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Fire Department Overall Run Profile as Reported to the National Fire Incident Reporting System (2020)

Topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS). Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information.

Findings

- In 2020, fire departments responded to 26,959,000 incident runs or calls as reported to the NFIRS. This total is a 6% decrease in the number of runs reported in 2019.
- Nearly two-thirds (64%) of the reported calls required emergency medical services (EMS) and rescue services from fire departments.
- Only 4% of all reported fire department runs were fire related.
- In 2020, fire runs were more prevalent on Saturdays, while severe weather calls peaked on Tuesdays and Thursdays.
- More than half (55%) of the reported calls were to residential properties. Of these calls to residential properties, 70% required EMS or rescue services, while only 3% were fire related.
- Approximately 8% of reported runs involved mutual or automatic aid.

Fire departments provide invaluable services to communities nationwide. They respond to all types of emergency and nonemergency situations. Emergencies involve fires, explosions, rescues, medical emergencies, hazardous conditions, natural disasters and false alarms. Nonemergency situations include service calls and good intent calls. Often, what is described to dispatchers does not reflect the actual incident type; nevertheless, fire departments are trained and prepared to respond to a wide variety of situations.[1]

To understand the fire department's full role in a community, this topical report profiles fire department run activity as reflected in the 2020 NFIRS Public Data Release (PDR) file.[2] In 2020, fire departments across the U.S. responded to 26,959,000 incident runs or calls as reported to the NFIRS.[3] This count reflects a 6% decrease in the number of calls (28,534,400) reported to the NFIRS in 2019, the latest year in which these data were examined.[4]

"Runs" or "calls" have different meanings for different fire departments. As NFIRS incident data reflect summary data from individual fire departments (not from individual fire stations in a fire department), a run or call as used in this topical report means the fire department's collective response to an incident. Runs and calls are used interchangeably throughout the report.

Types of incident runs

While "fire suppression" is one of the more complex fire department activities, only 4% of runs made by fire departments involved fire, as shown in Figure 1. EMS and rescue, good intent, false alarm, and service call incident type categories accounted for 92% of all reported runs.[5] Specifically, 64% of all fire department runs were categorized as EMS and rescue. Good intent calls (12%), false alarms and false calls (8%), and service calls (8%) were the next most prevalent incident type categories, followed by fire. The percentage distribution of runs by major incident type category is comparable to that reported to the NFIRS in 2019.[6]

Within the major incident type categories, EMS, medical assist, and dispatched and canceled en route calls were the leading specific types of fire department runs.[7] EMS calls accounted for 43% of all fire department runs. Medical assist calls accounted for 9% of runs, and fire departments were dispatched and canceled en route in 8% of calls.

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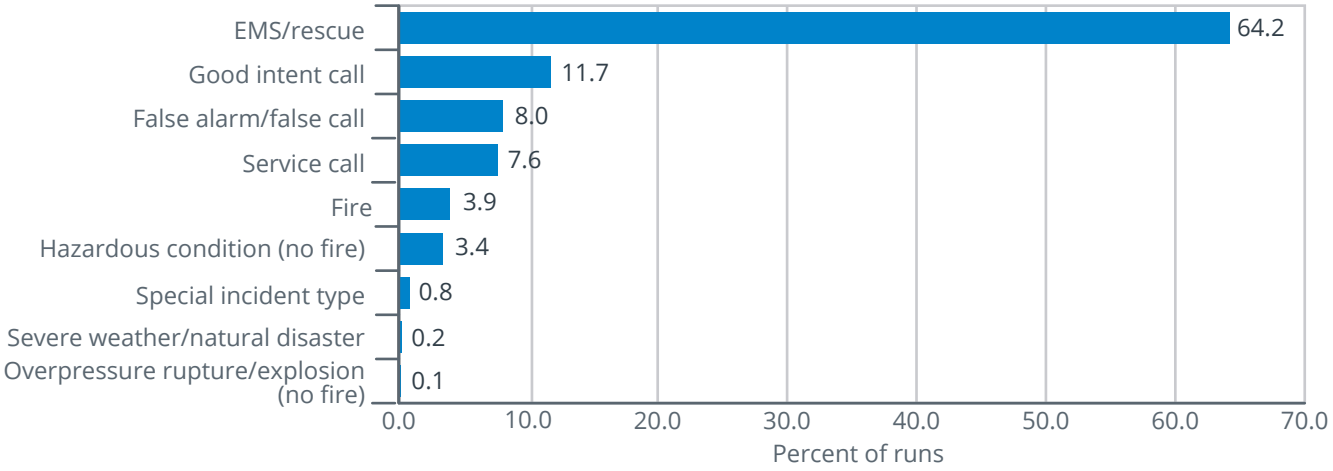
Figure 1. Fire department overall runs by major incident type category (Percent of runs, 2020)



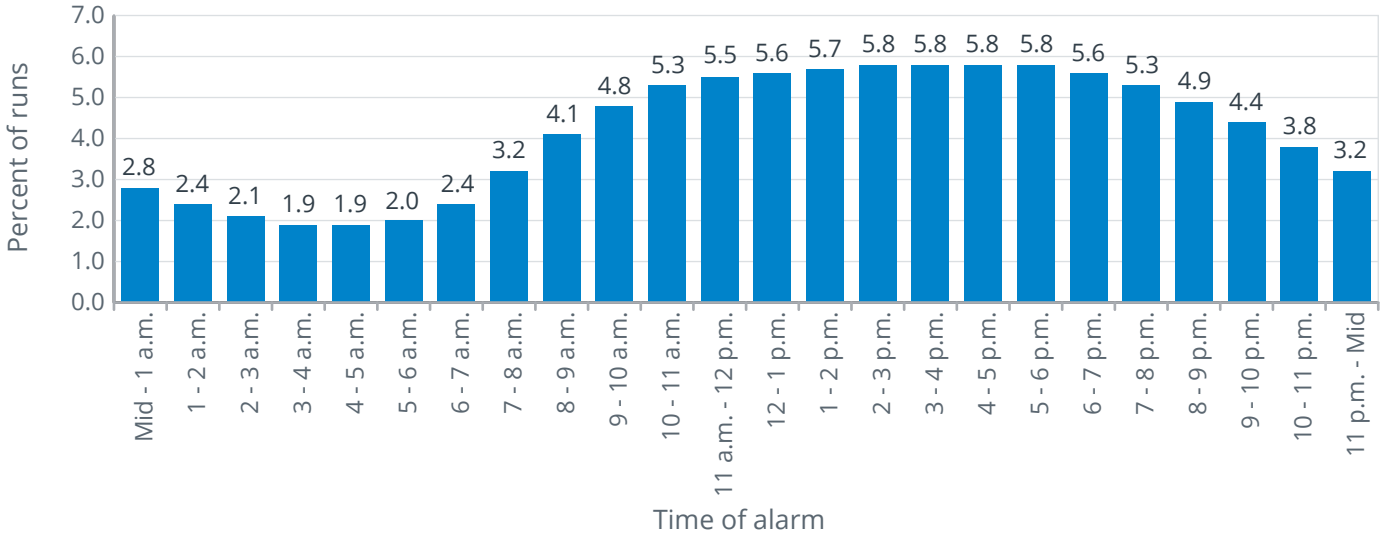
Source: NFIRS 5.0.
Note: Total does not add up to 100% due to rounding.

Hourly, weekly, monthly and seasonal profile of runs

Fire departments respond to incidents every day, at all times of the day and night. In 2020, the demand for fire department services was relatively constant from the late morning through the early evening. Peak demand was from 2 p.m. to 6 p.m., as shown in Figure 2.

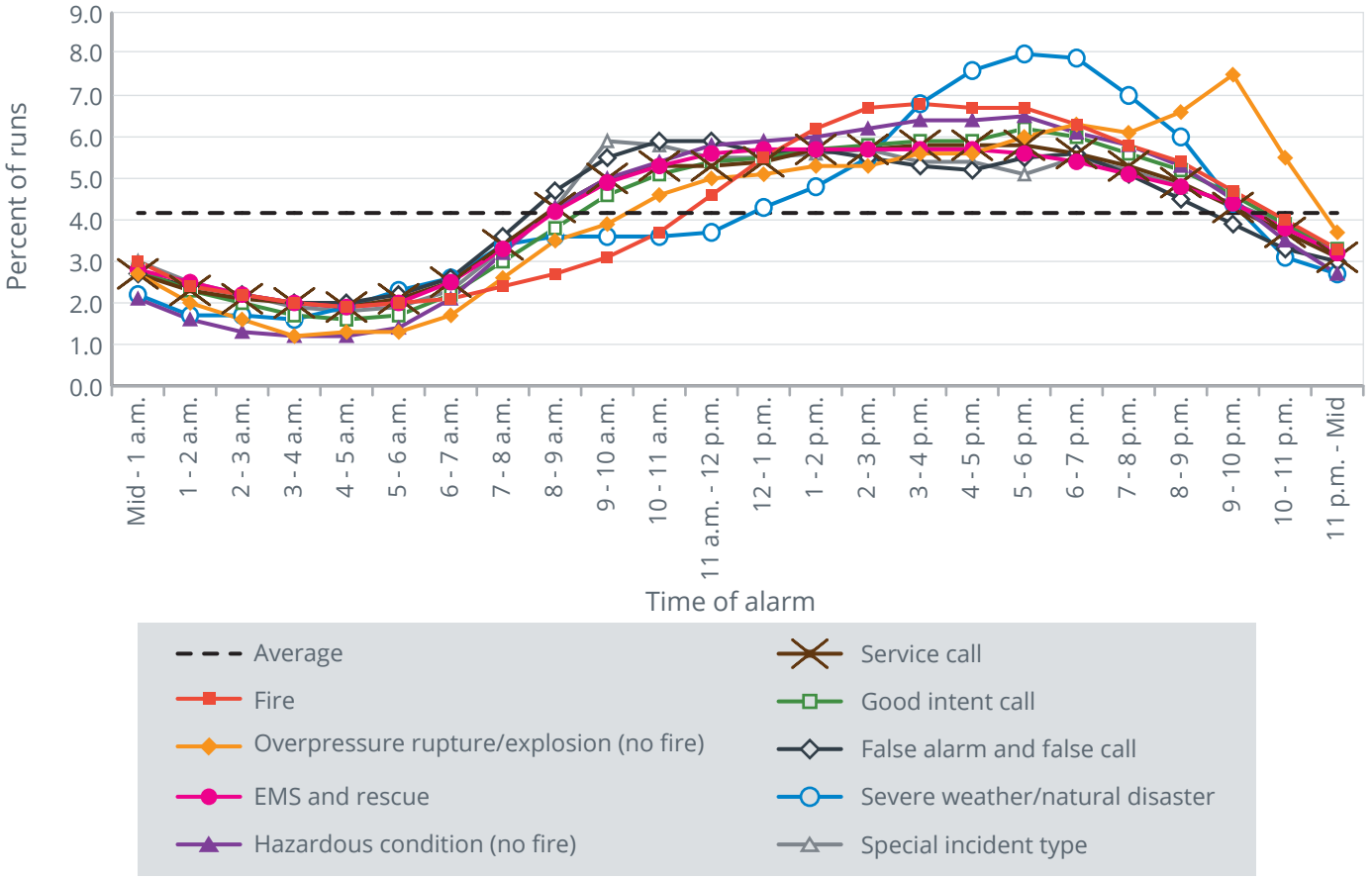
Each type of run has its own characteristic daily profile, as shown in Figure 3. All run types were lowest in the very early morning hours and increased during the morning as daily activities began. Most run types reached near peak demand in midmorning and remained relatively constant with peak hours occurring in the mid-to-late afternoon until early evening. Fire, severe weather, and explosion or overpressure rupture (e.g., citizen complaint) runs were notable exceptions. Fire runs increased slowly but steadily during the day, peaked from midafternoon to early evening, and then steadily decreased. Severe weather runs had below-average demand until noon, increased sharply through late afternoon and early evening, then decreased sharply during the late evening hours. Explosion or overpressure rupture runs had below-average demand until 10 a.m., steadily increased through the afternoon and early evening, then peaked at 9 p.m. and decreased sharply through midnight.

Figure 2. Fire department overall runs by time of alarm (Percent of runs, 2020)



Source: NFIRS 5.0.
Note: Total does not add up to 100% due to rounding.

Figure 3. Fire department overall runs by time of alarm and major incident type category (Percent of runs, 2020)



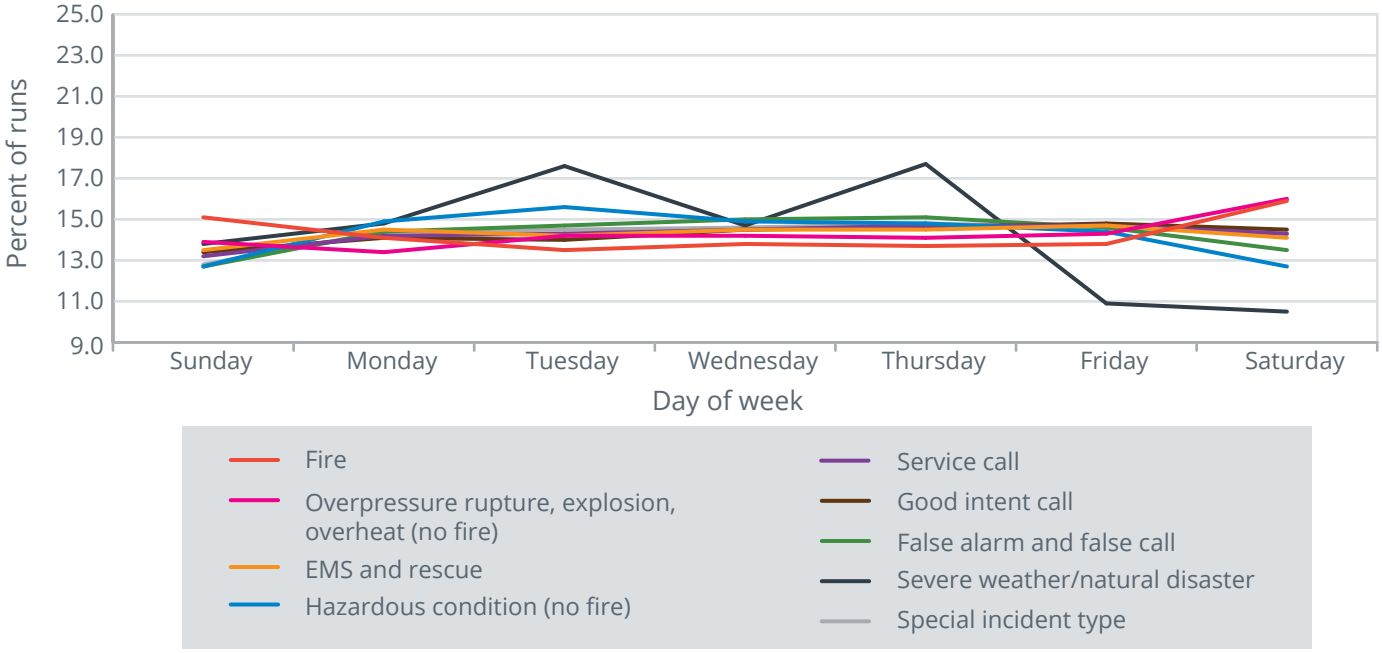
Source: NFIRS 5.0.

Except for calls to fires, explosions or overpressure ruptures, hazardous conditions, and severe weather events, fire department runs followed a consistent pattern by day of the week (Figure 4). In 2020, severe weather calls peaked on Tuesdays and Thursdays. More than half of the severe weather events reported on Tuesdays occurred in only 1 month — August (59%), whereas 59% of the severe weather events reported on Thursdays occurred over the 3 months of October (29%), August (18%) and April (12%).[8] Fire calls and explosion or overpressure rupture calls were more prevalent on Saturdays, whereas hazardous condition calls were more frequent on Tuesdays.

The monthly run occurrence was relatively constant (Figure 5). However, there was a slight increase in runs during January and July (each at 9%). Fire departments experienced the least runs during April at 7%.

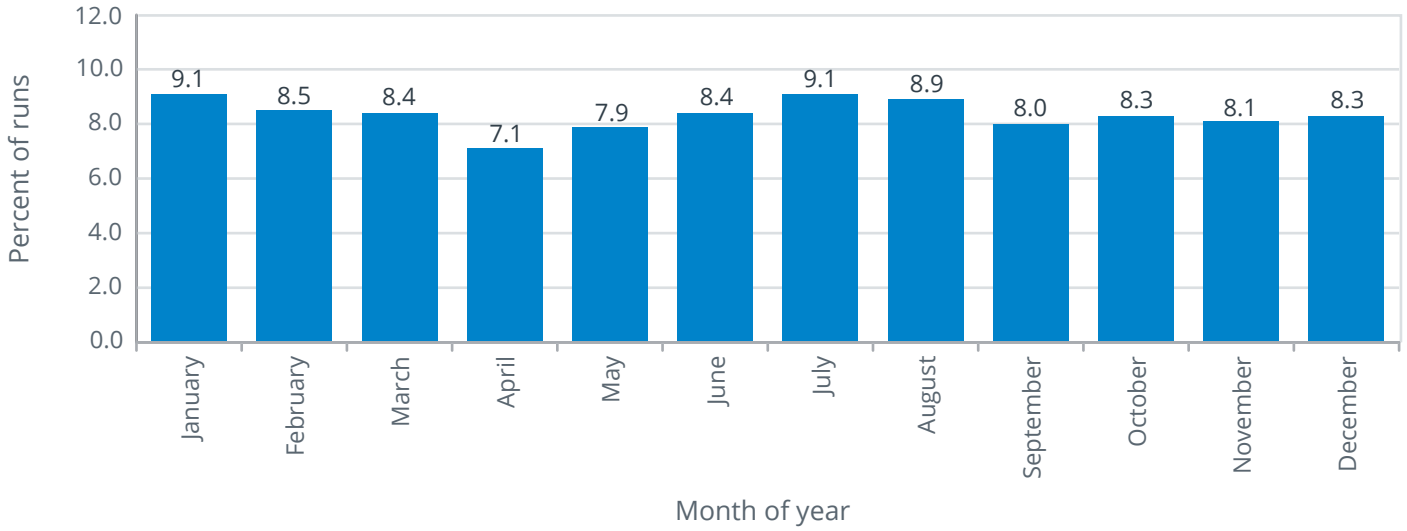
EMS and rescue responses were the most prevalent fire department responses each season, as shown in Figure 6.[9] This situation is to be expected as 64% of all fire department runs were categorized as EMS and rescue. Overall, the percentage distribution of the type of runs remained relatively consistent for each season.

Figure 4. Fire department overall runs by major incident type category and day of week (Percent of runs, 2020)



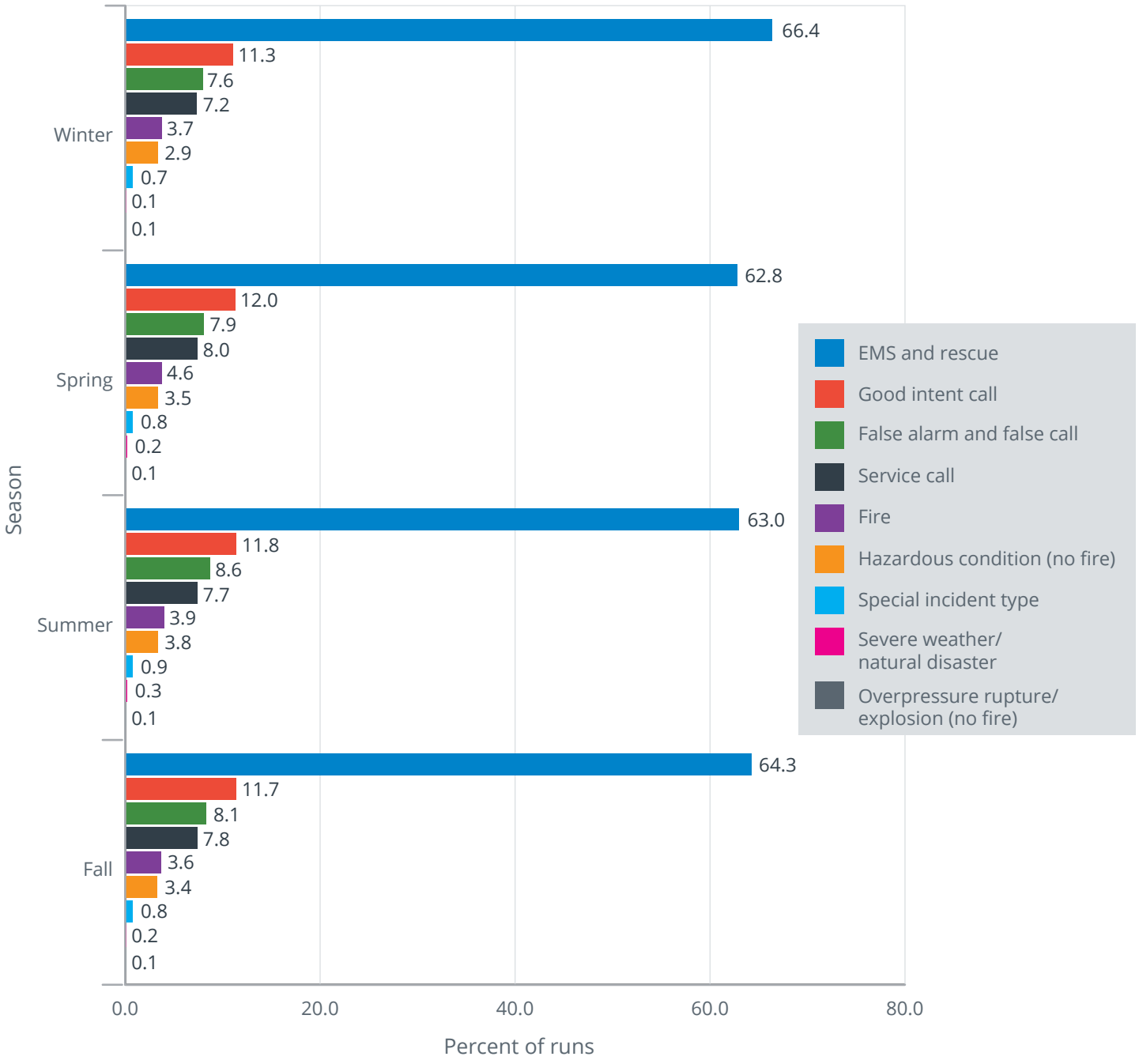
Source: NFIRS 5.0.

Figure 5. Fire department overall runs by month (Percent of runs, 2020)



Source: NFIRS 5.0.
Note: Total does not add up to 100% due to rounding.

Figure 6. Fire department overall runs by season and major incident type category (Percent of runs, 2020)



Source: NFIRS 5.0.
Note: For the spring and summer distributions of runs, the total percentages do not add up to 100% due to rounding.

Regional profile of runs

Fire departments in the Southern region reported the most runs in 2020 at 40% (Table 1).[10] This is to be expected as 38% of the U.S. population resided in the South in 2020.[11] Only 14% of all runs occurred in the Northeast.

For all regions, most calls to fire departments required EMS and rescue services (Figure 7). The Midwestern, Southern and Western regions reported the highest percentages of EMS and rescue runs ranging from 66% to 67%; the Northeast region had the lowest percentage at 50%. Some fire departments in the Northeast still limit their role to traditional fire suppression services, and others have only recently taken on EMS roles. This situation may explain the disparity between the percentages of EMS runs in the Northeast region and the rest of the nation.[12]

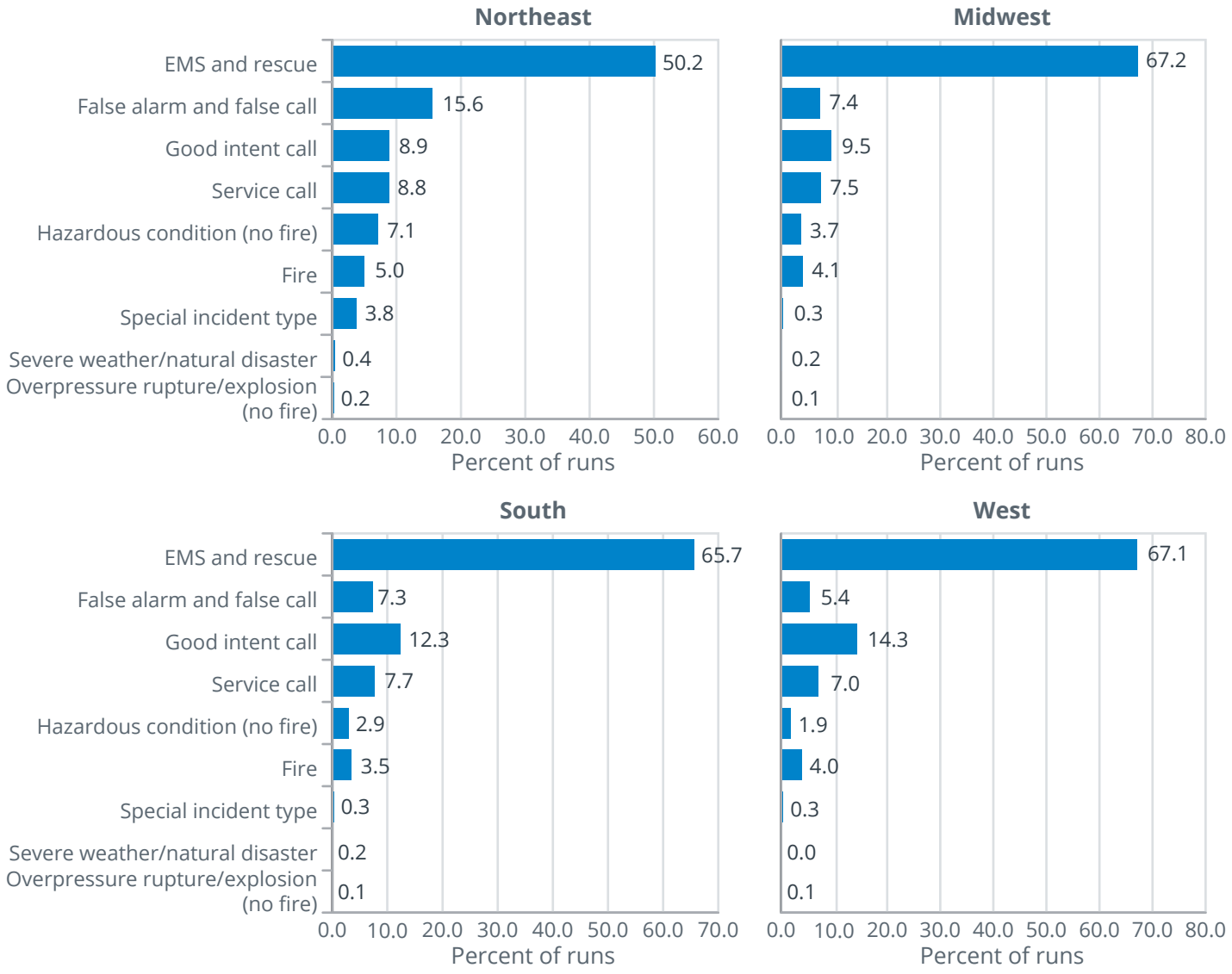
Special incidents, such as citizen complaints, represented 4% of all runs in the Northeastern region, which was the highest out of all the regions. False alarm calls were also highest in the Northeast (16%), whereas good intent calls were highest in the West (14%).

Table 1. Fire department overall runs by region (Percent of runs, 2020)

Region	Percent
Northeast	14.2
Midwest	21.5
South	39.6
West	24.7
Total	**100.0**

Source: NFIRS 5.0.

Figure 7. Fire department overall runs by region and major incident type category (Percent of runs, 2020)

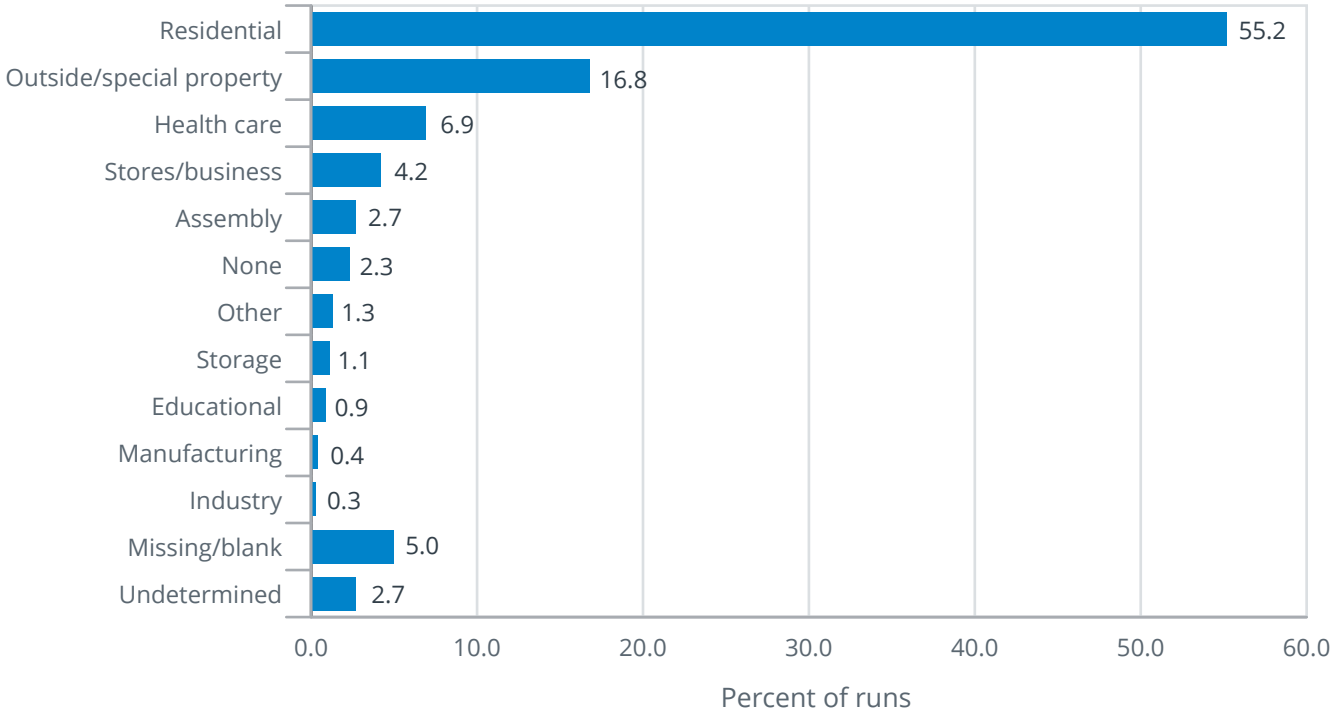


Source: NFIRS 5.0.
Note: For the West distribution of runs, the total percentage does not add up to 100% due to rounding.

Property use

In 2020, more than half of all calls involved residential properties (55%) followed by outside or special properties (17%), as shown in Figure 8.[13] Generally, 70% of all reported calls to residences required EMS and rescue services. Service calls (9%) and false alarm calls (8%) accounted for an additional 17% of all residential calls. Only 3% of the reported calls to residences were fire related.

Figure 8. Fire department overall runs by major property use category (Percent of runs, 2020)



Source: NFIRS 5.0.
Note: Total does not add up to 100% due to rounding.

Fire department aid

Aid offers additional resources to neighboring fire departments for large-scale or specialized incidents, or when response time to an incident may be faster by another jurisdiction. Aid is given or received, either automatically or mutually, for a specific incident. Automatic aid involves prearranged agreements according to hazard conditions, jurisdictions or incidents requiring special equipment. Mutual aid is generally requested on a reactive basis as resources are depleted at the incident.

Informal and formal aid relationships vary depending on the location or the type of the incident. Innovative aid relationships, which focus on improving the allocation of resources and response times, continue to augment the advancement of fire department services. Overall, 8% of fire department runs involved giving or receiving aid, either mutual or automatic (Table 2).

Types of aid

While 92% of all fire department runs were not aid related, the level of aid runs varies with the type of incident.[14] Aid-given and aid-received runs were more prevalent for fire incidents than for any other incident type category. While not as often as for fire incidents, good intent calls and explosion or overpressure rupture incidents also involved aid more often than other types of incidents (Table 2).

Table 2. Fire department overall runs by major incident type category and general type of aid (Percent of runs, 2020)

Major incident type category	Aid			No aid	Total
	Aid received	Aid given	Total		
Fire	10.1	21.7	31.8	68.2	100.0
Overpressure rupture/explosion (no fire)	8.1	5.5	13.7	86.3	100.0
EMS and rescue	2.7	3.2	5.9	94.1	100.0
Hazardous condition (no fire)	4.1	4.5	8.6	91.4	100.0
Service call	1.3	5.1	6.4	93.6	100.0
Good intent call	2.8	11.9	14.7	85.3	100.0
False alarm and false call	3.8	3.4	7.2	92.8	100.0
Severe weather/natural disaster	4.0	5.6	9.5	90.5	100.0
Special incident type	1.5	1.6	3.2	96.8	100.0
Overall	**3.0**	**5.1**	**8.2**	**91.8**	**100.0**

Source: NFIRS 5.0.
Note: Totals may not add up to 100% due to rounding.

NFIRS data specifications for overall fire department runs

Data for this report were extracted from the NFIRS PDR (full, all-incident data) file for 2020 (released February 2022).[15] Only Version 5.0 data were extracted.

- Overall fire department runs were defined using the major incident type categories as follows:

NFIRS major incident type category	Description
100-173	Fire (excludes Incident Type 110)
200-251	Overpressure rupture/explosion (no fire)
300-381	EMS and rescue
400-482	Hazardous condition (no fire)
500-571	Service call
600-672	Good intent call
700-751	False alarm and false call
800-815	Severe weather/natural disaster
900-911	Special incident type

Note: For a complete listing of the specific NFIRS Incident Types, view the NFIRS 5.0 Complete Reference Guide: https://www.usfa.fema.gov/downloads/pdf/nfirs/NFIRS_Complete_Reference_Guide_2015.pdf (January 2015).

- The major property use categories are defined as follows:

NFIRS major property use category	Description
100-186	Assembly
200-256	Educational
300-365	Health care, detention, and correction
400-464	Residential
500-599	Stores/businesses
600-679	Industry
700	Manufacturing
800-899	Storage
900-984	Outside/special property
000	Property use, other
NNN	None
UUU	Undetermined

Note: For a complete listing of the specific NFIRS Property Use codes, view the NFIRS 5.0 Complete Reference Guide: https://www.usfa.fema.gov/downloads/pdf/nfirs/NFIRS_Complete_Reference_Guide_2015.pdf (January 2015).

- The major aid categories are defined as follows:

NFIRS major aid category	Description
1-2	Aid received
3-5	Aid given
N	No aid given or received

Note: For a complete listing of the NFIRS aid given or received codes, view the NFIRS 5.0 Complete Reference Guide: https://www.usfa.fema.gov/downloads/pdf/nfirs/NFIRS_Complete_Reference_Guide_2015.pdf (January 2015).

Although voluntary, the NFIRS is the world's largest national database of incident information. By contributing to the NFIRS, the fire service is helping to make data-informed decisions ranging from local budget development to the identification of national preparedness initiatives. It is important that fire departments participate in the NFIRS and critical that the data they report are complete and accurate. This provides for sound decision-making that has impacts on reducing community risk and emergency response at the local level.

Analysis disclaimer

Complete or full years of data are required for statistical analyses presented in the topical reports. Although NFIRS data for a calendar year are often reported to the U.S. Fire Administration (USFA) throughout the year, fire departments and/or states have until the official cutoff date as set forth by the National Fire Data Center to submit their data to the USFA. Typically, this cutoff date is July 1 after the end of the previous calendar year. This provides states with ample time to perform data quality checks and correct incidents with questionable reported data before they are set to "released" status in the national production database and Enterprise Data Warehouse. Once the data are released to the USFA, additional data quality reviews are completed before the data are prepared for public release.

The analyses contained in this report reflect the current methods used by the USFA. The USFA is committed to providing the best and most current information and continually examines data received from participating fire departments and the analytical methods used to fulfill this goal.

To request additional information, visit: http://www.usfa.fema.gov/contact.html. Provide feedback on this report.

Notes:

[1]The incident type is defined as the actual situation that emergency personnel found on the scene when they arrived.
[2]NFIRS 5.0 contains both converted NFIRS 4.1 data and native NFIRS 5.0 data. This topical report includes only incident types that reflect native 5.0 data. Incident Type 110 (structure fire, other) is not included in this analysis as it is a "conversion only" code. That is, Incident Type 110 is technically a version 4.1 incident and, as such, is not included in this analysis. Aid runs, usually excluded in incident-based analyses, are included in the data for this report.
[3]The count of NFIRS runs is rounded to the nearest 100. The actual count of NFIRS runs used for the analyses in this report was 26,958,988. This count reflects only runs that were identified as valid and released by the states to the NFIRS before Jan. 15, 2022. Runs with Incident Type 110 (conversion-only code) were excluded from the analyses. In addition, runs were excluded from the analyses where the Incident Type or Aid fields contained blank values. By comparison, the National Fire Protection Association (NFPA) estimated that there were 37,272,000 fire department responses in 2019 (NFPA, "U.S. Fire Department Profile 2019," December 2021).
[4]USFA, Topical Fire Report Series, "Fire Department Overall Run Profile as Reported to the NFIRS (2019)," Volume 21, Issue 1 (May 2021).
[5]"Fire" includes structure, vehicle, outside and other fires. "Overpressure rupture/explosion (no fire)" includes overpressure ruptures from steam, air or gas, and chemical reactions; explosions; and excessive heat, overheat scorch burns with no ignition. "EMS and rescue" includes incidents such as medical assists, EMS incidents, and searches and rescues. "Hazardous condition (no fire)" includes incidents such as combustible/flammable liquid spills and leaks, chemical releases, radioactive conditions, electrical wiring problems, biological hazards, and bomb removal. "Service call" includes incidents involving a person(s) in distress, water problem, smoke or odor problem, animal problem or rescue, public service assistance, unauthorized burning, and cover assignments. "Good intent call" includes incidents such as dispatched and canceled en route, wrong location (no emergency found), controlled burning, steam or other gas mistaken for smoke, and hazardous materials release investigation (no hazardous condition found). "False alarm and false call" includes incidents such as malicious false alarms, bomb scares, system or detector malfunctions, unintentional system or detector operation (no fire), and biohazard scares. "Severe weather/natural disaster" includes incidents such as earthquake, flood, and windstorm assessments, lightning strikes (no fire), and severe weather standby. "Special incident type" includes citizen complaints, reports of code or ordinance violations, and other special incidents. For a description of how the major incident type categories are defined in the NFIRS, refer to the section of this report regarding NFIRS data specifications for overall fire department runs. For a complete list of the specific NFIRS Incident Types, view the NFIRS 5.0 Complete Reference Guide: https://www.usfa.fema.gov/downloads/pdf/nfirs/NFIRS_Complete_Reference_Guide_2015.pdf (January 2015).
[6]USFA, Topical Fire Report Series, "Fire Department Overall Run Profile as Reported to the NFIRS (2019)," Volume 21, Issue 1 (May 2021).
[7]Within the major incident type categories in the NFIRS, there are many subcategories. For example, EMS calls and medical assist calls are 2 specific subcategories of the EMS and rescue incident type category.
[8]The 2020 NFIRS data showed that of the severe weather and natural disaster runs that occurred on Tuesdays, there was 1 specific severe weather event that contributed to the spike on Tuesdays in 2020; 54% of all severe weather and natural disaster runs that occurred on Tuesdays happened on one single day: Tuesday, Aug. 4, 2020. On this date, 62% of the reported runs were in Connecticut, New Jersey and New York. According to the National Weather Service, on Aug. 4, 2020, Hurricane Isaias brought significant impacts all up and down the East Coast from flooding, tornadoes and strong winds. In all, there were 46 confirmed tornadoes from South Carolina to Connecticut that were associated with Hurricane Isaias (https://www.weather.gov/lwx/TropicalStormIsaias).
[9]In this report, winter is defined as January through March; spring is defined as April through June; summer is defined as July through September; fall is defined as October through December.
[10]The regions of the U.S. are defined by the U.S. Census Bureau as the **Northeast** (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont); **South** (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia); **Midwest** (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin); and **West** (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming).
[11]U.S. Census Bureau, Population Division. July 1, 2020 population estimates from Table 1. Annual Estimates of the Resident Population for the United States, Regions, States, the District of Columbia and Puerto Rico: April 1, 2020 to July 1, 2021 (NST-EST2021-POP), Release Date: December 2021, https://www.census.gov/data/tables/time-series/demo/popest/2020s-state-total.html.
[12]USFA, Topical Fire Report Series, "Fire Department Overall Run Profile," Volume 7, Issue 4 (December 2007).
[13]For a description of how the major property use categories are defined in the NFIRS, refer to the section of this report regarding NFIRS data specifications for overall fire department runs.
[14]For a description of how the major aid categories are defined in the NFIRS, refer to the section of this report regarding NFIRS data specifications for overall fire department runs.
[15]The NFIRS PDR files are available for download at: https://www.fema.gov/about/openfema/data-sets/fema-usfa-nfirs-annual-data.