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FOREST INSECT AND DISEASE CONDITIONS IN ALBERTA, SASKATCHEWAN, MANITOBA, AND THE NORTHWEST TERRITORIES IN 1981 AND PREDICTIONS FOR 1982

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ABSTRACT

No new major forest insect or disease problems developed in 1981 in the three prairie provinces and the Northwest Territories, although there were significant new infestations of the mountain pine beetle in Kootenay and Yoho national parks and the Cypress Hills. Significant extensions of mountain pine beetle infestations were recorded in planted pines at scattered locations throughout the agricultural-prairie zone of southern Alberta and southwestern Saskatchewan. The total forested area affected by the beetle was estimated to be about 77.5 km^2, the same as in 1980.

Spruce budworm populations declined further in Manitoba, and only small infestations of moderate-to-severe defoliation were observed in several locations. No defoliation was recorded elsewhere in the region except for small patches in Edmonton, Alberta.

Large areas of moderate-to-severe defoliation (about two-thirds of which were in agricultural zones) caused mostly by the forest tent caterpillar were again prominent in the region. Estimated defoliated areas totalled 121 000 km^2 in Alberta; 82 000 km^2 in Saskatchewan; 1000 km^2 in the Northwest Territories; and less than 1000 km^2 in western Manitoba.

No significant infestations of jack pine budworm occurred in Saskatchewan and Manitoba.

A lodgepole needle miner (*Eucordylea biopes* Freeman) and Meria needle blight of larch (*Meria laricis* Vuillemin) were reported for the first time in the region.

RESUME

En 1981, les insectes nuisibles et les maladies des arbres forestiers n'ont pas causé de nouveaux problèmes d'importance dans les provinces des Prairies et les Territoires du Nord-Ouest. Toutefois, il s'est produit de nouvelles et sérieuses infestations du dendroctone du pin ponderosa dans les parcs nationaux Kootenay et Yoho ainsi que dans le parc provincial des collines Cyprès; on a signalé que ces infestations s'étaient accrues de facon considérable dans certaines plantations de pins disséminées dans la région cultivée des prairies du sud de l'Alberta et du sud-ouest de la Saskatchewan. On a estimé à 77.5 km^2 la superficie totale ainsi ravagée, soit la même qu'en 1980.

Les populations de la tordeuse des bourgeons de l'épinette ont de nouveau diminuè au Manitoba, et, en plusieurs endroits, on n'a signalé que de faibles infestations qui ont causé une défoliation de modérée à grave. On n'a pas constaté de défoliation ailleurs dans la région, sauf certains îlots mineurs à Edmonton, en Alberta.

Il y a encore eu défoliation de modérée à grave, surtout causée par la livrée des forêts, sur de grandes superficies; les deux tiers des régions ravagées étaient dans des zones agricoles. On a estimé que les dégâts s'étendaient sur 121 000 km^2 en Alberta, 82 000 km^2 en Saskatchewan, 1000 km^2 dans les Territoires du Nord-Ouest et moins de 1000 km^2 dans l'ouest du Manitoba.

Il ne s'est pas produit d'infestations importantes de la tordeuse du pin gris en Saskatchewan et au Manitoba.

On a signalé pour la première fois dans la région la présence d'une mineuse du pin tordu (*Eucordylea biopes* Freeman) et la brûlure des aiguilles du mélèze (*Meria laricis* Vuillemin).

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INTRODUCTION

This report summarizes forest insect and disease conditions in Alberta, Saskatchewan, Manitoba, and the Northwest Territories in 1981 and provides predictions of the infestation levels of major insect pests for 1982. Surveys were conducted mainly by the staff of the Forest Insect and Disease Survey (FIDS) of the Northern Forest Research Centre, Canadian Forestry Service, with the cooperation of personnel from many federal, provincial, and municipal agencies.

We would like to acknowledge the assistance and cooperation of many individuals from the following agencies:

Alberta Agriculture
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Alberta Parks and Recreation
City of Edmonton
City of Prince Albert
City of Saskatoon
Department of Northern Saskatchewan
Manitoba Agriculture
Manitoba Department of Mines, Natural Resources and Environment
Parks Canada
PFRA Tree Nursery
Saskatchewan Agriculture
Saskatchewan Department of Tourism and Renewable Resources

FIDS staff for the 1981-82 fiscal year were as follows:

H.F. (Herb) Cerezke, Entomologist
J. (Jim) Emond, Senior Technician (Pest Extension Service)
H. (Howie) Gates, Entomology Technician
M. (Mike) Grandmaison, Insect/Disease Ranger
Y. (Yasu) Hiratsuka, Mycologist, Head FIDS
P.J. (Paul) Maruyama, Mycology Technician
B.H. (Ben) Moody, Damage Appraisal Officer
J. (Jack) Petty, Senior Technician (Field Surveys)
D. (Dianne) Szlabey, Insect Taxonomy Technician
G.N. (Gary) Still, Insect/Disease Ranger
R.C. (Craig) Tidsbury, Insect/Disease Ranger
H.R. (Dick) Wong, Insect Taxonomist
Two summer students (David Wade and Robert Knight) also worked for FIDS in 1981.

The following descriptions of pests are arranged more or less according to national and regional importance. Brief remarks on other noteworthy insects and diseases appear in the table on pages 9-11.

SPRUCE BUDWORM

Choristoneura fumiferana (Clemens)

There was a further general decline in spruce budworm populations in all regions in Manitoba in 1981. In the Interlake region, a small area of moderate-to-severe defoliation occurred near Moosehorn and east of Gypsumville and light defoliation was noted near Ashern and Waterhen. Similar defoliation patches occurred in scattered small woodlots along the west side of Lake Winnipeg from Riverton south to Sandy Hook. East of Lake Winnipeg, small infestations of moderate-to-severe defoliation were observed near Dorothy Lake in Whiteshell Provincial Park. Light defoliation was recorded in Poplar Bay at Lac du Bonnet and along Highway 304 near Sandy River and Wanipigow Lake. In northern Manitoba a small infestation of moderate defoliation was recorded at the Grass River Provincial Campsite on the west side of Wekusko Lake. In Riding Mountain National Park, light defoliation occurred along the south shore of Clear Lake from Wasagaming to Highway 10, a further decline from 1980.

The Manitoba Department of Natural Resources conducted a spray test with *Bacillus thuringiensis*, Dipel 88, aerially applied over 365 ha at 20 BIU/ha in 5.6 L of solution on spruce forest at Hecla Island Provincial Park. Budworm larval populations were reduced significantly and foliage protection was achieved.

Egg-mass surveys conducted in various locations in Manitoba indicate that budworm population levels generally will be lower than in 1981 and are expected to range mostly from nil to moderate (Table 1).

Table 1. Average spruce budworm egg-mass densities and predicted 1982 damage for Manitoba

Location	Egg masses per 10 m^2 of foliage	1982 damage forecast
Interlake region		
Moosehorn	18	Light
Waterhen	26	Light to moderate
Gypsumville	29	Light to moderate
Lake St. George	64	Moderate
Jackhead Harbour	52	Moderate
Arborg	6	Light
Southeastern Manitoba		
Lac du Bonnet	46	Light to moderate
Belair Provincial Forest	0	Nil
Wanipigow Lake	0	Nil
Northern Manitoba		
Wekusko Lake (two locations)	26, 119	Light, severe
Simonhouse Lake	0	Nil
Bakers Narrows	0	Nil
Riding Mountain National Park (seven locations)	0-7	Nil to light

No areas of defoliation were recorded in Saskatchewan, but in Alberta moderate-to-severe spruce budworm defoliation occurred in a few patches in Edmonton, where the current budworm outbreak began in 1979. Aerial and ground surveys were also conducted in Wood Buffalo National Park, near Fort Simpson, and along the Little Buffalo and Slave rivers in the Northwest Territories and in the Athabasca Forest of Alberta, but no noticeable defoliation was detected. The last significant budworm infestation in Alberta, in the Athabasca Forest, collapsed in 1980.

JACK PINE BUDWORM

Choristoneura pinus pinus Freeman

In Saskatchewan, jack pine budworm populations further declined in 1981 and remained very low in Nisbet and Torch River provincial forests. The infestation in a plantation near Senlac collapsed. Egg-mass samples collected in three areas of the Nisbet Provincial Forest indicated that light defoliation might occur in 1982 in the area north of Prince Albert.

No defoliation was recorded in Manitoba this year. Branch samples for egg-mass counts were collected in 10 locations, but the results were all negative.

ASPEN DEFOLIATORS

Primarily the forest tent caterpillar, *Malacosoma disstria* Hübner, and the large aspen tortrix, *Choristoneura conflictana* (F. Walker)

In 1981, moderate-to-severe defoliation of trembling aspen was mapped over an estimated 121 000 km^2 in Alberta (an increase of 46 000 km^2 from 1980), 82 000 km^2 in Saskatchewan (a decrease of 46 000 km^2 from 1980), and 1000 km^2 in the Northwest Territories (not surveyed in 1980) (Fig. 1). The total area affected in Manitoba was relatively small, less than 1000 km^2 (Fig. 1). The Alberta increase in part was due to increased aerial surveillance in 1981. Many of the aspen forests, particularly in northern areas, are not regularly surveyed due to remoteness and other circumstances.

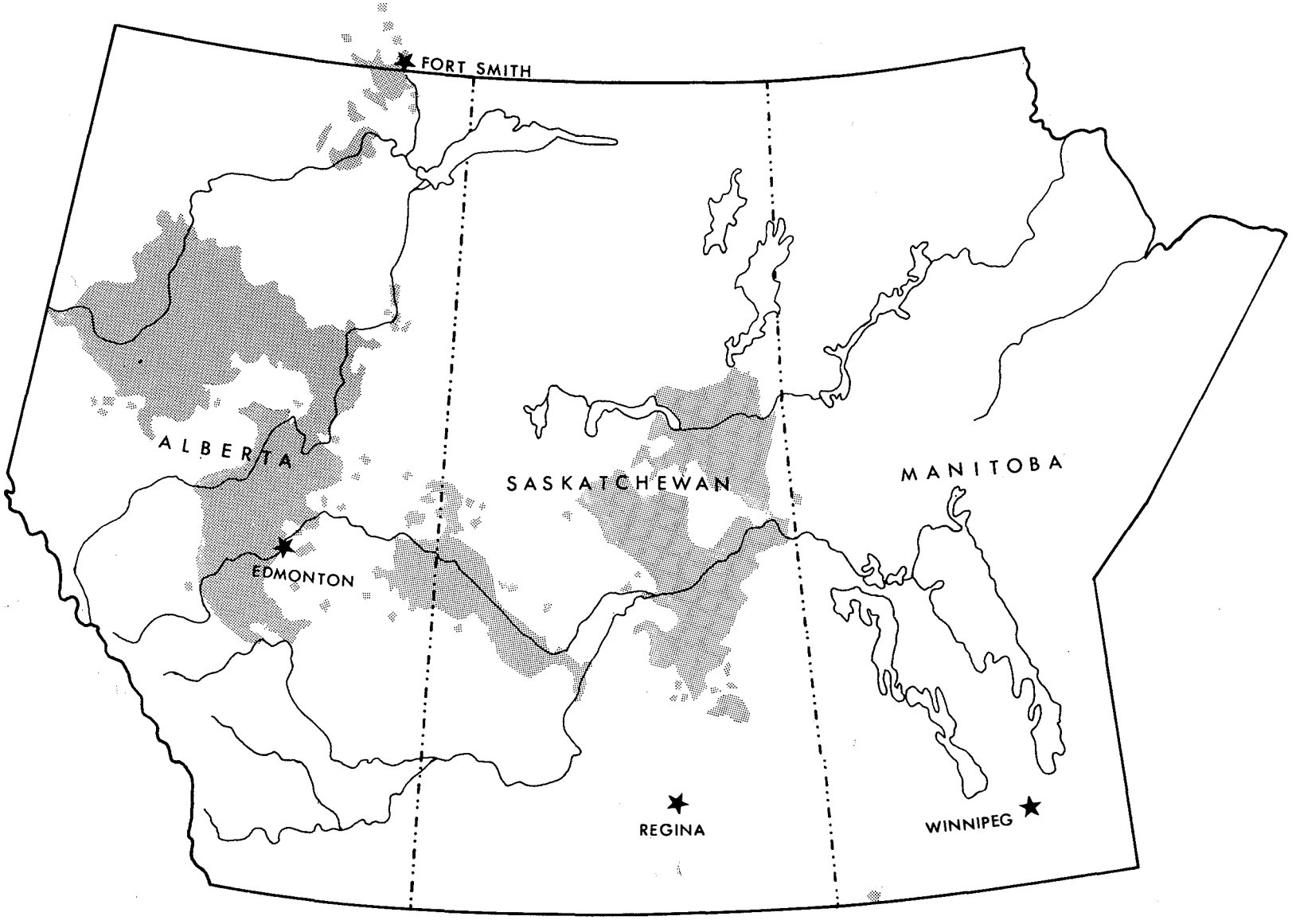

Figure 1. Areas of moderate-to-severe defoliation of trembling aspen by the forest tent caterpillar, large aspen tortrix, and Bruce spanworm in 1981, determined by aerial and ground surveys.

The forest tent caterpillar was again the major defoliator across the region, except in the Northwest Territories and Wood Buffalo National Park, where the large aspen tortrix predominated. The Bruce spanworm, *Operophtera bruceata* (Hulst), which was abundant and widespread in Alberta in 1980, declined significantly in 1981. The early aspen leaf curler, *Pseudexentera oregonana* Walsingham, was again recorded in most aspen stands across the region. A green fruitworm, *Orthosia hibisci* Guenée, and the linden looper, *Erannis tiliaria* (Harris), were again abundant in the Lesser Slave Lake area.

The recurring infestations have had their greatest impact in the agricultural zones, which comprised roughly two-thirds of the total area defoliated in 1981. Trembling aspen as well as many other deciduous tree species were affected. Considerable money has been spent on control measures in parks and recreation areas and to reduce damage to ornamentals, but radial growth losses and tree mortality in commercial aspen forests have not been serious enough to warrant any pest management program.

Forest tent caterpillar egg-band surveys were conducted in Manitoba, Saskatchewan, and Alberta to predict infestation levels in 1982. The results indicate that defoliation intensity and distribution in Saskatchewan and Alberta may be similar to what occurred in 1981. Populations are again increasing in western and northern Manitoba. Moderate-to-severe defoliation is predicted for Turtle Mountain Provincial Park and between Flin Flon and The Pas in 1982.

MOUNTAIN PINE BEETLE

Dendroctonus ponderosae Hopkins

The mountain pine beetle infestations in lodgepole pine stands reported in 1980 showed little expansion into new areas in 1981 but did intensify in most of the area mapped. Significant new infestations were reported in Kootenay and Yoho national parks (Fig. 2) and in localized stands in the Cypress Hills, and a general reinvasion and/or local buildup occurred in the provincial forest north of Blairmore. Although up to and including 1980 the total forested area affected by beetle-killed trees had grown to an estimated 77.5 km^2, it increased little in 1981; however, the total number of beetle-killed trees increased about one and one-half times.

Provincial Forest Lands: The main forested area of the current mountain pine beetle outbreak extends in Alberta from the United States border north about 120 km and includes Waterton Lakes National Park and the Bow-Crow Provincial Forest (Fig. 2). Within this forested area, two zones of infestation are recognized for purposes of provincial management: the first zone extends from Waterton Lakes National Park north to the Crowsnest Pass at Blairmore, and the second zone extends northward from Blairmore. In the first zone, beetle infestations have developed rapidly since 1977 when first detected, and by 1979 the outbreak was essentially beyond control. Plans for salvage of beetle-killed trees were then considered. In 1981 several new small infestations appeared, but most of the expansion resulted from intensification and coalescing of infestations already evident in 1980. No estimates were made of the number of 1980-attacked trees newly identified in 1981 as having red crowns. The Alberta Forest Service, however, estimated that 283 000 m^3 of lodgepole pine had been killed by the beetle up to 1981 in the zone between Blairmore and Waterton Lakes National Park. Of this, about 37% or 106 000 m^3 was salvaged for lumber and other wood products in 1980-81. Some of the remaining 177 000 m^3 is planned for salvage, but a large portion is unsalvagable due to deterioration, inaccessibility, unmerchantability, and environmentally sensitive areas. Aerial photography taken of the outbreak area in 1981 by the Alberta Forest Service will help to provide a more complete assessment of beetle-killed losses.

In the second infestation zone, numerous small scattered infestations were identified in 1980, and a control program was immediately implemented by the Alberta Forest Service to attempt containment and prevent northward spread. This resulted in the removal of about 1600 pocket infestations and 16 000 trees. Destruction of the beetle broods was by log burning, bark

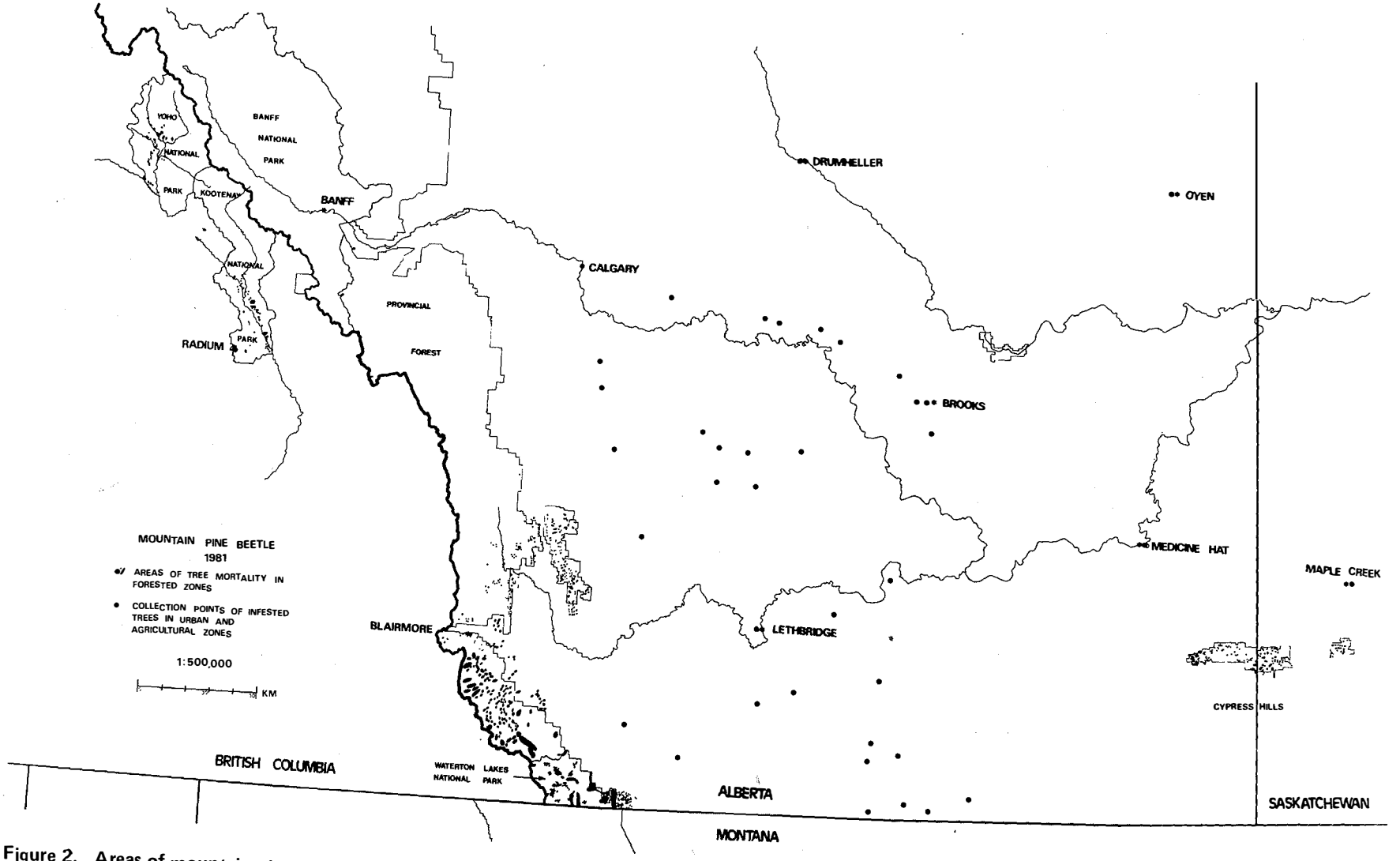

Figure 2. Areas of mountain pine beetle infestations in 1981.

peeling, and processing the logs into lumber and chipping the slabs. In 1981, the control program was continued with further removal of over 3000 infestation pockets and about 26 000 beetle-attacked trees. Tree removal by sanitation cuttings was augmented in difficult terrain with the use of helicopters. The infestation pockets removed in late 1980 and 1981 were widely distributed throughout the Porcupine Hills and Livingstone Range (Fig. 2) and are believed to have resulted from both reinvasion of beetles from the west and southwest and local buildup.

Indian Reserves: During 1981, control operations were extended into the Peigan Indian Reserve, immediately south of the Porcupine Hills, where over 700 beetle-attacked trees were removed. In the Blood Indian Reserve east of Waterton Lakes National Park, further intensification of infestations occurred, but no control action was taken.

National Parks: Aerial surveys were conducted in Banff and Jasper national parks, but no infestations were observed. In Yoho National Park, about 55 infestations were mapped with an estimated 1500 or more 1980-killed trees. Main areas of infestation were along the Emerald, Amiskwi, Otterhead, and Kickinghorse rivers, and on Tocher Ridge, Horne Ridge, Mt. Burgess, and Mt. Hunter. In two additional patches of dead pine on Mt. Stephen porcupine feeding was confirmed as the causal agent.

In Kootenay National Park similar increases in infestations occurred as in Yoho and are distributed in the southern half of the park northward to Kootenay Crossing. About 55 infestations were mapped with an estimated 2400 1980-killed trees. Most infestations are distributed along the valley adjacent to the Kootenay River, near the confluence of the Vermilion River and near Radium. One large infestation at the north end of the outbreak near Kootenay Crossing has had 79, 94, and 245 trees attacked respectively prior to 1980, in 1980, and in 1981. This infestation will be treated by selective tree removal.

In Waterton Lakes National Park, the number of beetle-killed trees increased considerably over that reported in 1980; the most notable increases were above the Waterton Park townsite, along the Cameron Creek valley, adjacent to Blakiston Creek, and in the Belly River valley. At least 85% of the pine component has been killed in some stands. Ground surveys of beetle survival and attacked trees in 1981 both indicate a declining trend in the park, and this is expected to continue in 1982. A similar trend seems likely in the forested area northward to the Crowsnest Pass. In Kootenay and Yoho national parks, however, a continued expansion of the outbreak is expected in 1982.

Provincial Parks: New infestations were reported in provincial parks, most notably in the Cypress Hills in both Saskatchewan and Alberta portions and in Beauvais Provincial Park, Alberta. In the central and western Cypress Hills blocks of Saskatchewan, 132 red-topped (mostly 1980-attacked) trees were mapped in 82 infestations. A control program under way since 1980 has resulted in the removal of over 500 beetle-attacked trees.

In the Alberta portion of the Cypress Hills, over 1000 red-topped trees (mostly 1979-80 attacked) were mapped in more than 500 scattered infestations. In a recently completed ground survey on 1616 ha, 748 infested trees (1979-81 attacked) were identified in 365 infestations, or an average of 2.05 trees per infestation. Data from this survey and from a spring beetle population assessment indicates that for 1981-82 the outbreak is static to slightly increasing. The current control program is expected to significantly reduce this trend in 1982.

Nonforested Areas: A survey was conducted in the prairie zone of southern Alberta and southwestern Saskatchewan to determine the extent and pattern of beetle dispersal into nonforested areas. Locations surveyed included park areas, campgrounds, urban centers, farm shelterbelts, cemeteries, and other areas of planted pine. Beetle-killed and/or beetle-attacked trees were identified in 38 locations (Fig. 2), indicating a long-range dispersal potential of 200-300 km from the nearest major infestation. The most common tree species affected was Scots pine, and a few lodgepole pine and at least one mugho pine

were also affected. Most mortality occurred on trees older than 20-25 years and with stem diameters greater than 6-8 cm. Much of the dispersal appears to have occurred in 1979. It is believed that the long-range dispersal was assisted by the late summer prevailing wind flow pattern from the west to southwest.

SPRUCE BEETLE

Dendroctonus rufipennis (Kirby)

Populations of spruce bark beetle in Waterton Lakes National Park have remained endemic for several years but increased noticeably in 1980 and 1981. On the east side of Cameron Lake and along the trail to Summit Lake, 14 beetle-killed trees plus several green, infested trees were found in 1981 compared to 5 in 1980. Many of the spruce in the area are overmature and some blowdown has occurred, which probably contributed to the population buildup. More-extensive surveys along the Alberta foothills are planned for 1982.

DUTCH ELM DISEASE

Ceratocystis ulmi (Buisman) C. Moreau

According to the Manitoba Department of Mines, Natural Resources and Environment and Manitoba Agriculture, infections of Dutch elm disease (DED) continued to increase and spread in 1981 in Manitoba. Previously reported in 18 municipalities in 1980, it has now been confirmed in an additional 22 areas. In Winnipeg a marked increase in the number of diseased trees was evident: 757 trees were confirmed infected in 1981 compared to 313 trees in 1980. In Brandon, 298 trees were diagnosed as having DED in 1981, whereas only 106 newly infected trees were recorded in 1980. Several other areas with new infections were Souris, Portage la Prairie, Morris, Steinback, and Hartney. A slight increase in the number of smaller European elm bark beetles, *Scolytus multistriatus* (Marsham) was noted during 1981 in Winnipeg.

In Saskatchewan in 1981, elm bark beetle surveys were conducted by the PFRA Tree Nursery at Indian Head, Saskatchewan Agriculture, and the Department of Tourism and Renewable Resources. For the first time, the Manitoba Agriculture laboratory in Winnipeg confirmed DED in a single tree in a cemetery in Regina. No evidence of DED was reported in other areas of the province where the native elm bark beetle occurs.

In Alberta, surveys of the two bark beetle species were conducted by Alberta Agriculture and the Canadian Forestry Service in the south and southeastern areas of the province. Elm trap logs and pheromone-baited sticky traps were located in shelterbelts and ornamental and boulevard elms in both rural and urban areas. Neither beetle species was detected.

WOOD BORERS

A large number of inquiries were again received in 1981 on wood borers causing damage, especially in fire-killed coniferous timber. Most of the inquiries concerned the white-spotted sawyer beetle, *Monochamus scutellatus* (Say), which causes worm-hole damage in weakened or freshly killed trees.

Severe forest fire conditions experienced throughout the northern halves of all three prairie provinces in 1980 resulted in extensive programs of timber salvage. Invasion of the fire-killed timber by large populations of the sawyer beetle was common in many stands of white spruce, black spruce, and jack pine. In one 54 000-ha area burned near Kipahigan Lake in northwestern Manitoba, a survey was conducted in April 1981 by the Manitoba Department of Natural Resources, Manitoba Forest Resources, and the Canadian Forestry Service to assess the abundance of the sawyer beetle in merchantable timber. The results indicated that high densities of *M. scutellatus* larval holes were common throughout most of the burn areas. Consequently up to a 30% loss in value can be expected due to downgrading because of worm-hole damage and checks and splits on severely burned trees.

In east-central Saskatchewan where 182 000 ha burned in 1980, salvage logs were divided into three hazard classes in order to

minimize losses due to wood borers and checking. Some log decks also received protective treatments of water and insecticidal sprays.

Wood-borer damage and checking are expected to be high again in 1982 as a result of the extreme forest fire conditions in 1981. In Alberta alone, over 1500 fires destroyed a record high of more than 526 000 ha of forests, mostly in the northern part of the province.

Other concerns related to log protection against wood-borer attack, especially in stored log decks and in whole logs processed for house and other building construction.

LODGEPOLE NEEDLE MINERS

Eucordylea biopes Freeman and
Eucordylea (Coleotechnites) starki Freeman

Discoloration of lodgepole pine foliage in the northern part of Banff National Park was brought to our attention by park wardens. A medium-to-high population of *Eucordylea biopes* and a moderate incidence of a needle cast, *Lophodermella concolor* (Dearness) Darker, were responsible for the damage. The infestation occurred over about 1200 ha on the lower slopes of Mt. Saskatchewan, Mt. Coleman, and Mt. Wilson, centering near the mouth of the Alexandra River valley. Light infestations of the needle miner extended from this area up the North Saskatchewan River valley to Nigel Creek and down to Saskatchewan Crossing. This is the first reported occurrence of *E. biopes* in Alberta. Previously this insect has been recorded only in the Cypress Hills, Saskatchewan.

Eucordylea starki was again present in Kootenay National Park along the Vermilion River valley between Ochre Creek and Vermilion Crossing. Discoloration due to needle mining was not evident in 1981, although medium populations were present. Low populations were reported near the Spiral Tunnels, Yoho National Park, and below the ski area on Mt. Norquay in Banff National Park.

SCLERODERRIS CANKER

Gremmeniella abietina (Lagerberg) Morelet

Banff and Jasper national parks as well as several areas in the foothills were surveyed, but the disease was not found outside of the known area in Jasper National Park. No survey was conducted along the Manitoba-Ontario border in 1981.

DWARF MISTLETOES

Arceuthobium americanum Nuttal ex Engelmann on jack pine and
Arceuthobium pusillum Peck on white spruce

Dwarf mistletoe on jack pine is a perennial problem throughout pine forests of the region. Host trees are often deformed and stunted and have reduced vigor and growth; mortality may occur before tree maturity. Mature stands with heavy, 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 1981 the Manitoba Department of Mines, Natural Resources and Environment established field study plots in infected jack pine and white spruce in the Belair Provincial Forest, Grand Beach Provincial Park, and Spruce Woods Provincial Forest to evaluate sanitation treatments aimed at reducing infection and spread of mistletoe.

In northeastern Alberta where wildfires burned over extensive tracts of forest land in 1980 and 1981, many jack pine stands heavily infected with mistletoe were also destroyed. Because the burns are often incomplete, 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. The Alberta Forest Service is considering experimenting with fire and/or other silvicultural techniques to remove residual infection sources in test block areas with the objective of increasing stand productivity.

LARCH SAWFLY
Pristiphora erichsonii (Hartig)

Numerous stands of tamarack along the Slave and Little Buffalo rivers near the Alberta-Northwest Territories boundary had moderate-to-severe sawfly defoliation. The most extensive area was southeast of Resolution Bay. Similar defoliation was observed west of the Fort Simpson airport and at numerous points along Highway 5 between Hay River and Fort Smith. In Wood Buffalo National Park moderate-to-severe defoliation of tamarack was observed near Fort Fitzgerald, near Four Mile Lake, and east of Carlson's Landing.

In the Marlboro-Obed area of west-central Alberta, larch sawfly populations declined for the second consecutive year. Defoliation was generally light, with only a few scattered trees having 50% or more defoliation. The parasite *Olesicampe benefactor* Hinz was released in this area in 1975. Up to 99% of the larvae collected from the release area and 84% of the larvae collected 12 km east of the release area were parasitized in 1981.

In Saskatchewan and Manitoba, larch sawfly populations remained at very low levels.

MERIA NEEDLE BLIGHT OF LARCH
Meria laricis Vuillemin

This disease was identified in the region for the first time on alpine larch (Highwood Pass area of Kananaskis Provincial Park on 1962 and 1981 samples) and western larch (Settlers Road, Kootenay National Park on a 1954 sample).

OTHER INSECTS AND DISEASES

Insect or disease	Host	Location	Remarks
Armillaria root rot *Armillaria mellea* (Vahl ex Fries) Kummer	Pine	All areas	Low but significant tree mortality in natural regeneration and plantations.
Birch leaf miners *Fenusa pusilla* (Lepeletier) *Heterarthrus nemoratus* (Fallen) *Profenusa thomsoni* (Konow)	Birch species	Urban centers	Common in most urban centers on planted birch and in native stands. Injury caused by *P. thomsoni* noted in the Clearwater Lake and Flin Flon area and between Simonhouse and Snow Lakes in Manitoba.
Chemical injury	All species	All areas	Mortality of and injury to nontarget trees and shrubs by agricultural chemicals (herbicides and soil sterilants) are increasing each year, especially in urban centers.

OTHER INSECTS AND DISEASES, continued

Insect or disease	Host	Location	Remarks
Comandra blister rust *Cronartium comandrae* Peck	Pine	Alberta	Very low incidence in pine regeneration areas.
European spruce sawfly *Gilpinia hercyniae* (Hartig)	Spruce	Manitoba	More abundant in Manitoba and has spread to the west and north.
Fire blight *Erwinia amylovora* (Burrill) Winslow *et al.*	Apple, cotoneaster, crab apple, hawthorn, mountain-ash, pear, etc.	Major urban centers	Infections remained at the same level as in 1980. Damage was reduced probably as a result of the warm, dry weather in the summer.
Frost damage	All species	All areas	Frost damage and winter drying were common in all areas. Damage attributed to low winter precipitaton and adverse temperature fluctuation in spring.
Larch casebearer *Coleophora laricella* Hübner	Larch	Manitoba	The population declined in Manitoba, and it still was not detected in Alberta or in Saskatchewan.
Lilac leaf miner *Gracillaria syringella* (Fabricius)	Lilac	Urban centers	Common in major urban centers; however, a decrease in damage was reported in all areas.
Needle discoloration	Most conifers	All areas	The usual incidence of self-pruning needle discoloration and casting occurred across the region. This may have resulted from drought conditions.
Pine root collar weevil *Hylobius warreni* Wood	Pine, spruce	Most forested areas	Occurred in low numbers in pine and spruce natural regeneration and plantations.

OTHER INSECTS AND DISEASES, continued

Insect or disease	Host	Location	Remarks
Rabbit damage	Lodgepole pine	Alberta	Girdling of regeneration was common in many areas, especially in central Alberta.
Silver leaf *Stereum purpureum* (Persoon) Fries (≡*Condrostereum p.*)	Mountain-ash, apple, cotoneaster, other species	Urban centers and farmsteads	Increased reported incidence over 1980 season.
Spruce gall aphids *Adelges cooleyi* (Gillette) *Pineus similis* (Gillette) *Pineus pinifoliae* (Fitch)	Spruce	All areas	A slight decrease in infestation reports but remained common on mature and ornamental plants in all areas.
Spruce spider mite *Oligonychus ununguis* (Jacot)	Spruce, juniper, cedar	All areas	A perennial problem and becoming more of a serious problem in urban centers of the region, especially on mature and semimature plantings.
Transplant injury	Many species	All areas	Increasingly prevalent in urban areas. Most problems are attributable to improper planting practices and poor quality of planting stock.
Winter drying (see Frost damage)			
Western gall rust *Endocronartium harknessii* (J.P. Moore) Y. Hiratsuka	Lodgepole pine, jack pine	All areas	Continues to be one of the more important disease problems in the region, especially in young regenerations and plantations.
Yellow-headed spruce sawfly *Pikonema alaskensis* (Rohwer)	Spruce	All areas	A general increase in damage reported from all areas, especially urban areas. Low-to-medium populations persisted in Manitoba.