2009 Rabies Summary
Massachusetts Department of Public Health

This report summarizes data collected on animal specimens sent to the William A. Hinton State Laboratory Institute (HSLI) for rabies testing from January through December 2009. Cumulative reports summarizing rabies testing from 1992-2002 and annual reports from 2003 to 2008 are available on the MDPH website and can be found through www.mass.gov/dph/rabies

Number of Submissions and Positive Results by Year

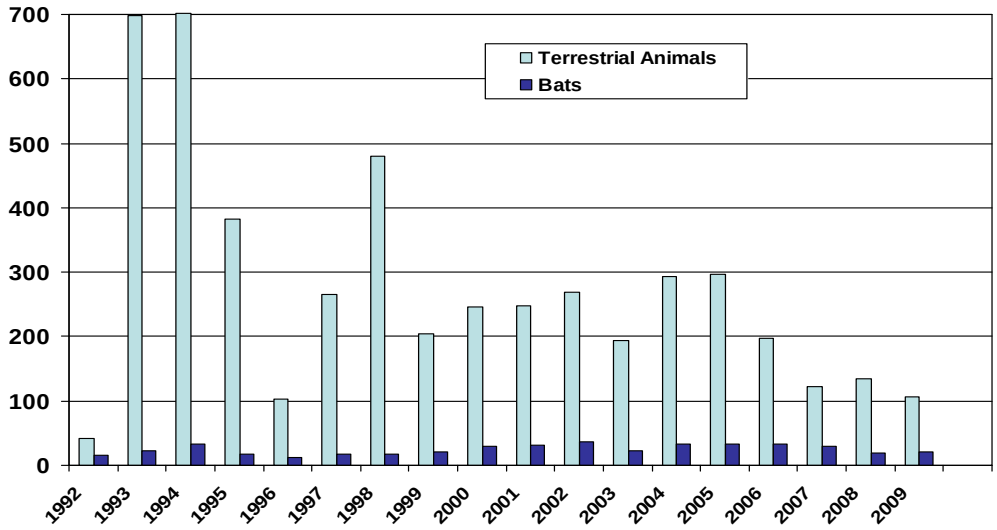
The number of terrestrial animals that tested positive for rabies in 2009 is the lowest since 1996 (see **Table 1**). This decline continues to reflect, in part, a reduction in surveillance animals being submitted from Cape Cod. The decline also likely reflects decreased raccoon and skunk populations on Cape Cod due to the 2004 introduction of the raccoon rabies virus, an observation that has been noted by multiple wildlife organizations familiar with the ecology of the area. Finally, because it has been 5 years since the raccoon strain of rabies reached the last rabies-free portion of Massachusetts, it is probable that the natural enzootic cycle of the virus has been established.

TABLE 1. Number of Submissions, Positive Results and Percent Positive by Year and Type of Animal

	TERRESTRIAL ANIMALS			BATS		
Year	Number Submitted	Number Positive	% Positive	Number Submitted	Number Positive	% Positive
1992	936	42	4%	143	15	10%
1993	3681	698	19%	291	22	8%
1994	4141	701	17%	391	34	9%
1995	3197	383	12%	241	17	7%
1996	2728	103	4%	277	12	4%
1997	2794	265	9%	334	17	5%
1998	3494	480	14%	444	18	4%
1999	2673	205	8%	597	21	4%
2000	2704	247	9%	613	29	5%
2001	2633	248	9%	713	32	4%
2002	2523	268	11%	614	36	6%
2003	2380	193	8%	603	23	4%
2004	2876	293	10%	603	34	6%
2005	2679	296	11%	709	33	5%
2006	2154	198	9%	756	34	5%
2007	2011	123	6%	791	29	4%
2008	2327	135	5%	750	19	3%
2009	**1770**	**107**	**6%**	**698**	**21**	**3%**
Total	**47,701**	**4,985**	**10%**	**9,568**	**446**	**5%**

The number of bats submitted for rabies testing remains relatively stable despite documented population losses in big and little brown bat populations due to “white-nose syndrome”.

Figure 1. Number of Rabies Positive Animal Submissions by Year and Animal Type



Notable Rabies Situations

In 2009, 2,468 specimens were submitted to the HSLI for rabies testing. Of these specimens, 128 were positive for rabies. **Table 2** shows positive animals in 2009. During the second quarter of 2009, a muskrat from Middlesex County tested positive for rabies. The muskrat bit a dog that was current on its rabies vaccine. No human contact was reported. The dog was given a rabies booster vaccination and was quarantined at home for 45 days. This was the first muskrat to test positive for rabies in Massachusetts.

During the third quarter of 2009, a goat from Franklin County tested positive for rabies. The goat developed severe neurologic symptoms requiring isolation from other livestock and euthanasia. There were no known human exposures, and other livestock that had contact with the goat, were quarantined for six months on the farm. Six weeks prior to illness, the goat was noted to have numerous porcupine quills in one of its legs. Anecdotally, it has been noted that animals submitted for rabies testing that have embedded porcupine quills are likely to test positive for rabies. It is theorized that the abnormal behavior of a rabid animal may lead it to interact with a porcupine, an animal that is normally avoided. In this instance, given the timing, it is possible that a rabid raccoon or skunk with embedded porcupine quills exposed the goat to both rabies and quills simultaneously.

Also during the third quarter of 2009, a domestic rabbit from Hampden County tested positive for rabies. The rabbit had been wounded by a skunk approximately three weeks earlier, while being allowed to run in a play yard outdoors. After that encounter, the owner was advised by a veterinarian to keep it isolated. It was kept caged in a basement until it subsequently developed neurologic symptoms, was euthanized and tested positive for rabies. The family dog received a rabies booster vaccination after reported direct contact with the rabbit. It was determined that no humans had an exposure requiring rabies post exposure prophylaxis.

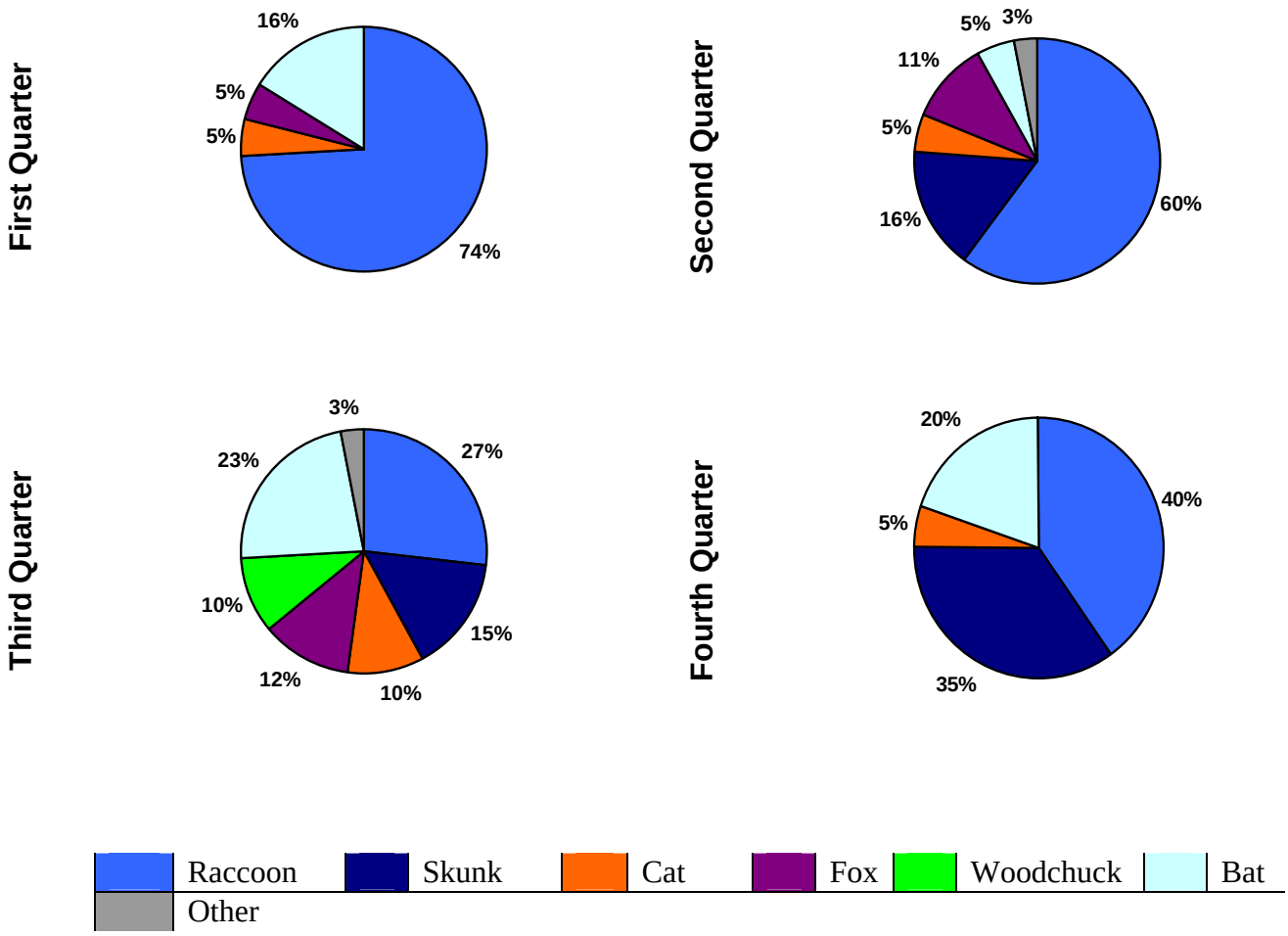
Number of Submissions and Positive Results by Species

Raccoons and skunks continued to account for the large majority of rabies positive animals in Massachusetts. (see **Figure 2**)

Table 2. Number of Animals Positive for Rabies/Animals Submitted (%), 2009								
Animal	**1st Quarter**		**2nd Quarter**		**3rd Quarter**		**4th Quarter**		**Total 2009**	
Raccoon	14/28	(50%)	22/60	(36.6%)	14/25	(56.0%)	8/15	(53.3%)	**58/128**	(45.3%)
Skunk	0/4	(--)	6/16	(37.5%)	8/56	(14.3%)	7/14	(50.0%)	**21/90**	(23.3%)
Cat	1/185	(0.5%)	2/192	(1.0%)	5/264	(1.90%)	1/222	(0.5%)	**9/863**	(1.0%)
Fox	1/5	(20%)	4/12	(33.3%)	6/12	(50.0%)	0/3	(--)	**11/32**	(34.4%)
Woodchuck	0/2	(--)	0/18	(--)	5/25	(20.0%)	0/2	(--)	**5/47**	(10.6%)
Bat	3/81	(3.7%)	2/120	(1.7%)	12/460	(2.6%)	4/37	(10.8%)	**21/698**	(3.0%)
Cow	0/0	(--)	0/2	(--)	0/0	(--)	0/2	(--)	**0/4**	(--)
Coyote	0/1	(--)	0/2	(--)	0/1	(--)	0/0	(--)	**0/4**	(--)
Dog	0/104	(--)	0/128	(--)	0/120	(--)	0/101	(--)	**0/453**	(--)
Otter	0/0	(--)	0/0	(--)	0/0	(--)	0/0	(--)	**0/0**	(--)
Other*	0/22	(--)	1/50	(2.0%)	2/47	(3.0%)	0/30	(--)	**3/149**	(2.0%)
TOTAL	**19/432**	**(4.4%)**	**37/600**	**(6.1%)**	**52/1010**	**(5.1%)**	**20/426**	**(4.7%)**	**128/2468**	(5.2%)

QII: Muskrat - QIII: Goat, Rabbit

Figure 2. Proportion of All Positive Results Represented by Each Species, by Quarter



Cumulative Submissions and Positive Results by Month

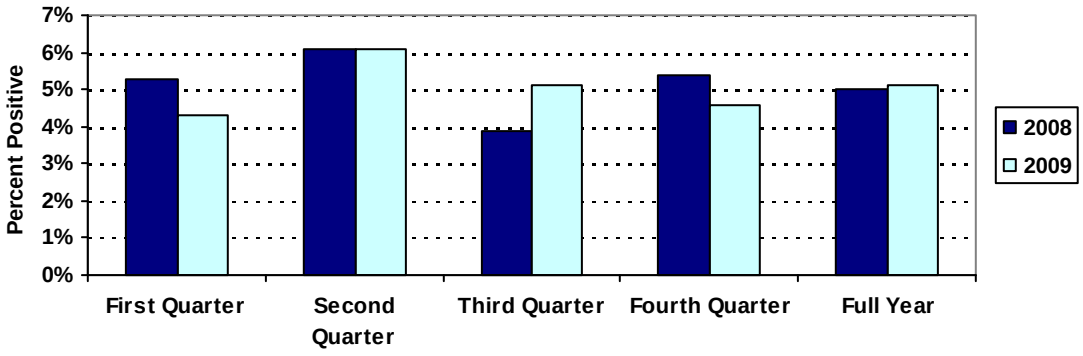
Animal submission numbers fluctuate throughout the year. As might be expected, the highest number of submissions occurs during June, July and August (see **Table 3**). The lowest number of submissions occurs during the winter months. This same trend is seen annually and is due to the greater activity of wildlife species during the spring and summer months coinciding with the time that humans increase their outdoor activity. These simultaneous events result in more frequent contact between humans and wildlife, and lead to more animal rabies testing.

Table 3. Submissions, Number Positive for Rabies, and Percent Positive by Month and Animal Type, 2008 and 2009

	TERRESTRIAL ANIMALS						BATS					
Month	**Submitted 2008**	**Positive 2008**		**Submitted 2009**	**Positive 2009**		**Submitted 2008**	**Positive 2008**		**Submitted 2009**	**Positive 2009**	
January	136	5	4%	118	5	4%	25	1	4%	30	1	3%
February	114	6	5%	115	6	5%	18	0	0%	23	2	9%
March	177	14	8%	118	5	4%	13	0	0%	28	0	0%
April	203	23	11%	143	12	8%	17	1	8%	18	1	6%
May	225	10	4%	139	10	7%	13	7	6%	45	1	2%
June	220	8	4%	198	13	7%	122	5	4%	57	0	0%
July	249	11	4%	194	15	8%	127	2	1%	143	2	1%
August	257	13	5%	178	10	6%	292	3	5%	296	7	2%
September	236	14	6%	178	15	8%	59	0	0%	21	3	14%
October	182	15	8%	128	7	5%	18	0	0%	9	2	22%
November	149	10	7%	145	5	3%	22	0	0%	9	1	11%
December	179	6	3%	116	4	3%	24	0	0%	19	1	5%
TOTAL	2327	135(6%)		1770	107(6%)		750	19(3%)		698	21(3%)	

The proportion of animals testing positive for rabies also varies throughout the year, generally showing a consistent pattern from year-to-year (see **Figure 2**).

Figure 3. Percent Positive of All Submissions by Quarter, by Year



Submissions and Positive Results by County

In 2009, each of the 14 counties in Massachusetts submitted at least one animal for rabies testing, and all counties, except Nantucket and Dukes, had at least one animal that tested positive (See **Table 4** below). Middlesex and Worcester counties submitted the highest number of animals (n = 453, n = 312, respectively). Worcester County had the highest number of animals that tested positive (n = 24) and Franklin County had the highest proportion of submitted animals that tested positive (20%).

Table 4. Rabies Testing Data by County- Number of Animals Positive for Rabies/Number of Animals Submitted (%)

County	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Cumulative	
Barnstable	1/21	(4.8%)	0/20	(--)	1/48	(2.1%)	1/20	(5.0%)	3/109	(2.8%)
Berkshire	**1/9**	**(11.1%)**	1/15	(6.7%)	**2/17**	**(11.7%)**	0/11	(--)	4/52	(7.7%)
Bristol	0/24	(--)	5/55	(9.1%)	2/71	(2.8%)	3/28	(10.7%)	10/178	(5.6%)
Dukes	0/0	(--)	0/1	(--)	0/0	(--)	0/2	(--)	0/3	(--)
Essex	0/57	(--)	3/82	(3.7%)	4/106	(3.8%)	2/54	(3.7%)	9/299	(3.0%)
Franklin	**1/6**	**(16.7%)**	**4/16**	**(25%)**	**4/27**	**(14.8%)**	**2/5**	**(40.0%)**	**11/54**	**(20.4%)**
Hampden	1/25	(4.0%)	1/21	(4.8%)	3/42	(7.1%)	2/23	(8.7%)	7/111	(6.3%)
Hampshire	**1/8**	**(12.5%)**	1/14	(7.1%)	**4/36**	**(11.1%)**	0/12	(--)	6/70	(8.6%)
Middlesex	3/89	(3.4%)	6/108	(5.6%)	8/173	(4.6%)	0/83	(--)	17/453	(3.8%)
Nantucket	0/0	(--)	0/2	(--)	0/1	(--)	0/0	(--)	0/3	(--)
Norfolk	0/53	(--)	3/67	(--)	7/150	(4.7%)	1/41	(2.4%)	11/311	(3.5%)
Plymouth	**5/37**	**(13.5%)**	**5/47**	**(10.6%)**	7/89	(7.8%)	3/33	(9.1%)	20/206	(9.7%)
Suffolk	2/50	(4.0%)	2/68	(2.9%)	1/110	(0.9%)	0/53	(--)	5/281	(1.8%)
Worcester	4/51	(7.8%)	5/72	(6.9%)	9/132	(6.8%)	6/57	(10.5%)	24/312	(7.7%)

Figure 4. Number of Animals Submitted for Rabies Testing by County, 2009