

**THE
GREATER WINNIPEG
MOSQUITO ABATEMENT
DISTRICT**



CULEX TARSAIS

Report for 1959

THE GREATER WINNIPEG MOSQUITO ABATEMENT DISTRICT

OFFICE OF THE BOARD

403—160 Princess Street, Winnipeg 2, Manitoba. Phone WH 3-6694

D. McKAY, West Kildonan
Chairman

J R. McINNES, C.A.
Hon. Treasurer

O. JOHANSON
Secretary

J D. BRANDT Old Kildonan
Vice-Chairman

V DRIVER, C.A.
Hon. Auditor

P BELSKI
Field Manager

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PROF G. L. SHANKS

PROF R. A. WARDLE

The Greater Winnipeg Mosquito Abatement District

REPORT OF THE SIXTH SESSION

Winnipeg, Manitoba,
December 31st, 1959.

The Chairman and Members,
The Greater Winnipeg Mosquito Abatement District.

Gentlemen:

On behalf of the Executive Committee I present this Sixth Annual Report of the Greater Winnipeg Mosquito Abatement District for the year ended December 31st, 1959.

Before commenting on the District's operation, it is with regret that I record the passing away of two valued and appreciated employees—Mr Edmund John Stansfield, February 25th, 1959, and Ernest Schultz, January 20th, 1959. Mr Stansfield was long associated with the organization and was appointed Field Manager in 1950. His cordiality and manifold virtues can but be inadequately expressed. Mr Schultz was engaged in mosquito control work since 1943 and his devotion to duty is acknowledged.

On March 1st, 1959, Mr Peter Belski, former Assistant to the late Mr. Stansfield, was appointed Acting Field Manager and confirmed as permanent on June 1st, 1959. The able performance of his responsibilities during his first year as Field Manager confirmed the recommendations and confidence placed in him in his previous years of employment.

At the Regular Meeting of the Board held in March 1959 approval was given to preliminary plans for the construction of an office and garage building. The District availed themselves of the services of the Design Branch of the City of Winnipeg, Engineering Department. Due to the heavy construction program, detailed plans and specifications will not be proceeded with until 1960. The building will be ready for occupancy in mid-summer 1960.

The Executive Committee recognizes the need for more public relations. The acquainting of the public with the District's control measures in relation to conditions, the limitations of equipment and facilities in relation to area under control (250 square miles) the continued search by the Technical Advisory Committee for the most positive method of control; the experiences of other Mosquito Abatement Districts and the World Health Organization in their fight

against this prolific invader all over the world. The Executive Committee is confident progress is being made and I quote in part the following from the report of the Chairman of the Technical Advisory Committee; Professor A. J. Thorsteinson

"The records once again show clearly that mosquito numbers are much larger a short distance outside the District"

Through a concerned approach to approved budget and with no addition to the mechanical force the District ended the year with a surplus of \$38,225.89, including reserves of \$25,800.00, well within the limitations as set out in the Act. The resultant amount of \$12,425.89 and reduced requirements in 1960 for building construction and property development will make available more funds for control measures.

In conclusion, I wish to express my appreciation for interest shown and co-operation given by member municipalities, by Members of the Board, by individuals, and by firms.

THE WINNIPEG BOARD OF PARKS AND RECREATION, for Field Headquarters at the Stores Department and locations for three mosquito traps at the main parks.

THE CITY OF WINNIPEG ENGINEERING DEPARTMENT for storage space for five trucks and three oil tanks.

THE SURVEY DEPARTMENT of the City of Winnipeg for assistance rendered.

THE POLICE DEPARTMENTS, in all municipalities, for nightly co-operation when fogging.

THE TECHNICAL ADVISORY COMMITTEE, for attendance at meetings and advice given.

LOCAL NEWSPAPERS and broadcasting stations.

HARBOUR PATROL, for advice on river conditions.

WEATHER OFFICE at Winnipeg Airport, for daily forecasts.

DEPARTMENT OF ENTOMOLOGY, University of Manitoba, for advice and use of equipment.

On the following pages appear more detailed reports from the Officers of the District, together with Auditor's Certificate and Financial Statement.

Respectfully submitted,

J. K. CRABB,
Chairman.

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FIELD MANAGER'S REPORT

P BELSKI—Field Manager

The heavy snow fall of 1958-1959 and 9 inches of rain from April 1st to July 10th, 1959, left extensive areas of flooded and wet land. The hatching of mosquito larvae began April 13th, and was practically continuous till September 15th, 1959. To control adult mosquitoes that hatched in the control area or flew in from outside, it was necessary between June 18th and August 19th, 1959, to fog the streets and lanes of the built up areas of Greater Winnipeg four times, with additional protection given to the parks and certain open air public gatherings.

Larviciding

Survey work started the first week in April. The first larvae were found on April 13th. Larval control was carried on as follows:

1. Five men used hand equipment to spray DDT from April 13th to September 15th, 1959, a total of 3,729 man hours.
2. Four men operated the two Aero-Mist Power Blowers from April 13th, to June 17th. Trucks travelled 2,742 miles while spraying.

Pre-Season Control

On the advice of the Technical Advisory Committee it has been decided to continue pre-season control.

1. In the fall of 1959, 4,639 acres of swamp land were sprayed with 1.1 lbs. DDT per acre, using two four-wheel drive Dodge Power Wagons, with Aero-Mist blowers. This will control breeding places in the spring and summer of 1960.
2. In the winter of 1959-60, 9,000 acres of bush land have been mapped to be treated with 30% DDT in Vermiculite, application is one lb. DDT per acre. This work will be done early in the new year using a Piper Cub aeroplane.

Fogging

Fogging again showed its importance in protecting residential areas, gardens, parks and playgrounds from adult mosquitoes. Six Tifas and two Swing-fog machines used 7% DDT oil solution for this control.

1. Five Tifa foggers started adulticiding June 18th, and continued to August 19th, 1959. The trucks travelled 6,591 miles while fogging.
2. Two Swing Fogs were used to adulticide places that were inaccessible to trucks or boat and started June 10th, and continued to August 28th, 1959, a total of 636 hours.

Five

3. The mosquito boat, "Harry M" travelled 354 miles while fogging the river banks on both sides of the Red, Assiniboine and Seine Rivers. Fogging the rivers started July 14th and continued to August 19th, 1959.

City and Municipal Police are notified each night of the route to be taken by fogging machines. Families throughout Greater Winnipeg, who ask for this service, are also notified at 11.00 p.m., to expect the fogger that night.

Night Fogging is necessary for the following reasons:

1. Lower wind speed at night does not blow the DDT fog away too quickly
2. Lower temperature at night allows the fog to stay low
3. Mosquitoes are more active at night and therefore more vulnerable to DDT Traffic on the streets is at a minimum and the hazard of interference by children is avoided.

Insecticides

DDT was used in the form of oil solution, water emulsion and in 30% DDT vermiculite granules.

New Jersey Larvicide, a Pyrethrin mixture, was used in an oil fog for quick knock down of flying mosquitoes, and for a larvicide in the vicinity of cattle and poultry ranches. This was found to be effective in killing both larvae and pupae of mosquitoes.

Mosquito Bombs, for larviciding, contain DDT and Lindane inside a capsule. These were used by the district and supplied free to municipalities applying for them, including:

Brooklands	St. Boniface
Charleswood	Old Kildonan
East Kildonan	St. James
East St. Paul	Tuxedo
North Kildonan	Winnipeg

Drainage

Two hundred and eighty-eight man hours of work were used in cleaning culverts, cutting willows out of ditches to allow free drainage and ease of spraying. Housing and industrial developments have drained many acres of low land. However new developments spread out towards other breeding grounds that must now be sprayed. Additional built-up areas have to be protected. Fogging operations have to be extended and new problems arise.

Equipment

The five trucks travelled a total of 14,166 miles in 1959 without having an accident.

Six

Top Minnows (*Gambusia affinis*)

On May 23rd, 1958, fifty of these minnows were placed in a pond in King's Park. By November 1958, there were several thousand of all sizes. About one thousand minnows were taken from this pond late in the fall and transferred to the trout hatchery at Caddy Lake for the winter

Then came the big test. On January 6th, 1959, a check on the pond at King's Park was made under seven inches of ice, there were no fish found. Then later the trout hatchery reported that no *Gambusia* minnows survived the winter. The 1958-59 winter was one of the coldest in years.

On May 17th, 1959, R. Brust, B.S.A., and J MacTavish, B.A., the two University students assisting in mosquito work, wandered over to the pond in King's Park and saw *Gambusia* minnows. When the two students reported back to the University they had enough live *Gambusia* with them to prove the fish can survive a winter here. We now have *Gambusia* minnows in eight ponds in and around Greater Winnipeg, we intend to place more in other ponds.

Special Requests

The District has received many requests from public and private organizations and individuals for special fogging or spraying for outdoor picnics, parties, parks, etc.

Boy Scout and Girl Guide outings, service clubs, parks, and community clubs were done, provided such work did not interfere with routine work to protect entire communities. Private parties were referred to private contractors who are equipped to do such work.

Those seeking advice as to how they could spray their own premises were given necessary information.

Visitors to the District

Dr. M. Kozakiewicz, M.D., D.P.H., Medical Director Brandon Health Unit, Brandon, Man.

Mr I. S. Lindsay Defence Research Board of Canada, Entomological Section.

From Minneapolis-St Paul, Minnesota, U.S.A. The Metropolitan Mosquito Control District, the following personnel: Mr. George W Matthews, Chairman; Mr A. B. Schaefer, Commissioner; Mr Jerome Akin, Commissioner; Mr Thomas Stepka, Executive Board, Mr. Albert W Buzicky Director Mr Charles L. Langer, Business Administrator

The National Film Board took colored movies of plane operations. Mr Gordon Sparling of the National Film Board states the pictures were excellent.

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THE TECHNICAL ADVISORY COMMITTEE REPORT

PROF. A. J. THORSTEINSON Chairman

In this third year of operation of the Mosquito Survey and Investigations Project we have arrived at a stage where our records provide a contrasting picture of the variability of mosquito incidence from year to year. For example, there were four peaks of mosquito activity in 1957 only two in 1958 but in 1959 there were six more noticeable peaks and three or more smaller peaks. In each year there was one major peak which occurred during July in 1957 and 1958 but in 1959 it arrived one month earlier. These variations are of course correlated with the pattern of heavy rainfall and favourable mosquito breeding conditions.

Our Mosquito Breeding Survey provides information that enables us to predict the larger outbreaks some days in advance and in the future this will enable the field crews to switch over from larviciding to fogging operations in good time.

The records once again show clearly that mosquito numbers are much larger a short distance outside the District and we attribute the protection achieved inside the District to the larviciding operations both with DDT granules and sprays. However when large populations of mosquitoes emerge from the breeding areas outside the district, residents of Greater Winnipeg do experience mosquito annoyance. Whenever this occurs prompt fogging operations are required to relieve this distress. It must remain our objective, therefore, to develop means to intercept invading mosquitoes from breeding areas beyond reach of the larviciding program so that we may become less dependent on emergency measures such as fogging. On the basis of our preliminary experience last summer we are now in a position to investigate this problem intensively in 1960.

The contributions elsewhere in this report by the student investigator Mr. R. Brust, B.S.A., and Field Manager Mr. P. Belski, indicate the diversity and extent of our investigations. The support of the Greater Winnipeg Mosquito Abatement District and the Defence Research Board of Canada will enable us to consolidate our findings and extend our studies to mosquito control.

MOSQUITO SURVEY AND INVESTIGATIONS PROJECT University of Manitoba, Department of Entomology

R. A. BRUST B.S.A., Technical Assistant

Breeding Survey

(a) Aircraft Applications

Pre-season applications of DDT granules were used to eliminate breeding of mosquito larvae on 10,856 acres of bushland in 1959 (1 lb. of actual DDT per acre). A few small tracts were controlled with DDT sprays from trucks. A survey was conducted on all acres treated in the fall of 1957 and 1958 and mosquito breeding was found in only two localities. This survey shows that applications of 30% DDT in vermiculite is an effective measure of breeding control.

(b) Ground Spray

Although DDT in an oil spray was applied from trucks on 7,699 acres of swamp land and ditches, breeding was found in ditches on June 29. Presumably excessive rainfall early in the season caused much of the insecticide treatment to be carried down ditches to the rivers. Ground crews kept ditches and accessible low lying areas well sprayed to arrest further larval development.

Adult Mosquito Survey

Mosquito light traps were operated from May 14 to September 3 (Fig. 1) outside and inside the Greater Winnipeg District.

Due to excessive rainfall in early spring (Fig. 2) and above normal temperatures in early June, the peak of adult emergence was reached approximately one month earlier than the two previous years. Comparatively high numbers of adults appeared in May; the largest occurred in June.

On the basis of our records for 1957 and 1958 heavy precipitation is followed by a peak of adult emergence after 10-14 days provided the temperature exceeds 60° F. If the temperatures are lower the adult emergence occurs after 18-24 days.

Ultra-Violet Light Traps

One ultra-violet fluorescent lamp was fitted to a new Jersey light trap. Daily catches were compared to standard incandescent light bulb traps (Fig. 3) at Oak Bluff and Kildonan Park. The ultra-violet and standard light bulb traps stood approximately 10 feet apart. In as much as ultra-violet light traps appear to be four times more effective they would have many uses where the trapping of large numbers is necessary for example, in the recovery of tagged insects.

The Greater Winnipeg Mosquito Abatement District

Spraying



Swing-fogs in action

Fogging



Fogging river bank



Pre-season Mosquito control



Fogging by Tifa Fogger

Mosquitoes for Virus Studies

Several thousand adult mosquitoes were taken to the Virus Laboratory of the Winnipeg General Hospital. Under the direction of Dr W. L. Parker, the mosquitoes were assayed for viruses but none were found.

11 Year DDT History in Mosquito Control

The World Health Organization Kit was used to test mosquito resistance to DDT. The Greater Winnipeg Mosquito Abatement District has used DDT for mosquito control for the 11th year and to date no resistance has been found. DDT concentration of .004 parts per million gave 100% control. DDT resistance is not suspected unless LC50 is greater than .1 parts per million for *Aedes* and *Anopheles*, or 1 p.p.m. for *Culex* species. (LC50 dosage required to kill 50% of the mosquito sample)

Larval Control with Detergents

Experimental test results of one particular detergent are given in table 1. Four brand name detergents were used in the laboratory tests but no appreciable difference in larval mortality was observed.

TABLE 1.

Average of Three Tests of a Known Detergent

Detergent	No. of Tests	No. of Insects	Dead	Living	Percent Mortality
100 p.p.m.	1	60	60	0	100%
	2	60	60	0	100%
50 p.p.m.	1	60	32	28	53%
	2	60	25	25	41%
25 p.p.m.	1	60	20	40	33%
	2	60	17	43	28%
10 p.p.m.	1	60	5	55	8%
	2	60	4	56	7%
Control	1	60	0	60	0%
	2	60	0	60	0%

Mosquito Species

Keying of mosquitoes from the Greater Winnipeg area and surrounding districts in 1959 was done largely by a Student assistant, Mr Jack MacTavish, B.A. The most common species to the least common species respectively is given in Table 2. According to McLeod, J. A., and McLintock, J. (1947) *Anopheles earlei* (= *occidentalis*) has been known to be the earliest species.

Twelve

TABLE 2.

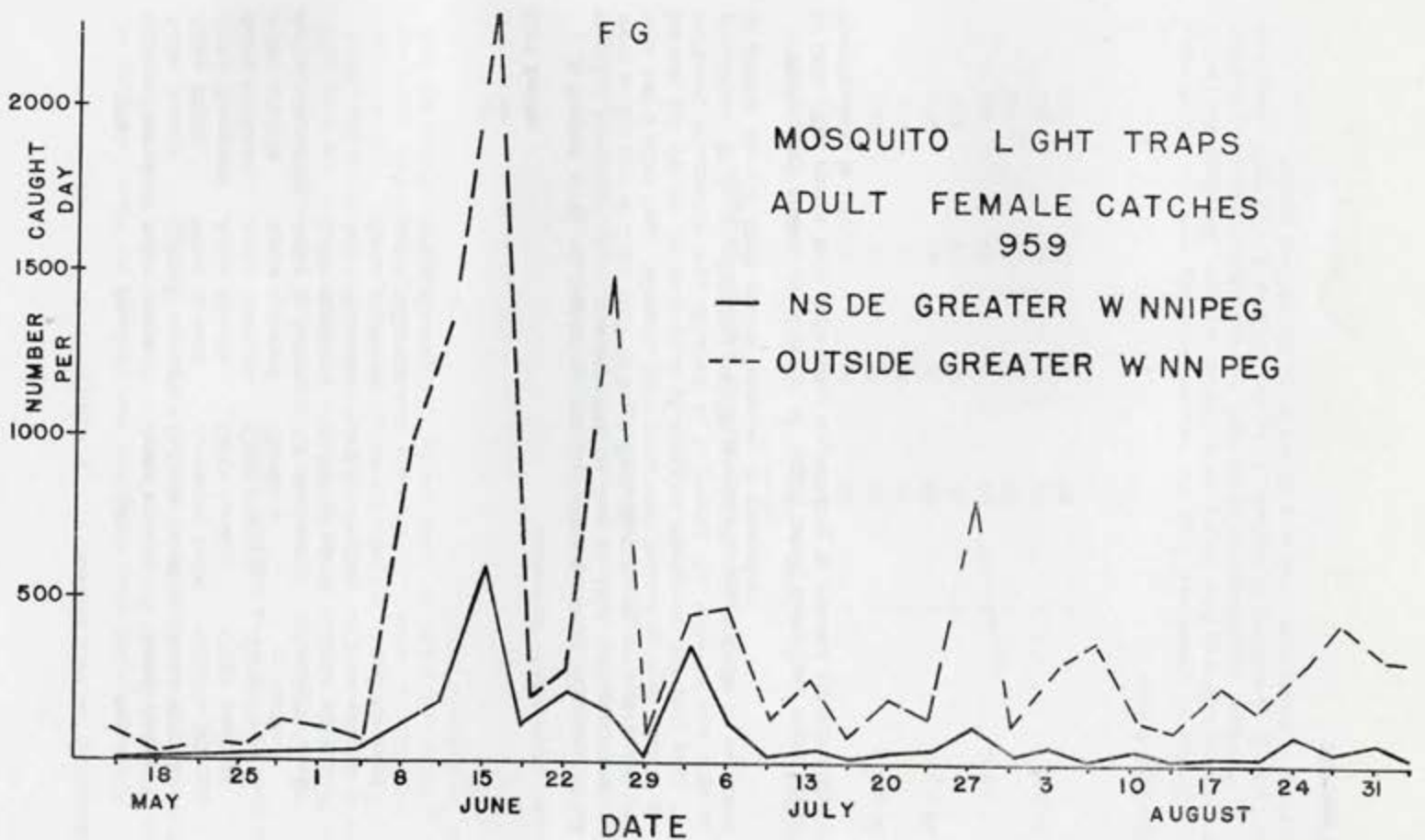
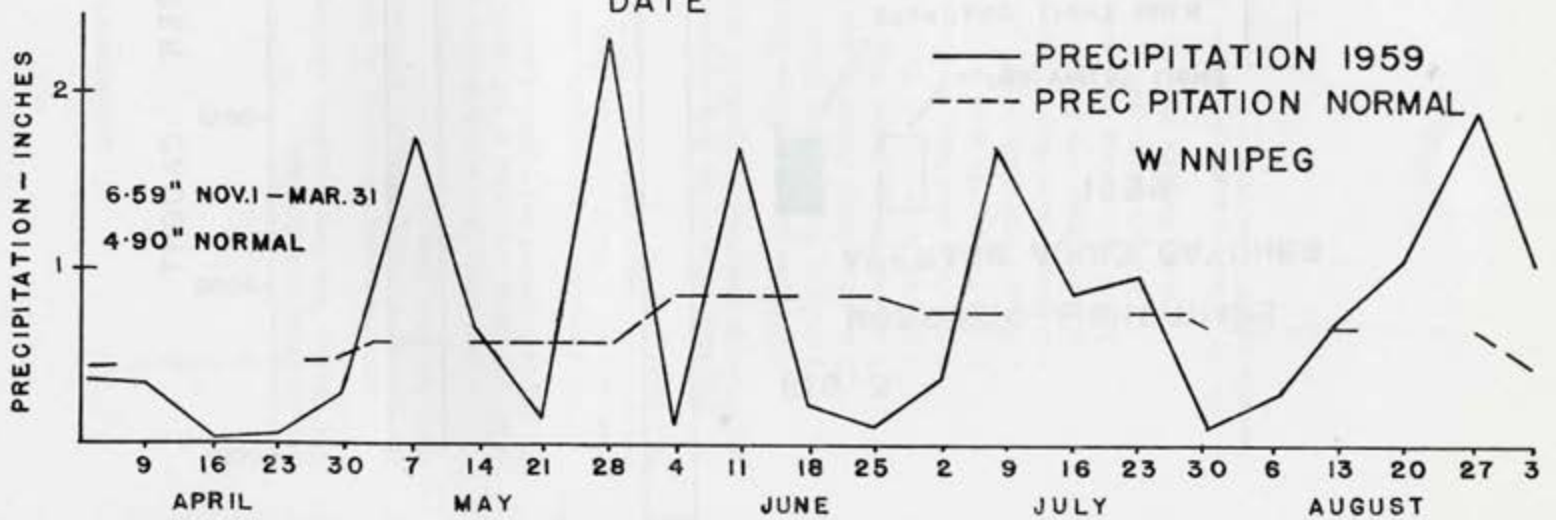
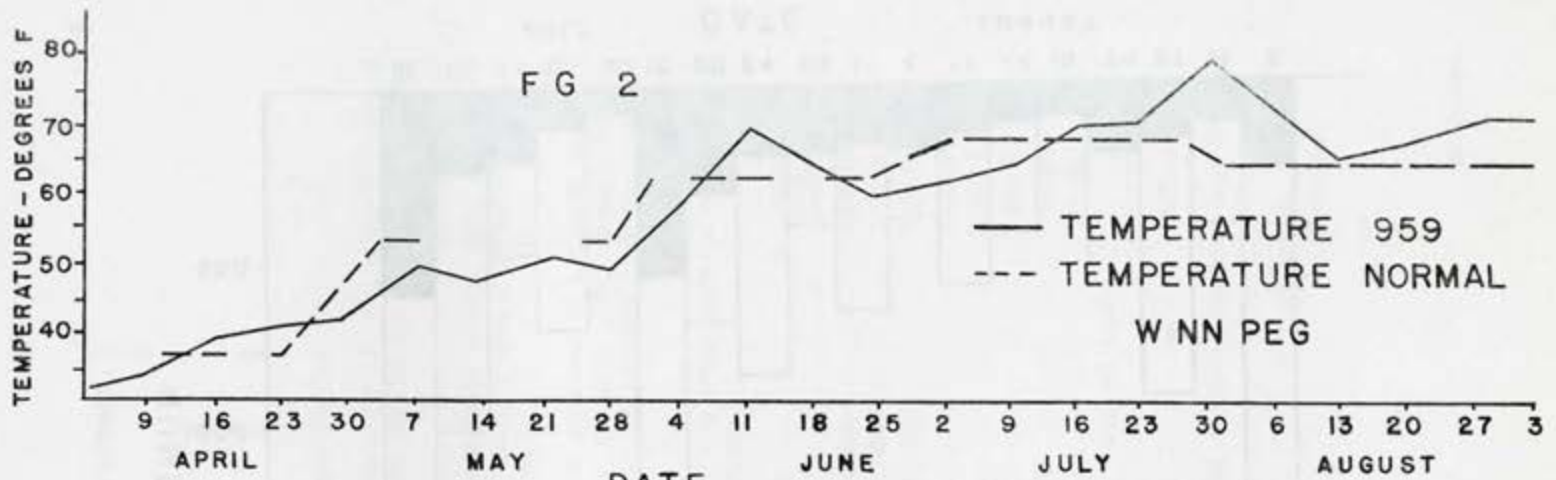
May	June	July	August
<i>Culiseta inornata</i>	<i>Aedes vexans</i>	<i>Aedes vexans</i>	<i>Aedes vexans</i>
<i>Aedes dorsalis</i>	<i>Culiseta inornata</i>	<i>Culiseta inornata</i>	<i>Aedes dorsalis</i>
<i>Aedes fitchii</i>	<i>Culex tarsalis</i>	<i>Anopheles earlei</i>	<i>Culiseta inornata</i>
<i>Aedes flavescens</i>	<i>Aedes dorsalis</i>	<i>Culex tarsalis</i>	<i>Culex restuans</i>
<i>Aedes erichsonii</i>	<i>Aedes stimulans</i>	<i>Culex restuans</i>	<i>Mansonia</i>
<i>Aedes eristalis</i>	<i>Aedes spencerii</i>	<i>Mansonia</i>	<i>perturbans</i>
<i>Aedes compestris</i>	<i>Aedes flavescens</i>	<i>perturbans</i>	<i>Anopheles earlei</i>
	<i>Aedes communis</i>	<i>Aedes intrudens</i>	<i>Aedes riparius</i>
	<i>Aedes diaantaeus</i>	<i>Aedes stimulans</i>	<i>Culex apicalis</i>
	<i>Aedes intrudens</i>		<i>Aedes spencerii</i>
	<i>Aedes sollicitans</i>		
	<i>Aedes cineris</i>		

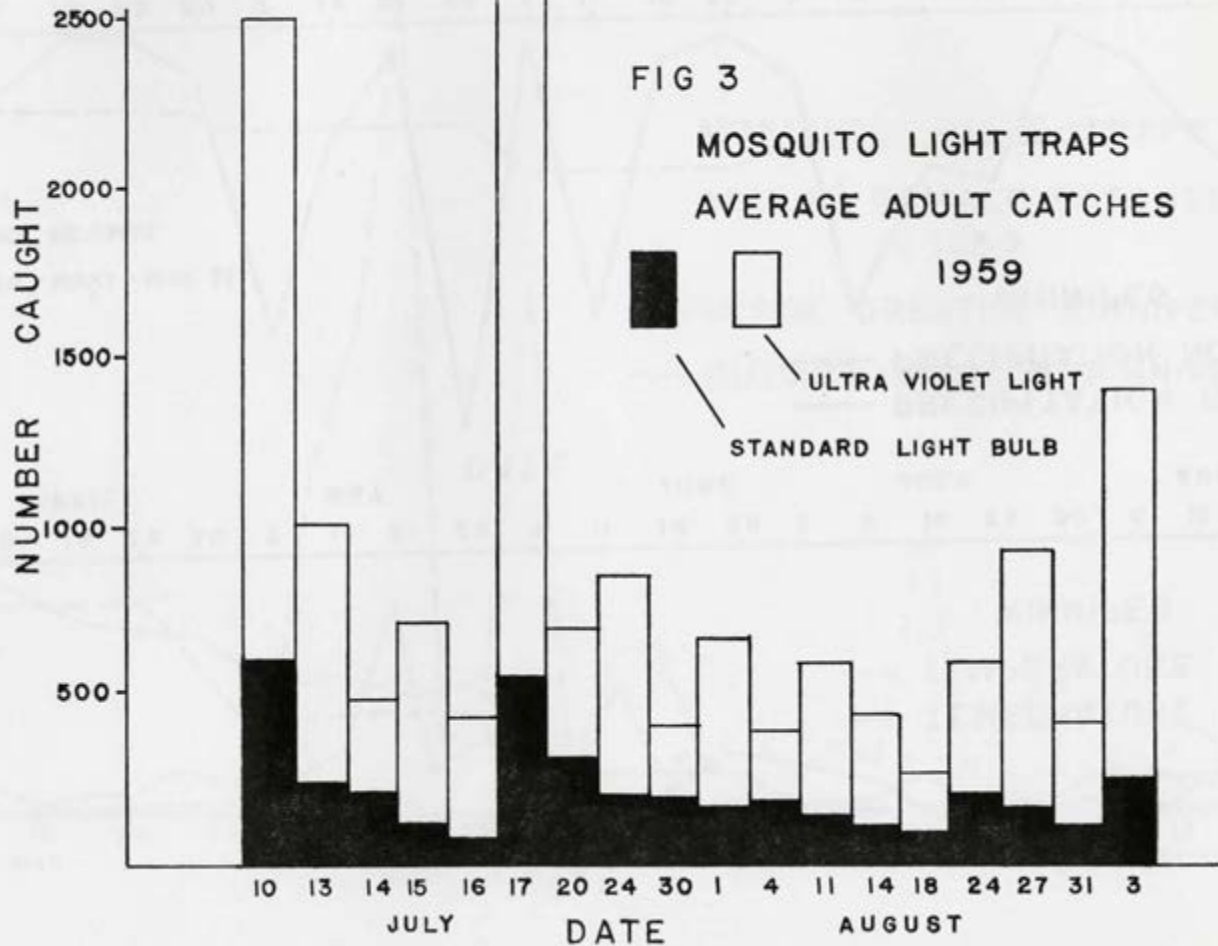
DDT Barrier

A barrier spray on vegetation was laid down north of Winnipeg. This so-called insecticide carpet was deposited on June 16, 1959, with ground equipment at the rate of 2 lbs. DDT in No. 2 Fuel Oil per acre, on a strip 100 feet wide and 5 miles long. Mosquito light traps were located on both sides of the barrier, but due to the early peak of mosquito emergence this past year, insufficient information was obtained as to predict the value of this type of protection. If the experimental barrier proves effective it could be expanded to protect the city from outside invasions of mosquitoes.

Preliminary studies of dispersal of tagged adult mosquitoes were begun in 1959. The results were sufficiently encouraging to warrant extending these investigations in 1960.

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SECRETARY'S REPORT

The Chairman and Members,
The Greater Winnipeg Mosquito Abatement District.

I have the honour to submit the Sixth Annual Report of the Finances of the Greater Winnipeg Mosquito Abatement District for the fiscal year ended December 31st, 1959.

The year began with a cash balance of \$6,426.57 receipts based on the levy of 20c per capita, amounted to \$80,439.40, making a total of \$86,865.97 available for mosquito control and capital expenditure.

The expenditures for mosquito control amounted to \$48,640.08 leaving a cash balance at December 31st, 1959, of \$38,225.89. This amount includes reserves for building construction \$22,000.00 and Aeroplane Hire for pre-season treatment \$3,800.00.

The book value of the field equipment and repair parts, as per inventory, and property amounted to \$38,064.16 as follows

1 Half-ton General Motors Truck	\$ 1,241.36
1 One-ton International Truck	2,346.15
1 One-ton Dodge Power Wagon (1954)	3,459.90
1 One-ton Dodge Power Wagon (1956)	3,707.45
1 One-ton International Truck (1958)	3,686.20
2 Lawrence Aero-Mist Blowers	3,141.89
6 Tifa Fogging Machines	10,642.00
2 Swing Fogging Machines	740.00
1 In-Board Motor Boat "Harry M"	635.00
1 Gasoline Tank and Pump	690.00
Miscellaneous field equipment, tools, oil tanks, and repair parts	3,117.63
Property Building Site	4,656.58

On the following pages are shown the Auditor's Certificate and detail of Receipts and Disbursements.

O. JOHANSON,
Secretary.

AUDITOR'S CERTIFICATE

The Chairman and Members,
The Greater Winnipeg Mosquito Abatement District,
Winnipeg, Manitoba.

I have audited the books and accounts of the Greater Winnipeg Mosquito Abatement District for the year ended December 31, 1959, and have obtained all the information and explanations required by me.

I hereby certify that, in my opinion, the attached Statement of Receipts and Disbursements correctly reflects the transactions of the Greater Winnipeg Mosquito Abatement District for the year ended December 31, 1959 according to the best of my information and explanations given to me and as shown by the books of the District.

V DRIVER,
Chartered Accountant.

City Auditor's Department,
Winnipeg, Manitoba,
March 14th, 1960.

GREATER WINNIPEG MOSQUITO ABATEMENT DISTRICT

STATEMENT OF RECEIPTS AND DISBURSEMENTS

January 1st to December 31st, 1959

Cash on hand and on Deposit with City Treasurer
December 31st, 1958 \$ 6,426.57

RECEIPTS

Levy:

City of Winnipeg	\$51,018.60
City of St. Boniface	5,727.20
City of St. James	4,911.20
City of East Kildonan	3,400.00
Department of Defence Production (R.C.A.F. Station)	343.80
Town of Transcona	1,653.80
Town of Tuxedo	240.00
Village of Brooklands	787.60
Village of Brooklands (1958 Levy Received 1959)	787.60

Municipalities

Charleswood	960.00
East St. Paul	299.80
Fort Garry	2,698.00
North Kildonan	540.00
Old Kildonan	202.20
St. Vital	3,600.00
West Kildonan	3,029.60
West St. Paul	240.00

80,439.40

\$86,865.97

DISBURSEMENTS

Operating

Wages, Salaries and Gratuities	\$23,830.09
Workmen's Compensation	211.86
Unemployment Insurance	192.52
Truck Hire and Car Allowances	2,800.96
Gasoline and Oil	1,370.40
Equipment Repairs and Parts	1,167.82
Sundry Expense	281.12
Insurance on Equipment and Liability	399.34
Printing, Stationery and Postage	186.53
Printing Annual Report, 1958	215.60
Insecticides and Oil	14,719.86
Field Equipment	41.79
Survey and Research	3,000.00
Taxes, Lot 1, Block 9, Plan 6519, D.G.S. 69/71	222.19

48,640.08

Cash on hand and on Deposit with City Treasurer
December 31st, 1959 \$38,225.89

STUDYING INTERNATIONALITY AND THE CHANGING CLIMATE

APPROACHING THE STUDY OF INTERNATIONALITY

BY J. H. HARRIS

Department of Geography, University of Toronto

TABLE I

Year	Area	Population	Area	Population
1950	North America	150,000,000	Europe	300,000,000
1960	North America	170,000,000	Europe	320,000,000
1970	North America	190,000,000	Europe	340,000,000
1980	North America	210,000,000	Europe	360,000,000
1990	North America	230,000,000	Europe	380,000,000
2000	North America	250,000,000	Europe	400,000,000
2010	North America	270,000,000	Europe	420,000,000
2020	North America	290,000,000	Europe	440,000,000
2030	North America	310,000,000	Europe	460,000,000
2040	North America	330,000,000	Europe	480,000,000
2050	North America	350,000,000	Europe	500,000,000
2060	North America	370,000,000	Europe	520,000,000
2070	North America	390,000,000	Europe	540,000,000
2080	North America	410,000,000	Europe	560,000,000
2090	North America	430,000,000	Europe	580,000,000
2100	North America	450,000,000	Europe	600,000,000

