**2017 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 2017. A cumulative report summarizing rabies testing from 1992-2002, and annual reports from 2003 to 2016 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 2017 was lower than that of the previous year (see **Table 1 and Figure 1**). The number and percentage of bats that tested positive in 2017 was slightly less 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%** |
| **Total** | **60,469** | **5,744** | **10%** | **17,213** | **656** | **4%** |

 \* Calculated to nearest percent

**Notable Rabies Situations**

In 2017, 2,453 specimens were submitted to the MASPHL for rabies testing. Of these specimens, 96 (4%) tested positive for rabies. **Table 2** shows data on positive animals for 2017.

In Worcester County, a 6-month-old, unvaccinated, indoor cat developed neurologic symptoms including seizures, hypersalivation, and aggression.  The kitten was euthanized and tested positive for rabies.   The owner reported fostering the kitten, along with the kitten’s mother, for a four month period prior to the onset of symptoms; three other kittens from the same mother had been adopted into other homes.  The owner reported obtaining the mother cat and kitten from a local rescue organization.  As a foster family, they reported they had received no education about rabies or any other potential risks associated with fostering animals.

The owners and their young child had been exposed to the rabid cat and significant exposure could not be ruled out.  The owners and the child, who had had close contact with the cat in the home, received post-exposures rabies prophylaxis.  Two employees at the veterinary clinic were identified as having cared for the cat before it was euthanized and could not rule out potential exposure; they also received PEP.

In the United States, a combination of stray dog control programs and required vaccination have significantly reduced the incidence of rabies in domestic animals. However, in places with a terrestrial strain of the virus, spillover into domestic animals continues to occur; unvaccinated cats with outdoor lifestyles are at particular risk, as are the people who have contact with them. Animal rescue organizations should provide education about rabies and other zoonotic diseases to foster families. Fortunately, in this case, the Department of Agricultural Resources followed up on the status of the litter mates that had been adopted by other residents; all kittens were quarantined but remained healthy.

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

Raccoons, skunks and foxes accounted for the large majority of rabies positive animals in Massachusetts in 2017, 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 (%), 2017** |
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|  | **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 | 8 | 20 | 40% | 7 | 56 | 12.5% | 9 | 25 | 36% | 10 | 14 | 71.4% | 34 | 115 | 29.6% |
| Skunk | 2 | 7 | 28.6% | 3 | 17 | 17.6% | 7 | 49 | 14.3% | 8 | 14 | 57.1% | 20 | 87 | 23% |
| Cat | 1 | 138 | 0.7% | 0 | 142 | 0% | 0 | 180 | 0% | 0 | 137 | 0% | 1 | 597 | 0.2% |
| Fox | 1 | 3 | 33.3% | 5 | 13 | 38.5% | 5 | 6 | 83.3% | 0 | 8 | 0% | 11 | 30 | 36.7% |
| Woodchuck | 0 | 3 | 0% | 4 | 38 | 10.5% | 4 | 38 | 10.5% | 0 | 7 | 0% | 8 | 86 | 9.3% |
| Bat | 1 | 85 | 1.2% | 6 | 182 | 3.3% | 10 | 594 | 1.7% | 3 | 59 | 5.1% | 20 | 920 | 2.2% |
| Cow | 0 | 0 | 0% | 0 | 2 | 0% | 0 | 0 | 0% | 0 | 0 | 0% | 0 | 2 | 0% |
| Coyote | 0 | 3 | 0% | 0 | 3 | 0% | 0 | 3 | 0% | 1 | 1 | 100% | 1 | 10 | 10% |
| Dog | 0 | 125 | 0% | 0 | 139 | 0% | 0 | 142 | 0% | 0 | 114 | 0% | 0 | 520 | 0% |
| Bob Cat | 0 | 0 | 0% | 1 | 1 | 0% | 0 | 0 | 0% | 0 | 0 | 0% | 1 | 1 | 0% |
| Other\* | 0 | 19 | 0% | 0 | 23 | 0% | 0 | 24 | 0% | 0 | 19 | 0% | 0 | 85 | 0% |
| Total | 13 | 403 | 3.2% | 26 | 616 | 4.2% | 35 | 1061 | 3.3% | 22 | 373 | 5.9% | 96 | 2453 | 3.9% |

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

**Figure 2. Proportion of All Positive Results Represented by Each Animal, by Quarter, 2017**

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

**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 normally small between years during the same month and significant departures from this seasonal pattern can be used to detect alterations in the intensity of virus circulation in an area. Of note, the number of bats submitted for testing increased between 2016 and 2017 and the number of terrestrial animals decreased significantly between this same time period.

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| **Table 3. Submissions, Number Positive for Rabies, and Percent Positive by Month and Animal Type: 2016 and 2017** |
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|  | **TERRESTRIAL ANIMALS** |  |  | **BATS** |
| **Month** | **Submitted 2016** | **Positive 2016** | **Unsatisfactory 2016** | **Submitted 2017** | **Positive 2017** | **Unsatisfactory 2017** | **Submitted 2016** | **Positive 2016** | **Unsatisfactory 2016** | **Submitted 2017** | **Positive 2017** | **Unsatisfactory 2017** |
| January | 106 | 5 | 5% | 1 | 1% | 113 | 6 | 5% | 0 | 0% | 29 | 1 | 3% | 7 | 24% | 27 | 0 | 0% | 5 | 19% |
| February | 99 | 7 | 7% | 1 | 1% | 88 | 4 | 5% | 1 | 1% | 23 | 0 | 0% | 3 | 13% | 24 | 0 | 0% | 0 | 0% |
| March | 117 | 12 | 10% | 2 | 2% | 117 | 2 | 2% | 2 | 2% | 26 | 1 | 4% | 6 | 23% | 34 | 1 | 3% | 1 | 3% |
| April | 124 | 7 | 6% | 1 | 1% | 103 | 6 | 6% | 2 | 2% | 18 | 0 | 0% | 1 | 6% | 25 | 1 | 4% | 3 | 12% |
| May | 151 | 10 | 7% | 2 | 1% | 140 | 6 | 4% | 1 | 1% | 37 | 2 | 5% | 4 | 11% | 33 | 2 | 6% | 2 | 6% |
| June | 201 | 8 | 4% | 6 | 3% | 191 | 8 | 4% | 5 | 3% | 153 | 2 | 1% | 24 | 16% | 124 | 3 | 2% | 8 | 6% |
| July | 170 | 14 | 8% | 11 | 6% | 177 | 5 | 3% | 13 | 7% | 112 | 3 | 3% | 15 | 13% | 94 | 3 | 3% | 5 | 5% |
| August | 207 | 22 | 11% | 14 | 7% | 168 | 11 | 7% | 2 | 1% | 348 | 6 | 2% | 42 | 12% | 466 | 3 | 1% | 45 | 10% |
| September | 180 | 15 | 8% | 8 | 4% | 122 | 9 | 7% | 1 | 1% | 25 | 4 | 16% | 3 | 12% | 34 | 4 | 12% | 6 | 18% |
| October | 111 | 10 | 9% | 5 | 5% | 120 | 4 | 3% | 3 | 3% | 13 | 2 | 15% | 1 | 8% | 24 | 3 | 13% | 3 | 13% |
| November | 120 | 5 | 4% | 0 | 0% | 119 | 9 | 8% | 3 | 3% | 14 | 0 | 0% | 2 | 14% | 14 | 0 | 0% | 1 | 7% |
| December | 114 | 5 | 4% | 0 | 0% | 75 | 6 | 8% | 1 | 1% | 35 | 0 | 0% | 3 | 9% | 21 | 0 | 0% | 2 | 10% |
| **TOTAL** | **1700** | **120** | **7%** | **51** | **3%** | **1533** | **76** | **5%** | **34** | **2%** | **833** | **21** | **3%** | **111** | **13%** | **920** | **20** | 2% | **81** | **9%** |

\* 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. Over the course of the year, nearly twice as many terrestrial animals were positive than were unsatisfactory while there were three or four times as many unsatisfactory bats as positive ones.

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.

**Submissions and Positive Results by County**

In 2017, all counties in Massachusetts submitted at least one animal for rabies testing, and all counties, except Barnstable, Dukes, Nantucket, and Plymouth had at least one animal that tested positive (see **Table 4 and Figure 4**). Middlesex, Worcester, Essex, and Norfolk counties submitted the highest number of animals (n = 524, n = 366, n = 287, n=277 respectively). Worcester, Essex, Middlesex, Franklin, and Bristol counties had the highest number of animals that tested positive (n=22, n=15, n=12, n=17, n=11, n=11) and Franklin County had the highest percentage of submitted animals that tested positive (23.9%).

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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 | 13 | 0.0% | 0 | 29 | 0.0% | 0 | 37 | 0.0% | 0 | 17 | 0.0% | 0 | 96 | 0.0% |
| Berkshire | 0 | 15 | 0.0% | 3 | 25 | 12.0% | 3 | 32 | 9.4% | 1 | 4 | 25.0% | 7 | 76 | 9.2% |
| Bristol | 1 | 24 | 4.2% | 3 | 42 | 7.1% | 2 | 70 | 2.9% | 5 | 28 | 17.9% | 11 | 164 | 6.7% |
| Dukes | 0 | 2 | 0.0% | 0 | 2 | 0.0% | 0 | 2 | 0.0% | 0 | 0 | 0.0% | 0 | 6 | 0.0% |
| Essex | 3 | 48 | 6.3% | 4 | 66 | 6.1% | 2 | 129 | 1.6% | 6 | 44 | 13.6% | 15 | 287 | 5.2% |
| Franklin | 1 | 7 | 14.3% | 3 | 12 | 25.0% | 5 | 21 | 23.8% | 2 | 6 | 33.3% | 11 | 46 | 23.9% |
| Hampden | 0 | 40 | 0.0% | 1 | 31 | 3.2% | 1 | 43 | 2.3% | 0 | 27 | 0.0% | 6 | 141 | 4.3% |
| Hampshire | 0 | 14 | 0.0% | 0 | 17 | 0.0% | 3 | 38 | 7.9% | 1 | 8 | 12.5% | 4 | 77 | 5.2% |
| Middlesex | 2 | 84 | 2.4% | 4 | 122 | 3.3% | 5 | 232 | 2.2% | 1 | 86 | 1.2% | 12 | 524 | 2.3% |
| Nantucket | 0 | 0 | 0.0% | 0 | 1 | 0.0% | 0 | 0 | 0.0% | 0 | 0 | 0.0% | 0 | 1 | 0.0% |
| Norfolk | 0 | 45 | 0.0% | 2 | 58 | 3.4% | 1 | 136 | 0.7% | 3 | 38 | 7.9% | 6 | 277 | 2.2% |
| Plymouth | 0 | 27 | 0.0% | 0 | 60 | 0.0% | 0 | 78 | 0.0% | 0 | 35 | 0.0% | 0 | 200 | 0.0% |
| Suffolk | 0 | 33 | 0.0% | 0 | 61 | 0.0% | 1 | 77 | 1.3% | 1 | 20 | 5.0% | 2 | 191 | 1.0% |
| Worcester | 2 | 51 | 3.9% | 6 | 90 | 6.7% | 12 | 165 | 7.3% | 2 | 60 | 3.3% | 22 | 366 | 6.0% |

**Mapping**

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

 **Figure 5.**

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