

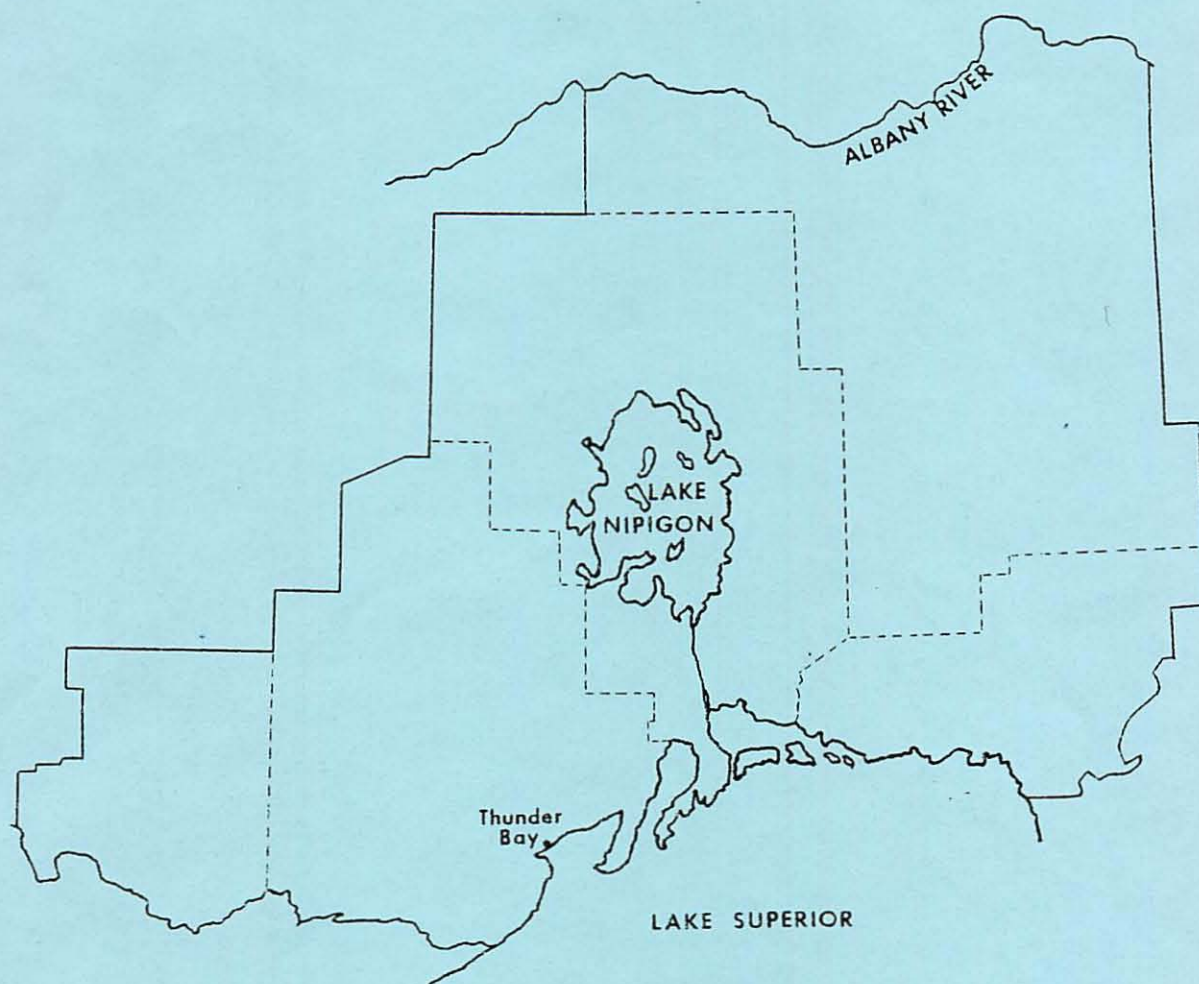
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AUTHOR FILE

1982

Results of forest insect and disease surveys in the NORTH CENTRAL REGION of Ontario, 1981



CARRIED OUT BY THE GREAT LAKES FOREST
RESEARCH CENTRE IN CO-OPERATION WITH
THE ONTARIO MINISTRY OF NATURAL RESOURCES

SURVEY HIGHLIGHTS

Information is presented on various forest insects and diseases found in the North Central Region in 1981. The cooperation and assistance provided by the Ontario Ministry of Natural Resources, forest industry and Parks Canada is gratefully acknowledged.

Current defoliation of balsam fir and spruce caused by spruce budworm varied across the Region. Damage areas increased in the north-eastern part of the Thunder Bay District and at various locations in the Terrace Bay District. The infestation size in Geraldton District remained much the same, while minimal declines were observed in the Atikokan District and at points in the remainder of the Thunder Bay District. Increased populations of birch skeletonizer were found at many points in the Atikokan District, but less frequently to the east. Forest tent caterpillar population levels rose, with the infestation in the southeastern part of Thunder Bay District increasing slightly; forecasts indicate limited expansion in 1982. Aspen leafblotch miner and white pine weevil populations increased in the western and eastern parts of the Region, respectively.

Lack of rain during July and August resulted in discoloration and early leaf drop on white birch in many areas in the Atikokan and Terrace Bay districts. There were no significant changes in forest diseases, except that spruce needle rust, leaf and twig blight of aspen, and jack pine needle cast were found more often at various points in the Region.

A special survey of pest problems in white spruce cones and in white spruce plantations is also summarized in this report.

This year the rating system for insects and diseases has been revised. The following categories now apply:

Major Insects or Diseases

Capable of causing serious injury to or death of living trees or shrubs (formerly categories A and B)

Minor Insects or Diseases

Capable of sporadic or localized injury but not usually a serious threat to living trees or shrubs (formerly Category C)

Other Forest Insects/Diseases (Tables)

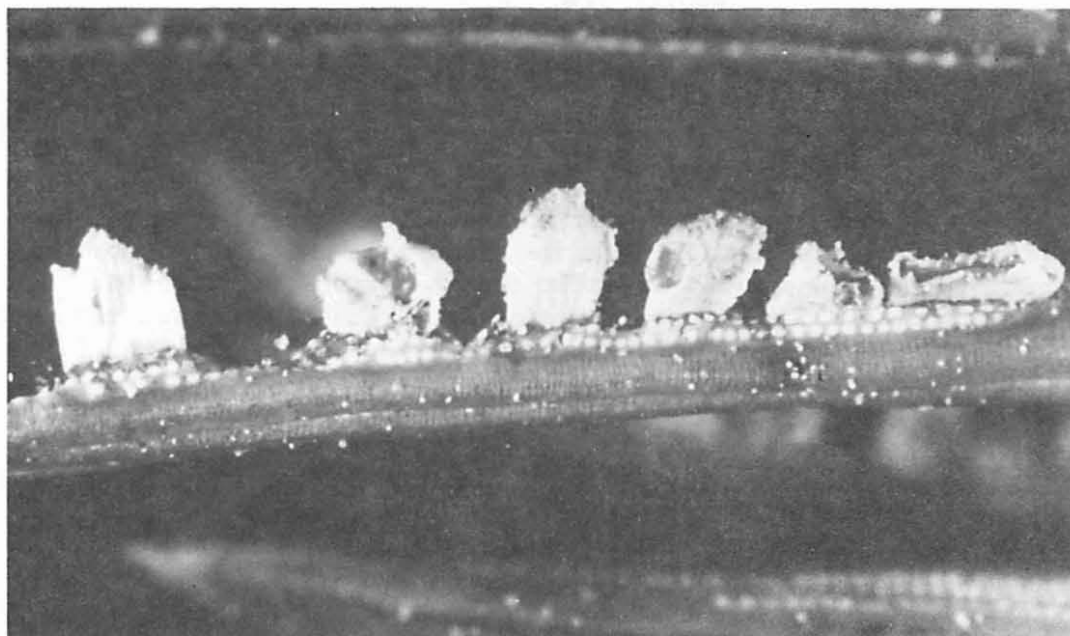
These tables provide information on two types of pest: 1) those which are of minor importance and have not been known to cause serious damage to forest trees, and 2) those which are capable of causing serious damage but, because of low populations or for other reasons, did not cause serious damage in 1981.

Ontario Ministry of Natural Resources districts affected by individual insect or disease conditions are still listed under each pest name in the Table of Contents.

W. D. Biggs

V. Jansons

Frontispiece



Closeup (4X) of spruce (*Picea* spp.) needle infected by spruce needle rust (*Chrysomyxa ledi* [Alb. and Schw.] d By.) disease



Typical feeding on white birch (*Betula papyrifera* Marsh.) by the birch skeletonizer (*Bucculatrix canadensisella* Cham.)

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INSECTS

Major Insects

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

The last report of this insect at noteworthy population levels was in 1974. Until 1977 it was rated as scarce and since that time there has been no mention of it in regional reports. However, in 1981 insect numbers began increasing at many locations, particularly in the southwestern part of the Region. Numerous pockets of heavy damage (see Frontispiece) to white birch (*Betula papyrifera* Marsh.) were observed from the Seine River east to the town of Atikokan and at many other locations south of Highway 11 in the Atikokan District. Also, a stand of approximately 5 ha was severely defoliated in Lindsley Township, Geraldton District. Smaller pockets of medium-to-heavy infestation were found east of the town of Atikokan in Atikokan District, and along Highway 11 from the town of Longlac, Geraldton District, southwest to Ledger Township, Nipigon District. Scattered pockets of light infestation were found along the Catlonite Road south of the town of Longlac, Geraldton District and north of Highway 17 in the southeastern and southwestern parts of the Thunder Bay and Nipigon districts, respectively. Trace levels of damage were observed at other locations in the Region. Extensive and accurate aerial mapping was virtually impossible because of early foliage discoloration and leaf drop caused by drought. Information taken from ground checks resulted in a fairly accurate delineation of this infestation covering approximately 1800 km² in the central part of Atikokan District, as well as at individual points in the remainder of the Region (Fig. 1).

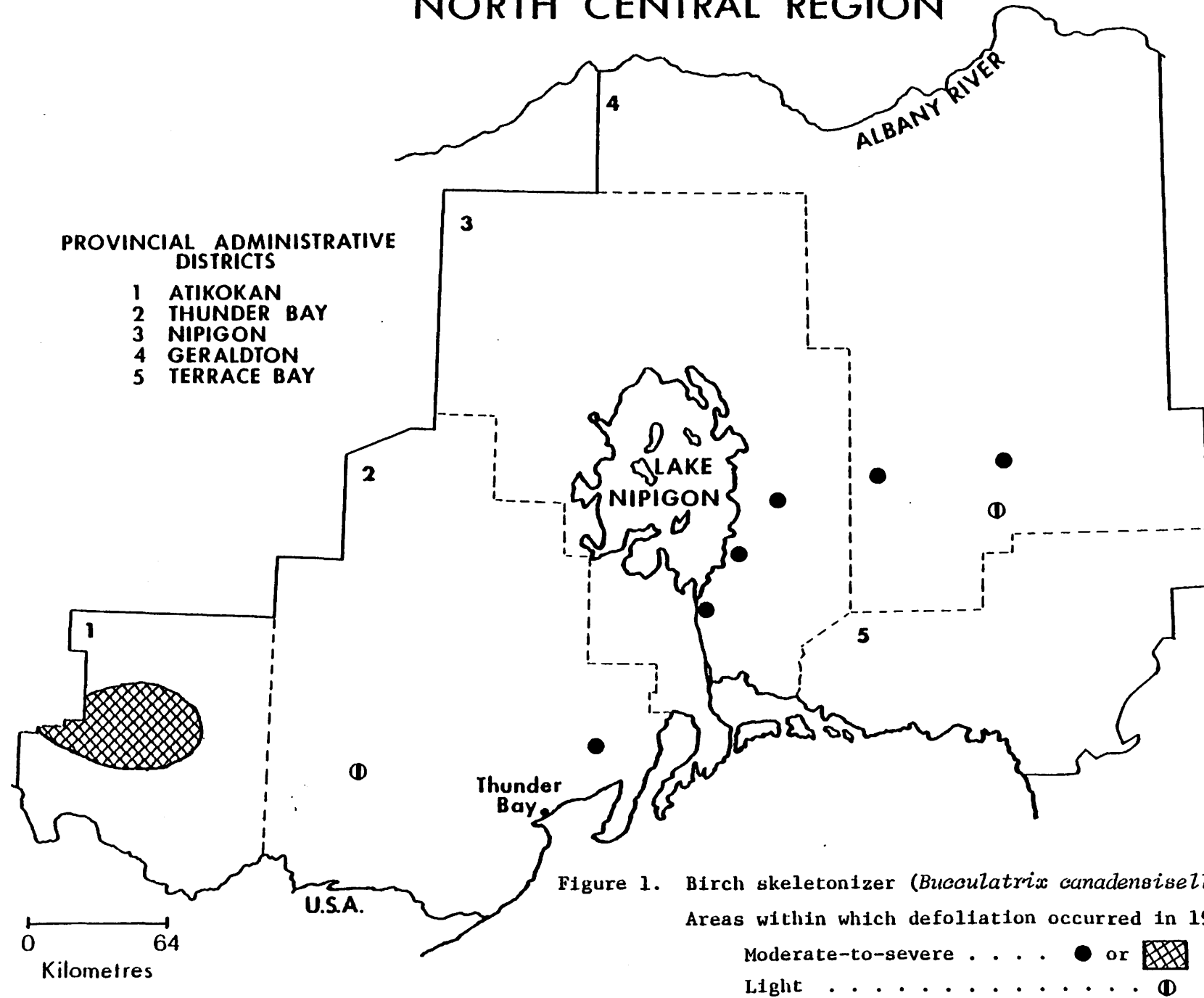
Spruce Budworm, *Choristoneura fumiferana* (Clem.)

The results of damage surveys, population sampling, and egg-mass counts will be included with those of other Regions in a special report to be published later this year. That report will provide a complete description and analysis of developments in the spruce budworm situation in Ontario in 1981 and will give infestation forecasts for the province for 1982.

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

Population levels of this insect were down from those of the previous year. The damage caused by this shoot-boring insect is usually found in the upper part of the tree where it frequently affects the terminal shoot. Feeding in the pith by the insect weakens the shoot, and this results in breakage at the point where the larva exits from the feeding chamber. Evaluations in the Atikokan District of insect populations in jack pine (*Pinus banksiana* Lamb.) regeneration were made south of Flanders near Darby Lake where 4% of the terminals were damaged in a 60 ha stand, and south of Crooked Pine Lake in Trotter Township where 5% of the terminal shoots were attacked in a 40 ha stand. Low populations were observed at various other locations in the Atikokan and Thunder Bay districts.

NORTH CENTRAL REGION



Birch Leafminer, *Fenusa pusilla* (Lep.)

This forest insect, which is more of a pest on open-grown ornamental birch, goes through two generations per year in northern Ontario. Larval feeding takes place during the early part of the summer, most notably in June, and in the latter part of the season, mainly in August. Again this year population levels were high on the various species of ornamental and native birch planted in the city of Thunder Bay, with clumps of brown trees noticeable along Highway 102 to Kaministiquia. Low-to-medium populations were observed at various other locations on young trees in the western part of the Thunder Bay District, and low levels were found elsewhere in the Region.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Moderate-to-severe defoliation of hardwoods, mainly trembling aspen (*Populus tremuloides* Michx.), covered approximately 650 km² in the south-central part of the Thunder Bay District. This represents an increase of about 100 km² over the area infested in 1980. For the most part the townships of Paipoonge, Neebing and Scoble were completely infested; however, population levels were not as high within the city of Thunder Bay. Moderate-to-severe damage was found throughout the southern half of Oliver and McIntyre townships, the northern half of Blake Township and in the eastern part of O'Connor and Gillies townships (Fig. 2).

During the latter part of July, 100 cocoons were examined at each of seven locations within the infestation to monitor the amount of parasitism by the flesh fly (*Sarcophaga aldricchi* Park.). The average level of parasitized pupae was 55%, probably not enough to contribute to a decline in the infestation.

Seven locations were selected for counting egg bands laid by the forest tent caterpillar. The results of these samples (Table 1) are useful for forecasts of the population levels and spread potential for 1982. The infestation in the Thunder Bay District will probably maintain its present level of vigor. A spread of high populations is expected to the south and west of the present infestation, with a more moderate increase to the north.

The only other collection of this insect was taken from a light trap located at French Lake Ranger Station in the Atikokan District. A total of 44 moths were captured during the month of July. This is an insignificant number of adult insects in terms of tree damage.

NORTH CENTRAL REGION

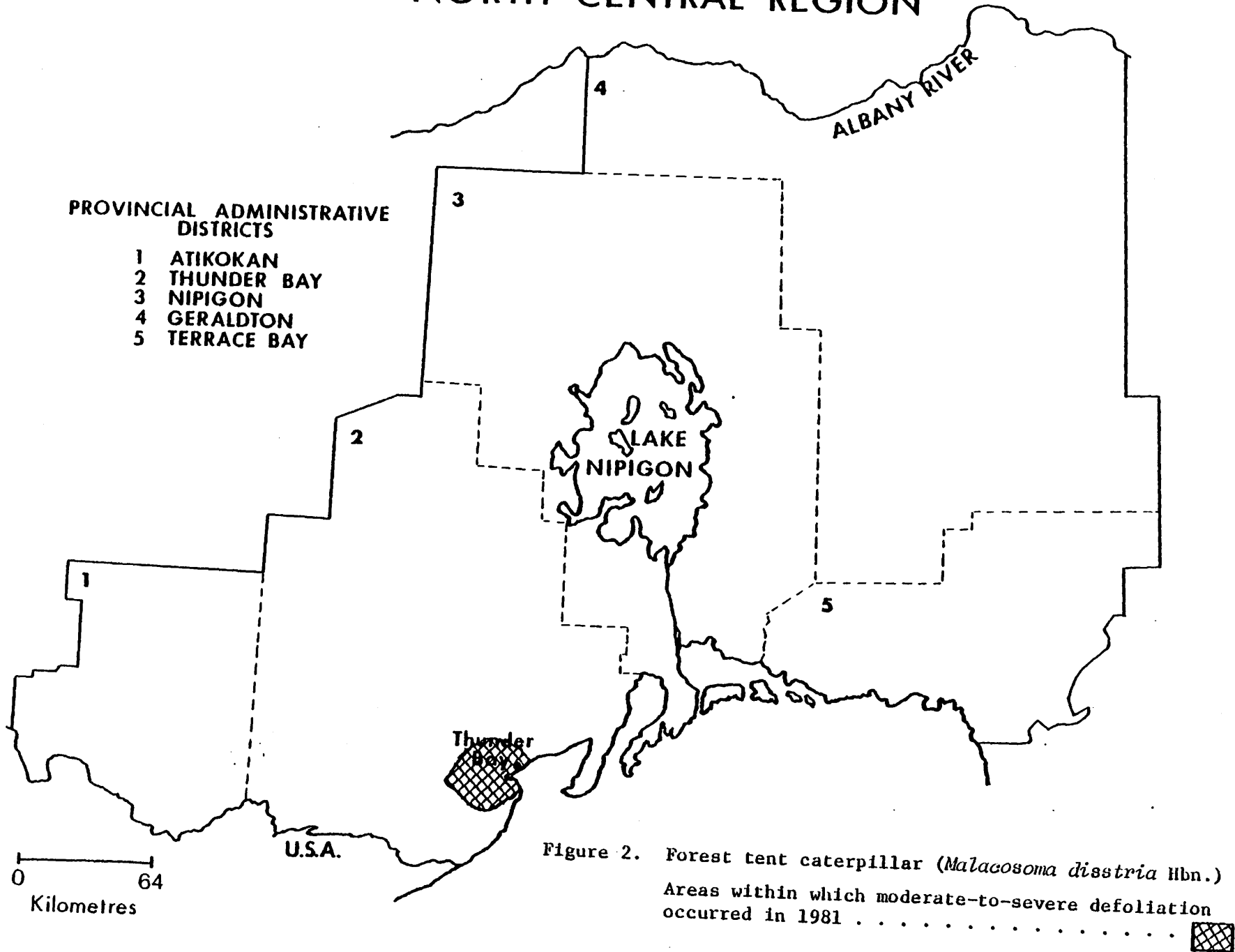


Table 1. Summary of forest tent caterpillar egg-band counts on trembling aspen in Thunder Bay District in 1981, with infestation forecasts for 1982.

Location (Twp)	Avg DBH of trees (cm)	Avg no. of egg bands per tree	Infestation forecast for 1982
Thunder Bay District			
Blake	11	15	severe
Connree	13	1	light
McIntyre	9	18	severe
Neebing	10	29	severe
O'Connor	19	31	severe
Oliver	10	22	severe
Oliver - Town Line Rd.	11	3	moderate

Sawyer Beetles, *Monochamus* spp.

Damage caused by the adult sawyer beetle was seen less frequently in the Region this year than in 1980. However, heavy damage was reported by the Ontario Ministry of Natural Resources (OMNR) on scattered 10 m black spruce (*Picea mariana* [Mill.] B.S.P.) and white spruce (*P. glauca* [Moench] Voss) residuals left in a 60 ha cutover near the junction of the Garden Lake and Chisamore Lake roads northwest of Abitibi-Price Camp 230 in the Thunder Bay District. Light-to-moderate feeding was observed on 12 m black spruce and white spruce fringe trees adjacent to a 6 ha cut-over in Clavet Township in the eastern part of the Geraldton District. Low population levels of beetles were observed in small jack pine cut-overs southeast of English River in Thunder Bay District, but feeding was not apparent on the fringe trees.

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

Population levels of this insect, formerly known as *Lithocolletis ontario* Free., increased in the western half of the Region and declined in the eastern part. Heavy damage to young trembling aspen was found throughout the central part of Atikokan District and at numerous locations in the Thunder Bay District, particularly in the rural townships around the city of Thunder Bay. Populations were low in Nipigon, Geraldton and Terrace Bay districts.

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

No significant change in the status of this insect was noted in the Region. In 1981 moderate-to-severe defoliation was reported on scattered young black spruce along Highway 17/11 in the Sunshine area, on clumps of white spruce in Pyramid Township, Thunder Bay District, and at various points along Highway 17 in the Terrace Bay District. A recurring high population caused complete defoliation and some tree mortality in a small hedgerow of black spruce and white spruce at Klotz Lake Provincial Park, Geraldton District. Moderate-to-severe damage also recurred on open-grown black spruce in Rainbow Falls Provincial Park, Terrace Bay District. An evaluation was done in a 16-year-old black spruce plantation in Stirling Township, Nipigon District, where a low population level was found on 7% of the trees in this 20 ha stand. This insect continued to be a problem on ornamental spruce trees in some urban areas in the Region.

White Pine Weevil, *Pissodes strobi* (Peck)

Following two years of declining populations, the number of damaged trees increased in the eastern part of the Region. The highest population was found in the Limestone Lake Management Area, Nipigon District, where the percentage of weeviled black spruce trees increased to 8.7% in one plantation. Small numbers of infested trees were also more common in young black spruce and white spruce stands throughout the Geraldton and Terrace Bay districts. There was little change in the population levels in the western part of the Region, where numbers of damaged trees remained generally low (Table 2). Small, open-grown black spruce trees were found weeviled along Highway 17 between Shabaqua and English River, Thunder Bay District, along Highway 17 in Patience Township, Nipigon District, and in the Highway 11 area east of Longlac, Geraldton District.

It is interesting to note the preference of this insect for spruce trees in the eastern part of the Region, and for jack pine in the western part.

Larch Sawfly, *Pristiphora erichsonii* (Htg.)

Following a 3-year period of severe defoliation the population collapsed in a 1 ha stand of tamarack (*Larix laricina* [Du Roi] K. Koch) in Tuuri Township, Terrace Bay District. The accumulated tree mortality reached an estimated 60% in this stand of pole-sized trees. In the Geraldton District moderate-to-severe damage continued along Highway 11 between Jellicoe and Geraldton, and in Ashmore Township. Also a new light infestation was observed in a 5 ha stand north of the town of Geraldton in McQuesten Township. Low-to-medium larval populations were

common on young trees in the area northwest of the city of Thunder Bay to Shabaqua, Thunder Bay District. Light defoliation was found at various other locations in the Region.

Table 2. Summary of damage caused by the white pine weevil in four districts in the Region in 1981 (counts based on the examination of 150 trees at each location).

Location	Area affected (ha)	Estimated trees per ha	Host	Avg ht of trees (m)	Trees weeviled (%)
Atikokan District					
Southeast of Darby Lake	60	3500	jP	2.0	1.3
Trottier Twp	40	4000	jP	1.7	4.0
Thunder Bay District					
Stedman Twp	30	4000	jP	2.7	2.7
Nipigon District					
Limestone Lake, hydro line	15	3000	bS	3.0	4.0
Limestone Lake, airstrip	20	4000	bS	3.5	8.7
Geraldton District					
McQuesten Twp	20	3000	bS	3.0	1.3

Mountain-ash Sawfly, *Pristiphora geniculata* (Htg.)

Population levels of this insect remained much the same as they had been the previous year. In 1981 light defoliation of mountain ash (*Sorbus americana* Marsh.) was observed in Pyramid Township, Thunder Bay District, and west of the town of Atikokan, Atikokan District. These two locations represent an extension in the northern and western range of this introduced insect.

High populations recurred at various locations in the southern half of the Thunder Bay and Terrace Bay districts. A particularly high population was noted in Rainbow Falls Provincial Park where most of the trees were completely defoliated. The damage was generally much lighter along Highway 17 from the town of Terrace Bay east to Pic Township where the damage level increased again. Light-to-moderate damage was observed at numerous other points in the remainder of the Region.

Table 3. Other forest insects.

Insect	Host(s)	Remarks
<i>Aceria</i> sp. nr. <i>dispar</i> Nalepa A poplar gall mite	tA	Populations declined to endemic levels in Atikokan District where heavy infestations were reported in 1980; small numbers were reported in McKelvie Twp, Geraldton District.
<i>Adelges abietis</i> (Linn.) Eastern spruce gall adelgid	wS	small numbers common at scattered locations throughout the Region
<i>Archips cerasivoranus</i> (Fitch.) Uglynest caterpillar	ecCh	small numbers of colonies at scattered locations in the south-central part of the Thunder Bay District
<i>Coleophora laricella</i> (Hbn.) Larch casebearer	tL	Populations declined to low levels in Ashmore and Oakes Twps, Geraldton District.
<i>Compsolechia niveopulvella</i> Chamb. Paleheaded aspen leafroller	tA	light infestation in Leslie Twp, Terrace Bay District, and in Kilkenny Twp, Nipigon District; small numbers common elsewhere in the Region
<i>Epinotia nisella</i> Clerck. Yellowheaded aspen leaftier	tA	light population in the Hillsport area, Geraldton District
<i>Eriocampa ovata</i> (Linn.) Woolly alder sawfly	Al	severe defoliation in rural area around the city of Thunder Bay
<i>Gonioctena americana</i> (Schaeef.) American aspen beetle	tA	Populations declined in Thunder Bay District; light defoliation was observed on clumps of young trees in Eva Twp, Nipigon District.
<i>Hyphantria cunea</i> (Dru.) Fall webworm	tA, Al	small numbers of colonies in McIntyre Twp, Thunder Bay District

(continued)

Table 3. Other forest insects (continued).

Insect	Host(s)	Remarks
<i>Ips pini</i> (Say) Pine engraver	bS	low population in fire-killed trees, McComber Twp, Nipigon District
<i>Micrapteryx salicifoliella</i> Cham. Willow leafminer	W	High populations caused severe browning of foliage at numerous locations through the Geraldton District and the northern part of Nipigon District.
<i>Neodiprion nanulus nanulus</i> Schedl. Red pine sawfly	jP	scattered trees with moderate defoliation in Trewartha, Collier and Stedman Twps, Thunder Bay District; small number of colonies at one location in Walters Twp, Nipigon District
<i>Neodiprion pratti banksianae</i> Roh. Jack pine sawfly	jP	low population at one location on Halfway Road, Geraldton District
<i>Neodiprion virginianus</i> complex Redheaded jack pine sawfly	jP	colonies found on individual trees at two locations in Thunder Bay District and at Dawson Trail Campgrounds, Atikokan District
<i>Nymphalis antiopa</i> (L.) Mourningcloak butterfly	W, Po	very common on scattered trees in the western part of the Region
<i>Petrova albicapitana</i> (Busck.) Northern pitch twig moth	jP	numerous young trees infested in a 40 ha plantation in Golding Twp, Thunder Bay District, and in Legault Twp, Nipigon District
<i>Phratora hudsonia</i> Brown Birch leaf beetle	wB	low populations, Rainbow Falls Provincial Park, Terrace Bay District

(continued)

Table 3. Other forest insects (concluded).

Insect	Host(s)	Remarks
<i>Phyllonorycter nipigon</i> (Free.) Balsam poplar leafblotch miner	bPo	high numbers at various locations, Thunder Bay District
<i>Sciaphila duplex</i> Wlshm. Spotted aspen leafroller	tA	light population in Leslie Twp, Terrace Bay District
<i>Zeiraphera</i> spp. Spruce bud moths	wS	heavy damage to individual trees in an area between Nipigon and Dorion, Nipigon District; light damage levels common throughout the Region

TREE DISEASES

Major Diseases

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

This root disease can be found in many areas across the Region. It is particularly easy to spot in an area of coniferous regeneration, such as jack pine or spruce, but seldom kills very many trees. The trend continued this year. Trace levels of mortality were observed in Golding Township, Thunder Bay District, at various locations along the Goldfield and Halfway roads in Geraldton District, and along the Wintering Road in Terrace Bay District.

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

Once again this foliar disease of trembling aspen was not observed above a trace level, but it was found more frequently through the Region. A trace of foliar damage was noticeable on 20-year-old trees in Goldie Township, Thunder Bay District; on scattered clumps of trees in Nipigon Township, Nipigon District; and on scattered pockets of 6 m trees west of Hillsport and Manitouwadge, Terrace Bay District. This disease was not observed elsewhere in the Region.

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

Infection levels of these diseases increased at a few locations in the Region. These two needle rusts are very closely related and are found infecting both white spruce and black spruce (see Frontispiece); therefore, they are treated as one pest. These rusts are not usually a serious problem, but when damage levels are high, defoliation and growth loss will be noticeable. Scattered clumps of spruce were moderately infected (defoliation averaged 40%) in the large cutover area south of Flanders in the southwestern part of Atikokan District. Moderate damage was recorded in a 10 ha black spruce stand in Lindsley Township, Geraldton District. Affected trees were common, with foliage damage at trace levels, at other points in the Region.

A Needle Rust of Pine, *Coleosporium asterum* (Diet.) Syd.

The only significant occurrence of this disease in the Region was in a 40 ha jack pine plantation in Goldie Township, Thunder Bay District. An evaluation showed that 100% of the trees were affected, but the foliar damage level was only 14%. Trace levels of infection were found at scattered locations along the Flanders Road in Atikokan District.

Jack Pine Needle Cast, *Davisomycella ampla* (Davis) Darker

In 1981 light-to-moderate levels of foliar damage were common in numerous young jack pine stands in the eastern part of the Region. However, evaluations of the disease showed that foliar damage did not exceed 10% (Table 4). Trace levels of infection were observed at some areas in the western districts of the Region.

Table 4. Summary of trees affected and defoliation caused by a needle cast on jack pine in three districts in 1981 (counts based on the examination of 150 trees at each location).

Location	Area affected (ha)	Esti- mated trees per ha	Avg ht of trees (m)	Trees affected (%)	Defolia- tion level (%)
Geraldton District					
Goldfield Rd, km 82	10	4000	4.0	25	9
Fulford Twp	25	3000	3.8	25	10
Nipigon District					
Eva Twp	10	2000	6.3	41	7
Terrace Bay District					
Hillspport	25	2000	4.0	30	10
Stray Twp	20	2000	4.5	20	10

Pine Needle Cast, *Lophodermella* sp.

A low level of damage caused by a needle cast fungus was observed on 5 m jack pine within a 2 ha plantation in Pic Township, Terrace Bay District. The fungus was assigned to the genus *Lophodermella* and has been tentatively identified as either *L. sulcigena* (Rostr.) Hoehn. or *L. montivaga* (Petr.) Dearn. The former is known only from Europe where it causes significant damage to various pine hosts, and the latter has been found on pine in the western United States and Canada. Further investigation of the identity of this organism and damage caused by it will be carried out in 1982.

Leaf and Twig Blight of Aspen, *Venturia macularis* (Fr.) Müller & Arx

Conditions were more favorable for the development of this disease in 1981. The level of incidence was high at various points in the Region, but generally the amount of damaged foliage was low to moderate. The heaviest damage was found in a 10 ha stand of trembling aspen along the Halfway Road in Geraldton District, where 80% of the trees were affected and 40% of the shoots were damaged. Numerous trees were affected throughout a 40 ha cutover in Hele Township, Nipigon District, where 15% of the shoots were infected, and in 10 ha stands in each of Pardee and McTavish townships, Thunder Bay District, where infection was 5% and 10%, respectively. Elsewhere in the Region low damage levels were common.

Table 5. Other forest diseases.

Organism	Host(s)	Remarks
<i>Chrysomyxa arctostaphyli</i> Diet. Spruce broom rust	wS	small numbers of trees infected in Pic Twp, Terrace Bay District
<i>Endocronartium harknessii</i> (J.P. Moore) Y. Hirat. Western gall rust	jP	common in various age classes throughout the Region
<i>Gremmeniella abietina</i> (Lagerb.) Morelet Scleroderris canker	jP	light mortality (about 5%) in in a 1.5 ha planting of young trees along Hwy 625, Geraldton District; lower branch infections common elsewhere in the Region
<i>Gymnosporangium clavipes</i> (Cke. & Pk.) Coke. & Pk. Quince rust	Se	moderate-to-severe infections on numerous trees, Lett Twp, Nipigon District
<i>Gymnosporangium cornutum</i> Arth. ex Kern Mountain-ash-juniper rust	Mo	light incidence of infection along Hwy 17, Nipigon and Terrace Bay districts
<i>Hypoxyylon mammatum</i> (Wahl.) J. H. Miller Hypoxyylon canker	tA	stem cankers common throughout the Region

(continued)

Table 5. Other forest diseases (concluded)

Organism	Host(s)	Remarks
<i>Isthmiella crepidiformis</i> (Darker) Darker Needle cast	wS	light incidence on numerous trees in the Barbara Lake seed production area, Terrace Bay District
<i>Isthmiella faullii</i> (Darker) Darker Needle cast	bF	heavy foliar damage on scattered small trees, Rainbow Falls Provincial Park, Terrace Bay District
<i>Lophodermium pinastri</i> (Schröd. ex Hook.) Chev. Pine needle cast	jP	numerous infected trees in a 5 ha plantation in Pic Twp, Terrace Bay District
<i>Melampsorella caryophyllacearum</i> Schroet. Yellow witches' broom	bS	infections on widely scattered trees, Coldwell Twp, Terrace Bay District
<i>Mycosphaerella populicola</i> G.E. Thoms. Leaf spot of poplar	bPo	widespread in Thunder Bay and Atikokan districts
<i>Pucciniastrum goeppertianum</i> (Kuehn.) Kleb. Needle rust	bF	severe foliar damage on a small group of young trees at one point on the Goldfield Road, Geraldton District; trace-to-light incidence at Neys Provincial Park and at numerous locations in the Terrace Bay and Geraldton districts
<i>Rhizosphaera kalkhoffii</i> Bub. Needle cast	bS	infections found at scattered locations in the Terrace Bay District
<i>Sarcotrichila balsamea</i> (Davis) Korf Snow blight	bF	severe browning of foliage on several young understory trees, Rainbow Falls Provincial Park, Terrace Bay District
<i>Sirococcus strobilinus</i> Preuss Shoot blight of red pine	rP	common on understory trees at the Dawson Trail Campgrounds, Atikokan District

Abiotic Damage

Drought

A drought condition caused by low levels of precipitation during the months of July and August (Table 6) caused premature foliage discoloration in many white birch stands in the Region. This was particularly noticeable on high, rocky sites in the Atikokan and Terrace Bay districts. Records from the towns of Atikokan and Marathon revealed that rainfall levels were very low during the above-mentioned months. Many white birch, particularly small-diameter trees, had lost their foliage by mid-September. This condition was further complicated by the fact that there was heavy birch skeletonizer damage in parts of the Atikokan District as well.

Table 6. A summary of rainfall during July and August over a period of 6 years at four locations in the Region^a

Location	Normal for July and August	Total rainfall for July and August (mm)					
		1981	1980	1979	1978	1977	1976
Atikokan	106.7	65.1	204.1	201.8	225.9	222.0	148.1
Geraldton	84.7	80.3	153.8	98.8	178.2	186.7	124.5
Marathon	72.0	9.5	161.4	233.0	213.3	289.9	160.5
Thunder Bay	79.5	93.0	251.7	105.9	155.7	264.2	76.7

^a Data from the Atmospheric Environment Service

Frost Damage

A trace level of damage was found in one white spruce plantation in the Limestone Management Area of Nipigon District.

Special Surveys

White Spruce Cone Insect and Disease Survey

A survey of insects and diseases causing damage to white spruce female flowers and developed cones was carried out this year. The term "damage" in this case is defined as any type of feeding evident on the exterior or interior of the flowers or cones. It was a very poor year

for flowers and cones on white spruce, particularly older trees, in the Region. The trees sampled averaged 6 m high and were outside any area infested by spruce budworm.

In the first sample from Geraldton District, 45% of the female flowers were found to be damaged. Nearly half of these damaged flowers were fed on by the spruce bud moth (*Zeiraphera canadensis* Mut. & Free.). The remaining half of these damaged conelets had been attacked by Lepidoptera species that could not be identified because they were no longer present in the sample. Damage was minimal (only 2%) in the sample collected in Thunder Bay District (Table 7). However, 88% of the conelets from this sample were infested at this time with spruce cone maggot (*Hylemya anthracina* [Czerny]) eggs. Therefore, a high potential for damage did exist in this sample.

The second collection, consisting of developed cones (Fig. 3), was made in late July. A high proportion of damaged cones (96% and 92%, respectively) was found in the Nipigon and Thunder Bay districts. (Table 7). Spruce cone maggot damage was present in many of the cones (about 68% on average) from the two locations. Also, moderate numbers of cones, 18% and 24%, respectively, were damaged by the spruce seed moth (*Laspeyresia youngana* [Kft.]).

Other insects and damage were found in all of the samples submitted, but at insignificant levels. No evidence of disease infection or damage was detected.

Table 7. A summary of the percentages of damaged white spruce female flowers collected between 3 June and 8 June and damaged white spruce cones collected between 29 July and 31 July in three districts in 1981.

Location	No. of female flowers examined	Female flowers damaged (%)	Developed cones examined	Developed cones damaged (%)	No. of cones damaged by ^a	
					Lepidoptera	Other insects
Geraldton District						
Ashmore Twp	221	45				
Nipigon District						
Limestone Lake			100	96	40	56
Thunder Bay District						
Hwy 17/11 near Finmark Rd.	120	2	111	92	31	71

^a Damage to an individual cone may be caused by more than one insect.

White Spruce Plantation Survey

Again this year a particular tree species was singled out for examination in a special survey for insects and diseases. This type of survey is important from the standpoint of the economic value of the trees examined and the base line data gathered on pests affecting this host species. The pattern for stand selection was the same as in the last two surveys conducted in 1979 and 1980, with emphasis on stands considered to be high-value, i.e., those on which money had been spent at some stage of their development.

Generally, no major pests were found to be causing problems at the various locations sampled. All areas examined were outside any area infested by spruce budworm, other than at trace population levels. Trees with spruce budworm and coneworm on them were present at varying percentages, but the resulting defoliation levels were insignificant (Table 8). *Zeiraphera* sp. was also present at many of the locations, but defoliation was not above trace level. A very low level of damage by white pine weevil was found at one location in McMaster Township, Thunder Bay District. Low populations of spruce adelgids (*Adelges* spp.) were found at seven of the eleven plot locations. The spruce bud midge (*Rhabdophaga swainnei* Felt), an insect that kills the central bud at the tips of twigs, was found in two of the stands examined. The most noteworthy of these was in McTavish Township, Thunder Bay District where 42% of the trees were infested by this insect and on 54% of these infested trees the terminal bud was killed (Fig. 4).

In all the plantations examined there were not many diseases present. Spruce needle rust (*Chrysomyxa* spp.) was found on a high percentage of the trees at two locations, but defoliation was only at trace levels. Frost damage was present at low levels at one location in Geraldton District, whereas in a similar survey done on white spruce in 1978, frost damage was common. A random selection of dominant and co-dominant trees in the > 6 m height class were sampled with an increment borer for any sign of internal defect. No stain or rot was found in any of the cores taken.

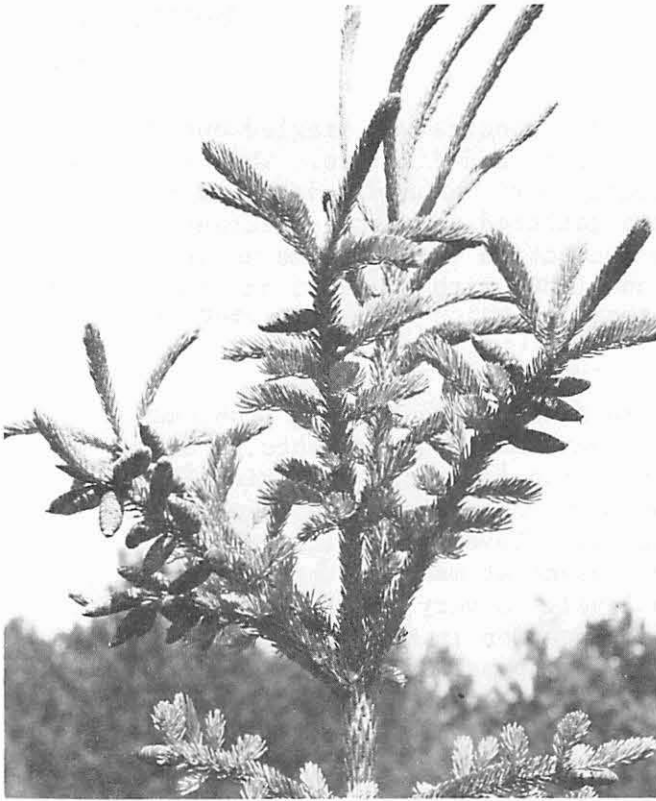


Figure 3

Developed cones on a young white spruce (*Picea glauca* [Moench] Voss) tree



Figure 4

A white spruce terminal bud killed by the spruce bud midge (*Rhabdophaga swainei* Felt)

Table 8. A summary of insect, disease and abiotic damage in a special survey of high-value white spruce in the Region (percentages based on the examination of 150 trees at each location).

Location	Avg ht of trees (m)	Area of plan- tation (ha)	Esti- mated trees/ha	Spruce budworm and coneworm		<i>Zairaphera</i> sp. affected (%)	White pine weevil leaders attacked (%)	Spruce needle rust		Frost	
				trees attacked (%)	defol- iation (%)			trees affected (%)	defol- iation (%)	trees affected (%)	defol- iation (%)
Geraldton District											
Gallaway Rd, km 55	1.7	20	3700	0	0	0	0	100	2	0	0
Junction of Greta and Grear Rds	1.5	50	2900	0	0	0	0	0	0	12	2
Klotz Lake	4.7	25	2900	46	2	0	0	0	0	0	0
Nipigon District											
Limestone Lake, 1962 planting	2.5	10	4000	0	0	17	0	5	2	0	0
Limestone Lake	5.8	10	2900	0	0	34	0	0	0	0	0
Stirling Twp	3.3	20	2500	4	0	12	0	13	<1	0	0
Thunder Bay District											
Goldie Twp	3.4	60	3800	36	0	45	0	79	1	0	0
McMaster Twp	7.0	16	1000	69	0	39	1	0	0	0	0
McTavish Twp	1.5	8	3200	3	0	27	0	3	<1	0	0
O'Connor Twp	10.0	5	900	100	1	100	0	0	0	0	0
Palpoonge Twp	1.6	5	3500	17	0	85	0	0	0	0	0