

# The Rabies Reporter

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## RABIES VACCINE-BAIT PROGRAMS FOR 1994

### FOX RABIES CONTROL

*The strategic program objective for 1994 - 2001 is to eliminate the arctic fox strain of rabies from Ontario.* In 1994, operations will expand into western Ontario.

Experience in eastern Ontario, France and Germany has indicated that dramatic reductions of rabies will occur only after the third or fourth vaccine treatment of an area. Figure 1 shows proposed areas to be baited, and the estimated numbers of baits needed for each zone. Originally,

baiting treatments were to move progressively westward, but low rabies levels in central Ontario allowed the major effort to be moved further west. However, we must also keep the eastern Ontario experimental area rabies-free. In central Ontario, priority will be given to the agricultural townships, where rabies was most frequent in past years. Baits left over from eastern and western operations (usually 3 - 6%) will be dropped into the area marked "extra" in Figure 1.

Aircraft will fly lines 1.8 km apart, and bait at 20 baits/km<sup>2</sup>. Baits were placed into the built up areas from Oshawa to Hamilton (black area in Figure 1) during July and August, mostly by hand.

Three Twin Otters will be used, flying from Stratford for western Ontario, and Irvine Lake for eastern. The start date is September 19.

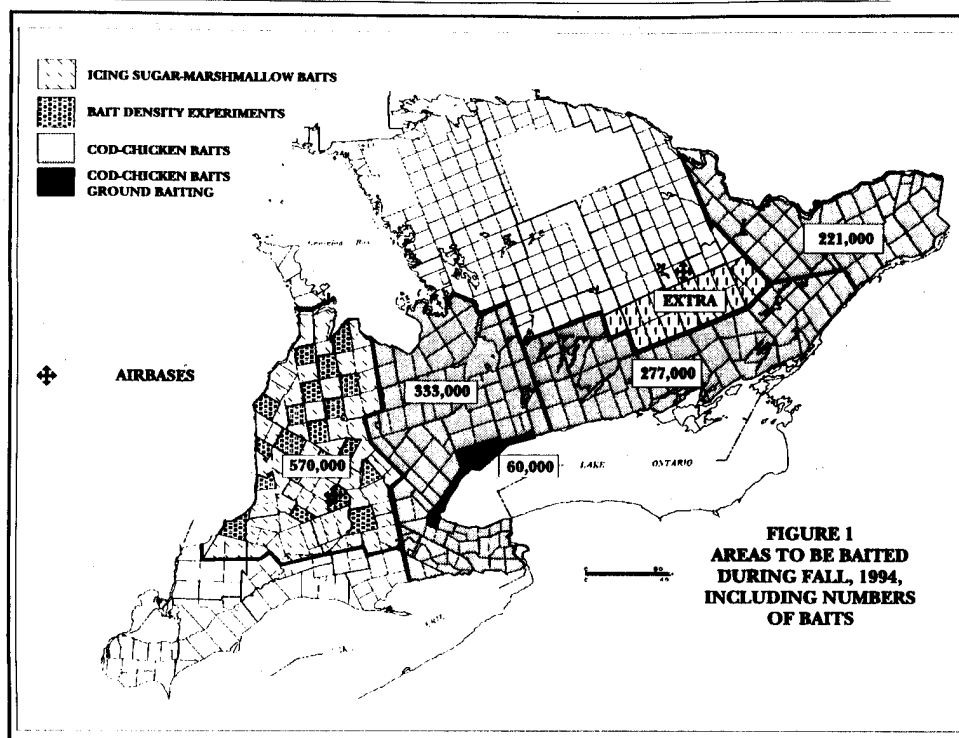
A large area in southwestern Ontario will be baited with the new Icing-Sugar-Marshmallow (ISM) baits, rather than the normal Chicken-

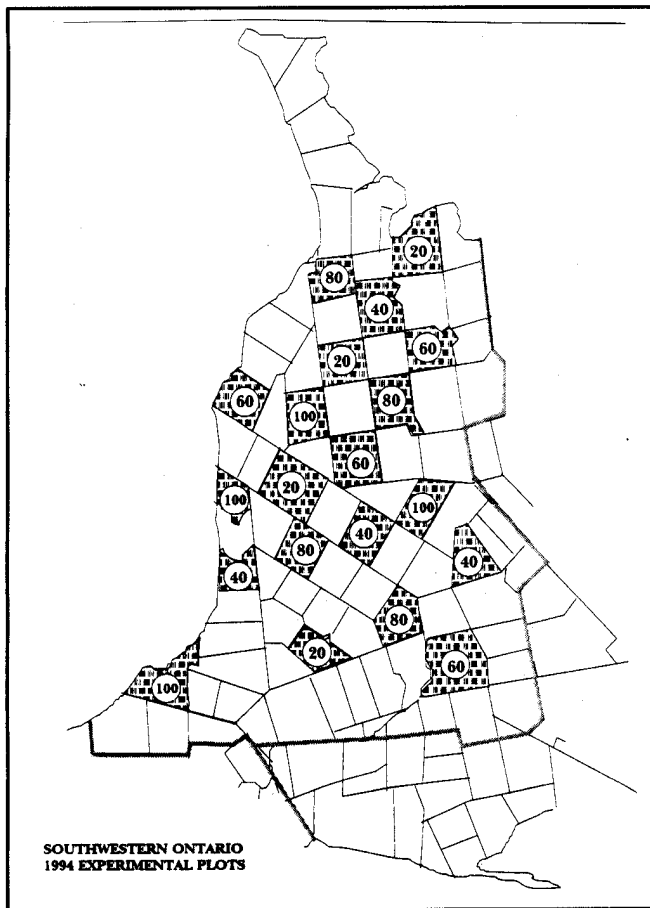
Cod (CC) bait (Figure 1). The ISM bait was developed for raccoons, but foxes will accept it. It may prove to be the dual bait we need for a joint fox and raccoon rabies program. There are significant questions about the effective density of baits suitable for reaching two species which will compete for the same baits. For this fall, all baits will contain fox vaccine, which is not effective in raccoons. Raccoon acceptance of baits will be assessed using tetracycline marks in teeth taken from specimens obtained from trappers in the experimental area.

### RACCOON BAIT EXPERIMENT - 1994

The major thrust of this fall's work will be to determine the relation between the number of baits dropped per km<sup>2</sup>, and the proportion of raccoons which have marks in their teeth. Defining the shape of this curve will help to fine-tune tactics for baiting raccoons, and thereby keep the cost of raccoon rabies control as low as possible.

Optimistically, we should only have to bait the Niagara Peninsula, and possibly a strip 10 - 20 km wide along the St. Lawrence, and ultimately along the Ottawa River, depending on movements of the raccoon rabies front. If that is all the area needing to be baited, detailed knowledge of the best bait density is probably not critical, because the area will be small enough that over-baiting will cost less than the proposed experiments. However, if raccoon rabies does penetrate farther into southern Ontario, better knowledge of bait





densities will keep the program cost-effective. If information from this trial allows reduction of bait densities by 25 baits/km<sup>2</sup>, the \$250,000 cost of this experiment would be recovered from baiting a 5000 km<sup>2</sup> area.

Detailed knowledge of bait density will be an Ontario contribution to international efforts to control raccoon rabies. If oral baiting can be shown to be cost-effective, and other jurisdictions, notably New York, adopt the strategy, keeping Ontario free of raccoon rabies will be much easier.

The overall objective of the experimental program is to determine how to immunize a sufficient proportion of a raccoon population to control rabies. To do that requires knowledge of several factors, including bait density and flight line spacing.

The primary objective this year is to estimate the shape of the curve relating bait density to acceptance of ISM baits by raccoons. There are two secondary objectives: to determine if fox acceptance of ISM baits at 20/km<sup>2</sup>

is the same as for CC baits at 20/km<sup>2</sup>, and to estimate the shape of the density/acceptance curve for foxes. Future experiments will address flight line spacing.

Many of the 1990 and 1991 experimental plots failed to yield enough fox specimens for rigorous analysis. Plots for this year will cover one or two whole townships. Each plot is surrounded by townships baited at 20/km<sup>2</sup>. Four replicate plots will be baited at each experimental density, 20, 40, 60, 80 and 100 baits/km<sup>2</sup>. Plots were allocated randomly, with the re-

striction that each eco-region (an area of similar ecological characteristics according to the Ecological Land Classification for Canada) receive at least one plot of each density. Flight line spacing will be 1.8 km. High densities will require several flights along the same line.

Raccoons and foxes will be collected from the whole experimental ISM bait area. Limited samples of both species will be collected from eastern Ontario and the CC bait areas west of Toronto. As the ERA fox vaccine does not regularly stimulate antibody responses in raccoons, serum collection is unnecessary from raccoons. Given that 4000-6000 raccoon specimens are to be collected, trappers are requested to turn in only heads. Whole fox carcasses have been requested, to enable collection of fluids for antibody analysis. Brain samples will be collected from all specimens.

Canine teeth will be used to check for tetracycline, which is evidence that

the individual ate a bait. Teeth also allow determination of age. Comparison will also be made of the likelihood of finding tetracycline marks in premolar teeth as well as canines. Premolars are very small teeth in most carnivores, and can be removed from live animals using appropriate surgical methods. However, there are indications that evidence of bait ingestion is harder to find in premolars than in canines.

## T-V-R- IN THE NIAGARA FRONTIER

The major field effort to stop raccoon rabies this year is a Trap-Vaccinate-Release project aimed at vaccinating 70% of all the raccoons living between the Niagara River and the Welland Canal, an area of 700 km<sup>2</sup>. This is the largest T-V-R project ever attempted.

Trapping began in Fort Erie on May 2, and the first round was completed on 9 September. Two trappers started the program, and were joined by 3 more in mid-May. The whole area has been divided into 77 cells. Rural cells are about 10 km<sup>2</sup>, while urban areas are divided into 4 km<sup>2</sup> patches. Each cell has the full attention of one trapper for a week. One hundred traps are set on Monday, checked each morning, and closed on Friday. Each raccoon and skunk is vaccinated by injection, ear-tagged, and released at the point of capture. An additional 25 traps are worked in the area covered the previous week, to assess what proportion of raccoons were captured during the first week of trapping.

The early start was necessary because raccoon rabies was so close to Fort Erie, but it had a major disadvantage. Young raccoons do not go far from the den until late June or early July. Even if they were caught earlier, they would not be old enough to react to the vaccine. Therefore, a second round of trapping will cover a strip about 3 km wide along the Niagara

River from Fort Erie to Niagara-on-the-Lake. This will start in late September.

There were 10 - 20 raccoons caught per km<sup>2</sup> in Fort Erie and in the countryside between there and the City of Niagara Falls. Raccoons were scarce within Niagara Falls, but proved numerous again along the strip through Queenston to Niagara-on-the-Lake. Considering that these density estimates are for adults only, this project will handle a lot of raccoons before it is done. On the Welland Canal side, up to 100 raccoons were trapped in some cells.

During September and October, trappers will revisit the strip along the Niagara River, to trap young born this year, and to make a thorough assessment of trapping success of the May-June efforts.

## RACCOON RABIES IN NEW YORK

This issue includes two maps of the advance of raccoon rabies in New York. The state map indicates that the advance of raccoon rabies during the first 6 months of 1994 was not rapid, possibly a result of the severe winter and its effect on raccoon survival.

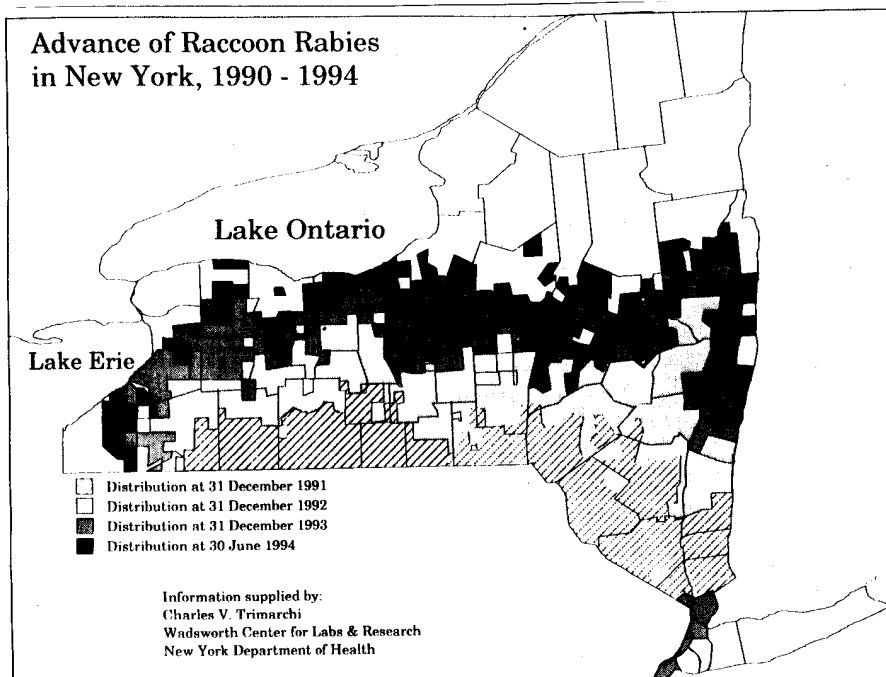
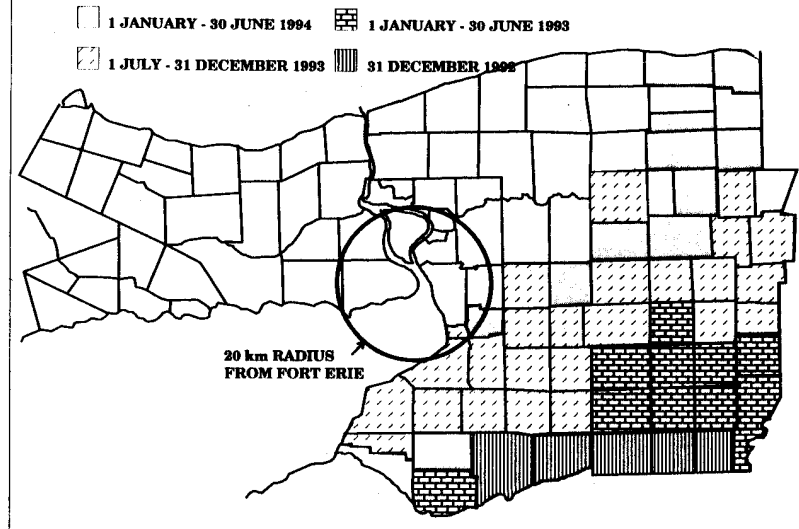


FIGURE 2. RACCOON RABIES IN THE NIAGARA FRONTIER



The Niagara Frontier map, including all town boundaries, shows little new movement toward Fort Erie. Perhaps that was to be expected, since the municipalities between the rabies front and the Peace Bridge are downtown Buffalo. Along the Lake Erie shore south of the bridge there is a lot of industry, and then several marinas and high density townhouse developments. Those are poor raccoon habitats.

It now appears most likely that raccoon rabies will first reach the Niagara River near Niagara Falls, late in 1994.

## RABIES IN THE AMERICAS CONFERENCE, NOV. 16 - 19 1994

Terntative agenda (may change)

Wednesday 16 November

7:45 - 8:30 Registration/coffee  
8:30 - 9:00 Welcome & Introduction  
9:00 - 12:15 Sessions 1 & 2  
12:15 - 1:25 Lunch  
1:25 - 5:00 Sessions 3 & 4

Thursday 17 November

8:00 - 8:30 Registration/coffee  
8:30 - 12:05 Session 5  
12:05 - 1:15 Lunch  
1:15 - 4:50 Session 6

Friday 18 November

8:00 - 8:30 Registration/coffee  
8:30 - 12:05 Session 7 & 8  
12:05 - 1:15 Lunch  
1:15 - 4:50 Sessions 9 & 10  
6:00 Banquet

Saturday 19 November

8:00 - 8:30 Registration/coffee  
8:30 - 12:05 Sessions 11 & 12  
12:05 - 12:20 Closing comments

Despite the appearance of the schedule, there will be no concurrent sessions. Some sessions are short enough to fit two, one after the other, into a morning or afternoon. There will be coffee breaks mid-morning and mid-afternoon.

Session titles are:

1. Coping with Invading Rabies Epizootics.

2. Pathogenesis of Rabies.
3. Advances in Rabies Vaccines.
4. Developments in Bait Delivery Systems.
5. Rabies Control in the Real World.
6. Epidemiology of Wildlife Rabies.
7. Public Information Session.
- 8 & 9 Human Safety.
10. Communication and Education.  
About Rabies and Its Control.
11. Molecular Epidemiology and  
Taxonomy of Rabies Viruses.
12. Economic and Administrative  
Aspects of Rabies and Rabies  
Control.

Yes, you should be registered by now, but late registration is possible. If you are giving a paper and have not yet sent in your abstract (tsk! tsk!), send it in right away. Planning for the conference is going well.

## PREDICTING THE SPREAD OF RACCOON RABIES INTO ONTARIO

**DON'T PANIC!!** The map on this page shows one scenario for the natural spread of raccoon rabies into Ontario. This is the worst case possible. In the U.S.A., the front of raccoon rabies has moved at roughly 40 - 60 km per year. If you look at the New

York portion of this map, or at the detailed map on page 3, you will quickly see that the advance has not been even. In some parts of New York, in one year, there have been jumps of 60+km, whereas in other localities the advance was more modest. The lines on this map are about 60 km apart, so they show the fastest the front might move. Realistically, it should take 1.2 to 1.5 times as long for raccoon rabies to reach you than is indicated on this map. And that will only happen if the countermeasures have no effect at all.

This map does not include any delay caused by natural or man-made barriers. As raccoon rabies moved north in the U.S.A., it crossed two major rivers as big as the Niagara River. The Susquehanna River held the front up for over 18 months, near Harrisburg, PA. However, raccoon rabies crossed the Hudson River as though it was "no problem"! What effect, if any will the Niagara or St. Lawrence Rivers have? Although it is possible for raccoons to cross Canadian rivers on the ice, most Canadian raccoons stay in their dens in very cold weather, except during mating in February and March. Will they cross the ice or not? Raccoons certainly cross bridges; in fact, they have been observed on the pedestrian walkway of the Whirlpool

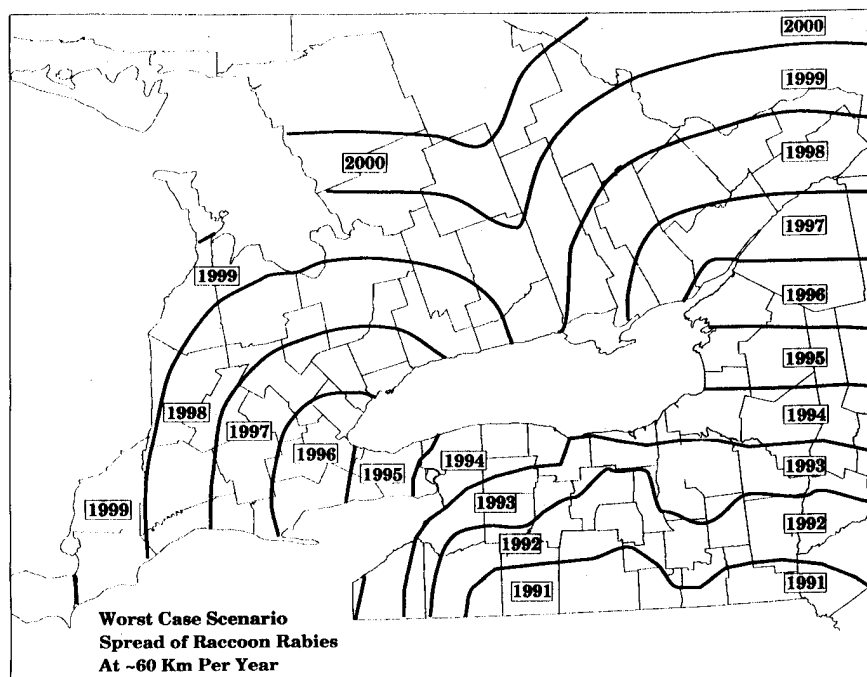
Bridge in Niagara Falls, and crossing the nearby rail bridge. However, most of the St. Lawrence bridges are very long - does that deter raccoons?

Finally, the MNR Trap-Vaccinate-Release zone between the Niagara River and the Welland Canal is designed to prevent the disease from crossing. Theoretically, that should hold the advance of raccoon rabies back indefinitely.

So why have the map at all? It is a reaction to a widespread media perception that Ontario is about to be overrun. The truth is that raccoon rabies should not, for example, reach Metro Toronto before 1997 at the very earliest, even if the Niagara T-V-R does not work.

## COMMENT

The number of rabies cases was very low in the central, western and southern regions during this quarter. In fact, since 1968 there has only been one lower figure in central, and none in western or southern for April-June. These low numbers are the aftermath of outbreaks. Theoretically, that is the best time to start baiting. Time will tell if the theory holds up.



**The Rabies Reporter**, a scientific newsletter about current issues in rabies research and control, is a joint effort of the Rabies Research Unit, Ontario Ministry of Natural Resources; the Food Production and Inspection Branch of Agriculture and Agri-Food Canada; The Ontario Ministry of Health and the Department of Geography, Queens University, Kingston. Articles for future issues will be welcomed by the editor. Comments, letters, submissions and enquiries should be sent to:

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# Animal Rabies Report: April to June 1994

| Animal Type      | Fox |            |    | Skunk |            |    | Other Wildlife |            |    | Dog |            |    | Cat |            |    | Livestock |            |    | Total |            |    |
|------------------|-----|------------|----|-------|------------|----|----------------|------------|----|-----|------------|----|-----|------------|----|-----------|------------|----|-------|------------|----|
| County or Area   | #   | Cumulative |    | #     | Cumulative |    | #              | Cumulative |    | #   | Cumulative |    | #   | Cumulative |    | #         | Cumulative |    | #     | Cumulative |    |
|                  |     | 94         | 93 |       | 94         | 93 |                | 94         | 93 |     | 94         | 93 |     | 94         | 93 |           | 94         | 93 |       | 94         | 93 |
| Eastern          |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            |    |
| Stormont         |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| Dundas           |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| Glengarry        |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 1  |
| Prescott         |     |            | 1  | 1     | 1          | 1  |                |            |    |     |            |    |     |            |    |           | 1          | 1  | 1     | 2          | 3  |
| Russell          |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| Carleton         |     |            |    |       |            |    |                |            |    | 1   | 1          |    |     |            |    |           |            |    | 1     | 1          | 0  |
| Renfrew          |     |            |    |       |            |    |                |            |    |     | 1          |    |     |            |    |           |            |    | 0     | 0          | 1  |
| Lanark           |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| Grenville        |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| Leeds            |     |            |    |       |            |    |                |            |    |     |            | 2  |     |            |    |           |            |    | 0     | 0          | 2  |
| Frontenac        |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| Lennox-Addington |     |            |    |       |            |    |                |            |    |     |            | 3  |     |            |    |           |            |    | 0     | 0          | 3  |
| Central          |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            |    |
| Hastings         | 1   | 2          | 2  | 2     | 3          |    | 2              | 4          |    |     |            | 1  |     |            |    | 7         | 7          |    | 12    | 17         | 2  |
| Prince Edward    |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           | 1          | 1  | 0     | 1          | 1  |
| Northumberland   |     |            | 1  | 2     | 2          |    |                |            |    |     | 1          |    |     |            |    |           |            |    | 2     | 2          | 2  |
| Victoria         |     | 2          | 7  | 6     | 6          | 4  |                |            |    | 1   |            |    |     | 1          | 1  |           | 2          |    | 7     | 11         | 12 |
| Haliburton       |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| Peterborough     | 2   | 2          | 11 | 4     | 9          |    |                |            |    |     |            | 1  |     |            |    |           |            | 5  | 6     | 11         | 17 |
| Durham           | 3   | 6          | 28 | 2     | 3          | 14 |                |            |    |     |            |    |     |            |    |           | 3          | 5  | 5     | 12         | 47 |
| York Region      | 1   | 6          | 13 | 4     | 6          | 4  |                |            |    |     |            |    | 1   |            |    |           | 1          | 5  | 5     | 13         | 23 |
| Scarborough      |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| East York        |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| City of Toronto  |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| City of York     |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| North York       |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| Etobicoke        |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    | 0     | 0          | 0  |
| Simcoe           | 1   | 2          | 8  |       |            | 1  |                | 2          |    |     |            |    | 2   |            |    |           |            | 1  | 1     | 4          | 14 |

# Animal Rabies Report: April to June 1994

| Animal Type         | Fox |            |    | Skunk |            |    | Other Wildlife |            |    | Dog |            |    | Cat |            |    | Livestock |            |    | Total |            |    |
|---------------------|-----|------------|----|-------|------------|----|----------------|------------|----|-----|------------|----|-----|------------|----|-----------|------------|----|-------|------------|----|
| County or Area      | #   | Cumulative |    | #     | Cumulative |    | #              | Cumulative |    | #   | Cumulative |    | #   | Cumulative |    | #         | Cumulative |    | #     | Cumulative |    |
|                     |     | 94         | 93 |       | 94         | 93 |                | 94         | 93 |     | 94         | 93 |     | 94         | 93 |           | 94         | 93 |       | 94         | 93 |
| Western             |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            |    |
| Peel                |     | 1          | 1  | 1     | 1          |    | 1              |            |    | 1   | 1          |    |     |            |    |           |            | 1  | 4     | 2          |    |
| Halton              |     | 3          | 2  |       |            |    |                |            |    |     |            | 2  | 1   |            |    |           |            | 0  | 5     | 3          |    |
| Dufferin            |     | 2          |    |       | 4          |    |                |            |    |     |            |    |     |            |    | 1         | 2          | 0  | 3     | 6          |    |
| Wellington          | 2   | 17         | 4  | 3     | 6          | 4  | 1              |            |    |     |            | 3  | 7   |            | 4  | 9         | 9          | 12 | 40    | 17         |    |
| Waterloo            | 1   | 14         | 9  | 1     | 6          | 5  | 1              | 1          |    |     |            | 1  | 2   | 1          | 1  | 8         | 2          | 5  | 31    | 17         |    |
| Perth               | 3   | 9          | 5  |       | 1          | 4  |                |            | 1  |     |            | 1  | 2   | 1          |    | 1         | 3          | 4  | 14    | 13         |    |
| Grey                | 4   | 9          | 24 |       |            | 6  |                |            |    |     |            |    |     | 4          |    | 5         | 15         | 4  | 14    | 49         |    |
| Bruce               | 2   | 4          | 32 |       | 3          | 9  | 1              | 1          |    |     |            |    |     | 1          | 1  | 1         | 16         | 3  | 9     | 59         |    |
| Huron               | 2   | 4          | 15 | 2     | 3          |    |                |            |    |     |            |    |     |            |    | 2         | 1          | 4  | 9     | 16         |    |
| Southern            |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            |    |
| Wentworth           |     | 2          | 5  |       | 1          |    |                |            |    |     |            |    |     | 1          |    | 1         | 2          | 0  | 4     | 8          |    |
| Haldimand - Norfolk | 2   | 5          | 4  |       |            | 1  |                |            |    |     |            | 1  | 2   |            | 2  | 3         | 1          | 4  | 9     | 8          |    |
| Brant               | 2   | 5          | 6  | 1     | 2          |    |                |            |    | 3   |            | 1  | 3   | 2          |    | 1         |            | 4  | 14    | 8          |    |
| Niagara             | 9   | 15         | 8  | 1     | 4          |    | 2              | 2          |    | 1   |            | 2  | 2   | 1          | 2  | 2         |            | 16 | 26    | 9          |    |
| Elgin               |     |            | 10 |       | 1          | 3  |                |            |    |     |            | 1  | 1   | 3          |    |           | 2          | 0  | 2     | 19         |    |
| Oxford              |     |            | 6  |       | 3          | 3  |                |            |    |     |            | 1  | 1   |            |    | 1         | 4          | 0  | 5     | 14         |    |
| Middlesex           |     |            | 9  | 1     | 1          | 4  |                |            |    |     |            | 2  | 3   | 1          | 4  | 2         | 2          | 7  | 18    |            |    |
| Lambton             | 1   | 5          | 15 | 1     | 3          | 3  |                |            |    |     |            | 2  |     | 4          | 1  | 1         | 1          | 3  | 9     | 25         |    |
| Kent                | 1   | 3          | 15 | 1     | 1          | 1  |                | 1          |    |     |            |    |     | 3          |    | 1         | 9          | 2  | 5     | 30         |    |
| Essex               | 1   | 6          | 6  |       |            |    |                | 1          |    | 1   |            | 2  | 1   |            |    |           | 1          | 1  | 8     | 10         |    |
| Northern            |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            |    |
| Muskoka             | 1   | 1          | 1  |       |            |    |                |            |    |     |            | 2  |     |            |    |           |            | 1  | 1     | 3          |    |
| Parry Sound         |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            | 0  | 0     | 0          |    |
| Nipissing           |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            | 0  | 0     | 0          |    |
| Sudbury             |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            | 0  | 0     | 0          |    |
| Cochrane            | 3   | 5          | 13 |       |            | 1  | 1              |            |    |     |            |    |     |            |    | 1         |            | 3  | 6     | 15         |    |
| Timiskaming         |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            | 0  | 0     | 0          |    |
| Algoma              |     |            |    |       |            |    |                |            |    |     |            |    |     |            |    |           |            | 0  | 0     | 0          |    |

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| Animal Type           | Fox |            |     | Skunk |            |    | Other Wildlife |            |    | Dog |            |    | Cat |            |    | Livestock |            |    | Total |            |     |
|-----------------------|-----|------------|-----|-------|------------|----|----------------|------------|----|-----|------------|----|-----|------------|----|-----------|------------|----|-------|------------|-----|
| County or Area        | #   | Cumulative |     | #     | Cumulative |    | #              | Cumulative |    | #   | Cumulative |    | #   | Cumulative |    | #         | Cumulative |    | #     | Cumulative |     |
|                       |     | 94         | 93  |       | 94         | 93 |                | 94         | 93 |     | 94         | 93 |     | 94         | 93 |           | 94         | 93 |       |            |     |
| Northern ( continued) |     |            |     |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            |     |
| Thunder Bay           |     |            |     |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            |     |
| Rainy River           |     |            |     |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            |     |
| Kenora                |     |            |     |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            |     |
| Subtotals             |     |            |     |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            |     |
| Eastern               |     |            | 1   | 1     | 1          | 3  | 1              | 1          | 4  |     |            |    |     |            |    | 1         | 1          | 2  | 3     | 9          |     |
| Central               | 8   | 20         | 70  | 20    | 29         | 23 | 2              | 6          | 3  |     | 1          | 4  | 1   | 1          | 2  | 7         | 14         | 12 | 38    | 71         |     |
| Western               | 14  | 63         | 92  | 7     | 20         | 32 | 1              | 4          | 1  |     | 2          | 1  | 5   | 13         | 6  | 27        | 6          | 48 | 54    | 108        |     |
| Southern              | 16  | 41         | 84  | 5     | 16         | 15 | 2              | 2          | 2  |     | 5          | 7  | 3   | 11         | 19 | 6         | 14         | 22 | 32    | 89         |     |
| Northern              | 4   | 6          | 14  |       |            | 1  |                |            | 1  |     |            | 2  |     |            |    |           | 1          |    | 4     | 7          |     |
| Totals                | 42  | 130        | 261 | 33    | 66         | 74 | 6              | 13         | 11 | 0   | 8          | 14 | 9   | 25         | 27 | 40        | 36         | 83 | 130   | 278        |     |
|                       |     |            |     |       |            |    |                |            |    |     |            |    |     |            |    |           |            |    |       |            | 470 |

Livestock this quarter: 10 cattle; 8 sheep; 1 horse

Other wildlife this quarter: 1 coyote; 4 raccoons; 1 big brown bat

