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The rabies reporter

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Rabies in 2012: another year of very few cases

Beverly Stevenson, Ministry of Natural Resources

The final quarter of 2012 was very quiet with only one rabid bat reported.

There were only 28 rabies cases in Ontario this year. This is only the second time since 1957 that Ontario has had fewer than 30 cases in a single year. (There was a 29th case but this case did not originate in Ontario and therefore is not included in the tables or maps. This case occurred in a human that acquired rabies while working in the Dominican Republic.)

Once again, bats made up the majority of rabies positives. Of the 28 cases, 25 were in bats (22 big brown bats, 2 eastern red bats, and 1 little brown bat). This is consistent with levels from 2011 when there were 25 rabid bats. The dog from eastern Ontario (Frontenac County) was also infected with bat strain rabies. Although it is uncommon for bat strain rabies to occur in other species, bats can transmit rabies to any mammal species.

The remaining two cases occurred in a skunk (Wellington County) and a cat (Perth County). This is also similar to 2011 cases when there was 1 rabid skunk and 1 cow. Both of these cases were responded to immediately with high-density, aerial baiting in the localized area (8km by 8km plots). However, the cases in 2012 were much more localized; only 16 kms separated the two cases. In 2011, the skunk and cow were separated by approximately 100 kms.

If there are no additional cases in a different area in 2013, the annual oral rabies vaccination area will be much reduced in 2013 since the 2012 cases were so close to each other.

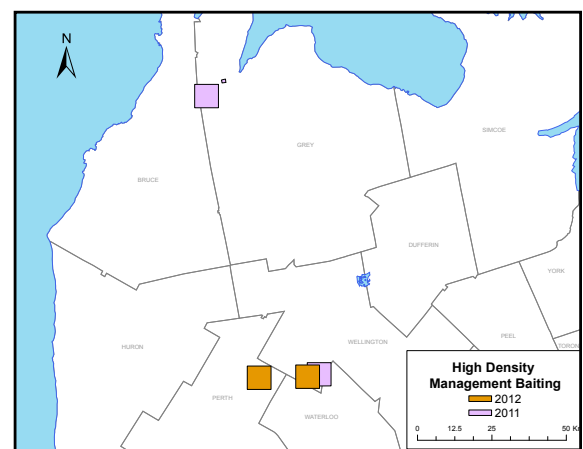


Figure 1. Location of high density baiting in response to terrestrial rabies cases.

The Rabies Reporter, a scientific newsletter about current issues in rabies research and control, is a joint effort of the Rabies Research Unit of the Ontario Ministry of Natural Resources; the Rabies Laboratory at the Ottawa Laboratory (Fallowfield) of the Canadian Food Inspection Agency; and the Ontario Ministry of Health and Long-Term Care. Articles for future issues will be welcomed by the editor. The Rabies Reporter is not refereed, and should not be cited in papers intended for refereed journals. Send contributions, letters and inquiries to:

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Oral rabies vaccination programs 2012

Beverly Stevenson, Ministry of Natural Resources

Our annual oral rabies vaccination (ORV) program began in mid-August in southeastern Ontario and ended in southwestern Ontario approximately one month later.

Southeastern Ontario

For the first time in three years, Mother Nature co-operated and the southeastern Ontario baiting was completed before Quebec baiting began. We were off to a great start!

On August 18th, we distributed approximately 25,000 baits from Twin Otter aircraft on Howe, Simcoe, Wolfe, and Hill Islands and along the mainland near Iroquois to prevent the reincursion of raccoon rabies which persists near the border in New York state.

Quebec

From southeastern Ontario, the aircraft and staff headed to Bromont, Quebec. From August 20th-23rd, approximately 521,000 baits were distributed in southern Quebec to create a barrier of vaccinated raccoons along the Quebec-Vermont border. Although Quebec has been free of raccoon rabies since April 2009, cases still persist near the border in northern Vermont; a vaccination zone must be maintained to prevent reincursion of the disease into Quebec.

The only glitch in the program was when we learned on August 21st that a raccoon in Alexandria Bay, New York, had tested positive for rabies. Alexandria Bay is located on the St. Lawrence River and the baits we had distributed on August 18th did not protect the Ontario mainland directly across the river.

Traditionally, two airplanes have been used for Quebec's ORV program but due to the success of the program, ORV was scaled back somewhat for 2012. We completed 19 flights in four days with one airplane before proceeding to our next destination.

Southeastern Ontario - Round 2

Due to the proximity of Alexandria Bay to mainland Ontario, it was decided to distribute additional baits in southeastern Ontario.

On August 24th, the staff and aircraft headed back to southeastern Ontario and distributed approximately 17,000 baits on Grenadier and Tar islands and the mainland near the Ivy Lea bridge. Despite only having three days to deliver baits to eastern Ontario, create new flightlines, notify the public and relevant agencies, and get permission to fly near the border crossing, the flight went without a hitch.

From here, the airplane returned to its base of operations in northern Ontario and the baiting staff returned to the office in Peterborough. Other baiting staff would be used for the next phase of the ORV program.

Niagara

On August 27th, MNR staff headed to the Niagara area to begin the hand and aerial distribution of baits that would create a buffer of vaccinated raccoons. This buffer of vaccinated animals would help prevent raccoon rabies from invading from New York state. Due to the successful bait distribution with the helicopter in 2011, an EC130 helicopter was used again in 2012. Helicopters are



Figure 2. Helicopter baiting along the Niagara gorge.

much more maneuverable than Twin Otters to target the baits to baitable habitat and avoid the houses, vineyards and orchards that are so abundant in the Niagara peninsula.

While the hand baiting crews began distributing baits in urban areas that afternoon, the remaining staff took to the air to begin the aerial ORV. With only minor delays, we distributed approximately 59,000 baits by helicopter within 3 days. We made several successful adaptations to the previous year's program (including distributing baits along the irrigation ditches in vineyards during the evenings when workers were less likely to be present) which resulted in an additional 5,000 baits being distributed by air this year.

Once aerial baiting was completed, the aerial staff helped the hand baiting staff finish their baiting. By September 6th, approximately 26,000 baits were distributed throughout the urban areas.

Southwestern Ontario

On September 16th, staff headed to the Saugeen Municipal Airport near Hanover, Ontario for the final phase of the 2012 ORV program.

As in 2011, only one aircraft was required to complete the job which covered approximately 17,000 km².

From September 16th-21st, Twin Otter C-FOPJ completed 19 flights in southwestern Ontario distributing approximately 264,000 baits to control fox strain rabies.

Although there were a couple of accessibility issues, they were easily overcome. Canadian Forces Base Meaford

normally closes their firing ranges temporarily so we can complete the ORV flight over their property. This year however, there were training conflicts and they were unable to close the ranges during the week that we would be in southwestern Ontario. Their very cooperative range control officer offered to handbait the base for us. Approximately 1,700 baits were delivered by us on September 10th and the base was baited the following day.

The second accessibility issue was with one of the First Nations properties to be baited. Although we were unable to access the reserve during our regular ORV program, their land use planning coordinator agreed to distribute baits by hand on the reserve. Approximately 1,300 baits were delivered on October 25th and distributed on the 30th.

All in all, it was a very successful ORV program thanks to the cooperation of Mother Nature and Murphy!

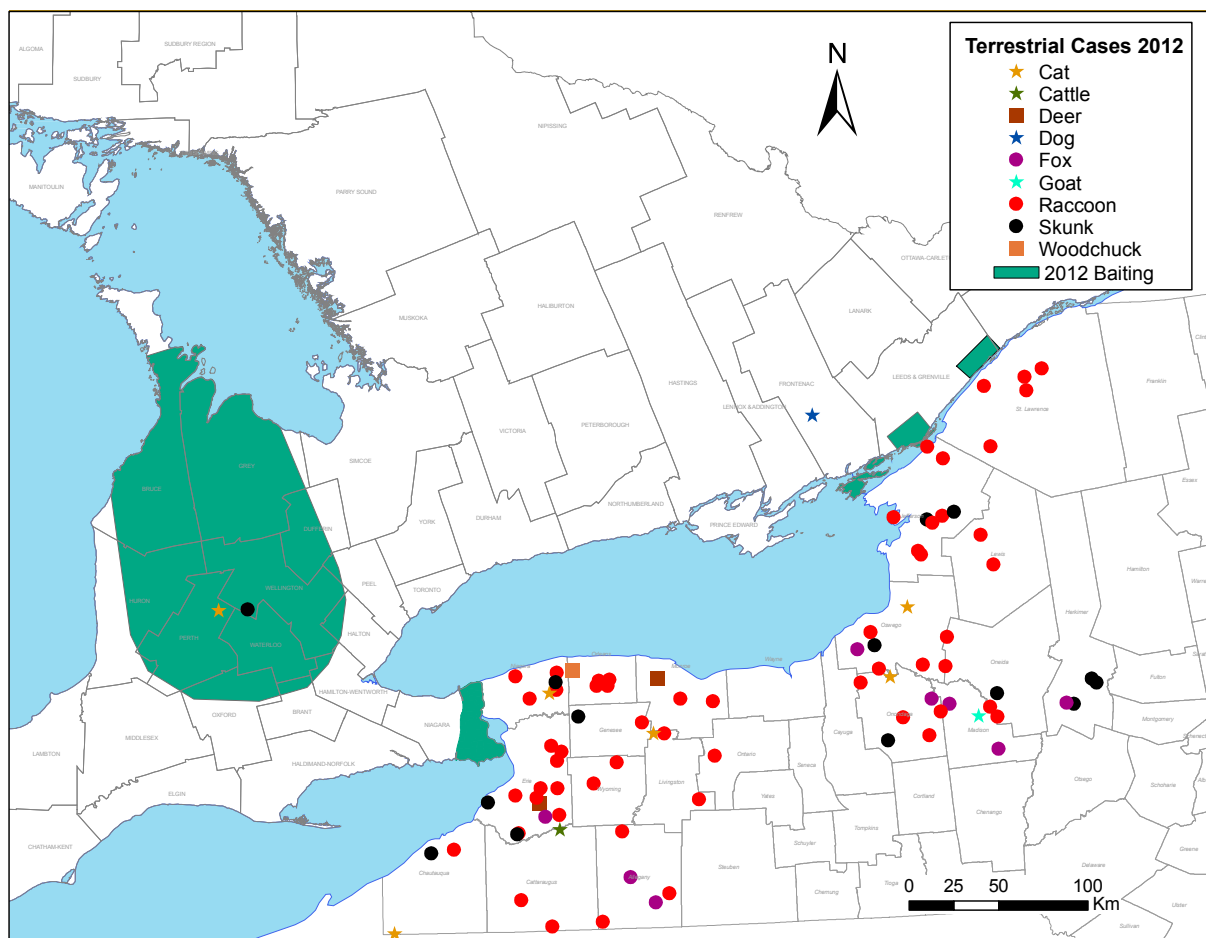


Figure 3. Terrestrial rabies cases in Ontario and bordering New York State during 2012 as well as Oral Rabies Vaccination areas in Ontario.

Summary of ONRAB field trials in the U.S., 2012

Kathleen Nelson, United States Department of Agriculture

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services' (WS) National Rabies Management Program (NRMP) coordinates oral rabies vaccination (ORV) in the US with the goal of controlling and eventually eliminating certain rabies variants to protect human and animal health and reduce significant costs associated with living with rabies.

Large-scale ORV operations have distributed more than 128 million Raboral® V-RG vaccine baits by air and ground across 19 U.S. states since 1995. During 2012, approximately 4.3 million V-RG baits were distributed in 12 eastern states to manage the raccoon rabies variant (Figure 1). The NRMP continues to pursue new vaccine-bait combinations to increase the likelihood of eliminating specific rabies virus variants. Artemis Technologies, Inc. in Guelph, Ontario, Canada, along with numerous partners and collaborators, developed the ONRAB® ORV bait, which

Table 1. ORV bait distribution targeting raccoons in the eastern U.S., 2012.

State	Area (km ²)	RABORAL V-RG	ONRAB	Totals
Alabama	4,215	284,016		284,016
Florida	36	2,700		2,700
Georgia	3,286	217,977		217,977
Maine	2,331	126,750		126,750
Massachusetts	1,007	47,629		47,629
New Hampshire	5/8		35,682	35,682
New York	12,557	642,330	128,553	770,883
North Carolina	3,931	223,647		223,647
Ohio	11,341	504,887	272,034	776,921
Pennsylvania	6,378	459,920		459,920
Tennessee	10,538	606,901		606,901
Vermont	6,407		435,758	435,758
Virginia	4,877	275,250		275,250
West Virginia	20,951	953,789	132,678	1,086,467
Totals	88,433	4,345,796	1,004,705	5,350,501

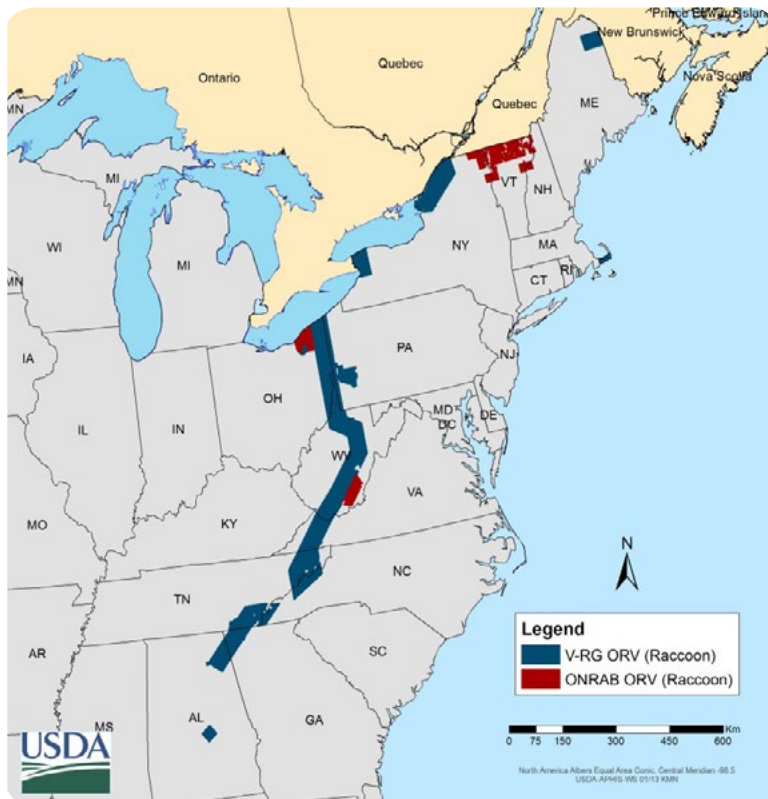


Figure 4. ORV zones for management of raccoon variant rabies in the eastern US.

has been integral to the elimination of raccoon rabies in Quebec as well as to help Ontario maintain raccoon rabies free status. Following encouraging results from the first U.S. field trial using ONRAB® in West Virginia in 2011, expanded trials were completed during 2012 to further evaluate the safety and immunogenicity of this promising oral vaccine.

During August and September 2012, over 1 million ONRAB® baits were distributed in strategic areas of New York, New Hampshire, Ohio, Vermont, and West Virginia (Table 1). Baseline (pre-ONRAB® distribution) and post-ONRAB® distribution sampling included: enhanced rabies surveillance, sera for rabies and human adenovirus serology, and teeth for age and biomarker analysis. Additionally, sera was collected from Raboral® V-RG bait zones in WV and VA utilizing the same sample collection protocol as ONRAB® for comparison. Monitoring for abnormalities among animals and enhanced surveillance for human bait contact (post-bait only) were also integral to the safety evaluation. Approximately 3,441 serum samples were collected during the pre-bait evaluation (including V-RG comparison samples), and 2,089 serum samples were collected for the post-bait evaluation. Pending results from the 2012 field trials will help guide future research and management decisions for ORV in the U.S.

Dr. Susan Nadin-Davis receives the Queen's Jubilee award

Christine Fehlner-Gardiner, Canadian Food Inspection Agency

In recognition of over 30 years of professional excellence as a scientist and researcher in the federal government, Dr. Susan Nadin-Davis was awarded the Queen Elizabeth II Diamond Jubilee Medal in a ceremony held at the Canadian Food Inspection Agency headquarters in Ottawa at the end of January. As part of the 60th anniversary celebrations to commemorate the accession to the throne of Queen Elizabeth II, this medal has been created to honour her Majesty for her service to Canada. It is also an opportunity to honour the significant contributions and achievements by Canadians to a particular province, territory, region or community within Canada, or an achievement abroad that brings credit to Canada. Susan's work has exemplified the spirit of this award.

While spearheaded by her colleagues at CFIA, Susan's nomination was supported by collaborators from across Canada, in the USA and in Europe. Here is an excerpt of the nomination:

"Dr. Nadin-Davis has contributed significantly to the Government of Canada's priorities of strengthening the safety of the food supply, protecting the environment and contributing to the health of Canadians. She has modernized diagnostic testing at the CFIA, bringing her expertise in molecular biology to the development of tools and methods for the detection and characterization of pathogenic agents such as rabies and rabies-related viruses, *Taylorella sp.* (causing contagious equine metritis), *Campylobacter sp.*, bovine immunodeficiency-like virus, bovine syncytial virus, bovine herpesvirus, and the causative agent of scrapie.

Dr. Nadin-Davis is an internationally recognized expert in molecular characterization of rabies viruses. She has contributed with significant impact to the understanding of rabies epidemiology both within Canada and abroad, collaborating on research projects with scientists from several provinces: Ontario, Quebec and Newfoundland, and from the USA, India, Cuba, Saudi Arabia, Brazil, Iran, China, Mexico, and South Africa. She was an integral part of the CFIA team contributing to the

development of a novel recombinant adenovirus-based vaccine for the oral vaccination of wildlife against rabies. This vaccine has been widely used in Canada for the control of rabies in foxes, skunks and raccoons and is currently undergoing field trials in the USA.

Although CFIA is primarily concerned with the diagnosis of animal, plant and food-borne diseases, the Ottawa Laboratory - Fallowfield also serves as the sole testing laboratory for human rabies cases in Canada. The methodologies developed by Dr. Nadin-Davis for the diagnosis of rabies in ante-mortem samples and for virus characterization have been instrumental not only in the rapid identification of human rabies cases,



Figure 5. Dr. Susan Nadin-Davis accepts the Queen's Jubilee award.

but also in the ensuing epidemiological investigations to determine the source of infection. Since 2007, Dr. Nadin-Davis' real-time quantitative RT-PCR assay has allowed the quantitation of virus in saliva samples during the course of experimental treatments of two patients in Canada suffering from rabies. These analyses were instrumental in informing decisions of the treating physicians. Dr. Nadin-Davis' work on rabies virus variant typing, developed in tandem with antigenic typing methods, has led to a better understanding of the epizootiology of rabies in Canadian wildlife and was instrumental in identifying the probable sources of fox rabies outbreaks in northern Ontario and in Newfoundland and Labrador, and raccoon rabies outbreaks in New Brunswick, Quebec and Ontario. Furthermore, her work on bat rabies viruses and bat species identification methodologies helped to identify that there are numerous bat virus variants associated with specific bat reservoir species, and contributed significantly to our understanding of how bat rabies is maintained within these populations in North America.

Dr. Nadin-Davis has contributed significantly to the worldwide recognition of CFIA as a center of expertise in rabies. She has authored or co-authored over 50 publications including research articles in peer-reviewed scientific journals and multiple book chapters, and has represented the Government of Canada at numerous scientific conferences and symposia where she has presented her work. She was a member of the Rhabdovirus study group for the International Committee on Taxonomy of Viruses (ICTV) from 1997-2008, and was one of three Canadian members of the International Steering Committee of the annual "Rabies in the Americas (RITA)" conference from 2001-2007. In 2005, she organized the RITA conference held in Ottawa, which welcomed over 250 delegates from around the world.

In 2000, Dr. Nadin-Davis was appointed Adjunct Professor in the Department of Biochemistry, Microbiology and Immunology in the University of Ottawa Faculty of Medicine. She has demonstrated leadership by mentoring post-doctoral researchers, graduate and undergraduate students from Trent, Carleton and Ottawa Universities and has trained

numerous visiting scientists from around the world in methods of rabies virus characterization and molecular epidemiology. She has also been a guest lecturer in microbiology at Carleton University. Her scientific expertise was recognized by the Natural Science and Engineering Research Council of Canada (NSERC) where she served as a reviewer of projects for the Industrial Research Fellowships Fund from 2001-2004 and 2006-2008. She is frequently requested to provide peer-review of manuscripts by national and international scientific journals.

Since emigrating from Wales, Dr. Nadin-Davis has grasped what it is to be a Canadian, embracing change and challenges, striving for excellence, and is a superb example of a person who should be honoured for her distinguished service to the Government of Canada and to the Canadian Public."

The rabies "community" within Canada and around the world has long recognized the important contributions made by Susan to the field. It is wonderful to see this work also recognized outside of the rabies community. Congratulations Susan for this great achievement!

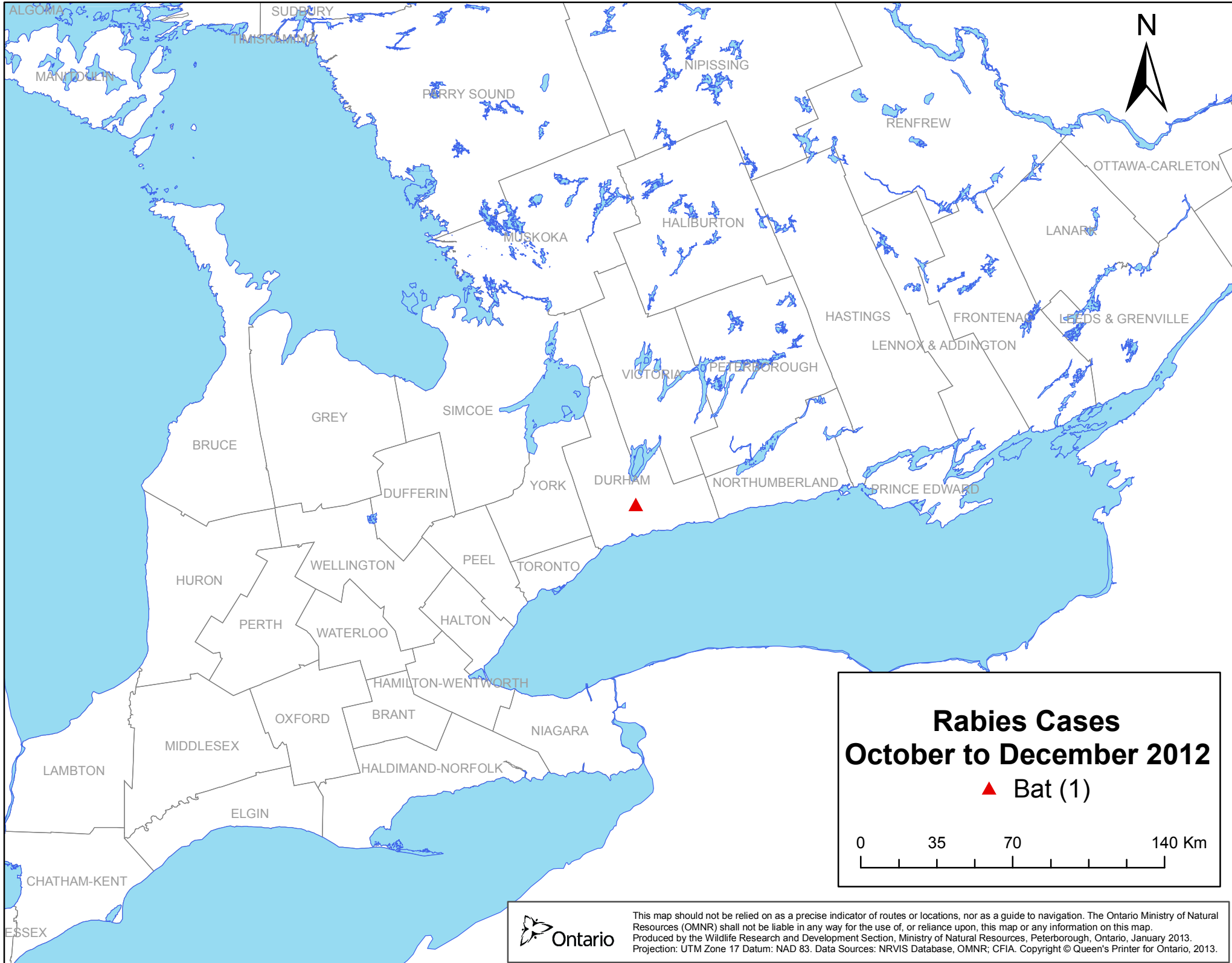
Rabies in the Americas

The Public Health Agency of Canada is organizing the 2013 Rabies in the Americas (RITA) conference which will be held from October 27th-31st. Details of RITA XXIV will be available at <http://www.rabiesintheamericas.org/home>. RITA is an annual event that has been held since 1990. The meeting provides an opportunity for researchers, health professionals, international, national and local managers of rabies programs, wildlife biologists, laboratory personnel and other people interested in advancing knowledge of rabies surveillance, prevention and control, to meet each other, to share their successes and also to discuss the challenges to be met.

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Animal Rabies Report: October to December 2012

Animal Type	Fox			Raccoon			Skunk			Other Wildlife			Bat			Dog			Cat			Livestock			Totals		
County or Region	Cumulative			Cumulative			Cumulative			Cumulative			Cumulative			Cumulative			Cumulative			Cumulative			Cumulative		
	#	12	11	#	12	11	#	12	11	#	12	11	#	12	11	#	12	11	#	12	11	#	12	11	#	12	11
Southern																											
Wentworth														4											0	0	4
Haldimand-Norfolk																									0	0	0
Brant													2												0	2	0
Niagara													2	2											0	2	2
Elgin													2	1											0	2	1
Oxford														1											0	0	1
Middlesex													1	1											0	1	1
Lambton														1											0	0	1
Kent													2												0	2	0
Essex																									0	0	0
Northern																											
Muskoka																									0	0	0
Parry Sound																									0	0	0
Nipissing																									0	0	0
Sudbury and Manitoulin													1	3											0	1	3
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	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	1	0	0	0	0	0	0	0	0	5	3
Central	0	0	0	0	0	0	0	0	0	0	0	0	1	9	5	0	0	0	0	0	0	0	0	0	1	9	5
Western	0	0	0	0	0	0	0	1	1	0	0	0	0	2	3	0	0	0	0	1	0	0	0	1	0	4	5
Southern	0	0	0	0	0	0	0	0	0	0	0	0	0	9	10	0	0	0	0	0	0	0	0	0	0	9	10
Northern	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	1	3
Totals	0	0	0	0	0	0	0	1	1	0	0	0	1	25	24	0	1	0	0	1	0	0	0	1	1	28	26



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