

The Rabies Reporter

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In This Issue:

Welcome to the Rabies Reporter

Skunk Rabies Incidence Maps, January - March 1990

Fox Rabies Incidence Maps, January - March 1990

Animal Rabies Report: January - March 1990

Information on the Rabies Reporter

In The Insider

Introduction to the UTM

Welcome to the Rabies Reporter!

What, you ask, is the Rabies Reporter? It is a descendant of the annual summary and forecast which used to appear each fall. But it will hopefully be more than that. There will be rabies forecast maps issued in July and January, covering the periods September to April and April to September. There will be summaries of rabies case distributions for the past 3 months and 12 months. And there will be feature articles, commenting on highlights of the Ontario rabies situation.

The Rabies Reporter began in the Ministry of Natural Resources. Foxes and skunks are the major agents which spread rabies in southern Ontario. MNR has a large research program aimed at eliminating the disease from these wild species. Rabies is also important to Agriculture Canada and the

Ontario Ministry of Health, and the Reporter project has developed out of these common interests. Professor Roly Tinline, of the Department of Geography at Queen's University, working for the MNR rabies research program, undertook to analyze the patterns of the spread of rabies in Ontario. That required a computer database of all the rabies case records from Agriculture Canada's Animal Diseases Research Institute, Nepean (ADRI). During his efforts to get a usable database, Roly made some suggestions on better ways to record the data, and AgCan were sufficiently interested that they contracted Roly to revise their system. The result was the UTM system highlighted in this issue. A more important result was that rabies case records are now available for computer analysis within a few days of the end of each month. That, in turn, made the Rabies Reporter possible, a project that Chuck LeBer at OMOH was also

working on. We all got together, and here is the result. We need feedback from our readers. Can you suggest ways to improve presentation of the case records? What sorts of feature articles would you like to see in future issues? What don't you like about the Reporter? Would you prefer the Animal Rabies Summary Table grouped by county rather than health unit? Please let us know. Where appropriate we will publish letters to the editor.

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Rabies Incidence Maps

Included in this and future issues of the Rabies Reporter are maps showing the actual locations of diagnosed cases of fox and skunk rabies during the preceding three months. These maps are the results of efforts of Caroline Fielding and Roly Tinline of the Department of Geography, Queens University, Kingston to develop computer database to speed analysis of rabies outbreaks.

The maps utilize the UTM coordinates reported on the rabies specimen submission forms submitted to ADRI, Ottawa. Dots on the maps show the actual location of each rabies case *for which the UTM coordinates were properly* (continued on back page)

recorded. Coordinates which are incomplete, erroneous or otherwise rejected cannot be used and those cases cannot be indicated on the maps. As a result incidence as shown on the maps may vary from that reported in the Animal Rabies Report (also to be a regular feature of the Rabies Reporter). For comparison purposes, incidence maps for the previous quarter and the same quarter of the previous year are included. In some cases, particularly in northern areas, numbers are used on the maps to indicate multiple incidences attributed to a single reporting location, rather than an actual location of each case. There is an important difference between these and all previous maps of rabies in Ontario. Previously such maps presented cases as random dots within each reporting area - a representation of density rather than location.

For more information on UTM mapping and the "Rabies Database" see this month's Insider.

Zoonosis Reports

Thanks to the generosity of Chuck LeBer at OMOH, we are able to include the Zoonosis Reports in the Rabies Reporter. If you are familiar with the previous form of the Zoonosis Reports, you will notice a few changes. The most obvious of these are: the results are summarized by quarter rather than by month and some animal categories have been combined together.

The decision to publish quarterly summaries was arrived at separately by both OMOH and the Rabies Unit, and fits very well with the quarterly format of the Rabies Reporter. As a result monthly breakdowns of rabies incidence will not be readily available.

Combination of animal categories was decided on by Rabies Unit Staff. Foxes and skunks are the only terrestrial species which spread rabies in Ontario and together comprise over 97% of all reported wildlife cases. If you are interested in incidence in other animals in particular (for example horses or bats) we will be glad to provide quarterly breakdowns.

For the time being we have maintained the physical layout of the Animal Rabies Reports much the same as the Zoonosis Reports.

This may change in later issues, possibly in response to reader comments.

Information on the Rabies Reporter

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, Queen's University, Kingston.

The Rabies Reporter will be published quarterly: January, May, July and October.

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

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Inside This Issue

An introduction to the UTM and its use in rabies research and control, by Caroline Fielding, Queens University, Kingston Ontario

The UTM

Analysis of the rabies situation in Ontario is severely hampered by the lack of locational information. Agriculture Canada has recognized the need for an improved location system for disease reporting and as of January 1988 the Universal Transverse Mercator Code (UTMC) became the preferred locator. Although not yet mandatory, the UTM must be included on the rabies submission form in order to make effective use of the data gathered by the federal veterinarians. With this locational information we can better monitor the disease, predict outbreaks and target vaccination programmes to effectively reduce rabies regionally. Thus we would like to take this opportunity to review, briefly, the UTM.

Why the UTM ?

To understand the characteristics and epidemiology of any disease it is necessary to analyze the spatial pattern(s) or distribution of its presence (or absence) in an environment. Thus the need for a "locator". Previously, specimens submitted for rabies testing were coded according to "nearest town" or lot and concession. These error-prone systems were cumbersome and unsuitable for spatial analysis due to low and irregular resolution and dependence upon constantly changing political boundaries. The UTM, based on an international standardized grid system, maintains a constant, high level of resolution and is independent of political

boundaries and human population densities.

Furthermore, it is easy to use in both reporting and analysis and is transferable to maps of differing scales or information.

What is the use of better location information? The primary purpose of rabies diagnosis is health protection and the old system guaranteed that the necessary information would get to the right people quickly. However, when Roly Tinline and others tried to study the patterns of rabies spread, the records were frustrating to use. For example, does rabies occur more frequently on certain soil types? With modern computerized soil maps, that should be easy to examine. But the highest spatial resolution of rabies records was by township or often county, resulting in difficult analysis and a very coarse result. The UTM system will change that in a very positive way.

The UTM and the NTS

The UTM is derived from the Universal Transverse Mercator (UTM) coordinate system - a global grid network that is the basis for Canada's National Topographic Map System (NTS). The UTM required on the rabies submission form is a 12 digit number consisting of a 6 digit map sheet number and a 6 digit easting/northing coordinate. Both must be read from the NTS 1:50,000 scale map sheets. The UTM map sheet number is simply the NTS 1:50,000 map sheet number (found in the top left and right corners of the map as well as at the bottom center on latest editions). The format, however, is slightly different. As a consequence of computer data entry, zeros must be included to ensure the value is read correctly. Thus an NTS map sheet number of 31D6 must be entered as 031D06 on the submission form. If entered as 31D6 or 310D60 it is interpreted incorrectly by the computer. A bolded box present on the form aids the correct entry of the number. It highlights the character reference in the map sheet number.

The final 6 digits of the UTM represent the easting and northing coordinates, 3 digits each, as read from the 1:50,000 NTS map sheets. A two digit easting/northing grid is found directly on the map and the third digit is an estimate (in tenths) of the distance the location falls between the grid lines. The easting is read first, from left to right, followed by the northing, read from bottom to top. Again, the easting/northing coordinate must be 6 digits.

Incorrect or incomplete UTM's are rejected by AgCan's computer and are lost.

Queen's University Department of Geography has been reconstructing the locational information in Agriculture Canada's historical data set. This has been a lengthy process as data format and township boundary changes have created havoc. Use of the UTM eliminates many of the problems that plagued the old system and allows immediate generation of the spatial distribution of the latest rabies cases to a resolution of 100 m². This information facilitates the prediction of outbreaks, detailed habitat studies, epidemiological analyses and the development of rabies control strategies.

Common Errors Found in UTM Reporting

Between January 1/88 and June 30/89, 2981 rabies cases were confirmed in Ontario by ADRI (Animal Diseases Research Institute). Errors in UTM reporting were found in over 25 % of these cases. A closer look revealed 2 main classes of error - true and inadvertent. To understand the source of these errors it is necessary to describe the path by which the UTM is gathered and recorded.

Information Path

In Ontario, federal veterinarians are requested to include on the submission form, the UTM location and the District Office (DO) code for any specimen sent to ADRI for rabies testing. This informa-

tion is entered into AgCan's computer network called the Lab Sample Control System (LSCS). The LSCS then checks the map sheet number portion of the UTMIC against a master list of map sheets valid for each DO. If the map sheet number matches the DO code, the UTMIC is accepted and included in the database as a valid location. If it does not, it is rejected as "invalid for district" and is not included in the database.

Inadvertent Errors

In practice, District Office boundaries cannot be rigidly defined. Many DO's are often located within close proximity to one another and a rabies case may be handled by a DO other than the one responsible for that area. As a consequence of the "permeability" of the district boundaries but "rigidity" of the master check list, the LSCS is inadvertently rejecting valid UTMICs. When the DO code listed on the submission form does not cross-reference with the map sheet number supplied, the LSCS rejects the UTMIC.

A frequent example occurs in the area around Alliston (mapsheet number 031D04). Physically, closer to the Barrie DO (TBAE), the map sheet covering this area is listed as under the jurisdiction of the Richmond Hill (TRIL) DO. Thus when the TBAE code is compared to the UTMIC map sheet number this case is rejected as an error. This type of problem has created UTMIC error rates of over 50%. This is also a major problem for cases found within Toronto as the map sheets are listed under the Toronto DO code (TAAA) but are actually handled by the Richmond Hill DO (TRIL).

AgCan has been advised of this problem. Possible solutions are

- i) redefine the boundary files or
- ii) completely eliminate or bypass the checking process.

Up to December 31, 1989, however, these solutions were not acceptable to AgCan as the LSCS database was processed by consultants (DMR Group) and consequently, any changes would cost. As of January, AgCan has regained control of the database processing and we are encouraging AgCan to make the minor

adjustments necessary to eliminate the "invalid for district" problem.

For the past 2 years Queen's University has been trying to retroactively add these "invalid for district" UTMICs back into the database. This has been possible only because ADRI archival staff have kept track of these rejected UTMICs and forwarded the information to Queen's.

True Errors

True errors in the UTMIC come in several forms:

Missing or Incomplete UTMIC.

The UTMIC is the only locational information accepted by the LSCS. If absent, the smallest level of spatial resolution for such cases becomes the county. Incomplete UTMICs are not entered into the database.

Missing or Misplaced Zeros.

The LSCS will only accept a 12 digit UTMIC. Forgotten or misplaced zeros, even in the easting or northing, can cause the UTMIC to be rejected or an erroneous value included.

Old Submission Forms.

UTMICs entered on old submission forms were error-ridden. New submission forms aid in the entry of the 12 digit UTMIC through the use of highlighting and the division of the UTMIC into sections.

Incorrect Map Sheet Numbers.

Invalid map sheet numbers represent a variety of errors. For example, the "crossing" of map sheet numbers such that 030D03 is obviously a mixture of the valid map sheets 030M14 and 031D03 but is not a valid sheet in itself. Another frequent error occurs in the recording of the final two digits of the map sheet number (following the character reference). This value can never be greater than 16 as it reflects the subdivision of the 1:250,000 scale NTS maps into sixteen 1:50,000 scale maps.

These errors often represent misplaced zeros. Values, however, such as 19 are frequently found.

Non AgCan Submissions.

Submissions from local Humane Societies, bylaw, police and health officials as well as Animal Control personnel must indicate the original location of the specimen - not simply the location of the association involved.

Use of 1:250,000 NTS MAPS.

Due to the size of the areas they cover, vets in Northern Ontario District Offices appear to use the 1:250,000 NTS map sheets to determine the UTMICs. This effectively reduces the resolution of the UTMIC from 100 m² to 1 km². These UTMICs are accepted by the LSCS but must be slightly corrected to compensate for this. This is not a significant problem for habitat analysis given the homogeneity of the northern landscape. They must, however, code the specific animal location and not simply the UTMIC for the nearest town.

Easting and Northings.

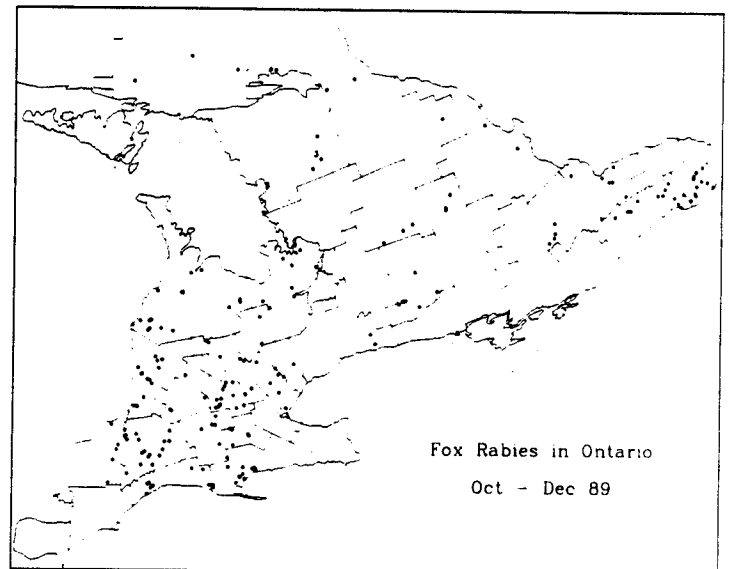
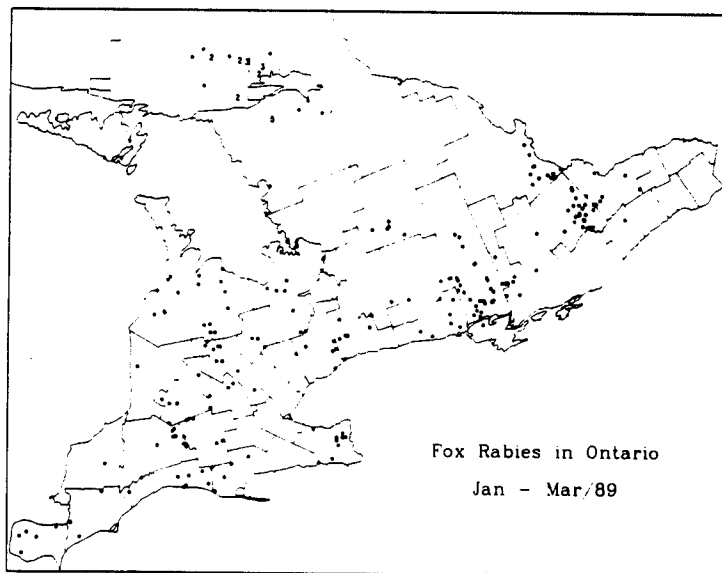
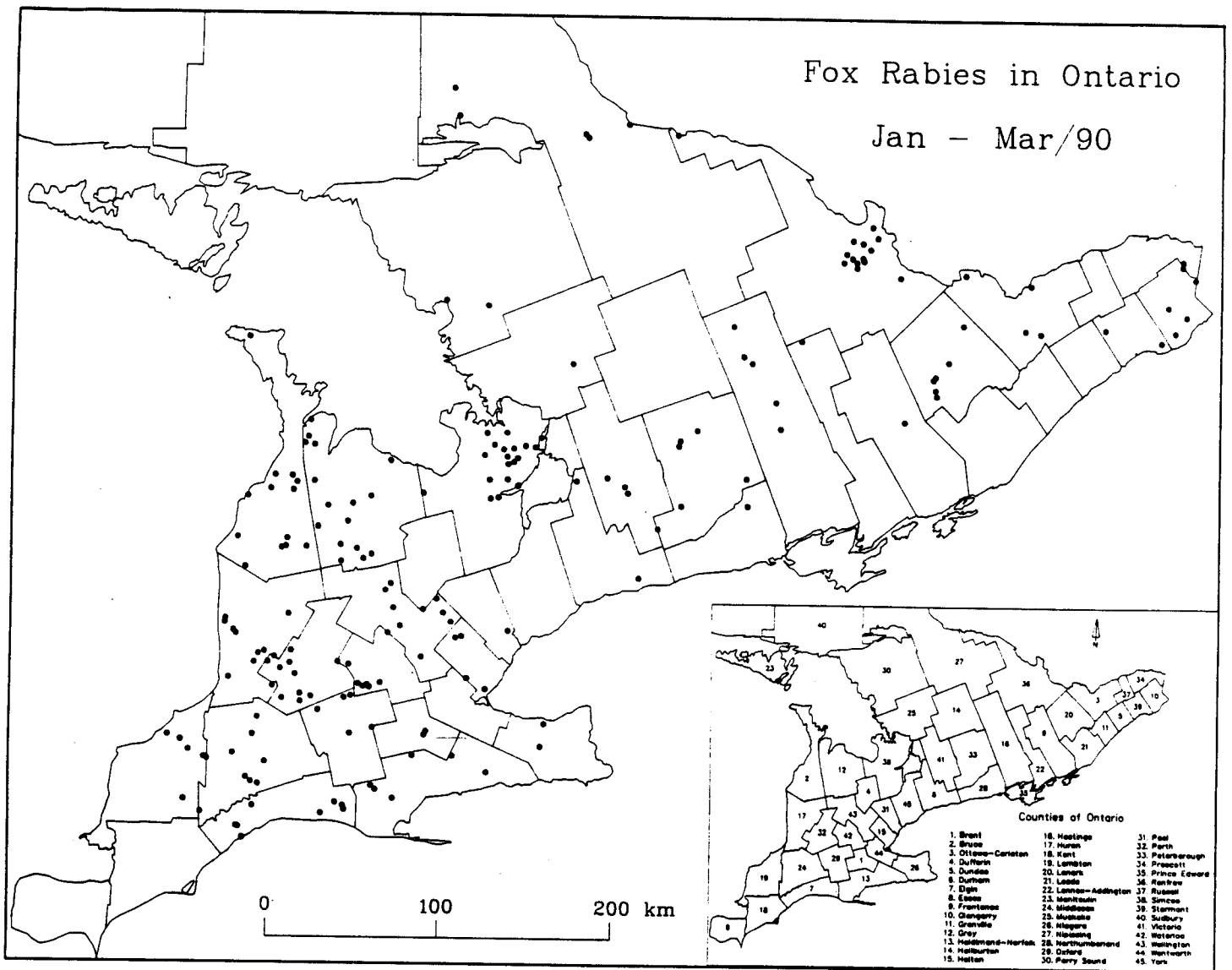
The LSCS has no mechanism by which to check the accuracy of eastings and northings. Thus a UTMIC can never be rejected based on inaccuracy. Several obvious errors, however, have appeared in the database including eastings and northings that indicate locations well into the U.S.A. and Lake Ontario. Also comparisons of addresses given and the UTMICs reveal discrepancies. It is uncertain, however, if these differences are intended or due to difficulties involved in interpreting urban addresses on the NTS maps.

Conclusions

Although UTMIC error rates were initially high, within the past year they have dropped significantly, presumably due to increasing user familiarity with the system. Agriculture Canada, however, must be encouraged to correct the checking system as the "invalid for district" rejections represent a vast proportion of the errors.

Animal Rabies Report: January to March 1990

Animal Type	Health Unit by Area	Fox		Skunk		Other Wildlife		Dog		Cat		Cow		Other Domestic		Total			
		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative		#	Cumulative	
			90	89		90	89		90	89		90	89		90	89		90	89
Eastern																			
	Eastern Ontario	10	10	2	9	9	2	1	1	1	1	8	8	2		2	30	7	
	Leeds-Grenville-Lanark	6	6	28	1	1	4			1		2	2	14	1	5	10	55	
	Ottawa-Carleton	3	3	7	2	2	1				1			2			5	13	
	Renfrew	22	22	17			1	1	1	3	3	2	2	10			29	34	
	Kingston-Frontenac	1	1	9										1		1	1	1	
	Hastings-Prince Ed.	4	4	30	2	2	2		5	1		1	1	6			8	44	
Central East																			
	Peterborough	4	4	3	2	2	9				1	1	3	3		2	10	16	
	Haliburton	7	7	13	7	7	4	1	2		1	1	2	4			20	26	
	Durham	3	3	7	5	5	5				1			9		3	8	25	
	Muskoka-Parry Sound	3	3	13							1		1	1			4	4	
	Simcoe	25	25	7	3	3	10	1	1	1	1	1	1	16			31	35	
	York Regional	1	1	2			5				1						1	10	
	Peel	1	1				1				1	1	1	1			3	2	
	Scarborough			1														3	
	East York																		
	North York						1											2	
	City of Toronto																		
	City of York																		
	Etobicoke			1														2	
Central West																			
	Wellington-Duff-Grey	10	10	12	3	3	4	1	1		6	2	2		9	9	7	28	
	Waterloo	7	7	3	4	4	3			1	1	1			3	3		15	
	Halton	7	7				3	1	1			1	1	1			9	4	
	Hamilton-Wentworth	3	3				1					1	1				4	2	
	Brant	4	4	1	1	1	1		2	2	2	1	1	1		2	11	4	
	Niagara	2	2	13					2	1	3		5				3	23	
	Haldimand-Norfolk	7	7	5											3	3	17	7	



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
Southwestern																								
Elgin-St. Thomas	8	8	7	1	1	7				3	3	4	3	3	1				3	1	1	16	16	22
Oxford	5	5	5	2	2	3						1	2	2		4	4	6				13	13	15
Perth	11	11	7	3	3	4			1	1	1					2	2	2				18	18	14
Grey	16	16	10	5	5	12							2	2		23	23	6	3	3	3	49	49	31
Bruce	12	12	2	2	2	4							1	1	1	10	10	8	1	1		26	26	19
Huron	12	12	2	2	2	4										23	23	4	3	3		40	40	10
Middlesex	8	8	9	1	1	3							1	1	1	12	12	17	1	1		23	23	29
Lambton	7	7	1	3	3	5										1	1	1				11	11	7
Kent-Chatham	2	2	4	1	1	15	1					4						1	1	1	4	4	25	
Windsor-Essex			5	2	2	37						2									2	2	44	
Northern																								
North Bay and District	16	16	6	4	4	1												2			20	20	9	
Timiskaming																								
Porcupine																								
Sudbury District	8	8	14	1	1	1															10	10	15	
Algoma																								
Thunder Bay																								
Northwestern																								
Sub Totals																								
Eastern	46	46	93	14	14	8	2	2	2	4	4	10	1	1	4	13	13	35	1	1	7	83	83	163
Central East	44	44	47	17	17	36	2	2	2	5	1	6	3	3	4	10	10	28			5	77	77	136
Central West	40	40	34	8	8	12	2	2	2	4	4	12	5	5	6	17	17	10	11	11	5	87	87	81
Southwestern	81	81	57	22	22	93				2	4	11	9	9	2	75	75	48	10	10	3	202	202	216
Northern	24	24	20	5	5	2												2				30	30	24
Total	235	235	251	66	66	151	6	6	11	13	13	39	18	18	16	115	115	123	22	22	20	479	479	620

Totals include clinical and other species

Other: Eastern Ontario: 1 bison Perth: 1 coyote

75

Clinical, Current:

Renfrew: 1 wolf Sudbury District: 1 coyote

Other Species, Current:

Skunk Rabies in Ontario

Jan - Mar '90

