

# THE MASSACHUSETTS FIRE PROBLEM



## Massachusetts Fire Incident Reporting System

2016 Annual Report

Charles D. Baker  
Governor

Karyn E. Polito  
Lieutenant Governor

Thomas A. Turco III  
Secretary of Public Safety  
and Security

Peter J. Ostroskey  
State Fire Marshal



Department of Fire Services  
Division of Fire Safety • Fire Data and Public Education Unit

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## ABOUT THE COVERS

The drawings on the front and back covers of this report are the 2017, 1<sup>st</sup> and 2<sup>nd</sup> place winners of the 35<sup>th</sup> annual statewide **Arson Watch Reward Program Poster Contest**.

The contest is sponsored by the Massachusetts Property Insurance Underwriting Association (MPIUA) on behalf of all property and casualty insurance companies of Massachusetts. The poster theme was **Fire Prevention – Everyone/Everyday**.

A countywide poster contest was held for all students in grade 6-8. Twelve out of 14 counties participated and about 1,000 posters were submitted. Posters were judged by an impartial panel. First and 2<sup>nd</sup> place county winners were chosen at MPIUA. All 1<sup>st</sup> place county winners were entered into the Massachusetts statewide contest. An award ceremony was held in honor of all county winners at the Sheraton Framingham Hotel on June 7, 2017, and the three state winners were announced and presented with their awards.

The front cover drawing is by Ora Lin, a student at the Burncoat Middle School in Worcester, Massachusetts. Ora's poster was the 1<sup>st</sup> place winner in the Worcester County poster contest, and was automatically entered into the statewide contest, along with 11 other county winners, where it was chosen as the 1<sup>st</sup> place state winner.

The back cover drawing is by Elena Batres Murcia, a student at the Cyrus Peirce Middle School in Nantucket, Massachusetts. Elena's poster was the 1<sup>st</sup> place winner in the Nantucket County poster contest and was also automatically entered into the statewide contest where it was chosen as the 2<sup>nd</sup> place state winner.

MPIUA generously sponsored the printing of the *2016 Annual Report of the Massachusetts Fire Incident Reporting System (MFIRS)* and provided the cover posters. MPIUA has provided this sponsorship of the report and the poster contest for 34 years.

## DEPARTMENT OF FIRE SERVICES MISSION

The mission of the Department of Fire Services is, through coordinated training, education, prevention, investigation, and emergency response, to provide the citizens of Massachusetts with the ability to create safer communities; to assist and support the fire service community in the protection of life and property; to promote and enhance firefighter safety; and to provide a fire service leadership presence in the Executive Office of Public Safety and Security in order to direct policy and legislation on all fire related matters.

## EXECUTIVE SUMMARY

This is the 2016 Annual Report of the Massachusetts Fire Incident Reporting System (MFIRS), which summarizes the Massachusetts fire experience for 2016. It is based on the 31,889 individual fire reports submitted by members of 366 fire departments and fire districts. It is this effort that makes it possible to look at the total fire experience, to identify our fire problems and to develop strategies to address these issues. One of the goals of the Division of Fire Safety is to provide the fire service and the public with accurate and complete information about the fire experience in Massachusetts.

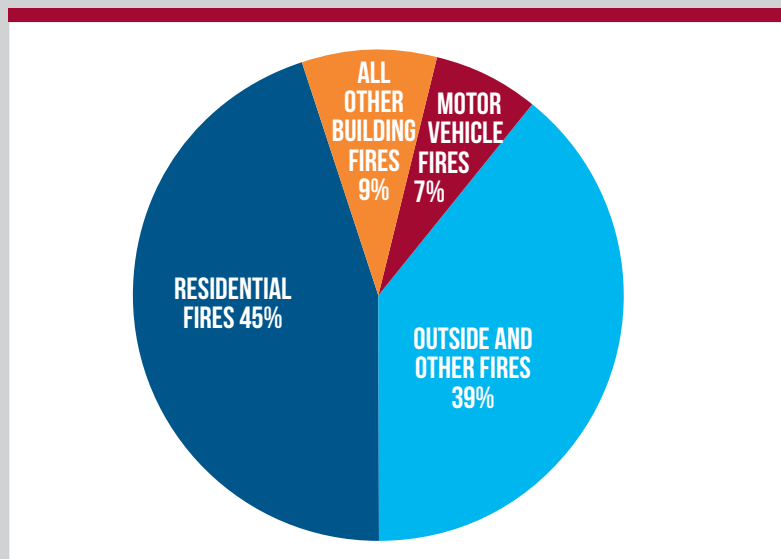
## FIRES BY INCIDENT TYPE

### 16,955 Structure, 2,357 Vehicle, 12,577 Outside and Other Fires in 2016

There were 31,889 fire and explosion incidents reported by fire departments to the Massachusetts Fire Incident Reporting System (MFIRS) in 2016. The 16,995 structure fires, 2,357 motor vehicle fires, and 12,577 outside and other fires caused 56 civilian deaths, 295 civilian injuries, 483 fire service injuries, and an estimated dollar loss of \$258.6 million in property damages. In 2016 there were 1.76 civilian deaths for every 1,000 fires. See Figure 1.

Figure 1

### FIRES BY INCIDENT TYPE



## CIVILIAN FIRE DEATHS

### 56 Civilians Died in Massachusetts Fires

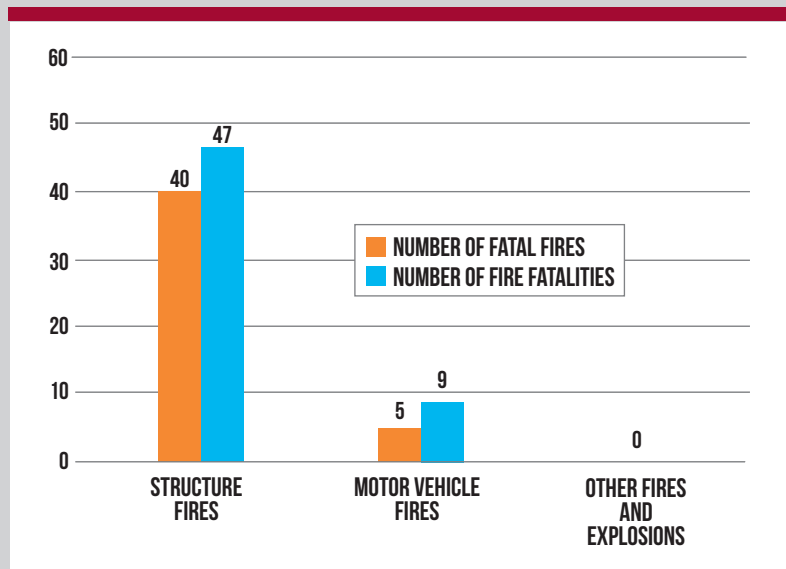
Fifty-six (56) civilians died in Massachusetts fires in 2016. Forty-seven (47), or 84%, of these deaths occurred in structure fires. Forty-five (45), or 80% of these fire deaths, occurred where people feel safest, in their home. There were nine civilian deaths in motor vehicle fires. See Figure 2.

Structure fires decreased by 1% from the previous year.

Sixteen civilians over the age of 65 died in Massachusetts fires in 2016. These fatalities accounted for more than one-third of fire deaths in the state.

Figure 2

## FATAL FIRES AND FIRE DEATHS



### Over Two-Thirds (68%) of People Died in Fires at Night

Over two-thirds (68%) of civilians died at night, at home, while they were sleeping. Many of these fire victims did not have working smoke alarms or residential sprinklers. See Figure 3.

### 2016 is above the 5- and 10-Year Averages

The 56 fire deaths in 2016 are 10% above the five-year average and 14% above the 10-year average number of fire deaths. See Figure 4.

Figure 3

## CIVILIAN FIRE DEATHS BY HOUR

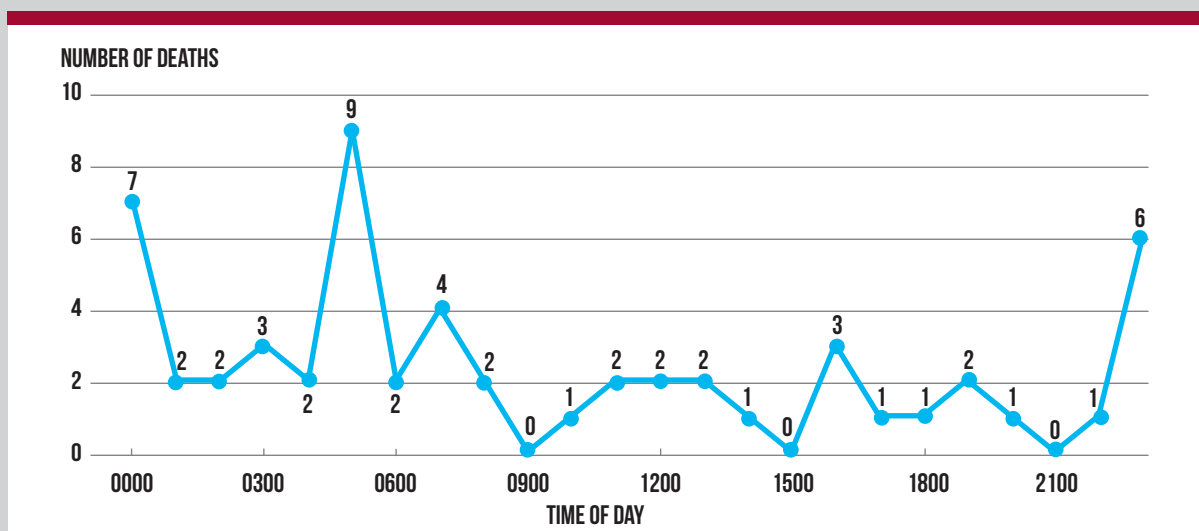
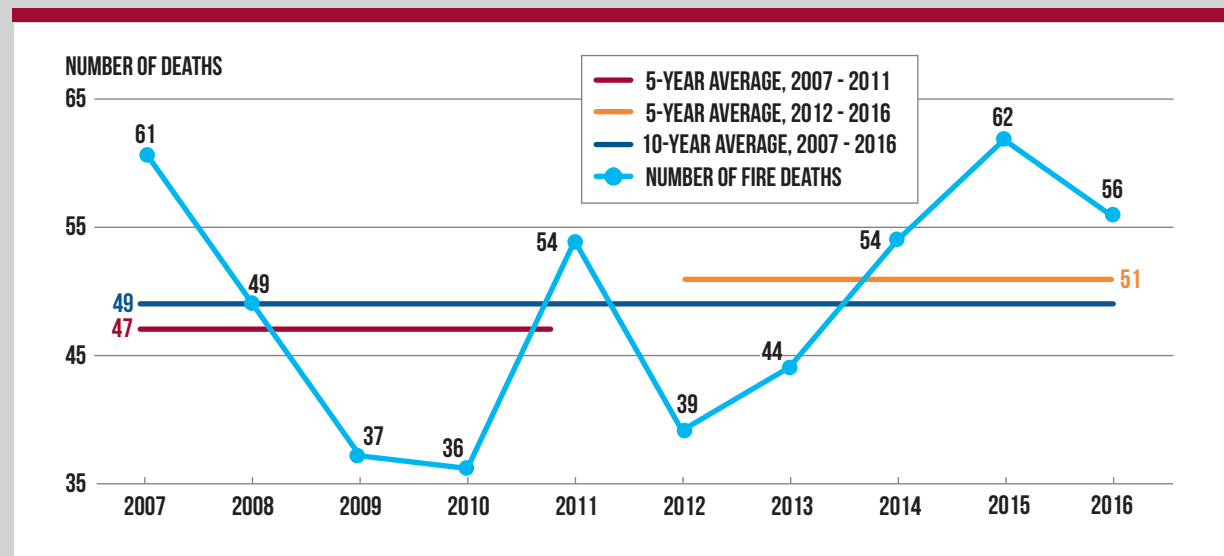


Figure 4

## CIVILIAN FIRE DEATHS BY YEAR



### 30 Men, 22 Women and 4 Children under 18 Died from Fires in 2016

Of the 56 fire deaths in 2016, 30, or 54%, were men, 22, or 39%, were women and four, or 7%, were children under 18. See Figure 5.

### Nearly One-Third of Fire Deaths in 2016 Were People over the Age of 65

Sixteen (16), or 29%, of civilian fire victims were over 65 years of age. This included 8 elderly men and 8 elderly women. Four (4), or 7%, of the civilian fire victims were under 18 years old. Thirty-six (36), or 64%, were adults between 18 and 65 years of age. See Figure 6.

Figure 5

## CIVILIAN FIRE DEATHS BY GENDER

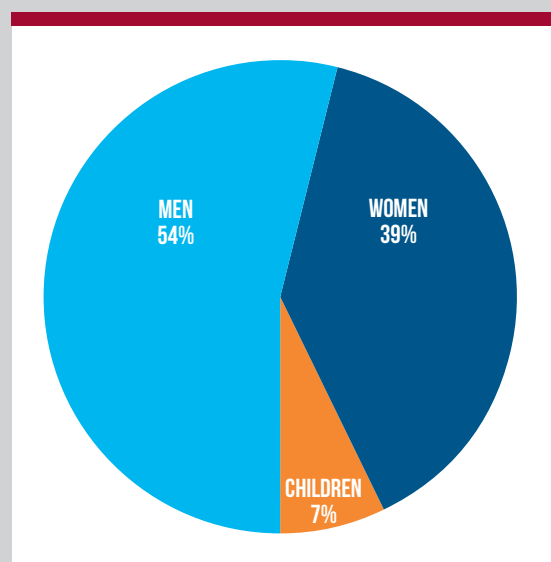


Figure 6

## CIVILIAN FIRE DEATHS BY AGE

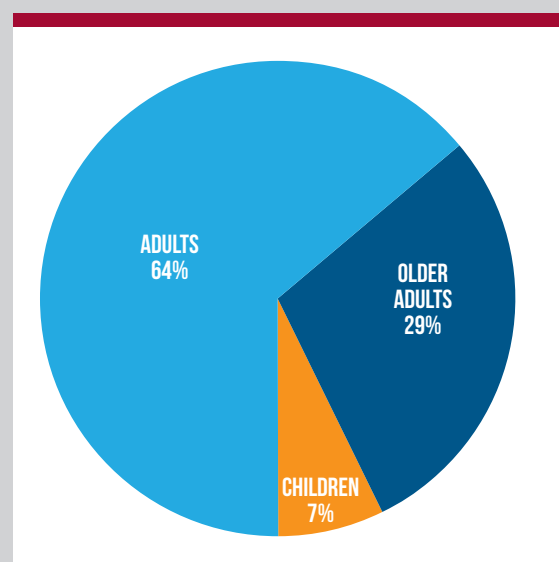


Figure 7

## FIRE DEATHS BY AGE COMPARED TO PERCENT OF POPULATION

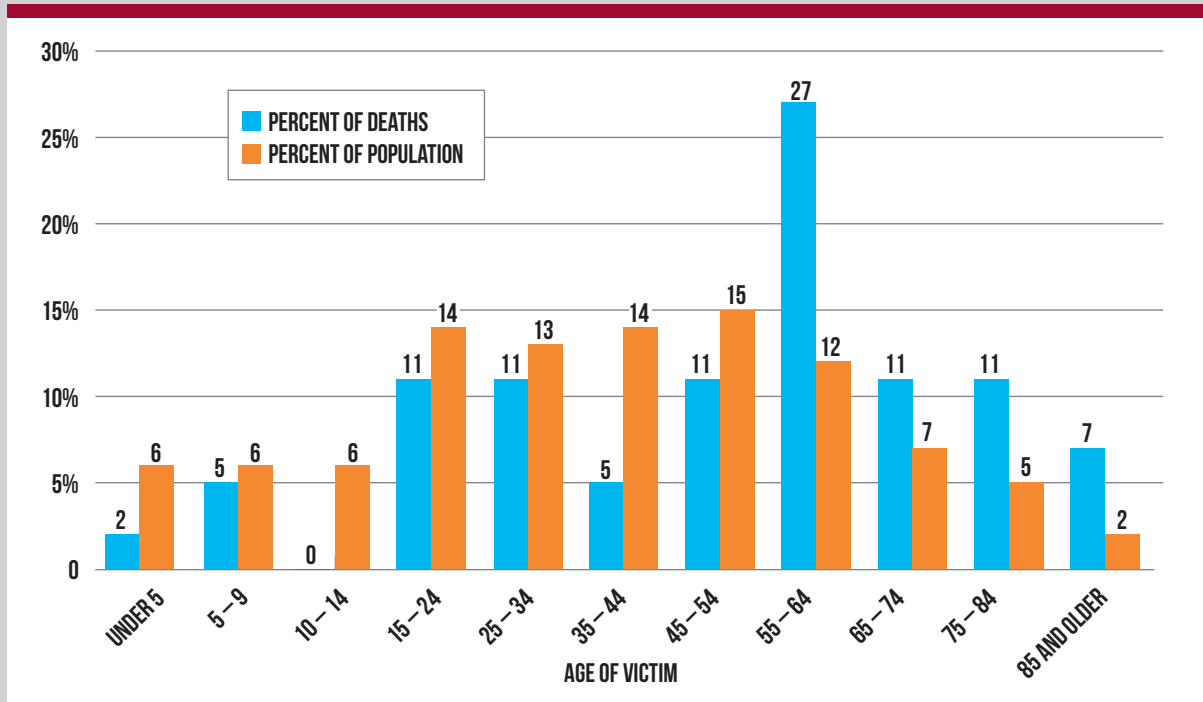


Figure 8

## CHILD FIRE DEATHS BY YEAR

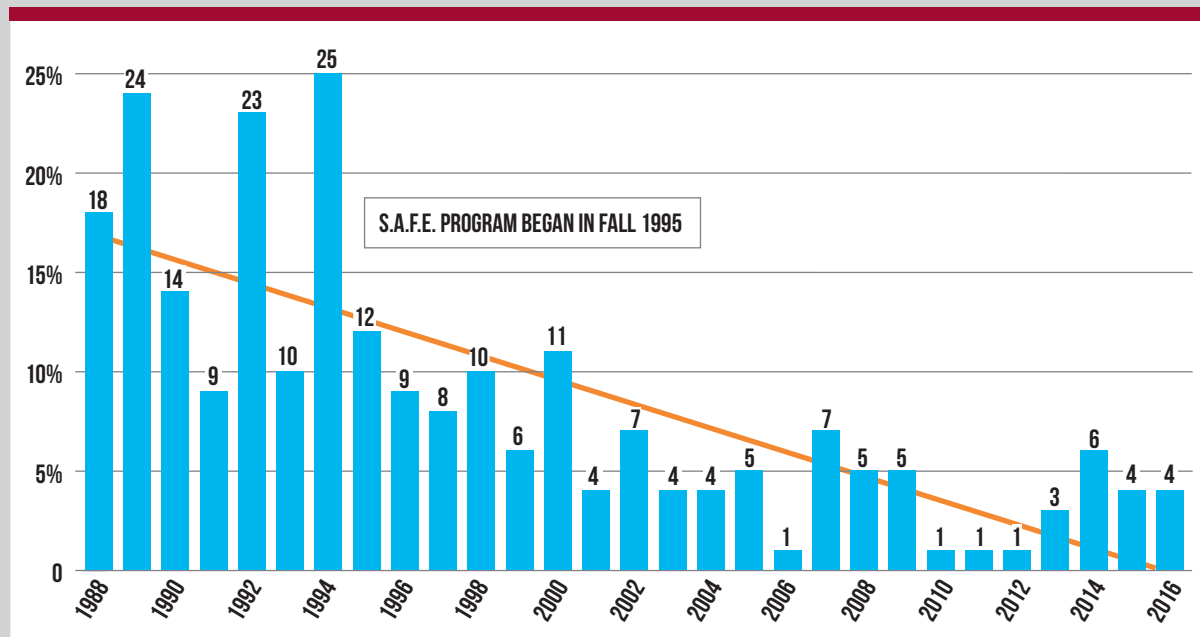
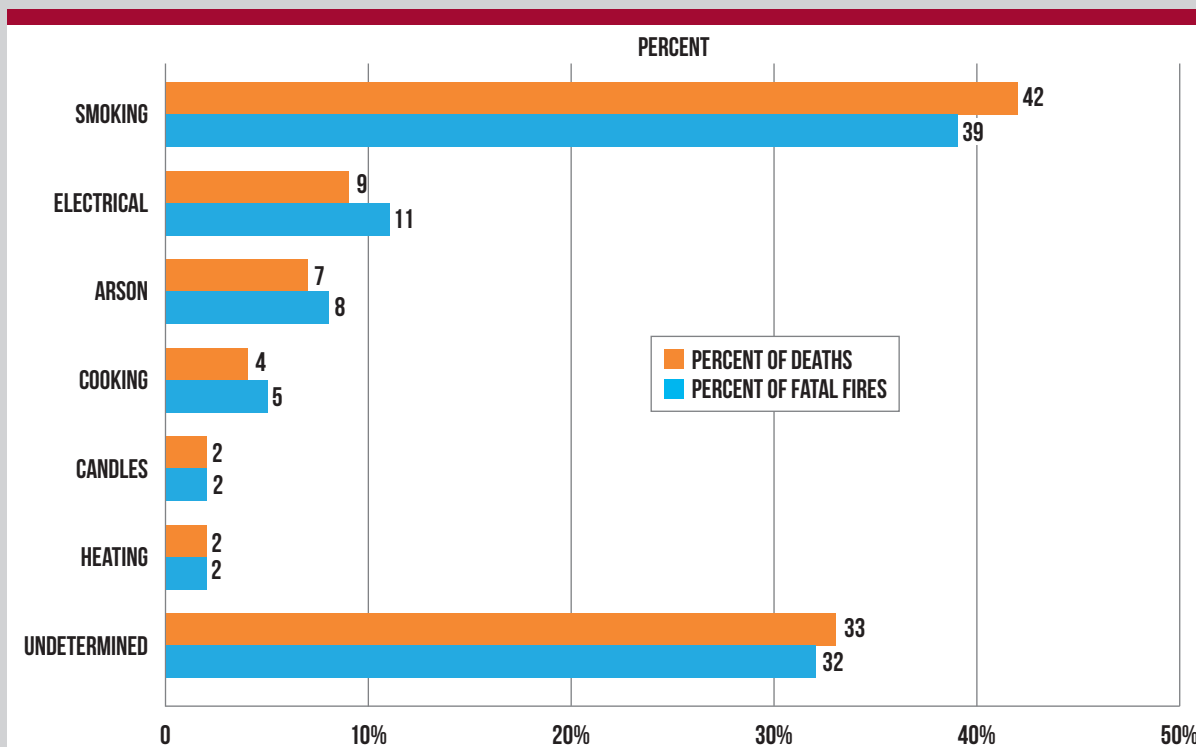




Figure 9

## CAUSES OF RESIDENTIAL FATAL FIRES AND FIRE DEATHS



### Older Adults are Twice as Likely to Die in a Fire than any Other Age Group

Older adults, especially those over the age of 85, had the greatest risk of dying in a fire. Adults over the age 85 account for 2% of the population but 7% of the fire deaths, making them over 3 times more likely to die in a fire than any other age group. Figure 7 shows the percentage of fire deaths versus population percentage by age groups in 2016.

### Average Annual Child Fire Deaths Down 72% Since the Start of S.A.F.E.

In the 21 years since the S.A.F.E. Program began (1996 to 2016), the average number of child fire deaths per year was 5. In the 21 years prior to the S.A.F.E. Program (1975 to 1994), the average number of child fire deaths per year was 19. This 72% drop in the number of average annual child fire deaths is significant compared to the 45% drop in the average number of fire deaths during the same years. See Figure 8.

### Smoking Fires are Leading Cause of Fire Deaths

In 2016, the improper disposal of smoking materials was the leading cause of residential fire deaths and fatal residential fires. These fires accounted for 19, or 42%, of residential fire deaths. Electrical problems were the second leading cause of fire deaths, accounting for four, or 9%, of residential fire deaths. See Figure 9.

## SMOKE ALARMS

Of the 56 civilian fire deaths in 2016, 45 occurred in residential structures. Only 24% of the buildings where these deaths happened had working smoke alarms.

### One- and Two-Family Homes had Lowest Percentage of Operating Alarms

Only 46% of smoke alarms operated in one- and two-family homes in 2016. See Figure 10.

Smoke alarms don't last forever and must be replaced, like all appliances. Smoke alarms last 10 years, whether they are battery-powered or hard-wired. Smoke alarms that are 10 years old or older should be replaced.

Smoke alarms are the key to notifying occupants of danger whether they are asleep or awake, but smoke alarms cannot guarantee escape from fires.

Figure 10

## SMOKE ALARM STATUS IN 1- AND 2-FAMILY HOME FIRES

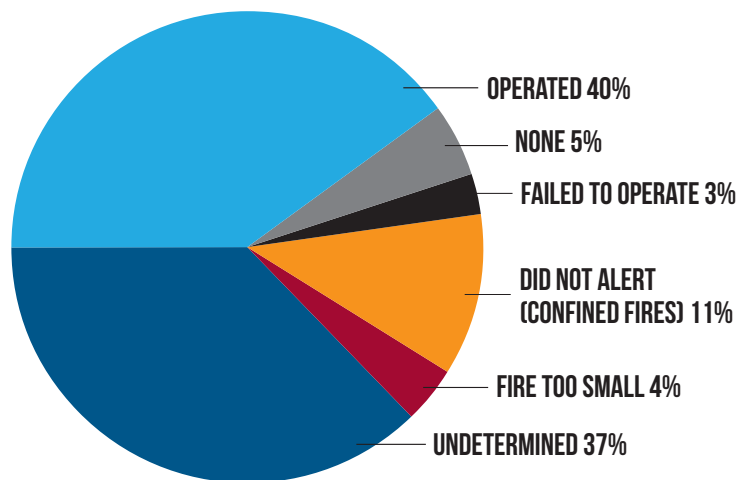
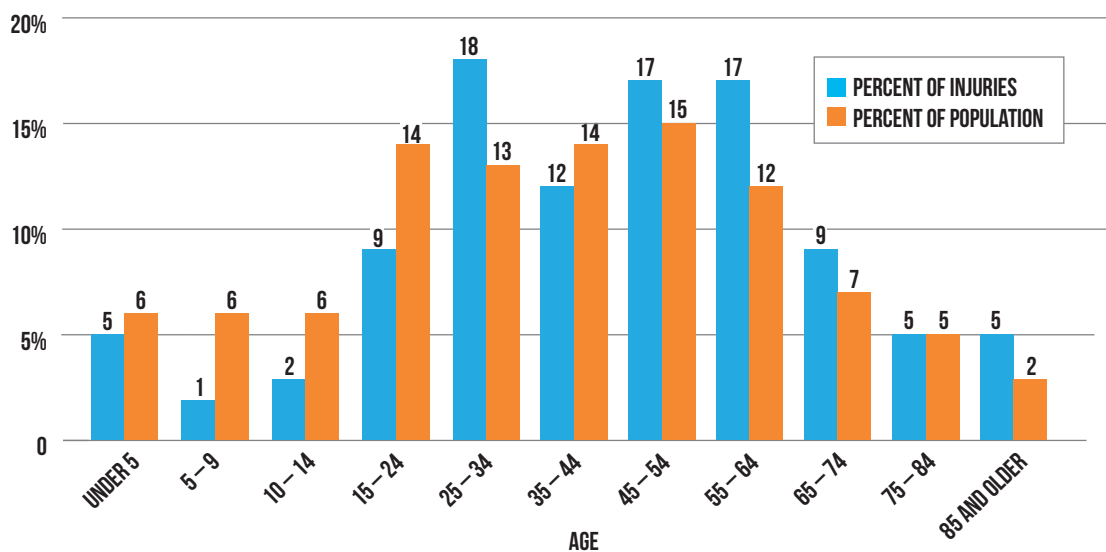


Figure 11

## INJURIES BY AGE COMPARED TO PERCENT OF POPULATION





## CIVILIAN INJURIES

### 295 Civilians Injured in Fires in 2016 – Mostly at Home

Massachusetts fires injured 295 civilians in 2016. Two hundred and fifty-eight (258), or 87%, of civilian injuries occurred in structure fires. Two hundred and thirty-three (233) injuries occurred in residential building fires, accounting for 79% of all injuries and 90% of all structure fire injuries. Thirteen (13), or 4%, occurred in motor vehicle fires. Twenty-four (24), or 8%, of civilian injuries occurred in outside and other fires. Special outside fires accounted for six, or 2%, of all civilian injuries. Brush fires accounted for six, or 2%, of civilian fire injuries; and outside rubbish fires accounted for two, or 1% of all civilian fire injuries. Ten (10), or 3%, of civilian injuries were caused by unclassified fires.

### Adults 45 to 64 at High Risk for Fire Injury

Adults between the ages of 45 and 54 represent 14% of the Massachusetts population, yet they accounted for 17% of the injuries at structure fires in 2016. Adults between the ages of 55 and 64 represent 9% of the population but they accounted for 16% of the injuries in 2016. People in these age groups are most at risk of being injured in a fire because they are more likely to try and control the fire. In these age groups, 23% of fire-related injuries happened while people were trying to control a fire. See Figure 11.

## FIRE SERVICE INJURIES

### 483 Firefighters Injured in 2016

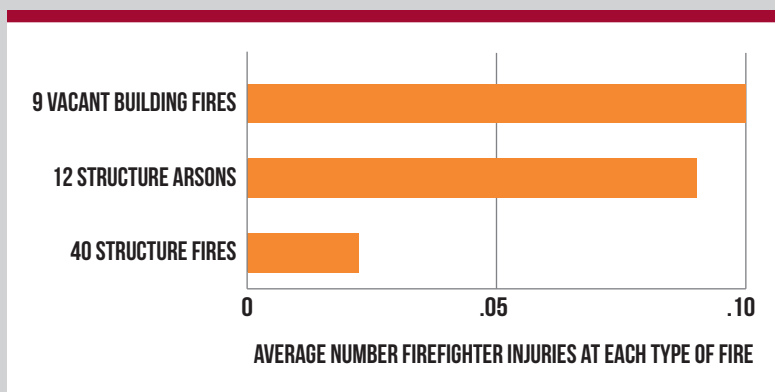
In 2016, 483 firefighters were injured while fighting the 31,889 reported fires in Massachusetts. On average, one firefighter was injured at one of every 66 fires in 2016.

### Firefighters Injured at 1 of Every 9 Vacant Building Fires

Vacant building fires were one of the most dangerous types of fire for firefighters in 2016. These fires accounted for 33, or 7%, of all firefighter injuries. These 33 injuries also represent 8% of firefighter injuries from fighting structure fires in 2016. On average there was one firefighter injury for every nine vacant building fires; one firefighter injury for every 12 structure arsons; and one firefighter injury for every 41 structure fires. See Figure 12.

Figure 12

### ONE FIREFIGHTER IS INJURED AT EVERY:



### Over 1/3 of Injuries from Overexertion or Strain

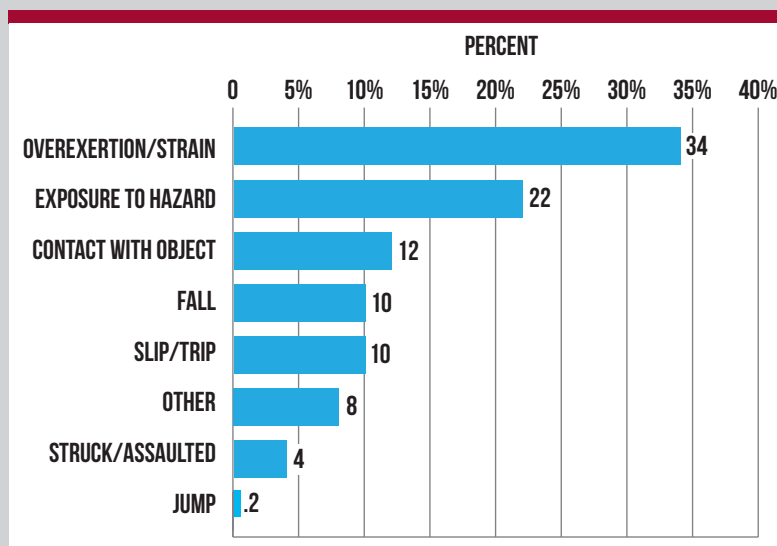
Thirty-four percent (34%) of all firefighter injuries in 2016 were from overexertion or strain. See Figure 13.

In 2016, 483 firefighters were injured while fighting the 31,889 reported fires in Massachusetts. On average, one firefighter was injured at one of every 66 fires in 2016.

In 2016, over one-third of all firefighter injuries were from overexertion or strains. Twenty-two percent were from exposure to hazards.

Figure 13

### CAUSES OF FIREFIGHTER INJURIES



## RESIDENTIAL BUILDING FIRES

### 84% of Building Fires Occurred in Residential Occupancies

Massachusetts fire departments reported that 14,174, or 84%, of the 16,832 building fires occurred in residential occupancies. These fires caused 45 civilian deaths, 223 civilian injuries, 361 fire service injuries and an estimated dollar loss of \$177 million.

### Over Half of Residential Fires Happened in Multi-Family Homes

Over half (51%) of residential building fires happened in multi-family buildings in 2016. Thirty-four percent (34%) of these fires happened in one- or two-family homes.

Figure 14

### RESIDENTIAL FIRES BY OCCUPANCY TYPE

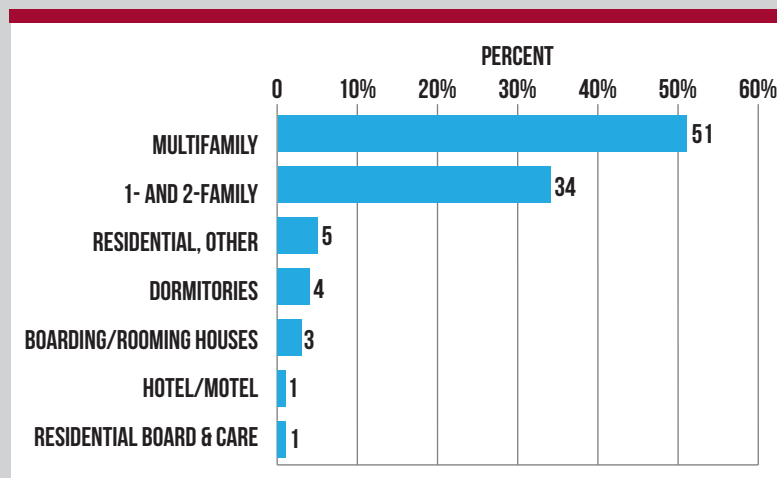
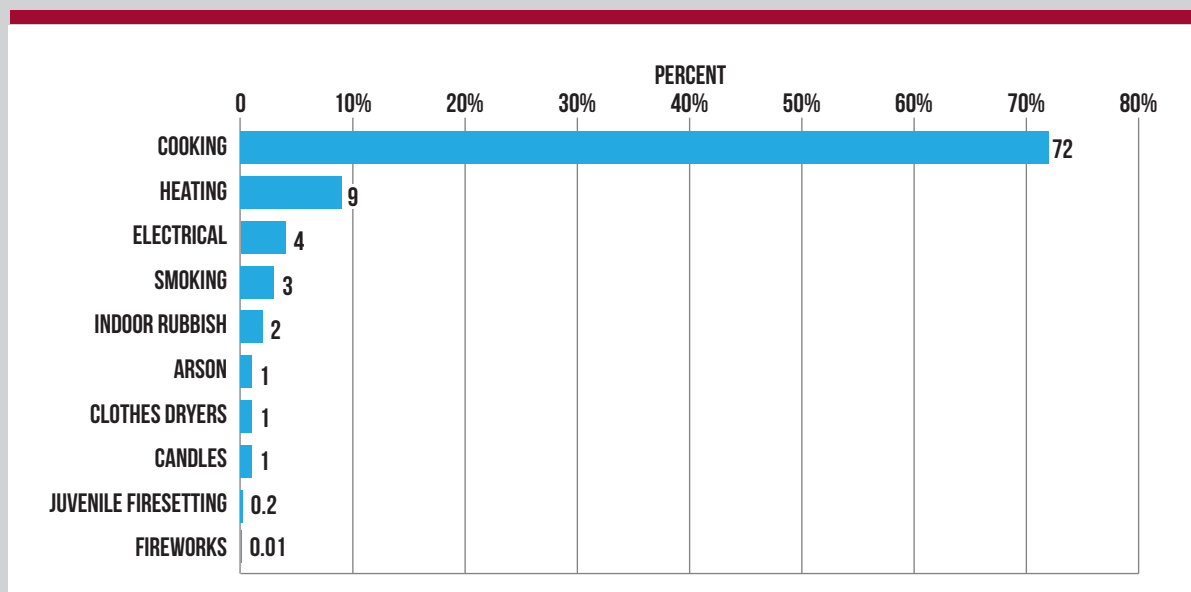


Figure 15

## CAUSES OF RESIDENTIAL FIRES



Dormitories accounted for 4% of the fires. Three percent (3%) happened in rooming houses. Residential board and care facilities and hotels or motels each accounted for 1% of the residential fires. Five percent (5%) of the fires occurred in unclassified residences. See Figure 14.

### Cooking & Heating were the Leading Causes of Fires in 1- & 2-Family Homes

Cooking caused 44% of fires in one- and two-family homes in 2016. Heating equipment caused 23% of these fires, electrical problems caused 8%. The unsafe and improper use of smoking materials caused 5% and indoor rubbish fires caused 3% of these fires. Arson, clothes dryers, and candles each caused 1% of the fires. Juvenile-set fires and fireworks each accounted for less than 1% of the fires in one- and two-family homes in 2016. See Figure 15.

## MOTOR VEHICLE FIRES

### 2,357 Motor Vehicle Fires Account for 7% of all Reported Fires

The 2,357 motor vehicle fires in 2016 caused nine civilian deaths, 13 civilian and 16 fire service injuries, and an estimated \$18.2 million in property damage. These incidents accounted for 7% of the reported 31,889 fires in 2016. Motor vehicle fires accounted for 16% of civilian fire deaths. Motor vehicle fires decreased by 11% from 2015.

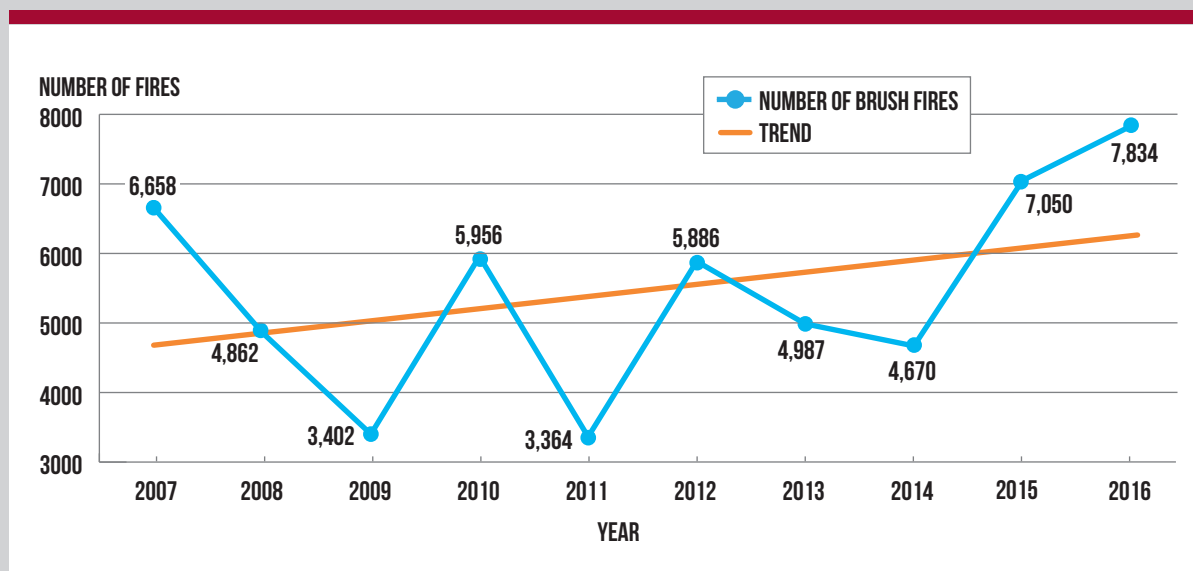
## OUTSIDE AND OTHER FIRES

### 12,577 Brush, Trash, and Other Outside Fires

In 2016, 12,577 outside and other fires caused 24 civilian and 50 fire service injuries, and an estimated dollar loss of \$5.8 million. The 7,834 tree, grass and brush fires, 2,862 outside rubbish fires, 948 special outside fires, 80 cultivated vegetation or crop fires, and 853 other fires accounted for 39% of the total fire incidents in 2016. These fires were up 6% from the 11,842 outside and other fire incidents reported in 2015.

Figure 16

## BRUSH FIRES BY YEAR



In 2016, 151 structure arsons, 88 motor vehicle arsons, and 503 outside and other arsons caused four civilian deaths, accounting for 7% of civilian fire deaths, four civilian injuries and 15 fire service injuries.

### Brush Fires

Brush fires are the most variable category of fires from year to year. Large increases and decreases are not uncommon and are often dependent on the weather. If it is a dry spring or summer, the number of brush fires usually increases. In 2016, the reported number of brush fires increased by 748 or 11%, from the 7,050 reported in 2015. See Figure 16.

## ARSON FIRES

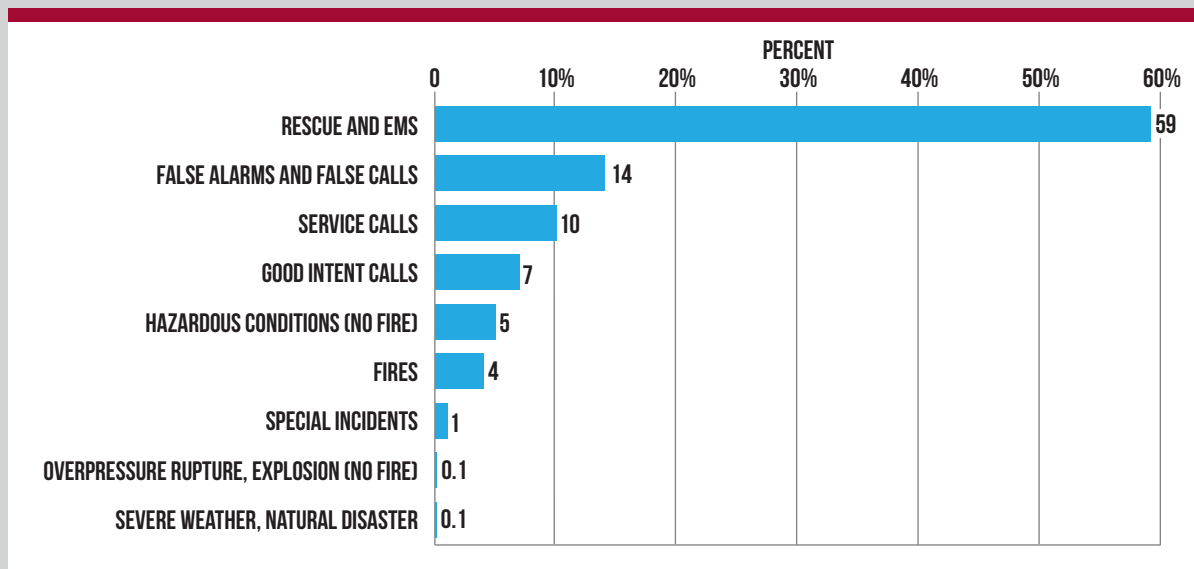
### 742 Arsons - 151 Structures, 88 Vehicles, and 503 Other Arsons

Seven hundred forty-two (742), or 2%, of the 31,889 fire incidents reported to the Massachusetts Fire Incident Reporting System were considered to be intentionally set, or arson<sup>1</sup>. The 151 structure arsons, 88 motor vehicle arsons, and 503 outside and other arsons caused four, or 7%, of civilian fire deaths, four civilian injuries and 15 fire service injuries. The estimated dollar loss from arsons was \$11.1 million. The average dollar loss per arson was \$14,901. Total arson was down by 8% from the 803 in 2015.

<sup>1</sup> In MFIRS (v5) a fire is considered an arson if the Cause of Ignition = 1 (Intentional) and the Age of Person (Fire Module) is greater than 17 or if the field is blank; or if the Wildland Module is used, the Wildland Fire Cause = 7 (Incendiary) and the Age of the Person (Wildland Module) is greater than 17 or if the field is left blank.

Figure 17

## RESPONSES BY INCIDENT TYPE



## NON-FIRE INCIDENTS

### 59% of all Massachusetts Calls were EMS Incidents

In 2016, 350 fire departments in Massachusetts reported 890,895 responses to MFIRS (including mutual aid responses). Rescue and EMS calls were by far the leading type of call that Massachusetts fire departments responded to, with 59% of all reported calls. See Figure 17.

## CONCLUSIONS

### Working Smoke Alarms Save Lives

Most people die in fires at night in the so-called safety of their own home. While the overall trend in the number of deaths continues to decline, smoking was the leading cause of all fatal fires in 2016. Yet cooking, something we do everyday, is still the leading cause of fires in the home and the leading cause of civilian fire injuries. We must all work to address this problem.

The lack of working smoke alarms or sprinkler systems are contributing factors to these tragedies. We have under 3 minutes to get out of a building if there is a fire. It is important to remember that properly maintained alarms provide early warning of a fire, and residential sprinklers provide the opportunity to safely escape. Having a practiced home escape plan in addition to working smoke alarms allows us to get out of our houses quickly. Time is of the essence in a fire.

Cooking remains the leading cause of fires in the home and the leading cause of civilian fire injuries. The lack of working smoke alarms or sprinkler systems are contributing factors to these tragedies.

## 2016 FIRES BY COUNTY

| County       | Total Fires   | Structure Fires | Vehicle Fires | Other Fires   | Civilian Deaths | Civilian Injuries | Fire Service Deaths | Fire Service Injuries | Dollar Loss          |
|--------------|---------------|-----------------|---------------|---------------|-----------------|-------------------|---------------------|-----------------------|----------------------|
| Barnstable   | 829           | 346             | 75            | 408           | 1               | 16                | 0                   | 12                    | \$7,276,344          |
| Berkshire    | 548           | 301             | 55            | 192           | 1               | 10                | 0                   | 14                    | 4,148,891            |
| Bristol      | 2,034         | 816             | 305           | 913           | 7               | 32                | 0                   | 21                    | 18,880,214           |
| Dukes        | 50            | 12              | 10            | 28            | 0               | 0                 | 0                   | 0                     | 840,601              |
| Essex        | 2,870         | 1,308           | 209           | 1,353         | 3               | 21                | 0                   | 65                    | 28,312,749           |
| Franklin     | 341           | 158             | 26            | 157           | 8               | 11                | 0                   | 7                     | 2,722,830            |
| Hampden      | 2,134         | 1,033           | 215           | 886           | 2               | 29                | 0                   | 59                    | 13,382,435           |
| Hampshire    | 369           | 168             | 30            | 171           | 0               | 11                | 0                   | 7                     | 5,204,955            |
| Middlesex    | 6,131         | 3,354           | 350           | 2,427         | 6               | 48                | 0                   | 126                   | 45,155,094           |
| Nantucket    | 51            | 26              | 4             | 21            | 0               | 0                 | 0                   | 0                     | 5,120,000            |
| Norfolk      | 3,154         | 1,638           | 213           | 1,303         | 4               | 25                | 0                   | 43                    | 19,942,109           |
| Plymouth     | 2,075         | 820             | 215           | 1,040         | 8               | 39                | 0                   | 29                    | 17,893,607           |
| Suffolk      | 6,914         | 4,627           | 304           | 1,983         | 5               | 12                | 0                   | 44                    | 54,875,212           |
| Worcester    | 4,389         | 2,348           | 346           | 1,695         | 11              | 41                | 0                   | 56                    | 34,851,181           |
| <b>Total</b> | <b>31,889</b> | <b>16,955</b>   | <b>2,357</b>  | <b>12,577</b> | <b>56</b>       | <b>295</b>        | <b>0</b>            | <b>483</b>            | <b>\$258,607,032</b> |

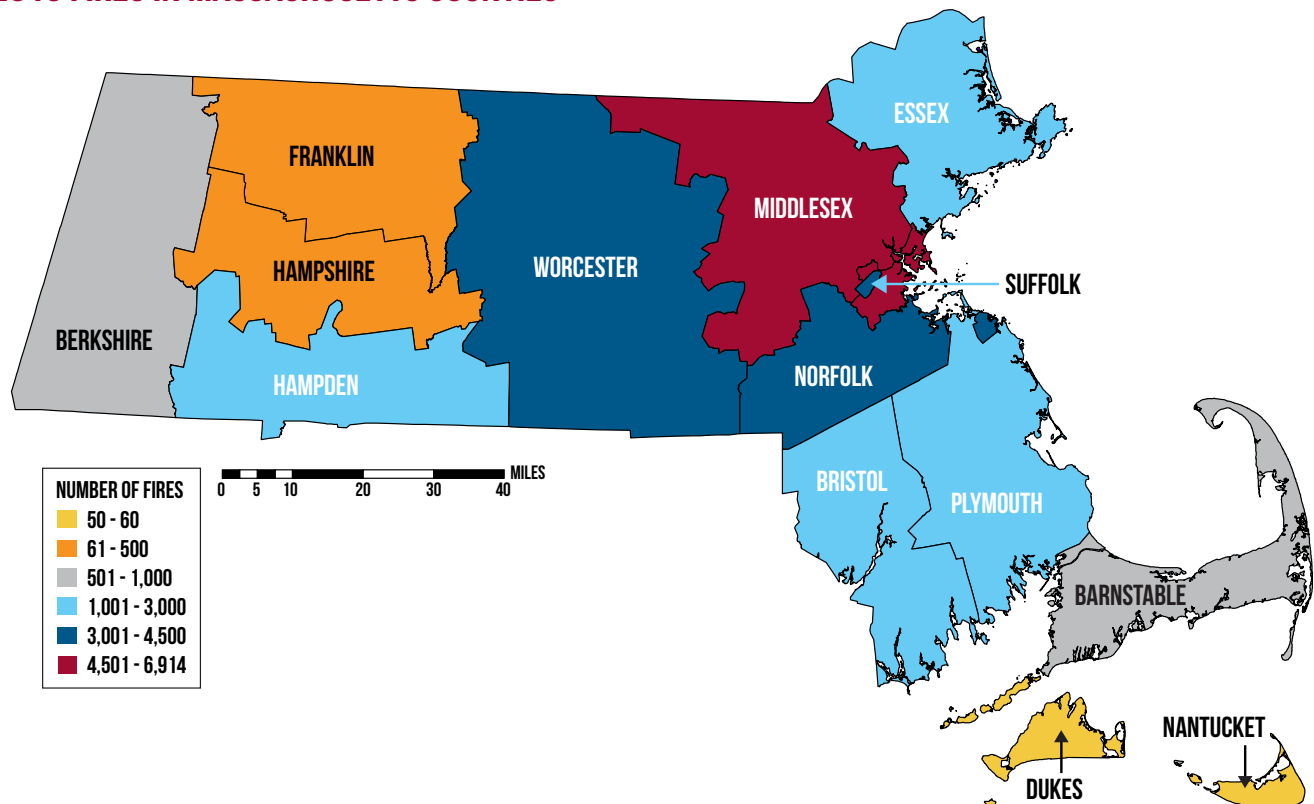
## 2016 ARSONS BY COUNTY

| County       | Total Arsons | Structure Arsons | Vehicle Arsons | Other Arsons | Civilian Deaths | Civilian Injuries | Fire Service Deaths | Fire Service Injuries | Dollar Loss         |
|--------------|--------------|------------------|----------------|--------------|-----------------|-------------------|---------------------|-----------------------|---------------------|
| Barnstable   | 28           | 8                | 0              | 20           | 1               | 0                 | 0                   | 0                     | \$979,501           |
| Berkshire    | 26           | 11               | 2              | 13           | 0               | 0                 | 0                   | 1                     | 20,000              |
| Bristol      | 78           | 21               | 20             | 37           | 1               | 1                 | 0                   | 2                     | 796,070             |
| Dukes        | 2            | 0                | 1              | 1            | 0               | 0                 | 0                   | 0                     | 2,500               |
| Essex        | 100          | 17               | 10             | 73           | 0               | 0                 | 0                   | 0                     | 677,824             |
| Franklin     | 16           | 3                | 0              | 13           | 0               | 0                 | 0                   | 0                     | 200                 |
| Hampden      | 94           | 21               | 12             | 61           | 0               | 0                 | 0                   | 7                     | 741,125             |
| Hampshire    | 24           | 5                | 1              | 18           | 0               | 0                 | 0                   | 1                     | 143,202             |
| Middlesex    | 72           | 10               | 11             | 51           | 0               | 1                 | 0                   | 0                     | 271,202             |
| Nantucket    | 0            | 0                | 0              | 0            | 0               | 0                 | 0                   | 0                     | 0                   |
| Norfolk      | 54           | 9                | 2              | 43           | 0               | 0                 | 0                   | 0                     | 259,054             |
| Plymouth     | 41           | 10               | 2              | 29           | 1               | 1                 | 0                   | 0                     | 689,520             |
| Suffolk      | 123          | 20               | 11             | 92           | 1               | 1                 | 0                   | 0                     | 1,024,441           |
| Worcester    | 84           | 16               | 16             | 52           | 0               | 0                 | 0                   | 1                     | 5,451,633           |
| <b>Total</b> | <b>742</b>   | <b>151</b>       | <b>88</b>      | <b>503</b>   | <b>4</b>        | <b>4</b>          | <b>0</b>            | <b>15</b>             | <b>\$11,056,272</b> |

## 2016 NON-FIRE RESPONSES BY COUNTY AND BY INCIDENT TYPE

| County               | Total Non-Fire Responses | Over-pressure Rupture, Explosion (No-fire) | Rescue, EMS Incidents | Hazardous Conditions (No-fire) | Service Calls | Good Intent Calls | False Alarm Calls | Severe Weather, Natural Disaster | Special Incidents |
|----------------------|--------------------------|--|-----------------------|--------------------------------|---------------|-------------------|-------------------|----------------------------------|-------------------|
| Barnstable           | 51,237                   | 44   | 36,856                | 1,930                          | 3,679         | 2,361             | 6,109             | 38                               | 220               |
| Berkshire            | 11,589                   | 7  | 6,772                 | 720                            | 1,534         | 634               | 1,845             | 22                               | 55                |
| Bristol              | 66,740                   | 58   | 45,054                | 2,572                          | 4,115         | 4,103             | 10,359            | 31                               | 448               |
| Dukes                | 927                      | 4  | 95                    | 77                             | 53            | 146               | 543               | 0                                | 9                 |
| Essex                | 96,934                   | 80   | 55,353                | 3,735                          | 15,128        | 6,272             | 15,569            | 63                               | 734               |
| Franklin             | 7,722                    | 8  | 4,444                 | 374                            | 939           | 590               | 822               | 33                               | 212               |
| Hampden              | 42,275                   | 60   | 24,131                | 1,821                          | 3,498         | 5,976             | 6,630             | 16                               | 143               |
| Hampshire            | 13,343                   | 22   | 9,005                 | 572                            | 826           | 771               | 2,074             | 21                               | 52                |
| Middlesex            | 187,432                  | 143  | 110,661               | 9,861                          | 19,782        | 11,294            | 29,978            | 119                              | 5,639             |
| Nantucket            | 2,885                    | 7  | 1,274                 | 239                            | 125           | 133               | 1,102             | 4                                | 1                 |
| Norfolk              | 86,479                   | 84   | 52,951                | 5,421                          | 8,387         | 5,805             | 11,976            | 111                              | 1,744             |
| Plymouth             | 83,906                   | 81   | 57,667                | 4,378                          | 6,898         | 5,088             | 9,457             | 120                              | 217               |
| Suffolk              | 105,331                  | 81   | 56,981                | 4,775                          | 14,074        | 9,126             | 17,898            | 21                               | 2,375             |
| Worcester            | 98,574                   | 91   | 65,881                | 3,822                          | 8,557         | 6,506             | 12,503            | 68                               | 1,146             |
| <b>Massachusetts</b> | <b>855,374</b>           | <b>770</b>                                 | <b>527,125</b>        | <b>40,552</b>                  | <b>87,595</b> | <b>58,805</b>     | <b>126,865</b>    | <b>667</b>                       | <b>12,995</b>     |

## 2016 FIRES IN MASSACHUSETTS COUNTIES







**MFIRS**  
Massachusetts Fire Incident Reporting System

Department of Fire Services  
[www.mass.gov/dfs](http://www.mass.gov/dfs)  
(978) 567-3380