A REVIEW OF IMPORTANT FOREST INSECT AND DISEASE PROBLEMS IN THE FORT FRANCES DISTRICT OF ONTARIO, 1950-1980

Compiled by

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FOREWORD

The first forest insect surveys in Ontario were carried out in 1936 from the Dominion Entomological Laboratory in Ottawa and continued from this location until 1944, when the province of Ontario was divided, for the purpose of these surveys, into northern and southern Ontario. In 1945, personnel from Ottawa continued to conduct and report on surveys in the area south of the Algonquin Park and Parry Sound forest districts, while personnel from the Forest Insect Laboratory in Sault Ste. Marie carried out surveys in the area to the north. In 1950 responsibility for reporting insects for all of Ontario fell to the Sault Ste. Marie laboratory. In 1952 the Forest Disease Survey was initiated with headquarters in Maple, Ontario, and was moved to Sault Ste. Marie in 1967. The results of these surveys of insects and diseases are reported in the Annual Report of the Forest Insect and Disease Survey (FIDS) published by Canadian Forestry Service headquarters in Ottawa. In addition, annual district and regional reports, begun in 1948, are prepared by FIDS technicians (Rangers) in Sault Ste. Marie. In 1980 a new provincial report was released in Ontario. The contents of the following review have been abstracted from these reports and compiled in alphabetical order by the scientific names of species in each of the following categories:

Major Insects or Diseases

Capable of causing serious injury to or death of living trees or shrubs.

Minor Insects or Diseases

Capable of causing sporadic or localized injury but not usually a serious threat to living trees or shrubs.

Abiotic Damage

Damage caused by non-living factors.

All measurements in this review are in metric form and conversions from Imperial measurements given in the earliest reports are taken to the second decimal point [i.e., sq. mi. to km^2 = area (sq. mi.) x 2.59 = area km^2]. Infestation maps in this review were copied from the original maps in the FIDS technicians' reports. Abbreviations for the common names of the host tree species, along with the scientific names, are shown in Appendices A and B. To facilitate the location of hosts, deciduous and coniferous species have been separated and listed alphabetically under the common names.

Appendix C is a series of maps for northwestern Ontario grouped alphabetically by insect species or disease pathogen and showing the location of infestations within a region or infestation boundaries that extend beyond regions.

ACKNOWLEDGMENTS

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We also wish to acknowledge the following authors of the annual FIDS district and regional reports, from which this review was abstracted:

1950-1951	D.G. MacGillivray
1952-1956	J.R. McPhee
1957-1960	M.J. Hildebrand
1961-1966	M.J. Thomson
1967-1969	J. Hook
1970-1972	C.A. Barnes
1973	M.J. Thomson, C.A. Barnes, M.J. Applejohn
1974-1975	M.J. Thomson, E.L. Houser
1976-1979	M.J. Thomson, R.J. Sajan
1980	M.J. Thomson, V. Jansons

TABLE OF CONTENTS

(cont'd)

TABLE OF CONTENTS (concl.)

INTRODUCTION

This report is a review of significant forest insects and diseases that have occurred in the Fort Frances District between 1950 and 1980. The Fort Frances District has undergone a number of boundary changes since 1950. The most significant of these occurred in 1973 when the eastern part of the district became part of the Atikokan District and a section of the former Kenora and Sioux Lookout districts was added to the northern part of the district. In the selection of pests for this report, particular attention was paid to the major working groups of host species in the area, namely hardwoods (poplar and white birch) and conifers (white, jack and red pine, balsam fir, white and black spruce, and tamarack). Also included are pests that cause damage to shade and ornamental trees. The insects and diseases described are capable of causing, or have caused, tree mortality or a reduction in growth. Also included are abiotic conditions that have caused tree damage, i.e., frost, wind, snow and hail.

SUMMARY

FOREST INSECTS

Eastern Blackheaded Budworm, *Acleris variana* (Fern.) [Major]
page 11

No tree mortality was recorded as caused by this defoliator, which affects primarily spruce, balsam fir and eastern hemlock. Trace or light populations were present through the district from 1950 to 1980.

Fall Cankerworm, *Alsophila pometaria* (Harr.) [Major]
pages 11-12

Although this insect rarely causes tree mortality, heavy defoliation retards growth and vigor, making host trees susceptible to attack by other pests. Moderate-to-heavy infestations were present periodically in Fort Frances and Rainy River.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham. [Major]
pages 12-14

Defoliation by this insect seldom causes mortality of the host, but weakened trees are subject to attack by secondary insects and diseases. Large outbreaks of this insect usually last 3 to 4 years, then decline rapidly. Moderate-to-heavy infestations were present in the district from 1970 to 1974 and again in 1980.

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.) [Major]
page 15

No tree mortality was recorded as caused by this defoliator, which affects primarily aspen and poplar. In 1973 a single pocket of moderate-to-severe defoliation occurred near Lake of the Woods.

Spruce Budworm, *Choristoneura fumiferana* (Clem.) [Major]
pages 15-36

This insect is considered the most destructive insect pest of several coniferous hosts in eastern Canada, the main hosts being white spruce and balsam fir. Though not major hosts, black spruce, eastern hemlock and tamarack are attacked and considerable tree mortality can occur. Populations were generally light from 1950 to 1952. Pockets of moderate-to-severe defoliation appeared in 1953 and continued to expand until 1962, when a substantial decline occurred. Numbers remained low until 1974, when a 4,000-ha infestation was detected near Bennett Lake. Heavy infestations persisted from 1975 to 1980.

Jack Pine Budworm, *Choristoneura pinus pinus* Free. [Major]
pages 37-44

This is a destructive pest of pines that can cause mortality after two years of severe defoliation. Moderate-to-heavy infestations were present in the district from 1959 to 1961 and from 1966 to 1968, when a general decline occurred.

Larch Casebearer, *Coleophora laricella* (Hbn.) [Major]
page 45

A serious pest of both native and European larch, this insect can cause reduced tree growth and tree mortality after two successive years of complete defoliation. The casebearer was first recorded in the district in 1961, and although it continued to spread through the district, little damage occurred.

Introduced Pine Sawfly, *Diprion similis* (Htg.) [Major]
pages 45-46

This sawfly has two generations per year. Heavy defoliation by second-generation larvae after buds are formed causes considerable

branch mortality and occasional tree mortality. Most pine species are susceptible to attack. The sawfly was first recorded in the district in 1970, and in subsequent years was found at many points on Rainy Lake and through the western part of the district, but no extensive damage occurred.

Greenstriped Mapleworm, *Dryocampa rubicunda rubicunda* (Fabr.) [Major]
pages 46-47

This insect defoliates both red maple and sugar maple, but prefers red maple understory trees. Although it was found in low numbers at many points in the district from 1958 to 1980, damage was minimal, except in 1978 when a small infestation caused moderate-to-severe defoliation at two locations on Rainy Lake.

Aspen Twoleaf Tier, *Enargia decolor* (Wlk.) [Major]
page 47

No tree mortality was recorded as caused by this defoliator, which affects aspen and cottonwood; however, heavy defoliation retards the growth and reduces vigor, leaving host trees susceptible to attack by other pests. Outbreaks of this insect last only a few years. Except for 1959, little defoliation occurred in the district.

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr. [Major]
page 48

This insect usually infests lateral shoots and causes only aesthetic damage. When high populations develop, some leaders are infested and killed, causing deformity of infested trees. Varying degrees of infestation were reported from 1958 to 1960, from 1964 to 1968 and from 1976 to 1980.

Birch Leafminer, *Fenusa pusilla* (Lep.) [Major]
page 49

Defoliation by this miner can weaken trees and leave them susceptible to secondary insects and diseases, and may be a predisposing factor in birch decline. As a rule these insects attack single trees, but when populations build up, stands of trees are severely defoliated. This insect was first reported in 1972 and has been of little consequence in the district.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn. [Major]
pages 49-67

This caterpillar is widely distributed throughout North America. Infestations usually last an average of five years and high populations denude large areas of susceptible stands. The principal host attacked is aspen; however, many other deciduous species also suffer severe defoliation. Repeated defoliation retards tree growth and reduces vigor, leaving the tree susceptible to attack by other pests. High populations were present in the district from 1950 to 1953, from 1962 to 1971 and from 1977 to 1979. Light defoliation was found in the western part of the district in 1980.

Balsam Fir Sawfly, *Neodiprion abietis* complex [Major]
page 68

Severe defoliation can cause mortality of balsam fir and white spruce trees when an infestation persists over a period of years. Little defoliation occurred from 1950 to 1960. In 1961 an increase in populations resulted in conspicuous discoloration of foliage in McCrosson Twp. Only low numbers were found from 1962 to 1980.

Pine Sawflies: Red Pine Sawfly, *Neodiprion nanulus nanulus* Schedl.,
Jack Pine Sawfly, *N. pratti banksianae* Roh., and
Redheaded Jack Pine Sawfly, *N. virginianus* complex
pages 68-72 [Major]

These sawflies are capable of causing mortality of semimature and plantation pine trees when populations are high. All three species have caused considerable damage to plantations and natural stands throughout the district.

Swaine Jack Pine Sawfly, *Neodiprion swainei* Midd. [Major]
pages 72-73

The Swaine jack pine sawfly is the most destructive sawfly on jack pine in eastern Canada. It has killed thousands of hectares of merchantable trees between the 46th and 49th parallels. Sawflies were present in low numbers in most years along shorelines and on islands in Rainy Lake and Lake of the Woods but rarely caused serious defoliation.

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.) [Major]
page 74

Although this insect has not been known to cause tree mortality, severe browning of foliage over a period of years can cause a reduction in growth. Sporadic infestations were reported frequently but were of relatively short duration.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.) [Major]
pages 75-81

This destructive insect has been categorized as a serious pest of young spruce plantations and open-growing ornamentals. High mortality can occur after successive years of severe defoliation. This sawfly caused varying amounts of damage during the entire period 1950-1980.

White Pine Weevil, *Pissodes strobi* (Peck) [Major]
page 82

This weevil is considered the most destructive pest of white pine in North America. Successive weeviling over a period of years results in multiple-stemmed trees. Leader mortality occurred in pine and spruce plantations and ranged up to 10% in some years.

Larch Sawfly, *Pristiphora erichsonii* (Htg.) [Major]
pages 83-84

The larch sawfly is the primary defoliating insect of native larch and most exotic species of larch. On good sites, larch trees can withstand six to nine years of severe defoliation before mortality occurs; on less favorable sites, mortality may follow three or more years of complete defoliation. Heavy infestations were present in the district from 1950 to 1971.

Aspen Leafroller, *Pseudexentera oregonana* Wlshm. [Major]
pages 85-87

No tree mortality was recorded as caused by this defoliator, which feeds almost exclusively on trembling aspen. Moderate-to-severe defoliation occurred from 1976 to 1979.

Other Noteworthy Insects [Major and Minor]
pages 88-91

These are insects that have the potential for causing damage to stands, regeneration and plantations.

FOREST DISEASES

Armillaria Root Rot, *Armillaria mellea* (Vahl: Fr.) Kummer [Major]
page 95

This root rot disease often kills trees previously stressed by drought, insects, other pathogens or unfavorable environment. However, under some circumstances the fungus, or certain strains of the fungus, can kill vigorous trees. Both deciduous and coniferous trees are attacked. Mortality ranged up to 7.5% in plantations in 1972.

Dutch Elm Disease, *Ceratocystis ulmi* (Buism.) C. Moreau [Major]
page 95

This major disease organism, which affects all species of elm, was first recorded in Ontario in Prescott County in 1946, and has gradually spread throughout most of the known range of elm in Ontario. The organism was first recorded in the district in 1977 and by 1980 had spread west to Rainy River and Lake of the Woods Provincial Park.

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary and *C. ledicola* (Peck) Lagerh. [Major]
page 96

These, the most widely spread rusts in the Canadian boreal forest, are a concern on mature trees, but the potential for damage in nurseries can be high. Sporadic infections were present for many years but no serious damage occurred.

Ink Spot of Aspen, *Ciborinia whetzelii* (Seaver) Seaver [Major]
page 97

This ink spot disease is widespread throughout the range of aspen. Many poplar species and hybrids are susceptible, but trembling aspen is most commonly affected. Heavily infected trees may be defoliated prematurely and repeated attacks can reduce increment and even kill regeneration. Medium-to-heavy infections of this organism were reported, but were relatively rare in the district.

Rusts of Pine: Pine Needle Rust, *Coleosporium asterum* (Dietel) Sydow, Sweet Fern Blister Rust, *Cronartium comptoniae* Arthur, White Pine Blister Rust, *C. ribicola* J.C. Fischer, and Western Gall Rust, *Endocronartium harknessii* (J.P. Moore) Y. Hirats.
pages 97-100 [Major]

These rusts may kill trees outright or make them more susceptible to insects, decay, and wind breakage, depending on the degree of infection. All organisms occur throughout the district.

Tar Spot Needle Cast, *Davisomycella ampla* (J. Davis) Darker [Major]
pages 100-101

This pathogen causes severe defoliation when incidence is high. In years of severe defoliation, trees are weakened and growth is reduced. Infection can be so severe that all but the current year's foliage may be cast off. No serious damage has been reported in the district.

Hypoxylon Canker, *Hypoxylon mammatum* (Wahlenb.) J. Miller [Major]
pages 101-102

Mortality caused by this disease is usually restricted to trees in the 7-cm to 13-cm DBH class, growing on poor sites, but branch and top mortality may occur in trees of greater diameter. The disease was found throughout the district, with incidence as high as 55% and mortality of 28% in some stands.

Shoot Blight, *Sirococcus conigenus* (DC.) P. Cannon & Minter
pages 102-103 [Major]

This pathogen is capable of killing trees outright in many age classes, especially young understory regeneration. The principal host is red pine although other pines are susceptible to attack. No tree mortality was attributed to this organism in the district.

Shoot Blight, *Venturia macularis* (Fr.) E. Müller & v. Arx. [Major]
page 104

Reduced stocking of regeneration aspen occurs when the incidence of this disease is high. Trees more than 5 years old are seldom affected and, therefore, the disease is of little economic importance in natural stands. Moderate-to-severe shoot mortality was recorded in 1977 and 1978.

Other Noteworthy Diseases
page 105

These are diseases with the potential for causing damage to natural stands, regeneration and plantations.

ABIOTIC DAMAGE

pages 109-111

Abiotic damage is caused by a variety of factors, e.g., frost, winter drying, salt, etc. Weakened trees are susceptible to a number of diseases.

INSECTS

Eastern Blackheaded Budworm, *Acleris variana* (Fern.)

Host(s): bF, spruce [Major]

Year	Remarks
1950-1952	trace populations through the district
1953	light defoliation of black and white spruce trees along the north arm of Rainy Lake
1954-1955	trace populations at several locations
1956-1957	not reported
1958	trace populations at two locations
1959	not reported
1960-1966	trace populations at a few locations
1967-1970	not reported
1971-1974	trace populations at a few points
1975-1979	not reported
1980	light infestation on ornamental blue spruce trees in Fort Frances

Fall Cankerworm, *Alsophila pometaria* (Harr.)

Host(s): deciduous species [Major]

Year	Remarks
1950-1951	Light defoliation of Manitoba maple, elm and apple trees occurred in the towns of Fort Frances and Rainy River.
1952-1954	not reported
1955	a pocket of heavy infestation in McIrvine Twp
1956	A light infestation occurred in Fort Frances and defoliation ranging from 90 to 100% was observed on basswood trees near Pinewood

(cont'd)

Fall Cankerworm, *Alsophila pometaria* (Harr.) (concl.)

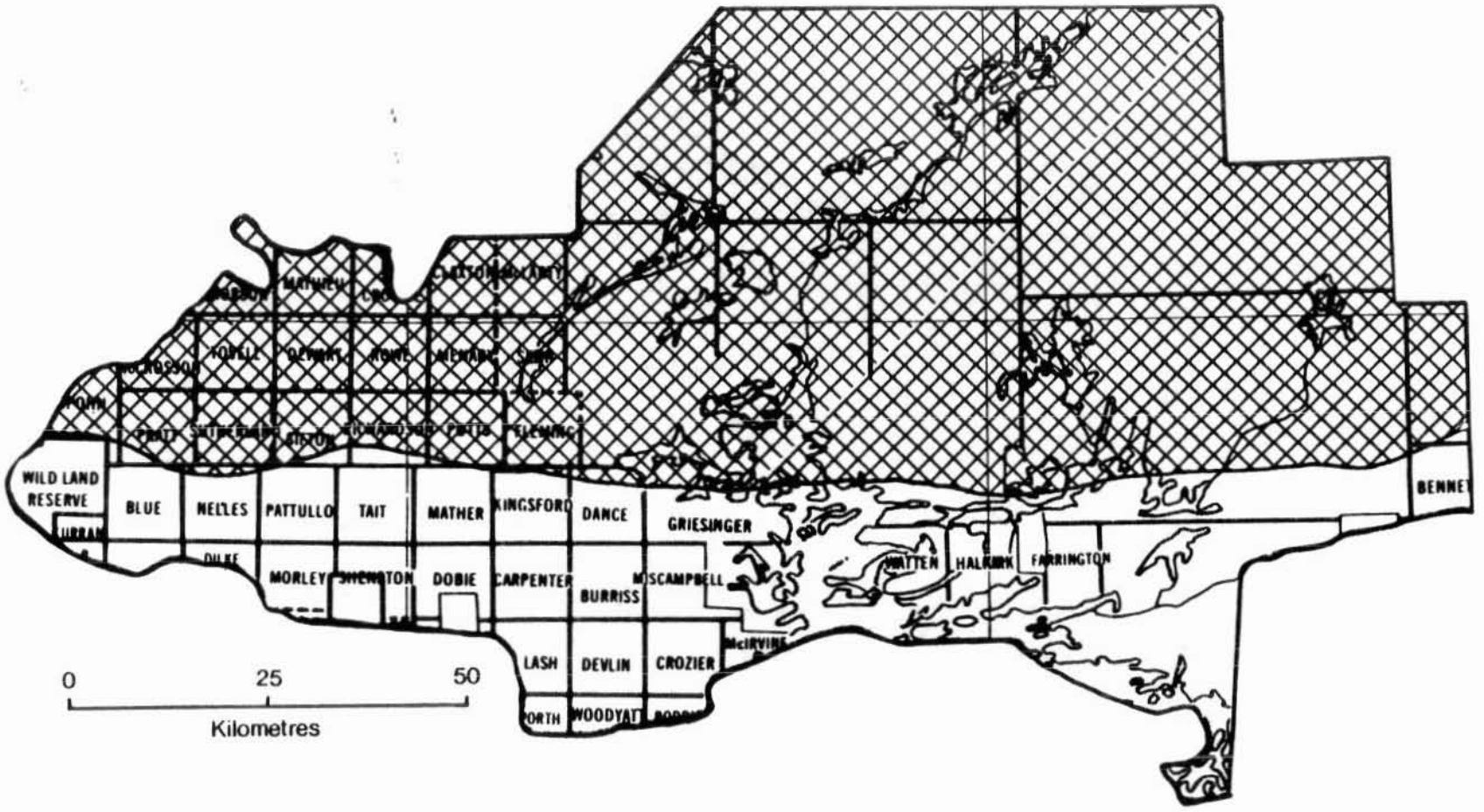
Year	Remarks
1957-1959	light infestation in Fort Frances
1960	low numbers in McIrvine Twp
1961-1968	not reported
1969	Severe defoliation of Manitoba maple, black ash, basswood, elm and apple trees occurred in Fort Frances.
1970	occasional trees heavily defoliated west of Fort Frances
1971-1973	severely defoliated ornamental trees in Fort Frances
1974	The infestation declined to low levels.
1975-1980	not reported

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

Host(s): wB [Major]

Year	Remarks
1950-1969	not reported
1970	moderate-to-severe defoliation throughout the northern part of the district (see map, page 13)
1971	moderate-to-severe defoliation in many areas through the district; not mapped because of premature leaf drop due to drought
1972	Moderate-to-severe defoliation persisted throughout the district (see map, page 14).
1973	Moderate-to-severe defoliation recurred throughout the district.
1974	The infestation collapsed and no damage was observed.
1975-1979	not reported
1980	moderate-to-severe defoliation of a 2.5-ha stand along Highway 11, west of Seine River

FORT FRANCES DISTRICT



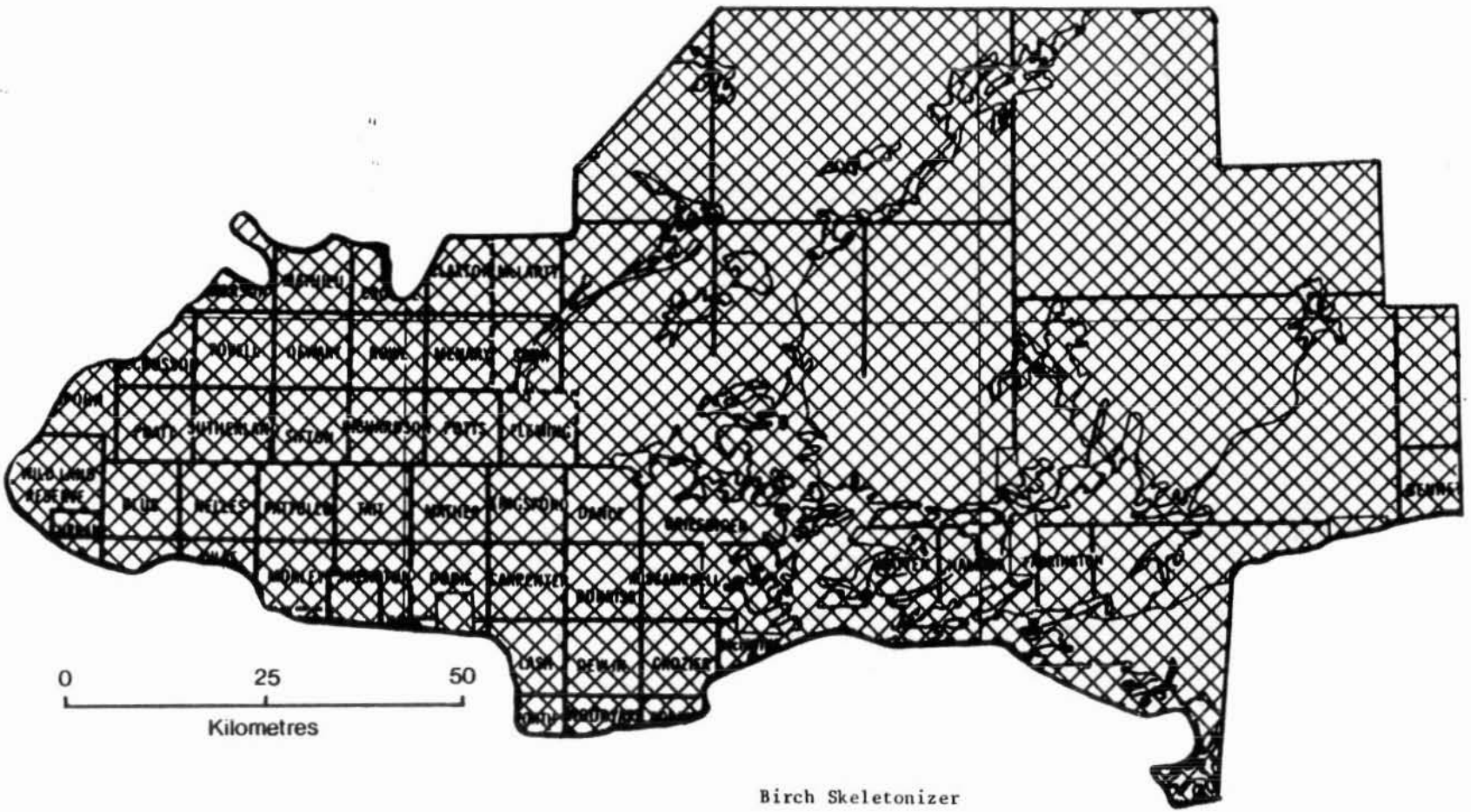
Birch Skeletonizer

Areas within which defoliation occurred in 1970

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



Birch Skeletonizer

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.)

Host(s): tA [Major]

Year	Remarks
1950-1968	not reported
1969-1972	low numbers at scattered locations
1973	a single pocket of moderate-to-severe defoliation near Lake of the Woods
1974-1980	not reported

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Host(s): spruce, bF [Major]

Year	Remarks
1950	trace populations in Crozier, Shenston and Pattullo twps
1951	slightly increased populations; light defoliation of open-grown white spruce trees at one location on the north arm of Rainy Lake
1952	low numbers at several locations
1953	A medium-to-heavy infestation in the Kenora District expanded south into the northern part of the district.
1954	The infestation continued to expand in the northern part of the district (see map, page 18).
1955	The infestation spread from the northern part of the district south into Minnesota between Fort Frances and Iron Lake (see map, page 19).
1956	Infestations increased in extent and intensity, and stands over the entire eastern and northern parts of the district suffered moderate-to-severe defoliation (see map, page 20).

(cont'd)

Spruce Budworm, *Choristoneura fumiferana* (Clem.) (cont'd)

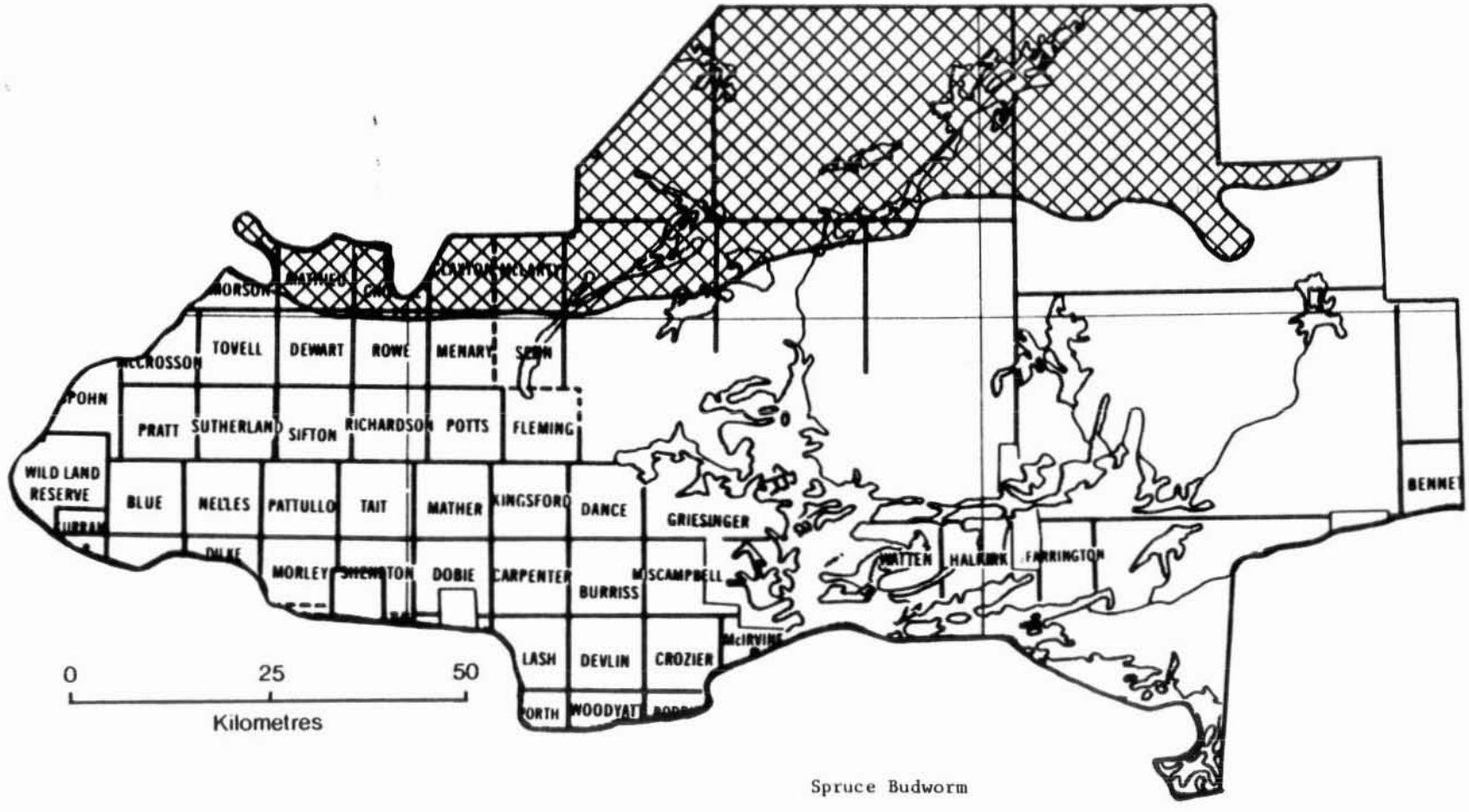
Year	Remarks
1957	No major change in infestation boundaries occurred (see map, page 21).
1958	Moderate-to-severe defoliation persisted in the eastern and northern parts of the district (see map, page 22).
1959	Infestations in the western part of the district collapsed. Moderate-to-severe defoliation was mapped in the eastern part, and light defoliation in the northern part (see map, page 23).
1960	Moderate-to-severe defoliation persisted in the eastern part of the district (see map, page 24).
1961	Moderate-to-severe defoliation was mapped from Rainy Lake east to the district boundary (see map, page 25).
1962	A marked decline in the extent and intensity of the infestation and in resultant damage was observed (see map, page 26).
1963	The infestation declined to a small pocket of light defoliation near Vista Lake and in Bennett Twp (see map, page 27).
1964	low numbers found in the district
1965-1966	trace populations
1967	Pockets of light infestation were located in Potts, Mather, Lash and Woodyatt twps (see map, page 28).
1968	Pockets of light infestation were observed in Potts, Devlin and Crozier twps (see map, page 29).
1969-1970	trace populations in Sifton, Mather and Potts twps
1971	A small area of moderate-to-severe defoliation was mapped in the Namakan Lake area.
1972	Small pockets of moderate-to-severe defoliation persisted in the Namakan Lake area.
1973	not reported

(cont'd)

Spruce Budworm, *Choristoneura fumiferana* (Clem.) (concl.)

Year	Remarks
1974	A 4000-ha infestation was detected near Bennett Lake in the eastern part of the district (see map, page 30).
1975	The infestation at Bennett Lake doubled in size (see map, page 31) and budworms were found commonly at many locations.
1976	Pockets of moderate-to-severe defoliation were mapped in a 27,500-ha area between Bennett Twp and Watten Twp (see map, page 32).
1977	Infestations continued to expand (see map, page 33).
1978	The infestation expanded to 255,566 ha and spread northward (see map, page 34).
1979	The infestation located between Bennett Lake and Rainy Lake increased to 306,000 ha (see map, page 35).
1980	The infestation experienced a variety of boundary changes but changed very little in overall size (see map, page 36).

FORT FRANCES DISTRICT



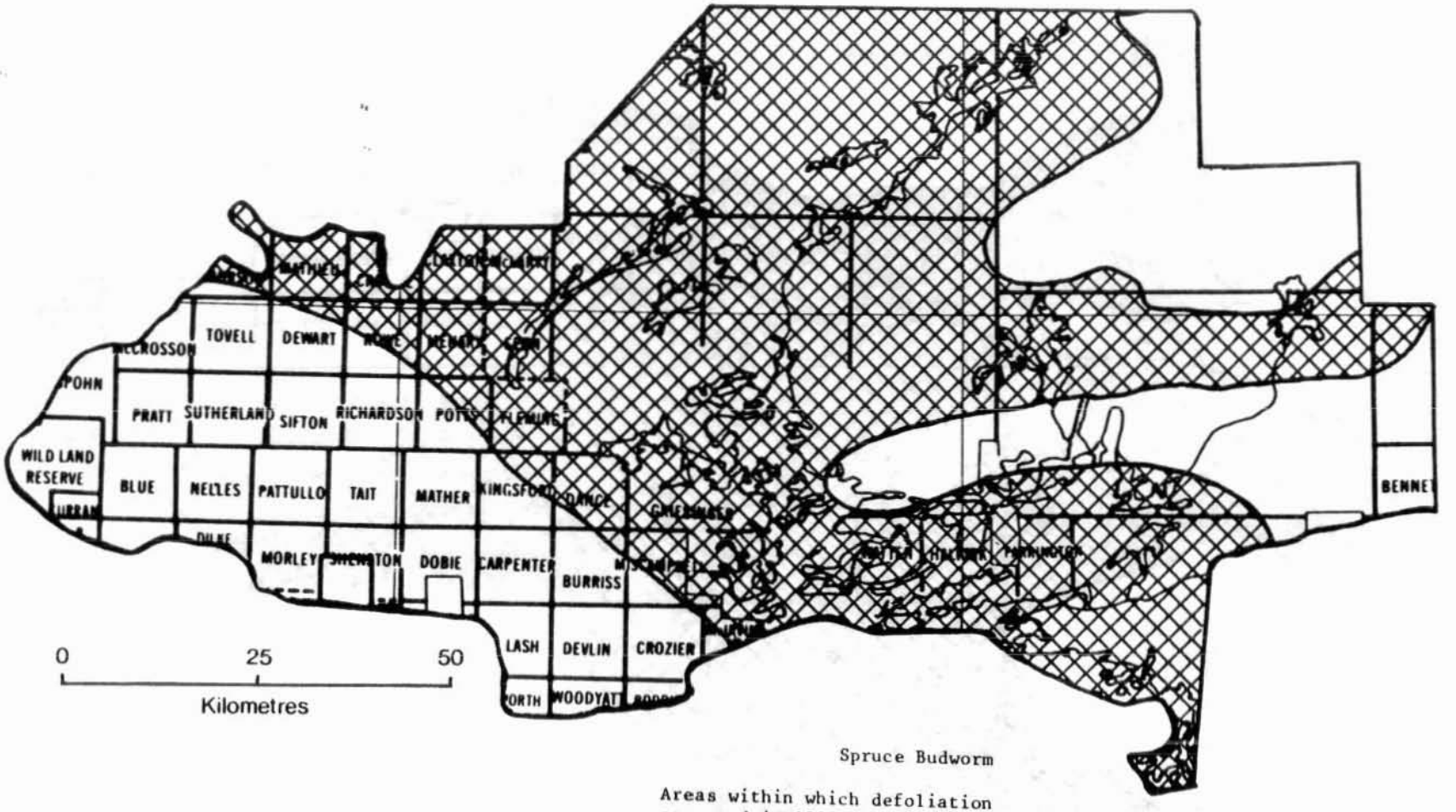
Spruce Budworm

Areas within which defoliation occurred in 1954

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



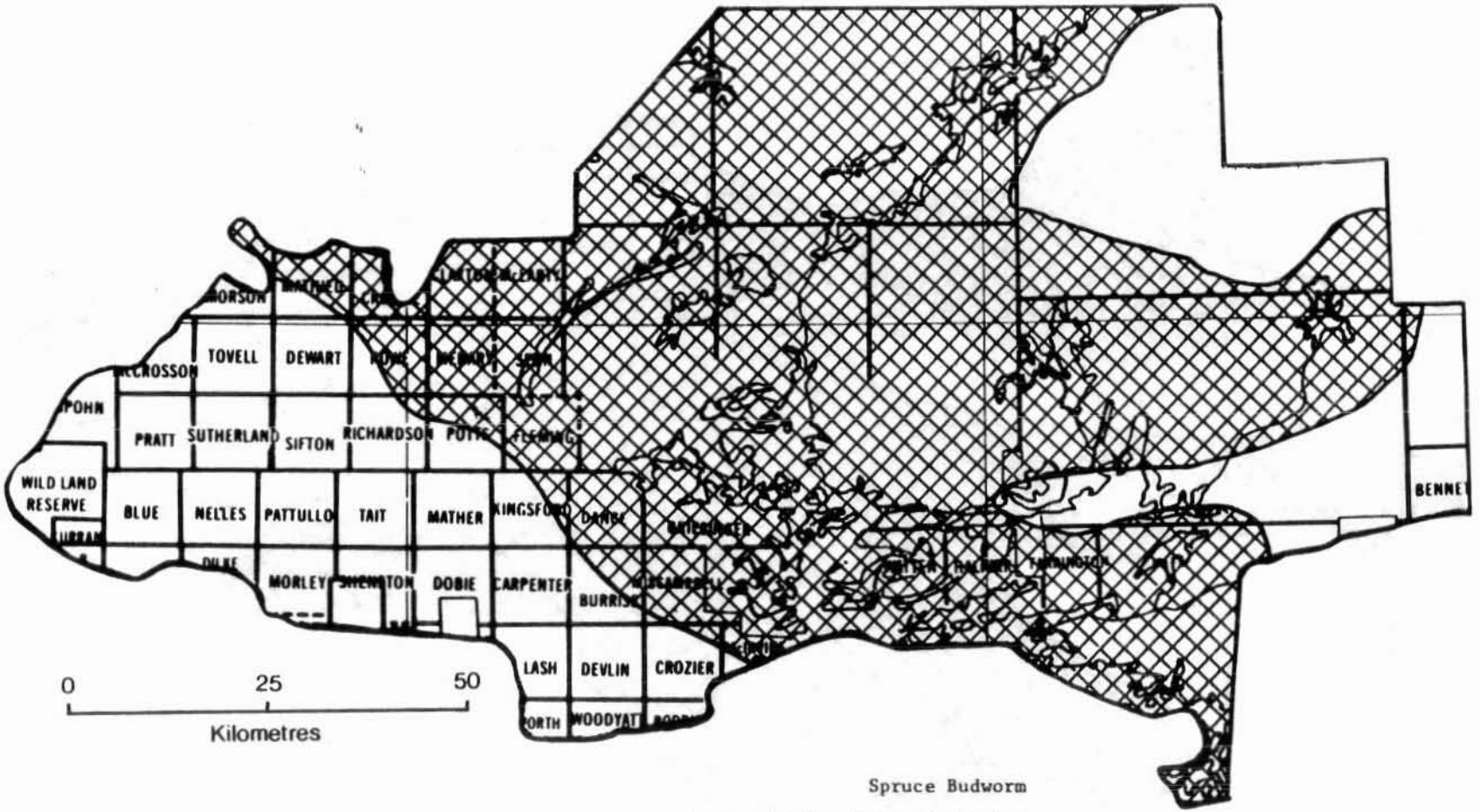
Spruce Budworm

Areas within which defoliation occurred in 1955

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



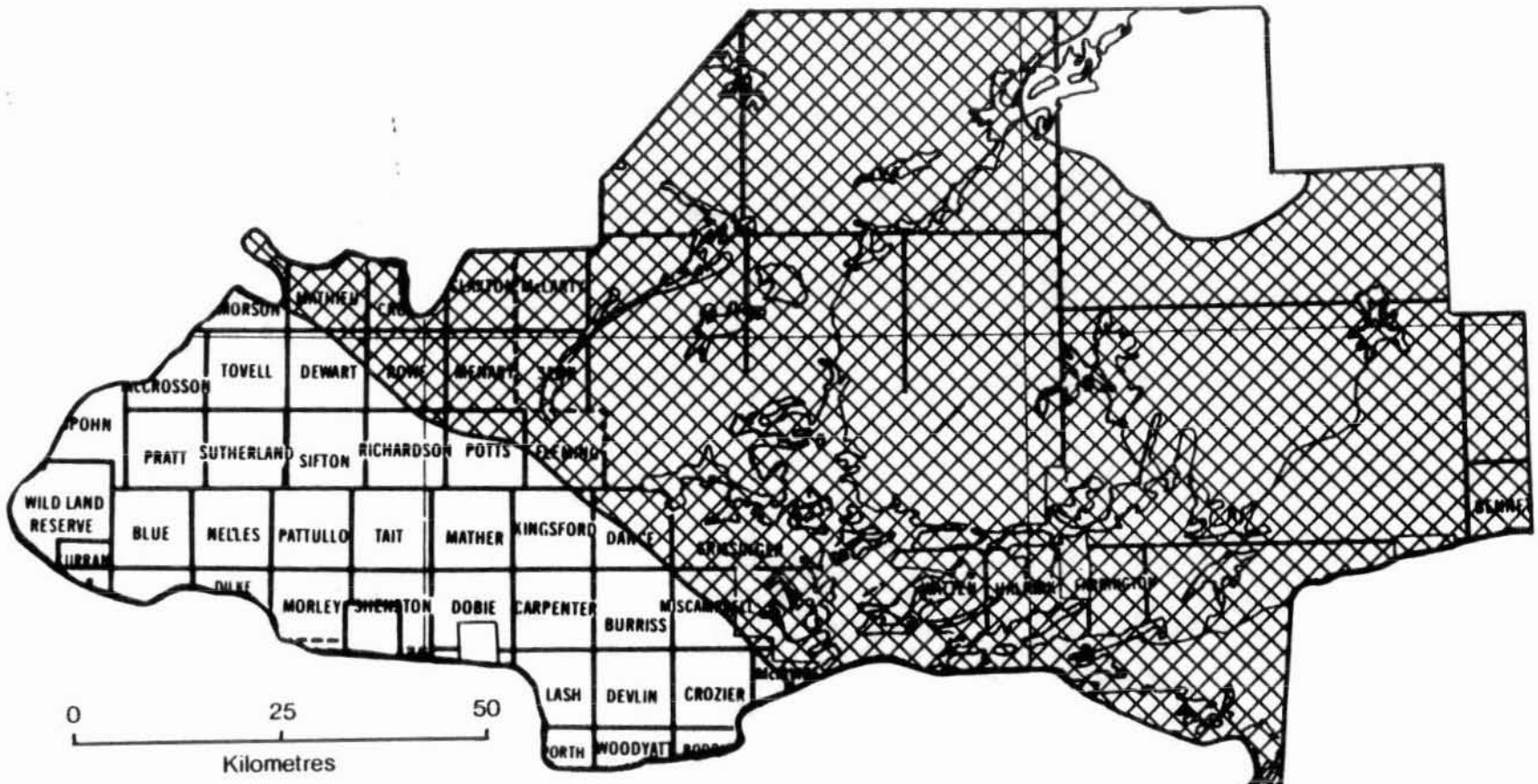
Spruce Budworm

Areas within which defoliation occurred in 1956

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



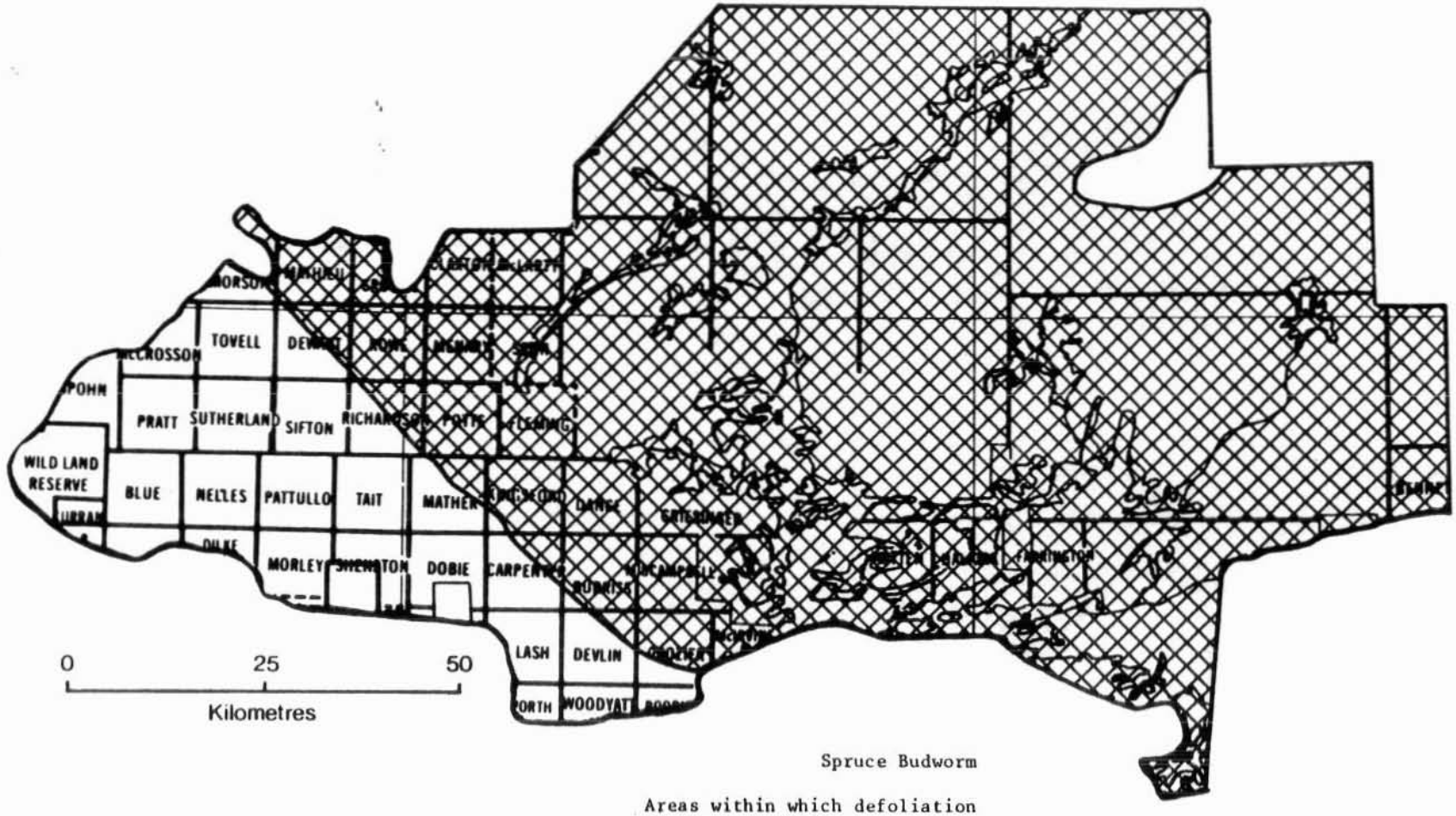
Spruce Budworm

Areas within which defoliation occurred in 1957

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



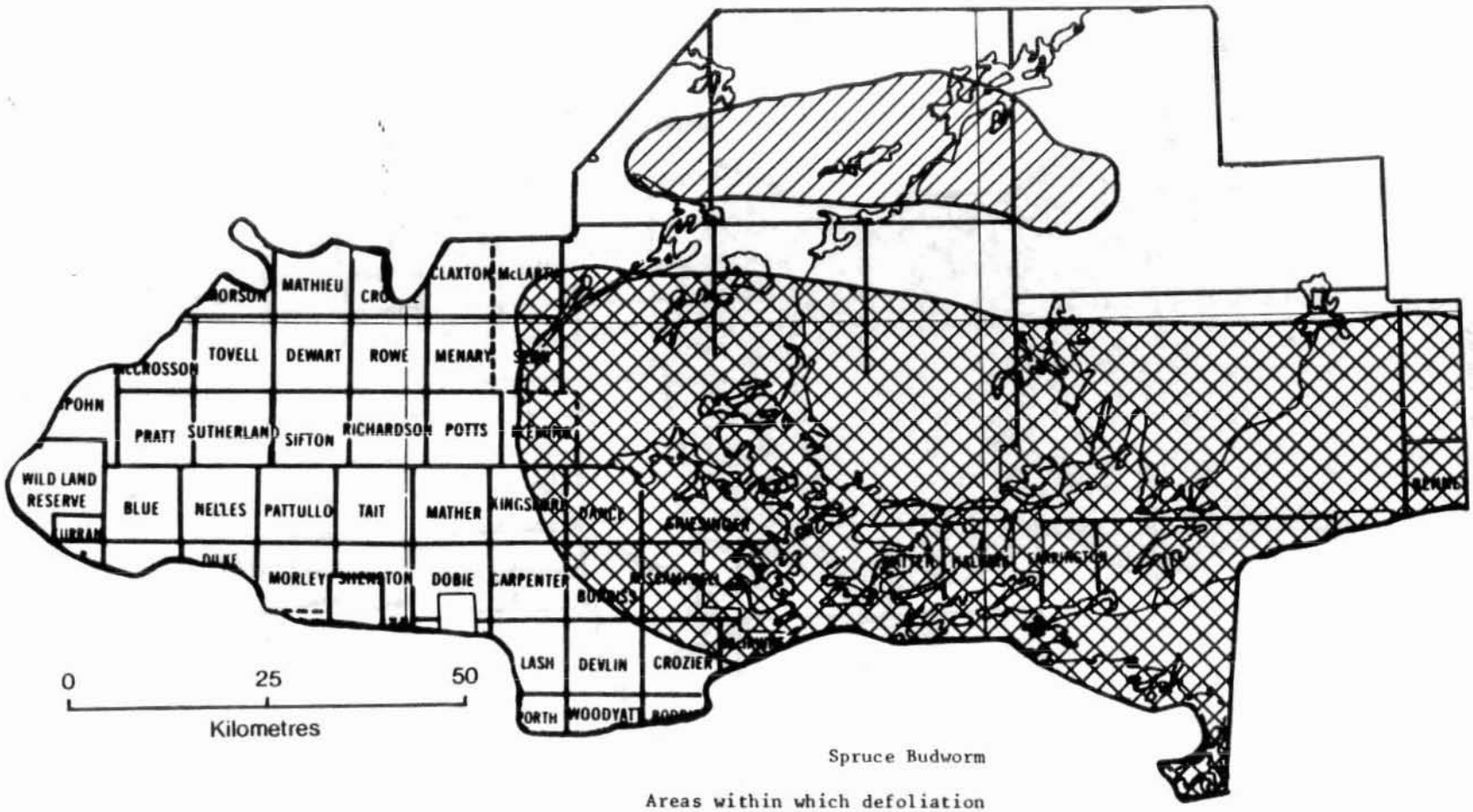
Spruce Budworm

Areas within which defoliation occurred in 1958

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



Spruce Budworm

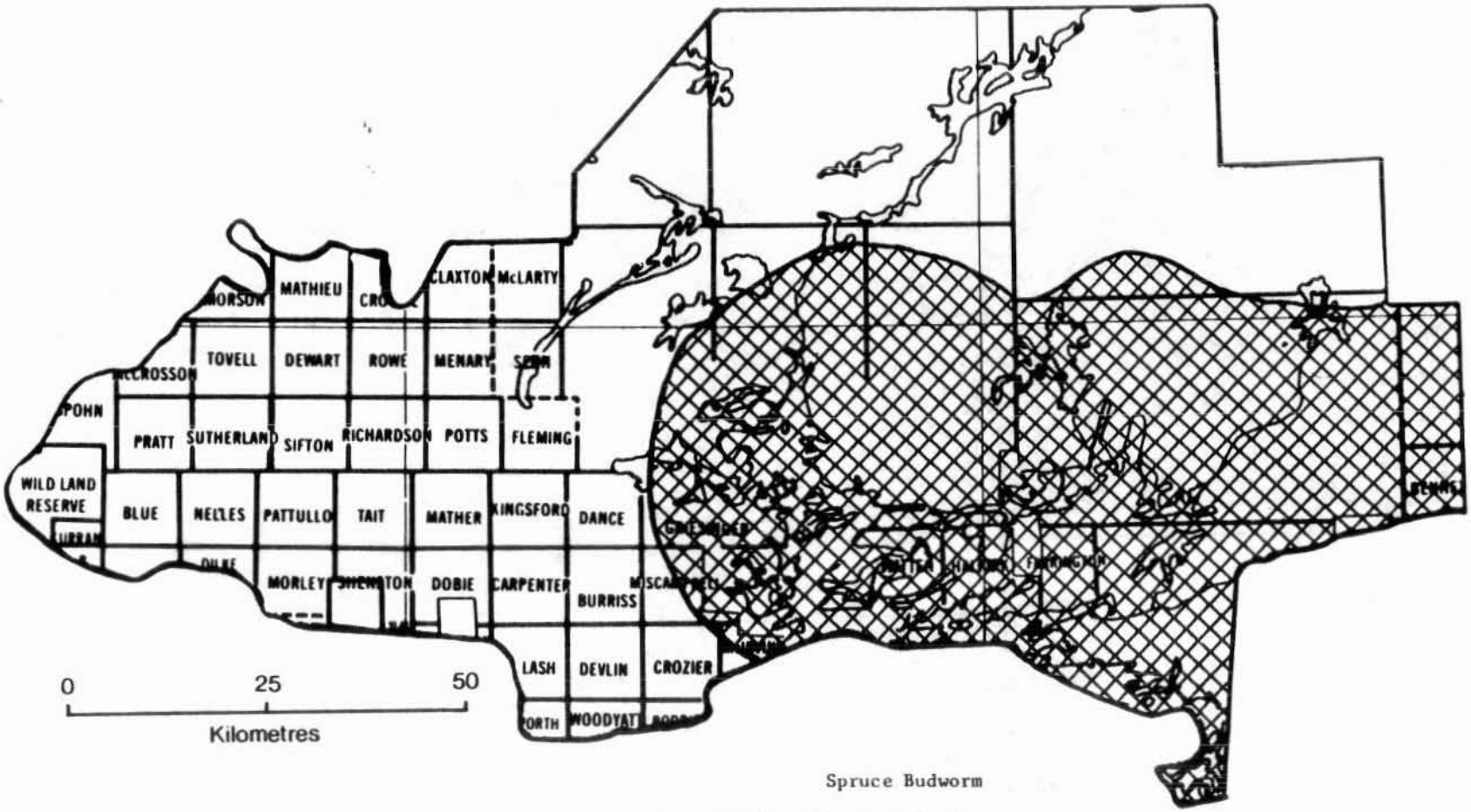
Areas within which defoliation occurred in 1959

LEGEND

Light defoliation

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



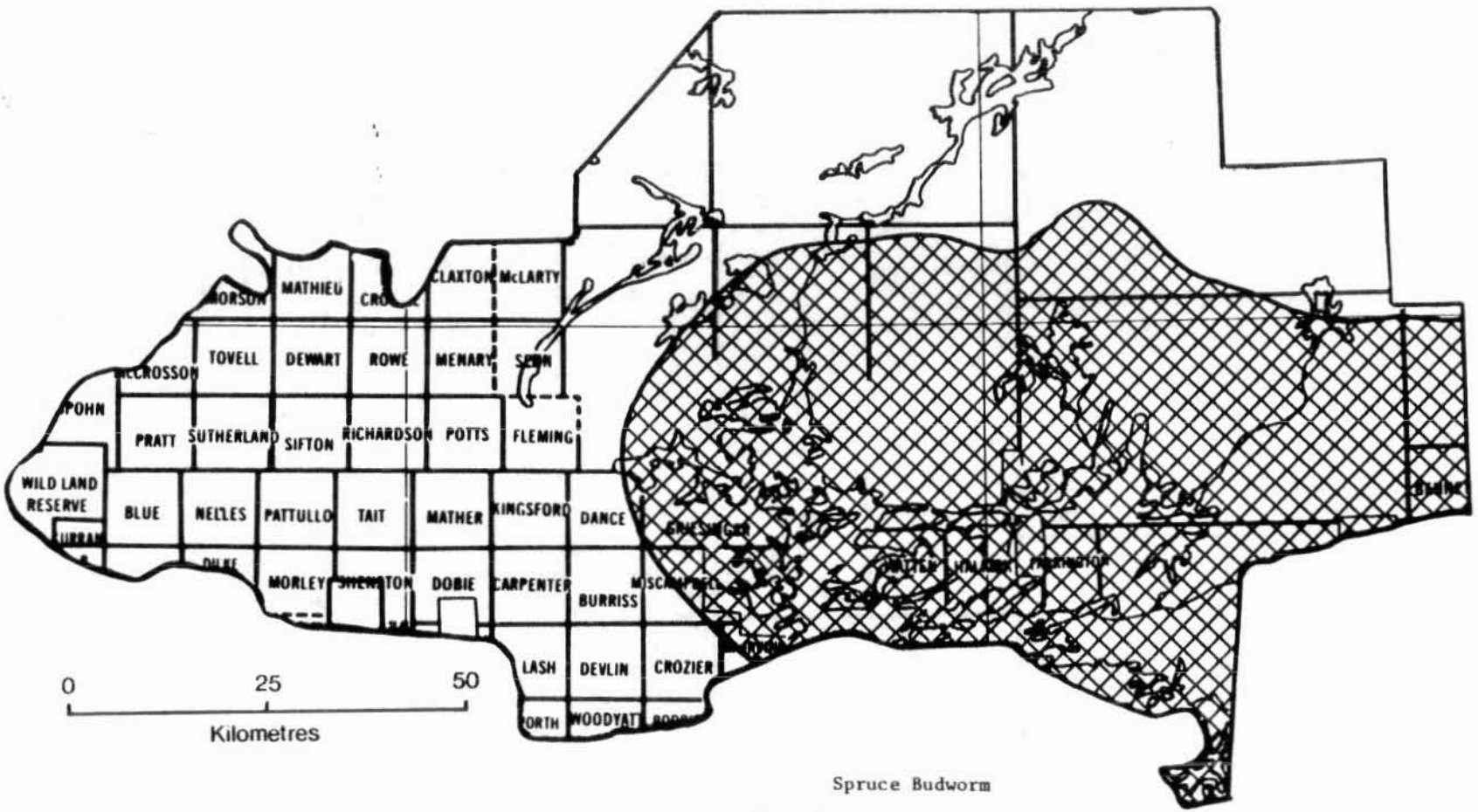
Spruce Budworm

Areas within which defoliation occurred in 1960

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



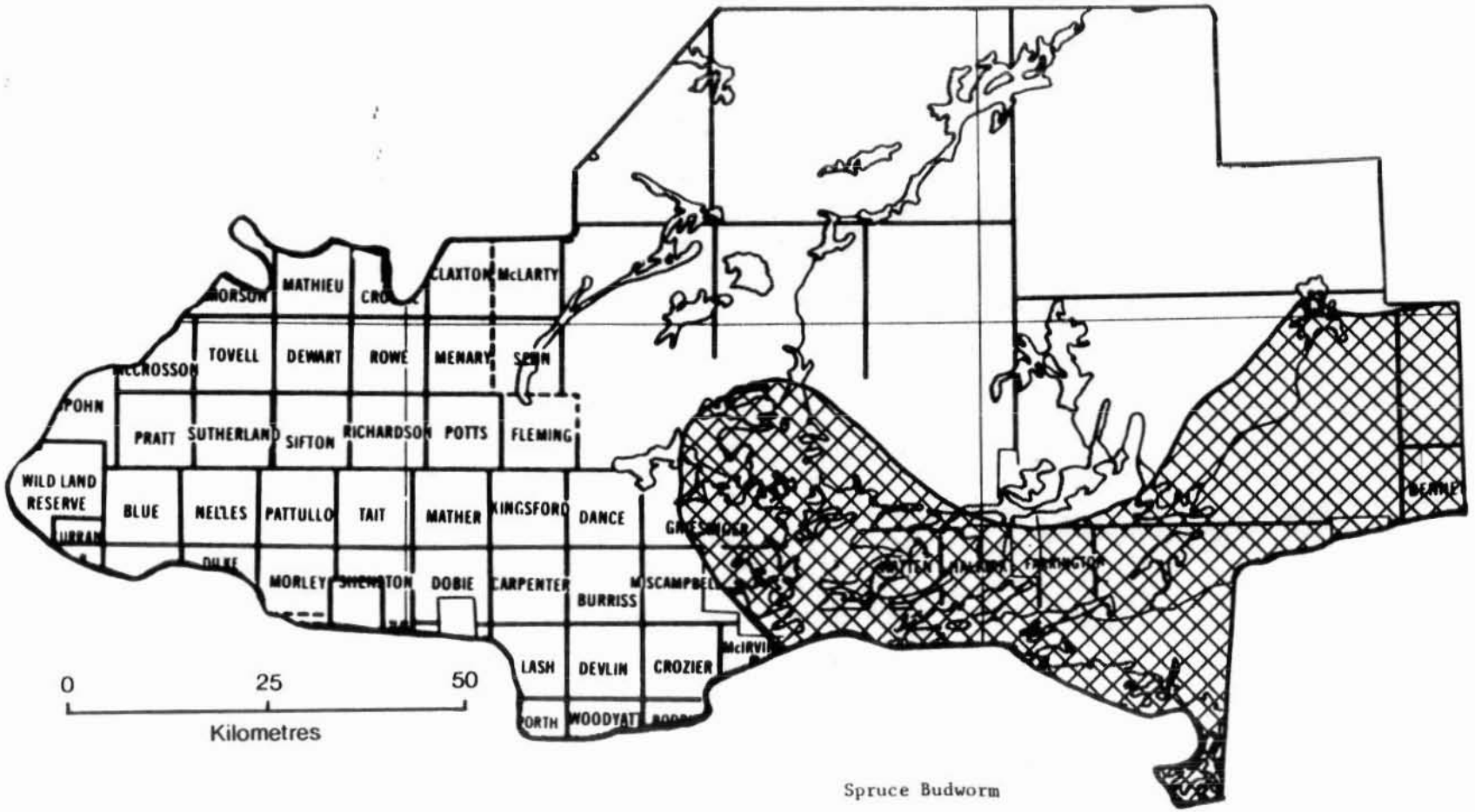
Spruce Budworm

Areas within which defoliation occurred in 1961

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



Spruce Budworm

Areas within which defoliation occurred in 1962

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT

Spruce Budworm

Areas within which defoliation occurred in 1963

LEGEND

Light defoliation ◐ or ▨

FORT FRANCES DISTRICT

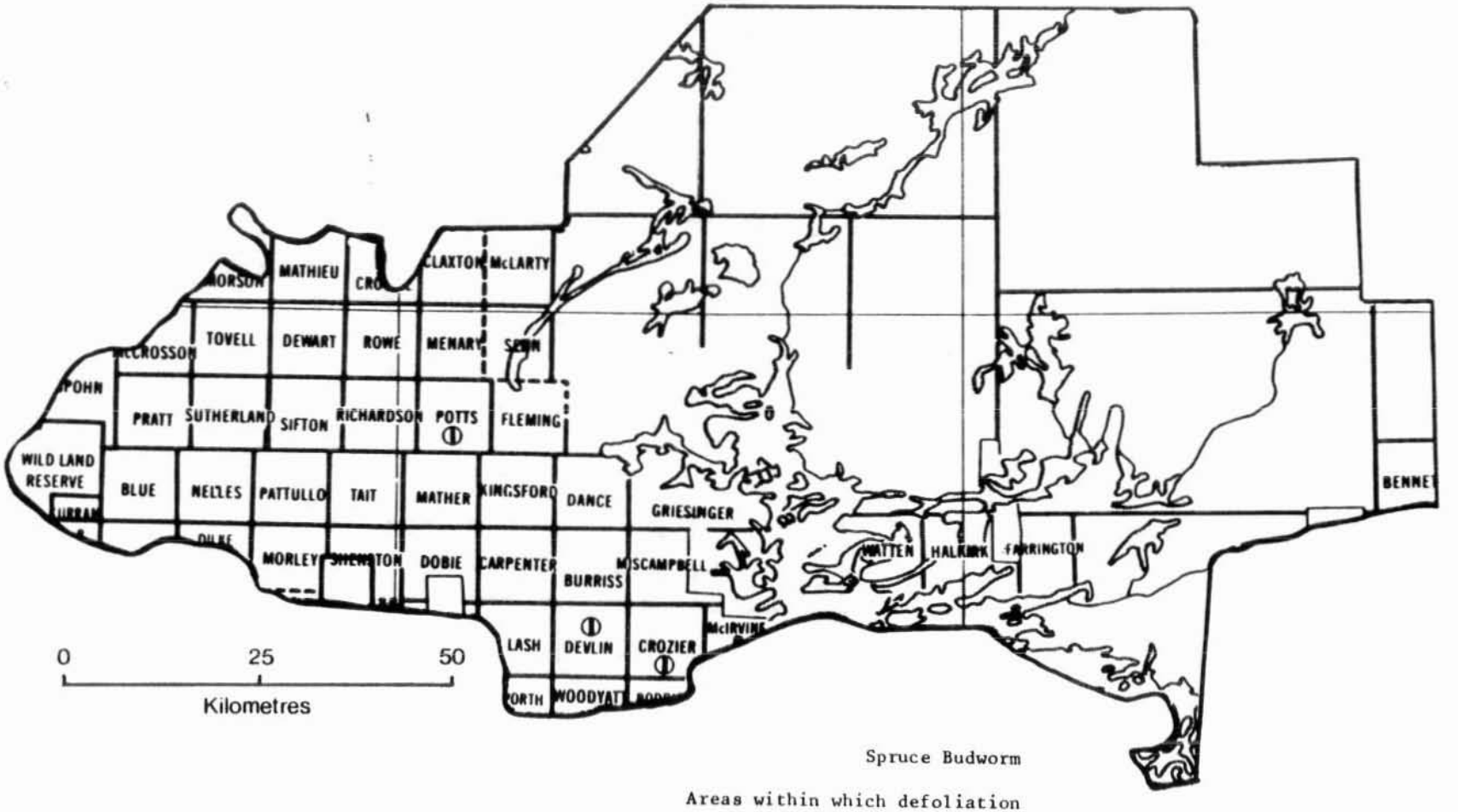
Spruce Budworm

Areas within which defoliation occurred in 1967

LEGEND

Light defoliation ◐

FORT FRANCES DISTRICT



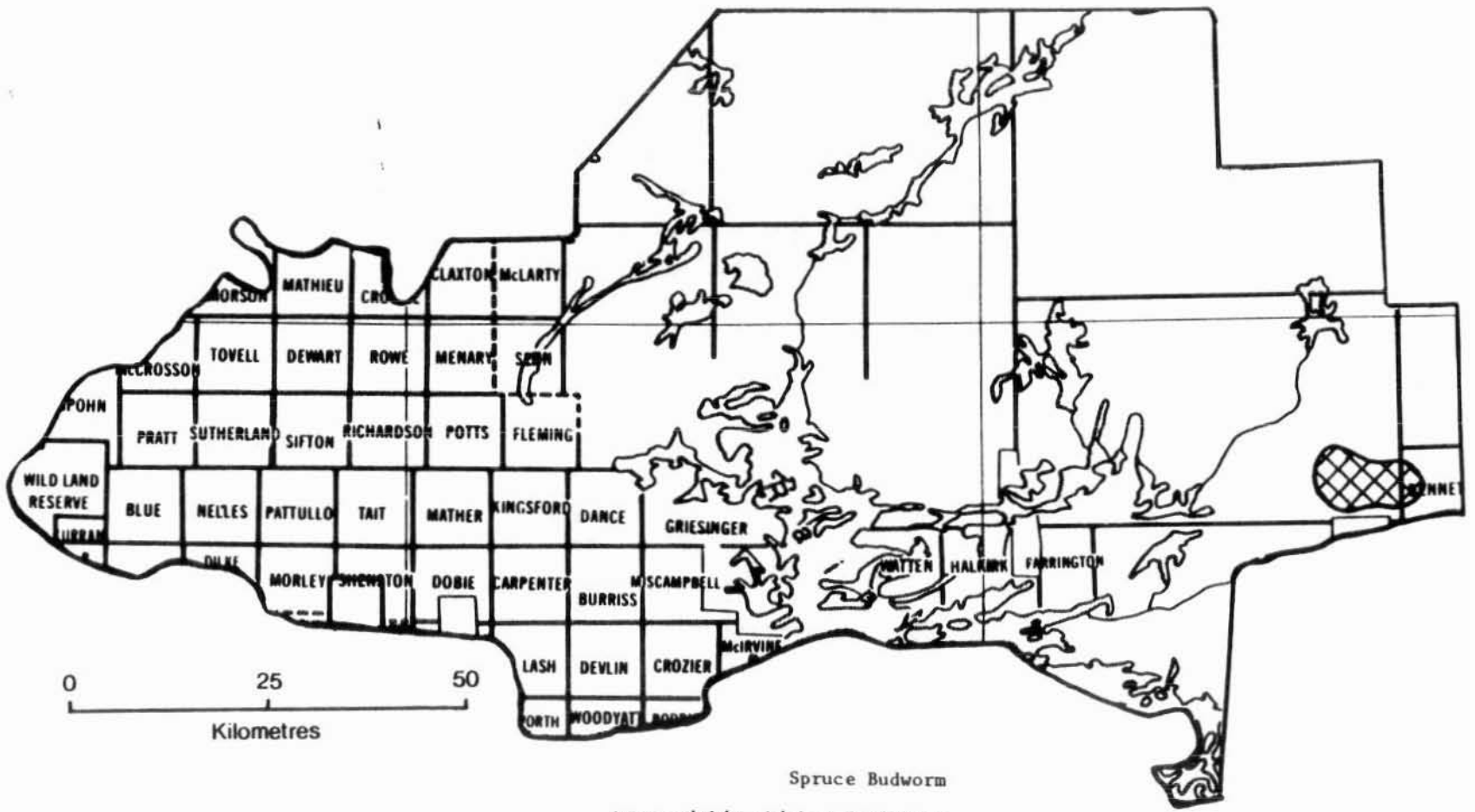
Spruce Budworm

Areas within which defoliation occurred in 1968

LEGEND

Light defoliation ◑

FORT FRANCES DISTRICT



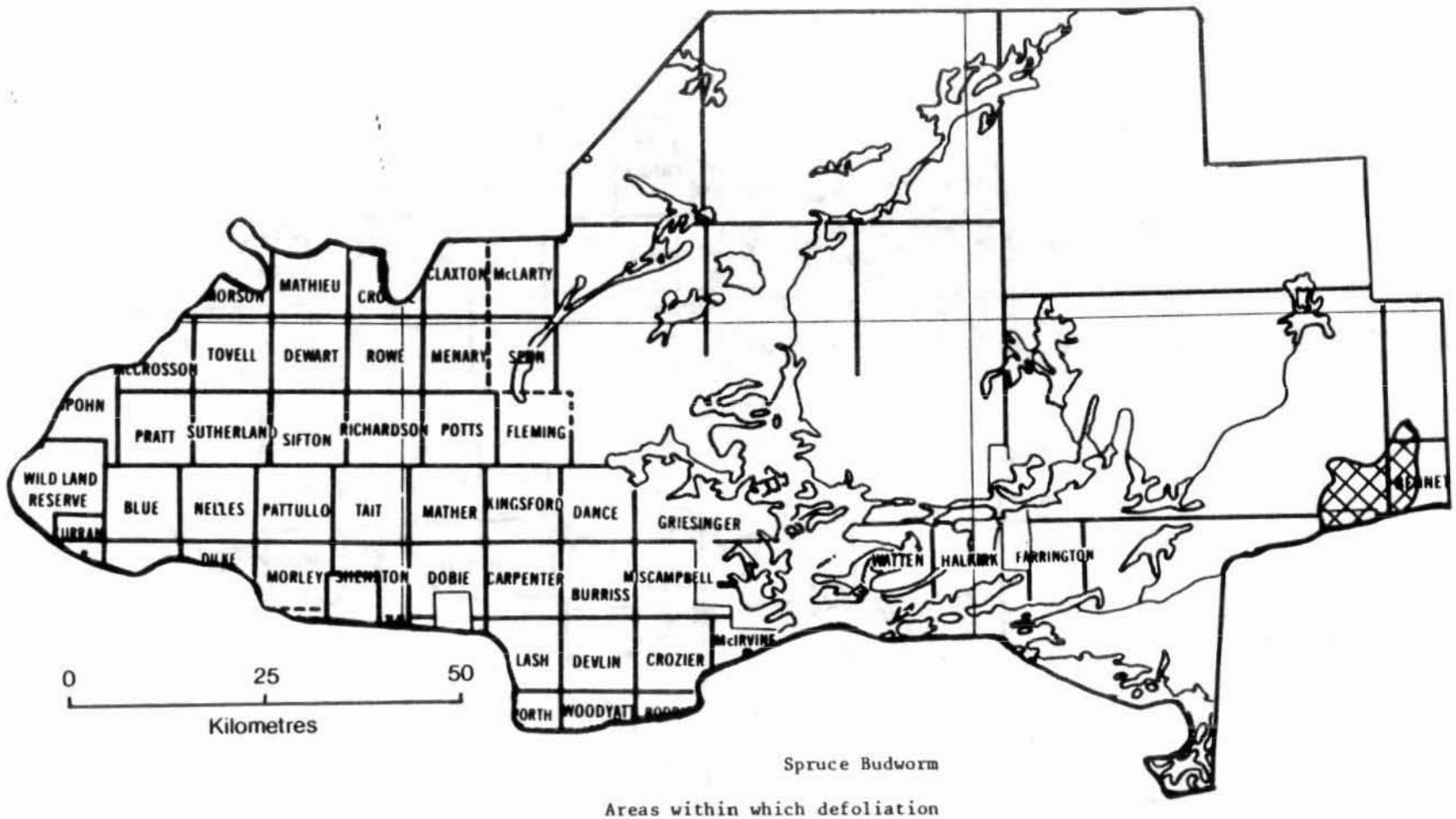
Spruce Budworm

Areas within which defoliation occurred in 1974

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



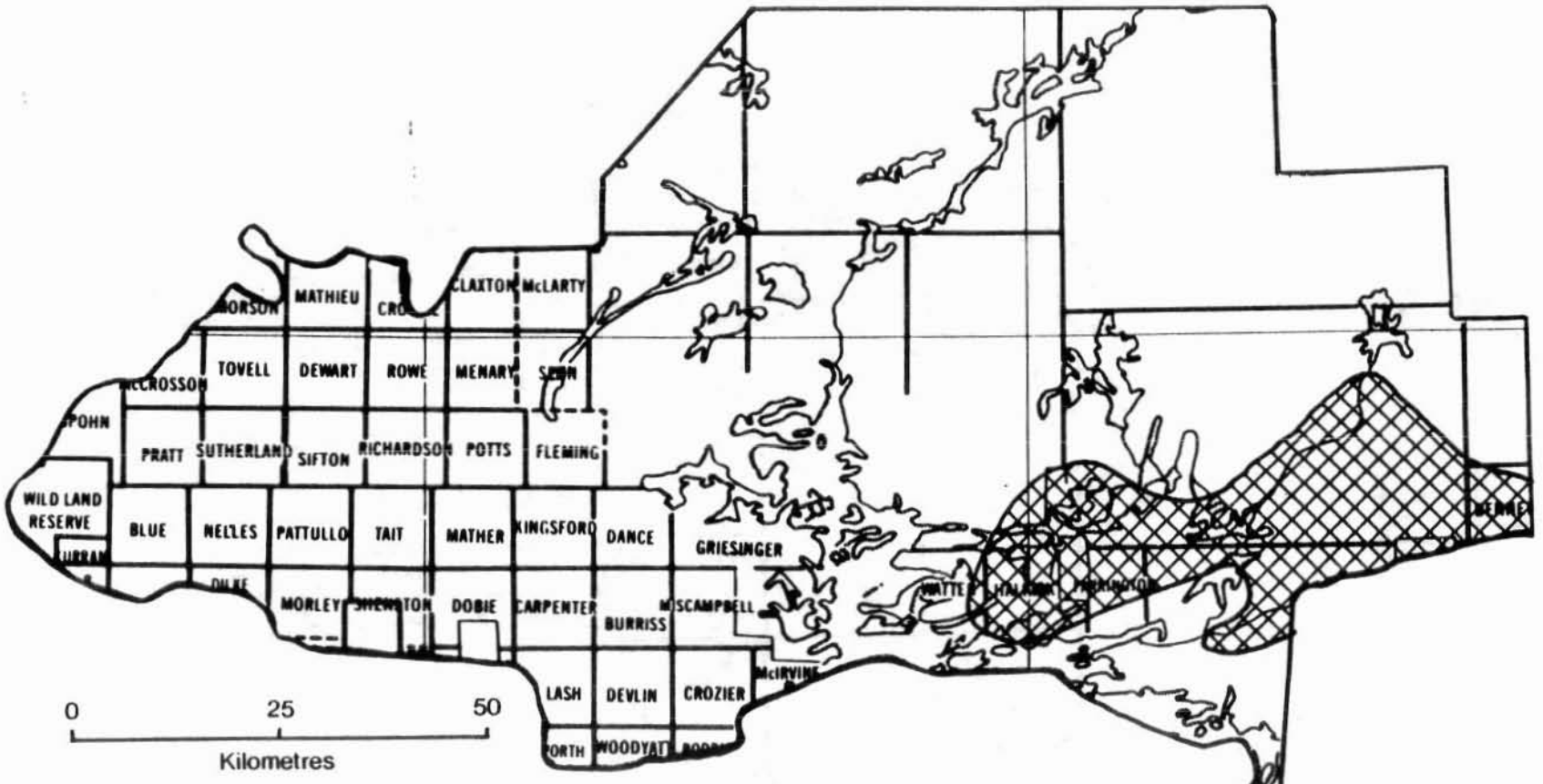
Spruce Budworm

Areas within which defoliation occurred in 1975

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



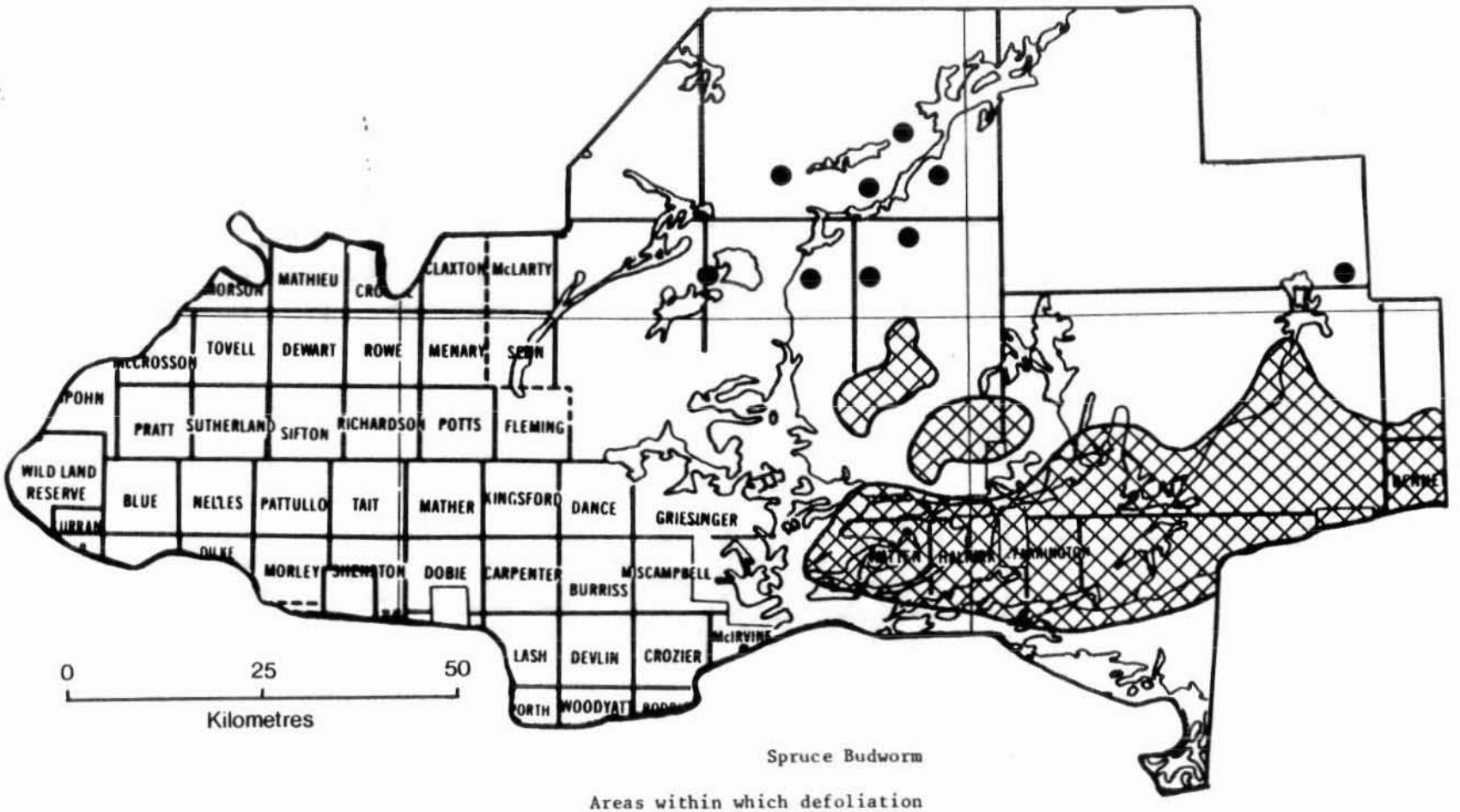
Spruce Budworm

Areas within which defoliation occurred in 1976

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



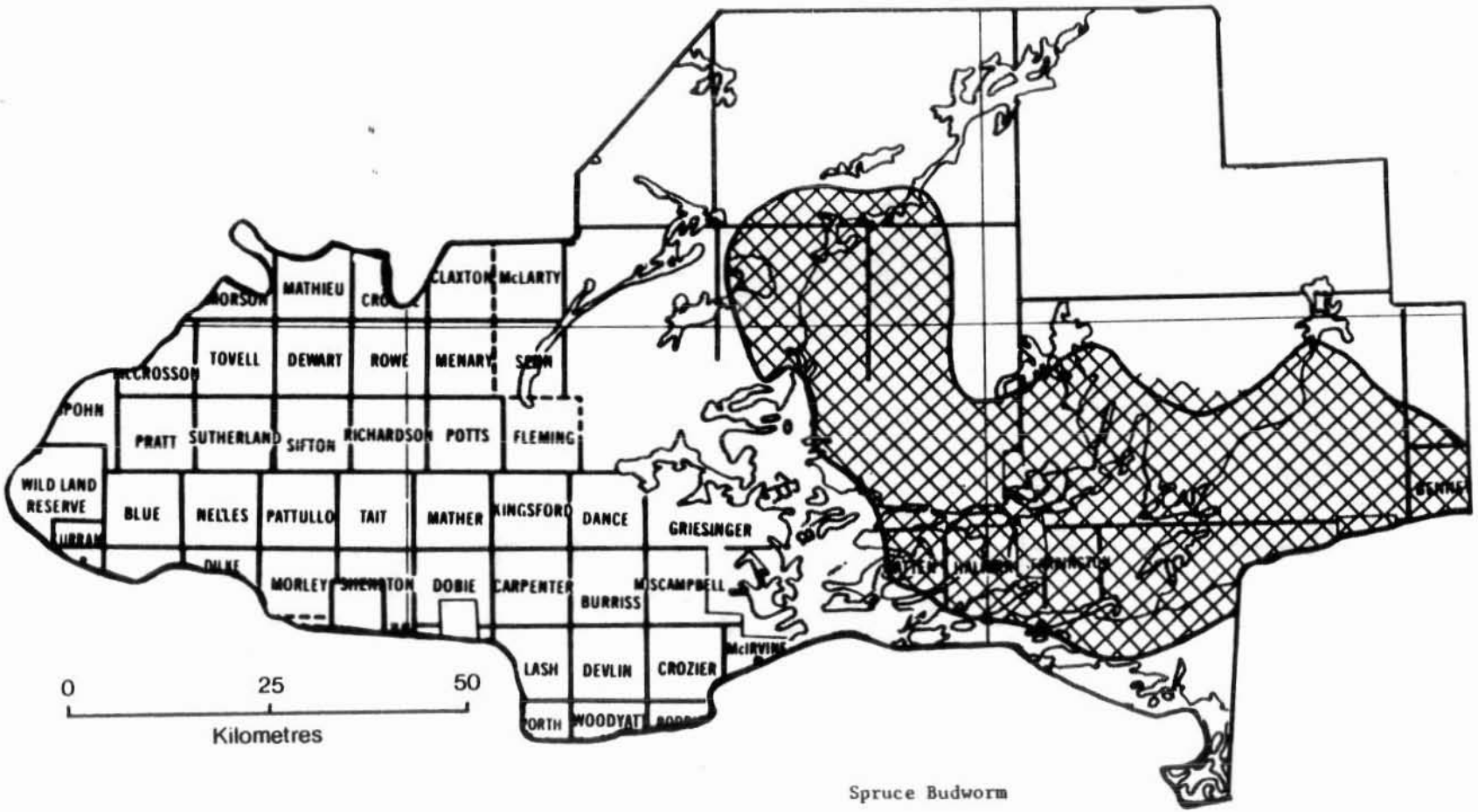
Spruce Budworm

Areas within which defoliation occurred in 1977

LEGEND

Moderate-to-severe defoliation ● or ▨

FORT FRANCES DISTRICT



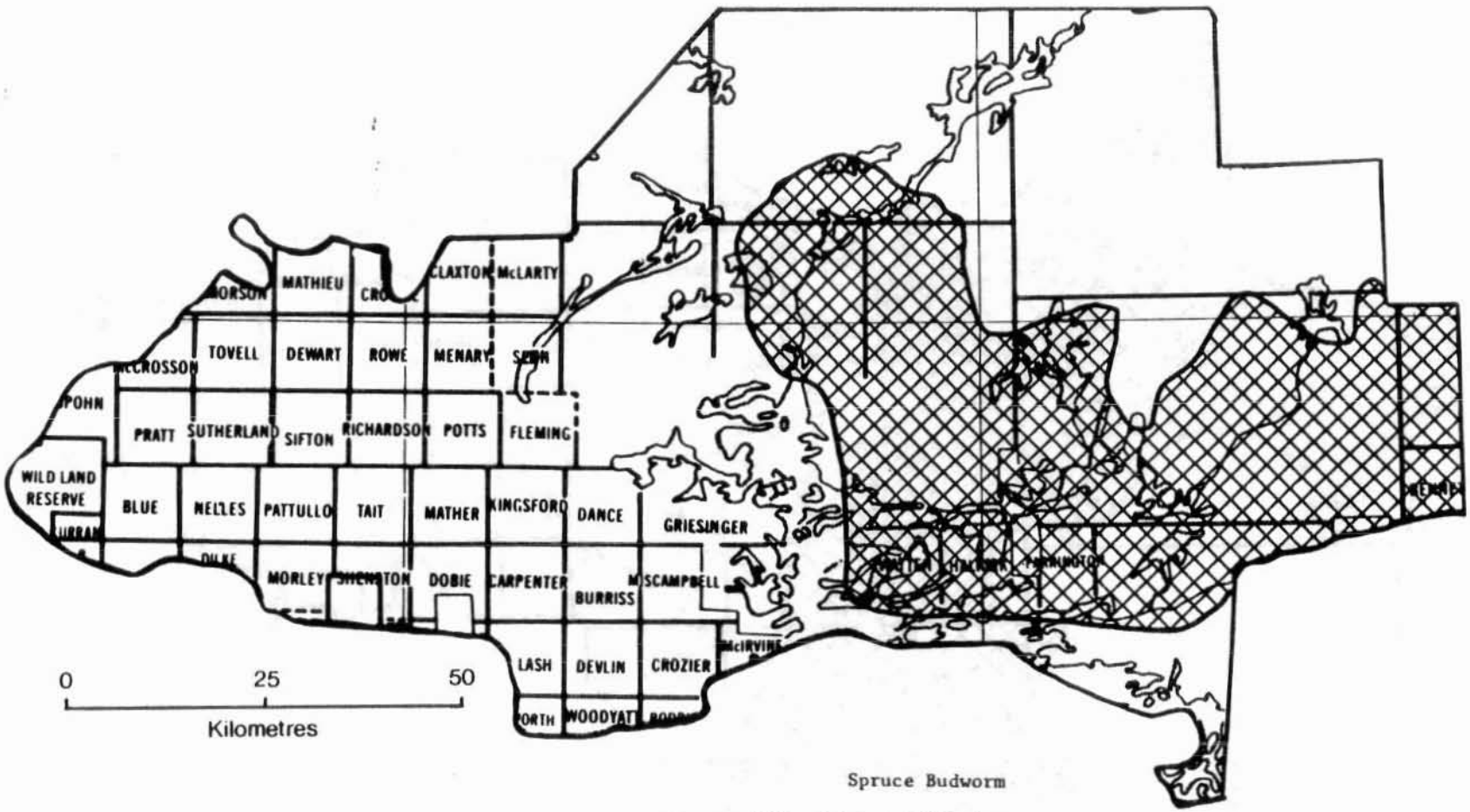
Spruce Budworm

Areas within which defoliation occurred in 1978

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



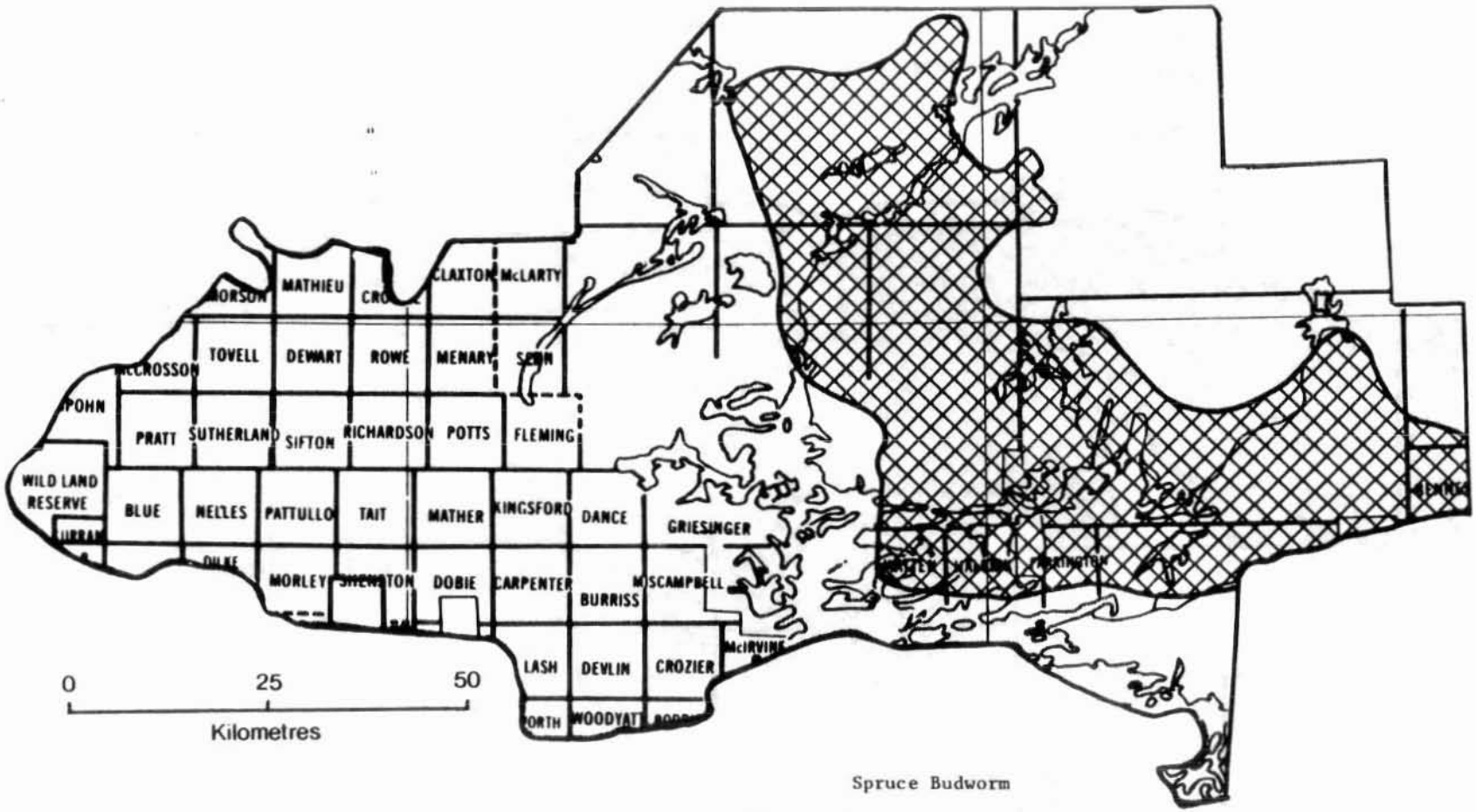
Spruce Budworm

Areas within which defoliation occurred in 1979

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



Spruce Budworm

Areas within which defoliation occurred in 1980

LEGEND

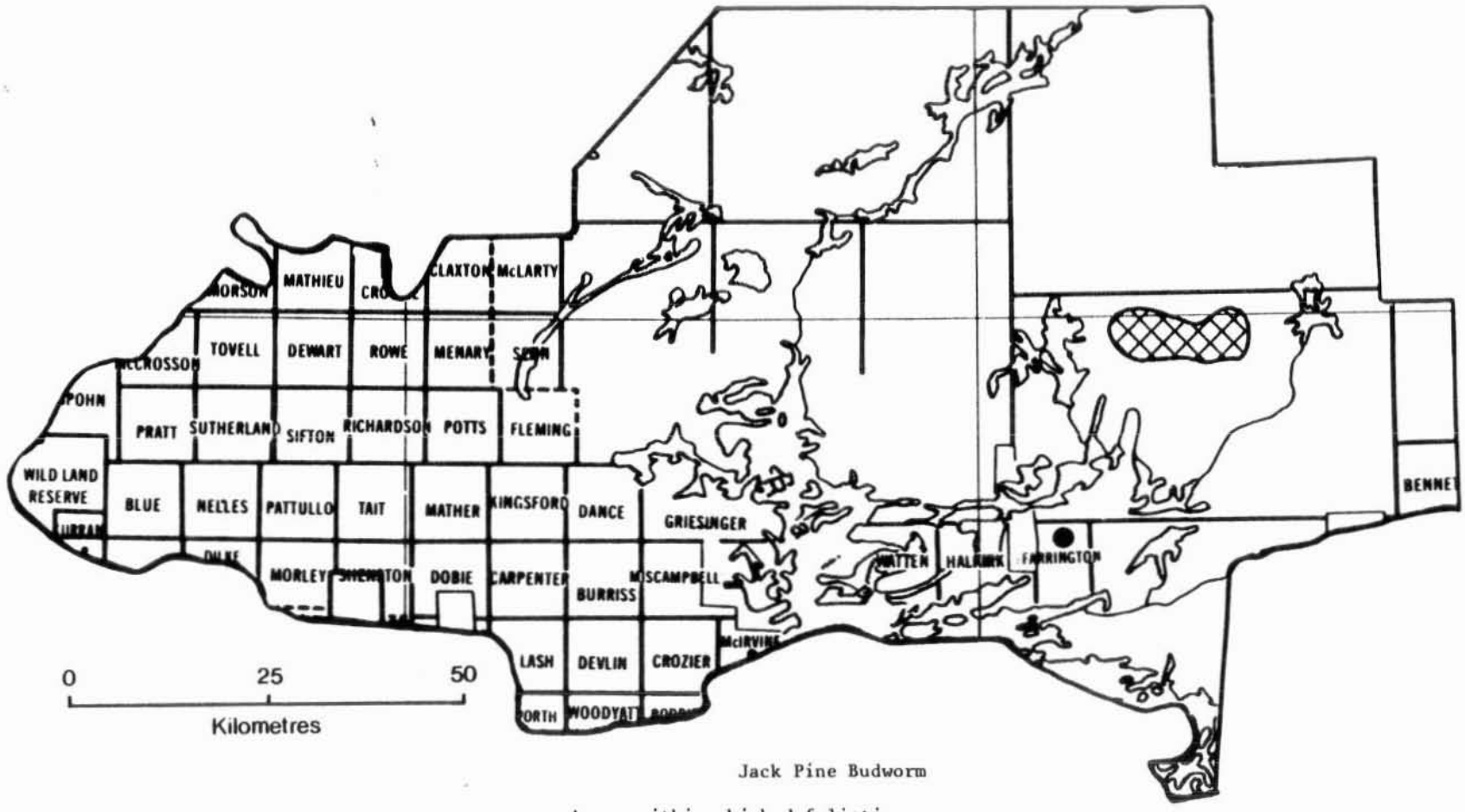
Moderate-to-severe defoliation

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

Host(s): jP [Major]

Year	Remarks
1950-1958	not reported
1959	moderate-to-severe defoliation over 129 km^2 in the Lowe Lake-Tessup Lake area and in Farrington Twp (see map, page 38)
1960	The area and intensity of defoliation remained the same in the Lowe Lake-Tessup Lake area and in Farrington Twp (see map, page 39).
1961	moderate-to-severe defoliation of approximately 186 km^2 of jack pine stands north of Rainy Lake (see map, page 40).
1962	Populations declined to trace levels.
1963-1965	not reported
1966	approximately 1032 km^2 of moderate-to-severe defoliation in the northern part of the district (see map, page 41)
1967	moderate-to-severe defoliation over 1032 km^2 in the northern half of the district; two pockets of moderate-to-severe defoliation in Sifton and Dance twps (see map, page 42)
1968	The infestation declined to trace levels in the northern part of the district. There was a new pocket of light defoliation in a 50-year-old stand between Redgut Bay on Rainy Lake and the Seine River (see map, page 43).
1969	Populations declined to trace levels.
1971	new infestations in the northeastern part of the district (see map, page 44)
1972	The infestation collapsed, and defoliation was negligible.
1973-1980	not reported

FORT FRANCES DISTRICT



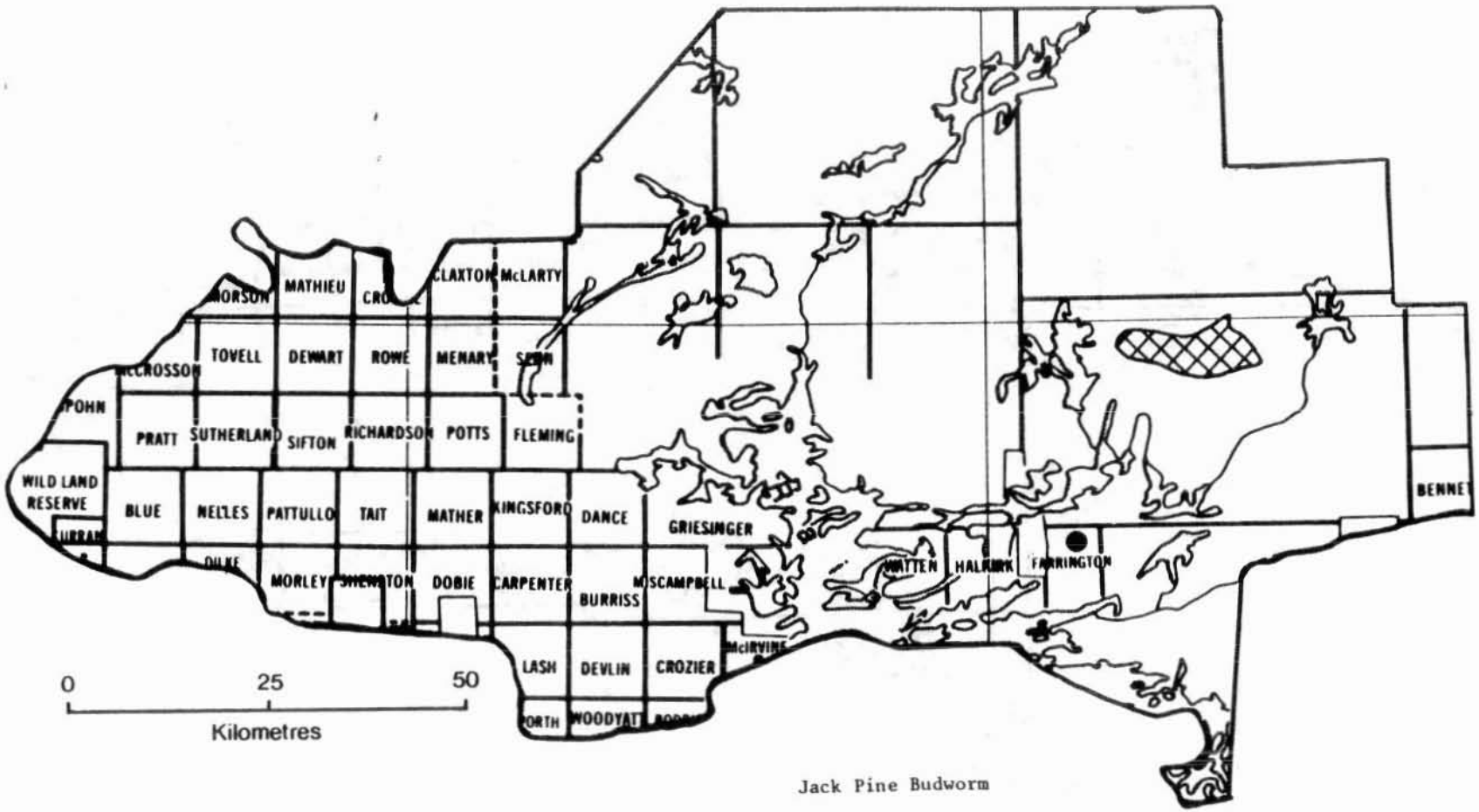
Jack Pine Budworm

Areas within which defoliation occurred in 1959

LEGEND

Moderate-to-severe defoliation ● or ▨

FORT FRANCES DISTRICT



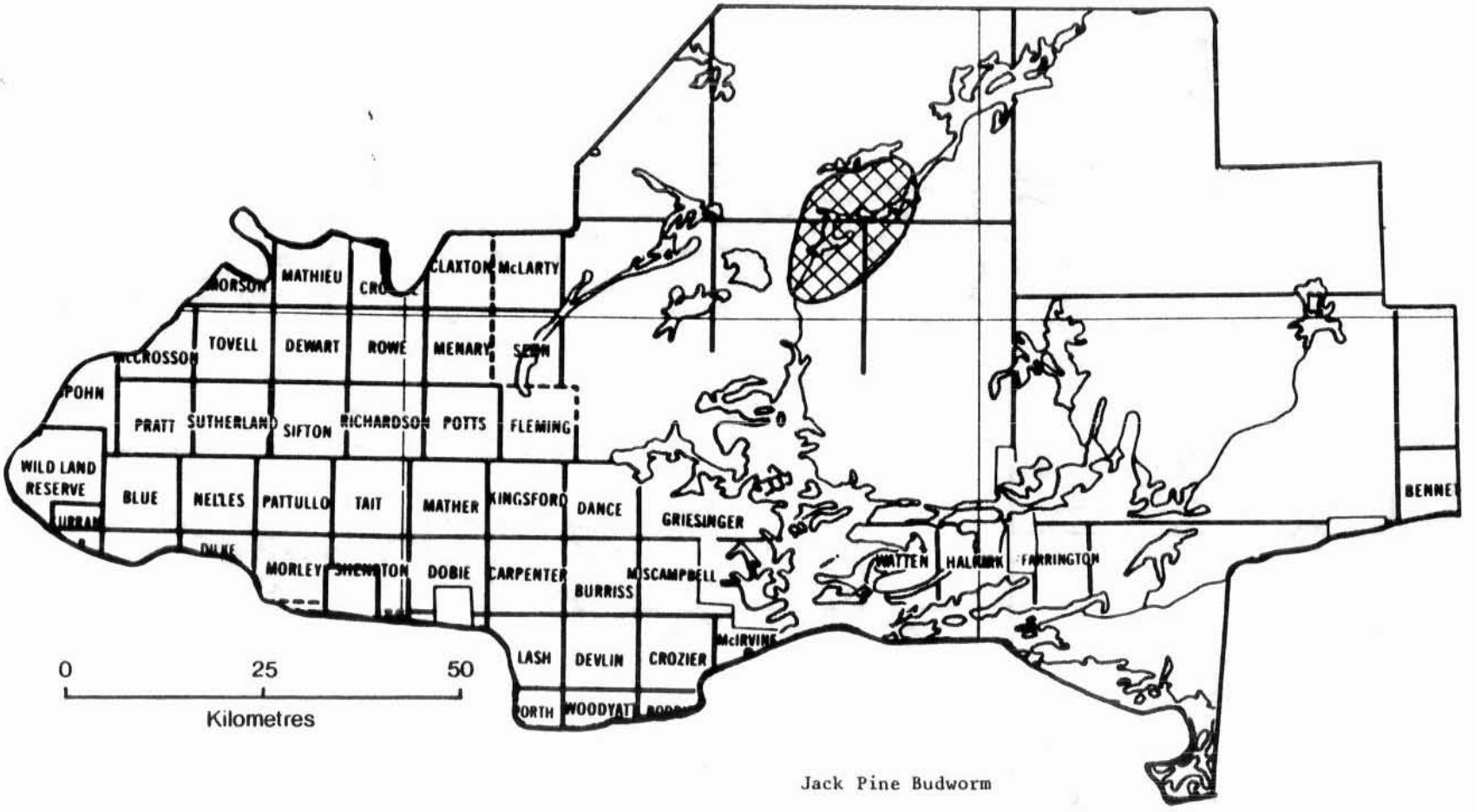
Jack Pine Budworm

Areas within which defoliation occurred in 1960

LEGEND

Moderate-to-severe defoliation ● or ▨

FORT FRANCES DISTRICT



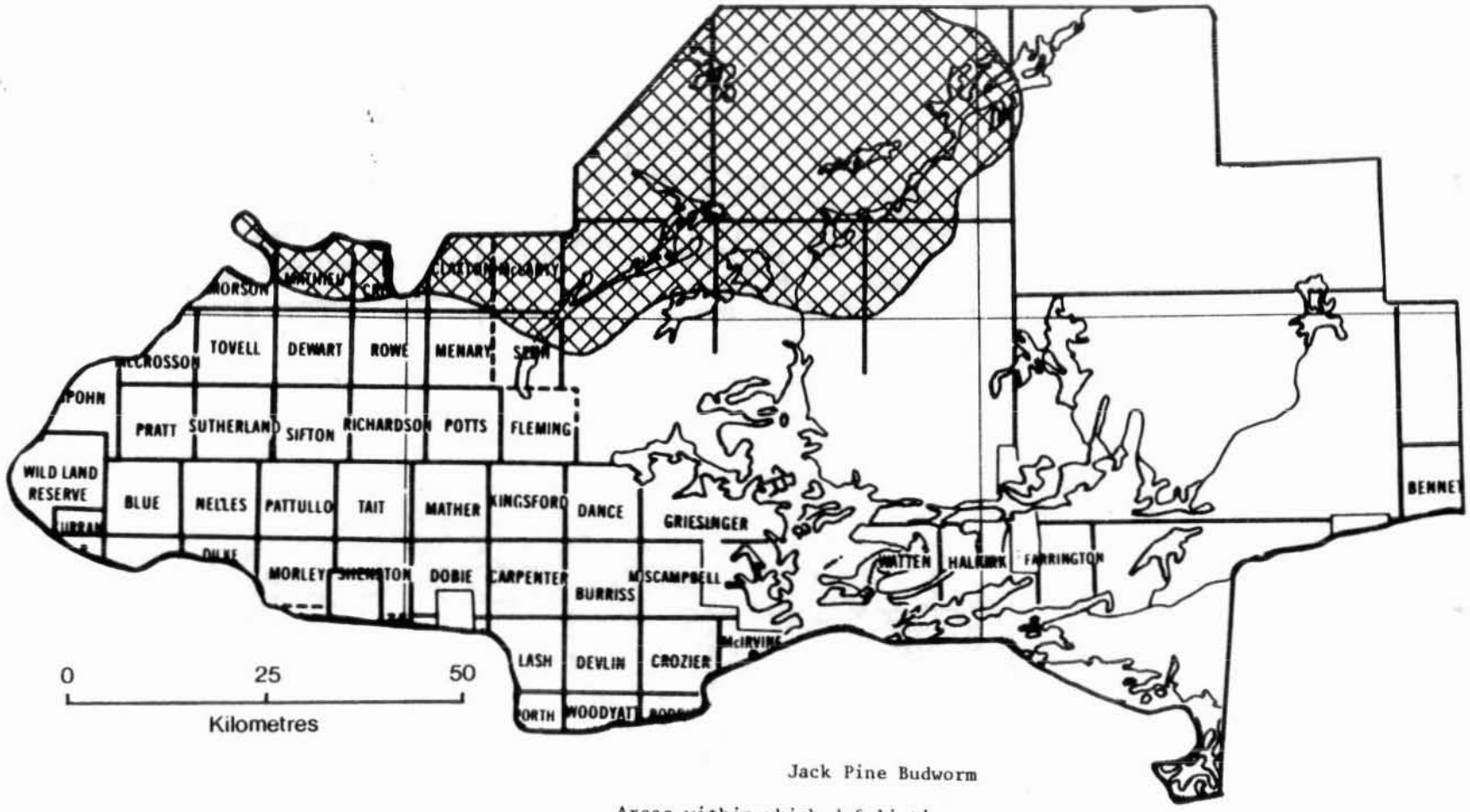
Jack Pine Budworm

Areas within which defoliation occurred in 1961

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



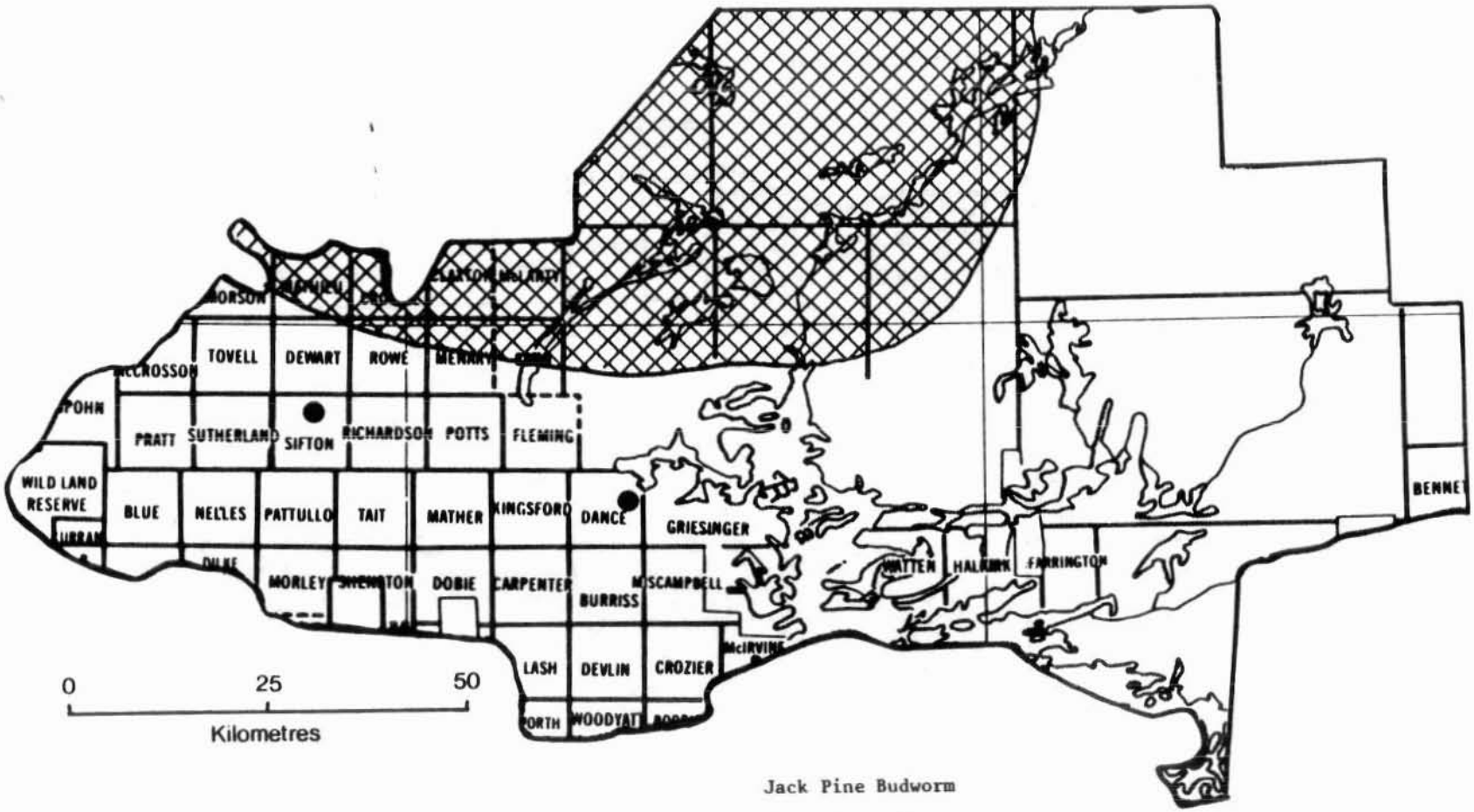
Jack Pine Budworm

Areas within which defoliation occurred in 1966

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



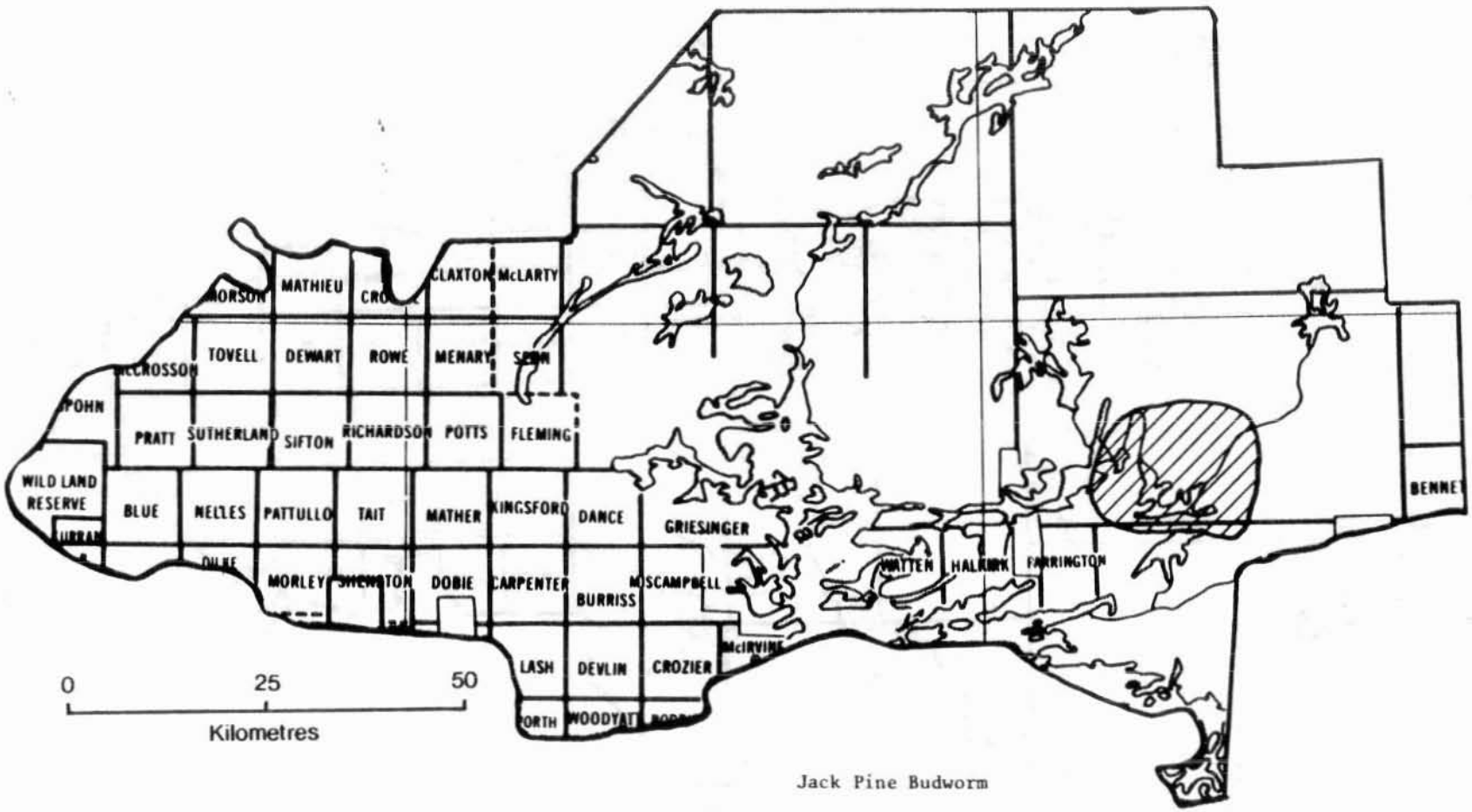
Jack Pine Budworm

Areas within which defoliation occurred in 1967

LEGEND

Moderate-to-severe defoliation ▨ or ●

FORT FRANCES DISTRICT



Jack Pine Budworm

Areas within which defoliation occurred in 1968

LEGEND

Light defoliation

FORT FRANCES DISTRICT

Jack Pine Budworm

Areas within which defoliation occurred in 1971

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation

Larch Casebearer, *Coleophora laricella* (Hbn.)

Host(s): tL [Major]

Year	Remarks
1950-1960	not reported
1961	first record in the district; low numbers of larvae found in Morley Twp
1962	low numbers in Miscampbell, Woodyatt, Devlin and McIrvine twps
1963	continued to spread through the western part of the district; low numbers found in Potts Twp
1964-1965	little change in distribution or intensity
1966-1971	trace populations, no change in distribution
1972-1976	not reported
1977	low numbers in Lash Twp
1978-1979	not reported
1980	low numbers in Lash Twp

Introduced Pine Sawfly, *Diprion similis* (Htg.)

Host(s): pine [Major]

Year	Remarks
1950-1969	not reported
1970	first record in the district; varying degrees of defoliation within an 8,000-ha triangular area bounded by Fort Frances, Bear Pass and Rice Bay on Rainy Lake
1971	The insect was found infesting pine over 40,000 ha from Fort Frances, east along Highway 11 for 48 km, north to MacDonald Inlet on Rainy Lake, and south to the international border.

(cont'd)

Introduced Pine Sawfly, *Diprion similis* (Htg.) (concl.)

Year	Remarks
1972-1973	declined to low numbers
1974	low numbers along shorelines of Rainy Lake
1975	low numbers on Rainy Lake and in Morley and Woodyatt twps
1976	not reported
1977	Moderate-to-high populations were recorded on ornamental jack pine in Dilke twp.
1978	light damage to Scots pine in Atwood Twp.
1979	trace populations in Claxton Twp and at Kaiarskons Lake
1980	not reported

Greenstriped Mapleworm, *Dryocampa rubicunda rubicunda* (Fabr.)

Host(s): maple [Major]

Year	Remarks
1950-1957	not reported
1958	low numbers found at Porter Inlet, Vague Point and Rebecca Island in Rainy Lake
1959	Low numbers persisted at Porter Inlet, but the insect was not found elsewhere.
1960	low numbers at Porter Inlet and Pine Narrows on Rainy Lake and near Little Pine Lake
1961	not reported
1962-1963	trace level at Hangingstone Point on Rainy Lake
1964-1965	not reported
1966	two colonies at Porter Inlet on Rainy Lake
1967-1975	not reported

(cont'd)

Greenstriped Mapleworm, *Dryocampa rubicunda rubicunda* (Fabr.) (concl.)

Year	Remarks
1976	low numbers along the Manitou Access Road
1977	light defoliation west of Mine Centre along Highway 11 and at Potts Lake
1978	A small infestation caused moderate-to-severe defoliation at Windy Point and Commissioner's Bay on Rainy Lake.
1979	not reported
1980	Scattered colonies were found at several locations in Watten Twp.

Aspen Twoleaf Tier, *Enargia decolor* (Wlk.)

Host(s): poplar [Major]

Year	Remarks
1950-1958	not reported
1959	Defoliation ranging from 10% to 65% was general through the western part of the district.
1960	Populations declined and defoliation was generally light.
1961	Populations collapsed; one larva was found.
1962-1968	not reported
1969	pockets of light defoliation in the western part of the district
1970-1980	not reported

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

Host(s): pine [Major]

Year	Remarks
1950-1957	not reported
1958	light infestations along Lake Despair Road and in Potts Twp
1959	Both populations from the 1958 outbreak declined to trace levels.
1960	low numbers along Lake Despair Road, in Manitou Rapids Indian Reserve and in Potts Twp
1961	low numbers in a small jack pine plantation in Shenston Twp
1962-1963	not reported
1964	moderate-to-severe damage in jack pine regeneration in Morson Twp; low numbers in Mather Twp
1965	Populations declined and little damage occurred.
1966-1968	trace numbers in Morson Twp
1969	not reported
1970-1975	not reported
1976	6% leader damage along Manion Lake Road
1977	2% leader damage along Manion Lake Road
1978	trace levels through the district.
1979	3% terminal damage along Manion Lake Road
1980	low numbers through the district

Birch Leaf Miner, *Fenusa pusilla* (Lep.)

Host(s): birch [Major]

Year	Remarks
1950-1971	not reported
1972	small area of light defoliation west of Emo
1973-1980	not reported

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Host(s): deciduous species [Major]

Year	Remarks
1950	Moderate-to-severe defoliation occurred at several locations in the central and eastern parts of the district (see map, page 52).
1951	Infestations continued to expand (see map, page 53).
1952	Infestations coalesced and most stands in the district suffered moderate-to-severe defoliation. In the northwestern part of the district there was light defoliation (see map, page 54).
1953	Heavy infestations and moderate-to-severe defoliation persisted over the western part of the district (see map, page 55).
1954	Unusually low temperatures following egg hatch resulted in high mortality of larvae. No defoliation was observed.
1955	single colonies noted in Burriss and Mather twps
1956-1960	not reported
1961	light defoliation observed in Sutherland Twp; trace populations at several points
1962	Pockets of moderate-to-severe defoliation occurred at five scattered locations (see map, page 56).

(cont'd)

Forest Tent Caterpillar, *Malacosoma disstria* Hbn. (cont'd)

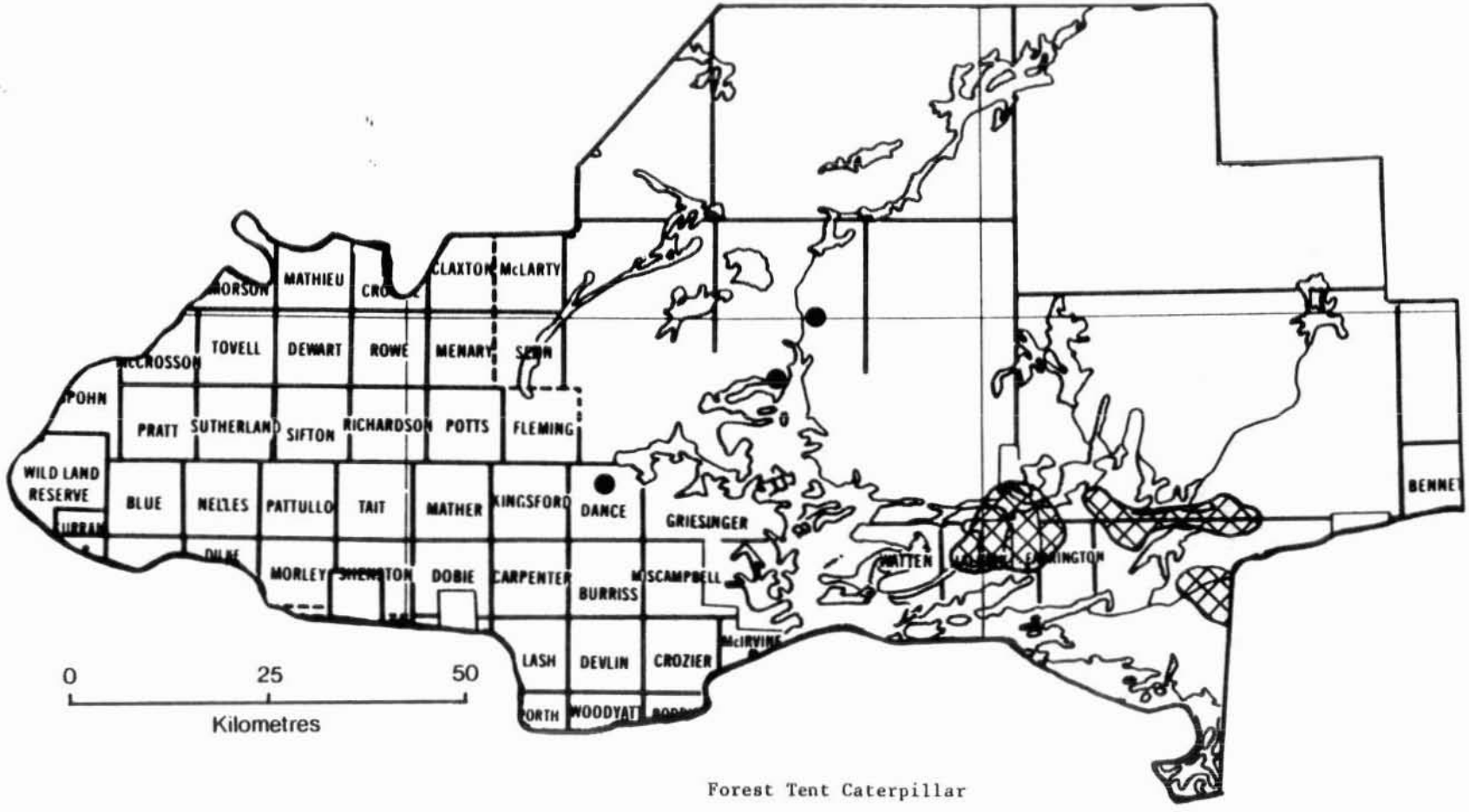
Year	Remarks
1963	Infestations expanded and the eastern two-thirds of the district suffered moderate-to-severe defoliation (see map, page 57).
1964	Moderate-to-severe defoliation was mapped through the northeastern part of the district and light defoliation was general in the southwestern section (see map, page 58).
1965	Infestation and defoliation levels were similar to those observed in 1964.
1966	Weather conditions reduced the infestation and moderate-to-severe defoliation was confined to the eastern part of the district (see map, page 59).
1967	Moderate-to-severe defoliation persisted in the south-eastern part of the district (see map, page 60).
1968	The infestation declined appreciably from 1967 (see map, page 61).
1969	The infestation expanded westward (see map, page 62).
1970	Heavy infestations persisted west of Fort Frances; light defoliation occurred east of the heavy infestation (see map, page 63).
1971	The infestation in the Fort Frances area continued to expand (see map, page 64).
1972	The infestation declined to low levels.
1973-1976	not reported
1977	trace population in the northwestern part of the district.
1978	Moderate-to-severe defoliation occurred over a large area in the western part of the district and pockets of heavy infestation were mapped in the eastern part of the district (see map, page 65).
1979	moderate-to-severe defoliation in the eastern and western parts of the district (see map, page 66)

(cont'd)

Forest Tent Caterpillar, *Malacosoma disstria* Hbn. (concl.)

Year	Remarks
1980	Only light defoliation remained west of a line from Lake of the Woods Provincial Park to Highway 11 in Morley Twp, an area of approximately 647 km^2 (see map, page 67).

FORT FRANCES DISTRICT



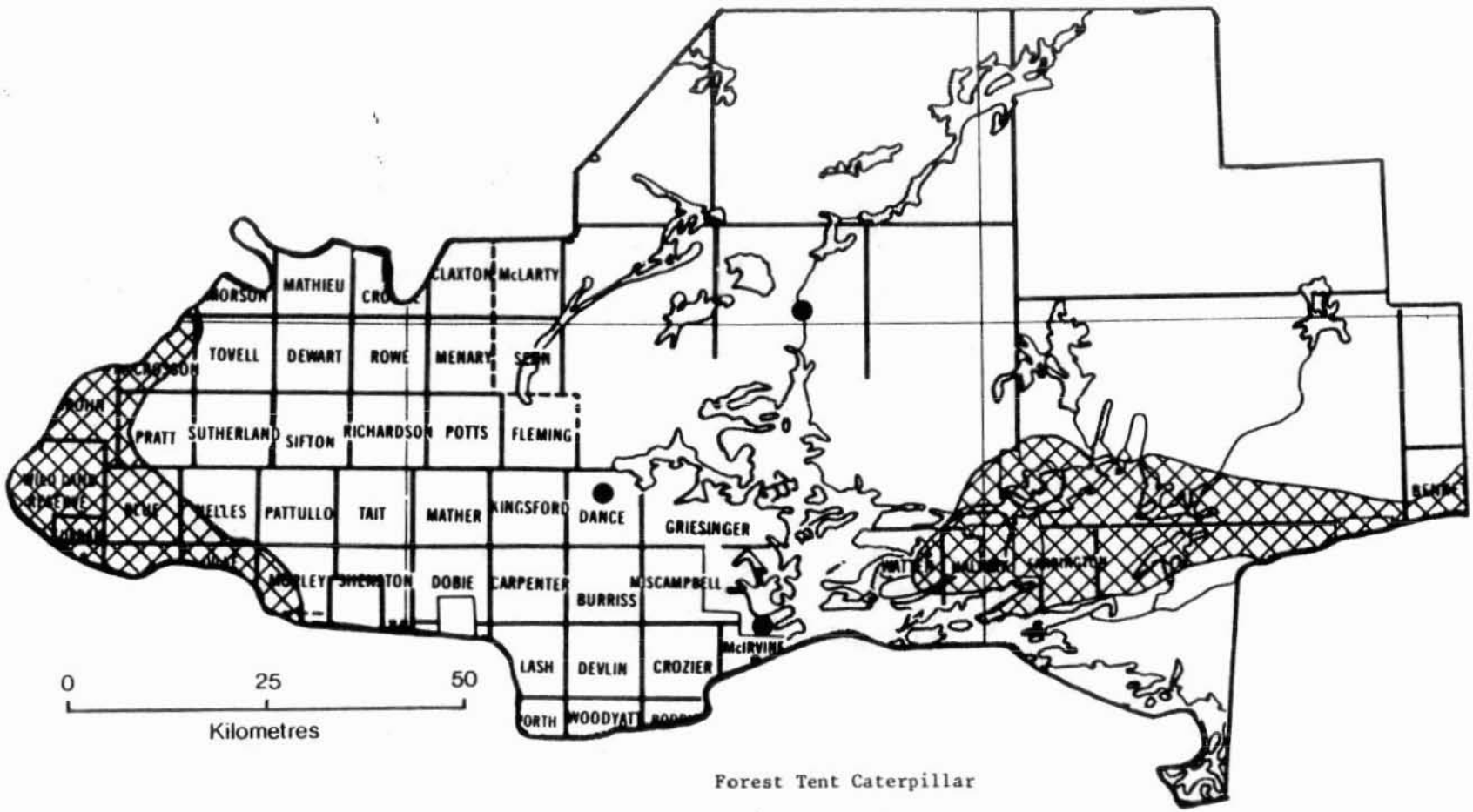
Forest Tent Caterpillar

Areas within which defoliation occurred in 1950

LEGEND

Moderate-to-severe defoliation ● or ▨

FORT FRANCES DISTRICT



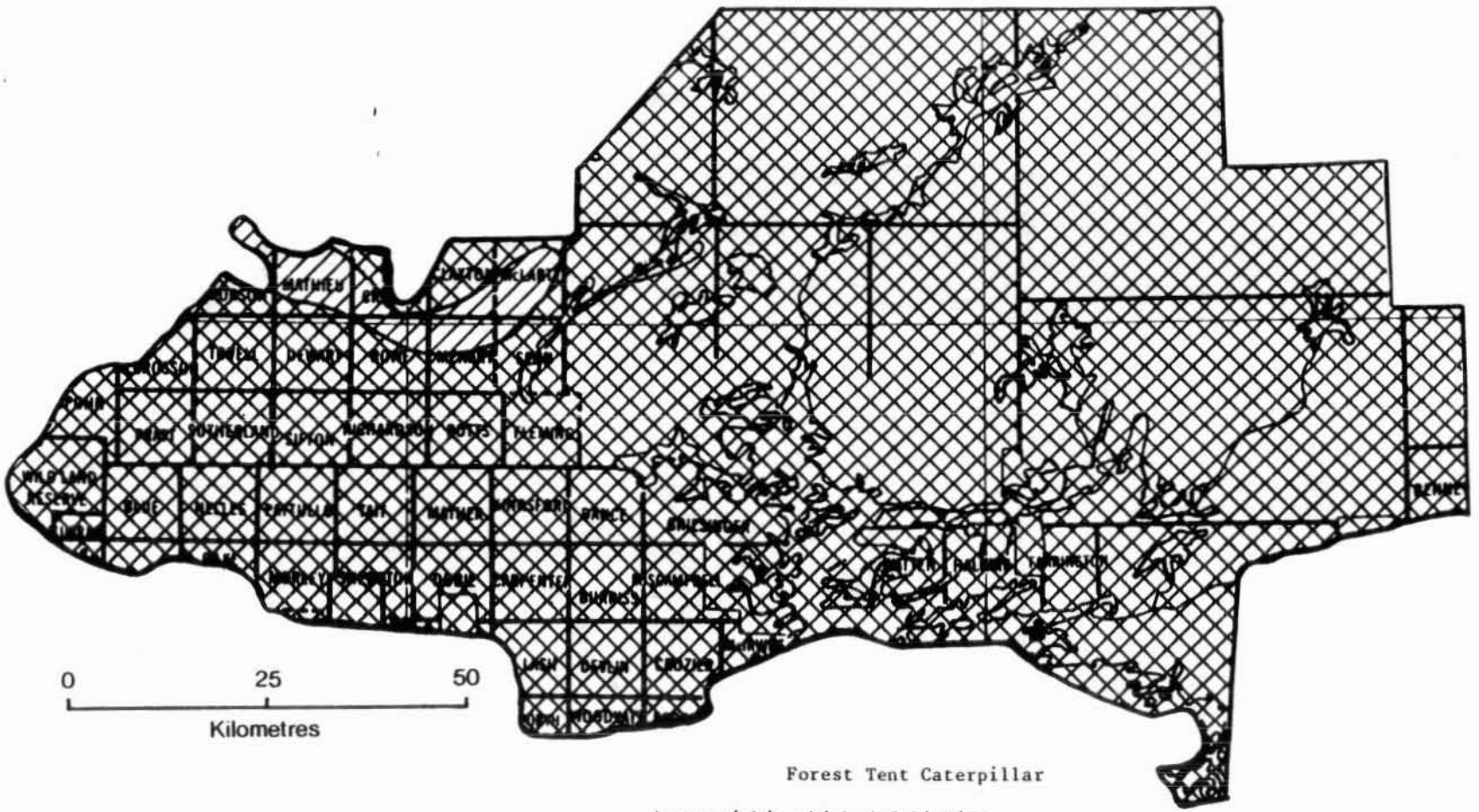
Forest Tent Caterpillar

Areas within which defoliation occurred in 1951

LEGEND

Moderate-to-severe defoliation ● or

FORT FRANCES DISTRICT



Forest Tent Caterpillar

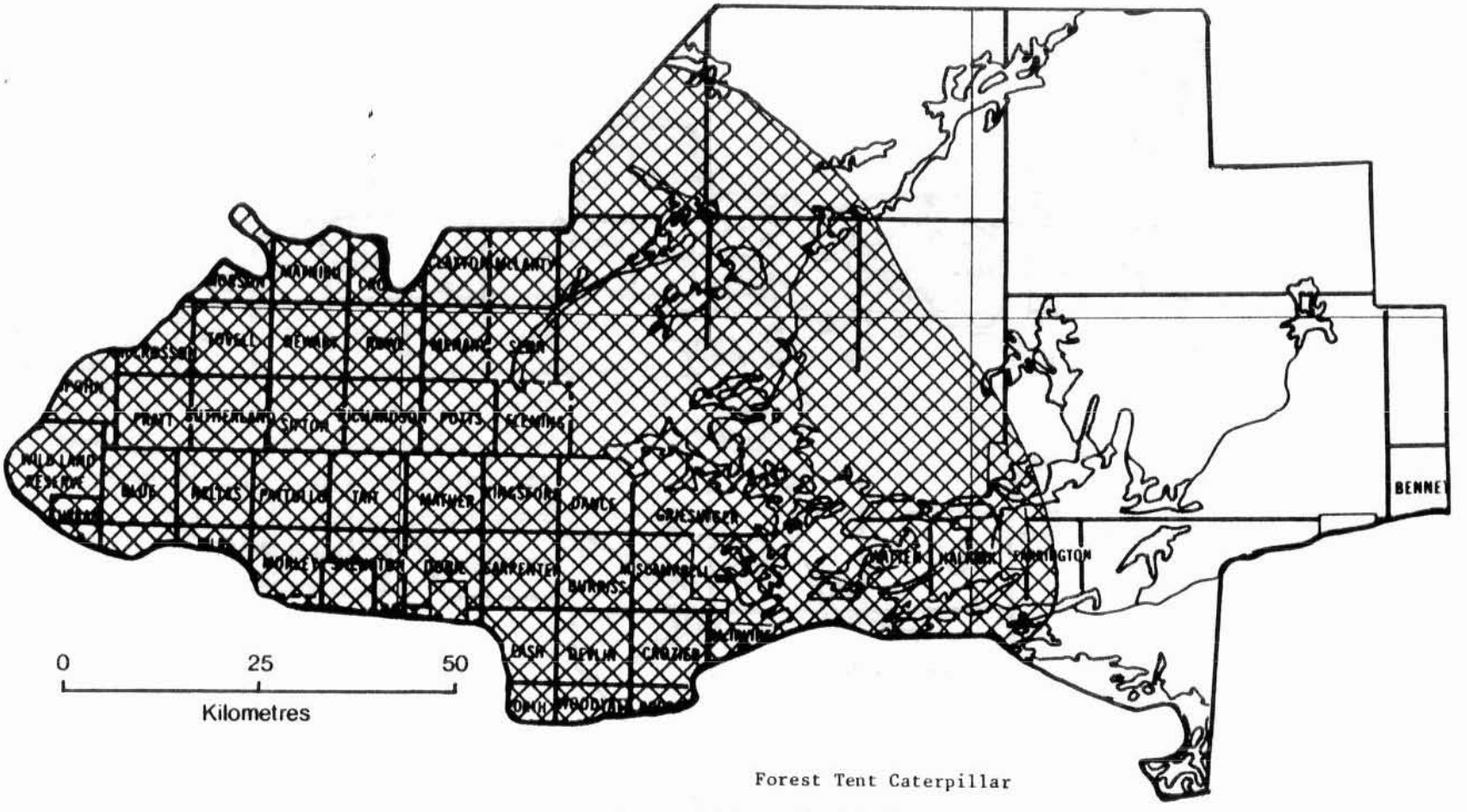
Areas within which defoliation occurred in 1952

LEGEND

Light defoliation

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



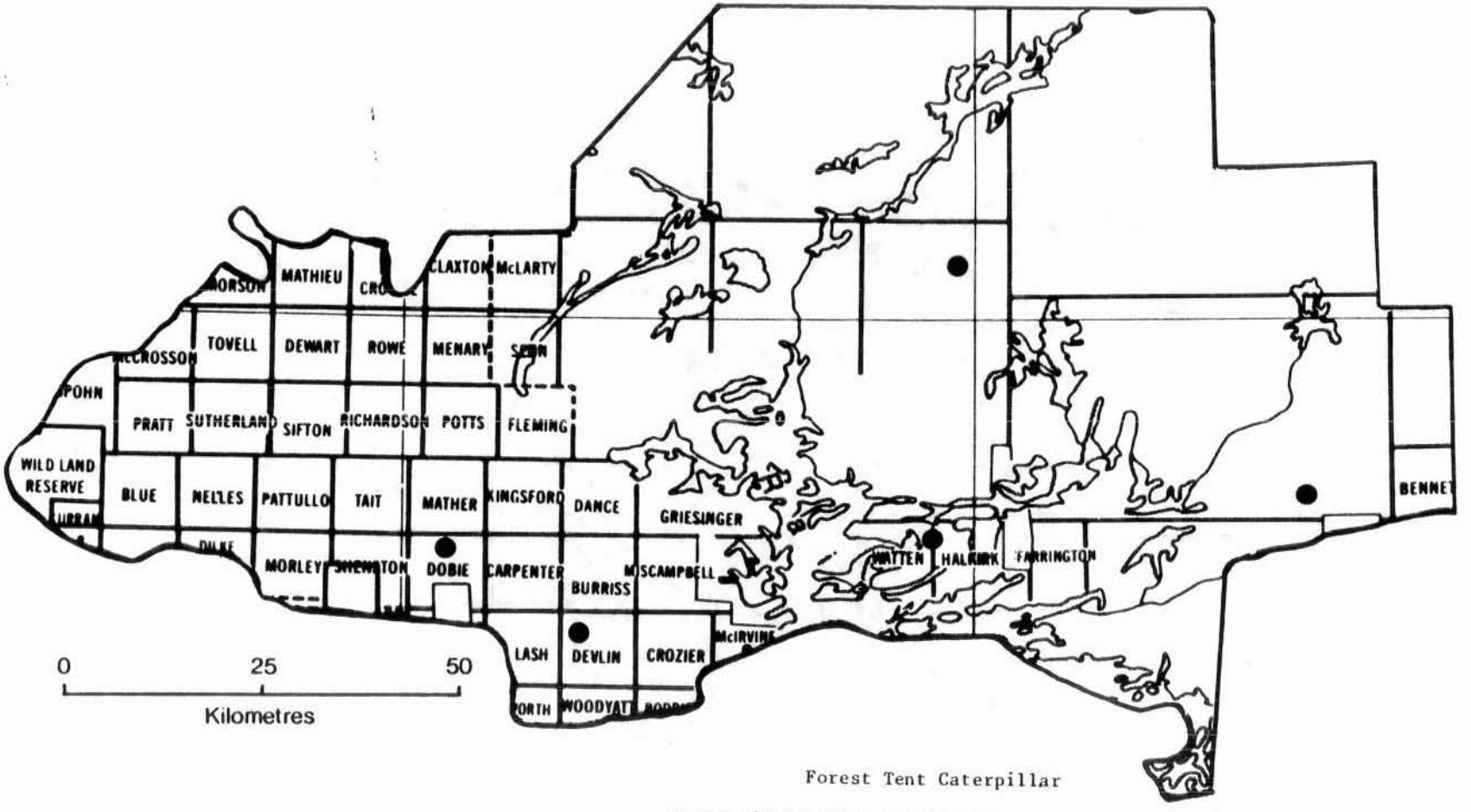
Forest Tent Caterpillar

Areas within which defoliation occurred in 1953

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



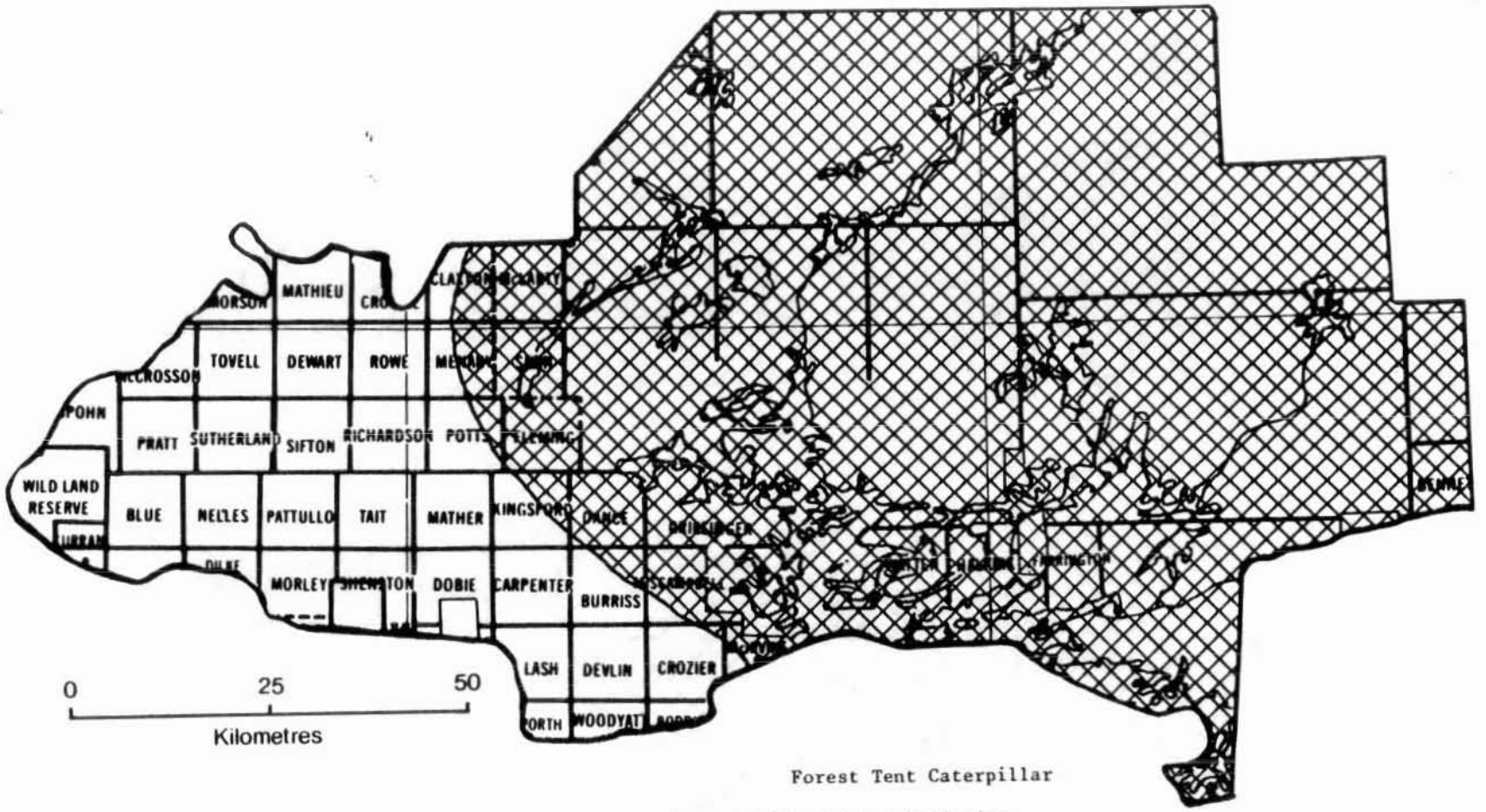
Forest Tent Caterpillar

Areas within which defoliation occurred in 1962

LEGEND

Moderate-to-severe defoliation ●

FORT FRANCES DISTRICT



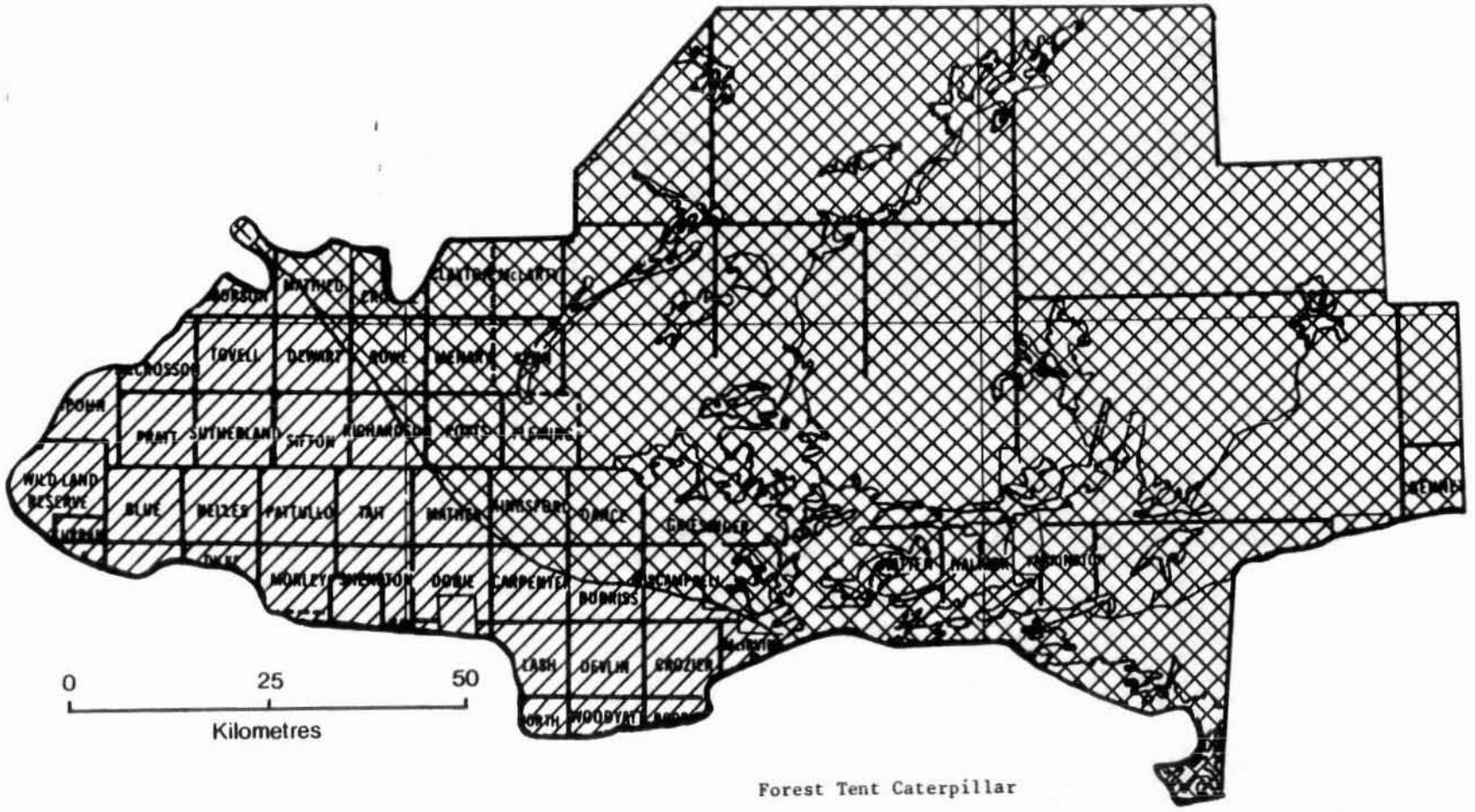
Forest Tent Caterpillar

Areas within which defoliation occurred in 1963

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



Forest Tent Caterpillar

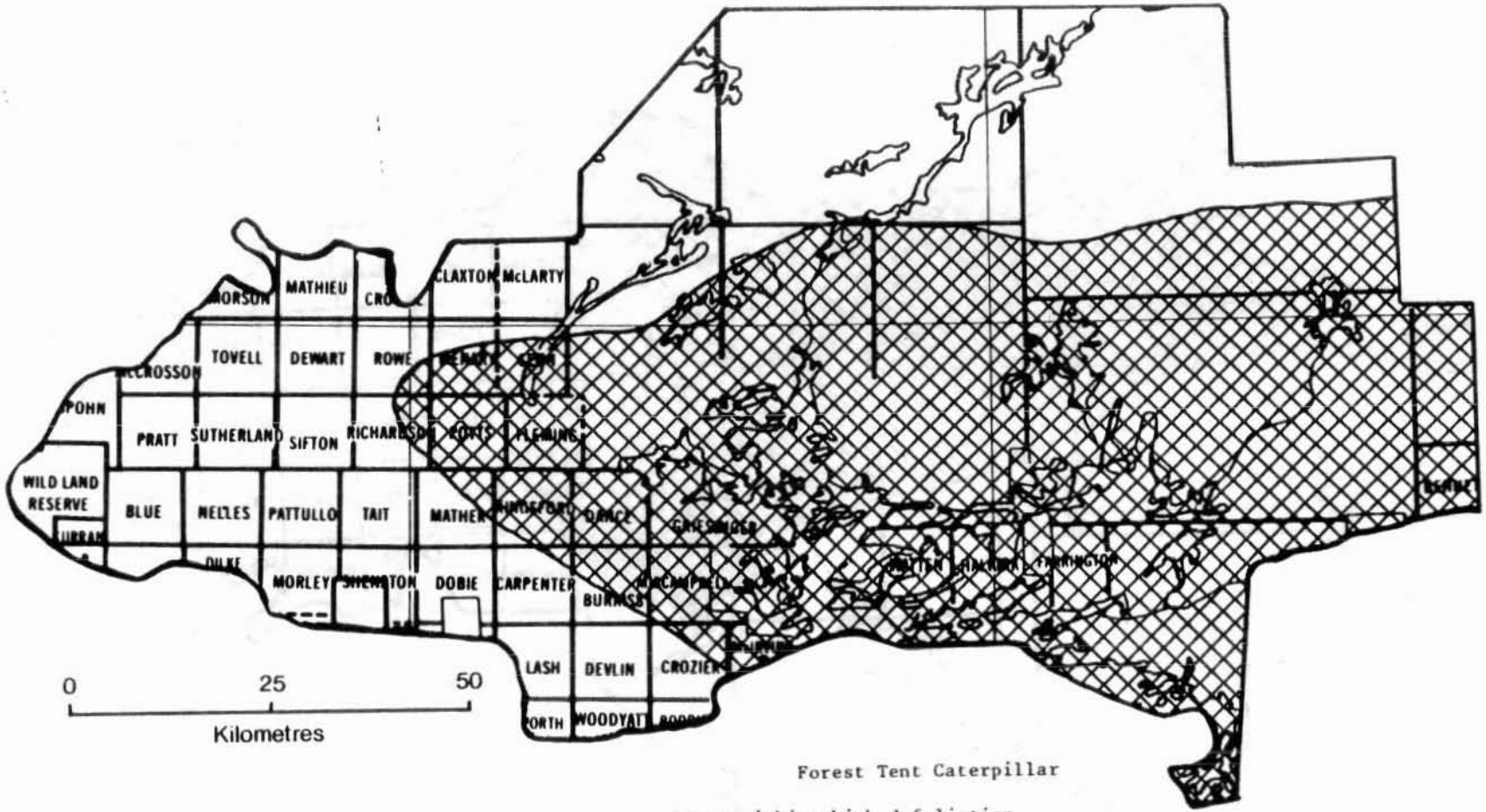
Areas within which defoliation occurred in 1964

LEGEND

Light defoliation

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



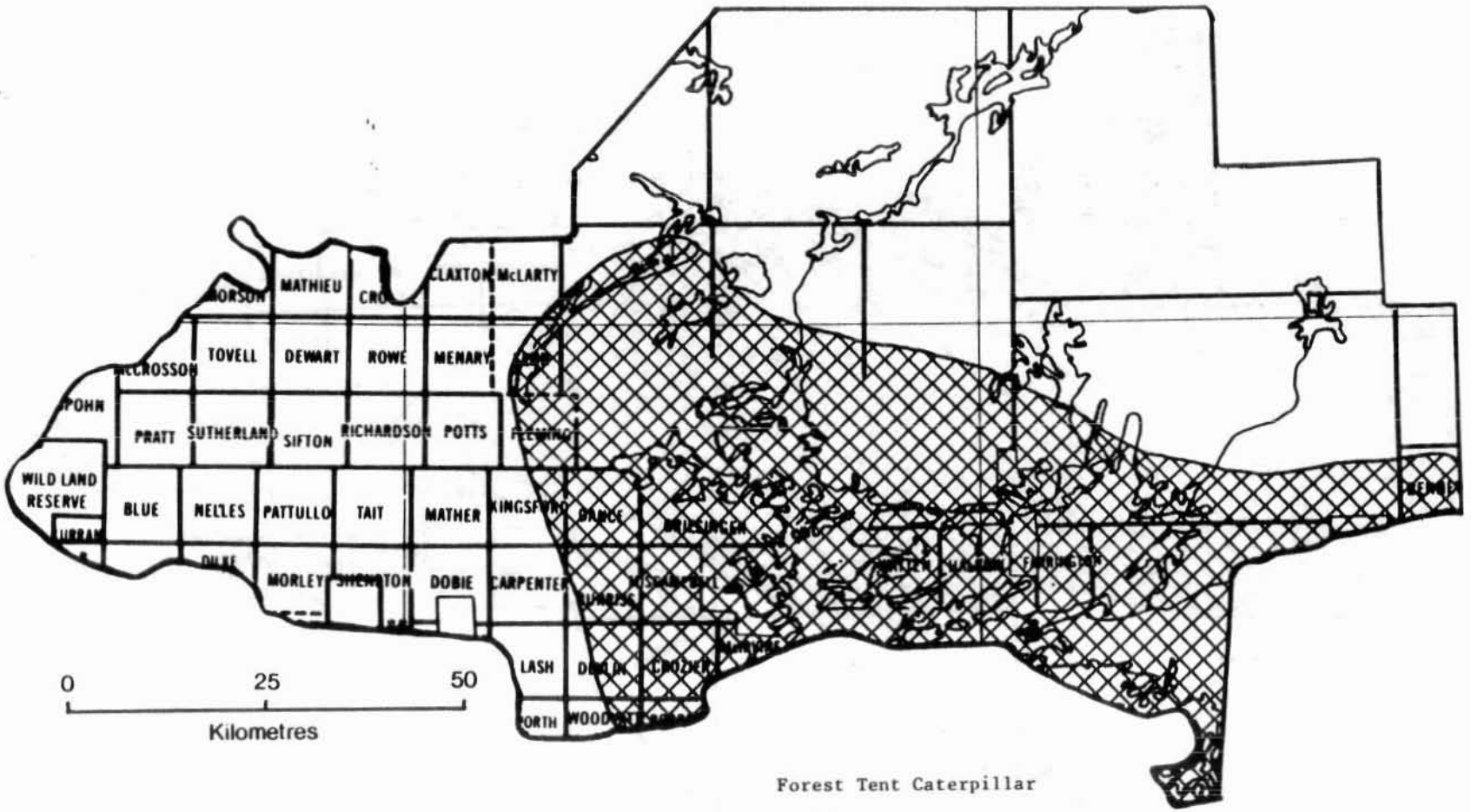
Forest Tent Caterpillar

Areas within which defoliation occurred in 1966

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



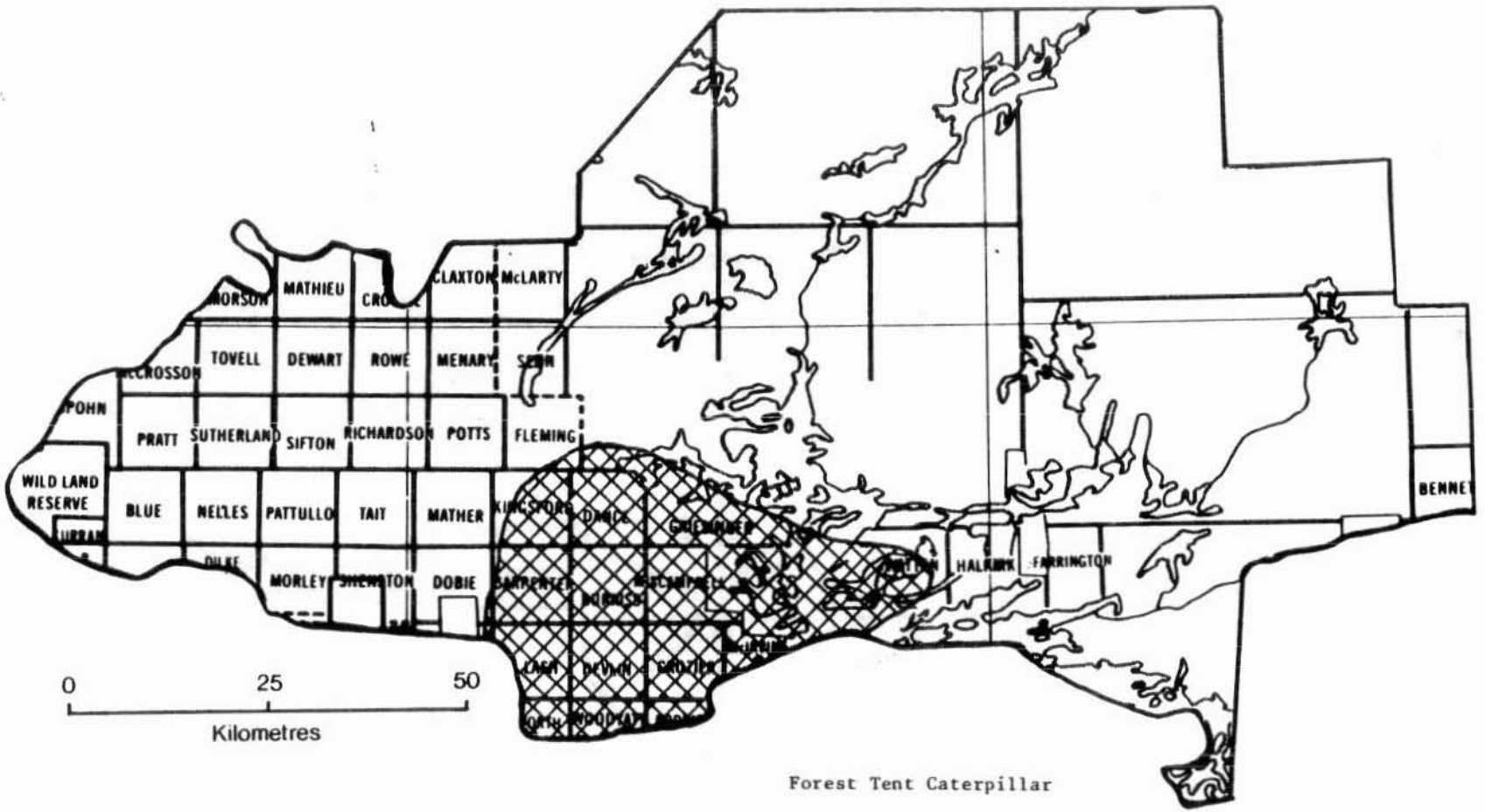
Forest Tent Caterpillar

Areas within which defoliation occurred in 1967

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



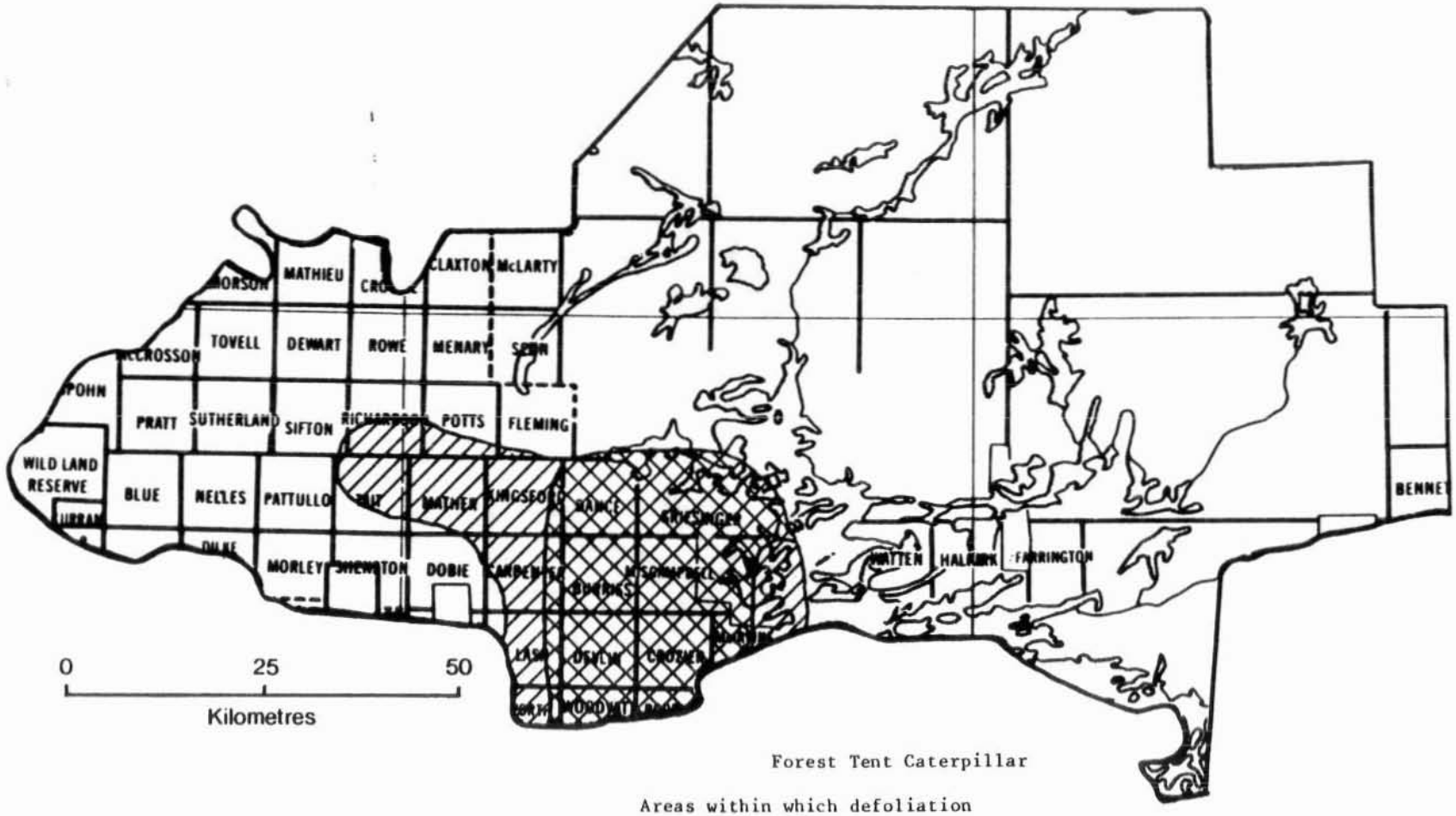
Forest Tent Caterpillar

Areas within which defoliation occurred in 1968

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



Forest Tent Caterpillar

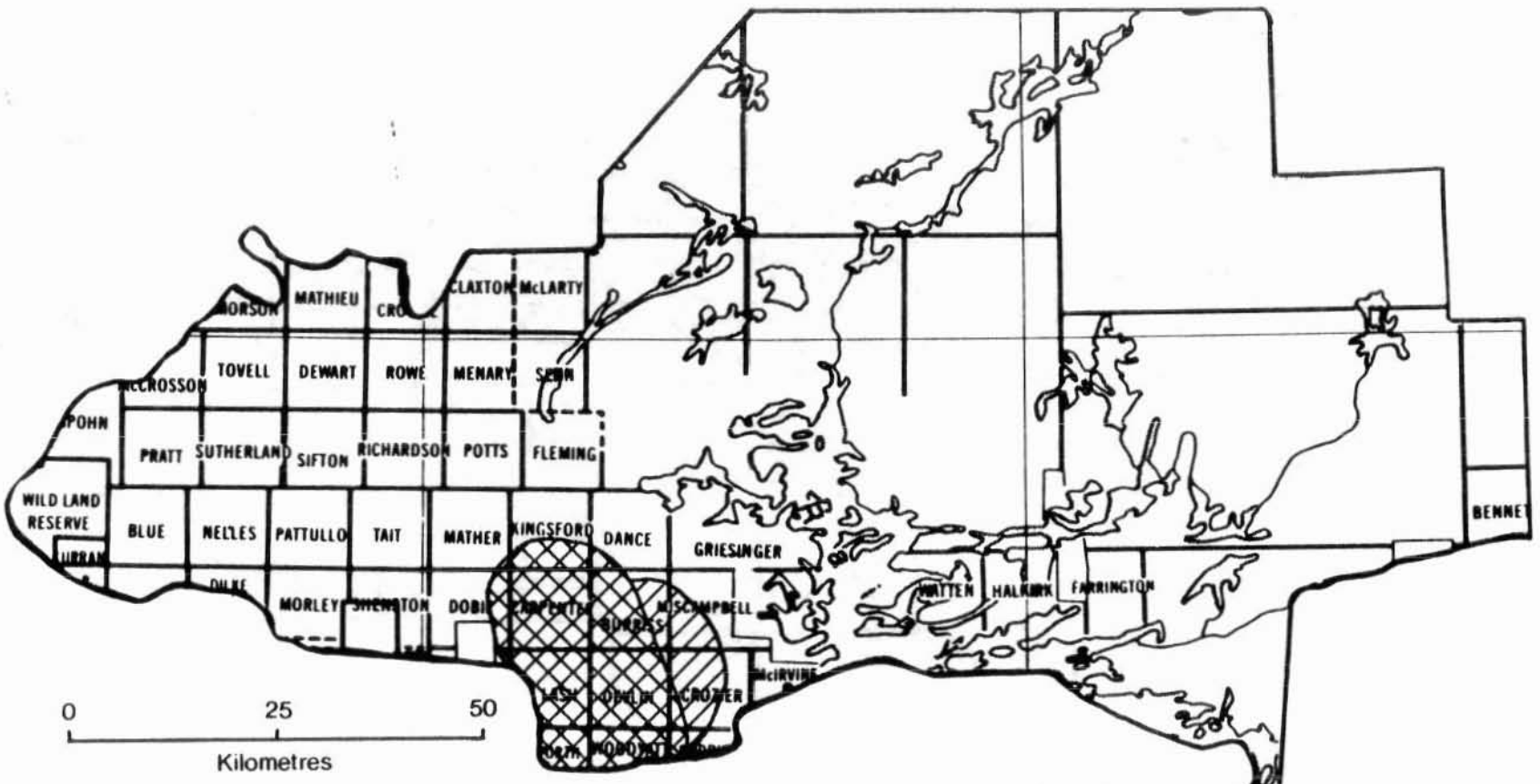
Areas within which defoliation occurred in 1969

LEGEND

Light defoliation

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



Forest Tent Caterpillar

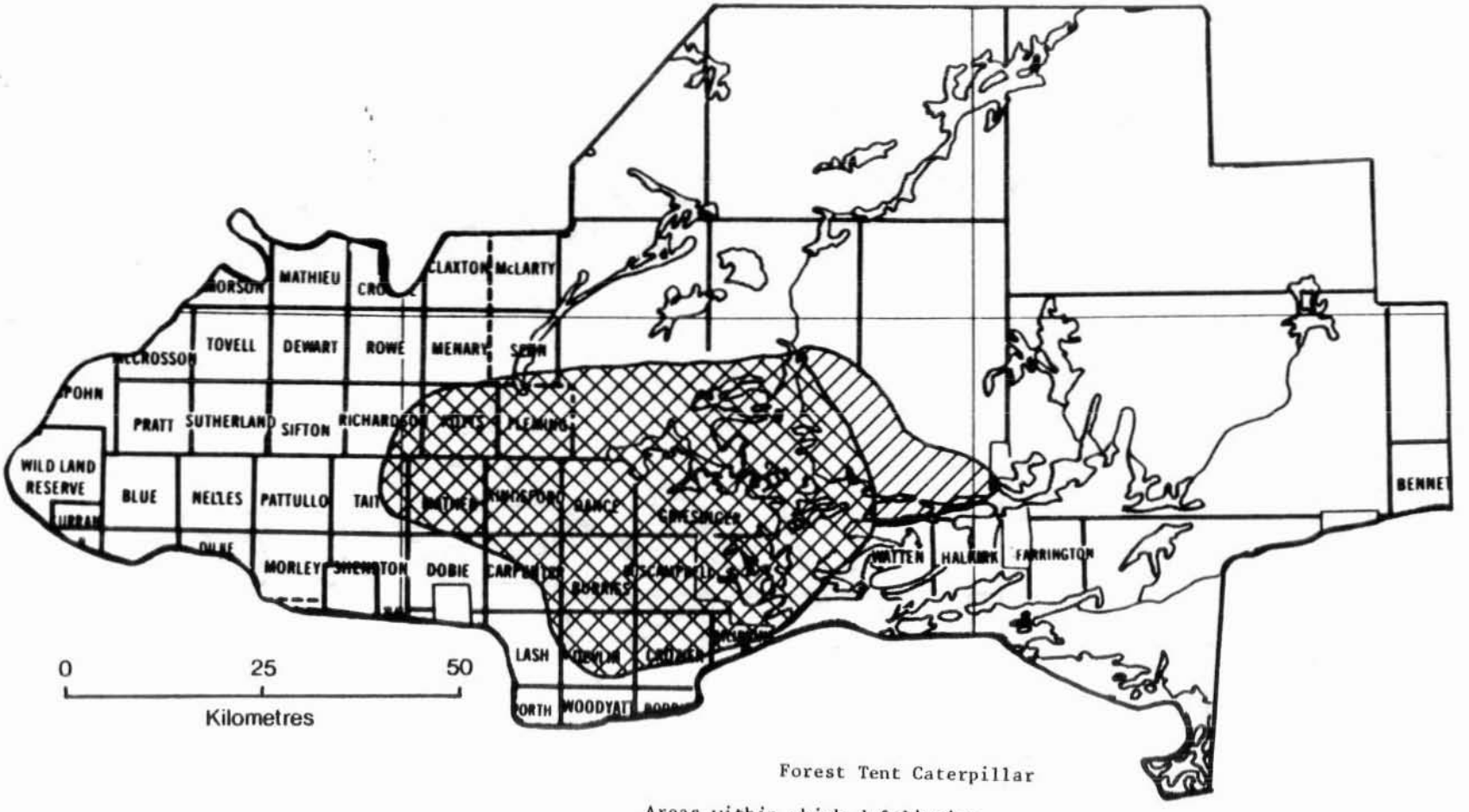
Areas within which defoliation occurred in 1970

LEGEND

Light defoliation

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



Forest Tent Caterpillar

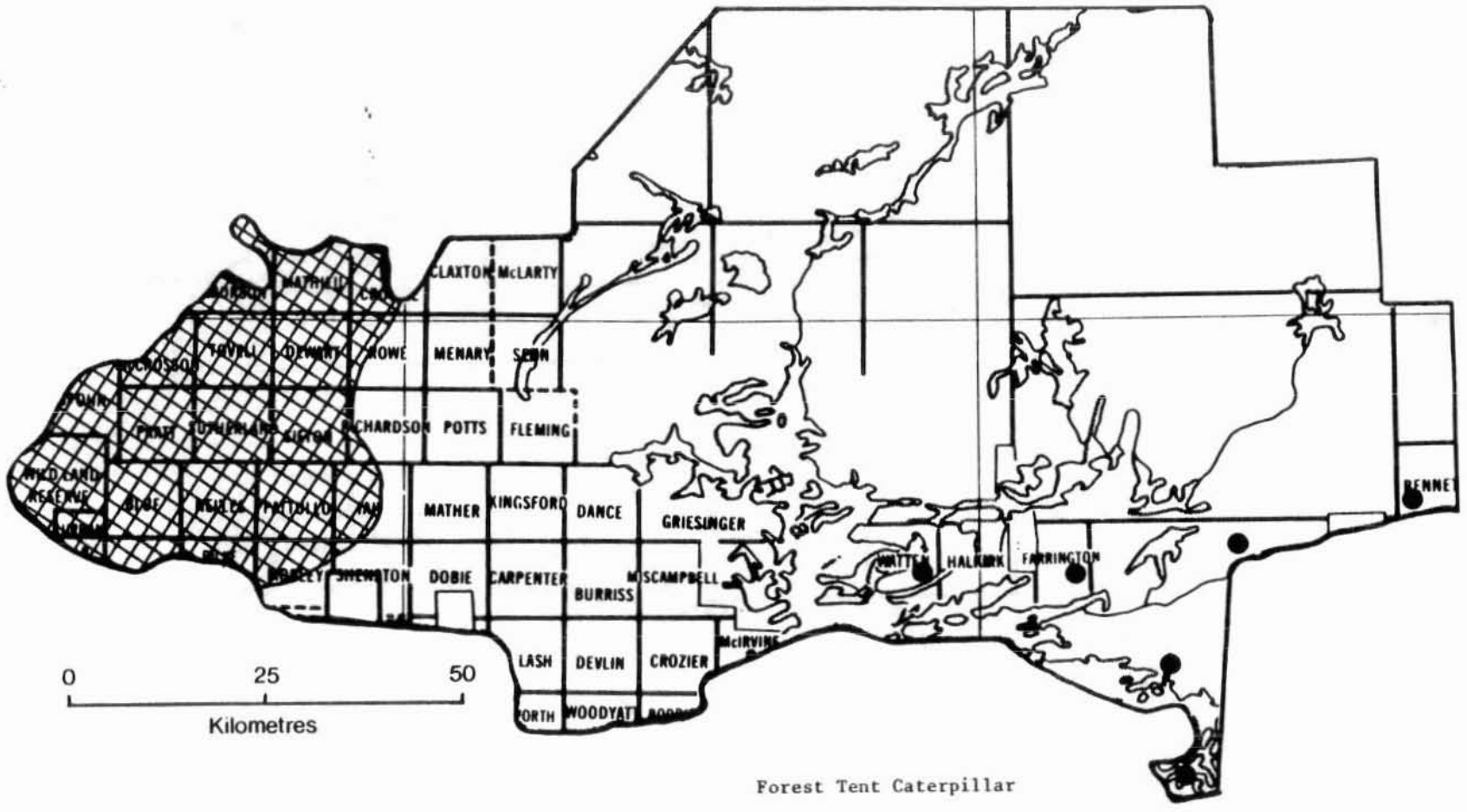
Areas within which defoliation occurred in 1971

LEGEND

Light defoliation

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



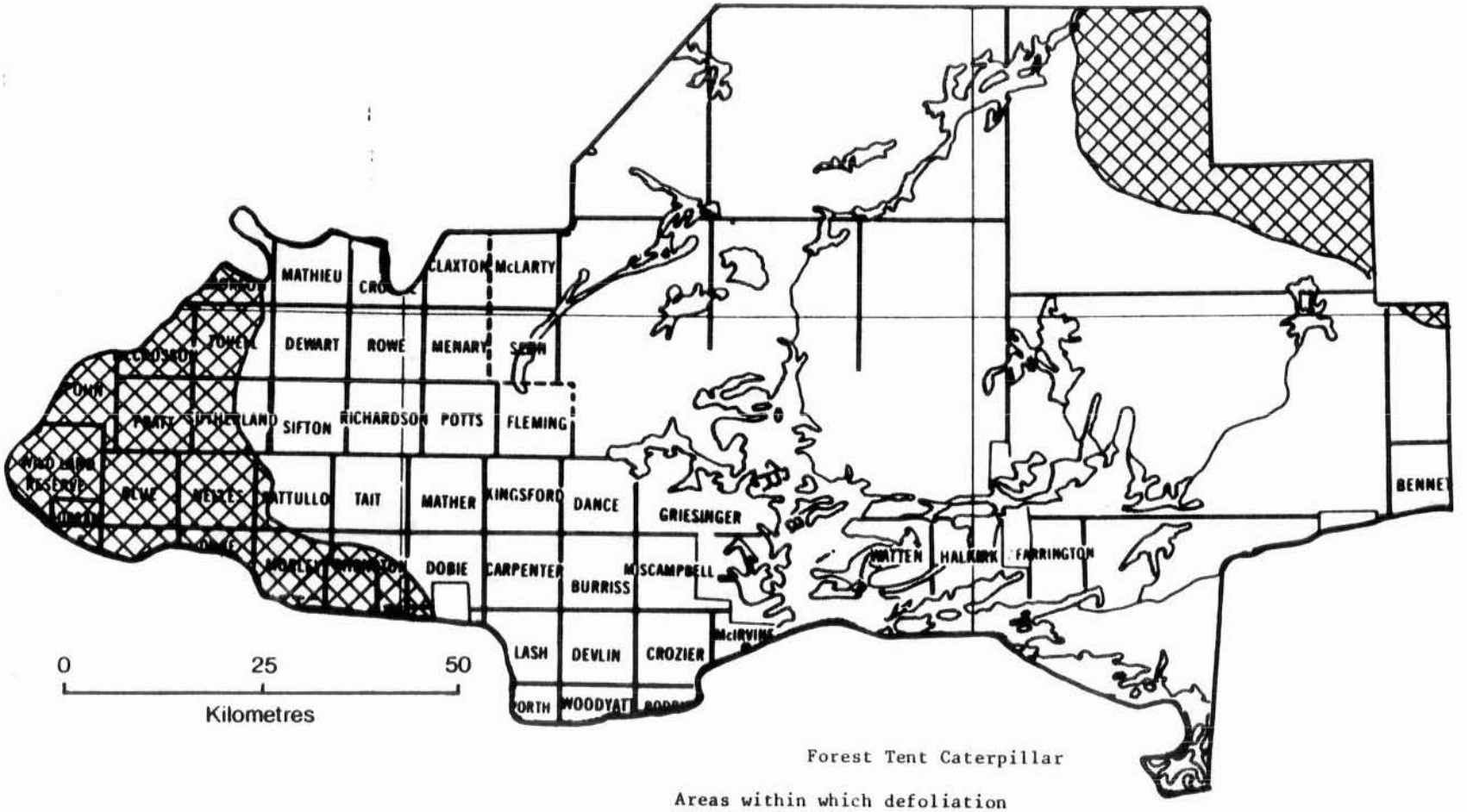
Forest Tent Caterpillar

Areas within which defoliation occurred in 1978

LEGEND

Moderate-to-severe defoliation ● or

FORT FRANCES DISTRICT



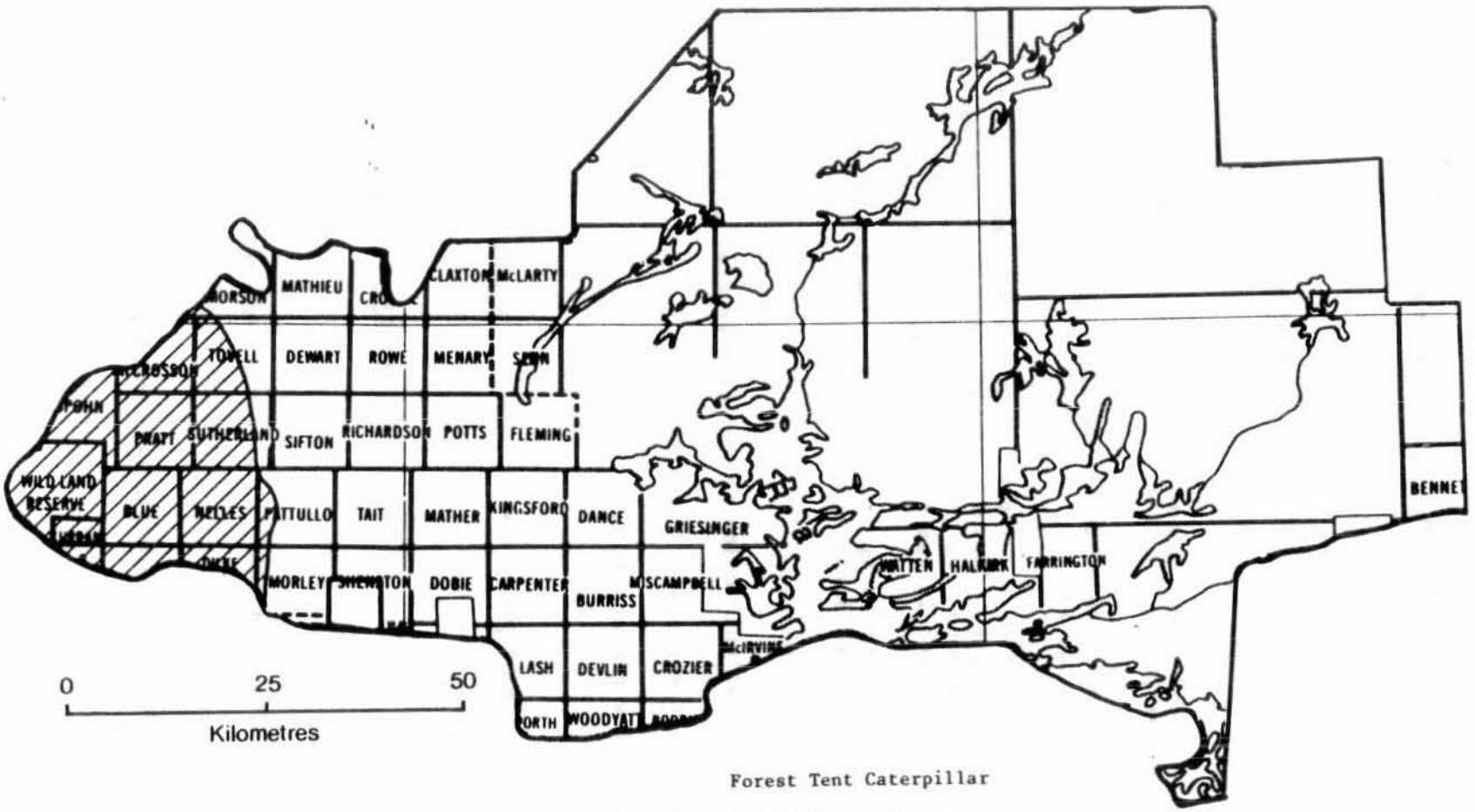
Forest Tent Caterpillar

Areas within which defoliation occurred in 1979

LEGEND

Moderate-to-severe defoliation

FORT FRANCES DISTRICT



Forest Tent Caterpillar

Areas within which defoliation occurred in 1980

LEGEND

Moderate-to-severe defoliation

Balsam Fir Sawfly, *Neodiprion abietis* complex

Host(s): bF, spruce [Major]

Year	Remarks
1950-1952	not reported
1953	trace populations on the north arm of Rainy Lake and in Devlin Twp
1954-1960	trace populations at several locations, with little annual fluctuation
1961	An increase in population levels was general across the district. Conspicuous browning of foliage was observed in McCrosson Twp and small pockets of light infestation occurred in seven townships west of Fort Frances.
1962-1968	Populations again declined to low levels and little change occurred during this period.
1969-1970	not reported
1971-1974	occasional colonies found at several points
1975-1979	not reported
1980	low numbers in Halkirk Twp

Red Pine Sawfly, *Neodiprion nanulus nanulus* Schedl.

Host(s): rP, nP [Major]

Year	Remarks
1950	not reported
1951	trace population along eastern shoreline of Rainy Lake
1952	not reported
1953	A heavy infestation occurred along the north arm of Rainy Lake.

(cont'd)

Red Pine Sawfly, *Neodiprion nanulus nanulus* Schedl. (concl.)

Year	Remarks
1954	A heavy infestation recurred along the north arm of Rainy Lake.
1955	moderate-to-severe defoliation on several jack pine trees at Standing Stone Point on Rainy Lake
1956	light defoliation of several small groups of jack pine trees on Rainy Lake and in Burriss Twp
1957	low numbers at several locations
1958	not reported
1959	low numbers at eight locations
1960	low numbers at four locations
1961	trace populations at several locations
1962	low numbers on Haymarsh and Hostess islands on Rainy Lake
1963	small, light infestation on Rebecca Island, Rainy Lake
1964-1969	trace populations at several locations
1970	not reported
1971	trace populations at two locations
1972-1973	not reported
1974	trace populations at two locations
1975-1978	not reported
1979	low numbers at Bear Pass, Rainy Lake
1980	light defoliation of small jack pine trees at Caliper Lake Provincial Park

Jack Pine Sawfly, *Neodiprion pratti banksianae* Roh.

Host(s): jP [Major]

Year	Remarks
1950-1952	not reported
1953	Lightly defoliated trees were observed at several locations along the north arm of Rainy Lake and scattered colonies were found in Lash, Pattullo and Menary twps.
1954-1955	Moderate-to-severe defoliation recurred along the north arm of Rainy Lake and at several points on Dash Lake. Small pockets of light defoliation were observed at Sawbill and Eltrut Lake, in the Wild Land Reserve and in Spohn Twp.
1956	Small groups of shoreline trees were moderately to severely defoliated at Vista, Pickwick, Kishkutena and Rainy lakes and at Sabaskong Bay on Lake of the Woods.
1957	Small open-grown trees suffered up to 90% defoliation at Shoe Bay on Rainy Lake. Lightly defoliated trees were observed at several other locations on Rainy Lake and at two points in Richardson Twp.
1958-1961	Little change in distribution or infestation intensity was observed.
1962-1966	declined to trace levels
1967-1969	not reported
1970	scattered colonies on Sandy Island in Rainy Lake and near Mine Centre
1971	trace levels
1973-1974	not reported
1975	low numbers at several points on Rainy Lake
1976-1978	not reported
1979	trace populations at a few locations
1980	not reported

Redheaded Jack Pine Sawfly, *Neodiprion virginianus* complex

Host(s): jP [Major]

Year	Remarks
1950-1951	not reported
1952	lightly defoliated roadside trees west of Fort Frances
1953	severely defoliated roadside trees in Lash Twp
1954	pockets of heavily defoliated open-grown trees at Shoal Lake, on Woodchuck Island in Rainy Lake and at the mouth of the Little Canoe River
1955	small groups of severely defoliated trees in Aylsworth and Richardson twps
1956	Only light defoliation was observed in Aylsworth Twp but severe defoliation was again recorded in Richardson Twp.
1957	Populations were light in Richardson Twp and medium to heavy on several trees in Claxton Twp.
1958	small pockets of moderate-to-severe defoliation in Richardson, Claxton and Aylsworth twps
1959	only light defoliation in Richardson, Aylsworth and Claxton twps
1960	Open-grown roadside trees suffered moderate-to-severe defoliation along Highway 71 from Nestor Falls to Potts Twp.
1961	severely defoliated roadside trees in Morley and Claxton twps
1962	Severe defoliation persisted in Claxton and Morley twps. Light infestations also occurred in Kingsford Twp and on Lichen Island, Rainy Lake.
1963-1965	pockets of light infestation observed in Richardson, Dobie, Claxton, Potts and Kingsford twps
1966	Populations declined to trace levels.
1967	trace populations

(cont'd)

Redheaded Jack Pine Sawfly, *Neodiprion virginianus* complex (concl.)

Year	Remarks
1968	not reported
1969	trace populations on several islands in Rainy Lake
1970	trace populations along Pearson's Side Road
1971-1973	not reported
1974	trace populations at several points
1975	light defoliation of scattered trees along the shoreline of Rainy Lake
1976-1977	not reported
1978	low numbers at McInnis Creek, Bear Pass and Crowrock Inlet
1979	trace population at Little Turtle Lake Road
1980	not reported

Swaine Jack Pine Sawfly, *Neodiprion swainei* Midd.

Host(s): jP [Major]

Year	Remarks
1950-1951	not reported
1952	Numerous colonies were observed in jack pine stands at Redgut Bay on Rainy Lake. Low numbers of colonies were noted in Tovell and Pattullo twps.
1953	Increased population levels caused moderate-to-severe defoliation along Redgut Bay in Rainy Lake. Light defoliation was noted at several points along Shoal, Grassy and Wild Potato lakes.
1954	Moderate-to-severe defoliation was recorded at Porter Inlet on Rainy Lake and at one location on Bad Vermilion Lake. Lightly defoliated trees were observed at several points along the south arm of Rainy Lake.

(cont'd)

Swaine Jack Pine Sawfly, *Neodiprion swainei* Midd. (concl.)

Year	Remarks
1955	trace populations at Bad Vermilion, Pipestone and Rainy lakes and in Senn Twp
1956	traces at Off Lake and at Porter Inlet
1957	trace population at one location
1958	not reported
1959	moderate-to-severe defoliation at several points in Sabaskong Bay, Lake of the Woods; lightly defoliated trees at Loonhaunt Lake
1960	Moderate-to-severe defoliation persisted along the south shore of Sabaskong Bay, Lake of the Woods.
1961	not reported
1962-1963	Severe defoliation occurred on an island in Rocky Inlet Bay, Rainy Lake.
1964	Pockets of moderate-to-severe defoliation occurred at Bad Vermilion Lake and at scattered locations along shorelines on Rainy Lake and Lake of the Woods.
1965	Light infestations occurred on shoreline trees at Brule Narrows on Rainy Lake, in Morson Twp, and near Jackfish Lake and Lake Despair.
1966	trace populations at several locations on Rainy Lake
1967-1974	not reported
1975	moderate-to-severe defoliation on islands and shorelines at several locations on Rainy Lake and Lake of the Woods
1976-1980	not reported

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.)

Host(s): aspen [Major]

Year	Remarks
1950	moderate-to-severe discoloration of foliage at many locations throughout the district
1951	widespread foliar damage throughout the district; heavy foliage discoloration east of Rainy Lake
1952-1955	not reported
1956	heavy infestations in the Turtle River area
1957	light infestation in Roddick and Carpenter twps
1958	not reported
1959	high populations at Eltrut Lake
1960	low numbers in Carpenter, Richardson and Claxton twps and in the Wild Land Reserve
1961	moderate-to-severe mining in Dobie and Mather twps and light mining in Crozier, Dance, Lash, Potts and Sutherland twps
1962	small pockets of severe mining along shores of Eltrut, Pipestone and Feather lakes; low numbers in Crozier, Dance, Lash, Potts and Sutherland twps
1963-1967	trace populations
1968-1975	not reported
1976	small pockets of moderate-to-severe foliage discoloration near Little Turtle Lake
1977-1978	small area of moderate-to-severe foliar discoloration in the vicinity of Windy Point on Rainy Lake
1979	small pockets of heavy infestation in the southeastern part of the district
1980	moderate-to-severe mining at many locations in the district

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

Host(s): spruce [Major]

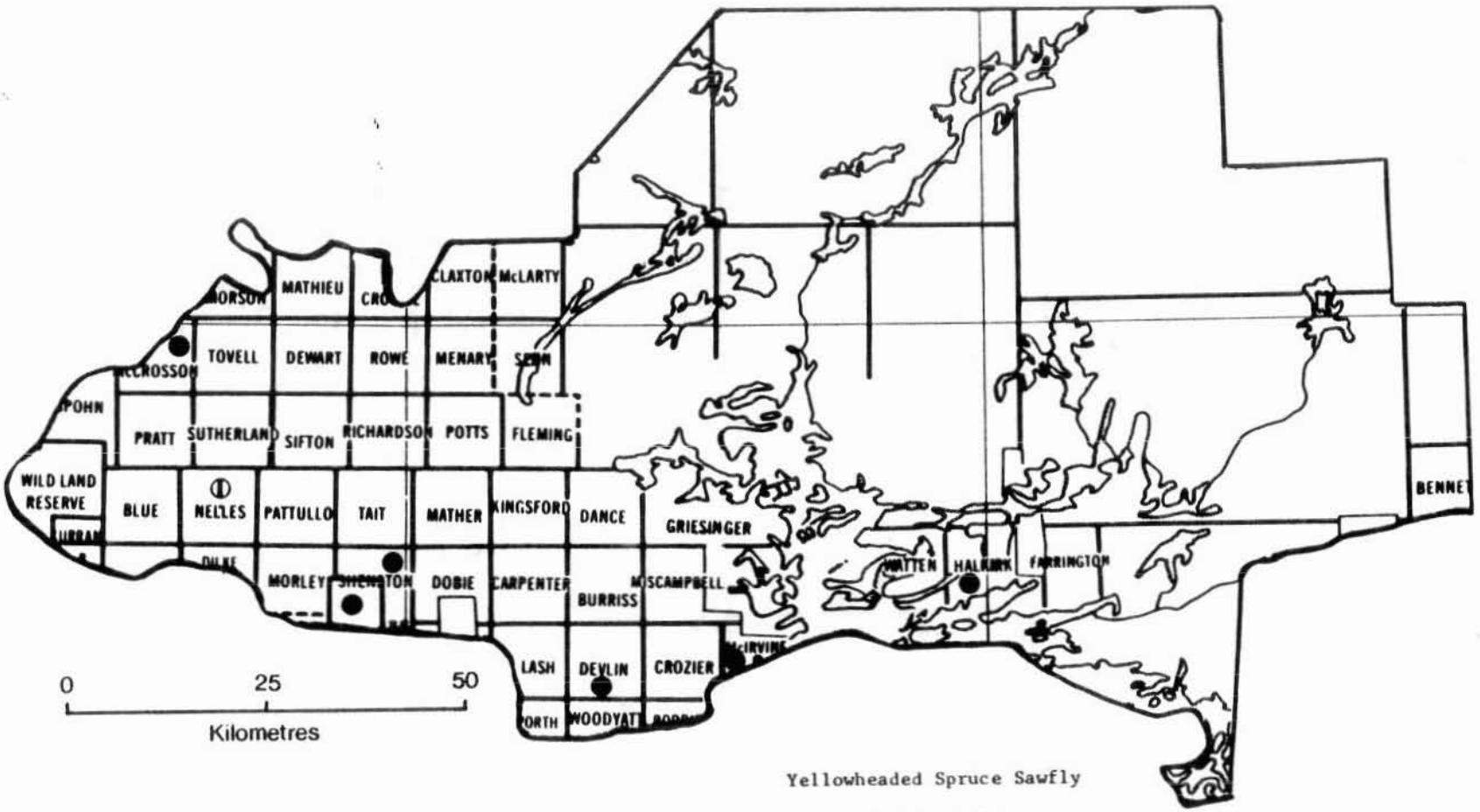
Year	Remarks
1950	Moderate-to-severe defoliation of ornamental trees occurred in Fort Frances, in farm woodlots in Crozier, Shenston, Tait and McCrosson twps and at Loonhaunt Lake.
1951	Moderate-to-severe defoliation was common through McCrosson, Morley, Lash, Claxton and Atwood twps and in Fort Frances.
1952	heavy damage to roadside trees west of Fort Frances
1953	moderate-to-severe defoliation recorded on an island south of Rocky Inlet in Rainy Lake; light defoliation noted in Dance, Carpenter, Tait, Sifton and Miscampbell twps
1954	Damage was confined to one area in Sifton Twp where roadside white spruce trees were severely defoliated.
1955	lightly defoliated trees at several locations in Pattullo, Spohn and Devlin twps and along the shores of Sandpoint and Rainy lakes
1956	moderate-to-severe defoliation of small trees along Highway 70 south of Nestor Falls and in McIrvine, Devlin and Spohn twps
1957	Moderate-to-severe defoliation of roadside trees recurred along Highway 70 south of Nestor Falls, at Finlayson and Burdett lakes and in the town of Fort Frances.
1958	moderate-to-severe defoliation at several points in Devlin, Barwick and Claxton twps and at Spawn Inlet, Rainy Lake
1959	Moderate-to-severe defoliation recurred along Highway 70 south of Nestor Falls and in McIrvine Twp.
1960	Moderate-to-severe defoliation was observed in Claxton, Dobie, Sifton, Lash and Spohn twps.
1961	Moderate-to-severe defoliation occurred on a spruce hedge in the Wild Land Reserve and on open-grown trees in Morley Twp. Light defoliation was observed in Kingsford, Roddick, Crozier, Spohn, Dilke, Potts, Mather and McCrosson twps.

(cont'd)

Yellowheaded spruce sawfly, *Pikonema alaskensis* (Roh.) (concl.)

Year	Remarks
1962	Moderate-to-severe defoliation was confined to open-grown trees in Claxton and Pratt twps and at one point at Devil's Cascade on Rainy Lake.
1963	Light defoliation was observed at several points in Spohn and Potts twp and at Vista, Otukamamoan and Pipestone lakes. Heavy defoliation occurred on an island in Kishkutena Lake.
1964	lightly defoliated trees at 17 locations
1965-1966	little change noted
1967	ornamentals severely defoliated in the towns of Rainy River and Fort Frances
1968-1969	moderate-to-severe defoliation of roadside trees between Barwick and Rainy River
1970-1971	light infestations at several locations
1972	moderate-to-severe defoliation of roadside trees near Stratton and Pinewood
1973	trace populations
1974	light defoliation at Stokes Bay on Rainy Lake
1975	light defoliation in Sutherland Twp and in Lake of the Woods Provincial Park
1976	moderate-to-severe defoliation at several locations in the district; light defoliation in Nelles Twp (see map, page 77)
1977	Infestations continued (see map, page 78).
1978	Infestations persisted (see map, page 79).
1979	scattered infestations (see map, page 80)
1980	pockets of heavy infestation (see map, page 81)

FORT FRANCES DISTRICT



Yellowheaded Spruce Sawfly

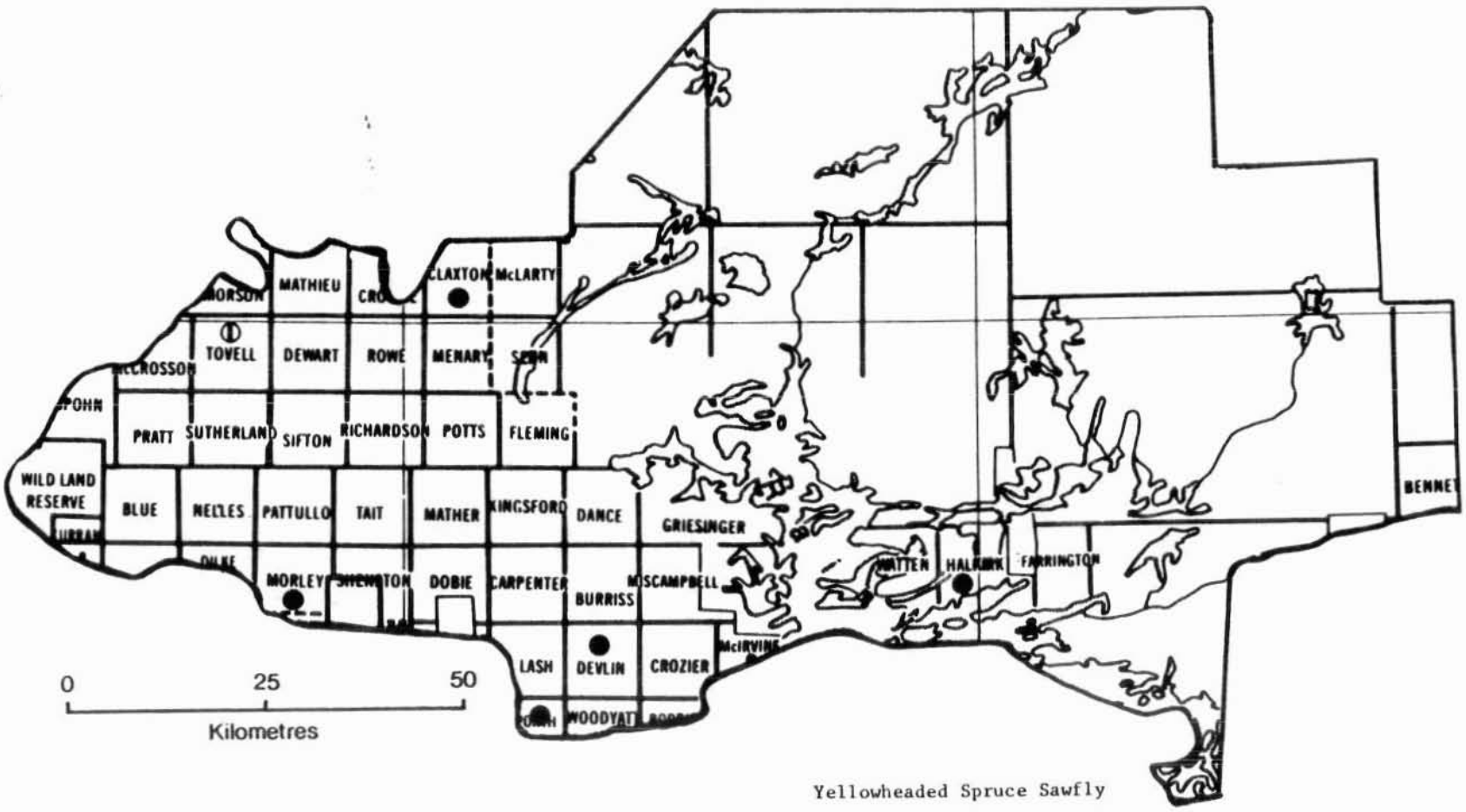
Areas within which defoliation occurred in 1976

LEGEND

Light defoliation ①

Moderate-to-severe defoliation ●

FORT FRANCES DISTRICT



Yellowheaded Spruce Sawfly

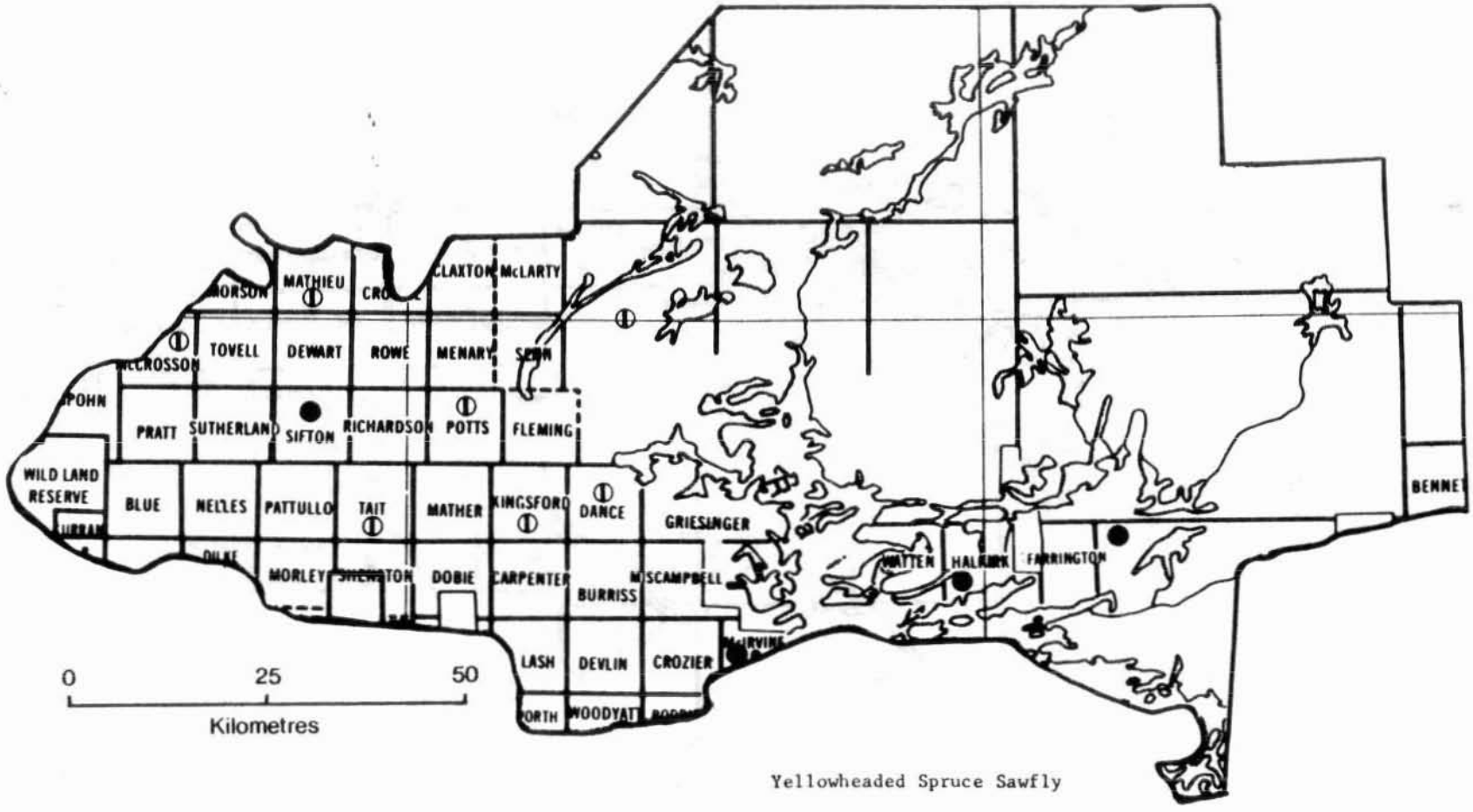
Areas within which defoliation occurred in 1977

LEGEND

Light defoliation ◑

Moderate-to-severe defoliation ●

FORT FRANCES DISTRICT



Yellowheaded Spruce Sawfly

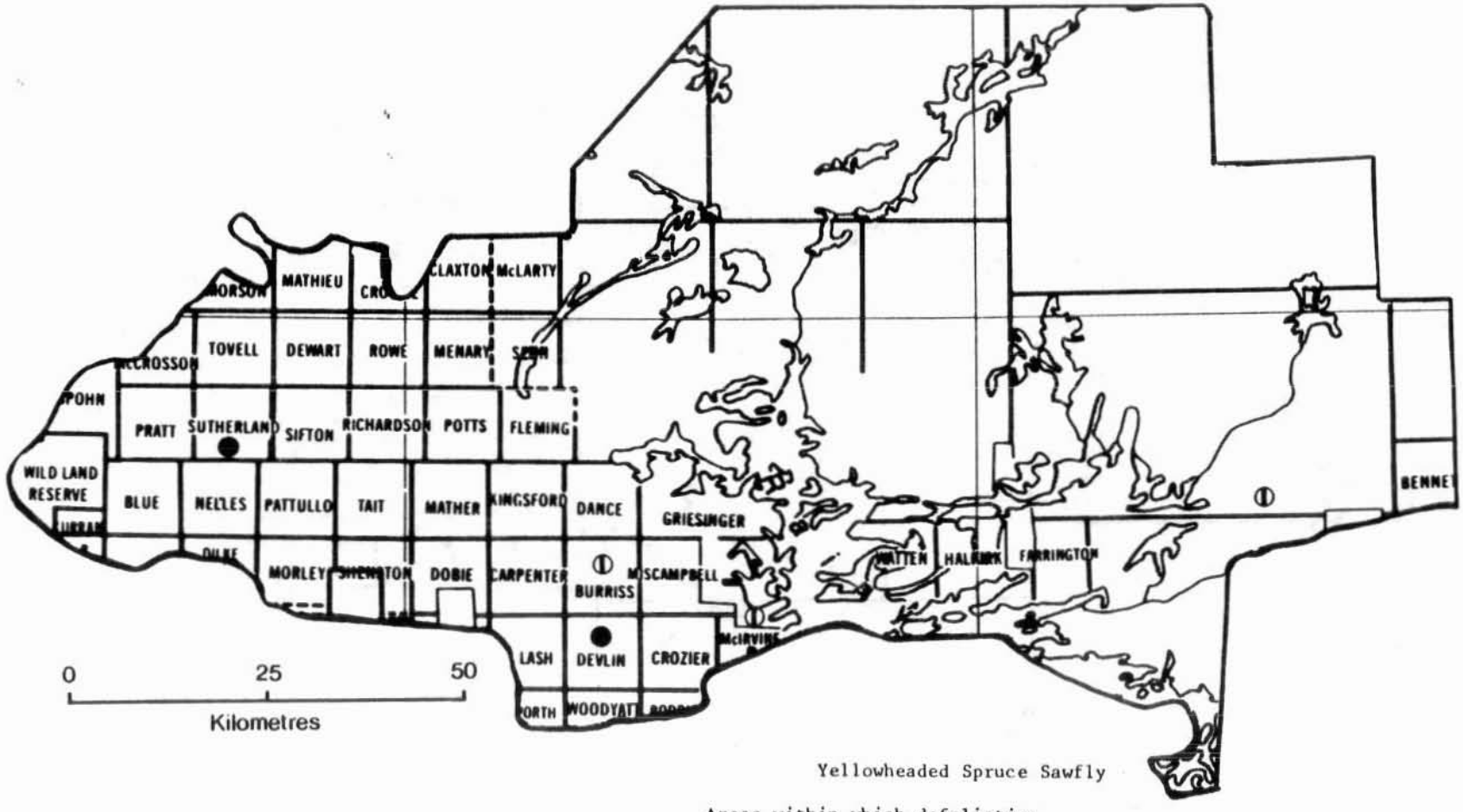
Areas within which defoliation occurred in 1978

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

FORT FRANCES DISTRICT



Yellowheaded Spruce Sawfly

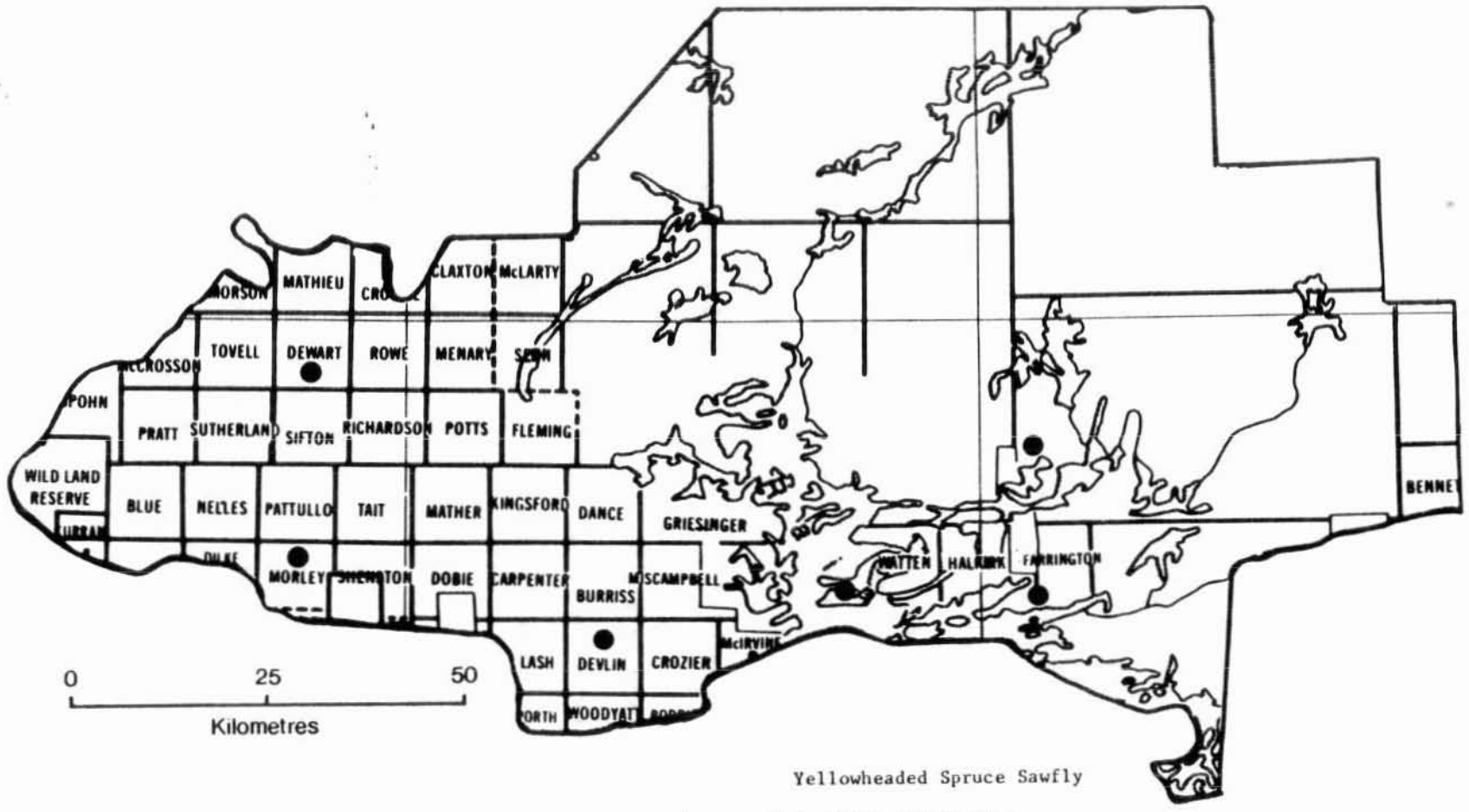
Areas within which defoliation occurred in 1979

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

FORT FRANCES DISTRICT



Yellowheaded Spruce Sawfly

Areas within which defoliation occurred in 1980

LEGEND

Moderate-to-severe defoliation ●

White Pine Weevil, *Pissodes strobi* (Peck)

Host(s): pine, spruce [Major]

Year	Remarks
1950-1958	not reported
1959	light damage along the Lake Despair Road
1960	low numbers in Claxton Twp
1961	light damage on Sand Point Island and near Moose Bay on Rainy Lake
1962	not reported
1963	Leader damage of 4% and 6% occurred on white pine in Miscampbell Twp and on jack pine in Morson Twp.
1964	little change in population levels or distribution
1965-1966	low numbers in Morson and Miscampbell twps
1967	low numbers in Greisinger and Burriss twps
1968	8% leader mortality in Greisinger Twp and light damage noted in a 2-ha jack pine plantation in Kingsford Twp
1969-1973	low numbers throughout the district
1974-1975	low numbers along Manion Lake and along the road from Fort Frances to Dryden
1976	10% leader damage in white pine regeneration in Kingsford Twp
1977	6% leader damage along Manion Lake Road
1978	5% leader damage along Manion Lake Road
1979	8% leader mortality along Manion Lake Road
1980	3% leader mortality along Essox Lake Road

Larch Sawfly, *Pristiphora erichsonii* (Htg.)

Host(s): tamarack [Major]

Year	Remarks
1950	Moderate-to-severe defoliation extended through most larch stands in the southern two-thirds of the district.
1951	Moderate-to-severe defoliation persisted through most larch stands in the district.
1952	Little change in population levels was observed. Moderate-to-severe defoliation recurred.
1953	Moderate-to-severe defoliation was again general in tamarack stands throughout the district.
1954	Heavy infestations persisted, particularly in Potts, Tait, Shenston, Crozier, Dobie and Burriss twps, where defoliation averaged 75%.
1955	Although defoliation was generally less severe than in 1954, heavy infestations recurred at many points throughout the district.
1956	Pockets of moderate-to-severe defoliation recurred in the southern part of the district.
1957	Heavy infestations persisted in Potts, Miscampbell, Dilke, Sifton and Dewart twps.
1958	Pockets of moderate-to-severe defoliation recurred throughout the district.
1959	Populations declined at most locations in the district and defoliation was generally light, with scattered pockets of moderate-to-severe defoliation.
1960	Little change in population levels was observed.
1961	Pockets of new, moderate-to-severe defoliation were observed in Morley Twp.
1962	Populations declined substantially to low numbers at six widely separated points west of Rainy Lake.
1963	Populations reached a low ebb.

(cont'd)

Larch Sawfly, *Pristiphora erichsonii* (Htg.) (concl.)

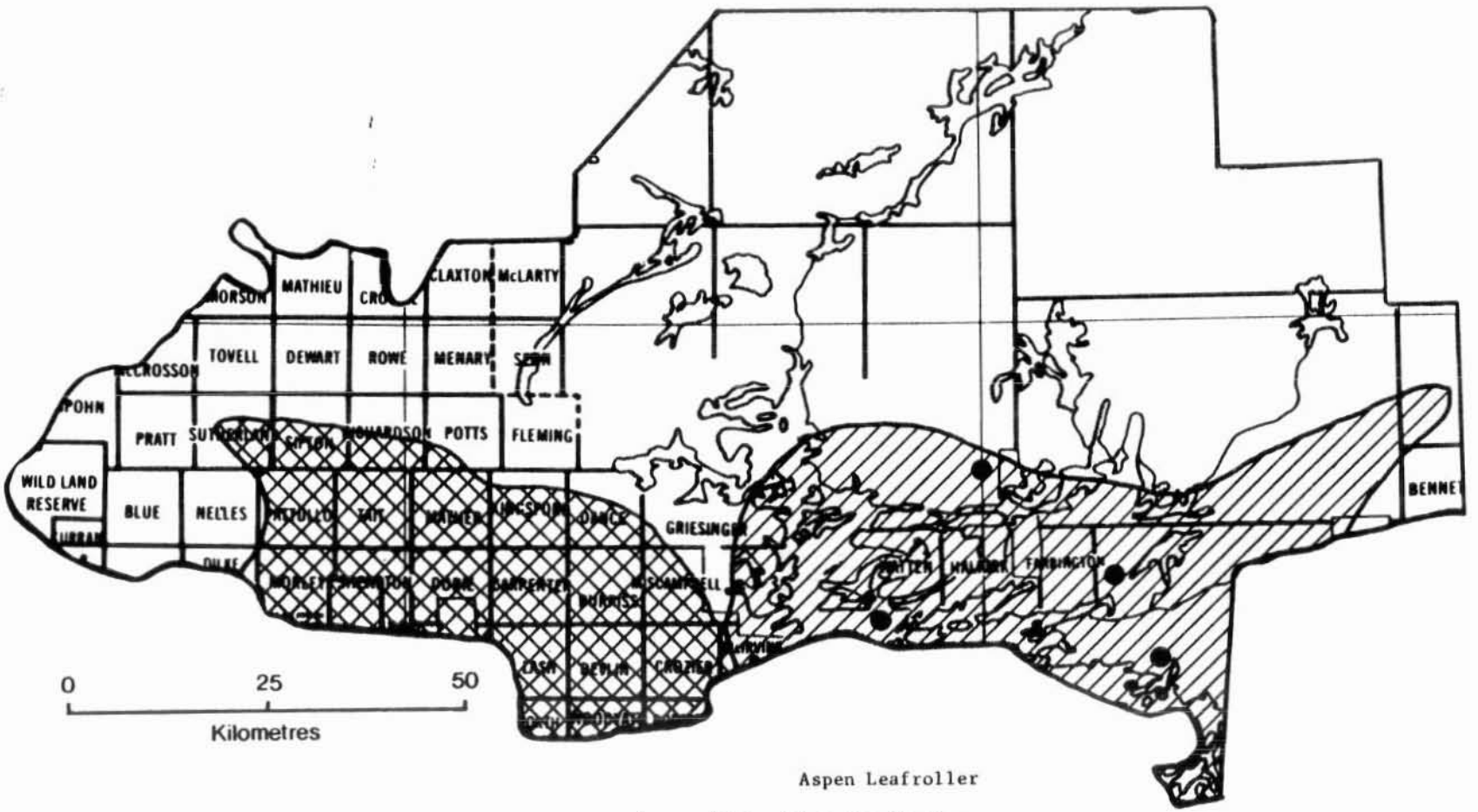
Year	Remarks
1964	Populations remained low.
1965	Populations increased markedly and pockets of moderate-to-severe defoliation occurred in Potts, Nelles and Sifton twps.
1966	Moderate-to-severe defoliation occurred at several locations in the southern part of the district.
1967	Little change occurred. Moderate-to-severe defoliation was observed in Miscampbell, Burriss and Crozier twps and in the Wild Land Reserve.
1968	Small pockets of moderate-to-severe defoliation occurred in Burriss, Richards, Pratt and Morley twps.
1969	Little change was observed. The most severe damage occurred in Burriss Twp.
1970	slightly increased populations
1971	Pockets of heavy infestation were observed at several locations along Highways 11, 600 and 621 in the western part of the district.
1972-1973	general decline in population levels
1974	not reported
1975	a few pockets of light defoliation
1976-1977	trace populations
1978	Low populations were general in the southwestern part of the district, except in Morley Twp, where several small stands suffered moderate-to-severe defoliation.
1979-1980	trace populations

Aspen Leafroller, *Pseudexentera oregonana* Wlshm.

Host(s): poplar [Major]

Year	Remarks
1950-1973	not reported
1974	moderate-to-severe defoliation of 160 ha of trembling aspen along Manion Lake Road
1975	30% defoliation in a 1.5-ha stand in Rowe Twp
1976	80% defoliation in a 10 km^2 area east of Rat River Bay on Rainy Lake and in an 8 km^2 area near Blaze Point, also on Rainy Lake
1977	light and moderate-to-severe defoliation over large areas in the southern part of the district (see map, page 86)
1978	approximately 3,600 km^2 of moderate-to-severe defoliation (see map, page 87); light defoliation general in the southeastern part of the district
1979	Defoliation decreased to 41 km^2 in the western part of the district.
1980	not reported

FORT FRANCES DISTRICT



Aspen Leafroller

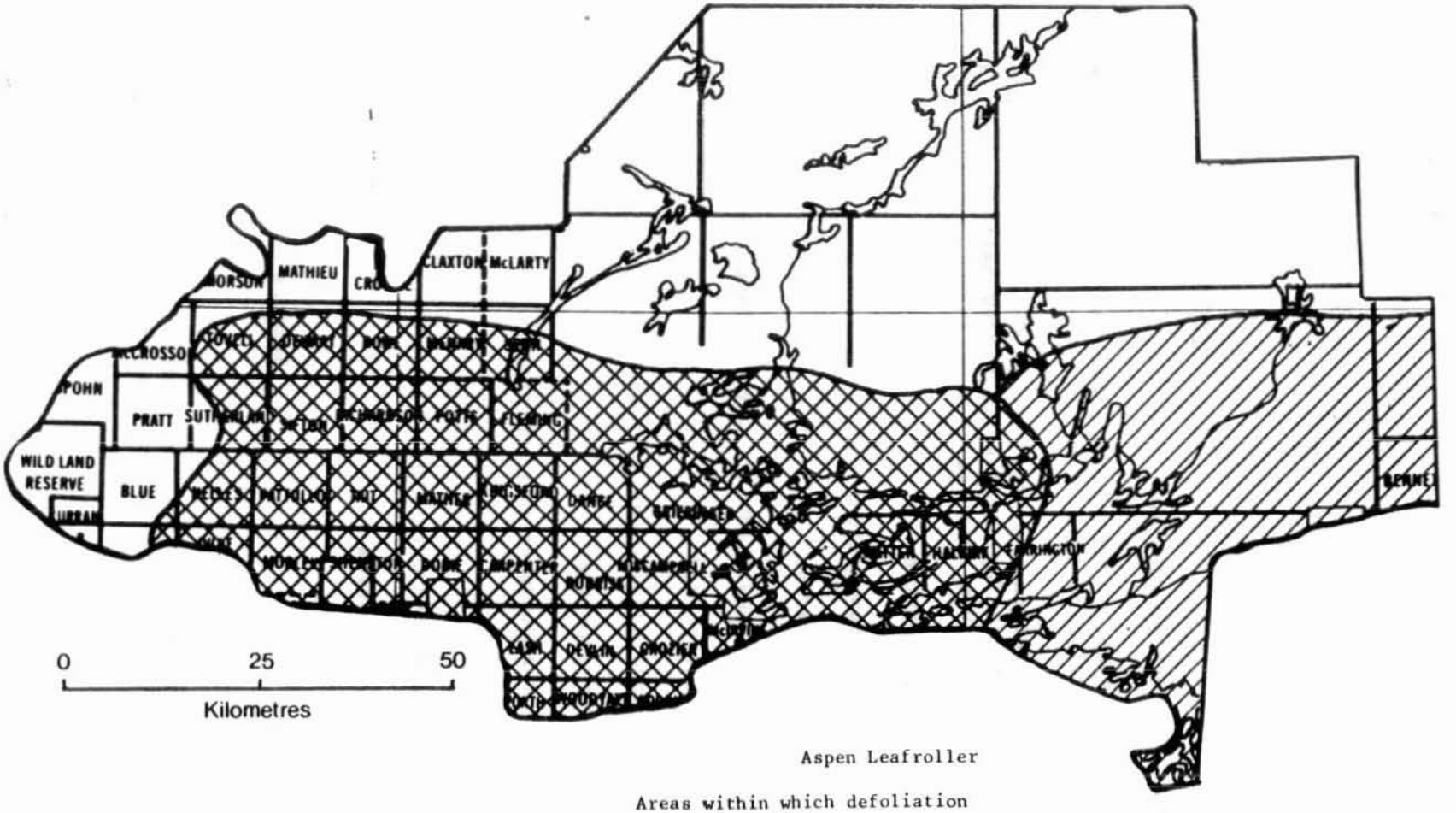
Areas within which defoliation occurred in 1977

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

FORT FRANCES DISTRICT



Aspen Leafroller

Areas within which defoliation occurred in 1978

LEGEND

Light defoliation

Moderate-to-severe defoliation

Other Noteworthy Insects

European Spruce Sawfly, *Gilpinia hercyniae* (Htg.)

Host(s): spruce [Minor]

Year	Remarks
1950-1951	trace populations
1952	larvae recovered for the first time from Carpenter and Farrington twps
1953	Populations spread from Carpenter Twp northwest to Pattullo Twp and east to Miscampbell Twp but little defoliation was observed.
1954	not reported
1955-1958	trace populations
1959	not reported
1960-1966	trace populations at several locations
1967-1969	not reported
1970-1974	trace populations at four locations
1975-1979	not reported
1980	low numbers at one location in Mather Twp

Fall Webworm, *Hyphantria cunea* (Dru.)

Host(s): deciduous species [Major]

Year	Remarks
1950-1953	not reported
1954	moderate-to-severe defoliation of small elm trees in Fort Frances; light defoliation along roads from Rainy Lake to Lake of the Woods

(cont'd)

Fall Webworm, *Hyphantria cunea* (Dru.) (concl.)

Year	Remarks
1955	Only light defoliation occurred in Fort Frances and in the town of Stratton.
1956	Webs formed by this insect were observed commonly in Fort Frances and in the western part of the district.
1957	moderate-to-severe defoliation of understory trees on two islands in Rainy Lake and along roadsides in Dewart and Morson twps
1958	not reported
1959-1961	low numbers at several locations
1962	not reported
1963-1965	trace populations
1966	not reported
1967	Tents were observed commonly along roads west of Fort Frances and on islands in Rainy Lake.
1968	low numbers present in the western part of the district
1969	not reported
1970-1972	tents common along roadsides west of Fort Frances
1973-1974	not reported
1975-1976	occasional tents along roadsides west of Fort Frances
1977	scattered colonies observed along Highway 11 west of Bear Pass
1978	low numbers at a few locations
1979	trace levels at Caliper Lake Park
1980	a few colonies in McIrvine Twp

Hemlock Looper, *Lambdina fiscellaria fiscellaria* (Gn.)

Host(s): coniferous and deciduous species [Major]

Year	Remarks
1950-1951	Low numbers were found from Fleming Twp to the north end of Pipestone Lake.
1952-1953	not reported
1954	trace populations, Menary Twp
1955-1957	not reported
1958	trace populations at several points
1959	not reported
1960	trace populations at four locations
1961	not reported
1962	trace populations at Pipestone Lake and in Worthington Twp
1963	not reported
1964	trace populations in Miscampbell and Potts twps
1965	trace populations at several locations
1966	not reported
1967	trace population in Potts Twp
1968-1973	not reported
1974	low numbers at Redgut Bay on Rainy Lake
1975-1980	not reported

Balsam Shootboring Sawfly, *Pleroneura brunneicornis* Roh. (= *borealis* Felt)

Host(s): bF [Minor]

Year	Remarks
1950	not reported
1951	infested buds at several points
1952-1955	not reported
1956-1960	low numbers at many locations
1961-1972	not reported
1973	heavily infested trees near Nestor Falls and Emo
1974	lightly damaged trees at several points
1975-1980	not reported

Pine Tortoise Scale, *Toumeyella parvicornis* (Ckll.)

Host(s): jP [Major]

Year	Remarks
1950-1954	not reported
1955-1960	low numbers at several locations
1961	small pocket of medium-to-heavy infestation in Burriss Twp; lightly infested trees in Lash Twp and the Wild Land Reserve
1962	one infested tree in the Wild Land Reserve
1963-1980	not reported

DISEASES

Armillaria Root Rot, *Armillaria mellea* (Vahl: Fr.) Kummer

Host(s): all species [Major]

Year	Remarks
1950-1954	not reported
1955	dead balsam fir trees in Devlin Twp and at Off Lake
1956-1970	not reported
1971	light infection on red pine at Boffin Lake
1972	caused jack pine mortality of 5% and 7.5%, respectively, along Manion Lake Road and in Burriss Twp
1973-1978	not reported
1979	light infections in jack pine plantations near Manion Lake and in Burriss Twp
1980	not reported

Dutch Elm Disease, *Ceratocystis ulmi* (Buism.) C. Moreau

Host(s): wE [Major]

Year	Remarks
1950-1976	not reported
1977	first record in the district; one infected tree in Fort Frances
1978	three infected trees in Fort Frances, two 8 km west of Fort Frances and two 11 km southeast of Rainy River
1979	new infection centers in Roddick Twp and near Emo
1980	continued to spread westward; new infection centers in Rainy River and Lake of the Woods Provincial Park

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary and *C. ledicola* (Peck) Lagerh.

Host(s): wS, bS [Major]

Year	Remarks
1950-1954	not reported
1955	medium-to-heavy infections in Burriss and Roddick twps
1956-1962	not reported
1963	low numbers of infected trees at three locations
1964	not reported
1965	moderate-to-severe foliage discoloration in Sifton Twp
1966	moderate-to-severe foliage discoloration in Sifton and Kingsford twps
1967	not reported
1969	medium-to-heavy infections in Burriss Twp and at one location on Rainy Lake
1970	approximately 2 ha of light infection near Nestor Falls
1971	medium-to-heavy infection along the Blackhawk-Off lakes Road
1972	one small area of medium-to-heavy infection near Off Lake
1973-1974	not reported
1975	moderate-to-severe foliar damage at Mine Centre and in Bennett Twp
1976	light foliar damage near Mine Centre, Glenorchy, Nickel Lake and in Dance Twp
1977-1978	not reported
1979	light foliar damage near Mine Centre and in Kingsford Twp
1980	not reported

Ink Spot of Aspen, *Ciborinia whetzelii* (Seaver) Seaver

Host(s): wS, bS [Major]

Year	Remarks
1950-1954	not reported
1955	medium-to-high incidence of infection at several points in Dewart and Lash twps
1956-1962	not reported
1963	medium-to-heavy infections in McCrosson Twp
1964-1974	not reported
1975	light infection levels at several locations
1976	light infection in Claxton Twp
1977-1980	not reported

Pine Needle Rust, *Coleosporium asterum* (Dietel) Sydow

Host(s): jP, rP [Major]

Year	Remarks
1950-1957	not reported
1958-1959	light infections at four locations
1960	found at only one location
1961-1964	not reported
1965	light infections common throughout the district
1966	medium-to-heavy infections in Potts and Miscampbell twps
1967	not reported
1968	light infection levels at several locations
1969	not reported
1970	light infections through the district

(cont'd)

Pine Needle Rust, *Coleosporium asterum* (Dietel) Sydow (concl.)

Year	Remarks
1971	heavy infection at Turtle Tank Siding
1972-1973	not reported
1974	medium-to-heavy infections near Wasaw Lake
1975	medium-to-heavy infections in plantations in Menary Twp
1976-1978	not reported
1979	light infections in Dance Twp; medium-to-heavy infections in Burriss Twp
1980	not reported

Sweet Fern Blister Rust, *Cronartium comptoniae* Arthur

Host(s): jP [Major]

Year	Remarks
1950-1969	not reported
1970	moderate-to-severe infections at Mile 30 and Mile 38 on Highway 11 and light infection at one point in Farrington Twp
1971	moderate-to-severe infections at Turtle Tank Siding and Manion Lake
1972	moderate-to-severe infections at Turtle Tank Siding and Mine Centre
1973	moderate-to-severe infections at Bernadine Lake, Mine Centre and Turtle Tank Siding
1974	not reported
1975	heavy infection at Mine Centre
1976-1978	not reported
1979	light infection at Manion Lake Road
1980	not reported

White Pine Blister Rust, *Cronartium ribicola* J.C. Fischer

Host(s): wP [Major]

Year	Remarks
1950-1954	not reported
1955	light infections in Burriss Twp and at Lower Manitou Lake
1956-1965	not reported
1966-1967	light infection levels through the district
1968	medium-to-heavy infection levels at Wasaw Lake and on several islands north of the Noden Causeway and along Sandy Bay on Rainy Lake
1969	medium-to-heavy infections on several islands in Rainy Lake, in plantations near Wasaw Lake and in Kingsford Twp
1970-1972	not reported
1973	high infection levels at Nestor Falls, Bear Pass, Caliper Lake and Rainy Lake
1974	light infections at Indian Reserve 23A and in Claxton Twp
1975	35% of trees severely affected on Last Island, Rainy Lake
1976	light damage in the Rainy Lake area
1977-1980	not reported

Western Gall Rust, *Endocronartium harknessii* (J.P. Moore) Y. Hirats.

Host(s): jP [Major]

Year	Remarks
1950-1967	not reported
1968	heavy infections near Lake Despair and Mine Centre
1969	common throughout the district
1970	not reported

(cont'd)

Western Gall Rust, *Endocronartium harknessii* (J.P. Moore) Y. Hirats. (concl.)

Year	Remarks
1971	moderate-to-severe infections along Turtle Tank Road, and light infections along Manion Lake Road
1972	not reported
1973	light infections along Manion Lake Road
1974	severely affected trees at Mine Centre and Grimshaw Lake
1975	not reported
1976	light infections along Manion Lake Road
1977-1978	not reported
1979	moderate-to-severe infections along Manion Lake Road
1980	not reported

Tar Spot Needle Cast, *Davisomycella ampla* (J. Davis) Darker

Host(s): jP

Year	Remarks
1950-1957	not reported
1958	light infections at several locations
1959	moderate-to-severe foliar discoloration at three locations
1960	two trees moderately discolored in Claxton Twp
1963	not reported
1964-1965	infections were common throughout the district but little damage occurred
1966	medium-to-heavy infection near Mine Centre

(cont'd)

Tar Spot Needle Cast, *Davisomycella ampla* (J. Davis) Darker (concl.)

Year	Remarks
1967-1971	not reported
1972	common throughout the district
1973	low levels at several locations
1974-1975	not reported
1976	low infection levels along the Glenorchy Road
1977-1978	not reported
1979	light damage recorded in Mather Twp, south of Finland and along Highway 11 in Watten Twp
1980	not reported

Hypoxylon Canker, *Hypoxylon mammatum* (Wahlenb.) J. Miller

Host(s): aspen [Major]

Year	Remarks
1950-1952	not reported
1953-1954	Samples of this disease were recovered from many stands throughout the district.
1955	common throughout the district; 13% of trees cankered in a plot at Off Lake
1956-1963	not reported
1964	Mortality plots established at five locations showed tree mortality ranging from 2% to 13%.
1965-1966	no appreciable change in infection levels
1967	Mortality increased on permanent sample plots, with a high of 28% on Rainy Lake.

(cont'd)

Hypoxylon Canker, *Hypoxylon mammatum* (Wahlenb.) J. Miller (concl.)

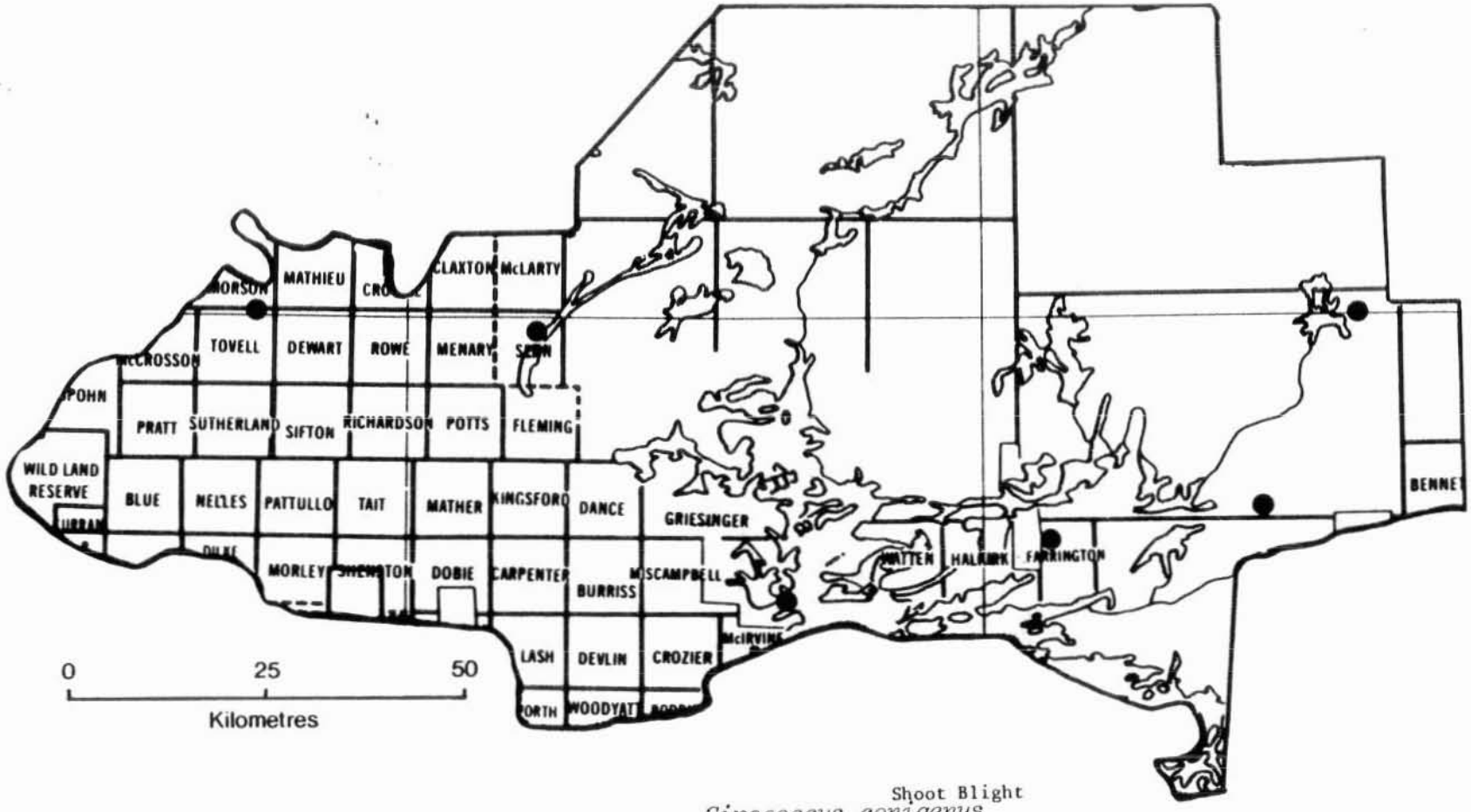
Year	Remarks
1968	Cankered aspen occurred commonly throughout the district. Incidence was 40% and 55% in Roddick and Kingsford twps, respectively.
1969	The highest mortality attributed to this canker was 3% in Northeast Bay, Rainy Lake.
1970-1974	not reported
1975-1977	observed commonly throughout the district
1978-1980	no apparent change in the status of this disease in the district

Shoot Blight, *Sirococcus conigenus* (DC.) P. Cannon & Minter

Host(s): rP [Major]

Year	Remarks
1950-1972	not reported
1973	medium-to-high infection level at Caliper Lake and at several other points (see map, page 103)
1974	new infection centers at two locations in the western part of the district
1975	no change in distribution or intensity
1976	new infection center in a plantation 9.6 km east of Fort Frances
1977	not reported
1978	new infection center on Lower Manitou Lake
1979	a few infected trees at Grassy Portage Bay on Rainy Lake
1980	light infections at Caliper and Lawrence lakes

FORT FRANCES DISTRICT



Shoot Blight

Sirococcus conigenus

Locations of infection centers in 1973

LEGEND

Infection centers ●

Shoot Blight, *Venturia macularis* (Fr.) E. Müller & v. Arx

Host(s): aspen [Major]

Year	Remarks
1950-1954	not reported
1955	found commonly in aspen stands throughout the district
1956-1957	not reported
1958	observed generally throughout the district
1959	not reported
1960	occurred commonly throughout the district
1961	not reported
1962-1964	medium-to-heavy infections common throughout the district
1965-1968	generally light infections in the district
1969	generally light with pockets of medium-to-heavy infections on islands in Rainy Lake
1970	light infections common in the district
1971	not reported
1972	light infections common in the eastern part of the district
1973-1974	not reported
1975-1976	light infections common throughout the district
1977	92% of trees infected with 79% shoot mortality in one plot near Olive Siding
1978	51% of trees infected and 51% shoot mortality in a plot in Claxton Twp
1979	common through the western part of the district
1980	small pocket of high infection in Farrington Twp

Other Noteworthy Diseases

White Trunk Rot, *Phellinus igniarius* (L.: F.) Quélet

Host(s): poplar [Major]

Year	Remarks
1950-1953	not reported
1954	light infections at numerous locations throughout the district
1955	light infections common throughout the district
1956-1962	not reported
1963	low infection levels throughout the district
1964	common throughout the district
1965	not reported
1966-1969	no change in distribution or intensity of this organism in the district
1970-1980	not reported

Red Ring Rot, *Phellinus pini* (Brot.: Fr.) A. Ames

Host(s): conifers [Major]

Year	Remarks
1950-1954	not reported
1955	light infections at three locations
1956-1966	not reported
1967	light infections at several locations
1968-1980	not reported

ABIOTIC DAMAGE

Drought

Year	Remarks
1950-1963	not reported
1964	35% mortality of jack pine in an assessment plot in Morson Twp
1965	47% stem mortality in Morson Twp
1966	49% mortality in Morson Twp
1967-1970	not reported
1971	moderate-to-severe damage at Caliper, Pipestone, Loonhaunt, Kaiarskons and Clarkson lakes and at Bear Pass on Rainy Lake
1972	no additional mortality; general recovery of stands affected in 1971
1973	not reported
1974	light damage on islands in Rainy Lake and on high sites near Heron and Eltrut lakes
1975	approximately 20% mortality over 194 km^2 in the Little Turtle Lake area; similar damage at Windy Point and Rocky Inlet on Rainy Lake and along Highway 71 south of Nestor Falls
1976	Mortality increased to approximately 75% in some stands over an area of 420 km^2 in the Little Turtle Lake area.
1977	The area of damage increased to approximately 1965 km^2.
1978-1980	not reported

Frost

Year	Remarks
1950-1963	not reported
1964	Heavy frosts in late May caused severe injury to new foliage of conifers in Menary, Morson and Carpenter twps and in the Wild Land Reserve.
1965	light damage general throughout the district
1966-1971	not reported
1972	light mortality of new foliage of white spruce and jack pine near Mine Centre
1973-1977	not reported
1978	moderate-to-severe damage to spruce and balsam fir foliage in McCrosson and Kingsford twps
1979-1980	not reported

Hail

Year	Remarks
1950-1979	not reported
1980	moderate-to-severe damage on an island and along shorelines of Essox Lake

Wind Damage

Year	Remarks
1950-1961	Trees in all diameter classes were windthrown in a 129 km^2 area between Caliper Lake and Redgut Bay on Rainy Lake.
1962-1969	not reported
1970	notable damage to stands of jack pine, white birch, trembling aspen, and balsam fir near Mine Centre and along the east shore of Rainy Lake north of Highway 11

(cont'd)

Wind Damage (concl.)

Year	Remarks
1971-1972	not reported
1973	small areas of damage in Rowe and Morson twps and near Devil's Cascade on Rainy Lake
1974-1980	not reported

Winter Drying

Year	Remarks
1950-1964	not reported
1965	85% of trees damaged in a Scots pine plantation in Miscampbell Twp
1966-1969	not reported
1970	moderate-to-severe damage at Lavallee Road in Woodyatt Twp
1971-1980	not reported

APPENDICES

APPENDIX A

DECIDUOUS HOST

Common Name	Scientific Name	Abbreviations
Alder	*Alnus* spp.	Al
Apple	*Malus*	Ap
Ash, black	*Fraxinus nigra* Marsh.	As
Aspen, largetooth	*Populus grandidentata* Michx.	lA
trembling	*tremuloides* Michx.	tA
Basswood	*Tilia* spp.	Ba
Beech	*Fagus grandifolia* Ehrh.	Be
Birch, white	*Betula papyrifera* Marsh.	wB
yellow	*alleghaniensis* Britt.	yB
Butternut	*Juglans cinerea* L.	Bu
Cherry, eastern choke	*Prunus virginiana* L.	eaCh
pin	*pensylvanica* L.f.	pCh
Elm, white	*Ulmus americana* L.	wE
Horse-chestnut	*Aesculus hippocastanum* L.	hChe
Ironwood	*Ostrya* spp.	I
Maple, Manitoba	*Acer negundo* L.	mM
red	*rubrum* L.	rM
sugar	*saccharum* Marsh.	sM
Mountain-ash, American	*Sorbus americana* Marsh.	aMo
Oak, bur	*Quercus macrocarpa* Michx.	bO
red	*rubra* L.	rO
Poplar, balsam	*Populus balsamifera* L.	bPo
Carolina	X *canadensis* Moench	cPo
Lombardy	*nigra* var. *Italica* Muenchh.	lPo
silver	*alba* L.	sPo
Willow	*Salix* spp.	W

APPENDIX B

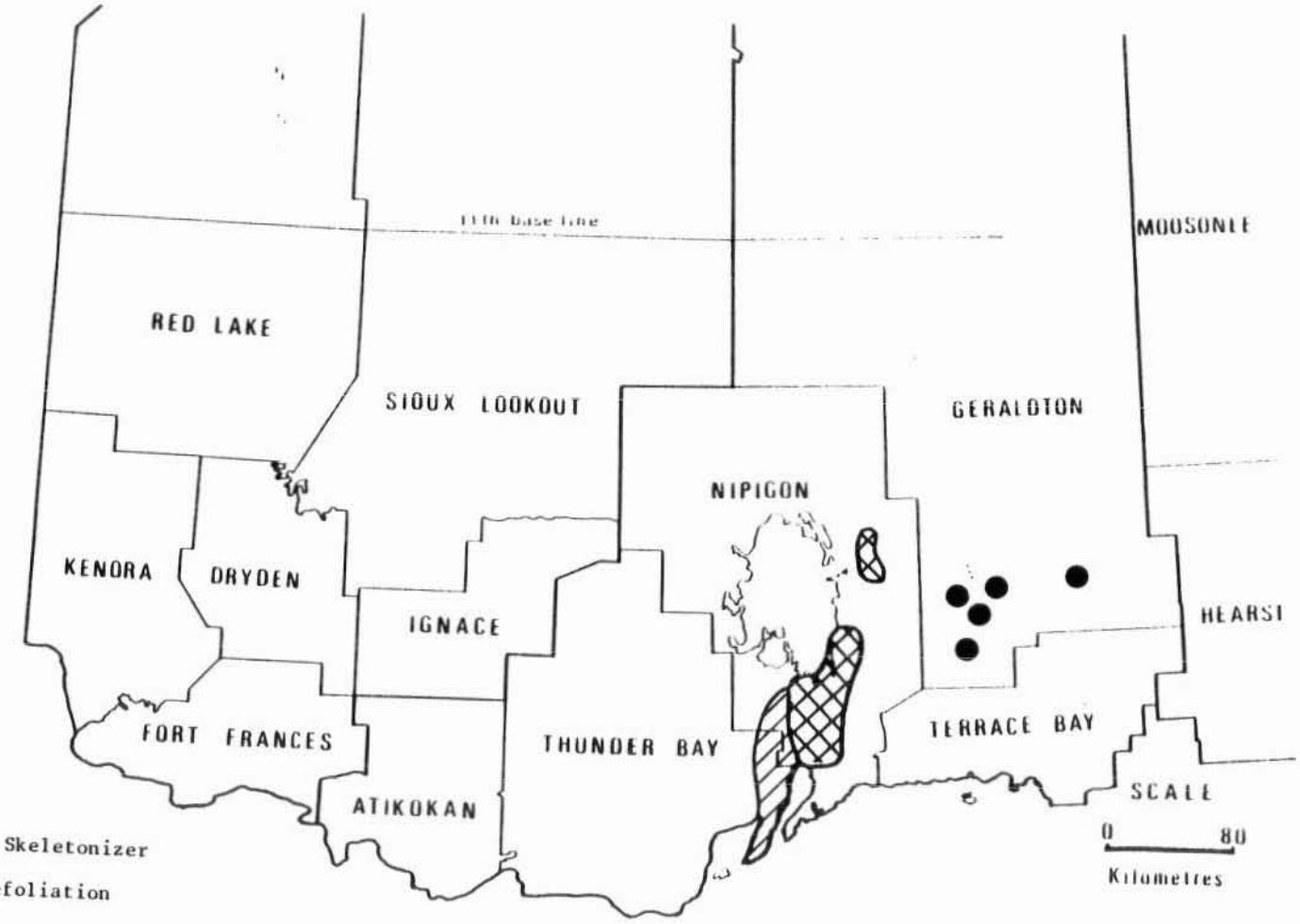
CONIFEROUS HOST

Common Name	Scientific Name	Abbreviations
Cedar, eastern white	*Thuja occidentalis* L.	eC
Fir, balsam	*Abies balsamea* (L.) Mill.	bF
Larch	*Larix laricina* (Du Roi) K. Koch	tL
Pine, Austrian	*Pinus nigra* Arnold	aP
eastern white	*strobus* L.	wP
jack	*banksiana* Lamb.	jP
mugho	*mugho* Turra var. *mughus* Zenari	mP
red	*resinosa* Ait.	rP
Scots	*sylvestris* L.	scP
Spruce, black	*Picea mariana* (Mill.) B.S.P.	bS
Colorado	*pungens* (Engelm.)	colS
Norway	*abies* (L.) Karst.	nS
red	*rubens* Sarg.	rS
white	*glauca* (Moench) Voss	wS

APPENDIX C

MAPS - NORTHWESTERN ONTARIO

NORTHWESTERN ONTARIO



Birch Skeletonizer

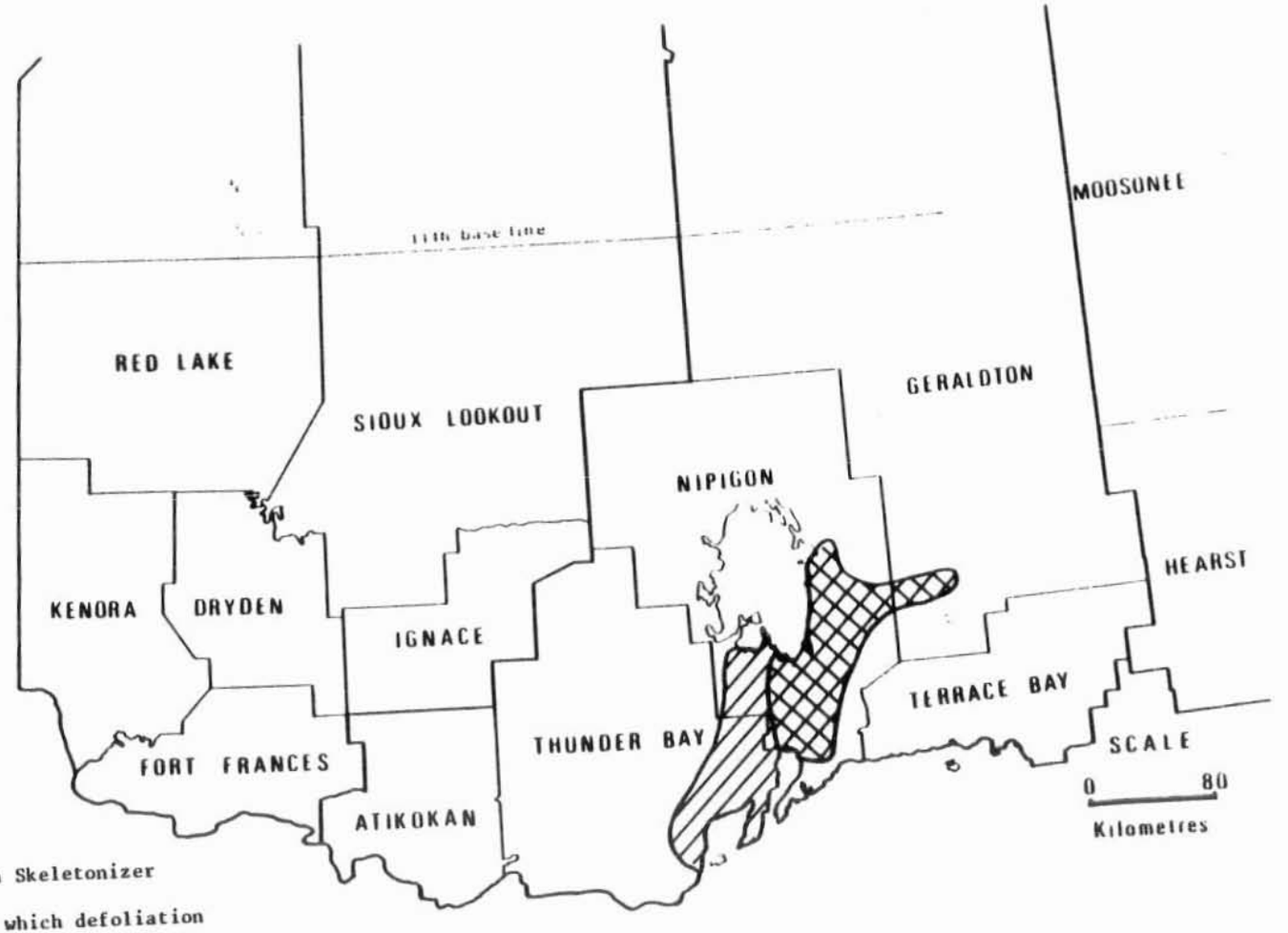
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Birch Skeletonizer

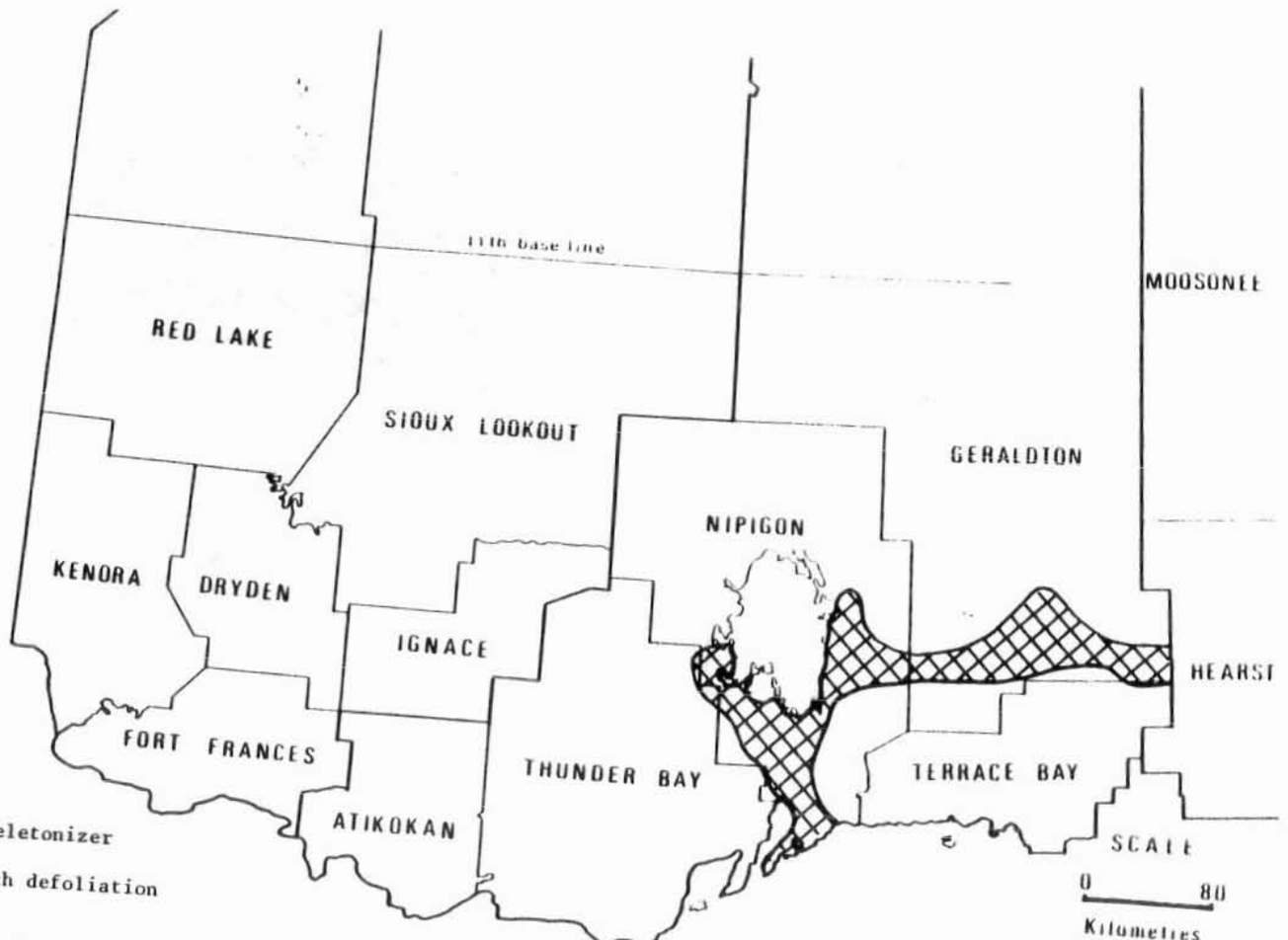
Areas within which defoliation occurred in 1963

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



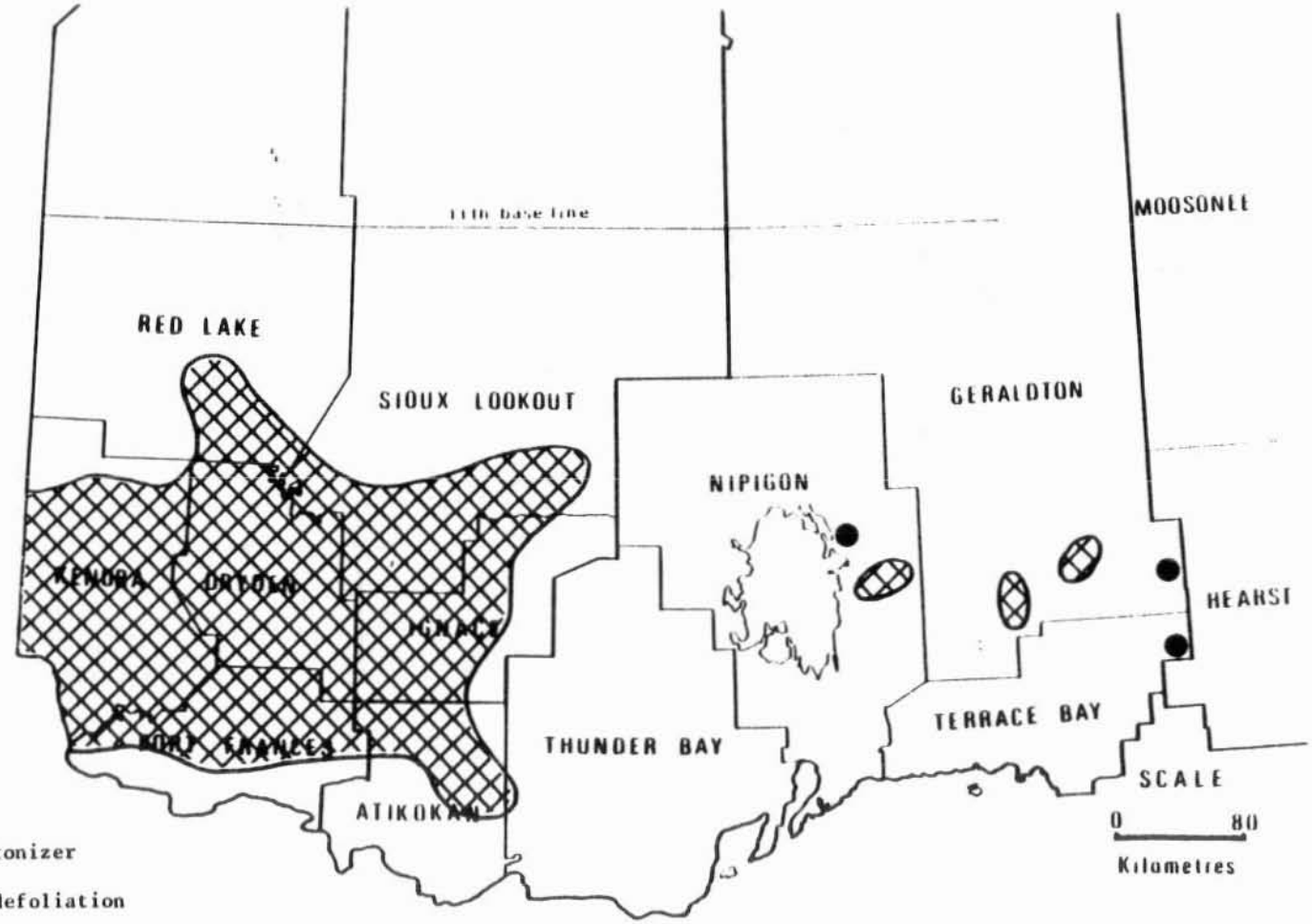
Birch Skeletonizer

Areas within which defoliation occurred in 1964

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



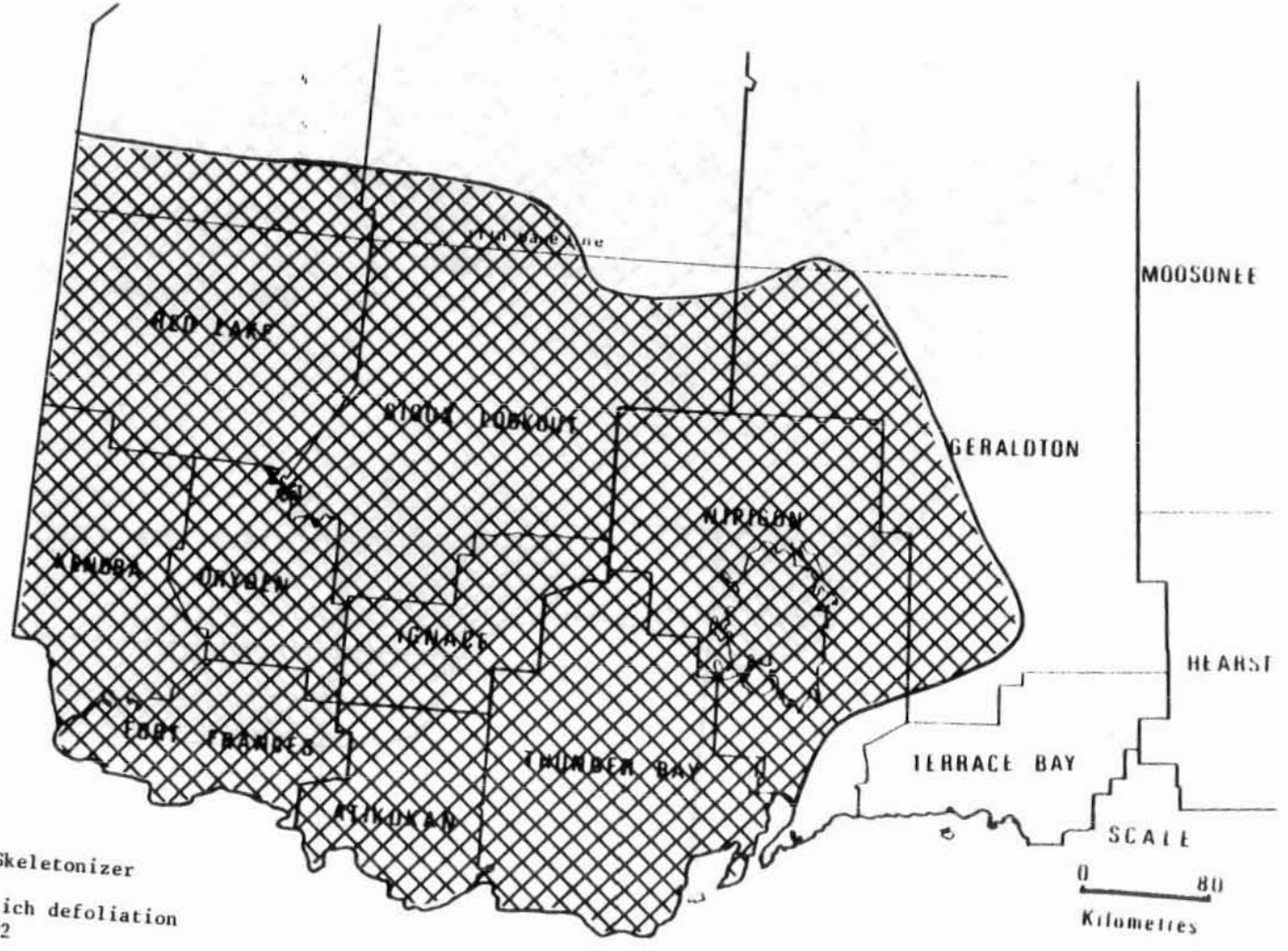
Birch Skeletonizer

Areas within which defoliation occurred in 1970

LEGEND

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



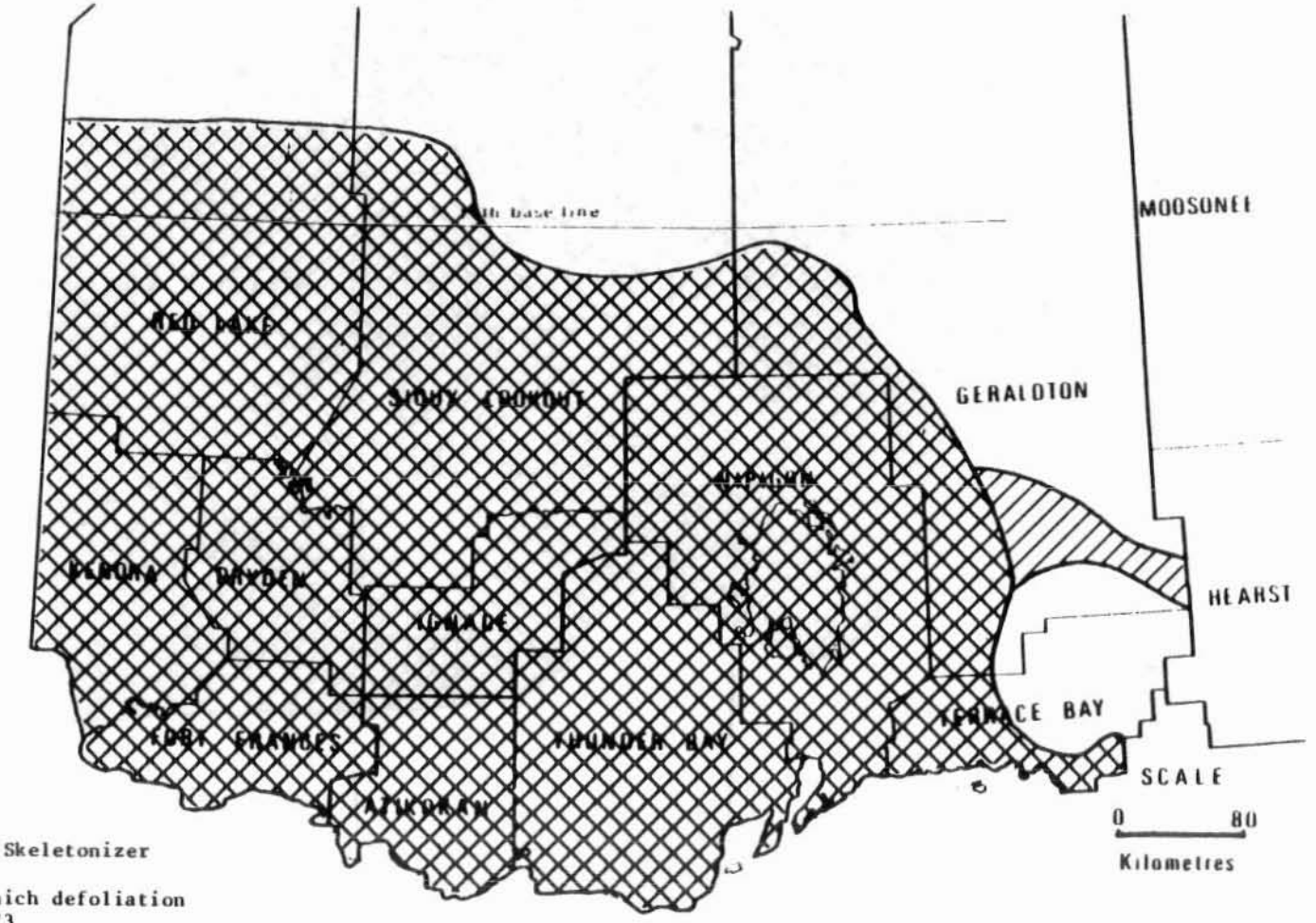
Birch Skeletonizer

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Birch Skeletonizer

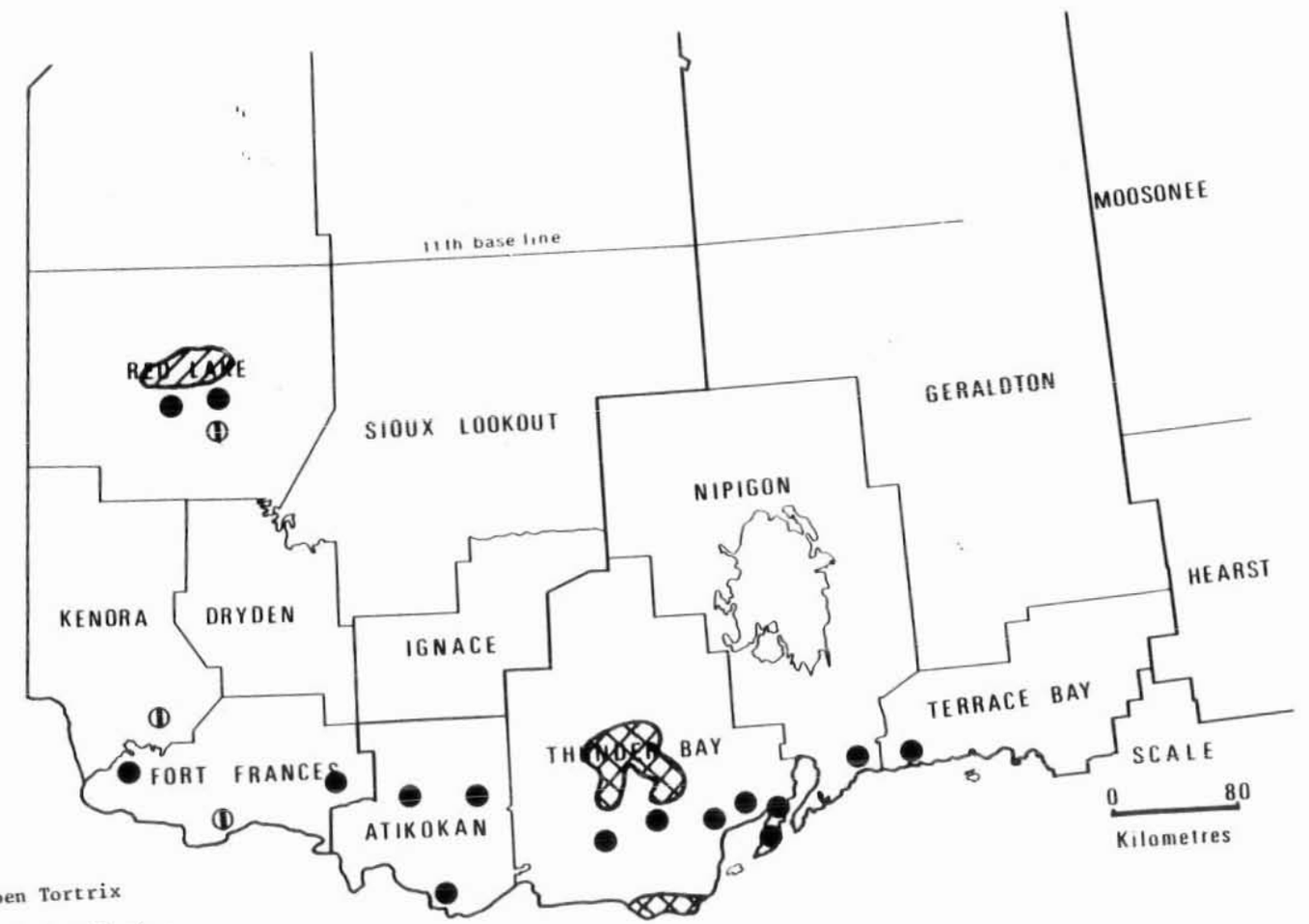
Areas within which defoliation occurred in 1973

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Large Aspen Tortrix

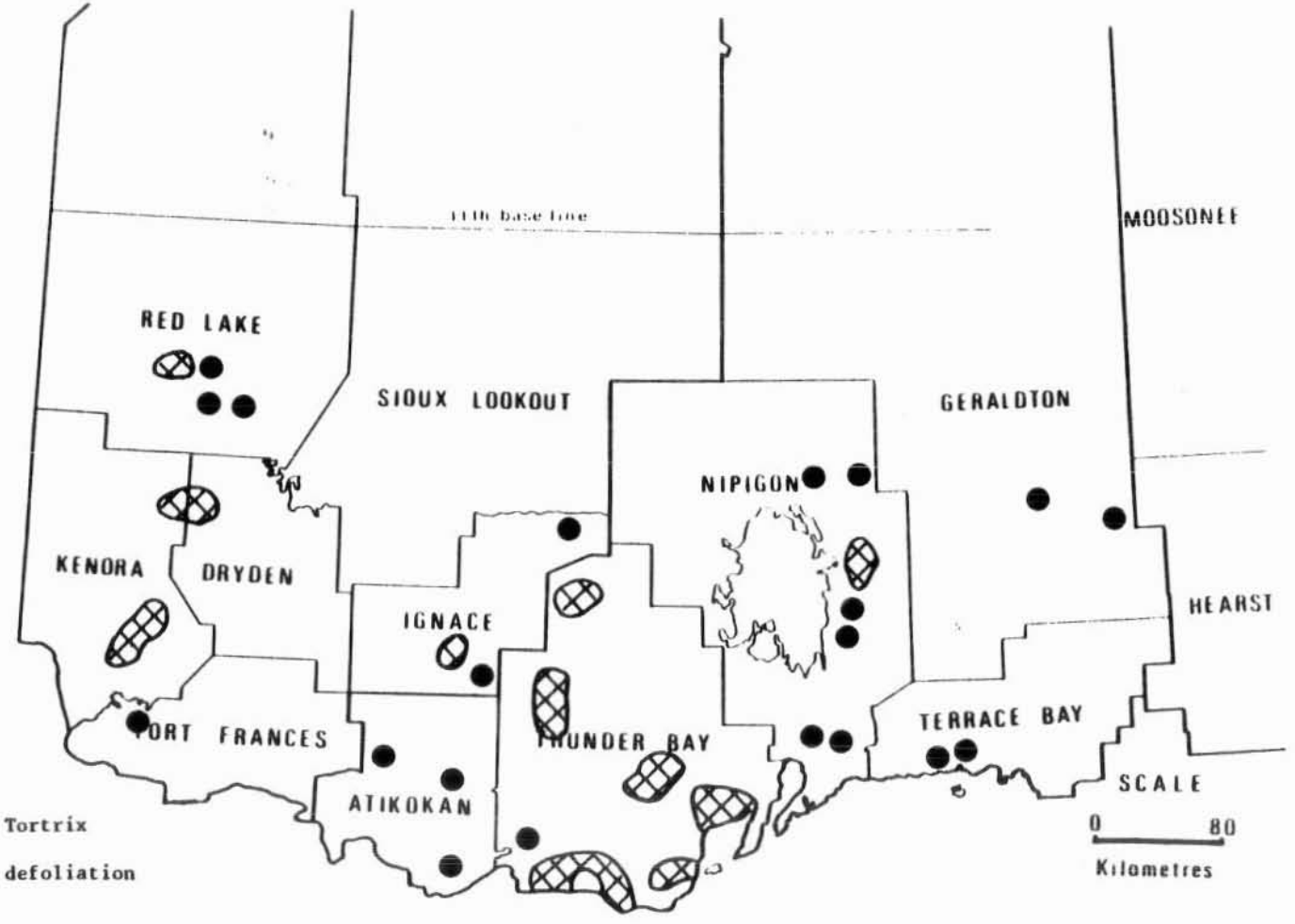
Areas within which defoliation occurred in 1970

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



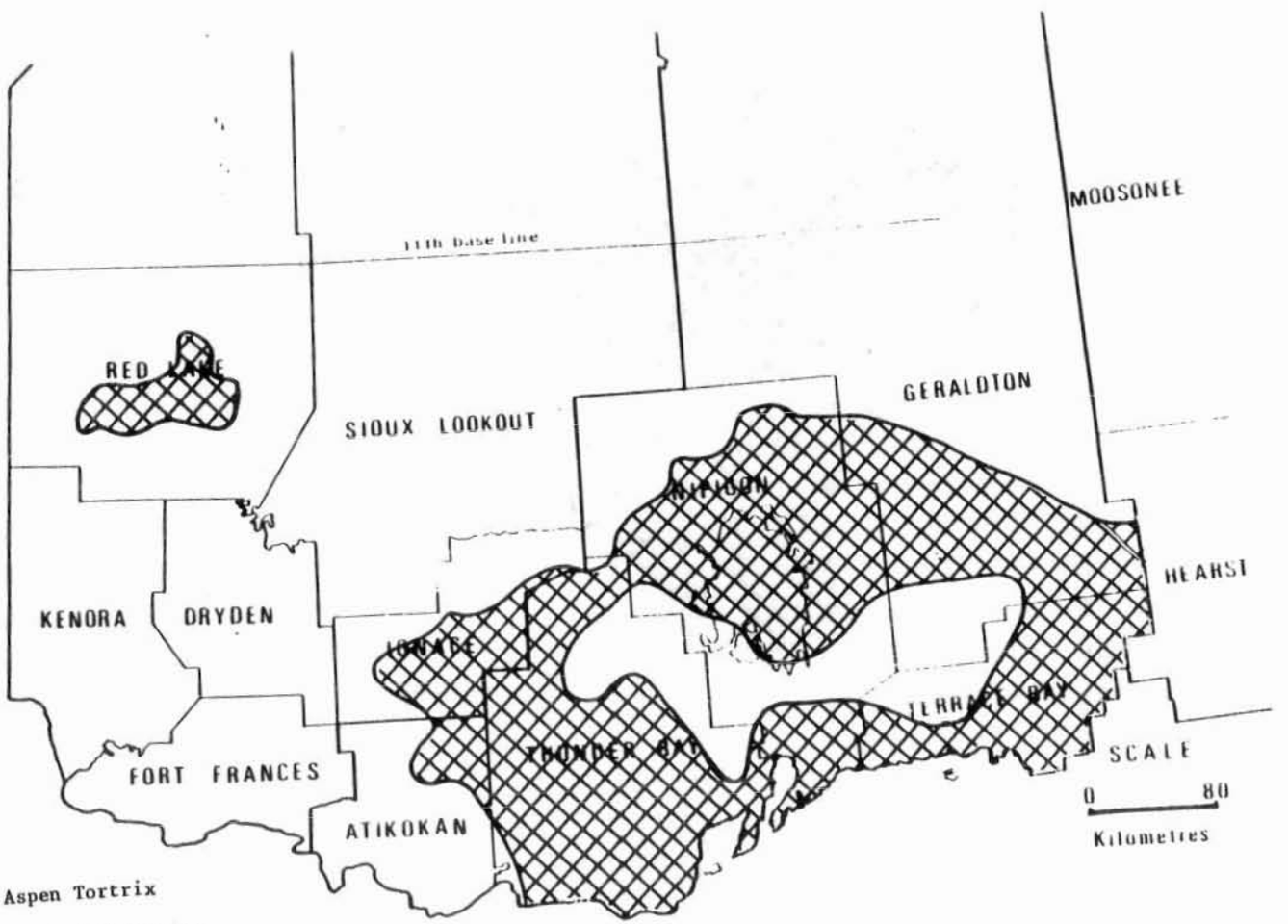
Large Aspen Tortrix

Areas within which defoliation occurred in 1971

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



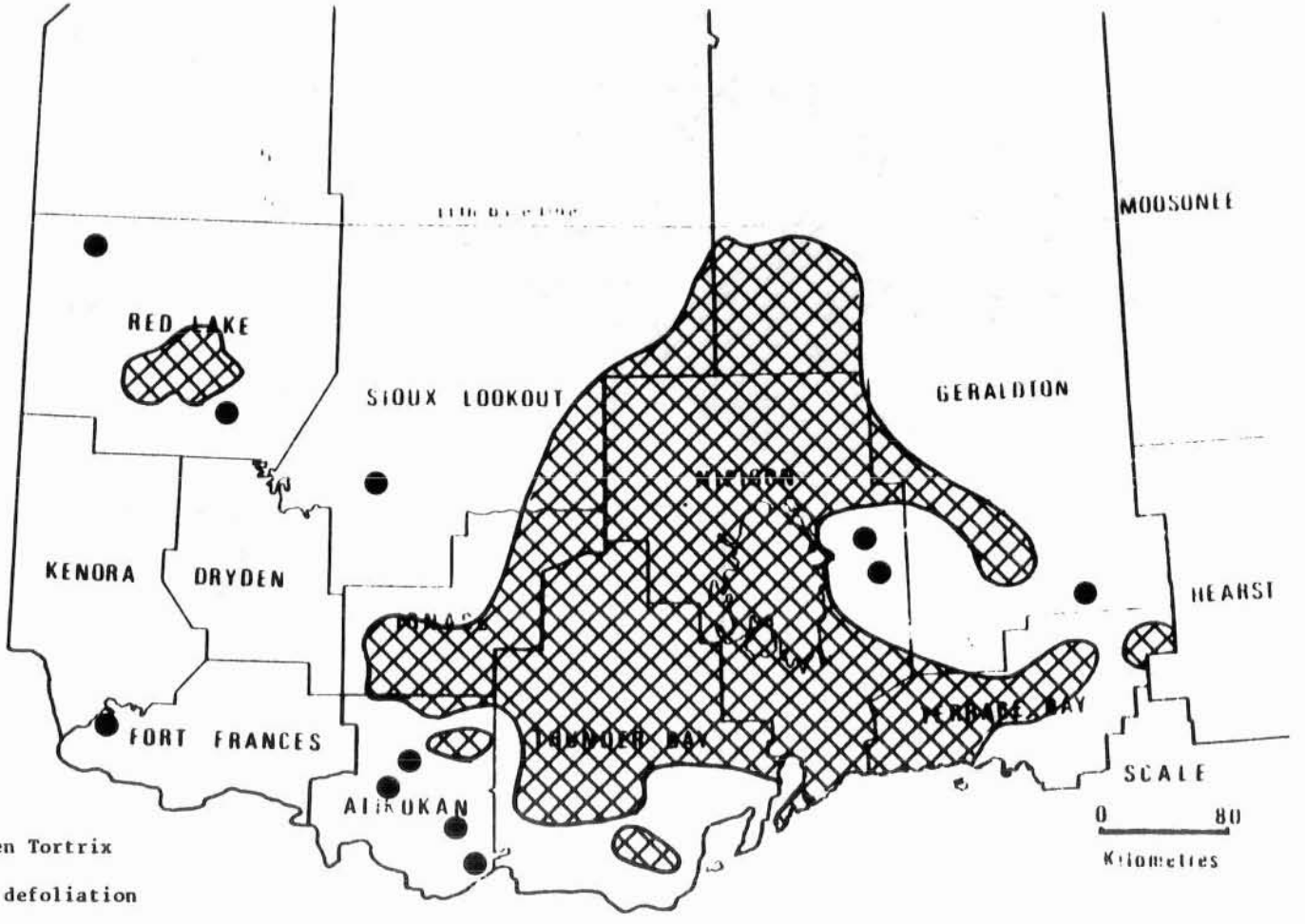
Large Aspen Tortrix

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



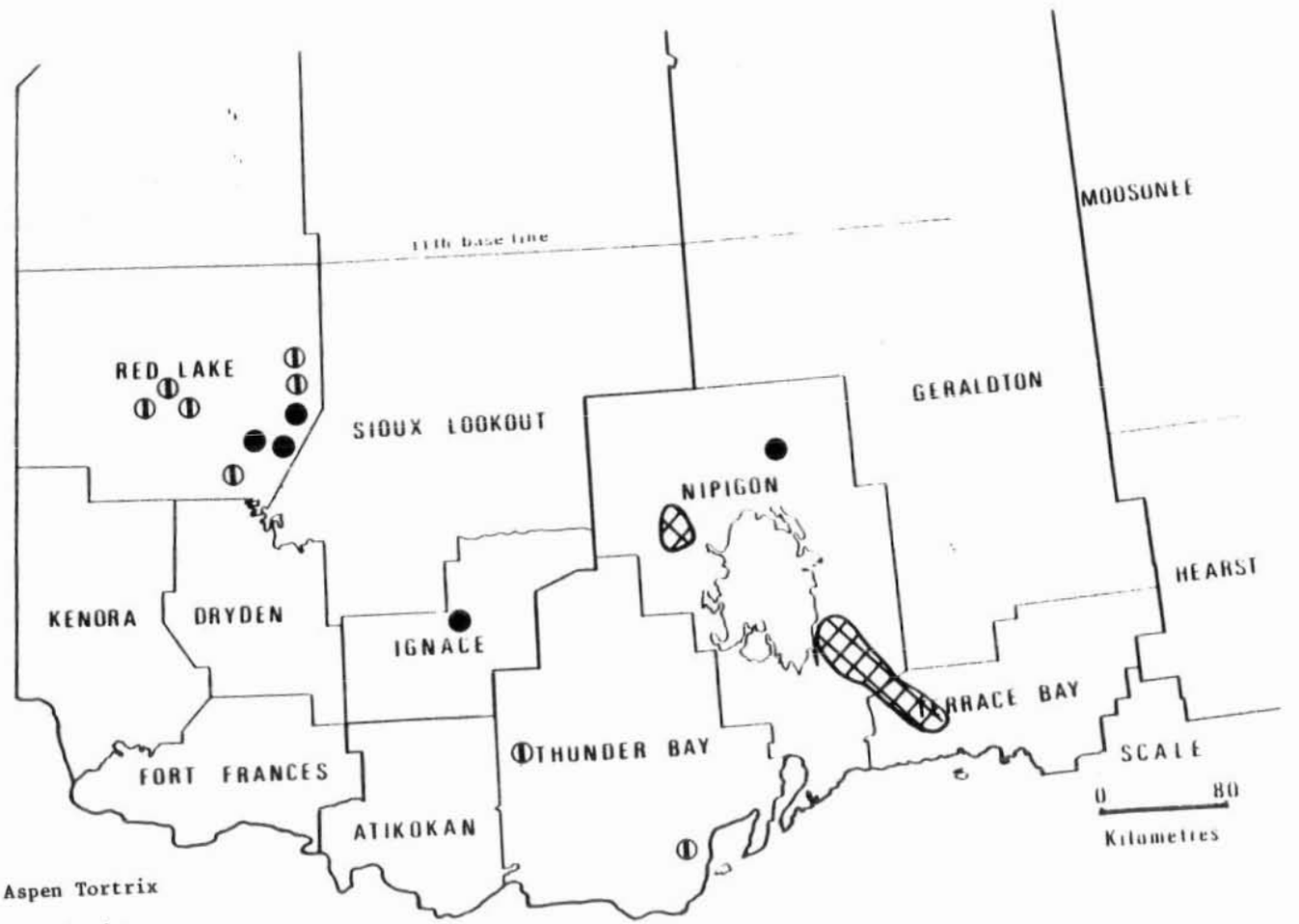
Large Aspen Tortrix

Areas within which defoliation occurred in 1973

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Large Aspen Tortrix

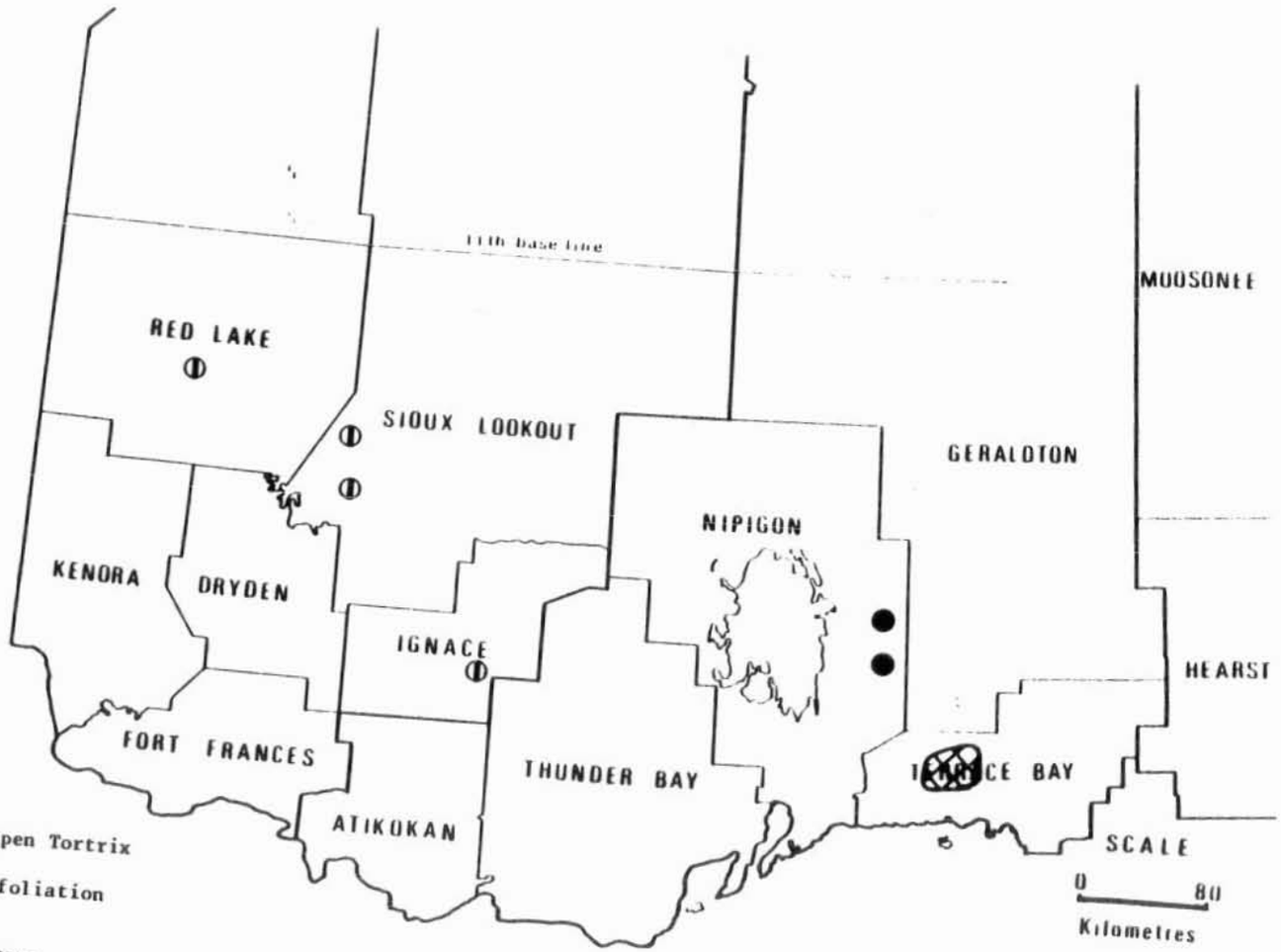
Areas within which defoliation occurred in 1974

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Large Aspen Tortrix

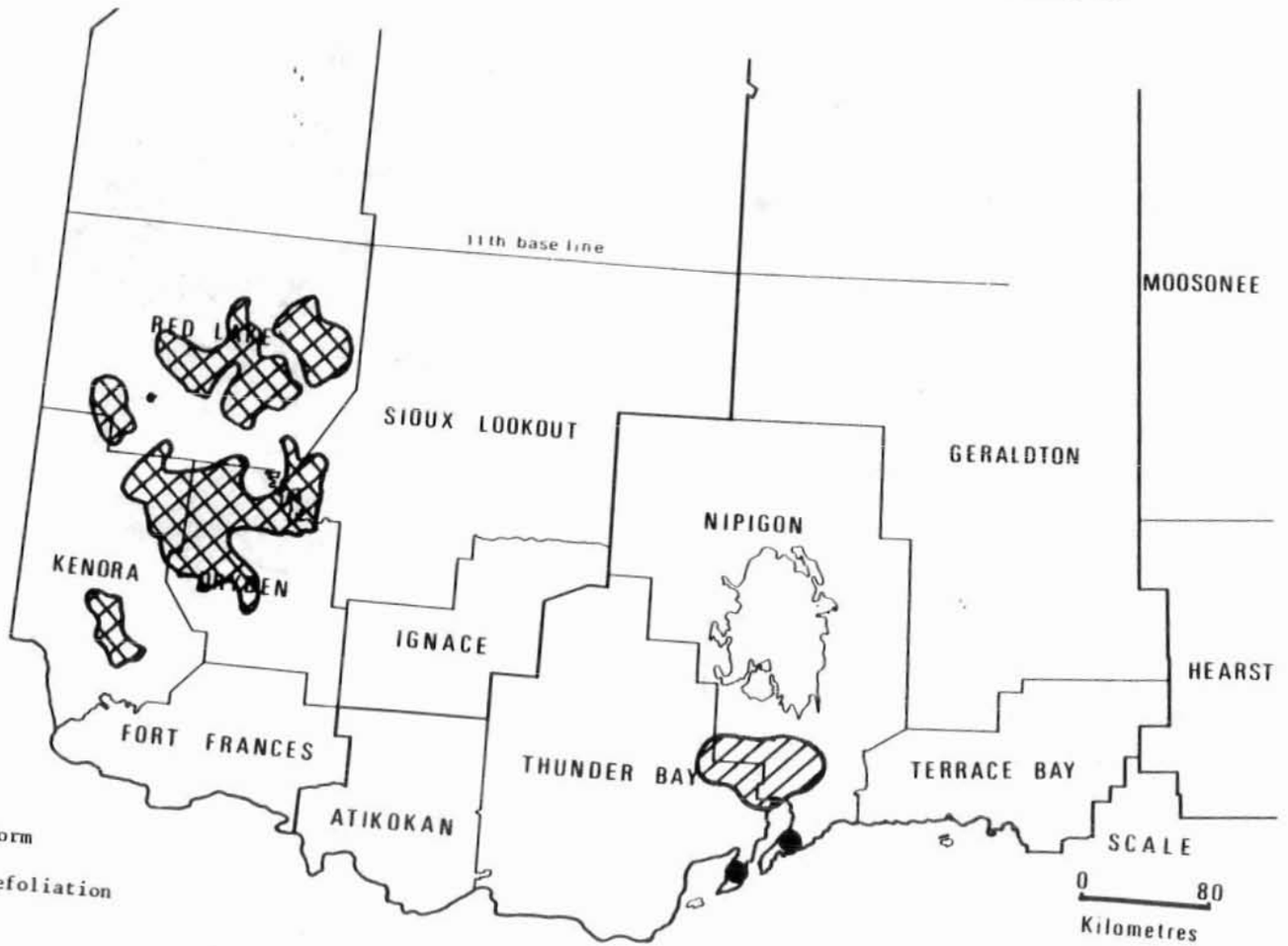
Areas within which defoliation occurred in 1975

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

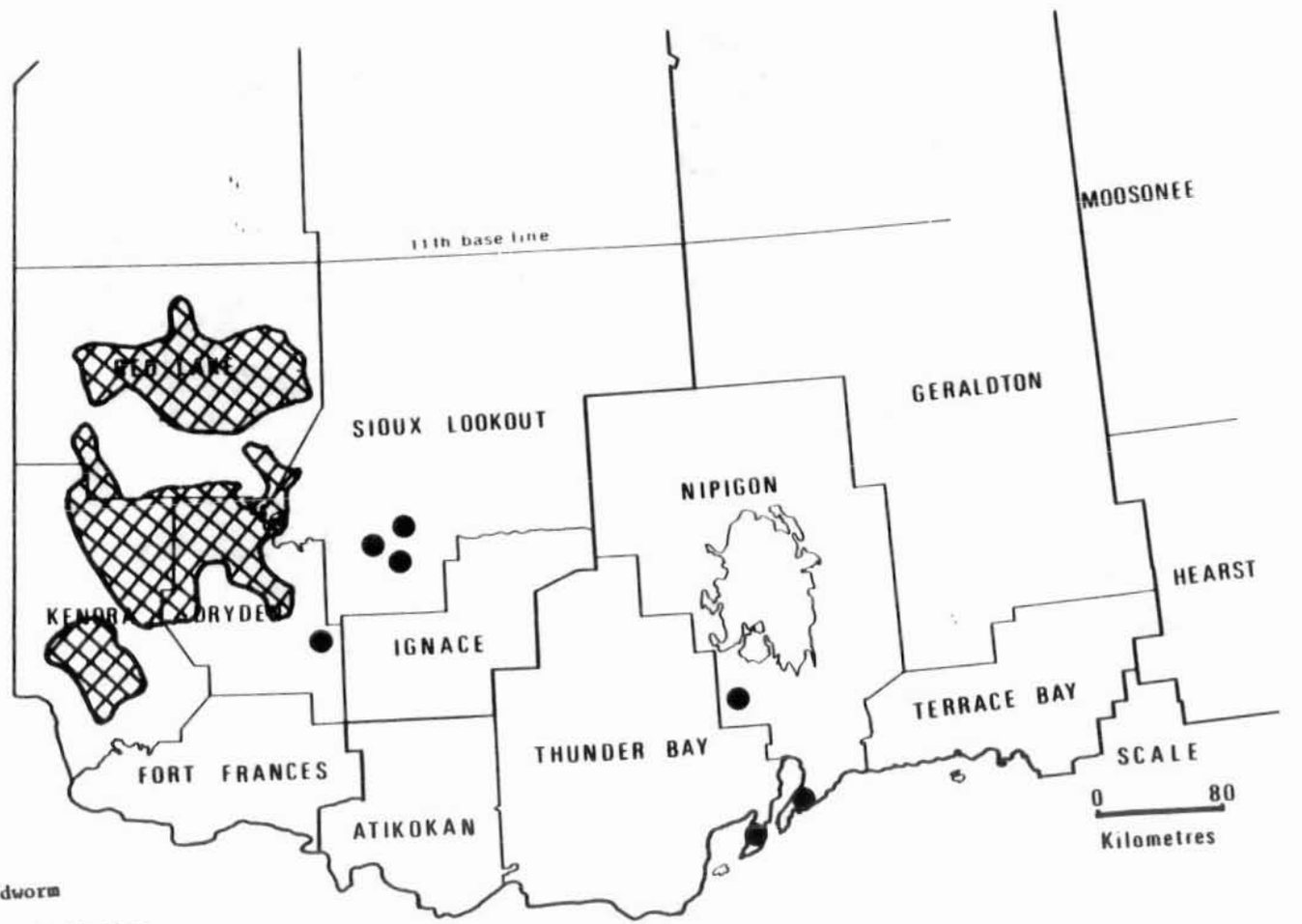
Areas within which defoliation occurred in 1950

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



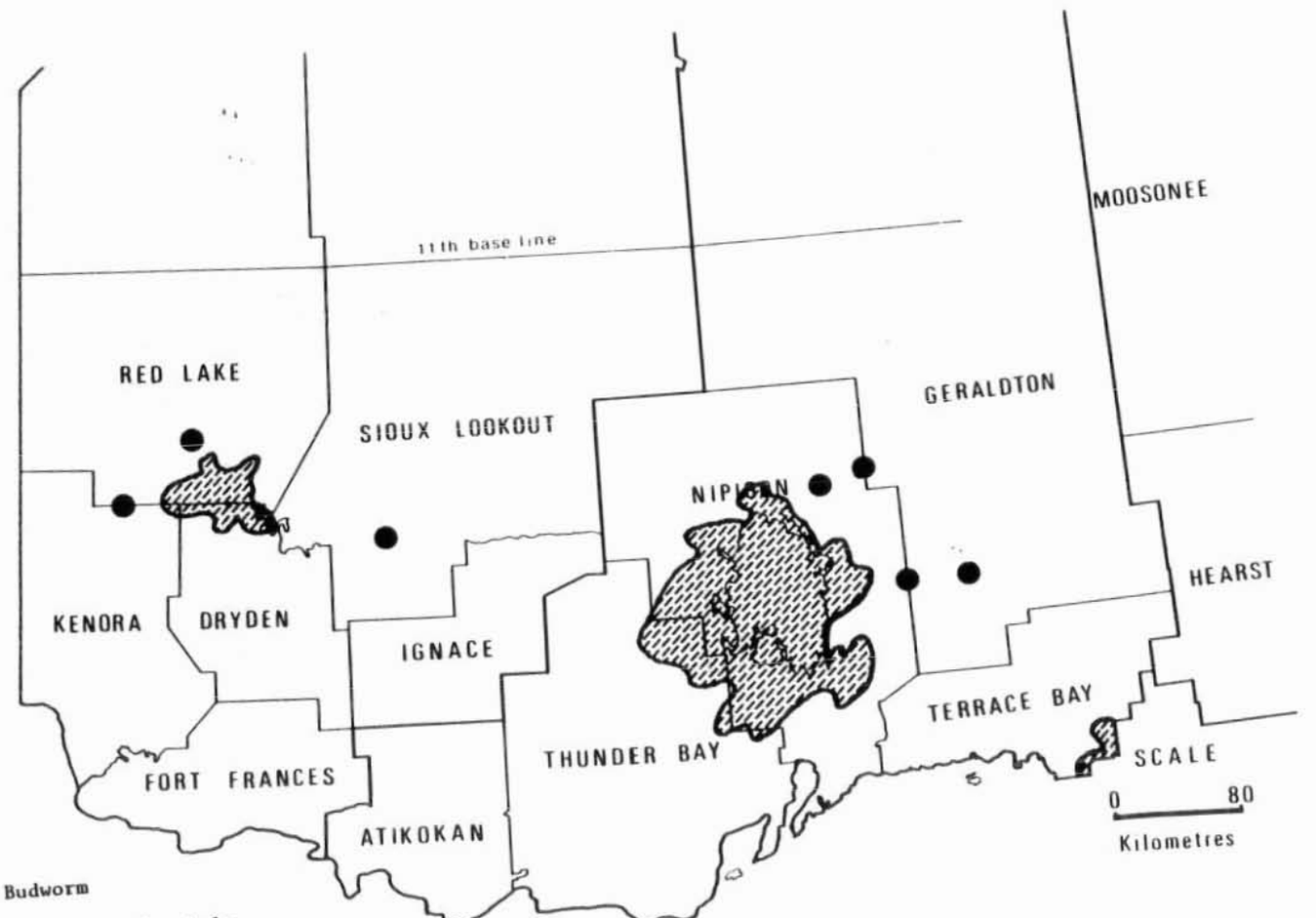
Spruce Budworm

Areas within which defoliation occurred in 1951

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



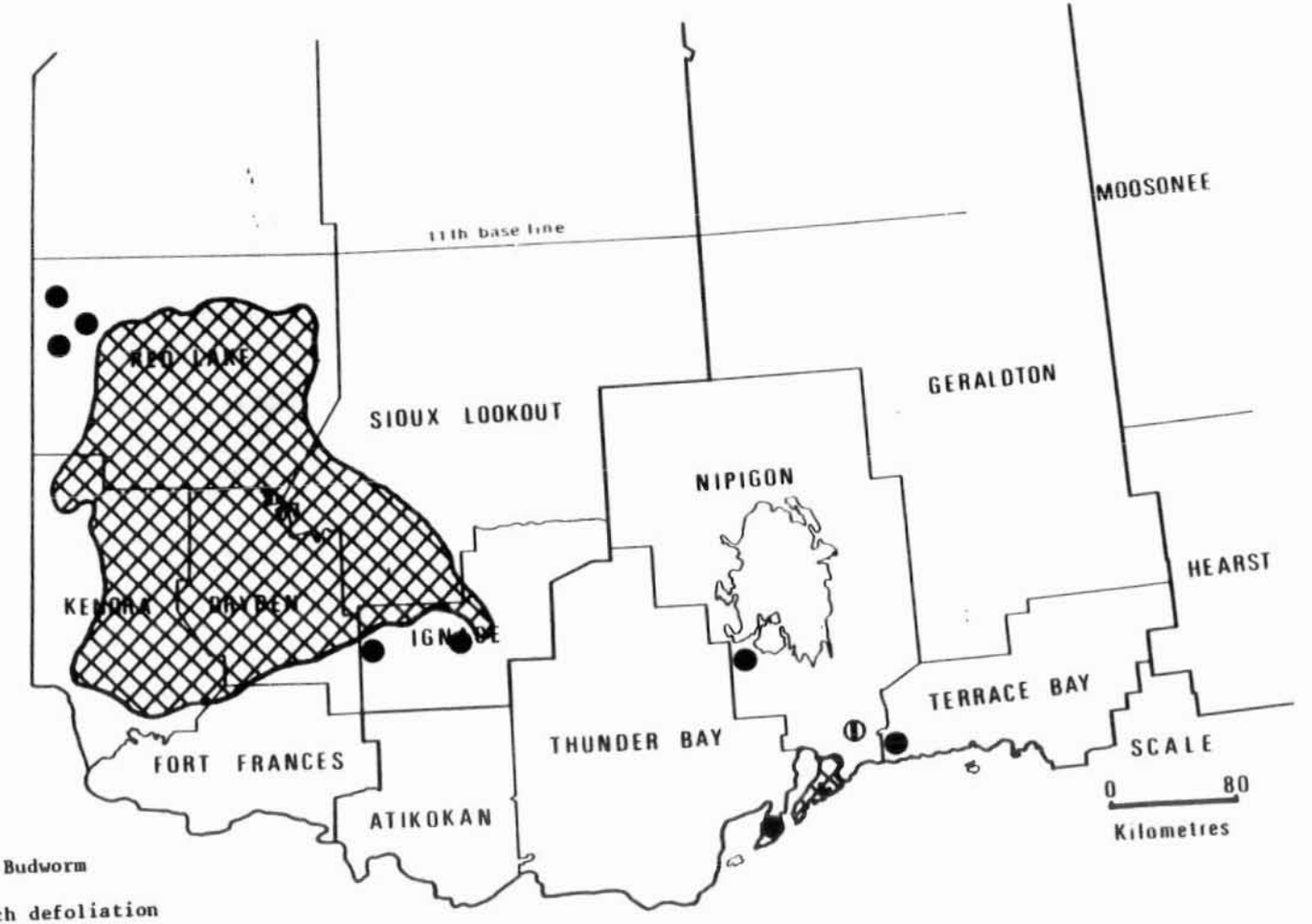
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1951

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

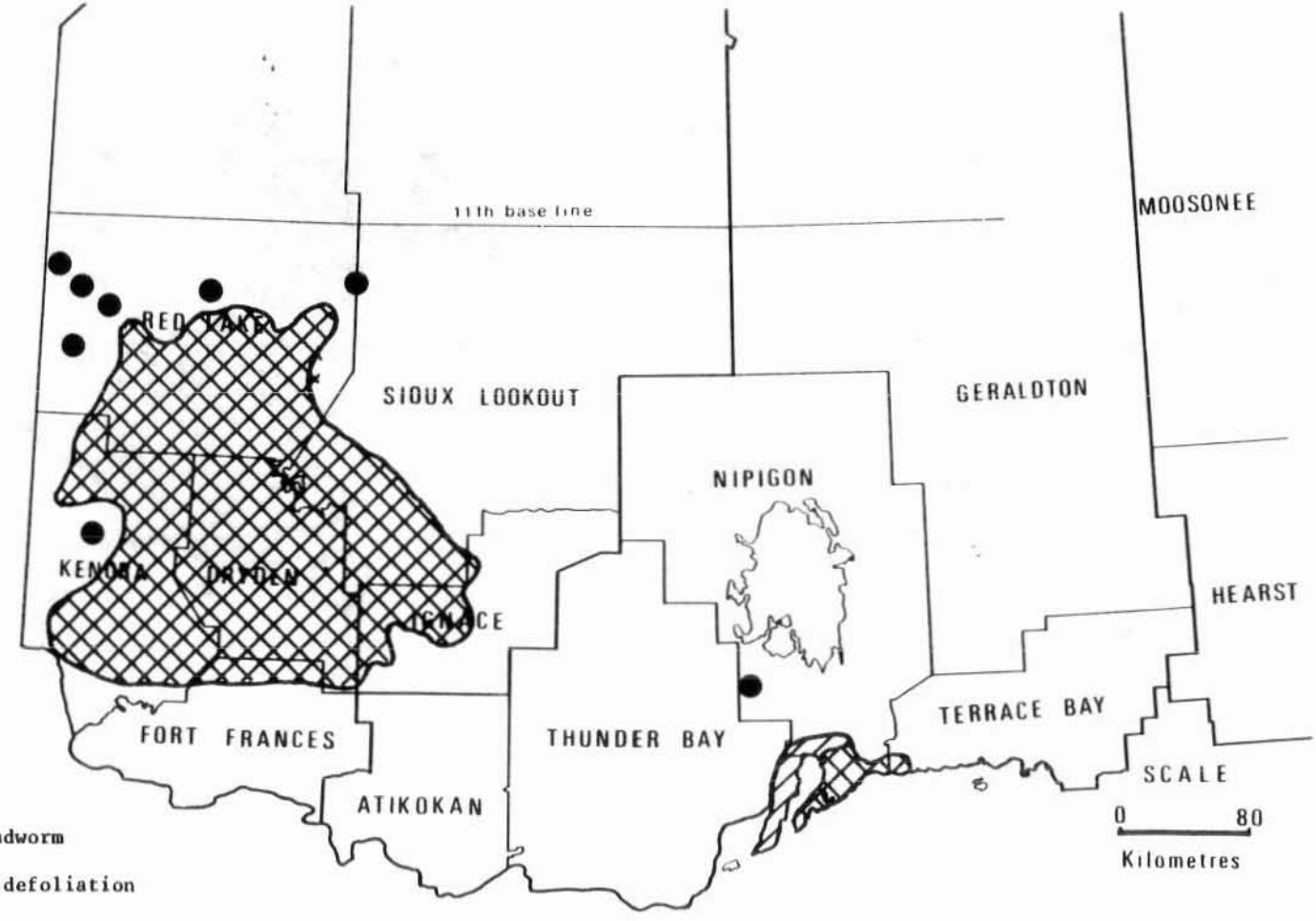
Areas within which defoliation occurred in 1952

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

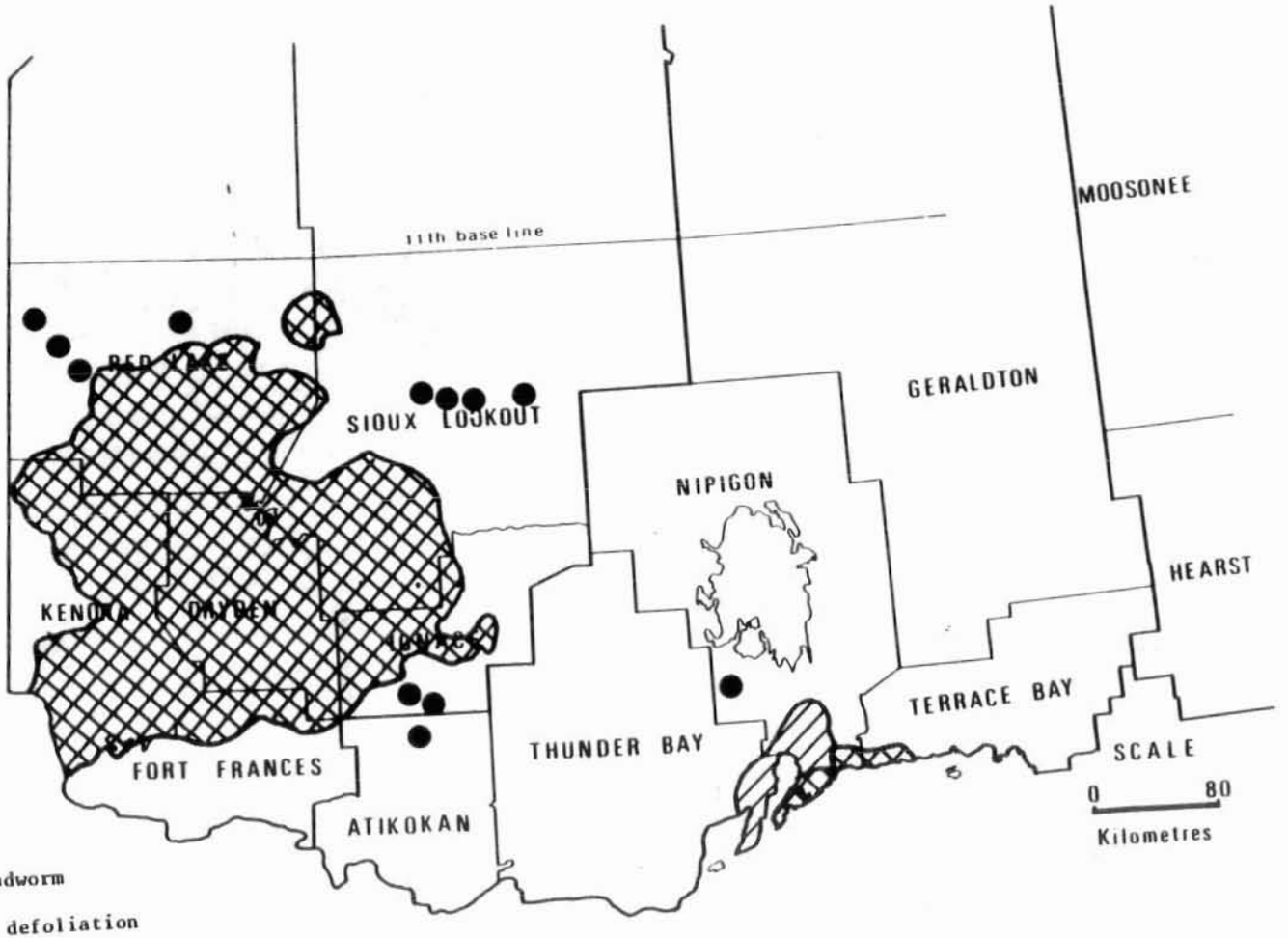
Areas within which defoliation occurred in 1953

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Spruce Budworm

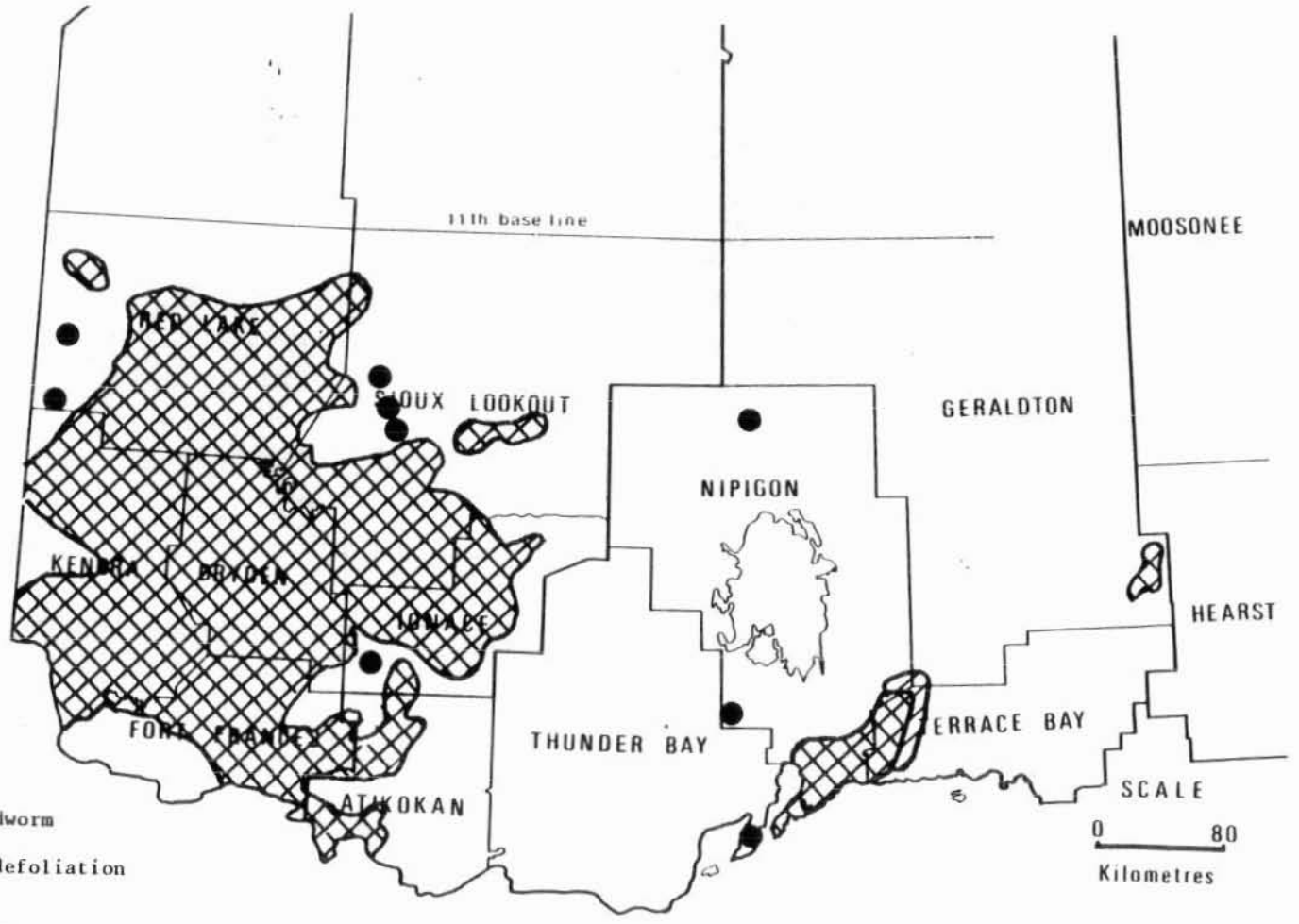
Areas within which defoliation occurred in 1954

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Spruce Budworm

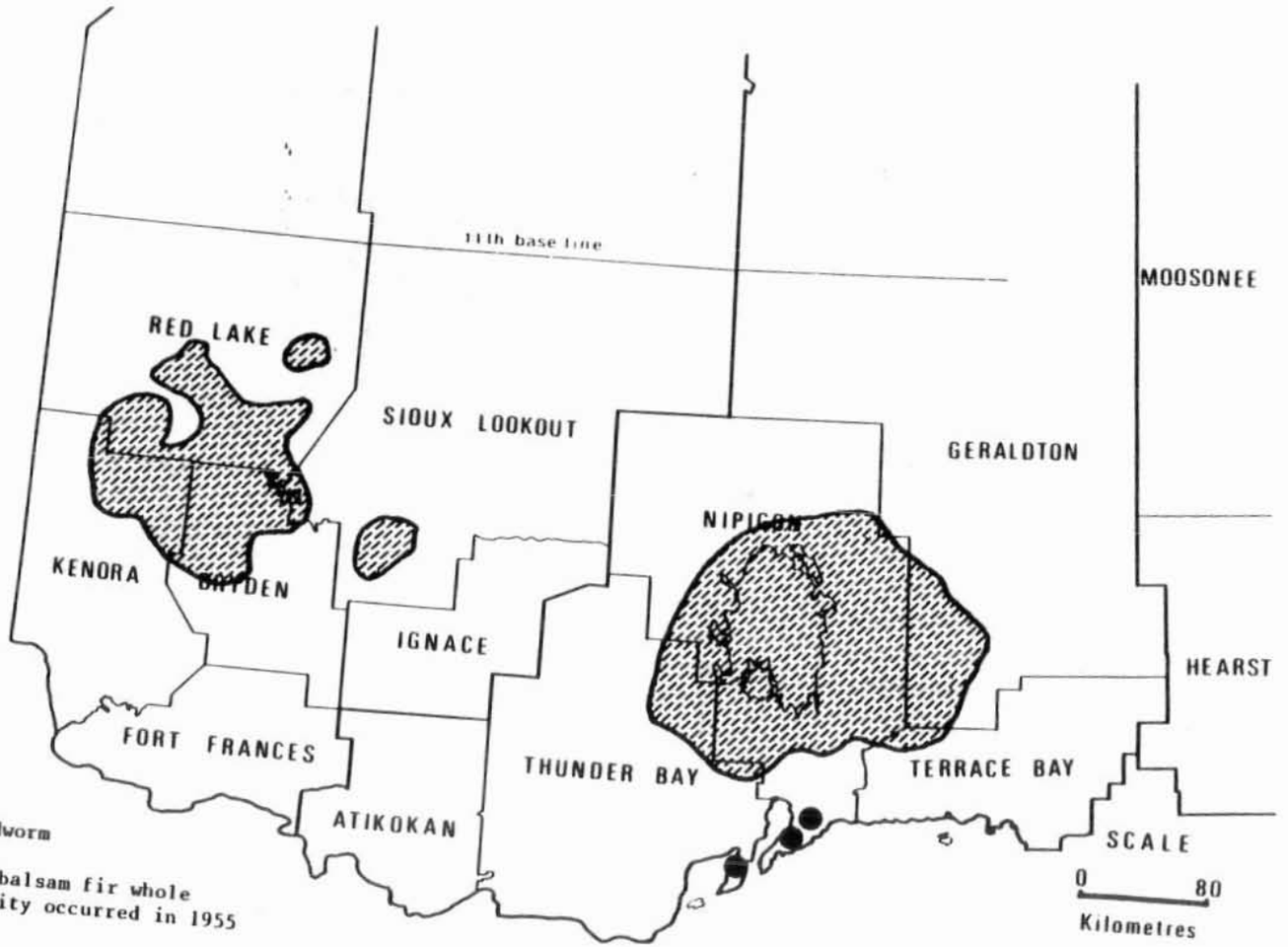
Areas within which defoliation occurred in 1955

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



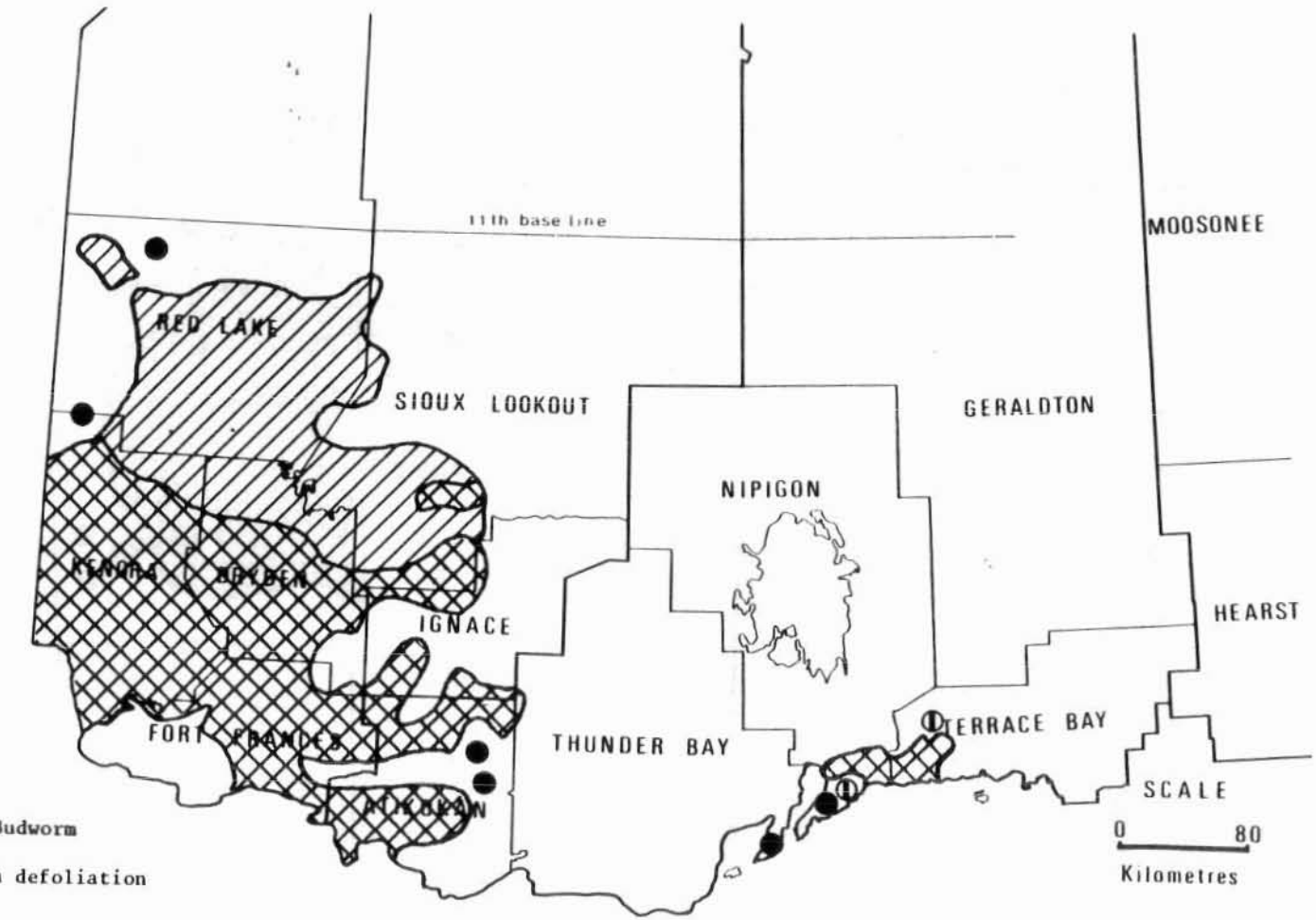
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1955

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

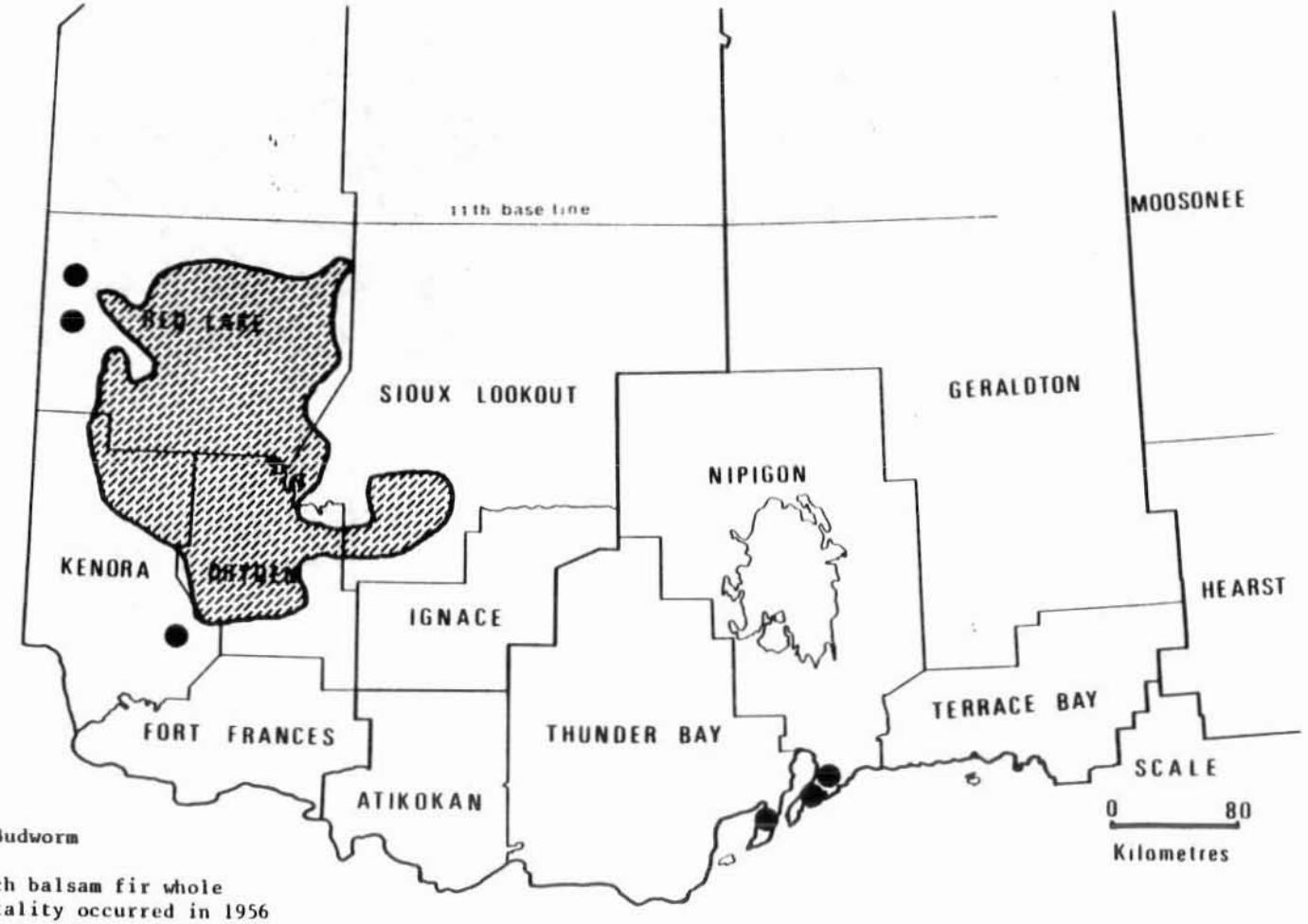
Areas within which defoliation occurred in 1956

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



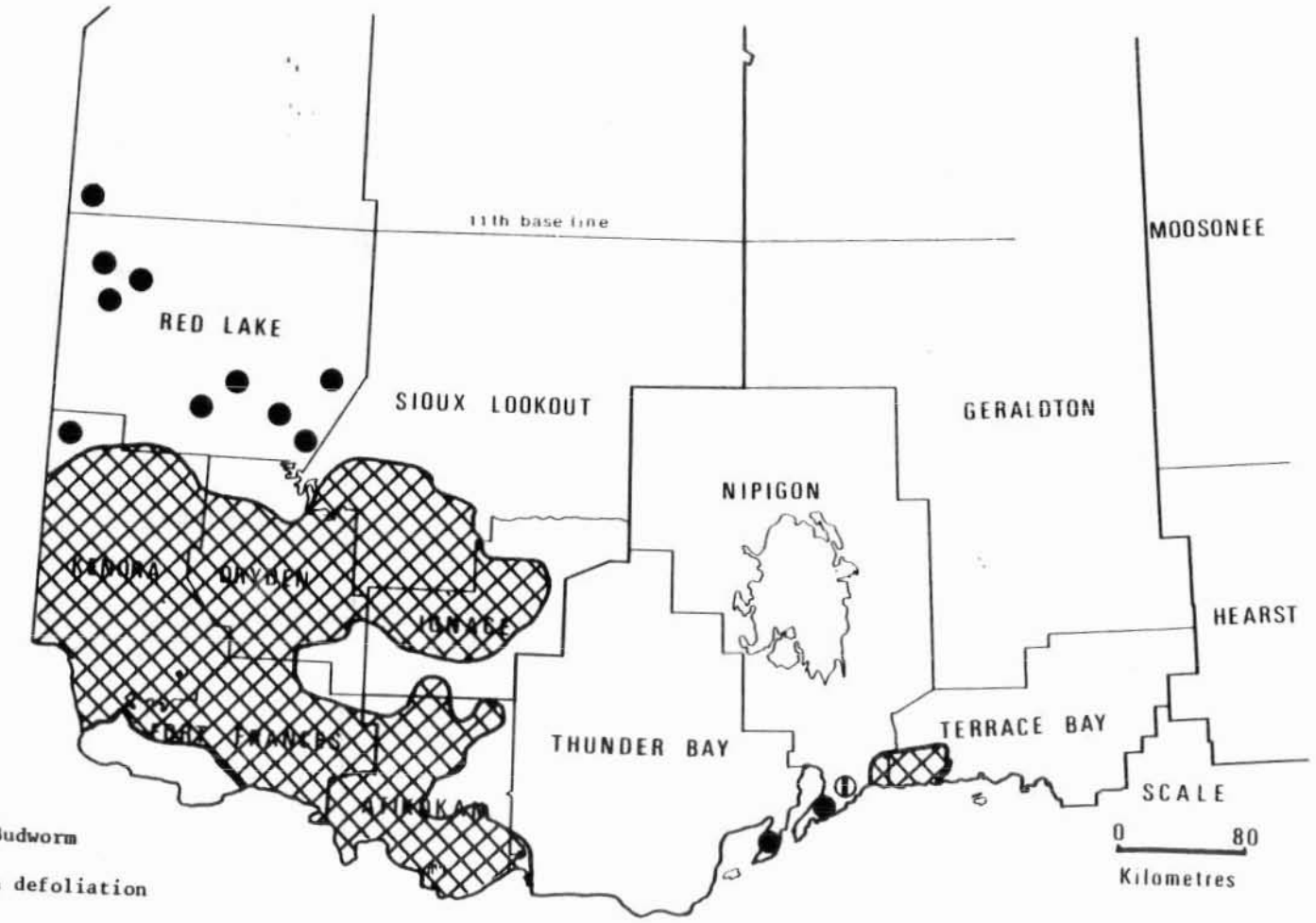
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1956

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

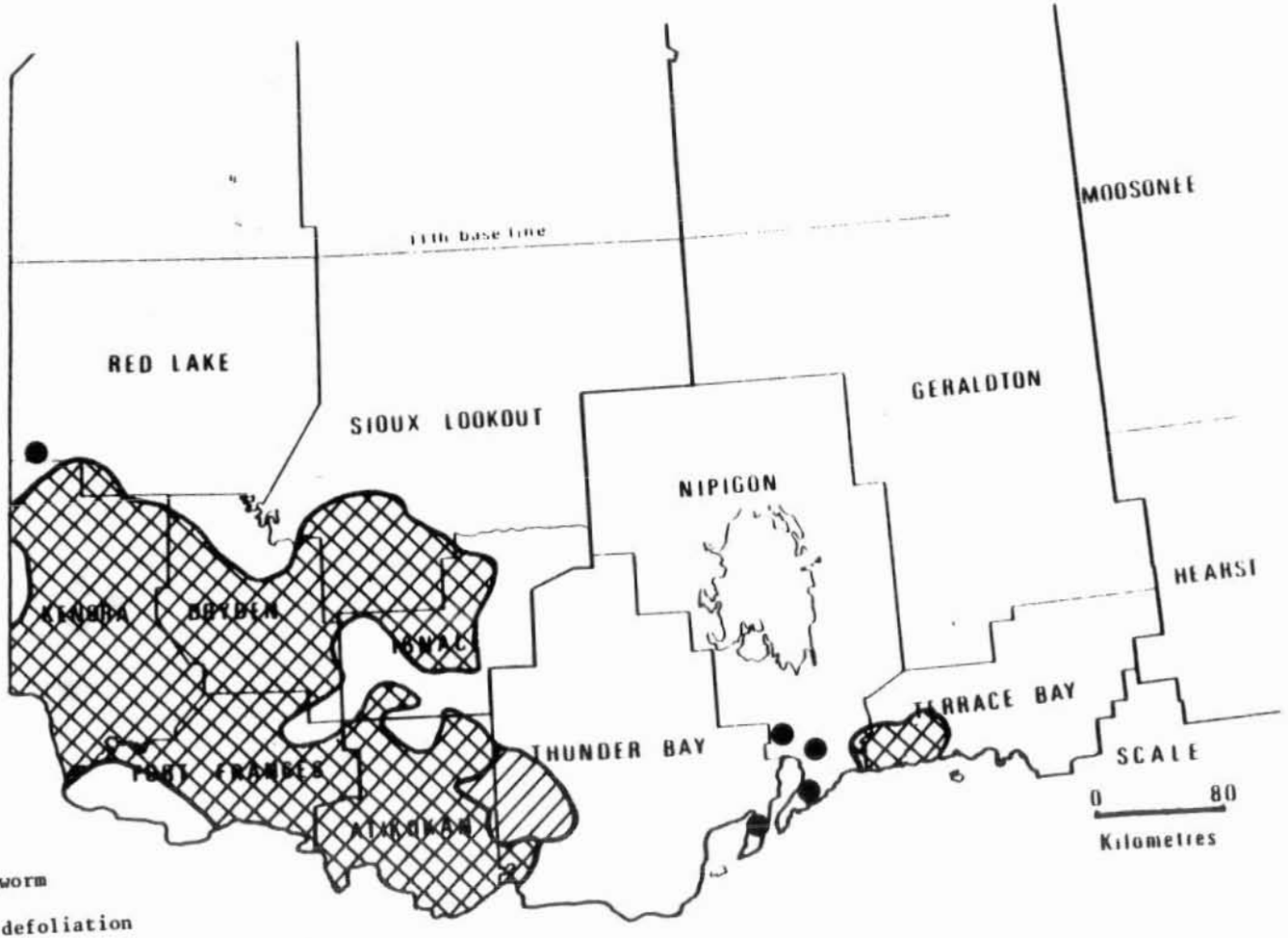
Areas within which defoliation occurred in 1957

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

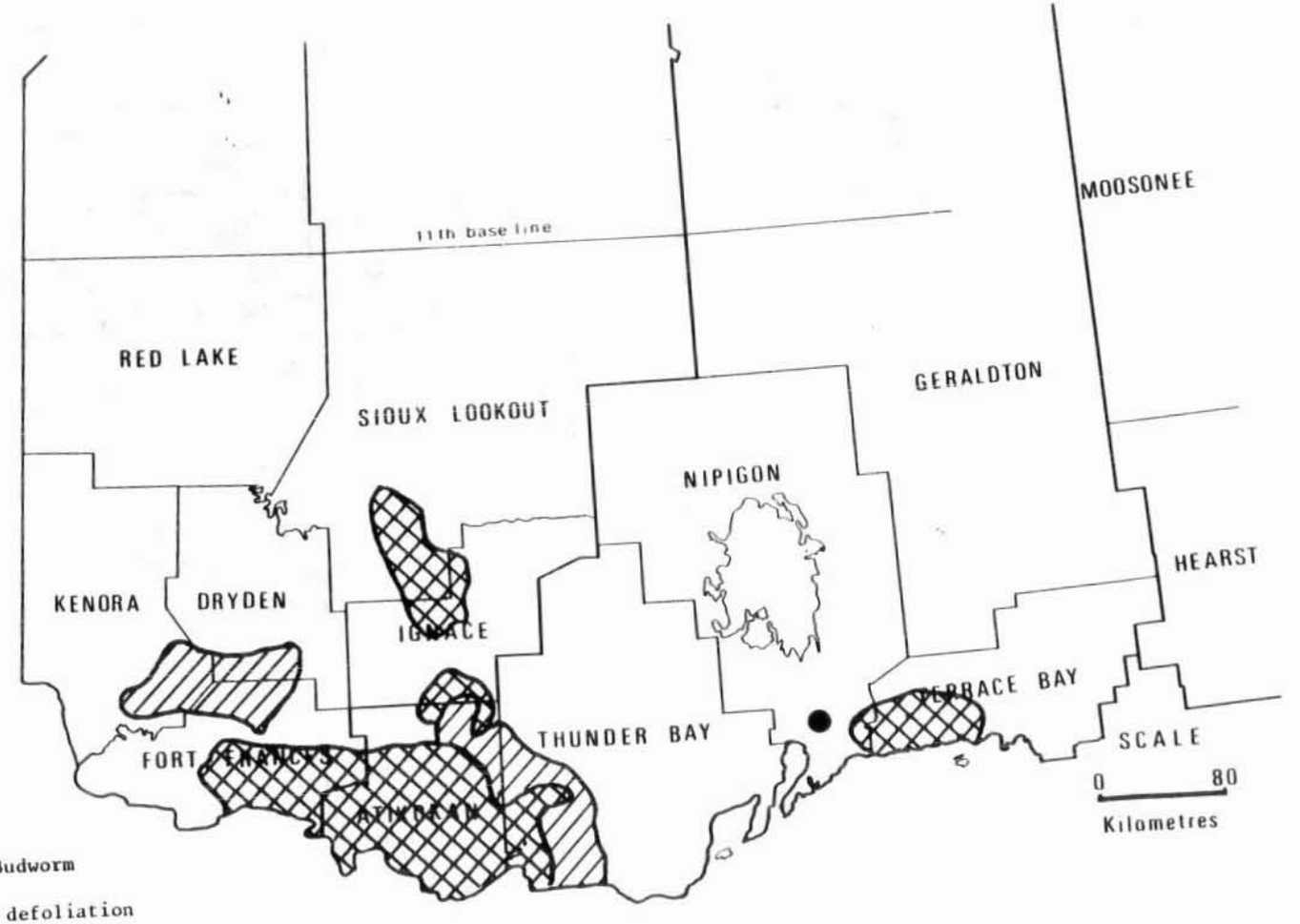
Areas within which defoliation occurred in 1958

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Spruce Budworm

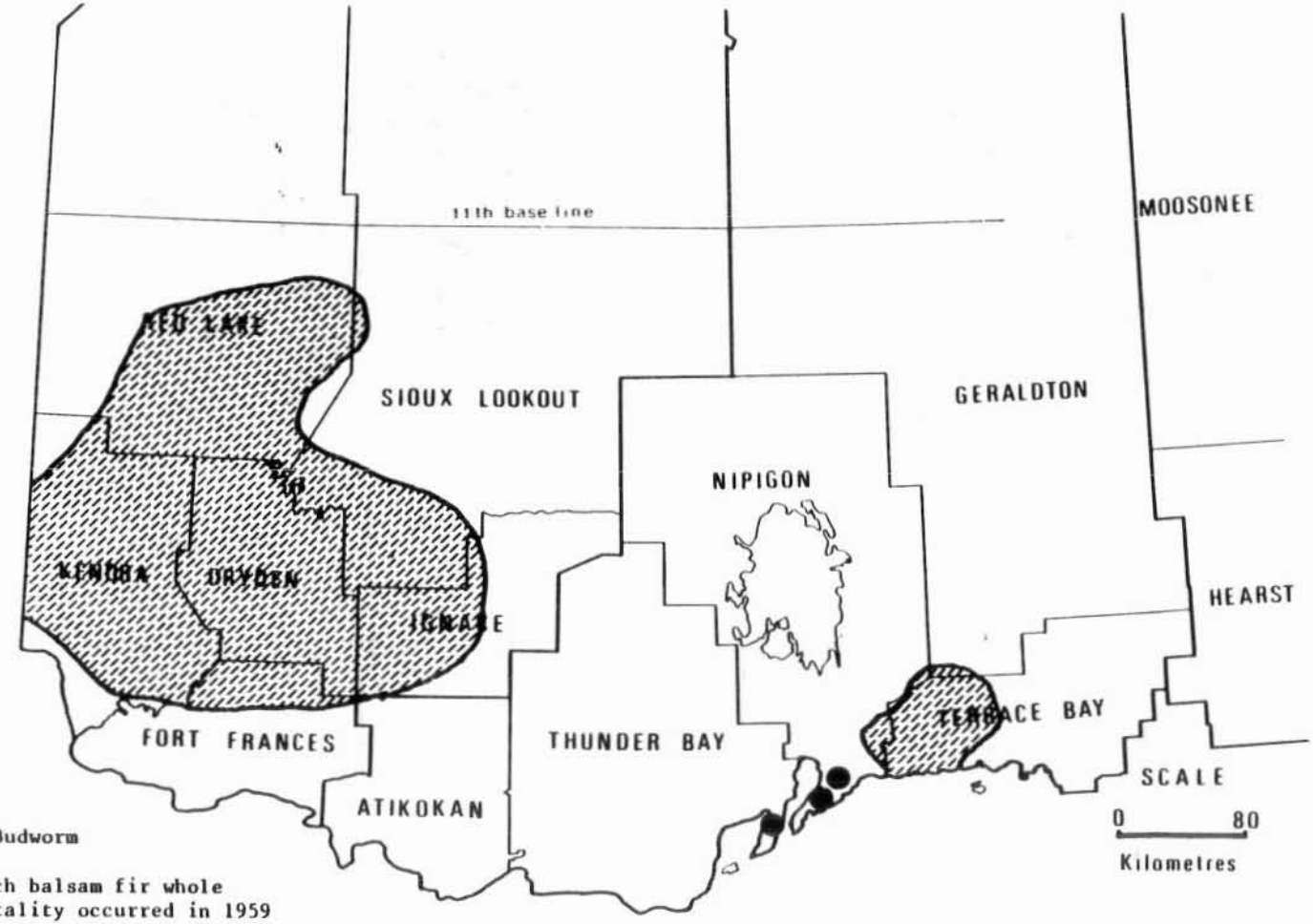
Areas with which defoliation occurred in 1959

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



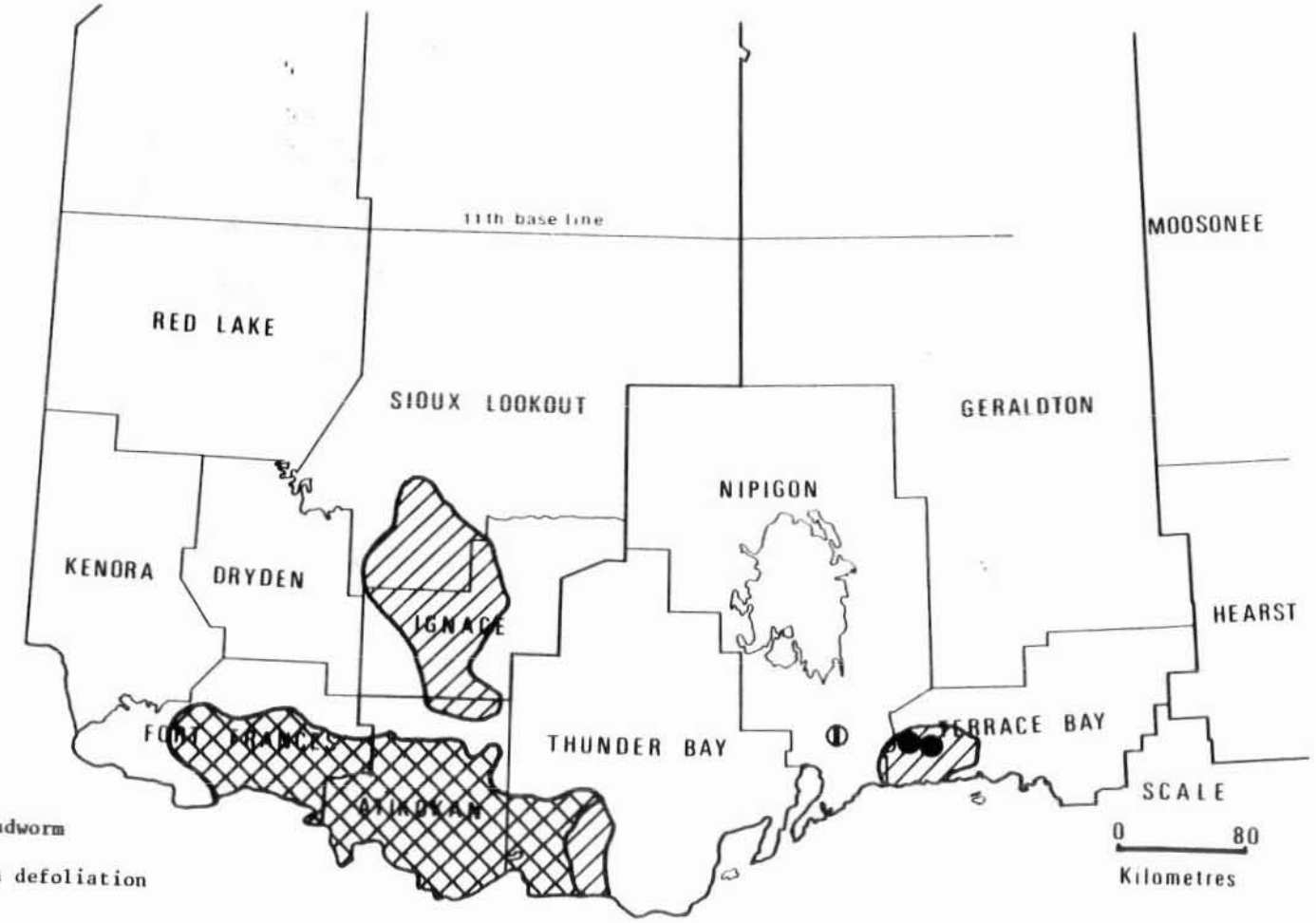
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1959

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

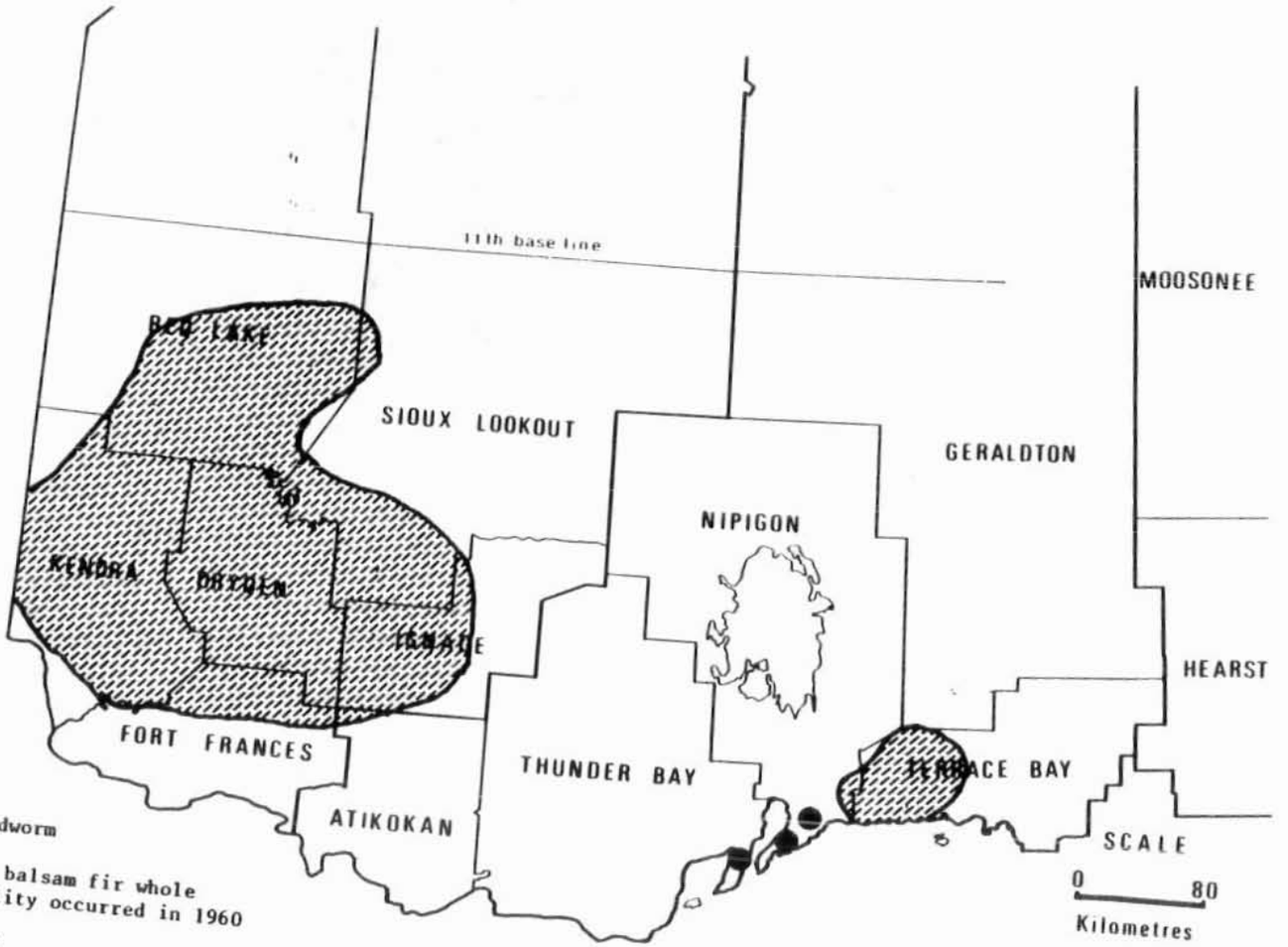
Areas within which defoliation occurred in 1960

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



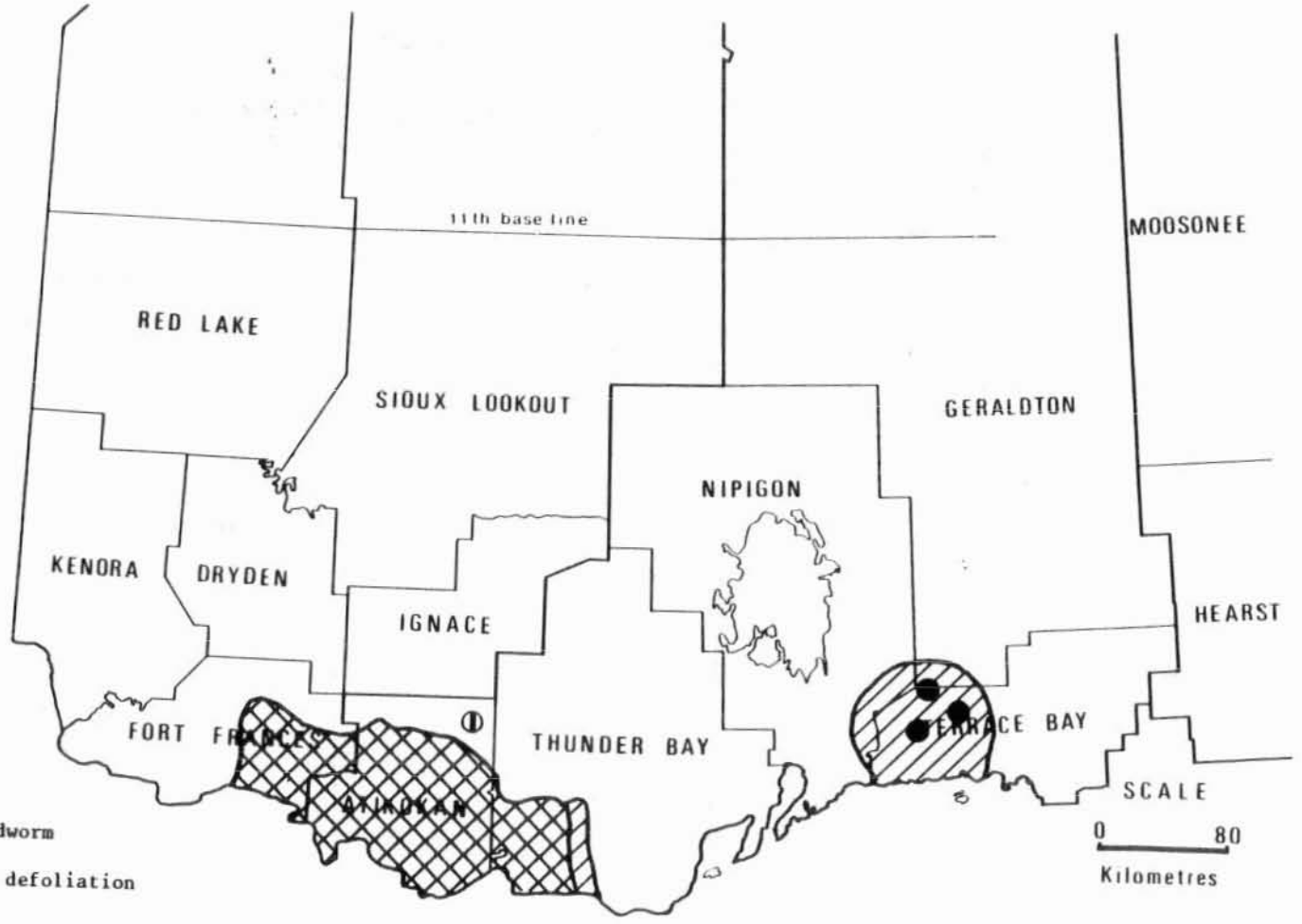
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1960

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

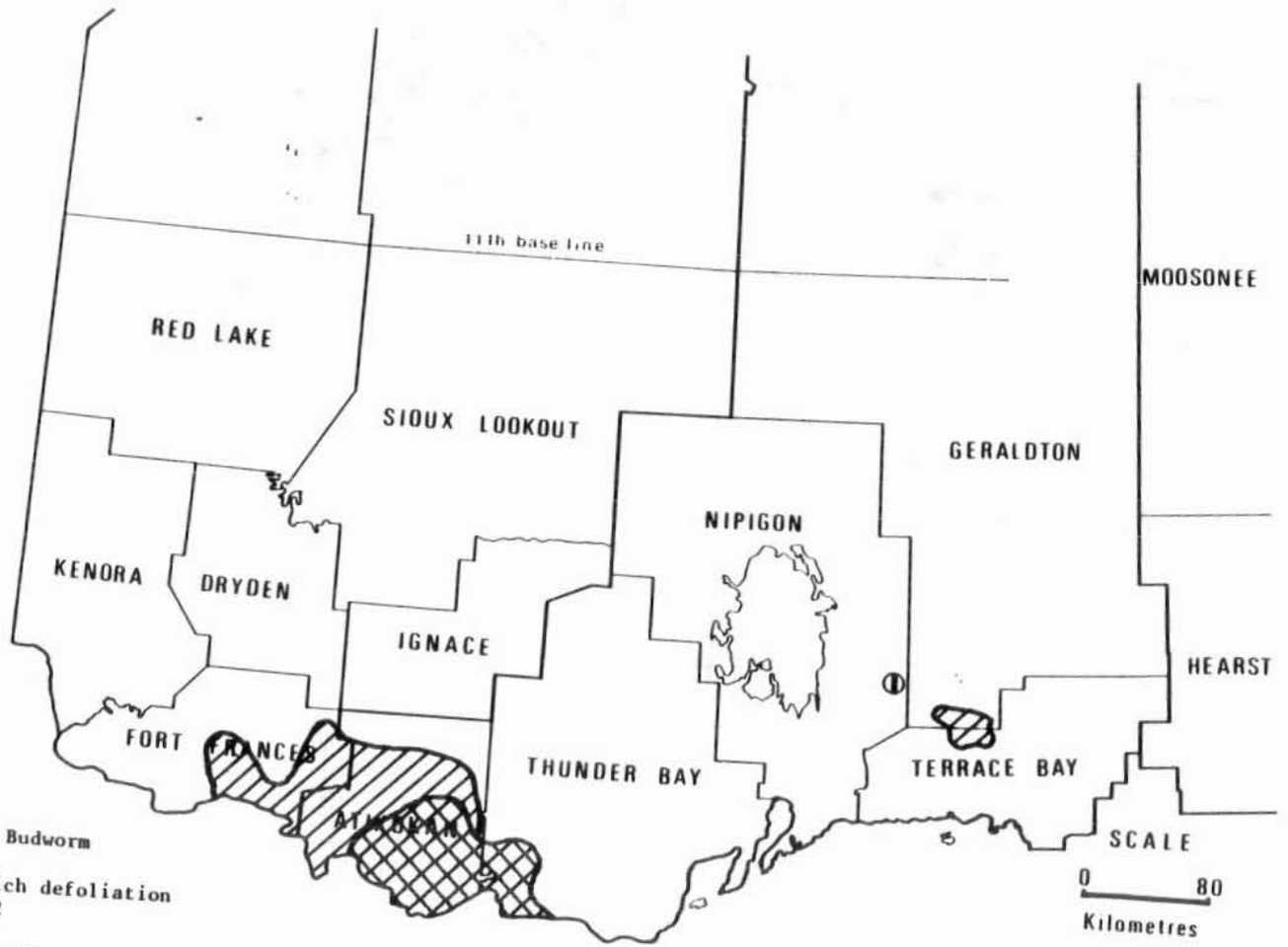
Areas within which defoliation occurred in 1961

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



Spruce Budworm

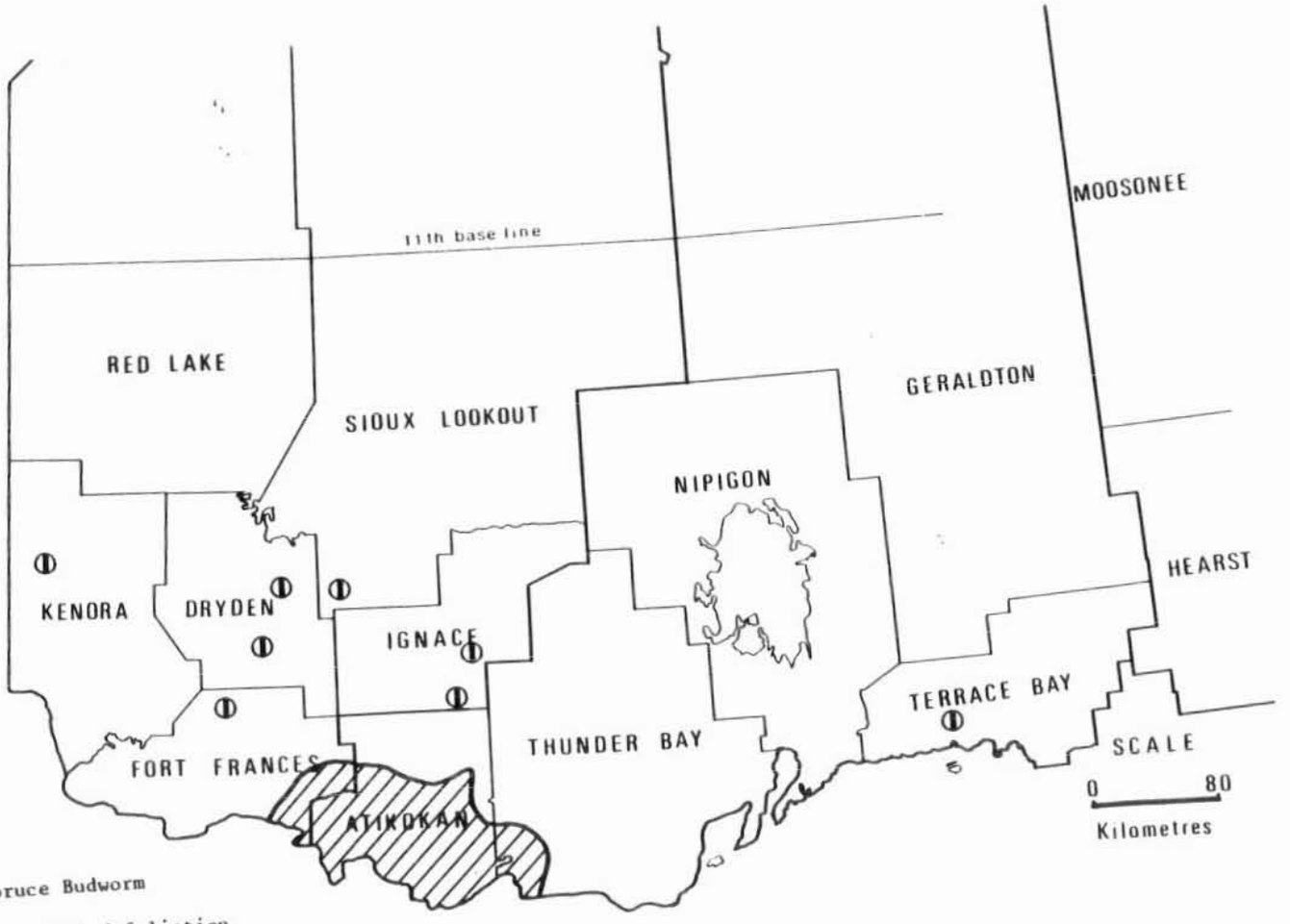
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ▩

NORTHWESTERN ONTARIO



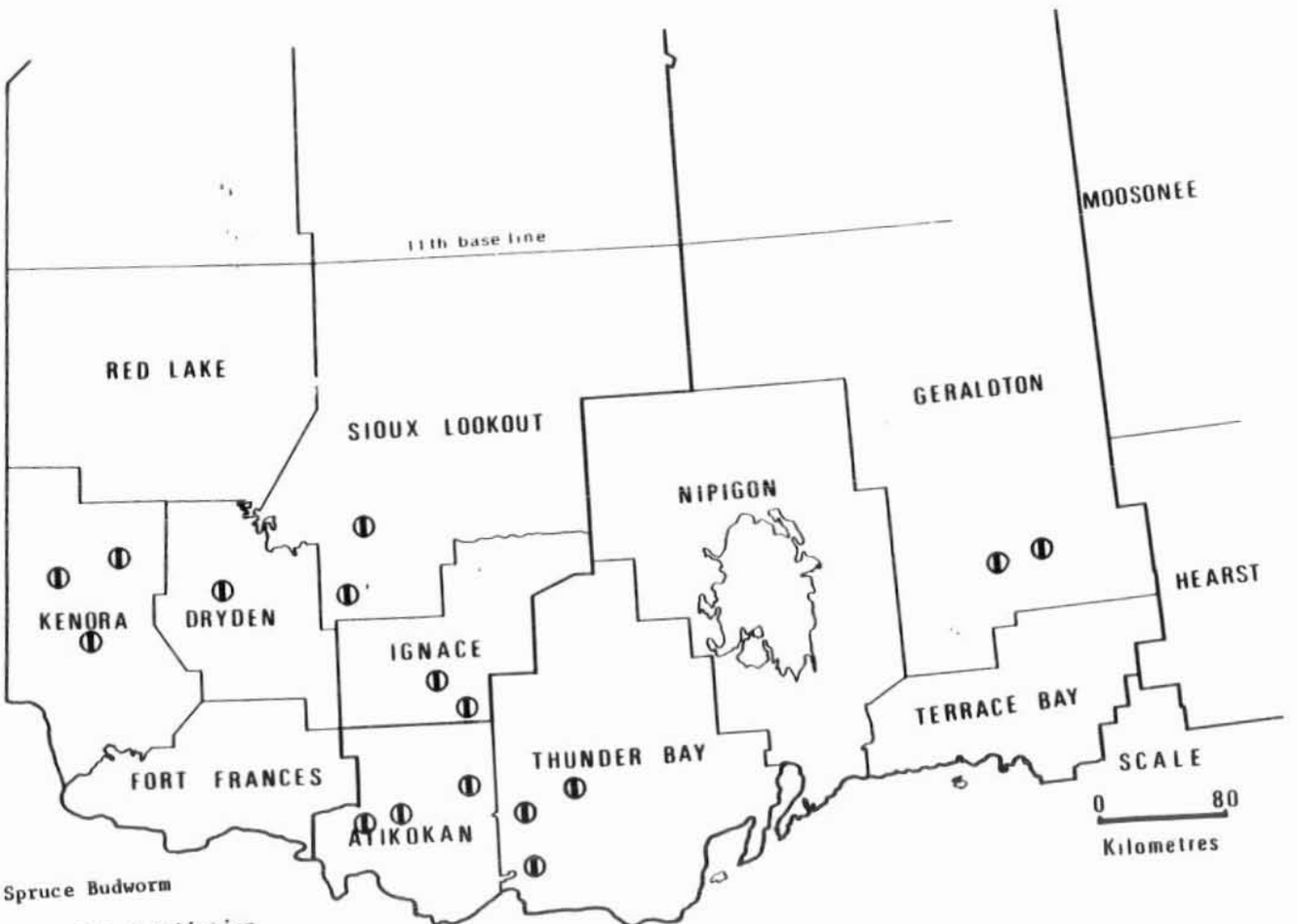
Spruce Budworm

Areas within which defoliation occurred in 1963

LEGEND

Light defoliation ◐ or ▨

NORTHWESTERN ONTARIO



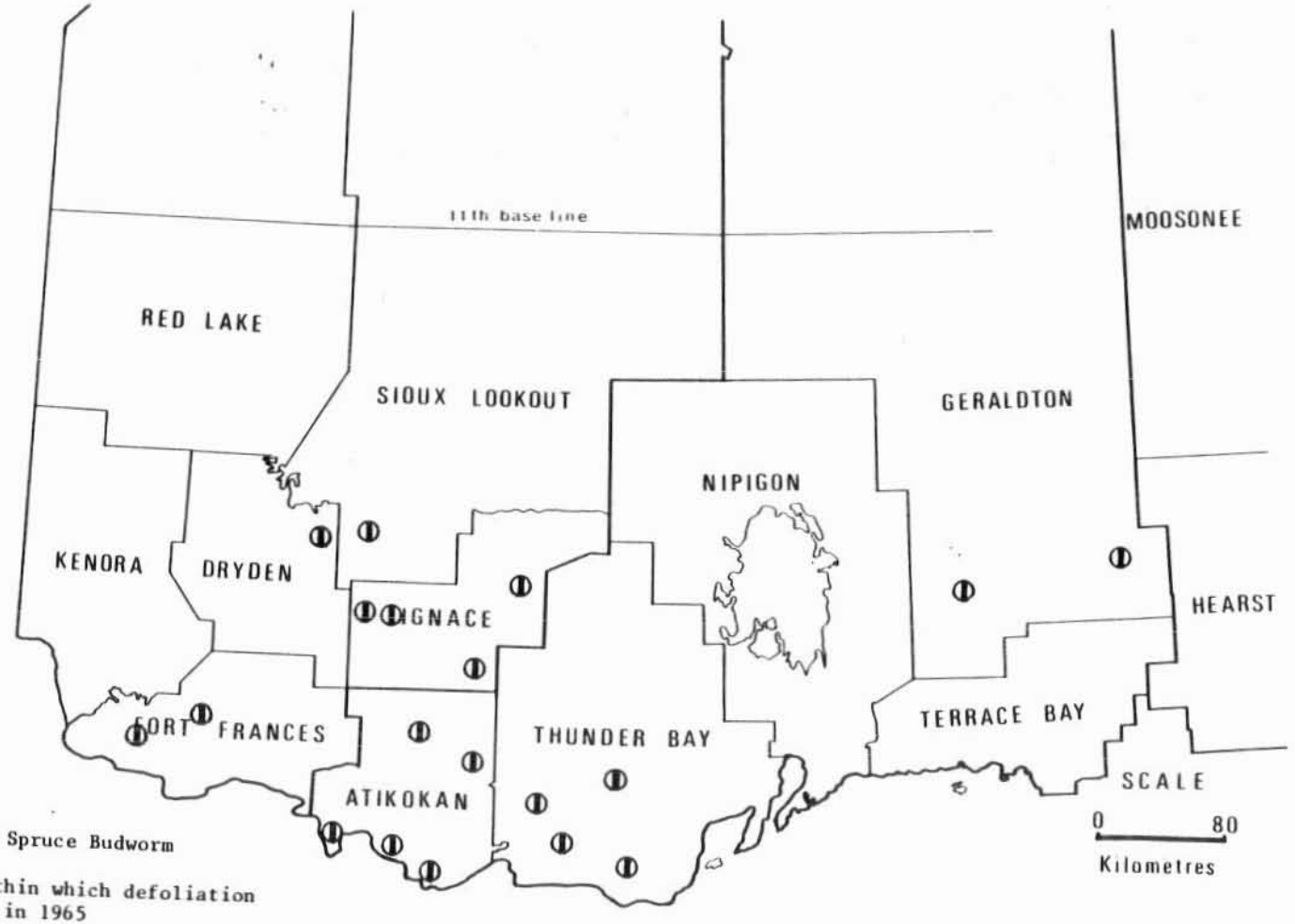
Spruce Budworm

Areas within which defoliation occurred in 1964

LEGEND

Light defoliation

NORTHWESTERN ONTARIO



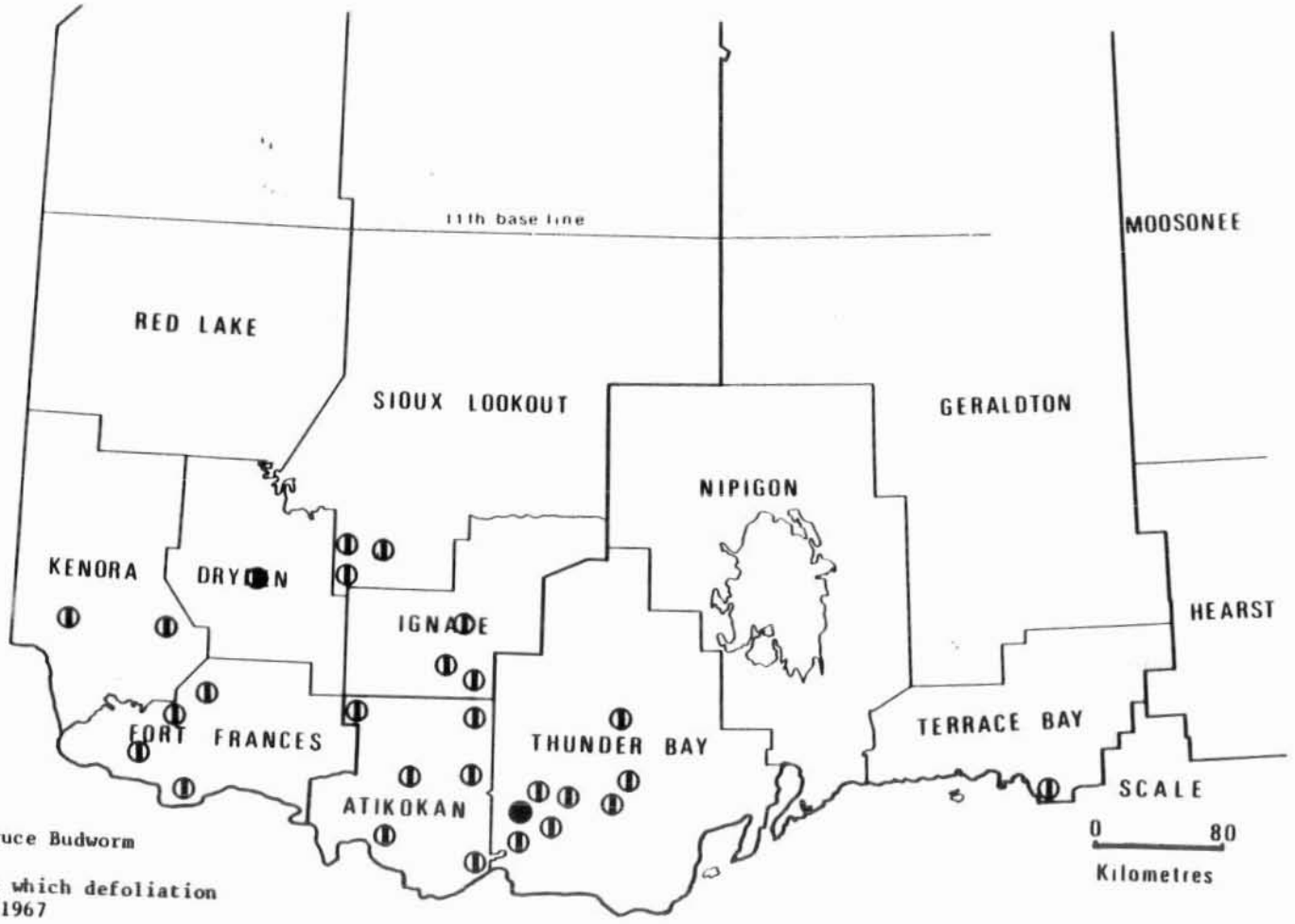
Spruce Budworm

Areas within which defoliation occurred in 1965

LEGEND

Light defoliation ◐

NORTHWESTERN ONTARIO



Spruce Budworm

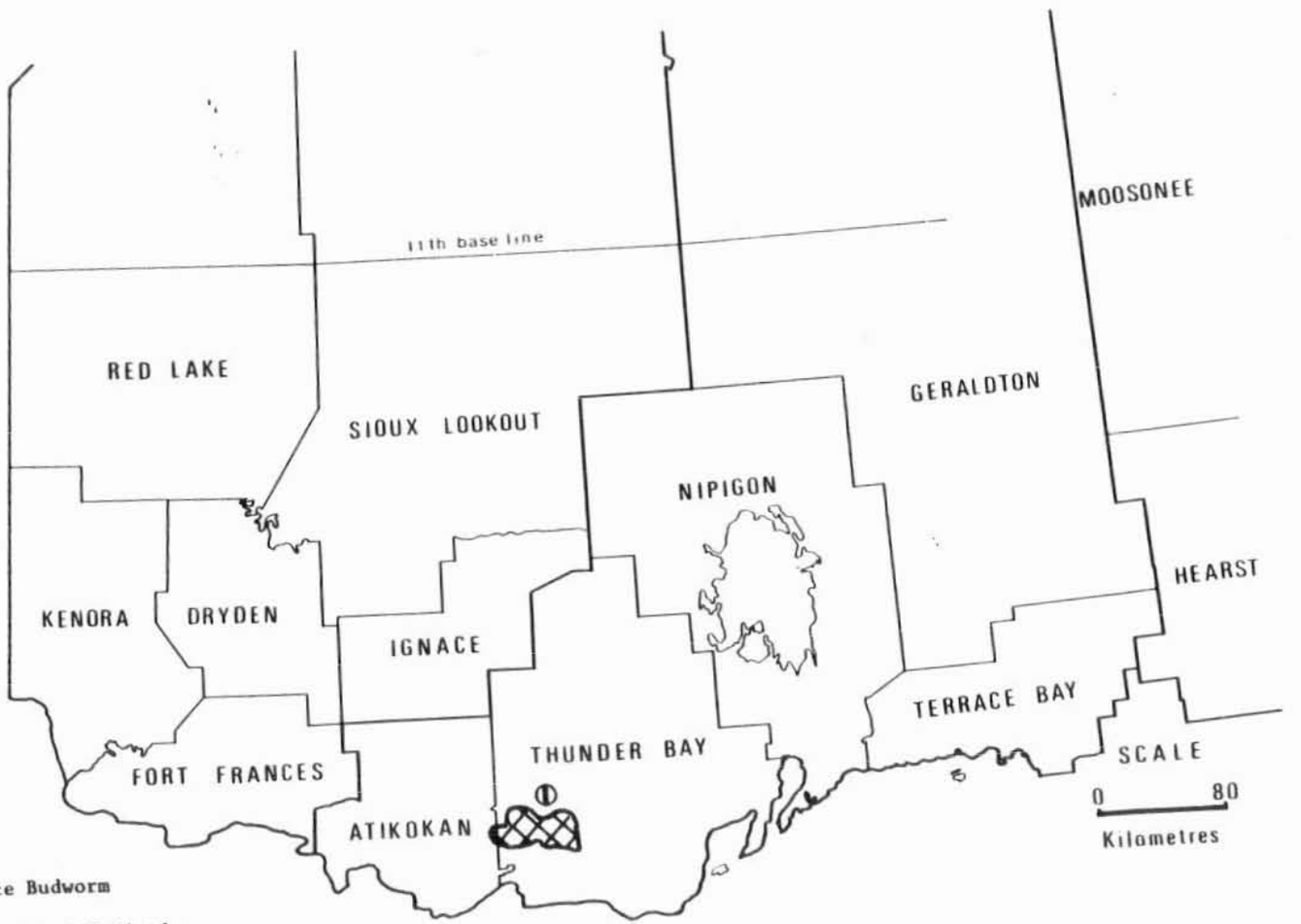
Areas within which defoliation occurred in 1967

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Spruce Budworm

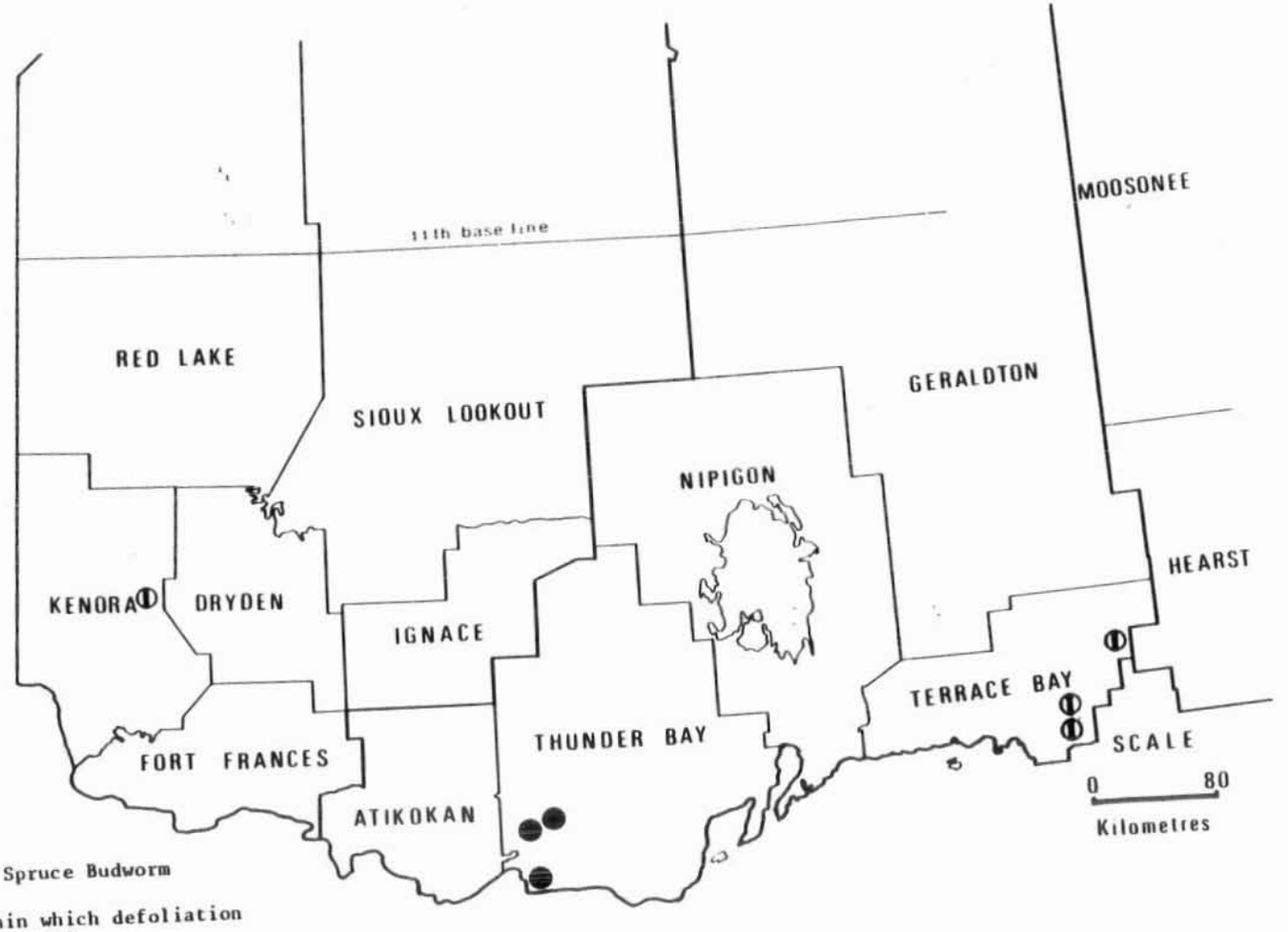
Areas within which defoliation occurred in 1968

LEGEND

Light defoliation ①

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Spruce Budworm

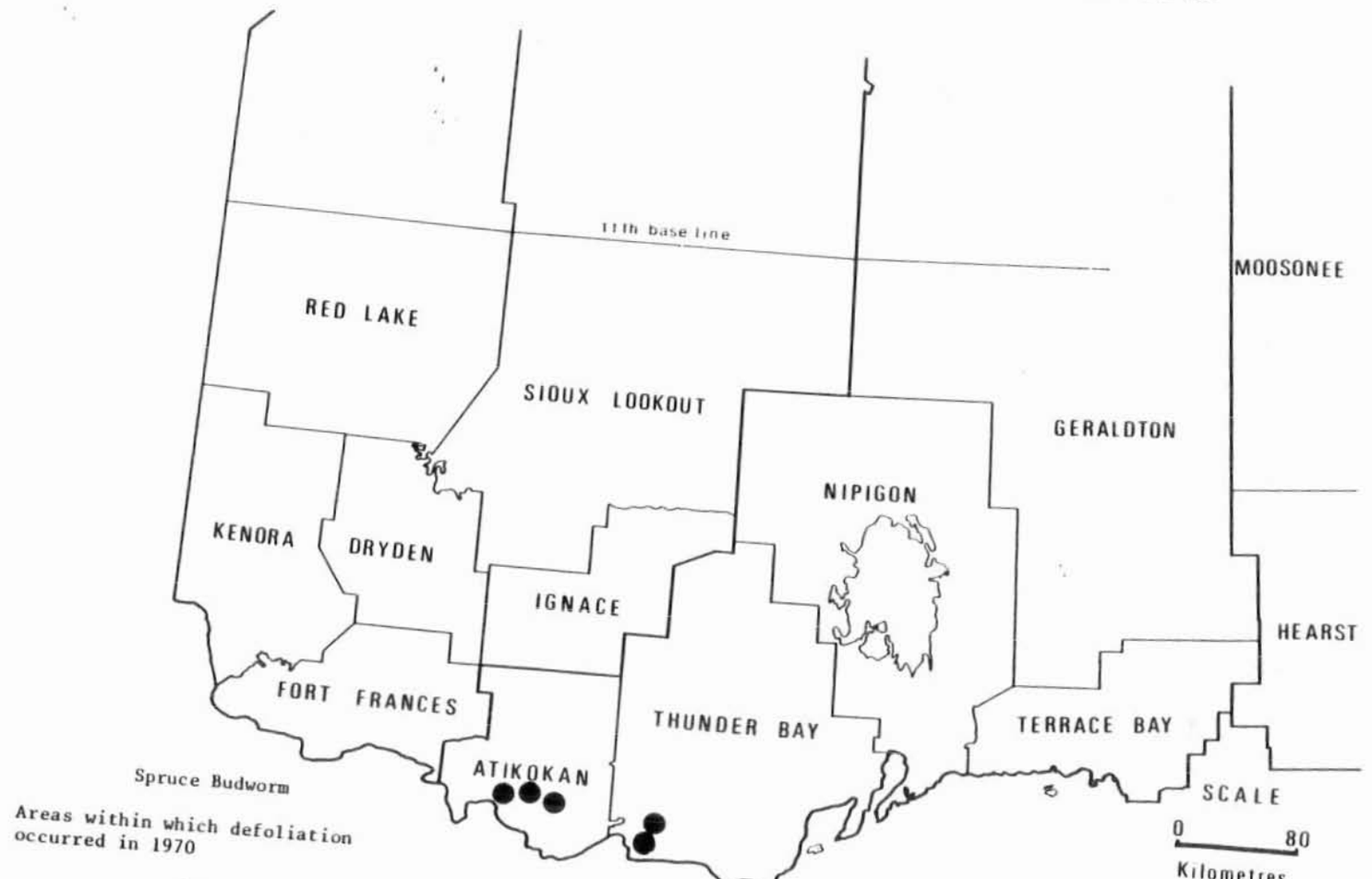
Areas within which defoliation occurred in 1969

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



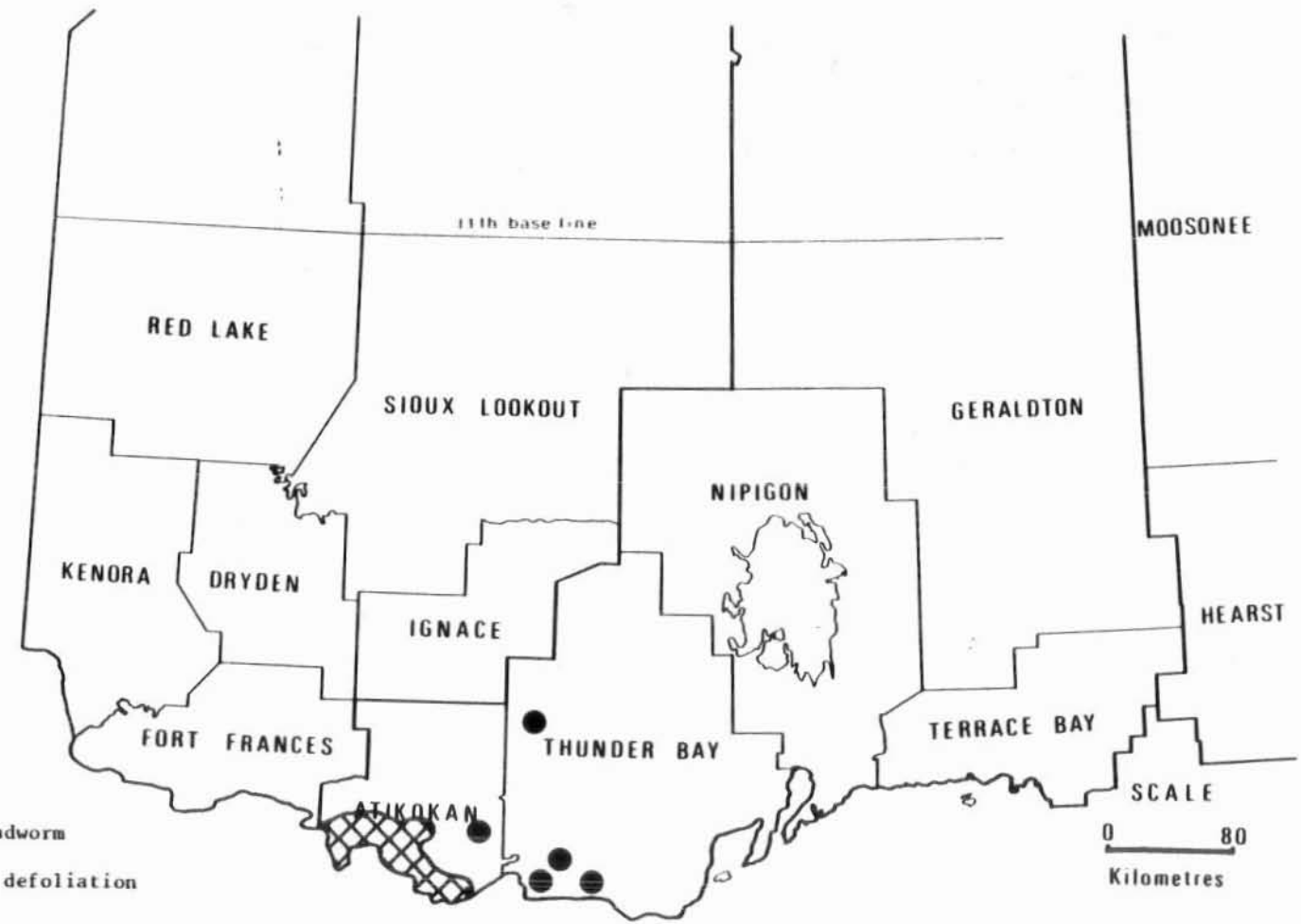
Spruce Budworm

Areas within which defoliation occurred in 1970

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Spruce Budworm

Areas within which defoliation occurred in 1971

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO

Spruce Budworm

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO

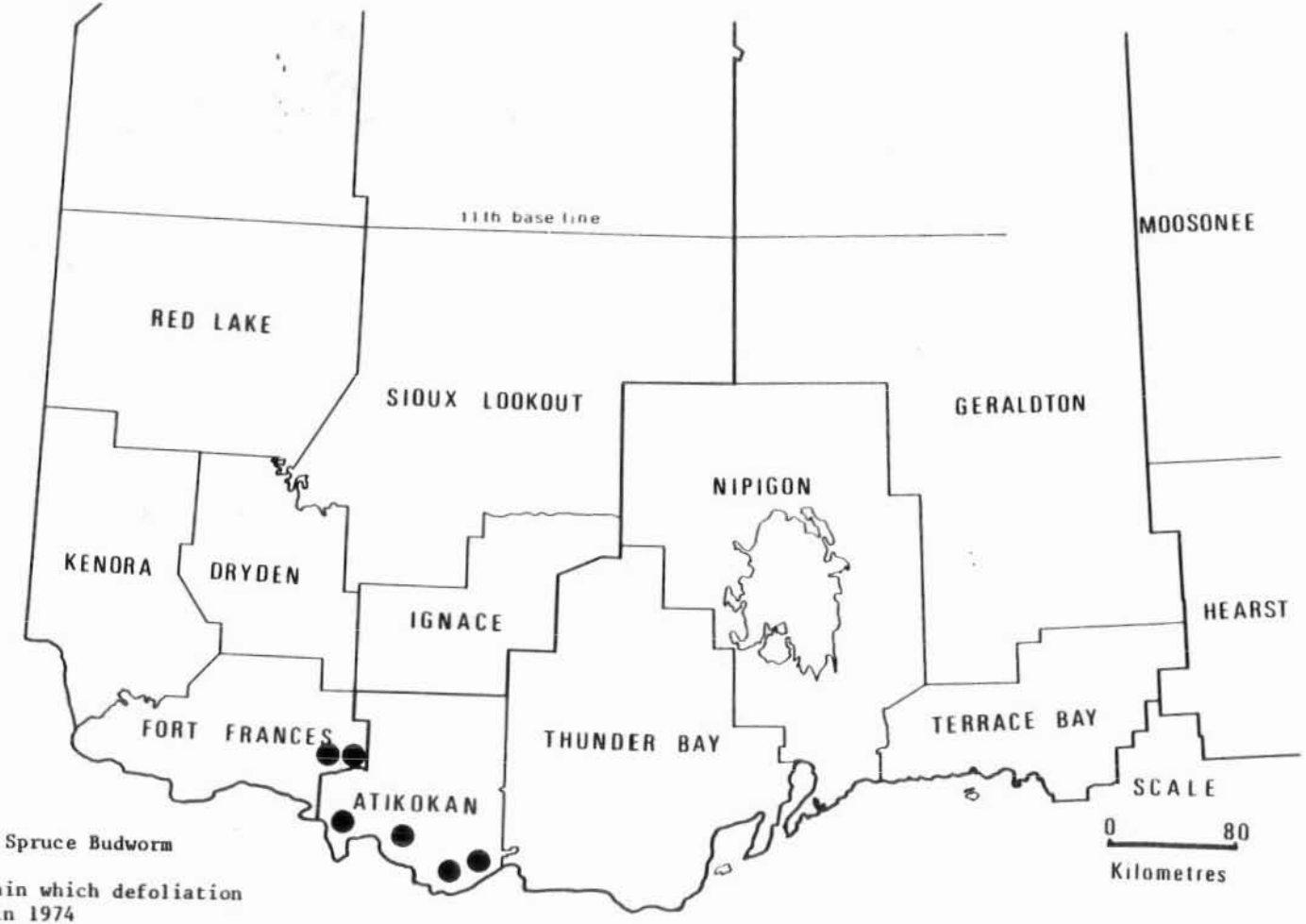
Spruce Budworm

Areas within which defoliation occurred in 1973

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Spruce Budworm

Areas within which defoliation occurred in 1974

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO

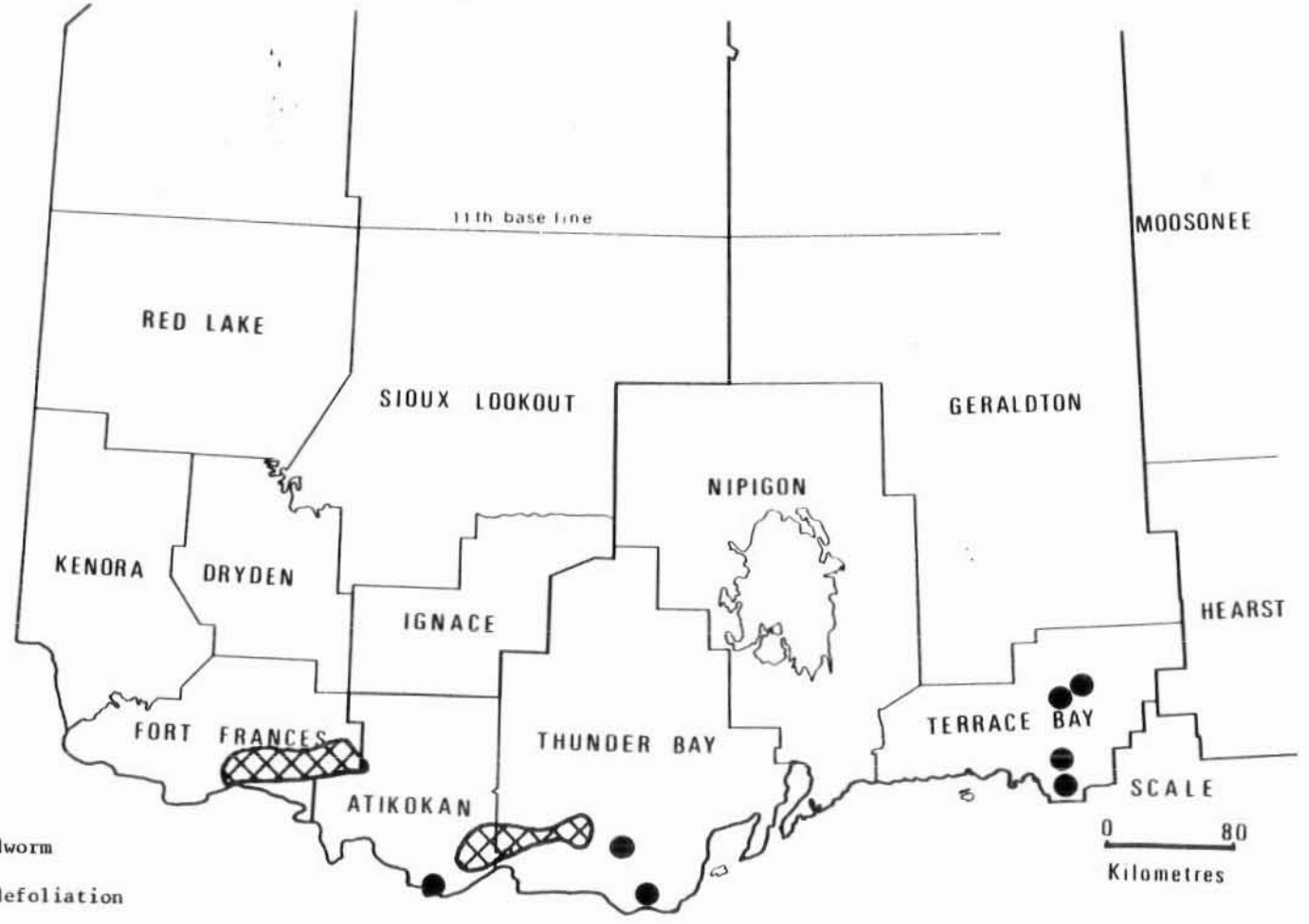
Spruce Budworm

Areas within which defoliation occurred in 1975

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



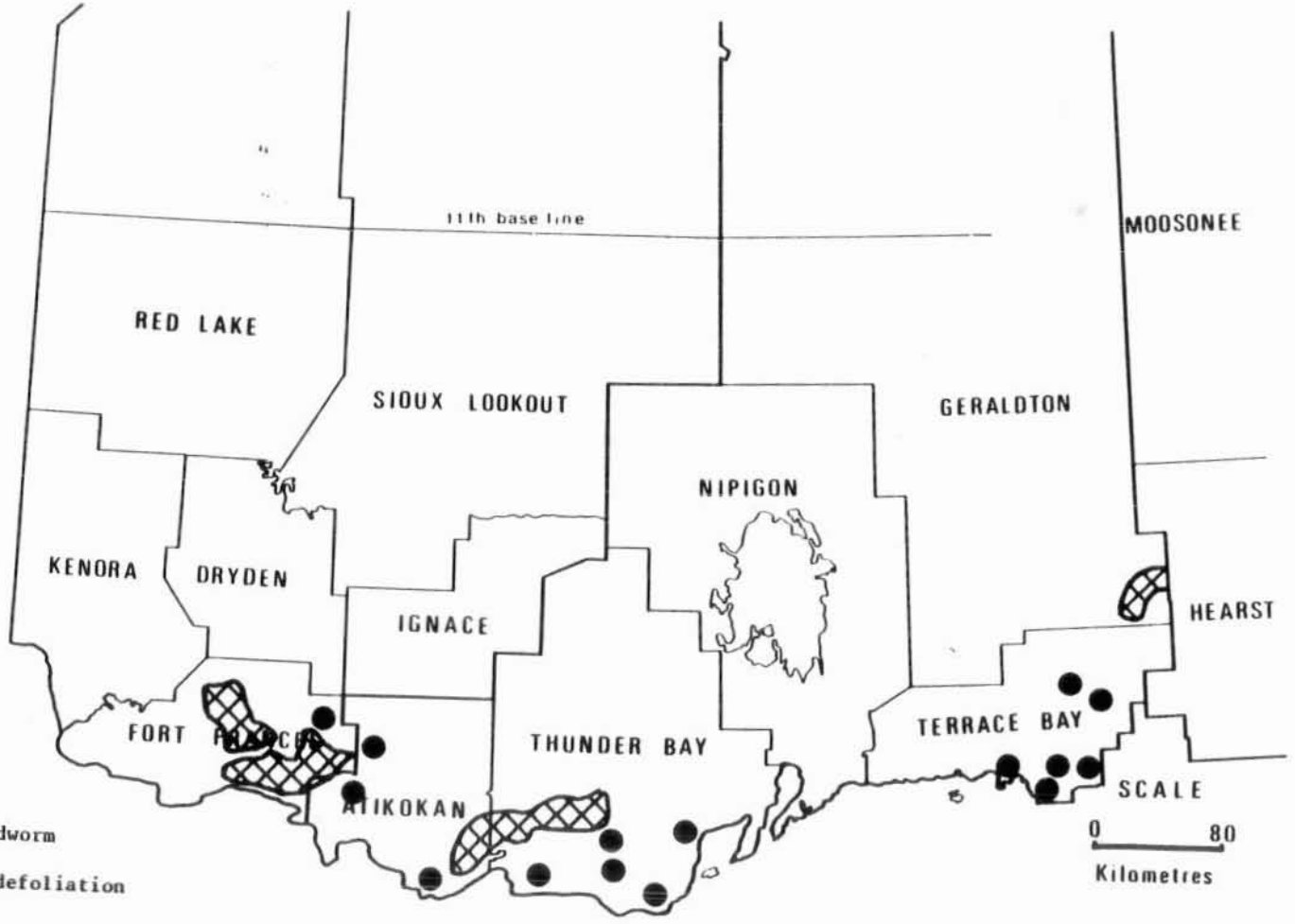
Spruce Budworm

Areas within which defoliation occurred in 1976

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



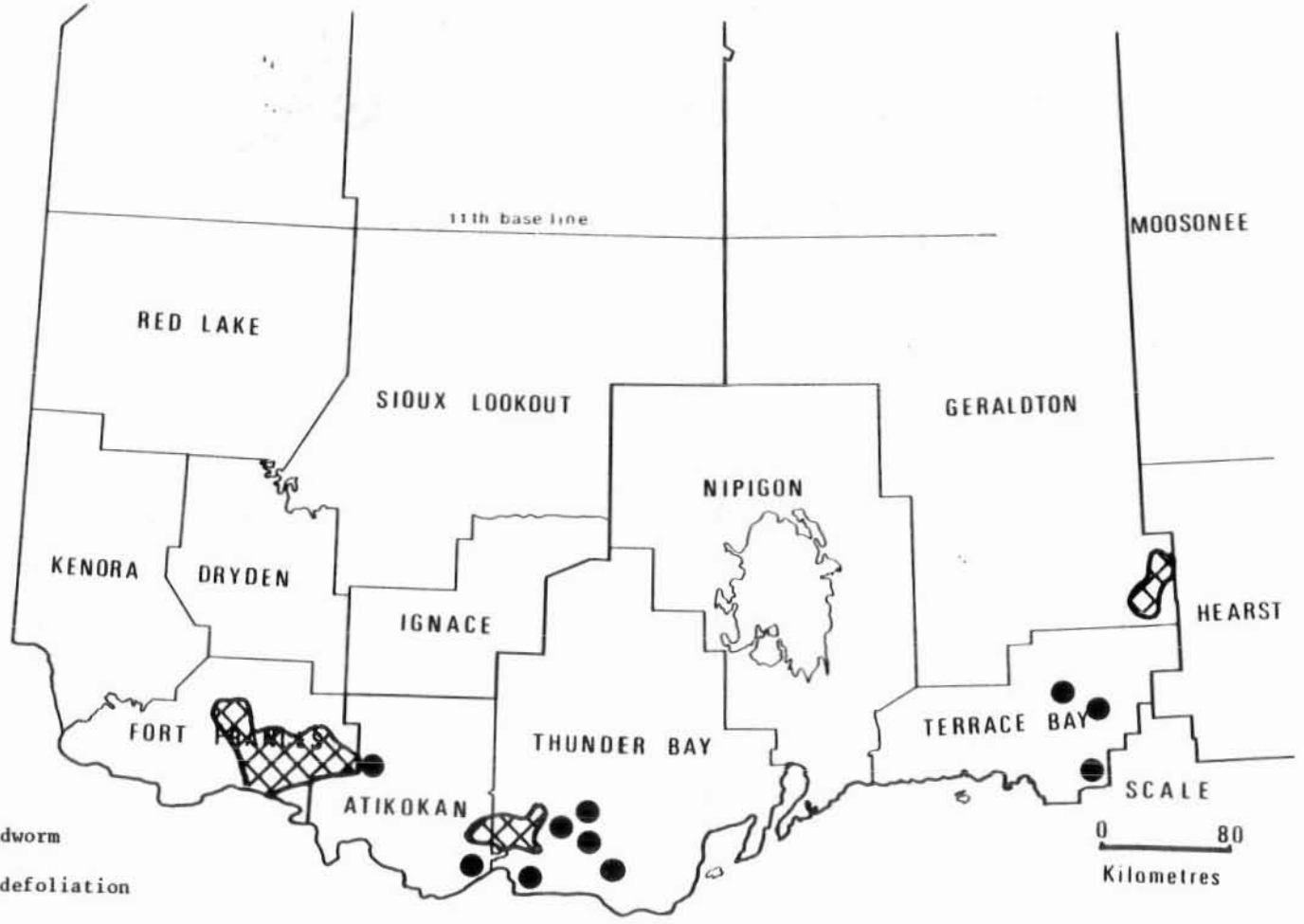
Spruce Budworm

Areas within which defoliation occurred in 1977

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



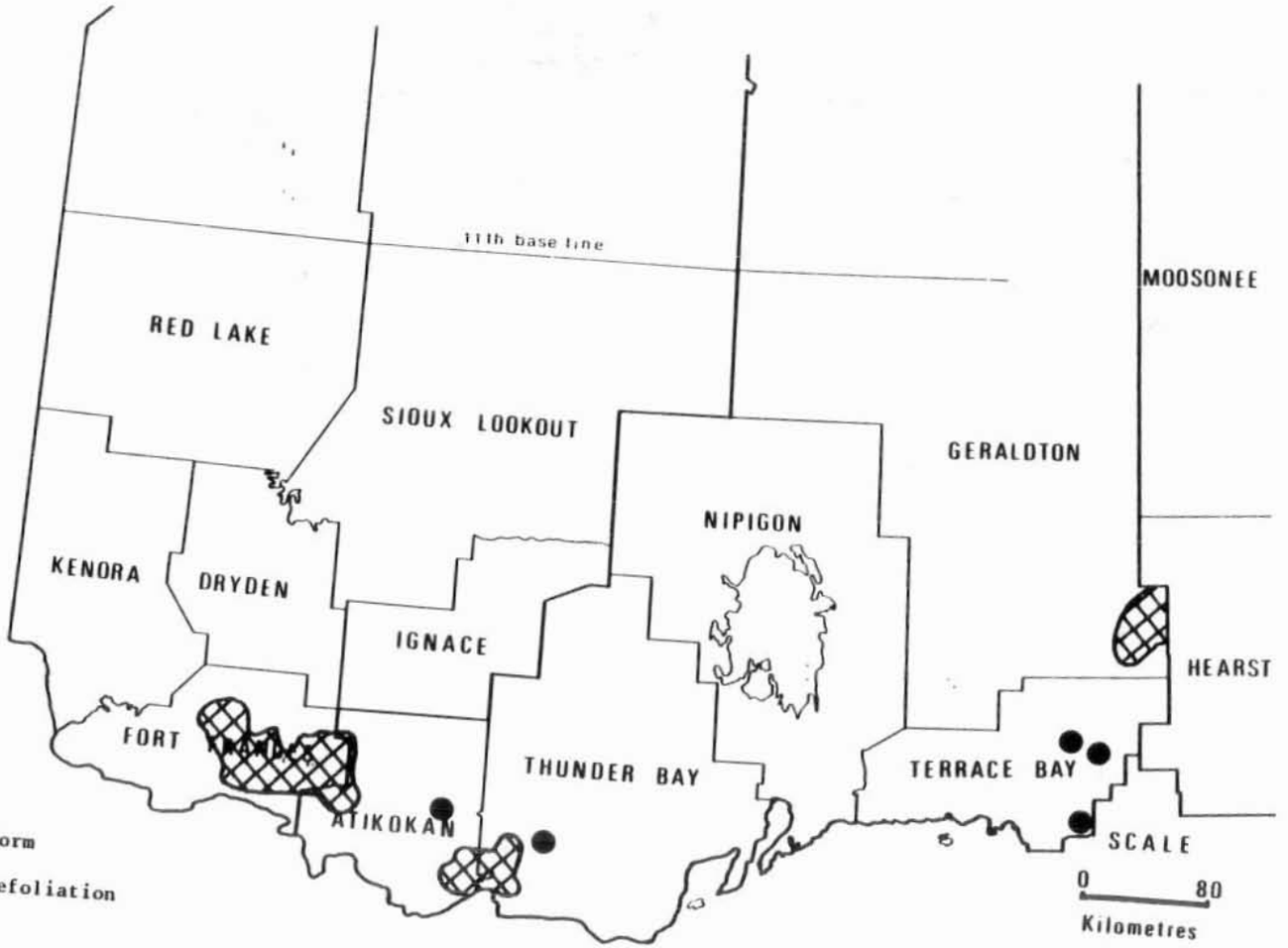
Spruce Budworm

Areas within which defoliation occurred in 1978

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



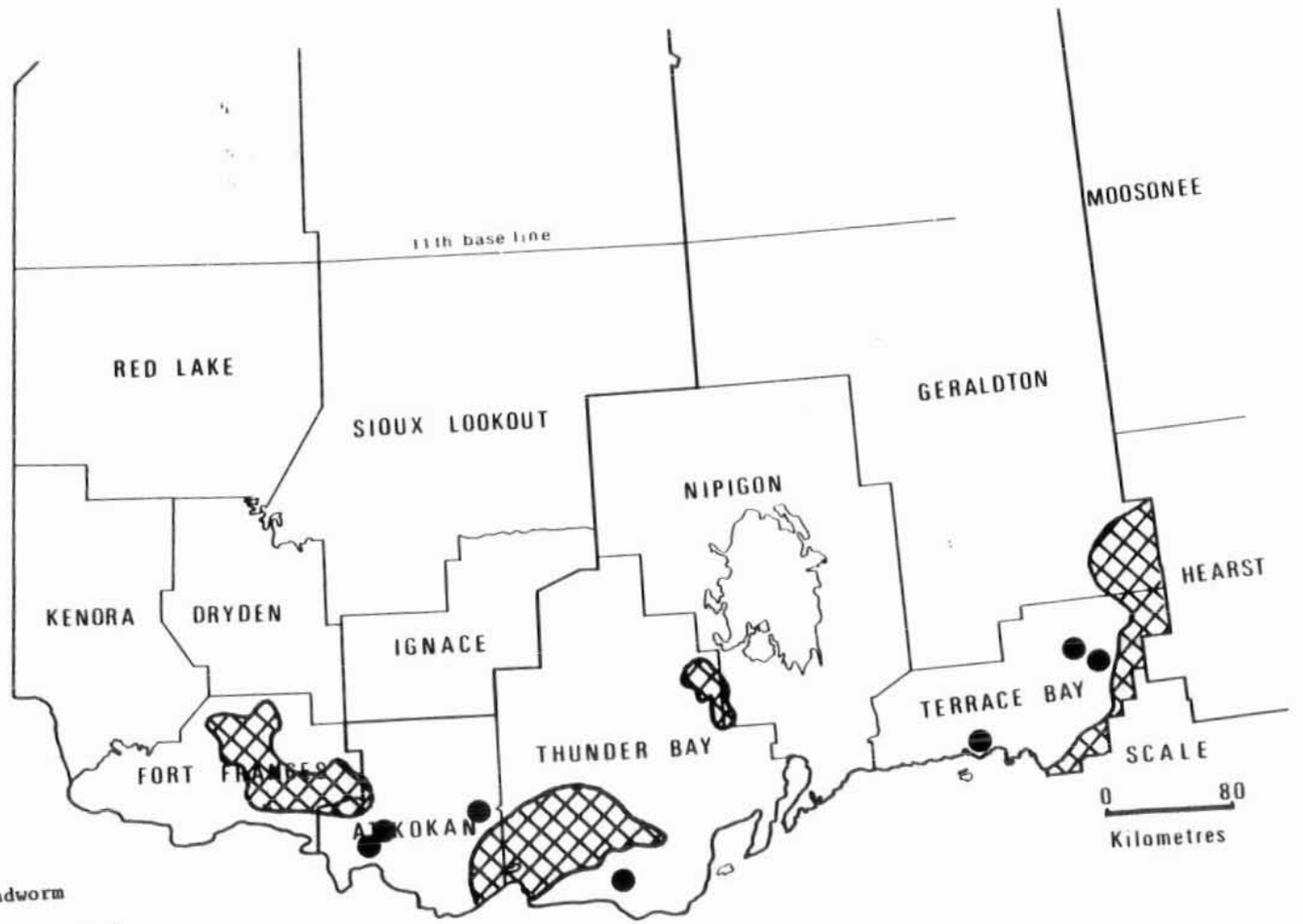
Spruce Budworm

Areas within which defoliation occurred in 1979

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



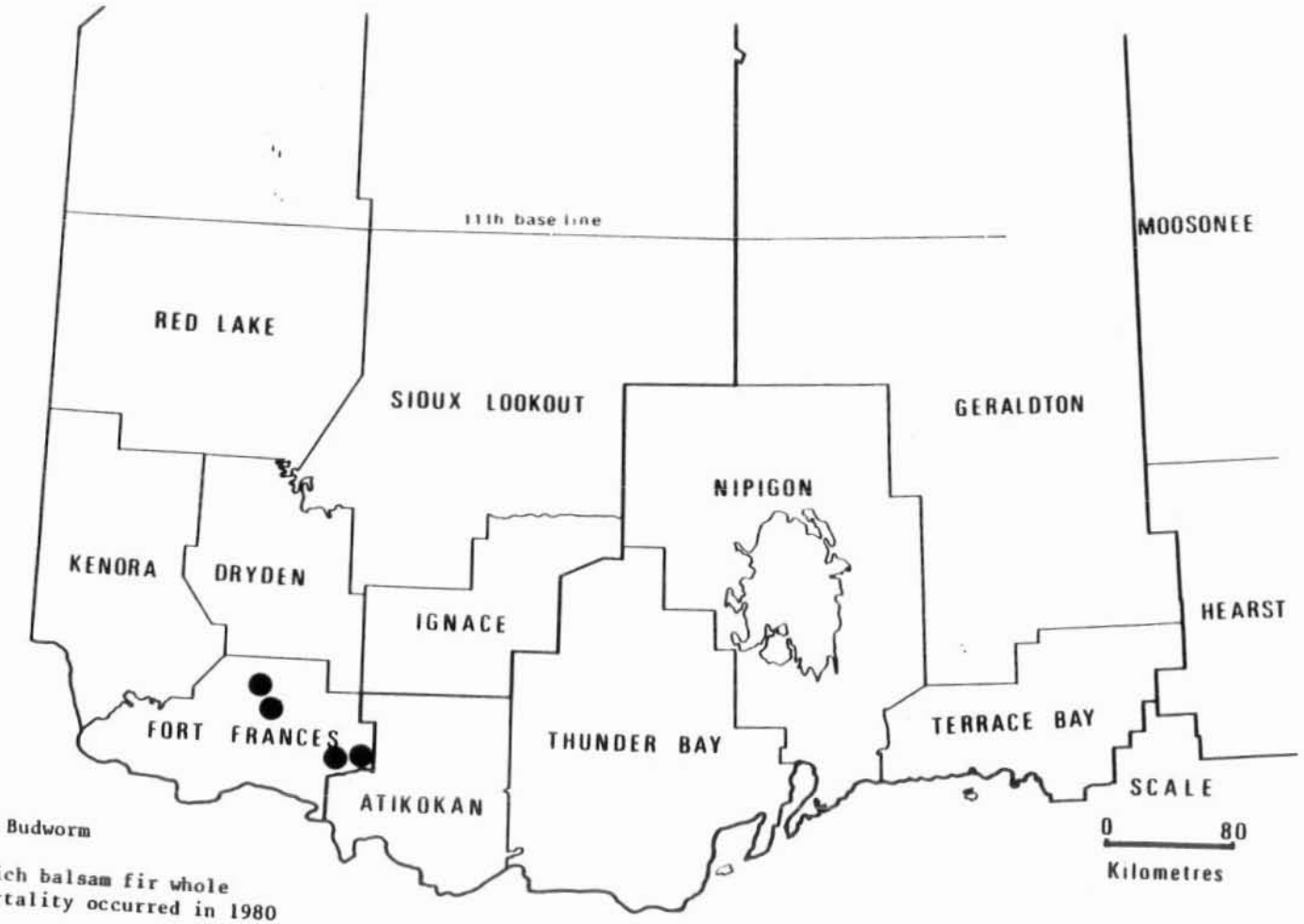
Spruce Budworm

Areas within which defoliation occurred in 1980

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



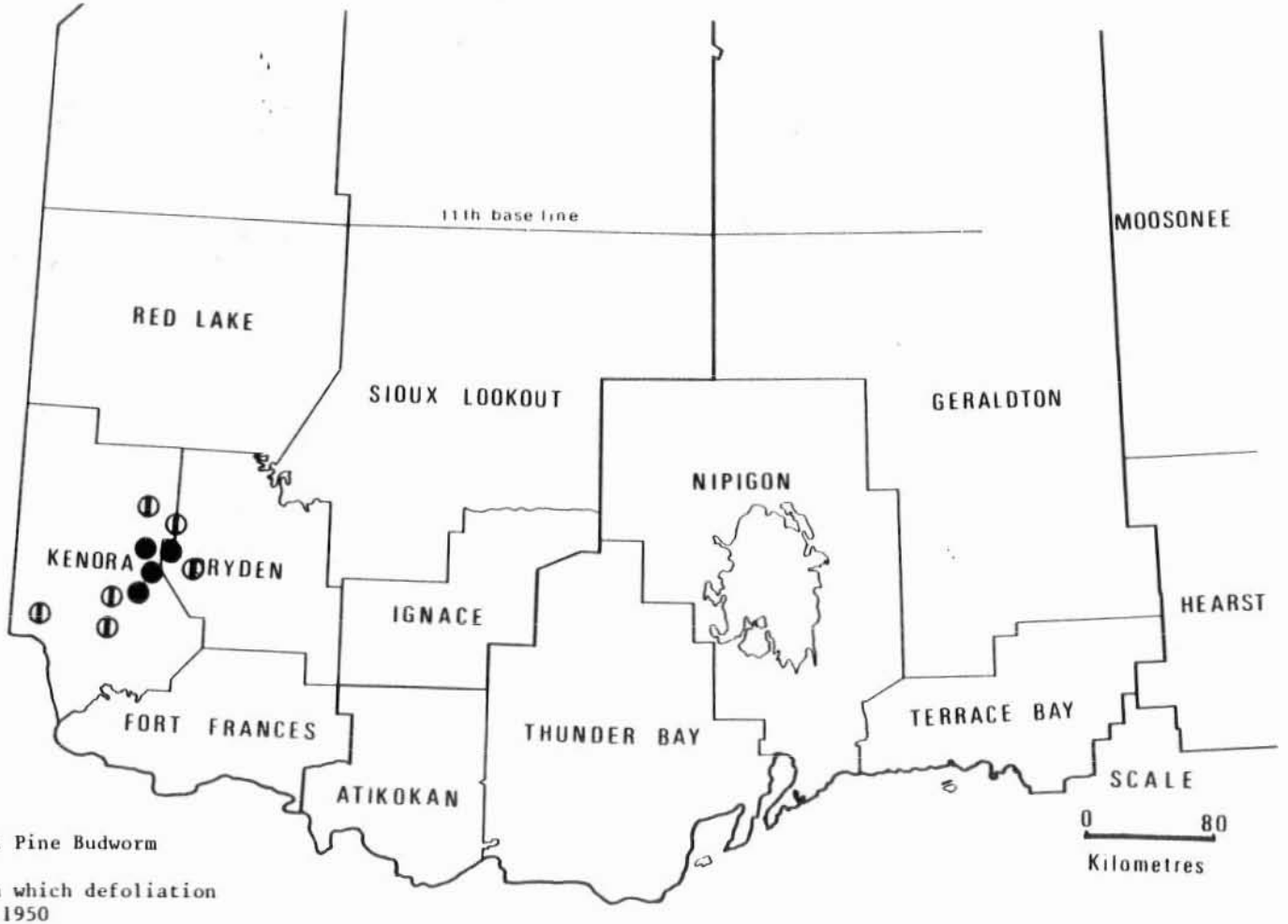
Spruce Budworm

Areas within which balsam fir whole tree and top mortality occurred in 1980

LEGEND

Mortality ●

NORTHWESTERN ONTARIO



Jack Pine Budworm

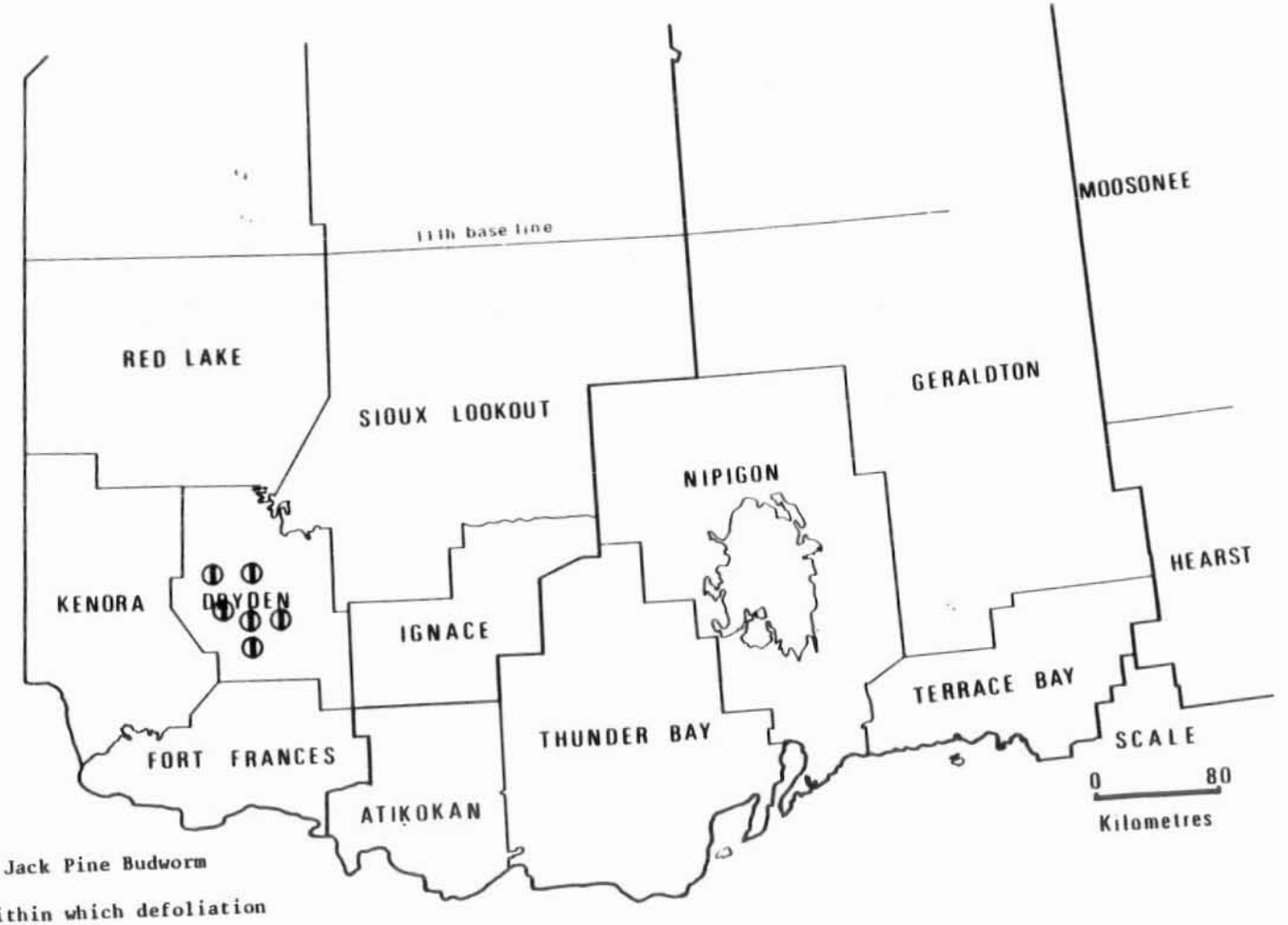
Areas within which defoliation occurred in 1950

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



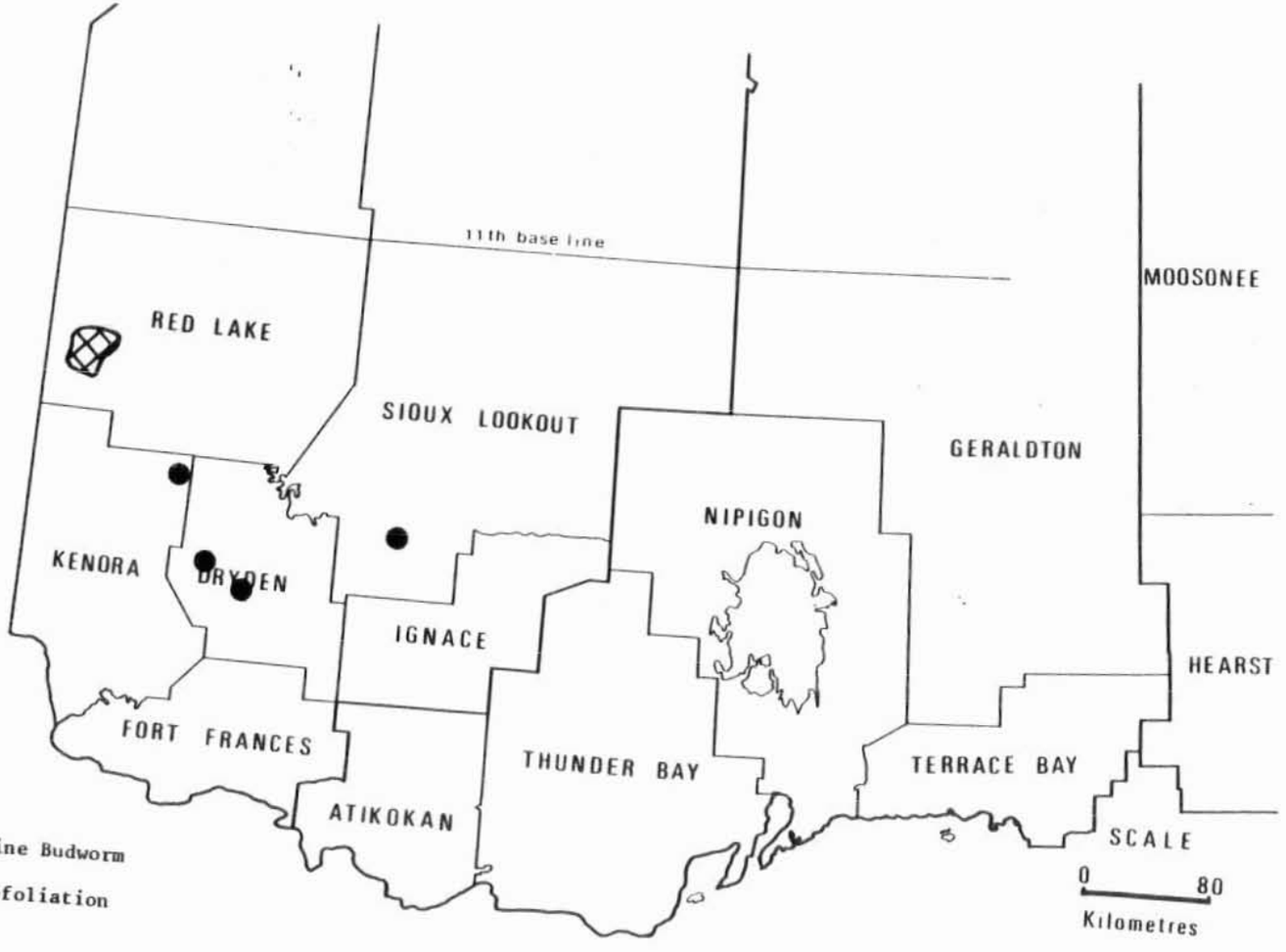
Jack Pine Budworm

Areas within which defoliation occurred in 1951

LEGEND

Light defoliation ◐

NORTHWESTERN ONTARIO



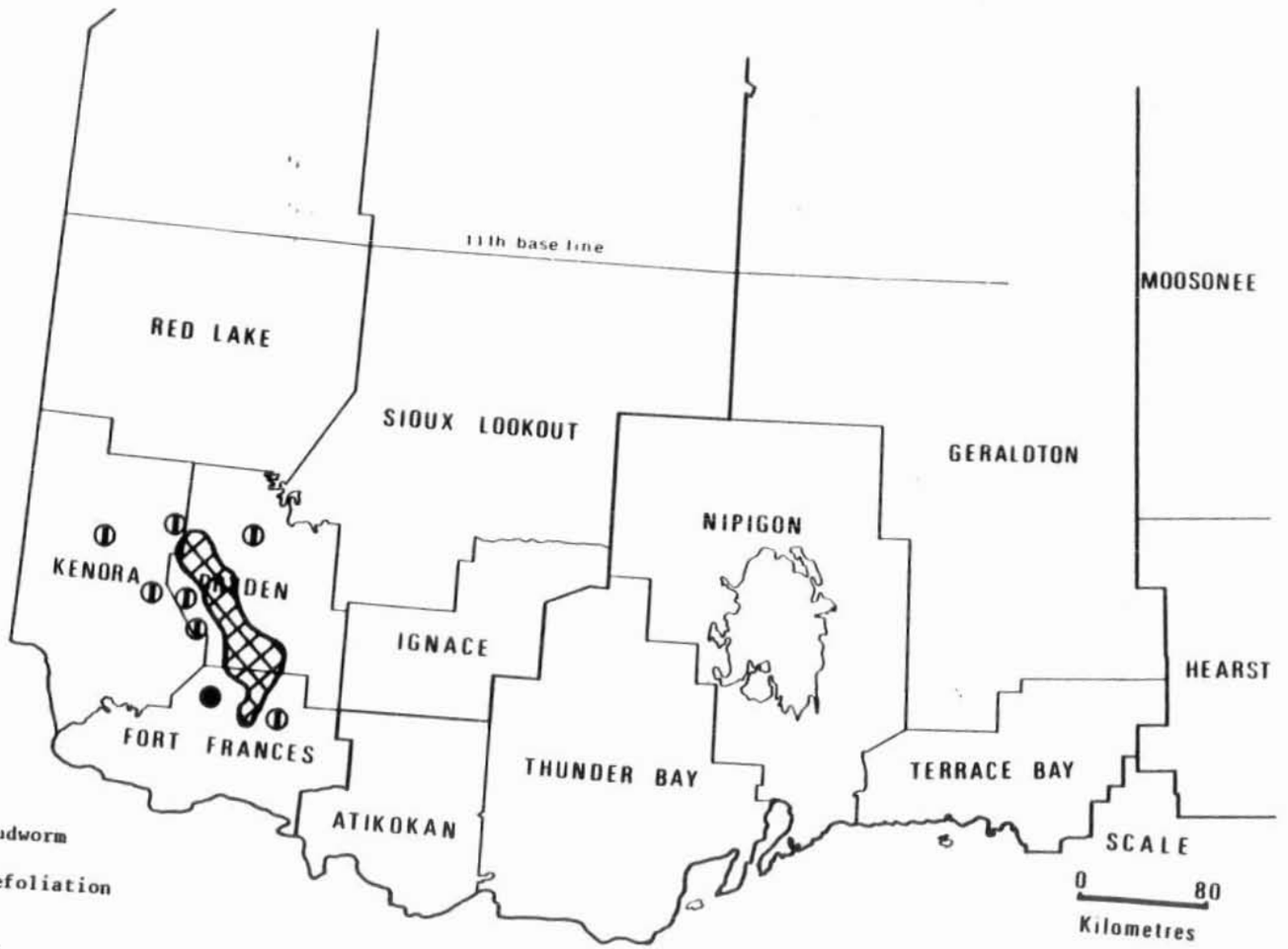
Jack Pine Budworm

Areas within which defoliation occurred in 1954

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Jack Pine Budworm

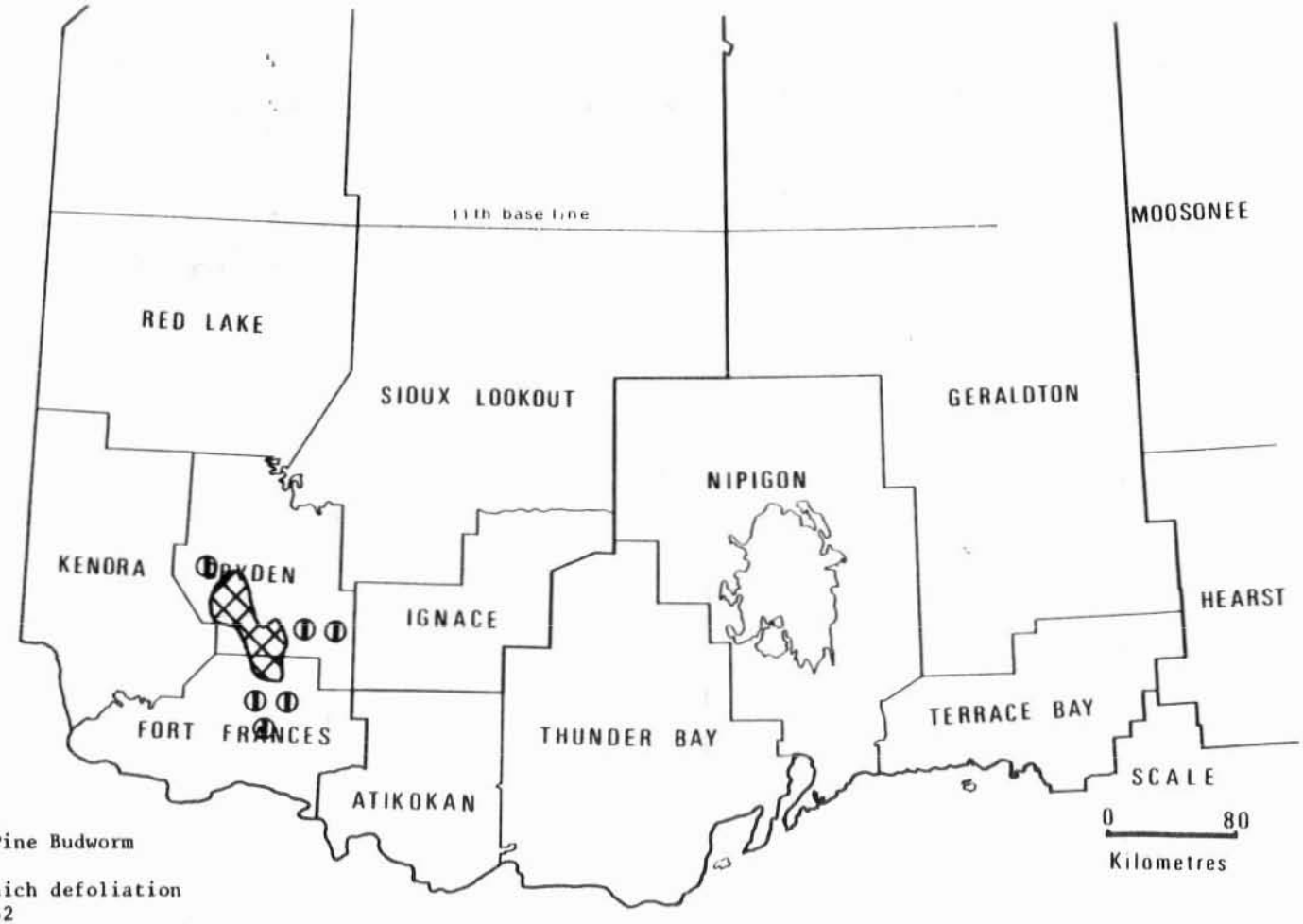
Areas within which defoliation occurred in 1961

LEGEND

Light defoliation ◐ or

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Jack Pine Budworm

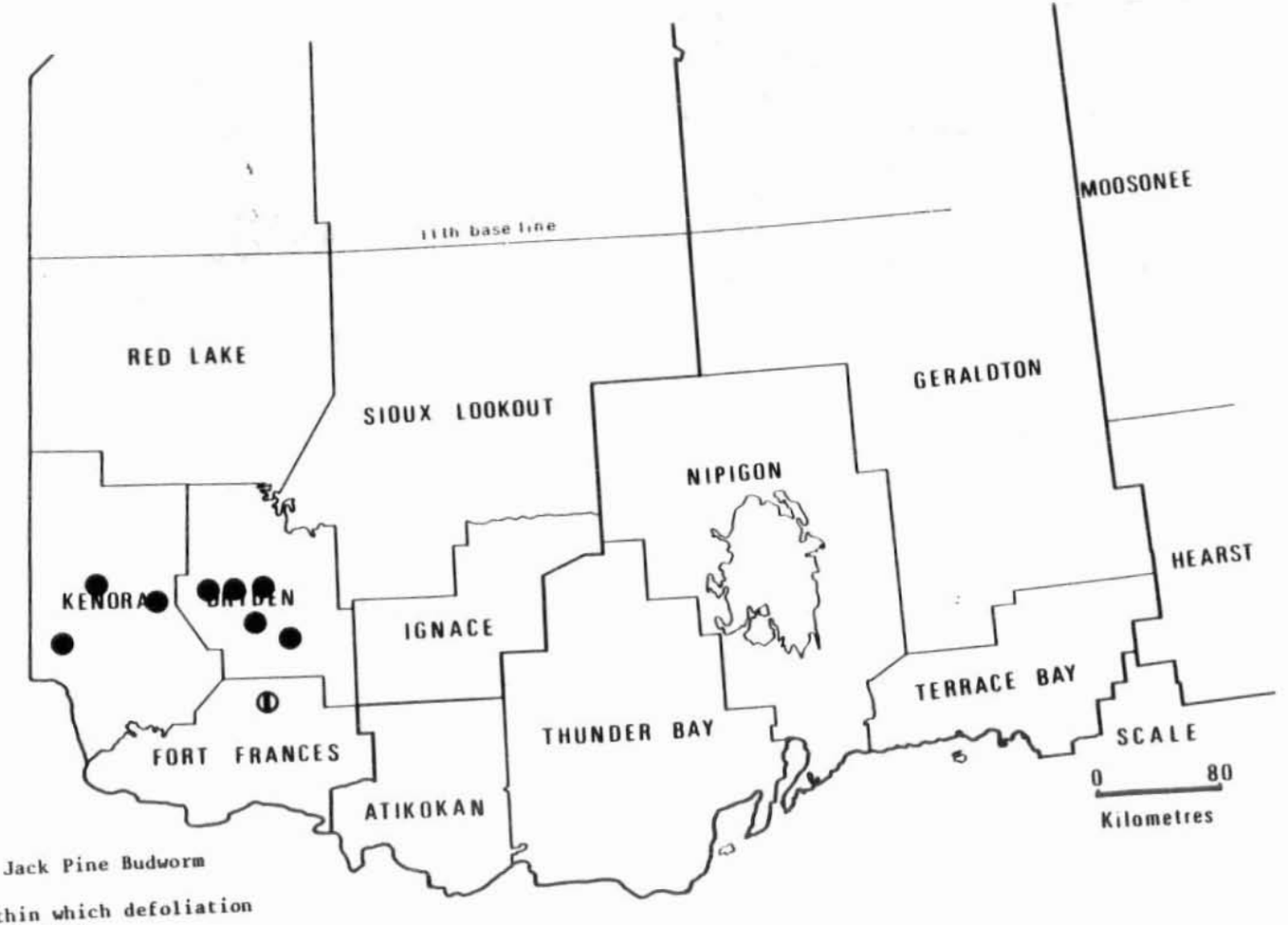
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ①

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Jack Pine Budworm

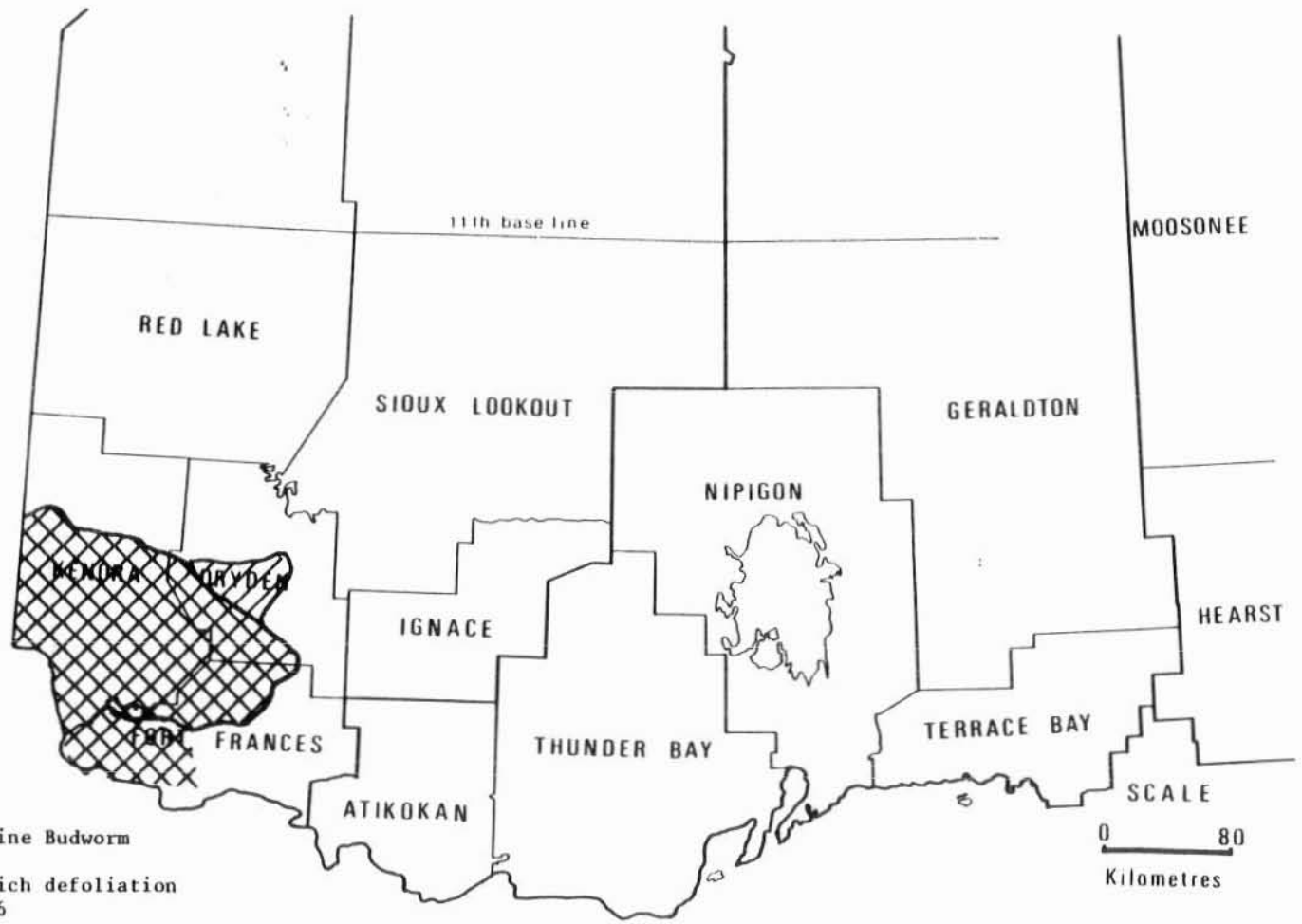
Areas within which defoliation occurred in 1965

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Jack Pine Budworm

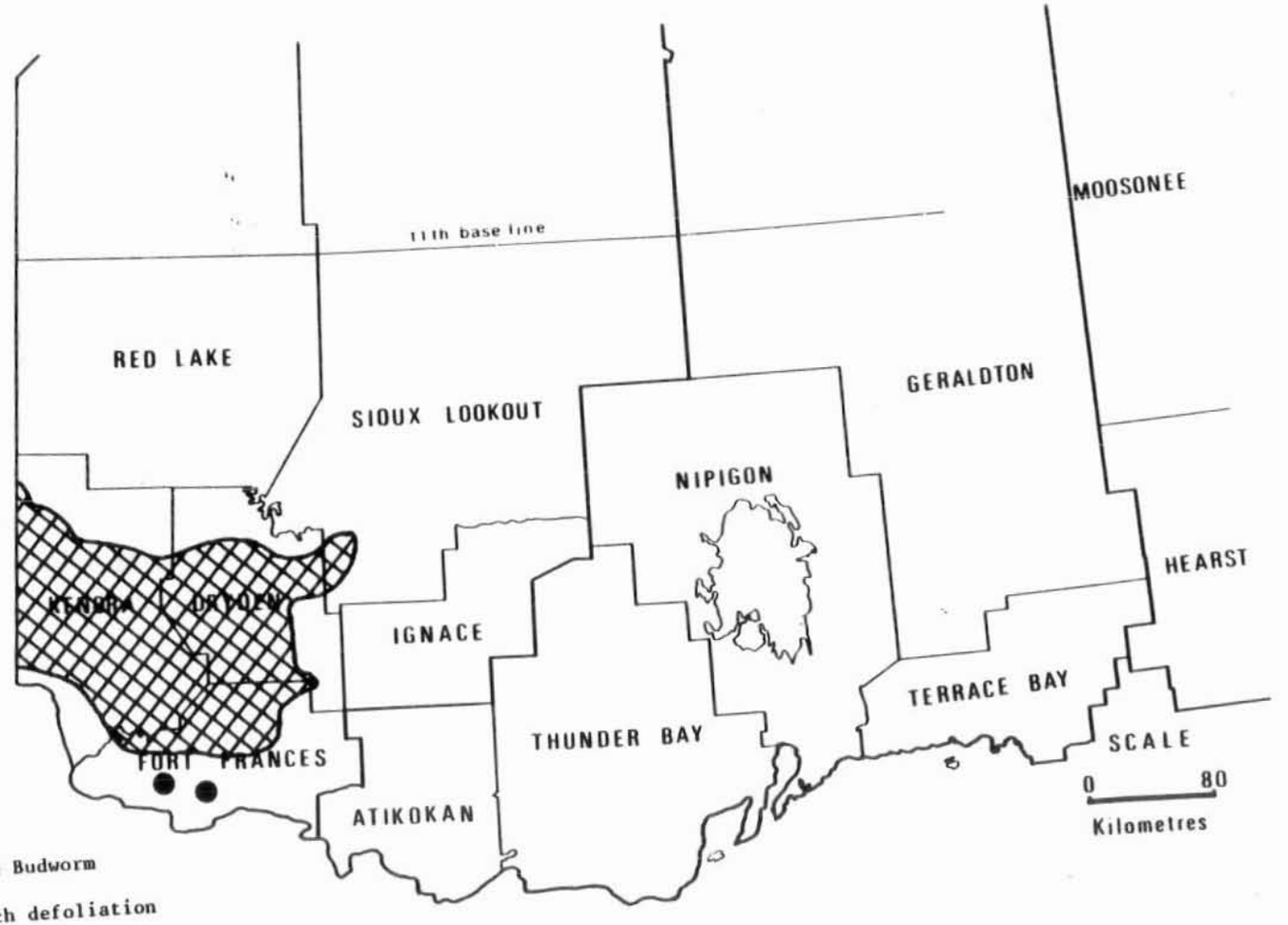
Areas within which defoliation occurred in 1966

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



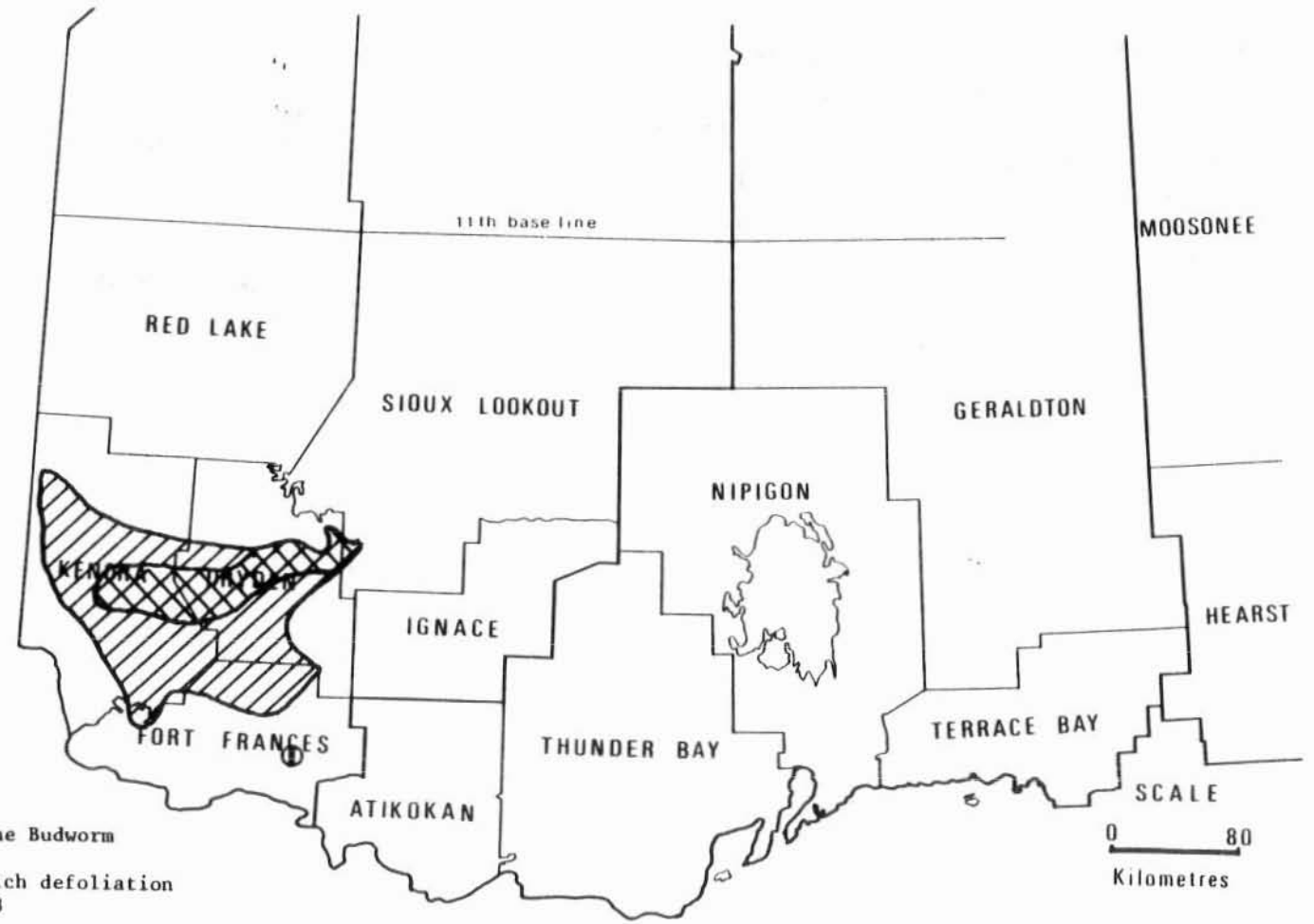
Jack Pine Budworm

Areas within which defoliation occurred in 1967

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Jack Pine Budworm

Areas within which defoliation occurred in 1968

LEGEND

Light defoliation ◑ or ▨

Moderate-to-severe defoliation ▩

NORTHWESTERN ONTARIO

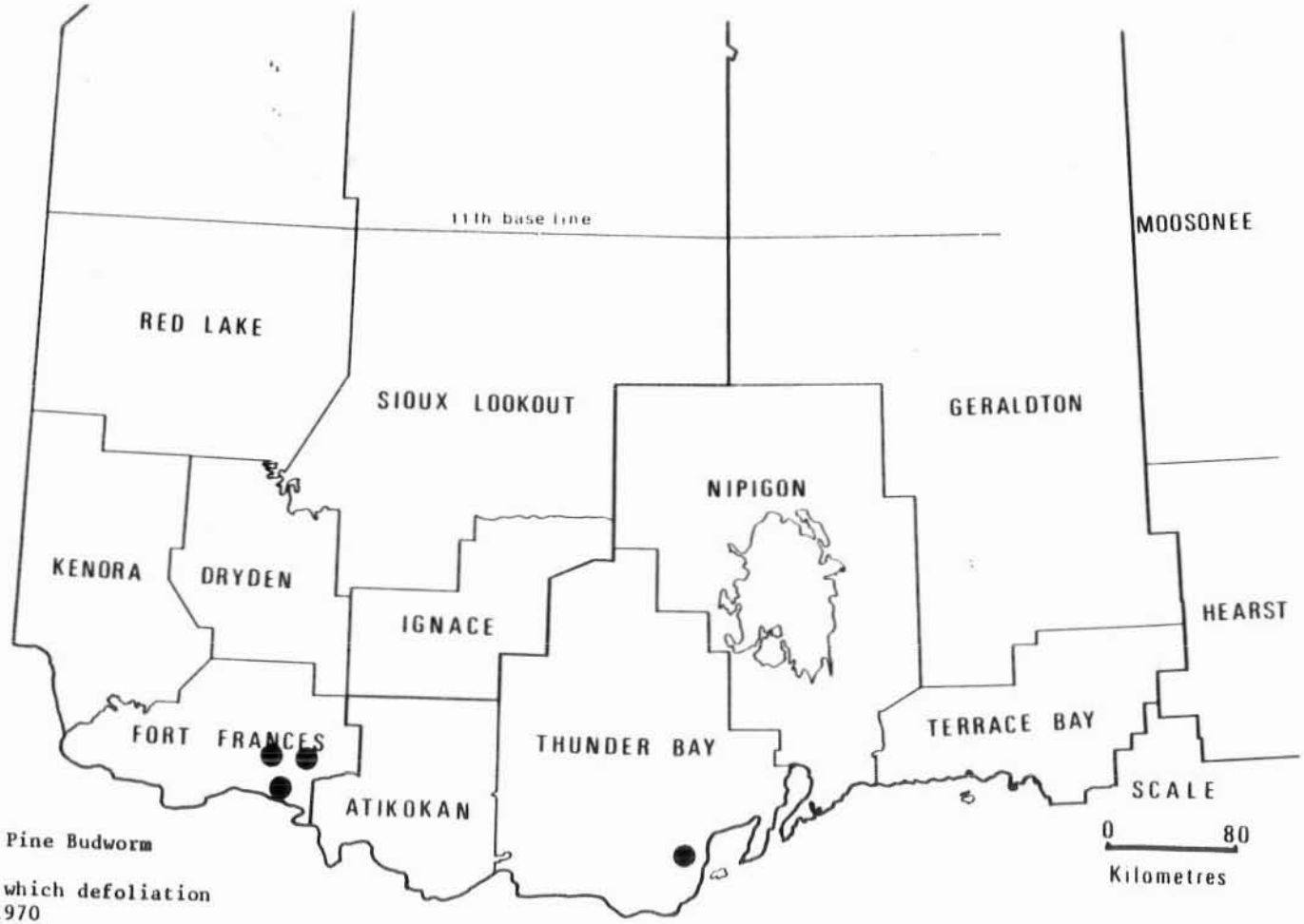
Jack Pine Budworm

Areas within which defoliation occurred in 1969

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



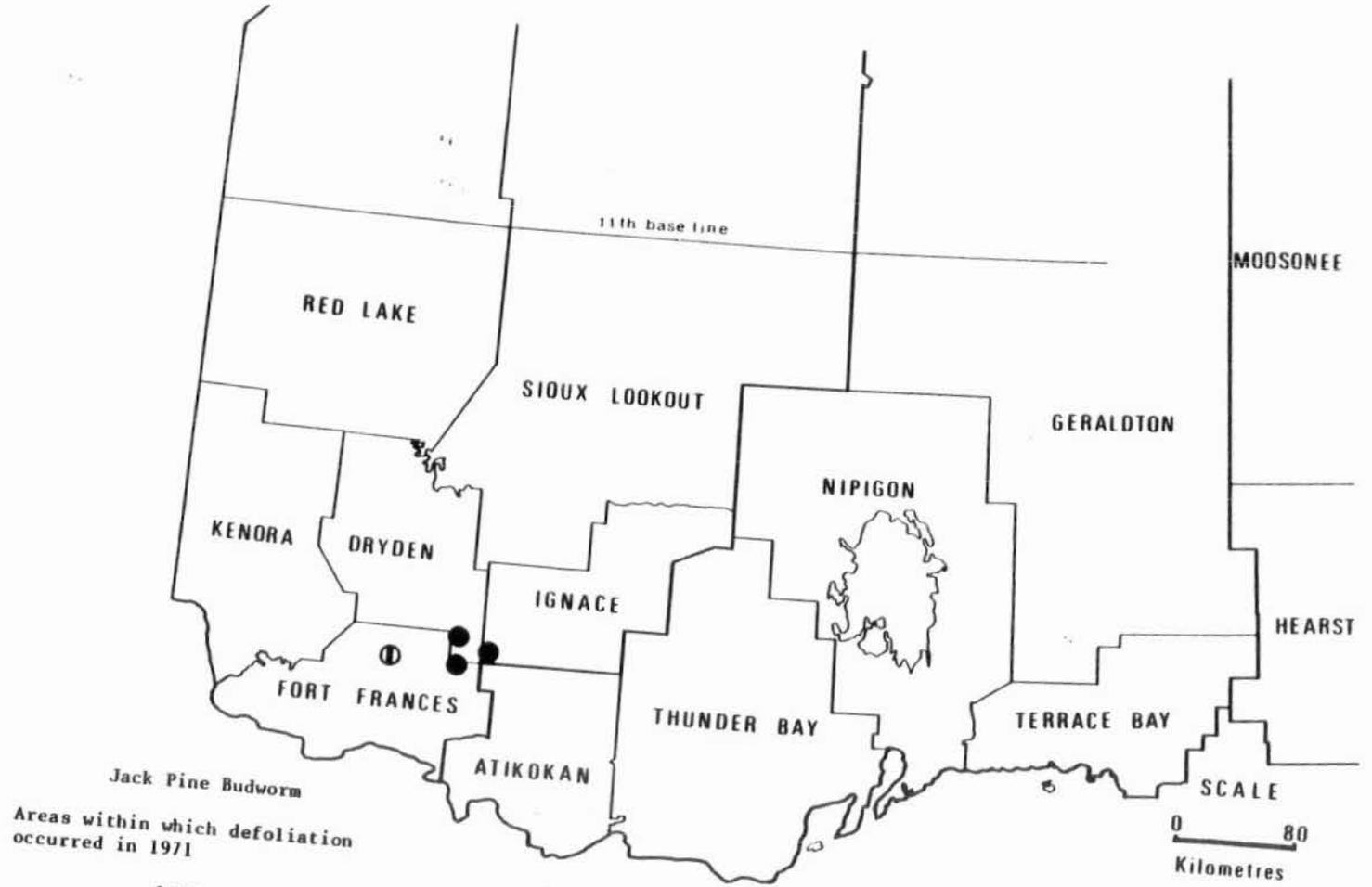
Jack Pine Budworm

Areas within which defoliation occurred in 1970

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Jack Pine Budworm

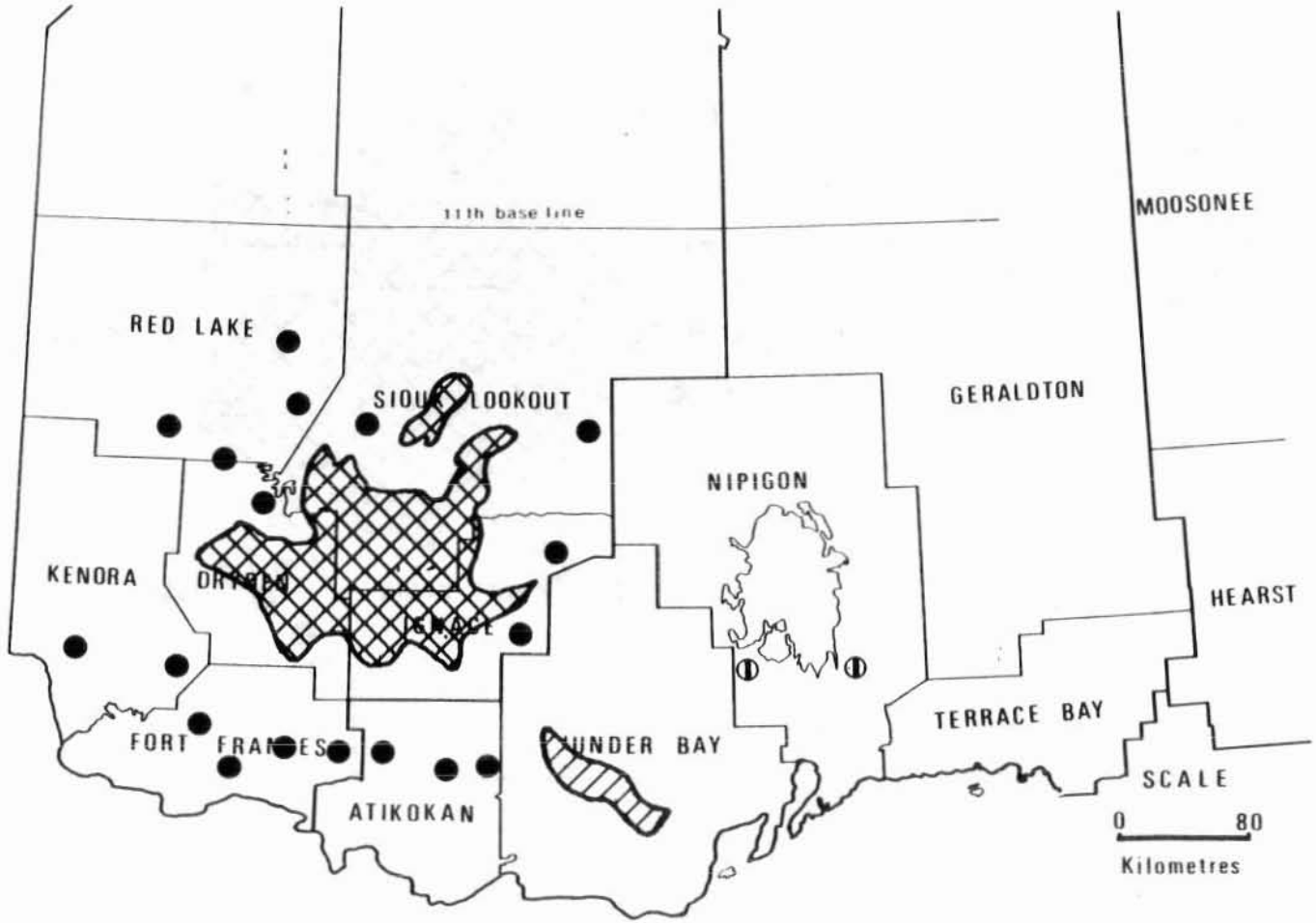
Areas within which defoliation occurred in 1971

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

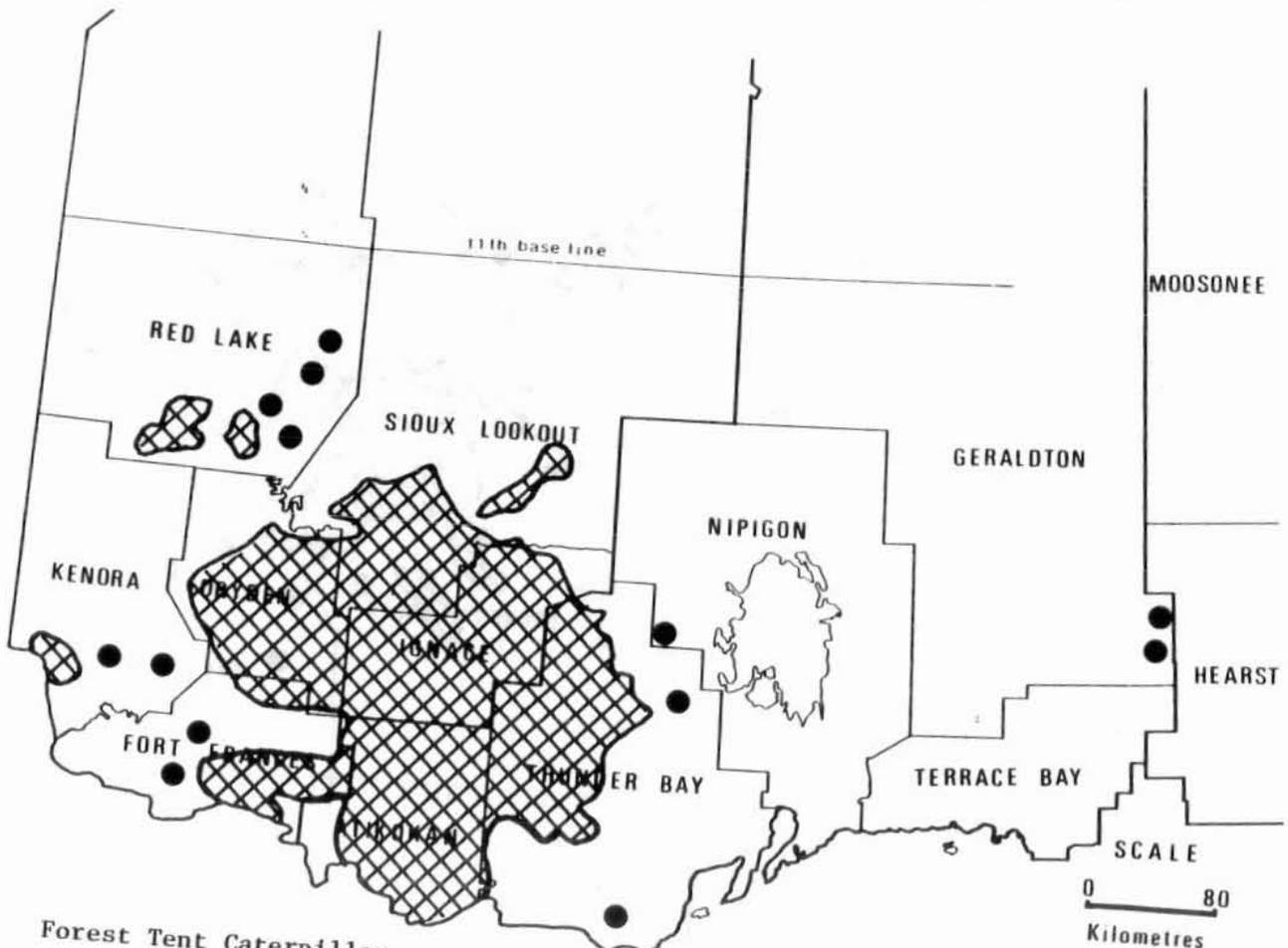
Areas within which defoliation occurred in 1950

LEGEND

Light defoliation ◐ or

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



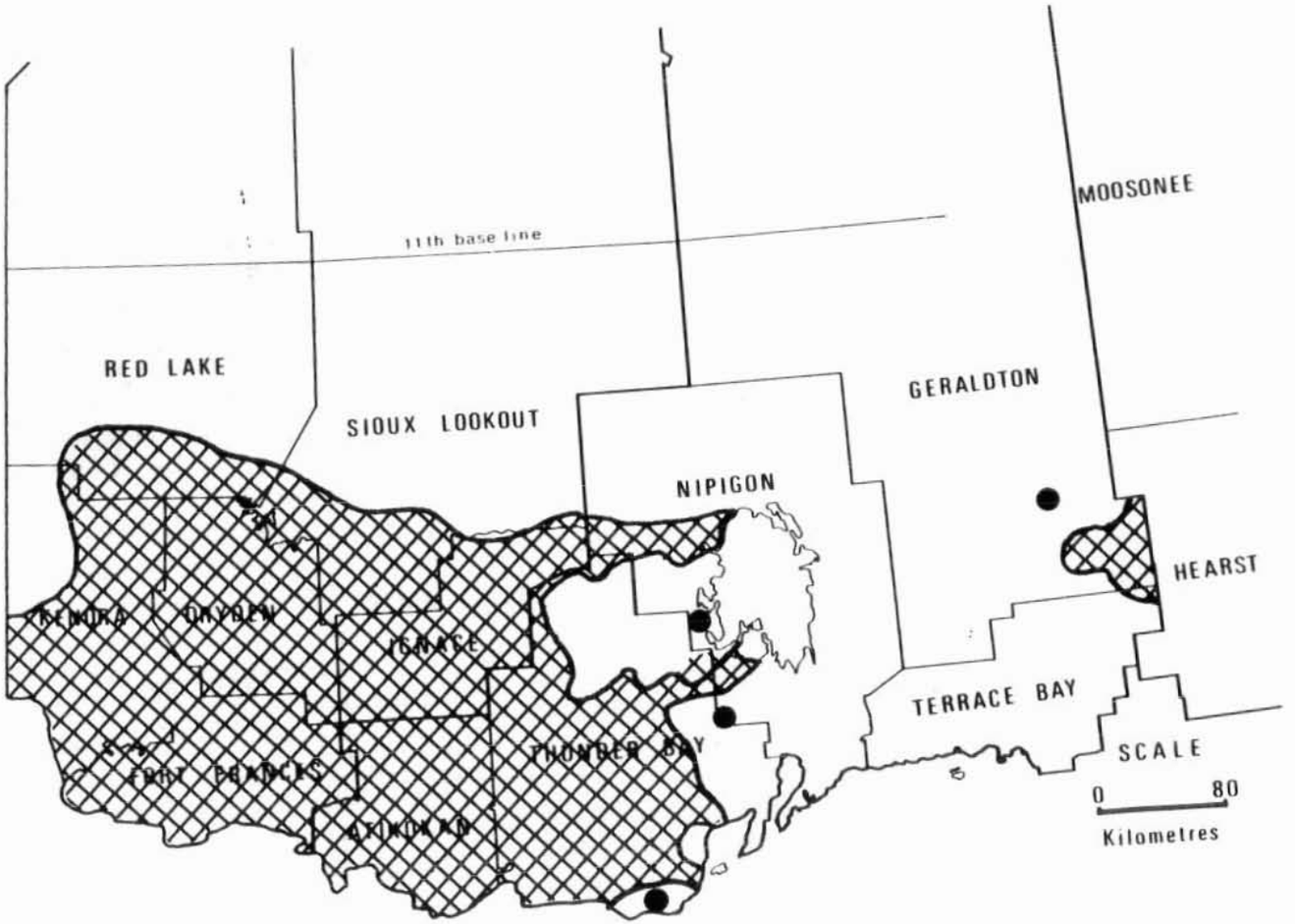
Forest Tent Caterpillar

Areas within which defoliation occurred in 1951

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



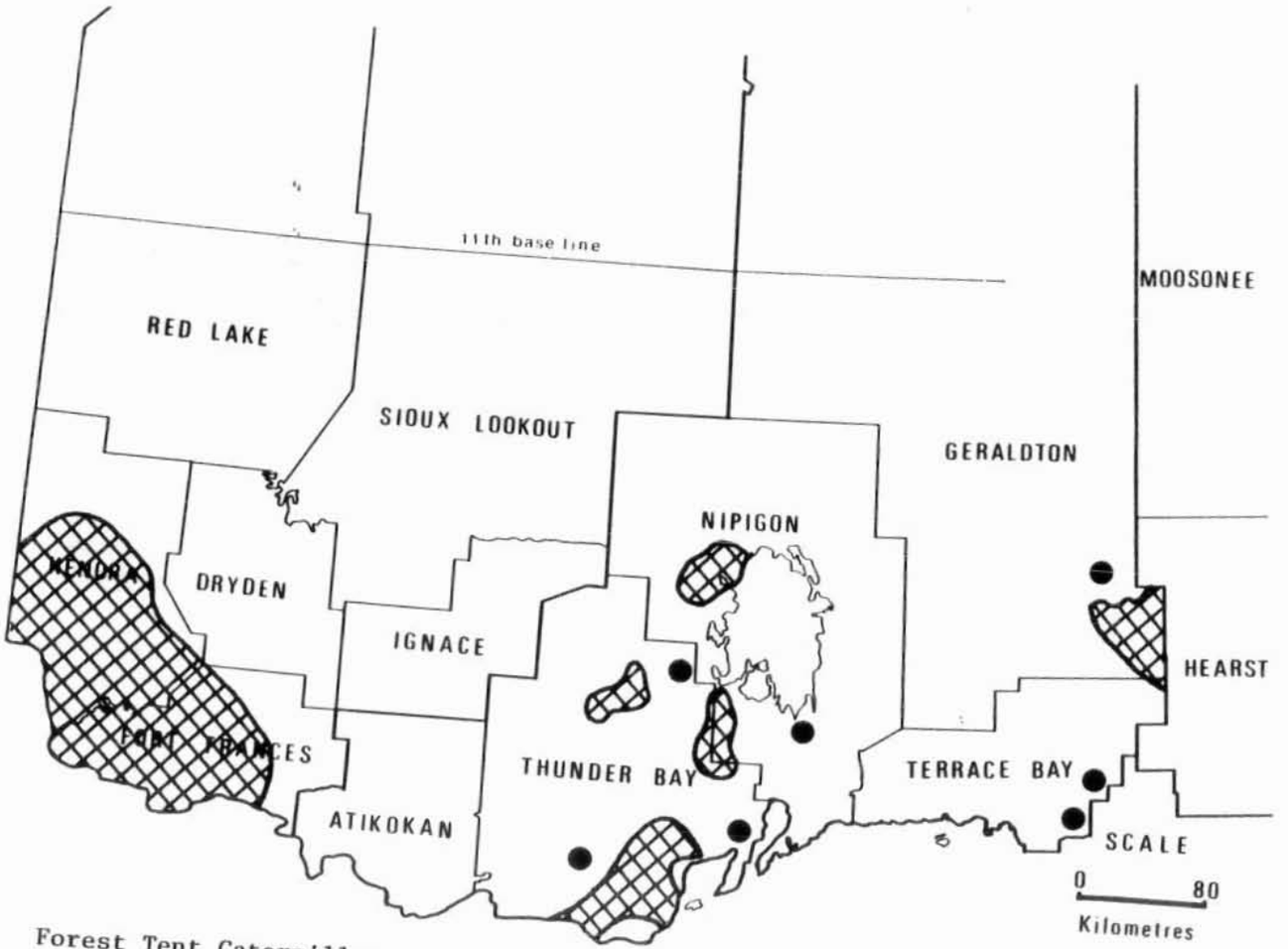
Forest Tent Caterpillar

Areas within which defoliation occurred in 1952

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

Areas within which defoliation occurred in 1953

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO

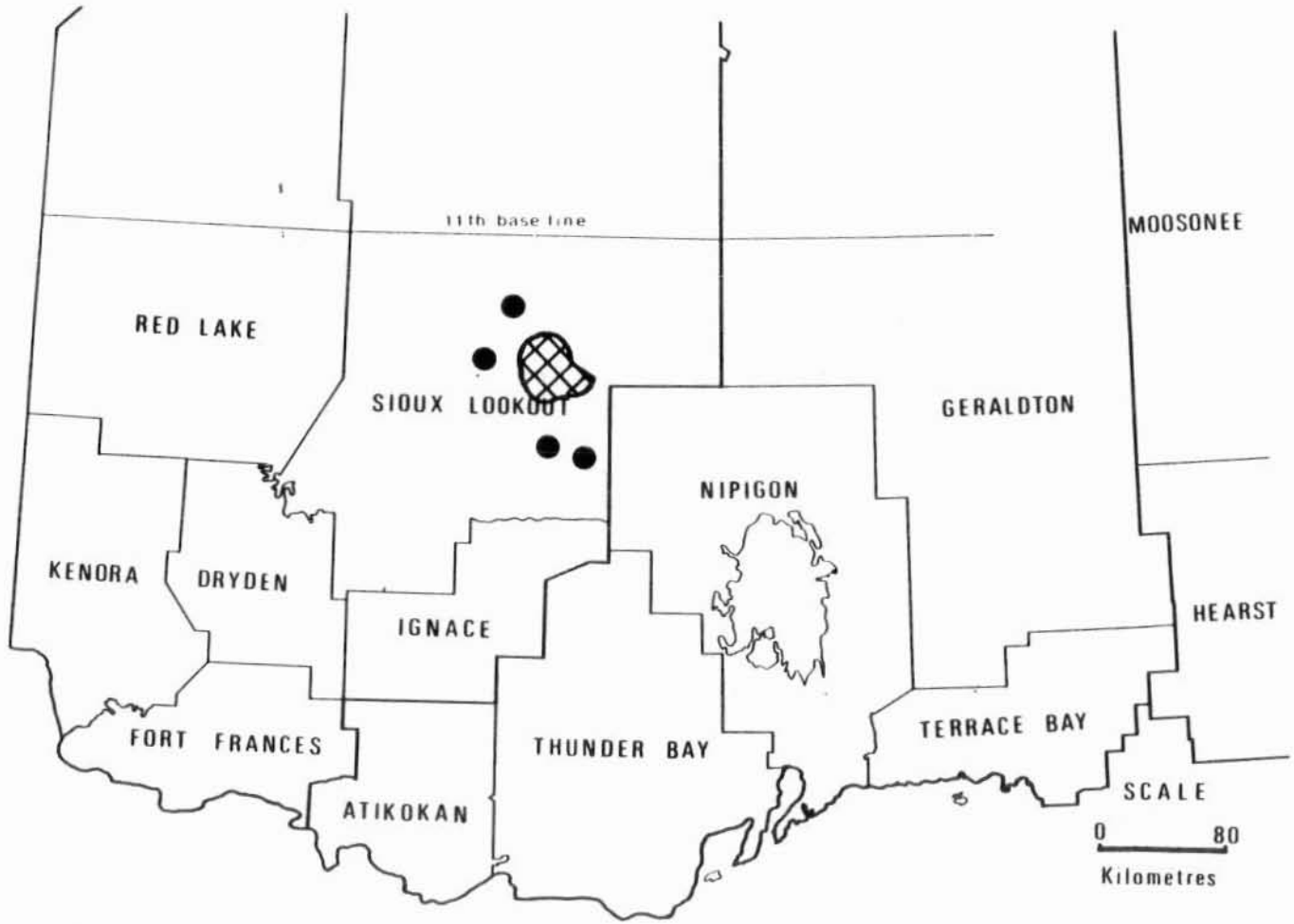
Forest Tent Caterpillar

Areas within which defoliation occurred in 1954

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

Areas within which defoliation occurred in 1956

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO

Forest Tent Caterpillar

Areas within which defoliation occurred in 1957

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO

Forest Tent Caterpillar

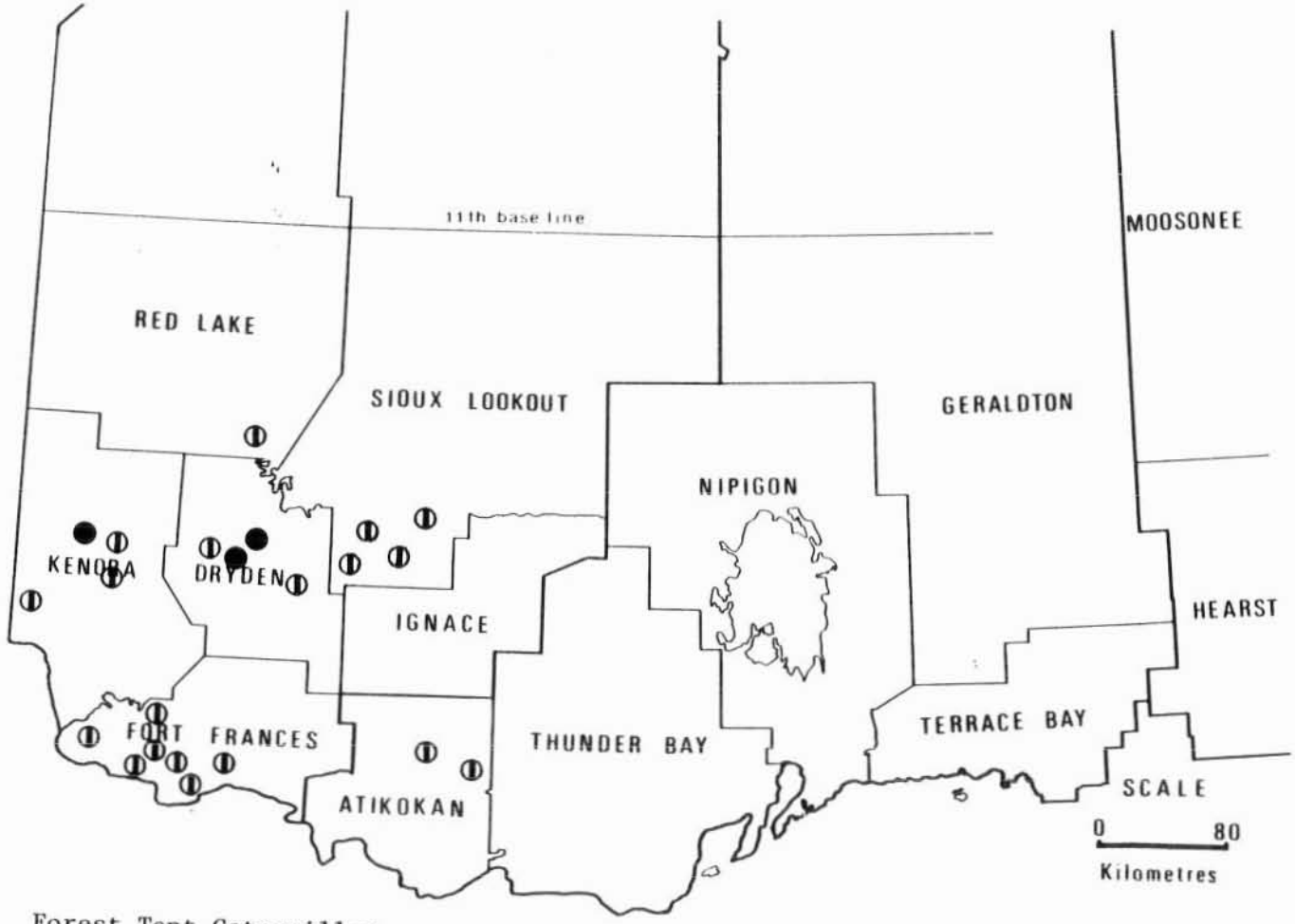
Areas within which defoliation occurred in 1959

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

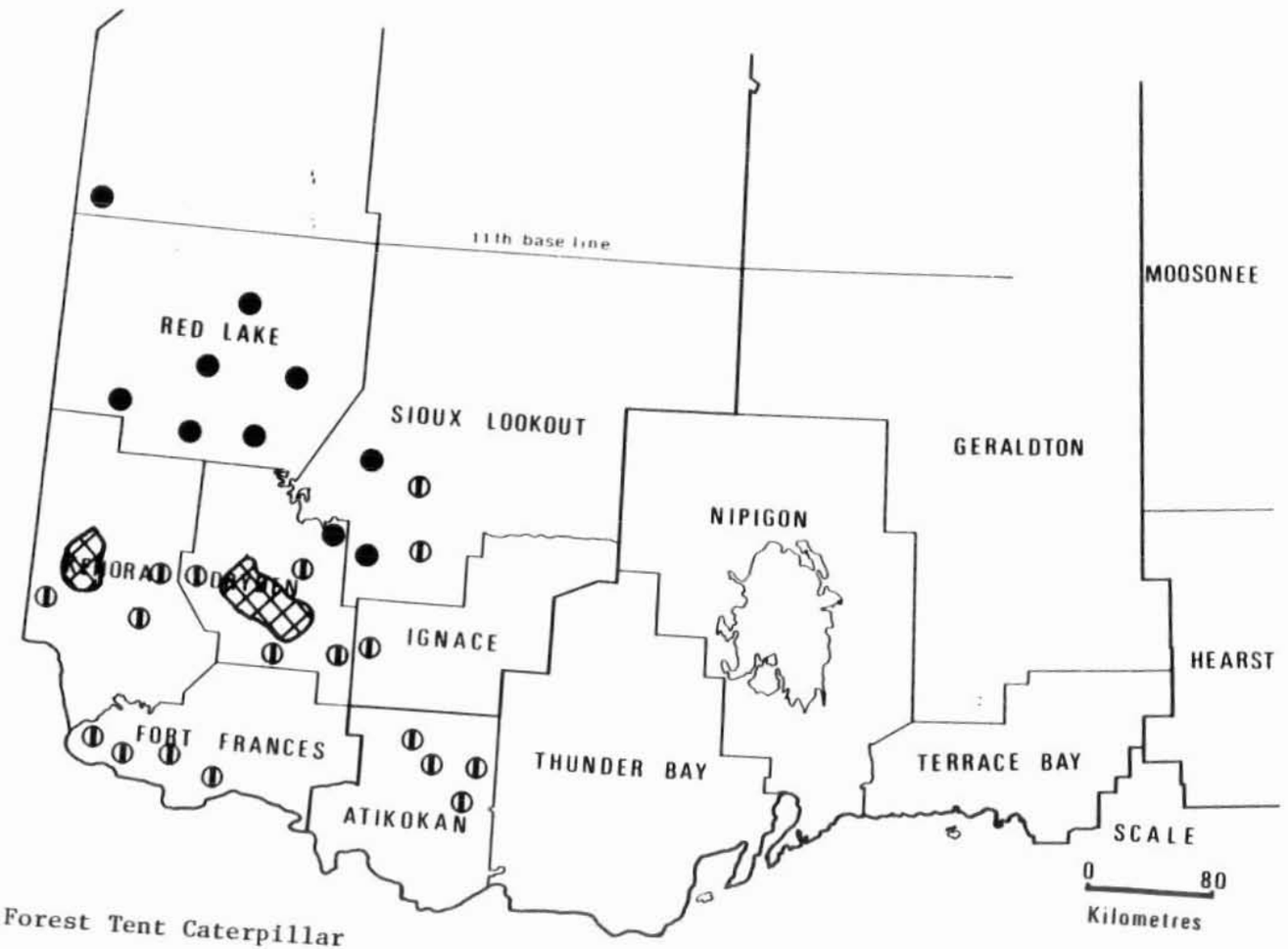
Areas within which defoliation occurred in 1960

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

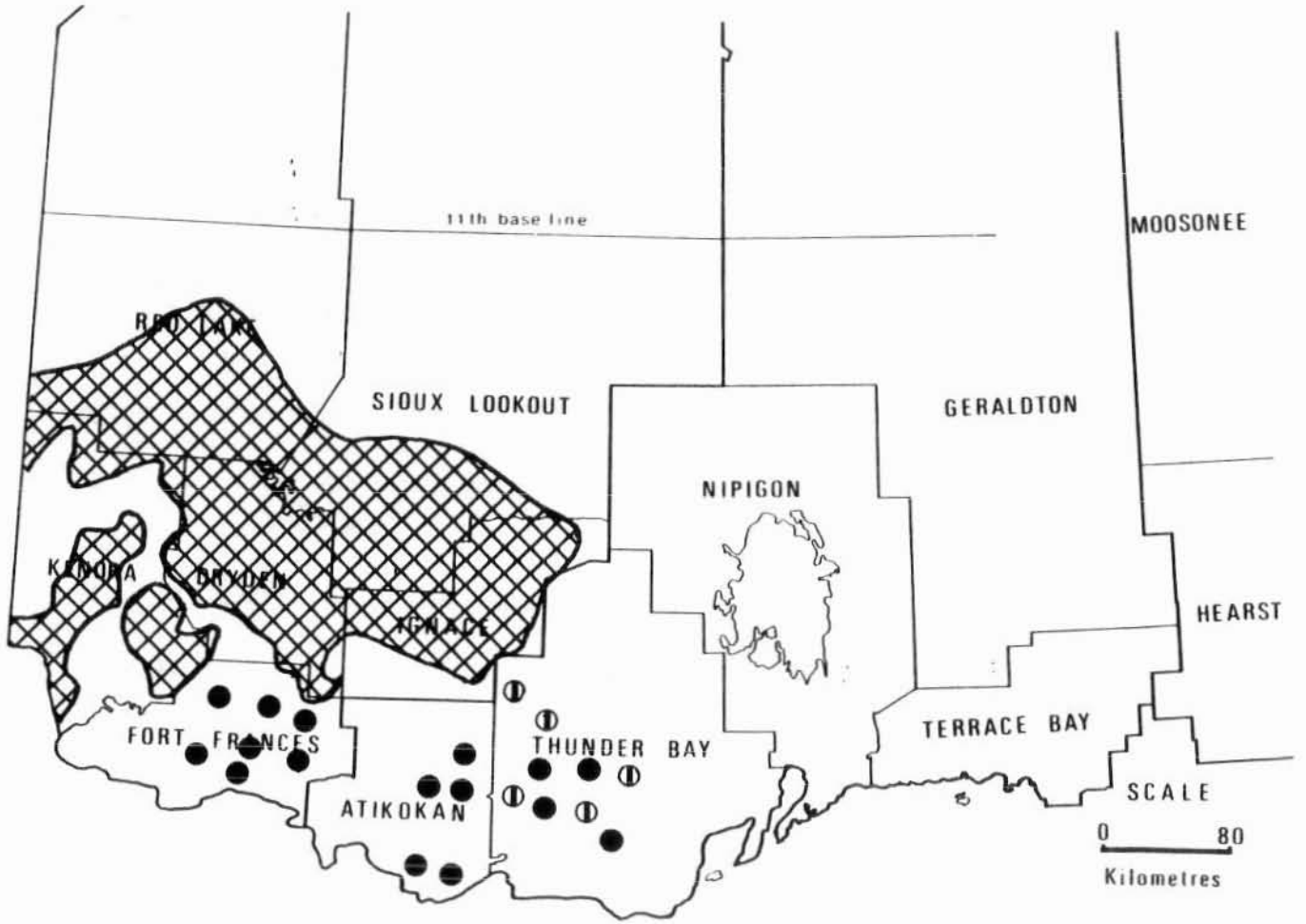
Areas within which defoliation occurred in 1961

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

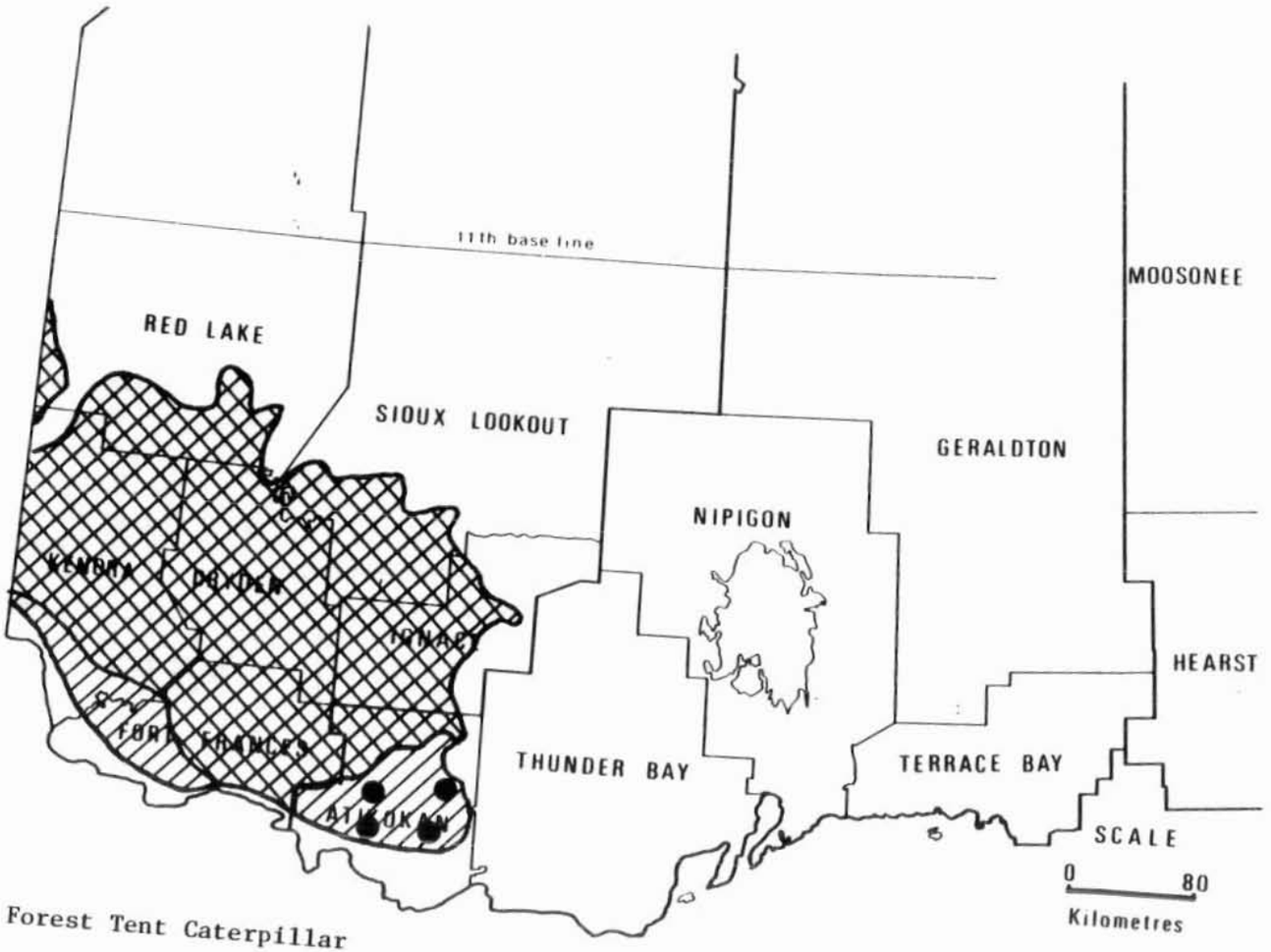
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

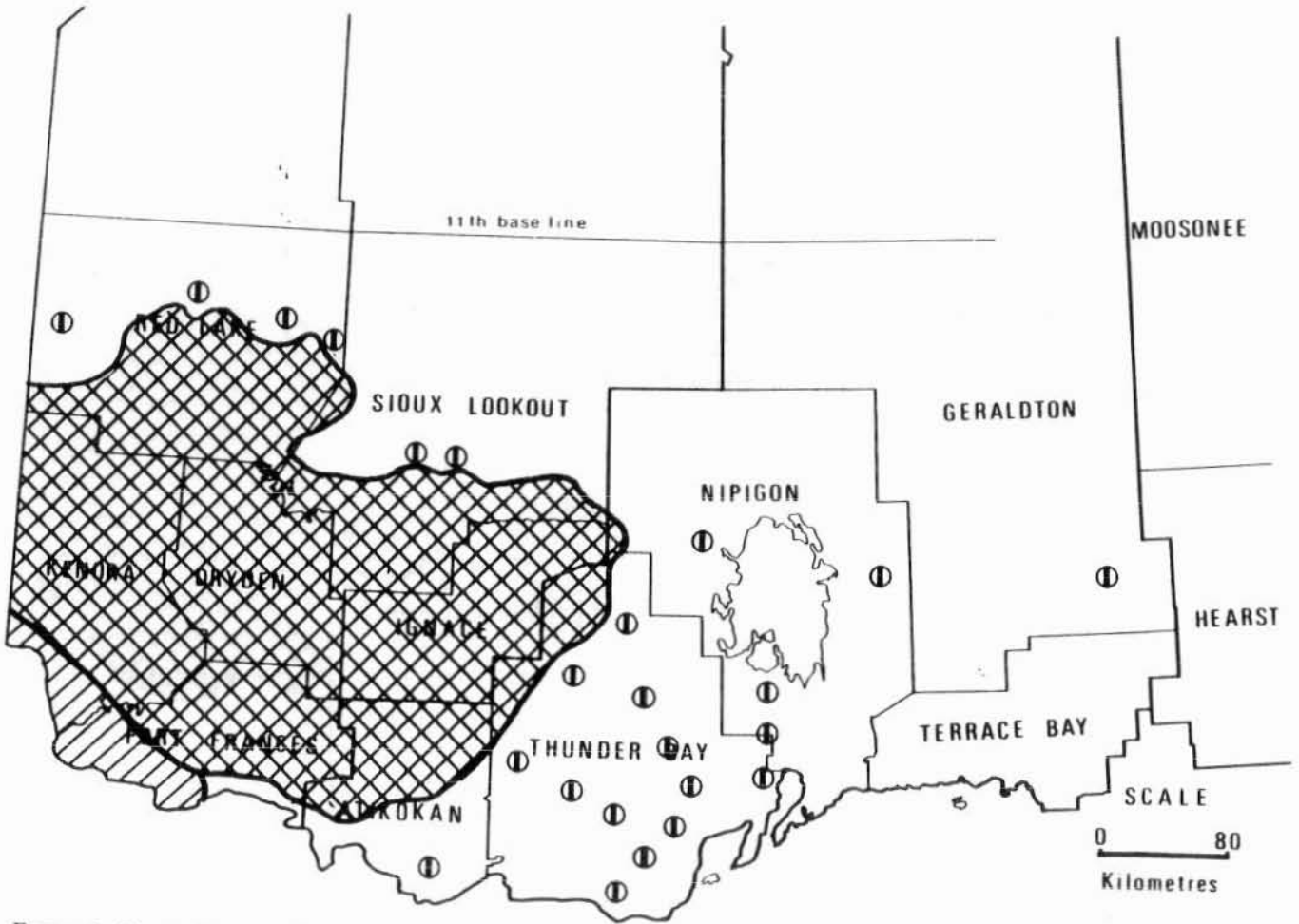
Areas within which defoliation occurred in 1963

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

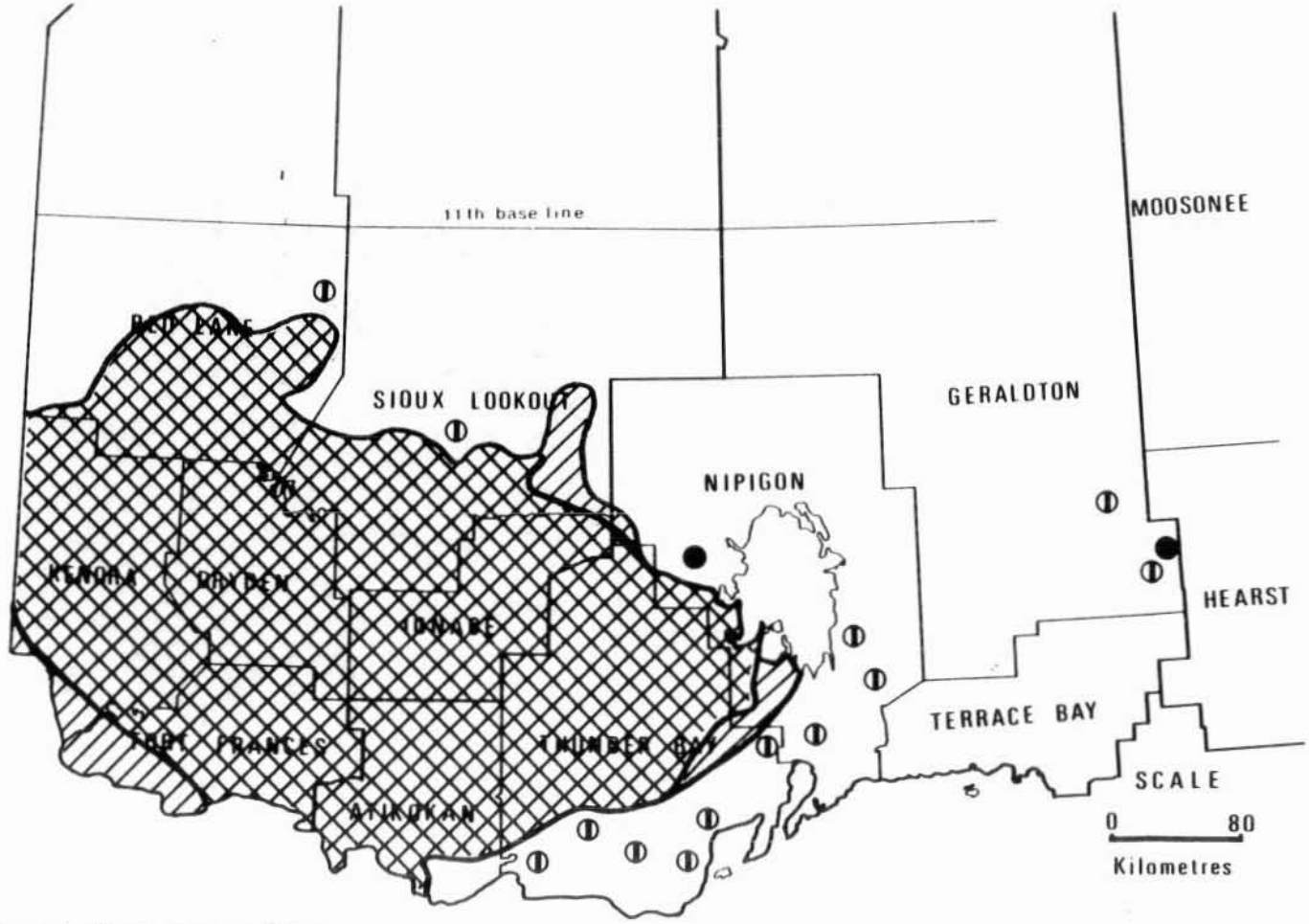
Areas within which defoliation occurred in 1964

LEGEND

Light defoliation ◐ or

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

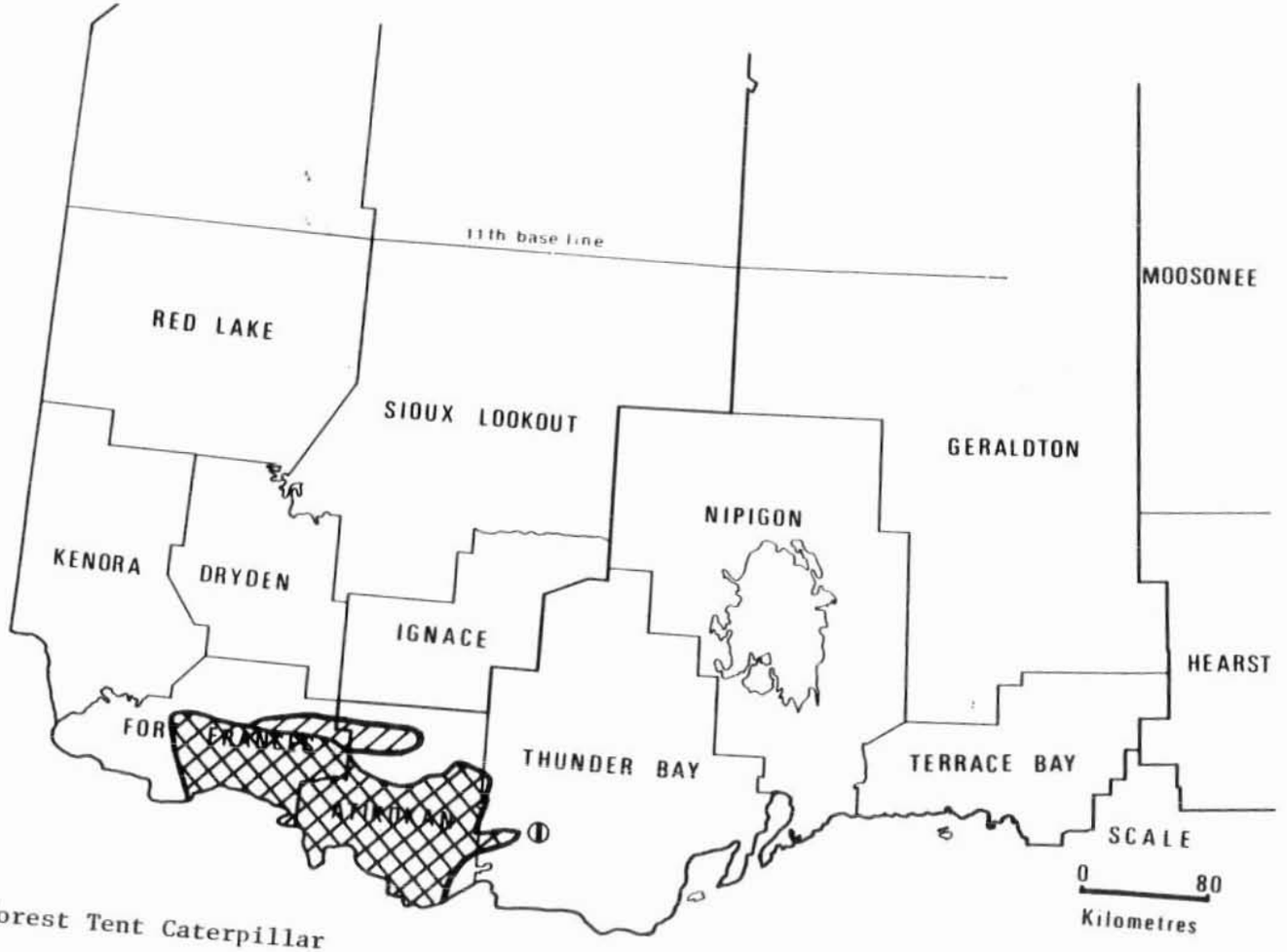
Areas within which defoliation occurred in 1965

LEGEND

Light defoliation ◐ or

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

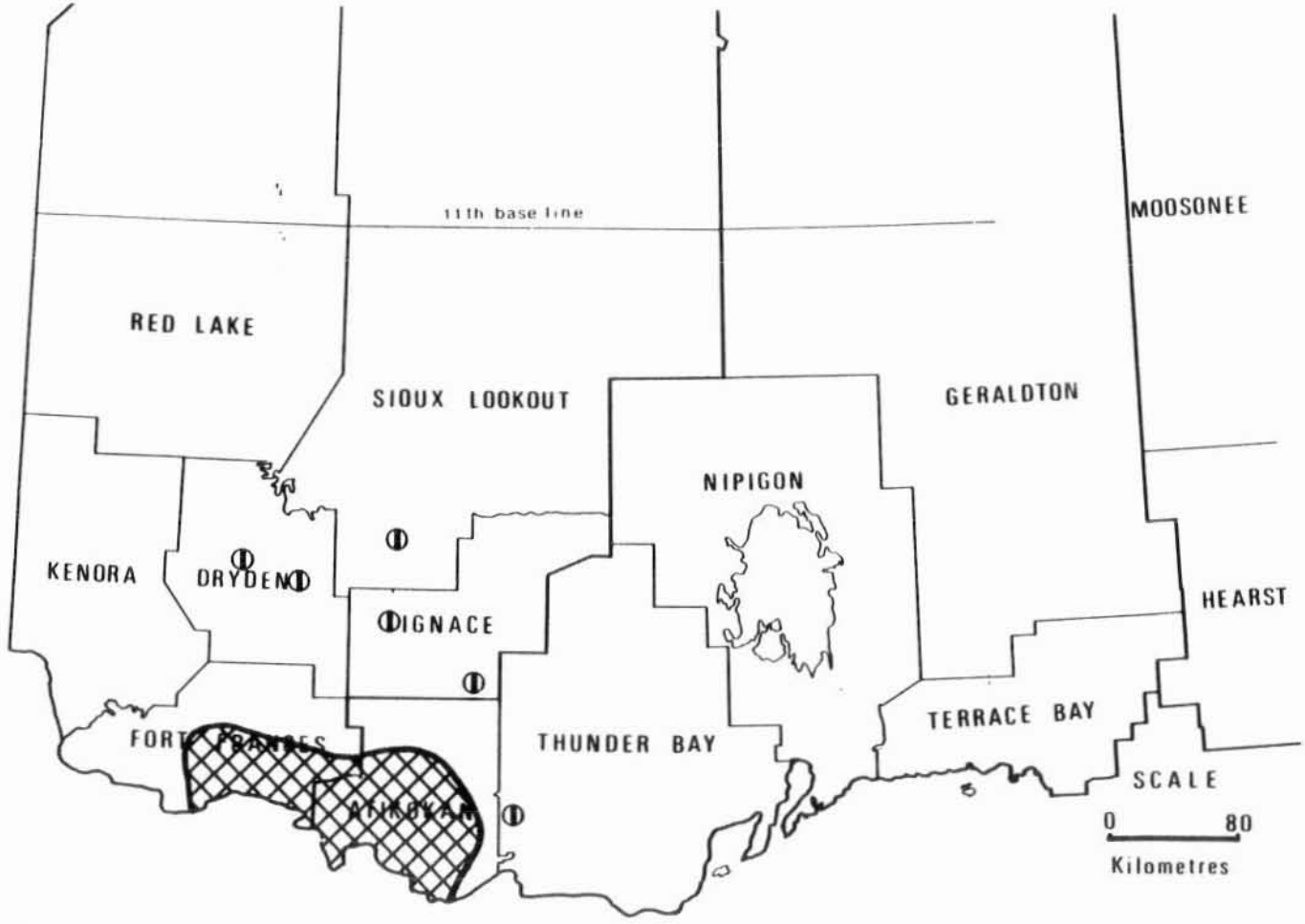
Areas within which defoliation occurred in 1966

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ▩

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

Areas within which defoliation occurred in 1967

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO

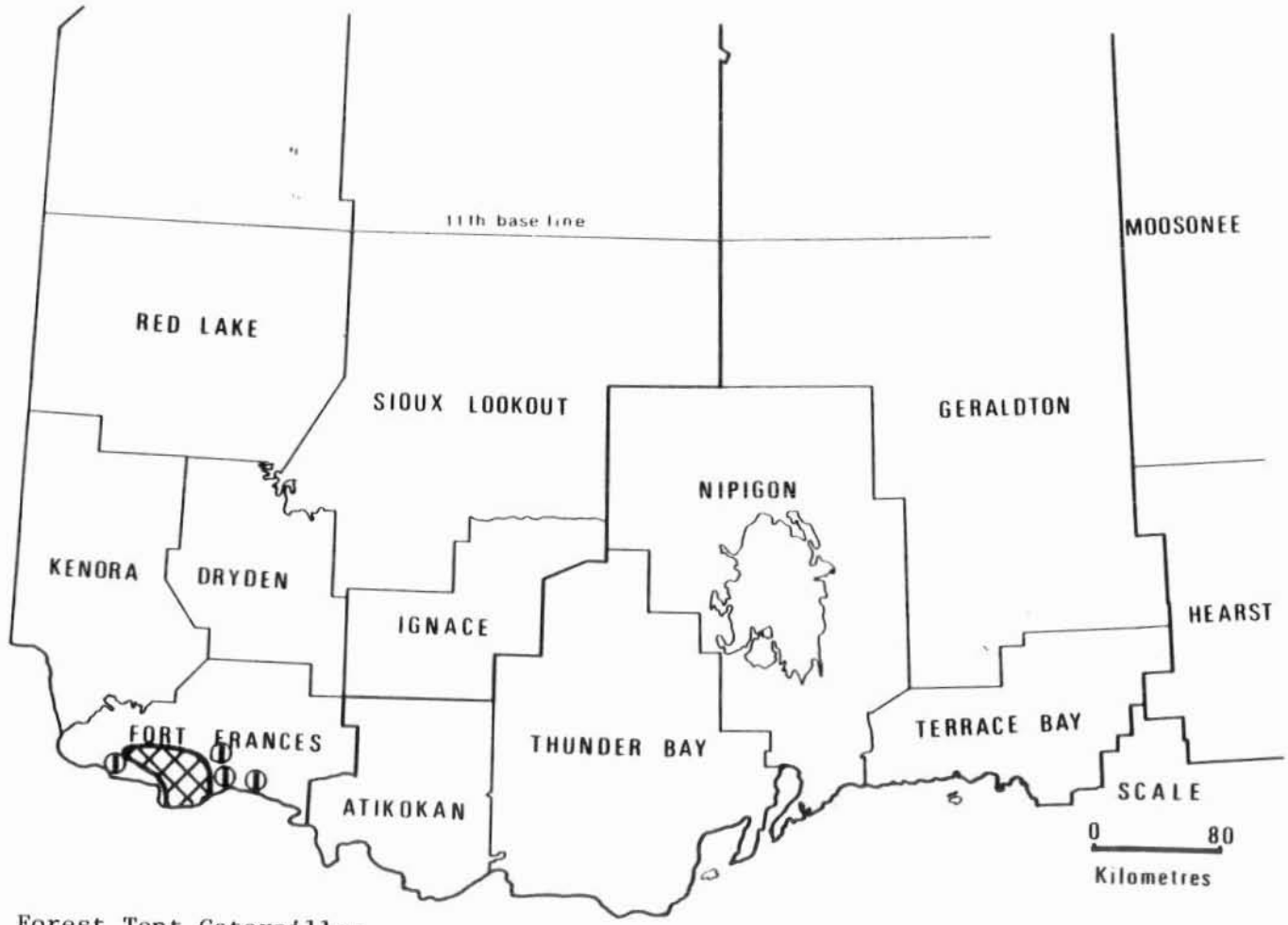
Forest Tent Caterpillar

Areas within which defoliation occurred in 1968

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

Areas within which defoliation occurred in 1969

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ▨

NORTHWESTERN ONTARIO

Forest Tent Caterpillar

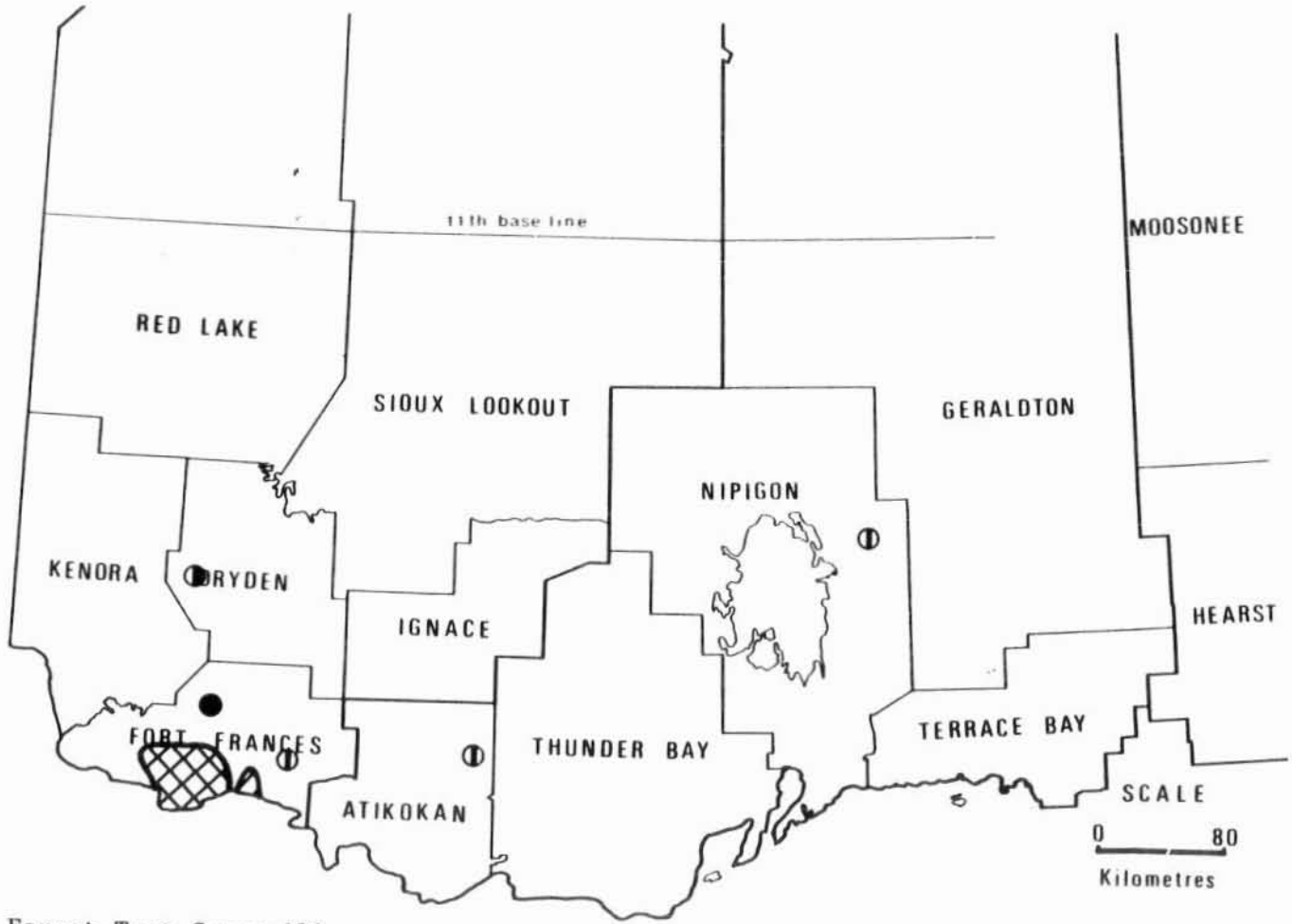
Areas within which defoliation occurred in 1970

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

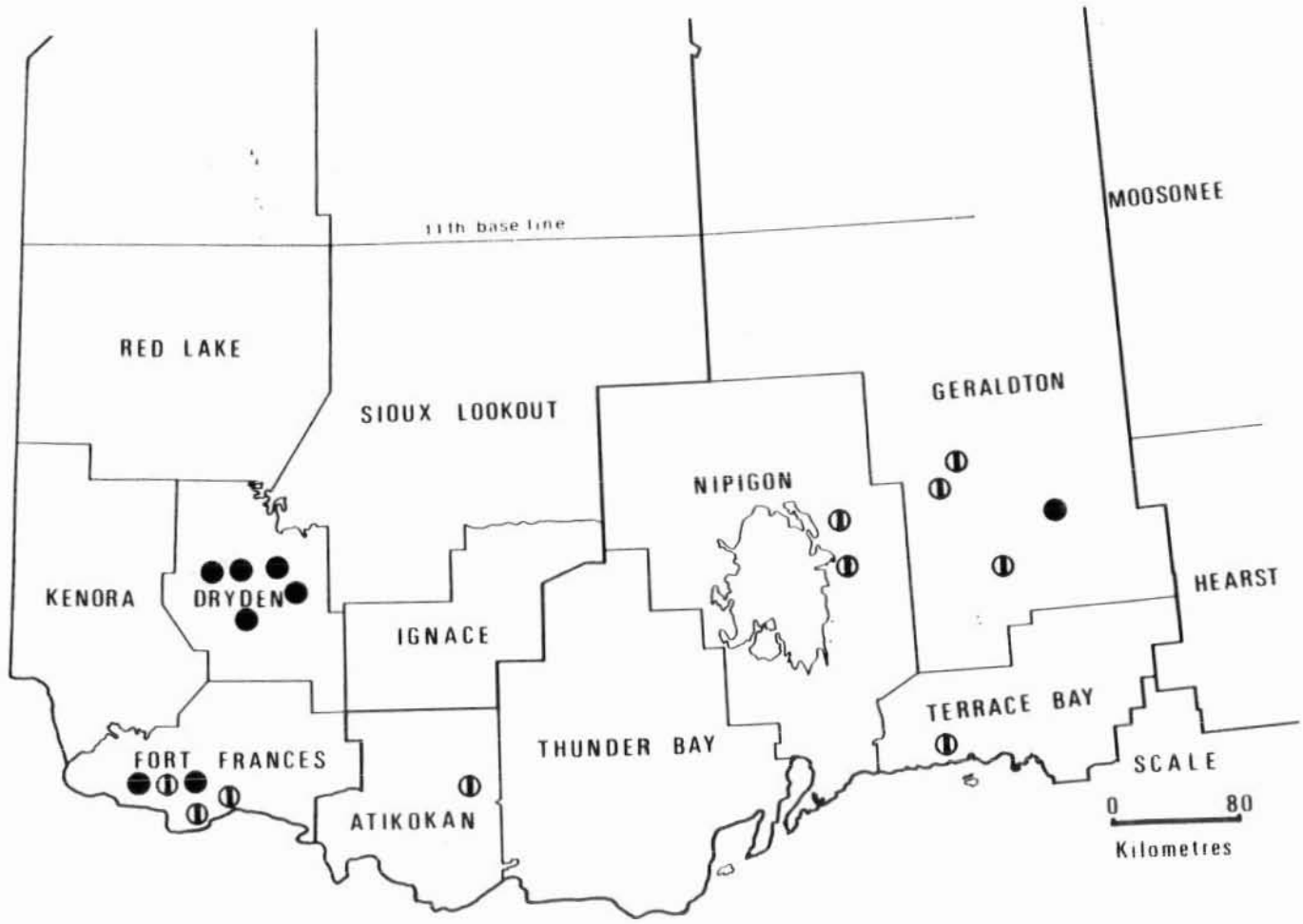
Areas within which defoliation occurred in 1971

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

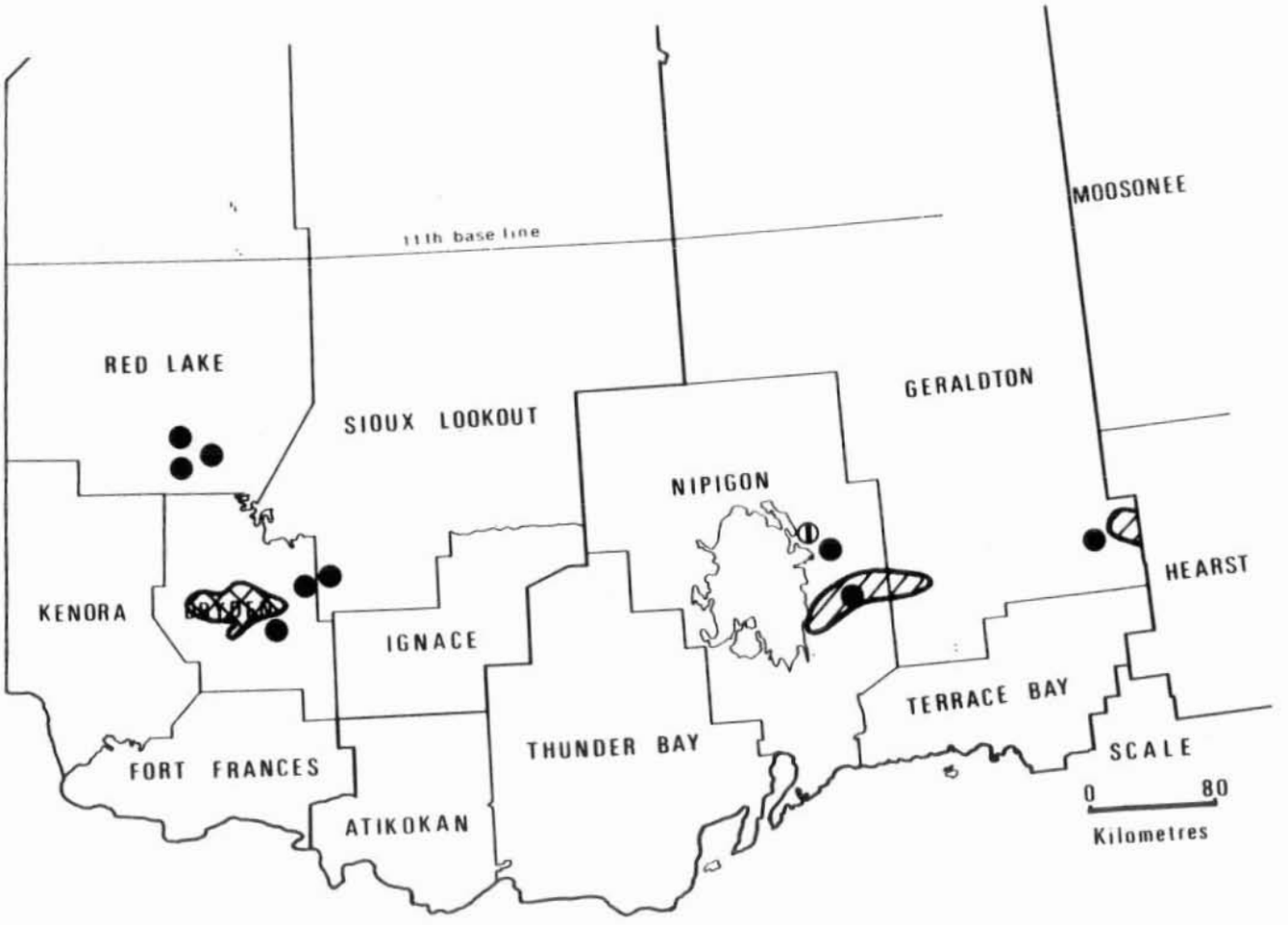
Areas within which defoliation occurred in 1972

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

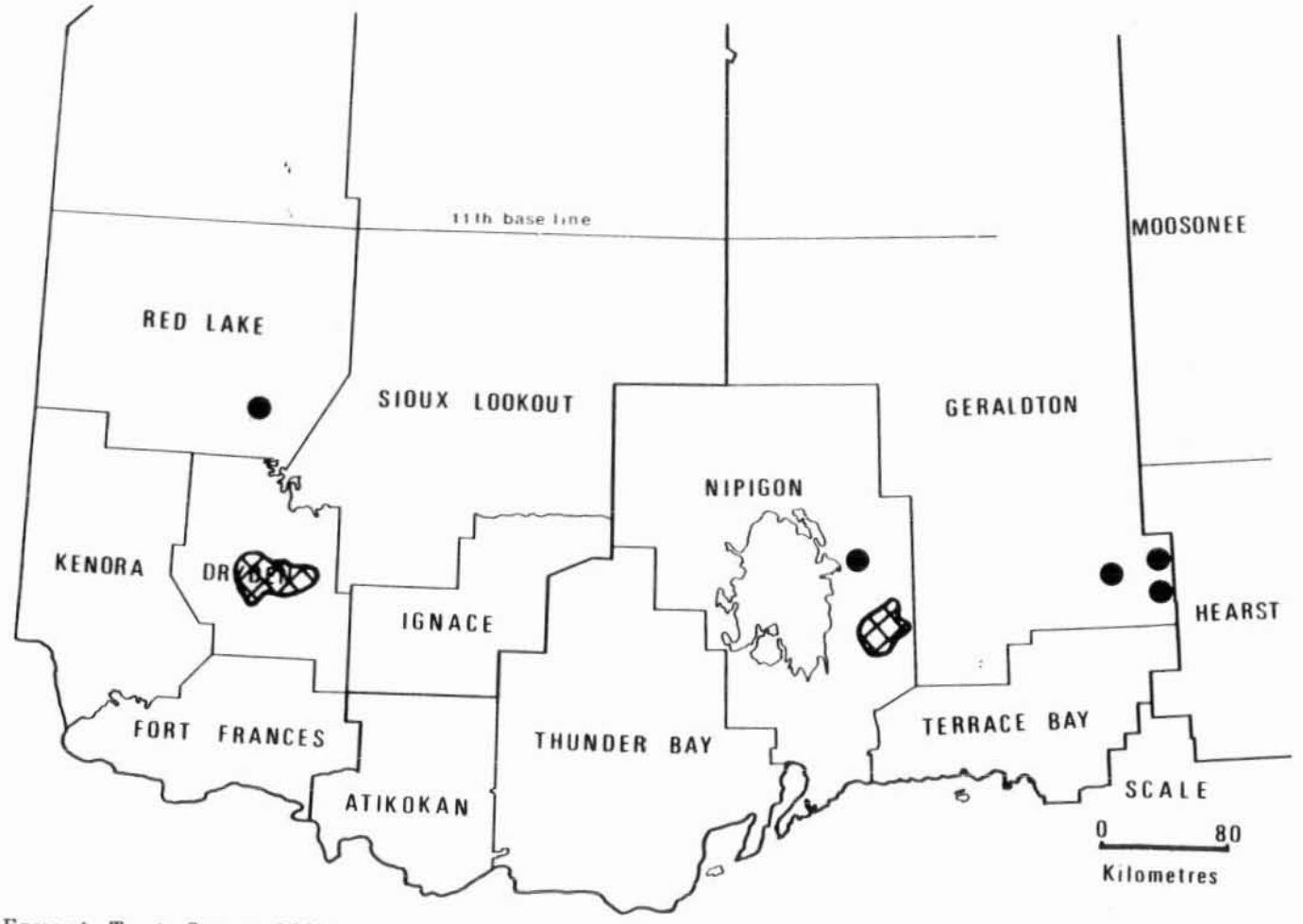
Areas within which defoliation occurred in 1973

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



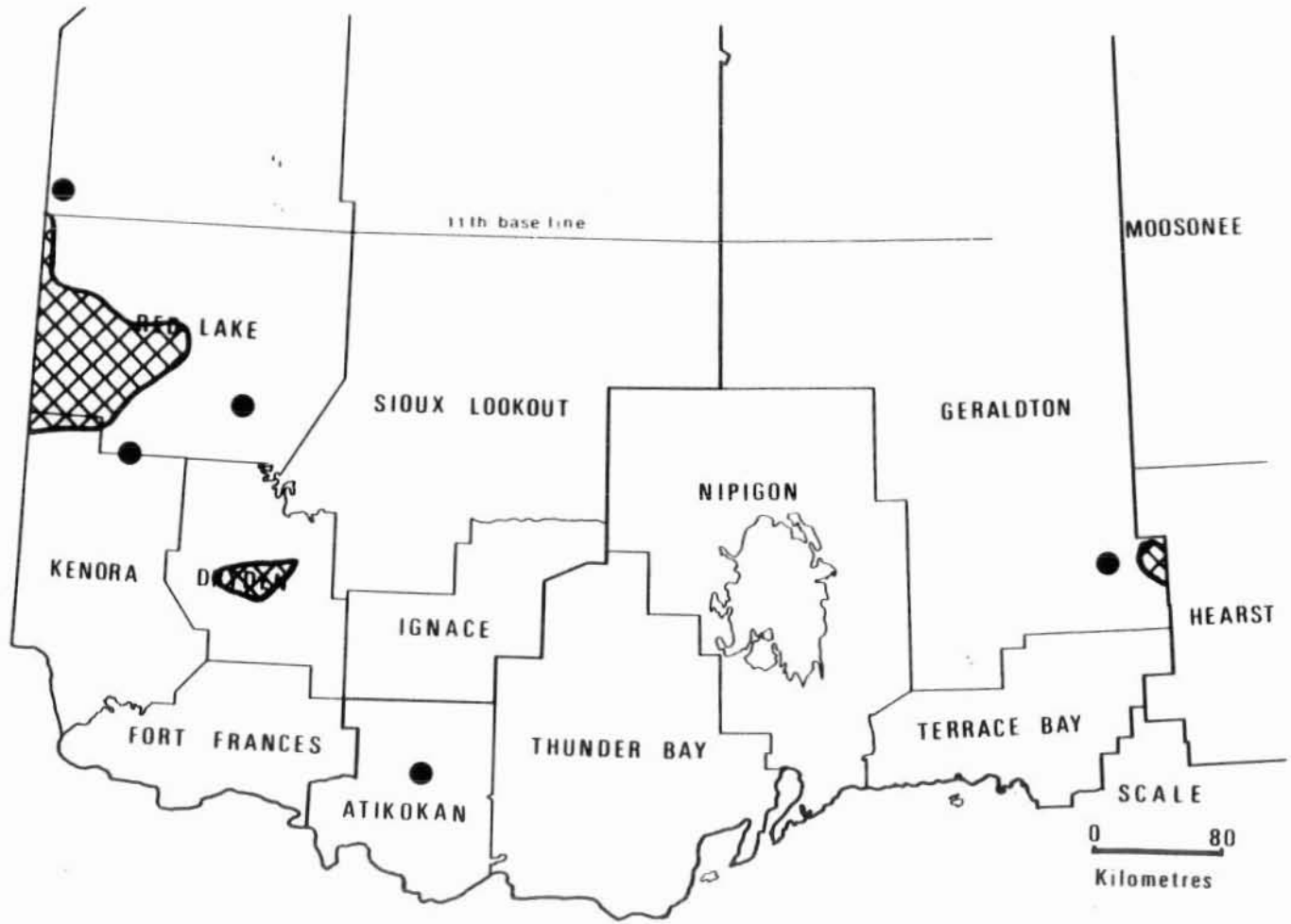
Forest Tent Caterpillar

Areas within which defoliation occurred in 1974

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



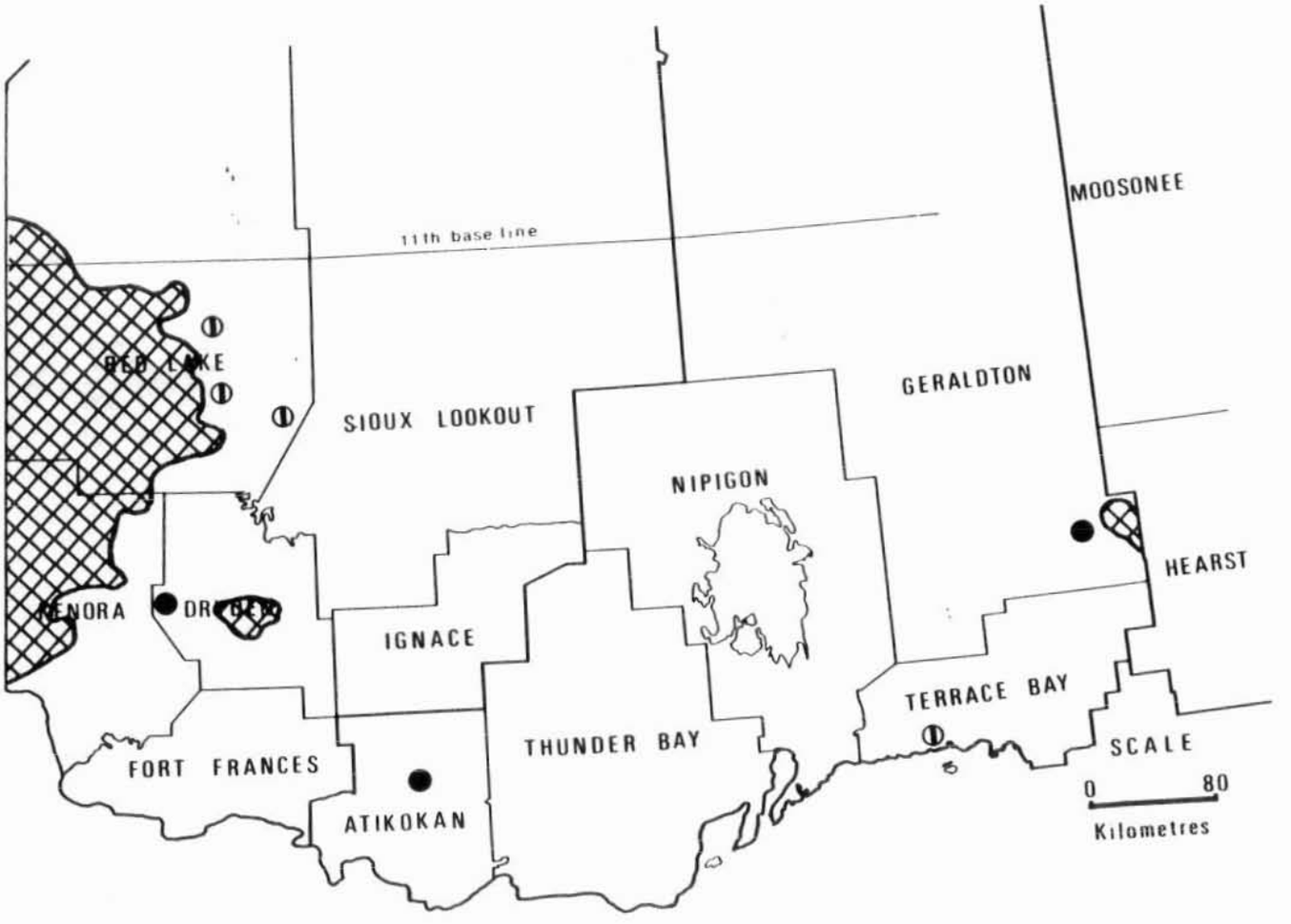
Forest Tent Caterpillar

Areas within which defoliation occurred in 1975

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

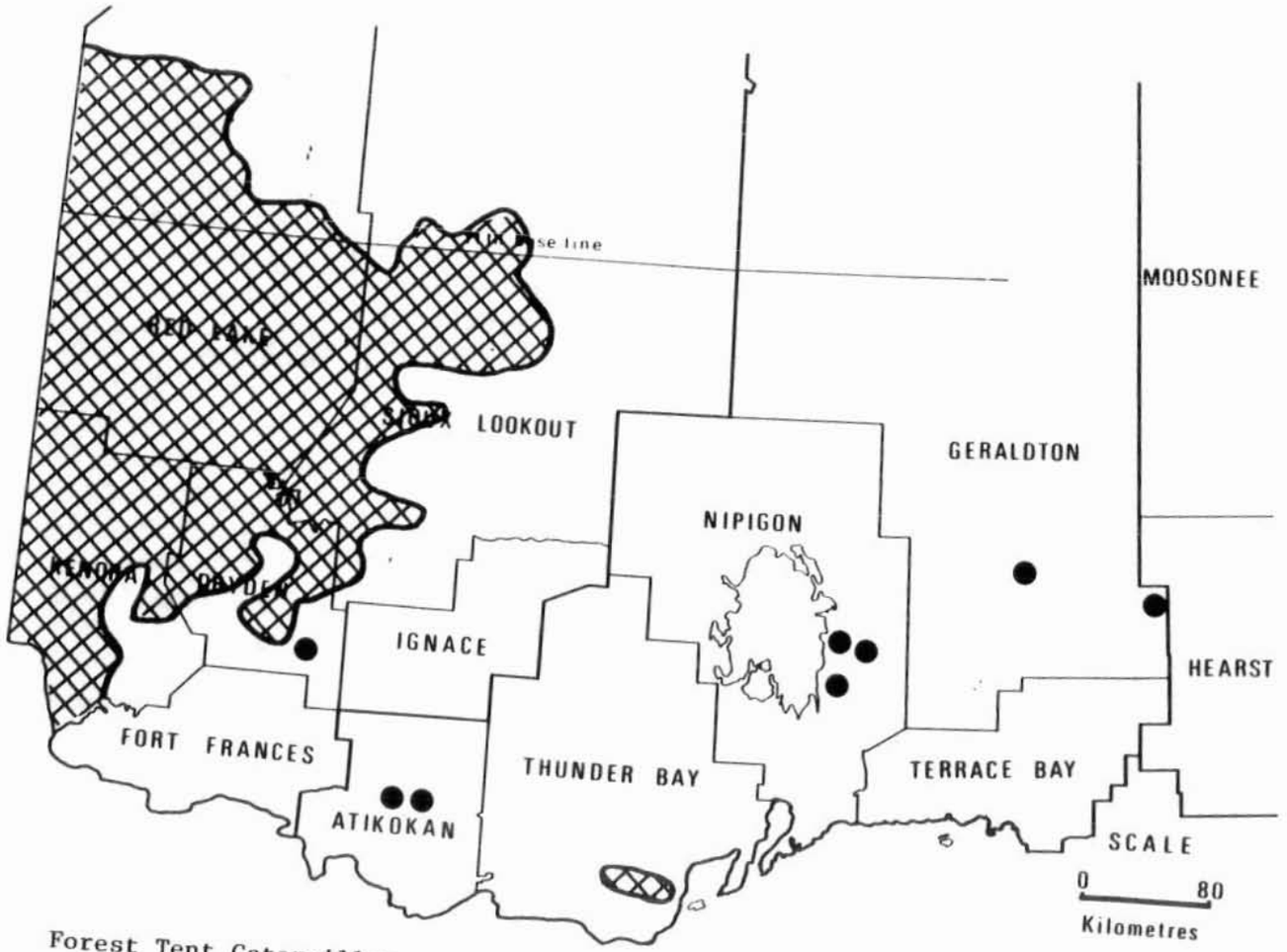
Areas within which defoliation occurred in 1976

LEGEND

Light defoliation ◑

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



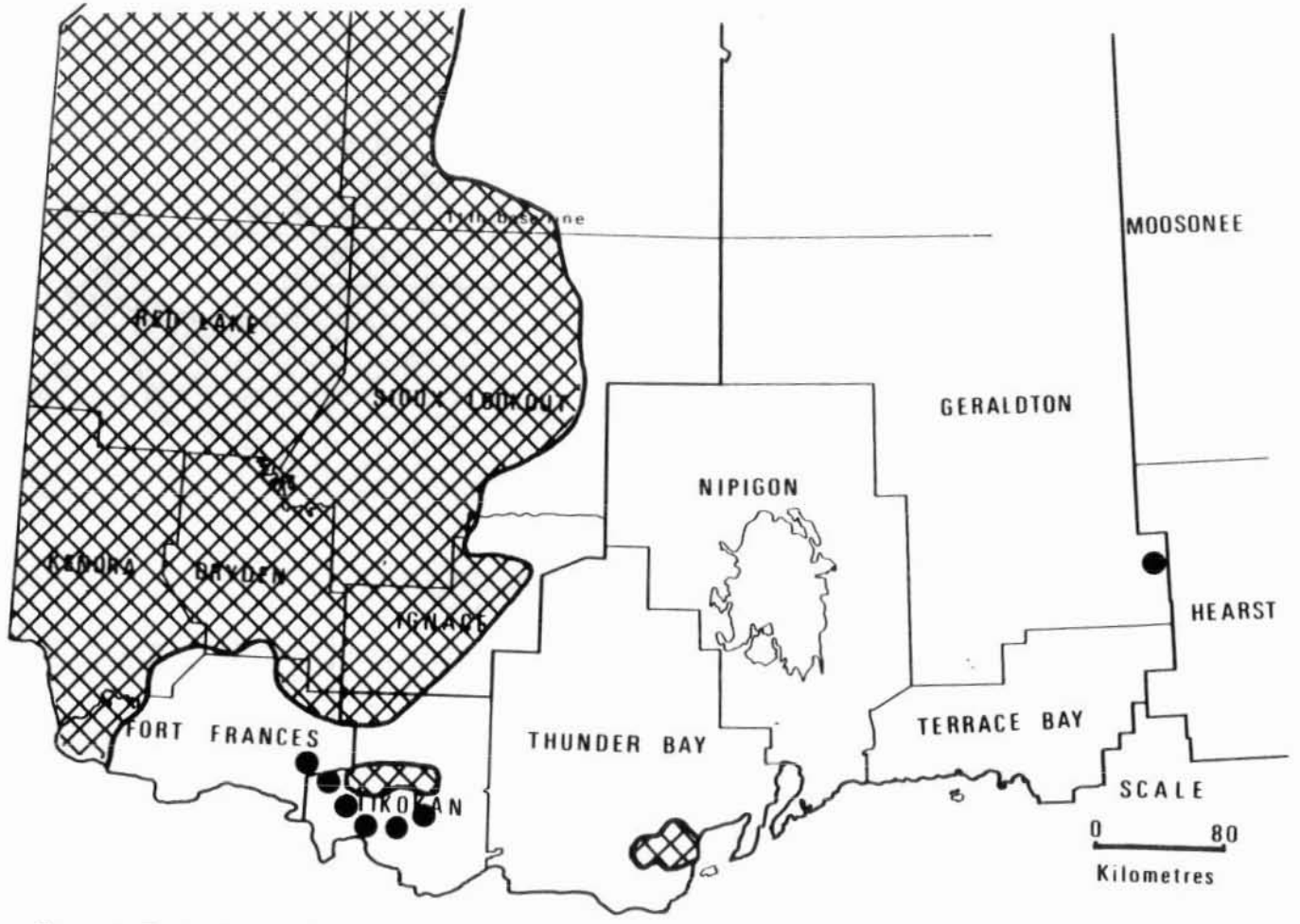
Forest Tent Caterpillar

Areas within which defoliation occurred in 1977

LEGEND

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



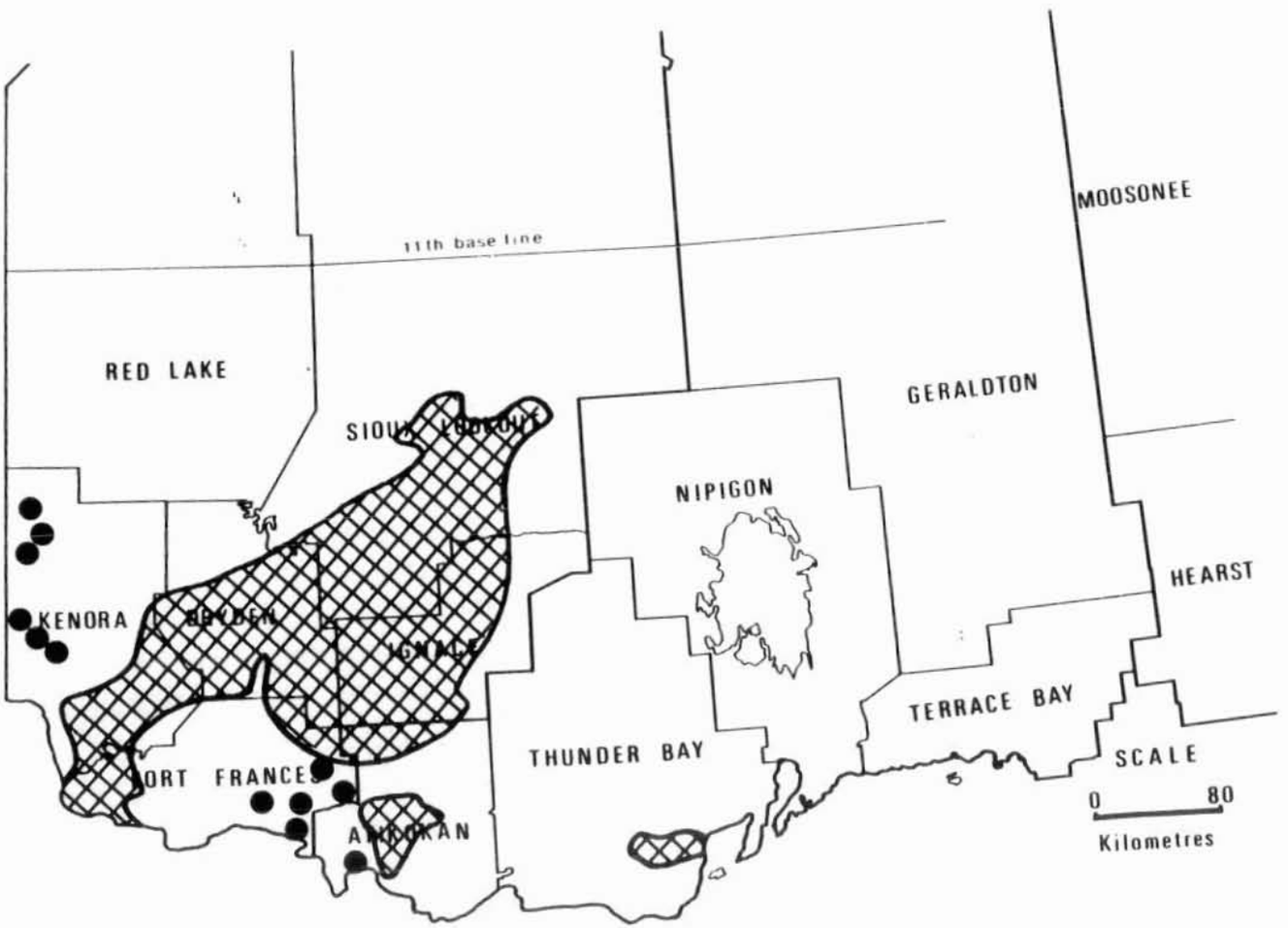
Forest Tent Caterpillar

Areas within which defoliation occurred in 1978

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



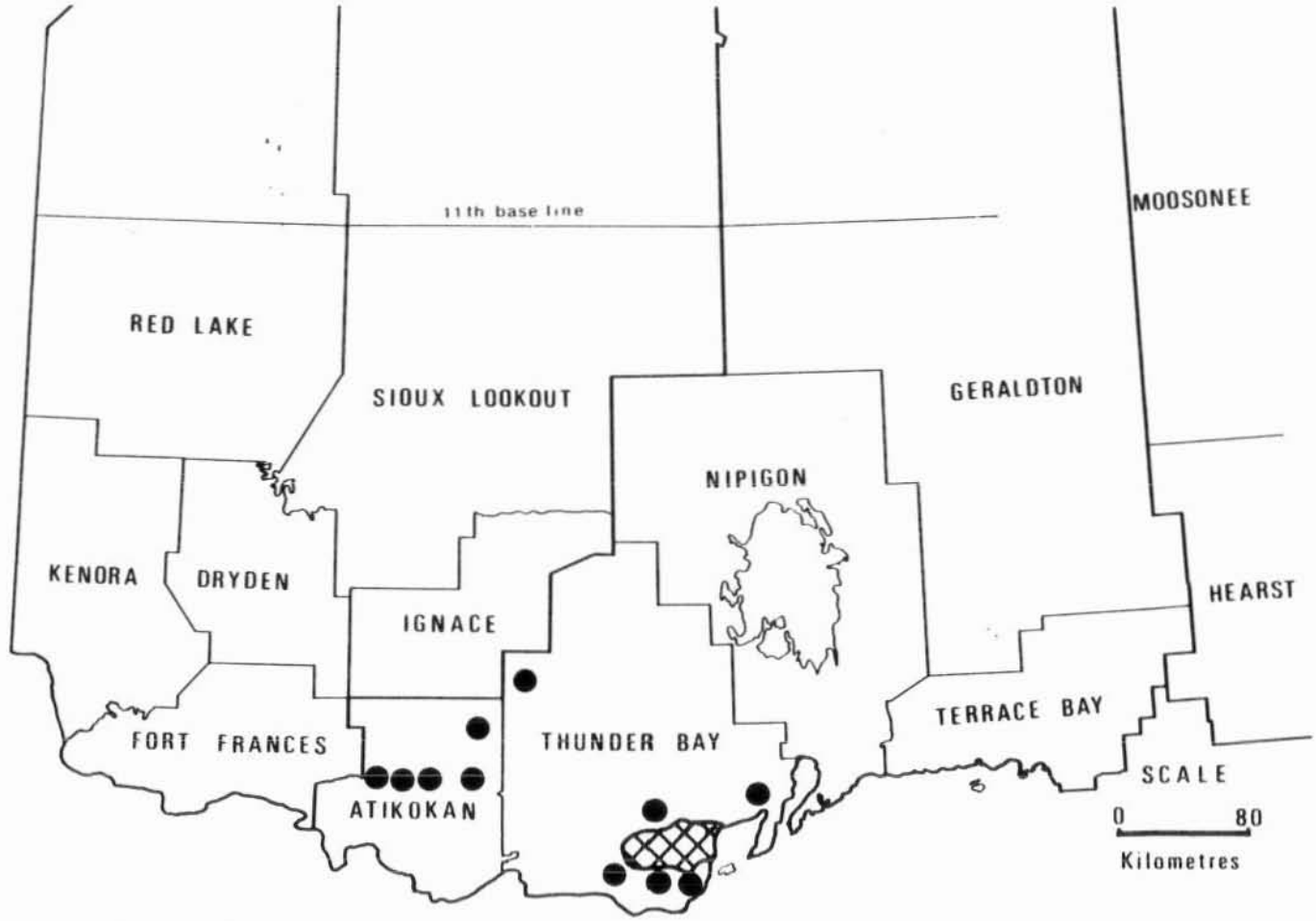
Forest Tent Caterpillar

Areas within which defoliation occurred in 1979

LEGEND

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



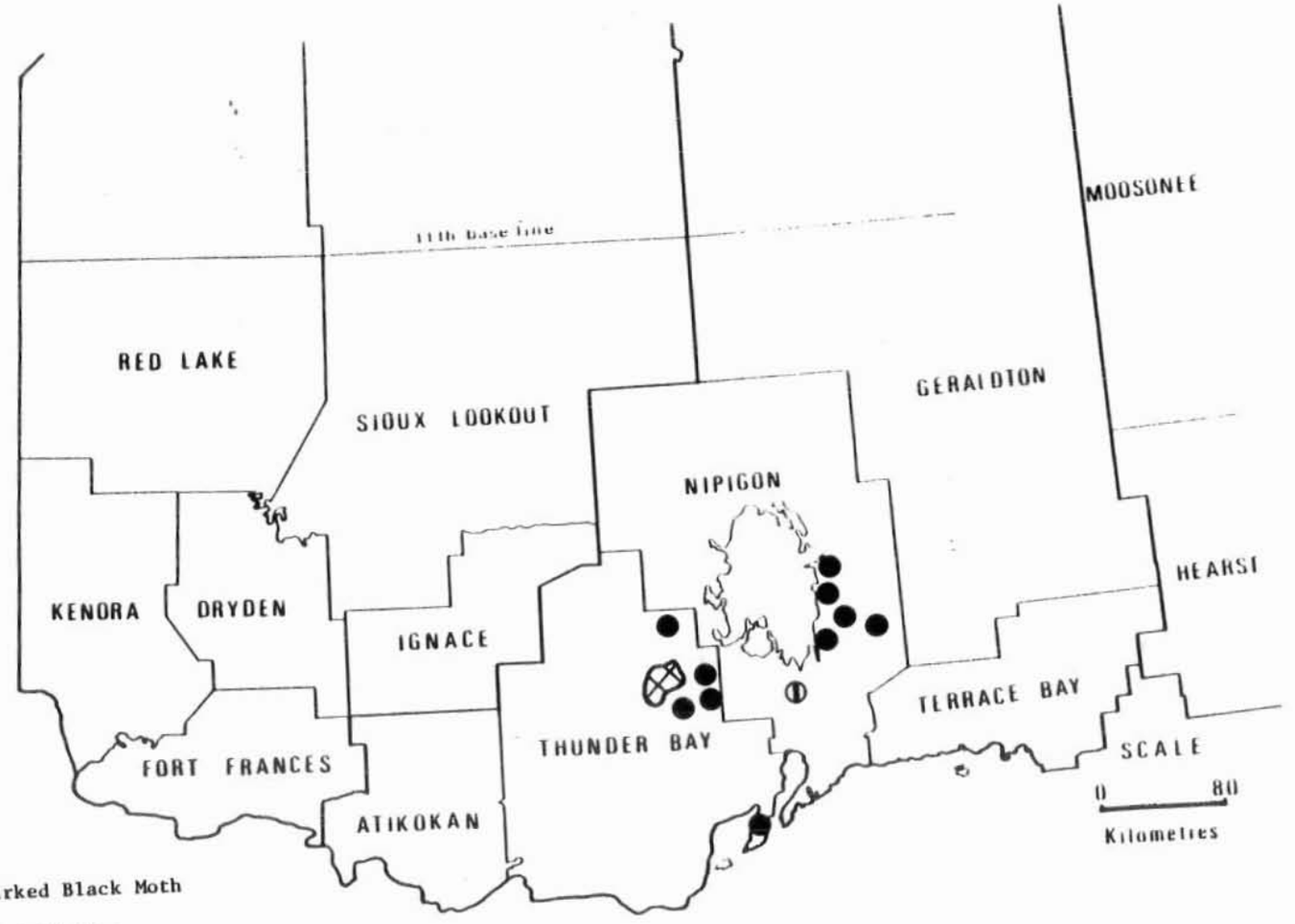
Forest Tent Caterpillar

Areas within which defoliation occurred in 1980

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Spearmarked Black Moth

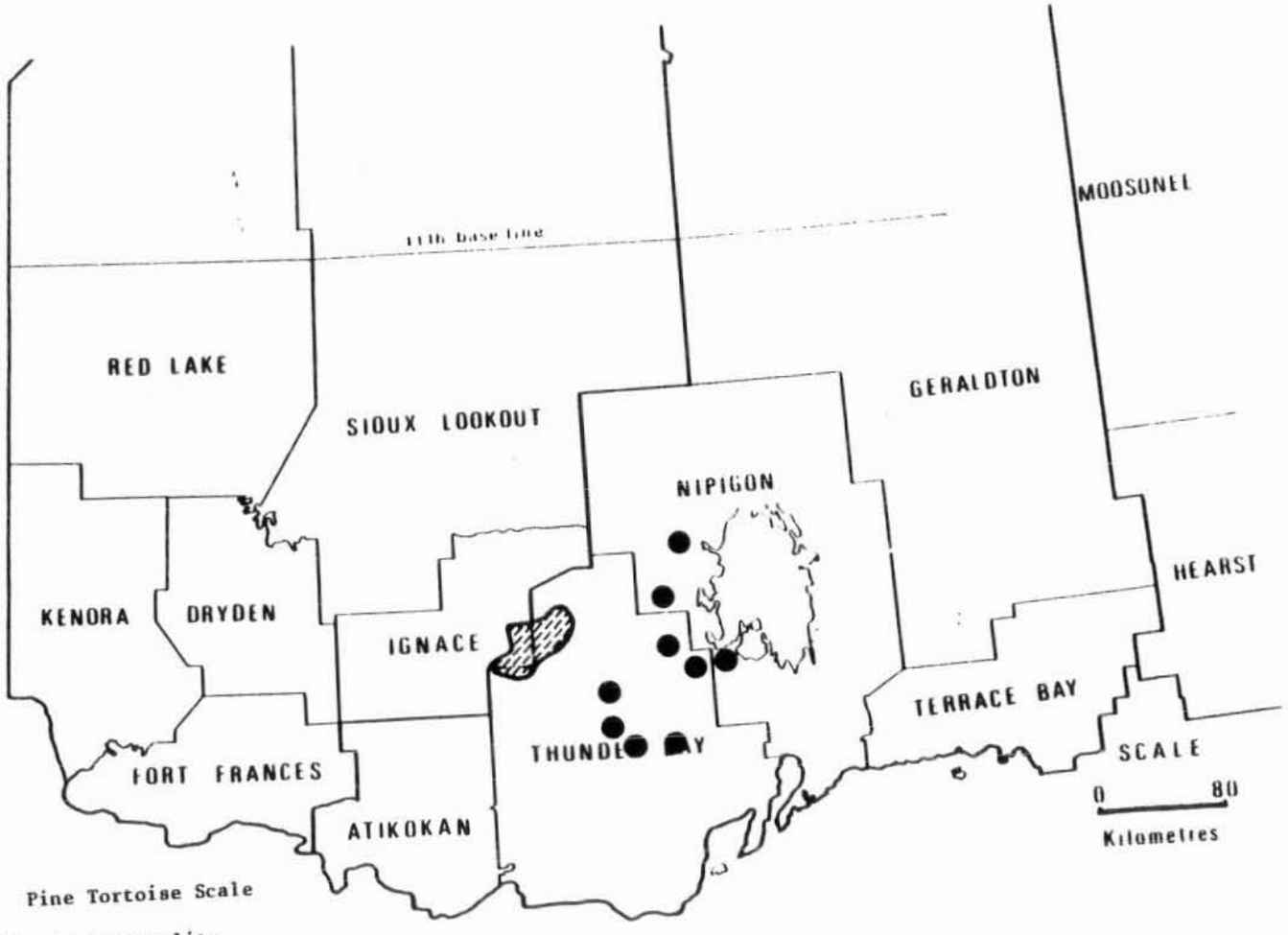
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



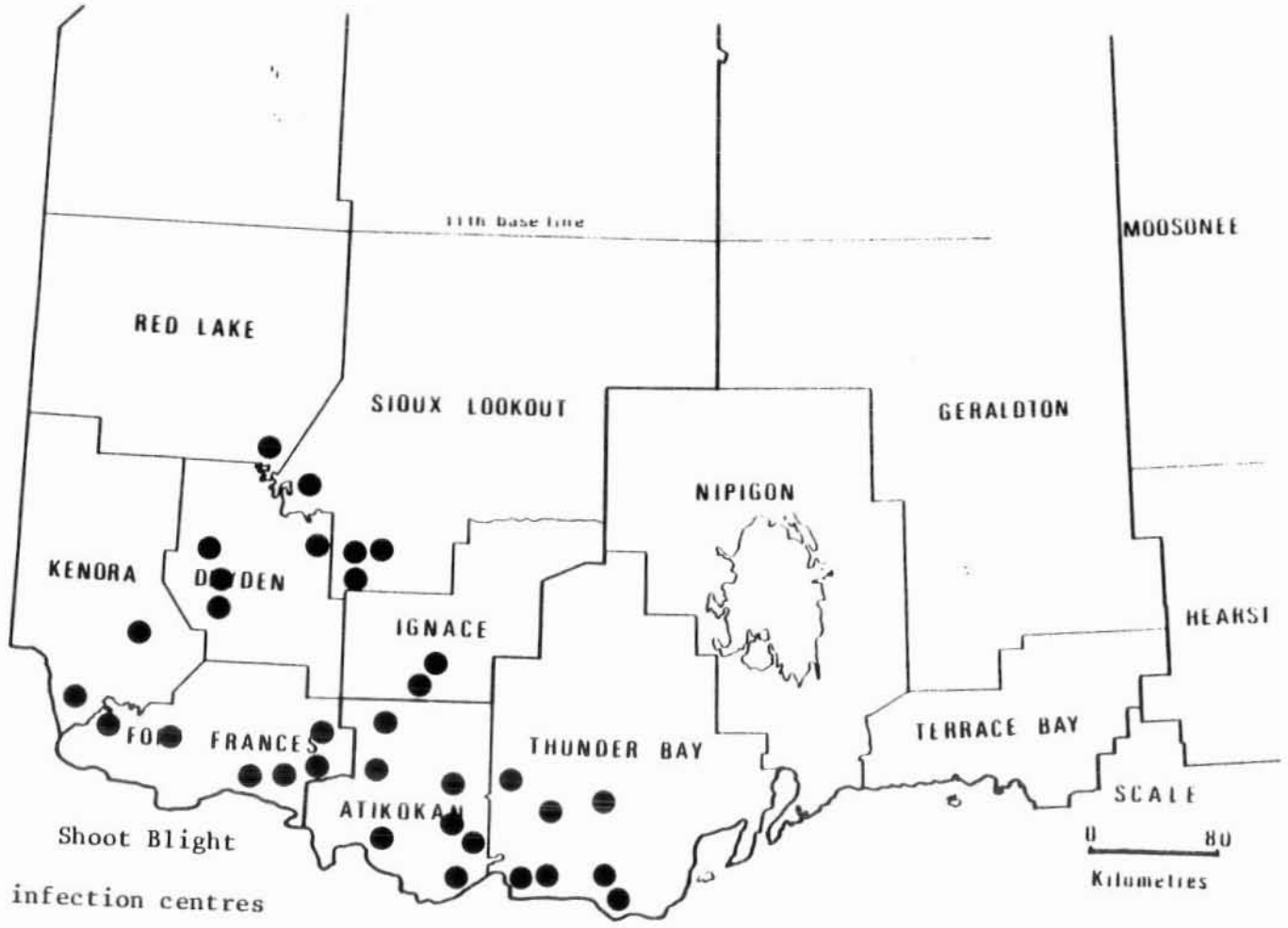
Pine Tortoise Scale

Areas within which mortality occurred in 1957

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



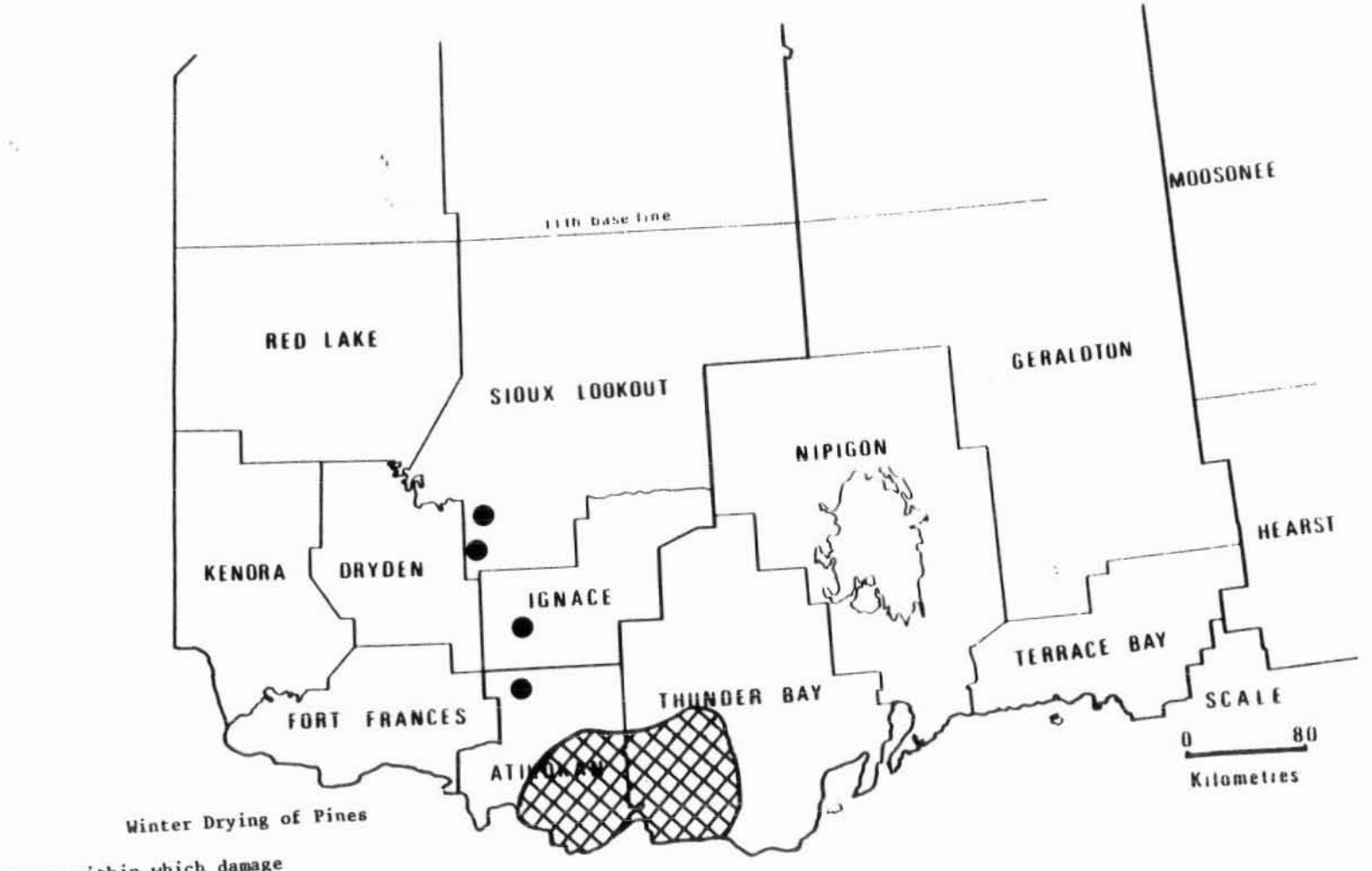
Shoot Blight

Locations of infection centres in 1973

LEGEND

Infection centres ●

NORTHWESTERN ONTARIO



Winter Drying of Pines

Areas within which damage occured in 1973

LEGEND

Moderate-to-severe damage ● or ▨