

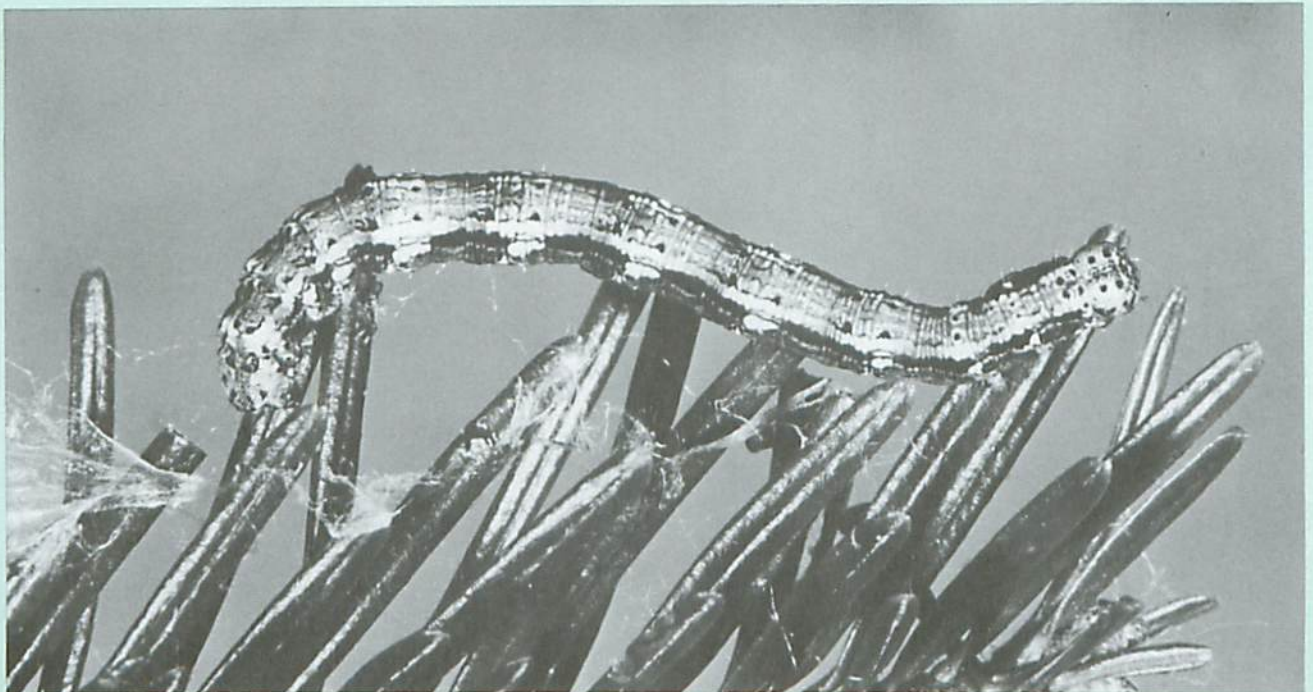
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SURVEY BULLETIN

Forest Insect and Disease Conditions in Ontario

Fall 1993



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FOREST INSECT AND DISEASE CONDITIONS IN ONTARIO

Fall 1993

This is the third of three bulletins describing forest pest conditions in Ontario in 1993.

FOREST PEST REVIEW

Seventy-two people attended the seventeenth annual forest pest review for Ontario, held at Roberta Bondar Place in Sault Ste. Marie on 28 October 1993. The meeting was organized by the Canadian Forest Service, Ontario Region, and the Ontario Ministry of Natural Resources (OMNR). Guests were welcomed by Trevor Isherwood, Director of Provincial Operations Branch of OMNR. A wide variety of topics were discussed by speakers from the OMNR, E.B. Eddy Forest Products, the Michigan Department of Natural Resources, Agriculture Canada, the Ontario Ministry of the Environment, and Natural Resources Canada, Ontario Region, Forest Pest Management Institute, and Northwest Region.

Topics included the situation and forecasts for spruce budworm, gypsy moth, and jack pine budworm; pests in Michigan and the prairie provinces; *Trichogramma* and spruce budworm; RH5992 trials; attitudes toward spraying; updates on nursery pests; the scleroderris situation; the pinewood nematode and pine shoot beetle; a new licensing system for pesticide applicators; and forest health.

FOREST INSECTS

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

The 1993 spruce budworm situation was described in detail in the summer *Survey Bulletin*. The overall area of moderate-to-severe defoliation declined by 604,585 ha to 8,991,177 ha. Most of the defoliation occurred in northwestern Ontario, in a large infestation stretching from the Manitoba border east to the central Hearst District. Smaller pockets of infestation were mapped along the northern rivers in the Moosonee District. Small infestations were also mapped near Sault Ste. Marie in the Sault Ste. Marie District, on the border of the Sudbury and North Bay districts, and in white spruce plantations in the Kemptville and Midhurst districts.

Aerial surveys disclosed a large increase in the area within which spruce budworm-caused mortality is evident (Fig. 1). Altogether, approximately 5,032,925 ha of balsam fir and white spruce mortality were mapped, up from the 3,943,442 ha recorded in 1992 (Table 1). Most of the increase occurred in the eastern part of the main outbreak in the Nipigon, Geraldton, Wawa, and Hearst districts. There were also sizable increases in the area surrounding the north part of Lake of the Woods in the Kenora District and in the north-central Fort Frances District. Numerous small, scattered pockets of new mortality were recorded throughout the Dryden District and the southern part of the Sioux Lookout District. Small, scattered pockets of new mortality were detected in the Lac Seul area of the Sioux Lookout District, and north and west of Red Lake in the Red

Lake District. There was an increase in the size of the single patch of mortality in the Algonquin Park District in the Central Region.

The annual spruce budworm egg-mass survey was carried out in late August and September, with at least 511 locations sampled. A comparison of 330 locations sampled in 1992 and 1993 (Table 2) showed an overall reduction of 36% in egg-mass densities, making 1993 the fourth consecutive year of overall declines. Egg-mass densities nonetheless remained sufficiently high to suggest that moderate-to-severe defoliation will probably persist in 1994 in most areas infested this year.

In the Northwest Region, there might be some reduction in the area of moderate-to-severe defoliation in the vicinity of Lake of the Woods and in the Thunder Bay and Nipigon districts, but most of the current infestations will persist in 1994.

Cover photo: Mature larva of the hemlock looper on balsam fir.

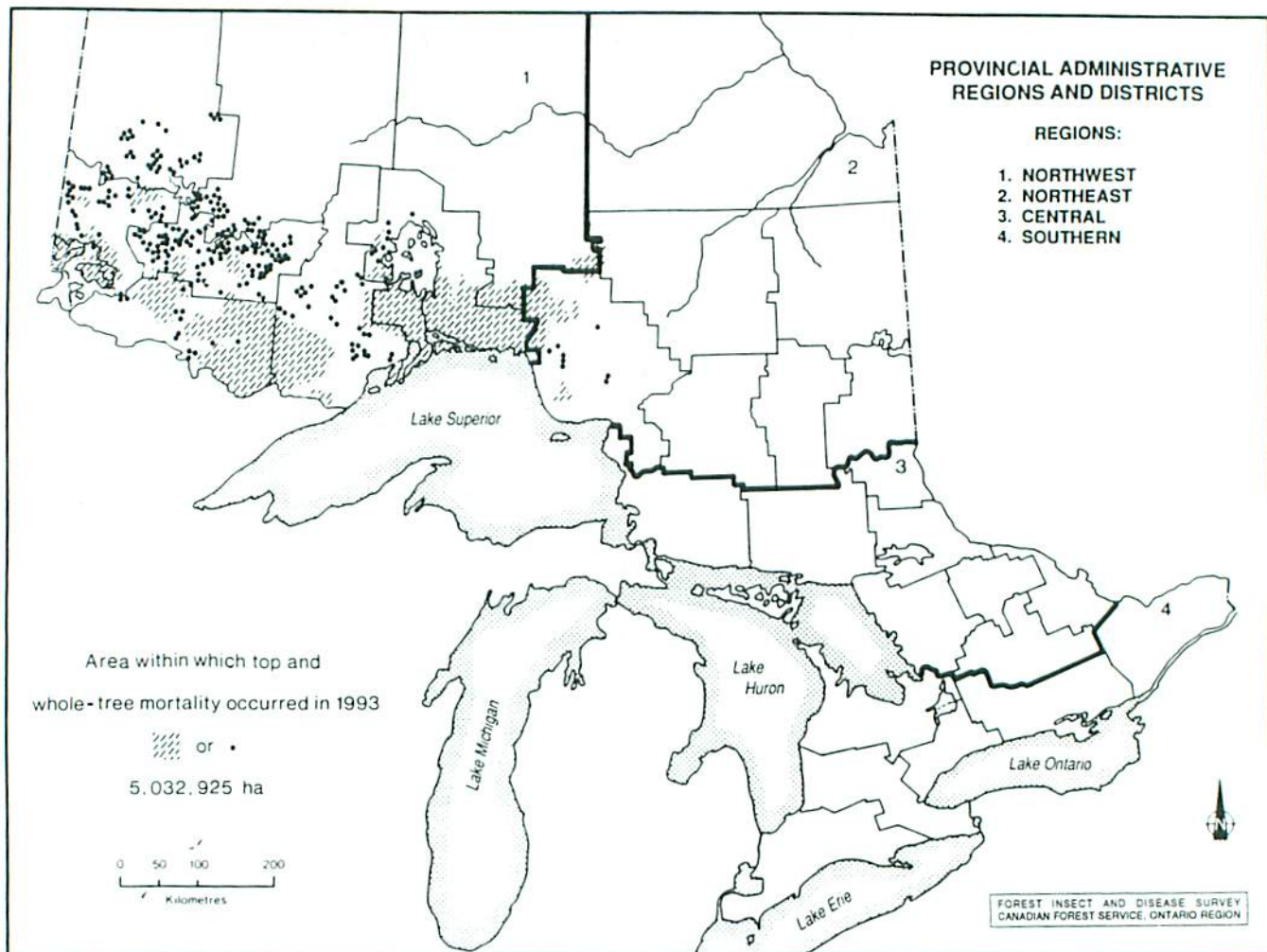


Figure 1. Spruce budworm mortality.

Table 1. Gross area of spruce budworm-associated tree mortality in Ontario in 1991, 1992, and 1993.

Region	Total area (ha)			Increase (ha) since 1992	
	District	1991	1992		1993
<i>Northwest</i>					
	Dryden	266,190	287,744	337,936	50,192
	Fort Frances	1,214,497	1,219,405	1,251,605	32,200
	Geraldton	57,898	64,018	311,085	247,067
	Kenora	204,702	285,542	494,522	208,980
	Nipigon	910,158	943,743	1,373,518	429,775
	Red Lake	46,082	67,813	78,163	10,350
	Sioux Lookout	23,981	38,066	47,916	9,850
	Thunder Bay	735,289	754,240	761,700	7,460
		3,458,797	3,660,571	4,656,445	995,874
<i>Northeast</i>					
	Wawa	277,582	280,281	365,180	84,899
<i>Central</i>					
	Algonquin Park	0	2,590	11,300	8,710
Total		3,736,379	3,943,442	5,032,925	1,089,483

Conditions were similar in the Northern Region, with reduced egg-mass densities in the Wawa District and increased densities in the Hearst District. Infestations will probably persist in currently affected areas, but no major expansion is expected.

Egg-mass densities also decreased in the Central Region, but small infestations in the Sault Ste. Marie, Sudbury, North Bay, and Algonquin Park districts are likely to persist in 1994. There is also a possibility that new pockets of infestation will be detected.

There was a slight increase in egg-mass densities in the Southern Region, but little change is expected in the small, discrete pockets of infestation in the Kemptville and Midhurst districts. There is also a possibility that new pockets of damage might be discovered in this part of the province in 1994.

Table 2. Comparison of spruce budworm egg-mass densities in Ontario between 1992 and 1993.

Region District	Number of locations		Average egg-mass density per 9.29 m ² of branch		Change (%)
	Sampled in 1993	Common to 1992 and 1993	1992	1993	
<i>Northwest</i>					
Dryden	30	14	382	183	-52
Fort Frances	24	20	383	294	-23
Geraldton	43	25	268	109	-59
Kenora	44	15	411	264	-36
Nipigon	60	35	326	141	-36
Red Lake	22	11	358	339	-5
Sioux Lookout	17	12	431	233	-46
Thunder Bay	60	40	154	88	-43
	300	172	306	175	-43
<i>Northeast</i>					
Chapleau	14	12	2	2	0
Cochrane	5	5	0	0	0
Hearst	36	21	90	128	+43
Kirkland Lake	10	6	1	0	-100
Timmins	10	10	1	0	-100
Wawa	39	31	226	146	-35
	114	85	105	85	-19
<i>Central</i>					
Algonquin Park	6	5	119	52	-56
Bancroft	3	3	3	0	-100
North Bay	11	8	94	59	-38
Parry Sound	6	6	3	3	0
Pembroke	1	1	15	0	-100
Sault Ste. Marie	24	16	67	10	-85
Sudbury	24	16	89	88	-1
Temagami	6	5	1	2	+100
	81	60	65	39	-41
<i>Southern</i>					
Aylmer	2	2	26	0	-100
Cambridge	1	1	170	619	+264
Kemptville	4	3	414	567	+37
Maple	2	2	137	168	+23
Midhurst	6	4	324	347	+7
Tweed	1	1	36	31	-14
	16	13	236	313	+33
Total	511	330	208	133	-36

**Jack Pine Budworm,
Choristoneura pinus pinus Free.**

The status of the jack pine budworm was also discussed in detail in the summer *Survey Bulletin*. The total area of moderate-to-severe defoliation

increased from 158,784 ha in 1992 to 282,247 ha in 1993. All of the defoliation occurred in the eastern part of the province in the Sudbury, Temagami, Sault Ste. Marie, Parry Sound, Algonquin Park, and Pembroke districts.

The largest increase in defoliation area occurred in the Sudbury District, where 168,840 ha were mapped, much of which was new infestation in the northern and western portions of the district. A new infestation (1,095 ha) occurred in Sagard Township, north of Elliot Lake in the Sault Ste. Marie District, and a small pocket (50 ha) was discovered in Armagh Township, Temagami District. Infestations in the Parry Sound, North Bay, and Pembroke districts all increased in area. A small 1992 infestation, which occurred in a 533-ha jack pine stand in Sheffield Township, Tweed District, collapsed in 1993.

Egg-mass surveys totaling 271 locations were also carried out for jack pine budworm in the late summer and fall. Analysis of the results, with a comparison of 183 locations sampled in 1992 and 1993, showed an overall increase of 16% in egg-mass densities (Table 3).

Most of the change occurred in the Central Region where increases were recorded in the Parry Sound, Sault Ste. Marie, Sudbury, and Temagami districts. Decreases occurred in the Pembroke, Algonquin Park, and North Bay districts.

These results indicated that infestations in 1994 will probably persist in most of the areas in which they occurred in 1993. There is potential for expansion of infestations in the Sudbury and North Bay districts, where new areas might be invaded or small pockets of defoliation might coalesce to form a more contiguous outbreak. In the Parry Sound District, the infestation had persisted for four consecutive years. Much of the host in the infested area was damaged and, as a result, populations might decline despite an increase in egg-mass densities. Based on egg-mass counts, results showed that populations remained low in the Northeast Region and declined to very low levels in the Northwest Region.

A survey of jack pine stands in affected areas of the Parry Sound District showed a single body of dead and moribund jack pine along the Georgian Bay coast between Point au Baril and the Pickerel River. Smaller, scattered

pockets of dead jack pine were also recorded in the Shawanaga, Mowat, Wallbridge, Blair, and Brown townships. Results from four 100-tree mortality plots in this area showed the incidence of bare tops ranging from 13 to 40% and dead trees ranging from 26 to 38%.

Gypsy Moth, *Lymantria dispar* (L.)

Gypsy moth populations declined dramatically, with the total area of moderate-to-severe defoliation reduced to 9,784 ha, compared with 34,460 ha in 1992. Most of the 1993 defoliation occurred in the Sudbury District, with some 6,645 ha of defoliation mapped south and west of the city of Sudbury. A further 2,357 ha were mapped in the western Aylmer District, near Sarnia and in Pinery Provincial Park. Small pockets of damage were mapped at a few locations in the Midhurst, Maple, and Tweed districts.

The annual gypsy moth pheromone trap survey was again carried out in 1993 in northern Ontario parks and campgrounds in order to help follow the spread of this introduced pest in the province. As expected, traps deployed near the "leading edge" of the insect's range caught the most moths. Thus, all traps in the Sudbury and North Bay districts caught adult moths, with the number per trap ranging from 4 to 38 (Fig. 2). Further west in the Sault Ste. Marie District, 14 moths were caught in 10 traps in Mississagi Provincial Park in Raimbault Township, three moths were caught in two traps in Pancake Bay Provincial Park in Herrick Township, and a single moth was caught at Agawa Bay campground in Lake Superior Provincial Park. Six moths were caught in two traps at Findlayson Point Provincial Park in Temagami District. Single moths were caught at Shoals Provincial Park, Spanish Chutes in the Chapleau District, and the Muldrew Lake Boat Launch in Dublin Township, Timmins District.

There were no gypsy moth egg-mass surveys conducted in Ontario in 1993, so predictions for 1994 must be

Table 3. Comparison by region of jack pine budworm egg-mass densities in Ontario between 1992 and 1993.

Region District	Number of locations sampled in 1993	Number of locations common to 1992 and 1993	Total number of egg masses		Change (%)
			1992	1993	
Northwest	91	47	23	5	-78
Northeast	46	36	3	5	+67
Central					
Algonquin Park	4	4	24	15	-38
Bancroft	2	2	0	0	0
North Bay	3	3	13	9	-31
Parry Sound	12	11	89	140	+57
Pembroke	12	8	31	27	-14
Sault Ste. Marie	23	16	30	45	+48
Sudbury	70	49	279	323	+15
Temagami	8	7	1	2	+200
Total (Central Region)	134	100	467	561	+20
Overall total	271	183	493	571	+16

based on historical trends. Although gypsy moth populations collapsed in the province during the previous two years, historical patterns indicate that a resurgence will likely occur during the next few years. The insect will likely reinfest areas where it has previously occurred and will probably continue to expand its range to the north and west. Defoliation is likely to continue in and around Pinery Provincial Park in 1994, but the situation in the rest of the province is unclear.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

The summer *Survey Bulletin* reported a dramatic decline in populations of the forest tent caterpillar, with the total area of moderate-to-severe defoliation decreasing from 16,051,424 ha to 655,256 ha. The defoliation was located in three separate areas of the province: in the Northern Region in the central parts of the Hearst and Cochrane districts, with scattered pockets in adjacent areas of the Wawa and Chapleau districts; in the Central Region in adjacent areas of the eastern Sudbury and

western North Bay districts and the southeast corner of the Bancroft District; and in the Southern Region in the central part of the Kemptville District and the northwest corner of the Tweed District.

Egg band counts to forecast 1994 population trends were carried out in late summer and early fall. These indicated that populations in the Northern Region will probably decline further, with the main areas of defoliation occurring in the southwest part of the Cochrane District. Counts in the Central Region indicated that some pockets of defoliation might persist in the area of the Sudbury-North Bay boundary and that medium-to-heavy defoliation might recur in the Kashabog Lake area in the southwest part of the Bancroft District. Surveys in the Southern Region indicated that infestations in the Kemptville and Tweed districts could persist at about the same level as in 1993. The above predictions notwithstanding, it should be noted that all the infestations described are several years old; established control factors such as diseases, parasites, predators, and smaller-than-normal egg bands could cause population collapses.

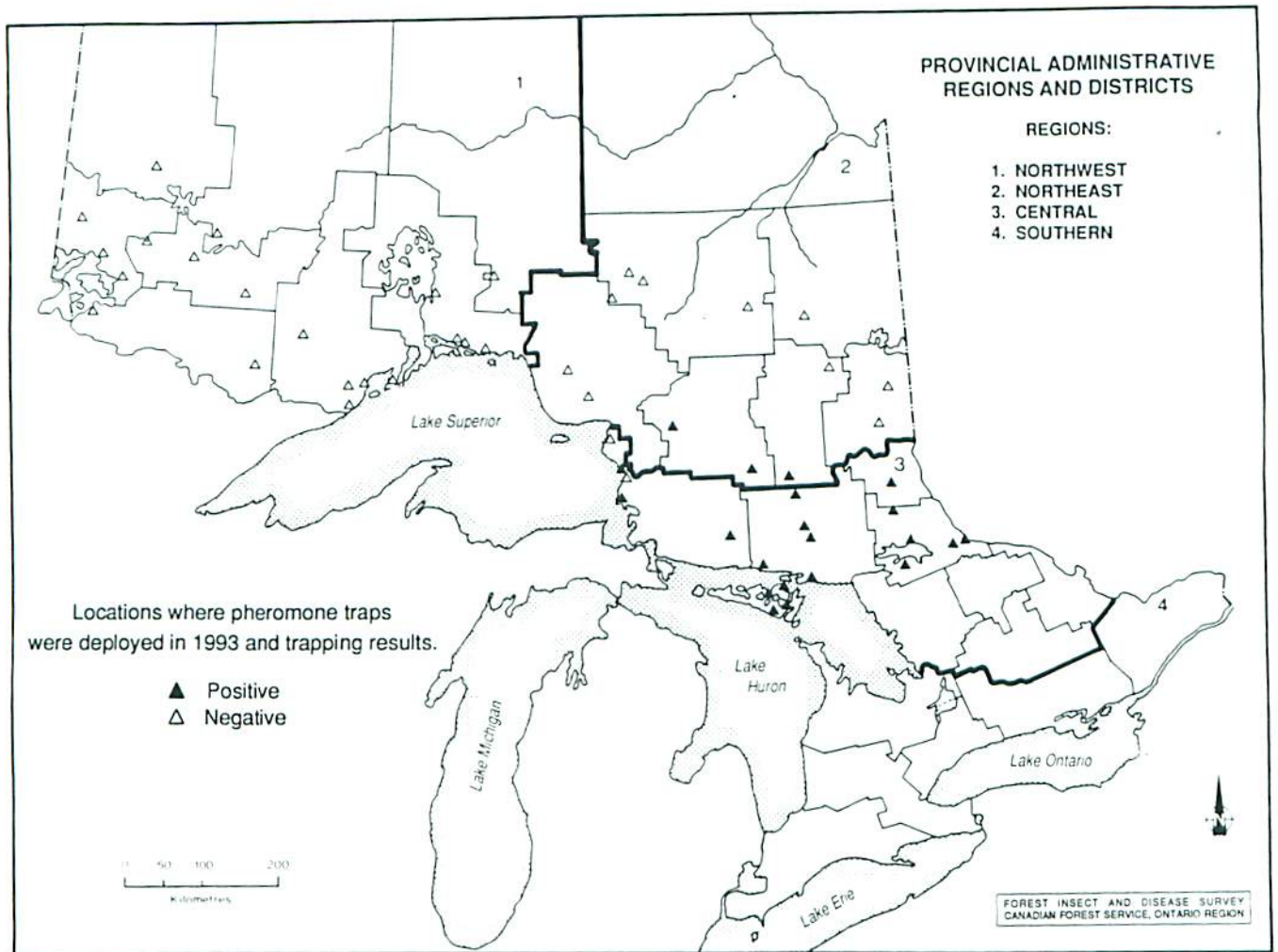


Figure 2. Gypsy moth.

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

Further to information presented in the summer *Survey Bulletin*, four pockets of heavy infestation by the pine false webworm were aerielly sketch-mapped west of Rice Lake, in Hope Township, Tweed District. The trees were severely defoliated, with 80% of the old foliage and 30% of the new foliage consumed. Two smaller patches of defoliation were also found in 30-year-old red pine plantations north of the town of Havelock in the Belmont and Dummer townships, Tweed District. A 4-ha plantation of 7-m red pine in Snowdon Township, Bancroft District, had 100% of the trees infested, with an average 83% loss of old foliage and 26% of new foliage consumed.

**Poplar Flea Beetle,
Altica populi Brown**

Unusually heavy infestations of the poplar flea beetle caused severe browning of balsam poplar foliage throughout most of the Parry Sound, Bancroft, and Pembroke districts. Heavy damage also occurred in scattered stands in the Kemptville and Tweed Districts in the area between Smiths Falls and Madoc. Sporadic, heavy infestations occurred in the southern part of the North Bay District, with the heaviest damage in Papineau Township, where 70% defoliation occurred.

**Birch Skeletonizer,
Bucculatrix canadensisella Cham.**

A marked decline was evident in the area affected by the birch skeletonizer in 1993. The total area within

which moderate-to-severe defoliation occurred stood at 7,858,495 ha, down from the 12,103,480 ha recorded in 1992 (Fig. 3). Most of the decline occurred in the Wawa, western Hearst, and Chapleau districts, along with areas in the northern Parry Sound and southern Sudbury districts. A large area of moderate-to-severe defoliation (2,775,924 ha) persisted, however, in white birch stands in the northern Kirkland Lake and Timmins districts and the southern Hearst and Cochrane districts, with a small extension into the northeastern Chapleau District. A second infestation of 132,400 ha occurred east of Brunswick Lake in the southern Hearst District. Another large infestation totaling 597,755 ha encompassed most of the Temagami District and adjacent areas in the northern North Bay District and the northeastern Sudbury District.

In southern Ontario, a large infestation totaling 4,310,290 ha stretched from the southern Parry Sound and Pembroke districts eastward through parts of the Bancroft, Tweed, and Kemptville districts to the Quebec border. White birch and yellow birch stands were severely defoliated within this area, along with grey birch stands in the Kemptville District. The insect was also widespread in the Midhurst and Maple districts, but damage was very sporadic, with only occasional trees severely defoliated.

Introduced Pine Sawfly, *Diprion similis* (Htg.)

Increased numbers of the introduced pine sawfly, a white pine pest, were reported from a number of areas in southern Ontario. The most severe

damage occurred along the edge of Georgian Bay in the Parry Sound District. Moderate-to-severe defoliation also occurred in the Carling Township area, on shoreline trees between Sand Bay and Snug Harbour as well as in about 20 offshore islands, including Franklin Island. Further south in the Cowper-Conger townships area, white pine on 50 small islands was severely defoliated. Damage was most severe on white pine along shorelines or on exposed points. Trees ranging from 9 m to 16 m in height sustained complete loss of old foliage and as high as 90% of new foliage. Jack pine trees in the same area were attacked, but defoliation there was less than 10%.

In Cayuga Township, Cambridge District, 1.7-m trees in a 10-ha white pine seed orchard sustained an average

50% defoliation, with 100% of the trees attacked. Defoliation in the 10-20% range was recorded on 26-m white pine on the shoreline of Charleston Lake in the Rear of Yonge and Escott townships, Kemptville District. Similar defoliation levels were also recorded in a white pine tree improvement area at the G. Howard Ferguson Tree Nursery, Kemptville District. Very light defoliation (11%) was recorded in the Glencairn seed orchard in Tosorontio Township, Midhurst District.

Greenstriped Mapleworm, *Dryocampa rubicunda* F.

Heavy infestations of the green-striped mapleworm persisted in a 2-ha red maple stand in Broder Township, Sudbury District, where 80% of the trees were attacked, with an average

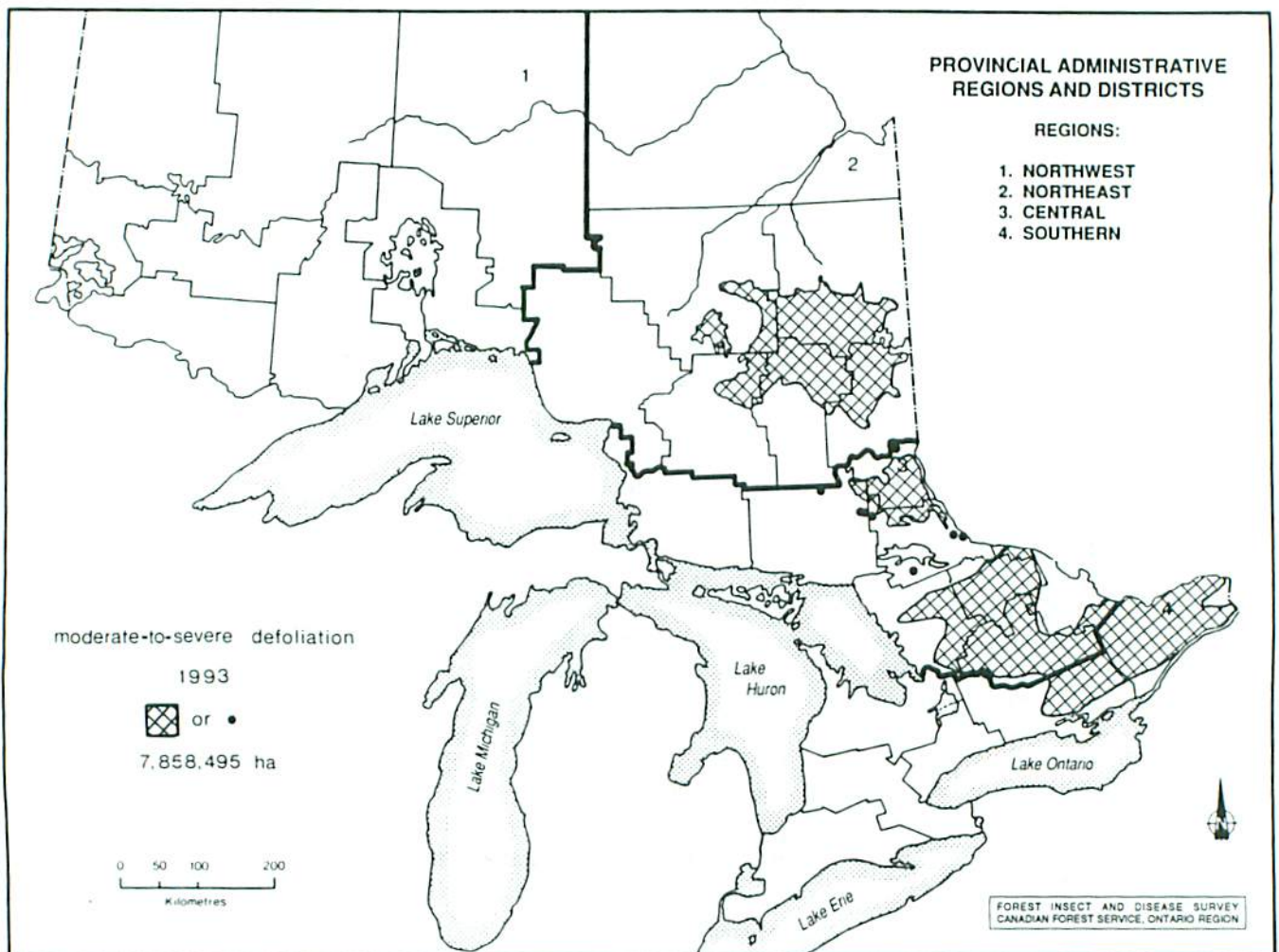


Figure 3. Birch skeletonizer.

60% defoliation. Medium infestations were observed in the city of Sudbury and in Macbeth Township, Sudbury District. Light infestations were reported on red maple understory at one location in Maria Township, Pembroke District.

**Eastern Pine Shoot Borer,
Eucosma gloriola Heinr.**

Populations of the eastern pine shoot borer generally declined in northern Ontario, particularly in the Kirkland Lake, Timmins, and Temagami districts, where numbers had been high for several years. While attacks to lateral shoots were common, the more serious leader damage was usually quite low. There were a few exceptions; at the Venturi Township jack pine seed orchard, 13.3% of the 2.5-m trees in a 25-ha area had leader damage. Leader damage ranged from 10 to 12% in several young jack pine stands in Wawa and Sault Ste. Marie districts. The most severe damage recorded this year was in a 5-ha, 1.7-m jack pine family test site at Fallscamp Lake, Thunder Bay District, where 28.6% of the leaders were destroyed.

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

Reports of the usually common pest, the birch leafminer, were scarce in 1993. Heavy infestations occurred in white birch stands in Dorion Township, Thunder Bay District, where foliar damage in the 80-100% range was observed. High populations were evident on ornamentals in the town of Dryden and in roadside stands along several highways in the Dryden District, with foliar damage from 20 to 70%. Approximately 20% foliar damage was reported on 3-m to 8-m white birch along Highway 72 in the Sioux Lookout District.

**Fall Webworm,
Hyphantria cunea (Drury)**

Populations of the fall webworm remained at generally low levels throughout the province. In the Aylmer District,

generally light defoliation was reported on a variety of hardwoods at Turkey Point in Charlotteville Township, while black walnut sustained 15% foliar damage in Rondeau Provincial Park and Point Pelee National Park. Defoliation in the 10% range occurred on willow along the shore of Lake St. Clair in Dover Township. Black ash had medium levels of defoliation at several locations in the Midhurst, Maple, and Tweed districts, and black ash, along with white elm, sustained similar damage at a few locations in the Bancroft, Parry Sound, and Pembroke districts. A single pocket of heavy damage occurred on black ash near Rideau Ferry in North Elmsley Township, Kemptville District.

In northern Ontario, low populations were reported on a number of deciduous species in the North Bay, Temagami, and Kirkland Lake districts.

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

In 1992, a small (10 ha) infestation of hemlock looper was discovered in Campbell Township on Manitoulin Island, Sudbury District. It was the first such infestation in Ontario in many years. In 1993, the total area infested on Manitoulin Island increased to 1,260 ha. The most widespread and heavy damage occurred on the Wikwemikong First Nation lands on the east end of the island, along with scattered 5- to 10 ha pockets of damage in Campbell, Burpee, Mills, and Assiginack townships. A single pocket of infestation was also mapped on a small island in Beaverstone Bay adjacent to the nearby mainland. The preferred host in these areas was balsam fir, with some trees completely defoliated. Eastern white cedar was also attacked, sometimes heavily, along with scattered eastern white pine overstory trees. In one instance where these hosts were completely defoliated, the insect also heavily defoliated trembling aspen in the same area. Severe damage was also observed on understory white and

black spruce and ground juniper at one location where red maple and white birch were also lightly defoliated.

A second hemlock looper infestation was discovered in three townships in the Kemptville District. In this area, eastern hemlock sustained moderate-to-severe defoliation in five scattered pockets surrounding Charleston Lake, with a total area of 70 ha affected.

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

Increased populations of the red-headed pine sawfly were reported in the eastern part of the North Bay District, where the heaviest damage occurred in several red pine plantations in Cameron Township. The most severe damage in this area was in a small plantation of 1.7-m trees that sustained an average of 50% defoliation, with some individual trees completely denuded. In Paxton Township, Parry Sound District, 28% of the trees in a 10-ha, 0.9-m red pine plantation sustained 18% defoliation and 2.7% mortality. Similar infestation levels were recorded in Peck Township, Algonquin Park District, where 22% of the 1.3-m red pine were attacked, resulting in 26% defoliation and 6% mortality.

Populations declined elsewhere in the province, particularly in the Sudbury District, where spray programs planned by E.B. Eddy Paper Company and the Ontario Ministry of Natural Resources were cancelled due to low populations of this pest.

**Swaine Jack Pine Sawfly,
Neodiprion swainei Midd.**

Populations of the swaine jack pine sawfly remained generally low in the Temagami and Kirkland Lake districts. An infestation on Island 127 in Lake Temagami of the Temagami District, increased from light to heavy in 1993. An aerial survey of previously infested jack pine stands in the Banks-Makobe lakes area of the Kirkland Lake and Temagami districts failed to detect any current defoliation.

European Fruit Lecanium, *Parthenolecanium corni* Bouché

In addition to information contained in the summer *Survey Bulletin*, subsequent surveys found that the European fruit lecanium caused branch mortality ranging from 10 to 60% on 2.5-m sugar maple in Minden Township, Bancroft District. It also caused 20-30% branch mortality on 2.3-m sugar maple and ironwood at a site in Ridout Township, Bancroft District. Low whole-tree mortality levels (less than 1%) were observed at both locations.

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

Increased populations and heavy leaf-mining damage caused by the aspen leafblotch miner occurred on young and occasionally older trembling aspen stands in northern Ontario. Trembling aspen regeneration and young stands were heavily attacked from the Manitoba border eastward to the Geraldton, White River, and Wawa districts. Particularly severe damage was observed in the Thunder Bay District, where foliage browning and premature leaf drop occurred in aspen stands ranging from 1 to 17 m in height.

Heavy infestations also occurred in northeastern Ontario in the central Kirkland Lake District and the eastern Timmins District. Severe leaf browning also occurred here, with 10-15 mines per leaf recorded. Low populations were reported in the southern parts of the Cochrane and Hearst districts.

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

The yellowheaded spruce sawfly is a pest of young open-grown white and black spruce. It can be very damaging in young plantations as well as in ornamental and fringe trees along roads, lake shores, and other exposed situations.

Populations of the insect varied considerably across northern Ontario, but it was most prevalent in the Thunder Bay, Nipigon, and Fort Frances districts. In these areas, roadside white and black spruce along the highway cor-

ridor between Nipigon and Thunder Bay were heavily attacked, with defoliation ranging from 40 to 100%. Similar damage occurred along Highway 17 between Kakabeka Falls and Shabaqua, and along Highway 11 between Shabaqua and Kashabowie. Ornamental white spruce and blue spruce in the city of Thunder Bay and the town of Atikokan sustained defoliation ranging from 30 to 100%. Ornamental white spruce were also severely defoliated in the town of Fort Frances, Fort Frances District, and in the town of Ear Falls, Red Lake District.

Black spruce were heavily infested along the Vermilion River Road, Sioux Lookout District, and in small windbreaks between Thunder Lake and Dryden, Dryden District. There were a number of reports of damage, some of it severe, in white spruce and black spruce plantations in the Kenora, Wawa, North Bay, and Sault Ste. Marie districts. Populations in the Hearst, Cochrane, and Kirkland Lake districts, which had been high in previous years, declined to low levels in 1993.

In southern Ontario, the most severe damage occurred in a 2-ha, 1.9-m white spruce plantation in Bastard Township, Kemptville District, where 18% of the trees sustained an average of 65% defoliation. Open-grown, roadside white spruce had defoliation ranging from 20 to 40% in a number of areas in the Parry Sound and Bancroft districts. Similar defoliation levels were recorded on ornamental white spruce in the town of Bancroft and at Carson Lake Provincial Park, Pembroke District.

White Pine Weevil, *Pissodes strobi* Peck

Populations of the white pine weevil declined in a number of areas in northern Ontario. While the insect was found in numerous young stands and plantations, infestation levels were usually less than 10%. There were a few exceptions, including: in Smilsky, Cuthbertson, and McNie townships, Sault Ste. Marie District, where jack pine stands in the 2- to 4-m height range sustained leader damage of 16.0,

14.7, and 13.0%, respectively; Kenozhe Lake, Fort Frances District, where 12% of the 1.3-m jack pine were attacked (though at Sunny Lake in the same district leader damage to 1.3-m jack pine declined from 21% to 6.7%); and in the North Bay District where leader damage of 16% was recorded on 2.3-m white pine in a 1.5-ha plantation in Orlig Township.

In southern Ontario, populations were somewhat higher. In Cardwell Township, Parry Sound District, a 5-ha plantation of 3.9-m white pine had 22% leader damage. Increased populations were reported in the Cambridge and Aylmer districts, with the most severe damage—60% leader damage—occurring in a 3-ha, 4.6-m white pine plantation in Charlotteville Township, Aylmer District. Twenty-three percent of the trees were infested in a 2-ha, 3-m white pine plantation in Minto Township, Cambridge District. In Ramsay Township, Kemptville District, leader damage in a 2.5-ha, 4.8-m white pine plantation rose from 8.0% to 33.3% in 1993. Leader damage of 16.7% was recorded in a 0.5-ha, 4.8-m Norway spruce plantation in Lanark Township, Kemptville District. In Hungerford Township, Tweed District, leader damage increased from 0.7% to 18.7% in a 5-ha, 2.1-m white pine plantation.

A Pine Needle Midge, *Resseliella pinifoliae* (Felt.)

Reports of pine needle midge, a white pine pest, increased in 1993. The most severe damage occurred in the Alice-Frazer townships area of the Pembroke District, where trees averaging 7 metres in height had 70-80% current foliage loss. Similar damage occurred on various-sized white pine in the Lake of Two Rivers area of the Algonquin Park District. Current foliar damage in the 60% range occurred on 5-m roadside white pine in Laxton Township, Bancroft District. The insect also caused 50% foliar damage in a 1-ha white pine plantation in Puslinch Township, Cambridge District, and 40% foliar damage in a small plantation in Antrim Township, Sudbury

District. Lower levels of damage were reported in the G. Howard Ferguson Tree Nursery in the Kemptville District and in the Thessalon Tree Nursery in the Sault Ste. Marie District.

Pear Thrips, *Taeniothrips inconsequens* (Uzel)

The pear thrips is an introduced pest of a number of plants, including fruit trees and, in some instances, sugar maple. A special survey, conducted in 1989 to determine the status of this pest in Ontario, revealed that it was present at generally low population levels within most of the range of sugar maple. In 1993, a follow-up survey was conducted in cooperation with Agriculture Canada to assist with a study on climate matching techniques. The survey was concentrated on the northern edge of the range of sugar maple and on areas where it was scarce in the previous survey.

Results showed that pear thrips were collected at nine of 29 sites sampled in the Central Region, with positive results in the Parry Sound, North Bay, Sudbury, and Sault Ste. Marie districts. It was not found in the Temagami or Kirkland Lake district in the extreme northern range of sugar maple. In the Southern Region, the insect was collected at 10 of 18 sites sampled with positive results in the Tweed, Kemptville, Aylmer, and Midhurst districts.

In addition to the damage described in the 1993 survey, pear thrips caused varying levels of damage to sugar maple along a 4.5-km stretch of the Niagara escarpment in the city of St. Catharines, Cambridge District. The most heavily infested stands sustained foliar damage of 30-40%, mainly on the lower foliage. The same level of damage was reported on 22-m sugar maple in one stand in Hallowell Township, Tweed District.

Other Noteworthy Insects

Beech Scale

A heavy infestation of the beech scale (*Cryptococcus fasisuga* Lindling.) was discovered in a small beech stand

in Thorold Township in the Niagara peninsula area of the Cambridge District. Low populations were recorded in several other stands in the same area.

Birch Edgeminer

The birch edgeminer (*Scolioneura betuleti* Klug.) caused 90% foliar damage to 15-m fringe white birch in Cardiff Township, Bancroft District.

Maple Trumpet Skeletonizer

Low population levels of the maple trumpet skeletonizer (*Epinotia aceriella* [Clem.]) occurred in many sugar maple stands in the Southern Region. A small, heavy infestation caused 75% defoliation of 12-m fringe sugar maple at one location in Clarke Township, Maple District.

Mountain-ash Sawfly

Heavy infestations of the mountain-ash sawfly (*Pristiphora geniculata* [Htg.]) were reported on ornamental mountain-ash in Chelmsford and Valley East, Sudbury District. Moderate damage was reported in several parks in the Kirkland Lake and Temagami districts, and low numbers occurred in the eastern Fort Frances and western Thunder Bay districts.

Northern Pine Weevil

A heavy infestation of the northern pine weevil (*Pissodes approximatus* Hopk.) caused 60% mortality within a small, 1.4-m red pine plantation in Tehkummah Township, Sudbury District. It was also found infesting 2% of the 1.5-m trees in a white pine seed orchard in Mattawan Township, North Bay District, and approximately 1% of the trees in a 10-ha plantation of 5-m white pine in Egremont Township, Midhurst District.

Oak Skeletonizer

Light infestations of the oak skeletonizer (*Bucculatrix ainliella* Murt.) occurred in numerous red oak stands in the Midhurst, Maple, and Tweed districts.

Pitted Ambrosia Beetle

The pitted ambrosia beetle (*Corthylus punctatissimus* [Zimm.]) caused

light mortality (1-5%) of understory sugar maple regeneration in a few stands in the Midhurst, Kemptville, Sault Ste. Marie, and North Bay districts.

Redheaded Jack Pine Sawfly

The redheaded jack pine sawfly (*Neodiprion virginiana* complex) caused a 60% loss of old foliage on 8-m open-growing trees at one location in Carling Township, Parry Sound District. The insect also caused light defoliation of jack pine at several points along the Graham Road, Thunder Bay District, and along the Sturgeon Bay Road, Nipigon District.

Red Pine Cone Beetle

Populations of the red pine cone beetle (*Conophthorus resinosae* Hopk.) declined markedly in 1993, with very low populations reported in the Kirkland Lake, Temagami, Nipigon, and Geraldton districts.

Spider Mite

Low populations of a spider mite (*Oligonychus* sp.) occurred in three red pine compartments in the Orono Forest Tree Nursery. They were successfully controlled with the insecticide Orthene.

Spruce Spider Mite

The spruce spider mite (*Oligonychus ununguis* [Jac.]) caused moderate-to-severe defoliation in a number of larch plantations in Edwardsburgh Township, Kemptville District. It also caused light defoliation of windbreak larch at the Orono Forest Tree Nursery in the Maple District.

Striped Alder Sawfly

The striped alder sawfly (*Hemichroa crocea* [Geoff.]) caused heavy defoliation of 10-m white birch at the OMNR Geraldton fire base in the Geraldton District.

Walnut Caterpillar

Low populations of walnut caterpillar (*Datana integerrima* G. & R.) caused 5-15% defoliation of 17.5-m black walnut in a small stand in Pittsburg Township, Tweed District.

White Pine Cone Beetle

Heavy infestations of the white pine cone beetle (*Conophthorus coniperda* [Schw.]) caused premature white pine cone drop in the Blind River area of the Sault Ste. Marie District.

Willow Flea Weevil

Heavy infestations of the willow flea weevil (*Rhynchaenus rufipes* [LeC.]) were observed on ornamental and (occasionally) forest willow trees in the Kemptville, North Bay, and Sudbury districts, and at one location in the Aylmer District.

TREE DISEASES

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

Reports received since the publication of the summer *Survey Bulletin* showed numerous additional conifer plantations attacked by *Armillaria* root rot across the province. With a few exceptions, however, infection levels were less than 5%. In the Midhurst District, pockets of 50 or more dead and dying trees were discovered in separate 35- and 45-year-old red pine plantations in Oro Township. Smaller pockets of dead and dying trees were reported in red pine plantations at Canadian Forces Base Borden in the Midhurst District, and in Uxbridge and Clarke townships, Maple District. A mortality rate of 7.3% was recorded at the Bluebird Lake jack pine family test site in the Thunder Bay District, and 6% mortality was found in a 1-ha jack pine seed orchard in Kirkwood Township, Sault Ste. Marie District.

Armillaria root rot was also associated with hardwood mortality in several areas. The most severe case was at Mellon Lake, Sheffield Township, Tweed District, where severely stressed 14.2-m red oak sustained 54% mortality over 2 years. The disease caused scattered mortality of mature red oak and sugar maple at several locations in the Kemptville and Tweed districts. It was also associated with overmature, stressed, and dying beech

trees in Rondeau Provincial Park, Harwick Township, Aylmer District.

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

The heaviest infections of spruce needle rusts this year were in the Nipigon and Wawa districts. At Boxer Lake in the Nipigon District, a 2-m stand of black spruce had 100% of the trees infected with 90% foliar damage. Another 25-ha stand of mixed 10-m black and white spruce near the town of Wawa, Wawa District, had 100% of the trees affected, with an average 80% foliar damage. Damage was much more severe on white than black spruce at this site. A number of other black and white spruce stands were evaluated in the two districts, with infection levels from 50 to 100% and accompanying defoliation at 20-80%. Infection levels and foliar damage, which had been high in some areas of the Cochrane, Hearst, Timmins, and Kirkland Lake districts in previous years, declined in 1993.

Reports of these diseases were received from a number of other areas in northern Ontario and, though levels of infection were sometimes as high as 100%, actual foliar damage was usually quite low. In several of the more severely infected stands in the Wawa and Nipigon districts, a rust parasite, *Fusarium avanaceum* (Fr. Fr) Sacc., was found in the rust pustules on more heavily infected trees.

Ink Spot of Aspen, *Ciborinia whetzellii* (Seaver) Seaver

Late season surveys disclosed heavy infections of ink spot of aspen in a 10-m trembling aspen stand near Ouimet Canyon in McTavish Township, Thunder Bay District, and on 8-m trees in Waldie Township, Sudbury District. Foliar damage was 80% in McTavish Township and 30% in Waldie Township. Low levels of damage occurred in a 13-ha stand in Reeves Township, Chapleau District.

Needle Cast, *Cyclaneusma minus* (Butin) DiCosmo Peredo and Minter

This needle cast was severe in scattered pockets within a Scots pine Christmas tree plantation in McIntyre Township, Thunder Bay District. Defoliation varied from 10 to 80%, with an average of about 60% for the plantation. While the infections were not likely to kill trees, the discoloration and loss of older foliage lowered the quality of the Christmas trees and rendered some unsaleable.

Scleroderris Canker Disease, *Gremmeniella abietina* (Lagerb.) M. Morelet

The status of the North American and European races of *Scleroderris* canker disease was described in the summer *Survey Bulletin*. Since then, a few additional reports of the North American race were received from the Timmins, Kirkland Lake, Temagami, and Sault Ste. Marie districts. In all instances, infection levels were quite low (0.7-2.7%) and associated damage was negligible.

A single new confirmation of the European race was made in Somerville Township, Bancroft District. This is adjacent to Galway Township, where new finds of the European race were made earlier in the summer of 1993.

Jack Pine Needle Blight, *Hendersonia pinicola* Wehm.

Aerial surveys disclosed pockets of heavy jack pine needle blight infection in a 200-ha, 16-m jack pine stand in the Geraldton District. This stand, located west of Nakina, contained pockets of damage with about 25% of the trees affected overall and foliar damage as high as 90% on some trees.

Balsam Poplar Leaf Diseases, *Mycosphaerella populicola* G.E. Thompson, *Linospora tetraspora* G.E. Thompson

Infection by balsam poplar leaf fungi caused severe leaf browning and premature defoliation in most balsam

poplar stands in the Fort Frances, Thunder Bay, Nipigon, Hearst, and Cochrane districts. Many stands were completely bare by early September. Severe, but less widespread damage was reported at the Timmins, Kirkland Lake, and Kenora districts. Extensive premature defoliation also occurred in some areas of the Sault Ste. Marie District. Scattered pockets of heavy infection by *M. populicola* were reported in Tosorontio Township, Midhurst District; Ennismore Township, Tweed District; and Somerville Township, Bancroft District. Less-severe damage occurred in balsam poplar stands in the northwest portion of the Cambridge District.

Butternut Canker, *Sirococcus clavignenti-juglandacearum* N.M.G. Nair, Kostichka & Kuntz

New infection sites of the introduced pathogen, butternut canker, were reported in North Crosby and Lavant townships, Kemptonville District, and in Tyendinaga Township, Tweed District. Branch mortality ranged from 30 to 50% on trees 7.5-11.2 m in height. New infection sites were also found in Charlotteville Township, Aylmer District, and in Hibbert and Goderich townships, Cambridge District.

Diplodia Tip Blight, *Sphaeropsis sapinea* (Fr.) Dyko & B. Sutton

In addition to information presented in the summer *Survey Bulletin*, heavy infections of diplodia tip blight were discovered in Scots pine plantations in Beverly, Maryborough, and Brantford townships, Cambridge District, and in King Township, Maple District. Roadside Austrian pine at one location in Houghton Township, Aylmer District, had 70% branch and shoot mortality. A high infection rate was noted on 45-year-old red pine along the Dieppe Road in Canadian Forces Base Borden. In Skead Township, Kirkland Lake District, 31% of the trees in a 5-ha red pine plantation had 10% shoot mortality.

Other Noteworthy Diseases

Anthracoses

A leaf anthracnose (*Apiognomonia errabunda* [Roberge] Höhn.) caused 60-70% foliar damage to white ash in several townships in the Midhurst and Maple districts.

Another anthracnose (*Apiognomonia veneta* [Sacc. & Speg.] Höhn.) caused twig and branch mortality of sycamore trees in Point Pelee National Park in Mersea Township, Aylmer District.

Aspen Shoot Blight

Shoot blight of aspen (*Venturia macularis* [Fr.:Fr.] E. Müll. & Arx) caused severe damage to trembling aspen regeneration in numerous cut-over areas in the Sioux Lookout and Dryden districts. Heavy infections were also reported at one location on the Lisle Road in Canadian Forces Base Borden.

Birch Leaf Blight

A leaf blight of birch (*Septoria betulae* Pass.) was widespread, with moderate damage levels in white birch stands in the northern Sudbury and North Bay districts. The heaviest infection was in a 5-ha stand in Falconbridge Township, Sudbury District, where 60% of the trees had 40% foliar damage. It was also widespread but at lower levels in Sault Ste. Marie District.

Dutch Elm Disease

Heavy infections of Dutch elm disease (*Ophiostoma ulmi* [Buisman] Nannf.) were reported on white elm reproduction and young trees in the Kemptonville, Tweed, Midhurst, and Maple districts.

Gall Rust

Heavy infections of the gall rust (*Gymnosporangium cornutum* Arthur ex Kern) turned mountain-ash foliage a brilliant orange at many points along the north shore of Lake Superior in the Nipigon District.

Leaf Blight

A leaf blight (*Marssonina tremulae* [Lib.] Kleb) caused 60-90% defol-

iation of scattered largetooth aspen in Lindsay Township, Midhurst District, and 10-75% foliar damage in Carolina poplar stool beds in the G. Howard Ferguson Forest Tree Nursery in the Kemptonville District.

Leaf Spot

An increased incidence of the leaf spot (*Marssonina betulae* [Lib.] Magn.) was noted in the Terrace Bay-Schreiber area of the Nipigon District and along the Catlonite Road, Geraldton District, where infection levels of 50-75% were recorded.

Shoot Blight

A shoot blight (*Sirococcus conigenus* [DC.] P.F. Cannon & Minter) was found that caused 10% shoot damage on 80% of red pine regeneration at one location in Winkler Township, Sault Ste. Marie District.

Spongy Root Rot

The spongy root rot (*Perenniporia subacida* [Peck] Donk) was associated with severely declining silver maple in a plantation in the Parkhill Conservation area in McGillivray Township, Aylmer District. The silver maple were growing in close proximity to black walnut and might have been damaged by the toxin juglone from the walnut trees.

ABIOTIC CONDITIONS

Forest Dieback (Oak Mortality)

In 1992, widespread areas of forest decline with conspicuous oak mortality were reported in the Parry Sound, Bancroft, and Tweed districts. In addition to the outright mortality of oak, many trees exhibited moderate-to-severe dieback. The decline was probably caused by several years of severe stress that included drought along with forest tent caterpillar and gypsy moth infestations.

Conditions in 1993 stabilized somewhat and few new areas of mortality were found. In some areas, trees that had been badly damaged continued to die but at a reduced rate. The situation was somewhat different in the Tweed District, where trees continued to die on poor sites with shallow, rocky

soils. Aerial mapping revealed an additional 3,880 ha of damage, bringing the total area mapped in the district in 1992 and 1993 to 5,607 ha.

Leaf Scorch

The incidence of scorch damage declined in 1993 compared with the previous two years. Widespread but generally light damage was reported in the Aylmer and Cambridge districts, where the most severe foliar damage (25%) occurred on a few sugar maple trees in Clinton Township, Cambridge District.

In the Sudbury, North Bay, and Sault Ste. Marie districts, where widespread damage occurred in 1992, only a single area of heavy foliar damage was reported in 1993. That was in a 3-ha sugar maple stand in Nipissing Township, North Bay District, where 30% of the 10-m trees sustained 70% foliar damage.



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