FOREST INSECT AND DISEASE CONDITIONS IN ALBERTA, SASKATCHEWAN, MANITOBA, AND THE NORTHWEST TERRITORIES IN 1982 AND PREDICTIONS FOR 1983

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ABSTRACT

Forest pest conditions in Manitoba, Saskatchewan, Alberta, and the Northwest Territories during 1982 are summarized, and predictions are made for 1983. Eleven major pests are discussed in detail, and additional noteworthy insect, disease, and other damage agents are covered in a table.

New infestations of the spruce budworm occurred in all three provinces and the Northwest Territories and caused moderate-to-severe defoliation at several locations. A newly reported infestation of the jack pine budworm caused similar defoliation in central Manitoba.

Defoliation of trembling aspen, caused mostly by the forest tent caterpillar, was again extensive. Areas of moderate-to-severe defoliation of aspen occurred within an estimated 13 000 000 ha in Alberta, 2 100 000 ha in Saskatchewan, and 600 000 ha in Manitoba. In the Northwest Territories the area defoliated by large aspen tortrix decreased and was widely scattered.

Infestations of the mountain pine beetle occurred within the same areas in 1981 and killed over one-half million trees. Two new small infestations occurred, one within the south end of Banff National Park and the other in Kananaskis Provincial Park. No infestations of Dutch elm disease were found in Saskatchewan; however, 3000 native elms were infected in 63 municipalities throughout southern Manitoba.

Intensive surveys of dwarf mistletoe infected jack pine stands were initiated in 1982. The introduced pine sawfly, *Diprion similis* (Hartig), a species native to Europe, was observed for the first time in southeastern Manitoba.

RÉSUMÉ

On décrit sous forme abrégée les conditions d'infestation des forêts au Manitoba, en Saskatchewan, en Alberta et dans les Territoires du Nord-Ouest en 1982 et on fait des prévisions pour 1983. Onze ravageurs importants font l'objet d'une discussion détaillée et un tableau porte sur d'autres insectes, maladies et agents nuisibles dignes de mention.

De nouvelles infestations de la tordeuse des bourgeons de l'épinette sont survenues dans les trois provinces et les Territoires et ont causé une défoliation moyenne à grave en plusieurs endroits. Une nouvelle infestation de la tordeuse du pin gris a causé des dommages similaires dans le centre du Manitoba.

La défoliation du peuplier faux-tremble, causée surtout par la livrée des forêts, est restée étendue. Moyenne à grave, elle couvrait 13 000 000 ha en Alberta, 2 100 000 en Saskatchewan et 600 000 au Manitoba. Dans les Territoires du Nord-Ouest, la superficie défeuillée par la tordeuse du tremble a fondu en plages fortement disséminées.

Le dendroctone du pin ponderosa a infesté les mêmes régions qu'en 1981 et tué plus d'un demi-million d'arbres. Deux nouvelles infestations mineures sont survenues, la première dans le sud du parc national Banff et la seconde dans le parc provincial Kananaskis. La maladie hollandaise de l'orme ne s'est pas manifestée en Saskatchewan; toutefois, près de 3 000 ormes indigènes ont été infectés dans 63 municipalités du sud du Manitoba.

Des relevés intensifs des peuplements de pins gris infectés par le faux-gui ont débuté en 1982. Le diprion importé du pin (*Diprion similis* (Hartig)), insecte indigène d'Europe, a été observé pour la première fois dans le sud-est du Manitoba.

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INTRODUCTION

This report summarizes forest insect and disease conditions in Alberta, Saskatchewan, Manitoba, and the Northwest Territories in 1982 and provides predictions of the infestation levels of major insect pests for 1983. Surveys were conducted mainly by the staff of the Forest Insect and Disease Survey (FIDS) of the Northern Forest Research Centre, Canadian Forestry Service (CFS), with the cooperation of personnel from many federal, provincial, and municipal agencies.

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Alberta Agriculture
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City of Edmonton
City of Prince Albert
City of Saskatoon
Department of Northern Saskatchewan
Manitoba Agriculture
Manitoba Department of Natural Resources
Parks Canada
PFRA Tree Nursery
Saskatchewan Agriculture
Saskatchewan Department of Tourism and Renewable Resources
Canada Department of Indian Affairs and Northern Development

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Four summer students (David Wade, Fred Stanley, Candace Liard, and Tarra Kongsrude) also worked for FIDS in 1982.

The following descriptions of pests are arranged more or less according to national and regional importance. Brief remarks on other noteworthy insects, diseases, and vegetation disturbances appear in the table on pages 16-18.

SPRUCE BUDWORM
Choristoneura fumiferana (Clemens)

Several new spruce budworm infestations were reported from white spruce and balsam fir areas in Manitoba, Saskatchewan, Alberta, and the Northwest Territories in 1982, and populations were generally higher than in 1981 (Fig. 1).

Manitoba: The number of areas of infestation increased, and moderate-to-severe defoliation occurred in 17 predominantly white spruce areas scattered over 31 380 ha of forests and containing 4090 ha of white spruce and balsam fir stands. Tree mortality of the balsam fir component is occurring in about 2000 ha in three main areas of spruce-fir forests weakened by repeated defoliation since 1975. No control operation was conducted in Manitoba in 1982.

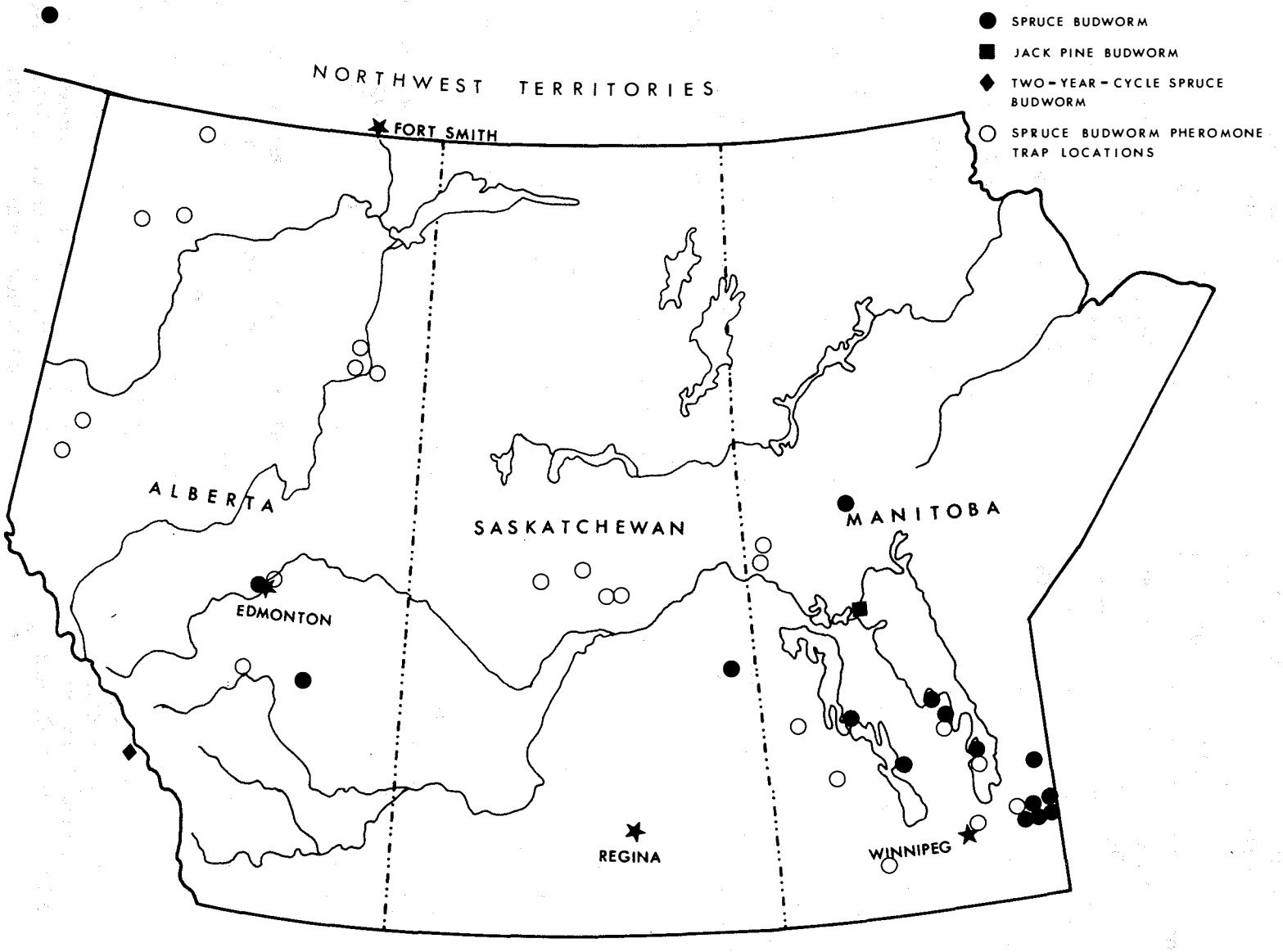

Figure 1. Areas of moderate-to-severe defoliation by budworms, *Choristoneura* species, in 1982 and the locations of spruce budworm pheromone traps.

In the Interlake region, moderate-to-severe defoliation[1] was widespread from Kinwow Bay (Lake Winnipeg) through the Saint Lakes area to Moose Island (Fisher Bay). Scattered patches of similar defoliation occurred at Hecla Provincial Park, Grindstone Provincial Recreation Park, and the Waterhen areas. A small infestation was recorded in the Moosehorn area. Elsewhere, light defoliation was detected east of Gypsumville and in a few scattered, small woodlots along the west side of Lake Winnipeg from Riverton south to Sandy Hook.

East of Lake Winnipeg, scattered pockets of moderate-to-severe defoliation were observed in the Whiteshell Provincial Park along the Winnipeg River system from Otter Falls to the vicinity of Slave Falls, in the Big Whiteshell Lake area, between Crowduck Lake and Eaglenest Lake, and between the Whiteshell River and White Lake. In Nopiming Provincial Park, generally light-to-moderate defoliation was recorded in the Bird Lake cottage area. Other patches of moderate-to-severe defoliation were observed approximately 10 km east of Bissett and in the Poplar Bay area of Lac du Bonnet. Defoliation at Wanipigow Lake was light.

In northern Manitoba, moderate-to-severe defoliation, mainly on white spruce, occurred in the Grass River Provincial Campsite on the west side of Wekusko Lake. This infestation has persisted for several years and has no doubt contributed to the bud damage and resultant poor growth of balsam fir. There was a further decline in defoliation in Riding Mountain National Park. Only a very light infestation was recorded in the cottage area along the south shore of Clear Lake.

Egg-mass surveys were conducted in the fall of 1982 to forecast population levels in 1983. Twelve locations in the infested areas of Manitoba were sampled by FIDS, while other locations were sampled by the Forestry Branch, Manitoba Department of Natural Resources (Table 1). Results indicate that the spruce budworm populations will increase in the areas sampled and that moderate-to-severe defoliation will occur on about 6000 ha of white spruce and balsam fir stands.

Saskatchewan: For the first time since 1968, moderate-to-severe defoliation occurred on 364 ha of white spruce scattered over 2000 ha in the commercial forests north of Usherville. The last major outbreak, at Namew Lake on the Saskatchewan-Manitoba border during 1951-68, ranged over 840 000 ha and caused up to 30% white spruce and 40% balsam fir tree mortality in some areas. Egg-mass samples at one location indicate that budworm populations will again be high in the Usherville area in 1983.

Alberta: Moderate-to-severe defoliation of white spruce intensified along the North Saskatchewan River in the city of Edmonton. New spruce budworm infestations were recorded in two areas in central Alberta, where moderate-to-severe defoliation occurred on 200 ha of white spruce near Castor and on about 8 ha at Big Knife Provincial Park. Egg-mass surveys at these two locations indicate that moderate-to-severe defoliation could occur in 1983. The average number of egg masses per 10 m^2 of foliage was 304 and 106 at Castor and Big Knife Provincial Park, respectively.

Northwest Territories: New spruce budworm infestations were detected on two large islands in the Liard River. Moderate-to-severe defoliation of white spruce occurred on approximately 50 ha in each area. The last recorded outbreak in the Northwest Territories, in the Little Buffalo Falls and Hook Lake areas, collapsed in 1980.

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[1] Moderate-to-severe defoliation = 30% or more of current foliage removed.

Table 1. Average spruce budworm egg-mass densities and predicted 1983 damage for Manitoba

Location	Egg masses per 10 m^2 of foliage	1983 damage forecast[1]
Interlake region		
Moosehorn	28 (18)[2]	Light to moderate
Waterhen	314 (26)	Severe
Lake St. George (6 locations)[3]	236	Severe
Lake St. Andrew (4 locations)[3]	68	Moderate
Southeastern Manitoba		
Lac du Bonnet	654 (46)	Severe
Bird Lake	420	Severe
Bisset	466	
Whiteshell Provincial Park		
Junction Hwy. 309 and 307	142	Moderate to severe
Big Whiteshell Lake area	592	Severe
11 locations[3]	371	Severe
Hecla Island Provincial Park (11 locations)[3]	415	Severe
Grindstone Point Provincial Park (7 locations)[3]	170	Moderate to severe
Northern Manitoba		
Wekusko Lake	304 (119)	Severe
Riding Mountain National Park (4 locations)	1.2	Light

[1] Egg masses per 10 m^2 and potential defoliation:
Up to 25 = Light
50-100 = Moderate
200+ = Severe

[2] Figures in brackets are for 1981.

[3] Source: Beaubien 1982.

Monitoring of spruce budworm populations by use of pheromone-baited traps was initiated in the prairie provinces in 1982. Traps were deployed in white spruce/balsam fir stands at 24 locations: 10 in central and northern Alberta, 4 in central Saskatchewan, and 10 across Manitoba (Fig. 1). Male moths were recovered from pheromone traps at all locations, indicating the presence of low or endemic populations.

Other: The two-year-cycle budworm, *Choristoneura biennis* Freeman, which feeds heavily in even years, caused moderate defoliation of alpine fir and spruce over 30 ha in Kootenay National Park.

Table 2. Results of 1982 jack pine budworm egg-mass survey in Manitoba and 1983 forecast

Location	Avg. no. of egg masses per 10 m^2	Defoliation forecast for 1983
3 km north of Grand Rapids	85	Moderate
11 km north of Grand Rapids	465	Severe

JACK PINE BUDWORM
Choristoneura pinus pinus Freeman

In **Manitoba,** a jack pine budworm infestation was recorded for the first time since 1979. Moderate-to-severe defoliation was fairly continuous over a 40-km distance north of Grand Rapids. Results from an egg-mass survey indicate that moderate-to-severe defoliation will occur in this area in 1983 (Table 2).

In **Saskatchewan,** surveys in the Nisbet and Torch River provincial forests failed to detect any jack pine budworm infestation.

ASPEN DEFOLIATORS
Primarily the forest tent caterpillar, *Malacosoma disstria* Hübner, and the large aspen tortix, *Choristoneura conflictana* (Walker)

In 1982, moderate-to-severe defoliation of trembling aspen was mapped over an estimated 600 000 ha in Manitoba (an increase of 500 000 ha from 1981), 2 100 000 ha in Saskatchewan (a decrease of 6 000 000 ha from 1981), and 13 000 000 ha in Alberta (an increase of 900 000 ha from 1981) (Fig. 2). In the Northwest Territories the area defoliated decreased from 100 000 ha in 1981 to only a few small scattered areas in 1982. Although there was an increase in Alberta, defoliation of aspen in many of the areas surveyed did not appear to be as complete as in previous years.

The forest tent caterpillar was again the major defoliator across the region except in the Northwest Territories and Wood Buffalo National Park, where large aspen tortrix predominated. The Bruce spanworm, *Operophtera bruceata* (Hulst), the early aspen leaf curler, *Pseudexentera oregonana* Walsingham, a green fruit worm, *Orthosia hibisci* Guenée, the linden looper, *Erannis tiliaria* (Harris), and a poplar leaf roller, *Anacampsis niveopulvella* (Chambers) were present but probably caused little defoliation.

The recurring forest tent caterpillar infestations have had their greatest impact in the agricultural and marginally agricultural zones, which include roughly two-thirds of the total area mapped in 1982. In addition to trembling aspen, many other deciduous tree species were affected. The greatest concerns are the protection of valued ornamental and shade trees and shrubs, the unpleasantness and nuisance of invading caterpillars and moths in public use areas, and the maintenance of aesthetics in parks and recreation areas. Considerable expense has been incurred on control measures in such areas. In the commercial aspen forests, radial growth losses and tree mortality due to defoliation are not significant to the forest industry at present since only a small portion of the hardwood volume is harvested.

In **Manitoba,** moderate-to-severe defoliation of trembling aspen and other

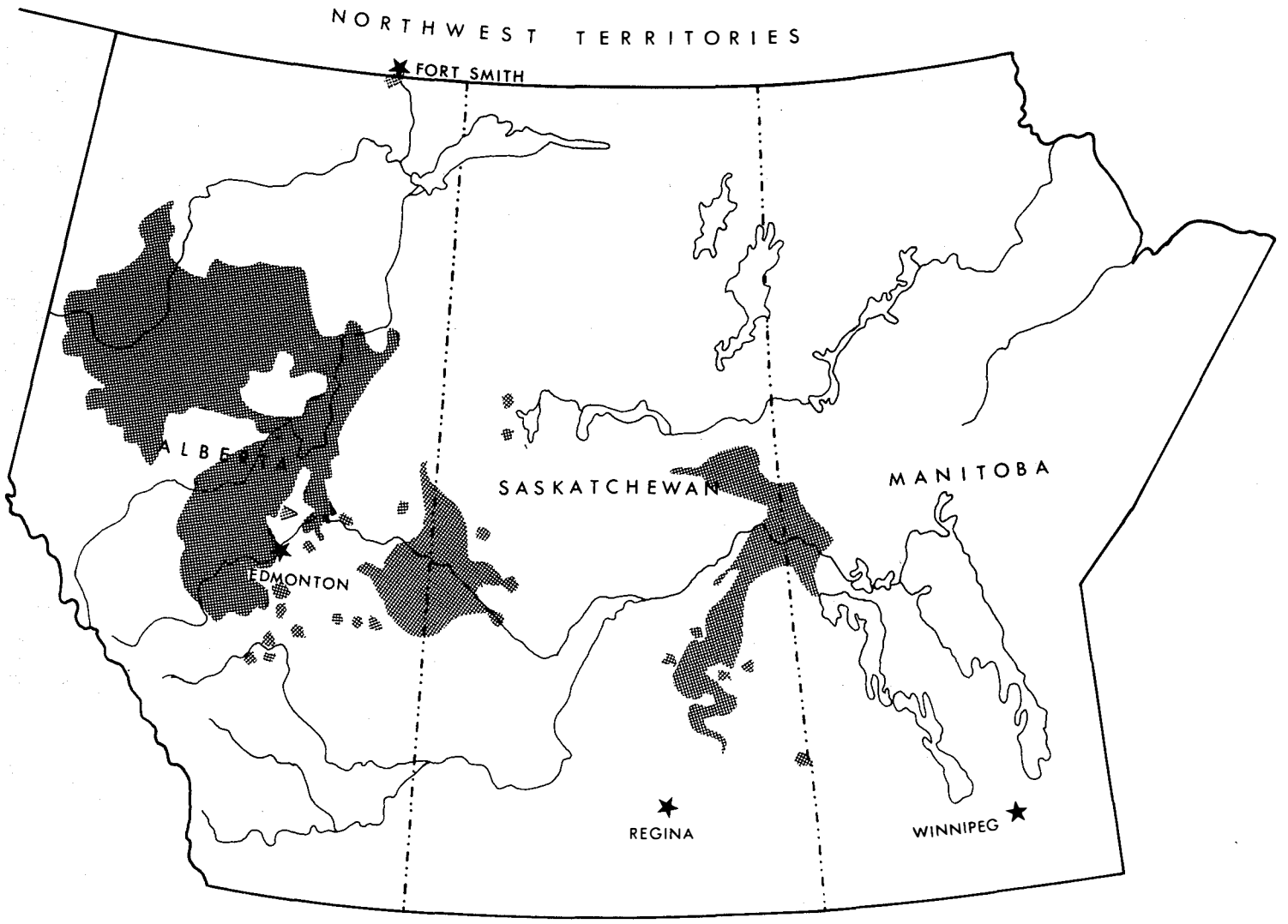

Figure 2. Areas of moderate-to-severe defoliation of trembling aspen primarily by the forest tent caterpillar and large aspen tortrix in 1982, determined by aerial and ground surveys.

associated broadleaf hosts extended from the Saskatchewan border between the Kisseynew Lake area eastward to the Simonhouse and Cormorant lakes and Overflow Bay area. A decline in caterpillar populations resulted in light defoliation in Turtle Mountain Provincial Park.

Infestations in **Saskatchewan** have continued to decline since 1980. Coincident with the decline in many areas were decreased moth fecundity in 1981, high mortality of unhatched and early post-hatch larvae, and high incidences of virus disease and the parasite *Sarcophaga aldrichi* Parker.

Populations of the forest tent caterpillar were present in some locations in central **Alberta** before 1977, but new outbreaks developed in the Slave Lake-Peace River area in 1977. Since then, populations have remained relatively high in the Whitecourt, Edson, Grande Prairie, Peace River, Slave Lake, Athabasca, and Lac La Biche provincial forests and in agricultural areas in central and eastern Alberta.

In the **Northwest Territories,** the aspen forest area moderately to severely defoliated by the large aspen tortrix declined sharply from that recorded in 1981. Small, widely scattered patches of moderate-to-severe defoliation were observed in the Martin Hills area, in Wood Buffalo National Park, and between Fort Smith and Little Buffalo Falls.

Egg-band surveys of the forest tent caterpillar were conducted in the fall of 1982 to predict 1983 infestation levels. Forty-four locations were sampled in Manitoba, 60 in Saskatchewan, and 86 in Alberta. Results indicate that in Manitoba, moderate-to-severe defoliation will intensify throughout the current outbreak area. Light defoliation may occur in parts of Turtle Mountain and Asessippi provincial parks. Population increases above endemic levels are expected in the Interlake region as the infestation advances southeastward. A further general decline in caterpillar populations is expected in 1983 in Saskatchewan, mainly in the west-central outbreak area. In Alberta, caterpillar populations are predicted to decline; only 42% of the sampled locations are expected to be severely defoliated in 1983, compared to 68% in 1982. Within the outbreak areas, however, most of the aspen may still be severely defoliated in 1983.

MOUNTAIN PINE BEETLE
Dendroctonus ponderosae Hopkins

Infestations of the mountain pine beetle in Alberta, southwestern Saskatchewan, and the Rocky Mountain national parks in 1982 occurred in the same areas as in 1981 and in two new locations: in the south end of Banff National Park and in Kananaskis Provincial Park (Fig. 3). Generally little spread occurred from previously reported infestations; most new tree mortality was within areas of existing infestations.

Provincial Forest Lands: Within provincial forest lands in southwestern Alberta, mortality of lodgepole pine in 1982 occurred in 483 infestations over an estimated 4260 ha. This represents just over one-third of the total area (11 000 ha) affected since the beginning of the outbreak in about 1976. Within this 4260 ha an estimated 576 000 stems (estimated volume of 190 160 m^3) were killed by the beetle as a result of 1981 attacks. In 1980 the AFS began salvage operations in heavily damaged areas and to date has harvested an estimated 123 633 m^3 of affected lodgepole pine. A control zone north of the salvage areas was again treated with sanitation cuts and destruction of beetle broods by the AFS to arrest northward spread and intensification of beetle populations. The number of trees requiring treatment was greatly reduced in 1982, indicating that the control program is successful. Since 1980, however, Alberta has spent almost $3.7 million in support of the control program.

Provincial Parks: Infestations in provincial parks in the Cypress Hills of

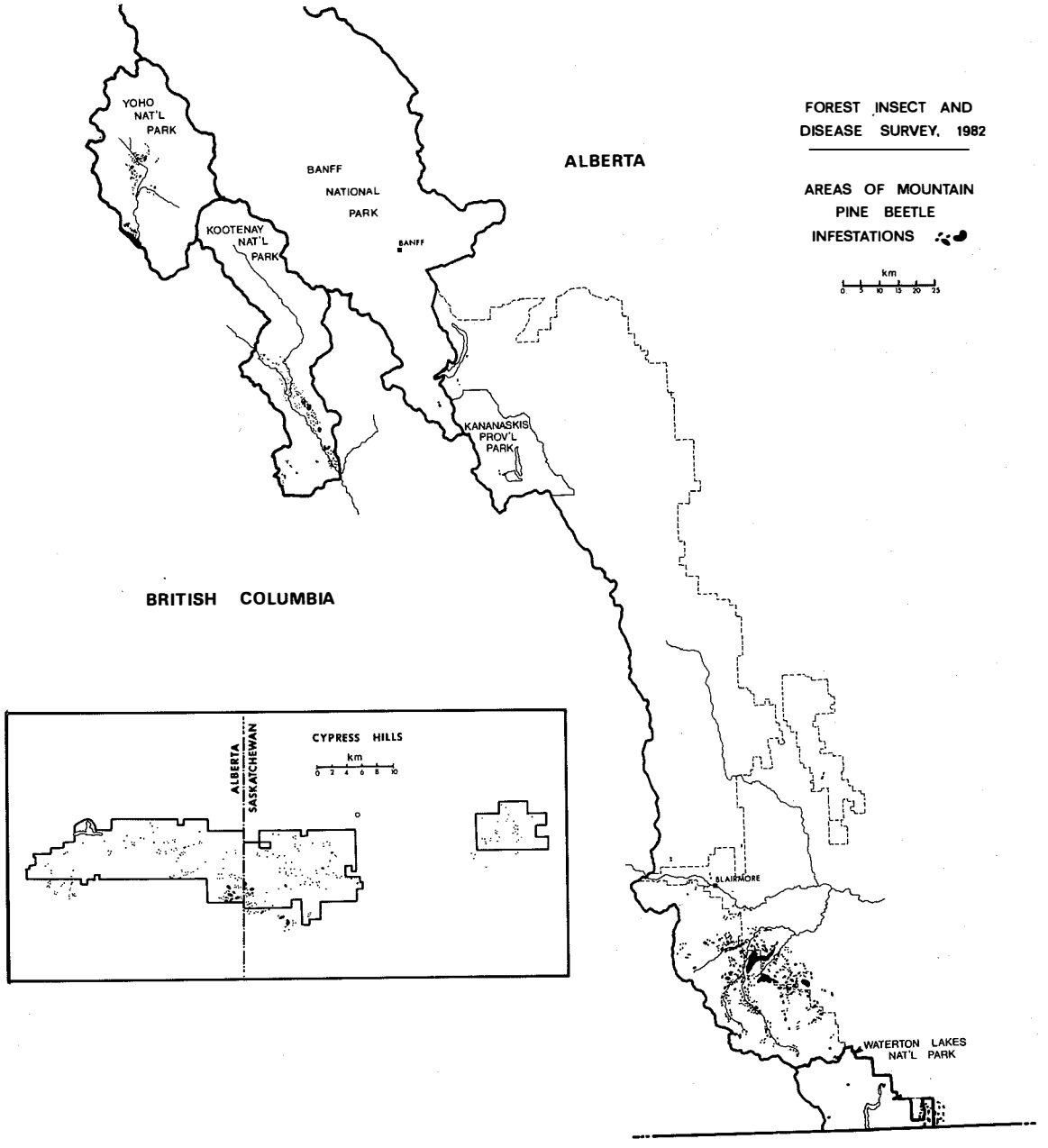

Figure 3. Areas of mountain pine beetle infestations in southwestern Alberta and the Cypress Hills on the Alberta-Saskatchewan border in 1982.

southwestern Saskatchewan and southeastern Alberta continued to increase in some localities. About 150 trees attacked in 1981 were mapped in each province. Control programs, consisting of the cutting and burning of infested trees, have been conducted by both provinces since 1980 and have helped to reduce the spread and intensification of beetle populations. During the 1982-83 winter season, over 1000 trees attacked in 1982 are to be removed from the Alberta portion of the Cypress Hills and a similar number from the Saskatchewan portion. The new infestations reported within Kananaskis Provincial Park included about 30 1982-attacked trees, all of which have now been cut and burned.

National Parks: The number of trees killed[2] by the mountain pine beetle in Yoho declined from about 1500 stems in 1981 to 710 stems in 1982, whereas in Kootenay the number increased from an estimated 2400 stems in 1981 to 3400 stems in 1982. The latter figure was obtained from aerial and ground surveys and from low elevation aerial color photography (1:5000) over about one-half of the outbreak area. Most of the increase in Kootenay Park resulted from intensification within the areas reported last year. Ground surveys in the fall of 1982 suggest that fewer trees will be killed from the 1982 attacks than were killed from the 1981 attacks.

During early 1982, national parks personnel completed a small control project at the north end of the outbreak in Kootenay Park, where about 500 trees were cut and burned. The objective of the project was to reduce northward spread and intensification of the infestation. Only 30-50 trees were scheduled for removal during the 1982-83 winter.

The infestation reported for the first time in Banff National Park included 7 trees attacked in 1981 and 9 trees attacked in 1982. This infestation will be assessed in the spring of 1983 to determine if control action is necessary.

Infestations in Waterton Lakes National Park were similar to those reported in 1981 and in general continued to decline from the levels mapped in 1980. Most of the tree mortality resulting from 1981 attacks is now distributed in the eastern portion of the park along the Belly River valley, where an estimated 20% of the pine component is affected. No beetle-attacked trees were found in Jasper National Park.

Indian Reserves: Control operations were again extended into the Peigan Indian Reserve, which is within the provincial beetle control zone. In the Blood Indian Reserve east of Waterton Lakes National Park, the beetle infestation intensified, but no control action was taken.

Nonforested Areas: A survey was conducted for the second year in the prairie zone of southern Alberta and southwestern Saskatchewan to determine the extent of beetle dispersal into nonforested areas. No additional beetle-killed or beetle-attacked trees were identified beyond those reported at 38 locations in 1981.

SPRUCE BEETLE
Dendroctonus rufipennis (Kirby)

Spruce beetle infestations in British Columbia and elsewhere in Canada have expanded in recent years and have caused significant spruce mortality. Warm summers, mild winters, and increases in susceptible overmature spruce and blowdown have triggered a rapid increase in populations of this beetle, which is usually found at endemic levels in logging slash or in wind-thrown or damaged trees.

In response to reports of spruce beetle population increases in British Columbia and the discovery of a few

[2] Mortalities recorded in 1981 or 1982 were trees attacked in the previous year.

beetle-killed trees in Waterton Lakes National Park in 1981, the AFS initiated surveys in spruce stands in 1982. Aerial and ground surveys and assessment were conducted in 18 areas on the west side of the Blairmore District in the Bow-Crow Forest. These areas contained large-diameter spruce with visible evidence of past attacks. Of the 7745 trees tallied, only 170 (2.2%) currently contain living beetles; the beetle population was classified as stable but with significant potential to increase.

DUTCH ELM DISEASE
Ceratocystis ulmi (Buisman) C. Moreau

Dutch elm disease (DED) is probably the most important and serious tree problem in **Manitoba.** It is currently spreading and destroying native and planted white elm stands over a wide area of the southern part of the province. The disease was first recorded in Manitoba in 1975 in Winnipeg, Brandon, and Selkirk when 7, 10, and 45 infected trees were diagnosed. By 1982 localized infections were found in 63 urban and rural municipalities as the disease spread along the Manitoba-North Dakota border and westward from Brandon toward Saskatchewan (Fig. 4). Localized infections of light-to-severe intensity occur in native and planted elm stands, including farm shelterbelts, throughout the area.

According to the Manitoba Department of Natural Resources and Manitoba Agriculture, there were 2952 elm trees infected with DED in 1982 compared to 2744 trees in 1981. In Winnipeg the number of confirmed infected trees increased to 1115 in 1982 from 757 in 1981. In Brandon, 286 trees were diagnosed as having DED in 1982, whereas 298 trees were confirmed in 1981. The overall increase in these totals can be attributed in part to more intensive surveillance.

The Manitoba provincial DED program is directed toward control of the disease in cities and towns. No control attempts are made in rural areas because of the large number of elm trees involved and the difficulty of access along rivers and streams. In localities where the disease has been established for 3 or more years and no sanitation or control measures have been applied, at least 85% of the natural elms are dead or dying. In the city of Winnipeg, however, where good sanitation practices (tree removal and pruning) were initiated several years prior to the appearance of the disease, control has been effective, and less than 1% of the total elm population has been affected each year.

In **Saskatchewan,** intensive surveys by the PFRA Tree Nursery at Indian Head, Saskatchewan Agriculture, and the Department of Tourism and Renewable Resources have failed to detect any new infections since 1981, when one infected tree was found in Regina. Surveys were also conducted to determine the distribution and presence of the two primary bark beetle vectors of the disease. Eight new distribution records were established for the native elm bark beetle, *Hylurgopinus rufipes* Eichhoff, in southeastern Saskatchewan. For the first time in Saskatchewan a single specimen of the European elm bark beetle, *Scolytus multistriatus* (Marsham), was recovered from a pheromone trap at Port of Big Beaver near the Montana border.

In **Alberta,** surveys by Alberta Agriculture and the CFS in the west, south, and southeastern areas of the province failed to detect the disease or the two elm bark beetle vectors.

DWARF MISTLETOES
Arceuthobium americanum Nuttal ex Engelmann on jack and lodgepole pine and *A. pusillum* Peck on white spruce

Dwarf mistletoes on pine and spruce are a perennial problem, especially throughout the jack pine forests of northern Alberta, northern and central Saskatchewan, and central and southern Manitoba. Host trees are often deformed and stunted and have reduced vigor and growth, and mortality may occur before tree maturity. Mature stands with heavy,

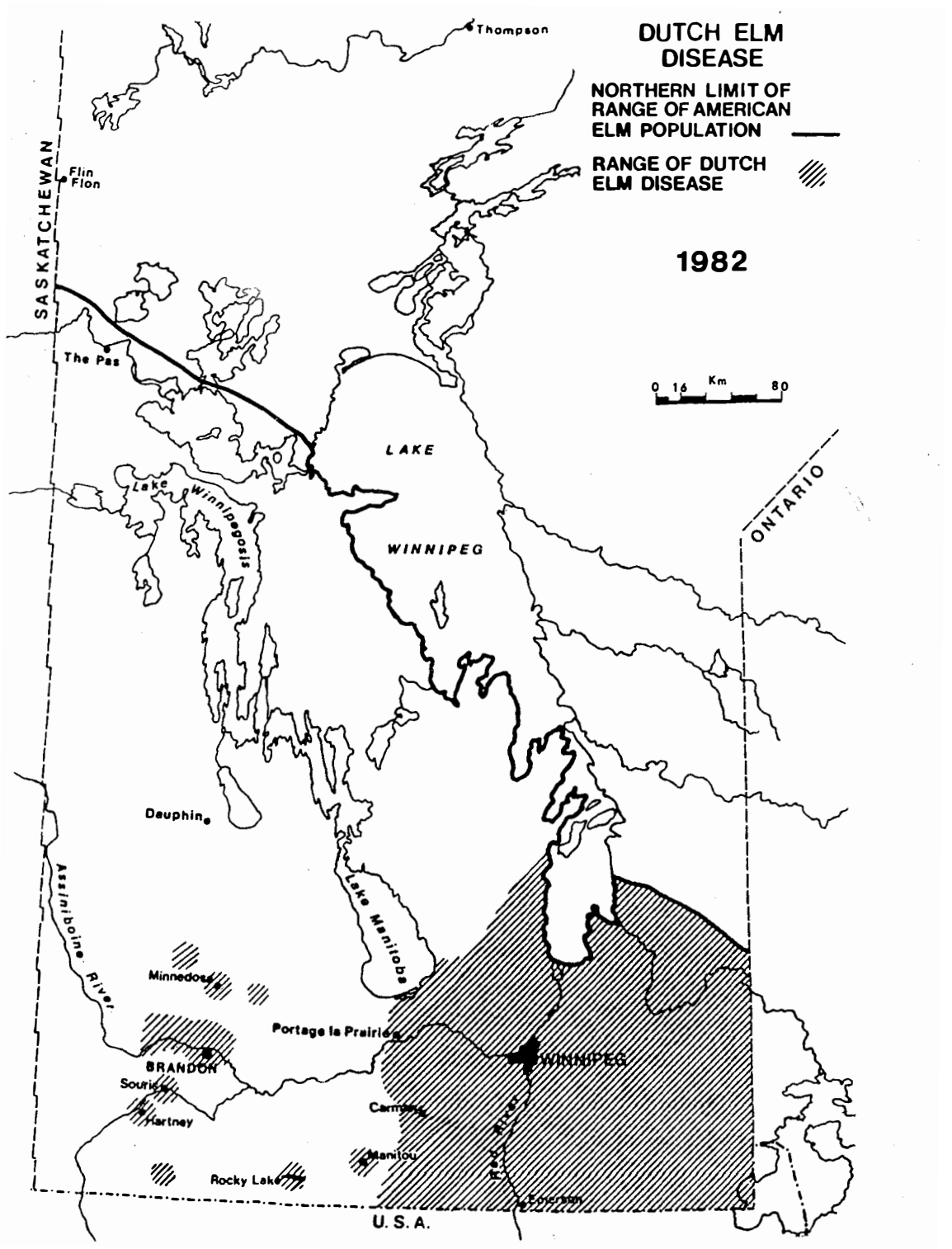

Figure 4. Areas of Dutch elm disease infections in 1982 (from unpublished results of the Dutch Elm Disease Program, Forestry Branch, Manitoba Department of Natural Resources).

long-term infection often have little commercial value for timber products, while young infected stands may require extensive silvicultural treatment to make them productive.

In northeastern **Alberta**, where wildfires burned over extensive tracts of forest land in 1980, 1981, and 1982, many heavily mistletoe-infected jack pine stands were also destroyed. Because the burns are often incomplete, however, small islands of infected trees or scattered individual trees may survive and aid in early dispersal of mistletoe into the new stands of pine regeneration. In 1982 the AFS conducted limited operational trials with bulldozers and hand cutting of trees to remove residual infection sources in test block areas with the objective of increasing stand productivity.

In **Saskatchewan**, FIDS initiated systematic roadside surveys to assess dwarf mistletoe (*A. americanum*) intensity and distribution and established impact plots in jack pine stands in the Nisbet and Fort a la Corne provincial forests. Results of the roadside surveys indicated that in the Nisbet Forest, 53% of the 27 km surveyed was adjacent to mistletoe-infected stands (25% was moderately to severely infected[3]), and 77% of the 2.2 km of immature pine stands studied contained residual infected mature trees, a potential reinfection source. In the Fort a la Corne Provincial Forest, 23% of the 32 km of mature jack pine stands surveyed was mistletoe infected (11% moderate-to-severe), and 10% of the 11 km of immature pine stands examined had residual infected mature trees.

With FIDS acting in an advisory capacity, the Saskatchewan Department of Tourism and Renewable Resources initiated timber cruises in the Nisbet Provincial Forest to determine product utilization and degree of dwarf mistletoe infection. Forest stands were first preselected on the basis of their probable utilization (ties, posts, or pulp) and included only stands of jack pine more than 7 m in height. The jack pine stands assessed in 1982 are within an area of 20 000 ha. The objective of this survey is to define pine stands that are severely infected with dwarf mistletoe and to redirect timber harvesting to them on a priority basis.

In **Manitoba**, the Manitoba Department of Natural Resources remeasured dwarf mistletoe study plots. They also conducted aerial surveys using a FIDS tape-event recorder apparatus to assist in the recording, retrieval, and interpretation of in-flight observations to map mistletoe-infected jack pine stands in the Belair Provincial Forest.

WOOD BORERS

Numerous inquiries were received during 1982 on wood borer problems, which are largely inherent in the salvage of fire-killed timber and the current depressed logging industry. The increase in salvage material and an overall reduction in sales of timber products have resulted in a high proportion of damaged or downgraded material in the market. Severe and extensive forest fires during the past three seasons throughout northern areas of the prairie provinces have helped create favorable breeding conditions for a variety of flatheaded and roundheaded borer species. The most common and damaging species causing wormholes and degrading in white spruce logs is the white-spotted sawyer beetle, *Monochamus scutellatus* (Say). Other species contributing to minor damage, also in white spruce, are *Tetropium cinnamopterum* Kirby, *T. parvulum* Casey, and a *Xylotrechus* sp. Since a large portion of the harvested white spruce is exported to United States markets, the appearance of

[3] Moderate-to-severe infection = more than 33% of the trees infected.

any live or dead larvae or wormholes in the finished wood product is a major cause of concern and complaint.

In one large mill in north-central Alberta, the loss due to downgrading from wormhole damage was estimated at 35-40%. In this case, high populations of *Monochamus* were believed to have originated from heavy blowdown in the Buffalo Head Hills and from fire-killed timber during the spring of 1981. Other problems have arisen from the necessity of mill-yard storage and decking of large volumes of noninfested green-cut logs with fire-killed logs, which are usually infested.

Several large, mature white spruce in a campground area in Kootenay National Park were observed to harbor populations of carpenter ants (*Camponotus* sp.) in the lower stem. Their excavations are contributing to weakened stems and increased risk of blowdown.

LODGEPOLE NEEDLE MINER
Eucordylea (Coleotechnites) starki (Freeman)

The infestation of needle miner in stands of lodgepole pine in the Rocky Mountain national parks remained much the same as that reported in 1981. Medium-to-high populations persisted along the North Saskatchewan River valley in Banff National Park. Specimens from this area submitted to the CFS Biosystematics Unit in Ottawa were first identified and reported as *E. biopes* in 1981 but were later identified as *E. starki*. Adult moths of this population emerged during 1981, whereas other populations of this species in the Rocky Mountain national parks have appeared in even-numbered years. This population differs from those found in other areas of the national parks in that moth flight occurs in odd-numbered years. A low population was present on the lower slopes of Mt. Norquay in Banff National Park.

The infestation along the Vermilion River valley between Marble Canyon and Vermilion Crossing in Kootenay National Park has decreased to a low level.

A BIRCH LEAF SKELETONIZER
Lyonetia species (probably *L. prunifoliella* Hübner)

For the past 2 years moderate-to-severe skeletonizing of white birch was noted along the Kicking Horse valley from near Field to the west gate of Yoho National Park and toward Golden, British Columbia.

Specimens submitted to the Biosystematics Unit in Ottawa were identified as *Lyonetia* species, probably *L. prunifoliella*. This represents a record in North America if confirmed.

LARCH SAWFLY
Pristiphora erichsonii (Hartig)

Moderate-to-severe defoliation of tamarack stands recurred in the Northwest Territories at locations west of the Fort Simpson airport, along the main highways linking Enterprise, Hay River, Fort Resolution, and Fort Smith, and in the Rae, Yellowknife, and Prosperous Lake areas. An introduced European parasite, *Olesicampe benefactor* Hinz, was released near Bell Rock in the Fort Smith area in the spring of 1981 and was recovered from larch sawfly cocoons collected near Bell Rock in the summer of 1981. In 1982, cocoons were collected about 1 km west of this release point. The cocoons were reared, but no evidence of *O. benefactor* was found to confirm its spread in the area.

In west-central Alberta, Saskatchewan, and Manitoba, larch sawfly populations remained at low levels.

NEW OR INTRODUCED PESTS

Field surveys are conducted annually in eastern and southern Manitoba and western Alberta to detect or determine the status of new economically important

species in the prairie provinces. Pheromone-baited traps to detect the European pine shoot moth, *Rhyacionia buoliana* (Schiffermuller), were set out for the second consecutive year in southwestern Alberta, the Cypress Hills area of Saskatchewan, and southern Manitoba. No moths have been recovered, suggesting that the European pine shoot moth has not invaded the prairie provinces. This insect is known to occur in the northwestern United States, southern British Columbia, and parts of Ontario.

The introduced pine sawfly, *Diprion similis* (Hartig), was detected for the first time in southeastern Manitoba. Light-to-moderate defoliation occurred on a Scots pine shelterbelt at Hadashville. Similar defoliation was reported by the Manitoba Department of Natural Resources on Scots pine plantations in Birds Hill Provincial Park, on a nearby private property, and on red and white pines at Granite Lake (Ontario side).

The pinewood nematode, *Bursaphelenchus xylophilus* (Steiner and Buhrer) Nicle, was morphologically identified from samples taken from two recently killed dwarf mistletoe-infected trees in the Belair Provincial Forest in Manitoba (Knowles *et al.* 1983). This is the first report of *B. xylophilus* in Canada. It is believed to be similar to the pinewood nematodes known to cause pine wilt disease in Japan. These nematodes are transmitted to healthy pine twigs by wood boring beetles.

OTHER INSECTS AND DISEASES

Insect or disease	Host	Location	Remarks
Armillaria root rot *Armillaria mellea* (Vahl ex Fries) Kummer	Pine	Prairie provinces	Low but significant tree mortality in natural regeneration and plantations. Manitoba reports levels of infection plus mortality in Scots pine of 26%, 34%, and 40% in 3 plantations.
Bark beetle *Hylurgops rugipennis* (Mannerheim)	Jack pine	NWT	Possibly first record of this species in NWT. Found associated with *Ips pini* in small patches of recently killed jack pine near Fort Smith.
Birch leaf miners *Fenusa pusilla* (Lepeletier) *Heterarthrus nemoratus* (Fallen) *Profenusa thomsoni* (Konow)	Birch species	Prairie provinces	Continued to cause moderate-to-severe foliage injury in most urban centers. Damage was also noted in numerous native birch stands, particularly in northwestern Manitoba, as in 1981.
Chemical injury	Several species	Prairie provinces	Mortality of and injury to nontarget trees and shrubs by agricultural chemicals (herbicides) and soil sterilants) reported in many areas, especially in urban centers.
Comandra blister rust *Cronartium comandrae* Peck	Pine	Alberta	Low level of infections in pine regeneration areas.
European spruce sawfly *Gilpinia hercyniae* (Hartig)	Spruce	Manitoba	Populations increased and have spread to the eastern boundary of Winnipeg.
Fall cankerworm *Alsophila pometaria* (Harris)	Manitoba maple White elm	Manitoba Saskatchewan	Patches of moderate-to-severe defoliation from Winnipeg to Selkirk and in Saskatoon.

Other insects and diseases, continued

Insect or disease	Host	Location	Remarks
Fire blight *Erwinia amylovora* (Burrill) Winslow *et al.*	Apple Cotoneaster Crab apple Hawthorn Mountain ash	Major urban centers	A marked increase of infections reported on planted mountain ash. Infections on other species continued at much the same level as in 1981.
Frost damage	Many species	Prairie provinces and NWT	Frost damage was common in several areas. Damage is attributed to low winter precipitation and adverse temperature fluctation in spring.
Hypoxylon canker *Hypoxylon mammatum* (Wahlenberg) J.H. Miller	Aspen	Prairie provinces	Light-to-moderate infection common throughout host range.
Larch casebearer *Coleophora laricella* Hübner	Larch	Manitoba	Low populations in Manitoba, but absent in Alberta and Saskatchewan.
Lilac leaf miner *Caloptilia (Gracillaria) syringella* (Fabricius)	Lilac	Urban centers	Common in major urban centers; however, a decreased in damage was reported in all areas.
Needle discoloration	Most conifers	Prairie provinces and NWT	The usual incidence of self-pruning needle discoloration and casting occurred across the region. This may have resulted from drought conditions.
Needle droop	Red pine	Manitoba	Needle droop, the result of of physiological drought, was common in 2 young red pine plantations.
Pine root collar weevil *Hylobius warreni* Wood	Pine Spruce	Prairie provinces	Occurs in low numbers in pine and spruce natural regeneration and plantations.

Other insects and diseases, continued

Insect or disease	Host	Location	Remarks
Pitch nodule maker *Petrova albicapitana* (Busck) *P. metallica* (Busck)	Jack pine Lodgepole pine	Prairie provinces and NWT	Caused numerous red tops and branches on young trees.
Porcupine damage	Pine	Prairie provinces and NWT	Numerous conspicuous patches of red trees caused by stem girdling in Saskatchewan and NWT.
Rabbit damage	Lodgepole pine Jack pine Spruce	Prairie provinces	Girdling of regeneration was common in many areas, especially in central Alberta and Saskatchewan.
Red belt injury	Lodgepole pine	Alberta	Red foliage evident in Waterton Lakes National Park, southern Bow-Crow Provincial Forest, and Kananaskis Provincial Park.
Scleroderris canker *Gremmeniella abietina* (Lagerberg) Morelet	Lodgepole pine	Alberta	Found only in known areas in Jasper National Park.
Silver leaf *Stereum purpureum* (Persoon) Fries (≡ *Condrostereum p.*)	Mountain ash Apple Cotoneaster Other species	Urban centers and farmsteads	A notable decrease in reported infections in 1982. Still remains a fairly serious problem in most urban areas.
Spruce gall aphids *Adelges cooleyi* (Gillette) *Pineus similis* (Gillette) *Pineus pinifoliae* (Fitch)	Spruce Pine	Prairie provinces and NWT	Damage by all three species remained at approximately the same level as that reported in 1981.
Spruce needle rust *Chrysomyxa* spp.	Spruce	Prairie provinces and NWT	Common. Medium-to-high infections occurred in west-central Alberta.
Spruce spider mite *Oligonychus ununguis* (Jacot)	Spruce Juniper Cedar	Prairie provinces	A perennial but serious problem in urban centers of the region, especially on mature and semi-mature plantings.

Other insects and diseases, concluded

Insect or disease	Host	Location	Remarks
Transplant injury	Many species	Prairie provinces	Increasingly prevalent in urban areas. Most problems are attributable to improper planting practices and poor quality of planting stock.
Western gall rust *Endocronartium harknessii* (J.P. Moore) Y. Hiratsuka	Lodgepole pine Jack pine	Prairie provinces and NWT	Continues to be one of the more important disease problems in the region, especially in young regeneration and plantations.
White pine weevil *Pissodes strobi* (Peck)	Spruce Pine	Prairie provinces	Infested dead tops common on saplings throughout the region.
Willow leaf miner *Lyonetia* sp.	Willow	Prairie provinces and NWT	Patches of moderate-to-severe damage common in northern Manitoba, central Saskatchewan, and NWT.
Winter drying	Several species	Prairie provinces	A common and major factor causing foliage and branch injury in 1982. The most notable species affected were spruce, juniper, cedar, fir, poplar, and willow.
Yellow-headed spruce sawfly *Pikonema alaskensis* (Rohwer)	Spruce	Prairie provinces and NWT	A general increase in damage reported from all areas, especially urban areas. Low-to-medium populations persisted in Manitoba, Saskatchewan, and Alberta.

SELECTED PUBLICATIONS AND REPORTS

The following reports and publications produced in 1982 by the Forest Insect and Disease Survey and other staff at the Northern Forest Research Centre may be of interest to readers of this report.

Cerezke, H.F. 1982. Insects and diseases: present status and what must be done to meet Saskatchewan's potential. Pages 108-125 *in* Forest Congress '82: the Saskatchewan potential. Saskatchewan Forestry Association, Prince Albert, Saskatchewan.

Hall, R.J. (Compiler). 1982. Uses of remote sensing in forest pest damage appraisal. Proceedings of a seminar held May 8, 1981, in Edmonton, Alberta. Environ. Can., Can. For. Serv., North. For. Res. Cent. Edmonton, Alberta. Inf. Rep. NOR-X-238.

Hiratsuka, Y., H.F. Cerezke, B.H. Moody, J. Petty, and G.N. Still. 1982. Forest insect and disease conditions in Alberta, Saskatchewan, Manitoba, and the Northwest Territories in 1981 and predictions for 1982. Environ. Can., Can. For. Serv., North. For. Res. Cent. Edmonton, Alberta. Inf. Rep. NOR-X-239.

Ives, W.G.H., J.A. Muldrew, and R.M. Smith. 1982. Experimental aerial application of forest tent caterpillar baculovirus. Environ. Can., Can. For. Serv., North. For. Res. Cent. Edmonton, Alberta. Inf. Rep. NOR-X-240.

Moody, B.H. 1982. The role, informational requirements, and pest problems of the forest insect and disease survey. Pages 43-50 *in* R.J. Hall (Compiler). Uses of remote sensing in forest pest damage appraisal. Proceedings of a seminar held May 8, 1981. Environ. Can., Can. For. Serv., North. For. Res. Cent. Edmonton, Alberta. Inf. Rep. NOR-X-238.

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Beaubien, Y. 1982. Spruce budworm egg mass survey, 1982. Manit. Dep. Nat. Resour. For. Branch. Winnipeg, Manitoba. For. Pest Manage. Rep. 82-7.

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