

**FOREST HEALTH CONDITIONS**  
**IN THE**  
**SOUTHCENTRAL REGION OF ONTARIO**  
**2002**

FOREST DISTRICTS: *Aurora, Aylmer, Bancroft, Guelph,  
Kemptonville, Midhurst, Parry Sound,  
Pembroke and Peterborough*

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## Abstract

In 2002 the status of major forest disturbances, forest health and quarantine pests in the South Central Region of Ontario were reported on by the Forest Health Monitoring Unit (FHMU) of the Canadian Forest Service (CFS) and the Ontario Ministry of Natural Resources (OMNR), under a cooperative Memorandum of Agreement (MOA).

In 2002 the emerald ash borer, *Agrilis planipennis* Fairmaire, was found in southwestern Ontario in the Windsor area. It was deemed to be of quarantine significance and is now regulated. Other introduced pests included: gypsy moth, *Lymantria dispar* (L.), which caused moderate-to-severe defoliation on 16 796 ha, in six districts; the pine false webworm, *Acantholyda erythrocephala* (L.), which infested a total of 2 140 ha; and, Dutch elm disease, *Ophiostoma ulmi* (Buisman) Nannf., which was found across most of southern Ontario. Detection surveys were conducted for pine shoot beetle, *Tomicus piniperda* (L.) in support of Canadian Food Inspection Agency's regulatory actions.

There was a major decrease from 315 836 ha in 2001 to 52 878 ha this year in the area infested by forest tent caterpillar, *Malacosoma disstria* Hbn. The area damaged by large aspen tortrix, *Choristoneura conflictana* (Wlk.) was reduced from 8 264 ha to 2 249 ha and the spruce budworm, *Choristoneura fumiferana* (Clem.) defoliated area was down somewhat to 131 123 ha. Hemlock looper, *Lambdina f. fuscicollaria* (Gn.) defoliation recurred and areas of tree mortality caused by the hickory bark beetle have increased to 409 ha. The severe drought of 2001 resulted in branch and whole tree mortality on a total of 6 719 ha in seven of nine districts of the region. There were also areas of damage as a result of snow damage and blowdown recorded in 2002.

## OVERVIEW

This report deals with forest health conditions in the Southcentral Region of the province of Ontario for the year 2002. The Southcentral Region consists of the nine districts as defined by the Ontario Ministry of Natural Resources (OMNR) geographical boundaries and includes most of the area south of the French River or what is generally considered to be “southern Ontario”. The results as presented are in three sections: major forest disturbances, exotic quarantine pests and forest health monitoring.

The headline of the season was the discovery of a new pest, the Emerald ash borer, in the Windsor area. This unfortunate occurrence resulted from an accidental importation of this exotic pest from Asia. The infested area is under quarantine with the hope that it can be contained or eradicated. Other exotics that were monitored during 2002 were the pine shoot beetle and satin moth.

The varied forest cover types makes for interesting problems. Typically the areas of damage are not widespread but tend to be more localized in nature. Counter to this was the extensive drought in 2001 and this has resulted in numerous areas of damaged trees this year in the form of branch and whole tree mortality. There was an increase in the number of instances of trees suffering attacks from beetles which have been generally considered to be secondary insects and not primary tree killers. A dramatic increase in the population levels and damage of the gypsy moth occurred with defoliation reports from six districts but this was offset by reductions in both numbers and area affected by forest tent caterpillar. There was damage from several other agents, which were serious but more localized in occurrence. These include pine false webworm, spruce budworm, larch casebearer, hemlock looper, hickory bark beetle, Dutch elm disease and damage from blowdown and snow.

Trends in forest health are obtained through the monitoring of a variety of established plots. There are a number of plots in a variety of forest stands and types. Ongoing studies are related to drought damage, ice storm damage, long term effects of air pollution and climate change. The plots include ones that were formerly called the international North American Maple Project (NAMPP) plot network; the former national Acid Rain National Early Warning System (ARNEWS) plot system; and a mixture of regional plots that include oak health plots and OMNR growth and yield plots.

The forest health monitoring is conducted by staff from OMNR and the Canadian Forestry Service (CFS) of Natural Resources Canada. It is made possible by an annual agreement between OMNR and the CFS. In the Southcentral Region the CFS personnel were Hugh Evans ([hevans@nrcan.gc.ca](mailto:hevans@nrcan.gc.ca)) based in Angus and Doug Lawrence working the far southwestern part out of St. Williams. The OMNR staff included Wayne Ingram ([wayne.ingram@mnr.gov.on.ca](mailto:wayne.ingram@mnr.gov.on.ca)) stationed at Kemptville and Ed Czerwinski ([ed.czerwinski@mnr.gov.on.ca](mailto:ed.czerwinski@mnr.gov.on.ca)) in the central area around Peterborough.

The authors acknowledge the support and assistance of others in the CFS and OMNR as well as personnel in forest industry, the Canadian Food Inspection Agency and numerous other organizations without whose efforts and contributions this joint report would not be possible.

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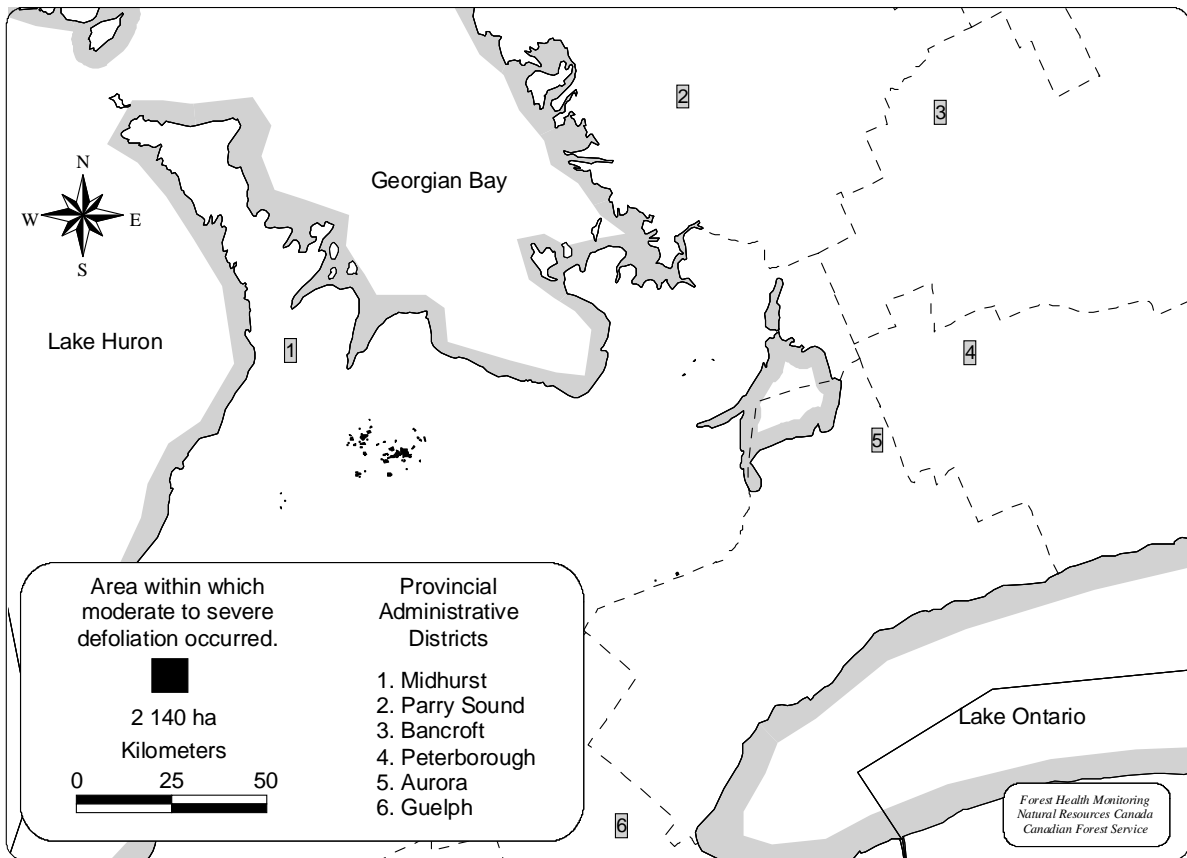
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# MAJOR FOREST DISTURBANCES

## Insects

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

The pine false webworm repeated as one of the most damaging pests of plantation trees in the Southcentral Region. The total area of moderate to severe defoliation was 2 140 ha which compares to 2 403 ha in 2001 (Fig.1).



**Figure 1.** Area within which pine false webworm (*Acantholyda erythrocephala* (L.)) caused moderate to severe defoliation in 2002.

The heaviest and also the most extensive damage recurred in Grey County, Midhurst District where there was an area of 2 006 ha affected. The affected stands were within a triangular area between the communities of Chatsworth, Markdale and Chesley. Here pines in numerous stands were affected with moderate to severe defoliation. The damage was extremely heavy in many situations. The favored host in this area was eastern white pine, *Pinus strobus* L.,

but Scots pine, *Pinus sylvestris* L., was also heavily damaged. Damage on red pine, *Pinus resinosa* Ait., was less severe. Trees of all age and size classes were affected.

Comparatively small areas of infestation occurred in Bruce County, Midhurst District. There were four areas totaling 40 ha delineated along the Saugeen River southeast of Paisley. The areas were in proximity to the Brant Tract of the Bruce County Forest. This large area of pine was treated with an aerial application of Neem in 2002 as well in 2001. The resultant foliage protection appears to be good.

Likewise aerial spraying, in past years, appears to have significantly reduced the area of damage in Simcoe County, Midhurst District. Overwintering population surveys revealed that numbers were not high enough to warrant a spray program in 2002. Areas of defoliation have been reduced and totaled only 94 ha in 2002. Areas of moderate to severe defoliation were aerially mapped in the New Tecumseth, Adjala-Tosorontio, Oro-Medonte and Springwater townships. There were locations of population increases noted in Essa Township on young red pine and in adjacent Scots pine stands of CFB Borden.

There was no visible damage in previously affected areas of Peterborough and Aurora districts in 2002.

#### **Fall Cankerworm, *Alsophila pometaria* (Harr.)**

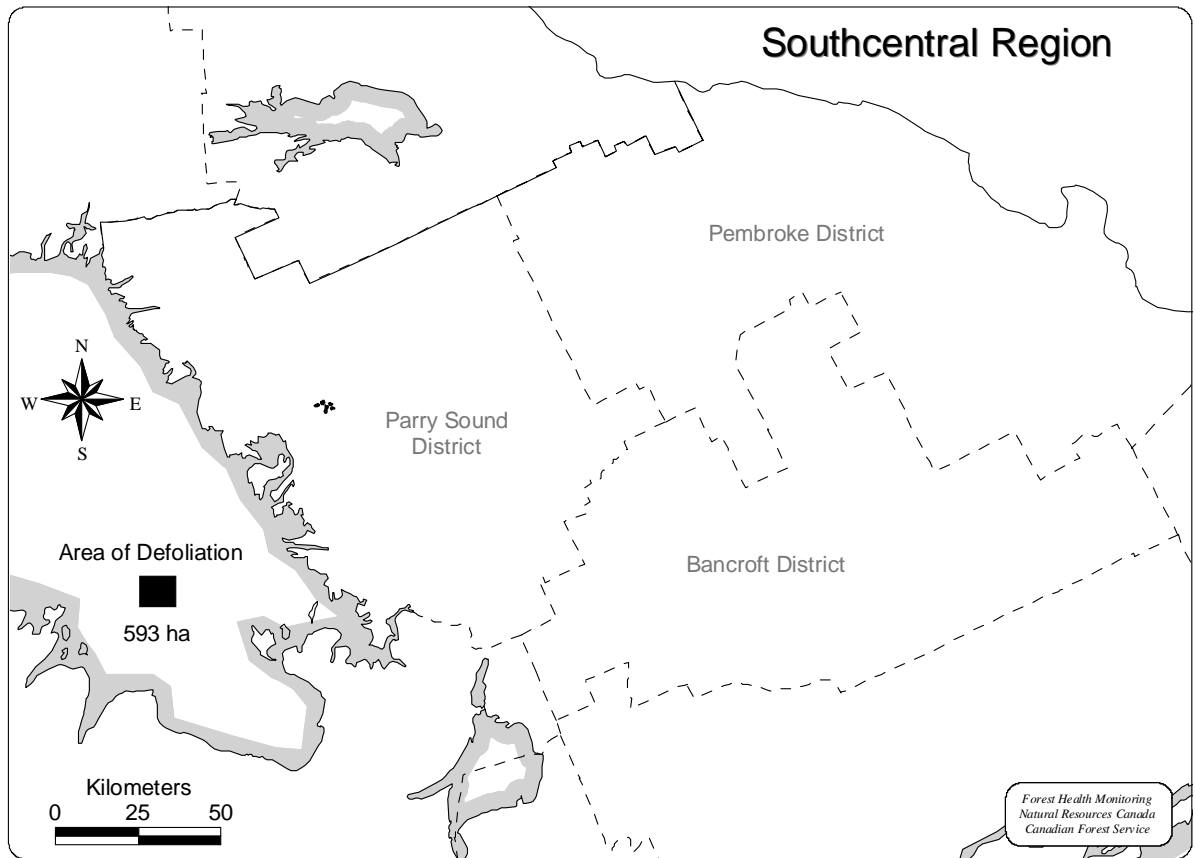
There was a total of five areas of moderate to severe defoliation caused by the fall cankerworm. The infested areas were in the Manitouwabing Lake area, of McKellar Township, Parry Sound District and totalled 593 ha in size (Fig. 2). A variety of deciduous hosts were affected including sugar maple, *Acer saccharum* Marsh. but the heaviest damage, often resulting in complete defoliation, was on basswood, *Tilia americana* L. It is interesting to note that the literature states that the distribution of this pest in Ontario more or less coincides with that of basswood. Also in the Parry Sound District light to moderate defoliation occurred along Highways 69 and 559 in Carling Township. Ten percent defoliation was recorded in a sugar maple stand in Prince Edward County, Peterborough District.

#### **Poplar Flea Beetle, *Altica populi* Brown**

The poplar flea beetle is a defoliator of balsam poplar, *Populus balsamifera* L. The feeding damage of the larvae turn the leaves a distinct bronze colour. The total area delineated in 2002 with damage from this pest was 3 547 ha (Fig.3).

The largest areas of damage occurred in the Pembroke District where there was a total of 3 220 ha of moderate to severe defoliation. The main infestation consisted of a number of small pockets centred around Clear Lake in Bonnechere Valley (formerly Sebastopol) Township. Areas of damage extended from Barry's Bay to Renfrew. Also in the Pembroke District there were locations of damage in McLaughlin, Dickson and Anglin townships within Algonquin Park.





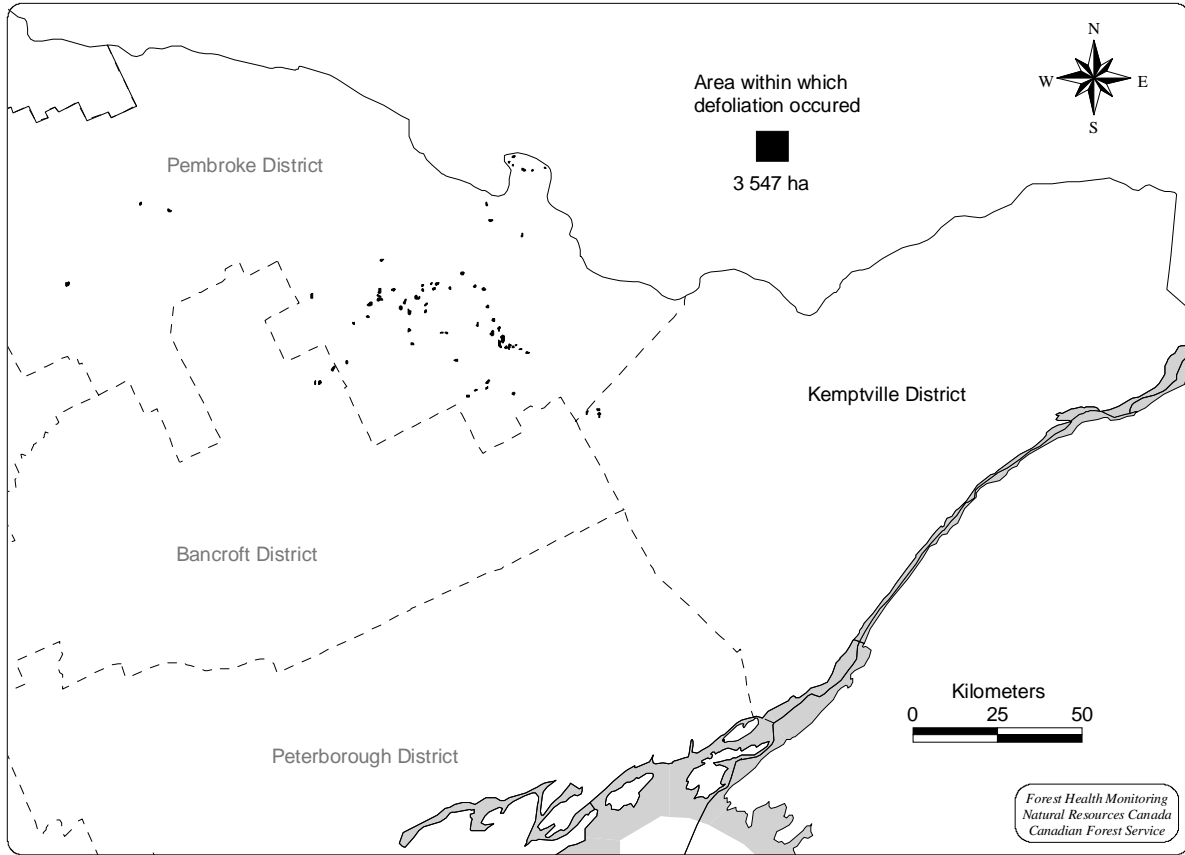
**Figure 2.** Area within which fall cankerworm (*Asophila pomataria* (Harr.)) caused moderate to severe defoliation in 2002.

Relatively small areas of infestation were delineated in the area north of Lanark, Kemptville District (167 ha) and in Addington Highlands (formerly Denbigh) Township, Bancroft District (160 ha). Similar damage was reported in balsam poplar stands in the Dundalk area in the south end of Grey County, Midhurst District and along Highway 11 in the north east part of the Parry Sound District.

**Cedar Leafminer, *Argyresthia canadensis* Free. and *A. thuiella* (Pack.)**

High populations of cedar leafminers occurred throughout much of the Aurora, Bancroft, Kemptville, Midhurst, Pembroke and Peterborough districts. Increased numbers caused widespread foliar browning in many areas within these jurisdictions. This was particularly evident in the Kemptville District where a large area of severely damaged eastern white cedar, *Thuja occidentalis* L. was aerially delineated. The infestation was centred in the Kemptville area and extended from the communities of Malakoff and Dwyer Hill in the north, south to the Merrickville and South Gower areas. The total area affected here was 28 336 ha (Fig 4). Within

this area trees have been heavily defoliated for up to 3 years. In the most severe instances trees have suffered top and/or whole tree mortality. Complicating this, is the fact that many of these areas, both here and elsewhere in the Kemptville District, were also affected by drought conditions in the past couple of years.



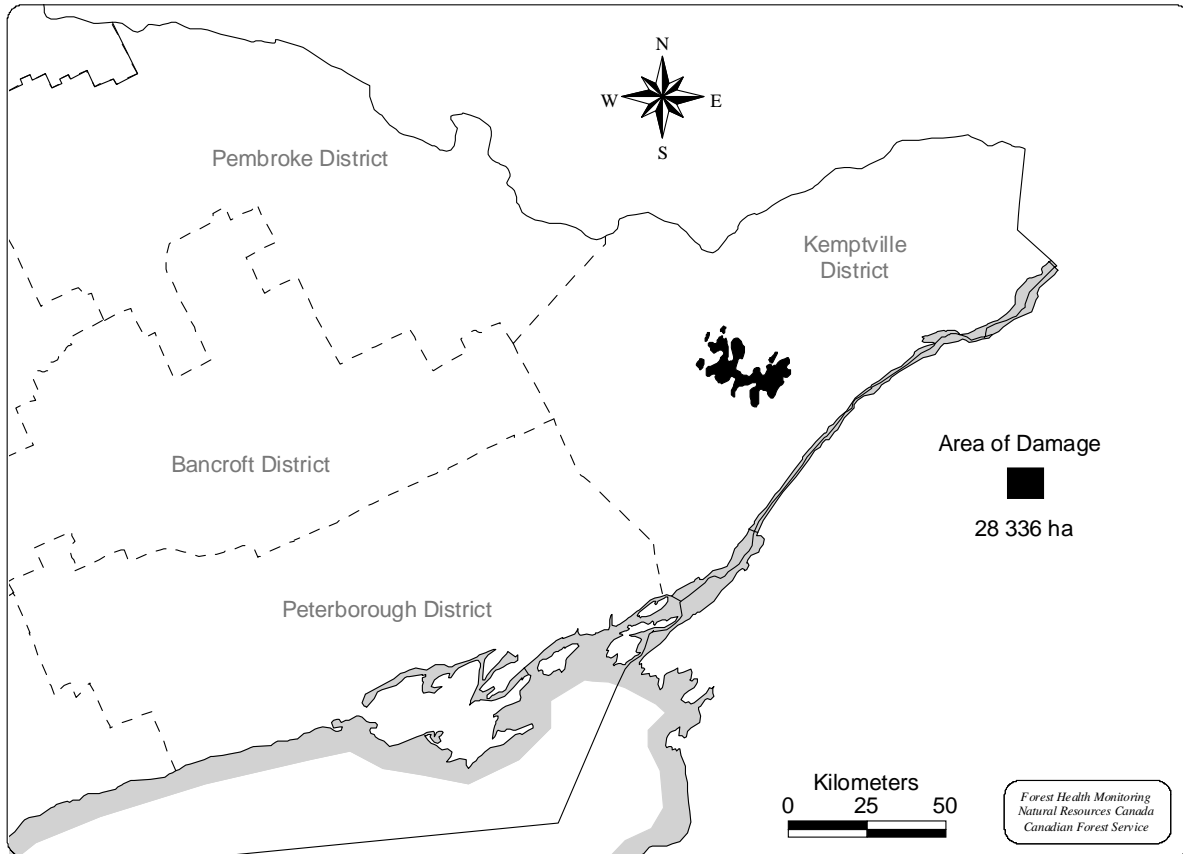
**Figure 3.** Area within which poplar flea beetle (*Altica populi* Brown) caused moderate to severe defoliation in 2002.

### **Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.)**

The large aspen tortrix is a spring defoliator of trembling aspen *Populus tremuloides* Michx. and largetooth aspen, *P. grandidentata* Michx. It is the most serious defoliator of aspen next to the forest tent caterpillar, *Malacosoma disstria* Hbn. In 2002, moderate to severe defoliation by the pest was mapped over a total of 2 249 ha, a reduction from the 8 264 ha in 2001. Areas of damage abated in all three of the districts that had infestations in 2001 (Table 1).

This year the areas of damage totalled 2 112 ha in the Bancroft District and the largest area was in Hastings Highlands (formerly Monteagle) Township but defoliation was also recorded in Carlow and Mayo Township and in Addington Highlands (formerly Denbeigh) Township. There was another 137 ha of defoliation recorded in an adjacent area near Khartum,

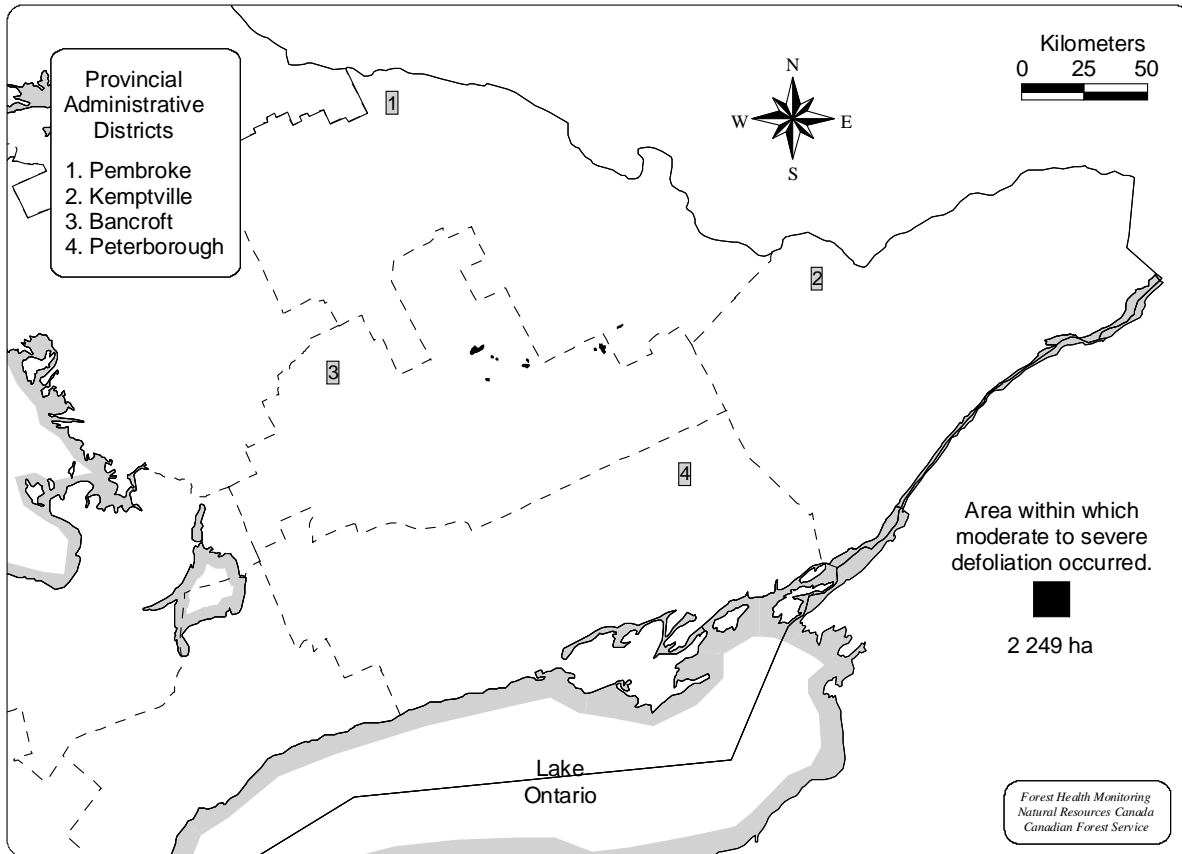
Pembroke District (Fig 5). Elsewhere, there were small areas of light defoliation in the CFB Borden area, Midhurst District and near Dalrymple Lake, Peterborough District.



**Figure 4.** Area within which cedar leafminer (*Argyresthia canadensis* Free. and *A. thuiella* (Pack.)) caused damage in 2002.

**Table 1.** Gross area of moderate to severe defoliation caused by the large aspen tortrix in the Southcentral Region from 1999 to 2002.

District	Area of defoliation (ha)			
	1999	2000	2001	2002
Bancroft	12	12	4 520	2 112
Midhurst	0	0	2 203	0
Pembroke	5	0	1 541	137
<b>Total</b>	<b>17</b>	<b>12</b>	<b>8 264</b>	<b>2 249</b>



**Figure 5.** Area within which large aspen tortrix (*Choristoneura conflictana* (Wlk.)) caused moderate to severe defoliation in 2002.

### **Spruce Budworm, *Choristoneura fumiferana* (Clem.)**

The area of moderate-to severe defoliation in Ontario caused by spruce budworm totalled 131 123 ha in 2002, a decrease of 38 699 ha compared to the 169 822 ha defoliated in 2001. All of the decrease 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, Kemptville and Pembroke districts.

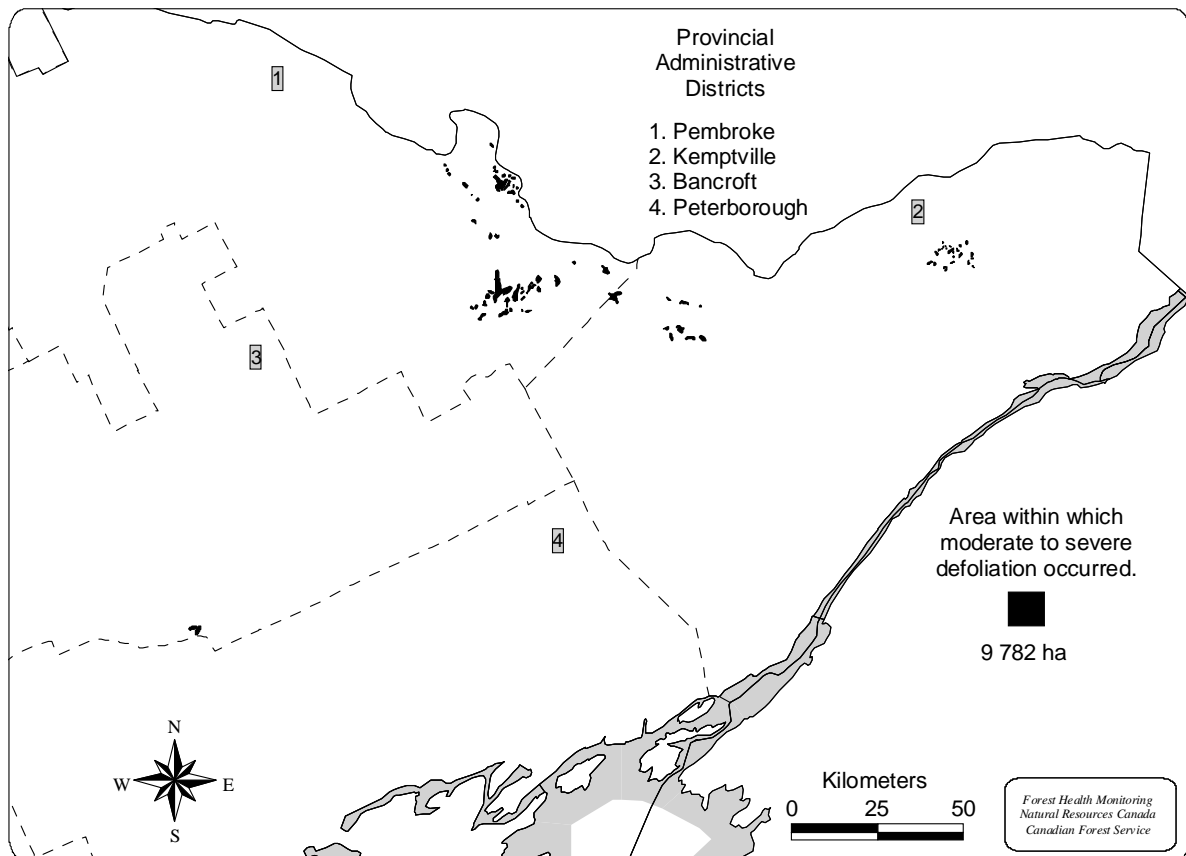
In the Southcentral Region the overall area of defoliation in 2002 of white spruce, *Picea glauca* (Moench) Voss and balsam fir, *Abies balsamea* (L.) Mill. trees caused by the spruce budworm remained similar to that recorded in 2001. There was a slight increase of the infestation by 46 ha. The largest area of damage 6 908 ha was recorded again in the Pembroke District. This was a reduction from the previous year of 1 397 ha but this decrease was offset by increases in both the Bancroft and Kemptville districts (Table 2, Fig. 6). Observations in southeastern Ontario indicate that budworm larval populations may have been adversely affected by late spring frosts. This appeared to reduce the level of damage somewhat but not necessarily the area of damage.

The largest areas of infestation in the Pembroke District occurred in the area from Renfrew through Ferguslea to Shamrock and in the Foresters Falls area along the Ottawa River. There were also several pockets delineated along the Highway 17-Muskrat Lake corridor from Perretton to Haley Station.

In the Kemptville District there were eight areas of moderate to severe defoliation in the Carp-Almonte area and the infestation persisted in some 25 pockets in the LaRose Forest area east of Ottawa. The total area infested was increased to 2 435 ha in 2002.

The infestation in the Bancroft District (439 ha) was new this year and occurred within Petroglyphs Provincial Park. Moderate defoliation ranging from 25-75 percent prevailed on white spruce in the park.

Elsewhere in the region light defoliation occurred in a previously infested area at Balsam Lake Provincial Park, Peterborough District. Here white spruce suffered 10-25 percent defoliation. Low numbers of budworm were also found in white spruce plantations in the town



**Figure 6.** Area within which spruce budworm (*Choristoneura fumiferana* (Clem.)) caused moderate to severe defoliation in 2002.

of Minto (formerly Minto Township) and around the Valens area, Guelph District.

**Table 2.** Gross area of moderate to severe defoliation caused by the spruce budworm in the Southcentral Region from 1998 to 2002.

District	Area (ha)				
	1998	1999	2000	2001	2002
Aurora	36	0	0	0	0
Aylmer	4	0	0	0	0
Bancroft	131	0	0	0	439
Guelph	9	0	0	0	0
Kemptville	15 755	4 524	129	1 431	2 435
Midhurst	27	0	0	0	0
Parry Sound	0	0	0	0	0
Pembroke	9 781	4 290	10 933	8 305	6 908
Peterborough	384	0	0	0	0
Total	26 132	8 814	11 062	9 736	9 782

### Larch Casebearer, *Coleophora laricella* (Hbn.)

The feeding damage by the larch casebearer turns the needles a distinct bronze colour. The most commonly affected host is tamarack, *Larix laricina* (Du Roi) K. Koch but it can also cause defoliation on European larch, *Larix decidua* Mill.

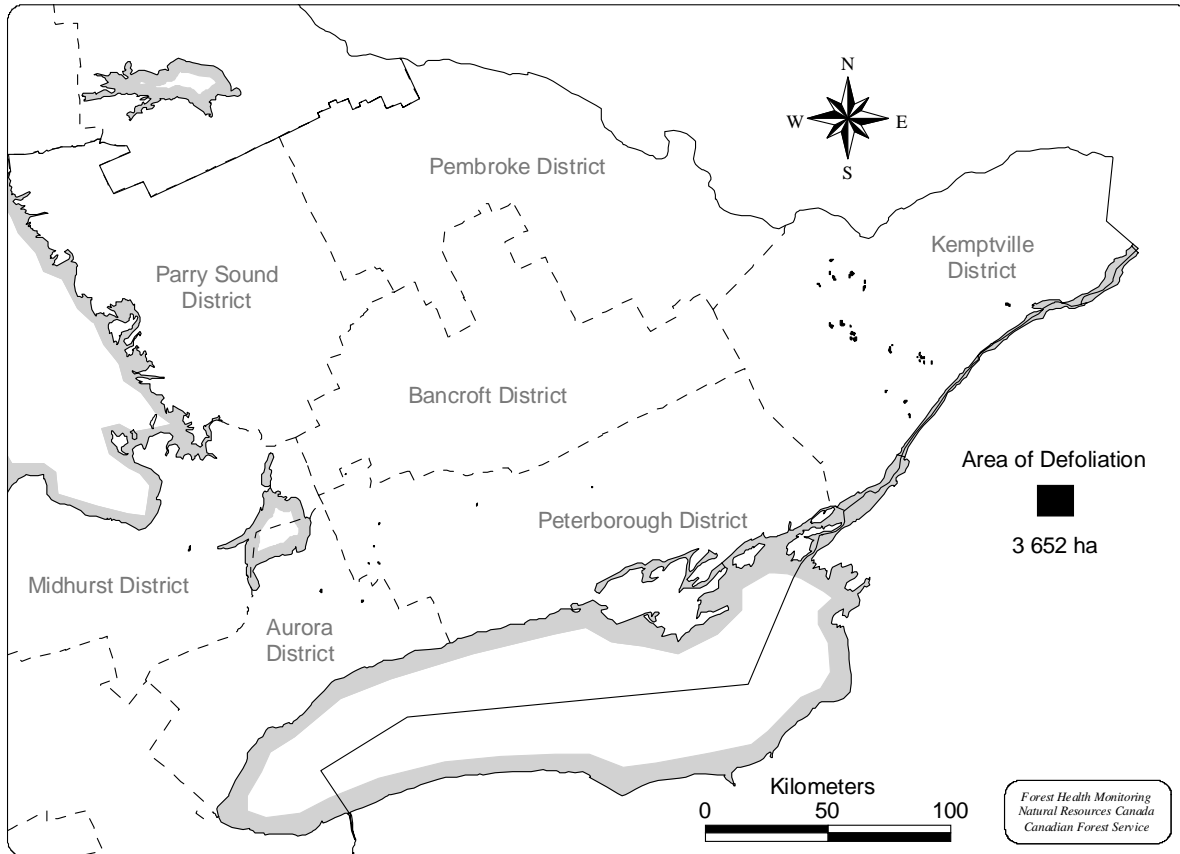
There were numerous locations of damage in 2002. The total area delineated with damage from this pest was 3 652 ha. The largest areas of damage occurred in the Kemptville District where there was a total of 3 207 ha of moderate to severe defoliation. Relatively small areas of infestation were delineated in Peterborough District with 116 ha and in Aurora District and Midhurst District which had 174 ha and 155 ha, respectively (Fig. 7).

The areas of damage in the Kemptville District were mostly in low lying areas of tamarack and the largest areas occurred in a triangular area bounded by the towns of Carlton Place, Stittsville and Richmond; in the Hanlan Marsh area near Merrickville and Nolans Corners; and north of Brockville and east to Spencerville. Repeated damage for several years has resulted in an increase in secondary insects such as bark beetles and some tree mortality.

There were seven widely scattered areas of moderate to severe defoliation of tamarack in the Peterborough District and these extended from Lake Scugog along the Trent Severn Waterway to the Madoc area. Many areas of less intense defoliation were observed in other parts of the district. The two areas of severe damage to natural tamarack in the Aurora District

were on Scugog Island, Scugog Township and north of Uxbridge along the Uxbridge Brook.

In the Midhurst District native larch was affected and the largest area of defoliation was in the Minesing Swamp north of Angus. Other points of notable damage occurred near Barrie, at



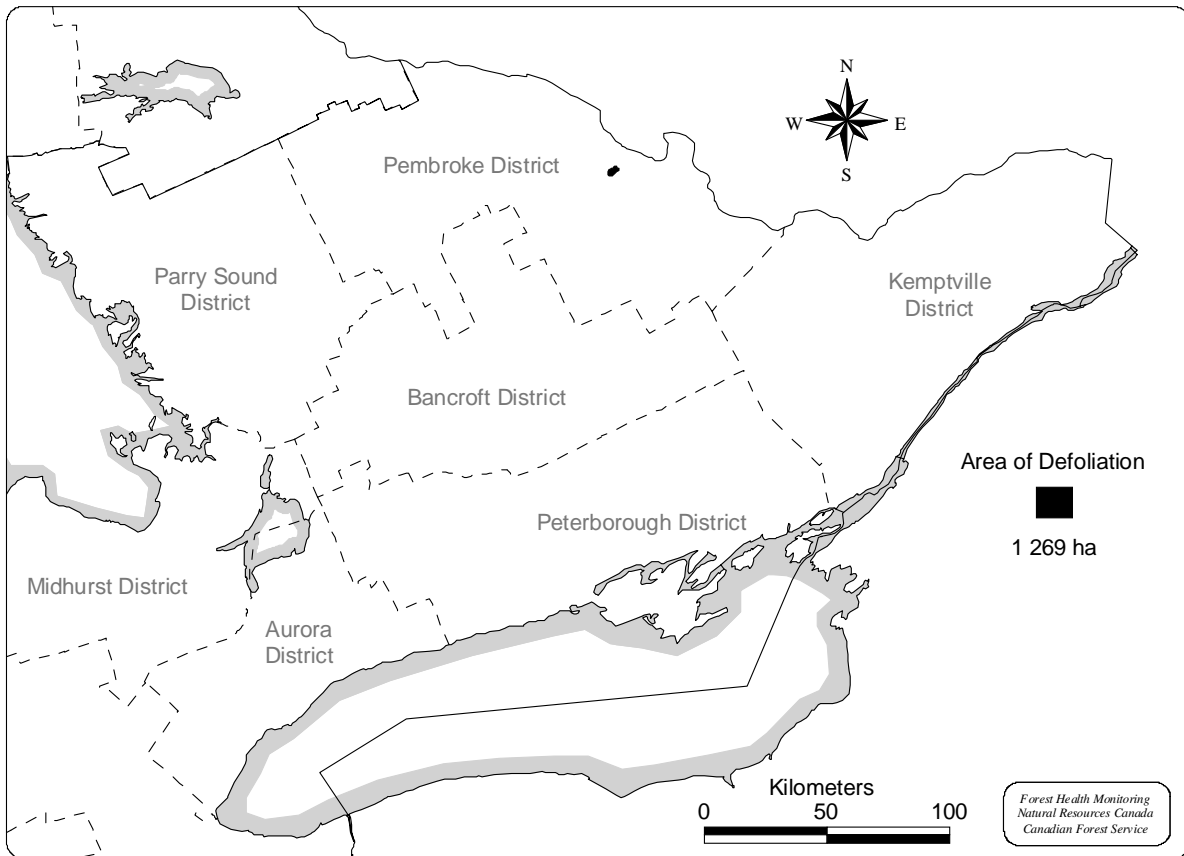
**Figure 7.** Area within which larch casebearer (*Coleophora laricella* (Hbn.)) caused moderate to severe defoliation in 2002.

Earl Rowe Provincial Park near Alliston and in numerous areas south of Owen Sound. There were small pockets of moderate to severe defoliation in tamarack stands in the town of Erin (formerly Erin Township), Guelph District and some light damage was noted south of Brantford, Aylmer District.

### Birch Leafminer, *Fenusa pusilla* (Lep.)

The birch leafminer is a pest of birch, *Betula* spp. In the southern Region it is most destructive to white birch, *Betula papyrifera* Marsh. but it also affects gray birch *B. populifolia* Marsh. The larvae feeding between the leaf layers turn the foliage a distinct bronze like colour.

Populations were elevated across the eastern part of southern Ontario in 2002 with areas of damage recorded from Aurora District east to Kemptville District. The largest area of damage occurred from Alice to Davis Mills in Laurentian Valley Township (formerly Alice Township), Pembroke District (Fig 8). White birch of all sizes and ages sustained foliar damage as high as 100 percent at this location and this large area of damage totalled 1 269 ha. There were also several hundred hectares of damage reported along the Uxbridge-Scugog townline just north of Chalk Lake, Aurora District.



**Figure 8.** Area within which birch leafminer (*Fenusa pusilla* (Lep.)) caused moderate to severe defoliation in 2002.

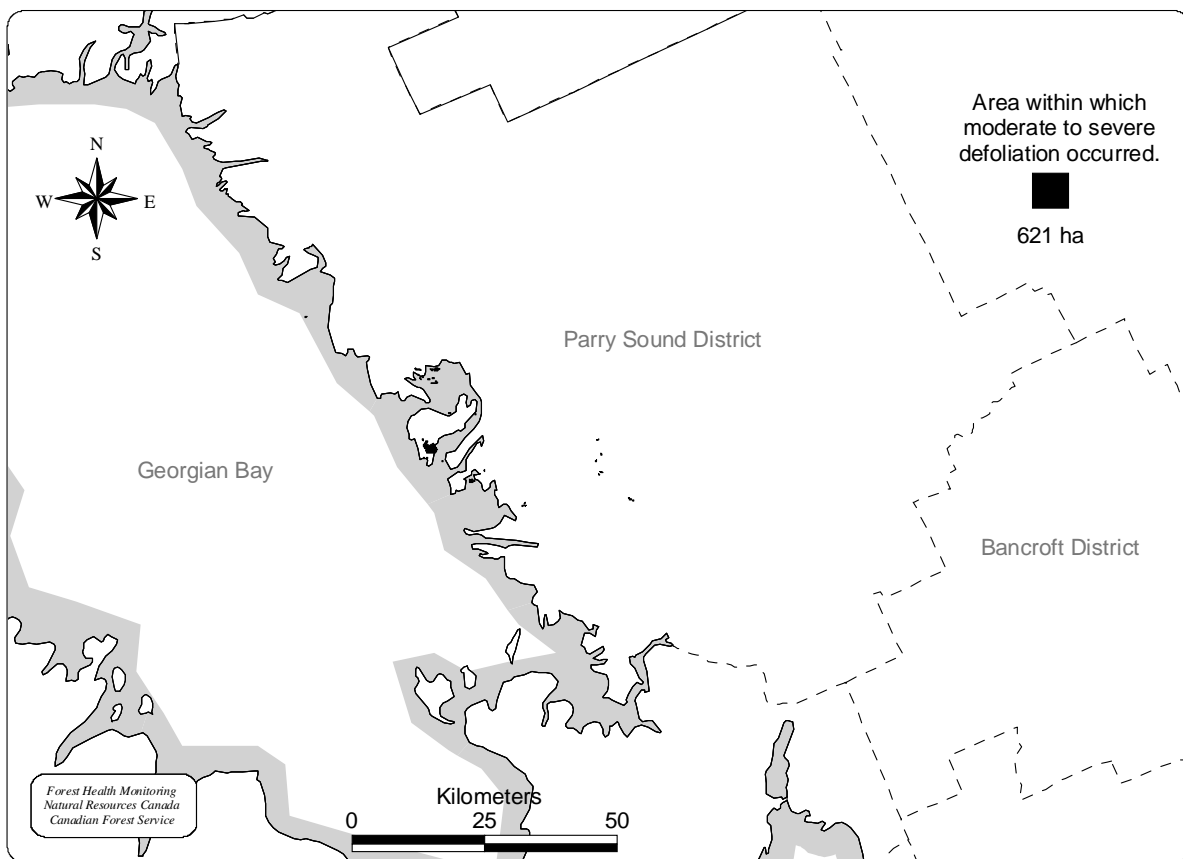


## Hemlock Looper, *Lambdina f. fiscellaria* (Gn.)

The hemlock looper recurred in many of the same stands of the Parry Sound District that were infested in 2001. Once again, eastern hemlock, *Tsuga canadensis* (L.) Carriere was the favored host. Other conifers that served as hosts of the looper included balsam fir and eastern white cedar. There was no visible damage this year on eastern white pine.

In 2002 moderate to severe defoliation prevailed over an area of 621 ha, a slight increase from the 533 ha that was affected in 2001. All damage occurred in the Parry Sound District (Fig. 9). Almost all of the infested areas were on islands.

In the northwest corner of the Parry Sound (body of water), infested areas included all of Grave, Green and Shawnee islands and parts of Goat, Hailstone, Johnson, Loon, Mowat, and Spectacle islands. Nearby there was a newly infested location on the mainland in the southeast corner of Deep Bay. Further north there was an isolated infestation on eastern white cedar on a small island to the southwest of Shawanaga Island.



**Figure 9.** Area within which hemlock looper (*Lambdina f. fiscellaria* (Gn.)) caused moderate to severe defoliation in 2002.

There was a new infestation on Victoria Island in Menominee Channel, south of Parry Sound Harbor and a nameless island in Depot Harbor was re-infested. Also re-infested was a large area at the south end of Parry Island and to the south of here Tranquility, Matthews and Delos islands. A nameless island in Johnny Bay was also infested as were two small islands in Clear Lake.

Infested areas were seen on Jessica Island and two other nameless nearby islands in the west end of Healey Lake. Several islands in Lake Joseph hosted the looper and these include Burgess, Emerald, Fairy, Gitchee, Round, Star and Yoho islands and at the extreme north end of the lake on Frasers Island.

There were numerous small areas of grey topped trees suggesting whole tree mortality and/or top mortality on the islands in Lake Joseph and at the north end of Parry Sound. These areas occurred on Grave, Goat and Green, Hailstone, Johnson, Mowat, and Spectacle islands in Parry Sound; on the two small islands in Clear Lake; and on Burgess, Gitchee, Round and Star islands in Lake Joseph.

**Forest Tent Caterpillar, *Malacosoma disstria* Hbn.**

The forest tent caterpillar outbreak did not expand to the degree that was anticipated in 2002. In the Northwest Region the area of infestation was dramatically reduced whereas it more or less remained static in the Northeast Region. In the Southcentral Region areas of defoliation were greatly reduced. The 2002 total area of defoliation on aspen, *Populus* spp., birch, *Betula* spp., maple, *Acer* spp., and oak *Quercus* spp., in the Province was 8 245 965 ha, compared to 13 279 988 ha recorded in 2001 (Table 3).

**Table 3.** Gross areas of moderate-to-severe defoliation caused by forest tent caterpillar in Ontario by OMNR region from 1998-2002.

Region	Area (ha)				
	1998	1999	2000	2001	2002
Northwest	118 223	1 481 124	5 970 778	10 487 276	5 821 879
Northeast	2 867 895	2 172 459	1 202 982	2 476 876	2 371 208
Southcentral	0	0	36 672	315 836	52 878
Total	2 986 118	3 653 583	7 210 432	13 279 988	8 245 965

The outbreak first reached the Southcentral Region in the year 2000 with areas in Parry Sound and Midhurst districts affected. In the following year, 2001 there were considerable expansions in both of these districts and newly infested areas were detected in Bancroft and

Peterborough districts. It was expected that numbers would continue to increase however the opposite occurred and populations nosedived in 2002. This year the total area affected was only 52 878 ha, compared with 315 836 ha in 2001 (Table 4).

The cause of the forest tent caterpillar larval population decline is thought to have been primarily because of the late spring. Larva hatch appeared to occur at the normal time (early May) but there was an extended period of cold and wet weather after this. During this time foliage development was stalled and the young larvae likely either starved because of the lack of feeding material or succumbed to the cold temperatures. Whether it is related or not is unknown but it is noteworthy that at the same time of the tent caterpillar decline there was a converse action in the numbers of gypsy moth, *Lymantria dispar* (L.) (See gypsy moth writeup, page 27).

In spite of this decline there remained sizeable areas of moderate to severe defoliation. Most of the defoliated area occurred in the Parry Sound District. The largest area was in the French River-Hwy 522 area at the north end of the district where the main host was trembling aspen. Other notable areas of defoliation occurred further south near Ardbeg and in several areas between the towns of Parry Sound and Bala. In these latter areas favoured hosts were sugar maple and red oak, *Quercus rubra* L. There was an entire collapse, except for scattered low populations, in the Peterborough and Bancroft districts with no areas of defoliation reported in either district (Fig. 10).

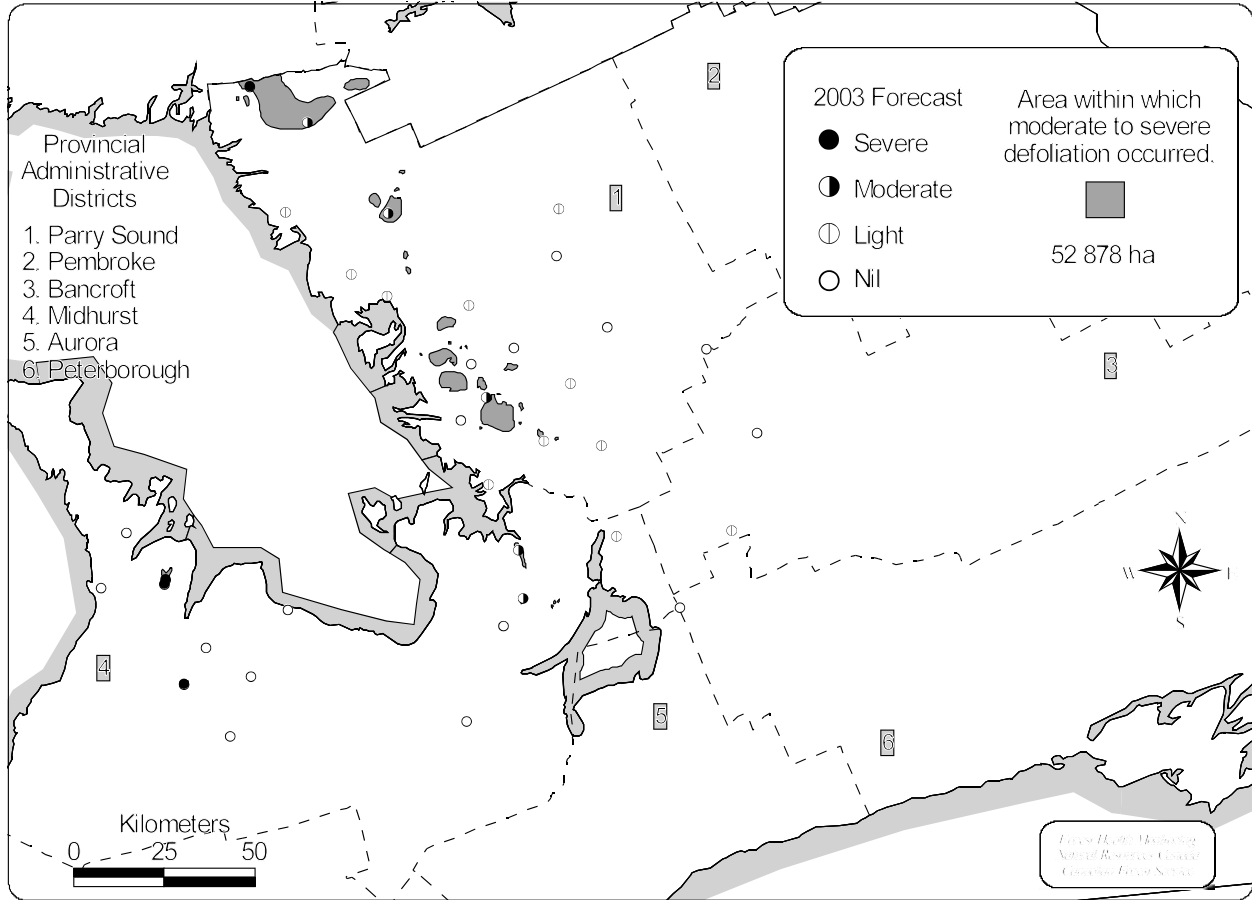
In the Midhurst District there were areas of defoliation in Oro-Medonte (formerly Oro and Medonte townships) and Tay townships in the east and in Georgian Bluffs Township (formerly Keppel Township) and in Chatsworth Township (formerly Sullivan Township) in the west part of the district. These two areas, near Owen Sound, in the west part of the Midhurst District were only lightly infested in 2001 so the increased area of defoliation followed the normal pattern.

**Table 4.** Gross areas of moderate to severe defoliation caused by forest tent caterpillar in the Southcentral Region, 1999 to 2002.

District	Area of Defoliation (ha)		
	2000	2001	2002
Bancroft	0	22 421	0
Midhurst	5 823	54 785	2 356
Parry Sound	30 849	235 672	50 522
Peterborough	0	2 985	0
Total	36 672	315 836	52 878

An egg mass survey was carried out at 36 locations in the fall of 2002. This survey is done to obtain a forecast that indicates where defoliation by the forest tent caterpillar

might be expected to occur in 2003. All of the severe forecasts and most of the moderate forecasts are from areas that were defoliated this year. Beyond the infested areas the counts are predicting either no or light defoliation (Fig. 10 and Table 5).



**Figure 10.** Area within which forest tent caterpillar (*Malacosoma disstria* Hbn.) caused moderate to severe defoliation in 2002 and population forecasts for 2003.

**Table 5.** Summary of forest tent caterpillar egg-band counts on host trees<sup>a</sup> (5-15 or <15cm diameter breast height) at 36 locations in the Southcentral Region of Ontario in 2002, with defoliation forecasts for 2003.

Location (former township name)	Tree species <sup>a</sup>	Average DBH of trees	Average number of egg-bands/tree	Defoliation forecasts for 2003 <sup>b</sup>
<b><u>Bancroft District</u></b>				
Head Lake	tA	13	1	L
Minden Hills (Lutterworth) Township	tA	13	0	N
<b><u>Midhurst District</u></b>				
CFB Borden	tA	17	0	N
Chatsworth (Holland) Township	sM	>20	0	N
Chatsworth (Sullivan) Township	sM	22	31	S
Oro-Medonte (Medonte) Township	sM	14	3	M
Springwater (Vespra) Township	tA	14	0	N
Georgian Bluffs (Keppel) Township	sM	15	15	S
Georgian Bluffs (Keppel) Township	sM	21	32	S
Highway 12 at Coldwater	tA	10	4	M
Meaford (St. Vincent) Township	bPo	18	0	N
Meaford (Sydenham) Township	sM	16	0	N
Ramera (Rama) Township	tA	12	1	L
South Bruce Peninsula (Amabel) Township	sM	15	0	N
South Bruce Peninsula (Albemarle) Township	ltA	16	0	N
West Grey (Glenelg) Township	sM	16	0	N
<b><u>Parry Sound District</u></b>				
French River	tA	10	14	S
Madigans	tA	18	5	L

Location (former township name)	Tree species <sup>a</sup>	Average DBH of trees	Average number of egg-bands/tree	Defoliation forecasts for 2003 <sup>b</sup>
Skerryvore	tA	16	1	L
Nobel	tA	12	1	L
Mactier	tA	10	0	N
Lost Channel	tA	12	2	M
Crooked Bay	tA	7	0	N
Foots Bay	tA	14	1	M
Gordon Bay	tA	10	0	N
Muskoka Airport	tA	10	1	L
Ardbeg	tA	13	4	M
Huntsville	tA	12	0	N
Beatrice	tA	20	1	L
Dorset	tA	11	0	N
Torrance	tA	13	1	L
Sprucedale	tA	12	0	N
Rosseau	tA	10	0	N
Orrville	tA	10	1	L
Burk's Falls	tA	12	1	L
<b><u>Peterborough District</u></b>				
Bolsover	tA	12	0	N

<sup>a</sup> Tree species: tA = trembling aspen, sM=sugar maple, bPo=balsam poplar, ltA largetooth aspen

<sup>b</sup> N= nil, L= light, M= moderate, S= severe

### **Hemlock Borer, *Melanophila fulvoguttata* (Harris)**

The hemlock borer is a native species of flatheaded borer from the family Buprestidae. Eastern hemlock is its principal host. It is normally a secondary pest however the borer can

become a problem to trees under stress. Such was the case this year following the severe drought of 2001.

This year there were several reports of damage due to the hemlock borer. There were five pockets of damage along the shores of Catchacoma and Mississauga lakes in Galway, Cavendish & Harvey Township (formerly Cavendish and Harvey townships), Bancroft District. An assessment in the early summer at Catchacoma Lake disclosed that 26 percent of the trees were moribund and that whole tree mortality had begun. The total area affected at that time was 19 ha.

Individual hemlock were dead at Cache Lake, Algonquin Park, Pembroke District and Mark S. Burnham Provincial Park, Peterborough District. The borer was also associated with dead and dying moisture stressed trees in the Healey Lake area, Parry Sound District.

### **Carpenterworm, *Prionoxystus robiniae* (Peck)**

The carpenterworm was first reported in the Kemptville District in the years following the 1998 ice storm. This destructive pest was found attacking the major branches and main stems of ice damaged Carolina poplar, *Populus X canadensis* Moench and silver maple, *Acer saccharinum* L. in Avonmore and near Cornwall at that time.

Since then the carpenterworm has been confirmed from numerous locations. The general area of damage from the pest extended from Brockville down along the St. Lawrence River to the Lancaster area. Here the insect is attacking silver maple in campgrounds and in old agricultural fields. Further away from the river in addition to the Avonmore area, the pest has been recorded in the towns of Kemptville and Winchester Springs.

### **Hickory Bark Beetle, *Scolytus quadrispinosus* Say**

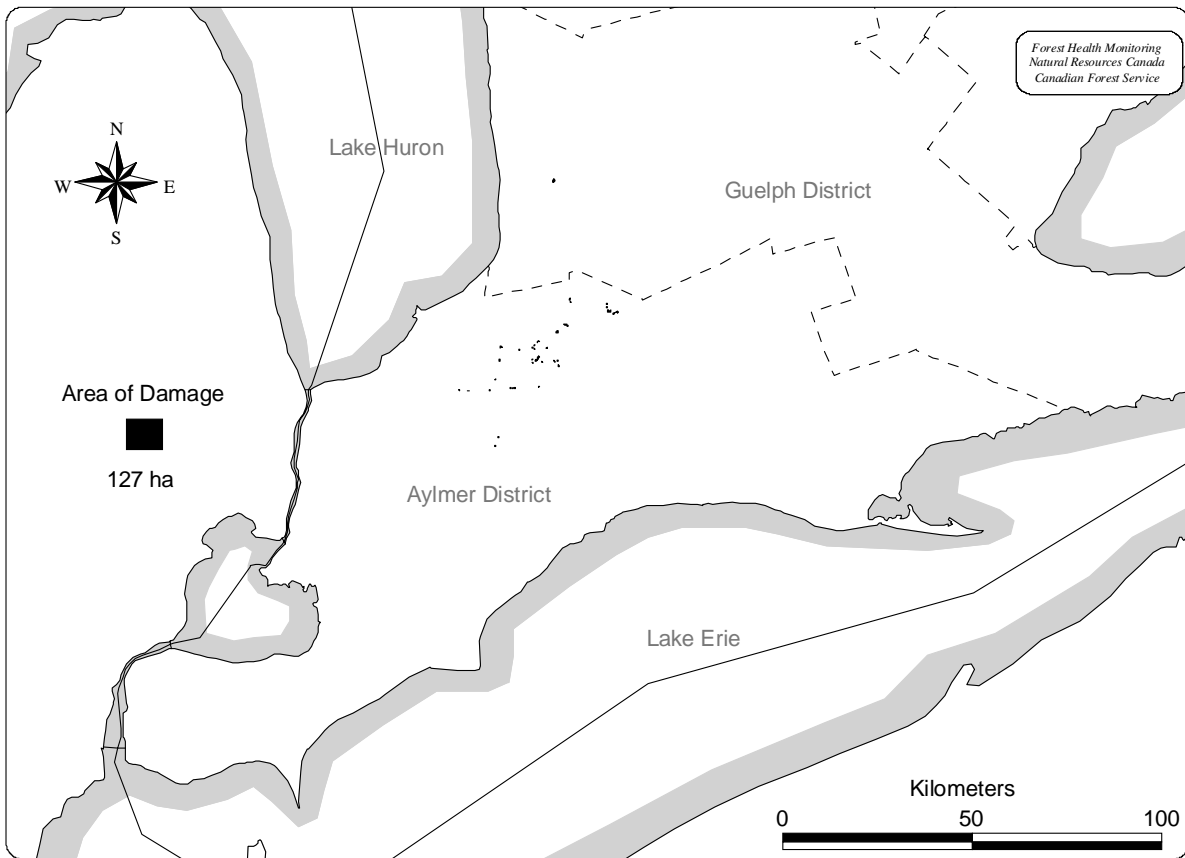
There were infestations totalling approximately 127 ha of damage caused by the hickory bark beetle in 2001. Ten woodlots were affected in Middlesex County; One in McGillivray Township, eight in Middlesex Centre and one in Adelaide Township in the Aylmer District. Trees most affected include bitternut hickory *Carya cordiformis* (Wangenh.) K. Koch and shagbark hickory *Carya ovata* (Mill.) K. Koch. There was tree mortality recorded in 2001 and it was felt that the pest had been active but was undetected prior to this for about a year.

There has been a dramatic increase in the spread and damage level of this pest in 2002. A total of 48 more locations with damage were detected with an area of 409 ha. There are infested stands in Middlesex and Lambton counties in the Aylmer District and in a single stand in Huron County of the Guelph District. Bitternut hickory appears to be the favoured host. The level of damage and tree mortality varied but in many situations practically all of co-dominant bitternut hickory are dead.

In Middlesex County the newly infested woodlots occurred in Adelaide Metcalfe (formerly Adelaide and Metcalfe townships) Township (8), Lucan Biddulph (formerly Biddulph

Township) Township (4), North Middlesex (formerly East Williams, West Williams and McGillivray townships) Township (21), Middlesex Centre (formerly Lobo and London townships) Township (8), Thames Centre (formerly West Nissouri Township) Township (1); In Lambton County the infested woodlots were all in Warwick Township (5); While in Huron County the location of damage was in the Municipality of Huron East (formerly Tuckersmith Township) (1) (Fig. 11).

This species is a serious pest of hickories. The maturation feeding of the adults in the summer indicates the whereabouts of infested stands. They feed at the bases of the leaf petioles and on the twigs for a short time before they construct longitudinal egg galleries in the stems and branches. The larvae feed across the grain between the bark and wood at the cambium layer. They overwinter as larvae, pupate in the bark in the spring, then emerge as adults in early summer. There is one generation per year.



**Figure 11.** Area within which hickory bark beetle (*Scolytus quadrispinosus* Say) caused damage in 2002.



## MAJOR FOREST DISTURBANCES

### Diseases

#### **Dutch Elm Disease, *Ophiostoma ulmi* (Buisman) Nannf.**

Dutch elm disease continues to devastate the remaining elm, *Ulmus* spp. trees in southern Ontario. It remains at epidemic levels throughout the region. There are numerous areas of dead and dying elm that is reminiscent of the first wave of the disease that swept through the same area some thirty years ago. Trees appear to be decimated in a single season. Diseased trees that show initial branch flagging symptom can be completely brown and dead in a three to four week period. The apparent new, more aggressive strain of the disease is very efficient and leaves few trees in its path. Forty three percent of living American elm, *Ulmus americana* L. were affected at one location. Such levels of damage are not uncommon.

### OTHER AGENTS DAMAGING TREES

***Acleris semipurpurana* (Kft.), Oak leaf shredder.** Light defoliation occurred on red oak in Pinery Provincial Park, Aylmer District and was found with gypsy moth in Peterborough District.

***Anelaphus parallelus* (Newm.) and *A. villosus* (F.), Twig pruner.** Damaged twigs of red oak were observed in numerous stands across the Aylmer District and in the eastern portion of the Peterborough District.

***Anisogramma anomala*, Eastern filbert blight.** Caused branch and whole tree mortality in a filbert, *Corylus* spp. orchard in Delhi Township, Aylmer District.

***Anisota finlaysoni* Riotte, Shorthorned oakworm.** Approximately 10 ha of oak was heavily defoliated on Gordon Island in the St. Lawrence River, Kemptville District. High numbers occurred in Norfolk and Delhi townships, Aylmer District.

***Apiognomonina veneta* (Sacc. & Speg.) Höhn., Sycamore anthracnose.** Heavy infections were common throughout the range of the hosts, sycamore, *Platanus occidentalis* L. and London plane, *Platanus acerifolia* (Ait.) Willd. in the Aylmer and Guelph districts.

***Baliosus nervosus* (Panz.), Basswood leafminer.** Heavy defoliation occurred in the Angus-Borden area, Midhurst District.

***Coleophora serratella* (L.), Birch casebearer.** Small pockets of moderate to severe defoliation were reported in Bancroft, Peterborough and Kemptville districts.

***Corthylus punctatissimus* (Zimm.), Pitted ambrosia beetle.** Noticeable damage occurred to American beech, *Fagus grandifolia* Ehrh. regeneration at Farlain Lake and on sugar maple in Oro-Medonte Township, Midhurst District.

***Cryptococcus fagisuga* Linding., Beech scale.** Collections were made in Grey County, Midhurst District and high numbers were seen in the Kemptville District.

***Datana integerrima* G. & R., Walnut caterpillar.** High numbers occurred on black walnut, *Juglans nigra* L. in Nanticoke Township, Aylmer District.

***Dendroctonus simplex* LeC., Eastern larch beetle.** Associated with mortality of drought stressed European Larch in Tay Township, Midhurst District.

***Diprion simplex* (Htg.), Introduced pine sawfly.** Trace numbers were found at the Glencairn Seed Orchard, Midhurst District.

**Frost Damage.** Late frost was responsible for early foliage damage on trembling aspen and red oak at points in the Parry Sound District.

***Hyphantria cunea* (Drury), Fall webworm.** Common on ash and elm in low lying areas of the Pembroke and Kemptville districts.

***Ips pini* (Say), Pine engraver.** High populations were encountered in many areas where tree mortality occurred following the stress created by drought conditions in 2001. Most often found attacking red pine.

***Malacosoma americanum* (F.), Eastern tent caterpillar.** Population levels remained high especially in parts of the Midhurst, Parry Sound and Kemptville districts.

***Meria laricis* Vuill., Meria needle cast.** Moderate to severe discolouration was evident on 10 percent of larch in Sydenham Township, Midhurst District.

***Microsphaera penicillata* (Wallr.:Fr.) Lev., Powdery mildew.** Heavy leaf damage was reported on sycamore in the City of Windsor.

***Neodiprion lecontei* (Fitch), Redheaded pine sawfly.** Populations were encountered in Midhurst, Bancroft, Peterborough and Pembroke districts. Incidence was 80 percent in one plantation of 4m red pine in Hungerford Township, Peterborough District.

***Neodiprion sertifer* (Geoff.), European pine sawfly.** Defoliation on Scots pine, ranging from 10 to 25 percent occurred at points in Midhurst and Peterborough districts.

***Paraclemensia acerifoliella* (Fitch), Maple leafcutter.** Sugar maple sustained severe defoliation in 60 ha areas near Moira Lake west of Tweed and at Cordova Lake north of

Havelock, Peterborough District. Small areas of damage also occurred in Winchester, Finch and Osnabruck townships, Kemptville District.

***Phaeocryptopus gaemanni* (T. Rohde) Petr., Swiss needle cast.** Caused 90 percent foliar damage to old needles of Douglas fir, *Pseudotsuga menziesii* (Mirb.) Franco on plantation trees, Clarington Township, Aurora District.

***Pococera robustella* (Zell.), Pine webworm,** High numbers caused noticeable damage to jack pine, *Pinus banksianae* Lamb. along Highway 69, Parry Sound District.

***Podapion gallicola* Riley, Pine gall weevil.** Branch mortality of 40 percent occurred at Chandos Lake, Bancroft District. Also common at several locations in the Midhurst District.

***Sphaeropsis sapinea* (Fr.) Dyko & B. Sutton, Diplodia tip blight.** Heavy infections of the disease occurred on Scots Pine in Uxbridge, Scugog and Clarington townships and in the north end of Oshawa, Aurora District and at several points in the Midhurst District including CFB Borden, Mulmur Township, near Sauble Beach and in the Durham-Priceville area.

***Thrips calcaratus* Uzel, Basswood thrips.** Caused up to 90 percent defoliation to basswood on trees located from Havelock to Sharbot Lake, Peterborough District.

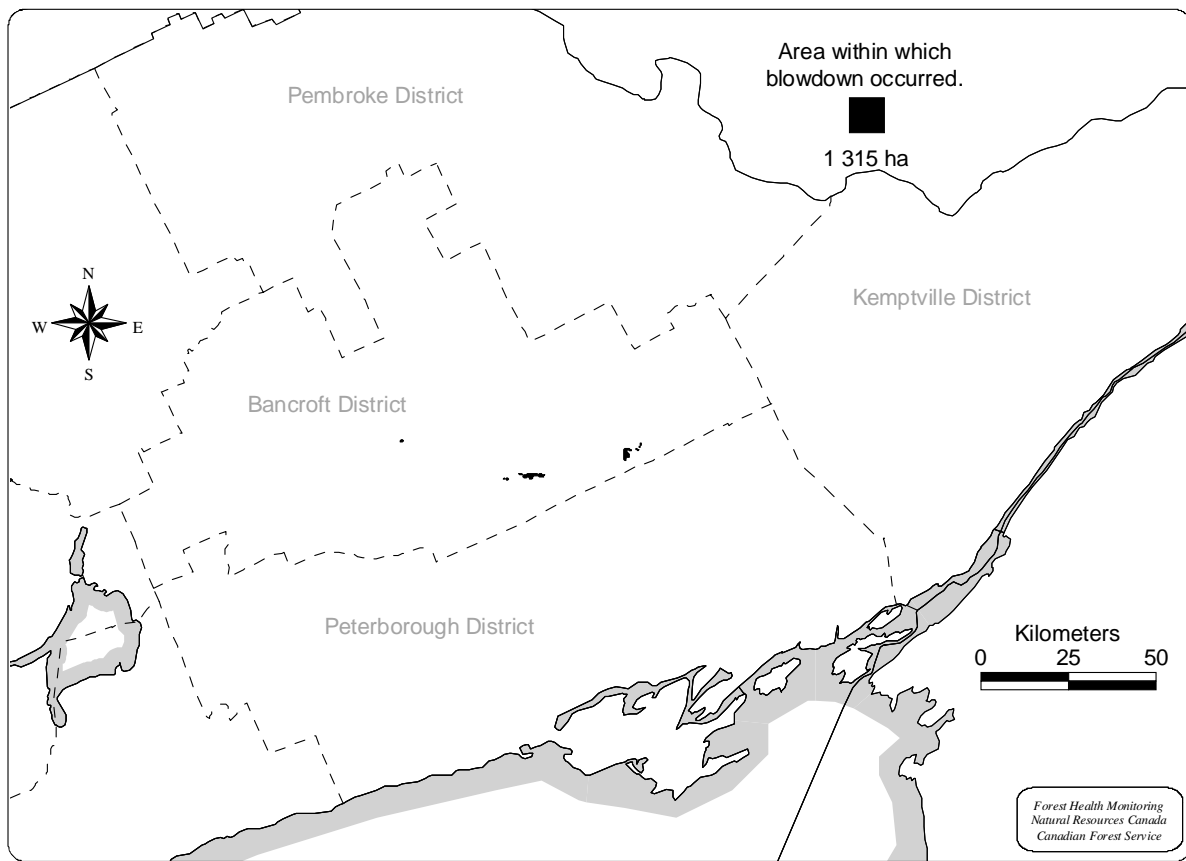
## MAJOR FOREST DISTURBANCES

### Abiotic Conditions

#### Blowdown

A “microburst”, which is a downward rush of air or a severe downdraft with very high winds, occurred in Bancroft District northeast of the city of Peterborough. This microburst referred to as straight-line winds from downbursts or ‘derecho” happened on 2 August 2002. Aerial reconnaissance disclosed that the storm’s path started south of Gilmour in Tudor and Cashel (formerly Tudor Township) Township and crossed Highway 62 and proceeded eastward. It ended just east of Cloyne in Barrie Township (Fig. 12). Considerable damage occurred to both deciduous and coniferous trees in the track of the storm. The total area affected was 1 315 ha.

Another storm in early September left damage across approximately 20 ha in Head, Clara and Maria (formerly Clara Township) Township, Pembroke District. The damage was sustained to seed trees left in cutovers.



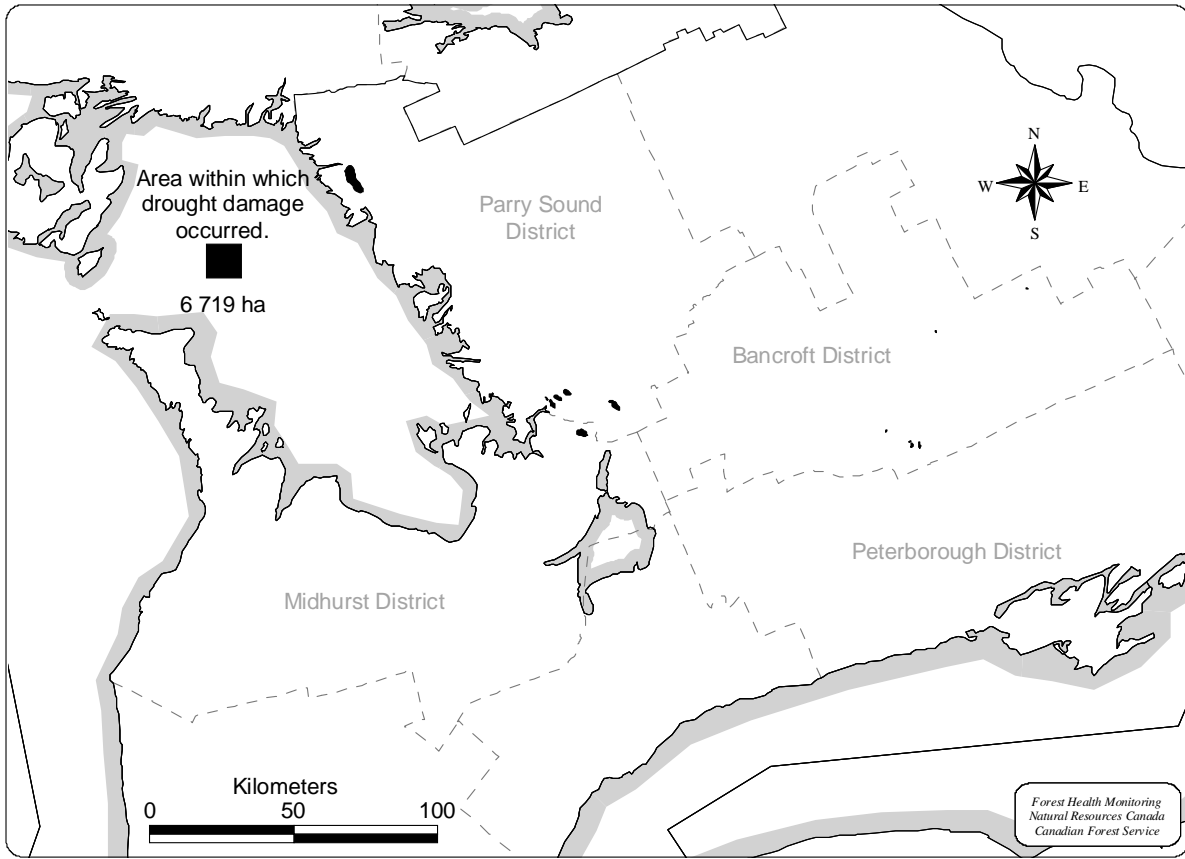
**Figure 12.** Area within which blowdown occurred in 2002.

### **Drought Damage**

In 2001 there were visible signs of drought damage recorded on trees within 3 325 545 ha in the Southcentral Region. As a consequence of last year's drought dead and dying trees were aerially mapped within this drought affected area. The total area of drought damage in 2002 in the form of tree mortality in the Southcentral Region was 6 719 ha of which: 5 646 ha was in the Parry Sound District; 272 ha, Bancroft District; 791 ha in Midhurst District; and 10 ha in Peterborough District. (Fig. 13). There was also considerable damage in the Pembroke and Kemptville districts where the damage was considered to be too general and widespread to be mapped. Points of damage were also recorded in Aurora District. There was no tree mortality reported in the Aylmer or Guelph districts.

Different hosts were affected in different areas. One of the most obvious areas of mortality was along Highway 69 south of the Magnetawan River, Parry Sound District where jack pine and eastern white pine were the principal hosts affected. Further south red oak was the main host affected in an area that straddles the Midhurst-Parry Sound boundary from Beausoleil

Island on Georgian Bay east to the Gravenhurst area. Many of the sites in both of these areas are rocky with thin soils on which only scrub sized trees grow. Drought conditions recur on these sites periodically, hence the low stocking and limited growth. Also in the Parry Sound District there were areas of tree mortality on other hosts including red pine in Laurier and Ballantyne townships and in the town of Parry Sound; eastern hemlock in the Healey Lake area; and tamarack in the Emsdale-Burks Falls area.



**Figure 13.** Area within which drought damage occurred in 2002.

In addition to the red oak mortality in the Midhurst District as a result of the drought of 2001 there were numerous other areas of suspected damage, particularly to red pine in the east part of the district. There was also a location of European larch mortality in Tay Township, Midhurst District. In the Aurora District pockets of red pine occurred at the Orono Crown Forest in Clarington Township and in the Town of Milton where both eastern white pine and red pine were affected.

There were hundreds of pockets of dead and dying red pine ranging from two to three trees to several hectares in the Peterborough and Bancroft districts. The largest area was located east of Kasshabog Lake in Havelock, Belmont-Methuen Township (formerly Methuen). Eastern

hemlock was affected and recorded in at least five pockets on the shores of Catchacoma and Mississauga lakes, Galway-Cavendish and Harvey Township (formerly Cavendish Township). Balsam fir trees were also affected in these two districts and trees died either singly or in small groups. The mortality occurred in shallow soiled or well-drained sandy sites.

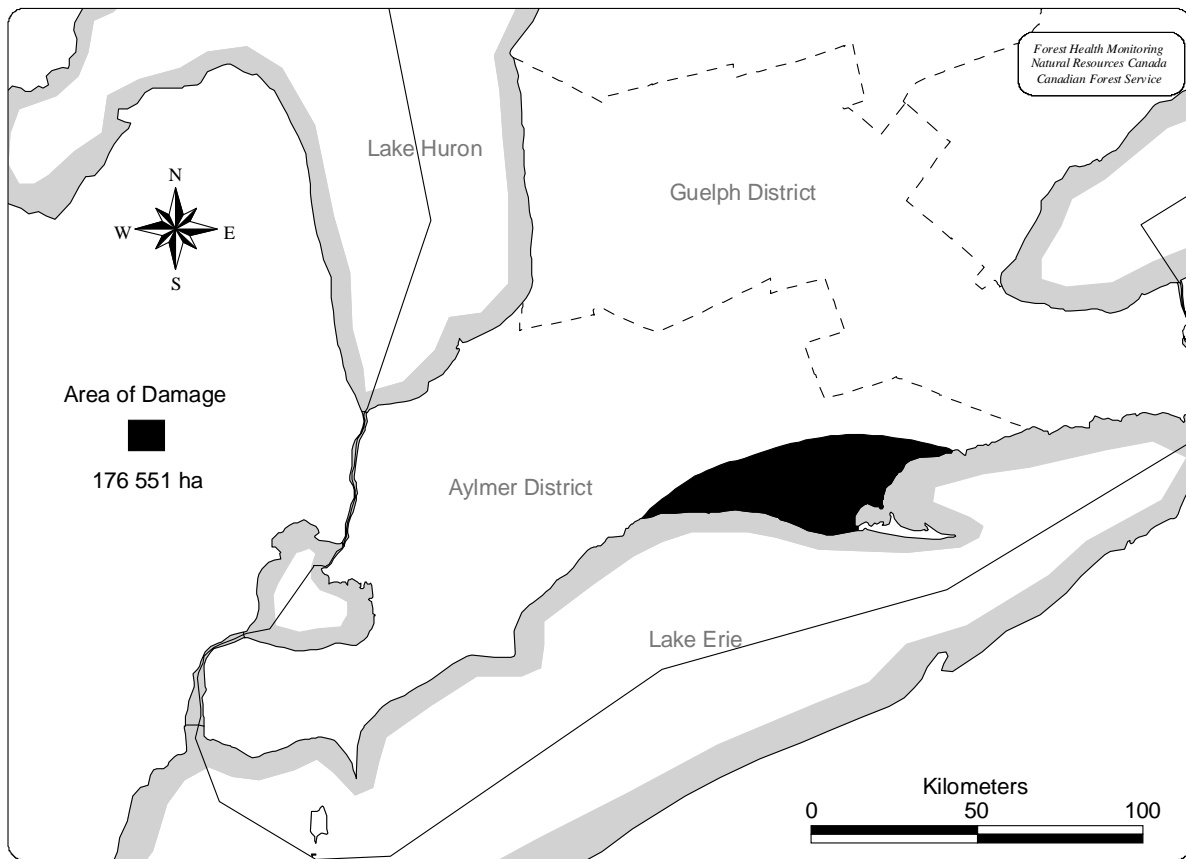
There were numerous species that were affected by the drought of 2001 in the Pembroke and Kemptville districts. The most heavily affected tree was red pine with some fifty pockets of mortality being aurally detected. As well there were localized areas of tree mortality on spruce, *Picea* spp., eastern white cedar and balsam fir and on maple and oak. The drought was also cited as a factor in beech, *Fagus* spp. decline near Palmer Rapids, Pembroke District. This year much of the area of these two districts experienced drought like conditions again during August and September. Affected trees that lost their leaves prematurely included beech, ash, *Fraxinus* spp. and maple.

Organisms that were associated with the drought damaged trees included various beetles including the pine engraver, *Ips pini* (Say); another bark beetle, *Hylurgops rugipennis pinifex* (Fitch); the white spotted sawyer, *Monochamus scutellatus* (Say), the northeastern sawyer, *M. notatus* (Drury), hemlock borer, *Melanophila fulvoguttata* (Harris); the eastern larch beetle, *Dendroctonus simplex* LeC. as well as the disease Armillaria root rot, *Armillaria ostoyae* (Romagn.). There were smaller than normal leaves on trembling aspen in many areas of the region. The foliage was of normal colour but was sparse and diminutive and this is thought to have been related to the stress caused by the drought.

### **Snow Damage**

Snow damage to trees occurred in the Aylmer District in 2002. Heavy wet snow accumulated on trees in mid February through an area from Port Dover to Port Stanley along Lake Erie reaching as far north as the towns of Simcoe, Delhi, Tillsonburg and Aylmer. Trees on some 176 551 ha were affected (Fig. 14).

Damage consisted of tops and branches being broken down or off. The main conifers affected were Scots pine, western red cedar, *Thuja plicata* Donn ex D. Don and eastern white pine. Affected hardwoods included trembling aspen, other poplars, birch, black locust, *Robinia pseudoacacia* L., willow, *Salix* spp. and elm.



**Figure 14.** Area within which snow damage occurred in 2002.

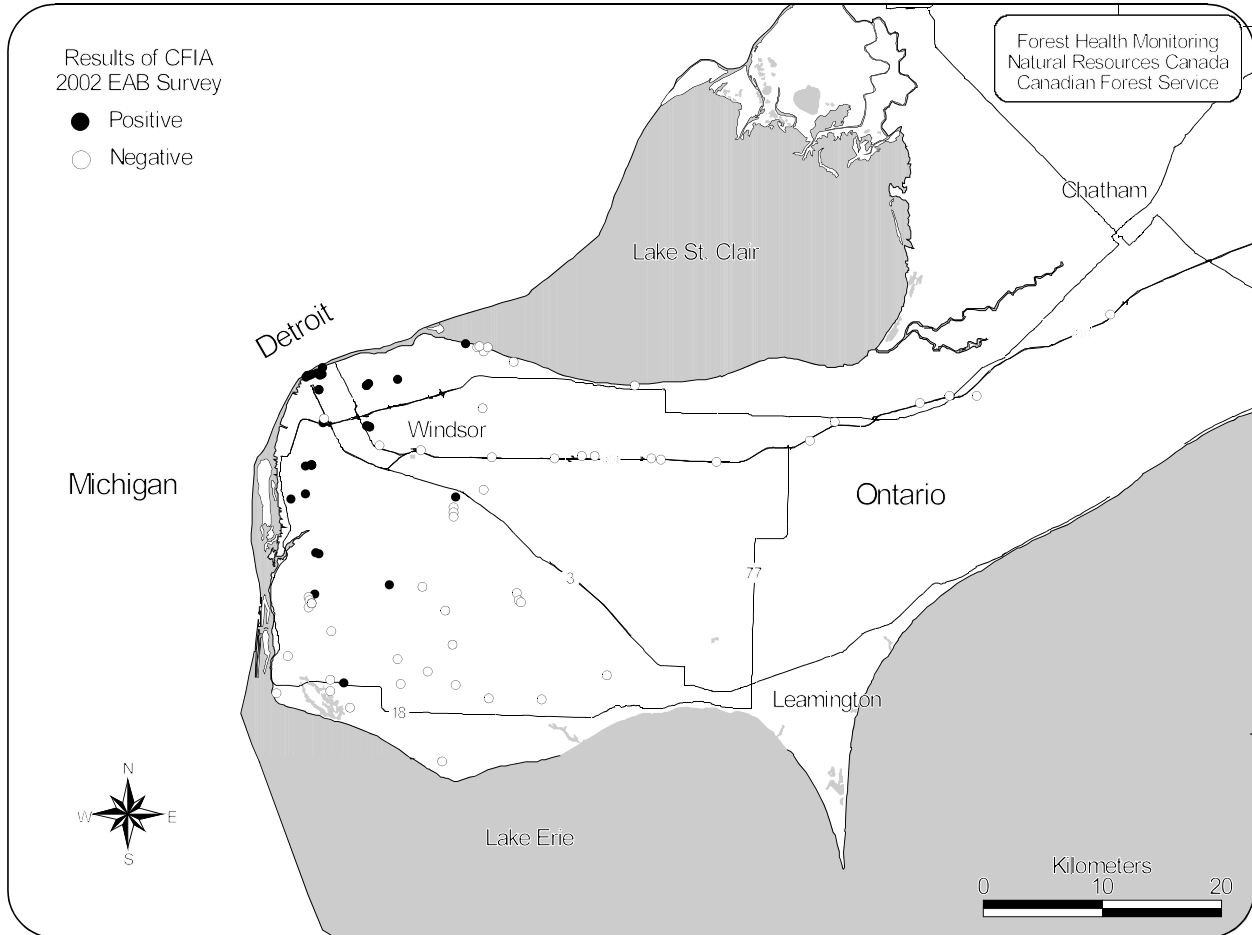
## Quarantine/Exotic Pests

### **Emerald Ash Borer, *Agrilus planipennis* Fairmaire**

The emerald ash borer (EAB), a beetle native to eastern Asia, was found in Windsor in early July by CFS/OMNR Forest Health staff. It is thought to have been introduced to North America on wood packaging or dunnage at least five years ago. The insect is believed to have been in Michigan for at least five years but only two or three years in Ontario. The distribution of this insect is confined to six counties in southeastern Michigan and the adjacent Windsor area.

A Pest Risk Assessment done in August determined that EAB was of quarantine significance. Hence the Canadian Food Inspection Agency (CFIA) issued a Ministerial Order “declaring certain places to be infested with the EAB and prohibiting or restricting the movement of the pest and nursery stock, trees, logs, lumber and wood with bark attached, wood chips, or bark chips from trees in the genus *Fraxinus* (commonly known as ash) and firewood of all species that has not been treated in a manner to eliminate the pest” The known infested area

(the greater Windsor area) was declared a regulated area. In the Windsor area five jurisdictions are under the order and these include the City of Windsor and the towns of Amherstburg, Essex, LaSalle and Tecumseh (Fig. 15). In the fall of 2002 a management/eradication plan called for 5 zones, each with a different management strategy. This management technique is ongoing.



**Figure 15.** Results of a survey for emerald ash borer (*Agrilus planipennis* Fairmaire) in 2002.

EAB is considered a primary tree killer that does not need other factors such as drought to predispose the tree to attack. When a tree is lightly infested there are generally no symptoms, however when populations build up and after two or three years of continuous infestation the trees nutrient and water transport system is disrupted, wilting occurs and eventually the tree dies.

The life cycle of EAB usually spans one year. It comes from an area of Asia that has similar weather so winter survival will not likely be hindered. It overwinters as a larva and then pupates in the spring. Adults emerge in mid-May to mid-July and do some maturation feeding on the leaves. Flight dispersal is usually short. After egg hatch, the newly hatched larvae feed through the bark toward the cambial area. Larvae etch deeper into the outer sapwood as their development progresses. The galleries or feeding chambers are typically S-shaped and packed with fine frass.



Symptoms of attack are many and include crown dieback and wilting, epicormic sprouting or branch suckering on the stem or butt, bark splits, D-shaped exit holes and woodpecker attack markings. For the most part these symptoms become visible only after the tree has been attacked for at least a year, making early detection of the pest very difficult.

To date the pest has only been found on ash and all species of ash are likely susceptible. The literature suggests that other trees may be hosts for EAB and these include walnut, *Juglans* spp. and elm.

### **Satin Moth, *Leucoma salicis* (L.)**

The satin moth, an introduced insect was commonly found throughout the Kemptville District and along Highway 17 west to the Petawawa area, Pembroke District. In the Parry Sound District there was a new location of the pest recorded at Bala and moderate to severe defoliation recurred on poplar trees in Gravenhurst. Satin moths will feed on native poplar and willow, but prefers introduced exotic species of poplar which are usually planted as ornamentals, hedge rows or wind breaks. The satin moth is a native of Europe and Western Asia and was first discovered in North America in 1920. It was first found in Ontario in 1972 in the southeastern part of the province and has since gradually spread west.

### **Gypsy Moth, *Lymantria dispar* (L.)**

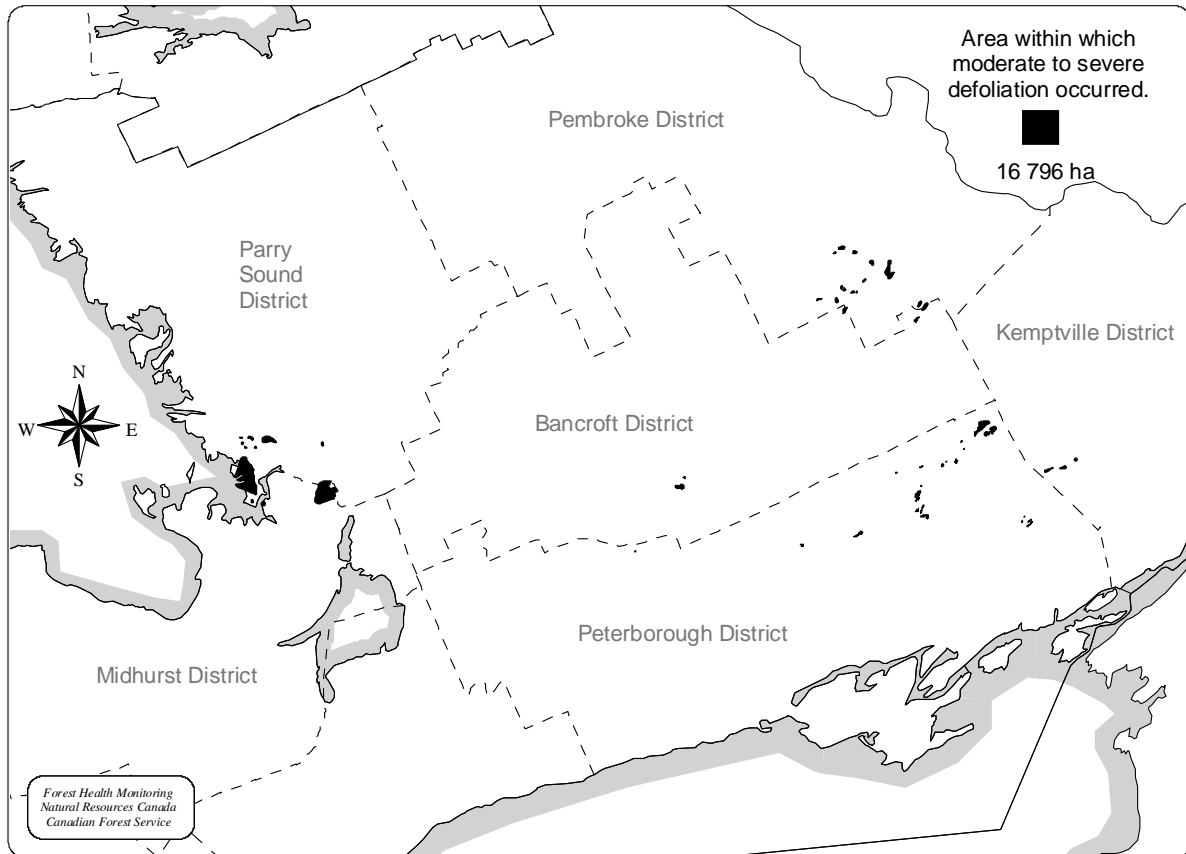
Gypsy moth populations increased dramatically in numerous areas of the region in 2002. Areas of damage occurred in Parry Sound, Midhurst, Bancroft, Peterborough, Pembroke and Kemptville districts. Scattered infestations extended from Severn Sound in the southeast part of Georgian Bay, at the Midhurst-Parry Sound District border, east as far as the western part of the Rideau lakes area, Kemptville District. The total area of moderate to severe defoliation was 16 796 ha an increase from the 771 ha recorded in 2001 (Table 6, Fig. 16). The main hosts in the defoliated areas were red oak, trembling aspen and largetooth aspen. Numerous other tree species were affected including balsam poplar, white birch, bitternut hickory, sugar maple, basswood as well as bur oak, *Quercus macrocarpa* Michx. and white oak, *Quercus alba* L.

The largest area of defoliation occurred north of Port Severn in the Honey Harbour-Six Mile Lake area, Parry Sound District. Just north of here were several smaller pockets in and around the Wahta Mohawks First Nation lands. West of Sparrow Lake, there was another sizeable area of damage that straddled the Parry Sound-Midhurst District boundary. North of the town of Parry Sound there were notable areas of gypsy moth larvae and points of moderate defoliation along Highway 69 in Carling Township and along highways 69 and 522 in Wallbridge Township.

Most of the areas of gypsy moth infestation in the Parry Sound and Midhurst districts were within the area infested by forest tent caterpillar in 2001. In many areas defoliated by the caterpillar this year, gypsy moth were plentiful and contributed to the overall defoliation. This

was particularly evident in the Foothills Bay and Blackstone Lake areas, Parry Sound District. The decline of the forest tent caterpillar is converse to the rise of gypsy moth.

A resurgence of gypsy moth was noted throughout the Bancroft and Peterborough districts. The general build up of populations resulted in several areas of moderate to severe defoliation. There was a total of thirty-two areas mapped and they extended from the south side



**Figure 16.** Area within which gypsy moth (*Lymantria dispar* (L.)) caused moderate to severe defoliation in 2002.

of Chandos Lake, Bancroft District east to Frontenac Provincial Park, South Frontenac (formerly Bedford) Township, Peterborough District. Also in the Peterborough District a large area north of Sharbot Lake, Central Frontenac (formerly Oso) Township was infested along with locations at other points in Central Frontenac (formerly Kennebec and Olden), Stone Mills (formerly Sheffield) and Madoc townships as well as in the Municipality of Tweed (formerly Hungerford Township). Some of this area is where gypsy moth was first recorded as causing significant damage in 1981 in Ontario.

There were a total of sixteen areas of moderate to severe defoliation delineated in the Pembroke District and they were all in the area from Clear Lake south to Black Donald Lake.

Many of these infestations were in the rugged hilly terrain typical of the area. In Kemptville District there was one area of severe defoliation on the hillside shoreline of Upper Rideau Lake at Westport.

It remains unclear what will develop from this current infestation of gypsy moth. There were numerous observations of high numbers of adults and egg masses from areas across the infested districts. Virus and fungal diseases, including the fungus, *Entomophaga maimaiga* E.m. Humber, Shimaza & Soper were generally prevalent in larval populations this year but did not seem to be a factor in reducing the population as in other years. This may change in 2003 but larvae can do considerable amounts of damage even when affected by virus and fungal diseases.

**Table 6.** Gross area of moderate to severe defoliation caused by the gypsy moth in the Southcentral Region from 1999 to 2002.

District	Area (ha)			
	1999	2000	2001	2002
Aylmer	2 933	891	5	0
Bancroft	0	0	238	799
Guelph	10 150	17 606	0	0
Midhurst	0	0	0	3 539
Kemptville	1 660	0	0	364
Parry Sound	0	0	0	7 666
Pembroke	0	18	528	2 098
Peterborough	366	0	0	2 330
Total	15 109	18 515	771	16 796

### **Pine Shoot Beetle, *Tomicus piniperda* (L.)**

In an effort to control the pine shoot beetle, a log bait program in conjunction with trapping using Lindgren traps was conducted in Muskoka, Parry Sound and Nipissing districts\* by OMNR during the late winter and spring of 2002. The effort was made at two locations, one at Parry Sound and the other at Sturgeon Falls of the Nipissing districts, where adults had been collected in Lindgren traps in 2001. At these two sites there were no beetles found in either the logs or Lindgren traps. The operational control program was carried out for the second consecutive year in Muskoka. The beetle was first detected here in 2000 and this is the northern front for the pest. Adults were found in both logs and traps at these sites.

There were low populations of the beetle doing shoot damage to Scots pine in the area of Highway 11 at the Kirk Line, Bracebridge but only on trees that were adjacent to recent dead and dying trees that served as brood trees. Elsewhere, there was virtually no current shoot damage compared with 2001, even at sites that had populations last year indicating the effectiveness of the trap log program. At the same time there was a Lindgren trapping program conducted by CFIA staff in Algoma, Sudbury, Nipissing and Parry Sound districts. In the Parry Sound District the traps were deployed along highways 11 and 69. Several of these sites were positive for adults.

As a follow up to the above two efforts a visual survey was conducted in the Parry Sound, Nipissing, Sudbury and Algoma districts by the CFS/OMNR Forest Health team. Timing of the survey coincided with the peak period of shoot damage near the end of August and into early September. Special emphasis was placed on locations of known adult catches from the past two years, 2001 and 2002. Many of these sites were examined more than once. There was a total of 142 locations examined of which 92 locations were in the Parry Sound District. Results of these visual surveys revealed only one positive location of shoot damage. The positive location is located 2.0 km up the Blackwater Lake Road, off Highway 518 north of the village of Orrville in the Township of Seguin, Parry Sound District. Here, there was only trace evidence of the insect found with just a couple of affected Scots pine shoots seen. Two separate visits were made to this site. There were no new areas added to the already regulated areas in 2002 (Table 7).

**Table 7.** Summary of Counties, Regional or District Municipalities where pine shoot beetle has been found and regulated by year.

Year Found	District, County or Regional Municipality*
1993	Haldimand-Norfolk, Hamilton-Wentworth, Halton, Niagara, Peel, Waterloo, Wellington
1994	Brant, Dufferin, Oxford
1995	Durham, Grey, Simcoe, City of Toronto
1996	Lambton, Middlesex, York
1997	Northumberland
1998	Bruce, Elgin, Huron, Perth, Victoria
1999	Essex, Kent
2000	Frontenac, Haliburton, Hastings, Lennox-Addington, Peterborough
2001	Muskoka, Prince Edward
2002	none added

\* municipal region, county or district boundary (not OMNR district boundaries)

Populations of pine shoot beetle further south in areas where it has become established were generally not as severe nor as widespread in 2002 compared with recent years. There were however pockets of heavy damage from Simcoe to Delhi in the Aylmer District; moderate numbers occurred

in West Grey, Clearview, Springwater, Mulmur and Oro-Medonte townships, Midhurst District; medium and high populations caused damage to immature Scots pine in several areas in the City of Oshawa and in Scugog and Clarington townships, Aurora District; and many locations of heavy damage on both Scots pine and jack pine were delineated from the Pontypool area eastward across the south side of Rice Lake to the Castleton area and on Scots pine at Sandbanks Provincial Park, Peterborough District.

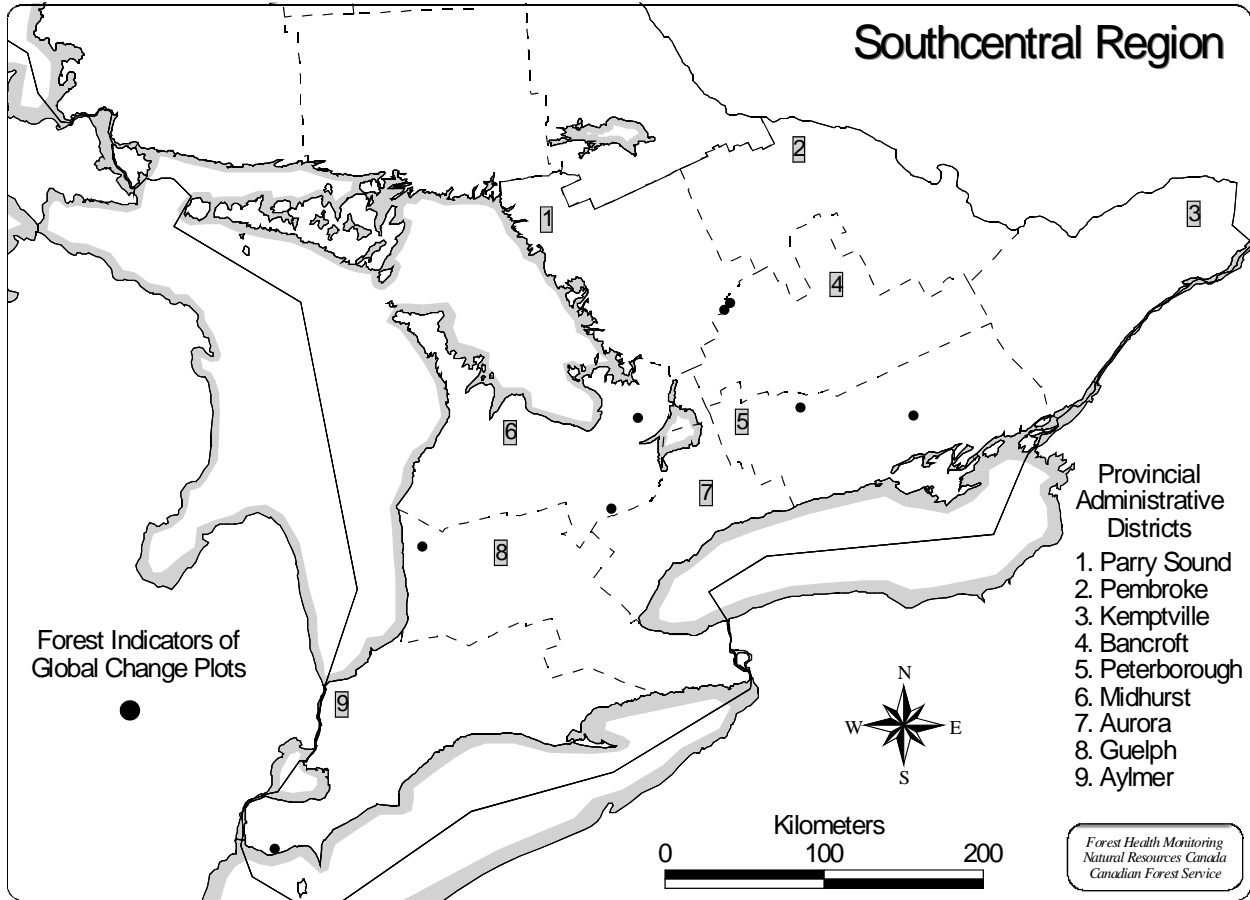
Many of the affected areas now have an abundance of trees affected by Diplodia tip blight shoot disease and this in combination with the shoot beetle has devastated many of the Scots pine plantations in southern Ontario.

## **FOREST HEALTH PLOT MONITORING**

### **Forest Indicators of Global Change Project**

The Forest Indicators of Global Change Project is a multi-disciplinary, multi-network, multi-agency gradient study across eastern Canada. It is highly-directed, merging process research, indicator development and forest health monitoring. It has three objectives; to conduct a field evaluation of forest conditions indicators; link ecological process indicators of forest condition to Acid Rain National Early Warning System (ARNEWS) measurements; and to influence the direction of ARNEWS post 2000. The gradient was selected based on atmospheric deposition (acid, ozone) and meteorology (precipitation, temperature). Stand characteristics and history, soil, topography and dominant tree species were also used to select plots. Sugar maple is contiguous as a dominant species across the gradient; with eastern white pine dominate as the coniferous species in Ontario. The project is expected to last from 3 to 5 years and is expected to provide new indicators for early detection of change in forest health due to Global Change.

Eight Forest Indicators of Global Change plots were assessed in the Southcentral Region this year. Seven of these plots were in established ARNEWS plots and one an established North American Maple Project (NAMP) plot (Fig. 17).

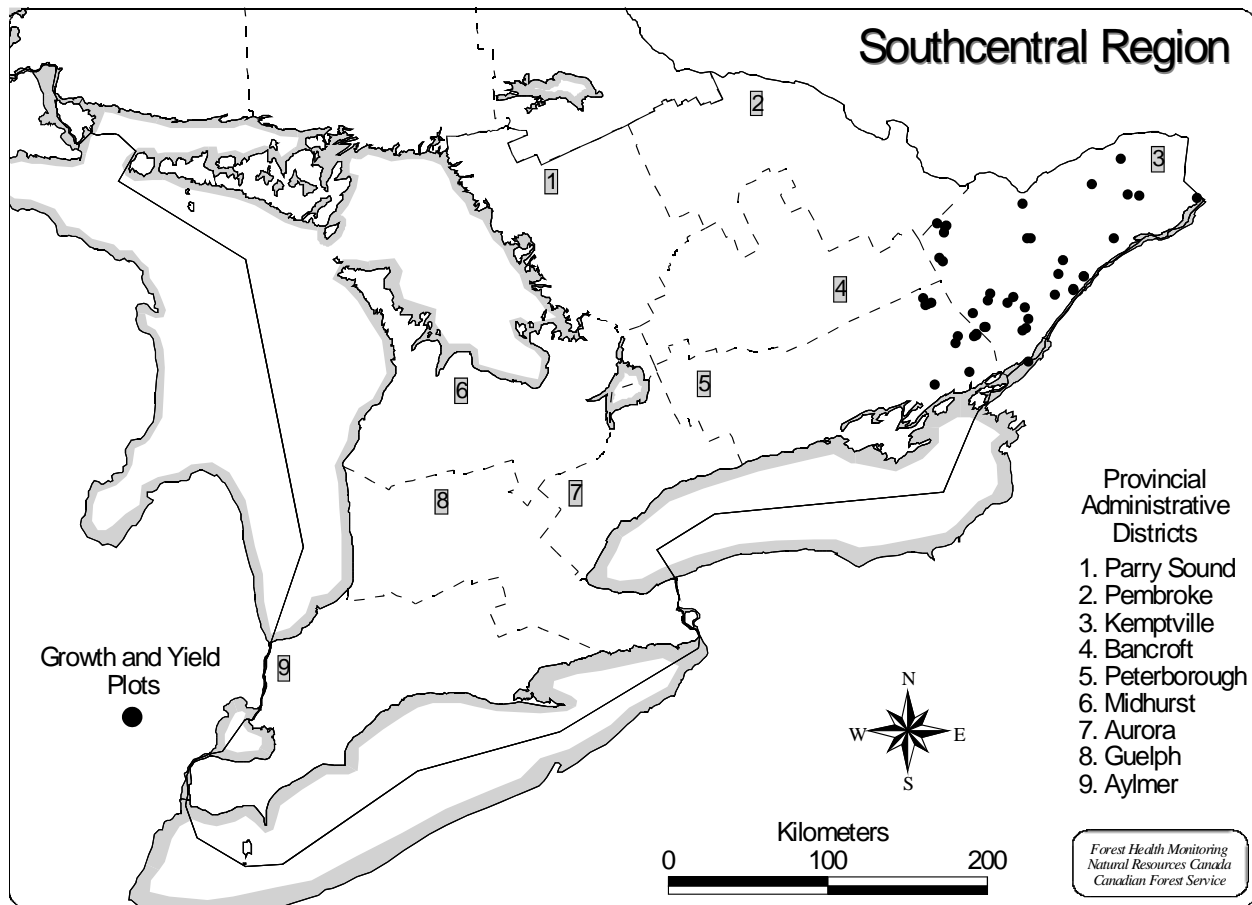


**Figure 17.** Locations of research plots for the Global Change Gradient Project.

### Growth and Yield

The Ontario Growth and Yield Program is made up of over 4000 permanent sample plots representing a cross sample of all the forest types in Ontario. The plots are spread across the province and use an ecosystem-based approach to gather data on a wide range of parameters the most important being timber growth and yield. This information will assist in monitoring the growth and dynamics of Ontario's forests and provide baseline data needed to create computer models, which can predict future growth and dynamics.

The Eastern Ontario ice storm of the winter of 1998 gave rise to the need to develop a method for assessing storm damage to trees. In 2000 forty eight growth and yield study plots were selected to represent the ice damage in the affected area. In 2001 and 2002, forty six of these plots were re-evaluated (Fig. 18). The severe drought situation of 2001 make data from these plots more pertinent. Plots were evaluated on four basic variables: vigor, dieback, foliage transparency and pests. Special attention was placed on stem wounds, stem damage by insects and early signs of decay.

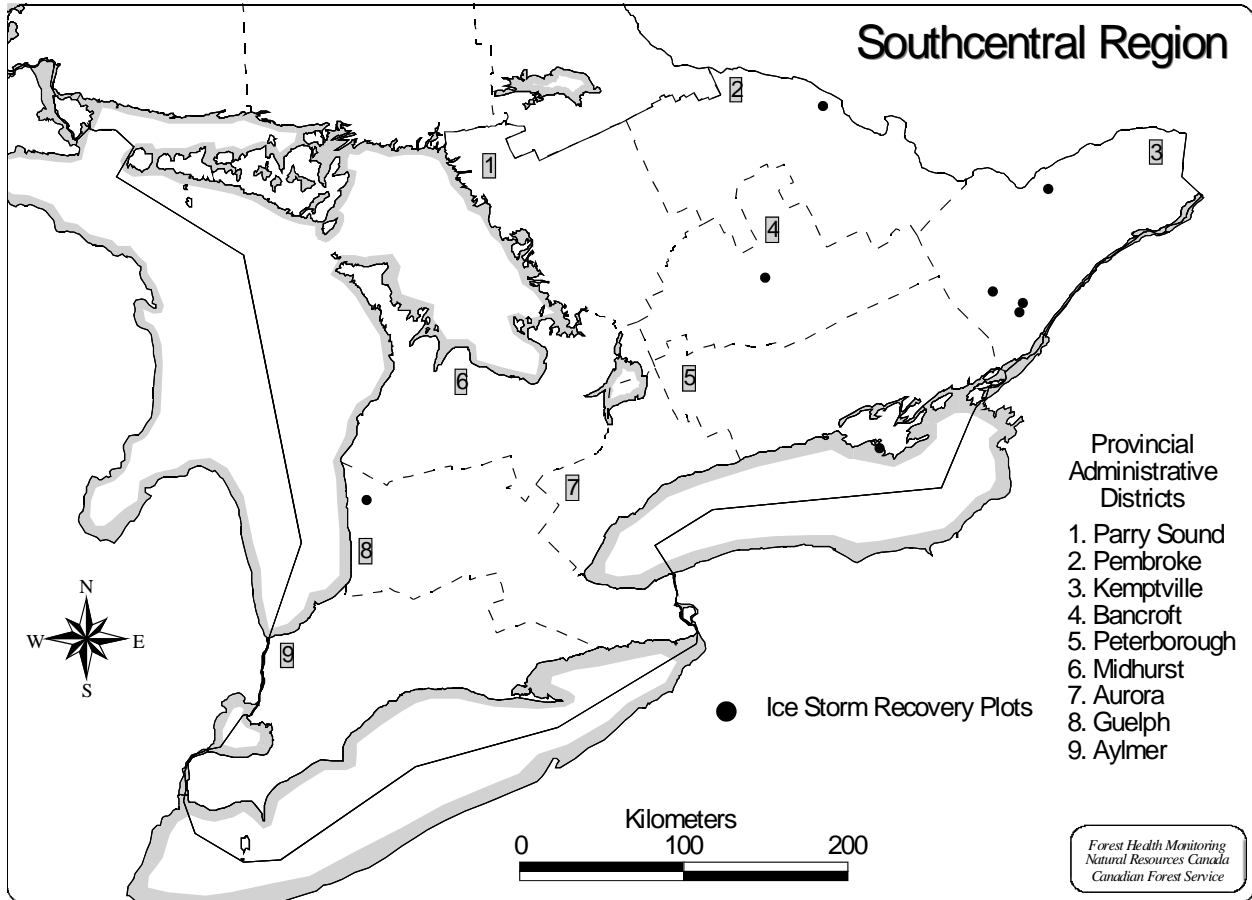


**Figure 18.** Locations of Growth and Yield Study plots.

### **Ice Storm Impact and Recovery Case Study**

An Ice Storm Impact and Recovery Case Study was initiated by the Forest Health Monitoring Unit from Sainte-Foy, Quebec. The ice storm struck the Maritime Provinces, southwestern Quebec and eastern Ontario in January 1998. The object of this case study is to examine the impact of this storm on the forests and how they recover from this major stress. The majority of the plots were in Quebec, some in the maritime Provinces and eight were evaluated in Ontario. Four plots involved damaged areas with different degrees of freezing rain and four were control areas. The four existing ARNEWS plots were ice damaged plots in Rear of Yonge & Escott and Gloucester townships in the Kemptville District and non ice-damaged areas in West Wawanosh in the Guelph District and Buchanan Township in the Pembroke District. Four existing NAMP (North American Maple Project) plots were also used: two in ice damaged areas, Rear of Yonge & Escott and Burgess townships and two in non damaged areas, Hallowell Township in the Peterborough District and Cardiff Township in the Bancroft District (Fig. 19).

The study examined crown condition and recovery rates by looking at regeneration and ground vegetation, tree radial growth and recovery, stand gaps (canopy openings), coarse woody debris, woody insects and diseases. Results from this study will be included in a future report from the study leader in Sainte-Foy, Quebec.

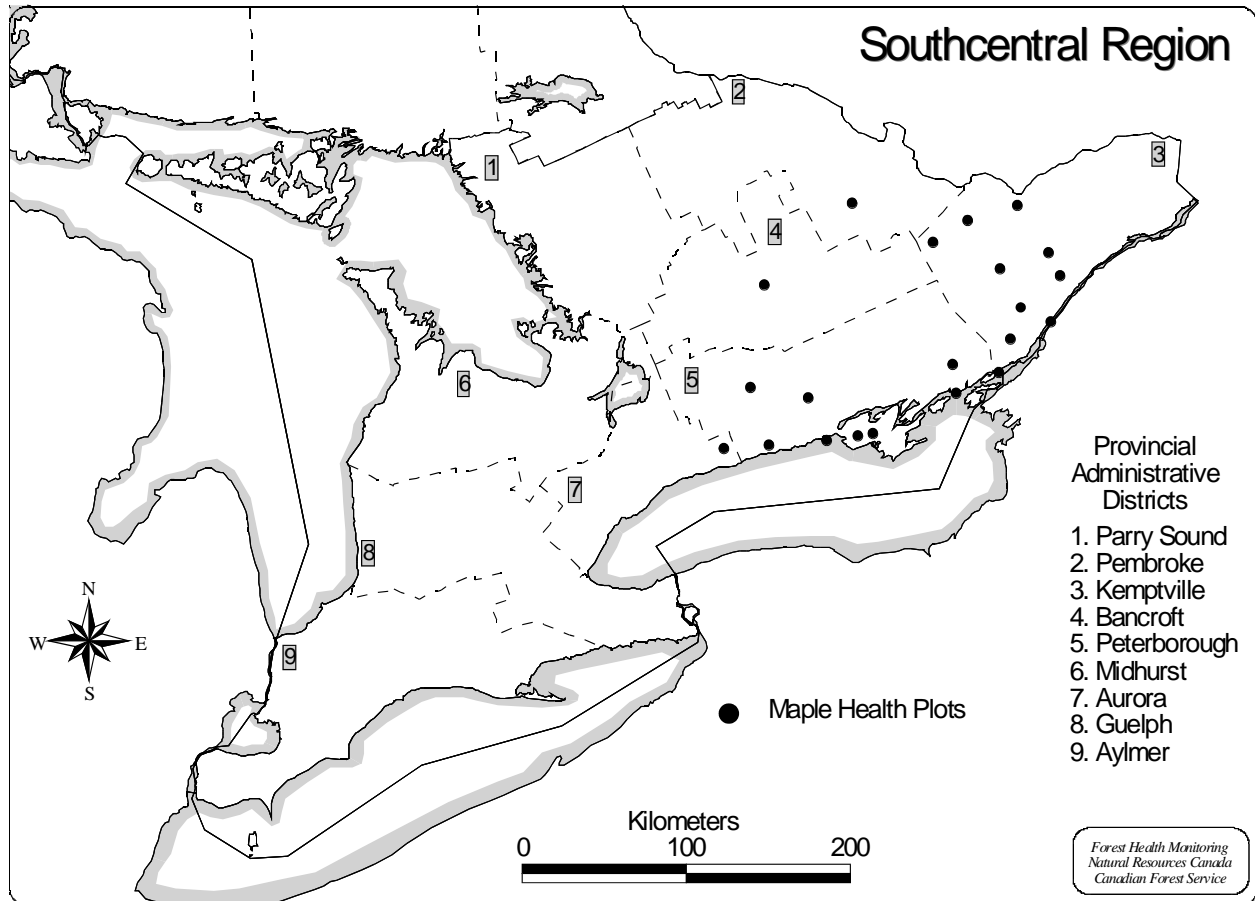


**Figure 19.** Locations of Ice Storm Impact and Recovery Case Study plots.

### Maple Health

Public concern over maple decline in the mid-seventies and eighties prompted the establishment of 116 maple study plots in Ontario. These plots were monitored yearly until 1996 when this project was ended. As a result of the ice storm of 1998, 14 of these plots in the ice damaged area and six non ice damaged control plots were re-evaluated (Fig. 20). The severe drought situation of 2001 make data from these plots more pertinent. The plots were made up of 25 semi-mature and mature trees in natural stands, rural (country windrow or roadside trees) or urban (community street side or park trees). Each numbered plot tree on these 20 plots has been evaluated for vigor, dieback, light transparency and defoliating or wood damaging insects and diseases for the past three years.





**Figure 20.** Locations of Maple Health plots.

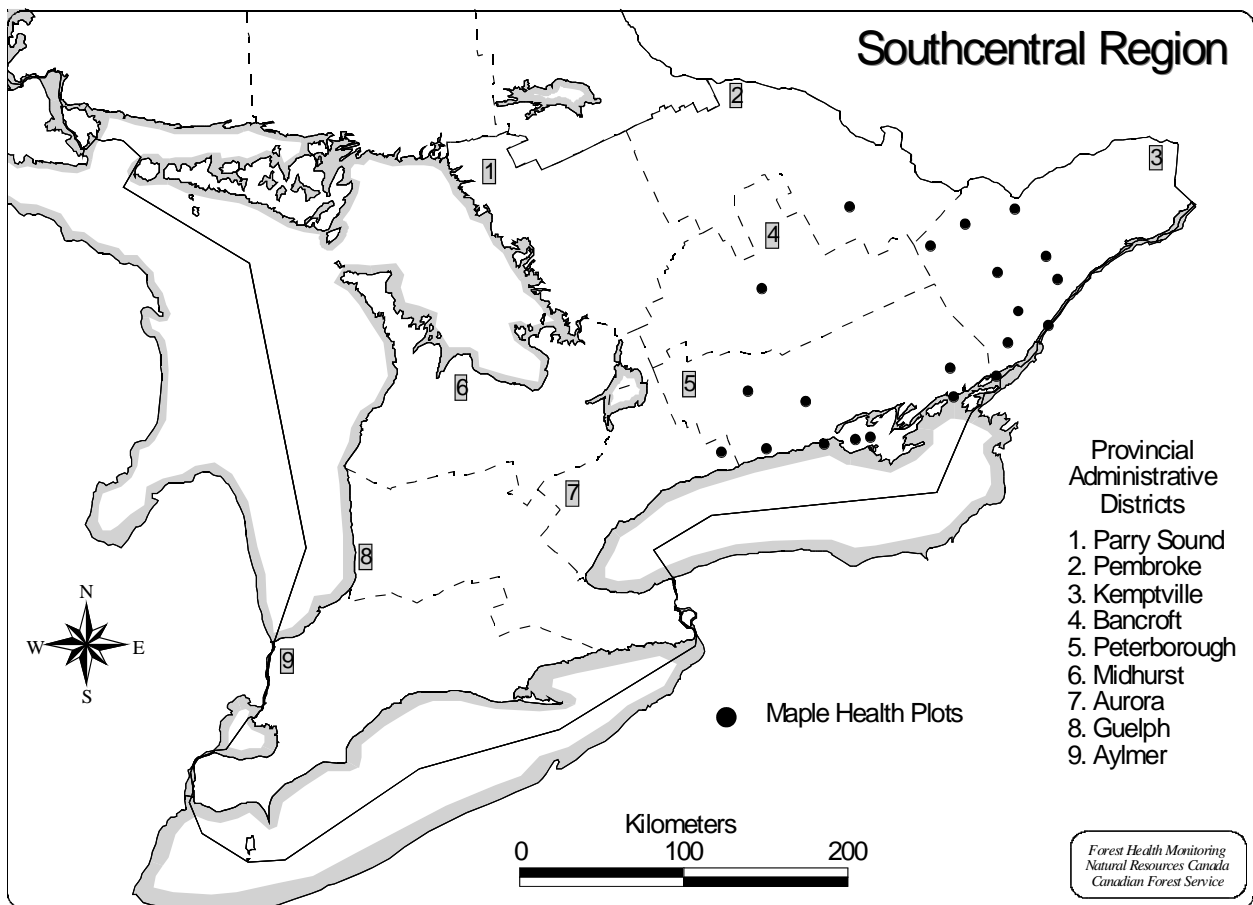
### **Oak Health**

The oak plots, a network of plots in red oak stands, were re-tallied in 2002. The oak plot network is the oldest plot system of the FHMU. Trees are examined in 12 different oak stands at localities across southern Ontario (Fig. 21). One hundred mature oak have been examined annually at each assessment plot. A standardized assessment method is used for most hardwood health plots that has been developed or modified from the NAMP protocol and has been used since 2000. Information on tree vigor, crown dieback, transparency, foliar pests present with degree of foliage loss, condition of bole, presence of disease and abiotic problems and tree mortality were recorded. A summary of crown dieback information for all plots in 2002 and for the four years previous has been tabulated (Table 8).

**Table 8.** A summary of the percentages of red oak by crown condition from 12 plot locations in the Southcentral Region of Ontario for 5 year period ending in 2002. ( Data based on the examination of 100 host trees at each location. )

Year	Total percentage of dead crown					Tree mortality	
	0-5	6-25	26-45	46-65	>65	New dead	Old dead *
1998	25.6	45.4	2.3	0.6	0.2	0.8	25.1
1999	20.6	49	3.5	0.4	0.5	0.1	25.9
2000	8.7	38.8	24.2	1.2	0.5	0.6	26.0
2001	25.4	44.1	2.3	0.6	0.5	0.3	26.8
2002	14.8	53.7	2.2	0.3	0.5	1.7	26.8

\*includes cut trees



**Figure 21.** Locations of Oak Health plots.

There was a drastic increase in the number of dead trees (1.7%) this year. Most of this, a total of 11 trees, occurred on the two plots in the Kemptville District where the newly dead trees had all been extremely affected by the drought of 2001. The trees that succumbed (total five) on the two plots in Pembroke District had been in severe decline the previous year.

Not reflected in the summary is the damage that occurred to trees on the two plots near Lake Erie, Aylmer District. Here a total of ten trees suffered medium to heavy snow damage. Gypsy moth was the most noticeable insect defoliator in 2002. It was recorded at seven of the plots and defoliation ranged from 5 to 10 percent.