ANNUAL DISTRICT REPORTS
FOREST INSECT AND DISEASE SURVEY
ALBERTA REGION
1964

INFORMATION REPORT

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

CALGARY, ALBERTA

DEPARTMENT OF FORESTRY

FOREST ENTOMOLOGY AND PATHOLOGY BRANCH

March, 1965

ANTHONY MACHUK

Anthony Machuk, Supervisor of the Northern Division of the Forest Insect and Disease Survey for the Alberta-Northwest Territories Region was killed in a flying accident near Fort Rae, N.W.T. on August 25, 1964. He was born at Rembrandt, Manitoba on January 25, 1920, attended Public and High schools at Gretna, Manitoba, and served with the Canadian Army from 1940 to 1945, being overseas for 4 years. He was employed as a Conservation Officer with the Manitoba Department of Mines and Natural Resources from 1945 to 1955 when he resigned to join the staff of the Forest Insect and Disease Survey at Winnipeg. In 1960 he transferred to Calgary to take over supervisory duties in the Survey's Northern Division. He is survived by his wife, Elvera, a daughter, Mrs. Beverley MacPherson of Vancouver, 2 sons, Stanley aged 18 and Douglas aged 15, and 2 grandchildren.

Tony's organizing ability, attention to detail and powers of observation resulted in valuable contributions to the Survey and to the Department. His enthusiasm for his work, his quiet competence and his wide outdoor experience made him an interesting and pleasant companion. He is sorely missed by his friends and associates.

ANNUAL DISTRICT REPORTS

ALBERTA

(Forest Insect and Disease Survey)

by

J. K. Robins, N. W. Wilkinson, F. J. Emond, J. Petty,

V. B. Patterson, R. W. Barry, G. Smith,

E. J. Gautreau, A. Machuk

INFORMATION REPORT 1964

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

CALGARY, ALBERTA

(Based on investigations carried out in 1964)

DEPARTMENT OF FORESTRY

FOREST ENTOMOLOGY AND PATHOLOGY BRANCH

March, 1965

INTRODUCTION

Field technicians of the Forest Insect and Disease Survey for the Alberta Region were engaged in field activities from early May until mid-October in 1964. During this period, 1,904 insect and 631 disease samples were made. The weather during the field season was abnormally cool with some localized excesses of rainfall. In the Grande Prairie area, twice the normal precipitation occurred, restricting travel to main roads. As in the past few years, the major insect pests were the spruce budworm, the forest tent caterpillar and the larch sawfly.

Mr. R. W. Barry joined the field staff in the winter of 1964 to fill a position that had been vacant since 1962. This brought the field staff up to its normal complement of 8 men who were assigned district and regional responsibilities as follows:

Southern Division
Supervisor - J. Petty

District 1.	Crowsnest-Bow River	N. W. Wilkinson
District 2.	Clearwater	F. J. Emond
District 3.	National Parks	J. Petty

Central Division
Supervisor - V. B. Patterson

District 4.	Brazeau-Athabasca	V. B. Patterson
District 5.	Lac la Biche	R. W. Barry

Northern Division
Supervisor - A. Machuk

District 6.	Slave Lake-Grande Prairie	G. J. Smith
District 7.	Peace River	E. J. Gautreau
District 8.	Northwest Territories	A. Machuk

SUMMARY OF INSECT AND DISEASE CONDITIONS

Spruce Budworm, Choristoneura fumiferana (Clem.)

Spruce budworm populations were again high throughout most of the outbreak areas in northern Alberta and the Northwest Territories. Some extensions in the Wabasca River and Slave River outbreaks occurred. The effects of the repeated moderate to severe defoliation of many white spruce stands along the Wabasca, Slave and Mackenzie rivers have become increasingly evident. While the size and remoteness of the areas involved have precluded large scale damage appraisal, ground and aerial surveys have established that extensive tree mortality has occurred, and that if budworm populations remain at their present level, mortality will rise sharply. The most serious damage has occurred along the Wabasca River near the mouth of the Muddy River, around Long Island in the Slave River, opposite the mouth of the Redstone River and at the mouth of the Blackwater River. Opposite the mouth of the Redstone River, 650 trees were examined; 57 per cent had been killed by the spruce budworm. South of Fort Norman, above Old Fort Point, 31 per cent of the 204 trees tallied had been similarly killed.

In southern Alberta, the Cypress Hills outbreak subsided. Two-year-cycle spruce budworm caused light to moderate damage to spruce and alpine fir at a number of locations in Banff and Kootenay national parks.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

In 1964, moderate to severe defoliation of aspen stands by the forest tent caterpillar extended over about 15,000 square miles compared to 69,000 square miles in 1963. This spectacular reduction resulted from high mortality of early instar larvae. Observers at hatching study plots at Lac la Biche, Grande Prairie and Peace River reported that normal hatching occurred 7 to 10 days prior to aspen leafing. The larvae remained on their host until after leafing occurred, moulted to the second instar and disappeared. Unfortunately, observers believing that the leafing of the host marked the end of the critical hatching period, curtailed observations. As a result, the cause and mode of their disappearance was not definitely established although some larval migration was noted and some larvae were seen descending on webs.

In the older portions of the outbreak, the collapse was almost complete. Most the the defoliation occurred along the western and southern fringes where in 1963, defoliation was mostly spotty, moderate to severe, light, or absent. A notable exception occurred in the southern part of the Lac la Biche District where many aspen stands have been severely defoliated yearly since 1958. Here, the outbreak persisted in moderate to severe categories over an area of about 4,000 square miles.

Based on egg surveys carried out in the fall of 1964, moderate to severe defoliation of aspen may occur in 1965 over much the same area as in 1964 with some extension along the south-central fringe.

Larch Sawfly, Pristiphora erichsonii (Htg.)

The epicenter of the larch sawfly outbreak continued its northwestward trend in 1964. The only reports of moderate or severe defoliation of extensive stands of tamarack came from north of the Mackenzie River and Great Slave Lake. Moderate to severe defoliation occurred in small areas in west-central Alberta and adjacent to the Peace River in Wood Buffalo National Park. Many tamarack stands which had previously supported high populations of larch sawflies were examined during the course of ground surveys. In most instances, larvae were present although defoliation seldom exceeded a trace.

Needle Rusts

Needle rusts of spruce, Chrysomyxa ledi de Bary, Chrysomyxa ledicola Lagerh., and Chrysomyxa empetri (Pers.) Schroet. were found at many locations in 1964. The most severe infections were found in the foothills of west-central Alberta and in Banff and Kootenay national parks. Fir needle rusts, Pucciniastrum epilobii Otth. and Pucciniastrum goeppertianum (Kühn.) Kleb. reached outbreak proportions in an area surrounding the Yellowhead Forestry Tower southeast of Hinton.

Needle Casts of Pine

Elytroderma deformans (Weir) Darker was the most common needle cast of the region in 1964, causing light to moderate damage to pine foliage in many areas. This cast was especially abundant in pine stands which had previously been damaged by red belt. Lodgepole pine regeneration in the Steep Creek area south of Grande Prairie was heavily attacked by Lophodermium pinastri (Schrad. ex Fr.) Chev. Hendersonia pinicola Wehm. caused severe damage to lodgepole pine foliage in many areas in Banff and Jasper national parks and on Blueberry Mountain, northwest of Spirit River.

TABLE I

OTHER NOTEWORTHY INSECTS AND DISEASES
WHICH OCCURRED IN THE ALBERTA REGION IN 1964

Causal Agent	Host	Remarks
Insect		
Poplar gall mite, *Aceria parapopuli* (Kiefer)	Poplar	This insect was again a major pest of farm shelterbelts in southern Alberta.
Aspen agrilus, *Agrilus granulatus* (Say)	Poplar	Contributed to mortality of drought-weakened native and planted poplars in many areas in east-central Alberta.
Linden looper, *Erannis tiliaria* (Harr.)	M. maple	Larvae of this insect completely defoliated 80 acres of native Manitoba maple along Ross Creek east of Medicine Hat.
Needle miner, *Evagora starki* Free.	Lp. pine	The expected severe defoliation of lodgepole pine by this insect on the slopes of Mount Norquay did not occur in 1964. Winter mortality, bird predation, and parasitism were believed responsible.
Grey willow leaf beetle, *Galerucella decora* Say	Poplar Willow	Adults caused moderate to severe damage to poplars in east-central Alberta. Damage to willow by larvae was less severe than in 1963.
Willow leaf miner, *Lyonetia* sp.	Willow	Caused severe damage to willow in many areas in northern Alberta and Wood Buffalo National Park.
Aspen leaf miner, *Phyllocnistis populiella* Cham.	T. aspen	High populations of these insects were found in many areas in southwestern and northeastern Alberta and along the Liard and Mackenzie rivers.

Table I - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Yellow-headed spruce sawfly, Pikonema alaskensis (Roh.)	Spruce	This insect caused some damage to native and planted spruce at widely separated points throughout Alberta and the Northwest Territories. Populations were generally low.
Disease		
Spruce cone rust, Chrysomyxa pirolata Wint.	Spruce	This disease was widespread throughout west-central Alberta in 1964. Cone damage in this area averaged 20-30 per cent.
Poplar ink spot, Ciborinia whetzelii (Seaver) Seaver	T. aspen	Light to moderate damage by this disease was reported from many points in western Alberta and from the Cypress Hills.
Aspen shoot blight, Pollaccia radiosa (Lib.) Bald. & Cif.	T. aspen	This disease was common on regeneration aspen in west-central Alberta.
Winter drying of conifers	Lp. pine	Although not as widespread as in 1963, "red belt" was severe in some areas in western Alberta and between the Liard and Kotaneelee ranges in the Northwest Territories.

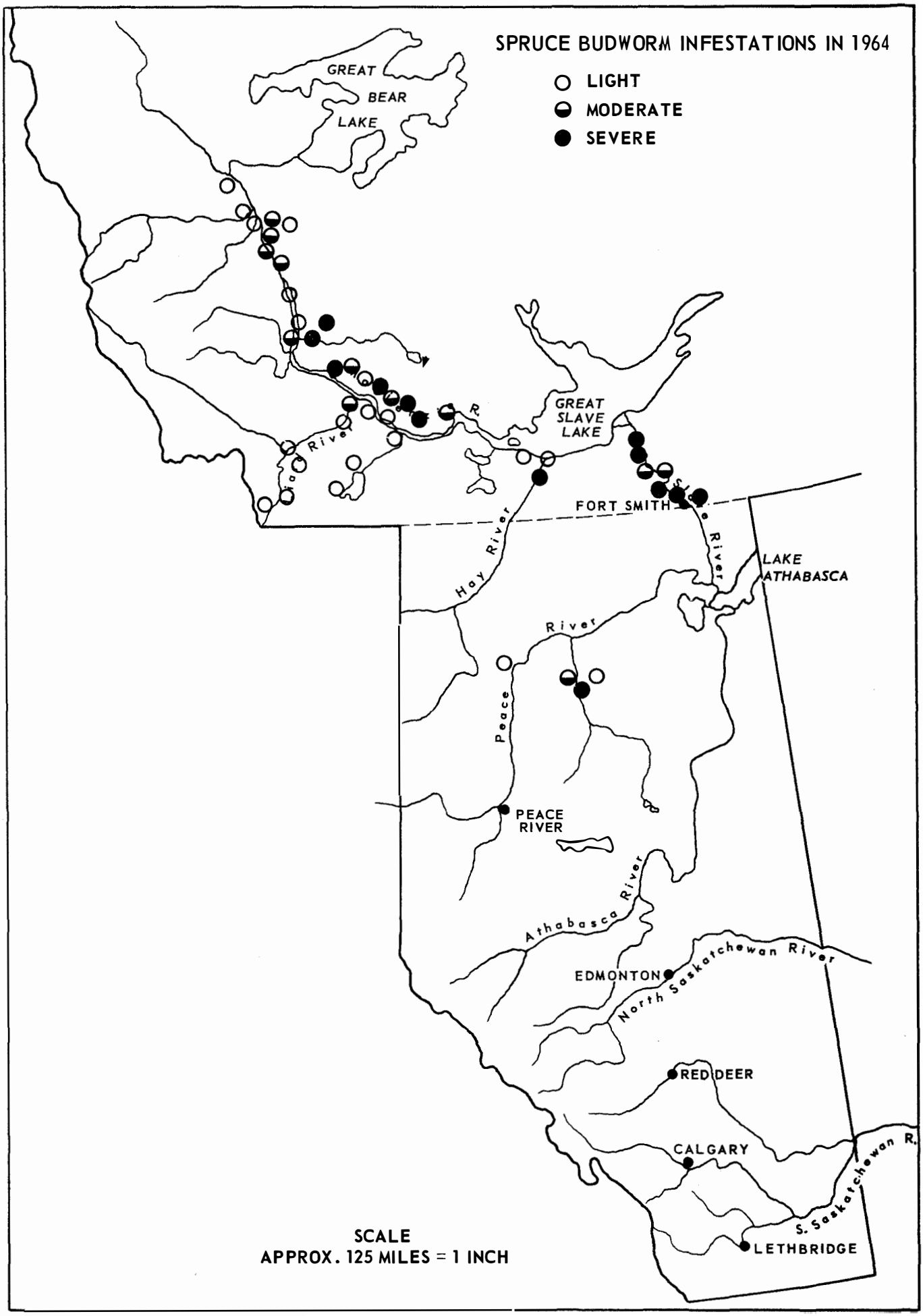
ACKNOWLEDGMENTS

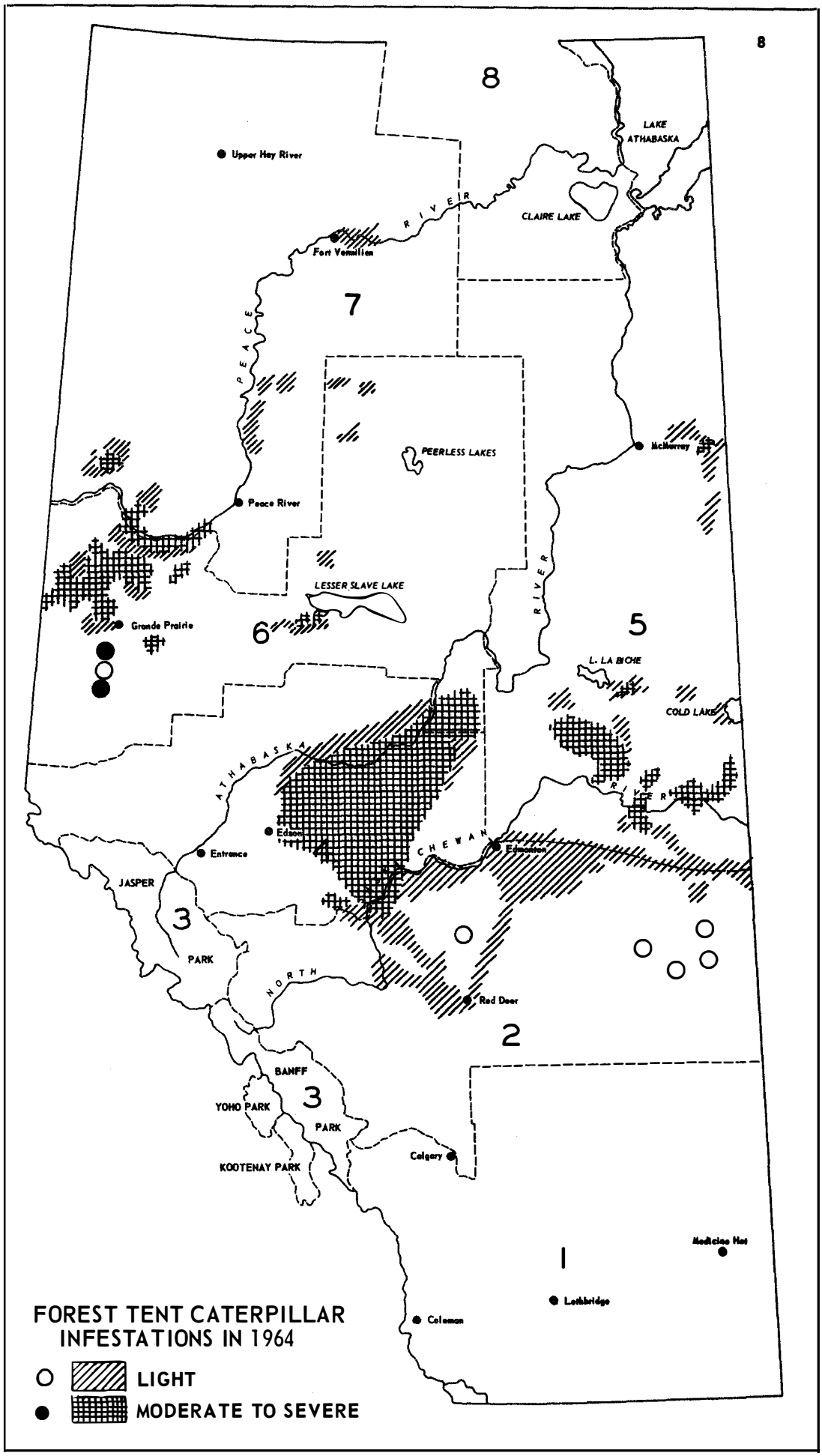
The field staff of the Forest Insect and Disease Survey gratefully acknowledges the assistance rendered by personnel of the Alberta Forest Service, the Provincial Agricultural Extension Service and the Department of Northern Affairs and National Resources.

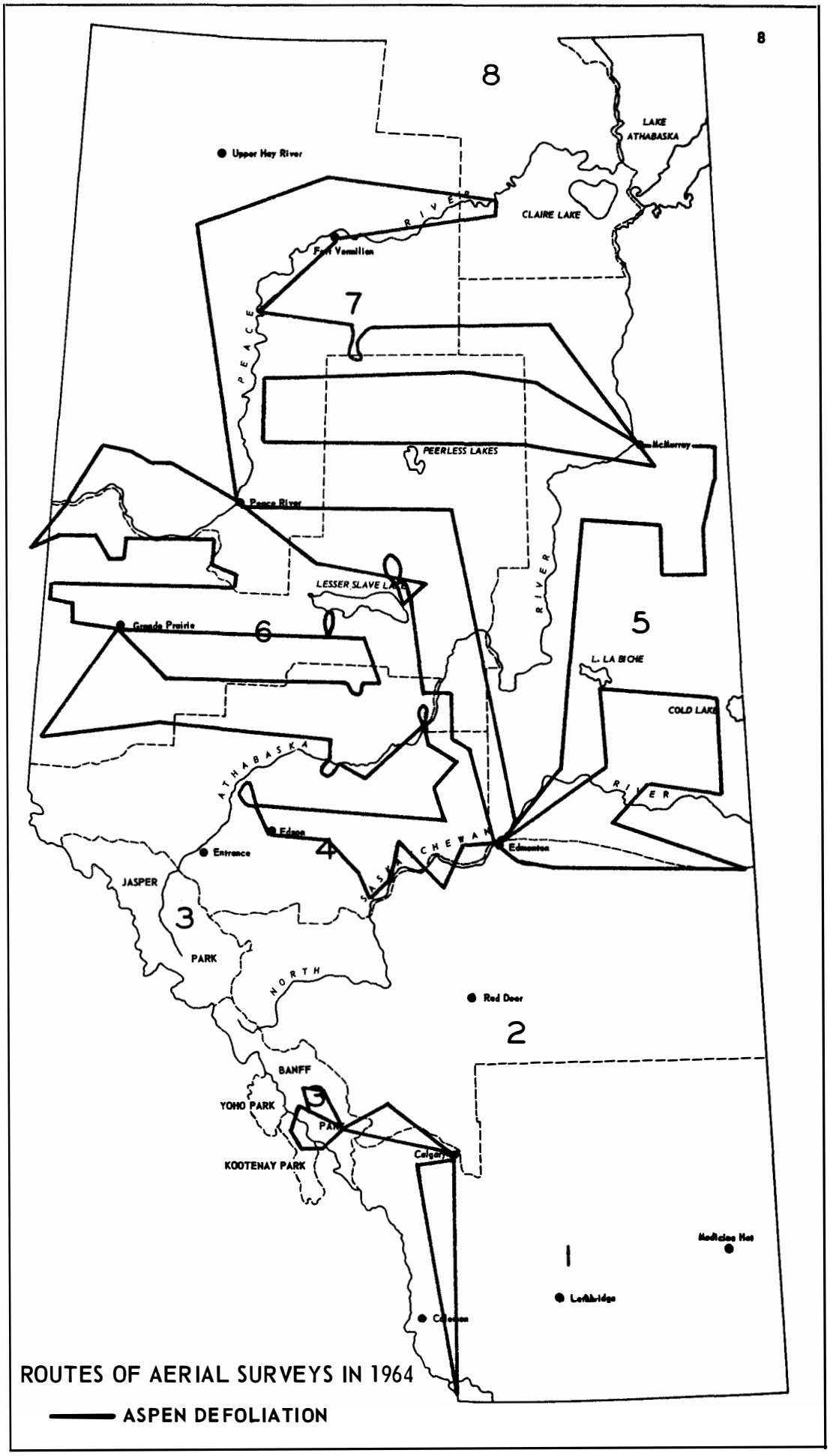
SUMMARY OF AERIAL SURVEYS 1964

PURPOSE	DISTRICT	DATE	AIRCRAFT	COST PER HOUR	TOTAL HOURS	TOTAL COST
Forest tent caterpillar	Clearwater, Brazeau-Athabasca, Lac la Biche, Grande Prairie, Peace River	June 23-27	Cessna 172	30.00	23.40	751.25*
Forest tent caterpillar	Lac la Biche, Peace River, Grande Prairie	June 23-27	Cessna 180G (Floats)	50.00 (Zone-K) 42.00 (Zone-G)	19.55	907.98*
Aspen defoliators	Crowsnest-Bow River	June 25	Cessna 172	30.00	3.20	100.00
Needle miner	Banff National Park Kootenay National Park	June 26	Cessna 180	42.00	3.20	140.00
Spruce budworm	Mackenzie District	July 13-18	Cessna 180G (Floats)	50.00 (Zone-L) 55.00 (Zone-O)	26.55	1,471.32*
Bark beetle	Mackenzie District	Aug. 11	Cessna 180G (Floats)	50.00	3.15	162.50
			TOTALS		80.25	3,533.05

* Pilots expenses included

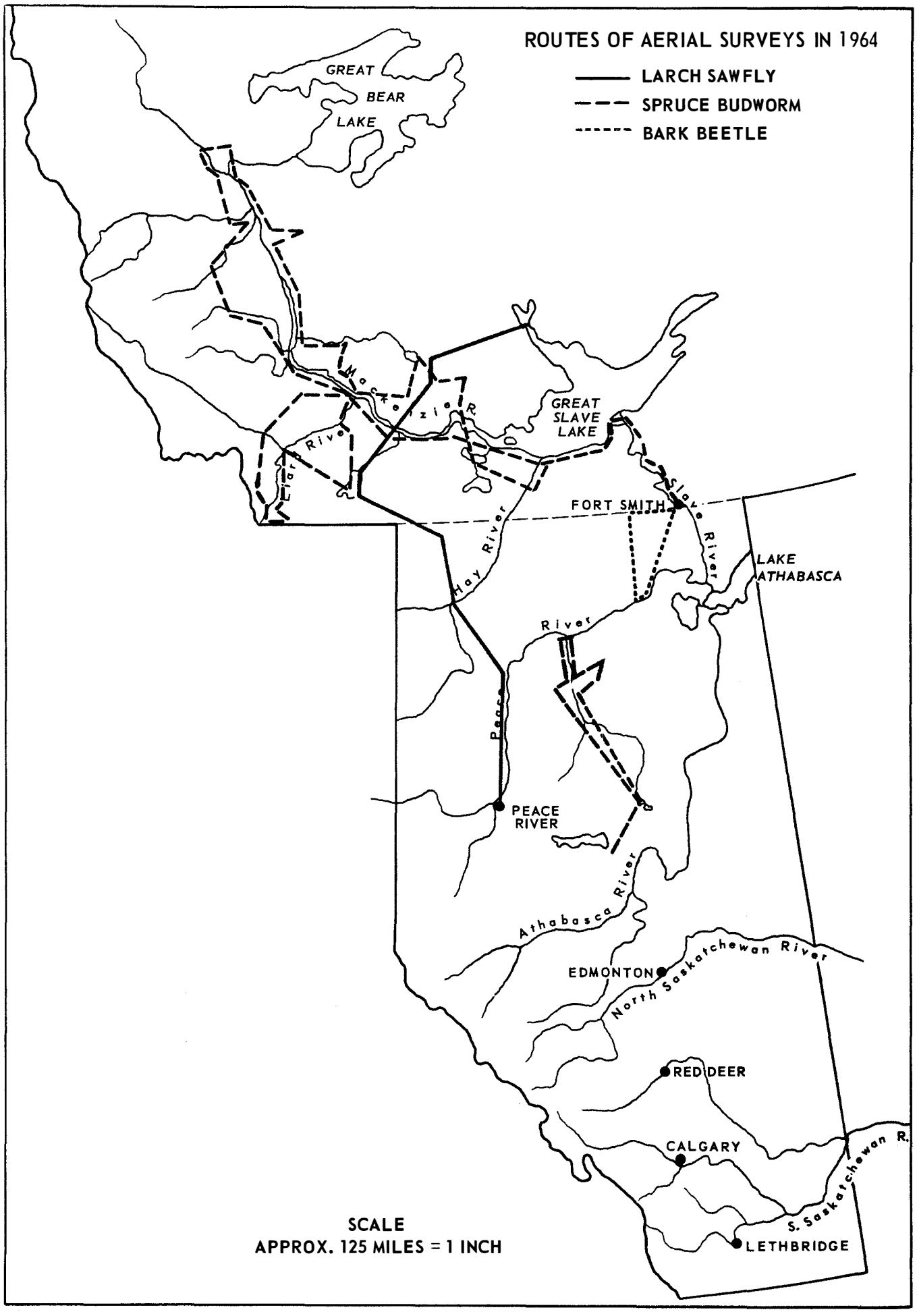

SPRUCE BUDWORM INFESTATIONS IN 1964
LIGHT
MODERATE
SEVERE
GREAT
BEAR
LAKE
GREAT
SLAVE
LAKE
FORT SMITH
Hay River
LAKE
ATHABASCA
River
Peace
PEACE
RIVER
Athabasca River
EDMONTON
North Saskatchewan River
RED DEER
CALGARY
S. Saskatchewan R.
LETHBRIDGE
SCALE
APPROX. 125 MILES = 1 INCH


8
7
6
5
3
3
3
2
1
Upper Hay River
LAKE ATHABASKA
CLAIRE LAKE
Fort Vermilion
PEACE RIVER
PEERLESS LAKES
McMurray
Peace River
LESSER SLAVE LAKE
Grande Prairie
L. LA BICHE
COLD LAKE
ATHABASKA RIVER
Edson
Entrance
Edmonton
CHEWAN
JASPER PARK
NORTH
Red Deer
BANFF PARK
YOHO PARK
KOOTENAY PARK
Calgary
Medicine Hat
Lethbridge
Coleman
FOREST TENT CATERPILLAR INFESTATIONS IN 1964
LIGHT
MODERATE TO SEVERE



ROUTES OF AERIAL SURVEYS IN 1964

ASPEN DEFOLIATION


ROUTES OF AERIAL SURVEYS IN 1964
LARCH SAWFLY
SPRUCE BUDWORM
BARK BEETLE
GREAT
BEAR
LAKE
Mackenzie R.
Liard River
GREAT
SLAVE
LAKE
FORT SMITH
Slave River
Hay River
LAKE
ATHABASCA
River
Peace
PEACE
RIVER
Athabasca River
EDMONTON
North Saskatchewan River
RED DEER
CALGARY
S. Saskatchewan R.
LETHBRIDGE
SCALE
APPROX. 125 MILES = 1 INCH

ANNUAL DISTRICT REPORT

CROWSNEST-BOW RIVER DISTRICT

ALBERTA 1964

by

N. W. WILKINSON

INFORMATION REPORT

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

CALGARY, ALBERTA

DEPARTMENT OF FORESTRY

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MARCH 1965

INTRODUCTION

There were no major outbreaks of forest insects or diseases in the Crowsnest-Bow River District in 1964. A combination of drought, Cytospora canker and a poplar Agrilus has caused injury and death to many poplar trees in shelterbelts and native aspen bluffs in the District. Cooley spruce gall aphids and spruce spider mites were cause for concern by owners of coniferous shelterbelts near Drumheller and Acme. In many areas of southern Alberta, maple and ash shelterbelts have deteriorated in the past few years as a result of defoliation by fall cankerworm, linden looper and owner neglect. The infestation of needle miner in the Cypress Hills Provincial Park has enlarged from that reported in 1963. A low population of pine needle scale persists in the Crowsnest Pass and in Cypress Hills Provincial Park. A decline in the numbers of grey willow leaf beetles was evident in 1964. The spruce budworm outbreak in Cypress Hills Provincial Park has collapsed. Populations of the douglas-fir beetle were low in the Porcupine Hills. Low populations of the Engelmann spruce beetle were active in overmature spruce stands in the headwater area of Racehorse Creek.

Dwarf mistletoe has continued to intensify throughout the foothills and mountains over the past 5 years. Comandra blister rust, white pine blister rust, western gall rust and stalactiforme rust are established throughout the pine growing areas of the District. Indian paint fungus is common in alpine fir stands throughout the southwest portion of the Crowsnest Forest Reserve.

INSECT CONDITIONS

Gall Mites, *Aceria parapopuli* (Kiefer), and *Aceria neoessigi* (K.)

The poplar bud gall mite, *A. parapopuli* has caused malformation of poplars in some shelterbelts in the District. The most severe damage was found in Brooks where 100 per cent of the hybrid poplar in a shelterbelt were malformed as a result of attack by this insect. Light infestations were found near Drumheller, Elkwater, Waterton Lakes, west of Stavely and south of Longview. Infestations of the closely related mite, *A. neoessigi*, were found in an aspen shelterbelt near Cereal and on native aspen west of Stavely.

Cooley Spruce Gall, Adelges cooleyi (Gill.)

A. cooleyi was the only species of gall aphid found on coniferous trees. Light infestations were found in shelterbelts near Drumheller and Acme. Low populations were also active on native white spruce in Cypress Hills Provincial Park, Waterton Lakes National Park, along the Trunk Road and in the Crowsnest Pass. Few new galls were found, and judging from the number of old galls the population numbers have decreased considerably this year. One collection was taken from Douglas fir in the west Castle River Watershed. The "monomorphic cycle" on spruce was found near Acme, in Cypress Hills Provincial Park, the Crowsnest Pass and Streeter Basin Watershed area.

Fall Cankerworm, Alsophila pometaria (Harr.)

Populations of fall cankerworm were generally low throughout the agricultural area of the District. Collections were taken from shelterbelt and native growing Manitoba maple in the area from Lethbridge to Medicine Hat and northward to Acadia Valley. At a location 9 miles wouthwest of Acadia Valley high populations of fall cankerworm in conjunction with the linden looper, Erannis tiliaria (Harr.) caused severe defoliation.

Poplar Agrilus, Agrilus granulatus (Say)

This is one of the most abundant wood borers in the District. Infestations of this borer were found on poplar throughout the agricultural area of the District, in Cypress Hills Provincial Park and in the foothills west of Calgary. Damage resulting from these infections may be the main reason for dead tops and dead trees in many shelterbelts and aspen bluffs. Previously this injury was attributed to drought and disease. More research is necessary to determine the exact status of this insect.

Engelmann spruce Beetle, Dendroctonus obesus (Mann.)

A low population of this bark beetle was found infesting living Engelmann spruce in the headwater drainage area of Racehorse Creek. The timber in this area is overmature so this may be the start of an increase in population numbers in the area.

Linden Looper, Erranis tiliaria (Harr.)

Populations of this looper in Manitoba maple shelterbelts in the Medicine Hat-Acadia Valley area were higher this year than for several years. An outbreak occurred near Medicine Hat where a high population completely defoliated approximately 80 acres of native growing Manitoba maple along Ross Creek. Disease and parasites were cause for a high larval mortality rate in this area resulting in cadavers covering the ground under some trees to a depth of one inch.

A Needle Miner, Evagora biopes Free.

The infestation of this needle miner in Cypress Hills Provincial Park has enlarged from that reported last year. Medium to high populations were found in the Grayburn Creek Valley and along the Reesor Lake Road 8 miles east of Highway 48. Sequential samples taken in late summer indicate this infestation will continue with populations in the medium-low range.

Grey Willow Leaf Beetle, Galerucella decora Say

Adults of the grey willow leaf beetle were present in many shelterbelts of the agricultural part of the District in early summer. The infestations were light in the southwest part of the District and gradually increased in numbers to the northeast where medium populations were found in the Oyen area. No noticeable damage was caused by larvae of this species in 1964.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

Light infestations of this insect were found on lodgepole pine south of Coleman, south of Hillcrest and in Cypress Hills Provincial Park and on limber pine east of Burmis. Damage to the host trees was negligible.

DISEASE CONDITIONS

Dwarf Mistletoe, Arceuthobium americanum Nutt. ex Engelm.

Observations indicate that this parasitic plant on lodgepole pine is widespread throughout the pine growing area of the District. Infected stands were found in Cypress Hills Provincial Park and in the mountains and foothills from Waterton Lakes National Park to the Bow River. Re-examination of an outbreak 13 miles north of Coleman indicated an intensification of the disease on regeneration pine. Surveys revealed that 56 per cent of the regeneration pine is now infected, whereas, 10 per cent were infected in 1959. White spruce in a small area 13 miles south of Seebe is infected with this disease. On some trees hypertrophic symptoms were numerous although few aerial plants were found. Suppressed trees appeared to be more susceptible than others. Dead branches and dead trees were frequent in the area.

Comandra Blister Rust, Cronartium comandrae Pk.

This blister rust was found to be widespread in the foothills and mountain regions of the District. Collections were taken from lodgepole pine and the alternate host Comandra pallida A. DC.

Cytospora Canker, Cytospora chrysosperma (Pers.) Fr.

Poplar shelterbelts and aspen bluffs throughout the agricultural area and the foothills are infected with this disease. The infections are more severe where the trees have suffered damage from drought over the past few years. In many of the Cytospora infected shelterbelts and aspen bluffs the Poplar agrilus, Agrilus granulatus (Say) caused damage also. This wood borer may be responsible for many of the dead tops and dead trees which was previously attributed to drought and Cytospora canker.

Specimens of C. chrysosperma were taken near Hilda, north of Cardston on the St. Marys Dam project, in the Porcupine Hills, east of Pincher Creek and west of Calgary.

Indian Paint Fungus, Echinodontium tinctorium Ell. & Ev.

Alpine fir in the Crowsnest Forest Reserve is infected with this brown stringy trunk rot. Examination revealed that 70 per cent of the merchantable trees in the upper watershed areas of the Castle River and Racehorse Creek were infected. This condition results in a substantial economic loss in lumber operations in these areas.

Windthrow

High winds in southern Alberta during early June 1964 caused extensive windthrow of forest cover in a number of areas between Waterton Park and Crowsnest. Approximately 3,500 acres of spruce and pine were blown down. Lodgepole pine was the cover type over most of this area. The largest areas of windthrown pine were found along Tent Mountain Road south of Crowsnest and on the north slope of Mt. Blakiston in Waterton Lakes National Park. Spruce was damaged in the upper watershed area of the Castle River and along Bauerman Brook near Twin Lakes Cabin.

TABLE I

SUMMARY OF INSECT AND DISEASE COLLECTIONS BY HOSTS

Host Coniferous	Collections Insect	Disease	Host Deciduous	Collections Insect	Disease
White spruce	24	5	Trembling aspen	24	12
Engelmann spruce	8	6	Balsam poplar	6	2
Miscellaneous spruce	4	0	Hybrid poplar	6	3
Lodgepole pine	24	11	Willow	7	7
Limber pine	7	1	Manitoba maple	10	0
Douglas fir	3	1	Green ash	1	0
Alpine fir	3	6	Elm	4	0
Alpine larch	1	0	Birch		1
Miscellaneous larch	1	0			
	75	30		58	25
Insect collections from miscellaneous hosts					22
Disease collections from miscellaneous hosts					31
			GRAND TOTAL		235

TABLE II

OTHER NOTEWORTHY INSECTS AND DISEASES
WHICH OCCURRED IN THE CROWSNEST-BOW RIVER DISTRICT, 1964

Causal Agent	Host	Remarks
Insect		
Twice-stabbed lady beetle, Chilocorus stigma (Say)	Lp. pine	Low population feeding on pine needle scale in Crowsnest Pass area.
Spruce budworm, Choristoneua fumiferana (Clem.)	W. spruce	The outbreak in Cypress Hills Provincial Park has collapsed.
Leaf tier, Compsolechia niveopulvella Cham.	T. aspen	Caused a trace of damage in the Hilda-Empress area.
Douglas-fir beetle, Dendroctonus pseudotsugae Hopk.	Douglas fir	A low population in Porcupine Hills.
Wooly elm aphid, Eriosoma americanum (Riley)	Elm	Light infestation near Hussar, Langdon and in Cypress Hills.
Prairie tent caterpillar, Malacosoma lutescens (N. & D.)	Willow Currant Prunus sp.	Low populations in the agricultural area.
Spruce spider mite, Oligonychus ununguis (Jac.)	W. spruce Juniper	A low population in the agricultural area.
Boxelder aphid, Periphyllus negundinis Thos.	M. maple	Widespread but low population in agricultural area.
Pitch nodule maker, Petrova sp.	Lp. pine	Populations low in Cypress Hills and Crowsnest Pass.
Poplar serpentine miner, Phyllocnistis populiella Cham.	T. aspen	Low populations in Cypress Hills and foothill region.
Engelmann spruce weevil, Pissodes engelmanni Hopk.	E. spruce	Low populations in the southwest corner of the District.

Table II - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Larch sawfly, *Pristiphora erichsonii* (Htg.)	S. larch	Found only at K.F.E.S.
Leaf tier, *Pseudexentera improbana oregonana* Wlshm.	T. aspen	Populations extremely low this year.
Poplar borer, *Saperda* sp.	T. aspen	A small infestation but high population south of Cowley.
Poplar and willow borer, *Sternochetus lapathi* (L.)	Willow sp.	Medium to high populations from Racehorse Creek headwaters to west Castle River headwaters.
A spruce needle miner, *Taniva albolineana* Kft.	W. spruce	Light infestations at Drumheller and Calgary on ornamental spruce.
Disease		
Apiosporina witch's broom, *Apiosporina collinsii* (Schw.) v Höhnel	Saskatoon	Scattered light damage near Bowness, in Cypress Hills Provincial Park and Crowsnest Pass.
Shoestring root rot, *Armillaria mellea* (Vahl ex Fr.) Quél.	E. spruce D. fir Lp. pine W. spruce	Found on spruce and fir in Waterton Lakes National Park, on spruce near Elkwater and on pine in the Porcupine Hills.
Yellow witch's broom of spruce, *Chrysomyxa arctostaphyli* Diet.	W. spruce	Light damage in Cypress Hills Provincial Park, Waterton Lakes National Park and in the Crowsnest Pass.
Spruce needle rust, *Chrysomyxa ledicola* Lagerh.	*Ledum* sp. E. spruce	Light damage in the mountains from the Bow River to Waterton Lakes.
Spruce cone rust, *Chrysomyxa pirolata* Wint.	W. spruce *Pyrola* sp.	Light damage in Marmot Creek Basin and in Cypress Hills Provincial Park.

Table II - Other noteworthy insects and diseases - Cont'd.

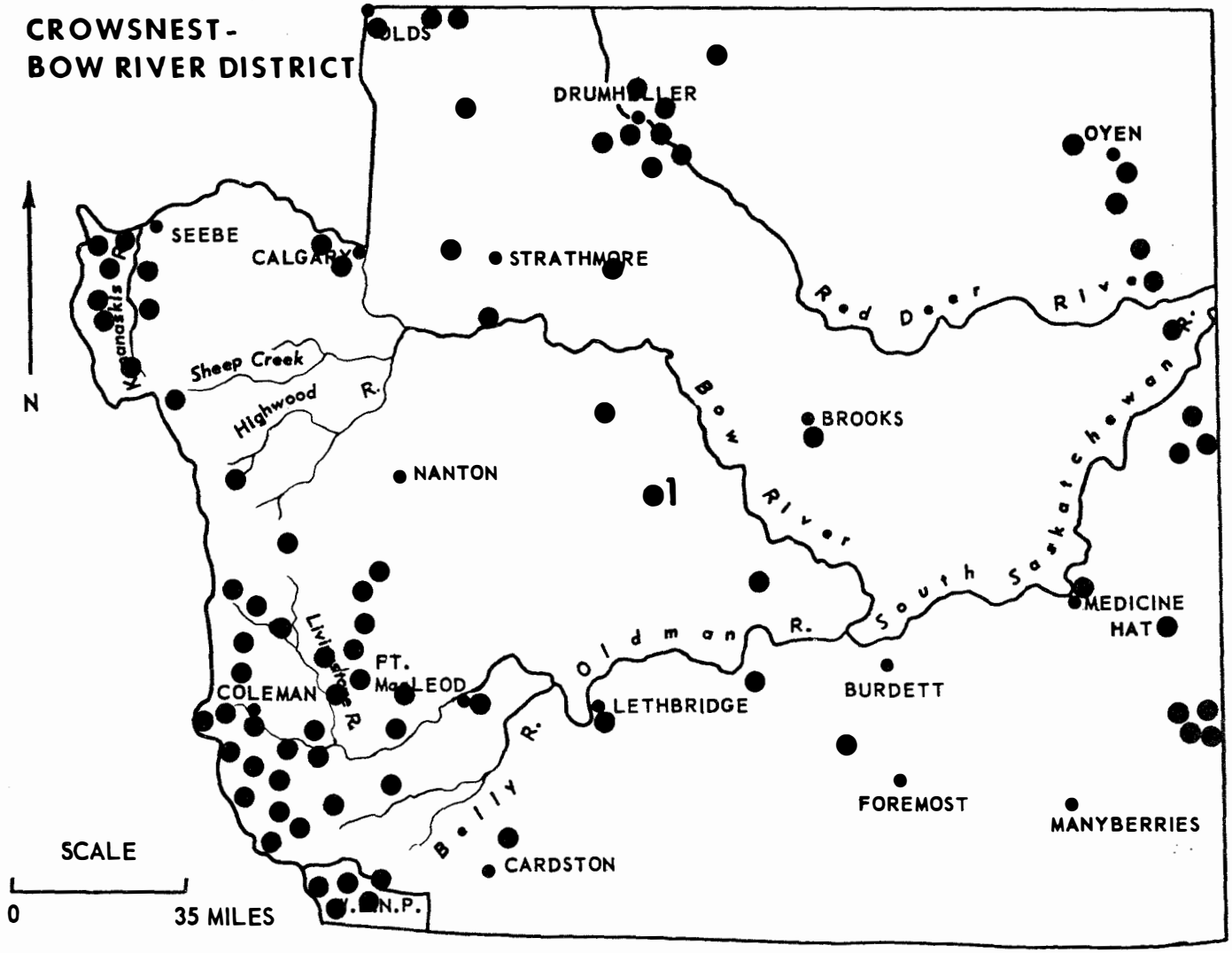
Causal Agent	Host	Remarks
Leaf rust, *Cronartium coleosporioides* Arth.	Indian paint brush	Light damage in Marmot Creek Basin and south of Canmore.
White pine blister rust, *Cronartium ribicola* J. C. Fischer	*Ribes* sp.	Light damage in the Porcupine Hills.
Black knot of cherry, *Dibotryon morbosum* (Schw.) T.S.	*Prunus* sp.	Collected in Cypress Hills Provincial Park, Waterton Lakes National Park and in the Foothills.
Fruit stem rust, *Gymnosporangium clavipes* (Cke. & Pk.)	Saskatoon	Severe damage in the Crowsnest Pass.
Fir needle cast, *Hypodermella mirabilis* Darker	A. fir	Light damage in Snowshoe area of Waterton Lakes National Park.
Hypoxylon canker, *Hypoxylon pruinatum* (Klotzsche) Cke.	T. aspen	Found near Torrington, in Cypress Hills Provincial Park, Waterton Lakes National Park and the Crowsnest Pass.
Poplar branch gall, *Macrophoma tumefaciens* Shear	B. poplar	Found in Drumheller area, a range extension record.
Larch needle rust, *Melampsora medusae* Thuem.	T. aspen	Light to moderate damage from the headwaters of Old Man River to the headwaters of the West Castle River.
Peniophora sp.	Lp. pine	Found in Cypress Hills Provincial Park.
Western gall rust, *Peridermium harknessii* J. P. Moore	Lp. pine	Common in Cypress Hills Provincial Park, the Crowsnest Pass and along the Trunk Road.
Fir needle rust, *Pucciniastrum epilobii* Otth.	A. fir Fireweed	Found in the Crowsnest Pass and Marmot Creek Basin.

TABLE III

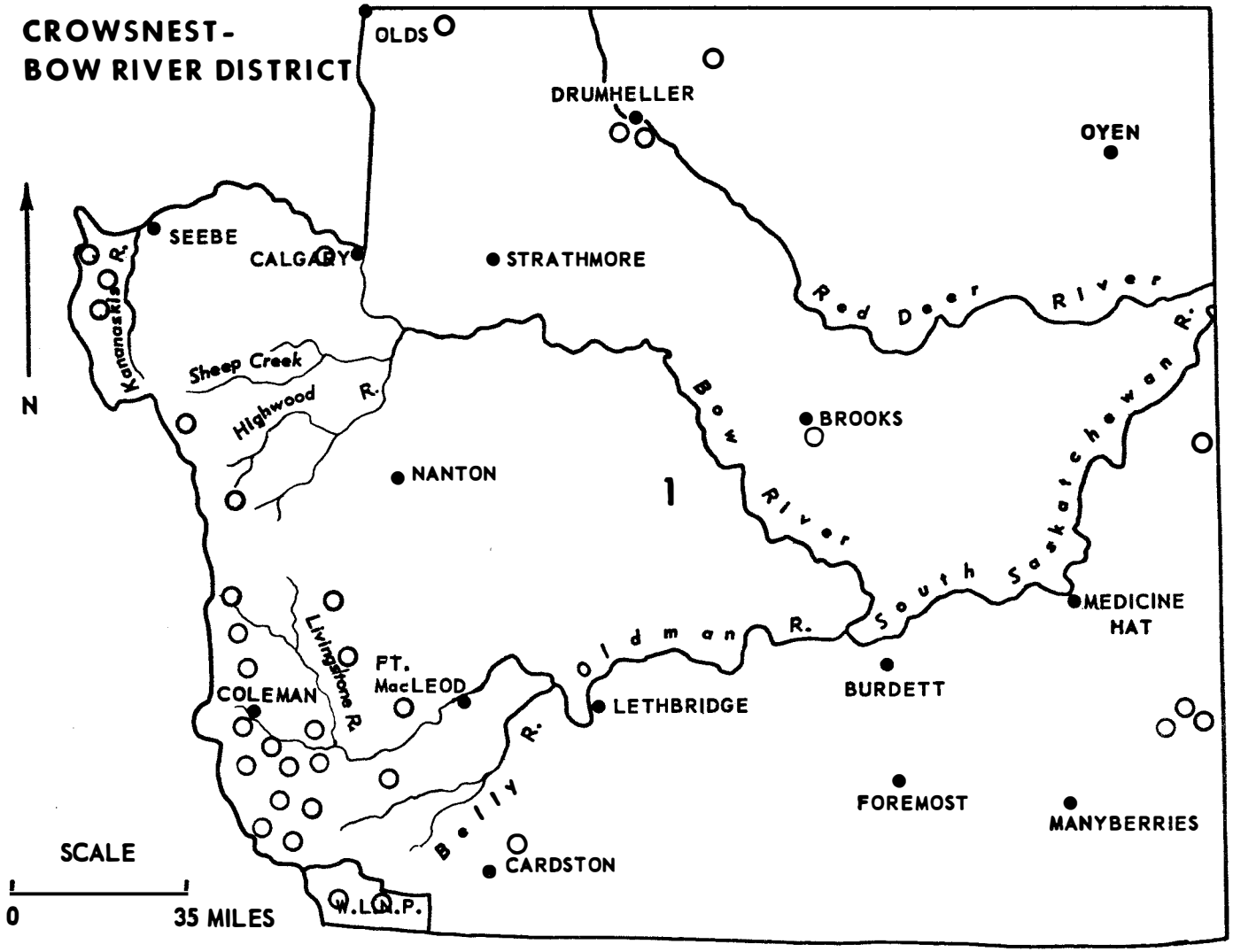
SUMMARY OF RECORDED DISEASE OUTBREAKS
UNDER INVESTIGATION IN THE CROWSNEST-BOW RIVER DISTRICT

Outbreak number	Location	Causal organism	Remarks
1-1	2 miles north-east of Castle Ranger Station.	Atropellis piniphila (Weir) Lohman & Cash	To be re-examined in 1965.
1-2	2 miles south of Kananaskis Experimental Station.	Atropellis piniphila (Weir) Lohman & Cash	To be re-examined in 1965.
1-4	5 miles south of Kananaskis Experimental Station.	Arceuthobium americanum Nutt. ex Engelm.	Re-examined in 1964. See report section.
1-7	Waterton Lakes National Park.	Armillaria mellea (Vahl ex Fr.) Quél.	To be re-examined in 1966.
1-8	Dutch Creek Road.	Arceuthobium americanum Nutt. ex Engelm.	To be re-examined in 1965.
1-12	13 miles north of Coleman on Trunk Road.	Arceuthobium americanum Nutt. ex Engelm.	Re-examined in 1964. See report section.
1-13	Elkwater.	Peridermium harknessii J. P. Moore	To be re-examined in 1965.
1-14	Blairmore.	Arceuthobium americanum Nutt. ex Engelm.	To be re-examined in 1965.
1-15	Elkwater.	Arceuthobium americanum Nutt. ex Engelm.	To be re-examined in 1965.
1-11-16-17-18	Crowsnest Forest Reserve	Cronartium ribicola J. C. Fischer	Determined in 1962 as one continuous outbreak. Infections occur at Hillcrest, Coleman, Waterton Lakes National Park and in the Porcupine Hills.

LOCATION OF POINTS WHERE INSECT COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964



LOCATION OF POINTS WHERE DISEASE COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964



ANNUAL DISTRICT REPORT

CLEARWATER DISTRICT

ALBERTA 1964

by

F. J. EMOND

INFORMATION REPORT

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

CALGARY, ALBERTA

DEPARTMENT OF FORESTRY

FOREST ENTOMOLOGY AND PATHOLOGY BRANCH

MARCH 1965

INTRODUCTION

Significant changes took place in the status of three of the more important forest insect pests in the Clearwater District during 1964. These were: a decline in population levels and defoliation caused by the grey-willow leaf beetle; a decline in populations of the larch sawfly although their distribution remained much the same in the District; an increase of the forest tent caterpillar in the northwest portion of the District while a decrease was evident in the northeastern agricultural area. Population levels of the Bruce spanworm remained approximately the same as in 1963. A population increase of the leaf tier, Compsolechia niveopulvella Cham. was reported from the southwest forested area and in the eastern half of the District. Populations of the yellow-headed spruce sawfly and spruce spider mite remained at much the same level as in the previous season. A decrease in spruce gall aphids was noted throughout the District.

No new disease outbreaks were reported during the 1964 field season. Needle rusts of spruce were reported from along the Forestry Trunk Road north and south of Nordegg. Spruce cone rust was present in varying degrees of infection along the Trunk Road from the Ghost Ranger Station to the northern boundary of the District. Red belt of conifers and clumping of aspen, which are generally associated in the Clearwater District, were again present throughout the foothills area.

INSECT CONDITIONS

Gall Aphids on Conifers, Adelges cooleyi (Gill.), Adelges lariciatus (Patch), Pineus similis (Gillette)

Light damage caused by these gall aphids was usually found wherever spruce was inspected in the District. There was only one exception. This was along Highway 1A from Cochrane west to Canmore where medium to high populations of aphids were present and moderate to severe damage occurred.

P. similis galls constituted the most prevalent species in all areas. A. cooleyi and A. lariciatus were almost always present, but in very low populations and damage attributed to these latter 2 species was considered light.

Leaf Tier, Compsolechia niveopulvella Cham.

Population levels of this insect were reported as being higher in 1964 than in the previous season.

In the western half of the District, light to moderate defoliation of aspen was evident west of Cochrane to Seebe Junction and in the area north of Chochrane to Caroline and Spruce View. North of Caroline to the north boundary of the District population levels gradually tapered off and defoliation throughout this area was light.

In the eastern half of the District light to moderate defoliation was present in the Lacombe-Stettler-Bashaw area. In the remainder of the eastern half low populations of this insect were common in all aspen stands inspected.

Grey Willow Leaf Beetle, Galerucella decora Say

Defoliation of willow by this species showed a definite decline over the previous season. Adults were generally found throughout the entire District and light damage to hybrid poplar shelterbelts in the Stettler-Hardisty-Coronation area was reported. Larvae of this beetle were responsible for moderate to severe skeletonizing from Cochrane north for 15 miles and east of Cochrane for 2 miles. In these areas severe skeletonizing was generally restricted to the fringe areas of the stand while towards the center the damage was usually light. Light defoliation was evident in the remainder of the District wherever willow occurred.

American Aspen Beetle, Gonioctena americana (Schaeff.)

Adults and larvae of the American aspen beetle were responsible for moderate to severe defoliation of regeneration aspen poplar in the following areas: 6 miles northwest of Crimson Lake, 10 miles north of Rocky Mountain House, in the Meadow Creek area northwest of Cochrane, near New Norway, between Ranfurly and Innisfree south of Highway 16, and in the Wainwright-Czar area. In the remainder of the District, adults and larvae could generally be found wherever aspen occurred, but populations were low and damage was at a minimum.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

In the eastern half of the District tent caterpillar larvae were present throughout the entire general area north of Highway 14 from the Saskatchewan border west to Edmonton, but damage in this area was light. In the Vermilion area, where moderate and severe damage was present in aspen stands in 1963, only light defoliation was evident and this was widely scattered.

In the western half of the District, aspen defoliation by the forest tent caterpillar was definitely on the increase. Light defoliation was recorded from Edmonton west to Warburg and Cornwood, Edmonton south to Red Deer, from Red Deer west to Rocky Mountain House and from Rocky Mountain House north to within 12 miles of Buck Creek. Severe and moderate defoliation was evident in the northwest corner of the District from Cornwood west to Drayton Valley and south from Drayton Valley to a point 12 miles south of Buck Creek.

Sequential sampling plots were established throughout the northwest portion of the District during the fall of 1964. Information from these plots revealed that moderate to severe defoliation can be expected to occur as far south as Winfield with a probable increase of damage eastward to the Warburg and Thorsby districts.

Tent Caterpillars, Malacosoma lutescens (N. & D.), and Malacosoma pluviale (Dyar)

The prairie tent caterpillar, M. lutescens, was present in high populations in the northeast portion of the District. Moderate to severe defoliation of rose, chokecherry and pincherry was reported in the following areas: Islay, south and east of Vermilion, south of Lloydminster, Bodo, Provost and east of Wainwright to the Saskatchewan Border. Low populations, with resultant light damage, were noted near Mirror, Auburndale, Czar, and east of Stettler.

The western tent caterpillar, M. pluviale, was responsible for light to moderate defoliation of scrub birch and willow along the Forestry Trunk Road from a point 16 miles south of Nordegg to within 10 miles of the Ghost Ranger Station. Low populations of this caterpillar were observed feeding upon rose bushes in several areas throughout the remainder of the District but damage was light.

Spruce Spider Mite, Oligonychus ununguis (Jac.)

Damage to spruce needles by this mite was again found to be common in spruce shelterbelts and ornamentals inspected during the season. Light to moderage damage was found in the following agricultural areas: Edmonton-south, Red Deer, Lacombe, Stettler and Olds. Low populations persisted throughout the remainder of the agricultural area and damage was light. In the forested area of the District population levels of this mite remained low and the damage was of no consequence.

Yellow-headed Spruce Sawfly, Pikonema alaskensis (Roh.)

Populations of the yellow-headed spruce sawfly remained at approximately the same level as in the 1963 season. Moderate to severe

defoliation of ornamental spruce was reported from the following locations: one-half mile south of Edmonton, one mile east of Cochrane, north of Gadsby, near Auburndale and west of Wetaskiwin. Light to moderate defoliation in spruce shelterbelts was noted near Clover Bar, Clive, Vermilion, Camrose and New Norway. Larvae could generally be found in the remainder of the agricultural area where spruce was used for shelterbelt purposes but the use of chemical sprays kept population levels to a minimum. In the forested area of the District, low numbers of larvae were generally found in samples taken from native spruce, but damage was considered light.

Larch Sawfly, Pristiphora erichsonii (Htg.)

A general decline in population levels and defoliation by this sawfly was evident in tamarack stands in the Clearwater District during 1964. In the western half of the District, where moderate and severe defoliation occurred in 1963, only light defoliation was present. In the eastern half of the District, where only Siberian larch is affected and damage is usually fairly extensive, defoliation was far below normal.

Leaf Tier, Pseudexentera improbana oregonana Wlshm.

Very little change in the status of this leaf tier was reported throughout the aspen range of the District during 1964. Low to medium populations were common in the Cochrane, Morley, Wainwright, Camrose, Sylvan Lake, New Norway and Cooking Lake areas. Throughout the remainder of the District, population levels were generally low and damage was light.

DISEASE CONDITIONS

Spruce Needle Rusts, Chrysomyxa empetri (Pers.) Schroet., Chrysomyxa ledicola Lagerh.

An increase in the distribution of spruce needle rusts was noted in the Clearwater District during 1964. Moderate to severe damage caused by C. empetri to both black and white spruce was observed along the Forestry Trunk Road in the following areas: 11 miles south of the Red Deer Ranger Station, 16 miles south of Nordegg, 35 miles north of the Clearwater Ranger Station and along Highway 12, 2 miles south of Winfield. C. ledicola caused moderate damage to white spruce at 3 locations: 23 miles north of the Red Deer Ranger Station, one mile east

of the Clearwater Ranger Station, and 6 miles south of Nordegg. Light damage was noted near Crimson Lake, 5 miles east of Rocky Mountain House and at Horburg. No evidence of rust damage was found on either shelterbelt or ornamental spruces in the agricultural area east of Highway 2.

Spruce Cone Rust, Chrysomyxa pirolata Wint.

This rust, affecting cones of white and black spruce, was present in variable degrees of damage throughout the foothills area of the District. Light to moderate damage to white spruce cones was reported in the following areas: Nordegg, south to the Ghost Ranger Station along the Forestry Trunk Road, Nordegg southwest to the Banff Park Boundary along the Thompson Trail, from Nordegg east to Rocky Mountain House along Highway 11 and from Rocky Mountain House north to Crimson Lake and Alder Flats. Severe damage, in which approximately 80 per cent of the cones were affected, was noted in the area from Nordegg north along the Trunk Road to the Brazeau River. Black spruce was commonly infected in the same areas as white spruce, but the damage was mugh lighter.

Drought Damage

Further deterioration of trembling aspen as a result of the severe drought experienced in 1961 was very evident in the extreme southeast part of the District. Increase in mortality was particularly evident in the following areas: south of Bodo, Gooseberry Lake, Veteran, Consort and Monitor. A secondary disease, Cytospora chrysosperma (Pers.) Fr., and a wood borer, Agrilus granulatus (Say), both common in these areas, accelerated mortality.

Red Belt

Red belt or climatic injury, was not as prominent this year as in the previous season. Light damage was observed along the Forestry Trunk Road between the Red Deer River and Nordegg, north of Nordegg to the Brazeau River, and in the Saskatchewan River Valley southwest of Nordegg to the Cline River. Light damage was also noted in the Meadow Creek-Ghost River Valley area west of the Ghost Ranger Station.

Along the Forestry Trunk Road, in the James River Camp area, numerous dead spruce and pine were noted along the valley bottom. Cause of death of these trees was attributed to severe red belt during the winter of '62-63. Aspen clumping, a common climatic injury to aspen poplar, was fairly common throughout the red belt areas of the Clearwater District.

TABLE I

SUMMARY OF INSECT AND DISEASE COLLECTIONS BY HOSTS

Host Coniferous	Collections Insect	Disease	Host Deciduous	Collections Insect	Disease
White spruce	99	24	Trembling aspen	94	10
Black spruce	8	10	Balsam poplar	20	2
Lodgepole pine	23	13	Willow sp.	10	4
Scots pine	9	1	Alder	4	0
Larch sp.	13	0			
	152	48		128	16
Insect collections from miscellaneous hosts					31
Disease collections from miscellaneous hosts					5
			GRAND TOTAL		380

TABLE II

RESULTS OF SEQUENTIAL SAMPLING
AND DEFOLIATION ESTIMATES
FOREST TENT CATERPILLAR, 1964

Location	Predicted defoliation for 1964	Actual defoliation for 1964	Predicted defoliation for 1965
Leslieville	*	Light	Light
Rimbey	*	Light	Light
Sundre	*	Nil	Light
Penhold	*	Nil	Light
Winfield	*	Light	Severe

* All plots established in 1964

TABLE III

OTHER NOTEWORTHY INSECTS AND DISEASES
WHICH OCCURRED IN THE CLEARWATER DISTRICT, 1964

Causal Agent	Host	Remarks
Insect		
Poplar bud-gall mite, *Aceria parapopuli* (Kiefer)	N.W. poplar T. aspen	Light damage in shelter-belts and native aspen throughout the District.
Black-headed budworm, *Acleris variana* (Fern.)	W. spruce	Medium populations in the Rocky-Eckville-Sundre areas.
Pine tube maker, *Argyrotaenia tabulana* Free.	Lp. pine	A decline in populations over the previous season.
Pear slug, *Caliora cerasi* (L.)	Cotoneaster	Considerable defoliation throughout the District.
Green rose chafer, *Dichelonyx backi* Kby.	T. aspen W. spruce	Usually found associated with other leaf beetles. A decline in populations this year.
Sawfly, *Diprionidae*	Juniper (communis)	Moderate damage to juniper in the Garrington Ferry area.
Leaf roller, *Epinotia nisella* form *criddleana* Kft.	T. aspen	Moderate damage in an area 9 miles west of Cochrane along Highway 1A.
Lilac leaf miner, *Gracilaria syringella* (F.)	Lilac	Moderate damage in the cities of Calgary and Red Deer.
Pyralidae, *Griselda radicana* Wlshm.	W. spruce	Common in spruce beating samples.
Root borer, *Hepialidae*	T. aspen Alder	Common in District in dry, sandy soil areas.
Geometridae, *Itame loricaria julia* Evers.	T. aspen	Found in association with other aspen defoliators throughout the District.

Table III - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Caragana aphid, *Macrosiphium carraganae* Cholod.	Caragana	Light damage in caragana hedges and shelterbelts in the southeast part of the District.
Sawfly, *Neodiprion* sp.	Lp. pine S. pine	Light to moderate defoliation to native and shelterbelt pine.
Poplar serpentine miner, *Phyllocnistis populiella* Cham.	T. aspen B. poplar	Found throughout the entire District on both native and shelterbelt poplars.
Engelmann spruce weevil, *Pissodes engelmanni* Hopk.	W. spruce B. spruce	Light damage to spruce terminals throughout forested area of the District.
Poplar borer, *Saperda calcarata* Say	T. aspen	Considerable damage in aspen stands. More pronounced in the western half of District.
Disease		
Dwarf mistletoe, *Arceuthobium americanum* Nutt. ex Engelm.	Lp. pine	No noticeable change in intensity or infection areas.
Armillaria root rot, *Armillaria mellea* (Vahl ex Fr.) Quél.	W. spruce	Well established west of Ricinus, north of Rocky and west of Crimson Lake.
Atropellis canker, *Atropellis piniphila* (Weir) Lohman & Cash	Lp. pine	Common throughout the pine stands in the District.
Yellow witch's broom of spruce, *Chrysomyxa arctostaphyli* Diet.	W. spruce B. spruce	Brooms common in spruce stands in the foothills area.
Comandra blister rust, *Cronartium comandrae* Pk.	Lp. pine (primary host) C. pallida (alternate host)	Found on both hosts throughout the western half of the District.

Table III - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Leaf rust on willow, Melampsora epitea Thuem.	Willow	Severe infection area west of Ricinus to the Trunk Road. Scattered light damage in remainder of District.
Rodent damage	Lp. pine T. aspen B. poplar	Light-moderate-severe damage noted in the Warburg, Alder Flats, Winfied and Claysmore areas.
Spruce needle cast, Sarcotrichila piniperda (Rehm) Korf.	W. spruce	Moderate infection still present near James River Bridge. No change in infection area.

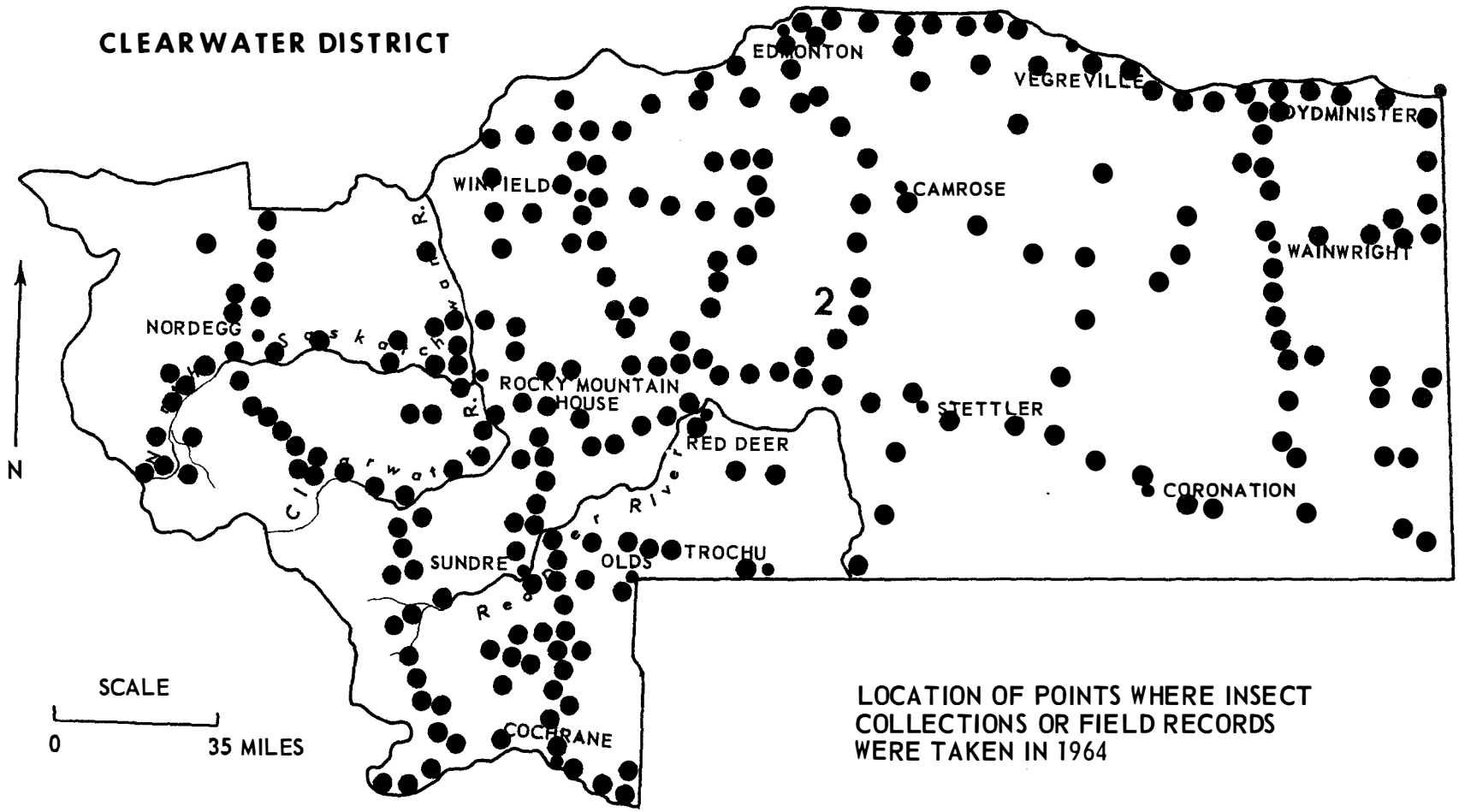
TABLE IV

SUMMARY OF RECORDED DISEASE OUTBREAKS
UNDER INVESTIGATION IN THE CLEARWATER DISTRICT

Outbreak number	Location	Causal organism	Remarks
2-1	18 miles north of the Clearwater Ranger Station along the Trunk Road.	Atropellis piniphila (Weir) Lohman & Cash	Re-examination due in 1965
2-2	2 miles south of the Clearwater Ranger Station along the Trunk Road.	Atropellis piniphila (Weir) Lohman & Cash	Re-examination due in 1965
2-3	23 miles north of Nordegg, Chungo Creek area.	Atropellis piniphila (Weir) Lohman & Cash	Re-examination due in 1965

Table IV - Summary of Recorded Disease Outbreaks - Cont'd.

Outbreak number	Location	Causal organism	Remarks
2-7	10 miles east of Nordegg.	Atropellis piniphila (Weir) Lohman & Cash	Re-examination due in 1965
2-9	16 miles west of Upper Saskatchewan Ranger Station.	Arceuthobium americanum Nutt. ex Engelm.	Re-examination due in 1965


CLEARWATER DISTRICT
EDMONTON
VEGREVILLE
WINFIELD
CAMROSE
WAINWRIGHT
2
NORDEGG
ROCKY MOUNTAIN HOUSE
STETTLER
RED DEER
CORONATION
SUNDRE
OLDS
TROCHU
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SCALE
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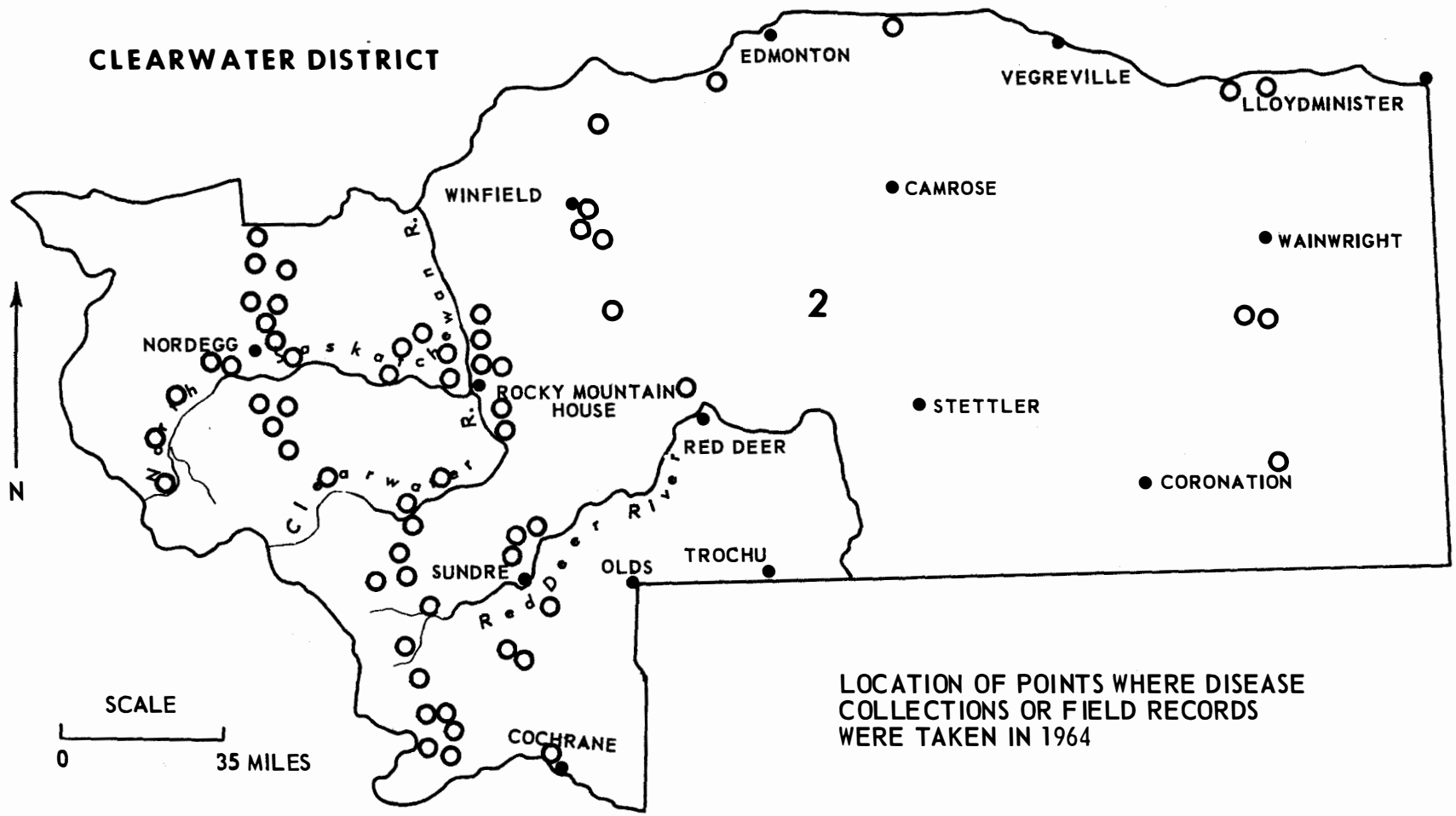
35 MILES
LOCATION OF POINTS WHERE INSECT COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964


CLEARWATER DISTRICT
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VEGREVILLE
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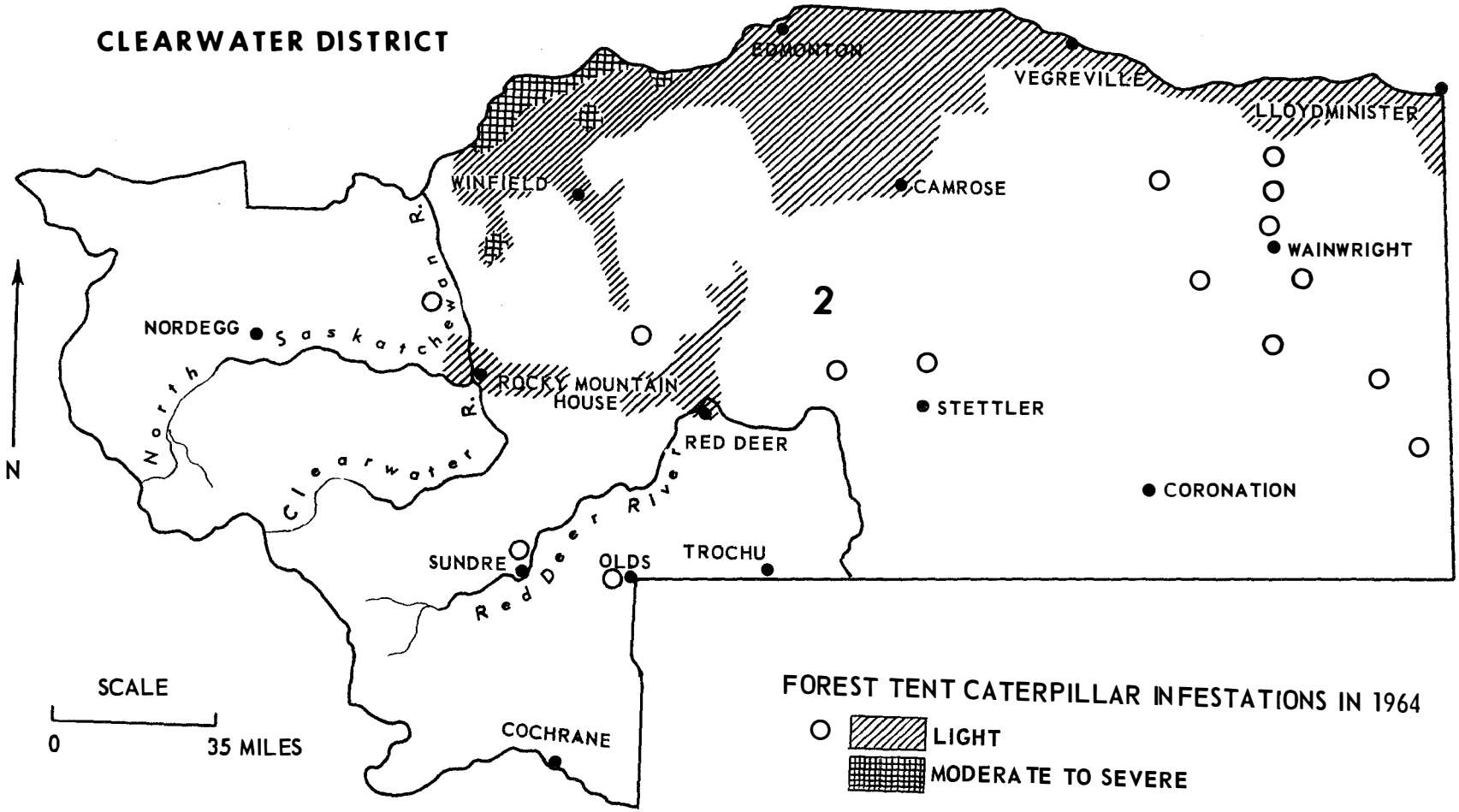

CLEARWATER DISTRICT
EDMONTON
VEGREVILLE
LLOYDMINISTER
WINFIELD
CAMROSE
WAINWRIGHT
2
NORDEGG
Saskatchewan R.
ROCKY MOUNTAIN HOUSE
STETTLER
RED DEER
North Clearwater R.
CORONATION
N
SUNDRE
OLDS
TROCHU
Red Deer River
SCALE
0
35 MILES
COCHRANE
FOREST TENT CATERPILLAR INFESTATIONS IN 1964
LIGHT
MODERATE TO SEVERE

ANNUAL DISTRICT REPORT

NATIONAL PARKS DISTRICT

ALBERTA 1964

by

J. PETTY

INFORMATION REPORT

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

CALGARY, ALBERTA

DEPARTMENT OF FORESTRY

FOREST ENTOMOLOGY AND PATHOLOGY BRANCH

MARCH 1965

INTRODUCTION

Population levels of lodgepole needle miner declined markedly in the Mt. Norquay area during the period January to June, although discoloration was noted in stands of lodgepole pine in this and other areas in the Bow River Valley. Defoliation by spruce budworm was heavier near Saskatchewan River Crossing than in 1963 and an infestation appears to be building up in Kootenay National Park between Vermilion Crossing and Marble Canyon. Black-headed spruce budworm caused noticeable damage to regeneration spruce in many parts of the District. Severe infestations of the poplar serpentine miner were present in parts of Kootenay and Yoho national parks but decreased sharply in Jasper National Park.

Spruce needle rusts were evident in many areas of the District this past season and they caused much concern to personnel of the Parks. A new outbreak of stalactiforme rust was recorded and one old outbreak was re-examined. Needle casts of lodgepole pine were present south of Jasper and in the Bow River Valley between Eisenhower Junction and Sawback. One small area of red belt was recorded in Banff National Park. The area in Jasper National Park so severely damaged by red belt in previous years, showed signs of tree mortality.

INSECT CONDITIONS

Black-headed Budworm, Acleris variana (Fern.)

For the first time in many years black-headed budworm caused noticeable defoliation in some areas of the National Parks District. In Jasper National Park light defoliation was seen west of Jasper near Derr Creek and north of Jasper in the Snake Indian Valley between Celestine Lake and Seldom Inn. Light defoliation of spruce regeneration was evident in Yoho National Park along the Kicking Horse Valley from the mouth of the Yoho Valley to a point 15 miles southwest of Field. This budworm was also found in low numbers along the Emerald Lake Road ant at the lower end of the Ice River Road. In Kootenay National Park light damage was noted along the East Kootenay Fire Road. Collections of this budworm were made in most areas of Banff National Park but the amount of damage they caused was minimal.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Populations of spruce budworm continued to cause damage in an overmature stand of spruce and alpine fir in the Saskatchewan Crossing

area of Banff National Park. The infestation extended south from the Warden Station along the Banff-Jasper Highway for a distance of 3 miles. In this area moderate defoliation, primarily to intermediate trees, was evident on the current year's foliage. Since moth flight occurred this past season, defoliation by late instar larvae was more noticeable than in 1963.

In Kootenay National Park spruce budworm caused light damage to spruce and alpine fir along the Vermilion River from a point 2 miles south of Vermilion Crossing north to Tokumm Creek. The center of this infestation is near Hawk Creek and gradually decreases in both directions along the Vermilion River.

Two areas of light defoliation were recorded in Yoho National Park. In one area, near the mouth of the Yoho Valley, low populations have been present for a number of years with very little change noted from year to year. The other area mentioned was at the lower end of the Ice River Road near the southern boundary of the Park.

Leaf Beetle, Chrysomela aeneicollis Schffr.

Infestations of these leaf beetles on willow were again evident in 1964 at the higher elevations in many areas of Banff, Yoho, and Kootenay national parks. In Banff National Park moderate defoliation was noted along the Cascade Fire Road from Flint Park turnoff to the Red Deer River. Light infestations were found up Healy Creek to Bourgeaux Cabin, up Redearth Creek to Shadow Lake, along Boom Creek, west of Lake Louise, and at a few locations along the Banff-Jasper Highway. Infestations were light in Yoho National Park along the Amiskwi Valley Road, 4.5 miles up the Otterhead River and near Lake O'Hara. Light damage was noted from Hawk Creek north and east to Marble Canyon and Vermilion Pass in Kootenay National Park.

Needle Miner, Evagora starki Free.

Nineteen sixty-four, the flight year for lodgepole needle miner, saw a decrease in populations of that generation in the Mt. Norquay area. Several factors entered into natural control of needle miner populations on Mt. Norquay. By June the population had declined to 25.6 per cent of what it was in the fall of 1963. Winter mortality, parasites and bird predation were the factors responsible for this loss.

Moderate discoloration in the lodgepole pine stands was notable in the following areas: between Stony Squaw Mountain and Mt. Norquay, on the northeast slopes of Massive Mt. above Wolverine Creek, on the slopes of Mt. Eisenhower to Johnston Creek, and on the southwest slopes of Mt. Ishbel from Johnston Creek to Massive Siding. On either side of

Johnston Creek infestations were more concentrated in the gullies than on the ridges between the gullies. Light discoloration of lodgepole pine was noted on the southwest slopes of Mt. Inglismaldie above Johnson Lake.

Results of sequential sampling in the fall were inconclusive due to the fact that hatching had not been completed. However, it did show the population trend. In Banff National Park medium-low populations were recorded one mile up Johnston Creek and at the 5,000 foot elevation on Massive Mountain above Wolverine Creek. In the Bow River Valley low populations were present between Banff and a point 11 miles northwest of Eisenhower Junction. In Kootenay National Park a medium-low population was recorded at Black Creek, and low populations were present at Hawk Creek and 1.8 miles west of Marble Canyon.

Sampling on Mt. Norquay was left until late in the fall to allow all the time possible for the eggs to hatch. Twenty trees were sampled in this area in mid-September and it was found that only two-thirds of the eggs had hatched.

Unfavorable weather conditions in August delayed the hatching of many eggs until the latter part of September. During this time many of the mined needles, in which the eggs are laid, dropped from the trees. This will undoubtedly be a controlling factor of the 1964-1966 generation.

Grey Willow Leaf Beetle, Galerucella decora Say

The grey willow leaf beetle was found in many areas of Banff and Jasper national parks this past season. In Banff National Park low populations were present along the Saskatchewan River near the east boundary of the Park and along the Red Deer River also near the east boundary. In Jasper National Park low populations were found north of Jasper near Patricia and Pyramid lakes, along the Snaring River 10 miles north of Jasper, in the Snake Indian Valley near Seldom Inn and between Medicine and Maligne lakes.

Spruce Spider Mite, Oligonychus ununguis (Jac.)

Moderate infestations of spruce spider mite caused discoloration of Douglas fir foliage near the Administration Building in Jasper. Spruce in Jasper Townsite and around Jasper Park Lodge supported low populations of mites. In Banff Townsite many spruce hedges had moderate infestations while the more open, individual trees along the boulevards had light infestations. Low populations occurred on Douglas fir near Sinclair Canyon in Kootenay National Park.

Poplar Serpentine Miner, Phyllocnistis populiella Cham.

The severe infestations that have been present in Jasper National Park for the past few years were greatly decreased in 1964. Moderate infestations were found northwest of Jasper to Patricia and Pyramid lakes and west of Jasper along the Yellowhead Highway from Geikie to the west boundary of the Park. Light infestations occurred around Jasper Townsite and north to Fiddle Creek, along the Miette Road, the Maligne Lake Road, and in the Athabasca Valley south from Jasper for 30 miles.

In Kootenay National Park severe infestations were present in the Kootenay Valley south from Kootenay Crossing to the Park Boundary. This severe infestation extended northeast of Kootenay Crossing to Wardle Creek and west from the main valley along the highway for a short distance towards Sinclair Summit. The infestation was light near Sinclair Summit and increased to moderate near Radium. At the south end of the Park near Stoddart Creek the infestation was moderate.

The infestation in Yoho National Park was severe between Leanchoil and the west entrance to the Park and south of Leanchoil along the Beaverfoot River to the Ice River. Northeast from Leanchoil along the Kicking Horse Valley, the intensity decreased gradually from severe to light in the vicinity of Field.

Infestations in Banff National Park were generally light except in the Bow River Valley between Lake Louise and Banff. Here a few small areas of moderate damage were recorded.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Yoho and Kootenay national parks were the only areas where this weevil was found in 1964. A few terminals of regeneration spruce were destroyed by spruce weevils near Leanchoil and 3 miles up the Ottertail Valley in Yoho National Park. The infested area in Kootenay National Park was the same as that reported in previous years, that is along the Kootenay River Valley for its length within the Park. At the sample plot established near Kootenay Crossing 37 tips were weevilled in 1964 as compared to 39 tips weevilled in 1963.

Lodgepole Terminal Weevil, Pissodes terminalis Hopping

In Kootenay National Park light infestations were recorded in stands of regeneration lodgepole pine along the Settlers Road and near the campground at Radium. A few infested terminals were collected east of the bungalow camp at Saskatchewan Crossing in Banff National Park. There has been a light infestation in this area for several years

and many deformed tops have developed. In Jasper National Park several trees near Patricia Lake were infested.

Larch Sawfly, Pristiphora erichsonii (Htg.)

Larch sawfly was found in 3 widely separated areas of the National Parks District in 1964. Light damage to western larch was seen along the Settlers Road in Kootenay National Park. In a small stand of tamarack at Mile 4 of the Miette Road in Jasper National Park, a medium population was present. In this area the top two-thirds of the trees had very short needle growth which, from a distance, gave the appearance of moderate defoliation although the actual defoliation was light. The third area was near Snow Creek Pass along the Cascade Fire Road in Banff National Park. Alpine larch in this area supported low populations with the result that only light defoliation was evident.

DISEASE CONDITIONS

Spruce Needle Rusts, Chrysomyxa empetri (Pers.) Schroet., Chrysomyxa ledicola Lagerh., and Chrysomyxa ledi de Bary

Spruce needle rusts were evident in many areas of the National Parks District this past season and were the cause of much concern by personnel of the Parks. C. ledicola was collected most frequently but C. ledi and C. empetri were also found. Several areas in Banff, Yoho and Kootenay national parks were sampled with a view to obtaining intensity data (see table III). Infected spruce needles were found throughout Banff National Park but the most notable damage was caused in the following areas: Spray River Valley from Mile 4.8 to Mile 19 south of Banff, Cascade River Valley north of Banff from Mile 6 to Mile 7.5, along Highway 1 west of Banff at Mile 7, 1.5 miles up Healy Creek Fire Road, one mile up Redearth Creek, near Waterfowl Lakes, 2.8 miles south of Saskatchewan Crossing, and near Catarac Creek.

In Kootenay National Park moderate infections covered a large area in the northern section of the Park. The center of this outbreak was Marble Canyon and the Paint Pots and the outbreak extended south along the Vermilion River to Numa Creek Valley, northeast to Vermilion Summit, northwest along Ochre Creek and into Yoho National Park down the Ottertail River to within 3 miles of the Trans Canada Highway. A few moderately infected trees were also noted along the Dollyvarden Fire Road and on the east side of the Kootenay River near Dog Lake.

In addition to the previously mentioned area along the Ottertail River in Yoho National Park, moderate damage was noted near Sink Lake and 2 miles along the road to Lake O'Hara. Light damage occurred in an area 2 miles along the Ice River Road.

Spruce needle rusts were not prominent in Jasper National Park although light damage was noted along the Sunwapta River near Grizzly and Beauty creeks.

Darluca filum (Biv.) Cast., a hyperparasite, was found on many of the rust pustules in the Ottertail River area of Yoho National Park. This fungus prevents rust spore dissemination. It is the first record of this hyperparasite in the Alberta Region.

Needle Casts of Lodgepole Pine, Hendersonia pinicola Wehm., Hypodermella montivaga (Petrak) Dearn., Hypodermella sp.

Needle casts caused discoloration of the foliage of lodgepole pine in the Athabasca Valley south of Jasper and in the Bow Valley between Eisenhower Junction and Sawback. H. montivaga caused damage south of Jasper along both sides of the Athabasca River to Athabasca Falls in Jasper National Park. Light damage caused by a Hypodermella sp. was reported from Mt. Norquay and 8 miles west of Banff in Banff National Park. H. pinicola caused light damage along the Bow Valley between Eisenhower Junction and Sawback and along Brewster Creek from the mouth to its junction with Howard Douglas Creek.

Stalactiforme Rust, Peridermium stalactiforme A. & K.

The outbreak of stem rust at Mile 59 of the Banff-Jasper Highway was re-examined and no change was noted in the size of the infected area. In 3 sample plots established an average of 16.6 per cent of the trees were infected. A new outbreak near Saskatchewan Crossing was recorded and, samples taken at 6 locations along the right of way cut for the David Thompson Highway showed an average of 16 per cent of the trees were infected.

A high incidence of infection of this rust was found in a small stand of regeneration pine 5 miles up Brewster Creek Fire Road. Light damage caused by this stem rust was recorded north of Banff near Fortymile Creek and in the Spray River Valley 16 miles south of Banff.

Red Belt

Red belt damage to stands of lodgepole pine was noted in the Red Deer Valley 42 miles north of Banff. It occurred between the 5,600

and 6,000 foot elevation levels on both sides of the Valley. On the north side of the Valley it encompassed an area of about one square mile while on the south side it was about one half of that size. Red belt did not recur in 1964 along Ashler Ridge in Jasper National Park. Tree mortality was evident in this area as a result of severe damage in the 2 previous years.

TABLE I

SUMMARY OF INSECT AND DISEASE COLLECTIONS BY HOSTS

Host Coniferous	Collections Insect	Disease	Host Deciduous	Collections Insect	Disease
White spruce	38	4	Trembling aspen	22	1
Engelmann spruce	19	9	Balsam poplar	4	1
Misc. spruce	9	5	Birch	3	0
Lodgepole pine	55	14	Willow	32	0
Misc. pine	0	1			
Douglas fir	12	6			
Alpine fir	14	5			
Misc. larch	7	3			
	154	47		61	2
Insect collections from miscellaneous hosts					14
Disease collections from miscellaneous hosts					5
GRAND TOTAL					283

TABLE II

OTHER NOTEWORTHY INSECTS AND DISEASES
WHICH OCCURRED IN THE NATIONAL PARKS DISTRICT, 1964

Causal Agent	Host	Remarks
Insect		
Cooley spruce gall aphid, Adelges cooleyi (Gill.)	W. spruce D. fir	Present in all areas but lighter than in past years.
Lodgepole pine beetle, Dendroctonus murrayanae Hopk.	Lp. pine	Numerous trees, damaged by porcupine, supporting low populations near Beauty and Grizzly creeks, J. N. P.
Spruce coneworm, Dioryctria reniculella (Grote)	W. spruce	Found in association with budwormsthroughout Y. N. P.
Needle miner, Evagora florae Free.	Lp. pine	Light infestation associated with E. starki on Mt. Norquay, B. N. P.
Caragana aphid, Macrosiphum carraganae Cholod.	Caragana	Light infestations on hedges in Banff and Jasper townsites.
Forest tent caterpillar, Malacosoma disstria Hbn.	T. aspen	Light defoliation to a few trees near Radium, K.N.P.
Western tent caterpillar, Malacosoma pluviale (Dyar)	Willow T. aspen W. birch Rose	Light damage recorded in southwestern sections of Yoho and Kootenay national parks.
Pine needle scale, Phenacaspis pinifoliae (Fitch)	Lp. pine D. fir	Light infestations persist near Radium, K.N.P.
Spruce bud scale, Physokermes piceae Schr.	Spruce	Light infestation along Spray River Valley, B.N.P.
Yellow-headed spruce sawfly, Pikonema alaskensis (Roh.)	Spruce	Severe damage to a few trees near Patricia Lake and 14 miles south of Jasper, J.N.P. Moderate on a few trees north of Banff, B.N.P.

Table II - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Poplar and willow borer, Sternochetus lapathi (L.)	Willow	Found east of Radium along the Settlers Road and near Dog Lake, K.N. P.
Disease		
Shoestring root rot, Armillaria mellea (Vahl ex Fr.) Quél.	D. fir	Some mortality evident along Trans Canada Highway east of Banff.
Spruce cone rust, Chrysomyxa pirolata Wint.	Spruce	Light infections in all areas of the District.
Comandra blister rust, Cronartium comandrae Pk.	Lp. pine	Found south of Leanchoil Y.N.P., near Saskatchewan Crossing and Flint Park, B.N.P.
White pine blister rust, Cronartium ribicola J. C. Fischer	W.b. pine	Branch infections on a few trees near King Mountain Lookout, Y.N.P.
Canker on spruce, Cytospora curreyi Sacc.	E. spruce	Some top killing of spruce in Cascade Valley, B.N.P.
Larch needle cast, Hypodermella laricis Tub.	W. larch	Still present but very light along Settlers Road, K.N.P.
Leaf and twig blight, Pollaccia elegans Serv.	B. poplar T. aspen	Regeneration poplars between Lake Minnewanka and Banff affected.
Fir needle rust, Pucciniastrum epilobii Otth.	A. fir	Light along Settlers Road and Dollyvarden Creek in K.N.P. Light in Amiskwi Valley, Y.N.P.

TABLE III

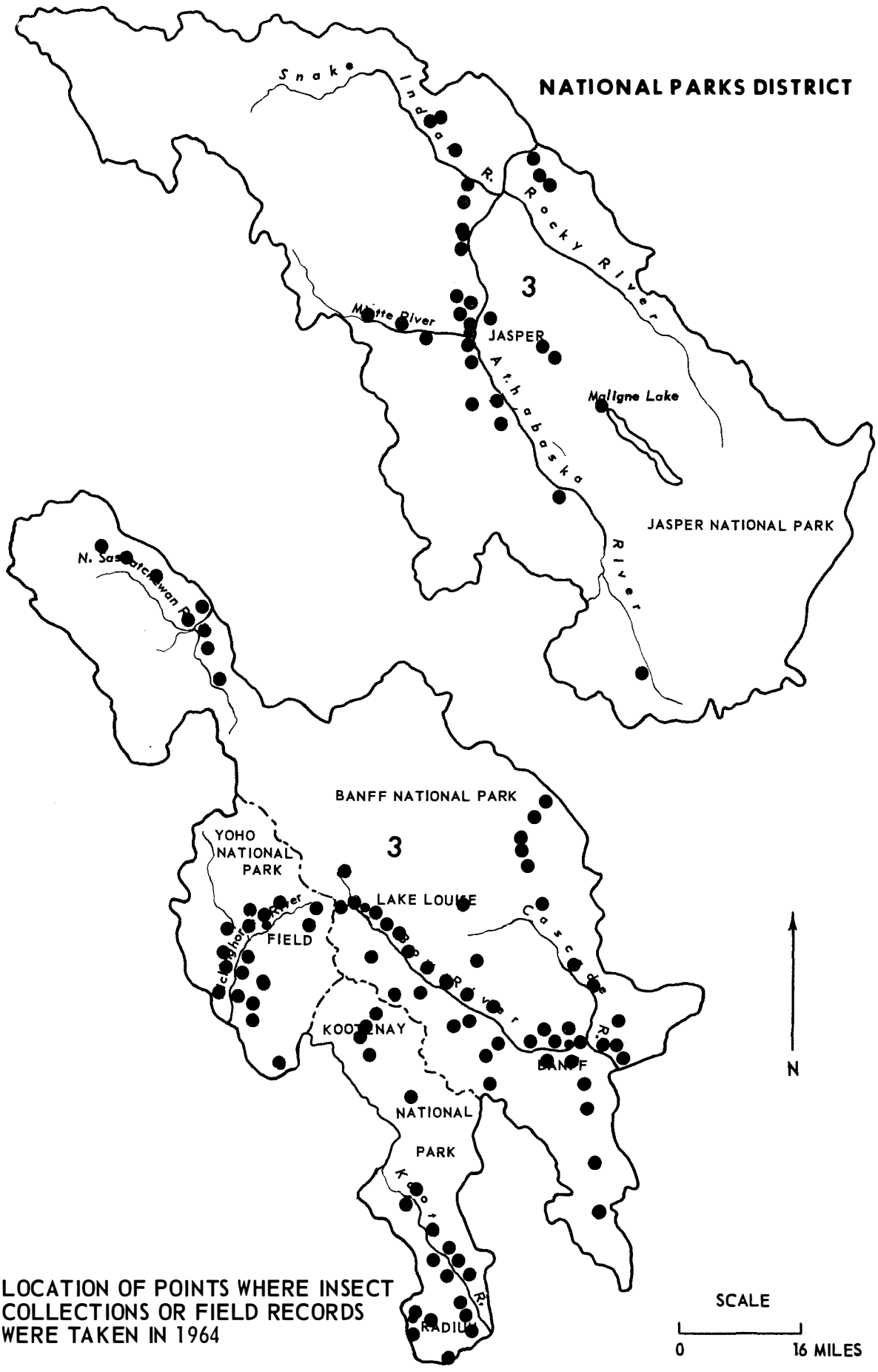
SPRUCE NEEDLE RUST *Chrysomyxa* spp.

Location	Tree I		Tree II		Total		% Infected
	Needles						
	Inf.	Non-Inf.	Inf.	Non-Inf.	Inf.	Non-Inf.	
Spray Valley 4.7 mi. S. Banff	64	36	72	28	136	64	68.0
" " 7.6 mi. S. Banff	42	58	62	38	104	96	52.0
" " 8.9 mi. S. Banff	51	49	58	42	109	91	54.5
" " 11.7 mi. S. Banff	62	38	61	39	123	77	61.5
Cascade Valley 1.3 mi. N. Gate	52	48	54	46	106	94	53.0
" " 1.6 mi. N. Gate	84	16	86	14	170	30	85.0
Ottertail Valley 5.7 mi. S. Gate	41	59	33	67	74	126	37.0
" " 8.7 mi. S. Gate	70	30	72	28	142	58	71.0
" " 9.5 mi. S. Gate	62	38	97	3	159	41	79.5
Sink Lake	67	33	70	30	137	63	68.5
Numa Creek	58	42	51	49	109	91	54.5
Marble Canyon Camp	31	69	53	47	84	116	42.0

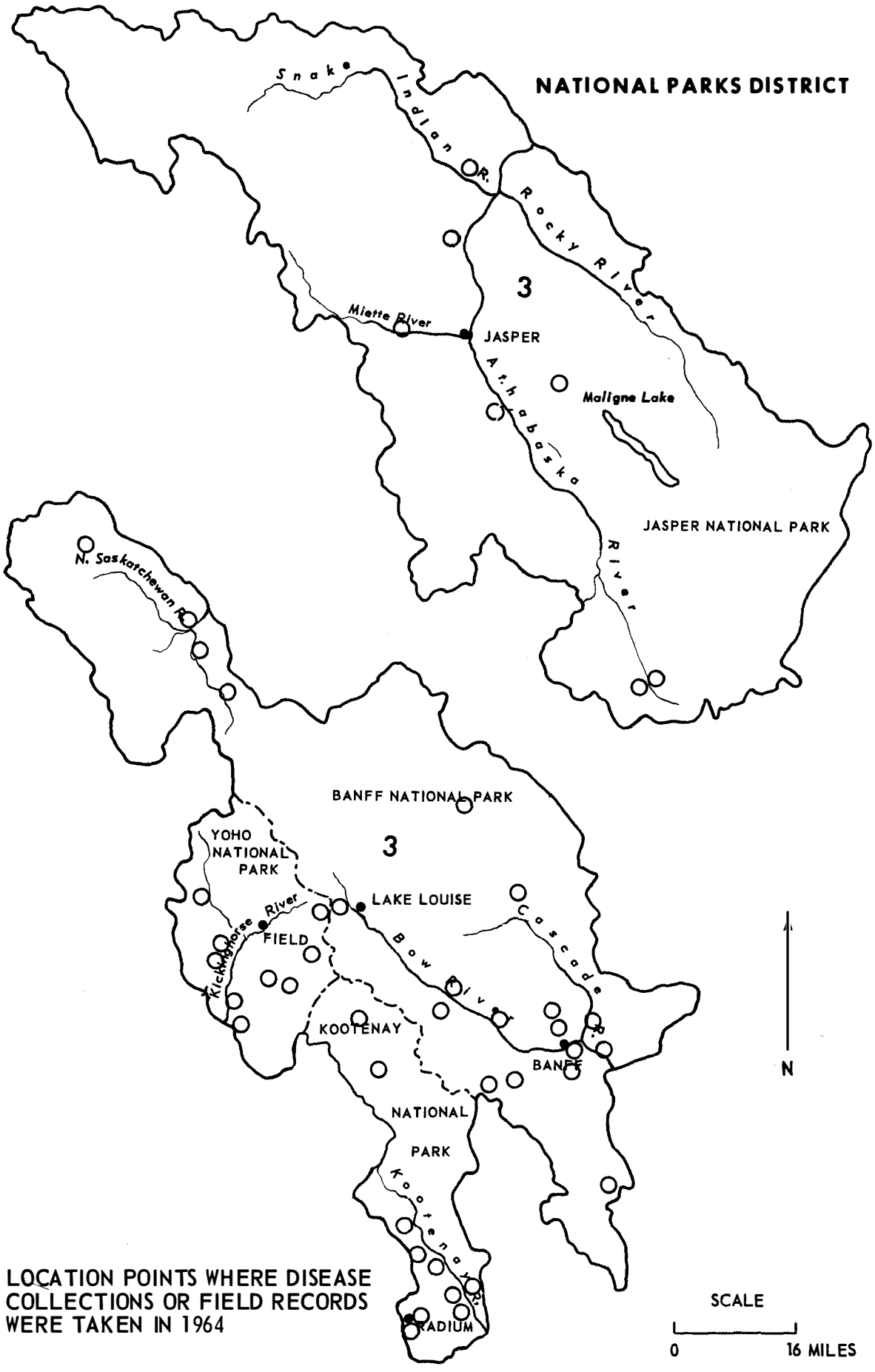
TABLE IV

SUMMARY OF RECORDED DISEASE OUTBREAKS
UNDER INVESTIGATION IN THE NATIONAL PARKS DISTRICT

Outbreak number	Location	Causal Organism	Remarks
3-1	Geraldine Lake Road	Atropellis piniphila (Weir) Lohman & Cash	To be re-examined 1969.
3-2	Sundance Canyon	Atropellis piniphila (Weir) Lohman & Cash	To be re-examined 1965.
3-3	59.5 miles north Lake Louise Junction	Peridermium stalactiforme A. & K.	No noticeable change in area. 16.6% trees affected.
3-9	Snaring River	Arceuthobium americanum Nutt. ex Engelm.	Most trees dead. No aerial plants seen.
3-13	Jasper Townsite	Arceuthobium americanum Nutt. ex Engelm.	100 per cent infection. Trees dying.
3-14	Marmot Basin Trail	Atropellis piniphila (Weir) Lohman & Cash	To be re-examined 1965.
3-15	10 miles west of Banff	Rhabdocline pseudotsugae Syd.	Discontinued 1964.
3-18	Settlers Road	Hypodermella laricis Tub.	Discontinued 1964.
3-19	Settlers Road	Peridermium harknessii J. P. Moore	To be re-examined 1965.
3-20	Between Mt. Eisenhower and Johnston's Canyon	Arceuthobium americanum Nutt. ex Engelm.	To be re-examined 1966.
3-21	Between Astoria and Whirlpool rivers	Arceuthobium americanum Nutt. ex Engelm.	To be re-examined 1966.
3-22	Between Astoria and Whirlpool rivers	Atropellis piniphila (Weir) Lohman & Cash	To be re-examined 1965.



LOCATION OF POINTS WHERE INSECT COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964



LOCATION POINTS WHERE DISEASE COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964

ANNUAL DISTRICT REPORT

BRAZEAU-ATHABASCA DISTRICT

ALBERTA 1964

by

V. B. PATTERSON

INFORMATION REPORT

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

CALGARY, ALBERTA

DEPARTMENT OF FORESTRY

FOREST ENTOMOLOGY AND PATHOLOGY BRANCH

MARCH 1965

INTRODUCTION

There was considerable change in the boundaries of the area infested by the forest tent caterpillar in the Brazeau-Athabasca District. The outbreak advanced southeast to the North Saskatchewan River and collapsed almost completely northwest of a line through Whitecourt. The grey willow leaf beetle populations which have declined in recent years, hit a new low in 1964. The larch sawfly infestation also hit a low level for recent years and throughout most of the District defoliation was light. The spruce sawfly population remained at the same low level it has been at for a number of years.

Stem, foliage, and cone rusts were common in 1964. Atropellis canker of pine was recorded in 3 areas not previously surveyed for this disease.

INSECT CONDITIONS

Gall Mites, Aceria neoessigi (K.)

Leaf galls caused by these mites were common on aspen poplar in 1964. Low populations occurred throughout the Greencourt-Fox Creek-Little Smoky area. Within this area, pockets of moderate to severe injury occurred near Greencourt and Whitecourt and along Highway 43 west of Fox Creek.

Grey Willow Leaf Beetle, Galerucella decora Say

The grey willow leaf beetle caused very little injury in the Brazeau-Athabasca District in 1964. Low populations of adults were recorded on aspen poplar in the Edmonton-Spruce Grove and Whitecourt-Little Smoky areas; on willow in the Entrance-Robb area, and northwest of Entrance near Jarvis, Peppers and Rock lakes. Moderate skeletonizing of willow by larvae was recorded along the shoreline of Muskiki Lake, southwest of Mountain Park. Severe skeletonizing of willow occurred in a small area 16 miles north of Drayton Valley.

Root Borers, Hepialidae

Aspen poplar in the Entrance-Hinton area are infested with a species of root borer. The infestation is found along the Athabasca

River Valley and is confined mainly to trees growing on sandy shelves 100-400 feet above the present river bed. Some mortality of aspen has occurred and the remaining trees have a stunted, unhealthy appearance. Ninety per cent of the trees examined in the area around the Entrance Headquarters cabin contained one or more Hepialid larvae.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The forest tent caterpillar infestation covered approximately 6,000 square miles of the Brazeau-Athabasca District in 1964. Severe defoliation of aspen poplar occurred throughout an area of roughly 3,800 square miles. Moderate and light defoliation occurred over the remaining 2,400 square miles.

The southeastward movement of the infestation which was evident in 1963, continued in 1964. The eastern edge of the infestation which was mainly west of the Pembina River in 1963, moved east of the River for a distance of 35 miles on a 125 mile front. The eastern boundary of the infestation followed a line roughly through Westlock and Drayton Valley. South and east of Drayton Valley the infestation extended across the North Saskatchewan River into the Clearwater District. The northwest boundary of the infestation moved southeastward to a line northeast and southwest through Timue, Whitecourt and Wolf Creek. The southwestern boundary was roughly a line through Wolf Creek and Lodgepole.

East of the main front to Edmonton, low populations were found at most locations inspected. No noticeable defoliation occurred in this area.

High populations of the flesh fly, Sarcophaga aldrichi Park., an important parasite of the forest tent caterpillar, was a factor in the collapse of the outbreak north and west of Whitecourt. Other contributing factors were a Polyhedral virus disease and weather conditions unfavorable to larval development.

See Table II for predicted defoliation in 1965, arrived at from data obtained by sequential samples taken in the permanent sample plots distributed throughout the District.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

Populations of this species remained at the same low level as in the past few years. Planted spruce in farm shelterbelts were attacked in a hit-and-miss pattern. This was probably a result of a control program adopted by owners when populations built up to noticeable levels. At locations where control measures had not been taken, popu-

lations rose to a point where considerably injury occurred. This was most noticeable in the Shoal Creek-Westlock area and around private homes in Edmonton.

Larch Sawfly, Pristiphora erichsonii (Htg.)

Populations of the larch sawfly hit a new low for recent years. No tamarack stands were entirely without some degree of infestation but throughout most of the Brazeau-Athabasca District only light injury occurred.

The only area where noticeable injury occurred was in the vicinity of Lake Obed. The tamarack in this area suffered moderate to severe defoliation in a hit-and-miss pattern. This condition was present east of Obed for 10 miles along either side of Highway 16 and south of Hargwen for 8 miles along the McLeod River.

All areas that were in the light infestation category in 1963 showed still less defoliation in 1964. Conversely at Obed there has been a population increase since 1960. Recorded defoliation in this area over the past five years was as follows: light in 1960, moderate in 1961 and 1962, severe in 1963 and 1964.

DISEASE CONDITIONS

Atropellis Canker, Atropellis piniphila (Weir) Lohman & Cash

A survey for this disease on lodgepole pine was made north of Cabin Creek Ranger Station along the Huckleberry Tower Road. Respresentative samples were taken at 4 mile intervals and infected trees were found at each check point.

From information gathered this year and in previous years, it is known that Atropellis is present in all immature pine stands along the road between Muskeg River Ranger Station and Simonette Tower. This road roughly parallels the Huckleberry Tower Road at a distance of 15 miles and it is probable that the stands in the area between them are similarly infected.

Atropellis was also found in an area not previously surveyed west of Lodgepole. This location is approximately 40 miles west of the Lodgepole-Brazeau Dam Road, along the new Elk River Trunk Road. There was evidence of damage from Mile 38 to Mile 42. Numerous dead trees with a diameter of 6 inches had typical canker scars. On living

trees, resin flow was heavy but there was little discoloration of the wood. Another area where Atropellis had not previously been recorded was along the Mobile Oil Road 25 miles north of Whitecourt. Approximately 25 per cent of the lodgepole pine were infected with as many as 7 cankers per tree.

Spruce Needle Rust, Chrysomyxa ledicola Lagerh.

This rust was widespread in the District in 1964. White spruce foliage was lightly infected in the following areas: from Rock Lake west of Hinton to Muskiki Lake east of Mountain Park, south of McKay to Lodgepole, northwest of Fort Assiniboine in the Swan Hills. In the McKay-Lodgepole area, about 10 acres with moderate to severe damage was recorded 17 miles south of Cold Creek Ranger Station. Moderate damage was recorded along the McLeod River southwest of Medicine Lodge.

The alternate host, Labrador tea, was severely infected at Muskiki Lake. At all other sample points the alternate host was lightly infected.

Spruce Cone Rust, Chrysomyxa pirolata Wint.

Spruce cone rust occurred throughout the foothills of the Brazeau-Athabasca District and at widely separated points in the Whitecourt-Fox Creek area.

It was found generally on white spruce and occasionally on black and Engelmann spruce. The intensity of disease ranged from 3-94 per cent with most of the samples falling in the 20-30 per cent range. The most severely infected stands were found in these areas: north of Hinton along the Obed Tower Road, southeast of Hinton along the McLeod River, and west of Robb.

Pine Needle Cast, Elytroderma deformans (Weir) Darker

In Entrance Provincial Park this needle cast caused moderate to severe injury at the north end of Jarvis Lake and along the west side of Gregg Lake. The disease has persisted for a number of years leaving only the previous years infected needles and the current years healthy ones. This is common in this area on trees 4 inches in diameter growing under mature fire residuals. All these trees have small round crowns with a broomed appearance due to the tufts of needles left on the branch ends.

Spruce Needle Cast, Lophodermium macrosporum (Hartig) Rehm

White spruce were severely infected with this needle cast along the west side of Gregg Lake. Most of the old infected needles on the lower branches had been cast. The recently infected dead needles remained on the branches giving the lower crowns a greyish appearance.

Stalactiforme rust, Peridermium stalactiforme A. & K.

Infections of this rust of pine were recorded in several widely separated areas in 1964. Light damage was found near Luscar, Rock Lake, Windfall and in Entrance Provincial Park. High mortality resulted from rodents feeding on rust infected trees near Lodgepole. Thirty per cent of the standing trees showed evidence of rodent damage and were either dead or dying. Another 10 per cent had fresh rust infections not yet attacked by rodents.

Needle Rusts of Fir, Pucciniastrum epilobii Otth. and Pucciniastrum goeppertianum (Kuehn) Kleb.

These needle rusts are often present at a low degree of incidence on fir. In 1964 they occurred in outbreak proportions in the area southeast of Hinton. This is the first severe outbreak that has been recorded in Alberta.

Alpine fir was severely infected by the rusts in 3 different areas west of the Yellowhead Forestry Tower in the pulpwood lease of North West Pulp and Power Limited. The affected areas, which lie at an elevation of 4,200-4,700 feet, have all been logged and are well stocked with alpine fir regeneration.

TABLE I

SUMMARY OF INSECT AND DISEASE COLLECTIONS BY HOSTS

Host Coniferous	Collections Insect	Disease	Host Deciduous	Collections Insect	Disease
White spruce	23	35	Trembling aspen	113	14
Engelmann spruce	1	5	Balsam poplar	8	1
Black spruce	5	6	Misc. poplar	1	1
Misc. spruce	2	2	Willow	15	3
Lodgepole pine	8	27	Birch	4	1
Misc. pine	2	0			
Tamarack	22	0			
Misc. larch	1	0			
Balsam fir	0	0			
Misc. fir	1	6			
	65	81		141	20
Insect collections from miscellaneous hosts					19
Disease collections from miscellaneous hosts					14
			GRAND TOTAL		340

TABLE II

RESULTS OF SEQUENTIAL SAMPLING
AND DEFOLIATION ESTIMATES
FOREST TENT CATERPILLAR, 1964

Location	Predicted defoliation for 1964	Actual defoliation for 1964	Predicted defoliation for 1965
Edmonton	Light	Nil	Light
Whitecourt	Light	Light	Light
Little Smoky	Moderate	Nil	Light
Blue Ridge	Moderate	Light	Light
Entwistle	Mod. to severe	Severe	Severe
Ft. Assiniboine	Severe	Severe	Moderate
Edson	Moderate	Nil	Light
Lodgepole	*	Severe	Severe
Carrot Creek	*	Severe	Severe

* New plots 1964

TABLE III

OTHER NOTEWORTHY INSECTS AND DISEASES
WHICH OCCURRED IN THE BRAZEAU-ATHABASCA DISTRICT, 1964

Causal Agent	Host	Remarks
Insect		
Birch skeletonizer, *Bucculatrix canadensisella* Chamb.	Birch	Severe injury along the North Saskatchewan River Valley in Edmonton.
Elm aphids, *Eriosoma americanum* (Riley) *Eriosoma lanigerum* (Hausm.)	A. elm	Moderate injury in Edmonton, St. Albert, Stony Plain and Shoal Creek area.
Cone insects, *Lepidoptera*	W. spruce E. spruce	Collected at a number of locations in the foothills and in the Whitecourt area.
Leaf beetles, *Magdalis* sp.	Willow B. poplar W. spruce	On regeneration in cut-over area east of Peppers Lake. Moderate injury to willow and spruce, light injury to poplar.
Sawflies, *Neodiprion* sp.	Lp. pine	Found 16 miles east of Hinton along Highway 16. Average of one colony per tree.
Box-elder aphid, *Periphyllus negundinis* Thos.	M. maple	Light infestation in Edmonton.
Poplar borer, *Saperda calcarata* Say	T. aspen	Common in area north of Barrhead and northeast of Blue Ridge.
Disease		
Fire blight, *Erwinia amylovora* (Burrill) Winslow	Crabapple	Common in Stony Plain-Edmonton area.
White trunk rot, *Fomes igniarius* (L. ex Fr.) Kickx	T. aspen	Common in the area south of MacKay and in the Swan Hills north of Ft. Assiniboine.

Table III - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Red ring rot, Fomes pini (Thore ex Pers.) Lloyd	Lp. pine	Fruiting bodies found on living trees at 2 locations along Simonette Tower Road.
Pine needle cast, Hypodermella montana Darker	Lp. pine	Light damage in Rock Lake area and east of Mountain Park. Moderate damage in Eagles Nest Pass.
Willow leaf rust, Melampsora epitea Thuem.	Willow	Severe in small patches throughout foothills.
Willow stem rust, Melampsora paradoxa Diet. et Holw.	Willow	Numerous stem cankers found in small area northwest of Whitecourt. Stems dead above cankers.

TABLE IV

SUMMARY OF RECORDED DISEASE OUTBREAKS
UNDER INVESTIGATION IN THE BRAZEAU-ATHABASCA DISTRICT

Outbreak number	Location	Causal organism	Remarks
4-1	Lovett	Atropellis piniphila (Weir) Lohman & Cash	To be re-examined 1965.
4-3	Whitecourt	Arceuthobium americanum Nutt. ex Engelm.	Re-examined 1962, boundaries unchanged.
4-5	Robb	Armillaria mellea (Vahl ex Fr.) Quél.	Re-examined 1962. Mortality caused by A. mellea was 15.3 per cent, an increase of 1.6 per cent over 1959 data.

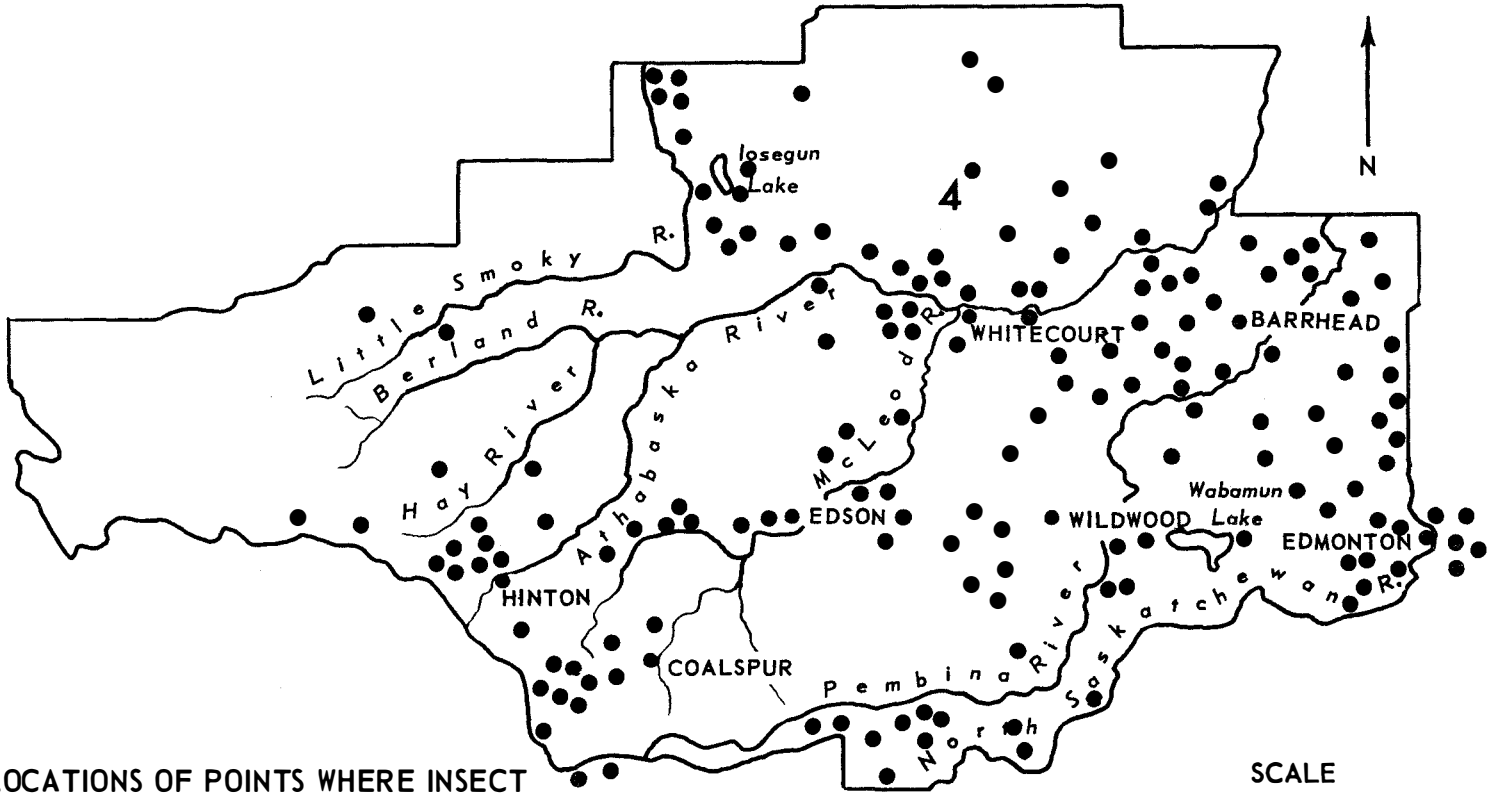
Table IV - Summary of Recorded Disease Outbreaks - Cont'd.

Outbreak number	Location	Causal organism	Remarks
4-9	Hinton	Peridermium harknessii J. P. Moore	Re-examined 1963. 20 per cent of trees checked were infected with P. harknessii.
		Peridermium stalactiforme A. & K.	50 per cent of trees checked were infected with P. stalactiforme.
4-11	Hinton	Atropellis piniphila (Weir) Lohman & Cash	Re-examined 1963. 34 per cent of trees checked were infected with an average of 3.5 cankers per tree.
4-12	Entrance	Peridermium stalactiforme A. & K.	Re-examined 1963. 22.2 per cent of trees checked were infected and 7.4 per cent were dead.
4-13	Robb	Peridermium harknessii J. P. Moore	re-examined 1962. No change in intensity from 1959 data.
4-14	Robb	Peridermium stalactiforme A. & K.	Re-examined 1962. Incidence slightly decreased from 1959 data.
4-18	Fort Assiniboine	Arceuthobium americanum Nutt. ex Engelm.	Re-examined 1962 following 1961 fire. There are still a number of old infected fire residuals and "islands" of young uninfected pine.
4-19	Fort Assiniboine	Arceuthobium americanum Nutt. ex Engelm.	Area reserved for study of the spread of dwarf mistletoe in pine regeneration.
4-20	Edson	Atropellis piniphila (Weir) Lohman & Cash	Examined 1963. 46.7 per cent of trees checked were infected with 1.6 cankers per tree.
4-21	Cadomin	Atropellis piniphila (Weir) Lohman & Cash	Examined 1963. 72 per cent of trees checked were infected with 3.1 cankers per tree.

Table IV - Summary of Recorded Disease Outbreaks - Cont'd.

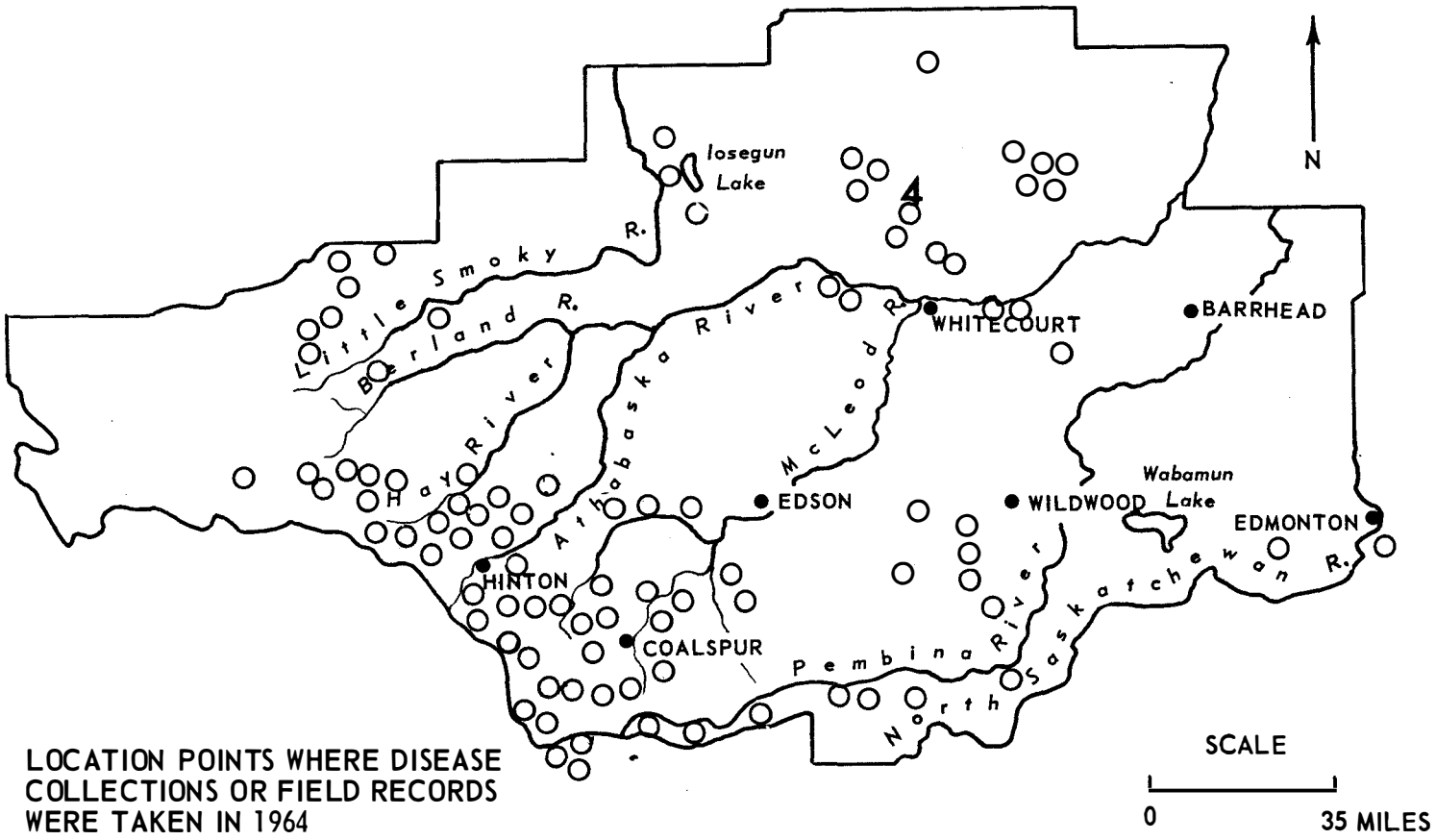
Outbreak number	Location	Causal organism	Remarks
4-22	Hinton	Armillaria mellea (Vahl ex Fr.) Quél.	Examined 1963. 31 per cent of pine checked were infected. Other species not affected.
4-23	Entrance	Rodent damage	Examined 1963. Suspected rust infection on which rodents feed.

BRAZEAU-ATHABASKA DISTRICT



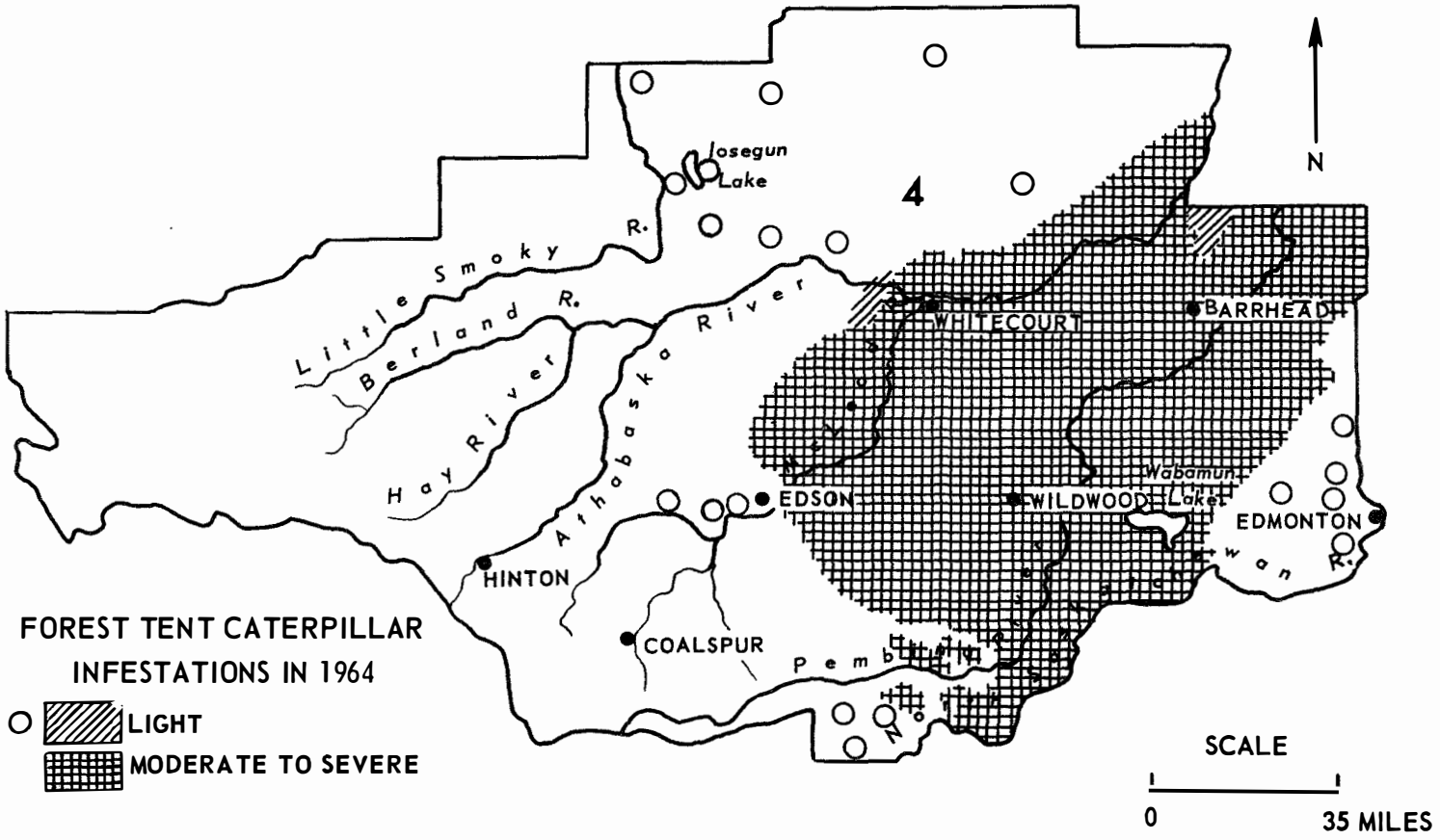
LOCATIONS OF POINTS WHERE INSECT COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964

BRAZEAU-ATHABASKA DISTRICT

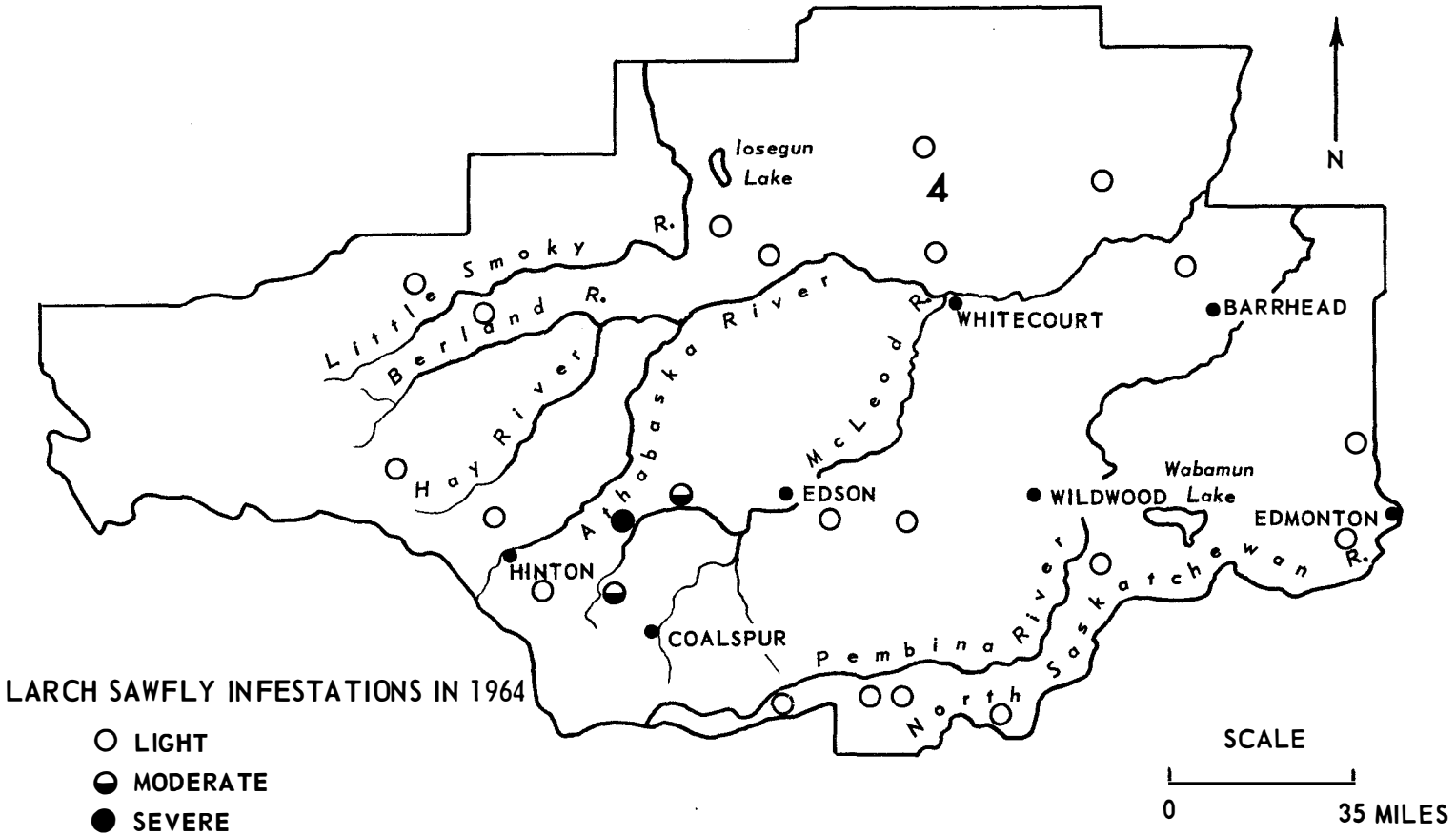


LOCATION POINTS WHERE DISEASE COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964

BRAZEAU-ATHABASKA DISTRICT



BRAZEAU-ATHABASKA DISTRICT



ANNUAL DISTRICT REPORT

LAC LA BICHE DISTRICT

ALBERTA 1964

by

R. W. BARRY

INFORMATION REPORT

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

CALGARY, ALBERTA

DEPARTMENT OF FORESTRY

FOREST ENTOMOLOGY AND PATHOLOGY BRANCH

MARCH 1965

INTRODUCTION

The forest tent caterpillar was again the most destructive forest insect in the Lac la Biche District in 1964 although a major breakup in the infestation occurred. North of Lac la Biche very little damage was evident while south of this region patchy defoliation conditions prevailed. A slight decrease of damage, over the previous season, by the grey willow leaf beetle was evident during 1964. Damage by the poplar serpentine leaf miner was light in the southern part of the District. Low populations of larch sawfly caused very little damage to tamarack in the District. The numbers of the yellow-headed spruce sawfly were reduced in the western region of the District.

No new disease outbreaks were recorded during the 1964 season. Phenology observations on jack pine and lodgepole pine were continued in 1964. Light infections of a spruce needle rust were found throughout the southern part of the District.

INSECT CONDITIONS

Grey Willow Leaf Beetle, Galerucella decora Say

Population levels of this leaf beetle were lower in 1964 than in the previous season. High larval populations in the Amisk River Valley south of Lac la Biche and in the Ft. Fitzgerald region caused severe skeletonizing of willow foliage. Moderate, sporadic damage to willow occurred within the triangular area bounded by Derwent, Innisfree, and Lloydminster. Light, scattered infestations were present in the remainder of the District south of a line running through Athabasca, Lac la Biche, and Cold Lake.

Arctiidae, Haploa lecontei Guer.

Larvae, identified to be H. lecontei, were collected along the Clearwater River approximately 10 and 15 miles east of McMurray. Numerous larvae were observed feeding on a variety of hosts including trembling aspen, balsam poplar, willow, and various shrubs growing in this area. At the time these insects were collected, June 2, larvae were considered to be near maturity although the leaves had only been out for 7 to 10 days. Defoliation at this time was light. Due to the inaccessibility of the area further observations were not possible. Available information indicates this insect is rare and has been previously collected only in eastern Saskatchewan, Manitoba, and northern Ontario.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

A sharp decline in the forest tent caterpillar infestation occurred in the District in 1964. Several areas, supporting high populations in 1963, sustained little or no damage in 1964. High mortality of early instar larvae coupled with high 1963 parasitism are factors contributing to this decline. North of Lac la Biche light defoliation of aspen was confined to the Cowpar, Shoru, Gypsy, and Campbell Lake regions. This area, between Townships 67 and 92, sustained severe defoliation in 1963. The population decline in the southern half of the District was not as striking as in the north. As a result, light, moderate, and severe patches of defoliation were evident throughout this area. Moderate to severe damage was recorded south of Caslan, and around Vilna, Duvernay, Elk Point, and Frog Lake. Light damage was noted along the boundaries of the previously mentioned areas as well as along Highways 15 and 45 from Edmonton to Andrew and northeast to Bellis. Small, isolated blocks of light defoliation were observed in the following regions: Cold Lake, Wolf Lake, Beaver Lake, Vermilion, and Athabasca.

At the study plot 3 miles northeast of Lac la Biche hatching commenced on May 7, approximately 8 days before the aspen foliage appeared. During the period from May 10 to 13 the larvae appeared to wander aimlessly. From May 13 to approximately May 20 few larvae were observed on the trees. About May 20 an increase in the numbers of larvae was noted but only light feeding occurred.

Collections made from plots near Elk Point, for parasite recovery, revealed pupae parasitism is down from 78 per cent in 1963 to 52 per cent in 1964.

Sequential sampling throughout the District indicated a population increase for 1965. This increase may be due to adult flights from other areas and may also be affected by the reduced influence of parasites. A map at the conclusion of this report illustrates the area defoliated and the degree of defoliation.

Yellow-headed Spruce Sawfly, Pikonema alaskensis (Roh.)

A decline in the numbers of this sawfly was evident in the Lac la Biche District in 1964. Populations were mainly concentrated on shelterbelts in the southeast portion of the District. Severe damage to the ornamentals occurred near Duvernay and Ft. Kent while moderate damage was evident near Fresnoy and Ardmore. Light damage was evident in most spruce shelterbelts examined in the District and to a few scattered native spruce. Spraying of spruce south of Wandering River and north of Athabasca greatly reduced populations in these areas.

Larch Sawfly, Pristiphora erichsonii (Htg.)

A continuation of the decline in the population levels of this sawfly was evident in the District in 1964. Light defoliation of tamarack was noted in the Athabasca, Ellscott, Grassland, and Primrose Lake regions. Tamarack in the remainder of the accessible portions of the District yielded some larvae but damage was negligible. Tamarack north of Lac la Biche was not examined in 1964.

DISEASE CONDITIONS

Dwarf Mistletoe, Arceuthobium americanum Nutt. ex Engelm.

Observations and gathering of data on the phenology of dwarf mistletoe on pine was continued in the Lac la Biche District in 1964.

Light damage on regeneration jack pine was noted in a 15 square mile area near Franchere and in a small stand of mature trees near Maloy.

Spruce Needle Rust, Chrysomyxa ledicola Lagerh.

Light damage caused by this needle rust was evident in the southern part of the District on white and black spruce. Collections were taken from the alternate host, Labrador tea, at Cowpar Lake, 15 miles west of Lac la Biche and 26 miles south of Lac la Biche.

TABLE I

SUMMARY OF INSECT AND DISEASE COLLECTIONS BY HOSTS

Host Coniferous	Collections Insect	Disease	Host Deciduous	Collections Insect	Disease
White spruce	37	4	Trembling aspen	142	5
Black spruce	3	1	Balsam poplar	6	0
Lodgepole pine	0	0	Misc. poplar	0	1
Jack pine	7	3	Willow	13	1
Balsam fir	0	1	Birch	2	1
Tamarack	28	0	Alder	0	0
	75	9		163	8
Insect collections from miscellaneous hosts					9
Disease collections from miscellaneous hosts					6
GRAND TOTAL					270

TABLE II

RESULTS OF SEQUENTIAL SAMPLING
AND DEFOLIATION ESTIMATES
FOREST TENT CATERPILLAR, 1964

Location	Predicted defoliation for 1964	Actual defoliation for 1964	Predicted defoliation for 1965
Andrew	Light	Light	Light
Ashmont	Severe	Light	Severe
Athabasca	Severe	Light	Light
Beauvallon	Light	Light	Severe
Bonnyville	Light	Light	Light
Brierville	Light	Light	Nil
Calling Lake	Light	Nil	Light
Cold Lake	Light	Light	Light
Dewberry	Light	Light	Severe
Elk Point (N)	Severe	Light	Severe
Elk Point (S)	Light	Light	Severe

Table II - Results of Sequential Sampling - Cont'd.

Location	Predicted defoliation for 1964	Actual defoliation for 1964	Predicted defoliation for 1965
Ellscott	Severe	Nil	Light
Grassland	Moderate	Nil	Light
Lac la Biche	Light	Nil	Light
Mannville	Light	Nil	Nil
Rochester	Severe	Moderate	Moderate
Star	Light	Light	Severe
Two Hills	Nil	Nil	Discontinue
Vermilion	Light	Nil	Moderate
Vilna	Severe	Moderate	Severe
Wandering River	Light	Nil	Nil
Warspite	Moderate	Nil	Light

TABLE III

OTHER NOTEWORTHY INSECTS AND DISEASES
WHICH OCCURRED IN THE LAC LA BICHE DISTRICT, 1964

Causal Agent	Host	Remarks
Insect		
Woolly larch aphid, *Adelges strobilobius* (Kalt.)	B. spruce	A high population near Calling Lake.
Ugly-nest caterpillar, *Archips cerasivoranus* (Fitch)	B. poplar Pin cherry Rose	Infestations near Clyde, Fedora, and Lac la Biche.
Leaf roller, *Badebecia urticana* Hbn.	T. aspen	Low populations in Elk Island Park, near Dewberry, and Paxon.
Leaf tier, *Compsolechia niveopulvella* Cham.	T. aspen	Low populations near Caslan, Legal, Claysmore, and in Elk Island Park.
American aspen beetle, *Gonioctena americana* (Schaeff.)	T. aspen	Low populations near Innisfree, Plamondon, Wandering River, and north of Athabasca.

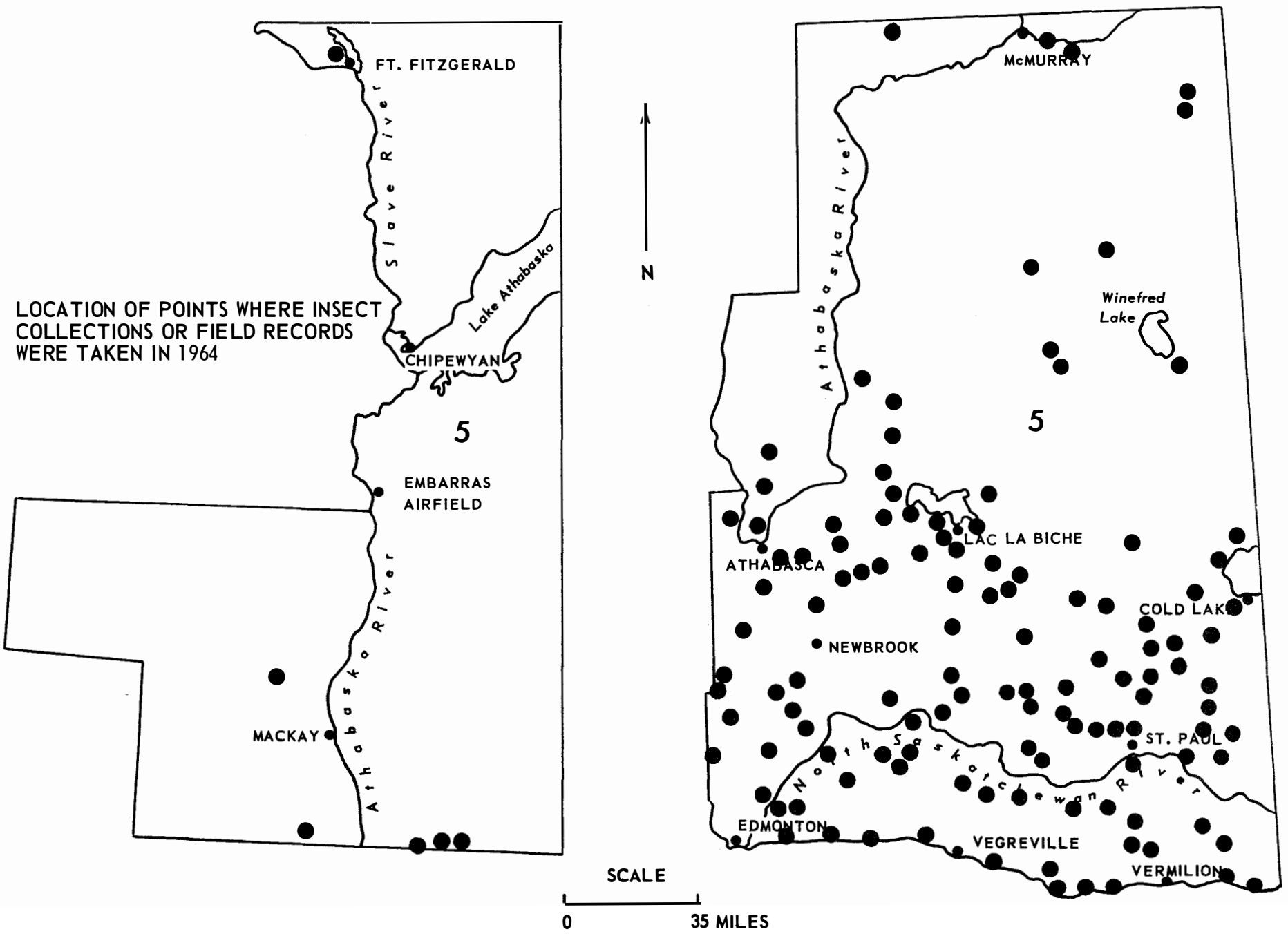
Table III - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Prairie tent caterpillar, *Malacosoma lutescens* (N. & D.)	Chokecherry Rose	Small infestations near Elk Point and Derwent.
Western tent caterpillar, *Malacosoma pluviale* (Dyar)	Rose	Low population at Grosmont. Numerous tents along N. A. R. from Tweedie to Margie.
Pitch nodule maker, *Petrova albicapitana* (Busck)	J. pine	Low populations throughout the District.
Poplar serpentine miner, *Phyllocnistis populiella* Cham.	T. aspen	Low population near Ft. Fitzgerald.
Engelmann spruce weevil, *Pissodes engelmanni* Hopk.	W. spruce	Low populations along Highway 2 near Grosmont.
Leaf tier, *Pseudexentera improbana oregonana* Wlshm.	T. aspen	Low populations occurred throughout the southeast portion of the District.
Leaf roller, *Sciaphila duplex* Wlshm.	T. aspen	Low populations scattered throughout the District.
Disease		
Yellow witch's broom of spruce, *Chrysomyxa arctostaphyli* Diet.	W. spruce	Collected 26 miles south of Lac la Biche.
Comandra blister rust, *Cronartium comandrae* Pk.	Toad flax	One collection made at Ft. Fitzgerald.
Needle cast of fir, *Hypodermella nervata* Darker	B. fir	Collection made at Cowpar Lake. New herbarium record for this District.
Shear galls of poplar, *Macrophoma tumefaciens* Shear	T. aspen	One collection made at Cowpar Lake. New herbarium record for this District.

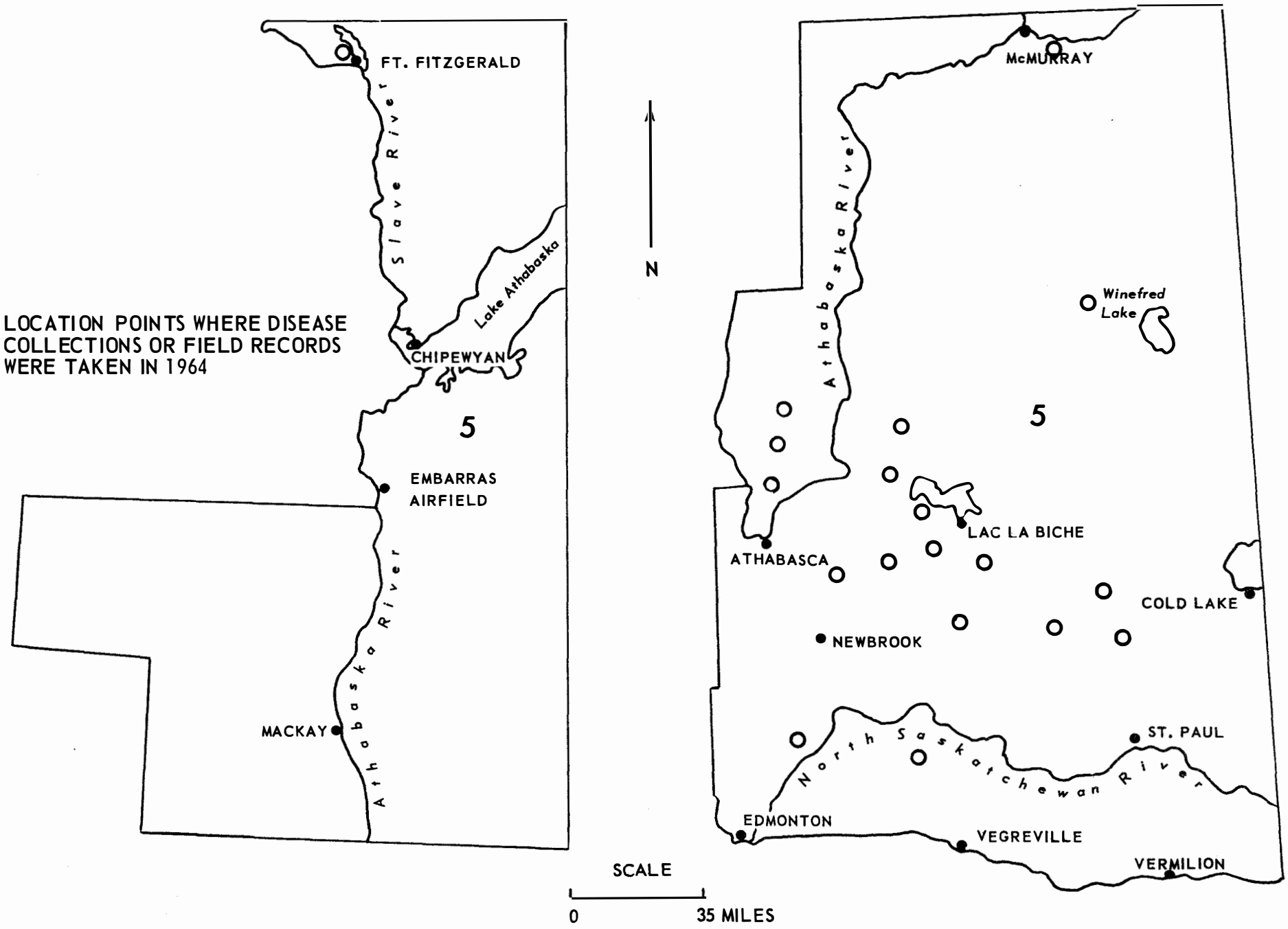
TABLE IV

SUMMARY OF RECORDED DISEASE OUTBREAKS
UNDER INVESTIGATION IN THE LAC LA BICHE DISTRICT

Outbreak number	Location	Causal organism	Remarks
5-3	60 miles north of Lac la Biche	Arceuthobium americanum Nutt. ex Engelm.	Not examined in 1964.
5-4	Bellis	Arceuthobium americanum Nutt. ex Engelm.	To be examined in 1965.
5-6	Calling Lake	Fomes igniarius (L. ex Fr.) Kickx	Not examined in 1964.
5-7	Elk Island Park	Hypoxylon priunatum (Klotzsche) Cke.	Not examined in 1964.



LAC LA BICHE DISTRICT



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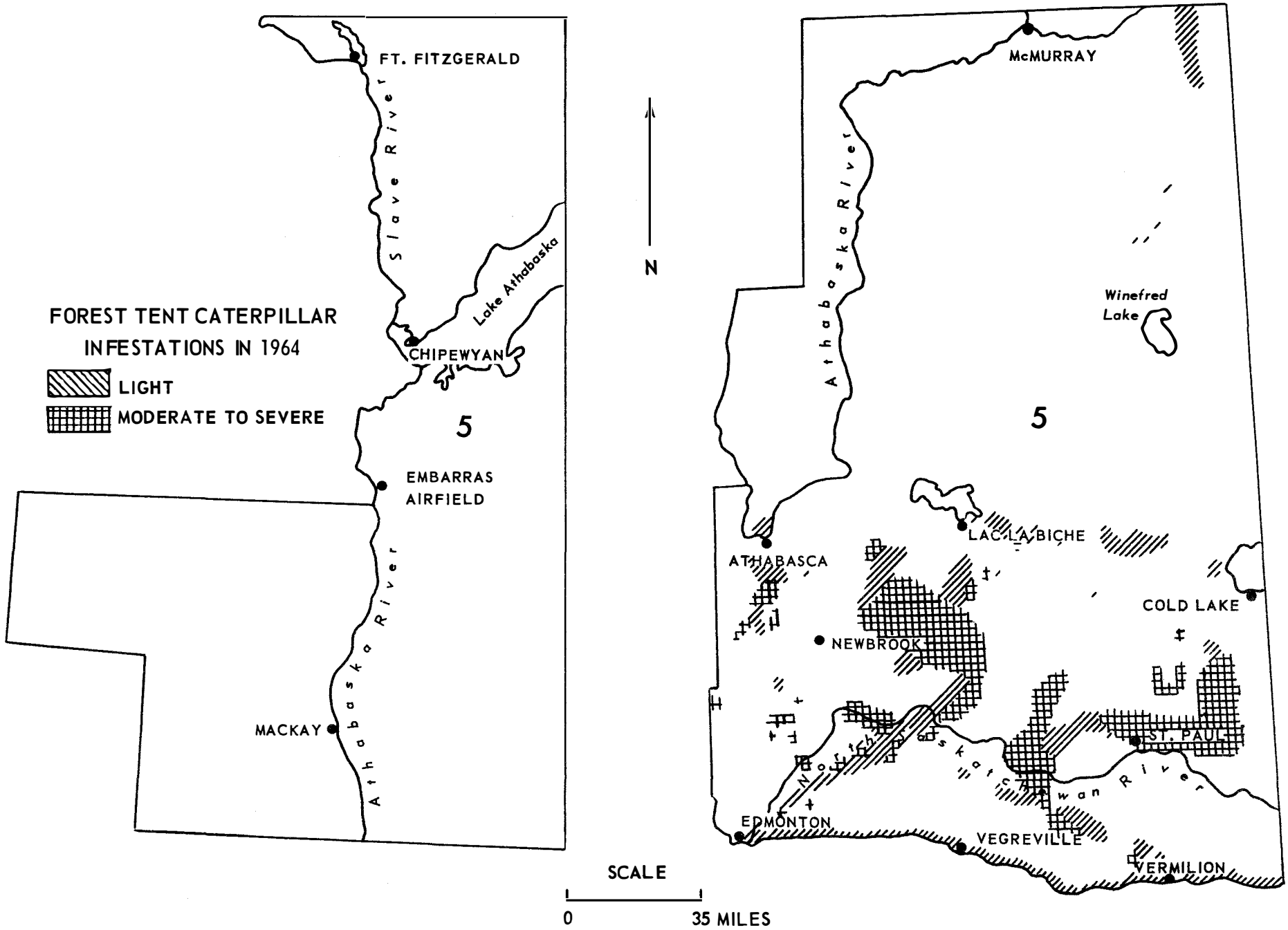

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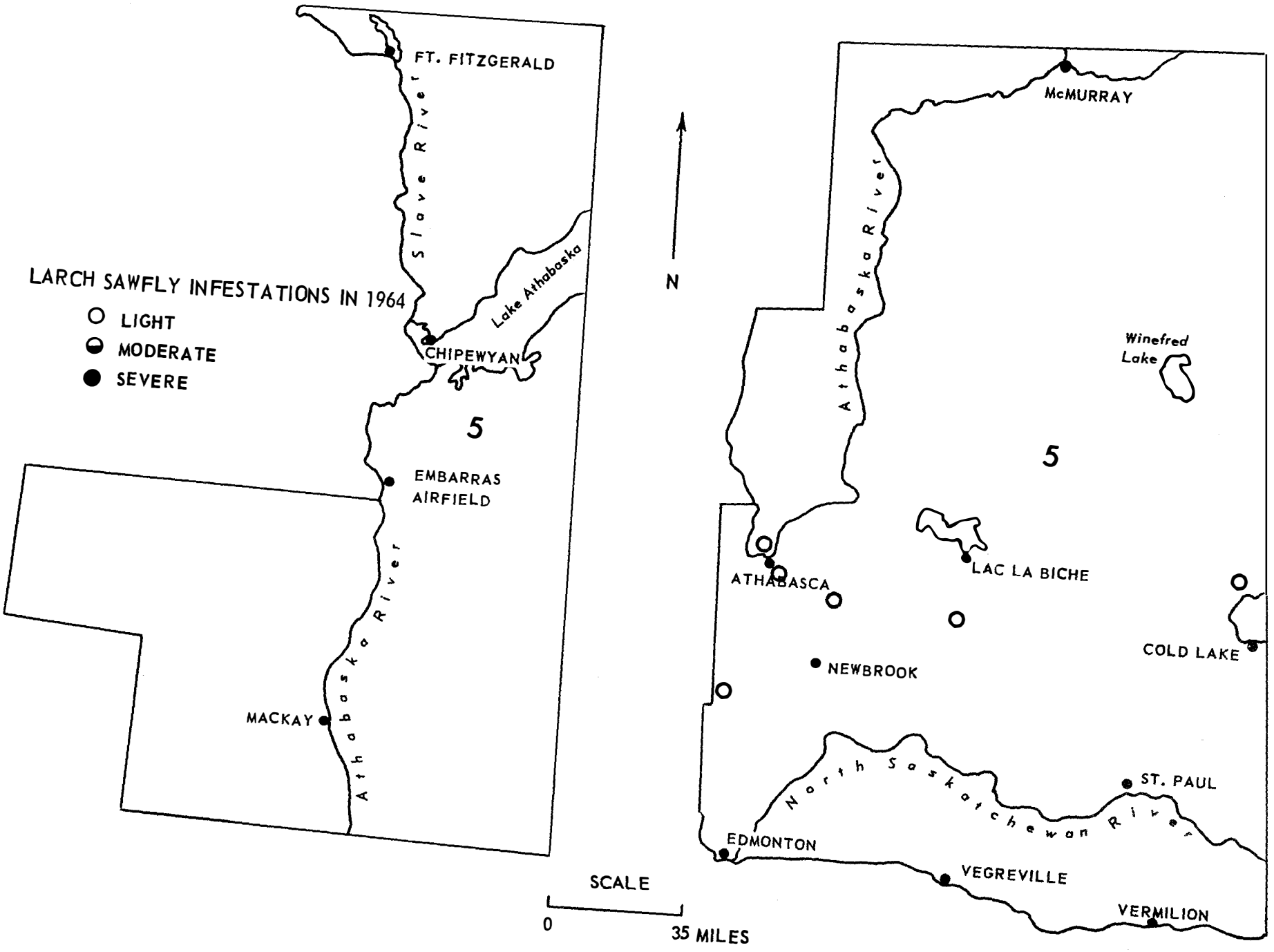


LAC LA BICHE DISTRICT

ANNUAL DISTRICT REPORT

GRANDE PRAIRIE-SLAVE LAKE DISTRICT

ALBERTA 1964

by

G. SMITH

INFORMATION REPORT

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

CALGARY, ALBERTA

DEPARTMENT OF FORESTRY

FOREST ENTOMOLOGY AND PATHOLOGY BRANCH

MARCH 1965

INTRODUCTION

Infestations of the forest tent caterpillar, the most notable defoliator of deciduous forests in recent years, suddenly subsided in most of the Grande Prairie-Slave Lake District. The area of aspen which was defoliated in 1964 was approximately a twenty fifth of that defoliated in 1963. Leaf beetles caused light damage to aspen in the southwestern part of the District. The decreasing trend in populations of the larch sawfly continued during the 1964 season. An infestation of spruce budworm was observed northwest of Loon Lake and an increase in the area of defoliated spruce was noted in the outbreak along the Wabasca River. Populations of the yellow-headed spruce sawfly were much the same as in 1963.

No new disease outbreaks were recorded during the 1964 season. There was no "red belt" injury to conifers during the winter of 1963-64. Four species of fungi caused leaf and shoot damage in the deciduous forests. Excessive rainfall caused foliage discoloration in poorly drained areas in the western part of the District.

INSECT CONDITIONS

A Poplar Twig Borer, Cerambycidae

Borers, which attacked the upper stems of aspen saplings, were numerous near Bonanza, Spirit River, Eaglesham, Bad Heart, Sexsmith and Beaverlodge. There is no previous record of this borer in these areas and no adults were found to make identification possible. It is not yet known if their boring causes terminal or branch mortality.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Spruce budworm caused severe defoliation on the east side of the Wabasca River in Township 97, Range 9, W. 5 near the northern boundary of the Slave Lake Forest. This was an eastward extension of the infestation since the 1962 survey of this area.

Northwest of Loon Lake, moderately defoliated spruce were observed in Township 89, Range 11, W. 5. This infestation had not previously beenreported and could be an extension of the outbreak near Loon Lake. Due to extremely wet weather and impassible roads, the budworm outbreak near Loon Lake was not examined in 1964.

Elsewhere in the District, low populations of budworm larvae were found south of Smoky Tower and in the Stetson Creek-Sherman Meadows area.

A Willow Leaf Beetle, Disonycha alternata Ill.

In 1964, high populations of this leaf beetle were found in the District for the first time. Moderate to severe defoliation of young willow occurred along the east end of Lesser Slave Lake, along the Smoky River near Watino and along the Cutbank River north of Musreau Lake.

Grey Willow Leaf Beetle, Galerucella decora Say

In the eastern half of the District, patches of severely skeletonized willow were observed along Highway 44 from Jarvie north to Smith, particularly near Jarvie and near Chisholm Tower. Light to moderate damage occurred near Steele Lake and Fawcett Lake. In the western half of the District, moderate to severe patches of defoliation occurred along the forestry road southeast of Grovedale, in the Deep Valley Creek area and south of Snipe Lake near Sweathouse Tower. These beetles were commonly found in other locations but did not cause noticeable damage.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

In 1964 there was an unpredicted and rather phenominal decline in populations of these caterpillars. Hatching commenced on May 9 and larval populations were high throughout the District. During the third week in May the larvae began to disappear from the trees. In many areas larval disappearance commenced after the aspen had leafed out and it is not known why they wandered from the trees. This dissapearance occurred primarily in the eastern part of the Grande Prairie Forest and in the Slave Lake Forest. In areas which were not severely defoliated in 1963, the larval survival rate was high in 1964.

In the Slave Lake Forest, approximately 400 square miles of aspen between Flatbush and Jarvie sustained moderate to severe defoliation. This was an eastward extension of the large defoliated area in the Whitecourt Forest. A small isolated patch of moderate to severe defoliation was also observed 10 miles southwest of Joussard.

Defoliation in the Grande Prairie Forest was found mainly in the northwest. Moderate to severe defoliation occurred in the area bounded by an irregular line running northwest from Huallen to the British Columbia border 6 miles southwest of Demmitt, from this point northeast to Boone Lake, southeast from Boone Lake to Buffalo Lake and then southwest back to Huallen. Defoliation within this area was not continuous but was patchy and irregular.

Continuous severe defoliation was observed in the area bounded on the south by a line from Boone Lake east to Heart Valley, north into the Birch Hills, southwest to Woking, from Woking northwest to Whitburn, from Whitburn south to the east side of White Mountain and southwest back to Boone Lake.

Elsewhere in the western part of the District, small isolated patches of moderate to severe defoliation were observed in the following areas: along the Smoky River near Bezanson, Bad Heart and Watino, along the Peace River east and west of Dunvegan, and on the north slope of the Birch Hills south of Codesa.

The map accompanying this report outlines the infestations in the District and the category of the defoliation. Table II provides the actual defoliation of aspen expected in 1965 in the vicinities of the permanent sampling stations where egg band sampling was carried out.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

Colonies of these caterpillars were commonly observed throughout the District but damage was noticeably only in small severely infested areas south of Hondo and north of Fawcett. In these areas, considerable shrub-sized birch, alder, willow and aspen were defoliated.

Yellow-headed Spruce Sawfly, Pikonema alaskensis (Roh.)

Light to moderate defoliation of aspen was observed in many of the shelterbelts in the western half of the District. In the forested area, severe defoliation was observed on young white spruce along the Smoky River east of Bezanson and on black spruce 8 miles northwest of Hythe. No spruce sawfly damage was found in the eastern half of the District.

Lodgepole Terminal Weevil, Pissodes terminalis Hopping

Numerous terminals of regeneration lodgepole pine were damaged by these weevils in 1964. This was the first time in recent years that damage by this species was noticeable. One infestation, covering several square miles, was found along Chinook Ridge 77 miles southwest of Grande Prairie. Another infestation, less than a square mile in area, was found 21 miles south of Grovedale.

Larch Sawfly, Pristiphora erichsonii (Htg.)

Populations of this sawfly declined noticeably for the second consecutive year. The only severe defoliation of tamarack in the District

was observed near the south side of the Wapiti River approximately 10 miles south of Hinton Trail. Light to moderate defoliation was found southeast of this area along the Two Lakes Forestry Road and in a small stand along the road to Musreau Lake 33 miles southeast of Grovedale. In the Slave Lake Forest, moderate defoliation was observed along the road to Steele Lake 10 miles northeast of Fawcett. In many of the tamarack stands elsewhere, although a few sawfly larvae were found, no defoliation was evident.

The aerial survey north of Lesser Slave Lake was cancelled, and since the area was inaccessible by road in 1964, it is not known what sawfly damage occurred there. On a flight with the Alberta Forest Service from Talbot Lake to Slave Lake in mid-August, no defoliation could be seen.

The accompanying map shows the distribution of the larch sawfly in the District in 1964.

Poplar Borer, Saperda calcarata Say

The infestations of this borer in living aspen, reported in 1963, were re-examined this year and considerable new boring was noted. Infestations, not previously reported, were found northeast of Smith, on Saskatoon Mountain and in a farm shelter grove southwest of Dimsdale. In this grove a high percentage of the trees were severely infested and had to be felled and burned as a control measure.

DISEASE CONDITIONS

Spruce Needle Rust, Chrysomyxa empetri (Pers.) Schroet.

Severe damage caused by this rust on Engelmann spruce was found on Hat Mountain south of Grande Prairie and on black spruce, 8 miles northwest of Hythe. Light damage was found on white spruce 51 miles southwest of Valleyview and on black spruce 7 miles south of Grande Prairie.

Spruce Cone Rust, Chrysomyxa pirolata Wint.

Cone rust affected, in varying intensity, the heavy cone crop throughout the District in 1964. From 50 to 90 per cent of the cones of white spruce were affected 17 miles northwest of Hythe, 12 miles west of Woking, in the Nose Creek Bridge area and along the Sherman Meadows Airstrip. Light damage was observed northeast of Fawcett, west of Canyon Creek and 30 miles southeast of Grovedale. Approximately 25 per cent of the cones were in-

fected in these areas. Light damage was also found on black spruce cones at 4 locations in the western part of the District.

Poplar Inkspot, Ciborinia whetzelii (Seaver) Seaver

This disease, which kills the leaves of trembling aspen, was found in almost all aspen stands examined this season. Severe infections caused noticeable discoloration of aspen south of Grovedale for a distance of 15 miles, north of Gordondale in an area approximately 5 miles square, along the highway between Sturgeon Lake and Valleyview and from Valleyview northeast to Triangle. This is an annual disease and will not necessarily affect these stands next season.

Leaf Blight of Balsam Poplar, Linospora tetraspora Thompson

In the Slave Lake Forest along Highways 2 and 44, this blight caused early foliage discoloration and leaf drop of balsam poplar. Numerous stands were entirely discolored by the end of August.

Pine Needle Cast, Lophodermium pinastri (Schrad. ex Fr.) Chev.

This fungus was present in most of the lodgepole pine stands examined in the District. A re-examination was carried out in the area 22 miles south of Grovedale in which severe damage was reported in 1963. The only foliage remaining on the trees was the current year's needles and those of the 1963 growth which had not been infected.

Stalactiforme Rust, Peridermium stalactiforme A. & K.

The known distribution of this rust was extended northward in the District with the recording of light damage to lodgepole pine 7 miles northwest of Blueberry Mountain. Small scattered patches of moderately infected regeneration lodgepole pine were observed again along Chinook Ridge south of Grande Prairie. As an increasing number of infected trees have been observed each year, this disease appears to be intensifying in this area.

Aspen Shoot Blight, Pollaccia radiosa (Lib.) Bald. & Cif.

Blighted aspen regeneration was observed quite commonly throughout the District this season. In the Slave Lake Forest, 7 miles east of Kinuso and 5 miles northwest of Smith, the foliage of entire stands of pole sized aspen shrivelled and discolored due to severe infection.

Dying Mature Aspen

On an aerial survey in late June, it was noted that many large mature trembling aspen had failed to foliate normally in the following areas: along the north side of the Goose River south of Sunset House, along the south and northeast sides of Lesser Slave Lake, along the Little Smoky River northeast of Valleyview, along the Smoky River northeast of Bad Heart and along the south side of the Peace River east of Dunvegan.

It was first thought that these abnormal trees were seed bearers but, when examined from the ground in July, it was found that among the affected trees, some had produced only small leaves, some had normal sized but only partially opened buds, while others had small tightly closed buds. Of 5 trees felled only one showed evidence of flowers or seeds being produced. The affected trees occupied good growing sites and while their roots and trunks appeared sound, the sap flow had ceased. Most of the mature aspen northeast of Valleyview are fire residuals, but this was not the situation in the other areas. The affected trees were observed wither singly or in groups throughout stands of the same age class.

It is rather unusual that such a number of these mature aspen should die during the same year. We are unable to ascribe the cause to any specific disease, insect prest or climatic condition. The fact that the affected stands have been severely defoliated by the forest tent caterpillar for the past 3 years may be significant when determining the cause. No similarly affected trees of a comparative age were observed in areas which had not been defoliated.

High Water Table

Due to the abnormally wet season and resultant high water table in the western part of the District, the foliage of aspen in many of the low lying and poorly drained areas, turned a reddish color in August. The discolored foliage in these areas fell much earlier than that on trees growing in better drained sites. Examination of the soil under discolored patches of aspen always revealed water at or near the surface. Affected areas will be under observation next year to determine whether or not permanent damage will result. Conifers growing in these sites showed no external signs of damage in late September.

Red Belt

Red belt was absent from the mountains and foothills of the District in 1964 although the injury caused in previous years was still evident. The severely damaged stands reported in 1962 and 1963 in the

basin at the head of Grayling Creek were surveyed from the air in June. At this time it was not possible to determine if trees severely injured in 1963 would recover.

Due to excessive rainfall and impassable roads, a planned study of the overall effects of "red belt" in the Grayling Creek area could not be carried out.

TABLE I

SUMMARY OF INSECT AND DISEASE COLLECTIONS BY HOSTS

Host Coniferous	Collections Insect	Disease	Host Deciduous	Collections Insect	Disease
White spruce	44	16	Trembling aspen	119	31
Engelmann spruce	0	3	Balsam poplar	7	16
Black spruce	4	8	Willow	21	10
Lodgepole pine	23	14	Birch	1	5
Jack pine	12	3	Alder	5	4
Alpine fir	5	1			
Balsam fir	4	1			
Tamarack	25	0			
	117	46		153	66
Insect collections from miscellaneous hosts					9
Disease collections from miscellaneous hosts					25
GRAND TOTAL					416

TABLE II

RESULTS OF SEQUENTIAL SAMPLING
AND DEFOLIATION ESTIMATES
FOREST TENT CATERPILAR, 1964

Location	Predicted defoliation for 1964	Actual defoliation for 1964	Predicted defoliation for 1965
Debolt	Light	Nil	Nil
Sturgeon Lake	Light	Nil	Nil
High Prairie	Severe	Nil	Nil
Driftpile	Moderate	Nil	Nil
Slave Lake	Light	Nil	Nil
Fawcett Lake	Light	Nil	Nil
Huallen	Severe	Moderate	Nil
Demmitt	Severe	Light	Nil
Baytree	Severe	Nil	Nil
Spirit River	Severe	Severe	Moderate
Tangent	Severe	Nil	Light
Grovedale	Severe	Nil	Nil
Wanham	Severe	Nil	Light

TABLE III

OTHER NOTEWORTHY INSECTS AND DISEASES
WHICH OCCURRED IN THE GRANDE PRAIRIE-SLAVE LAKE DISTRICT, 1964

Causal Agent	Host	Remarks
Insect		
Black-headed budworm, Acleris variana (Fern.)	W. spruce	Low populations near Gordondale, Long Lake and Rock Island Lake.
Gall aphids on conifers, Adelges lariciatus (Patch)	W. spruce B. spruce	Three severe infestations found in native stands.
Ugly-nest caterpillar, Archips cerasivoranus (Fitch)	Chokecherry Pin cherry	Infestations along east end of Lesser Slave Lake, 4 miles west of Triangle and 7 miles south of Grande Prairie.

Table III - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Fringed looper, *Campea perlatta* Gn.	T. aspen	Common in the District. Present in most aspen samples.
A leaf beetle, *Chalcoides* sp.	T. aspen	Caused severe leaf damage near Bonanza, Gordondale and Hayfield.
A leaf beetle, *Chrysomelidae*	Alder	Moderate infestation near Deep Valley Creek.
A leaf beetle, *Chrysomela semota* Brown	B. poplar Willow	Three widely separated infestations found.
A leaf tier, *Compsolechia niveopulvella* Cham.	T. aspen	Noted a slight increase in populations.
Lodgepole pine beetle, *Dendroctonus murrayanae* Hopk.	Lp. pine	Sampled from living tree in Pinto Creek area.
Cone insects, *Diptera*	W. spruce	Cones severely infested 55 miles southwest of Grande Prairie.
American aspen beetle, *Gonioctena americana* (Schaeff.)	T. aspen	Caused moderate damage in the Hazelmere area.
A root borer, *Hepialidae* sp.	T. aspen	Infested aspen roots found in 5 locations in western region.
A looper, *Itame loricaria julia* Evers.	T. aspen	Very common this season. Larvae found in 21 beating samples.
Willow leaf miner, *Lyonetia* sp.	Willow	Severe infestations in northern part of the Slave Lake Forest.
A sawfly, *Neodiprion* sp.	J. pine	Infestation persists from year to year along the Smoky River east of Bezanson.
Bruce spanworm, *Operophtera bruceata* (Hlst.)	T. aspen	Larvae present in 7 beating samples. Noticeable increase in Hayfield-Halcourt area.

Table III - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Green-headed spruce sawfly, Pikonema dimmockii (Cress.)	W. spruce	Few larvae found 20 miles south of Grovedale and in the Two Lakes area.
Engelmann spruce weevil, Pissodes engelmanni Hopk.	W. spruce	Noticeable reduction in populations. No new infestations found.
Scale insects	T. aspen	Infestation found on aspen stems in city of Grande Prairie.
Disease		
Spruce needle rust, Chrysomyxa ledi de Bary	W. spruce Labrador tea	Light damage on spruce. Alternate host severely infected.
Spruce needle rust, Chrysomyxa ledicola Lagerh.	W. spruce	Four lightly infected areas were found.
Comandra blister rust, Cronartium comandrae Pk.	Lp. pine Toad flax	Caused mortality in young pine in the Muddy Creek area. Very heavy on the alternate host.
Pine needle cast, Elytroderma deformans (Weir) Darker	Lp. pine	Damage was moderate near the junction of Deep Valley Creek and Simonette River, light 20 miles west of this point.
Pine needle cast, Hendersonia sp.	Lp. pine	Light damage 11 miles northwest of Blueberry Mountain. Range extension.
Pine needle cast, Hypodermella concolor (Dearn.) Darker	Lp. pine	Light damage 11 miles northwest of Blueberry Mountain. Range extension.
Fir needle cast, Hypodermella nervata Darker	B. fir	Light damage in the Talbot Lake area.
Leaf cast, Lophodermium maculare (Fr.) De Not.	Bilberry	New herbarium record.

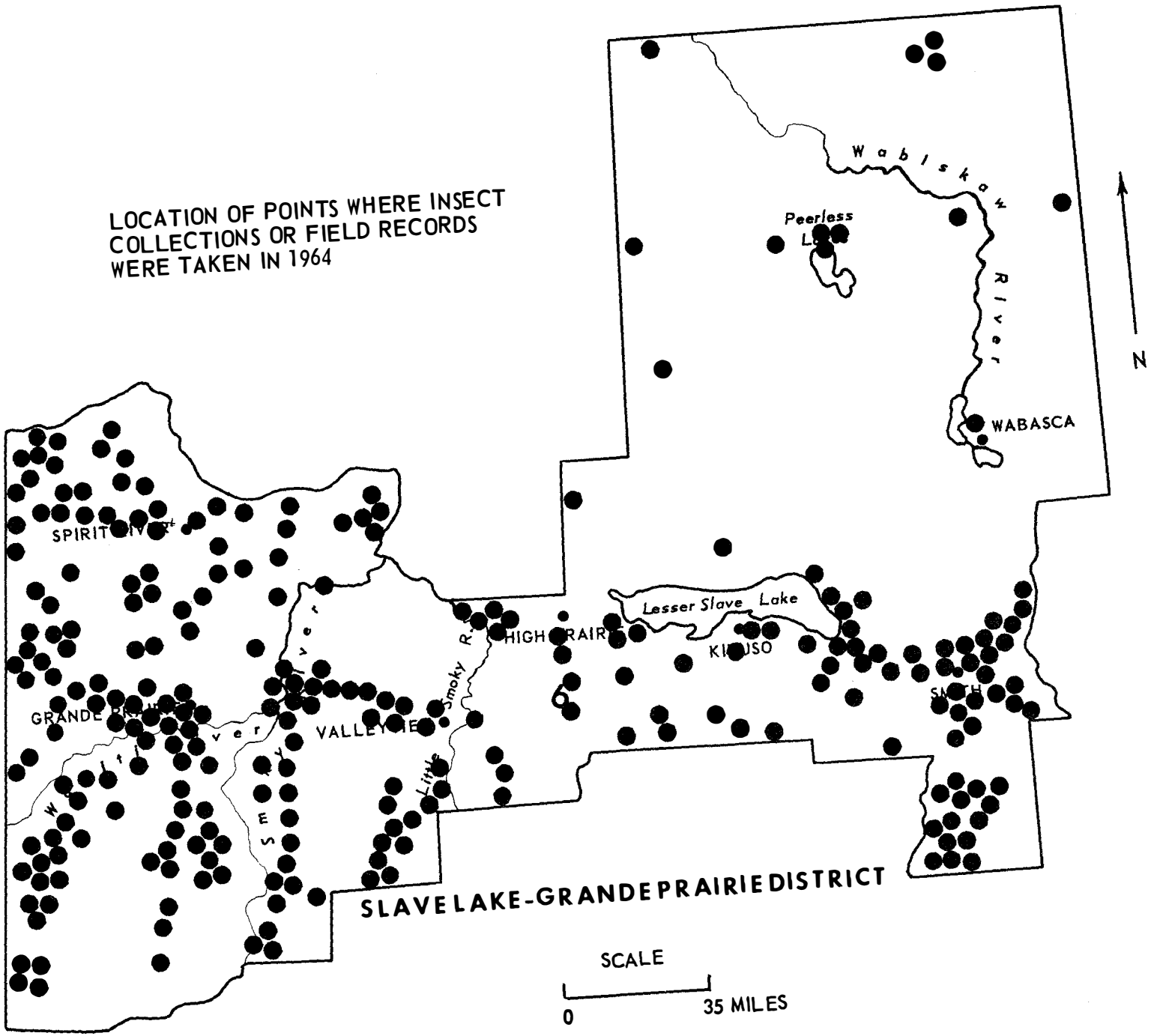
Table III - Other Noteworthy Insects and Diseases - Cont'd.

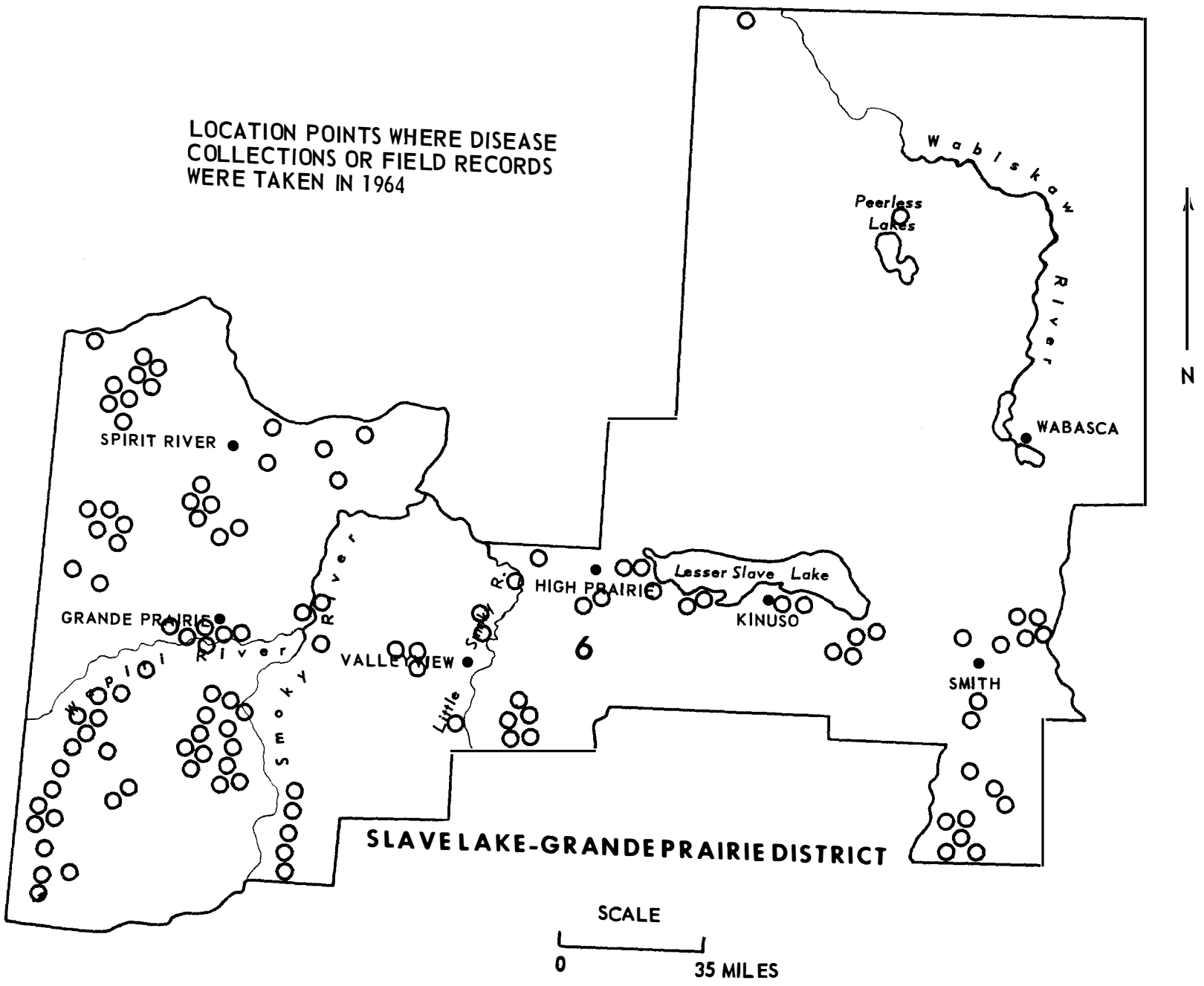
Causal Agent	Host	Remarks
Leaf cast, *Lophodermium sphaerioides* (Alb. & Schw.) Rehm	Labrador tea	New herbarium record.
Larch needle rust, *Melampsora medusae* Thüem.	T. aspen	Severe damage on leaves of this host (alternate) caused noticeable discoloration in many stands.
Leaf rust, *Melampsoridium betulinum* (Fr.) Kleb.	Water birch	New herbarium host record.
Western gall rust, *Peridermium harknessii* J. P. Moore	Lp. pine	Previously unreported damage found 11 miles northwest of Blueberry Mountain and south Sweathouse Tower.
Black canker of spruce, *Retinocyclus abietus* (Crouan) Groves & Wells	W. spruce	Light damage 9 miles southeast of Grande Prairie.
Poplar ink spot, *Sclerotium* sp.	B. poplar	Sampled north of Gordondale. Rare on this host.
Canker and dieback, *Tuburcularia vulgaris* Tode	Apple Manchurian elm	New herbarium host records.
Hyperparasite of dwarf mistletoe, *Wallrothiella arceuthobii* (Pk.) Sacc.	J. pine	The dwarf mistletoe 7 miles south of Grande Prairie, was severely infected by this beneficial organism.
Spruce needle cast, (Undescribed species)	W. spruce	Small area severely infected on west slope of Chinook Ridge.

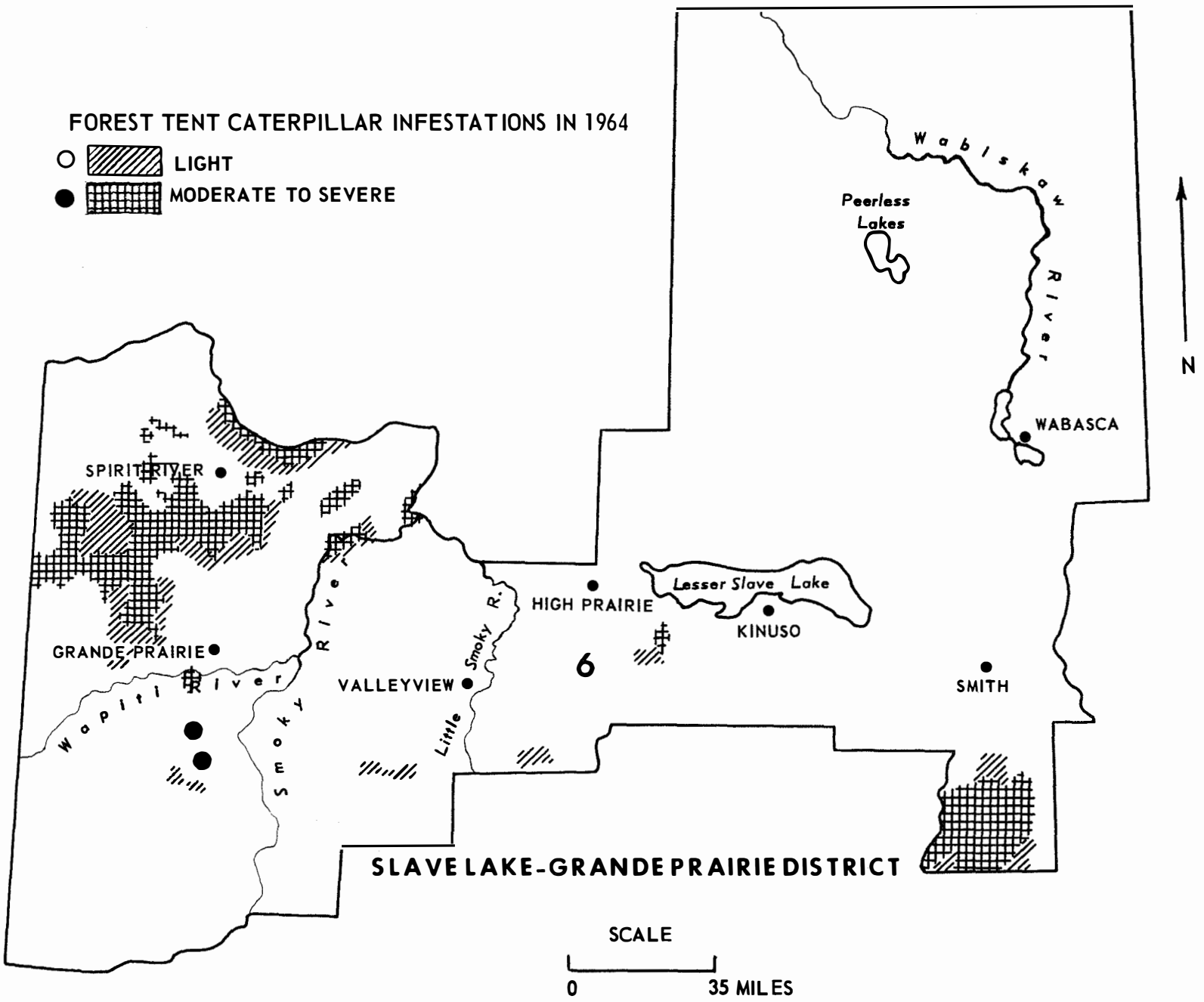
TABLE IV

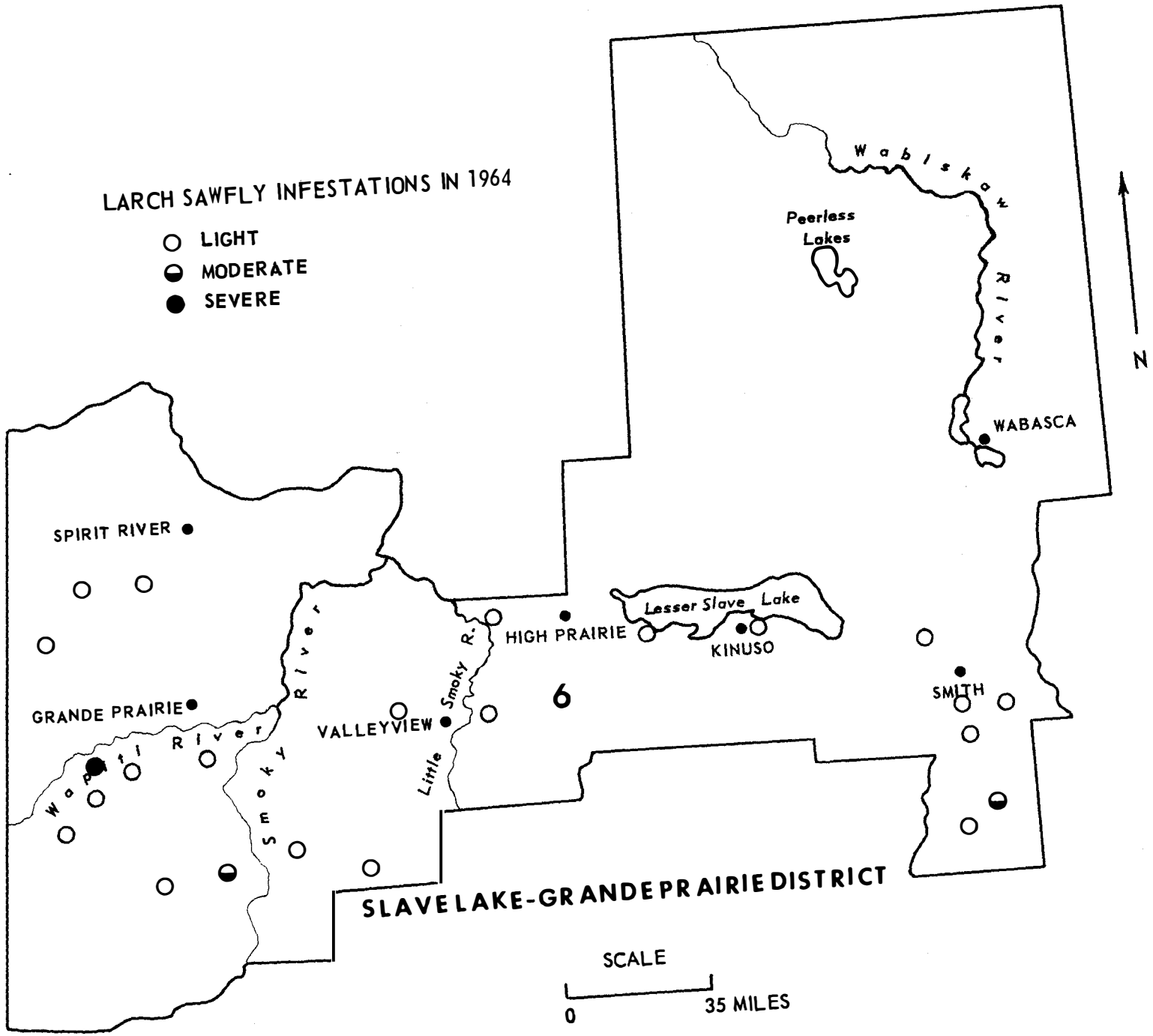
SUMMARY OF RECORDED DISEASE OUTBREAKS
UNDER INVESTIGATION IN THE GRANDE PRAIRIE-SLAVE LAKE DISTRICT

Outbreak number	Location	Causal organism	Remarks
6-2	Grovedale	Atropellis piniphila (Weir) Lohman & Cash	Re-examine in 1965.
6-4	Grande Prairie	Arceuthobium americanum Nutt. ex Engelm.	Re-examine in 1965.
6-5	Slave Lake	Arceuthobium americanum Nutt. ex Engelm.	Re-examined from the air. Brooms observed in an irregular area of sparsely growing jack pine extending northwest from Marten River Campground, a distance of 10 miles.


LOCATION OF POINTS WHERE INSECT COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964
Wabiskaw River
Peerless Lake
WABASCA
N
Lesser Slave Lake
HIGH PRAIRIE
KINUSO
SMITH
VALLEYVIEW
Smoky River
Little Smoky River
SLAVE LAKE-GRANDE PRAIRIE DISTRICT
SCALE
0
35 MILES


LOCATION POINTS WHERE DISEASE COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964
Wabiskaw River
Peerless Lakes
N
WABASCA
SPIRIT RIVER
GRANDE PRAIRIE
Wapiti River
Smoky River
VALLEYVIEW
Sturgeon
Little
HIGH PRAIRIE
Lesser Slave Lake
KINUSO
SMITH
6
SLAVE LAKE-GRANDE PRAIRIE DISTRICT
SCALE
0
35 MILES


FOREST TENT CATERPILLAR INFESTATIONS IN 1964
LIGHT
MODERATE TO SEVERE
Wabiskaw River
Peerless Lakes
N
WABASCA
SPIRIT RIVER
HIGH PRAIRIE
Lesser Slave Lake
KINUSO
GRANDE PRAIRIE
Wapiti River
Smoky River
VALLEYVIEW
Smoky R.
Little
6
SMITH
SLAVE LAKE-GRANDE PRAIRIE DISTRICT
SCALE
0
35 MILES


LARCH SAWFLY INFESTATIONS IN 1964
LIGHT
MODERATE
SEVERE
Wabiskaw River
Peerless Lakes
N
WABASCA
SPIRIT RIVER
Lesser Slave Lake
HIGH PRAIRIE
KINUSO
Smoky R.
Little Smoky River
GRANDE PRAIRIE
Wapiti River
VALLEYVIEW
6
SMITH
SLAVE LAKE-GRANDE PRAIRIE DISTRICT
SCALE
0
35 MILES

ANNUAL DISTRICT REPORT

PEACE RIVER DISTRICT

ALBERTA 1964

by

E. J. GAUTREAU

INFORMATION REPORT

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

CALGARY, ALBERTA

DEPARTMENT OF FORESTRY

FOREST ENTOMOLOGY AND PATHOLOGY BRANCH

MARCH 1965

INTRODUCTION

The major forest insect problems in the Peace River Forest in 1964 were the spruce budworm, forest tent caterpillar, and the willow leaf miner. The spruce budworm continued to cause moderate to severe defoliation near the junction of the Wabasca and Muddy rivers. This area of severe defoliation increased in size from that reported in 1963. The forest tent caterpillar outbreak, present in the Peace River Forest for the past several years, collapsed this season. Severe defoliation was recorded only in the Watino and Dunvegan areas. Populations of the willow leaf miner have built up considerably in the District since first being reported in 1963. Infestations were present from the Northwest Territories Boundary south to Manning. Population levels of the yellow-headed spruce sawfly showed little change from that reported in 1963. An aerial survey of tamarack stands, conducted during August revealed only light defoliation in the Bistcho Lake area.

A severe infection of dwarf mistletoe on mature jack pine was located near Prairie Point. A leaf blight of balsam poplar was present in epidemic levels from High Level south to Peace River. Re-examination of the outbreak of black canker on spruce near Mile 109, Mackenzie Highway, revealed that there was no significant change in the status of this disease since first reported in 1953.

INSECT CONDITIONS

Gall Mite, *Aceria neoessigi* (K.)

An increase in population levels of this mite was noted in the District in 1964. The most notable foliage damage was recorded on aspen regeneration in the following areas: Guy, Girouxville, Peace River, Griffin Creek and Lothrop. On many of the trees in these areas as much as 50 per cent of the foliage was affected which gave the branches a flowery appearance. Light infestations were noted in the vicinities of Reno, Nampa, Jean Cote, Martin River, Berwyn, Brownvale, Fairview, Hines Creek, and Cherry Point.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Utilization of an Alberta Forest Service helicopter made possible an aerial survey of spruce budworm damage along the Wabasca River east of Wadlin and Talbot lakes. The infestation along the Wabasca River extended from Twp. 97, to Twp. 100, and northwest along

the Muddy River to the southeast corner of Twp. 99, Rge. 11. An eastward extension from the Wabasca River was noted along Senex Creek to Sec. 19, Twp. 98, Rge. 8, W. 5. North of this area pockets of light defoliation occurred up to the vicinities of Owl Creek and Mikkwa River.

The most severe damage to white spruce was centered in the stands along the north banks of the Muddy River to its confluence with the Wabasca where considerable mortality was noted. Elsewhere in the infested area, severe mortality was not evident although spruce foliage along the Wabasca River in Twp. 98, Rge. 10, was very sparse, indicating more mortality may occur in this area. Severe defoliation throughout the infested area covered an area of 53 square miles as compared with only 12 square miles severely defoliated in 1963.

Willow Leaf Miner, Lyonetia sp.

This species of willow leaf miner was widely distributed throughout the northern half of the Peace River District. Prior to 1963 it had never been recorded in the District. High populations were detected in 1963 north of High Level. In 1964 populations built up considerably, and the infestation spread south to Manning. Light to moderate infestations on willow were common bordering the Mackenzie Highway, from Paddle Prairie to High Level. Scattered "pockets" of light, moderate and severe damage occurred northwest of Paddle Prairie to Hay Lakes. North of High Level damage was generally severe and extended into the Northwest Territories. Severe infestations were present on willow bordering creeks and mustkegs throughout the Buffalo Head Hills. South of Manning very low populations were detected near Deadwood Tower.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The outbreak of the forest tent caterpillar, present in the Peace River District for the past several years, collapsed throughout most of the infested area reported in 1963. Severe defoliation in 1964 was restricted to narrow bands bordering the Peace and Smoky rivers in the vicinities of Watino and Dunvegan. "Pockets" of moderate defoliation occurred in the vicinities of Clear Prairie, Scots wood and near Watt Mountain Tower. In the Fort Vermilion area a narrow band of light defoliation was observed along the Peace River from a few miles east of Fort Vermilion to Adams Landing. (See accompanying map for further detail).

A good hatch of forest tent caterpillar eggs occurred throughout the District in early May. Severe mortality of 1st, 2nd and 3rd instar larvae occurred and it is believed that virus disease combined with late leafing and inclement weather after hatching was completed, were the chief factors in the collapse of the forest tent caterpillar

outbreak in the Peace River District. The virus which was found throughout the District was identified as a nuclear polyhydrosis and it was the first report on record of 2nd instar larvae dying from this disease.

Mass collections to determine the incidence of parasitism and disease of late instar caterpillars and pupae were taken whenever possible. Rearing of these collections revealed that a high mortality resulted from a combination of the above factors.

An egg band survey was conducted throughout the District in the fall to forecast the status of this insect in 1965. The results as shown in Table II indicate only low populations of caterpillars will be present in the District.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

With few exceptions the general frequency of tents of the western tent caterpillar on shrubs in the Peace River Forest Division has remained low. During the 1964 season the heaviest concentration of tents was recorded on rose, chokecherry and saskatoon bordering the Peace River south of Worsley. Elsewhere in the District low populations of this caterpillar were observed as far north as High Level.

Yellow-headed Spruce Sawfly, Pikonema alaskensis (Roh.)

The yellow-headed spruce sawfly was the principal defoliator of white spruce plantations in the agricultural areas of the District. Severe damage occurred to plantation spruce foliage in the vicinities of Donnelly, Three Creeks, Grimshaw, and Chinook Valley. High populations of this insect were also noted on black spruce bordering the Mackenzie Highway near the Northwest Territories Boundary.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

This insect was observed at widely separated points throughout the District. In the Ft. Vermilion and La Crete areas very light damage was present on open grown spruce. Low populations were also noted on regeneration spruce bordering the Hay River north to Meander River settlement.

Larch Sawfly, Pristiphora erichsonii (Htg.)

The upward trend in population levels of this important pest of tamarack that were reported in 1963 did not continue in 1964. This

insect, although widely distributed throughout the District, caused only light damage during 1964. Ground survey observations revealed only small "pockets" of light defoliation north of Steen River. An aerial survey of tamarack stands was conducted in the District during August and the only defoliation detected was in the Bistcho Lake area. Some tree mortality was observed in the northwestern portion of the District during the aerial survey where tamarack trees have been defoliated for many years.

DISEASE CONDITIONS

Dwarf Mistletoe, Arceuthobium americanum Nutt. ex Engelm.

A severe infection of dwarf mistletoe was located on mature jack pine near Prairie Point in Sec. 30, Twp. 107, Rge. 16, W. 5. Aerial plants associated with this disease were also noted on jack pine regeneration. Very little tree mortality was seen in the area although this disease has been present in the stand for some time. A light infection of Wallrothiella arceuthobii (Pk.) Sacc., a fungus hyperparasite of dwarf mistletoe plants was found in the area. The collection of this fungus hyperparasite extended its known distribution further north in Alberta and also constituted a new herbarium record for the District.

Poplar Ink Spot, Ciborinia whetzelii (Seaver) Seaver

This disease was widespread on aspen foliage in the Manning and Three Creeks Ranger Districts. "Pockets" of light to moderate infections were common in those areas. The perfect stage of poplar ink spot was collected from aspen foliage near Hotchkiss. The imperfect stage of this disease was collected on balsam poplar foliage in the same area. These collections constituted new herbarium records for Alberta.

Leaf Blight of Balsam Poplar, Linospora tetraspora Thompson

This leaf blight of balsam poplar was present at epidemic levels in the Peace River District from High Level south to Peace River. There was a marked increase in intensity of this disease on balsam poplar foliage from that reported in 1963.

Black Canker of Spruce, Retinocyclus abietis (Crouan) Groves & Wells

Re-examination of the black canker outbreak on white spruce

bordering the Mackenzie Highway south of Kemp Creek, revealed that only 20 per cent of the stand was infected with an average of one canker per tree. Due to the relatively insignificant change that has occurred in the status of this disease since first reported in 1953, observations on the outbreak will be discontinued.

TABLE I

SUMMARY OF INSECT AND DISEASE COLLECTIONS BY HOSTS

Host Coniferous	Collections Insect	Disease	Host Deciduous	Collections Insect	Disease
White spruce	41	4	Trembling aspen	109	11
Black spruce	8	6	Willow sp.	27	3
Tamarack	8	1	Balsam poplar	5	5
Lodgepole pine	7	9	Birch sp.	2	
Jack pine	5	8			
Balsam fir	2	5			
	71	33		143	19
	Insect collections from miscellaneous hosts				23
	Disease collections from miscellaneous hosts				23
			GRAND TOTAL		312

TABLE II

RESULTS OF SEQUENTIAL SAMPLING
AND DEFOLIATION ESTIMATES
FOREST TENT CATERPILAR, 1964

Location	Predicted defoliation for 1964	Actual defoliation for 1964	Predicted defoliation for 1965
Whitelaw	Severe	Nil	Light
Peace River	Moderate	Nil	Light
Dixonville	Light	Nil	Nil
Deadwood	Light	Nil	Nil
La Crete	Light	Nil	Nil
McLellan	Moderate	Nil	Nil
Donnelly	Severe	Light	Nil

TABLE III

OTHER NOTEWORTHY INSECTS AND DISEASES
WHICH OCCURRED IN THE PEACE RIVER DISTRICT, 1964

Causal Agent	Host	Remarks
Insect		
Black-headed budworm, *Acleris variana* (Fern.)	W. spruce B. spruce	This insect was found throughout most of the forested area of the District, but populations were low enough that no serious damage occurred.
Cooley spruce gall aphid, *Adelges cooleyi* (Gill.)	W. spruce	Low populations in the Fairview, Hotchkiss, and High Level areas.
Leaf beetle, *Chalcoides* sp.	T. aspen	These beetles caused moderate foliage damage in the High Level, Ft. Vermilion, and La Crete areas.

Table III - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Oblique-banded leaf roller, *Choristoneura rosaceana* Harr.	Saskatoon Chokecherry Rose	Caused moderate to severe damage to ornamental rose "blossoms" in the town of Peace River.
Leaf beetle, *Chrysomela semota* Brown	B. poplar	Balsam poplar regeneration bordering the Mackenzie Highway in the vicinities of Indian Cabin and Steen River was lightly defoliated.
Leaf tier, *Compsolechia niveopulvella* Cham.	T. aspen	Low populations of this insect observed in the District.
Allegheny spruce beetle, *Dendroctonus punctatus* Lec.	B. spruce	Low populations of this bark beetle were observed attacking black spruce near High Level.
Green rose chafer, *Dichelonyx backi* Kby.	T. aspen Chokecherry	High populations of adults observed in the Cadotte Lake area.
Grey willow leaf beetle, *Galerucella decora* Say	Willow	Low to medium populations observed in the agricultural area south of Peace River.
Pine root collar weevil, *Hylobius pinicola* (Couper)	B. spruce	Light infestation near High Level.
Spruce spider mite, *Oligonychus ununguis* (Jac.)	W. spruce	Caused light damage in the Fairview and Hines Creek areas.
Poplar serpentine miner, *Phyllocnistis populiella* Cham.	T. aspen	Populations were very low this season.
Spruce gall aphid, *Pineus pinifoliae* (Fitch)	B. spruce	Low populations observed in the Hotchkiss and Hutch Lake area.

Table III - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Disease		
Spruce needle rust, *Chrysomyxa empetri* (Pers.) Schroet.	B. spruce Crowberry	Light damage to black spruce in the Watt Mountain area. The alternate host, crowberry, was severely infected near Steen River; new herbarium record on this host.
Spruce needle rust, *Chrysomyxa ledi* de Bary	B. spruce Leather leaf	Black spruce near Keg River was lightly infected with this rust. Leatherleaf, the alternate host, was found to be heavily infected near Watt Mtn. Tower. New herbarium record for Alberta on this host.
Spruce needle rust, *Chrysomyxa ledicola* Lagerh.	W. spruce Labrador tea	Light damage caused by this rust was found on white spruce near Watt Mtn. Tower. The alternate host, Labrador tea was heavily infected in the District.
Pine needle rust, *Coleosporium asterum* (Diet.) Syd.	Lp. pine J. pine	Caused light damage on lodgepole pine near Manning and Keg River, moderate damage on jack pine near Carcajou. New herbarium record for District 7.
Pine needle cast, *Elytroderma deformans* (Weir) Darker	Lp. pine	Foliage of lodgepole pine was lightly infected near Cherry Point. New herbarium record for District 7.
Fire blight, *Erwinia amylovora* (Burrill) Winslow	Dolgo crab	Collected a sample of this disease at Peace River. New herbarium record for the District and range extension for Alberta.

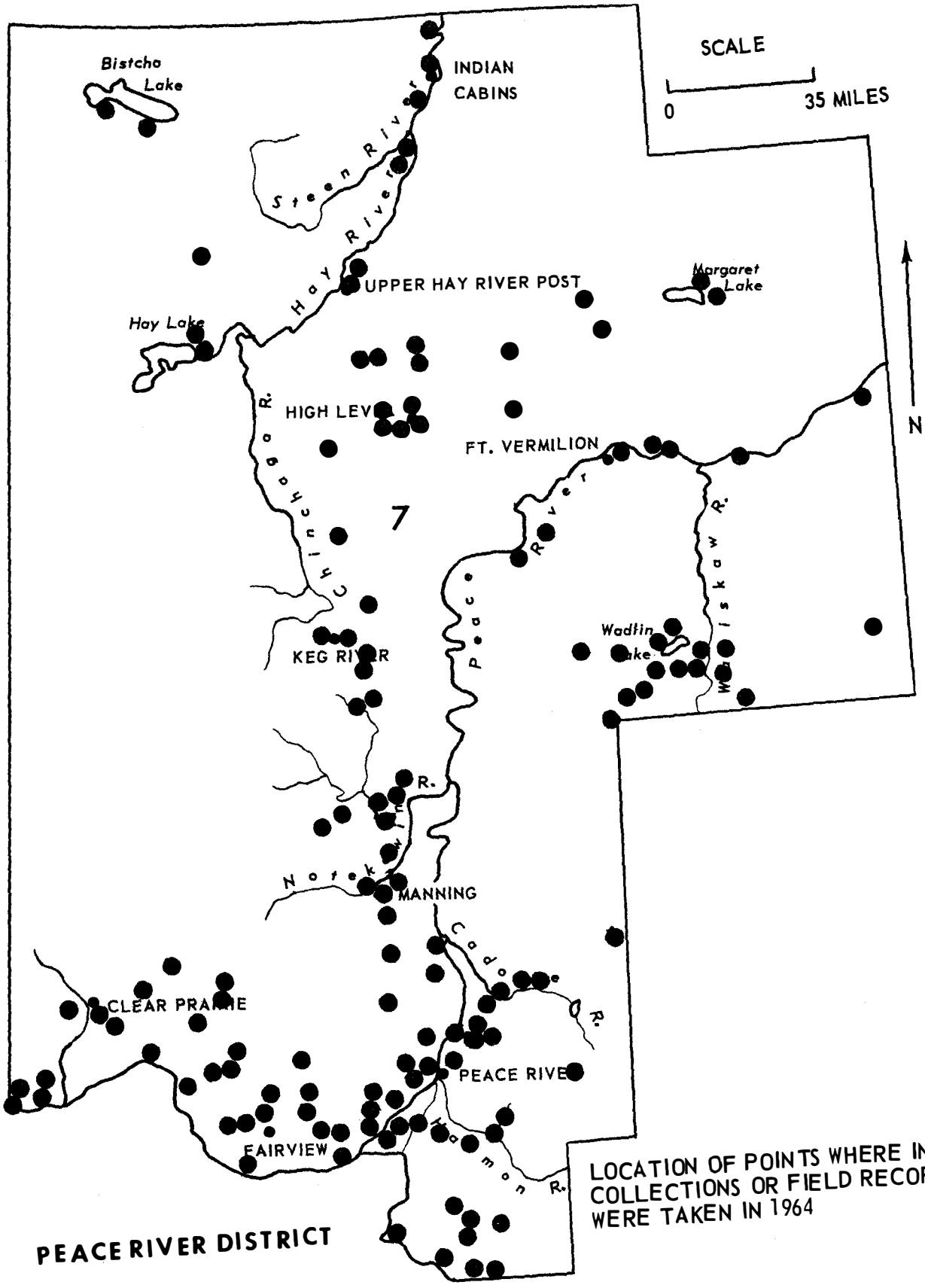
Table III - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Juniper needle cast, Lophodermium juniperinum (Fries) De Notaris	Dwarf juniper	Range extension northward to Peace River.
Poplar leaf spot, Marssonina tremuloidis (Ell. & Ev.) Kleb.	T. aspen	This leaf spot was common in the District. Not causing serious damage.
Willow leaf rust, Melampsora epitea Thuem.	Willow	Common throughout the District. Severe damage in the agricultural area south of Peace River.
Western gall rust, Peridermium harknessii J. P. Moore	Lp. pine	Severe infection near Watt Mountain Tower.

TABLE IV

SUMMARY OF RECORDED DISEASE OUTBREAKS
UNDER INVESTIGATION IN THE PEACE RIVER DISTRICT

Outbreak number	Location	Causal Organism	Remarks
7-1	Mile 109 Mackenzie Highway.	Retinocyclus abietis (Crouan) Groves & Wells	Examined 1964. 20 per cent of trees infected with one canker per tree. Discontinued.
7-2	Clear Hills Twp. 59, Rge. 12, W. 6.	Peridermium harknessii J. P. Moore	Outbreak not examined in 1964.
7-3	Mile 88-97 Mackenzie Highway.	Peridermium stalactiforme A. & K.	Outbreak not examined in 1964.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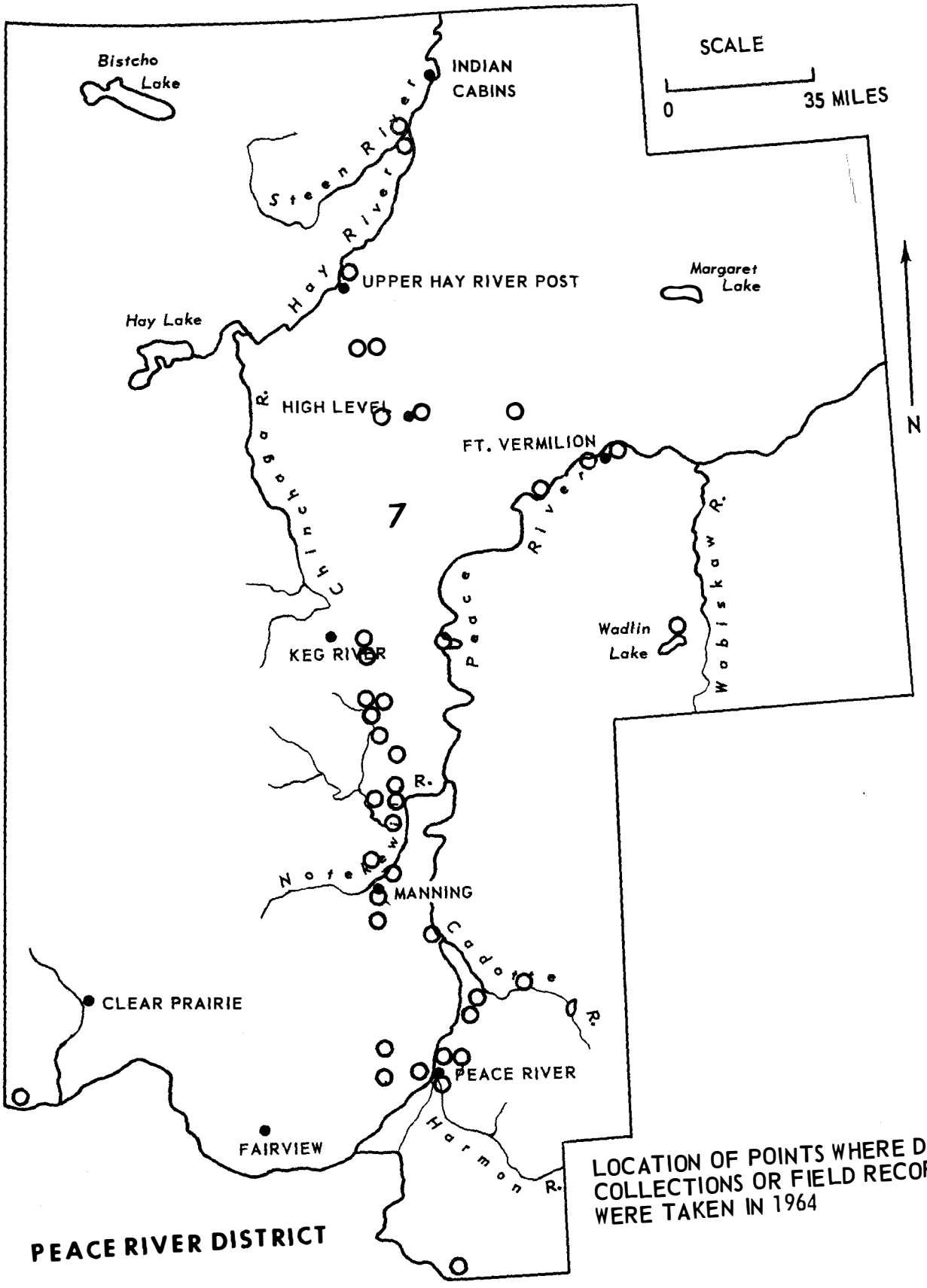
35 MILES
N
Bistcho Lake
INDIAN CABINS
Steen River
Hay River
UPPER HAY RIVER POST
Margaret Lake
Hay Lake
HIGH LEVEL
FT. VERMILION
Chinchaga R.
Peace River
Wadlin Lake
Wabiskaw R.
KEG RIVER
7
Notekeh R.
MANNING
Cadotte R.
CLEAR PRAIRIE
PEACE RIVER
FAIRVIEW
Eaglesham R.
PEACE RIVER DISTRICT
LOCATION OF POINTS WHERE INSECT COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964


SCALE
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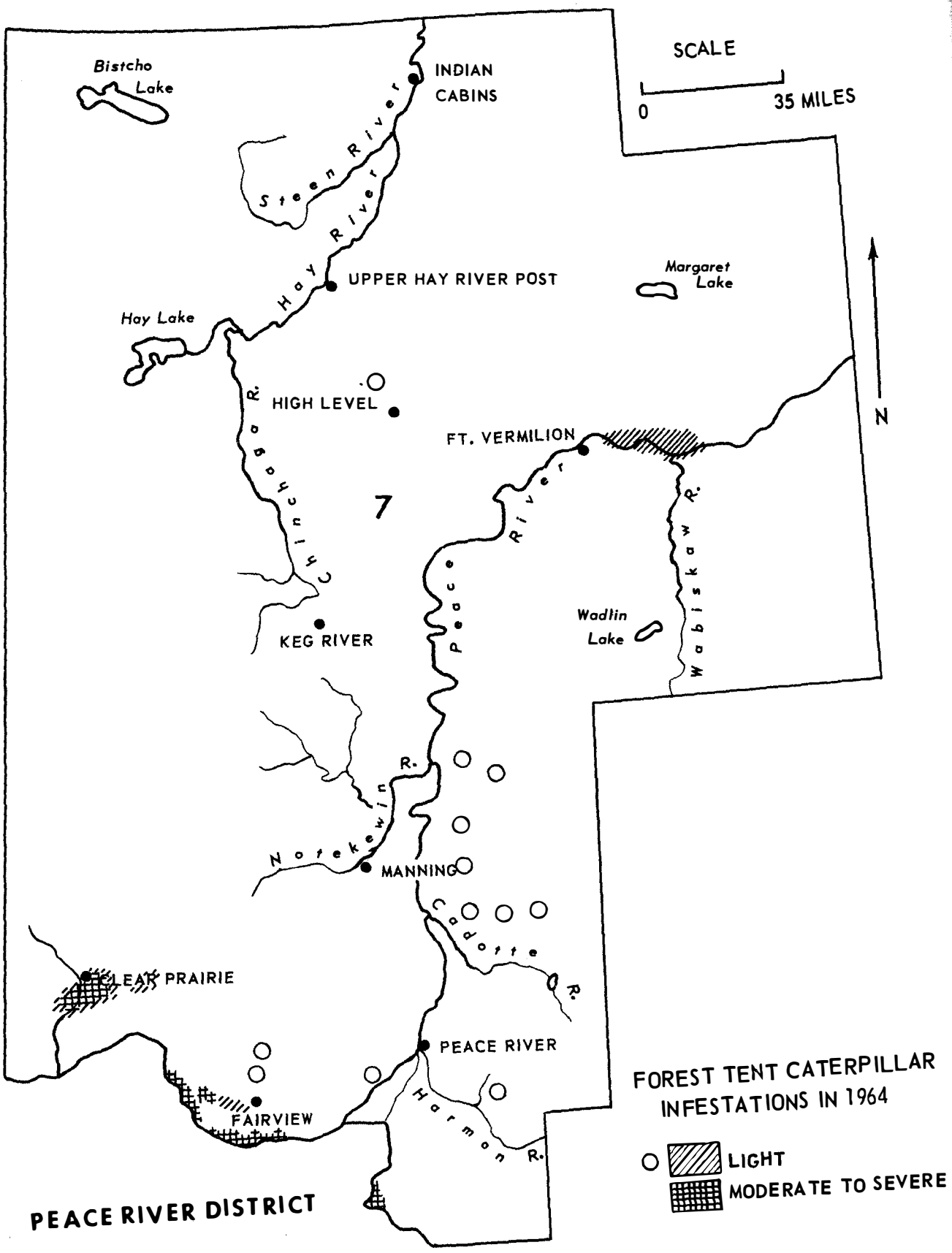
N
Bistcho Lake
INDIAN CABINS
Steen River
Hay River
UPPER HAY RIVER POST
Margaret Lake
Hay Lake
HIGH LEVEL
FT. VERMILION
Chinchaga R.
7
Peace River
Wadlin Lake
Wabiskaw R.
KEG RIVER
R.
Notekwan
MANNING
Cadotte R.
CLEAR PRAIRIE
PEACE RIVER
FAIRVIEW
Harmon R.
PEACE RIVER DISTRICT
LOCATION OF POINTS WHERE DISEASE COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964


SCALE
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N
Bistcho Lake
INDIAN CABINS
Steen River
Hay River
UPPER HAY RIVER POST
Margaret Lake
Hay Lake
HIGH LEVEL
Chinchaga R.
FT. VERMILION
Peace River
Wabiskaw R.
7
KEG RIVER
Wadlin Lake
Notekewin R.
MANNING
Cadotte R.
CLEAR PRAIRIE
PEACE RIVER
FAIRVIEW
Harmon R.
FOREST TENT CATERPILLAR INFESTATIONS IN 1964
LIGHT
MODERATE TO SEVERE
PEACE RIVER DISTRICT

ANNUAL DISTRICT REPORT

MACKENZIE DISTRICT

1964

by

E. J. GAUTREAU and A. MACHUK

INFORMATION REPORT

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

CALGARY, ALBERTA

DEPARTMENT OF FORESTRY

FOREST ENTOMOLOGY AND PATHOLOGY BRANCH

MARCH 1965

INTRODUCTION

The most important forest insects in the Mackenzie District during 1964 were the spruce budworm, larch sawfly, poplar serpentine miner and the yellow-headed spruce sawfly. The spruce budworm outbreak in the Northwest Territories persisted with little change from 1963 although more tree mortality was evident. The epicenter of the larch sawfly outbreak moved northwestward and, in 1964 was situated north of the Mackenzie River in the vicinity of the Horn River. The poplar serpentine miner caused severe damage along the Mackenzie River from Mills Lake to Fort Norman and along the Liard River from Nahanni Butte to Fort Liard. High populations of the yellow-headed spruce sawfly were found at scattered locations throughout the eastern half of the District. The spruce bark beetle outbreak along the Peace River between the 5th Meridian and Trident Creek was re-examined.

Adverse weather conditions during the winter of 1963-64 caused severe "red belting" of pine along Chinket Creek between the Liard and Kotaneele ranges. Spruce needle rust, Chrysomyxa woronini Tranz was reported in 2 new areas of the District in 1964. Severe drought injury to trembling aspen and jack pine occurred over an extensive area between Enterprise and Yellowknife.

INSECT CONDITIONS

Gall Aphids on Conifers, Adelges lariciatus (Patch)

White spruce in the vicinity of Ft. Smith and near Peace Point in Wood Buffalo National Park supported low populations of this insect. A severe infestation of pineapple shaped galls caused by Adelges sp. prob. lariciatus was present on regeneration white and black spruce in the Lawrence Lake area. This was the largest and most severe infestation of this insect encountered in the District.

Spruce Budworm, Choristoneura fumiferana (Clem.)

This insect was the most destructive pest in the Mackenzie District during 1964. An increase in populations occurred along the Slave River from a point 10 miles north of McConnel Island to within 8 miles of the mouth of the Salt River. The western boundary of the infestation lay west of the Little Buffao River and the eastern boundary approximately 8 to 10 miles east of the Slave River.

Moderate defoliation occurred on Sawmill Island near Ft. Smith, and along the north side of the Slave River between Ft. Smith and Bell Rock. Moderate to severe defoliation was recorded west of Ft. Smith along the Salt River and at Little Buffalo Falls.

The infestation along the Hay River has expanded and moderate to severe defoliation occurred for 10 miles along the river in the Enterprise area.

Along the Mackenzie River, moderate to severe defoliation was observed near Mills Landing, Jean Marie Creek, and for a distance of 40 miles upstream along the Rabbitskin River. Light to moderate damage occurred between the Mackenzie and the Rabbitskin rivers and for distances varying from 8 to 15 miles north of the Rabbitskin River.

Moderate to severe damage occurred south of Ft. Simpson for approximately 30 miles along the Liard River. Pockets of light and moderate damage were observed further south along the Liard River. These occurred near Nahanni Butte, Ft. Liard, near the mouth of the Petitot River, and along the Kotaneelee River about 15 miles upstream from the Liard River.

Along the Mackenzie River from Ft. Simpson to McGern Island defoliation was predominately light with pockets of moderate damage occurring throughout the area. Severe defoliation was recorded along the southwestern slopes of the Ebbutt Hills. Moderate to severe damage extended up the Willow Lake River for approximately 30 miles where it terminated in the light category. The severe infestation on McGern Island collapsed leaving a few scattered patches of light and moderate damage. Light damage was observed on Old Fort Island and pockets of light and moderate defoliation occurred between Wrigley and the mouth of the Johnson River. From this point to the mouth of the Dahadinni River moderate damage, with occasional pockets of severe defoliation, was recorded along the east shore of the Mackenzie River. Moderate to severe damage occurred for a distance of 8 to 10 miles up stream along the Blackwater River. No defoliation was observed below the Dahadinni River to Norman Wells although low populations of budworm were present in the area. Pockets of light damage were observed along the eastern slopes of the Martin Hills and from this area east to Ft. Simpson.

A strip cruise was conducted one half mile north of the confluence of the Redstone and Mackenzie rivers. Over 50 per cent of the spruce trees in this area were dead and most of the remainder were in such a weakened condition that survival is thought unlikely.

A report from Forestry personnel working in Wood Buffalo National Park indicated that spruce budworm defoliation was present in the Park along the Peace River in several areas.

Spruce Bark Beetle, Dendroctonus obesus (Mann.)

An aerial and ground survey was conducted in Wood Buffalo National Park along the Peace River between Big Island and Trident Creek to determine the percentage of spruce bark beetle attack. Two cruise strips, each approximately one mile in length by one chain in width, were run through representative stands of white spruce. One cruise strip was on Big Island and the other on the south side of the Peace River east of Trident Creek. The results of the survey revealed that .006 per cent mortality occurred. During the aerial inspection very few red-topped trees were noted and the ground cruise carried out later confirmed the aerial observation that only light bark beetle damage was occurring in the area. The composition and advanced age of these stands make them very susceptible to bark beetle attack and it is recommended that a close watch be kept on the area in the future.

Willow Leaf Miner, Lyonetia sp.

High populations of these insects caused moderate to severe damage to willow foliage throughout the southern portion of Wood Buffalo National Park and along the Slave River between Great Slave Lake and Ft. Smith. Light infestations were noted at the mouth of the Buffalo River and along the Mackenzie Highway between Hay River and Enterprise.

Pitch Nodule Maker, Petrova albicapitana (Busck)

This insect was well established throughout the eastern portion of the Mackenzie District. High populations were still present 6 miles northwest of Yellowknife and it was noted that many infested branches were broken off by snow and wind.

Poplar Serpentine Miner, Phyllocnistis populiella Cham.

High populations of this insect were again present along the Mackenzie River between Mills Lake and Fort Norman and along the Liard River between Nahanni Butte and Ft. Liard. Pockets of moderate to severe damage also occurred along the Mackenzie Highway between Ft. Providence and Ft. Rae. On the eastern side of the District pockets of moderate to severe damage occurred along the Slave River north of Ft. Smith, near Pine Lake, and along the Peace River between Peace Point and Jackfish Lake.

Yellow-headed Spruce Sawfly, Pikonema alaskensis (Roh.)

High populations of this sawfly were noted at several locations throughout the eastern half of the District. Severe defoliation occurred

to open grown spruce between Ft. Providence and Mile 70 of the Yellowknife Highway. Several small areas of moderate to severe damage were recorded along the Mackenzie Highway between Hay River and the Alberta Boundary. In the Ft. Smith area, light to moderate defoliation was observed along the road to Salt River. Elsewhere in the District, scattered light pockets of defoliation were observed along the road to Prelude Lake northeast of Yellowknife. During the aerial survey in Wood Buffalo National Park moderate to severe defoliation was observed on regeneration spruce growing on the north shore of a small unnamed lake between Arrow and Sass lakes.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Populations of this weevil remained about the same level as that reported in previous years. Low populations were recorded north of Ft. Providence, along the south shore of Great Slave Lake near the mouth of the Buffalo River, and south of Pine Lake in Wood Buffalo National Park. Damage to black and white spruce leaders were observed west of Ft. Smith near the Salt and Little Buffalo rivers.

Larch Sawfly, Pristiphora erichsonii (Htg.)

Surveys conducted by air, water, and ground in the Mackenzie District revealed an increase in the amount of defoliation in the area between the Mackenzie River and Yellowknife. Populations of this insect declined markedly south of the Mackenzie River and Great Slave Lake. Defoliation of tamarack stands in this area ranged from light to moderate in 1964 as compared to monderate and severe in 1963. Since the outbreak of the larch sawfly was first detected in the District, the center of the infestation has been gradually moving northwestward and now lies in the vicinity of the Horn River.

Light defoliation was present in tamarack stands from Mile 30 to Mile 60 Yellowknife Highway.

The western boundary of severe defoliation extends from the confluence of the Trout and the Mackenzie rivers to Willow Lake. The eastern boundary of severe defoliation was not determined in 1964. Defoliation along the Liard River from Ft. Simpson to Ft. Liard ranged from light to moderate. Tamarack stands northeast of Ft. Simpson were not investigated during the August aerial survey. In the southeastern portion of the District pockets of light to moderate defoliation occurred along the Slave River and in Wood Buffalo National Park.

The accompanying map shows the distribution and degree of defoliation by the larch sawfly as determined by ground and aerial surveys.

Spruce Needle Miner, Taniva albolineana Kft.

Light damage to spruce needles by the spruce needle miner was observed at Dal Lake, Cli Lake, and in the Martin Hills northwest of Ft. Simpson. Several other small infestations of this insect were observed in the Ft. Smith and Hay River-Pine Point areas but caused no serious damage.

DISEASE CONDITIONS

Spruce Needle Cast, Bifusella crepidiformis Darker

This spruce needle cast caused light damage to black spruce foliage over a small area along the north shore of Willow Lake. Light to moderate damage was observed on white spruce near the mouth of the Buffalo River. This spruce needle cast was also common throughout the remainder of the eastern portion of the District.

Spruce Needle Rust, Chrysomyxa ledicola Lagerh.

Labrador tea, the alternate host of this spruce needle rust, was severely infected throughout the Mackenzie District this season although no severe damage to spruce foliage was observed. During the aerial survey a small stand of regeneration spruce north of Arrow Lake appeared to be severely damaged with what is thought to be Chrysomyxa sp. rust. A landing in the area to check this observation was not possible.

Spruce Needle Rust, Chrysomyxa woronini Tranz.

This fungus, previously reported from the Mackenzie District in 1963, was located in 2 new areas of the District in 1964. Light damage was noted on regeneration black spruce growing along the north shore of Willow Lake in the Horn Mountains and near a large unnamed lake in the Martin Hills. Samples were again obtained from the Ebbut Hills where this disease was collected in 1963. No collections were made on the alternate host.

Comandra Blister Rust, Cronartium comandrae Pk.

Two stands of jack pine infected with blister rust were located in the District in 1964. A light incidence of stem and branch infections were noted at Kakisa Lake and at Mile 110 Yellowknife Highway. Heavy infections were observed on the alternate host, northern comandra,

in the following areas: Mile 29 Pine Point Road, 28 miles southwest of Ft. Rae, Prelude Lake, and 16 miles northwest of Ft. Smith. No severely damaged pines were noted in these areas.

Drought

Severe drought injury and premature foliage drop occurred over an extensive area along the Yellowknife Highway between Enterprise and Yellowknife. Most deciduous species in the younger age classes dropped their foliage prematurely, and by the first of August much of the foliage on the older trees turned yellow. Stands of jack pine southwest of Ft. Rae to Fawn Lake and between Ft. Rae and Prelude Lake were also severely affected by drought.

Larch Needle Rust, Melampsora medusae Thuem.

Two collections of this organism on tamarack foliage estended the known range north and westward. One collection was made in the Ebbutt Hills, and the other along the South Nahanni River at Virginia Falls. In both instances the damage was light.

Aspen foliage, the alternate host of larch needle rust, was found lightly infected in most aspen stands south of Hay River and in the Ft. Providence area. Eight collections of the telial stage on overwintered aspen leaves were made for the Calgary herbarium.

Stalactiforme Rust, Peridermium stalactiforme A. & K.

Regeneration jack pine along the Yellowknife Highway 20 miles north of Ft. Providence was severely damaged by stalactiforme rust. Preliminary surveys in the area indicated that 50 per cent or more of the trees were infected with stem cankers. A more detailed survey will be conducted in the area in 1965.

Red Belt

Adverse weather conditions during the winter of 1963-64 caused severe red belt of pine along Chinkeh Creek between the Liard and Kotaneelee ranges. This area of red belt extends for about 15 miles along the lower slopes of the Chinkeh Creek Valley and varies in width from one half to one and one half miles. Previously red belted pine in the area have died.

TABLE I

SUMMARY OF INSECT AND DISEASE COLLECTIONS BY HOSTS

Host Coniferous	Collections Insect	Disease	Host Deciduous	Collections Insect	Disease
White spruce	64	7	Trembling aspen	47	16
Black spruce	21	9	Willow	16	1
Tamarack	27	3	Birch	5	1
Jack pine	19	14	Balsam poplar	12	5
Lodgepole pine	0	1	Alder	5	0
	131	34		85	23
Insect collections from miscellaneous hosts					5
Disease collections from miscellaneous hosts					20
GRAND TOTAL					298

TABLE II

OTHER NOTEWORTHY INSECTS AND DISEASES
WHICH OCCURRED IN THE MACKENZIE DISTRICT, 1964

Causal Agent	Host	Remarks
Insect		
Black-headed budworm, *Acleris variana* (Fern.)	W. spruce B. spruce	Commonly taken in beating samples throughout the eastern portion of the District. Not causing any serious damage.
Poplar bud-gall mite, *Aceria parapopuli* (Kiefer)	T. aspen	Low populations near Yellowknife.
Leaf beetle, *Chalcoides* sp.	T. aspen	Light infestations along the Yellowknife Highway between Mile 50-70 and near the Northwest Territories-Alberta Boundary south of Enterprise.

Table II - Other Noteworthy Insects and Diseases - Cont'd.

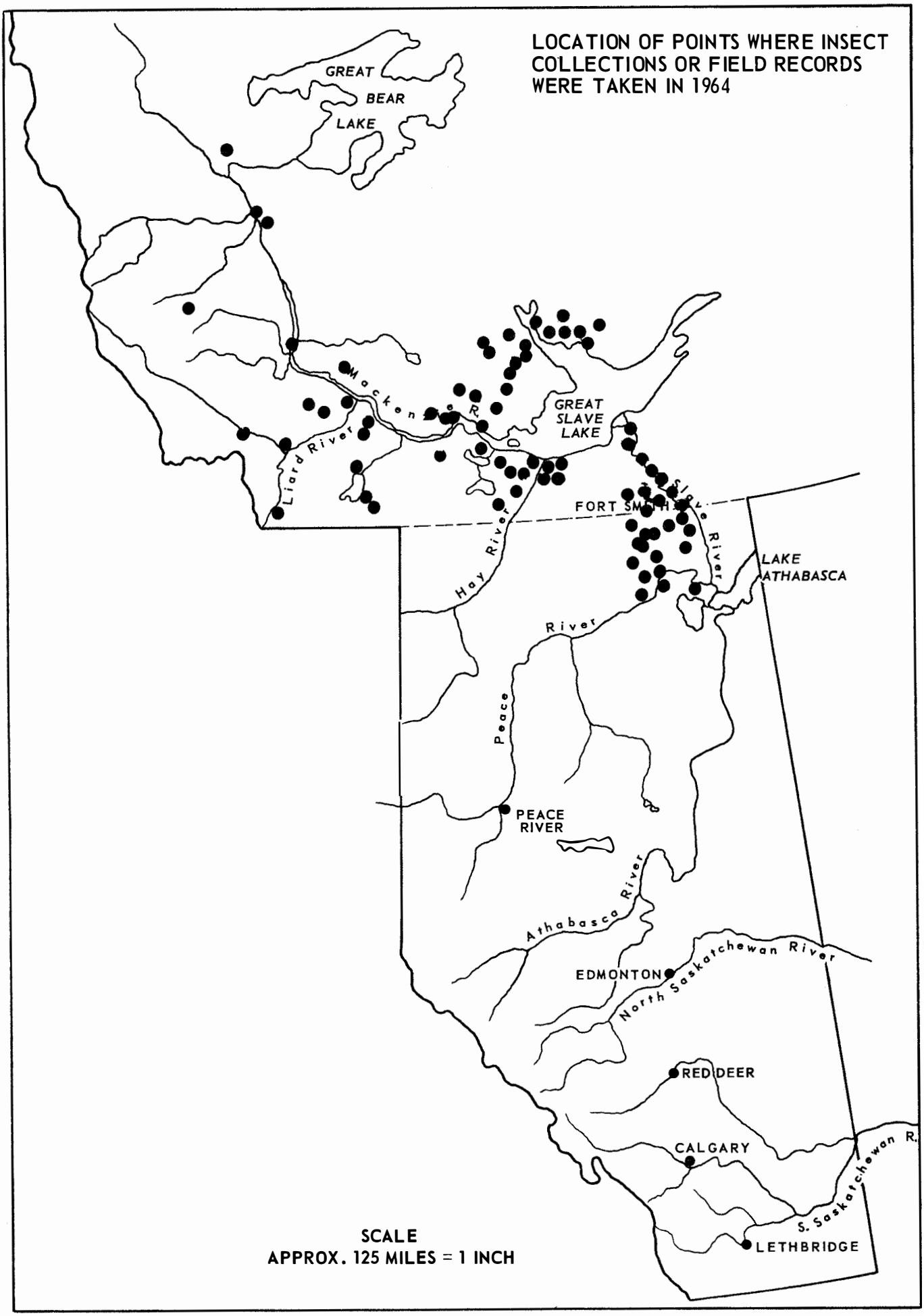
Causal Agent	Host	Remarks
Aspen leaf beetle, *Chrysomela crotchi* Brown	T. aspen	Low populations between Enterprise and Ft. Providence.
Leaf beetle, *Chrysomela semota* Brown	B. poplar	Light infestation between Enterprise and Ft. Providence.
Leaf tier, *Compsolechia niveopulvella* Cham.	T. aspen	Very low populations in the District.
Grey willow leaf beetle, *Galerucella decora* Say	Willow	Low populations in Wood Buffalo National Park and in the vicinity of Ft. Smith.
American aspen beetle, *Gonioctena americana* (Schaeff.)	T. aspen	Low populations near Peace Point.
Bark beetle, *Ips* spp.	W. spruce B. spruce	Medium populations observed infesting windfall and slash along the south shore of Great Slave Lake in the Buffalo River area.
Forest tent caterpillar, *Malacosoma disstria* Hbn.	T. aspen	One collection taken near Peace Point in Wood Buffalo National Park.
Western tent caterpillar, *Malacosoma pluviale* (Dyar)	T. aspen	Low populations between Peace Point and Carlson's Landing.
Sawfly, *Neodiprion* sp.	W. spruce	Low populations throughout the eastern portion of Wood Buffalo National Park.
Balsam fir sawfly, *Neodiprion abietis* (Harr.)	W. spruce	Low populations in Wood Buffalo National Park.
Spruce spider mite, *Oligonychus ununguis* (Jac.)	W. spruce	Shade and ornamental trees lightly infested at Ft. Smith.

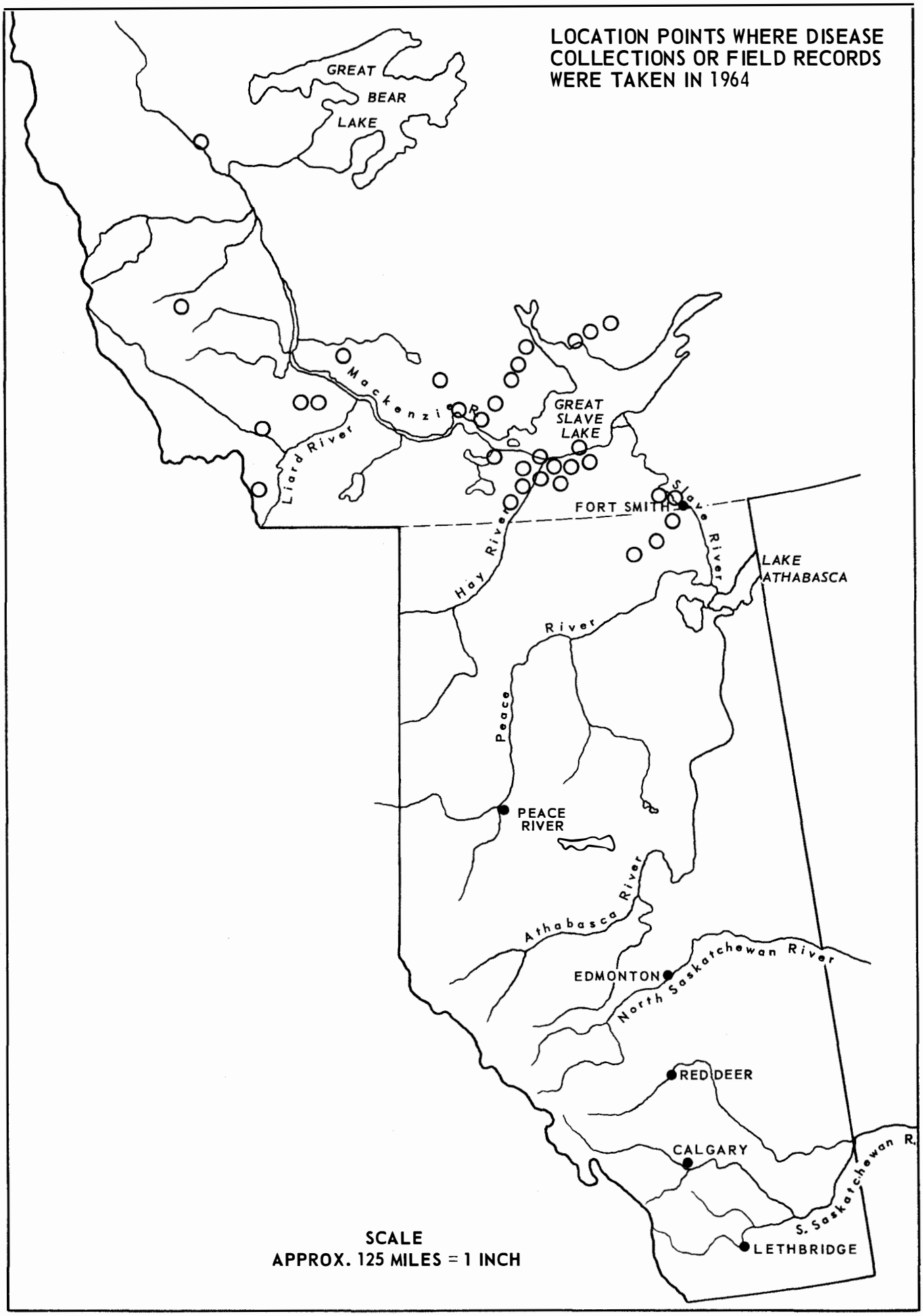
Table II - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Tortricidae, *Pandemis canadana* Kft.	T. aspen	Light infestation along the Yellowknife Highway between Ft. Providence and Yellowknife.
Ragged spruce gall aphid, *Pineus similus* (Gillette)	W. spruce B. spruce	Found in low numbers along the lower Mackenzie and Liard rivers.
Leaf tier, *Pseudexentera improbana oregonana* Wlshm.	T. aspen	Low populations in the Ft. Smith area.
Poplar borer, *Saperda calcarata* Say	T. aspen	Small stand of aspen severely infested near the Kakisa River.
Disease		
Shoe-string root rot, *Armillaria mellea* (Vahl ex Fr.) Quél.	J. pine	Regeneration pine between Ft. Smith and Salt River lightly infected.
Yellow witch's broom of spruce, *Chrysomyxa arctostaphyli* Diet.	Bearberry	Alternate host severely infected.
Spruce needle rust, *Chrysomyxa empetri* (Pers.) Schr et.	W. spruce Crowberry	Spruce foliage lightly infected in the Dal Lake area. Crowberry, the alternate host, severely infected at Yellowknife and Trout Lake.
Spruce needle rust, *Chrysomyxa ledi* de Bary	W. spruce	Light damage near Cli Lake.
Cytospora canker, *Cytospora chrysosperma* (Pers.) Fr.	T. aspen	Moderate damage 14 miles northwest of Enterprise.
Hirschioporus abietinus (Dicks. ex Fr.) Donk	B. spruce	New herbarium record on this host.

Table II - Other Noteworthy Insects and Diseases - Cont'd.

Causal Agent	Host	Remarks
Pine needle cast, *Hypodermella montana* Darker	J. Pine	Jack pine stands, 23 miles south of Yellowknife lightly infected.
Pine needle cast, *Lophodermium pinastri* (Schrad. ex Fr.) Chev.	J. pine	Light damage 10 miles southeast of Hay River.
Macrophoma gall of poplars, *Macrophoma tumefaciens* Shear	T. aspen	New range extension to Ft. Smith
Western gall rust, *Peridermium harknessii* J. P. Moore	J. pine	Lightly infected trees along Pine Point Road between the Mackenzie Highway and the Buffalo River.


LOCATION OF POINTS WHERE INSECT COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964
GREAT BEAR LAKE
Mackenzie R.
GREAT SLAVE LAKE
Liard River
Hay River
FORT SMITH
Slave River
LAKE ATHABASCA
River
Peace
PEACE RIVER
Athabasca River
EDMONTON
North Saskatchewan River
RED DEER
CALGARY
S. Saskatchewan R.
LETHBRIDGE
SCALE
APPROX. 125 MILES = 1 INCH


LOCATION POINTS WHERE DISEASE COLLECTIONS OR FIELD RECORDS WERE TAKEN IN 1964
GREAT BEAR LAKE
Mackenzie R.
Liard River
GREAT SLAVE LAKE
FORT SMITH
Slave River
Hay River
LAKE ATHABASCA
Peace River
PEACE RIVER
Athabasca River
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North Saskatchewan River
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LETHBRIDGE
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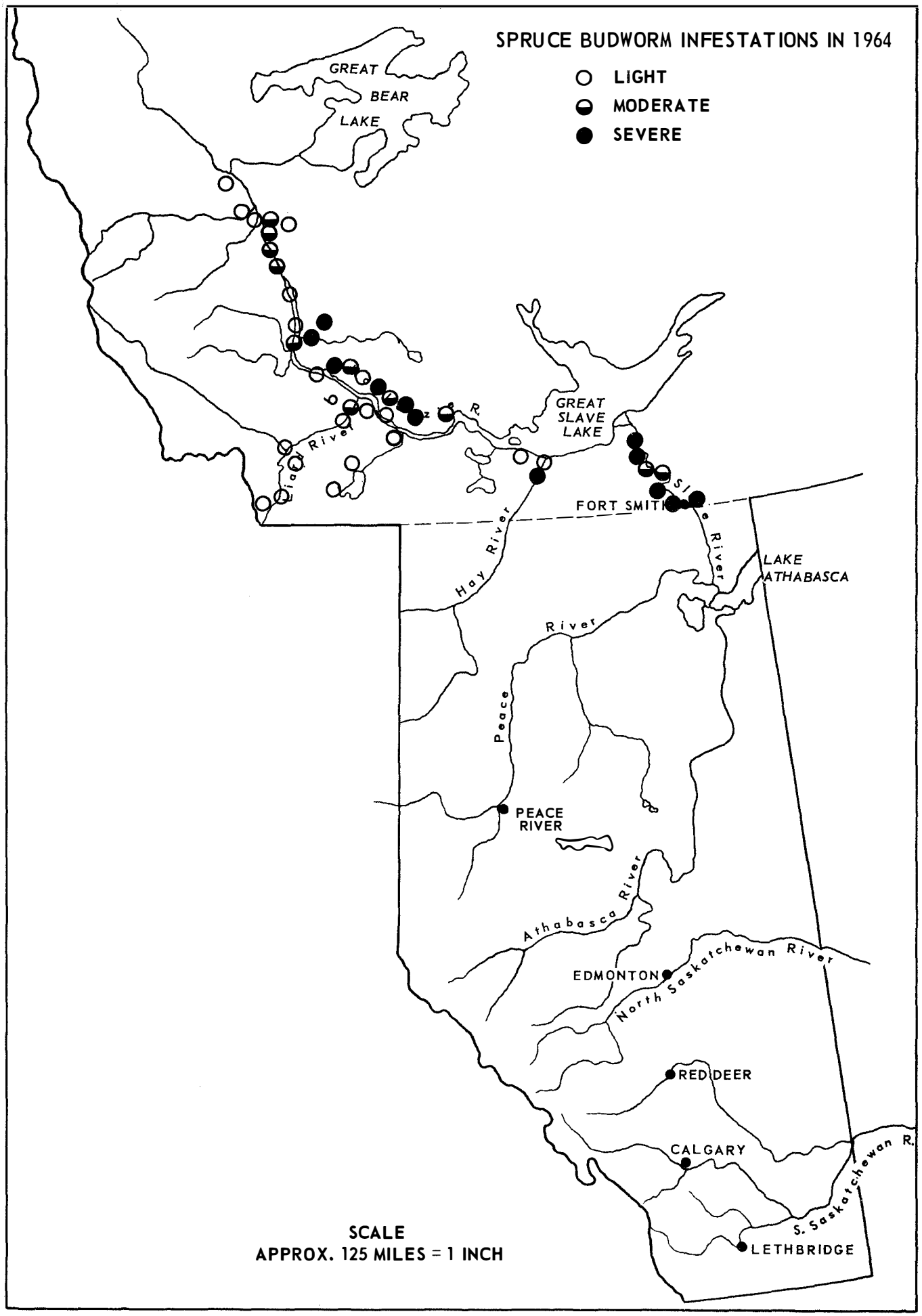
SPRUCE BUDWORM INFESTATIONS IN 1964
LIGHT
MODERATE
SEVERE
GREAT
BEAR
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LAKE
FORT SMITH
Hay River
LAKE
ATHABASCA
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Peace
PEACE
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Athabasca River
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North Saskatchewan River
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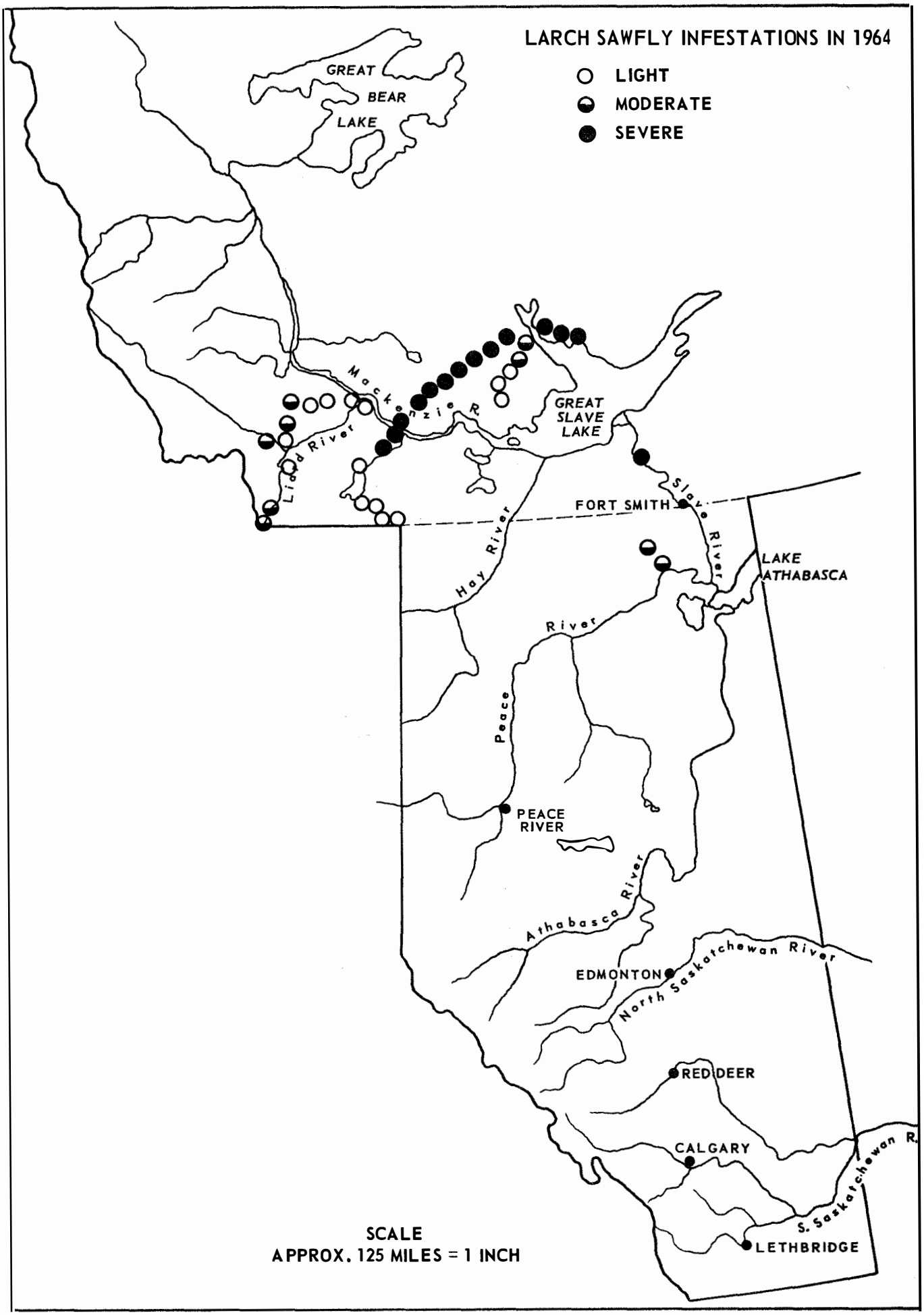
LARCH SAWFLY INFESTATIONS IN 1964
LIGHT
MODERATE
SEVERE
GREAT
BEAR
LAKE
MacKenzie R.
Liard River
GREAT
SLAVE
LAKE
FORT SMITH
Slave River
Hay River
LAKE
ATHABASCA
River
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