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**Bureau of Infectious Disease and Laboratory Sciences**

**Rabies Annual Surveillance Summary, 2018**

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https://www.mass.gov/infectious-disease-surveillance-reporting-and-control

**Acknowledgments**

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**2018 Rabies Summary**

**Massachusetts Department of Public Health**

The following summarizes data collected on animal specimens from Massachusetts sent to the Massachusetts State Public Health Laboratory (MASPHL) for rabies testing from January to December 2018. Annual reports from 2013 to 2017 are available on the MDPH website at [www.mass.gov/dph/rabies](http://www.mass.gov/dph/rabies).

**Number of Submissions and Positive Results by Year\***

The number and percentage of terrestrial animals that tested positive in 2018 was lower than that of the previous year (see **Table 1 and Figure 1**). The number and percentage of bats that tested positive in 2018 was slightly higher than that of the previous year.

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| **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 | 926 | 42 | 5% | 143 | 15 | 10% |
| 1993 | 3660 | 698 | 19% | 289 | 22 | 8% |
| 1994 | 4119 | 700 | 17% | 391 | 34 | 9% |
| 1995 | 3175 | 383 | 12% | 241 | 17 | 7% |
| 1996 | 2701 | 103 | 4% | 277 | 12 | 4% |
| 1997 | 2771 | 264 | 10% | 334 | 17 | 5% |
| 1998 | 3483 | 480 | 14% | 439 | 18 | 4% |
| 1999 | 2643 | 205 | 8% | 595 | 21 | 4% |
| 2000 | 2666 | 247 | 9% | 611 | 29 | 5% |
| 2001 | 2615 | 248 | 9% | 710 | 32 | 4% |
| 2002 | 2505 | 267 | 11% | 613 | 36 | 6% |
| 2003 | 2358 | 193 | 8% | 602 | 23 | 4% |
| 2004 | 2842 | 291 | 10% | 600 | 34 | 6% |
| 2005 | 2653 | 296 | 11% | 708 | 33 | 5% |
| 2006 | 2122 | 197 | 9% | 756 | 34 | 5% |
| 2007 | 1988 | 123 | 6% | 787 | 29 | 4% |
| 2008 | 2298 | 135 | 6% | 748 | 19 | 3% |
| 2009 | 1747 | 106 | 6% | 696 | 21 | 3% |
| 2010 | 1740 | 117 | 7% | 678 | 14 | 2% |
| 2011 | 1700 | 90 | 5% | 753 | 20 | 3% |
| 2012 | 1594 | 73 | 5% | 1196 | 38 | 3% |
| 2013 | 1644 | 79 | 5% | 1045 | 18 | 2% |
| 2014 | 1644 | 108 | 7% | 1175 | 40 | 3% |
| 2015 | 1642 | 103 | 6% | 1073 | 39 | 4% |
| 2016 | 1700 | 120 | 7% | 833 | 21 | 3% |
| 2017 | 1533 | 76 | 5% | 920 | 20 | 2% |
| **2018** | **1565** | **68** | **4%** | **884** | **26** | **3%** |
| **Total** | **62,034** | **5,812** | **9%** | **18,097** | **682** | **4%** |

 \*Data current as of February 11, 2019 and subject to change.

 \*\* Calculated to nearest percent

**Notable Rabies Situations**

In 2018, 2,449 specimens were submitted to the MASPHL for rabies testing. Of these specimens, 94 (4%) tested positive for rabies. **Table 2** shows data on positive animals for 2018. In 2018, six animals tested positive; all were cats. Five of the six were identified as stray cats.

In Norfolk County, a stray cat was euthanized and tested positive for rabies. Prior to being euthanized, the cat appeared at a family party and had been seen throughout the neighborhood. Multiple exposures were reported including bites to several residents. Due to the initial exposures reported in the neighborhood, the local Animal Inspector and the local Public Health Nurse went door-to-door throughout the neighborhood to ensure notification of the situation and identify additional exposures. Additionally, a telephone message was sent out to notify the community of the rabid cat in the neighborhood, including a description of the cat’s appearance and contact information for MDPH if a resident had contact with the cat. Photographs of the cat were posted to local websites, and rabies prevention information was provided to 25 homes in the area. Numerous exposed residents were identified from this collaborative investigation and post-exposure rabies prophylaxis (PEP) was recommended for numerous residents who reported direct contact with the rabid cat.

In Franklin County, an owned cat tested positive for rabies following the onset of neurological symptoms. The cat spent time both indoors and outdoors on the family farm. The vaccination history of this cat was unknown. The owner’s daughter sustained a scratch from the cat and therefore PEP was recommended and initiated.

In Worcester County, a 12-week old feral kitten was euthanized and tested positive for rabies. The kitten was dropped off at a local animal hospital with a wound of unknown origin. At the time of the injury, the kitten was not experiencing neurologic symptoms. Three days later, the kitten exhibited neurologic symptoms and was euthanized. Three employees at the veterinary hospital were identified as having cared for the kitten before it was euthanized. One employee received post-exposure rabies prophylaxis as she performed an oral exam on the cat without gloves and she had both eczema and cuts on her hands. There is also a possibility that mucous membrane exposure may have occurred during the oral exam. Another employee received PEP as she was concerned she may have received a scratch from the kitten. Prior to being seen at the veterinary hospital, the kitten was at an animal rescue shelter, where five staff members handled the kitten. PEP was recommended for those who sustained a bite or scratch from the kitten. Trace back investigation revealed that the kitten was adopted from a farm in Hampden County. The farm owner reported multiple scratches from the rabid kitten and reported that the rabid kitten was from a feral cat colony on the farm. MDPH worked with local animal control officers to catch and assess other cats from the colony for wounds or signs of illness.

Each of these cases illustrates an important step in rabies prevention: 1) Residents should not feed or interact with feral cats or other wild animals; 2) Domestic animals with wounds of unknown origin must be treated as possibly having been exposed to rabies; 3) Even domestic animals that remain primarily indoors should be vaccinated against rabies; and 4) Trace back investigations to identify potentially exposed residents can be difficult and involve participation from the community and local partners. If a resident believes he/she has been exposed to a wild animal, or you see a sick animal, please contact your local jurisdiction or MDPH at (617) 983-6800.

**Number of Submissions and Positive Results by Species**

Raccoons, skunks and foxes accounted for the large majority of rabies positive animals in Massachusetts in 2018, although their proportion of all rabies positive animals varied by quarter (**Figure 2**).

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| **Table 2. Number of Animals Positive for Rabies/Animals Submitted (%), 2018** |
|
|   | **1st Quarter** | **2nd Quarter** | **3rd Quarter** | **4th Quarter** | **Total** |
| Animal | Number Positive | Number Submitted | % | Number Positive | Number Submitted | % | Number Positive | Number Submitted | % | Number Positive | Number Submitted | % | Number Positive | Number Submitted | % |
| Raccoon | 10 | 21 | 47.6% | 9 | 65 | 13.8% | 8 | 17 | 47.1% | 10 | 17 | 58.8% | 37 | 120 | 30.8% |
| Skunk | 1 | 8 | 12.5% | 5 | 20 | 25.0% | 8 | 50 | 16.0% | 0 | 7 | 0% | 14 | 85 | 16.5% |
| Cat | 0 | 128 | 0% | 2 | 145 | 1.4% | 2 | 213 | 0.9% | 2 | 139 | 1.4% | 6 | 625 | 1.0% |
| Fox | 0 | 1 | 0% | 3 | 10 | 30.0% | 2 | 5 | 40.0% | 3 | 5 | 60.0% | 8 | 21 | 38.1% |
| Woodchuck | 0 | 1 | 0% | 1 | 34 | 2.9% | 1 | 46 | 2.2% | 0 | 4 | 0% | 2 | 85 | 2.4% |
| Bat | 1 | 92 | 1.1% | 7 | 204 | 3.4% | 13 | 512 | 2.5% | 5 | 76 | 6.6% | 26 | 884 | 2.9% |
| Coyote | 0 | 1 | 0% | 0 | 0 | 0% | 0 | 4 | 0% | 0 | 0 | 0% | 0 | 5 | 0% |
| Dog | 0 | 116 | 0% | 0 | 148 | 0% | 0 | 138 | 0% | 0 | 117 | 0% | 0 | 519 | 0% |
| Other\* | 0 | 19 | 0% | 0 | 34 | 0% | 0 | 25 | 0% | 1 | 27 | 3.7% | 1 | 105 | 1.0% |
| Total | 12 | 387 | 3.1% | 27 | 660 | 4.1% | 34 | 1010 | 3.4% | 21 | 392 | 5.4% | 94 | 2449 | 3.8% |

\* Includes alpacas, bears, chipmunks, goats, horses, mice, muskrats, opossums, pigs, rabbits, rats, squirrels, deer, donkeys, fishers, otters, and weasels.

**Figure 2. Proportion of All Positive Results Represented by Each Animal, by Quarter, 2018**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Raccoon |  | Skunk |  | Cat |  | Fox |  | Woodchuck |  | Bat |
|  | Bear |  |  |  |  |  |  |  |  |  |  |

**Cumulative Submissions and Results by Month**

Animal submission numbers fluctuated throughout the year. As might be expected, the highest number of submissions for both terrestrial animals and bats occurred during June, July and August (see **Table 3**). 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 outdoor activity. These simultaneous events result in more frequent contact between humans and wildlife, and lead to more animal rabies testing.

The proportion of animals testing positive and unsatisfactory for rabies also varies throughout the year, generally showing a consistent pattern from year-to-year (see **Table 3 and Figure 3**). The change in the percent positive is typically small between years during the same month and significant departures from this seasonal pattern can be used to detect changes in the intensity of virus circulation in an area. Of note, the number of bats submitted for testing decreased between 2017 and 2018 and the number of terrestrial animals increased slightly between this same time period.

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| **Table 3. Submissions, Number Positive for Rabies, and Percent Positive by Month and Animal Type: 2017 and 2018** |
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|  | **TERRESTRIAL ANIMALS** |  |  | **BATS** |
| **Month** | **Submitted 2017** | **Positive 2017** | **Unsatisfactory 2017** | **Submitted 2018** | **Positive 2018** | **Unsatisfactory 2018** | **Submitted 2017** | **Positive 2017** | **Unsatisfactory 2017** | **Submitted 2018** | **Positive 2018** | **Unsatisfactory 2018** |
| January | 113 | 6 | 5% | 0 | 0% | 110 | 4 | 4% | 1 | 1% | 27 | 0 | 0% | 5 | 19% | 49 | 1 | 2% | 2 | 4% |
| February | 88 | 4 | 5% | 1 | 1% | 95 | 3 | 3% | 1 | 1% | 24 | 0 | 0% | 0 | 0% | 27 | 0 | 0% | 2 | 7% |
| March | 117 | 2 | 2% | 2 | 2% | 90 | 4 | 3% | 1 | 1% | 34 | 1 | 3% | 1 | 3% | 16 | 0 | 0% | 0 | 0% |
| April | 103 | 6 | 6% | 2 | 2% | 106 | 5 | 5% | 0 | 0% | 25 | 1 | 4% | 3 | 12% | 27 | 0 | 0% | 2 | 7% |
| May | 140 | 6 | 4% | 1 | 1% | 167 | 9 | 6% | 5 | 3% | 33 | 2 | 6% | 2 | 6% | 68 | 1 | 1% | 2 | 3% |
| June | 191 | 8 | 4% | 5 | 3% | 183 | 6 | 3% | 7 | 4% | 124 | 3 | 2% | 8 | 6% | 109 | 6 | 6% | 9 | 8% |
| July | 177 | 5 | 3% | 13 | 7% | 194 | 7 | 4% | 17 | 9% | 94 | 3 | 3% | 5 | 5% | 176 | 1 | 1% | 16 | 9% |
| August | 168 | 11 | 7% | 2 | 1% | 178 | 9 | 5% | 7 | 4% | 466 | 3 | 1% | 45 | 10% | 305 | 5 | 2% | 28 | 9% |
| September | 122 | 9 | 7% | 1 | 1% | 126 | 5 | 4% | 6 | 5% | 34 | 4 | 12% | 6 | 18% | 31 | 7 | 23% | 7 | 23% |
| October | 120 | 4 | 3% | 3 | 3% | 141 | 9 | 8% | 3 | 2% | 24 | 3 | 13% | 3 | 13% | 12 | 2 | 17% | 0 | 0% |
| November | 119 | 9 | 8% | 3 | 3% | 90 | 6 | 5% | 0 | 0% | 14 | 0 | 0% | 1 | 7% | 25 | 2 | 8% | 2 | 8% |
| December | 75 | 6 | 8% | 1 | 1% | 85 | 1 | 1% | 1 | 1% | 21 | 0 | 0% | 2 | 10% | 39 | 1 | 3% | 0 | 0% |
| **TOTAL** | **1533** | **76** | **5%** | **34** | **2%** | **1565** | **68** | **4%** | **49** | **3%** | **920** | **20** | **2%** | **81** | **9%** | **884** | **26** | **3%** | **70** | **8%** |

\* Calculated to nearest percent

The distribution of results of rabies testing that were positive and of specimens unsatisfactory for testing varies throughout the year and by animal type (terrestrial versus bats) (**Figure 3**). In every quarter, more bats are unsatisfactory for testing than test positive for rabies. In contrast, positive terrestrial animals outnumbered the unsatisfactory samples in all quarters.

Because samples that are unsuitable for testing (reported out as “unsatisfactory”) require the same public health response as positive animals, it is critical to reduce the number of unsatisfactory specimens as much as possible. Ensuring the proper handling, storage and shipping as well as prompt submission of animals are important for improving specimen quality. MDPH Guidance on proper specimen submission for rabies testing can be found at this link: <https://www.mass.gov/lists/state-public-health-laboratory-specimen-submission-forms#instructions-for-special-sample-collection>.

**Submissions and Positive Results by County**

In 2018, all counties in Massachusetts submitted at least one animal for rabies testing, and all counties, except Dukes and Nantucket had at least one animal that tested positive (see Table 4 and Figure 4). Middlesex, Worcester, Norfolk, and Essex counties submitted the highest number of animals (n = 524, n = 343, n = 300, n=263 respectively). Plymouth, Middlesex, Norfolk, Worcester, and Hampden had the highest number of animals that tested positive (n=18, n=16, n=12, n=12, n=11) and Plymouth County had the highest percentage of submitted animals that tested positive (9.2%).

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| **Table 4. Rabies Testing Data by County- Number of Animals Positive for Rabies/Number of Animals Submitted (%**) |
|   | **Quarter 1**  | **Quarter 2** | **Quarter 3** | **Quarter 4** | **Cumulative** |
| County | Number Positive | Number Submitted | % Positive | Number Positive | Number Submitted | % Positive | Number Positive | Number Submitted | % Positive | Number Positive | Number Submitted | % Positive | Number Positive | Number Submitted | % Positive |
| Barnstable | 0 | 16 | 0% | 0 | 33 | 0% | 1 | 36 | 2.8% | 0 | 15 | 0% | 1 | 100 | 1.0% |
| Berkshire | 0 | 8 | 0% | 0 | 18 | 0% | 0 | 23 | 0% | 1 | 11 | 9.1% | 1 | 60 | 1.7% |
| Bristol | 1 | 29 | 3.4% | 4 | 44 | 9.1% | 4 | 65 | 6.2% | 1 | 28 | 3.6% | 10 | 166 | 6.0% |
| Dukes | 0 | 0 | 0% | 0 | 1 | 0% | 0 | 4 | 0% | 0 | 0 | 0% | 0 | 5 | 0% |
| Essex | 2 | 40 | 5.0% | 0 | 71 | 0% | 1 | 101 | 1.0% | 4 | 51 | 7.8% | 7 | 263 | 2.7% |
| Franklin | 0 | 9 | 0% | 1 | 17 | 5.9% | 3 | 29 | 10.3% | 0 | 7 | 0% | 4 | 62 | 6.5% |
| Hampden | 2 | 25 | 8.0% | 3 | 41 | 7.3% | 5 | 62 | 8.1% | 1 | 18 | 5.6% | 11 | 146 | 7.5% |
| Hampshire | 0 | 12 | 0% | 0 | 24 | 0% | 0 | 38 | 0% | 1 | 14 | 7.1% | 1 | 88 | 1.1% |
| Middlesex | 1 | 99 | 1.0% | 7 | 131 | 5.3% | 4 | 219 | 1.8% | 4 | 75 | 5.3% | 16 | 524 | 3.1% |
| Nantucket | 0 | 0 | 0% | 0 | 0 | 0% | 0 | 1 | 0% | 0 | 0 | 0% | 0 | 1 | 0% |
| Norfolk | 2 | 39 | 5.1% | 6 | 92 | 6.5% | 0 | 129 | 0% | 4 | 40 | 10.0% | 12 | 300 | 4.0% |
| Plymouth | 1 | 28 | 3.6% | 4 | 38 | 10.5% | 11 | 96 | 11.5% | 2 | 33 | 6.1% | 18 | 195 | 9.2% |
| Suffolk | 0 | 26 | 0% | 0 | 55 | 0% | 0 | 78 | 0% | 1 | 37 | 2.7% | 1 | 196 | 0.5% |
| Worcester | 3 | 56 | 5.4% | 2 | 95 | 2.1% | 5 | 129 | 3.9% | 2 | 63 | 3.2% | 12 | 343 | 3.5% |

**Mapping**

MDPH produces a “heat map” of rabies-positive terrestrial animals on an annual basis (see **Figure 5**).

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