STATUS OF IMPORTANT FOREST PESTS IN ONTARIO IN 2003

by

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OVERVIEW

In 2003, the Canadian Forest Service and Ontario Ministry of Natural Resources deployed a team of 12 Forest Health Technicians throughout Ontario. The season's activities included a cooperative study of the aspen decline/mortality problem in northeastern Ontario. Based on aerial surveys, it is clear that aspen decline/mortality increased in 2003 to over 500 000 ha. The area defoliated by spruce budworm (*Choristoneura fumiferana* Clem.), increased to 230 000 ha, whereas the area defoliated by gypsy moth (*Lymantria dispar* [L.]) and forest tent caterpillar (*Malacosoma disstria* Hbn.) declined to 59 000 ha and 4 500 000 ha respectively. Large aspen tortrix (*Choristoneura conflictana* [Wlk.]) defoliated a total of 5 179 ha in 2002 and Bruce spanworm (*Operophtera bruceata* [Hulst]) defoliation, which was mapped around Lake of the Woods in 2002, was not evident in 2003.

Continued emphasis was placed on introduced pests in 2003. Both the emerald ash borer, *Agrilus planipennis*, which occurred across Essex County in Southwestern Ontario, and the Asian Longhorned beetle, *Anoplophora glabripennis*, which was discovered in the cities of Toronto and Vaughan were major concerns in Ontario this year. Both insects are native to temperate forests in Asia and were introduced into Ontario within the last 4-6 years.

FOREST INSECTS

Spruce Budworm, *Choristoneura fumiferana* Clem.

The area of moderate-to-severe current defoliation caused by spruce budworm totalled 229 726 ha in 2003, an increase of 98 603 ha from 2002 (Table 1). Increases were noted in all three OMNR regions but were particularly significant in northeastern Ontario in the North Bay District. All of the decreases in area of defoliation occurred in northeastern Ontario in the North Bay District. There was a slight increase in the Sudbury District. Infestations also occurred in the Bancroft, Pembroke and Kemptville districts.

Table 1: Gross area of moderate-to-severe defoliation caused by the spruce budworm in Ontario, 2000 - 2003.

Region	Area (ha)			
District	2000	2001	2002	2003
Northwest				
Kenora	0	0	0	1 188
	0	0	0	1 188
Northeast				
North Bay	87 646	127 788	88 607	158 305
Sault Ste. Marie	130	0	0	0
Sudbury	16 242	32 298	32 734	41 071
	104 018	160 086	121 341	199 376
South Central				
Bancroft	0	0	439	3 805
Kemptville	129	1431	2 435	2 117
Pembroke	10 933	8 305	6 908	22 818
Peterborough	0	0	0	422
	11 062	9 736	9 782	29 162
TOTAL	115 080	169 822	131 123	229 726

Gypsy Moth, *Lymantria dispar* (L.)

Gypsy moth infestations decreased considerably in 2003 to a total area of 59 413 ha of moderate-to-severe defoliation mapped this year, compared to 153 674 ha mapped in 2002 (Table 2). Much of the defoliation, 25 732 ha, occurred in or near Parry Sound. Virus and fungal diseases, including *Entomophaga maimaiga*, were generally prevalent in larval populations this year.

Table 2: Gross area of moderate-to-severe defoliation caused by the gypsy moth in Ontario, 2000 - 2003.

Region	Area (ha)			
District	2000	2001	2002	2003
Northeast				
North Bay	217	183	0	0
Sault Ste. Marie	0	0	0	130
Sudbury	0	6 391	136 878	979
	217	6 574	136 878	1 109
South Central				
Aylmer	891	5	0	0
Bancroft	0	238	799	5216
Guelph	17 606	0	0	0
Kemptville	0	0	364	938
Midhurst	0	0	3 539	11 728
Parry Sound	0	0	7 666	25 732
Pembroke	18	528	2 098	0
Peterborough	0	0	2 330	14 690
	18 515	771	16 796	58 304
TOTAL	18 732	7 345	153 674	59 413

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

The total area of forest tent caterpillar defoliation in the province continued to decline in 2003 to a total area of 4 490 000 ha, compared to 8 245 964 ha in 2002 (Table 3). Large decreases occurred in every district except Nipigon, where there was a significant increase in damage for the second consecutive year. As in 2002, the largest decrease occurred in the Northwest Region where 2 757 629 ha of moderate-to-severe defoliation was mapped, compared with 5 821 878 ha in 2002.

Table 3: Gross area of moderate-to-severe defoliation caused by the forest tent caterpillar in Ontario, 2000 - 2003.

Region	Area (ha)			
District	2000	2001	2002	2003
Northwest				
Dryden	1 655 278	2 053 529	1 389 513	0
Fort Frances	1 832 570	2 351 938	643 256	6 345
Kenora	1 222 642	1 657 053	2 685	0
Nipigon	717	10 755	363 406	857 302
Red Lake	530 163	1 940 113	0	0
Sioux Lookout	421 986	1 166 290	530 450	0
Thunder Bay	307 422	1 307 598	2 892 569	1 893982
	5 970 778	10 487 276	5 821 879	2 757 629
Northeast				
Chapleau	1 139	880	614	0
Cochrane	131 732	47 447	10 017	0
Hearst	274 687	240 926	175 126	141 690
Kirkland Lake	501 414	1 130 928	894 615	418 379
North Bay	19 675	320 146	300 769	318 330
Sault Ste. Marie	283	10 038	11 869	26 549
Sudbury	27 131	368 560	809 822	608 301
Timmins	246 921	357 951	168 376	155 477
	1 202 982	2 476 876	2 371 208	1 668 726
Southcentral				
Bancroft	0	22 421	0	0
Midhurst	5 823	54 785	2 356	2 798
Parry Sound	30 849	235 672	50 522	60 889
Peterborough	0	2 985	0	0
	36 672	315 836	52 878	63 687
TOTAL	7 210 432	13 279 988	8 245 965	4 490 042

Pine False Webworm, *Acantholyda erythrocephala* (L.)

The Pine False Webworm defoliated a total of 820 ha in 2003, compared with 2 140 ha of moderate-to-severe defoliation in 2002 (Figure 1). The heaviest damage was again situated in Grey County in the west part of Midhurst District. Here there were some 65 locations of damage

scattered through a general agricultural/reforested area from Chatsworth south to Dornoch and Markdale. The most damage occurred on eastern white pine and to a lesser degree on other pines. This differs somewhat from the past couple of years when Scots pine in the area was also heavily damaged. Because of this difference the total area of damage is reduced from that of 2002. Trees of all age and size classes were affected.

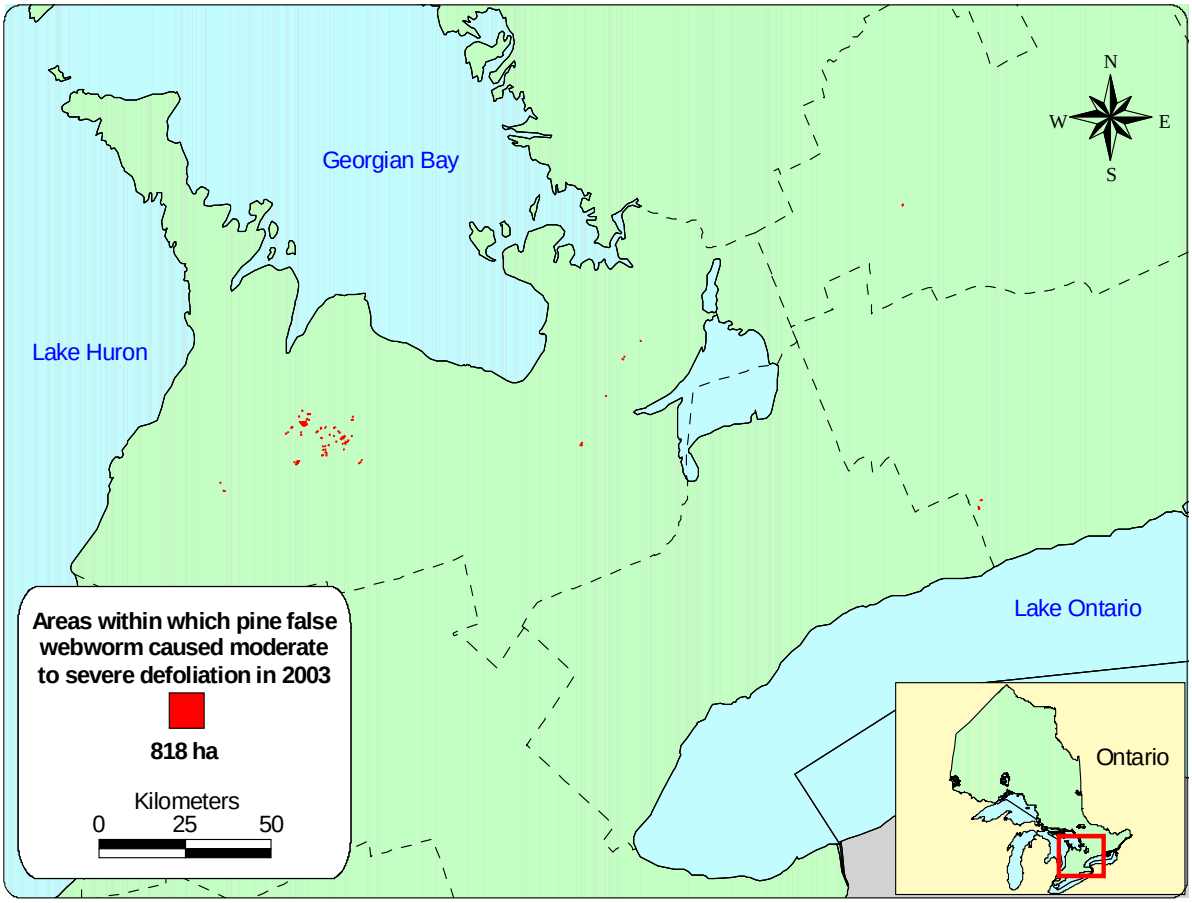


Figure 1. Areas of Pine False Webworm defoliation in Ontario in 2003.

OTHER DEFOLIATING INSECTS

Hemlock Looper, *Lambdina f. fiscellaria* (Gn.)

In 2003 a total of 8 542 ha of defoliation caused by the hemlock looper was recorded in northeastern Ontario in the Sudbury District. Some of the areas heavily damaged in Sudbury and Parry Sound districts in 2002 had varying levels of tree mortality this year. A total of 1 771 ha of nemlock looper-caused mortality was mapped in the Sudbury District, and 384 defoliated ha were detected at the southwest end of Parry Island in the Parry Sound District; no current defoliation was recorded in the Parry Sound District in 2003.

Bruce Spanworm, *Operophtera bruceata* (Hulst)

Moderate-to-severe defoliation was recorded over an area of 17 774 ha of aspen in northwestern Ontario (Figure 2). In 2002 Bruce spanworm defoliated a total of 264 687 ha primarily north and east of Lake of the Woods in northwestern Ontario.

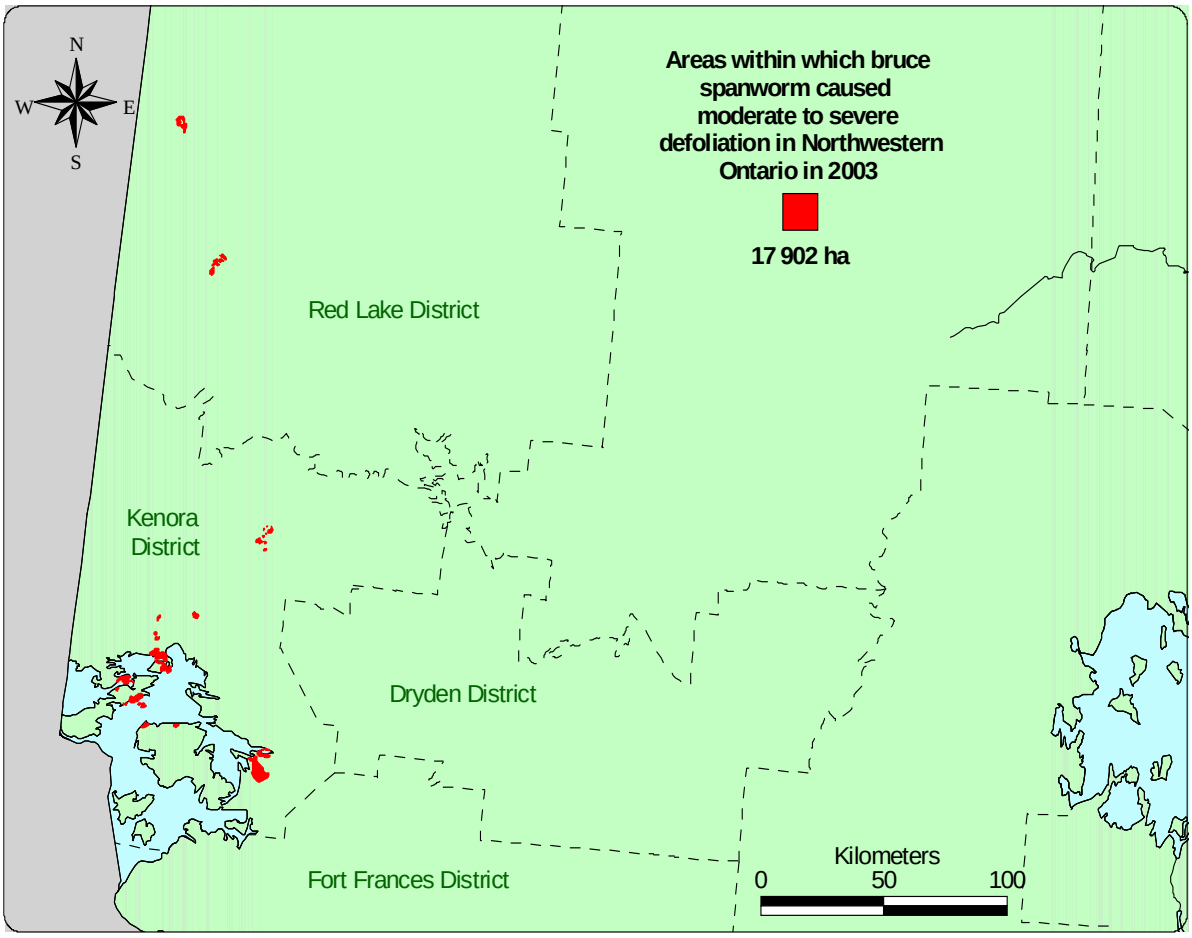


Figure 2 Areas of Bruce Spanworm defoliation in Ontario in 2003.

Larch Casebearer, *Coleophora laricella* (Hbn.)

In 2003 the larch casebearer defoliated 16 800 ha, primarily in eastern Ontario, but also at isolated locations across southern Ontario (Figure 3). This was an increase in defoliation compared to 2002, when 3 700 ha were defoliated across a similar area.

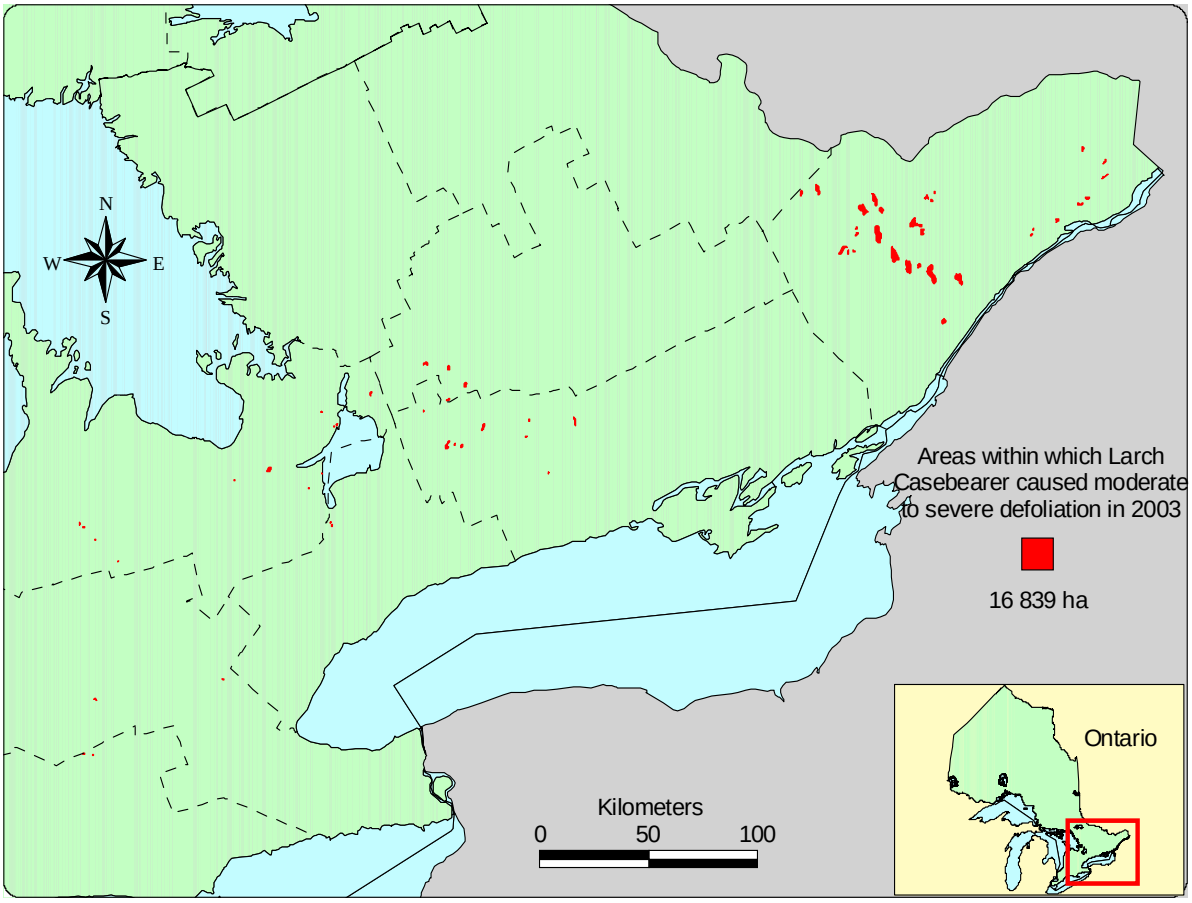


Figure 3. Areas of Larch Casebearer defoliation in Ontario in 2003.

Beetle Activity (*Agrilus sp*)

About 900 ha of balsam poplar mortality was evident in 2003 throughout an area west of Thunder Bay. Stands examined had high levels of an *Agrilus* species (buprestidae) wood borer activity causing the trees to be girdled. A total of 28 pockets in O'Connor, Oliver, Paipoonge and Neebing townships were mapped but mortality probably exists to a lower degree in other stands in the area. Ground checks of numerous stands indicate that most balsam poplar are dead or dying. Balsam poplar is the major species in the stands and in some cases comprises as much as 75%. Trembling aspen trees, the other main tree species in these stands, are living. This area has experienced drought years, forest tent caterpillar defoliation, and a severe winter in 2002-2003 when the area received very little snow with very cold temperatures. Stands examined had buprestid wood borer activity causing the trees to be girdled. The typical D-shaped exit holes were observed on most dead trees. Larvae have been collected from the trees but not yet identified. Adults were collected but may not be associated with the damage.

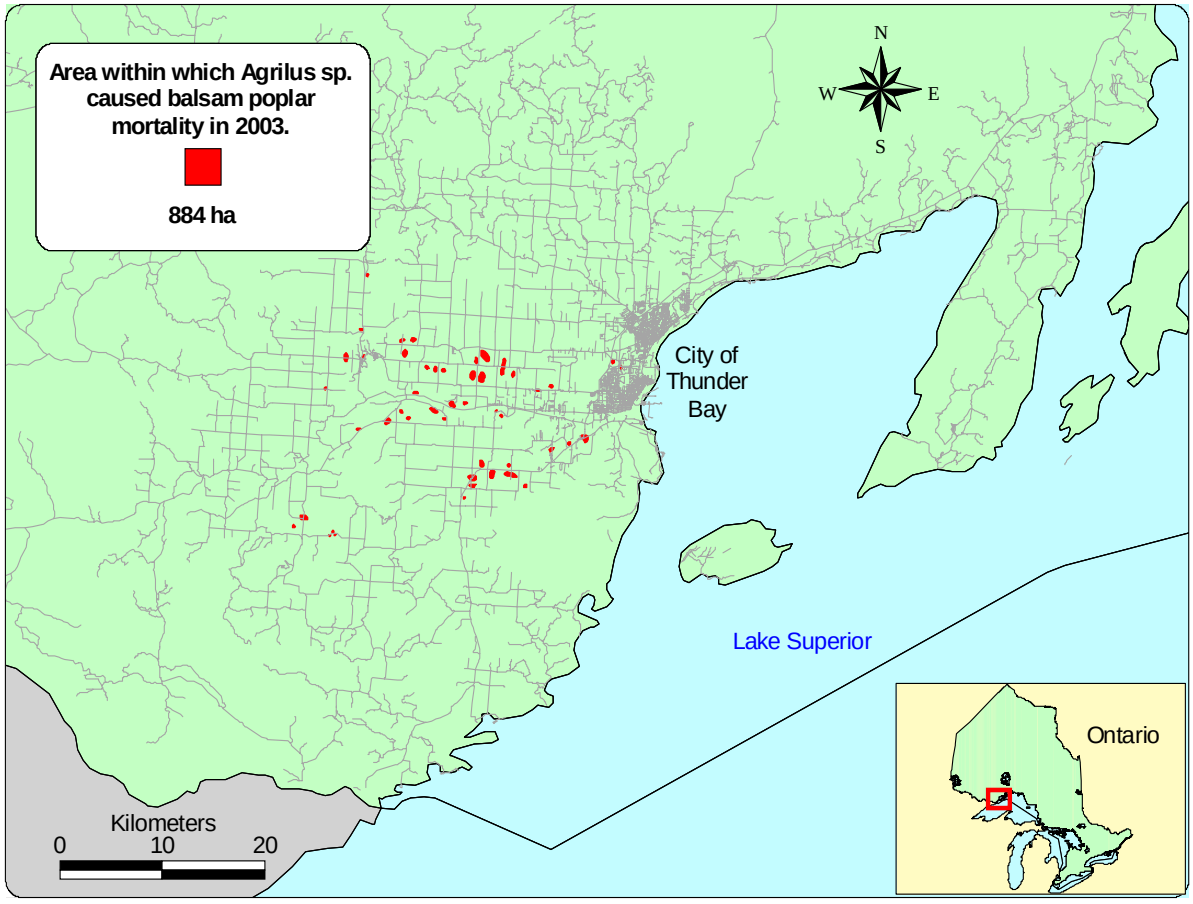


Figure 4. Areas of *Agrilus sp.* damage in Thunder Bay District in 2003.

Hickory Bark Beetle, *Scolytus quadrispinosus* Say

The hickory bark beetle is one of most serious insect pest of hickories. Since 2001, hickory bark beetle has been infesting stands and woodlots in Aylmer district and has since spread into Guelph district. Aerial mapping in 2003 of the hickory bark beetle-infested woodlots disclosed most of the hickory mortality in East and West Williams townships, Middlesex County, Aylmer District and one stand in Stephen Township, and two stands in Usborne Township, Huron County, Guelph District (Figure 5).

Outbreaks of this insect occur, as with other bark beetles, following periods of drought. Adults feed for a short period at the base of leaf petioles and at twig junctions of the host, before flying to the trunks and branches to bore into the bark and construct egg laying galleries, where the most serious damage occurs when populations are high.

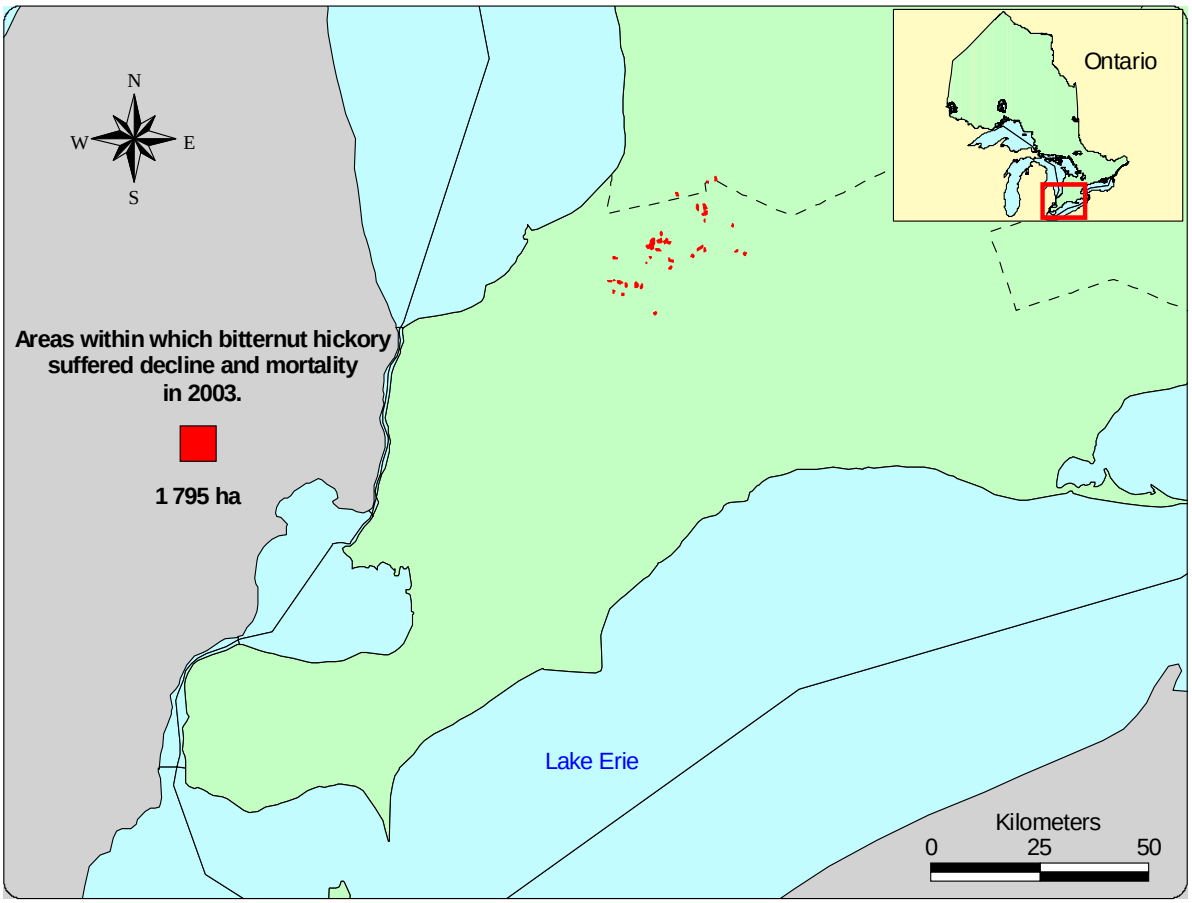


Figure 5. Areas of hickory bark beetle damage in Ontario in 2003.

ABIOTIC

Aspen Decline/Mortality

In 2000, 174 898 ha of aspen decline/mortality was aerially mapped, primarily in the northeast Region of Ontario (Figure 6). In 2001, the area of decline/mortality increased to 319 462 ha; in 2002, the area mapped increased further by 123 072 ha for a total of 442 324 ha (Table 4, Figure 7). Preliminary tree mortality data indicates that about 70% of the aspen are dead compared to an average mortality of 54% for last year. In 2003, an additional 62 700 ha of mortality and decline was mapped, for a total area of 505 022 ha.

Repeated defoliation by the forest tent caterpillar (*Malacosoma disstria* Hbn.) occurred from 1995 to 1999. The second area of damaged aspen stands is located west of Hearst along the Highway 631 corridor. Whole-tree mortality and declining crowns are visibly scattered through the stands although the decline is not as severe as in the Smooth Rock Falls area. Typical boreal mixed-wood forests are also found here growing amongst the Arnott Moraines, which are glacio-fluvial tills characterized by well drained soils.

Figure 6. Aerial view of aspen mortality in Northeastern Ontario.

Table 4: Gross area of aspen decline/mortality in 2000 - 2003.

Region / District	Area (ha) 2000	2001	2002	2003
Northwest				
Nipigon	832	217	880	880
	832	217	880	880
Northeast				
Chapleau	0	0	43	7 069
Cochrane	87 619	128 572	183 929	217 330
Hearst	83 612	177 234	236 688	246 872
Kirkland Lake	0	2 692	5 313 938	7 599
Timmins	2 835	10 395	14 315	23 674
Wawa	0	359	1 156	1 598
	174 066	319 252	441 444	504 142
TOTAL	174 898	319 462	442 324	505 022

Other insects including the aspen two-leaf tier, *Enargia decolor* (Wlk.) and the aspen leafroller, *Pseudexentera oregonana* (Walsingham), have caused multiple years of defoliation from 1989-1994. Drought damage and potential freeze-thaw events are also believed to be involved.

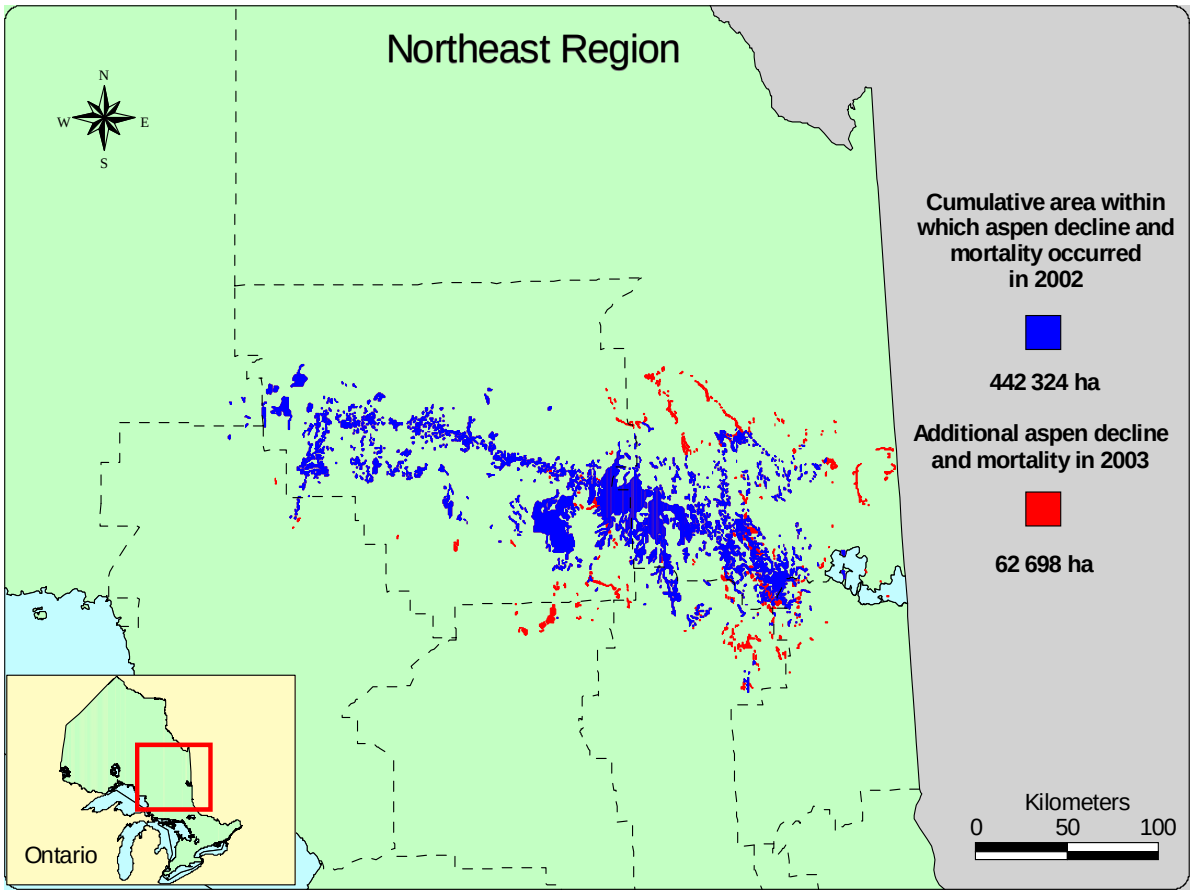


Figure 7. Areas of aspen mortality/decline in Ontario in 2003.

INVASIVE FOREST PESTS

Emerald Ash Borer, *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae)

The emerald ash borer, EAB, was first detected in North America in the spring of 2002, in southeastern Michigan, near Detroit. Based upon evidence collected from dead green ash trees (*Fraxinus pennsylvannica* var. *subintegerrima* [Vahl] Fern), it was concluded that it had been present in Michigan for at least five years. This insect is native to Asia, and was likely transported to North America in solid wood packing material, or in logs that are used to stabilize cargo within containers during shipping.

In July 2002 infested ash trees were detected within the city limits of Windsor, in

southwestern Ontario by a team of forest health technicians from the Canadian Forest Service and the Ontario Ministry of Natural Resources. Subsequent surveys by the Canadian Food Inspection Agency (CFIA) have shown that the beetle has spread through much of Essex County and into the adjoining Chatham-Kent (Figure 8).

In Ontario, the emerald ash borer attacks stressed and healthy, urban and forest trees of all sizes. Other biotic and abiotic factors have been affecting the health of ash trees in Ontario for the past several years. Some of these other factors can result in symptoms that are very similar to those displayed by trees that are infested with the EAB, making it critical to properly identify which factor is actually affecting a particular tree.

The EAB was previously unknown in North America and little was known of the beetle in its native range. Because of this, the CFIA requested the assistance of the CFS in conducting a research program to study:

- The development of early detection methods for trees infested with EAB.

- Trapping methods for the detection of adult insects. As part of any control program development of effective traps to locate the insects before they infest new trees is critical. Woodborers such as EAB are usually attracted to trees by odours or colour. Work is underway to test the effectiveness of different traps.

- The effectiveness and movement of tree-injected insecticides to control EAB. A study has been initiated to evaluate imidacloprid, a synthetic chemical, as a systemic insecticide to kill EAB larvae feeding under the bark. There is no single answer to the control of EAB. Current techniques to control the spread of EAB rely on tree removal and destruction of the infested wood. While this will likely remain the most effective approach, methods are urgently needed so that we can avoid complete elimination and destruction of valuable trees from streets or parks.

- The biology and seasonal development of the insect to determine emergence patterns, adult longevity, possible natural enemies. Conduct an examination of site and tree factors affecting susceptibility and vulnerability to damage by EAB, and determine what species of ash and other hardwoods EAB can attack.

- The dispersal distance for EAB in a single season and to determine the conditions that influence it to take flight. One of the key questions is, how far can this beetle fly? The beetle was not believed to be a strong flier in its native habitat. However, work conducted by the CFS has shown that the beetle can fly up to 5 km per day, which has greatly influenced the size of the firebreak needed to contain the insect. Based on these and other findings, the CFIA is attempting to contain the beetle through the creation of a 10 km wide firebreak between Lake St Clair and Lake Erie (see Figure 8) within which all ash trees will be removed. In addition, a 10 km area of suppression (from which all infested trees will be removed), will be established west of the no ash zones.

- The development of early detection methods for trees infested with EAB. Presently EAB is

detected only when the tree shows evidence of insect galleries, or beetles have emerged, creating their classic D-shaped holes. EAB can also attack the top of the tree, making exit holes impossible to observe. To detect new infestations and to prevent the further spread of the insect, identification of early symptoms is needed.

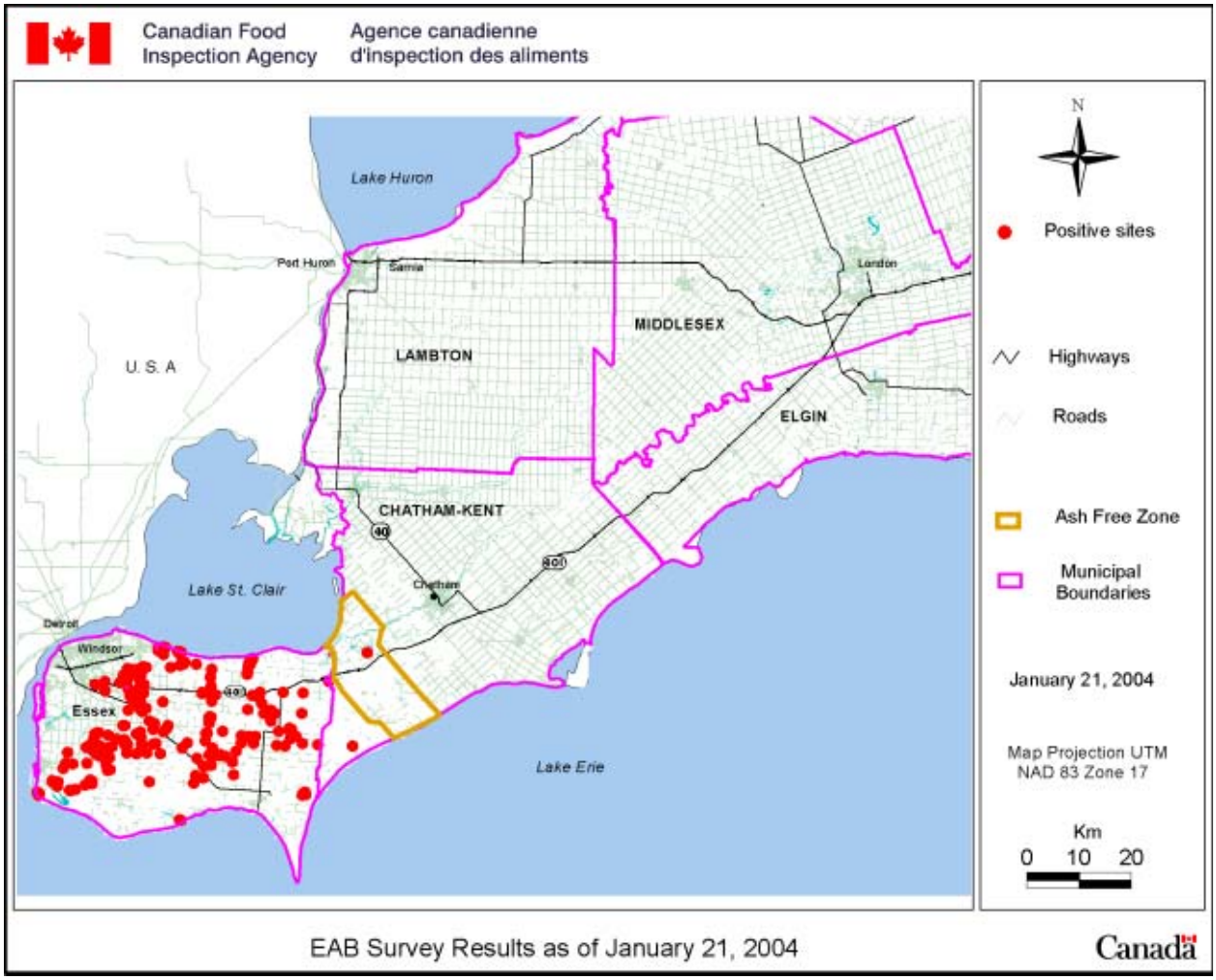


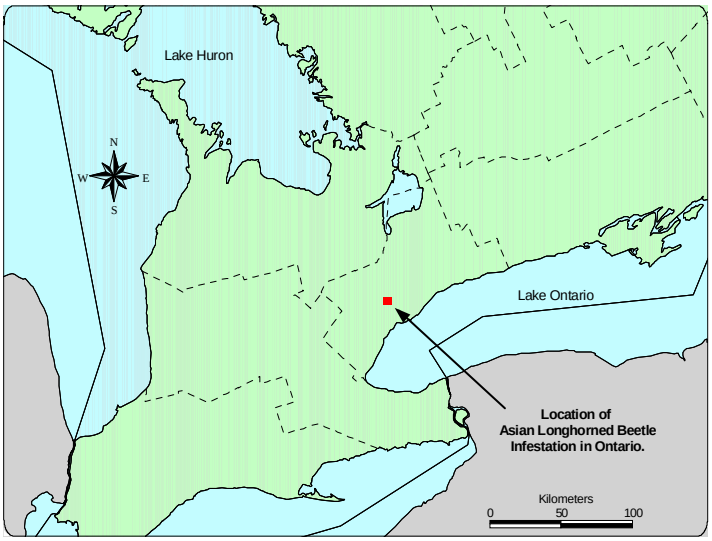
Figure 8. Results of CFIA survey for emerald ash borer in Ontario.

Asian Longhorned Beetle, *Anoplophora glabripennis*

The Asian longhorn beetle (ALHB) was discovered in the Toronto/Vaughan area in September, 2003 (Figure 9) . This insect was first discovered in the mid 1990s in Chicago and New York and subsequently in New Jersey. In Canada the CFIA had intercepted the beetle at various locations in Ontario but this was the first record of an established population in Canada. Numerous infested trees have been located in industrial, residential and park areas by the CFIA in North Toronto and the adjacent community of Vaughan. Like the EAB, Asian Longhorned

beetle is an exotic insect pest from Asia that likely arrived in wood packing material in the industrialized area in which it was found.

The ALHB attacks many hardwood species in Canada, but prefers maple, elm, birch and sycamore. While some pest management alternatives are being experimentally tested, tree removal is still the only viable control method. A number of other science based issues such as clarification of susceptible tree species in the Toronto area, and rate of insect spread and population growth are still unclear.



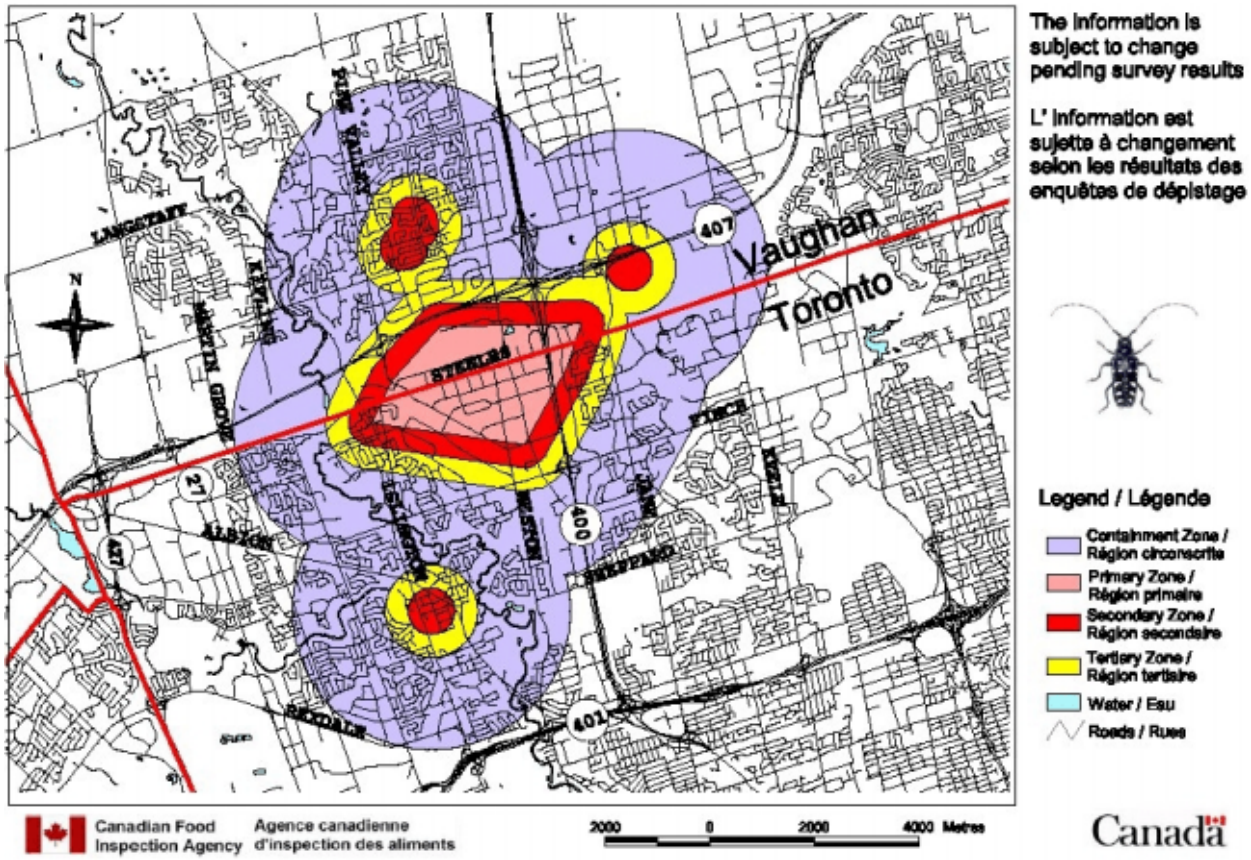


Figure 9. Areas of Toronto and Vaughan infested by the Asian Longhorned Beetle in 2003.

Beech Bark Disease (*Nectria coccinea* var. *faginata*)

Since the late 1960s, surveys have detected heavy infestations of beech scale *(Cryptococcus fagisuga* Lind.) in numerous woodlots in southern Ontario; the insect is now known to be distributed across southern Ontario. Although confirmed samples of beech bark disease from Ontario have not been previously reported, it has been suggested that the disease has been present in Ontario for some 10 years (D. Houston pers comm.). In 1999, ten positive locations with the disease were identified and confirmed in southern Ontario. The first location was in the southern portion of Murray Township in Hastings County, northwest of the city of Trenton (Figure 10).

In areas of eastern Canada where the disease has been present for a long time, diseased beech trees are identified by the warty appearance on the stem from the numerous cankers. However, in Ontario the disease is in its early stages in most locations and does not always show the classic symptoms typically identified with beech bark disease in more established areas.

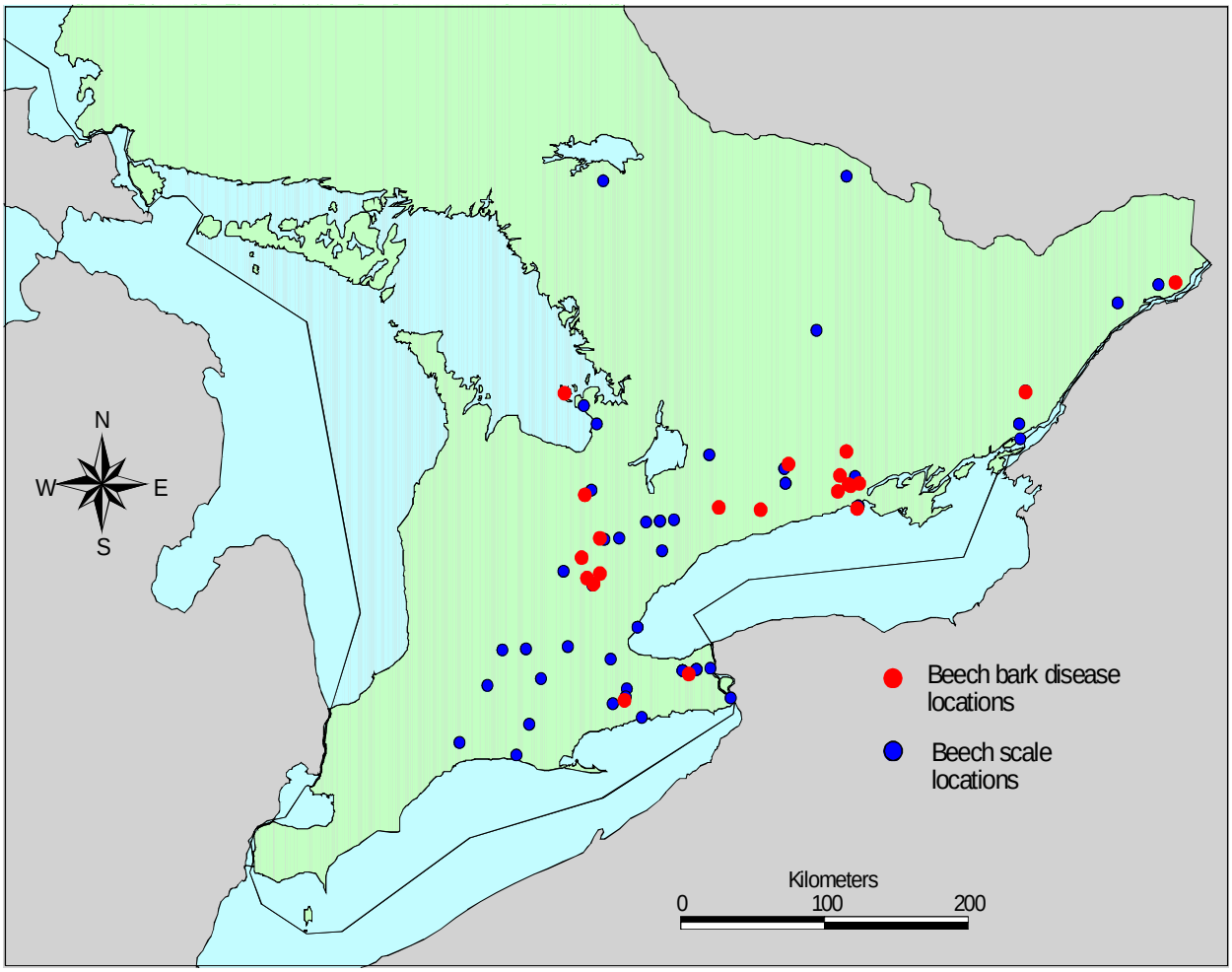


Figure 10. Known locations of Beech Bark Disease and Beech Scale in Ontario in 2003.

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