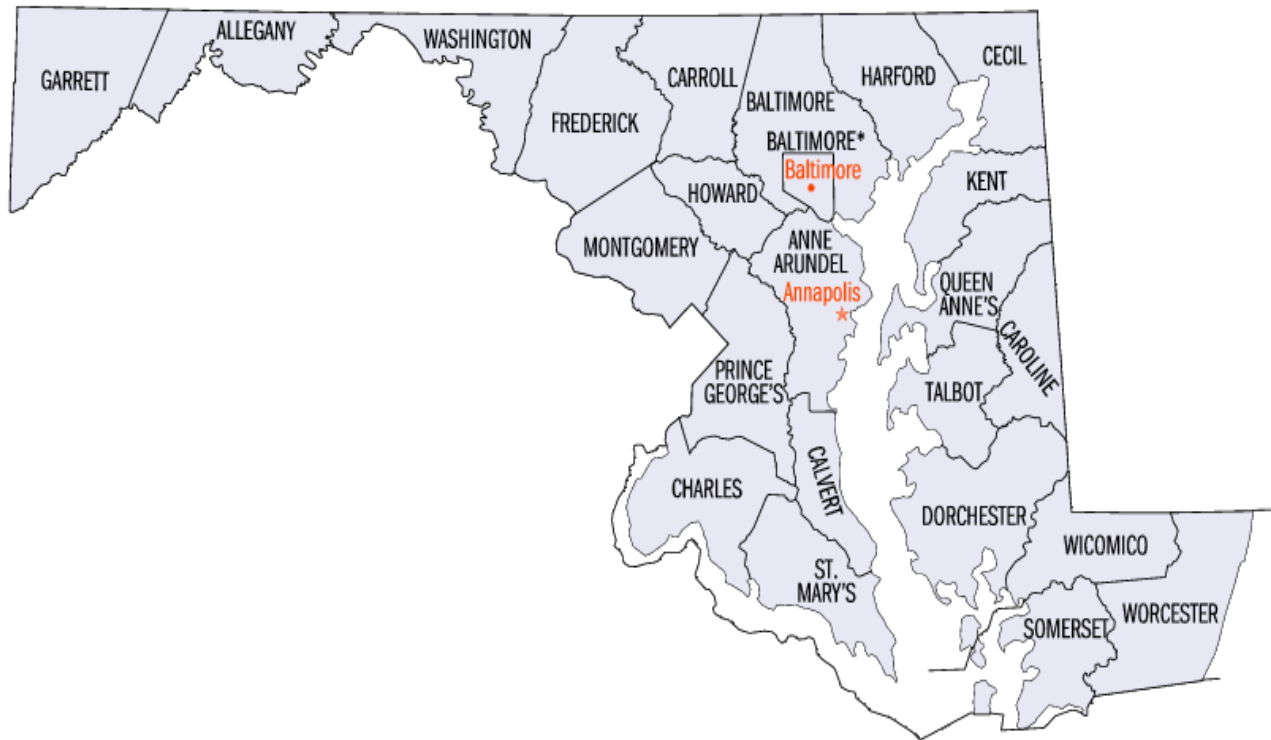


REPORT OF LABORATORY CONFIRMED CASES OF ANIMAL RABIES IN MARYLAND

2005



Map Courtesy of the Department of Commerce,
Economics and Statistics Administration,
Bureau of the Census

Boundaries as of January 1, 1990

**Center for Veterinary Public Health
Office of Epidemiology and Disease Control Programs
Community Health Administration
Maryland Department of Health and Mental Hygiene**

Preface

This report presents surveillance data on laboratory confirmed rabid animals in Maryland in 2005. The Maryland Department of Health and Mental Hygiene's (DHMH) Laboratories Administration tested the majority of the animals. In addition, the Maryland Department of Agriculture (MDA) Animal Health Diagnostic Laboratory in Salisbury also tested select animals for rabies. The DHMH Laboratories Administration, Virology Section, tested all animals involved in human exposure for rabies.

Within DHMH, the Division of Rabies and Vector-borne Diseases determines the number of laboratory confirmed rabid animals reported for each jurisdiction by comparing individual and monthly reports from both laboratories with monthly reports submitted by the 24 local health jurisdictions in Maryland. Rabid animals are reported by the date of specimen receipt at the rabies laboratory and by the jurisdiction submitting the animal for testing. Also included in this document are detailed summary data comparing rabies cases in Maryland over a 20-year period, from 1985-2005.

The Center for Veterinary Public Health (CVPH) would like to thank the communicable disease and environmental health staff of the local health departments in Maryland for their case investigations and reporting of rabies surveillance data. The CVPH would also like to express appreciation to the DHMH Rabies Laboratory and the Salisbury Animal Health Laboratory for their excellent diagnostic work and timely reporting as well as the Centers for Disease Control and Prevention (CDC) for their epidemiological and laboratory support. Finally, we wish to thank three individuals (two CVPH staff members and one student intern) who were instrumental in the preparation of this report: Mary Armolt, who collected and tabulated the data and input it into tables, Sarah Beck who composed and edited the text and refined the tables and graphs, and Kimberly C. Mitchell, who reviewed and edited the document.

Report of Laboratory Confirmed Cases of Animal Rabies in Maryland, 2005

In 2005, the 24 jurisdictions of Maryland combined reported 386 laboratory confirmed cases of rabies in animals (Tables 1, 2, and 3). The Maryland Department of Health and Mental Hygiene (DHMH) Rabies Laboratory and the Salisbury Animal Health Laboratory collectively received 5009 specimens for diagnostic testing in 2005 (8.0% positive). These data indicate a slight increase from the number of specimens submitted from last year (4861 submitted specimens in 2004, including those with inconclusive results) as well as an increase from the number of specimens submitted in 2003 (4828 specimens). This represents a change in the general trend from the last few years, since prior to this year there had been a steady decrease in submissions (Table 6). Similarly, the number of laboratory confirmed rabies cases (386 in 2005) represents the first increase in rabies cases seen since 2000, when the number of rabies cases jumped from 419 to 505 cases (Figure 5). The largest numbers of cases were submitted in June, July, and August 2005, similar to previous years, in which the largest numbers of laboratory-confirmed positive animals were reported in June, August, and September (Figure 4). As in the past, this pattern is most likely due to more frequent contact between humans and animals as a result of increased recreational activity outdoors during warmer months.

Animal rabies was reported from all 24 Maryland jurisdictions in 2005. The jurisdictions with the fewest laboratory confirmed cases were Kent and Dorchester counties, each with only 2 cases, and Calvert and Garrett counties, each with 5 cases. Last year in 2004, Kent, Dorchester, and Garrett counties all had very low numbers of confirmed rabid animals (1, 4, and 4 respectively); however, Calvert county decreased from 8 to 5 from 2004 to 2005 (Table 1, Figure 1). Allegany County, in which 3 rabid animals were confirmed in 2004 and 1 in 2003, increased to 9 rabid animals in 2005. The jurisdictions with the largest number of laboratory confirmed cases of rabies in 2005 included Montgomery and Frederick counties with 41 cases, Baltimore County with 34 cases, and Carroll County with 30 cases. Frederick and Montgomery counties have traditionally been the two jurisdictions in Maryland with the largest number of rabies cases (46 and 52 cases respectively in 2004), although their numbers have substantially dropped over the last year. Although Montgomery and Frederick counties combined accounted for 30% of the total laboratory-confirmed animal rabies cases in 2004, in 2005 they accounted for only 21% of the rabid animals in Maryland. On the other hand, the 2005 data for Carroll County show a large jump in rabies cases over the past year (14 cases in 2004).

For the purposes of this report, the main species of concern for rabies infection and transmission are bats, cats, dogs, foxes, groundhogs, and skunks. This is based on a comparatively higher prevalence of positive laboratory-confirmed results in these species. All other species are categorized as "other". For 2005, there were two rabies positive reports for species in the "other" category: 1 bovine and 1 beaver (Table 1). Other species that were tested for rabies in 2005 but that did not have positive laboratory results include the following species: cavies, chipmunks, coyotes, deer, ferrets, gerbils, goats, guinea pigs, hamsters, horses, lambs, moles, mice, muskrats, pigs, ponies, rabbits, rats, sheep, squirrels, voles, and 6 unclassified animals described as "other" in the species column (Table 2). Of the species categorized in the "other species" category, opossums were the most commonly tested (162 cases) followed by squirrels (84 cases) and rabbits (64 cases) (Table 2).

Wild animals, including raccoons (245 cases), bats (41 cases), foxes (39 cases), skunks (28 cases), groundhogs (2 cases), and beavers (1 case), accounted for 92.2% of laboratory confirmed animal rabies cases in Maryland during 2005 (Tables 1, 2, and 3). This is to be expected, given that most cases of animal rabies since 1980 have occurred in wild animals (Table 6). Raccoons represented the majority of laboratory confirmed cases of rabies in animals in 2005 with 245 positive cases, or 63.5% of the positive animals of all species, representing a drop in the proportion of rabies cases from 2004,

in which 72.6% of positive cases were raccoons (Table 6). The species with the next highest prevalence of rabies after raccoons were bats (41 cases, 10.6% of the total confirmed rabies cases), foxes (39 cases, 10.1%), cats (28 cases, 7.3%), and skunks (27 cases, 7.0%). In 2004 there were 23 bats, 24 foxes, 13 cats, and 22 skunks, indicating that there was a large increase in wildlife species other than raccoons. Most notably, the number of bats and foxes with positive test results increased markedly, and the number of positive cats more than doubled from 2004 to 2005. In 2003, bats had relatively low numbers of rabies cases (7 confirmed cases), and in 2004 these numbers rose to 23 cases; however, this is still much lower than the 41 bats reported in 2005. This increase could represent either an increase in detection or an increase in numbers of rabid animals; however, this is a significant trend given that most human rabies cases are attributable to the bat serovar. Other wild species reported very low numbers of infected animals. These included groundhogs (2 cases) and a beaver (1 case). Despite fluctuations, the wild animals with consistently high numbers of positive rabies test results remain predominantly raccoons, with significant numbers of bats, foxes, and skunks. A more detailed listing of annual rabies counts by species can be found in Table 2.

Local health jurisdictions report rabies test results in both domestic and wild animals. For purposes of this report, the term “domestic animals” is divided into two categories: small domestics and large domestics. Small domestics include dogs, cats, and ferrets, while large domestics include livestock (horses, cattle, pigs, sheep, and goats). In 2005, there were 31 total positive rabies cases among domestic animals—28 cats, 1 dog, 1 horse and 1 bovine—constituting 8.0% of the total rabies cases (Table 2). As in 2004, cats composed the overwhelming majority of domestic animal rabies cases (93% of rabies cases in domestic animals). The total number of rabid domestic animals in 2005 is exactly twice as many as in 2004, in which there were only 15 total rabies-positive domestic animals, including 13 cats, 2 cattle, and 1 dog. This dramatic increase in rabies positive domestic animals is attributable to the huge jump in feline cases in 2005. Unlike 2003 and similar to 2004, there were no laboratory-confirmed rabies positive results in ferrets or pigs in 2005 (Table 6).

The Maryland Department of Health and Mental Hygiene (DHMH) Rabies Laboratory and the Salisbury Animal Health Laboratory routinely administer the direct fluorescent antibody test (dFA) as the rabies laboratory test of choice. This is a post-mortem test that requires tissues from the cerebrum, hippocampus, and brainstem. The three possible laboratory results for rabies laboratory testing are positive, negative, and unsatisfactory. An unsatisfactory result refers to one in which the result cannot be obtained or is inconclusive. Most commonly, unsatisfactory test results are from small animals, such as bats, with severe autolysis and loss of sufficient fresh brain tissue with which to run the dFA test. For practical purposes, cases in which there were human exposures to an animal with an unsatisfactory test result were treated as if the result were positive, generally resulting in recommendations for human rabies post-exposure prophylaxis (PEP).

No cases of rabies in humans were reported in Maryland during 2005. The last case of human rabies in Maryland occurred in 1976 and was the result of a bat exposure.

**Table 1: Laboratory Confirmed Cases of Animal Rabies by
Jurisdiction and Species, in Maryland, 2005**

Jurisdiction	Bat Total	Cat Total	Dog Total	Fox Total	Groundhog Total	Raccoon Total	Skunk Total	Other * Total	Grand Total
Allegany				1		6	2		9
Anne Arundel	11	2				13			26
Baltimore	2	2	1	3		28			36
Baltimore City	8					11			19
Calvert				2		2	1		5
Caroline						8			8
Carroll		4		8		17	1	1	31
Cecil		1		3		6	1		11
Charles	1	1		3		5	1		11
Dorchester						2			2
Frederick	1	4		2		28	5	1	41
Garrett		1				3	1		5
Harford	3	1		4		14		1	23
Howard		1				8			9
Kent						2			2
Montgomery	3	1		1		36			41
Prince George	9	1		1	1	11			23
Queen Anne's	1					6	5		12
Somerset	1	1				5			7
St. Mary's	1	1		4		5	4		15
Talbot				1	1	5	2		9
Washington		5		3		4	2		14
Wicomico		2		2		5	2		11
Worcester				1		15			16
Total Positive	41	28	1	39	2	245	27	3	386

* Includes one cow and one beaver.

Table 2: Rabies Laboratory Test Results for All Species in 2005

Species	Negative	Positive	Unsatisfactory	TOTAL
Bat	787	41	28	856
Beaver	3	1		4
Cat	1842	28	5	1875
Cavy	1			1
Chipmunk	10		1	11
Cow	24	1		25
Coyote	1			1
Deer	16			16
Dog	870	1	1	872
Ferret	10			10
Fox	96	39	1	136
Gerbil	1			1
Goat	13			13
Groundhog	140	2	4	146
Guinea Pig	1			1
Hamster	9			9
Horse	24	1		25
Lamb	2			2
Mole	4		1	5
Mouse	27			27
Muskrat	9			9
Opossum	148		14	162
Other	6			6
Pig	1			1
Pony	1			1
Rabbit	62		2	64
Raccoon	294	245	12	551
Rat	35		2	37
Sheep	4			4
Skunk	21	27	4	52
Squirrel	82		2	84
Vole	2			2
Grand Total	4546	386	77	5009

Figure 1: Laboratory-Confirmed Rabies Cases (n=386) by Jurisdiction (n=24), 2005

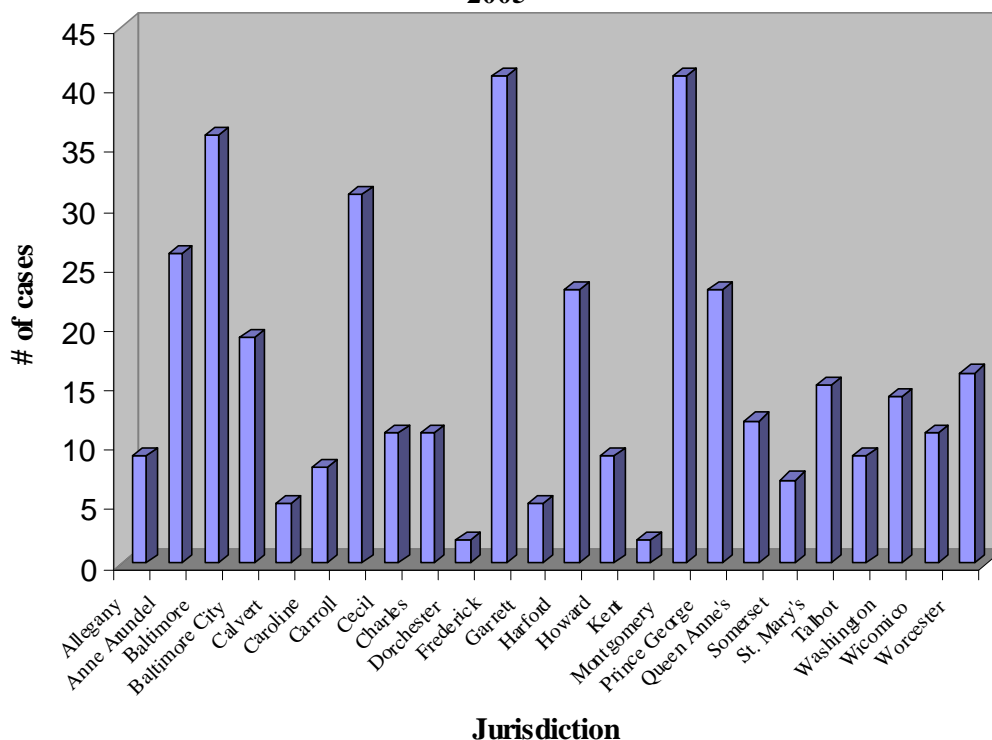


Table 3: Laboratory Confirmed Cases of Animal Rabies by Species in Maryland, 2005

Species	Frequency	Percent Positive
Raccoon	245	63.47
Bat	41	10.62
Fox	39	10.10
Cat	28	7.25
Skunk	27	6.99
Groundhog	2	0.52
Beaver	1	0.26
Cow	1	0.26
Dog	1	0.26
Horse	1	0.26
Grand Total	386	100

Figure 2: Laboratory Confirmed Rabid Animals (n=386) in Maryland by Species, 2005

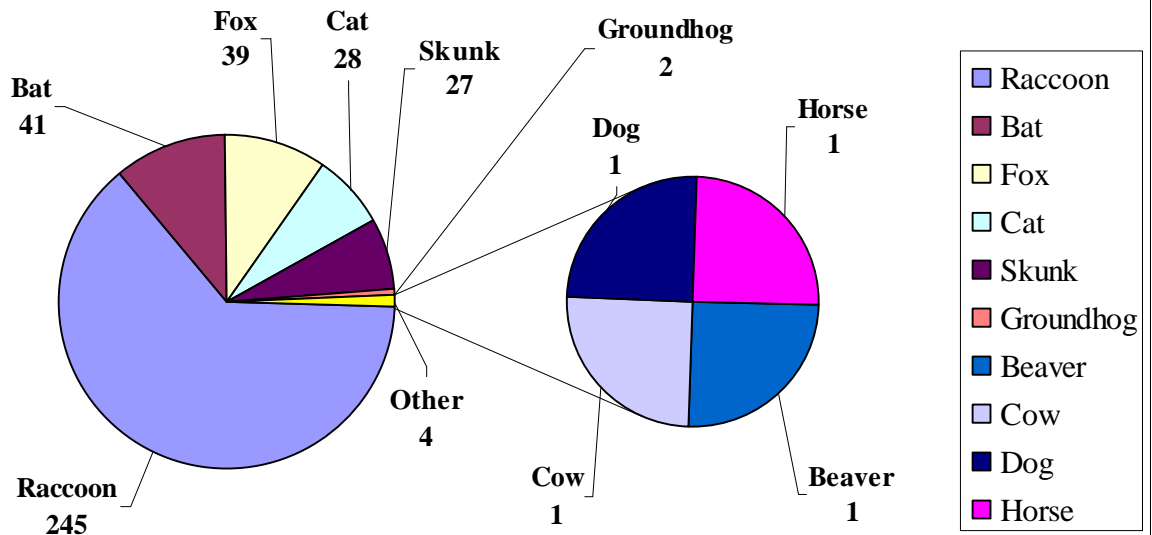


Figure 3: Distribution of Tested Animals (n=5009) by Species, 2005

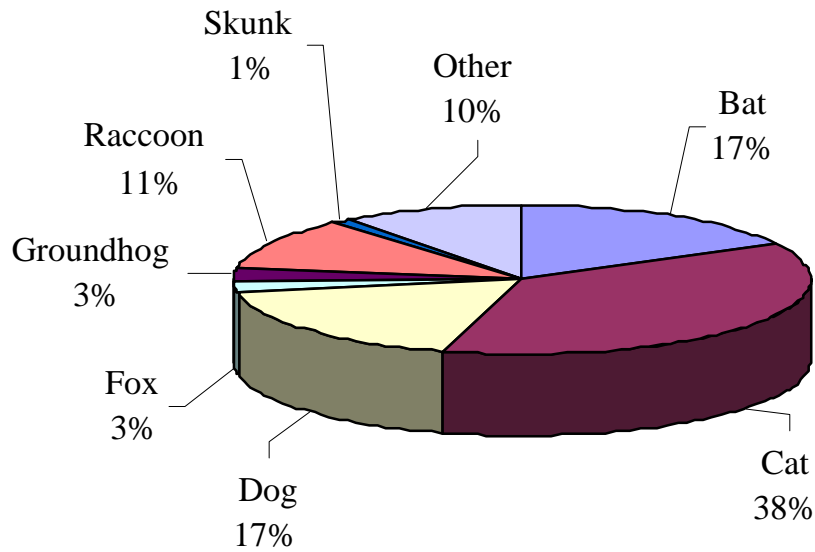


Table 4: Laboratory Results of Animals Tested for Rabies by Month and Species, in Maryland, 2005

Month	Bat				Cat				Dog				Fox				Groundhog			
	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total
January	41	1	2	44	120	4		124	68			68	5	1		6				
February	32			32	109	1		110	55			55	4	1		5	2			2
March	27		2	29	132	1		133	78			78	2	3		5	6		1	7
April	29	1	2	32	113	2		115	69			69	3	1		4	14			14
May	37	2	1	40	129	1	1	131	72	1		73	9	6		15	12			12
June	134	6	3	143	218	3	1	222	97			97	12	9		21	29			29
July	97	3	5	105	196	3	1	200	74			74	12	5		17	22		2	24
August	261	14	6	281	188	4		192	89		1	90	11	2	1	14	18	1		19
September	53	8	4	65	177	3	1	181	67			67	10	3		13	17		1	18
October	11			11	191	1		192	71			71	10	4		14	10	1		11
November	30	6	2	38	144	4		148	68			68	10	1		11	8			8
December	35		1	36	125	1	1	127	62			62	8	3		11	2			2
Grand Total	787	41	28	856	1842	28	5	1875	870	1	1	872	96	39	1	136	140	2	4	146

Table 4: Laboratory Results of Animals Tested for Rabies by Month and Species, in Maryland, 2005 (cont'd)

Month	Raccoon				Skunk				Other				TOTAL			
	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total
January	14	14		28	1	3		4	25			25	274	23	2	299
February	12	16	1	29	1	1		2	24	1	1	26	239	20	2	261
March	21	27	1	49	3	3		6	38		2	40	307	34	6	347
April	24	20	2	46		1		1	45			45	297	25	4	326
May	34	20	2	56		1		1	59			59	352	31	4	387
June	49	26	2	77	1	1	1	3	59		2	61	599	45	9	653
July	24	15		39	6	2		8	43		2	45	474	28	10	512
August	25	22	3	50	4	1	1	6	50	1	6	57	646	45	18	709
September	23	27		50	1	4		5	64		3	67	412	45	9	466
October	44	25		69	2	6	1	9	36		5	41	375	37	6	418
November	17	12	1	30	1	2	1	4	27		1	28	305	25	5	335
December	7	21		28	1	2		3	26	1		27	266	28	2	296
Grand Total	294	245	12	551	21	27	4	52	496	3	22	521	4546	386	77	5009

Figure 4: Number of Tested Animals (n=5009) and Laboratory Confirmed Animal Rabies Cases (n=386), 2005

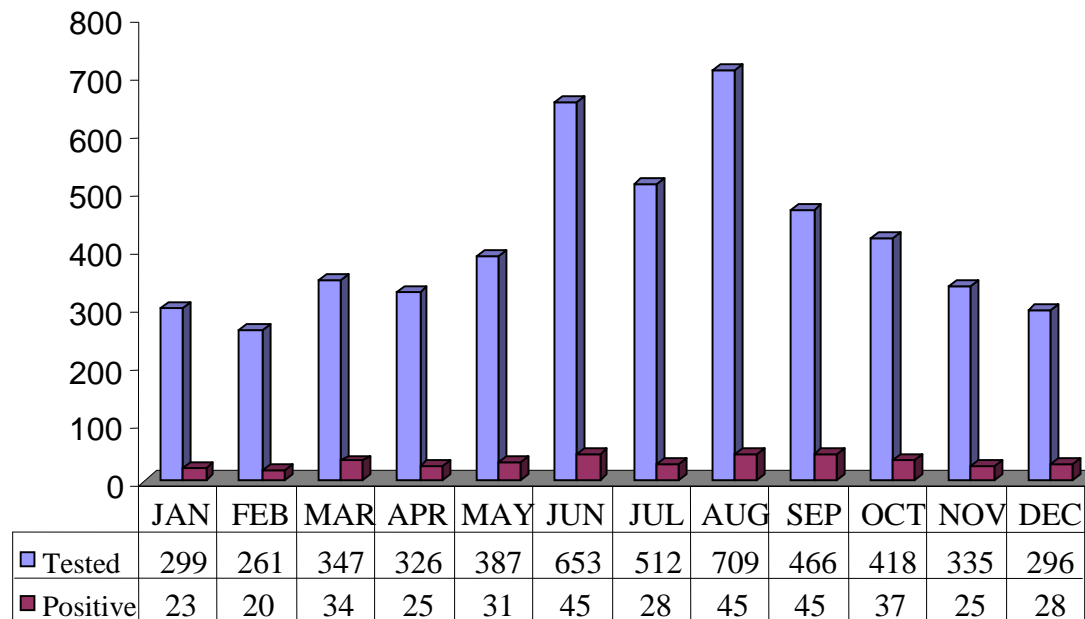


Table 5: Laboratory Results of Animals Tested for Rabies by Jurisdiction and Species in Maryland, 2005

Species	Bat				Cat				Dog				Fox				Groundhog			
Jurisdiction	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total
Allegany	14		1	15	55			55	10			10	4	1		5	2			2
Anne Arundel	149	11	9	169	213	2	1	216	111			111	12			12	10			10
Baltimore	32	2	3	37	195	2		197	92	1		93	9	3	1	13	15			15
Baltimore City	133	8	2	143	152			152	116			116	8			8				
Calvert	2			2	12			12	9			9	1	2		3	2		1	3
Caroline	7		1	8	23			23	8			8	2			2				
Carroll	13		1	14	107	4	1	112	7			7	3	8		11	10			10
Cecil	6			6	43	1		44	11			11		3		3	1			1
Charles	15	1		16	65	1	1	67	38		1	39	4	3		7	7			7
Dorchester	2			2	9			9	4			4	1			1				
Frederick	19	1	1	21	167	4	2	173	60			60	9	2		11	23			23
Garrett	5		1	6	5	1		6	6			6	1			1	3			3
Harford	22	3	1	26	122	1		123	45			45	9	4		13	6			6
Howard	10		1	11	58	1		59	30			30	2			2	7		1	8
Kent	4			4	11			11	8			8	1			1				
Montgomery	98	3	2	103	229	1		230	120			120	14	1		15	30			30
Prince George's	225	9	3	237	147	1		148	107			107	7	1		8	18	1	1	20
Queen Anne's	4	1		5	16			16	11			11	3			3	1			1
Somerset		1		1	6	1		7	5			5								
St. Mary's	7	1		8	17	1		18	18			18	1	4		5	1			1
Talbot	1			1	11			11	8			8	3	1		4		1		1
Washington	9		2	11	131	5		136	21			21	2	3		5	3			3
Wicomico	6			6	33	2		35	21			21		2		2	1			1
Worcester	4			4	15			15	4			4		1		1			1	1
Grand Total	787	41	28	856	1842	28	5	1875	870	1	1	872	96	39	1	136	140	2	4	146

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Table 5: Laboratory Results of Animals Tested for Rabies by Jurisdiction and Species in Maryland, 2005 (cont'd)

Species	Raccoon				Skunk				Other				Total			
Jurisdiction	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total	Negative	Positive	Unsatisfactory	Total
Allegany	5	6	1	12		2		2	7			7	97	9	2	108
Anne Arundel	68	13	2	83	1			1	71		1	72	635	26	13	674
Baltimore	29	28	1	58				0	30		1	31	402	36	6	444
Baltimore City	41	11	2	54				0	15		1	16	465	19	5	489
Calvert	5	2		7		1		1	7			7	38	5	1	44
Caroline	1	8	1	10	2			2	5			5	48	8	2	58
Carroll	2	17		19		1		1	4	1	1	6	146	31	3	180
Cecil	8	6		14		1		1	4			4	73	11	0	84
Charles	6	5		11	3	1	1	5	23		3	26	161	11	6	178
Dorchester	4	2		6				0	4			4	24	2	0	26
Frederick	20	28	2	50	6	5		11	68	1	2	71	372	41	7	420
Garrett	12	3	1	16	1	1		2	8		4	12	41	5	6	52
Harford	10	14		24				0	17	1	1	19	231	23	2	256
Howard	2	8		10				0	11			11	120	9	2	131
Kent	3	2		5				0	3			3	30	2	0	32
Montgomery	40	36	2	78	2			2	95		2	97	628	41	6	675
Prince George's	14	11		25	2		1	3	63		3	66	583	23	8	614
Queen Anne's	1	6		7		5		5	11		1	12	47	12	1	60
Somerset	2	5		7				0	4			4	17	7	0	24
St. Mary's	3	5		8	2	4	1	7	14		1	15	63	15	2	80
Talbot	5	5		10		2		2	2			2	30	9	0	39
Washington	6	4		10	1	2		3	9			9	182	14	2	198
Wicomico	2	5		7		2		2	13			13	76	11	0	87
Worcester	5	15		20	1		1	2	8		1	9	37	16	3	56
Grand Total	294	245	12	551	21	27	4	52	496	3	22	521	4546	386	77	5009

Table 6: Laboratory Confirmed Animal Rabies by Species 1985 –2005

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
All Species	760	683	450	338	389	468	579	553	624	520	441	638	619	439	394	413	505	396	366	336	386
Raccoons	672	586	384	255	295	382	467	413	501	412	326	512	494	346	311	313	366	272	263	244	245
Other species	88	97	66	83	94	86	112	140	123	108	115	126	125	93	83	100	139	114	103	92	141

Species	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	TOTALS
Bats	34	28	18	21	26	14	13	17	9	5	10	11	11	8	4	17	27	35	7	23	41	564
Beavers							1						1		1					1	1	7
Cats	11	18	2	13	16	11	15	22	21	9	17	19	23	12	19	18	23	11	21	13	28	365
Cattle	3	3	2	2		2	1			1	2	2	1	3	1	2	1	2	2	2	1	39
Chipmunk																	1					1
Deer		1		1														1		1		5
Dogs	1		4		2	1	2	2	3	2	2	1	1	2		1	1	1	2	1	1	31
Ferrets										1									1			2
Foxes	21	25	18	21	23	17	18	27	21	30	36	34	44	27	22	28	38	30	39	24	39	608
Goats		1		1																		2
Groundhogs	7	7	2	5	4	4	10	6	6	4	6	13	6	5	7	9	5	7	12	5	2	153
Horses	2	1			3	1	1	1	2	1	1				2		1	3	1		1	21
Muskrats									1													1
Opossums	1										2		1			1			1			8
Otters						1			1			1										3
Pig																			1			1
Sheep					1							1										2
Skunks	6	12	20	19	19	35	51	65	59	55	39	44	37	34	26	24	42	34	16	22	27	767
Squirrels	2	1																				5
Rats																						1
Rabbits														2								3
Raccoons	672	586	384	255	295	382	467	413	501	412	326	512	494	346	311	313	366	272	263	244	245	9883
Weasels															1							1
TOTALS	760	683	450	338	389	468	579	553	624	520	441	638	619	439	394	413	505	396	366	336	386	12475

Figure 5: Number of Laboratory Confirmed Animal Rabies Cases, 1985-2005

