

The Rabies Reporter

July 1998

Volume 9, Number 2

ISSN 1186-8961

In this issue:

- new Rabies Unit necropsy facilities
- tracking tile studies
- results of the 1997 T-V-R
- rabies in the second quarter
- Artemis Technologies operational
- plans for 1998 bait drops

THE RABIES UNIT FINALLY HAS A HOME NEW NECROPSY FACILITY IS INAUGURATED WITH MUCH HARD WORK

The new Ministry of Natural Resources post-mortem facility at Trent University was finally functional on May 19, 1998. That was the day we started sampling our 1200 fox carcasses which had been collected and stored since October 1997. The new facility has two stainless-steel necropsy tables equipped with sinks and running water, and one table has a large operating room light over it which gives the impression of an ER. There are two other stainless tables with sinks and a

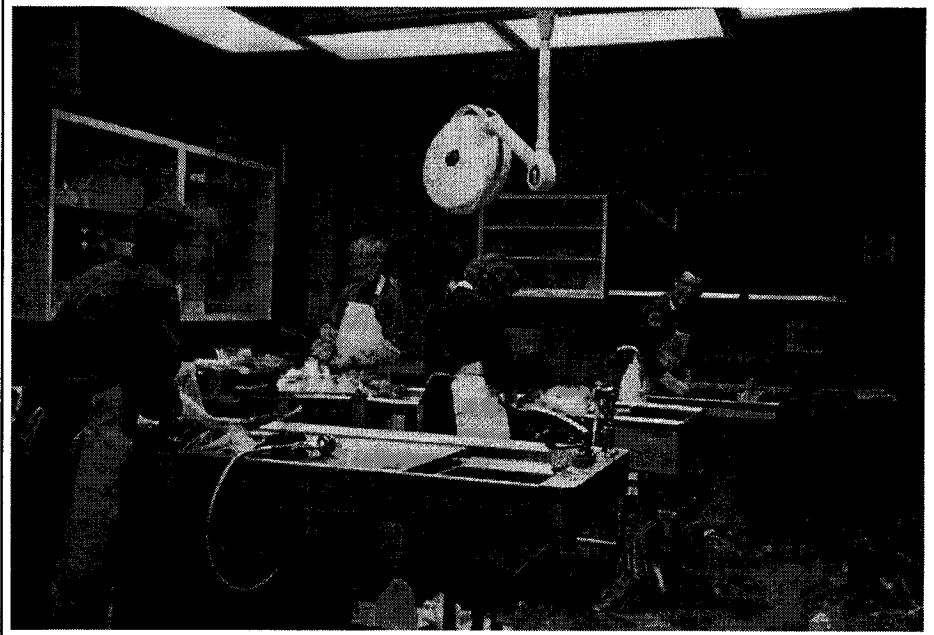


Figure 1. The Rabies Unit working through 1200 foxes in the new necropsy facility at Trent University. Staff from left to right are: Andrew Silver, Peter Bachmann, Nancy Eaton, and Terry Medd.

third that is portable and adjustable (so that two might share the light). There is also an ante-room for changing clothes, spinning blood or entering data and which is also equipped with a phone. The post-mortem lab has a walk-in cold room and adjacent to this are two large walk-in freezers, all used for storing samples.

That was where we stored our mountain of fox carcasses, after bringing the freezer-truck down from Midhurst, where the carcasses had accumulated while we waited for the freezers to become functional. During a typical year, we would process fox carcasses within a few weeks of getting them from the trappers, but this year we had some growing pains concerning the move from

Maple. The collection of animals starts in October and ends in February. Kathryn MacDonald and I are on the road one or two weeks each month, visiting trappers who have called to tell us they have carcasses ready for pickup. This year the facilities were not ready so we used a large freezer truck to store the foxes until we could get them to Peterborough. The truck was unloaded into the freezer in March at the Trent location but the laboratory was still not complete (only been working on it for a year at this point), so we waited until May to start the necropsy.

As you can imagine, with the delays we had experienced we were a little anxious to get the sampling finished so we did a 10 day "fox blitz". With the help of Andrew Silver, Kim Bennett, Nancy Eaton, Beverly Stevenson, Peter Bachmann, Kathryn MacDonald and Terry Medd all aspects of the necropsy program were completed successfully. The necropsy itself consists of the following procedures:

1. Using bone scissors to remove both upper canine teeth;
2. Extracting a portion of the brain stem with a modified 3cc syringe known as a "brain sucker";

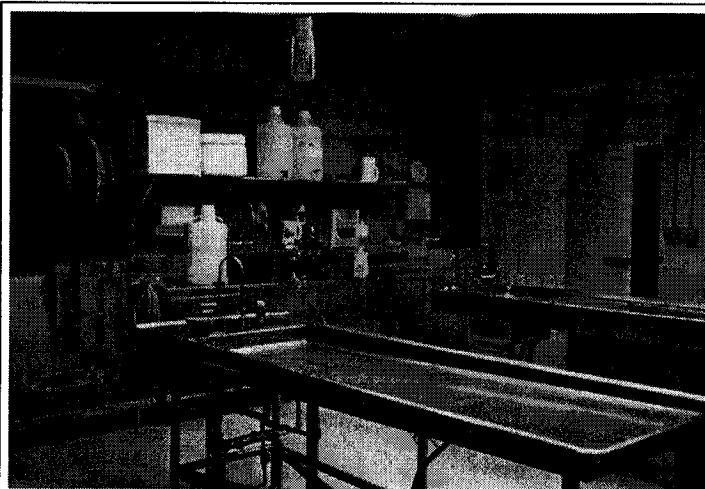


Figure 2. View of the necropsy room from the opposite side, showing the door to the walk-in cold room, where carcasses are thawed.

3. Removing the left and right submaxillary salivary glands;
4. Opening the body cavity and extracting a blood sample from the heart, chest or abdomen with a syringe. This blood tissue is then centrifuged to extract serum;
5. Inspecting reproductive tracts for placental scars which are counted and graded to density: light to dark.

The sampling is done as part of the MNR commitment to monitor the efficiency of the fox baiting program. The foxes are collected from licenced trappers and hunters across Southern Ontario and we remove the samples for specific analyses, which are:

1. Teeth are sectioned and inspected using an ultra-violet microscope to determine the age of the animal and presence of tetracycline (which indicates that the fox ate a bait);
2. Brain samples are tested to determine if rabies virus is present and, if so, which strain;
3. Salivary glands are used for an assay which determines if rabies virus was being excreted (positive rabies specimens only);
4. Blood (serum) samples are used to determine if the fox has antibody (immunity) to rabies;
5. Placental scars might provide a fox fecundity index in relation to population dynamics.

The blood, brains and salivary glands are sent to the Canadian Food Inspection Agency laboratory in Nepean for rabies virus testing and the Rabies Unit analyses the teeth.

Over the past four years we have fallen behind in statistical analysis of all the results of the annual carcass collections. This summer we will catch up, and, hopefully, by early 1999, a paper will be ready for a journal describing the details of tetracycline and antibody frequencies among foxes from eastern Ontario, from 1989 to 1997.

We expect to collect harvested animals again this fall and winter but we are, at this point, still working to determine the scope and size of the collection.

*Terry Medd
Rabies Unit
Trent University
Peterborough*

TRACKING TILES HELP TO UNRAVEL WHAT RACCOONS LIKE ABOUT BAITS

There are a lot of variables which affect a raccoon's decision about whether or not to eat a novel bait which it encounters in the wild. Most of these we can only guess at, yet, if oral vaccination is to be cost-effective, we need to find the bait mixture that raccoons are most likely to eat when they find it. Some important questions remain to be answered: do bait preferences change from season to season?

What time of year is the best to get the maximum uptake of baits by raccoons? Do preferences change from region to region? Does the structure of the bait help or hinder the process of getting liquid vaccine into the raccoon's mouth? Since 1995, the Rabies Research Unit has been conducting tracking tile studies to try to get wild raccoons to help us answer some of these questions.

A tracking tile consists of a one-meter-square by 3mm PVC tile. Within the boundaries of the tile, a 60cm x 60 cm section of kraft paper is placed. This leaves a 19cm wide perimeter which is

track on the paper as it investigates the bait. The resultant animal track can then be identified, thus giving valuable statisti-

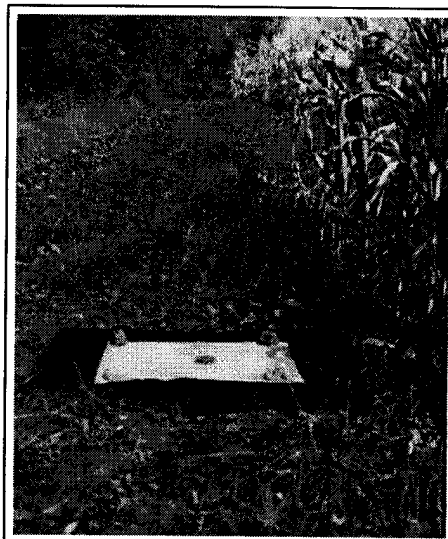


Figure 1. A tracking tile, with an FP bait, set at the edge of a corn

cal insights about animal/bait contacts. The fate of the bait can also be studied.

Two bait types have been compared in these experiments. First is the made-in-Ontario Sugar-Vanilla (SV) bait, which is a fat-based mixture with icing sugar and vanilla scent added. It is basically our fox bait with new attractants. This bait contains a blister-pack and 1.8ml of distilled

water plus red food colouring. The second test bait is made of fishmeal and polymer (FP): this is the preferred bait of workers in the U.S.A.. It has a shape similar to the outer cover of a matchbox, with a channel down the center, into which a soft plastic sachet, containing 1.8ml of distilled water and blue food colouring, is placed. (In 1995 experiments, there was no blister pack or sachet, but

Table 1. Animal contacts on tracking tiles which had either Sugar-Vanilla (SV) or Fishmeal Polymer (FP) baits in 1995 and 1996. There were 521 ttn for SV baits, and 465 ttn for FP baits.

Species recorded on tile	Contacts per Tracking Tile Night (ttn)	
	SV Baits	FP Baits
	Statistically Different	
Raccoon	0.350	0.410
Mouse/vole	0.073	0.052
Cat	0.023	0.060
Red fox	0.017	0.047
Skunk	0.015	0.045
Bird	0.008	0.011
Rabbit	0.002	0.004
Squirrel	0.008	0.000
Chipmunk	0.002	0.002
Dog	0.006	0.011
Fisher	0.002	0.000
Porcupine	0.000	0.002
Coyote	0.000	0.002
Human	0.006	0.002
Mink	0.020	0.000
Slug	0.000	0.011

smeared, using a paint brush, with a 10:1 mixture of xerox ink and mineral oil. An experimental bait is placed on the center of the paper. The idea is that the animal must step in the ink on its way to the bait, and therefore must leave a permanent

these were used in 1996, 97 and 98, except that some FP baits in 1998 lacked sachets.) The FP bait is currently being used to combat rabies in raccoons, coyotes, and gray foxes rabies in the USA.

Table 2. Consumption of Sugar-Vanilla (SV) and Fishmeal Polymer (FP) baits placed on tracking tiles during July - October 1995 and 1996.

Animal	Number of baits		Percent 100% consumed		Percent Partially eaten		Percent Untouched		Percent Unknown	
	SV	FP	SV	FP	SV	FP	SV	FP	SV	FP
Raccoon	184	190	87 *	69	4	13	6	7	3	11
Cat	12	28	25	39	25	11	42	25	8	25
Mouse/vole	38	24	0	0	55	25	24	63	21	12
Skunk	8	20	43	65	0	5	43	15	14	15
Red fox	9	22	78	50	0	0	0	18	22	32

During the field season (June - October 1995-97; April - present 1998) tracking tiles have been placed in both rural and urban habitats within southern Ontario. The first purpose was to determine which species is the most frequent animal contacting the S-V and FP baits (Table 1). Clearly, raccoons visit the baits much more frequently than any other species, and they seem to be equally attracted, overall, to each bait type. Note that this table also combines urban and rural observations, yet there were some differences between these two, especially in the frequency of visits by cats. Dogs are rare visitors, which reduces a worry that, if dogs frequently ate baits, they might increase the probability of human contact with the vaccine. The fact that foxes are rare visitors probably expresses the fact that raccoons are roughly 10 times more abundant than foxes in southern Ontario. However, analysis of tetracycline data from our large-scale bait drops indicates that foxes find SV baits just as frequently as they find conventional chicken-cod fox baits. Armed with that result, we are going to change to the SV mixture for fox baits, so that, when we are using a vaccine effective orally in both foxes and raccoons, only one bait will be needed. (The current vaccine in fox baits works well in foxes, but not in raccoons. Actually, it works in raccoons if it is injected, but it is not effective orally, when raccoons eat baits.)

Other data such as the amount of bait consumed and blister pack contact are also measured. Bait contact, bait consumption and blister pack contact will help us to determine the effectiveness of the bait in delivering vaccine to raccoons (Table 2). You can see from this table that SV baits are more likely to be eaten completely than are FP baits, but the difference is not large, and probably not serious.

In the 1995 and 1996 studies, there was some indication that raccoons changed their preferences for one bait over the other in different months, but the

results were complicated by the fact that the FP baits arrived late in 1995, so some comparisons could be made only in 1996. Therefore, in 1998, the study will run from April to October, with both baits available in a variety of habitats, throughout the time that raccoons are feeding actively. Stay tuned for results.

What types of animal tracks do you find in Southern Ontario? The most common include raccoon, domestic cats, dogs, skunks, squirrels, birds, as well as mice and voles. Less common contacts include fox, coyote, woodchuck, mink, fisher and porcupine. Some of the more interesting ones have included a snake, a garden slug, a human and a weasel. Personally, my best is a Ford tractor.

The 1998 study is widespread. Scott Taylor and Nancy Eaton have tracking tiles active in the Barrie-Midhurst area, Rick Rosatte and I are working around Peterborough. Two summer students are also using tiles east of Peterborough. Hopefully the outcome of these studies will tell us more about which bait is better, and when is the best time of year to put them out.

*Mike R. Allan
Rabies Unit
Trent University
Peterborough*

RESULTS OF THE TVR PROGRAMS IN THE NIAGARA AND ST. LAWRENCE AREAS 1997

The Rabies Unit continued the Trap-Vaccinate-Release (TVR) program along the Niagara and St. Lawrence Rivers during 1997, in an effort to keep raccoon rabies out of Ontario. The objective of the program was to create buffer zones of vaccinated raccoons at the most likely points of entry for raccoon rabies. The theory

behind this tactic is that if a rabid raccoon enters the buffer zones it will succumb to rabies without transmitting the disease as most of the raccoons, skunks, dogs and cats in the area will be vaccinated against rabies (MNR vaccinates raccoons, skunks and a few foxes, citizens vaccinate their cats and dogs). We were particularly concerned with the St. Lawrence region as 55 rabid raccoons and skunks were reported in Jefferson and St. Lawrence Counties, New York, during 1997. Only 8 rabid raccoons and skunks were reported as being rabid in Niagara County, NY, during that year, possibly as a result of the success of the Cornell aerial baits drops in the area since 1995.

During June 16 - October 31, 1997, 14 trappers (7 in Niagara and 7 along the St. Lawrence) live-trapped, vaccinated against rabies (using Imrab®), ear-tagged for identification and released raccoons, skunks and foxes in the target zones. That area in Niagara consisted of a 700 km² area of urban and rural habitat located between the Niagara River and Welland Canal. In the St. Lawrence region the target zone was between Kingston and Mallorytown (an area from the St. Lawrence River shoreline to 8 km north of the river), including Wolfe and Howe Islands and the bridge-heads at Prescott and Iroquois and the perimeter of the city of Cornwall. In general, 75 live-traps were set in each trapping cell for 4 or 8 nights. Each cell was then re-trapped for 4 or 8 nights using 25 live-traps. Raccoon population density estimates were calculated using a modified Petersen Index, and the capture-recapture data.

Niagara TVR Program: A trapping effort of 51,895 trap-nights produced 7,322 captures of 4,617 different raccoons during the trapping period. Sixty-two percent (2,874) of those were adults of which 54% (1555/2874) were vaccinated during a previous year. Other captures included 116 skunks, 1,913 opossum, 1,000 cats, 42 squirrels, 37 rabbits, 20 rats, 20 birds, 11 groundhogs, 9 foxes, 5 coyotes, 4 mink, 2 weasel, 1 chicken and 1 dog. The estimated raccoon population during 1997 was 5,887 (5,561-6,139) individuals with an average density of 8.4 raccoons/km² in the 700 km² target zone. About 78% (75 - 83%, 95% C.I.) of the raccoon population was captured and vaccinated. We are quite confident in this estimate as some (47/79) of the cells were trapped during 4 different weeks. During the 4th week of

trapping, 76% (424/556) of the animals captured were vaccinated previously during 1997. Also of note was an opossum population estimate of 1,137 (1,065-1,225, 95%C.I.) individuals in the Niagara TVR area. That suggests up to 1.6 (1.5-1.8, 95%C.I.) opossums/km².

St. Lawrence TVR Program: A total of 4,215 raccoons (2,896 different animals) were captured using 40,870 trap-nights during the 1997 TVR program. Sixty-eight percent (1,965/2,896) of the raccoons were adults of which 26% (507/1,965) were vaccinated during a previous year. This low figure is due to the fact that only 43% of the raccoons were vaccinated during 1996 due to insufficient trapping effort. Other captures during the St. Lawrence TVR program included 555 skunks (383 different animals), 801 cats, 6 foxes, 38 ground hogs, 7 fisher, 7 birds, 2 turtles, 48 rabbits, 5 dogs, 6 marten, 33 squirrels, 10 rats, 17 porcupine, 1 otter and 2 muskrats.

The estimated raccoon population in the entire TVR area (about 720 km²) was 4,575 (4,322 - 4,867, 95%C.I.) individuals. About 63% (59 - 67%, 95%C.I.) of the raccoons were vaccinated during 1997. Raccoon density averaged about 6.5/km². There was a lot of variation among areas in both characteristics.

Conclusion/Future Plans: Both the Niagara and St. Lawrence TVR programs were considered a success during 1997 as a sufficient number of raccoons were vaccinated to contain any isolated cases of raccoon rabies that might appear in the vaccination zones. Plans are to continue both TVR programs during 1998. Should raccoon rabies appear outside of the buffer zones plans are to implement a point infection control program to contain those isolated cases.

*Rick Rosatte
Rabies Unit
Trent University
Peterborough*

Editor's note: Rick provided graphs to go with this article, but at the last minute I could not get two computer programs to exchange them, so they had to be left out.

RABIES IN ONTARIO DURING THE SECOND QUARTER OF 1998

The tables and maps show that rabies continues to decline slowly. The best news is that there has not been a rabid fox anywhere in Ontario since November 1997. Skunks continue to be our problem, with the remnants of outbreaks showing in the corners of Perth-Huron-Bruce-Grey, in Waterloo-Wellington-Dufferin, and in eastern Peterborough.

There were actually more rabies cases in southern Ontario during the first half of 1998 than there were in the same period a year ago. Last year, after you extracted the 109 foxes from Kapuskasing and region, there were 24 cases, in southern Ontario, from January to the end of June, compared to 29 this year. Three out of five of this increase were bats, but there were two more skunks and one extra cow than there were last year. Isn't it nice to note one-digit changes, after the hundreds of cases per quarter that we saw during the 1980's. The second quarter average from 1980-1989 was 399 rabid animals, of which 180 were foxes and 114 were skunks.

There is a change in the tables in this issue. The title "Other Wildlife" has been changed to "Bats", to catch up with reality. All "Other Wildlife" cases for almost two years have been bats.

Outside Ontario, there have now been five rabid foxes, plus some skunks and cattle just east of Montreal, between Mont Ste. Hilaire and Ste. Hyacinthe. There was one rabid fox during the quarter near La Sarre, in northern Quebec, due east of Cochrane, Ontario, and about 10 km from the Quebec - Ontario border. Raccoon rabies continues to be active just across the St. Lawrence from Brockville, as reported in the last issue. However, there has been no major spread in the April - June period there, or along either side of Lake Champlain, farther east. The next dispersal time for raccoons is August - September.

In summary, with so few rabies cases there is not much to discuss.

*Charlie MacInnes
Rabies Unit
Trent University
Peterborough*

ARTEMIS TECHNOLOGIES IS UP AND RUNNING

Artemis Technologies is a new company, founded by Andy Beresford and Alec Beath, expressly to make baits for the MNR rabies program. Several members of the Rabies Unit visited their new plant, at 50 Watson Road in Guelph, on June, 1998. We found a modern miracle in action. Within less than a year, Andy and Alec have purchased a former warehouse and machine shop, and installed within it a carefully thought out facility for production of virus vaccine and all other parts of the MNR baits. Andy Beresford was chief of virus production at Langford Laboratories and its successors. He was responsible for the layout of the virus-handling facilities. Alec Beath has his own heating and cooling business, and he designed the heating, freezing and air-handling for the new plant. This is a real partnership!!

The heart of producing live rabies virus vaccine is to keep the virus contained, and keep all possible contaminating organisms out. That requires facilities with isolated air subsystems for each production room, systems which are at negative pressure to the outside, so that air always flows inwards when a door is opened. All air sucked out of each room is filtered before it is exhausted.

In order to ensure sterility, all materials which come out of virus production areas must be autoclaved (except the vaccine and baits!). Andy and Alec put a lot of thought into the floor plan, so that incoming and outgoing materials pass through efficiently, with as little as possible opportunity for moving contaminants. Cleanliness is also a discipline, and there are changing rooms at each entry way where staff and visitors don sterile outer garments. You can't recognise anyone inside the facility, because all the suits look the same!!

The Artemis plant was officially opened in May, but the first baits were not actually off the line until mid-June. That means that the team have until August to complete production and testing of 1.1 million baits for this fall.

As you frequently encounter in small, new enterprises, this is really a family business. When the plant opened, I talked to Andy's father-in-law, who reckoned he had spent over 600 hours helping to build the facility. Everyone is working long days and weeks now, to catch up with the production schedule.

Artemis will also take on key roles in developing the machinery to make

improved baits that Ken Lawson and Rick Rosatte have devised. The next version of the Ontario bait will be slimmer, and outwardly simpler.

The company will also work with MNR and CFIA to develop adenovirus vaccine for production. We wish all of them well.

*Charlie MacInnes
Rabies Unit
Trent University
Peterborough*

PLANS FOR 1998 BAIT DROPS AGAINST FOX RABIES

In 1998 we will have 1.1 million baits to deploy. About 40,000 of these will be put out by hand, in green space in the urban complex from Oshawa to Hamilton. That work began on 12 July, and will continue until we are done.

There has been a lot of discussion on how to scale back baiting as rabies becomes more scarce. There are two priorities. First, we must keep rabies from coming back in areas that we have treated. Second, we need to guard against re-invasion from outside the treated areas.

The three remaining foci of rabies in skunks are so well spread out that it would not be wise to cut back substantially on the area to be treated in southern Ontario. Therefore, as shown in Fig. 1, we plan to treat most or all of the core area treated last year.

Rabies in foxes has persisted for two years in the valley of the Richelieu River, east of Montreal. In 1997, we baited the area south of that city, to provide a block against possible movements into eastern Ontario. Rabies cases this year are in the same small area as last year, so we have decided to ask permission to eliminate this outbreak. That will require baiting a triangle enclosed by the U.S. border on the south, a north-south line 30 km east of the Richelieu River on the east, and the south bank of the St. Lawrence. It will, of

course, be impossible to drop baits in the heavily urbanized parts of the south shore from Salaberry de Valleyfield on the west, to Longueuil, Chambly and Mont St. Hilaire on the east. I tried to prepare a map, but my scanner technology could not produce a readable copy. The exact number of baits for this area has not been determined, because of the extensive urbanization. We have 90,000 baits available, which should be almost enough. If more are required, we will take them from the areas designated A and B in Fig. 1. Area A will be reduced first, and, at the moment, I do not anticipate needing any of the baits allocated for area B.

No drop is currently planned in northern Ontario or Quebec.

*Charlie MacInnes
Rabies Unit
Trent University
Peterborough*

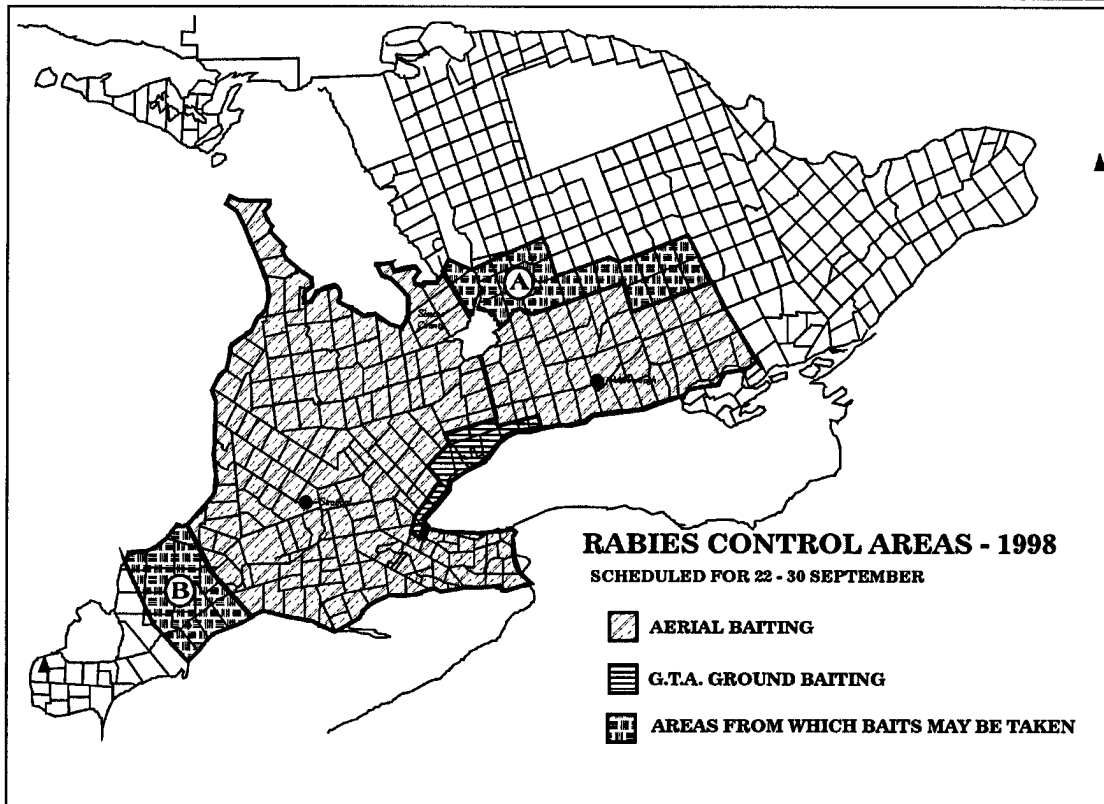


Figure 1. Areas to be treated by aerial drop of baits in September 1998.

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 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:

The Rabies Reporter
Rabies Research Unit,
Ontario Ministry of Natural Resources
P.O. Box 4840,
Peterborough, Ontario K9J 8N8

Telephone: (705) 755-2270

Fax: (705) 755-2288

e-mail: macinncc@gov.on.ca or
macinnch@netrover.com

Also, visit our home page on the internet, at
<http://www.gis.queensu.ca/RReport er/mm.html>

Animal Rabies Report: April to June 1998

[illegible]

Animal Rabies Report: April to June 1998

[illegible]

Animal Rabies Report: April to June 1998

Animal Type	Fox			Skunk			Bat			Dog			Cat			Livestock			Total		
County or Area	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		98	97		98	97		98	97		98	97		98	97		98	97		98	97
Thunder Bay																			0	0	0
Rainy River																			0	0	0
Kenora																			0	0	0
Subtotals																					
Eastern							3	3	2										3	3	2
Central				1	2	4													1	2	4
Western				8	15	11	1	1	1								5	4	9	21	17
Southern							3	3	1										3	3	1
Northern																			0	0	10
Totals	0	0	10	9	17	15	7	7	4	0	0	1	0	0	0	5	4	16	29	34	

Livestock this quarter: None

Bats this quarter: 7 big brown

