

REPORT ON JACK PINE SAWFLY - SURVEY IN QUEBEC - 1956

by

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INTRODUCTION

In 1956, for the third consecutive year, a survey was conducted on jack pine, with the main purpose of supplementing information already obtained on distribution and abundance of jack pine sawflies in the various regions of Quebec. The territory investigated in previous years was extended eastward in 1956 so as to include new areas of the Upper St. Maurice, Jacques Cartier, Lake St. John and Saguenay regions.

The field work was performed by members of the Laboratory of Forest Zoology, Canadian Department of Agriculture, Quebec City, in cooperation with landholders' personnel. The survey staff included one forest ranger and five assistant technicians available part-time. Cooperators' personnel consisted of forest rangers, who were given special instructions prior to sampling.

METHODS

The procedure followed was approximately the same as in past years. It consisted in investigating jack pine stands particularly in the vicinity of roads accessible to motor vehicles. Each stand was first visited to get an estimation of its condition and on this basis, representative locations were chosen for the sampling. Most of the stands were sampled once, that is either in the spring or the fall and a few areas were sampled in both seasons.

In 1956, sampling was performed in 273 different locations, that is 196 by members of the Division and 77 by landholders. The location of each sample is represented by a circle on Maps 1, 1A, 1B and 1C, where those showing a reference number represent sawfly positive locations. Sample points surveyed both for cocoons and eggs represent 63 per cent of the total, whereas 1 per cent were examined for cocoons only and 36 per cent for eggs only. Unfortunately, only a few localities could be sampled for larvae due to a shortage of personnel at the time of feeding.

The cocoon sample consisted in the number of cocoons found in one foot quadrate of surface humus. At the beginning of the season 20 such units were examined at each station, but as the season progressed, the number was dropped to ten, for the reason mentioned above. All cocoons collected were classified according to external appearance in one of the following categories: sound, host emerged, parasitized, destroyed by predators and dead from other causes.

Egg sampling consisted in examining for egg scars, foliage samples cut with a pole pruner from the upper section of jack pine tree crowns. However, since the pruner could not be extended more than 25 feet, taller trees had to be felled. In the first case, the sample consisted of two branches from each of five trees while in the other case, five branches were taken from each of two trees. Each sample branch was carefully examined to detect the presence of eggs on the needles. The egg scars are easily

found on the current year's needles until the foliage is consumed by the larvae. This normally does not occur until the following season since the old foliage is the preferred food.

Additional to the sampling, permanent plots were established in 22 different locations, to follow the progress of the infestation from year to year. They were one-tenth acre plots in which 25 trees were tagged and described as to diameter, height, age, and degree of defoliation.

GENERAL CONDITIONS

Three species of sawflies were recorded on jack pine in 1956. Neodiprion swainei Midd. was the most abundant and widely distributed species, its presence being recorded in all surveyed regions. Neodiprion pratti banksianae Roh. was again present at the two points reported in 1955 and Neodiprion virginianus Roh. was found only at St. Hilarion in Charlevoix County. Unless otherwise stated, this report deals with N. swainei responsible for most of the damage recorded in jack pine stands in Québec. A proportion of 48 per cent of the localities gave sawfly positive records. Greater concentrations of positive locations were in the upper section of Ottawa, Gatineau and Lievre rivers, in the lower St. Maurice and in the vicinity of Chicoutimi. Map II shows the degree of infestation by this sawfly for the current year, in the various regions of the Province. Detailed figures on cocoon and egg population for each infested locality sampled in 1956, are presented in Tables 1 to 6.

Observations of the current year revealed that the infestation in general was less severe than in previous years. In the upper Saguenay region however, the larval population was heavy during the summer season and a relatively high number of sound cocoons was found in the fall. Only a small proportion of the shoots examined showed the presence of egg scars, and no great difference was observed between 1955 and 1956 as to egg population. In the first case, out of a total of 21,938 shoots examined, the percentage affected was estimated at 0.7 per cent with an average of 51 eggs per shoot compared to 0.8 per cent and 44 eggs obtained for 1956 on the 19,713 shoots studied. The highest proportion of affected shoots found was 5.3 per cent. The figures obtained for the upper Saguenay in 1956 were 2.9 per cent affected with an average of 35 egg scars per shoot.

Further examination of egg scars led to the conclusion that the percentage of survival in the egg stage is generally high, most records being over 90 per cent. Emergence was relatively low in only two locations: point 32¹ on Barrière Road and point 49 on the upper Gatineau, estimated at 32.9 and 31.8 per cent respectively.

CONDITIONS BY REGIONS

Harricana-Bell-Ottawa watersheds (Table 1)

Jack pine stands located in Abitibi-Ouest, Rouyn-Noranda and west of the Bell River in Abitibi-Est county are generally young and show only

1. Refers to number on maps 1, 1A, 1B or 1C.

traces of the sawfly. A light infestation in a young stand in the vicinity of Rapid 7 (3) is the only one worth mentioning.

Barriere Road area (Table 2)

Infestation in the region of the Barriere Road has been known for several years and extensive sawfly damage was the main reason for the acceleration of cutting operations in this area. The lower section of the road now contains only scattered jack pine trees left after the cut, whereas operations are now going on in pure and mixed jack pine stands in the upper section.

Two sawfly species, N. swainei and N. pratti banksianae were found in this area in 1955 and again in 1956. The latter was present in only one locality, i.e. in a 90 year-old jack pine stand along the Ottawa River (22) where it was reported in 1955. The former was found in nearly all the localities sampled and different degrees of infestation from light to severe were recorded. Along the lower 25 miles of the road, jack pine trees were generally lightly infested, whereas the most important centers of infestation were located along the upper portion. Dead tops were abundant in older stands and tree mortality was evident in scattered areas. Cocoon sampling made in the spring indicated that the infestation has been active for several years in this area and the high proportion of sound cocoons was an indication that populations would probably be high in 1956. Unusually high counts were obtained at points 23, 27, 28 and 33.

Gatineau watershed (Table 3)

In the lower section of the Gatineau watershed, only scattered jack pine stands were found. A young stand examined in Aylwin Township showed no sign of infestation. In the Baskatong Lake region there are extensive areas covered by young even-aged jack pine stands showing only traces of sawfly damage. On the eastern side of the Gatineau River, in the vicinity of Sturgeon Depot, jack pine stands are older; a few scattered sawfly specimens could be found but no important damage was recorded. Worthy of mention, however, is one 90 year-old stand (43) on the Notawissi Road, which revealed the presence of a light infestation of N. pratti banksianae. In this locality, approximately the same conditions were witnessed as in locality 22 mentioned above. The cocoon population was generally low indicating the infestation was recent.

The upper Gatineau area i.e. north of latitude 47°30' was examined by way of the Parent Road. Only traces of N. swainei were found on the Bazin River road (56) but an important center of infestation was located in Gosselin Township (51) in an overmature jack pine stand growing in mixture with black spruce. The sawfly population apparently decreased in the area as a whole, for a few years, but defoliation was heavy in some places, again in 1956. Damage varied from medium at Mileage 46 to severe in the vicinity of Fortier River.

Lievre watershed (Table 4)

The insect was present in the majority of the localities sampled on the upper Lievre River in 1956. In this region there are apparently

two main centers of infestation. The first one is located on the road from Pine Lake Depot to Waterloo Lake (63). Heavy defoliation was recorded in an overmature stand of jack pine mixed with black spruce where the insect has been active for several years as indicated by the high number of cocoons in the soil. Most jack pine trees have been severely defoliated and show dying or dead tops. Approximately the same conditions exist at a short distance along the road (64 and 65) where old stands of jack pine alternate with young ones. Although younger stands were generally affected to a lesser degree, severe defoliation was recorded in restricted areas.

The second center of infestation, although of less importance, was found in an extensive young stand growing in the vicinity of Red Pine Depot and along the Red Pine River (61). The high proportion of sound cocoons in the humus layer seems to indicate a more recent infestation than in the previous case.

St. Maurice Watershed (Table 5)

The St. Maurice watershed is one of the most important in Quebec as to volume of jack pine stands. It contains large tracts of old forest made up of jack pine growing in mixture with black spruce and extensive younger stands of pure jack pine which originated after forest fires. Sampling for sawflies in these stands revealed the presence of all three species, in 1955, but *N. swainei* was the only one reported in 1956, yet with a reduced population. This huge territory can be divided into two main areas on the basis of sawfly abundance.

The first of these areas is located west of the St. Maurice River, extending in latitude from the Mattawin River to the Transcontinental railway and contains the most important infestation centers; old jack pine trees still standing are either dying or dead as a result of repeated defoliation; young trees have also been severely defoliated for many years but had enough vitality to resist. A light to medium infestation was located at the margin of the main area of infestation, in a mature jack pine stand, at the mouth of the Chienne River (117), a tributary of the Mattawin River. The insect has been present in this stand for a few years, but no important damage has resulted as yet. A more serious infestation center has been recorded in the Chienne Depot area where the insect has been known to occur for at least ten years; for this reason, cutting programs have been practiced for the last decade for the purpose of eliminating old jack pine trees. In 1956, especially high cocoon counts, 37 cocoons per square foot of litter, were made in the vicinity of Lake Alice (107). On the road from the Chienne Depot to the Chapeau de Paille Depot, defoliation varied from light to medium. In this latter area, an immature stand (100) was found with an average population of 28 cocoons per unit. Approximately the same conditions were recorded in an immature stand on the road to Lake Gagnon (98).

In the Lake Gagnon area, the infestation varied from light to medium and seemed more recent than those referred to above, even though the insect was well distributed. The most heavily infested stand (91) gave an average population of 19 cocoons and another locality (108) gave an average of 15 individuals per square foot.

In the Lake Hambone area, an infestation center (89) is known to have existed for a few years, in a mature stand of jack pine mixed with black spruce, but no important change has occurred since it was first recorded. The population averaged 11 cocoons this spring and the presence of sound cocoons shows that the infestation was still active. The localities sampled on the Flamand River and in the vicinity of Oriskany Club revealed the presence of only small numbers of sawflies. Point (85) in a section of the extensive 30 year-old stand surrounding the Club was the only one showing a moderate defoliation in 1956.

In the Casey-Manouane area, where an important center of infestation was known to exist in previous years, sampling was performed in the fall only. In this area, the focus of infestation was located in the vicinity of Manouane Lake where old jack pine trees were either dying or dead, mortality sometimes reaching a proportion of over 50 per cent. Although sampling was done after the early frosts when soil conditions were not very favourable for cocoon collection, an average population of 14 cocoons were found in one locality (71). It appeared that the infestation was spreading northward from the center described above. One indication of that move was obtained 4 miles south of Casey (76) where 3.2 per cent of the new shoots showed signs of oviposition scars whereas no cocoons were found in the five quadrates examined. The presence of the sawfly was also evident on the road going along the Manouane River from Sanmaur. The infestation, however, has been on the wane in this area for a few years. Medium cocoon counts were made on this road in the vicinity of Lake Manouane (80 and 81) but no severe damage could be attributed to the insect.

The remaining territory sampled in the St. Maurice watershed may all be classified in one category and contains jack pine trees either not affected or showing only traces of attack. In two locations on the Trenche River (120 and 121), however, a light infestation was found in a pure mature jack pine stand. The cocoon population varied from light to medium but no sound cocoons were found which indicates that the infestation will probably be on the decrease in 1957.

Lake St. John and Jacques Cartier areas (Table 6)

Jack pine stands in the Lake St. John area may be divided into two groups: first, young and pure jack pine stands located within 20 miles of the lake shore, originating after the forest fires in the colonization areas; second, older jack pine stands often mixed with black spruce, located in forest areas farther from the lake.

Sampling for sawflies in these stands revealed the presence of N. swainei in three main areas outside of which the insect was either rare or absent. Moderate to severe defoliation was recorded this year in

Charlevoix, Dechêne and Chabanel townships (122 and 125) on the Ouiatchouane River, south of Lake St. John. The insect is known to have been present in this area for at least ten years and damage to trees has been very important. However, as a result of the recent cutting of old jack pine stands, the infestation has decreased over the last few years and was less severe in 1956 than in 1955. Similar conditions existed on the Riviere aux Rats (127) located on the north shore of Lake St. John, where an infestation had been active for the same period of time and where the elimination of old stands brought about a reduction in sawfly population. The insect is still present in a few stands of the Perdrix Blanche River, a tributary of the Riviere aux Rats. Old jack pine trees which are still standing show dying or dead tops and young stands in some areas have been seriously defoliated in previous years.

In Tremblay Township (131), eight miles north of Chicoutimi, moderate to severe damage was recorded in a 30 year-old stand left undisturbed in a colonization area. Defoliation was almost complete on some of the trees. Unfortunately, no definite records could be obtained on the cocoon population since the area was visited rather late in the fall. However, approximately 4 per cent of the 1956 shoots revealed the presence of oviposition scars.

In the Jacques Cartier region, jack pine stands are not very numerous. Examination of a few stands revealed the existence of a light infestation center in a mature stand, on the Malbaie River (133). Defoliation was recent and no important damage has been recorded as yet. The same conditions prevailed in Settrington Township in Charlevoix County. In the same area, in addition to N. swainei, a few larvae collected at the time of sampling were identified as N. virginianus Roh.

FACTORS OF NATURAL CONTROL

The main factor of natural control was undoubtedly the weather which considerably delayed the emergence of the adults in the spring and prevented a good proportion of the larvae from completing their development before the early frosts in the fall. For this reason, in many areas, sound cocoons were less numerous after the summer season than in the spring. This was especially evident for the Chienne area in the St. Maurice watershed where examination of 220 quadrates gave a ratio of 11 per cent sound cocoons in the spring, compared to 2.1 per cent obtained in 60 quadrates in the same area, in the fall. Individuals which emerged earliest and happened to be in locations protected from frosts were apparently the only larvae to spin cocoons in 1956.

Apart from the weather, other factors also played an important role in the control of the insect, but their action cannot be evaluated with a great degree of accuracy with the records on hand. Such results would involve complex methods used at a greater sampling intensity. Yet, classification of the cocoons collected in the soil, in the different categories mentioned above, reflects their relative value for a certain period of time. Sorting of the 8,558 cocoons collected in 1956 gave the following results:

| | |
|---------------------------|-------|
| Apparently sound | 6.4% |
| Host emerged | 15.3% |
| Parasite emerged | 18.1% |
| Destroyed by predators | 56.9% |
| Mortality by other causes | 3.3% |

It is evident from these data that next to the weather, small mammals, which are cocoon predators, constituted the most important single factor of control. The parasites also exerted a moderate effect and in order to obtain more precise information on their action, 321 apparently sound cocoons collected in various areas were reared through during the winter. Results were as follows: N. swainei, adults emerged 135, hymenopterous parasites 113, dipterous parasites 33, larvae with cyst formation 3, dead from unknown causes 38. The parasites recovered belonged to the following species: Diptera: Spathimeigenia spinifera Tns., Hymenoptera: Aptesis indistincta (Prov.), Perilampus hyalinus Say., Olesicampe lophyri (Riley), Dahlbominus fuscipennis (Zett.). All these parasites attack the active larvae except the last species which deposits its eggs on the larva inside the cocoon. It is also of interest to mention that in the Clova area, one parasite species was reported as destroying a large percentage of eggs.

A virus disease which destroyed an important number of larvae in certain sectors of the St. Maurice and undoubtedly caused an appreciable reduction in the sawfly population in a few restricted areas, was also reported for the first time in 1956.

CONCLUSION AND RECOMMENDATIONS

Results of the 1956 survey indicate a general decline in sawfly infestation through most of the territory under attack. The population has been largely reduced in most areas where it was exceedingly high a few years ago. This reduction could be expected on the basis of the small number of living larvae entering hibernation in the fall of the preceding year, but the situation was aggravated by unfavourable weather conditions which prevented most larvae from completing their development before the arrival of frosts in the fall of the current year. The Saguenay area was the only one where infestations remained fairly high.

What the future of the outbreak will be is difficult to tell, although it is believed that the insect population will build up again more or less rapidly depending on weather conditions. For this reason, it is important to continue the survey, to establish the relative abundance of the insect from year to year and the amount of damage done in various regions of the Province. No important change in the procedure is contemplated, although it is realized that larger samples would be necessary to secure more precise data. This is hardly possible on the whole territory covered by this report because of the amount of work involved. It is believed that for the purpose of this survey, it is sufficient to obtain an approximate idea of the relative population

levels in various areas and to record stand damage and mortality. However, starting next year, an attempt will be made to collect more precise data in the permanent sample plots already established.

ACKNOWLEDGMENT

The writer takes pleasure in expressing his gratitude to the landholders and their personnel for their cooperation.

Table 1

Population Density of Jack Pine Sawflies in Positive Localities of "Harricana-Bell - Ottawa" Watersheds in 1956

| Area | Stand | | | | Cocoon sampling | | | Egg-scar sampling | | | | |
|------------------------|-----------------------|--------|---------|-------------|------------------------|------------------------------|---------|-------------------------|-------------------------|----------------------|----------------------|--|
| | Locality no. (on map) | % J.P. | Form | No. samples | Av. no. cocoons/sample | % Survival (sound & emerged) | % sound | No. '56 shoots examined | Percent shoots affected | Av. no. eggs/cluster | Percent eggs hatched | |
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| <u>SPRING SAMPLING</u> | | | | | | | | | | | | |
| Harricana & Bell R. | 1 | 100 | Im. (1) | 2 | 1.5 | 33.3 | 0 | 407 | 0 | | | |
| | 2 | 90 | Im. (2) | 10 | 0.7 | 28.6 | 0 | 317 | 0.6 | 43 | | |
| | 3 | 80 | M. (2) | 10 | 1.7 ± 0.5(3) | 22.2 | 5.8 | 731 | 1.5 | | | |
| Ottawa R. (center) | 4 | 100 | Im. | 10 | 0.5 ± 0.2 | 60 | 0 | 434 | 0 | 53 | | |
| | 5 | 50 | M. | 10 | 0.3 ± 0.2 | 0 | 0 | 688 | 0.6 | | | |
| | 6 | 100 | M. | 10 | 0.2 | 0 | 0 | | 0 | | | |
| | 8 | 70 | M. | 10 | 0.2 | 50 | 0 | 760 | 0 | | | |
| Chochoouane R. | 9 | 100 | M. | 10 | 0 | | 0 | 375 | 0 | | | |
| | 10 | 100 | M. | 5 | 1.8 | 11.1 | 11.1 | 161 | 0 | | | |
| | 11 | 100 | M. | - | | | | 880 | Trace(5) | 1 | | |
| | 13 | 90 | M. | 10 | 24.8 ± 4.8 | 27.1 | 2.4 | 664 | 0.7 | | | |
| | 15 | 100 | M. (4) | 10 | 35.7 | 16.5 | 1.5 | 400 | 0 | | | |
| | 16 | 70 | Ov. (4) | 10 | 20.9 | 19.1 | 2.9 | 830 | 0.4 | 14 | | |
| Capitachouane R. | 17 | 100 | Im. | 10 | 0.5 ± 0.2 | 0 | 0 | 745 | 0 | | | |
| | 19 | 80 | Ov. | 10 | 0.3 ± 0.2 | 33.3 | 0 | 710 | 0 | | | |

(1) Im = Immature
 (2) M = Mature
 (3) Standard error only for localities of ten or more quadrates
 (4) Ov = Overmature
 (5) Trace: Eggs on previous year's shoots only.

Table 1 (Cont'd)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
|---------------------|---|----|-----|-----|---|----------------------|------|---|------|-------|----|----|--|
| | | | | | | <u>FALL SAMPLING</u> | | | | | | | |
| Harricana & Bell R. | | 1 | 100 | Im. | 3 | 0 | | | 597 | 0 | | | |
| | | 2 | 100 | Im. | 2 | 0 | | | 946 | 0 | | | |
| | | 3 | 80 | M. | 5 | 0 | | | 401 | 0 | | | |
| Ottawa R. (center) | | 7 | 75 | M. | 5 | 0 | | | 908 | Trace | | | |
| Chochoouane R. | | 9 | 100 | M. | 2 | 1.5 | 33.3 | 0 | 846 | 0 | | | |
| | | 12 | 50 | Im. | - | | | | 591 | 2.8 | 39 | | |
| | | 13 | 90 | M. | - | | | | 1062 | 0 | | | |
| | | 14 | 90 | Im. | 2 | 4.7 | 36.1 | 0 | 572 | 0 | | | |
| Capitachouane R. | | 18 | 95 | | | | | | 623 | 0.9 | 34 | | |

Table 2

Population Density of Jack Pine Sawflies in Positive Localities of the Barriere Road in 1956

| Area | Locality no. (on map) | Stand | | | | Cocoon sampling | | | | Egg-scar sampling | | | |
|------------------------|-----------------------|--------|------|-------------|------------------------|------------------------------|---------|---------------------|-------------------------|----------------------|----------------------|--|--|
| | | % J.P. | Form | No. samples | Av. no. cocoons/sample | % Survival (sound & emerged) | % sound | No. shoots examined | Percent shoots affected | Av. no. eggs/cluster | Percent eggs hatched | | |
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | |
| <u>SPRING SAMPLING</u> | | | | | | | | | | | | | |
| Barriere Road | 21 | 60 | Ov. | 10 | 0 | 25 | 0 | 861 | 0.7 | 6.1 | 100 | | |
| | 22(1) | 60 | Ov. | 10 | 3.2 | 15.6 | | 710 | 0.1 | 2 | 82.9 | | |
| | 24 | 60 | M. | 12 | 16. ± 3.2 | 15.2 | | 549 | 0.9 | 55 | | | |
| | 25 | 70 | Ov. | 10 | 10.5 ± 0.9 | 17.3 | | 1004 | 0 | 64 | 96.9 | | |
| | 27 | 60 | M. | 11 | 27.3 ± 5.1 | 15.8 | | 716 | 0.1 | 22 | 97.7 | | |
| | 29 | | M. | 10 | 26. ± 3.6 | 16.9 | | 610 | 0.3 | 39 | 98.9 | | |
| | 31 | 95 | M. | 10 | 17.1 ± 3.9 | 21. | | 782 | 0.6 | 70 | 99.0 | | |
| | 33 | 65 | Ov. | 10 | 21.4 | 12.7 | | 1278 | 0.2 | 33 | 90.8 | | |
| | 34 | 70 | Ov. | 10 | 14.1 | | | 926 | 0.3 | | | | |
| <u>FALL SAMPLING</u> | | | | | | | | | | | | | |
| Barriere Road | 20 | 95 | Ov. | 5 | | 31.3 | | 858 | 0.2 | 36 | 72.2 | | |
| | 22 | 60 | M. | 2 | 24 | 16.1 | 0 | 1025 | 0 | | | | |
| | 23 | 50 | M. | 2 | 15.5 | | 0 | 559 | 0 | 77 | 96.1 | | |
| | 25 | 50 | M. | 2 | | | | 434 | 1.2 | | | | |
| | 26 | 80 | Ov. | | | | | 501 | 0 | | | | |
| | 29 | 95 | M. | 2 | 9 | 27.7 | 5.5 | 1119 | 0 | | | | |
| | 30 | 40 | Ov. | | | | | 909 | 0.4 | 145.5 | 91.8 | | |
| | 32 | 70 | M. | | | | | 658 | 0.3 | 39 | 38.9 | | |
| | 35 | 90 | Ov. | | | | | 1198 | 0.5 | 36 | 81.9 | | |
| | 36 | 80 | Ov. | | | | | 883 | 0.1 | 149 | 100 | | |
| | 37 | 90 | Ov. | | | | | 819 | 0.1 | 29 | 100 | | |
| | 38 | 90 | Ov. | | | | | 702 | 0.1 | 50 | 98.9 | | |
| | 39 | 80 | M. | | | | | 570 | 0.3 | | | | |

Table 3

Population Density of Jack Pine Sawflies in Positive Localities
of the Gatineau Watershed in 1956

| Area | Locality no. (on map) | % J.P. | Stand | Cocoon sampling | | | Egg-scar sampling | | | | | |
|-------------------|--------------------------|--------|-------|-----------------|------------------------|------------------------------|-------------------|---------------------|-------------------------|----------------------|----------------------|------|
| | | | | No. samples | Av. no. cocoons/sample | % Survival (sound & emerged) | % sound | No. shoots examined | Percent shoots affected | Av. no. eggs/cluster | Percent eggs hatched | |
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| Baskatong | 41 | 100 | Im. | 10 | 0.6 | 16.6 | 0 | | 0 | | | |
| | 43 (1) | 72 | M. | 8 | 2.9 | 8.7 | 0 | | 0 | | | |
| Baskatong | 40 | 100 | | | | | | 937 | 0.4 | 63 | 97.2 | |
| | 41 | 100 | M. | 3 | 0 | | | 864 | 0 | | | |
| | 42 | 100 | | | | | | 828 | 0.1 | 22 | 95.4 | |
| | 43 | 100 | Im. | 2 | 0 | | | 1199 | 0 | | | |
| | 44 | 30 | | | | | | 495 | Trace | 10 | 100 | |
| | 45 | 80 | | | | | | 434 | 0.2 | | | |
| | 46 | 60 | | | | | | 364 | Trace | | | |
| | 47 | 70 | | | | | | 478 | Trace | | | |
| | 48 | 50 | | M. | 15 | 2.4 ± 0.5 | 19.4 | 0 | 525 | 0 | 66 | 31.8 |
| | 49 | 40 | | | | | | 772 | 0.1 | | | |
| Upper Gatineau R. | 50 | 30 | | | | | | | | | | |
| | 51 | 70 | | 10 | 16.8 | 19 | 2.45 | | | | | |
| | 52 | 25 | | | | | | 538 | Trace | | | |
| | 53 | 30 | | | | | | 181 | Trace | | | |
| | 54 | 70 | | M. | | | | 591 | Trace | 67 | 94.7 | |
| | 55 | 100 | | | | | | 674 | 1.5 | | | |
| Bazin R. | 56 | 100 | | | | | 251 | 0.4 | 82 | 97.5 | | |

(1) Neodiprion pratti banksianae

Table 5

Population Density of Jack Pine Sawflies in Positive Localities of the "St. Maurice" Watershed in 1956

| Area | Stand | | | | Cocoon sampling | | | | Egg-scar sampling | | | |
|--------------------|-----------------------|---------|------|-------------|------------------------|------------------------------|---------|--------------|---------------------|-------------------------|----------------------|----------------------|
| | Locality no. (on map) | % J.P. | Form | No. samples | Av. no. cocoons/sample | % Survival (sound & emerged) | % sound | '56 examined | No. shoots affected | Percent shoots affected | Av. no. eggs/cluster | Percent eggs hatched |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| SPRING SAMPLING | | | | | | | | | | | | |
| Low. Mattawin R. | 114 | 90 | M. | 10 | 1.4 ± 0.6 | 14.3 | 0 | 505 | Trace | | | |
| | 115 | 90 | M. | | | | | 444 | Trace | | | |
| | 116 | 100 | M. | 20 | 9.3 ± 1.9 | 17.1 | 1.1 | 337 | 0.3 | 55 | 100 | |
| | 117 | 80 | M. | | | | | 588 | 0.5 | 17 | 84.3 | |
| Masson Reservoir | 111 | 40 | Im. | | | | | 612 | 0.2 | 74 | 94.6 | |
| | 112 | 100 | M. | | | | | 638 | Trace | | | |
| | 113 | 100 | Im. | | | | | 483 | Trace | | | |
| St. Maurice Valley | 119 | 50 | Im. | 10 | 0.4 | 50 | 0 | | | | | |
| Chienne R. | 98 | 90 | Im. | 20 | 32. | 12.6 | 2.5 | 1022 | 0.4 | 20 | 97.5 | |
| Chapeau de paille | 100 | 100 | Im. | 20 | 28.1 ± 3.1 | 36.1 | 14.6 | 616 | 0.3 | 34 | 92.5 | |
| | 101 | 100 | Im. | 10 | 1.5 ± 0.5 | 46.7 | 26.7 | 267 | 0.4 | 53 | 95.7 | |
| | 102 | 80 | Im. | 20 | 1.1 ± 0.3 | 22.7 | 9.1 | 803 | 0.2 | 68 | | |
| | 103 | 100 | Im. | 10 | 0.1 | 0 | 0 | 183 | 0 | | | |
| | 105 | 30 | Ov. | 20 | 14.2 ± 2.1 | 17.0 | 3.2 | 692 | 0.6 | 49 | 94.4 | |
| | 106 | 100 | Im. | 10 | 6.4 ± 1.7 | 17.2 | 3.1 | 800 | 2.6 | 39 | 92.7 | |
| | 107 | 80 | Im. | 20 | 36.8 ± 3.2 | 18.8 | 6.1 | | | | | |
| Gagnon Lake | 90 | 100 | Im. | 10 | 6.1 ± 0.9 | 41.0 | 32.8 | 724 | 2.1 | 48 | 85.2 | |
| | 91 | 95 | M. | 20 | 18.8 ± 2.6 | 37.5 | 18.1 | 607 | 0.8 | 28 | 92.2 | |
| | 94 | Missing | M. | 10 | 6.4 ± 1.8 | 21.9 | 14.1 | 449 | 2.6 | 55 | 97.3 | |
| | 95 | 100 | Im. | 10 | 4.7 ± 0.9 | 55.3 | 38.3 | 407 | 1.0 | 47 | 88.3 | |
| | 96 | 100 | Im. | 20 | 7.8 ± 0.8 | 40.8 | 21.7 | 730 | 1.9 | 46 | 94.5 | |
| | 108 | 100 | Im. | 20 | 15.1 ± 2.1 | 37.4 | 19.5 | 351 | 0 | | | |

Table 5 (Cont'd)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|----------------------|-----|-----|-----|----|------------|------|------|-----|-----|----|------|
| Flamand- | 82 | 98 | M. | 10 | 0.4 ± 0.2 | 25 | 0 | 425 | 0.2 | 87 | 100 |
| Oriskany- | 83 | 99 | M. | 10 | 0.5 ± 0.7 | 80 | 20 | 384 | 0.3 | 64 | 100 |
| Hambone I. | 84 | 95 | M. | 10 | 0.6 ± 0.3 | 33.3 | 33.3 | 836 | 0 | | 97.2 |
| | 85 | 99 | M. | 10 | 2.1 ± 0.6 | 66.7 | 47.6 | 428 | 5.3 | 47 | 100 |
| | 87 | 50 | Im. | 10 | 0.3 ± 0.2 | 0 | 0 | 907 | 0.8 | 62 | |
| | 88 | 40 | Im. | 10 | 0.2 ± 0.1 | 50 | 50 | 903 | 0 | | |
| | 89 | 60 | M. | 20 | 10.9 ± 1.3 | 31.7 | 13.8 | 614 | 1.1 | 58 | |
| <u>FALL SAMPLING</u> | | | | | | | | | | | |
| Low. Mattawin R. | 116 | 80 | | | | | | | | | |
| | 117 | 80 | M. | 20 | 4.2 ± 0.9 | 7.1 | 0 | 495 | 0.2 | 40 | 100 |
| Masson Reservoir | 110 | 100 | | | | | | | | | |
| | 99 | 90 | | | | | | | | | |
| Chapeau de paille | 101 | 80 | | | | | | | | | |
| | 107 | 80 | Im. | 20 | 13.9 ± 1.7 | 10.1 | 0.7 | 232 | 0.4 | 69 | 100 |
| Gagnon Lake | 92 | 100 | | | | | | | | | |
| | 97 | 100 | | | | | | | | | |
| | 102 | 90 | | | | | | | | | |
| | 96 | 100 | Im. | 20 | 4.8 ± 0.8 | 22.3 | 5.3 | 254 | 1.2 | 78 | 100 |
| | 91 | 95 | M. | 20 | 18.7 ± 2.8 | 17.7 | 2.4 | 227 | 1.3 | 53 | 100 |
| | | | | | | | | 466 | 0.6 | 72 | 100 |
| Flamand | 86 | 80 | | | | | | 264 | 1.1 | 48 | 100 |

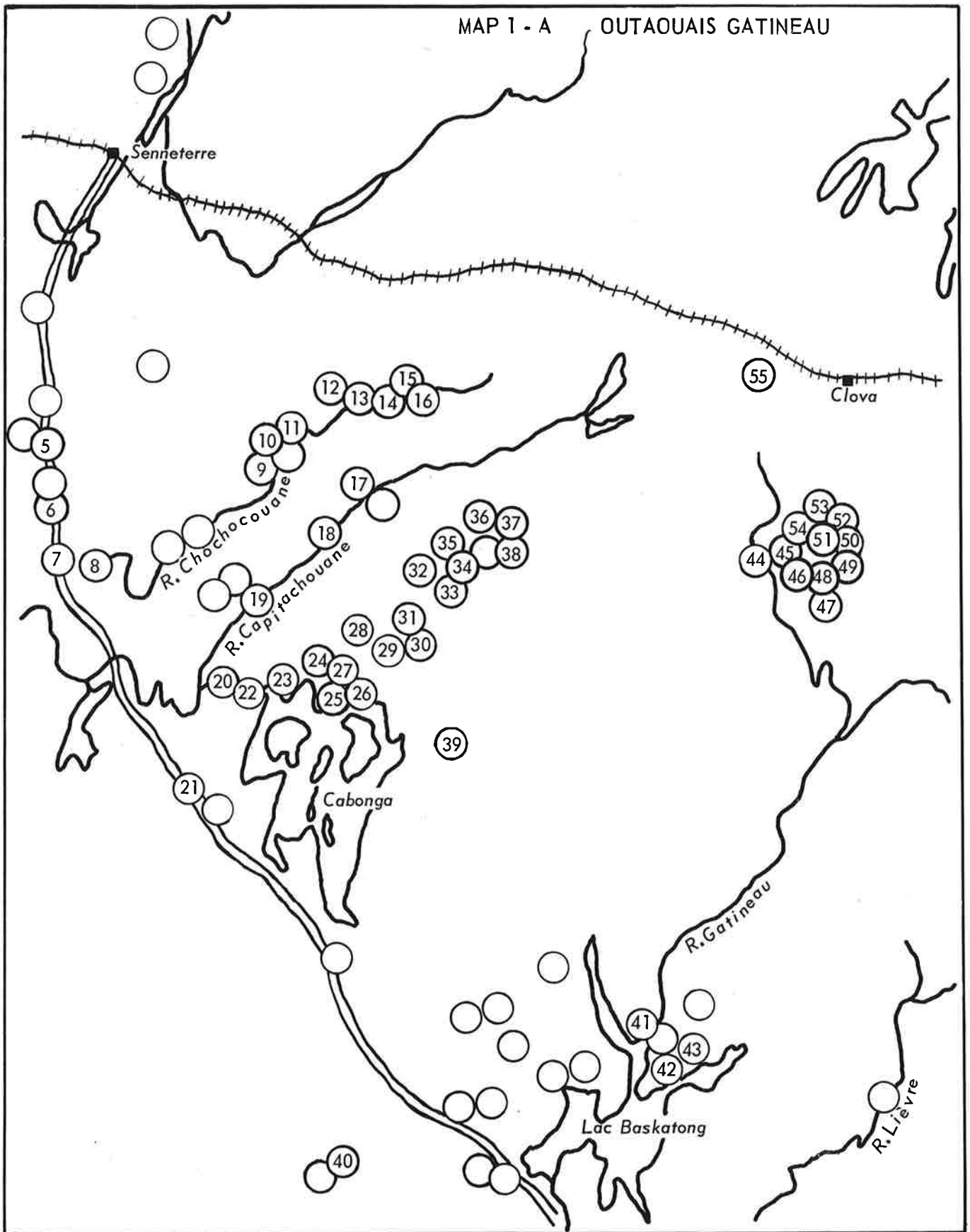
Table 5 (Cont'd)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|----------|-----|-----|-----|----|------------|------|------|------|-------|----|------|
| Casey & | 70 | | | | | | | 682 | Trace | | |
| Manouane | 71 | 100 | Ov. | 20 | 13.8 ± 5.4 | 23.2 | 18.1 | 304 | 1.3 | 55 | 93.6 |
| | 72 | 95 | Ov. | 10 | 0.6 | 16.7 | 0 | 270 | 0.4 | 67 | 95.5 |
| | 73 | 100 | | | | | | 1173 | 0.25 | 48 | 98.6 |
| | 74 | 90 | Ov. | 10 | 0.7 | 28.6 | 0 | 303 | 0 | | |
| | 75 | 70 | | | | | | 1396 | Trace | | |
| | 76 | 100 | M. | 5 | 0 | | | 186 | 3.2 | 35 | 99. |
| | 77 | 90 | Ov. | 20 | 1.6 ± 0.9 | 15.2 | 0 | 275 | 1.1 | 84 | 97.2 |
| | | | | | | | | | | | |
| Sannaur | 78 | 100 | M. | 10 | 0.1 ± 0.1 | 0 | 0 | 450 | 0.2 | 88 | 98.9 |
| | 79 | 100 | Im. | 10 | 0.6 | 0 | 0 | 401 | 0 | | |
| | 80 | 100 | M. | 10 | 3.1 ± 0.5 | 9.7 | 0 | 829 | 0 | | |
| | 81 | 40 | M. | 10 | 7.9 | 15.2 | 0 | 636 | 0 | | |
| | | | | | | | | | | | |
| Trenche | 120 | 100 | M. | 20 | 8.1 ± 1.6 | 6.1 | 0 | 366 | 0.2 | 73 | 97.2 |
| | 121 | 50 | Ov. | 20 | 2.1 ± 0.7 | 9.3 | 0 | 370 | 0.2 | 93 | 82 |

Table 6

Population Density of Jack Pine Sawflies in Positive Localities
of the "Lake St. John and Jacques Cartier" Areas

| Area | Stand | | | Cocoon sampling | | | | Egg-scar sampling | | | |
|-----------------|--------------------------|--------|------|-----------------|------------------------|------------------------------|---------|-------------------------|-------------------------|----------------------|----------------------|
| | Locality no. (on map) | % J.P. | Form | No. samples | Av. no. cocoons/sample | % Survival (sound & emerged) | % sound | No. '56 shoots examined | Percent shoots affected | Av. no. eggs/cluster | Percent eggs hatched |
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | <u>FALL SAMPLING</u> | | | | | | | | | | |
| Ouiatchouan | 122 | 100 | M. | 10 | 12.9 | 11.6 | 0 | 322 | 0.3 | 47 | 85.1 |
| | 125 | 95 | Ov. | 2 | 2.5 | 20 | 0 | 320 | 0 | | |
| Chamouchouare | 126 | 100 | Im. | 2 | 0.5 | 0 | 0 | 594 | 0 | | |
| R. aux Rats | 127 | 65 | Im. | 10 | 0.3 ± 0.3 | 0 | 0 | 318 | 0 | | |
| Saguenay | 128 | 100 | M. | 10 | 0 | | | 498 | 0.2 | 73 | 98.6 |
| | 129 | 100 | M. | | | | | 464 | 0.9 | | 91.2 |
| | 130 | 100 | Im. | 2 | 5 | 50 | 10 | 550 | 1.7 | 62 | 94.3 |
| | 131 | 100 | Im. | 2 | 44.5 | 27 | 18 | 496 | 4.2 | 24 | 92.9 |
| | 132 | 100 | Im. | 7 | 0 | | | 341 | 0.6 | 87 | 97.2 |
| Jacques Cartier | 133 | 100 | M. | 2 | 4 | 50 | 12.5 | 558 | 0 | | |

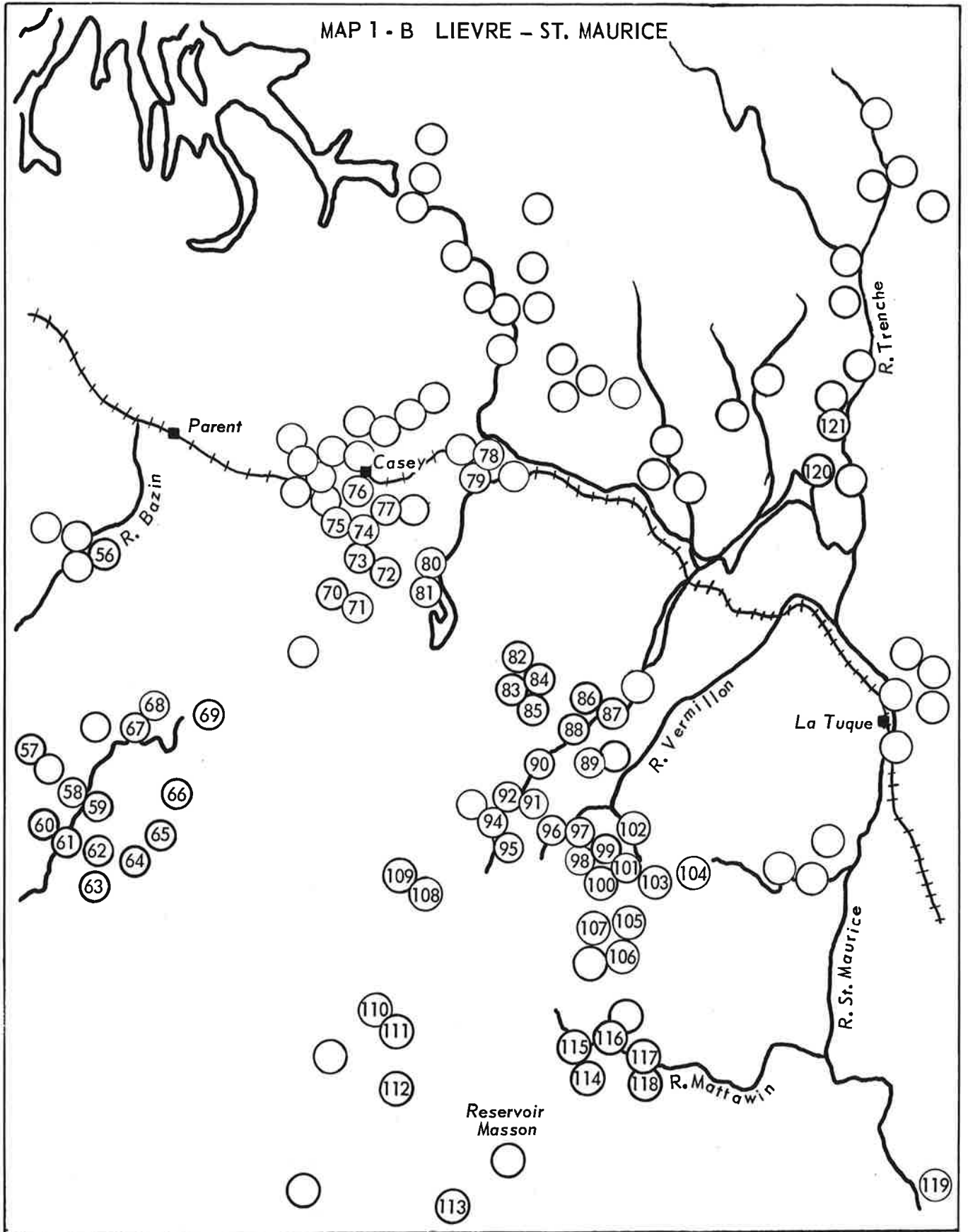


JACK PINE SAWFLIES SURVEY - 1956

Positive Localities (4)

Negative Localities ○

MAP 1 - B LIEVRE - ST. MAURICE

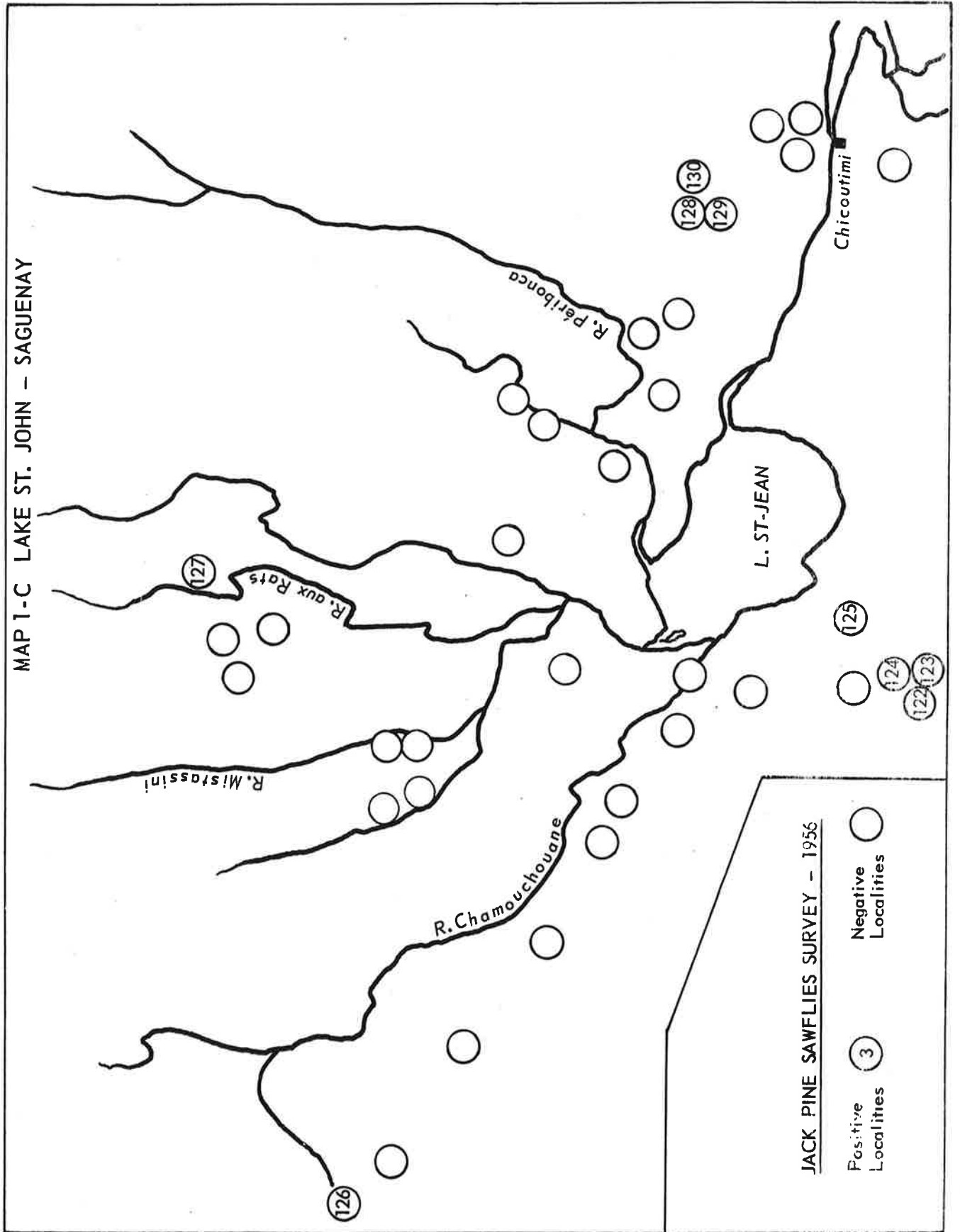


JACK PINE SAWFLIES SURVEY - 1956

Positive Localities (5)

Negative Localities (○)

MAP 1-C LAKE ST. JOHN - SAGUENAY



JACK PINE SAWFLIES SURVEY - 1956

Positive Localities (3)
Negative Localities (○)

LABORATOIRE DE ZOOLOGIE FORESTIERE
SERVICE DES SCIENCES
MINISTERE FEDERAL DE L'AGRICULTURE
QUEBEC

LABORATORY OF FOREST ZOOLOGY
SCIENCE SERVICE
CANADIAN DEPARTMENT OF AGRICULTURE
QUEBEC

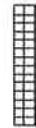
INFESTATIONS DE LA TENTHREDE DU PIN GRIS - 1956

JACK PINE SAWFLY INFESTATIONS - 1956

GRAVE
SEVERE



MOYENNE
MEDIUM



LEGERE
LIGHT

