Forest Health Conditions in Ontario 2023

Ministry of Natural Resources and Forestry

Ontario

Forest Health Conditions in Ontario 2023

Compiled by Ontario Ministry of Natural Resources and Forestry, Science and Research Branch.

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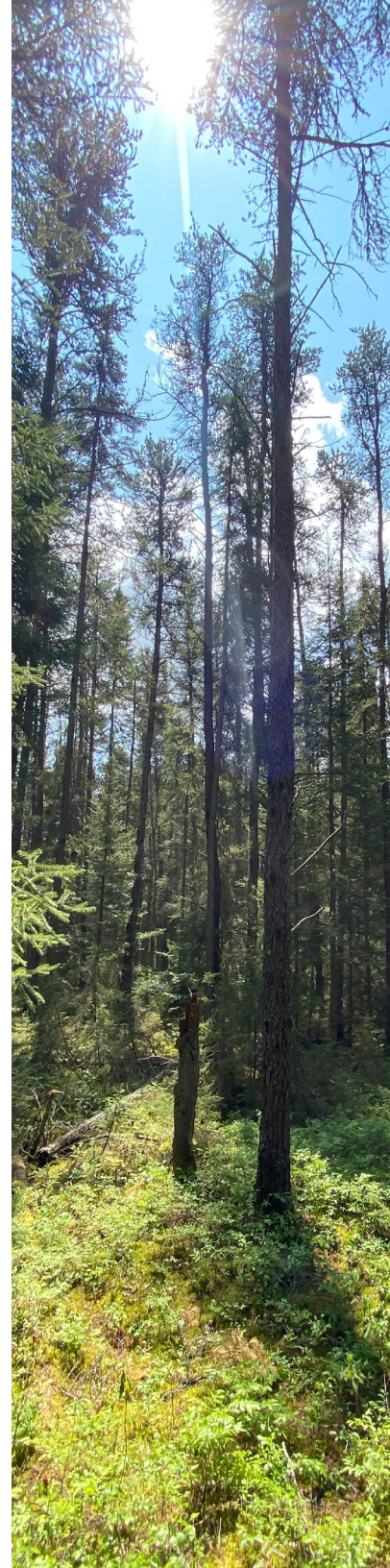
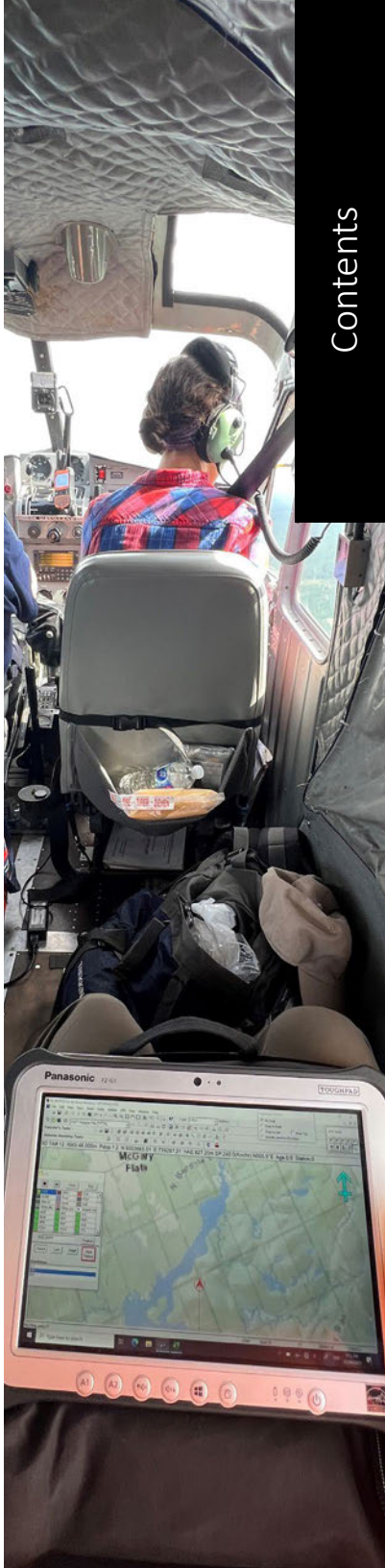


Contents



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Sommaire
État de santé des forêts 2023

En 2023, les températures sont demeurées principalement autour ou légèrement au-dessus de la moyenne sur 30 ans. Les chutes de neige et de pluie supérieures à la moyenne qui se sont abattues sur la province tôt dans l'année ont été p par un temps plus sec qui a perduré le reste de l'année et leur a fait contrepoids. Les événements météorologiques notables qui ont eu lieu durant l'année incluent des tornades dans le sud et plusieurs épisodes localisés de pluie abondante à l'été et à l'automne.

La superficie relevée de la zone de chablis d'un peu plus de 4 000 ha a été nettement inférieure à celle de 2022.

Principaux parasites des forêts qui se sont nourris de feuilles ou d'aiguilles des arbres et régions touchées :

- la population de tordeuses de pin gris a continué de décliner dans le nord;
- la population de tordeuses des bourgeons de l'épinette a diminué, mais la principale zone touchée demeure le nord-est;
- la population de livrées des forêts a augmenté partout dans le nord;
- la population de spongieuses a continué de décliner, mais on a observé davantage la présence de parasites et d'agents pathogènes.

On a continué de consigner la présence de la maladie corticale du hêtre qui est attribuable à un insecte envahissant (cochenille du hêtre) et à un champignon envahissant. Cette maladie continue de se propager dans la région du Sud.

On a signalé la présence de la maladie de la feuille du hêtre dans de nouvelles zones des districts où on en avait déjà signalé la présence.

On a détecté l'agrile du frêne (coléoptère) dans de nouvelles régions de la zone réglementée des districts de Kemptville-Kingston et de Minden-Parry Sound, dans la région du Sud, et des districts de Sudbury et de Sault Ste. Marie-Blind River, dans la région du Nord-Est.

On a confirmé la présence du puceron lanigère de la pruche à trois nouveaux endroits dans la région du Sud.

Les premiers signalements du flétrissement du chêne, une espèce envahissante causée par un champignon, ont été confirmés au Canada dans les régions de Niagara Falls et de Springwater.

Introduction

Forest health monitoring in Ontario is conducted by the Ontario Ministry of Natural Resources and Forestry (MNRF).

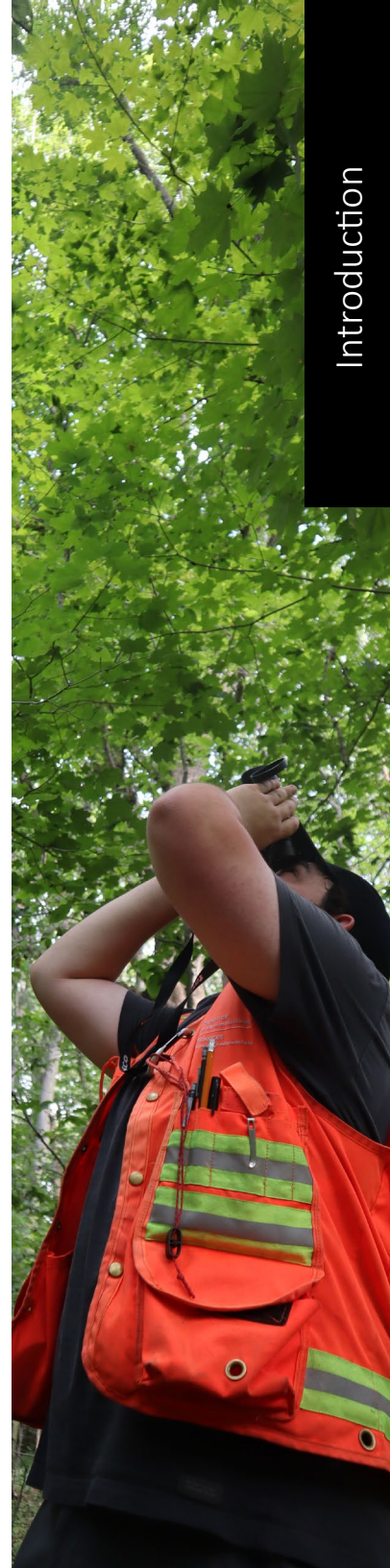
The annual forest health monitoring program has five components:

- Aerial mapping of major forest disturbances to quantify the extent and severity (e.g., insect outbreaks, weather events, decline, and disease damage)
- Biomonitoring through the collection of insect and disease samples to track occurrence, changes in range or host species attacked, or changes in abundance
- Surveying for pests of interests, particularly invasive species or pests affecting high value trees such as plantations or seed orchards
- Conducting or supporting research in forest entomology, pathology, or weather effects
- Establishing and surveying temporary and permanent sample plots to monitor health of select forest ecosystems

Forest health monitoring in Ontario includes documenting the occurrence of biotic (e.g., insects, disease) and abiotic (e.g., snow and drought damage) disturbances and events. All forested area in the province, regardless of ownership, is monitored and reported on each year.

In 2023, insect diagnostics were executed through a partnership among MNRF, the Canadian Forest Service (CFS), and the Invasive Species Centre (ISC). Samples collected by forest health monitoring program staff were identified by ISC staff. The CFS provided laboratory space and access to its historical insect reference collection. Disease samples were identified at the MNRF's Ontario Forest Research Institute (OFRI). Results of the insect and disease collections were entered into a national database managed by CFS.

Maps, tables, and graphs were produced from aerial surveys of major forest disturbances. Maps and write-ups in this report now reference the new Regional Operations Division district boundaries and names in effect as of 2023. Results from the annual monitoring program were reported provincially at the Forest Health Review in Orillia and as part of the MNRF's Science Insights seminar series and nationally at the Forest Pest Management Forum in Ottawa and are described in more detail in this report.



Weather patterns

Weather affects the growth, phenology (timing of life cycle stages), dispersal, and survival of forest insects. Forest pathogens, especially leaf diseases and needle cast fungi, can be more common during wet or humid periods. Also, extreme weather events such as drought, snowfall, flooding, tornadoes, microbursts, frost, freezing, scorch, and rapid temperature fluctuations can affect tree health, causing foliage or twig death, or tree decline and mortality.

Most of January was mild, with temperatures above normal (based on the 30-year average) across the province. Near the end of the month, temperatures dropped to below normal in the north and normal in the south. Precipitation varied between normal levels in the Far North and southern Ontario and below normal in northern Ontario. Eastern Ontario to the Quebec border had 150% of normal snowfall and Ottawa had the second snowiest January on record. A freezing rain event occurred in Ottawa, eastern Ontario, and Cornwall in early January, while elsewhere in southern Ontario substantial rainfall and scattered thunderstorms occurred, with 20.6 mm reported in downtown Toronto. More freezing rain fell January 12–13 in eastern Ontario. On January 25, a major snowstorm in southern Ontario left 15–27 cm of snow across the region.

In February, temperatures were below normal in northernmost areas, above normal in southernmost areas, and normal elsewhere. Temperatures fluctuated, for example, from −21.8 degrees Celsius on February 3 to 15 degrees Celsius on February 15 in Toronto. In Red Lake, Kenora, Dryden, and Timmins areas, precipitation levels were as much as 50% below average. In contrast, in Ottawa and Sudbury snowfall totals were above average and Toronto had more than double the normal precipitation (42.2 mm). In mid- to late February, several mixed precipitation weather events brought snow, freezing rain, ice pellets, and rain across southern Ontario.

In March, temperatures were closer to seasonal normals. Northwestern Ontario was very dry as was southern Ontario, until a heavy rain at the end of the month. Snow in the southern part of the province had melted, but snow cover remained from Lake Superior shoreline northward. On March 3–4, strong winds and heavy snow hit southern Ontario, with some areas reporting 25–30 cm. On March 10, another storm hit southern Ontario, with more than 15 cm of snow reported around the Golden Horseshoe. A winter storm with heavy and blowing snow in northern Ontario resulted in up to 40 cm of snow at Nagagami. A March 25–26 storm resulted in snow in northeastern Ontario and high wind gusts in southern Ontario.

In April, warm and cold anomalies occurred. In the second week, temperatures were warm across the province, especially in the south. On April 13, Oakville and Baldwin reached a record breaking 31.0 degrees Celsius. By the third week, colder temperatures prevailed in the north and then spread across the province. Precipitation was mostly near or above normal across the province. Anomalies included the Thunder Bay area recording 200% of average monthly precipitation and Sault Ste. Marie, Kenora, and Sudbury recording 300% of the monthly average snowfall. On April 1, a spring storm brought rain, thunderstorms, freezing rain, and snow. Southwestern Ontario had pea- to grape-sized hail, strong wind gusts between 80 and 100 km/h, and heavy rain (30–60 mm) while

the Sudbury and Sault Ste. Marie areas had snow events. On April 5–6, a winter storm was recorded in northern Ontario, an ice storm in northeastern and eastern Ontario, and heavy rain across most of southern Ontario. Numerous thunderstorms across the province were associated with several hours of snow, ice pellets, freezing rain, and rain. Hundreds of trees in eastern Ontario were damaged.

In May, Northwestern Ontario was warmer than normal while southern Ontario was near normal. Temperatures increased provincewide towards the end of the month, exceeding 30 degrees Celsius even in the north. May was a dry month in the southwest and northwest, with some areas having less than 20% of normal precipitation. In northeast and eastern Ontario, an extended period of rain in early May contributed to high water levels on the Ottawa and Mattawa rivers. At the end of May, poor air quality warnings caused by smoke from wildfires began in northwestern Ontario.

In June, temperatures were above normal in northern Ontario, particularly around Hudson Bay and the northwest, and near normal in the south. Conditions were very dry in the north. Areas north and northeast of Thunder Bay to Moosonee had less than 10% of normal monthly precipitation. Conversely, precipitation was 300% higher than normal in Muskoka. Mid-month, substantial rainfall (50–70 mm) was recorded in the south and northeast. Two Enhanced Fujita Scale-0 (EF-0) tornadoes that damaged trees were recorded in western Ontario, one in St. Thomas and the other in Beachville.

In July, temperatures across the province were near normal. High humidex warnings (near 40 degrees Celsius) in early July prompted heat warnings. Precipitation in the southwest was over 250% of monthly normal but in the north was below normal for the third consecutive month. For example, Timmins received 31% of mean monthly precipitation and most of it was in the first week. In southwestern Ontario, high daily precipitation amounts were recorded in St. Thomas (104 mm) and London (80 mm) on July 2nd. On July 13, four tornadoes were reported in eastern Ontario — two EF-1 tornadoes in Barrhaven and two EF-0 tornadoes in Embrun and Fournier. All caused damage to surrounding trees. Substantial rainfall (40–80 mm) was associated with this storm. On July 24, another storm brought heavy rain to northeastern and central Ontario and high winds and hail in southwestern Ontario. Tennis ball-sized hail was reported in Cottam. The Northern Tornadoes Project confirmed two tornados and four microbursts: an EF-1 tornado in South Buxton, EF-0 in Petrolia, and four EF-0 downbursts in Point Edward/Sarnia, Wardesville, Wilkesport, and Alvinston. On July 26, severe thunderstorms tracked through southwestern Ontario and substantial rain fell in northeastern Ontario. This storm produced an EF-1 tornado in Blenheim and an EF-1 downburst in the Harrow-Kingsville area. On July 28, a severe storm hit eastern Ontario and the National Capital Region. Tornado warnings were issued but none reported.

In August, the mean monthly temperature was near normal for most of the province, but slightly warmer near Hudson Bay and cooler in northeastern Ontario. No 30 degree Celsius days were recorded and, in much of the northeast, early morning temperatures were below freezing in the last week. The southwest had a very wet August, with 200 mm of rain from London to Windsor and over 300 mm south of Windsor to Lake Erie. On August 3, severe thunderstorms occurred in northeastern, central, and eastern Ontario. An EF-0 tornado with a max speed

of 130 km/h touched down in Ottawa. Downed trees were reported from Lindsay to Sudbury. Golf ball-sized hail was also reported in Lindsay. On August 10, severe thunderstorms affected southern Ontario, particularly Ottawa. Flash flooding occurred with 78 mm of rain reported, with 49 mm falling in one hour. On August 23–24, another round of thunderstorms affected southwestern Ontario. Harrow received 185 mm of rain in 9 hours and 129 mm were reported at Point Pelee. An EF-0 downburst was reported near Dresden in Chatham-Kent. The next night, three tornadoes and a downburst were reported: EF-1 tornados in Tecumseh and near Cottam, an EF-0 tornado in Windsor, and an EF-0 downburst in Chatham. All these events caused damage to trees and properties.

September was warmer than normal with a prolonged heat event at the beginning of the month and temperatures above 30 degrees Celsius in many locations. It was also quite dry. In the Far North, it was the fifth consecutive month with lower than normal precipitation. Some areas, such as Trenton, had the driest September recorded in 108 years. That said, east of Timmins 150% more precipitation than normal was recorded. On September 6–7, rain and thunderstorms affected the north with flood warnings issued by the MNRF. Almost a week later, another system brought more rain to central and northeastern Ontario.

October was warmer than average across the province, with the highest temperatures in eastern Ontario. Daily maximum temperatures above 30 degrees Celsius were widespread October 3–4. Temperatures cooled then warmed again in the following weeks. At the end of the month, a cold wave moved from the northwest across the province. Overnight temperatures in the northwest dropped to −10 degrees Celsius in northwestern Ontario on October 27. After consecutive drier months, precipitation was near normal across most of the north. Some areas were wetter than normal, particularly around Cobalt, east of Lake Huron to Sudbury, and north of Kenora. Snow fell in the northeast in the second week of October, especially north of Sudbury. The first major snowfall occurred later in the month from northwestern Ontario to James Bay. Lake effect snows also occurred east of Lake Huron, Georgian Bay, and Lake Superior. Snowfall was below average from Timmins to Red Lake and in the Far North, but in the northwest was 150% above normal. On October 1st, thunderstorms resulted in hail in northwestern Ontario.

Temperatures were near normal for November, except for the very western edge of the province, which was slightly warmer. The province was also drier than average, particularly in the Far North and south. Snowfall amounts were below average for the month. Snow bands off Lake Huron brought snow to between Sarnia and London, with up to 15 cm in Strathroy and Appin. Lightning accompanied this event, with more than 400 strikes reported. On November 8–9, an event with freezing rain, freezing drizzle, and snow affected northeastern and southern Ontario. On November 28, lake effect snow from the Great Lakes affected southern Ontario with up to 20 cm reported in Bracebridge, Lucknow, and Markdale.

In December, temperatures were warmer than normal. This difference was higher in the northwest and decreased towards the southeast. Three notable warm waves swept the province, with few winter-like cold spells. In the southwest, double digit daily maximum temperatures were reported, including 16 degrees Celsius on December 9. Only the first week of the month was noticeably cooler in northeastern and eastern Ontario. Precipitation averages were near normal or drier for most of the province. In the last week, substantial rain was recorded in the south

and northeast, with areas southeast of Lake Huron receiving over 50 mm. Snowfall and snow cover was well below average for December. December 3–4, snow and freezing rain affected eastern Ontario with up to 25 cm of snow reported in Renfrew. On December 12–13, lake effect snow bands caused snow squalls downwind of Georgian Bay and Lake Superior.

Weather data was summarized from Ontario's Monthly Weather Review produced by the Government of Canada.

Extreme weather and abiotic events

In 2023, 741 forest fires were recorded in Ontario, a substantial increase from the 269 in 2022. More than 429,771 ha of forest burned in 2023 compared to 2,517 ha in 2022. The largest fire was SLK033 at 62,378 ha. The fire season was active in much of Canada, particularly in Quebec where more than 5,228,524 ha of forest burned. These substantial fires in northern Quebec and Ontario resulted in poor air quality warnings across the province in June and smoke affecting the northern United States. The air quality health index (AQHI) in Ottawa exceeded 10 (very high health risk) with high concentrations of particulate matter. The smoke smell drifted as far south as New York City. The continued hot and dry conditions resulted in continued forest fires and generated smoke that affected parts of northern Ontario. Later in the month, smoke also affected central and southern Ontario, with AQHI levels above 10, for example, for Sault Ste. Marie, Ottawa, and Windsor.

This year, 4,331 ha of blowdown were recorded, a decrease from 10,563 ha in 2022. Most of the recorded blowdown was in Southern Region, and most of the area was from the May 21, 2022 derecho not recorded during 2022 surveys. Tornado damage was also recorded. The Northern Tornados Project documented 39 tornados in 2023 and 102 events, including microbursts.

Insect infestations

After four consecutive years of increase, spruce budworm defoliation decreased in the province. The area of moderate to severe defoliation declined from 2,029,039 ha in 2022 to 1,983,041 ha in 2023. Most (1,850,904 ha) of this defoliation was in Northeast Region, with over half (1,089,204 ha) in Timmins Kirkland Lake and Hearst Cochrane Kapuskasing districts. In Northwest Region, 119,017 ha of moderate to severe defoliation were mapped, with most of it in Nipigon Geraldton District (101,885 ha). In Southern Region, the bulk of the 13,119 ha of moderate to severe defoliation was recorded in Minden Parry Sound District. Some light spruce budworm defoliation (4,863 ha) was also mapped in Northwest and Southern regions. In 2023, 8,889 ha of tree mortality caused by spruce budworm was mapped in Ontario. Every district in Northeast Region as well as Minden Parry Sound Bracebridge District had mappable spruce budworm mortality.

In October 2023, spruce budworm population surveys were undertaken to forecast defoliation levels based on the number of overwintering larvae on tree branches. Between the Northeast and Northwest regions, 58 locations were

sampled. In the Northeast Region, trees were sampled in Hearst Cochrane Kapuskasing, Timmins Kirkland Lake, and Chapleau Wawa districts. The defoliation forecast was severe for seven locations, moderate for twenty-one, and light for twenty-one. In Northwest Region, trees were sampled in Nipigon Geraldton, Thunder Bay Ignace, and Dryden Fort Francis Atikokan districts. The defoliation forecast results at these locations were moderate for one and light for the remaining eight.

For the fourth consecutive year, moderate to severe defoliation by jack pine budworm decreased in the province. It dropped from 130,674 ha in 2022 to 45,294 ha in 2023. Varying levels of moderate to severe jack pine budworm defoliation were recorded in all districts in Northwest Region, most of it in Red Lake Sioux Lookout and Kenora districts, and in Chapleau Wawa District in Northeast Region. Light jack pine budworm defoliation (11,923 ha) was also mapped in Northwest Region. Jack pine tree mortality, caused by consecutive years of moderate to severe defoliation, was mapped in most districts in Northwest Region totalling 5,508 ha. Following the same trend as the moderate to severe defoliation, most of this mortality was mapped in Red Lake Sioux Lookout and Kenora districts.

In October 2023, jack pine budworm population forecast surveys were undertaken in Chapleau Wawa District. Forecast defoliation is based on the number of overwintering jack pine budworm larvae on collected tree branches. Six locations were surveyed with light defoliation forecast for all. The highest average number of larvae per branch was 19.

For the third consecutive year, the area of moderate to severe forest tent caterpillar defoliation increased, from 261,255 ha in 2022 to 407,188 ha in 2023. Most of this defoliation was in Northeast Region (318,155 ha) but in Northwest Region the area more than doubled, from 24,465 ha in 2022 to 89,032 ha in 2023, most of it in Nipigon Geraldton District (72,048 ha). Most of the defoliation in Northeast Region (297,198 ha) was in Hearst Cochrane Kapuskasing and Timmins Kirkland Lake districts. A small area (31 ha) of light forest tent caterpillar defoliation was also mapped in Dryden Fort Frances Atikokan District.

The area of moderate to severe spongy moth defoliation continued to decrease considerably, with 2,529 ha recorded in 2023 compared to 22,427 ha in 2022. All the moderate to severe defoliation was recorded in Aylmer Guelph District. No spongy moth defoliation forecast surveys (MKPs) were completed in 2023 due to the continued decline of spongy moth populations as observed in ground and aerial surveys.

Cedar leafminer moderate to severe defoliation decreased from 14,133 ha in 2022 to 13,006 ha in 2023. All this defoliation was mapped in Southern Region, with most of it in Pembroke District (8,455 ha). Light cedar leafminer defoliation (3,588 ha) was also mapped in Southern Region, with most of it split nearly evenly between Aurora Midhurst Owen Sound District (1,427 ha) and Kemptville Kingston District (1,458 ha). A small area of mortality (21 ha) was also mapped in Pembroke District.

Several other insects caused localized defoliation or damage in various parts of Ontario. These occurrences did not develop into provincially significant areas of defoliation but do contribute to overall effects on forest health.

Forest pathogens and tree decline

Most tree pathogens do not cause symptoms over areas large enough to be aerially mapped, except when the damage is severe. In 2023, brown spot needle blight damage was mapped in Southern Region. Both moderate to severe defoliation (722 ha) and light defoliation (24 ha) were mapped this year. No other disease was aerially mappable, likely attributable to the relatively drier spring and early summer.

Invasive species

Beech leaf disease was first reported in Ohio in 2012 and in 2017 symptoms were confirmed in Aylmer District. Since then, beech leaf disease has also been confirmed in Aylmer Guelph, Aurora Midhurst Owen Sound, and Peterborough Bancroft districts. During 2018 and 2019, ministry forest health experts worked with AgCanada and U.S. researchers to describe the nematode found in symptomatic leaves and reproduced symptoms in beech using solutions containing the nematode. They also determined how the nematode overwinters and the types of tissues that are infected during the growing season. Knowing the causal agent, they plan to investigate how the nematode is being spread locally and regionally. In 2023, beech leaf disease was reported in new areas in districts where beech leaf disease was previously reported, and ongoing research projects continue across the range of beech in Ontario.

Emerald ash borer is an invasive insect that is regulated by the Canadian Food Inspection Agency (CFIA). As of June 30, 2016, the area regulated to control emerald ash borer in Ontario includes Southern Region and the southern part of Northeast Region, south of Montreal River, which is at the northern end of Sault Ste. Marie Blind River District. The City of Thunder Bay in Northwest Region is also regulated for this borer. In 2023, 192 ha of ash decline caused by emerald ash borer were aerially mapped in Northeast Region between Sault Ste. Marie Blind River and Sudbury districts, all within the quarantined area. During ground surveys, new occurrences and resulting mortality were found in the quarantined area in Kemptville Kingston and Minden Parry Sound districts in Southern Region as well as Sudbury and Sault Ste. Marie Blind River districts, Northeast Region.

In June 2023, the Canadian Food Inspection Agency confirmed the first detection of oak wilt in Canada in the City of Niagara Falls. Soon after, two other detections were reported, both in Southern Region. Baited traps were deployed by MNRF forest health program staff near two of these sites to identify sap beetle species present in the area that could be vectors for oak wilt spread.

Three new locations with hemlock woolly adelgid, outside the regulated areas, were confirmed by the Canadian Food Inspection Agency in Southern Region. All three locations were in Aylmer Guelph District and one was reported by MNRF forest health staff during hemlock woolly adelgid eDNA surveys.

In 2023, new occurrences of beech bark disease were observed in Southern Region in Peterborough Bancroft, Pembroke, and Minden Parry Sound Bracebridge districts.

Pest index — Major forest disturbances

Major forest disturbances occur when an insect, disease, or weather event affects a very large area, is not specific to a region, or has affected more than one region in the past. These disturbances, listed below, are considered of provincial significance.

Pest index — Minor forest disturbances

Minor forest disturbances are identified regionally using forest health surveys. These disturbances, listed below, could have local or regional significance to forest health conditions.

Pest index — Invasive forest species

Invasive forest species are insects or diseases that are not native to Ontario. Invasive species have the potential or proven ability to have deleterious effects on forest health, tree health, ecosystem functioning, or social and economic values. Invasive species found during forest health monitoring field work in Ontario in 2023 are listed below.

Host index

Tree and shrub species mentioned in this report and their scientific names.

Common name	Scientific name
American beech	*Fagus grandifolia* Ehrh.
American elm/white elm	*Ulmus americana* L.
Austrian pine	*Pinus nigra* J. F. Arnold
Balsam fir	*Abies balsamea* (L.) Mill.
Balsam poplar	*Populus balsamifera* L.
Basswood	*Tilia americana* L.
Black ash	*Fraxinus nigra* Marsh.
Black locust	*Robinia pseudo-acacia* L.
Black spruce	*Picea mariana* (Mill.) BSP
Black walnut	*Juglans nigra* L.
Bur oak	*Quercus macrocarpa* Michx.
Eastern hemlock	*Tsuga canadensis* (L.) Carrière
Eastern white cedar	*Thuja occidentalis* L.
Eastern white pine	*Pinus strobus* L.
Green ash	*Fraxinus pennsylvanica* Marshall
Jack pine	*Pinus banksiana* Lamb.
Largetooth aspen	*Populus grandidentata* Michx.
Manitoba maple	*Acer negundo* L.
Norway maple	*Acer platanoides* L.
Pin cherry	*Prunus pensylvanica* L. f.
Red maple	*Acer rubrum* L.
Red oak	*Quercus rubra* L.
Red pine	*Pinus resinosa* Ait.
Sassafras	*Sassafras albidum* (Nutt.) Nees
Scots pine	*Pinus sylvestris* L.
Silver maple	*Acer saccharinum* L.

Common name	Scientific name
Speckled alder	*Alnus incana spp. rugosa* (Du Roi) J. Clausen
Sugar maple	*Acer saccharum* Marsh.
Tamarack/larch	*Larix laricina* (Du Roi) K. Koch
Trembling aspen	*Populus tremuloides* Michx.
White ash	*Fraxinus americana* L.
White birch	*Betula papyrifera* Marsh.
White oak	*Quercus alba* L.
White spruce	*Picea glauca* (Moench) Voss
Willow species	*Salix spp.*

Major forest disturbances

Mapped area

Major forest disturbances are mapped to quantify annual status and support trend analysis. The following table outlines area (in hectares) of mapped defoliation/damage by severity class for major disturbances in 2023.

Common name	Light	Moderate to severe	Tree mortality	Total
Blowdown	0	4,331	0	4,331
Brown spot needle blight	25	722	0	747
Cedar leafminer	3,588	13,007	21	16,616
Drought	0	24	0	24
Emerald ash borer	0	0	192	192
Forest tent caterpillar	31	407,188	0	407,219
Greenstriped mapleworm	0	224	0	224
Ice	0	255	0	255
Jack pine budworm	11,924	4,5294	5,508	62,726
Larch casebearer	65	1,217	0	1,282
Pine needleminer	0	66	0	66
Satin moth	0	4,766	0	4,766
Snow	0	339	0	339
Spongy moth	0	2,528	0	2528
Spruce budworm	4,864	1,983,041	8,890	1,996,795
Whitespotted sawyer beetle	0	47	29	76
Willow leafminer	0	5,278	0	5,278

Major forest disturbances maps

Provincial overview

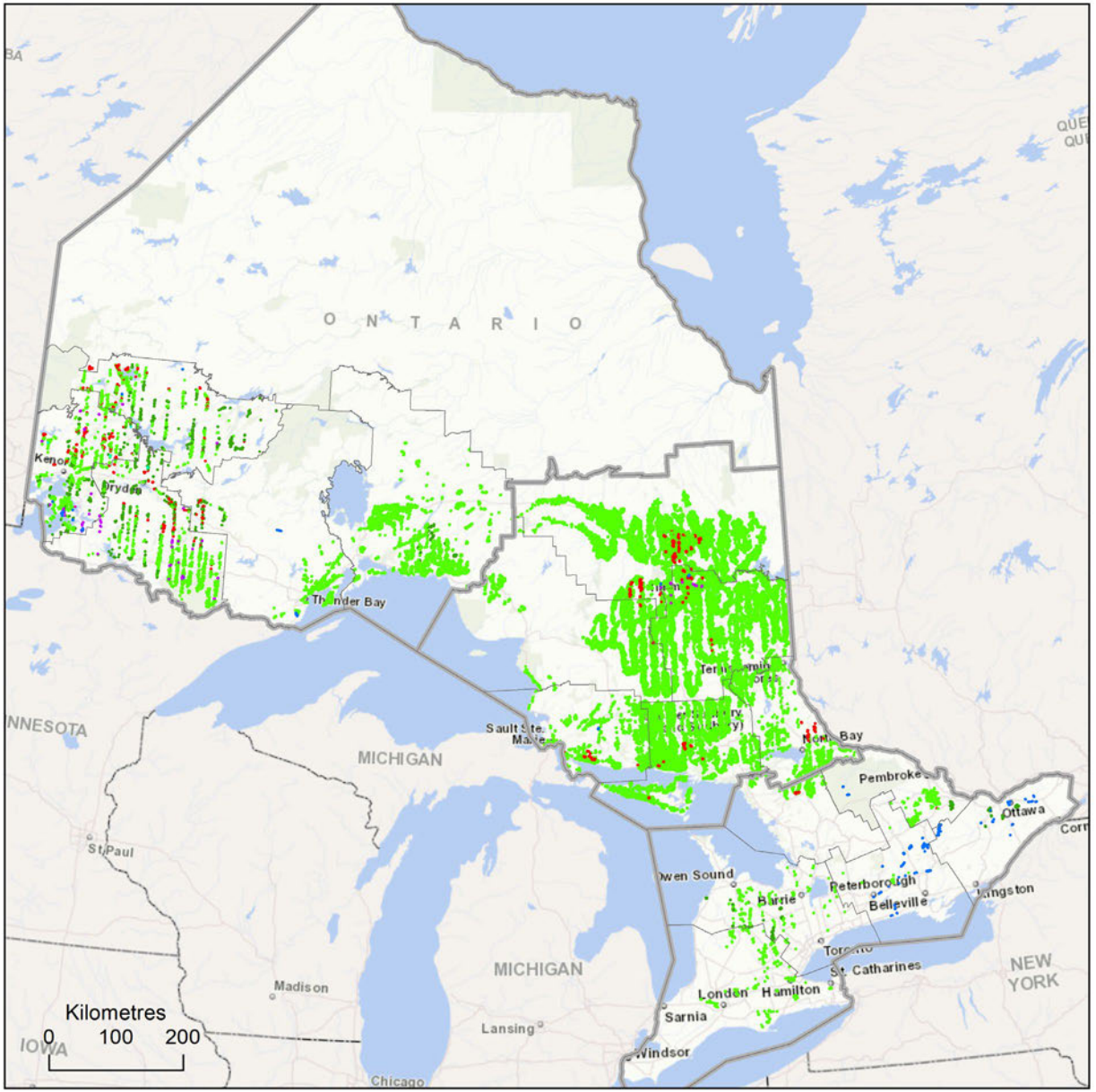
Forest damage ranking 2023

Abiotic damage (blowdown, severe weather)

- Light 5 ha
- Moderate-Severe 801 ha
- Severe 4,671 ha
- Mortality 162 ha

Biotic damage (insects and disease)

- Light 20,498 ha
- Moderate-Severe 2,463,381 ha
- Mortality 14,641 ha



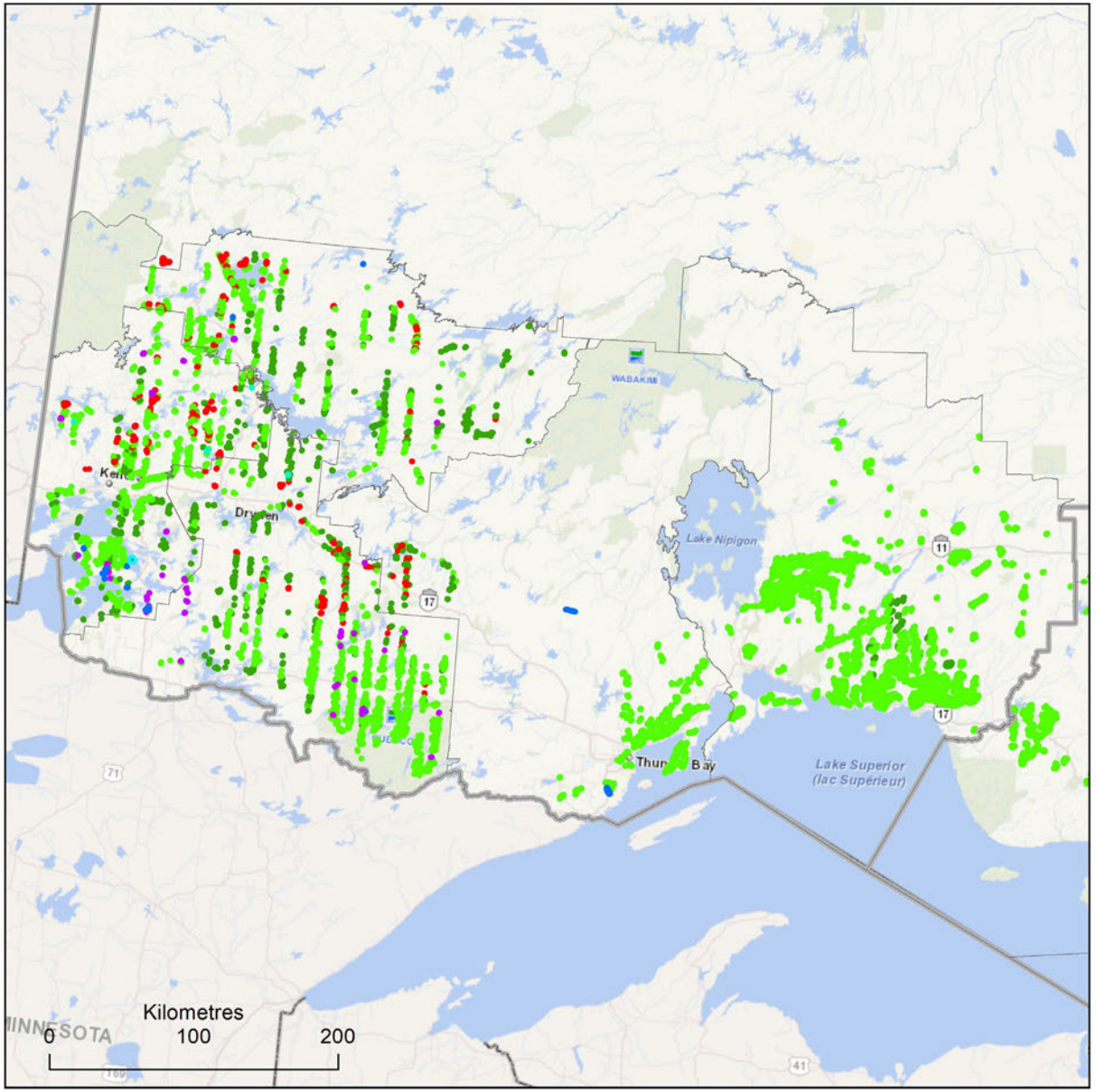
Northwest Region Forest damage ranking 2023

Abiotic damage (blowdown, severe weather)

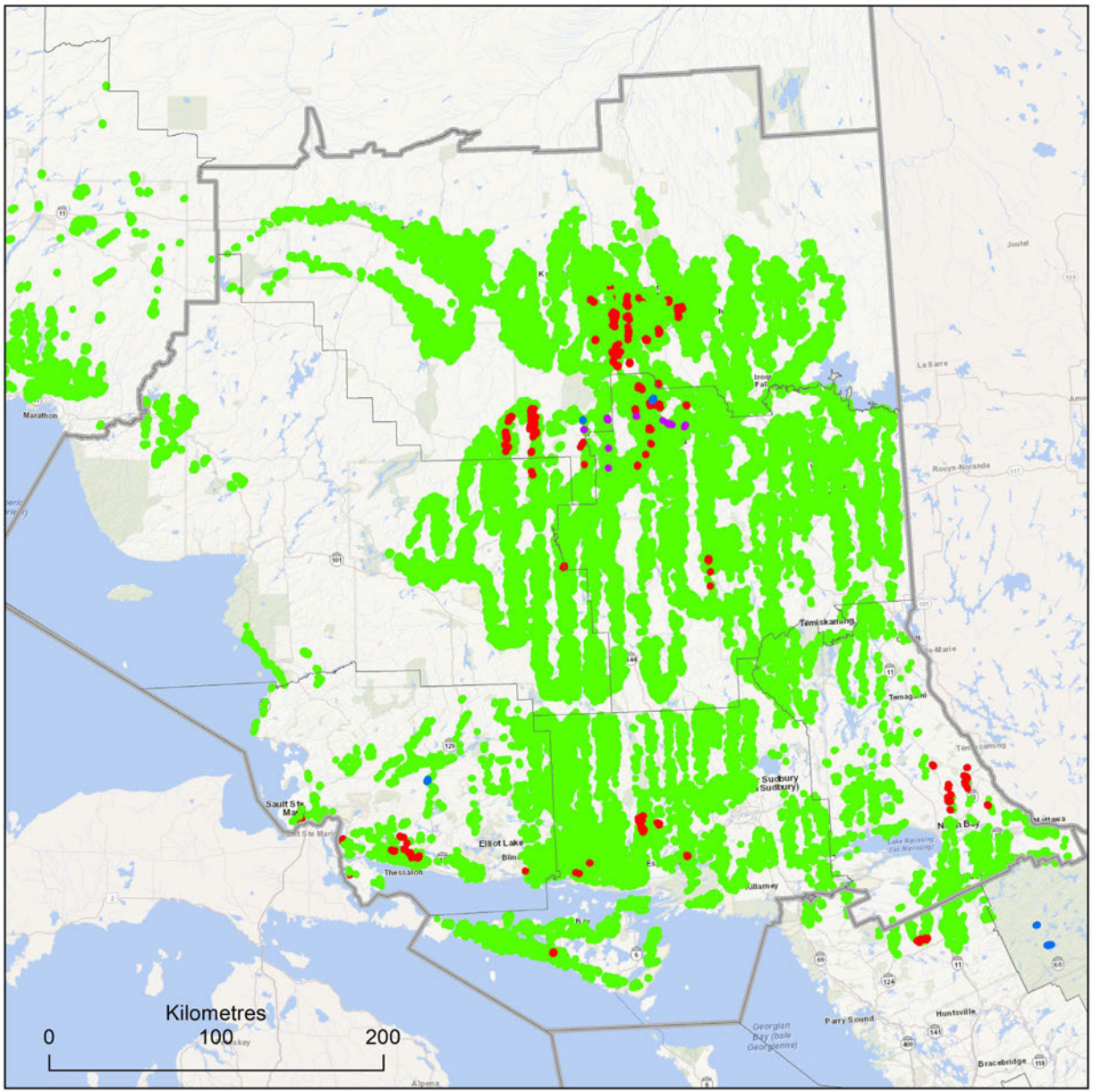
- Light 5 ha
- Moderate-Severe 546 ha
- Severe 981 ha
- Mortality 162 ha

Biotic damage (insects and disease)

- Light 16,571 ha
- Moderate-Severe 245,296 ha
- Mortality 5.538 ha



Northeast Region Forest damage ranking 2023



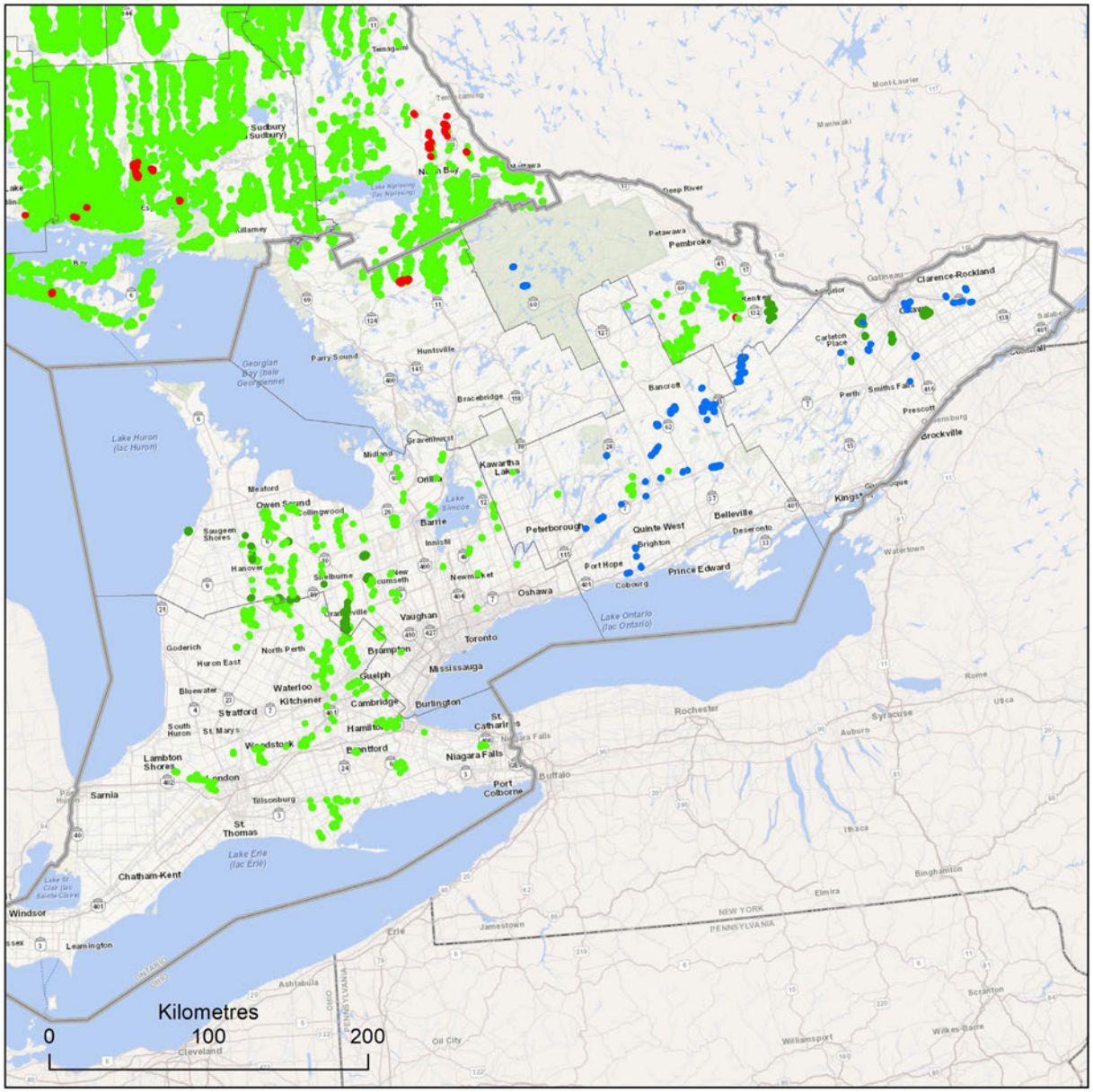
Southern Region Forest damage ranking 2023

Abiotic damage (blowdown, severe weather)

- Severe 3,456 ha

Biotic damage (insects and disease)

- Light 3,927 ha
- Moderate-Severe 31,877 ha
- Mortality 357 ha

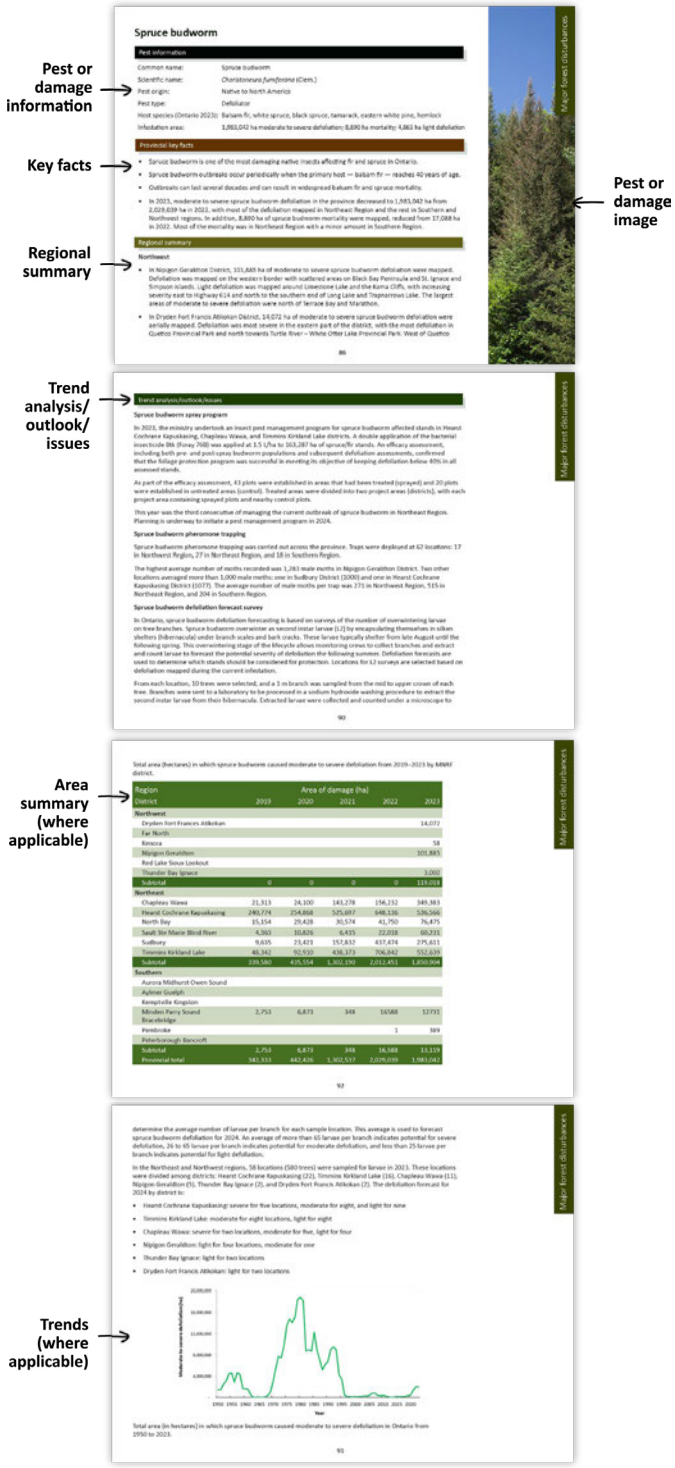


Example report

How to read a major disturbance report

Each report summarizes information about an event or disturbance affecting the health of Ontario's forests, and may include:

- **Pest/damage information** – basic information about the disturbance, including the type, origin, host species, and area affected that year
- **Key facts** – overview of the disturbance, including provincial scale information about the disturbance, possible effects, and annual activity
- **Regional summary** – regional summaries, outlining more specific information by MNRF administrative region (Northwest, Northeast, Southern)
- **Image** – a photo of the disturbance or pest
- **Outlook** – where applicable, an overview of potential future implications and developments for the disturbance
- **Trends** – where applicable, additional information about possible trends
- **Area summary** – where applicable, information about the total area in which the disturbance caused moderate to severe damage from 2019 to 2023 by MNRF region and district.

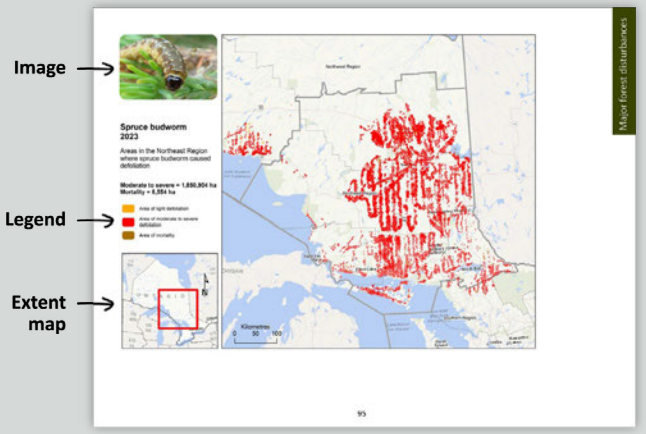


Example map

How to read the maps in this report

For major disturbances, the following spatial information is provided:

- **Damage map** – shows the areas of infestation or damage. Light damage is typically shown in orange, moderate to severe damage in red, and mortality in yellow. Smaller areas are outlined in pink to make them stand out.
- **Image** – photo of the disturbance or pest
- **Legend** – describes map features
- **Extent map** – map of Ontario with the focal area outlined in deep red



Beech bark disease

Pest information

Common name:	Beech bark disease
Scientific name:	*Neonectria faginata* (Lohman, Watson & Ayers) Castl. & Rossman*, Neonectria ditissima* (Tul. & Tul.) Samuels & Rossman
Pest origin:	Invasive — native to Europe
Pest type:	Canker
Host species (Ontario 2023):	American beech
Infestation area:	Localized

Provincial key facts

- Beech bark disease is the result of an insect-fungal pathogen complex initiated by the infestation of beech scale *(Cryptococcus fagisuga)* on American beech.
- As the insect and fungus become established in a stand, they reduce growth, deform trees, decrease wood quality and mast production, and may cause early tree death.
- Beech bark disease has been identified across the range of beech in Ontario, as far north as St. Joseph Island, Sault Ste. Marie District.
- Three distinct phases of beech bark disease development are evident in Ontario:
  - Advancing front: Beech scale populations have recently colonized unaffected beech trees. Scale infestations combined with other stressors can contribute to beech decline.
  - Killing front: Scale populations build rapidly and the fungus colonizes trees. The killing front is characterized by high tree mortality.
  - Aftermath forest: The disease has passed through and remains endemic. Large remnant trees continue to decline and young trees become infected, disfigured, and gradually decline.
- In 2023, new locations with beech bark disease were identified in Southern Region.

Regional summary

Southern

- In Peterborough Bancroft District, severe beech bark disease was recorded on Williams Lake Road in Maynooth, and on a forestry road off Hwy 127, north of Lake Saint Peter in Hastings County. Signs and symptoms at both locations included fungal fruiting bodies and cankers, tree decline, and mortality. Light beech scale was present.
- In Pembroke District, light beech bark disease damage was observed on 10% of beech trees in a mature maple-beech stand on Hemlock Bluff Trail off Hwy 60 in Algonquin Park. The disease affected various age classes of beech but was more severe on older trees. Light beech scale was present.
- In Minden Parry Sound Bracebridge District, moderate beech bark disease damage was found on a codominant beech tree off Island Lake Road in Kearney.

Beech Bark Disease and Beech Scale in Ontario 1999 - 2023

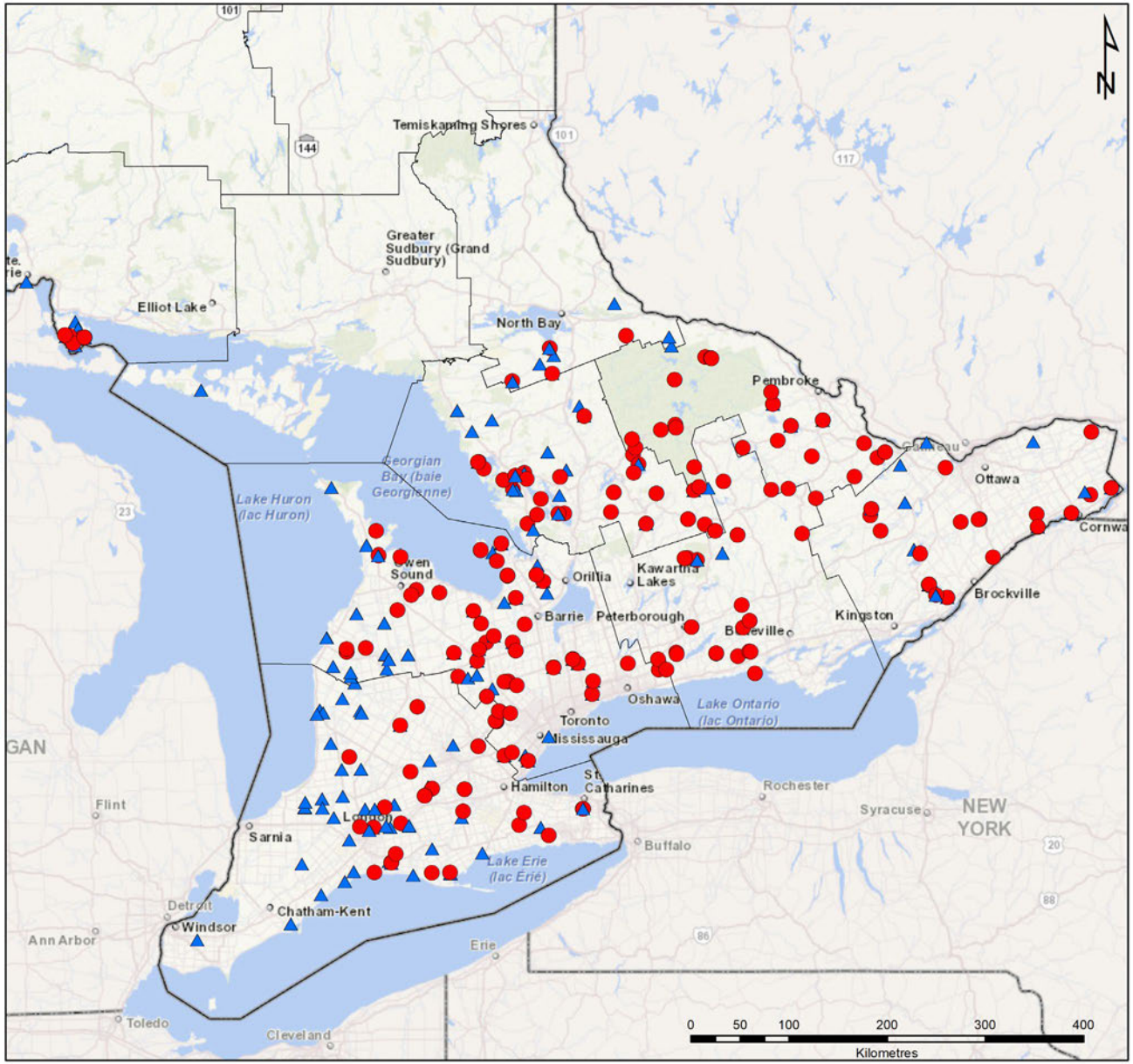
- Beech bark disease detected
- Beech scale detected

Produced by:
Biodiversity and Monitoring Section
Ministry of Natural Resources and Forestry

Sources:
Base Data: MNRF LIO
Projection: Transverse Mercator
Datum: NAD 83

Published Jan 2024

Ontario



Beech leaf disease

Pest information

Common name:	Beech leaf disease
Scientific name:	*Litylenchus crenatae mccannii* Handoo et al. 2020
Pest origin:	Unknown
Pest type:	Leaf blight
Host species (Ontario 2023):	American beech
Infestation area:	Localized

Provincial key facts

- Beech leaf disease was first identified in the United States in Lake County, Ohio, in 2012 and has since been detected west from Michigan, northeast to Maine, and southeast to Virginia. In Ontario, it currently occurs between Lake Erie and Georgian Bay and along the shores of Lake Ontario.
- Symptoms of beech leaf disease were first confirmed in southern Ontario in 2017 in Aylmer District.
- The primary symptom is striping or banding on leaves caused by the thickening of tissue between veins. Severely affected leaves have yellowed bands and are coarse and curled. Early leaf drop of severely affected leaves and bud abortion make tree crowns appear thin.
- Beech leaf disease symptoms have been confirmed in Southern Region in locations in Aylmer Guelph, Aurora Midhurst Owen Sound, and Peterborough Bancroft districts.
- In 2023, new beech leaf disease detections were made in districts where beech leaf disease had previously been confirmed in Southern Region.

Regional summary

Southern

- In Aylmer Guelph District, moderate to severe beech leaf disease symptoms were reported in areas of Rondeau Provincial Park (Chatham Kent), affecting all age and canopy classes of American beech. In Middlesex County, moderate beech leaf disease symptoms were reported on understory beech trees at Lucan Conservation Area in Lucan. In Perth County, light to moderate beech leaf disease symptoms were reported on beech of all ages and canopy classes at Shakespeare Conservation Area in Perth East Twp. This detection represents the first record of beech leaf disease in Perth County. In Lambton County, trace symptoms of beech leaf disease were observed on two understory beech trees at Mandaumin Woods Nature Reserve, Sarnia. In Waterloo Region, trace symptoms of beech leaf disease were observed on several understory beech at Baden Hills Regional Forest in Wilmot Twp. In Haldimand County, trace symptoms of beech leaf disease were observed at La Fortune Park in Caledonia affecting understory and mature beech trees along a recreational trail.
- In Midhurst Aurora Owen Sound District, three new beech leaf disease detections were reported in 2023. Light beech leaf disease damage was detected at Belfountain Conservation Area south of the Village of Caledon, Peel Region. This detection is the first for the disease in Peel Region. Beech leaf disease was detected for the first time in Simcoe County at Copeland Forest in Hillsdale. Damage at this location was light, affecting about five per cent of understory beech leaves. In Halton Region, trace symptoms were detected at Limehouse Conservation Area in Halton Hills.
- In Peterborough Bancroft District, a new detection of severe beech leaf disease was made in Northumberland County in a woodlot off Concession Road 12E, Hastings. The foliar damage ranged from light banding to severely shrivelled leaves and early leaf drop. All age classes were affected. In Peterborough County, a new beech leaf disease detection was made along a recreation trail at Fleming College, Sutherland Campus in the City of Peterborough. Foliar symptoms ranged from trace to light banding on a few understory trees. Trace beech leaf disease symptoms were also reported on understory beech trees in a mature maple dominated forest in Mark Burnham Provincial Park on Hwy 7, east of the City of Peterborough.

Trend analysis/outlook/issues

Work on beech leaf disease is ongoing with several partners. Now that a causal agent has been identified, the ministry is investigating the impact of the disease and how the nematode is being spread locally and regionally. In 2019, a long-term health assessment plot network was established to monitor effects of beech leaf disease on forests with and without beech bark disease. In 2022, understory beech tree mortality and changes in the amount of light reaching the forest floor were observed. This change in light may alter the future plant community.

A pilot study to identify potential insect spreaders of the *Litylenchus crenatae mccannii* (LCM) nematode associated with beech leaf disease was carried out from 2021 to 2022. This work involved establishing and monitoring Lindgren traps and collecting leaf/bud samples in Aylmer, Aurora, Peterborough, Kemptville, and Parry Sound districts as well as broad survey sampling of potential insect vectors across all districts in southern Ontario and areas of Sudbury District. A surprising discovery was the detection of nematode DNA in forests outside the range of those with symptoms.

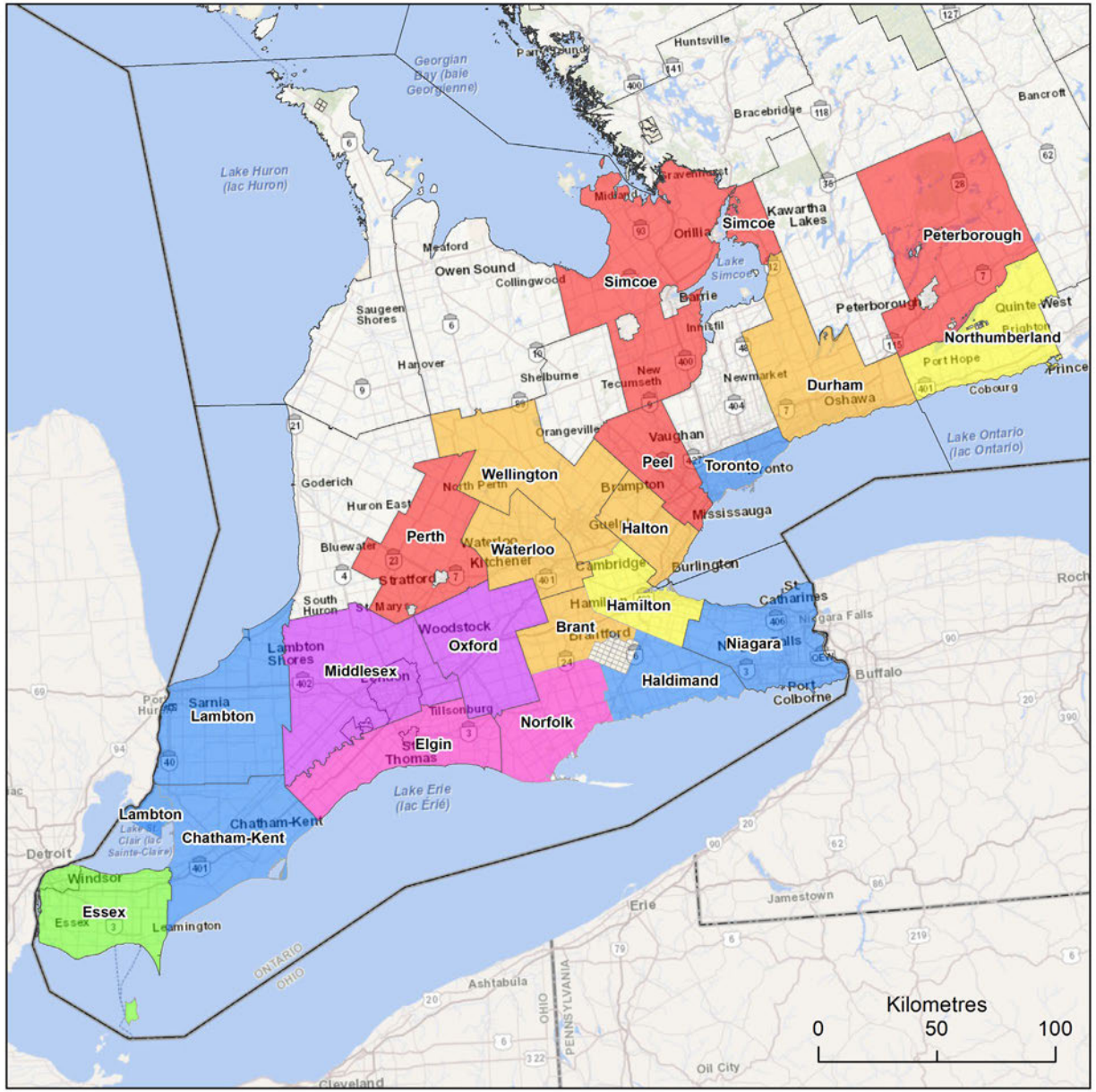
Two beech leaf disease monitoring studies were underway in 2023. One study was the continuation of the long-term beech health assessment plots in Aylmer Guelph District to determine the combined effects of beech leaf disease, beech scale, and beech bark disease on the health of beech trees and beech forests in Ontario. In 2023, a notable decline was observed in the beech sapling layer. Later analysis showed that 22% of the saplings and 14% of trees tagged in 2019 had died. The second study was to investigate the range of the LCM nematode, its population changes from year to year, and population thresholds for symptoms to appear. The minimum population for nematode detection was also investigated. Bud and leaf samples were collected in Southern and Northeast regions at symptomatic and asymptomatic sites. Samples were analyzed for presence of the LCM nematode and results are forthcoming. In addition, data collected in 2022 on the range of the LCM nematode was included in a research article (Fitza et al. 2024).

Beech leaf disease in Ontario

Upper and single tier municipalities where beech leaf disease has been confirmed

Year of detection

- 2017
- 2018
- 2019
- 2020
- 2021
- 2022
- 2023



Blowdown

Pest information

Common name:	Blowdown
Scientific name:	NA
Pest origin:	NA
Pest type:	Abiotic
Host species (Ontario 2023):	NA
Infestation area:	4,332 ha

Provincial key facts

- Blowdown, damage to trees caused by high winds or extreme weather events, is a natural disturbance process in forests. The extent and frequency of such damage is sporadic.
- Less blowdown was recorded in 2023 (4,332 ha) than in 2022 (10,563 ha). In 2023, localized areas of blowdown were found in all three regions, with the most area (3,117 ha) in Southern Region.

Regional summary

Northwest

- In Thunder Bay District, 569 ha of blowdown were aerially mapped from a suspected tornado. The narrow band of damage was evident south of Armistice Lake and crossed Hine Lake stretching for about 11 km in a west to east direction.
- In Kenora District, 346 ha of blowdown were aerially mapped on the central northwest arm of McPherson Island on Lake of the Woods.
- In Dryden Fort Francis Atikokan District, 37 ha of blowdown were aerially mapped as small areas in Quetico Provincial Park east of Quetico Lake, north of Little Turtle River about 40 km southeast of Ignace, and along the northwest shoreline of Little Raleigh Lake, east of Pinafore Road.
- In Red Lake Sioux Lookout District, 29 ha of blowdown were mapped along the southern shores of Longlegged River, 3 km north of Fly Road.

Northeast

- In Timmins Kirkland Lake District, 126 ha of blowdown were aerially mapped in the northwest part of the district close to the Mattagami River in Reid Twp.
- In Sault Ste. Marie Blind River District, 74 ha of blowdown were recorded. Three small areas of blowdown were recorded in the central part of the district in the southwest corner of Sturgeon Twp along Hwy 129 between the highway and the Mississagi River. Snapped hardwood and softwood trees were noted south and north of Izaak Lake Road from a storm in early July.
- In Hearst Cochrane Kapuskasing District, 33 ha of blowdown were mapped in the southern part of the district in Montcalm Township south of the Hicks-Oke Bog Provincial Nature Reserve.

Southern

- In Peterborough Bancroft District, 2,085 ha of blowdown were mapped during 2023 aerial surveys from the derecho storm that occurred in May 2022. Small areas of blowdown were mapped along the route of the storm including the southeast end of Kawartha Highlands Provincial Park, North Kawartha Twp, Vansickle in Hastings County, Steenburg Lake and Saint Ola in Limerick Twp, and the western boundary of Bon Echo Provincial Park, Addington Highlands Twp. Blowdown from a July 2022 tornado was mapped in small, intermittent areas along the Hwy 7 corridor in South Dummer, Havelock, Round Lake, Marmora, Madoc, and Actinolite.
- In Kemptville Kingston District, a derecho wind event occurred in May 2022. From that event, 2,462 ha of blowdown were mapped and reported in the 2022 Forest Health Conditions Report. An additional 770 ha of damage from that storm was detected during 2023 aerial surveys in the northwest corner of Lanark County from Buckshot Lake to Round Schooner Lake near the Renfrew County border, on Scotch Corners Road at the northwest end of Mississippi Lake, near Rathwell's Shore, and east of Ottawa International Airport in the City of Ottawa.
- In Pembroke District, 262 ha of blowdown were mapped in Algonquin Provincial Park. Tornado damage was mapped from Sunbeam Lake eastward for 4.3 km to Burnt Island Lake. According to the Tornado Project at Western University, the Sunbeam Lake Tornado occurred in 2021 and had wind speeds up to 190 km/h. A smaller area of blowdown measuring 1.8 km in length was mapped on the south side of Stag Lake.

Total area (in hectares) in which blowdown caused severe damage and/or mortality in 2019–2023 by MNRF district.

Region / District	Area of damage (ha) 2019	2020	2021	2022	2023
Northwest					
Dryden Fort Frances Atikokan		1,169		133	37
Far North	3,144	204			
Kenora	10			145	346
Nipigon Geraldton	249				
Red Lake Sioux Lookout	2,867		30	79	29
Thunder Bay Ignace			7	265	569
Subtotal	6,269	1,373	37	622	981
Northeast					
Chapleau Wawa	1,243			65	
Hearst Cochrane Kapuskasing	24	38		350	33
North Bay			39	13	
Sault Ste Marie Blind River	25		364	119	74
Sudbury			188		
Timmins Kirkland Lake	207	55	13	60	126
Subtotal	1,499	93	604	607	234
Southern					
Aurora Midhurst Owen Sound					
Aylmer Guelph					
Kemptville Kingston	77			2,715	770
Minden Parry Sound Bracebridge			63		
Pembroke	645			716	262
Peterborough Bancroft				5,903	2,085
Subtotal	722	0	63	9,334	3,117
Provincial total	8,490	1,466	704	10,563	4,332

Blowdown 2023

Areas in Ontario where blowdown caused damage

Severe = 4,332 ha

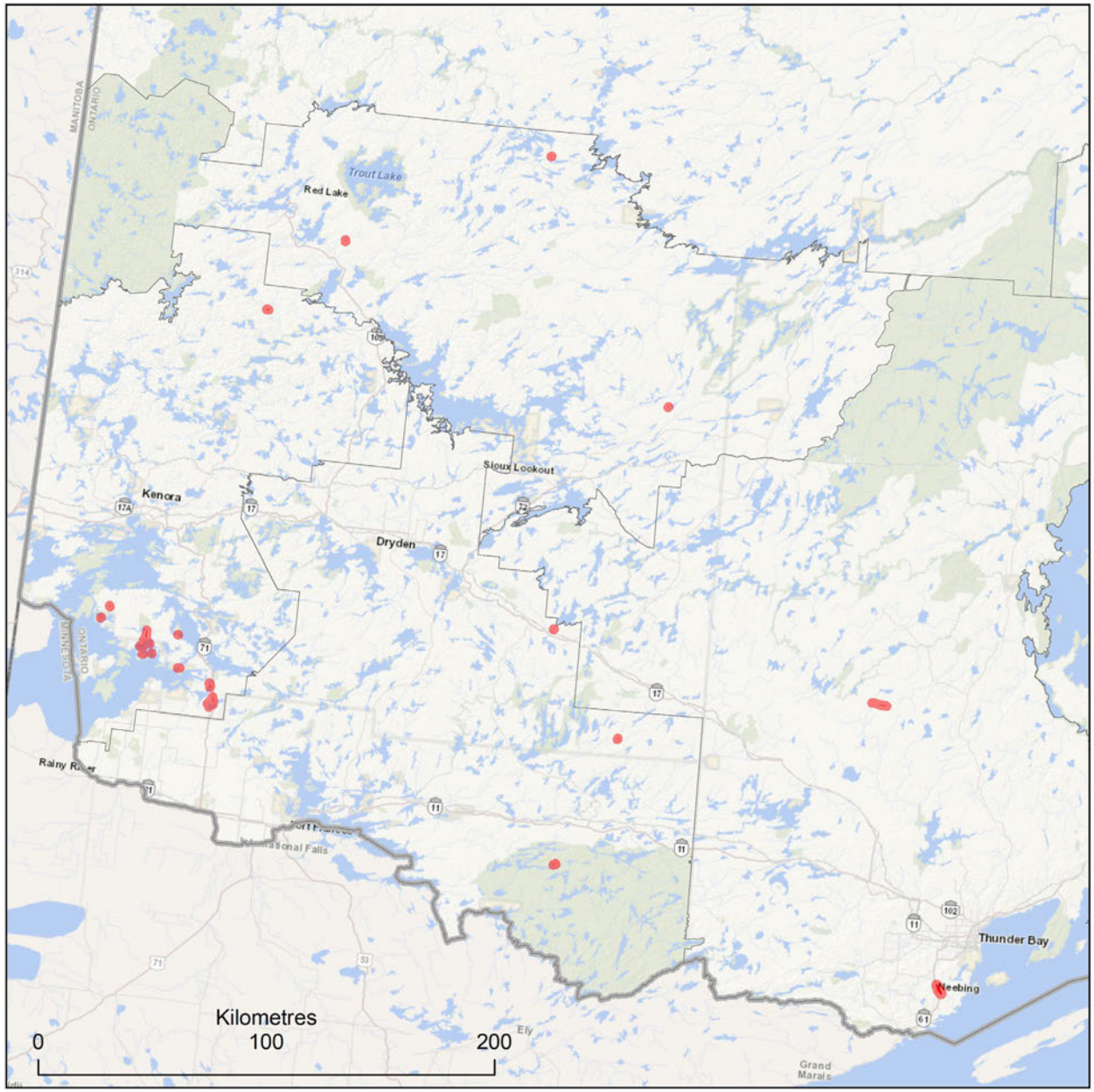
Area of severe damage

Blowdown 2023

Areas in the Northwest Region where blowdown caused damage

Severe = 981 ha

Area of severe damage

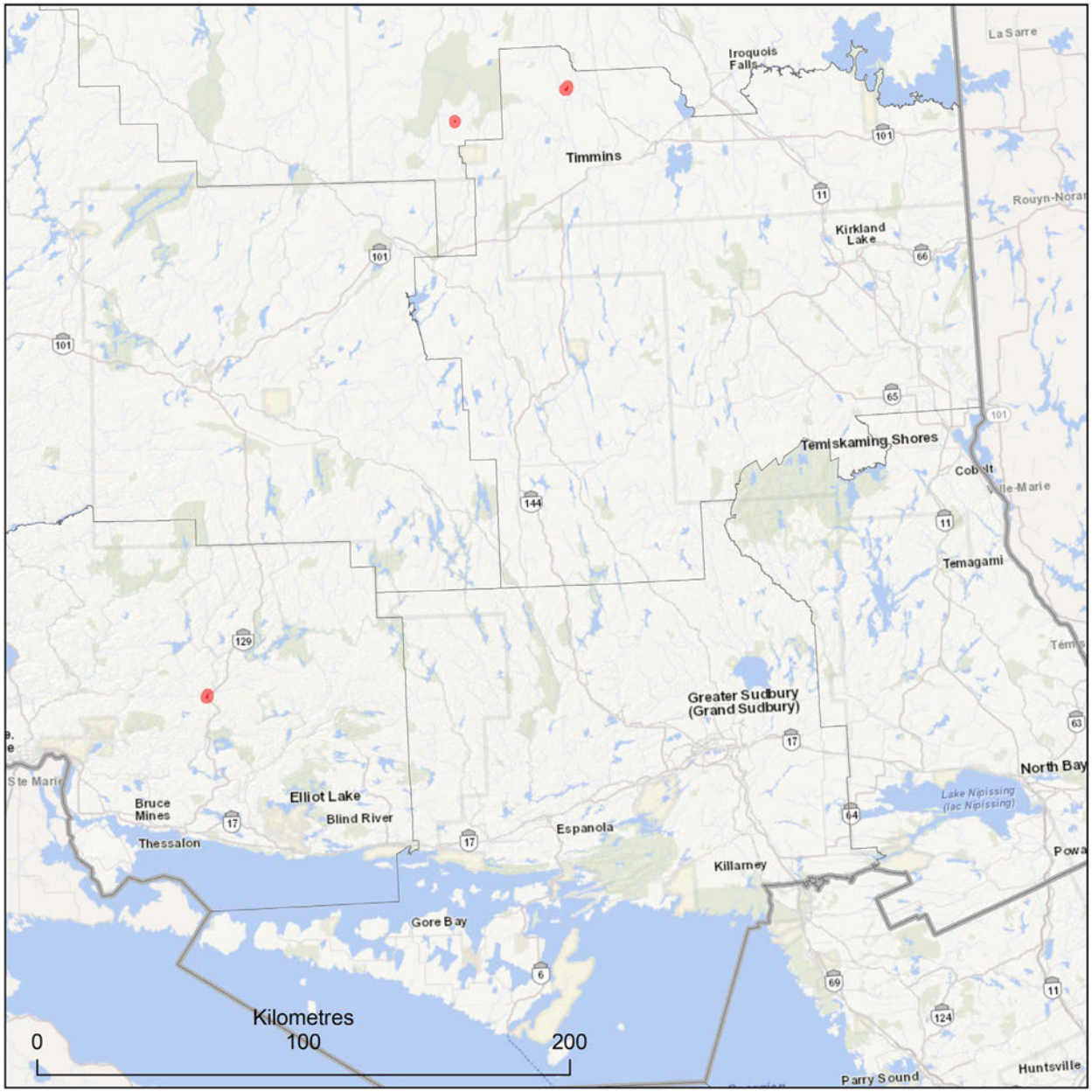


Blowdown 2023

Areas in the Northeast Region where blowdown caused damage

Severe = 234 ha

Area of severe damage

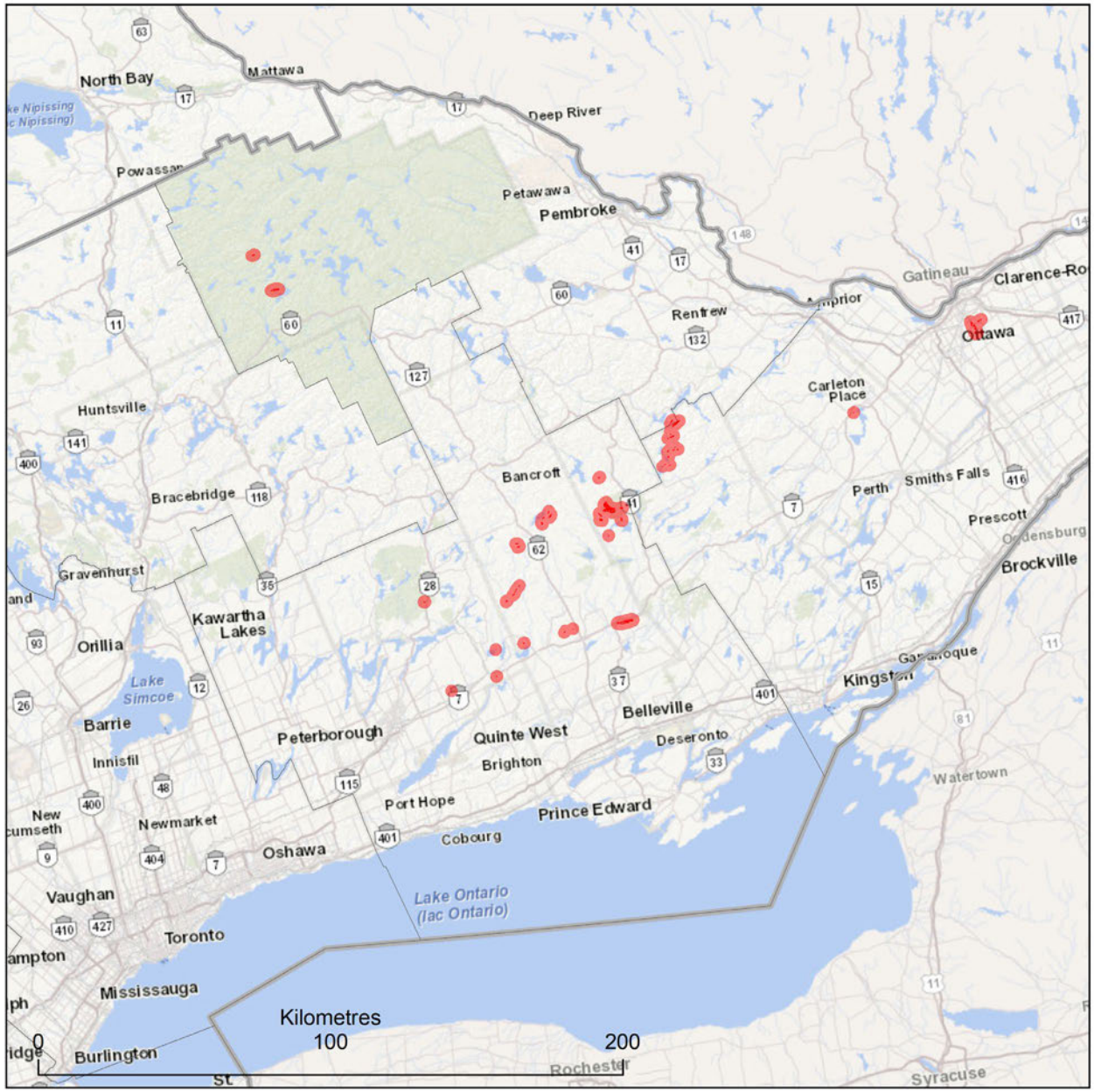


Blowdown 2023

Areas in the Southern Region where blowdown caused damage

Severe = 3,117 ha

Area of severe damage



Brown spot needle blight

Pest information

Common name:	Brown spot needle blight
Scientific name:	*Lecanosticta acicola* (Thum.) Syd.
Pest origin:	Native
Pest type:	Needle blight
Host species (Ontario 2023):	Scots pine, red pine
Infestation area:	722 ha (moderate to severe), 25 ha (light)

Provincial key facts

- This disease affects pines, especially Scots and Austrian pines, of all ages but is most damaging to seedlings and smaller trees.
- Several years of infection by brown spot needle blight reduces tree growth. Coupled with other factors, such as drought and secondary insect attack, this blight may result in branch and tree mortality.
- In some affected locations, previous years' needles turn brown and drop in June, leaving only current years' shoots on trees.
- In 2023, scattered areas of new brown spot needle blight damage were observed in Southern Region.

Regional summary

Southern

- In Aurora Midhurst Owen Sound District, 495 ha of moderate to severe brown spot needle blight damage were mapped across the district. The most concentrated areas of damage were near Glen in West Grey Twp and scattered across the northern parts of Grey Highlands (Grey County), and in Simcoe County near Orillia and Midland. In addition, a few small areas of moderate to severe damage were observed in southern Dufferin County near Mono, northern Peel Region near Orangeville, and northern York Region near East Gwillimbury. Moderate to severe brown spot needle blight damage was mapped in Halton Region east of Halton Hills. Small areas of moderate to severe damage were mapped in Durham region in northern and southern Uxbridge Twp. Twenty-five hectares of light brown spot needle blight damage were mapped in western and southern Grey County, near Chesley and West of Shelburne, respectively.

- In Aylmer Guelph District, 227 ha of moderate to severe brown spot needle blight damage were mapped throughout the centre of the district. Damage was mapped in Wellington County in areas between Guelph and Hwy 401 (Puslinch Twp), with one small area mapped north of Guelph Lake in Eramosa. Small areas of damage were mapped between Morrison Road and the Grand River, and in a small plantation south of Brigadoon Woods. In Hamilton, one area was mapped south of Mountsberg along Concession Road 11 East, east of Centre Road. In Norfolk County, damage was mapped around Simcoe. Another small area was mapped along Forestry Farm Road adjacent to St. Williams Conservation Reserve, and west of Walsingham along North Walsingham and South Walsingham Townline Road. In Oxford County, a small Scots pine plantation with moderate brown spot needle blight damage was mapped north of Woodstock along Hwy 59 near Willow Lake (East Zorra Tavistock.

Total area (in hectares) in which brown spot needle blight caused moderate to severe damage in 2019–2023 by MNRF district.

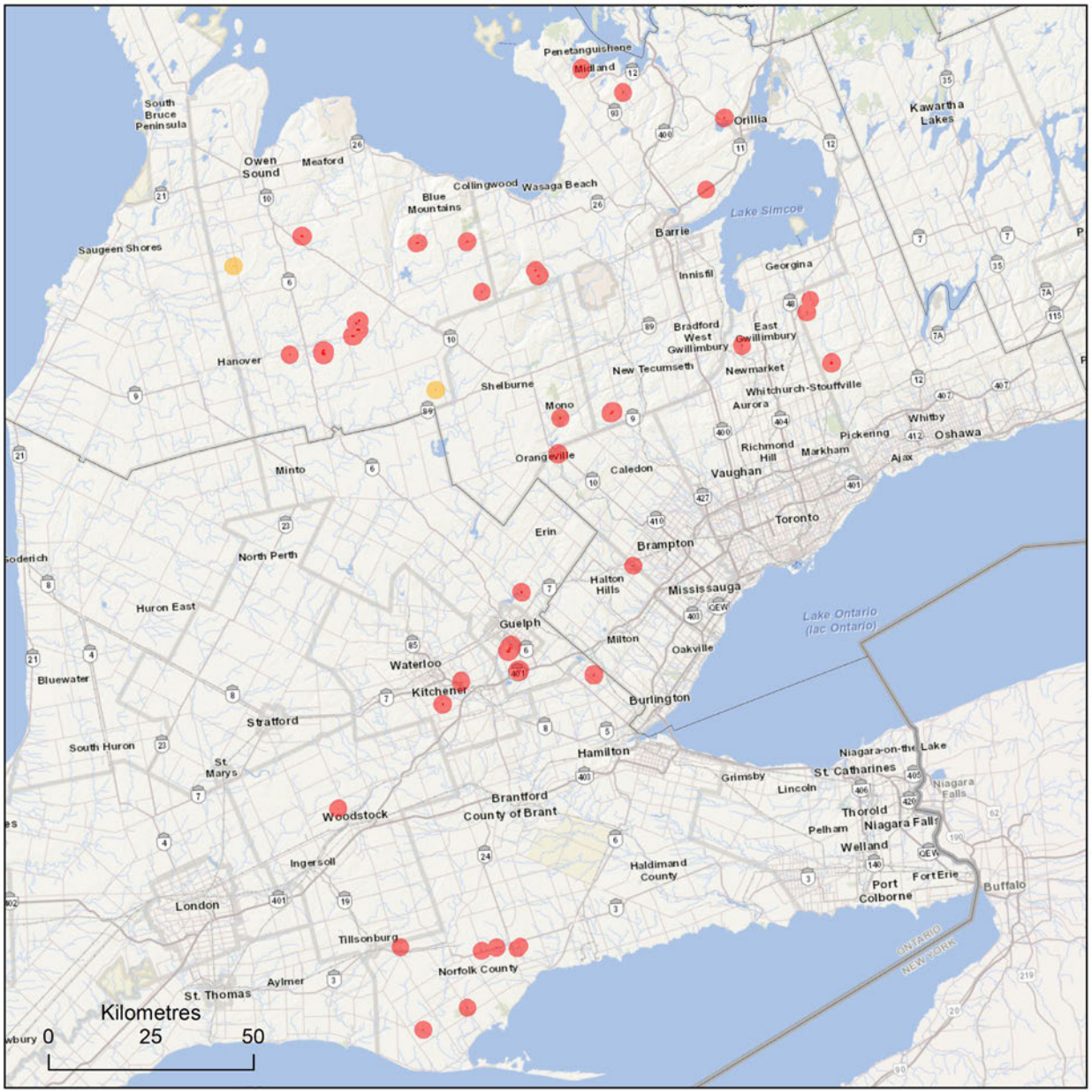
Region	Area of damage (ha)				
District	2019	2020	2021	2022	2023
Northwest					
Dryden Fort Frances Atikokan					
Far North					
Kenora					
Nipigon Geraldton					
Red Lake Sioux Lookout					
Thunder Bay Ignace					
Subtotal	0		0	0	0
Northeast					
Chapleau Wawa					
Hearst Cochrane Kapuskasing					
North Bay	76				
Sault Ste Marie Blind River	154			77	
Sudbury	58				
Timmins Kirkland Lake					
Subtotal	288		0	77	0
Southern					
Aurora Midhurst Owen Sound	3,352			816	495
Aylmer Guelph	885			798	227
Kemptville Kingston					
Minden Parry Sound Bracebridge	1,527		327	52	
Pembroke					
Peterborough Bancroft	80			130	
Subtotal	5,844		327	1,796	722
Provincial total	6,132		327	1,873	722

Brown spot needle blight 2023

Areas in Ontario where brown spot needle blight caused defoliation

Light = 25 ha
Moderate to severe = 722 ha

- Area of light defoliation
- Area of moderate to severe defoliation



Cedar leafminer complex

Pest information

Common name:	Cedar leafminer complex
Scientific name:	*Argyresthia aureoargentella* Brower, *Argyresthia canadensis* Freeman, *Argyresthia thuiella* (Peck), *Coletechnites thujaella* (kft.)
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	Eastern white cedar
Infestation area:	13,006 ha (moderate to severe), 3,588 ha (light), 21 ha (mortality)

Provincial key facts

- Cedar leafminer complex is a group of similar insects that mine cedar foliage, including:
  - *Argyresthia aereoargentella* Brower
  - *Argyresthia canadensis* Freeman
  - *Argyresthia thuiella* (Pack)
  - *Coletechnites thujaella* (Kft.)
- The last widespread cedar leafminer outbreak occurred in Southern Region from 2002 to 2007, resulting in substantial crown dieback and some whole tree mortality.
- In 2023, cedar leafminer defoliation was mapped across Southern Region.

Regional summary

Southern

- In Pembroke District, 8,455 ha of moderate to severe cedar leafminer defoliation and 702 ha of light defoliation were mapped during aerial surveys. This year was the third of consecutive defoliation. In the southern part of the district, large areas of moderate to severe defoliation were mapped between Lake Clear and Lac Doré. Small areas of moderate to severe defoliation were mapped East of Hwy 41 between Mink Lake and Constant Lake within the municipal boundaries of North Algona Wilberforce and Bonnechere Valley Townships. Tree mortality was mapped on Hwy 41 south of Constant Lake. In the southwest corner of the district, moderate to

severe defoliation was recorded in the townships of Brudenell, Lyndoch, and Raglan southwest of Quadeville. Small areas of defoliation were mapped along Hwy 512 and Hwy 66 east of Letterkenney Road, east of Barry's Bay, and one small area of defoliation in Bell Bay Provincial Park. Small areas of light defoliation were mapped southwest of Renfrew heading south towards Norway Lake. During ground surveys, light cedar leafminer defoliation was observed in a mature eastern white cedar and balsam fir forest on Hazley Bay Drive south of the City of Pembroke.

- In Aurora Midhurst Owen Sound District, 2,493 ha of moderate to severe defoliation and 1,428 ha of light defoliation caused by cedar leafminer were mapped during aerial surveys. In Grey County, scattered areas of moderate to severe and light defoliation were mapped through the townships of Chatsworth, West Grey, Southgate, and Grey Highlands, with a few areas of defoliation extending into Meaford and The Blue Mountains. In Dufferin County, concentrated areas of light to severe defoliation were mapped in central East Garafraxa Twp and central Amaranth Twp along the Grand River and Willow Brook from Black's Corners to Craigsholme. Several areas of defoliation were also mapped around Violet Hill and Mono Cliffs Provincial Park in Mono Twp and along the Pine River in Terra Nova (Mulmur Twp). Small areas of defoliation were present west of Hawkins Corners in Severn Twp, east of Hwy 27 in Springwater Twp, along the northwest shore of Lake Simcoe between Shanty Bay and Lakeview and north of Mono Cliffs Provincial Park. Small areas of moderate to severe defoliation were mapped in York Region near Georgina and in Durham Region near the northern end of Brock Twp east of Lake Simcoe.
- In Aylmer Guelph District, 2,058 ha of moderate to severe cedar leafminer defoliation were mapped, a slight decrease from 2,213 ha in 2022. Most of the defoliation occurred in the northeast part of the district, north of Hwy 401. Large areas of defoliation were detected north of Guelph heading towards the Aurora Midhurst Owen Sound District boundary, north of Kitchener in areas along the Grand River extending to Lake Belwood, southwest of Clifford in the Township of Howick, southwest of Pike Lake, and south of Mt. Forest, with large areas mapped along the South Saugeen River and Bethel Creek. Small, isolated areas south of Hwy 401 were mapped east of Drumbo along Oxford County Road 29, at Lehman Conservation Area in Delhi, along Spencer Creek at Christie Lake Conservation Area near Dundas, and an area southwest of Stoney Creek off Green Mountain Road. A small area of defoliation was also mapped north of Ethel in Huron County.
- In Kemptville Kingston District, 1,458 ha of light cedar leafminer defoliation were mapped. Small areas of light defoliation were mapped south of Ottawa, west of Stittsville along Hwy 417, northwest of Munster on Flewellyn Road, in Baxters Corners on Malakoff and 4th Line Road, and north of Metcalfe along 8th Line Rd. In Beckwith Twp, a small area of light defoliation was mapped on the east side of Mississippi Lake.

Total area (in hectares) in which cedar leafminer caused moderate to severe defoliation in 2019–2023 by MNRF district.

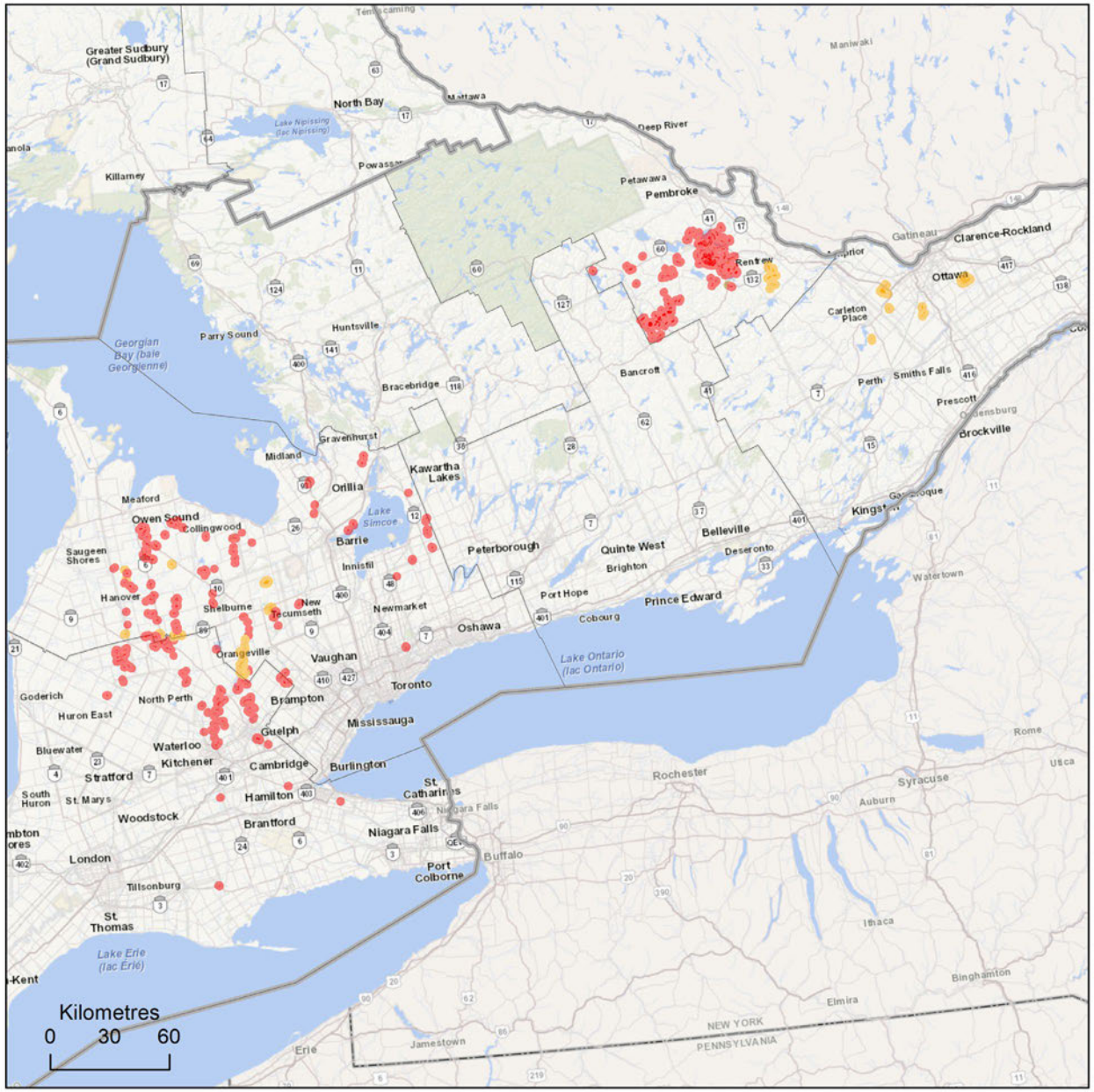
Region	Area of damage (ha)				
District	2019	2020	2021	2022	2023
Northwest					
Dryden Fort Frances Atikokan					
Far North					
Kenora					
Nipigon Geraldton					
Red Lake Sioux Lookout					
Thunder Bay Ignace					
Subtotal	0		0	0	0
Northeast					
Chapleau Wawa					
Hearst Cochrane Kapuskasing					
North Bay					
Sault Ste Marie Blind River					
Sudbury					
Timmins Kirkland Lake					
Subtotal	0		0	0	0
Southern					
Aurora Midhurst Owen Sound				678	2,493
Aylmer Guelph				2,205	2,058
Kemptville Kingston	226		3,342	44	
Minden Parry Sound Bracebridge					
Pembroke			9,294	11,206	8,455
Peterborough Bancroft	118				
Subtotal	344		12,636	14,133	13,006
Provincial total	344		12,636	14,133	13,006

Cedar leafminer 2023

Areas in Ontario where cedar leafminer caused defoliation

Light = 3,588 ha
Moderate to severe = 13,006 ha
Mortality = 21 ha

- Area of light defoliation
- Area of moderate to severe defoliation
- Area of mortality



Drought

Pest information

Common name:	Drought
Scientific name:	NA
Pest origin:	NA
Pest type:	Abiotic
Host species (Ontario 2023):	Various species
Infestation area:	24 ha

Provincial key facts

- Drought is a prolonged period of dryness that can affect forest growth and survival.
- Symptoms can include wilted foliage; sparse canopy; and leaf scorch, yellowing, drop, and premature fall colouration.
- Trees weakened by drought have reduced ability to survive insect and disease infestations.
- In 2023, below average precipitation and high temperatures were reported throughout the season in parts of the Northwest region where drought damage was mapped.

Regional summary

Northwest

- In Kenora District, 13 ha of moderate to severe damage was mapped about 1.6km east of Tetu Lake near the Manitoba border.
- In Dryden Fort Frances Atikokan District, 11 ha of moderate to severe damage was mapped in the southeastern corner of Quetico Provincial Park between Kenny Lake and Canyon Falls.

Drought 2023

Areas in Ontario where drought caused damage

Severe = 24 ha

Area of severe damage

Emerald ash borer

Pest information

Common name:	Emerald ash borer
Scientific name:	*Agrilus planipennis* (Fairmaire)
Pest origin:	Invasive — native to Asia
Pest type:	Wood borer
Host species (Ontario 2023):	Ash species
Infestation area:	192 ha

Provincial key facts

- Since it was discovered in Windsor in 2002, emerald ash borer has threatened ash trees in Ontario.
- Since 2002, this insect has spread east to Ottawa and north to Sault Ste. Marie and Thunder Bay.
- This beetle is expected to spread across the entire range of ash, causing widespread mortality in Ontario.
- In 2023, emerald ash borer mortality was mapped in Northeast Region and further damage and mortality were observed in Southern Region.

Regional summary

Northeast

- In Sault Ste. Marie Blind River District, 161 ha of emerald ash borer ash mortality were mapped by the southwest side of the City of Sault Ste Marie in Aweres and Korah townships, southeast Laird Twp at the west end of Calabogie Road, and on the west side of St. Joseph Island in St. Joseph Twp, northwest of Kentvale. Emerald ash borer damage was also observed during ground surveys in Batchewana Bay Provincial Park on smaller white ash along the beach. The trees were in slight decline with epicormic shoots at their bases. This sighting is the most northerly for Sault Ste Marie Blind River District.
- In Sudbury District, 30 ha of emerald ash borer mortality were mapped southwest of Meldrum Bay on the west edge of Manitoulin Island. Severe emerald ash borer was also observed along River Road E. near Massey. Signs and symptoms continued west along this road and included crown dieback, epicormic shoots, and woodpecker damage.

Southern

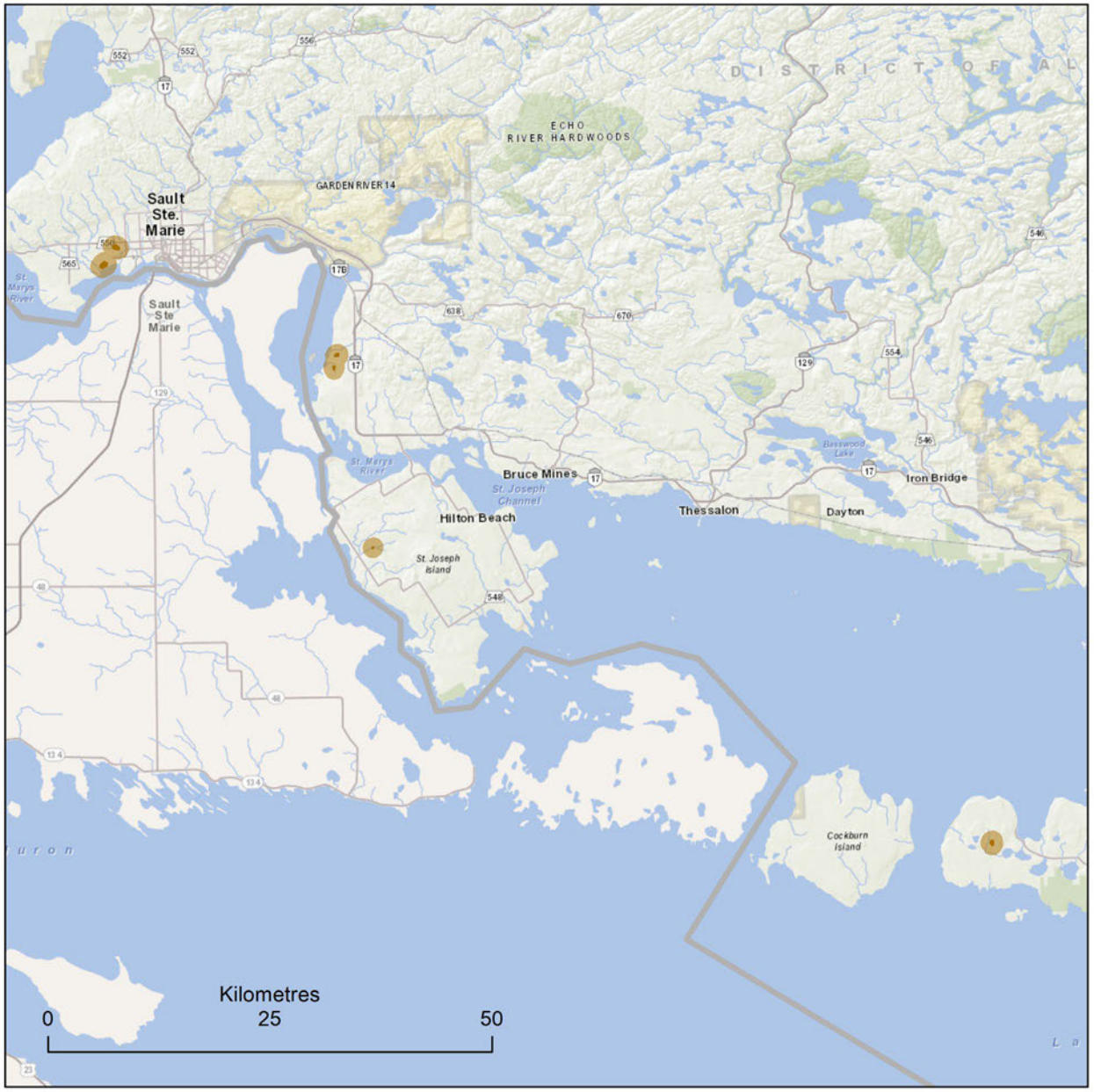
- In Kemptville Kingston District, severe emerald ash borer damage and mortality was observed on Zealand Road, northeast of Maberly. Signs and symptoms included woodpecker damage, epicormic shoots, and characteristic serpentine galleries. Emerald ash borer mortality was also observed nearby on Willis-Armstrong and Clarendon roads on the north side of Silver Lake. Declining ash was observed from Lavant Station to Joes Lake and eastward to Hwy 511 in the Lanark Highlands.
- In Minden Parry Sound Bracebridge District, severe emerald ash borer damage was observed along Hwy 529A, Pointe Au Baril, and Rosseau View Boulevard, Rosseau. Signs and symptoms observed at and near both sites included crown dieback, epicormic shoots, and woodpecker damage.

Emerald ash borer 2023

Areas in Ontario where emerald ash borer caused mortality

Mortality = 192 ha

Area of mortality



Forest tent caterpillar

Pest information

Common name:	Forest tent caterpillar
Scientific name:	*Malacosma disstria* Hbn.
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	Various deciduous species
Infestation area:	407,188 ha

Provincial key facts

- On average in Ontario, forest tent caterpillar outbreaks have occurred every ten to twelve years, with each outbreak continuing for three to five years.
- In the south, forest tent caterpillar feed primarily on sugar maple and oak, and in the north this pest is found mostly on trembling aspen but also feeds on several other deciduous species.
- In 2023, 407,188 ha of moderate to severe defoliation were aerially mapped in Northeast and Northwest regions, with forest tent caterpillar in Southern Region detected during ground surveys.

Regional summary

Northwest

- In Nipigon Geraldton District, 72,048 ha of defoliation were aerially mapped with most concentrated in the northwest and central parts of the district. Substantial areas were mapped from Orient Bay and McDiarmid on the east side of Lake Nipigon, east to the Geraldton area, with the most severe defoliation near the Beardmore and Jellicoe areas. Damage occurred from a few kilometres north of Highway 17 near Beatty, Watson, and Wildgoose Lakes to south of Highway 17, as far as Trapnarrows Lake and Lake Jean. A few very isolated areas were mapped as far north as Ara and Meta Lakes. Only sparse pockets of defoliation were mapped between Geraldton and Longlac. East of Longlac, defoliation was very sparse but two notable areas were mapped, one northeast of Caramat and one southeast of Chipman Lake.

- In Thunder Bay Ignace District, 16,635 ha of defoliation were mapped primarily in the southeast area of the district north of Hwy 11 and Hwy 17. Other areas were scattered north and northeast of the City of Thunder

Bay from Dog Lake to Black Sturgeon River near Nipigon, with the most severe defoliation near the Greenwich Lake and Wolfpup Lake areas. A few smaller areas of defoliation were mapped to the southwest of Thunder Bay near Fallingsnow Lake. Isolated reports about defoliation of boulevard trees were noted in the City of Thunder Bay.

- In Dryden Fort Frances Atikokan District, 344 ha of moderate to severe forest tent caterpillar defoliation were recorded. East near English River and the north shore of Sowden Lake, three patches of moderate defoliation were mapped. Most defoliation was along parts of the Revel River system, Highway 17, and south along Highway 622 to Bending Creek. Defoliation was also evident east of Dinorwic and west of Melgund Creek with a 10-kilometre swath alongside the Canadian Pacific Railway. Two small areas of light defoliation were also mapped south and west of Ignace.

- In Red Lake Sioux Lookout District, about 5 ha of moderate to severe defoliation were aerially mapped on a small island in the northeast bay of Trout Lake, northeast of Red Lake.

Northeast

- In Hearst Cochrane Kapuskasing District, 193,810 ha of moderate to severe defoliation were aerially mapped. Most of the defoliation was recorded in the western part of the district. Defoliation was mapped from Moonbeam to Calstock along Hwy 11, with the largest area of defoliation between Opasatika and Mattice. From Mattice the infestation continued south with a large area of defoliation from the northern tip of Brunswick Lake, continuing east to Opasatika Lake, and then northeast towards the Town of Opasatika. In the eastern part of the district, larger areas of defoliation were recorded southwest of Iroquois Falls towards Frederick House Lake, from Nellie Lake to north of Hwy 652 in Kennedy Township, north of Cochrane to Inglis Township, and southeast of Greenwater Provincial Park to O'Malley Lake. Small, isolated areas of defoliation were also recorded along Hwy 634 near Fraserdale, northwest of Lake Abitibi, and southeast of the Hicks-Oke Bog Provincial Nature Reserve in the townships of Aitken, Fortune, and Montcalm.

- In Timmins Kirkland Lake District, 103,388 ha of moderate to severe defoliation were aerially mapped. In the western part of the district a large swath of defoliation was recorded along Hwy 101 from Horwood Lake northeast to Frederick House Lake. Smaller pockets of defoliation in the central part of the district were recorded from Gogama to Ferris Lake in the township of Mond. One small area of defoliation was recorded in the southwestern part of the district west of Hwy 144 along the East Spanish River in the townships of Chalet and Paudash. Defoliation was also mapped along Hwy 101 near Matheson heading south along Hwy 11 to Ramore and Sesekinika Lake. Other areas with substantial defoliation included Hwy 66 just east of King Kirkland to Virginiatown and the Quebec border. Scattered areas of defoliation were evident near Watabeag Lake, Thornloe, Englehart, and West of Charlton along Hwy 560.

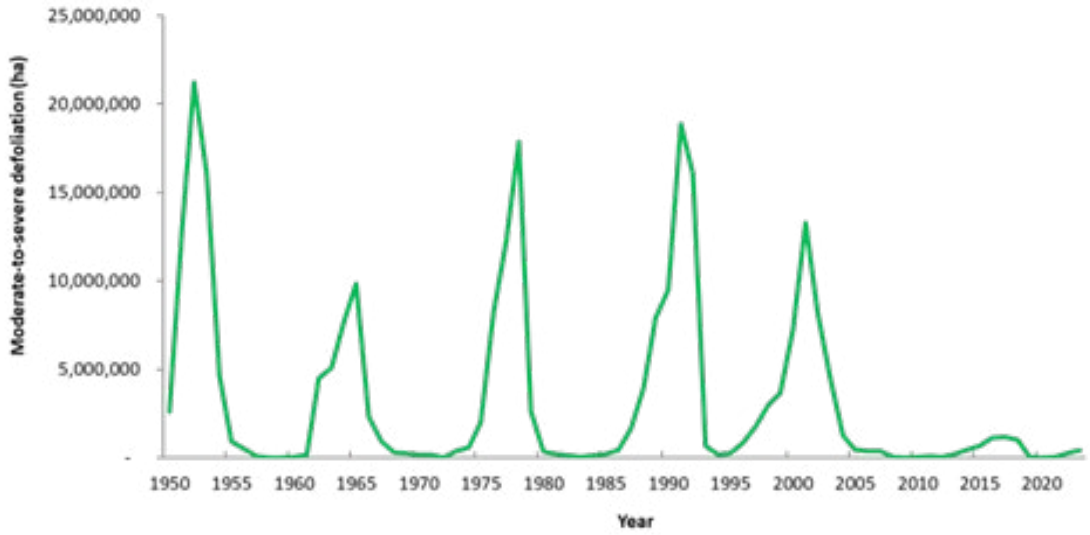
- In Chapleau Wawa District, moderate to severe defoliation was mapped in the eastern part of the district and concentrated around the town of Foleyet. Defoliation surrounded Ivanhoe Lake with large areas northeast of the lake leading north to the town of Foleyet and to the bottom of Oates Township. Another large area of defoliation was mapped at the northwest corner of Oswald Township. Smaller patches of severe defoliation were mapped eastward to the district border. Another small patch was mapped to the north in the northwest corner of Montcalm township.

- In Sudbury District, 8,369 ha of moderate to severe forest tent caterpillar defoliation were mapped in the City of Greater Sudbury by Val Caron, Val Therese, and Hanmer, as well as on Manitoulin Island around Wikwemikong.

Southern

- In Aylmer Guelph District, trace populations of forest tent caterpillar were reported at two locations in Huron County during ground surveys. Trace defoliation of red oak, trembling aspen, and young white ash trees were observed along Piney Line between the Maitland River and County Road 25 (Blythe Road), west of Auburn (Ashfield-Colborne-Wawanosh Twp). Trace defoliation caused by forest tent caterpillar was also reported on red oak and trembling aspen west of Lakelet at the corner of Toll Gate Line and Huron Bruce Road (Howick Twp).

- In Peterborough Bancroft District, trace forest tent caterpillar defoliation was recorded on red oak saplings in a semi-mature red oak and eastern white pine forest on Hwy 507, south of Catchacoma in Peterborough County.



Area (in hectares) of moderate to severe defoliation caused by forest tent caterpillar in Ontario, 1950–2023.

Total area (in hectares) in which forest tent caterpillar caused moderate to severe defoliation in 2019–2023 by MNRF district.

Region / District	Area of damage (ha) 2019	2020	2021	2022	2023
Northwest					
Dryden Fort Frances Atikokan				772	344
Far North					
Kenora					
Nipigon Geraldton				8,586	72,048
Red Lake Sioux Lookout				24	6
Thunder Bay Ignace				15,106	16,635
Subtotal	0		0	24,487	89,032
Northeast					
Chapleau Wawa			220	5,142	12,588
Hearst Cochrane Kapuskasing	30,202		29,257	132,870	193,810
North Bay	69				
Sault Ste Marie Blind River	50				
Sudbury	3,073		5,893	7,287	8,370
Timmins Kirkland Lake			1,556	91,469	103,388
Subtotal	33,393		36,926	236,768	318,156
Southern					
Aurora Midhurst Owen Sound					
Aylmer Guelph					
Kemptville Kingston					
Minden Parry Sound Bracebridge	95				
Pembroke					
Peterborough Bancroft					
Subtotal	95		0	0	0
Provincial total	33,488		36,926	261,255	407,188

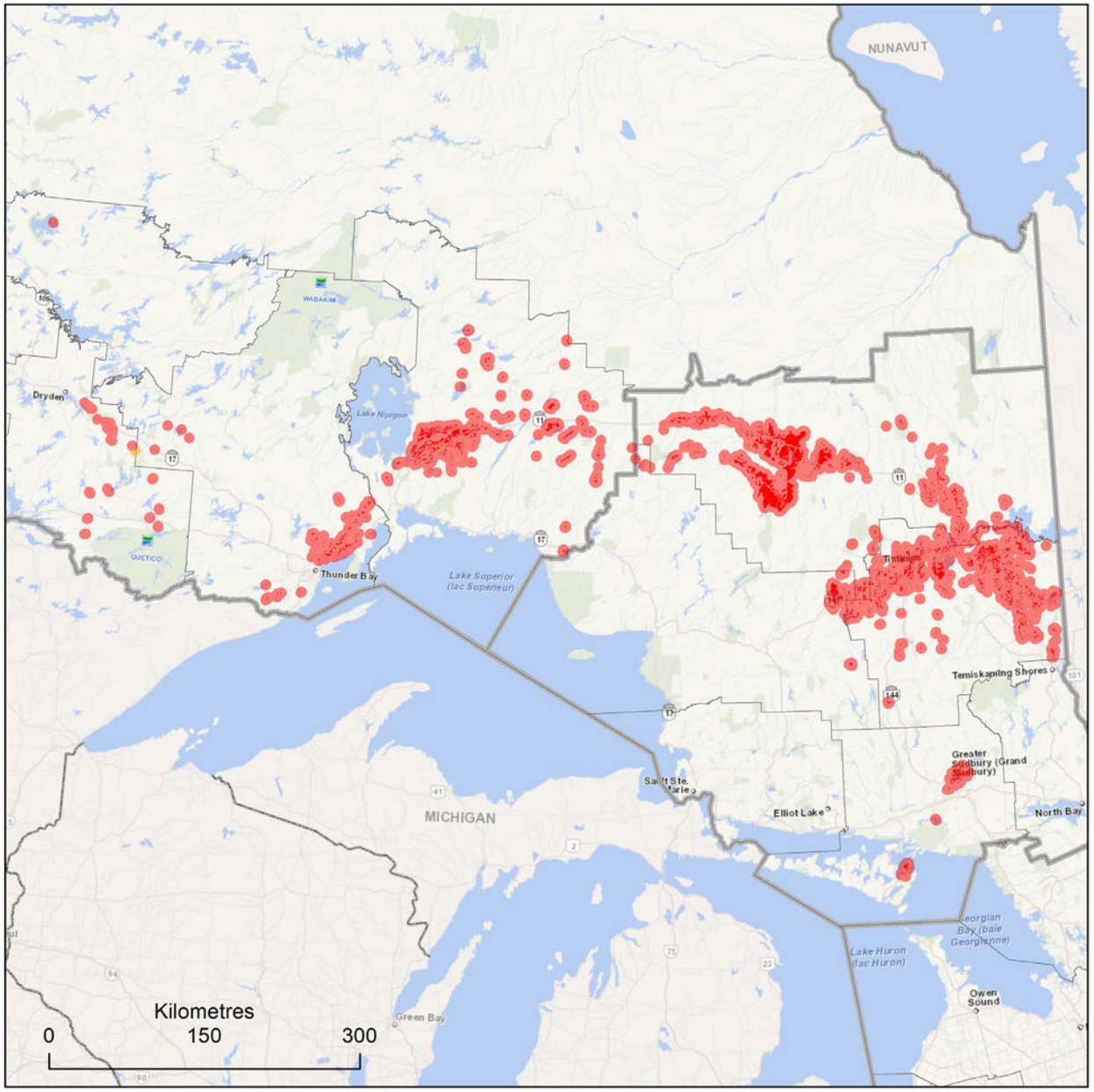
Forest tent caterpillar 2023

Areas in Ontario where forest tent caterpillar caused defoliation

Light = 31 ha
Moderate to severe = 407,188 ha

Area of light defoliation

Area of moderate to severe defoliation



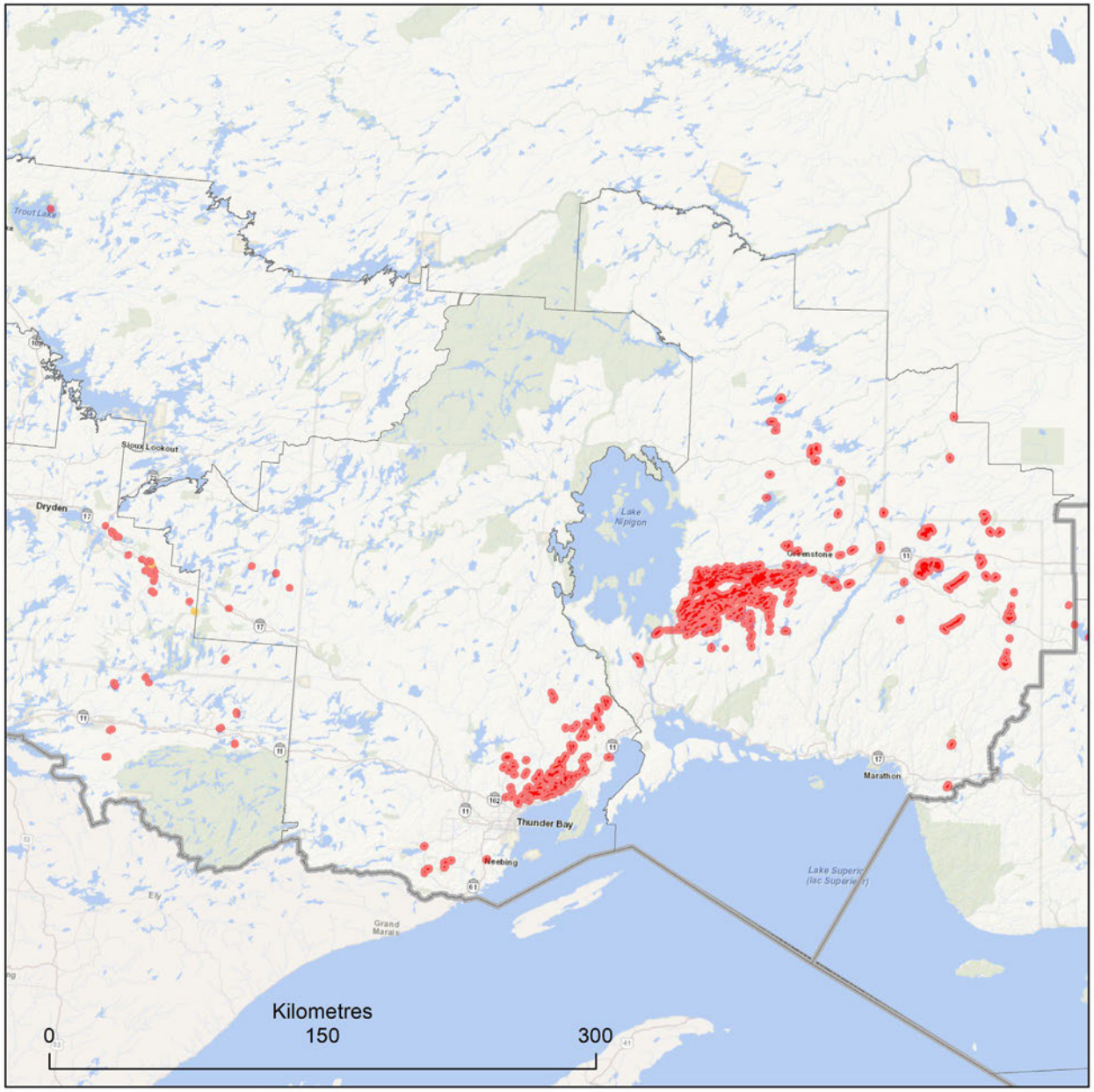
Forest tent caterpillar 2023

Areas in the Northwest Region where forest tent caterpillar caused defoliation

Light = 31 ha
Moderate to severe = 89,032 ha

Area of light defoliation

Area of moderate to severe defoliation



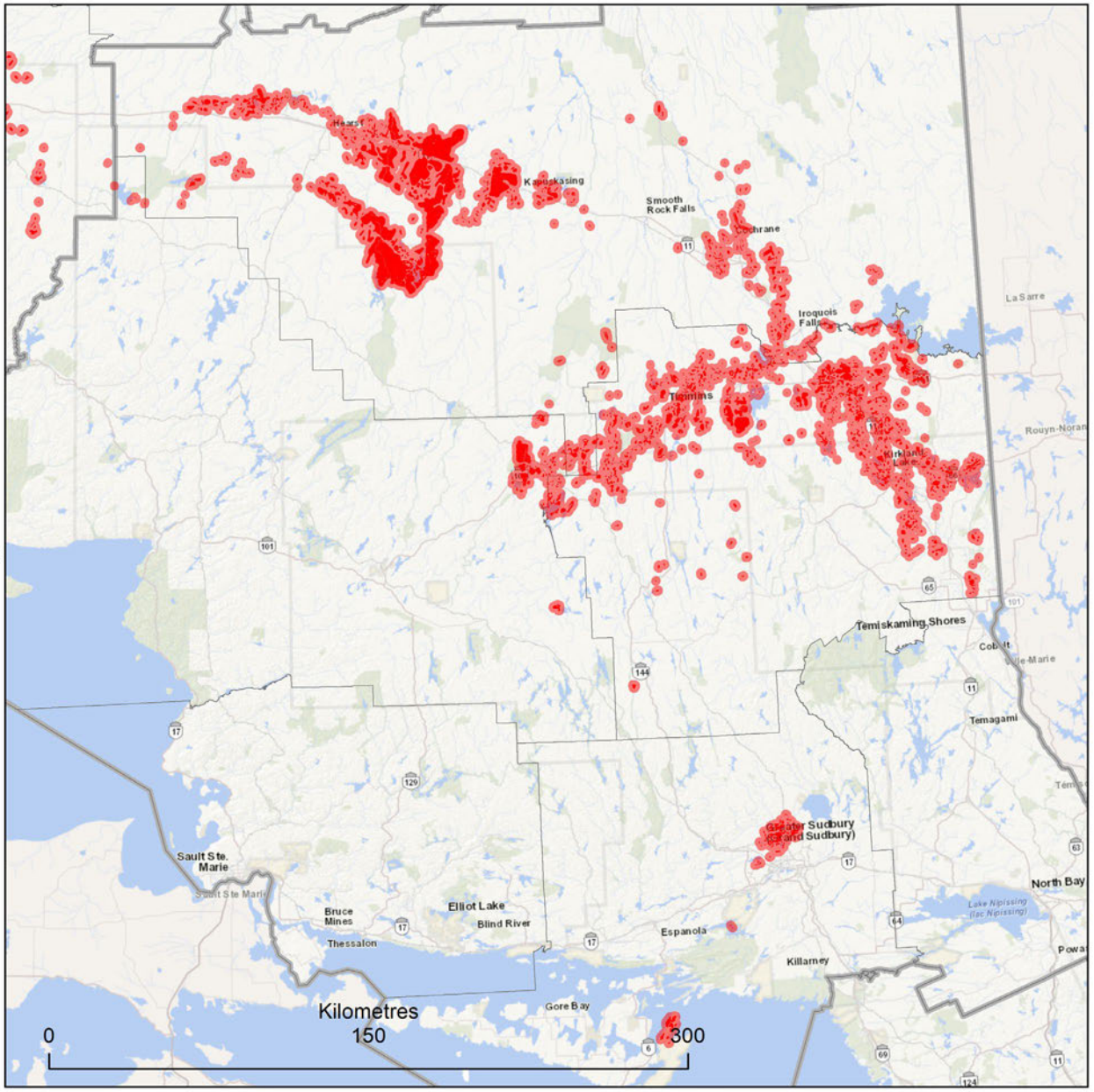
Forest tent caterpillar 2023

Areas in the Northeast Region where forest tent caterpillar caused defoliation

Moderate to severe = 318,156 ha

Area of light defoliation

Area of moderate to severe defoliation



Frost damage

Pest information

Common name:	Frost damage
Scientific name:	NA
Pest origin:	NA
Pest type:	Abiotic
Host species (Ontario 2023):	Oak, poplar, balsam fir, red maple, silver maple, ash species
Infestation area:	Localized

Provincial key facts

- Frost can be damaging to new conifer shoots and emerging or flushed hardwood leaves.
- Heavier frost damage is encountered in low lying areas causing newly emerged conifer shoots to droop and turn red and hardwood leaves to curl and turn black.
- In 2023, due to a late May frost event, frost damage was reported in Northeast and Southern regions, especially on red oak trees.

Regional summary

Northeast

- In North Bay District, a late May frost resulted in damage on newly emerged red oak leaves and shoots across the district. Concentrated areas of frost damage included the Restoule area and Klock's Road east of Mattawa. The new shoots and leaves had shrivelled and new leaves reflushed by mid-June. Some inner leaves were only partially damaged. All sizes and canopy classes of red oaks were affected.

- In Sudbury District, the late May frost affected red oaks across the southern edge of the district, most notably on Manitoulin Island.

Southern

- In Pembroke District, severe frost damage was observed throughout northern areas of Algonquin Park where it affected all age classes of red oaks. Concentrated areas of oak trees appeared pink on hillsides as the leaves began to reflush along Brent Road and the shores of Cedar Lake in late May. Frost damage to red oak was intermittent and moderate along Baron Canyon Road from Hwy 26 to Lake Traverse and along Basin Depot Road. In Renfrew County, severe frost damage was observed on red oaks from the southwest corner of Brudenell-Lyndoch-Raglan Twp to Head-Clara-Maria Twp. The damage was intermittent following the distribution of red oaks and increasing in severity in more exposed areas such as forest edges and high ridges throughout Madawaska Valley, Greater Madawaska, Griffith Uplands, the Opeongo Hills, and Calabogie Highlands. Severe frost damage increased with higher latitudes in Laurentian Hills Twp and Head-Clara-Maria Twp. Damage was also observed in Bonnechere Valley Twp along Hwy 41 from the south end of the township to the north end of Eganville. New leaves of red oaks were blackened by frost, then dried and shrivelled.

- In Kemptville Kingston District, severe frost damage was observed after a late May frost. Red oak was most affected. Young red oak leaves were darkened, dry, and shrivelled from the frost causing the trees to reflush in mid-June. Bur oak was also affected with moderate to severe frost damage in some locations. Other species including ash, poplar, balsam fir and maple had occasional light to moderate frost damage. Light frost damage to young poplar species, red and silver maple keys, and ash trees were also observed. Intermittent frost damage was also observed on red oak and ash species throughout Prescott-Russell, Stormont, Glengarry, and Dundas counties, especially from Alexandria to Cornwall. In Lanark Highlands Twp., light to severe frost damage was observed on many of the red and bur oaks. Light frost damage was observed on new shoots of balsam fir on Black Creek Road, east of Lavant Station in Lanark Highlands Twp. All age classes of balsam fir were affected.

- In Peterborough Bancroft District, widespread intermittent frost damage followed a late May frost. Red oaks of all age classes were damaged north of Hwy 7, in North Kawartha Twp along Hwy 28 from Burleigh Falls to north of Apsley, and east of Apsley toward Wollaston Twp along Hwy 620. Symptoms included shrivelled brown leaves and shoots on new growth, and a re-flush of pinkish-red leaves by early to mid June.

- In Aylmer Guelph District, a frost event caused intermittent damage to red, white, and black oaks in parts of Pinery Provincial Park near Grand Bend. Severe damage appeared on understory oaks and in the lower crowns of overstory oaks. Areas most severely affected were around Chalet parking lot and along Heritage Trail. Symptoms included brown, shrivelled shoots and leaves. By late June, affected trees had reflushed new leaves and the damage was less visible.

- In Minden Parry Sound Bracebridge District, a late May frost resulted in damage on newly emerged red oak leaves and shoots across the district. The new shoots and leaves had shrivelled and new leaves reflushed by mid-June. Some inner leaves were only partially damaged. All sizes and canopy classes of red oaks were affected.

Hemlock woolly adelgid

Pest information

Common name:	Hemlock woolly adelgid
Scientific name:	*Adelges tsugae* (Annand)
Pest origin:	Invasive — native to Asia
Pest type:	Sap-sucking insect
Host species (Ontario 2023):	Eastern hemlock
Infestation area:	Localized

Provincial key facts

- In Canada, populations of hemlock woolly adelgid are established in British Columbia, Nova Scotia, and Ontario.
- In Ontario, hemlock woolly adelgid was first found in Etobicoke, near Toronto, in 2012 on five ornamental trees. In 2013, the Canadian Food Inspection Agency (CFIA) detected an infestation during pest-specific surveys in the Niagara Gorge near Niagara Falls. The pest was again detected by the CFIA during surveys in 2019 in the Niagara Gorge and in a forested area near Wainfleet, Niagara Region. CFIA confirmed the presence of hemlock woolly adelgid in Fort Erie, also in Niagara Region in 2021, and in the town of Pelham (Niagara Region) and Grafton in Northumberland County in 2022.
- The insect has two generations per year in Canada, and is dispersed naturally by wind, birds, and mammals. It can also be spread by human movement of nursery stock and other wood products such as firewood.
- Feeding damage causes branch, twig, bud, and shoot dieback and leads to premature needle loss and eventual tree mortality.
- In 2023, the CFIA confirmed the presence of hemlock woolly adelgid in three new locations outside the regulated areas in Southern Region.

Regional summary

Southern

- In 2023, the Canadian Food Inspection Agency confirmed three new detections of hemlock woolly adelgid at locations in Hamilton, Haldimand County, and Lincoln (Niagara Region). These detections are outside current regulated areas for this invasive pest, which include the city of Niagara Falls, the town of Fort Erie, and the township of Wainfleet.

Trend analysis/outlook/issues

MNRF forest health field staff have been trained in survey protocols and procedures for detecting hemlock woolly adelgid. The ministry will continue to collaborate with federal partners in both the CFIA and Natural Resources Canada-Canadian Forest Service to support related survey and scientific initiatives.

In 2023, the Forest Health program supported hemlock woolly adelgid phenology research led by researchers at the Canadian Forest Service. The goal of this research is to better understand the life cycle of hemlock woolly adelgid at two known infested sites in southern Ontario.

Forest health staff also supported a hemlock woolly adelgid environmental DNA (eDNA) project led by MNRF researchers. The goal of this project is to test new detection tools for this pest. Forest health field staff sampled hemlock trees for hemlock woolly adelgid eDNA from 44 sites across southern and northeastern Ontario, including some high-risk sites near known infestations and near the U.S. border. Hemlock branches were collected and eDNA was extracted using an eDNA sampler in the field at the lab in Sault Ste. Marie. Testing is ongoing. To date, adelgid eDNA was detected at one location in the Niagara Region.

Hemlock Woolly Adelgid in Ontario

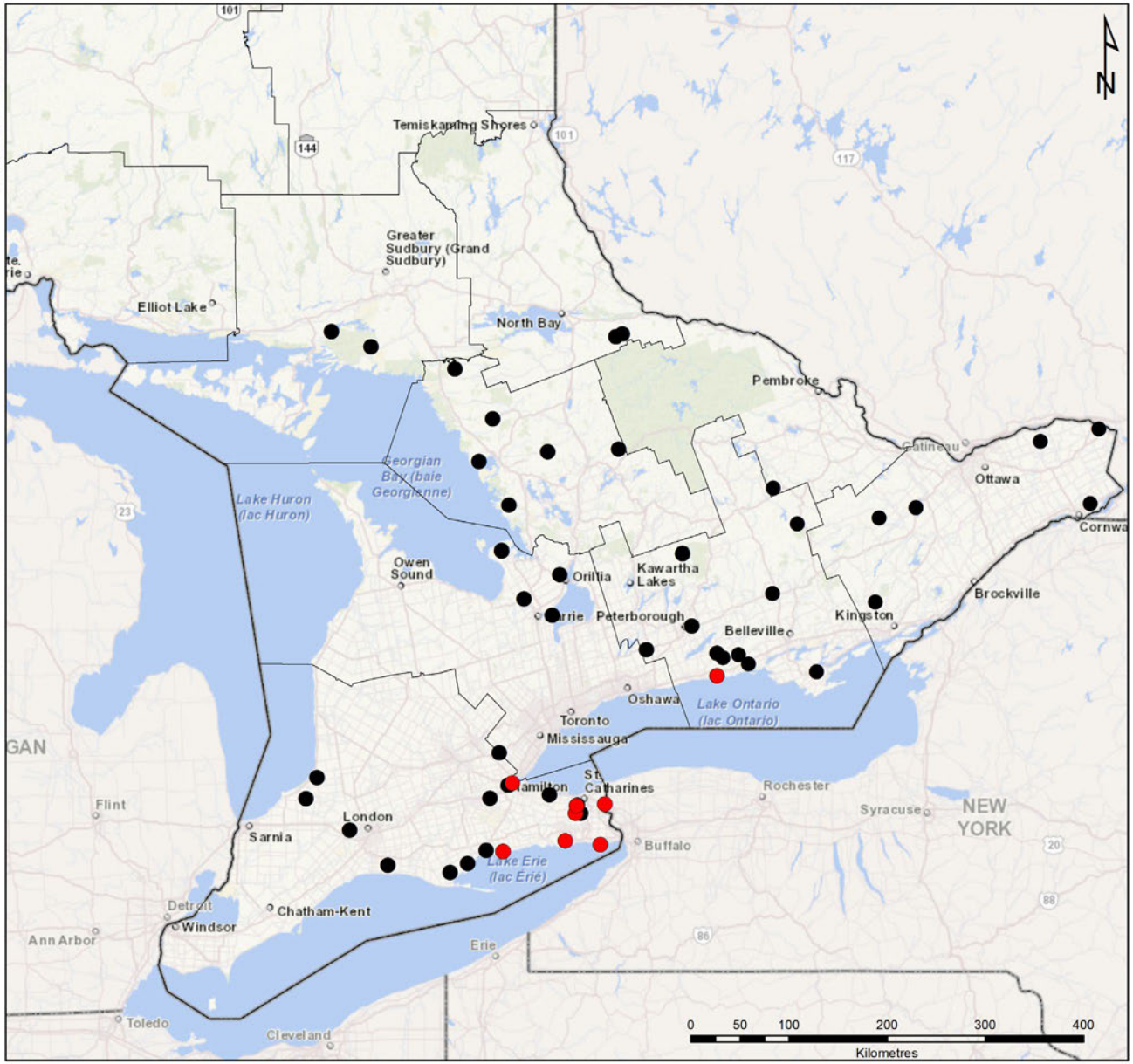
- Known presence
- 2023 eDNA sample location

Produced by:
Biodiversity and Monitoring Section
Ministry of Natural Resources and Forestry

Sources:
Base Data: MNRF LIO
Projection: Transverse Mercator
Datum: NAD 83

Published Jan 2024

Ontario



Ice damage

Pest information

Common name:	Ice damage
Scientific name:	NA
Pest origin:	NA
Pest type:	Abiotic
Host species (Ontario 2023):	Various
Infestation area:	255 ha

Provincial key facts

- Ice damage, which is any damage to trees from freezing rain or extreme cold weather events, is part of natural forest processes. The frequency of these events continues to be sporadic and damage is highly variable in extent and severity.
- In 2023, ice damage from a November 2022 ice storm event was mapped in Northeast Region.

Regional summary

Northeast

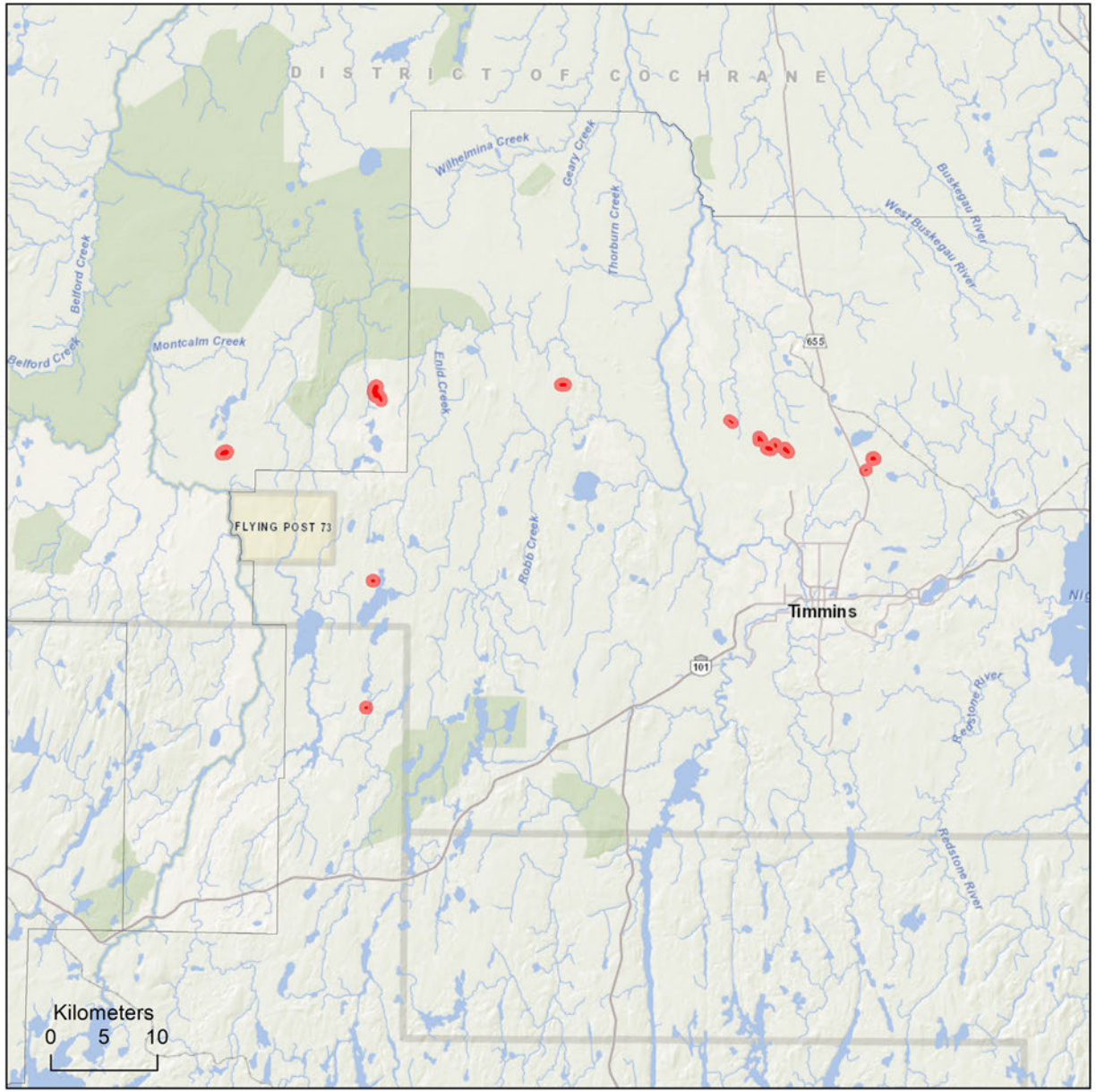
- In Timmins Kirkland Lake District, 144 ha of ice damage were mapped in the northwest corner of the district, north of Hwy 101. The largest area of damage was recorded in Jessop Township, north of Timmins. This ice storm event occurred in November 2022.
- In Hearst Cochrane Kapuskasing District, 111 ha of ice damage were mapped in the southern part of the district in the townships of Fortune and Montcalm, south of the Hicks-Oke Bog Provincial Nature Reserve. This damage was also caused by the November 2022 ice storm.

Ice Damage 2023

Areas in Ontario where ice caused damage

Moderate to severe = 255 ha

Area of moderate to severe damage



Jack pine budworm

Pest information

Common name:	Jack pine budworm
Scientific name:	*Choristoneura pinus pinus* Freeman
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	Jack pine
Infestation area:	45,294 ha of moderate to severe defoliation, 11,924 ha of light defoliation, 5,509 ha of mortality

Provincial key facts

- Jack pine budworm outbreaks occur in Ontario about every eight to ten years.
- In Ontario, broad-scale control programs have been undertaken to protect high value jack pine stands during an outbreak, with the most recent one carried out in 2021 in Northwest Region.
- For the fourth consecutive year, the area of moderate to severe jack pine budworm defoliation has decreased in Ontario. In 2023, 45,294 ha of moderate to severe defoliation were aerially mapped. Of that, most was mapped in Northwest Region with a small area in Northeast Region. In addition, 5,509 ha of jack pine mortality were aerially mapped in Northwest Region.

Regional summary

Northwest

- In Kenora District, 18,057 ha of moderate to severe defoliation and 4,016 ha of light defoliation were mapped. Small to medium areas of jack pine budworm defoliation were detected throughout the entire district during aerial surveys. In the southern part of the district, large areas of defoliation were detected on Bigsby and Big islands, on the Aulneau Peninsula, northeast of Shoal Lake, and in Eagle-Dogtooth Provincial Park. Small to medium areas of defoliation were recorded north of Hwy 17, with larger areas of defoliation in the central part of the district east of Hwy 658 between Silver Lake and Lount Lake, southeast of Maynard Lake, and surrounding Big Canon Lake southeast of Grassy Narrows. In addition, 1,976 ha of jack pine mortality were recorded in areas north of Hwy 17 in the northern part of the district. Notable locations include northeast of Caribou Falls, west and east of Maynard Lake, south of Lount and Little Fox lakes, and northeast of Clay Lake.

- In Red Lake Sioux Lookout District, 11,504 ha of moderate to severe defoliation and 4,105 ha of light defoliation were mapped. Large areas of defoliation were mapped in the western part of the district near Trout Lake, including the Trout Lake Provincial Nature Reserve and south of Little Trout Lake. Moderate to severe defoliation was also mapped in Pakwash Provincial Park with smaller areas of defoliation found northwest of the park towards Bug River and the eastern boundary of Woodland Caribou Provincial Park around Pipestone Bay. Small areas of defoliation were scattered in the eastern part of the district towards the Thunder Bay Ignace District boundary. In 2023, 11,504 ha of mortality were mapped. In the western part of the district, large areas of mortality were detected near Trout Lake, in and around Pakwash Provincial Park, and southeast of Hatchet Lake in Woodland Caribou Provincial Park. In the central part of the district, mortality was mapped east of Uchi Lake just west of the Wenasaga River. In the eastern part of the district, mortality was recorded northeast of Snelgrove Lake, northeast of Clamshell Lake, south of Holger Lake, east of Tully Lake, north of Kashaweogama Lake, and east of Root Lake from the Root River northward to Roadhouse River.

- In Dryden Fort Frances Atikokan District, 2,183 ha of moderate to severe defoliation and 2,989 ha of light defoliation were mapped. Small, scattered areas of moderate to severe defoliation were mapped throughout much of the district, with high severity areas mapped between Eagle-Dogtooth Provincial Park and Winnange Lake Provincial Park in the western part of the district. Moderate to severe defoliation was also mapped in the central part of the district in areas south of Dryden between Eagle and Wabigoon lakes extending south to Hwy 11. In the eastern part of the district, defoliation was mapped northwest of Turtle River-White Otter Lake Provincial Park heading towards Hwy 17. In the northern part of the district, small scattered areas of defoliation were mapped north of Hwy 17. Small areas of light defoliation were also mapped in Quetico Provincial Park. In 2023, 922 ha of mortality were recorded in the district and mapped in Turtle River-White Lake Otter Lake Provincial Park, along Hwy 17 from Borups Corners to Butler, west of Gullwing Lake, and near Blue Lake Provincial Park.

- In Thunder Bay Ignace District, 664 ha of moderate to severe defoliation and 813 ha of light defoliation were mapped. Most defoliation was recorded in the western part of the district, south of Barrel Lake extending south on the eastern side of Sandbark Lake Provincial Park, beyond Hwy 17 to Kay Lake and areas along Reba River to Hwy 17. In the southeast part of the district, one area of moderate to severe defoliation was mapped south of Moosehill, east of Hwy 61 to Loch Lamond. In 2023, 257 ha of mortality were mapped in the western part of the district from Barrel Lake south to areas east of Sandbar Lake Provincial Park and continuing south to Hwy 17 east of Ignace.

- In Nipigon Geraldton District, 20 ha of moderate to severe defoliation were mapped in 2023. One small area of jack pine budworm defoliation was recorded southwest of White Lake along the eastern district border.

- In Far North District, 1 ha of moderate to severe defoliation was mapped northwest of Paishk Creek. In 2023, 482 ha of mortality was mapped in the southwestern corner of the district, east of Linge Lake and Woodland

Caribou Provincial Park in Red Lake Sioux Lookout District.

Northeast

- In Chapleau Wawa District, 12,865 ha of moderate to severe defoliation were aerially mapped in the western part of the district. Large areas of moderate to severe defoliation were detected northeast of Pukaskwa National Park along the shore of the East Bremner River. Defoliation continued northeast towards Kwinkwaga Lake, with large areas of defoliation mapped in the townships of Flood, Johns, Cecile, and Common. Small areas of defoliation were recorded southeast of White Lake in the townships of Atikameg, Bryant, and McCron. Five areas of defoliation were also detected south of White River Provincial Park, with the largest area in Laberge Twp.

Trend analysis/outlook/issues

Jack pine forest health plots

In the mid-1990s, plots were established in jack pine stands in the northern regions to monitor the effects of jack pine budworm and the overall health of jack pine forests across northern Ontario.

In 2023, 95 plots (45 in Northeast Region, 50 in Northwest Region) comprising 4,750 jack pine trees were assessed. Trees were rated for any pest, disease, or abiotic factors that affect health/condition and the abundance of male flowers.

In Northeast Region, 23 trees in jack pine plots died. Most (65%) of this mortality was caused by armillaria root rot. Blowdown was responsible for 9% of the mortality and sawyer beetles were responsible for 4%. The cause of mortality for the remaining 22% was unidentified.

In Northwest Region, 41 trees in jack pine plots died. Armillaria cause 10% of the mortality, jack pine budworm 7%, blowdown 7%, sawyer beetles 2%, and one tree was cut. The cause of mortality for the remaining 72% was undocumented.

The abundance of male flowers varied between the Northeast and Northwest regions in 2023. In Northeast Region, 74% of live trees had moderate to high numbers of male flowers while the remaining 26% had nil to few. In Northwest Region, 20% of live trees had moderate to high numbers of male flowers while the remaining 80% had nil or few.

In Northwest Region, 44% of the live trees were affected by jack pine budworm. In Northeast Region, jack pine budworm was not observed affecting the trees in the forest health plots.

In addition, some jack pine male flower surveys were not completed in 2023 due to road closures from nearby forest fires and flooding.

Jack pine budworm pheromone trapping

Jack pine budworm pheromone trapping was completed across the province in 2023. Traps were deployed at 76 locations: 39 in the Northwest Region, 28 in the Northeast Region, and 9 in Southern Region.

Southern Region had the highest average number of moths per trap at 64 male moths. The highest average number was at a trap in Minden Parry Sound Bracebridge district with 216 male moths per trap.

In the Northeast Region the average number of male moths per trap was 8. The highest trap count was 110 male moths per trap in Sudbury District. In addition, some traps were not deployed in 2023 due to road restrictions from nearby forest fires.

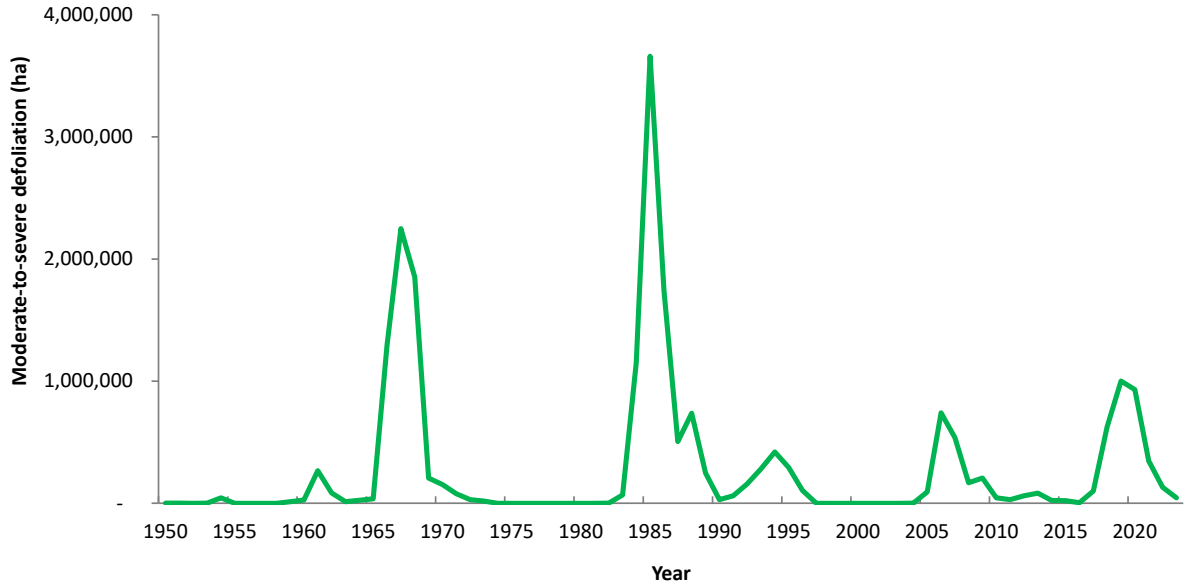
The Northwest Region had the lowest average male moth trap captures per region with 3 male moths per trap. The highest trap count was in Kenora District with an average of 12 male moths per trap.

Jack pine budworm defoliation forecast survey

In Ontario, jack pine budworm defoliation forecasting is based on surveys of the number of overwintering larvae on jack pine branches. Jack pine budworm overwinter as a second instar larva (L2) by encapsulating themselves in silken shelters (hibernacula) under branch scales and bark cracks. Larvae are typically in these shelters from late August until the following spring. This overwintering stage of the lifecycle provides an opportunity to collect branches to extract and count larvae to forecast the potential severity of defoliation for the following year. Defoliation forecasts are used to determine which stands might be considered for protection.

Locations for L2 surveys were selected based on defoliation mapped during the current infestation. From each location, 10 jack pine trees were selected, and a 1 m branch was sampled from the mid- to upper crown of each tree. Branches were sent to a laboratory to be processed in a sodium hydroxide washing procedure used to extract the second instar larvae from their hibernacula. These larvae were then separated from other fine debris using hexane and a separatory funnel and put onto filter papers for microscopic examination. Larvae were counted under a microscope to determine the average number of larvae per branch for each sample location. This average was used to forecast expected jack pine budworm defoliation in 2024.

In Northeast Region, six locations (60 trees) were sampled for overwintering larvae in 2023. All locations were in Chapleau Wawa District. The 2024 forecast for all locations was light defoliation. The highest average number of second instar larvae per branch was 19.



Area (in hectares) of moderate to severe defoliation caused by jack pine budworm in Ontario, 1950–2023.

Total area (in hectares) in which jack pine budworm caused moderate to severe defoliation from 2019 to 2023, by MNRF district.

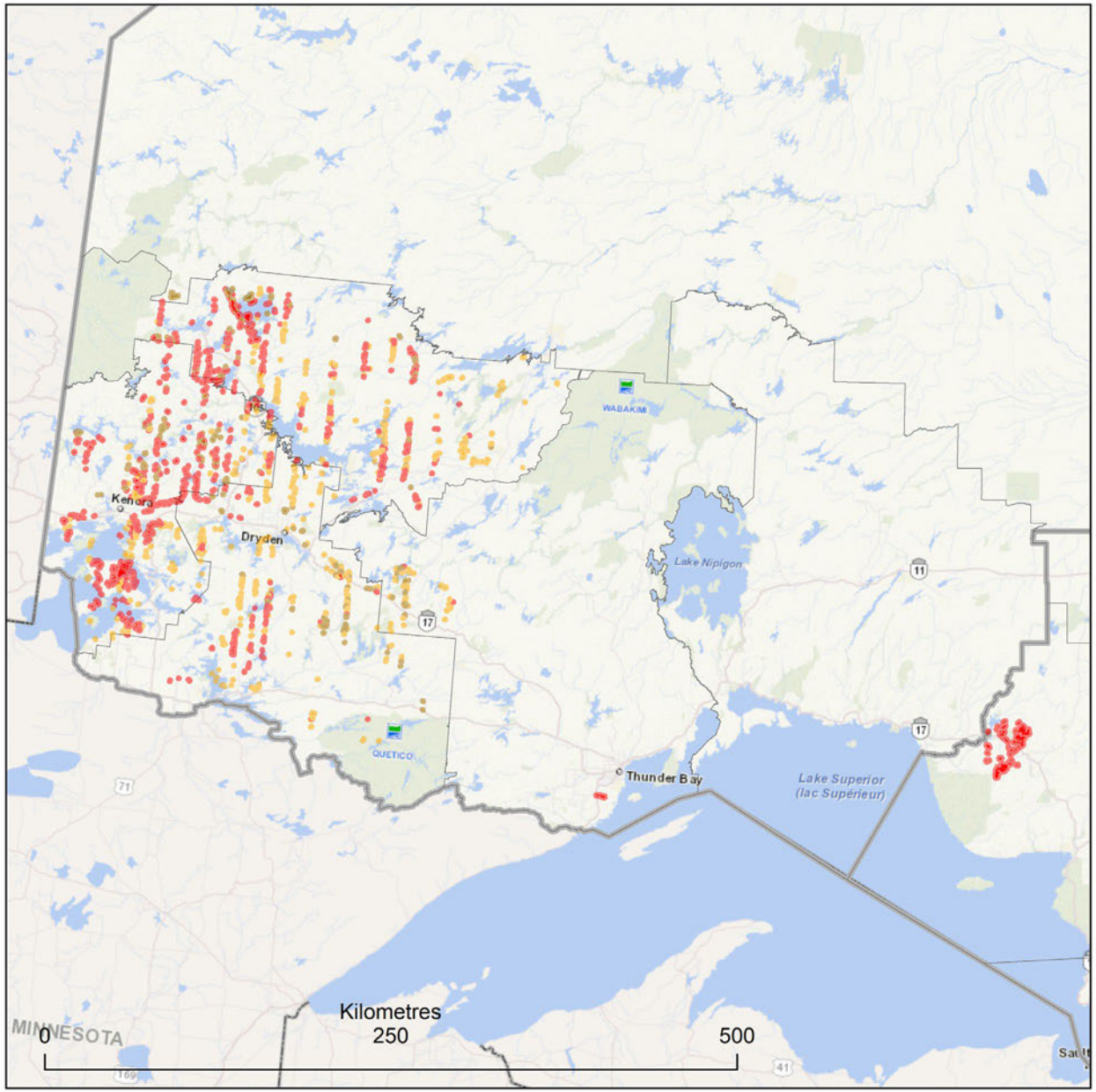
Region	Area of damage (ha)				
District	2019	2020	2021	2022	2023
Northwest					
Dryden Fort Frances Atikokan	101,533	145,005	31,256	23,865	2,183
Far North	433,707	100,609	11,247	38	1
Kenora	122,280	119,631	52,726	2,242	18,057
Nipigon Geraldton			36,064	40,213	20
Red Lake Sioux Lookout	339,910	380,051	43,224	7,617	11,504
Thunder Bay Ignace	3,840	184,338	171,613	46,619	664
Subtotal	1,001,269	929,635	346,129	120,593	32,429
Northeast					
Chapleau Wawa				610	12,865
Hearst Cochrane Kapuskasing				9,470	
North Bay					
Sault Ste Marie Blind River					
Sudbury		128	137		
Timmins Kirkland Lake					
Subtotal	0	128	137	10,081	12,865
Southern					
Aurora Midhurst Owen Sound					
Aylmer Guelph					
Kemptville Kingston					
Minden Parry Sound Bracebridge					
Pembroke					
Peterborough Bancroft					
Subtotal	0	0	0	0	0
Provincial total	1,001,269	929,763	346,266	130,674	45,294

Jack pine budworm 2023

Areas in Ontario where jack pine budworm caused defoliation

Light = 11,924 ha
Moderate to severe = 45,294 ha
Mortality = 5,509 ha

- Area of light defoliation
- Area of moderate to severe defoliation
- Area of mortality

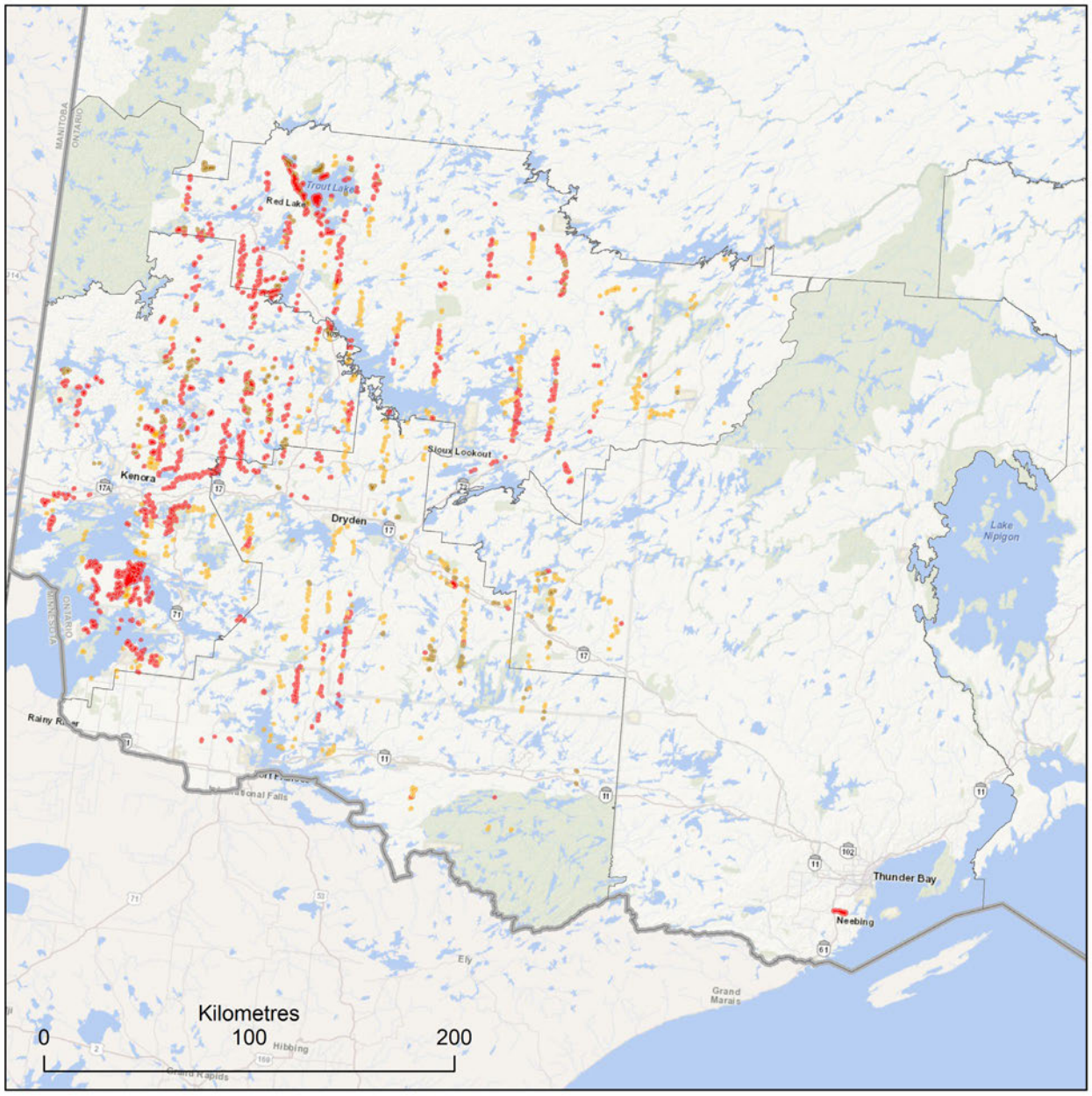


Jack pine budworm 2023

Areas in Northwest Region where jack pine budworm caused defoliation

Light = 11,924 ha
Moderate to severe = 32,429 ha
Mortality = 5,509 ha

- Area of light defoliation
- Area of moderate to severe defoliation
- Area of mortality

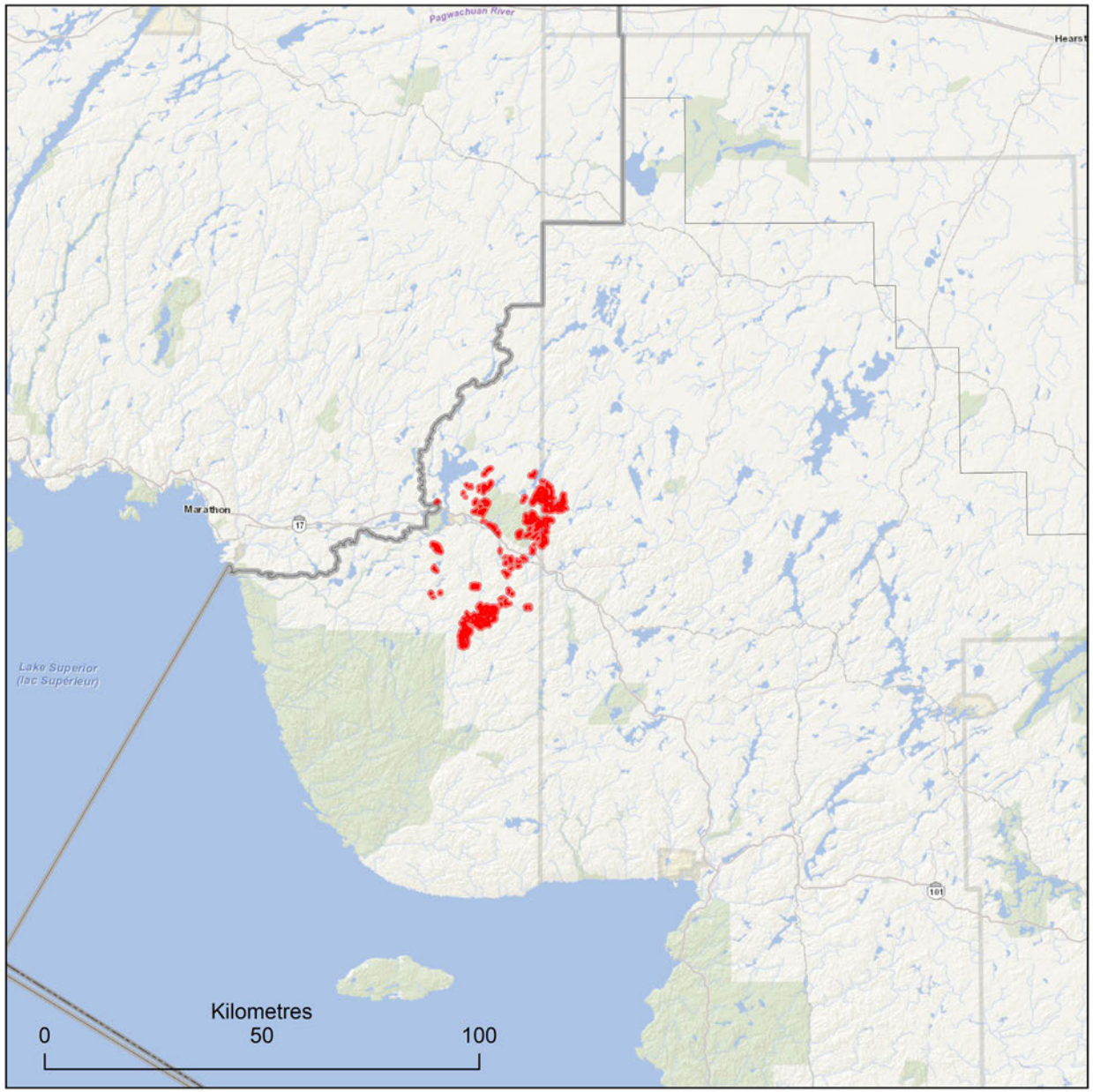


Jack pine budworm 2023

Areas in Northeast Region where jack pine budworm caused defoliation

Moderate to severe = 12,865 ha

Area of moderate to severe defoliation



Jack pine budworm pheromone trapping results 2023

Average number of moths per trap

- < 10
- 10 - 25
- 25 - 50
- 50 - 100
- > 100

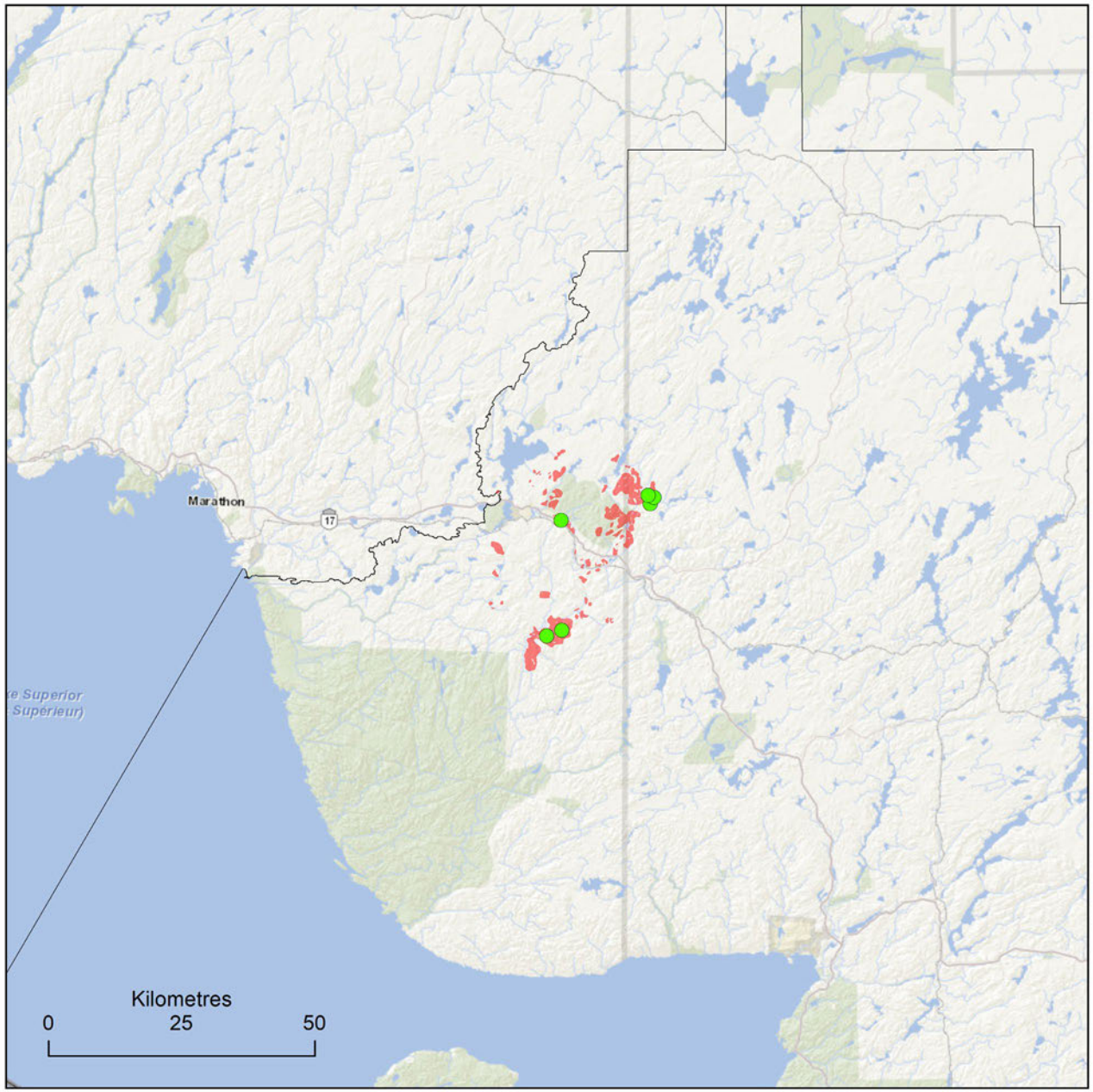
Jack pine budworm second instar larvae survey results

Defoliation forecast 2024

- Light

Jack pine budworm defoliation 2023

- Area of moderate to severe defoliation
- Area of light defoliation
- Area of mortality



Larch casebearer

Pest information

Common name:	Larch casebearer
Scientific name:	*Coleophora laricella* (Hübner)
Pest origin:	Invasive — native to Europe
Pest type:	Defoliator
Host species (Ontario 2023):	European larch, tamarack
Infestation area:	1,217 ha (moderate to severe), 66 ha (light)

Provincial key facts

- Larch casebearer was introduced to North America in Massachusetts in 1886 and was detected in Ontario in 1905. This pest is now found across the range of tamarack and throughout European larch plantations in Ontario.
- Larch casebearer is a serious defoliator of tamarack. In Southern Region, defoliation was last mapped in 2018.
- Since 2019, observations of small populations and resulting defoliation were only detected during ground surveys.
- In 2023, areas of defoliation were mapped in three districts during aerial surveys in Southern Region.

Regional summary

Southern

- In Aurora Midhurst Owen Sound District, 820 ha of moderate to severe and 66 ha of light larch casebearer defoliation were mapped during aerial surveys. In Simcoe County, large areas of moderate to severe defoliation were aerially mapped in the Minesing Wetland in Springwater Twp. In Grey County, small areas of moderate to severe larch casebearer defoliation were mapped near Bells Lake, and one small area of light defoliation was mapped northeast of Hanover, both in West Grey Twp. In Durham Region, a small area of defoliation was mapped at the south end of Lake Scugog, south of Port Perry in Scugog Twp. During ground surveys, moderate defoliation was recorded on young tamarack at Zephyr Creek Wetlands in Cedarbrae, York Region.
- In Peterborough Bancroft District, 252 ha of moderate to severe larch casebearer defoliation were mapped during aerial surveys between Centre Line Road and Beaver Creek Road north of Marmora, and in several small areas between County Road 40 and County Road 44 in Centre Dummer north of Hwy 7. Smaller areas

of moderate to severe defoliation were mapped on Steeles Road in Victoria Place and Glenarm Road in the Municipality of Kawartha Lakes, County Road 48 near Balsam Lake Provincial Park, and North Baptiste Lake Road south of Maynooth. During ground surveys, moderate defoliation was recorded on North Marmora Road in Marmora, and County Road 46 in Lasswade. Light defoliation was observed on County Road 25 near Griffis Corners, Colborne.

- In Aylmer Guelph District, 146 ha of moderate to severe defoliation of tamarack and European larch were aerially mapped in the northeast section. In Wellington County, three areas of moderate to severe defoliation were aerially mapped between the City of Guelph and Hwy 401 (Puslinch Twp). In Waterloo Region, two small areas of moderate to severe defoliation were aerially mapped northeast of Ayr (North Dumfries Twp) along Cedar Creek. In Oxford County, moderate defoliation was mapped in a small wetland west of Drumbo near Windfall and at a second area along Black Creek near Plattsville in Blandford-Blenheim Twp.
- In Kemptville Kingston District, moderate larch casebearer defoliation was observed during ground surveys on Hwy 8 on young tamaracks on the fringe of a red pine plantation in Larose Forest, south of Bourget in the Municipality of Clarence-Rockland.

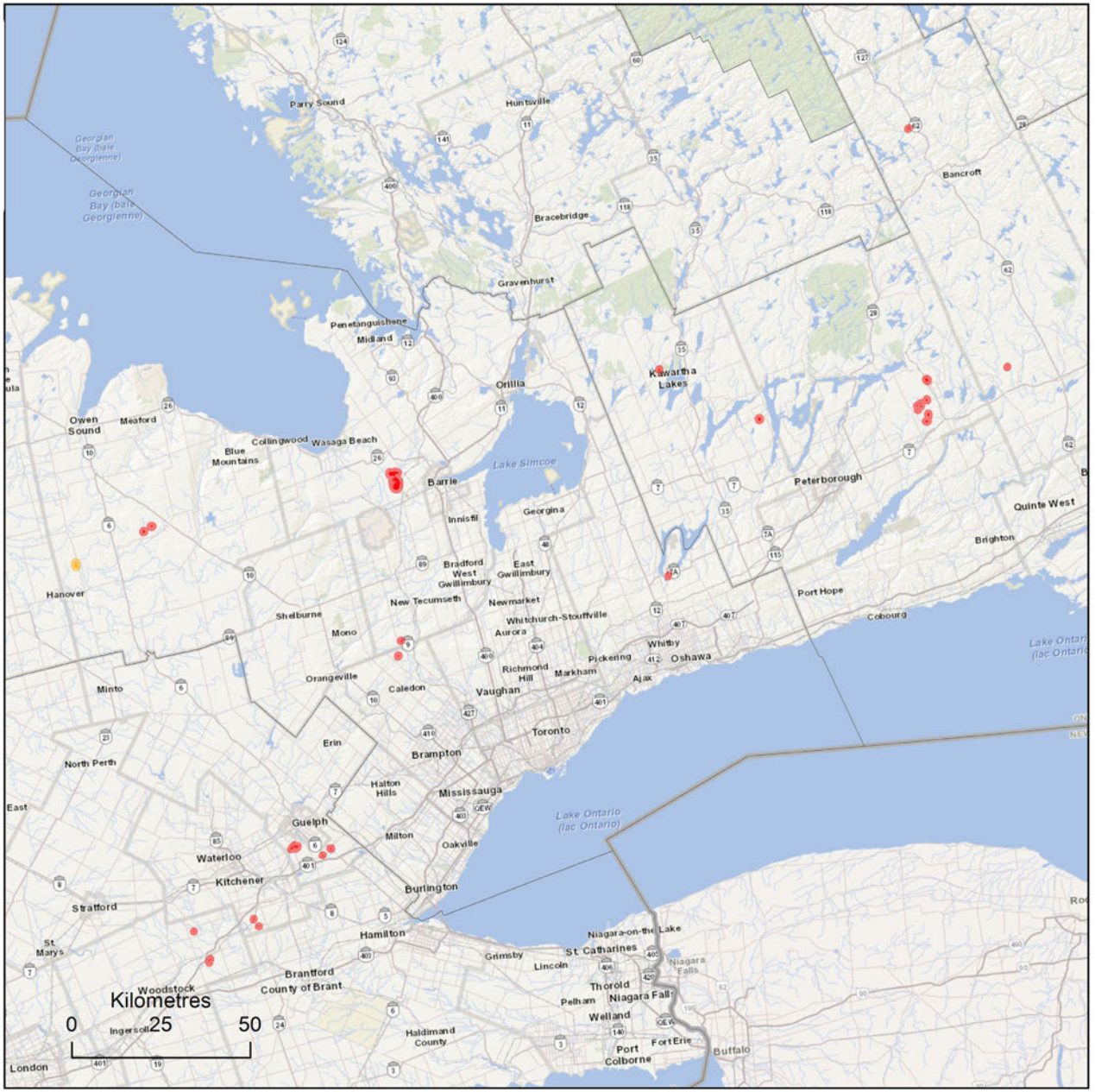
Larch casebearer 2023

Areas in Ontario where larch casebearer caused defoliation

Light = 66 ha
Moderate to severe = 1,217 ha

Area of light defoliation

Area of moderate to severe defoliation



Oak wilt

Pest information

Common name:	Large aspen tortrix
Scientific name:	*Bretziella fagacearum* (Bretz)
Pest origin:	Invasive — unknown
Pest type:	Vascular wilt
Host species (Ontario 2023):	Red oak
Infestation area:	Localized

Provincial key facts

- Oak wilt is a disease caused by an invasive forest pathogen, named *Bretziella fagacearum*. Locally, the disease is spread by insect vectors such as sap beetles (Coleoptera: Nitidulidae) and root grafting. Long distance movement is often the result of people moving oak wilt infected wood.
- Oak wilt poses a risk to all oak species in eastern Canada, especially the red oaks (Quercus section Lobatae).
- Sweet smelling, fungal pressure pads develop on stems and large branches of newly killed trees and cause the bark to crack. Nitidulid beetles crawl through the cracks to feed on the fungus. New infections of oak wilt occur when the beetles transfer fungal spores on their bodies from the pressure pads on infected trees to fresh wounds on uninfected oak trees. Oak wilt pockets develop when the fungus spreads through root grafts from infected to nearby uninfected trees.
- Of the hundreds of species of nitidulid beetles, only a subset has behaviours (flight timing, host preference) that result in oak wilt transmission. Current species of interest are *Carpophilus sayi* and *Colopterus truncatus*, since they are known vectors for oak wilt in the United States.
- Current efforts are focused on early detection and prevention of oak wilt establishment by developing best management practices and pruning guidelines.
- In June 2023, the Canadian Food Inspection Agency confirmed the first detection of oak wilt in Canada in the City of Niagara Falls in southern Ontario.

Regional summary

Southern

- In June, the Canadian Food Inspection Agency confirmed oak wilt at a residential property in the City of Niagara Falls, making it the first known occurrence of the disease in Canada. Other detections were confirmed shortly after at a residential property in the Township of Springwater, near Barrie, and at an institutional property in the Town of Niagara on the Lake.

Trend analysis/outlook/issues

- Research efforts to better understand nitidulid beetle vectors continued in 2023.
- In 2021, results from a three-year study in Ontario, New Brunswick, and Manitoba showed that oaks in central and eastern Canada were most at risk of oak wilt infection between April and end of July. This determination was made using the flight patterns of the two most common beetle vectors.
- In 2022, oak trees were wounded at five locations in Sault Ste. Marie on a weekly basis between April and August to determine when beetles were attracted to oak wounds. This work showed that beetles rarely visited wounds before bud break and was repeated by collaborators in New Brunswick, Manitoba, and Michigan, which showed similar results.
- In 2023, oaks were wounded in southern and northern Ontario and New Brunswick and before, during, and after bud break. The wounding yielded 120 beetles representing 12 species. Species that visited wounds most often were *Carpophilus sayi*, *Epuraea avara*, and *Glischrochilus sanguinolentus*. Only one beetle, a species rarely detected in Canada, visited wounds before budbreak which supports further narrowing of the high-risk period. This study will be repeated in northern Ontario in 2024.
- Baited traps were deployed near the confirmed oak wilt detection sites in Niagara Falls and Midhurst (Springwater Twp) to determine species of sap beetles in the area. Insects from these traps are also being tested for the pathogen.

Nitidulid beetle flight trap and wounding locations 2023

Nitidulid beetle monitoring locations

- Flight trap and tree wounding location
- Flight trap location
- Confirmed presence

Satin moth

Pest information

Common name:	Satin moth
Scientific name:	*Leucoma salicis* (L.)
Pest origin:	Invasive — native to Europe and Asia
Pest type:	Defoliator
Host species (Ontario 2023):	Populus spp.
Infestation area:	4,766 ha

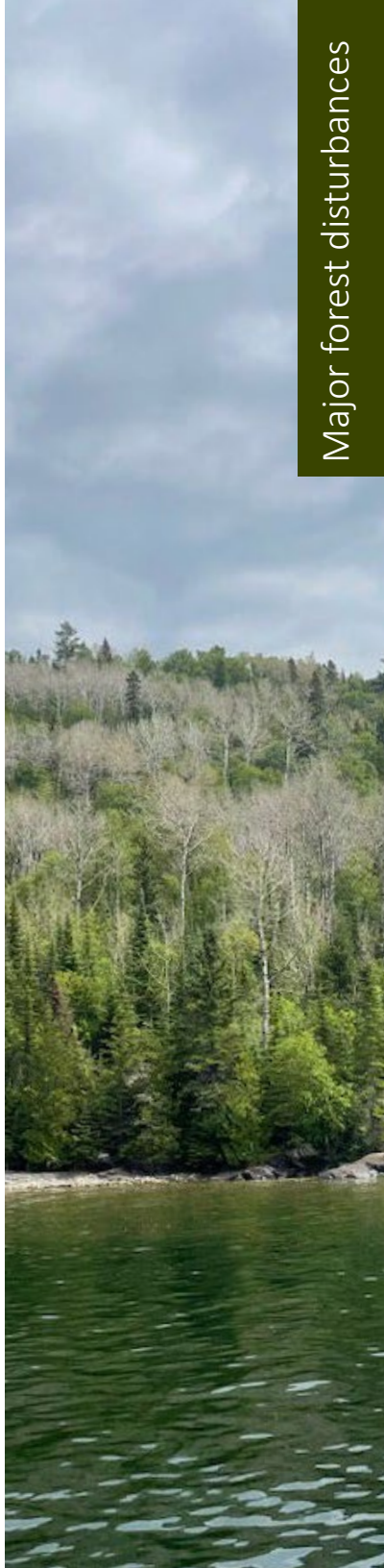
Provincial key facts

- Satin moth is found across North America, including most of southern Ontario. This pest continues to expand its range in Ontario, spreading from the south and reaching Sault Ste. Marie in 2011 and Thunder Bay in 2016.
- Satin moth normally infests individual or small groups of ornamental poplar trees, especially European white and Carolina poplar, but will occasionally defoliate poplar and aspen stands.
- In 2023, 4,766 ha of satin moth defoliation were aerially mapped in Northwest Region.

Regional summary

Northwest

- In Thunder Bay Ignace District, areas of moderate to severe satin moth defoliation were mapped across Sibley Peninsula in Sleeping Giant Provincial Park, in Fort William First Nation, and near the Terry Fox monument along Hwy 11 northeast of Thunder Bay and northeast of Neebing.

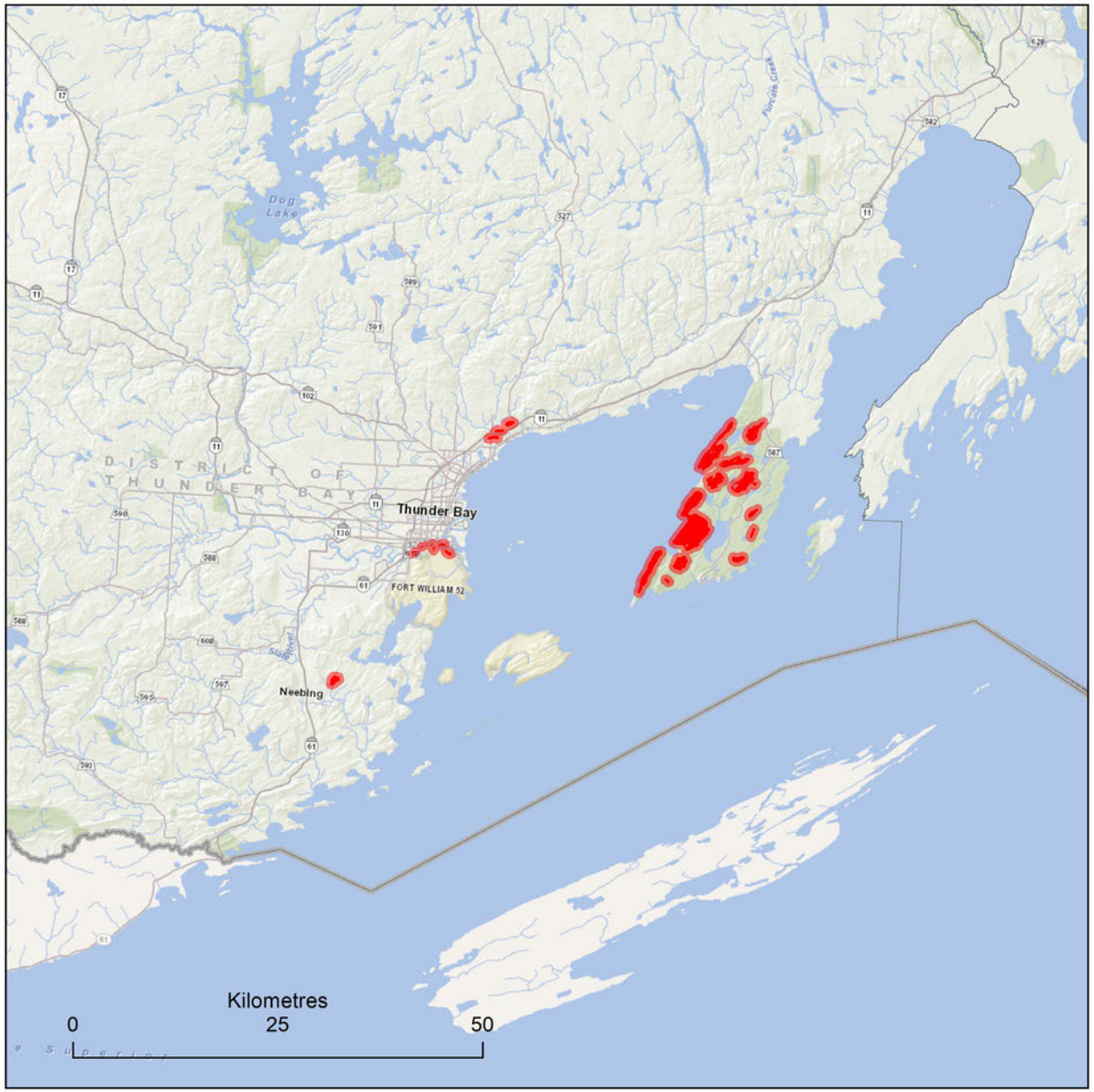


Satin Moth 2023

Areas in Ontario where satin moth caused defoliation

Moderate to severe = 4,766 ha

Area of moderate to severe defoliation



Snow damage

Pest information

Common name:	Snow damage
Scientific name:	NA
Pest origin:	NA
Pest type:	Abiotic
Host species (Ontario 2023):	Various species
Infestation area:	340 ha

Provincial key facts

- Damage consists of trees of all ages and sizes being uprooted, snapped off, bent over, or showing various amounts of crown damage.
- Snow damage in Ontario can be substantial but events are sporadic and effects vary considerably.
- In 2023, snow damage was mapped and observed in Southern Region.

Regional summary

Southern

- In Kemptville Kingston District, 246 ha of snow and ice damage were mapped during aerial surveys. Although snow and ice damage were extensive throughout Prescott-Russell and Stormont, Dundas, and Glengarry counties, only a few small areas could be detected during aerial surveys. In Prescott-Russell counties, small areas were mapped in the Municipality of The Nation along Hwy 417 from Casselman to Vars, and on Bertrand Sideroad. Small areas were also mapped in the City of Ottawa on Dunning Road, Spruce Ridge Road, and Dwyer Hill Road. In Lanark County, a small area was mapped in the Town of Prospect. In Leeds and Grenville counties, small areas were mapped east of the City of Kemptville and on Regional Road 20 west of East Oxford. Most of the snow and ice damage was observed during ground surveys. Severe damage was observed in Stormont-Dundas-Glengarry counties from Chesterville to Alexandria and southward to the St. Lawrence River. In Leeds and Grenville counties, snow damage was observed intermittently from Bishops Mills to the City of Kemptville. In Lanark County, occasional snow and ice damage was observed on Bennett Lake Road and MacDonald's

Corners Road and on Darling Road southwest of Tatlock in Lanark Highlands Twp. Snow damage to Scots pine was observed on Hwy 15 north of Franktown in Mississippi Mills Twp.

- In Peterborough Bancroft District, 93 ha of snow damage were mapped including in the City of Peterborough, on Sir Sanford Fleming Drive near Harper Road, and north of Hwy 7 between Drummond Line and County Road 28. In Alnwick/Haldimand Twp, a small area of snow damage was mapped along Hwy 401 from Brimley Road North to Gully Road near Grafton. Small areas were also mapped on Boyce Road in Colborne and on County Road 22 and Covert Hill Road in Castleton. Scots pine were most severely affected, and damage included broken tops and branches on semi-mature trees and bent over and snapped saplings.

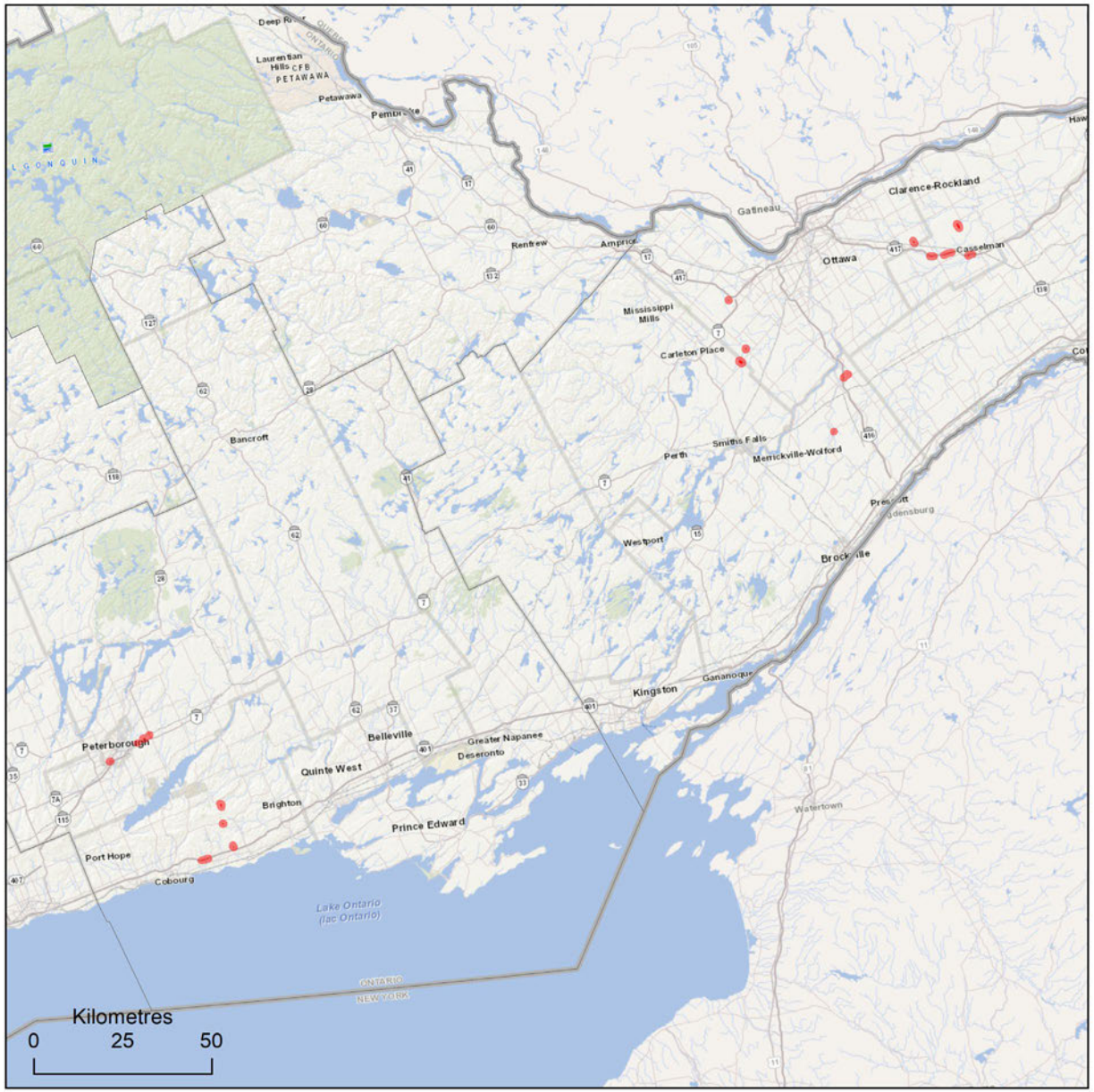
- In Pembroke District, snow damage was observed intermittently over 120 km along Hwy 17 from the City of Pembroke to Deux-Rivieres covering Laurentian Hills Twp and Head-Clara-Maria Twp. Severe snow damage was also observed on Government Road in Whitewater Region Twp. Light to moderate snow damage was observed intermittently on Opeongo Road west of Lake Clear to Barry's Bay and throughout Madawaska Valley and Killaloe-Hagarty-Richards townships. Intermittent snow damage was observed on Centennial Lake Road in Madawaska Twp.

Snow
2023

Areas in Ontario where snow caused damage

Severe = 340 ha

Area of severe damage



Spongy moth

Pest information

Common name:	Spongy moth
Scientific name:	*Lymantria dispar dispar* (L.)
Pest origin:	Invasive — native to Europe
Pest type:	Defoliator
Host species (Ontario 2023):	Most hardwood species
Infestation area:	2,529 ha (moderate to severe)

Provincial key facts

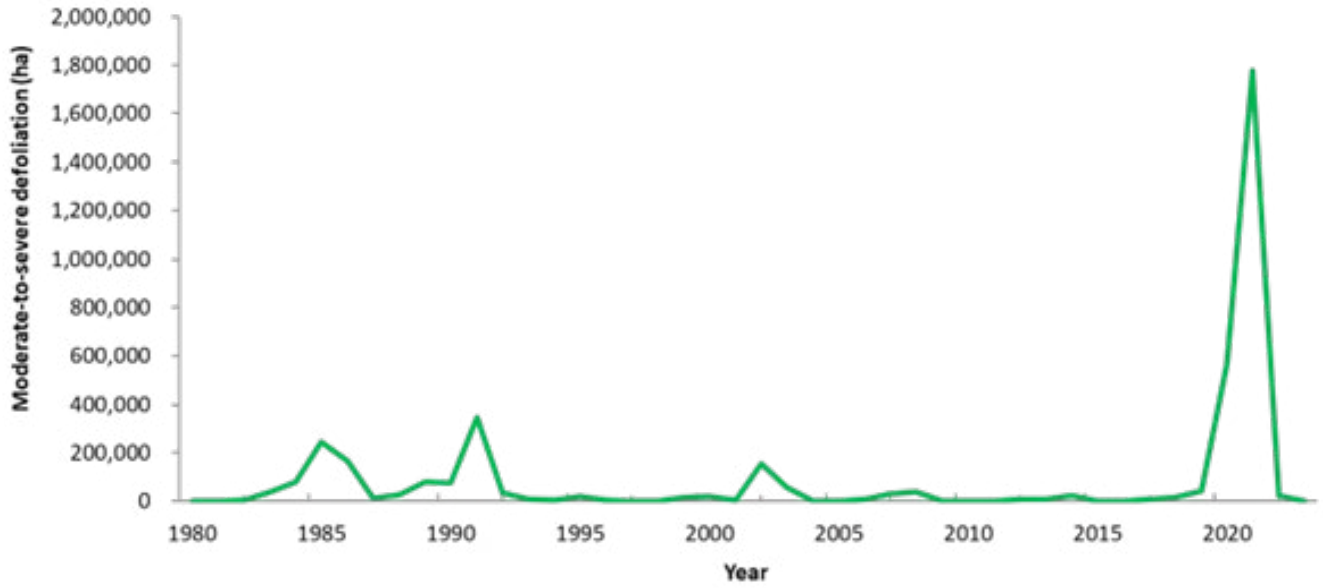
- Spongy moth (formerly known as LDD or gypsy moth) was discovered in Ontario in 1969, with the first incidence of severe defoliation recorded in Kemptville District in 1981.
- Spongy moth outbreaks are cyclical, typically occurring every seven to 10 years. In Ontario, major outbreaks have peaked in 1985, 1991, 2002, and 2008. The most recent outbreak, which peaked in 2021, was the most widespread recorded in the province.
- Spongy moth prefers a range of hosts including oak, birch, and aspen, and occasionally feeds on softwoods, such as eastern white pine and Colorado blue spruce. In 2023, defoliation was recorded on all preferred host tree species.
- Moderate to severe spongy moth defoliation decreased substantially from 1,779,744 ha in 2021 to 22,427 ha in 2022 and 2,529 ha in 2023. This decrease indicates a population collapse in northeastern Ontario and parts of southern Ontario, particularly in southeastern Ontario.
- In 2023, defoliation was aerially mapped only in Aylmer Guelph District. No mappable defoliation was reported elsewhere in the province.

Regional summary

Southern

- In Aylmer Guelph District, 2,529 ha of moderate to severe spongy moth defoliation were aerially mapped. This year is the seventh consecutive that spongy moth was mapped in the district. In Norfolk County, large areas were aerially mapped south and east of Delhi, around Pine Grove and Nixon, and between Walsingham and

Cultus. Large areas of defoliation were recorded at St. Williams Conservation Reserve Nursery Tract on both sides of 6th Concession Road, west of Walsh along Hwy 3, and south of Courtland on Hwy 59. A small area of moderate to severe defoliation was documented south of Delhi at Powell's Corners. In Hamilton, moderate to severe defoliation was aerially mapped in areas of Dundas Valley including conservation areas and private lands between Dundas and Ancaster, extending west to Copetown. Small areas of defoliation were evident south of Hwy 5 West in West Flamborough around Peter's Corners. Moderate to severe defoliation was evident at the Royal Botanical Gardens Arboretum between Long Valley Brook and Hickory Brook. In Oxford County, moderate to severe defoliation occurred in woodlots north and south of Hwy 401 at Forest Estates (Blandford-Blenheim Twp) and around the Thames River from Thamesford to Kintore (Zorra Twp). In Middlesex County, moderate to severe spongy moth defoliation was mapped west of London around Kilworth, including the northern part of Komoka Provincial Park. Defoliation was recorded along Hwy 22 from Lobo to Poplar Hill and in Coldstream (Middlesex Centre), south of Springbank (North Middlesex Twp), and on Hwy 16 in Plover Mills (Thames Centre Twp). In Haldimand County, moderate to severe defoliation was aerially mapped in woodlots around Cranston between the Grand River to Hwy 6. In Niagara Region, moderate to severe defoliation was recorded in the eastern and western parts of Short Hills Provincial Park. In Brantford, two small areas of moderate to severe defoliation were mapped between the Grand River and Tutela Heights Road. In Middlesex County, moderate to severe defoliation of willows and aspens were observed in an area east of Fanshawe Reservoir at Fanshawe Conservation Area (Thames Centre) during ground surveys.



Area (in hectares) of moderate to severe defoliation caused by spongy moth in Ontario, 1980–2023.

Total area (in hectares) in which spongy moth caused moderate to severe defoliation from 2019 to 2023, by MNRF district.

Region	Area of damage (ha)				
District	2019	2020	2021	2022	2023
Northwest					
Dryden Fort Frances Atikokan					
Far North					
Kenora					
Nipigon Geraldton					
Red Lake Sioux Lookout					
Thunder Bay Ignace					
Subtotal	0	0	0	0	0
Northeast					
Chapleau Wawa					
Hearst Cochrane Kapuskasing					
North Bay		407	3,349		
Sault Ste Marie Blind River		246	3,641		
Sudbury		24,262	68,875		
Timmins Kirkland Lake			52		
Subtotal	0	24,916	75,917	0	0
Southern					
Aurora Midhurst Owen Sound		57,356	273,438	8	
Aylmer Guelph	2,529	99,387	233,454	20,215	2,529
Kemptville Kingston		238,192	454,917	685	
Minden Parry Sound Bracebridge		2046	83,332		
Pembroke		13,547	149,053	452	
Peterborough Bancroft		133,941	509,632	1,066	
Subtotal	2,529	544,468	1,703,827	22,427	2,529
Provincial total	2,529	569,384	1,779,744	22,427	2,529

Spongy moth 2023

Areas in Ontario where spongy moth caused defoliation

Moderate to severe = 2,529 ha

Area of moderate to severe defoliation

Spruce budworm

Pest information

Common name:	Spruce budworm
Scientific name:	*Choristoneura fumiferana* (Clem.)
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	Balsam fir, white spruce, black spruce, tamarack, eastern white pine, hemlock
Infestation area:	1,983,042 ha moderate to severe defoliation; 8,890 ha mortality; 4,863 ha light defoliation

Provincial key facts

- Spruce budworm is one of the most damaging native insects affecting fir and spruce in Ontario.
- Spruce budworm outbreaks occur periodically when the primary host — balsam fir — reaches 40 years of age.
- Outbreaks can last several decades and can result in widespread balsam fir and spruce mortality.
- In 2023, moderate to severe spruce budworm defoliation in the province decreased to 1,983,042 ha from 2,029,039 ha in 2022, with most of the defoliation mapped in Northeast Region and the rest in Southern and Northwest regions. In addition, 8,890 ha of spruce budworm mortality were mapped, reduced from 17,088 ha in 2022. Most of the mortality was in Northeast Region with a minor amount in Southern Region.

Regional summary

Northwest

- In Nipigon Geraldton District, 101,885 ha of moderate to severe spruce budworm defoliation were mapped. Defoliation was mapped on the western border with scattered areas on Black Bay Peninsula and St. Ignace and Simpson islands. Light defoliation was mapped around Limestone Lake and the Kama Cliffs, with increasing severity east to Highway 614 and north to the southern end of Long Lake and Trapnarrows Lake. The largest areas of moderate to severe defoliation were north of Terrace Bay and Marathon.
- In Dryden Fort Francis Atikokan District, 14,072 ha of moderate to severe spruce budworm defoliation were aerially mapped. Defoliation was most severe in the eastern part of the district, with the most defoliation in Quetico Provincial Park and north towards Turtle River – White Otter Lake Provincial Park. West of Quetico

Provincial Park, areas of defoliation were mapped north of Seine River Village towards Bernadine Lake, from Shoal Lake to Big Turtle River, and near Rainy Lake. From Quetico Provincial Park to Hwy 502, small areas of defoliation were detected along Hwy 11. Three small areas of defoliation were also recorded in the northern part of the district. Two small areas were mapped in Dryden north of Wabigoon Lake and one small area was mapped northwest of Dryden close to Knob Lake.

- In Thunder Bay Ignace District, 3,003 ha of moderate to severe spruce budworm defoliation were mapped near Thunder Bay, with mostly roadside trees and ornamentals affected. Moderate to severe defoliation was recorded on spruce trees along Arthur Street and Oliver Road. Smaller areas of defoliation were mapped south and southwest of the City of Thunder Bay near Jarvis Bay, along the Minnesota border, as well as the Arrow Lake and Fallingsnow areas.
- In Kenora District, 58 ha of moderate to severe defoliation were mapped on the southern shoreline of Big Island, northwest of Lake of the Woods.

Northeast

- In Timmins Kirkland Lake District, 552,639 ha of moderate to severe defoliation were mapped, spread throughout most of the district. In the western part of the district, the infestation continued to intensify south of Gogama towards the southern district boundary. In the eastern part of the district, defoliation was most severe in the northeast and southeast, stretching from Hwy 569 near Englehart north to Lake Abitibi and extending west to Chamberlain Twp, Grassy Lake, Magusi River, and along Ghost River. Additional areas of moderate to severe defoliation included Splashwater Creek just north of Kirkland Lake to Swastika and Otto Lake, and south towards Round Lake. About 1,226 ha of spruce budworm mortality were mapped in the district. In the western part of the district, mortality was mostly in the northwest corner, north of Hwy 101. Small areas of mortality were also recorded west of Halliday Lake in the townships of Halliday, Mond, and Natal. In the central part of the district, small areas of mortality were recorded near Grassy River-Mond Lake Lowlands and Ferris Lake Uplands Provincial Park. Ground surveys in the northwest corner of the district revealed host species in severe decline. Moderate to severe defoliation has been mapped in this area for the last nine years and these trees are likely to die soon.
- In Hearst Cochrane Kapuskasing District, 536,565 ha of moderate to severe spruce budworm defoliation were mapped. Defoliation persisted from the Kapuskasing River in the west to the Ontario-Quebec border in the east. In the western part of the district, defoliation was recorded as far north as Little Long Dam and continued south to the district boundary. Defoliation continued to affect more area in the west, with new areas mapped north of Penelton Lake northeast towards Opasatika. In the eastern part of the district, defoliation was mapped as far north as Fraserdale, in a southeast direction towards the Ontario-Quebec border, and as far south as the southern district boundary. About 5,207 ha of spruce budworm mortality were mapped in the district. In the western part of the district, mortality was recorded in the townships of Wadsworth, Lisgar, Ossin, Lougheed, and Davin, northeast of the Chapleau-Nemegosenda River Provincial Park along the southern district boundary.

Smaller areas of mortality were mapped nearby in the townships of Strachan and Melrose. In the eastern part of the district, mortality was recorded along Hwy 11 between Fauquier and Smooth Rock Falls and south to the district boundary. The largest area of mortality occurred in the townships of Haggart and Sydere, south of Departure Lake. Larger areas of mortality were also recorded in Greenwater Provincial Park and northwest of the park in the township of Colquhoun.

- In Chapleau Wawa District, 349,383 ha of moderate to severe spruce budworm defoliation were mapped. In the northwest part of the district, defoliation was mapped for the first time in the current outbreak cycle. Large areas of moderate to severe defoliation were recorded around White Lake Provincial Park, south of Bremner, Pokei Lake/White River Wetlands Provincial Park, and east of Obatanga Provincial Park in the townships of Dahl, Dambrossio, and Bernst. In the eastern part of the district, the infestation persisted and continued to spread. Large areas of moderate to severe defoliation were mapped from Ivanhoe Lake Provincial Park southwest towards Wakami Lake Provincial Park. New, large areas of defoliation in the eastern part of the district were mapped from Wakami Lake Provincial Park north towards Kinogama River, from Kinogama River northwest towards Windermere Goldie Lake Cons Reserve, around Ramsden Lake northeast of Little Missinaibi Lake, between D'Arcy Lake and Lipsett Lake north of Hwy 101, and surrounding Bonar Lake in Bonar and Copperfield Twps. In the southwest part of the district in Lake Superior Provincial Park, the infestation continued, with new areas of defoliation east of the park in the townships of Grootenboer, Grzela, Loach, and Raaflaub. In 2023, 124 ha of mortality were recorded north of Ivanhoe Lake in Oates Twp.
- In Sudbury District, 275,611 ha of moderate to severe spruce budworm defoliation were mapped. Defoliation was most severe in the western part of the district, from Webbwood and adjoining both the Sault Ste. Marie Blind River and Timmins Kirkland Lake districts. In the eastern part of the district, large areas of defoliation were mapped east of Friday and Scotia lakes and across Manitoulin Island. About 905 ha of mortality were mapped in the district west of Mud Lake on Manitoulin Island, between Spanish and Walford Station, east of Brady Lake north of Lake Panache, and north of Agnew Lake in the townships of Hyman, Totten, and Porter.
- In North Bay District, 76,475 ha of moderate to severe spruce budworm defoliation were mapped. The largest area of defoliation was in the northwest part of the district from Lady Evelyn-Smoothwater Provincial Park, southward to Sturgeon River Provincial Park. Larger areas of defoliation were mapped north of Bay Lake in the northern part of the district, from West Nipissing south towards Lake Nipissing in the central part of the district, and south of Mattawa River Provincial Park in the southern part of the district. About 519 ha of mortality were mapped in the district from Widdifield Forest Provincial Park towards Anderson Lake in Mulock Twp, south of Jocko River in Jocko Twp, and southwest of Francis Lake in the townships of Olrig and Butler.
- In Sault Ste. Marie Blind River District, 60,231 ha of moderate to severe spruce budworm defoliation were aerially mapped. Most of the defoliation was mapped in the eastern, central, and southern parts of the district with small, scattered areas of defoliation in the northwest and southwest. The largest and contiguous areas of moderate to severe defoliation were recorded on the east side of the district along the district boundary east

of Rocky Island Lake from Kettle Lake (Sudbury District) in the north to Serpent River and along Lake Huron in the south. Smaller more scattered areas of moderate to severe spruce budworm defoliation were also mapped in the southcentral part of the district along Hwy 17 between Blind River and Lake George and up to Wakomata Lake. Small, scattered areas of defoliation were also observed in the central part of the district from Searchmont to Aubry Lake and between Ranger Lake and Horner Lake to north of Seymour Lake. Small areas of moderate to severe defoliation were also recorded north of the city of Sault Ste. Marie to Heyden and north to Karalash Corners north of Goulais River. On the northwest side of the district, scattered areas of defoliation were mapped along the coast of Lake Superior from Cottrell Cove (north of Pancake Bay Provincial Park) to the northern boundary of Chapleau Wawa District. Farther east, a small new area of defoliation was mapped south of Montreal River (Sault Ste. Marie Blind River District boundary) in the areas of Alvin, Union, and Dyer lakes in Raaflaub Twp. A few small areas of moderate to severe defoliation were mapped on St. Joseph Island. Most of it was on the southeast side of the island from Jocko Bay to Mosquito Bay and the west side of Caufield Lake, all in St. Joseph Twp. Only three small areas of defoliation were recorded on the northwest side of the island, two north of Harmony near the junction of A Line and F&G Line and one west of Island Spring Golf Resort near the junction of 10th Sideroad and K Line. About 573 ha of spruce budworm mortality were mapped along the Thessalon River between Rydal Bank and Little Rapids. Four small areas of mortality were also mapped farther north in Rose Twp west of Emerson Lake and around McKinnon Creek. Most of this mortality was white spruce with a minor component of balsam fir.

Southern

- In Minden Parry Sound Bracebridge District, 12,731 ha of moderate to severe defoliation were mapped along the northern edge of the district along Hwy 11 from south of Trout Creek to north of Burk's Falls. About, 336 ha of mortality were mapped in the district, south of Lake of Many Islands.
- In Pembroke District, 389 ha of moderate to severe defoliation were mapped. Large numbers of spruce budworm were observed on white spruce and balsam fir in a semi-mature mixed forest on Brent Road at the north end of Algonquin Park; defoliation was assessed as light in July. Trace amounts of defoliation were observed in a mature forested stand on Mink Lake Road in the northwest corner of Algonquin Park near South River. Defoliation was more severe on the outskirts of the park. Trace amounts of defoliation were also observed on balsam fir and white spruce in a mature conifer forest on Hazley Bay Drive, southeast of the City of Pembroke along the Ottawa River.
- In Aurora Midhurst Owen Sound District, 248 ha of light defoliation were mapped in Bruce County, southwest of Port Elgin.
- In Peterborough Bancroft District, spruce budworm was detected causing light to moderate defoliation at Balsam Lake Provincial Park in Bexley Twp. Trace amounts of defoliation were detected on The Ridge Road south of Wollaston Lake, along Crowe River in Rawdon Twp, and along Bolton Road in Percy Twp.

Trend analysis/outlook/issues

Spruce budworm spray program

In 2023, the ministry undertook an insect pest management program for spruce budworm affected stands in Hearst Cochrane Kapuskasing, Chapleau Wawa, and Timmins Kirkland Lake districts. A double application of the bacterial insecticide Btk (Foray 76B) was applied at 1.5 L/ha to 163,287 ha of spruce/fir stands. An efficacy assessment, including both pre- and post-spray budworm populations and subsequent defoliation assessments, confirmed that the foliage protection program was successful in meeting its objective of keeping defoliation below 40% in all assessed stands.

As part of the efficacy assessment, 43 plots were established in areas that had been treated (sprayed) and 20 plots were established in untreated areas (control). Treated areas were divided into two project areas (districts), with each project area containing sprayed plots and nearby control plots.

This year was the third consecutive of managing the current outbreak of spruce budworm in Northeast Region. Planning is underway to initiate a pest management program in 2024.

Spruce budworm pheromone trapping

Spruce budworm pheromone trapping was carried out across the province. Traps were deployed at 62 locations: 17 in Northwest Region, 27 in Northeast Region, and 18 in Southern Region.

The highest average number of moths recorded was 1,283 male moths in Nipigon Geraldton District. Two other locations averaged more than 1,000 male moths: one in Sudbury District (1000) and one in Hearst Cochrane Kapuskasing District (1077). The average number of male moths per trap was 271 in Northwest Region, 515 in Northeast Region, and 204 in Southern Region.

Spruce budworm defoliation forecast survey

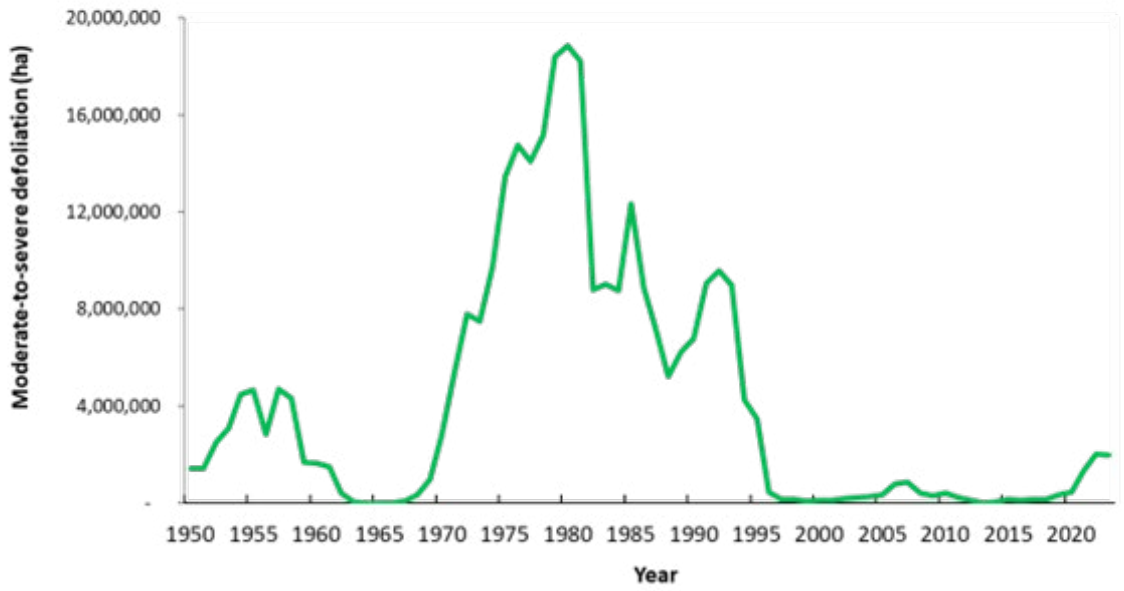
In Ontario, spruce budworm defoliation forecasting is based on surveys of the number of overwintering larvae on tree branches. Spruce budworm overwinter as second instar larvae (L2) by encapsulating themselves in silken shelters (hibernacula) under branch scales and bark cracks. These larvae typically shelter from late August until the following spring. This overwintering stage of the lifecycle allows monitoring crews to collect branches and extract and count larvae to forecast the potential severity of defoliation the following summer. Defoliation forecasts are used to determine which stands should be considered for protection. Locations for L2 surveys are selected based on defoliation mapped during the current infestation.

From each location, 10 trees were selected, and a 1 m branch was sampled from the mid to upper crown of each tree. Branches were sent to a laboratory to be processed in a sodium hydroxide washing procedure to extract the second instar larvae from their hibernacula. Extracted larvae were collected and counted under a microscope to

determine the average number of larvae per branch for each sample location. This average is used to forecast spruce budworm defoliation for 2024. An average of more than 65 larvae per branch indicates potential for severe defoliation, 26 to 65 larvae per branch indicates potential for moderate defoliation, and less than 25 larvae per branch indicates potential for light defoliation.

In the Northeast and Northwest regions, 58 locations (580 trees) were sampled for larvae in 2023. These locations were divided among districts: Hearst Cochrane Kapuskasing (22), Timmins Kirkland Lake (16), Chapleau Wawa (11), Nipigon Geraldton (5), Thunder Bay Ignace (2), and Dryden Fort Francis Atikokan (2). The defoliation forecast for 2024 by district is:

- Hearst Cochrane Kapuskasing: severe for five locations, moderate for eight, and light for nine
- Timmins Kirkland Lake: moderate for eight locations, light for eight
- Chapleau Wawa: severe for two locations, moderate for five, light for four
- Nipigon Geraldton: light for four locations, moderate for one
- Thunder Bay Ignace: light for two locations
- Dryden Fort Francis Atikokan: light for two locations



Total area (in hectares) in which spruce budworm caused moderate to severe defoliation in Ontario from 1950 to 2023.

Total area (hectares) in which spruce budworm caused moderate to severe defoliation from 2019–2023 by MNRF district.

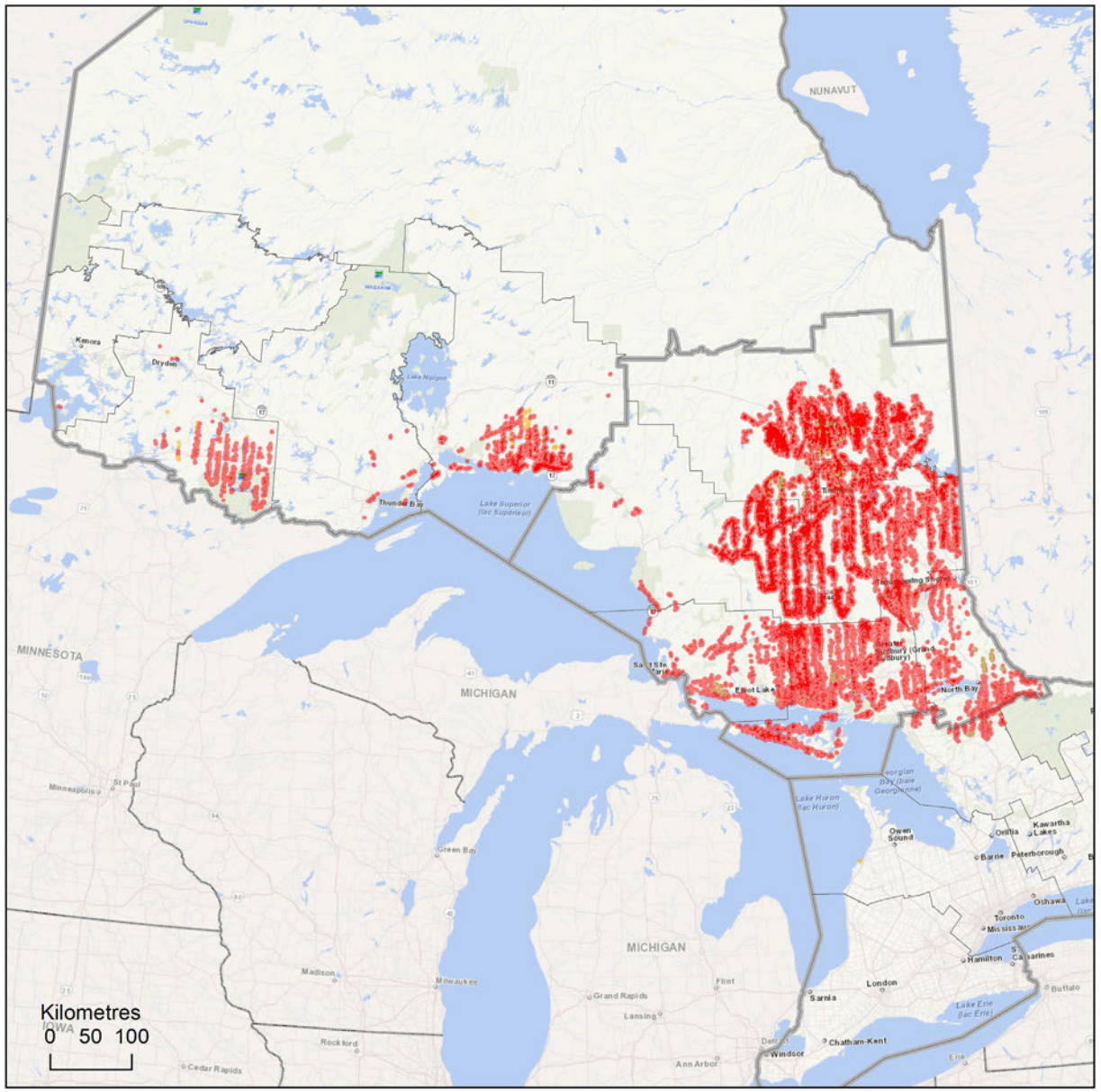
Region	Area of damage (ha)				
District	2019	2020	2021	2022	2023
Northwest					
Dryden Fort Frances Atikokan					14,072
Far North					
Kenora					58
Nipigon Geraldton					101,885
Red Lake Sioux Lookout					
Thunder Bay Ignace					3,002
Subtotal	0	0	0	0	119,018
Northeast					
Chapleau Wawa	21,313	24,100	143,278	156,232	349,383
Hearst Cochrane Kapuskasing	240,774	254,868	525,697	648,136	536,566
North Bay	15,154	29,428	30,574	41,750	76,475
Sault Ste Marie Blind River	4,363	10,826	6,435	22,018	60,231
Sudbury	9,635	23,421	157,832	437,474	275,611
Timmins Kirkland Lake	48,342	92,910	438,373	706,842	552,639
Subtotal	339,580	435,554	1,302,190	2,012,451	1,850,904
Southern					
Aurora Midhurst Owen Sound					
Aylmer Guelph					
Kemptville Kingston					
Minden Parry Sound Bracebridge	2,753	6,873	348	16588	12731
Pembroke				1	389
Peterborough Bancroft					
Subtotal	2,753	6,873	348	16,588	13,119
Provincial total	342,333	442,426	1,302,537	2,029,039	1,983,042

Spruce budworm 2023

Areas in Ontario where spruce budworm caused defoliation

Light = 4,864 ha
Moderate to severe = 1,983,041 ha
Mortality = 8,890 ha

- Area of light defoliation
- Area of moderate to severe defoliation
- Area of mortality

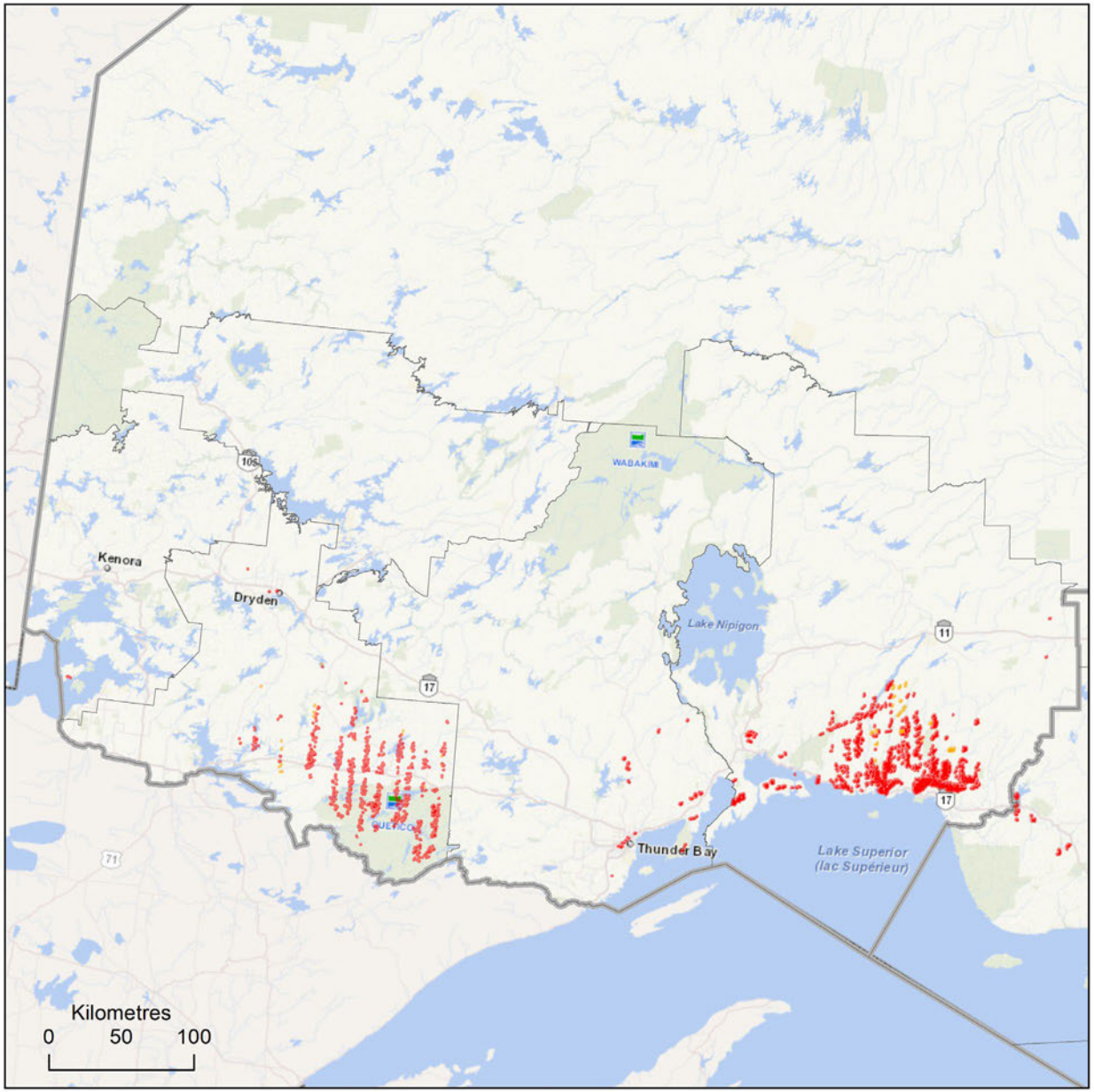


Spruce budworm 2023

Areas in the Northwest Region where spruce budworm caused defoliation

Light = 4,616 ha
Moderate to severe = 119,018 ha

- Area of light defoliation
- Area of moderate to severe defoliation
- Area of mortality

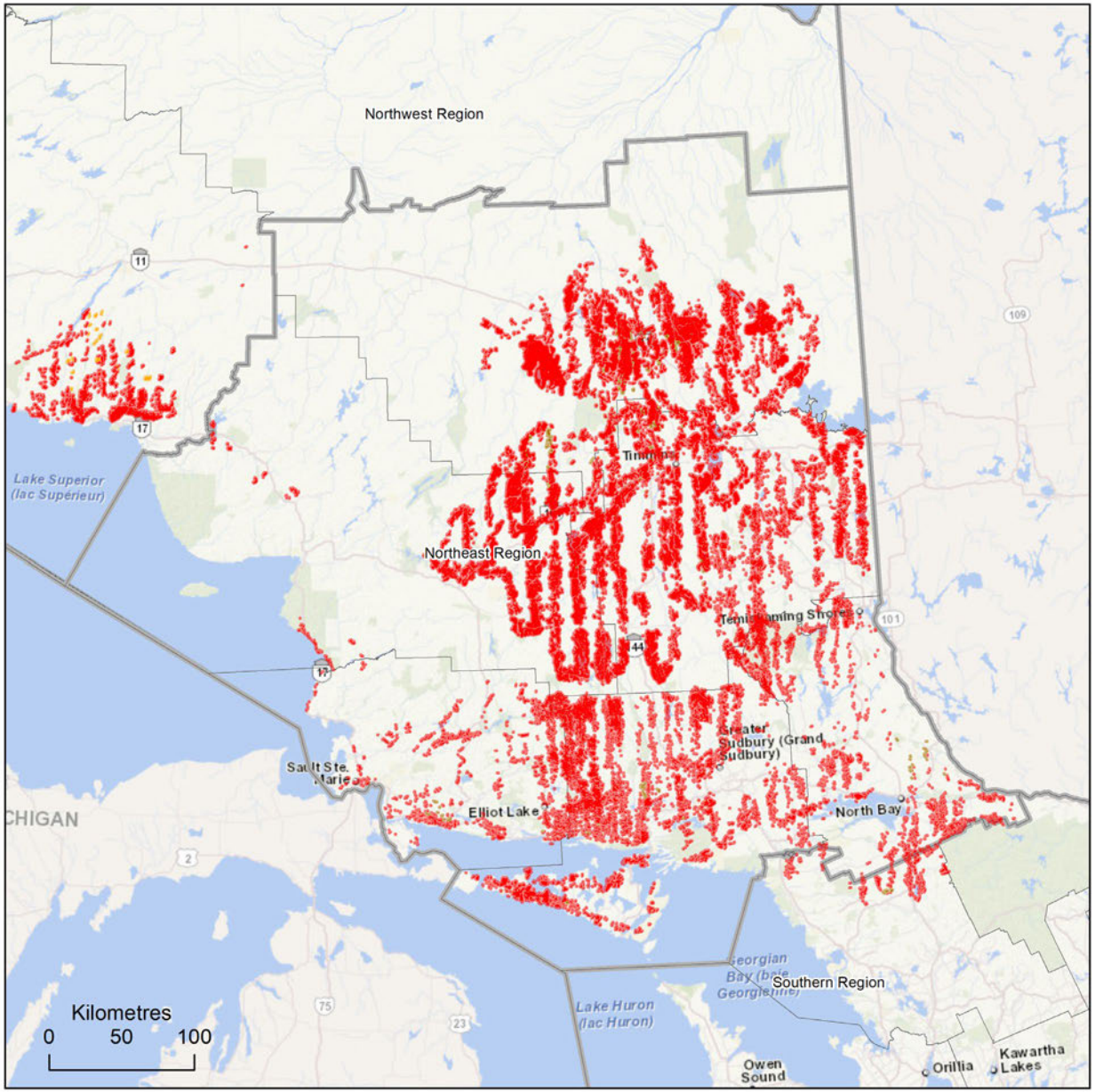


Spruce budworm 2023

Areas in the Northeast Region where spruce budworm caused defoliation

Moderate to severe = 1,850,904 ha
Mortality = 8,554 ha

- Area of light defoliation
- Area of moderate to severe defoliation
- Area of mortality



Spruce budworm 2023

Areas in the Southern Region where spruce budworm caused defoliation

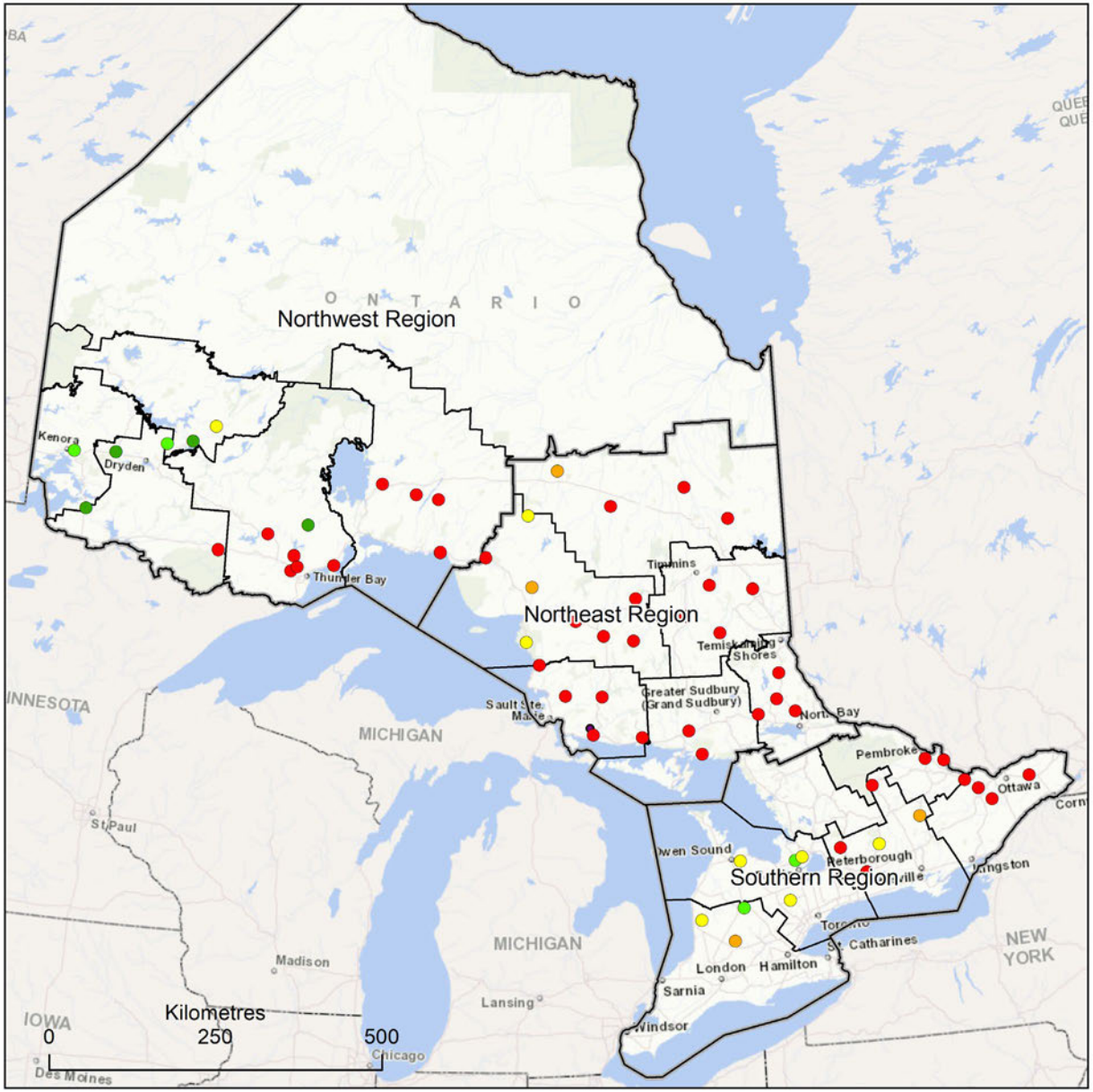
Light = 248 ha
Moderate to severe = 13,119 ha
Mortality = 336 ha

- Area of light defoliation
- Area of moderate to severe defoliation
- Area of mortality

Spruce budworm pheromone trapping results 2023

Average number of moths per trap

- 10 - 25
- < 10
- 25 - 50
- 50 - 100
- > 100



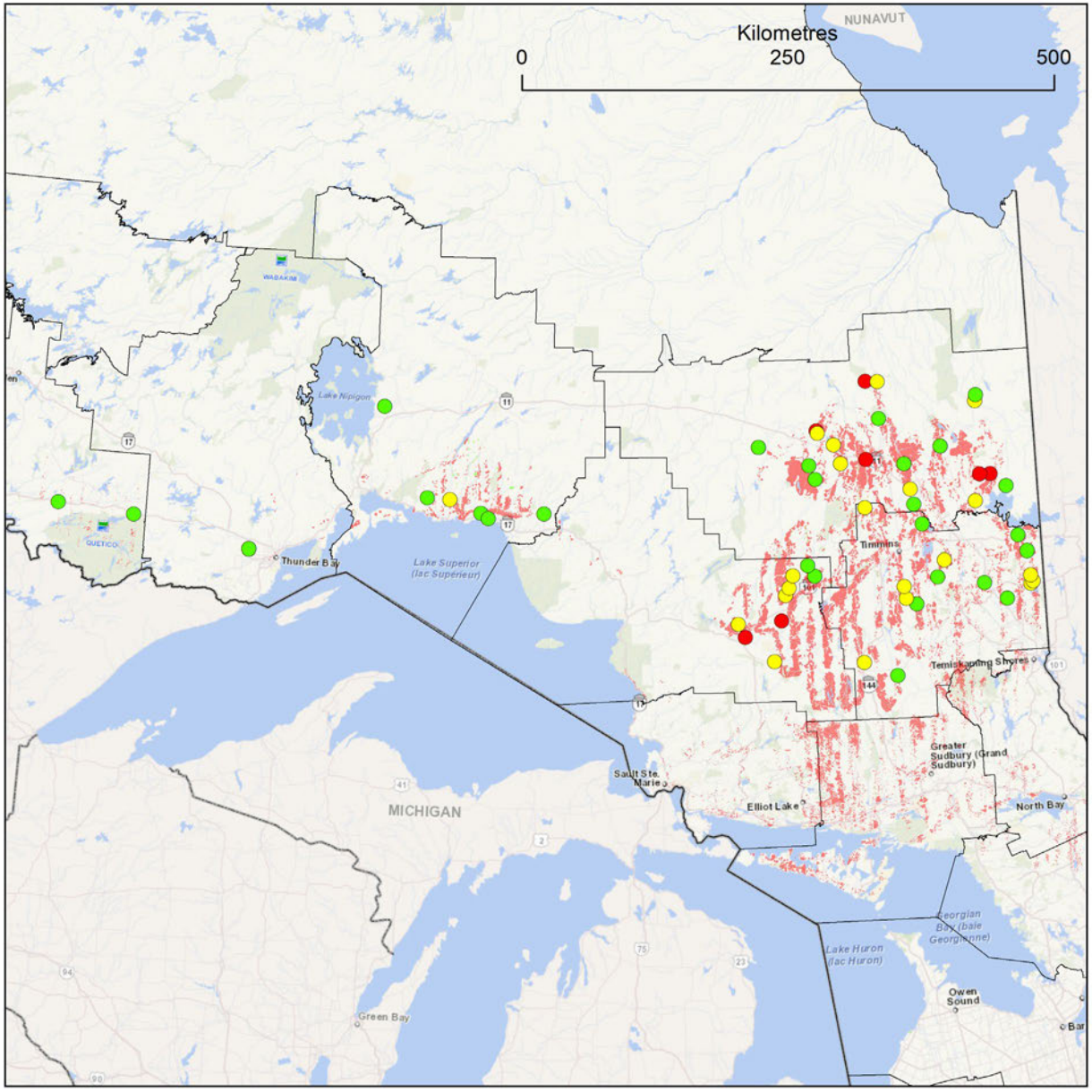
Spruce budworm second instar larvae survey results

Defoliation forecast 2024

- Severe
- Moderate
- Light

Spruce budworm defoliation 2023

- Area of moderate to severe defoliation
- Area of light defoliation
- Area of mortality



Whitespotted sawyer beetle

Pest information

Common name:	Whitespotted sawyer beetle
Scientific name:	*Monochamus s. scutellatus* (Say)
Pest origin:	Native to North America
Pest type:	Wood borer
Host species (Ontario 2023):	Jack pine
Infestation area:	46 ha (moderate to severe defoliation), 29 ha (mortality)

Provincial key facts

- Whitespotted sawyer beetle is one of the most widely distributed and common wood borers in North America.
- This pest is mainly found on recently dead or dying trees.
- Larvae tunnelling damage severely downgrades lumber value.
- Larger populations often occur near other forest disturbances, such as blowdown, drought, multiple years of defoliation, fire, and harvests.
- This beetle is often confused with the invasive Asian long-horned beetle.
- In 2023, whitespotted sawyer beetle damage was observed in the Northwest and Northeast regions.

Regional summary

Northwest

- In Kenora District, 34 ha of whitespotted sawyer beetle maturation feeding damage was observed during ground surveys at the Interfor sawmill in Ear Falls. Along with the feeding damage observed at the sawmill site, 29 ha of mortality were observed nearby.
- In Red Lake Sioux Lookout District, 12 ha of moderate to severe defoliation were observed at the end of Wenasaga Rd, north of Jubilee Lake.

Northeast

- In Sault Ste. Marie Blind River District, a small area of whitespotted sawyer beetle maturation feeding damage

was observed during ground surveys. Semi-mature jack pine trees had red flagging or dead needles on twigs from the feeding of adult whitespotted sawyer beetles. This damage was was evident about 300 m along Shoepack Lake Rd southwest of Moonshine Lake in the central part of Vance Twp.

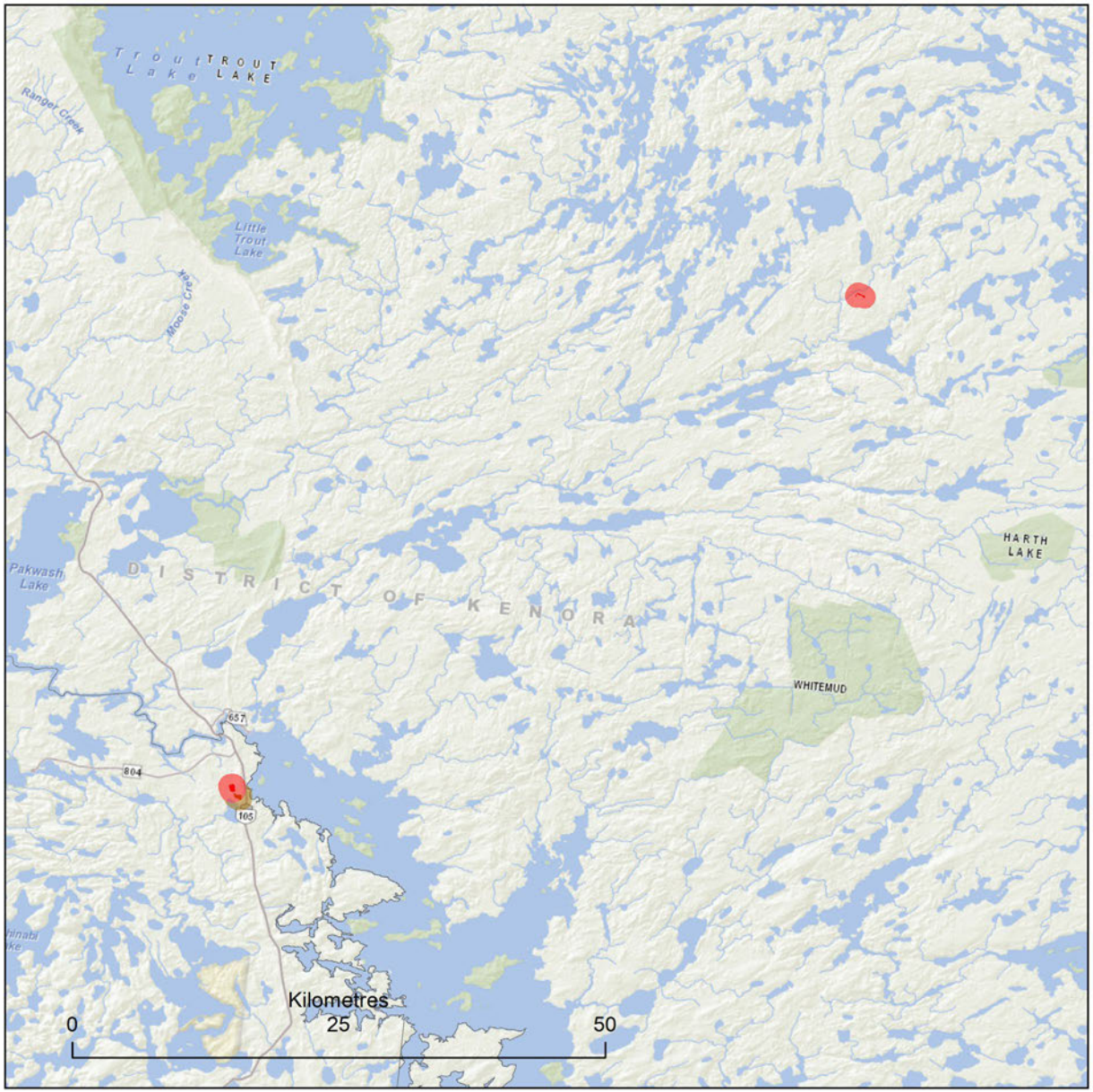
Whitespotted sawyer beetle 2023

Areas in Ontario where whitespotted sawyer beetle caused damage

Moderate to severe = 47 ha
Mortality = 29 ha

Area of moderate to severe damage

Area of mortality



Willow leafminer

Pest information

Common name:	Willow leafminer
Scientific name:	*Micrurapteryx salicifoliella* (Cham.)
Pest origin:	Native to North America
Pest type:	Leaf miner
Host species (Ontario 2023):	Willow spp
Infestation area:	5,278 ha

Provincial key facts

- Willow leafminer is a defoliator that affects willow.
- This pest can be widespread at times.
- The larvae feed on the inner tissue of leaves causing foliage to turn brown and drop prematurely.
- This pest was most recently recorded in Ontario in 2014.
- In 2023, willow leafminer appeared in large numbers on native willow in Northeast and Northwest regions.

Regional summary

Northwest

- In Nipigon Geraldton District, 3 ha of moderate to severe defoliation from willow leafminer were mapped along the eastern boundary line in Frances Twp.

Northeast

- In Hearst Cochrane Kapuskasing District, 4,935 ha of defoliation from willow leafminer were mapped. Defoliation was scattered across the district, with more concentrated areas in the western part around the Town of Hearst, northeast of Nagagamisis Lake in Langemarck Twp, west of Nagagami River along Hwy 11, in Fushimi Lake Provincial Park, along Hwy 11 from Hearst to Val Rita, flanking the Missinaibi River south of Mattice, and north of Rene Brunelle Provincial Park towards Goose Island in the Kapuskasing River. In the eastern part of the district, defoliation was mapped largely north of Hwy 11. Defoliation was mapped between Cochrane and Fauquier, as far north as Fraserdale. Other areas of defoliation were mapped southeast of Little Abitibi Lake in

the townships of Bragg and Heighington, and south of Pierre Lake in Swartman and Potter townships. Ground surveys throughout the field season revealed extensive defoliation to willow in drainage ditches alongside roadways, in marshes, and along watercourse edges.

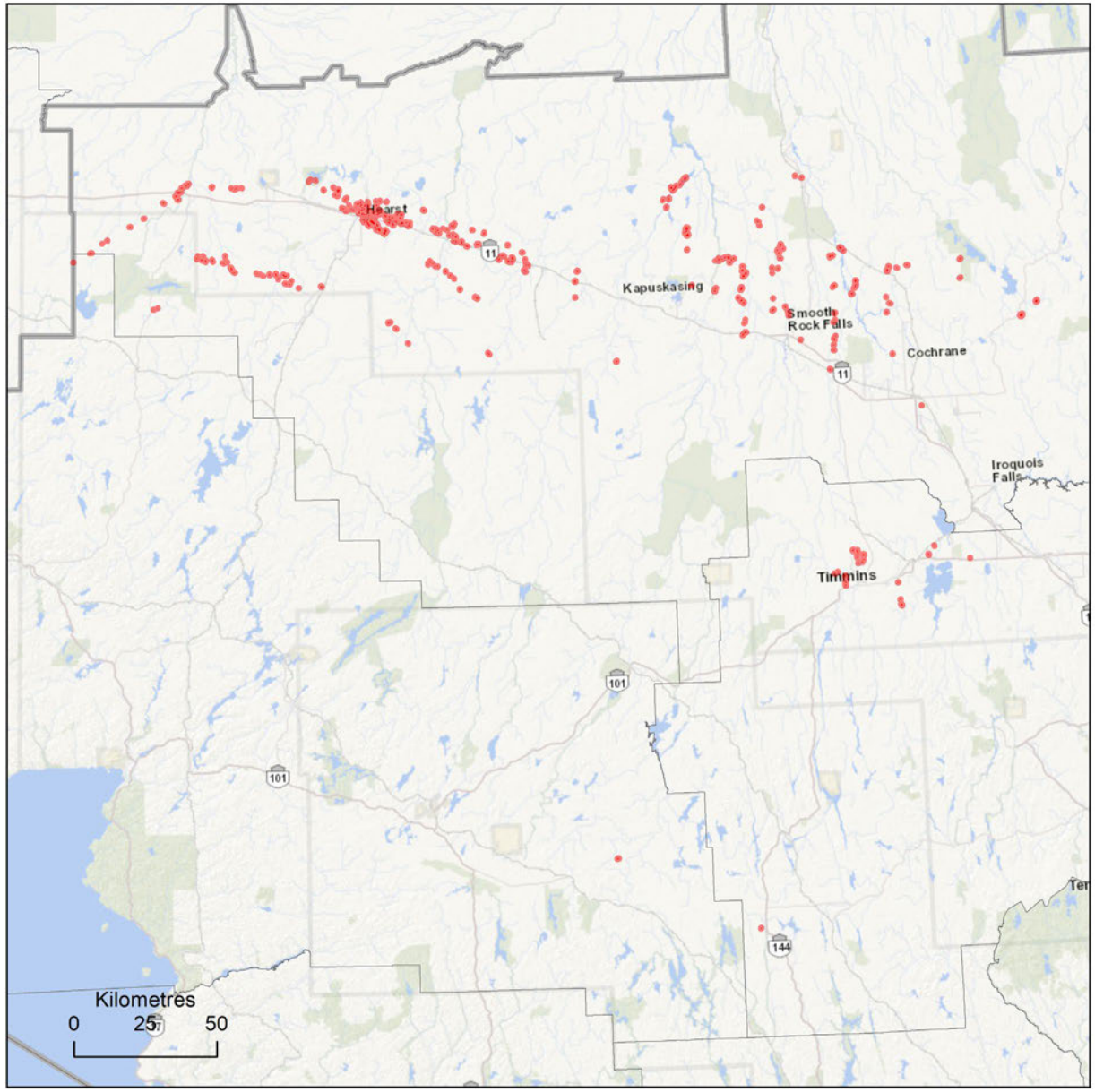
- In Timmins Kirkland Lake District, 309 ha of defoliation were mapped in the northwest corner. Small areas of defoliation were recorded north of Nighthawk Lake, south of Porcupine in the townships of Whitney and Shaw, along Government Rd N and Lefebvre Rd in Timmins, and around the Timmins airport. One small area of defoliation was detected northeast of Biscotasi Lake Provincial Park in Arden Twp.
- In Chapleau Wawa District, 31 ha of defoliation were mapped. In the eastern part of the district, a small area of moderate to severe defoliation was recorded in Fawn Twp, northeast of Wakami Lake Provincial Park. In the northwest part of the district, a small area of defoliation was detected north of Nagagami Lake in Hiawatha Twp.

Willow leaf miner 2023

Areas in Ontario where willow leaf miner caused defoliation

Moderate to severe = 5,278 ha

Area of moderate to severe defoliation



Minor forest disturbances

Basswood leafminer

Pest information

Common name:	Basswood leafminer
Scientific name:	*Baliosus nervosus* (Panz.)
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	Basswood
Infestation area:	Localized

Provincial key facts

- Basswood leafminer is distributed through the range of basswood in Ontario.
- The adults skeletonize the upper layer of the leaf and the larvae mine the leaves.
- Basswood leafminer is often found throughout southern Ontario, with minor feeding damage on edge and understory trees. During periodic outbreaks, mature trees can be defoliated to the upper crown.
- In 2023, basswood leafminer was observed in two districts in Southern Region during ground surveys.

Regional summary

Southern

- In Aylmer Guelph District, moderate to severe basswood leafminer defoliation was observed in areas where it has been reported for several consecutive years in western Elgin and southern Middlesex counties. Defoliation of American basswood of all ages and canopy classes was reported along edges of woodlots around Dutton, West Lorne, and Rodney in Elgin County. The defoliation extended into areas around Newbury and Glencoe in Middlesex County.
- In Peterborough Bancroft District, basswood leafminer defoliation was reported on mature American basswood in two locations in Kawartha Lakes. Moderate to severe defoliation was observed north of Cameron Lake along Lenwil Road and Concession Road 2 in Fenlon Falls. Light to moderate basswood leafminer defoliation was reported at Indian Point Provincial Park and light defoliation was observed nearby in a mature hardwood stand on Indian Point Road in Coboconk.

Beech scale

Pest information

Common name:	Beech scale
Scientific name:	*Cryptococcus fagisuga* Linding.
Pest origin:	Invasive — native to Europe
Pest type:	Sucking insect
Host species (Ontario 2023):	American beech
Infestation area:	Localized

Provincial key facts

- Beech scale was first found in Canada in the 1890s in Halifax, Nova Scotia.
- In Ontario, it was first found in 1966 in Elgin County along the north shore of Lake Erie.
- This insect is now found across the range of beech in Ontario.
- Infestation with scale predisposes beech trees to beech bark disease, which noticeably reduces vigour and eventually kills the tree.
- In 2023, various levels of beech scale were observed in Southern Region.

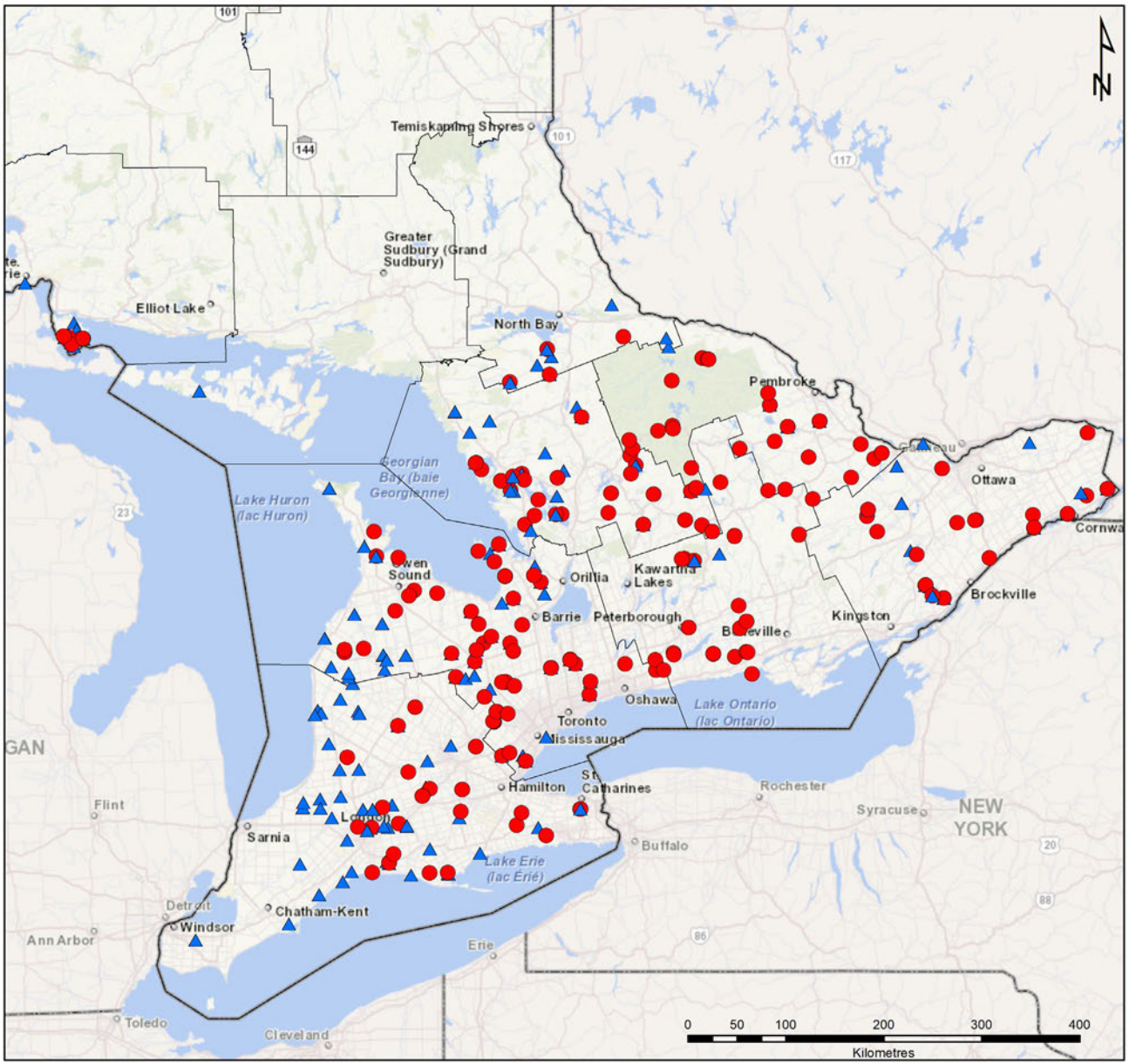
Regional summary

Southern

- In Alymer Guelph District, light to severe beech scale populations were observed during ground surveys on mature American beech trees along Watterworth Road, north of Newbury at the boundary of Lambton and Middlesex counties.
- In Minden Parry Sound Bracebridge District, light to moderate beech scale was collected on a single mature beech tree on East Bear Lake Rd, Monteith.

Beech Bark Disease and Beech Scale in Ontario 1999 - 2023

- Beech bark disease detected
- Beech scale detected



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Ministry of Natural Resources and Forestry

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Published Jan 2024

Ontario

Birch skeletonizer

Pest information

Common name:	Birch skeletonizer
Scientific name:	*Bucculartrix canadensisella* (Chambers)
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	White birch
Infestation area:	Localized

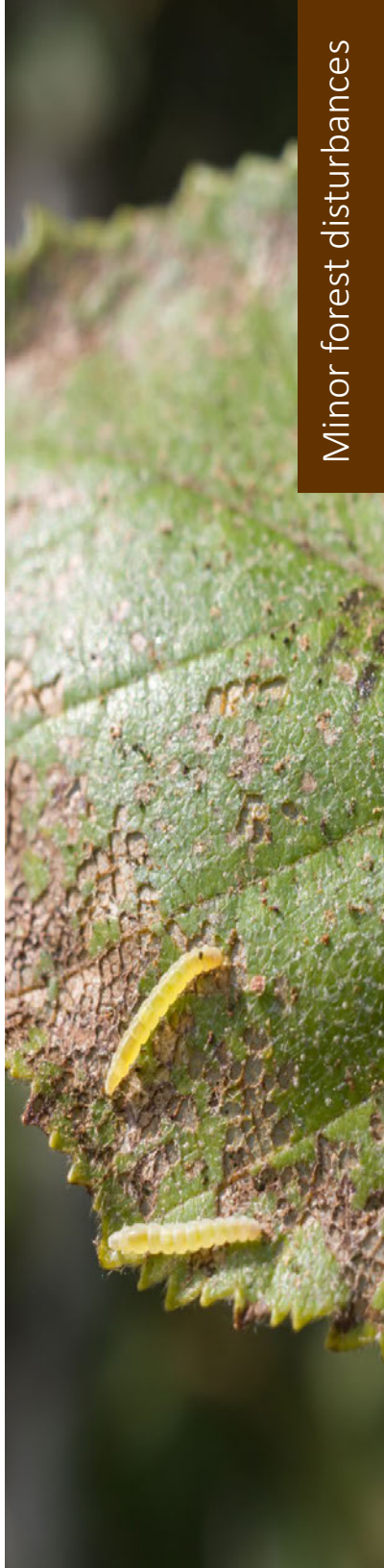
Provincial key facts

- Birch skeletonizer has minimal effects on host trees as it is a late season defoliator.
- Its main host is white birch, but other birches can be affected.
- Outbreaks of this pest are cyclical and relatively short-lived (2–3 years).
- Defoliation by this pest was last reported in Southern Region in 2021.
- In 2023, birch skeletonizer defoliation was reported in Pembroke District.

Regional summary

Southern

- In Pembroke District, light birch skeletonizer defoliation was reported in a hardwood forest on Trout Lake Road in the southwest corner of Brudenell-Lyndoch-Raglan Twp, Renfrew County. All white birch trees in this young to semi-mature stand were affected. Light defoliation was also observed throughout Brudenell-Lyndoch-Raglan Township.



Dutch elm disease

Pest information

Common name:	Dutch elm disease
Scientific name:	*Ophiostoma ulmi* (Buisman) Nannf.
Pest origin:	Invasive — native to Asia
Pest type:	Vascular wilt
Host species (Ontario 2023):	American elm
Infestation area:	Localized

Provincial key facts

- Dutch elm disease was first introduced to North America in the early 1930s and quickly spread across eastern North America and into Ontario in the mid 1940s.
- European elm bark beetle and the native elm bark beetle are the main vectors of Dutch elm disease. Root grafting is another way the disease spreads.
- Dutch elm disease is now found throughout the natural range of elm in Ontario.
- In 2023, symptoms of the disease were reported in Southern Region.

Regional summary

Southern

- In Kemptville Kingston District, severe Dutch elm disease symptoms and mortality were reported in a mature stand of ash and elm on Hwy 7 west of Perth in late June. Similar symptoms were observed nearby on Old Brooke Road and Tamarack Road north of Christie Lake in Tay Valley Twp, and intermittently from Murphy's Point to Westport along the north shore of Big Rideau Lake. Severe symptoms of Dutch elm disease were observed intermittently along Fifth Lake Road and Long Lake Road east of Tamworth in Central Frontenac County and along Waba Road and Hwy 29 from Packenham to Almonte, in the northeast corner of Lanark County.

Elm leafminer

Pest information

Common name:	Elm leafminer
Scientific name:	*Fenusa ulmi* Sund.
Pest origin:	Invasive — native to Europe
Pest type:	Defoliator
Host species (Ontario 2023):	American elm
Infestation area:	Localized

Provincial key facts

- Elm leafminer was introduced to North America before 1898 and has since become well established in the Great Lakes Region including southeastern Canada.
- Larval feeding causes leaf browning and irregular holes that can affect tree aesthetics and may reduce vigour and growth of most elm species.
- In 2023, Elm leafminer caused localized defoliation in Southern Region.

Regional summary

Southern

- In Kemptville Kingston District, elm leafminer caused severe defoliation to fringe American elm trees on Rutledge Road near Darling Lane in Sydenham, South Frontenac County. All age classes were affected.
- In Peterborough Bancroft District, light elm leafminer defoliation was recorded on American elm saplings in Brighton Wildlife Area, Northumberland County.

Elongate hemlock scale

Pest information

Common name:	Elongate hemlock scale
Scientific name:	*Fiorinia externa* Ferris
Pest origin:	Invasive — native to Asia
Pest type:	Scale insect
Host species (Ontario 2023):	Eastern hemlock
Infestation area:	Localized

Provincial key facts

- This insect was accidentally introduced to North America around the start of the twentieth century with the first detected in New York City in 1908.
- It is an armoured scale insect that primarily feeds on eastern hemlock in North America, but is known to infest spruce, cedar, pine, fir, and yew species.
- Elongate hemlock scale insects are commonly found on the underside of hemlock needles and damage host trees by inserting their piercing mouthpart into needles and feeding on water and nutrients. This feeding injury causes needle chlorosis and premature needle drop, reducing the overall health of infested trees, and allowing for successful attacks by other pests and secondary organisms.
- In 2023, elongate hemlock scale damage was reported in Southern Region.

Regional summary

Southern

- In Aylmer Guelph District, populations of elongate hemlock scale were observed at Beamer Memorial Conservation Area in Grimsby. High numbers of this insect were found on the underside of needles of all hemlock trees surveyed at this location, but damage to infested trees was minimal.

Trend analysis/outlook/issues

With the recent detections of hemlock woolly adelgid in areas of Southern Ontario, elongate hemlock scale may be of interest because it could contribute to reduce overall hemlock tree health. Reports from some U.S. states indicate the simultaneous coexistence of populations of elongate hemlock scale and hemlock woolly adelgid on hemlock trees.

Fall cankerworm

Pest information

Common name:	Fall cankerworm
Scientific name:	*Alsophila pometaria* (Harris)
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	Basswood, American beech, red oak, sugar maple
Infestation area:	Localized

Provincial key facts

- Fall cankerworm is an early season defoliator of hardwood trees that can reach epidemic levels throughout its range in North America.
- The distribution of this native pest is thought to coincide with the range of basswood in Ontario.
- This pest has one generation per year.
- In North America, fall cankerworm has an outbreak cycle with large populations present for two to three years followed by sharp population declines for five to eight years.
- The most recent outbreak of fall cankerworm in Ontario occurred between 2016 and 2019, with areas of defoliation aerially mapped across Southern Region in 2016, 2017, and 2018. Fall cankerworm is often found feeding alongside spongy moth.
- In 2023, defoliation caused by fall cankerworm was not aerially mapped but localized defoliation was reported in several areas of the Aylmer Guelph and Peterborough Bancroft districts.

Regional summary

Southern

- In Aylmer Guelph District, fall cankerworm caused localized defoliation at several locations. In Huron County, high populations of fall cankerworm were observed intermittently along Pinery Line between County Road 25 (Blythe Road) and the Maitland River west of Auburn in Ashfield-Colborne-Wawanosh Twp during ground surveys. Red oak and American basswood were moderately to severely defoliated while white ash was moderately defoliated. Trace fall cankerworm defoliation was observed at two locations in Middlesex County during ground surveys. At Chapman Tract (Middlesex Centre), fall cankerworm caused trace defoliation of understory sugar maple, American beech, and basswood. At Mystery Falls Management Area (North Middlesex), trace defoliation affected understory American beech and sugar maple. Spongy moth was also present in low numbers at both locations.

In Elgin County, trace fall cankerworm defoliation of understory black cherry and sugar maple trees was reported at Springwater Conservation Area (Malahide Twp) and a private woodlot south of County Road 45 (John Wise Line) in Jaffa. In Norfolk County, trace populations of fall cankerworm caused trace defoliation of understory sugar maple and American beech at Lehman Conservation Area in Delhi and at Harris/Harris/Floyd Tract near Frogmore.

- In Peterborough Bancroft District, light fall cankerworm defoliation was recorded in Prince Edward County on basswood trees that bordered a farm field on Allison Road, Demorestville.

Fall webworm

Pest information

Common name:	Fall webworm
Scientific name:	*Hyphantria cunea* (Drury)
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	American elm, ash spp., alder spp., cherry spp., black walnut, and white birch
Infestation area:	Localized

Provincial key facts

- Fall webworm is one of the few native North American insects accidently introduced into Europe and Asia.
- Its effect on tree health is usually limited because defoliation occurs late in the growing season, but persistent infestation can cause branch and crown dieback.
- In Canada, only one generation of fall webworm occurs per year, whereas two will occur in warmer climates.
- High populations of this pest often last only two to three years, making associated tree mortality unlikely.
- In 2023, defoliation from fall webworm varied from trace to severe in Northeast and Southern regions.

Regional summary

Northeast

- In North Bay District, moderate to severe fall webworm defoliation was observed along Hwy 17 east from North Bay to Corbeil, along Hwy 11 south of North Bay to Powassan, west of Gormanville road to Beaucage Park Road along the Lake Nipissing shoreline, and along Hwy 63 near Redbridge and Songis Road.
- In Sault Ste Marie Blind River District, moderate to severe fall webworm defoliation was recorded along the southeast part of Hwy 556 (Ranger Lake Road), more along Hwy 556 near Little Garden River Road, and along Hwy 129 north of Hwy 556 in Villeneuve and Rollins townships. Individual nests were seen predominantly on speckled alder, and on young white birch, white elm, and pin cherry.

Southern

- In Aylmer Guelph District, fall webworm caused light to moderate defoliation of black walnut and young ash trees along westbound of Hwy 403 between Hwy 24 and the Grand River near Brantford. Large silk webs were observed on branches, with some webs covering entire crowns of young black walnut trees.
- In Pembroke District, Algonquin Park had light to moderate fall webworm defoliation observed on ash and alder species along Barron Canyon Road from the Squirrel Depot Gate to Lake Traverse. In Laurentian Hills Twp, light fall webworm defoliation was observed on ash species along Wylie Road in Chalk River. In Laurentian Valley Twp, trace fall webworm defoliation was observed southeast of the City of Pembroke on Beachburg Road near Hwy 40.
- In Peterborough Bancroft District, intermittent clusters of light to moderate fall webworm defoliation were observed on Porter Rd near Millbrook. Defoliation was also observed along Hwy 28 and Youngs Point Road close to Lakefield and Hwy 7 in Preneveau. In Northumberland County, light to moderate fall webworm defoliation was observed on County Road 28 and Hwy 2 near Birdsalls on the north side of Rice Lake. Fall webworm was observed causing defoliation on ash species, black walnut, and black cherry.
- In Kemptville Kingston District, Prescott and Russell United Counties had light fall webworm defoliation that was observed on white birch on Concession Road 3 north of Casselman. Lower populations of fall webworm also caused light defoliation to young American elm and white birch between Casselman and Limoges and northward to Russel Road in the Municipality of the Nation and Clarence-Rockland. In Leeds-Grenville County, light fall webworm defoliation was observed intermittently north of Prescott along Hwy 18 to Bishops Mills.

Greenstriped mapleworm

Pest information

Common name:	Greenstriped mapleworm
Scientific name:	*Dryocampa rubicunda* (F.)
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	Red maple, sugar maple
Infestation area:	225 ha

Provincial key facts

- Greenstriped mapleworm feeds primarily on red and sugar maple.
- Larvae feed on the underside of leaves and consume most of the leaf tissue other than the mid rib and larger veins.
- Severe infestations may decrease growth, cause crown dieback, and reduce the sap quality of sugar maple.
- In 2023, greenstriped mapleworm defoliation was aerially mapped for the first time in Southern Region.

Regional summary

Southern

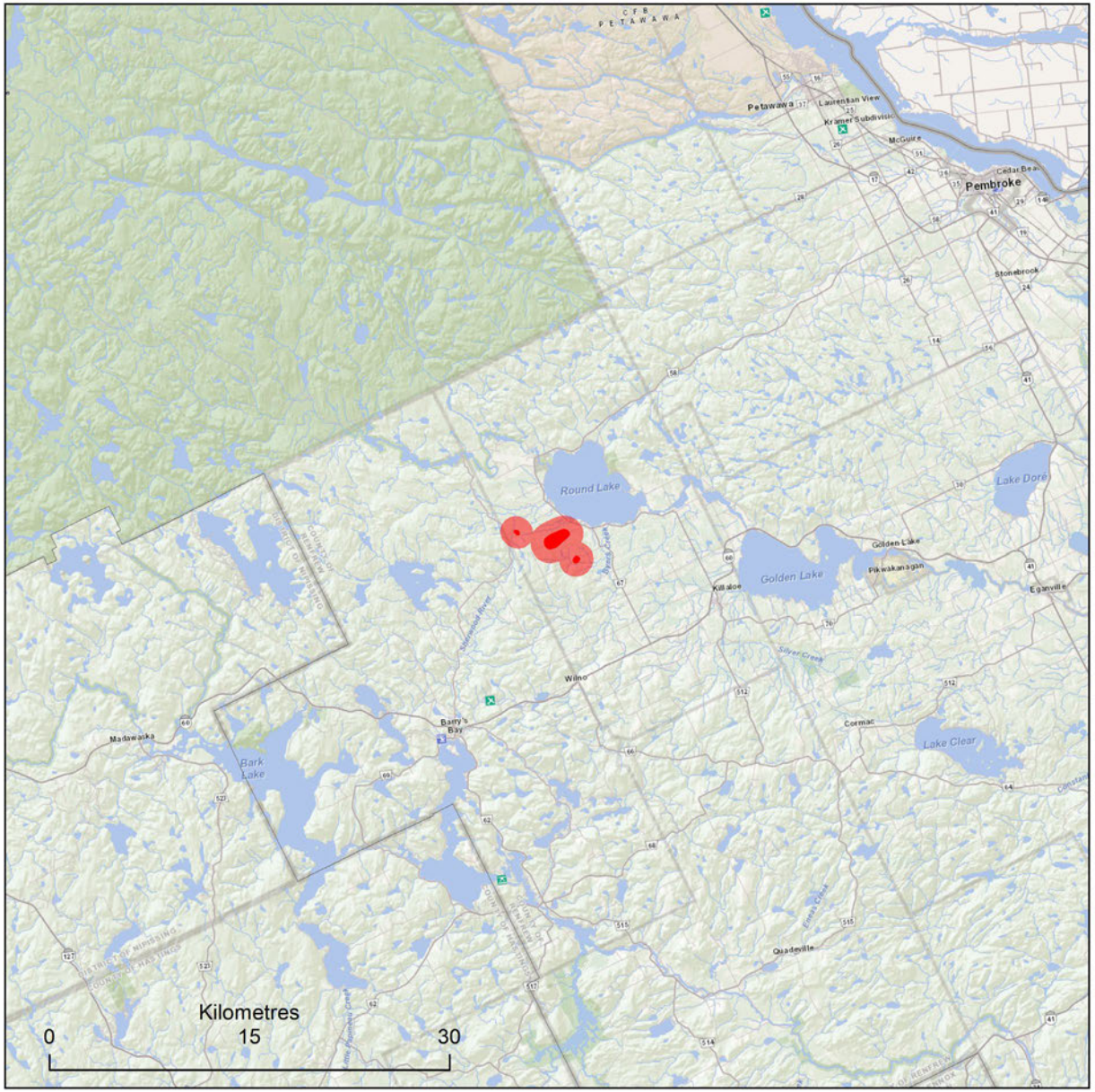
- In Pembroke District, 225 ha of moderate to severe greenstriped mapleworm defoliation were aerially mapped in Renfrew County. Three small areas of defoliation were mapped on or near Division Road, west of Round Lake in Killaloe-Haggarty-Richards Twp. Red maple and sugar maple were affected. In Laurentian Hills Twp, severe greenstriped mapleworm defoliation was observed in a semi-mature red maple stand on Barron Canyon Road west of the City of Pembroke. Similar defoliation was also observed in small, localized areas on Wylie Road in Chalk River and on Doran Road in the Town of Petawawa.

Greenstriped mapleworm 2023

Areas in Ontario where greenstriped mapleworm caused defoliation

Moderate to severe = 225 ha

Area of moderate to severe defoliation



Hemlock looper

Pest information

Common name:	Hemlock looper
Scientific name:	*Lambdina fiscellaria fiscelleria* (Guenée)
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	Eastern hemlock
Infestation area:	Localized

Provincial key facts

- Hemlock looper is a native defoliator of eastern hemlock, balsam fir, and white spruce. It is found in Canada, from Newfoundland to Alberta, and in the United States.
- Repeated periodic outbreaks of hemlock looper have occurred over large areas of eastern Canada, especially in Newfoundland.
- Hemlock looper caused moderate to severe defoliation to eastern hemlock and balsam fir from 2001 to 2005 in Southern and Northeast regions. Repeated defoliation caused considerable tree mortality in some areas.
- A small area of defoliation was last reported in 2019 in Peterborough District, Southern Region.
- In 2023, light hemlock looper defoliation was observed in Sudbury District.

Regional summary

Northeast

- In Sudbury District, light hemlock looper defoliation was observed along Panache Lake Road and Hannah Lake Road. On hemlock trees along the south shore of Lake Panache near Espanola, light hemlock looper defoliation added to moderate to severe defoliation from spruce budworm.

Imported willow leaf beetle

Pest information

Common name:	Imported willow leaf beetle
Scientific name:	*Plagiodera versicolora (Laich.)*
Pest origin:	Invasive — native to Europe
Pest type:	Defoliator
Host species (Ontario 2023):	Willow spp.
Infestation area:	Localized

Provincial key facts

- Imported willow leaf beetle was introduced to North America in 1915 and is now widely distributed across the range of willow in Ontario.
- Up to three generations of this insect can occur in a year.
- This pest has the potential to cause severe defoliation, but the damage is not serious unless defoliation occurs in several consecutive years.
- In 2023, localized imported willow leaf beetle defoliation was reported in Southern Region.

Regional summary

Southern

- In Kemptville Kingston District, light imported willow leaf beetle defoliation was observed on mature willows along Charleville Creek and its tributaries in Augusta Twp, Leeds, and Grenville County.
- In Pembroke District, trace imported willow leaf beetle defoliation was observed in a willow thicket surrounded by mature trembling aspen and eastern white pine forest on Scenic Road between Wilno and Kilaloe, Renfrew County.

Japanese beetle

Pest information

Common name:	Japanese beetle
Scientific name:	*Popillia japonica* (Newm.)
Pest origin:	Invasive — native to Japan
Pest type:	Defoliator
Host species (Ontario 2023):	Sassafras, basswood
Infestation area:	Localized

Provincial key facts

- Populations of this invasive insect have existed in Ontario since its discovery in the Niagara Peninsula, Southern Region, in 1939.
- Commonly encountered as an exotic horticultural pest, the Japanese beetle will also feed on many native tree species. Adults are heavy feeders, known to attack both foliage and fruit of more than 250 host plants. Preferred woody hosts in Ontario include basswood, oak, and white birch.
- In 2023, Japanese beetle was reported during ground surveys in Aylmer Guelph District, Southern Region.

Regional summary

Southern

- In Aylmer Guelph District, moderate to severe Japanese beetle defoliation was reported in three counties. In Middlesex County, severe defoliation of several open-grown basswood trees was reported along Brigham Road between Longwoods Road and Gideon Drive (Middlesex Centre Twp). In Elgin County, moderate to severe Japanese beetle defoliation was observed in forests along westbound Hwy 401 between Graham Road and Downie Line in West Elgin Twp. All age and canopy classes of sassafras were affected. In Norfolk County, moderate to severe defoliation of sassafras was observed along the edge of a forest on Charlotteville Road 2 at Vermeulen Road, north of Forestville.

Locust leafminer

Pest information

Common name:	Locust leafminer
Scientific name:	*Odontota dorsalis* (Thunb.)
Pest origin:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	Black locust
Infestation area:	Localized

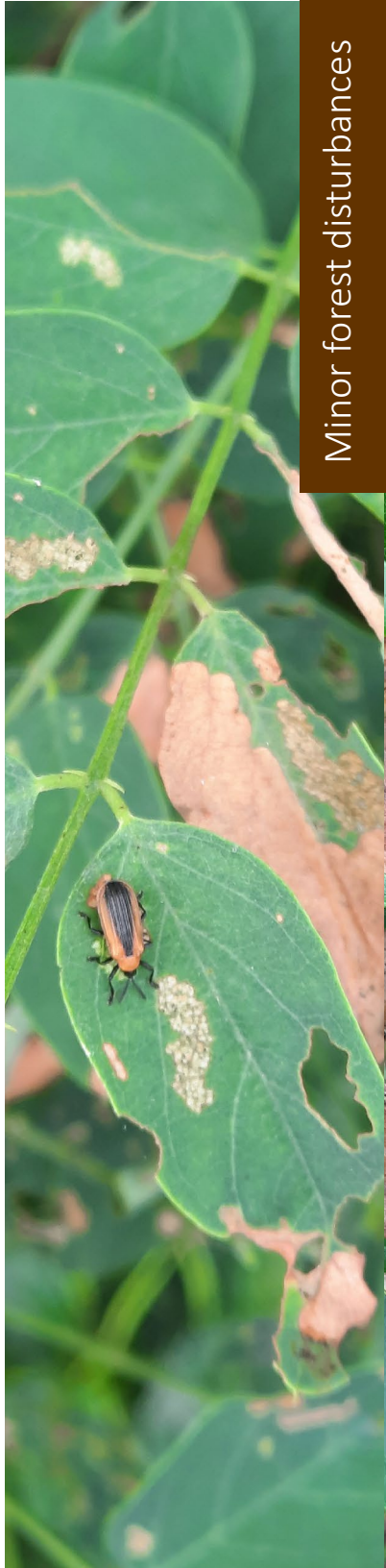
Provincial key facts

- Locust leafminer occurs in southern Canada and most of eastern United States and can cause extensive widespread damage mainly to black locust trees.
- Adult and larval feeding causes leaf browning and may cause mortality if severe defoliation occurs during a poor growing season.
- Parasites of locust leafminer larvae and pupae reduce high populations.
- In 2023, locust leafminer caused moderate to severe defoliation to black locust in Southern Region.

Regional summary

Southern

- In Peterborough Bancroft District, severe locust leafminer defoliation was recorded in a semi-mature stand of black locust on Hwy 2 in Grafton. All age classes were affected in this stand as well as several trees on residential properties nearby. Moderate to severe locust leafminer defoliation was also observed on east-bound Hwy 401 between Cobourg and Grafton.



Pine false webworm

Pest information

Common name:	Pine false webworm
Scientific name:	*Acantholyda erythrocephala* (L.)
Pest origin:	Invasive — native to Europe and Asia
Pest type:	Defoliator
Host species (Ontario 2023):	Eastern white pine
Infestation area:	Localized

Provincial key facts

- First collected in Ontario in 1961, pine false webworm was initially a pest of young pine plantations.
- Starting in 1993, severe defoliation was recorded on semi-mature and mature pine near Peterborough and Simcoe.
- Infestation peaked in 1997, with almost 9000 ha of moderate to severe defoliation.
- In 2023, pine false webworm was observed in the Northeast Region.

Regional summary

Northeast

- In Sault Ste Marie District, pine false webworm defoliation was observed on the lower branches of a mature eastern white pine near Little White River and Hwy 546 in the southwest corner of Sagard Twp near Poulin Twp. The branch defoliation was severe but overall defoliation of the tree was less than 10%. The defoliation was limited to eastern white pine trees on the edge of the stand. A small area of light to moderate pine false webworm defoliation was also seen in Kirkwood Forest (Kirkwood Twp) north of Thessalon on young regeneration along the edge of a mature eastern white pine stand.

Pine needleminer

Pest information

Common name:	Pine needleminer
Scientific name:	*Exoteleia pinifoliella* (Cham.)
Pest origins:	Native to North America
Pest type:	Defoliator
Host species (Ontario 2023):	Jack pine
Infestation area:	66 ha

Provincial key facts

- Pine needleminer occurs in the eastern half of Canada and the United States.
- In Ontario, pine needleminer feeds on jack pine and sometimes Scots, red, and pitch pine, occasionally causing extensive defoliation.
- Pine needleminers have one life cycle per year.
- In 2023, localized pine needleminer defoliation was observed in Southern Region.

Regional summary

Southern

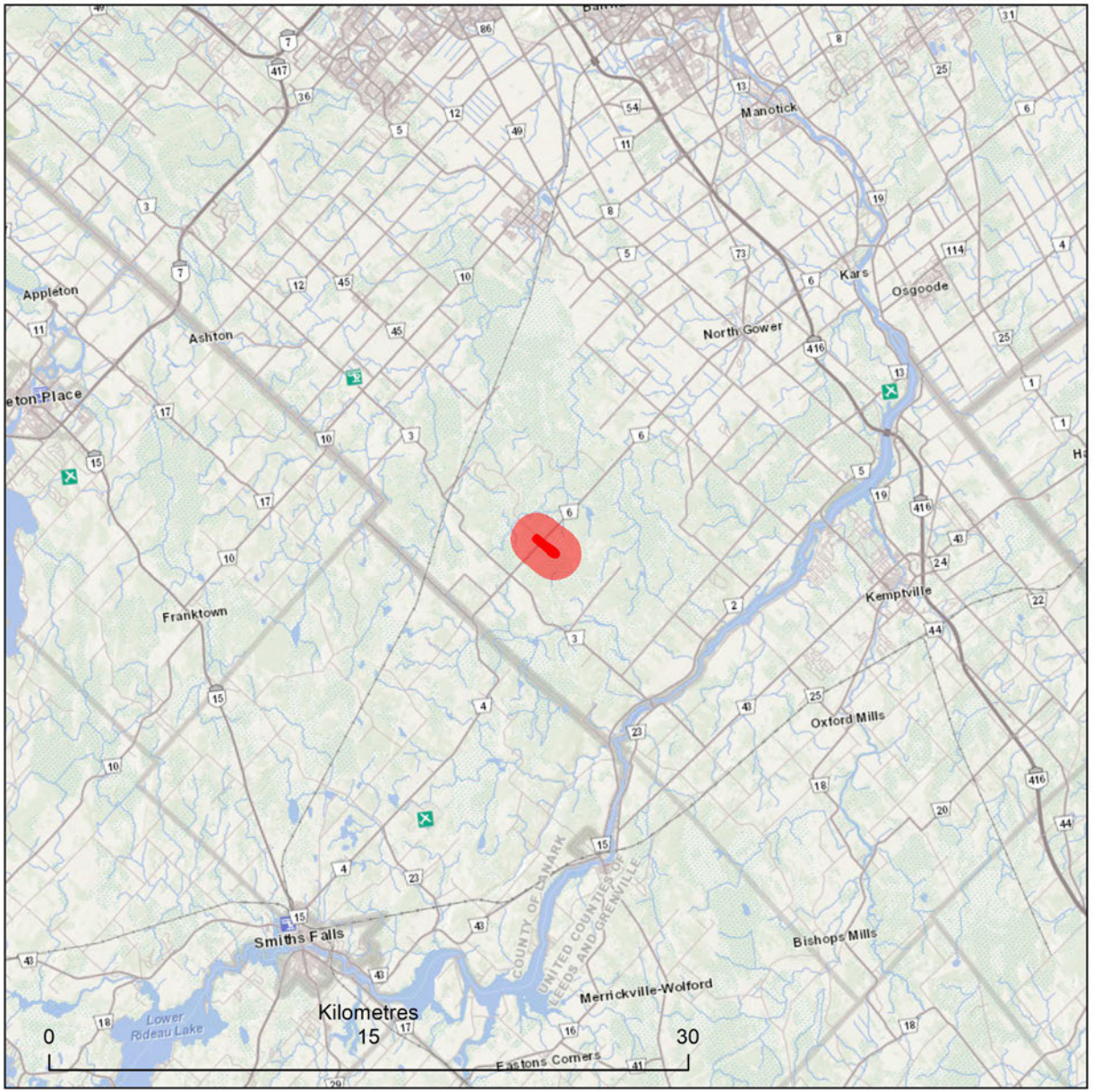
- In Kemptville Kingston District, 66 ha of moderate to severe pine needleminer defoliation were mapped during aerial surveys in the City of Ottawa. Defoliation was in a large stand of semi-mature jack pine on Roger Stevens Road, north of Burritt's Rapids. Needleminers were numerous, affecting all jack pines in the stand.

Pine needleminer 2023

Areas in Ontario where pine needleminer caused defoliation

Moderate to severe = 66 ha

Area of moderate to severe defoliation



White pine blister rust

Pest information

Common name:	White pine blister rust
Scientific name:	*Cronartium ribicola* J. C. Fisch.
Pest origin:	Invasive — native to Asia and Europe
Pest type:	Rust disease
Host species (Ontario 2023):	Eastern white pine
Infestation area:	Localized

Provincial key facts

- This disease is relatively common throughout Ontario where Ribes spp. (the alternate host) occur near five needle pine.
- It causes branch dieback, reduces growth, and, if infection reaches the stem, eventually kills the tree.
- Porcupine damage can be present on trees with white pine blister rust since they are attracted to the sweet sap at the canker.
- In 2023, white pine blister rust plantation surveys were completed in four white pine plantations in Northeast Region.

Regional summary

Northeast

- In Timmins Kirkland Lake District, annual white pine blister rust plantation surveys were completed in Evanturel, Eby, and Ingram townships. The Evanturel Twp plantation had the highest occurrence of white pine blister rust (39%) compared to the Ingram Twp (23%) and the Eby Twp (1%) plantations. Evanturel also had the most porcupine damage (14%) compared to Ingram (4%) with none recorded at Eby.
- In North Bay District, an annual white pine blister rust plantation survey was completed in Gurd Twp. About one third of the tree crowns on the south side of the plantation had been mechanically cut. White pine blister rust had affected 19% of the trees, most (97%) were non-severe infections (branches). Porcupine damage was found on 11% of the trees.

White pine weevil

Pest information

Common name:	White pine weevil
Scientific name:	*Pissodes strobi* (Peck)
Pest origin:	Native to North America
Pest type:	Shoot borer
Host species (Ontario 2023):	Eastern white pine
Infestation area:	Localized

Provincial key facts

- In eastern North America, white pine weevil occurs throughout the range of its preferred host, eastern white pine.
- Although it mostly affects eastern white pine, it may damage other species of pine and spruce.
- White pine weevil prefers young trees in plantations and stands without overstory cover.
- This pest targets the terminal leader, and its presence is detected by the drooping, wilted appearance of the current year's leader called a shepherd's hook.
- Repeated attacks can result in deformed and multi-stemmed trees, reducing wood quality and merchantable timber volume.
- In 2023, white pine weevil affected eastern white pine in Peterborough Bancroft District.

Regional summary

Southern

- In Peterborough Bancroft District, severe white pine weevil damage was observed on Hwy 28 north of Apsley, North Kawartha Twp. Larvae caused shoot damage to multiple terminal leaders of young eastern white pine trees. The trees had a shrub-like form from several years of infestation. White pine weevil damage was also recorded intermittently along County Road 507 between Buckhorn and Gooderham. Light white pine weevil damage was observed on three young open-grown eastern white pine trees at Windy Ridge Conservation Area in Omemee.