial and territorial governments.

The industry mainly consists in traditional forest products, these includes lumber and other solid wood products, and pulp and paper. It also includes upstream activities, such as forest management and logging. Non-traditional forest products are growing in prominence.

In Ontario, wood industry produces a broad range of primary and secondary forest products and is one of the most important and substantial contributors to the provincial economy. The revenue from export of softwood lumber averages \$1 billion annually. Ontario receives most of its wood product manufacturing revenue from the other wood products manufacturing subsector, which averages revenue of \$2.03 billion CAD. Ontario's converted paper product manufacturing is the province's highest earner, with \$4.8 billion CAD revenues.

The roundwood production for 2015 is presented in the table below:

**Table 6 : Total roundwood production by ownership and species in Ontario**

|                       |                 | Volume (thousand m <sup>3</sup> ) |
|-----------------------|-----------------|-----------------------------------|
| Provincial crown land | Softwood        | 10,949                            |
|                       | Hardwood        | 3,323                             |
|                       | Total           | 15,192                            |
| Private land          | Softwood        | 224                               |
|                       | Hardwood        | 307                               |
|                       | Total           | 636                               |
| Federal land          | Softwood        | -                                 |
|                       | Hardwood        | -                                 |
|                       | Total           | -                                 |
| <b>Total</b>          | <b>Softwood</b> | <b>11,728</b>                     |
|                       | <b>Hardwood</b> | <b>3,632</b>                      |
|                       | <b>Total</b>    | <b>15,829</b>                     |

Source : [http://nfdp.ccfm.org/products/quick\\_facts\\_e.php](http://nfdp.ccfm.org/products/quick_facts_e.php)

According to the report on State of Ontario's forests<sup>7</sup>, the forest sector faced a downturn in the second part of years 2000. Estimated operating surpluses, a measure of profitability, in the paper and wood products manufacturing sectors declined from 2004 to 2008 (Figure 10). For the paper manufacturing sector, it declined since 2000.

<sup>7</sup> <https://www.ontario.ca/document/state-ontarios-forests>

**Figure 10: Changes in Ontario paper and wood product manufacturing sector operating surpluses from 1999 to 2008**



Source : State of Ontario's forests

The Ontario Wood Promotion Program, created in 2005, supports the forest products and wood manufacturing sectors. There is the promotion of local wood products. The Ministry of Natural Resources and Forestry advocates for the industry by providing information about building code changes and how people can heat/power with forest biomass.

Ontario's Ministry of Natural Resources and Forestry tries to keep the industry competitive by assisting with the building of an industry cluster, the Bluewater Wood Alliance, by helping develop workforce capacity to alleviate worker shortages and by supporting FPInnovations' Wood Products Manufacturing Initiative.

## Employment

Over 50% of forest industry jobs of Canada are in Ontario and Quebec.

In 2016, the total number of people employed in the forest sector in Ontario was 49,525 people. The clear majority of employees work in the wood product manufacturing industry (22,567) the pulp and paper product manufacturing industry (20,333). The other subsectors are support activities for forestry industry (4,083) and Forestry and logging industry (2,450).

The employment in the forest industry follows a diminishing trend. It is explained that it fluctuates with economic cycles. However, the number of employees in 2016 was at its lowest over the last 26 years.



**Table 7 : Employment in the forest sector in Ontario**

| Year | Employment | Year | Employment |
|------|------------|------|------------|
| 1990 | 89,100     | 2004 | 114,567    |
| 1991 | 75,500     | 2005 | 99,492     |
| 1992 | 70,400     | 2006 | 93,250     |
| 1993 | 75,100     | 2007 | 81,483     |
| 1994 | 79,100     | 2008 | 77,517     |
| 1995 | 80,200     | 2009 | 67,108     |
| 1996 | 79,600     | 2010 | 69,742     |
| 1997 | 75,800     | 2011 | 63,975     |
| 1998 | 84,000     | 2012 | 63,117     |
| 1999 | 76,100     | 2013 | 57,317     |
| 2000 | 86,200     | 2014 | 63,175     |
| 2001 | 93,550     | 2015 | 57,617     |
| 2002 | 96,733     | 2016 | 49,525     |
| 2003 | 101,200    |      |            |

Source: <http://cfs.nrcan.gc.ca/statsprofile/employment/on>

### 3. Sustainability of Ontario forest

#### 3.1. Evolution of forest area and risk of conversion

Over the past 25 years, the forest area in Canada has remained stable losing 1.2 million ha (0,34%). The main cause for this decrease is the clearing of forest land for new, non-forest land uses, for example: agriculture, road and hydroelectric developments. Over the next 10 to 20 years, the overall forest area is expected to remain stable.

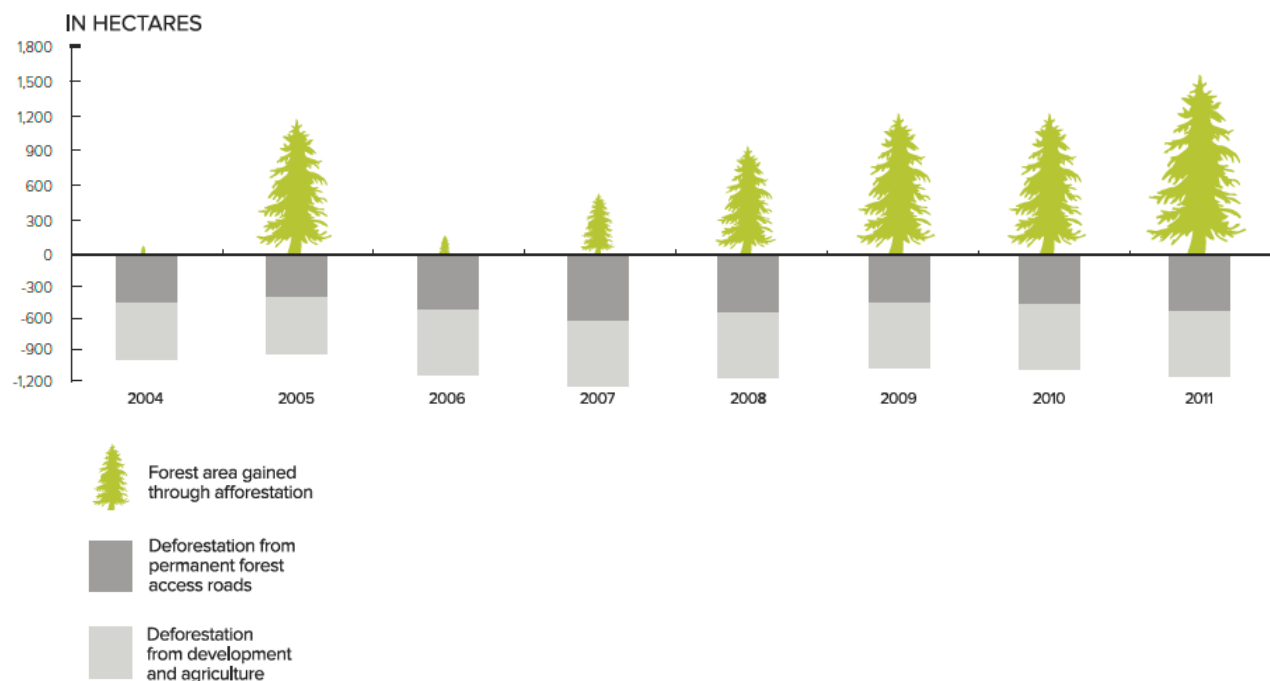
**Table 8: Estimated area (millions of hectares) of forest in Canada**

| Year        | 1990  | 1995  | 2000  | 2005  | 2010  | 2015  |
|-------------|-------|-------|-------|-------|-------|-------|
| Forest area | 348.3 | 348.0 | 347.8 | 347.6 | 347.3 | 347.1 |

Source: The state of Canada's Forests – Annual Report 2017

According to the State of Ontario's Forests Report, the forests are very stable in terms of area. Indeed, as can be seen on Figure 11, the estimated yearly gains and losses during the period 2004-2011 are respectively in the range of maximum + 0 ha to + 1500 ha and maximum -900 ha to -1200 ha. This is about +/-0.002% change yearly, if compared to the total estimated forest area in Ontario.

**Figure 11: Afforestation and deforestation in Ontario (2004-2011)**



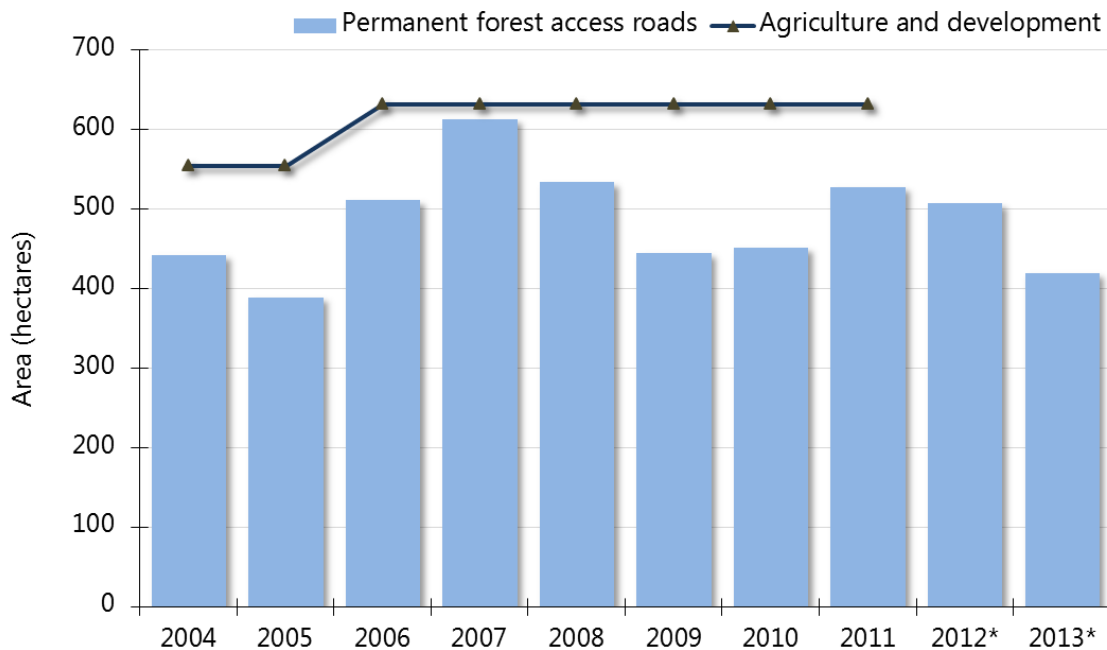
source : State of Ontario's Forests Report, 2016

Of course, forests located near the large cities (Ottawa, Toronto, etc....) are more subject to land use change than the rest of the province, due peri-urban developments. For example, in the small South

Nation Conservation area, between Ottawa and the south boundary of Ontario, it is estimated that more than 4% of the forests have been lost between 2008 and 2014 <sup>8</sup>.

The estimated annual deforestation in Ontario is shown on Figure 12. In 2009-2013, approximately 2,352 hectares were deforested in the Area of Undertaking<sup>9</sup> due to permanent road construction, for an annual average of 470 hectares per year. Because temporary operational roads are no longer included in the estimate of deforestation, the average annual rate is much lower and more accurate than that reported for 1990-2008 (6,210 hectares per year). A preliminary analysis of deforestation associated with the development of mines in northern Ontario showed an additional loss of approximately 3,100 hectares of forest over 1999-2013 (approximately 220 hectares per year).

**Figure 12: Estimated annual deforestation in Ontario 2004-2013**



\*2012-13 agriculture and development data missing

Source: <https://www.ontario.ca/page/deforestation>

The area of afforestation is presented in Figure 13. A total of 9,910 hectares was afforested in 2004-2013. Annual rates of afforestation increased in the early 1990s, declined sharply to a low of 21 hectares in 2004 and since then have increased to just over 1,500 hectares in 2013

During 2009-2013, afforestation remained high at 1,200-1,500 hectares annually. This coincides with the introduction of Ontario's 50 Million Tree Program. This program, funded by the Ministry of Natural Resources and Forestry and administered by Forests Ontario and other partners, provides funding and

<sup>8</sup>

<http://www.sdgcounties.ca/sites/default/files/documents/2016%20Forest%20Cover%20and%20Trends%20Analysis%20-%20October%202017.pdf>

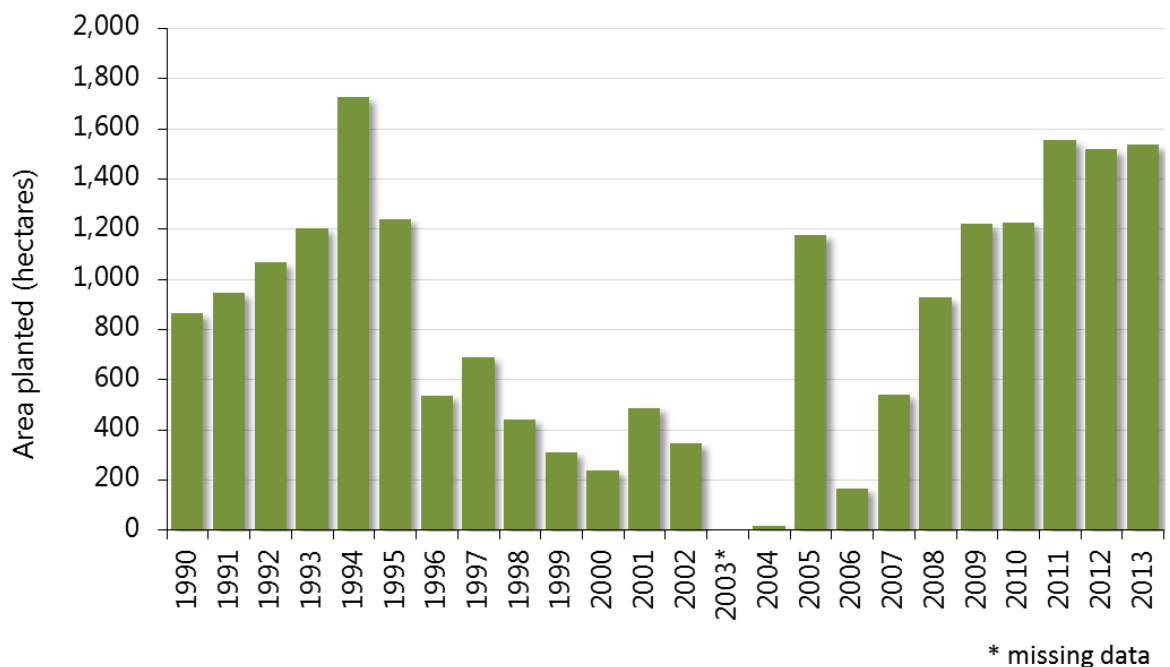
<sup>9</sup> See Figure 9

information for landowners willing to plant trees on their property. The goal of the program is to plant 50 million trees by 2025. To date, more than 20 million trees have been planted, creating more than 10,500 hectares of new forests across Ontario.

The current rate of afforestation reported here likely underestimates the total area planted, since it only includes planting efforts through the 50 Million Tree Program and other projects of Forests Ontario. Natural old-field conversion to forested land is not included.

Although afforestation declined sharply through the late 1990s and early 2000s, the provincial commitment to afforestation has been well received by landowners, resulting in continued increases in annual planting areas, which is why the trend of this indicator is considered to be improving.

**Figure 13: Area of afforestation in Ontario 1990-2013**



Source : <https://www.ontario.ca/page/afforestation>

The FSC risk assessment platform [www.globalforestregistry.org](http://www.globalforestregistry.org) considers that Canada is at low risk in terms of conversion of forest to other land uses, because the following criterion is verified at the country level:

- There is no net loss AND no significant rate of loss (> 0.5% per year) of natural forests and other naturally wooded ecosystems such as savannahs taking place in the eco-region in question.

### **3.2. Living wood volumes and removals**

Canada's forests contain about 47 billion m<sup>3</sup> of wood. The repartition by type of wood is presented in the table below:

**Table 9: Wood volume on forest land by wood type**

| Ecozone      | Wood volume<br>(million m <sup>3</sup> ) |
|--------------|--|
| Coniferous   | 34,163.69                                |
| Mixedwood    | 7,383.55                                 |
| Broadleaf    | 5,771.84                                 |
| Non-treed    | 1.39                                     |
| <b>Total</b> | <b>47,320.47</b>                         |

Source: [https://nfi.nfis.org/resources/general/summaries/en/html/CA3\\_T15\\_FORAGE20\\_VOL\\_en.html](https://nfi.nfis.org/resources/general/summaries/en/html/CA3_T15_FORAGE20_VOL_en.html)

Wood volume in Ontario is estimated to be over 7 billion m<sup>3</sup>. the total forest growth equals 63 million m<sup>3</sup> each year or about 0.9% of its total wood.

The growing stock evolution by tree species in the Area of Undertaking is presented in Table 10. The indices are calculated by provincial forest type for 33,598,866 ha of forested land within the Area available for harvest which is located in the center of the province.

**Table 10: Growing stock volume by tree species in Ontario (thousand m<sup>3</sup>)**

| Species            | 1963             | 1986             | 1996             | 2001             | 2006             | 2011             | 2016             |
|--------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Red and White Pine | 152,480          | 112,178          | 147,651          | 201,130          | 212,708          | 219,243          | 225,293          |
| Jack Pine          | 611,493          | 547,170          | 555,702          | 549,431          | 515,616          | 517,541          | 527,063          |
| Spruce             | 1,585,039        | 1,716,833        | 1,670,259        | 1,693,589        | 1,633,719        | 1,587,621        | 1,587,201        |
| Balsam Fir         | 286,366          | 208,296          | 221,498          | 233,675          | 233,841          | 227,996          | 240,858          |
| Other Conifers     | 140,797          | 117,923          | 198,002          | 182,131          | 235,994          | 245,970          | 250,822          |
| Poplar             | 853,314          | 847,347          | 901,935          | 1,017,713        | 1,067,332        | 1,072,581        | 1,080,361        |
| White Birch        | 492,710          | 306,690          | 336,813          | 399,917          | 393,713          | 400,471          | 404,798          |
| Tolerant Hardwoods | 456,372          | 419,549          | 401,874          | 473,767          | 487,431          | 488,972          | 508,679          |
| <b>Total</b>       | <b>4,578,571</b> | <b>4,275,986</b> | <b>4,433,734</b> | <b>4,751,353</b> | <b>4,780,354</b> | <b>4,760,395</b> | <b>4,825,075</b> |

Source: <https://www.ontario.ca/page/forest-growing-stock>

Growing stock in Ontario is rather stable and even slowly growing since the end of the nineties. Volumes for most forest types have remained stable. However, spruce volume has declined noticeably, while poplar volume has increased. Stable or increasing gross total volume suggests that growth is keeping pace with depletions for all forest types. Mean annual increments are well within national averages, but age class imbalances remain. The annual increments are estimated to decrease for most species (except jack pine), which reflects that the forests are growing older : growth rate in mature, old forests tend to decline compared to middle aged forests.

Forest regeneration is the act of growing back the forest by natural or artificial means after harvesting trees. Forests will also regenerate following natural disturbances such as fire, insect infestation, disease outbreaks and weather events.

The amount of forest regenerated and the success of regeneration activities tell us how well the forest is being renewed and is an indication of forest sustainability.

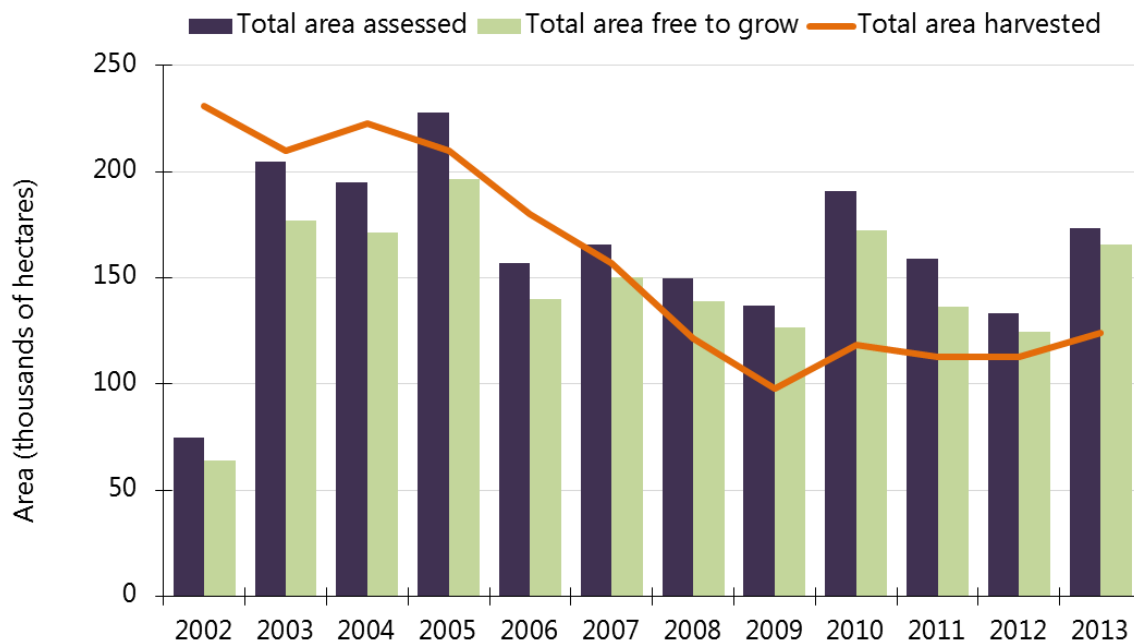
Ontario's forest managers conduct surveys to assess the status of regenerating forest areas. This data is summarized to provide the assessment of regeneration reported in management unit annual reports. The Ministry of Natural Resources and Forestry surveys a sample of the assessed areas to confirm the report.

If an area has regenerated successfully, it is classified as free to grow. This means that the regenerating trees meet the stocking, height and growth rate targets and are deemed to be healthy and free from competing vegetation.

However, it does not mean that the area has met its targeted forest type. Free to grow areas that have also achieved the planned forest type are classified as a 'silviculture success'.

Between 2009-2013, 731,638 hectares were assessed for regeneration status, with 91% determined to be free to grow. About 475,000 hectares of this free to grow area was assessed as a silviculture success.

**Figure 14: Annual assessed, classified as free to grow and harvested**

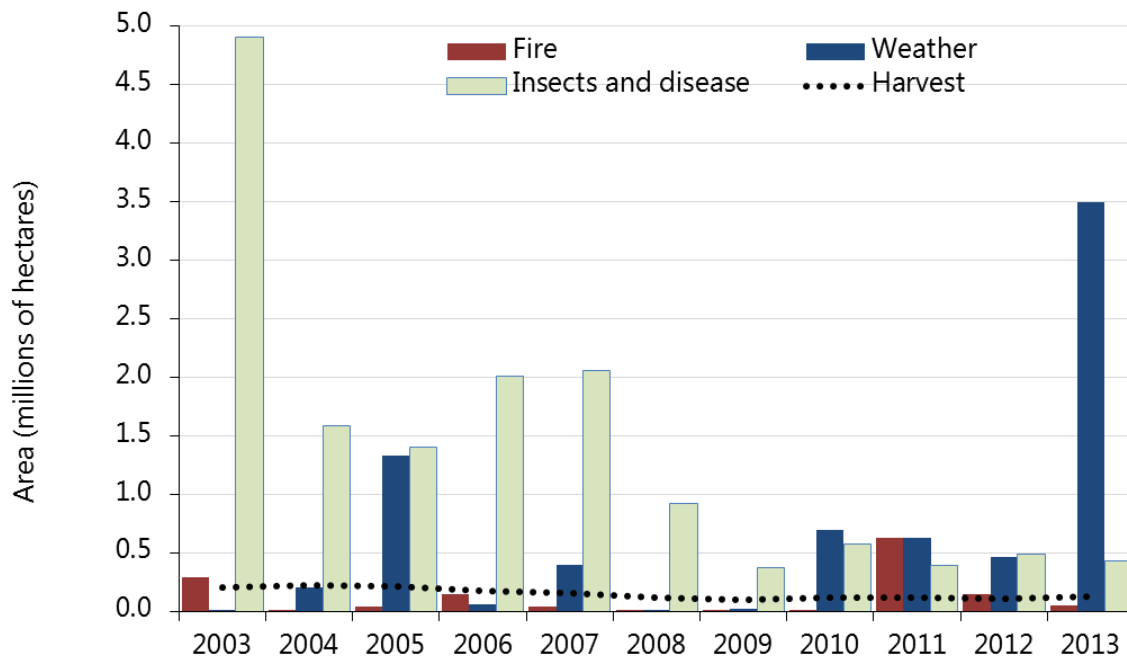


Source: <https://www.ontario.ca/page/forest-regeneration>

All these indicators show that forests in Ontario are managed and well monitored. Growing stock is increasing, deforestation is stable, afforestation is also stable and above deforestation, and the regeneration of forests is managed.

There are natural disturbances that affect forests. In Ontario, the main disturbances are wildfires, insects and diseases and weather. Forest areas affected by these are presented in Figure 15. It also includes harvest. The main disturbance between 2003 and 2013 appears to be insects and disease. In ten years, it destroyed almost 15 million ha when fire and weather destroyed respectively 1.4 million ha and 7.3 million ha.



**Figure 15: Forest area impacted by type of disturbance**

### 3.3. Protection of ecosystems and biodiversity

Ontario has a plan for the protection of biodiversity called Ontario's Biodiversity Strategy. In the province, some areas are naturally more diverse than others. The deciduous forest region of southern Ontario for example has a higher level of species diversity than the Hudson Bay Lowlands forest region of northern Ontario.

The SOF C&I<sup>10</sup> framework includes several biodiversity-related indicators that focus on Ontario's forests. The state of biodiversity in Ontario's Crown forests is assessed by examining the conservation of ecosystem diversity, species diversity, and genetic diversity.

In Ontario, there are different types of protected areas:

- Provincial Parks
- Conservation Reserves
- Wilderness Areas
- Dedicated Protected Areas from Community based land use planning in the Far North

These areas may contain:

- Old-growth forest
- Lakes, rivers and wetlands
- Archaeological sites or other cultural values
- Habitat for rare or endangered plants and animals

<sup>10</sup> State Of Forests Criterion & Indicators

The total area under protection is more than 10 million ha which represents approximately 15% of the total forest area in the province. In 2009-2013, over 30 protected areas were expanded or created.

Most of the new protected land added over the period is a result of community-based land use planning in the Far North of Ontario. While some of these new protected areas have yet to be classified, they move us closer to provincial conservation targets.

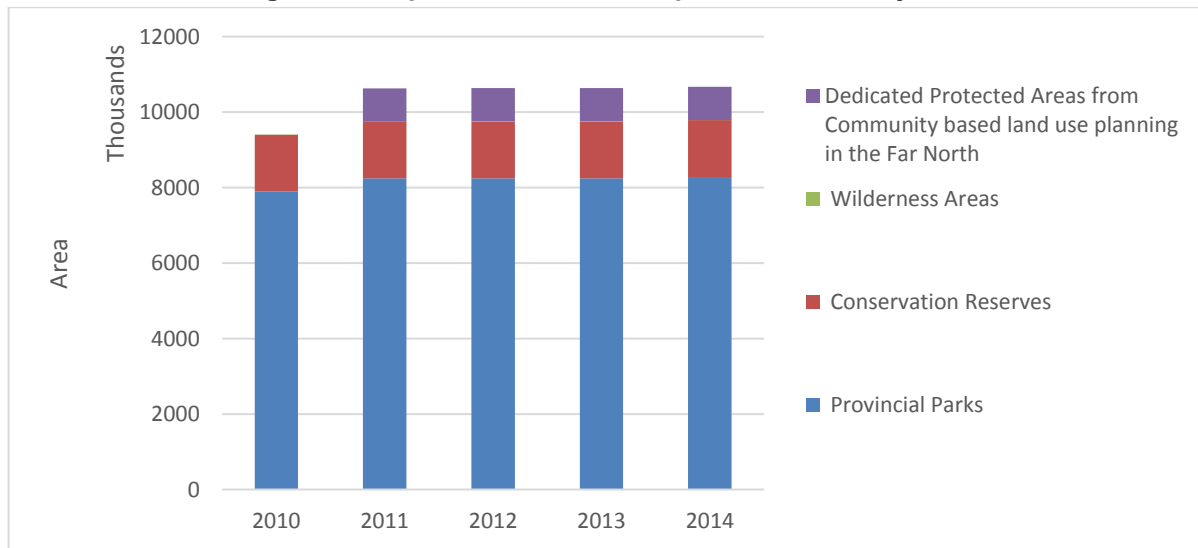
Other new protected areas include rare ecosystems such as alvars and Carolinian forest and provincially significant features like wetlands. Existing protected areas that have been expanded will benefit from larger core areas, a reduction in potential environmental stressors and increased resilience. These new and expanded protected areas provide ecosystem services in excess of \$1.4 billion annually, and more opportunities for Ontario families to experience the outdoors.

The recent expansion of protected zones within Algonquin Park has increased the area of the park that qualifies as protected by 96,089 hectares.

Significant gaps do remain in achieving provincial conservation targets, particularly in parts of the Mixedwood Plains and the Hudson Bay Lowlands ecozones.

Still, conservation organizations continue to acquire important conservation lands that contribute to the protected area system, and community-based land use planning in the Far North of Ontario will continue to further the achievement of conservation targets.<sup>11</sup>

**Figure 16: Expansion of Ontario's protected areas system**



Source: <https://www.ontario.ca/page/protected-areas-system>

In addition to the provincial initiatives for protected areas, there are the national protected area. the total area of provincial protected area accounts for 9.4% of the province territory while national protected area accounts for 1.3%. It means that a total of 10.7% of Ontario's area is protected for the conservation of biodiversity. The table below gives a summary of all the protected areas in Ontario.

<sup>11</sup> <https://www.ontario.ca/page/protected-areas-system>

**Table 11: Ontario's protected areas summary statistics**

| <b>Provincial Protected Area</b>                    | <b>Number</b> | <b>Hectares</b>   | <b>% of Province</b> |
|---|---------------|-------------------|----------------------|
| Regulated Provincial Park                           | 335           | 7,420,816         | 6.9%                 |
| Regulated Conservation Reserve                      | 295           | 1,515,630         | 1.4%                 |
| Dedicated Protected Area - Regulated under PPCRA    | 5             | 349,481           | 0.3%                 |
| Dedicated Protected Area - Non-regulated            | 4             | 879,970           | 0.8%                 |
| Wilderness Area                                     | 11            | 838               | <0.1%                |
| Total Provincial Protected Area                     | 650           | 10,166,735        | 9.4%                 |
| <b>National Protected Area</b>                      | <b>Number</b> | <b>Hectares</b>   | <b>% of Province</b> |
| National Park                                       | 5             | 205,570           | 0.2%                 |
| National Urban Park                                 | 1             | 1,874             | <0.1%                |
| National Marine Park                                | 1             | 11,350            | <0.1%                |
| National Marine Conservation Area                   | 1             | 1,088,000         | 1.0%                 |
| National Wildlife Area                              | 10            | 5,369             | <0.1%                |
| Migratory Bird Sanctuary                            | 8             | 31,905            | <0.1%                |
| <b>Other National Protected Area</b>                | <b>Number</b> | <b>Hectares</b>   | <b>% of Province</b> |
| National Capital Commission Area                    | 16            | 8,242             | <0.1%                |
| <b>Totals</b>                                       | <b>Number</b> | <b>Hectares</b>   | <b>% of Province</b> |
| <b>Total National Protected Area</b>                | <b>42</b>     | <b>1,352,310</b>  | <b>1.3%</b>          |
| <b>Total National and Provincial Protected Area</b> | <b>692</b>    | <b>11,519,045</b> | <b>10.7%</b>         |

Source: <https://www.ontario.ca/page/ontarios-parks-and-protected-areas>

Ontario has developed a conservation strategy for wetland for 2017-2030 which identifies the provincial vision, goals and outcomes for wetlands. It also sets out a series of actions that will be undertaken until 2030 to improve wetland conservation.

Ontario also possesses a database with native trees to plant depending on the region of the province. It helps protecting the initial biodiversity of Ontario<sup>12</sup>.

### **3.4. Protection of water<sup>13</sup>**

Aquatic organisms are sensitive to changes in habitat, including changes in water temperature, nutrient composition, and particulate matter levels. One of the greatest impacts on fish habitat is caused by increased sediment loading.

Water quality can be affected by forest harvesting, as forest cover is modified near waterways and through the construction of water crossings along forest access roads. This has the potential to increase water temperatures, nutrient loading, and amount of organic material in stream water.

Ontario monitors compliance with forest management guidelines for protecting water quality and fish habitat to minimize the effects of forest management practices on water resources in Ontario's forests.

<sup>12</sup> <https://www.ontario.ca/environment-and-energy/tree-atlas/>

<sup>13</sup> <https://www.ontario.ca/page/protecting-water-quality-and-fish-habitat>

Forest operations are regularly inspected to verify that management activities are in compliance with approved forest management plans and individual operational prescriptions.

Inspections are carried out by the Ministry of Natural Resources and Forestry or by Sustainable Forest License inspectors and include activities that have the potential to affect water quality and fish habitat.

A subset of the compliance reports that assessed water crossing activities for 2009-2013 are summarized by reporting group (industry, ministry) into 2 categories: compliant and non-compliant. Trends through time were examined to determine the state of water quality and fish habitat at stream crossings as a result of forest operations.

**Table 12: Summary of compliance reports for water crossings**

| Report Source      | Category          | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 |
|--------------------|-------------------|-----------|-----------|-----------|-----------|-----------|
| Industry           | Total Reports (#) | 608       | 665       | 553       | 681       | 654       |
|                    | Compliant %       | 99.7      | 98.6      | 99.4      | 99.2      | 99.4      |
|                    | Non-compliant %   | 0.3       | 1.4       | 0.6       | 0.8       | 0.6       |
| MNRF <sup>14</sup> | Total Reports (#) | 186       | 120       | 158       | 144       | 112       |
|                    | Compliant %       | 96        | 98.3      | 98.7      | 95.8      | 98.2      |
|                    | Non-compliant %   | 4         | 1.7       | 2.3       | 4.2       | 1.8       |

**Table 13 : Summary of compliance reports for fish habitat**

| Report Source | Category          | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 |
|---------------|-------------------|-----------|-----------|-----------|-----------|-----------|
| Industry      | Total Reports (#) | 608       | 665       | 553       | 682       | 655       |
|               | Compliant %       | 99.7      | 98.6      | 99.5      | 99.1      | 99.4      |
|               | Non-compliant %   | 0.3       | 1.4       | 0.5       | 0.9       | 0.6       |
| MNRF          | Total Reports (#) | 186       | 120       | 158       | 145       | 12        |
|               | Compliant %       | 95.7      | 98.3      | 98.7      | 95.9      | 98.2      |
|               | Non-compliant %   | 4.3       | 1.7       | 1.3       | 4.1       | 1.8       |

Source: <https://www.ontario.ca/page/protecting-water-quality-and-fish-habitat>

The overall compliance rate exceeded 97%. During the period 2009-2013, more than 3,000 compliance inspections were conducted by the forest industry and more than 700 checks and verifications were conducted by the ministry.

### **3.5. Protection of soils<sup>15</sup>**

As for water quality in forested area, soil has to be protected in order to maintain soil productivity which is a key indicator of forest ecosystem health. Forest management activities that reduce organic matter

<sup>14</sup> Ministry of Natural Resources and Forestry

<sup>15</sup> <https://www.ontario.ca/page/protecting-forest-soils>

levels, compact the soil or lead to erosion, reduce the ability of the soil to support productive forest growth.

To protect and conserve Ontario's forest soil, both the Ministry of Natural Resources and Forestry and the forest industry conduct compliance inspections that report soil and site damage from forest operations.

The state of soil protection during forest operations has been determined by examining trends through time

**Table 14: Summary of compliance reports assessing site disturbance**

| Report Source | Category          | 2009-2010 | 2010-2011 | 2011-2012 | 2012-2013 | 2013-2014 | Total |
|---------------|-------------------|-----------|-----------|-----------|-----------|-----------|-------|
| Industry      | Total Reports (#) | 1674      | 1628      | 1381      | 1397      | 1208      | 7288  |
|               | Compliant %       | 99.8      | 99.8      | 100.0     | 100.0     | 100.0     | 99.9  |
|               | Non-compliant %   | 0.2       | 0.2       | -         | -         | -         | 0.1   |
| MNRF          | Total Reports (#) | 461       | 436       | 406       | 415       | 289       | 2007  |
|               | Compliant %       | 99.1      | 98.2      | 100.0     | 100.0     | 100.0     | 99.4  |
|               | Non-compliant %   | 0.9       | 1.8       | -         | -         | -         | 0.6   |

Source: <https://www.ontario.ca/page/protecting-forest-soils>

During 2009-2013, 7,288 compliance inspections that specifically assessed site disturbance were filed by the forest industry, and a further 2,007 by the ministry (see table below). The indicator's state has been assessed as good since the overall compliance rate exceeded 99%.

As part of the guideline review and revision cycle it will be important in future to evaluate the effectiveness of these standards in achieving the desired objectives.

Of the 49 independent forest audits conducted in 2009-2013, only 7 provided recommendations to further reduce the occurrence of site damage. The recommendations were:

- develop more consistent standard operating procedures designed to minimize the occurrence of site damage
- provide operator training in sensitive site recognition and timing for operating in sensitive areas

To maintain soil productivity during forest management activities, close attention must be paid to the forest operations that are used, considering soil texture and moisture, slope and associated environmental conditions

### **3.6. Protection of carbon stocks**

In forest land the carbon stocks mainly includes:

- living above ground and below ground woody biomass,
- soil organic carbon,
- carbon in litter.

Carbon stock in managed forests in Ontario in 2015 is shown in the table below.

**Table 15 : Carbon stock in Ontario's managed forests in 2015**

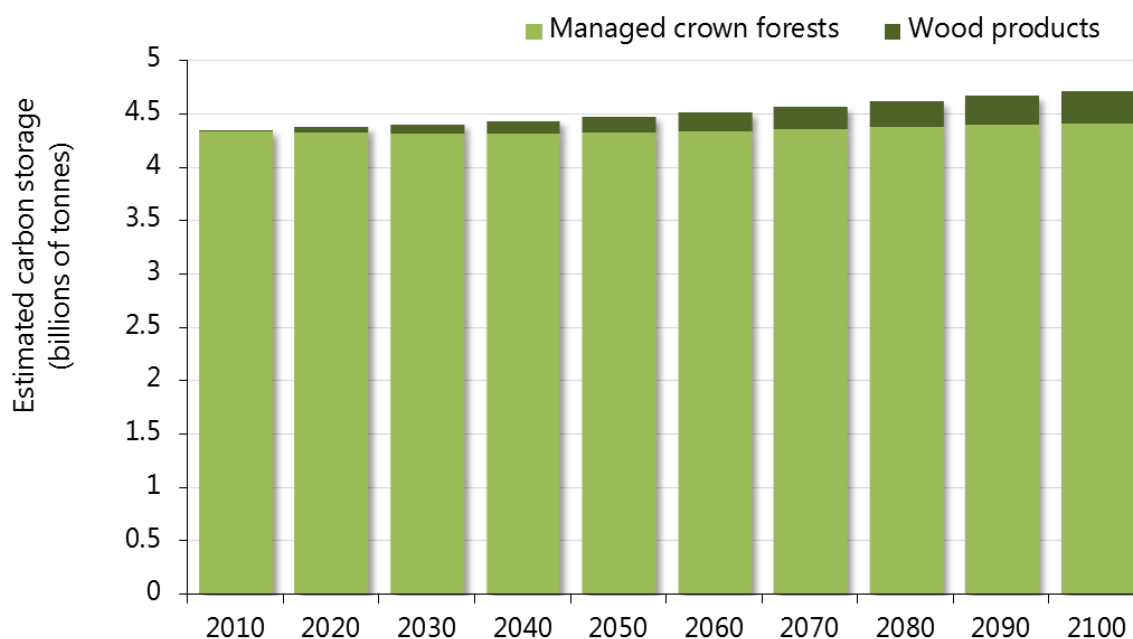
|                                | Crown land within AOU | Large Parks | Private Land | Measured Fire Zone | Total Managed Forest |
|--------------------------------|-----------------------|-------------|--------------|--------------------|----------------------|
| Area (million ha)              | 28.6                  | 1.7         | 4.1          | 5.3                | 39.7                 |
| Carbon stocks (million tonnes) | 4,333.50              | 261.3       | 667.9        | 711.5              | 5,974.20             |

Source: <https://www.ontario.ca/page/forest-carbon>

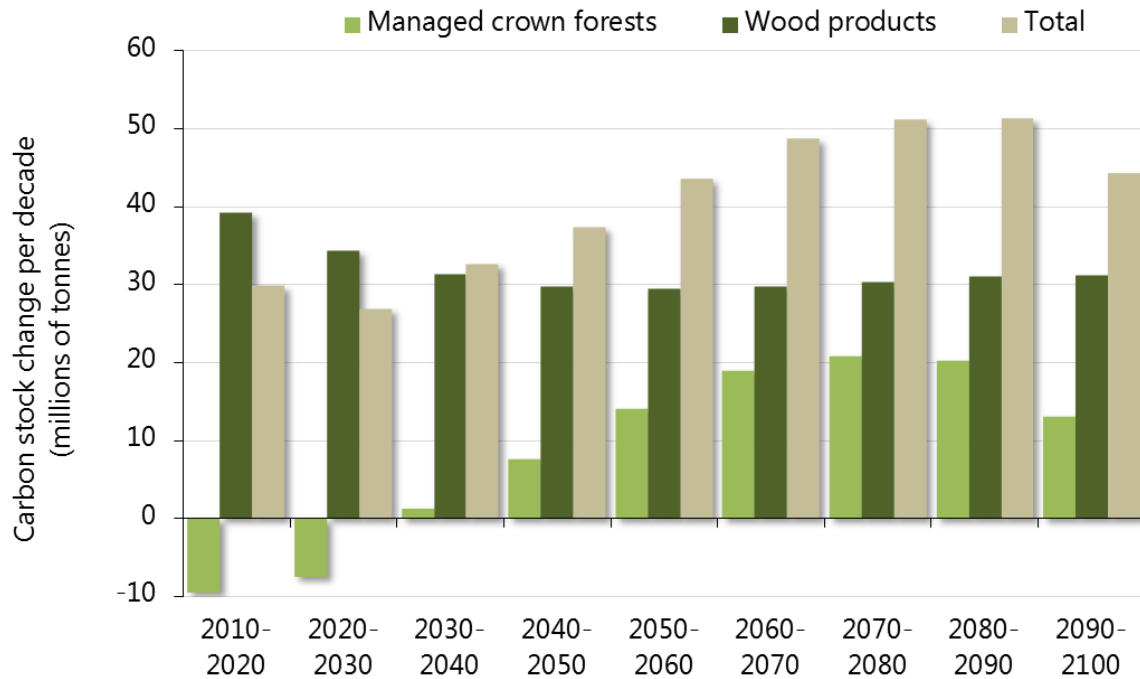
The forest carbon stocks have been estimated by the Ministry of Natural Resources and Forestry<sup>16</sup> using the Ontario forest carbon budget model FORCARB-ON. This has been made in the Area of the Undertaking and not the totality of the province's area. Carbon stock in forest is estimated using forest age, tree species and conversion into wood products.

In 2015, managed crown forests in the Area of the Undertaking stored an estimated 4.3 billion tonnes of carbon and wood products stored an additional 170.5 million tonnes.

Projection for future carbon stock in forests and carbon stock change have been made until the year 2100.

**Figure 17: Projected carbon storage in forests and wood products**Source: <https://www.ontario.ca/page/forest-carbon>

<sup>16</sup> <https://www.ontario.ca/page/forest-carbon>

**Figure 18: Projected changes in forest carbon stocks per decade**

Source: <https://www.ontario.ca/page/forest-carbon>

Currently and in the near future, managed crown forests present a negative change in carbon stock. This negative contribution is expected to reduce and become positive in 2030-2040. It will grow until 2070-2080 and reduce afterwards. Managed crown forests are considered a source of carbon because of the older age structure.

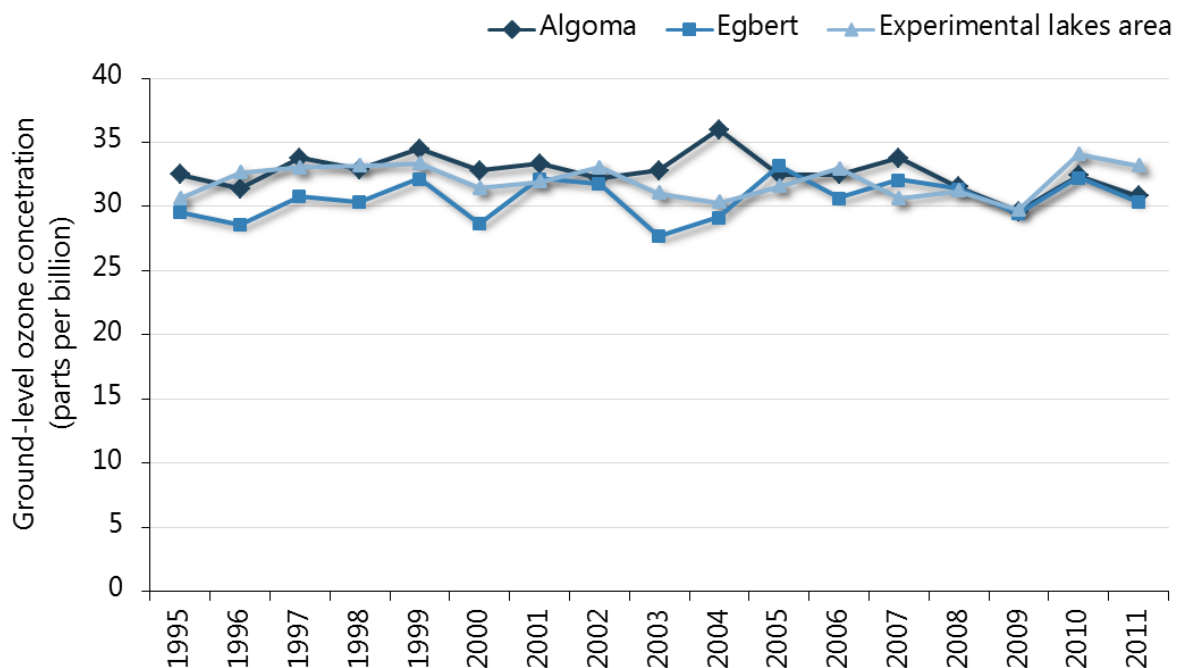
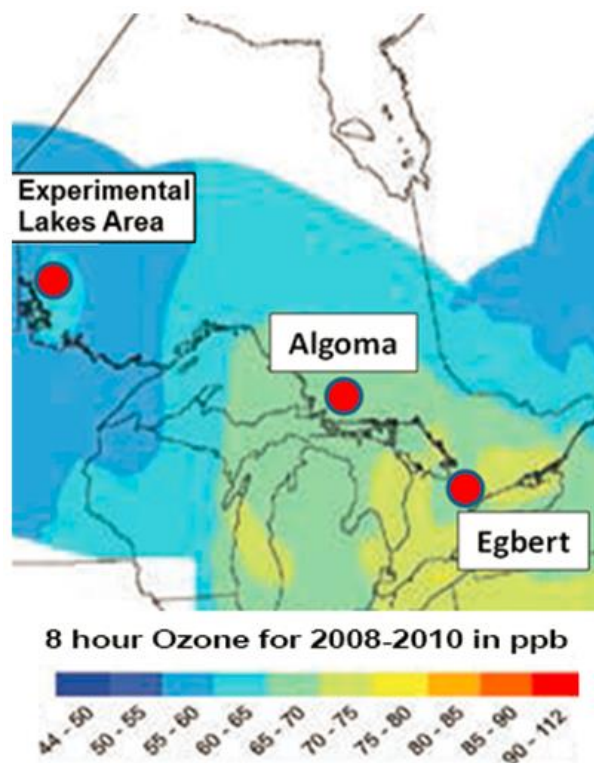
Despite a continuous decrease of carbon stocks in forests within Ontario's Area of Undertaking, due to age structure, the Ministry of Natural Resources and Forestry argues that the balance of carbon stocks remain positive when the forest products are considered.

### 3.7. *Protection of air quality*

#### **Ground-level ozone affecting forest health**

The presence of tropospheric ozone from urban pollution can affect human health and is also detrimental to forest quality. Indeed, tropospheric ozone can affect forest health by interfering with plant photosynthesis. In 1999, Ontario in agreement with all provinces (except for Quebec) have signed the Canada-wide Standards for Particulate Matter and Ozone which aims to reduce and limit the ground level ozone exposure to 65 parts per billion by 2010.

In the next figures is presented the ozone concentration at three sites in Ontario.

**Figure 19 : Average hourly ground-level ozone concentrations at three sites****Figure 20 : Map of peak ozone levels for 2008-2010 in parts per billion**

Source : <https://www.ontario.ca/page/ozone>

Ground-level ozone concentration are below 65 parts per billion and remain stable for the period between 1995 and 2011. However, the Ministry of the Environment and Climate Change reported a

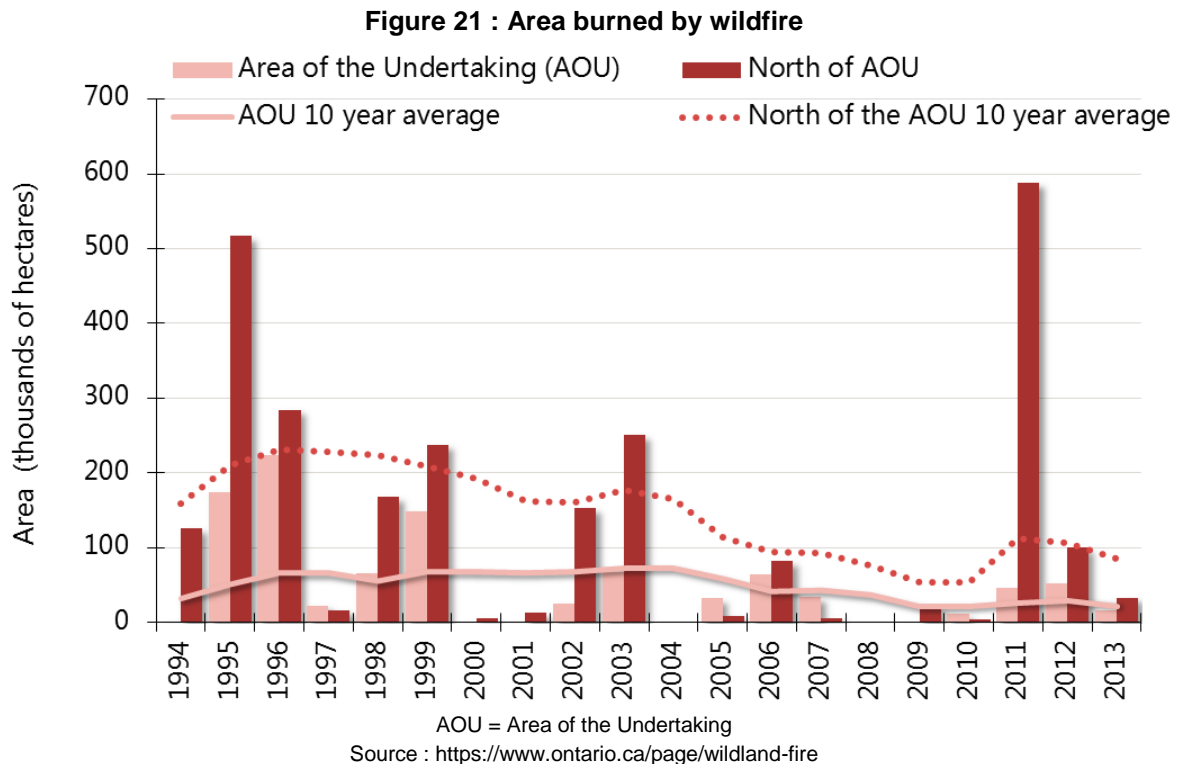


33% increase in annual average ground-level ozone concentration at one site in northern Ontario (Algoma) in 1993-2012. Across much of the Great Lakes region, peak ozone levels exceeded the federal standard of 65 parts per billion. In southern Ontario, peak ozone concentration decreased, while no change occurred in northern Ontario. The general evolution trend of ozone level in Ontario is mixed while concentration remain too high.

## Forest fires

Forest fires affect the air quality because of the emissions of various pollutants in the atmosphere.

Area of forest affected by fires in Ontario is shown in the figure below. A distinction between the Area of the Undertaking and north of the Area of the Undertaking is made.



During 2009-2013, approximately 876,000 hectares were burned by wildfires in 4,776 fires. More than 589,000 hectares (67%) of that area burned during the 2011 fire season north of the Area of the Undertaking, where prolonged drought conditions.

The area affected by wildfire is in general bigger north of the AOUs than in the AOUs. The 10 average informs on the trend of wildfire. The general trend appears to be slowly decreasing for both the AOUs and north of the AOUs since the mid-nineties. It does not mean wildfire will completely disappear. The occurrence of a fire in forested areas is unpredictable and change significantly from one year to another (for example prolonged periods of droughts). The impact of a fire on forests depends on the climatic condition of that year. Climate change may be increasing overall variability

### 3.8. *Illegal logging*

According to the government of Canada<sup>17</sup>, the country is recognized as a producer of legally and sustainably harvested forest products. Comprehensive laws and regulations have been put in place to govern harvesting and trade in timber. Forest operations are closely monitored and the law is enforced, Canada successfully keeps illegal logging and the trade in illegal timber down to negligible levels in all regions.

The FSC risk assessment platform [www.globalforestregistry.org](http://www.globalforestregistry.org) considers Canada as at low risk in terms of illegal logging, because the following criteria are all verified:

- Evidence of enforcement of logging related laws in the district <sup>18</sup>
- There is evidence in the district demonstrating the legality of harvests and wood purchases that includes robust and effective system for granting licenses and harvest permits <sup>19</sup>
- There is little or no evidence or reporting of illegal harvesting in the district of origin<sup>20</sup>
- There is a low perception of corruption related to the granting or issuing of harvesting permits and other areas of law enforcement related to harvesting and wood trade<sup>21</sup>

### 3.9. *Civil rights and traditional rights*

The FSC risk assessment platform [www.globalforestregistry.org](http://www.globalforestregistry.org) considers Canada as at low risk in terms of violation of civil and traditional rights, because the following criteria are all verified:

- There is no UN Security Council ban on timber exports from the country concerned<sup>22</sup>
- The country or district is not designated a source of conflict timber (e.g. USAID Type 1 conflict) <sup>23</sup>
- There is no evidence of child labor or violation of ILO Fundamental Principles and Rights at work taking place in forest areas in the district concerned <sup>24</sup>
- There are recognized and equitable processes in place to resolve conflicts of substantial magnitude pertaining to traditional rights including use rights, cultural interests or traditional cultural identity in the district concerned
- There is no evidence of violation of the ILO Convention 169 on Indigenous and Tribal Peoples taking place in the forest areas in the district concerned

### 3.10. *Forest certification*

The main forest certification schemes used in Canada are:

- The Canadian Standards Association (CSA) Sustainable Forest Management Standard (SFM), approved by the Standards Council of Canada
- The two standards of the Forest Stewardship Council (FSC) Principles and Criteria for Forest Management that are applicable to Ontario - Great Lakes/St. Lawrence Draft Standard and the National Boreal Standard;
- The SFI Inc.'s Sustainable Forestry Initiative (SFI).

<sup>17</sup> <http://www.nrcan.gc.ca/forests/canada/laws/17479>

<sup>18</sup> [www.illegal-logging.info](http://www.illegal-logging.info) ; [www.eia-international.org](http://www.eia-international.org) ; <http://www.ahec-europe.org/>

<sup>19</sup> [www.illegal-logging.info](http://www.illegal-logging.info) ; [www.eia-international.org](http://www.eia-international.org) ; <http://www.ahec-europe.org/>

<sup>20</sup> [www.illegal-logging.info](http://www.illegal-logging.info) ; [www.eia-international.org](http://www.eia-international.org) ; <http://www.ahec-europe.org/>

<sup>21</sup> <http://www.transparency.org/cpi2015>

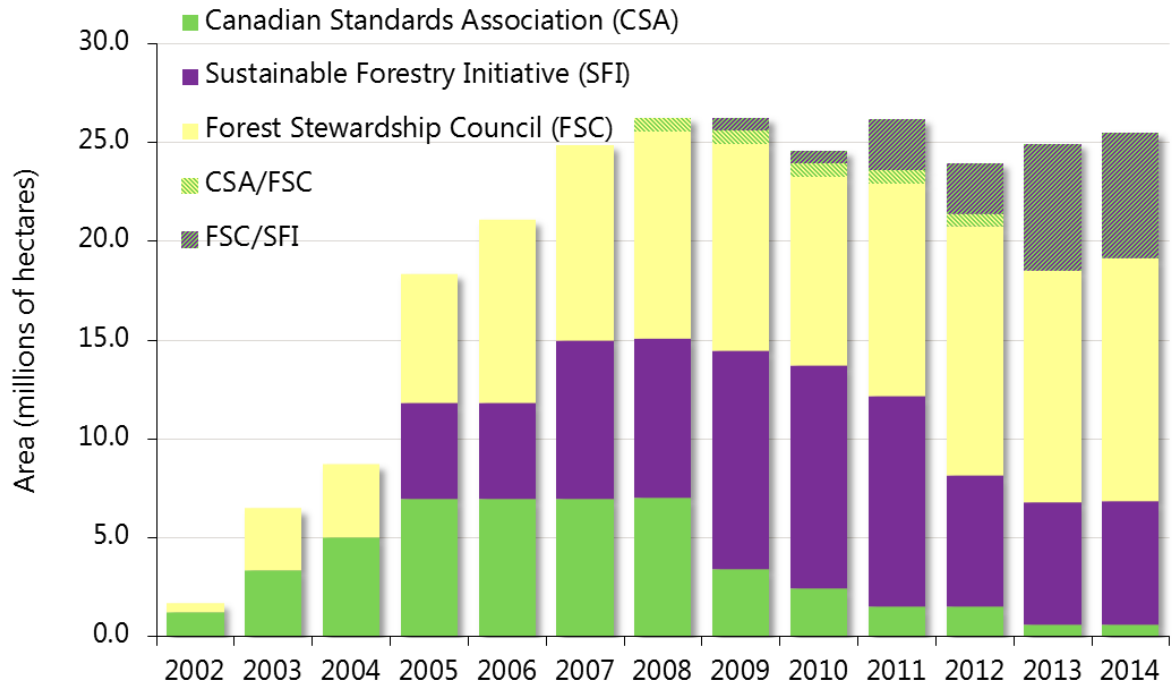
<sup>22</sup> <http://www.globalwitness.org/pages/en/forests.html>

<sup>23</sup> Conflict Timber: Dimensions of the Problem in Asia and Africa Volume I Synthesis Report

<sup>24</sup> Global Child labor trends 2000 to 2004. ILO (International Labour Office).

Ontario recognizes the value of forest certification for marketing forest products domestically and internationally and encourages the forest industry to pursue the certification of licensed Crown forests.

**Figure 22: Managed Crown forest area certified**



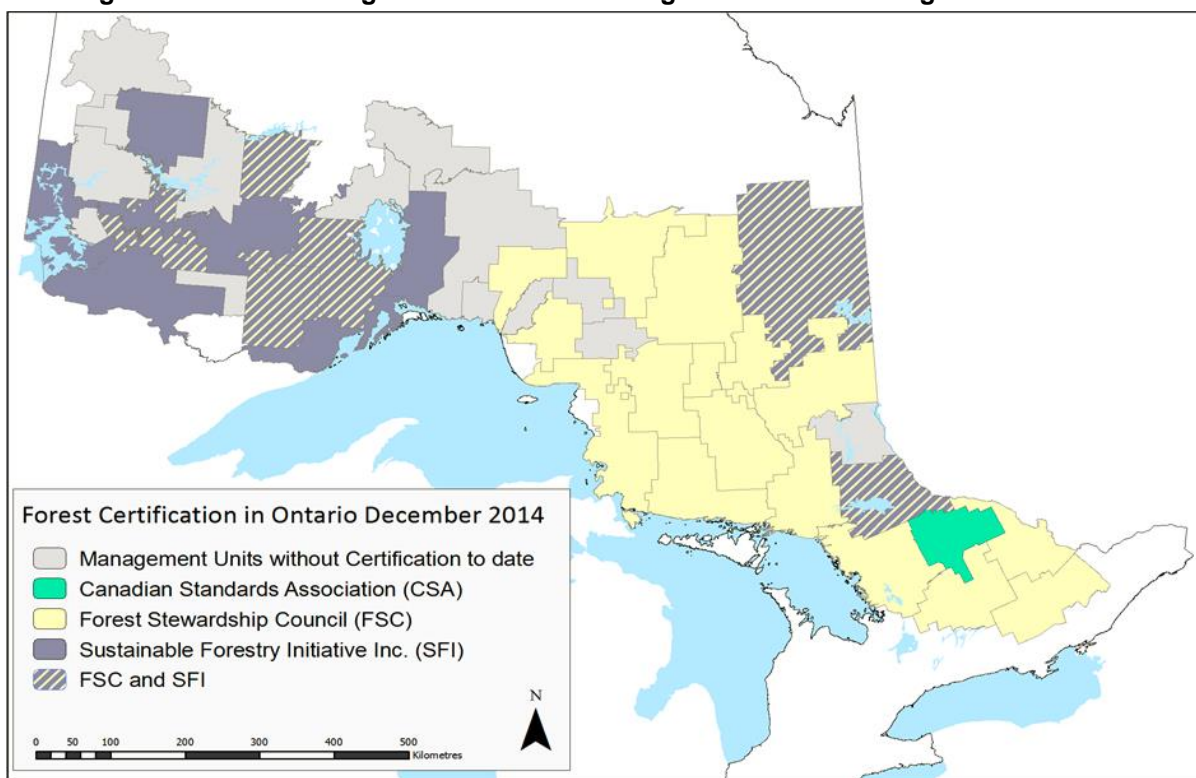
Source : <https://www.ontario.ca/page/forest-certification>

The total area of managed crown forest under certification in Ontario was over 25 million hectares in 2014.

According to the Ministry of Natural Resources and Forestry<sup>25</sup>, even though the extent of forest certification decreased in 2013 due to economic factors (including bankruptcies), Ontario supports the certification of Crown forests as it provides access to markets for forest products, in a context where the commercial demand for certified wood products is increasing.

The map of the forest management units certified against a forest management standard is presented in the figure below.

<sup>25</sup> <https://www.ontario.ca/page/forest-certification>

**Figure 23: forest management units certified against a forest management standard**

Source: Ministry of Natural Resources, State of Resources Reporting: Forest Certification in Ontario, March 2014

As managed forests can be under a certification program, only the Area of Undertaking is considered here. In the western part of the province, most of the forests are under the SFI program while in the east, forests under FSC are dominant. There are more management units without certification in the west. CSA only represent a small part of certified forest and only present in the east.

## 4. Conclusions

Forest land in Ontario is estimated to cover 71 million hectares. The total of forest area accounts for 66.1% of the province's area and 28.8% of the forest area in Canada. Coniferous species dominate the forests with mostly spruce and fir. In the south of the province there are more pines, maple and other species.

Most forests in Ontario are Crown or publicly owned (86.6%). Those are managed by provincial government. The rest (13.4%) is either federal, first nations or privately owned. The forest management units situated involved in commercial exploitation are constitute "Area of Undertaking". This area is roughly the South half of Ontario? No commercial exploitation on Crown Land can take place in the Northern half. Out of the 35 million ha forest in the Area of Undertaking in 2016, only 27 million ha are indeed meant to be used for commercial production, the rest being private forests or protected forests.

The Ministry of Natural Resources and Forestry is responsible for the long-term health and monitoring of Crown forests.

The forest industry is one of Canada's most important manufacturing sectors. In the recent years, forest industry in Ontario faced a downturn, as reflected in a decrease in the harvested volumes, incomes and employment.

The forest area in Ontario is extremely stable as the estimated gains (through afforestation programmes) and losses (mostly to agriculture, mining and access road construction) have been mostly balancing each other in recent years (period 2004-2001), and are limited to +/- 0.002% of the forest areas in the province.

The estimated growing stock in the Area of Undertaking is growing. It gained 300 million m<sup>3</sup> since 1963. However, the yearly growth in terms of volume is slowing down as the forests are ageing. Annually, the total area harvested is smaller than the total area considered as free to grow (successfully regenerated).

Currently and in the near future, managed crown forests present a negative change in carbon stock.. Despite a continuous decrease of carbon stocks in forests within Ontario's Area of Undertaking, due to age structure, the Ministry of Natural Resources and Forestry argues that the balance of carbon stocks remain positive when the forest products are considered as part of carbon sink.

Ontario has a plan for the protection of biodiversity called Ontario's Biodiversity Strategy. There are different types of protected areas, at the provincial and national level. The total national and provincial protected area accounts for 10.7% of Ontario's territory. Water and soil quality are monitored in the forest harvesting area to ensure the activity does not impact water and soil. The overall results from the checks are good for both water and soil quality.

Air quality can be impacted by emissions of GHG from the forest industry, tropospheric ozone and forest fires. Ground-level ozone concentrations are monitored and remain stable below the limit of 65 parts per billion. Forest fires have been particularly severe in 2011 but a 10-year average shows a decreasing trend for fires.

The FSC risk assessment platform [www.globalforestregistry.org](http://www.globalforestregistry.org) considers Canada is at low risk in terms of violation of illegal logging and in terms of violation of traditional and civil rights.

There are more than 25 million hectares under certification in Ontario most of the area is under either FSC or SFI. The Canadian Standard CSA (endorsed by PEFCP) has a very limited presence in Ontario.

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