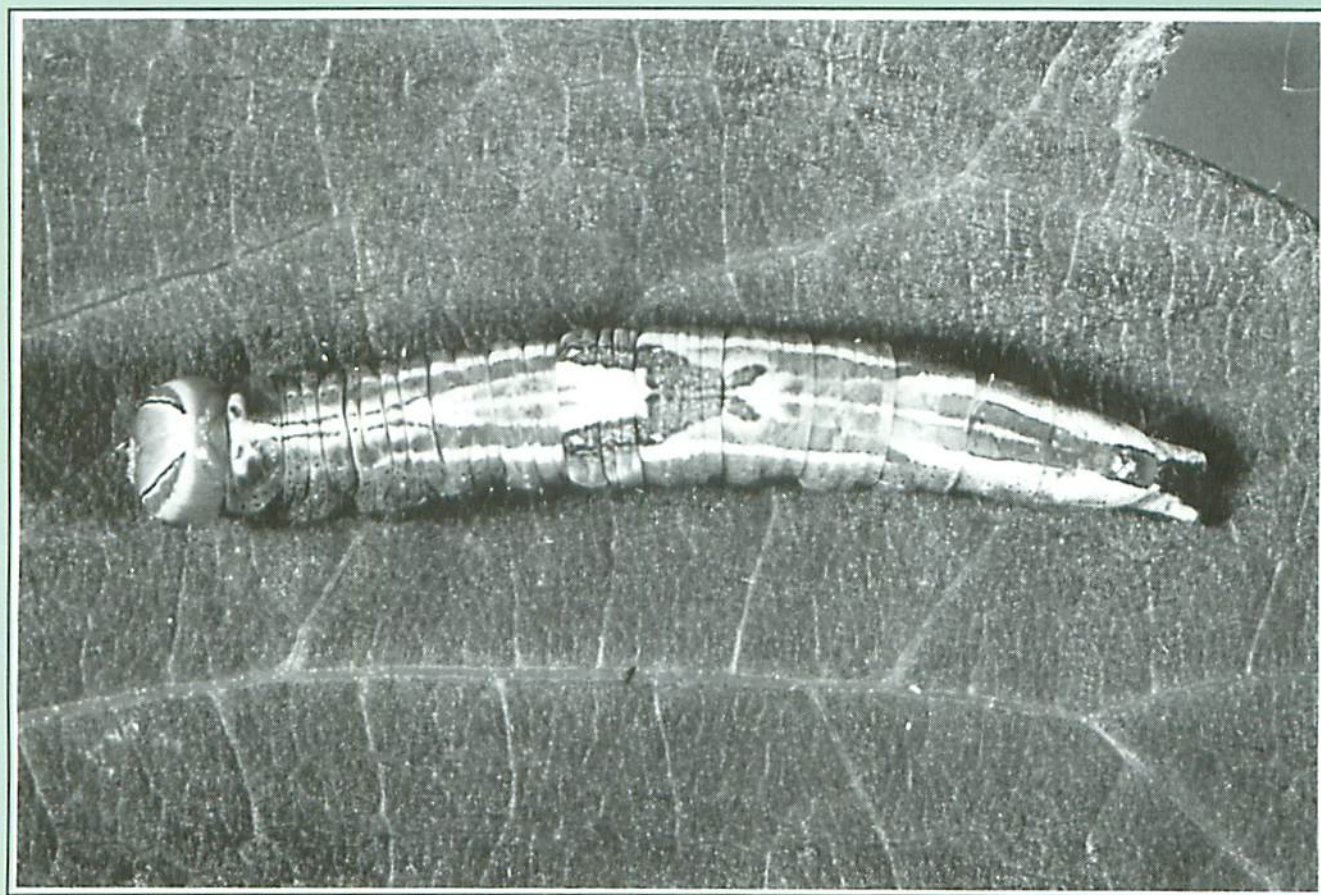


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# SURVEY BULLETIN

Forest Insect and Disease Conditions in Ontario  
Fall 1990



Forestry  
Canada

Forêts  
Canada

Canada



# FOREST INSECT AND DISEASE CONDITIONS IN ONTARIO<sup>1</sup>

Fall 1990

This is the third and final bulletin issued by the Forest Insect and Disease Survey (FIDS). Together, the bulletins summarize the results of pest surveys in Ontario's forests in 1990.

## FOREST PEST REVIEWS

The 14th annual Forest Pest Reviews for Ontario were held this year, with the northern review in Sault Ste. Marie on 7 November and the southern review in Barrie on 15 November. The northern review focused on such topics as spruce budworm (*Choristoneura fumiferana* [Clem.]), including the results of spray operations and trials, forest tent caterpillar (*Malacosoma disstria* Hbn.), gypsy moth (*Lymantria dispar* L.) and jack pine budworm (*Choristoneura pinus pinus* Free.). Other topics included forest pests in Michigan, vegetation management, surveys of seed orchards, provincial initiatives in forest health, nursery pests and pests in blowdown. Speakers included representatives of the Ontario Ministry of Natural Resources (OMNR), Michigan Department of Natural Resources, the Forest Pest Management Institute and Forestry Canada, Ontario Region.

Topics at the southern review included the gypsy moth, including the results of spraying operations with B.t. and experimental spraying with viruses, forest tent caterpillar, jack pine budworm, spruce budworm and the European strain of Scleroderris canker (*Ascocalyx abietina* [Lagerb.] Schlöpfer-Bernhard). Other items addressed were a study of the impact of white pine weevil (*Pissodes strobi* Peck) on jack pine (*Pinus resinosa* Ait.); the results of research on the control of pine false webworm (*Acantholyda erythrocephala* [L.]); damping off in southern Ontario nurseries; an update on nursery pests; and control of Leconte's sawfly (*Neodiprion lecontei* [Fitch]) and European pine sawfly (*Neodiprion sertifer* [Geoff.]) with viruses. Speakers represented OMNR, the Ontario Ministry of the Environment, the University of Toronto and Forestry Canada, including the Forest Pest Management Institute, Headquarters, Quebec Region and Ontario Region. The northern review was attended by 83 persons and the southern review had an attendance of 124 persons.

## FOREST INSECTS

Spruce Budworm, *Choristoneura fumiferana* Clem.

The summer Survey Bulletin reported a total of 6,780,446 ha of moderate-to-severe defoliation in Ontario in 1990. Most of this defoliation was located in the Northwestern and North Central regions, along with a new infestation in western Hearst District of Northern Region. Subsequent surveys disclosed an additional 2,815 ha of moderate-to-severe defoliation in Algonquin Park District of Algonquin Region, bringing the

1. Cover photo: mature larva of the saddled prominent (*Heterocampa guttivita* [Wlk.]).



1990 total to 6,783,261 ha (Fig. 1, Table 1). The infestation was located in the central and southern portions of Biggar Township, with small extensions into the northeastern and northwestern corners of adjacent Devine Township, along with a small pocket east of Birchcliffe Lake in Osler Township.

Additional pockets of moderate-to-severe defoliation were also found in a white spruce (*Picea glauca* [Moench] Voss) plantation in Tiny Township, Huronia District, and in a white spruce seed orchard at the Orono Forest Tree Nursery in Clarke Township, Lindsay District.

Surveys to determine the area of tree mortality caused by spruce budworm were carried out during the latter part of the field season. They disclosed a total area of 3,098,189 ha within which mortality of balsam fir (*Abies balsamea* [L.] Mill.) and white spruce has occurred (Fig. 2), an increase of some 1,214,473 ha over 1989. All the mortality referred to above is located in the Northwestern and North Central regions, where the outbreak has been damaging stands since 1979. Tree mortality that occurred during the early part of the current outbreak (1972 to 1984) in northeastern and southern Ontario has been dropped from the totals and the map, since the outbreak has subsided in these areas and the forests are in the process of regeneration.

The largest increases (1,048,860 ha) occurred in North Central Region, where stands have been severely damaged in much of Atikokan District and the southwestern corner of Thunder Bay District. Large areas of mortality are evident in southern Nipigon and eastern Thunder Bay districts between Lake Nipigon and the northern coast of Lake Superior. Several large patches of mortality are present in southern Terrace Bay District and smaller pockets were mapped in eastern Terrace Bay District and the southeastern corner of Geraldton District. In Northwestern Region, large areas of mortality are present in northern and eastern Fort Frances District, southern and northwestern Dryden District and in north-central Ignace District. Three sizeable pockets of mortality are located west, northwest and southeast of the town of Kenora and in another area in the northeastern corner of Kenora District. Numerous small patches of mortality are evident in southern Red Lake District and southwestern Sioux Lookout District.

The annual spruce budworm egg-mass survey was carried out in August for the purpose of forecasting population trends in 1991. Some 438 locations were sampled, of which 332 were sampled in both 1989 and 1990. A comparison of these surveys shows a province-wide decline of 10% in egg-mass densities (Tables 2, 3).

In Northwestern Region, egg-mass densities increased by 7% over all, with increases in the Fort Frances (11%), Kenora (33%), Red Lake (65%) and Sioux Lookout (22%) districts and decreases in the Dryden (28%) and Ignace (21%) districts. Infestations will probably persist throughout most of the area infested in 1990, with some slight expansion possible along the northern periphery of the outbreaks in the Kenora, Red

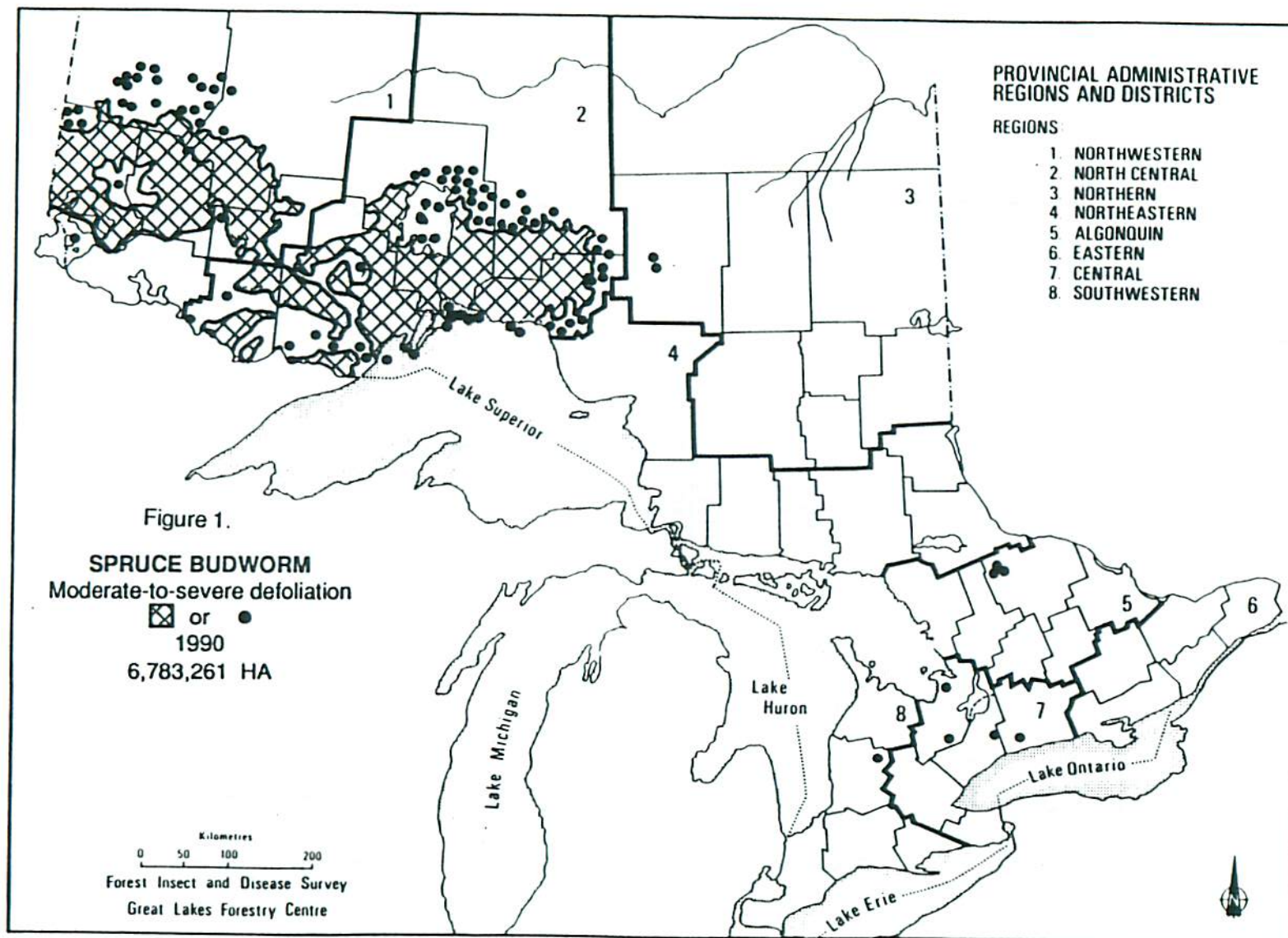




Table 1. Gross area (ha) of current moderate-to-severe defoliation by spruce budworm in Ontario from 1988 to 1990.

Region District	Area of moderate-to-severe defoliation (ha)		
	1988	1989	1990
<u>North Central</u>			
Atikokan	578,464	482,208	410,377
Thunder Bay	376,395	597,382	1,273,723
Nipigon	605,741	940,513	1,087,868
Terrace Bay	260,393	624,724	761,251
Geraldton	13,956	389,750	493,011
	<u>1,834,949</u>	<u>3,034,577</u>	<u>4,026,230</u>
<u>Northwestern</u>			
Ignace	512,961	419,620	314,071
Dryden	907,685	902,750	815,547
Sioux Lookout	540,334	586,772	523,344
Fort Frances	275,817	199,084	6,720
Kenora	886,627	897,779	859,395
Red Lake	266,361	199,054	228,747
	<u>3,389,785</u>	<u>3,205,059</u>	<u>2,747,824</u>
<u>Northern</u>			
Chapleau	0	0	0
Cochrane	0	0	0
Gogama	0	0	0
Hearst	0	0	6,392
Kapuskasing	0	0	0
Kirkland Lake	0	0	0
	<u>0</u>	<u>0</u>	<u>6,392</u>
<u>Northeastern</u>			
Blind River	0	0	0
Espanola	0	0	0
North Bay	0	0	0
Sault Ste. Marie	0	0	0
Sudbury	0	0	0
Temagami	0	0	0
Wawa	0	0	0
	<u>0</u>	<u>0</u>	<u>0</u>
<u>Algonquin</u>			
Algonquin Park	0	0	2,815
<u>Total</u>			
	<u>5,224,734</u>	<u>6,239,636</u>	<u>6,783,261</u>

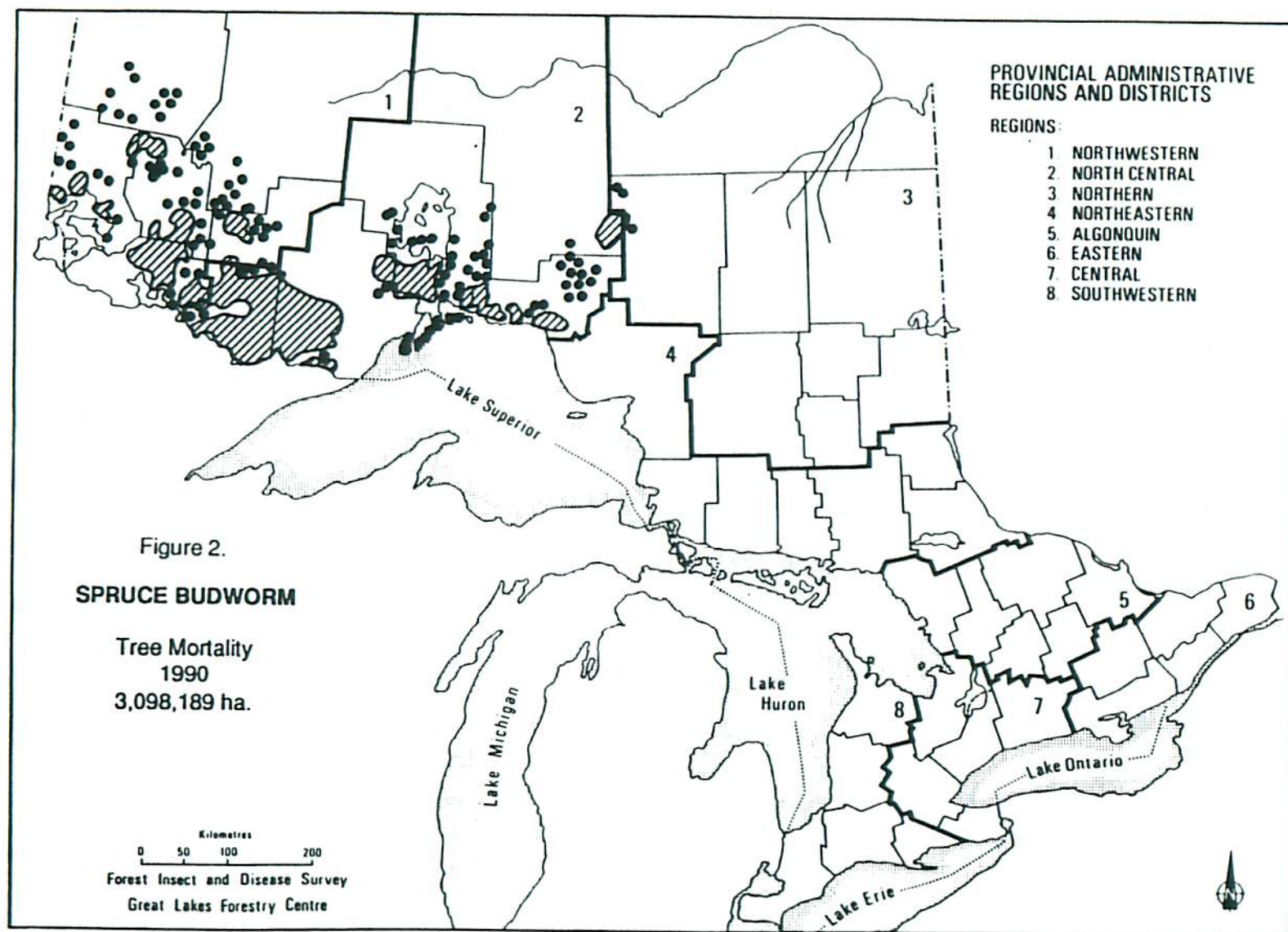


Table 2. Comparison of spruce budworm egg-mass densities in Ontario in 1989 and 1990.

Region District	No. of locations		Average egg-mass density per 9.29 m <sup>2</sup> of branch		% Change
	sampled	with increase	1989	1990	
<u>Northwestern</u>					
Dryden	19	6	567.4	410.1	-28
Fort Frances	13	6	228.6	253.6	+11
Ignace	22	8	307.9	243.6	-21
Kenora	19	8	340.2	452.3	+33
Red Lake	19	13	294.5	484.8	+65
Sioux Lookout	<u>19</u>	<u>13</u>	<u>272.2</u>	<u>332.5</u>	<u>+22</u>
Total	111	54	340.1	365.5	+7
<u>North Central</u>					
Atikokan	15	1	313.5	145.2	-54
Geraldton	18	9	708.7	699.6	-1
Nipigon	23	11	801.2	675.6	-16
Terrace Bay	33	15	605.9	302.2	-50
Thunder Bay	<u>59</u>	<u>28</u>	<u>262.5</u>	<u>264.4</u>	<u>+1</u>
Total	148	64	482.2	377.6	-22
<u>Northern</u>					
Chapleau	5	1	8.6	6.4	-26
Cochrane	5	0	2.0	0.0	-100
Gogama	3	0	0.0	0.0	0
Hearst	14	14	13.5	139.2	+931
Kapuskasing	3	2	0.0	25.7	+100
Kirkland Lake	3	1	0.0	1.3	+100
Timmins	<u>2</u>	<u>1</u>	<u>0.0</u>	<u>6.5</u>	<u>+100</u>
Total	35	19	6.9	59.3	+759
<u>Northeastern</u>					
Blind River	2	0	15.0	0.0	-100
Espanola	2	1	0.0	8.0	+100
North Bay	3	1	0.0	2.3	+100
Sault Ste. Marie	2	0	0.0	0.0	0
Sudbury	2	0	0.0	0.0	0
Temagami	2	0	5.5	0.0	-100
Wawa	<u>10</u>	<u>4</u>	<u>3.4</u>	<u>15.0</u>	<u>+341</u>
Total	23	6	3.3	7.2	+118
<u>Southern Ontario</u>	15	3	32.3	33.5	+4



Table 3. Comparison of spruce budworm egg-mass densities in Ontario in 1989 and 1990.

OMNR Region	No. of locations common to 1989 and 1990	Average egg-mass density per 9.29 m <sup>2</sup> of branch		± Change
		1989	1990	
Northwestern	111	340.1	365.5	+7
North Central	148	482.2	377.6	-22
Northern	35	6.9	59.3	+759
Northeastern	23	3.3	7.2	+118
Southern Ontario	15	32.3	33.5	+4
Total	332	331.1	298.8	-10

Lake and Sioux Lookout districts. There is also a possibility of an increase in the area affected in Fort Frances District and southern Ignace District.

In the North Central Region there was an overall decline of 22% in egg-mass densities which was composed of declines of 54, 1, 16 and 50%, respectively, in the Atikokan, Geraldton, Nipigon and Terrace Bay districts and an increase of 1% in Thunder Bay District. These declines notwithstanding, egg-mass densities are still sufficiently high that moderate-to-severe defoliation will likely persist throughout most of the area infested in 1990. There may be some intensification of defoliation in Geraldton District, but little expansion, if any, is expected in the eastern part of the outbreak.

Egg-mass densities increased markedly in the Northern and Northeastern regions, but widespread, heavy infestations are not expected in 1991. An exception to this trend will likely occur in Hearst District, where the infestations around Nagagamisis Lake will probably expand. There is also a possibility that small, new pockets of defoliation could be discovered in both regions in 1991.

Similarly, the small infestation in Algonquin Park District in southern Ontario may increase in size and new pockets of infestation may be discovered next year.

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

Infestations that had caused moderate-to-severe defoliation of 248,311 ha of jack pine in the Red Lake and Sioux Lookout districts in



Jack Pine Budworm, *Choristoneura pinus pinus* Free.

Infestations that had caused moderate-to-severe defoliation of 248,311 ha of jack pine in the Red Lake and Sioux Lookout districts in 1989 were reduced to 665 ha in three small pockets in 1990. New infestations totaling some 29,660 ha were mapped inland from Georgian Bay between Still River and Gordon Lake in Parry Sound District. The trees in this area are under extreme stress since they are growing on generally poor sites, were defoliated by jack pine budworm from 1983 to 1986, were subjected to drought conditions in 1988 and 1989 and were defoliated again by jack pine budworm in 1990. Examination of one stand in Wallbridge Township disclosed 54% of the trees living, 33% with dead tops and 13% dead.

Egg-mass surveys were carried out at 89 locations in the latter part of the field season in an effort to predict population trends in 1991. An analysis of the results indicates that infestations in Parry Sound District will persist next year and may possibly increase in intensity and area infested. Despite a forecast of moderate or severe defoliation at a couple of locations in the Red Lake and Sioux Lookout districts, populations are expected to continue to decline in these areas in 1991 following the collapse of the infestations this year. Small numbers of egg-masses resulted in predictions of light defoliation at several widely separated locations in the Thunder Bay, Terrace Bay and Geraldton districts in North Central Region and at single locations in Hearst District of Northern Region and the Espanola and Sudbury districts of Northeastern Region.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Aerial and ground surveys this year disclosed some 9,480,408 ha of moderate-to-severe defoliation in the province, up from 7,915,111 ha in 1989. Major increases in the area affected were recorded in the Northwestern, North Central and Northern regions and in Wawa District of Northeastern Region. These were offset somewhat by declines in the southern part of Northeastern Region as well as in the Algonquin, Eastern and Central regions. A small increase was recorded in Owen Sound District of Southwestern Region. Egg-band surveys were carried out by FIDS field staff in the latter part of the field season to allow prediction of population trends in 1991 (Fig. 3, 4 and 5). The results of these surveys indicate that populations will probably remain high in the areas infested in 1990 in the Northwestern and North Central regions. The outbreak may spread northward in the Kenora, Red Lake and Sioux Lookout districts of Northwestern Region and many of the smaller patches of infestation may coalesce to form larger areas of defoliation in the Thunder Bay and Nipigon districts of North Central Region. Infestations in the Hearst and Kapuskasing districts of Northern Region will probably enlarge and may amalgamate with expanding infestations in the adjacent Wawa and Geraldton districts of the Northeastern and North Central regions.

# NORTHWESTERN ONTARIO

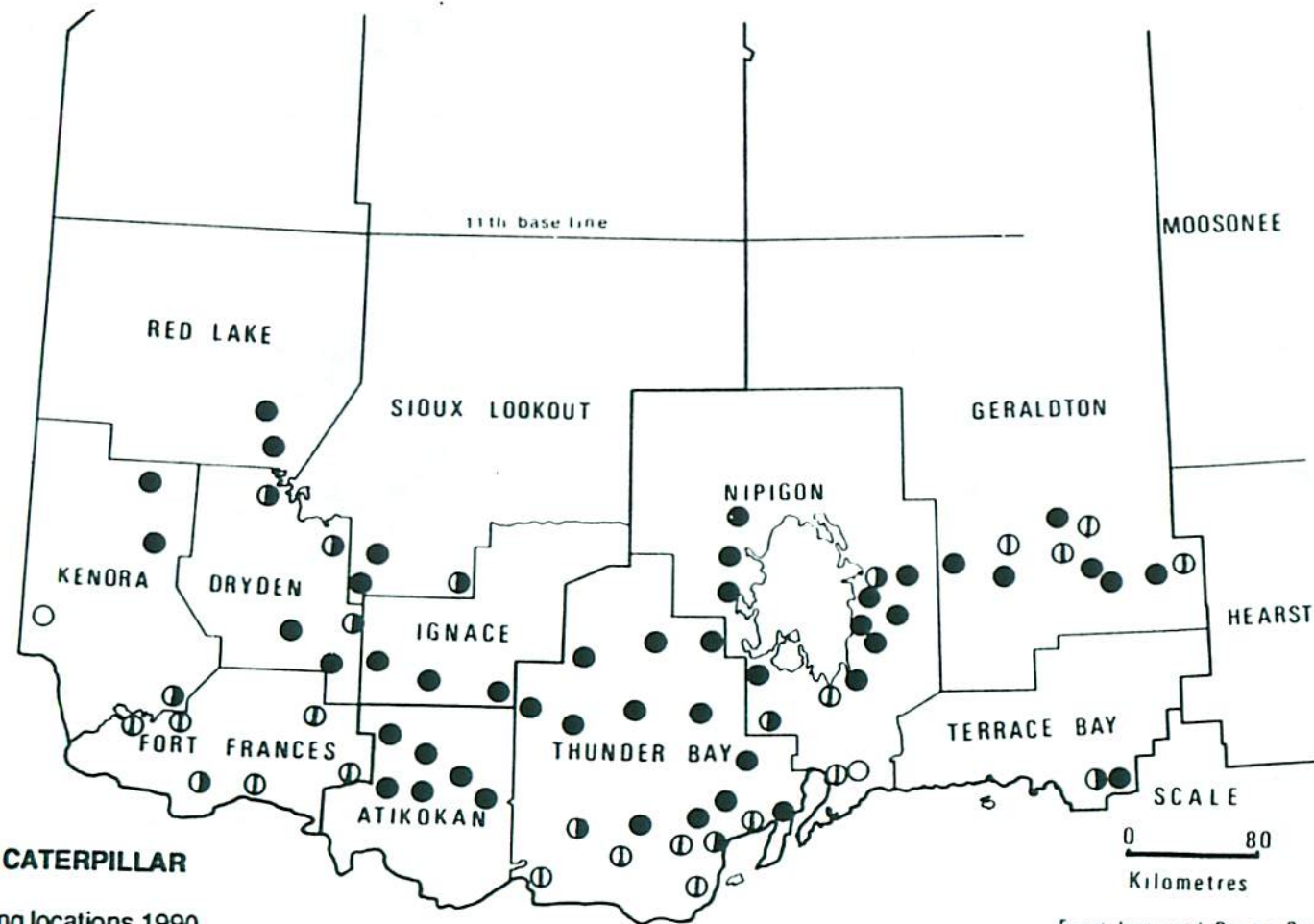


Figure 3.

## FOREST TENT CATERPILLAR

Egg-band sampling locations 1990  
Defoliation forecast 1991

- Severe
- ⊕ Moderate
- ⊖ Light
- Nil

Forest Insect and Disease Survey  
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# NORTHEASTERN ONTARIO

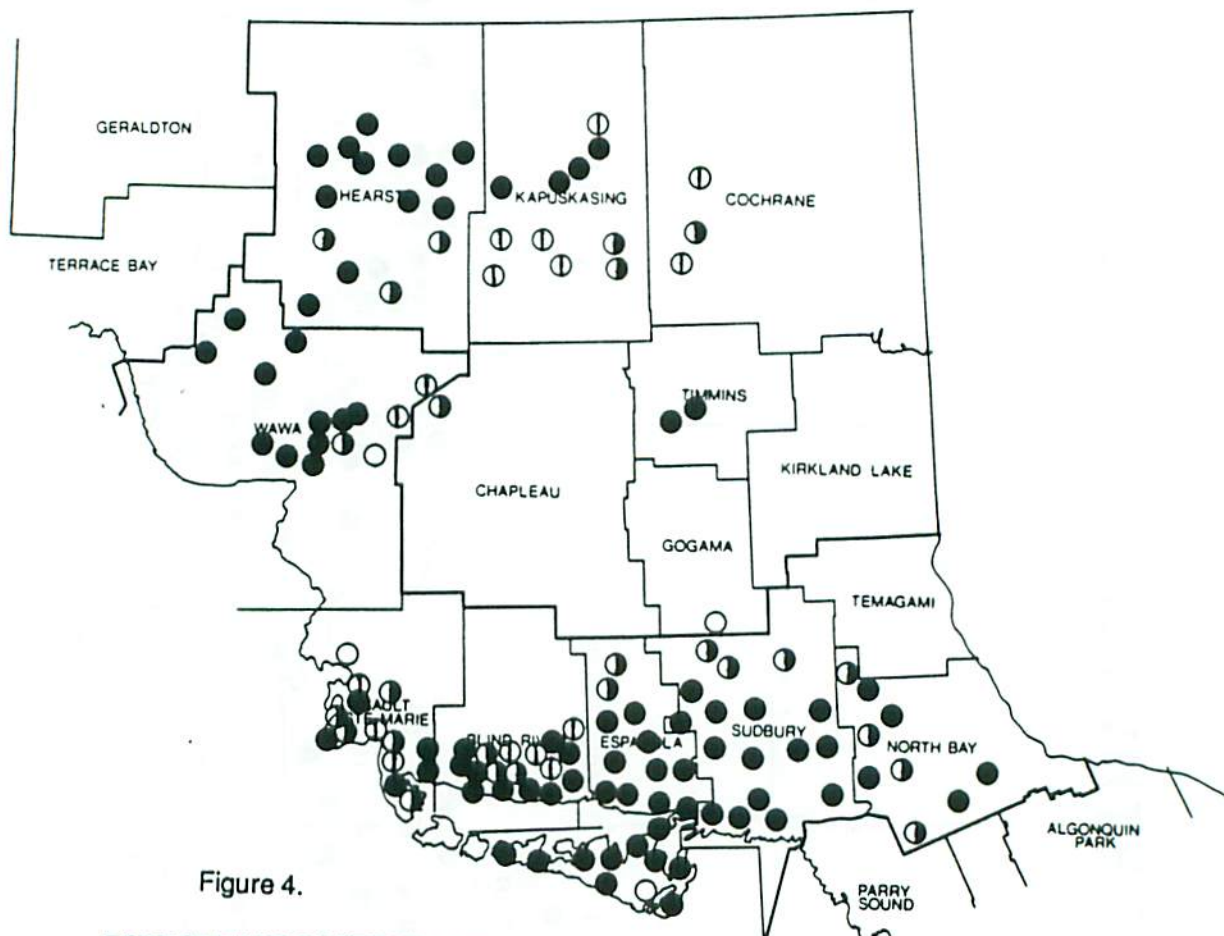


Figure 4.

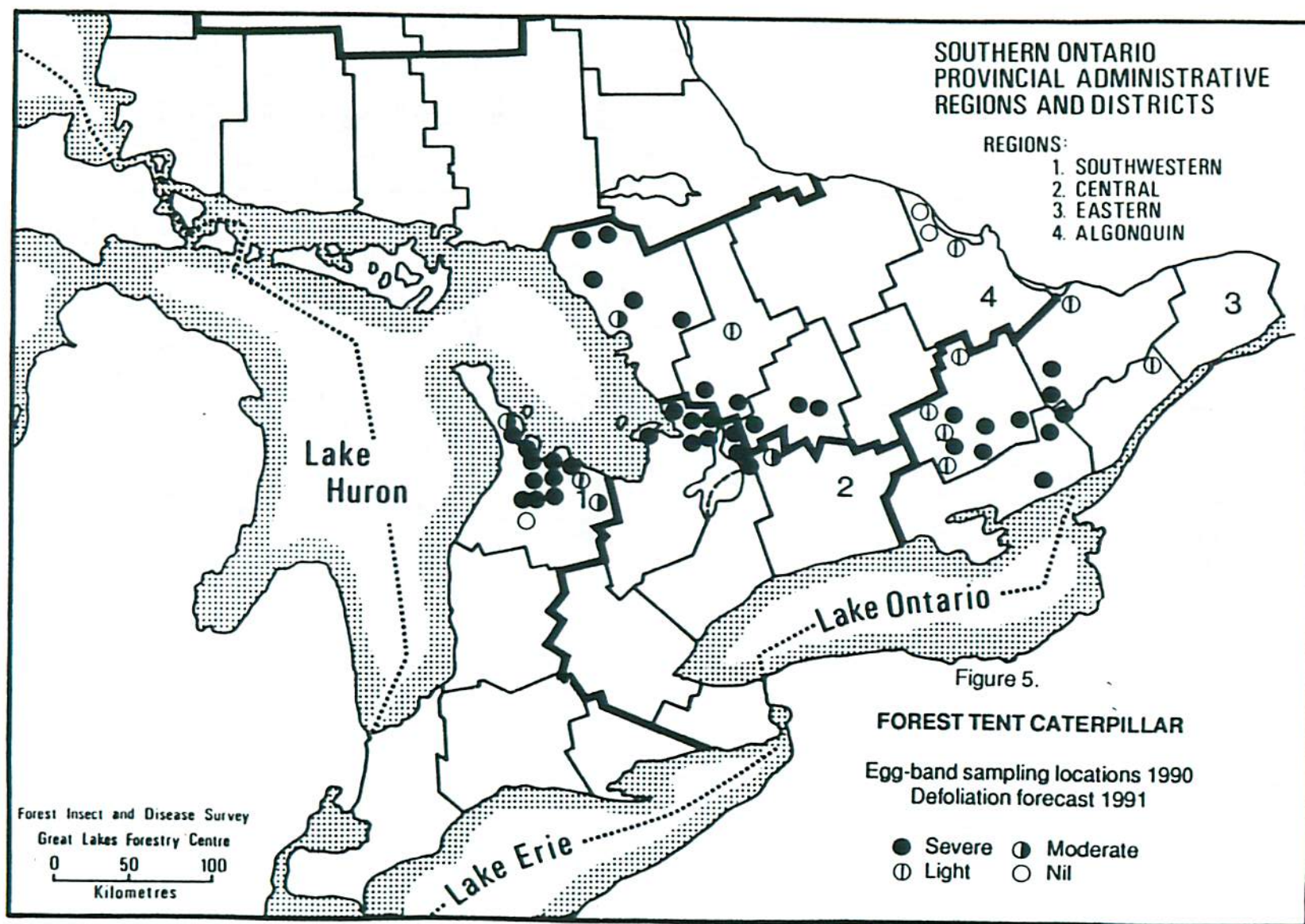
## FOREST TENT CATERPILLAR

Egg-band sampling locations 1990  
Defoliation forecast 1991

- Severe    ◐ Moderate
- ◑ Light    ○ Nil

0 Miles 60  
0 Kilometres 96

Forest Insect and Disease Survey  
Great Lakes Forestry Centre





The pattern of decline is likely to continue in southern Ontario, with scattered pockets persisting in some areas of the Tweed, Minden, Huronia, Parry Sound and Bracebridge districts. In contrast, there is a possibility that the area infested may expand slightly in Owen Sound District in 1991.

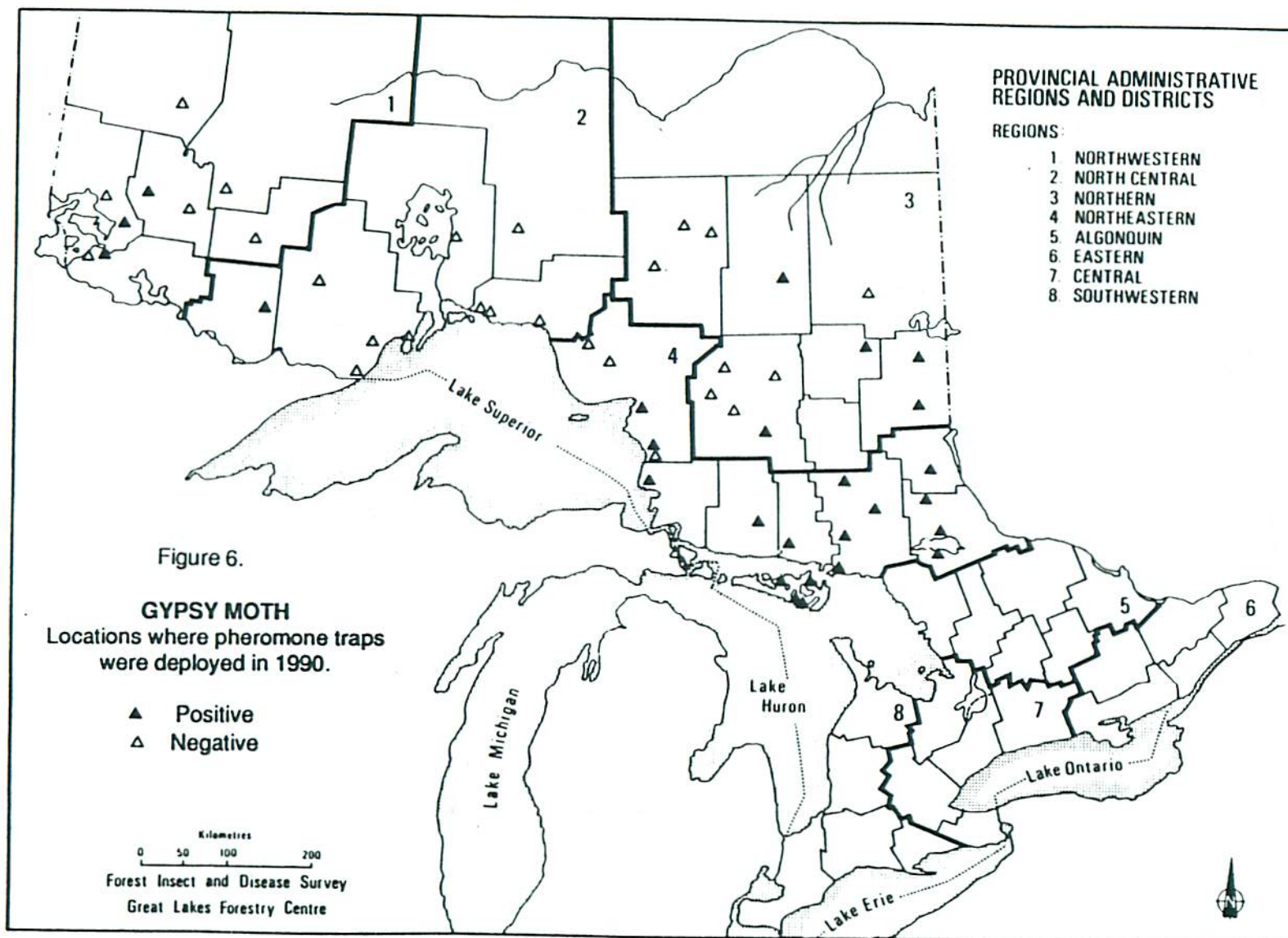
Gypsy Moth, *Lymantria dispar* (L.)

As reported in the summer Survey Bulletin, there was a slight decline in the area of moderate-to-severe defoliation caused by the gypsy moth in 1990. Province-wide, 77,648 ha of defoliation were mapped this year, compared with 81,640 ha in 1989. Most of this decline in the area affected occurred in the Brockville, Tweed, Carleton Place and Napanee districts of Eastern Region, accompanied by a slight decline in the area affected in Simcoe District of Southwestern Region. These declines were nearly offset by increases that occurred in all other areas in southern Ontario in which the gypsy moth is known to occur. The most significant increases were recorded in the Niagara Falls, Bancroft, Pembroke, Minden and Parry Sound districts.

In addition to the infestations described above, the insect continues to extend its range to the north and west. Small populations are now known to occur at Killarney Provincial Park and at four locations on the Wikwemikong Indian Reserve (at Clover Valley, Gore Bay, Wolseley Lake and near Manitowaning) on Manitoulin Island, at Sagamok Point on the Spanish Indian Reserve, and near Fort La Cloche, on the mainland in Espanola District. Egg masses of the gypsy moth have been found at several locations east, west and within the city of Sault Ste. Marie in Sault Ste. Marie District and in the city of Sudbury, Sudbury District.

The long-standing gypsy moth pheromone and burlap larval trapping programs in southern Ontario parks and campgrounds were discontinued in 1990 except for a small experimental program. The program was discontinued because it was felt that it had served its purpose in helping to track the spread of gypsy moth across southern Ontario, which is now considered to be generally infested. The pheromone-trapping program was continued, however, in northern Ontario parks (Fig. 6). As usual, two traps were deployed at each park, one near the entrance and one in a camping area. In some parks in which adults were caught in 1989, 10 traps were deployed in 1990. An examination of the results revealed that catches had been made in 16 of the 19 parks trapped in Northeastern Region. These included parks in southern Wawa District and in the Sault Ste. Marie, Blind River, Espanola, Sudbury, North Bay and Temagami districts. Catches were also made in the adjacent Kirkland Lake District and at single locations in the Chapleau, Timmins and Kapuskasing districts. These results are not unexpected, as the insect continues to extend its range northward. In northwestern Ontario, one or two moths were caught at single parks in each of the Atikokan, Fort Frances, Kenora and Dryden districts.

Although there is little data currently available in the form of





egg-mass surveys, it is apparent that the insect is now present in more areas of the province than ever before. Many of the current infestations will expand next year, and new pockets will also be found, thus increasing the overall area of moderate-to-severe defoliation in 1991.

Pine False Webworm, *Acantholyda erythrocephala* L.

Late-season reports indicate that this pest of pines (*Pinus* spp.) continues to extend its range into northern Ontario. Numerous light infestations were recorded in red pine (*Pinus resinosa* Ait.) plantations in the Espanola and North Bay districts and a single, light infestation was observed in a jack pine plantation in Stoddard Township, Hearst District. Late surveys in Bancroft District turned up a 4-ha red pine plantation in Mayo Township in which 91% of the trees sustained an average of 51% defoliation. A collection of eggs from Snowdon Township, Minden District, which were attacked by the parasite *Trichogramma* sp., represents the first North American record of the parasite on this introduced insect.

Black Army Cutworm, *Actebia fennica* (Tausch.)

No infestations of black army cutworm larvae were found in 1990; however, a pheromone-trapping program yielded catches of adult male moths, as outlined below. In Chapleau District, the total number of moths caught in two traps was 186 in Delmage Township, but no moths were caught in two traps in Marshall Township. Trapping in Hearst District yielded 55, 28 and 46 moths, respectively, in two traps in each of Elgie, Legge and Minnipuka townships. Three traps at the Thunder Bay Forest Tree Nursery in Thunder Bay District caught a total of 189 moths.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

Population levels of this late-season insect, which have remained at very low levels for several years, began increasing in 1990. Medium-to-heavy infestations caused defoliation of many white birch (*Betula papyrifera* Marsh.) stands in a wide band from Wallis Township, Hearst District, across Kapuskasing District to Marceau Township, Cochrane District. Pockets of mainly moderate defoliation were reported in many areas in the Timmins and Kirkland Lake districts, with a few areas of severe defoliation southwest of the city of Timmins, Timmins District. A few pockets of moderate-to-severe defoliation were also reported in Huotari Township, Wawa District.

Oak Leaf Shredder, *Croesia semipurpurana* (Kft.)

Generally very low population levels of this damaging pest of oak (*Quercus* spp.) prevailed across the province. Egg-mass surveys carried out in the latter part of the field season indicate that this trend will



probably continue in 1991. Exceptions occurred in red oak (*Quercus rubra* L.) stands in Thorold and West Lincoln townships, Niagara District, where egg counts were high enough for forecasts of moderate and severe defoliation, respectively, in 1991.

Maple Trumpet Skeletonizer, *Epinotia aceriella* (Clem.)

Heavy infestations recurred for the fourth consecutive year in a 25-ha sugar maple (*Acer saccharum* Marsh.) stand in Hallowell Township, Napanee District. Here, 75% of the trees sustained an average of 75% foliar damage. Light foliar damage was also reported throughout Carillon Provincial Park, Cornwall District, and in a 20-ha sugar maple woodlot in Rear of Yonge and Rear of Escott townships, Brockville District.

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

This shoot borer attacks the lateral shoots and, in some cases, the leaders of most pine species. Damage to the lateral shoots generally has little impact on the tree. Leader damage, however, can cause severe stem deformity, similar to that caused by the white pine weevil. The borer was widely distributed in young jack pine stands in northern Ontario, usually causing low levels of leader damage. The most severe damage levels occurred in North Central Region, particularly in the Atikokan and Thunder Bay districts. Here, leader damage levels of 18 and 16%, respectively, were recorded in a jack pine stand on Highway 11 at Lerome Lake and one on the Sapawe-Upsala Road, Atikokan District. In Thunder Bay District, significant leader damage was recorded as follows: Bluebird Lake, 10%; Fallscamp Lake, 19.5%; English River, 16%; and Granite River, 17%. Leader damage of 20 and 14.7%, respectively, was recorded on the Wegg Lake Road and the Overnight Lake Road in Sioux Lookout District. In most other locations, leader damage was less than 10%.

Birch Leafminer, *Fenusa pusilla* (Lep.)

In addition to information presented in the summer Survey Bulletin, heavy infestations were reported at a number of areas in North Central Region. The largest area affected was a 25-ha white birch stand in the Gorge Creek Road area, Nipigon District, where foliar damage ranged from 60 to 90%. In Oakes Township, Geraldton District, an 8-ha stand had 85% of the trees attacked, with 70% foliar damage, and a 15-ha stand on Highway 614, Terrace Bay District, had 90% of the trees attacked, with an average of 60% foliar damage. Numerous individual trees and small clumps of white birch, including ornamentals in the towns of Geraldton, Longlac, Terrace Bay and Manitouwadge, sustained foliar damage ranging from 80 to 100%. Defoliation of about 75% was also reported in a number of areas in Elgie Township, Hearst District.



Saddled Prominent, *Heterocampa guttivitta* (Wlk.)

For the first time since 1970, high population levels of the saddled prominent were observed in Algonquin Region. Moderate-to-severe defoliation was aerially mapped over approximately 2,017 ha of hardwood, (predominantly sugar maple) stands in the central part of Minden District. A single, small pocket of moderate-to-severe defoliation was also recorded in Ridout Township, Bracebridge District. The insect caused light defoliation in numerous other stands in central Minden District and eastern Bracebridge District. Although sugar maple was the preferred host, yellow birch (*Betula alleghaniensis* Britton) and beech (*Fagus* spp.) were also attacked. Most of the stands described above also sustained light forest tent caterpillar defoliation in the spring and early summer. In some stands, the beech caterpillar (*Dasylophia thyatiroides* [Wlk.]) was found feeding in conjunction with the saddled prominent.

Fall Webworm, *Hyphantria cunea* (Drury)

Field reports indicate that the fall webworm was widespread at generally low population levels across southern Ontario. Generally, single or small numbers of nests resulted in defoliation ranging from 5 to 50% on single trees or small groups of open-grown or fringe deciduous hosts. Exceptions occurred in Eastern Region, where open-grown clumps of black ash (*Fraxinus nigra* Marsh.) over a 2-ha area in Mountain Township, Cornwall District, were completely defoliated. Numerous lakeshore black ash in Charleston Lake Provincial Park, Brockville District, were completely encased in webbing and 100% defoliated. Occasional deciduous trees along the St. Lawrence Parkway, Brockville District, were completely defoliated. In Pembroke District of Algonquin Region, white ash (*Fraxinus americana* L.) in a 5-ha woodlot were completely defoliated. Black walnut (*Juglans nigra* L.) trees within a 10-ha area near Turkey Point, Simcoe District, sustained defoliation varying from 20 to 75%.

In northern Ontario, scattered small populations were reported from the Kirkland Lake, Thunder Bay, Sudbury, Sault Ste. Marie and Thunder Bay districts.

Redheaded Pine Sawfly, *Neodiprion lecontei* (Fitch.)

The heaviest infestations reported in 1990 were in Espanola District, where a 5-ha red pine plantation sustained an average of 65% defoliation on 94% of the trees and cumulative mortality has reached 40%. A nearby 0.4-m red pine plantation had 76% defoliation on 81% of the trees. In Gough Township, 70% defoliation was recorded on 97% of the 2.9-m red pine and a 4-ha red pine plantation sustained 43% defoliation on 49% of the trees, with 2% mortality, in Tennyson Township. A heavy infestation was recorded in Parkinson Township, Blind River District, where 1-m red pine in a 5-ha plantation had 97% of the trees affected with an average defoliation of 83%. Somewhat lower population levels



were observed in a number of other areas in the Blind River, Espanola, North Bay, Bancroft and Pembroke districts. Numerous young red pine plantations in Espanola District were treated with the Leconte virus by OMNR and E.B. Eddy Forest Products personnel to control this sawfly and some spray operations with Malathion were carried out by OMNR in North Bay District.

Swaine Jack Pine Sawfly, *Neodiprion swainei* Midd.

For the second consecutive year, populations of this sawfly increased in the Banks-Makobe lakes area of northwestern Temagami District. Although defoliation remains light, colonies of this insect were more numerous in jack pine stands that had a history of attack by the insect. Increased but still low population levels were also recorded in the Lake Temagami area of Temagami District, but a small, heavy infestation that has persisted for several years on Island 127 in Lake Temagami declined to a low level in 1990.

Redheaded Jack Pine Sawfly, *Neodiprion virginiana* complex

This common, late-season pest was reported from a number of areas in northern Ontario. The most severe damage occurred in a 200-ha jack pine plantation in Alcona Township, Chapleau District, where 80% of the 1.1-m trees were attacked and sustained an average of 45% defoliation.

Open-grown, 7-m trees in a 0.5-ha area in Margaret Township, Chapleau District, sustained an average of 20% defoliation. The insect was also reported in small numbers in the Timmins, Gogama, Temagami, Kirkland Lake, Wawa, Sault Ste. Marie and Thunder Bay districts.

Maple Leafcutter, *Paraclemensia acerifoliella* (Fitch)

Population levels that had been high for several years in Hallowell Township, Napanee District, declined to generally low levels in 1990. A similar decline was also reported in Murphy's Point Provincial Park, Carleton Place District. A heavy infestation was recorded in an 8-ha portion of a 40-ha sugar bush in McNabb Township, Pembroke District, where defoliation averaged 80% on larger trees and 100% on regeneration.

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.)

The most severe damage by this insect was again encountered in Northwestern Region. Young trembling aspen (*Populus tremuloides* Michx.) stands up to 10 m in height sustained foliar damage as high as 100% at numerous locations in the southern half of Ignace District. Similar damage levels were recorded in a 5-km<sup>2</sup> area near Goodie Lake in Sioux Lookout District and near Suffel and Longlegged lakes in Red Lake



District. Slightly lower damage levels, in the 65% range, were recorded at a number of locations in Dryden District and at a number of widely scattered areas in Hearst District. Foliar damage of 80 and 90%, respectively, were recorded at single locations in the Geraldton and Nipigon Districts.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.)

In addition to information presented in the summer Survey Bulletin, medium-to-heavy defoliation by this insect was reported on open-grown white spruce and black spruce (*Picea mariana* [Mill.] B.S.P.) in a number of areas in Chapleau District and in several districts in North Central Region. The most severe damage occurred in a 7-ha black spruce plantation in Roberta Township, Terrace Bay District, where defoliation averaged 55% and cumulative mortality has reached 15% despite a ground-spray operation to control the pest in this plantation. An infestation that affected about 1 ha within a black spruce plantation near Burrows Lake, Geraldton District, caused 60% defoliation with 50% cumulative mortality. A ground-survey operation at the O'Connor black spruce seed orchard in Thunder Bay District limited defoliation to about 11% on 40% of the trees. Defoliation of 5 to 15% was observed on black spruce in the Matawin and Pearson seed orchards, Thunder Bay District. Defoliation as high as 100% was reported on single trees and small groups of black spruce and white spruce on the fringes of roads and stands, along lake shores and in ornamental situations in the Thunder Bay, Atikokan and Chapleau districts. A single, 4-ha white spruce plantation in Glackmeyer Township, Cochrane District, sustained an average of 69% defoliation on 99% of the trees. Severe defoliation by this insect was suspected but not confirmed on planted white spruce in the Fraserdale area of Cochrane District. This area will be investigated early in 1991 to determine if control measures are necessary. A single, heavy infestation was reported on a white spruce windbreak in Watt Township, Bracebridge District, where defoliation averaged 35%.

White Pine Weevil, *Pissodes strobi* (Peck)

Numerous reports of white pine weevil damage were received from across northern Ontario. In most cases, leader damage was less than 10% but more severe damage was recorded in a number of areas, as follows: in the Vermeersch and Ferguson black spruce seed orchards, Ignace District, 12 and 24%, respectively; in a jack pine stand in Hagey Township, Thunder Bay District, 14%; in a white spruce plantation in Davies Township, Terrace Bay District, 14%; in a black spruce plantation in Alanen Township, Wawa District, 17%; in a black spruce plantation in Bragg Township, Cochrane District, 36.7%; in a 20-ha jack pine plantation in Cairo Township, Kirkland Lake District, 14%; in a 96-ha jack pine plantation in Hurlburt Township, Sault Ste. Marie District, 23%; in a 16-ha jack pine plantation in Viel Township, Blind River District, 13%; in a 4-ha white pine (*Pinus strobus* L.) plantation in Sisk Township,



North Bay District, 36%; and in two white pine plantations in Mattawan Township, North Bay District, 28 and 24%.

Reports from southern Ontario were scarce. A small white pine plantation in Ross Township, Pembroke District, sustained 39% leader damage and a small white pine plantation in Charlotteville Township, Simcoe District, had 6.7% leader damage. Generally low populations were reported elsewhere in southern Ontario.

Spearmarked Black Moth, *Rheumaptera hastata* (L.)

This insect caused moderate-to-severe damage to white birch foliage in small pockets in Quetico Park in southern Atikokan District. Aerial surveys revealed that a total area of about 2,000 ha was affected. The insect was also reported in small numbers on white birch at one location in Cochrane District.

Maple Webworm, *Tetralopha asperatella* (Clem.)

Heavy infestations by this maple (*Acer* spp.) pest were observed in sugar maple stands in the Eastnor, Albemarle, Keppel, Sydenham, Euphrasia, Holland and Sullivan townships of Owen Sound District. Many of these stands had been damaged previously by the forest tent caterpillar, with the maple webworm destroying the remaining foliage and thus causing severe stress to the trees. High population levels of the webworm were also reported in sugar maple stands in a number of widely separated areas in Eastern Region. Low population levels were observed at numerous points in Owen Sound District, in a few stands in Huronia District, and at two locations in West Wawanosh Township, Wingham District.

Other Noteworthy Insects

A small population of adult Saratoga spittlebugs (*Aphrophora saratogensis* [Fitch]) was observed on jack pine in an acid-rain monitoring plot in Cane Township, Kirkland Lake District.

A single, heavy infestation of the pine needle scale (*Chionaspis pinifoliae* [Fitch]) occurred on jack pine at one location on Lake Temagami in Cynthia Township, Temagami District.

The pine tortoise scale (*Toumeyella parvicornis* [Ckll.]) infested 32% of grafted experimental jack pine at the Thunder Bay Forest Tree Nursery. Heavy infestations by the insect have caused 11% mortality of densely stocked roadside jack pine in the Graham area of Thunder Bay District.



High population levels of the balsam fir bark beetle (*Pityokteines sparsus* [LeC.]) were associated with dead and dying balsam fir in several areas of spruce budworm-damaged timber in the Thunder Bay and Nipigon districts.

Increased populations of the walnut caterpillar (*Datana integerrima* G. & R.) caused defoliation of 60 to 80% on open-grown and fringe black walnut trees in a number of areas in the Wingham, Aylmer, Simcoe and Niagara districts.

Heavy infestations by the imported willow leaf beetle (*Plagioderia versicolora* [Laich.]) caused severe foliar browning of riverside and ornamental willow (*Salix* spp.) at a number of locations throughout southern Simcoe and Aylmer districts and in the city of Kingston, Napanee District. High population levels were also observed on ornamental willow in the southern half of Lindsay District.

The spruce spider mite (*Oligonychus ununguis* [Jac.]) caused severe damage to the old foliage of open-grown and windbreak white spruce and Norway spruce (*Picea abies* [L.] Karst.) at numerous locations in the Chatham, Aylmer, Simcoe and Niagara districts.

Heavy infestations by the alder flea beetle (*Macrohaltica ambiens* [LeC.]) were present in several areas in the Chapleau, Timmins and Kirkland Lake districts.

Light infestation by the pine sawfly (*Neodiprion maurus* Roh.) occurred on jack pine in family tests at Bluebird Lake and in Robson Township as well as in the Matawin seed orchard in Thunder Bay District. Small numbers were also reported at one location in Stoddart Township, Hearst District.

Foliar damage by the greenstriped mapleworm (*Dryocampa rubicunda* [F.]) was reduced from levels of 70 to 80% in 1989 to about 17% in 1990 in the Turtle Lake-Findlayson Lake area of Atikokan District.

Low population levels of the redhumped oakworm (*Symmerista canicosta* Franc.) and the pinkstriped oakworm (*Anisota virginensis* [Drury]) were found in red oak stands defoliated by the forest tent caterpillar in Harrison Township, Parry Sound District.

The oak leafmining sawfly (*Profenusa lucifex* [Ross]) caused 15 to 20% foliar damage to white oak (*Quercus alba* L.) trees in Serpent Mounds Provincial Park, Lindsay District.

Scattered pockets of severe foliar browning by the balsam poplar leafblotch miner (*Phyllonorycter nipigon* [Free.]) were observed in the Hearst, Kapuskasing and Cochrane districts.

Populations of the mountain-ash sawfly (*Pristiphora geniculata* [Htg.]) declined to low and occasionally medium levels across most of the province.

Populations of the larch sawfly (*Pristiphora erichsonii* [Htg.]) remained at generally low levels across the province.

Low population levels of the red pine cone beetle (*Conophthorus resinosae* Hopk.) were reported in young jack pine stands at a number of locations in the Timmins, Temagami and Kirkland Lake districts, and at two locations in Hearst District.

The jack pine tip beetle (*Conophthorus banksianae* McP.) infested 16% of 2.1-m jack pine in a 10-ha area in the Lumsden Township seed orchard, Sudbury District, and 14% of the 3-m jack pine in a 9-ha stand in Merritt Township, Espanola District.

A heavy infestation by the pitted ambrosia beetle (*Corthylus punctatissimus* [Zimm.]) killed 75% of 0.5- to 1-m sugar maple regeneration in a 3-ha area in Thessalon Township, Blind River District.

A large population of the spruce cone maggot (*Lasiomma anthracinum* [Czerny]) damaged 67% of the cones on 8-m black spruce in Gillies Limit, Temagami District.

#### TREE DISEASES

Armilaria Root Rot, *Armillaria ostoyae* (Romagn.) Herink.

The summer Survey Bulletin indicated that this disease was widespread in coniferous plantations throughout the province, usually at infection levels in the 1-2% range. Subsequent surveys at many locations in northern Ontario confirmed this, with a few exceptions. Jack pine family-test plantings at Bluebird Lake, Fallscamp Lake and near Raith, in Thunder Bay District, had infection levels of 7.0, 2.5 and 5.5%, respectively. Two jack pine plantations in McQueston Township, Geraldton District, sustained infections of 5.3 and 9.3% and 4.6% infection was recorded in a jack pine progeny test in Kirkwood Township, Blind River District.

Scleroderis Canker, *Ascochyta abietina* (Lagerb.) Schl pfer-Bernhard

The annual survey for the European race of this disease of pines detected infection centers in McMurrich and Ryerson townships, Parry Sound District; in Mayo Township, Bancroft District; and in Stevenson Township, Bracebridge District. The latter collection is a new distribution record, but none of the above represent any significant spread of the disease.

In addition to information contained in the summer Survey Bulletin, the North American race was also found at very low infection



levels in single plantations in Ryerson and McMurrich townships, Parry Sound District, and in Perry Township, Bracebridge District. In Smilsky Township, Sault Ste. Marie District, 69% of the 2.7-m trees in a jack pine family-test site were infected mainly on lower branches. Infection levels of 75 and 12%, respectively, were recorded in small red pine plantations in Parkinson Township, Blind River District, and Recollet Township, Wawa District. In Terrace Bay District, 56% of 3.6-m jack pine in a 30-ha plantation in Cecil Township were infected; in another 80-ha, 2.1-m jack pine plantation, 44% of the trees were attacked. In the Lukinto Lake area of Geraldton District, 23% of the 4.5-m jack pine were infected and an infection level of 25% was recorded in a 20-ha plantation near the Sturgeon River in Nipigon District.

Leaf Anthracnoses, *Aureobasidium apocryptum* (Ell. & Ev.)  
Hermanides-Nijhof  
*Apiognomonina errabunda* (Roberge) Höhnelt,  
*Discula campestris* (Pass.) v. Arx.,  
*Mycosphaerella effigurata* (Schwein.) House

The organisms *A. apocryptum*, *A. errabunda* and *D. campestris* caused widespread damage to sugar maple foliage throughout Eastern Region. The most severe damage occurred in Sandbanks Provincial Park, Napanee District, where foliar damage averaged 30% in a 2-ha mature sugar bush, and in the town of Campbellford, where 20% of the trees in a sugar maple plot had 100% of the foliage affected. *Discula campestris* also caused 25 to 100% infection on 50% of roadside sugar maple in Stanley and North Easthope townships, Wingham District.

*Mycosphaerella effigurata* caused widespread browning and pre-mature leaf drop of white ash throughout Eastern Region. Damage was particularly severe in a 2-ha stand in Sandbanks Provincial Park, where foliar damage averaged 60% on 90% of the trees. Similar damage levels were recorded in a 1-ha stand in Carillion Provincial Park, Cornwall District, a 1-ha stand in Charleston Lake Provincial Park, Brockville District, and in the Mill Pond conservation area in Brockville District.

The same organism caused 30% foliar damage to 60% of black ash trees at a location in Blake Township, Thunder Bay District.

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary and  
*C. ledicola* (Peck) Lagerh.

An increased incidence of these rusts was evident on black spruce and white spruce across northern Ontario, with the most conspicuous damage occurring in Northern Region. Numerous stands of these spruces throughout the Hearst, Kapuskasing, Cochrane and northern Kirkland Lake districts were attacked, with infection levels often reaching 100% and average foliar damage ranging from 1 to 60%. Individual or small clumps of large, open-grown white spruce in Cochrane District were heavily



attacked in a number of areas, with foliar damage of about 75%. In a number of areas in the Cochrane, Kapuskasing and Hearst districts, the rust itself was attacked by a parasitic fungus that appears to control the disease to some degree.

A high incidence of the disease was also evident in parts of North Central Region. The most severe damage was recorded in Thunder Bay District, where natural and plantation black spruce stands along Highway 811 west of Highway 527 had 100% infection levels and an average of 60% defoliation. Infection levels as high as 100% were recorded in many other areas in North Central Region; however, foliar damage was usually lower, ranging from 5 to 35%. The rust parasite mentioned above was also found at one site near Upsala in Thunder Bay District.

These diseases were also widespread in Northwestern Region, although incidence and infection levels were somewhat lower. The heaviest damage was recorded in a 15-ha black spruce stand on the Dixie Lake Road in Red Lake District, where 100% of 12-m black spruce were infected, with 100% foliar damage. An infection level of 80%, with 15% foliar damage, was recorded in the Ferguson black spruce seed orchard in Ignace District. Ornamental Colorado blue spruce (*Picea pungens* Engelm.) at a number of locations in the Kenora, Dryden and Fort Frances districts was heavily attacked, with foliar damage ranging from 25 to 75%.

#### Leaf Blight, *Septoria betulae* Pass.

Widespread, heavy infections by this leaf disease of white birch were reported in the Kirkland Lake and Timmins districts. Particularly heavy infections were observed north of Highway 101 in both districts; many small stands had infection and foliar damage levels of 100%. Defoliation in the 10-40% range was also common in northern Sudbury and Espanola districts. The most severe damage was observed in Leinster Township, Sudbury District, where 90% of the white birch in a 10-ha area sustained an average of 40% defoliation. The disease was observed at numerous locations in the Sault Ste. Marie, Blind River, Wawa, Red Lake, Sioux Lookout and Ignace districts. Foliar damage levels were somewhat lower in these districts, usually ranging from 2 to 10%. A single exception to this trend was recorded along the Beauregard Lake Road, Red Lake District, where white birch within a 30-ha area sustained an average of 60% defoliation.

Infestations that had been widespread and heavy for several years in southern Terrace Bay District subsided in 1990; however, a few small pockets of heavy infection persisted, with defoliation ranging from 80 to 100%.

#### Leaf Spot, *Septoria populicola* Peck

The incidence of this late-season leaf disease was considerably



reduced in 1990 in Northwestern Region, where it had been high last year. The heaviest damage detected this year was noted in small stands of balsam poplar (*Populus balsamifera* L.) along Highway 105, north of Ear Falls in Red Lake District, where premature leaf-fall averaged 50%. Defoliation averaged 30% on small clumps of trees along the same highway between the Chukumi River and the Bug River. Defoliation ranging from 25 to 75% occurred on small regeneration trees near the Manion Lake seed orchard in Fort Frances District. The disease also caused sporadic damage in the 60-90% range to occasional clumps of balsam poplar in the Nipigon, Geraldton and Terrace Bay districts. Discolored foliage and premature leaf drop were reported on balsam poplar throughout Eastern Region.

#### Shoot Blight of Aspen, *Venturia macularis* (Fr.) E. Müller & v. Arx

This disease was widespread at generally low levels on trembling aspen regeneration in the Red Lake, Sioux Lookout and Ignace districts. The heaviest damage occurred on 1.8-m regeneration in a 5-ha cutover along the Burma Road, Sioux Lookout District, where 75% of the new shoots were destroyed. Shoot mortality of 40% was recorded at one location near the junction of Highway 72 and the Hidden Bay Road, Sioux Lookout District. The disease was reported as common on ridges and hilltops in Maness and Michano townships in Wawa District. Here, stands ranging from 1 to 25 ha in size had shoot infections averaging about 25%. Shoot damage of 8% was recorded on 2.5-m largetoothed aspen (*Populus grandidentata* Michx.) along the Red Squirrel Road in Aston Township, Temagami District.

#### Other Noteworthy Diseases

White pine blister rust (*Cronartium ribicola* J.C. Fischer) was found infecting 34% of 1.4-m white pine, 14% with stem cankers, in a 5-ha area in Olive Township, Temagami District. The disease also attacked 12% of 1.4-m white pine, 8.7% severely, in a 30-ha area in Antoine Township, North Bay District.

Heavy infections of *Linospora* leaf blight (*Linospora tetraspora* G.E. Thompson) caused discoloration and premature leaf drop in balsam poplar stands at many locations in the Cochrane, Kapuskasing and Hearst districts. Numerous stands sustained 75 to 100% foliar damage.

Dutch elm disease (*Ceratocystis ulmi* [Buism.] C. Moreau) continues to devastate the remaining elms (*Ulmus* spp.) in Fort Frances District. An evaluation of semimature roadside elm near the town of Fort Frances showed that 17% were infected and 12% were dead.

A target canker (*Ceratocystis fimbriata* Ellis & Halsted) was found infecting 30% of the 9.0-m trembling aspen trees in a 2-ha area on the Stanton Bay Road, Atikokan District.



Tomentosus root rot (*Inonotus tomentosus* (Fr.) Teng) caused mortality of black spruce hedgerow trees at numerous locations in the Thunder Bay Forest Tree Nursery. The disease was also collected from the root systems of windthrown, mature black spruce in an Acid Rain National Early Warning System plot in Hopkins Township, Kapuskasing District.

A small pocket of severe damage caused by eastern dwarf mistletoe (*Arceuthobium pusillum* Peck) was detected on 16-m white spruce at Canadian Forces Base Borden in Huronia District.

The leaf anthracnose *Apiognomonia quercina* (Kleb.) Höhnelt caused 30 to 90% foliar damage to white oak in oak health plots in South Walsingham Township, Simcoe District, and in Bosanquet Township, Chatham District.

Leaf anthracnose diseases (*Microstroma juglandis* [Bereng.] Sacc. and *Gnomonia caryae* Wolf var. *caryea*) caused 100% foliar damage to a 0.5-ha stand of shagbark hickory (*Carya ovata* [Mill.] K. Koch) in Loughborough Township, Napanee District.

Horse chestnut leaf blotch (*Guignardia aesculi* [Peck] Stewart) caused foliar damage of about 65% on ornamental and open-grown horse chestnut (*Aesculus hippocastanum* L.) trees on the Niagara Peninsula, Niagara District. The same disease caused 80% foliar damage to ornamentals in the town of Lindsay, Lindsay District.

Severe infections of a needle cast (*Lophomerium autumnale* [Darker] Magasi) caused 80% foliar damage and light mortality to 1.0-m balsam fir regeneration in a 1-ha area in Gillies Limit, Temagami District.

Marssonina leaf spot (*Marssonina brunnea* [Ell. & Ev.] Magnus) was reported causing foliar damage ranging from 40 to 100% in trembling aspen stands in the Geraldton and Cochrane districts and on Carolina poplar (*Populus X canadensis* Moench) in Huronia District.

A tar spot disease (*Rhytisma acerinum* [Pers.] Fr.) caused complete premature leaf drop on sugar maple and silver maple (*Acer saccharinum* L.) in the Fonthill, Ridgeville and Pelham areas of Niagara District. A light infection by the same disease was recorded in the Parkhill Conservation Area in McGillivray Township, Aylmer District.

A root rot (*Cylindrocladium floridanum* Sob. & C.P. Seym.) caused 10% mortality of outplanted white spruce in part of one compartment at the Swastika Forest Tree Nursery.



## ABIOTIC CONDITIONS

### Blowdown (Wind Damage)

High winds, the result of a downburst, blew down trees in an area of some 270 ha of mixed timber in the Shebandowan Lake area of Haines and Hagey townships, Thunder Bay District. A second storm blew down a series of patches of mixed timber in a line from Sandford Township, Atikokan District, eastward through Hanniwell and and Colliwer townships, Thunder Bay District. The total area affected by this storm was 1,670 ha.

Violent thunderstorms on 27 and 28 August caused sporadic damage in the form of wind-snapped and uprooted trees in the Wingham, Chatham, Aylmer and Simcoe districts. The second of these storms, which was accompanied by tornadoes, caused the most serious damage in a band approximately 16 km long between Komoka and Port Stanley in Lobo, Delaware and Southwold townships, Aylmer District, with a total area of 421 ha affected.

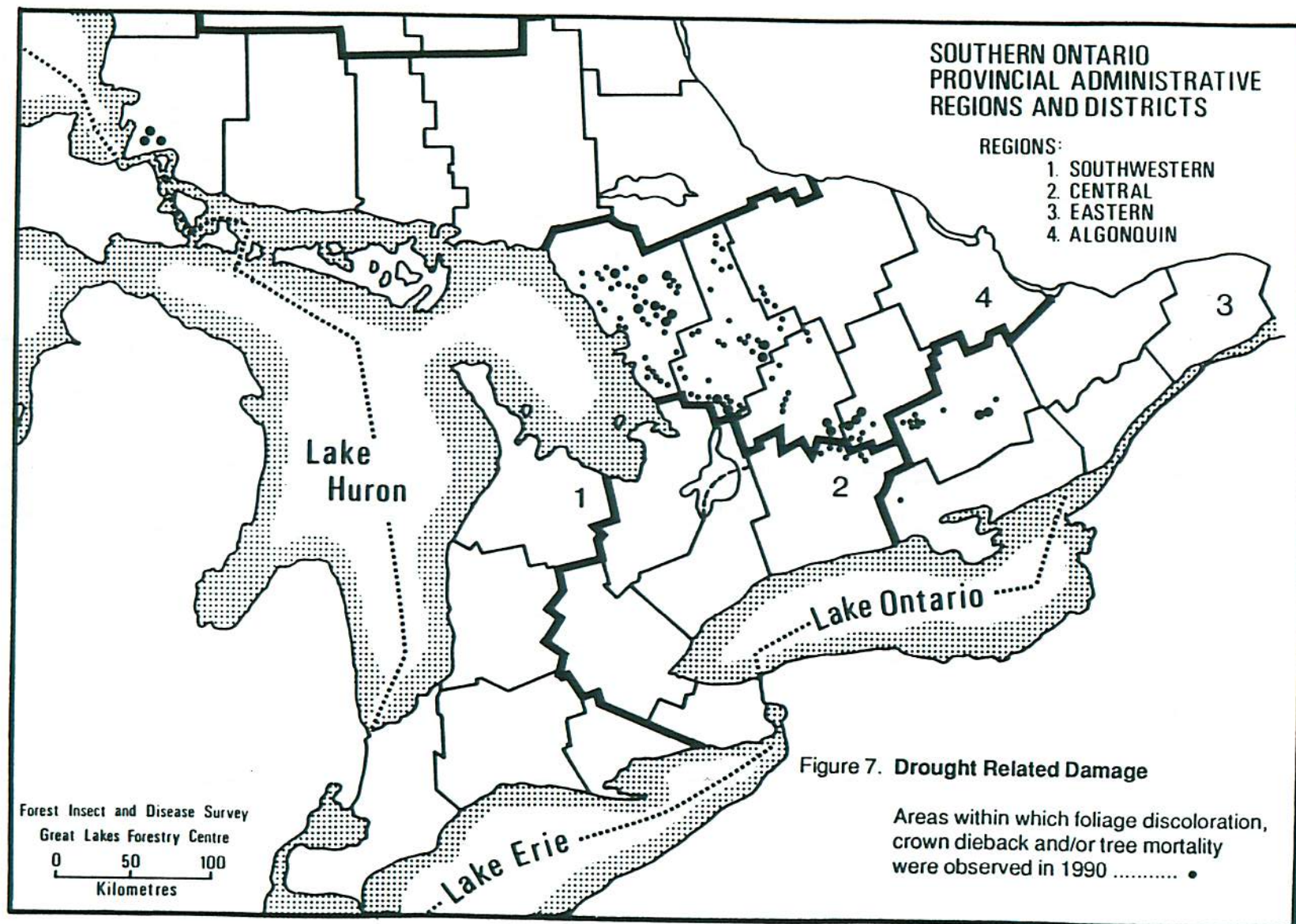
### Cedar Dieback

Conspicuous dieback of white cedar (*Thuja occidentalis* L.) was mapped in a 50-ha area in Goulbourn Township, Carleton Place District, where an evaluation revealed 18% top killing and 2% whole-tree mortality. Approximately 6% top killing was recorded in a 20-ha area of roadside white cedar in Augusta Township, Brockville District. A number of stress factors are thought to be responsible for the damage, including severe drought conditions in 1988 and 1989, heavy seed crops, heavy infestations by the cedar leafminer (*Argyresthia aureoargentella* Brower) from 1988 to 1990, and severe winter drying during the winter of 1988/1989.

### Drought-related Damage

The effects of severe drought conditions in 1988 and 1989 continued to manifest themselves in 1990. The most widespread and severe damage occurred in Algonquin Region, with somewhat lesser damage in the Eastern, Central and Northeastern regions (Fig. 7).

In Algonquin Region, many stands in the Parry Sound, Bracebridge, Minden and Algonquin Park districts and in the southwestern corner of Bancroft District displayed some form of abnormal foliar coloration and, in some cases, dieback or whole-tree mortality. Single-tree mortality of eastern white pine, hemlock (*Tsuga canadensis* [L.] Carr.) and balsam fir increased and was evident in many stands, particularly those growing on shallow soils. Dieback and whole-tree mortality of trembling aspen, white birch, yellow birch, sugar maple, red oak and white oak, was widespread on sites with shallow soils, particularly in stands that had been damaged by the forest tent caterpillar. The total area of hardwood





thus affected was 16,649 ha, with 5,896 ha in Bracebridge District, 3,146 ha in Minden District, 5,620 ha in Parry Sound District, 1,398 ha in Bancroft District and 589 ha in the adjacent Lindsay District of Central Region. Red oak was the species most severely affected. Evaluation of severely damaged stands disclosed the following levels of damage: 38% whole-tree mortality of 25-m red oak in a stand in Bexley Township, Lindsay District; 84% mortality of the red oak and white oak component in a stand near Mississauga Lake, Minden District; 27 and 36% mortality of red oak in two stands in Anstruther Township, Bancroft District; and 55% mortality of 25-m red oak in a stand in Stanhope Township, Minden District. In addition to the 16,649 ha of dieback and mortality described above, some 336,379 ha in which hardwood stands displayed premature foliar coloration and light crown dieback were aerially mapped in the Parry Sound, Bracebridge, Minden, Algonquin Park and Bancroft districts. Similar premature foliar coloration and light crown dieback were mapped in some 15,595 ha of predominantly sugar maple stands in Aweres, Tarentorus, Jarvis and Duncan townships of Sault Ste. Marie District, Northeastern Region.

In Eastern Region, crown dieback and tree mortality were aerially mapped in 11 pockets in Tweed District and one pocket in Napanee District, totaling 4,686 ha. The stands affected were growing on thin-soiled ridges and hilltops and all had been defoliated by the forest tent caterpillar for the past 3 years. The largest pocket (4,240 ha) was located in the Kaladar area of Tweed District, where stands had also been damaged by gypsy moth for several years. Whole-tree mortality occurred mostly on red oak and consisted of single trees and small clumps of dead trees.

Drought damage caused by lack of rainfall in 1990 caused discolored foliage and premature leaf-fall of white birch, white ash and pin cherry (*Prunus pensylvanica* L.f.) on shallow sites in a number of areas north of Highway 17 in Kenora District.

Similar damage was also reported on a variety of hardwood species growing on shallow sites in the northeastern part of Huronia District.

#### Leaf Scorch

The most widespread and severe damage occurred on sugar maple stands in several townships in Sault Ste. Marie District north of Sault Ste. Marie. Foliar damage ranging from 10 to 75% was particularly evident on hills and ridge tops in the Heyden-Bellevue area of Aweres and Vankoughnet townships, in the Tower Lake area of Meredith Township and northwest of Sault Ste. Marie in Fisher Township. Small pockets of damage ranging from 10 to 100% were recorded in the Granary Lake-Striker Township area and west of the town of Iron Bridge in Blind River District. Widespread leaf scorch was reported causing 75-100% foliar damage on open-grown, roadside sugar maple in the Huronia, Maple, Cambridge and Owen Sound districts. Seventy-five percent foliar damage

was also reported on ornamental sugar maple and little-leaf linden (*Tilia cordata* Mill.) along the Niagara Parkway in Bertie Township, Niagara District, and 18-m sugar maple in a 20-ha woodlot in Stanley Township, Wingham District, sustained 100% foliar damage. Somewhat lower levels of damage (30%) occurred on sugar maple trees in the town of Campbellford, Napanee District, and foliar damage ranging from 10 to 50% occurred on sugar maple in the cities of Kingston and Brockville. Leaf scorch was also reported as heavy on the exposed upper portions of dominant and codominant sugar maple and yellow birch crowns and on open-grown and forest-edge trees in the Parry Sound, Bracebridge and Minden districts.

#### Snow Damage

A November 1989 snowstorm deposited approximately 1 m of snow in the Gourlay-Laberge-Dahl townships area of northwestern Wawa District. This resulted in widespread damage in the form of broken tops. The most severe damage occurred in overstocked jack pine stands in the 40- to 80-year-old age class, although stands of trembling aspen, black spruce, white spruce and balsam fir were also damaged. Damage appraisals compiled by Domtar Forest Products staff showed that damage ranged from 1 to 50% in affected stands.

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December 1990  
ISSN 0832-7173