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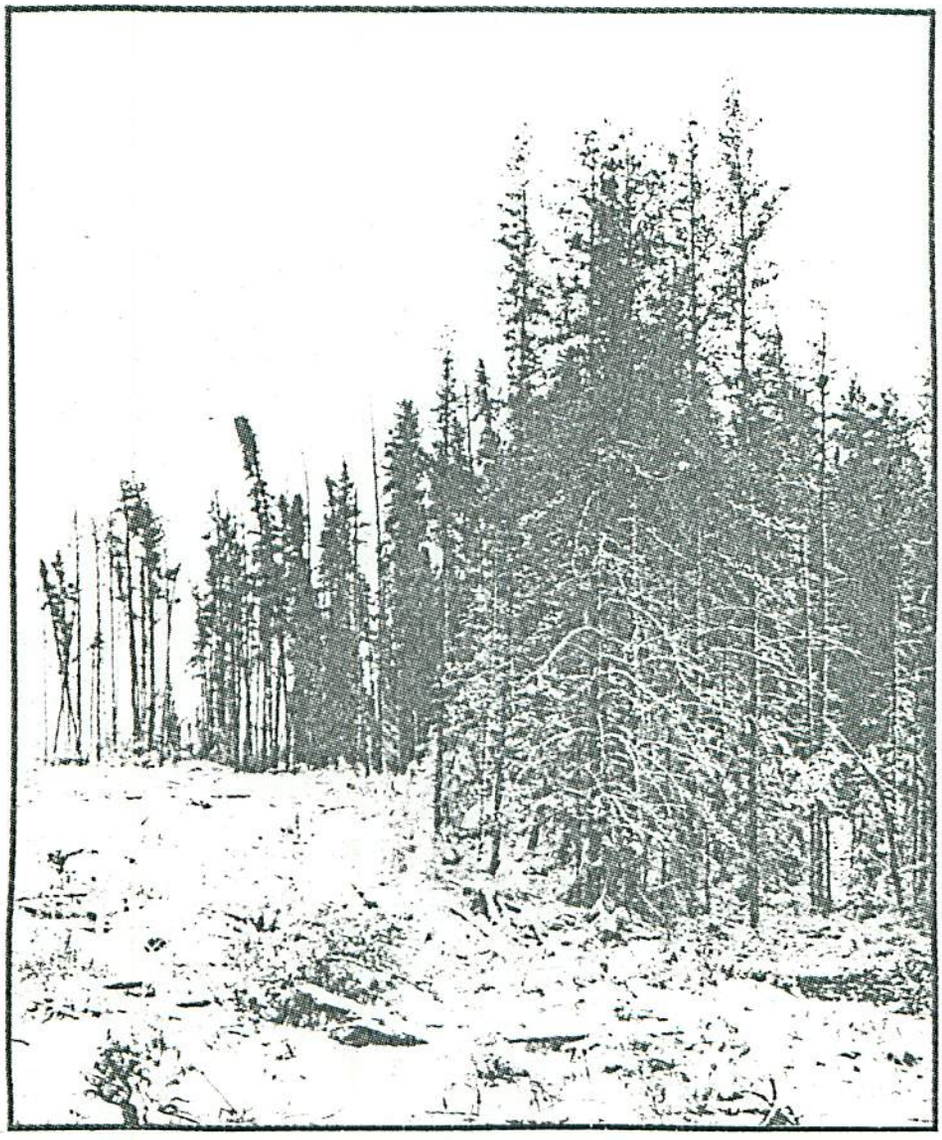
SURVEY BULLETIN

Forest Insect and Disease Conditions in Ontario

Summer 1980



Snowstorm, Harker Twp, Kirkland Lake District June 8-10, 1980
(*Photo courtesy of Brian Moulder, Ontario Ministry of Natural Resources, Temagami*)

GREAT LAKES FOREST RESEARCH CENTRE
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Forest Insect and Disease Conditions in Ontario

Summer 1980

This is the second of three bulletins to be issued by the Forest Insect and Disease Survey Unit describing forest pest conditions surveyed during the 1980 field season.

FOREST INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

The spruce budworm outbreak in Ontario continued to expand in 1980. Over all, the area infested by budworm this year within the province totals some 18 850 000 ha (46,580,000 acres), an increase of 420 000 ha (or slightly more than one million acres) over last year. Aerial surveys supported by ground observations showed that in general the major outbreaks have increased in size and, in addition, several new infestations were found.

Aerial surveys were conducted throughout the province by Forest Insect and Disease Survey personnel from early to mid-July for the purpose of detecting and mapping the extent of defoliation caused by budworm feeding. In spite of severe forest fire conditions, particularly in the Northwestern and North Central regions, the Ontario Ministry of Natural Resources provided sufficient aircraft time to enable the mapping to be carried out on schedule.

As noted in the spring Survey Bulletin, budworm emergence occurred generally in early May and development progressed rapidly ahead of normal, until early June. However, cool weather for a period of about two weeks from early to mid-June slowed things considerably, and development was normal or later than normal by the latter part of June in most locations. During the cool period in early June, temperatures frequently dipped below freezing at night. Significant mortality of budworm larvae was noted in Harker Township, Kirkland Lake District, following a period of below freezing temperatures and snow that occurred for three days from June 8-10. Up to 70% of the larvae on balsam fir and 30% on white spruce died, presumably as a result of the combination of cold temperatures and snow. Most of the larvae affected were fourth instar. Although some frost damage to balsam and spruce foliage was noted, it was not as heavy as expected in view of the high larval mortality. There were other reports of budworm larval mortality associated with cold temperatures, e.g., from the Blind River District. The overall effects of the cold on budworm in terms of extent and severity are not known; however, the egg-mass survey currently under way should provide an indication of any major effects. Refer to page 10 in this Bulletin for a general description of frost damage, i.e., extent, tree species affected, etc.

Data presented in this Bulletin describing the 1980 budworm situation are preliminary estimates and are subject to revision. The primary hosts of budworm in Ontario are balsam fir, white spruce and

black spruce growing on upland sites in mixed stands. It should be kept in mind that figures presented in this report describing areas affected by budworm actually represent gross areas within which stands containing one or more of the major host species show moderate-to-severe current defoliation and/or signs of previous damage.

As stated in the first paragraph, the total extent of defoliation and damage in 1980 amounted to 18 850 000 ha (46,580,000 acres) compared to 18 430 000 ha (45,540,000 acres) mapped in 1979. Infestations are present in three major geographical regions of the province (Fig. 1): southern Ontario (primarily Algonquin Region), northeastern Ontario (Northeastern and Northern regions) and northwestern Ontario (Northwestern and North Central regions). All increased somewhat in extent this year (see following table). In southern Ontario there were decreases in the extent of infested areas in Bancroft, Minden and Parry Sound districts although sizeable infestations remain in those districts. The decreases were offset by extensions in the Algonquin Park District where the total area infested was more than double that of 1979. Bracebridge and Pembroke districts remained at approximately the same levels as last year.

Outbreak region in Ontario	Gross area defoliated in millions of hectares (acres)		
	1979	1980	Changes
Southern	1.002 (2.475)	1.007 (2.488)	+ .005 (.013)
Northeastern	16.940 (41.859)	17.119 (43.302)	+ .179 (.443)
Northwestern	.488 (1.206)	.724 (1.790)	+ .236 (.584)
Total	18.43 (45.54)	18.850 (46.58)	.420 (1.040)

In northeastern Ontario, the net change between 1979 and 1980 was a small increase in the total extent of budworm infested area. The more significant changes are as follows: the western part of the Wawa District (formerly White River District) is now completely infested and budworm has spread further into the eastern part of the Terrace Bay and Geraldton districts. Much of the Sault Ste. Marie District was free of moderate-to-severe defoliation last year but has become reinfested. Elsewhere in the Northeastern and Northern regions, virtually all of the living susceptible forest is infested and there have been few changes since last year. In the Moosonee District, white spruce growing along rivers such as the Kenogami, Missinaibi, Mattagami, Abitibi, Albany and Moose and many of their tributaries as far north as James Bay show signs of budworm defoliation.

This year, the more significant changes in the budworm situation within the province occurred in northwestern Ontario. Moderate-to-severe defoliation increased by 50% and now totals 724 000 ha (1.79 million acres).

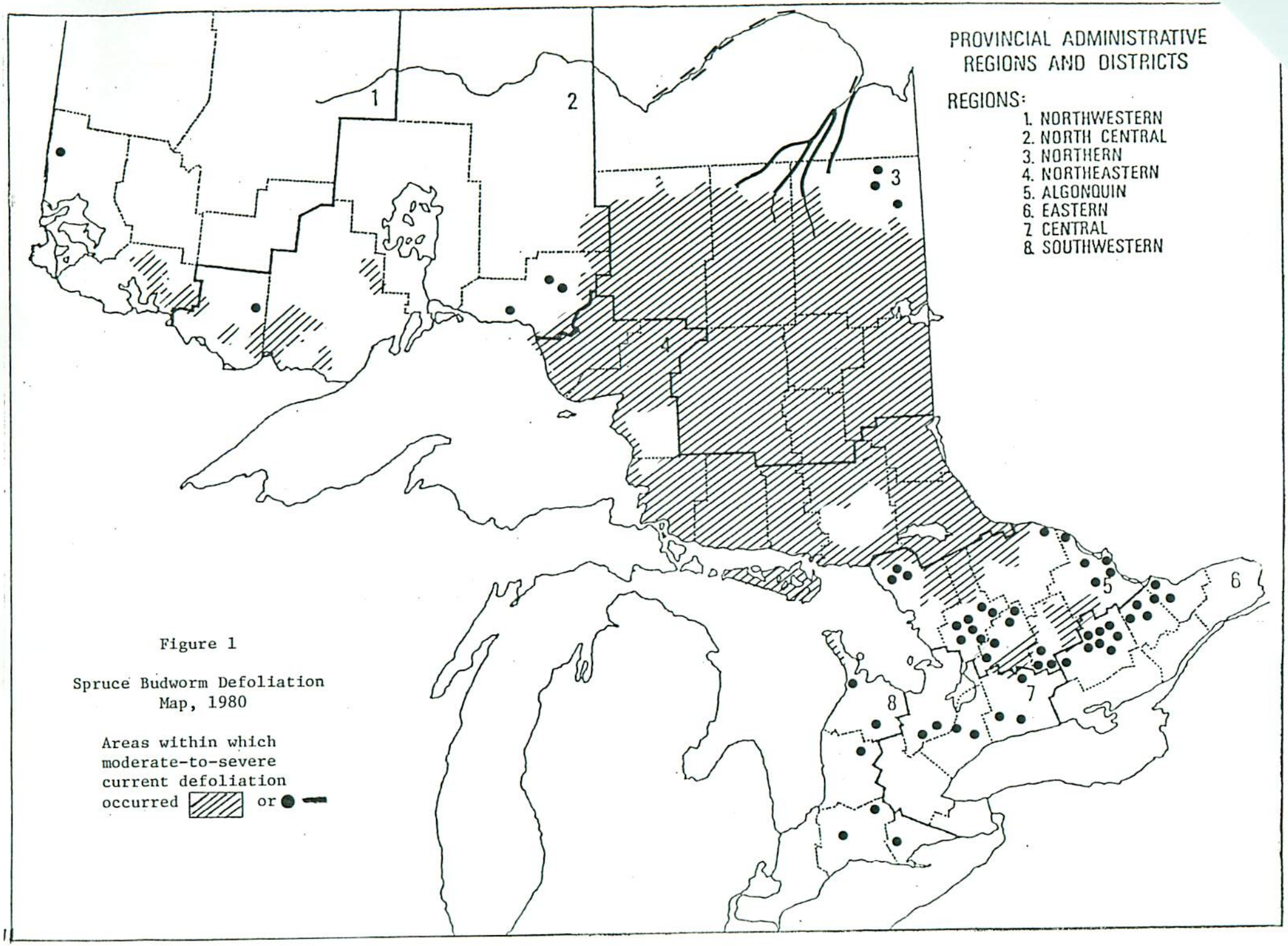

Figure 1

Spruce Budworm Defoliation Map, 1980

Most of this increase occurred in the Thunder Bay and Atikokan districts. The infestation extending from Kawnipi Lake, Atikokan District to Lower Shebandowan Lake, Thunder Bay District nearly doubled in size, spreading to Lac des Mille Lacs in the north and Horne Township in the east. Furthermore, budworm were easily collected east of the infestation and south of a line extending from Raith to Black Bay on Lake Superior. Generally, defoliation within this area was light with some small scattered pockets of moderately defoliated trees. Elsewhere in the Thunder Bay District, a new infestation totalling 60 700 ha (150,000 acres) in size was mapped west of Black Sturgeon Lake and the infestation at Arrow Lake, detected in 1979, expanded in 1980. In the Atikokan District, a small pocket of defoliation was reported again at Win Lake while a new area of some 20 200 ha (50,000 acres) of moderate-to-severe defoliation was found between Beaverhouse and Wolseley lakes. The infestation which occurs primarily in the Fort Frances District and extends west from Bennett Township to Watten Township and north to Lower Manitou Lake experienced a variety of boundary changes in 1980, but changed very little in overall size. A new infestation was detected on white spruce at Umfreville Lake, Kenora District, about 11 km (7 miles) east of the Manitoba border.

Aerial spraying operations were carried out in June to protect high-value areas in Parry Sound, Kirkland Lake, Chapleau, Gogama, Cochrane, Kapuskasing and Hearst districts. In total, approximately 10 000 ha (24,700 acres) were sprayed with some receiving double applications. Generally speaking, the operations were completed on schedule, although the early rapid development of budworm caused problems and there were some delays caused by poor weather. Helicopters and fixed wing aircraft were used to apply various *B.t.* formulations, Matacil, Orthene and Cygon. Province-wide egg-mass surveys to determine population changes and to provide infestation forecasts for 1981 are under way. Results of the egg-mass survey as well as updated tree mortality information will be summarized in the fall issue of the Survey Bulletin.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Heavy infestations recorded in aspen stands throughout the Northwestern Region during the past several years have virtually disappeared in 1980. Remaining is a small area of moderate defoliation west of Fort Frances adjacent to Lake of the Woods. In addition, oak, black ash, and willow species showed light and moderate defoliation in the towns of Emo and Fort Frances. Elsewhere a few small patches of light defoliation occurred in the Sioux Lookout and Ignace districts. Weather conditions are thought to influence the decline of populations. Warm weather during the latter part of April and early May was conducive to a successful larval hatch but then was followed by several days of extremely cool weather which probably affected larval survival adversely.

In the North Central Region the collapse of the infestation which had been present for several years in the Atikokan District was also attributed to the inclement weather. However, in the Thunder Bay District

the infestation continued to flourish and has expanded to approximately 540 km^2 (210 mi^2) from 414 km^2 (160 mi^2) where complete defoliation occurred throughout most of the above area.

In the Northern Region populations in the Hearst and Kapuskasing districts have declined to almost nil except for a few small pockets on the eastern edge of the Kapuskasing District. The infestation in the Cochrane District has increased in size and moderate-to-heavy defoliation was recorded. The infestation in the Kap-Kig-Iwan Provincial Park expanded slightly and moderate-to-heavy defoliation occurred in parts of four surrounding townships. Elsewhere in the Kirkland Lake District a small pocket of moderate defoliation was recorded in Beatty Township.

In the Northeastern Region moderate-to-heavy defoliation continued in the infestation just west of Sudbury and in a small pocket west of Espanola. An area of moderate-to-heavy defoliation was reported to extend from Jennings Township, Sudbury District east to within a few kilometres this side of Sturgeon Falls, North Bay District.

Cedar Leafminers, *Argyresthia thuiella* Pack., *A. canadensis* Free., *A. aureoargentella* Brower and *Pulicalvaria thujaella* Kft.

High populations of this complex persisted through southern Ontario especially in the Southwestern, Central and Eastern regions where virtually all cedar stands within these regions were affected to some degree, although defoliation for the most part ranged from moderate to severe. Tree and branch mortality was evident in a number of areas. In the Algonquin Region light and moderate populations were noted in the Bancroft and Pembroke districts.

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

High populations were again present in oak stands in several townships in the north central part of the Huronia District and in the Uxbridge-Maple area, Maple District. Aerial spray applications at Awenda Park and Midhurst nursery were deemed successful for the purpose of foliage protection. Positive results were also achieved in the Durham Regional Forest and on surrounding private lands where treatments were carried out. High populations continued in the Niagara District at scattered locations. In the northern part of the Tweed District, Eastern Region, heavy defoliation was reported in several areas. In the Algonquin Region and in the Espanola District, Northeastern Region, populations were mainly light. However, populations increased in the Sault Ste. Marie and Blind River districts where a number of scattered patches of oak were heavily defoliated.

Larch Casebearer, *Coleophora laricella* Hbn.

Generally, populations of this insect remained relatively high through southern Ontario and in several instances increases in populations and areas affected were reported. Conspicuous browning of foliage was noted at a number of locations in the Southwestern, Central, Eastern and

Algonquin regions and in many locations defoliation was severe. Elsewhere in the Northeastern, Northern and North Central regions populations ranged from trace to light except in the Geraldton District where moderate-to-heavy damage was reported at two locations.

Birch Leafminer, *Fenusa pusilla* (Lep.)

This insect was widely distributed through southern Ontario and increased populations were noted. Birch trees in a number of districts were severely attacked in the Southwestern, Central, Eastern and Algonquin regions where conspicuous browning of the foliage was evident. In the northern part of the province heavy leaf mining was noted at several locations in the Kirkland Lake and Timmins districts and in the Thunder Bay area. A number of reports of trace-to-light populations were received elsewhere in the province.

European Pine Sawfly, *Neodiprion sertifer* Geoff.

Reports of increased populations were received from the Southwestern Region after a number of years of low and declining populations. Generally, light defoliation occurred in the Central Region, although a few moderate infestations were reported. Scattered collections of this insect were made throughout the Eastern Region with heavy defoliation being recorded at a few locations. In the Algonquin Region relatively high populations were noted in a few locations but otherwise numbers were low. In the Northeastern Region populations were low on Manitoulin Island and in the Blind River District but high populations were observed at many locations in the city of Sault Ste. Marie. Several species of pine were attacked in all of the above areas.

Jack Pine Sawfly, *Neodiprion pratti paradoxicus* Ross.

Populations were widespread through the Eastern Region and pine trees showed moderate-to-heavy defoliation at several locations. In the Pembroke District of the Algonquin Region high populations persisted in North Algona Township and caused heavy damage. In addition, relatively high populations were reported in several other townships. Moderate-to-severe damage to individual trees was reported at a few locations in the Bancroft District.

Balsam Fir Sawfly, *Neodiprion abietis* complex

This insect was generally distributed through the districts of Pembroke, Algonquin Park and Bancroft and increased numbers were reported in some instances. Defoliation ranged from light to moderate mainly on single trees or small groups of trees.

High populations were recorded at several locations in the Huronia District, Central Region and in the Owen Sound District, Southwestern Region. New medium-to-heavy infestations were noted in two areas of the Owen Sound District. Elsewhere, this pest was reported

at several locations in the North Bay District, Northeastern Region, and was observed at single locations in the Hearst and Ignace districts in the northern part of the province.

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

High populations persisted in the central portion of the Huronia District, Central Region; however, some reduction in numbers was noted in the older infestations, although defoliation still ranged from moderate to heavy. Elsewhere, small numbers of larvae were observed in the remainder of the Huronia District as well as in the Maple District. In the Eastern Region high populations were recorded in single townships in the Ottawa and Brockville districts. Thus far surveys indicate that populations and distribution appear to have increased over 1979 in the Bancroft and Algonquin Park districts, Algonquin Region. Surveys for this pest of pine are still in progress and additional information will be forthcoming in the fall survey bulletin.

American Aspen Beetle, *Gonioctena americana* (Schaef.)

This species was present in a number of areas and, though commonly found, was causing severe defoliation in only a few districts, mainly on reproduction aspen in parts of the Timmins, Kirkland Lake, Gogama and Chapleau districts, Northern Region and in the Thunder Bay District, North Central Region. Elsewhere populations were low.

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

Although surveys for this pest of spruce are still in progress in many areas, preliminary reports from the Northwestern Region indicate that defoliation was heavy at a number of locations in the Fort Frances District and moderate in parts of the Kenora, Dryden and Sioux Lookout districts.

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

A number of ground checks for this species made along the Manitoba-Ontario boundary in the Kenora District produced negative results. However, one larva was collected on an island in High Lake. In the Huronia District, Central Region light infestations were reported in Scots pine plantings in Oro and Adjala townships. Elsewhere, only scattered low populations were noted. Small numbers were collected at one location on Pelee Island in the Southwestern Region.

Red Pine Sawfly, *Neodiprion nanulus nanulus* Schedl.

Moderate populations of this species were noted in a seed production area in the Algonquin Park District and in a private plantation in the Pembroke District. Elsewhere in the above districts scattered colonies were observed. Reports of this pest, usually in low numbers, were received from the districts of Ottawa, Chapleau, Gogama, Timmins, Thunder Bay and Fort Frances.

Boxelder Leafroller, *Archips negundana* (Dyar)

An increase in populations of this pest of Manitoba maple trees was recorded throughout the city of Sault Ste. Marie. In the Northwestern Region defoliation was heavy throughout the towns of Sioux Lookout and Fort Frances and to a lesser degree in the towns of Emo, Dryden and Kenora.

Spruce Bud Moth, *Zeiraphera canadensis* Mut. & Free.

In the North Central Region moderate-to-severe defoliation of white spruce was recorded in a number of areas in the Thunder Bay District. This condition was also noted in the Atikokan, Nipigon and Terrace Bay districts but was not as widespread as in the Thunder Bay District. A medium infestation was noted at one location in the Kenora District, Northwestern Region. High populations of the spruce bud moth were reported at several locations in the Simcoe and Aylmer districts, Southwestern Region. In some instances up to 60% of the new shoots were affected. A heavy infestation was reported at one location in Peel Township, Cambridge District.

Cottony Maple Scale, *Pulvinaria innumerabilis* Roth.

Heavy infestations of this scale on silver maple were reported at a number of locations east of Windsor in Tecumseh Township, Chatham District. Surveys are continuing in suspect areas and further information will be available in the fall survey bulletin.

Other Insects of Note

High populations of the satin moth, *Leucoma salicis* Linn., caused severe defoliation to Lombardy and silver poplars at a number of locations in the Eastern Region, especially in the Wolfe Island and Kingston areas.

The jack pine tip beetle, *Conophthorus banksianae* McPherson, caused conspicuous damage once again in jack pine plantations in the Kirkland Lake and Timmins districts, and was readily found at widely scattered locations in the Chapleau and Gogama districts. A slight increase in damage was noted in several locations in the Thunder Bay District, North Central Region.

Reports indicate that the spruce coneworm, *Dioryctria reniculelloides* Mut. & Mun. was commonly found in most districts in the Northern Region. Low numbers were reported at two locations in the Geraldton District, North Central Region. Small numbers were reported in Wingham District, Southwestern Region and in Huronia District, Central Region.

Light-to-moderate defoliation caused by the fall cankerworm, *Alsophila pometaria* (Harr.), was recorded on white elm west of Fort

Frances along Highway 11 in the Northwestern Region. In the Algonquin Region a severe infestation on Manitoba maple recurred at one location in the Pembroke District and a pocket of heavy defoliation was recorded in the Cambridge District, Central Region.

A complex of aspen defoliators such as *Pseudexentera oregonana* Wlshm., *Choristoneura conflictana* Wlk., *Enargia decolor* Wlk. and *Choristoneura rosaceana* Harr. caused varying degrees of damage in parts of the Central, Algonquin, Northeastern and Northern regions.

High populations of the elm spanworm, *Ennomus subsignarius* Hbn., persisted at Maple Ridge in the Blind River District, Northeastern Region.

Heavy infestations of the European pine shoot moth, *Rhyacionia buoliana* Schiff., were reported on young red pine plantings on the outskirts of Kitchener, Cambridge District, and south of Maxwell, Owen Sound District. In the Southwestern Region two small pockets of moderate-to-heavy infestation were reported on red pine, one in the Wingham District and another in the Aylmer District.

High populations of the oak leafroller, *Pseudexentera cressoniana* Clem., caused heavy defoliation to several species of oak in the Honey Harbour-Sparrow Lake area and medium infestation in Simcoe County Forest in the Huronia District. Heavy infestations in 1979 in the Cambridge-Paris area declined to low levels in 1980. In the Eastern Region defoliation ranged from trace to moderate at a number of locations in the central portion.

High populations of the pine spittlebug, *Aphrophora cribata* (Wlk.), were noted in a number of areas in the Southwestern and Central regions and at one location in the Blind River District, Northeastern Region. Although the insect was widespread, only low numbers were reported in the Pembroke, Algonquin Park and Bancroft districts, Algonquin Region and in the Chapleau and Gogama districts, Northern Region. White pine, Scots pine and jack pine were the preferred hosts.

Monochamus spp.

An attempt is under way to detect and assess the feeding damage and abundance of the adult sawyer beetle in northern Ontario. Thus far preliminary reports have been received from the districts of Sioux Lookout, Ignace, Atikokan, Thunder Bay, Wawa, Timmins and Kirkland Lake. Current feeding damage has been described as light and in most instances is confined to fringe jack pine trees in cutover areas. In addition, log piles are supporting relatively high populations of the adult beetle and this has necessitated spraying in some areas.

TREE DISEASES

Special surveys for the presence of the European race of Scleroderris disease which have been conducted throughout southern Ontario for the past several years were continued in 1980. In addition, surveys of high-value white pine and black spruce stands are being conducted in southern and northern Ontario, respectively. All stands will be examined for insects and disease organisms. Information derived from this work will eventually be used in determining the impact of forest pests on the forests. Tree disease conditions evaluated thus far are provided herein.

Rhizina Root Disease (*Rhizina undulata* Fr.) -- Activity by this root rot increases following fires. This year extremely heavy fruiting of the fungus was observed in the Simcoe County Forest, Huronia District, at a fire site currently being regenerated to white pine. The previous red and white pine plantations burned in the spring of 1979. Strands of the fungus were present on a number of chlorotic seedlings. In view of the large areas burned in northern Ontario, this disease could be a fairly important pest of regeneration in the next few years.

Oak Mortality -- Branch dieback and tree mortality of red oak are common throughout much of the range of oak in Ontario. Data from monitoring plots seem to indicate that oak leaf shredder defoliation aggravates the decline. As with maple decline, however, other influences such as Armillaria root rot are part of the complex. This year mortality appears to be especially high in the Huronia and Parry Sound districts of the Algonquin Region.

Maple Decline -- Sugar maple stands in the Algonquin and Southwestern regions continue to recover from the devastating dieback that occurred in 1977 and 1978. These stands had been defoliated by forest tent caterpillar, and 1977 was the last year of severe defoliation. Very little tree or branch mortality has occurred since about mid-June, 1978. The only trees continuing to decline had over 40% of the crown dead.

Preliminary impact analysis indicates that over 600 000 cubic metres (30,000,000 cubic feet) of maple were lost. A considerable amount of this has been salvaged particularly in the Parry Sound District. However, this is a very impressive loss. Over all, about 25 000 hectares (60,900 acres) of forest land were affected. Stands rated severely affected, i.e., those with over 50% of the sugar maple killed, were concentrated in the Parry Sound District. There, 8 000 hectares (20,000 acres) were rated severe. In Owen Sound District 500 hectares (1,250 acres) were rated severe.

It is very apparent that prolonged insect defoliation can have a tremendous impact on the forest. No doubt other factors such as weather and site have contributed to maple decline, but in this instance, prolonged defoliation seems to be the factor responsible for the development of dieback in many stands.

Pine needle rust, *Coleosporium asterum* (Diet.) Syd., was prevalent in a number of young red pine and jack pine stands throughout Ontario. Usually less than 5% of the needles were affected, and this damage was typically confined to lower branches.

Scleroderris Disease, *Gremmeniella abietina* (Lagerb.) Morelet -- Surveys to detect the European race of this fungus were carried out in southern Ontario again this year. A large number of stands were examined, especially in the Eastern Region which is closest to the New York infestation. Again, no evidence for this race was detected.

We are also screening disease samples to identify the race of the fungus associated with the disease in parts of Ontario where, until now, only the North American race has been found. We hope to confirm that the European race is absent in the province.

Frost Damage

A number of districts in various regions reported frost damage on both deciduous and coniferous foliage in 1980; however, this condition appeared to be more widespread and severe in the central and northeastern portions of the province (Fig. 2). Severe frost injury was general throughout the Northern Region and affected the districts of Chapleau, Gogama, Timmins, Kirkland Lake, Cochrane and Kapuskasing. Large areas in the southern section of the Wawa District and northern sections of the Sault Ste. Marie and Blind River districts were heavily damaged. Moderate-to-severe frost damage was recorded over most of the Temagami District and at a number of points in the Sudbury District. Moderate-to-heavy damage was reported on white spruce in the Swastika Tree Nursery.

The more sustained damage extended east from a line running just inside the Moosonee District along the west side of the Kapuskasing District, south through the Chapleau District into the southern part of the Wawa District and the northern part of the Sault Ste. Marie District.

Damage was recorded on many tree species, both coniferous and deciduous, although injury was more spectacular on broad-leaved trees. The damage described resulted when minus degree weather occurred at intervals in the period June 4 through to June 16. In the northern areas snow was also recorded, along with the frost, between June 8 and June 10.

Outside of the main body of injury, reports of frost ranging from light to severe on single trees and in pockets was recorded in southern Ontario, with the heaviest damage occurring in parts of the Algonquin Region. Scattered frost damage was reported in the Northwestern and North Central regions, where freezing temperatures had also been recorded in the latter two regions in late April and early May.

Salt Damage

This condition was again prevalent in a number of areas in southern

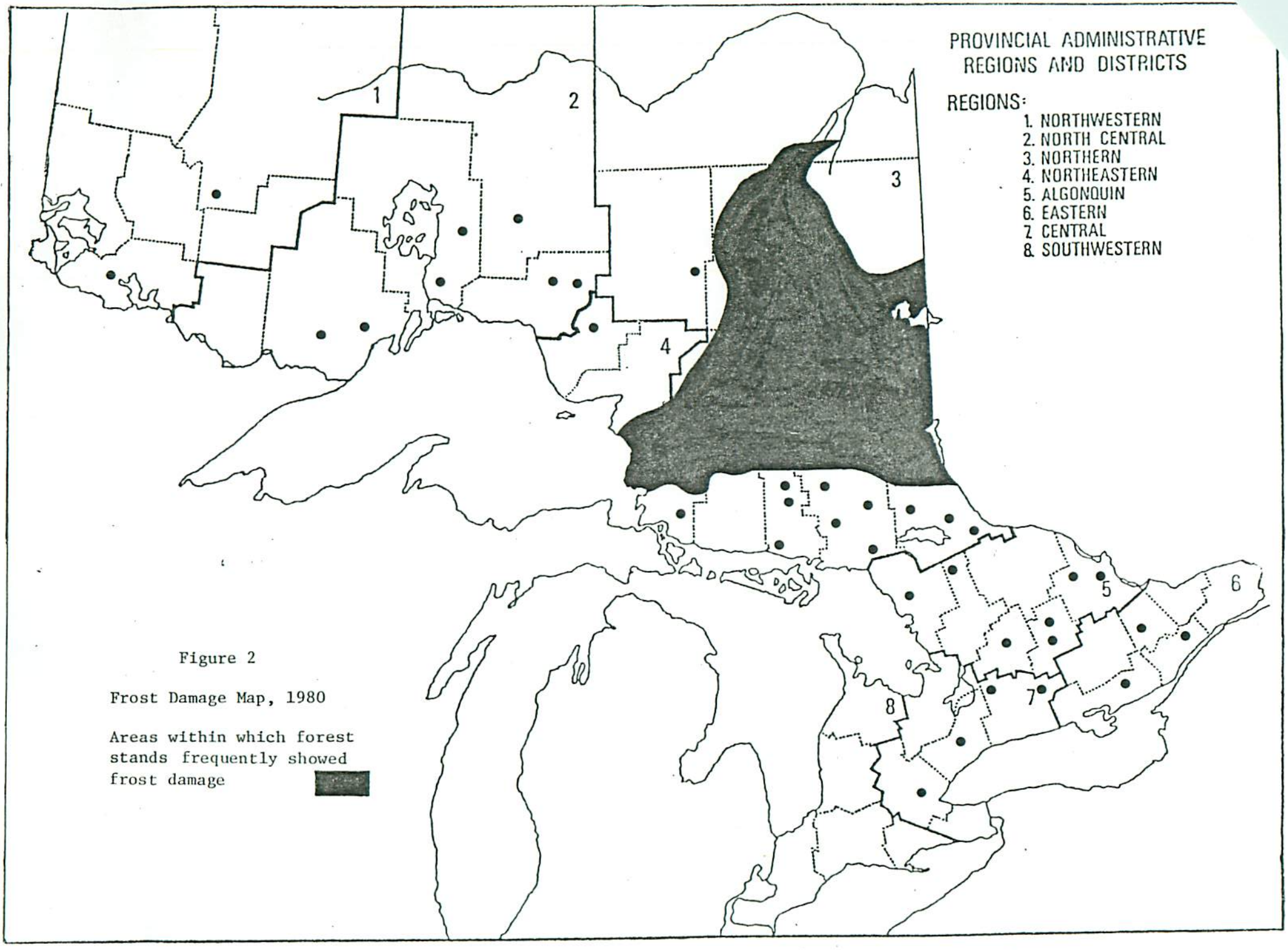

Figure 2

Frost Damage Map, 1980

Areas within which forest stands frequently showed frost damage

Ontario in 1980. Reports of heavy damage along major streets and highways were received from the Central and Southwestern regions and affected both deciduous and coniferous tree species. Particularly heavy damage occurred along highways 400 and 401.

Hail Damage

Considerable damage as a result of a hail storm in September 1979 has been recorded in Ponsford Township in the Pickle Lake area, Sioux Lookout District. Several tree species, both coniferous and deciduous, were damaged.

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