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# **ANNUAL DISTRICT REPORTS: FOREST INSECT AND DISEASE SURVEY; PRAIRIES REGION, 1971**

By J.K.Robins, V.B.Patterson, G.N.Still, K.L.Mortensen,  
E.J.Gautreau, R.C.Tidsbury, J.Petty, G.J.Smith,  
R.M.Caltrell and J.P.Susut

**NORTHERN FOREST RESEARCH CENTRE  
EDMONTON, ALBERTA  
INTERNAL REPORT NOR-13**

**MARCH, 1972**



**Environment  
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MARCH 1972

CANADIAN FORESTRY SERVICE  
DEPARTMENT OF THE ENVIRONMENT  
5320 - 122 STREET  
EDMONTON 70, ALBERTA, CANADA

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and J.P. Susut\*

INTRODUCTION

by

J.K. Robins

Field activities of the Forest Insect and Disease Surveys were seriously curtailed by lack of funds in 1971. General detection surveys bore the major brunt of this reduction of survey capabilities. Known outbreaks of serious pests were surveyed from the ground and air. Campgrounds in selected provincial and national parks were examined to assess the impact of high use on the forest plant community. The bulk of the field work was accomplished in July and August with some activity in June and September.

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\* All personnel of the Insect and Disease Survey,

Northern Forest Research Centre, Canadian Forestry Service, Department of the Environment, 5320 - 122 Street, Edmonton 70, Alberta, Canada.

District assignments and supervisory responsibilities were as follows:

Manitoba

District 1	Southern Manitoba	G.N. Still
District 2	Northern Manitoba	V.B. Patterson (Supervising Ranger)

Saskatchewan

District 3	Southeastern Saskatchewan	R.L. Mortensen (Supervising Ranger)
District 4	Northeastern Saskatchewan	R.C. Tidsbury
District 5	Western Saskatchewan	E.J. Gautreau

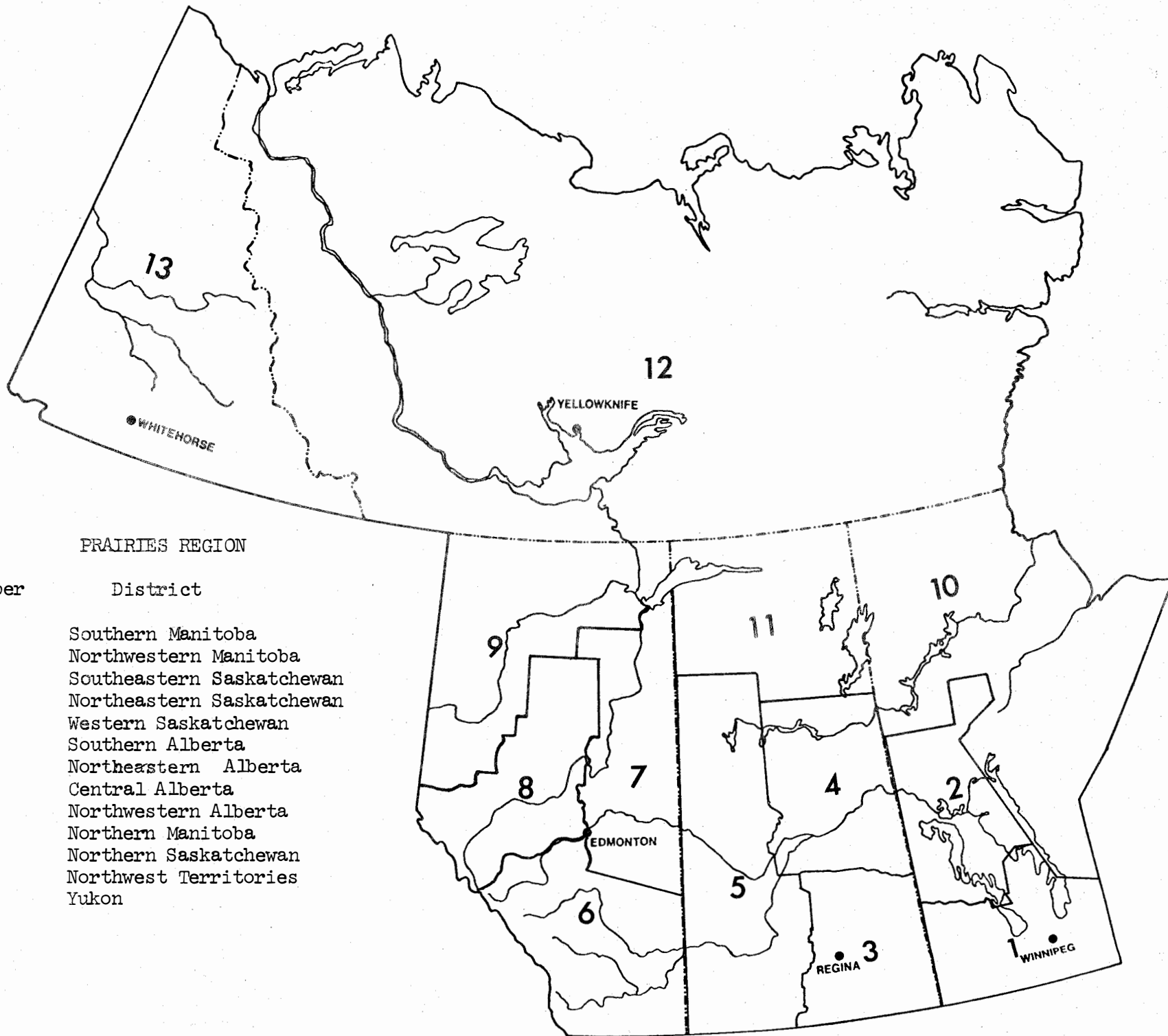
Alberta

District 6	Southern Alberta	G.J. Smith
District 7	Northeastern Alberta	J. Petty (Supervising Ranger)
District 8	Central Alberta and Yukon	J.P. Susut
District 9	Northwestern Alberta and N.W.T.	R.M. Caltrell

Summary of Insect and Disease Conditions

There were no major changes in the status of forest insects although many foliar diseases were more serious than in 1970. The spruce budworm outbreak was again severe in Sprucewoods Provincial Park and Forest in Manitoba and some increases in populations were noted along the Chinchaga River in Alberta. Infestations of the large aspen tortrix decreased in Alberta while increasing in west-central Saskatchewan and in south-central Manitoba. The forest tent caterpillar outbreak in Alberta remained relatively stable except for population increases around Rocky Mountain House; populations appear to be building up in central Manitoba. Little change was noted in the status of the spruce beetle outbreak in southwestern Alberta.

Forest disease conditions were characterized by increases in the incidence and severity of foliage diseases of both deciduous and coniferous tree species, severe winter injury to conifers in the Foothills, and severe rabbit damage co-incidental with a high point in the population cycle of the varying hare.



PRAIRIES REGION

Number	District
1	Southern Manitoba
2	Northwestern Manitoba
3	Southeastern Saskatchewan
4	Northeastern Saskatchewan
5	Western Saskatchewan
6	Southern Alberta
7	Northeastern Alberta
8	Central Alberta
9	Northwestern Alberta
10	Northern Manitoba
11	Northern Saskatchewan
12	Northwest Territories
13	Yukon

ANNUAL DISTRICT REPORTS, 1971 - MANITOBA

by

V.B. Patterson and G.N. Still

INSECT CONDITIONS

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

The infestation of the large aspen tortrix was present in Manitoba for the fourth consecutive year. Populations decreased in some areas, increased in others and were also found in areas where there were none recorded in 1970.

In Riding Mountain National Park the change in population levels was most noticeable. In the southeastern section where severe defoliation occurred in 1970, only a few larvae were recorded this year. North and west of Clear Lake where defoliation was light in 1970, patches of moderate to severe defoliation were recorded throughout the area. Moderate to severe defoliation was also recorded south of the Park near Onanole and along the Rolling River Valley near Minnedosa.

In the Interlake area moderate to severe defoliation occurred in the area between Narcisse and Hodgson, between Hnaua and Rosenberg and along the east side of Lake Manitoba from Camper to St. Martins.

In the Lake Manitoba Narrows area from Shergrove to Dog Lake, defoliation of aspen was moderate to severe. In this area, the forest tent caterpillar, Malacosoma disstria (Hbn.) was responsible for approximately fifty percent of the overall defoliation.



Moderate to severe defoliation occurred between Lakes Dauphin and Winnipegosis and south of Lake Dauphin near St. Rose and Ochre River. Isolated areas where moderate to severe defoliation occurred were in the Porcupine, Spruce Woods and Agassiz provincial forests; in the Black River Indian Reserve; near Lac Du Bonnett, Walkeyburg, Grand Beach, Stead, Paint Lake, and east of Namew Lake.

Spruce Budworm, Choristoneura fumiferana (Clem.)

An aerial survey was conducted over the Sprucewoods Provincial Park and Forest. Observations from the air indicated that the outbreak of spruce budworm was continuing at about the same level as in 1970. Moderate to severe defoliation occurred throughout the white spruce stands in both the Park and Forest as well as in the areas around Hughes, Melbourne and Sidney.

In the Vidor-Arborg-Geyser area, moderate to severe defoliation occurred in farm woodlots for the fifth consecutive year. These stands of white spruce are beginning to show the effects of repeated defoliation; dead branches and leaders and an overall decadent appearance. Moderate to severe defoliation also recurred in woodlots three miles south of Sylvan and four miles south of Fisher Branch. A new outbreak was detected in a woodlot approximately one mile north of Silver.

In Riding Mountain National Park low populations were recorded but defoliation was negligible.

Forest Tent Caterpillar, Malacosoma disstria (Hbn.)

Populations of the forest tent caterpillar were higher in the area surrounding the north arm of Lake Manitoba than in 1970. In this general area a complex of insects were responsible for moderate to severe defoliation. In the Narrows area between Shergrove and Dog Lake, high populations of forest tent caterpillars were present and caused approximately 50 percent of the defoliation. In the remainder of this general area, populations were low. There was a slight increase in population levels in the Teulon area and in Spruce Woods Provincial Park and Riding Mountain National Park. Low populations were recorded near Rosenberg, Red Rose, Fraserwood, Chatfield, Pinewa, in Birds Hill, and Clear Water provincial parks and in the Cormorant Provincial Forest.

Larch Sawfly, Pristiphora erichsonii (Htg.)

In southern Manitoba, severely defoliated stands of tamarack were observed in the study plot near Piney, near Richer Tower, South Junction, East Braintree and along the Central Agassiz Road near Julius and two miles south of Highway 15. Moderately defoliated stands were observed 10 miles south of Marchand, in the Dawson Creek area, one mile north of the Whitemouth Road on Highway 308 and in the vicinities of Birch Point, Sprague, West Hawk, Seven Sisters and Lee River. Light infestations were observed in the Interlake section, on Hecla Island, east of Lake Winnipeg along Highway 304 from Powerview to Wallace Lake, and in the areas around Falcon Lake, West Hawk, Caribou Tower, Telford and Gull Lake.

In northern Manitoba, moderate to severe defoliation of tamarack stands occurred at widely scattered points along Highway 10 in the area of The Bog. Light defoliation occurred in the Wakusko area, along Highway 6

near Minago and Hargrave rivers, and at Mile 55, Mile 60 and Mile 83 north of Grand Rapids.

Jackpine Budworm, Choristoneura pinus pinus Free.

In the Sandilands Provincial Forest, moderate to severe defoliation occurred in a band approximately one mile in width, extending from the village of Sandilands northerly along the west boundary of the reserve to approximately two miles northeast of the Marchand Ranger Headquarters. Patches of similar defoliation occurred approximately one mile south of the Halfway Fire Tower and one mile north of the Tower. Patches of moderate defoliation were observed from six to nine miles north of the Marchand Ranger Headquarters along the central Sandilands road; two miles east and two miles northeast of Woodridge; and two miles northeast of Carrick. A Scots pine plantation, approximately four miles southeast of Marchand Ranger Headquarters, was severely defoliated. Low larval populations were evident at scattered points throughout the remainder of the reserve.

Low populations were observed in the Agassiz and Belair provincial forests.

Yellow Headed Spruce Sawfly, Pikonema alaskensis (Roh.)

Some severe defoliation of roadside regeneration occurred at scattered points along the central Whiteshell Road and in young spruce plantings in the Falcon Lake and St. George areas. Moderate defoliation of young spruce was noted near Otter Falls, and in the Roblin and Wekusko areas.

Fall Cankerworm, Alsophila pometaria (Harr.)

Severe defoliation of Manitoba maple and bur oak occurred east and northeast of Riding Mountain National Park near the towns of Riding Mountain, Norgate, McCearry, Laurier, and Dauphin.

Defoliation was light generally along the Red River north of Winnipeg with patches of severe near Selkirk, Lockport, and in the north end of metro Winnipeg. Light defoliation was also recorded near Emerson and Beausejour.

A Leaf Roller, Epinotia solandriana Linn.

Medium populations of this leaf tier were recorded on aspen in the Dog Lake - Ashern area on Basket Creek, near the south end of Lake Winnipegosis and in Duck Mountain Provincial Park. The same species was recorded on balsam poplar at Beautiful, East Blue, Reid, and Steep Rock lakes.

Ugly Nest Caterpillar, Archips cerasivoranus (Fitch)

Hundreds of tents were observed on roadside chokecherry in the Grandview area, with the heaviest concentration between Duck Mountain Provincial Forest and the town of Grandview. Light infestations were recorded in the following areas: Duck Mountain, Birds Hill, Belair, Whiteshell.

DISEASE CONDITIONS

Thompson Smoke Easement Surveys

A twelfth annual survey of the Thompson Smoke Easement area was conducted in July. Aerial observations detected some flooding damage in the immediate vicinity of the Thompson smelter and two areas south of the smelter, showing symptoms of dead and decadent spruce and pine. These symptoms occurred primarily in an area starting about a half mile south of the smelter and extending southerly in a band approximately two miles wide and six miles long. A second band approximately one mile wide and six miles long was observed southwest of the smelter. No significant damage was found beyond these areas in the vicinities of established sulphur dioxide stations.

Jackpine Mistletoe, Arceuthobium americanum Nutt. ex Engelm.

The recent opening of Highway 6, from Grand Rapids to the junction of Highway 391 near Ponton, provided a good opportunity to better assess the extent of jackpine mistletoe in that area.

Scattered brooming was found along the highway from Grand Rapids through to seven miles north of the bridge at William River, a distance of some 60 miles north of Grand Rapids.

Patches of high incidence of broomed trees were recorded in miles 1, 4, 6, 7, 20, 24, 25, 27, 32, 34, 37 and 60, north of Grand Rapids; moderate in miles 17, 22, 26, 50 and 56, and low in miles 11, 20, 29, 30, 31, 36, 37, 47, 50, 56, and 57.

The hyperparasite, Wallrothiella arceuthobii (Pk.) Sacc. was present on mistletoe plants in the William River area.

OTHER NOTEWORTHY INSECTS AND DISEASES

<u>Causal Agent</u>	<u>Host</u>	<u>Remarks</u>
<u>INSECT</u>		
Poplar bud-gall mite, <u>Aceria parapopuli</u> (Keifer)	T. aspen	Light infestation of saplings in Northwest Angle and Spruce-woods provincial forests.
Black-headed budworm, <u>Accleris variana</u> (Fern.)	W. spruce	Traces near Caddy Lake.
A needle tier, <u>Amorbia humerosana</u> Clem.	W. spruce	Traces near Richer Fire Tower.
Spittle bug, <u>Aphrophora permutata</u> Uhl.	J. pine	Traces in the Moose Lake and Otter Falls areas.
Oak webworm, <u>Archips fervidanus</u> (Clem.)	B. oak	A few nests observed in Agassiz and Belair provincial forests and in Birds Hill Provincial Park.
A leaf roller on Manitoba maple, <u>Archips negundanus</u> Dyar.	M. maple	Small patches of moderate to severe defoliation along the Red River near Selkirk and Winnipeg and in a woodlot near Seven Sisters; traces common throughout southern Manitoba.
Birch skeletonizer, <u>Bucculatrix canadensisella</u> Chamb.	W. birch	Moderate to severe skeletonizing in the Pasquia and Wallace lakes areas and near Gypsumville; light on Hecla Island and near Birch Point, Caribou Tower, Wekusko Falls and at Mile 18 on Highway 6 north of Grand Rapids.
Pear slug, <u>Caliroa cerasi</u> (L.)	Cotoneaster	Severely infested shrubs common in plantings along the Trans Canada Highway from St. Anne to Portage la Prairie and in ornamentals throughout metro Winnipeg.
Oak leaf miner, <u>Cameraria macrocarpae</u> Freeman	B. oak	Moderate to severe leaf mining of small, open growing trees in the Camp Morton and Berlo areas; light near Gull Lake, Milner Tower and Gypsumville.

Aspen leaf beetle, <u>Chrysomela crotchii</u> Brown	T. aspen	Traces of defoliation in Northwest Angle and Belair provincial forests, and in Birds Hill Provincial Park.
Elm sawfly, <u>Cimbex americana</u> Leach	W. spruce	Traces in the Richer Tower area.
Yellow-necked caterpillar, <u>Datana ministra</u> (Drury)	B. oak	Light defoliation of a few trees near Poplarfield.
A leaf chafer, <u>Dichelonyx subvitatta</u> Lec.	T. aspen	Light leaf damage in the Narcisse area.
European spruce sawfly, <u>Diprion hercyniae</u> (Htg.)	W. spruce B. spruce	Only a slight extension of the known range in Manitoba along Highway 313, west of Point duBois; traces also found at scattered points throughout the known range of the species.
Ash flower gall, <u>Eriophyes fraxinflora</u> (Felt)	G. ash	Moderate on some trees in the Kiche Manitou Campground.
Woolly elm aphid, <u>Eriosoma americanum</u> (Riley)	W. elm	Light infestations in the Selkirk area.
Green striped looper, <u>Feralia jocosus</u> Gn.	W. spruce	Traces of defoliation near Caddy Lake.
American aspen beetle, <u>Gonioctena americana</u> (Schaeff.)	T. aspen	Severe defoliation of saplings in the Marchand area; moderate in Duck Mountain Provincial Park; light in Spruce Woods Provincial Forest, and near Glenboro, Stead, and Narcisse.
Root collar weevil, <u>Hylobius</u> sp.	Scots pine	Up to 10 per cent infested trees in plantations in the Agassiz Provincial Forest.
Fall webworm, <u>Hyphantria cunea</u> (Drury)	Willow T. aspen B. poplar	Widely separated nests observed in the Interlake area and in eastern Manitoba.
The smoky moth, <u>Lexis bicolor</u> Grt.	W. spruce	Traces near Richer Tower.
Willow leaf miner, <u>Lyonetia</u> sp.	Willow	Severe infestations between Wekusko and Ponton and along Highway 6 near Minago and Hargrave rivers.

Eastern tent caterpillar,  
Malacosoma americanum (F.)

Chokecherry A few tents seen near  
Narcisse.

Prairie tent caterpillar,  
Malacosoma californicum  
lutescens (N. & D.)

Chokecherry Numerous tents observed in  
Sprucewoods Provincial Forest,  
Riding Mountain National Park,  
and in the Interlake area; low  
incidence of tents common through-  
out southern Manitoba.

Western tent caterpillar,  
Malacosoma californicum  
pluviale Dyar

Pincherry Numerous tents observed in the  
Rose Grandview area; a few in the  
Willow Davidson Lake, Otter Falls,  
Shergrove, Grahamdale, and  
Fairford areas, and along the  
south shore of Lake Winnipegosis.

Willow sawfly  
Nematus ventralis Say

Willow Light defoliation noted near  
Gladstone.

Sawflies,  
Neodiprion spp.

J. pine Colonies frequently observed  
causing light defoliation in  
eastern Manitoba. N. maurus Roh.  
collected near Richer and  
Hodgson; N. nanulus nanulus  
Schedl. near Otter Falls; and  
N. swainei Midd. near Hodgson.

Balsam-fir sawfly,  
Neodiprion abietis complex

W. spruce Traces of defoliation near Richer.

False hemlock looper,  
Nepytia canosaria (Wlk.)

W. spruce Very light defoliation near the  
Richer and Seddon's fire towers.

Owlet moth,  
Nycteola cinereana N. & D.

B. poplar Light skeletonizing of saplings  
in Northwest Angle Provincial  
Park and near Gull Lake and  
Marchand.

A web-maker  
Nycteola frigidana Wlk.

Willow Light infestation in the Red  
Rose area.

Spiny elm caterpillar,  
Nymphalis antiopa (L.)

Willow Moderate to severe defoliation  
Chinese elm of widely scattered young trees  
W. elm throughout southern Manitoba,  
Chokecherry particularly along the Trans-  
Canada Highway and in metro  
Winnipeg. In central Manitoba  
there was light defoliation in  
the Sifton-Oak Brae area.



A leaf roller on oak, <u>Oleuthrutidae</u> sp.	B. oak	Moderate infestation throughout Sprucewoods Provincial Forest.
Bruce spanworm, <u>Operophtera bruceata</u> (Hulst)	T. aspen	Light defoliation in Spruce- woods Provincial Forest.
A fruit worm, <u>Orthosia hibisci</u> (Gn.)	T. aspen	Light defoliation associated with <u>C. conflictana</u> in Spruce- woods Provincial Forest.
Box elder aphid, <u>Periphyllus negundinis</u> Thos.	M. maple	High populations present in areas southeast of Dauphin and west of St. Rose du Lac.
Pitch nodule maker, <u>Petrova albicapitana</u> (Busck)	J. pine	Light infestations in jackpine stands throughout central and southeastern Manitoba.
Pine needle scale, <u>Phenacaspis pinifoliae</u> (Fitch)	W. spruce J. pine	A few severely infested saplings observed in Sprucewoods Provincial Forest; light near Marchand and Gypsumville.
Poplar serpentine miner, <u>Phyllocnistis populiella</u> Cham.	T. aspen	Recorded at Beautiful Lake, East Blue Lake, Bakers Narrows, and Reed Lake.
Green-headed spruce sawfly, <u>Pikonema dimmockii</u> (Cress.)	W. spruce B. spruce	Light defoliation in the Richer, Brereton, Seddons Tower, and Caddy Lake Areas.
White pine weevil, <u>Pissodes strobi</u> (Peck)	J. pine W. spruce	Widely scattered low incidence of infested tops observed in jackpine stands throughout the eastern half of the province, and in spruce stands in Riding Mountain National Park.
Poplar borer, <u>Saperda calcarata</u> Say	T. aspen	Boring damage observed in provincial campgrounds at Birds Hill, Otter Falls, Big Whiteshell, and St. Malo.
A borer, <u>Saperda populnea moesta</u> Lec.	T. aspen	Light infestation noted in Sprucewoods Provincial Park.
Leaf roller, <u>Sciaphila duplex</u> Wlshm.	T. aspen	Light leaf rolling in Sprucewoods Provincial Park.

Aspen webworm,  
Tetralopha aplastella Hlst.

T. aspen

Traces of infestation common in eastern half of the province at Mile 50 north of Grand Rapids and near Easterville Road junction.

Pine tortoise scale,  
Toumeyella numismaticum P.& M.

J. pine

Some moderately infested saplings near Richer and Seddons Tower; light near Vassar and Rosenberg.

DISEASE

Spruce mistletoe,  
Arceuthobium pusillum Peck

W. spruce

Several heavily broomed trees observed six miles northwest of Holland near the Cypress River.

Spruce needle rusts,  
Chrysomyxa spp.

B. spruce

Light infestations in the Belair Provincial Forest; traces of C. ledi de Bary near Hargrave River. Small patches of moderate infection of C. ledicola Lagh. along the Cat Lake Road.

Yellow witches' broom,  
Chrysomyxa arctostaphyli Diet.

B. spruce  
W. spruce

A few brooms noted in Belair and Sprucewoods provincial forests; west of Norgate; and along Highway 6 near Hargrave River.

Black rib of willow,  
Ciborinia foliicola  
(Cash & Davidson) Whet.

Willow

Traces of leaf infection on Hecla Island and in the Davidson Lake area.

Poplar ink spot,  
Ciborinia whetzellii (Seaver)  
Seaver

T. aspen

Moderate injury to foliage near Basket Creek. Light injury near Waterhen River, Meadow Portage, Hadashville, Point duBois, Davidson Lake, and in Northwest Angle Provincial Forest.

Pine needle rust,  
Coleosporium asterum (Diet.)  
Syd.

J. pine

Old needles moderately infected on scattered trees in Agassiz Provincial Forest and near Otter Falls; light in Northwest Angle and Belair provincial forests and near Rolling River in Riding Mountain National Park.

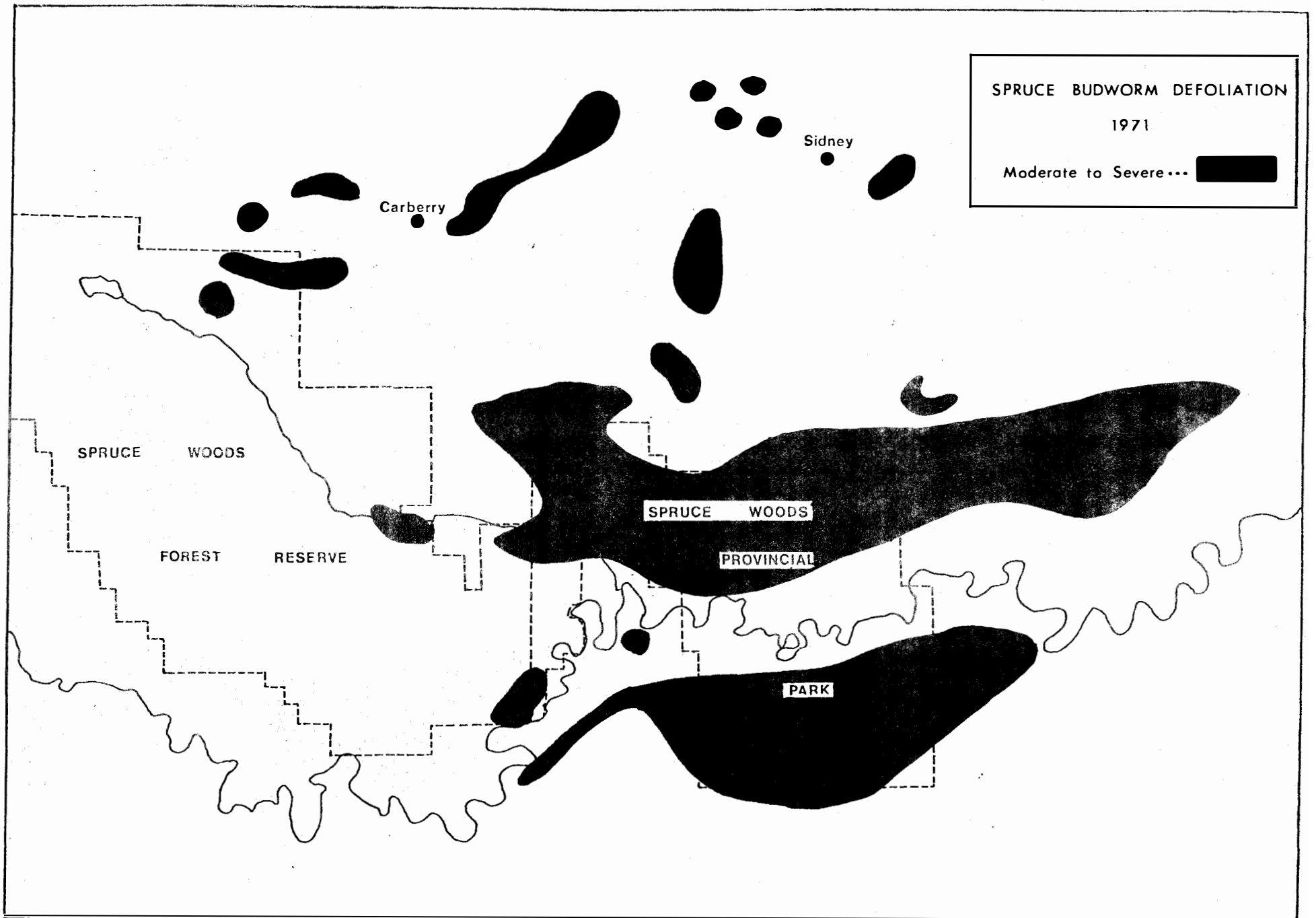
Comandra blister rust,  
Cronartium comandrae Pk.

J. pine

Trace infections observed near Rosenberg Tower.

Pine needle cast, <u>Darisonmycella ampla</u> (Davis) Darker	J. pine	Scattered light infections in the Moose Lake area.
Globuse gall of poplars, <u>Diplodia tumefaciens</u> (Shear) Zalasky	T. aspen	Moderate gall infections on a few trees at Otter Falls Provincial Campground.
Glucose gall rust, <u>Endocronartium harknessii</u> (J.P. Moore) Y. Hiratsuka	J. pine	Some moderately infected trees noted near Stead. Light infection common at widely scattered points throughout the range of jackpine in eastern Manitoba and along Highway 6 between Grand Rapids and Ponton.
Heartwood rot, <u>Fomes fraxinophilus</u> (Pk.) Sacc.	G. ash	Conks commonly found in Kiche Manitou Provincial Campground.
White trunk rot, <u>Fomes igniarius</u> (L. ex Fr.) Kickx.	T. aspen	Up to 40 per cent of trees with conks in some sections of Otter Falls Provincial Campground. Light infections in Sprucewoods Provincial Forest, Big Whiteshell and Brereton Lake provincial campground and in Duck Mountain Provincial Park.
Rusts, <u>Gymnosporangium</u> spp.	Saskatoon	Moderate to severe fruit and leaf infections noted in the Rennie, Davidson Lake, and Poplarfield areas.
Slash fungus, <u>Hirschioporus abietinus</u> (Dicks. ex Fr.) Donk.	B. spruce	Collected along Highway 6 near Hargrave River.
Hypoxylon canker of aspen <u>Hypoxylon mammatum</u> (Wahl.) Miller	T. aspen	Recorded on old dead, recently dead, and living trees throughout an area surrounding the north arm of Lake Manitoba; near Pine River; in Porcupine Provincial Forest; in Birds Hill and Whiteshell provincial parks; and in St. Malo Recreation area.
Brown cubical pocket rot, <u>Lenzites saepiaria</u> (Wulf, ex. Fr.) Fr.	B. spruce	Collection made along Highway 6 near Hargrave River.
Balsam poplar leaf blight, <u>Linospora tetraspora</u> Thompson	B. poplar	Scattered fringe patches of moderate to severe infection noted in Sandilands, Agassiz, and Northwest Angle provincial forests, on Hecla Island, and

Needle cast, <u>Lirula macrospora</u> (Hartig) Darker	B. spruce	at scattered points along Highway 6 between Grand Rapids and Ponton.  Light infections noted near Red Rose Fire Tower.
Larch-willow rust, <u>Melampsora paradoxa</u> Diet. & Holw.	Willow	Scattered clumps moderately infected in Birds Hill Provincial Park.
Fir needle rust, <u>Pucciniastrum goeppertianum</u> (Kuehn) Kleb.	B. fir	Light infections in the Caddy Lake and Otter Falls areas.
Decay fungi, <u>Trametes</u> sp.	Cottonwood	Fungus found on large wind- thrown tree at St. Ambroise Provincial Campground.
Aspen shoot blight, <u>Venturia macularis</u> (Fr.) E. Muell & V. Arx.	T. aspen	Severe infections in the Steep Rock-Bell lakes area of the Porcupine Provincial Forest and, in patches along main roadways throughout Riding Mountain National Park; light in Clear- water Provincial Park and at scattered points throughout central and southern Manitoba.



ANNUAL DISTRICT REPORTS, 1971 - SASKATCHEWAN

by

K.L. Mortensen, E.J. Gautreau, and R.C. Tidsbury

INSECT CONDITIONS

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

A number of infestations were reported throughout the Aspen Grove and Mixedwood sections of Saskatchewan in 1971. The largest, most continuous area of aspen defoliation occurred in the Thickwood Hills in an area bordered by Sand Beach, Wawgaw, Martins, Casavant, and Gordon lakes. Smaller pockets of moderate defoliation were recorded from Helene Lake to the Midnight Lake Fire Tower; along the east and southeast slopes of the Thunder Hills; along the east side of Prince Albert National Park from Cream Lake north to Cheeyas Lake; and north of La Ronge between Mile 28 and Mile 36 of Highway 102. Intermittent patches of light defoliation were observed at Battleford, Jackfish Lake, Meadow Lake and Dore Lake.

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

Damage to spruce shelterbelts was more widespread than in 1970. Severe defoliation was most frequently encountered in the Melfort-Tisdale-Nipawin area. Ornamental spruce in many of the provincial and regional parks were also attacked. Defoliation was generally light, but the occasional

tree at Duck Mountain, Buffalo Pound Lake and Kipabiskaw Lake was moderately defoliated. In the northern areas defoliation was generally confined to lake shore trees and open growing regeneration in campgrounds. Instances of these conditions existed at Waskesiu, Hanging Heart, Christopher, Emma, Montreal and Nesslin lakes.

Poplar Bud-gall Mite, Aceria parapopuli (Keifer)

This insect pest of poplars was again common in many plantings across western and central Saskatchewan. No new infestations were recorded, but serious damage was again observed in Thompson Lake Regional Park and Rowans Ravine Provincial Park. Widely scattered occurrences of the mite on trembling aspen were recorded in Nipawin Regional Park and in woodlots near Dundurn, Spiritwood and MacDowall. Very light infestations occurred on balsam poplar at the Highway 6 Campground near Melfort and on a farm shelterbelt near Codette.

Cottonwood Leaf Mining Beetle, Zeugophora scutellaris Suffr.

A number of infestations persisted in plantings of hybrid poplars throughout southern Saskatchewan. Moderate foliage damage occurred in Thompson Lake Regional Park and the Trans-Canada Highway Campground at Maple Creek. Light damage was recorded at the Trans-Canada Campground at Besant; in the recreation area at Saskatchewan Landing; and in Danielson, Rowan's Ravine and Echo Valley provincial parks.

Birch Skeletonizer, Bucculatrix canadensisella Chamb.

This insect caused extensive browning of white birch leaves in the Carrot River area from Shoal Lake east to the Otosquen Road. A small, isolated pocket of moderate to severe skeletonizing occurred along the east side of Emma Lake. Scattered, very light attacks were general throughout the remainder of the Mixedwood Section of the Province.

#### DISEASE CONDITIONS

Spruce Needle Rust, Chrysomyxa ledicola Lagh.

The incidence of this needle rust was generally high throughout most of the surveyed forested area. Pockets of moderate to high infections were recorded on black spruce at Greig, Otter, Waskesie, Little Bear, and Amisk lakes. A severe infection occurred, for the second year, in a small black spruce woodlot north of Peesane.

Very light infections on white spruce were scattered throughout the forested regions.

Aspen Shoot Blight, Venturia macularis (Fr.) E. Muell & V. Arx.

Small, moderate to severe infections of trembling aspen reproduction were recorded at La Ronge, Montreal, Little Bear, Pelican and Peepaw lakes. Elsewhere, light infections were common throughout the Province.



OTHER NOTEWORTHY INSECTS AND DISEASES

<u>Causal Agent</u>	<u>Host</u>	<u>Remarks</u>
<u>INSECT</u>		
Black-headed budworm, <u>Acleris variana</u> (Fern.)	W. spruce	Very light defoliation in Cypress Hills Park.
Fall cankerworm, <u>Alsophila pometaria</u> (Harr.)	M. maple	Populations remained very low throughout the agricultural areas.
Caragana aphid, <u>Aphid</u> sp.	Caragana	Moderate to heavy damage in the Nokomis-Govan area, and townsites of Kamsack and Canora.
Ugly nest caterpillar, <u>Archips cerasivoranus</u> (Fitch)	Chokecherry	Severe on ornamental shrubs in Danielson Park; moderate populations in the Prince Albert area.
An oakworm, <u>Archips fervidanus</u> (Clem.)	Bur oak	Moderate to heavy defoliation in the Qu'Appelle Valley north of Rocanville.
A tortricid, <u>Archippus packardianus</u> (Fern.)	C. spruce	Very light defoliation in a shelterbelt at Muenster, and at the Indian Head Forest Nursery Station.
Pear slug, <u>Caliroa cerasi</u> (L.)	Cotoneaster	Caused foliage discoloration at Battleford and Moose Jaw.
Spruce budworm, <u>Choristoneura fumiferana</u> (Clem.)	W. spruce	Low populations at Rosthern and Moosomin and in the West Block of Cypress Hills Park.
Aspen leaf beetle, <u>Chrysomela crotchi</u> Brown	T. aspen	Low adult populations widely distributed throughout the surveyed area.
Lodgepole needle miner, <u>Coleotechnites starki</u> Freeman	Lp. pine	Light infestation near Fort Walsh in Cypress Hills Park.
Spruce bark beetle, <u>Dendroctonus rufipennis</u> Kirby	W. spruce	Low populations at Island Lake, Sled Lake and in the Cypress Hills.

Spruce needleworm, <u>Dioryctria reniculella</u> (Grt.)	C. spruce W. spruce	Occasional larvae in samples from scattered points in the southern half of the Province.
Zimmerman pine moth, <u>Dioryctria zimmermani</u> (Grt.)	J. pine Lp. pine	Commonly found infesting Comandra rust cankers.
Woolly elm aphid, <u>Eriosoma americanum</u> (Riley)	W. elm	General throughout southern Saskatchewan with a moderate infestation in Saskatoon.
A needle miner, <u>Eucordylea canusella</u> Free.	J. pine	Moderate infestation in the Nisbet Forest from Prince Albert to Holbein.
Alder leaf miner, <u>Fenusa dohrnii</u> Tischb.	Alder	Moderate damage to scattered clumps at Jan, Kingsmere and Candle lakes.
American aspen beetle, <u>Gonioctena americana</u> (Schaeff.)	T. aspen	Numerous small pockets of moderate defoliation occurred in the Ministikiwan Lake, Midnight Lake, Montreal Lake and MacDowall areas.
Lilac leaf miner <u>Gracillaria syringella</u> (F.)	Lilac	Light infestations on ornamentals in western Saskatchewan.
Spotless fall webworm, <u>Hyphantria cunea</u> (Drury)	M. maple	A number of webs observed in the Saskatchewan River Delta area and the Qu'Appelle Valley around Marievale.
Aspen blotch miner, <u>Lithocolletis salicifoliella</u> Cham.	T. aspen	Light infestations common throughout the Aspen Grove Section.
Beet webworm, <u>Loxostege sticticalis</u> Linn.	Nanking cherry Honeysuckle	Isolated infestations in the Wilkie area; in Danielson Park and at the Indian Head Forest Nursery Station.
A sawfly, <u>Macremphytus varianus</u> Nort.	Dogwood	Caused severe foliage damage to scattered patches in the Pasquia Hills and to ornamentals at Kamsack.
Prairie tent caterpillar, <u>Malacosoma californicum lutescens</u> (N. & D.)	Chokecherry Rose	High populations in the Good Spirit - Yorkton - Saltcoats area. Generally light elsewhere.
Forest tent caterpillar, <u>Malacosoma disstria</u> Hbn.	T. aspen	One collection only, from Greenwater Lake Park.

Pine sawflies, <u>Neodiprion</u> spp.	J. pine	Widely scattered throughout the Mixedwoods Forest Section. Species most commonly collected were <u>N. virginiana</u> complex and <u>N. nanulus nanulus</u> Schedl.
Spruce spider mite, <u>Oligonychus ununguis</u> (Jac.)	W. spruce	Populations increased and light damage was recorded throughout much of southern Saskatchewan. A severe infestation was noted on ornamental spruce at Buffalo Narrows.
Bruce spanworm, <u>Operophtera bruceata</u> (Hulst.)	T. aspen	Late instar larvae were numerous in the Kenosee Lake area, and were responsible for numerous patches of moderate defoliation.
Pitch nodule maker, <u>Petrova albicapitana</u> (Busck.)	J. pine	Low populations common in most pine stands examined.
Pine needle scale, <u>Phenacaspis pinifoliae</u> (Fitch)	W. spruce Pine	Common in older spruce shelterbelts, severe infestation noted on ornamentals at Eastend and at the Federal Building at Yorkton.
Poplar serpentine miner, <u>Phyllocnistis populiella</u> Cham.	T. aspen B. poplar	Very low populations, but widespread.
Pine weevils, <u>Pissodes</u> spp.	Spruce Pine	Occasional leader damage of spruce by <u>P. strobi</u> (Peck) throughout the forested area. <u>P. terminalis</u> Hopping was common on reproduction Jack pine from Big River to Meetoos, and near Beauval.
Larch sawfly <u>Pristiphora erichsonii</u> (Htg.)	Tamarack	Generally low populations throughout all tamarack stands. Occasional fringe trees moderately defoliated along the Fir River Road. Severe defoliation occurred in a woodlot near Nipawin.
Gray willow-leaf beetle, <u>Pyrrhalta decora</u> (Say)	Willow	Some skeletonizing of scattered clumps in the Lac La Ronge, Christopher and Big Sandy lakes areas.

Aspen webworm,  
Tetralopha aplastella (Hlst.)

T. aspen

Very light infestations at Madge Lake, Nipawin Regional Park and Candle Lake.

DISEASE

Black rib of willow,  
Ciborinia foliicola (Cash & Davidson) Whet.

Willow

Light infections near Loon Lake, Green Lake, and Big River.

Poplar ink spot,  
Ciborinia whetzellii (Seaver) Seaver.

T. aspen

Light infections north of Meadow Lake.

Shot-hole of cherry,  
Coccomyces hiemalis Higgins

Chokecherry  
Pincherry

Widely scattered throughout the Province.

Leaf spot,  
Drepanopeziza populorum  
(Desm.) Hohn.

T. aspen

Pockets of severe infections throughout the Aspen and Mixedwood forests.

A leaf spot.  
Euryachora betulina  
(Fr.) Schroet.

W. birch

Light infections widely scattered throughout the Mixedwood Section.

Hypoxylon canker,  
Hypoxylon multiforme  
(Fr. ex Fr.) Fr.

Chokecherry

Collected near Maxstone.

Pine needle cast,  
Lophodermella concolor  
(Dearn.) Darker

Lp. pine

Pockets of moderate needle cast in the West Block of Cypress Hills Park.

Leaf spot,  
Phaeoramularia maculicola  
(Rom. & Sacc.) Sutton

T. aspen

Widely scattered light infections throughout the Mixedwood and Aspen Grove section of the Province.

Rhizinia root rot,  
Rhizinia undulata Fries

J. pine  
W. spruce  
B. spruce

Common in old burns from Meadow Lake Park north to Buffalo Narrows.

Needle cast,  
Sarcotrochila balsameae  
(Rehm) Karf.

B. fir

Localized severe infections at Smoothstone, Nessliu and Island lakes.

Leaf spot,  
Septoria caraganae (Jacz.) Died.

Caragana

Common throughout the plantings of caragana.

Leaf spot,  
Septoria musiva Pk.

B. poplar

Generally light and widely distributed throughout the Province.

ANNUAL DISTRICT REPORTS, 1971 - ALBERTA,  
NORTHWEST TERRITORIES, AND YUKON TERRITORY

by

J. Petty, G.J. Smith, R.M. Caltrell, and J.P. Susut

INSECT CONDITIONS

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

Infestations of large aspen tortrix were small and spotted in the aspen belt along the Foothills from the Porcupine Hills to near Highway 16. Patches of moderate to severe defoliation were noted in the following areas: north end of Porcupine Hills, between Turner Valley and Priddis, west side of Calgary, Red Lodge Provincial Park, Caroline - Stauffer area, four miles north of Rocky Mountain House and five miles west of Rimbey. In the remainder of this area populations were low.

In the Yukon Territory the populations that have been present and caused notable defoliation in past years have declined to endemicity.

Spruce Budworms, Choristoneura biennis Freeman, Choristoneura fumiferana (Clem.)

Re-examination of areas where spruce budworm, C. fumiferana has been recorded, showed no immediate hazard from the infestations present in 1971. Aerial surveys were conducted over the Chinchaga and Wabasca rivers

through the courtesy of Alberta Forest Service. Light defoliation was observed along the Chinchaga River in Townships 106 and 107, Range 1, and in Townships 108, 109, 110, Ranges 2 and 3. Along the Wabasca and Muddy rivers very light defoliation was observed in Township 98, Ranges 9 and 10, and in Township 99, Range 9.

The infestation of spruce budworm that has been present along the west side of the Athabasca River Valley north of McMurray persisted in 1971. Defoliation of white spruce and balsam fir was generally light in a narrow strip of timber along the road north of McMurray for approximately nine miles. Some intermediate and regeneration trees had moderate defoliation.

In Wood Buffalo National Park low populations occurred in the following areas: from Pine Lake south for eight miles, Carlson's Landing to Peace Point, at Fort Smith and at Little Buffalo Falls.

Infestations in the Northwest Territories were low to medium along the Slave River at Grand Detour, and light at Mile 183 of the Fort Simpson Highway.

High populations of the two-year-cycle budworm, C. biennis, were present in Kootenay National Park along the Vermilion River Valley between Ochre Creek and Vermilion Crossing. A large percentage of the new foliage of alpine fir and Engelmann spruce was destroyed and resulted in notable discoloration of the trees, particularly in the Numa Creek area. Successful overwintering of the present larval population could result in moderate to severe defoliation in 1972.

In Banff National Park low populations were present along the lower slopes of Mt. Murchison near Saskatchewan Crossing.

Spruce Beetle, Dendroctonus rufipennis Kirby

Aerial and ground surveys were again conducted in stands of mature Engelmann spruce in the Crowsnest Forest for the presence of spruce beetle. There was a slight increase in the number of attacked trees in 1971 over that reported in 1970, although the overall infestation remained low. This increase was noted in plots established along Bunny Creek, North Racehorse Creek and Upper Dutch Creek. For a complete (and current) report on the spruce beetle infestation in the Crowsnest Forest see Canadian Forestry Service Internal Report NOR-11, 1972, by L. Safranyik, J. Petty, and G.J. Smith.

In Banff National Park, along Boom Creek Valley, populations remained low. In a 3-mile traverse of mature Engelmann spruce only seven freshly attacked trees were noted.

The infestation in the upper Amiskwi River Valley of Yoho National Park was burned out by a forest fire and no recent attacks were noted on fire-weakened fringe trees.

A small pocket of mature spruce in Section 13, Township 6, Range 24, W. 5 supported a low population of spruce beetle. The area is adjacent to a clear cut area at Mile 10, Shell Oil Road, southwest of Valleyview.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

Infestations of forest tent caterpillar were concentrated within a triangular area, the points of which were Rocky Mountain House, Whitecourt and Edmonton. Defoliation within this area was patchy and ranged in severity from very light to severe. Small patches of light defoliation were observed

around Rocky Mountain House and in the Winfield-Norbuck area. Patchy, moderate to severe defoliation occurred in a 220-square mile area between Willesden Green Oilfield and Buck Lake, around Pigeon Lake and Wizard Lake. Light defoliation was general in these areas. From Drayton Valley to Wabamun Lake colonies of tent caterpillar were present but very little defoliation was evident. Along the north side of Wabamun Lake defoliation was light with small pockets of moderate interspersed throughout the area. Moderate, with small patches of severe defoliation was observed in an area bounded by Bilby, Heatherdown, Gladu Lake and Calahoo. Light to moderate defoliation was present south of Kakina Lake and south and west of Nakamun Lake. Within an area bounded by Gunn, Rich Valley, Oldman Lake, and Glenevis moderate to severe defoliation occurred. Defoliation between Birch Lake and Lessard Lake and in small patches around Lisburn and Sangudo was light to moderate. An area about 240 square miles between Blue Ridge and Whitecourt and south to Highway 43 had moderate defoliation. Except for a few small areas of moderate defoliation in the west part of Edmonton tent caterpillar was notably reduced from that reported in 1970.

Bruce Spanworm, Operophtera bruceata (Hulst)

Bruce spanworm was recorded in aspen stands along the west side of Alberta from the Porcupine Hills north to near High Level. Populations were lower than in 1970 in all areas except north of Manning where an increase was noted. The infestations in Edson and Hinton areas collapsed completely.

Patches of moderate to severe defoliation were observed in the following areas: Streeter Basin, Sarcee and Morley Indian reserves, west of Calgary, Innisfail-Penhold, west of Blackfalds, Sylvan Lake, Gilby-Leslieville,



Lavista-Leedale, and Winfield-Battle Lake. Populations caused moderate defoliation to individual trees at Mile 77, Mackenzie Highway and near Sulphur Lake. In the remainder of the area low populations were present.

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

Spruce trees used in farm shelterbelts, urban plantings and in some provincial parks in Central Alberta and the Peace River Block were subject to infestations of this spruce sawfly. Defoliation in many spruce shelterbelts was moderate to severe, particularly if the trees were less than 20 feet in height. In a number of locations trees that had been set out in urban centres and in provincial parks as ornamental plantings sustained moderate defoliation.

#### DISEASE CONDITIONS

Spruce Needle Rust Chrysomyxa ledicola Lagh., Chrysomyxa weirii Jacks., Chrysomyxa woroninii Tranz.

The incidence of C. ledicola increased in west-central Alberta. Severe infections were noted in Wabamun Lake Provincial Park and in small muskegs near Onoway. Moderate damage was observed along the Trunk Road 30 miles southeast of Grande Cache. Light infections with small patches of severe damage were general along Highway 43 from Whitecourt to Fox Creek. Medium to high infections on individual trees were present along the Shell Oil Road southwest of Valleyview, along the Trunk Road south of Goodwin and along the Two Lakes Road southwest of Grande Prairie. Light infections occurred in the following areas; between Cold Creek and Edson, near Swan Hills, along the Nipisi Road northwest of Slave Lake, 10 miles west of

Grovedale, Sherman Meadows and along the Kakwa Road south of Grande Prairie.

In southwestern Alberta an area of moderate infection occurred near Eau Clair Campground in the Kananaskis Valley.

Light infections occurred in the Yukon Territory near Teslin and Watson Lake.

C. weirii caused moderate damage to white spruce along the Clearwater River near the east boundary of the Clearwater-Rocky Forest Reserve.

A southern extension of the known range of C. woroninii was established in recording its presence near Sunwapta Falls in Jasper National Park. In the Yukon Territory a high incidence of infection was reported from Clinton Creek and a low incidence of infection near Dawson City.

#### Climatic Damage

Pockets of severe red belt damage to conifers were common along east slopes of the mountains of western Alberta from Waterton Lakes National Park to Highway 16 and in Jasper National Park along the Athabasca River Valley from Mt. Fryatt to Fiddle Creek.

Winter injury to aspen occurred in southwestern Alberta, Saskatoon Island Provincial Park and along the Pelly River near Stewart Crossing in the Yukon Territory. Although a large percentage of buds were killed most trees in southwest Alberta leafed out by mid-July. Mortality of branch tips and patches of killed trees were noted west of Calgary, southwest of

Sundre and in Saskatoon Island Provincial Park. Top killing was evident along the Pelly River.

#### Rabbit Damage

High populations of rabbits in a number of areas in the northern part of the Province and Yukon were responsible for mortality of regeneration of all tree species within the areas. Near Fort McMurray about 75 per cent of the stems in a small stand of regeneration pine and aspen had been completely chewed off. Other areas of severe damage were near Windfall, along the Mackenzie Highway between Grimshaw and Keg River, in the Clear Hills north of Worsley and in the Yukon Territory at Champagne, Stewart Crossing, and Carmacks.

#### OTHER NOTEWORTHY INSECTS AND DISEASES

<u>Causal Agent</u>	<u>Host</u>	<u>Remarks</u>
<u>INSECT</u>		
Black-headed budworm, <u>Acleris variana</u> (Fern.)	W. spruce	Low populations general in central and northern Alberta, Northwest Territories and near Champagne, Yukon Territory.
Lodgepole needle miner, <u>Coleotechnites starki</u> Freeman	Lp. pine	Larvae, in first year of 2-year cycle, common along Bow River Valley, Banff National Park.
Lodgepole pine beetle, <u>Dendroctonus murrayanae</u> Hopk.	Lp. pine	Low populations at mile 60 Can-For. Road south of Grande Prairie.
Douglas fir beetle, <u>Dendroctonus pseudotsugae</u> Hopk.	D. fir	One heavily infested living tree on Cross River Fire Road, Kootenay National Park.
American aspen beetle, <u>Gonioctena americana</u> Schaeff.	T. aspen	Patches of severe defoliation along foothills of southwest Alberta, in Hommy Provincial Park and near Sulfur Lake. Low

Warren's collar weevil, <u>Hylobius warreni</u> Wood	Lp. pine	populations general in west central Alberta. Caused notable mortality of regeneration near Swan Lake. Common in Hinton and Whitecourt areas and northwest Alberta.
Poplar serpentine miner, <u>Phyllocnistis populiella</u> Cham.	T. aspen	Light infestation in Jasper National Park. Populations in northwest Alberta and Yukon Territory were low; in Wood Buffalo National Park and the Northwest Territories they were high.
Weevils, <u>Pissodes canadensis</u> Hopk.	Lp. pine	High populations in regeneration infected with Comandra blister rust near Mayo, Yukon Territory.
Engelmann spruce weevil, <u>Pissodes engelmanni</u> Hopk.	W. spruce	Light infestations near Cold Creek, Edson and Fickle Lake.
Larch sawfly, <u>Pristiphora erichsonii</u> (Htg.)	Tamarack E. larch	Moderate to severe defoliation in tamarack stands between Pibroch and Jarvie. Light infestations north of Jarvie, between Long Lake Provincial Park and Highway 28, south of Grande Prairie, northwest of Fairview and Highways 1, 2 and 5 in the Northwest Territories.

DISEASE

Dwarf mistletoe, <u>Arceuthobium americanum</u> Nutt. ex. Engelm.	Lp. pine	No new areas of infection reported. Mortality of infected trees near the air field in Jasper National Park.
Spruce cone rust, <u>Chrysomyxa pirolata</u> Wint.	W. spruce	High incidence of infection in heavy cone crop along the foothills south from the Red Deer River.
Pine needle cast, <u>Elytroderma deformans</u> (Weir) Darker	Lp. pine	High incidence of infection in area between Athabasca Falls and Jasper in Jasper National Park. Moderate infection at Mile 52 Forestry Trunk Road south of Goodwin.

Pine needle cast,  
Gloeocoryneum cinereum  
(Dearn.) Weindlmayr.

Lp. pine

Caused severe discoloration and loss of foliage along the lower Amiskwi Valley, Yoho National Park.

Balsam poplar leaf blight,  
Linospora tetraspora  
Thompson

B. poplar

Small patches of severe infection throughout Slave Lake, Whitecourt and Edson forests. Low incidence in northeast Alberta and along Forestry Trunk Road south of Goodwin.

Pine needle cast,  
Lophodermella concolor  
(Dearn.) Darker

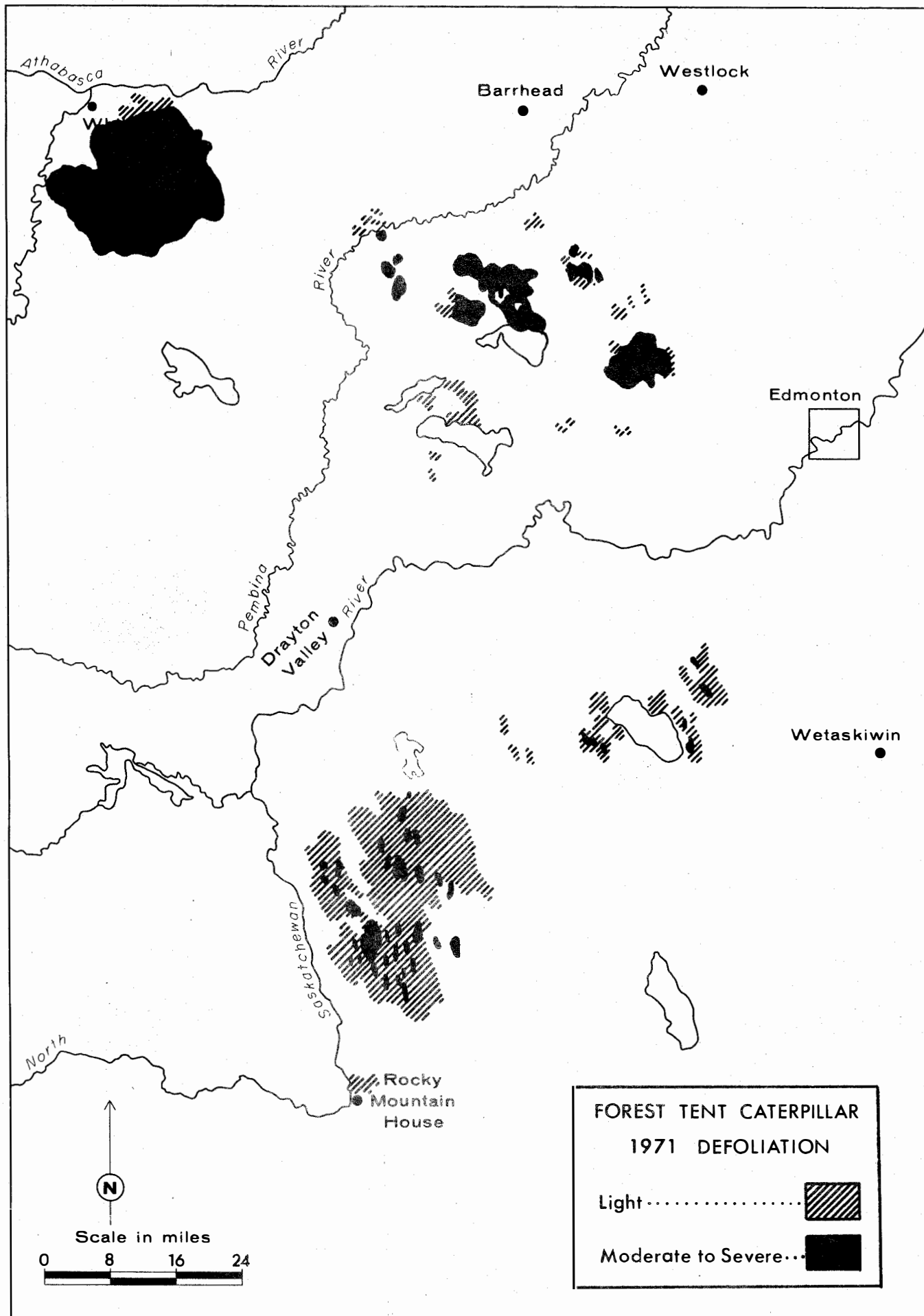
Lp. pine

Caused severe discoloration and loss of foliage along Kootenay River, Kootenay National Park.

Aspen shoot blight,  
Venturia macularis (Fr.)  
E. Muell & V. Arx.

T. aspen

Severe infections in Edson area. Light damage in central Alberta and in the Yukon Territory.



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<u>Coleosporium asterum</u> (Diet.) Syd.	15
<u>Cronartium comandrae</u> Pk.	15
<u>Davisomycella ampla</u> (Davis) Darker	16
<u>Diplodia tumefaciens</u> (Shear) Zalasky	16
<u>Drepanopeziza populorum</u> (Desm.) Holn.	25
<u>Elythroderma deformans</u> (Weir) Darker	33
<u>Endocronartium harknessii</u> (J.P. Moore) Y. Hiratsuka	16
<u>Euryachora betulina</u> (Fr.) Schroet.	25
<u>Fomes fraxinophilus</u> (Pk.) Sacc.	16
<u>Fomes igniarius</u> (L. ex Fr.) Kickx.	16
<u>Gloeocoryneum cinereum</u> (Dearn.) Weindlmayr.	34
<u>Gymnosporangium</u> spp.	16
<u>Hirschioporus abietinus</u> (Dicks. ex Fr.) Donk.	16
<u>Hypoxylon mammatum</u> (Wahl.) Miller	16
<u>Hypoxylon multifforme</u> (Fr. ex Fr.) Fr.	25
<u>Lenzites saepiaria</u> (Wulf. ex. Fr.) Fr.	16
<u>Linospora tetraspora</u> Thompson	16, 34
<u>Lirula macrospora</u> (Hartig.) Darker	17
<u>Lophodermella concolor</u> (Dearn.) Darker	25, 34
<u>Melampsora paradoxa</u> Diet. & Holw.	17
<u>Phaeoramularia maculicola</u> (Rom. & Sacc.) Sutton	25
<u>Pucciniastrum goeppertianum</u> (Koehn) Kleb.	17
<u>Rhizinia undulata</u> Fries	25
<u>Sarcotrochila balsameae</u> (Rehm) Karf.	25
<u>Septoria caraganae</u> (Jacz.) Died.	25
<u>Septoria musiva</u> Pk.	25
<u>Wallrothiella arceuthobii</u> (Pk.) Sacc.	10
<u>Venturia macularis</u> (Fr.) E. Muell & V. Arx.	17, 21, 34

MISCELLANEOUS

Climatic Damage	3, 31
Rabbit Damage	3
Thompson Smoke Easement Survey	10