SURVEY BULLETIN

Forest Insect and Disease Conditions in Ontario

Fall 1994

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FOREST INSECT AND DISEASE CONDITIONS IN ONTARIO

Fall 1994

This is the last of three bulletins issued annually by the Forest Insect and Disease Survey (FIDS) Unit of Natural Resources Canada, Canadian Forest Service–Ontario. The information presented herein is the result of surveys conducted during the latter part of the field season from mid-July through September.

Staff of the Unit were saddened by the passing of Dr. Donald Myren in late June following a brief illness. A native of Wisconsin, Don joined the department in 1969 after completing a Ph.D. in plant pathology at the University of Wisconsin. His early research focused on fomes root rot (*Heterobasidion annosum* [Fr.:Fr.] Bref.), which was a problem in southern Ontario pine plantations. He transferred to the FIDS Unit in 1974 as the disease survey mycologist. Here, he spent the rest of his career. Among his many contributions, Don led the development of and edited a book entitled Tree Diseases of Eastern Canada. It was published just before his death. Don is survived by his wife Terri and three children, and will be missed by his friends and colleagues.

Two former FIDS workers, A.H. Rose and J.E. MacDonald, also passed away in 1994.

A.H. (Art) Rose died in June at the age of 77. Born and raised in Sault Ste. Marie, he graduated from Queen's University with a B.A. in 1940 and received an M.A. from the University of Toronto in 1947. He served in the army during World War II, but spent most of his career with the FIDS Unit, where he worked from 1947 until late 1980 when he retired. He will be best remembered for the series on insect handbooks that he co-authored with O.H. Lindquist and that are still in demand today. He was active in the community and served on the executive of the Association for the Mentally Retarded, the Sault Ste. Marie Board of Education, and the Sault College Board of Governors.

J.E. (Jim) MacDonald died in July at the age of 86. Jim played an active part in the development of the FIDS Unit and served as its first chief ranger from 1945 until his retirement in 1970. It was under his direction that the first rangers were hired, field headquarters were built, and surveys were devised and initiated. He was one of the first local Christmas tree growers and led in the development of the industry in the Algoma area. Jim retired to the hamlet of Little Rapids, near Thessalon, where he was born and raised. He was active in local politics and served on the township council and chamber of commerce. He also authored several books dealing with the early history of that part of the north channel of Lake Huron. Among his many achievements and awards were the Canada Centennial Medal, an Honourary Doctor of Letters from Algoma University, the Provincial Seniors Achievement Award, and the Commemorative Canada 125 Medal. He was inducted into the Forestry Hall of Fame in Sault Ste. Marie in 1990.

Jim is survived by his wife Betty, two daughters, three grandchildren, and one great grandchild.

Don Myren

Art Rose

Jim MacDonald

PEST REVIEW

The eighteenth annual forest pest review for Ontario took place this fall. For the first time in several years two sessions were held: a southern review at Sir Sanford Fleming College in Lindsay on 26 October and a northern review at Roberta Bondar Place in Sault Ste. Marie on 01 November.

Guests were welcomed to the southern review by Tim Easley, Dean of the School of Natural Resources, Sir Sanford Fleming College. Speakers from the Ontario Ministry of Natural Resources (OMNR), Sir Sanford Fleming College, Agriculture Canada, University of Toronto, New York State Department of Natural Resources, and Natural Resources Canada, (Canadian Forest Service–Ontario and Forest Pest Management Institute) discussed a wide variety of topics. Among these were the entomology and pathology program and the environmental pest management program at Sir Sanford Fleming College, forest health, forest pests in New York, urban forest pests, the vegetation management alternative program, and the advanced forest pest management training program. Updates were presented on such pests as the gypsy moth, introduced pine sawfly, scleroderris canker disease, pine shoot beetle, pine false webworm, hemlock looper, jack pine budworm, spruce budworm, and forest tent caterpillar.

The northern Ontario session featured speakers from OMNR; Michigan Department of Natural Resources; E.B. Eddy Forest Products; University of Waterloo; and Natural Resources Canada, Ontario Region, and Forest Pest Management Institute. They addressed such topics as pheromone traps and the prediction of spruce budworm outbreaks, MIMIC trials, jack pine budworm spray operations in 1994 and plans for 1995, forest pests in Michigan, the vegetation management alternatives program, and herbicide operations. There were also updates on the status of the spruce budworm, jack pine budworm, scleroderris canker disease, pine shoot beetle, gypsy moth, and introduced pine sawfly. The two sessions were attended by 120 people; with 80 in the south and 40 in the north.

FOREST INSECTS

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

The 1994 eastern spruce budworm situation in Ontario was detailed in the summer *Survey Bulletin*. The gross area of moderate to severe defoliation was 4,266,656 ha, down from the 8,991,177 ha recorded in 1993. All of the decline was in the main part of the outbreak, with the most significant reductions in the Nipigon, Sioux Lookout, and Dryden districts of the Northwest Region and in the Hearst and Wawa districts of the Northeast Region. There was a small increase in defoliation in the Fort Frances District. Increases in the area of moderate to severe defoliation were recorded in the Algonquin Park, North Bay, and Sudbury districts of the Central Region and in the Kemptville and Midhurst districts of the Southern Region.

Aerial surveys revealed a marked increase in the area within which eastern spruce budworm related mortality of balsam fir *(Abies balsamea* [L.] Mill.) and white spruce *(Picea glauca* [Moench] Voss) occurred. The total area mapped was 7,783,336 ha; an increase of 2,750,411 ha over last year's total of 5,032,925 ha. The bulk of the increase occurred in the Northwest Region, particularly in the Dryden, Red Lake, Kenora, and Sioux Lookout districts, where numerous small pockets coalesced into much larger areas of mortality (Fig. 1). Substantial increases were recorded in the Fort Frances, Nipigon, and Thunder Bay districts. Smaller increases occurred in the Wawa District of the Northeast Region and the Algonquin Park District of the Central Region (Table 1).

Egg-mass sampling to forecast population trends for 1995 was carried out at 437 locations. A comparison of 332 locations sampled in 1993 and 1994 showed little change in overall egg-mass densities (Table 2). The extent of tree mortality will likely increase considerably, accompanied by population declines in the Northwest Region. Populations may remain steady or increase slightly in the Central Region (Sudbury, North Bay, and Algonquin Park districts) and infestations are likely to persist at about the same levels in the Southern Region.

Cover photo: Lecontes sawfly larval colony.

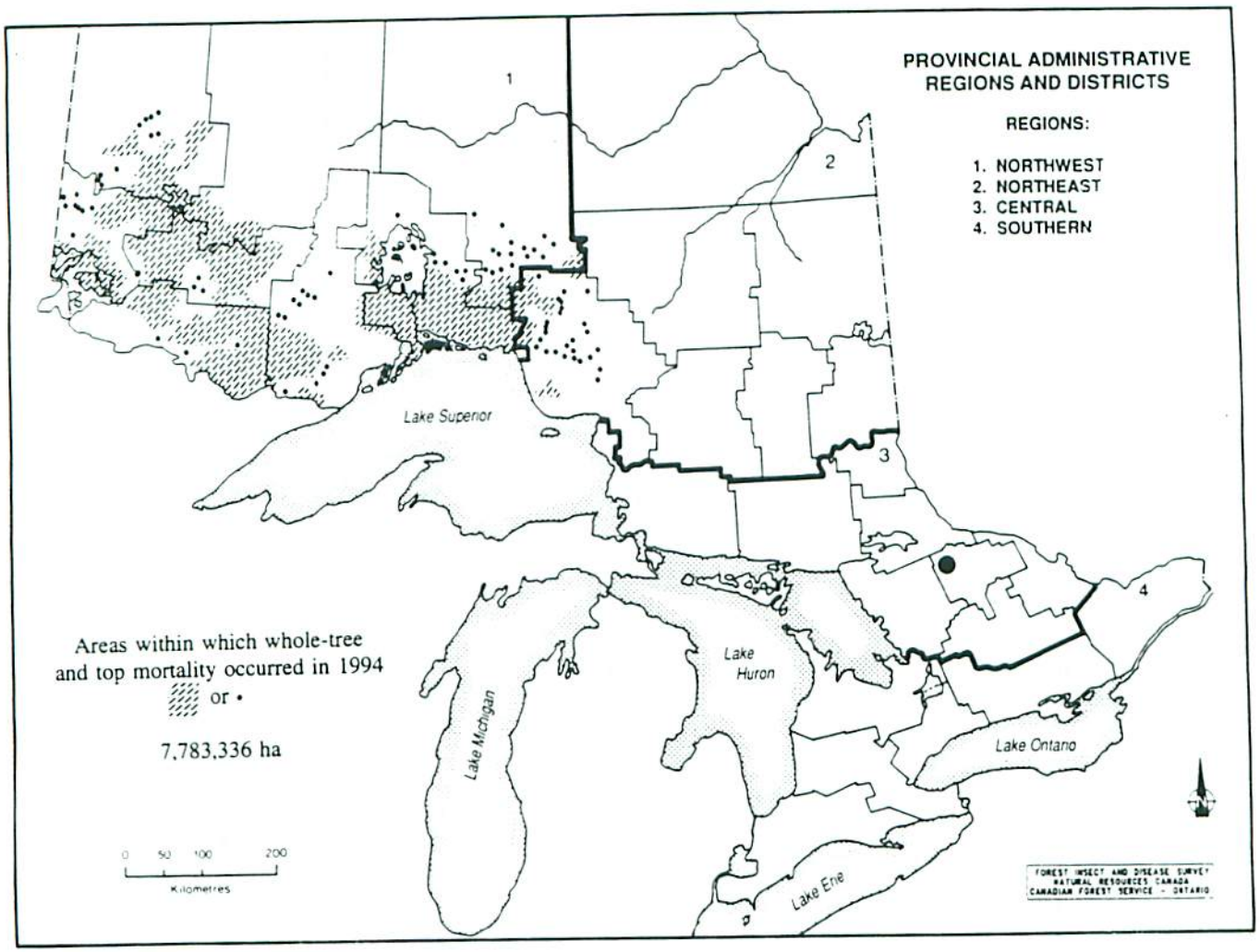

Figure 1. Eastern spruce budworm, Choristoneura fumiferana *(Clem.).*

Table 1. Gross area of spruce budworm associated tree mortality in Ontario in 1993 and 1994.

Region District	Total area (ha) 1993	 1994	Increase since 1993
Northwest			
Dryden	337,936	1,282,939	945,003
Fort Frances	1,251,605	1,376,666	125,061
Kenora	494,522	906,587	412,065
Nipigon	1,608,695	1,704,588	95,893
Red Lake	78,163	631,132	552,969
Sioux Lookout	47,916	440,648	392,732
Thunder Bay	837,608	1,006,928	169,320
	4,656,445	**7,349,488**	**2,693,043**
Northeast			
Wawa	365,180	418,266	53,086
Central			
Algonquin Park	11,300	15,582	4,282
Total	**5,032,925**	**7,783,336**	**2,750,411**

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

As reported in the summer *Survey Bulletin*, the total area of moderate to severe defoliation increased from 282,247 ha in 1993 to 419,344 ha *in* 1994. Most of this defoliation occurred in the Parry Sound and Sudbury districts, but there was also a sizeable area infested around the west end of Lake Nipissing in the North Bay District. Small areas of infestation were also mapped in the Pembroke, Algonquin Park, Temagami, Timmins, and Sault Ste. Marie districts.

In the Parry Sound District, the infestation has continued for 5 years and has caused extensive mortality of jack pine *(Pinus banksiana* Lamb.) along the northeast coast of Georgian Bay. Numerous stands growing on

Table 2. Comparison of eastern spruce budworm egg-mass densities in Ontario between 1993 and 1994.

Region District	Number of locations Sampled in 1994	Number of locations Common to 1993 and 1994	Average egg-mass density per 9.29 m^2 of branch 1993	Average egg-mass density per 9.29 m^2 of branch 1994	Change (%)
Northwest					
Dryden	32	28	151	249	+65
Fort Frances	19	15	413	382	-7.5
Geraldton	24	22	124	98	-21
Kenora	23	22	466	476	+2
Nipigon	40	27	106	71	-33
Red Lake	13	11	452	468	+3
Sioux Lookout	16	13	214	184	-14
Thunder Bay	46	41	122	124	+2
	213	**179**	**218**	**222**	**+2**
Northeast					
Chapleau	17	9	2	2	0
Cochrane	10	7	0	1	+100
Hearst	47	39	72	63	-12
Kirkland Lake	9	6	0	0	0
Timmins	10	6	0	0	0
Wawa	25	23	185	137	-26
	118	**90**	**79**	**63**	**-20**
Central					
Algonquin Park	10	2	10	8	-20
Bancroft	2	2	0	0	0
North Bay	15	5	55	200	+280
Parry Sound	11	5	0	0	0
Pembroke	5	1	0	0	0
Sault Ste. Marie	23	21	1	0	-100
Sudbury	18	9	2	0	-100
Temagami	5	3	3	0	-100
	89	**48**	**7**	**22**	**+214**
Southern					
Aylmer	2	2	0	0	0
Cambridge	1	1	619	324	-48
Kemptville	6	4	620	419	-32
Maple	2	2	168	247	+47
Midhurst	5	5	313	408	+30
Tweed	1	1	36	255	+608
	17	**15**	**336**	**319**	**-5**
Total	**437**	**332**	**155**	**155**	**0**

shallow, rocky sites have sustained 100% mortality. In the same area, scattered white pine (*Pinus strobus* L.) of all sizes was severely defoliated in 1994. Defoliation as high as 80% was recorded on some trees, and these may succumb if damage persists at this rate.

Mortality counts in less severely damaged stands ranged from 32 to 42% in Wallbridge, Harrison, and Brown townships. Jack pine is also beginning to die in the Sudbury District, where evaluations in Allen, Aylmer, and Scollard townships revealed that 12 to 34% of the trees were moribund and 6 to 10% were dead. A single stand in Latchford Township, North Bay District, had 10% mortality and 6% of the trees were moribund.

Egg-mass surveys were carried out at 221 locations (Table 3). In the Central Region, a comparison of 93 locations sampled in 1993 and 1994 showed an overall decrease of 24%. Based on these and other counts, infestations are expected to persist in 1995 in parts of the Sudbury District. This is where most defoliation occurred in 1994, but the overall area affected will probably decline next year. Heavy infestations are expected to continue in Sagard Township, Sault Ste. Marie District and in Westbrook Township, Timmins District. Heavy infestations are also likely to persist in affected areas in the Parry Sound District.

In the Northwest Region, a slight increase in egg-mass densities may result in a few areas of light defoliation, but no large or heavy infestations are expected.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Populations of the forest tent caterpillar collapsed over much of the area infested in 1993. Moderate to severe defoliation persisted, however, in an area totaling 166,060 ha in the southwest Cochrane District and adjacent areas in the southeast Hearst District. Egg-band surveys within this infestation indicate that although some pockets of defoliation may persist in 1995, the overall area of moderate to severe defoliation will probably decline substantially. Earlier aerial surveys disclosed crown dieback and mortality in 98,905 ha of trembling aspen (*Populus tremuloides* Michx.) stands in the southern Nipigon and northwest Wawa districts. Heavy infestations have persisted here for several years. Quantitative sampling in these stands revealed tree mortality ranging from 10 to 24% and crown dieback ranging from 10 to 90%.

Gypsy Moth, *Lymantria dispar* (L.)

Gypsy moth populations declined to generally low levels in 1994. The total area of moderate to severe defoliation was 5,645 ha, compared with 9,784 ha in 1993. Almost all the defoliation was in the Sudbury District, but a few pockets were recorded in the western part of the Aylmer District.

A pheromone trapping program, developed to assist in tracking the spread of this introduced pest, has been carried out in northern Ontario parks and campgrounds for a number of years. In 1994 adult moths were caught at all locations trapped in the North Bay and Sudbury districts and in the eastern part of the Sault Ste. Marie District. Numbers ranged from 1 to 29 moths

Table 3. Comparison by region of jack pine budworm egg-mass densities in Ontario between 1993 and 1994.

Region / District	Number of locations: Sampled in 1994	Number of locations: Common to 1993 and 1994	Total egg-masses: 1993	Total egg-masses: 1994	Change (%)
Central					
Algonquin Park	2	2	15	16	+7
North Bay	3	3	9	10	+11
Parry Sound	6	6	116	114	-2
Pembroke	4	3	28	14	-50
Sault Ste. Marie	22	22	45	43	-4
Sudbury	70	56	467	320	-31
Temagami	1	1	9	8	-11
	108	**93**	**689**	**525**	**-24**
Northeast					
Chapleau	15	15	2	1	-50
Timmins	10	9	1	36	+3500
	25	**24**	**3**	**37**	**+1133**
Northwest					
Dryden	17	17	1	1	0
Fort Frances	16	15	2	3	+50
Kenora	13	13	1	1	0
Red Lake	24	24	3	7	+133
Sioux Lookout	18	17	1	4	+300
	88	**86**	**8**	**16**	**+100**
Total	**221**	**203**	**700**	**578**	**-21**

(Fig. 2). Single moths were caught at the Agawa Bay and Pancake Bay campgrounds north of Sault Ste. Marie. A total of 15 moths was caught at the Finlayson Point Provincial Park on Lake Temagami, Temagami District. A single moth was caught in the Missinaibi Wild River Provincial Park, Chapleau District.

There were no egg-mass surveys for gypsy moth this year; therefore, predictions for 1995 must be based on historical trends and speculation. Gypsy moth populations are at their lowest level in 15 years in southern Ontario, but will probably begin to increase again in the next year or two. The insect is also likely to continue to extend its range to the north and west.

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

Further to information presented in the summer *Survey Bulletin*, pine false webworm population declines were reported in the Tweed District in 1994. Infestations persisted in a 3.8-m red pine plantation in Hinchinbrooke Township, but defoliation levels were reduced to 49% from the 80% recorded in 1993. Defoliation averaged 33% in a 1-ha, 6.6-m red pine (*Pinus resinosa* Ait.) plantation in Oso Township. Moderate to severe defoliation was recorded in several Scots pine plantations in Oxford-on-Rideau Township, Kemptville District, and light defoliation was reported on six, widely separated red pine plantations in the Bancroft and Tweed districts. Light defoliation was also reported at two locations in Beverly Township and one location in Puslinch Township, Cambridge District.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

For the second consecutive year, there was a marked decline in the area infested by this late season pest of white birch (*Betula papyrifera* Marsh.) and yellow birch (*Betula alleghaniensis* Britt.). The total area within which moderate to severe defoliation occurred was 2,990,824 ha. This compared with 7,858,495 ha in 1993. The largest area of infestation occurred from the southern Cochrane District south through the eastern Timmins District and the Kirkland Lake and Temagami

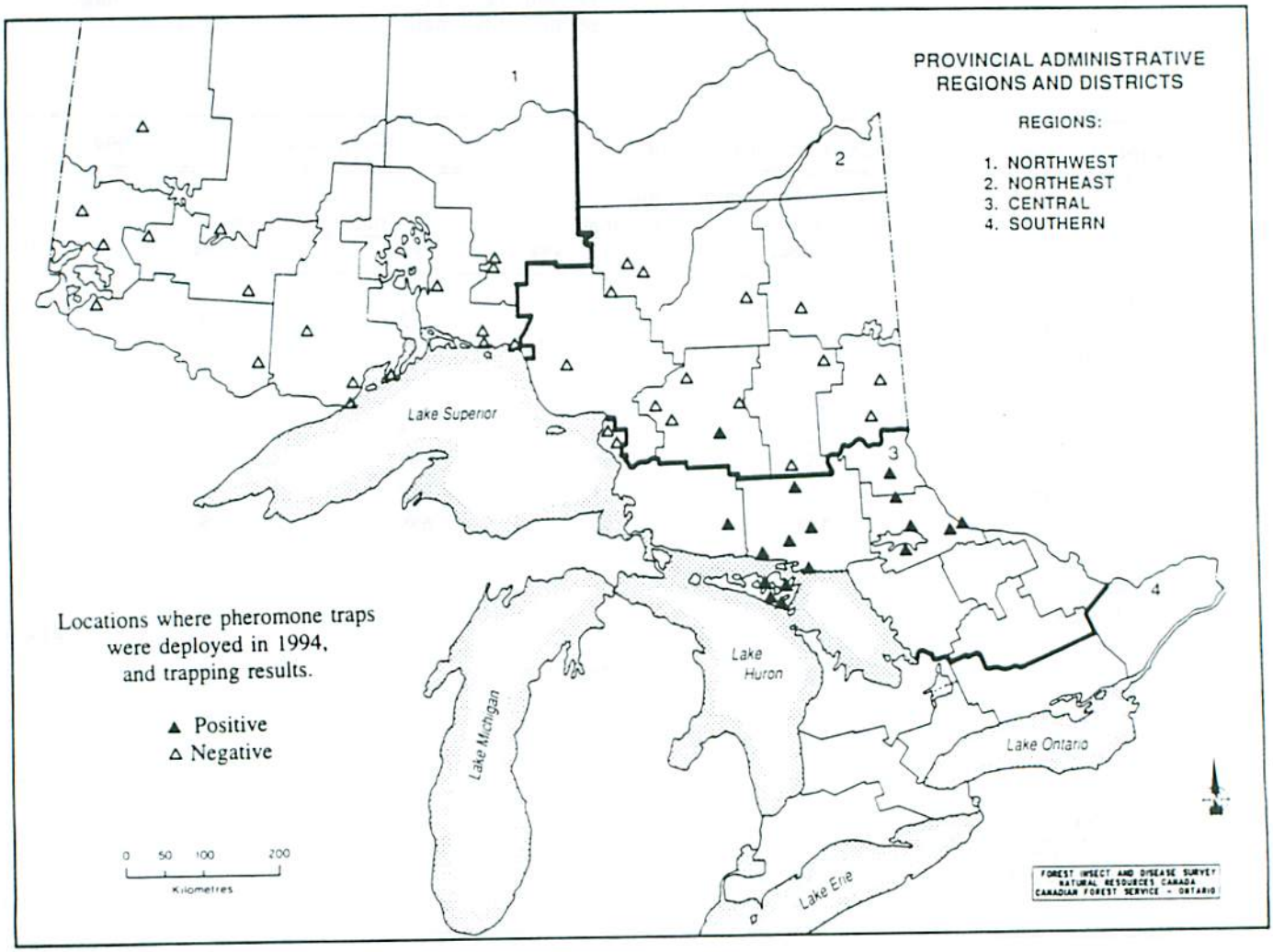

Figure 2. Gypsy moth, Lymantria dispar *(L.).*

districts to Hobbs and Sisk townships, North Bay District (Fig. 3). Small, discrete pockets of damage were mapped in Grant and Fell townships, North Bay District. A second sizeable pocket occurred in the area between Monteagle and Anstruther townships in the Bancroft District. Low populations caused light foliar browning and premature leaf drop at numerous other areas in the Central and Southern regions.

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

The 1994 status of this early season pest was described in the summer *Survey Bulletin*. Surveys conducted since that time have disclosed an infestation in the Pays Plat area of the Nipigon District. It totaled 1,905 ha of moderate to severe defoliation. This brings the total area of trembling aspen defoliated by this pest to 199,661 ha in 1994, compared with 45,464 ha in 1993. This last infestation stretched from Pays Plat Bay on Lake Superior, north into Yesno Township, and northeast along the Pays Plat River in unsurveyed territory. Light defoliation was also reported in a 2-ha area of semimature trembling aspen in Machar Township, Parry Sound District.

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

For the second consecutive year, unusually heavy infestations of this sawfly occurred along the Georgian Bay shoreline between Sand Bay and Big David Bay in the vicinity of Parry Sound. Heavy feeding by the first and second generation of the insect caused severe defoliation of mature and semimature white pine on 362 ha. The most severe defoliation (100%) was on shoreline trees on the mainland and adjacent islands. Although numerous larvae could be found as far as several miles inland, defoliation in these cases was in the light and occasionally moderate range. In addition, 36 ha of whole-tree mortality occurred on trees near the hamlet of Dillon and on several adjacent islands. The loss of these trees has affected the value of vacation properties in the area.

Elsewhere in the province light infestations were reported on white pine plantations in Tosorontio and

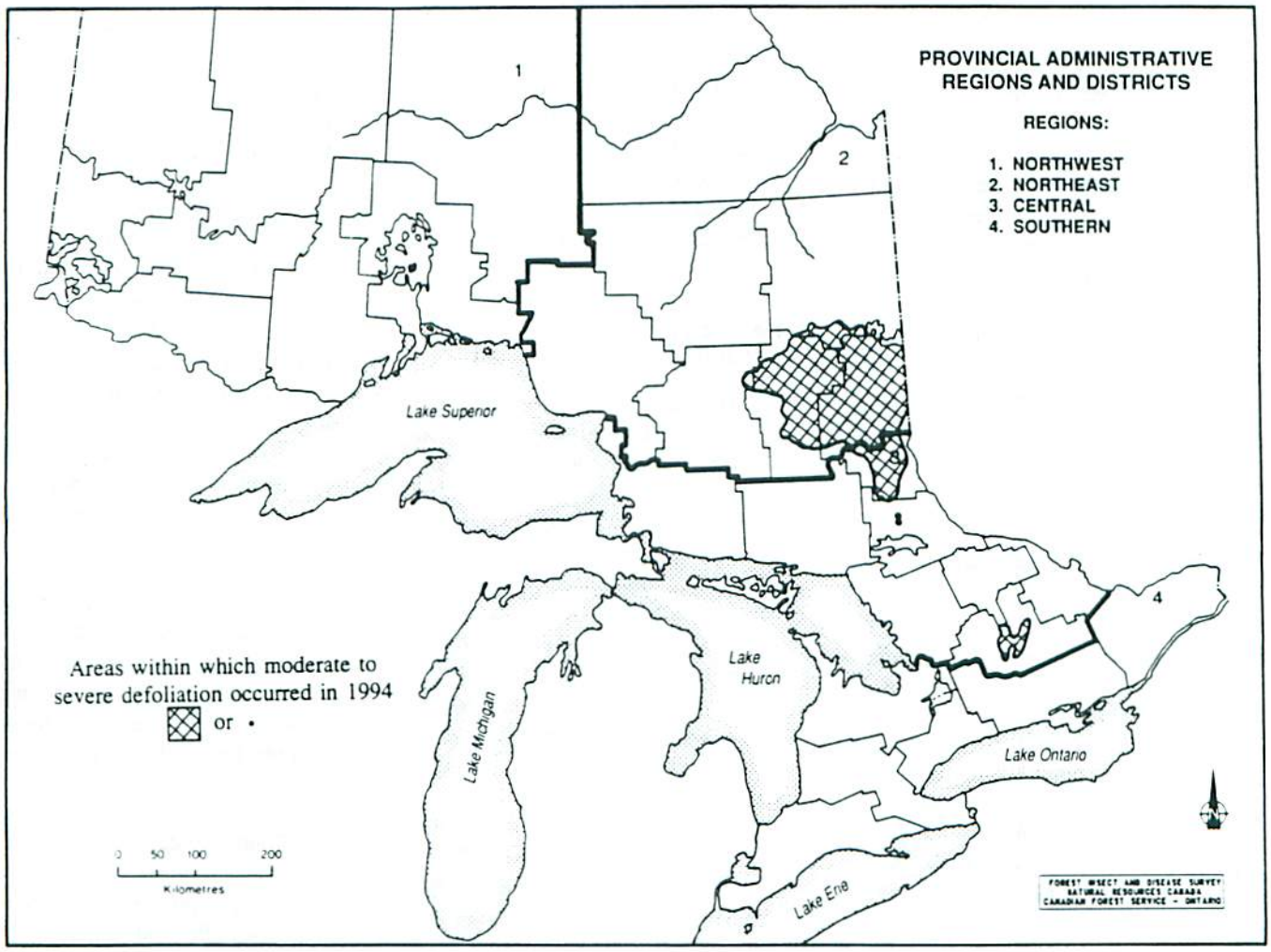

Figure 3. Birch skeletonizer, Bucculatrix canadensisella *Cham.*

Euphrasia townships, Midhurst District and in south Cayuga Township, Cambridge District. Low numbers of larvae were observed on white pine in Long Township, at the Kirkwood Forest Station, and in the Garden River First Nation lands in the Sault Ste. Marie District. Light defoliation was recorded on 2.5-m white pine at old Fort William, near Thunder Bay, Thunder Bay District.

Green Striped Mapleworm, *Dryocampa rubicunda rubicunda* (F.)

A large area of heavy infestation of this pest was observed north of Blind River on the Sudbury and Sault Ste. Marie district boundary. Most of the red maple (*Acer rubrum* L.) in some 26 townships between Mandamin Township, Sudbury District and Nicholas Township, Sault Ste. Marie District, sustained defoliation ranging from 40 to 100%. Smaller areas of moderate to severe defoliation were also observed in Lewis, Kirkwood, and Thompson townships, Sault Ste. Marie District and in seven scattered infestations between Wanapitei Lake and Beaverstone Bay, Sudbury District. A medium infestation caused 50% defoliation of the red maple component in a 12-ha mixed red maple–jack pine stand in Maria Township, Pembroke District.

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

This pest was widespread in the province in 1994 but, although high numbers of lateral shoots were sometimes attacked, leader damage was usually less than 5%. Exceptions to this trend were as follows: in Firstbrook Township, Temagami District, where a jack pine seed orchard and a jack pine family test planting had leader damage of 21 and 20%, respectively; at the Morson jack pine seed orchard, Fort Frances District, where 11% of the leaders were destroyed; and in May and Hallam townships, Sudbury District, where leader damage was 19 and 16%, respectively.

Fall Webworm, *Hyphantria cunea* (Drury)

Populations of this late season pest were generally low throughout the province. However, there were a few exceptions. In the Aylmer District, high webworm numbers severely defoliated black walnut (*Juglans nigra* L.) and willow (*Salix* spp.) trees in the Point Pelee National Park. Somewhat lower levels of damage were reported on willows in a marshy area along the Lake St. Clair shoreline. High webworm populations were also reported on black walnut in Charlotteville Township, Aylmer District and in the DeCew Falls area in Thorold Township, Cambridge District. Medium populations were observed on immature white elm (*Ulmus americana* L.) along the Ottawa River in Westmeath, Ross, Horton, and McNab townships, Pembroke District. Defoliation in the 60% range occurred on black ash (*Fraxinus nigra* Marsh.) in Wilberforce Township, Pembroke District.

In northern Ontario, generally light defoliation was reported on a variety of deciduous hosts in the Kirkland Lake, Temagami, Sault Ste. Marie, Dryden, and Thunder Bay districts.

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

Hemlock looper infestations on the east end of Manitoulin Island and in Beaverstone Bay north of Killarney, Sudbury District, declined from 1,260 ha in 1993 to 560 ha in 1994. Mortality in affected balsam fir stands on Wikwemikong First Nation lands on eastern Manitoulin Island was noted to be about 60%. On Long Island in Beaverstone Bay, mortality of balsam fir, eastern white cedar (*Thuja occidentalis* L.), white spruce, and black spruce (*Picea mariana* [Mill.] B.S.P.) was in the 95–100% range.

Heavy looper infestations recurred in small white cedar and eastern hemlock (*Tsuga canadensis* [L.] Carr.) stands near Charleston Lake, Kemptville District, and new infestations were found north of Ivy Lea and in several small pockets along Highway 401 in the Maple and Tweed districts. A total of 180 ha was affected in these areas. In two stands near Charleston Lake that have been heavily attacked for 2 consecutive years, mortality of eastern hemlock was 80 and 48% and branch dieback on the remaining trees was 53 and 26%, respectively. New infestations were also found in the southeast Bancroft District, where 397 ha were damaged on islands and lake shores in Clarendon, Palmerston, Miller, and South Canonto townships. Eastern hemlock and eastern white pine were the species most affected in this area.

Redheaded Pine Sawfly, *Neodiprion leconti* (Fitch)

Sporadic infestations of this pest were recorded in the Southern and Central regions. The most severe damage occurred in the Midhurst District on First Nation lands on Christian Island in Georgian Bay. Here, a number of red pine, eastern white pine, and Scots pine (*Pinus sylvestris* L.) plantations were attacked. A 36-ha, 7-year-old red pine plantation had 80% of the trees 100% defoliated. An additional 10% sustained 60% defoliation. In another 40-ha, 5-year-old red pine plantation, 30% of the trees were 100% defoliated and an additional 20% had 30% defoliation. In a smaller, 15-ha red pine plantation of 12-year-old trees, 60% of the trees sustained 100% defoliation. It is probable that many of the severely defoliated trees will die before spring.

A general population decline was evident in the Bancroft, Algonquin Park, Pembroke, Kemptville, and Tweed districts and small infestations caused generally light damage in most locations where the pest was found. A small plantation of 3.5-m red pine in Carling Township, Parry Sound District, had 10% of the trees 100% defoliated. Continued defoliation at this location has resulted in 30% mortality.

Sawfly populations remained generally low in the Sudbury and North Bay districts, where defoliation in

infested red pine and jack pine plantations ranged from 10 to 20%. Increasing, but still generally low, populations were encountered in the Espanola and Sault Ste. Marie districts. Defoliation was as high as 30% in Parkinson and Patten townships and reached 70% on 4% of the trees in Bouck Township, Sault Ste. Marie District.

Swaine Jack Pine Sawfly, *Neodiprion swainei* Midd.

Populations of this pest declined to very low levels in 1994. Defoliation as high as 60% was reported on 5- to 10-m jack pine on Island 127 in Lake Temagami, Biggs Township, Temagami District, and a low population occurred at one location in Carling Township, Parry Sound District.

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

Widespread, heavy infestations of this insect were again apparent in young trembling aspen stands from the western Hearst and Wawa districts to the Manitoba border. The most severe damage was recorded in the Sioux Lookout and Dryden districts. Here, numerous stands of young trees sustained 100% foliar damage and larger trees, in the 10- to 12-m range, had damage levels of 30 to 50%. The insect was common throughout the remainder of northern Ontario but, although infestation levels were sometimes high, foliar damage was much lower, usually ranging from 20 to 75%. An exception occurred in the northeast Sudbury District where young trembling aspen stands over a wide area were heavily attacked. Foliar damage was in the 80% range.

In southern Ontario, moderate defoliation (20–40%) was recorded on trembling aspen stands in Carling and McMurrich townships, Parry Sound District.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* Roh.

In addition to information presented in the summer *Survey Bulletin*, heavy sawfly infestations caused 100% defoliation to small groups of 1- to 4-m black spruce along Highway 17 between Kenora and the Dryden District boundary. Similar damage occurred on young white spruce and black spruce along Highway 17 between Ignace and Dinorwic in the Dryden District. Young black spruce, and occasionally white spruce, between Thunder Bay and Shebandowan sustained defoliation ranging from 25 to 100%. Ornamental white spruce and blue spruce (*Picea pungens* Ergelm.) were severely defoliated in Thunder Bay and white spruce ornamentals were heavily attacked in the towns of Fort Frances, Kenora, Red Lake, Emo, and Sioux Lookout. Small white spruce ornamentals in the Neys Provincial Park, Nipigon District, sustained 60% defoliation. Defoliation in the 80–100% range was recorded on open-grown, 2- to 3-m white spruce in Askin, Coleman, and Low townships, Temagami District. Roadside and ornamental white spruce between Kirkland Lake and Larder Lake and north of New Liskeard, Kirkland Lake District, sustained 60 to 100% defoliation. Similar defoliation levels were recorded in Stock, Thorneloe, Tisdale, and Whitney townships, Timmins District. At a single location in Denbigh Township, Bancroft District, 72% of the 1- to 4-m white spruce had an average of 42% defoliation; 8% were dead.

White Pine Weevil, *Pissodes strobi* (Peck)

As usual, infestations of the white pine weevil were widespread in young conifer stands in northern Ontario but, in most cases, leader damage was quite low (<10%). The few exceptions to this trend were as follows: in May Township, Sudbury District, 1.8-m jack pine sustained 21% leader damage; 2.5-m eastern white pine in the Gurd Township seed orchard, North Bay District, had 14% leader damage; 13% leader damage occurred on 2.9-m jack pine in the Robson family test plot, Thunder Bay District; and 12% leader damage occurred on 2.5-m and 2.7-m jack pine in Cuthbertson and Sturgeon townships, Thunder Bay District.

Weevil populations were considerably higher at some locations in southern Ontario. In the Kemptville District, eastern white pine in Front of Yonge and Bastard townships and Norway spruce (*Picea abies* [L.] Karst) in Lanark Township had 43, 20, and 22% leader damage, respectively. Leader damage of 45 and 25% was recorded in eastern white pine plantations in Charlotteville Township, Aylmer District and Minto Township, Cambridge District, respectively. Leader damage as high as 20% was recorded on eastern white pine, jack pine, and white spruce at a number of other widely separated areas in southern Ontario.

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

This insect was widespread in the Algonquin Park, Pembroke, and Bancroft districts, but infestation levels were generally lighter than in 1993. The highest populations were recorded in a 50-ha white pine plantation in Clara Township, Pembroke District, where 100% of the 1.7-m trees were infested and an average of 27% of the new foliage was damaged. In Mayo Township, Bancroft District, all the trees in a 1.9-m, 4-ha white pine plantation were attacked. An average of 19% of the new foliage was damaged. Moderate to severe defoliation was reported as common on 3- to 10-m white pine in the Kemptville and Tweed districts.

A single, heavy infestation was reported at the Halfway Lake Provincial Park, Sudbury District, where 80% of the 2.5-m trees sustained an average of 40% foliar damage. Light infestations were reported from single locations in Gurd Township, North Bay District and Kirkwood Township, Sault Ste. Marie District.

Redhumped Oakworm, *Symmerista canicosta* Franc.

Unusually heavy infestations occurred in several areas in the

Bancroft District. Defoliation ranging from 20 to 80% was recorded on 11-m red oak (*Quercus rubra* L.) in the Mississauga–Gold Lake area of the Bancroft District. Numerous areas of patchy red oak and white oak (*Quercus alba* L.) in Cavendish, Burleigh, Anstruther, and Harvey townships in the Bancroft District were lightly defoliated. Occasional, small pockets of trees in the same areas sustained defoliation in the 80% range. Light defoliation was recorded on red oak in Anglesea Township, Bancroft District; near Dillon in Carling Township, Parry Sound District; and in Esten and Lewis townships, Sault Ste. Marie District.

Red Pine Needle Midge, *Thecodiplosis piniresinosae* Kearby

This insect caused extensive damage to the new foliage of red pine stands in the Sault Ste. Marie District, and aerial mapping disclosed a total of 2,972 affected hectares. The most severe damage occurred in mature red pine stands north of Thessalon in Kirkwood Township and in adjacent areas in Rose, Lefroy, and Bridgland townships. This insect, which feeds at the base of the needles on the current year's growth, destroyed an average of 50% of the new foliage. However, on more heavily infested trees defoliation as high as 90% was recorded. Less severe damage was mapped in the surrounding townships of Aberdeen, Plummer, Plummer Additional, Galbraith, Haughton, and Parkinson. Moderate damage was mapped east of Sault Ste. Marie on the Garden River First Nation lands and north of the city in Van Koughnet and Gapp townships. Moderate damage was also mapped north of Aubrey Falls in Martel and Root townships. A single medium infestation was recorded in a 2-ha, 4-m red pine plantation in Carling Township, Parry Sound District.

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

There has been little change in the status of this introduced pest since its discovery in Ontario in 1993. Adult beetles were trapped in the early spring of 1994 by Agriculture Canada in Dufferin County. Previously uninfested, this county was added to a quarantine zone that also includes the counties of Haldimand–Norfolk, Hamilton–Wentworth, Niagara, Waterloo, and Wellington. Agriculture Canada personnel also found pine shoot beetle infested material in late July at three sites in Brant County and in mid-August at one site in Oxford County. FIDS rangers collected the beetle from four sites: one in Mono Township, Dufferin County; two in Puslinch Township, Wellington County; and one in South Cayuga Township, Haldimand–Norfolk County.

Other Noteworthy Insects

Light infestations of the maple trumpet skeletonizer (*Epinotia aceriella* [Clem.]) were reported in sugar maple (*Acer saccharum* Marsh.) stands throughout much of southern Ontario. The heaviest damage occurred in the Presqu'ile Provincial Park, Tweed District, where two stands of 24–m sugar maple had 40 and 95%, respectively, of the leaves infested.

The northern pitch twig moth (*Petrova albicapitana* [Bsk.]) attacked 49% of the 1.2-m jack pine in a 4-ha plantation on the outskirts of the city of Thunder Bay. Low moth numbers occurred at several locations in the Dryden and Sioux Lookout districts.

Declining populations of the beech scale (*Cryptococcus fagisuga* Linding.) were reported at three sites in the Cambridge District.

The whitespotted sawyer (*Monochamus s. scutellatus* [Say]) caused severe damage to 10-year-old jack pine in a 2-ha area adjacent to a cutover in Rowell Township, Dryden District.

The mountain-ash sawfly (*Pristiphora geniculata* [Htg.]) caused moderate to severe defoliation of mountain-ash (*Sorbus americana* Marsh.) throughout most of the Timmins and Kirkland Lake districts.

Heavy infestations of the willow flea weevil (*Isochnus rufipes* [LeC.]) occurred on various species of willow in a large area of the central Sudbury District. Pockets of heavy damage were also recorded in a number of areas in the North Bay, Bancroft, and Parry Sound districts and at the Guelph Lake Conservation Area, Cambridge District.

The gray willow leaf beetle (*Tricholochmaea d. decora* [Say]) caused severe browning of willow shrubbery in numerous areas of the Sioux Lookout and Dryden districts.

The white pine needle mite (*Trisetacus alborum* Keif.) caused moderate to severe foliar damage on eastern white pine at several locations in the Kenora and Fort Frances districts.

Medium and heavy infestations of the poplar flea beetle (*Altica populi* Brown) were reported on balsam poplar (*Populus balsamifera* L.) stands throughout the Bancroft and Parry Sound districts and the southern parts of the North Bay and Sudbury districts.

Increased populations of the red-headed jack pine sawfly (*Neodiprion virginiana* complex) caused light to moderate defoliation of young jack pine at a number of locations in the Nipigon District; in the Quetico Provincial Park, Fort Frances District; and at one location in Carling Township, Parry Sound District.

Heavy infestations of the early birch leaf edgeminer (*Messa nana* [Klug]) occurred on 14-m white birch in the Presqu'ile Provincial Park, Tweed District. Light infestations occurred at a few locations in the Pembroke, Bancroft, and Parry Sound districts. A single light infestation in an Acid Rain National Early Warning System (ARNEWS) plot in Priske Township, Nipigon District, was a new distribution record for this introduced insect.

Warren's root collar weevil (*Hylobius warreni* Wood) killed 2% of the 2.1-m trees in a 4-ha red pine plantation in Sisk Township, North Bay District.

The pales weevil (*Hylobius pales* [Hbst.]) caused 20% branch mortality in Scots pine Christmas tree plantations in South Plantagenet Township,

Kemptville District and in Sidney Township, Tweed District.

Increased, but low populations of the oak twig pruner (*Elaphidionoides* sp.) were observed in many oak stands in the Cambridge and Aylmer districts.

An infestation of eastern black-headed budworm (*Acleris variana* [Fern.]) caused 40% defoliation on 80% of the 20-m eastern hemlock trees in a small stand in the Restoule Provincial Park, North Bay District. Light defoliation was recorded on 15% of the recently planted 3-year-old eastern white pine in a 20-ha plantation in Sullivan Township, Midhurst District.

The birch leaf beetle (*Phratora hudsonia* Brown) caused 80% foliar browning on 70% of the 10-m white birch in an ARNEWS plot in Priske Township, Nipigon District.

The walnut caterpillar (*Datana integerrima* G. & R.) caused an average of 80% defoliation to black walnut and bitternut hickory (*Carya cordiformis* [Wong.] K. Koch) at several locations in the Kemptville and Tweed districts.

Heavy infestations of the short-horned oakworm (*Anisota finlaysoni* Riotte) caused 100% defoliation of bur oak (*Quercus macrocarpa* Michx) at one location in Kingston Township, Tweed District, and in a 1.6-ha stand on Corn Island in the St. Lawrence River in Front of Leeds and Lansdowne Township, Kemptville District.

Infestations of the northern pine weevil (*Pissodes nemorensis* Germ.) caused 4% mortality of 0.9-m trees in the Mattawan Township white pine seed orchard and 2% mortality in a small red pine plantation in Wilson Township, North Bay District.

Heavy infestations of the bronze birch borer (*Agrilus anxius* Gory) have caused up to 64% mortality to declining stands of white birch in the northern part of the Parry Sound District. These trees are growing on poor sites with shallow soils and have been under stress from drought, forest tent caterpillar, and in some cases, gypsy moth infestations for the past several years.

TREE DISEASES

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

North American Race

Further to information presented in the summer *Survey Bulletin*, a light infection of scleroderris canker was discovered in a 5-ha, 1.9-m jack pine family test area in Evelyn Township, Timmins District. In Skead Township, Kirkland Lake District, 22% of the 2.8-m trees in a 9-ha red pine plantation were infected. The disease was also found in a 3-m jack pine plantation at the Swastika Tree Nursery, but <1% of the trees were infected at this site. A few 3-m regeneration red pine at the Neys Provincial Park in the Nipigon District were also diseased.

European Race

The summer *Survey Bulletin* related the status of this race of the disease, with 39 confirmed collections in the Parry Sound and Bancroft districts. All of these were in areas where the disease had been previously found, with the exception of Minden Township, Bancroft District. This is a new location. Generally, infection levels appear to have intensified, but there have been no further finds since that time.

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

As usual, there were numerous reports of this organism in young conifer stands and plantations. In most cases, however, infection levels were less than 5%. In the Northumberland County Forest in Haldimand Township, Tweed District, two pockets of dead and dying trees were discovered. Sixty-four trees were affected in a 50-year-old red pine plantation and 12 trees were damaged in a 40-year-old plantation. A number of pockets of dead and dying trees were also discovered in red pine plantations in Oro and Vespra townships, Midhurst District. Here, the number of dead and infected trees ranged from 4 to 28. A pocket of 20 dead trees was recorded in a 10-m red pine plantation in Monmouth Township, Bancroft District. The disease also caused 6% mortality of 1.8-m jack pine in a 5-ha plantation in Ledger Township, Nipigon District. Armillaria root rot was also associated with widespread mortality in forest tent caterpillar damaged trembling aspen stands in the Wawa District. The disease was found on 24 and 10%, respectively, of the recently dead trees in two impact plots at White Lake in Ashmore Township.

Leaf Spot on Birch, *Septoria betulae* Pass.

Heavy infections of this disease caused widespread foliage browning in white birch stands north of Lake Superior in the Pays Plat Bay–Cypress Bay area of the Nipigon District. Aerial surveys disclosed a total of 74,330 ha affected from the Lake Superior coast to the vicinity of Upper Roslyn and Fitzpatrick lakes. Smaller discrete pockets of damage were mapped to the east of the main body of infection in the vicinity of Flicker, Stingray, Aguasabon, and Ruffle lakes. The organism was also observed sporadically in white birch stands in the Sudbury, North Bay, Algonquin Park, Pembroke, Sioux Lookout, and Dryden districts. The most severe infection in these districts occurred in the Foley Lake and Burma Lake road areas of the Sioux Lookout District. Here the incidence of infection was as high as 80% and foliar damage of 75% was recorded.

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

Heavy infections by both these late season organisms were found in small balsam poplar stands throughout the Fort Frances and Kenora districts, along the east side of Lake Nipigon and the Nipigon River, and south of Longlac in the Nipigon District. Heavy infections by *M. populicola* caused

foliar damage in the 50 to 100% range in balsam poplar stands in much of the Thunder Bay and western Nipigon Districts. Heavy infections by *L. tetraspora* were prevalent in most of the Hearst, Timmins, and Kirkland Lake districts and defoliation of 100% was recorded in many stands. High infection levels, with foliar damage ranging from 80 to 100%, were recorded west of Dryden and in the Snake Bay Road area of the Dryden District and along the Vermilion River Road, Sioux Lookout District. Small pockets of heavy infection were reported throughout the Kemptville and Tweed districts. Pockets of light and moderate damage occurred in the southern portion of the Cochrane District. Moderate levels of damage by *M. populicola* were observed in the Sudbury and North Bay districts.

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

In 1994 there were declines in both the incidence of these fungi and the severity of damage caused by them. Again, the most severe defoliation occurred in Lendrum Township, Wawa District, where white spruce in a 15-ha area sustained an average of 40% foliar damage. This was a reduction from the 25 ha affected in 1993, when average foliar damage was 80%. Black spruce in the same stand was unaffected. A small pocket of heavy infection was reported in the Neys Provincial Park, Nipigon District, where 90% of the 5-m black spruce sustained 60% foliar damage. The disease was prevalent in black spruce and white spruce stands in many other areas of northern Ontario but, although incidence was often as high as 100%, actual foliar damage was usually very light.

Jack Pine Needle Blight, *Hendersonia pinicola* Wehm.

Infections, which damaged jack pine stands in a 200-ha area near the town of Nakina in 1993, expanded considerably in 1994. Aerial surveys disclosed an area of 4,821 ha of moderate to severe foliar damage east and west of Nakina in Exton and Nakina townships, Nipigon District. In addition, heavy infections were also located in a small, 0.25-ha stand of jack pine regeneration on the Catlonite Road south of Long Lake and in a 0.5-ha jack pine plantation near Killala Lake, northwest of Marathon, in the Nipigon District. The organism was not encountered elsewhere in the province.

Butternut Canker, *Sircoccus clavigignenti-juglandacearum* N.M.G. Nair, Kostichka & Kuntz

This disease organism was collected for the first time in the easternmost parts of the province in Clarence, Caledonia, and Lancaster townships, Kemptville District. The disease is now prevalent in most areas of Ontario where butternut occurs. It was collected for the first time in South Burgess, Bastard, Edwardsburgh, Front of Yonge and Rear of Leeds, and Lansdowne townships, Kemptville District and in Oso Township, Tweed District.

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

Surveys during the latter part of the 1994 field season revealed heavy blight infections at several locations in the Cambridge and Aylmer districts. A 16-ha, 13-m Scots pine plantation and a small stand of 15-m red pine in Beverly Township, Cambridge District, were heavily infected. Branch mortality of 70% and light whole-tree mortality were recorded at the latter site. Small groups of Scots pine at single locations in South Walsingham Township and near the city of Aylmer in the Aylmer District sustained branch and shoot mortality in the 30% range. Damage levels were reduced in 1994 in the Midhurst and Maple districts but Austrian pine (*Pinus nigra* Arnold) south of the city of Barrie in the Midhurst District and at the Orono Forest Station in the Maple District were damaged by the fungus.

ABIOTIC CONDITIONS

Ash Dieback

This condition was prevalent in a large part of southern Ontario in 1994. White ash (*Fraxinus americana* L.), and some green ash (*Fraxinus pennsylvanica* Marsh.), of all age classes were affected in open-grown and fencerow situations and occasionally in mixed woodlots in the Kemptville, Tweed, Maple, and Midhurst districts. Typically, apparently healthy, vigorous trees began to lose foliage in early June. This was followed by twig and branch mortality in large sections of the crown. Whole-tree mortality sometimes resulted. In most situations during 1994 crown dieback ranged from 20 to 60%, but no whole-tree mortality was reported. The fungi *Durandiella fraxini* (Schwein.:Fr.) Seaver and *Dothiorella fraxinicola* Ellis & Everh. were frequently associated with this dieback but, although both organisms can be weakly parasitic, these agents were not the cause of the condition.

Browning of Eastern White Pine

An unusual browning condition was observed on eastern white pine in a number of areas in Ontario in 1994. Beginning in late June and continuing through August, the distal portion of the new needles turned brown and died on individual trees or groups of trees. Usually one-half to three-quarters of each needle was killed, but the basal portion remained green. There was no pattern to the occurrence of this phenomenon within stands or affected areas. In some instances severely affected trees were surrounded or adjacent to unaffected trees. No causal agent could be found.

White pine needle browning was most prevalent in the Fort Frances and Kenora districts, where numerous trees and small groups of trees were affected. All of the new foliage was damaged in some cases. Needle browning was also apparent in the Parry Sound District. Here, white pine near Lake of Bays, near the Killbear Provincial Park, and

in the Muskoka area had new foliage damage in the 60% range. Sporadic damage was also reported throughout the Sault Ste. Marie District and at single locations in the Sioux Lookout and Dryden districts.

Oak Mortality

Mortality and crown dieback of red oak, which began in 1992 in the Parry Sound and Bancroft districts, continued in 1994. In nearly all cases the trees were growing on poor sites and had been under stress from several agents. Trees that had been severely damaged continued to deteriorate and die, but at a reduced rate. The total area affected in the two districts increased from 62,389 ha in 1993 to 70,778 ha in 1994.

Winter Drying

In addition to information carried in the summer *Survey Bulletin*, a large area (300 ha) of winter drying occurred in a 4-m jack pine stand on the Snake Bay Road, Dryden District. This stand had been thinned in 1991, thus opening it up and making the trees susceptible to drying winds and warm sun in late winter when the root systems and stems were still frozen. This resulted in foliar damage of 60–100% on 100% of the trees. In spite of the loss of old foliage, new growth was healthy and the trees did not appear to sustain any permanent damage. A similar situation was recorded in a 3-m jack pine stand on the Vermilion River Road, Sioux Lookout District.

Other Noteworthy Diseases and Abiotic Conditions

A high incidence of Dutch elm disease (*Ophiostoma ulmi* [Buisman] Nannf.) was reported throughout the Midhurst, Tweed, and Kemptville districts; in several townships in the North Bay District; and on the east end of Manitoulin Island in the Sudbury District.

The poplar false tinder fungus (*Phellinus tremulae* [Bondartsev] Bondartsev & Borissov) infected 29% of the trembling aspen in an Acid Rain National Early Warning System Plot near Caribou Falls, Kenora District.

Black canker of willow (*Glomerella cingulata* [Stoneman] Spauld. & H. Schrenk) was prevalent in the town of Fort Frances. Many ornamentals were heavily infected and foliar damage was as high as 80%.

Shoot blight of aspen (*Venturia macularis* [Fr.:Fr.] E. Müll. & Arx) was widespread in the Sioux Lookout and Dryden districts. Trembling aspen regeneration in many areas sustained an incidence rate of 100%. Shoot damage ranged from 20 to 50%.

A small stand of trembling aspen in East Luther Township, Cambridge District, had 100% of the trees infected with *Mycosphaerella populicola* G.E. Thompson. Average foliar damage at this site was 80%.

Swiss needle cast (*Phaeocryptopus gaeumannii* [T. Rohde] Petr.) caused 83% foliar damage on 75% of the trees in a Douglas fir (*Pseudotsuga mensiesii van glauca* [Beissn.] Franco) Christmas tree plantation in Oxford-on-Rideau Township, Kemptville District.

White pine blister rust (*Cronartium ribicola* J.C. Fisch.) infected 90% of the 2.5-m eastern white pine in a 12-ha area in Suganaqueb Township, Wawa District and caused main-stem cankers on 1% of the trees in a 4.2-m, 2-ha plantation in Front of Yonge Township, Kemptville District.

Heavy infections of fireweed rust (*Pucciniastrum epilobii* G.H. Otth) caused severe defoliation of balsam fir at many locations in the southern half of the Hearst District.

Ink spot of aspen (*Ciborinia whetzelii* [Seaver] Seaver) caused 20% foliar damage on 5-m trembling aspen in a 10-ha area in Suganaqueb Township, Wawa District and 10% foliar damage on 3-m trees at Eskwanonwatin and Mound lakes, Nipigon District.

High winds blew down trees in an area measuring 3.5 km long by 100 m wide in McGiffin Township, Temagami District. Semimature white birch, trembling aspen, and jack pine were the main species affected.

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