A REVIEW OF IMPORTANT FOREST INSECT AND DISEASE PROBLEMS IN THE IGNACE 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, then was moved to Sault Ste. Marie in 1967. The results of these surveys of insects and diseases appear 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 three 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, as well as the full scientific names, are given 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.

ACKNOWLEDGMENTS

The authors wish to acknowledge Dr. G.M. Howse, Head, Forest Insect and Disease Survey Unit; Miss C.A. Plexman, Chief, Communications Services; and Mr. P. Jakibchuk, Technical Services Officer, for advice and support during the preparation of this review.

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

1950	G.R. Carter and W.J. Miller
1951	A.L. Rose and W.J. Miller
1952	W.J. Miller and P.E. Buchan
1953-1955	W.J. Miller and P.E. Buchan
1956	P.E. Buchan
1957-1959	P.E. Buchan and D. Bowen
1960-1969	P.E. Buchan
1970-1971	M.J. Thomson, C.A. Barnes and C.N. Davis
1972-1973	M.J. Thomson, C.A. Barnes and M.J. Applejohn
1974-1975	M.J. Thomson and E.L. Houser
1976-1979	M.J. Thomson and R.J. Sajan
1980	M.J. Thomson and V. Jansons

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TABLE OF CONTENTS (concl.)

INTRODUCTION

This report is a review of significant forest insects and diseases that have been encountered in the Ignace District from 1950 to 1980. The present Ignace District was formed in 1973 from parts of the former Sioux Lookout, Dryden and Kenora districts. In the selection of pests for this report, particular attention was paid to the major working groups of host species in the district, i.e., conifers such as jack pine, white pine, white spruce, black spruce and balsam fir, and tolerant hardwoods such as white birch and poplar, as well as some ornamental and shade trees. The insects and diseases included are capable of causing, or have caused, tree mortality or a reduction in growth. Also included are abiotic problems that cause damage to trees, e.g., frost, wind, hail and winter drying damage.

SUMMARY

FOREST INSECTS

Eastern Blackheaded Budworm, *Acleris variana* (Fern.) [Major]
page 9

No tree mortality has been recorded as caused by this defoliator, which affects primarily spruce, balsam fir and eastern hemlock. In 1965, a small pocket of medium-to-heavy infestation occurred along the Norway Lake Road, approximately 16 km south of Highway 17.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham. [Major]
pages 9-12

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. From 1970 to 1971, moderate-to-severe defoliation occurred in the western portion of the district. In 1972 and 1973, moderate-to-severe defoliation occurred throughout the entire district.

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.) [Major]
pages 10-15

No tree mortality was recorded as caused by this defoliator, which affects primarily aspen and poplar. Medium-to-heavy infestations were reported from 1971 to 1974. Since then, no infestations have occurred.

Spruce Budworm, *Choristoneura fumiferana* (Clem.) [Major]
pages 16-25

The budworm is considered the most destructive insect pest of several coniferous species in eastern Canada, its 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. Moderate-to-severe defoliation occurred from 1952 to 1959. In 1960, the infestation began to decline, however, balsam fir mortality increased.

Jack Pine Budworm, *Choristoneura pinus pinus* Free. [Major]
page 26

This is a destructive pest of pines that can cause mortality after approximately two years of severe defoliation. In 1971, a small pocket of moderate-to-severe defoliation occurred in the Islets Lake area, and trace levels were reported in 1974 at Smirch Lake.

Aspen Twoleaf Tier, *Enargia decolor* (Wlk.) [Major]
page 26

No tree mortality has been recorded as caused by this defoliator, which affects aspen and cottonwood, however, heavy defoliation by this insect retards growth and vigor, leaving host trees susceptible to attack by other pests. Outbreaks of this insect last only a few years. Moderate numbers were reported at Gulliver Lake in 1968, and 15% defoliation occurred in 1969 along the Scotch Lake Road.

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr. [Major]
page 27

This insect usually infests lateral shoots, and causes only aesthetic damage. When large populations develop, some leaders are infested and deformed or killed. Varying degrees of damage were reported periodically between 1963 and 1968 in the Sandbar Lake area and in Corman Township. In 1976, leader damage ranged from 5% to 11% at two locations, and from 1977 to 1980, damage ranged from 3% to 6%.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn. [Major]
page 28-37

This caterpillar is widely distributed throughout North America. Infestations usually last an average of five years, and large populations denude extensive 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 vigor, rendering the host susceptible to attack by other pests. Infestations were reported from 1950 to 1953, from 1961 to 1965 and again in 1978 and 1979.

Sawyer Beetles, *Monochamus* spp. [Major]
page 38

Although sawyer beetles are common and widespread in North America, damage seldom occurs except on decadent trees. However, adults migrating from dead timber and slash have caused varying degrees of damage to healthy stands adjacent to recently harvested areas. In 1955, 90% mortality occurred over 1,500 ha of jack pine. Again in 1964, 1977, and 1979, areas adjacent to cutovers suffered branch and whole-tree mortality.

Balsam Fir Sawfly, *Neodiprion abietis* complex [Major]
page 38

Severe defoliation can cause mortality of balsam fir and white spruce trees when an infestation persists over a period of years. Trace levels were reported in 1977 and 1980.

Pine Sawflies, Red Pine Sawfly, *Neodiprion nanulus nanulus* Schedl.,
Jack Pine Sawfly, *Neodiprion pratti banksianae* Roh.,
Neodiprion swainei Midd., Redheaded Jack Pine Sawfly,
Neodiprion virginianus complex [Major]
page 39

The sawflies listed are capable of causing mortality of semi-mature pine trees and plantations when population levels are high. From 1952 1952 to 1980, population levels of these sawflies were trace to low.

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.) [Major]
pages 39-41

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. Medium-to-heavy infestations occurred from 1950 to 1952, from 1956 to 1959, from 1960 to 1963, from 1970 to 1973, and from 1973 to 1978.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.) [Major]
page 41

This destructive insect is a serious pest of young spruce plantations and open-growing ornamentals. High mortality can occur after successive years of severe defoliation. Trace-to-low populations have been evident over the past 30 years.

White Pine Weevil, *Pissodes strobi* (Peck.) [Major]
pages 42-43

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. Varying degrees of damage have occurred over the past 30 years. In 1972, 17% of jack pine leaders were weeviled at one location along the Basket Lake Road.

Larch Sawfly, *Pristiphora erichsonii* (Htg.) [Major]
pages 43-45

The larch sawfly is the primary defoliating insect of native and of 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. Population levels of this sawfly fluctuated between 1950 and 1980, and the sawfly was found throughout the district.

Aspen Leafroller, *Pseudexentera oregonana* Wlshm. [Major]
page 45

No tree mortality caused by this defoliator, which feeds almost exclusively on trembling aspen, has been recorded. One small pocket was reported in the central part of the district in 1978.

Other Noteworthy Insects [Major and Minor]
pages 46-51

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

FOREST DISEASES

Armillaria Root Rot, *Armillaria mellea* (Vahl:Fr.) Kummer [Major]
page 55

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. Varying degrees of damage were reported periodically in the district from 1956 to 1980.

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard
pages 55-56 [Major]

This destructive pathogen of young planted pines or natural regeneration was first reported in the district in 1966. In 1980, 63% of all trees showed signs of infection in the Gulliver River area.

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary, [Major]
C. ledicola (Peck) Lagerh.
pages 56-57

These rusts, the most widely spread in the Canadian boreal forest, are of concern on mature trees, but the potential for damage in nurseries can be high as well. Pockets of medium-to-heavy infection occurred from 1955 to 1965.

Ink Spot of Aspen, *Ciborinia whetzelii* (Seaver) Seaver [Major]
page 58

The 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 perhaps even kill regeneration. Damage in the 30 years covered by this report did not exceed 6%.

Western Gall Rust, *Endocronartium harknessii* (J.P. Moore) Y. Hirats. [Major]
pages 58-59

This pathogen infects trees in all age classes; however, serious damage generally occurs only in small-diameter regeneration trees in stands or plantations. When stems are girdled by the gall, partial or whole-tree mortality results. Varying degrees of infection have been reported since 1955, with 30% of trees affected in 1966 at Sandbar Lake.

Hypoxylon Canker, *Hypoxylon mammatum* (Wahlenb.) J. Miller [Major]
page 60

Mortality caused by this disease is usually restricted to trees in the 7-cm to 13-cm diameter class growing on poor sites, but branch and top mortality may occur in trees of greater diameter. Infected trees are common in most stands throughout the district.

Shoot Blight, *Venturia macularis* (Fr.) E. Müller & v. Arx [Major]
pages 60-61

This foliar and shoot disease is particularly damaging to leaders of aspen regeneration, causing retarded height growth and clubbed tops. Varying degrees of damage have been reported since 1952.

Other Noteworthy Diseases
pages 61-64

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

ABIOTIC DAMAGE
pages 67-68

Abiotic damage is caused by a variety of conditions, such as frost, winter drying, salt, etc. Weakened trees are susceptible to a number of diseases. Abiotic damage has been reported periodically since 1962.

INSECTS

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

Host(s): spruce, balsam fir [Major]

Year	Remarks
1950-1953	not reported
1954	trace population levels on Highway 599
1955-1959	not reported
1960-1961	trace population levels
1962	trace population levels, Cathcart Township
1963	light infestation, Sturgeon Lake
1964	Light infestations were recorded at several locations.
1965	A small pocket of medium-to-heavy infestations was recorded along the Norway Lake Road, approximately 16 km south of Highway 17; elsewhere, populations declined.
1966	trace population levels at numerous locations
1967-1973	not recorded
1974	Light defoliation occurred on black spruce through much of the district, particularly along rivers and lakeshores.
1975-1980	not reported

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

Host(s): birch [Major]

Year	Remarks
1950-1956	not reported
1957	A light infestation was reported at Raleigh Lake.
1958-1969	not reported
1970-1971	Moderate-to-severe defoliation occurred over the western three-quarters of the district (see map, page 11).

(cont'd)

Birch Skeletonizer, *Bucculatrix canadensisella* Cham. (concl.)

Host(s): birch [Major]

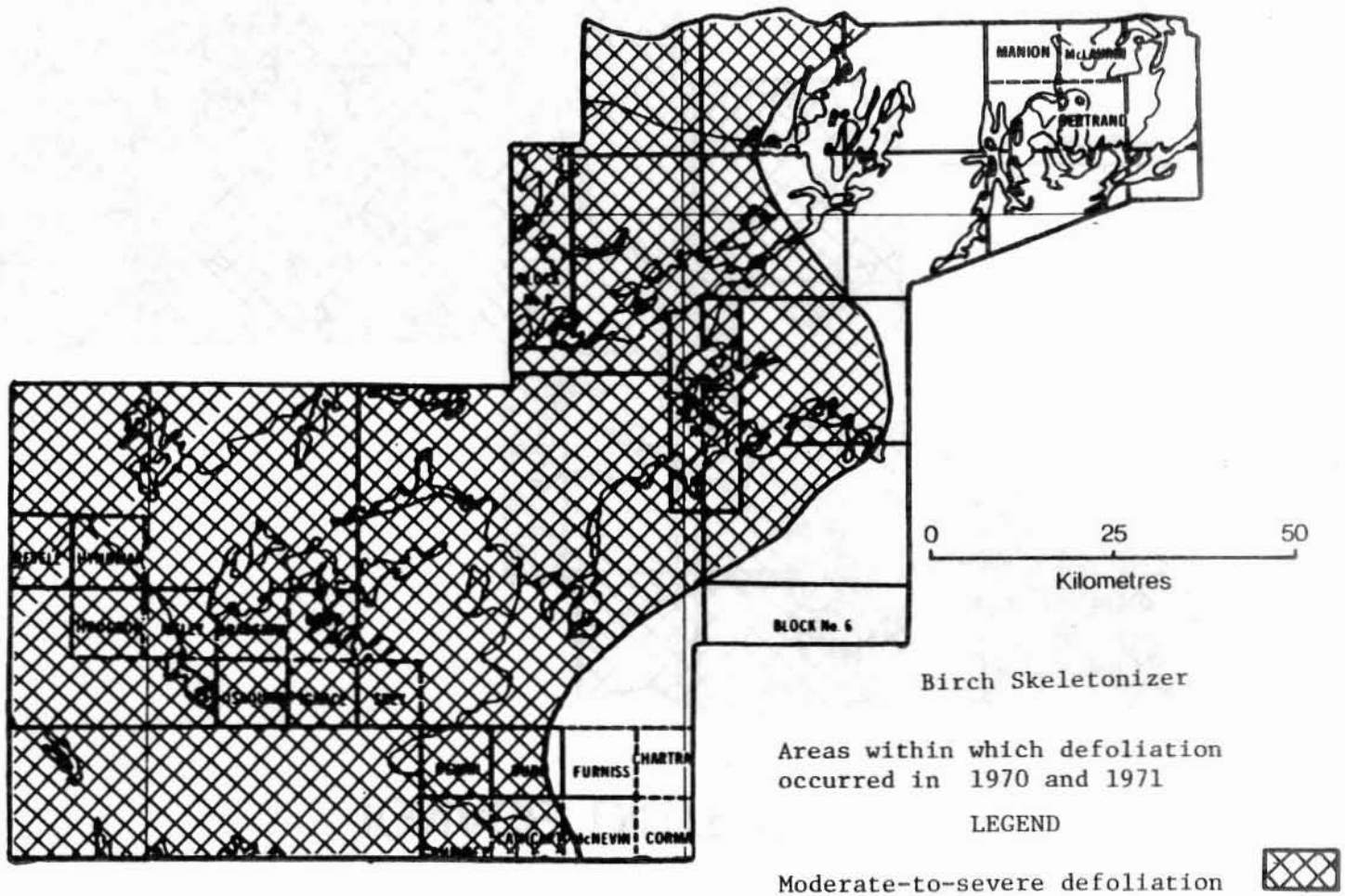
Year	Remarks
1972-1973	Moderate-to-severe defoliation occurred throughout the entire district (see map, page 12).
1974	The infestation collapsed.
1975-1980	not reported

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

Host(s): poplar [Major]

Year	Remarks
1950-1963	not reported
1964	trace population levels
1965-1970	not reported
1971	Moderate-to-severe defoliation occurred over much of Dewan and Grummett townships and in the Shikag Lake area (see map, page 13).
1972	The area of moderate-to-severe damage expanded and included most of the southeastern half of the district (see map, page 14).
1973	Moderate-to-severe defoliation persisted in the southeastern part of the district (see map, page 15).
1974	A small area of moderate-to-severe defoliation was reported northeast of Sowden Lake.
1975-1980	not reported

IGNACE DISTRICT



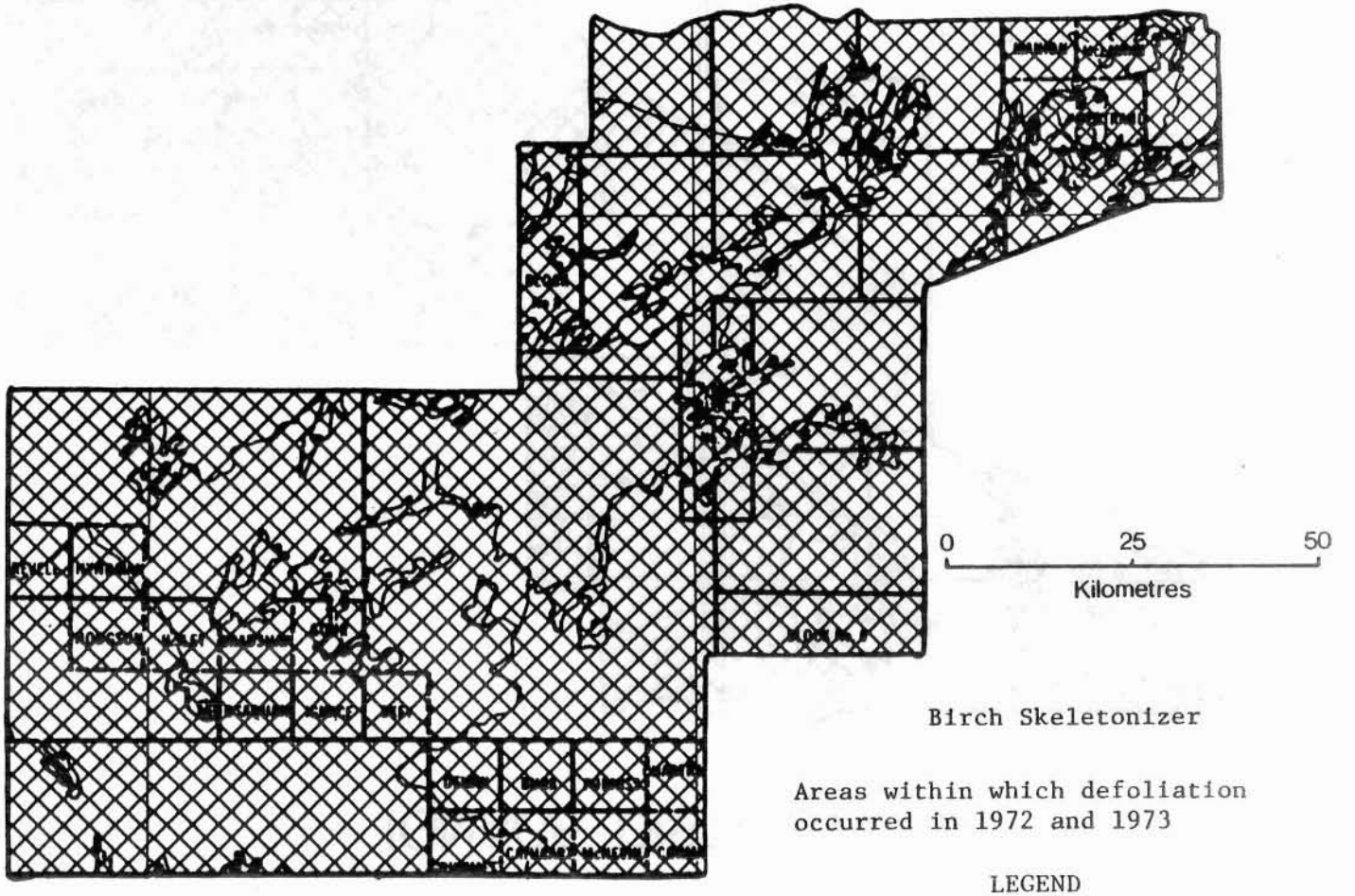
Birch Skeletonizer

Areas within which defoliation occurred in 1970 and 1971

LEGEND

Moderate-to-severe defoliation

IGNACE DISTRICT



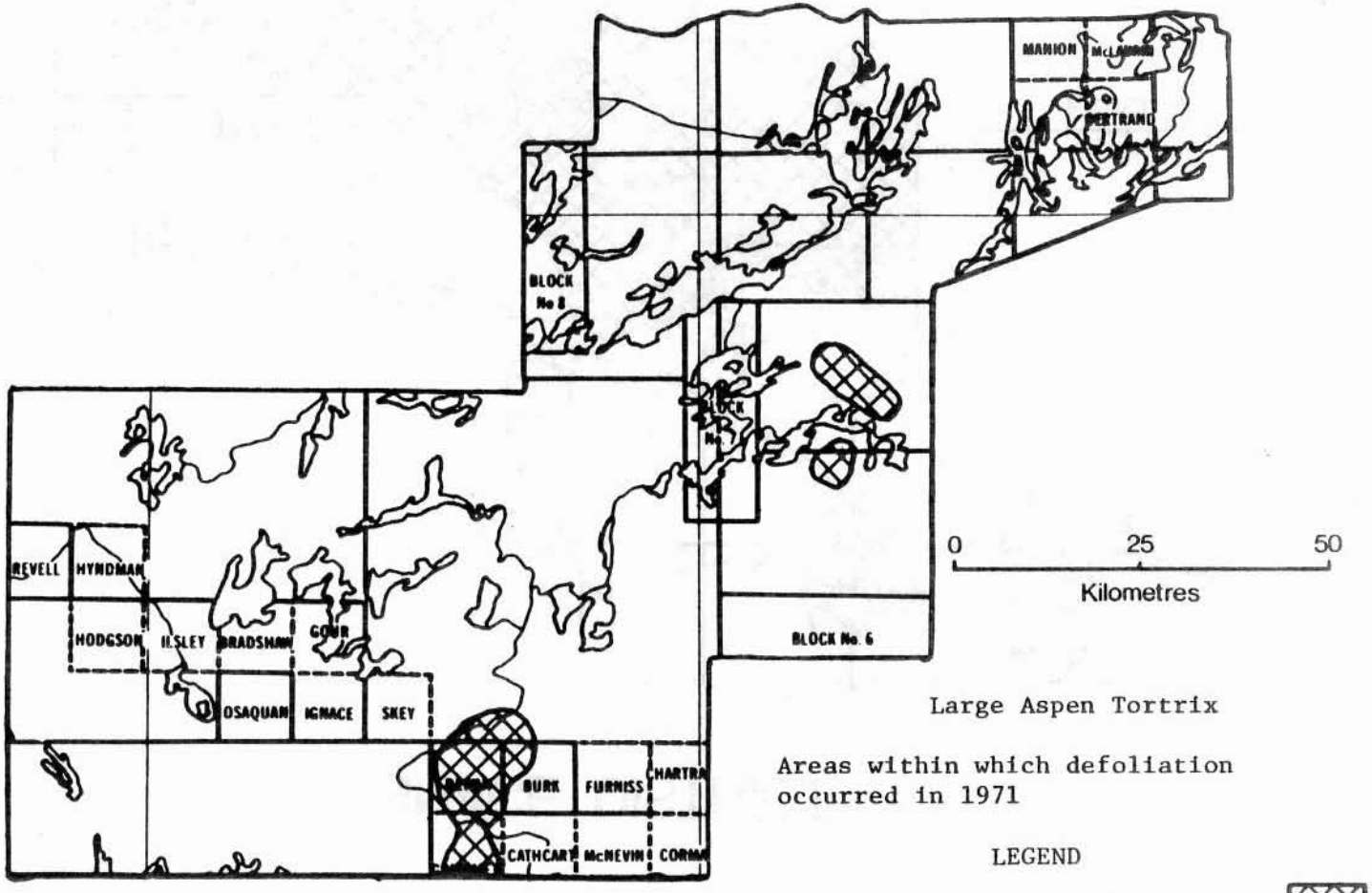
Birch Skeletonizer

Areas within which defoliation occurred in 1972 and 1973

LEGEND

Moderate-to-severe defoliation

IGNACE DISTRICT



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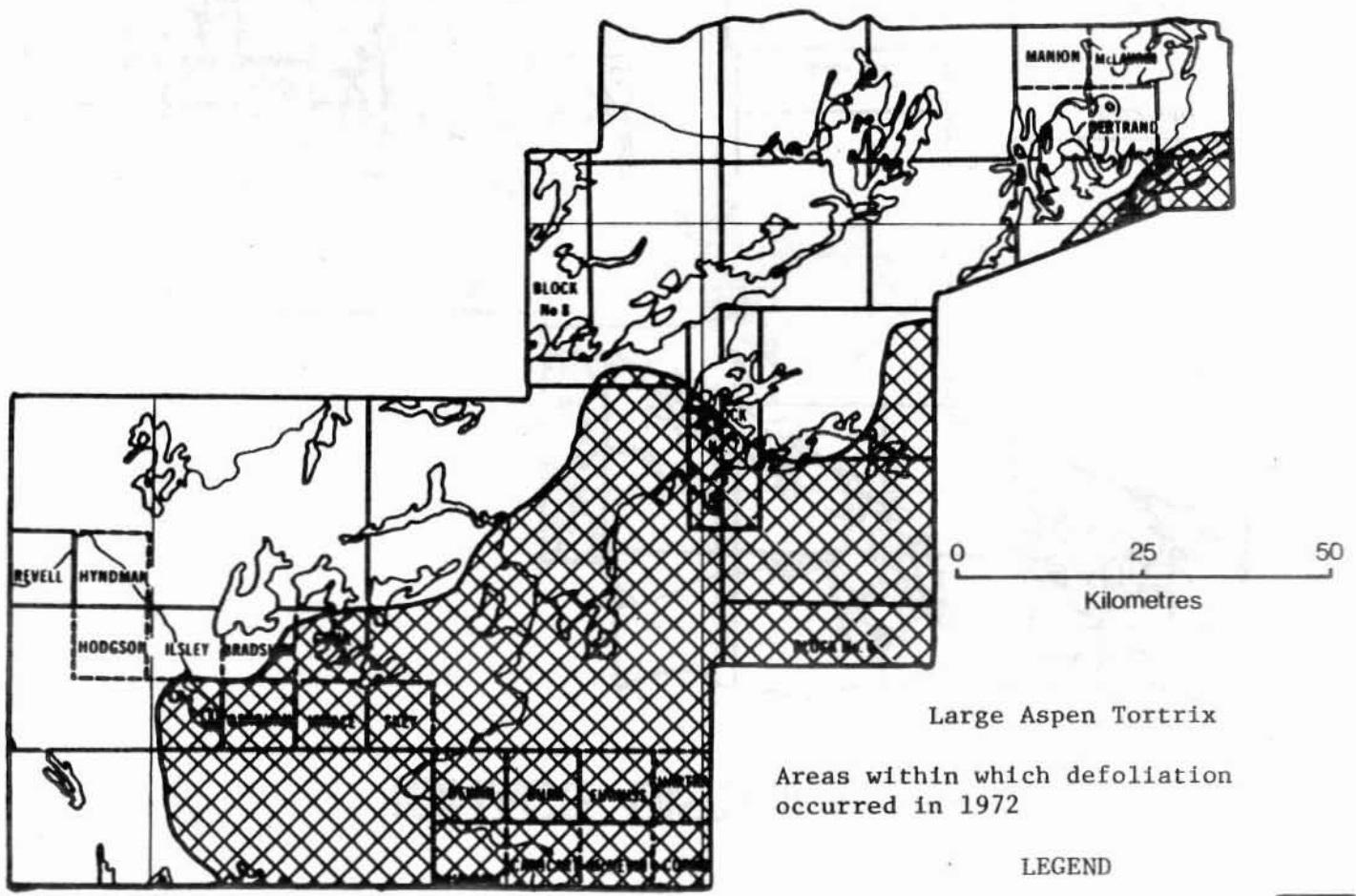


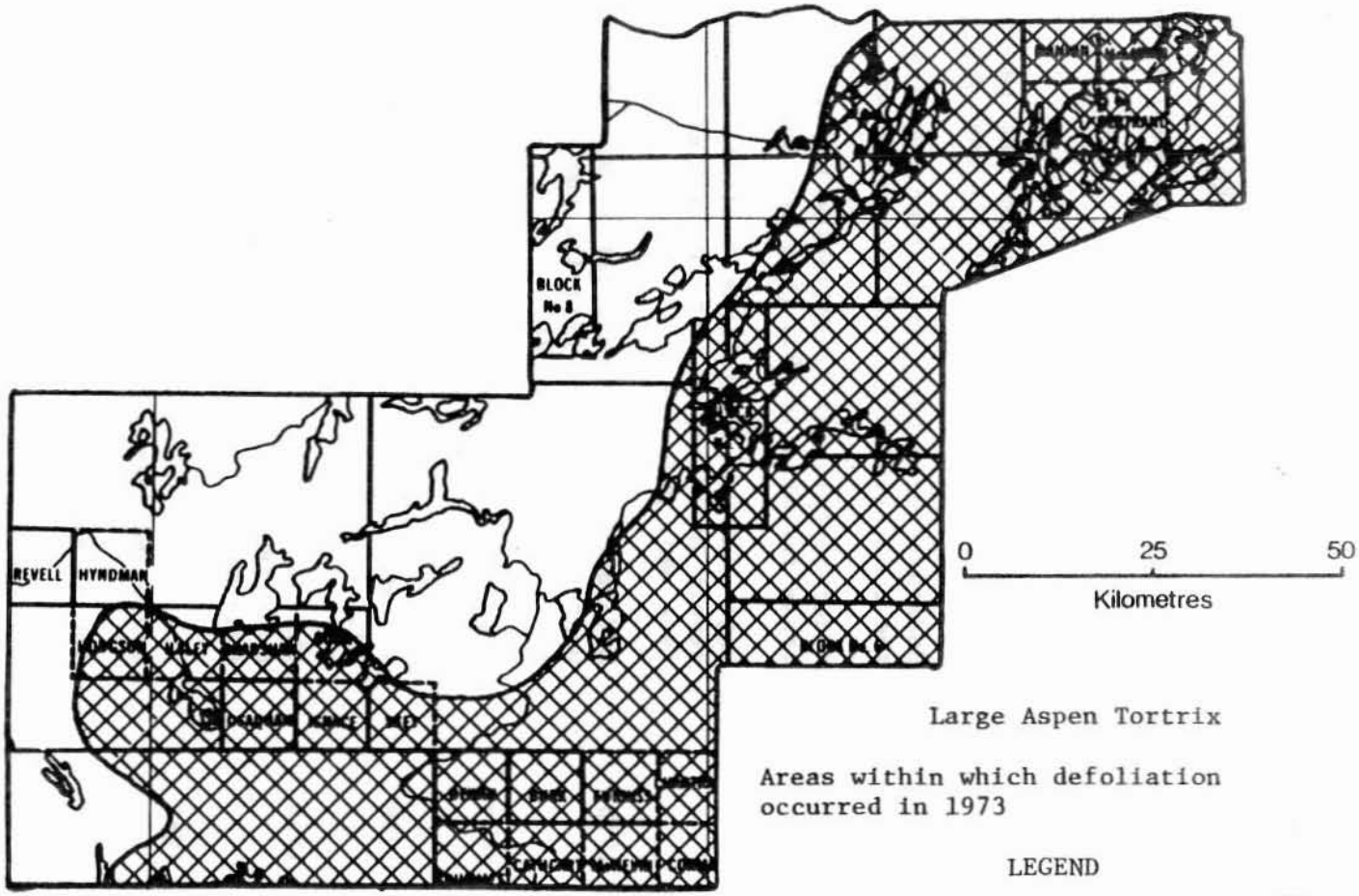
Large Aspen Tortrix

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation

IGNACE DISTRICT



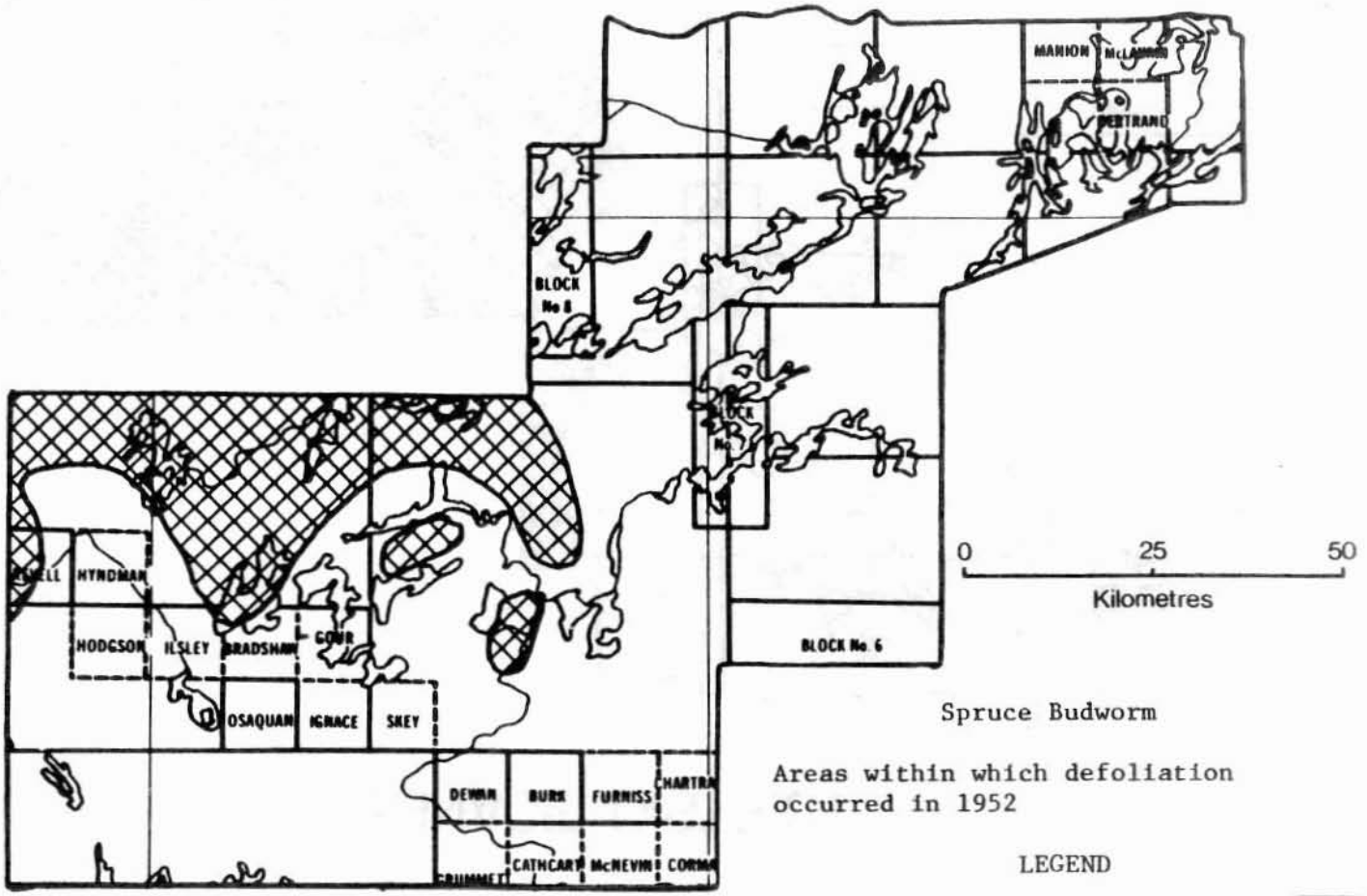
Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Host(s): spruce, balsam fir [Major]

Year	Remarks
1950	One location in Ignace Township experienced a light infestation.
1951	not reported
1952	Moderate-to-severe defoliation was general in the northwestern section of the district (see map, page 17).
1953	Moderate-to-severe defoliation recurred in approximately the same area as in 1952 (see map, page 18).
1954	Moderate-to-severe defoliation was again present in those areas infested in 1953 (see map, page 19).
1955	High budworm populations continued to cause moderate-to-severe defoliation over the western part of the district (see map, page 20).
1956	Moderate-to-severe defoliation was general over the northwestern part of the district and in the south-central section (see map, page 21).
1957	Little change in the boundaries or intensity of infestation occurred in 1957 (see map, page 22).
1958	Infestations occurred over the same areas defoliated in 1957 (see map, page 23).
1959	The area covered by the infestation decreased sharply, but a large area of moderate-to-severe defoliation persisted (see map, page 24).
1960	The infestation continued to decline, but tree mortality increased (see map, page 25).
1961	low numbers in the Sturgeon Lake area
1962-1963	not reported
1964-1969	trace population levels
1970-1974	not reported

(cont'd)

IGNACE DISTRICT



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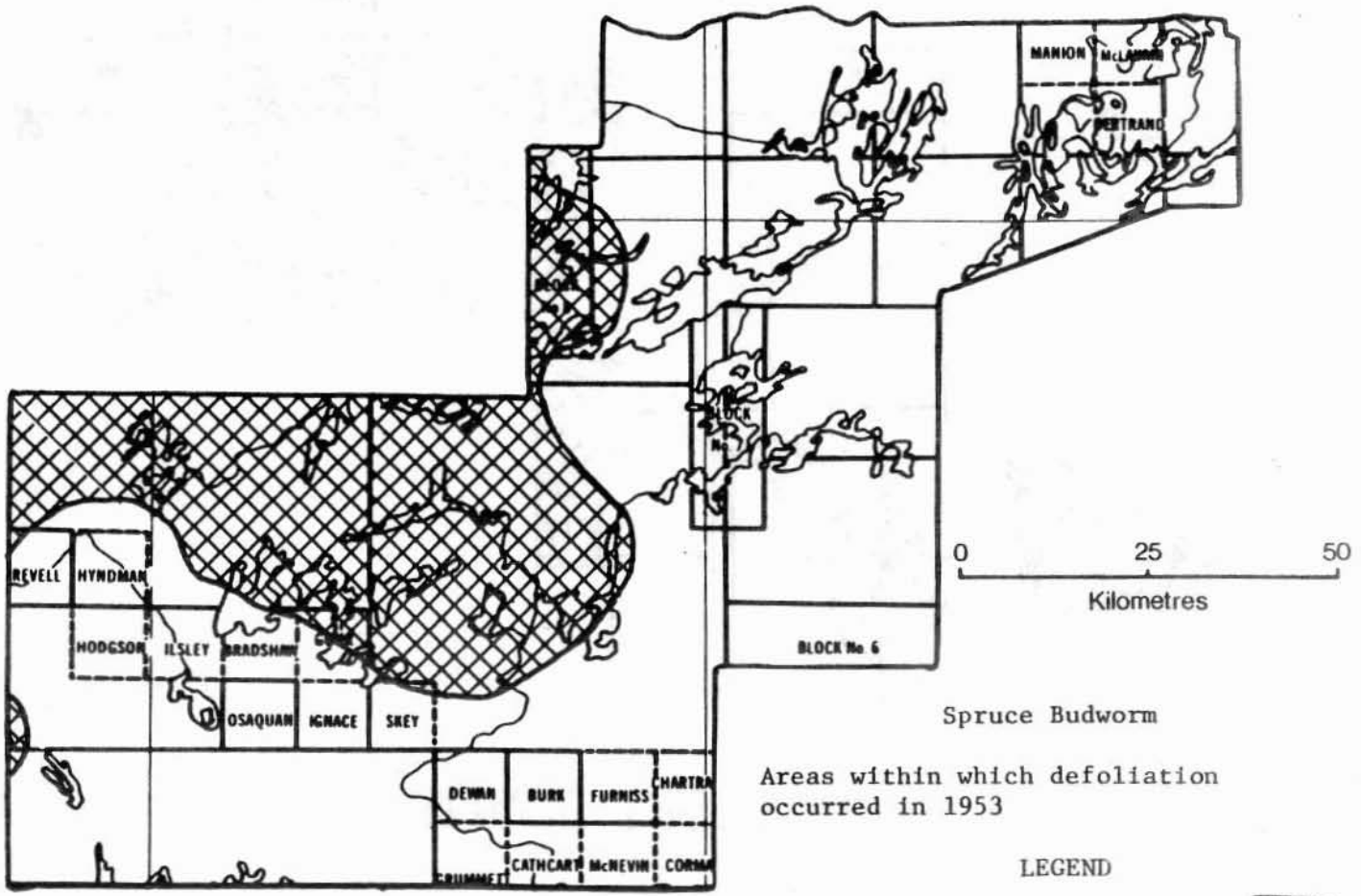


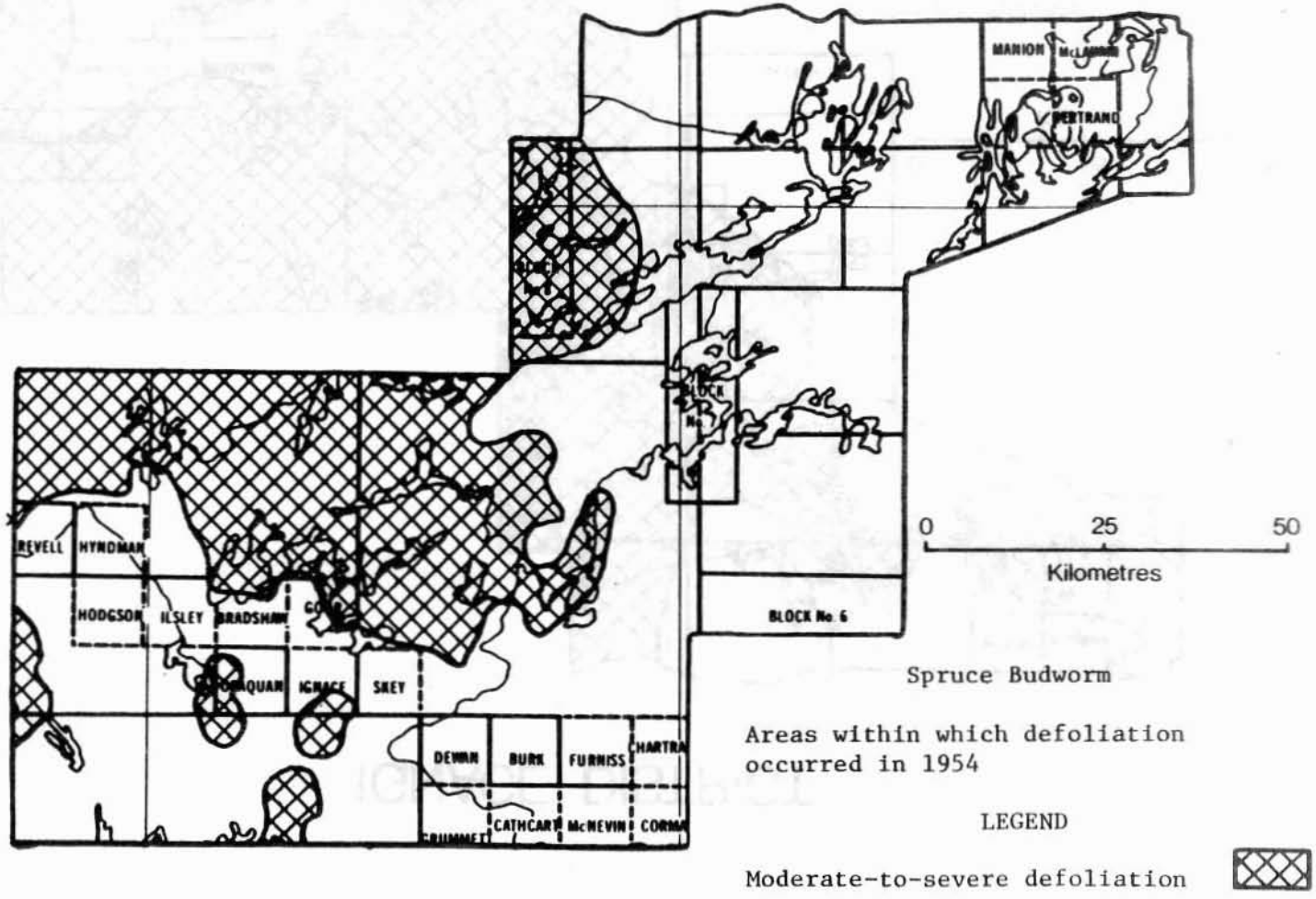
Spruce Budworm

Areas within which defoliation occurred in 1953

LEGEND

Moderate-to-severe defoliation

IGNACE DISTRICT



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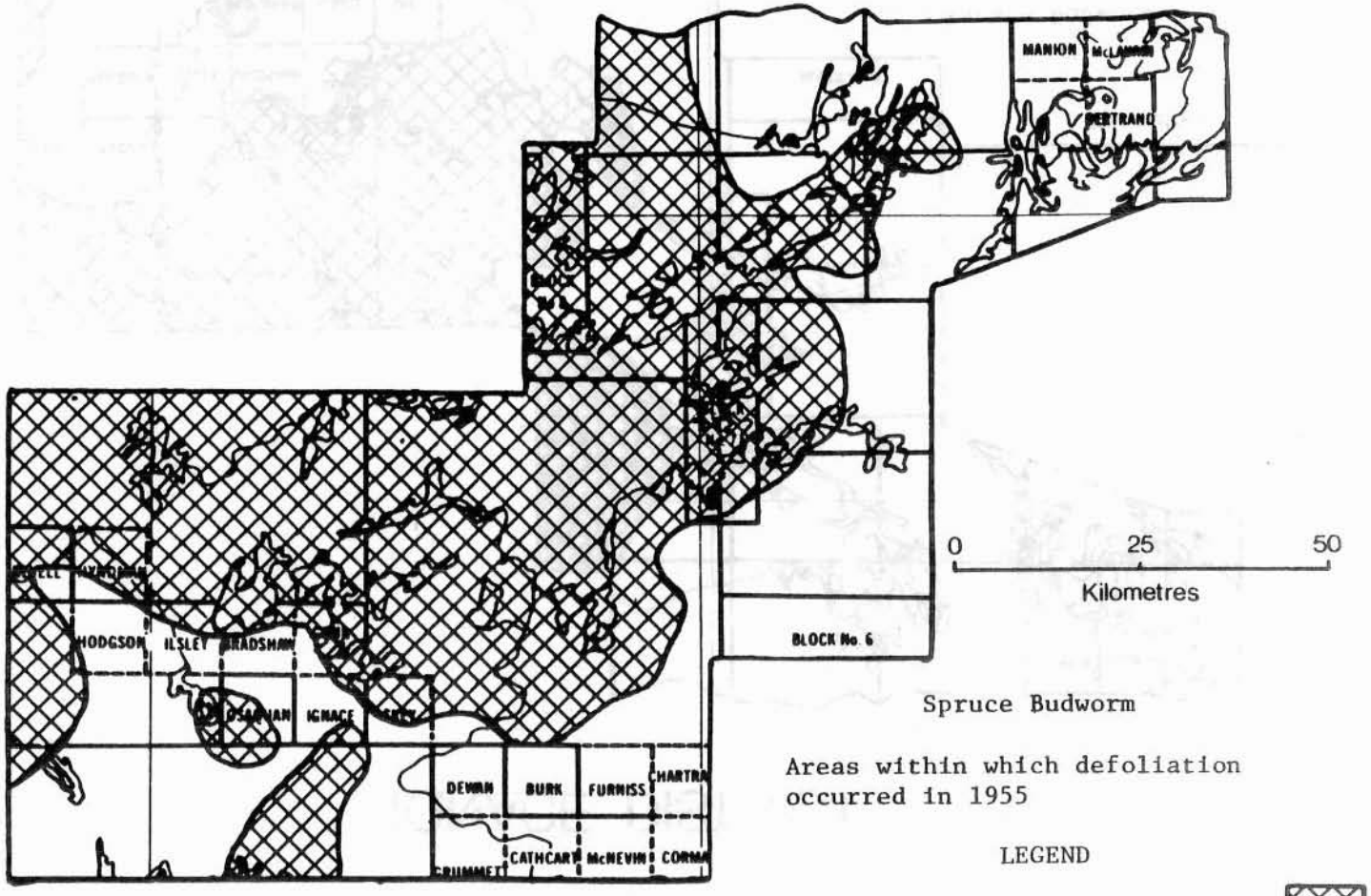


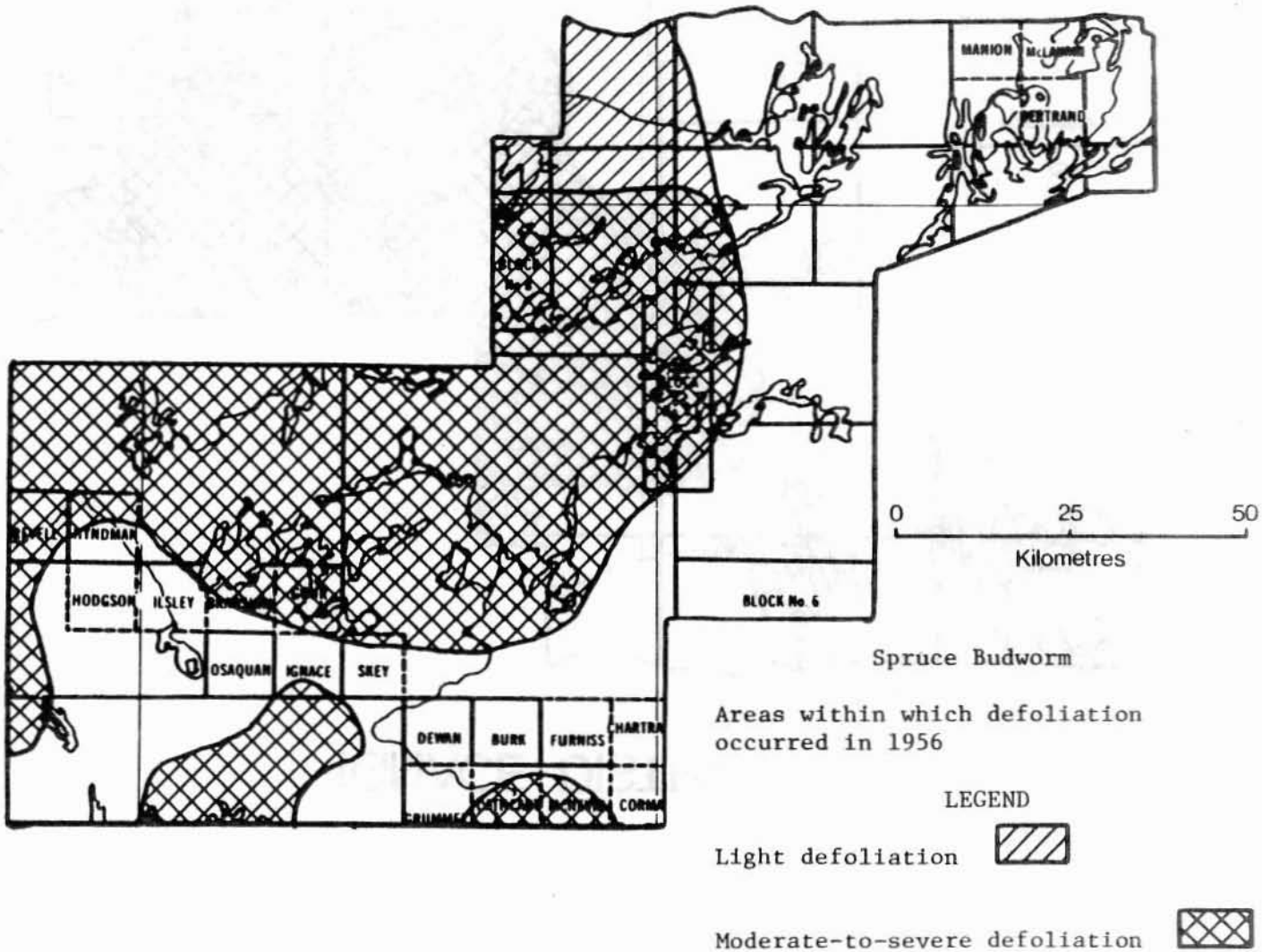
Spruce Budworm

Areas within which defoliation occurred in 1955

LEGEND

Moderate-to-severe defoliation

IGNACE DISTRICT



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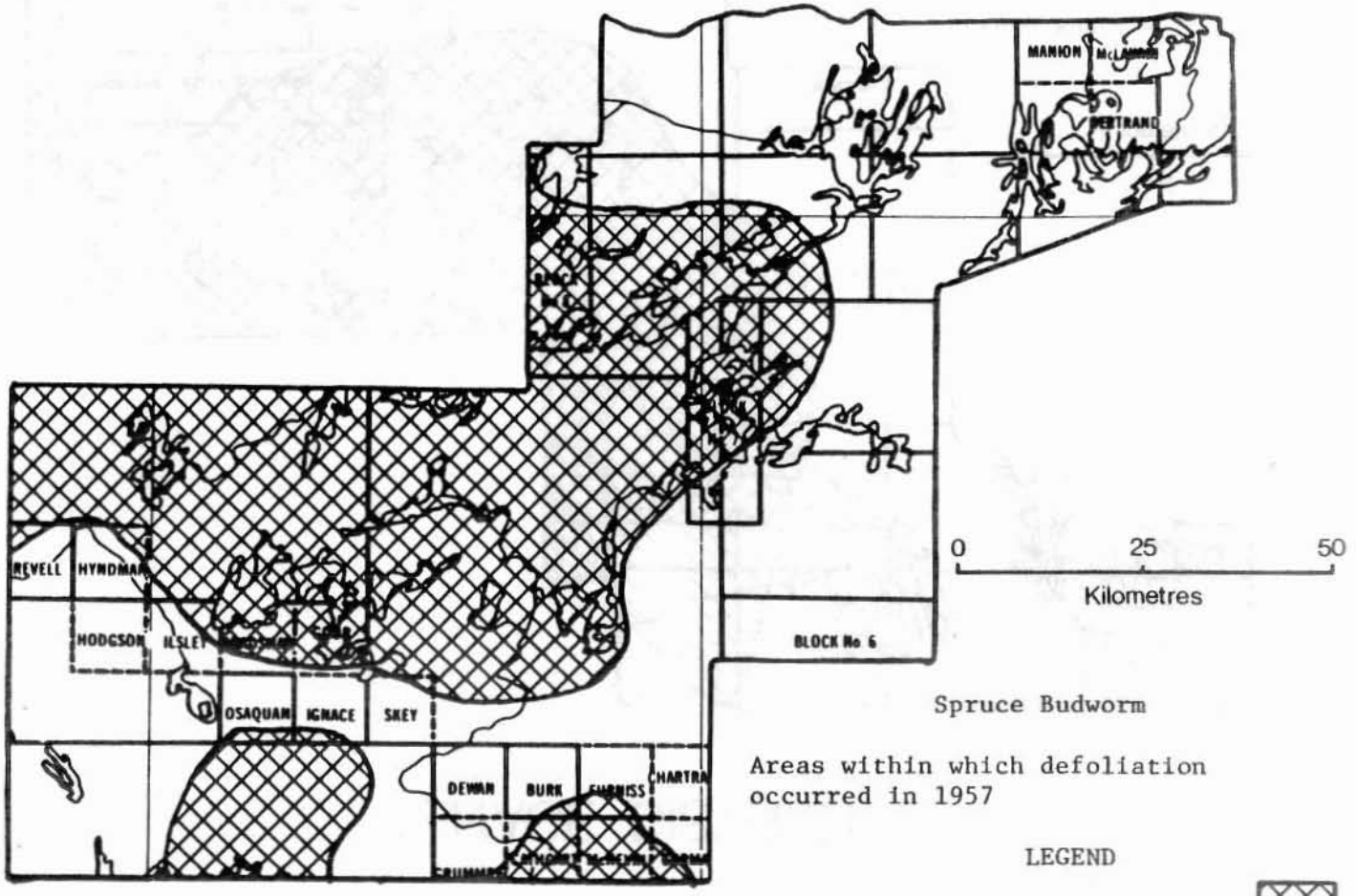


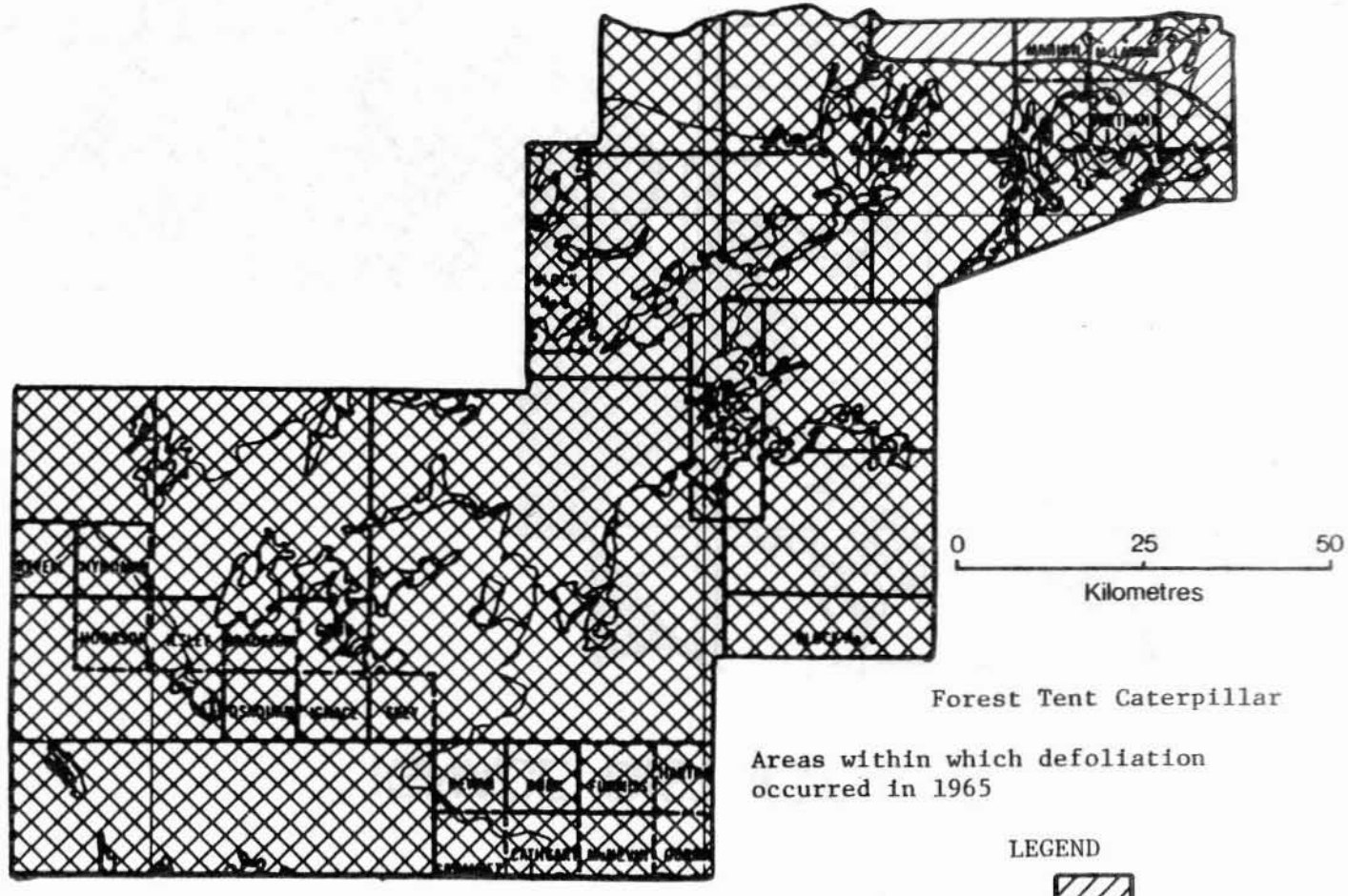
Spruce Budworm

Areas within which defoliation occurred in 1957

LEGEND

Moderate-to-severe defoliation

IGNACE DISTRICT



Forest Tent Caterpillar

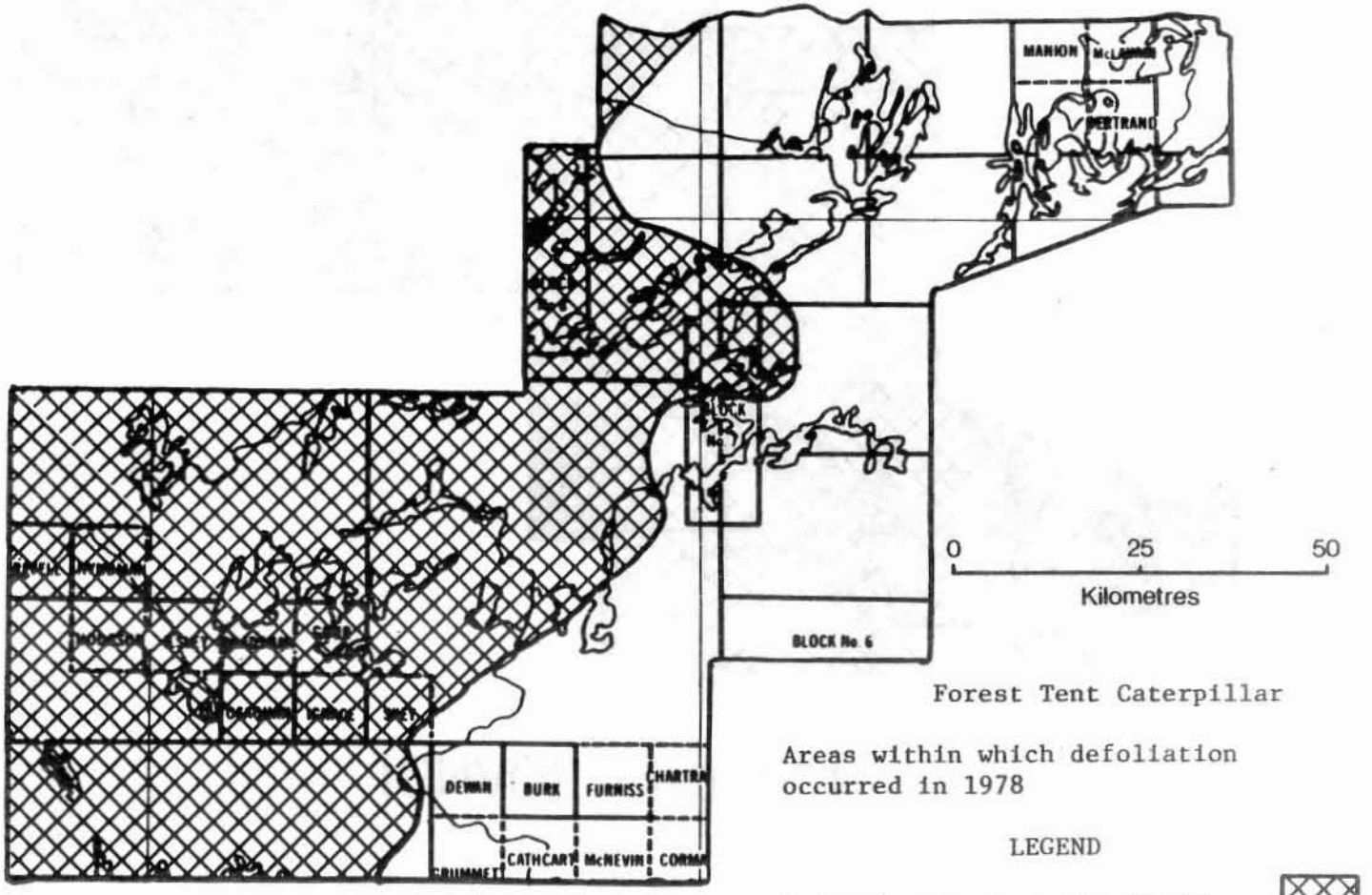
Areas within which defoliation occurred in 1965

LEGEND

Light defoliation

Moderate-to-severe defoliation

IGNACE DISTRICT



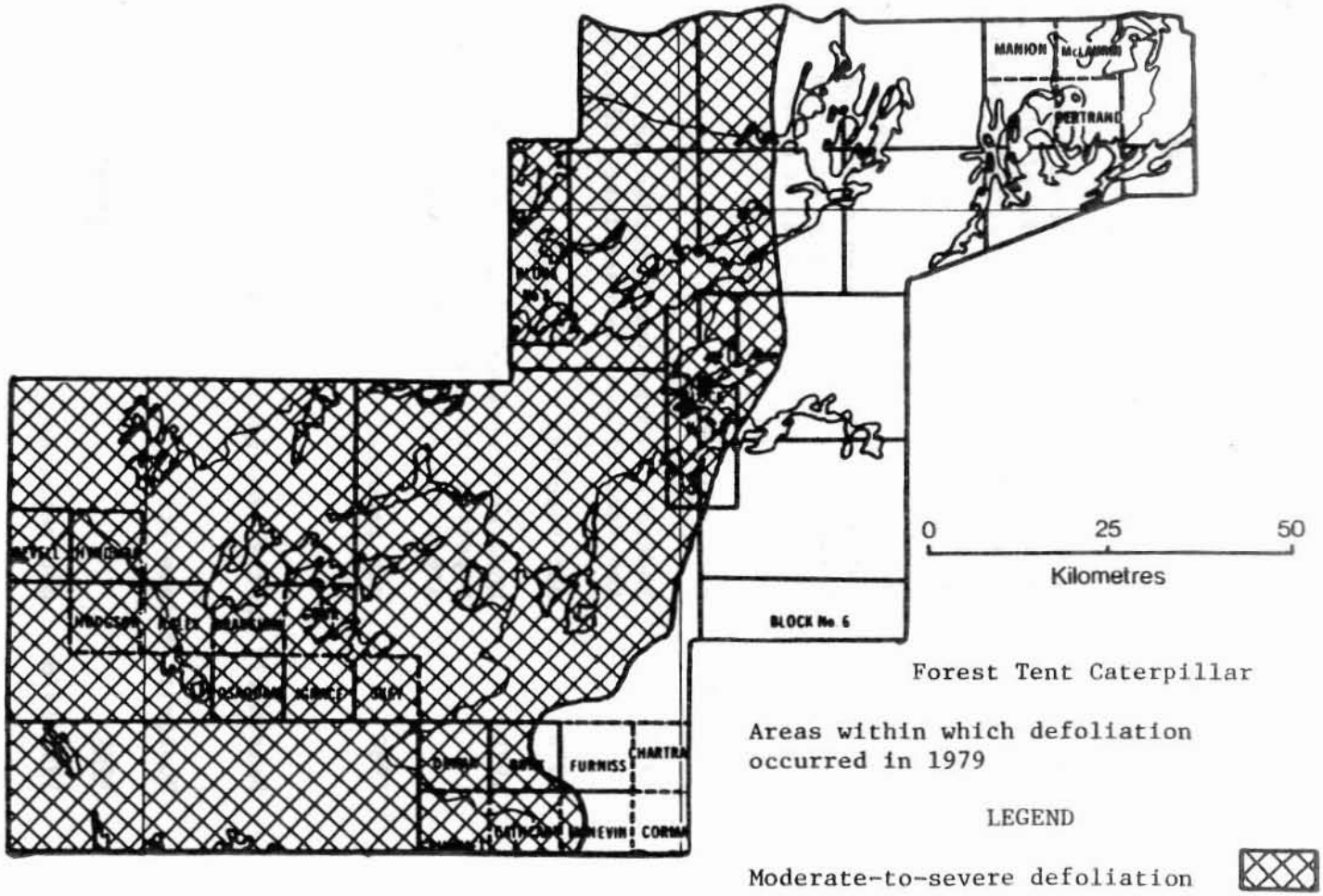
Forest Tent Caterpillar

Areas within which defoliation occurred in 1978

LEGEND

Moderate-to-severe defoliation

IGNACE DISTRICT



Forest Tent Caterpillar

Areas within which defoliation occurred in 1979

LEGEND

Moderate-to-severe defoliation

Sawyer Beetles, *Monochamus* spp.

Host(s): conifers [Major]

Year	Remarks
1950-1954	not reported
1955	A medium-to-heavy infestation caused up to 90% mortality of jack pine trees with a DBH of 10 cm in 1,500 ha of forest adjacent to a recently cut-over area south of Bonheur.
1956-1963	not reported
1964	Jack pine trees adjacent to 1963 and 1964 cut-over areas north of Ignace suffered branch and whole-tree mortality as a result of feeding damage caused by adult beetles. Balsam fir, tamarack and black spruce were also damaged, but to a lesser degree.
1965-1976	not reported
1977	Moderate damage was recorded in a pure jack pine stand on the west side of Vanessa Lake, adjacent to cut-over areas.
1978	not reported
1979	Moderate-to-severe damage resulting from adult feeding was reported in forests adjacent to cutovers in the Sowden Lake area, and approximately 48 km south of Savant Lake.
1980	not reported

Balsam Fir Sawfly, *Neodiprion abietis* complex

Host(s): balsam fir [Major]

Year	Remarks
1950-1976	not reported
1977	Trace population levels were recorded at several points along Highway 599, south of the English River.
1978-1979	not reported
1980	trace population levels at Smirch Lake

Pine Sawflies, *Neodiprion nanulus nanulus* Schedl., *N. pratti banksianae* Roh., *N. swainei* Midd., *N. virginianus* complex

Host(s): pine [Major]

Year	Remarks
1950-1951	not reported
1952-1953	*N. nanulus nanulus* - trace populations
1954-1955	not reported
1956	Light infestations of *N. nanulus nanulus* were reported at Dibble and Lower Scotch lakes.
1957	*N. virginianus* - trace populations
1958-1975	not reported
1976	Scattered colonies of *N. virginianus* were reported on fringe trees along Highway 17, at the English River.
1977-1979	not reported
1980	Low numbers of *N. virginianus* were reported in Corman Township.

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

Host(s): trembling aspen [Major]

Year	Remarks
1950	Medium-to-heavy infestations were common throughout the district.
1951-1952	Medium-to-heavy infestations were found in all stands that escaped defoliation by the forest tent caterpillar.
1953	Severe frost caused the infestation to collapse.
1954	not reported
1955	Low numbers were recorded in Corman and Skey townships and at Tabor Lake.

(cont'd)

Aspen Leafblotch Miner, *Phyllonorycter ontario* (Free.) (cont'd)

Host(s): trembling aspen [Major]

Year	Remarks
1956	Medium-to-heavy infestations occurred on aspen reproduction at Bending and Wapegeisi lakes.
1957	Infestations recurred at approximately the same levels and at the same locations as in 1956. Lightly infested trees were observed in Bradshaw and Skey townships.
1958	One small area of medium-to-heavy infestation persisted north of White Otter Lake.
1959	trace population levels
1960	Moderate populations occurred near Gulliver Lake.
1961	Medium-to-heavy infestations recurred near Gulliver Lake.
1962	Medium-to-heavy infestations recurred near Gulliver Lake; noticeable damage was also recorded in Revell, Corman and Gour townships.
1963	Moderate populations were reported at Gulliver Lake.
1964	trace population levels
1965	not reported
1966-1967	trace population levels
1968-1969	not reported
1970	Medium-to-heavy infestations were reported near Gulliver River and Ignace.
1971	High numbers of leafblotch miners occurred on fringe trees west of English River, where more than 90% of the leaves were mined over a large area of affected forest.
1972	Small pockets of large populations occurred at several locations.
1973	Medium-to-heavy infestations were reported throughout the southern half of the district.

(cont'd)

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

Host(s): trembling aspen [Major]

Year	Remarks
1974	Populations were reduced to low levels.
1975	Small pockets of moderate-to-severe defoliation occurred near Martin Siding.
1976-1978	Medium-to-heavy infestations occurred at several locations in the southern half of the district.
1979	low populations
1980	High numbers of leafblotch miners occurred along roadsides north of Martin Siding.

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

Host(s): spruce [Major]

Year	Remarks
1950-1957	not reported
1958	Lightly defoliated roadside trees were reported in Ignace Township.
1959-1971	not reported
1972-1974	trace population levels
1975	not reported
1976	Low population levels occurred in the Watcomb Lake area.
1977	Light defoliation occurred at Raven Lake in Burk Township.
1978	Low populations were reported at two locations.
1979	low populations
1980	not reported

White Pine Weevil, *Pissodes strobi* (Peck)

Host(s): pine, spruce [Major]

Year	Remarks
1950-1955	not reported
1956	trace population levels
1957-1960	not reported
1961	Leader damage in McNevin Township was reported on 8% of jack pine regeneration.
1962	Damage in McNevin Township was reduced to 6% weeviling.
1963	trace populations, Corman Township
1964	From 2% to 6% of the leaders were damaged on jack pine regeneration at four locations.
1965	The proportion of weeviled trees ranged from 2% to 10% at five locations; the heaviest damage occurred in Ignace Township.
1966	Leader damage occurred in 3% to 15% of all trees at four locations, but was heaviest at Sandbar Lake Provincial Park.
1967	Damage declined; leader damage was evident in 1% to 7% of all trees at three locations.
1968	Leader mortality ranged from 3% to 9% at three locations.
1969	A high of 7% of all trees showed leader damage in Ignace Township.
1970	Seventeen percent of jack pine trees showed leader damage along the Basket Lake Road.
1971	Damage was reduced; 7% of the trees along the Basket Lake Road were affected.
1972	Seventeen percent of the trees on the Basket Lake Road were weeviled.
1973	Damage declined; 7% of all leaders were affected on the Basket Lake Road.

(cont'd)

White Pine Weevil, *Pissodes strobi* (Peck) (concl.)

Host(s): pine, spruce [Major]

Year	Remarks
1974	Leader damage occurred on 2%-9% of jack pine regeneration at five locations.
1975	Leader damage occurred on 1%-6% of all trees at five surveyed locations.
1976-1977	An average of 4% of trees experienced weeviling at four locations.
1978	Damage decreased; an average of 2% of the trees had affected leaders.
1979-1980	trace population levels

Larch Sawfly, *Pristiphora erichsonii* (Htg.)

Host(s): larch [Major]

Year	Remarks
1950	Moderate-to-severe defoliation, affecting up to 70% of the trees in a stand, was general throughout the central part of the district.
1951	Pockets of medium-to-heavy infestation were evident throughout the district. Defoliation averaged 65%.
1952	Populations declined to moderate levels in numerous infested areas.
1953	Moderate-to-severe defoliation occurred at most locations; defoliation averaged 75%.
1954	Populations declined to low numbers, except in the north-eastern part of the district, where moderate-to-severe defoliation occurred in six places.
1955	A further decline in population levels occurred. Light defoliation was recorded at several locations.

(cont'd)

Larch Sawfly, *Pristiphora erichsonii* (Htg.) (cont'd)

Host(s): larch [Major]

Year	Remarks
1956	Population levels continued to decline, although light defoliation persisted in several areas, and moderate numbers of sawflies were found in small stands throughout the district.
1957	Medium-to-heavy infestations occurred at four points in the southwestern part of the district.
1958	Several pockets of moderate-to-severe defoliation occurred throughout the central part of the district.
1959	Medium-to-heavy infestations occurred around Gulliver and Scotch lakes.
1960	Medium-to-heavy infestations were observed at several locations along Highway 17 west of English River.
1961	Light infestations were general throughout the district.
1962	trace populations
1963-1964	Light infestations occurred in Corman and Cathcart townships.
1965	Pockets of medium-to-heavy infestation were found southeast of Sturgeon Lake and near the town of Ignace.
1966-1967	Population levels continued to increase. Moderate-to-severe defoliation occurred at several locations, particularly along Highway 17, east and west of Ignace.
1968	Moderate numbers of sawflies were reported at three locations west of Ignace.
1969	Moderate numbers of sawflies were reported near Ignace, where defoliation averaged 30% per stand.
1970	Numerous stands in the Sturgeon Lake area were moderately to severely defoliated.
1971	Moderate-to-severe defoliation occurred at scattered locations.

(cont'd)

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

Host(s): larch [Major]

Year	Remarks
1972	Populations declined to low levels.
1973	Only scattered colonies were observed.
1974	Approximately 50% defoliation occurred at four points in the Sowden and Goshen lakes area.
1975	Heavily damaged stands, where defoliation averaged 80%, were mapped in the Goshen and Sowden lakes area.
1976	Populations declined, leaving only scattered colonies.
1977	trace population levels
1978	Scattered colonies were found along Highway 17, from Revell Township to Ignace Township, and along Highway 599, from Ignace to Sturgeon Lake.
1979	Small pockets of moderate-to-severe defoliation were found at Young Lake and in Ignace Township.
1980	Small pockets of tamarack, ranging from 2.5 to 5.0 ha in size, experienced moderate-to-severe defoliation.

Aspen Leafroller, *Pseudexentera oregonana* Wlshm.

Host(s): trembling aspen

Year	Remarks
1950-1977	not reported
1978	One small pocket of light defoliation occurred in the central part of the district.
1979	trace population levels
1980	Small populations were reported at Sandbar Lake Provincial Park.

Other Noteworthy Insects

Jack Pine Resin Midge, *Cecidomyia resinicola* (O.S.) (= *reeksi* (Vock.)

Host(s): jack pine [Minor]

Year	Remarks
1950-1972	not reported
1973	Medium infestations were recorded on regeneration near Tache Crossing in Revell Township.
1974	Damage decreased in the Basket Lake area.
1975-1980	not reported

Jack Pine Tip Beetle, *Conophthorus banksianae* McP.

Host(s): jack pine [Minor]

Year	Remarks
1950-1959	not reported
1960	trace population levels
1961-1962	not reported
1963-1964	trace population levels
1965	Thirty-eight percent of jack pine were attacked in Revell Township.
1966	The percentage of trees affected increased to 48% in Revell Township.
1967	Damage increased in Revell Township, where 67% of trees were affected.
1968	Fifty-three percent of the trees in Revell Township were affected.
1969	low numbers
1970	Light infestations were reported south of Valora.

(cont'd)

Jack Pine Tip Beetle, *Conophthorus banksianae* McP. (concl.)

Host(s): jack pine [Minor]

Year	Remarks
1971-1973	not reported
1974	One percent of trees showed leader damage near Martin Siding in McNevin Township.
1975	Two percent of trees showed leader damage near Martin Siding and at Molzan Lake.
1976-1980	not reported

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

Host(s): larch [Major]

Year	Remarks
1950-1956	not reported
1957	Small numbers were reported at Sturgeon Lake.
1958-1963	not reported
1964-1965	Large numbers were reported in Dewan Township on beating tray samples.
1966	Trace numbers were reported in Dewan Township.
1967	not reported
1968	trace population levels
1969-1980	not reported

Northern Pitch Twig Moth, *Petrova albicapitana* (Busck)

Host(s): jack pine [Minor]

Year	Remarks
1950-1954	not reported
1955	Small numbers were reported at Mameigwess and Indian lakes.
1956	not reported
1957-1958	trace population levels
1959	not reported
1960-1964	trace population levels
1965-1966	not reported
1967	Populations increased, and as many as 27% of the trees were attacked in Corman Township.
1968	not reported
1969	Forty percent of jack pine were infested in Cathcart and McNevin townships.
1970	trace population levels
1971-1974	not reported
1975	trace population levels
1976-1977	The twig moth was widely distributed throughout the district.
1978	not reported
1979-1980	small numbers

Spruce Bud Midge, *Rhabdophaga swainei* Felt

Host(s): spruce [Minor]

Year	Remarks
1950-1962	not reported
1963	2% of terminal buds damaged in Corman Township
1964	2% of terminal buds damaged in Osaquan Township
1965	4% of terminal buds damaged in Hodgson Township
1966	42% of terminal buds damaged at one location north of Ignace
1967-1980	not reported

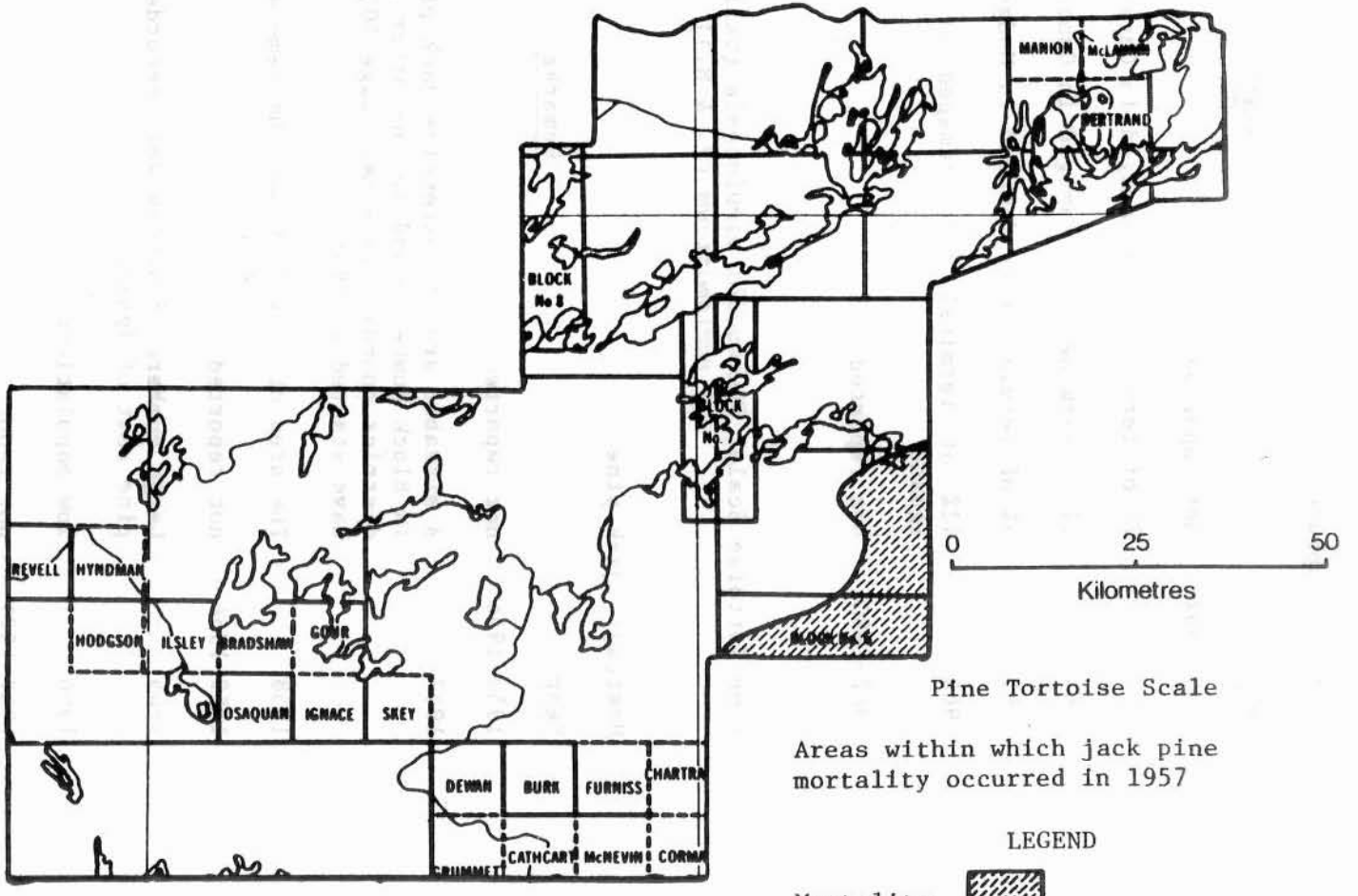
Pine Tortoise Scale, *Toumeyella parvicornis* (Ckll.)
[= *numismaticum* (P. & M.)]

Host(s): jack pine [Major]

Year	Remarks
1950-1956	not reported
1957	A sizeable area of extensive jack pine mortality was mapped in Block Number 6 and in one other area on the Thunder Bay district boundary (see map, page 50). This infestation may have started in 1955.
1958	The area of mortality was the same as that of 1959.
1959-1964	not reported
1965	Large numbers of scales were recorded on second-growth jack pine east of Ignace.
1966	low populations
1967-1971	not reported
1972	Moderate numbers were reported along Basket Lake Road.

(cont'd)

IGNACE DISTRICT



DISEASES

Pine Tortoise Scale, *Toumeyella parvicornis* (Ckll.)
[= *numismaticum* (P. & M.)] (concl.)

Host(s): jack pine [Major]

Year	Remarks
1973	not reported
1974-1975	Light damage occurred in Revell Township.
1976-1980	not reported

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

Host(s): deciduous, coniferous [Major]

Year	Remarks
1950-1955	not reported
1956-1958	trace population levels
1959-1969	not reported
1970	5% tree mortality along Basket Lake Road
1971	7.5% mortality reported in jack pine plantations along Basket Lake Road
1972	2.5% mortality reported in jack pine plantations near Wintering Lake and near Basket Lake Road
1973	not reported
1974	2% mortality reported in jack pine plantations at Crystal River and Martin Siding
1975	Mortality of 1% to 2% was reported in jack pine plantations in Revell Township and Martin Siding, respectively.
1976	Trace infestations were reported in jack pine regeneration along the Basket Lake Road.
1977-1978	not reported
1979	trace population levels
1980	1% mortality at Pinafore Lake

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard

Host(s): pine [Major]

Year	Remarks
1950-1965	not reported

(cont'd)

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schläpfer-Bernhard (concl.)

Host(s): pine [Major]

Year	Remarks
1966	Stem cankers were found for the first time in Skey Township; survey data for this year revealed 1% mortality and 2% infection in sampled stands.
1967	Infection was still observed in Skey Township.
1968-1969	not reported
1970	In an 80-ha plantation in the Gulliver River area, 63% of the jack pine were affected.
1971-1980	not reported

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

Host(s): spruce [Major]

Year	Remarks
1950	not reported
1951	Both rusts were prevalent in the district, but caused little damage.
1952	Trace levels of infection were reported in Corman and Cathcart townships.
1953	Trace levels of infection recurred in Corman Township.
1954	trace levels of infection
1955	Medium-to-heavy infections were reported on black spruce in Corman Township.
1956	not reported
1957	Scattered trees were heavily infected.
1958	not reported

(cont'd)

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

Host(s): spruce [Major]

Year	Remarks
1959-1960	Varying degrees of damage occurred at many points.
1961	not reported
1962	Light infections were reported at many widely separated locations.
1963	not reported
1964	Light infections were reported at several locations.
1965	Severe damage occurred in Ignace Township. Light infections were reported at Young and Gulliver lakes.
1966	Medium-to-heavy infections occurred along Highway 599 near the English River.
1967	Decreased damage was reported along Highway 599. Light damage occurred at Sturgeon Lake.
1968	One area of moderate infection was reported at Cloven Lake.
1969	Trace levels of infection were reported in Skey Township.
1970	trace levels of infection
1971	not reported
1972-1977	trace levels of infection
1978	Light damage occurred at Paguchi Lake.
1979-1980	trace levels of infection

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

Host(s): pines [Major]

Year	Remarks
1965	not reported
1966	24% of jack pine regeneration lightly affected in Corman Township and 30% at Sandbar Lake
1967-1968	Trace levels of infection were common throughout the district.
1969-1970	not reported
1971	Trace levels of infection were reported along Basket Lake Road.
1972	7½% of trees affected along Basket Lake Road, and 5% at Wintering Lake
1973	not reported
1974	Trace levels of infection were reported along Highway 599 at Crystal River.
1975	From 1% to 8% of the trees at three locations were affected.
1976	2% mortality reported along Basket Lake Road
1977	Low levels of infection were common in the district.
1978	not reported
1979	4% of trees severely affected at Valora Crossing
1980	not reported

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

Host(s): trembling aspen [Major]

Year	Remarks
1950-1956	not reported
1957-1959	trace levels of infection
1960-1969	not reported
1970-1972	trace levels of infection
1973-1974	not reported
1975	trace levels of infection
1976	not reported
1977	Defoliation levels of 3% and 6% were reported in aspen regeneration stands at Suzanne and Savant lakes, respectively.
1978-1980	not reported

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

Host(s): pines [Major]

Year	Remarks
1950-1954	not reported
1955	trace levels of infection
1956	not reported
1957	trace levels of infection
1958-1959	not reported
1960	trace levels of infection
1961-1962	not reported
1963-1964	trace levels of infection

(cont'd)

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

Host(s): poplar [Major]

Year	Remarks
1950-1952	not reported
1953	Trace levels of infection were reported at several locations.
1954-1955	The canker was common throughout the district, but its impact was not measured.
1956-1963	not reported
1964-1969	The canker was found in most aspen stands examined.
1970-1974	not reported
1975-1977	The canker was common throughout the district, but its impact was not measured.
1978-1980	No change in the incidence of this organism was reported.

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

Host(s): trembling aspen [Major]

Year	Remarks
1950-1951	not reported
1952	Specimens of shoot blight were collected from Bradshaw Township.
1953-1955	trace levels of infection
1956	not reported
1957-1959	Shoot blight was commonly observed throughout the district.
1960-1961	not reported
1962-1964	trace levels of infection

(cont'd)

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

Host(s): trembling aspen [Major]

Year	Remarks
1965	90% of shoots affected in Ignace Twp and 77% in Cathcart Twp
1966	On average, 31% of shoots were affected at locations in Skey Township and along Valora Road and Norway Lake Road.
1967-1970	trace and light levels of infection
1971	not reported
1972	trace and light levels of infection
1973-1974	not reported
1975	Light levels of infection were common throughout the district.
1976	Only 2% of trees were affected along Hwy 17 west of Raven Lake.
1977	32% terminal shoot mortality reported in Isley Twp
1978	Terminal shoot mortality increased to 59% in Isley Township.
1979	light levels of infection
1980	not reported

Other Noteworthy Diseases

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

Host(s): pines [Minor]

Year	Remarks
1950-1963	not reported
1964-1966	trace levels of infection

(cont'd)

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

Host(s): pines [Minor]

Year	Remarks
1967-1968	not reported
1969-1973	trace levels of infection
1974-1980	not reported

Fireweed Rust, *Pucciniastrum epilobii* Otth

Host(s): Balsam fir [Minor]

Year	Remarks
1950-1962	not reported
1963	Light levels of infection were observed at scattered points in the district.
1964	Medium-to-heavy levels of infection were reported at one point along Highway 599.
1965	light levels of infection
1966	not reported
1967	90% of shoots infected at one location in Dewan Township
1968	light levels of infection
1969	not reported
1970-1971	trace levels of infection
1972-1976	not reported
1977	trace levels of infection
1978	not reported
1979	Trace levels of infection were reported southwest of the Sturgeon River.
1980	not reported

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

Host(s): red pine [Major]

Year	Remarks
1950-1972	
1973	This form of shoot blight was first recorded in the district in this year, causing light damage in the Balmoral and Dimple lakes area (see map, page 63).
1974	2% mortality reported at Sandbar Lake
1975-1980	not reported

ABIOTIC DAMAGE

Frost

Year	Remarks
1950-1963	not reported
1964	47% of buds damaged in the Ignace area, primarily on balsam fir
1965-1980	not reported

Wind

Year	Remarks
1950-1962	not reported
1963	Severe damage was reported approximately 16 km west of Ignace.
1970	Small pockets of damage were observed near Ignace.
1973	Severe damage was reported in the northeastern and southeastern corners of the district.
1974-1980	not reported

Hail

Year	Remarks
1950-1968	not reported
1969	Approximately 16 km^2 of jack pine, balsam fir and black spruce were severely damaged near Kay Lake.
1970-1980	not reported

Winter Drying

Year	Remarks
1950-1969	not reported
1970	Light damage was reported on jack pine regeneration at Basket Lake and in one area south of the Valora crossing.
1971-1972	not reported
1973	Severe damage occurred on jack pine at Mameigwess Lake, and moderate damage was reported along the Martin Access Road.
1974	34 and 36% of red pine trees affected at Wintering and Paguchi lakes, respectively
1975-1980	not reported

APPENDICES

APPENDIX A

DECIDUOUS HOSTS

Common Name	Scientific Name	Abbreviations
Alder	*Alnus* spp.	Al
Apple	*Malus* spp.	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* Britton	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 HOSTS

Common Name	Scientific Name	Abbreviations
Cedar, eastern white	*Thuja occidentalis* L.	eC
Fir, balsam	*Abies balsamea* (L.) Mill.	bF
Larch (tamarack)	*Larix laricina* (Du Roi) K. Koch	tL
Pine, Austrian	*Pinus nigra* Arnold	aP
eastern white	*strobus* L.	wP
jack	*banksiana* Lamb.	jP
mugho	*mugo* 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

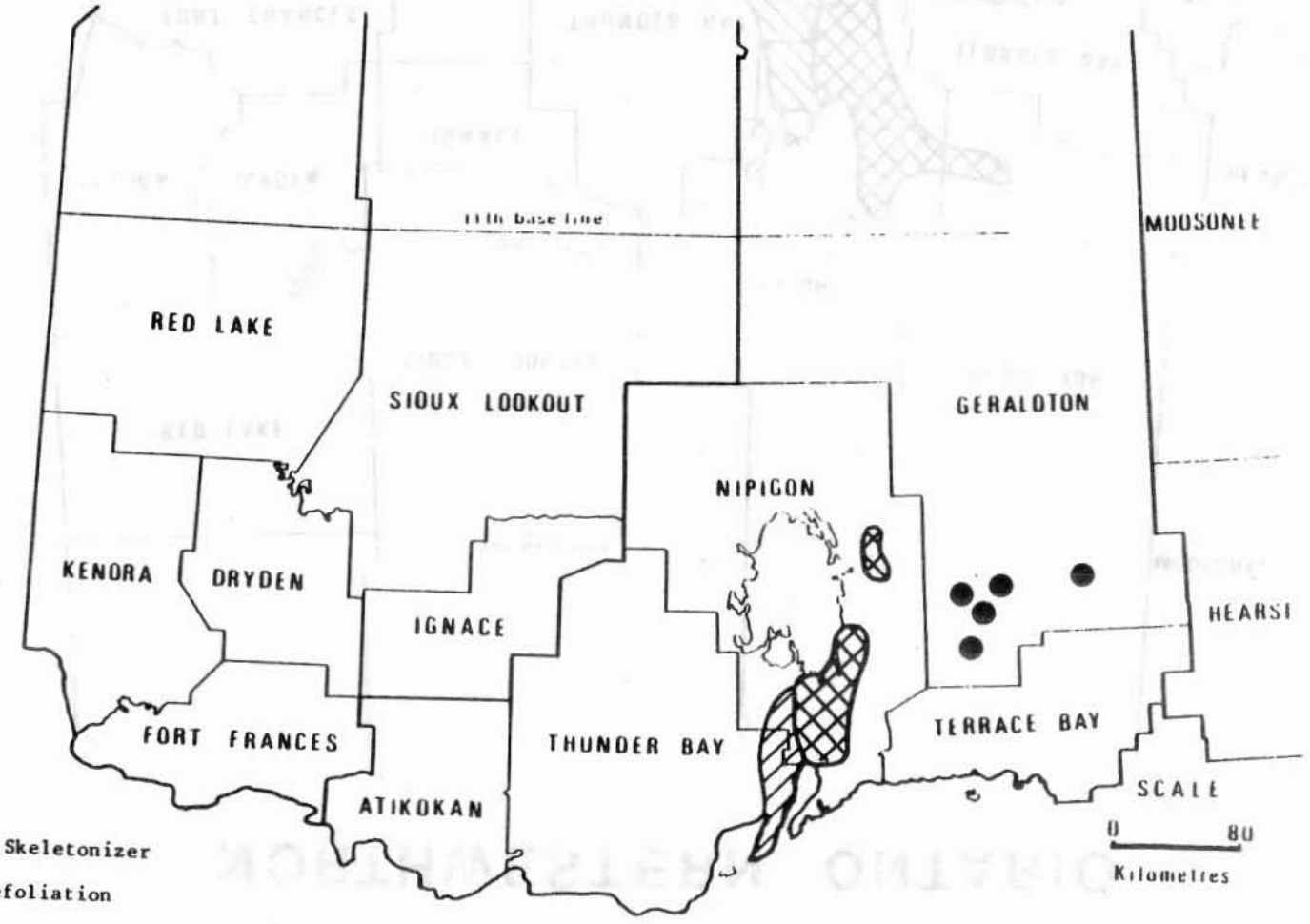
Areas within which defoliation occurred in 1963

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



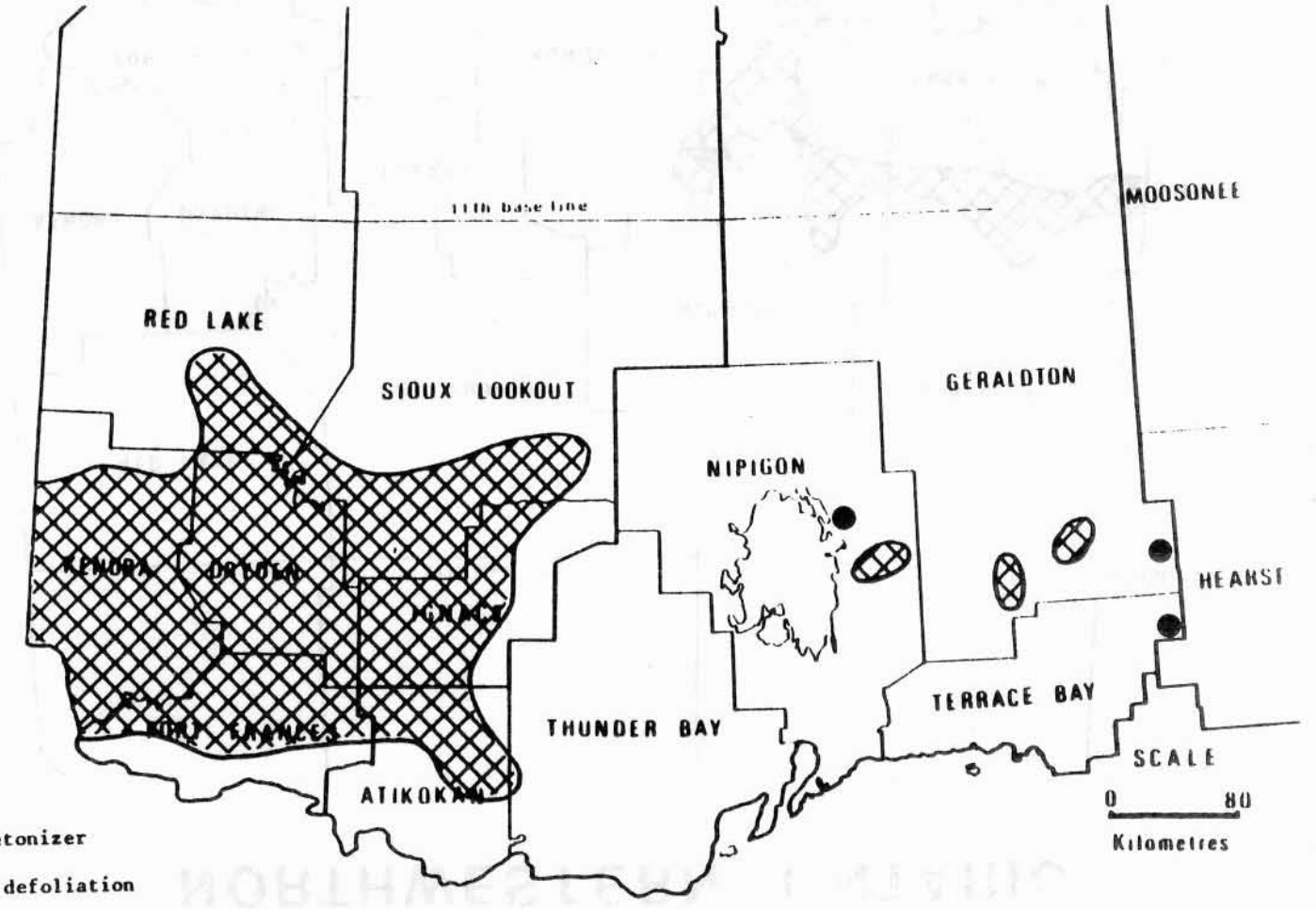
Birch Skeletonizer

Areas within which defoliation occurred in 1962

LEGEND

Light defoliation

NORTHWESTERN ONTARIO



Birch Skeletonizer

Areas within which defoliation occurred in 1970

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO

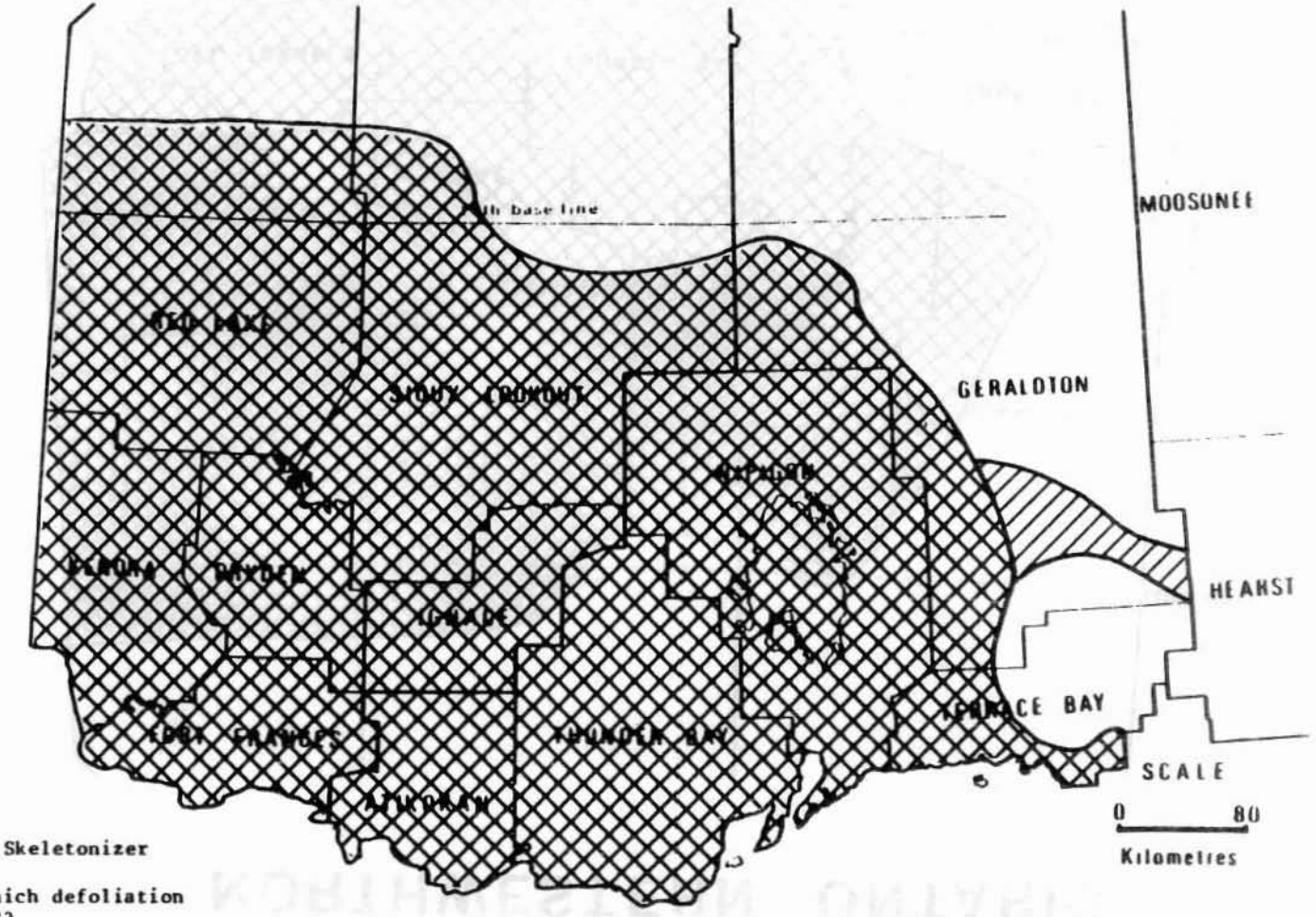
Birch Skeletonizer

Areas within which defoliation occurred in 1964

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Birch Skeletonizer

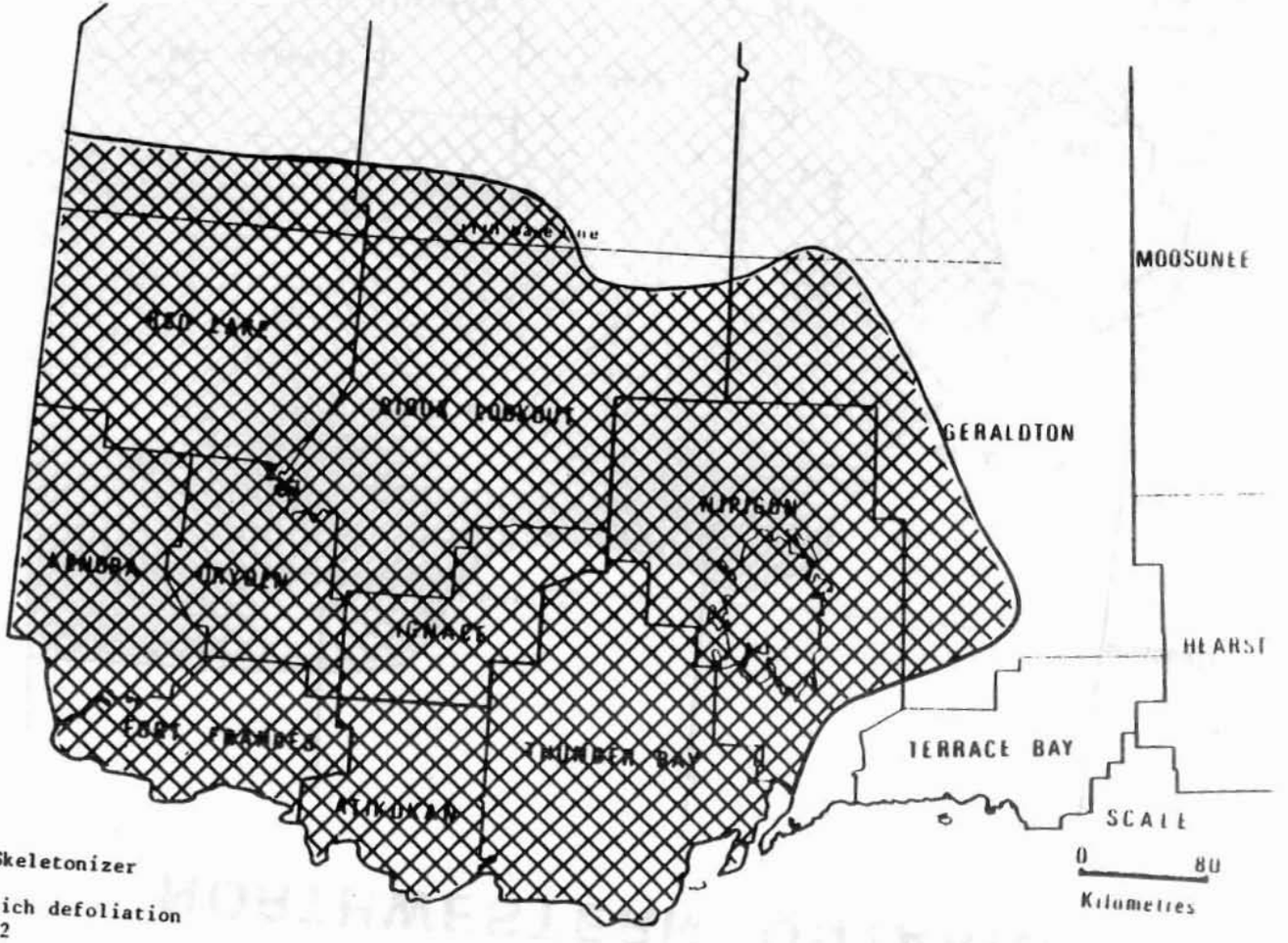
Areas within which defoliation occurred in 1973

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



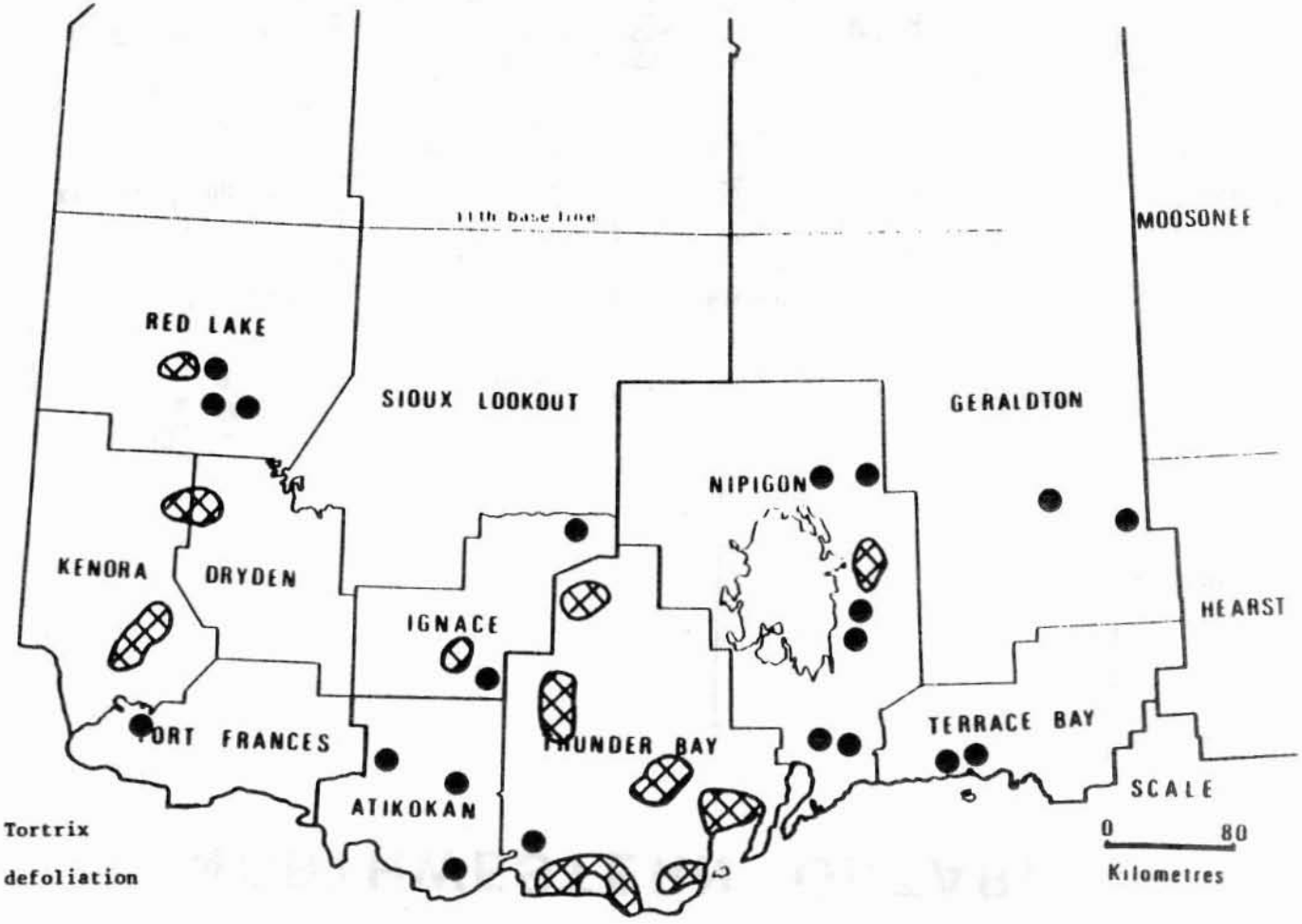
Birch Skeletonizer

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



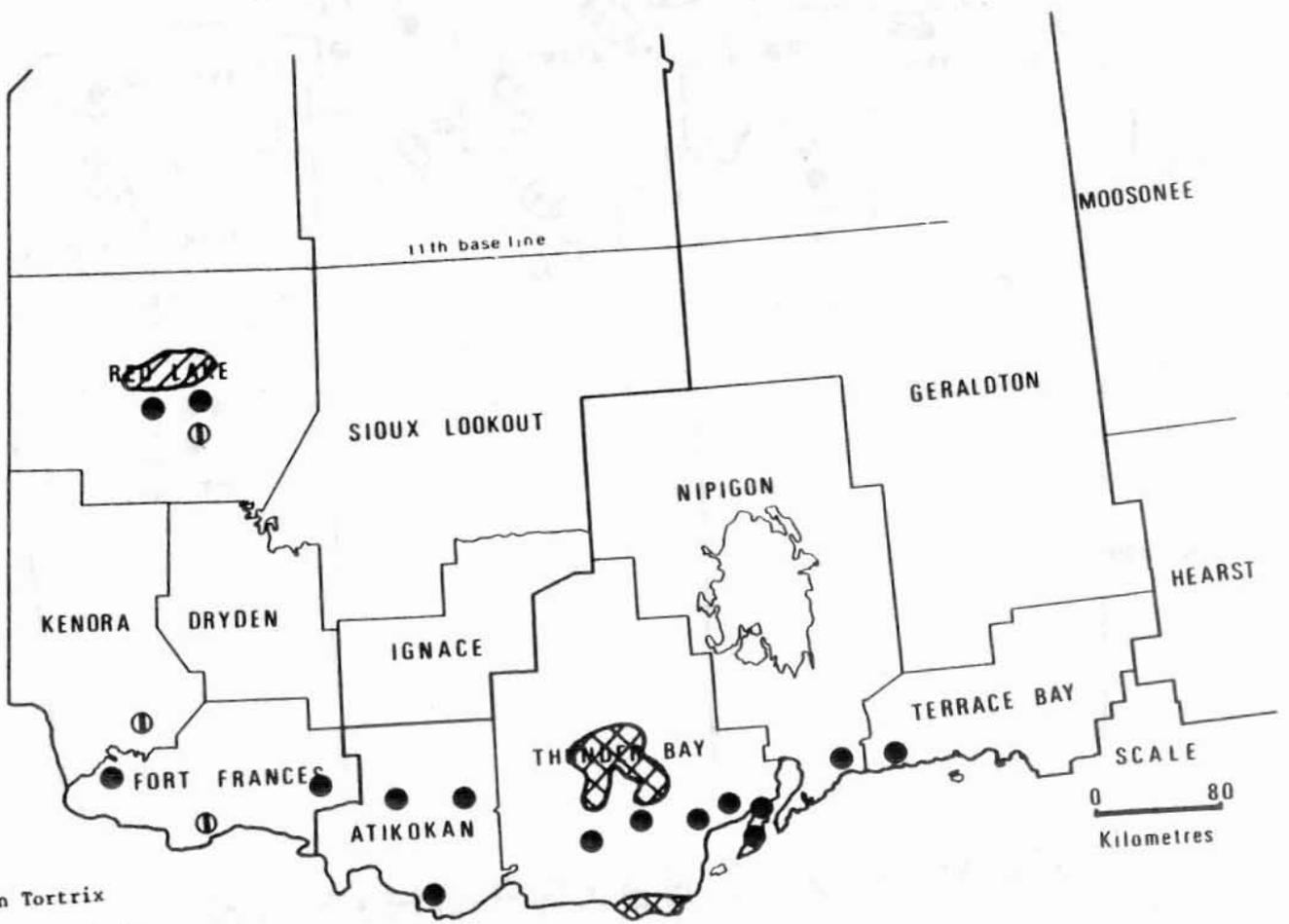
Large Aspen Tortrix

Areas within which defoliation occurred in 1971

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Large Aspen Tortrix

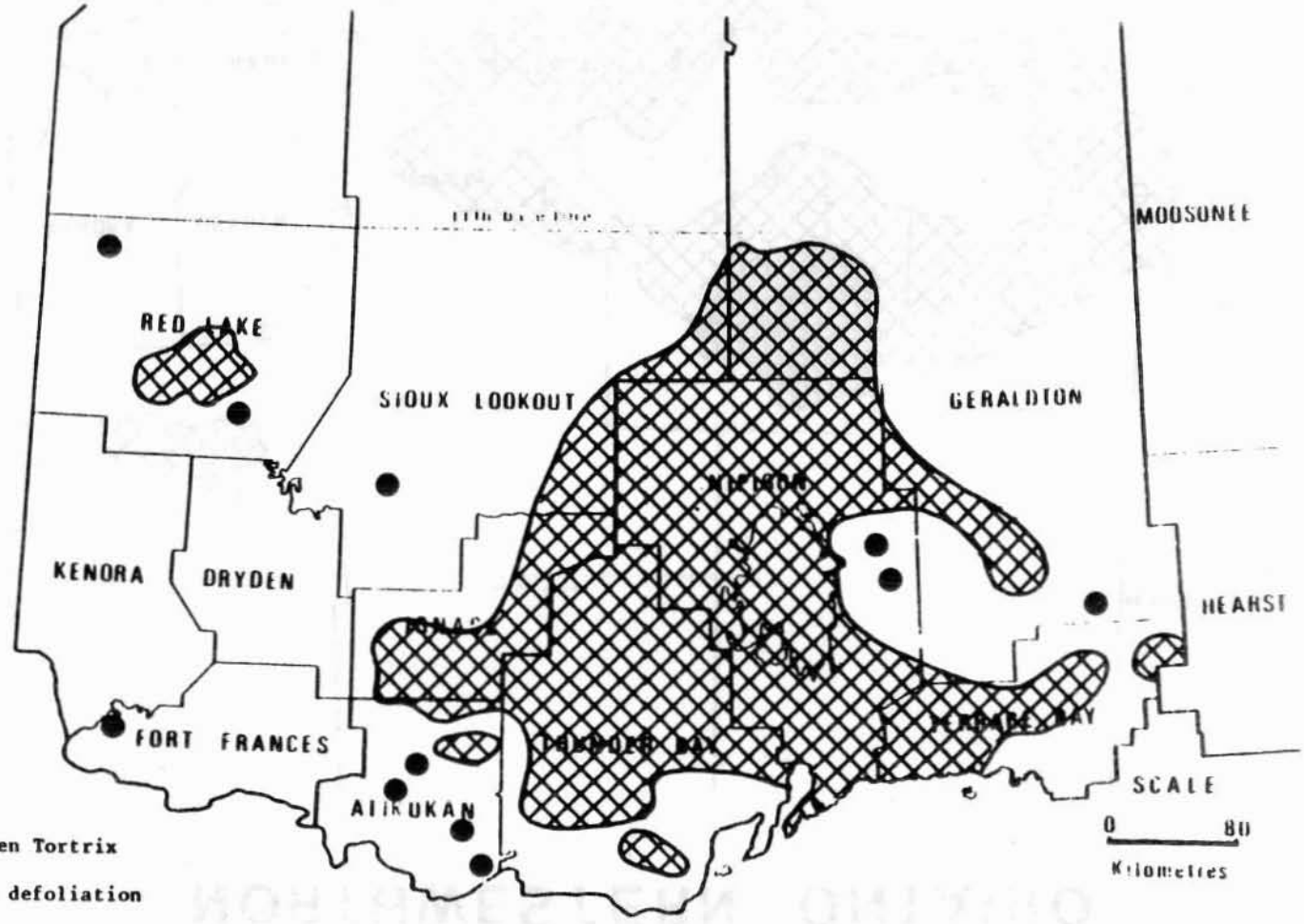
Areas within which defoliation occurred in 1970

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



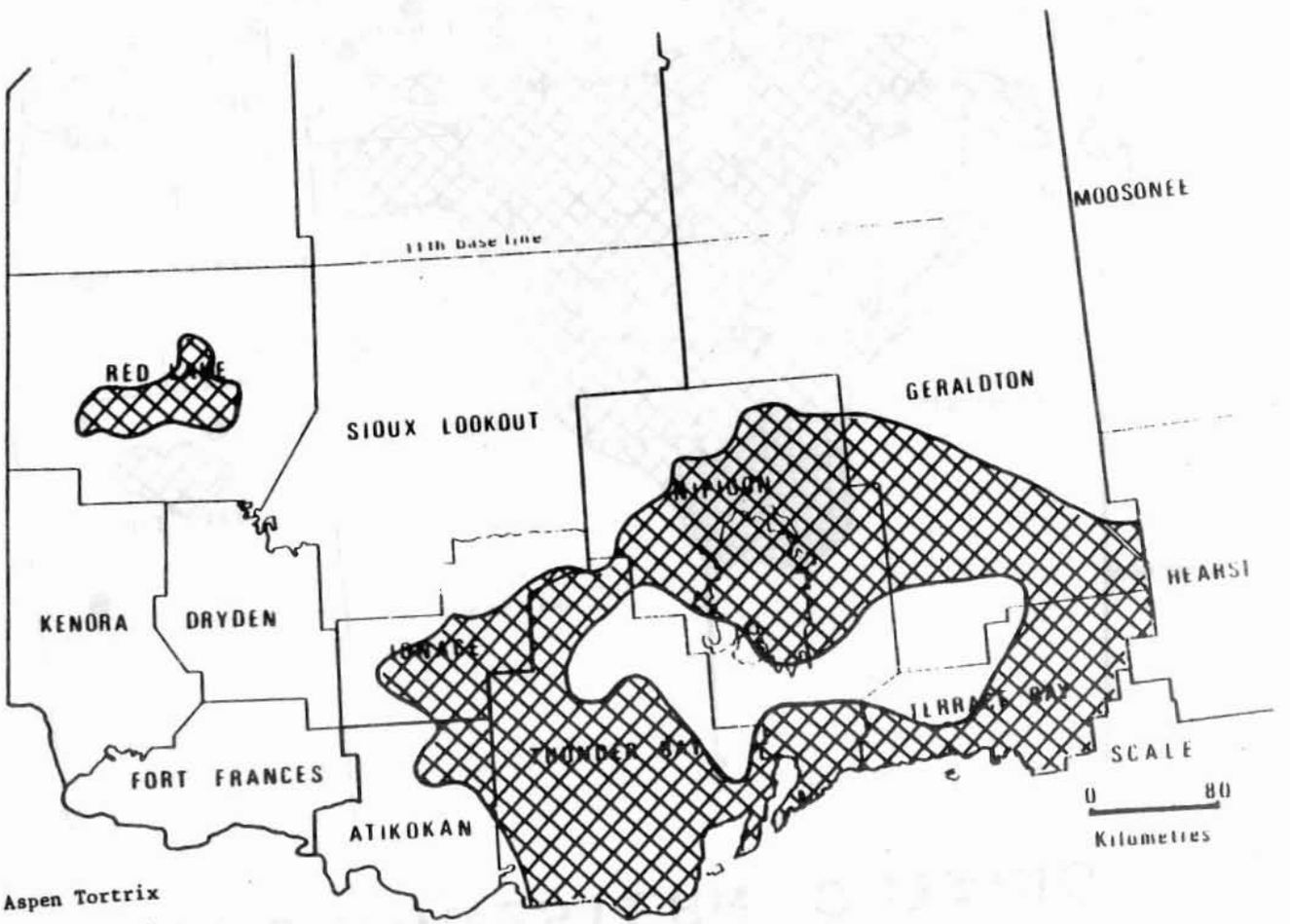
Large Aspen Tortrix

Areas within which defoliation occurred in 1973

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Large Aspen Tortrix

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO

Large Aspen Tortrix

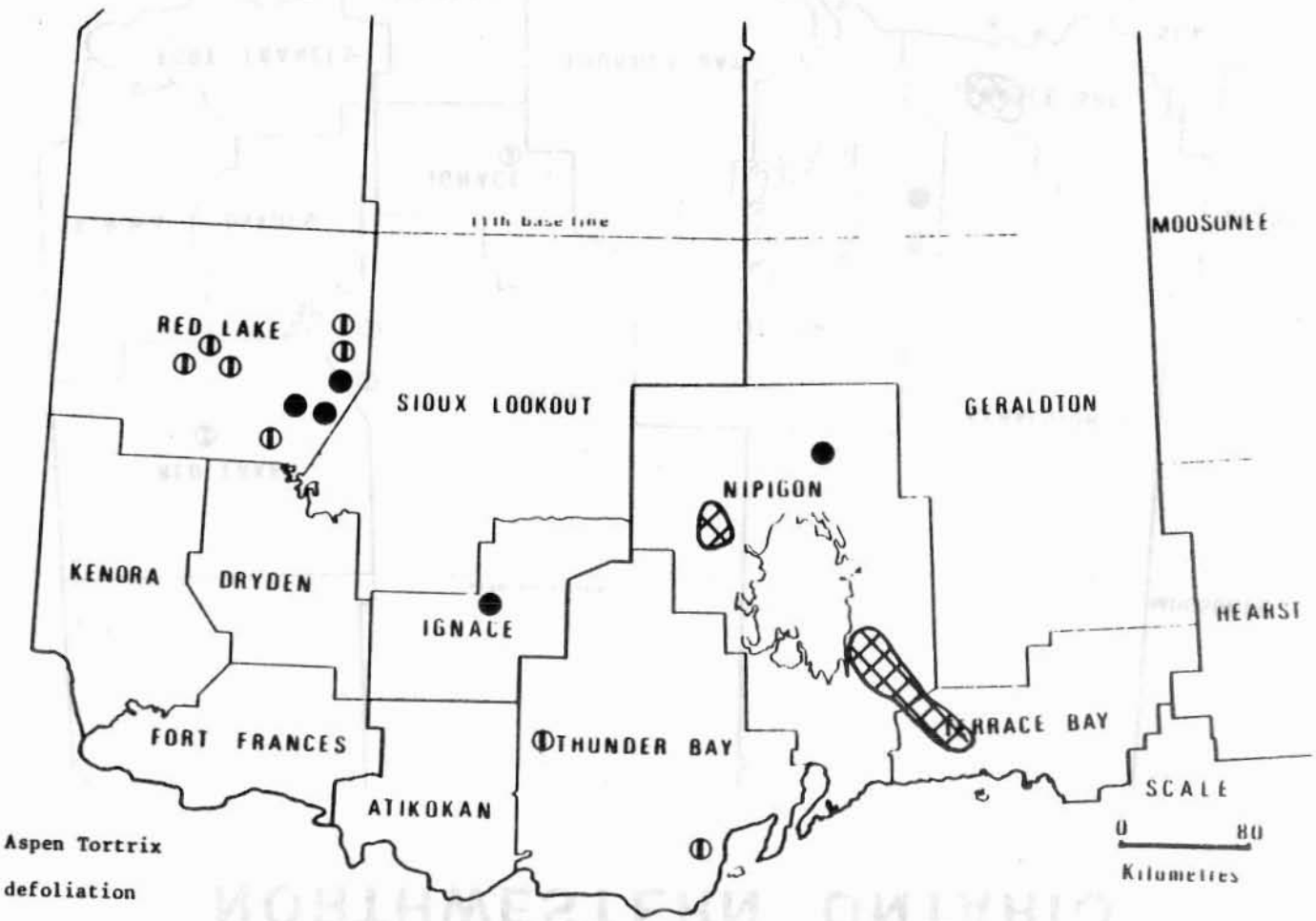
Areas within which defoliation occurred in 1975

LEGEND

Light defoliation ①

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Large Aspen Tortrix

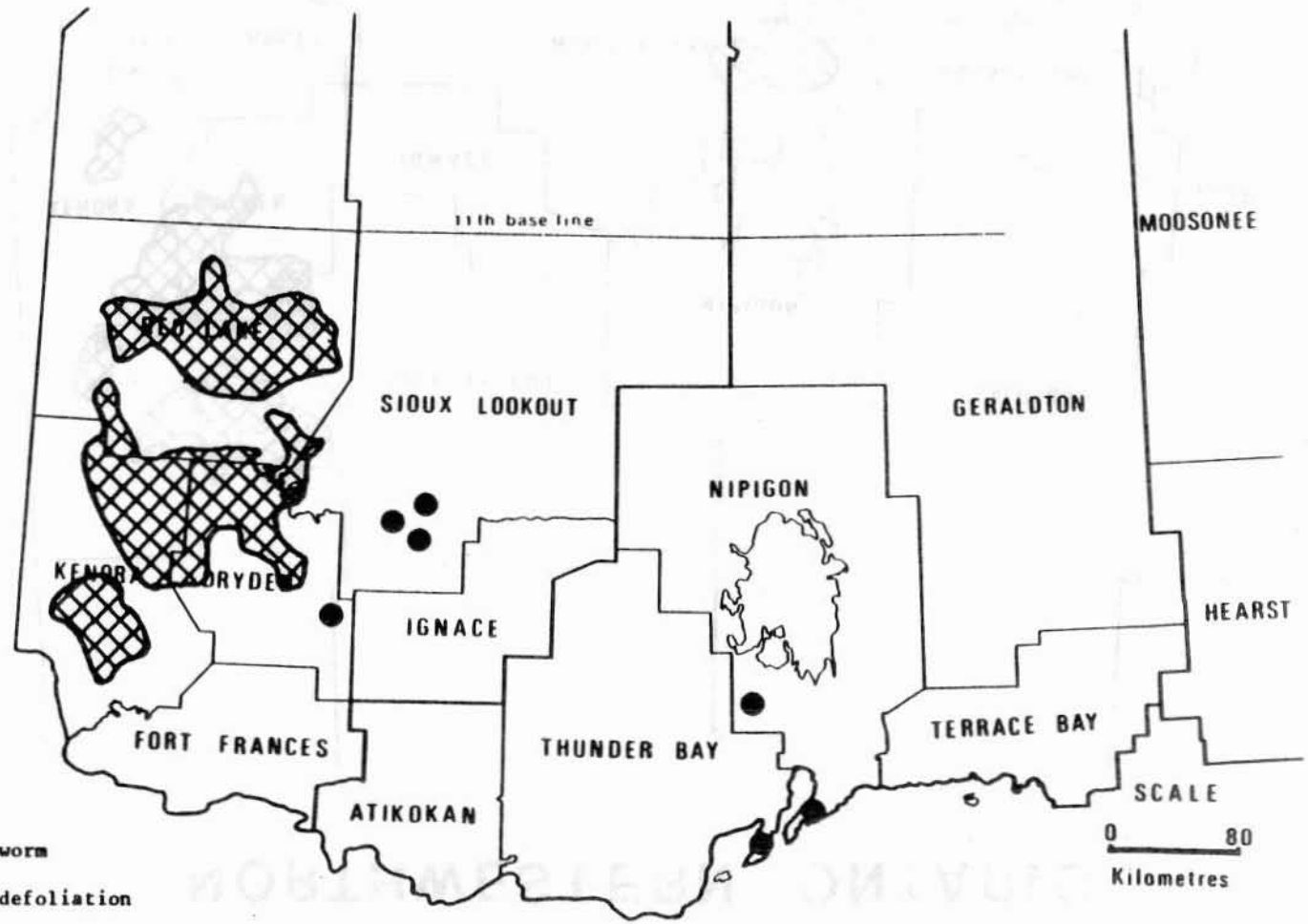
Areas within which defoliation occurred in 1974

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



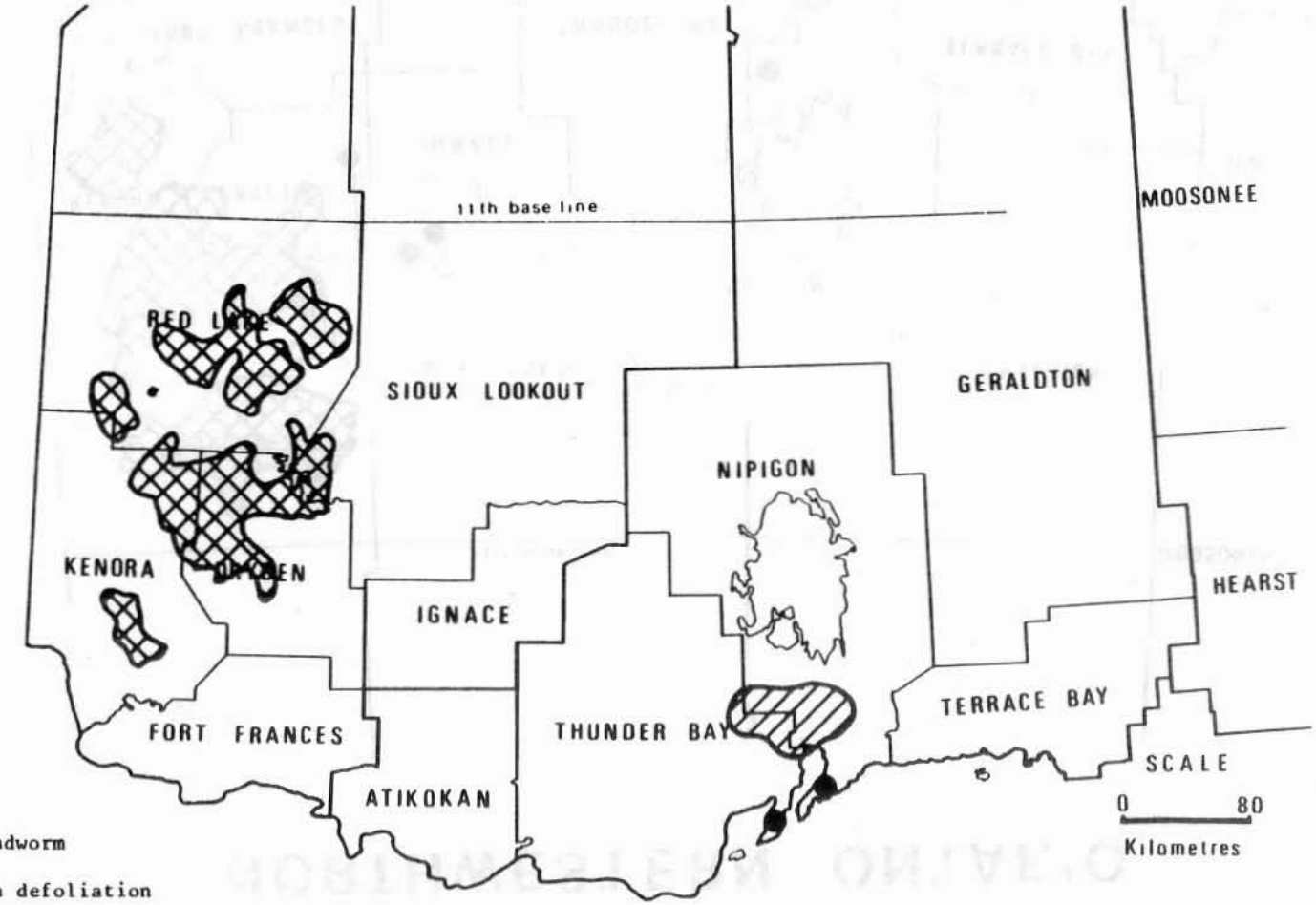
Spruce Budworm

Areas within which defoliation occurred in 1951

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

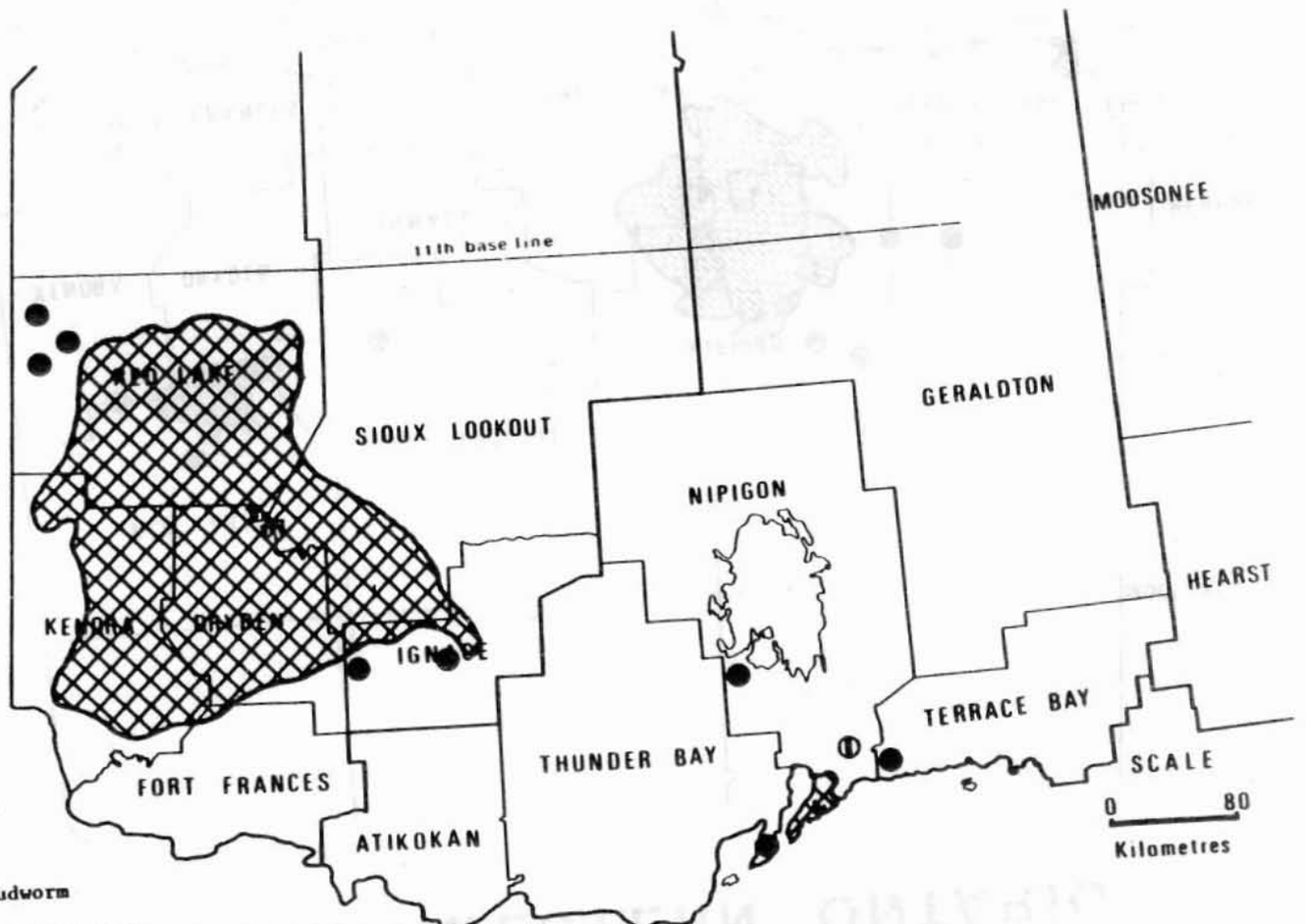
Areas within which defoliation occurred in 1950

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Spruce Budworm

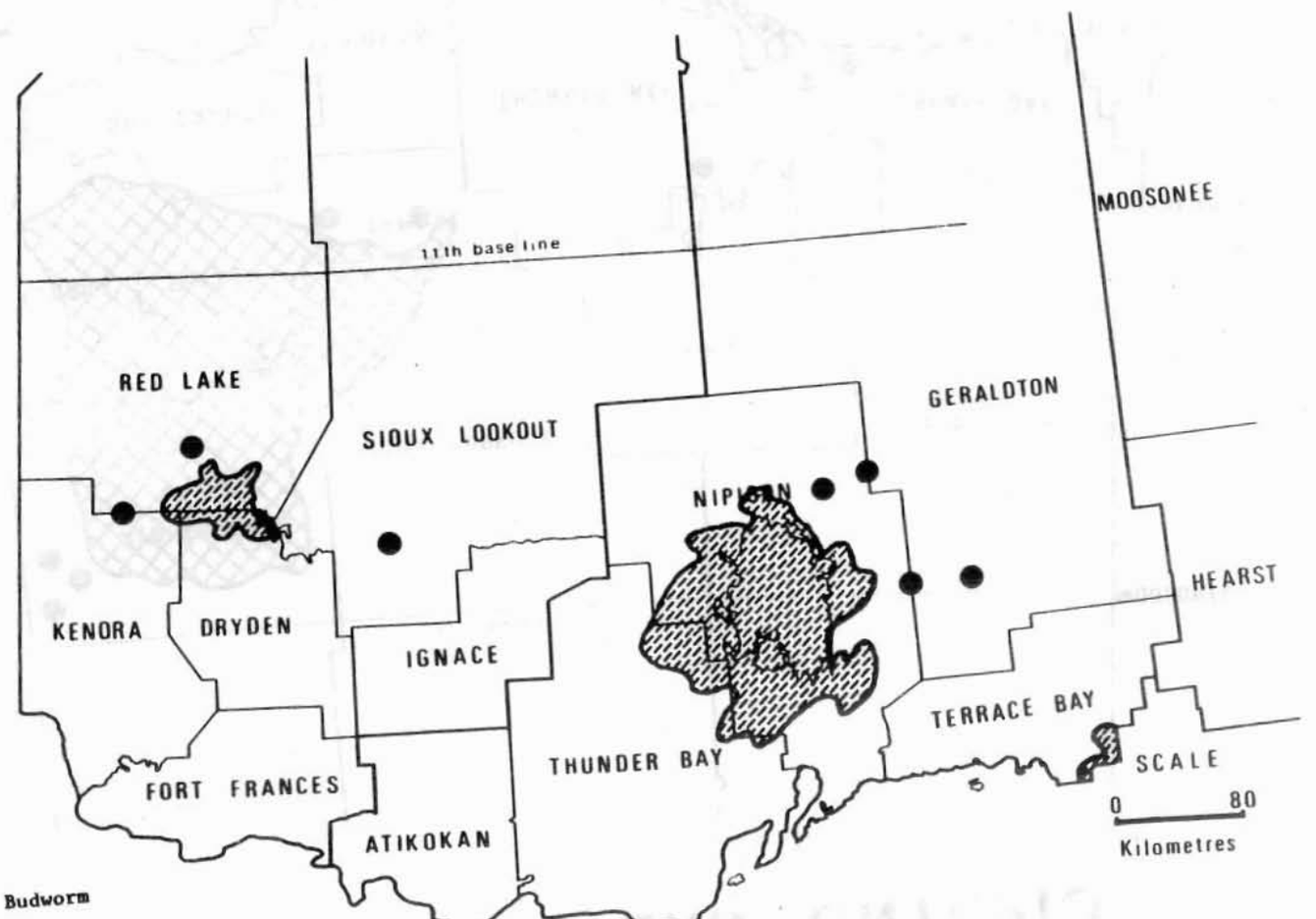
Areas within which defoliation occurred in 1952

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



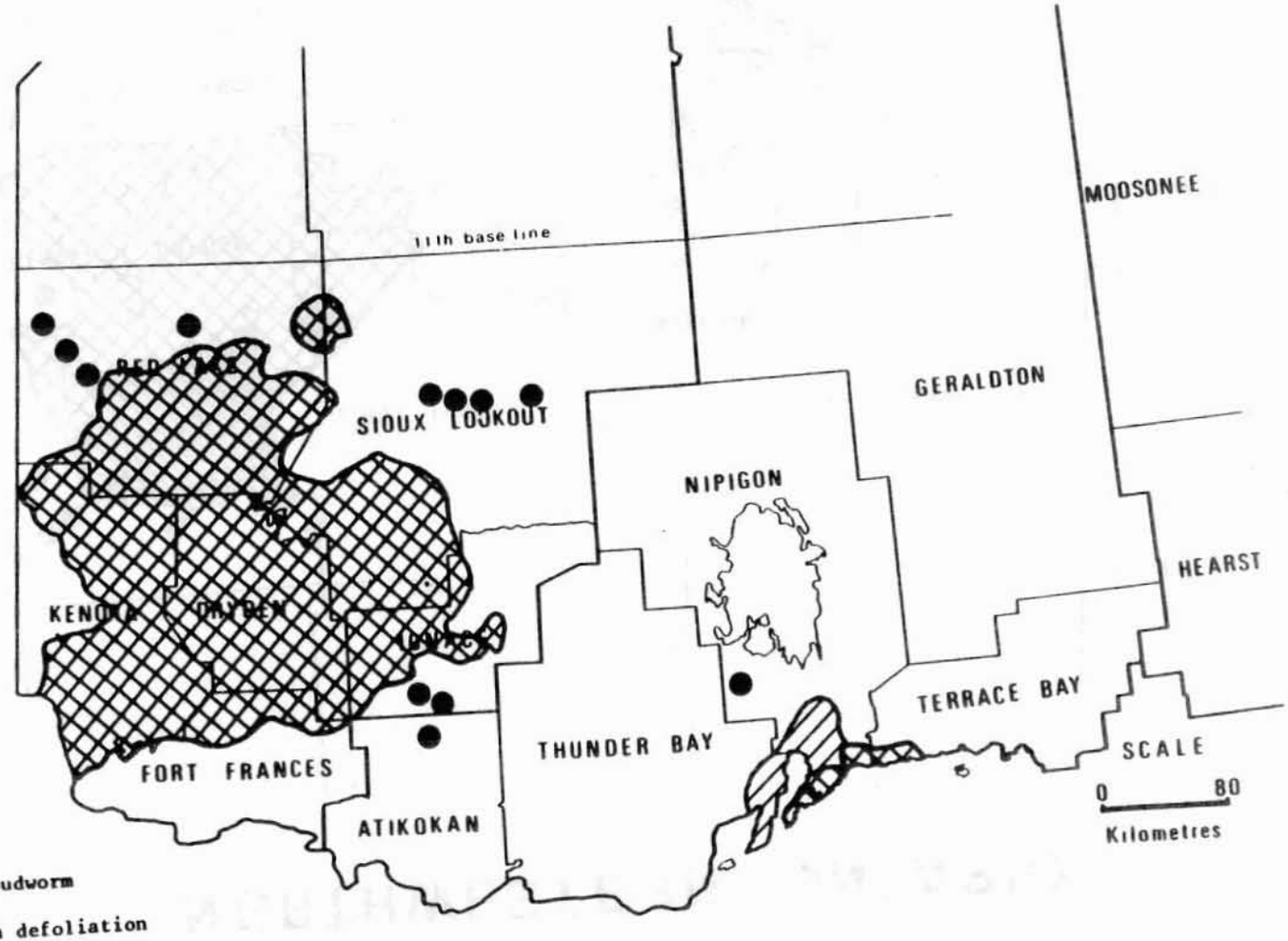
Spruce Budworm

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

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

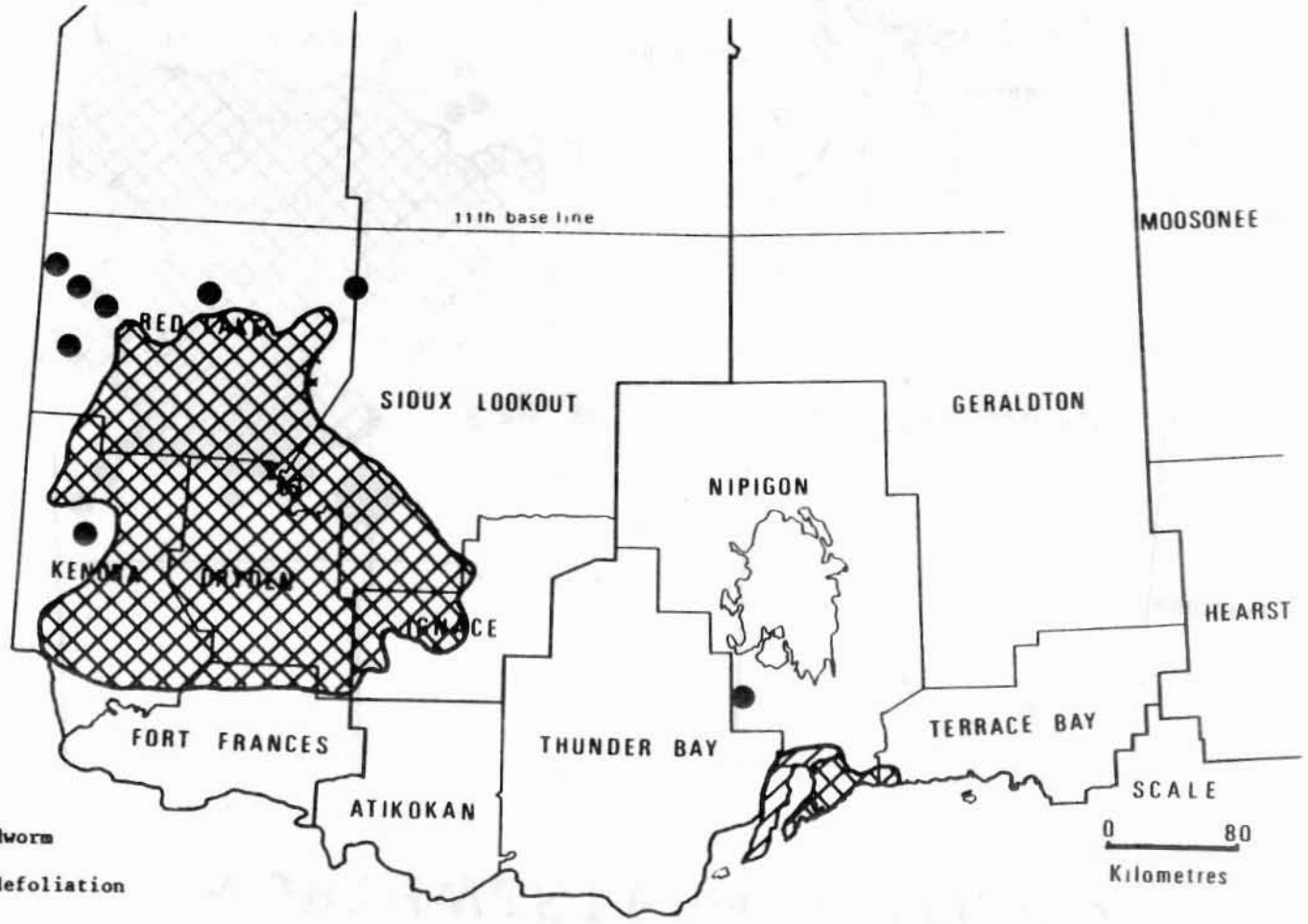
Areas within which defoliation occurred in 1954

LEGEND

Light defoliation

Moderate-to-severe defoliation or

NORTHWESTERN ONTARIO



Spruce Budworm

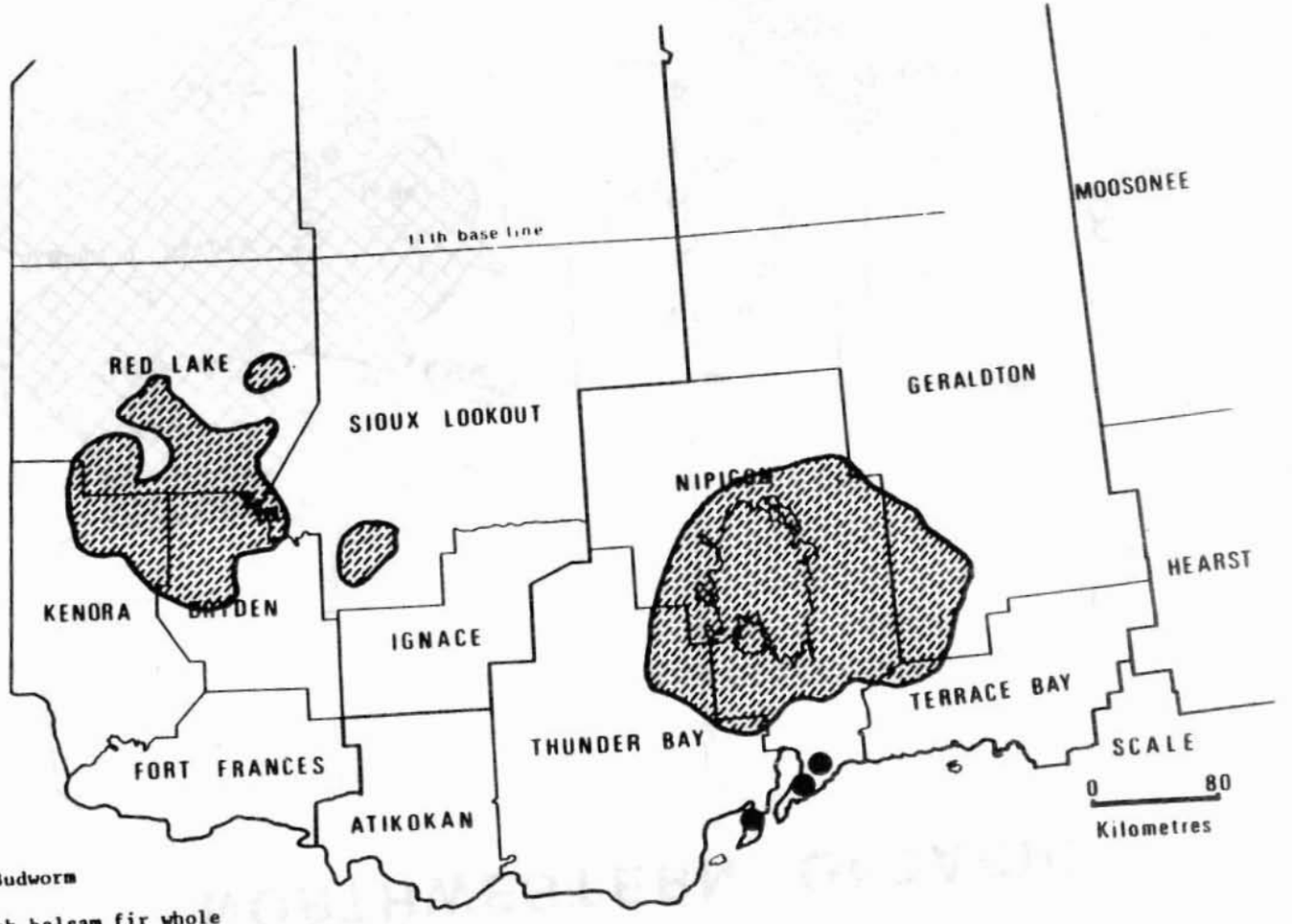
Areas within which defoliation occurred in 1953

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



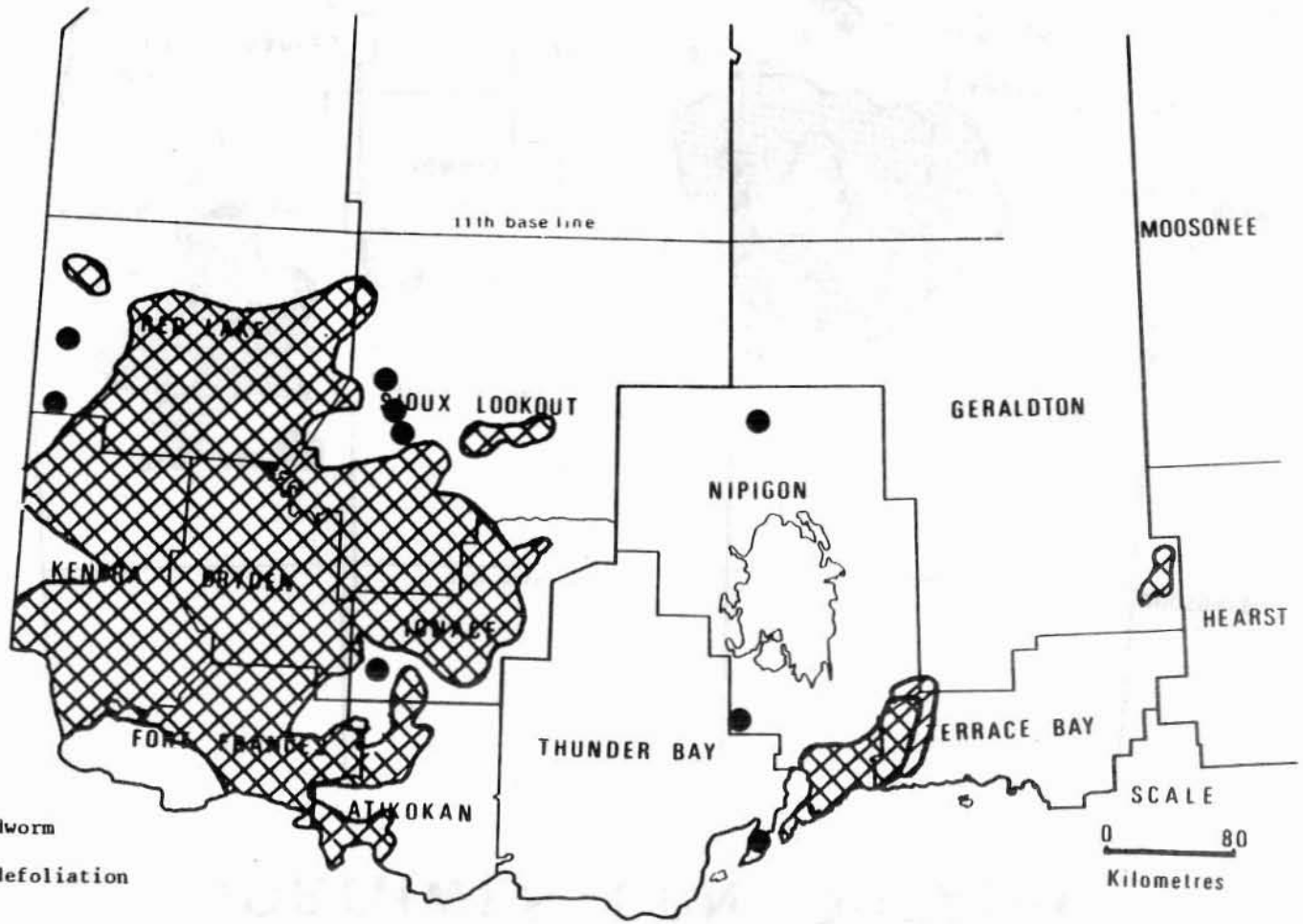
Spruce Budworm

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

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

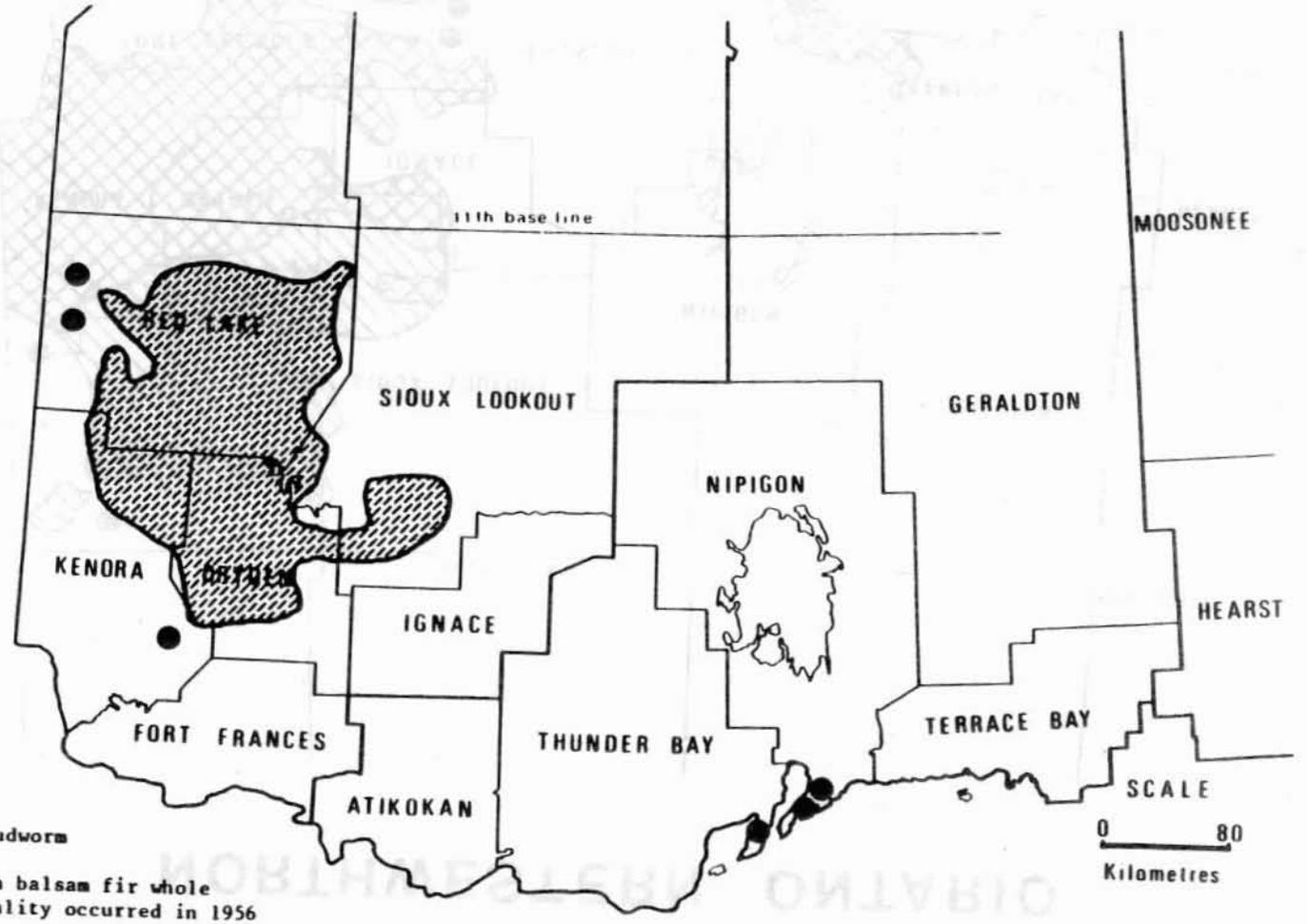
Areas within which defoliation occurred in 1955

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



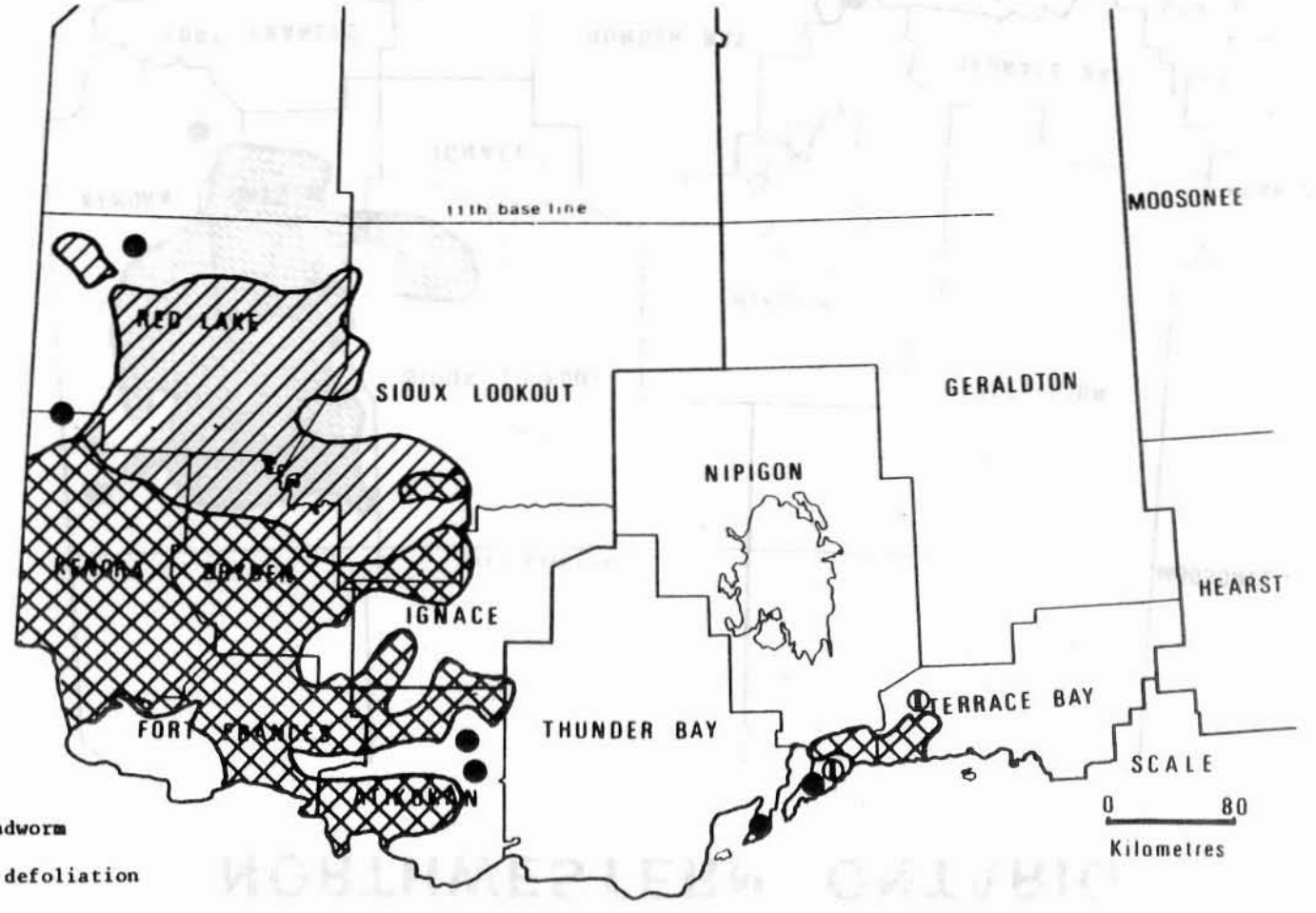
Spruce Budworm

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

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

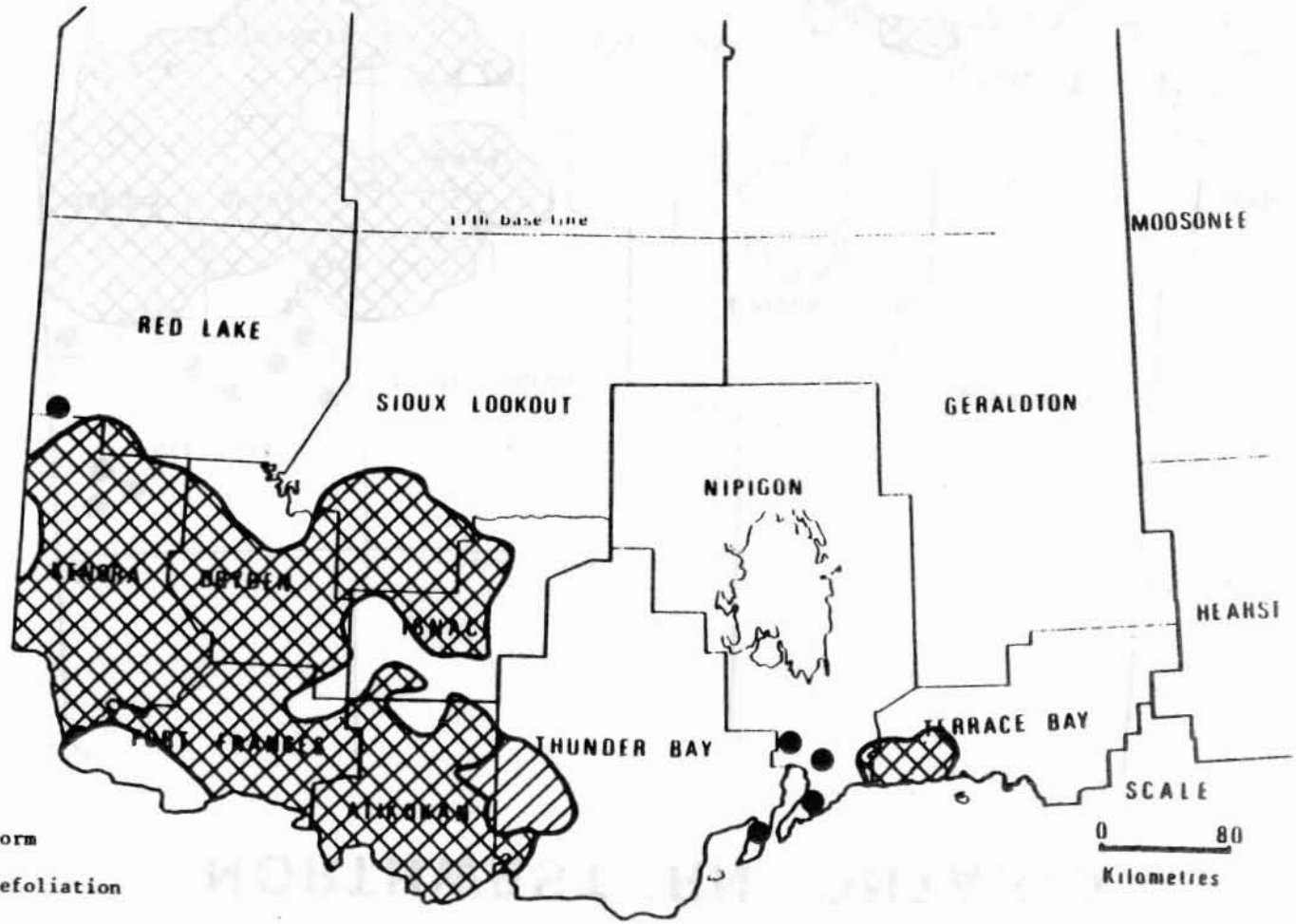
Areas within which defoliation occurred in 1956

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



Spruce Budworm

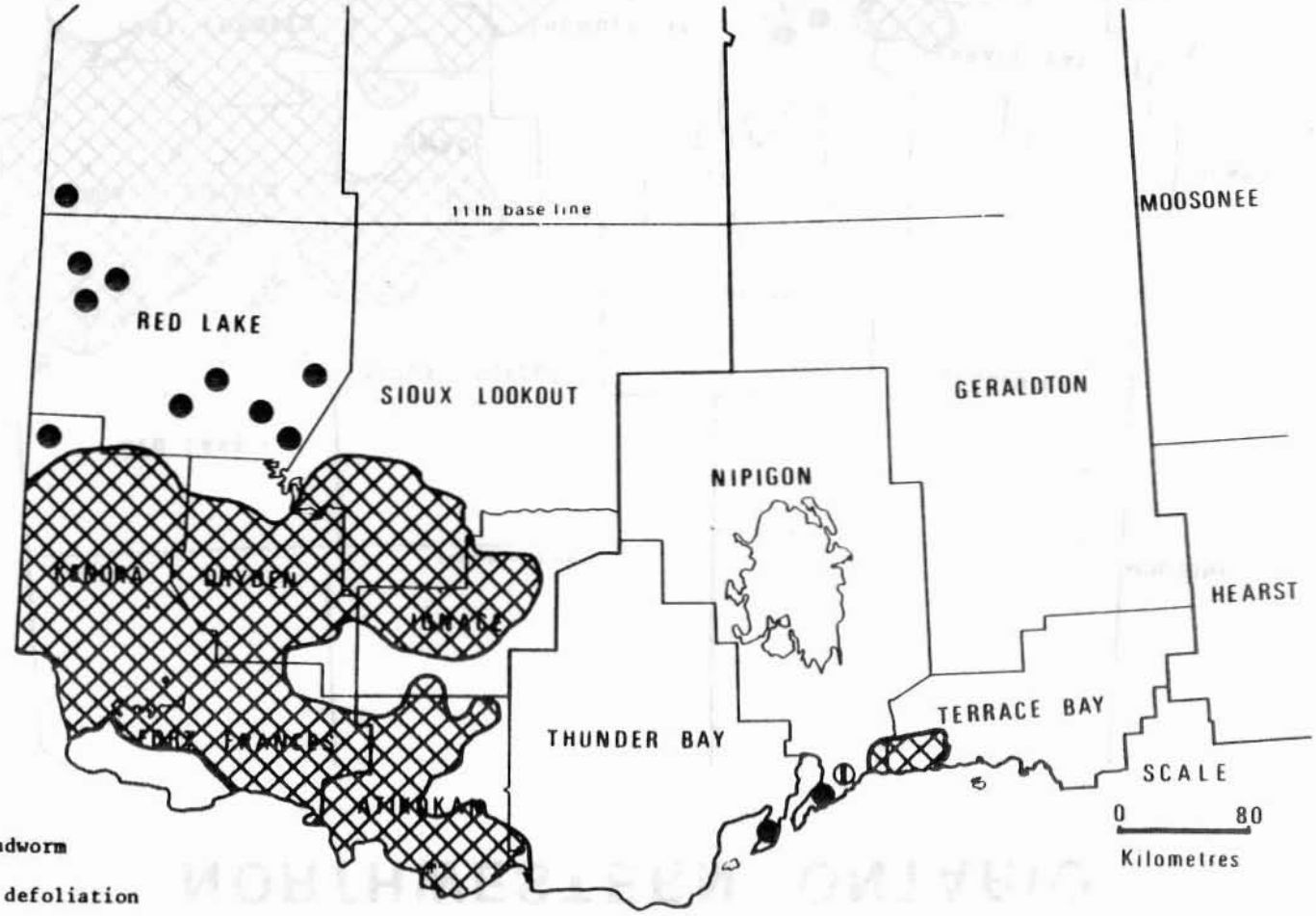
Areas within which defoliation occurred in 1958

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Spruce Budworm

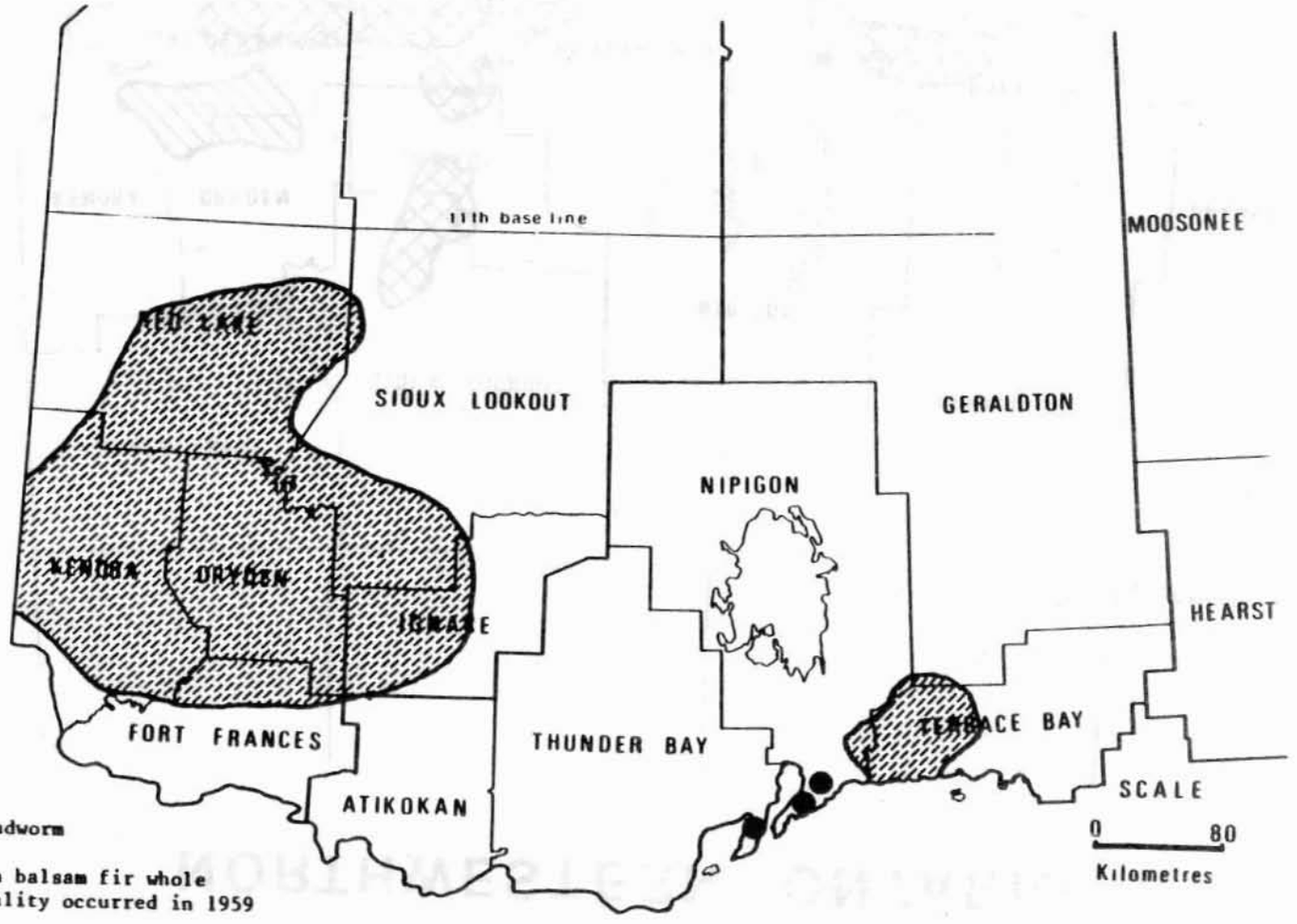
Areas within which defoliation occurred in 1957

LEGEND

Light defoliation ◑

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



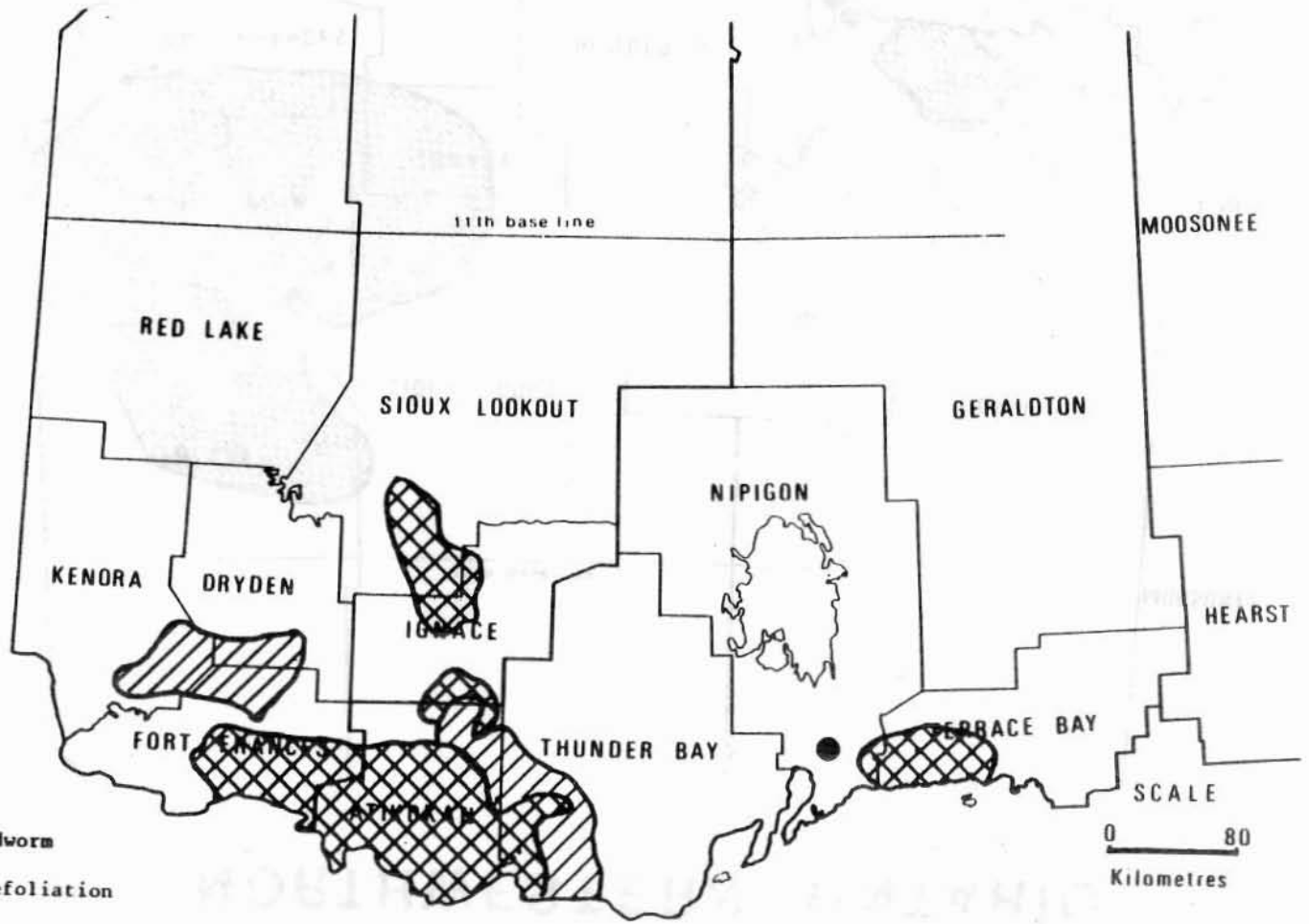
Spruce Budworm

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

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

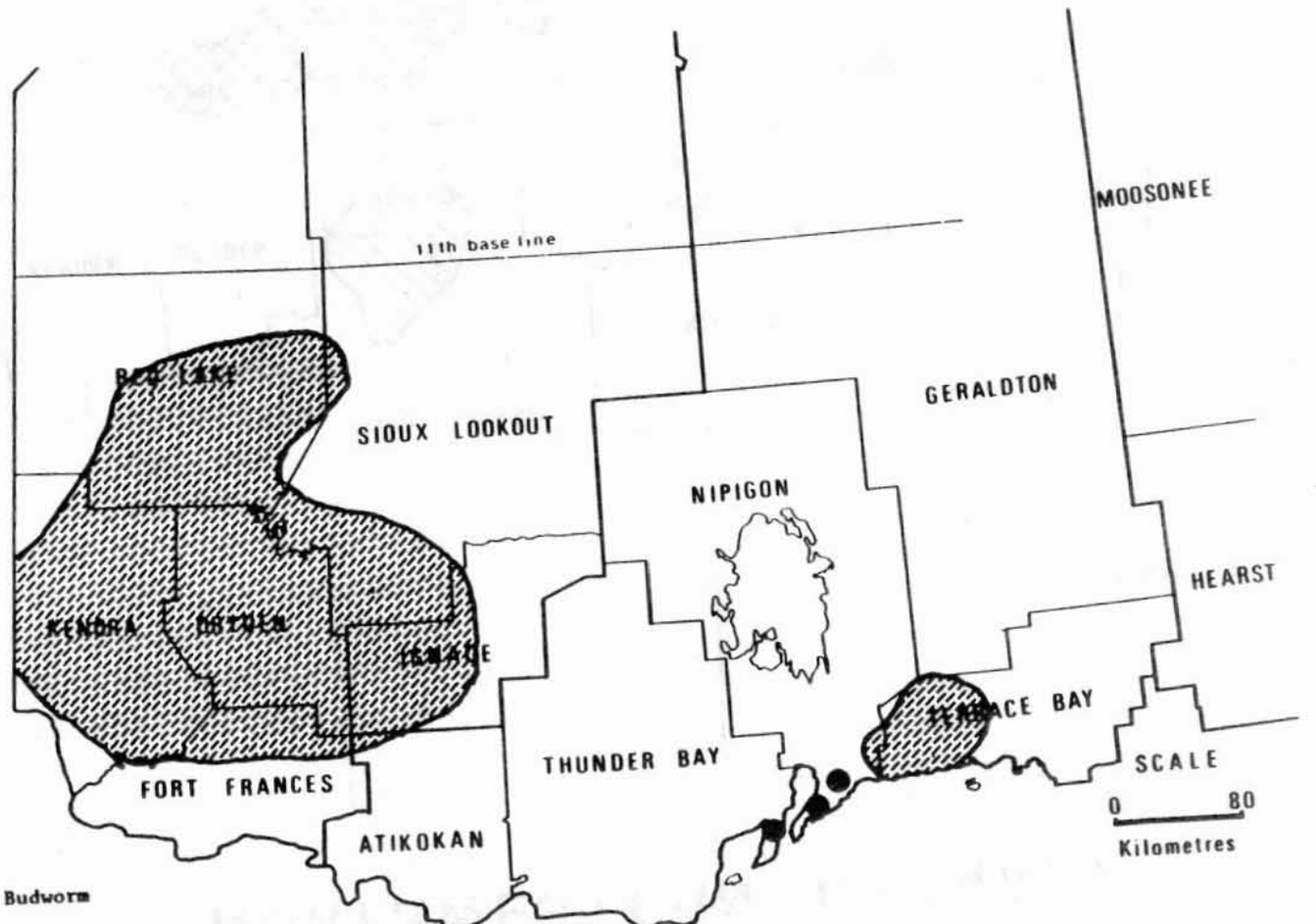
Areas with which defoliation occurred in 1959

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Spruce Budworm

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

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO

Spruce Budworm

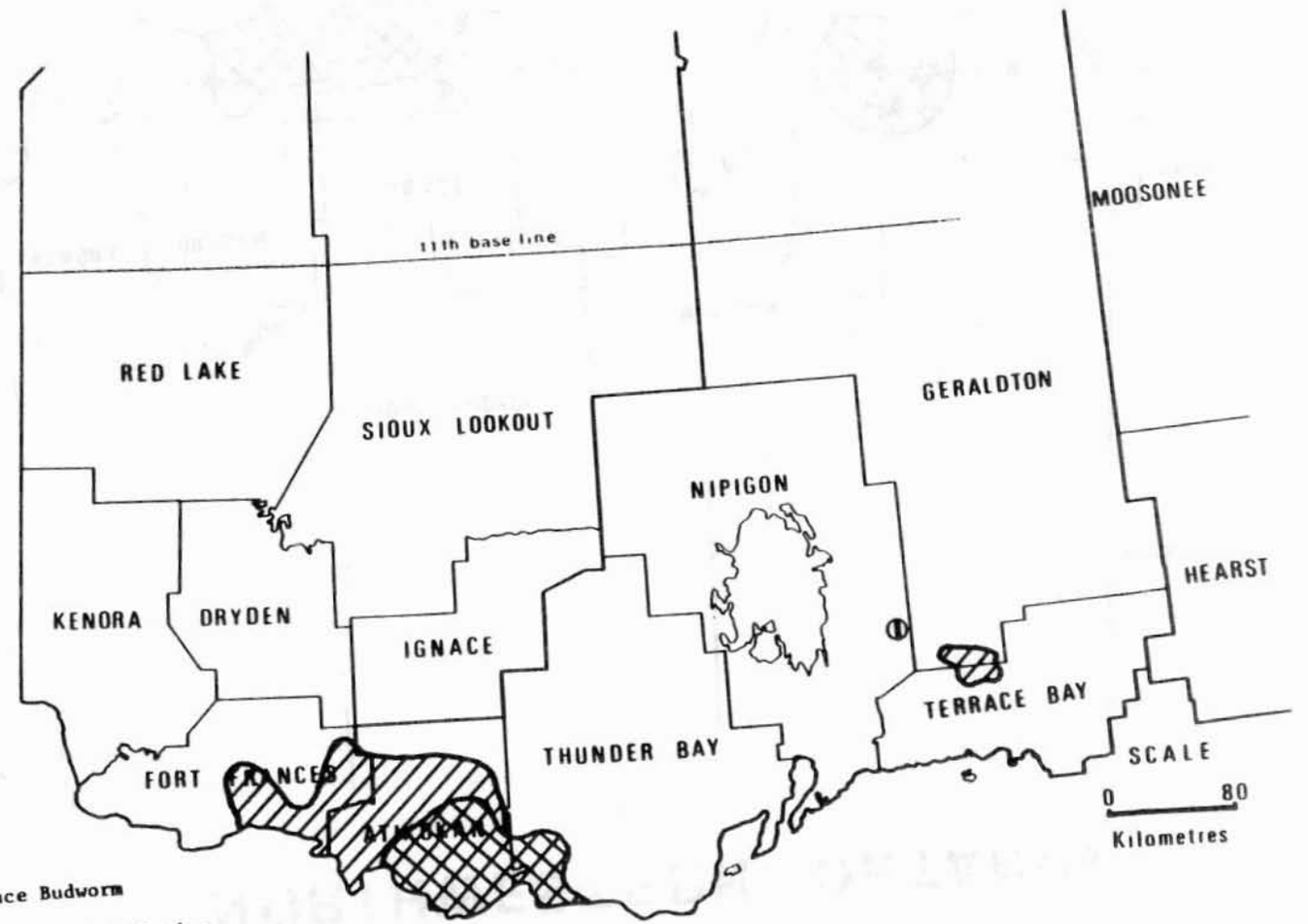
Areas within which defoliation occurred in 1960

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



Spruce Budworm

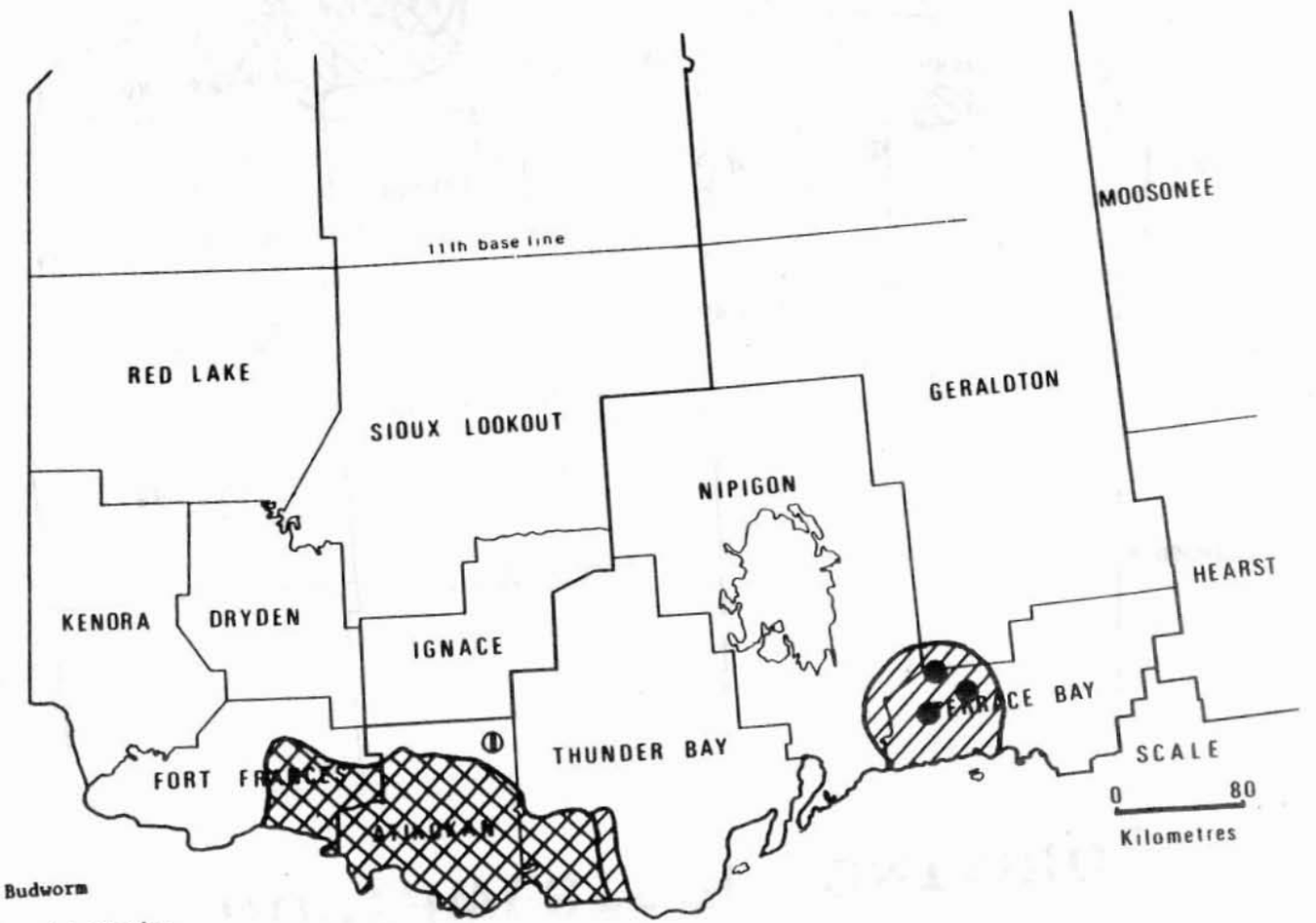
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ◑ or ▨

Moderate-to-severe defoliation ▩

NORTHWESTERN ONTARIO



Spruce Budworm

Areas within which defoliation occurred in 1961

LEGEND

Light defoliation ◑ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO

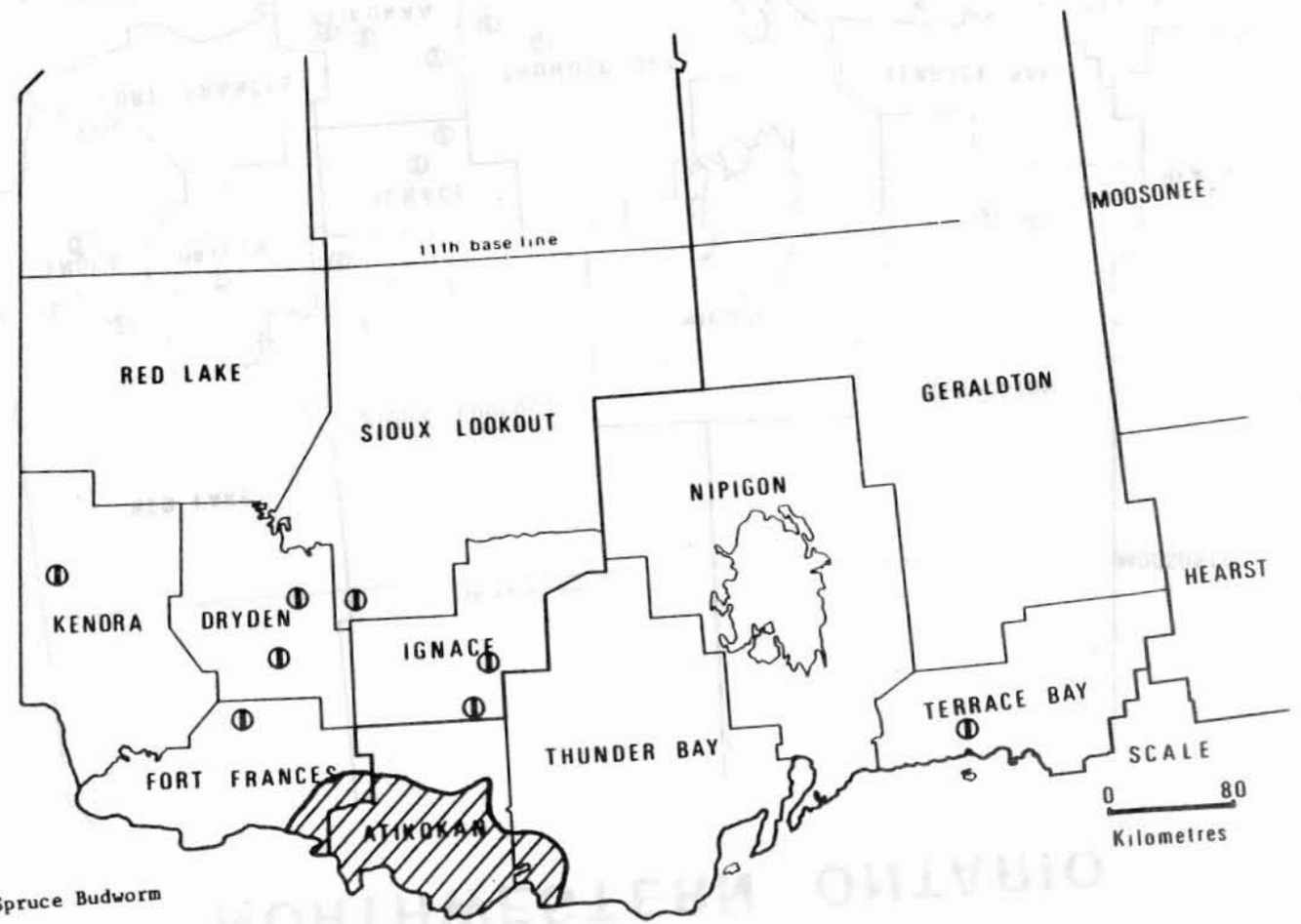
Spruce Budworm

Areas within which defoliation occurred in 1964

LEGEND

Light defoliation

NORTHWESTERN ONTARIO



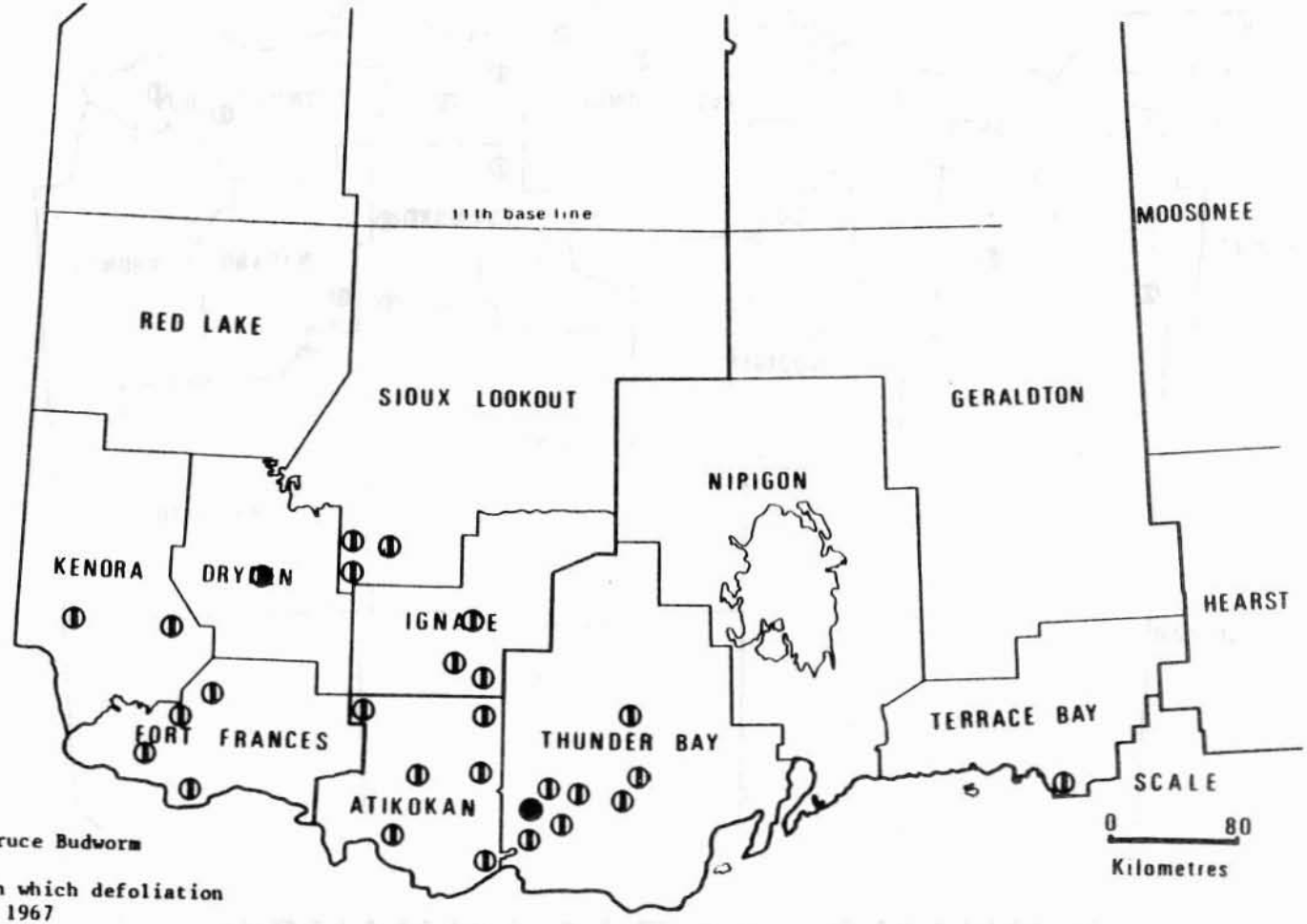
Spruce Budworm

Areas within which defoliation occurred in 1963

LEGEND

Light defoliation ◑ or ▨

NORTHWESTERN ONTARIO



Spruce Budworm

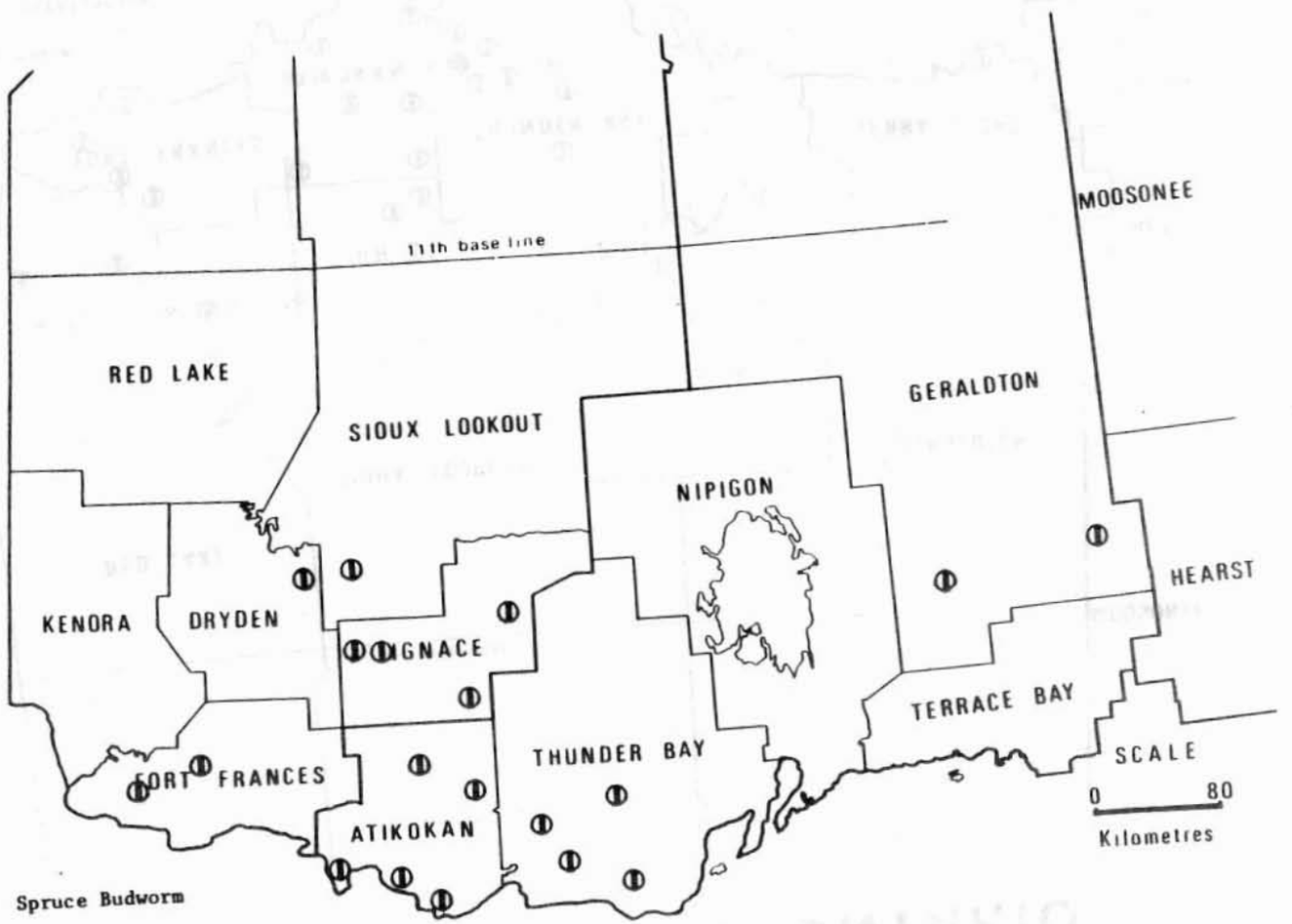
Areas within which defoliation occurred in 1967

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



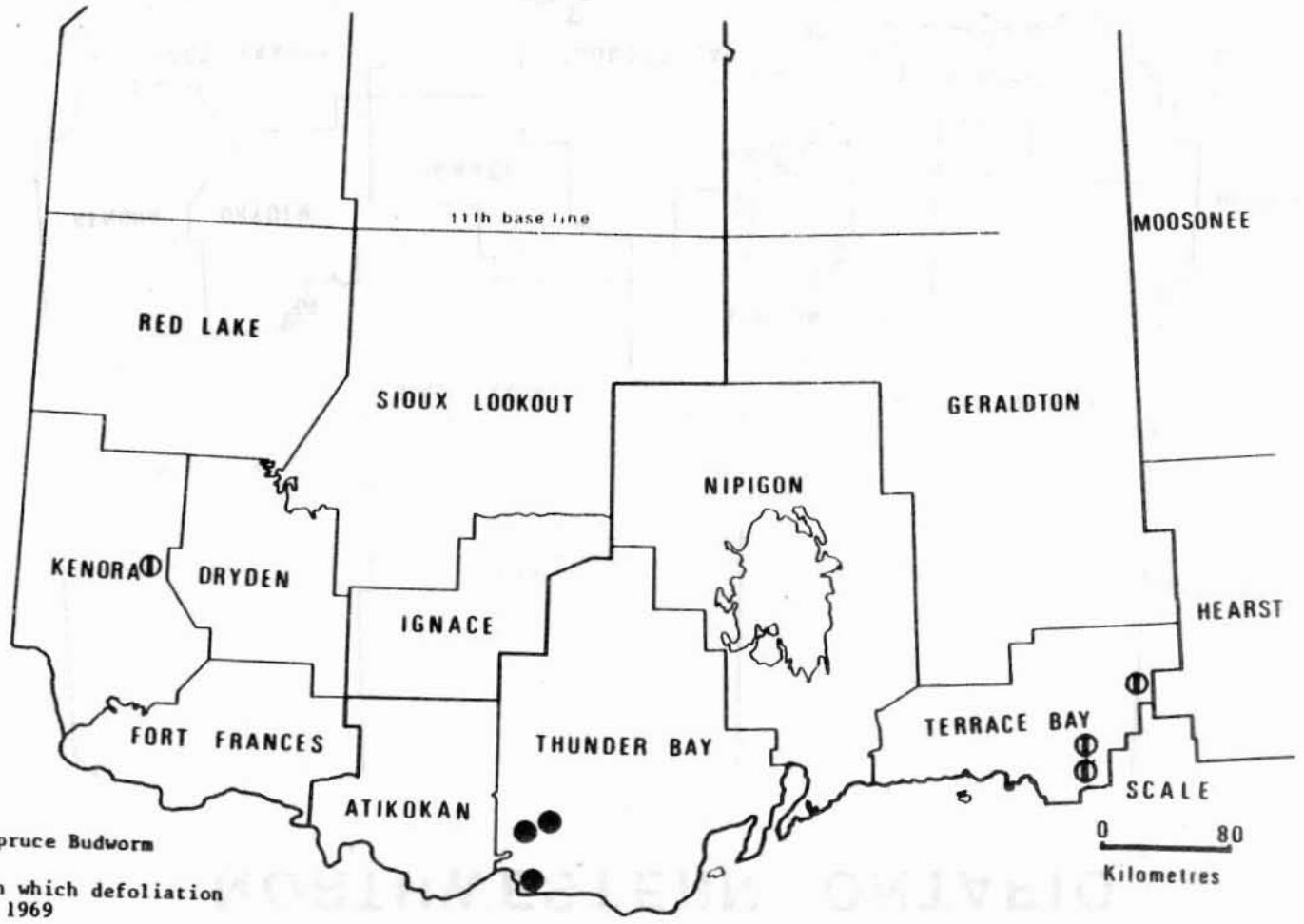
Spruce Budworm

Areas within which defoliation occurred in 1965

LEGEND

Light defoliation

NORTHWESTERN ONTARIO



Spruce Budworm

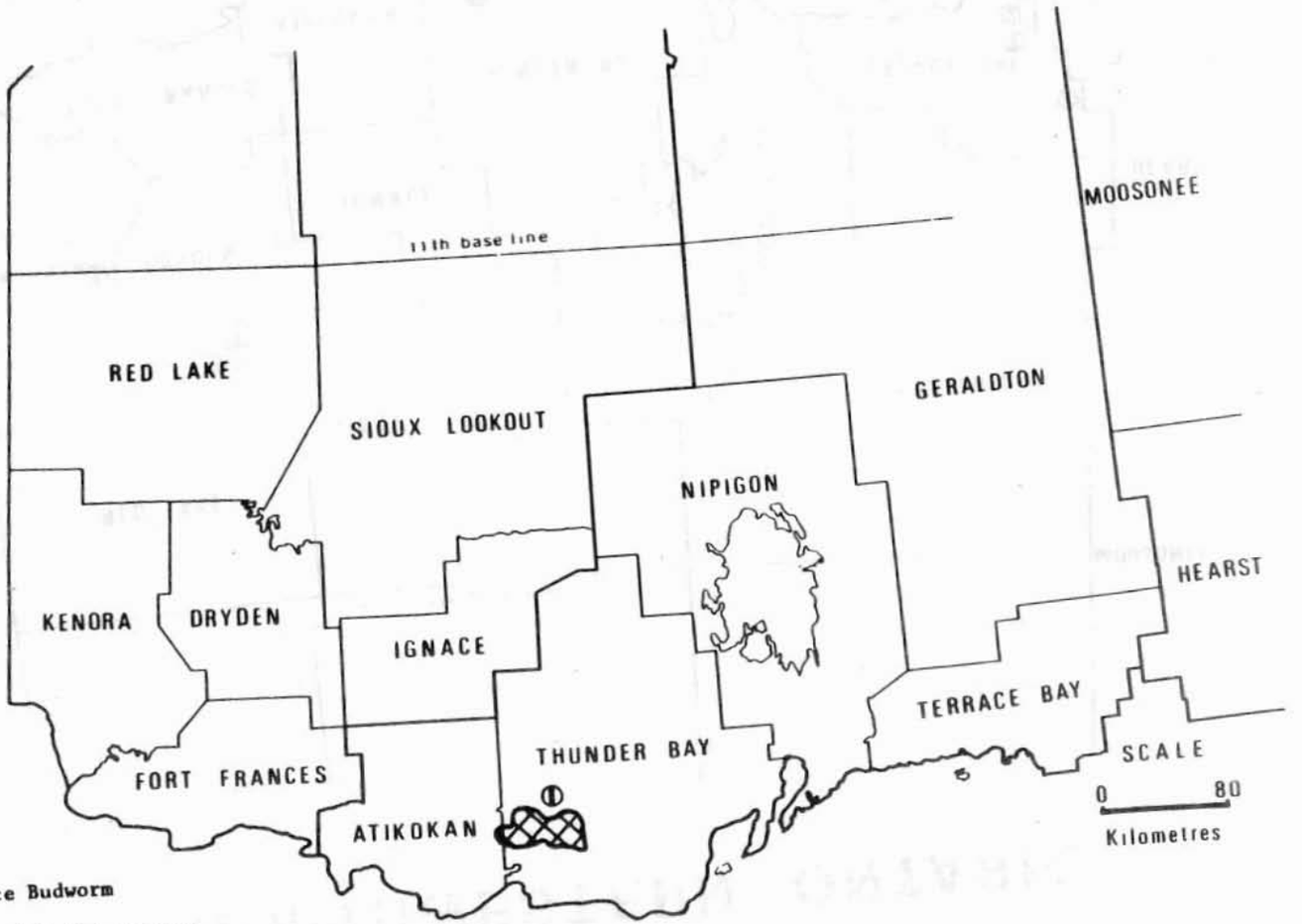
Areas within which defoliation occurred in 1969

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Spruce Budworm

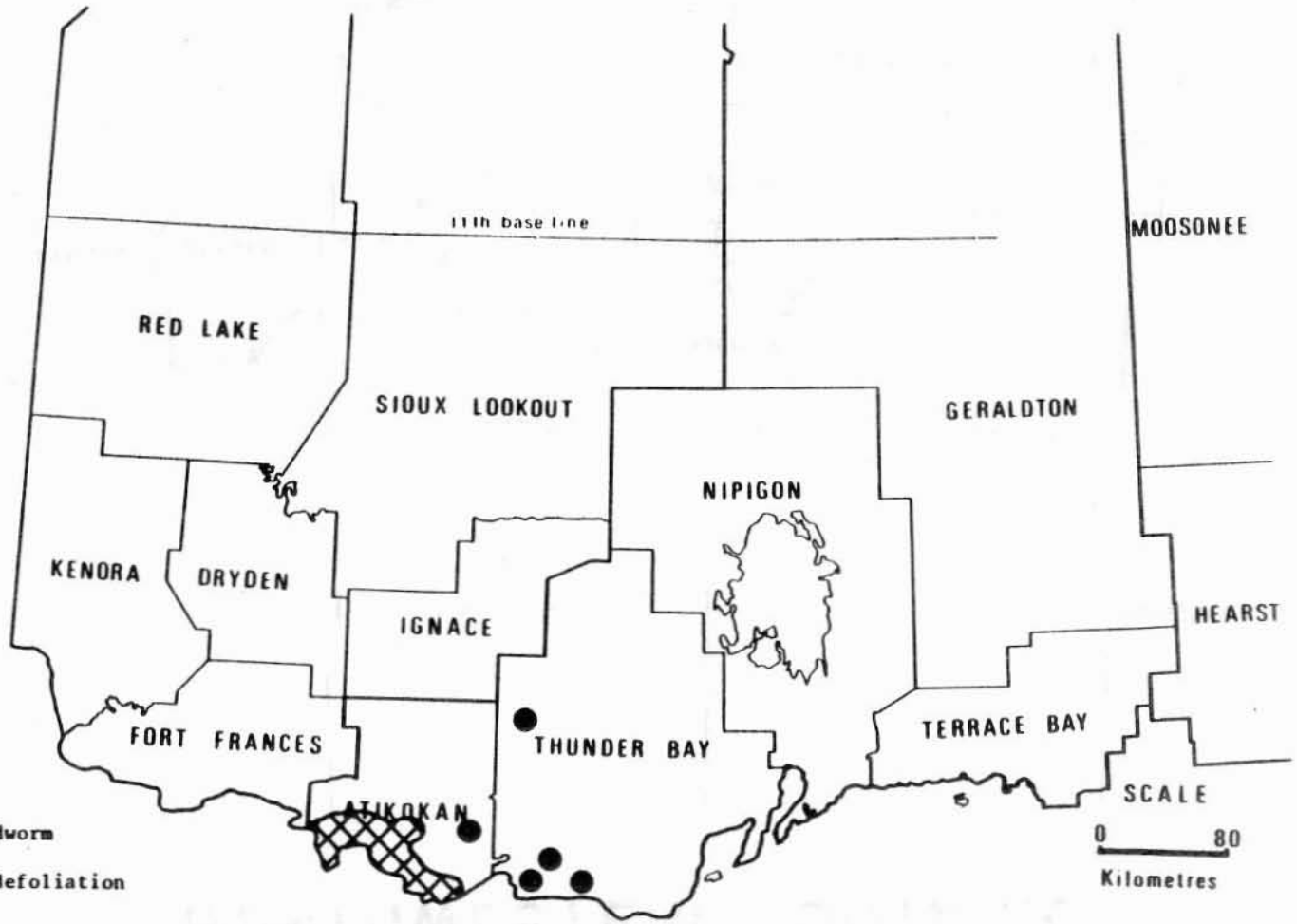
Areas within which defoliation occurred in 1968

LEGEND

Light defoliation ①

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



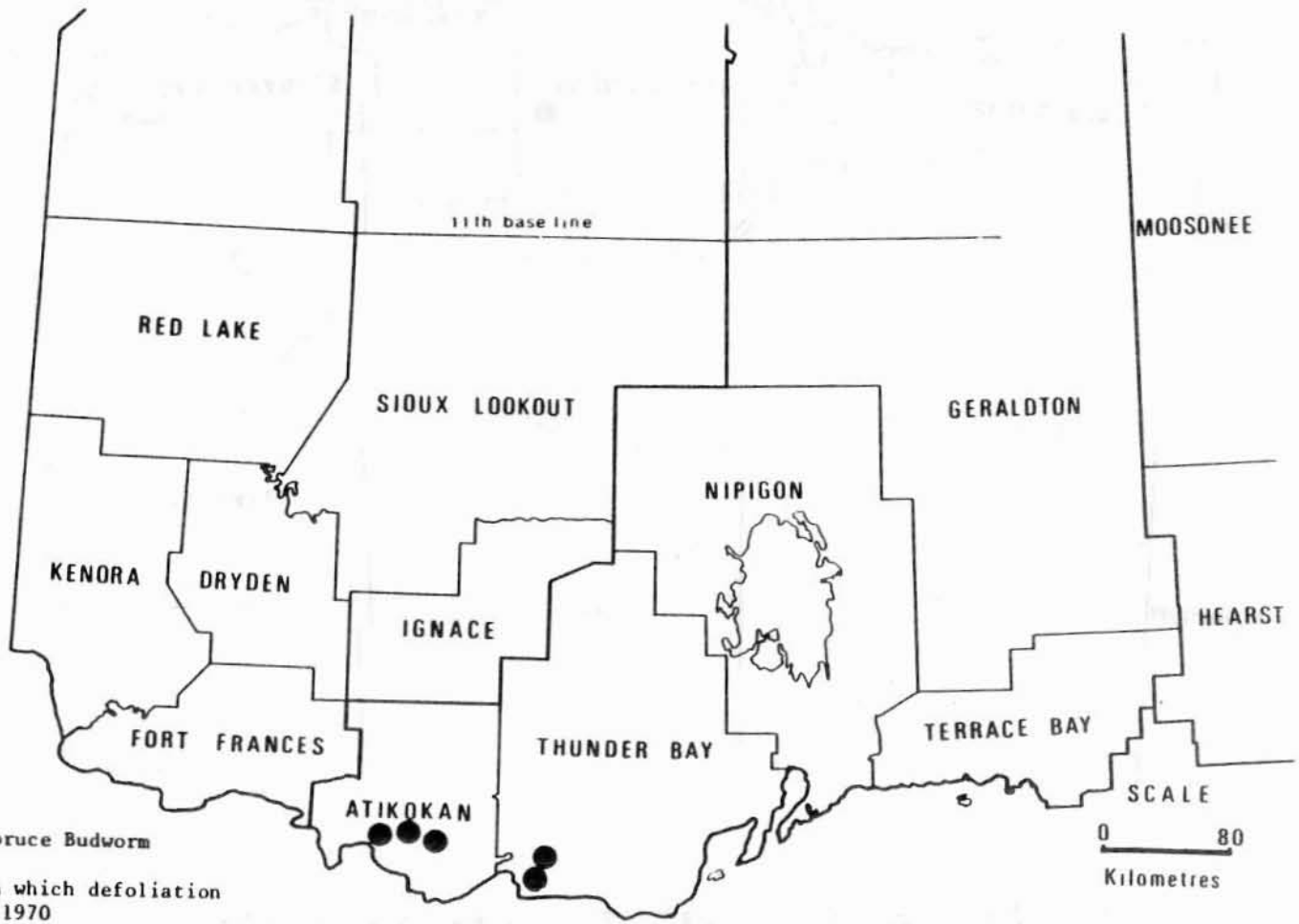
Spruce Budworm

Areas within which defoliation occurred in 1971

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



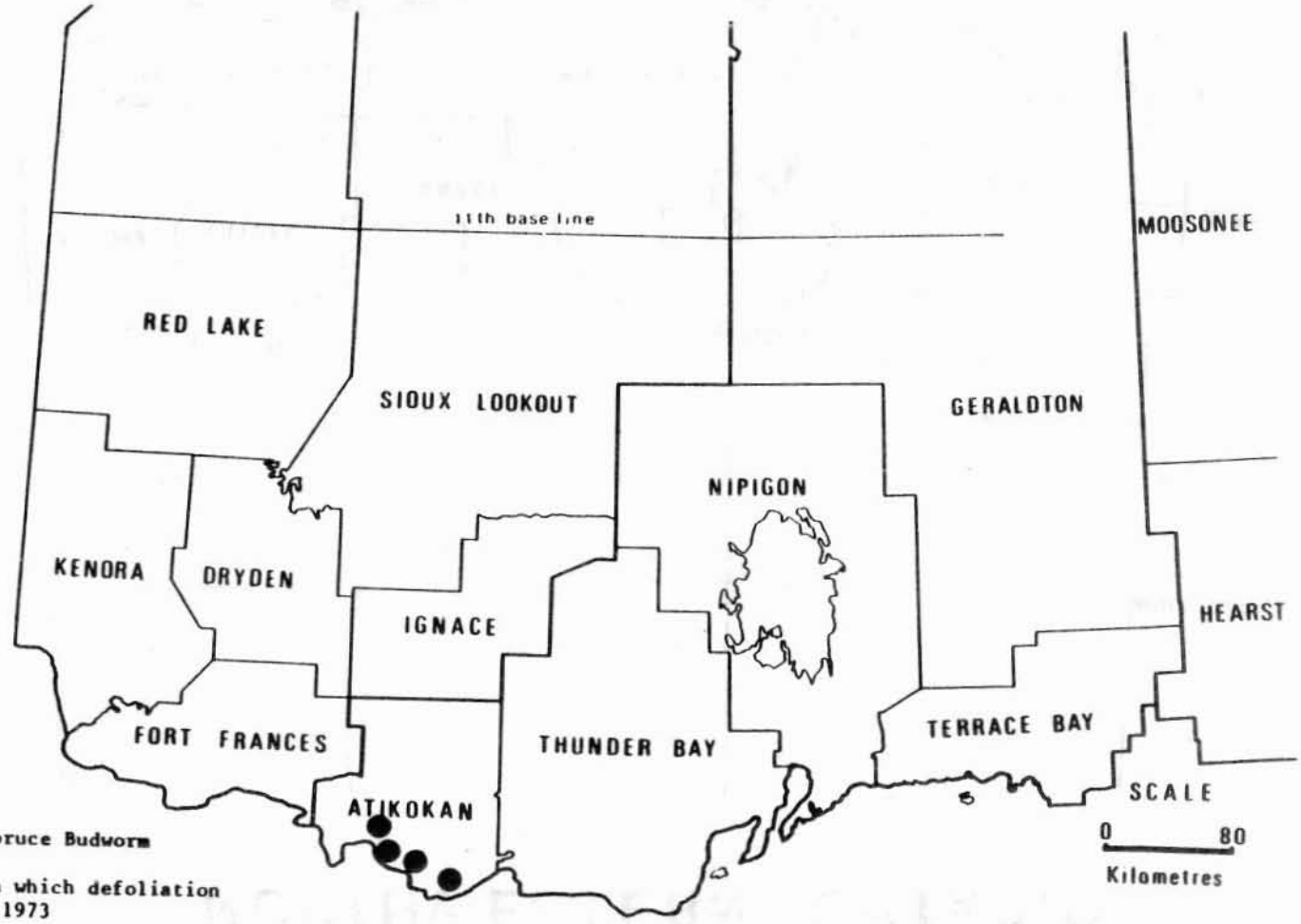
Spruce Budworm

Areas within which defoliation occurred in 1970

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



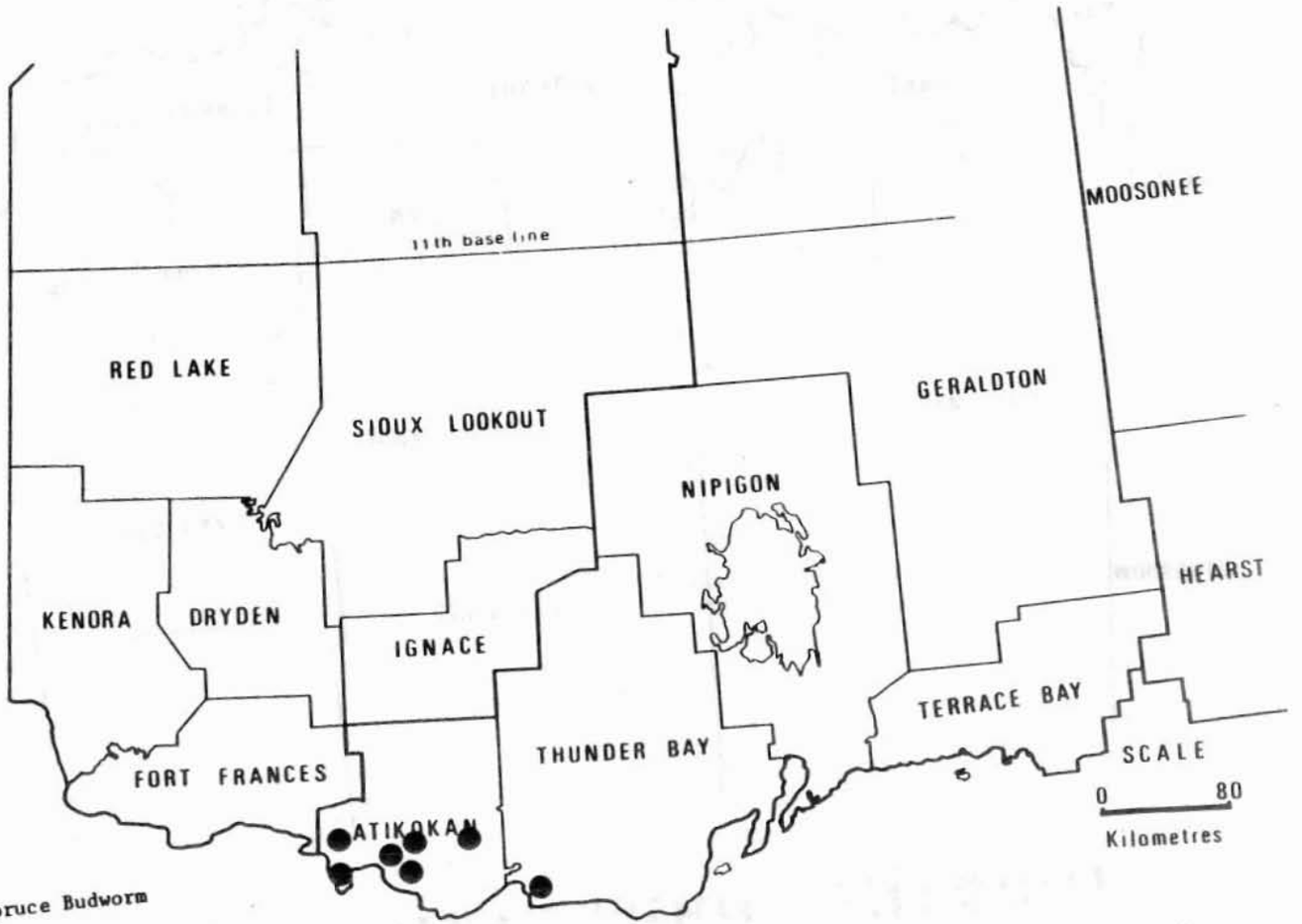
Spruce Budworm

Areas within which defoliation occurred in 1973

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



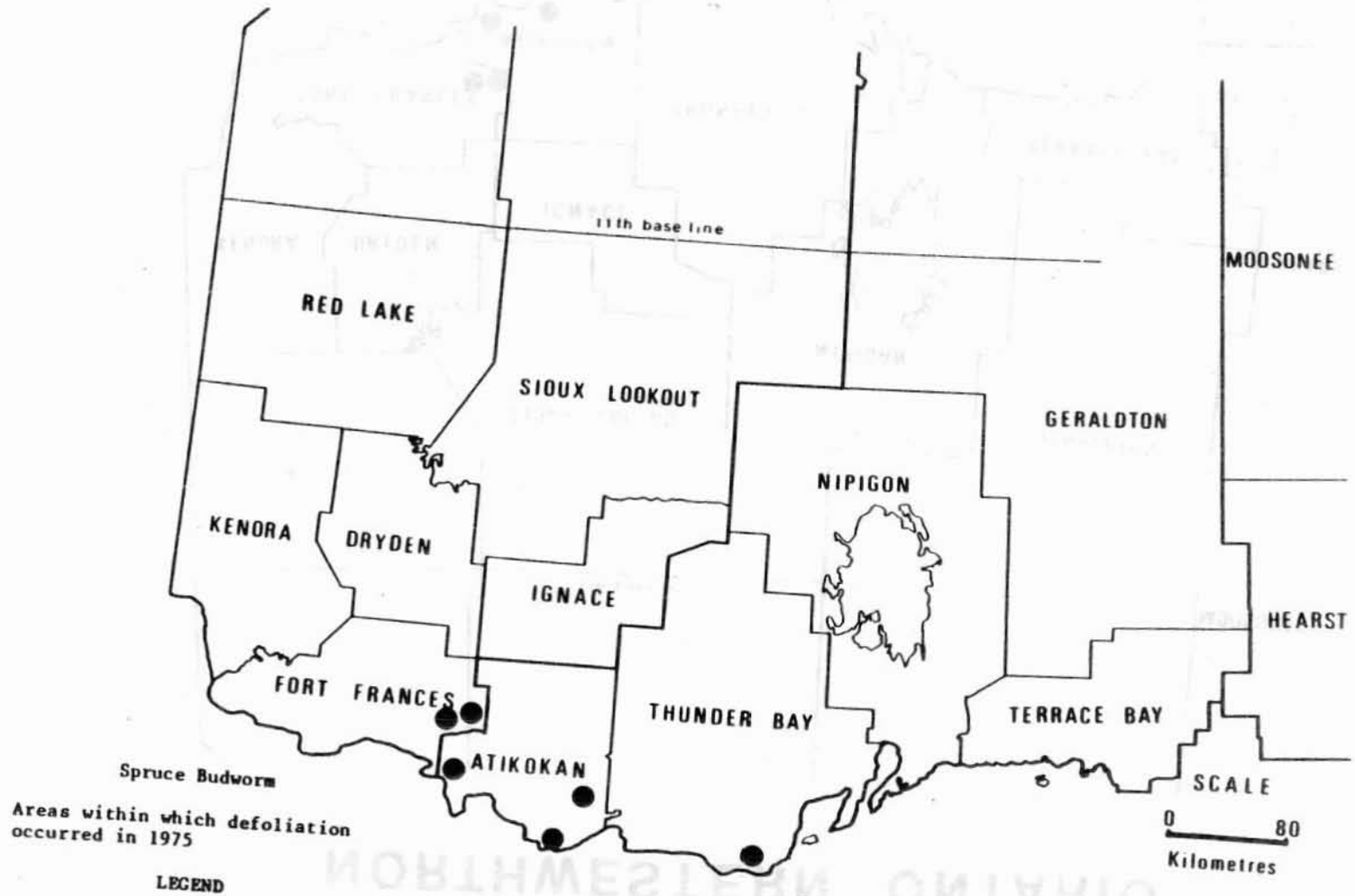
Spruce Budworm

Areas within which defoliation occurred in 1972

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Spruce Budworm

Areas within which defoliation occurred in 1975

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO

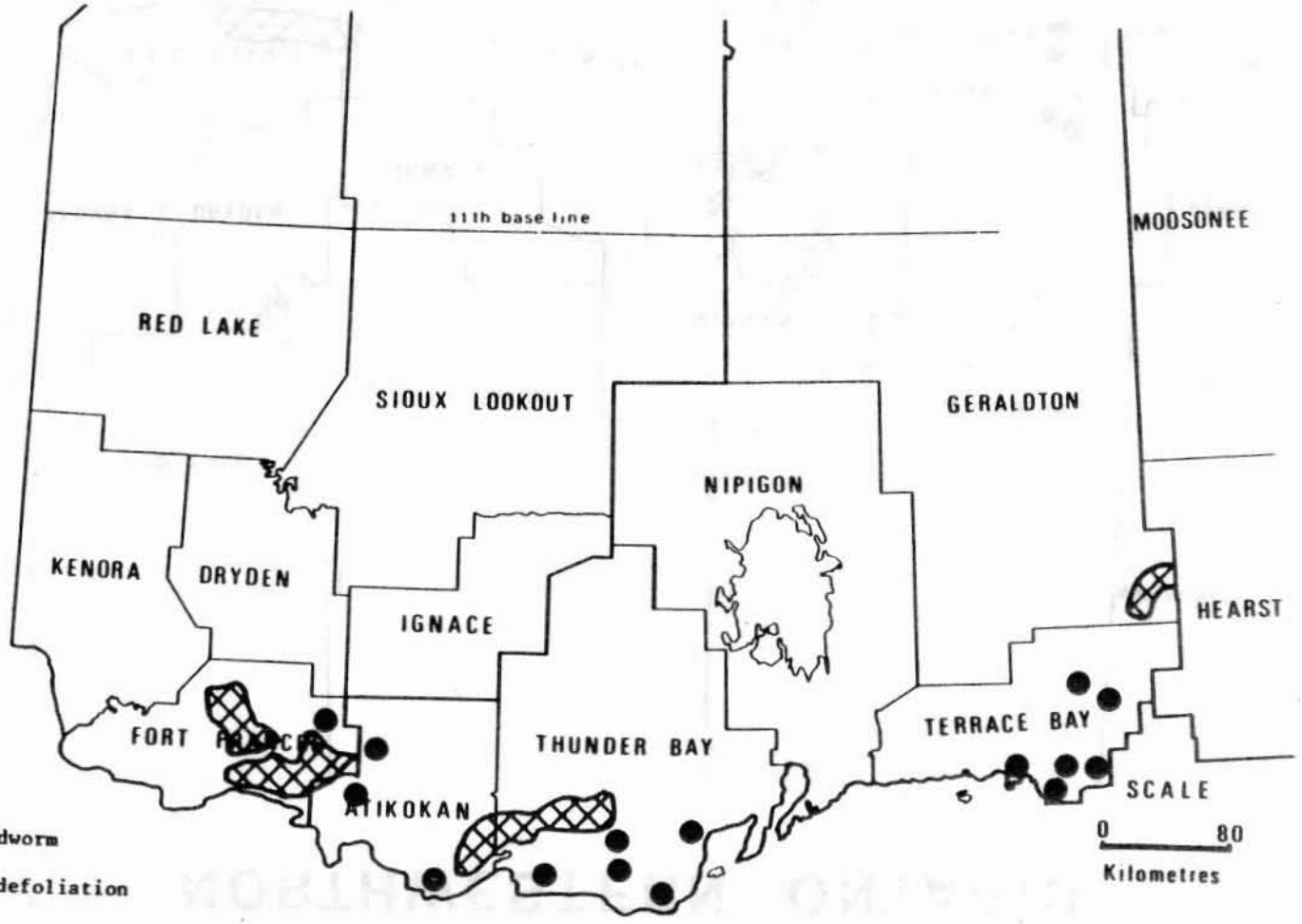
Spruce Budworm

Areas within which defoliation occurred in 1974

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



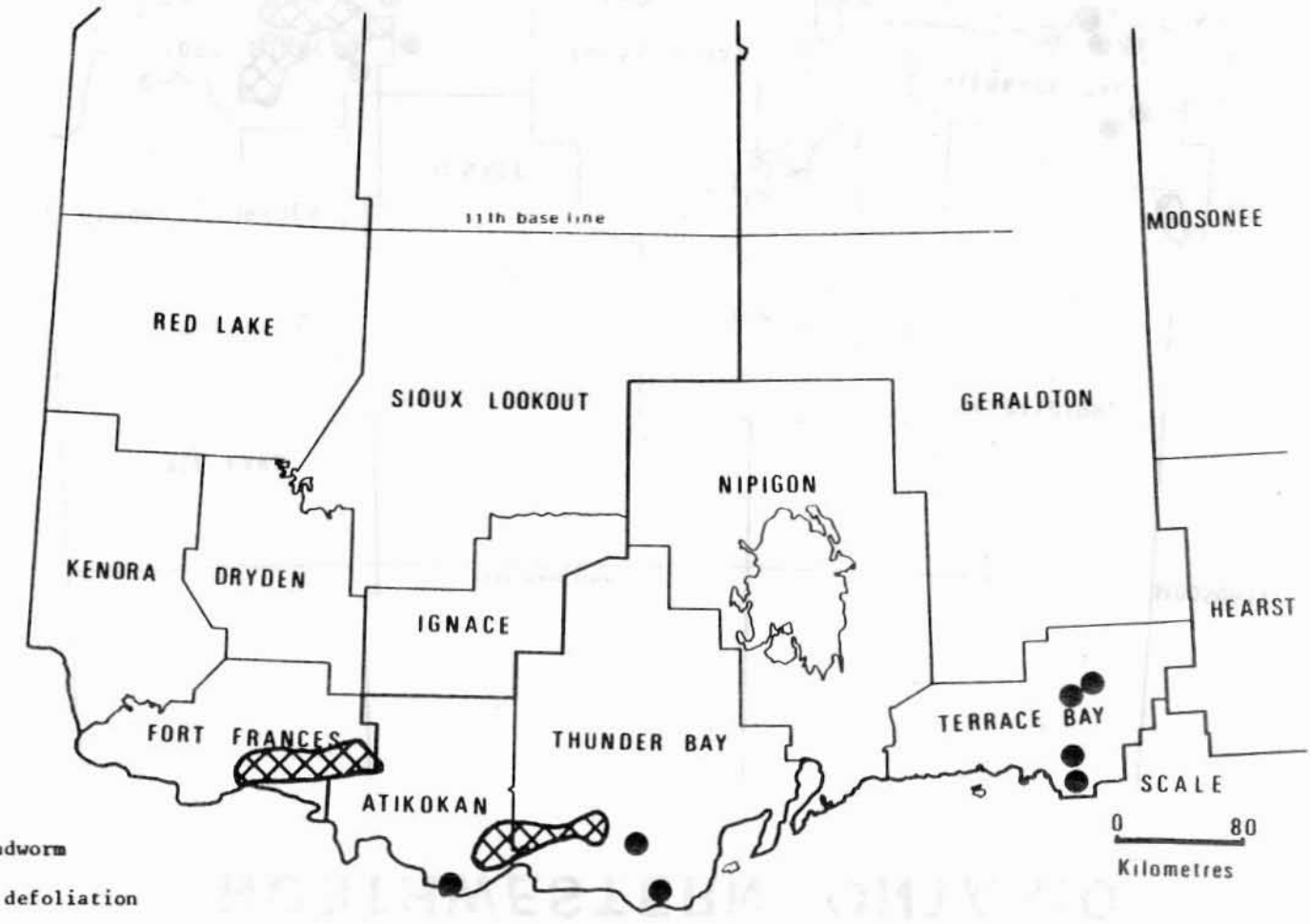
Spruce Budworm

Areas within which defoliation occurred in 1977

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



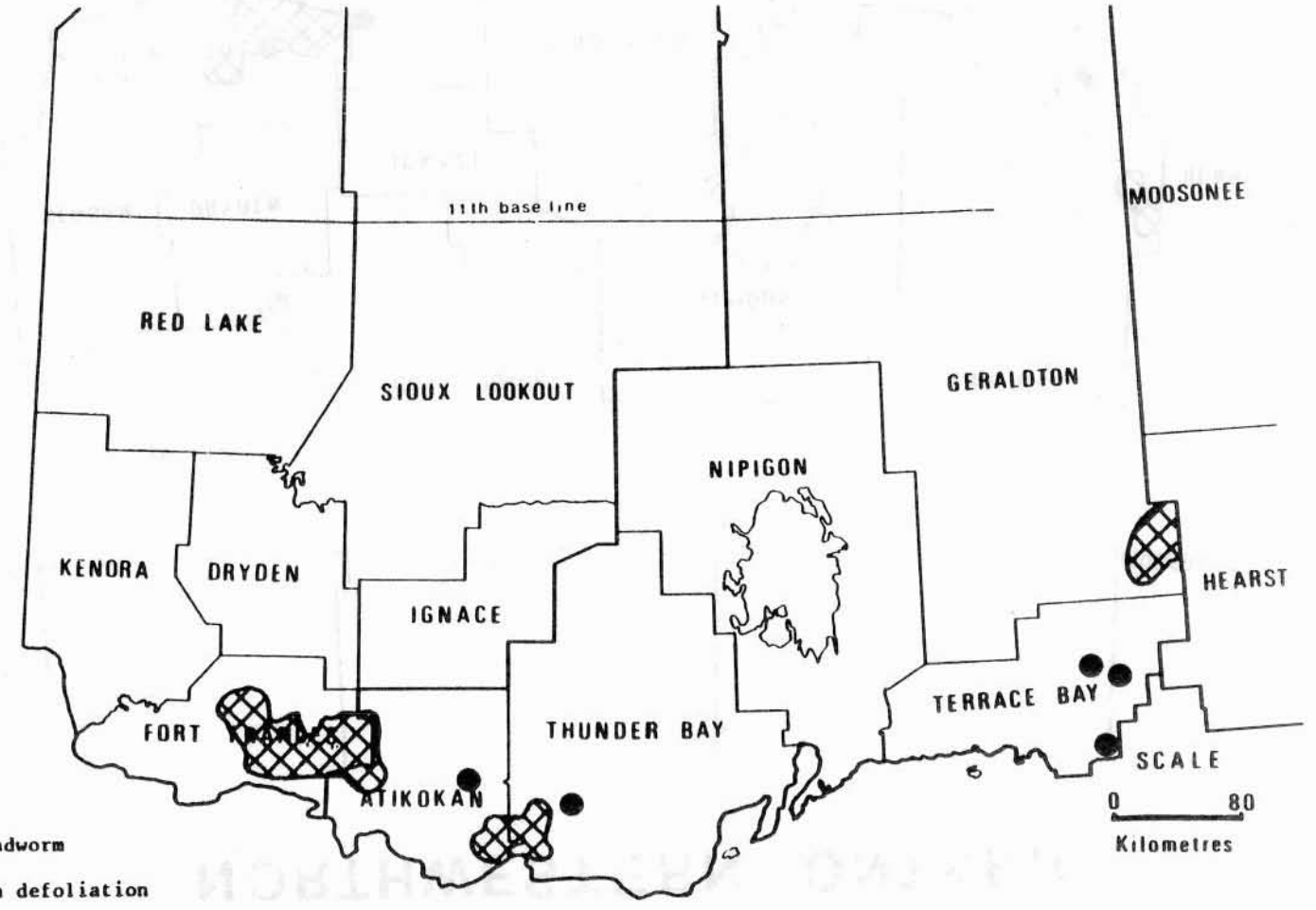
Spruce Budworm

Areas within which defoliation occurred in 1976

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



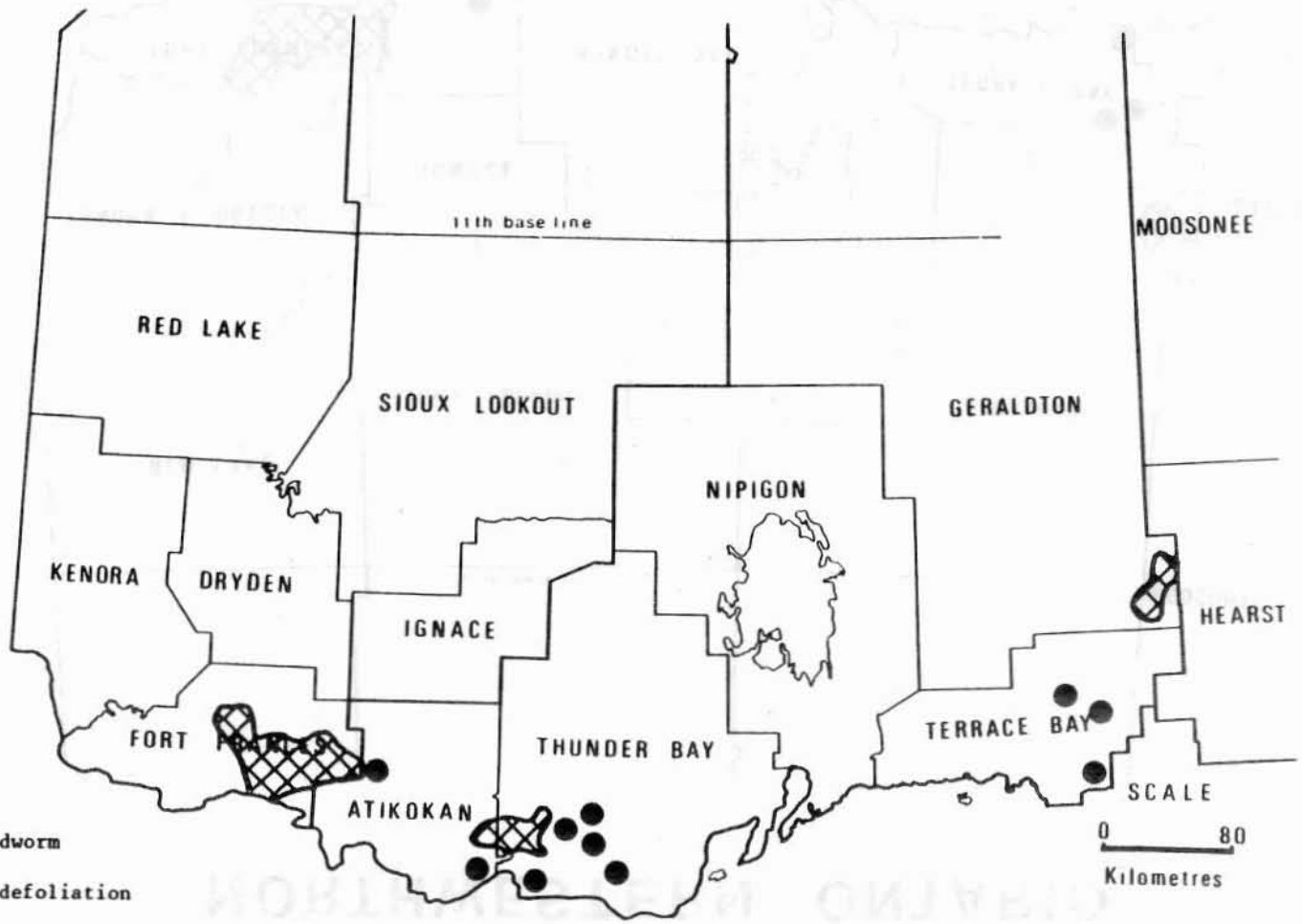
Spruce Budworm

Areas within which defoliation occurred in 1979

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

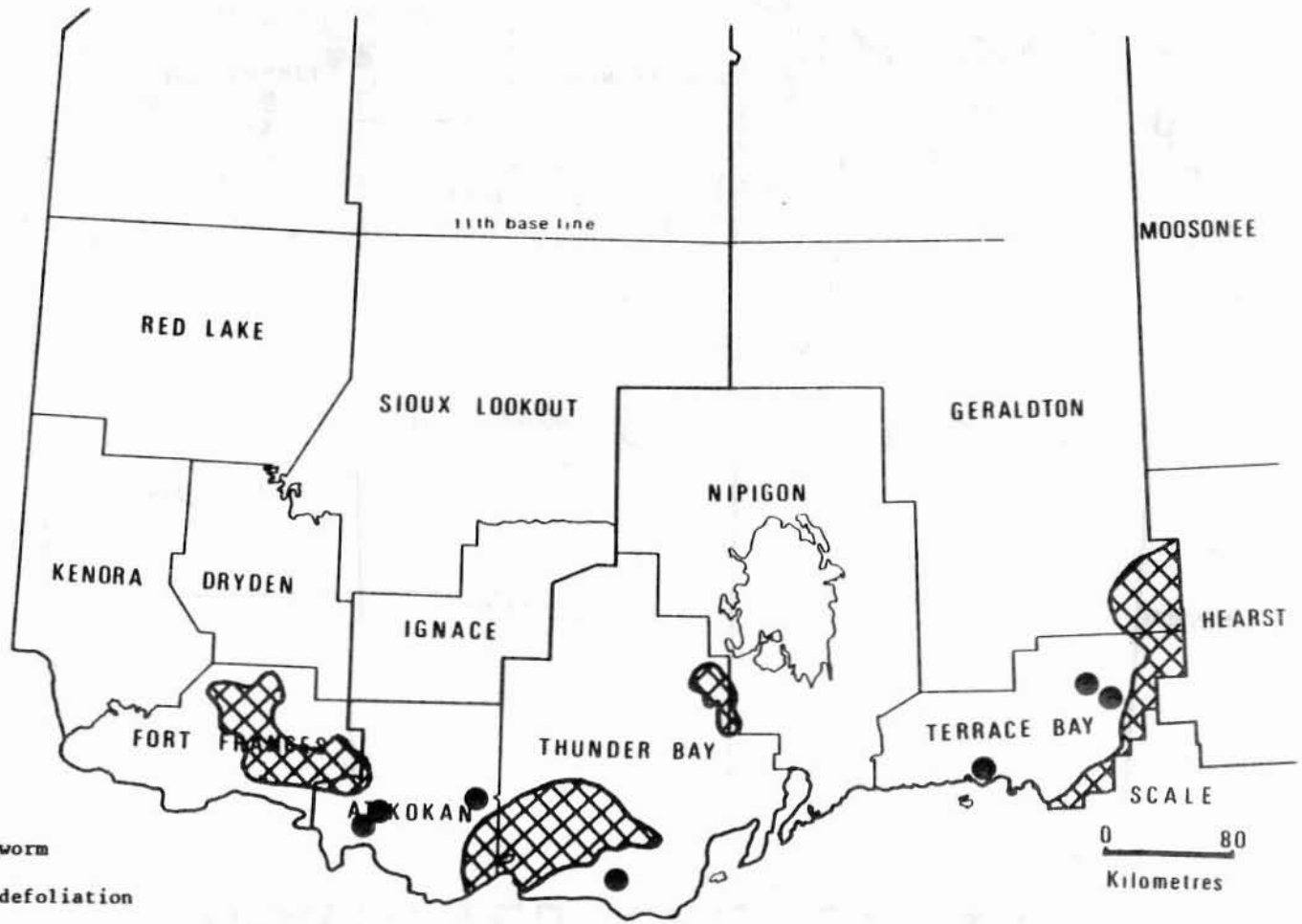
Spruce Budworm

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

LEGEND

Mortality ●

NORTHWESTERN ONTARIO



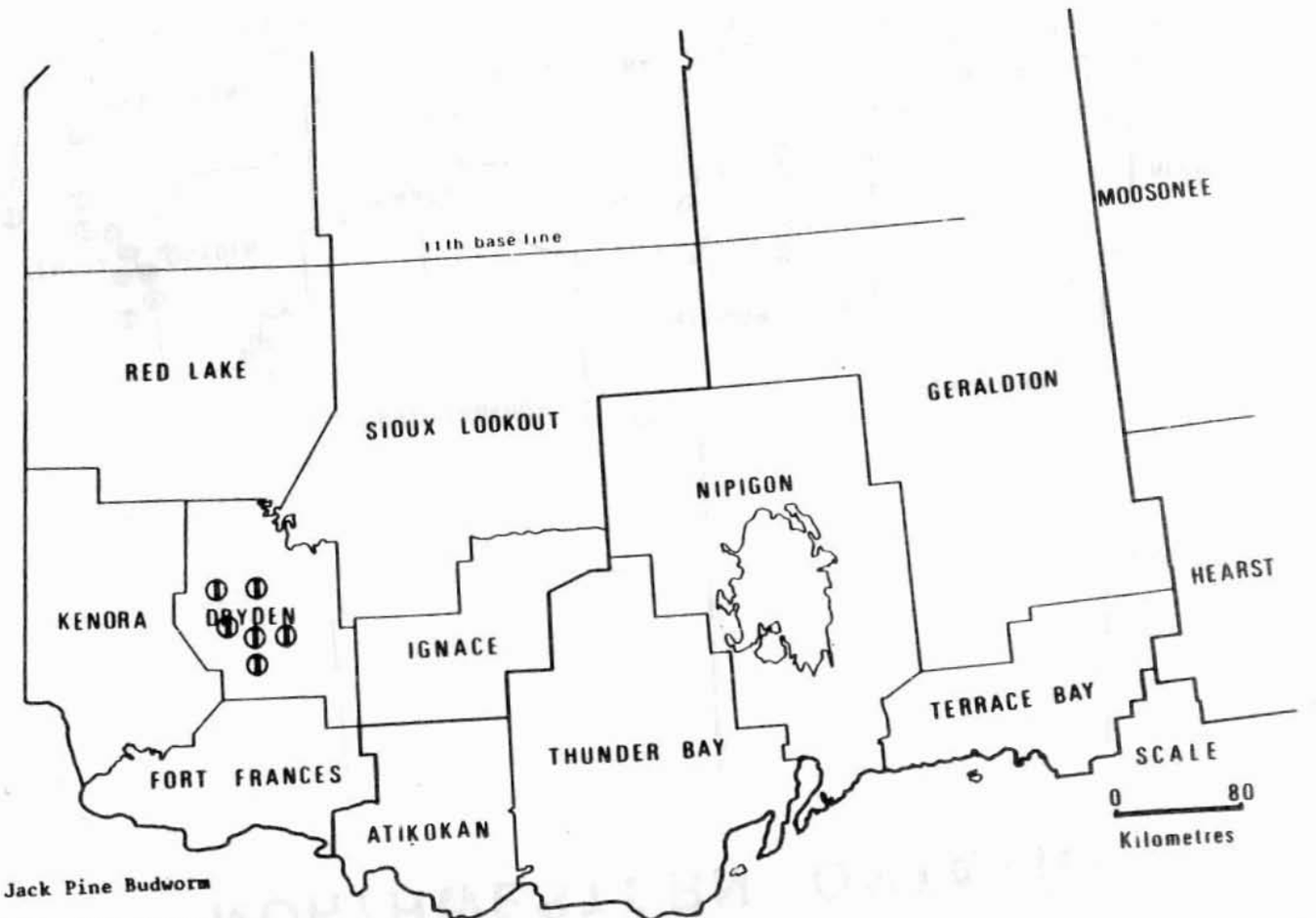
Spruce Budworm

Areas within which defoliation occurred in 1980

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



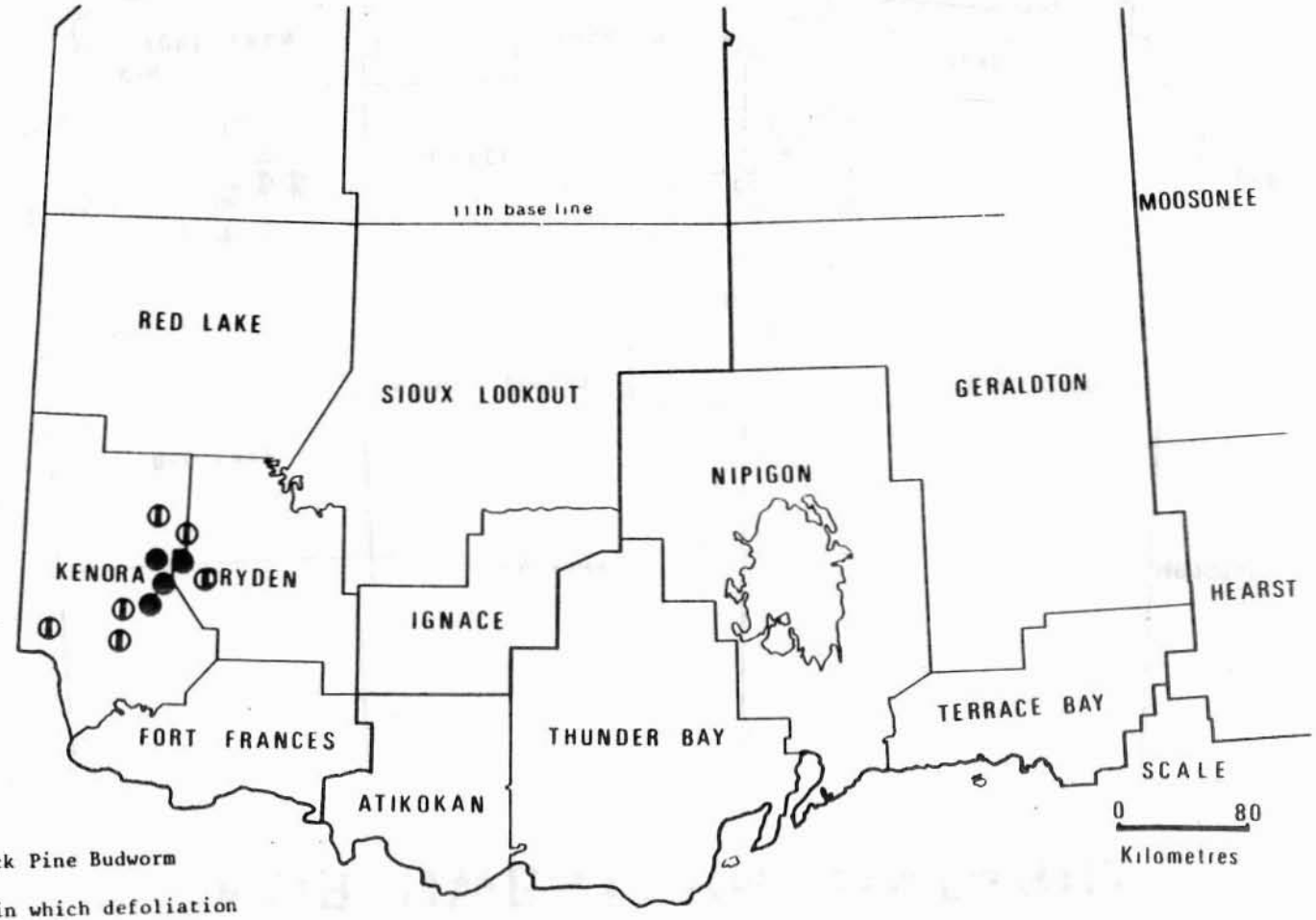
Jack Pine Budworm

Areas within which defoliation occurred in 1951

LEGEND

Light defoliation ①

NORTHWESTERN ONTARIO



Jack Pine Budworm

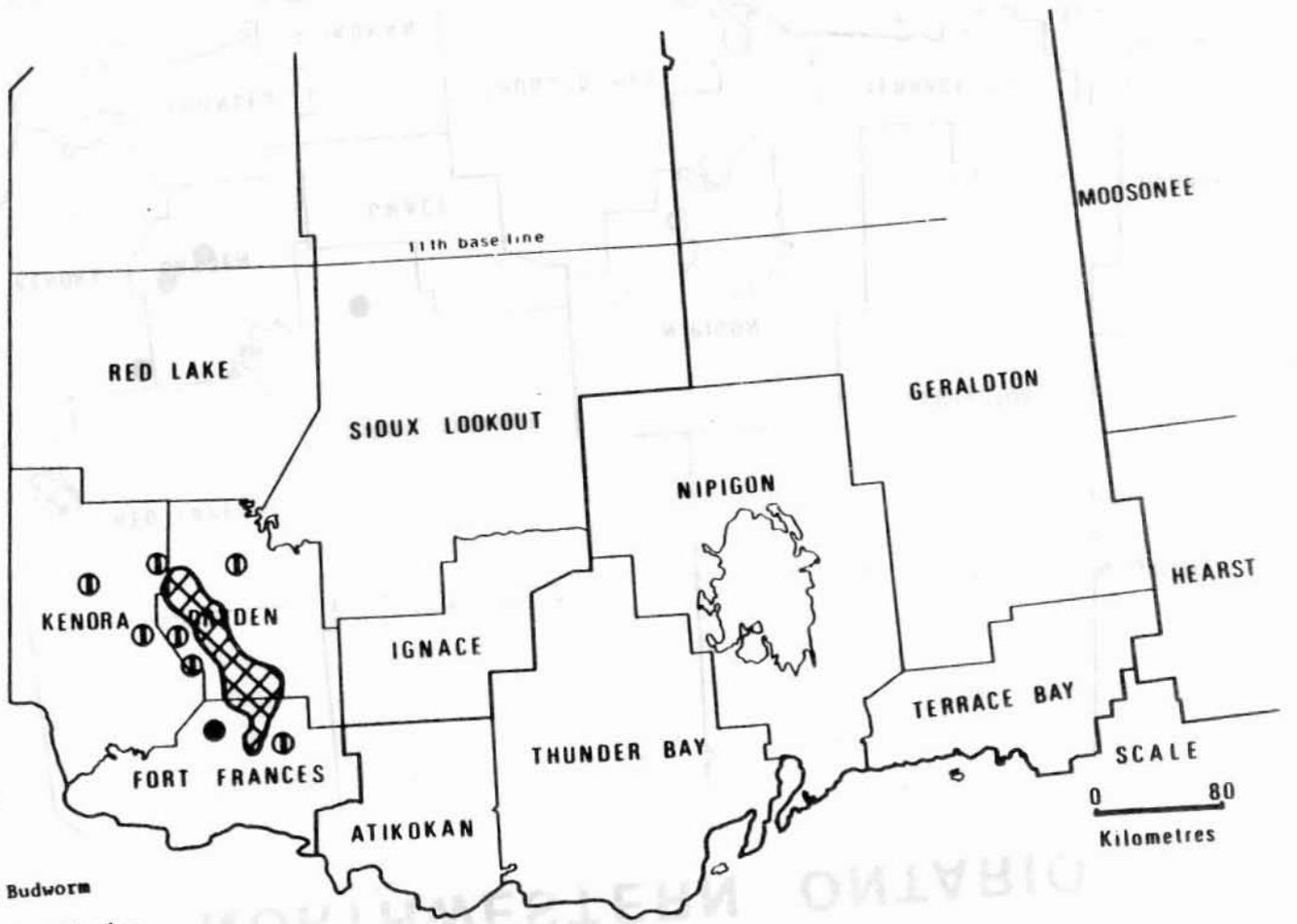
Areas within which defoliation occurred in 1950

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Jack Pine Budworm

Areas within which defoliation occurred in 1961

LEGEND

Light defoliation ◐ or

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO

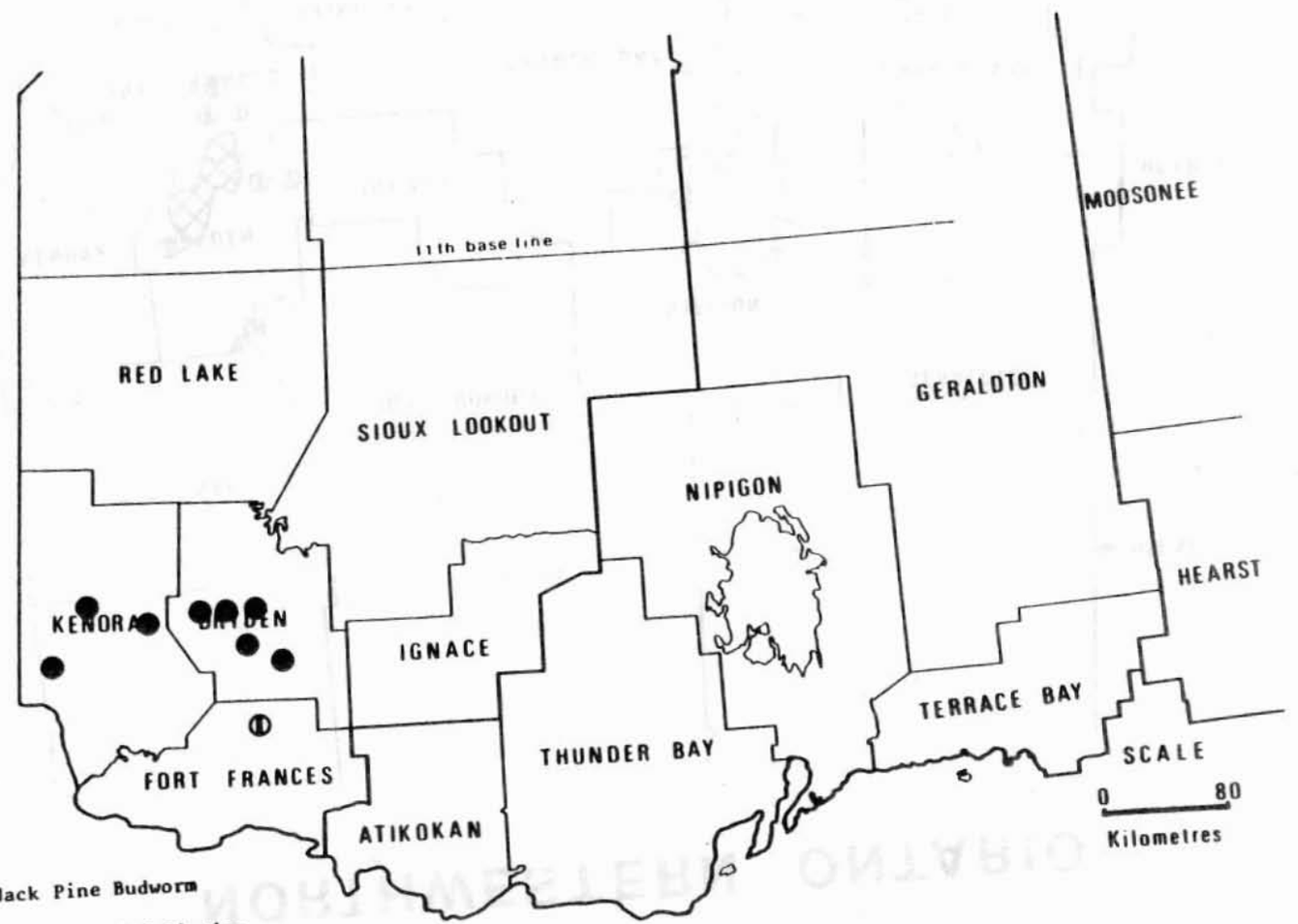
Jack Pine Budworm

Areas within which defoliation occurred in 1954

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Jack Pine Budworm

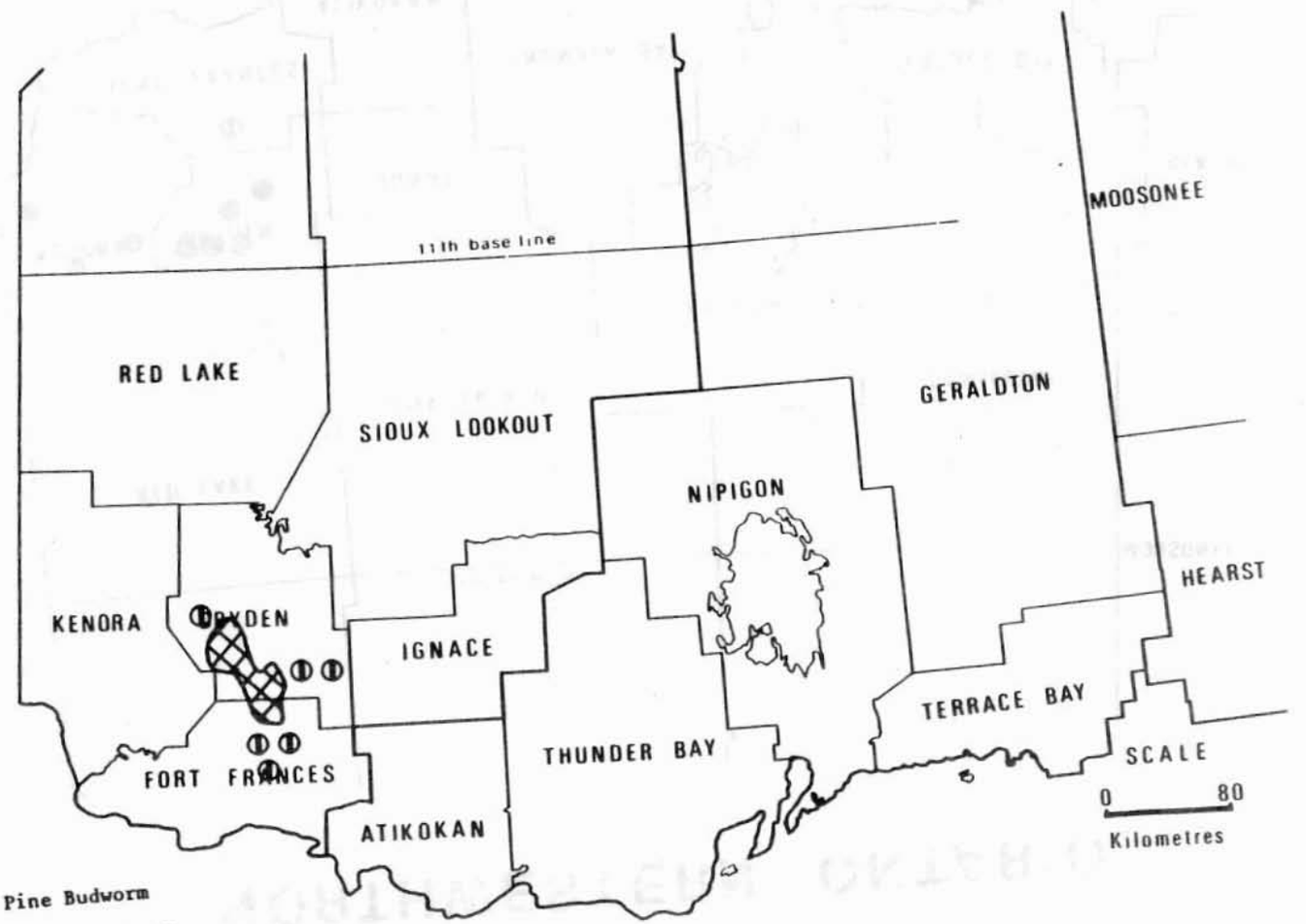
Areas within which defoliation occurred in 1965

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Jack Pine Budworm

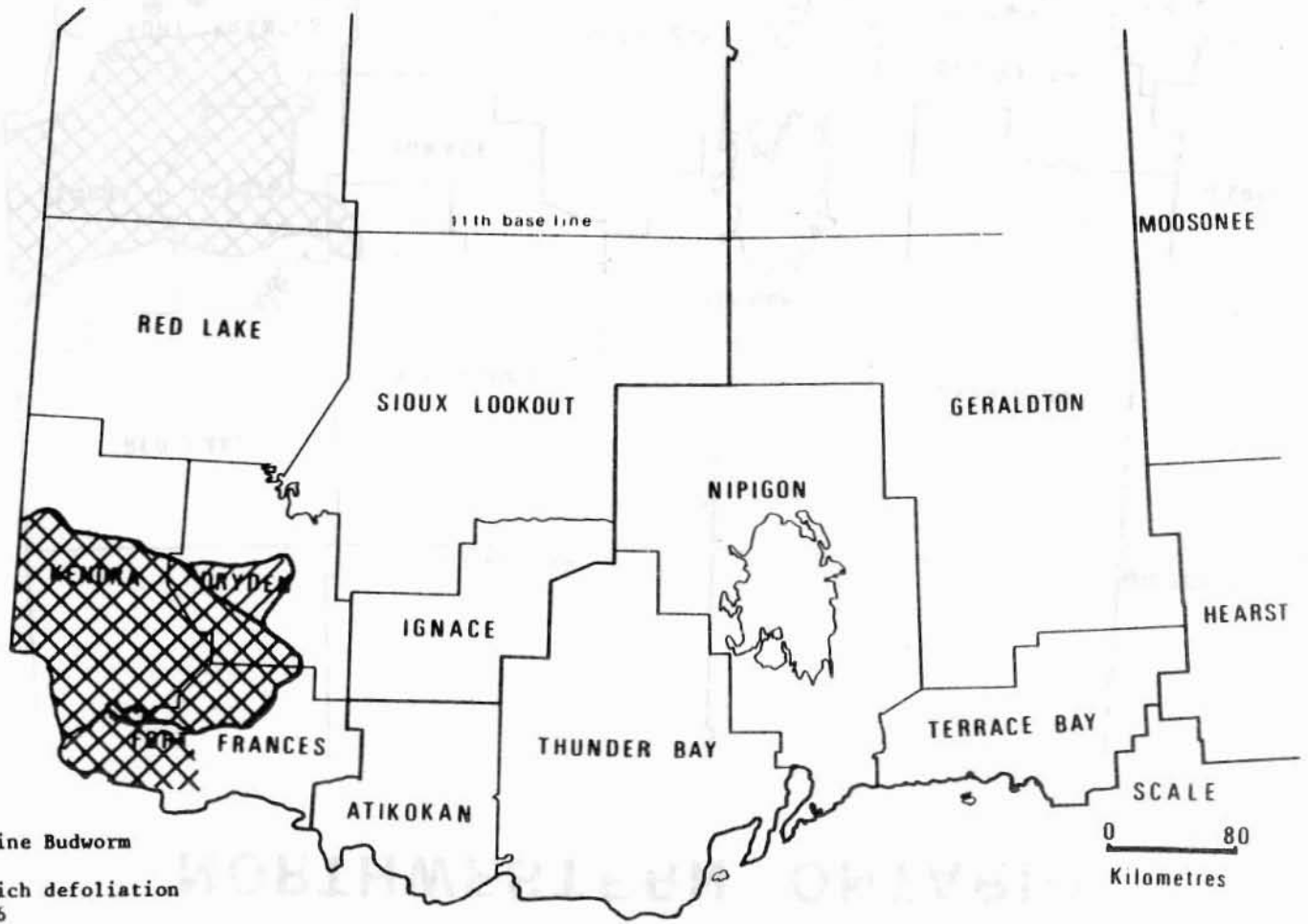
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ①

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Jack Pine Budworm

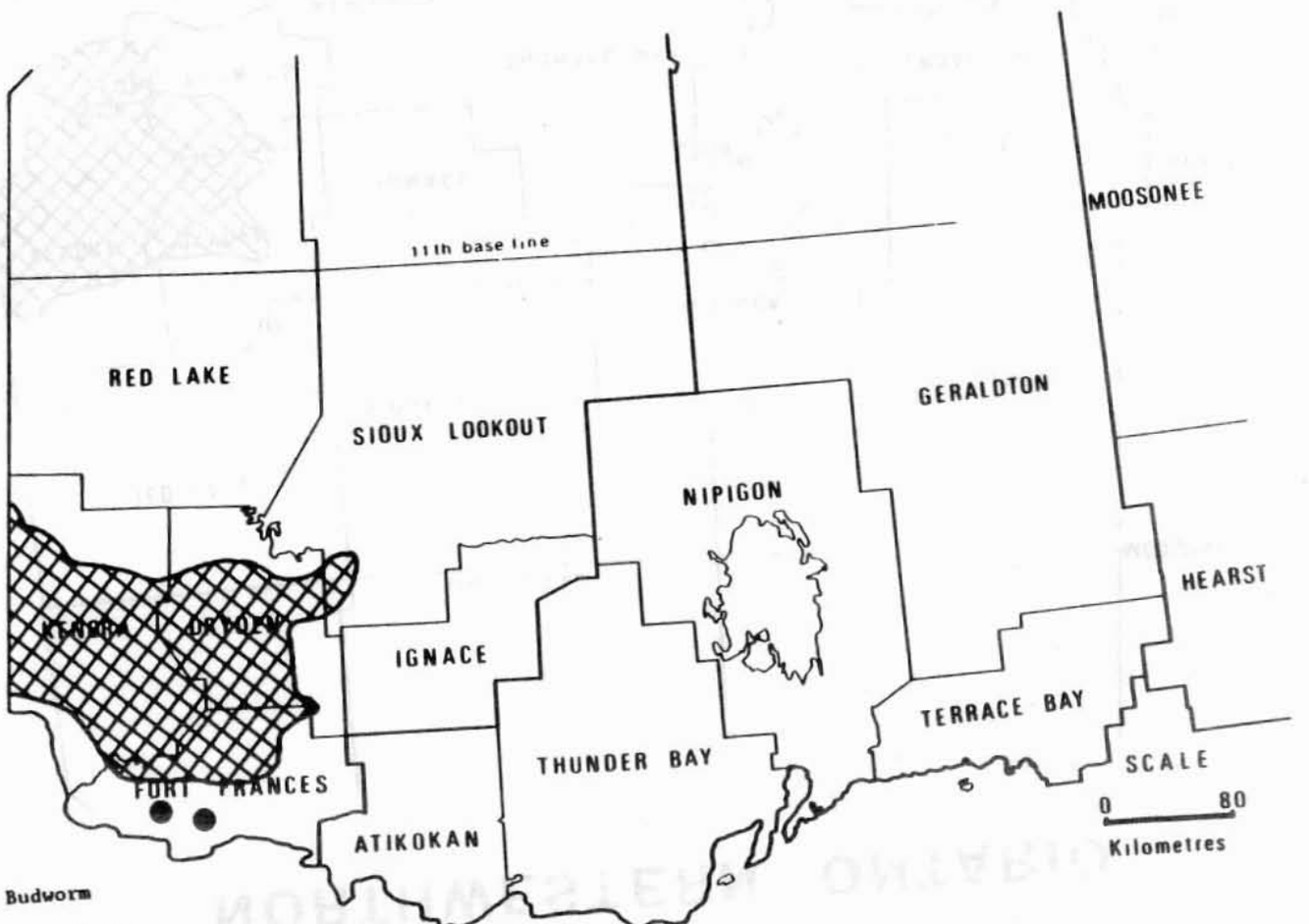
Areas within which defoliation occurred in 1966

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



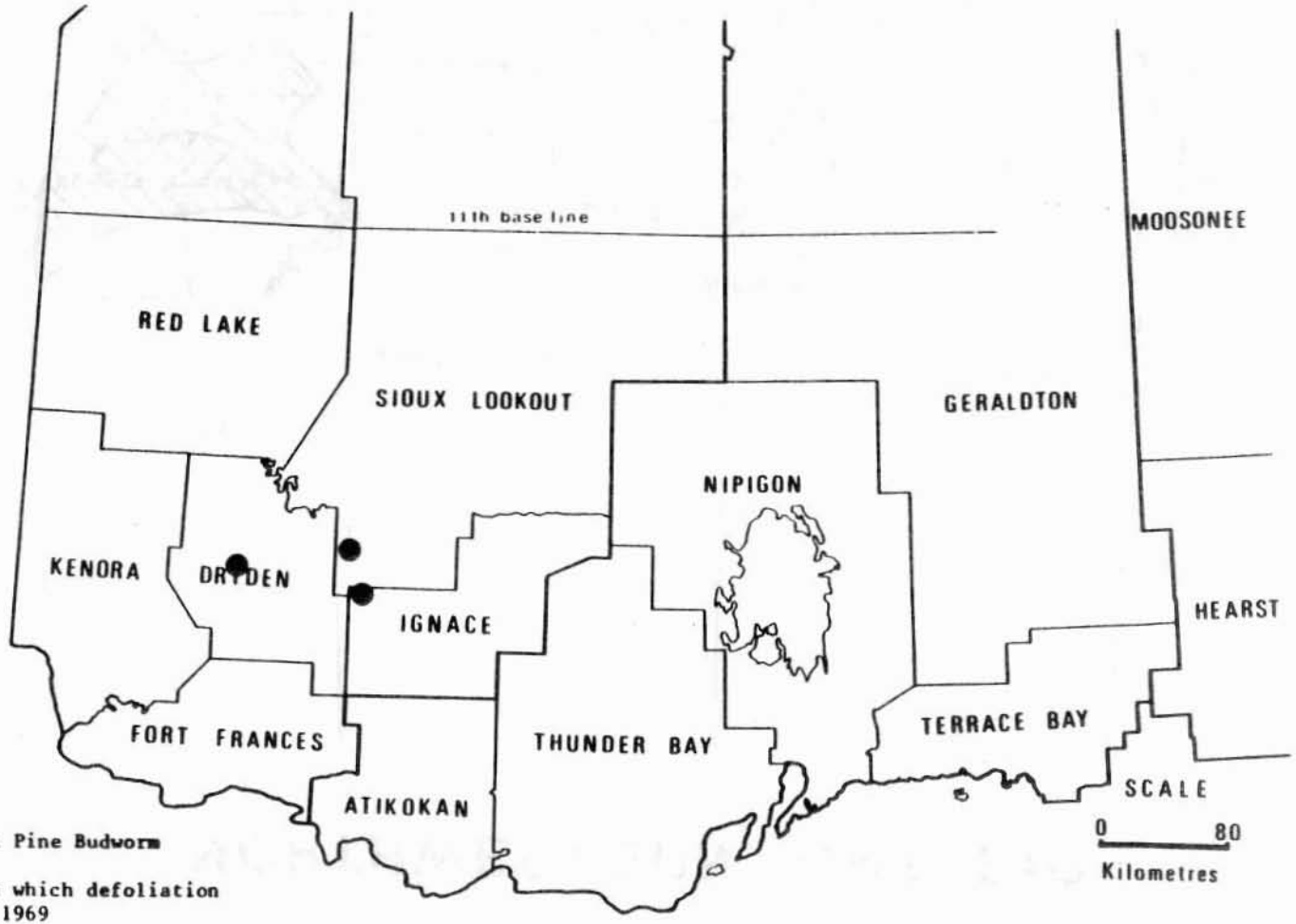
Jack Pine Budworm

Areas within which defoliation occurred in 1967

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



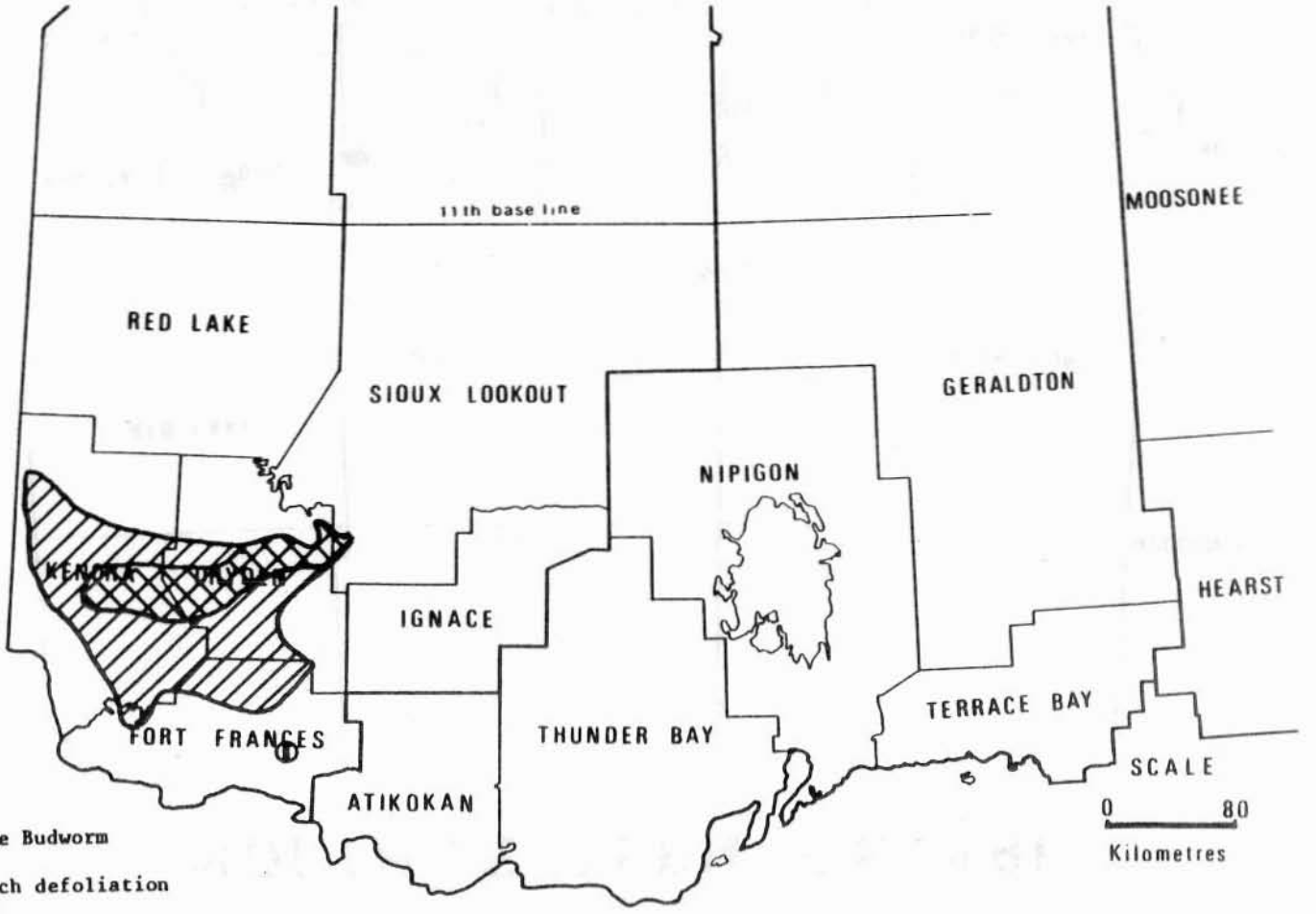
Jack Pine Budworm

Areas within which defoliation occurred in 1969

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Jack Pine Budworm

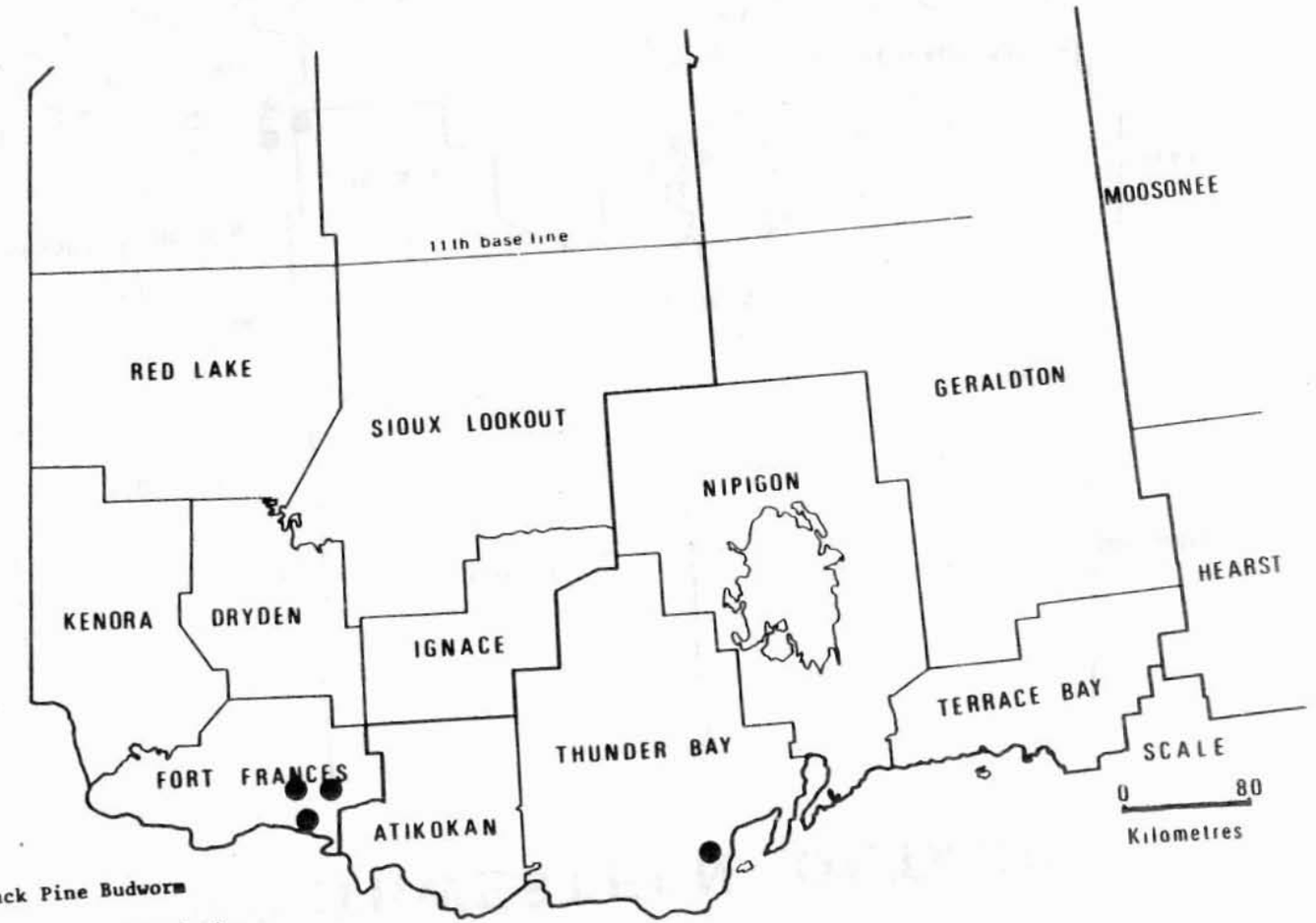
Areas within which defoliation occurred in 1968

LEGEND

Light defoliation ① or

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



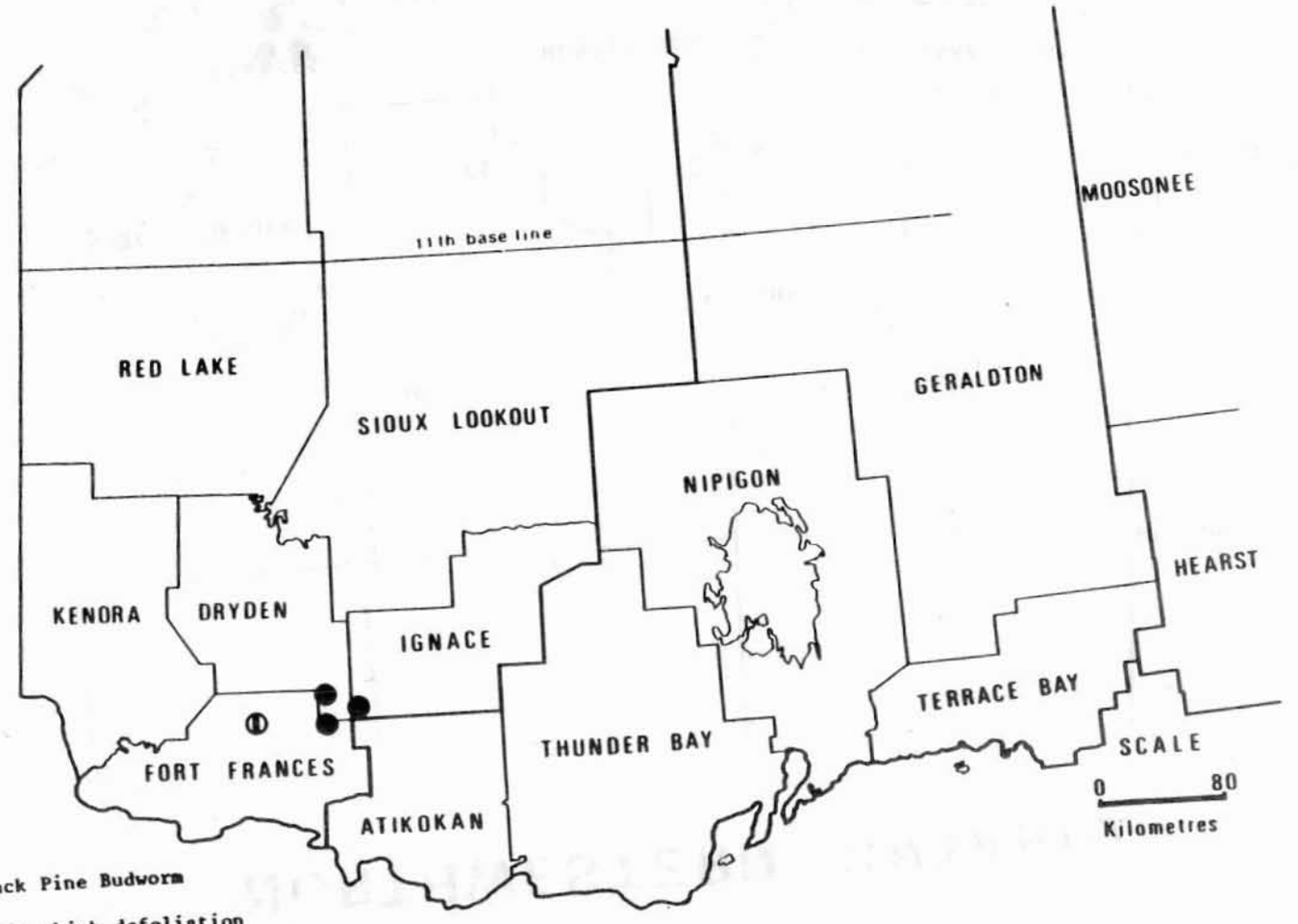
Jack Pine Budworm

Areas within which defoliation occurred in 1970

LEGEND

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Jack Pine Budworm

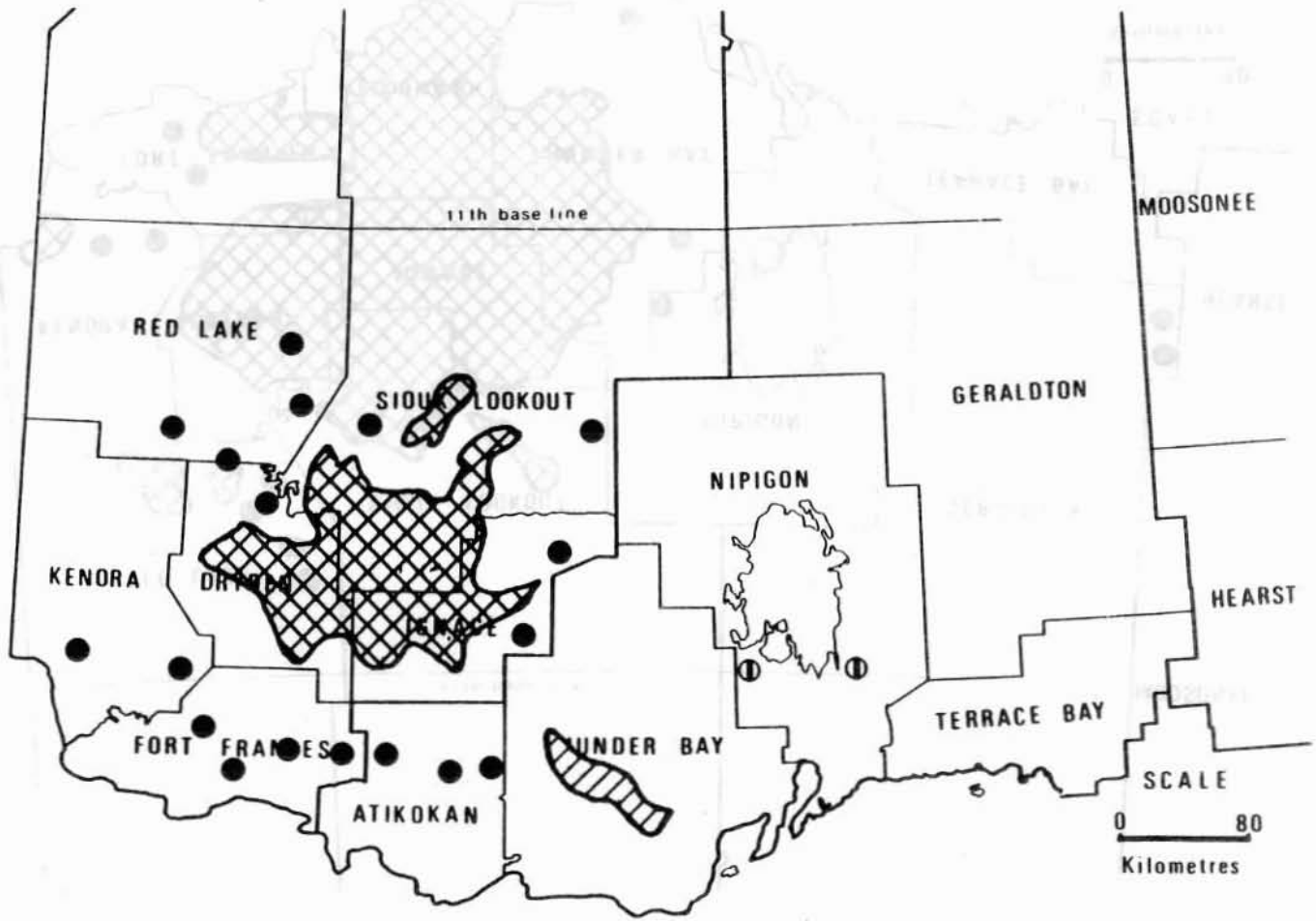
Areas within which defoliation occurred in 1971

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

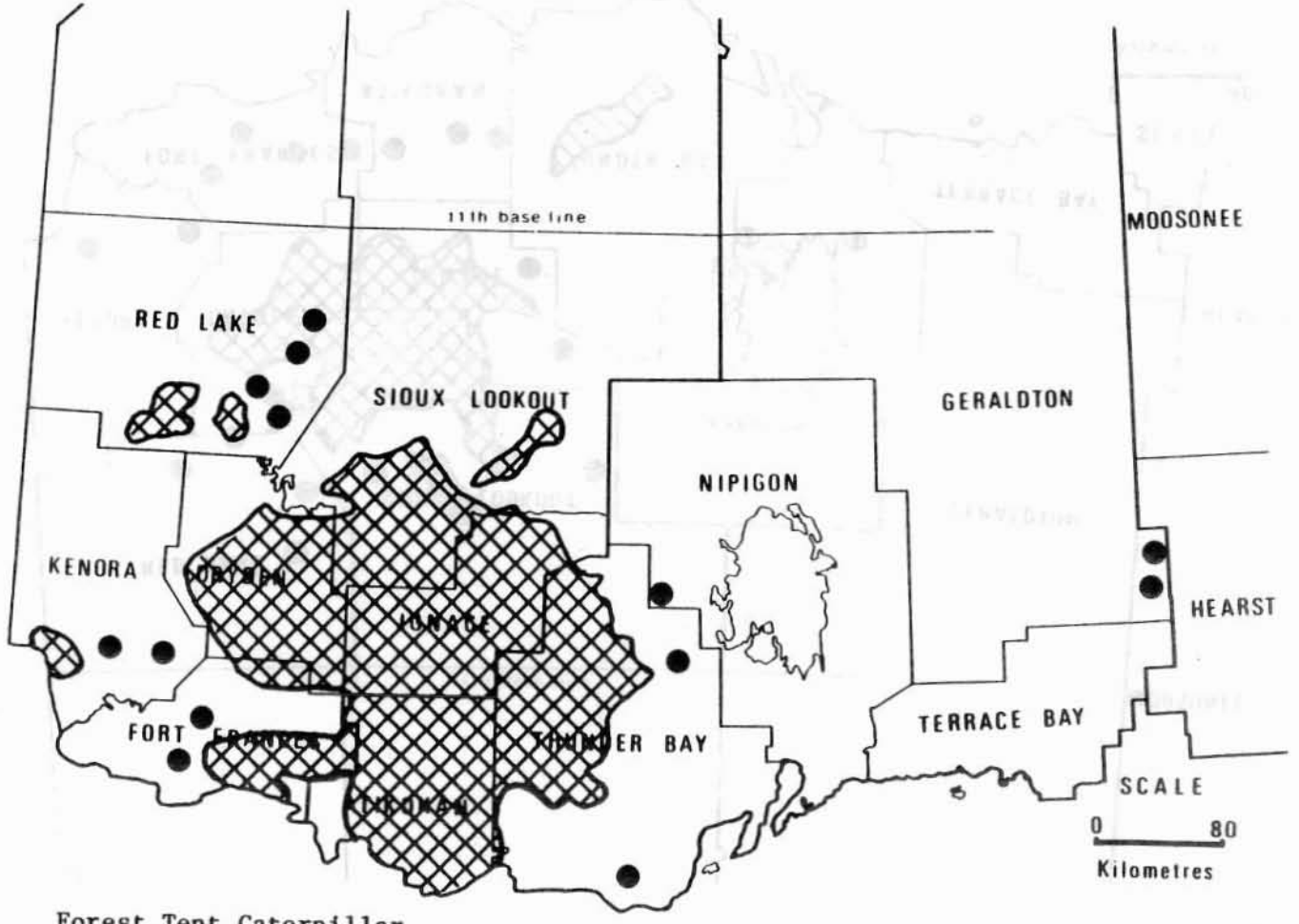
Areas within which defoliation occurred in 1950

LEGEND

Light defoliation ◐ or

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



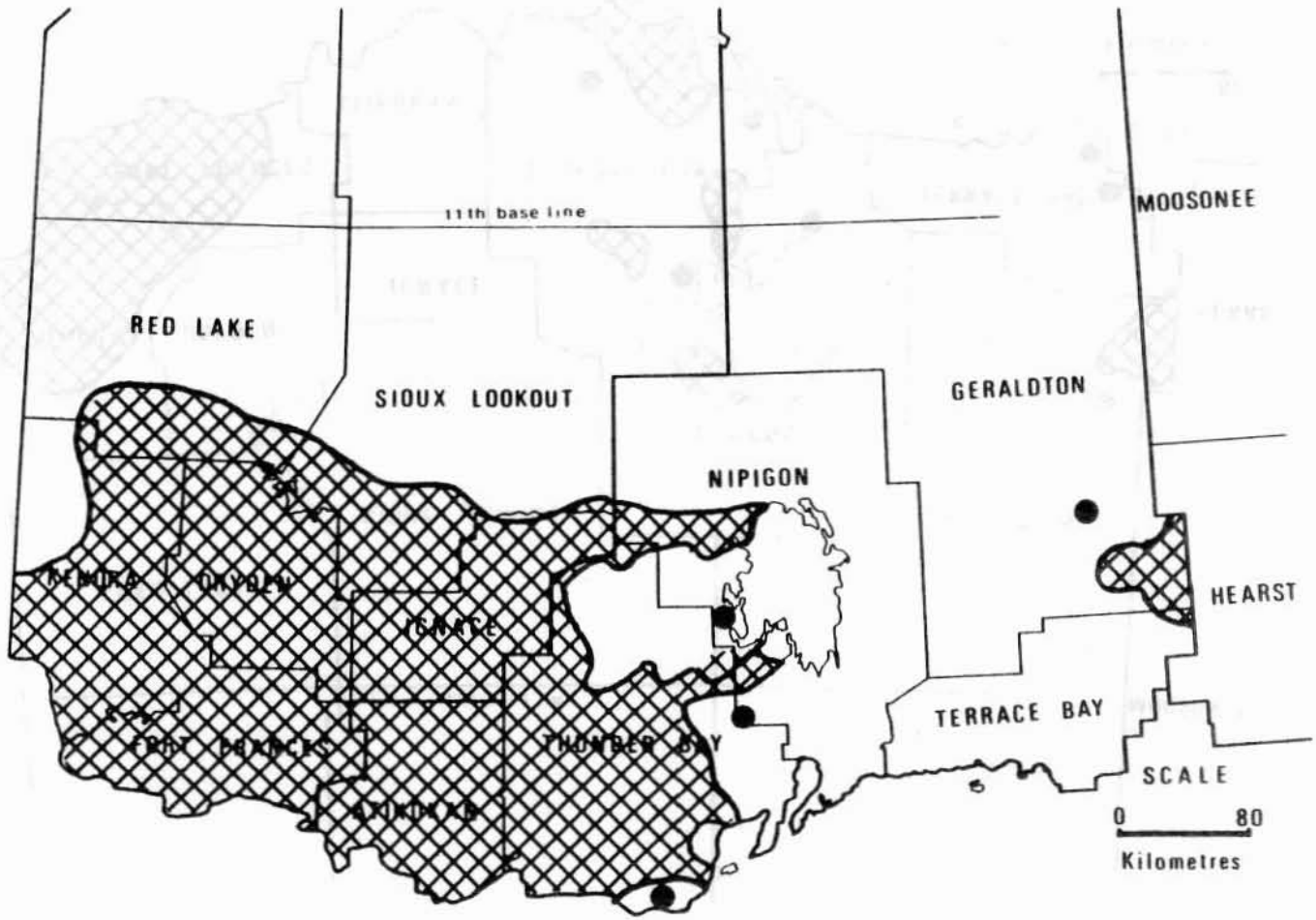
Forest Tent Caterpillar

Areas within which defoliation occurred in 1951

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



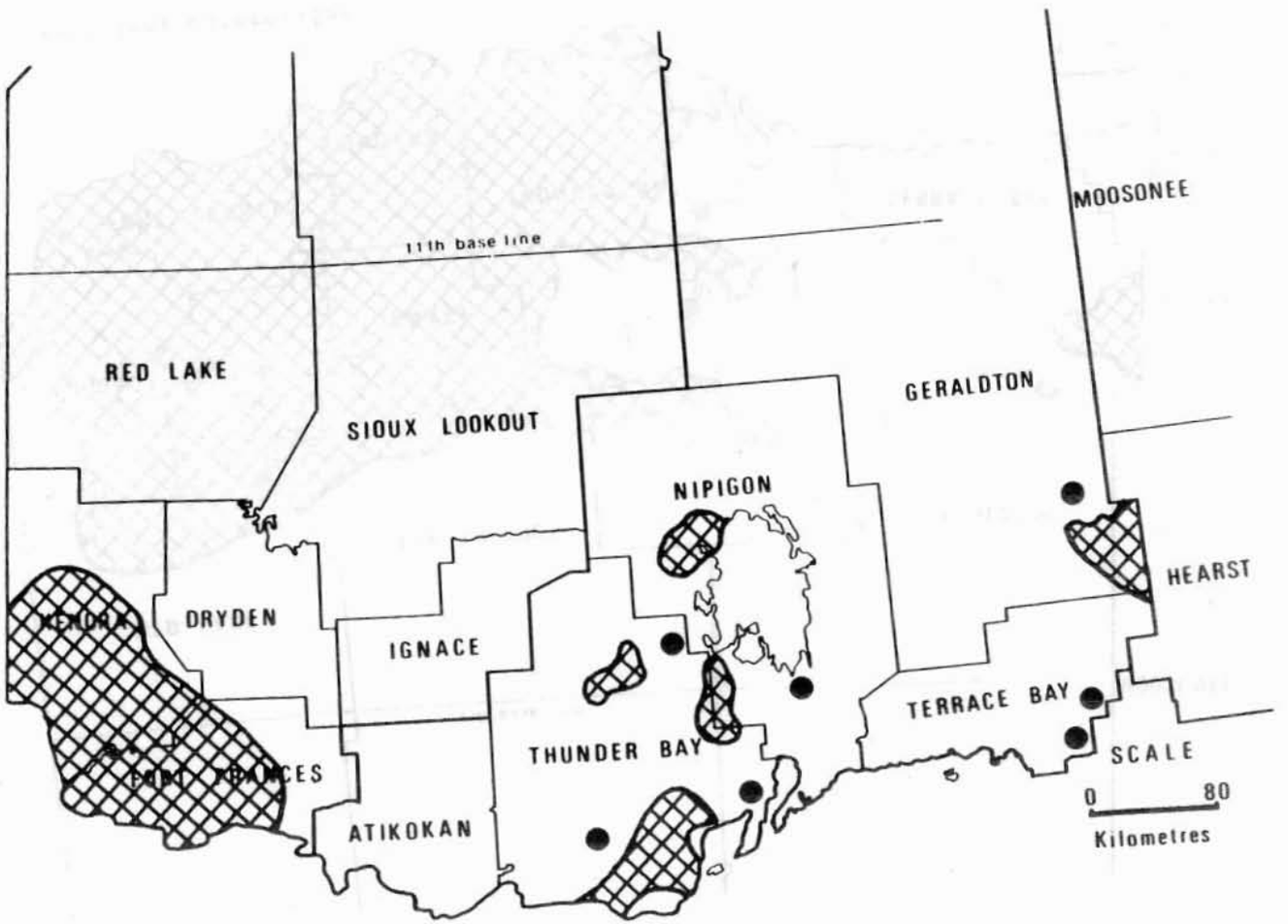
Forest Tent Caterpillar

Areas within which defoliation occurred in 1952

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



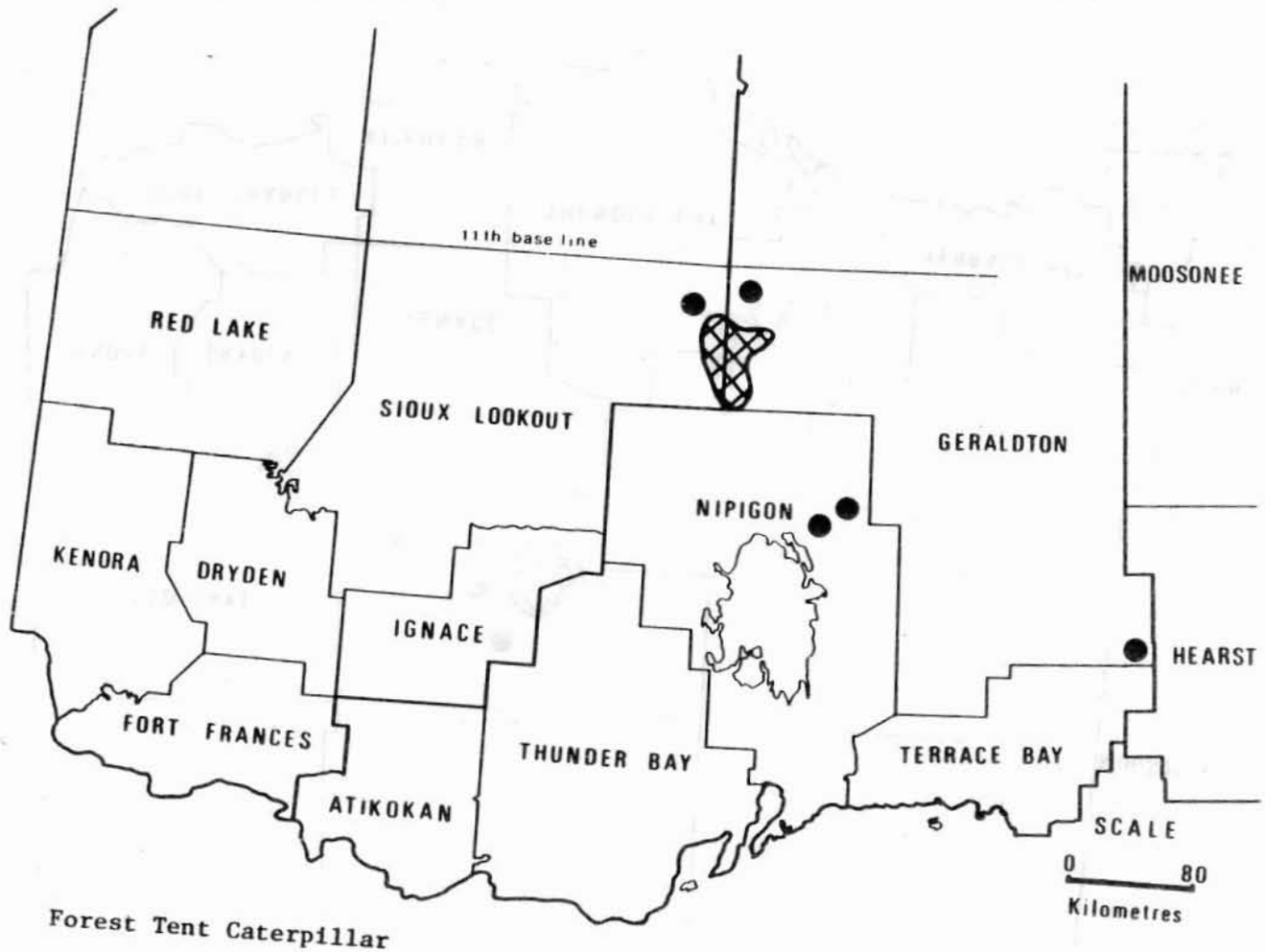
Forest Tent Caterpillar

Areas within which defoliation occurred in 1953

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



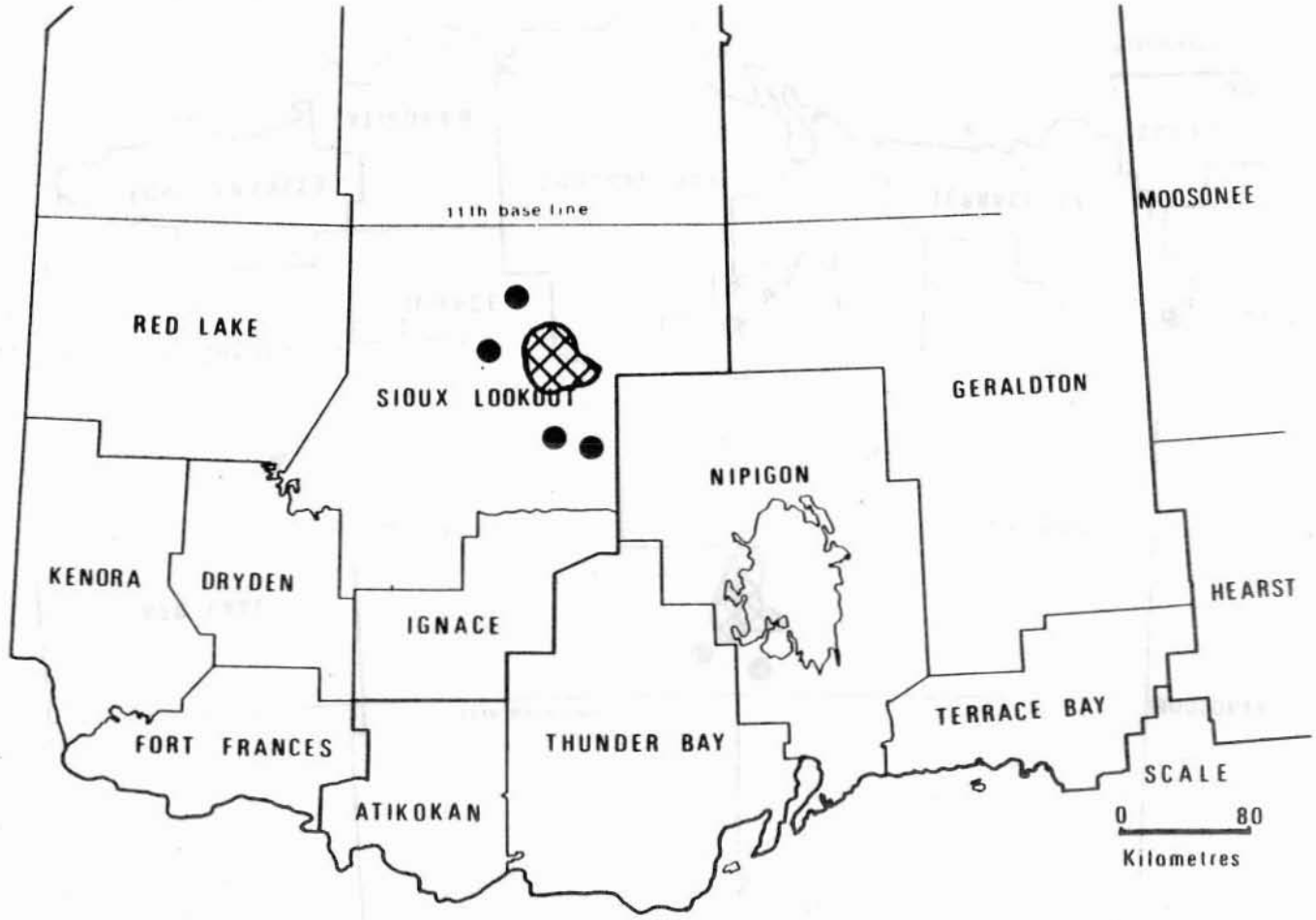
Forest Tent Caterpillar

Areas within which defoliation occurred in 1954

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



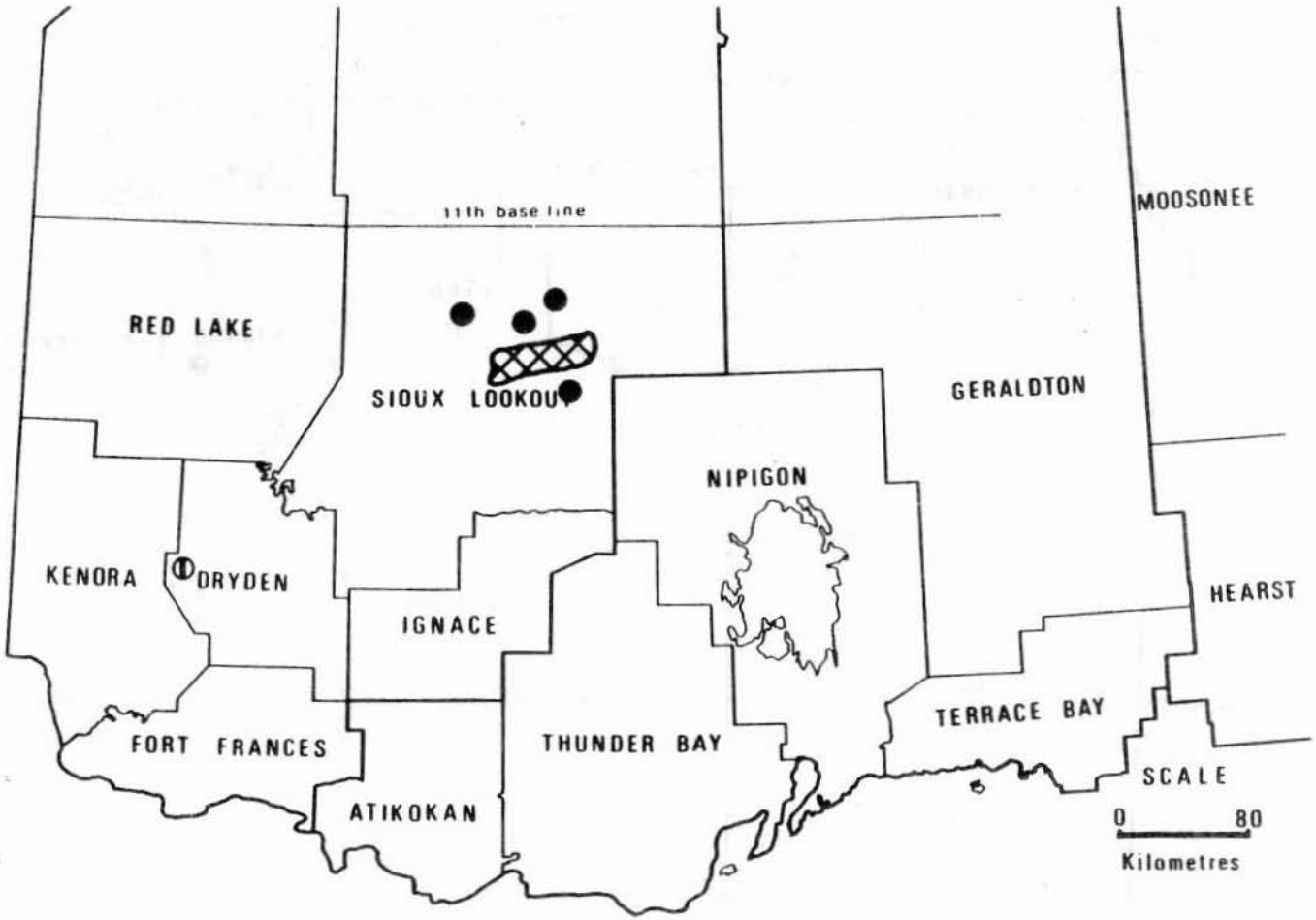
Forest Tent Caterpillar

Areas within which defoliation occurred in 1956

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

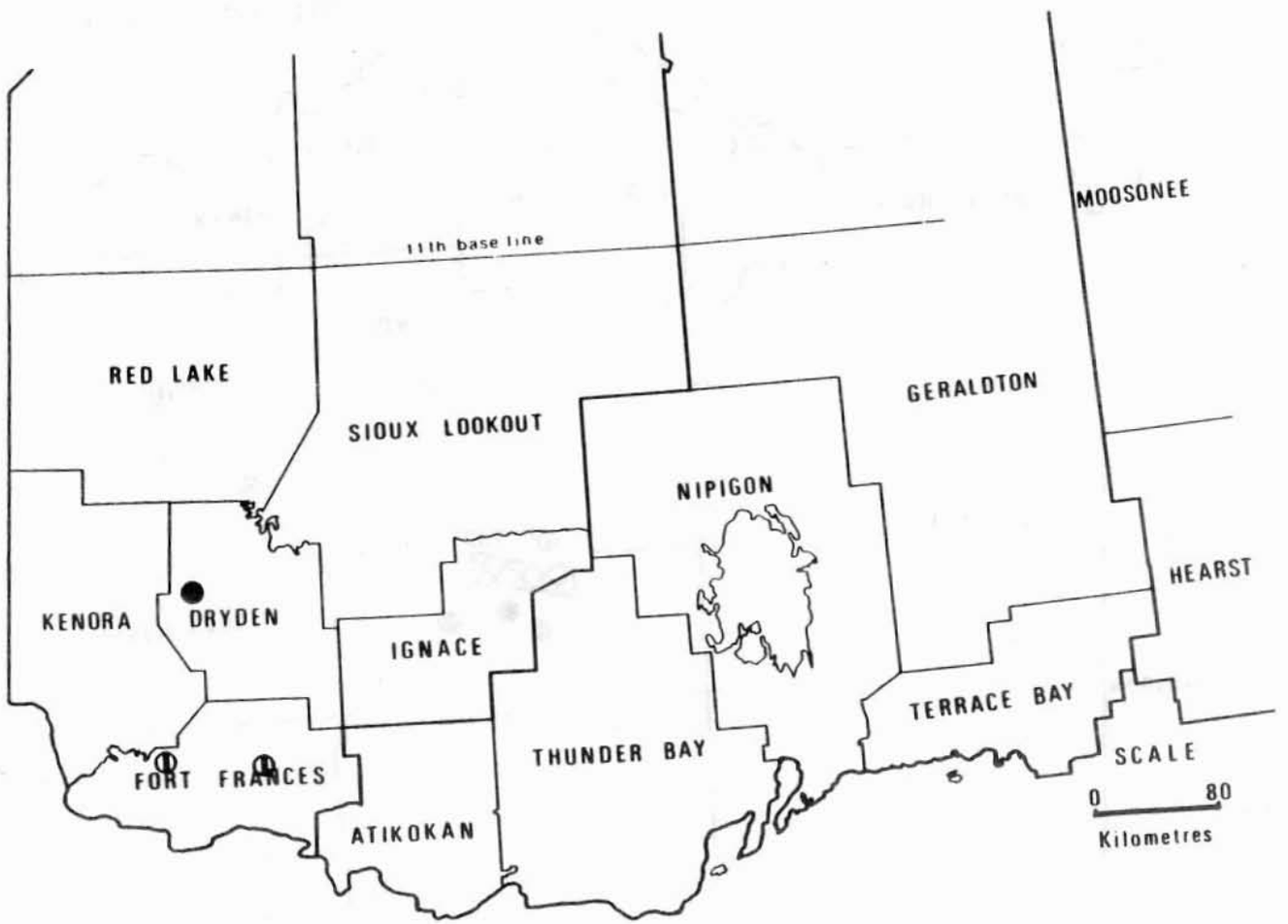
Areas within which defoliation occurred in 1957

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

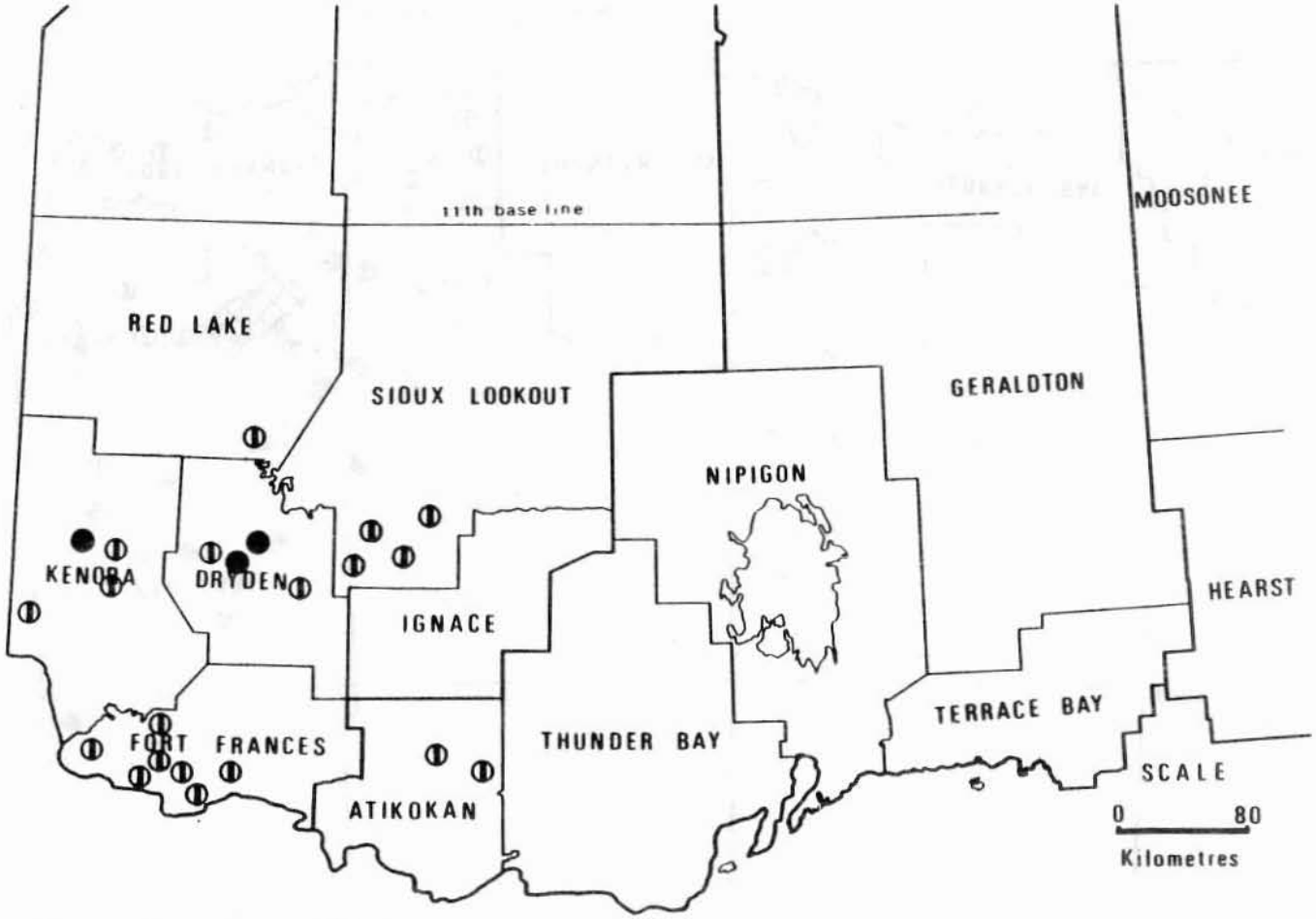
Areas within which defoliation occurred in 1959

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

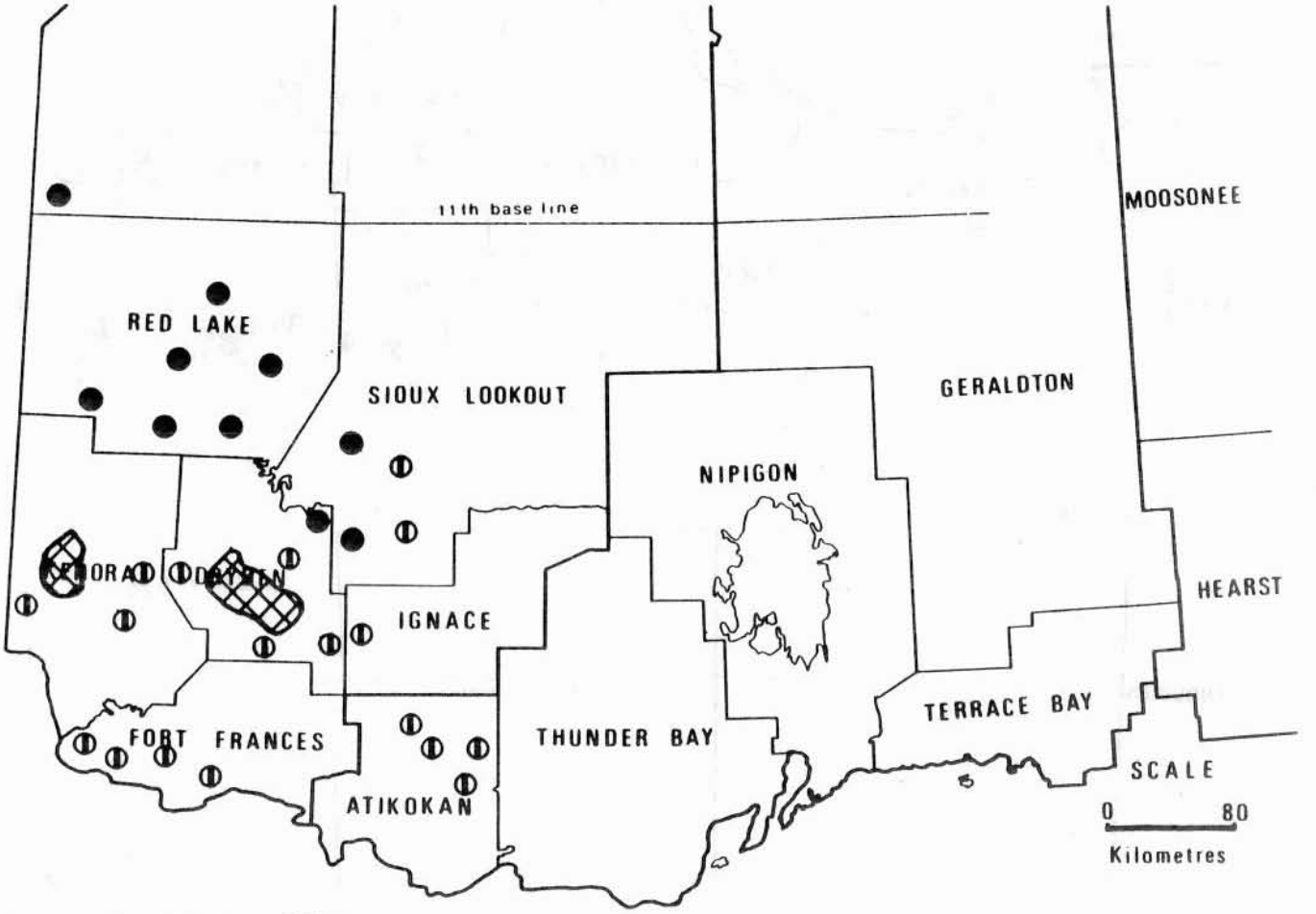
Areas within which defoliation occurred in 1960

LEGEND

Light defoliation ◑

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

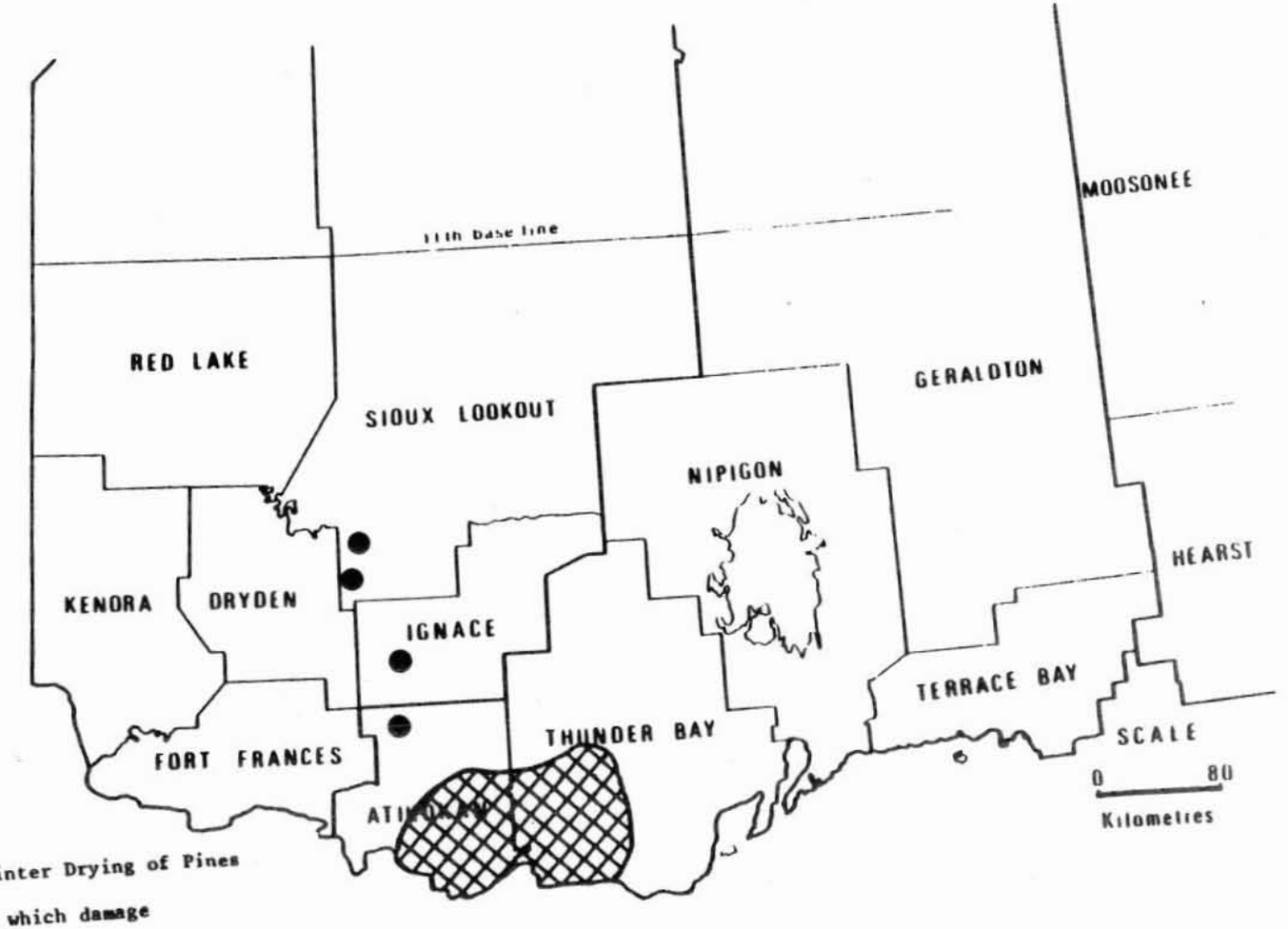
Areas within which defoliation occurred in 1961

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



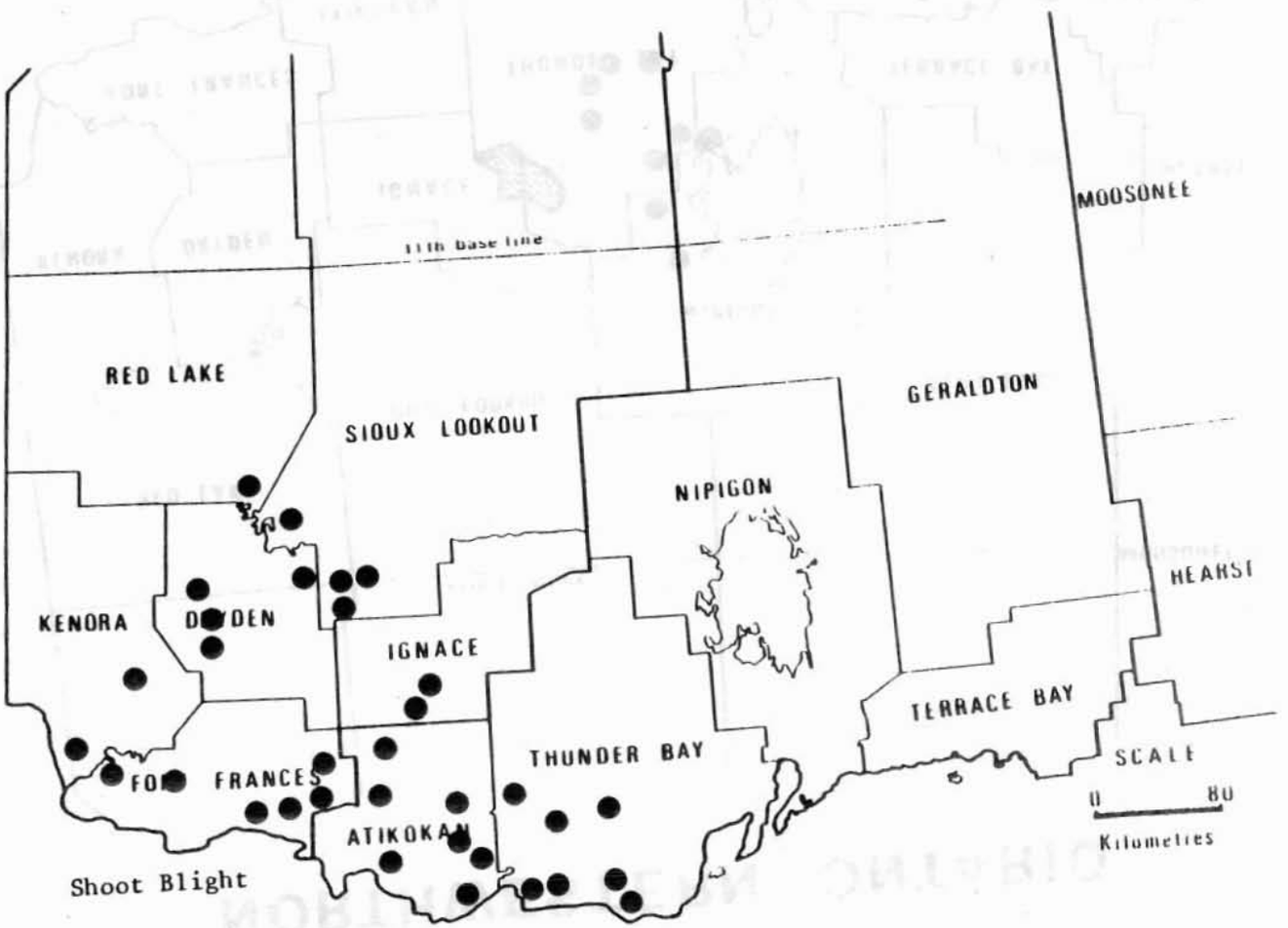
Winter Drying of Pines

Areas within which damage occured in 1973

LEGEND

Moderate-to-severe damage ● or ▨

NORTHWESTERN ONTARIO



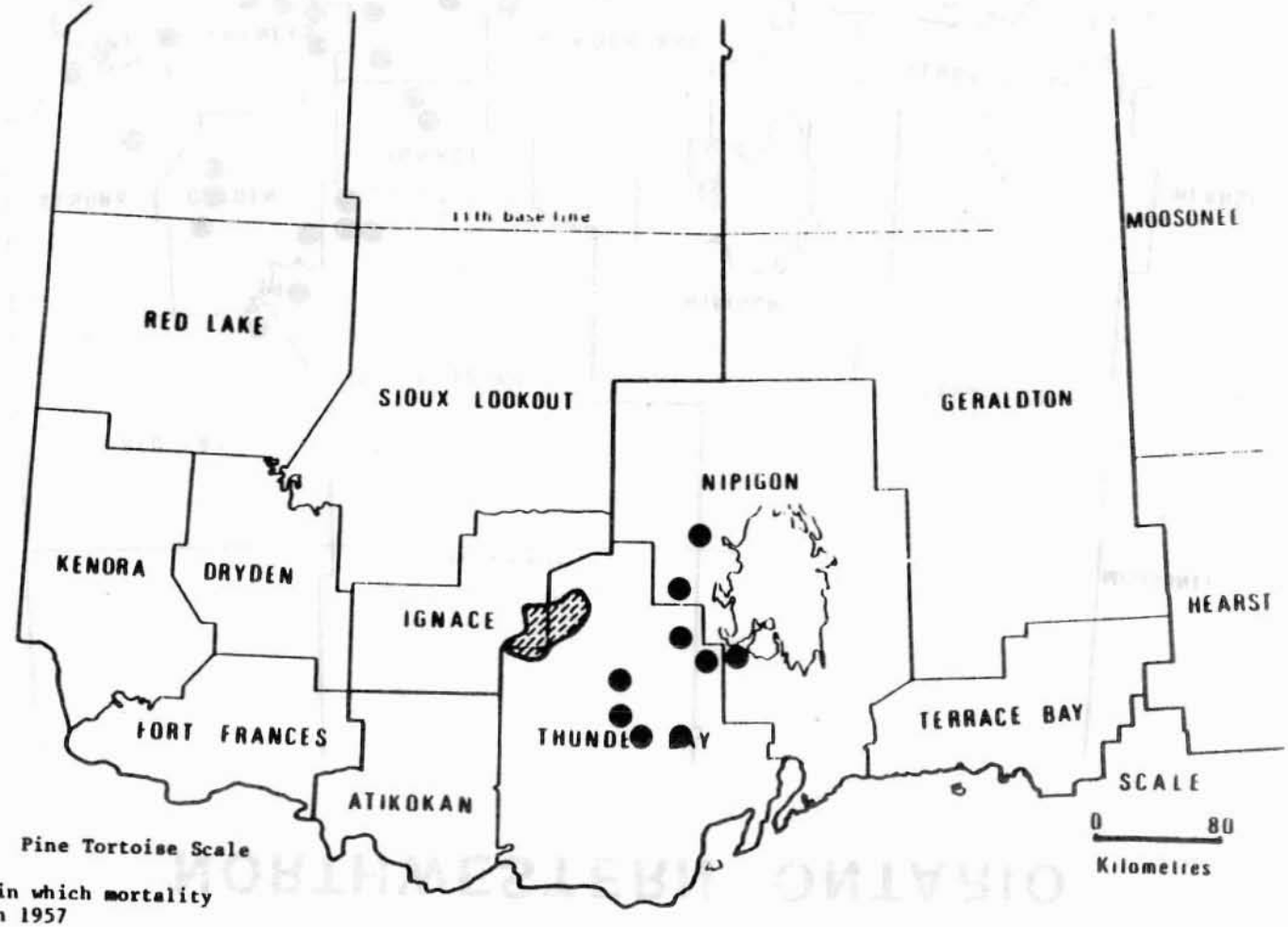
Shoot Blight

Locations of infection centres in 1973

LEGEND

Infection centres ●

NORTHWESTERN ONTARIO



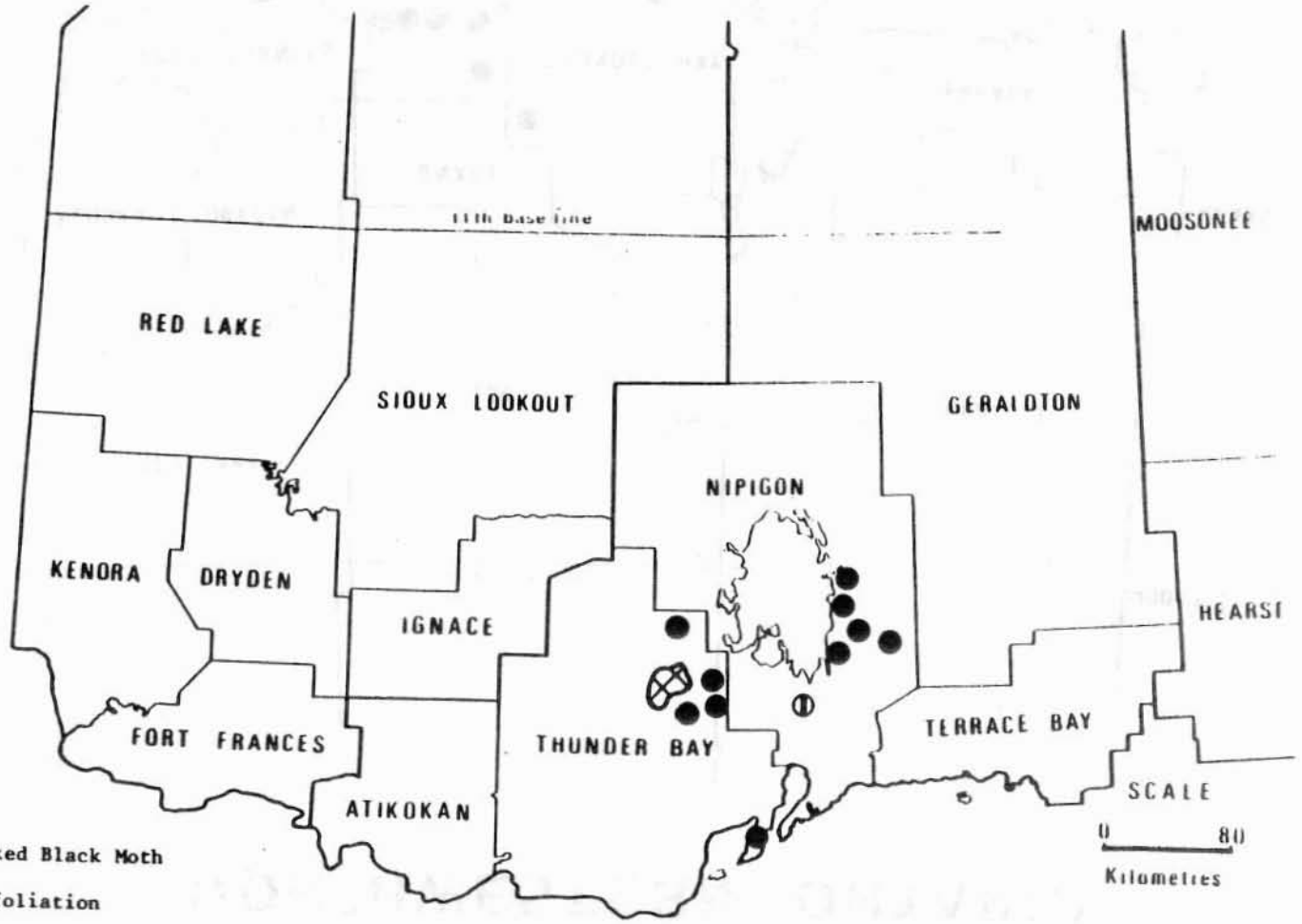
Pine Tortoise Scale

Areas within which mortality occurred in 1957

LEGEND

Mortality ● or ▨

NORTHWESTERN ONTARIO



Spearmarked Black Moth

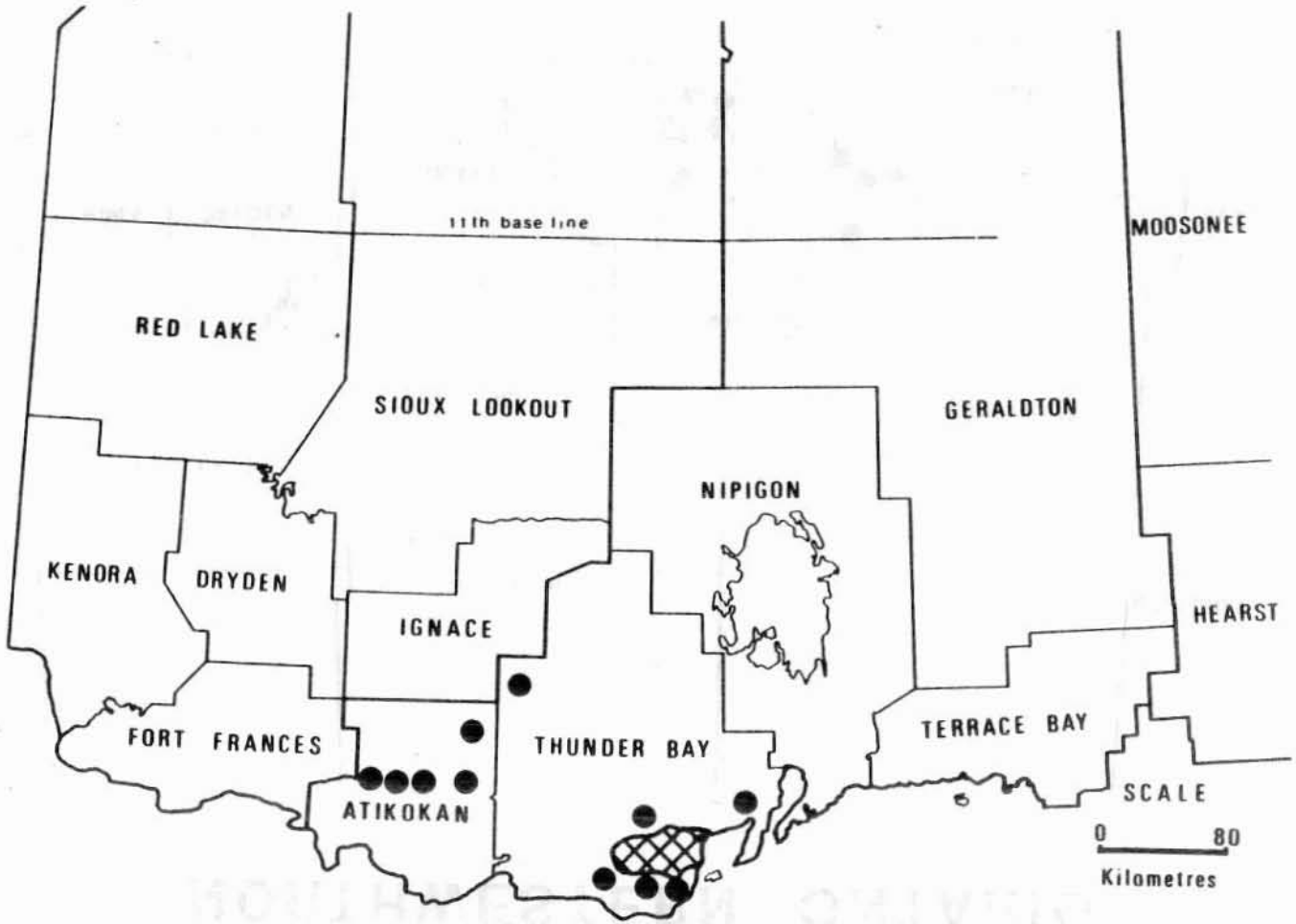
Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



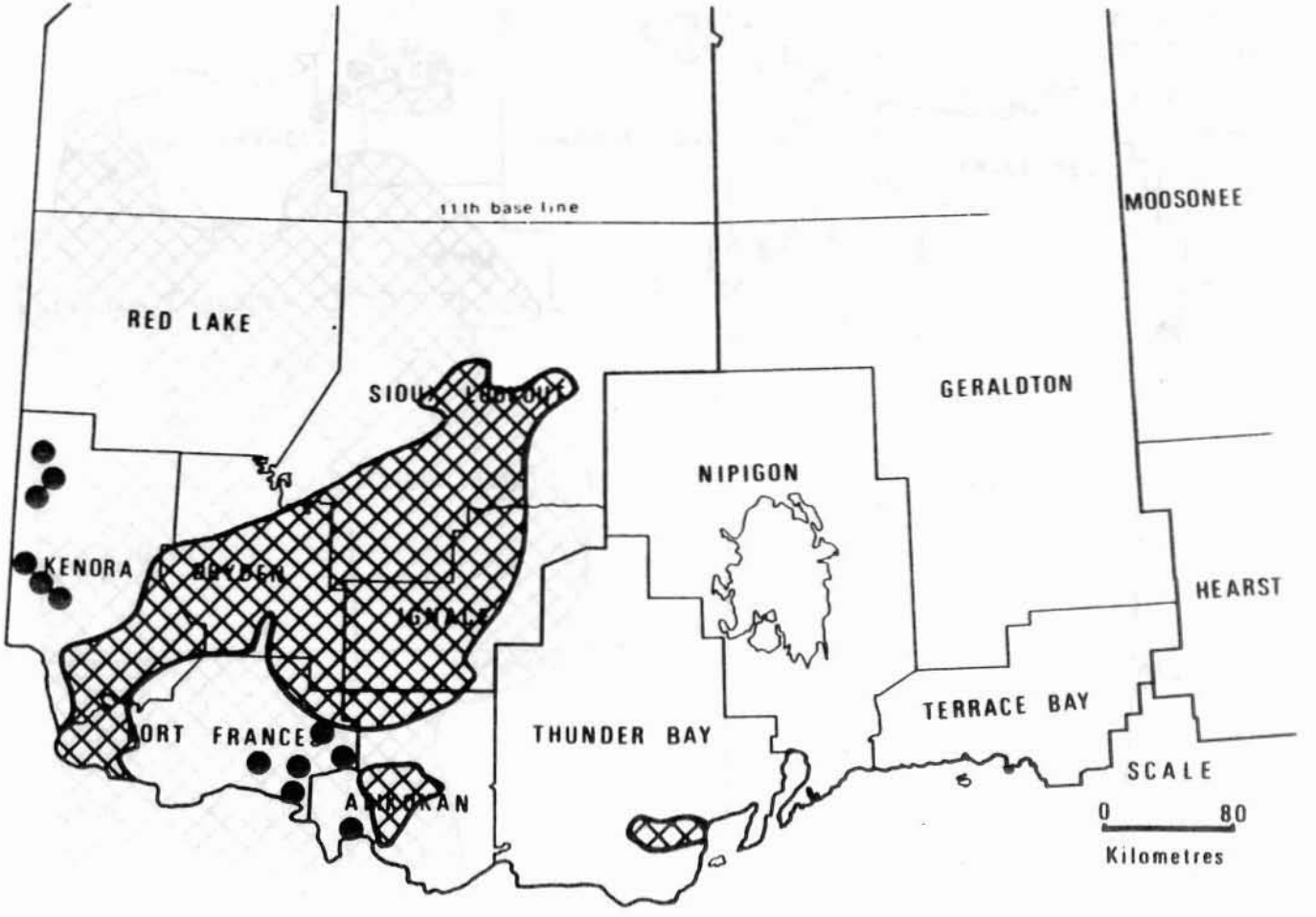
Forest Tent Caterpillar

Areas within which defoliation occurred in 1980

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



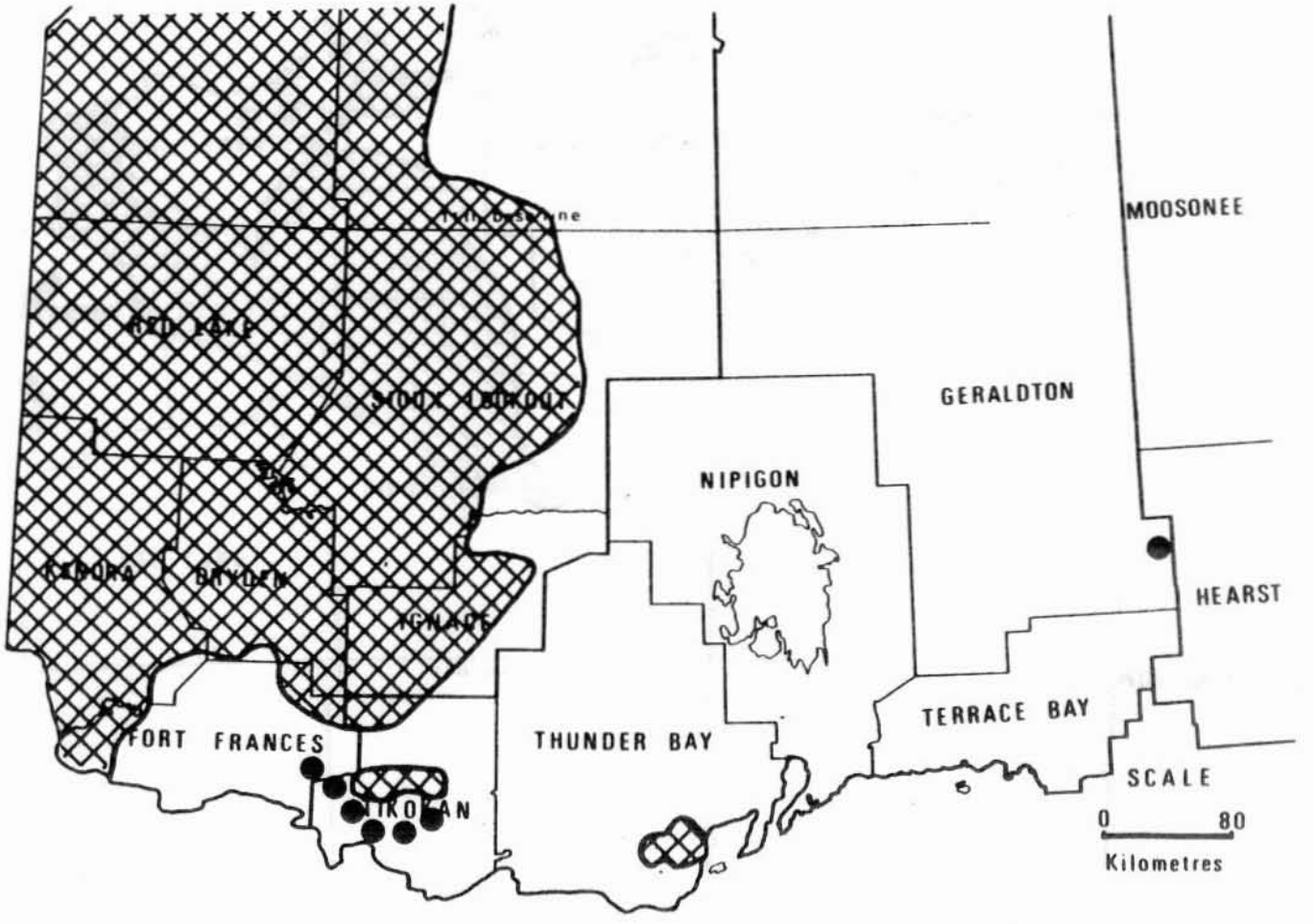
Forest Tent Caterpillar

Areas within which defoliation occurred in 1979

LEGEND

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



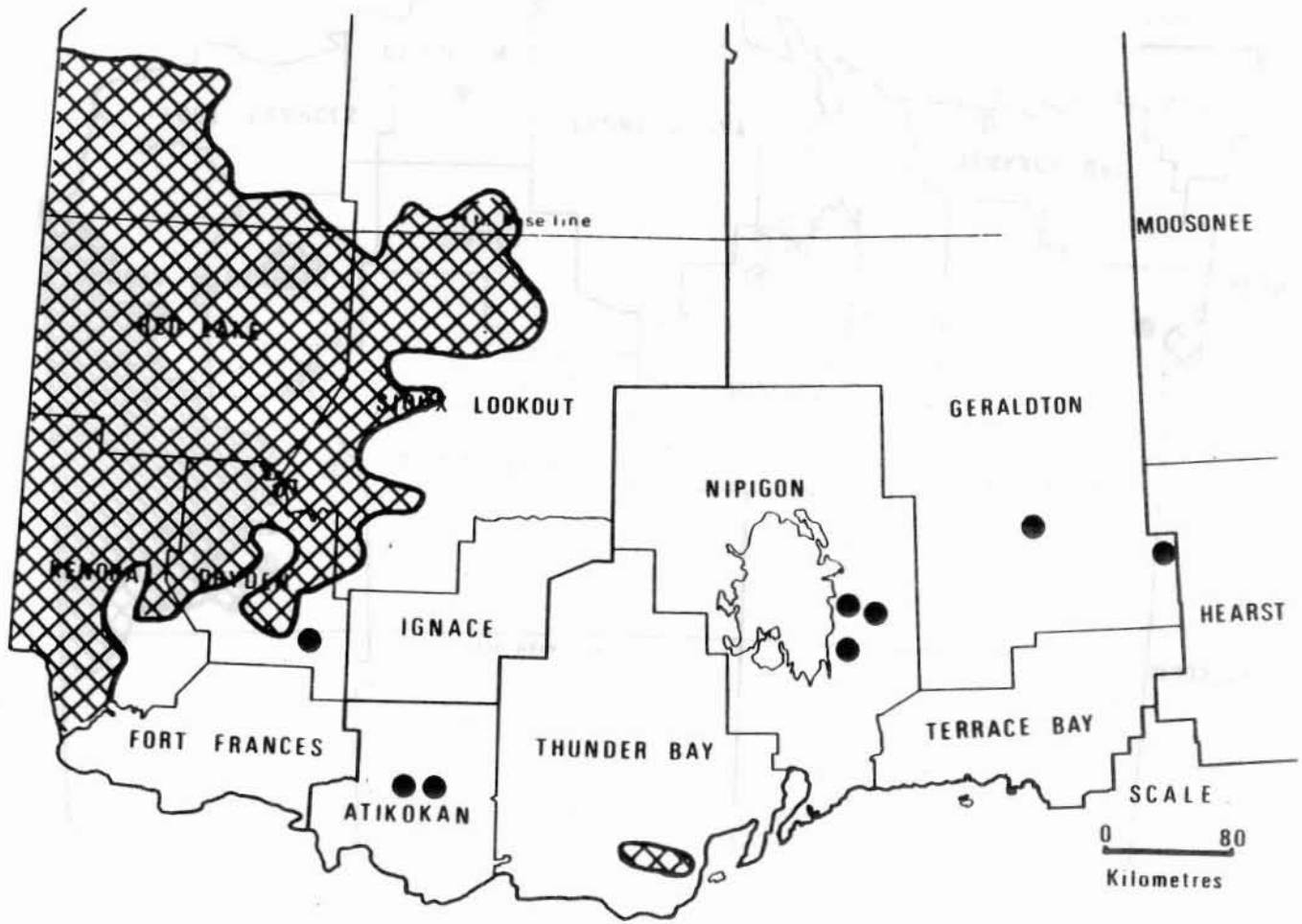
Forest Tent Caterpillar

Areas within which defoliation occurred in 1978

LEGEND

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



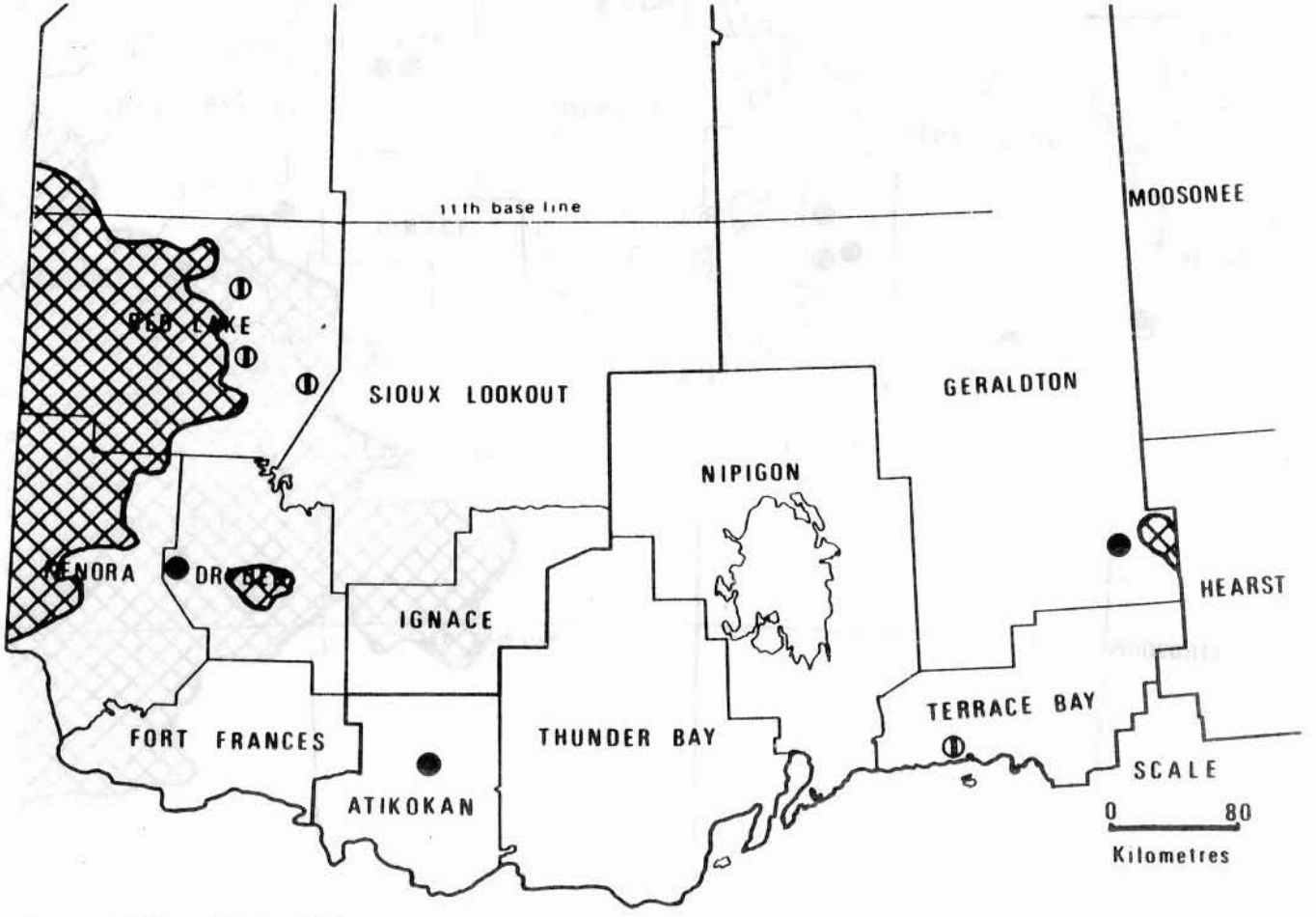
Forest Tent Caterpillar

Areas within which defoliation occurred in 1977

LEGEND

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

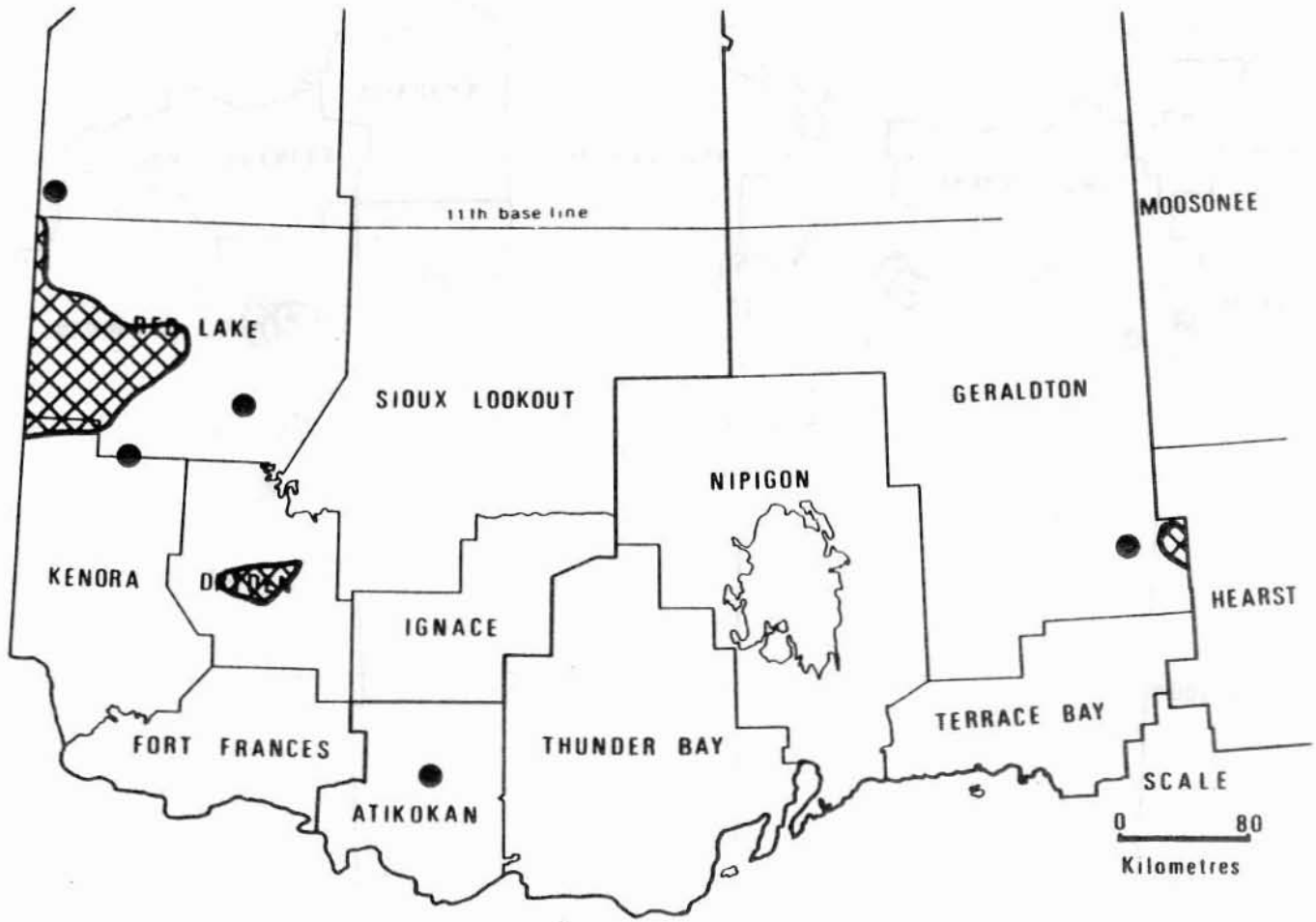
Areas within which defoliation occurred in 1976

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



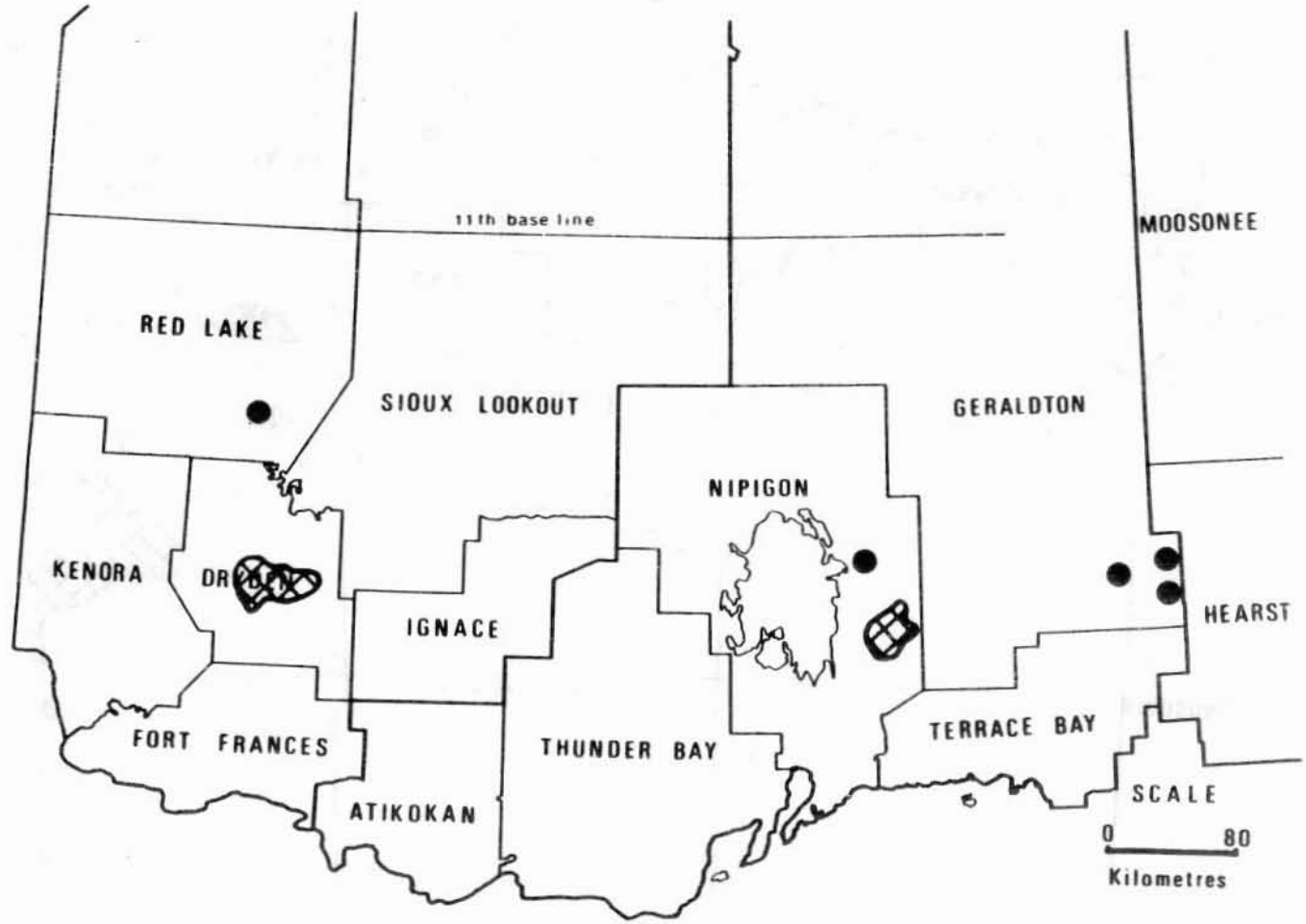
Forest Tent Caterpillar

Areas within which defoliation occurred in 1975

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



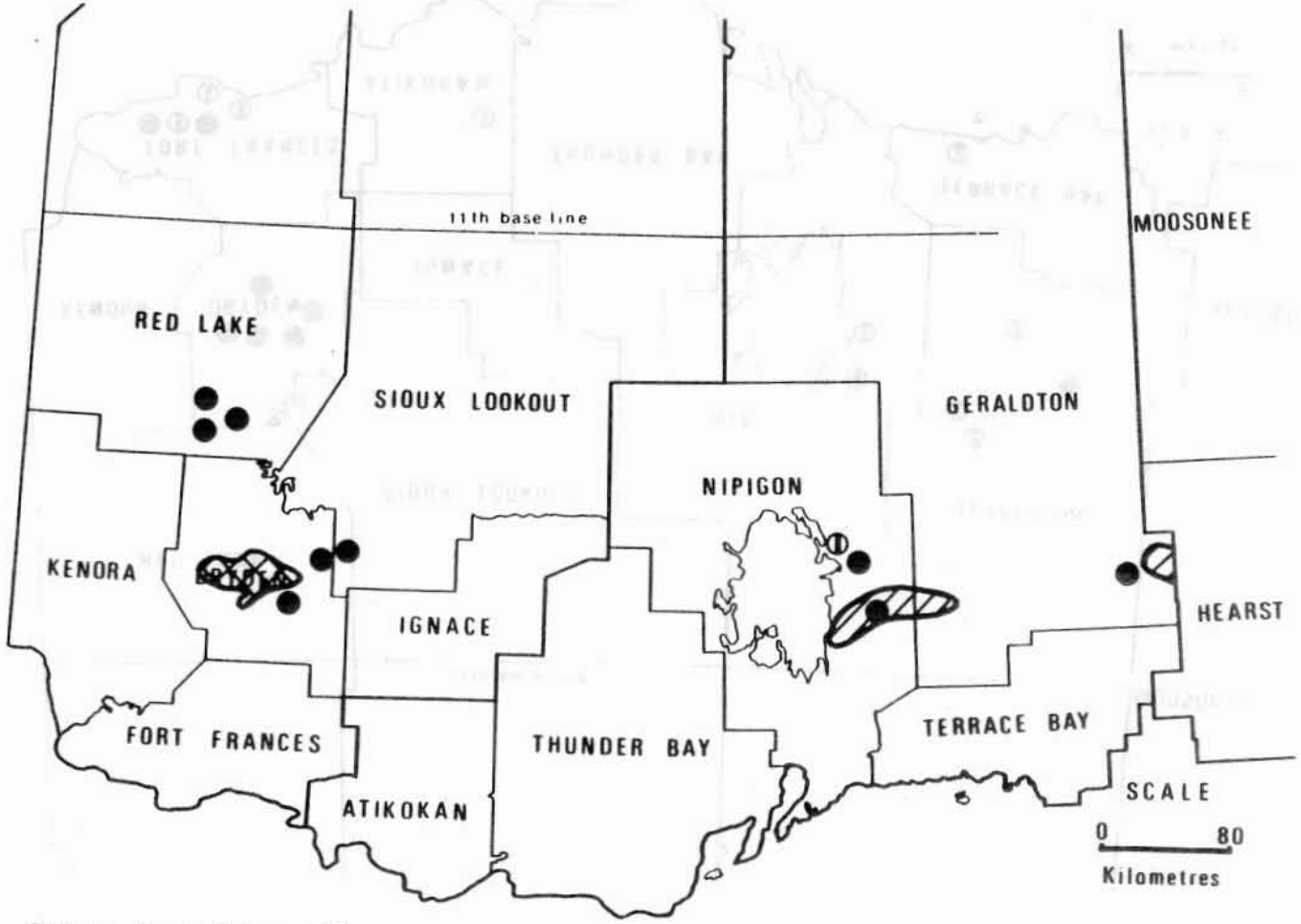
Forest Tent Caterpillar

Areas within which defoliation occurred in 1974

LEGEND

Moderate-to-severe defoliation ● or ▨

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

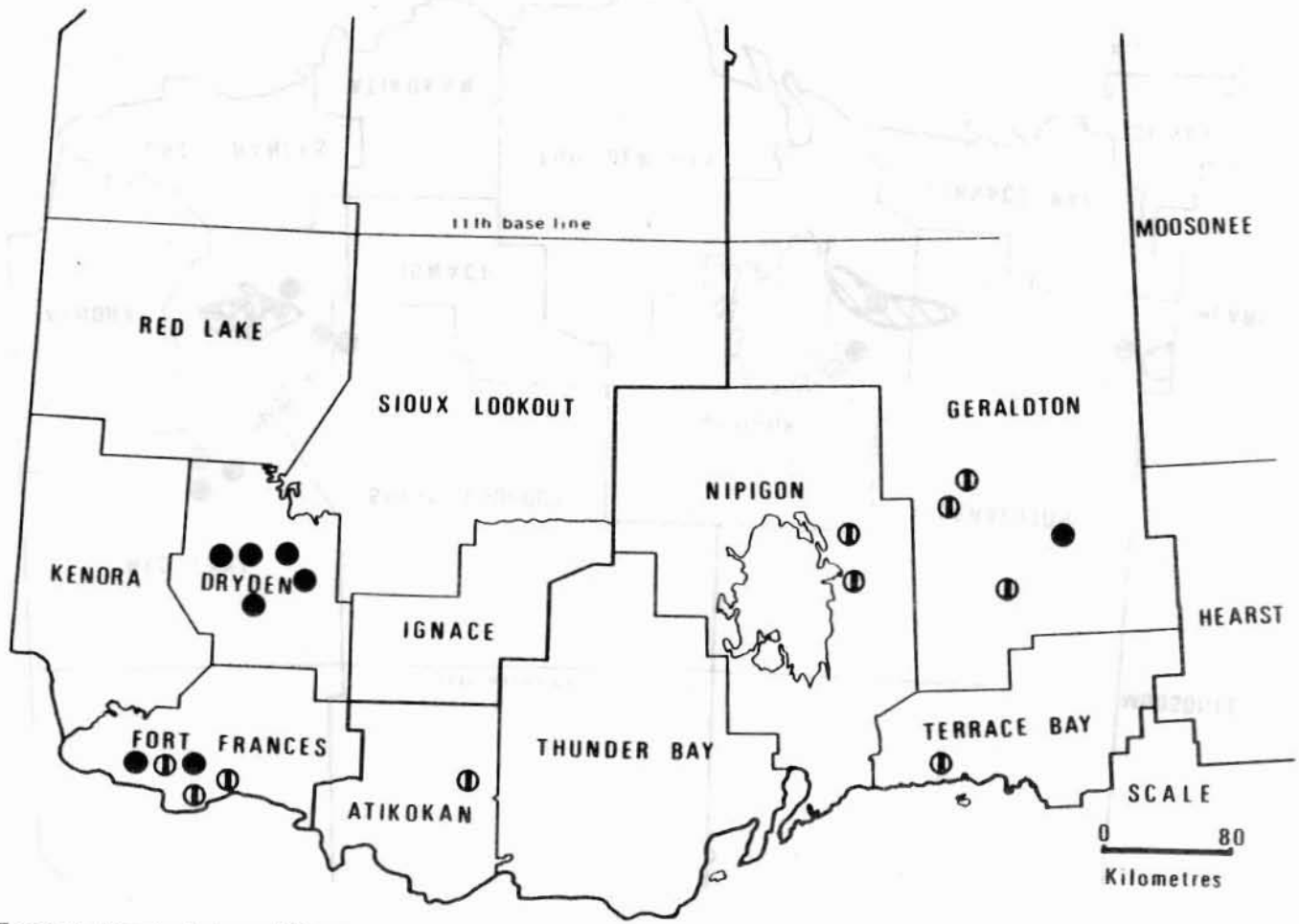
Areas within which defoliation occurred in 1973

LEGEND

Light defoliation ◐ or

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

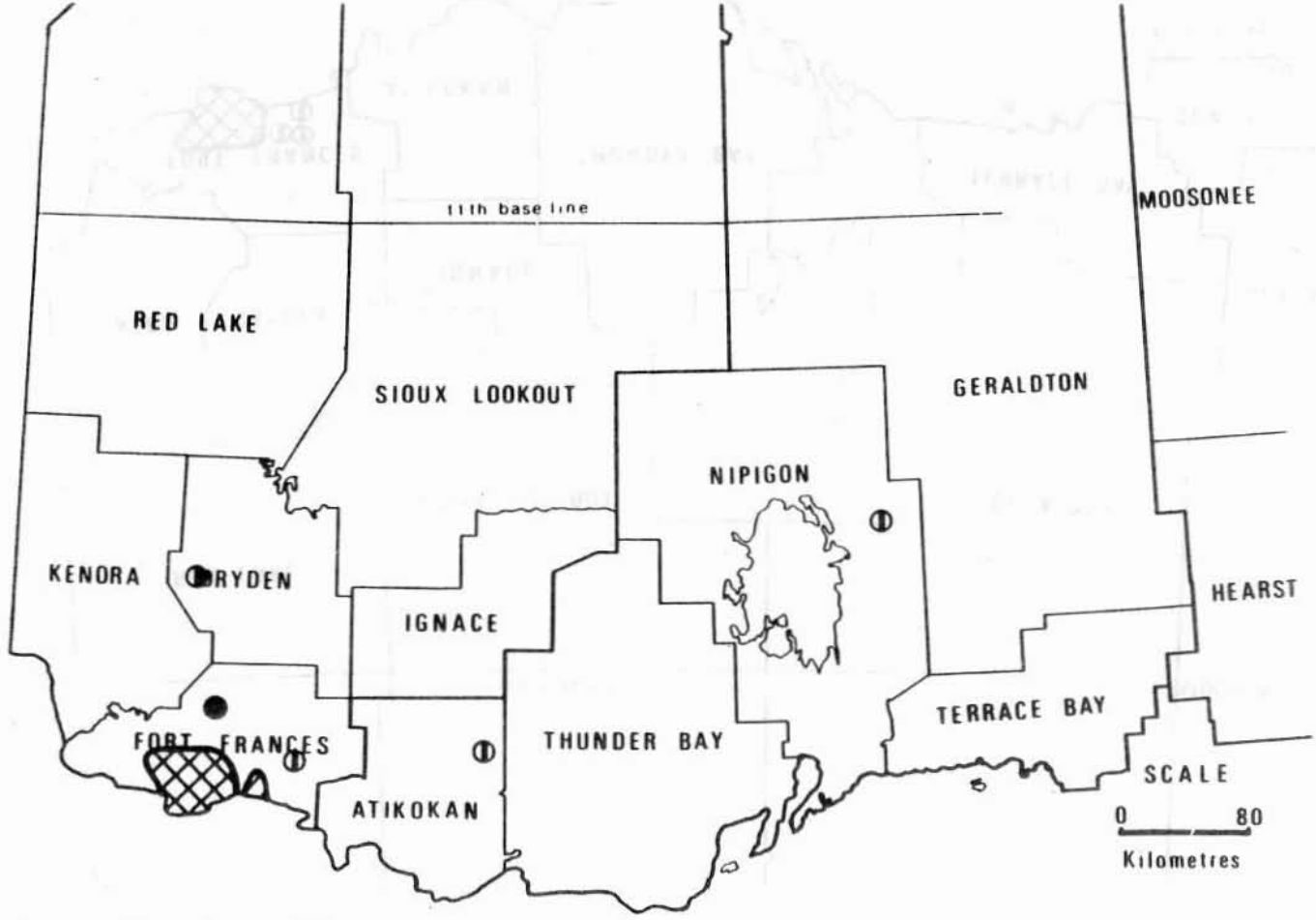
Areas within which defoliation occurred in 1972

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ●

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

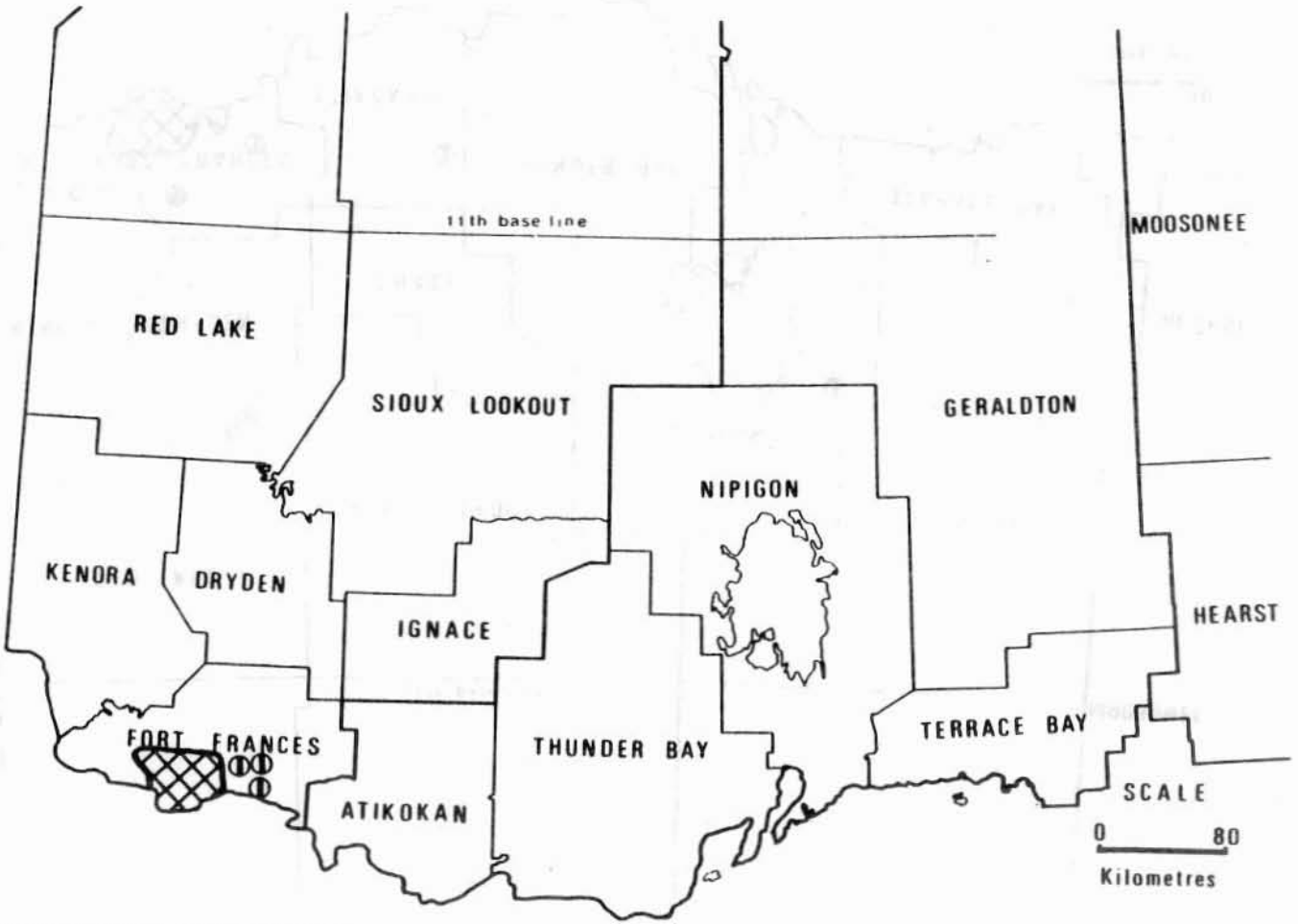
Areas within which defoliation occurred in 1971

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ● or ▩

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

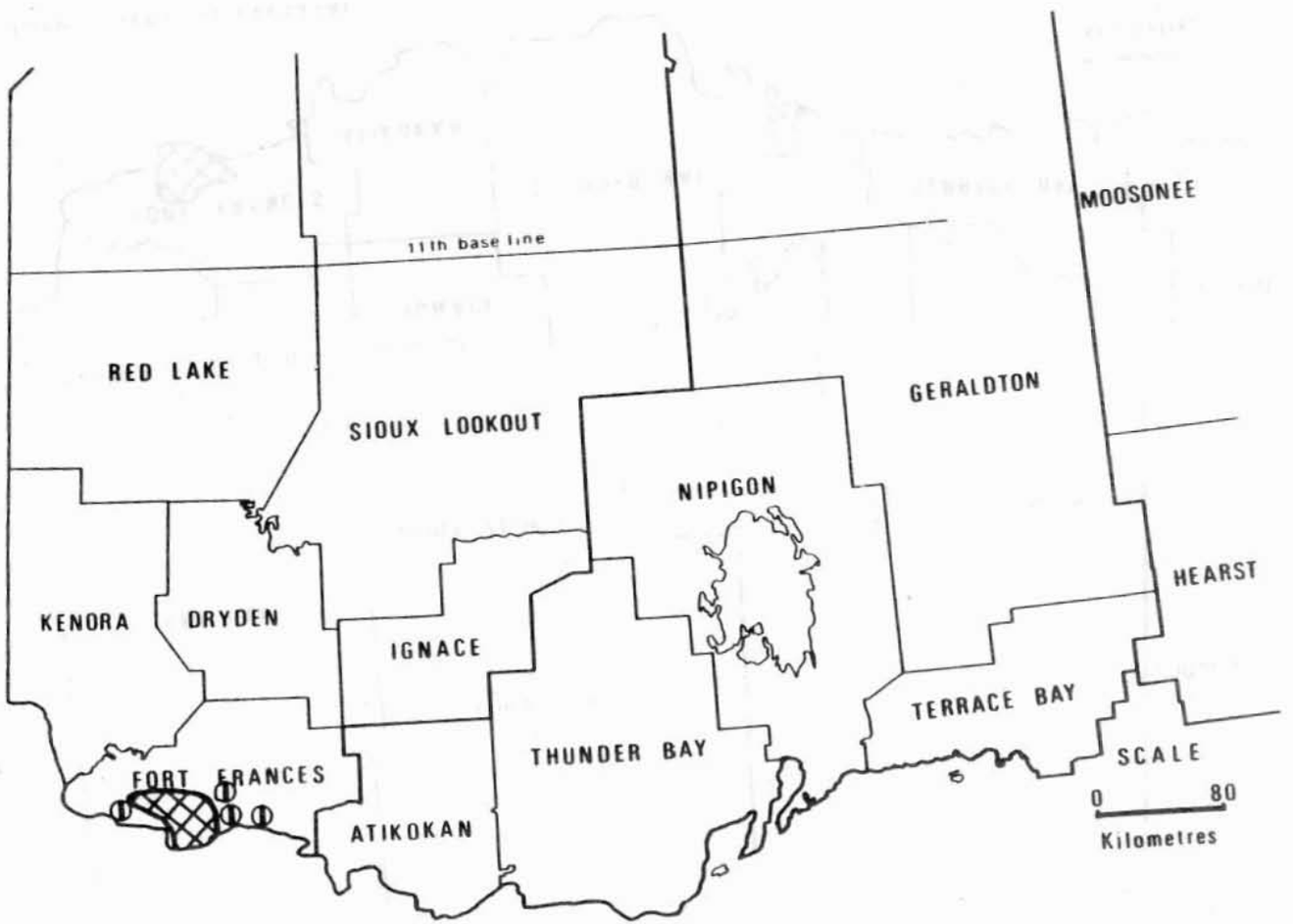
Areas within which defoliation occurred in 1970

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ▨

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

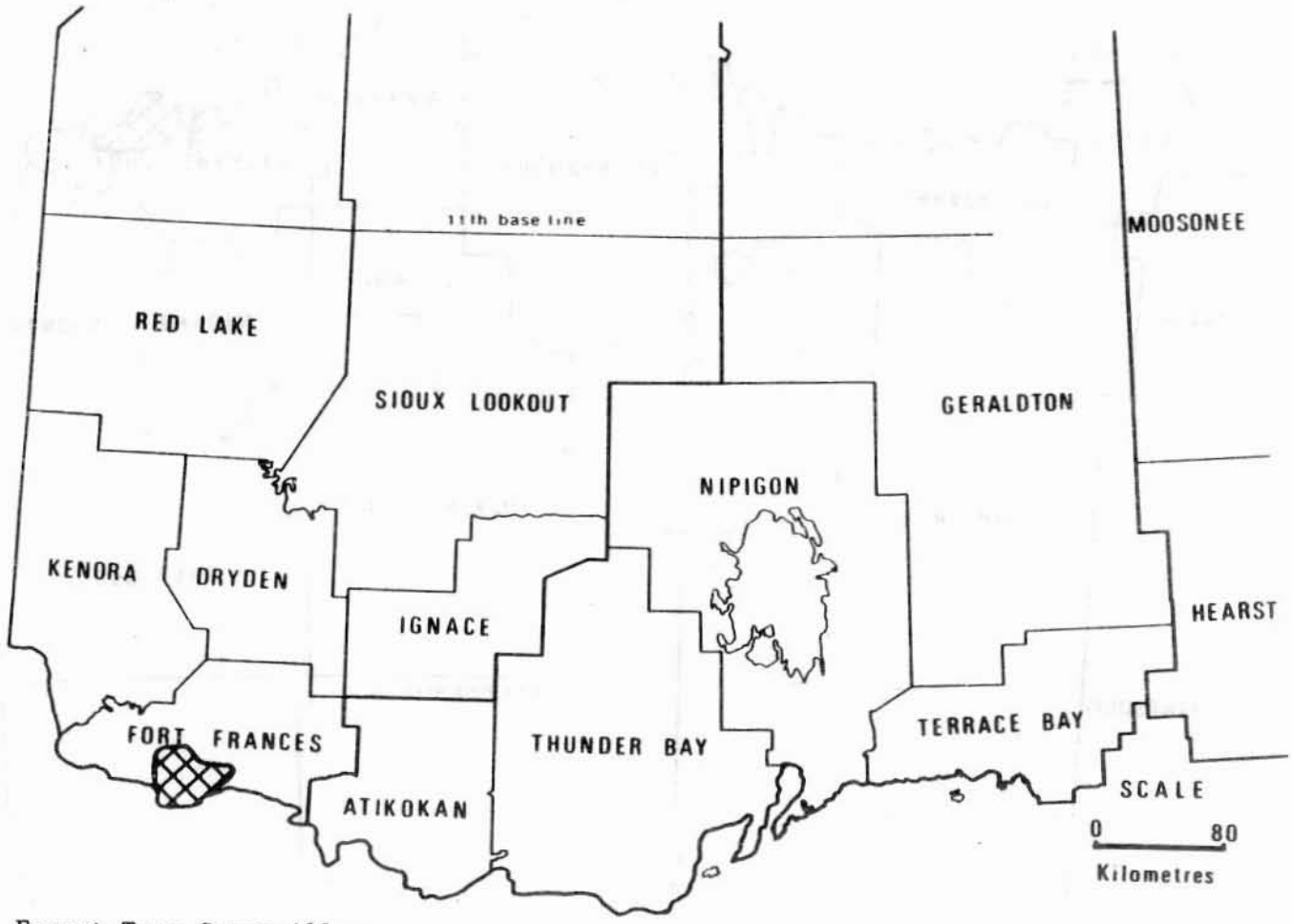
Areas within which defoliation occurred in 1969

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



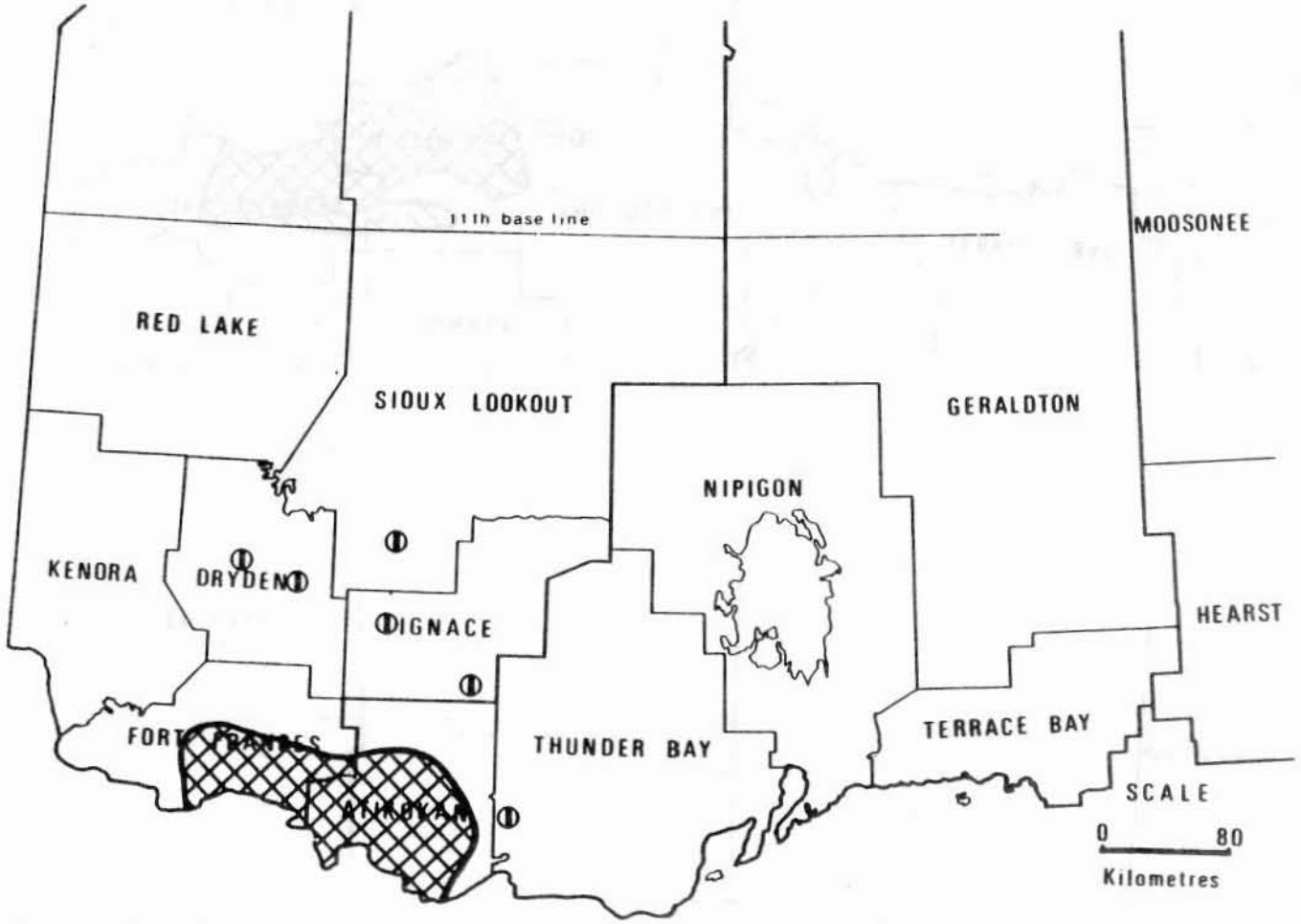
Forest Tent Caterpillar

Areas within which defoliation occurred in 1968

LEGEND

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

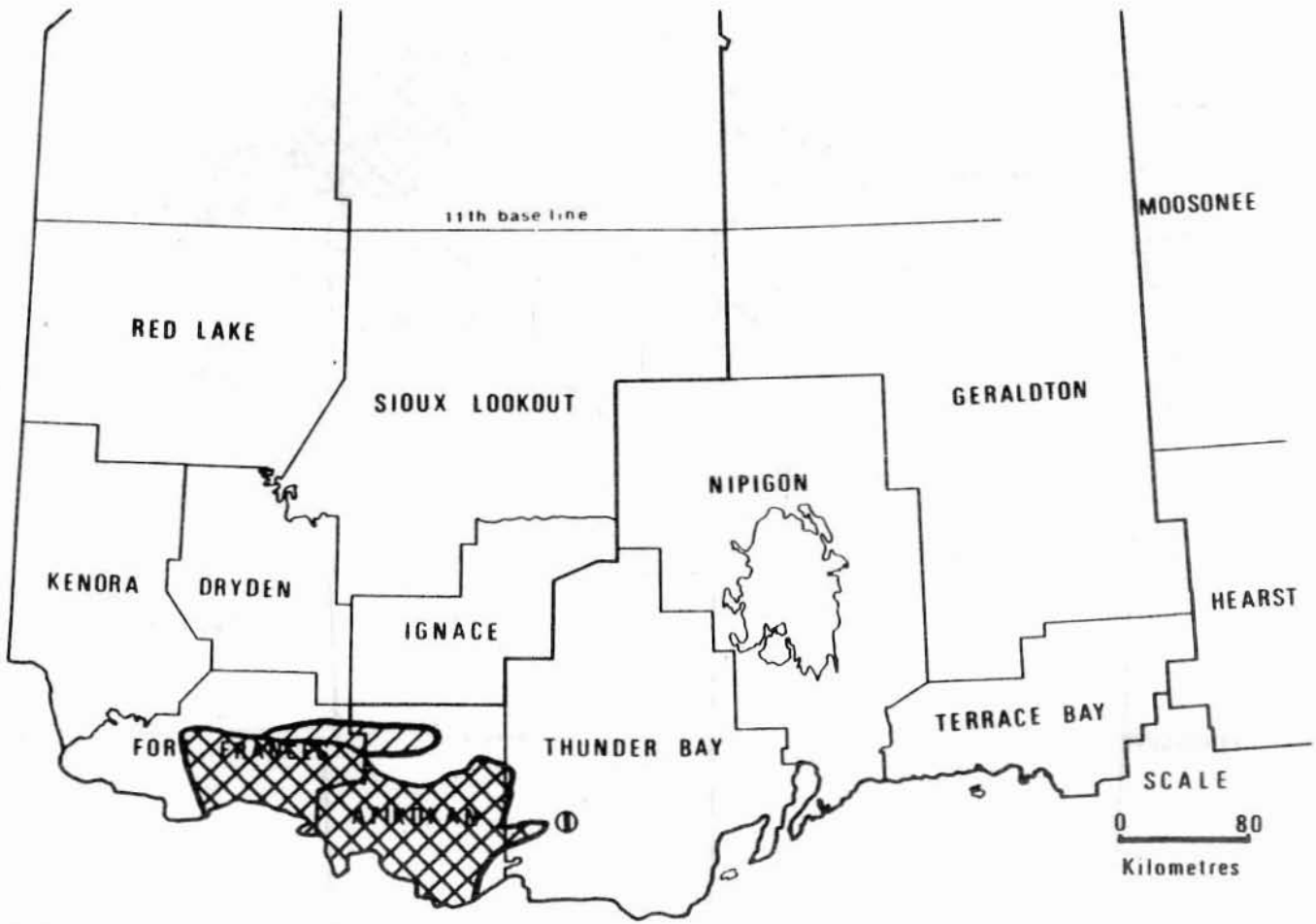
Areas within which defoliation occurred in 1967

LEGEND

Light defoliation

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

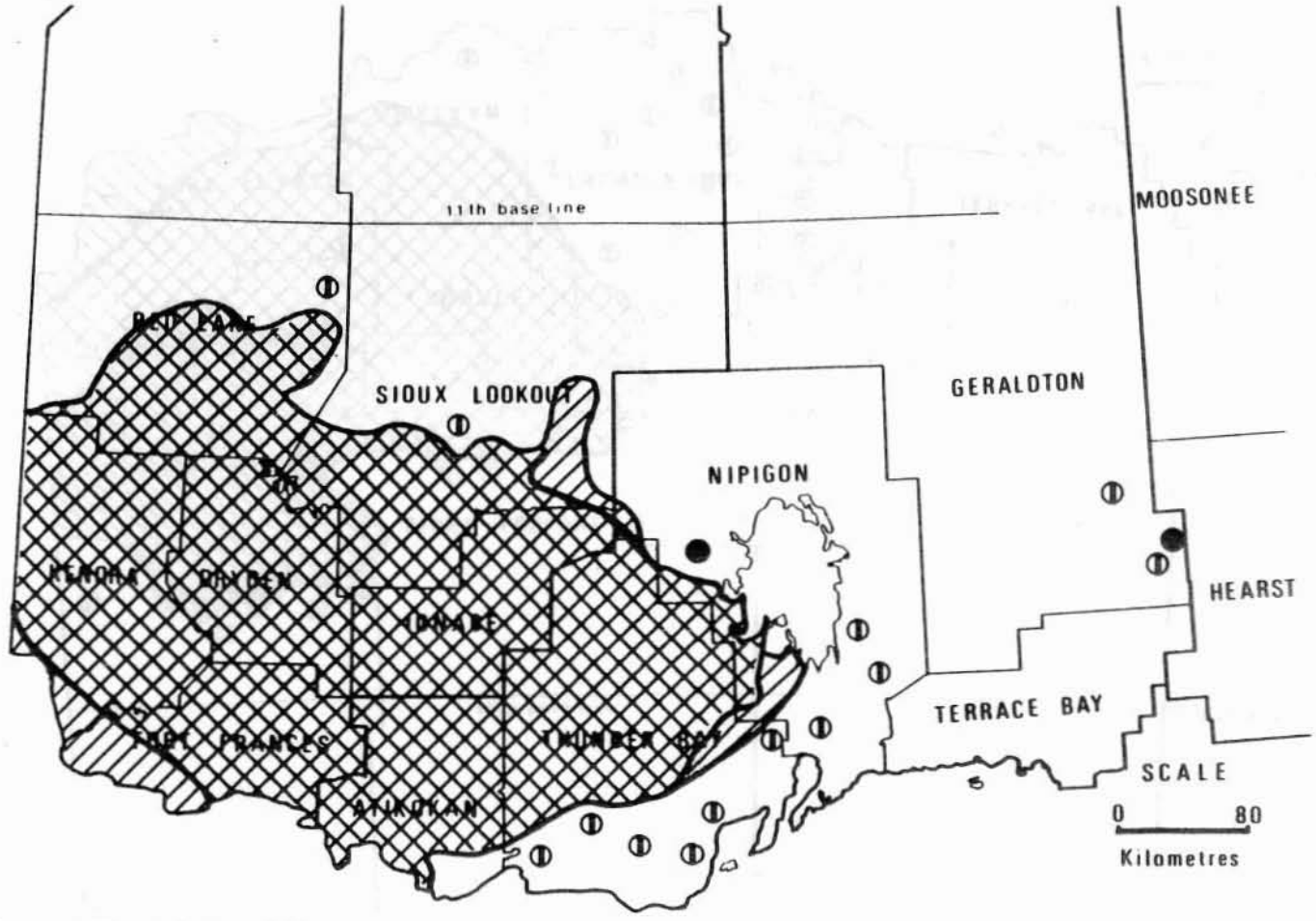
Areas within which defoliation occurred in 1966

LEGEND

Light defoliation ◐ or ▨

Moderate-to-severe defoliation ▩

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

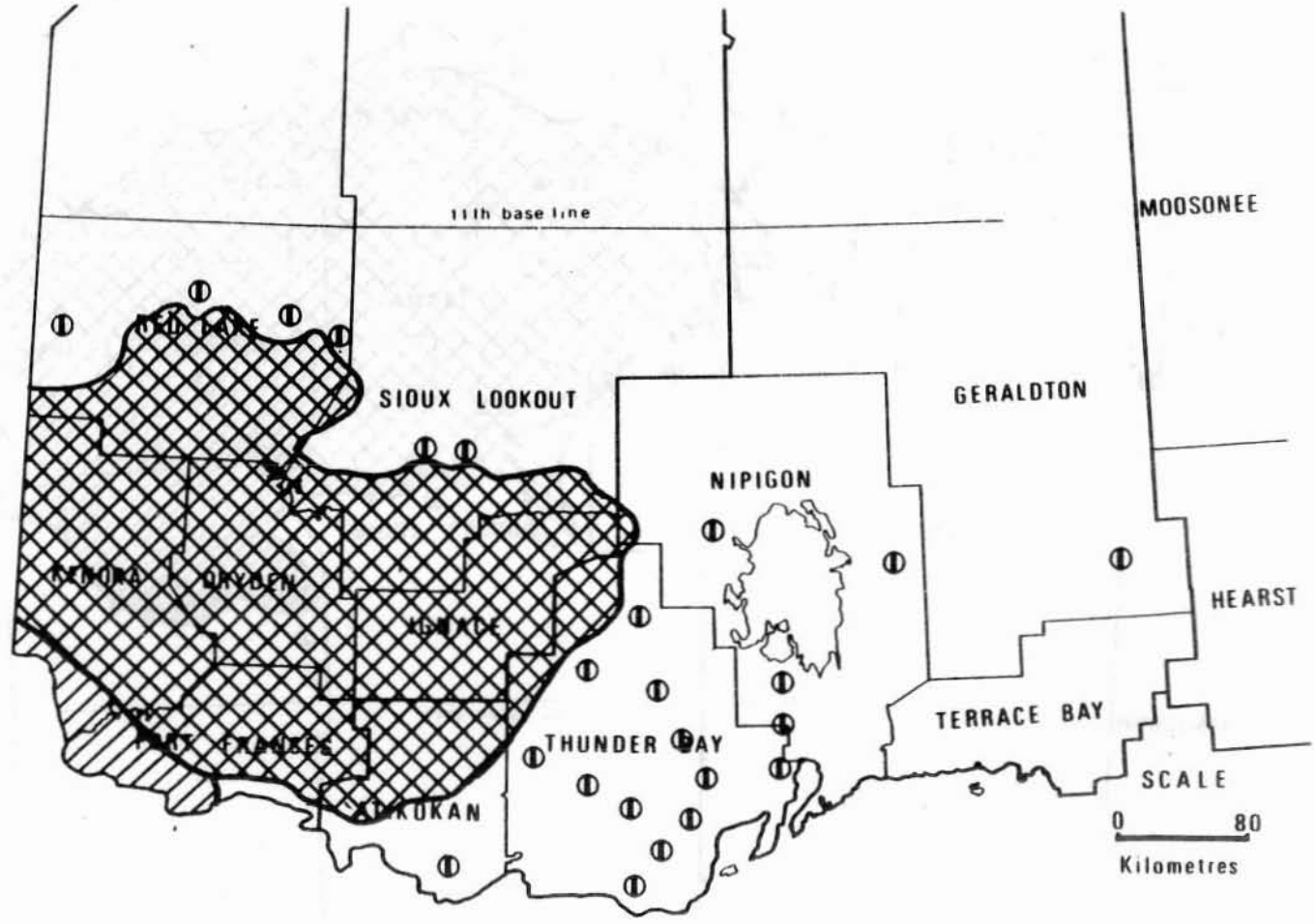
Areas within which defoliation occurred in 1965

LEGEND

Light defoliation ◐ or

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

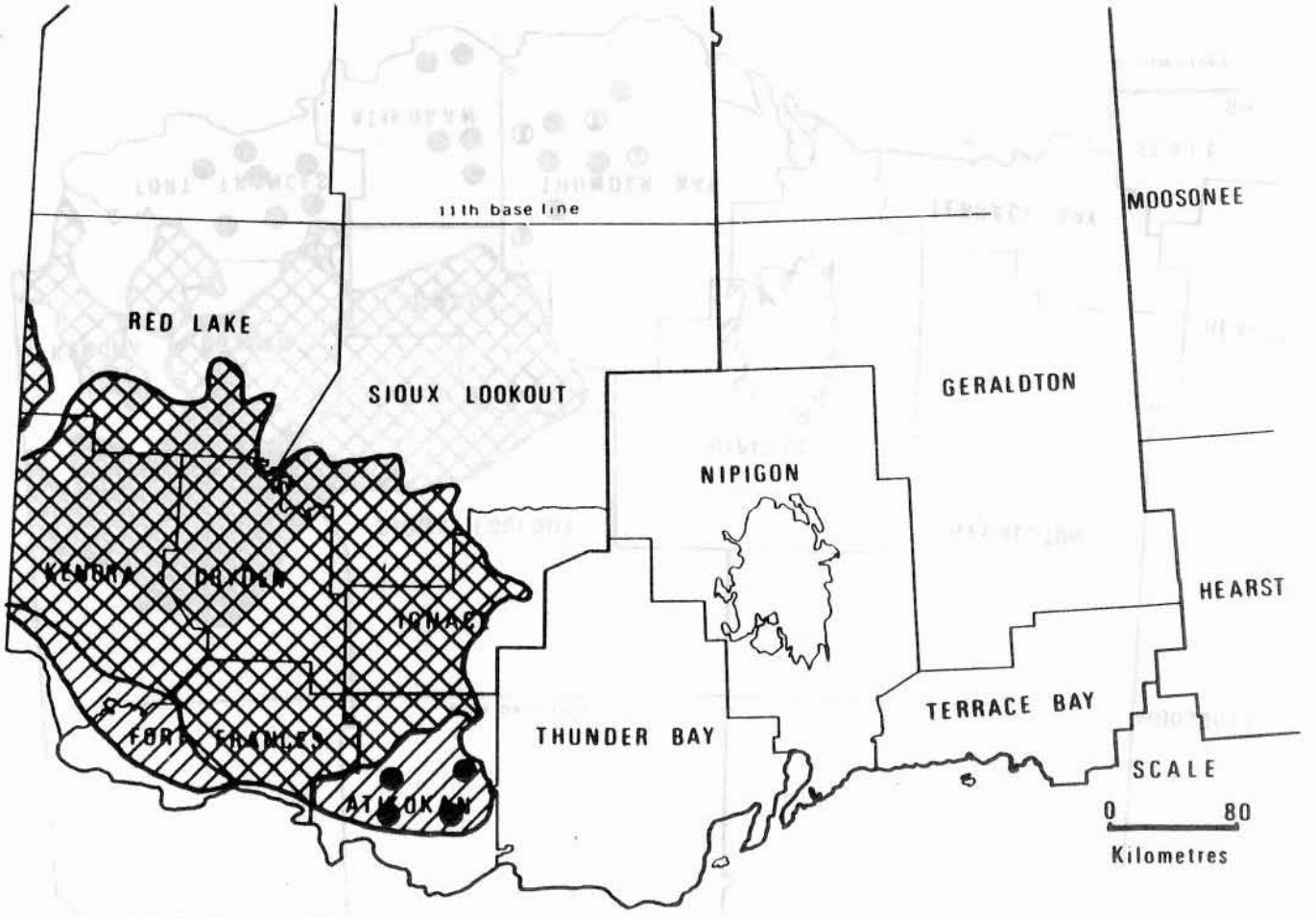
Areas within which defoliation occurred in 1964

LEGEND

Light defoliation or

Moderate-to-severe defoliation

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

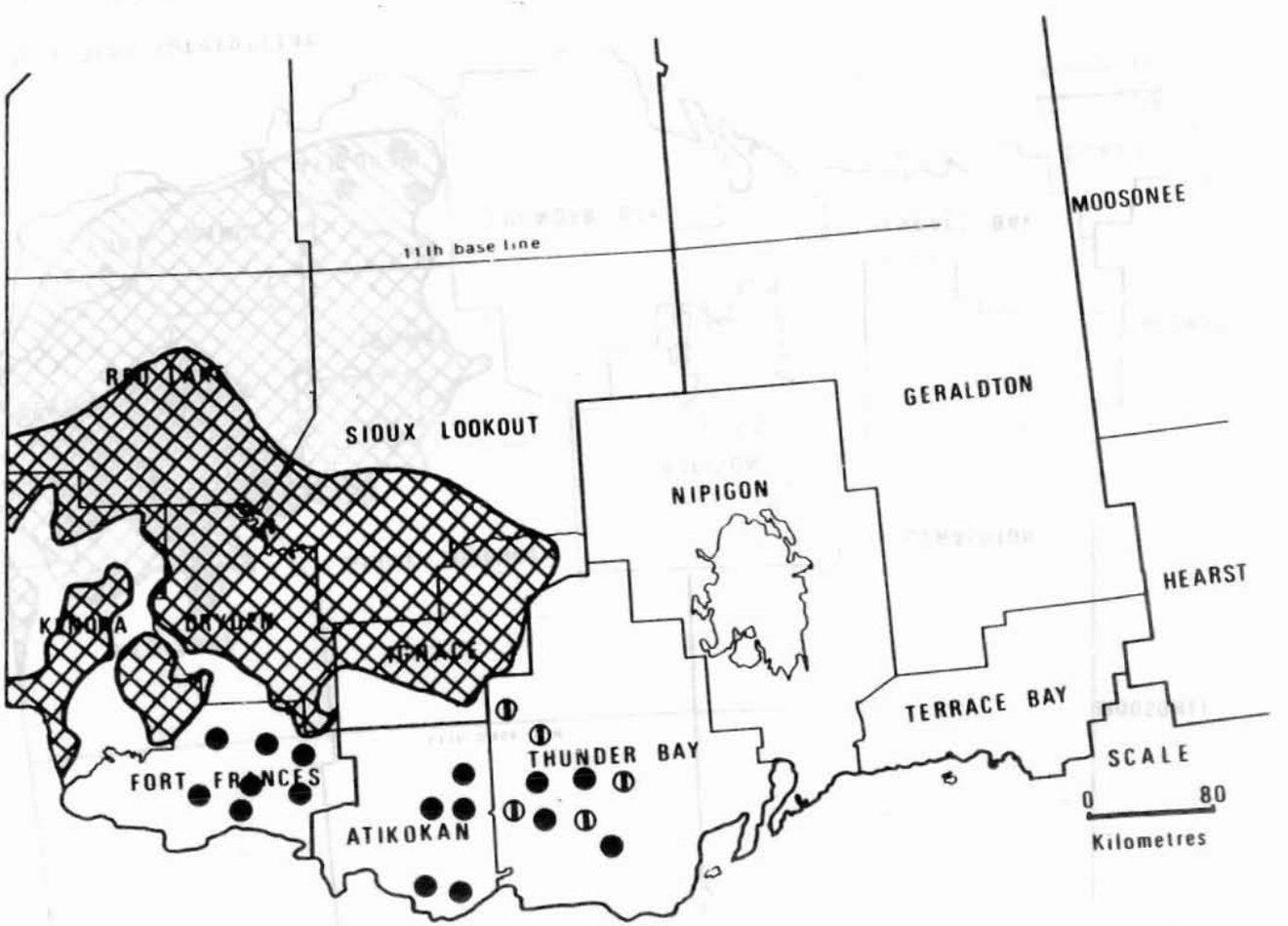
Areas within which defoliation occurred in 1963

LEGEND

Light defoliation

Moderate-to-severe defoliation ● or

NORTHWESTERN ONTARIO



Forest Tent Caterpillar

Areas within which defoliation occurred in 1962

LEGEND

Light defoliation ◐

Moderate-to-severe defoliation ● or ▨