The Rabies Reporter

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In this issue:

FIRST QUARTER RABIES ANOTHER RECORD LOW NUMBER OF CASES

There were only 32 rabies cases in the first quarter of 1996. Last year at this time we crowed that it was the first time the first quarter total had fallen below 100. This year's total was so small that both Peg Hauschildt and I had to check our sources before we could believe it was true.

This really is a symptom of success of the bait program. First, there were only 8 fox cases, and 3 of those were around Moosonee. Second, skunk and livestock cases both outnumbered fox cases, a most unusual occurrence.

Figure 1 shows the first quarter rabies totals for the last 39 years. The decline in recent years is very conspicuous, and the unique nature of the first quarter totals of 1994 and 1995 is clearly evident.

The only shadow over this success story is the considerable outbreak building around James Bay. There have been sporadic cases in the region since 1990, but by late April there had been 7 cases confirmed in 1996. Most were in the immediate vicinity of Moosonee and Moose Factory, with one further up the coast at Cache. Given the very sparse human population of the region, this small number of cases is certain to be only a tiny reflection of the number of cases and the size of the area covered. Will this outbreak move down into the farming country around Cochrane? Should we bait in the north this fall? At the moment all options are open, and final decisions will be made in late summer, when we see how this event is progressing.

There is another case of concern. There was a single rabid skunk in Hastings County during the first quarter. Is that the last of the 1994 mini-outbreak, or it it the start of the next? There were only three rabid animals in the Eastern and Central Regions combined, a bat in Ottawa, and a skunk in each of Hastings and Victoria. If the rest of this year follows the pattern of 1993 and 1994 in the original eastern Ontario baiting area, cases, except occasional cattle, should peter out by the end of the year in the Central Region.

During the coming fall we will have only 1.3 million baits to distribute. The plan is to stop baiting eastern Ontario, depending on the distribution of new cases up to the end of July. This one case in Hastings will have us scratching our heads as we plan the fall flights.

Charlie MacInnes
Rabies Unit
Maple

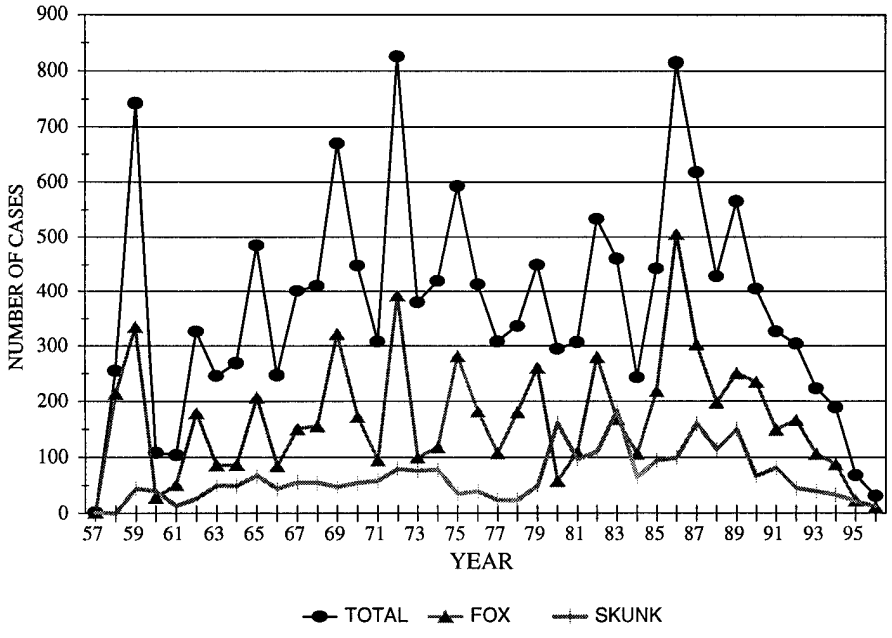

Figure 1. First quarter totals of rabies cases in Ontario, 1957-1996

RABIES CASES IN TEXAS: CONTROL OF COYOTE RABIES IS WORKING

The rabies situation in Texas is very different from that in Ontario. There are at least three distinct strains of rabies in terrestrial mammals, plus several bat strains in Texas, whereas Ontario has only the arctic fox strain on the ground, plus some bat strains. The terrestrial strains are spread by coyotes in south Texas, gray foxes in south-central Texas, and skunks

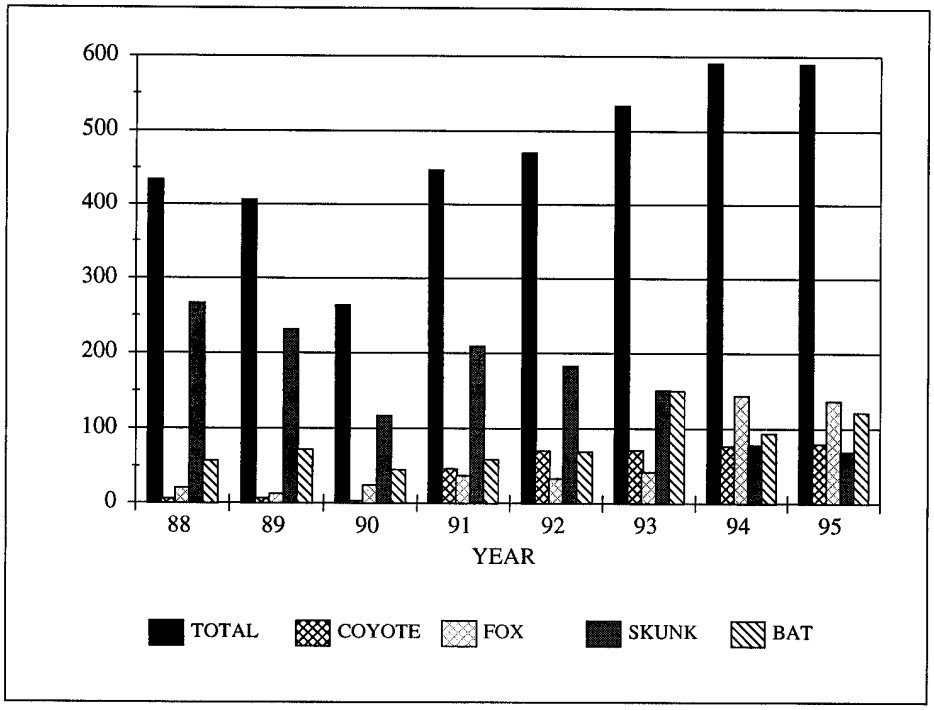

Figure 1. Rabies cases in Texas, showing the numbers of cases in the principal vector species.

through most of the state, wherever skunks occur. Despite the greater diversity of terrestrial rabies, Texas has reported only about 250 - 600 rabid animals annually. Figure 1 (on the next page) shows the details. The most important feature of the situation is that the numbers of each vector species are not large, so detecting changes statistically will be difficult. You can also see that the individual "outbreaks" have changed from year-to-year, which will add to the difficulty of determining whether the change was due to the bait program, or just another natural event. However, the numbers on this graph do not show some extremely important aspects of the situations.

First, what is going on with the coyote strain. The coyote-dog outbreak is localized in south Texas, but has been spreading northward at about 40 miles a year. The graph above shows only rabid coyotes, yet rabid dogs have been almost as numerous as coyotes within the outbreak area. Thus, analysis of the spread on the map will be more important than looking at the changes in numbers. As reported in the summary of Rabies In The Americas two issues ago, the northward spread of coyote rabies slowed to 5 miles after the February 1995 baiting. What is probably most important to Texans is that had the outbreak continued to spread, it would have entered the city of San Antonio, where over a million people live. It has not done so. It will take more time to be sure that this halt was due to the baiting, but the indications are certainly positive. The numbers of cases are also dropping just as they did in Ontario. You may remember that we have been cautious about effects of baiting. In the latest newsletter from south Texas, there were 21 cases reported for January - April 1996, compared to 75 for the same period in 1995, and 46 in 1994. The change is in the right direction, especially considering that in a spreading outbreak, there should have been more cases this year than last. Next year's figures and map will be very interesting!

The gray fox "outbreak" has been in Texas for 3 decades, and was more or less stable in the area covered, most of which is very sparsely populated by humans. In 1994 there was a great increase in cases, but part of that was spread at the edges, and again, San Antonio, Austin and other cities were threatened. Since the first baits for gray foxes were dropped in 1996, it is too early to see whether there has been an effect of the program, but I am optimistic.

Why not go after the skunk strain, since it has, for several years, provided the largest numbers of cases? The major reason here is, again, the distribution of cases. Skunk rabies occurs over a lot of the state, but numbers of cases are very small in any one locality. Skunk rabies would certainly not be my choice of where to start with a control method as new as vaccine-baits. Across the U.S.A as a whole, skunk strains cover a greater area than any other terrestrial form of rabies. Yet, everywhere, the number of cases per unit area is small, and the area covered is huge. Skunks may be restricted in the habitats they use in the drier parts of the U.S.A., so baiting by habitat may be possible in some places. Someday, research will have to be directed at skunks. At the moment, the guesses at cost for controlling skunk rabies are huge, and the local benefits relatively small. Also, the coyote and gray fox situations seem to persist only within Texas, whereas the skunk strain occurs in all of the neighboring states.

A final note: in the years since 1988, there have been four human deaths in Texas, two due to bat strains of rabies, and two due to the coyote strain. Controlling rabies in coyotes appears possible, and is proceeding well. As in Ontario, dealing with bat rabies directly does not seem feasible at the moment, but there is a lot of public education which can help people realize the nature and risk of exposure to a bat.

Charlie MacInnes
MNR Rabies Unit
Maple

AIR SERVICE AND RABIES UNIT ACCOMPLISHMENT

- - -

OVER TEN MILLION SERVED !

Table 1 on this page tallies all the baits put out by the M.N.R. teams since 1989. The total is now over ten million when you include the hand-placed baits in Metro Toronto, Ottawa and the trappers' Cambridge experiment.

We have come a long way from that rain-soaked kickoff ceremony in a hanger at Kingston airport on 2 October 1989. In that year we planned to use the Twin Otters like Cessnas, flying with a map on the navigator's lap, following felt-pen flight lines drawn on the sheet. Of course, it took more than one sheet for some flights, and if you have never tried to follow a map when flying 270 km/h at 200 m, you may not appreciate how hard that is. Secondly, we were trying to follow the bush lines midway between concession roads. Of course, these aren't as regular in most of eastern Ontario as they were in our 1976-87 study areas in Huron and adjacent counties. Further, there were no rules back in the 1840's which said the road systems had to line up from township to township. And we knew that we had some long lines over forested country, with no regular landmarks. After a day of struggling, Neil Ayers asked quietly if we were interested in using the LORAN system on the aircraft. Peter Bachmann then spent two days on his knees on the hanger floor, crawling over 40+ map sheets and estimating latitude and longitude, and writing this information on a pad. Before each flight, we punched all this into the LORAN set, sitting cramped in the aircraft cockpit, and holding up the airplane for 30 - 45 minutes. Roly Tinline watched the process and said he was sure that he could do this by computer by next year. Meanwhile, we became unpopular in the small airline passenger area: they weren't geared to having 30+ people hanging around all day. Fortunately, the Kingston Flying Club rented us their class room. From those small beginnings evolved the system which, in Texas, dropped 2.5 million baits in

Table 1. The numbers of baits distributed by air or on the ground, by the Rabies Unit - Air Service team, plus cooperators in Texas and New York, 1989 - 1996.

Year	Place	Target species	Purpose & op-type[a]	Bait type	Area (km^2)	Number of baits
1989	EONT[b]	Red Fox	CA	CMO[c]	14,660	285,010
	Cambridge	Red Fox	EG	CMO	775	15,500
	Metro Toronto	Red Fox	CG	CMO	-[d]	10,262
1990	EONT	Red Fox	CA	CMO	31,460	568,044
	SWONT	Red Fox	EA	CMO	6,525	176,044
	Cambridge	Red Fox	EG	CMO	1,550	31,000
	Metro Toronto	Red Fox	CG	CMO	-	27,535
1991	EONT	Red Fox	CA	CMO	28,805	567,829
	SWONT	Red Fox	EA	CMO/CC	4,275	106,297
	Cambridge	Red Fox	EG	CMO	1,600	33,600
	MetroToronto	Red Fox	CG	CMO	-	28,371
	Ottawa	Red Fox	CG	CMO	-	10,496
1992	EONT	Red Fox	CA	CC	29,590	580,501
	Kirkland Lake	Red Fox	CA	CC	5,575	106,500
	Metro Toronto	Red Fox	CG	CC	-	21,635
	Ottawa	Red Fox	CG	CC	-	10,250
1993	EONT	Red Fox	CA	CC	28,805	543,385
	Central Wall	Red Fox	CA	CC	6,600	138,000
	Kapuskasing	Red Fox	CA	CC	900	18,000
	Metro Toronto	Red Fox	GA	CC	-	24,992
1994	SONT	Red Fox	CA	CC	62,500	1,250,000
	SWONT	Raccoon/fox	EA	SV	5,327	202,000
	Greater Toronto	Red Fox	CG	CC	-	46,000
1995	SONT	Red Fox	CA	CC	70,400	1,437,572
	SWONT	Raccoon/fox	EA	SV	5,740	191,520
	Reserves	Red Fox	CG	CC	220	5,600
	Greater Toronto	Red Fox	CG	CC	-	45,509
	Quebec	Red Fox	CA	CC	7,400	148,000
	Texas	Coyote	CA	FMP/DFP	38,900	830,000
	New York	Raccoon	E/CA	FMP/SV	2936	159,397
1996	Texas	Coyote	CA	FMP	46,600	1,315,960
	Texas	Gray Fox	CA	DFP	44,000	1,249,293
	TOTAL		**AERIAL**			**9,873,352**
			GROUND			**310,750**

[a] Purpose: C = Control, E = Experiment; Operation type: A = Aerial, G = Ground distribution

[b] EONT = Eastern Ontario; SWONT = Southwestern Ontario, SONT = All southern Ontario

[c] Bait Types: CMO = Chicken-Mineral Oil; CC = Chicken-Cod; SV = Sugar-Vanilla; FMP = Fishmeal-Polymer; DFP = Dog Food Polymer

[d] Baits are only distributed in "green space", so exact area cannot be determined.

31 days. The bearpit sessions during and after each year's operations resulted in progressive improvements over the years, and we have also incorporated technology which just wasn't available "way back" in 1989. LORAN gave way to GPS, computers became more and more prominent, Irvine Lake came on stream, and eventually we were invited to Texas and New York.

As you can see from the table, we have done several experiments over the years. The results are in the process of being written up, but they were used as soon as the teeth were read to improve the next bait drop. For example, the 1991 SWONT experiment indicated that straight flight lines, ignoring habitat, up to 4 km apart, made no difference to fox acceptance. That enabled us to simplify the EONT flying, and it saved 30% on flying time.

Building a smooth system has been very much a team effort. Everyone who has flown, or even watched from the ground has had input. There are many heroes. Derek Mancini designed and built the bait machines. Peter Smith built the controls, and came out to the airbase in several seasons to get them running. Carolyn Fielding designed the early flight maps, while Bruce Pond developed the flight sheets and the data capture system. Then Roly and Dave Ball revised all that! Meanwhile Dave Johnston learned how to maintain the bait machines, and Mike Pedde took that over when Dave retired.

Peter Bachmann and
Charlie MacInnes
OMNR Rabies Unit
Maple

RABIES AND RABIES CONTROL IN NEW ENGLAND

There have been two meetings, plus some corridor discussion at the Cornell seminar, about coordinated action in New England. Meanwhile raccoon rabies is more than half way up the states of Vermont and New Hampshire, and fox rabies is still moving through Vermont and New Hampshire, and an isolated pocket has developed on the Maine coast.

Both Quebec and New Brunswick have formed Task Forces to prepare potential responses to the threat. Vermont is getting more interested in active control, and the New Hampshire representatives were personally enthusiastic, but admitted that they had an uphill battle to fight to convince their government. The USDA-APHIS-ADC people in New Hampshire and Vermont are personally interested, but their agency has to be invited in by the states. The last meeting, in St. Johnsbury, Vermont, left Don Lein, Laura Bigler and Charlie MacInnes to draw up a plan of action.

It was very clear to all participants that there is much money to be saved by coordinated action. For example, one of the Quebec scenarios was to establish a wall of vaccinated raccoons all along the Quebec border. New Brunswick considered a similar approach, and found that they could shorten the wall if they put their baits in Maine. If you study the map, a wall in New York, from the east end of Lake Ontario along the Border inside New York state, across northern Vermont, then turning southeastward to the Atlantic from where Quebec, New Hampshire and Maine come together, will protect Quebec, New Brunswick AND Ontario, and the length of the line is less than a wall inside Quebec and New Brunswick stretching from Quebec's border with Ontario and New York to the ocean in New Brunswick.

The second point which was supported by most participants was that the goal of baiting must be to eliminate raccoon rabies, not just keep it from moving farther north. Baiting is expensive, and a blocking wall will presumably have to be renewed each year forever, or until raccoon rabies dies out naturally, whichever comes first!

It is a daunting task to try to get 14 states and 3 provinces to work together, but the end result will be worth it. There is more interest in the approach than there was last year at this time, but there is a long way to go.

There was provision made at the meetings to try to get some baiting in place this summer, but raising the money in time is a major hurdle.

I also attended the annual meeting of the NEUSAAHA, which brings together the state and federal veterinary authorites for the northeastern U.S.A. Don Lein was asked to put on a session on rabies control, and he invited me to describe the Ontario program. The highlight, at least for me, however, was an address by the regional director of ADC, outlining that agency's approach to rabies control. At the regional level they are definitely interested in taking part. Another very interesting presentation was by Steve Rowell, describing the bait trial keeping raccoon rabies off Cape Cod. So far the "wall" is successful, but the two rabies positive animals taken on the Cape side of the barrier are fine illustrations of the people problems involved. In one case, a kitten from west of the barrier spent several weeks in the protected zone, and came down with rabies shortly after returning home, west of the barrier. In the second case, a raccoon was hit by a car on the western (infected) edge of the barrier. It was injured but not dead, so a sympathetic motorist picked it up, drove east across the bait zone, and took the animal to a veterinarian. Fortunately the vet was alert, and put the animal down immediately. What if....?

The New England pot is beginning to rumble and whine. It isn't boiling yet, but the noises are positive.

Charlie MacInnes
OMNR Rabies Unit
Maple

NEW YORK SYMPOSIUM ON RABIES CONTROL ITHACA, NY 21 MARCH 1996

The fourth annual New York symposium was held in the Veterinary School, Cornell University, Ithaca, on 21 March. The first presentation was by Dr. Charles Rupprecht of the Centers for Disease Control. He discussed the fact that a majority of human rabies deaths in the U.S.A. for which the virus has been typed are due to bat strains, and especially the Silver-haired Bat. There is a large task ahead to bring public awareness up to date of what is known about the dangers of bat rabies. Dr. Rupprecht also described some results obtained by one of his graduate students. The growth of Silver-haired Bat virus was compared with another rabies strain in cultures of a variety of cells. The overall conclusion is that the SHB virus grows better in a wider variety of cells, includung human epidermis, than the other strain tested. Dr. Rupprecht speculated that this is exactly what one would expect of a virus which must maintain itself in an uncommon and sparsely distributed host. This is just a start!

Charles Trimarchi gave a summary of rabies in New York during 1995. That was printed in the last issue of The Rabies Reporter

The highlights of the meeting were updates on the various bait trials ongoing in New York. Don Lein and Laura Bigler described the planning and conduct of the aerial bait drops which the Rabies Unit helped with in October. Rabies is significantly less frequent among raccoons tested from Niagara County, compared to adjacent Orleans county, which received no baits. Otherwise, results have been slow to come in due to the late date of the drops, and the early onset of winter.

The trials in the enzootic areas, in Albany and Rensselaer Counties are also indicating significant reduction of rabies. These were experiments involved hand-distribution of baits, and included two campaigns per year. Asessment of results was hampered by very low raccoon populations occurring in the wake of the epizootic front passing through.

Ward Stone of NYDEC described his efforts to find out how many raccoons actually came down with rabies in a local area. He obtained over 1,099 raccoons, of which 736 were rabies positive, from Albany County alone, during the period 1 January 1993 to 31 January 1993. Most of these were obtained in 1993, when the epizootic was at its height. He discussed necropsy finding which were indicators of rabies. Many of the animals had severe wounds on the nose or face, indicating that extreme aggression is frequent in rabid raccoons. Also of interest, all 22 raccoons which had porcupine quills were rabies positive.

New York Department of Health mounted a quick bait project around the first rabies cases in southern Clinton County. It is too early to say whether that was successful, but the only cases of rabies so far this spring have been south of the treated areas.

I presented results from the Ontario fox and raccoon rabies cotrol efforts.

A pleasant surprise was to find that the attendee from Maine was Dwight Welch, now a wildlife biologist with the Maine department. Dwight worked for the Rabies Unit for almost two years. His account of the reception of raccoon rabies by his Maine colleagues was very interesting. The wildlife group do not see saving raccoons as a priority, and needed to be briefed on the public health implications of the outbreak.

Don Lein hosted a fine banquet, sponsored by Rhone-Merieux. The after dinner discussion centered around how to expand the baiting to cover all of New England.

Charlie MacInnes,
Rabies Unit, Maple

NEWS FROM THE RABIES UNIT

May 15 was D-day in the Ministry of Natural Resources. The Ministry's overall budget is to be reduced by almost 35% in this and the next fiscal years. Due to the crisis in operating funds, staff cuts had to be deep. The Rabies Unit learned that they would lose three colleagues, Wendy Sinclair, Sarah Crosgrey and Mike Pedde. Each of these is a hard worker who plays an essential and unique role in the Unit. It is too soon to say how we will accomodate to their loss. The Rabies Reporter will suffer greatly, as Wendy has carried the whole load of duplicating and mailing it, as well as maintaining the mailing list. Stay tuned.

It was also announced in April that the Maple station will be completely closed within the next year. The Rabies Unit will be moving to Peterborough. Currently we are slated to have offices in the new MNR building downtown, and labs somewhere else, possibly on the Trent University campus.

The ancient chinese curse is too close to the bone - "May you live in interesting times"!

Chris Nunan, founder of The Rabies Reporter has been very ill. Last September he was successfully treated for cancer. He accepted a temporay assignment in the Assistant Deputy Minister's office, and, as the year wore on, became sicker and sicker. He suffers from double vision, balance problems, and extreme dizziness if he looks down. He has been through a battery of modern tests, and been examined for a stroke, MS, and possible brain tumor. All tests were negative. His last statement to me was "The doctors are at a loss. I guess it is up to me to get well on my own". At the moment, Chris hopes to be back at work in August. We all wish him well.

Charlie MacInnes
Rabies Unit, Maple

RESULTS OF THE 1994 BAIT DENSITY EXPERIMENT USING THE ONTARIO RACCOON BAIT

In 1994 we dropped Sugar-Vanilla (SV) baits, known elsewhere as the Ontario Raccoon bait, on several 1-2 township sized plots in western Ontario (Fig. 1). The objective of the experiment was to determine the best density of baits to reach a substantial proportion of the raccoon population. The original design called for 4 plots at each of 20, 40, 60, 80 and 100 baits/km^2, surrounded by areas baited at 20/km^2. Unfortunately, one of the 60/km^2 plots only received 40/km..^{2} The baits were filled with fox vaccine, and were part of the overall fox rabies control program. All the baits were dropped along flight lines 1.8 km apart, the standard fox spacing in 1994. All baits contained tetracycline, and it was from the biomarker results that we would evaluate success with raccoons.

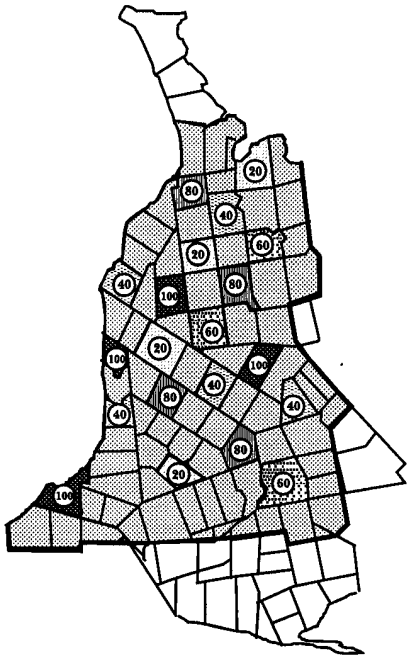

Figure 1. Map of the 1994 experimental plots in southwestern Ontario, showing the target density for each plot.

The results are shown in Fig. 2. Initially these were disappointing, in that previous experiments at 75 baits/km^2 had given much higher acceptance. The culprit was almost certainly flight line-spacing. In Fig. 2, the results of 3 earlier experiments, where lines were only 0.75 km apart are shown. Those points show that acceptance was high at closer flight spacing.

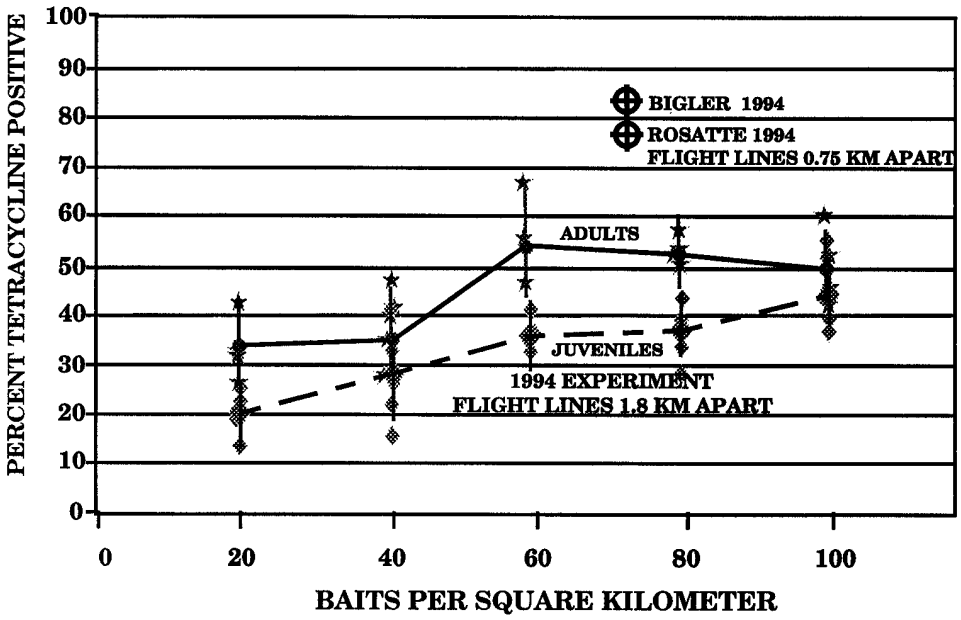

Figure 2. Graph of the relation between bait density and acceptance of SV baits by raccoons. Also shown are the single points from earlier experiments.

The results of this experiment are very good in another respect. There were clear increases in acceptance between low and high bait densities. The relationships seem different between adults and juveniles. There seemed little difference between 80 and 100 baits/km^2, and the critical density seemed to be in the 60-80 baits/km^2 range. The critical density in this context is the threshold below which acceptance starts to drop if bait density is decreased. Detailed statistical analysis has not yet been done, so these conclusions may change.

In 1995, the experiment involved 40 baits/km^2 dropped at 3 different flight spacings, 0.5, 1 and 2 km. The data should help greatly to understand the relation between flight spacing, bait density and acceptance. There is one other favourable result of this experiment. The SV bait is also an excellent fox bait, as more than 80% of all foxes taken in 20 baits/km^2 areas were tetracycline positive.

Charlie MacInnes,
Rabies Unit,
Maple.

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:
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Animal Rabies Report: January to March 1996

Animal Type	Fox			Skunk			Other Wildlife			Dog			Cat			Livestock			Total		
County or Area	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		96	95		96	95		96	95		96	95		96	95		96	95		96	95
Eastern																					
Stormont																			0	0	0
Dundas																		1	0	0	1
Glengarry																			0	0	0
Prescott																			0	0	0
Russell																			0	0	0
Carleton							1	1				1							1	1	1
Renfrew																			0	0	0
Lanark																			0	0	0
Grenville																			0	0	0
Leeds																			0	0	0
Frontenac																			0	0	0
Lennox-Addington																			0	0	0
Central																					
Hastings			1	1	1														1	1	1
Prince Edward																			0	0	0
Northumberland																			0	0	0
Victoria				1	1	2													1	1	2
Haliburton																			0	0	0
Peterborough						1									1				0	0	2
Durham																		1	0	0	1
York Region						1													0	0	1
Scarborough																			0	0	0
East York																			0	0	0
City of Toronto																			0	0	0
City of York																			0	0	0
NorthYork																			0	0	0
Etobicoke																			0	0	0
Simcoe			1			2													0	0	3

Animal Rabies Report: January to March 1996

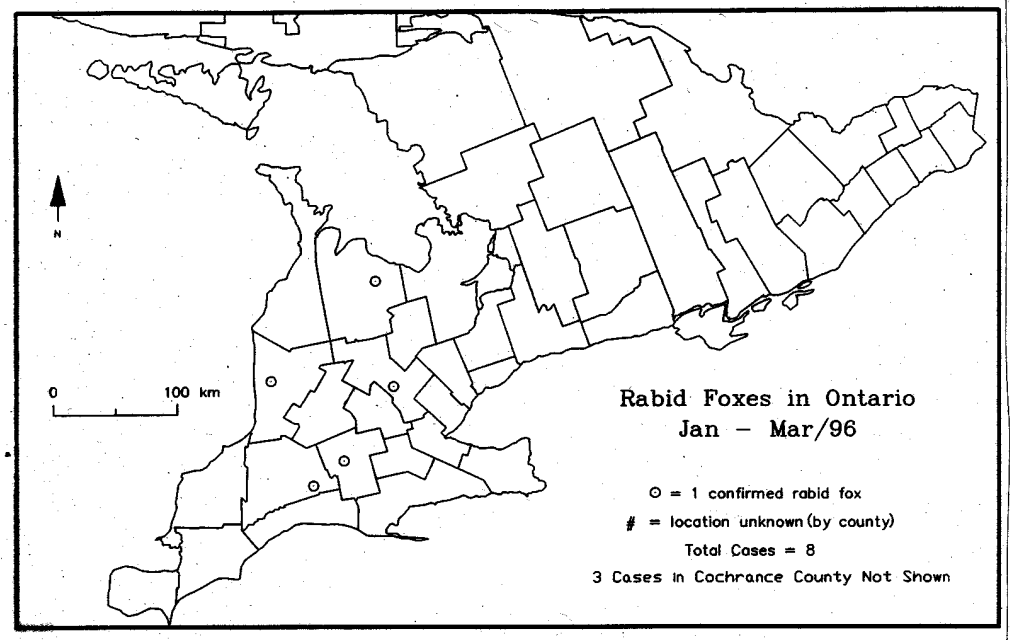
Animal Type	Fox			Skunk			Other Wildlife			Dog			Cat			Livestock			Total		
County or Area	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		96	95		96	95		96	95		96	95		96	95		96	95		96	95
Western																					
Peel																			0	0	0
Halton																			0	0	0
Dufferin			1			1										1	1	3	1	1	5
Wellington	1	1				4												3	1	1	7
Waterloo				2	2	2									1	2	2	2	4	4	5
Perth						1										2	2		2	2	1
Grey	1	1	6	2	2											4	4	2	7	7	8
Bruce				1	1	3							1	1					2	2	3
Huron	1	1		3	3	1												1	4	4	2
Southern																					
Wentworth																			0	0	0
Haldimand - Norfolk			5			1												3	0	0	9
Brant						1													0	0	1
Niagara			1			2													0	0	3
Elgin			3															1	0	0	4
Oxford	1	1	4							1	1	1							2	2	5
Middlesex	1	1	1	2	2													1	3	3	2
Lambton																			0	0	0
Kent																			0	0	0
Essex																			0	0	0
Northern																					
Muskoka																			0	0	0
Parry Sound																			0	0	0
Nippissing																			0	0	0
Sudbury																			0	0	0
Cochrane	3	3																	3	3	0
Timiskiming																			0	0	0
Algoma																			0	0	0

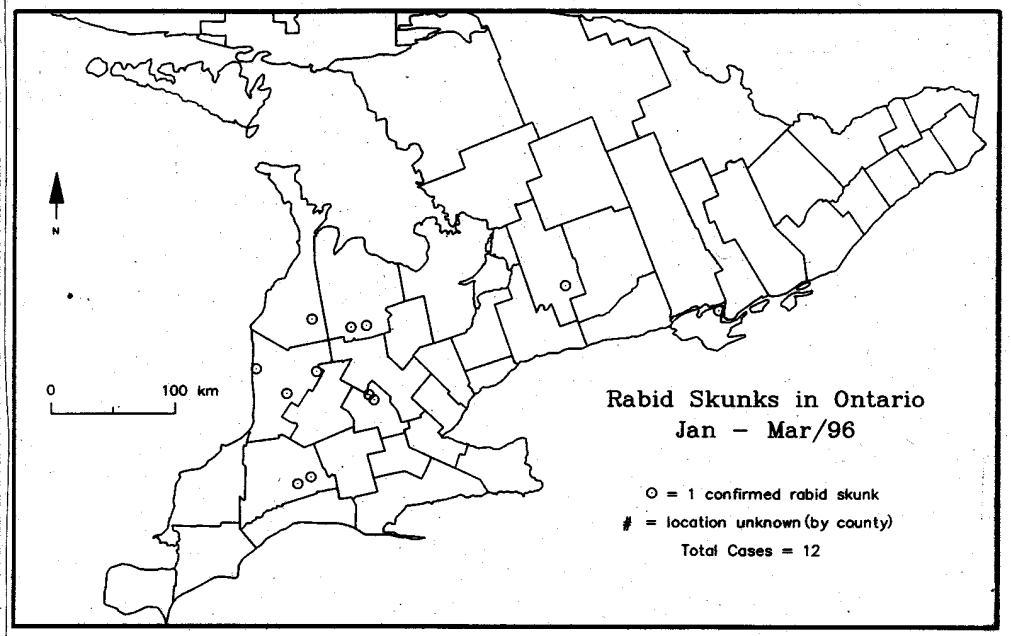
Animal Rabies Report: January to March 1996

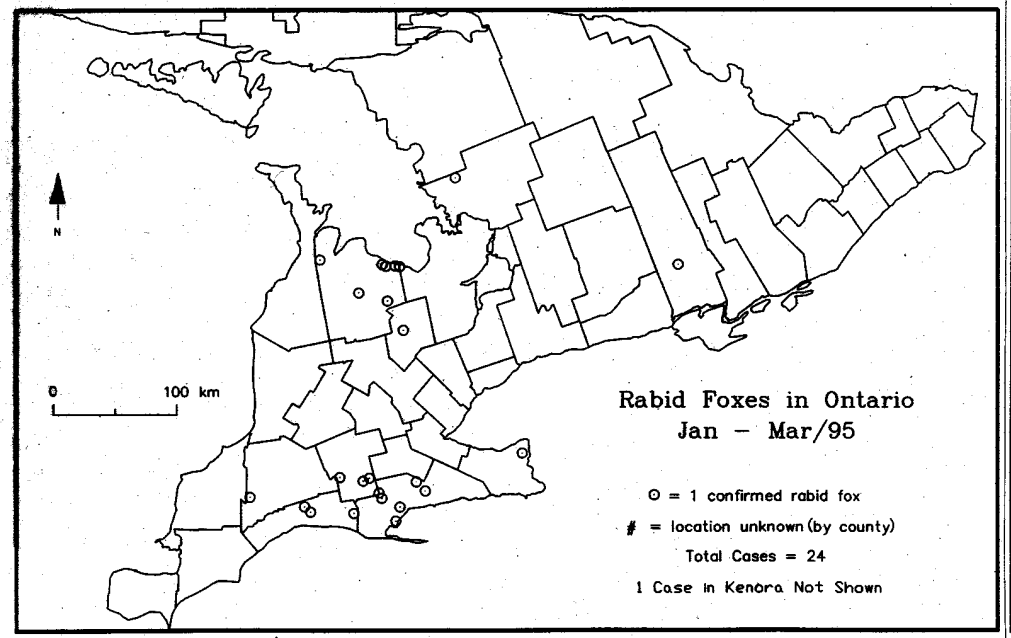
Animal Type	Fox			Skunk			Other Wildlife			Dog			Cat			Livestock			Total		
County or Area	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		96	95		96	95		96	95		96	95		96	95		96	95		96	95
Thunder Bay																			0	0	0
Rainy River																			0	0	0
Kenora									1										0	0	1
Subtotals																					
Eastern							1	1				1						2	1	1	3
Central			2	2	2	6									1			1	2	2	10
Western	3	3	7	8	8	12							1	1	1	9	9	11	21	21	31
Southern	2	2	14	2	2	4				1	1	1						5	5	5	24
Northern	3	3							1										3	3	1
Totals	8	8	23	12	12	22	1	1	1	1	1	2	1	1	2	9	9	19	**32**	**32**	**69**

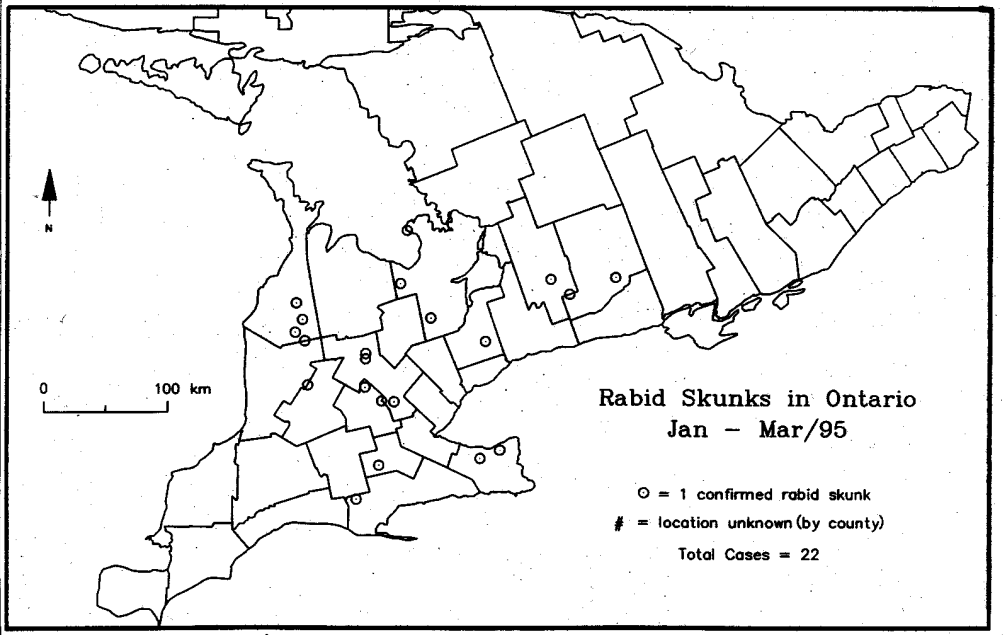
Livestock this quarter: 7cattle; 1 goat;;1 sheep

Other wildlife this quarter: 31big brown bats;









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