The Rabies Reporter

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RABIES IN ONTARIO SUMMARY OF 1999 RABIES CASES

There were 99 rabid animals diagnosed for Ontario by the CFIA-ADRI rabies laboratory. The most important event in 1999 was the arrival of the raccoon strain of rabies into Ontario. Figures 1 shows the whole rabies picture since the invasion of fox rabies in the 1950's, including the raccoon cases in 1999. Figure 2 shows the same data, but only from 1995-99. The latter figure shows that, although rabies case numbers were greater in 1999 than in 1998, the extent of the rise was not alarming. Even that conclusion is mildly misleading, as a 40% decrease in rabid bats reduced the profile of the greater number of rabid skunks.

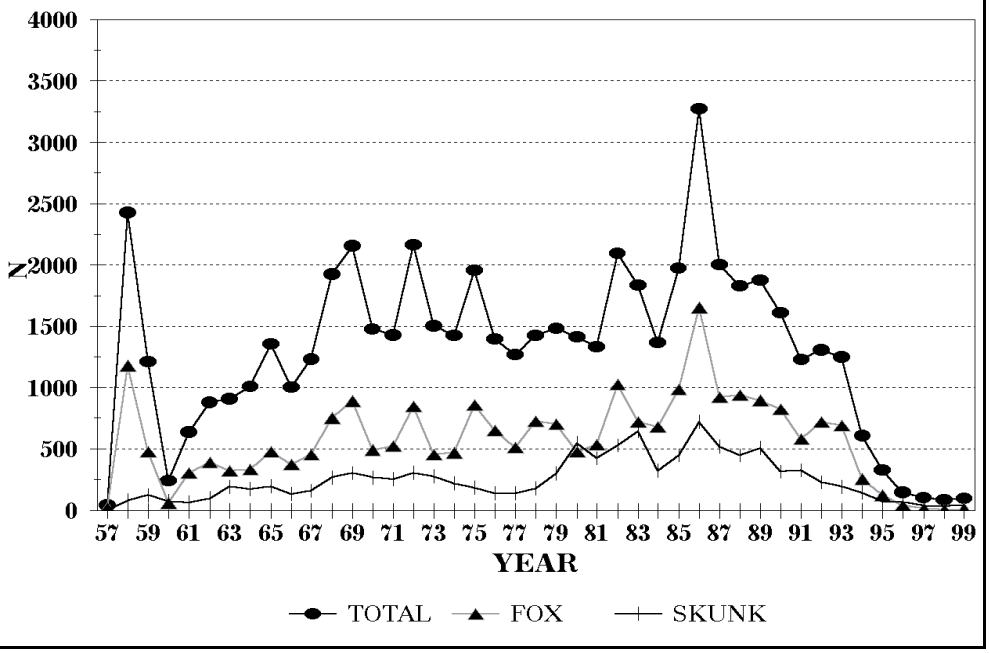

Figure 1. Rabid foxes and skunks, and total rabies cases in Ontario, for each year since 1957. Baiting began in eastern Ontario in 1989, and expanded to the rest of southern Ontario in 1994.

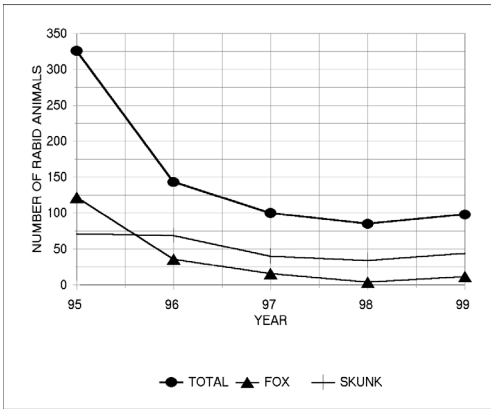

Figure 2. Rabid foxes and skunks, and total rabies cases in Ontario, 1995-99.

Skunks were one of our two major problems in 1999. There were 46 rabid skunks in 1999, compared to only 33 the year before, an increase of 40%. As the maps show, there was an ongoing outbreak in Waterloo-Wellington-Dufferin, and the adjacent counties of Grey, Bruce, Huron and Perth. Remember that skunks used to be the number two wild species spreading the Arctic fox strain of rabies in southern Ontario (Fig. 1), and that skunks, unfortunately, do not react to the vaccine in our fox baits. However, we began the widespread bait drops on the assumption that skunks cannot maintain this strain of rabies indefinitely in isolation from rabid foxes. In the eastern Ontario experiment, rabies dropped out of the skunk population within months of the last rabid fox. It is taking longer do disappear in western Ontario, and we simply do not know how much longer it may persist. It is clear that there are many fewer rabid skunks under present circumstances than there were before rabies was controlled in the fox population. The adenovirus-recombinant oral rabies vaccine that we are developing for raccoons is also effective orally in skunks, but I hope fox strain rabies disappears from skunks before that is ready to go in the field.

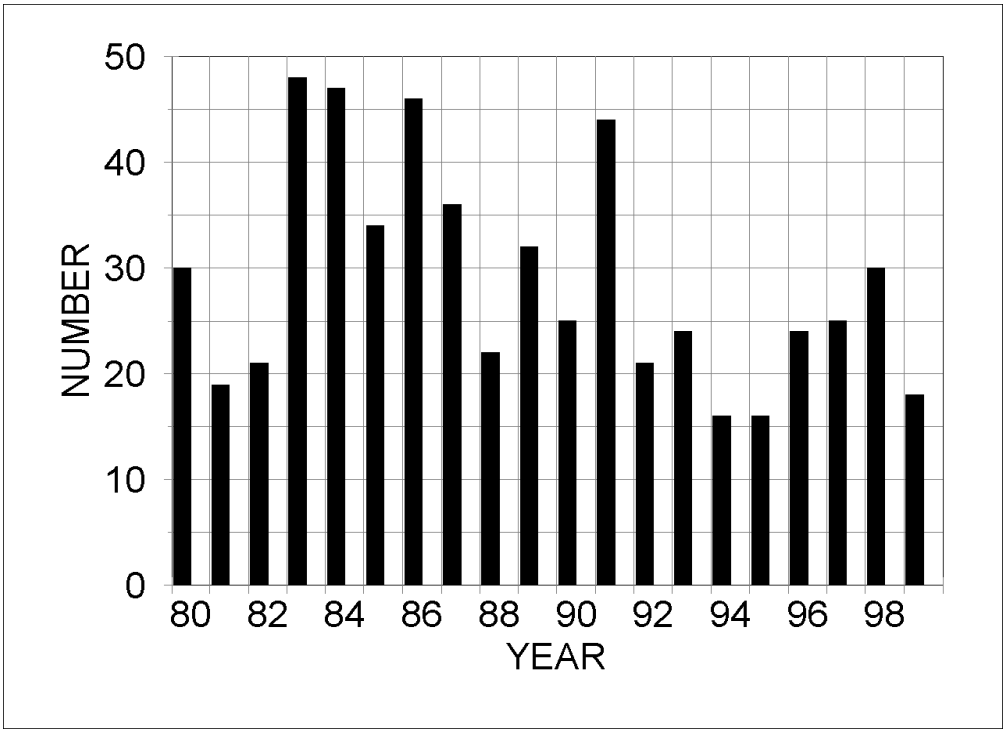

Figure 3. Rabid bats in Ontario, 1980-99.

There were four skunks diagnosed with bat strains of rabies during 1999. If we remove these from the statistics, the increase of Arctic fox strain rabies in skunks was only 27%. Three of the bat strain cases were in eastern Ontario, and one was in London. This is a very high number compared to previous years, but we must remember that, when there were 300-600 rabid skunks a year, most were not checked for strain. The ADRI policy has always been that every rabid animal from areas where there were baits dropped was typed, but, due to the high expense, and the fact that the monoclonal antibody technique was quite new in 1989, it was impossible to type the virus in every animal before 1994.

There were 12 rabid foxes in 1999, three times as many as in the previous year. All were within the area covered by the rabid skunks. One of these foxes was infected by ERA virus, which must have come from one of our baits. The other 11 underline the need to keep foxes vaccinated until rabies has disappeared from skunks, as stated in the last issue. The international standard for claiming elimination is that there has been no case in the whole region for two years.

Following this line of thought, there has been no fox strain rabies in the whole of the Eastern Region since 1994, except for a single skunk in Renfrew County in November 1996. In fact, only Dundas County, and Ottawa-Carleton had fox strain cases in 1994. In the Central Region, the end came more recently, except for the counties of Prince Edward and Haliburton, which have been free of fox strain rabies since before 1993. Simcoe County saw its last cases in 1995. Toronto, Northumberland County and York and Durham Regions had their last cases (except for bat strain) in 1996, Victoria County had a case in 1998, and Peterborough had one in 1999. In the Southern Region, Lambton, Kent, Essex, and Hamilton-Wentworth have been free of fox strain rabies since 1994 or earlier. Brant, Niagara, Elgin and Oxford were clear from 1996 on, and Haldimand-Norfolk and Middlesex have been clear since 1997. The original area of fox rabies was about 96,000 km^2; that has been

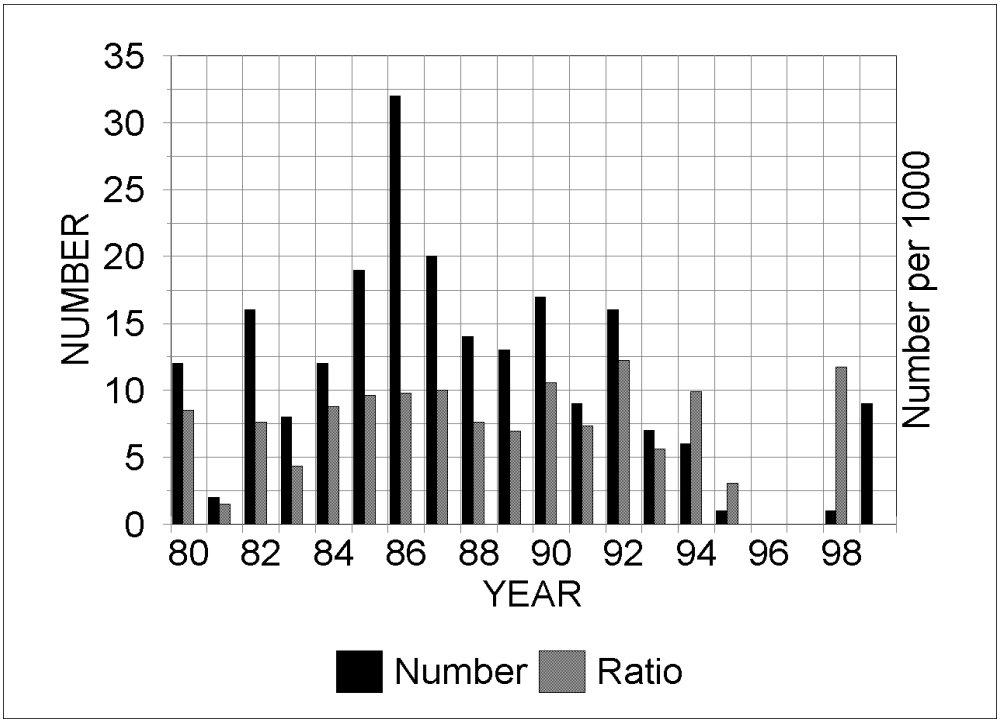

Figure 4. The numbers of confirmed rabid raccoons in Ontario since 1980. Prior to 1999, all rabid raccoons were probably infected with the Arctic fox strain of rabies. The gray bars show the number of rabid raccoons per 1000 rabid foxes, indicating that raccoons infected with fox virus were uncommon. They never served as foci for spread of rabies among raccoons.

reduced to less than 10,000 km^2.

Rabies in bats was down in 1999, but well within the normal variation seen over the past two decades (Figure 3). When you read the following article, on rabies in New York, you will realize that rabies in bats is likely much under-reported in Ontario. New York has undertaken a lot of public education about the danger to humans of rabies in bats in the past few years. This has raised the number of suspect bats submitted, but has not increased the small percent of those that are found to be rabies positive.

The big news of the year, of course, was the incursion of raccoon rabies into eastern Ontario. Figure 4 shows, however, that we have had rabid raccoons before, but these were always in association with fox strain, but, as explained above, were not usually typed. The failure of rabies to spread among raccoons around those cases is strong evidence that the individuals in question were infected with fox strain rabies. Figure 4 shows that raccoons were only occasionally infected by foxes before 1994, as there were only 5-10 rabid raccoons per 1000 foxes. By contrast, in 1999, the ratio was 585 rabid raccoons per 1000 foxes, a result of (i) the invasion of raccoon strain, and (ii) the scarcity of rabid foxes compared to previous years.

In 1999, one rabid raccoon in Peterborough County, was infected with Arctic fox strain, and another, near Arnprior in Renfrew County, was probably bat strain. The remaining 7, however, were raccoon strain, identical to what was across the St. Lawrence in New York. The locations of the first three of those were discussed in the last Rabies Reporter. Since the publication of the last issue, there have been major developments. On 10 December, a rabid raccoon was encountered on Wolfe Island, Frontenac County (ON), near the ferry from the U.S. mainland in Jefferson County, NY. On 16 December another case was observed, this time on the mainland, in the control area from case #2. Two outbreaks have developed: one on Wolfe Island, with a total of six cases by 18 February 2000, and the other in the North Augusta area of Elizabethtown township, just north of Brockville (see Figure 5). Most of the latter are in the valley of a stream with the romantic name of Mud Creek.

Wolfe Island has been treated by Trap-Vaccinate-Release each year since 1995. However, the 1999 operation was less successful than usual, with only 50% of the raccoons estimated to be vaccinated. The trapper who normally covers the island was pulled away to deal with the Point Outbreak Control operations, and the job was finished late in the year.

As you can see in Figure 5, all of the mainland cases have occurred within the treatment areas established in 1999. Most of them are in or close to the TVR zone of case # 2. That TVR zone also had only 50% success. Another 3 occurred just along the edge of a small triangle which was not treated at all, as it lay between between the point outbreak TVR and the baited zone. It appears from these very scanty data that the point outbreak operations last summer probably had an important effect, but we will learn more as the coming summer unfolds. To 10 March, 2000, there had been a total of 22 cases of raccoon strain rabies in Ontario, starting with the 14 July, 1999 cases near Domville.

The surveillance in eastern Ontario has been much greater than normal, so the number of cases encountered is probably higher than normal. Rick Rosatte has hired trappers to search for potentially rabid animals, the public has been much sensitized, and Doug Hayes and his CFIA crew have been very active. The locations and the clustering of cases are both very

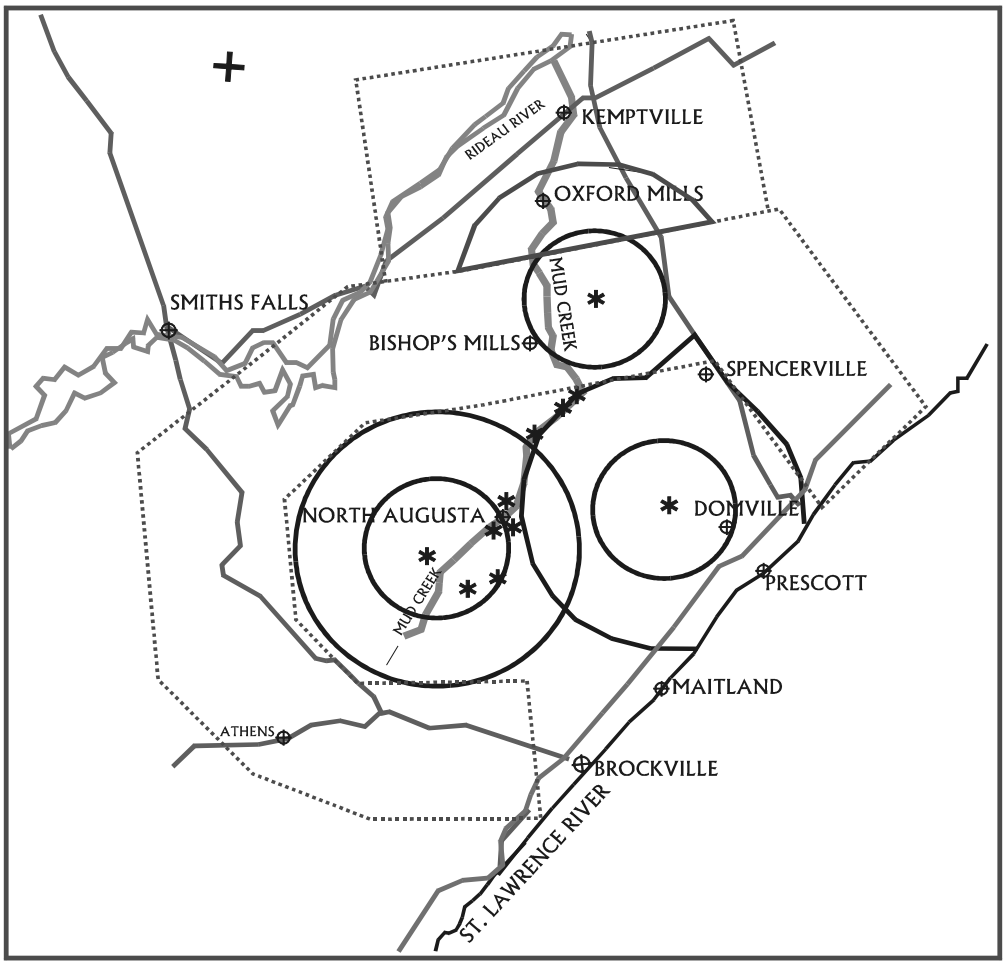

Figure 5. Map of the racoon rabies affected area in eastern Ontario. The broken lines enclose bait drop areas, the concentric circles indicate the three point outbreak control operations. Three cases which occurred on 3 March, 2000, are not shown. They were found in the immediate vicinity of North Augusta.

interesting. I hope they really do indicate that the outbreak is localized. That will make it easier to control.

To summarize the year: (1) Arctic fox strain cases increased slightly, in both skunks and foxes. There was only one case of that strain east of Toronto. The remaining cases were clustered in the northern parts of western Ontario. It will be particularly interesting to see if that outbreak moves southwards, or begins to die out, during 2000. (2) Raccoon strain rabies entered eastern Ontario. There were 7 cases to the end of the year, and there have been 15 more between 5 January and 3 March 2000. (3) Bat strain cases were down, but still , are not shown within the normal range.

The first year of the new millenium will be a great challenge for the rabies unit. We will have over 800,000 Ontario Slim baits to deploy, and, of course, the TVR crews will be active. We are still planning exactly what to do, so details will be presented in the next issue.

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NEW YORK STATE 1999 RABIES ANNUAL SUMMARY

While New York again reported the largest number of animal rabies cases for any state in the nation, 1999 was the first year since 1990 that the state total was less than one thousand. The 929 laboratory confirmed cases were 167 (15.2%) fewer than the 1,096 recorded in 1998. The smaller number of rabid animals was almost entirely due to fewer reported rabid raccoons, as the 520 cases in that animal were 169 (24.5%) less than the 689 confirmed in 1998. Contrastingly, the number of rabid bats (118) was a record total for the second consecutive year. Rabies cases were once again widely distributed geographically in the state, with rabies in terrestrial mammals reported in 56, and bat rabies in 41, of the state's 62 counties. Only Hamilton County of the Adirondack Mountain region and the New York City boroughs of Staten Island and Brooklyn had no confirmed cases of bat or terrestrial rabies for the year.

The New York State Department of Health received 9,423 animals for rabies examination during the year, which was 4.7% fewer than the 1998 total, but 4.5% greater than the average for the previous five-year period. The New York City Health Department rabies laboratory received 942 animals for examination, down from 1,015 in 1998, for a statewide total of 10,365 examinations for rabies in animals. Animal specimens for rabies examination were received from every New York State county. The Wadsworth Center rabies laboratory also examined samples from four human patients for the purpose of antemortem diagnosis of rabies (all rabies-negative).

The animals received for rabies examinations included representatives of 56 species. Domestic species comprised 33.6% (3,227) and wild species 66.4% (7,138) of all tested. Bat specimens, which included bats of seven of nine indigenous New York species, comprised the largest single category for the second consecutive year, with a total of 3,555 received. This was an increase of 414 (13.2%) from the 1998 total, and bats constituted 34.2% of all animals received for testing. The laboratories also examined 2,114 cats (20.4% of all animals tested), 1,710 raccoons (16.5%), 927 dogs (8.9%), 579 skunks (5.6%), 527 rodents and lagomorphs (5.1%), 272 foxes (2.6%), 152 cattle (1.5%), 449 other wild animals (4.3%), and 80 other domestic animals (0.7%). Among the animals received by the Wadsworth Center rabies laboratory for diagnosis, 22.4% had reportedly bitten one or more persons, 20.1% had some other non-bite human contact, 33.9% had contact with one or more domestic animals, and 33.4% were non-contact surveillance specimens.

Rabid wildlife accounted for 95.0% (883) of the state's 929 total cases during the year. The rabid wildlife consisted of 520 raccoons (58.9% of all rabid wildlife), 187 skunks (21.2%), 118 bats (13.4%), 44 foxes (5.0%), 10 woodchucks (1.1%), a white-tailed deer, a bobcat, a coyote, and a bear. Overall, the rabies positivity rate was 12.4% among all wildlife received for examination. The rabid black bear was a 1.5 year old juvenile that had demonstrated a lack of fear of humans and entered a home in Marbletown, Ulster County, in early July. This was the first laboratory-confirmed rabid bear in this state. The rabies virus isolated from the brain of the bear was demonstrated by monoclonal antibody evaluation to be the variant responsible for raccoon rabies.

The raccoon rabies outbreak spread into previously unaffected towns at its front in St. Lawrence County during 1999, in which this variant of rabies virus also appeared for the first time in raccoons across the St. Lawrence River in southern Ontario, Canada. The cyclic nature of raccoon rabies was evident in previously affected areas of the state, with a downward trend presently predominant: a decreased number of terrestrial rabies cases were recorded in 35 counties, an increased number in 13, and no change occurred in 8. Among all raccoons received for testing at the Wadsworth Center, 22.9% (293) had a reported contact with a human, 34.9% (446) contact with a dog, 6.0% (76) contact with a cat, and 42.4% were non-contact surveillance specimens. Among rabid raccoons, 14.8% (76) had a reported contact with a human, 47.6% (244) contact with a dog, 7.0% (36) contact with a cat, and 37.8% (194) were non-contact surveillance specimens. The rabies positivity rate was 30.4% among all raccoons tested, 25.9% among raccoons in contact with a human, 47.4% among raccoons in contact with a cat, and 54.7% among raccoons in contact with a dog. The rabies positivity rate among skunks received was 32.3%, and among foxes 16.2%. There were 38 rabid grey foxes during the year, widely distributed in 37 towns in 22 counties. The rabid grey foxes were again more commonly associated with successful aggressive behavior: while

only 2.1% of rabid raccoons and 1.6% of rabid skunks actually bit a human, 50.0% of the rabid grey foxes bit one or more persons.

Rabies infection was identified in 46 domestic animals, including 31 cats (67.4% of cases in domestic species), 8 cattle (17.4%), and 7 horses (15.2%). All of the rabid cats were infected with the variant of rabies virus associated with raccoon rabies. The 7 rabid horses matches the greatest annual number of cases in that species, first recorded in 1994. This was the second consecutive year in which there were no recognized cases of rabies in domestic dogs in the state, although 1,782 dogs were examined during the two-year period.

The 3,495 bats examined at the Wadsworth Center included 2,352 big brown bats, comprising 67.3% of all bats tested, and 940 little brown bats (26.9%). Among all bats received, 17.4% (607) had potentially exposed a human, 26.4% (921) had contact with a cat, and 7.6% (267) had contact with a dog. A large proportion of the other bats received had been submitted because they were encountered in close proximity to a sleeping person or an unattended child. The 118 rabid bats included 102 big brown bats, (86.4% of all rabid bats), 9 little brown bats (7.6%), 4 eastern pipistrelles, 2 hoary bats, and one bat unidentifiable to species. Overall, the rabies positivity rate in bats in 1999 was 3.3%. This rate was not significantly different than the 1998 rate of 3.5%, or the 3.6% rate for the previous five-year period.

Among the common house-dwelling species, the rabies positivity rate was 4.3% in big brown bats, and for little brown bats 1.0%. One of the rabid bats was a juvenile, 65 (55.1%) were female, 46 (39.0%) were male, and 6 (5.1%) were unidentifiable to gender. Although 83.9% of bat specimens and 77.1% of the rabid bats were received and tested from June to September, at least one rabid bat was detected in each month of 1999.

For more information visit the rabies laboratory website at www.wadsworth.org/rabies

New York City Health Department data provided by Dr. Igbal Poshni

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EARLTON BAIT DROP EXPERIMENT

MNR has a long history of success fighting rabies in Ontario by vaccinating foxes using baits dropped from Twin Otter aircraft. Efforts have expanded greatly over the past several years and the Rabies Research Unit now drops three different types of baits in two provinces and four states to vaccinate red and gray foxes, raccoons, and coyotes against rabies

The first rabies bait used in Ontario in 1989 was a 3.5 x 3.5 x 1.6 cm oleo wax cube, containing a chicken-cod essence, that weighed approximately 16.5g. Development of this bait continued over the next 10 years. The bait used in Ontario today has a similar consistency but it is a slimmer (3.5 x 3.5 x 1.1cm, 13.0g), darker-colored version of the original bait. It is now referred to as the Ontario Slim (OS) bait. In addition to the OS bait, MNR has dropped two other types of baits containing an oral rabies vaccine in an effort to control rabies in New York, Vermont, Ohio, and Texas. The bait used most often in the States is referred to as the Fishmeal Polymer (FP) bait. It is a chunky, square bait that measures 3.3 x 3.3 x 2.2cm and weighs a hefty 23.7g. The other bait sometimes used in the States looks a bit like the ketchup or mustard packets you see in restaurants. It is called the Linhart Sachet (LS), named after Sam Linhart, the person who developed it. It measures 5.7 x 2.2 x 0.3cm and weighs a feathery 2.2g. The major difference between the baits, besides weight and composition, is that the OS and FP baits have a matrix surrounding the blister pack containing the vaccine, whereas the LS bait is simply an unprotected plastic package (coated with an attractant) containing the rabies vaccine. The Linhart baits used in this experiment were not coated with an attractant.

In order to bait effectively, in other words, to drop baits out of the plane so that they land only in appropriate areas, the navigator needs to know something about how the baits behave when they fall from the plane. We have a pretty good idea how the original Ontario bait behaves based on results from a bait drop study conducted out of McFarlane Lake, near Sudbury, Ontario in early February 1989. Results of that experiment are written up in an internal report (Bachmann *et al*. 1989) if anyone is interested. Little is known, however, about the behavior of the 3 new baits being used in Ontario, Quebec, and the States in the fight against rabies in foxes, raccoons, and coyotes. Early last summer a decision was made to take the guess work out of this job and conduct a small bait drop experiment. The objective of the study was to test whether there was a difference in the way the three rabies vaccine baits scattered, or drifted, when dropped from a Twin Otter aircraft, flying at a given height and speed, under similar wind conditions.

The first task was to find a suitable airport. Earlton Airport in northeastern Ontario was chosen for several reasons. First, the airport could supply jet fuel. Second, the airport had two runways (one tarmac and the other gravel) and both were of adequate length. The airport manager agreed to give us full use of the gravel runway, which meant that we would be able run our experimental flights without being interrupted by local air traffic. He also said that he could arrange to have the grass cut around the gravel runway to make it easier for us to find the baits. It was a bonus that the airport experienced low air traffic at that time of year and that lodging and food were only minutes away.

After locating the perfect airport, we started to plan for the experiment. One of the most challenging jobs, besides designing all the experiments and gathering all the appropriate gear, was to figure out how we were going to find and identify our baits once they were dropped from the

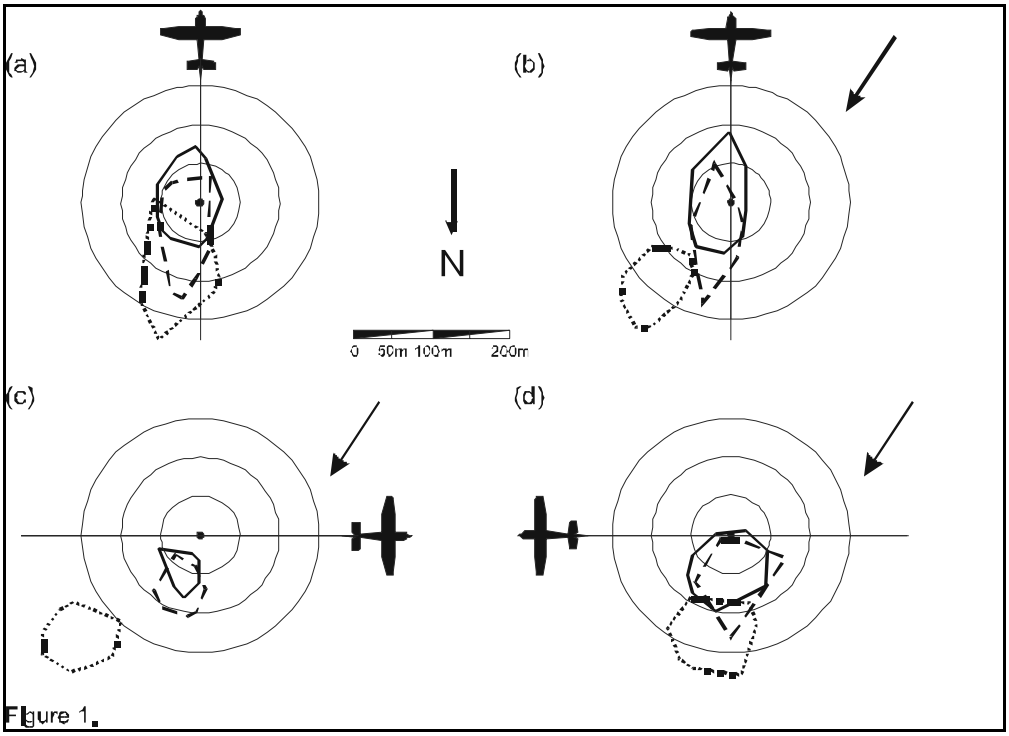

Figure 1.

Figure 1. Distribution of each of the 3 bait types dropped under 4 wind conditions (a) no wind, (b) crosswind, (c) headwind, and (d) tailwind. Wind speed and direction were approximately 12 knots and 210° (SSW), respectively. Solid black line - Fishmeal polymer (FP) bait, large dotted line - Ontario Slim bait (OS), small dotted line - Linhart Sachet (LS).

aircraft. Before the FP and LS baits were loaded onto the plane, they were spray-painted fluorescent orange to make them easier to find in the gravel and short grass. The white OS baits did not need to be painted since they were easily seen in the gravel and short grass. All baits were identified (using a black, permanent marker) by a number which represented the wind condition in which they were to be dropped. There were four different wind conditions to contend with, and 100 baits of each type (OS, FP, and LS) were to be dropped in each case, so, as you can imagine, the numbering task was no small chore.

On June 20 1999, we headed north to Earlton, loaded with tons of gear and tubs and tubs of baits. Individual baits were to be located using a transect method and the location of each bait found was to be quantified using a grid or X-Y coordinate system. So, the first order of business was to set up a search grid on the ground around the spot where the baits were to be dropped from the plane. We set up a grid which measured 350m along the X-axis (range -100 to 250m) and 400m along the Y-axis (range 0 to 400m). Coloured flags were placed at 2m intervals along the X-axes and numbered 0-98 within each 100m section. Distances along the Y-axis were determined using a 100m length of string numbered 0-98 at 2m intervals. Before beginning each Y transect, the bait locator placed the 0 end of the string at the start of the line and then dragged the other end of the string in a straight line up to the next 100m mark.

Once the grid was complete, we were ready to begin the experiments. The basic idea of each experiment was to drop a sample of each of the three different baits all at once as the plane flew over a target at a given height and speed. Baits were first dropped in a no wind situation and then under three different wind conditions, a crosswind, headwind, and tailwind. Because the wind direction was constantly changing throughout the day, we did our best using the windsock to choose the appropriate flight direction for each experiment. At the beginning of each experiment, the appropriate bait number was selected depending on the wind condition and the Twin Otter aircraft was loaded with 100 baits of each type (OS, FP, LS). After takeoff, the pilot flew the aircraft along a pre-determined flight line for approximately 200m at a height of 500 feet and a speed of 145 knots. When the nose of the aircraft was directly over a target or drop spot outlined on the ground, the navigator signaled to the crew at the back of the plane to open the chute and drop all 300 baits. The same drop spot was not used for all experiments because of the anticipated effect of wind on some of the baits. An attempt was made to position the drop spot for each experiment so that most of the baits would land within the search grid.

Baits were collected after the first experiment to test the search method. After that, baits on the ground were collected only when all experiments were complete. Individual baits were located using a transect method. The entire 350m x 400m grid was searched by having bait locators walk slowly along transect lines (along the Y-axis) spaced 2m apart. Each bait locator searched an area 1m to the left and 1m to the right of the transect line. When a bait was found, the locator picked it up and recorded (1) the transect number (position along the X-axis as indicated on the colored flag), an estimate of the distance (to the nearest 0.5m) of the bait along the X-axis (transect number -1 $\leq$ X distance $\leq$ transect number +1), an estimate of the distance (to the nearest 0.5m) along the Y-axis, the bait type, the bait number, and a code representing damage to the bait (for OS baits only).

When all baits had been collected, their positions were plotted using the X-Y coordinates. For each wind condition, a boundary was drawn around the main cluster or grouping of each bait type. An outlier was defined as a bait that fell 60m

or more from the main grouping of baits. The straight-line distance of each bait from the drop spot was determined using trigonometry. Outliers were not included in the analyses.

As you might expect, the lighter Linhart Sachet baits, were affected by both wind and propwash, the backward force of air from the plane's propellers, much more than either the Ontario Slim or Fishmeal Polymer baits (Figure 1a). In a no wind situation, only 2 LS baits were found at or in front of the drop spot, the rest drifted back 50-150m as a result of propwash. Most of the heavier FP baits, on the other hand, landed within 60m of the drop spot (~50% in front, 50% in back), a result of both the forward momentum of the plane and backward force of propwash. The OS baits, which were not quite as heavy as the FP baits, were blown back a little further by propwash, up to about 100m, and only about 25% of the baits landed in front of the drop spot. The average distances of the FP (n=92) and OS (n=96) baits from the drop spots were very similar, 35 and 38m, respectively, but the scatter of the OS baits around the drop spot was much greater. The average distance of the LS baits (n=89) from the drop spot was 101m, almost 3 times that of the FP and OS baits.

When all three baits were dropped in a crosswind, there was quite a bit of overlap among the distributions of the OS and FP baits; however, there was no overlap with the distribution of the LS baits (Figure 1b). With the orientation of the runway approximately north-south, the SSW wind was not exactly a full crosswind; however, the effect of the crosswind on bait scatter is evident in Figure 1b. Several FP baits, only a few OS baits, and no LS baits landed on the upwind side of the flight line. A combination of the SSW wind and propwash caused all but two of the OS baits and all of the LS baits to drift back behind the drop spot. These forces much less effected the FP baits with roughly 25% of the baits landing in front of the drop spot. The average distances of the FP (n=85) and OS (n=52) baits from the drop spots were 37 and 53m, respectively. The LS baits (n=91) drifted on average 145m from the drop spot, about 2½ - 3½ times as far as the OS and FP baits.

A headwind had the most dramatic effect on bait scatter. As a result of both the wind force and propwash from the plane's propellers, no baits fell in front of the drop spot when the plane flew in a headwind. There was some overlap of the distributions of the FP and OS baits, but again there was no overlap with that of the LS baits (Figure 1c). Although the OS baits scattered a bit further than the FP baits, when compared with the LS baits, these two bait types behaved quite similarly. On average, the LS baits (n= 81) were blown an incredible 211m from the drop spot, while the FP (n=22) and OS (n=20) baits scattered on average 55 and 64m, respectively.

The effect of a tailwind on bait scatter was somewhat countered by the effect of the plane's propwash. Although all three bait types were blown a bit north due to the SSW wind, the overall effect of the tailwind and the counter effect of the propwash caused most baits to scatter around an imaginary line drawn down through the drop spot (Figure 1d). If the tailwind had been a true tailwind, that is, a wind straight from the west, the bait distributions may have been centered more over the drop spot. Regardless, the combined effect of a tailwind and propwash from the plane's propeller is evident in Figure 1d. The overlap of the FP and OS bait distributions with that of the LS baits are due only to a couple of baits. One OS bait in particular, which did not qualify as an outlier, dragged the distribution of those baits about 40m to the north and into that of the LS baits, otherwise they would not have overlapped. It is obvious from the diagram that the lighter LS baits were blown much further north due to the SSW wind. In a true tailwind, the distribution of the LS baits may have overlapped a bit more with that of the FP and OS baits. As the average distances indicate, the FP (n=76) and OS (n=41) baits scattered rather similarly, 50 and 56m, respectively. The LS baits (n=97), on the other hand, drifted on average over twice that distance, 134m.

After all the baits had been collected, it was obvious the sample sizes for the OS and FP baits were smaller after the first experiment. Baits dropped in the first experiment were collected that same day as a test of the collection method. The rest of the experiments were conducted over the next two days and baits collected at the end. The search for baits was only possible while the daylight was adequate. When the search for baits could no longer be carried out effectively, the search effort had to be abandoned until the next day. It was obvious the following morning that the OS baits especially, but also some of the FP baits, had become quite a hit with the local wildlife, ravens and foxes in particular. Although we were annoyed to find the animals nibbling away at our sample sizes, the incident was useful for examining bait preference in an anecdotal sort of way. A few other small bait drop experiments were conducted at the airport that week and when the totals of all baits found were compared with the total of all baits dropped, the findings were very interesting. In total, almost 90% of all LS baits dropped were found using our transect method. In contrast, 75% of the FP baits and only 55% of the OS baits were found. Since the LS baits were the slimmest and often most difficult baits to find, one would expect to have found at least the same number or more of the OS and FP baits using the same search method, but this was not the case. Since several ravens were seen pecking at baits on the ground and others were observed flying off with baits, it is quite likely that the smaller sample sizes of FP and OS baits after the first experiment were due to animal snacking. Also, some baits were found in clusters of 2 or 3, sometimes 4, as though animals had stashed them. Some of the outlier baits in the data may have been the result of these animals relocating them. It should be noted that the low preference for the LS baits by local wildlife may be due to the fact they were not coated with the attractant usually applied when they are used in the bait drop programs.

I think it would be interesting to examine the effect of a true 12knot tailwind on the

distributions of all three baits, especially the Linhart sachets. Would a true tailwind cause the distributions of all three bait types to be centered over the drop spot? It would also be interesting to determine the wind speed needed to overpower the effect of the propwash for each of the three different bait types.

In summary, results of this study clearly showed that the thin, rectangular, plastic Linhart Sachet baits were affected by the natural forces of wind, and propwash created by the aircraft's propeller, much more than the heavier, cube-shaped, oleo-wax Ontario Slim and U.S. Fishmeal Polymer baits. These results suggest that navigators will have to pay special attention to wind speed and wind direction when dropping the LS baits from Twin Otters (and possibly other aircraft) to ensure the baits land only in target areas. It is also important to keep in mind that the plastic sachet baits will probably drift even further when dropped in higher wind conditions or from heights greater than 500 feet.

Lucy Brown
Rabies Unit
Peterborough

TEXAS ORVP 2000

It was once again time for the Ontario contingent's annual trip south to assist Texas with it's Oral Rabies Vaccination Program (ORVP). With this being the new millennium everyone was hoping there would be no Y2K problems to deal with, especially in the computerized navigation systems. On January 1st the 3 Rabies Unit staff made it as far as Sudbury on the first leg of their trip north to Sault Ste. Marie. The following day was spent driving northwest into a major snow storm but we still managed to make it to the hangar where we met up with some of the other pilots and engineers. We loaded the bait machine equipment, tools and personal gear, only to find that the scheduled flight with our remaining crew from Thunder Bay and Dryden had been delayed.

The Ontario team consisted of 3 Twin Otter aircraft, [C-G]OGA, OGC, and OPG. The team included pilots, Neil Ayers, Al Quinn, Ted Bekker, Gord Leamy, Ray Fread and Jason Karas. Engineers Marc Benoit, Randy Godda, and Milt Harder would trade places after two weeks with Joe Spence, Bob Everatt and Tom Thomson. Avionics and flight watch was covered by Pierre Verhelst. The Rabies Unit team was Andrew Silver (in charge of bait machines), Kim Bennett and Mark Gibson.

The following morning at 8:00 the planes were pulled from the hangar, fuelled up and once the remaining staff arrived it was off on the first leg south. Our first stop for fuel was Springfield, Illinios where we checked the weather only to find tornado type conditions blocking our way. The pilots filed a flight plan heading west a little then south to Texarkana, Arkansas where it was gradually getting warmer. Once we had fuelled it was off to Kingsville, Texas. We landed shortly after sundown and said our hellos and got reacquainted with old friends. It sure was nice to enjoy a warm coastal evening breeze in January wearing just a t-shirt.

The next morning started with a get acquainted meeting with Gayne Fearneyhough outlining this year's operation. From there it was off to the airport to unload the aircraft, give safety briefings and train navigators, bombers and loaders. The majority of people were familiar faces from past bait drops, from the Texas Department of Health and Texas Wildlife Services. This year there was a stronger presence from the Texas National Guard due in part to a bout of gastroenteritis that infected most of the people from last years group. The majority of the Guard this year were new and under the supervision of Major Alanzo.

The first flights were about 3 hours in duration and off to a bumpy and windy start. More than a couple of white airsick bags accompanied the first load of garbage and bait tubs coming off the maiden flights for this year. The weather for the 2 weeks of the southern, coyote portion of the project was overall pretty nice with only the odd slow-down due to morning fog or rain. Pico de gallo, brisket, smoked venison and javelina as well as some moose sausage from Ray Fread were all a big hit of the numerous cook-outs and tailgate parties. As we were fairly close to the Mexican border, who could resist a shopping trip for blankets, bottles of pure vanilla, ironwood and obsidian carvings and some Canadian anti freeze (Tequila, Kahlua or Anejo Rum). A trip to Corpus Christi for seafood and a visit to the aircraft carrier Lexington was a big hit. The highlight of the flying in South Texas had to be the Padre Island flight where we flew over dunes, deer, surf, fisherman, kids flying kites, sunbathers, winter Texans or as we call them Snowbirds and returned over a large cattle stockyard (pee-yoo!) and a large grass fire (cough-hack) On the 14th, the replacement engineers arrived to spell off the first gang who were heading back to Ontario. While in Kingsville, we distributed 1,055,000 doses of vaccine on 92 flights and flew a total of 38,163 miles.

The move from Kingsville to Fredericksburg was undertaken on the 17th with an extremely foggy morning that delayed the flights until the fog could burn off. Once again all the new faces were given a safety briefing and training session before the afternoon meeting which introduced all the new people and outlined this portion of the project. The rest of the afternoon was free to relax, do laundry or see the sights, as Fredericksburg is a touristy old German community with shops, restaurants and the Nimitz museum. San Antonio was only about an hour's drive away, so a trip to see the Alamo, the river walk and a great blues concert at the Majestic Theatre was in order.

On January 24th the last flights were completed using up the remaining off time baits. The Best Western put on a wind-up party for us complete with a dinner of chicken fried steak and white gravy. Boy oh boy, the cholesterol meter should be off the scale. The rest of the evening followed with a few glasses of Shiner Bock beer, a couple of games of pool and a little two step dancing. The following day the rental

vehicles had to be returned to Austin so it gave those of us that went a last chance to shop while the rest of the people prepared the planes for the flight home. The order of the day was to find a specific type of Tony Lama cowboy boots then a trip to Jan Buck's favorite restaurant: the Hyde Park Bar and Grill. On the way back, what would a trip be without a visit to a one horse town named Luckenbach made famous by Willie Nelson.

Over a 7 day period the central Texas portion for gray fox distributed 915,000 baits on 81 flights covering a total of 28,772 miles. The 2000 program was responsible for the distribution of oral rabies vaccine over more than 24,000 square miles (62,540 square kilometres) of Texas. Since 1994 there has been a 96% reduction in the number of rabies cases reported in domestic and wild animals in South Texas and strong indications that similar success can be achieved in Central Texas.

On the 26th we said our goodbyes to our friends in Texas and started our journey home with OGA and OGC flying to the Sault and OPG dropping the Rabies Unit staff off in Peterborough before heading on to Timmins. With one fuel stop in Bowling Greens, Kentucky we made it to Peterborough by sunset. Boy what a temperature shock to the body after more than 3 weeks in the Lone Star State.

Hats off to the Texas agencies and volunteers involved for such a smooth running and successful operation. Everyone worked very hard as a team and sometimes under difficult conditions such as long hours, bad weather and air sickness to make this years program work. This program has worked once again as in years past and keeps getting better each successive year. Thanks again for the hospitality YA ALL from your Canadian counterparts EH !!!

Mark Gibson
Rabies Unit
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RABIES IN THE AMERICAS CONFERENCE FOR 1999 SAN DIEGO, CALIFORNIA

Large international meetings soon provide two quite different sets of contacts. On one hand, one gets to meet with colleagues working in the same subject area to trade the latest news. Perhaps more valuable to many is the chance to listen to people from other specialties also working with rabies, to find out what's new in unrelated areas. The papers presented by the first group are often already familiar. The real virtue of meeting with these people is to discuss the most recent happenings, and in the case of oral vaccination, to make plans for coordinated operations. The 1999 Rabies in the Americas meeting was a good one. As has become customary, papers covered a wide range of subjects, from detailed molecular biology through diagnostic techniques in the Third World, to field studies of rabies in the wild. There were a number of new observations from other parts in the world which help fill gaps in our knowledge of rabies, or to expand horizons.

On the second day of this meeting there was a symposium entitled Rabies 2000. There were a variety of review papers presented, including an excellent comprehensive review all of present-day rabies, worldwide, by Meslin and Stöhr of WHO. This was followed by the first paper I have heard on the actual rabies situation in India. After discussing in detail the problems of detecting human deaths due to rabies in India, Dr. Srinivasan estimated that the number of humans dying of rabies each year in India is perhaps about 30,000. Next, Dr. Charles Rupprecht of CDC presented a thought provoking discussion on the conundrum of rabies in North America. He used the theme of comparing old ideas with modern views of the same subjects.

Testing suspect animals for rabies is done routinely in developed country laboratories, using expensive equipment and carefully controlled laboratory conditions. The CDC rabies group in Atlanta reported on a possible new diagnostic technique which would be much more suitable for use in remote places in tropical countries. The group were much concerned with the personal safety of people doing the test. They fixed specimens in formalin and applied a mixture of monoclonal antibodies from a global spectrum of lyssa viruses, then used a colorimetric detection system that requires only normal light microscopy. Preliminary experiments with this test indicated good sensitivity and specificity, with the whole test taking about an hour for a single specimen. In addition to the new test, there were several papers on quality control among laboratories, in the USA, and in Latin American countries. In the decade that I have been going to these meetings, the improvement in the laboratory situation in the Americas, Mexico in particular, has been dramatic. There have been a few examples in the USA of false positive diagnoses, probably due to use of contaminated instruments. A bear in a roadside zoo in Iowa was temporarily diagnosed as rabies positive, but careful testing showed that rabies was not present. Meanwhile, there was a lot of public health activity generated by the initial diagnoses of rabies. I found the level of variation among the laboratories in different states in the USA distressing, but one can be proud to be Canadian, as our system is uniform and high-quality country-wide.

There were several papers on the identification and phylogeny of rabies and rabies-related viruses all over the world. I was impressed by new knowledge, and by better organization of existing knowledge. There is still a lot of question about what constitutes a different variant of rabies virus, as compared with variation within a a single variant. One paper on bats in Brazil indicated 50 strains of virus isolated between 1994 and 1998. Six of these were from vampire bats, ten from fruit bats, and

the rest from insectivorous species. These were grouped into six clusters, and the paper discussed the distribution of these clusters among the three rather different bat groups. A comparable studying in South Africa also indicated great diversity. And not only is there variation with a classical rabies, but Africa has several related viruses such as Lagos Bat, Mokola and Duvenhage. Variation within the Mokola group is greater than anticipated, and the authors suggested than that these rabies-related infections may be much more widespread than currently thought.

There were three papers on rabies in humans which were very interesting. The first reported on the second recognized human infection with the Australian Bat Lyssavirus (ABL). About a month after the death of the first human from this virus in 1996, a family in Mackay in Queensland held a birthday party for a young daughter. During the party, a fruit bat flew into the living room, and attacked one of the children. The birthday child's mother pulled the bat off her guest, and let it go outside. Some months later, when the first fatality was diagnosed as rabies, the woman was offered post-exposure treatment. She declined. In 1998, 17 months after the bat attack, she was admitted to hospital. She was initially diagnosed with tetanus. Serum and CSF were screened for a variety of viruses, but nothing was found. RNA extracted from a saliva sample finally yielded ABL, after sophisticated PCR and sequencing analyses. Rabies antibody was eventually found in serum, 16 days after the woman entered hospital. She died on day 19. The second paper was intriguing for a different reason. The sagui is a marmoset native to the northeastern part of Brazil. Between 1991 and 1998 there were seven human deaths in which the recognized exposure species was the sagui. In five of those the exposure occurred when the victim was trying to capture a marmoset in the wild. In the sixth case, the marmoset attacked a person near a house. The last case involved an animal kept as a house pet. The rabies virus isolated from two of the humans and one marmoset turned out to be a very distinctive variant, closest to a known bat variant, but quite different from it. It is still unknown whether the marmoset is the primary reservoir of this particular rabies variant, but, if it is, this would be the first case of rabies maintained in a primate species. The third paper traced the origin and travels of an African flying fox that eventually died of Lagos Bat virus in Bordeaux, France, showing the risk of transporting rabies when exotic species are part of the pet trade.

Sharon Messenger, attached to CDC, gave an excellent paper on rabies as a mortality factor in a huge roost of Mexican free-tailed bats. Rabies was responsible for a high portion of the dead bats found under a bridge in Texas, but the numbers of dead or dying bats were in the tens or low hundreds, compared to an overall population of several hundred thousand bats in the roost. The prevalence of rabies neutralizing antibodies in this bat population was relatively high, but Messenger discussed previous studies in relation to the cutoff point for deciding that a sample is rabies positive. What is clear from this study is that rabies is always present in these large bat roosts, but rarely if ever causes large-scale mortality. There is a lot more to be learned about the dynamics of rabies in bats.

There were two papers in which health workers in California detailed potential mass exposures to rabies. In one case, when a hospital was renovated, a large bat roost was discovered above a hanging ceiling. Bats flew through the upper floors of the building for several days, and 183 were caught and tested for rabies: all were negative. Electrical workers involved in rewiring were exposed to a lot of bats. Eventually 24 people received post-exposure treatment, even though no rabies was detected. In the other case, children at a riding camp in the mountains above San Diego noticed bats flying through their sleeping cabins, which had no window screens. A thorough investigation by County public health authorities resulted in recommendations to modify the cabins, and a letter was sent to 52 other camps. No rabies was detected, and this camp had been in operation for several years. However, the U.S. experience that half of the recent human deaths to bat variants of rabies involved no known contact with the bat, and may have occurred while people were asleep, raised serious concerns.

There were two papers which reported "far out" uses of rabies virus. One related to the possible use of a recombinant rabies virus for immunization against HIV. Laboratory experiments have been very encouraging, both showing that HIV genes can be introduced into rabies virus, and showing that this might have vaccine activity. The second paper was an excellent presentation by a neurologist who used rabies to trace neural pathways in the brain. Because rabies travels only inside nerves, and is easily seen by fluorescent antibody techniques, tracing neural pathways in monkeys was easily done. This work has also taught us some of limitations on rabies transport in nerves.

There were a number of papers on vaccination of dogs, some centered on attempts to develop a species specific oral vaccine which could be used in tropical countries. A lot of progress has been made, worldwide, towards protecting humans by vaccinating dogs, including the "feral" dogs, in South America, Africa and perhaps even Asia. A variety of candidate vaccines were discussed, from the SAG2 apathogenic modified live rabies virus to an adenovirus recombinant.

When it came to oral vaccination, there was a wide variety of presentations from both Europe and North America. There were progress reports from Texas Ohio, New York, Florida and Ontario. There was an interesting paper on simulation of low-level persistence of fox rabies in central Europe. These authors point out that it will take special efforts to stamp out this low-level persistence. Other topics ranged from the legal aspects of aerial bait drops to details of reading tetracycline marks in teeth. Oral vaccination in Europe has reduced rabies cases by better than 99 percent, from the western edge of rabies in France east to the borders of the former Soviet Union. There

are still a few pockets of rabies remaining, and extra effort is being put into eliminating those. Dennis Slate and his colleagues from USDA-APHIS-Wildlife Services presented a number of studies which help back up oral vaccination efforts. Dennis originated a sampling method called the hair salon. A bait is placed in the middle of a two-litre pop bottle with both ends cut off. A glue strip is stuck to the top of this small tunnel. When a raccoon, or other mammal investigates the bait, it leaves behind some hair on the glue strip. Hair salons were put out in Vermont to simulate where baits would fall from a Twin Otter during an air drop. Preliminary results indicated that raccoons detected several adjacent baits, in a variety of habitats.

One of the highlights of the conference for me was a dinner meeting hosted by Merial, on the subject of the coated sachet bait. There is a great deal of interest in this bait, because it is more than 30 percent cheaper than the traditional fishmeal polymer. We discussed how it should be mass produced, and a number of issues regarding its use over large areas. What made this meeting so useful was the fact that all of the major oral vaccination groups were represented, so a wide variety of concerns were presented and discussed. In another dinner meeting, we agreed to get moving on a coordinated plan to keep rabies out of Canada, then move it south and west out of New England. At the same time, a similar coordinated approach will be mounted to contain westward spread, and push the disease south and east out of Ohio, West Virginia and Pennsylvania.

I found this a worthwhile meeting. I learned a lot, and I had the opportunity to pass on some of our experiences in Ontario. The Ontario group was well represented, with presentations by Rosatte, Nunan, Tinline and myself. Laura Maxwell of ADRI also gave a good review of her work searching for adenovirus antibodies in raccoons sera collected by our MNR team.

Charlie MacInnes
Rabies Unit
Peterborough

TOWARDS INTER-JURISDICTION COOPERATION TO FIGHT RACCOON RABIES

There has been a lot of action on a New England plan to stop the spread of raccoon rabies. Overall, while there is no written agreement yet, I am cautiously optimistic that we are making progress towards one.

On 30 November the Canadian side had a conference call, including CFIA, Ontario, Quebec and New Brunswick. On the first round of investigating whether oral vaccination was justified, New Brunswick had failed to show that oral vaccination would be cost-effective. Ontario data on fox rabies may help this, but the final answers for raccoon rabies are not yet available. The second obstacle was a position statement by the Northeast Furbearer Technical Committee, which expressed a number of negative opinions.

On 15 December there was a meeting in Burlington, Vermont. This meeting covered several related topics:

1. Description of the rabies control activities which took place in 1999. The actual participants in these projects were Cornell University, New York State Department of Health, Quebec, Ontario, and USDA-APHIS-Wildlife Services. Baits to counter raccoon rabies were dropped in New York, Vermont, Quebec, and Ontario. Ontario also conducted three point outbreak control operations, and trap-vaccinate-release projects along the Niagara and St. Lawrence Rivers.
2. There was some discussion of areas of concern. Raccoon rabies has reached the Penobscot River around Bangor, Maine, and if it moves upstream along this river, it will reach the potato growing country in Maine, and from there the St. John River Valley in New Brunswick. Northward movement appears to have halted in New Hampshire, and in western Maine; we cannot completely be sure of this, however, since the areas concerned have very low human populations, and therefore rabies cases might not the reported. This is mountainous country, and, if raccoon rabies does not go above 400 or 500 metres, as in the Adirondacks in New York, then the absence of rabies may be real.
3. There were several presentations of results from ongoing projects, by Laura Bigler from Cornell, by Dennis Slate and others from Wildlife Services, and by Brian Laniewicz on the NYSDOH project. Overall, oral vaccination seems to be working reasonably well. The Wildlife Services studies in Vermont and New York on raccoon density, raccoon visits to test baits, etc. are providing very interesting follow-up results. There was also some discussion of the meaning of tetracycline marks and serology derived from field projects. It is clear that neither tetracycline nor rabies antibody are absolutely reliable methods to assess raccoon uptake of baits. Nevertheless, careful analysis of results provides very useful information.
4. The trend in the afternoon was the discussion of the desirability of a coordinated approach to controlling raccoon rabies. Most jurisdictions were in favor of control, but there were two major reservations. First, it has to be shown more clearly that controlling raccoon rabies is cost-effective. Wildlife Services have made substantial progress on a cost-benefit study. Copies of a first draft were distributed. Secondly, for states with small populations, the source of funding is a major problem.
5. The conclusion of the meeting resulted in the appointment of a small committee to prepare a very brief plan. The objective of this document would be to get the attention of senior administrators in the various states. The committee consists of Millie Eidson, Dennis Slate, Laura Bigler, and Charlie MacInnes. The deadline for the first draft of this was 13 February, so that it could be presented at the Wildlife Services cooperators meeting.

The last meeting took place in the Wildlife Services head office in Riverdale,

Maryland. This meeting brought together representatives from all the states which are engaged in rabies control, and cooperating with Wildlife Services. It was very important, as the acting deputy administrator of wildlife services attended, and appeared to be favorably impressed by the progress made. He indicated that there was support within the agency to apply for major funding for future oral vaccination operations.

The meeting began with the presentation of a distinguished service award to Sam Linhart. This was much deserved recognition for a 40-year career concerned with finding the best bait for particular uses.

The morning of the first day was taken up with presentation and discussion all of the wildlife services cost benefits study for oral vaccination. This project is progressing well. It is an economic model based on avoidance of future costs. It proposes on a band of baits stretching from Lake Erie to the Gulf of Mexico, designed to prevent the movement of raccoon rabies into the midwest and the Mississippi Valley states. There was a critical discussion of the assumptions of the model, and suggestions were made for some sensitivity testing. The model has been run on a variety of assumptions, and the overall summary is that it almost always showed was that oral vaccination will be cost-effective. It does take some time for the benefits to outweigh the costs, but, in almost every scenario, this pay-back period was less than ten years.

The afternoon began with two presentations from the Ohio project. One sought to analyze the influence of method of distribution on serum positivity rates. This study indicated that targeted distribution from a helicopter provided higher proportions of serum positives than uniform distribution from fixed wing aircraft. However, the habitats for these two distribution methods were different, so in the summer of 2000 a targeted distribution zone will be located in agricultural country. The second presentation reported on an experiment comparing 75, 150, and 300 baits per square kilometer. There is a significant increase in serum positives from 75 to 300, but the 150 group actually had slightly less serum positives than the 75 group. The tetracycline from these plots has not been analyzed yet.

The next presentation was from Ontario, describing the success and problems with the point outbreak control operations of the summer of 1999. I started by showing the situation on the New York side, then I gave a full summary of the raccoon rabies situation in Ontario, including Wolfe Island, and the baiting that we did in both Ontario and New York. In both areas where we have had subsequent cases of raccoon rabies in Ontario, the trap-vaccinate-release was less successful than we had intended. We will have to do better in 2000. I also discussed briefly how the percent vaccinated is calculated for TVR operations, and indicated that the in-year estimate was the most optimistic estimate, and the percent ear-tagged among adults in the following year was the lowest possible vaccination rate. The true value probably lies somewhere in between. There appear to be some raccoons which are not susceptible to trapping in the first year, but become trappable subsequently.

The next topic was a lengthy discussion of the sachet bait. This bait will simplify manufacturing, and reduce costs, size, and weight. So far experiments in New York indicate that the uptake (by raccoons) is as good as that of fishmeal polymer baits. With coyotes, the picture is not as clear. Captive coyotes tended to gulp the bait, and investigators could not tell whether the sachet was punctured in the mouth, or further down the digestive tract. Field tests in Texas indicated reasonable acceptance and seroconversion. Further experiments are planned. This session ended with a review by Miguel Escobar of Merial of the production and stocking of these baits. The biggest problem at the moment is developing the means to incorporate the number of the production serial on the label. Since the labels on sachets are pre-printed, Merial will have to estimate the volume of each production lot quite precisely, and order the printed plastic accordingly. There was also a discussion of how to incorporate a biomarker into the sachet, as currently there is no tetracycline in the coating. I described of the results of our experimental drops at Earlton, comparing the drift of the sachet with the other two bait types. Using sachet baits on a large-scale will require a different philosophy of dropping, as the drift of these baits will make it impossible to miss individual houses in the countryside.

The Texas program was summarized by Dr. Fearneyhough. There have been 8 cases of the coyotes/dog strain of rabies in South Texas in 1999. Five of these, a coyote and four dogs, occurred in one town. There was one rabid steer some distance from this last concentration of cases. However, the program has been so successful that the vaccination zone is being made smaller, and concentrated in the south, along the Rio Grande. A relatively wet season in early 1999 made it a good year for gray foxes, so cases off the gray fox rabies strain were more numerous. Despite that, the program had to be cut back due to a reduction in funding. There will be lobbying to regain the funding necessary for this part of the Texas program.

The rest of the meeting was taken up with reviews of future perspectives, and presentation of detailed plans for the various projects. This began with reviews from Ohio and its neighbors. At the moment Ohio is the only state in the region putting money into oral vaccination, and its program will be unable to extend outside the state's boundaries. Raccoon rabies has penetrated the Appalachian Mountains and is approaching the Ohio River in West Virginia, thereby threatening an end run around the south end of the present Ohio bait "wall". West Virginia will not make any initiatives unless someone else pays the bill. Approaches from USDA and CDC will be essential. Surveillance for rabies cases, and laboratory diagnoses are both minimal, and in urgent need of improvement. The situation in Pennsylvania seems similar, although the laboratory setup is more advanced. The

state has lived with raccoon rabies for 20 years, the disease is present in every county in the state, and it appears that unless federal dollars are forthcoming the state will not become involved. However, it was noted that the governor has recently appropriated several million dollars to deal with West Nile virus. Ohio is proceeding to prepare a regional plan, with much involvement by Wildlife Services staff. Wildlife Services for its part in making an application for contingency funding to enable the baiting to be extended into West Virginia and Pennsylvania.

Dr. Eidson (NYDOH) then presented the plan for New England. The short-term goal is to stop further spread of raccoon rabies. The medium-term goals involved clearing raccoon rabies out of the planning area. The long-term goal is to coordinate this plan with comparable efforts in other regions, e.g. 0hio and its neighbors. Dr. Eidson emphasized that this plan must include the agriculture and wildlife agencies in each state, as well as the public health authorities.

Dr. Bobby Acord, now the administrator of wildlife services, made a brief appearance. He was very encouraging. He clearly believes that this is a worthwhile approach, he wants to see more coordination, and he is willing to fight for more federal funding.

There was some discussion of need for Memoranda Of Understanding between states and agencies. Their needs to be an MOU between Wildlife Services and CDC. MOU's with Canadian federal and provincial agencies also need to be established.

Charlie MacInnes
Rabies Unit
Peterborough

HAVE YOU A LATENT ARTICLE FOR THE RABIES REPORTER?

This is the longest issue of the Rabies Reporter. In part, that is due to contributions from others. Please keep that up - we need the diversity of ideas and opinions.

The next issue will see a major face-lift. Software problems are forcing this, but I hope to achieve a format which makes it easier to be consistent, and avoid silly errors. The last few issues have been proofreaders' nightmares!

Charlie MacInnes
Rabies Unit
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RABIES IS STILL PRESENT IN FAR NORTHERN ONTARIO

A red fox from Peawanuck, northern Ontario was confirmed to have the Arctic fox strain of rabies in January. Mr. Hunter, a resident of Peawanuck, destroyed the fox after he found it in his dog kennel in late December or early January. Approximately one month later his dog began to exhibit symptoms similar to rabies. Both the fox and the dog were submitted to CFIA North Bay for testing. The fox was RV+ but the dog was negative. Thanks to Pierre Verhelst (MNR Aviation Services) and Dr. Chuck Lockton (CFIA) relaying this information to us.

Shirley Stevenson, sister of Bev of the Rabies Unit, is currently working in Fort Severn, west along the Hudson Bay coast from Peawanuck. She reported two suspicious animals which have been sent for rabies testing. The first was a fox which was killed after being seen running with some dogs. A fox had also been seen several days earlier fighting with some dogs in Fort Severn. The second animal being tested is a dog which the owner came home to find running around in circles and drooling. The dog died later that day.

This indicates that rabies is still present in the Hudson Bay lowlands. Given the minimal human population in that area, several cases of rabies could go unnoticed.

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The Rabies Reporter, a scientific 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, Canadian Food Inspection Agency; the Ontario Ministry of Health; and the Geographic Information Systems Laboratory of the Department of Geography, Queens University, Kingston. Articles for future issues will be welcomed by the editor. Comments, letters, submissions and inquiries should be sent to:

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705-755-2270 or 905-640-6832
Fax 705-755-2276
e-mail
charlie.macinnes@mnr.gov.on.ca
or
macinnch@netrover.com
Also, visit our website at
http://www.gis.queensu.ca/RReporter/mnr.html
or the rabies home page on the internet at
http://www.mnr.gov.on.ca/rabies/rabmenu.html
From within the governement firewall the address is:
http://mnrweb.mnr.gov.on.ca/sird/rabies

Animal Rabies Report: October to December 1999

Animal Type	Fox			Raccoon			Skunk			Other Wildlife			Bat			Dog			Cat			Livestock			Totals		
County or Region	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		99	**98**		**99**	**98**		**99**	**98**		**99**	**98**		**99**	**98**		**99**	**98**		**99**	**98**		**99**	**98**		**99**	**98**
Eastern																											
Stormont																									0	0	0
Dundas																									0	0	0
Glengarry																									0	0	0
Prescott																									0	0	0
Russell																									0	0	0
Ottawa-Carleton													5	4											0	5	4
Renfrew					1		1	1																	1	2	0
Lanark							1	1																	1	1	0
Grenville				1	3								1												1	4	0
Leeds				1	2		1	1					1	1											2	4	1
Frontenac				2	2									4											2	2	4
Lennox & Addington													1												0	1	0
Central																											
Hastings													1												0	1	0
Prince Edward													1												0	1	0
Northumberland																									0	0	0
Victoria			1					1																	0	1	1
Haliburton																									0	0	0
Peterborough					1				4																0	1	4
Durham													1	11											0	1	11
York Region																									0	0	0
Toronto														1											0	0	1
Simcoe													1												0	1	0

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Animal Type	Fox			Raccoon			Skunk			Other Wildlife			Bat			Dog			Cat			Livestock			Totals		
County or Region	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		99	98		99	98		99	98		99	98		99	98		99	98		99	98		99	98		99	98
Western																											
Peel	1	1					1	1																	2	2	0
Halton														1											0	1	0
Dufferin		1					1	4	4									1					3		1	8	5
Wellington		5	1				2	8	5					2			1	1				2	5	1	4	21	8
Waterloo		3						3	2				1	1											1	7	2
Perth	1	1						2	6						1									2	1	3	9
Grey			1				7	17	6												1		4	1	7	21	9
Bruce		1	1				3	5	5														1	2	3	7	8
Huron								1	1													1	1	2	1	2	3
Southern																											
Wentworth																									0	0	0
Haldimand-Norfolk														1											0	1	0
Brant															1										0	0	1
Niagara															1										0	0	1
Elgin															2										0	0	2
Oxford																									0	0	0
Middlesex								1							2										0	1	2
Lambton													1	1	2										1	1	2
Kent																									0	0	0
Essex																									0	0	0

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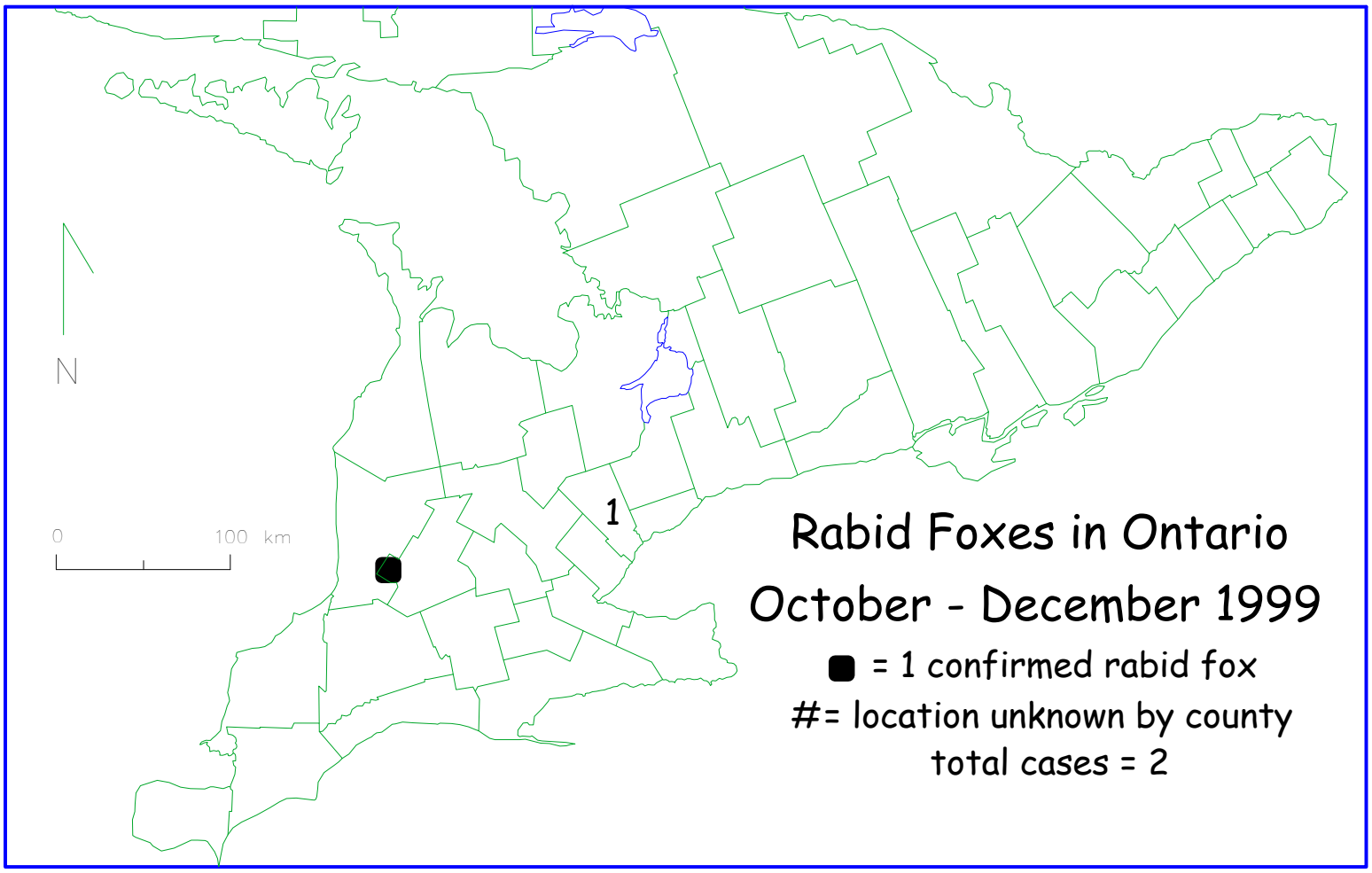
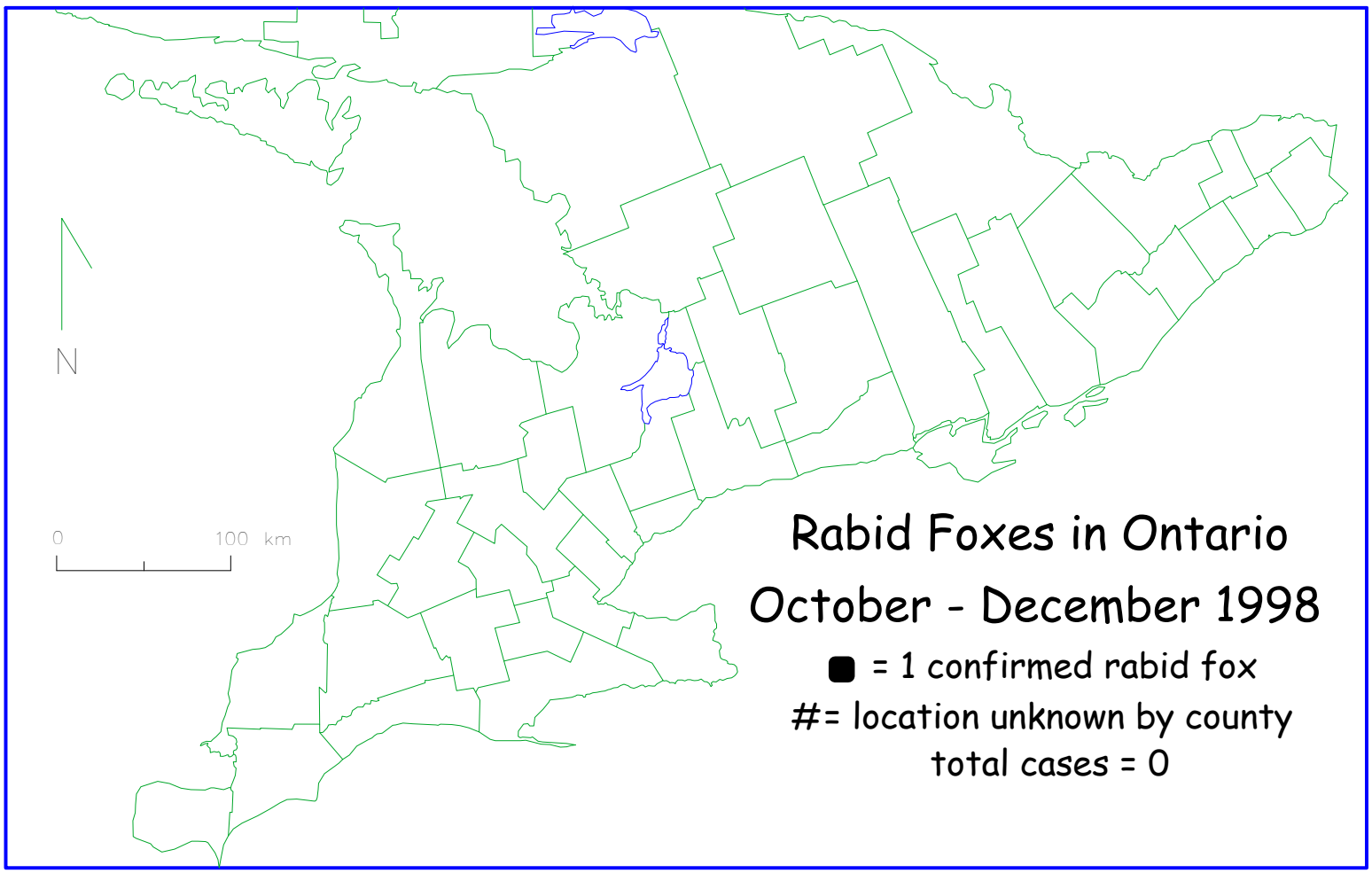
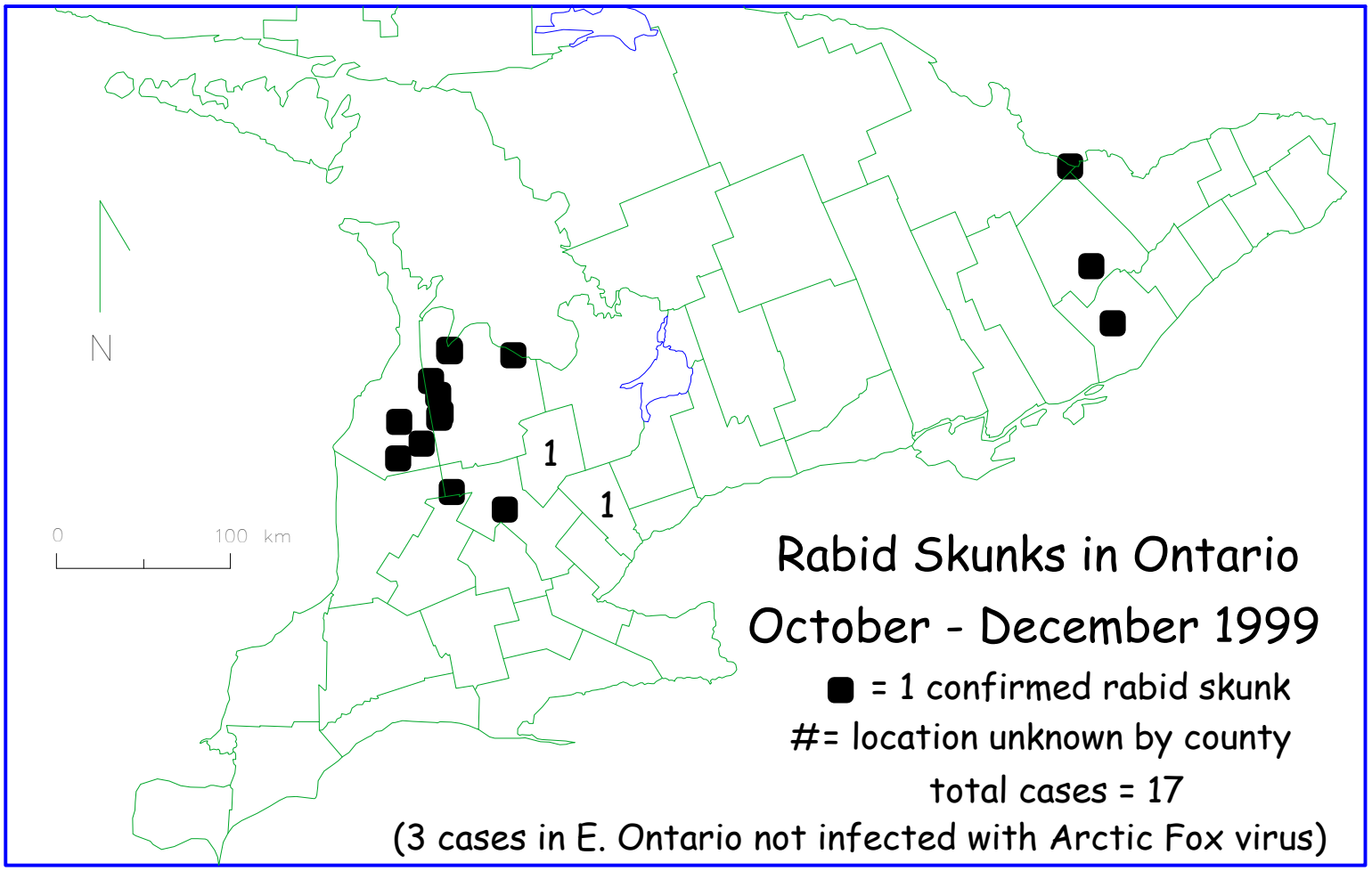
Animal Type	Fox			Raccoon			Skunk			Other Wildlife			Bat			Dog			Cat			Livestock			Totals		
County or Region	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		99	**98**		**99**	**98**		**99**	**98**		**99**	**98**		**99**	**98**		**99**	**98**		**99**	**98**		**99**	**98**		**99**	**98**
Northern																											
Muskoka																									0	0	0
Parry Sound																									0	0	0
Nipissing																									0	0	0
Sudbury																									0	0	0
Cochrane																									0	0	0
Timiskaming																									0	0	0
Algoma																									0	0	0
Thunder Bay																									0	0	0
Rainy River																									0	0	0
Kenora																									0	0	0
Regional Totals																											
Eastern				**4**	**8**		3	3						8	9										**7**	**19**	**9**
Central			1		1			1	4					4	12										**0**	**6**	**17**
Western	2	12	3				14	41	29				1	4	1		1	2			1	3	14	8	**20**	**72**	**44**
Southern								1					1	1	8										**1**	**2**	**8**
Northern																									**0**	**0**	**0**
TOTALS	**2**	**12**	**4**	**4**	**9**	**0**	**17**	**46**	**33**	**0**	**0**	**0**	**2**	**17**	**30**	**0**	**1**	**2**	**0**	**0**	**1**	**3**	**14**	**8**	**28**	**99**	**78**

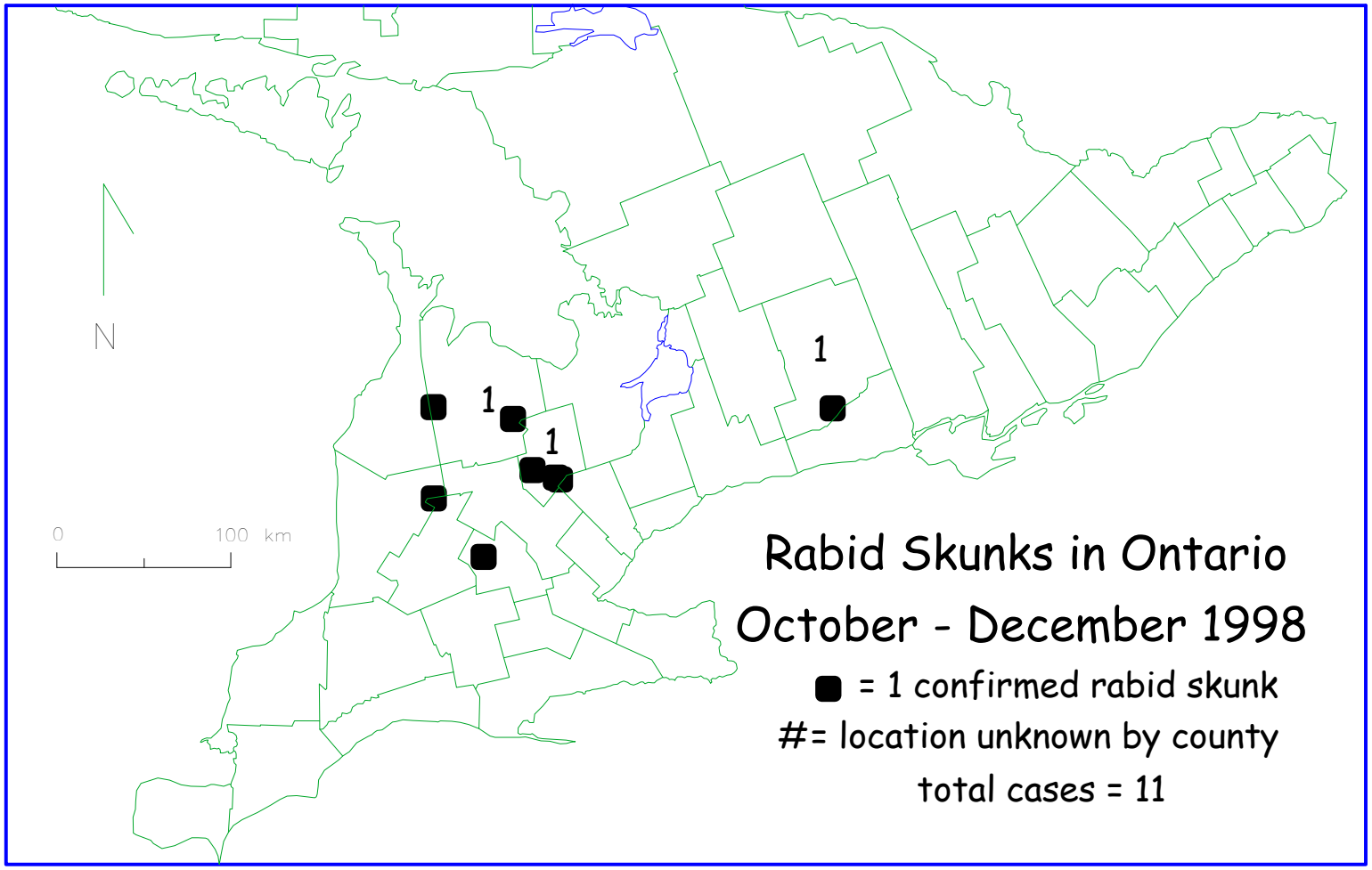
Notes for this quarter:
The skunks in Renfrew, Lanark, and Leeds Counties, Eastern Region, were infected with the big brown bat variant.
The fox in Dufferin County was infected with ERA vaccine.
All the rabid bats in the fourth quarter were big brown bats.



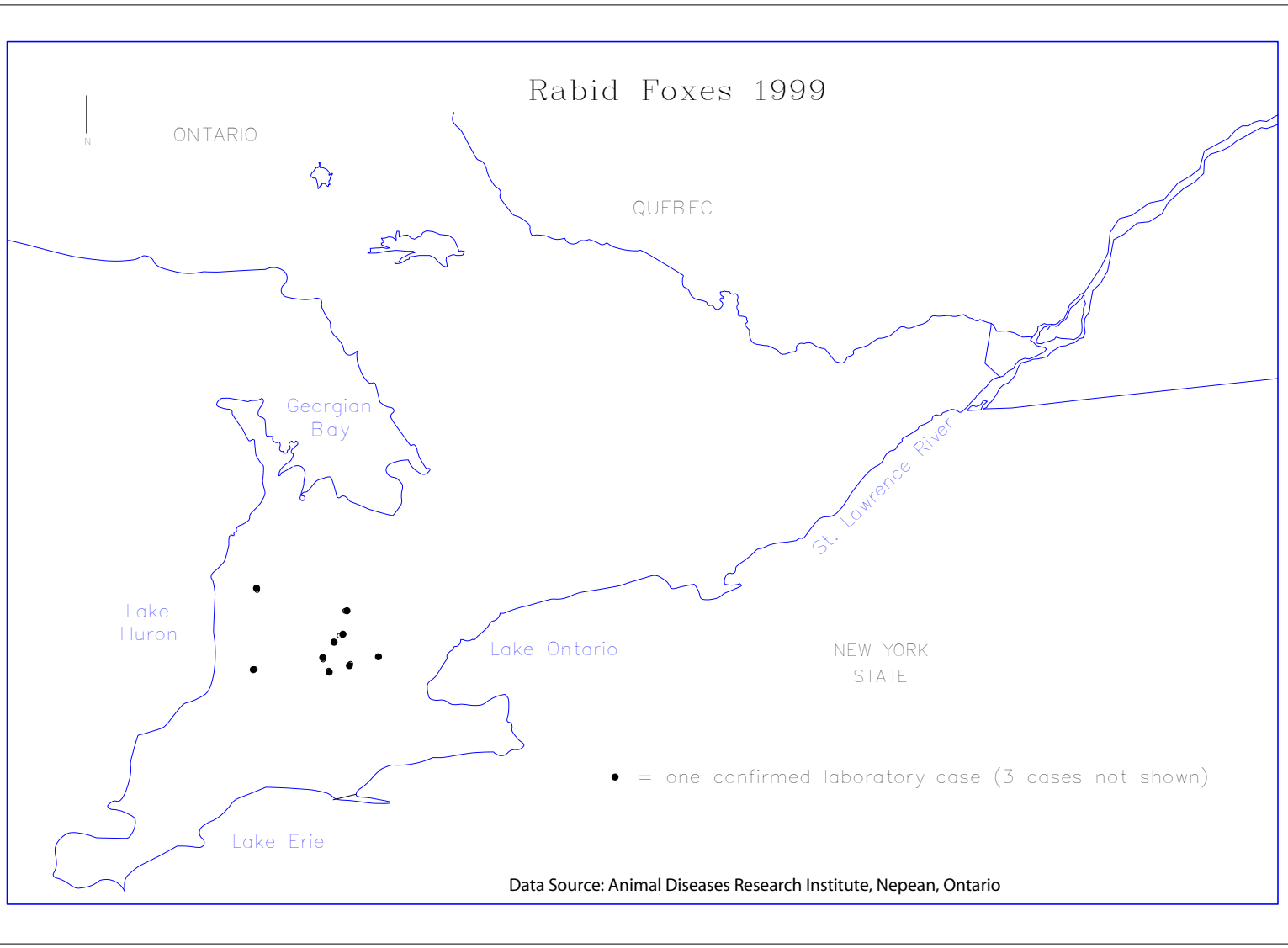


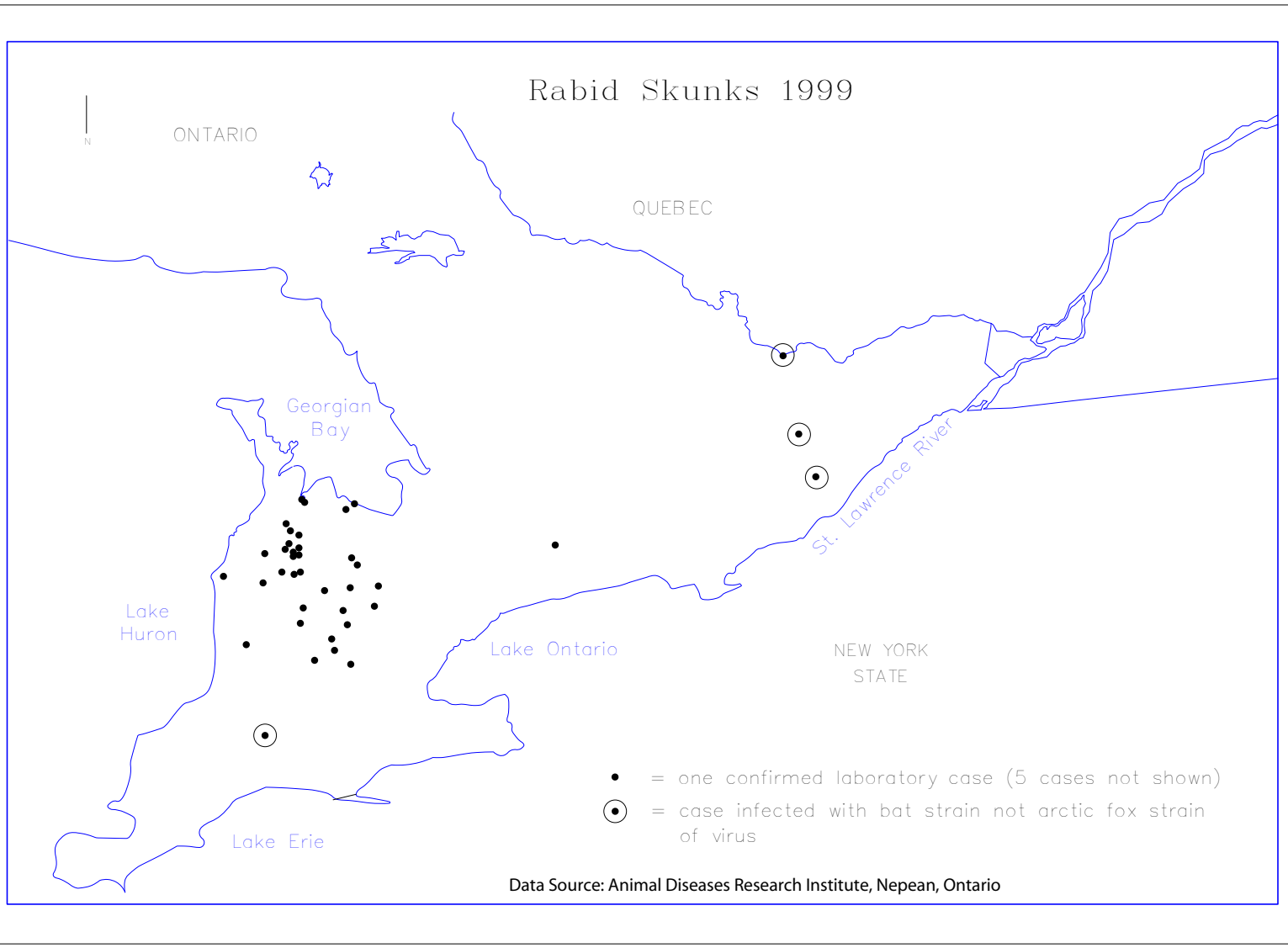
GIS Lab, Queen's University
Data Source: Animal Diseases Research Institute, Nepean, Ontario





GIS Lab, Queen's University
Data Source: Animal Diseases Research Institute, Nepean, Ontario


Rabid Foxes 1999
N
ONTARIO
QUEBEC
Georgian Bay
St. Lawrence River
Lake Huron
Lake Ontario
NEW YORK STATE
Lake Erie
• = one confirmed laboratory case (3 cases not shown)
Data Source: Animal Diseases Research Institute, Nepean, Ontario


Rabid Skunks 1999
N
ONTARIO
QUEBEC
Georgian Bay
Lake Huron
Lake Ontario
St. Lawrence River
NEW YORK STATE
Lake Erie
• = one confirmed laboratory case (5 cases not shown)
⊙ = case infected with bat strain not arctic fox strain of virus
Data Source: Animal Diseases Research Institute, Nepean, Ontario