

ROADWAY SYSTEMS & DRIVERS  
TECHNICAL REPORT



# Roadside Assistance Providers Fatally Struck by Vehicles at the Roadside: Incidence and Characteristics

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## **Title**

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Roadside Assistance Providers Fatally Struck by Vehicles at the Roadside: Incidence and Characteristics

*(January 2024)*

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## Foreword

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When a vehicle breaks down or a minor crash has occurred, drivers and their families can become stranded on the side of the highway as traffic speeds past. Roadside assistance providers courageously dedicate themselves to helping motorists during this time of great vulnerability, often placing themselves in harm's way to ensure that others are able to return home safely. Unfortunately, every year, far too many roadside assistance providers are stuck by passing vehicles and are unable to return home to their own families.

Since its founding in 1947, the AAA Foundation for Traffic Safety has been dedicated to preventing injuries and saving lives on our roads. However, as a foundation created and supported by AAA, finding ways to protect the roadside assistance providers who dedicate themselves to protecting the rest of us is uniquely personal. This report describes the results of research that seeks to understand the characteristics of crashes in which roadside assistance providers have died in the line of duty, to help us find ways to prevent such tragedies from happening in the future. This report should be of interest to roadside assistance professionals as well as first responders, road authorities with responsibility for traffic incident management, policymakers, and all motorists.

C. Y. David Yang, Ph.D.

*President and Executive Director  
AAA Foundation for Traffic Safety*

## About the Sponsor

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AAA Foundation for Traffic Safety  
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## List of Abbreviations and Acronyms

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BLS	Bureau of Labor Statistics
DOT	Department of Transportation
ERSI	Emergency Responder Safety Institute
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
MMUCC	Model Minimum Uniform Crash Criteria
NHTSA	National Highway Traffic Safety Administration
OSHA	Occupational Safety and Health Administration
RAP	Roadside Assistance Provider

## Executive Summary

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Roadside assistance providers including motor vehicle towing personnel, mobile mechanics, and safety service patrollers often work on or alongside highways to help stranded motorists after vehicle breakdowns or crashes. This places them at risk of being struck by passing vehicles. Research is needed to understand the circumstances of crashes involving roadside assistance providers, to inform and prioritize efforts to protect them.

Unfortunately, when roadside assistance providers are injured or killed in crashes, the sources of data used most in traffic safety research do not reliably report the fact that the victim was a roadside assistance provider. When they are struck while working outside of their vehicle, they typically are reported simply as pedestrians, rendering them indistinguishable from other pedestrians injured or killed in crashes. This has hindered past efforts to study roadside assistance provider safety.

In the current study, industry records were used to identify roadside assistance providers struck and killed by vehicles. Those records were matched to a federal database of all fatal crashes nationwide to determine which crash victims in the database were roadside assistance providers. These matched data were then used to examine the characteristics of the crashes in which roadside assistance providers were killed, with a focus on types of factors relevant to the selection or prioritization of potential countermeasures to protect roadside assistance providers.

The study identified 123 roadside assistance providers fatally struck while working in the road or at the roadside in years 2015 (the first year of victim records available) through 2021 (the latest year of national fatal crash data available). There appears to have been an increasing trend in the number of roadside assistance providers killed each year; however, trends should be interpreted with caution as it is possible that some cases were missed. The vast majority of these deaths occurred on Interstate highways or other high-speed limited-access highways. Most crashes occurred during good weather on roads that were not slippery. Nearly two-thirds occurred in darkness; however, information regarding use of high visibility safety apparel, emergency lighting, and other safety equipment was unavailable in most cases. Approximately one in four crashes occurred in the travel lanes of the roadway, highlighting the importance of increasing compliance with *Slow Down, Move Over* laws, which require drivers to move over one lane or reduce speed when approaching roadside assistance providers, police, firefighters, emergency medical service providers, and in some states also other workers working at the roadside. However, more than half of all crashes occurred when the striking driver departed the roadway and struck the roadside assistance provider on the shoulder or roadside, suggestive albeit not necessarily indicative of the involvement of factors such as impairment, fatigue, or distraction. More than one-third of striking

drivers who were tested for alcohol were alcohol-positive; however, nearly half were not tested.

The current study represents the most comprehensive compilation of data on roadside assistance provider fatalities of which the AAA Foundation for Traffic Safety is aware. Records of 123 roadside assistance providers fatally struck by vehicles were identified; slightly more than reported in a federal occupational fatality database and far more than in national fatal motor vehicle crash data.

Based on the findings of this research, as well as the limitations encountered, this report makes the following recommendations:

- There is a need to reinforce public awareness of and increase motorist compliance with *Slow Down, Move Over* laws; research to investigate the most effective approaches to increase compliance is also needed.
- Countermeasures are needed to protect roadside assistance providers and first responders from out-of-control vehicles that depart the roadway by preventing the original road departure, by protecting those at the roadside from being struck, or by reducing the severity of any impact that may occur. Research is needed to determine what countermeasures are most effective and practical to meet this need.
- Training for roadside assistance providers should emphasize the importance avoiding working or standing on the traffic-facing side of the incident scene whenever possible and minimize time spent on the traffic-facing side of the scene when it cannot be avoided altogether, as well as provide strategies for how to do so.
- In cases where countermeasures are site-specific or where deployment must be prioritized, results of the current study suggest that efforts should focus on protecting roadside assistance providers working on high-speed limited-access highways.
- State police crash report forms should include data fields designed to report whether a crash victim was an incident responder, and type of responder when applicable, as called for in the current edition of the Model Minimum Uniform Crash Criteria. Additionally, states should consider collecting additional information in crashes in which roadside assistance providers and other emergency response personnel are struck by vehicles, or at least in those that result in the injury or death of a responder.



## Introduction

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Roadside Assistance Providers (RAPs) including motor vehicle towing personnel, emergency roadside technicians, mobile mechanics, and safety service patrollers work to assist motorists whose vehicles have become disabled due to mechanical failures, crashes, or other causes. Whereas law enforcement, firefighting, and emergency medical service personnel are classified “first responders,” RAPs are often termed “second responders.” When RAPs are called to assist a motorist at the roadside, they are often required to work under high-risk conditions, such as on the shoulder or even in the travel lane of a high-speed roadway that remains open to traffic, placing them at risk of being struck by passing vehicles. Using occupational fatality and employment data from the Bureau of Labor Statistics (BLS) between 2005 and 2015, a previous study by Bunn et al. (2018) found that the motor vehicle towing industry had more than double the occupational fatality rate of other transportation incident management industries including law enforcement and fire protection.

Although RAPs clearly face substantial risk in the line of duty, little research has examined characteristics of crashes in which RAPs are injured or killed (Chandler & Bunn, 2019). Studies examining first responders as well as RAPs often include relatively little data specifically regarding RAPs, likely due at least in part to crash report forms and data reporting conventions that hinder the identification of crash victims as RAPs (Horrey et al., 2021). Although the Model Minimum Uniform Crash Criteria (MMUCC) (National Highway Traffic Safety Administration [NHTSA], 2017, 2024) calls for the collection of data including whether each crash-involved person was an incident responder and the type of responder if applicable, NHTSA reported that state police crash reports collected fewer than 50% of the MMUCC data elements as of 2022 (Agency Information Collection Activities, 2022). It is evident from the few studies that have attempted to examine injuries or fatalities of RAPs that the current state of data collection and reporting has hindered research on the topic.

Yu et al. (2013) examined a sample of 265 crashes in Wisconsin between 2000 and 2010 in which emergency responders were struck by vehicles; however, most involved law enforcement officers and few were RAPs. (The article did not specifically report the number of RAPs; however, calculations from reported data indicate it was fewer than 10.) The authors noted that the state’s police crash report form did not provide any data fields to note that a crash-involved person was a tow-truck driver, likely leading to undercounting of towing operators struck by vehicles. Carrick & Srinivasan (2023) examined Florida crashes between 2011 and 2020 in which a driver was cited for a violation of the state “*Slow Down, Move Over*” law. In most of the crashes examined, only the responder’s vehicle, not the responder, was struck. The authors reported that of 519 crashes examined, only 34 involved a responder struck as a pedestrian, the majority of which were law enforcement officers. Of the 34, only nine were RAPs (seven towing and two safety service patrol), thus limiting the depth of analysis that could be conducted

regarding the characteristics of crashes in which RAPs were struck. The authors noted that the state's crash database lacked detail necessary to identify all emergency roadside response personnel, and that their method of identifying only crashes in which a driver was cited for violating the state's *Slow Down, Move Over* law would not identify all crashes in which responders were struck. Chandler & Bunn (2019) examined injuries and deaths of towing operators reported in an Occupational Safety & Health Administration (OSHA) database between 2002 and 2017, and identified 106 total injuries or deaths of towing operators, including 39 in which the towing operator was a pedestrian struck by a passing vehicle. However, the authors noted that OSHA is not required to investigate all occupational injuries that occur on public roadways and thus that OSHA's database likely did not include all such injuries and deaths.

Bunn et al. (2018) examined traffic incident management occupational fatalities in Kentucky between 2005 and 2016 identified through the state's National Institute for Occupational Safety and Health (NIOSH)-funded Fatality Assessment and Control (FACE) occupational fatality surveillance program. Of 29 such traffic incident management fatalities identified, 11 were RAPs (six towing and five transportation agency personnel, e.g., safety service patrol or similar). The article noted that the state's crash database only correctly identified the occupation of four of the 29 fatalities in total, including only three of the 11 RAPs. Thus, had crash data been the only source of information used, a large majority of all deaths of traffic incident management personnel, including but not limited to RAPs, would not have been identified as having involved traffic incident management personnel or RAPs. Importantly, however, the study noted that the occupations of all but one of the traffic incident management fatalities were identified correctly through a different source of data: media reports.

Yang et al. (2023) examined media reports describing over 5,000 incidents in which emergency responders including RAPs were struck or nearly struck by vehicles between 2001 and 2020. Although not stated explicitly in the article, the study data appeared to include approximately 85 RAPs who died and roughly an additional 200 who were struck or nearly struck. Although the study notes that results could potentially be biased by differential media reporting in relation to incident severity or responder type, results suggest that incidents involving RAPs were significantly more likely to be fatal than incidents involving other types of responders. This study was able to make effective use of data from media reports to identify crashes involving emergency responders including RAPs—at least partially overcoming this key shortcoming of state and national crash databases discussed previously. However, many crash-related details almost universally available in crash databases (e.g., location relative to the roadway, driver actions contributing the crash, even the time of day) were not reported in a substantial proportion of the media articles and thus were not available for analysis.

Given the well-documented limitations of crash databases that hinder the identification of crash victims as RAPs, as well as the noted success of identifying them

through media reports, the current study sought to use data from both sources to identify and examine the characteristics of crashes in which RAPs were struck and killed by vehicles.

## Method

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This purpose of the current study was to conduct a descriptive analysis of the characteristics of crashes in which RAPs were struck and killed by vehicles. Because RAPs are not consistently identifiable in crash databases, RAPs struck and killed by vehicles were first identified using records compiled by two organizations that memorialize RAPs who died. These records were then matched to a database of all fatal crashes in the U.S. to obtain additional information about the crashes. These matched records were then analyzed to describe the characteristics of the crashes in which RAPs were killed in years 2015–2021.

### Records of Roadside Assistance Providers Who Died

Records of roadside assistance providers who died were obtained from two sources: The National Tow List’s “Fallen Operators” (2015–2021) and the Emergency Responder Safety Institute’s struck-by-vehicle fatality incidents data (2019–2021).

The National Tow List maintains a free list of towing providers globally on their website and maintains an up-to-date list of all towing related news on their publicly available [Facebook page](#). Each year starting in 2016, the National Tow List has compiled a list of “Fallen Operators” in their Facebook photo albums, which details the name, age, date, location (city and state), and circumstances of death for tow operators who died in the preceding year. The list of Fallen Operators from years 2015–2021 included a total 334 deaths of tow truck drivers, including deaths unrelated to being struck by a vehicle (e.g., medical events, incidents involving equipment). The authors manually reviewed the descriptions of the circumstances of each death. Based on this review, 122 deaths for which circumstances were described as “struck” or similar were included in the current study.

The Emergency Responder Safety Institute (ERSI) maintains a list of struck-by-vehicle fatalities of all types of emergency responders on its [website](#) (ERSI, 2023). The list is compiled from daily searches of internet sources, news reports, social media pages, and through contacts in the police, fire, EMS, and towing industries. The list details the name, date of the incident and death, location (state and county), type of emergency responder, on/off-duty status, organization/employer, and activity of struck-by fatalities along with a hyperlink to a news story or source. The first full year for which ERSI’s struck-by-vehicle fatality incident data is available was 2019. ERSI receives funding and

support from the U.S. Fire Administration, the Department of Homeland Security, the Department of Justice’s Office of Justice Programs, and the Federal Highway Administration.

Data obtained from ERSI included 155 records of responder deaths, including law enforcement, EMS/firefighters, tow truck drivers, road service technicians, mobile mechanics, and safety service patrollers. From these records, 68 were identified as RAPs (i.e., towing, road service technicians, mobile mechanics, and safety service patrollers), and were included in the current study.

Records from the National Tow List and ERSI were combined into a single list (hereafter referred to as *RAP records*). This included 59 deaths reported by the National Tow List in 2015–2018, 63 deaths reported by both organizations in 2019–2021, and five additional deaths reported only by ERSI in 2019–2021. After removing duplicates, the final combined list of RAP records included records of 127 roadside assistance providers struck and killed by vehicles in 2015–2021.

### **Data on All Fatal Crashes in the United States**

Data on all fatal crashes in the U.S. were obtained from the NHTSA’s Fatality Analysis Reporting System (FARS) (NHTSA, 2023a). FARS includes a record of every crash that involves a motor vehicle in-transport, occurs on a public roadway, and results in the death of at least one involved person within 30 days of the crash. Data in FARS are compiled from police crash reports and include detailed information about all vehicles and people involved in fatal crashes, as well as information about the characteristics of the road, environmental conditions at the time of the crash, and the sequence of events that led up to the crash.

### ***Matching RAP Records to Fatal Crash Data***

RAP records were matched to corresponding records in FARS through a multi-stage process. Data available in both RAP records and in FARS included the victims’ age, date of death, and the state in which the crash occurred. (The National Tow List also included the city of the crash; ERSI also included the crash date and the county.)

In the first round of matching, the date of death, victim’s age, and state from RAP records uniquely identified 95 records in FARS. An additional seven RAP records each matched two FARS records on the basis of these variables.

For records with multiple possible matches, the authors sought media reports about the crashes to obtain additional information that could potentially help to determine which FARS record was the correct match. For RAP records obtained from ERSI, the links provided by ERSI were used. For RAP records obtained from the National Tow List, the authors performed Google searches for relevant media articles using search

terms including the victim's name, state, date of crash or death, and search terms *crash OR accident OR hit OR struck OR killed OR died OR fatal*). When articles were located, the authors manually abstracted information such as the approximate time of the crash, the name of the road on which the crash occurred, and sometimes additional location information. These additional data were then used to determine which of the FARS records, if any, was the correct match for each RAP record. Using this procedure, the seven RAP records each initially matched to two FARS records were uniquely matched to a single FARS record, yielding 102 matched records, after which 25 remained unmatched.

For the 25 remaining unmatched records, online news reports were searched as described above, both to obtain additional information as described above and to confirm or correct information in the original RAP records. Several corrections were made to victim's ages (in most cases by  $\pm 1$  year) and crash and death dates (usually by  $\pm 1$  day). Such corrections to ages in dates in the RAP records resulted in three additional matches to FARS, leaving 22 RAP records still unmatched.

For the remaining unmatched records, matching criteria were relaxed to allow discrepancies of  $\pm 1$  day in the crash date and date of death, age was not required to match, and new potential matches were examined manually to check for agreement with respect to the crash city or county, time, and the road on which the crash occurred and determine which, if any, was the correct match. This process yielded 17 additional matches including several with age discrepancies of 1 year, one with an age discrepancy of 2 years, one with an age discrepancy of 4 years, and six with discrepancies of 1 day in the date of death. In one additional case, RAP records listed a fatally injured towing operator as 61 years of age but the matched FARS record (matched on state, county, road, date, time, and number and type of vehicles in the crash) listed the victim's age as 34. The authors identified the same crash in the relevant state crash database, and in it the victim's age was listed as 61. The authors thus concluded that this was the correct match, and that the victim's age was entered incorrectly into FARS.

Of five cases remaining unmatched, no online news article could be found pertaining to two of the crashes/victims. Another was determined through online news articles to be outside the scope of state and national traffic fatality data because the victim died several months after the crash. In one case, it was unclear whether the towing operator had died or not, as multiple sources of data provided conflicting information. For this crash, an article on a crowdsourced website described a crash in which a 35-year-old male driver of a sedan struck a stopped tow truck, killing the 48-year-old male towing operator. The FARS record of what was clearly the same crash (matched on date, time, state, city, road, makes and models of vehicles involved, and approximate ages of their drivers) indicated that the 35-year-old male driver of the striking vehicle died while the 47-year-old male driver of the struck tow truck survived. Given this discrepancy, the authors searched a death notice for the towing operator and

found none. However, a search for the striking driver yielded a death notice for a person of the same name (per media report), age, and state who died on the date of the crash. Given these conflicting data, this crash was not included in the current study.

The last unmatched case was confirmed through multiple mainstream television and print media reports to have been a tow operator who was struck and killed by a vehicle on a public road thus was clearly within the scope of FARS; however, FARS contained no record of any fatal crash in the corresponding city within several weeks of the crash date indicated in the RAP record and media reports. The authors uniquely identified the relevant crash in the state Department of Transportation's crash database based on the crash date, time, county, city, and road. However, the crash was coded in the state's database as a non-fatal crash. In attempt to reconcile RAP record and media reports with the state's coding of the crash as non-fatal and its absence from FARS, the authors requested and obtained a redacted copy of the police crash report for the relevant crash. In the police report, the police officer's narrative clearly stated, "Unit #1 did not see the tow truck...and *struck the tow truck driver who was standing next to Unit #2 killing him.*" However, the tow truck driver was erroneously omitted from the portion of the police report that lists the injury severity of persons who were injured or killed, and a checkbox at the top of the form intended to be marked for fatal crashes was not marked, collectively explaining the miscoding of the crash in the database as non-fatal and consequent omission from the FARS database. This case was included in the study. The authors used data abstracted from the police report to populate relevant variables in the study database. Ultimately, 123 RAP records were matched to their corresponding records in crash databases.

### ***Identification of Roadside Assistance Providers Using FARS Alone***

Before 2019, the FARS database did not specifically identify motor vehicle towing personnel, safety service patrollers, or other RAPs when they were struck while outside of their vehicle (NHTSA, 2023b). However, it included a code for *emergency services personnel* including but are not limited to RAPs. Of the 123 RAPs identified in the current study through RAP records, 55 were killed in 2015–2018, and only 9 of them were identified in FARS as emergency services personnel.

The NHTSA added new codes to the FARS database in 2019 to facilitate the identification of crash victims as towing operators or other transportation workers (including but not limited to RAPs, e.g., state highway safety service patrollers). In years 2019–2021, 26 crash victims were coded as towing operators and 16 as transportation workers. By comparison to RAP records, 22 of the 26 persons coded in FARS as towing operators and 3 of 16 persons coded in FARS as transportation workers were confirmed to have been RAPs. Media reports regarding the other four crash victims identified in FARS as towing operators indicated that two were not struck by vehicles; no reports were identified regarding the remaining two. Of the 13 transportation workers identified

in FARS but not in the RAP records, 12 were determined to have not been RAPs (most were road construction/maintenance workers) and one could not be determined.

In sum, FARS only identified as RAPs 34 of the 123 crash victims identified through RAP records, including those who were identified in FARS as emergency services workers as well as the those identified more specifically as towing operators or transportation workers. Moreover, the new variables added to FARS in 2019 identified only 25 of the 68 RAPs identified through RAP records in years 2019–2021 and between zero and three additional RAPs not identified through the RAP records. Thus, it was determined that FARS alone was insufficient to identify RAPs struck and killed by vehicles, even with the new variables added in 2019.

### *Analysis*

The 123 RAP records and matched FARS records were analyzed to describe the characteristics of the crashes in which RAPs were fatally struck by vehicles, with a focus on factors potentially relevant to the development or prioritization of countermeasures to protect RAPs.

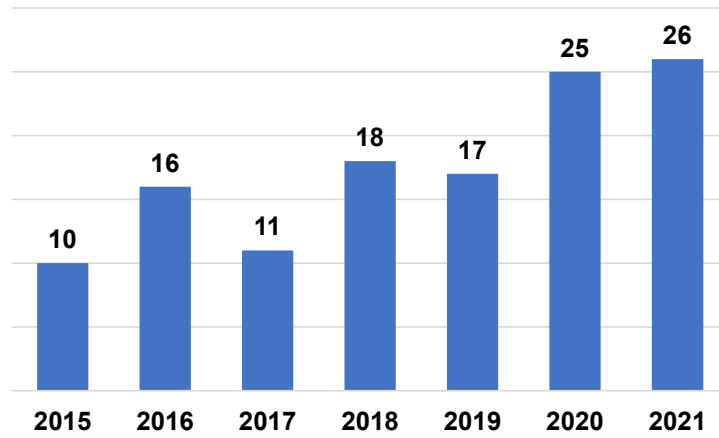
## **Results**

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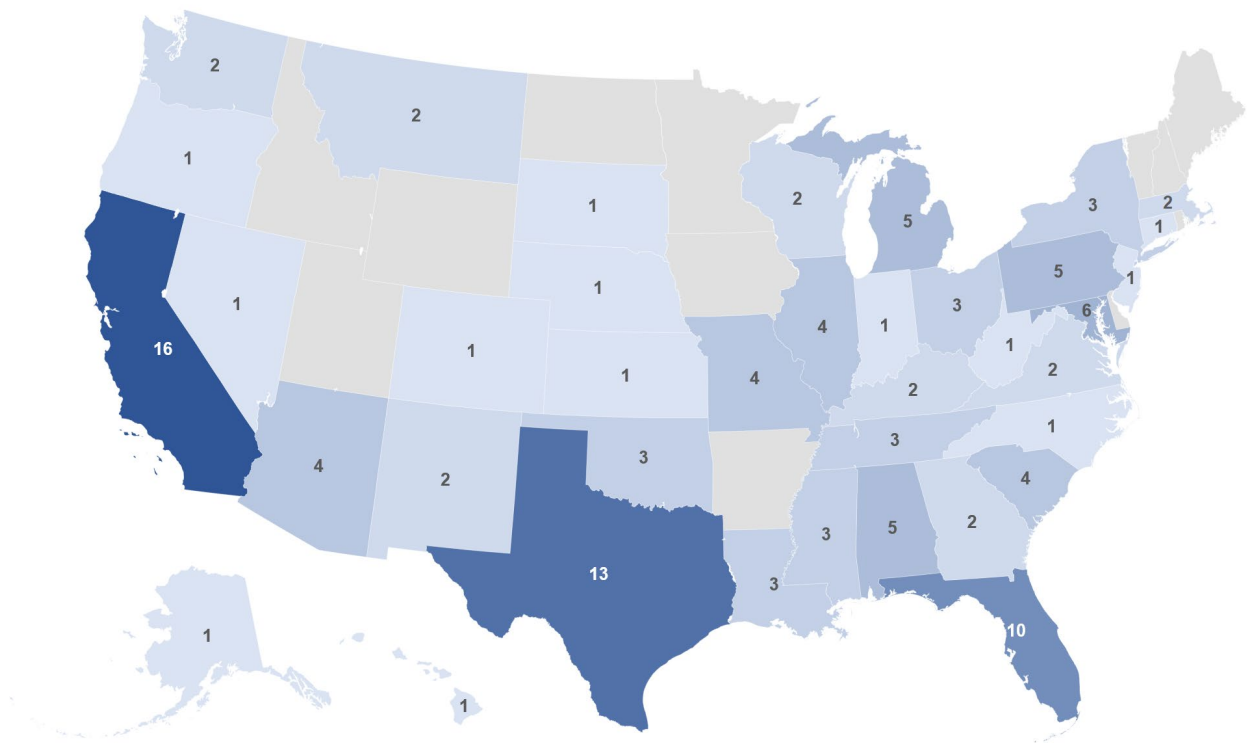
### **Overall Trends and Patterns**

Figure 1 shows the distribution of the 123 RAP deaths identified by year. The data are indicative of a statistically significant increasing trend in the number of RAPs identified who were fatally struck by vehicles each year ( $P=0.001$  for linear trend). While the total number of people killed in all crashes each year also increased over the study period, fatalities identified as RAPs also increased significantly as a proportion of total traffic fatalities ( $P=0.0064$  for linear trend in proportion), indicating that the increasing trend in RAPs fatally struck by vehicles was even greater than the overall increasing trend in all traffic fatalities. Note that trends should be interpreted with caution; if RAP records were less complete in earlier years than in later years, this could result in the magnitude of the trend being overestimated.

Figure 2 shows the number of RAP fatalities identified in each state over the study period. Unsurprisingly the three most populous states (California, Texas, and Florida) accounted for the largest numbers of RAP fatalities. Differences between states should be interpreted with caution, however, as the methodology used to identify cases could have resulted in the unintentional omission of some RAP fatalities, and even a small number of additional cases could impact the distribution of fatalities by state significantly.



*Figure 1. Annual Number of Roadside Assistance Providers Struck and Killed by Vehicles, United States, 2015–2021.*



*Figure 2. Number of Roadside Assistance Providers Struck and Killed by Vehicles, by State, 2015–2021.*



Figure 3 shows the ages of RAPs fatally struck by vehicles. Their average age was 41 years, the youngest was 21, and the oldest was 80. All of them were men.

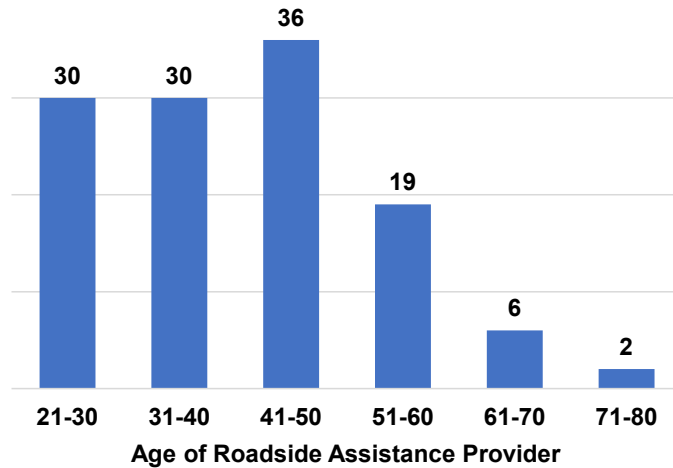


Figure 3. Ages of Roadside Assistance Providers Struck and Killed by Vehicles, United States, 2015–2021.

## Characteristics of Crashes

### Roadway and Environment

Figure 4 shows the types of roads on which RAPs were struck and killed by vehicles. In total, 85% of all deaths of RAPs struck by vehicles occurred on high-speed limited-access highways. More than two-thirds of all cases occurred on Interstate highways; the majority of the remainder occurred on other limited-access highways. Nearly 90% of all RAP fatalities occurred at locations with speed limits of 55 mph or higher; only six occurred at locations with speed limits below 45 mph.

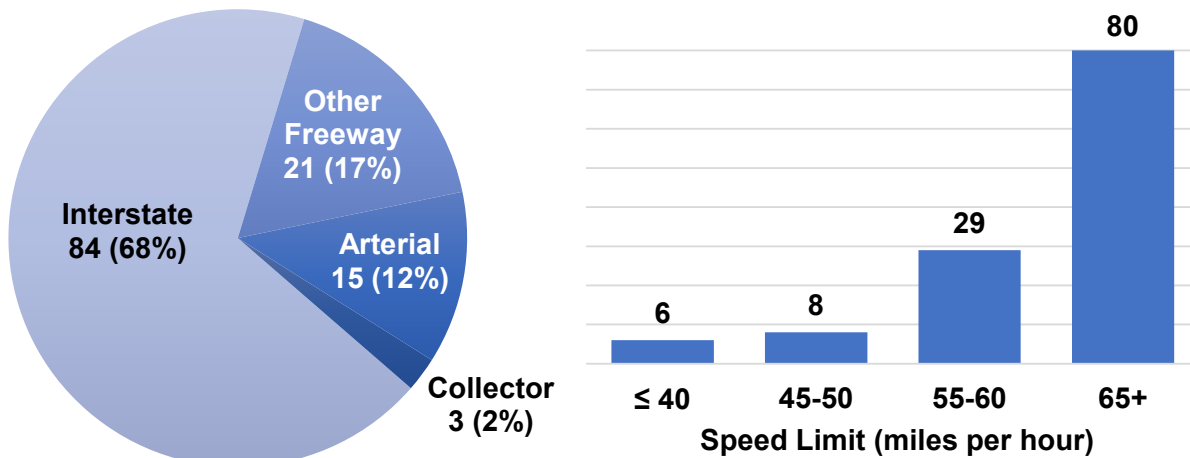


Figure 4. Functional Classification and Speed Limit of Roads on which Roadside Assistance Providers were Struck and Killed by Vehicles, United States, 2015–2021.

Figure 5 shows the time of day and lighting conditions present when RAPs were struck and killed by vehicles. The majority occurred during nighttime hours. Nearly two-thirds occurred during darkness, most of which occurred at unlit locations. Nearly one-third of all RAP fatalities occurred between the hours of 9 p.m. and 1 a.m.

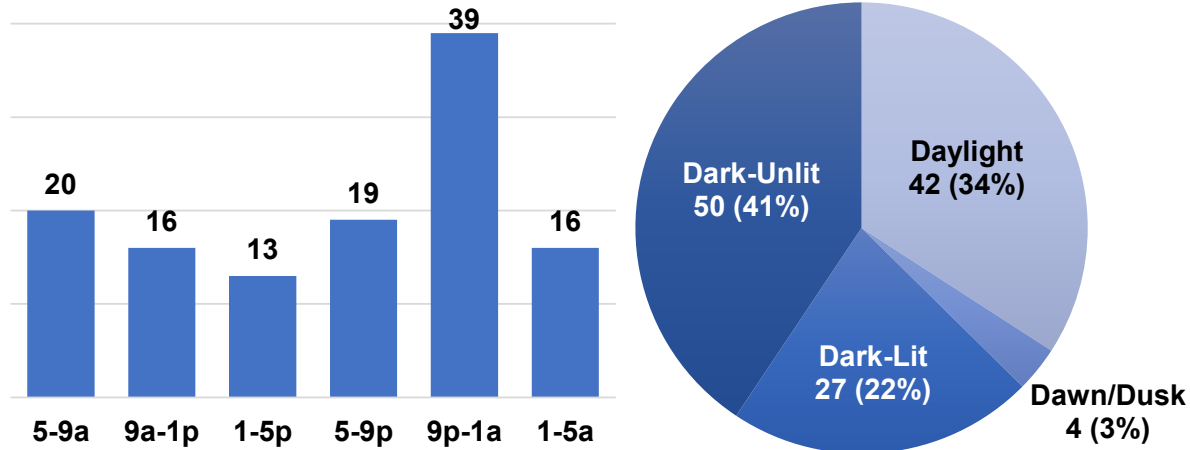


Figure 5. Time of Day and Lighting Conditions when Roadside Assistance Providers were Struck and Killed by Vehicles, United States, 2015 – 2021.

Figure 6 shows the weather and roadway surface conditions present at the locations where RAPs were fatally struck. The road was reported as dry and weather was reported as clear or cloudy without precipitation in 103 of the 123 crashes examined (84%). Precipitation was only noted in 16 crashes (13%). Similarly, the road was only noted as wet in 13 crashes (11%) and icy in seven (6%).

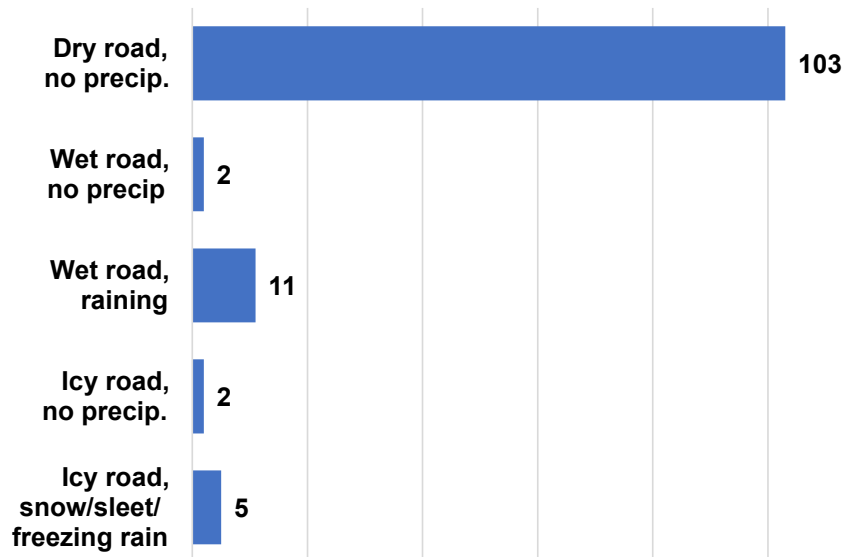
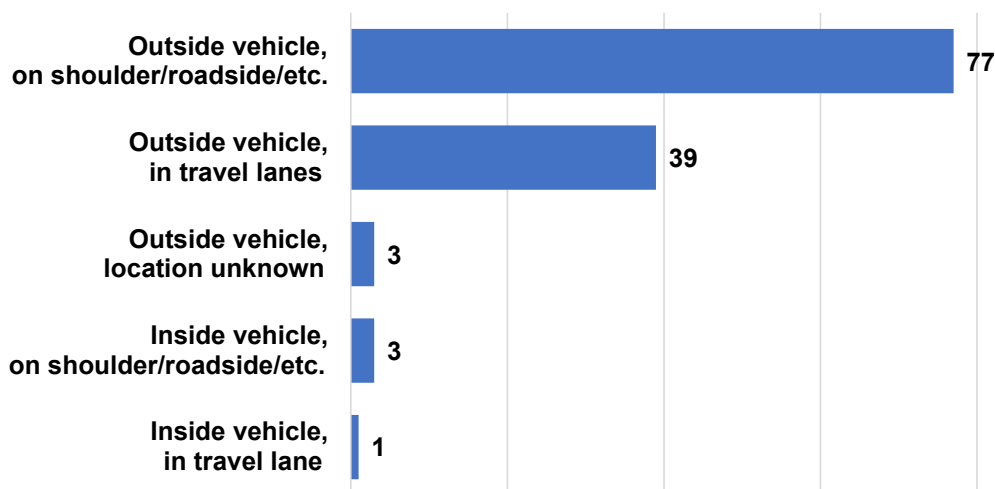


Figure 6. Road Surface and Weather Conditions Present when Roadside Assistance Providers were Struck and Killed by Vehicles, United States, 2015–2021.

### *Pre-Crash Circumstances*

Figure 7 shows the locations of RAPs when they were struck. All but four of them were outside of their vehicles. Sixty-three percent (77 of 123) were standing or working outside of the travel lanes on the shoulder or roadside. Approximately one-third (39 of 123) were working or standing in the travel lanes. Three were known to be outside of their vehicles, but it was unclear whether they were located in the travel lanes or on the shoulder/roadside. Of the four RAPs who were killed while inside of their roadside assistance vehicle, three were parked on the shoulder or roadside and one was reported in FARS as in-transport on the roadway.



*Figure 7. Location of Roadside Assistance Providers Struck and Killed by Vehicles, United States, 2015–2021.*

Table 1 shows the general sequence of events in crashes in which RAPs were struck and killed by vehicles, up to the point at which the RAP was struck. Note that crashes that shared similar major events were grouped together, the details provided are intended to be representative examples of a general type of crash; they do not necessarily fully capture all of the details of every crash in the same group. Also note that events that occurred after the RAP was struck were not examined, as the focus was on understanding events that occurred leading up to the RAP being struck.

*Table 1. General Sequences of Events in Crashes in which RAPs were Struck and Killed, United States, 2015–2021.*

Crash Type	General Description	Specific Details	Number (%)	
A-1	Vehicle in transport strikes RAP directly	RAP struck in travel lanes of roadway	24	(20%)
A-2		Vehicle departs road first, then strikes RAP outside of travel lanes	36	(29%)
B-1	Vehicle in transport strikes RAP vehicle and/or disabled vehicle, then one of those vehicles strikes RAP	RAP vehicle or disabled vehicle struck in travel lanes of roadway	4	(3%)
B-2		Striking vehicle departs road first, initial impact occurs outside of travel lanes	39	(32%)
B-3		Striking vehicle departs road and strikes RAP vehicle (RAP inside of vehicle)	3	(2%)
C	Vehicles collided on the road first, then one of those vehicles strikes the RAP		16	(13%)
D	RAP vehicle struck while re-entering traffic with disabled vehicle in tow		1	(1%)

In the most common general type of crash, labelled A in Table 1, a vehicle in transport (i.e., a vehicle being driven on the roadway) struck the RAP directly. This general type of crash accounted for 60 of the 123 RAP fatalities examined (49%). In crash type A-1, which accounted for 40% of type A and 20% of all RAP fatalities, the RAP was standing or working in the travel lanes of the roadway when the vehicle struck him. In type A-2 (60% of crash type A and 29% of all RAP fatalities), the vehicle first traveled out of the travel lanes and onto the shoulder or roadside before striking the RAP. As noted previously, these generalized descriptions are intended only to capture the key details leading up to the RAP being struck and do not fully capture every detail of every crash. For example, in some of these crashes, the striking vehicle may have struck the RAP vehicle, the disabled vehicle, a guardrail, etc., after striking the RAP; however, data indicate that the striking vehicle struck the RAP directly, before any other impacts in the crash. Finally, of particular note, in 25 of these crashes, only the RAP worker and neither the RAP vehicle nor disabled vehicle was struck.

In crash type B, a vehicle in transport first struck the RAP vehicle or a disabled vehicle, leading to a chain of events resulting in the RAP being struck and killed. This general crash type accounted for 43 of the 123 RAP fatalities examined (37%). Most commonly, in 39 of the cases examined, a vehicle in transport first departed the roadway, and then struck the RAP vehicle or disabled vehicle outside of the travel lanes of the roadway, after which one of these vehicles (the vehicle in transport, the RAP

vehicle, or the disabled vehicle) fatally struck the RAP (crash type B-2 in Table 1). These include cases in which the RAP was standing on the shoulder or roadside when struck as well as cases when the RAP was standing on the RAP vehicle (e.g., standing on the flatbed actively securing the disabled vehicle to the flatbed) and cases where the RAP was standing between the RAP vehicle and disabled vehicle and became pinned when the disabled vehicle was struck. In multiple cases, media reports or other sources described the vehicle in transport driving up the ramp of the flatbed, becoming airborne, and striking the RAP upon landing. Also included within crash type B were four cases that occurred within the travel lanes of the road (i.e., where the striking vehicle did not depart the road prior to the crash) and three in which the RAP was seated inside the cab of the parked RAP vehicle and was killed when the vehicle was struck.

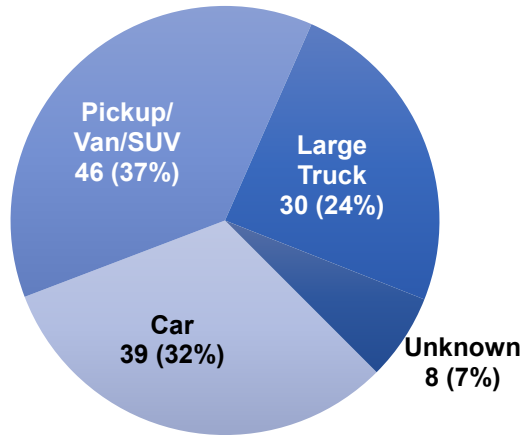
In a less common yet still significant scenario, 16 cases (13% of all RAP fatalities) followed an initial collision between two or more vehicles in transport on the road (type C in Table 1). In most of these cases, one of the vehicles involved in the initial collision then struck the RAP directly, though a few involved more complex chains of events (in two cases, one of the original vehicles then struck the RAP vehicle, which then struck the RAP, and one case involved multiple impacts between multiple vehicles in transport on the roadway before one of those vehicles subsequently struck the RAP).

Finally, in one case, a vehicle in transport struck the RAP vehicle while the RAP vehicle was attempting to re-enter traffic with the disabled vehicle in tow.

### **Characteristics of Striking Vehicles and Drivers**

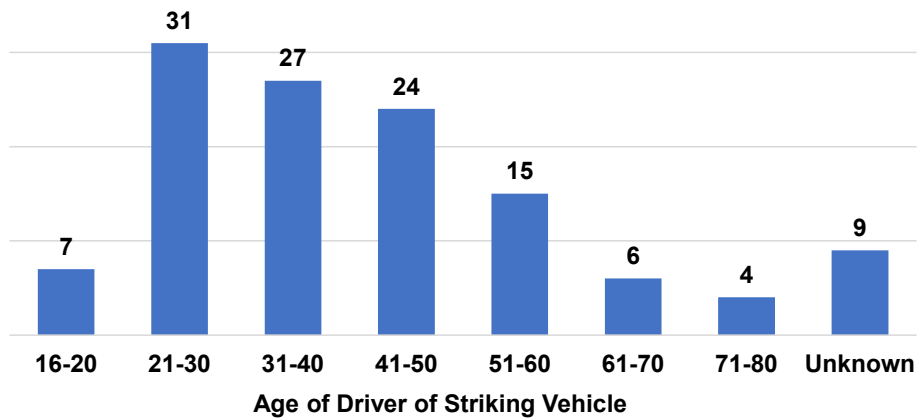
The characteristics of the vehicles and drivers who struck RAPs were examined to gain additional insight into the safety risks experienced by RAPs. Note that in cases where the RAP was struck in a complex sequence of events that involved multiple vehicles, this analysis focused on the vehicle and driver that crash data indicate initiated the sequence of events that led to the RAP being struck, even if it was not necessarily the same vehicle that physically struck the RAP. Also note that 26 of the drivers who fatally struck RAPs (21%) left the scene of the crash; some still had not yet been identified before the FARS data were finalized, resulting in some missing information about striking drivers and vehicles.

Figure 8 shows the types of vehicles that struck and killed RAPs. Slightly more than one-third were pickup trucks, vans, or SUVs and slightly fewer than one-third were passenger cars. Nearly one in four was a large truck. Vehicle type was unknown for eight striking vehicles.



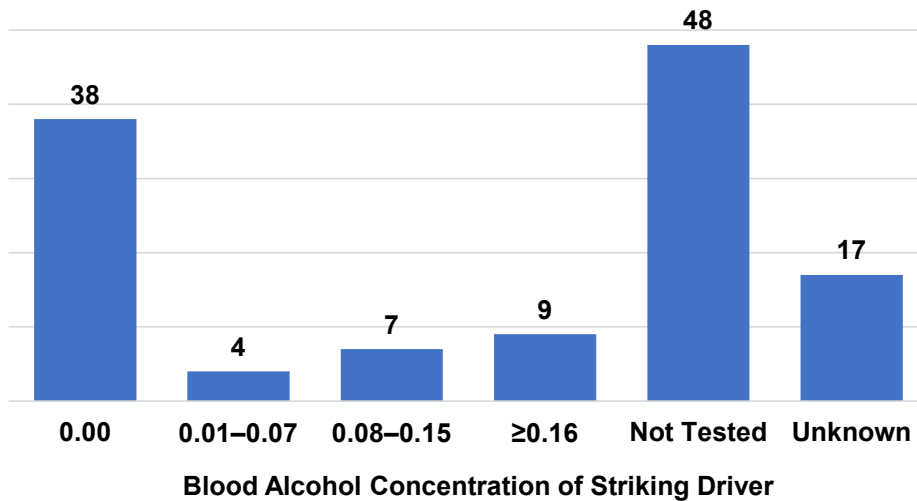
*Figure 8. Types of Vehicles that Struck and Killed Roadside Assistance Providers, United States, 2015–2021.*

Figure 9 shows the ages of the drivers of the vehicles that struck and killed RAPs. Age was unknown for nine drivers who left the scene and were not subsequently identified. Excluding those of unknown age, the median age of these drivers was 38 years, the youngest was 17 and the oldest was 80. Excluding nine for whom sex was not determined, 82 (72%) were men and 32 (28%) were women.



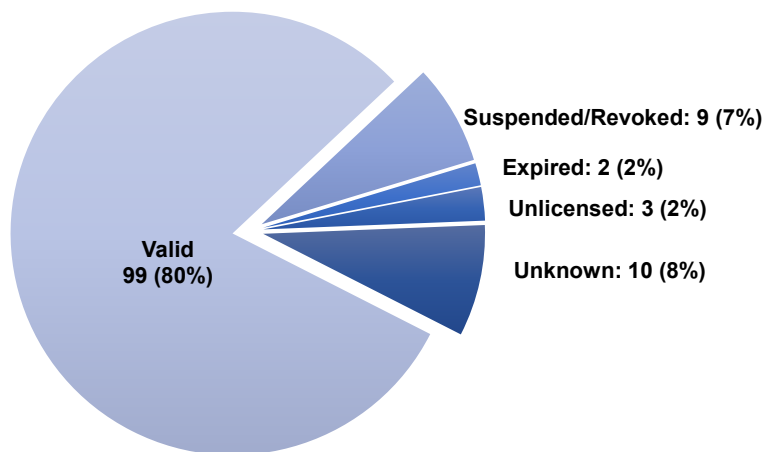
*Figure 9. Ages of Drivers who Struck and Killed Roadside Assistance Providers, United States, 2015–2021.*

Figure 10 shows data regarding alcohol involvement among drivers who struck RAPs. Of drivers who were tested for alcohol and had confirmed results (58 of 123), 20 (16% of all drivers; 34% of those with alcohol data) tested positive for alcohol, and 16 (13% of all; 28% of those with alcohol data) had a blood alcohol concentration higher than the legal limit, including nine whose blood alcohol concentration was more than double the legal limit. Notably, however, 48 of 123 drivers (39%) who struck and killed RAPs were not tested for alcohol, and no information about alcohol testing and/or results were available for another 17 (14%).



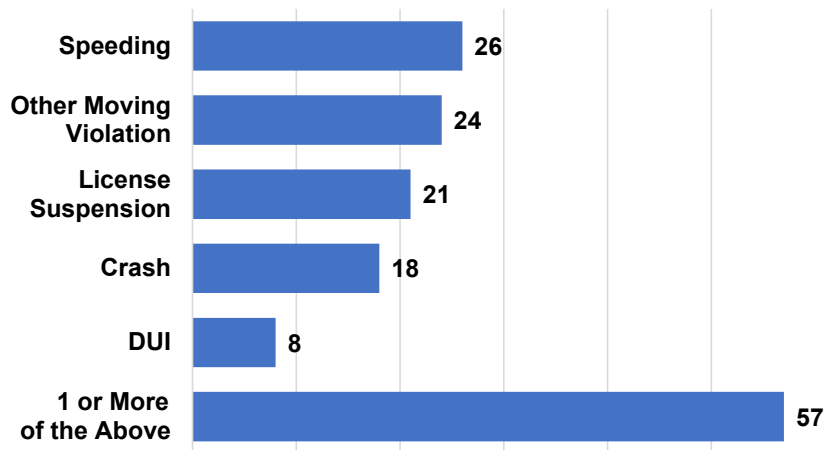
*Figure 10. Blood Alcohol Concentration of Drivers who Struck and Killed Roadside Assistance Providers, United States, 2015–2021.*

Figure 11 shows the driver license status of drivers who struck and killed RAPs. Among those whose license status could be determined (113 of 123), one in eight lacked a valid driver’s license. Three were completely unlicensed, nine were driving with a suspended or revoked license, and two had an expired driver’s license. Note, however, previous research has shown that drivers who leave the scene of crashes are disproportionately likely to lack a valid license (Benson et al., 2021), thus it is likely that at least some of the 10 whose license status was not determined may have lacked a valid license. Among those who were driving large trucks requiring a commercial driver’s license, all held the appropriate class of license for their vehicle.



*Figure 11. Driver’s License Status of Drivers who Struck and Killed Roadside Assistance Providers, United States, 2015–2021.*

Figure 12 shows selected items on the driving records of the striking drivers in the 5 years preceding the crash for 110 of the 123 striking drivers; driving history information was unavailable for 13. The data indicate that 26 of them (24% of those with available data) had one or more convictions for speeding violations in the past 5 years, and 24 (22%) had one or more convictions for other moving violations. Twenty-one striking drivers (19% of those with driving history data) had had their license suspended at least once in the past 5 years, 18 (16%) had been involved in at least one crash, and eight (7%) had at least one previous driving under the influence (DUI) conviction. Note that the previous statistics are not mutually exclusive and should not be added. In total, more than half of all striking drivers with available driving history data (57 of 110) had at least one conviction for speeding, DUI, another moving violation, a license suspension, or a crash on their recent driving records.



*Figure 12. Driving History in Previous 5 Years, Drivers who Struck and Killed Roadside Assistance Providers, United States, 2015–2021.*

*Note: Speeding, other moving violation, and DUI refer to convictions only; violations not resulting in convictions are not included. Data are based on 110 drivers with driving history data available.*

## Discussion

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Although previous research had examined particular subsets of crashes involving traffic incident management or roadside assistance personnel (Carrick & Srinivasan, 2023; Chandler & Bunn, 2019; Yu et al., 2013), the current study is, to the best of the authors' knowledge, the first study that has sought to identify and characterize all crashes in which RAPs, including motor vehicle towing personnel, safety service patrollers, emergency roadside technicians and mobile mechanics, were fatally struck by passing vehicles while working at the roadside.



Previous research noted that RAPs were not readily identifiable in state crash databases (Bunn et al., 2018) due to limitations in police crash report forms (Carrick & Srinivasan, 2023; Yu et al., 2013), and are not comprehensively covered in an OSHA database of occupational fatalities because OSHA is not required to investigate occupational fatalities on public roads other than in work zones (Chandler & Bunn, 2019). However, a study of NIOSH-funded state-level occupational fatality surveillance concluded that traffic incident management fatalities including those of RAPs were reliably identified by media reports (Bunn et al., 2018). While media reports are useful to identify incidents involving RAPs, they lack much of the contextual information typically available in crash databases (Yang et al., 2023). Thus, the current study identified RAPs fatally struck by vehicles using lists previously compiled by two industry organizations, largely based on media reports in conjunction with other sources, to memorialize towing operators and emergency responders who died. These records were then linked to NHTSA's FARS database—a database of all fatal crashes in the U.S.—to obtain additional information to enable the examination of crash characteristics.

Results indicate that at least 123 RAPs were struck and killed by vehicles on U.S. roads in 2015–2021. The true number could be higher as it is possible some cases were missed. The data suggest that there was an increasing trend over the study period in the annual number of RAPs struck and killed by vehicles. Moreover, while there was an overall national increase in traffic fatalities over the study period, the increase in fatalities of RAPs struck by vehicles was shown to be significantly greater. The trend should be interpreted with caution given the possibility that some cases could have been missed; however, unless a very large number of cases were missed disproportionately among the earlier years of the study, it does appear that the annual number of RAPs struck and killed by vehicles is increasing.

Results include many similarities but also differences relative to past research and provide several insights that may help to inform countermeasures to protect RAPs. In a study of Florida crashes in which a driver was cited for a Move-Over Law violation, none resulted in the death of a responder (Carrick & Srinivasan, 2023). In a Wisconsin study of road worker and incident responder struck-by crashes, <10% resulted in a worker or responder's death (Yu et al., 2013). Not unexpectedly, crashes examined in the current study—all of which resulted in the death of a RAP—differed from those in many respects.

In the current study, 68% of RAP struck-by deaths occurred on Interstate highways and 18% occurred on other limited-access highways, and nearly 90% occurred at locations with posted speed limits of 55 mph or higher, all far higher than in previous studies. In another study of crashes involving disabled vehicles not focused specifically on RAPs, Spicer et al. (2021) found that fatalities of pedestrians attending to disabled vehicles increased by 27% from 2014 to 2018. While that research did not distinguish between RAPs and other motorists (e.g., the drivers of the disabled vehicles), it highlights that substantial proportions of such fatalities occur late at night and on Interstates,

consistent with findings from the current study. While it is important for motorists and responders to take precautions at all times, when considering ways to prevent future struck-by fatalities of RAPs, it is important to recognize that the overwhelming majority of RAP struck-by fatalities occur on high-speed limited access highways. While Interstates and other limited access highways often provide wide shoulders and long sight distances to improve safety, working outside of a vehicle on such facilities is clearly dangerous to RAPs, both because drivers do not ordinarily expect to encounter pedestrians on freeways or Interstates, and because high traffic speeds increase the risk that a crash will be fatal (Tefft, 2013). These results indicate that, in the context of any potential countermeasures that are site specific or that can only be deployed on a limited basis, the need to protect RAPs from being struck and killed by passing vehicles is clearly greatest on high-speed limited-access highways.

In contrast to previous studies of mainly non-fatal crashes (Carrick & Srinivasan, 2023; Yu et al., 2013), a substantial majority of crashes examined (63%) occurred in darkness, of which nearly twice as many occurred at unlit locations as at locations with lighting. While FARS does not include details regarding responders' use of emergency lighting, flares, high-visibility safety apparel, or other countermeasures to increase their conspicuity to passing motorists, the high proportion of RAP struck-by fatalities occurring in darkness highlights the potential importance of countermeasures to increase the visibility and conspicuity of the scene and workers.

In a study of occupational safety data from OSHA, Chandler & Bunn (2019) noted that a substantial proportion of cases in which towing operators were struck occurred while the operator was actively loading or securing the disabled vehicle onto the tow truck—a scenario in which the authors noted that the raised flatbed or the disabled vehicle could potentially block approaching drivers' view of the vehicle's emergency lighting. It would be useful to investigate the prevalence of this scenario in a larger sample of crashes such as those examined in the current study; however, such details are beyond the scope of FARS. Multiple media reports of crashes examined in the current study described the striking vehicle driving up the raised ramp of the flatbed and then either landing on the tow operator or pushing the disabled vehicle (already on the flatbed) into him; however, most crashes were not described in sufficient detail to determine how many of the crashes examined involved this or similar scenarios. This suggests, albeit not conclusively, that there may be a particular need to ensure the visibility and conspicuity of tow trucks and towing personnel while a disabled vehicle is actively being loaded onto the tow truck.

Carrick & Srinivasan (2023) noted that many responders struck by vehicles were positioned on the traffic-facing side of the incident scene when struck. Chandler & Bunn (2019) also identified entering/exiting the vehicle and working on the traffic-facing side of the scene as prominent factors in injuries and fatalities of towing operators reported in an OSHA database. Although FARS data only indicate the responders' location as in the

travel lane versus on the shoulder and not specific position relative to vehicles, data suggest that many of the fatally injured RAPs were likely positioned on the traffic-facing side of the scene as well. In nearly half of the crashes examined, the first harmful event of the crash was a vehicle in transport striking the RAP (i.e., before having struck the RAP's vehicle or disabled vehicle). In fact, in approximately one-third crashes examined, only the RAP and not the RAP's vehicle nor the disabled vehicle was struck. It is possible that some of these RAPs were positioned elsewhere. For example, the narrative description of one case from the current study that was also identified in an OSHA database of workplace fatality inspections stated that the RAP was walking behind his vehicle removing cones from the road when he was struck. However, the data would appear to suggest that a substantial proportion of RAPs who were struck and killed by vehicles were likely positioned on the traffic-facing side of the scene. Another case identified in the above-mentioned OSHA database stated that the RAP was attempting to change a tire on the traffic-facing side of a semi-trailer when he was struck. Current safety training practice for towing operators emphasizes the importance of minimizing exposure to traffic and suggests strategies such as entering and exiting the vehicle on the passenger side and using passenger side controls wherever possible. However, in some circumstances working at least briefly on the traffic-facing side of the scene may be inevitable. Nonetheless, collectively, these findings suggest that reinforcing RAP training to avoid working on traffic-facing side of the scene whenever possible may be particularly important to protecting RAPs from being fatally struck by vehicles.

The current study identified 29 fatal crashes in which either the RAP or their vehicle was struck directly in the travel lanes of the road, killing the RAP. *Slow Down, Move Over* laws are a key countermeasure to protect RAPs as well as other first responders. These laws generally require drivers to move over one lane whenever possible, and to reduce speed if moving over is impossible, when passing emergency response personnel, RAPs, and in some states also certain other types of vehicles stopped on the side of the road (AAA, 2023). Compliance with *Slow Down, Move Over* laws—which require drivers to move over one lane or reduce speed when approaching roadside assistance providers, police, firefighters, emergency medical service providers, and in some states also other workers working at the roadside—should prevent such crashes and deaths. Previous AAA Foundation research has found that use of vehicle-mounted variable message signs (Liu et al., 2023) and cones and flares (Blomberg et al., 2023) increase the likelihood of drivers moving over, though both studies reported that compliance was not universal even when these countermeasures were used.

Another important finding of this research, however, is that 60% of incidents in which RAPs were struck and killed by vehicles were preceded by the striking vehicle driving off the road onto the shoulder or roadside. In a study of crashes in which RAPs, as well as first responders, were struck by vehicles, Yang et al. (2023) reported that crashes in which responders were killed were significantly more likely to involve out-of-control vehicles, compared with crashes in which the responder survived. While not

conclusive, these observations suggest that many drivers who drove off the road before striking a RAP might have been impaired, fatigued, or distracted. In the current study, approximately one-third of the striking drivers who were tested for alcohol tested positive, although nearly 40% were not tested. While not investigated in the current study, the roles of fatigue and distraction are known to be substantially underreported in crash data (Tefft, 2012). Although none of these features are unique to RAP fatalities, RAPs are particularly vulnerable to such crashes given their exposure to traffic while working on the side of high-speed highways.

Protecting RAPs from apparently out-of-control vehicles leaving the road and striking them on the roadside presents a difficult challenge. If a substantial proportion of these drivers are indeed impaired, fatigued, distracted, or otherwise not actively controlling their vehicles, awareness of *Slow Down, Move Over* laws and motivation to comply may not be sufficient to prevent these crashes. Moreover, in addition to the 60% of RAP fatalities preceded by another motorists departing the road, another 13% were preceded by a collision between multiple vehicles in transport, after which one of the vehicles involved in the original crash then struck the RAP. While preventing vehicles from departing the road or colliding on the road in the first place would be optimal, most countermeasures to prevent road departure are vehicle-based (e.g., advanced driver assistance systems such as lane departure warning or automatic emergency braking) or infrastructure-based (e.g., rumblestrips to alert drivers that road departure is imminent and given them an opportunity to redirect their vehicle). Beyond general countermeasures intended to prevent road departure, there are also countermeasures measures to provide advance warning to approaching motorists through in-vehicle GPS or mobile apps, giving them more opportunity to respond by changing lanes or slowing down. Whether such measures would effectively reduce the risk of other motorists departing the road or colliding near the original incident scene (e.g., by helping the approaching motorists to regain situational awareness sooner) is unclear, likely depends on the causes of the original road departure or collision, and would also be dependent upon the approaching drivers having and using relevant technology. While such countermeasures should help to protect RAPs, they are outside of the immediate control of the RAPs working on the side of the road. Blomberg et al. (2023) provides a review of countermeasures that RAPs can deploy in the field and notes that many require additional evaluation and some pose questions of practicality. Thus, results of the current study suggest that countermeasures deployed by RAPs in the field to redirect out-of-control vehicles, prevent them from striking a RAP, or mitigate the severity of any impact, may be especially important for preventing RAP fatalities. More research is needed, however, to identify countermeasures that are both effective and practical to deploy in the conditions in which RAPs work.

Results also highlight shortcomings in current crash data collection and reporting practices and needs for improvement with respect to data related to RAPs. Only 34 of the 123 RAPs identified in the current study were identifiable in FARS as RAPs or emergency

services personnel. Before 2019, NHTSA's FARS database lacked sufficient detail to identify crash victims as RAPs, and identified only 9 of the 55 in the current study as emergency services personnel. In 2019, NHTSA added new data elements to FARS to identify crash victims who were specific types of incident responders including tow operators and other transportation workers (NHTSA, 2023b). However, even after this addition, FARS identified only 25 of the 68 fatally struck RAPs who were identified through RAP records in the current study, and at most three additional RAPs not identified through those RAP records. Thus, although FARS now includes these new data elements, it will not be possible to rely solely on FARS to identify fatally injured RAPs unless and until individual states update their police crash report forms to record this information, as individual police crash reports are the main source of information used by NHTSA to enter information into FARS.

Moreover, while the methodology used for the current study was premised on the belief that all RAPs struck and killed by vehicles on public roads would be present in FARS (but not necessarily identifiable as RAPs), the authors identified one RAP fatality that was absent from FARS altogether. Further investigation revealed that its absence from FARS was due to the corresponding state police crash report erroneously not being marked as fatal, even though the officer's narrative clearly stated that a tow truck driver was killed. The incidence of fatal crashes missing from FARS due to errors in the original crash reports is unknown.

## **Limitations**

This research is subject to several limitations that should be noted. No existing source of research data reliably identifies all RAPs fatally struck by vehicles (Horrey et al., 2021). The current study relied on records compiled by two industry groups that memorialize RAPs who died. It is possible that some fatally injured RAPs were overlooked, as those organizations' records were compiled from news reports, social media, and word of mouth. The BLS reports that 90 persons employed in the motor vehicle towing industry were killed in "pedestrian-vehicular incidents" during the 2015 to 2021 study years excluding 2019 (corresponding BLS data were unavailable for 2019) (*Bureau of Labor Statistics Data*, n.d.); the current study found records of 106 fatally injured RAPs, including 98 towing operators and eight other RAPs during the same years. Thus, even if the current study failed to identify some RAPs who should have been included, it appears that the current study nonetheless examined a more comprehensive set of RAP fatalities than had ever previously been assembled. Until all states update their police crash report forms to enable the identification of crash victims as towing operators or other roadside service providers as provided in the MMUCC (National Highway Traffic Safety Administration, 2017), there remains a need for research using other sources of data both to produce accurate statistics regarding RAP fatalities and injuries and to examine crash circumstances in greater depth to inform and prioritize efforts to protect them.

In addition, while FARS contains extensive data about the circumstances of crashes, it was not designed specifically to collect information at the level of detail that would be desirable to understand the circumstances of crashes in which RAPs were struck by vehicles. For example, while this research identifies that 63% of fatalities of RAPs occurred in darkness, it provides little information about use of vehicle lighting, high visibility safety apparel, or temporary traffic control devices such as cones and flares, all of which are important to the safety of RAPs working at the roadside. Additionally, while results suggest that nearly half of fatally injured RAPs may have been on the traffic-facing side of the incident scene when struck—a finding with important implications for RAP training—the data lack the level of detail needed to confirm this conclusively. As noted previously, research has suggested that risk of being struck may be particularly high while actively loading the disabled vehicle onto the raised flatbed, possibly due to the RAP vehicle’s emergency lighting being obscured (Chandler & Bunn, 2019); however, the data available for the current study lacked sufficient detail to determine the prevalence of this scenario. If pertinent data were routinely collected in investigations of crashes in which RAPs (and other emergency response personnel) were struck by vehicles, or at least in those resulting in severe injuries or fatalities, it would provide valuable data for researchers as well as practitioners that would help to inform and prioritize efforts to protect them. Such information could be collected in a supplemental form conceptually analogous to supplemental forms used for crashes resulting in fatalities and crashes involving commercial vehicles. While it is acknowledged that states are sensitive to increasing the length and complexity of forms that law enforcement officers are required to complete when investigating crashes, it should also be noted that far fewer than 1% of all crashes involve RAPs or emergency response personnel, thus any such supplemental data form would be used extremely rarely.

Finally, while fatalities represent the worst possible outcome, the current study was unable to examine non-fatal RAP injuries. The current study relied on memorials of RAPs who died to identify cases—a methodology clearly not generalizable to non-fatal crashes. In a study of crashes related to disabled vehicles but not specific to RAPs, Spicer et al. (2021) estimated that an average of 1,111 pedestrians were injured and 294 were killed each year while working on, entering, exiting, or attending to disabled vehicles nationwide in 2014 to 2018. If assumed to be applicable to RAPs, the ratio of non-fatal injuries to fatalities in that study would suggest that for every RAP fatally struck, there may be perhaps three to four additional RAPs who are struck as pedestrians and suffer non-fatal injuries, or perhaps roughly 100 annually in recent years. Clearly more research is needed to quantify and examine the characteristics of RAPs who are struck by vehicles yet survive, both because any of these crashes could have been fatal had circumstances been different, and because non-fatal injuries can nonetheless result in inability to work, lost wages, and even life-altering disability. Contrasting the results of the current study to previous studies of predominantly non-fatal crashes of incident responders (Carrick & Srinivasan, 2023; Yu et al., 2013), it appears likely that the

characteristics of non-fatal crashes in which RAPs survive crashes differ in many ways from fatal crashes.

## Conclusion and Recommendations

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This research represents the most comprehensive examination of struck-by fatalities of roadside assistance providers of which the AAA Foundation for Traffic Safety is aware. Results indicate that at least 123 roadside assistance providers were struck and killed by vehicles between 2015 and 2021. There appears to have been an increasing trend in fatalities of roadside assistance providers struck by vehicles during these years, even larger than the increasing trend in traffic fatalities overall over the same period. Results highlight the importance of reinforcing motorist compliance with *Slow Down, Move Over* laws. However, results also indicate that a substantial proportion of these incidents involve out-of-control vehicles that departed the road prior to striking roadside assistance providers, suggesting an additional need for countermeasures to prevent vehicles from departing the road in the first place, redirecting out-of-control vehicles to prevent them from striking roadside assistance providers, and/or mitigating the severity of any impact that may occur. Results also suggest, albeit inconclusively, that some of the roadside assistance providers who died may have been working on the traffic-facing side of the scene, reinforcing the importance of training to avoid operating on the traffic-facing side of the scene to the greatest extent possible. Comparison of the number of cases identified through industry memorial websites versus through variables coded in crash data highlight the need for improvements in data collection forms and reporting procedures to ensure that roadside assistance providers who are injured or killed in the line of duty are identifiable in crash reports and databases, as such data are critical to researchers as well as practitioners to identify, develop, and prioritize ways to protect roadside assistance providers.

Based on the findings of this research, as well as the limitations encountered, this report makes the following recommendations:

- There is a need to reinforce public awareness of and increase motorist compliance with *Slow Down, Move Over* laws; research to investigate the most effective approaches to increase compliance is also needed.
- Countermeasures are needed to protect roadside assistance providers and first responders from out-of-control vehicles that depart the roadway by preventing the original road departure, by protecting those at the roadside from being struck, or by reducing the severity of any impact that may occur. Research is needed to determine what countermeasures are most effective and practical to meet this need.
- Training for roadside assistance providers should emphasize the importance avoiding working or standing on the traffic-facing side of the incident scene

whenever possible and minimize time spent on the traffic-facing side of the scene when it cannot be avoided altogether, as well as provide strategies for how to do so.

- In cases where countermeasures are site-specific or where deployment must be prioritized, results of the current study suggest that efforts should focus on protecting roadside assistance providers working on high-speed limited-access highways.
- State police crash report forms should include data fields designed to report whether a crash victim was an incident responder, and type of responder when applicable, as called for in the current edition of the Model Minimum Uniform Crash Criteria (NHTSA, 2024). Additionally, states should consider collecting additional information in crashes in which roadside assistance providers and other emergency response personnel are struck by vehicles, or at least in those that result in the injury or death of a responder.



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