

The Rabies Reporter

September, 1990

Volume 1,2

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io rabies initiatives are well regarded at the international level.

WHO Awards to Ontario Rabies Research

The World Health Organization recently recognized the contributions of several Ontario researchers and programs in research and control of rabies in wildlife populations. The presentations took place at the recent WHO Seminar on Wildlife Rabies Control held in Geneva, Switzerland, (DATE). Recipients of the awards were: David Johnston of the O.M.N.R. Rabies Research Unit, Dr. Kenneth F. Lawson of Connaught Laboratories and Dr. Alex Wandeler of Agriculture Canada. Dr. Konrad Bogel of the World Health Organization stated that the awards recognized the contributions of the entire team that each recipient represented.

Dave Johnston was honored as a pioneer in the field of bait development and aerial distribution of baits. Dr. Lawson was cited for his extensive work with vaccines in baits. The work of both researchers has led to the present experimental control program of the Ontario Ministry of Natural Resources. Dr. Wandeler was honored for his pioneering work in rabies control in Europe and is presently involved in development of vaccines for foxes and skunks.

The recognition of these three researchers is concrete evidence that Ontario

1990 Rabies Program

By the time that you read this, the 1990 Rural Rabies Baiting Program will be gearing up for bait distribution. This year, two distinct operations are being undertaken; the Eastern Ontario large scale experiments and the Southwestern Ontario experimental plot program.

The Eastern Ontario program will continue and expand the work first done in 1989. This year baits will be dropped in an area approximately bounded by Kingston north to the Ottawa River on the west and extending east to the Quebec border; an area of 30,000 km². The area to be baited includes the counties of Frontenac (including Wolfe and Howe Is.); Lanark, Leeds and Grenville; Stormont, Dundas and Glengarry and Prescott and Russell. The majority of the Regional Municipality of Ottawa-Carleton, Renfrew County and Lennox and Addington County (including Amherst Is.) will also be baited. A total of 538,000 baits will be distributed, resulting in an overall bait density of 20 baits/km², excluding lakes and populated areas which are not baited.

The operation will be based out of Irvine Lake, just north of Bon Echo Provincial Park in Lennox and Addington County, and is scheduled to run 9 October to 31 October 1989.

The Southwestern Ontario program is designed to test modifications of bait design, and baiting equipment and procedures in small scale, replicatable experiments, the results of which can be applied to the Eastern Ontario large scale trials.

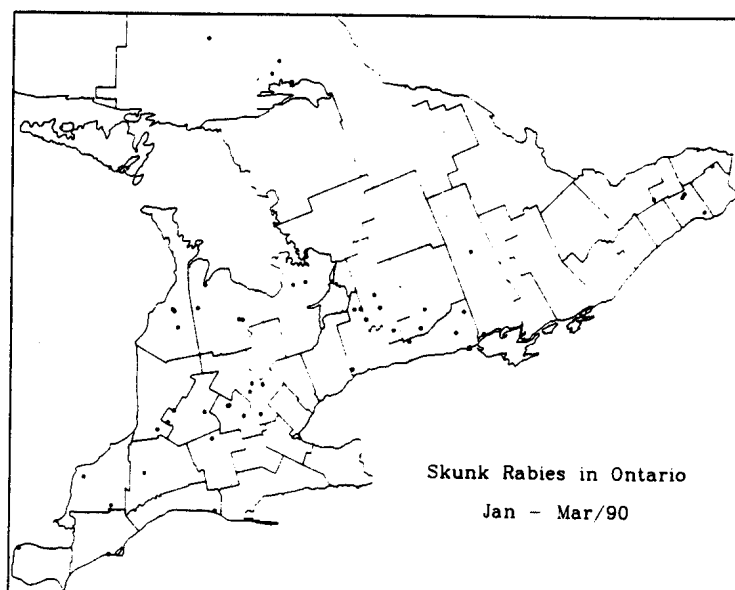
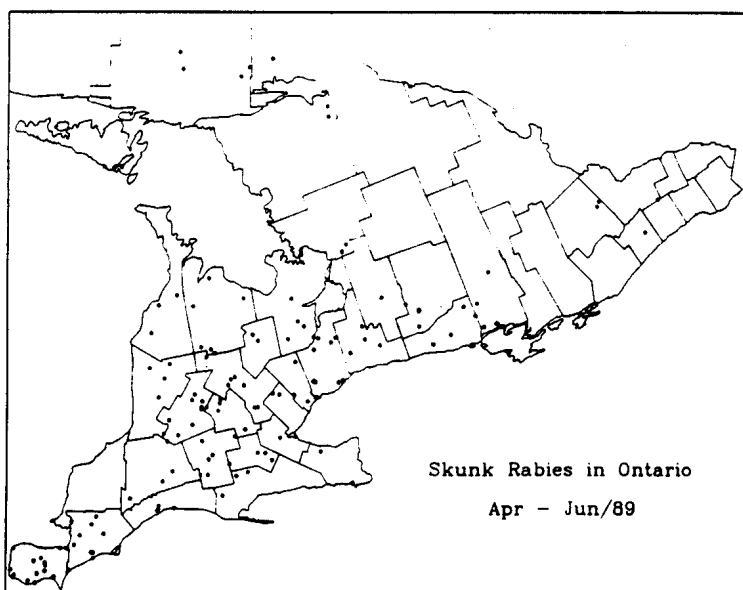
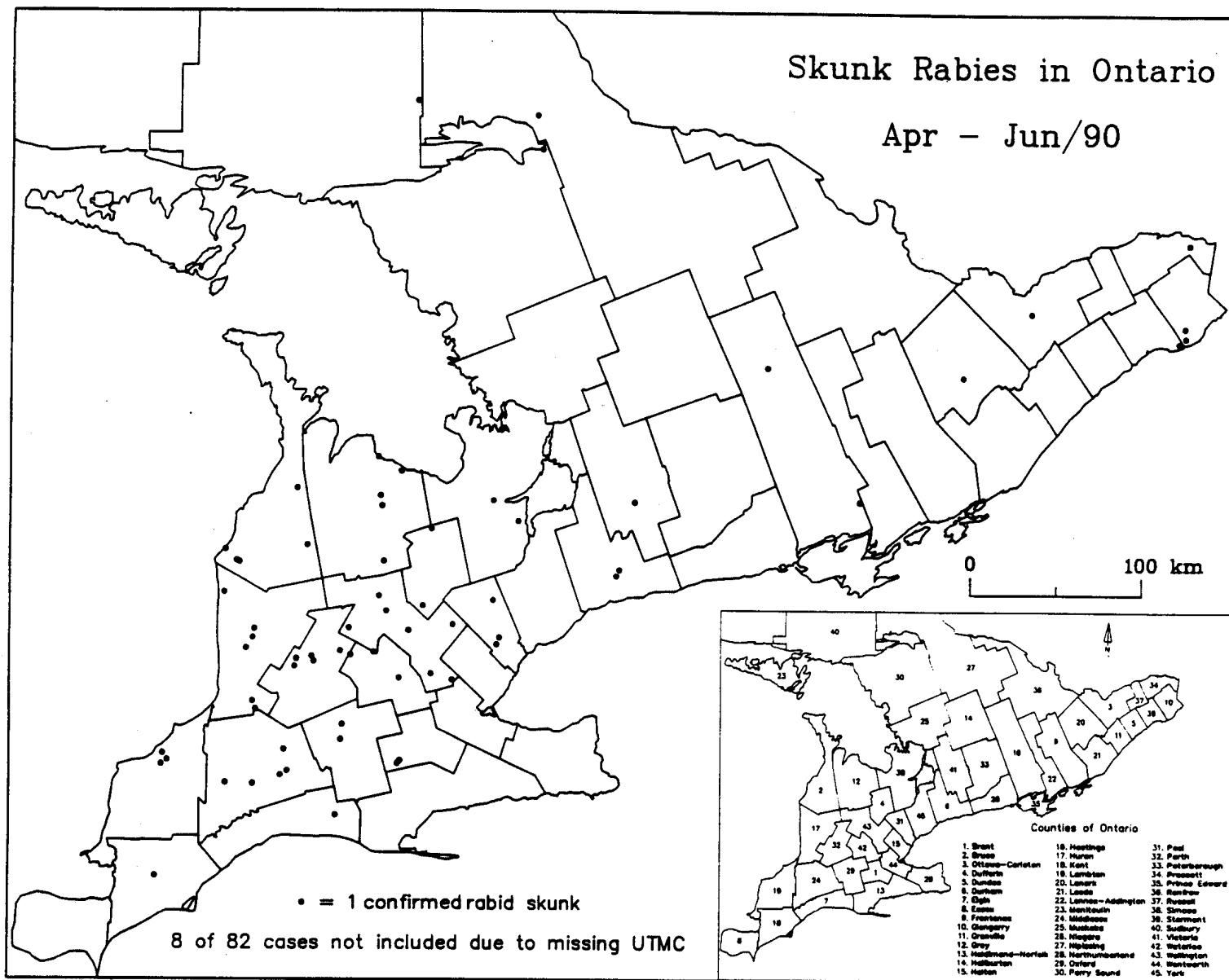
Experimental plots are 15x15 km (225 km²) and are located in areas where previous trapper returns suggest that sufficient fox samples can be obtained. Plots lie within the counties of Bruce, Grey, Huron, Perth, Middlesex, Elgin, Lambton, Kent and Oxford.

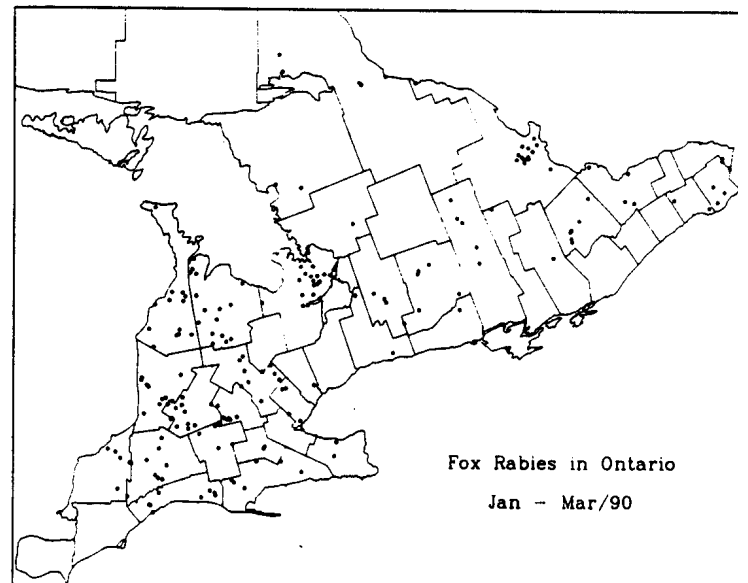
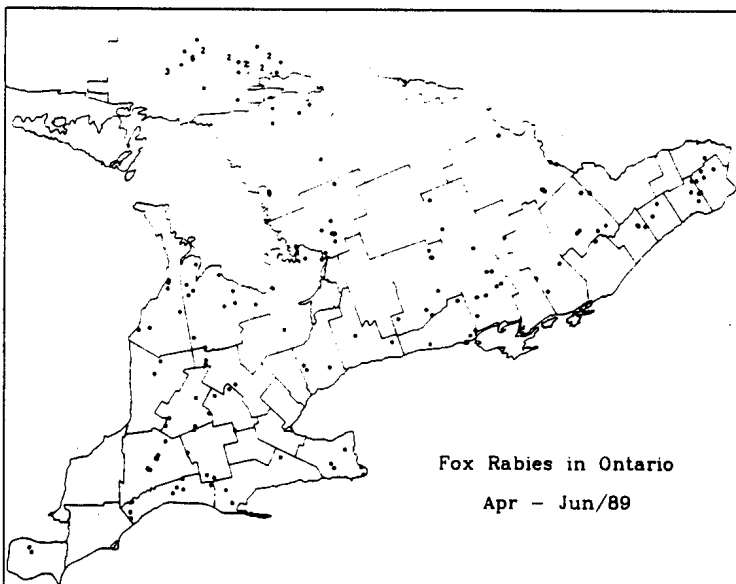
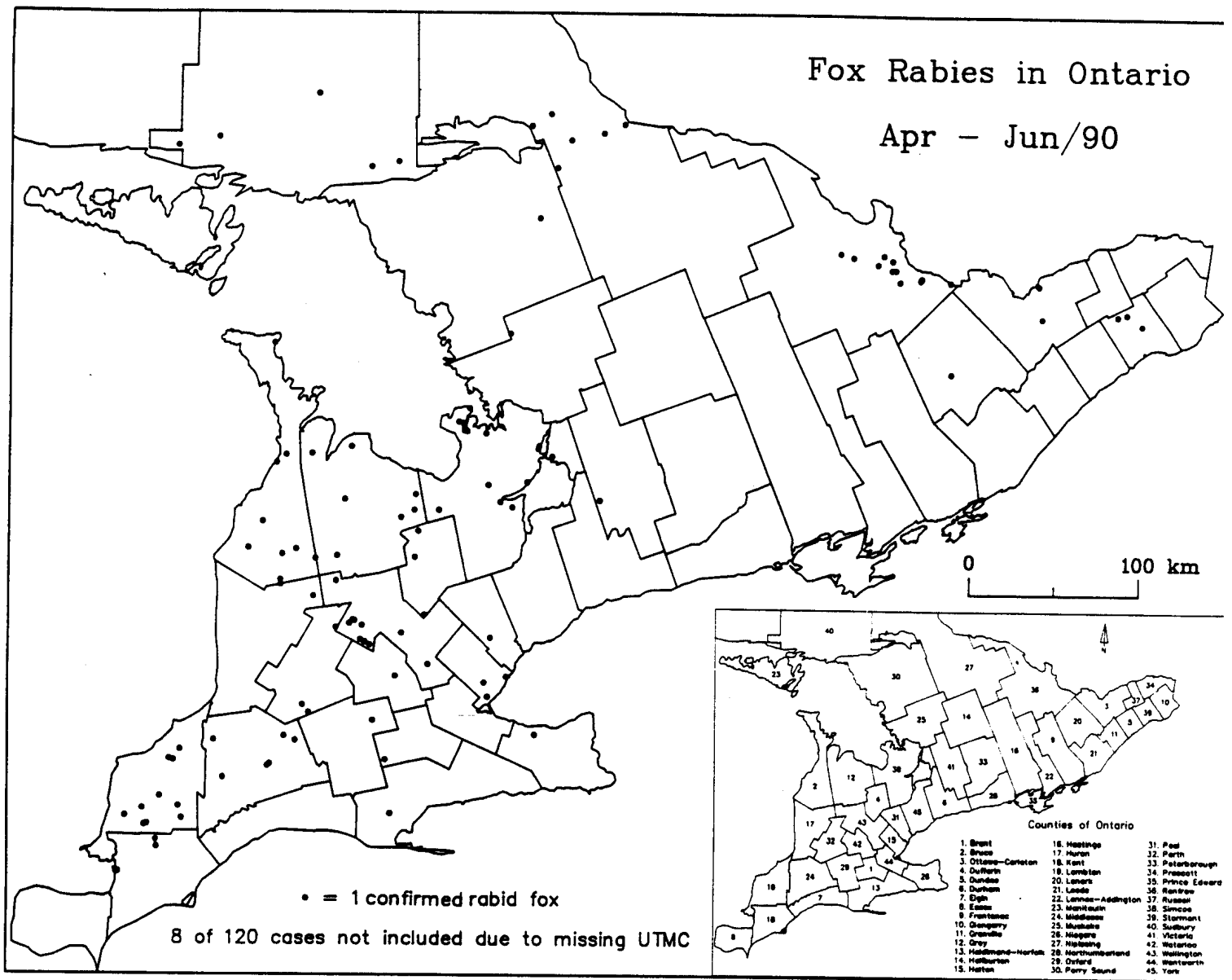
Baits will be distributed 24 September to 30 December, 1990. The operation will be based out of the Goderich Airport.

Predicting Rabies Events

This issue includes "predictions" of anticipated changes in the distribution of fox and skunk rabies to the end of 1990. These are only predicted changes from the current normal, high or low levels for individual areas. The April-June maps and the summaries of cases to date this year and last year will indicate whether rabies is presently high or low in an area. The major purpose of these predictions is to help local authorities allocate time and funds for public information programs.

The predictions are based chiefly on examination of time-series patterns of rabies incidence for each county. Admittedly, counties are not the best unit for analysis. However, continuous rabies incidence records at the county level are available since 1957, when rabies first invaded terrestrial wildlife in southern Ontario. The county unit is consistent with the accuracy of the records. Previous to 1988, rabies cases were located to the address of the reporting individual, or the local MOH or Agriculture Canada office, which wasn't necessarily the location of the actual event. Rabies cycles in counties varies from the strong regular cycles in Lanark county (Figure 1), peaking every 4 years, to weak patterns in





Animal Rabies Report: April to June 1990

Animal Type		Fox			Skunk			Other Wildlife			Dog			Cat			Cow			Other Domestic			Total		
Health Unit by Area	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		
		90	89		90	89		90	89		90	89		90	89		90	89		90	89		90	89	90
Eastern																									
Eastern Ontario	3	13	17	8	17		1	2		4	1	2		1	9	4				2	14	43	27		
Leeds-Grenville-Lanark	1	7	12	1	2	7			2	1	1	3		2	2	4	19		1	9	5	19	82		
Ottawa-Carleton	4	7	9	1	3	3								1			3			1	5	10	20		
Renfrew	9	31	24		1		1	1	4	3			2	20	22	13	1	1			31	59	44		
Kingston-Frontenac		1	14							7			1				1		1		1	1	17		
Hastings-Prince Ed.		4	41	2	4	7		1	17						1	10				1	2	10	68		
Central East																									
Peterborough	1	5	9	1	3	16	2	2					1	1		3	1				2	4	14	31	
Haliburton	1	8	16	1	8	10	1	2	4	1	1		2	3	2	6	4				4	7	27	44	
Durham		3	9	3	8	9	1	1	1					1	1	1	13				3	5	13	37	
Muskoka-Parry Sound	2	5	38	1	1	8	1	1	2						1	2	2					6	10	51	
Simcoe	19	44	12	4	7	15	1	2	1	2	3	2	2	1	9	10	19	2	2		39	71	50		
York Regional		1	5			9			1			1					1					1	19		
Peel	1	2		3	3	4	1	1					1			1	1				5	8	5		
Scarborough			1			2			1														5		
East York																									
North York						1	1	1													1	1	2		
City of Toronto			1				1	1													1	1	1		
City of York																									
Eobicoke			2			8			1	1											1	1	11		
Central West																									
Wellington-Duff-Grey	13	23	16	11	14	16		1	1			8	2	4	1	1	10	12	1	4	6	28	56	60	
Waterloo	2	9	7	2	6	8						2	3	4			3	1				7	22	18	
Halton	5	12				8	2	3		1	1		1	1	1	2					10	19	9		
Hamilton-Wentworth		3		1	1	4								1				1			1	5	5		
Brant	1	5	1	2	3	5	1	1			2	2	1	2		1						5	14	8	
Niagara	1	3	19			2	1	1	2		1	4	1	1	6					2		3	8	33	
Haldimand-Norfolk	3	10	8	1	1	2								2	1	4	2					5	15	14	

Animal Type	Fox			Skunk			Other Wildlife			Dog			Cat			Cow			Other Domestic			Total		
Health Unit by Area	#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
		90	89		90	89		90	89		90	89		90	89		90	89		90	89		90	89
Santhwesters																								
Elgin-St. Thomas		8	15	1	2	12				3	5	3	6	2	1	4			1		5	21	38	
Oxford	2	7	9	3	5	9	1	1			2		2	1	2	6	7			8	21	77		
Perth	4	15	11	5	8	12	2	2	1	1	2		1	1	3	5	4			16	33	28		
Grey	10	26	19	9	14	17	2	2					2	4	2	3	26	10	3	3	26	65	51	
Bruce	12	24	13	5	7	6							1	2	1	13	23	26	1	1	31	57	47	
Huron	1	13	4	7	9	10									1	2	25	5	1	4	11	51	20	
Middlesex	7	15	16	6	7	7	2						1	2			12	19			16	39	44	
Lambton	11	18	1	3	6	5							2	2	2	3	2				18	29	8	
Kent-Chatham	4	6	5	2	3	25		1	1	4			1	1				1		7	11	36		
Windsor-Essex			7	1	3	56				3										1	3	66		
Northern																								
North Bay and District	9	25	13	1	5	2	2	2		1	1				2	2	2	2	1	1	5	16	36	
Timiskaming																								
Porcupine																								
Sudbury District	6	14	37	1	2	6				1	1			1			2				8	17	49	
Algoma																								
Thunder Bay																								
Northwestern																								
San Totals																								
Eastern	17	63	145	12	26	18	1	3	3	2	6	17	1	2	6	23	36	50	1	2	14	57	142	258
Central East	24	68	93	13	30	82	9	11	8	5	6	8	3	6	7	13	23	41	2	2	9	69	147	256
Central West	25	65	51	17	25	45	4	6	3	1	4	16	8	13	10	3	20	16		6	6	58	139	147
Southwestern	51	132	100	42	64	159	7	7	2	1	5	14	11	20	7	26	101	78	1	11	4	139	330	366
Northern	15	39	50	2	7	8	2	2	0	2	2	1			1	2	2	4	1	1	6	24	53	71
Total	132	367	439	86	152	312	23	29	16	11	23	56	23	41	31	67	182	189	5	22	39	347	811	1098

Rabies Predictions

Figure 1.

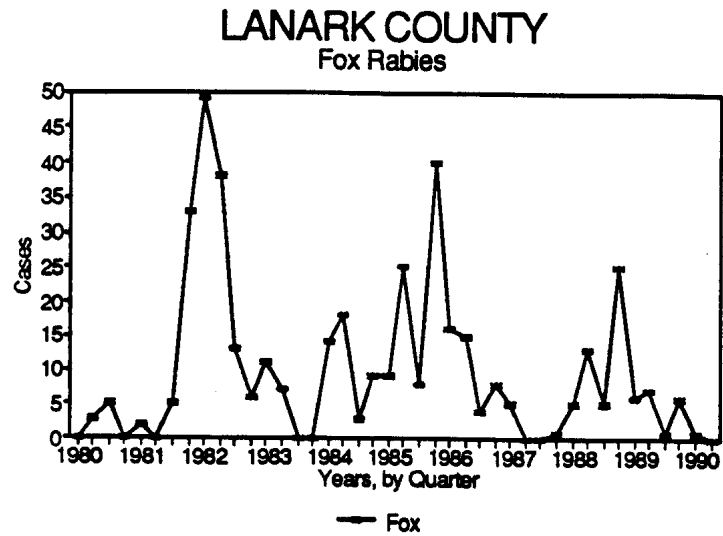


Figure 2.

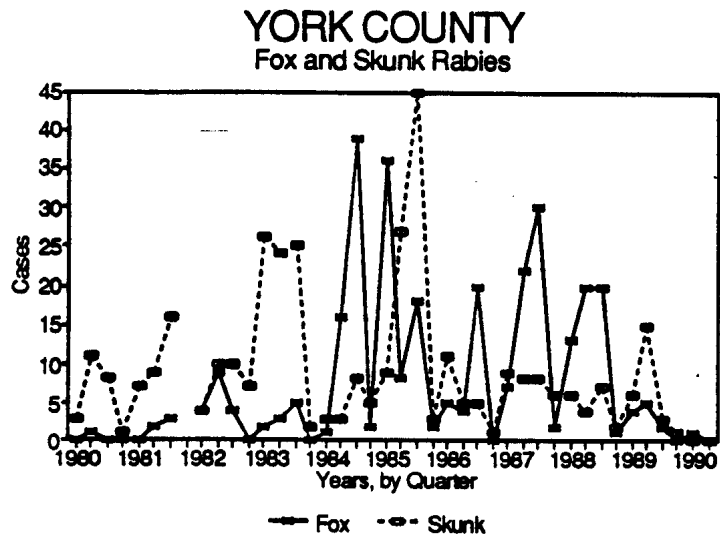
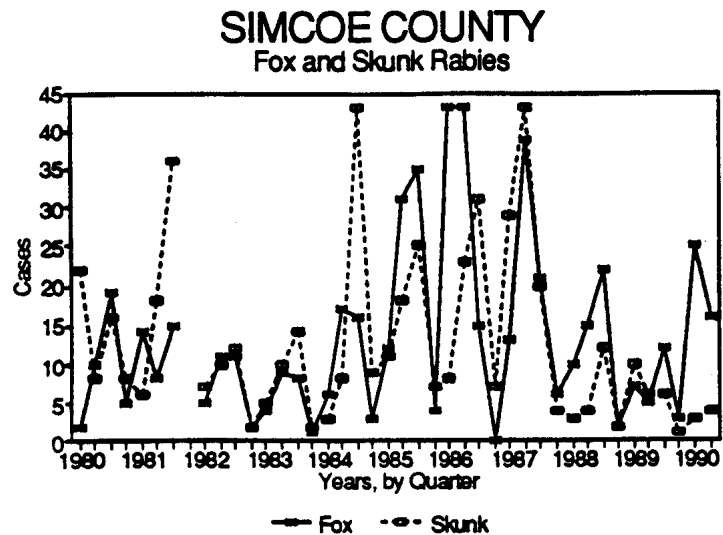
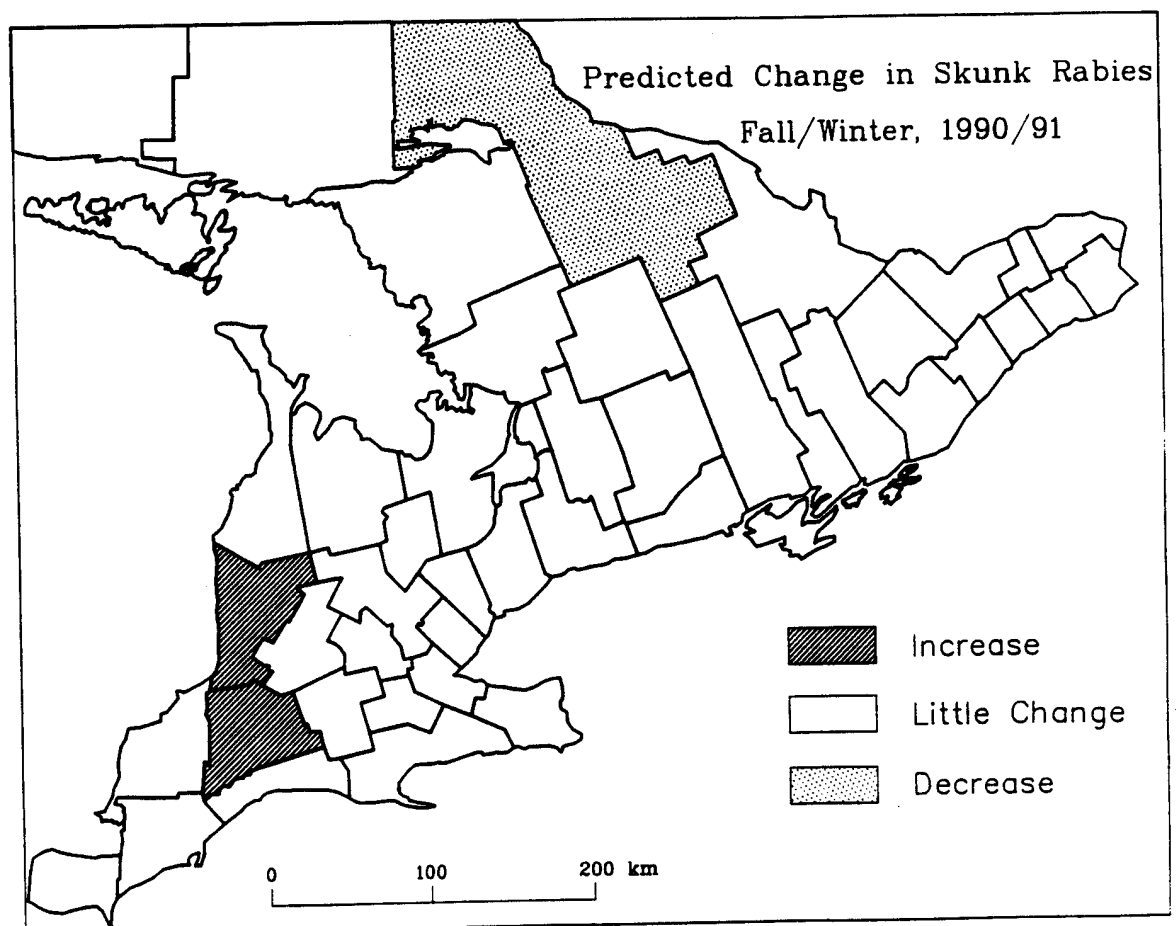
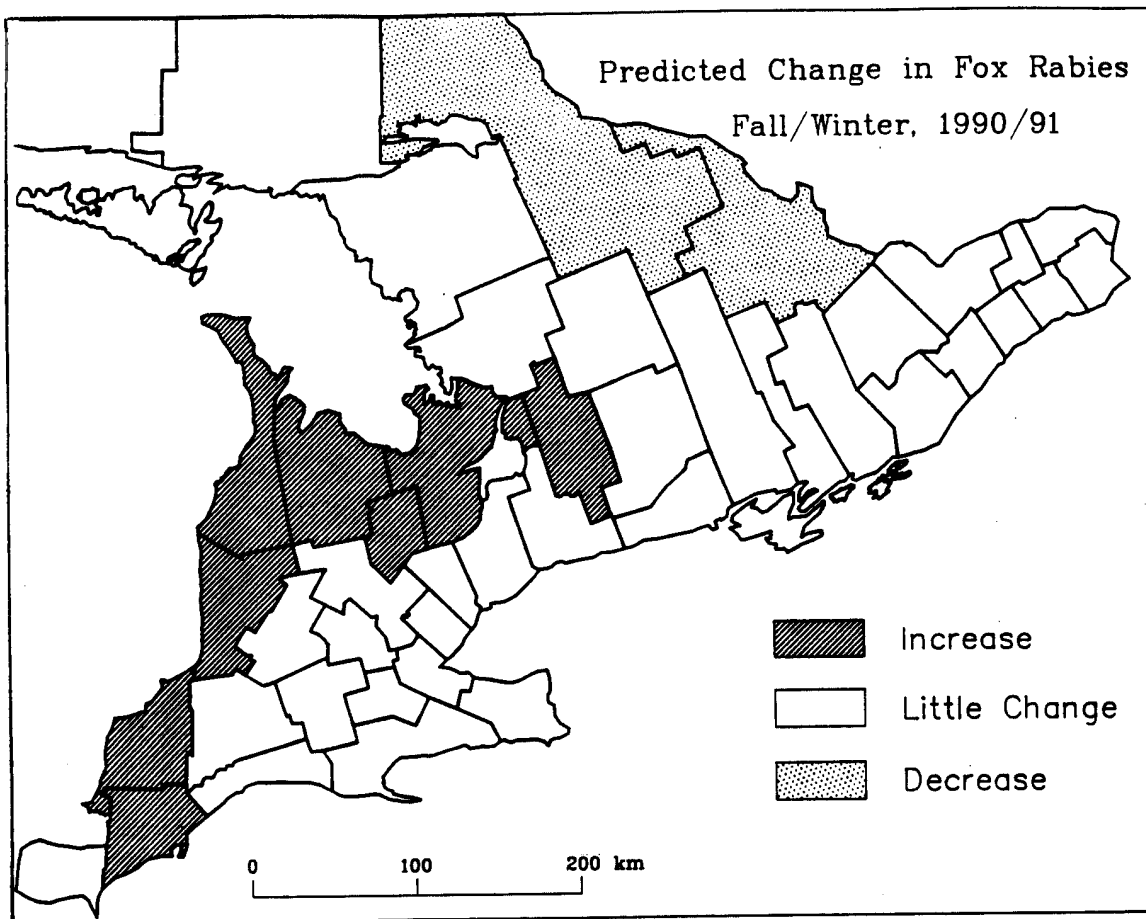


Figure 3.





Simcoe county (Figure 2) and the jumble of York county (Figure 3).

Rabies occurrence is probably related to geographic factors such as soil, vegetation, agricultural land use, and climate. County boundaries take no account of those features. As a result, in counties which have two or more very different landforms within their boundaries such as Hastings, Frontenac and Lennox and Addington, rabies reports are averages of the northern shield, with few foxes and low rabies incidence and the southern farmland with numerous foxes and more frequent rabies.

The natural distribution of rabies does not necessarily coincide with county boundaries. This problem is more acute in southwestern Ontario, where the county boundaries cut up larger areas of similar habitat, than in eastern and central Ontario. In the April/June fox rabies map in this issue there is a tight cluster of cases overlapping the boundaries of Grey Simcoe and Dufferin counties. This is almost certainly a single rabies event, which will be unnoticed when the cases are recorded in each county. Another such cluster may involve parts of Bruce, Huron, Grey and Wellington counties which would not show up in the pre-1988 (pre - UTM) records.

Changes in political boundaries further confuses location data. York County, (Figure 3) no longer exists, as it was replaced by the five cities/boroughs of Metro Toronto, plus York Region, but information collected previously has not been adjusted. Large metropolitan areas can produce separate urban skunk and rural fox rabies cells as seen in York county. Older records can be gleaned for good location data but this will be expensive. It will be much more satisfactory to look at time patterns by habitat, but that is still some time in the future.

Since 1988, Agriculture Canada has used the UTM grid for recording case locations (see Volume 1.1 for a description) which are used to plot the maps in the Rabies Reporter. Now we can see real clusters of rabies cases which cross county boundaries, or which are isolated in a small part of a county. These can now be used to predict direction of spread, and help refine our guesses about occurrence of rabies in counties adjacent to current peaks. In 3 or 4 more years we will have enough good point data to try more meaningful time-series analyses.

County-based time series data from southwestern Ontario (Simcoe County, Figure 2) do not show cycles as cleanly as comparable plots from eastern Ontario (Lanark County Figure 1). Again, we hope to overcome this problem when we can plot case records on geographic features rather than political boundaries.

The predictions deal only with rabies in foxes and skunks, the two species primarily involved in spreading terrestrial rabies. Over 97% of wild animals reported with rabies are foxes or skunks, and domestic animals almost always contract rabies from foxes or skunks: there is no evidence of dog-to-dog or cow-to-cow (etc.) transmission, except in very unusual cases, such as a bitch and her puppies. Foxes and skunks comprise about 65% of all domestic and wild rabies cases, and provide the amount of data necessary for time-series analysis. In addition, fox/skunk rabies leads domestic/companion incidence by 1 - 6 months, the approximate incubation of this rabies strain in most species. Similarly, in eastern Ontario, skunk cases generally lag 1 - 6 months behind the peak of fox rabies.

Improving Rabies Predictions

The major obstacle to improving these predictions is lack of knowledge. We do not have ongoing estimates of fox and skunk densities in southern Ontario, nor do we have knowledge of reproduction and survival, area by area. Variations in rabies cycle timing clearly indicate local variations in the dynamics of fox populations. An understanding of the quantitative relationship between fox density and rabies outbreaks, coupled with local estimates of density, would dramatically increase confidence in estimates. We hope, once the UTM system is fully in place, to relate rabies incidence to habitat variables. Hopefully the latter, which are thoroughly mapped for agricultural purposes, can serve as surrogates for population information.

Refinement of habitat analysis should also increase the accuracy of the Ontario Rabies Model - a computer simulation of an Ontario fox population. Within the model, we are able to simulate rabies outbreaks and test various vaccination and other control measures. Results from the model played a key role in the design of the field experiment in eastern Ontario.

By building habitat variations into the model, we will be able to explore their effects on fox populations and rabies. The model itself will become a predictive tool, and should help even more in planning future control efforts.

Another Use of the Predictions

An increase in rabies cases in the south ends of the counties of Leeds, Frontenac and Lennox and Addington was predicted to occur during the winter of 1989-90. That area was part of the 1989 experimental bait drop. The expected increase in rabies cases did not occur. It is too early to be sure that this was a result of the baiting program, but the trend is certainly encouraging.

How Good Are The Predictions.

We believe the predictions will be correct more often than not. In some case an increase in rabies cases may start later than predicted. In other cases, an intense but very localized outbreak may not be predicted, due to limitations from using data at the county level.

The Rabies Reporter will carry two sets of predictions each year. We may change from January to June and July - December, to April - August and September - March. The reason for this is that major rabies outbreaks in southern Ontario most often occur in the period October - February, so the revised schedule will fit the rabies pattern more closely.

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 Branch
P.O. Box 5000, Maple, Ontario L6A-1S9