FOREST INSECT AND DISEASE SURVEYS IN THE NORTH CENTRAL REGION OF ONTARIO, 1977

H. R. FOSTER AND H. D. LAWRENCE

GREAT LAKES FOREST RESEARCH CENTRE

SAULT STE. MARIE, ONTARIO

CANADIAN FORESTRY SERVICE

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Information Office,
Great Lakes Forest Research Centre,
Canadian Forestry Service,
Department of the Environment,
Box 490, Sault Ste. Marie, Ontario.
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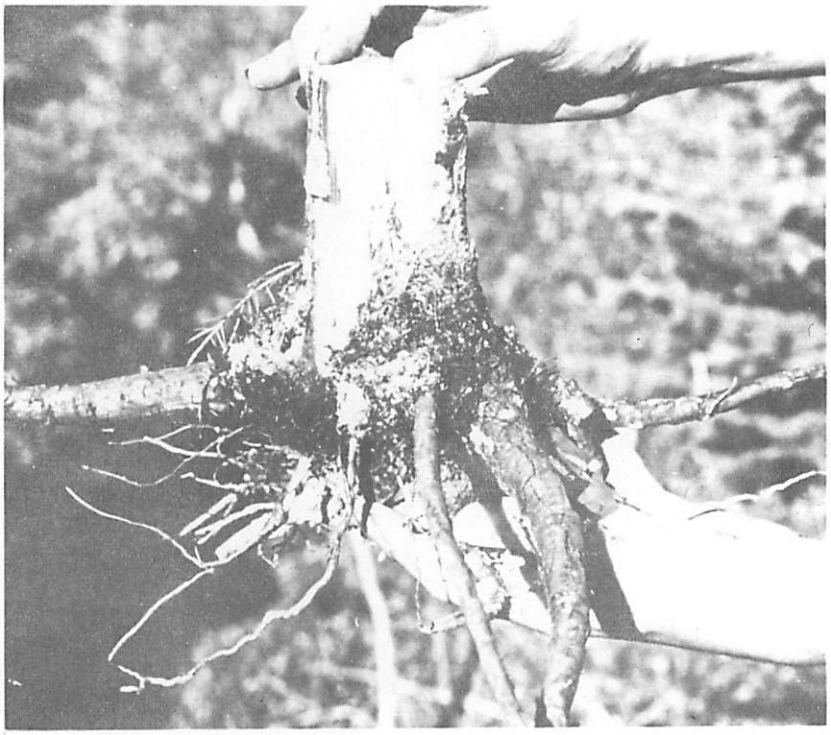
Frontispiece

Severe defoliation by the Bruce spanworm, *Operophtera bruceata* (Hlst.), near MacDiarmid.



Armillaria root rot, *Armillaria mellea* (Vahl ex Fr.) Kummer, on plantation white spruce at Limestone Lake.

SURVEY HIGHLIGHTS

An outstanding feature of the 1977 field season was the effect of unusual weather conditions on both insects and tree diseases. Freezing temperatures between June 3 and 9, 1977 caused severe and widespread frost damage to young conifers and deciduous trees in the eastern half of the Region.

Unusually warm weather in May 1977 resulted in rapid spruce budworm development in the Pukaskwa National Park, in a large area north and west of the town of White River, and in several small areas elsewhere in the White River District. Sizeable new heavy infestations were mapped near Manitouwadge just southeast of the Hour Glass Lake infestation in Terrace Bay District, and in excellent white spruce stands in the Pagwachuan River area in Geraldton District. Similar increases occurred from the Kawnipi Lake area in Atikokan District northeast to Shebandowan Lake area in Thunder Bay District, where last year's pockets of infestation coalesced to double the infestation size in 1977. The only other significant increases west of Lake Nipigon were scattered small pockets south and east of the Seine River in the western part of Atikokan District. Damage by early feeding insects such as forest tent caterpillar, Bruce spanworm, aspen leafroller and linden looper showed appreciable increases. The unusually high level of damage by the Bruce spanworm in 1976 was exceeded in 1977 as total defoliation was common from Nipigon to Beardmore.

The 1976 drought and 1977 frosts played a significant role in increasing tree mortality of young jack pine in cutover areas at Sturgeon River, at Mileage 52 (87 km) on the Goldfield Road, and in extensive white spruce plantations in the Limestone Lake area. Drought was also responsible for large increases in single-tree balsam fir mortality, considerable black spruce mortality in northeastern Geraldton District and an appreciable increase in jack pine and red pine mortality in the southwestern part of Quetico Provincial Park. Gremmeniella (≡ scleroderris) canker of pine remains a major problem in young jack pine plantations in Herbert and Nickle townships in Terrace Bay District and in Bain Township, Geraldton District.

H. R. Foster
Supervisor

ACKNOWLEDGMENTS

The excellent cooperation of personnel from the Ontario Ministry of Natural Resources and forest industry in carrying out pest surveys in 1977 is greatly appreciated.

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INSECTS

Bronze Poplar Borer, *Agrilus liragus* Bart. & Br., and an Ambrosia Beetle *Trypodendron* sp.

Trembling aspen (*Populus tremuloides* Michx.) trees continued to die in a small stand near the plywood mill at Longlac where the attack on weakened trees was again high and tree mortality increased to 80% in 1977 (Fig. 1). The bronze poplar borer was the most common beetle attacking these weakened trees but numerous attacks by ambrosia beetles were observed on newly dead trees and on other seriously weakened trees. Some light mortality has occurred in areas outside the original 2 ha (5 acre) stand.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

The results of damage surveys, population sampling and egg-mass counts have been included with those of other survey regions in a special report by Howse et al. (Report O-X-280). This report provides a complete description and analysis of developments in the spruce budworm situation in Ontario in 1977 and gives infestation forecasts for the province for 1978.

Linden Looper, *Erannis tiliaria* Harr.

In Thunder Bay District high numbers of larvae in 1976 through Blake, Crooks and Pardee townships were reduced to low numbers in 1977. The decline can probably be attributed to a disease that was noticed in the population in 1976. Low numbers were commonly associated with the infestation of the Bruce spanworm in the Helen-Jessie lakes area in Nipigon District. Farther north in the Orient Bay-Beardmore area where Bruce spanworm larvae stripped extensive aspen (*Populus* sp.) stands, appreciable numbers of linden looper larvae were also found.

Eastern Pineshoot Borer, *Eucosma gloriola* Heinr.

For the second consecutive year, regeneration jack pine (*Pinus banksiana* Lamb.) in cut-over areas in Atikokan District suffered heavy attack by this shoot borer. Damaged leaders and lateral shoots were especially noticeable north of Eva Lake where 67% of the trees were attacked and north of Sapawe in Hutchinson Township where 43% of the trees were damaged. The insect was not collected in any of the other districts in the Region.

Birch Leafminer, *Fenusa pusilla* (Lep.)

This was the only insect causing appreciable damage to white birch (*Betula papyrifera* Marsh.) foliage in 1977. Browning of the foliage, a common occurrence in and around Thunder Bay for several years, was again commonly observed. Moderate damage was observed on ornamental trees in built-up areas and in the extensive area bordered on the south by Nipigon-Terrace Bay and on the north from Orient Bay to Upper Roslyn Lake. Light populations were observed elsewhere in Thunder Bay District and at many points in Nipigon, Terrace Bay and Geraldton districts.

Aspen Leafblotch Miner, *Lithocolletis ontario* Free.

Leaf mining by this insect which has increased appreciably in recent years reached its highest levels in 1977. Severe mining of young aspen occurred generally across Atikokan District and in the area south of a line from English River to Poshkokagan Lake in Thunder Bay District. Severe mining was common in the Beardmore-Orient Bay areas in Nipigon District, in the Longlac-Nakina area in the Geraldton District and in the Manitouwadge and White Lake areas in Terrace Bay and White River districts. Elsewhere in the last four districts mining of aspen was less intense.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Generally infestations on trembling aspen in the North Central Region increased in extent and intensity. The heavy infestation of forest tent caterpillar in the town of Atikokan in recent years spread westward in a band a few kilometres wide along Highway 11 for a distance of 32 km (20 mi.) to McAuley Lake. A medium-to-heavy infestation, a spill-over from the Northwestern Region, was mapped aerially in the northwest corner of Atikokan District in the Pekagoning Lake area (see Appendix, Fig. A1).

The light infestation last year in Thunder Bay District increased to heavy in 1977 and extended across the central areas of Neebing, Paipoonge and part of O'Connor townships, and larvae were encountered frequently in and around the city of Thunder Bay.

East of Lake Nipigon a trend to lower populations in 1975-1976 was somewhat reversed in 1977 and pockets of light infestation were observed in Walters and McComber townships and near Leopard Lake in Nipigon District. Defoliation in parts of Clavet and Boyce townships in the Geraldton District increased to severe, while the infestation just west of Lowbell Lake collapsed. Light infestation occurred in a small stand 6.4 km (4 mi.) south of Manitouwadge in Terrace Bay District.

Figure 1. Channelling caused by the bronze poplar borer, *Agrilus liragus* Bart. & Br., on trembling aspen near Longlac.

Egg-band counts indicate further increases and spread of the infestation in the Atikokan District, and the infestation in Thunder Bay District may double in size in 1978. Few increases were forecast for Nipigon, Geraldton and White River districts (Table 1).

Table 1. Summary of forest tent caterpillar egg-band counts on trembling aspen in five districts in 1977 with infestation forecasts for 1978

Location	Avg DBH of trees (cm)[a]	Avg no. trees sampled	Avg no. of egg bands per tree	Infestation forecast for 1978
Atikokan District				
Atikokan, north side	10	1	68.0	severe
Atikokan, south side	7	1	73.0	severe
Hwy 11, 5 mi. west of Atikokan	12	1	40.0	severe
Hwy 11, 15 mi. " " "	10	1	40.0	severe
Hwy 11, 25 mi. " " "	7	3	0.7	light
Clearwater West Lake	10	1	12.0	severe
Williamson Lake	10	3	1.3	light
Nym Lake turn	10	2	0.5	light
Thunder Bay District				
Gillies Twp	10	1	7.0	severe
Neebing Twp	7	1	33.0	severe
O'Connor Twp	7	1	9.0	severe
Oliver Twp	7	1	30.0	severe
McIntyre Twp	10	2	0.5	light
Paipoonge Twp	12	1	24.0	severe
Nipigon District				
Walters Twp	17	3	0.0	nil
McComber Twp	15	3	0.3	light
Geraldton District				
Eureka Lake	10	1	43.0	severe
Clavet Twp	20	3	0.3	light
Boyce Twp	17	3	1.0	light
White River District				
Hunt Twp	20	1	0.0	nil
Cecile Twp	20	1	0.0	nil
4 mi. south of Manitouwadge	25	1	0.7	light

[a] 1 cm = 0.39 in.

Sawyer Beetle Damage, *Monochamus* spp.

Adult feeding by sawyer beetles on twigs and branches was extensive enough in areas southeast of Armstrong to cause appreciable branch and some tree mortality in mature jack pine stands. Twig and bark damage observed in scattered areas east of Lake Nipigon to the Longlac area also indicated unusually high numbers of sawyer beetles. Adult beetles were reported as quite numerous by woods personnel in cut-over areas in Nipigon, Geraldton and White River districts. These beetles, usually abundant following forest fires, were observed in high numbers in many fire-free areas.

Drought conditions in the past two years along with extensive cutting operations may have provided the large amount of breeding material necessary for the increased populations observed in 1977.

Redheaded Jack Pine Sawfly, *Neodiprion virginianus* complex

The redheaded jack pine sawfly was one of the few insects to increase in population levels and distribution throughout most of the Region in 1977. Old foliage was stripped from young hedgerow trees west of Upsala in the Thunder Bay District and from occasional trees in Magone Township and south of Nama Creek in White River District. Defoliation was moderate on young trees in Raynar Township, Geraldton District. Light defoliation occurred at many other locations and single colonies of the insect were present in young jack pine stands across the Region.

Bruce Spanworm, *Operophtera bruceata* (Hlst.)

The first instance of this insect causing severe damage to trembling aspen in northeastern Ontario was reported at several locations in the Nipigon District in 1976. The severe damage at Caribou Lake, north of Armstrong, decreased to light in 1977. Moderate defoliation was maintained in two pockets near Black Bay and increased to severe in an area of about 145 km^2 (56 $mi.^2$) in Booth, Purdom and Nipigon townships. Moderate damage and scattered pockets of severe damage occurred in the adjoining area of over 260 km^2 (100 $mi.^2$) running east to Gurney on Lake Superior and northeast to Keemle Lake (see Appendix, Fig. A2). The area of severe damage tripled in size and extended from Orient Bay through Beardmore to Dorothea Township (see Frontispiece). Stands south of Beardmore were stripped by mid-May at least two weeks ahead of the stripping of poplars by the forest tent caterpillar. Although many trees were able to refoliate by the first week in July, some badly weakened trees failed to recover by the end of August. Some tree mortality may be evident in 1978.

Cutworms, *Peridroma saucia* Hbn. and *Euxoa ochrogaster* Gn.

Night surveys and checks of regeneration jack pine were carried out to determine the prevalence of cutworm larvae on newly sprouting jack pine seedlings at nurseries, and in forest regeneration. Little damage occurred except to garden vegetables, lawns and flowers in 1977. The cutworms *Peridroma saucia* Hbn. and *Euxoa ochrogaster* Gn. were identified from vegetable and flower samples from Geraldton District. A wide variety of cutworm adults were taken in a light trap at French Lake in Atikokan District.

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

Severe defoliation of scattered, young, open-grown white spruce (*Picea glauca* [Moench] Voss) and black spruce (*Picea mariana* [Mill.] B.S.P.) was again apparent from French Lake Park west to the Atikokan District boundary. Heavy damage was noted on semimature white spruce south of Flanders. In the Thunder Bay District the only significant defoliation occurred in the Northern Light Lake area and within the city of Thunder Bay. Infestations in towns east of Lake Nipigon were generally light-to-medium with little damage to forest stands.

White Pine Weevil, *Pissodes strobi* (Peck)

Damage by the white pine weevil varied from 2% on lodgepole pine (*Pinus contorta* Dougl.) in O'Meara Township, Geraldton District to 48% on Norway spruce (*Picea abies* [L.] Karst.) in Marks Township, Thunder Bay District (Table 2). Young jack pine stands were the favorite host in Atikokan District and in the Dog River area in the Thunder Bay District. Damage was light in lodgepole pine plantations in Geraldton District and on white and black spruce trees in White River District and along the Manitouwadge Road in Terrace Bay District. Checks in mid-June showed appreciable attack by the weevil on lodgepole pine in O'Meara Township but subsequent examination showed poor larval survival.

Larch Sawfly, *Pristiphora erichsonii* (Htg.)

In contrast to a decline in numbers in the Thunder Bay District where scattered severe defoliation has occurred for the past three years, an increase was apparent in the districts to the east. Defoliation was reduced to light in Poshkokagan Lake area, Thunder Bay District and along the Poshkokagan River to Chief Bay in Nipigon District. Defoliation increased to severe near Caramat, Stevens, Nakina and east of Longlac in Geraldton District, in a 20 ha (50 acre) larch (*Larix laricina* [Du Roi] K. Koch) stand near Terrace Bay and a 2 ha (5 acre) stand east of the Pic River, Terrace Bay District, and in scattered stands in Pukaskwa National Park, White River District. Trace-to-light defoliation was common through all these districts.

Table 2. Summary of damage by the white pine weevil in three districts in 1977 (counts based on the examination of 100 trees at each location).

Location	Tree species	Avg DBH of sample trees (cm)[a]	Trees weeviled in 1977
Atikokan District			
Eva Lake	jP	3	4
Hutchinson Twp	jP	3	4
Thunder Bay District			
Chisamore Lake area	jP	3	15
Stedman Twp, Graham Road	jP	3	7
Marks Twp	nS	10	48
Trewartha Twp	bS	3	2
Geraldton District			
O'Meara Twp	lP	3	2

[a] 1 cm = 0.39 in.

Mountain Ash Sawfly, *Pristiphora geniculata* (Htg.)

This introduced pest of mountain ash (*Sorbus americana* Marsh.) was first collected in the Region in 1969. The spread west in subsequent years was rapid until 1974 when this sawfly had reached a line running from Northern Light Lake through Dog Lake and south of Lake Nipigon. Low numbers were found this year at Burchell Lake, and this constitutes a further movement west of about 30 km (20 mi.). This insect caused severe defoliation, particularly in the Pukaskwa National Park in White River District in the southeast corner of Terrace Bay District, in the Pagwachuan and Klotz lakes area, Geraldton District, southwest of Nipigon, Nipigon District and from Thunder Bay west to Whitefish Lake, Thunder Bay District.

Aspen Leafroller, *Pseudexentera oregonana* Wlshm.

Trembling aspen stands within 1 036 km^2 (400 $mi.^2$) were severely defoliated by this leafroller in the area southwest of Kakabeka Falls to beyond Whitefish Lake (see Appendix, Fig. A3). This area is about half the size of the 1976 infestation. Heaviest damage in this area was

observed in southwest Pardee Township and north of Whitefish Lake in Jean and Strange townships where complete stripping of trees was common. Surrounding the area of heavy infestation light-to-moderate defoliation occurred over a much larger area, covering most of the Thunder Bay District west of the city of Thunder Bay and south of Highway 11. A second area of severe defoliation occurred southeast of Upsala in about 155 km^2 (60 $mi.^2$). Several other aspen defoliators occurred within these areas but at relatively low numbers. Light defoliation occurred along the Seine River in Atikokan District but only one collection was made in the eastern half of the Region.

Spruce Shootworms, *Zeiraphera canadensis* Mut. & Free., and *Z. destitutana* (Walker)

Damage that has been common on semimature and mature white spruce since 1974 in the Thunder Bay and Nipigon districts was again noticeable at scattered points, particularly in Boulevard Lake Park, on Sibley Peninsula, and in the Cheeseman Lake area of Thunder Bay District, and in the Black Sturgeon Lake and Jessie Lake areas of the Nipigon District. Other spruce foliage insects and budworm larvae were commonly associated with these shootworms in spruce foliage collections. No significant changes were observed in Terrace Bay and White River districts where populations were low on white spruce.

Pine Needle Sheathminer, *Zelleria haimbachi* Busck

This insect, not reported in the Region since 1970, caused appreciable damage to scattered stands and individual jack pine trees around Twin City Corners, Thunder Bay Forest Station and the Industrial Farm area in Paipoonge and Neebing townships in the Thunder Bay District. Low numbers were common in the southwest portion of the district but scarce elsewhere in the Region.

Table 3. Other forest insects

Insect	Host(s)	Remarks
Acleris variana Fern. Blackheaded budworm	wS, bF	Populations were generally reduced to trace levels in 1977.
Acrobasis betulella Hlst. Birch tubemaker	wB	observed at several points in north Geraldton and Nipigon districts

(continued)

Table 3. Other forest insects (continued)

Insect	Host(s)	Remarks
Altica ambiens alni Harr. Alder flea beetle	Al	high numbers at points in Atikokan District
Anacampsis niveopulvella Cham. Poplar leafroller	tA	common west of Postans, Thunder Bay District, and in the Beardmore-Macdiarmid area of Nipigon District
Aphrophora parallela (Say) Pine spittlebug	jP	common west of Thunder Bay, and in a few northern areas in Geraldton and Nipigon districts
Archips argyrospilus (Wlk.) Fruit tree leafroller	bO	light in a pocket of oak near Thunder Bay
Archips cerasivoranus (Fitch) Uglynest caterpillar	ecCh	heavy in Slate River Valley in Thunder Bay District, and light along the north part of the Goldfield Road in Geraldton District
Badebecia urticana Hbn. Leafroller	wB	common at Muskrat Lake, Nipigon District, and at Rainbow Falls, Terrace Bay District
Bucculatrix canadensisella Cham. Birch skeletonizer	wB	scarce in 1977
Cecidomyia reeksi Vock. Jack pine resin midge	jP	heavy on a few trees at Sandstone Lake; common elsewhere in Thunder Bay District
Cenopis pettitana Rob. Basswood leafroller	rM	common at Flanders Road, Atikokan District
Choristoneura conflictana Wlk. Large aspen tortrix	tA	almost complete collapse of infestations
Choristoneura pinus pinus Free. Jack pine budworm	jP	collected in small numbers in Thunder Bay District and first collection east of Lake Nipigon in six years (southeast of Jellicoe)

(continued)

Table 3. Other forest insects (continued)

Insect	Host(s)	Remarks
Dasineura balsamicola (Lintn.) Balsam gall midge	bF	heavy on a few trees at Manitou Falls, Terrace Bay District; light at Klotz Lake Park in Geraldton District
Dimorphopteryx melanognathus Roh. Birch-alder sawfly	wB	increased slightly in numbers in Terrace Bay and Geraldton districts
Dioryctria reniculelloides Mut. & Mun. Spruce coneworm	wS	common in mat samples and associated with shootworms in foliage samples
Diprion hercyniae (Htg.) European spruce sawfly	wS, bS	only one larva collected although numerous spruce mat samples taken
Dryocampa rubicunda rubicunda Fabr. Greenstriped mapleworm	rM	a few colonies on extreme west side of Atikokan District
Eriocraniidae	wB	light damage by leafminers at Obatanga Park in White River District and along the Goldfield Road in Geraldton District
Eriosoma lanigerum (Hausm.) Woolly apple aphid	wE	heavy on elm trees in the city of Thunder Bay
Eucordylea blastovora McLeod Spruce micro moth	wS	light in Booth Twp, Nipigon District and at Boulevard Lake, Thunder Bay District
Gonioctena americana (Schaef.) American aspen beetle	tA	common in Gull Bay area, Nipigon District; light at several points in Geraldton District
Gonioctena notmani (Schaef.) Willow leaf beetle	W	moderate at Chief Bay, Nipigon District

(continued)

Table 3. Other forest insects (continued)

Insect	Host(s)	Remarks
Gracillariidae (new)	W	heavy at many points in north Geraldton District
Halisidota maculata Harr. Spotted tussock moth	tA	common at Turtle River in Atikokan District
Hyphantria cunea Dru. Fall webworm	several deciduous hosts	light in the Thunder Bay to Kakabeka Falls area but not found in the area east of Lake Nipigon
Lambdina fiscellaria fiscellaria Gn. Hemlock looper	bF	collected at Tanner Lake Dam in Thunder Bay District
Lithocolletis nipigon Free. Balsam poplar leafblotch miner	bPo	Increases were common in most of Atikokan District, in the south half of Thunder Bay District and in the southernmost parts of the Nipigon District.
Malacosoma californicum pluviale Dyar Western tent caterpillar	pCh	relatively scarce in 1977
Messa populifoliella Town. Poplar leafmining sawfly	bPo	a few miners at Frank Lake, Geraldton District, and in Paipoonge Twp, Thunder Bay District
Neodiprion abietis complex Balsam fir sawfly	bF	reduced to quite low levels in 1977
Neodiprion nanulus nanulus Schedl Red pine sawfly	jP	scattered colonies in Paipoonge Twp in Thunder Bay District
Neodiprion pratti banksianae Roh. Jack pine sawfly	jP	generally scarce in the Region

(continued)

Table 3. Other forest insects (concluded)

Insect	Host(s)	Remarks
Nepticula sp. Leafminer	wB	serpentine miners at Goldfield Road, Geraldton District and Trout Bay Road in Thunder Bay District
Pikonema dimmockii (Cress.) Greenheaded spruce sawfly	wS, bS	small numbers on mat samples
Pineus floccus Patch Redspruce aphid	wS	moderate on a few trees at Pickerel Lake, Thunder Bay District
Pityophthorus sp. Bark beetle	jP	for the second year in succession appreciable small-tree mortality occurred in Bain Twp, Geraldton District
Pleroneura brunneicornis Roh. (= *borealis* Felt) Balsam shootboring sawfly	bF	Damage increased to moderate at many points in the Region.
Profenusa thomsoni (Konow) Ambermarked birch leafminer	wB	light at a few scattered points in the Region
Pyrrhalta decora (Say) Gray willow leaf beetle	tA	moderate on regeneration aspen in Ledger Twp, Nipigon District
Rheumaptera hastata Linn. Black looper	wB	collected at Klotz Lake, Geraldton District and near Orient Bay in Nipigon District
Rhyacionia adana Heinr. Pine tip moth	jP	scarce in plantations south of Longlac in Geraldton District
Sciaphila duplex Wlshm. Poplar leafroller	tA	a few larvae in mat samples at scattered points in the Region
Zeugophora spp. Poplar blackmine beetle	tA, bPo	Late frost reduced populations of these miners to trace levels except where the low temperatures were moderated by large bodies of water.

TREE DISEASES

Armillaria Root Rot, *Armillaria mellea* (Vahl ex Fr.) Kummer

Damage by Armillaria root rot increased appreciably in 1976-1977 to become an important factor in killing trees in young natural stands and plantations. An evaluation of 39% mortality at Mileage 52 of the Goldfield Road was identical to a tally in 1976 but the area of heavy tree mortality more than doubled in size (Table 4). Elsewhere in this young jack pine stand mortality increased at several points. Tree mortality was less spectacular in Bain Township in the Geraldton District.

Main centres of appreciable mortality in Nipigon District were the black and white spruce plantations at Limestone Lake and older plantings of red pine in Sandra Township (see Frontispiece). Sixteen million spruce trees have been planted in the Limestone Lake area of Nipigon District and considerable chlorosis of needles was observed on white spruce by midsummer 1977. Up to 10% of the trees have died in small areas; however, the mortality due to Armillaria root rot in the stand as a whole was considerably less. Although Armillaria root rot was a major cause of mortality, other factors that may have contributed to the chlorosis were faulty planting, severe drought in 1976, frost damage in 1977, the use of herbicides to control hardwood growth and heavy aphid attack on the main stems and roots. The presence of much larger numbers of chlorotic trees caused concern for the future stocking of white spruce plantations in this area. Black spruce mortality and chlorosis of foliage were considerably less, but appreciable Armillaria root rot was also observed for this species.

Tree mortality of jack pine was moderate with pockets having more than 10% of the trees dead in Herbert Township, Terrace Bay District. Dead and dying white and black spruce trees were common in the windbreaks at the Thunder Bay Forest Station, and in the Matawin River area.

Numerous dead red pine were present in the Chisamore Lake area, Thunder Bay District. Occasional tree mortality was observed at many additional locations in the above districts.

Dutch Elm Disease, *Ceratocystis ulmi* (Buism.) C. Moreau

This year, following detection of the disease 16 km (10 mi.) south of Thunder Bay in 1976, more intensive sampling was carried out to determine if the disease was present within the city of Thunder Bay. The causal fungus was not recovered from samples from unhealthy trees and trees exhibiting typical symptoms that were procured with the cooperation of personnel from the city of Thunder Bay. In Blake Township around the initial infection area a notable increase in dead and dying white elm (*Ulmus americana* L.) trees was evident. A large agricultural area lying between this area and the city has very few elms: it will probably act as a buffer zone.

Table 4. Mortality caused by Armillaria root rot in plots in four districts in 1977

Location	Tree species	Tree ht (m)[a]	Area affected (ha)[b]	Mortality (%)
Geraldton District				
Goldfield Road, Mi. 52	jP	2	50	39
Goldfield Road, Mi. 52	jP	2	500	7
Bain Twp	jP	2	10	10
Goodwin Twp	jP	2	1000	2
Nipigon District				
Sturgeon R., 1 Mi. west	jP	3	1	5
Sandra Twp	jP	11	1	5
Limestone Lake	wS	4	10	10
Terrace Bay District				
Herbert Twp	jP	1	5	10
Thunder Bay District				
Matawin River area	bS	1	20	5

[a] 1 m = 3.28 ft

[b] 1 ha = 2.47 acres

Needle Rusts of Spruce, *Chrysomyxa ledi* (Alb. and Schw.) d. By and *C. ledicola* Lagh.

Results of checks at several locations in the Region where special surveys were made in 1976 showed only minor changes in 1977, with low damage in most areas during both years. The rusts were common east of Lake Nipigon and less frequent in areas south and west of the Lake (Table 5).

Table 5. Trees affected and defoliation caused by spruce needle rusts in four districts in 1977

Location	Tree species	Ht of trees (m)[a]	Trees affected (%)	Defoliation level (%)
Thunder Bay District				
Mawn Lake	wS	1.9	9	3.5
Trewartha Twp	bS	9.0	50	10
Inwood Twp	bS	13.5	0	0
Geraldton District				
Bain Twp	wS	3.0	100	10
Lukento Lake	wS	12.0	100	5
Catlonite Road	bS	15.0	100	5
Terrace Bay District				
Manitouwadge Road	wS	14.0	100	5
Neys Park	wS	6.0	100	25
Jackfish Lake	wS	15.0	100	5
White River District				
Tukanee Lake	bS	15.0	25	2
Flood Lake	wS	5.0	100	5

[a] 1 m = 3.28 ft

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

Damage by the ink spot disease which has been light only at scattered locations in the Region in recent years was more commonly observed this year. The most noteworthy areas of defoliation were observed north of Geraldton, Geraldton District, in Sandra Township, Nipigon District, east of Shebandowan in Conacher Township in Thunder Bay District and west of Gehl Lake in Atikokan District (Table 6).

Western Gall Rust, *Endocronartium harknessii* (J. P. Moore) Y. Hiratsuka

High tree mortality occurred in plantations or stands in Bain Township, Geraldton District, in both 1976 and 1977. The presence of heavily infected older trees along the edge of young regenerating jack

pine stands was possibly responsible for the unusually high tree mortality. If this mortality continues along with additional tree mortality resulting from Gremmeniella (≡ scleroderris) canker of pine, the stocking of jack pine may be reduced to inadequate levels. Some tree mortality caused by the western gall rust was noted east of Beardmore, at Mileage 52 of the Goldfield Road and at several other points in the Region (Table 7).

Table 6. Summary of trees affected and defoliation caused by ink spot of aspen in five districts in 1977

Location	Trees affected (%)	Defoliation (%)	Area affected (ha)[a]
Atikokan District			
Gehl Lake	80	50	4
Crystal Lake	0	0	0
Thunder Bay District			
Conacher Twp	50	60	8
Dorion Twp	14	4	16
Inwood Twp	0	0	0
Lybster Twp	0	0	0
Sackville Twp	19	6	250
Muskrat Lake Rd	0	0	0
Stedman Twp	0	0	0
Wardrobe Twp	0	0	0
Nipigon District			
Sturgeon River	39	2	10
Crooked Green Lake	6	1	4
Sturgeon River south bridge	0	0	0
Sandra Twp	100	40	40
Geraldton District			
Fernow Lake, west	0	0	0
Ashmore Twp, north of Geraldton	100	40	40
White River District			
Ashley Twp, mi. 4.1	0	0	0

[a] 1 ha = 2.47 acres

Table 7. Summary of trees attacked and mortality caused by the western gall rust at five locations in 1977

Location	Trees affected (%)	Trees severely attacked (%)	Trees dead (%)
Geraldton District			
Kimberly-Clark Nursery	2	1	0
Bain Twp	10	10	5
Goldfield Road Mi. 52	2	1	1
Nipigon District			
Pifher Twp	1	1	0
Jackpine Road	1	0	0

Gremmeniella (≡ Scleroderris) Canker of Pine, *Gremmeniella abietina* (Lagerb.) Morelet (≡ *Scleroderris lagerbergii* Gremmen)

An accurate assessment of the damage caused by this organism in 1977 was impossible to attain in many instances owing to three complicating factors. First, the flagging of lower branches and tree mortality apparently caused by the severe drought conditions in 1976 was both widespread and severe in many young planted and natural jack pine stands in cut-over areas. Second, the effect of frost on lower branches was quite extensive, making it almost impossible to tell whether these factors or Gremmeniella (≡ scleroderris) canker of pine had caused the damage. The failure of many cankers to produce fruiting bodies increased the difficulty of assessing damage. However, a broad overall assessment of the damage caused by the organism showed reductions at many locations in the Region. Infection levels and tree mortality were again high in Bain Township, Geraldton District and in Nickle and Herbert townships in Terrace Bay District (Table 8). Extensive plantations of jack pine could be attacked in both of these locations.

Leaf and Twig Blight of Aspen, *Venturia macularis* (Fr.) Mueller & Arx (= *Pollaccia radiosa* [Lib.] Bald. & Cif.)

As suggested in the 1976 report the importance of this blight of aspen is related to the damage done to young aspen terminals. This year the disease was evaluated with this in mind. The occurrence of this disease across the Region was generally similar to the 1976 occurrence, with most stands suffering some infection and an average of 36.5% of the trees being affected within the stands (Table 9). As was the case last year, the defoliation level was only trace to low, the average being 4.8%. The percentage of terminals killed by the disease was down from 25% to 14%.

Table 8. Summary of jack pine trees affected or severely damaged and mortality caused by Gremmeniella (≡ scleroderris) canker of pine at eight locations in 1977

Location	Trees affected (%)	Trees severely attacked (%)	Trees dead (%)	Estimate of area affected (ha)[a]
Geraldton District				
Kimberly-Clark Nursery	5	5	2	2
Bain Twp	70	25	10	800
Terrace Bay District				
Herbert Twp	5	3	2	4
Herbert Twp	1	1	1	40
NW of camp 70	1	1	1	4
Nickle Twp	80	20	10	40
Hillsport Rd. junction	5	0	1	20
Terrace Bay 9 mi. north	70	20	5	4

[a] 1 ha = 2.47 acres

Ash Mortality

Semimature green ash (*Fraxinus pennsylvanica* var. *subintegerrima* [Vahl] Fern.) and black ash (*Fraxinus nigra* Marsh.) in the southern portion of the city of Thunder Bay suffered heavy top and total tree mortality this year. Neither pathogen nor insect was found associated with this condition, and since ash reacts unfavorably to change in water table and water supply, the lack of rainfall and drought conditions over the past two years have probably contributed to the widespread decline of ash in the city.

Drought

Following several years of dry conditions, numerous balsam fir (*Abies balsamea* [L.] Mill.), jack pine and some trembling aspen and white birch trees growing in shallow soils have died in areas west of Lake Nipigon and the Nipigon River. After the severe drought in 1976 this mortality increased to severe as follows: a large area around Whitefish Lake extending east to Lake Superior and including parts of nine townships in Thunder Bay District showed considerable balsam fir mortality; in Atikokan District in four scattered areas north of Basswood Lake heavy mortality involved mainly shallow rooted red pine (*Pinus resinosa* Ait.) and jack pine, and at the Horn west of Lac La Croix semimature jack pine

were killed in a sizeable area. Two cruises near Whitefish Lake area showed 35% and 45% mortality of 10-15 cm balsam fir.

East of Lake Nipigon, where the drought conditions were less severe, considerable balsam fir and black spruce mortality occurred. The balsam fir mortality is described in another section of this report. The most serious mortality was to black spruce stands in the area southwest of Pagwachuan River Station where trees have been dying for several years, and in extensive flat areas north of the Canadian National Railway and extending from Wababimiga Lake east to the eastern border of Geraldton District. Other similar mortality of conifers and deciduous trees was common in the Region.

Table 9. Summary of trees attacked, defoliation and leaders killed by the leaf and twig blight of aspen at 13 locations in 1977

Location	Trees attacked (%)	Foliage damage (%)	Leaders killed (%)	Area affected (ha)[a]
Atikokan District				
Crystal Lake	14	2	7	200
Thunder Bay District				
Dorion Twp	86	14	73	16
Wardrobe Twp	23	4	17	130
Sackville Twp	2	1	0	250
Muskrat Lake Rd	21	4	11	16
Stedman Twp	40	7	0	40
Inwood Twp	80	15	-	8
Lybster Twp	60	5	-	32
Nipigon District				
Sturgeon River, north	37	2	7	10
Crooked Green Lake	74	6	11	4
Sturgeon River, south bridge	21	1	9	4
Geraldton District				
West of Fernow Lake	8	1	1	50
White River District				
Ashley Twp	9	1	0	4

[a] 1 ha = 2.47 acres

Frost Damage

Probably the most severe and widespread damage by late spring frost in several decades occurred in 1977 through most of the eastern half of the North Central Region. Temperatures reached freezing levels every night from June 3 to 9 and frost was severe on three nights. Flower gardens and vegetable crops from Nipigon to White River were wiped out or severely damaged. Wild strawberry, blueberry, and pin cherry crops along with a number of wild flowers and shrubs were severely damaged. Damage to conifer foliage (in order of severity) was evident on white spruce, balsam fir, black spruce and to a lesser extent tamarack and jack pine. Several occurrences of severe damage were observed over the whole crown of semimature balsam fir and white spruce trees in the Geraldton District. The foliage of regeneration and small white birch trees turned brown overnight as extensive flat areas became similar to frost pockets. Hardy tree species such as alder (*Alnus* sp.), balsam poplar (*Populus balsamifera* L.) and trembling aspen were severely affected in many areas. A portion of the hundreds of locations with typical damage is listed in Table 10. Patterns of conifer damage were difficult to assess as severely damaged and damage-free trees were often observed side by side, and there was little continuity of the damage even in small areas. Tree mortality was high on small open-grown white birch and black and white spruce but assessment was complicated by severe drought damage in 1976 and by other diseases. The only area where noticeable damage occurred west of Lake Nipigon was at Mawn Lake in Thunder Bay District.

Root and Basal Stem Rot of Regeneration Trembling Aspen

The roots and lower stems of 10 young aspen trees were checked from each of 10 regeneration stands across the Region. Of the trees examined, 66% (range 30% to 90%) had defect. The preliminary data show that the roots had an average of 23% rot and 25% stain, with 6% rot and 39% stain showing in the stem (Table 11). Data on disease organisms present are not available since the processing of the material has not been completed. Larvae, or damage caused by a root boring insect, *Saperda calcarata* Grt., were evident at two locations. The large galleries excavated by this insect could act as an infection court for root rots.

Single-tree Mortality of Balsam Fir

Balsam fir tree mortality occurred on a wide scale in White River, Terrace Bay, Geraldton, and parts of Nipigon districts. The rate of mortality in 1977 more than doubled that of recent years, an increase which may be attributed to the severe drought experienced in 1976. Although no change in mortality occurred in the plot north of Caramat, appreciable newly dead trees were observed nearby. Extensive areas of increased mortality were observed in the rugged rocky areas north of Lake Superior from Marathon west to Schreiber and north along the Pic River to

Manitou Falls in Terrace Bay District. Other areas of appreciable mortality occurred in the area north and east of Orient Bay and in the Kinago Lake area of Nipigon District and in the Pagwachuan, Loughlan and Slim Jim lake areas, Geraldton District.

Table 10. Summary of foliar damage caused by late frosts at 17 locations in 1977.

Location	Tree species	Trees affected (%)	Foliar damage (%)
Thunder Bay District			
Mawn Lake	wS	78	40
Nipigon District			
Frank Lake	wS	10	60
Frank Lake	bS	5	30
Frank Lake	bF	20	60
Domtar Road, mi. 20	bS	100	50
Polly Lake, north	bS	50	40
Limestone Lake	wS	100	70
Eva Twp	bS	100	30
Geraldton District			
Goldfield Road, mi. 52	wB	100	100
Bain Twp, The Triangle	bS	50	30
Kimberly-Clark nursery	bS	100	10
Pagwachuan River	bS	50	20
O'Meara Twp	wS	100	100
Terrace Bay District			
Caramat south	bS	70	60
White River District			
Ashley Twp	bS	80	40
Magone Twp	wS	80	25
Strickland Twp	bS	80	20

Table 11. Plot data for stem and root defect of regeneration aspen in the North Central Region

Location	Tree age	Basal stem defect (%) stain	Basal stem defect (%) rot	Root defect (%) stain	Root defect (%) rot
Geraldton District					
Fernow Lake	6	10	0	40	20
Nipigon District					
Sturgeon River	10	80	0	20	20
Crooked Green Lake	8	40	10	20	30
Sturgeon R., south bridge	9	40	10	30	20
White River District					
Ashley Twp	6	70	0	20	10
Atikokan District					
Crystal Lake	7	10	10	10	20
Thunder Bay District					
Dorion Twp	6	40	0	40	30
Sackville Twp	9	20	0	20	10
Wardrobe Twp	6	30	10	20	10
Muskrat Lake Rd.	10	50	20	30	60

Winter Drying

Generally, winter drying was limited to small groups of trees and plantations in 1977, and little permanent damage resulted. A high of 35% needle kill was recorded on lodgepole pine plantings in O'Meara Township (Table 12). Red pine foliage was lightly affected in Sandra, Ashmore and Ledger townships as were jack pine trees in Pifher Township and the Longlac Nursery.

Table 12. Summary of damage caused by winter drying at four locations in 1977

Location	Tree species	Foliar damage (%)	Area affected (ha)[a]
Geraldton District			
O'Meara Twp	lP	35	20
Longlac Nursery	rP	10	20
Longlac Nursery	jP	5	20
Terrace Bay District			
Nickle Twp	jP	10	20

[a] 1 ha = 2.47 acres

Table 13. Other forest diseases

Organism	Host(s)	Remarks
Chrysomyxa arctostaphylii Diet. Yellow witches' broom	bS, wS	limited observations, light at Poplar Point in Eva Twp, Nipigon District
Coleosporium asterum (Diet.) Syd. Needle rust of pine	jP, lP	48% of trees affected and 12% defoliation west of Swallow Lake, Thunder Bay District; light on lodgepole pine in O'Meara Twp, Geraldton District
Cronartium comptoniae Arth. Sweetfern blister rust	jP	collected near camp 70, Terrace Bay District
Cronartium ribicola J.C. Fischer White pine blister rust	wP	active fruiting in infected areas less apparent than in previous years
Cytospora chrysosperma (Pers.) Fr. Cytospora canker	tA	collected in a young aspen stand, Nipigon District

(continued)

Table 13. Other forest diseases (concluded)

Organism	Host(s)	Remarks
Davisomycella ampla (Davis) Darker Needle cast	jP	foliar damage collapsed to very low levels in 1977
Hypoxylon mammatum (Wahl.) J.H. Miller Hypoxylon canker	tA	only one tree infected in 10 young aspen plot evaluations
Lirula nervata (Darker) Darker Needle cast	bF	brown foliage observed on young trees near Lizard Lake, Sibley Peninsula in Thunder Bay District
Multi-leader growth	bS, wS	up to 50% of trees in one compartment affected in Thunder Bay Forest Station; not a serious problem in Kimberly-Clark nursery
Sarcotrochila balsameae (Davis) Korf Snow blight	bF	on roadside trees in Sandstone Lake area and on Sibley Peninsula, Thunder Bay District
Septoria populicola Pk. Leaf spot	bPo	numerous scattered stands affected in Region; heaviest browning of foliage noticed west of Atikokan, south of Thunder Bay and Pic River area, Terrace Bay District

APPENDIX

Fig. A1. FOREST TENT CATERPILLAR

Areas within which light and severe defoliation occurred in 1977

Light defoliation . . . . . ◐

Severe defoliation . . . . . ●

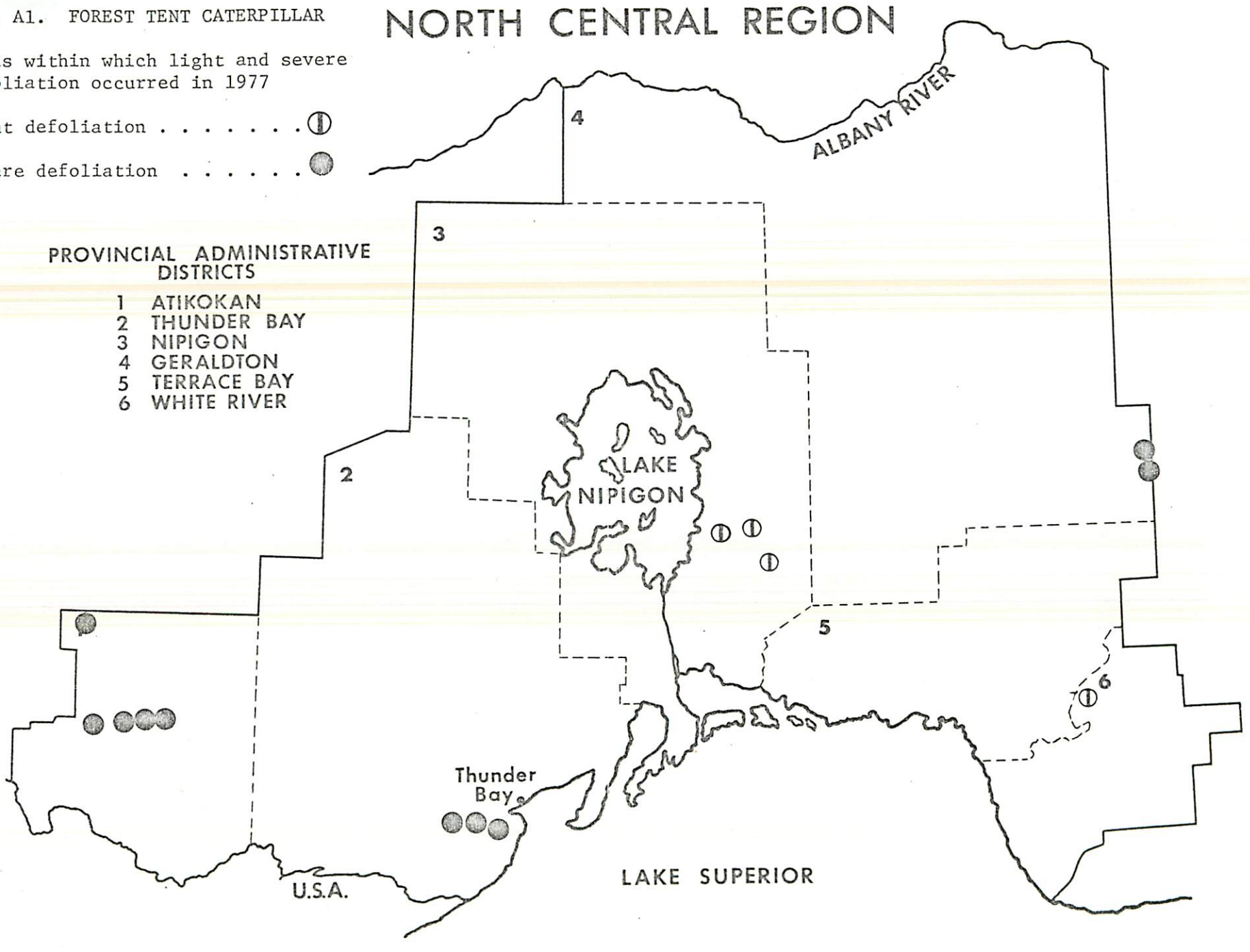

Fig. A2 BRUCE SPANWORM

Areas within which moderate-to-severe defoliation occurred in 1977

Moderate-to-severe defoliation . . . . ● or ▨

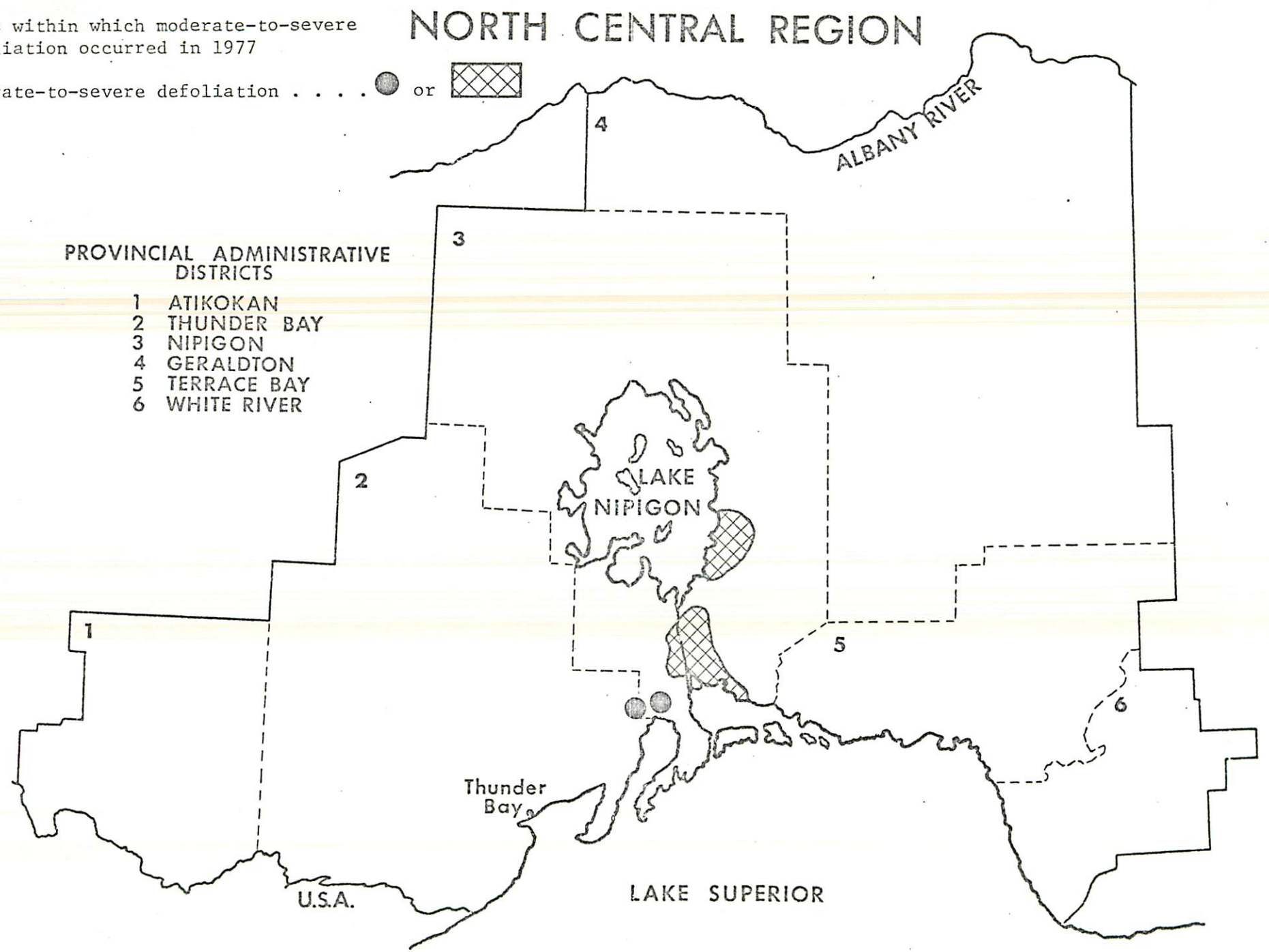

Fig. A3 ASPEN LEAF ROLLER