

The Rabies Reporter

December 1991

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Rabies Predictions: October '91 to March '92

This issue of the Rabies Reporter includes predictions of changes in the Ontario rabies situation for October '91 to March '92. Predictions are presented as the map at lower right, indicating the present rabies incidence and indicating the predicted direction of change. The map is accompanied by an article on how the rabies predictions are made and an Insider interpretation of the predictions.

Making Rabies Predictions.

Predicting rabies incidence is difficult for several reasons. First, reporting is done on the basis of suspected human contact. District vets cannot estimate cases in wildlife that do not come into contact with human beings. Therefore, we must assume that reported incidence reflects the pattern of incidence in wildlife, and that all reporters behave in the same way. Second, the data are aggregated on a county basis. When an outbreak occurs along the boundaries of adjacent counties, the apparent size of the outbreak is reduced since the cases are shared between counties. Finally, we do not know the size of the wildlife populations. Thus, we cannot estimate changes in incidence based on changes in the affected populations.

Despite these difficulties, there are four reasonable approaches to predicting rabies. All have been used in making the above estimates. First, rabies is a density

dependent disease. In areas where the fox population can rebuild quickly after a rabies outbreak, rabies is cyclical. This is particularly true in eastern Ontario. Here fox rabies has a strong 3-4 year cycle that has repeated since the 1950's. Furthermore, the peak usually occurs in the winter. Thus, prediction is a simple matter of extending the expected length of the cycle from the last peak or using a simple time series model to extrapolate the peak.

Second, rabies incidence in some areas is characterized by long periods with no rabies followed by a sharp increase for 1-3 years and then a sharp decline. The best examples of this pattern are the Essex/Kent/Lambton area and northern Ontario. While it is difficult to predict onset of rabies in those areas, past history indicates the outbreaks will end quickly and will not recur immediately.

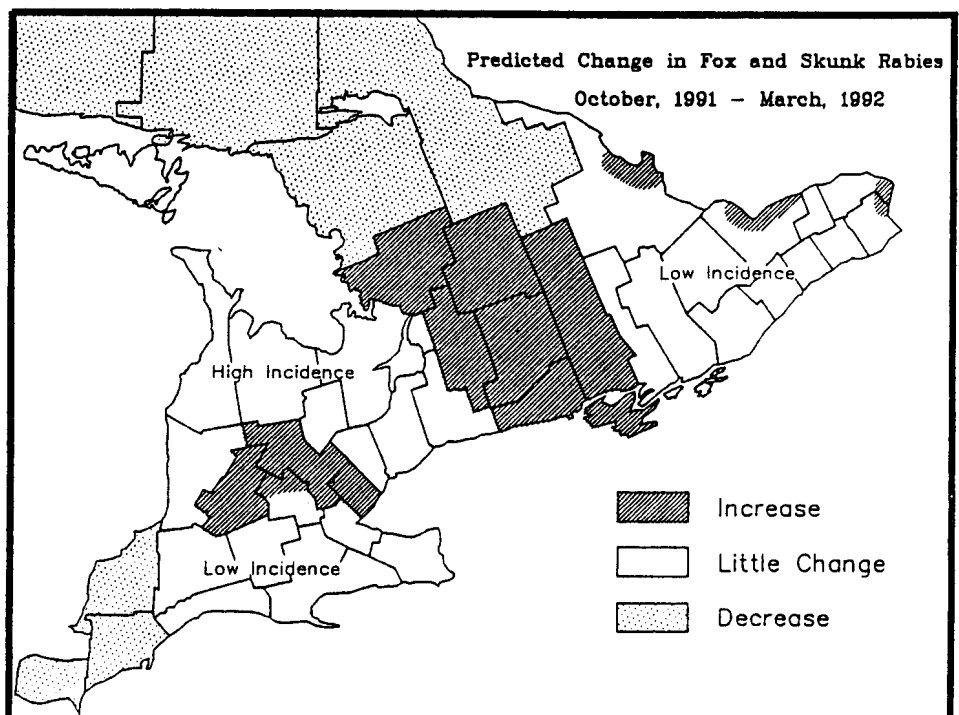
Third, rabies spreads into adjacent areas. Over the past two years, the new UTMC location codes used by Agriculture Canada for reporting rabies have enabled us to prepare the dot maps that you see in each edition of the Rabies Reporter. Typically, an outbreak occurs in a small area and then spreads outwards. By

following that spread on the rabies maps, we can make estimates of when rabies will reach adjacent areas. If those areas have sustained high levels of incidence in the past, then it is reasonable to assume that an epizootic will occur when rabies arrives.

Finally, skunk incidence tends to lag fox incidence by 1-6 months. Thus skunk incidence can be estimated from previous outbreaks in foxes. This relationship is weaker in non-agricultural areas such as the Canadian shield. Either there are fewer skunks in those areas and/or skunks are not reported as frequently as in agricultural and residential areas. Despite the overall decline in rabies in eastern Ontario, occasional cases in skunks will occur because of that lag.

We anticipate that our predictions will get better the longer we collect point form data using the UTMC location. When the check list was developed the Toronto Regional Office was considered responsible for cases falling within various map sheets including sheets 030M11 and 030M12. The Regional Office, however, is an administrative headquarters

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Animal Rabies Report: April to June 1991

Animal Type	Fox				Skunk				Other Wildlife				Dog				Cat				Livestock				Total			
County or Area	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative					
		91	90		91	90		91	90		91	90		91	90		91	90		91	90		91	90	91	90	91	90
Eastern																												
Stormont		1	5	1	1	1	6			1					2				1	1	2	15						
Dundas			2				3			1				2				1	1	0	3	7						
Glengarry			5				3	1	1								1	1	4	2	2	12						
Prescott			1	1	1	1	1										1	1		2	3	2						
Russell		5					1													0	5	1						
Carleton	6	11	7	2	4	3	1	2	1	3	1	2	1	2		1	4			10	23	12						
Renfrew		3	30	1	6					1		1	2	2			2	14	1	13	44							
Lanark			7			2				1								6	0	0	15							
Grenville																			0	0	0							
Leeds								1	1										1	1	0							
Frontenac			1	1	2														1	2	1							
Lennox-Addington										1	1								0	0	0							
Central																												
Hastings	8	14	3	1	3	4				2	2	1	1	1				1	10	18	8							
Prince Edward	7	12		2	3			1					1				1		9	18	0							
Northumberland	5	8	2	4	5	2							1	1	1	5	6	2	15	20	7							
Victoria	6	7	4	3	4	6			2					1					9	11	13							
Haliburton	15	18	2	3	3							1	1	1		2	2	1	21	24	3							
Peterborough	5	6	5	1	3	3			2	1	1				1	3	3	3	9	12	14							
Durham		1	3	3	4	8			1	1	2							1	3	5	13							
York Region	1	1	1	6	8				2			1				1	1		8	10	1							
Scarborough																			0	0	0							
East York																			0	0	0							
City of Toronto																			0	0	0							
City of York																			0	0	0							
North York																			0	0	0							
Etobicoke																			0	0	0							
Simcoe	21	33	41	10	14	7	1	1	3	2	3	3			2	1	9	5	35	60	61							

Rabies Predictions Fall and Winter

Wildlife rabies in Ontario has been declining since the peak of incidence in 1986 (Figure 1). In the past two years, rabies in both foxes and skunks has been lower than the average quarterly incidence 1980-1991. Declines in rabies is primarily due to reduced incidence in eastern Ontario.

Eastern Ontario did not undergo the cyclic rise in rabies expected in 1991, and presently has a low incidence of rabies in both foxes and skunks (Incidence Map, front page). This area has been treated by the OMNR Rabies Wildlife Vaccine Baiting program in 1989, 1990 and 1991. Theoretically, baiting in 1991 and future years will continue to suppress rabies incidence in the area. Exceptions to continuing low incidence in eastern Ontario occur in areas around Pembroke, Ottawa and Hawkesbury. Rabies levels in these locals are expected to rise due to a major rabies epizootic across the Ottawa River in Quebec (Figure 2). Rabies in Quebec is thought to have originally been established by rabid animals from Ontario. Movement of rabid foxes across the Ottawa River in the winter from Quebec may affect all counties bordering Quebec.

In Southwestern Ontario, typically high rabies levels in the Grey/Bruce/Simcoe area will continue. The major rabies outbreaks in Essex/Kent/Lambton is predicted to decline.

Over the past year, rabies in central Ontario has moved north and east from Simcoe and spread south from North Bay, producing the area of predicted increase in incidence forecast for central Southern Ontario. The eastern edge of this area has reached the western edge of the baiting treatment area - Lennox and Addington counties north to Renfrew county. Ideally rabies will be unable to penetrate into this vaccine "wall".

In the north a general decline in incidence is predicted for Algoma, Sudbury and Nipissing, although rabies may be able to enter the Clay Belt sometime this winter. C.D. MacInnes

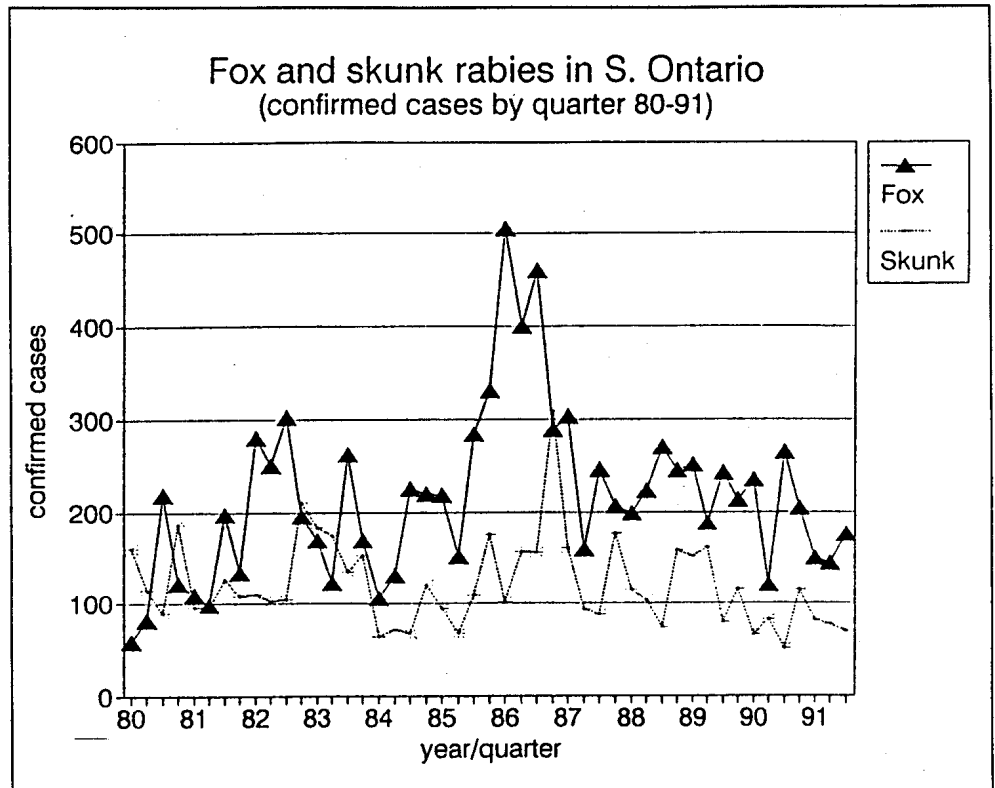


Figure 1.

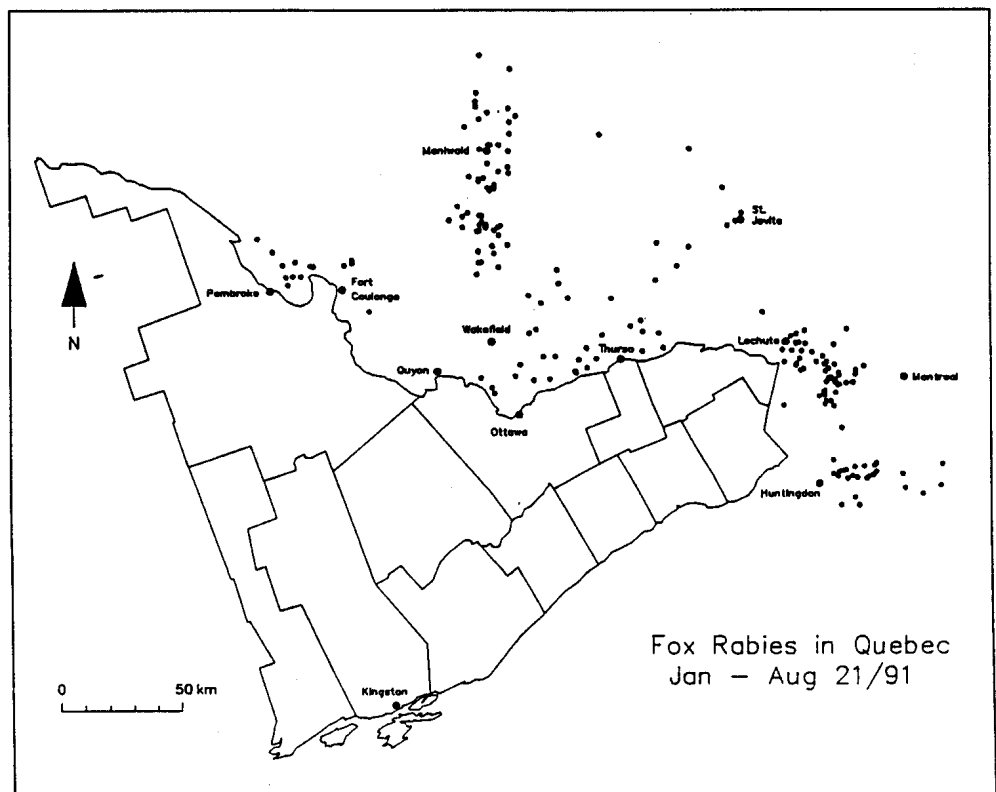
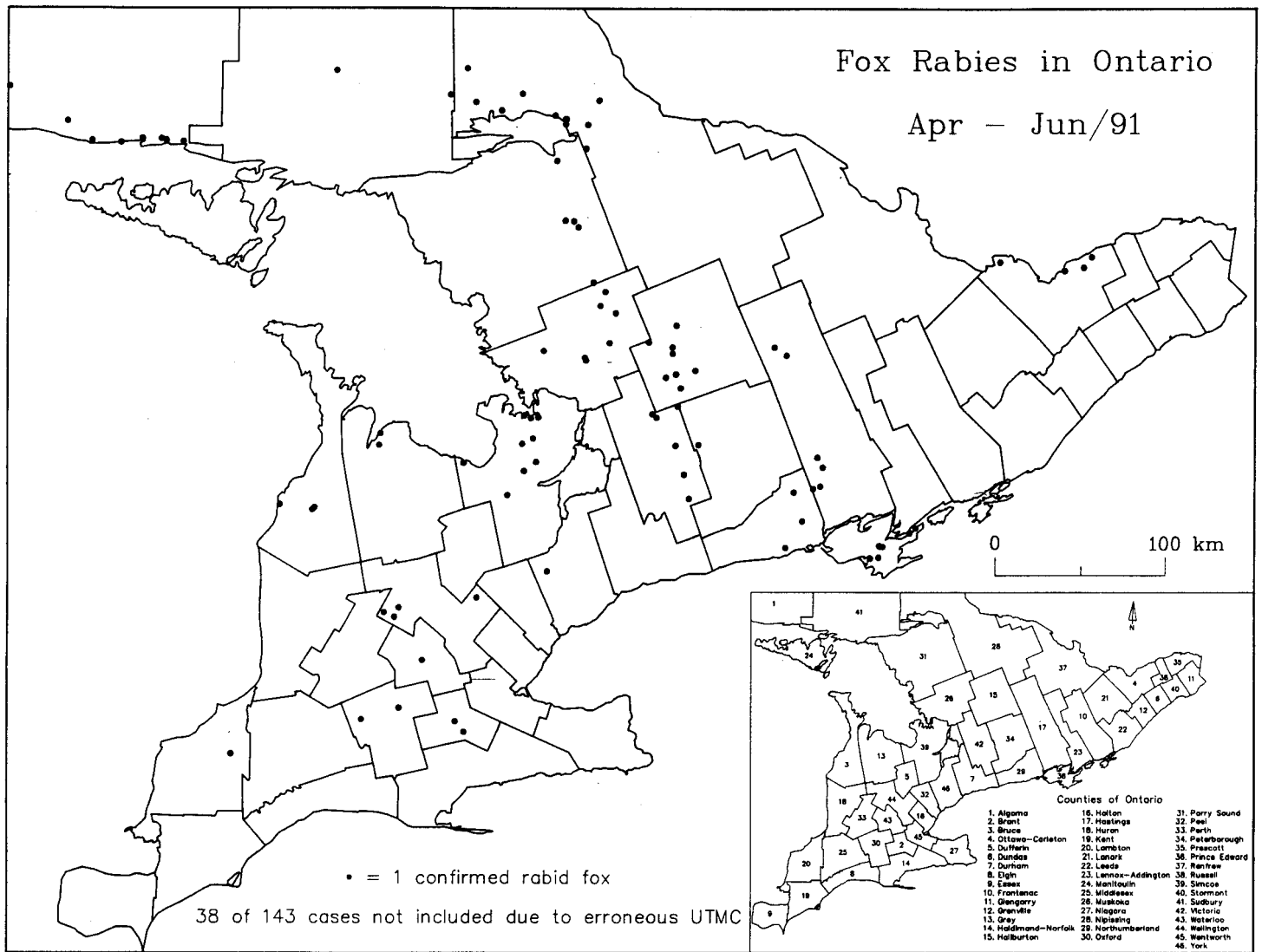


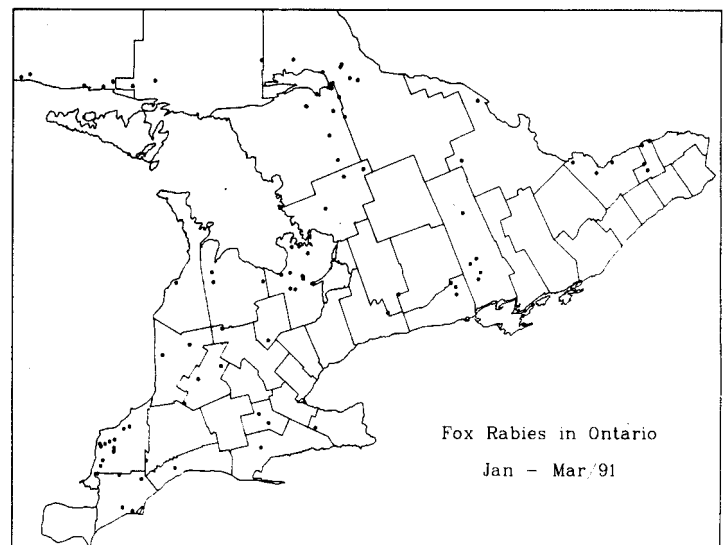
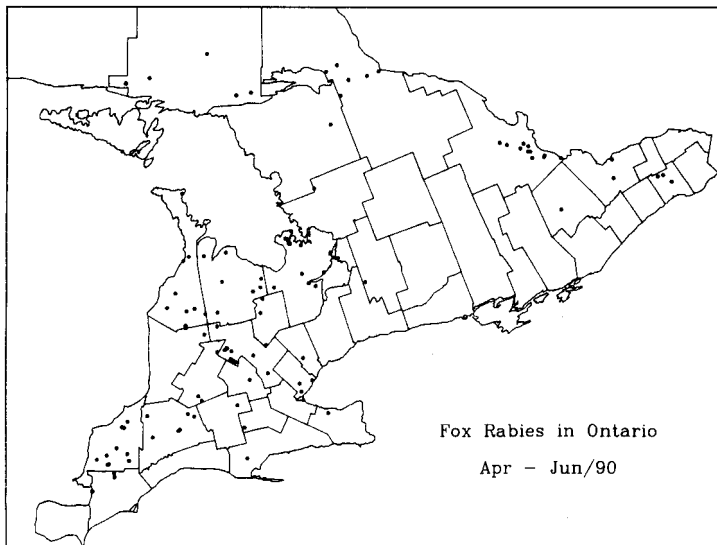
Figure 2.

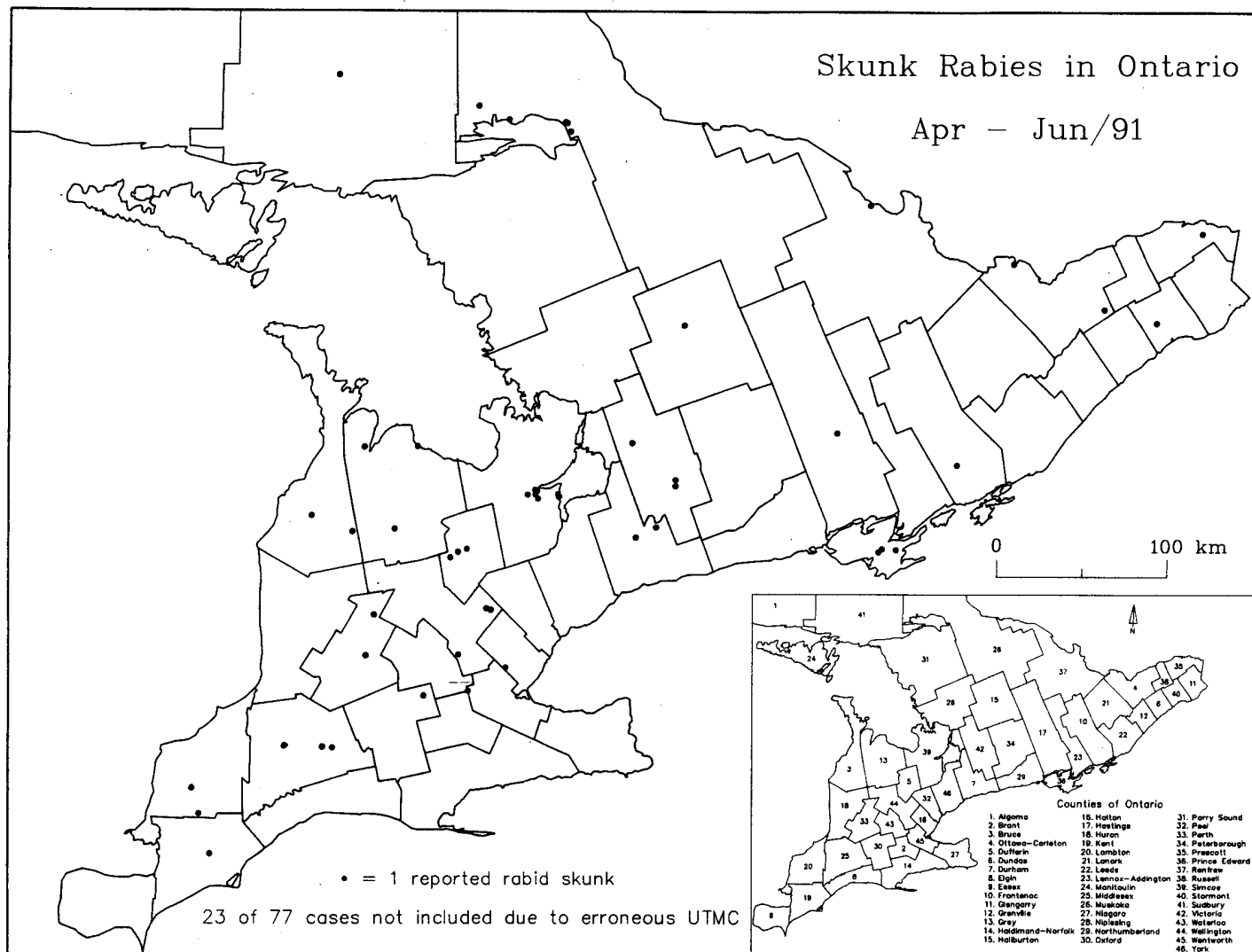
Animal Rabies Report: July to September 1991

Animal Type	Fox			Skunk			Other Wildlife			Dog			Cat			Livestock			Total		
County or Area	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		91	90		91	90		91	90		91	90		91	90		91	90		91	90
Eastern																					
Stormont		1	5	1	2	7	1	1	1						2			2	2	4	17
Dundas	2	2	4			4			1					2			1	4	2	5	13
Glengarry	1	1	8			3	1	2									1	6	2	4	17
Prescott	2	2	1	1	2	1		1	1								1		3	7	2
Russell	3	8		1	1	2													4	9	2
Carleton	3	14	8	2	6	6	2	3	1	1	2			2		4	1		8	31	16
Renfrew	8	11	56	5	11	2			2			6	2	1		2	2	24	13	26	91
Lanark			7	1	1	2	1	1	2			2						5	2	2	18
Grenville																		4	0	0	4
Leeds									1										0	1	0
Frontenac			1		2		4	4						2					4	6	3
Lennox-Addington	1	1									1							2	1	1	2
Central																					
Hastings	18	32	6		3	4	1	1		1	3	1	1	2				13	19	41	23
Prince Edward	15	27		2	5			1		1	1		1	2		2	3		20	39	0
Northumberland	2	10	5	1	6	3	1	1					2	3	1	2	8	14	8	28	23
Victoria	5	12	7	1	5	7	1	1	1	1	1				1	2	2		10	21	16
Haliburton	9	27	4	1	4		2	2	2					1	1		2	1	12	36	8
Peterborough	1	7	9	2	5	3	1	1	1		1	1	1	1	1		3	3	5	18	17
Durham		1	4		4	8	2	2	3		2				1			17	2	9	33
York Region		1	2	2	10		1	1	3								1	1	3	13	6
Scarborough			2																0	0	2
East York	Breakdown of third quarter 1991 statistics unavailable. Cumulative 1990 statistics in shaded area should be added to York region cumulative 1990 statistics for comparative purposes																				
City of Toronto																			0	0	0
City of York									1										0	0	1
North York									1										0	0	1
Etobicoke												1							0	0	0
Simcoe	9	42	67	7	21	12	3	4	6		3	3			6	1	10	22	20	80	116

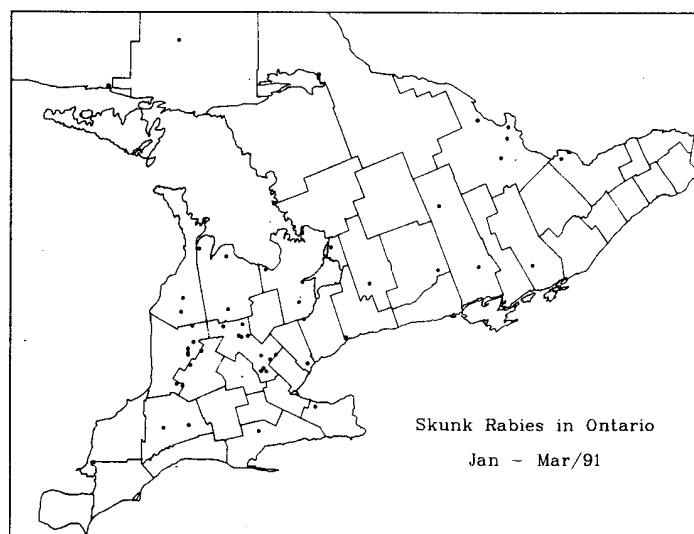
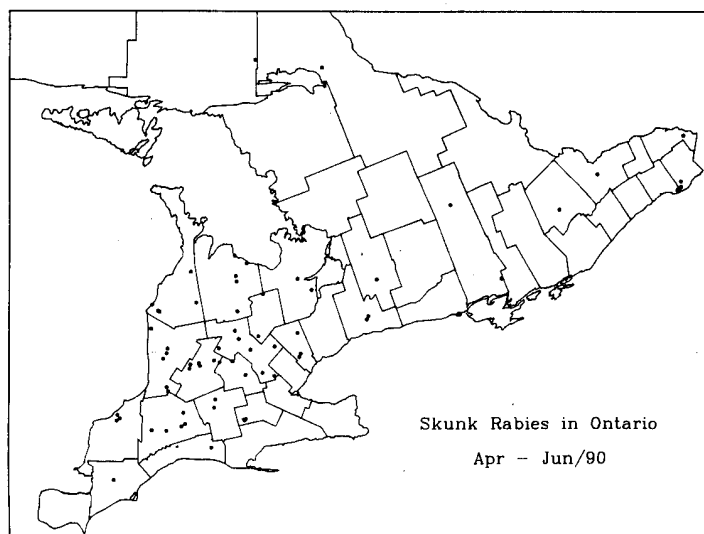


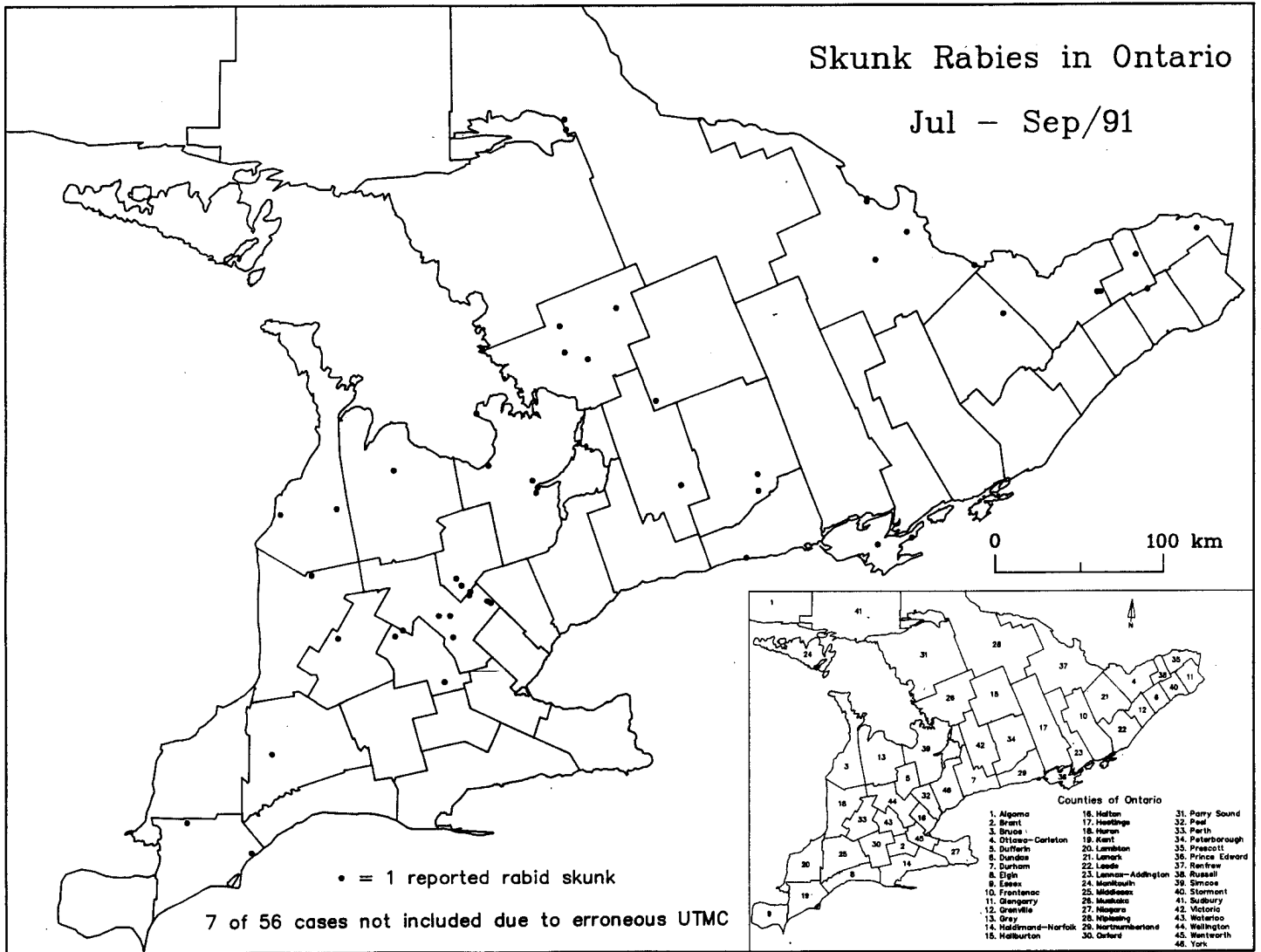
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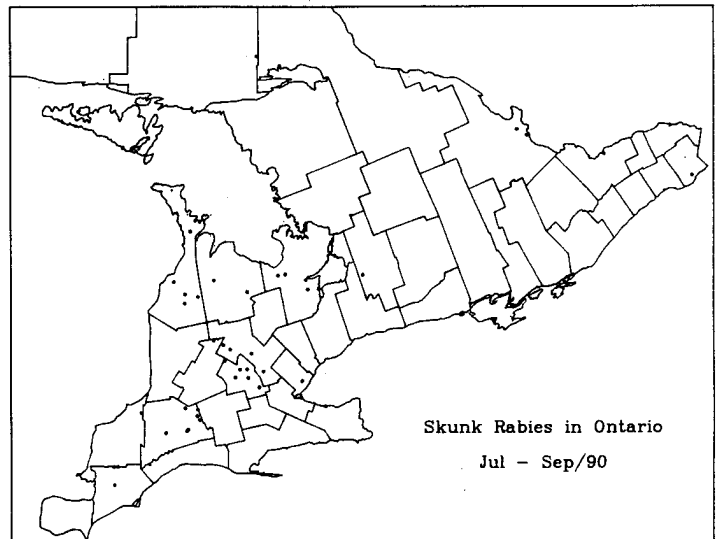
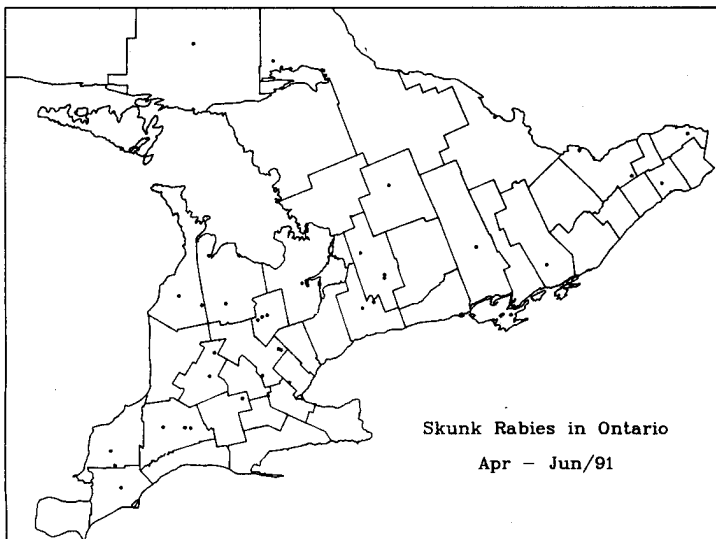


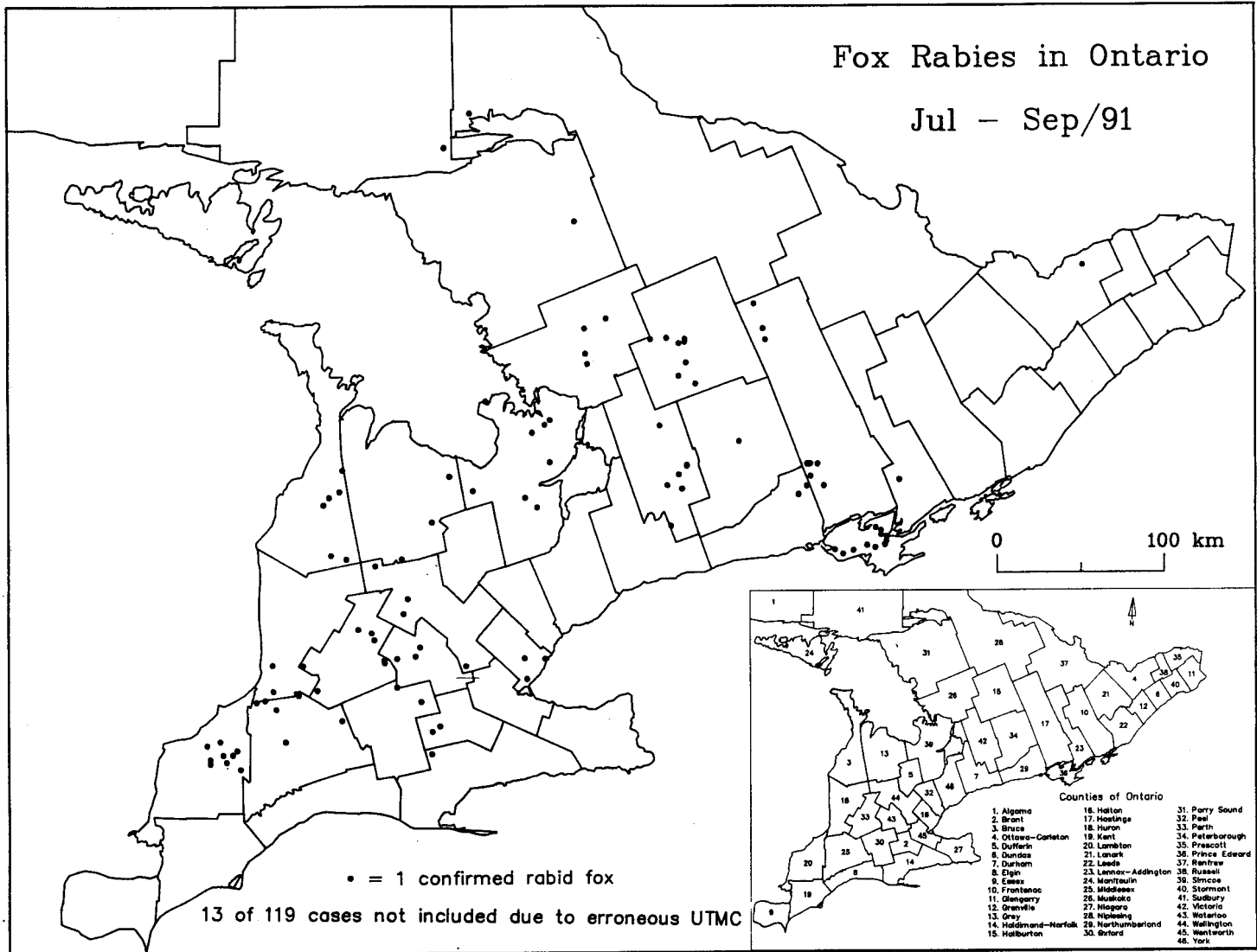
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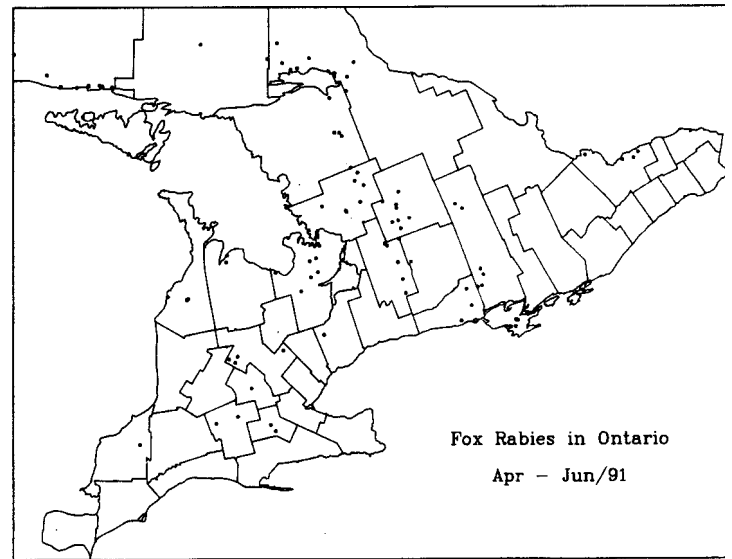
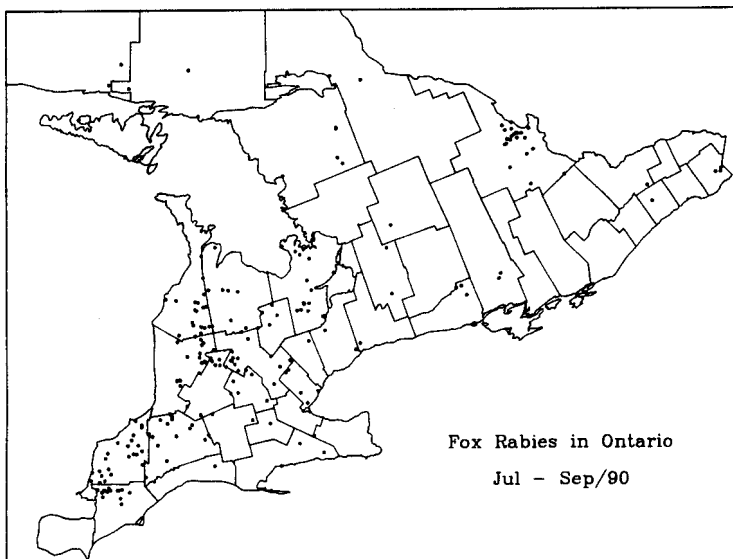


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Animal Rabies Report: July to September 1991

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Animal Rabies Report: July to September 1991

Animal Type	Fox			Skunk			Other Wildlife			Dog			Cat			Livestock			Total		
County or Area	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		91	90		91	90		91	90		91	90		91	90		91	90		91	90
Northern (continued)																					
Thunder Bay																			0	0	0
Rainy River																			0	0	0
Kenora																			0	0	0
Statistics for Northern Ontario unavailable at this time																					
Subtotals																					
Eastern	20	42	90	11	25	27	9	13	7	2	4	8	6	5	9	48	9	42	99	185	
Central	59	159	106	16	53	34	12	14	18	3	11	5	5	9	11	7	29	71	102	275	245
Western	59	95	219	29	84	81	3	7	11		2	6	1	5	26	10	44	139	102	237	482
Southern	29	65	149	7	27	47	7	13	12		3	19	7	18	2	35	66	45	150	311	
Northern	9	85	64	6	19	10	1	7	6	2	4	4		1	1	7	5	19	122	90	
Totals	176	446	628	69	208	199	32	54	54	7	24	42	6	27	61	124	329	310	883	1313	

Clinically Diagnosed Cases Not Included

Livestock: 16 bovine, 4 ovine

Other Wildlife: 22 big brown bat, 4 coyote, 1 little brown bat, 1 porcupine, 2 raccoon, 1 red bat, 1 wolf

Making Rabies Predictions, con't

codes. Once we get enough detailed data, we hope to get a clear picture of the relationship between rabies incidence and habitat. In turn, this should help us delineate meaningful spatial units to be used as the basis for analyzing the time series of incidence.

The Problem of Incidence By Health Unit in the Toronto Area

Until recently, the Ministry of Health (MOH) published rabies incidence in the Ontario Disease Surveillance Report (ODSR). Total monthly rabies cases were listed by species for each Health Unit. As the statistics were obtained from within the MOH, in cooperation with the local AgCan District Office (DO), rabies counts were available at the Health Unit level. These reports have been discontinued.

Rabies incidence counts can now be found in the Rabies Reporter. Produced by the Ministry of Natural Resources, data is obtained directly from Agriculture Canada's computer database, the Lab Sample Control System (LSCS). The only locational information in this database is the UTM and the county where the specimen was found. The purpose of the UTM is to allow specific identification of the location of the specimen. Locations can be identified to within 100 meters if the UTM is included on the submission reports. If desired, cases could be attributed easily to local Health Units. This would be a problem, however, in the Toronto region.

This problem is not due to the UTM but to a fault in AgCan's LSCS. The May, 1990 issue of the Rabies Reporter (Vol.1, No.1) outlined how for each rabies submission the LSCS runs a comparison check of the map sheet portion of the UTM against a listing of map sheets valid for each AgCan District Office. If they do not cross-reference, the UTM is rejected as "Invalid for District". The problem lies, however, where some map sheets have been misassigned causing UTM's to be rejected erroneously. This is significant to the Toronto area situation and is what prevents identification by Health Unit.

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Animal Rabies Report: April to June 1991

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Animal Type	Fox			Skunk			Other Wildlife			Dog			Cat			Livestock			Total	
	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		Cumulative	
		91	90		91	90		91	90		91	90		91	90		91	90	91	90
Northern (continued)																				
Thunder Bay																			0	0
Rainy River																			0	0
Kenora																			0	0
Subtotals																				
Eastern	6	20	58	6	14	19	2	4	4	1	2	5	1	6	2	3	9	26	19	55
Central	69	100	61	33	47	30	1	2	10	6	8	6	3	4	5	12	22	13	124	183
Western	14	36	102	20	61	49	4	4	6		2	3	2	4	12	9	34	36	49	141
Southern	8	35	72	10	20	30	6	6	5	1	3	7	2	7	17	10	33	19	37	104
Northern	31	76	44	7	13	8	3	6	2	1	2	3	1			6	6	7	49	103
Totals	128	267	337	76	155	136	16	22	27	9	17	24	9	21	36	40	104	101	278	586

Other Wildlife: 8 big brown bat, 1 coyote, 1 groundhog, 5 raccoons, 4 wolves

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.. Comments, letters, submissions and enquiries should be sent to:

The Rabies Reporter
Rabies Research Unit,
Wildlife Research
Ontario Ministry of Natural Resources
P.O. Box 5000, Maple, Ontario L6A-1S9
Telephone: (416) 821-7081 Fax:821-7149