U.S. Fire Administration

Firefighter Fatalities in the United States in 2015

October 2016

FEMA

U.S. Fire Administration

Mission Statement

We provide National leadership to foster a solid foundation for our fire and emergency services stakeholders in prevention, preparedness, and response.

FEMA

Firefighter Fatalities in the United States in 2015

Prepared by

U.S. Department of Homeland Security
Federal Emergency Management Agency
U.S. Fire Administration
National Fire Data Center

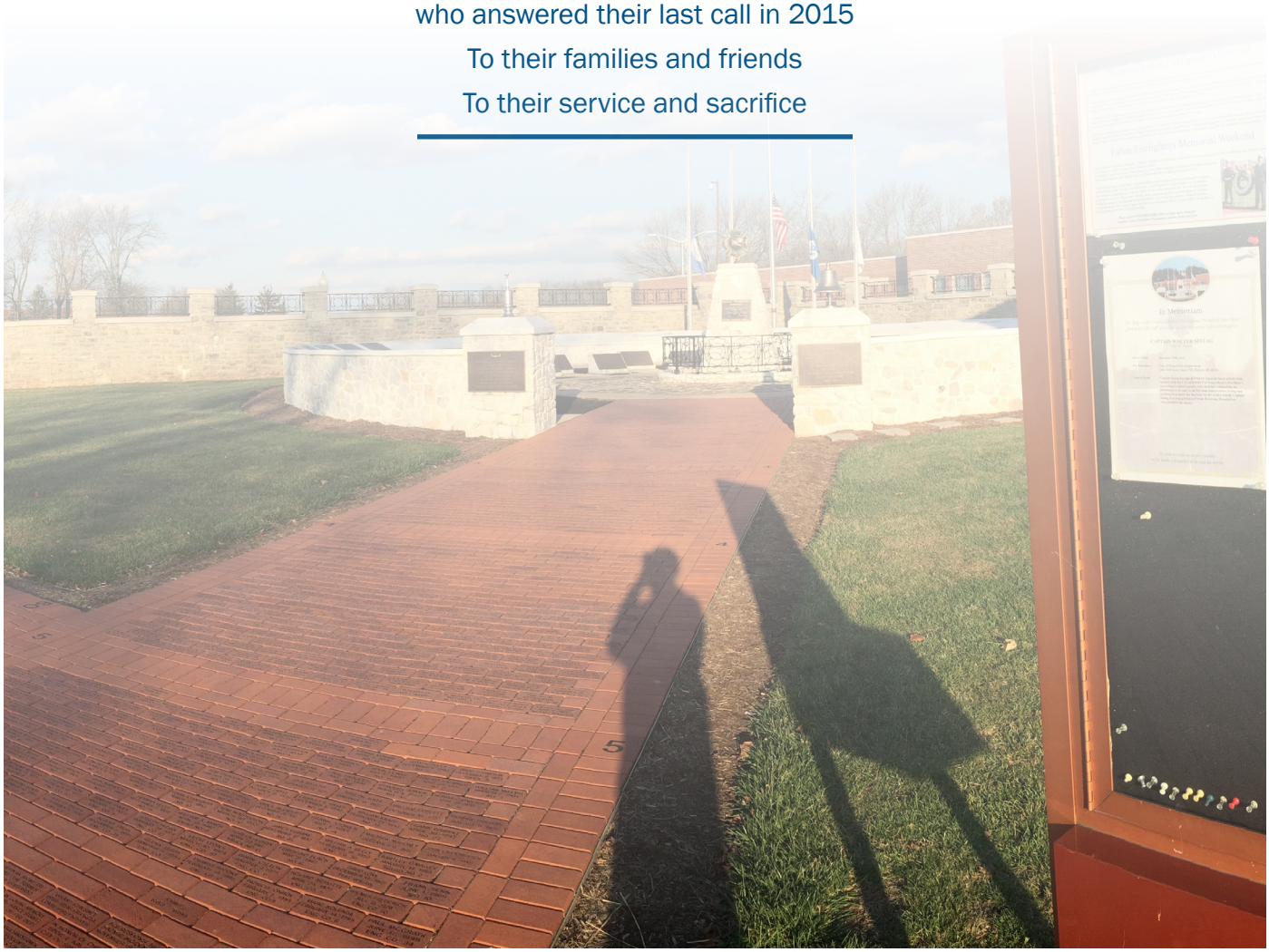
and

The National Fallen Firefighters Foundation
www.firehero.org

In memory of all firefighters
who answered their last call in 2015

To their families and friends

To their service and sacrifice



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Photo/Mark A. Whitney

Acknowledgments

This study of firefighter fatalities would not have been possible without the cooperation and assistance of many members of the fire service across the United States. Members of individual fire departments; chief fire officers; wildland fire service organizations, such as the U.S. Forest Service, the National Park Service, the Bureau of Land Management, the Bureau of Indian Affairs, the U.S. Fish and Wildlife Service; as well as the U.S. Department of Justice, the National Fire Protection Association, and many others, contributed important information to this report.

The National Fallen Firefighters Foundation was responsible for compilation of a large portion of the information used in this report. Their cooperation and work toward reducing firefighter deaths is gratefully acknowledged.

The ultimate objective of this effort is to reduce the number of firefighter deaths through an increased awareness and understanding of their causes and how they can be prevented. Firefighting, rescue and other types of emergency operations are essential activities in an inherently dangerous profession, and unfortunate tragedies do occur. These are the risks that all firefighters accept every time they respond to an emergency incident. However, the risks can be greatly reduced through efforts to improve training, emergency scene operations, and firefighter health and safety.

Background

For 39 years, the U.S. Fire Administration (USFA) has tracked the number of firefighter fatalities and conducted an annual analysis. Through the collection of information on the causes of firefighter deaths, USFA is able to focus on specific problems and direct efforts toward finding solutions to reduce the number of firefighter fatalities in the future. This information is also used to measure the effectiveness of current programs directed toward firefighter health and safety.

Several programs have been funded by USFA in response to this annual report. For example, USFA has sponsored significant work in the areas of general emergency vehicle operations safety, fire department tanker/tender operations safety, firefighter incident scene rehabilitation, and roadside incident safety. The data developed for this report are also widely used in other firefighter fatality prevention efforts.

In addition to the analysis, USFA, working in partnership with the National Fallen Firefighters Foundation (NFFF), develops a list of all on-duty firefighter fatalities and associated documentation each year. If certain criteria are met, the fallen firefighter's next of kin, as well as members of the individual's fire department, are invited to the annual National Fallen Firefighters Memorial Service. The service is held at the National Emergency Training Center (NETC) in Emmitsburg, Maryland, during Fire Prevention Week in October of each year. The 2016 Memorial Weekend will be held October 8 and 9, 2016. Additional information regarding the memorial service can be found at http://www.firehero.org, or by calling NFFF at 301-447-1365.

Other resources and information regarding firefighter fatalities, including current fatality notices, the National Fallen Firefighters Memorial database, and links to the Public Safety Officer Benefits (PSOB) program, can be found at http://apps.usfa.fema.gov/firefighter-fatalities/.

Introduction

This report continues a series of annual studies by USFA of on-duty firefighter fatalities in the U.S.

The specific objective of this study is to identify all on-duty firefighter fatalities that occurred in the U.S. and its protectorates in 2015 and to analyze the circumstances surrounding each occurrence. The study is intended to help identify approaches that could reduce the number of firefighter deaths in future years.

Who is a Firefighter?

For the purpose of this study, the term "firefighter" covers all members of organized fire departments with assigned fire suppression duties in all 50 states; the District of Columbia; and the territories of Puerto Rico, the Virgin Islands, American Samoa, the commonwealth of the Northern Mariana Islands, and Guam. It includes career and volunteer firefighters; full-time public safety officers acting as firefighters; fire police; state, territory and federal government fire service personnel, including wildland firefighters; and privately employed firefighters, including employees of contract fire departments and trained members of industrial fire brigades, whether full-time or part-time. It also includes contract personnel working as firefighters, or assigned to work in direct support of fire service organizations (e.g., air-tanker crews).

Under this definition, the study includes not only local and municipal firefighters, but also seasonal and full-time employees of the U.S. Forest Service, the National Park Service, the Bureau of Land Management, the Bureau of Indian Affairs, the U.S. Fish and Wildlife Service, and state wildland agencies. The definition also includes prison inmates serving on firefighting crews; firefighters employed by other governmental agencies, such as the U.S. Department of Energy; military personnel performing assigned fire suppression activities; and civilian firefighters working at military installations.

What Constitutes an On-Duty Fatality?

An on-duty fatality includes any injury or illness that was sustained while on-duty and proves fatal. The term "on-duty" refers to being involved in operations at the scene of an emergency, whether it is a fire or nonfire incident; responding to, or returning from, an incident; performing other officially assigned duties, such as training, maintenance, public education, inspection, investigations, court testimony or fundraising; and being on call, under orders or on standby duty (except at the individual's home or place of business). An individual who experiences a heart attack or other fatal injury at home, while he or she prepares to respond to an emergency, is considered on-duty when the response begins. A firefighter who becomes ill while performing fire department duties and suffers a heart attack shortly after arriving home (or at another location) may be considered on-duty since the inception of the heart attack occurred while the firefighter was on-duty.

On Dec. 15, 2003, the president of the U.S. signed the Hometown Heroes Survivors Benefit Act of 2003 into law. After being signed by the president, the act became Public Law 108-182. The law presumes that a heart attack or stroke is in the line of duty if the firefighter was engaged in nonroutine, stressful or strenuous physical activity while on-duty, and the firefighter becomes ill while on-duty, or within 24 hours after engaging in such activity. The full text of the law is available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_public_laws&docid=f:publ182.108.pdf.

The inclusion criteria for this study have been affected by this change in the law. Before Dec. 15, 2003, firefighters who became ill as the result of a heart attack or stroke after going off-duty needed to register a complaint of not feeling well while still on-duty in order to be included in this study. For firefighter fatalities after Dec. 15, 2003, firefighters will be included in this report if they became ill as the result of a heart attack

or stroke within 24 hours of a training activity or emergency response. Firefighters who became ill after going off-duty, where the activities while on-duty were limited to tasks that did not involve physical or mental stress, will not be included.

A fatality may be caused directly by an accidental or intentional injury in either emergency or nonemergency circumstances, or it may be attributed to an occupationally related fatal illness. A common example of a fatal illness incurred on-duty is a heart attack. Fatalities attributed to occupational illnesses also include a communicable disease contracted while on-duty that proved fatal when the disease could be attributed to a documented occupational exposure.

Firefighter fatalities are included in this report even when death is considerably delayed after the original incident. When the incident and the death occur in different years, the analysis counts the fatality as having occurred in the year in which the incident took place.

There is no established mechanism for identifying fatalities that result from illnesses, such as cancer, that develop over long periods of time and may be related to occupational exposure to hazardous materials or toxic products of combustion. It has proved to be very difficult to provide a complete evaluation of an occupational illness as a causal factor in firefighter deaths due to the following limitations: the exposure of firefighters to toxic hazards is not sufficiently tracked; the often delayed long-term effects of such toxic hazard exposures; and the exposures firefighters may receive while off-duty.

Sources of Initial Notification

As an integral part of its ongoing program to collect and analyze fire data, USFA solicits information on firefighter fatalities directly from the fire service and from a wide range of other sources. These sources include the PSOB program administered by the U.S. Department of Justice (DOJ), the National Institute for Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration, the U.S. Department of Defense, the National Interagency Fire Center, and other federal agencies.

USFA receives notification of some deaths directly from fire departments, as well as from such fire service organizations as the International Association of Fire Chiefs, the International Association of Fire Fighters, the National Fire Protection Association (NFPA), the National Volunteer Fire Council, state fire marshals, state fire training organizations, other state and local organizations, fire service internet sites, news services, and fire service publications.

Procedure for Including a Fatality in the Study

In most cases, after notification of a fatal incident, initial telephone contact is made with local authorities by USFA to verify the incident, its location, jurisdiction and the fire department or agency involved. Further information about the deceased firefighter and the incident may be obtained from the chief of the fire department, designee over the phone, or by other forms of data collection. After basic information is collected, a notice of the firefighter fatality is posted at the National Fallen Firefighters Memorial site in Emmitsburg, Maryland, as well as on the USFA website. A notice of the fatality is also transmitted by email to a large list of fire service organizations and fire service members.

Information that is routinely requested from fire departments that have experienced a fatality includes National Fire Incident Reporting System (NFIRS)-1 (incident) and NFIRS-3 (fire service casualty) reports; the fire department's own incident and internal investigation reports; copies of death certificates and autopsy results; special investigative reports; law enforcement reports; photographs and diagrams; and newspaper or media accounts of the incident. Information on the incident may also be gathered from NFPA or NIOSH reports.

After obtaining this information, a determination is made as to whether the death qualifies as an on-duty firefighter fatality according to the previously described criteria. With the exception of firefighter deaths after Dec. 15, 2003, the same criteria were used for this study as in previous annual studies. Additional information may be requested by USFA, either through follow-up with the fire department directly, from state vital records offices, or other agencies. The final determination as to whether a fatality qualifies as an on-duty death for inclusion in this statistical analysis is made by USFA. The NFFF criteria as a line-of-duty death (LODD) for inclusion in the annual National Fallen Firefighters Memorial Service is made by the NFFF.

2015 Findings

Ninety firefighters died while on-duty in 2015, four fewer than the 2014 total of 94 firefighter fatalities. The 2015 total includes 15 firefighters who died under circumstances that were part of inclusion criteria changes resulting from the Hometown Heroes Survivors Benefit Act. When not including these fatalities for the purposes of a trend analysis, there were 75 non-Hometown Hero firefighter fatalities in 2015, the fifth lowest annual total since 1977 (when USFA began this study).

The five years with the fewest annual total deaths of non-Hometown Hero firefighter fatalities have all occurred during the past six years.

An analysis of multiyear firefighter fatality trends needs to acknowledge the changes from the December 2003 Hometown Heroes Survivors Benefit Act. Some graphs and charts in this report may not indicate the Hometown Heroes portion of the total. However, this does not diminish the sacrifices made by any firefighter who dies while on-duty, or the sacrifices made by his or her family and peers.

In the same light, when conducting multiyear comparisons of firefighter fatalities in this report, the losses resulting from the attacks on the World Trade Center in New York City on Sept. 11, 2001, are sometimes also set apart for illustrative purposes. This action is by no means a minimization of the supreme sacrifice made by these firefighters.

Figure 1. On-Duty Firefighter Fatalities (1977 to 2015)

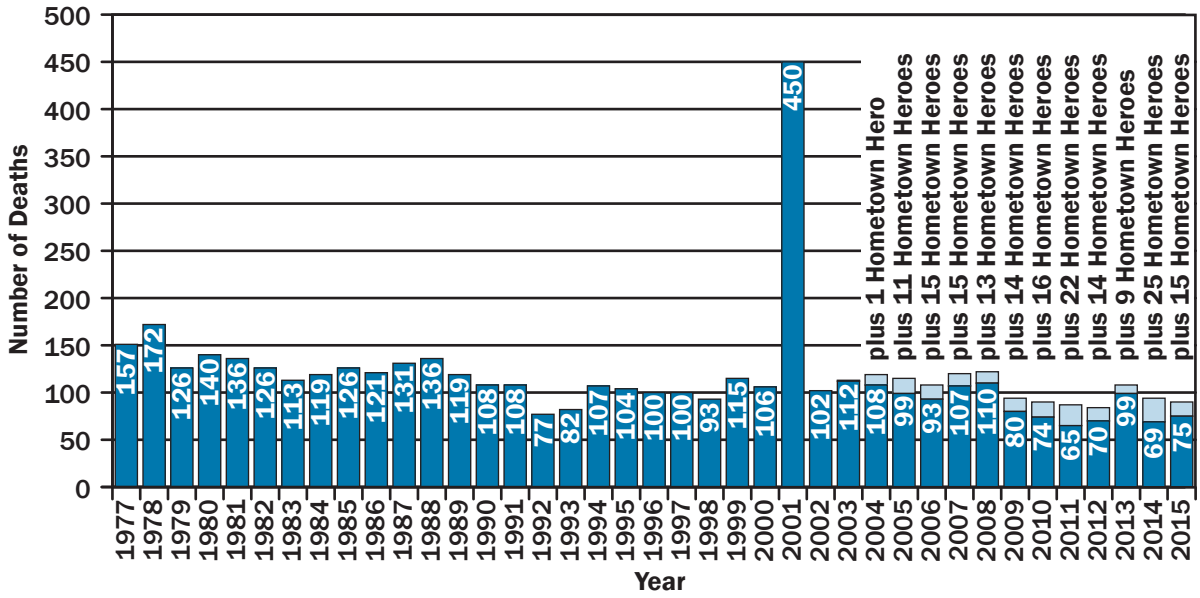
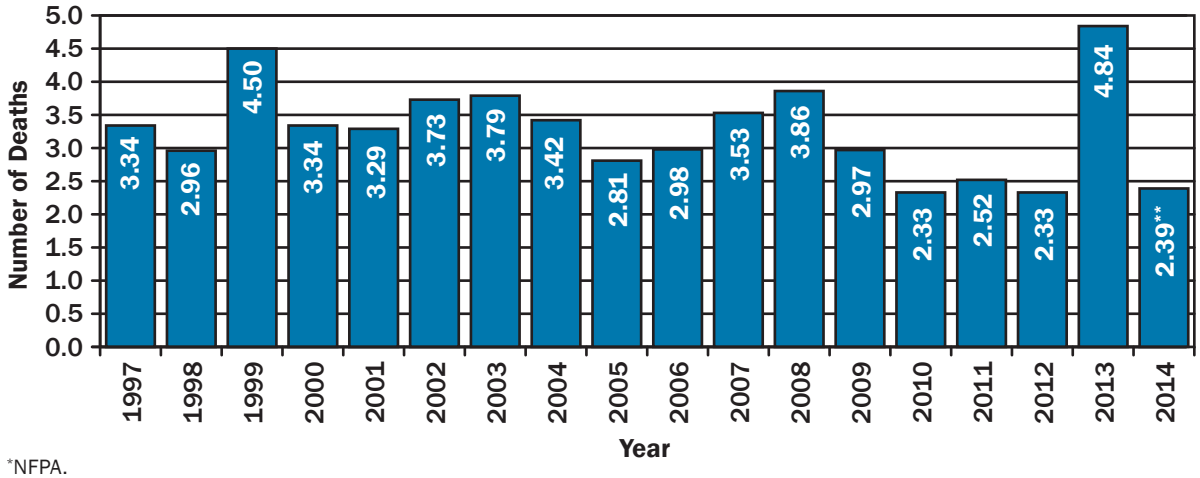


Figure 2. Firefighter Fatalities per 100,000 Fires*



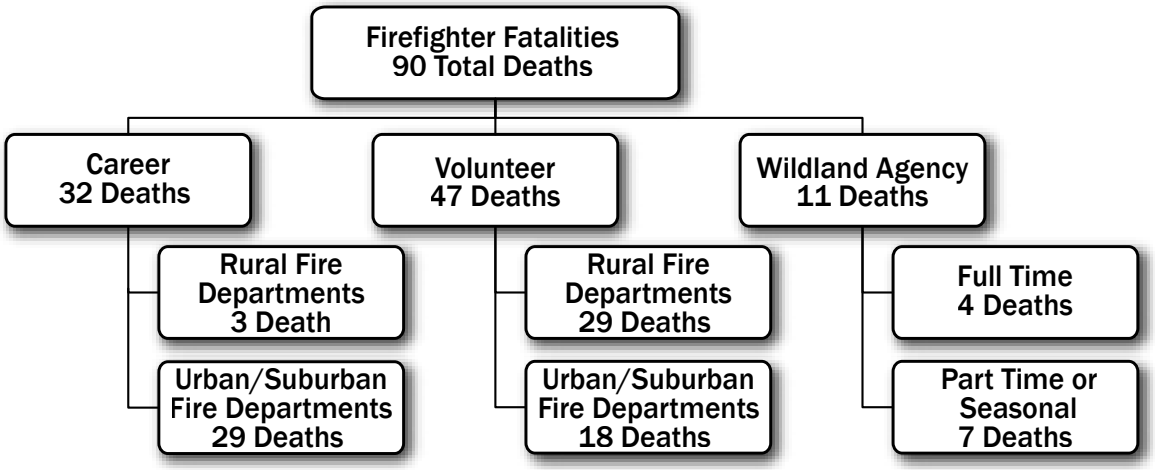
*NFPA.
**2015 ratio will be included in the 2016 report.

Since 1977, there has been a 35 percent decrease (46 percent when excluding firefighter fatalities associated with September 11, 2001), and over the past ten years alone, a 29 percent decrease in on-duty firefighter fatalities.

Career, Volunteer and Wildland Agency Fatalities

In 2015, firefighter fatalities included 32 career firefighters, 47 volunteer firefighters, and 11 part-time or full-time members of wildland or wildland contract fire agencies (Figure 3).

Figure 3. Career, Volunteer and Wildland Agency Fatalities (2015)



Gender

All 90 firefighters who died while on-duty in 2015 were male — only the fourth such year since 1990.

Multiple Firefighter Fatality Incidents

The 90 deaths in 2015 resulted from a total of 86 fatal incidents, including three multiple firefighter fatality incidents, taking the lives of seven firefighters.

Table 1. Multiple Firefighter Fatality Incidents

Year	Number of Incidents	Total Number of Deaths
2015	3	7
2014	2	4
2013	4	34
2012	4	10
2011	3	6
2010	4	8
2009	6	13
2008	5	18
2007	7	21
2006	6	17

Wildland Firefighting Fatalities

In 2015, 12 firefighters were killed during activities involving brush, grass or wildland firefighting. This total includes part-time and seasonal wildland firefighters, full-time wildland firefighters, and municipal or volunteer firefighters whose deaths are related to a wildland fire (Figure 4).

Figure 4. Firefighter Fatalities Related to Wildland Firefighting (2006 to 2015)

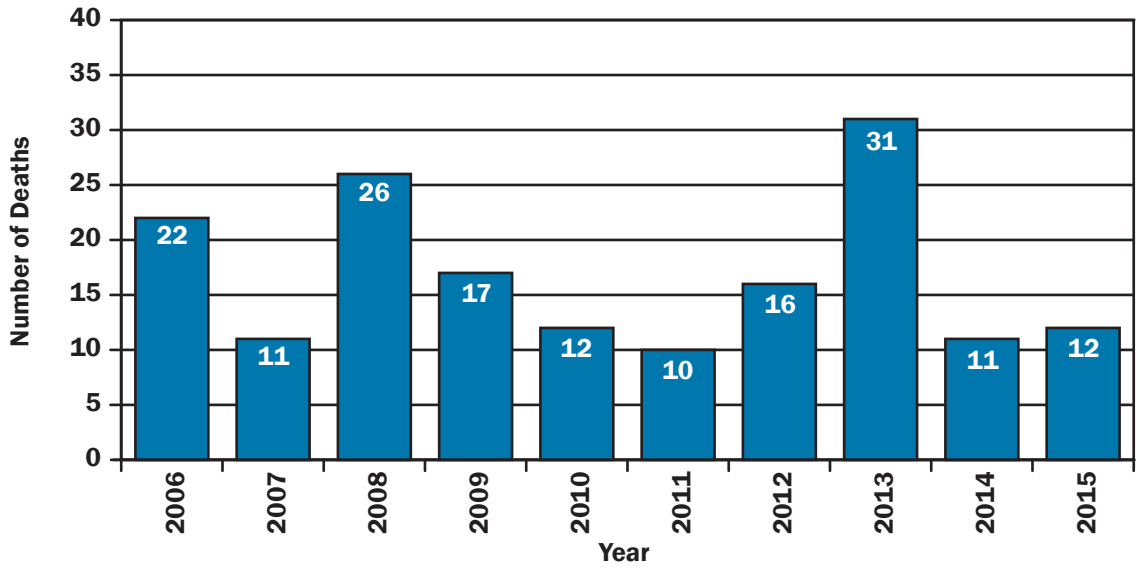


Table 2. Firefighter Deaths Associated With Wildland Firefighting

Year	Total Number of Deaths	Number of Fatal Incidents	Number of Firefighters Killed in Multiple-Death Incidents
2015	12	9	5
2014	11	11	0
2013	31	13	19
2012	16	12	6
2011	10	9	2
2010	12	12	0
2009	17	14	5
2008	26	15	14
2007	11	11	0
2006	22	13	13

Table 3. Wildland Firefighting Aircraft Deaths

Year	Total Number of Deaths	Number of Fatal Incidents
2015	2	1
2014	2	2
2013	0	0
2012	6	2
2011	0	0
2010	0	0
2009	5	3
2008	16	4
2007	1	1
2006	8	3

In 2015, there was one firefighter fatality incident from an aircraft crash related to wildland firefighting, taking the lives of one firefighter pilot and one firefighter.

Incident summary narratives for all of the 2015 firefighter fatalities, including links to independent investigations for many of the firefighter deaths conducted by the NIOSH Fire Fighter Fatality Investigation and Prevention Program, can be found at http://apps.usfa.fema.gov/firefighter-fatalities/.

Type of Duty

Activities related to emergency incidents resulted in the deaths of 44 firefighters in 2015 (Figure 5). This includes all firefighters who died responding to an emergency or at an emergency scene, returning from an emergency incident, and during other emergency-related activities. Nonemergency activities accounted for 46 fatalities. Nonemergency duties include training, administrative activities, performing other functions that are not related to an emergency incident, and post-incident fatalities where the firefighter does not experience the illness or injury during the emergency.

A multiyear historical perspective relating to the percentage of firefighter deaths that occurred during emergency duty is presented in Table 4.

Figure 5. Firefighter Deaths by Type of Duty (2015)

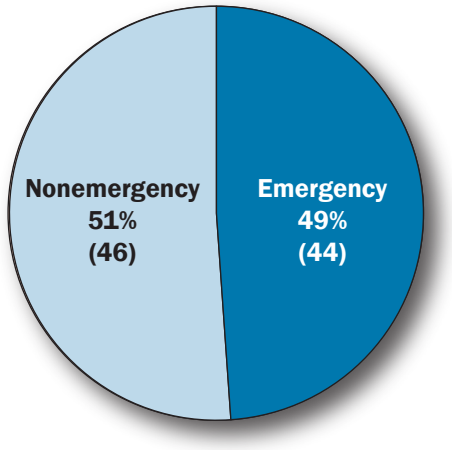


Table 4. Emergency Duty Firefighter Deaths

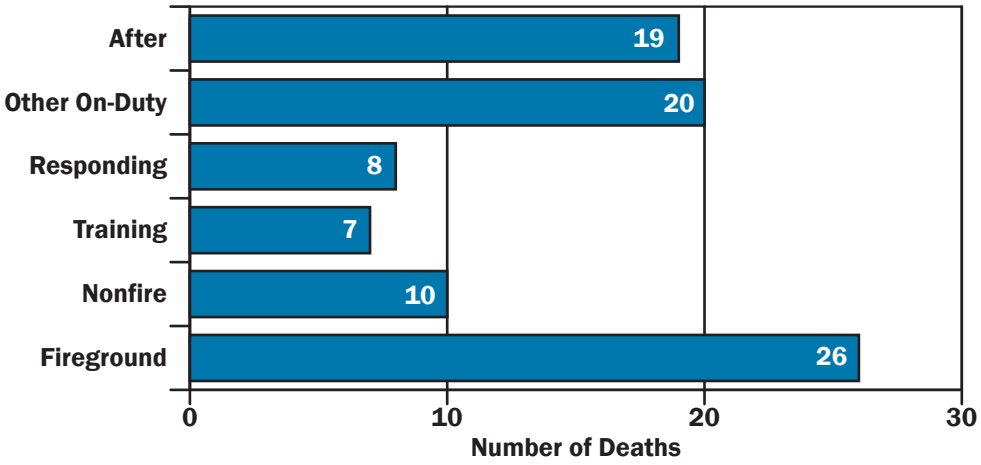
Year	Percentage of All Deaths	Percentage of All Deaths Excluding Hometown Heroes
2015	49	59
2014	46	63
2013	73	77
2012	56	65
2011	54	70
2010	55	67
2009	63	82
2008	64	70
2007	64	72
2006	58	66

The number of deaths by type of duty being performed is shown in Table 5 and presented graphically in Figure 6 for 2015. As has been the case for most years, fireground duties are the most common type of duty for firefighters killed while on-duty.

Table 5. Firefighter Deaths by Type of Duty (2015)

Type of Duty	Number of Deaths
After	19
Other On-Duty	20
Responding	8
Training	7
Nonfire	10
Fireground	26
Total	90

Figure 6. Firefighter Deaths by Type of Duty (2015)



Fireground Operations

Twenty-six firefighters were killed during fireground operations in 2015. Of these fatalities, 17 were at the scene of a structure fire, two were at the scene of a vehicle fire, and seven others were at the scene of a wildland or outside fire. The average age of the firefighters killed during fireground operations was 43, five years younger than the previous year, with the youngest being 18 years old and the oldest being 95 years old. Nine of those killed were volunteer, 12 were career and five were wildland firefighters. The nature of fatal injury while engaged in fireground operations for nine of the firefighter deaths was heart attack (35 percent). The nature of fatal injury for the other 17 deaths include: asphyxiation (five), crushed (three), trauma (five), and burns (four).

Type of Fireground Activity

Table 6 shows the types of fireground activities in which firefighters were engaged when they sustained their fatal injuries or illnesses. This total includes all firefighting duties on the fireground, such as wildland firefighting and structural firefighting.

Table 6. Type of Activity (2015)

Advance Hose Lines	10
Unknown	4
Scene Safety	2
Search and Rescue	2
Support	2
Ventilation	2
Setup	2
Water Supply	1
Incident Command	1

Fixed Property Use for Structural Firefighting Fatalities

There were 17 fatalities in 2015 where firefighters became ill or injured while on the scene of a structure fire. Table 7 shows the distribution of these deaths by fixed property use.

Table 7. Structural Firefighting Deaths by Fixed Property Use (2015)

Residential	12
Commercial	1
Other	4

Responding/Returning

In 2015, eight firefighters, all volunteers, died or experienced an onset of symptoms while responding to eight emergency incidents. For the first year on record, none died while returning from an incident. Of the eight firefighters who died while responding to incidents, the nature of fatal injury for five firefighters was heart attack. Two other fatalities were from a stroke. The average age of these seven responders was 58 years old. None were younger than age 50. Only one of the eight firefighters died from traumatic injuries resulting from a motor vehicle crash. He was a passenger in a fire department ambulance that struck the rear of a backhoe with a street sweeper attachment. According to the law enforcement crash report, early morning sunshine blinded the ambulance driver as they approached the backhoe.

Over the past ten years, the trend in the numbers of firefighters killed while responding to or returning from an incident has declined by 54 percent. For the second year in a row, and only the second year on record, no firefighters were killed from trauma caused by a vehicle crash while responding to an incident in a privately owned vehicle (POV). For the twenty year period of 1994 to 2013, there were an average of four POV response-related fatal incidents each year.

Table 8. Firefighter Deaths While Responding to or Returning From an Incident

Year	Number of Firefighter Deaths
2006	16
2007	26
2008	25
2009	15
2010	17
2011	11
2012	17
2013	14
2014	13
2015	8

Training

In 2015, seven firefighters died while engaged in training activities. Like the nine firefighters who died while engaged in training activities in 2014, all seven of the 2015 firefighters died from heart attacks. Four of the seven died while engaged in physical fitness activities, one died while involved in training exercises at the fire station, one died as part of a wildland crew involved in training hosted by an Indian reservation, and one was stricken while participating in air management exercises. The average age of the seven firefighters was 40 years old. The youngest was 30, and the oldest was 46. Over the past ten years, there has been a 33 percent decrease in firefighter fatalities while engaged in training.

Table 9. Firefighter Fatalities While Engaged in Training

Year	Number of Firefighter Deaths
2015	7
2014	9
2013	7
2012	8
2011	8
2010	12
2009	10
2008	12
2007	11
2006	9

Nonfire Emergencies

In 2015, 15 firefighters were killed during emergency duties not related to fire. These response calls included four motor vehicle accidents, six Emergency Medical Services calls, one technical rescue, two false alarms, and two "other" incidents. Six of the 15 firefighters died from traumatic injuries, including four that were struck by vehicles, and two who were killed in vehicle collisions involving fire department ambulances. One firefighter drowned when he was swept into a flooded storm drain while assisting with a water rescue. Eight firefighters, who were an average of 58 years old, died from heart attacks. The youngest of these eight was 31 years old, and the oldest was 71 years old.

After the Incident

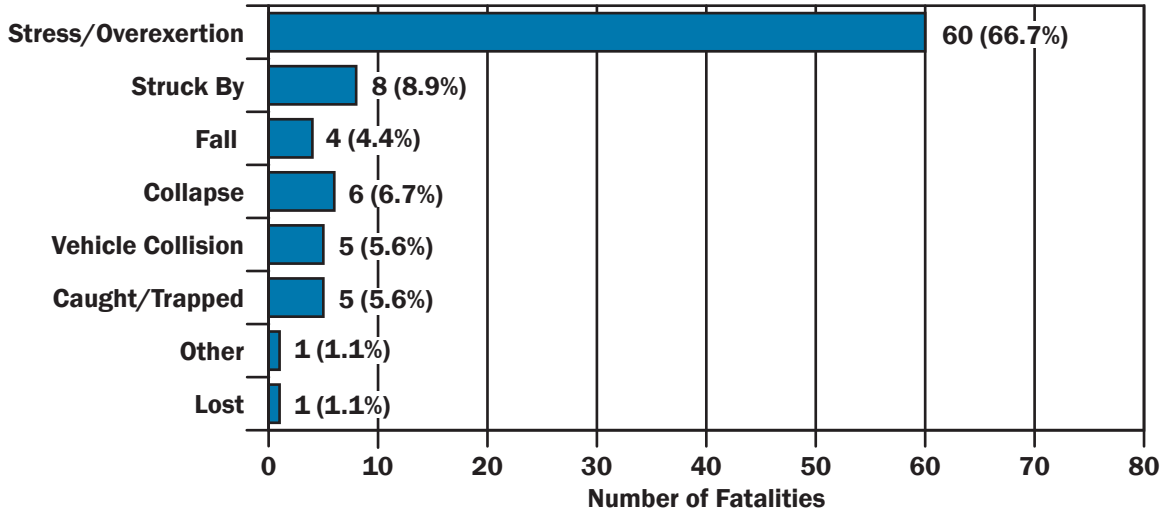
In 2015, 19 firefighters died after the conclusion of their on-duty activities: 17 from heart attacks and two from strokes. The average age was 54 years old. The youngest was 30, and the oldest was 69. Of the 19 deaths, 15 were classified as Hometown Heroes where no symptom or complaint of illness became evident or was reported during duty.

Cause of Fatal Injury

The term "cause of injury" refers to the action, lack of action or circumstances that directly resulted in the fatal injury. The term "nature of injury" refers to the medical cause of the fatal injury or illness, which is often referred to as the physiological cause of death. A fatal injury is usually the result of a chain of events, the first of which is recorded as the cause.

Figure 7 shows the distribution of deaths by cause of fatal injury or illness in 2015.

Figure 7. Fatalities by Cause of Fatal Injury (2015)



Alcohol and drugs were contributing factors for three on-duty firefighter fatalities in 2015, including one overdose of a legally prescribed opioid medication for pain management of a duty-related injury, one overdose involving a non-prescription drug, and one involving alcohol.

Stress or Overexertion

Firefighting is extremely strenuous, physical work, and it can be one of the more physically demanding of human activities.

Stress or overexertion is a general category that includes all firefighter deaths that are cardiac or cerebrovascular in nature, such as heart attacks and strokes, as well as other events, such as extreme climatic thermal exposure. Classification of a firefighter fatality in this cause of fatal injury category does not necessarily indicate that a firefighter was in poor physical condition.

In 2015, 60 firefighters died as a result of stress or overexertion:

- Fifty-four firefighters died due to heart attacks.
- Six firefighters died due to cerebrovascular accident (CVA) — stroke.

Table 10. Deaths Caused by Stress or Overexertion

Year	Number	Percent of Fatalities	Hometown Heroes
2006	55	50.9	15
2007	56	46.6	13
2008	55	45.0	12
2009	52	55.3	12
2010	56	62.2	16
2011	54	62.0	21
2012	48	57.1	14
2013	39	36.1	9
2014	63	67.0	24
2015	60	66.7	15
10-year average	53.8	54.89	15.1

Vehicle Crashes

In 2015, five firefighters died as the result of four separate vehicle crashes. One of the vehicle crashes in 2015 involved an aircraft (helicopter) taking the lives of two firefighters. Three firefighters were killed in three separate crashes involving fire department vehicles: two ambulances and one command/staff support vehicle. None of the crashes involved POVs.

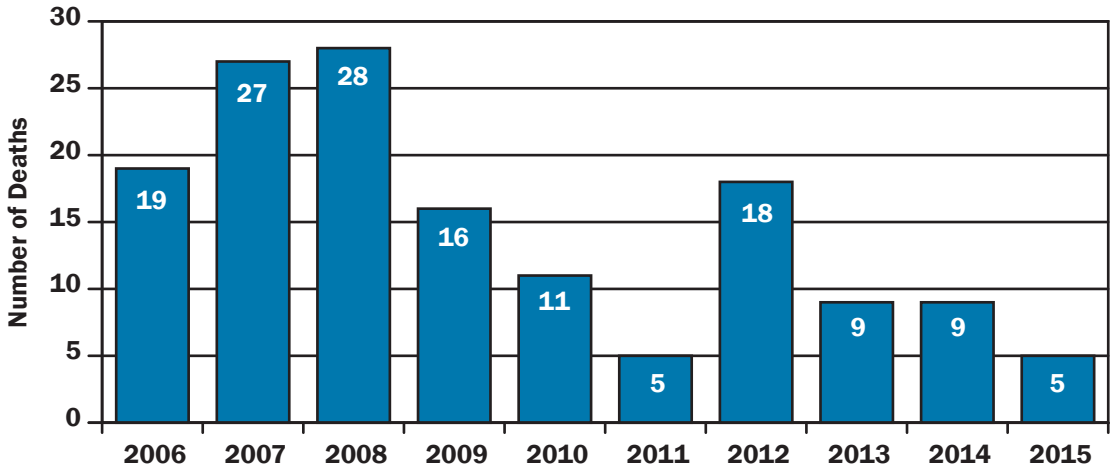
- One pilot and two passengers were supporting a 1 1/4-square mile, controlled burn when, for reasons unknown at this time, their Bell 206 L-1 helicopter crashed and burned. One firefighter was killed due to traumatic injuries, and the pilot (firefighter) died as the result of asphyxiation due to inhalation of combustion products. An additional firefighter in the helicopter sustained severe injuries, but survived.

- One firefighter was fatally injured when the ambulance he was driving was involved in a crash with a semitractor-trailer during a nonemergency ambulance transport. A paramedic passenger and the patient being transported were injured in the crash. As the ambulance traveled on a state highway, it rear ended a semitractor-trailer that was in the left lane preparing to make a left turn. The law enforcement crash report cited speed as a factor in the crash. The firefighter/operator of the ambulance was wearing his seatbelt at the time of the crash, and the vehicle's airbags deployed.

- While responding to an emergency call for a male with chest pain, one firefighter died from injuries sustained when the fire department ambulance, in which he was a passenger, collided with a slow-moving backhoe. The backhoe was being used with a sweeper attachment to clean the roadway. The firefighter killed was a front seat passenger in the ambulance. The ambulance driver and one other crew member on-board the ambulance were injured. The ambulance was traveling east when the accident occurred. According to the law enforcement crash report, early morning sunshine blinded the ambulance driver as they approached the backhoe. The firefighter killed in the crash was wearing his seat belt, and the vehicle's air bags deployed. The crew member in the patient treatment area of the ambulance was not wearing a seat belt at the time of the crash.

- One firefighter was involved in a motor vehicle collision while riding in the fire department's Ford F-150 pickup truck. He was returning from picking up equipment. Another vehicle pulled out directly in front of the department's truck, totaling it. As a result of the collision, the firefighter sustained serious fractures to both feet, and his right leg was amputated just below the knee. Almost two weeks later, as a patient in a rehabilitation center, the firefighter succumbed to his injuries.

Figure 8. Firefighter Fatalities in Vehicle Collisions (Including Aircraft)



A changing culture? From 1995 to 2006, there was an average of 20 firefighter deaths in vehicle collisions (including aircraft) each year. Over this 10-year period, there was a 110 percent increase in the trend of firefighters killed in vehicle collisions. In 2015, there were five firefighters killed in vehicle collisions. This represents the fewest number of firefighters killed in vehicle collisions in a single year (except for 1991 and 2011 when five firefighters were also killed in vehicle collisions in each of these years). Moreover, there has been a 78 percent decrease in the trend over the past decade (2006 to 2015) for firefighter deaths caused by all types of vehicle collisions (90 percent decrease for aircraft, 65 percent decrease for apparatus, and 87 percent decrease for POVs over the same decade).

Lost or Disoriented

One firefighter died in 2015 by becoming lost or disoriented inside of a burning structure. Firefighters arrived on the scene of a mutual-aid response call for a reported chimney fire. They observed fire coming from the ground floor. An entry team of firefighters entered the basement to extinguish the fire. During interior firefighting operations, one firefighter became separated from his team. He was quickly located by fellow firefighters and removed from the structure. Once outside, the firefighter became unresponsive, so firefighters initiated lifesaving measures. The firefighter was treated by paramedics at the scene and was transported by ambulance to the hospital where he succumbed to his injuries. His cause of death was the result of inhaling super-heated gases, leading to irreversible respiratory failure, and subsequently resulting in cardiac arrest. The cause of the fire was accidental — a wood burning stove situated too close to a wall.

Caught or Trapped

In 2015, five firefighters were killed in three separate incidents when they became caught or trapped. This classification covers firefighters trapped in wildland and structural fires who were unable to escape due to rapid fire progression and the byproducts of smoke, heat, toxic gas and flames. This classification may also include firefighters who drowned and those who were trapped and/or crushed.

- Firefighters were dispatched to a flooding incident in an apartment complex. Six children and an adult needed to be moved from their apartment to safety. One firefighter was seeking a safe path from the apartment. As the firefighter walked through the water at approximately 2238 hours, he stepped off (or fell off)

the driveway into a drainage ditch. The force of the water in the ditch began to drag the firefighter away. Other firefighters attempted to hold onto him, but were unable to do so. He and another firefighter were swept under the water into a drainage pipe. A mayday was called, and firefighters searched for the outflow of the pipe. The second firefighter that had been swept away emerged unharmed from the pipe, approximately 230 feet downstream. The first firefighter's body was not located until approximately 0130 hours. His body was recovered at 0325 hours. He was pronounced dead at the scene, and the cause of death was drowning.

- One firefighter was reported missing during the initial fire attack on a wildfire in the state of California. The firefighter had arrived on the scene at approximately 1809 hours and was last heard from at approximately 1926 hours. The fire had developed quickly, and firefighters feared that the missing firefighter was in trouble. The county sheriff's office was called for assistance in searching for the missing firefighter. Search and rescue personnel started the initial search at approximately 2000 hours and continued until about midnight (it was halted because of hazardous fire conditions). Efforts began again at 0600 hours the following morning and continued until the missing firefighter's body was discovered at 0917 hours. The cause of death was listed as carbon monoxide poisoning and smoke inhalation. From evidence at the scene, it appeared that the firefighter had been cut off by the fire. His fire shelter was not deployed.

- A four-member engine crew was assigned to a wildfire caused by electrical power lines contacting vegetation. Fire conditions changed rapidly, and the engine was forced to head for a pre-established safety zone in near-zero visibility. As the engine went back down the road, it jolted and dropped down as if a tire had popped. The apparatus continued downhill. The engine then left the roadway and came to a stop. Three firefighters were unable to escape the flames and died. The fourth firefighter was able to escape and received severe burns. The cause of death for the killed firefighters was burns and asphyxiation due to inhalation of combustion products. The November 2015 report entitled "Twisp River Fire Fatalities and Entrapments — Learning Review Status Report," contains a significant level of detail about the fire and the firefighter fatalities. The report is available through an internet search.

Collapse

In 2015, six firefighters in five incidents died as a result of a structural collapse.

- Firefighters were working on the scene of a residential structure fire when a porch collapse occurred. Three firefighters were trapped in the debris. Firefighters were able to remove one firefighter, and emergency medical treatment was provided. He was transported to the hospital, where he died. A cause of death report cited head injuries received in the collapse as the cause.

- Firefighters responded to a working structural fire in a residence at 2208 hours. Law enforcement officers reported smoke and fire before the fire department arrived. Firefighters arrived on the scene and rescued a resident at 2235 hours. At 2241 hours, all firefighters were ordered to evacuate the structure. A roll call was conducted, and one firefighter was not present. The missing firefighter was recovered from the basement of the structure at approximately 0130 hours. The resident of the home also died. Both deaths were caused by asphyxiation due to inhalation of combustion products.

- One firefighter fell approximately 15 feet through the ceiling of a bunker while fighting a grass and structure fire. The firefighter suffered second- and third-degree burns over 38 percent of his body, seven broken ribs and a punctured lung. The injured firefighter was flown to a hospital and went through numerous surgeries in the months after the incident. The firefighter passed away as a result of the injuries he sustained following four months in the hospital.

- Two firefighters were fatally injured in a wall collapse at a structure fire that was dispatched at 1927 hours. The fire involved a three-story Type 3 structure with apartments located on the second and third floors. The first floor contained four commercial spaces, three of which were occupied and open for business at the time of the incident. Initial regular alarm companies reported heavy smoke and commenced rescuing residents from the upper floors of the structure while attempting to determine the location and seat of the fire. After 19 minutes and 38 seconds of interior operations, the Incident Commander (IC) ordered an evacuation and switched operational tactics from "offensive" to "defensive." Shortly after this change in tactics, the IC ordered that a collapse zone be established. At 2006 hours, firefighters were operating inside a collapse zone when the D-side masonry wall collapsed. Four firefighters were transported to area hospitals, and two of these men passed away from their injuries. Several firefighters reported injuries resulting from the collapse, and two of these firefighters are undergoing extensive rehabilitation from injuries sustained. The cause of the fire was incendiary.

- Firefighters arrived at the scene of a working fire in a residence. Firefighters received word that two residents might have been trapped in the home. With the subject firefighter on the nozzle, firefighters advanced a handline through the front door of the residence. The floor collapsed, and the subject firefighter fell into the fully involved basement. The injured firefighter was rescued from the basement and transported to the hospital where he was pronounced dead approximately 60 minutes later. The cause of death was listed as asphyxiation.

Struck by Object

In 2015, being struck by an object was the cause of eight fatal firefighter injuries in eight separate incidents.

- One firefighter was directing traffic in front of the fire station when he was struck and killed by a van. The driver of the van reported to have been blinded by sunlight.

- Firefighters were working to establish a landing zone for a medical helicopter on a local highway. When the original site for the landing zone proved to be inadequate, firefighters and apparatus moved to an alternate site. One firefighter rode the back step of a pumper as it moved from the original site to the new site. When the pumper arrived at the new location, the driver backed up to reposition the apparatus, unaware that the firefighter was on the back step. As the apparatus backed up, it struck the firefighter. He was pronounced dead at the scene.

- Firefighters were dispatched to the scene of a motor vehicle crash with injuries. As apparatus arrived on the scene, they were placed in positions to protect the original crash scene. One lane in each direction was blocked. One firefighter, assigned to a traffic control point, was wearing reflective clothing and using two light wands. A vehicle drove around staged apparatus and into the incident scene, striking the firefighter. The vehicle left the scene of the crash. The firefighter received significant injuries and was treated and transported to the hospital where he died as a result of head injuries. The driver of the hit-and-run vehicle was later located and charged with driving under the influence and leaving the scene of an accident.

- Firefighters were on the scene of a vehicle fire that occurred as the result of a vehicle crash. The fire had been extinguished, and firefighters were preparing to leave the scene. A tree at the scene fell unexpectedly and trapped one firefighter beneath it. Firefighters quickly extricated the injured firefighter, provided emergency care, and transported him to the hospital, where he died as the result of traumatic injuries.

- One wildland firefighting crew was assigned to a lightning-caused fire. While firefighters were building a line, or firebreak, around a burning tree, the tree fell and struck two firefighters. One of the firefighters was severely injured, and CPR was initiated by other firefighters. The injured firefighter was flown-out by medical helicopter, but was declared deceased approximately 90 minutes after the incident. His death was caused by traumatic head injuries.

- One firefighter died of a self-inflicted gunshot wound while on-duty at the fire station.
- One firefighter was participating in the annual "Fill the Boot" fundraising campaign. He was wearing turnout pants and a reflective vest as he collected donations at an intersection. A pickup truck that had passed through the intersection turned around, drove back to the scene at a high rate of speed, and struck the firefighter. The vehicle then left the scene. The firefighter was treated by other firefighters at the scene and transported to the hospital where he died of traumatic injuries. The driver of the pickup truck was arrested and charged with multiple felonies.
- One firefighter was struck by a passing vehicle as he was directing traffic while the department was on the scene of a motor vehicle crash. The firefighter was wearing a reflective vest. The injured firefighter was rushed by ambulance to a hospital, then flown to a university trauma center, where he succumbed to his injuries. The law enforcement report on the incident said that the vehicle's driver, who killed the firefighter, was retrieving a mobile phone that had fallen to the floor of the vehicle and did not notice the emergency vehicles.

Fall

Four firefighters died in 2015 as the result of a fall.

- Firefighters were dispatched to a reported structure fire in a single family residence. Firefighters arriving on the scene reported a working fire in a two-story residence and advanced a handline into the structure. One firefighter and his crew joined the fire fight in the interior. Another company officer noticed fire coming through the first floor from the basement and ordered an evacuation. As firefighters exited the structure, the floor collapsed. The firefighter and his crew fell into the basement. Firefighters were able to rescue crew members but could not rescue the subject firefighter. After approximately one hour, the firefighter was recovered. Emergency medical care was provided. He was transported to the hospital, but he did not survive. The cause of death was asphyxiation from combustion products. Five other firefighters were injured in the incident. The fire was caused by an unattended exterior burn-barrel fire.
- One subject firefighter, along with the crew of a heavy rescue truck, responded to a report of a working fire in a residential highrise. Upon their arrival on the scene at 0604 hours, the truck crew was assigned to perform a search of the fifth floor. Once they arrived at the fifth floor landing, firefighters entered the area to search. Smoke was moderate, with visibility limited to 4 to 5 feet. At approximately 0612 hours, members of the truck crew, not including the subject firefighter, came to an elevator door that was open to the shaft. Firefighters marked the door "Do Not Enter Open Shaft" and continued with their search. Firefighters continued the search of the fifth floor and gave an "all clear" to Command at 0615 hours. At 0619 hours, Command called for a Personnel Accountability Report. The Company Officer for the truck crew could not account for the subject firefighter, and a search was initiated. At 0622 hours, the missing firefighter was located in the elevator shaft. He was wedged between the elevator and the shaft wall at the second floor level. A mayday was transmitted, and the trapped firefighter was extricated. He was transported by ambulance to the hospital where he was pronounced dead at 0708 hours. His death was caused by traumatic injuries.
- Firefighters were operating at the scene of a possible structure fire. A dumpster burned alongside of a metal warehouse, and a ladder crew, including the subject firefighter, were on the roof checking for extension. As he walked on the roof, the subject firefighter fell through a skylight. He received serious injuries, including open-bone fractures and a dislocated elbow. The injured firefighter was hospitalized and released to recuperate at home after several weeks of treatment. While at home, the firefighter began to complain of shortness of breath and chest pains. He was transported to the hospital, but became unresponsive while in the ambulance. He was pronounced dead at the hospital as a result of complications from the injuries received.

- One firefighter died from injuries sustained in a fall down an open elevator shaft while operating with fire crews in heavy smoke conditions inside of a burning warehouse building. The building was undergoing renovation, and several unauthorized changes, including removal of the elevator, had been made without permits. The injured firefighter was quickly removed from the building, transferred to a waiting ambulance, then taken to a hospital where he succumbed to his injuries. The cause of the fire was accidental — a worker's welder had ignited nearby combustibles.

Other

One firefighter died in 2015 of a cause not previously categorized. The firefighter was found unconscious while on-duty at the fire station. He had not been feeling well earlier in the day. He was transported to the hospital where he passed away.

Nature of Fatal Injury

Figure 9 shows the distribution of the 90 firefighter deaths that occurred in 2015 by the medical nature of the fatal injury or illness. For heart attacks, Figure 10 shows the type of duty involved.

Figure 9. Fatalities by Nature of Fatal Injury (2015)

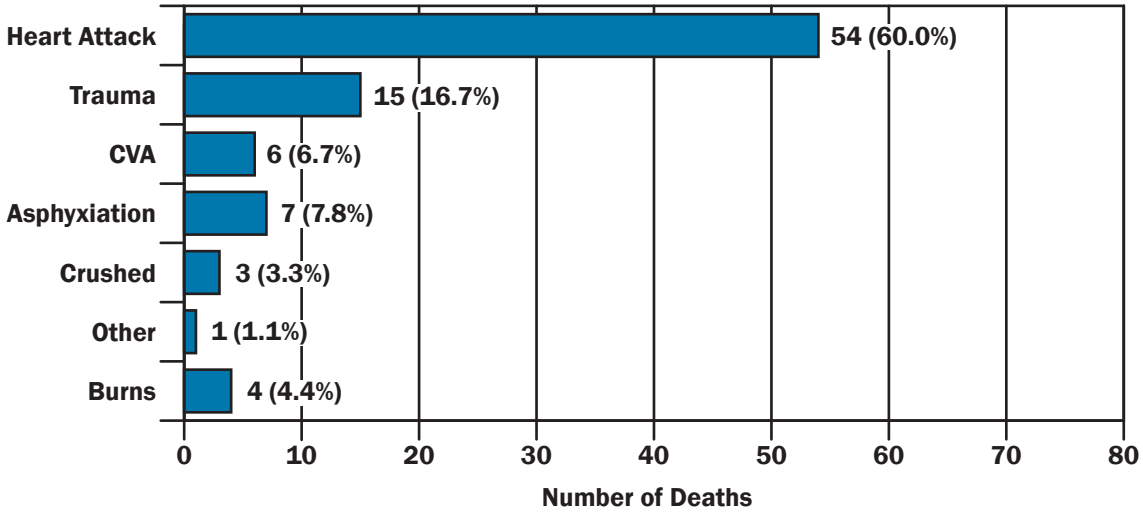
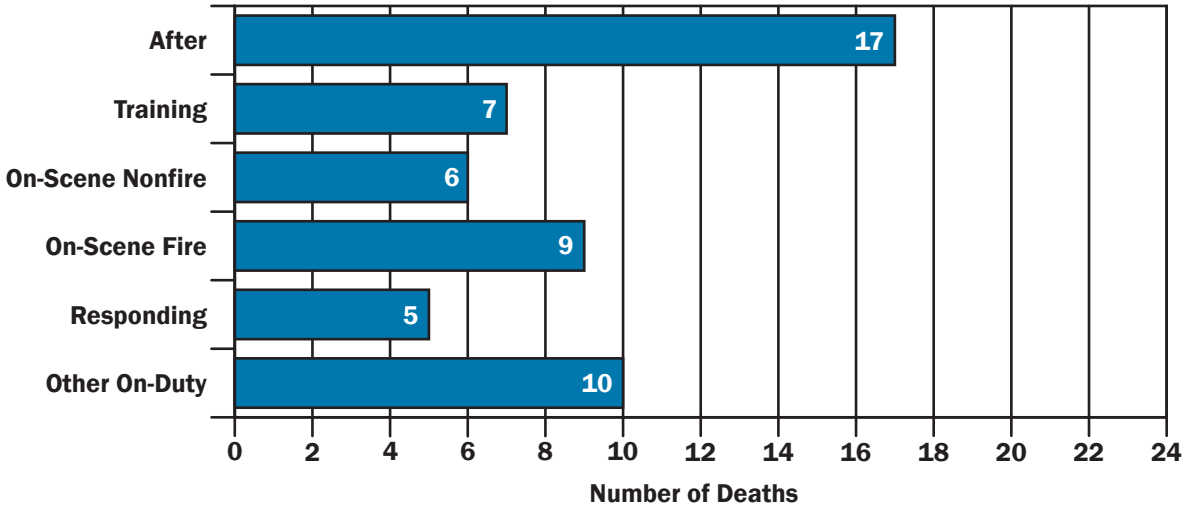


Figure 10. Heart Attacks by Type of Duty (2015)



Firefighter Ages

Figure 11 shows the percentage distribution of firefighter deaths by age (at the time of injury) and nature of the fatal injury. Table 11 provides a count of firefighter fatalities by age and the nature of the fatal injury.

Younger firefighters were more likely to have died as a result of traumatic injuries, such as injuries from an apparatus accident or becoming caught or trapped during firefighting operations. Stress-related deaths are rare below the 31 to 35 years of age category and, when they occur, often include underlying medical conditions.

Figure 11. Fatalities by Age and Nature (2015)

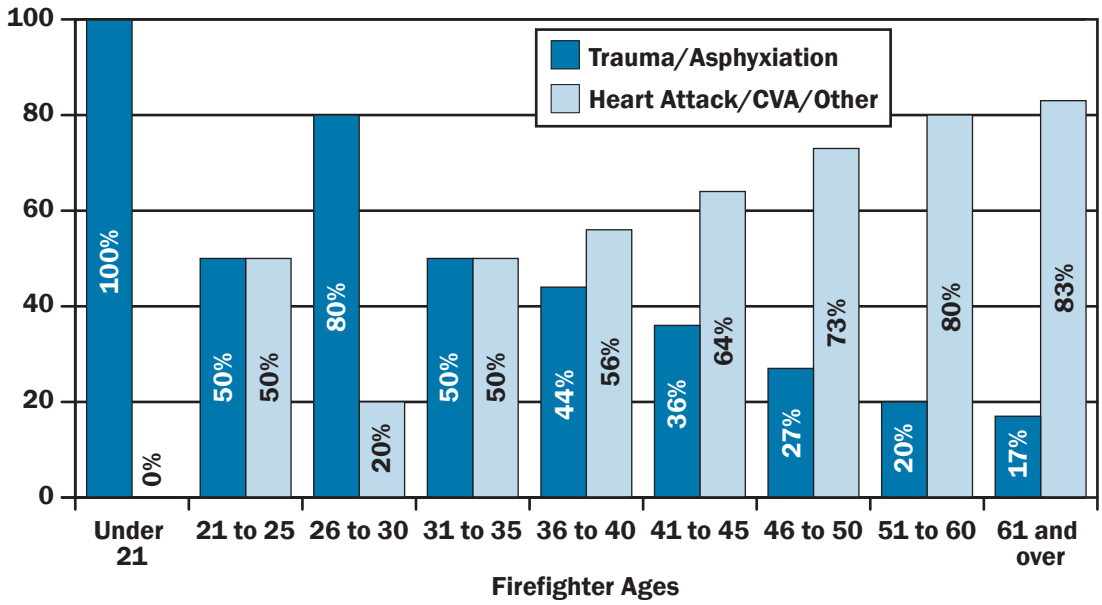


Table 11. Firefighter Ages and Nature of Fatal Injury (2015)

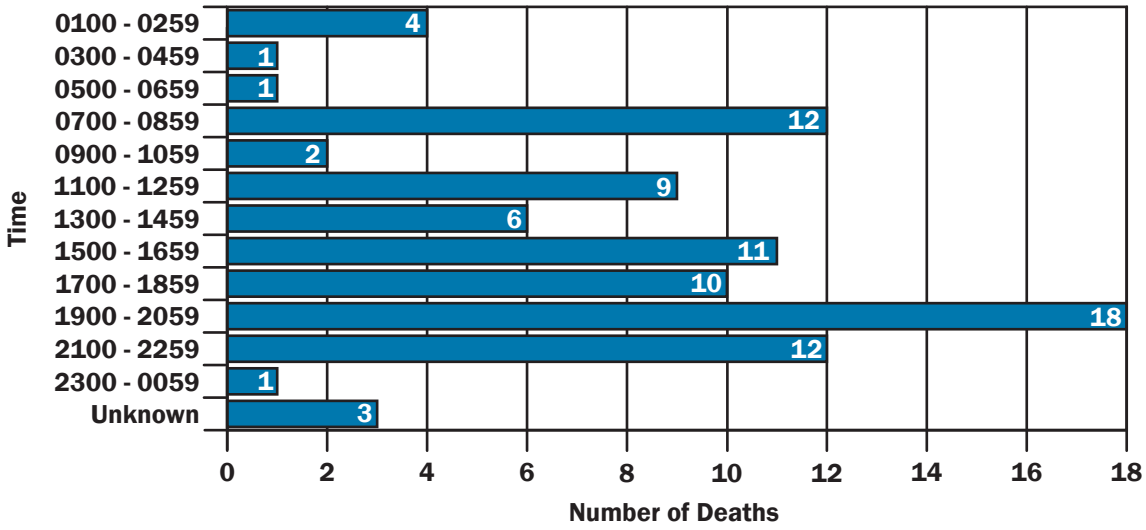
Age Range	Heart Attack/CVA/Other	Trauma/Asphyxiation
under 21	0	3
21 to 25	1	1
26 to 30	1	4
31 to 35	3	3
36 to 40	5	4
41 to 45	7	4
46 to 50	8	3
51 to 60	20	5
61 and over	15	3

Out of 3,000 on-duty firefighter deaths since 1990, there have only been three where the age of the firefighter killed was 90 years or older. Two of the three occurred in 2015 (and the third in 1999). The oldest firefighter to die in 2015 was also the oldest on-duty firefighter death on record. The fire police captain, who was 95 years old with 82 years of fire service experience, reported feeling ill while directing traffic around the scene of a two-alarm fire. He died of cardiac related issues after being taken to the hospital and subsequently placed in hospice care. The second oldest firefighter killed in 2015 (and on record) was 91 years old with 14 years of fire service experience. He died from injuries sustained in a motor vehicle collision while riding in the fire department's Ford F-150 pickup truck returning from picking up equipment. Another vehicle had pulled out directly in front of the department's truck. The youngest firefighter killed in 2015 was 18 years old. He and other firefighters were working at the scene of a residential structure fire when a porch collapse occurred, trapping three firefighters. He was rescued from the debris, but died in the hospital almost one week later due to his injuries.

Fatalities by Time of Injury

For 2015, the distribution of firefighter deaths, according to the time of day when the fatal injury occurred, is illustrated in Figure 12. The time of fatal injury for three firefighters was either unknown or not reported.

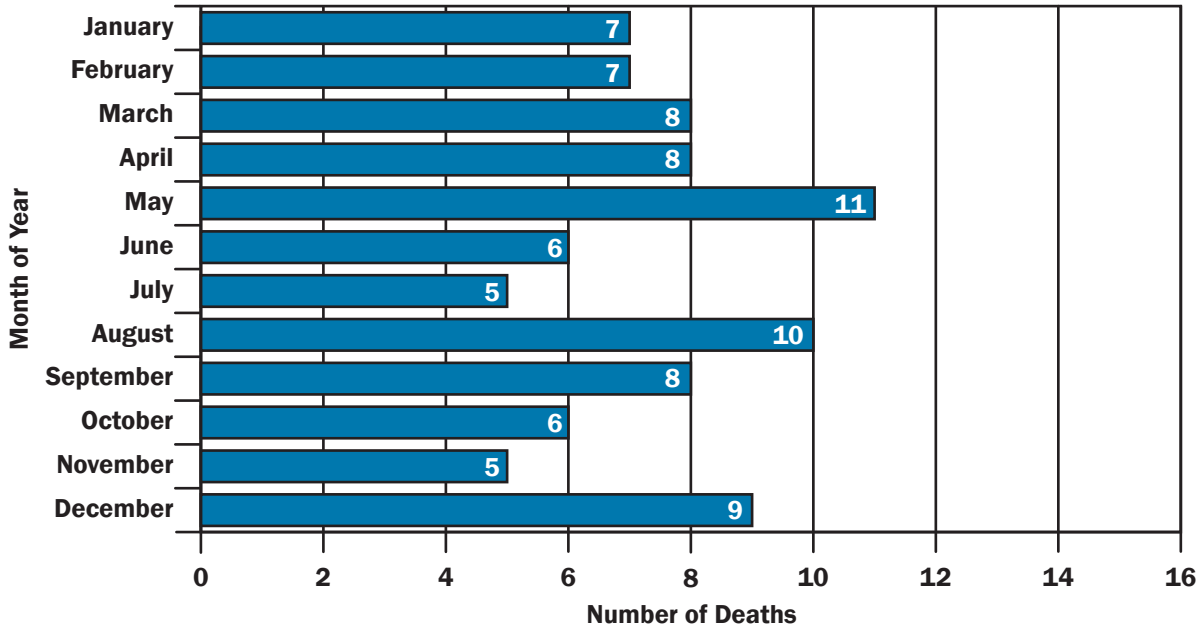
Figure 12. Fatalities by Time of Fatal Injury (2015)



Firefighter Fatality Incidents by Month of Year

Figure 13 illustrates the 2015 firefighter fatalities by month of the year.

Figure 13. Fatalities by Month of Year (2015)



State and Region

The distribution of firefighter deaths in 2015 by state is shown in Table 12. Firefighters based in 34 states died in 2015.

The highest number of firefighter deaths in 2015 (based on the location of the fire service organization) occurred in Texas and Pennsylvania with, respectively, six firefighter deaths each. With five deaths each, California, North Carolina, New Jersey and New York were the only additional states with five or more deaths in 2015.

Table 12. Firefighter Fatalities by State Based on Location of Fire Service* (2015)

State	Fatalities	Percentage
AL	1	1.1
CA	5	5.6
CO	1	1.1
CT	1	1.1
DC	1	1.1
GA	2	2.2
IA	1	1.1
ID	1	1.1
IL	3	3.3
KS	3	3.3
KY	3	3.3
LA	1	1.1
MD	1	1.1
ME	1	1.1
MI	4	4.4
MN	2	2.2
MO	4	4.4
MS	4	4.4
NC	5	5.6
NE	1	1.1
NJ	5	5.6
NY	5	5.6
OH	4	4.4
OK	1	1.1
OR	1	1.1
PA	6	6.7
SC	3	3.3
SD	2	2.2
TN	2	2.2
TX	6	6.7
VA	1	1.1
WA	3	3.3
WI	4	4.4
WV	1	1.1

* This list attributes the deaths according to the state in which the fire department or unit is based, as opposed to the state in which the death occurred. They are listed by those states for statistical purposes and for the National Fallen Firefighters Memorial at the NETC.

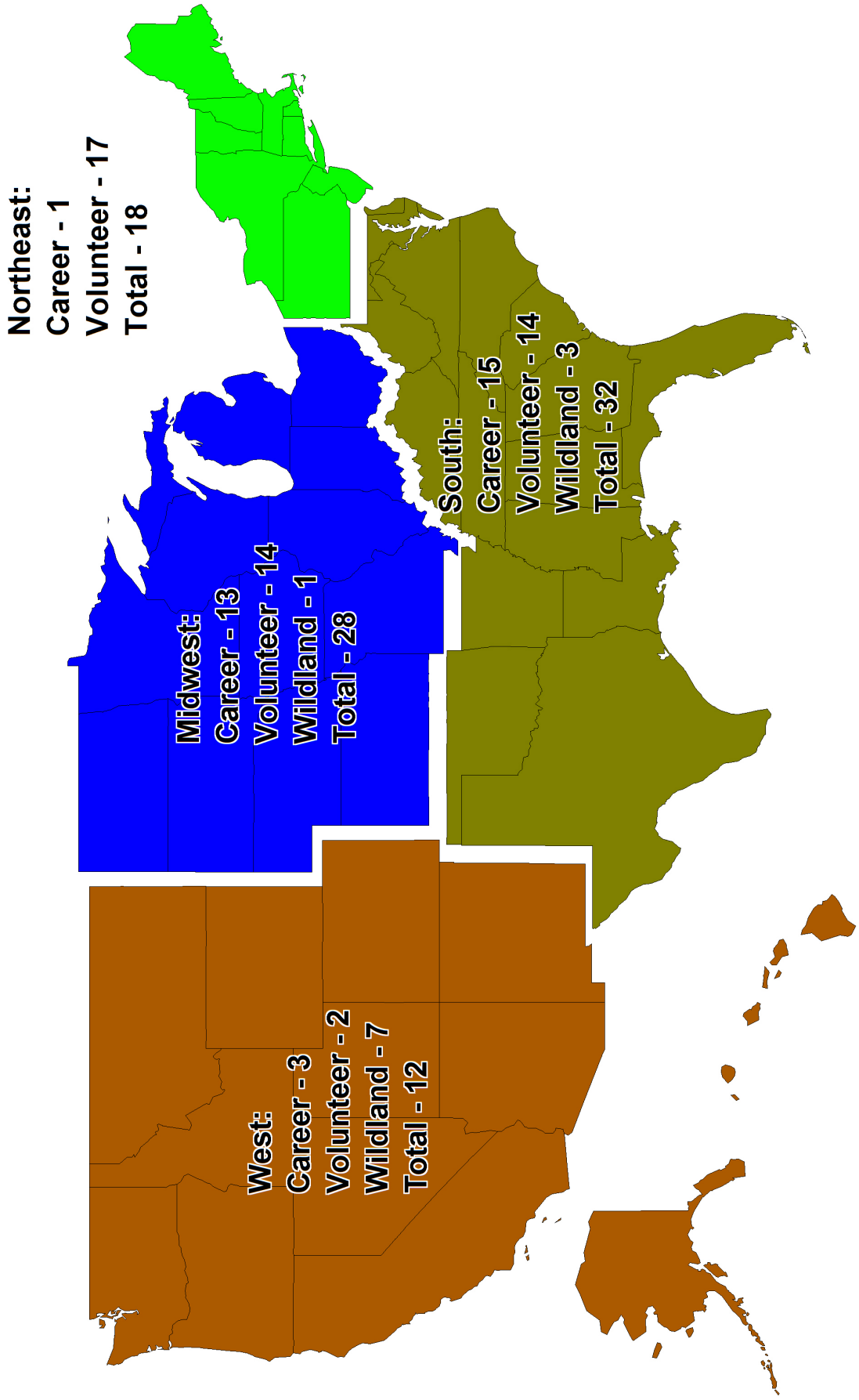


Figure 14. Firefighter Fatalities by Region (2015)

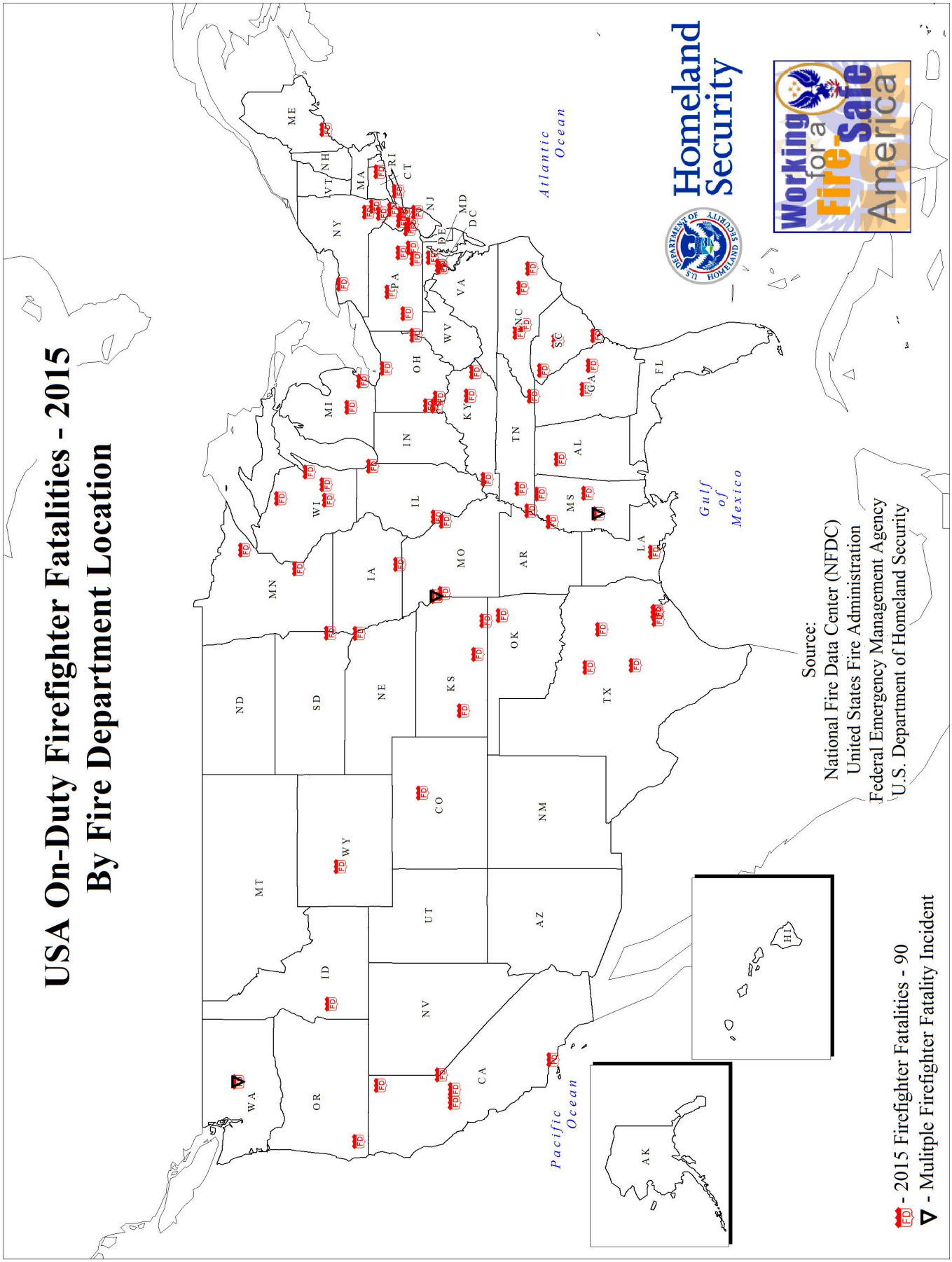
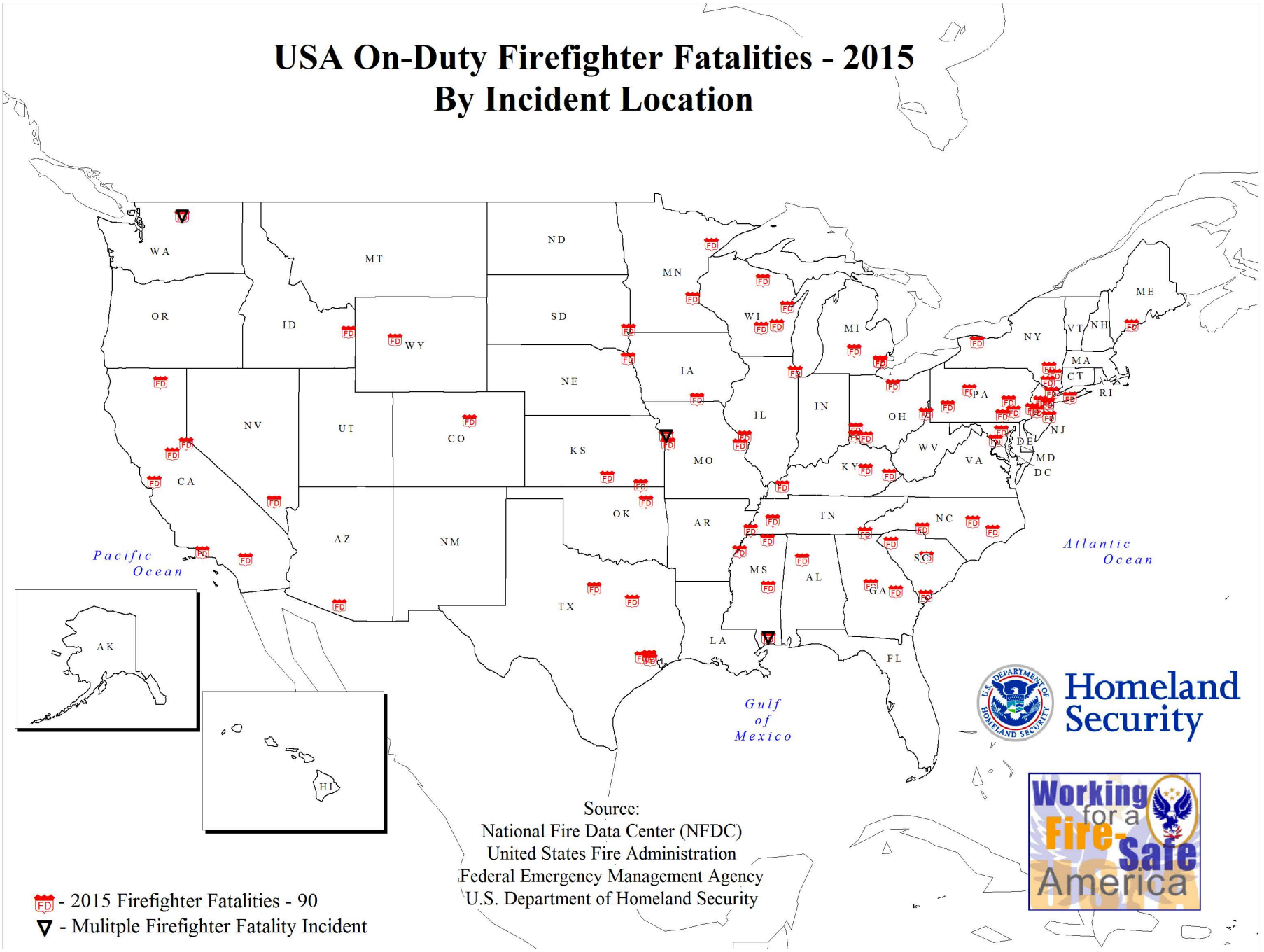


Figure 15. On-Duty Firefighter Fatalities by Fire Department Location (2015)

Figure 16. On-Duty Firefighter Fatalities by Incident Location (2015)



Analysis of Urban/Suburban/Rural Patterns in Firefighter Fatalities

The U.S. Census Bureau defines "urban" as a place having a population of at least 2,500, or lying within a designated urban area. "Rural" is defined as any community that is not urban. "Suburban" is not a census term, but may be taken to refer to any place, urban or rural, that lies within a metropolitan area defined by the Census Bureau, but not within one of the central cities of that metropolitan area.

Fire department areas of responsibility do not always conform to the boundaries used by the Census Bureau. For example, fire departments organized by counties or special fire protection districts may have both urban and rural coverage areas. In such cases, where it may not be possible to characterize the entire coverage area of the fire department as rural or urban, firefighter deaths were listed as urban or rural based on the particular community or location in which the fatality occurred.

The following patterns were found for 2015 firefighter fatalities. These statistics are based on answers from the fire departments, and when no data from the departments were available, the data were based upon population and area served, as reported by the fire departments.

Table 13. Firefighter Deaths by Coverage Area Type (2015)

Urban/Suburban	Rural	Total
47	43	90

Photo/Mark Whitney, USFA

Appendix

Firefighter Fatality Inclusion Criteria — National Fire Service Organizations

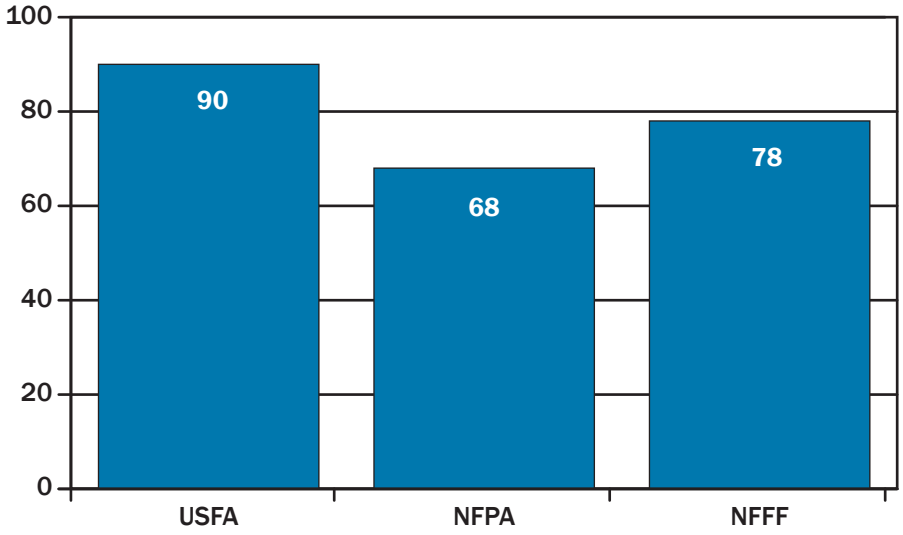
NFPA, NFFF, USFA, and other organizations individually collect information on firefighter fatalities in the U.S. Each organization uses a slightly different set of inclusion criteria that is based, at least in part, on the purposes of the information collection and data consistency for each organization.

As a result of the differing inclusion criteria, statistics about firefighter fatalities may be provided by each organization. These statistics do not coincide with one another. This section will explain the inclusion criteria for each organization and provide information about these differences.

In this report, the USFA includes firefighters who died while on-duty, became ill while on-duty and later died, as well as firefighters who died within 24-hours of an emergency response or training, regardless of whether or not the firefighter complained of illness while on-duty. The USFA counts firefighter deaths that occur in the 50 states, the District of Columbia, and U.S. protectorates, such as Puerto Rico and Guam. Detailed inclusion criteria is included in the Introduction section of this report.

For 2015, the USFA reported 90 on-duty firefighter fatalities.

Firefighter Fatalities in 2015 for Incidents Occurring in 2015



Inclusion Criteria for National Fire Protection Association's Annual Firefighter Fatality Study

Introduction

Each year, NFPA collects data on all firefighter fatalities in the U.S. These fatalities resulted from injuries or illnesses that occurred while the victims were on-duty. The purpose of the study is to analyze trends in the types of illnesses and injuries resulting in deaths that occur while firefighters are on the job. This annual census of firefighter fatalities, in its current format, dates back to 1977. (Between 1974 and 1976, NFPA published a study of on-duty firefighter fatalities that was not as comprehensive.)

What is a Firefighter?

For the purpose of the NFPA study, the term **firefighter** covers all uniformed members of organized fire departments, whether career, volunteer or combination, or contract; full-time public service officers acting as firefighters; state and federal government fire service personnel; temporary fire suppression personnel

operating under official auspices of one of the above; and privately employed firefighters including trained members of industrial or institutional fire brigades, whether full-time or part-time.

Under this definition, the study includes, besides uniformed members of local career and volunteer fire departments, those seasonal and full-time employees of state and federal agencies who have fire suppression responsibilities as part of their job description, prison inmates serving on firefighting crews, military personnel performing assigned fire suppression activities, civilian firefighters working at military installations, and members of industrial fire brigades. Impressed civilians would also be included if called on by the officer in charge of the incident to carry out specific duties. The NFPA study includes fatalities that occur in the 50 states and the District of Columbia.

What Does "On-Duty" Mean?

The term **on-duty** refers to being at the scene of an alarm, whether a fire or nonfire incident; being en-route while responding to or returning from an alarm; performing other assigned duties, such as training, maintenance, public education, inspection, investigations, court testimony and fund raising; and being on call, under orders or on standby duty (other than at home or at the individual's place of business). Fatalities that occur at a firefighter's home may be counted if the actions of the firefighter, at the time of injury, involved firefighting or rescue.

On-duty fatalities include any injury sustained in the line of duty that proves fatal, any illness that was incurred as a result of actions while on-duty that proves fatal, and fatal mishaps involving nonemergency occupational hazards that occur while on duty. The types of injuries included in the first category are mainly those that occur at an incident scene, in training, or in accidents while responding to or returning from alarms. Illnesses (including heart attacks) are included when the exposure or onset of symptoms are tied to a specific incident of on-duty activity. Those symptoms must have been in evidence while the victim was on-duty for the fatality to be included in the study.

Fatal injuries and illnesses are even included in cases where death is considerably delayed. When the onset of the condition and the death occur in different years, the incident is counted in the year of the condition's onset. Medical documentation specifically tying the death to the specific injury is required for inclusion of these cases in the study.

Categories not Included in the Study

The NFPA study does not include members of fire department auxiliaries; nonuniformed employees of fire departments; emergency medical technicians who are not also firefighters; chaplains; or civilian dispatchers. The study also does not include suicides as on-duty fatalities, even when the suicide occurs on fire department property.

The NFPA recognizes that a comprehensive study of firefighter on-duty fatalities would include chronic illnesses (such as cardiovascular disease and certain cancers) that prove fatal and that arose from occupational factors. In practice, there is still no mechanism for identifying on-duty fatalities that are due to illnesses that develop over long periods of time. This creates an incomplete picture when comparing occupational illnesses to other factors as causes of firefighter deaths. This is recognized as a gap, the size of which cannot be identified at this time because of the limitations in tracking the exposure of firefighters to toxic environments and substances and the potential long-term effects of such exposures.

2015 Experience

In 2015, a total of 68 on-duty firefighter deaths occurred in the U.S., according to the NFPA inclusion criteria.

National Fallen Firefighters Foundation

In 1997, fire service leaders formulated new criteria to determine eligibility for inclusion on the National Fallen Firefighter Memorial. LODDs shall be determined by the following standards:

1. (a) Deaths of firefighters meeting the DOJ's PSOB program guidelines, and those cases that appear to meet these guidelines whether or not PSOB staff has adjudicated the specific case prior to the annual National Fallen Firefighters Memorial Service.

   (b) Deaths of firefighters from injuries, heart attacks or illnesses documented to show a direct link to a specific emergency incident or department-mandated training activity.

2. While PSOB guidelines cover only public safety officers, the Foundation's criteria also include contract firefighters and firefighters employed by a private company, such as those in an industrial brigade, provided that the deaths meet the standards listed above.

3. Some specific cases will be excluded from consideration, such as deaths attributable to suicide, alcohol or substance abuse, or other gross abuses as specified in the PSOB guidelines.

The National Fallen Firefighters Memorial was built in 1981 in Emmitsburg, Maryland. The names listed there begin with those firefighters who died in the line-of-duty that year. The U.S. Congress created the NFFF to lead a nationwide effort to remember America's fallen firefighters. Since 1992, the tax-exempt, nonprofit foundation has developed and expanded programs to honor our fallen fire heroes and assist their families and coworkers by providing them with resources to rebuild their lives. Since 1997, the foundation has managed the National Fallen Firefighters Memorial Service held each October to honor the firefighters who died in the line-of-duty the previous year.

As of this writing, at the October 2016 Memorial Weekend, the foundation will be honoring 89 firefighters who died in the line-of-duty. There are 78 firefighters being honored that are associated with incidents and deaths that occurred in 2015, as well as 11 deaths as the result of incidents that occurred prior to 2015. More information on the 2016 Memorial Weekend, and the 78 firefighters to be honored, can be found at www.firehero.org.

Acronyms

CPR	cardiopulmonary resuscitation
CVA	cerebrovascular accident
DOJ	U.S. Department of Justice
IC	Incident Commander
LODD	line-of-duty death
NETC	National Emergency Training Center
NFFF	National Fallen Firefighters Foundation
NFIRS	National Fire Incident Reporting System
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
POV	privately owned vehicle
PSOB	Public Safety Officer Benefits
USFA	U.S. Fire Administration