APPENDIX B
Detailed Emphasis Area Document

Arizona Strategic Highway Safety Plan

Contents

The 2014 Arizona Strategic Highway Plan document, and appendices, are available on the Arizona Department of Transportation website at: azdot.gov/shsp

Introduction

This document is as an appendix to the Arizona 2014 Strategic Highway Safety Plan (SHSP). It is intended to be a "living" implementation document, connecting efforts of individual Emphasis Area teams to the overall goals and objectives of the SHSP. The 2014 SHSP is a data-driven, strategic approach to reduce fatalities and serious injuries on Arizona roads, and, it reflects a collaborative effort among multidisciplinary teams of safety stakeholders across the state.

SHSP Vision, Goals and Objectives

The Arizona SHSP adapted the national "Toward Zero Deaths" campaign theme into its overarching safety Vision of "Toward Zero Deaths by Reducing Crashes for a Safer Arizona." The statewide SHSP goal is to reduce fatalities and the occurrence and severity of serious injuries on all public roadways in Arizona. The SHSP objective is to reduce the five-year average total number of fatalities and serious injuries in Arizona by three to seven percent during the next five years from the 2013 base year. Fatality and serious injury data for 2013 became available just before publication of this plan and showed that fatalities increased from the 2012 total of 825 to 844 fatalities in 2013, while serious injuries decreased slightly from 4,462 in 2012 to 4,313. The five-year rolling average 2013 total number of fatalities and serious injuries is 5,378.
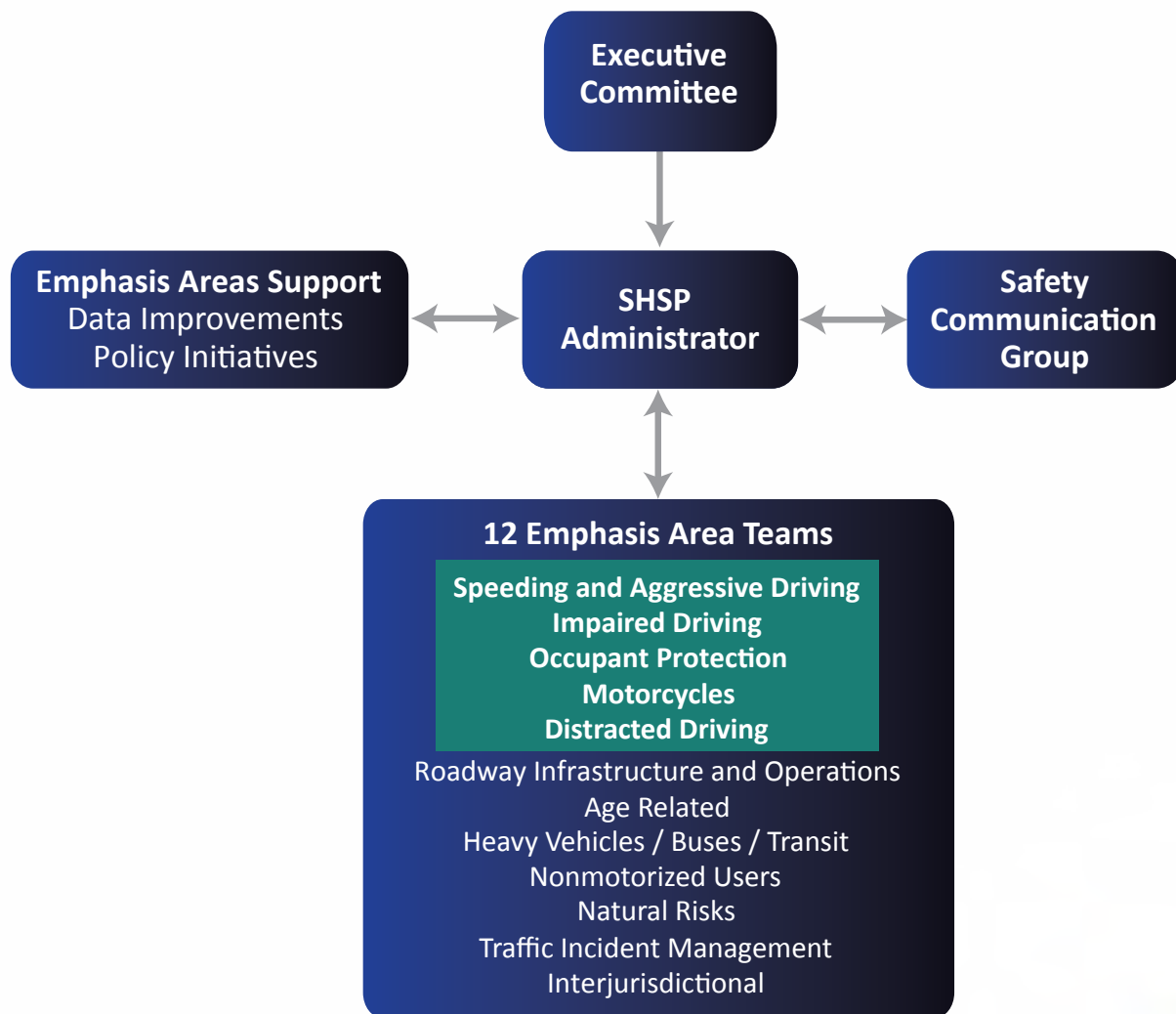
SHSP Update Schedule

The Arizona Department of Transportation (ADOT) has established a five-year update cycle for the SHSP consistent with federal requirements and standard practice in many other states. The 2014 SHSP will remain in effect until replaced with an updated plan by the end of the five-year period. The data analyses contained in this appendix will be updated each year with the availability of the most recent year's safety data. Updates to this document will also reflect changing priorities and action steps identified for implementation by the individual Emphasis Area teams.

SHSP Implementation

The 2014 SHSP update defines 12 Emphasis Areas focused on improving specific areas of roadway safety. During the SHSP update process, the Executive Committee recommended focusing especially on five Emphasis Areas that account for the greatest number of fatalities and serious injuries or appear to be trending upward. These five Emphasis Areas are highlighted on the following page along with the remaining seven Emphasis Areas. Status as a Top Focus Emphasis Areas will not affect project selection, prioritization or funding. Two additional Support Areas were defined to assist in the implementation of safety strategies within each Emphasis Area. The Emphasis Area and Support implementation teams are composed of transportation-safety professionals representing the 4 E's of safety: Engineering, Education, Enforcement and Emergency Medical Services. Making Arizona roads safer will be best accomplished with the collaborative and coordinated efforts of all four E's.

A new Safety Communication Group is being created to coordinate a unified marketing effort between state agencies and to provide assistance to local agencies or groups participating in SHSP-related media events and outreach. The SHSP administrator will manage the coordination, implementation and evaluation of the SHSP under the direction of the ADOT Traffic Engineering Section. The SHSP Administrator will serve as the direct line of communication between the Executive Committee, Emphasis Area teams and the Safety Communication Group.

Executive Committee

Emphasis Areas Support
Data Improvements
Policy Initiatives

SHSP Administrator

Safety Communication Group

12 Emphasis Area Teams

Speeding and Aggressive Driving
Impaired Driving
Occupant Protection
Motorcycles
Distracted Driving

Roadway Infrastructure and Operations
Age Related
Heavy Vehicles / Buses / Transit
Nonmotorized Users
Natural Risks
Traffic Incident Management
Interjurisdictional

The SHSP Executive Committee, composed of leaders of State transportation, public safety and health agencies, oversees and bears responsibility for overall implementation of the SHSP. The Executive Committee works together with the SHSP Administrator, Safety Communication Group, Emphasis Area teams and Emphasis Area Support teams to facilitate and assist in taking necessary actions to improve safety.

During implementation of the 2014 SHSP over the next five years, individual Emphasis Areas teams will contribute to achieving the statewide goal and objective by implementing strategies and action steps aimed at improving safety. The SHSP and this appendix document are intended to guide that process. Emphasis Area sections of this appendix, listed in alphabetical order, provide greater detail regarding trends in fatality and serious-injury data, safety strategies developed during the SHSP update process and current lists of action steps considered to assist in implementing safety strategies.

Crash Data Summaries

Crash information for Arizona was obtained from the Accident Location Identification Surveillance System (ALISS) database, which is maintained by the Arizona Department of Transportation (ADOT). ALISS is composed of data from the standard crash report forms filled out by law-enforcement officers responding to each crash incident. A crash report is required anytime a crash involves an injury or an estimated $1,000 or more in property damage.

The injury status of individuals involved in a crash is indicated on the police crash report using the KABCO severity scale, where K and A are the most severe classifications for fatality and serious or incapacitating injury. While lower-severity nonincapacitating injury (B), possible injury (C) and property damage only (O) crashes were often queried and considered for context, the data graphics in this appendix reflect only these most severe fatal and serious-injury crashes, i.e., K and A.

The following table summarizes the number of crashes by year for each of the eight years included in the 2014 update. While individual crashes may involve multiple fatalities and injuries of differing severity, the tabulated totals reflect just the number of crashes, counted by the most severe injury sustained.

Count of Statewide Crash Records by Severity for Years 2005 Through 2012

Severity	Year								Total
	2005	2006	2007	2008	2009	2010	2011	2012	
(K) Fatal Crashes	*1,049*	*1,126*	*952*	*843*	*709*	*695*	*755*	*742*	*6,871*
(A) Incapacitating Injury	*5,212*	*4,934*	*4,860*	*4,133*	*3,738*	*3,576*	*3,589*	*3,509*	*33,551*
(B) Nonincapacitating	17,506	16,642	16,120	14,108	12,342	12,374	12,690	12,757	114,539
(C) Possible Injury	23,108	23,818	22,580	19,274	17,409	17,440	16,861	17,114	157,604
(O) Property Damage Only	93,699	96,983	96,681	82,199	72,917	72,741	69,878	69,173	654,271
Total Crash Count	140,574	143,503	141,193	120,557	107,115	106,826	103,773	103,295	966,836
Total Percent Change	NA	2%	-2%	-15%	-11%	0%	-3%	0%	-27%

Source: Accident Location Identification Surveillance System (ALISS), ADOT Traffic Records Section, received July 2013. Information presented in this publication may be based on preliminary data and, as such, may differ slightly from previous or future crash summaries.

The ALISS database is used by ADOT to prepare the annual Arizona Motor Vehicle Crash Facts report that presents a statistical review of motor vehicle crashes in the state for each year. Compilation of this and other crash data reports rely on the most current information available. The ALISS database is updated regularly, as crash reports are submitted to ADOT from law enforcement agencies throughout the state. Therefore, slight differences are possible between this and other past or future reports.

The sections to follow provide a summary of statewide total trends in fatalities and serious injuries. Graphics similar to those in this introductory section are presented in later sections for crashes related to each Emphasis Area category. These graphics have been developed to describe the who, what, when, where and how relating to the most severe crashes. Relevant explanations with the first set of graphics for all crashes, are provided to guide interpretation of later graphics presented for each Emphasis Area.

Crash Data Summaries

What

Injury and crash counts have been analyzed for fatality and serious injury crashes for the eight years from January 1, 2005 through December 31, 2012. The total fatality count for this eight-year period is 7,719, and the eight-year count for serious injuries is 43,776. 2013 counts, available just before publication of this report, have not yet been included in the detailed analyses provided in this document.

Pie charts are used in later Emphasis Area sections to portray the magnitude of the Emphasis Area-related fatality and serious-injury counts with respect to the total number of all fatalities or serious injuries in the state. For example, young-driver-involved fatalities make up 30 percent of all traffic fatalities in Arizona. Similar perspectives can be drawn regarding the magnitude of crashes relating to each Emphasis Area. Insight can additionally be gained in comparing the fatality and serious-injury charts. The severity of crashes for an Emphasis Area are high when a greater portion is shown in the fatality pie chart than in the serious-injury pie chart. An example of this comparison is with the impaired-driver-involved crashes, where these crashes represent almost twice the proportion of fatalities compared to serious injuries. On the other hand, a higher volume but lower severity or crashes is associated with Intersection-related crashes, which make up 23 percent of all fatalities but 44 percent of all serious injuries.

Note that many individual crashes will fall into multiple Emphasis Area categories. For example, a single fatal crash may involve a *motorcyclist* being hit by a *young driver*, who was *impaired* and *speeding* through an *intersection*. A fatality associated with that crash would be reflected in each relevant Emphasis Area section.

When

Temporal trends in fatalities and serious injuries are shown on the following page for annual, monthly, weekday and hourly count totals. The monthly, weekday and hourly bar charts show total counts by each time period for the eight years from 2005 through 2012.

Similar graphics are shown in later sections for crashes related to each Emphasis Area. For example, the Motorcycle Emphasis Area section will show each of the four temporal trends in fatalities and serious injuries only for the subset of crashes involving a motorcycle.

With each of these temporal distribution charts, the total trend for all crashes has been plotted behind the bar chart. These background trends for all crashes, shown with the Emphasis Area-specific temporal bar charts in later sections, serves as a baseline to compare where category-specific trends are significantly different from the total trends. To allow for such a comparison, the total trends have been normalized to the average for each graphic in the Emphasis Area-specific charts. One example of insight that may be gained, in the comparison between an Emphasis Area trend and the total trend for all crashes, can be observed in the time-of-day chart for Impaired Driving, where the bars for night hour are shown far above the background total trend, indicating that severe impaired driving crashes occur at night much more often than do crashes represented in other Emphasis Areas. Potentially useful findings can likewise be identified in many of these temporal charts in each Emphasis Area section.

Crash Data Summaries

Statewide annual motor vehicle traffic fatalities have gone down since 2005 by 31 percent, or 368 persons. However, the lowest annual total was in 2010, at 759 fatalities. Fatalities have risen slightly since then. Total annual serious injuries have gone down since 2005 by 36.5 percent, or 2,564 serious injuries. But, annual totals have declined only four percent in the two-year period since 2010.

For the eight year reporting period, monthly fatality and serious-injury totals have been highest in spring and fall months. The lowest months have been December and January. These most severe crashes have also been highest on Fridays and Saturdays. The overall distribution of crash fatalities by time of day shows that the highest number of fatalities occurs during the 6:00 PM hour; while the and highest number of serious injuries occurs during the 3:00 PM hour.
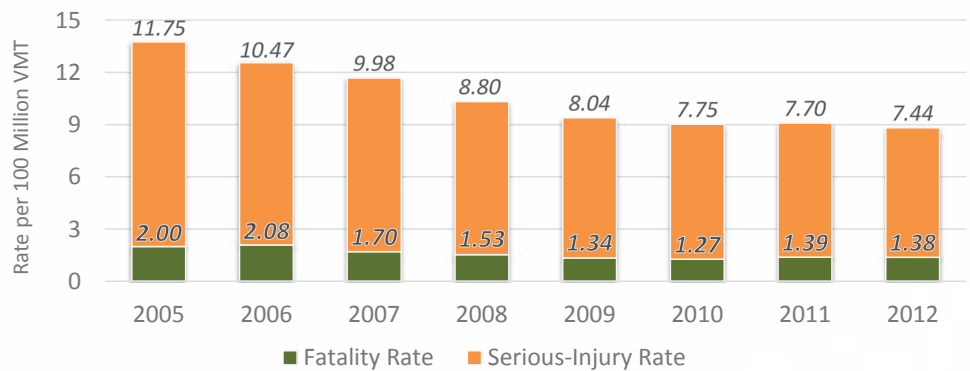
ARIZONA STRATEGIC HIGHWAY SAFETY PLAN
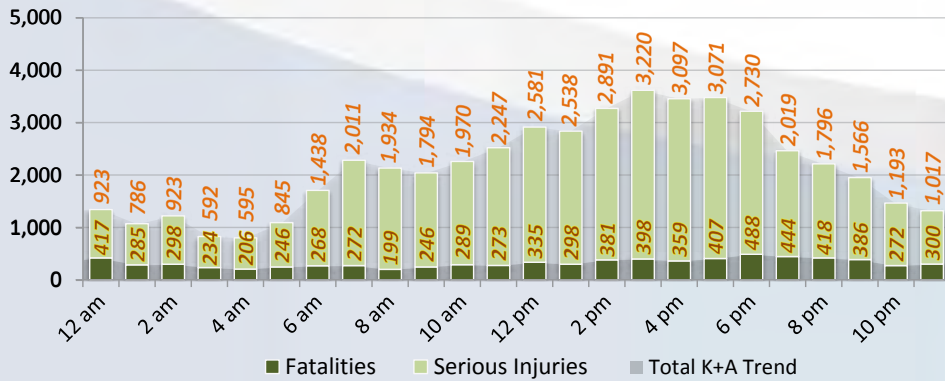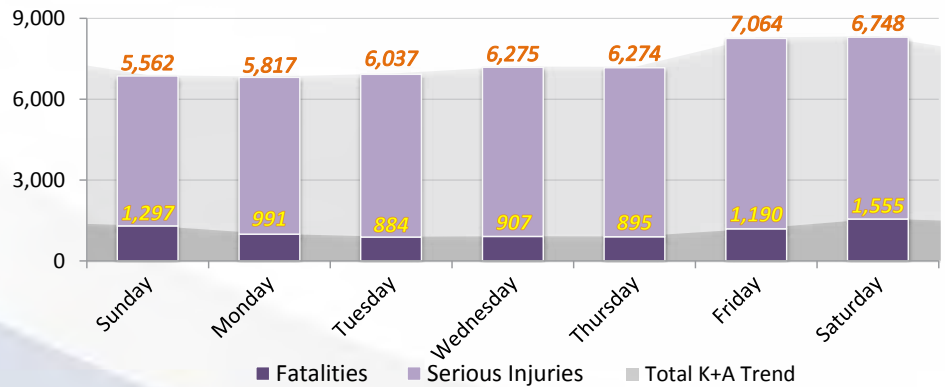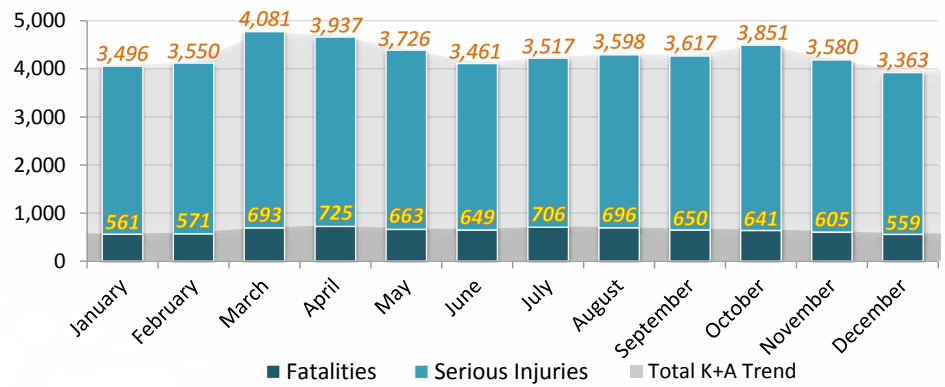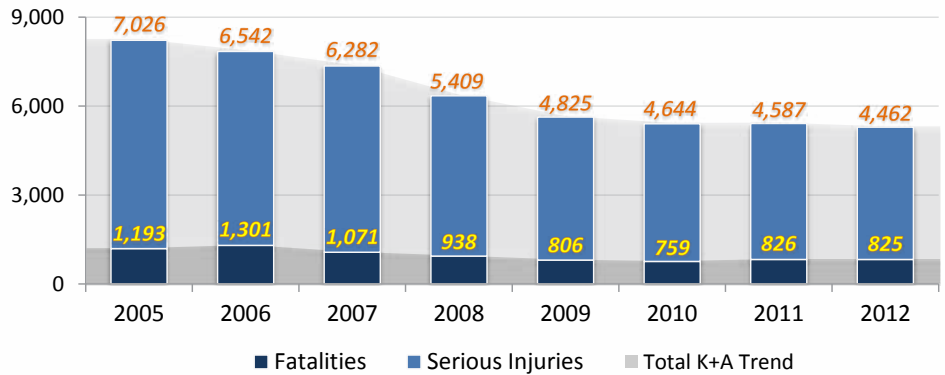
Annual rates for fatalities and serious injuries relative to vehicle miles of travel (VMT) can also be shown. Rates can be calculated to account for increased travel that can otherwise mask the benefit of safety improvements that have been made. For example, crash frequency may stay the same or go up after effective safety improvements have been implemented, due to a substantial increase in traffic. Statewide fatality and serious-injury rates are reported relative to 100 million VMT. VMT for the past eight years has been obtained from Arizona Highway Performance Monitoring System (HPMS) data. VMT estimates for 2012 are considered preliminary at the time of this report.

Emphasis Area fatality and serious-injury rates can be calculated only when VMT (or other appropriate exposure measure) is known for an Emphasis Area category. Urban and rural fatality and serious-injury rates relative to VMT for urban and rural areas are shown in the Interjurisdictional Emphasis Area section (B-67). Rates are not shown for other Emphasis Areas.

Figure b: Annual Trend in Statewide Fatality and Serious-Injury Rates

The state's fatality rate has declined by 31 percent since 2005, and serious-injury rates have declined by 36.7 percent. While the annual serious injury rate has been at least slightly lower each year, the fatality rate has recently gone up from the low of 1.27 percent in 2010 to 1.38 in 2012.

Rate per 100 Million VMT

Year	2005	2006	2007	2008	2009	2010	2011	2012
Serious-Injury Rate	11.75	10.47	9.98	8.80	8.04	7.75	7.70	7.44
Fatality Rate	2.00	2.08	1.70	1.53	1.34	1.27	1.39	1.38

■ Fatality Rate   ■ Serious-Injury Rate

Where

The density of fatal and serious-injury crashes is displayed on a state map for the eight-year period, shown on the following page. The density, or concentration, of crashes was determined by counting the number of severe crashes within a five-square-mile area (length of each side being 2.2 miles). Each small square on the maps represents an area where at least one severe crash took place, and the color of the square shown in the legend indicates the number range of how many fatal plus serious-injury crashes occurred within the area. The darkest red areas indicate the top five-percent of areas with the greatest numbers of severe crashes, from the set of all areas with at least one fatality or serious injury.

Similar crash density maps where prepared for each Emphasis Area. Visual comparison of densities, as shown on each map, helps to readily identify locations within the state where severe crashes were most prevalent for the analysis period. The numbers of crashes at a given location depend not only on risk factors associated with that location but also the exposure the location has to opportunities for crashes. Traffic volume is the most common measure of exposure, and due to this exposure, roadways with the most traffic often have the highest number crashes. High crash densities are, therefore, typically located around urban centers with the highest traffic levels. Comparisons between Emphasis Area-specific density maps, and with the statewide density map of all severe crashes, can add important insight regarding the propensity for crashes and their causes.

Crash Data Summaries

Fatal and serious-injury crashes are highest in urban centers with the highest traffic volumes and on major corridors throughout the state.
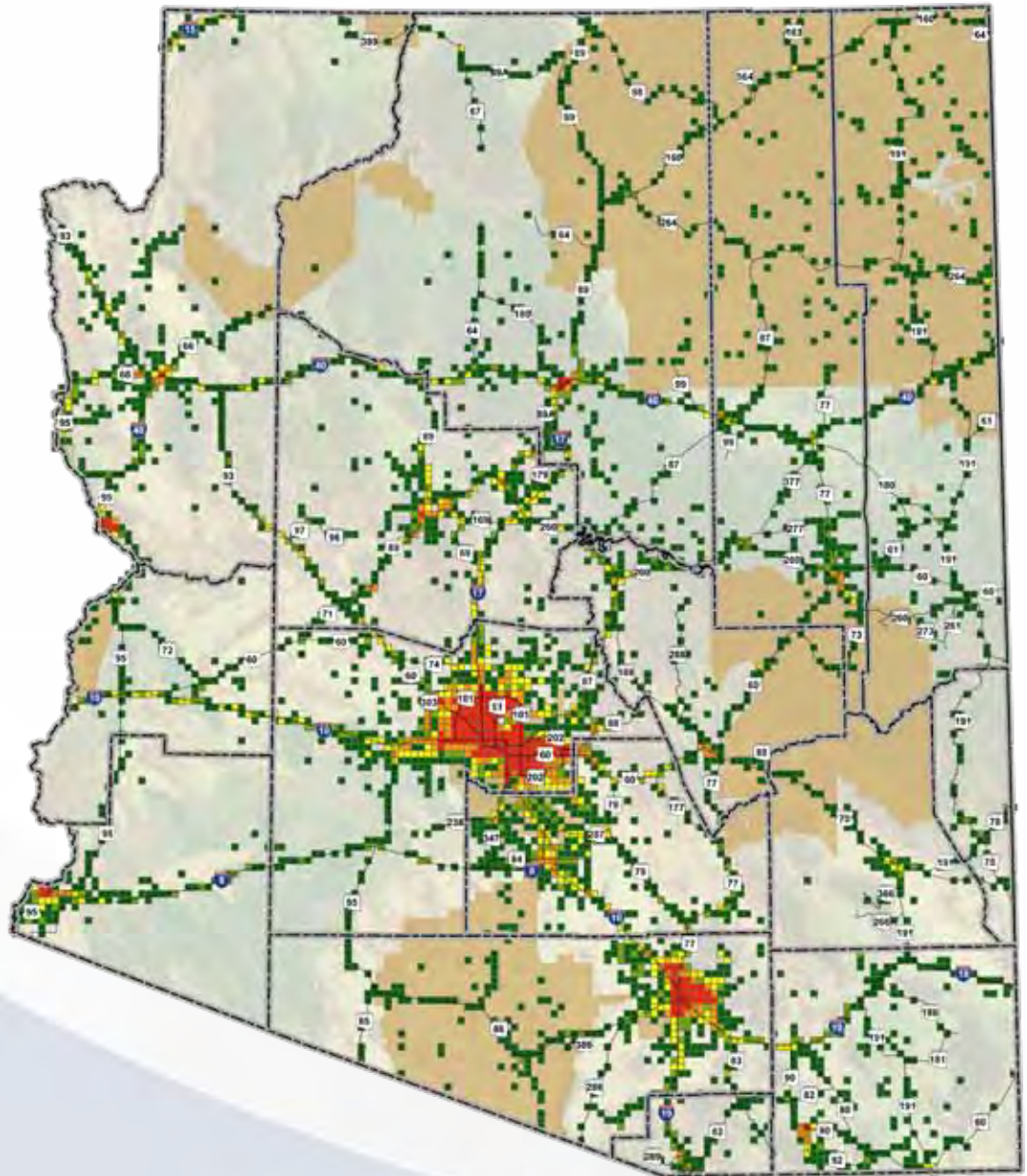
Crash Count per 5-Square-Mile

- 1 to 5 crashes
- 6 to 8 crashes
- 9 to 18 crashes
- 19 to 50 crashes
- 51 to 650 crashes

- Tribal Lands
- County Boundary
- Highway

0 5 10 20 30 40 Miles

N

Crash Data Summaries

Who

The distribution of fatalities and serious injuries for the eight-year period analyzed is shown in the chart below by the age and gender of drivers involved. Driver age categories are broken into five-year increments that help identify those who have most been involved in or contribute to these high-severity crashes.

Similar charts where prepared for individual categories of crashes of the Emphasis Areas. Note that a single fatality or serious injury may be counted in multiple columns when it involves two or more drivers in different age or gender groups. For example, a 65-year-old motorcyclist killed in a collision with a 20-year-old impaired driver would be reflected in two columns of the chart. In this sense, the Emphasis Area concern is regarding age and gender groups of drivers potentially contributing to these high-severity crashes. Exceptions to this are with unrestrained occupants, pedestrians and bicyclists, where the Emphasis Area concern is the vulnerability of road users. In these instances, the age and gender distributions represent the actual pedestrian or bicyclist victim, or the motor vehicle occupant crash victim that was not properly restrained. In these instances a fatality or serious injury could be counted in a single age and gender column only. The intent with all graphics is to inform and guide the implementation of strategies aimed at potential causes for fatalities or serious injuries.

Figure d: Total Fatalities and Serious Injuries by Driver Age and Gender

Young drivers are involved most frequently in severe motor vehicle crashes. For all age groups, male drivers are involved more often than females.
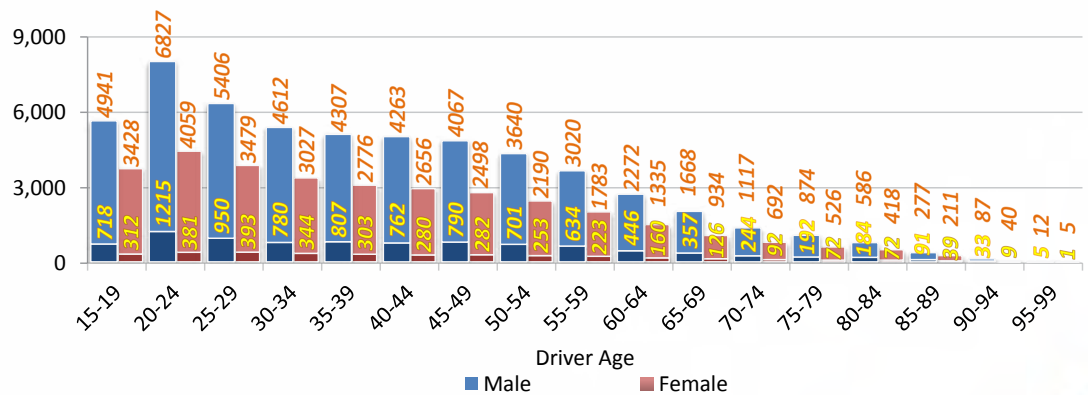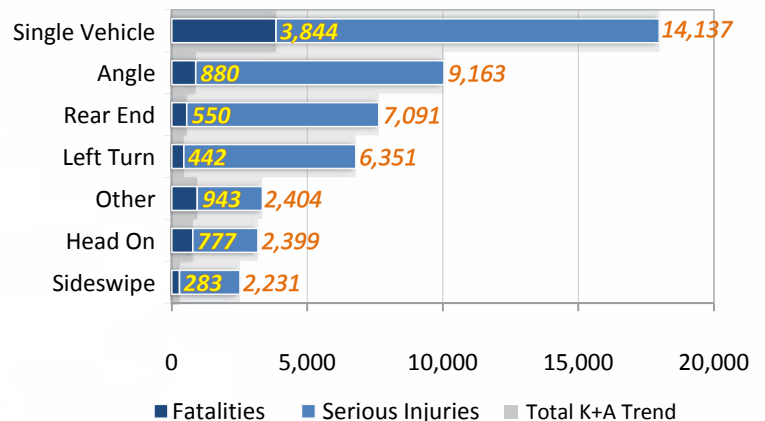
Crash Data Summaries

How

Fatalities and serious injuries are shown by vehicle crash type. Crash type totals are shown in the next figure for all crashes and in the Emphasis Area sections for individual crash categories. These charts help to reveal differences in how crashes are taking place throughout the state.

Pedestrian- and Bicycle-Involved crashes are often referred to as "Single Vehicle" or "Other," except when involving multiple motor vehicles. "Other" also includes "Backing" crashes and "Unknown" types of crashes. "Sideswipe" crashes included sideswipes for both the same and opposing directions of traffic flow.

With each of these crash-type distribution charts, the trend in all fatal and serious-injury crashes has been plotted behind the bar charts, as was done with the figures first shown on page B-6 in the section of this document titled 'When.' The background plot serves as a baseline to compare where Emphasis Area category-specific trends are significantly different from the total trends. For example, crashes attributed to distracted driving are associated with a much higher number of Rear-End-type collisions than other Emphasis Area categories, or than the average for all crashes. To allow for such a comparison within each Emphasis Area, this total fatality and serious-injury background trend has been normalized to the average for each Emphasis Area.

Figure e: Total Fatalities and Serious Injuries by Crash Type

For all crashes that occurred in the state during the 2005-2012 reporting period, fatalities and serious injuries have resulted most from Single-Vehicle crashes than from any other crash type. The next highest crash types where fatalities resulted were: Other, Angle and Head On. Additionally, Angle, Rear-End and Left-Turn crashes resulted in the highest numbers of serious injuries after the Single Vehicle category.

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Detailed Emphasis Area Descriptions

Detailed Emphasis Area descriptions, presented in the remainder of this document, contain graphics similar to those introduced in the previous Crash Data Summary to provide greater understanding of the characteristics and trends in the most severe crashes relating to specific Emphasis Areas. The descriptions also identify relevant strategies defined in the 2014 SHSP and a list of potential action steps associated with each strategy, as developed from the stakeholder input process during update of the 2014 SHSP. While specific information regarding individual action steps has not yet been determined for most strategies, the lists are intended to assist in tracking the efforts of leading/partnering agencies and the resources that will guide implementation of safety strategies. It is expected that proposed action steps will change and evolve as each Emphasis Area team works to implement and evaluate the effectiveness of strategies identified in the 2014 SHSP.

Several Emphasis Areas, containing two sufficiently different crash types, are divided into two separate subcategories and summarized on individual sections, making 16 sections in all for the 12 Emphasis Areas: The Age Related Emphasis Area has a separate section for Older Drivers and Young Drivers, the Natural Risks Emphasis Area addresses Animal-Involved and Weather-Related, Nonmotorized Users has been separated into Pedestrians and Bicyclists, and Roadway Infrastructure and Operations includes sections for Intersection / Railroad Crossings and for Lane / Roadway Departure. The remainder of this document presents textual and graphic information for the 16 areas of concern addressed by the 12 Emphasis Areas.
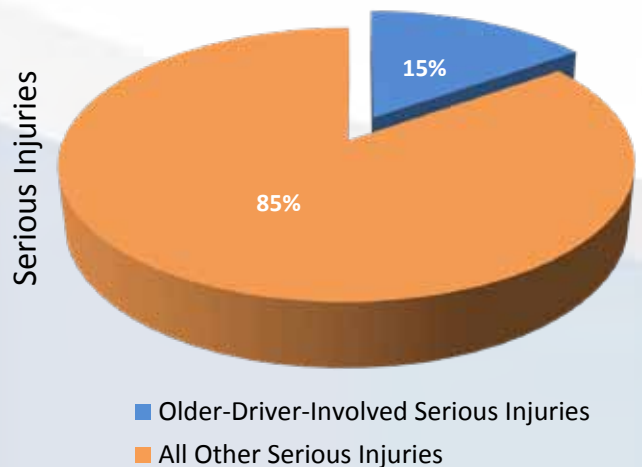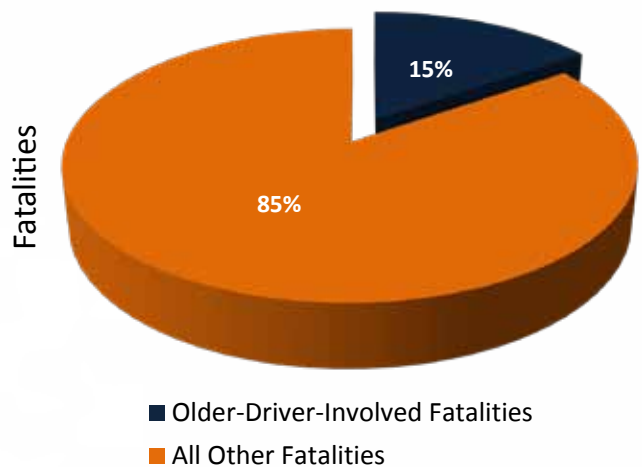
Section 1: Age Related | *Older Drivers*

Drivers 65 years old and older are the fastest-growing segment of the population in Arizona. While older-driver-involved crashes have been reduced since 2005 and 2006, the downward trend is modest when compared to the other Emphasis Areas and the trend in all safety categories together. In recent years, the trend for older-driver-involved crashes has been flat and even increasing.

What

Figure 1.1: Older-Driver-Involved Portion of All Fatalities and Serious Injuries

Older-driver-involved fatalities and serious injuries include all crashes in which a person 65 or older was involved as a driver. In Arizona 15 percent of all roadway fatalities involved a person 65 years or older. Crashes involving older passengers only have not been counted in these summaries.

All crashes presented here have been developed from fatal and serious-injury crashes occurring between January 1, 2005, and December 31, 2012, as provided in the state's Accident Location Identification Surveillance System (ALISS) database.

Fatalities

- 15%
- 85%

■ Older-Driver-Involved Fatalities
■ All Other Fatalities

Serious Injuries

- 15%
- 85%

■ Older-Driver-Involved Serious Injuries
■ All Other Serious Injuries

Where

Figure 1.2: Older-Driver-Involved Fatal and Serious-Injury Crash Density Map

Older-driver-involved severe crashes take place most often in the highest traffic locations in the major urban centers.
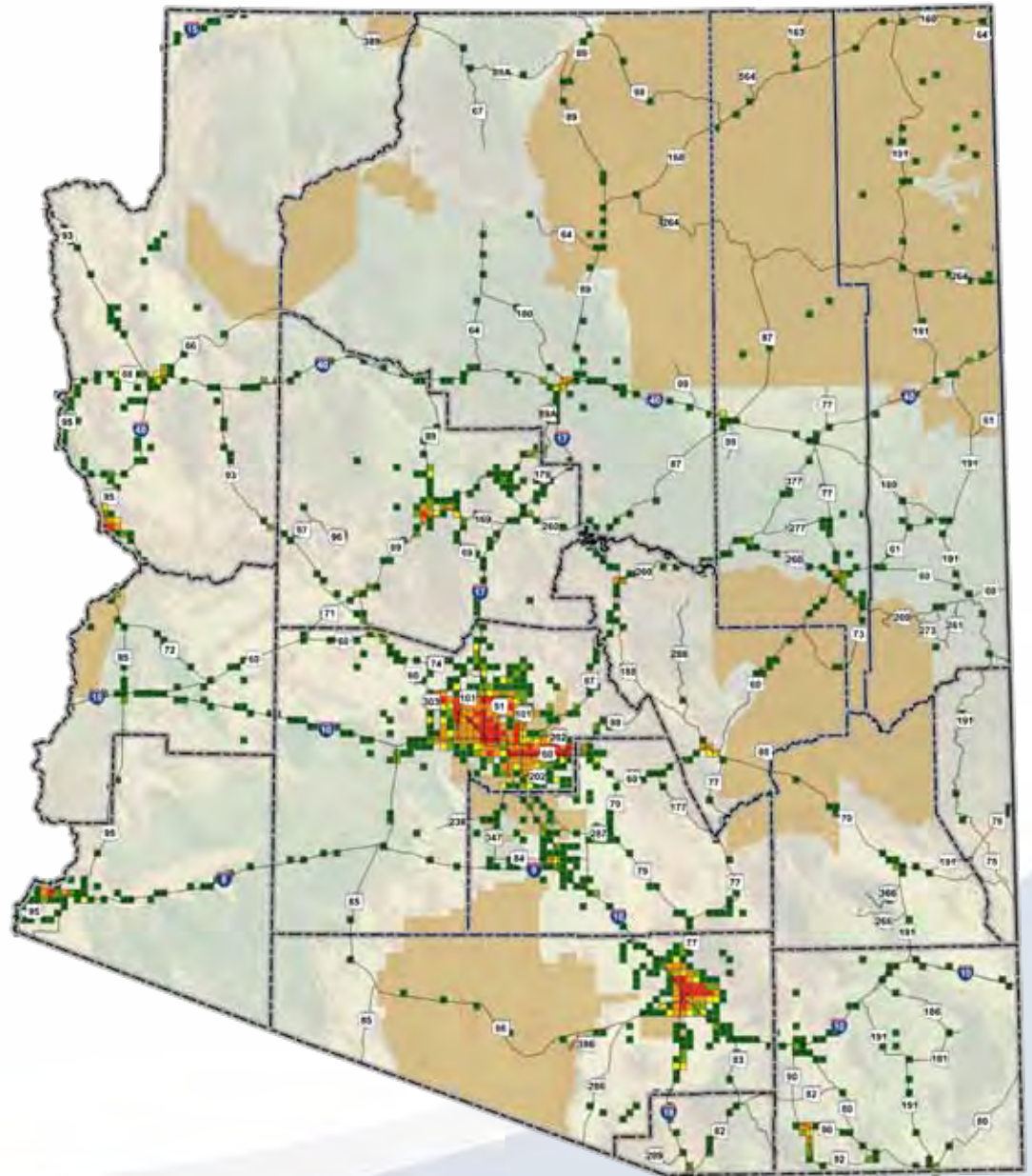
Crash Count per 5-Square-Mile

- ■ 1 to 3 crashes
- ■ 4 to 5 crashes
- ■ 6 to 8 crashes
- ■ 9 to 23 crashes
- ■ 24 to 85 crashes

- ▫ Tribal Lands
- ▫ County Boundary
- — Highway

0 5 10   20   30   40 Miles

N

Section 1: Age Related | *Older Drivers*

When

Older-driver fatalities have declined since 2005 by more than 29 percent and serious injuries have decreased by 15 percent. Fatalities and serious injuries are highest during winter months as well as on weekdays. The highest numbers of these serious crashes involving older persons occurs; the fewest take place during nighttime hours.
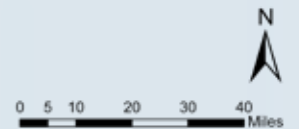
Figure 1.3: Temporal Trends in Older-Driver-Involved Fatalities and Serious Injuries

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN
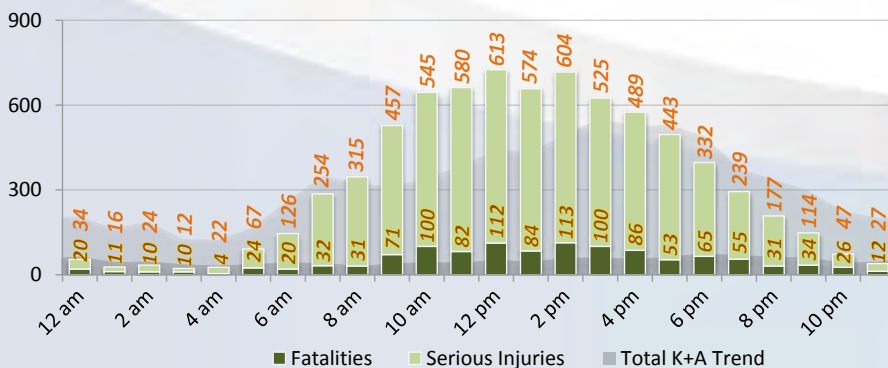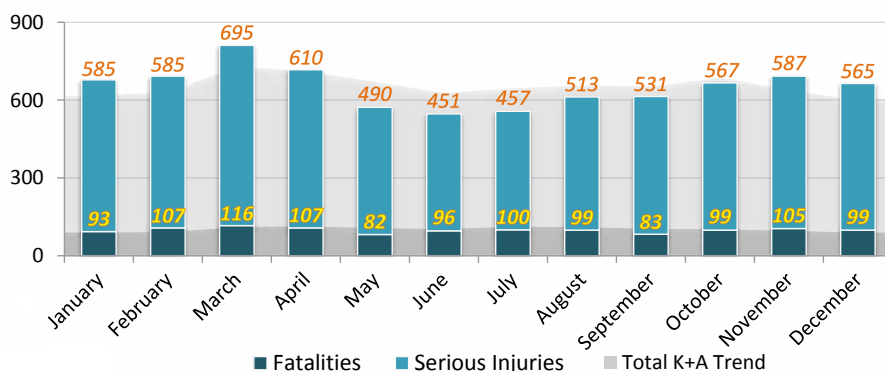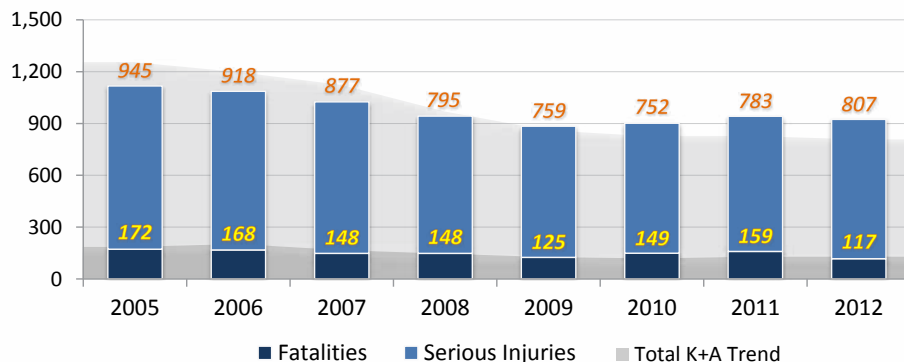
Section 1: Age Related | *Older Drivers*

Who

Figure 1.4: Older-Driver-Involved Fatalities and Serious Injuries by Driver Age and Gender
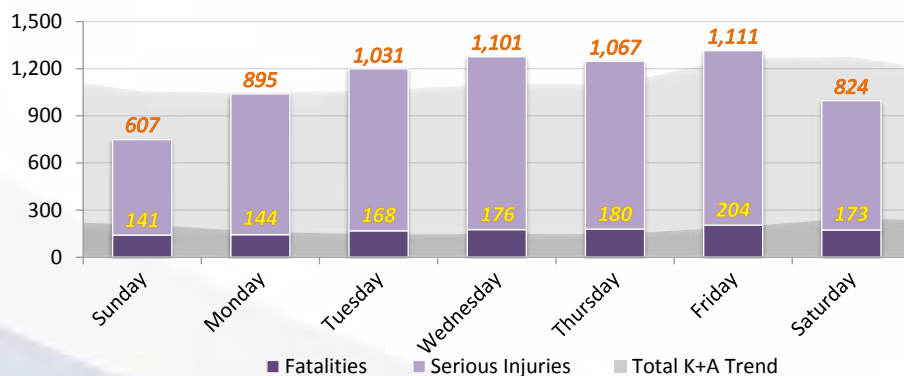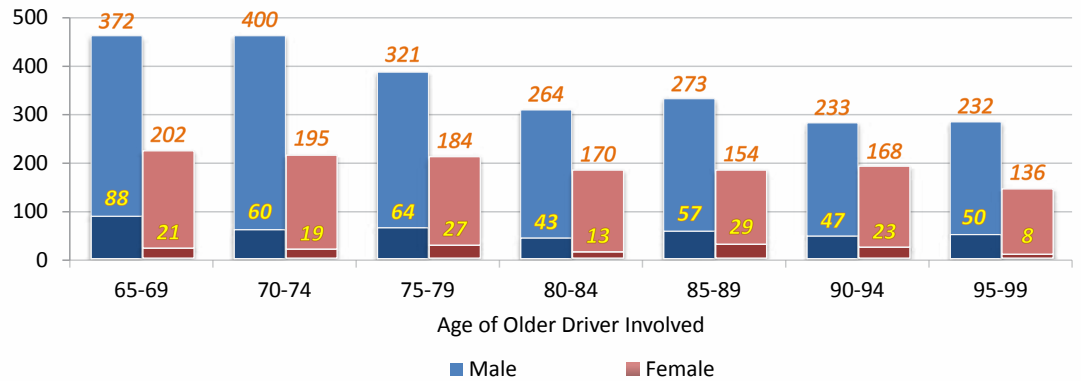
Older women are less likely than older men to be involved in fatal or serious-injury crashes This reduced likelihood probably due, in part, to differences in how much women and men drive, especially with respect to these older age groups. Further, as anticipated, as people age and drive less often, the total number of severe crashes decreases with each age group past 65.

How

Figure 1.5: Older-Driver-Involved Fatalities and Serious Injuries by Crash Type

Older drivers are less likely to be involved in single-vehicle collisions and more often involved in rear-end or intersection-angle and turning collisions.
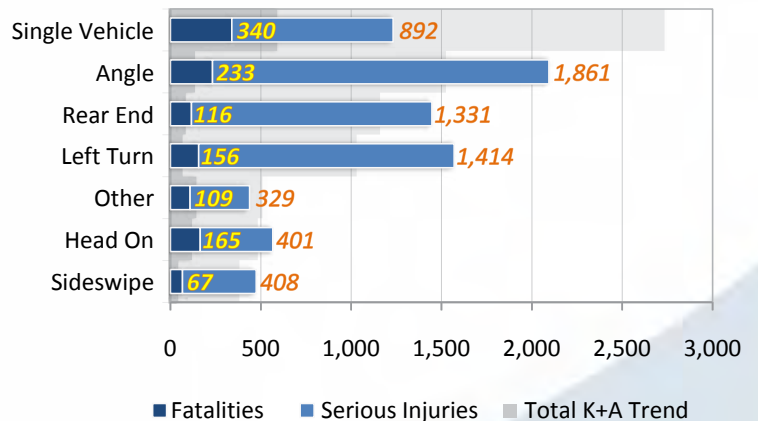
Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from older-driver-involved crashes on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 1: Age Related | *Older Drivers*

Strategies and Proposed Action Steps

A. Enhance license testing and renewal for older drivers (requires review and possible revision of ADOT policies and processes).			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
A.1 Revise license-renewal testing procedures; for example, reduce time between mandatory license renewals and conduct road/ written and physical testing more often.			
A.2 Require a mandatory road test every 10 years.			
A.3 Require periodic assessment of driving skills.			
A.4 Employ more motor vehicle division (MVD) certified driving testers for the medical drive tests.			
A.5 Utilize variable driver license restrictions (e.g., high-speed roadways, night driving and geographic boundaries).			
A.6 Reclassify older drivers as ages 75 years and older.			
A.7 Revisit policies on automatic reciprocity for out-of-state drivers.			

Section 1: Age Related | *Older Drivers*

Strategies and Proposed Action Steps

B. Require re-education of older drivers and periodic updates (requires review and possible revision of ADOT policies and processes).			
Strategy Leader:			
Supporting Key Partners:			

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1 Require a "refresher" safe-driving course for older drivers.			
B.2 In tribal communities, provide older-driver education and information in native languages at locations such as Chapter Houses, senior centers and via tribal radio stations.			
B.3 Provide education about increased risks for drivers ages 75 and older.			
B.4 Educate older drivers about newer, nonstandard traffic mechanisms such as roundabouts, single-point urban interchanges and diverging diamond interchanges.			

Section 1: Age Related | *Older Drivers*

Strategies and Proposed Action Steps

C. Strengthen reporting and referral of drivers with reduced skills by doctors, law-enforcement officers, emergency responders and others (requires review and possible revision of ADOT policies and processes).

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Encourage doctors, healthcare providers, law-enforcement officers and first responders to report older drivers who may have compromised driving ability to MVD.			
C.2 Increase training for doctors and healthcare providers about medical-assessment testing for their patients who are older drivers.			
C.3 Educate and encourage the public about the opportunity to report to MVD a family member who may be at risk due to reduced driving skills and abilities.			

D. Increase awareness about, and availability of, alternative transportation options.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Target older drivers with advertisements/information about alternate forms of transportation they would find appealing.			
D.2 Provide transportation alternatives for older drivers.			
D.3 Establish a broad-based coalition to plan for addressing older driver transportation needs.			

Section 1: Age Related | *Older Drivers*

Strategies and Proposed Action Steps

E. Make engineering and infrastructure improvements and enhancements to roadways.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Improve roadway delineation/striping, increase visibility of road signs and signal heads, and improve roadway lighting.			
E.2 Install advance signage and lane markings at intersections.			
E.3 Reduce speed limits in areas with a higher density of older drivers to accommodate longer reaction times.			
E.4 Integrate into design standards and policies the FHWA Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians.			
E.5 Design and build roads more forgiving of driver error.			

F. Promote insurance and other incentives for safe driving.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Reduce automobile insurance rates for safe drivers of any age.			
F.2 Encourage discounts on auto insurance for successful completion of voluntary defensive-driving class(es).			

Section 1: Age Related | *Older Drivers*

Strategies and Proposed Action Steps

G. Improve or enhance technology and vehicle engineering.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
G.1 Encourage use of in-vehicle lane-departure warning systems.			
G.2 Promote autonomous vehicle technology.			
G.3 Promote/install electronic safety devices in the vehicles of older drivers.			

H. Make use of other potential data sources to improve data collection on older drivers.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
H.1 Use insurance-provided in-vehicle monitoring devices to gather data and increase awareness about older drivers.			

I. Strengthen laws to protect older drivers.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
I.1 Develop stronger laws to protect older drivers and improve safety.			

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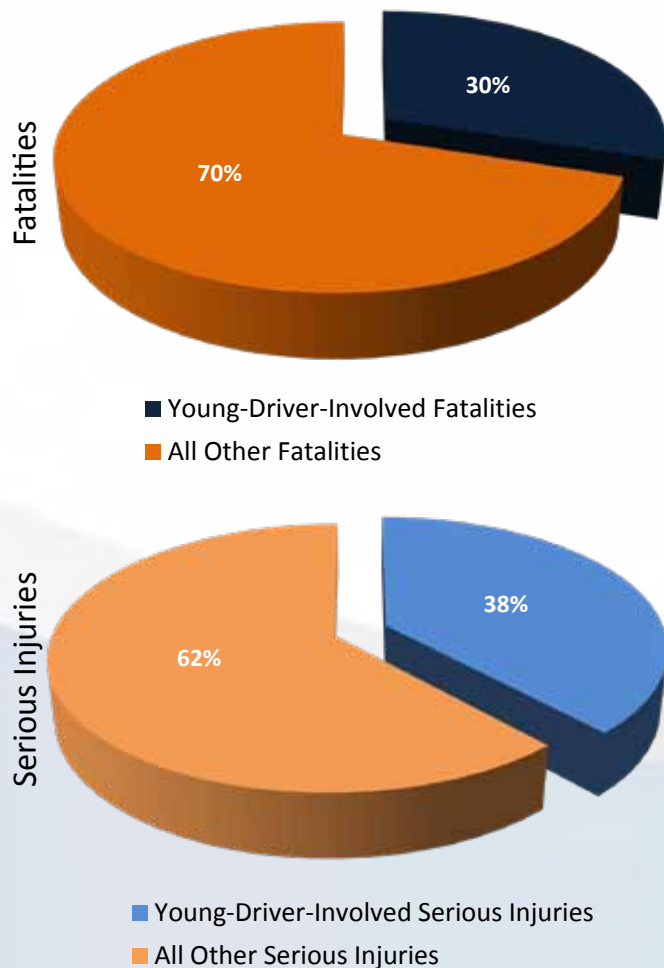
Section 2: Age Related | *Young Drivers*

In Arizona, young drivers are involved in more than a third of all severe fatality or serious-injury crashes, which is more than any other age group. Motor vehicle crashes remain the leading cause of death for ages five through 24 years. Young drivers have less driving experience, may be less likely to identify and react appropriately to hazardous conditions and are disproportionately involved in risky driving behaviors that directly result in more crashes. Young-driver-involved fatalities and serious injuries have declined since 2005, more than any other age group, yet this Emphasis Area category remains one of the most important areas where transportation safety can continue to be improved statewide.

What

Figure 2.1: Young Driver Involved Portion of All Fatalities and Serious Injuries

Young-driver-involved fatalities and serious injuries are counted as all fatalities or serious injuries where a driver under the age of 25 was involved. Often it is a passenger or other motorist who sustains the greatest injury. These victims make up 30 percent of all fatalities and 38 percent of all serious injuries during the reporting period, 2005-2012.

Fatalities

- 30%
- 70%

■ Young-Driver-Involved Fatalities
■ All Other Fatalities

Serious Injuries

- 38%
- 62%

■ Young-Driver-Involved Serious Injuries
■ All Other Serious Injuries

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Where

Young-driver-involved fatal and serious-injury crashes take place most often in locations in major urban centers with the highest traffic volumes.

Figure 2.2: Young-Driver-Involved Fatal and Serious-Injury Crash Density Map
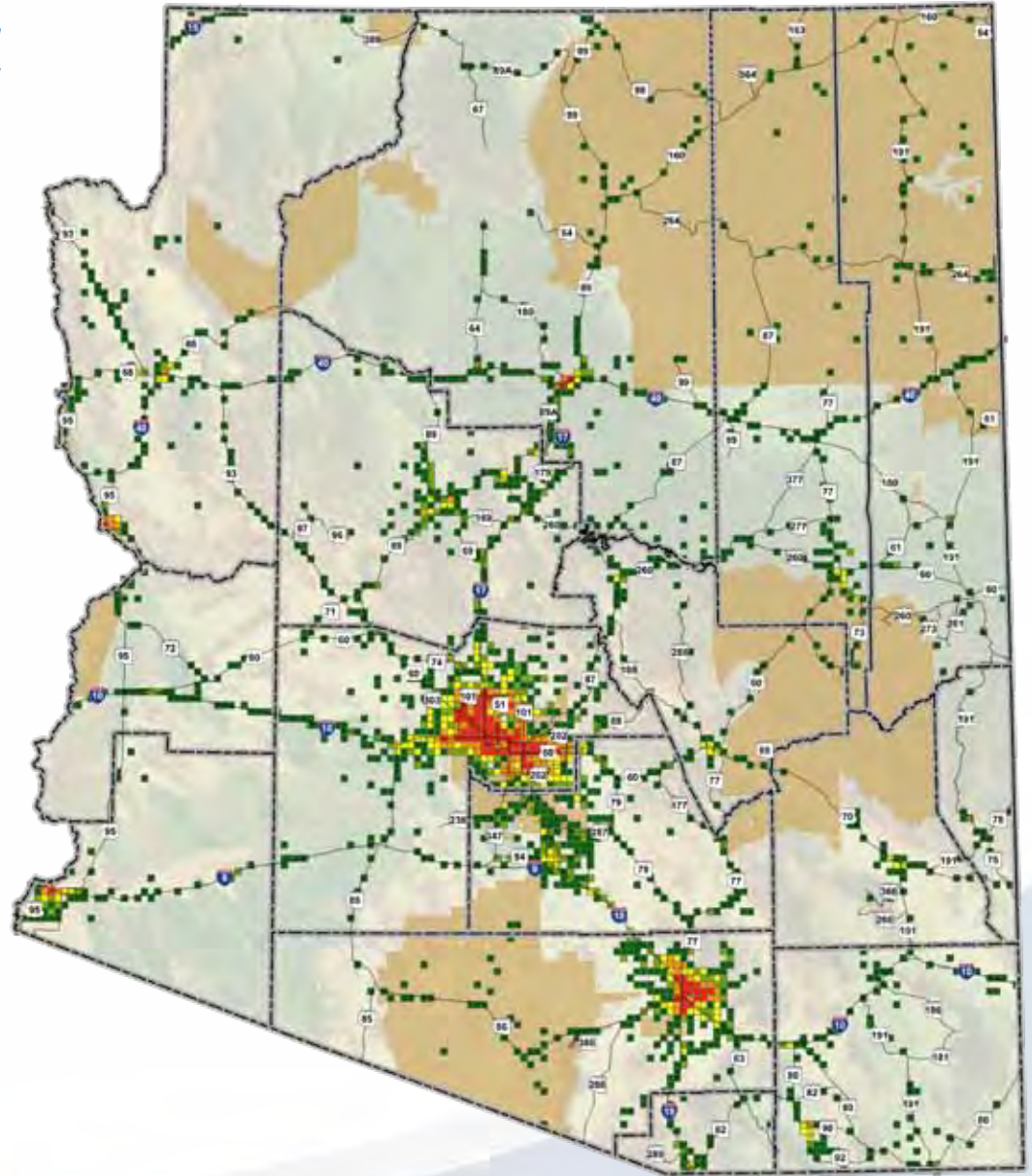
Crash Count per 5-Square-Mile Area
- 1 to 3 crashes
- 4 to 6 crashes
- 7 to 17 crashes
- 18 to 38 crashes
- 39 to 213 crashes

- Tribal Lands
- County Boundary
- Highway

0 5 10 20 30 40 Miles
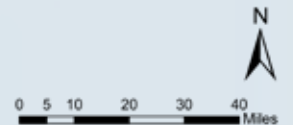
Section 2: Age Related | *Young Drivers*

When

Figure 2.3: Temporal Trends in Young-Driver-Involved Fatalities and Serious Injuries

Young-driver-involved fatalities and serious injuries have declined significantly since 2005, more than with any other age group. Fatal crashes involving young drivers are highest during weekends. The time-of-day trend illustrates that severe young-driver-involved crashes occur during nighttime hours more often than crashes not involving young drivers.

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN
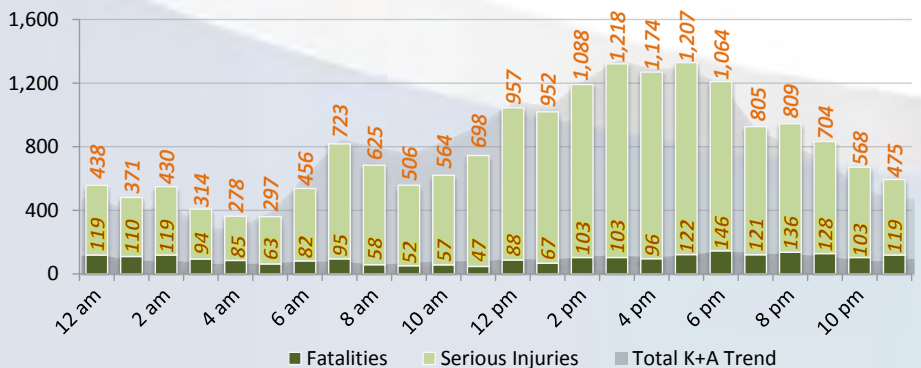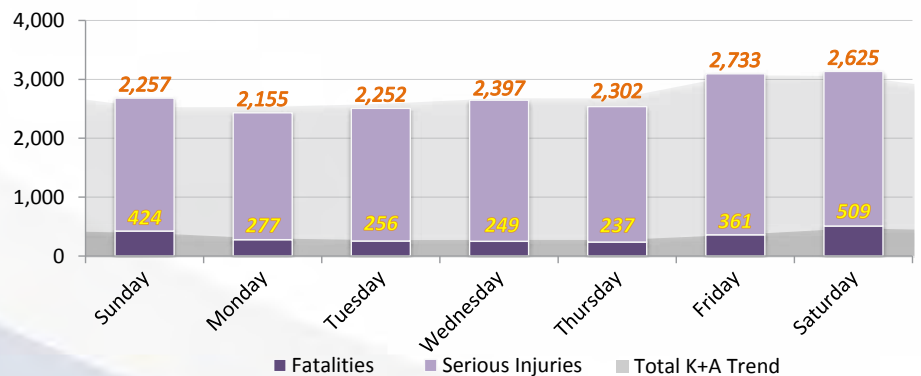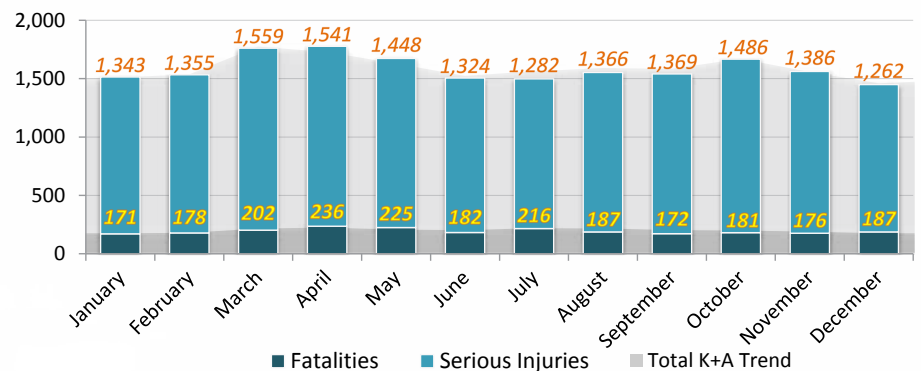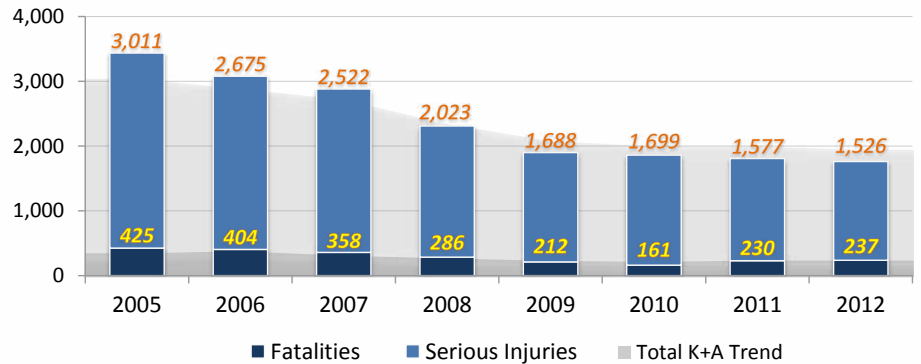
Section 2: Age Related | *Young Drivers*

Who

Figure 2.4: Young-Driver-Involved Fatalities and Serious Injuries by Driver Age and Gender
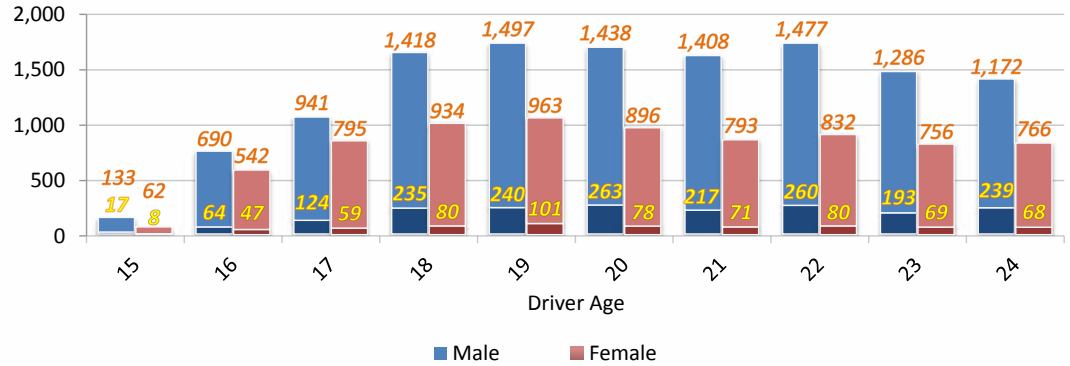
Drivers younger than 25 are involved in a greater number of severe crashes than any other age group for nearly all crash categories. More than twice the number of fatal crashes involved male young drivers than female young drivers. Fatality and serious injury totals for the eight-year period are highest for young drivers 19 years of age.

How

Figure 2.5: Young-Driver-Involved Fatalities and Serious Injuries by Crash Type
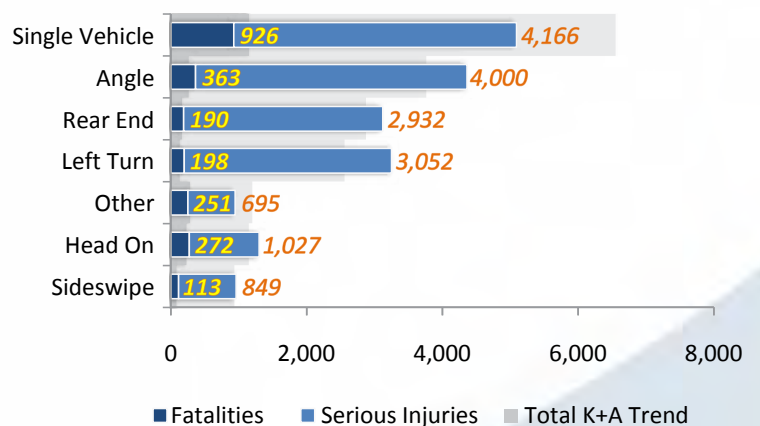
Young drivers have been involved in a lower-than-average portion of serious single-vehicle crashes. They have been involved in a higher-than-average portion of serious angle and turning collisions at intersections.

Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from young-driver-involved crashes on all public roadways in Arizona.

Performance Measure Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 2: Age Related | *Young Drivers*

Strategies and Proposed Action Steps

A. Strengthen driver education.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
A.1 Require driver's education.			
A.2 Set higher and more consistent driver-education standards.			
A.3 Return driver's education to public and private schools.			
A.4 Teach driving decision-making skills.			
A.5 Include "how to use the road" in driver education.			
A.6 Expand required education for bicycles, motorcycles, pedestrians.			
A.7 Provide driver-education and safety-restraint-usage workshops or materials on college campuses.			

Section 2: Age Related | *Young Drivers*

Strategies and Proposed Action Steps

B. Strengthen provisions and policies for graduated driver license (GDL).			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
B.1 For a learner's permit, set 16 as the minimum age to begin driving and require a minimum of six months of driving practice with 100+ hours of supervised practice driving. For an intermediate license, impose stricter restrictions on nighttime driving and passengers, an incident-free period of driving, and seat-belt-usage for all GDL drivers and all passengers.			
B.2 Prohibit use of cell phones and mobile devices by younger drivers while driving.			
B.3 Require a GDL for any new driver up to age 25.			
B.4 Limit the number of passengers in the vehicle for teen drivers.			

Section 2: Age Related | *Young Drivers*

Strategies and Proposed Action Steps

C. Strengthen driver license testing (written and road tests).			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
C.1 For MVD, Provide additional motorcycle operator practice test questions online with emphasis on consequences of both good and bad/risky driving habits.			
C.2 For MVD, Require younger drivers to review a brief but compelling distracted-driving video as part of the driver license application process.			
C.3 Provide more comprehensive driver testing to include driving skills (through MVD, high school education programs).			
C.4 Reduce drivers' information loss over time by increased driver testing.			
C.5 Provide online testing for continuous learning.			
C.6 Require teens who fail their driving test to wait a minimum of 30 days before retaking the test.			
C.7 Require mandatory retesting renewal for ALL drivers.			

Strategies and Proposed Action Steps

D. Enhance outreach campaigns to young drivers and their families about safe driving behavior and programs.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
D.1 Provide safe-driving information statewide through social media and peer-led marketing efforts.			
D.2 Maximize peer-to-peer awareness (middle and high schools, college); utilize college students to reach teens.			
D.3 Host mock crashes for high school students to capture their attention and maximize "shock factor."			
D.4 Launch a statewide traffic safety outreach campaign involving a broad list of stakeholders on all safety issues.			
D.5 Incorporate a parent-education component into driver's education to strengthen driver education and safety-restraint-usage outreach.			
D.6 Provide teens with access to alternative modes of transportation.			

Section 2: Age Related | *Young Drivers*

Strategies and Proposed Action Steps

E. Strengthen enforcement of GDL restrictions and compliance with GDL terms and conditions.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Fund speed-enforcement details.			
E.2 Investigate the primary seat-belt-usage requirement for younger drivers.			
E.3 Enforce GDL violations consistently.			
E.4 Set up law-enforcement checkpoints during peak seasons/events (prom, graduation, etc.).			
E.5 Require young drivers subject to GDL to be identified via vehicle decal.			
E.6 Publicize and enforce zero-tolerance laws for underage drinking and driving.			
E.7. Require younger drivers to disclose medications that impair reflexes or driving.			

F. Promote stronger parental/guardian education and engagement in the licensure process for young drivers.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Require parent/guardian education on the GDL law and the importance of the parent's role in ensuring teen safety.			
F.2 Require a parent/guardian component of mandatory driver education.			

Strategies and Proposed Action Steps

G. Promote technology monitoring young-driver behavior.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
G.1 Promote the use of in-vehicle monitoring technology to reward or penalize young drivers for safe or unsafe driving behavior.			

H. Improve data collection, integration, analysis and sharing at all levels.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
H.1 Improve data sharing about young drivers between safety stakeholders.			

I. Make engineering and infrastructure improvements and enhancements to roadways.

Strategy Leader:

Supporting Key Partners:

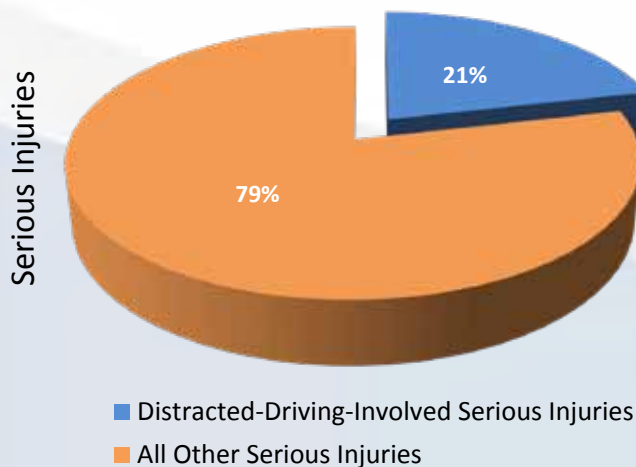| Action Steps	Leader(s) and Partners	Potential Resources	Status
I.1 Design and build roads that are more forgiving of driver error.			
I.2 Research connected vehicle technology.			
I.3 Create or enforce development regulations that would require traffic investments and address parking at all schools.			

Section 3: Distracted Driving

Distracted driving is a serious issue that is gaining attention statewide and across the nation. Historic crash data indicates distracted-driving fatalities and serious injuries have significantly declined since 2005, but remain a huge safety concern as drivers continue to engage in activities that take their attention from the road.

Arizona is updating the statewide crash report form to collect more information on how distractions contribute to crashes. This additional data is likely to reveal important trends for future years that are not currently apparent in the data for years prior to 2014, before this most recent revision to the crash report form.

What

Figure 3.1: Distracted-Driver-Involved Portion of All Fatalities and Serious Injuries

Distracted driving involves any activity whereby or in which the driver's eyes, hands or attention are diverted from the task of driving. Distracted-driver-involved fatalities and serious injuries are counted from crashes where vehicle drivers have been identified by the responding officer on the crash report to have been inattentive or distracted. Distracted-driving violations and crashes are underreported due to the difficulty of attributing crashes to distractions. As the information has been collected in the past, victims of these crashes make up 15 percent of total fatalities and 21 percent of total serious injuries.

Fatalities

- 15%
- 85%

■ Distracted-Driving-Involved Fatalities
■ All Other Fatalities

Serious Injuries

- 21%
- 79%

■ Distracted-Driving-Involved Serious Injuries
■ All Other Serious Injuries

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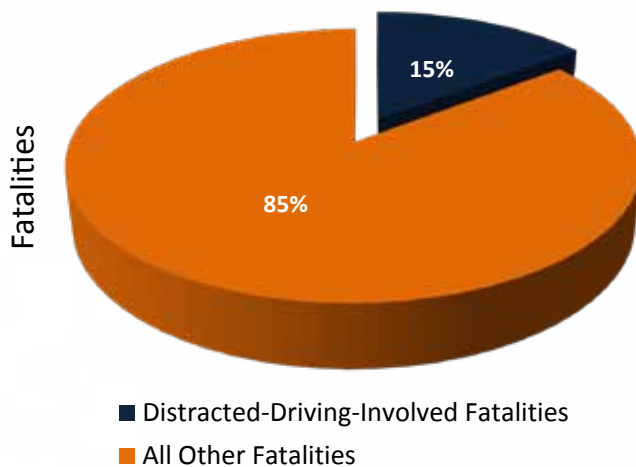
Where

Figure 3.2: Distracted-Driver-Involved Fatal and Serious-Injury Crash Density Map

Distracted-driver-involved serious crashes have taken place most often in the highest traffic locations in major urban centers.
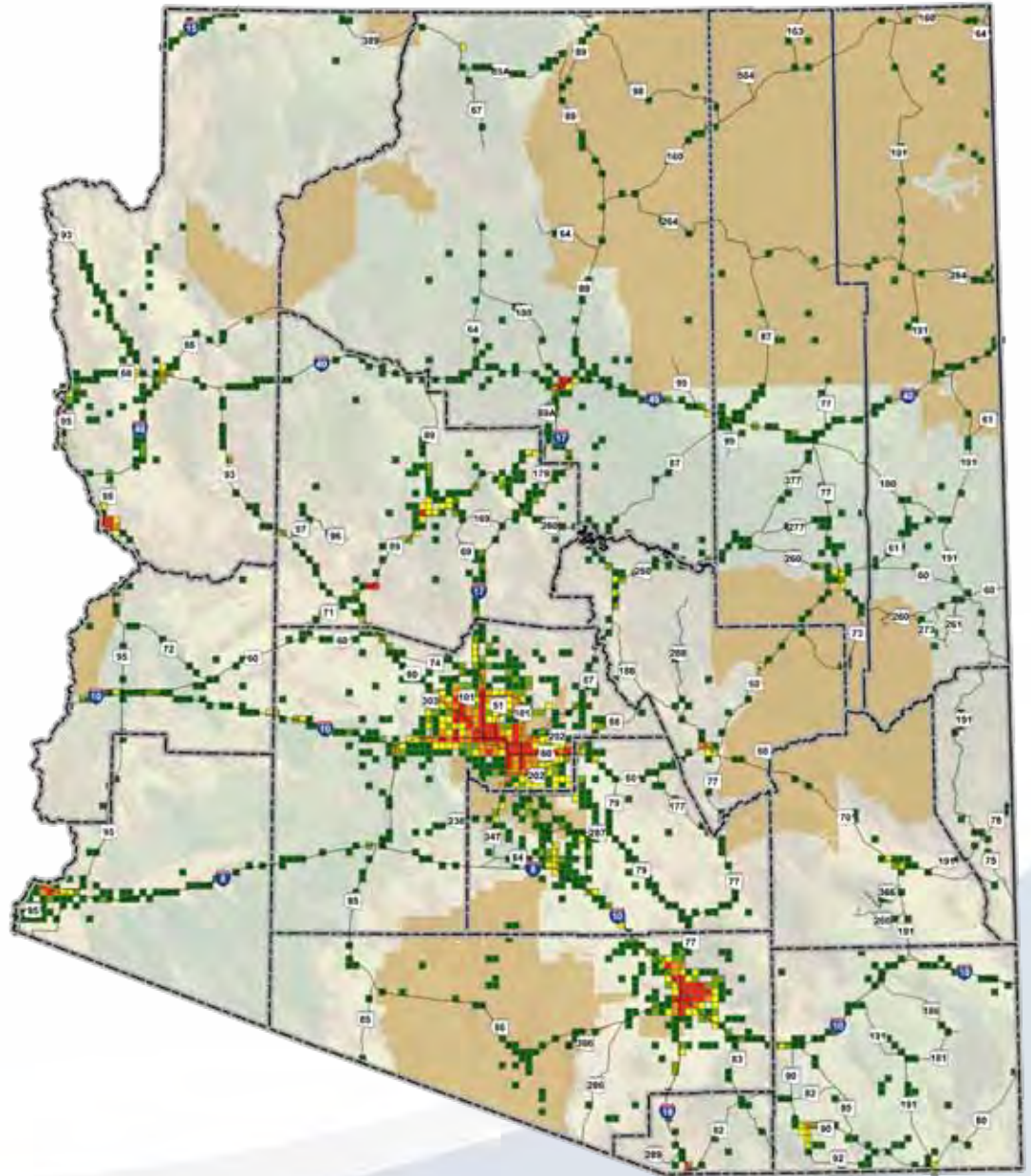
Crash Count per 5-Square-Mile Area

- 1 to 3 crashes
- 4 to 5 crashes
- 6 to 11 crashes
- 12 to 19 crashes
- 20 to 83 crashes

- Tribal Lands
- County Boundary
- Highway

N

0 5 10 20 30 40 Miles

Section 3: Distracted Driving

When

Figure 3.3: Temporal Trends in Distracted-Driver-Involved Fatalities and Serious Injuries

Fatalities attributed to distracted driving have declined by 67 percent since 2005, while serious injuries declined by 56 percent during the same time period. Monthly and weekly trends are similar to averages for all categories of serious crashes. Time-of-day trends show a lower-than-average occurrence of these serious crashes at night.

Figure 3.3: Temporal Trends in Distracted-Driver-Involved Fatalities and Serious Injuries
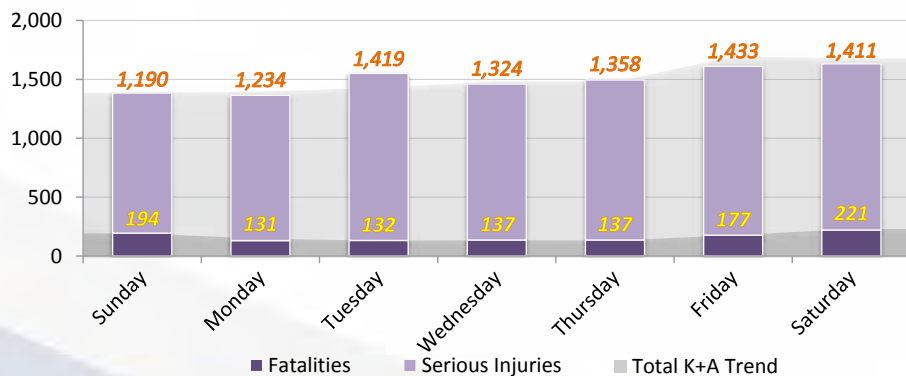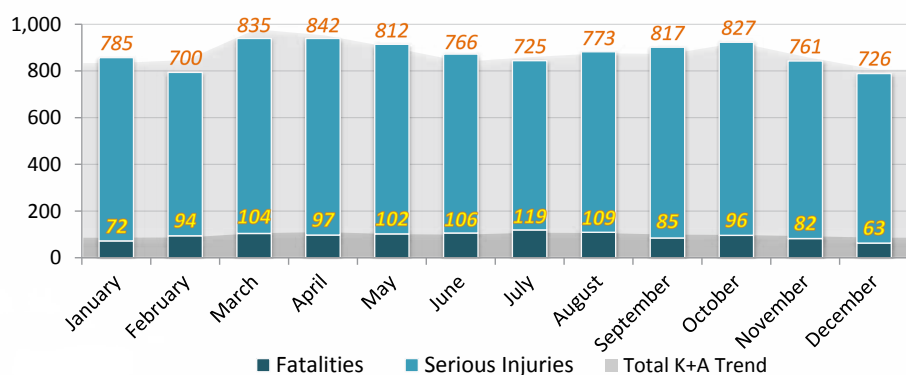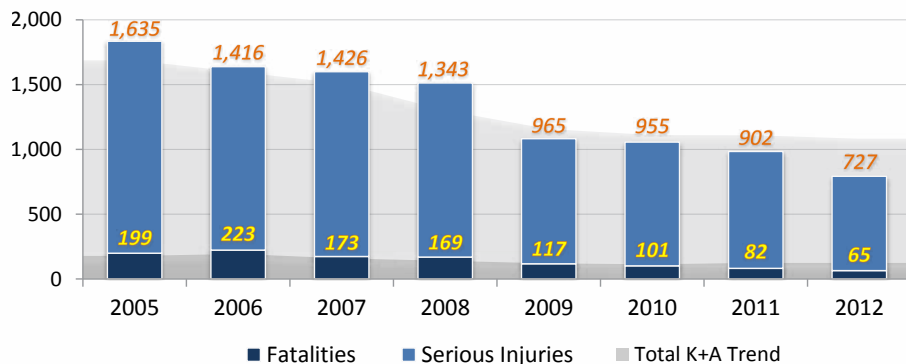
Section 3: Distracted Driving

Who

Figure 3.4: Distracted-Driver-Involved Fatalities and Serious Injuries by Driver Age and Gender

Distracted driving is a concern for both genders and for all age groups. As with other categories of serious crashes, males are involved in distracted-driving crashes far more often than females.
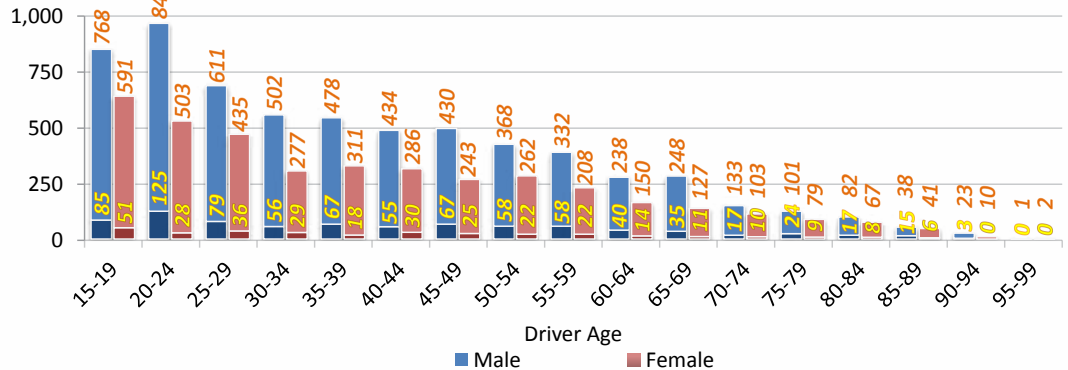
How

Figure 3.5: Distracted-Driver-Involved Fatalities and Serious Injuries by Crash Type

Distracted-driving fatalities and serious injuries occur mostly as single vehicle, run-off-the-road crashes. Not surprisingly, rear-end collisions are the crash type where distracted driving is most above the average for all categories.
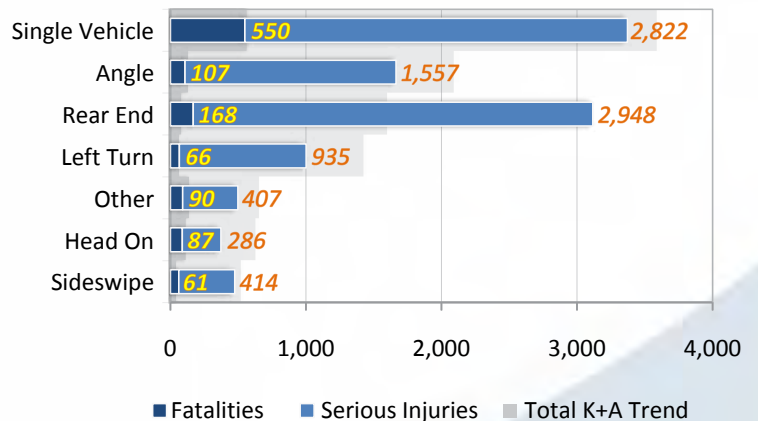
Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from distracted-driver-involved crashes on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 3: Distracted Driving

Strategies and Proposed Action Steps

A. Increase enforcement of existing laws to reduce distracted-driver-involved crashes.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
A.1 Explore local ordinances to ban using cell phones and texting while driving.			
A.2 Use data to identify "hot spots" / problem areas, and implement high-visibility enforcement campaigns.			
A.3 Increase fines and enforcement for citable distracted-driving offences, such as ARS 28-701.A.			

Section 3: Distracted Driving

Strategies and Proposed Action Steps

B. Conduct aggressive public information campaigns to discourage all forms of distracted driving.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
B.1 Report total fatalities and distracted-driver-related fatalities year-to-date on dynamic message signs and through other messages delivery means.			
B.2 Update the driver licensing and renewal process to include an educational component focused on reducing distracted driving.			
B.3 Use transit as a delivery mechanism to educate transit users regarding dangers of distracted driving.			
B.4 Prepare and provide meaningful education programs in public schools.			
B.5 Implement community-education programs through the school districts.			
B.6 Implement public information campaigns based on risk assessment, and reinforce the message that driving is a privilege, not a right.			
B.7 Educate the healthcare industry on its role regarding the effects of prescription drugs and over-the-counter medications on drowsy driving.			
B.8 Educate mass-transit employees on the risks of distracted and drowsy driving, and use transit as a delivery mechanism to educate transit users.			
B.9 Educate and engage parents to set the example, and teach children about the dangers of distracted driving.			

Section 3: Distracted Driving

Strategies and Proposed Action Steps

C. Encourage using technology to eliminate using cell phones, other mobile devices and texting while driving.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Implement technology to disable cell phones and mobile devices while driving.			
C.2 Utilize gaming / driving simulation technology to teach drivers about the dangers of distractions while driving.			

D. Improve data collection and reporting for distracted-driving crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Explore the opportunity to refine the crash report to better identify and report distracted driving.			
D.2 Explore opportunities and obstacles to associating cell phone records to a crash report for all injury crashes.			

Section 3: Distracted Driving

Strategies and Proposed Action Steps

E. Research and identify effective policies to discourage all forms of distracted driving that can be implemented by state, local and tribal governments.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Explore effective policies to discourage all forms of distracted driving to reduce the number and severity of distracted-driver-involved crashes.			
E.2 Promote insurance industry initiatives to reward drivers for voluntary participation in safe-driving education or use of safety-improving, in-vehicle technologies.			

F. Improve infrastructure and roadways to reduce the number and severity of crashes resulting from distracted driving.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Install centerline and shoulder rumble strips on rural highways.			
F.2 Study the possible connection of roadside advertisements and other distractions to crashes at high-risk locations.			

Section 4: Heavy Vehicles / Buses / Transit

Crashes involving commercial trucks, buses or other heavy vehicles can be very severe and result in several fatalities or serious injuries, often to the occupants of other vehicles involved. National studies have shown that in more than two-thirds of these crashes, drivers of other passenger vehicles were cited for contributing to these crashes. Further improvements to safety and education surrounding the operation of heavy vehicles in traffic will be important in improving safety on Arizona roads.

What

Figure 4.1: Heavy-Vehicle-Involved Portion of All Fatalities and Serious Injuries

Heavy-vehicle fatalities and serious injuries are counted from all crashes involving a vehicle that is either over 10,000 pounds in weight, contains nine or more seats, or carries hazardous material. These vehicles are involved in 13 percent of all traffic fatalities and nine percent of serious injuries.

Fatalities

13%

87%

■ Heavy-Vehicle-Involved Fatalities
■ All Other Fatalities

Serious Injuries

9%

91%
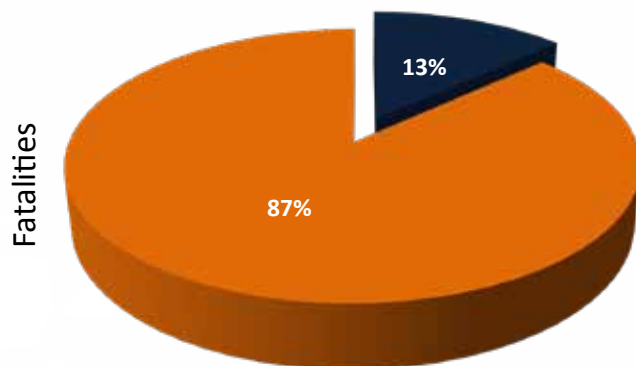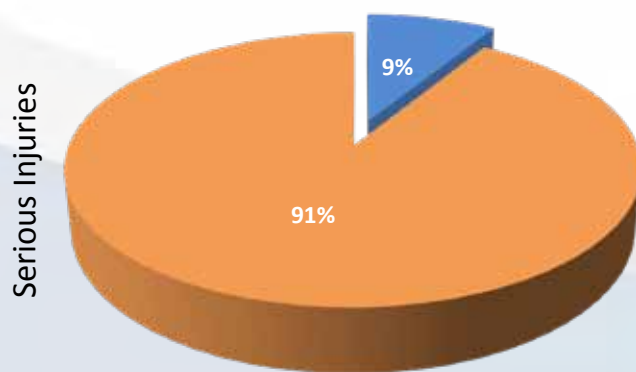
■ Heavy-Vehicle-Involved Serious Injuries
■ All Other Serious Injuries

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Where

Figure 4.2: Heavy-Vehicle-Involved Fatal and Serious-Injury Crash Density Map

Heavy-vehicle involved fatalities and serious injuries have occurred most often in urban areas with the highest traffic volumes. More often than average, these most severe crashes have taken place on freeways and state highways where travel speeds are higher and more likely to result in severe injury.
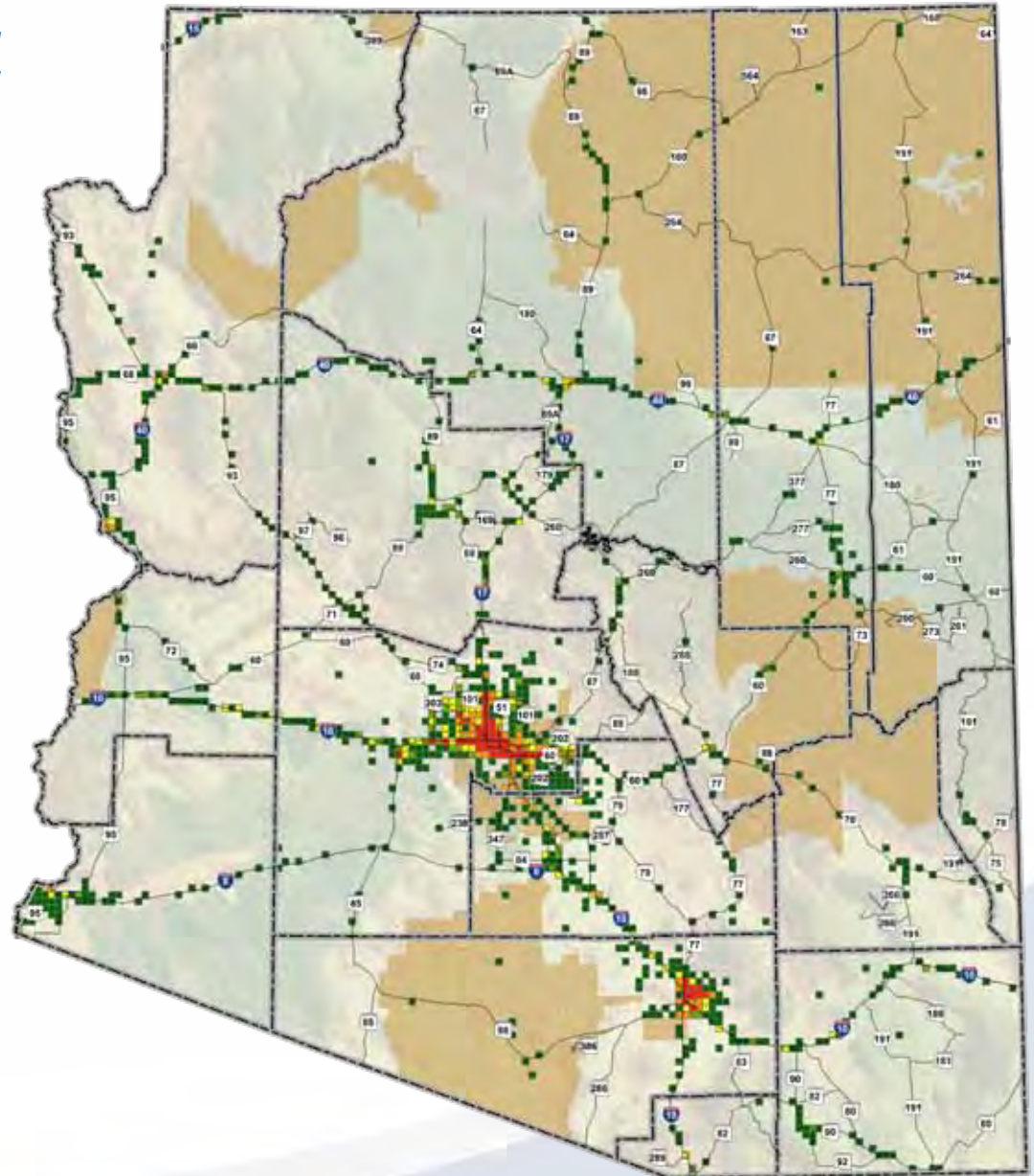
Crash Count per 5-Square-Mile Area

- 1 to 3 crashes
- 4 crashes
- 5 to 7 crashes
- 8 to 12 crashes
- 13 to 58 crashes

Tribal Lands
County Boundary
Highway
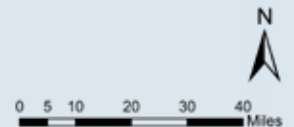
0 5 10   20   30   40 Miles

N

Section 4: Heavy Vehicles / Buses / Transit

When

Severe heavy-vehicle crashes have been reduced and then increased again, and for the most recent year, they were at nearly the same numbers as in 2005. These crashes are less likely than average to occur on weekends or late in the day when activities involving these vehicles are lower.

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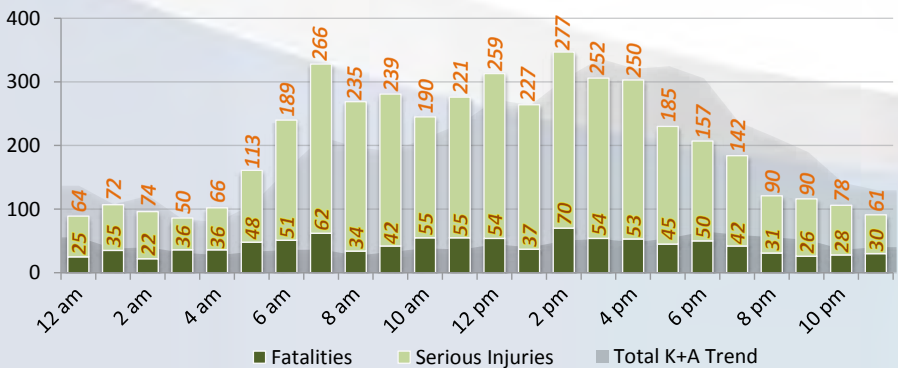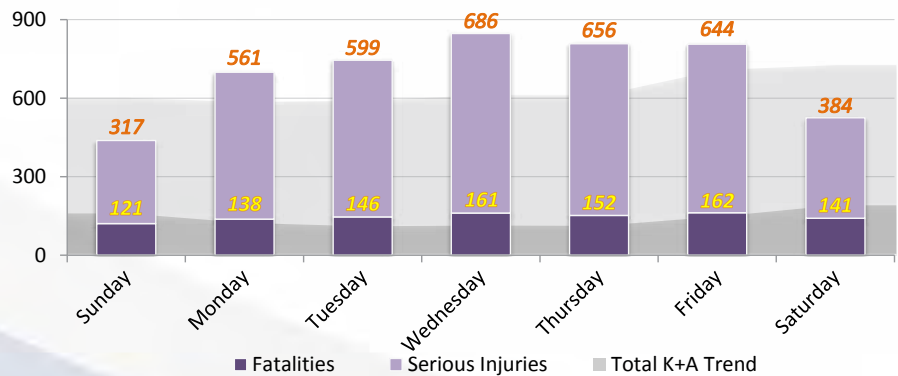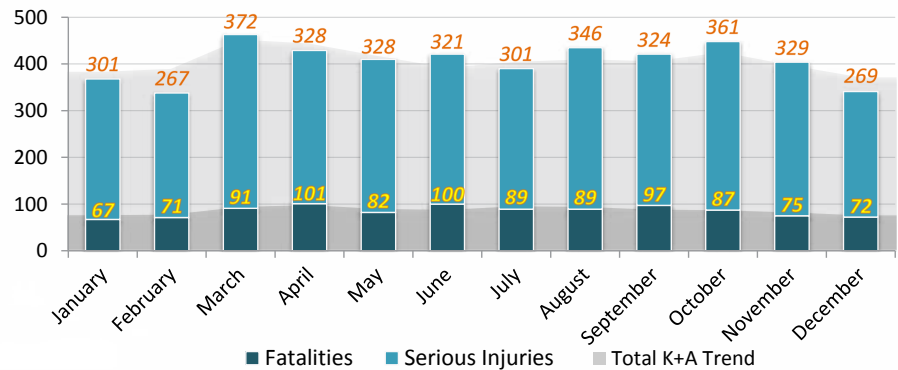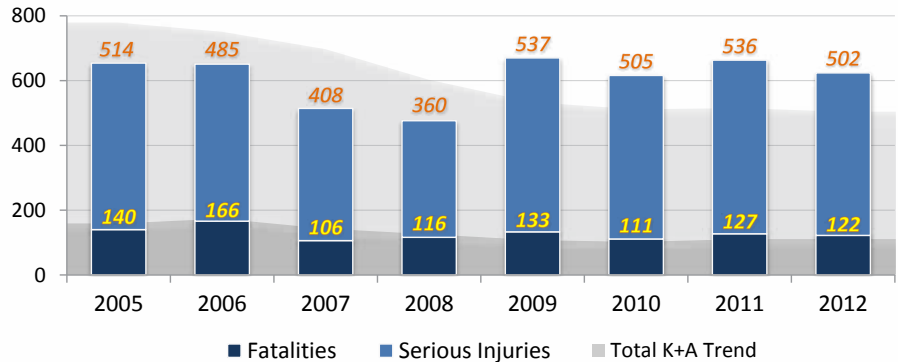
Who

Figure 4.4: Heavy-Vehicle-Involved Fatalities and Serious Injuries by Driver Age and Gender
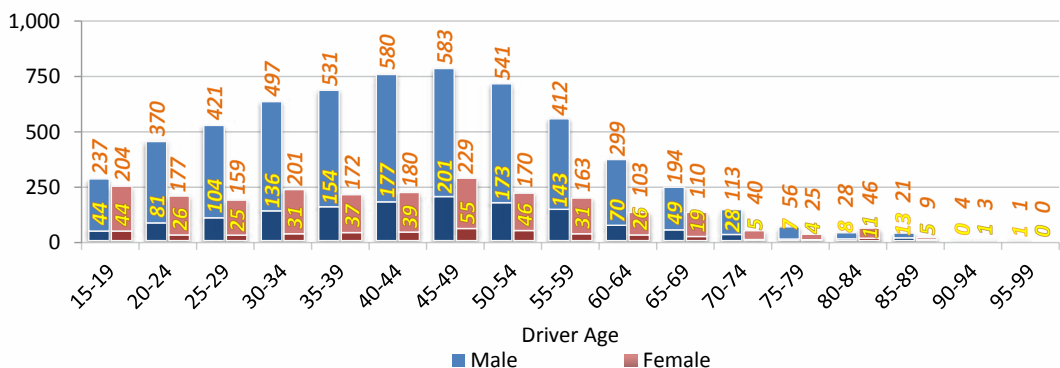
Drivers of heavy vehicles are less often to be younger or female. Consequently, fatalities and serious injuries involving heavy vehicles have most often involved male, middle-aged drivers. The highest numbers of heavy-vehicle fatalities and serious injuries have been with drivers aged 45 to 49.

How

Figure 4.5: Heavy-Vehicle-Involved Fatalities and Serious Injuries by Crash Type
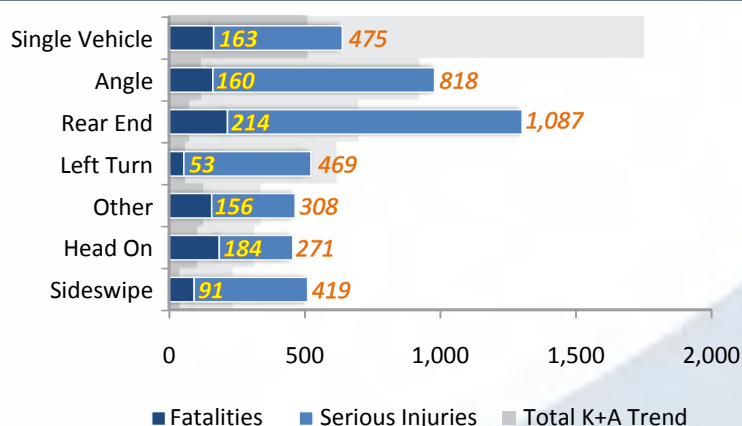
Heavy-vehicle-involved fatalities and serious injuries have most often been the result of multiple-vehicle rear-end collisions.

Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from crashes involving heavy vehicles on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 4: Heavy Vehicles / Buses / Transit

Strategies and Proposed Action Steps

A. Identify and improve infrastructure and operational characteristics on Arizona's roadways.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
A.1 Utilize electronic billboards for public service announcements and real-time dynamic message signs (DMS) to provide safety measures on state highways.			
A.2 Construct climbing lanes on steep grades.			
A.3 Construct designated truck lanes, zones and routes, and allow for separation between higher-speed cars and large trucks.			
A.4 Establish highway incident preplanned detour routes, such as designated corridors, signage and altering systems when major routes are blocked by heavy-vehicle crashes.			
A.5 Identify and enhance roadway segments with high frequency and severity of heavy vehicle related crashes, such as with additional signage.			
A.6 Install interactive truck rollover signage.			
A.7 Increase implementation of low-cost improvements and regulations to handle truck traffic and reduce passenger vehicle/ truck conflicts, such as "truck only" lanes.			
A.8 Modify speed limits and increase enforcement to reduce truck speeds and the speed of other vehicles.			
A.9 Establish "safety corridors" with increased fines for violations.			
A.10 Implement differential speed limits for heavy vehicles.			

Section 4: Heavy Vehicles / Buses / Transit

Strategies and Proposed Action Steps

B. Use engineering to reduce fatigue-related heavy-vehicle crashes on Arizona's roadways.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1 Create additional parking spaces by increasing efficient of use of existing parking spaces.			
B.2 Create additional parking spaces by adding parking areas.			
B.3 Incorporate rumble strips onto new and existing roadways.			
B.4 Increase opened rest areas in Arizona to reduce fatigue-related crashes.			

C. Improve enforcement-related efforts for heavy vehicles.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Establish "safety corridors" with increased fines for violations.			
C.2 Consider cross deputation (counties, tribal lands and DPS).			
C.3 Increase enforcement on state and tribal routes to increase safety for heavy vehicles.			
C.4 Use mock patrol cars to slow traffic.			
C.5 Provide coordination for law-enforcement agencies for commercial vehicle enforcement technical services, tow trucks, pupil transportation safety/enforcement and safe handling of toxic waste.			
C.6 Support electronic logbook technology to minimize fatigued driving by increasing compliance with driving limits.			
C.7 Provide training with trucking industry to strengthen employer-based enforcement of safe driving, including fatigued and inattentive driver technology.			
C.8 Encourage trucking industry to monitor heavy-vehicle speeding and hard braking.			

Section 4: Heavy Vehicles / Buses / Transit

Strategies and Proposed Action Steps

D. Strengthen commercial driver license program to enhance the testing process and the skill sets of heavy-vehicle operators on Arizona's roadways.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Offer advanced training for testing of commercial and noncommercial drivers.			
D.2 Enhance driver training for commercial driver license.			
D.3 Improve commercial driver license test administration.			
D.4 Increase fraud detection by state and third-party testers.			
D.5 Work with Arizona Truck Association on specific driver training for reacting to dust storm.			

E. Increase knowledge about "sharing the road" with heavy vehicles for all roadway users.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Incorporate Share the Road and other safety information into driver materials, including driver and defensive-driving class curriculums and testing.			
E.2 Provide print and electronic media packages with Share the Road information.			

Section 4: Heavy Vehicles / Buses / Transit

Strategies and Proposed Action Steps

F. Improve and enhance truck-safety data.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Increase the timeliness, accuracy and completeness of truck safety data.			

G. Increase development and execution of educational programs and information sharing to all roadway users regarding heavy vehicles.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
G.1 Increase awareness about driving in different weather conditions.			
G.2 Implement a 511 information system to transmit radio information to drivers.			
G.3 Develop and launch educational campaigns for experienced and new drivers.			

Section 4: Heavy Vehicles / Buses / Transit

Strategies and Proposed Action Steps

H. Improve maintenance of heavy vehicles to reduce the frequency of heavy-vehicle crashes caused by equipment failure.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
H.1 Increase and strengthen truck maintenance programs and inspection performance.			
H.2 Conduct post-crash inspections to identify major problems and inspection performance.			

I. Promote industry safety initiatives.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
I.1 Perform safety consultations with carrier safety management.			
I.2 Promote development and deployment of truck safety technologies.			

J. Utilize connected vehicle technology in commercial vehicles.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
J.1 Participate in the USDOT connected vehicle program.			

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Section 5: Impaired Driving

Impaired-driving crashes are more likely to be very severe and represent a far larger proportion of fatalities than that of less-severe crashes. While alcohol remains the largest contributor to impaired-driving crashes that result in fatalities or serious injuries, the trend in alcohol-related crashes is steadily declining; however, fatal and serious-injury crashes involving a driver impaired by drugs and medication are increasing.

What

Figure 5.1: Impaired-Driver-Involved Portion of All Fatalities and Serious Injuries

Impaired-driving fatalities and serious injuries include all fatalities and serious injuries in which a driver was under the influence of alcohol, drugs or medication, or was ill, fatigued or physically impaired. These impaired-driving crashes are more likely to be very serious and represent a far larger portion of fatalities than the portion of less-severe crashes. In Arizona, an impaired driver was involved in 34 percent of all crash fatalities and 20 percent of crash serious-injuries.

Fatalities

34%
66%

■ Impaired-Driver-Involved Fatalities
■ All Other Fatalities

Serious Injuries

20%
80%

■ Impaired-Driver-Involved Serious Injuries
■ All Other Serious Injuries

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN
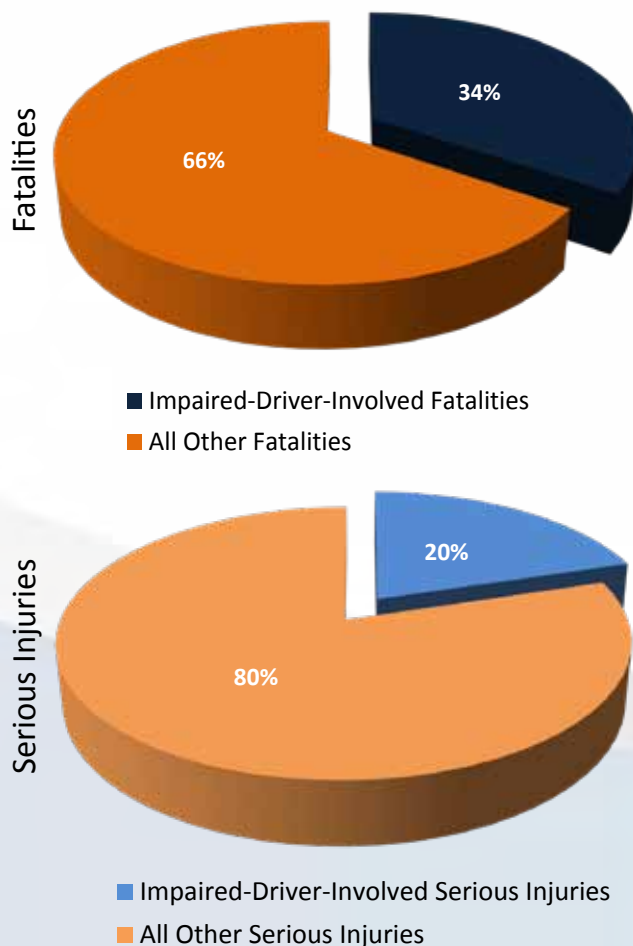
Where

Figure 5.2: Impaired-Driver-Involved Fatal and Serious-Injury Crash Density Map

Impaired-driver-involved severe crashes have taken place at a statewide level most often in the highest traffic locations in the major urban centers.
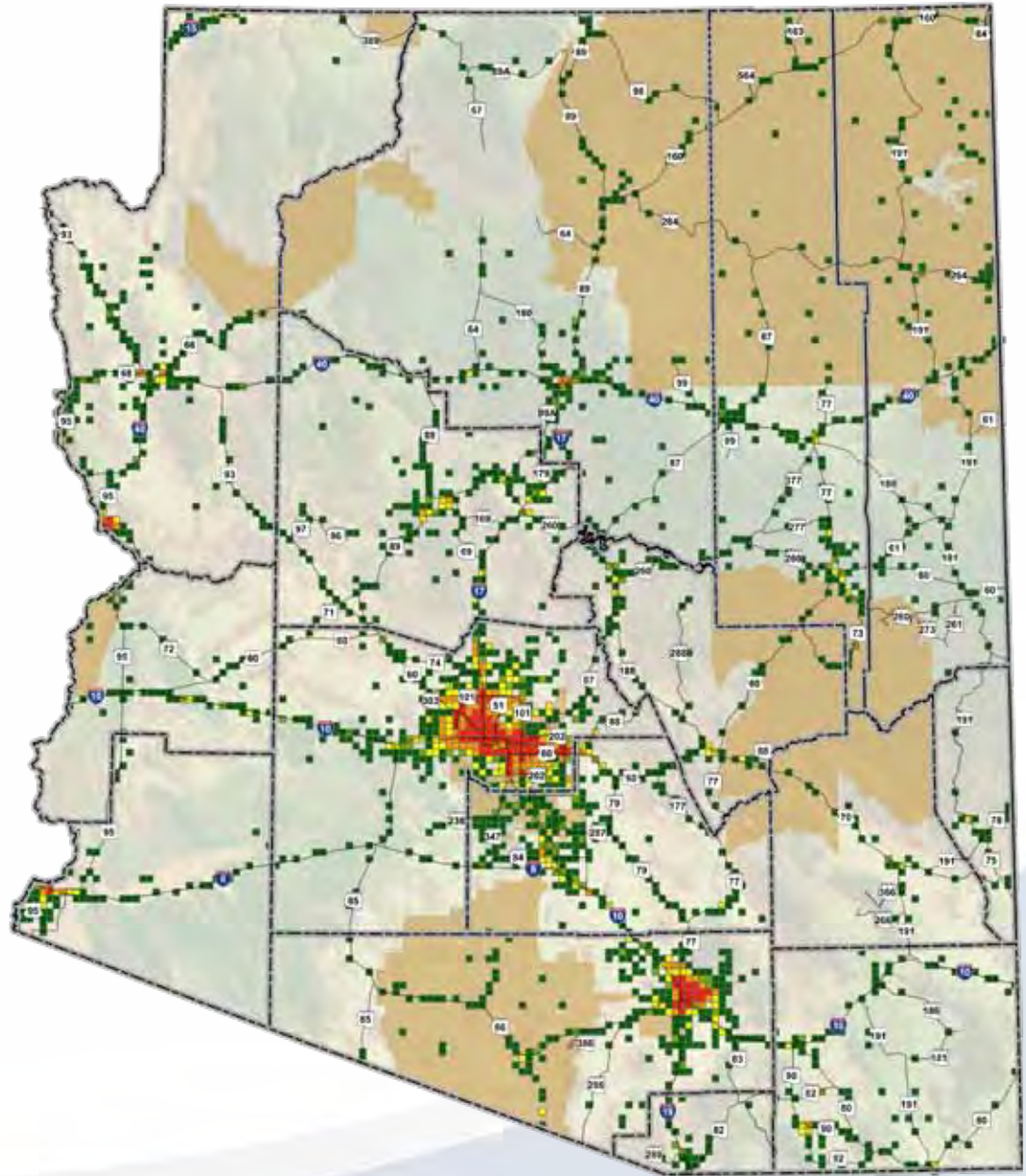
Crash Count per 5-Square-Mile Area

- ■ 1 to 3 crashes
- ■ 4 crashes
- ■ 5 to 8 crashes
- ■ 9 to 18 crashes
- ■ 19 to 121 crashes

▨ Tribal Lands
▢ County Boundary
— Highway

N

0 5 10 20 30 40 Miles
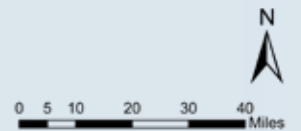
Section 5: Impaired Driving

When

Figure 5.3: Temporal Trends in Impaired-Driver-Involved Fatalities and Serious Injuries

Impaired-driver-involved fatalities and serious injuries decreased from 2005 through, but less than with most other categories of crashes. These impaired-driving crashes occur far more often on weekends and at night.

Figure 5.3: Temporal Trends in Impaired-Driver-Involved Fatalities and Serious Injuries

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN
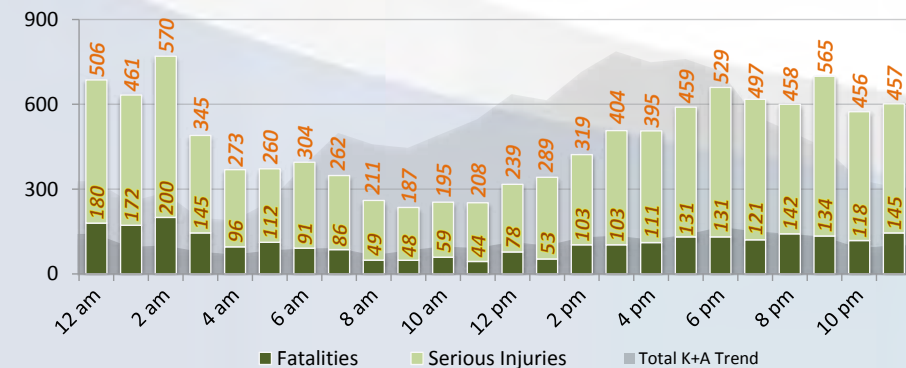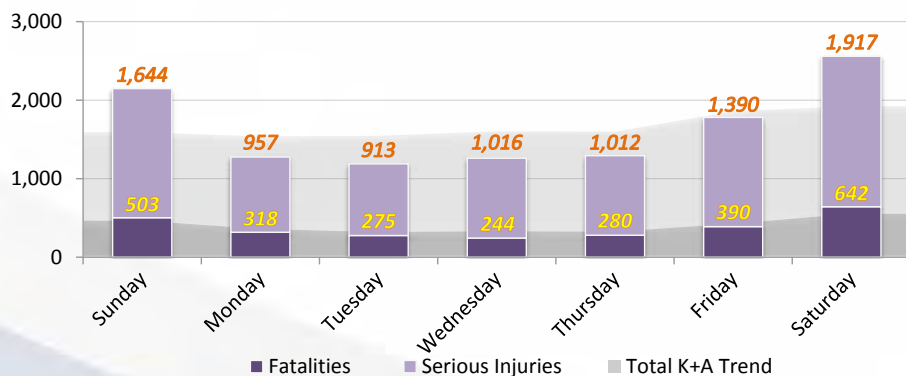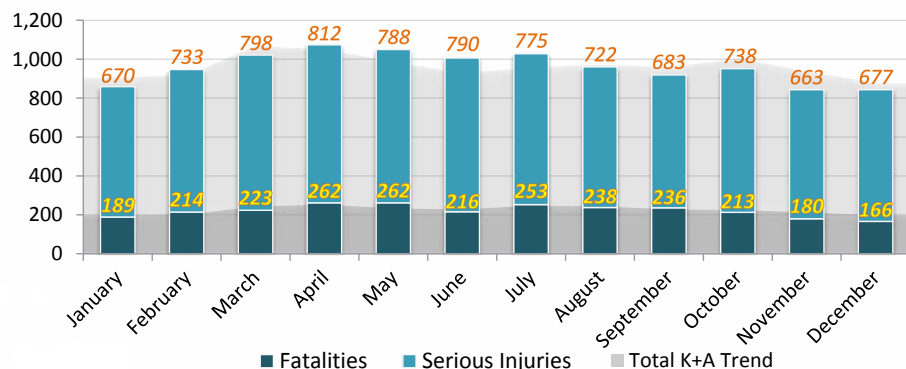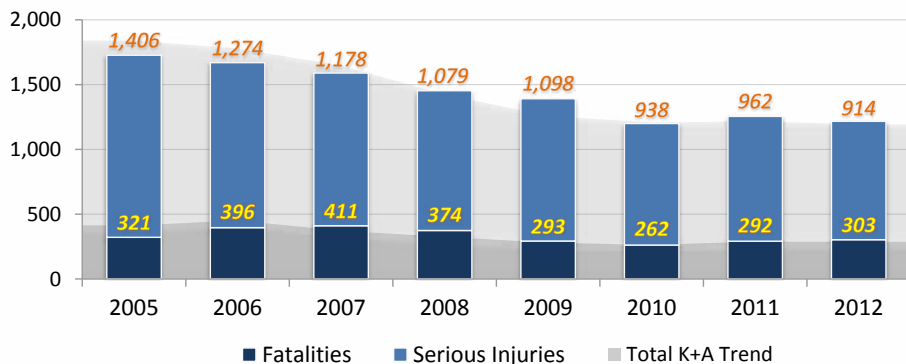
Who

Figure 5.4: Impaired-Driver-Involved Fatalities and Serious Injuries by Driver Age and Gender
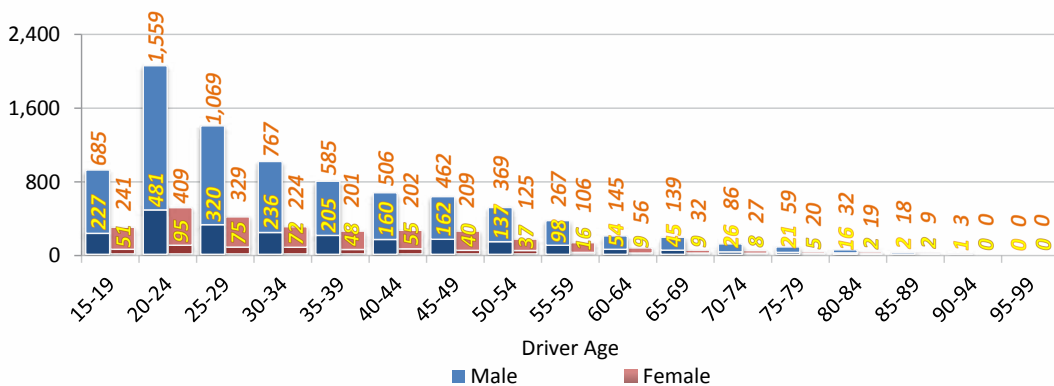
Impaired drivers contributing to these most severe crashes have most often been males in their early 20s. Although female drivers are involved in fewer of these crashes, those who are involved also are most often in their early 20s.

How

Figure 5.5: Impaired-Driver-Involved Fatalities and Serious Injuries by Crash Type
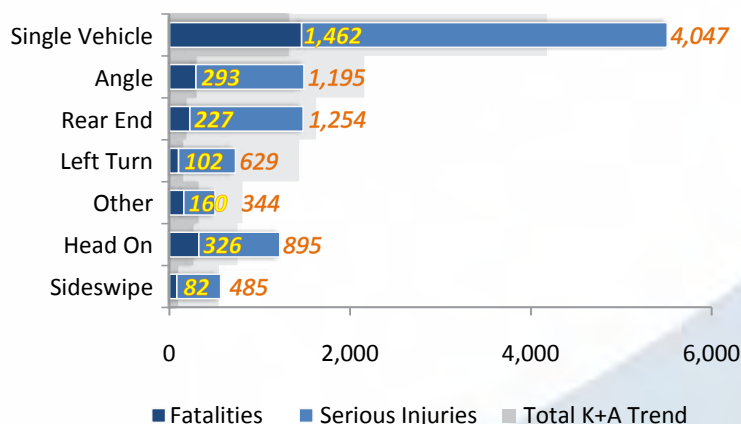
Impaired-driver-involved fatalities and serious injuries are most often lane-departure crashes that result in a single vehicle running off the road or crossing into on-coming traffic lanes. More often than average, these crashes result in a head-on collision with an oncoming vehicle.

Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from impaired-driver-involved crashes on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 5: Impaired Driving

Strategies and Proposed Action Steps

A. Conduct high-visibility impaired-driving enforcement initiatives.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
A.1 Encourage community-based enforcement by advertising phone number / data center / 911 to report suspicious drivers.			
A.2 Continue to purchase preliminary breath testers (PBTs) for law-enforcement officers.			
A.3 Continue to streamline DUI processing to make enforcement efforts more efficient.			
A.4 Continue to fund DUI enforcement details.			
A.5 Purchase high-visibility DUI processing units as funds are available.			
A.6 Continue to conduct and publicize standard and low-manpower sobriety checkpoints.			
A.7 Continue to conduct and publicize high-visibility saturation patrols.			
A.8 Generate public support for DUI checkpoints and saturation-enforcement details.			

Strategies and Proposed Action Steps

B. Increase educational efforts for everyone about the dangers and consequences of driving impaired.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
B.1 Develop meaningful DUI-education campaigns for specific target audiences, e.g., youth, educational professionals, parents, etc.			
B.2 Conduct a statewide multimedia campaign to educate the public on facts about the consequences of a DUI.			
B.3 Educate on the dangers of driving under the influence of medication and prescription drugs through a partnership with the healthcare community, the Arizona Department of Health Services and the Arizona Substance Abuse Partnership.			
B.4 Conduct training on drug impairment for education professionals (i.e., Drug Free Arizona) and parents. Include information on DUI/drug-impaired statistics and impairment caused by medication and prescription drugs.			
B.5 Work with the Emergency Room Nurses' Association to train emergency room nurses, doctors and primary-care doctors to assess and recognize alcohol/drug dependency in impaired drivers.			
B.6 Encourage training on liquor laws for owners of bars and other establishments where liquor is served, as well as servers and party hosts.			
B.7 Continue and expand the "Know Your Limits" program.			
B.8 Continue funding for Standardized Field Sobriety Testing (SFST), Advanced Roadside Impaired Driving Enforcement (ARIDE) and Drug Recognition Expert (DRE) training, and make all law enforcement agencies aware of opportunities.			
B.9 Continue to work with fire departments, other public health and safety agencies, and educational institutions to conduct mock crashes.			

Section 5: Impaired Driving

Strategies and Proposed Action Steps

C. Work with the court system to promote policies and practices that result in the imposition of meaningful penalties for impaired-driving convictions.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.2 Monitor judicial sentencing practices.			
C.2 Collaborate with judges and prosecutors to evaluate the court system and identify more potentially effective solutions (e.g., speedier process for obtaining search warrants).			
C.3 Continue to encourage local governments (cities, counties, tribal governments, etc.) to establish DUI courts.			
C.4 Better educate the judiciary on the severity of DUI-related crashes and their statewide impact on public health.			
C.5 Provide support to the crime labs for processing DUI cases.			
C.6 Educate the judiciary on available sentencing options for drug- and alcohol-dependent DUI offenders.			

D. Partner with employers to suggest policies and procedures aimed at reducing impaired driving by their employees.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Encourage employers to manage risk by using employee contracts to encourage voluntary compliance with DUI laws.			

Section 5: Impaired Driving

Strategies and Proposed Action Steps

E. Improve public awareness of and access to alternate forms of transportation.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Continue to create and support programs as alternatives to driving while impaired, such as free taxi services, designated drivers and complimentary shuttles provided by bar/liquor establishment owners.			
E.2 Better educate the public about available transportation resources.			

F. Improve data collection to understand and address impaired driving more effectively.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Review the new crash report form, and in the future, consider revisions to better capture DUI / impaired-driving data.			
F.2 Use data more intensively for law enforcement, education and research purposes.			
F.3 Continue to analyze and report the data on drug tests of suspected DUI offenders, particularly those who test negative for alcohol.			

Section 5: Impaired Driving

Strategies and Proposed Action Steps

G. Treat alcohol and drug dependency of DUI offenders.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
G.1 Recognize, assess and treat ongoing substance-abuse problems with programs, such as intervention.			
G.2 Educate the judiciary on available sentencing options for drug- and alcohol-dependent DUI offenders.			

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Section 6: Interjurisdictional Coordination

Arizona is the sixth-largest state in the nation by area, with an increasingly diverse population, including 22 federally recognized tribes, and nearly 400 miles of border with Mexico. Interjurisdictional coordination amongst agencies and safety stakeholders is critical to utilize all safety resources effectively and to maximize opportunities to improve safety for everyone on all public roadways. The Interjurisdictional Emphasis Area does not represent a particular crash characteristic or category, as seen with other Emphasis Areas. Fatality and serious-injury numbers thought to be relevant to this Emphasis Area are from crashes that have taken place in urban areas, rural areas, and on tribal lands. Urban areas have been defined using the 2010 census-derived urbanized boundary. All areas outside the urbanized boundary are considered rural. Tribal lands exist in both urban and rural areas. These lands are comprised of federal reservation land held in trust for the 22 tribes in Arizona and make up almost 28 percent of the state by area.

What

Figure 6.1: Urban, Rural, and Tribal Portion of All Fatalities and Serious Injuries

Forty-eight percent of all fatalities have taken place in rural areas. In contrast, only 24 percent of serious injuries have occurred in rural areas. Crashes of all severity in rural areas for the reporting period 2005-2012 was close to 11 percent of the statewide total. This is an indication of the increased severity when crashes occur outside urban areas, perhaps due to higher driving speeds and longer emergency response and transport times. This difference in the proportions between severities was even more pronounced on tribal lands, where 14 percent of all fatalities and only four percent of serious injuries have occurred.

Fatalities:
- 50% Urban Nontribal
- 2% Urban Tribal Lands
- 36% Rural Nontribal
- 12% Rural Tribal Lands

Serious Injuries:
- 75% Urban Nontribal
- 1% Urban Tribal Lands
- 21% Rural Nontribal
- 3% Rural Tribal Lands

Where

Figure 6.2 (a): Urban-Area Fatal and Serious-Injury Crash Density Map

Severe crashes in urban areas have most often taken place at intersection locations and where traffic volumes are highest.

Crash Count per 5-Square-Mile Area

- 1 to 39 crashes
- 40 to 73 crashes
- 74 to 128 crashes
- 129 to 187 crashes
- 188 to 650 crashes

- Tribal Lands
- County Boundary
- Highway

0 5 10   20   30   40 Miles

N

Section 6: Interjurisdictional Coordination

Where

Figure 6.2 (b): Rural-Area Fatal and Serious-Injury Crash Density Map

Severe crashes in rural areas have most often taken place on major corridors with high traffic volumes near urbanized areas.
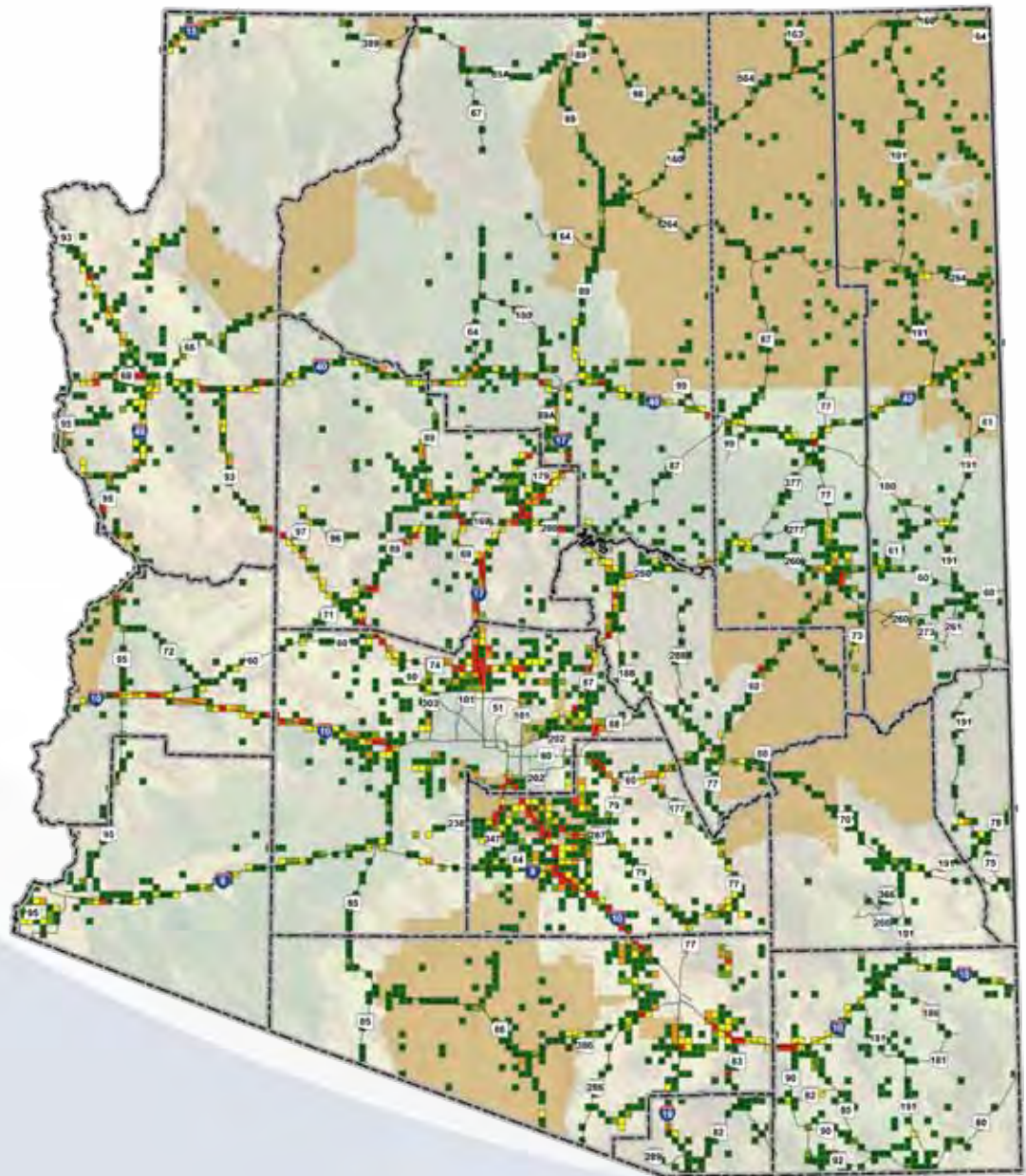
Crash Count per 5-Square-Mile Area

- ■ 1 to 3 crashes
- ■ 4 crashes
- ■ 5 to 7 crashes
- ■ 8 to 10 crashes
- ■ 11 to 57 crashes

- ▢ Tribal Lands
- ▢ County Boundary
- — Highway

N

0 5 10   20   30   40 Miles

Where

Figure 6.2 (c): Tribal-Land Fatal and Serious-Injury Crash Density Map

Fatalities and serious injuries on tribal lands are typically highest on corridors with high traffic volume. For example, areas with the highest number of crashes are within the Phoenix metropolitan region, namely the Loop 101 within the Salt River-Pima Indian Community, and Interstate 10 within the Gila River Indian Community.
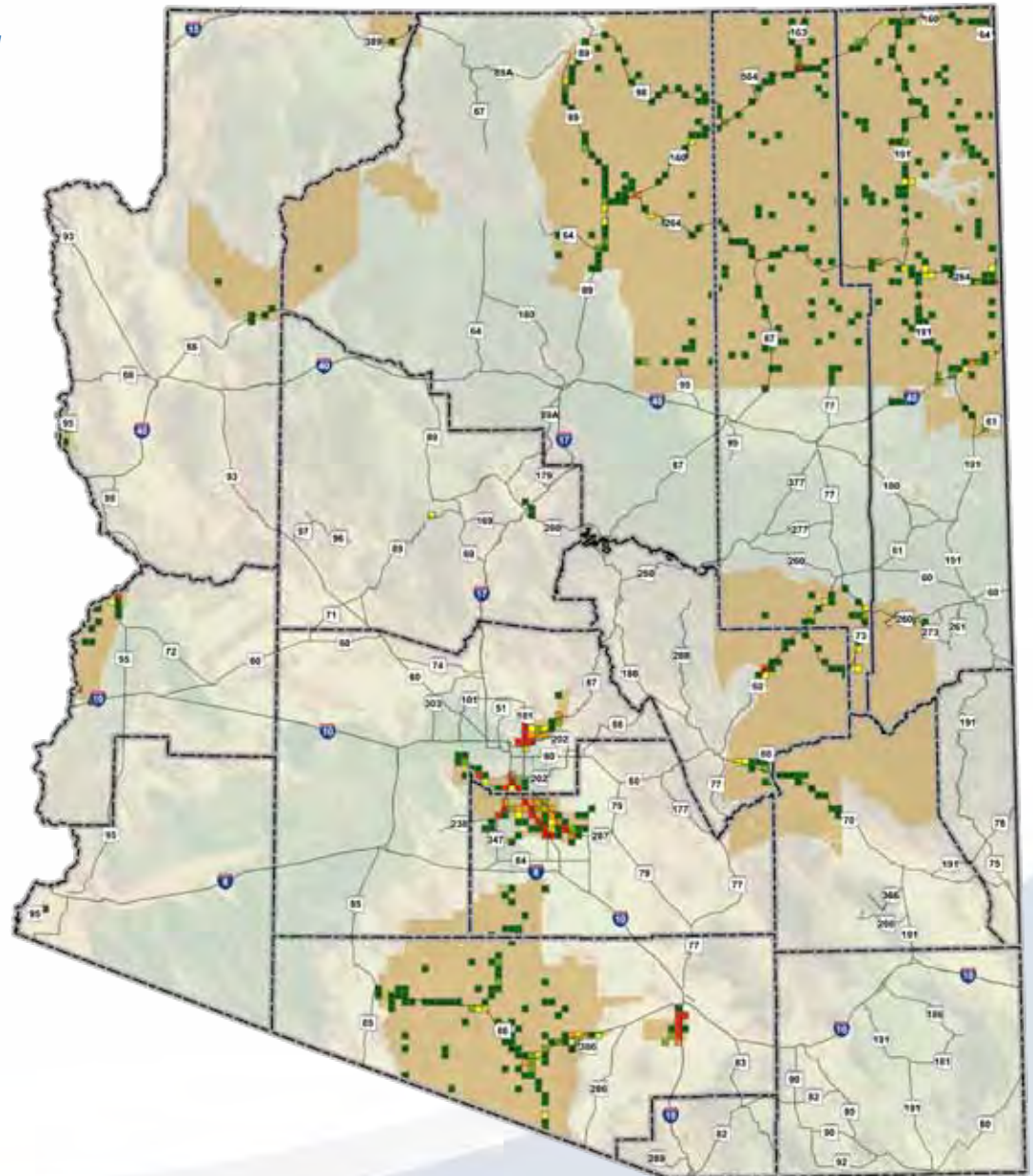
Crash Count per 5-Square-Mile Area

- 1 to 2 crashes
- 3 crashes
- 4 to 5 crashes
- 6 to 8 crashes
- 9 to 65 crashes

- Tribal Lands
- County Boundary
- Highway

0 5 10   20   30   40 Miles

N

When

Annual fatalities and serious injuries in urban areas have decreased overall by 30 percent and 38 percent, respectively, since 2005. These most severe crashes have most often occurred during spring and fall. Fatalities in urban areas have most often occurred on Fridays and Saturdays and least often on Tuesdays. Serious-injury crashes have occurred most often on Fridays. Time-of-day. Time-of-day trends in fatalities and serious injuries in urban areas have overall followed the general trend for all crashes.

Figure 6.3 (a): Temporal Trends in Urban Fatalities and Serious Injuries

When

Figure 6.3 (b): Temporal Trends in Rural Fatalities and Serious Injuries

Fatalities and serious injuries in rural areas have each decreased by 32 percent. Seasonal trends are different between urban and rural areas. Serious crashes in rural areas have been highest in July. Fatalities and serious injuries have been highest in rural areas on weekends. Time-of-day trends in fatalities and serious injuries for urban and rural areas have overall followed the general trend for all crashes.

Yearly chart (Fatalities / Serious Injuries / Total K+A Trend):

Year	Serious Injuries	Fatalities
2005	1,560	554
2006	1,541	650
2007	1,564	522
2008	1,480	472
2009	1,540	420
2010	1,079	328
2011	953	378
2012	1,062	376

Legend: ■ Fatalities ■ Serious Injuries ▨ Total K+A Trend

Monthly chart (Fatalities / Serious Injuries / Total K+A Trend):

Month	Serious Injuries	Fatalities
January	810	244
February	818	253
March	946	333
April	948	332
May	1,000	332
June	937	362
July	1,073	402
August	954	358
September	892	317
October	906	283
November	754	262
December	741	222

Legend: ■ Fatalities ■ Serious Injuries ▨ Total K+A Trend

Day of week chart (Fatalities / Serious Injuries / Total K+A Trend):

Day	Serious Injuries	Fatalities
Sunday	2,047	701
Monday	1,291	478
Tuesday	1,156	405
Wednesday	1,188	402
Thursday	1,263	426
Friday	1,721	544
Saturday	2,113	744

Legend: ■ Fatalities ■ Serious Injuries ▨ Total K+A Trend

Time of day chart (Fatalities / Serious Injuries / Total K+A Trend):

Time	Serious Injuries	Fatalities
12 am	251	214
1 am	242	109
2 am	210	109
3 am	194	116
4 am	220	94
5 am	280	123
6 am	384	151
7 am	384	141
8 am	382	101
9 am	469	125
10 am	522	163
11 am	604	156
12 pm	649	184
1 pm	693	143
2 pm	738	220
3 pm	745	218
4 pm	681	179
5 pm	726	201
6 pm	578	205
7 pm	479	184
8 pm	417	160
9 pm	377	150
10 pm	274	115
11 pm	280	139

Legend: ■ Fatalities ■ Serious Injuries ▨ Total K+A Trend

Section 6: Interjurisdictional Coordination

When

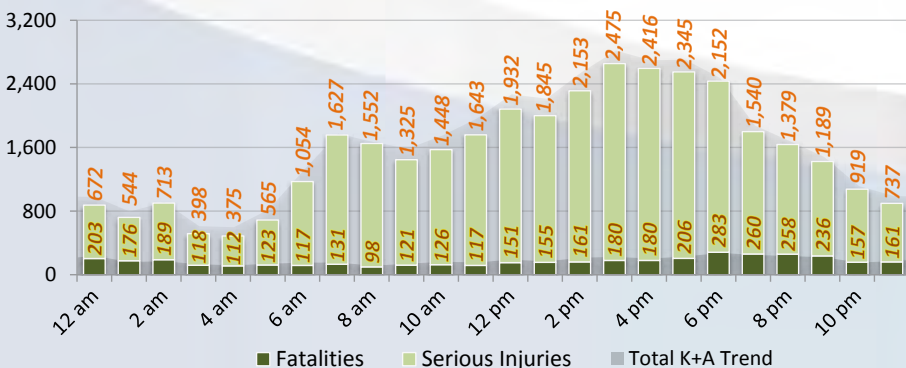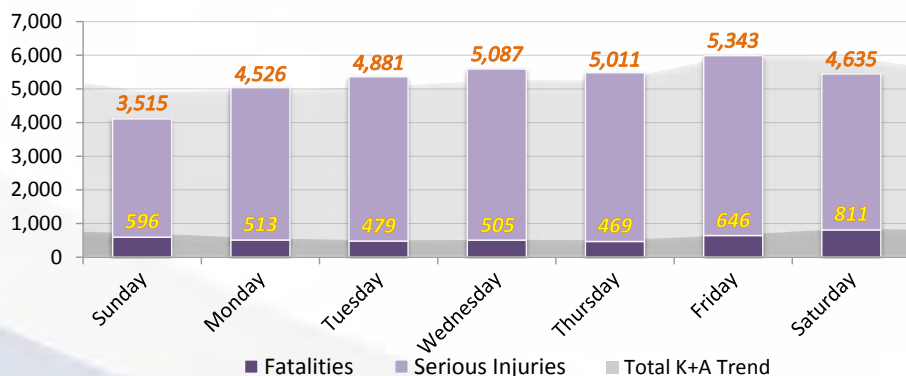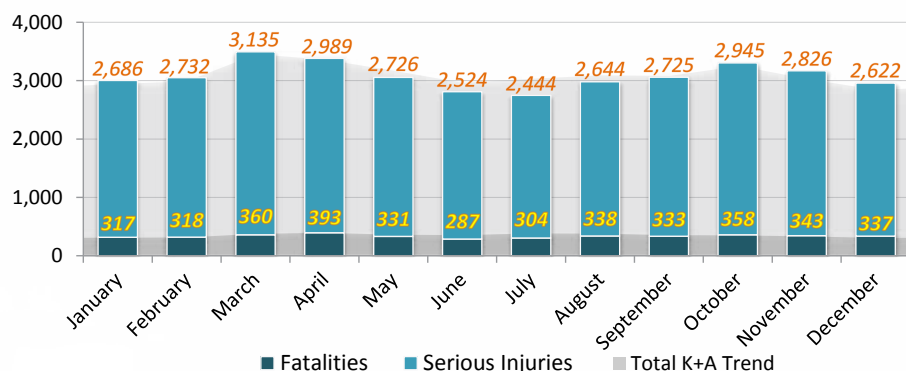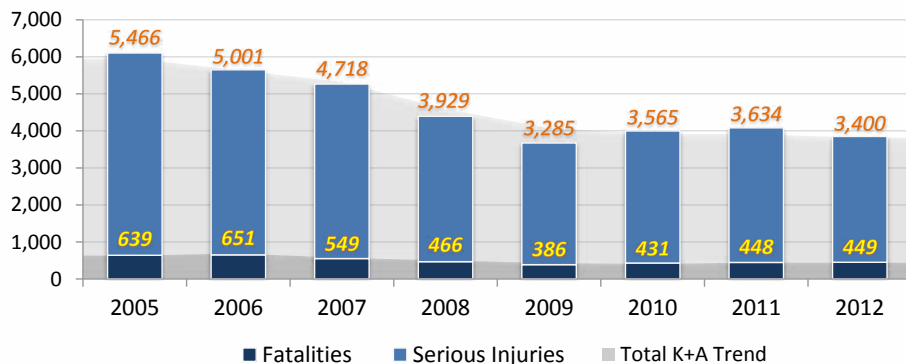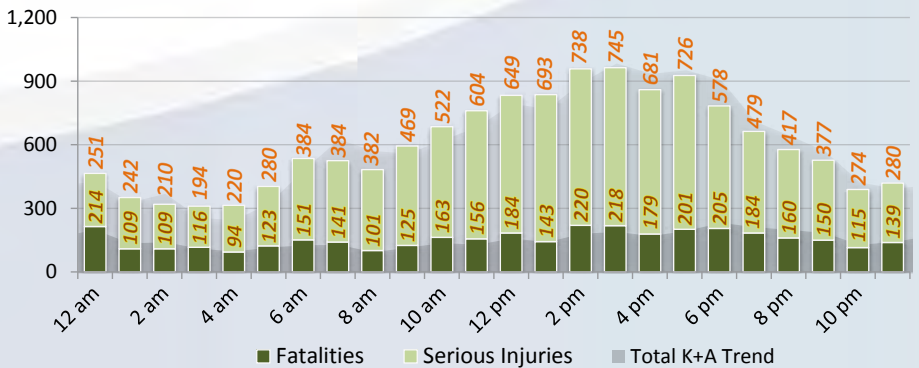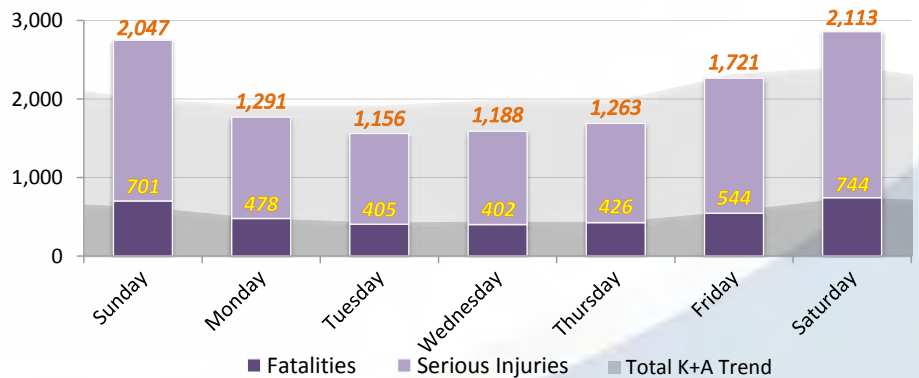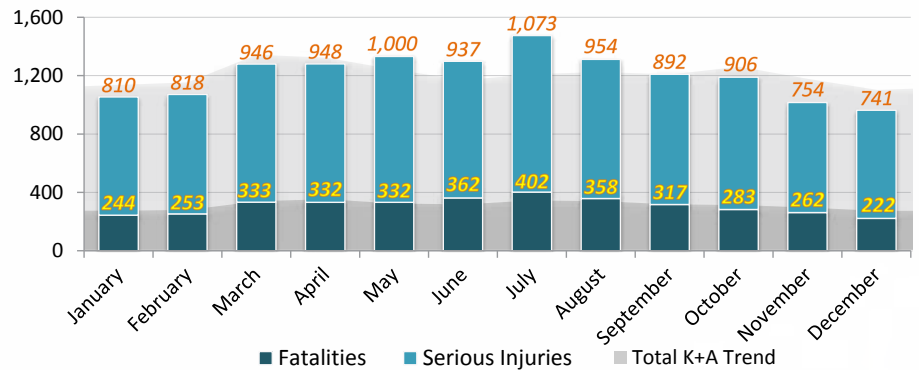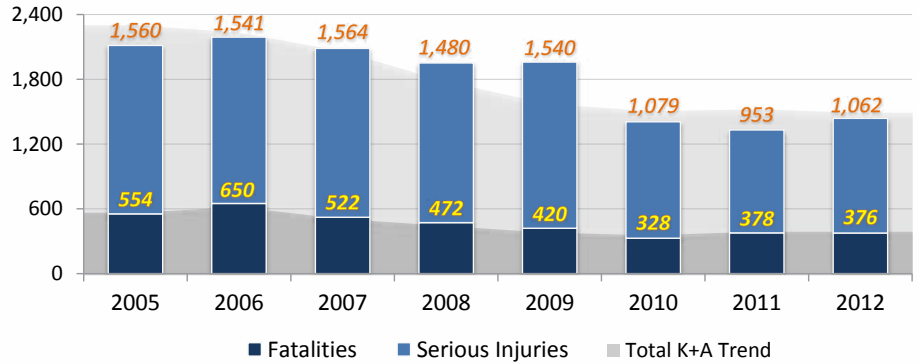*Figure 6.3 (c): Temporal Trends in Tribal-Land Fatalities and Serious Injuries*

Fatalities and serious-injuries on tribal lands increased between 2005 and 2007 but, by the end of 2012 these had decreased by 47 percent and 30 percent, respectively. These most severe crashes have been highest in July and on weekends. The highest number of fatalities on tribal lands has most frequently been indicated to occur between 12 and 1 a.m.

Chart 1 (by year):

Year	Serious Injuries	Fatalities
2005	239	145
2006	278	174
2007	276	180
2008	204	122
2009	187	102
2010	169	88
2011	162	127
2012	192	96

Legend: ■ Fatalities ■ Serious Injuries ▪ Total K+A Trend

Chart 2 (by month):

Month	Serious Injuries	Fatalities
January	146	74
February	137	63
March	135	101
April	161	85
May	164	79
June	142	92
July	164	111
August	139	100
September	155	93
October	128	92
November	110	73
December	126	71

Legend: ■ Fatalities ■ Serious Injuries ▪ Total K+A Trend

Chart 3 (by day of week):

Day	Serious Injuries	Fatalities
Sunday	316	192
Monday	199	124
Tuesday	208	117
Wednesday	164	118
Thursday	206	125
Friday	302	147
Saturday	312	211

Legend: ■ Fatalities ■ Serious Injuries ▪ Total K+A Trend

Chart 4 (by hour):

Hour	Serious Injuries	Fatalities
12 am	41	108
1 am	52	43
2 am	40	30
3 am	32	30
4 am	46	34
5 am	62	45
6 am	52	35
7 am	76	37
8 am	61	35
9 am	81	34
10 am	56	27
11 am	85	29
12 pm	99	24
1 pm	88	38
2 pm	119	45
3 pm	112	58
4 pm	89	38
5 pm	112	52
6 pm	102	63
7 pm	63	54
8 pm	66	52
9 pm	86	50
10 pm	41	34
11 pm	46	39

Legend: ■ Fatalities ■ Serious Injuries ▪ Total K+A Trend

When

Figure 6.3 (d): Temporal Trends in Urban-Area Fatality and Serious-Injury Rates

Fatality rates in urban areas declined to a low in 2009 of 0.90 fatalities per 100 million VMT from a 2005 rate of 1.51. The serious-injury rate declined for similar years and, like the fatality rate, has been relatively flat since 2010.

Figure 6.3 (e): Temporal Trends in Rural-Area Fatality and Serious-Injury Rates

The fatality rate for rural areas decreased annually from 2006 through 2010, to a low of 1.90 fatalities per 100 million VMT. The serious-injury rate was highest in 2009 at 9.08. Increases to both the fatality and serious-injury rate were noted during the most recent 2012 calendar year.

Section 6: Interjurisdictional Coordination

Who

Figure 6.4 (a): Urban Fatalities and Serious Injuries by Driver Age and Gender

Driver age and gender distributions for fatal and serious injury crashes in urban areas have overall followed the general trend for all crashes.

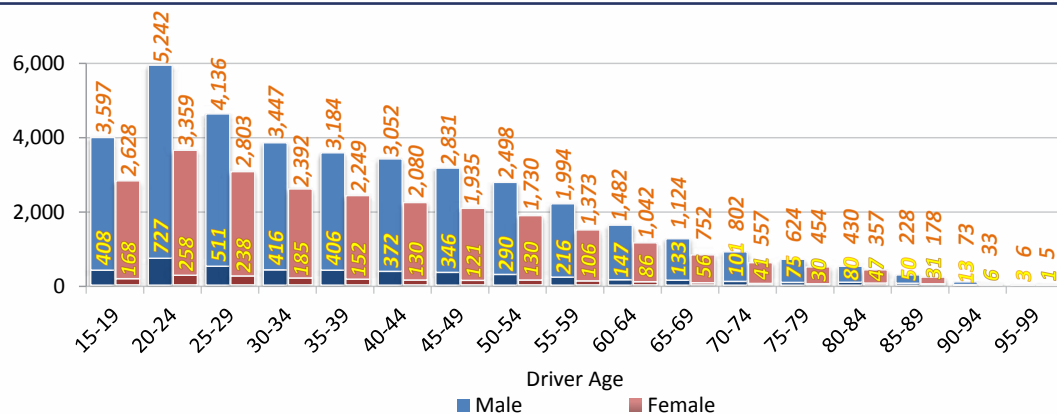Figure 6.4 (a): Urban Fatalities and Serious Injuries by Driver Age and Gender

Figure 6.4 (b): Rural Fatalities and Serious Injuries by Driver Age and Gender

In rural areas, fatal and serious-injury crashes have remained higher for drivers in their 40s and 50s as compared to urban crashes. The difference in the number of male and female severe crashes is higher in rural areas than in urban.

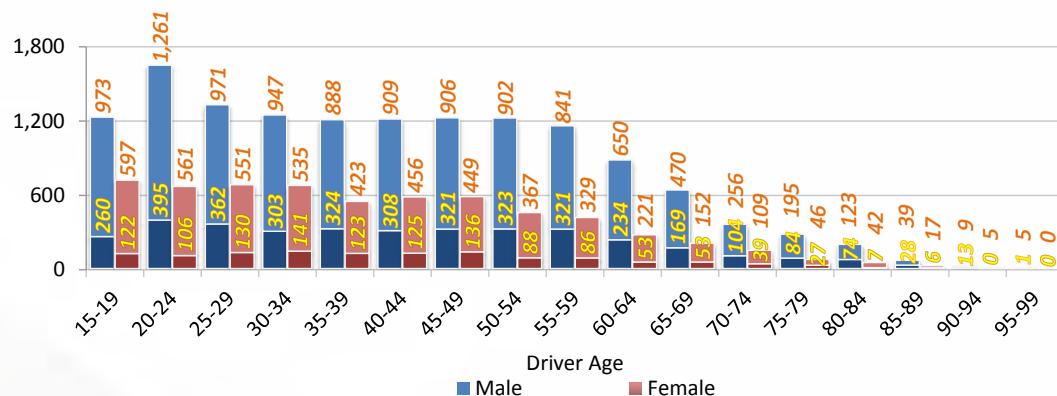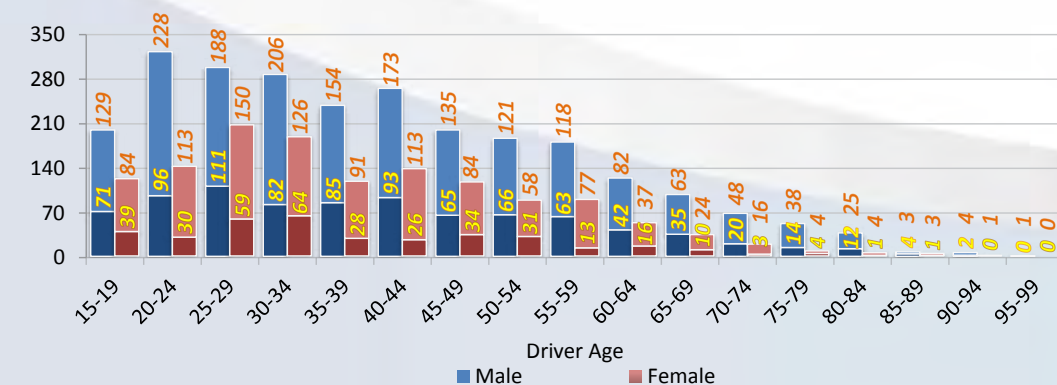Figure 6.4 (b): Rural Fatalities and Serious Injuries by Driver Age and Gender

Figure 6.4 (c): Tribal-Land Fatalities and Serious Injuries by Driver Age and Gender

As with most categories, severe crashes on tribal lands have occurred mostly for male drivers in their 20s.

Figure 6.4 (c): Tribal-Land Fatalities and Serious Injuries by Driver Age and Gender

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Section 6: Interjurisdictional Coordination

How

Figure 6.5 (a): Urban Fatalities and Serious Injuries by Crash Type

As with most Emphasis Area categories, fatalities and serious injuries have resulted in urban areas most from single-vehicle crashes. However, in urban areas, severe multiple-vehicle intersection angle and turning crashes have occurred more often than with other Emphasis Area categories or the statewide average for all crashes.
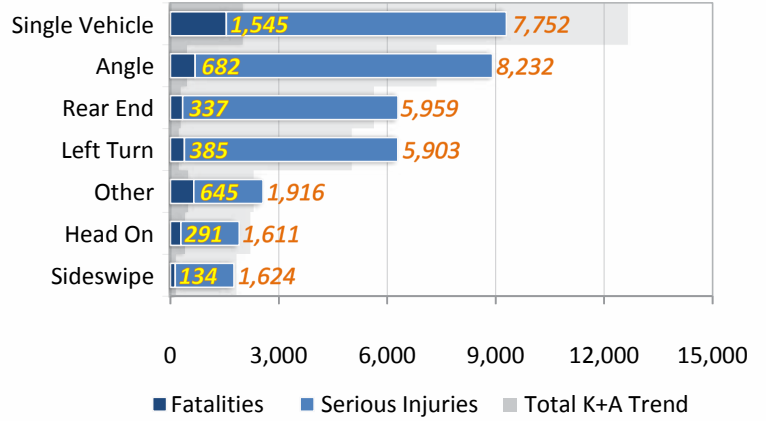
Figure 6.5 (b): Rural Fatalities and Serious Injuries by Crash Type

Fatalities and serious injuries in rural areas have resulted most from single-vehicle crashes. Severe rural crashes occur as single-vehicle lane-departure crashes far more often than with other Emphasis Area categories.
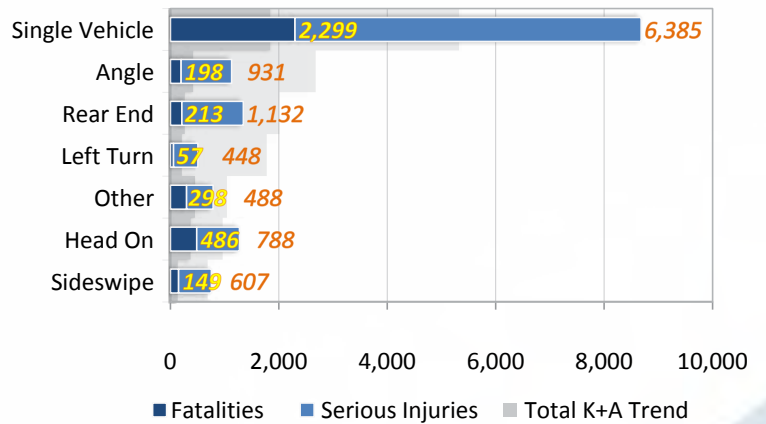
Figure 6.5 (c): Tribal-Land Fatalities and Serious Injuries by Crash Type

Severe crashes on tribal lands show a pattern that is similar to other rural crashes. Many of these fatalities and serious injuries have involved a single-vehicle in a lane- or roadway-departure crash.
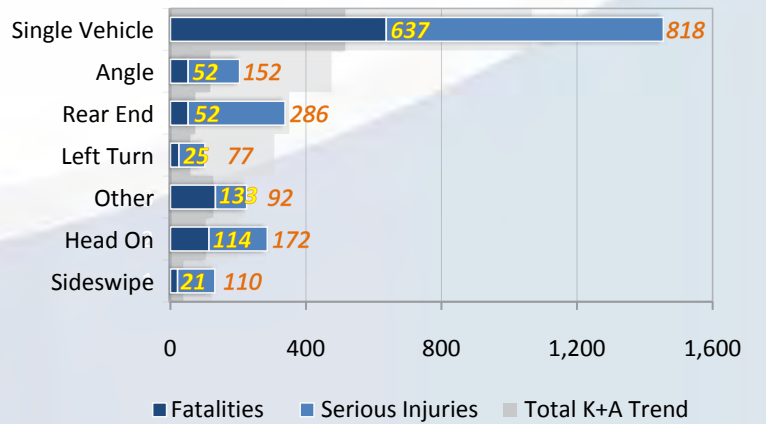
Section 6: Interjurisdictional Coordination

Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 6: Interjurisdictional Coordination

Strategies and Proposed Action Steps

A. Coordinate and promote interjurisdictional cooperation and practices throughout Arizona.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
A.1 Focus attention on coordination among intergovernmental agencies.			
A.2 Partner at all levels to address issues (state, county, cities, tribes, Bureau of Indian Affairs, Central Federal Lands, Forest Service, Park Service and Bureau of Land Management).			
A.3 Encourage Metropolitan Planning Organizations (MPOs), Councils of Governments (COGs), tribes, counties and local communities to adopt safety plans consistent with the SHSP, including annual progress reporting.			
A.4 Develop better understanding of the differences among the tribes and between the tribes and local nontribal entities. Integrate all entities into a state-level relationship.			
A.5 Coordinate quarterly meetings of focus groups to improve safety.			
A.6 Improve coordination among the tribes.			
A.7 Increase communication and partnerships between the state and tribes.			
A.8 Encourage shared jurisdictional authority to enhance enforcement efforts.			
A.9 Identify increased funding opportunities (e.g., increase state gas tax to leverage matching funds, supplemental Highway Safety Improvement Plan (HSIP), and other federal-aid funds for a rural road safety program).			
A.10 Provide training/education on MVD process/procedure for courts and law enforcement.			
A.11 Encourage/promote sharing of ideas on multicultural road safety education, training, campaigns, signage and other initiatives across the state.			
A.12 Begin to develop and implement strategies promoting a safety culture and a commitment to collaborate and cooperate, both internally and externally, to reach the common safety goal.			
A.13 Conduct educational and outreach campaigns to reduce impaired driving, speeding, aggressive driving, etc., and increase educational efforts to increase the use of occupant-protection devices.			
A.14 Educate all entities on the purpose of the SHSP, as well as local and tribal safety plans.			
A.15 Conduct annual tribal highway safety summits, and improve outreach to the tribes.			

Section 6: Interjurisdictional Coordination

Strategies and Proposed Action Steps

B. Improve data collection, integration, analysis and sharing at all levels.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s)**	**Partner(s)**	**Potential Resources**
B.1 Conduct a review of the current crash data collection, management and analysis functions with broad stakeholder input, develop and update a data improvement strategic plan, and announce the results at an annual data summit.			
B.2 Establish a means to provide crash data without compromising the confidentiality of individuals or "stereotyping" an area or region, and develop a system for data sharing among all relevant entities.			
B.3 Develop and conduct training on safety data collection, analysis tools and data-sharing opportunities.			
B.4 Develop a method to address safety issues when crash data are not available, or when crash types are rare but severe (e.g., pedestrian-involved incidents).			
B.5 Improve the application of safety data at all levels by sharing analytical methods and data-management practices between agencies.			
B.6 Provide monetary support to encourage Traffic and Criminal Software (TraCS), or other electronic crash reporting, implementation statewide.			
B.7 Update the state crash report form to improve information collected about distracted driving, secondary collisions and other potential gaps.			
B.8 Improve integration of crash data with other relevant databases (e.g., roadway infrastructure, weather and the prehospital trauma registry) for improved analysis of safety.			
B.9 Assist local governments and tribes in developing a database of actual crash reports.			

Section 6: Interjurisdictional Coordination

Strategies and Proposed Action Steps

C. Develop interjurisdictional methods and agreements to improve rural road infrastructure.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s)**	**Partner(s)**	**Potential Resources**
C.1 Develop and use predictive modeling techniques to contribute to requirements for project funding.			
C.2 Conduct a statewide rural road needs study to create and implement long term rural roadway safety improvement plans.			
C.3 Develop pavement marking and signing intergovernmental agreements to share resources to ensure pavement markings and signs are maintained in a manner consistent with the Manual of Uniform Traffic Control Devices (MUTCD).			
C.4 Develop interjurisdictional agreements to install lighting, rumble strips, signing, markings, etc., and address other issues, such as wildlife and dust.			
C.5 Provide a funding formula to address road safety assessment findings.			
C.6 Collaborate with law enforcement to identify high-risk locations and appropriate countermeasures.			
C.7 Assess the impact of speed limits on rural road crashes.			
C.8 Assist the regions and tribes with resources and support for project evaluation, prioritization and implementation.			

Section 6: Interjurisdictional Coordination

Strategies and Proposed Action Steps

D. Assist regions and tribal governments in evaluating safety data, identifying priorities and developing projects.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Allow ADOT-certified assistance agencies to help the tribes using federal aid funding to support this activity.			
D.2 Establish closer collaboration between the state and the tribes for lobbying on federal highway legislation in support of increased tribal resources.			
D.3 Address policy requirements for waiver of tribal sovereign immunity.			
D.4 Conduct an ADOT-led effort to address sovereign immunity and establish a true level of government-to-government dialogue between the tribes and other government agencies.			
D.5 Develop a program of "engineers on loan" to tribal agencies and other small agencies for traffic engineering expertise using ADOT employees and consultants.			

E. Prioritize research funding to support implementation of the SHSP.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Prioritize research funding to support SHSP implementation.			
E.2 Identify creative methods to increase funding beyond the gas tax.			
E.3 Establish budget limitations by type of safety improvement. If the amount exceeds $1 million, utilize other funding sources (e.g., STP to make safety funding go further and address more project/problems).			

Section 6: Interjurisdictional Coordination

Strategies and Proposed Action Steps

F. Review and provide recommendations to ADOT on the HSIP allocation process; work with ADOT to incorporate future performance measures and targets into the HSIP upon final MAP-21 ruling.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Utilize a task force to assess the HSIP funding allocation process.			
F.2 Encourage ADOT and all other jurisdictions to produce a safety management system report.			
F.3 Make sure HSIP allocation process contemplates and weighs (using predictive models) the impact of rapid population growth on roadways (e.g., expedite adding shoulders).			

G. Work with ADOT to incorporate data-driven strategies from local, regional and tribal safety plans into the HSIP.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
No action steps have been identified.			

Section 6: Interjurisdictional Coordination

Strategies and Proposed Action Steps

H. Coordinate engineering and operational efforts across jurisdictions.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
H.1 Consider regional signing and striping inventories that fund systematic upgrades to durable traffic markings and signs to provide retro reflectivity.			
H.2 Establish better consistency between agency sign/mark/operation transportation systems.			
H.3 Incorporate interjurisdictional traffic operations and management strategies.			
H.4 Commit adequate funding and staffing for traffic management centers so that center-to-center operations are most effective.			

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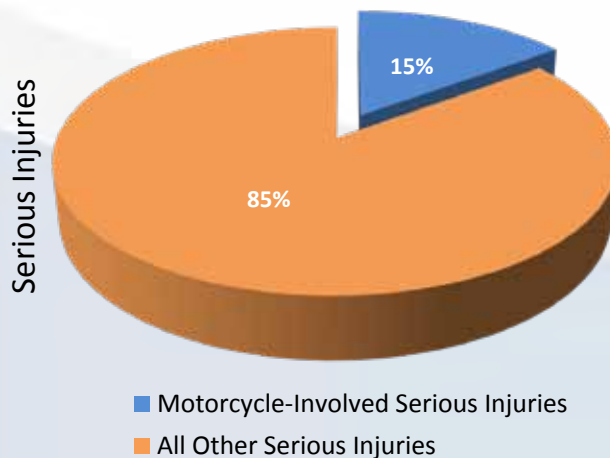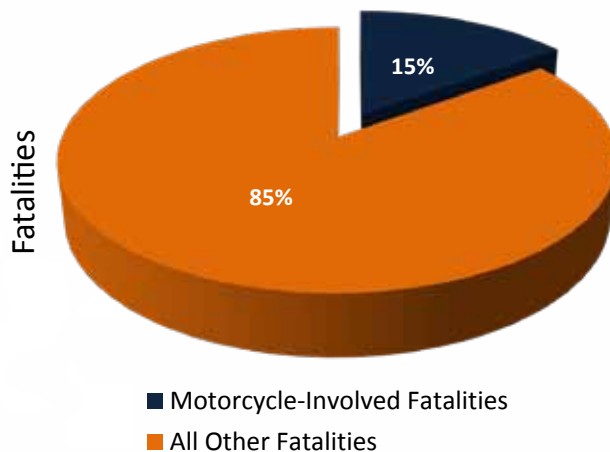
Section 7: Motorcycles

High-severity motorcycle crashes have increased slightly since 2005, while the same severity crash counts from most other categories have significantly reduced. While these most severe motorcycle crashes have gone down among teenagers and some other ages, crashes have increased dramatically among riders 55 years and older.

What

Figure 7.1: Motorcycle-Involved Portion of All Fatalities and Serious Injuries

Motorcycle-involved fatalities and serious injuries are counted from all crashes involving a motorcycle, ATV or moped. These crashes result in 15 percent of all fatalities and serious injuries.

Fatalities

15%

85%

- Motorcycle-Involved Fatalities
- All Other Fatalities

Serious Injuries

15%

85%

- Motorcycle-Involved Serious Injuries
- All Other Serious Injuries

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Where

Motorcycle-involved fatal and serious-injury crashes have taken place most often in areas of highest traffic volume in major urban centers.
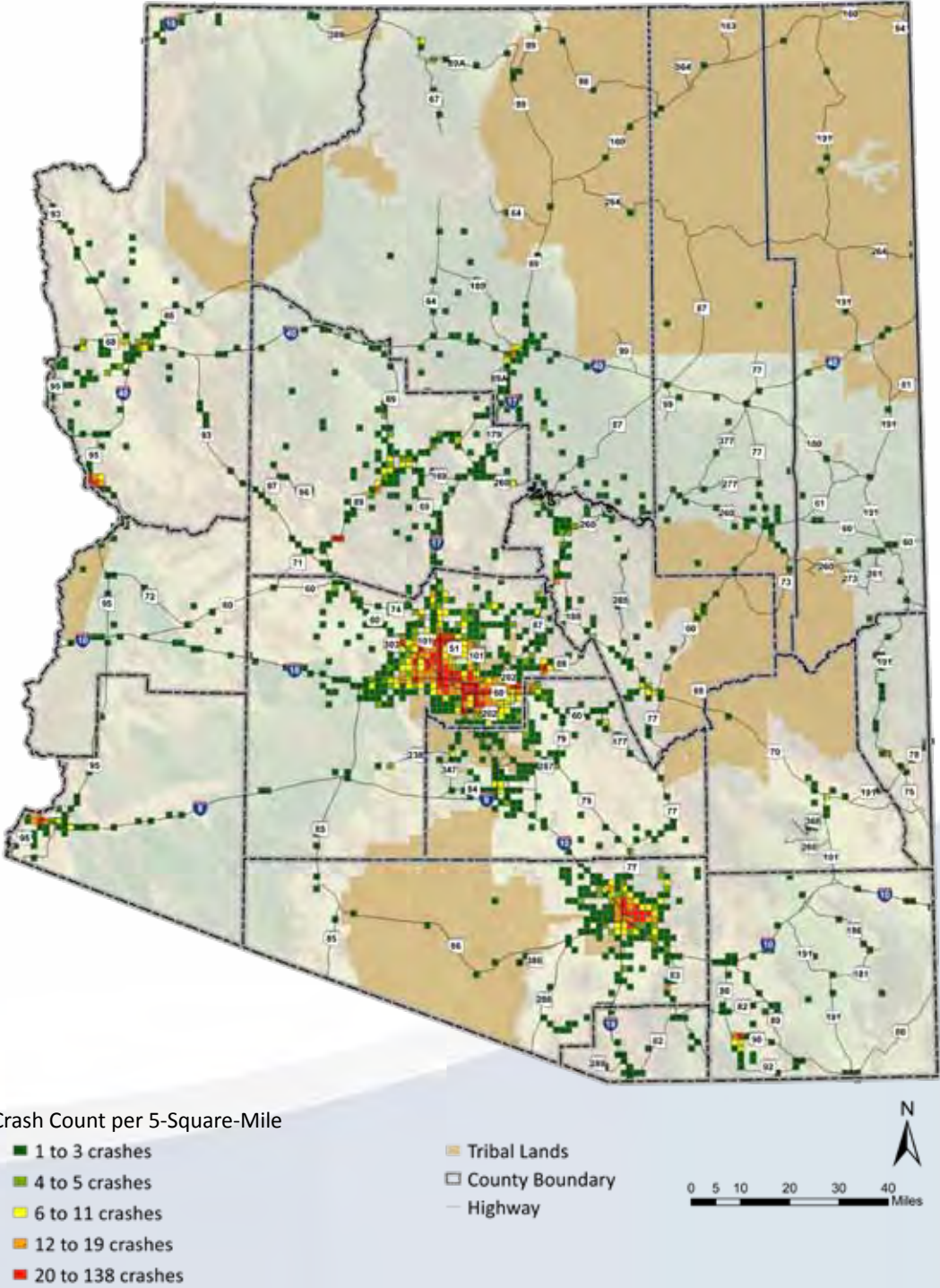
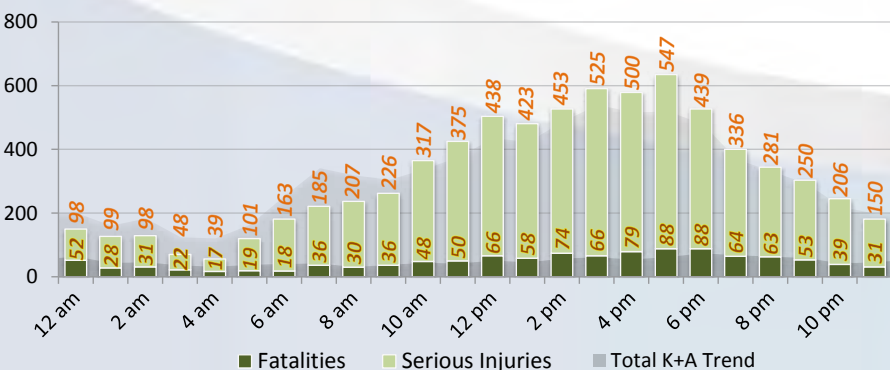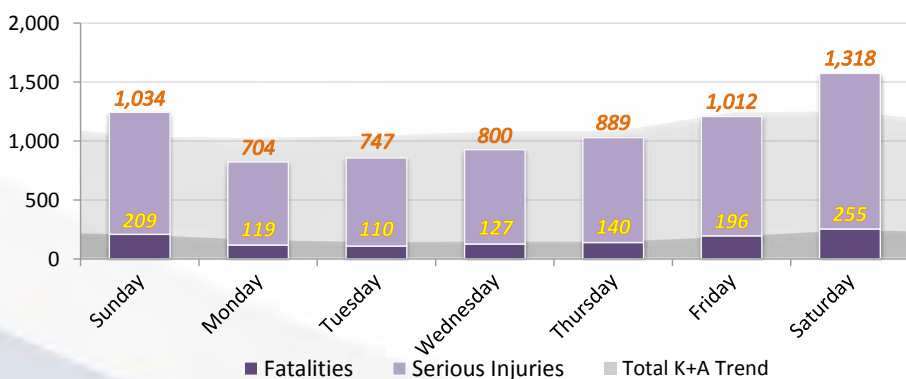*Figure 7.2: Motorcycle-Involved Fatal and Serious-Injury Crash Density Map*

Crash Count per 5-Square-Mile

- ■ 1 to 3 crashes
- ■ 4 to 5 crashes
- □ 6 to 11 crashes
- ■ 12 to 19 crashes
- ■ 20 to 138 crashes

▨ Tribal Lands
□ County Boundary
— Highway

0 5 10 20 30 40 Miles

N

Section 7: Motorcycles

When

Statewide motorcycle-involved fatalities and serious-injuries for the most recent years are at or slightly above the level for 2005. Motorcycle crashes have most often taken place during the best riding seasons in the months during spring and fall. These crashes have also taken place more often on weekends and in the warmer middle-to-end of daylight hours.

Fatalities ■ Serious Injuries ■ Total K+A Trend

Fatalities ■ Serious Injuries ■ Total K+A Trend

Fatalities ■ Serious Injuries ■ Total K+A Trend

Fatalities ■ Serious Injuries ■ Total K+A Trend

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN
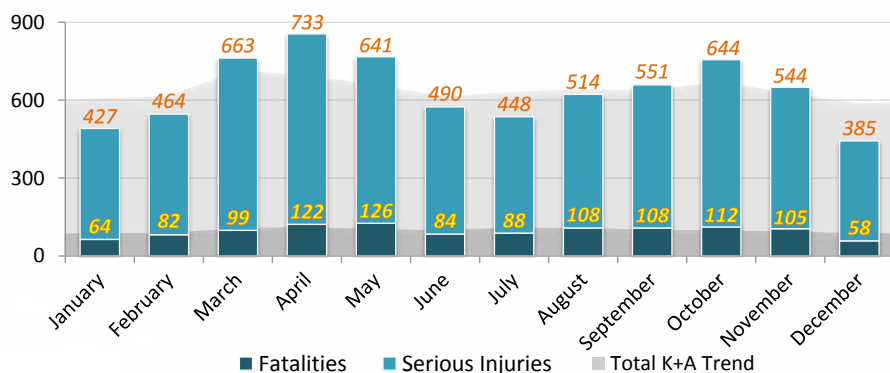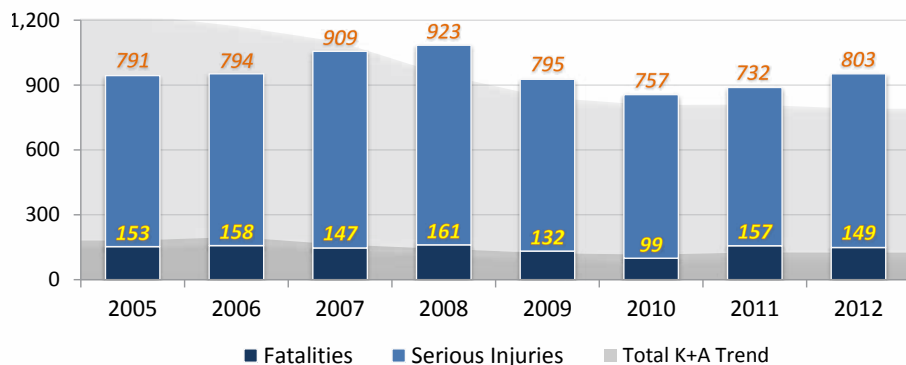
Who

Figure 7.4: Motorcycle-Involved Fatalities and Serious Injuries by Driver Age and Gender

There is a significant difference between the number of motorcycle crashes involving males vs. females. Males 20 to 25 years old have been associated with the most motorcycle-involved fatalities and serious injuries. How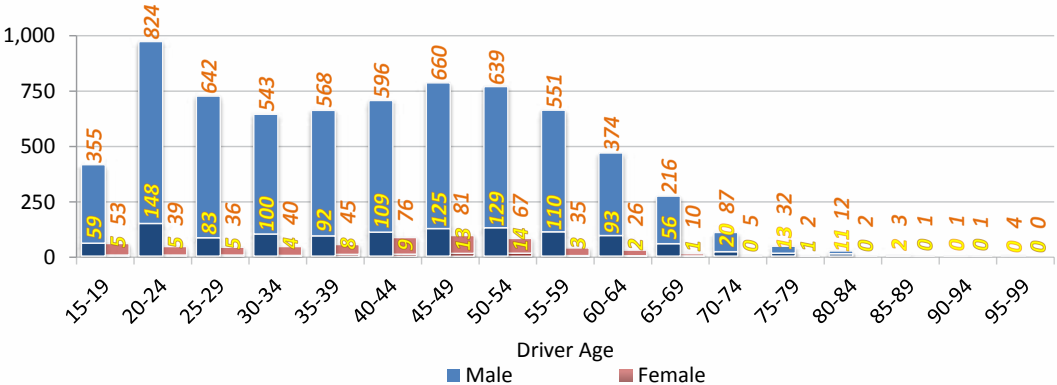ever, while the count trend during the eight-year period has been declining with these younger age groups, high severity motorcycle-involved crashes have doubled and even tripled among ages 55 and older.

How

Figure 7.5: Motorcycle-Involved Fatalities and Serious Injuries by Crash Type

Fatalities involving motorcycles occured from left-turn crashes more often than fatalities relating to most Emphasis Area categories or the average for all crashes. Sideswipe severe crashes involving motorcycles have also occurred at a higher than average amount. Motorcycle-involved fatalities, and serious injuries overall occurred most often as single-vehicle crashes. While the number of serious injuries resulting from these single-vehicle motorcycle crashes is much higher than the average for all crashes, the number of fatalities is lower.
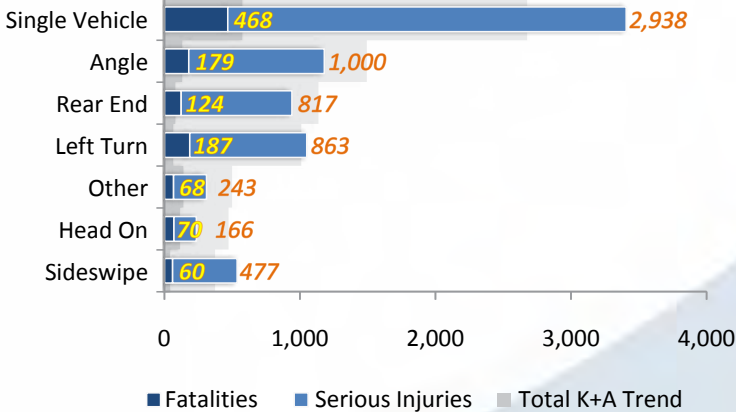
Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from crashes involving motorcycles on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 7: Motorcycles

Strategies and Proposed Action Steps

A. Improve public awareness, education and training for motorcyclists, motorists and all safety stakeholders to promote safer driving behaviors.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
A.1 Develop and launch a motorcycle safety campaign (e.g., build a "cool" brand for safety with attention-grabbing public service announcements / commercials).			
A.2 Promote education and training on gear usage (i.e., via public-private partnerships).			
A.3 Develop and execute an educational campaign to encourage helmet use.			
A.4 Promote proper maintenance of motorcycles to ensure they are safe and roadworthy.			
A.5 Increase awareness of motorcycle collisions associated with impairment and unlicensed riders.			
A.6 Form strategic alliances with the motorcycle-user community to foster and promote motorcycle safety.			
A.7 Expand existing impairment-prevention programs to include motorcycle riders and specific motorcycle events.			
A.8 Educate road users to be more conscious of the presence of motorcyclists.			
A.9 Educate motorcyclists regarding risk of crashes with wildlife and other animals.			
A.10 Promote and increase motorcyclist conspicuity to all road users.			

Strategies and Proposed Action Steps

B. Research, identify and implement effective policies to improve motorcycle safety at the state, local and tribal government levels.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1 Require mandatory motorcycle training for 18-year-old and younger applicants, with subsidy for low-income applicants.			
B.2 Research renewal of motorcycle endorsement with testing at least every five years.			
B.3 Investigate policy change to implement a graduated license system for motorcyclists.			
B.4 Discourage distracted driving, such as enforcing existing laws that prohibit texting and driving. Consider texting law.			
B.5 Research mandatory training options for motorcyclists.			

C. Enhance rider training programs to improve motorcycle safety.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Use incentives to promote motorcycle safety training in all jurisdictions.			
C.2 Ensure that licensing and rider training programs adequately teach and measure skills and behaviors required for crash avoidance.			

Section 7: Motorcycles

Strategies and Proposed Action Steps

D. Develop and execute enforcement programs to improve motorcycle safety.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Target enforcement to specific motorcycle riders' skills or lack thereof.			
D.2 Target enforcement in areas with known safety problems.			
D.3 Provide training for law enforcement to identify impaired motorcyclists.			
D.4 Provide a motorcycle-specific defensive driving school.			

E. Improve infrastructure features to help reduce the number and severity of motorcycle crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Identify pavement markings, surface materials and other treatments that reduce traction for motorcycles, and treat or replace those areas with high-traction material.			
E.2 Consider motorcycles in the selection of roadside barriers.			
E.3 Provide and maintain fully paved shoulders to accommodate roadside motorcycle recovery and breakdowns.			
E.4 Utilize roundabouts at intersections to reduce the number of angled crashes.			
E.5 Utilize lagging left-turn phase and protected left-turn at existing signalized intersections to reduce the number of angled crashes.			

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Strategies and Proposed Action Steps

F. Improve motorcycle crash, registration and licensing data collection, integration, analysis and sharing between agencies at all levels.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Gather additional data to determine effective measures to better reduce the frequency and severity of motorcycle-involved crashes.			

G. Seek funding to support motorcycle-related safety projects and programs.

Strategy Leader:

Supporting Key Partners:

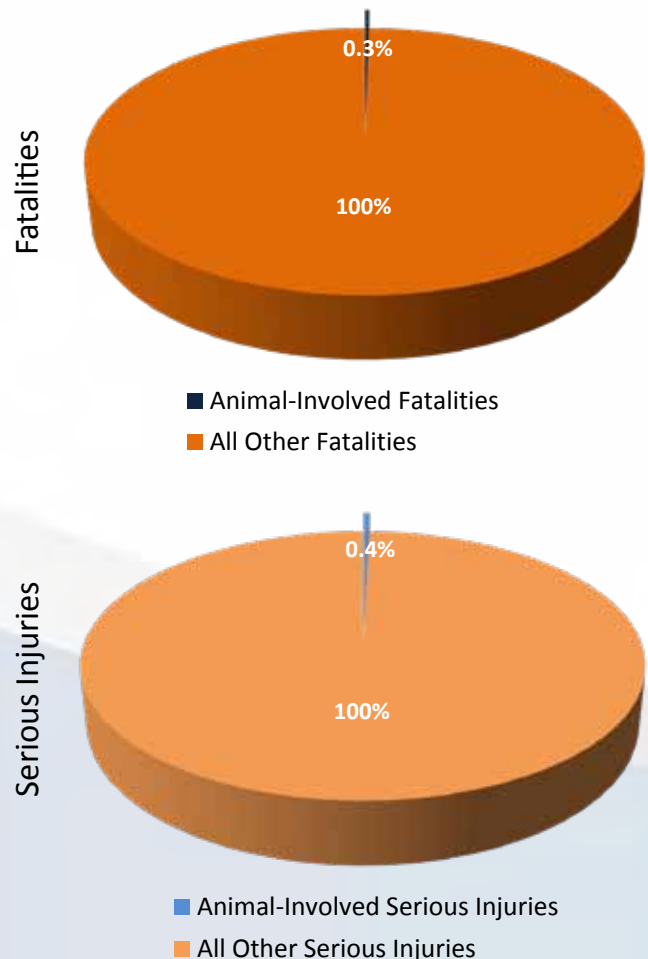| Action Steps	Leader(s) and Partners	Potential Resources	Status
G.1 Create and provide subsidies to assist riders in acquiring safe-riding gear.			
G.2 Subsidize training for low income riders.			
G.3 Develop programs that can be institutionalized and implemented in a self-sustaining way with dedicated funding.			

Section 8: Natural Risk | *Animal*

Crashes involving animals are relatively rare but can be very severe, especially when collisions are at high speeds and involve large animals such as elk, deer or livestock. Animal-involved crashes also become more severe when they occur in rural settings, where emergency response and transport times can be longer. More than half of the fatalities and serious injuries from crashes involving animals are motorcycle crashes, many of which involve unhelmeted riders. Strategies to eliminate high severity collisions with animals focus on improving roadway features to keep animals off roadways and improving driver awareness and behaviors.

What

Figure 8.1: Animal-Involved Portion of All Fatalities and Serious Injuries

Animal-involved fatalities and serious injuries are counted from all crashes where a collision took place with a wild animal, domestic pets or livestock. These crashes make up less than one percent of all fatalities and serious injuries.

Fatalities

0.3%

100%

- ■ Animal-Involved Fatalities
- ■ All Other Fatalities

Serious Injuries

0.4%

100%

- ■ Animal-Involved Serious Injuries
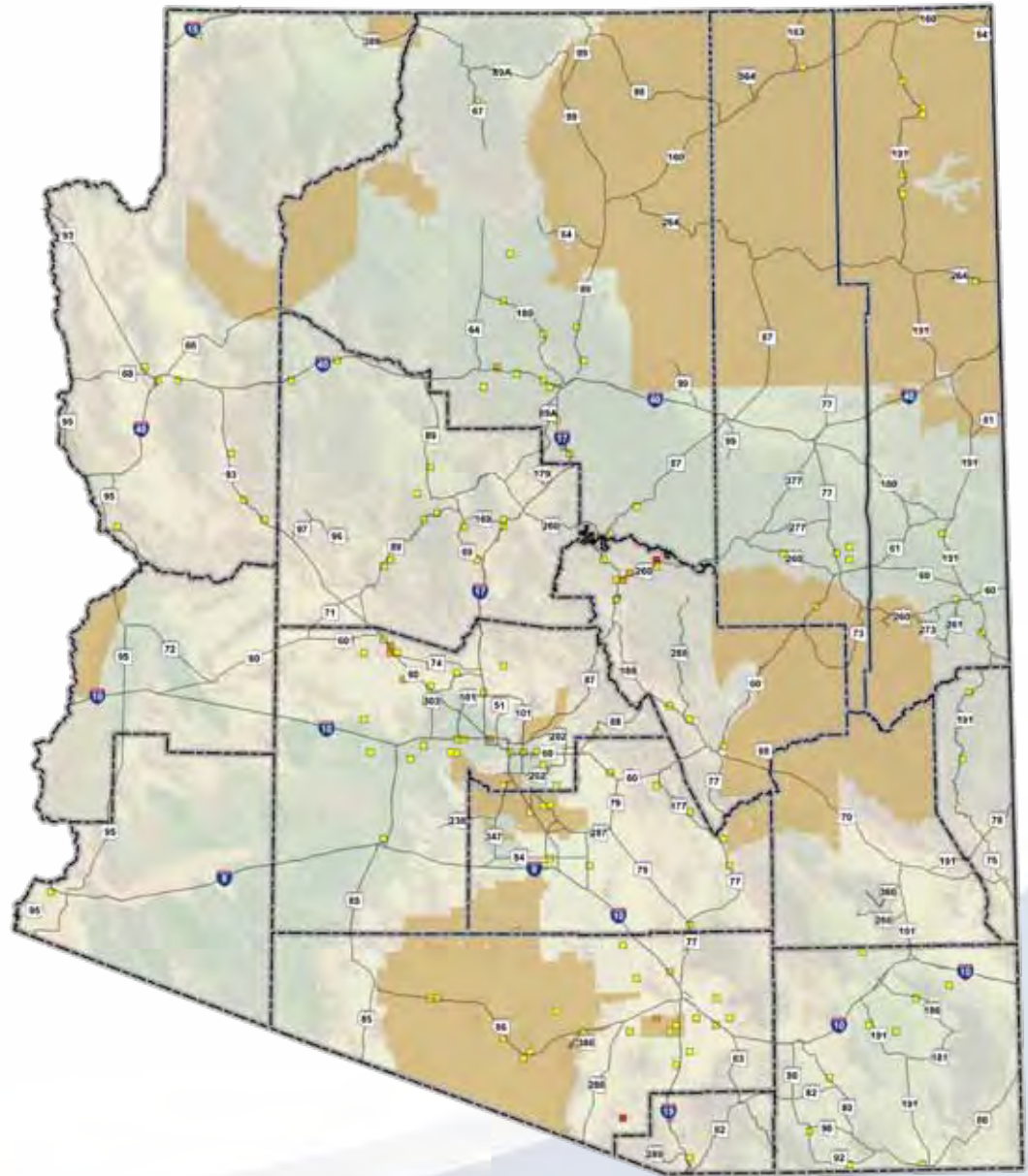- ■ All Other Serious Injuries

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Where

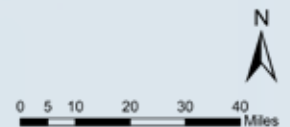*Figure 8.2: Animal-Involved Fatal and Serious-Injury Crash Density Map*

Animal-involved crashes have taken place most often on rural highways.

Crash Count per 5-Square-Mile

- 🟨 1 crash
- 🟧 2 crashes
- 🟥 3 crashes

- 🟩 Tribal Lands
- ⬜ County Boundary
- — Highway

Section 8: Natural Risk | *Animal*

When

Several fatalities and serious injuries involving collisions with animals occur every year. These collisions occur most often in summer months, on weekends and after dark.

Fatalities · Serious Injuries · Total K+A Trend

2005: 24 / 3 — 2006: 21 / 2 — 2007: 25 / 5 — 2008: 27 / 2 — 2009: 28 / 4 — 2010: 18 / 1 — 2011: 12 / 2 — 2012: 22 / 4

Fatalities · Serious Injuries · Total K+A Trend

January: 10 / 1 — February: 11 / 3 — March: 7 / 3 — April: 18 / 2 — May: 16 / 1 — June: 19 / 7 — July: 22 / 1 — August: 14 / 0 — September: 17 / 1 — October: 17 / 4 — November: 17 / 0 — December: 9 / 0

Fatalities · Serious Injuries · Total K+A Trend

Sunday: 31 / 7 — Monday: 22 / 1 — Tuesday: 12 / 5 — Wednesday: 17 / 2 — Thursday: 30 / 2 — Friday: 25 / 4 — Saturday: 40 / 2

Fatalities · Serious Injuries · Total K+A Trend

Who

Figure 8.4: Animal-Involved Fatalities and Serious Injuries by Driver Age and Gender

Male drivers in their 40s and 50s have been involved in the highest numbers of fatalities and serious injuries involving crashes with animals. This age distribution differs significantly from the distribution seen in other Emphasis Area categories. The numbers of female drivers involved in these animal-involved crashes is much lower than the number of male drivers involved in these crashes, as is seen with other Emphasis Area categories.
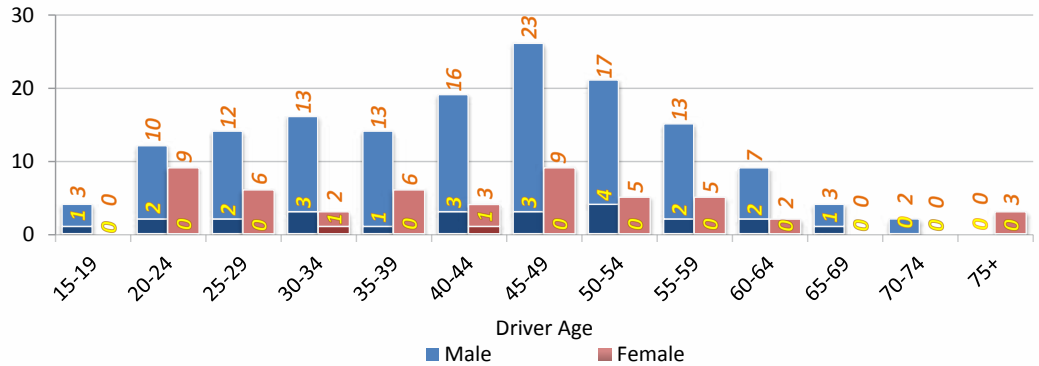
How

Figure 8.5: Animal-Involved Fatalities and Serious Injuries by Crash Type

Serious crashes with animals are different from most crash types as they usually involve only a single vehicle and an animal. More than half of the fatalities and serious injuries from crashes with animals are motorcycle crashes.
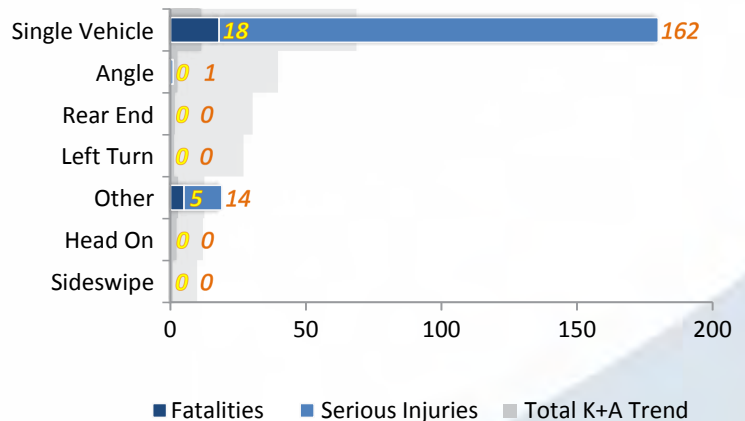
Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from animal-involved crashes on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

# Section 8: Natural Risk | *Animal*

Strategies and Proposed Action Steps

A. Implement comprehensive infrastructure improvements and maintenance to separate animals from the roadway while improving and maintaining wildlife connectivity.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
A.1 Establish exclusionary fencing to funnel animals to areas of safe crossing sites, control at-grade crossing points, establish crossing structures, grade separate where needed, and install escape measures for animals to exit, but not enter, road corridors.			
A.2 Improve sight distance, such as with safety shoulders/ maintenance clearing.			
A.3 Increase the installation of cattle guards outside ADOT right-of-way, such as on county or near tribal lands.			
A.4 Upgrade wildlife mitigation (exclusion and crossings) with road construction improvements.			
A.5 Install coordinated roadway lighting to improve roadway visibility while maximizing the use of wildlife crossings.			
A.6 Clear vegetation along the side of the road.			

Strategies and Proposed Action Steps

B. Enhance wildlife planning through research, planning and collaboration.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
B.1 Know long-term plans for adjacent land use, and involve the Bureau of Land Management and National Forest Service in the process.			
B.2 Include wildlife planning in prescoping of projects.			
B.3 Include the right people at the right time throughout transportation planning and design projects.			
B.4 Develop multiagency coalitions that focus on planning and exchanging best practices for wildlife.			
B.5 Showcase successes to secure buy-in (such as SR 260, I-17 to Woods Canyon).			
B.6 Consider educational institutions to conduct wildlife studies that can be incorporated into transportation projects.			
B.7 Develop a statewide comprehensive wildlife plan to identify corridors and linkages that can be used for transportation projects.			

Section 8: Natural Risk | *Animal*

Strategies and Proposed Action Steps

C. Increase driver awareness to reduce the frequency of animal-involved crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Establish a public awareness campaign to notify drivers not to stop for injured animals on highways and to call a statewide phone number to report injured animals and get assistance.			
C.2 Consider the use of signage to warn motorists of high-animal-crossing areas.			
C.3 Include motorcycle advocacy groups and coalitions in education and awareness.			
C.4 Use public information efforts to inform local and out-of-state drivers and land users where animal crashes are frequent.			

D. Improve the collection and quality of data for a better understanding of animal-involved crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Develop a data collection and reporting system that includes all agencies (federal, state, county, regional). Encourage partnerships to share and fund animal-tracking data and analysis.			
D.2 Increase the collection of sheep/elk/deer movement data to inform targeted mitigations.			
D.3 Explore opportunities to collect wildlife data using a smartphone application.			

Strategies and Proposed Action Steps

E. Utilize technology to reduce animal-involved incidents.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Utilize and maintain active warning systems to alert motorists.			
E.2 Provide statewide phone number to report dangerous road conditions (e.g., black ice, dead elk or deer in roadway).			
E.3 Explore opportunities to implement in-vehicle animal-detection systems.			

F. Advance research in wildlife-crash-reduction programs and their effectiveness to reduce or eliminate wildlife-involved crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Continue to explore the effectiveness of strategies and programs.			
F.2 Continue to research proper placement of treatments.			
F.3 Conduct research to determine wildlife patterns to be used for planning documents and inclusion in future projects (gap analysis).			

Section 8: Natural Risk | *Animal*

Strategies and Proposed Action Steps

G. Reduce the number of animals on the roadway to reduce the frequency of animal-involved crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
G.1 Educate owners of open-range animals on potential dangers to motorists.			
G.2 Reduce roadside animal attractants (i.e., food).			
G.3 Hold owners accountable for keeping their animals off the road.			

H. Explore opportunities to manage speed limits in animal-prone areas to reduce the number and severity of animal-involved crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
H.1 Explore opportunities for targeted enforcement or speed cameras.			

I. Utilize infrastructure improvements to reduce or eliminate animal-involved crashes on Arizona's roadways.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
I.1 Use high-friction pavement surface.			

Strategies and Proposed Action Steps

J. Better utilize existing funding options, and explore new funding opportunities for effective mitigation efforts to reduce or eliminate animal-involved crashes on Arizona's roadways.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
J.1 Pool state and local resources to fund wildlife-mitigation efforts.			
J.2 Identify a dedicated line item in the ADOT budget for funding wildlife crossing/mitigation efforts or aggressively seek federal grants for these efforts.			
J.3 Use ADOT programs to fund wildlife study/mitigation projects.			
J.4 Increase the budget to the Arizona Transportation Research Center (ATRC) specifically to fund necessary wildlife starts that have led to very successful mitigation efforts (e.g., I-17, SR 260, US 93).			
J.5 Use ADOT's Planning Assistance for Rural Areas (PARA) studies to fund linkage corridor analysis.			
J.6 Explore opportunities to fund comprehensive maintenance.			

K. Explore local ordinance opportunities to reduce animal-involved crashes on Arizona's roadways.

Strategy Leader:

Supporting Key Partners:

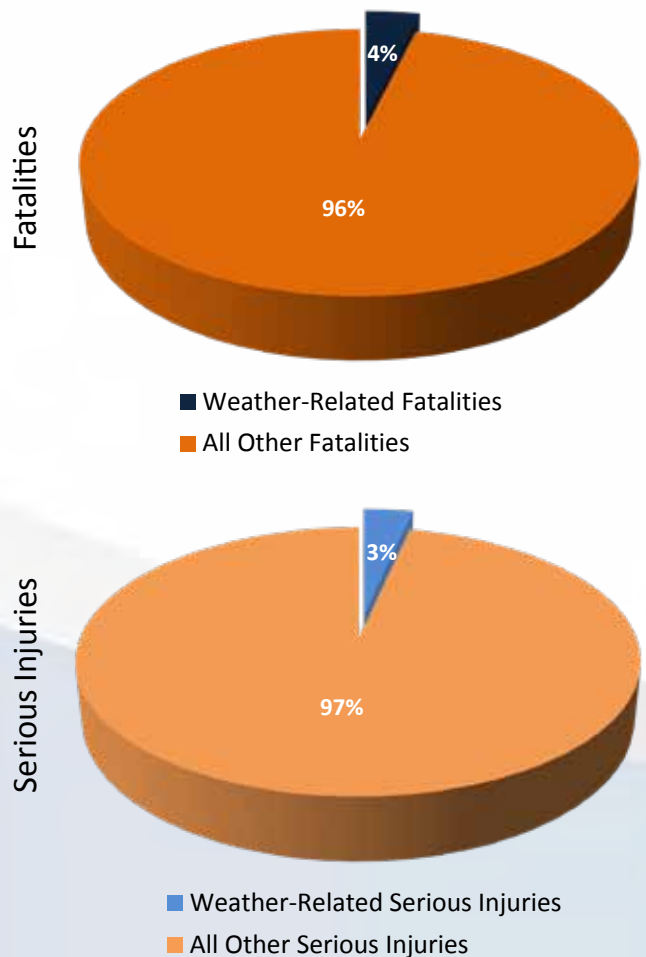| Action Steps	Leader(s) and Partners	Potential Resources	Status
K.1 Consider local ordinances to prevent feeding or encouraging wildlife, especially in "rural" areas with summer homes.			
K.2 Consider local ordinances on right-of-way fencing.			
K.3 Consider the development of a policy to identify locations of fencing and cattle guards.			

Section 9: Natural Risk | *Weather*

Favorable weather attracts residents and visitors to Arizona every year, but Arizona weather can pose unique risks to motorists. These risks range from snow and ice at higher elevations of the state to sudden thunderstorms and severe dust storms. While the frequency of severe weather events can be low, the risk of crashes associated with these events can be extremely high. The severity of some types of weather-related crashes also tends to be high and involve multiple vehicles.

What

Figure 9.1: Weather related Portion of All Fatalities and Serious Injuries

Weather-related fatalities and serious injuries are counted from all crashes involving any kind of rain, snow, ice, severe cross winds or blowing dust. These crashes contribute to four percent of all fatalities and more than three percent of serious injuries on Arizona roads.
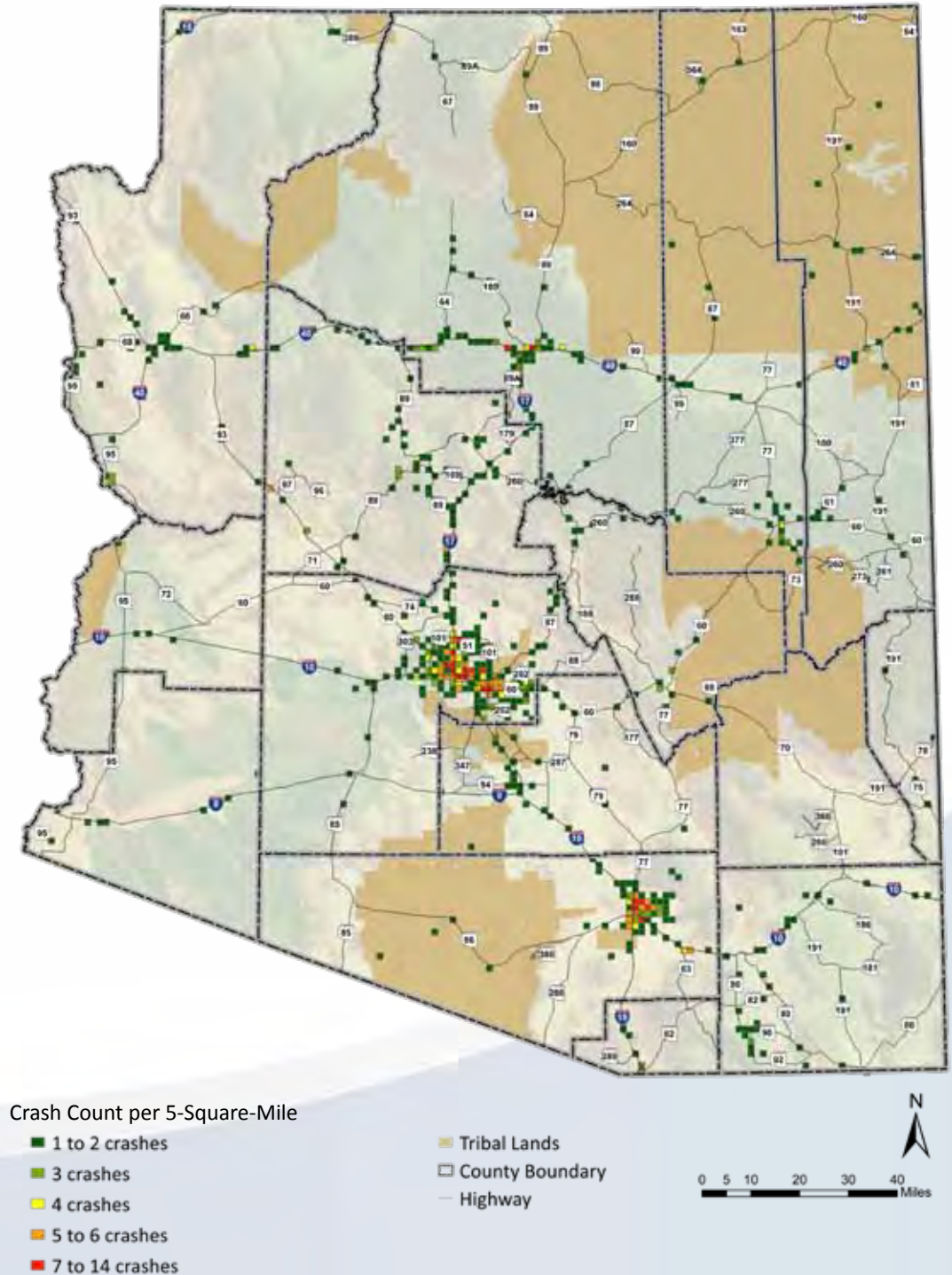

Fatalities

- 4%
- 96%

■ Weather-Related Fatalities
■ All Other Fatalities

Serious Injuries

- 3%
- 97%

■ Weather-Related Serious Injuries
■ All Other Serious Injuries

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Where

Figure 9.2 (a): Wet-Weather-Related Fatal and Serious-Injury Crash Density Map

Severe wet-weather-related crashes have taken place most often in areas with the highest traffic volume in urban centers. Snow-related severe crashes have taken place only in the higher-elevation parts of the state.
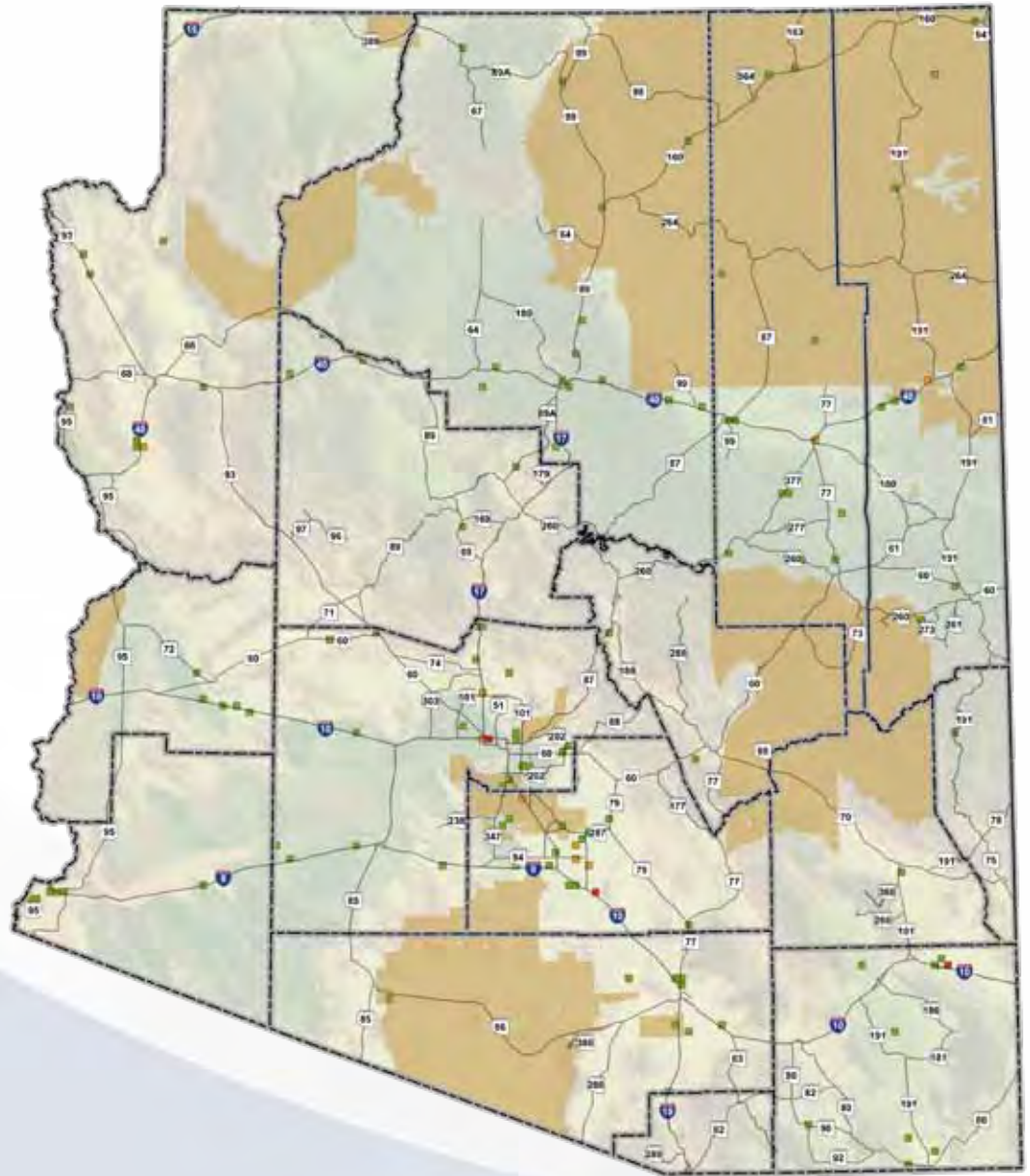
Crash Count per 5-Square-Mile

■ 1 to 2 crashes
■ 3 crashes
□ 4 crashes
■ 5 to 6 crashes
■ 7 to 14 crashes

▨ Tribal Lands
□ County Boundary
— Highway

N

0 5 10   20   30   40
Miles

Section 9: Natural Risk | *Weather*

Where

Severe cross winds contribute to as many fatalities and serious injuries as dust storms that eliminate visibility. However, these two contributing factors to crashes are different in many ways and generally take place in different parts of the state. Several hot spots for dust-related crashes have been identified along segments or stretches on I-10 and other parts of the state.

Crash Count per 5-Square-Mile

- ■ 1 crash
- ■ 2 crashes
- ■ 3 to 8 crashes
- ■ Tribal Lands
- ☐ County Boundary
- — Highway

N

0 5 10 20 30 40 Miles

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

When

Figure 9.3: Temporal Trends in Weather-related Fatalities and Serious Injuries

Weather-related fatalities and serious injuries have gone down more than 60 percent since 2005. These most severe crashes have taken place most often in winter and late summer months when high-risk weather events are most common. The greatest portion of these crashes also take place in the middle to late afternoon and on weekends.
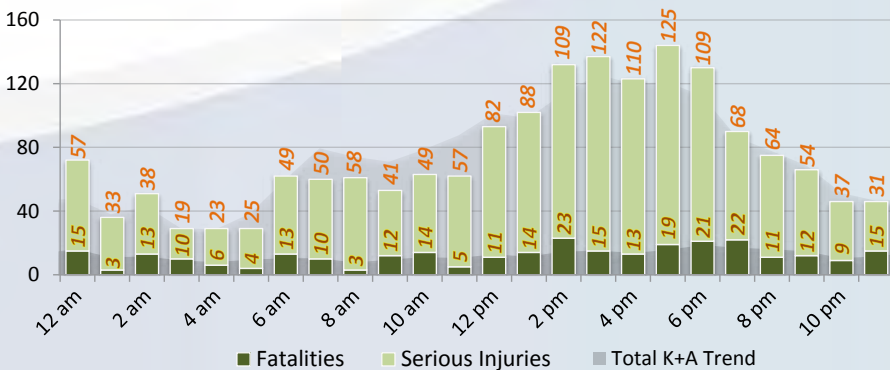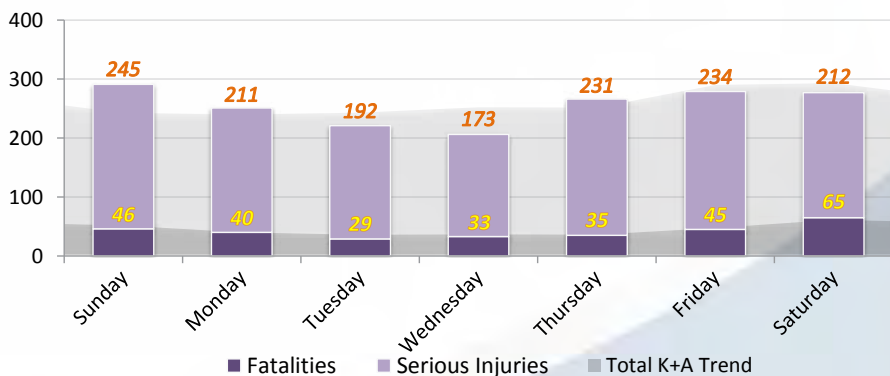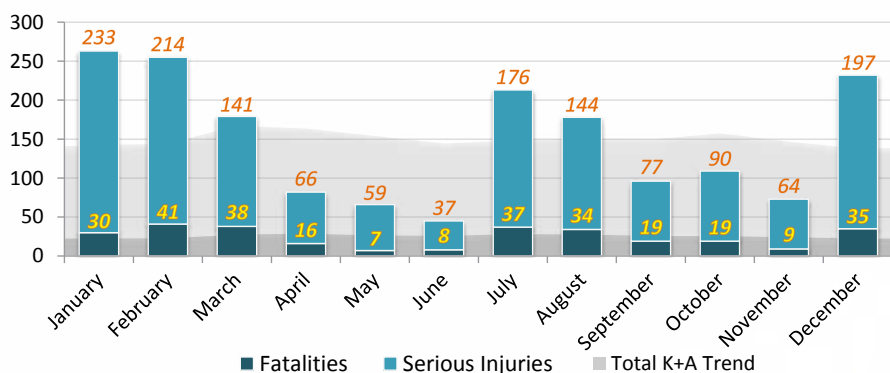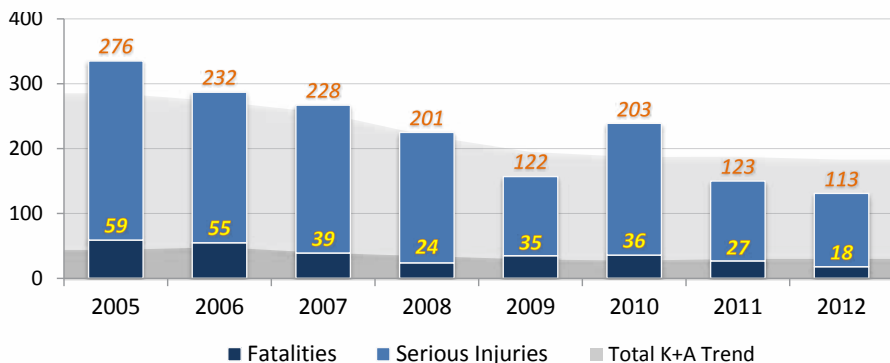
Section 9: Natural Risk | *Weather*

Who

Drivers in their early 20s are most often involved in very serious weather-related crashes. While the proportion of females to males involved in these crashes is still very low, females represent a higher portion of these weather-related crashes than they do with most other categories of crashes.
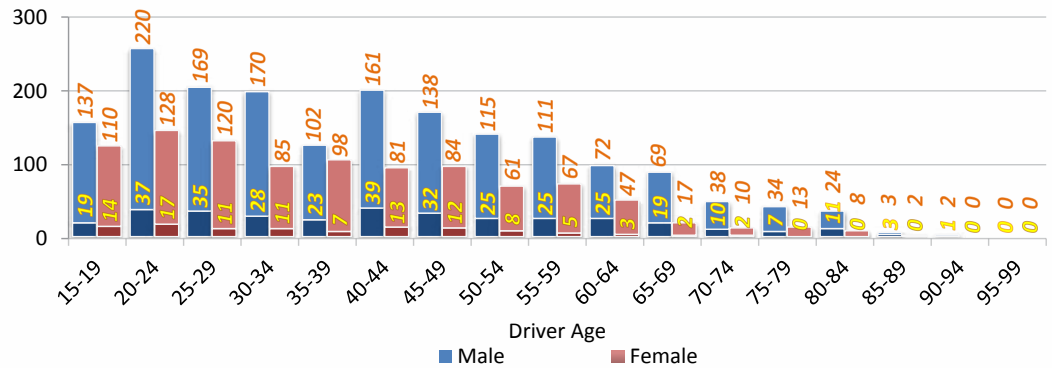
How

Different types of weather events result in varying types of crashes. Weather-related fatalities and serious injuries have occurred most often from single-vehicle, run-off-the-road crashes.
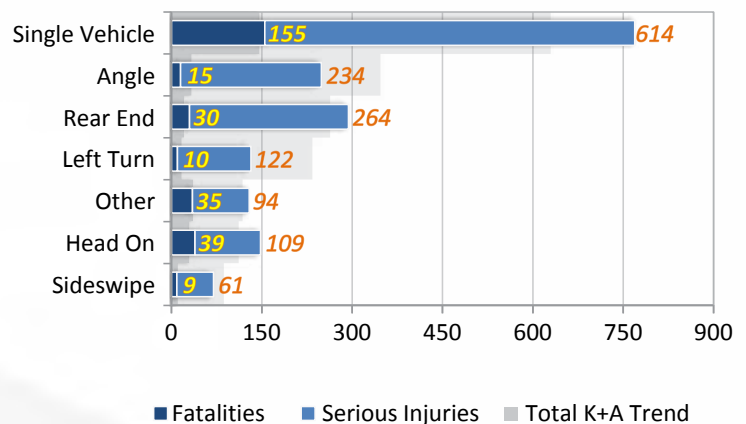
Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from weather-related crashes on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Strategies and Proposed Action Steps

A. Advance the use of detection and warning systems to reduce the frequency and severity of weather-related crashes.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
A.1 Install devices on Arizona roadways to detect and notify drivers of dust storms, low visibility and high winds and install integrated Intelligent Transportation Systems (ITS) and cameras to monitor weather conditions affecting visibility, surface hazards, ice or localized situations.			
A.2 Encourage the research and use of in-vehicle warning systems.			
A.3 Evaluate the use of phone applications to distribute warning messages.			
A.4 Enhance the coordination and data sharing between traffic operation centers in Flagstaff, Phoenix or Tucson during weather events.			
A.5 Enhance the use and development of an Amber Alert equivalent for potential weather-related incidents.			

Section 9: Natural Risk | *Weather*

Strategies and Proposed Action Steps

B. Increase proactive driver awareness of weather-related safety procedures to reduce the frequency and severity of weather-related crashes.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
B.1 Conduct public safety announcements and campaigns to educate drivers on dealing with hazard situations (e.g., what to do in dust storms, rain, etc.).			
B.2 Provide weather information to motorists.			
B.3 Utilize existing message boards, and install new safety guide signs with educational messaging in high-incident locations.			
B.4 Incorporate driver training on how to drive safely during dust storms and other weather events in defensive driving, traffic survival school, high school and other venues. Consider a "Welcome to Arizona" packet for licensed drivers (new or out-of-state) to inform the new driver/resident of the potential weather-related-incidents that they could encounter on Arizona's roadways and how to drive during those events.			
B.5 Provide drivers educational simulation of weather events (i.e. dust, ice or snow). Include more hands-on vehicle maintenance training, including changing filters and tires and using chains for tires.			

Strategies and Proposed Action Steps

C. Develop corridor or area-wide programs to address locations with a high number of weather-related crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Analyze data to identify locations, time and visibility (e.g. sun, fog) to minimize the risk of weather-related events.			
C.2 Prepare treatments and strategies before incidents occur.			
C.3 Consider cooperative programs to improve adjacent land use to minimize weather-related events.			
C.4 Conduct public awareness campaigns to address land use.			
C.5 Consider programs to buy/lease right-of-way adjacent to locations where there are high incidents of dust events to plant vegetation to stop soil mitigation.			

D. Alter the state of roadway devices to permit or restrict traffic flow to reduce weather-related crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Close bridges or road segments, or restrict the access of certain vehicles, during weather incidents.			
D.2 Implement weather-related signal timing plans during heavy rain, snow or icy conditions. Increase cycle lengths and reduce progression speeds.			

Section 9: Natural Risk | *Weather*

Strategies and Proposed Action Steps

E. Develop and implement comprehensive enforcement programs focused on weather-related crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Develop and implement comprehensive enforcement programs that include all partners.			
E.2 Expand the Arizona Stupid Motorist law to include motorists who drive into severe weather and cause severe crashes. This law and the "reasonable and prudent" and reckless-driving statutes would apply to aggressive drivers who cause crashes by traveling at unsafe speeds or by changing lanes when it is not safe to do so during a dust storm or other low-visibility event.			
E.3 Enforce speed limits, and manage traffic flow during weather incidents.			

F. Improve data collection and analysis of weather-related incidents to better determine crash causes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Modify the crash report form where appropriate to better capture data involving weather, dangerous road conditions and animal-involved crashes.			
F.2 Collect weather, pavement and traffic data to provide decision support to managers.			

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Strategies and Proposed Action Steps

| G. Utilize infrastructure improvements to reduce the number and severity of crashes caused by weather incidents.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
G.1 Use high-friction pavement surface.			
G.2 Improve infrastructure to widen shoulder, build additional pull-out areas, indicate roadway closure points and utilize ITS detections.			

Section 10: Nonmotorized Users | *Bicyclists*

Bicycling in Arizona is increasing in popularity both as a recreation and a means of travel. Bicyclists are often more difficult to see and are especially vulnerable to impact by motor vehicles. While awareness and efforts related to bicycle safety continue to increase, bicycle fatalities and injuries remains high and have increased in some areas.

What

Figure 10.1: Bicycle-Involved Portion of All Fatalities and Serious Injuries

Bicycle-involved fatalities and serious injuries are counted from all crashes between a motor vehicle and a bicycle or other pedalcycle. These crashes contribute to more than two percent of all fatalities and four percent of all serious injuries. Bicycle crashes not involving a motor vehicle are not counted in the data used for this analysis.

Fatalities

2%
98%

■ Bicycle-Involved Fatalities
■ All Other Fatalities

Serious Injuries

4%
96%
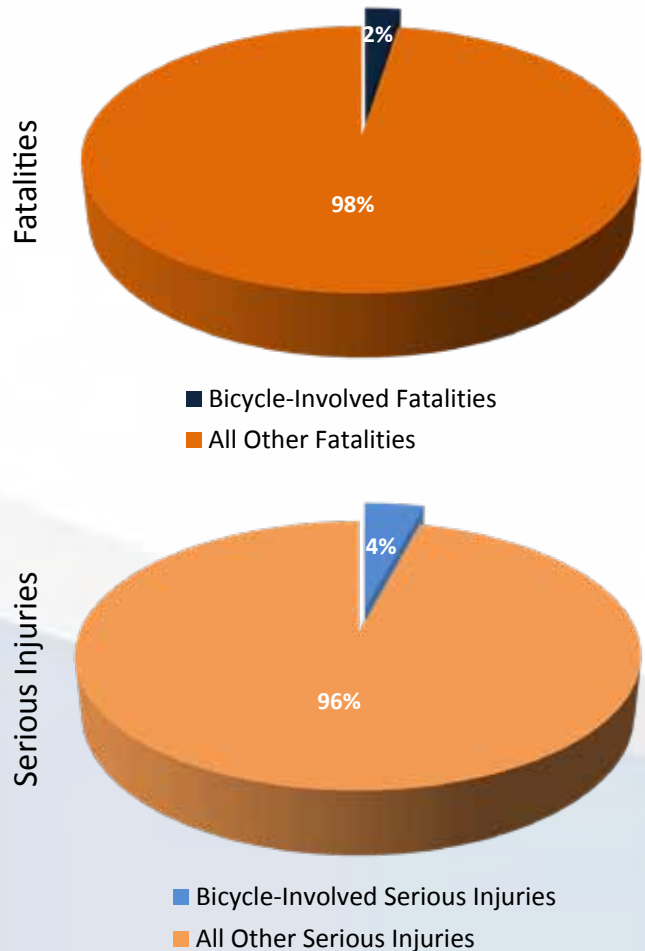
■ Bicycle-Involved Serious Injuries
■ All Other Serious Injuries

Where

Figure 10.2: Bicycle Involved-Fatal and Serious Injury Crash Density Map

Almost all bicycle-involved fatalities and serious injuries take place in urban areas on local jurisdiction roadways. A much higher number of these crashes occur at intersection locations, as compared to the average for all crashes.

Crash Count per 5-Square-Mile

- 1 to 4 crashes
- 5 to 7 crashes
- 8 to 13 crashes
- 14 to 18 crashes
- 19 to 36 crashes

- Tribal Lands
- County Boundary
- Highway
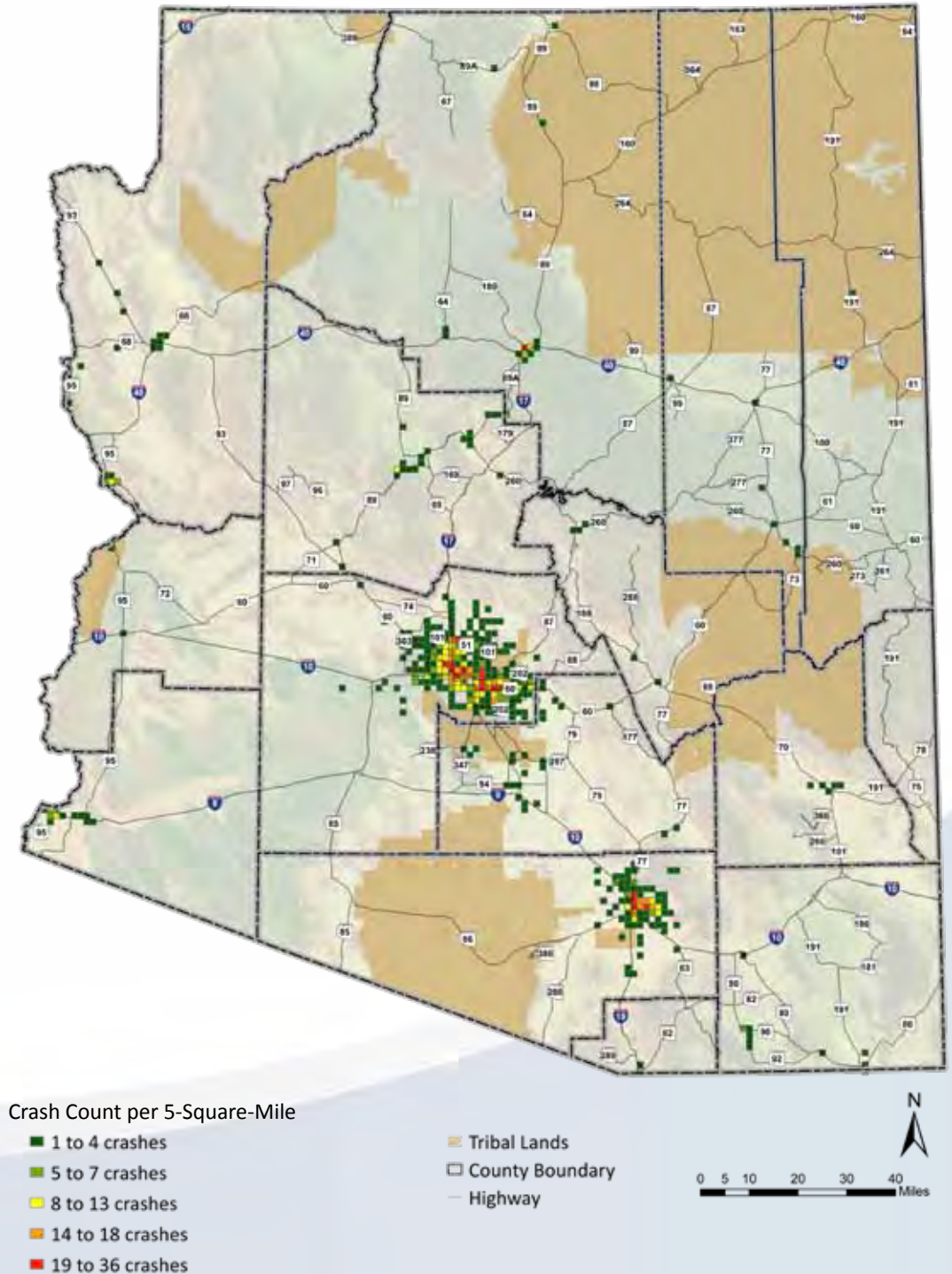
When

Figure 10.3: Temporal Trends in Bicycle-Involved Fatalities and Serious Injuries

While bicycle-involved fatalities and serious injuries have gone down since 2005, these counts have been up and down or essentially flat since 2008. High severity crashes involving bicyclists occurred most often in the spring and fall, when temperatures are most conducive to riding in most of the state. These crashes also take place most often in the middle of the week and during the peak traffic hours in the morning and late afternoon.
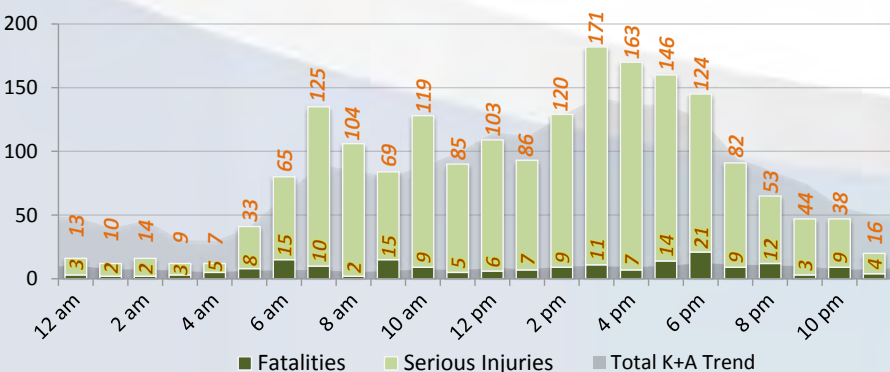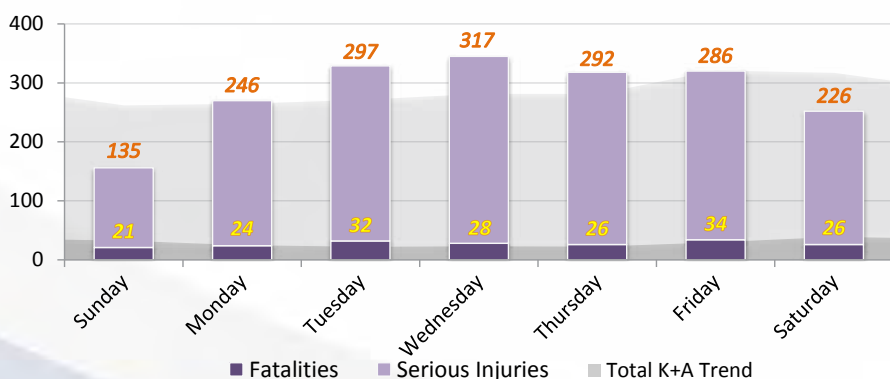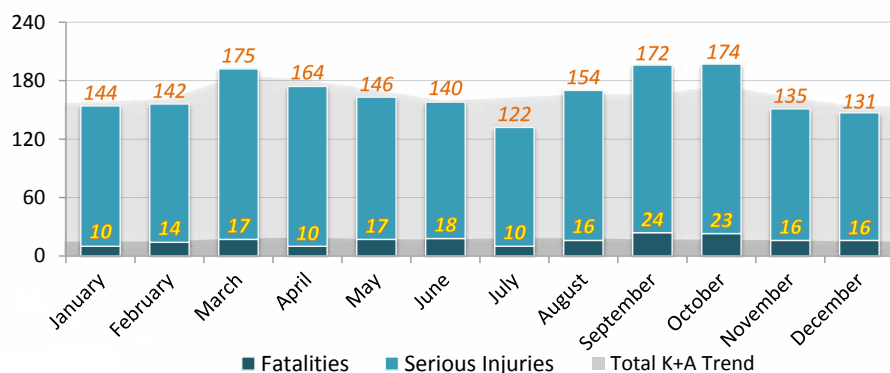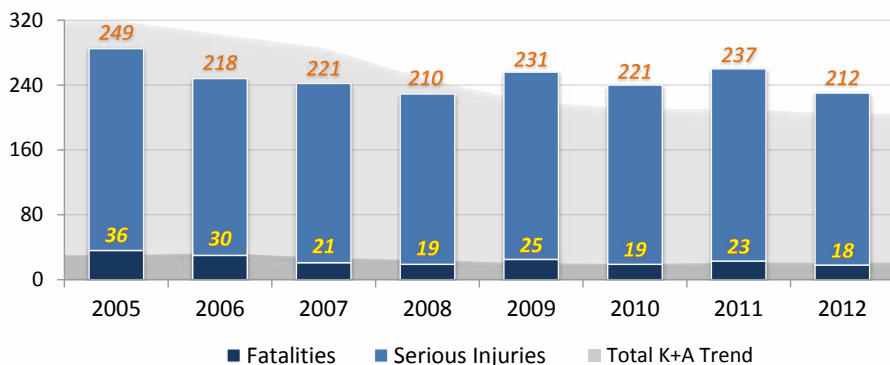
Section 10: Nonmotorized Users | *Bicyclists*

Who

There have been 8.5 times more male bicyclist fatalities than there have been female. Older children, teenagers and young adults are often the victims of these crashes involving a bicycle. A high number of these crashes also occurs with bicyclists 45 to 49 years old.
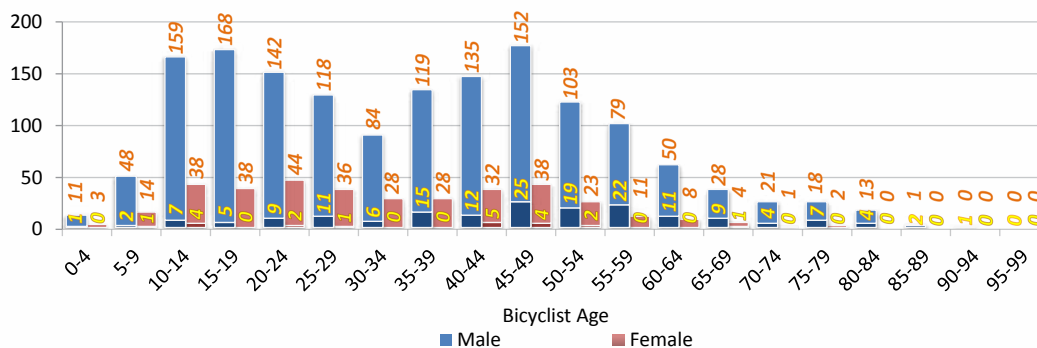
How

Crash type is not clearly defined for bicycle-involved crashes. Crashes involving only one vehicle are usually designated as single-vehicle crashes. When a crash report indicates "other" as the crash type, additional information is provided or described in the crash report narrative. Many of these most severe bicycle-involved crashes take place when the motorist turns and does not see the bicyclist.
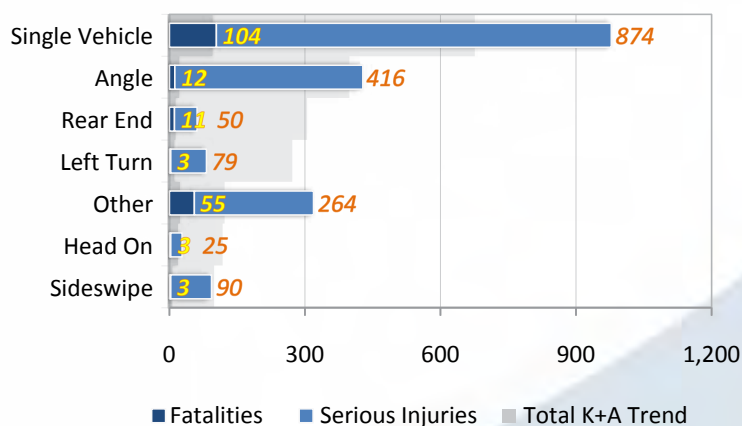
Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from crashes involving nonmotorized users on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 10: Nonmotorized Users | *Bicyclists*

Strategies and Proposed Action Steps

A. Improve public awareness to promote safer behavior by all roadway users relative to bicycle traffic.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
A.1 Develop and launch a bicycle safety campaign (e.g., build a "cool" brand for safety with attention-grabbing public service announcements/commercials).			
A.2 Develop and launch a campaign to prevent "wrong-way bicycling."			
A.3 Increase use of bicycle helmets by all bicyclists.			
A.4 Increase rider and bicycle conspicuity.			
A.5 Develop and launch a safety campaign that focuses on motorists.			

Section 10: Nonmotorized Users | *Bicyclists*

Strategies and Proposed Action Steps

B. Improve infrastructure features to reduce the frequency of bicycle crashes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1 Provide routine maintenance of bicycle facilities.			
B.2 Provide continuous bicycle facilities, including between jurisdictions.			
B.3 Install traffic-calming measures in high bicycle and motor vehicle areas.			
B.4 Provide bicycle-tolerable shoulder rumble strips.			
B.5 Provide safe roadway facilities for parallel travel to an arterial road (e.g. bike boulevards) on low-stress routes.			
B.6 Improve geometry, signing and striping.			
B.7 Improve crossing treatments.			
B.8 Install more separated bicycle ways.			

C. Conduct enforcement programs for all roadway users relative to bicycle traffic.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Enforce "wrong-way bicycling" laws and ordinances.			
C.2 Enforce Arizona's Three-Foot Passing Law.			
C.3 Increase school-zone enforcement efforts.			

Section 10: Nonmotorized Users | *Bicyclists*

Strategies and Proposed Action Steps

D. Enhance training programs for all roadway users and safety practitioners.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Provide training on bicycle-related laws, helmet usage and bicycle maintenance.			
D.2 Educate road users to be more conscious of the presence of bicyclists.			
D.3 Cooperate with local agencies to provide training for all roadway users regarding bicycle safety.			
D.4 Provide intersection safety education to roadway users.			
D.5 Increase frequency of vehicle driver license retesting to teach bicycle awareness to drivers.			

E. Improve data collection, integration, analysis and sharing at all levels.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Gather and analyze additional data to determine effective measures to better reduce the frequency and severity of bicycle-involved crashes.			

Strategies and Proposed Action Steps

F. Seek funding to support safety programs to improve bicycle safety.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Seek federal grants to pay for a bicycle helmet programs (similar to a child safety seat programs).			
F.2 Develop programs that can be institutionalized and implemented in a self-sustaining way with dedicated funding.			
F.3 Support the Safe Routes to School program.			
F.4 Investigate funding strategy for using HSIP funds for bicycle-safety roadway improvements.			

G. Research and identify effective policies to improve bicycle safety that can be implemented by state, local and tribal governments.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
G.1 Consider measures to mandate training for all roadway users regarding bicycle safety.			
G.2 Consider bicycle-helmet laws for children.			
G.3 Consider bicycle-helmet laws for adults.			
G.4 Encourage cities to enact code to require that bicycle riders on sidewalks must ride with the flow of traffic and not in excess of a safe speed.			
G.5 Encourage agencies to adopt "Complete Streets" policies.			

Section 11: Nonmotorized Users | *Pedestrians*

Every year in Arizona, more than 1,500 pedestrians are struck by a motor vehicle, and nearly 10 percent of those crashes result in a pedestrian fatality. As populations in Arizona grow and communities and cities become more walkable, pedestrian safety continues to be a critical safety focus.

What

Figure 11.1: Pedestrian-Involved Portion of All Fatalities and Serious Injuries

Pedestrian-involved fatalities and serious injuries are counted from all crashes involving a pedestrian and a motor vehicle. These crashes contribute to 15 percent of all fatalities and seven percent of serious injuries.

Fatalities

15%

85%

■ Pedestrian-Involved Fatalities
■ All Other Fatalities

Serious Injuries

7%

93%

■ Pedestrian-Involved Serious Injuries
■ All Other Serious Injuries

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Where

Pedestrian-involved high-severity crashes have taken place most often in the highest-traffic-volume locations in the major urban centers.
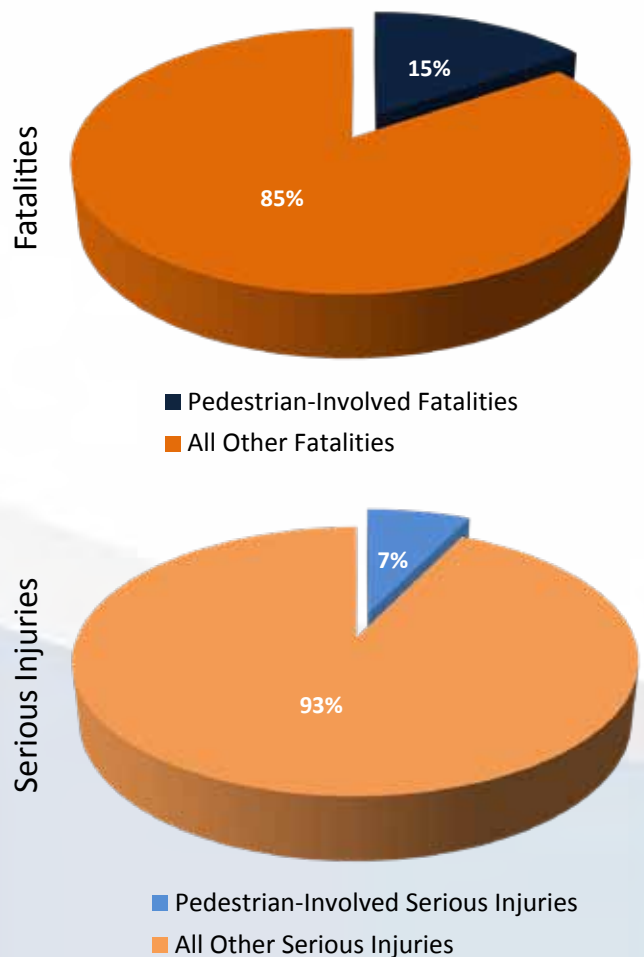
Figure 11.2: Pedestrian-Involved Fatal and Serious-Injury Crash Density Map
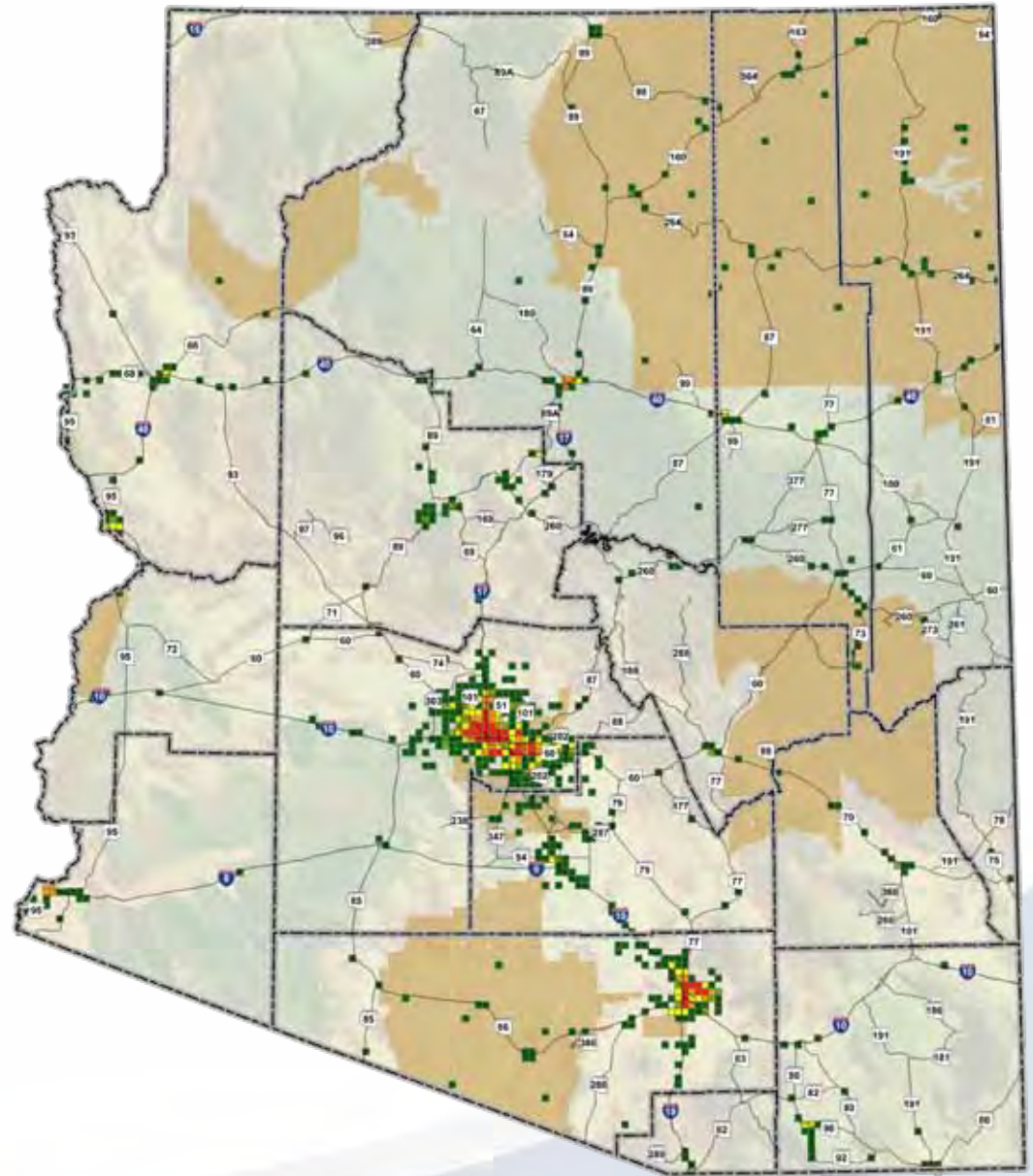
Crash Count per 5-Square-Mile

- 1 to 4 crashes
- 5 to 6 crashes
- 7 to 14 crashes
- 15 to 27 crashes
- 28 to 90 crashes

- Tribal Lands
- County Boundary
- Highway
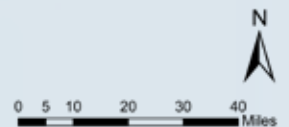
0 5 10 20 30 40 Miles

N

Section 11: Nonmotorized Users | *Pedestrians*

When

The numbers of pedestrian fatalities and serious injuries went down in 2008 and 2009 from the previous years. However, other years, before 2008 and after 2009, have remained flat or even increased. Severe pedestrian crashes are highest in the winter months and on Fridays. Pedestrian fatalities and serious injuries increase dramatically at the end of the day, likely due to poor lighting conditions.

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Section 11: Nonmotorized Users | *Pedestrians*

Who

Almost three times as many male pedestrians are killed than female pedestrians. Teenagers and young adults are often the victims of pedestrian crashes. A high number of males in their 40s are killed or seriously injured as pedestrians.
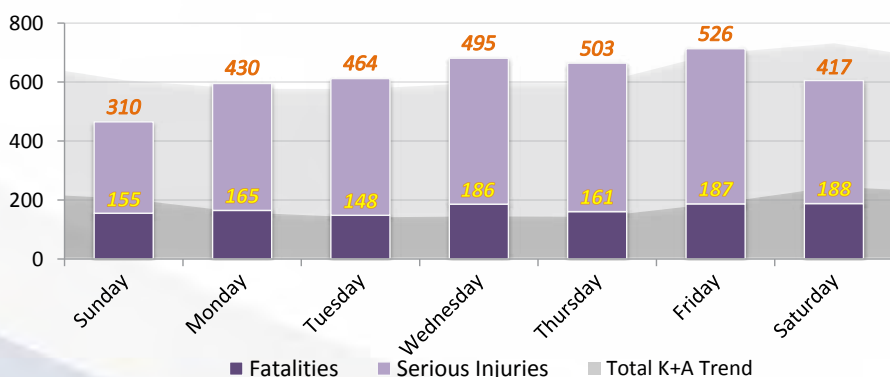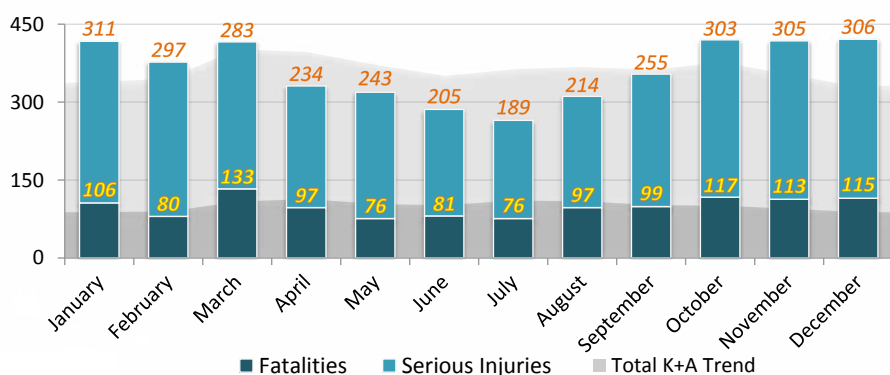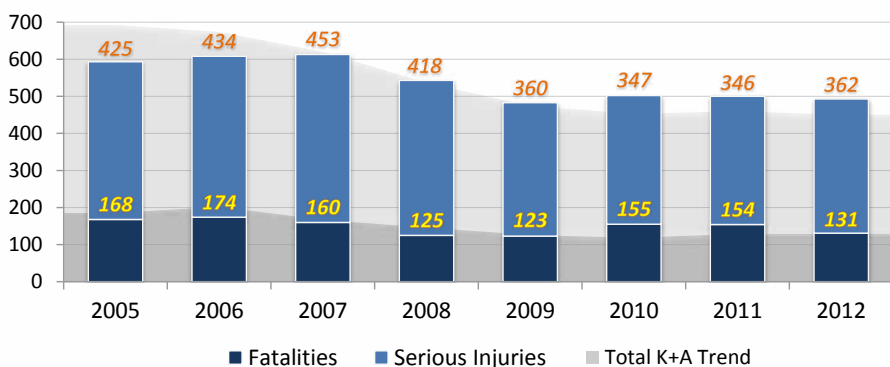
Figure 11.4: Pedestrian-Involved Fatalities and Serious Injuries by Pedestrian Age and Gender

How

Crash type is not clearly defined for pedestrian-involved crashes. Crashes involving only one vehicle are usually designated as a single-vehicle crashes. When a crash report indicates "other" as the crash type, additional information is provided or described in the narrative. Many of these severe pedestrian-involved crashes take place when the motorist turns and does not see the pedestrian.
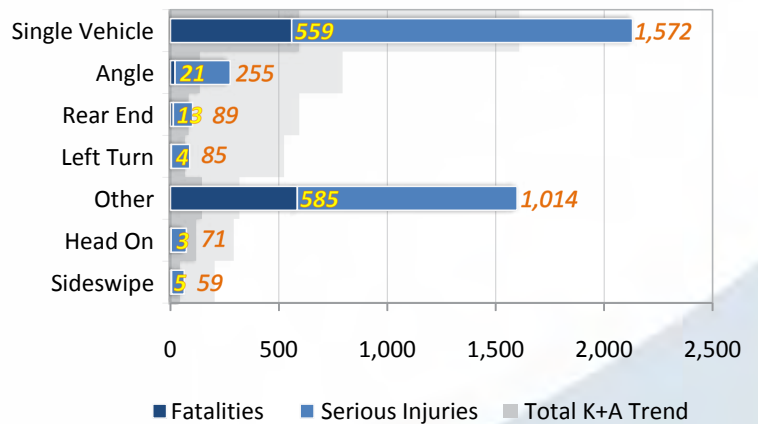
Figure 11.5: Pedestrian-Involved Fatalities and Serious Injuries by Crash Type

Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from crashes involving nonmotorized users on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 11: Nonmotorized Users | *Pedestrians*

Strategies and Proposed Action Steps

A. Reduce pedestrian exposure to vehicle traffic.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
A.1 Reduce pedestrian crossing distances, and provide mid-block crossings.			
A.2 Encourage agencies to adopt "Complete Streets" policies.			
A.3 Consider lengthening pedestrian clearance times at signals per the current Manual on Uniform Traffic Control Devices (MUTCD).			
A.4 Install countdown pedestrian signals.			
A.5 Test innovative pedestrian treatments.			
A.6 Reevaluate the placement of bus stop locations.			
A.7 Consider specialized pedestrian crossings at locations with high pedestrian activity or crash history that may include grade separations.			
A.8 Provide sidewalk/walkways/paved shoulders and ADA ramps.			
A.9 Collect data on pedestrian volumes to help assess safety risk.			

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Section 11: Nonmotorized Users | *Pedestrians*

Strategies and Proposed Action Steps

B. Improve sight distance and/or visibility between motor vehicles and pedestrians.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1 Install pedestrian beacons (high-intensity activated crosswalk [PHP/HAWK] or rapid flash beacon).			
B.2 Install lighting at pedestrian crossings.			
B.3 Implement high-visibility signing and pavement treatments at or near pedestrian crossings.			
B.4 Install solar-powered flashers at rural pedestrian crossing locations.			

C. Increase enforcement of existing laws designed to promote pedestrian safety, such as jaywalking and vehicles failing to stop for pedestrians at pedestrian crossings.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Conduct a pedestrian-safety enforcement campaign.			
C.2 Consider a "walking under the influence" (WUI) law.			
C.3 Establish special (higher fine) pedestrian enforcement zones.			

Section 11: Nonmotorized Users | *Pedestrians*

Strategies and Proposed Action Steps

D. Increase pedestrian-safety education for all roadway users.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
D.1 Provide pedestrian-safety education in schools.			
D.2 Conduct a pedestrian-awareness campaign.			
D.3 Work with schools, districts, PTAs and neighborhoods to build awareness and educate on pedestrian safety.			
D.4 Increase frequency of vehicle driver license retesting to teach pedestrian awareness to drivers.			

E. Reduce vehicle speeds in predictable locations, such as areas of high pedestrian traffic and school bus stops.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
E.1 Reduce speed limits in pedestrian crossing areas.			
E.2 Reduce vehicle speed by implementing physical chan changes to the roadway.			
E.3 Research connected vehicle technology at high pedestrian crossing locations.			

Strategies and Proposed Action Steps

F. Utilize the Safe Routes to School Program.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
F.1 Work with schools, districts, PTAs and neighborhoods to build infrastructure and awareness on pedestrian and bicycle safety.			

Section 12: Occupant Protection

Nearly 50 percent of people who died in a motor vehicle crash in Arizona were not using a seat belt or other safety device. This figure is compared to 24 percent for persons who sustained serious injuries that were not restrained in a crash, and 12 percent for persons who sustained minor injuries that were not restrained in a crash. Simply stated: Seat belts, child safety seats and helmets reduce the severity of crashes and save lives. Collisions in which motorists are unrestrained are also associated with a higher number of other unsafe behavioral characteristics, such as speeding and impaired driving, where safety risk is further increased.

What

Figure 12.1: Safety-Restraint-Not-Used-Related Portion of All Fatalities and Serious Injuries

Occupant-protection fatalities and serious injuries are counted from drivers or passengers who were not using a seat belt, a child-restraint system, or a helmet in the case of motorcyclists. Forty-nine percent of people who died in a motor vehicle crash, and 24 percent of those who were seriously injured, were not properly restrained.

Fatalities

51%

49%

■ Restraint-Not-Used Fatalities
■ All Other Fatalities

Serious Injuries

24%

76%

■ Restraint-Not-Used Serious Injuries
■ All Other Serious Injuries
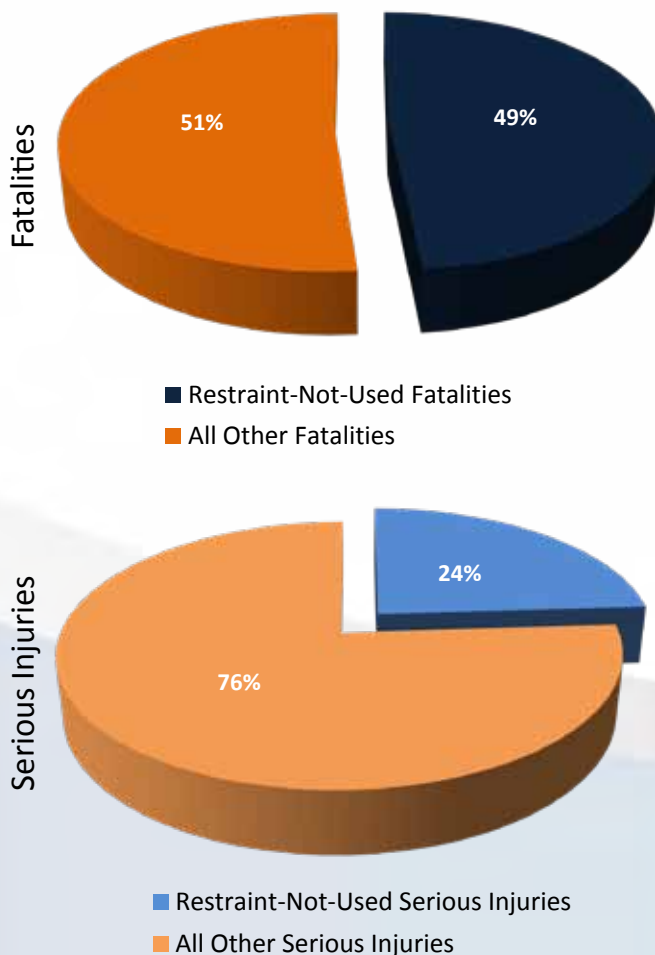
Where

Figure 12.2: Safety-Restraint-Not-Used-Related Fatal and Serious-Injury Crash Density Map

The highest number of fatalities and serious injuries from motorists not being properly restrained are in high-traffic-volume locations in the major urban centers. However, risk of fatality and serious injury in not using a safety restraint device is highest in rural areas, where emergency response and transport times are longest.

Crash Count per 5-Square-Mile

- ■ 1 to 3 crashes
- ■ 4 to 5 crashes
- ☐ 6 to 9 crashes
- ■ 10 to 21 crashes
- ■ 22 to 165 crashes

▨ Tribal Lands
☐ County Boundary
— Highway

0 5 10 20 30 40 Miles

N
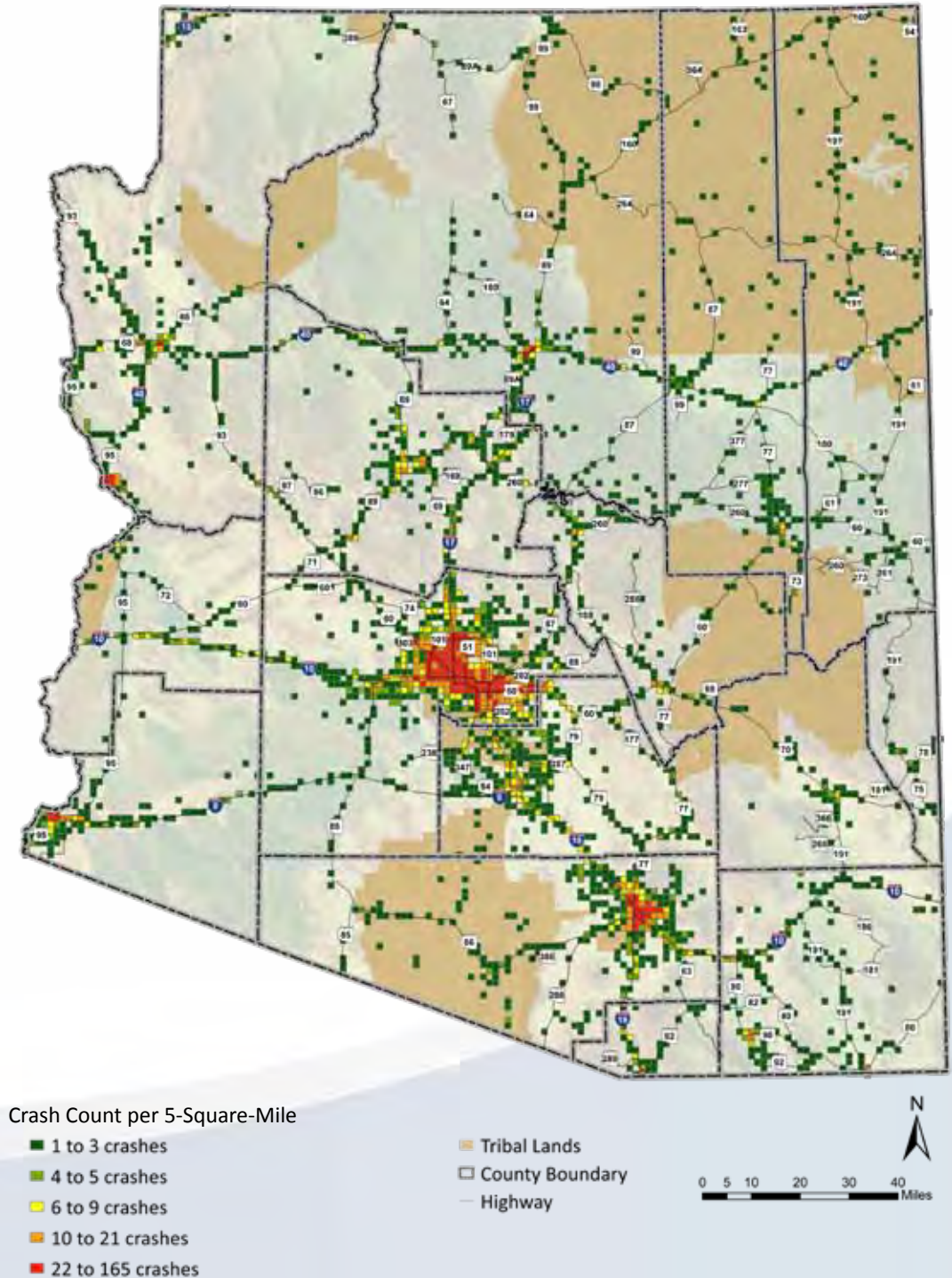
Section 12: Occupant Protection

When

Figure 12.3: Temporal Trends in Safety-Restraint-Not-Used Fatalities and Serious Injuries

Fatalities and serious injuries involving unrestrained motorists or passengers have decreased steadily since 2005, but they have leveled off or even started to increase in the most recent years. These fatalities and serious injuries take place slightly more often than average in summer months and at night, and much more often than average on weekends.

Chart 1 (2005–2012) — Fatalities, Serious Injuries, Total K+A Trend

Year	Serious Injuries	Fatalities
2005	2,428	583
2006	2,134	701
2007	1,865	531
2008	1,635	471
2009	1,417	389
2010	1,286	331
2011	1,141	363
2012	1,177	376

Chart 2 (Monthly) — Fatalities, Serious Injuries, Total K+A Trend

Month	Serious Injuries	Fatalities
January	1,040	285
February	1,044	298
March	1,160	325
April	1,233	360
May	1,163	345
June	1,105	295
July	1,116	371
August	1,112	350
September	1,112	317
October	1,070	286
November	1,012	261
December	916	252

Chart 3 (Day of Week) — Fatalities, Serious Injuries, Total K+A Trend

Day	Serious Injuries	Fatalities
Sunday	2,119	701
Monday	1,589	453
Tuesday	1,582	384
Wednesday	1,595	399
Thursday	1,686	402
Friday	2,087	593
Saturday	2,425	813

Chart 4 (Hour of Day) — Fatalities, Serious Injuries, Total K+A Trend

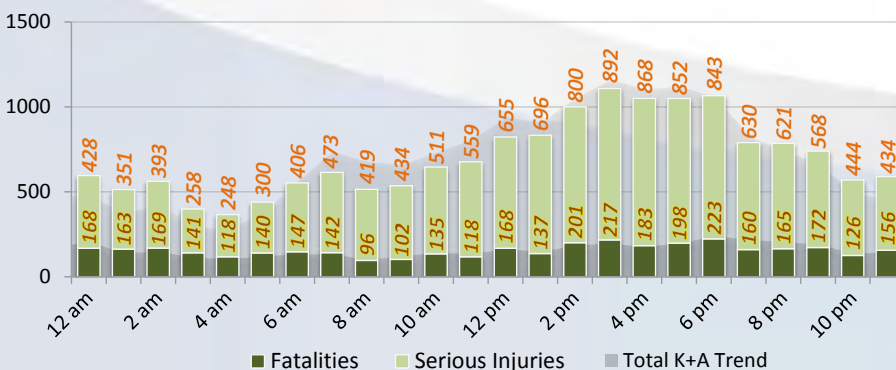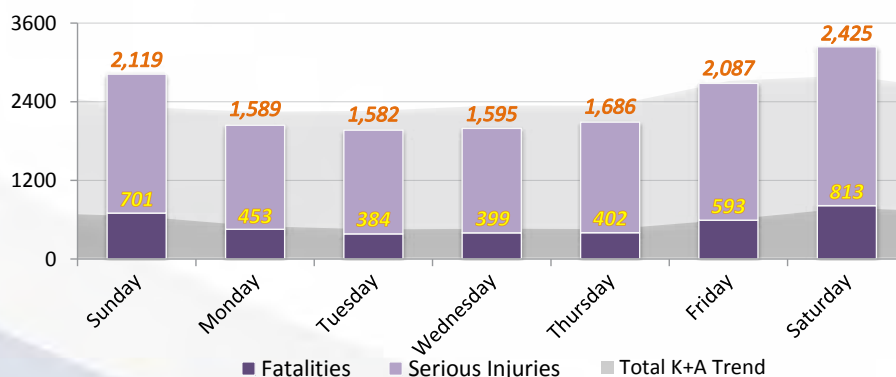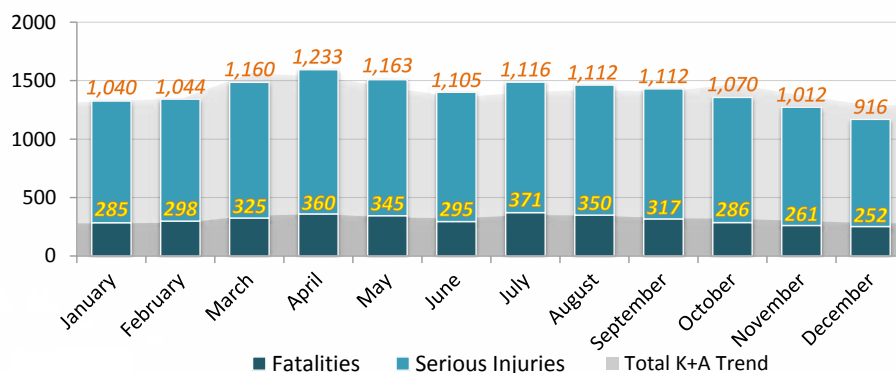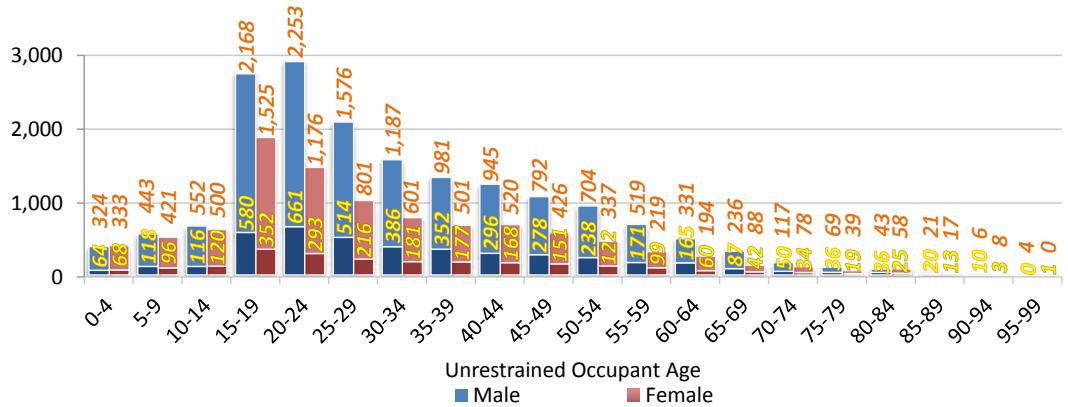| Time	Serious Injuries	Fatalities
12 am	428	168
1 am	351	163
2 am	393	169
3 am	258	141
4 am	248	118
5 am	300	140
6 am	406	147
7 am	473	142
8 am	419	96
9 am	434	102
10 am	511	135
11 am	559	118
12 pm	655	168
1 pm	696	137
2 pm	800	201
3 pm	892	217
4 pm	868	183
5 pm	852	198
6 pm	843	223
7 pm	630	160
8 pm	621	165
9 pm	568	172
10 pm	444	126
11 pm	434	156

Section 12: Occupant Protection

Who

Figure 12.4: Safety-Restraint-Not-Used Fatalities and Serious Injuries by Victim Age and Gender

Unrestrained teenagers and young adults are involved in the highest number of fatalities and serious injuries. There is little difference in the gender of unprotected child victims of these most severe crashes.

How

Figure 12.5: Safety-Restraint-Not-Used-Related Fatalities and Serious Injuries by Crash Type

Not wearing a seat belt results in fatalities and serious injuries especially in single-vehicle run-off-the-road crashes and lane-departure head-on collisions.
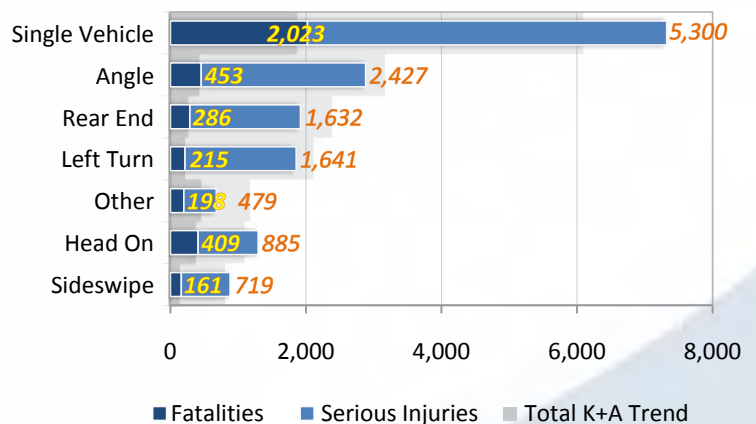
Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from crashes involving unrestrained or unprotected occupants on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 12: Occupant Protection

Strategies and Proposed Action Steps

A. Couple enhanced enforcement of existing restraint-use laws with high-visibility marketing about enforcement efforts.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
A.1 Incorporate crash consequences into enforcement messaging.			
A.2 Conduct a special, high-visibility, saturated seat-belt enforcement campaign (e.g., Click It or Ticket) similar to DPS's Seat Belt 500.			
A.3 Conduct child-protection-seat enforcement checkpoints.			
A.4 Conduct officer outreach to aggressively pursue seat belt contacts and issue citations to help the public to form the life-saving habit of being properly restrained.			
A.5 Strengthen nighttime seat-belt enforcement details, such as combined enforcement campaigns (impaired driving / seat belt use; speeding / seat belt use).			
A.6 Develop and execute targeted outreach and marketing campaigns in multiple languages, including English, Spanish and Navajo.			
A.7 Conduct checks of seat belt warning devices during emissions testing.			

Section 12: Occupant Protection

Strategies and Proposed Action Steps

B. Strengthen outreach and education about the proper use of seat belts and child-restraint devices to identified target audiences.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
B.1 Provide seat-belt education to children as a way to reach other family members.			
B.2 Provide parents with education about restraint usage, including consequences of crashes in which restraints are not used.			
B.3 Focus restraint-use public awareness campaigns for proven low-use individuals and/or high-risk families.			
B.4 Create a state-level clearinghouse for materials that offer guidance in implementing restraint-use programs.			
B.5 Develop and execute targeted outreach and marketing campaigns in multiple languages, including English, Spanish and Navajo.			
B.6 Provide community-wide child-restraint distribution programs coupled with high-profile inspection events/clinics utilizing certified child-protection-seat technicians.			
B.7 Promote community-wide and individualized child-protection-seat instruction through 1) community-level education with one-on-one contact via installing car seats; 2) integrating child-protection-seat education into home-visit programs (Maternal, Infant and Early Childhood Home Visiting (MIECHV) Program though the Arizona Department of Health Services); and 3) proper car-seat installation education with prenatal care.			
B.8 Require child-restraint-system training session, including demonstrated ability to install and use the device properly, to receive a free child safety seat.			
B.9 Train law-enforcement personnel to check for proper child-restraint use during all motorist encounters.			

Section 12: Occupant Protection

Strategies and Proposed Action Steps

C. Strengthen driver education and safety-restraint-usage outreach to identified target audiences.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Offer an annual driver-education class in schools to address high-risk teen driving behaviors, including restraint usage, distracted driving and speeding. Consider incorporating driver education into School Resource Officer (SRO) lesson plans.			
C.2 Teach teen drivers the physics of restraint usage.			

D. Improve restraint-usage data collection, integration, analysis and sharing between agencies at all levels.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Gather crash data on lack of restraint use vs. injuries/deaths resulting from other types of crashes to support educational, public awareness and other efforts.			
D.2 Link crash data with injury outcomes			

Section 12: Occupant Protection

Strategies and Proposed Action Steps

E. Research and identify effective policies to increase restraint usage that can be implemented by state, local and tribal governments.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Educate decision makers on the benefits on restraint usage.			
E.2 Consider tribal policies for enforcement of seat-belt usage.			
E.3 Consider increasing the fine for restraint-use violations.			

F. Promote employer engagement in efforts to encourage restraint usage 100 percent of the time.

Strategy Leader:

Supporting Key Partners:

| Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Recommend employer (governmental, public education and private organizations) policies requiring restraint usage by employees on the job, with possible sanctions for not wearing a seat belt when driving on behalf of work.			
F.2 Encourage employers / local businesses to provide donations for child seats and / or media buys in support of public awareness campaigns (cause marketing in support of restraint usage with "goodwill benefit" to donor).			

Intersections are locations of high numbers of crashes, which are especially common during times of high traffic. More than 45 percent of all crashes, including lower severity crashes, involved an intersection.

What

Figure 13.1: Intersection-Related Portion of All Fatalities and Serious Injuries

Intersection-related fatalities and serious injuries are counted from all crashes that relate to or take place in an intersection. Intersection crashes contribute to 23 percent of all fatalities and 44 percent of all serious injuries. The percentage of crashes at intersections with less severe injuries is again higher than what is shown for serious injuries.

Fatalities

- 23%
- 77%

■ Intersection-Related Fatalities
■ All Other Fatalities

Serious Injuries

- 44%
- 56%
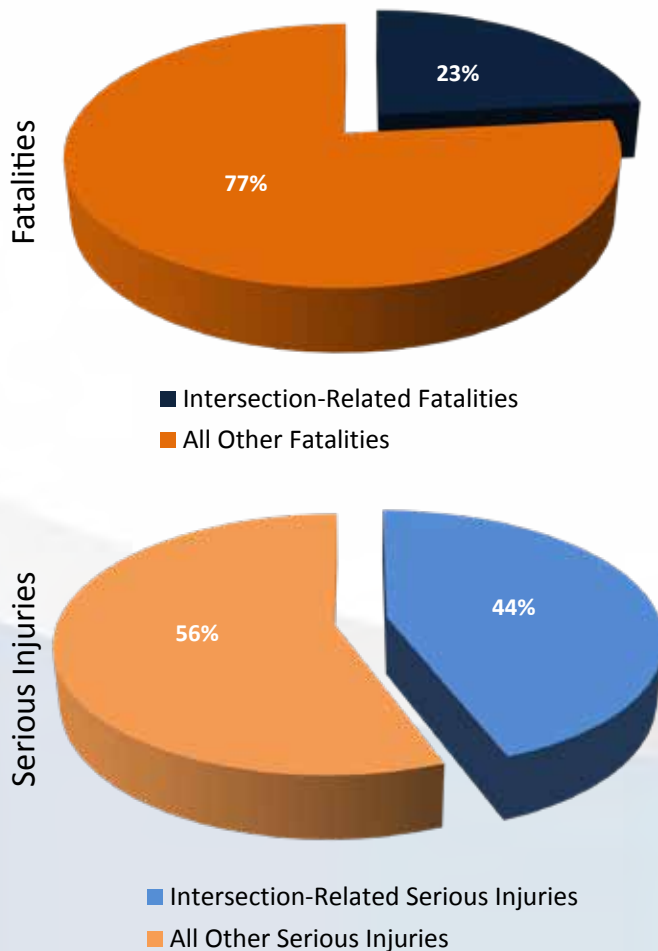
■ Intersection-Related Serious Injuries
■ All Other Serious Injuries

Where

Figure 13.2: Intersection-Related Fatal and Serious-Injury Crash Density Map

Intersection-related severe crashes have taken place most often in the highest traffic volume locations in the major urban centers.
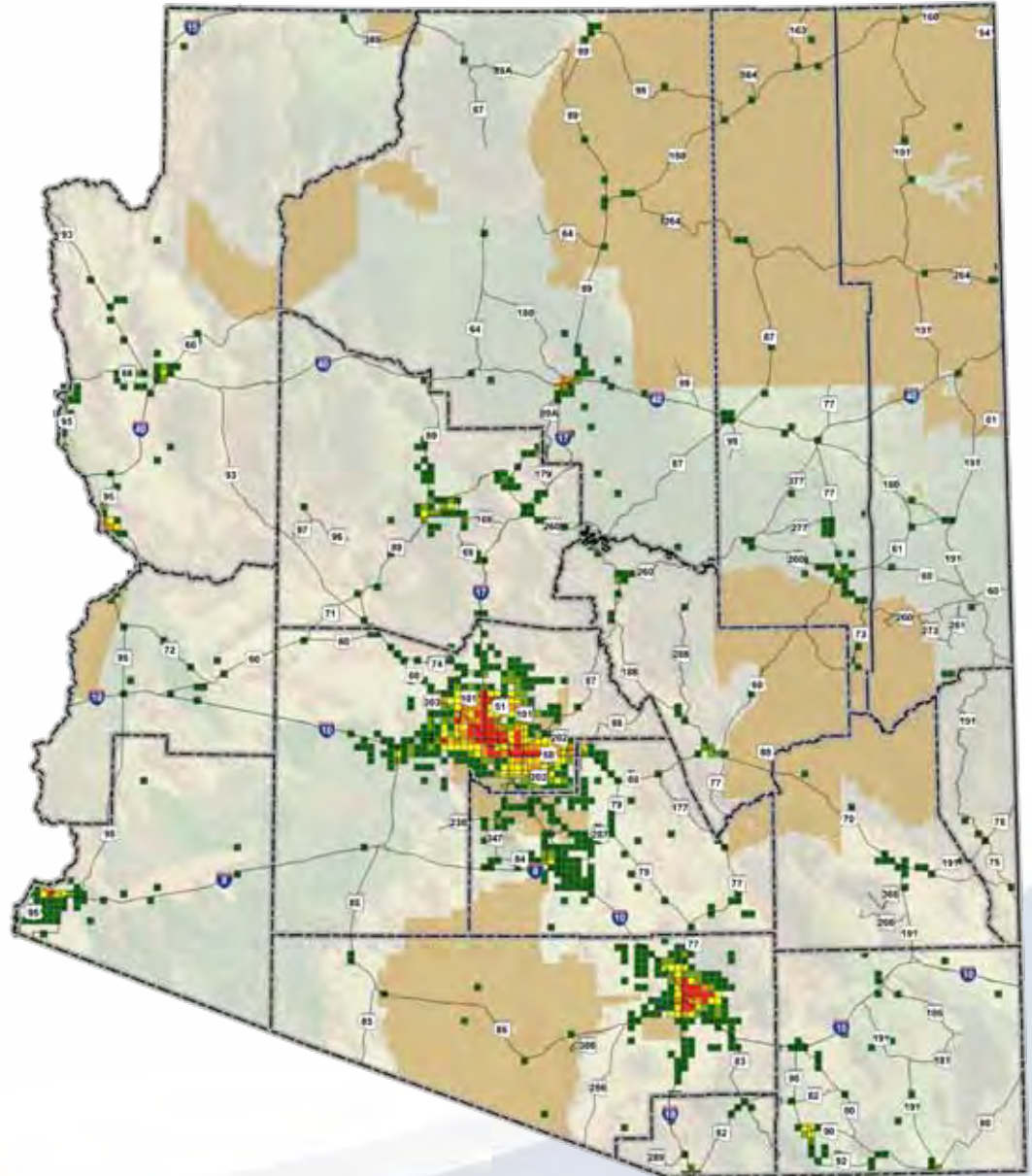
Crash Count per 5-Square-Mile

- 1 to 9 crashes
- 10 to 18 crashes
- 19 to 47 crashes
- 48 to 77 crashes
- 78 to 287 crashes

- Tribal Lands
- County Boundary
- Highway

N

0 5 10 20 30 40 Miles

When

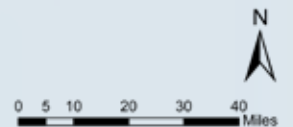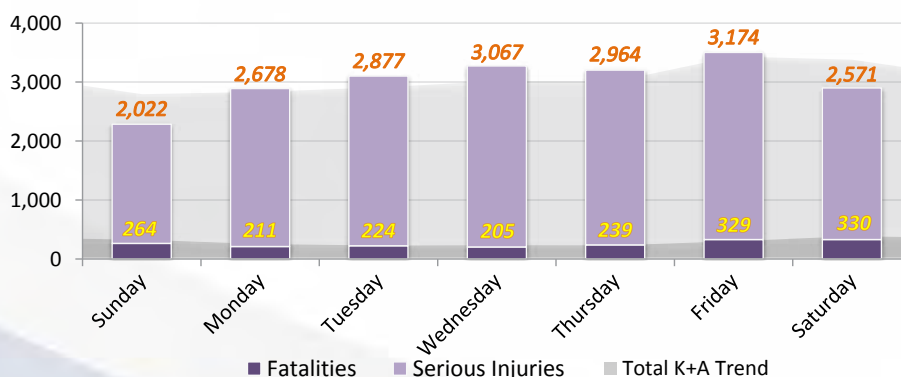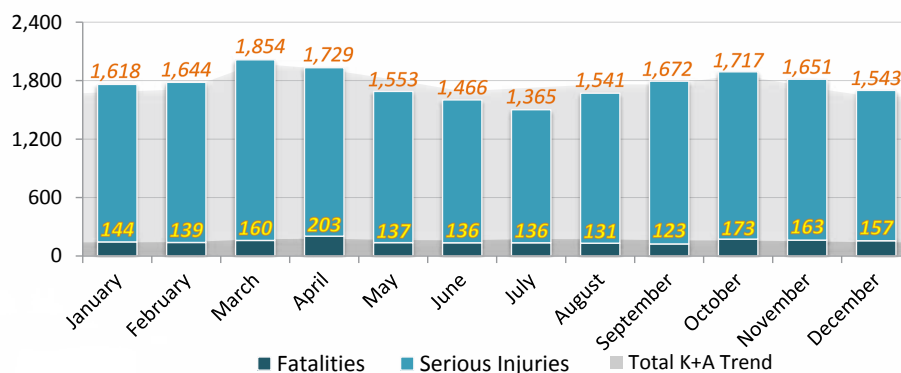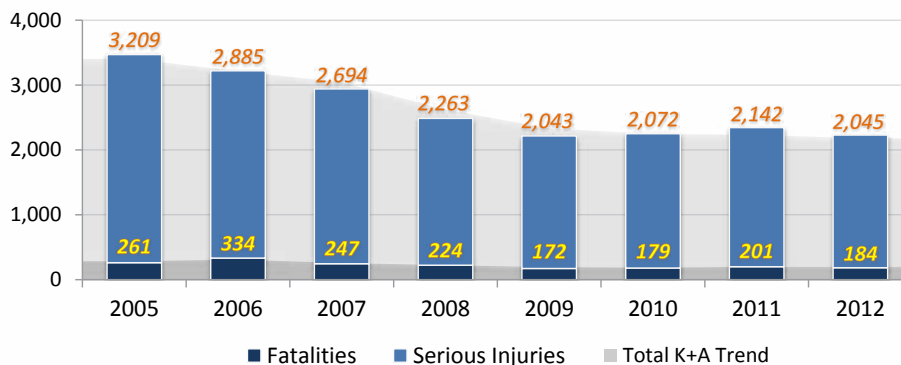*Figure 13.3: Temporal Trends in Intersection-Related Fatalities and Serious Injuries*

Intersection-related fatalities and serious injuries take place most often during times of highest traffic volume during the peak hours and on weekdays. Intersection-related high-severity crashes are lowest during summer months.

Figure 13.3: Temporal Trends in Intersection-Related Fatalities and Serious Injuries

Yearly chart (2005–2012), Serious Injuries / Fatalities:
- 2005: 3,209 / 261
- 2006: 2,885 / 334
- 2007: 2,694 / 247
- 2008: 2,263 / 224
- 2009: 2,043 / 172
- 2010: 2,072 / 179
- 2011: 2,142 / 201
- 2012: 2,045 / 184

Monthly chart, Serious Injuries / Fatalities:
- January: 1,618 / 144
- February: 1,644 / 139
- March: 1,854 / 160
- April: 1,729 / 203
- May: 1,553 / 137
- June: 1,466 / 136
- July: 1,365 / 136
- August: 1,541 / 131
- September: 1,672 / 123
- October: 1,717 / 173
- November: 1,651 / 163
- December: 1,543 / 157

Day of week chart, Serious Injuries / Fatalities:
- Sunday: 2,022 / 264
- Monday: 2,678 / 211
- Tuesday: 2,877 / 224
- Wednesday: 3,067 / 205
- Thursday: 2,964 / 239
- Friday: 3,174 / 329
- Saturday: 2,571 / 330

Hourly chart, Serious Injuries / Fatalities:
- 12 am: 314 / 58
- 1 am: 218 / 60
- 2 am: 256 / 52
- 3 am: 149 / 40
- 4 am: 120 / 31
- 5 am: 302 / 52
- 6 am: 641 / 62
- 7 am: 1,035 / 67
- 8 am: 959 / 48
- 9 am: 871 / 76
- 10 am: 951 / 71
- 11 am: 1,044 / 65
- 12 pm: 1,143 / 86
- 1 pm: 1,113 / 81
- 2 pm: 1,315 / 82
- 3 pm: 1,472 / 91
- 4 pm: 1,452 / 98
- 5 pm: 1,508 / 120
- 6 pm: 1,318 / 142
- 7 pm: 906 / 100
- 8 pm: 791 / 95
- 9 pm: 646 / 96
- 10 pm: 454 / 71
- 11 pm: 375 / 58

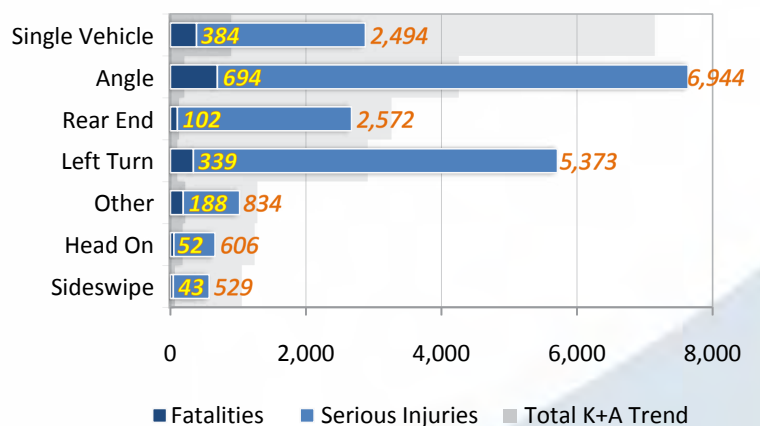# Section 13: Roadway Infrastructure and Operations | *Intersection*

Who

High-severity crashes at intersections have involved all ages and both genders. The portion of all female driver crashes that take place at an intersection is much higher than the portion of male driver crashes that take place at an intersection, but male drivers are still involved in more severe intersection-related crashes than female drivers overall. Young drivers, for both male and female, are at greatest risk.

How

Intersection-related fatalities and serious injuries occur most often as angle and left-turn collisions.

Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries on all public roadways in Arizona through enhanced roadway infrastructure and operations.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 13: Roadway Infrastructure and Operations | *Intersection*

Strategies and Proposed Action Steps: Intersection

A. Reduce frequency and severity of intersection crashes through traffic-control and operational improvements.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
A.1 Update signal timing on a regular schedule; implement adaptive signal control and centralized control to improve intersection operations and safety.			
A.2 In metro areas, adopt consistent signal timing practices (left-turn phasing, clearance intervals, etc.) to eliminate driver confusion.			
A.3 Improve coordination between state and local signals to improve operations and reduce driver frustration.			
A.4 Consider adding dilemma-zone detection at high-speed intersections.			

B. Implement speeding and red-light-running enforcement efforts.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1 Focus on speed and red-light-running enforcement, including use of automated systems.			

Section 13: Roadway Infrastructure and Operations | *Intersection*

Strategies and Proposed Action Steps: Intersection

C. Reduce frequency and severity of intersection crashes through geometric improvements.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
C.1 Require consideration of alternative intersection types (e.g. roundabouts, indirect left turns, etc.) that reduce conflicts and crash severity in the project assessment phase.			

Strategies and Proposed Action Steps: Railroad Crossings

A. Implement programs that create safety partnerships between railroads and state and local agencies.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
A.1 Hold frequent and continuing safety planning and action meetings.			

B. Make engineering and infrastructure improvements to increase safety at railroad crossings.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1 Coordinate adjacent intersection/railroad-crossing signals, including preemption.			
B.2 Improve tracking and reporting of railroad-crossing crashes.			
B.3 Improve railroad-crossing signing, pavement marking, lighting and use high-visibility materials.			
B.4 Consider installation of precrossing and queue-cutter signals.			
B.5 Consider grade-separated railroad crossing.			

Section 13: Roadway Infrastructure and Operations | *Intersection*

Strategies and Proposed Action Steps: Railroad Crossings

C. Increase public education about safe railroad crossing.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Conduct railroad-crossing safety education/awareness campaigns.			

D. Utilize railroad-crossing safety enforcement techniques.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Consider automated safety enforcement at railroad crossings.			
D.2 Consider adopt-a-crossing practices at railroad crossings.			

Section 14: Roadway Infrastructure and Operations | *Lane / Roadway Departure*
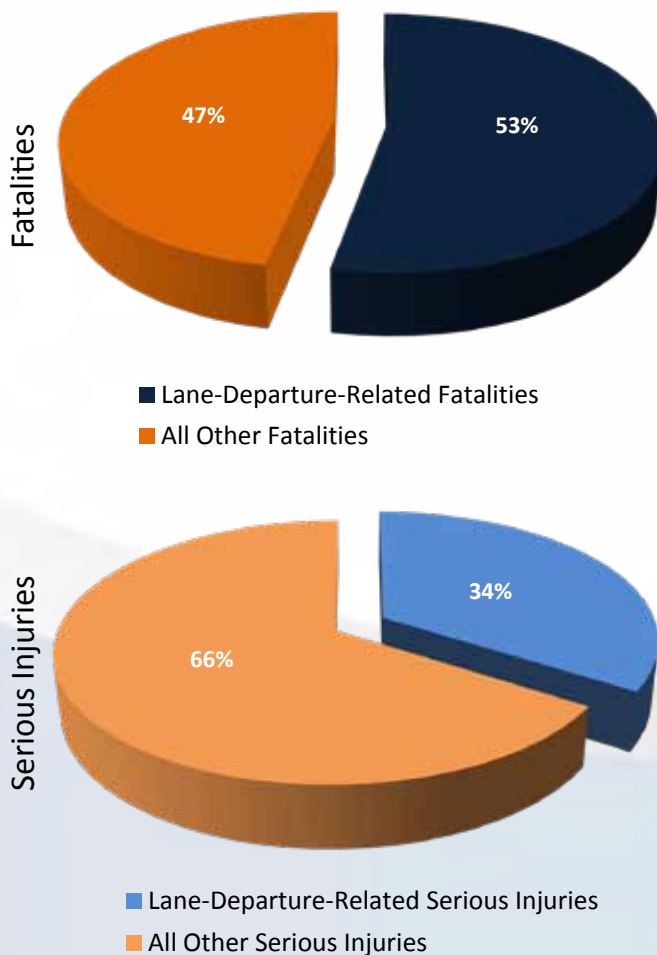

A lane departure is involved in more than half of all crash fatalities in Arizona. Lane-departure crashes often take place on rural highways at high speeds and frequently are very severe.

What

Figure 14.1: Lane-Departure-Related Portion of All Fatalities and Serious Injuries

Lane-departure-related fatalities and serious injuries are counted from all crashes where the collision was head-on, sideswipe, rollover, or took place with any fixed object on the roadside or median. More than 53 percent of all fatalities and 34 percent of all serious injuries occurred from a lane- or roadway-departure crash.


Fatalities

- 47%
- 53%

■ Lane-Departure-Related Fatalities
■ All Other Fatalities

Serious Injuries

- 34%
- 66%

■ Lane-Departure-Related Serious Injuries
■ All Other Serious Injuries

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Section 14: Roadway Infrastructure and Operations | *Lane / Roadway Departure*

Where

Figure 14.2: Lane-Departure-Related Fatal and Serious-Injury Crash Density Map
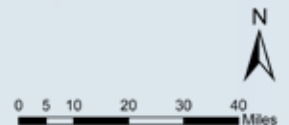
High-severity lane-departure crashes have taken place most often in the highest-traffic-volume locations in major urban centers.
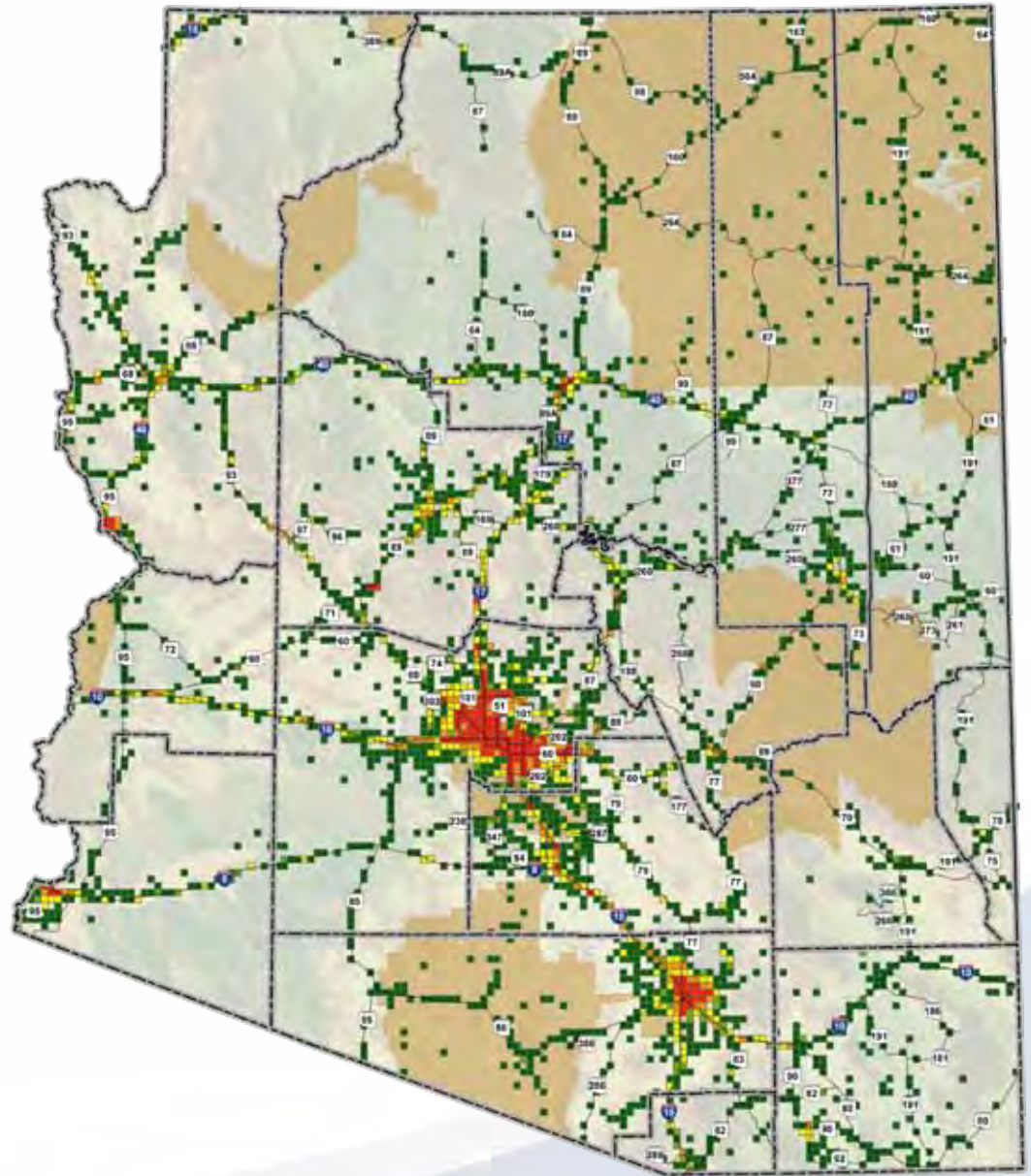
Crash Count per 5-Square-Mile

- ■ 1 to 4 crashes
- ■ 5 crashes
- ■ 6 to 10 crashes
- ■ 11 to 18 crashes
- ■ 19 to 235 crashes

- ▨ Tribal Lands
- ☐ County Boundary
- — Highway

0 5 10 20 30 40 Miles

N

When

Figure 14.3: Temporal Trends in Lane-Departure-Related Fatalities and Serious Injuries

Lane-departure-related fatality and serious-injury counts have gone down annually at nearly the rate for all crashes statewide. These high-severity crashes have been highest in July and have taken place far more often than average on weekends and at night.
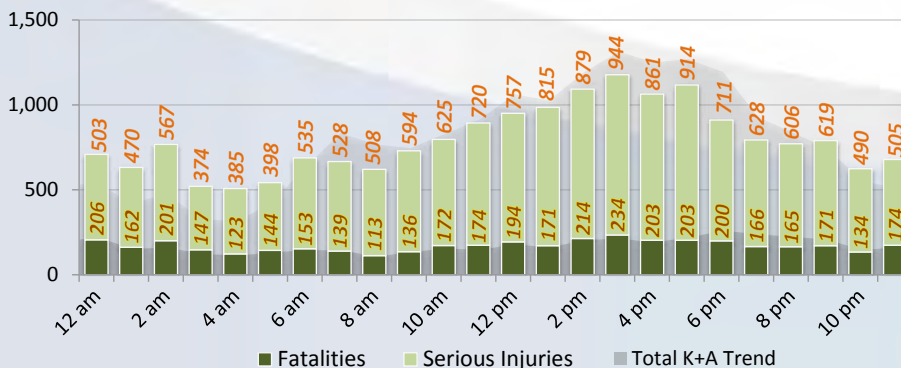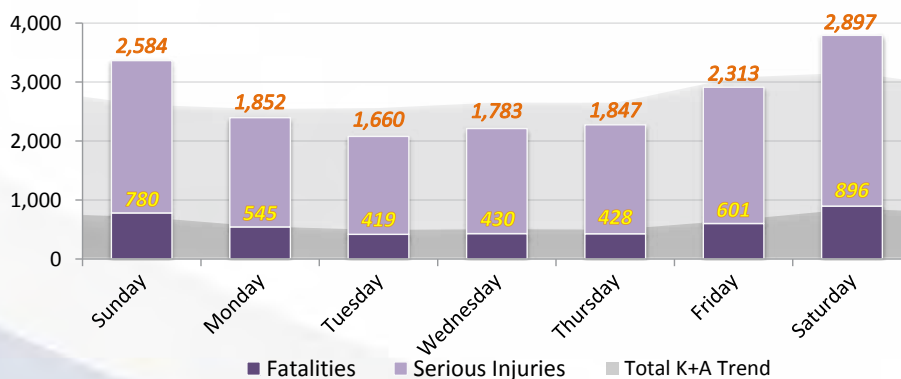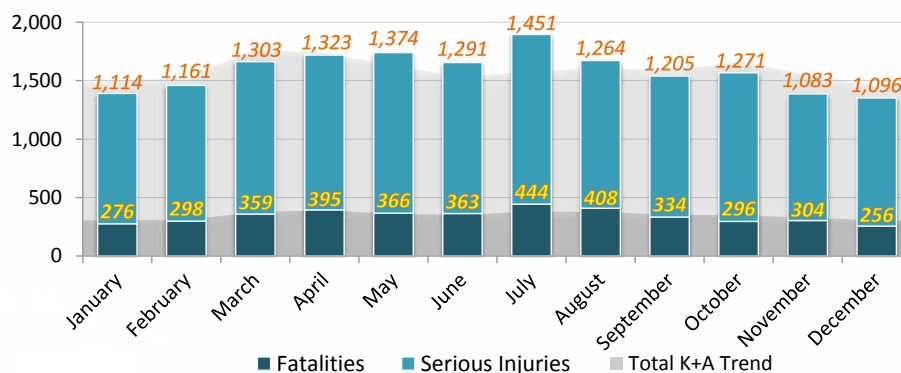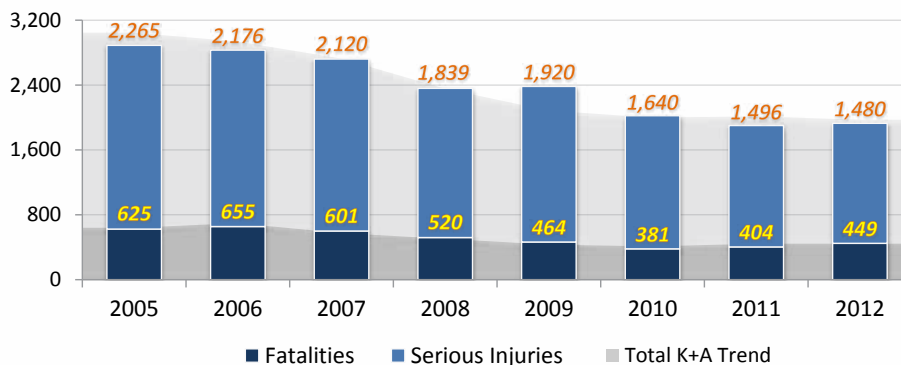
Section 14: Roadway Infrastructure and Operations | *Lane / Roadway Departure*

Who

Figure 14.4: Lane-Departure-Related Fatalities and Serious Injuries by Driver Age and Gender

Male drivers under 25 are involved most often in lane-departure fatalities and serious injuries. Among female drivers, teenagers most often run into another lane or off the roadway.
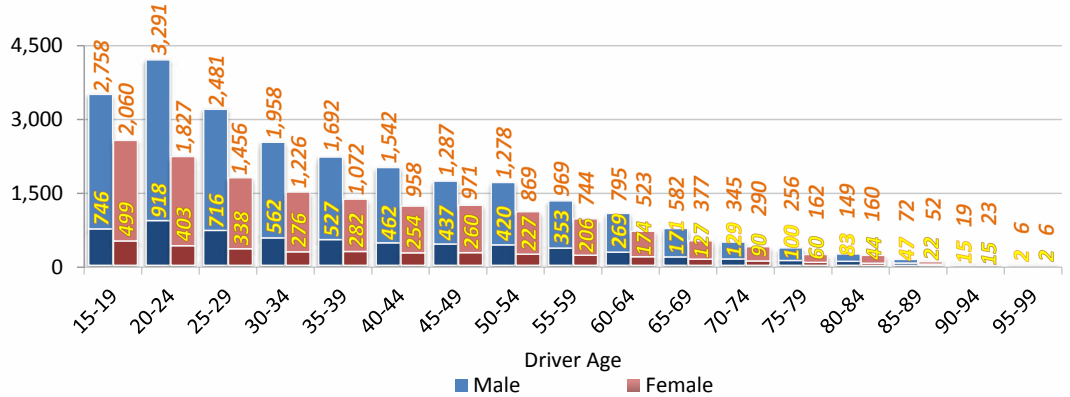
How

Figure 14.5: Lane-Departure-Related Fatalities and Serious Injuries by Crash Type

All but a few of the fatalities and serious injuries being counted as lane-departure crashes take place as single-vehicle, head-on or sideswipe crash types.
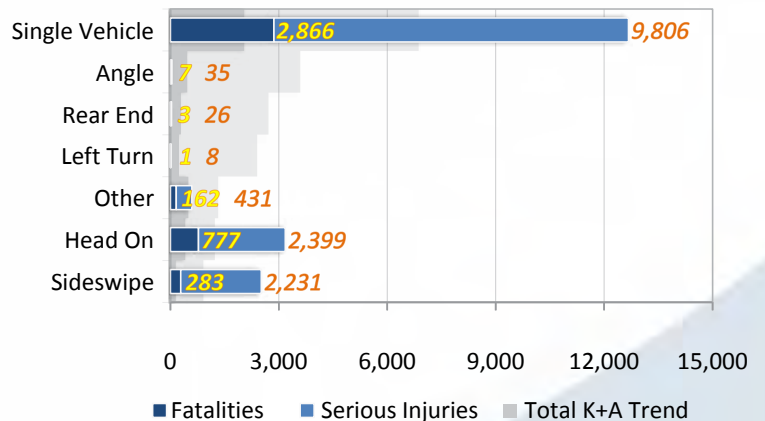
Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries on all public roadways in Arizona through enhanced roadway infrastructure and operations.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 14: Roadway Infrastructure and Operations | *Lane / Roadway Departure*

Strategies and Proposed Action Steps

A. Reduce the frequency and severity of lane- and roadway-departure crashes through roadway infrastructure improvements.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
A.1 Install shoulder rumble strips.			
A.2 Enhance centerline and edge line delineation using wider stripe and reflective raised-pavement markers.			
A.3 Increase the installation of curve signing.			
A.4 Provide or widen shoulders on rural highways.			
A.5 Set speed limits based on cross section.			
A.6 Implement a statewide rural road improvement program (state, tribal, locally owned roads) with a dedicated annual HSIP budget and limits on available funds.			
A.7 Install flexible delineators at the road edge.			
A.8 Implement a statewide rural road safety improvement plan and program.			

B. For vehicles that run off the road for any reason, minimize the potential for overturning or colliding with another object.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1 Flatten side slopes.			
B.2 Eliminate fixed objects (trees, etc.) within the clear zone on rural highways.			

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Strategies and Proposed Action Steps

C. Increase public education on corrective roadway departure driving techniques.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1 Include education and training in driver-education classes on how to safely correct from a lane or roadway departure.			

D. Research and evaluate the impact of recent vehicle technology improvements relating to the frequency and severity of crashes to better assess potential policy changes.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
No potential action steps have been defined.			

Section 15: Speeding and Aggressive Driving

Speeding is the leading behavioral characteristic of drivers contributing to fatal and serious-injury crashes in Arizona. Speeding is commonly associated with other high-risk behaviors, such as aggressive or impaired driving and lack of restraint use. Speeding substantially increases both the occurrence and severity of collisions.

What

Figure 15.1: Speeding-Involved Portion of All Fatalities and Serious Injuries

Speeding-involved fatalities and serious injuries are counted from all crashes involving at least one motorist driving above the speed limit or driving too fast for conditions. These crashes contributed to 38 percent of all fatalities and 34 percent of all serious injuries.
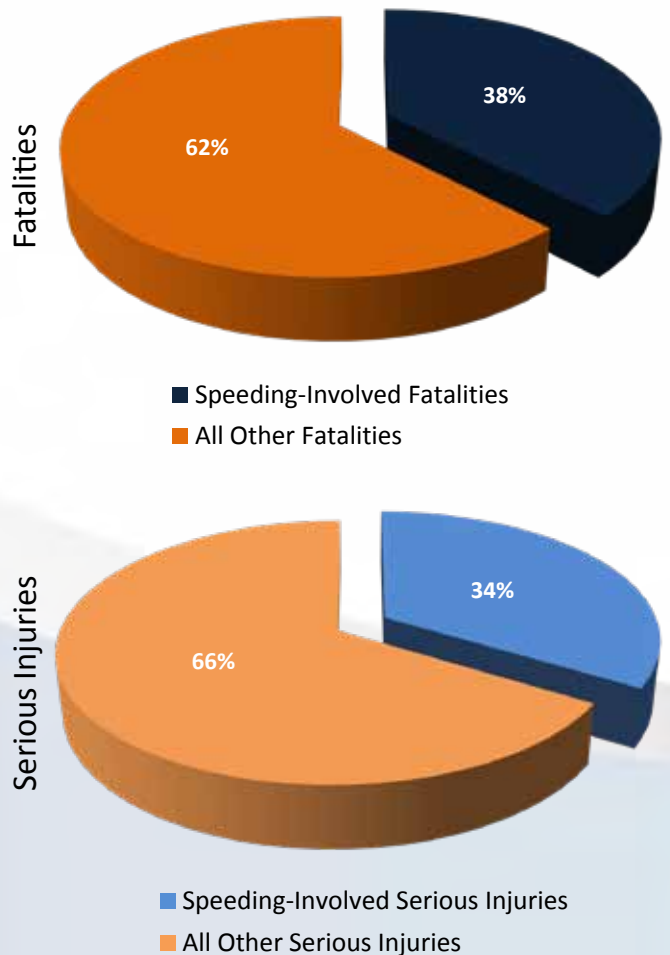
Fatalities

- 38%
- 62%

■ Speeding-Involved Fatalities
■ All Other Fatalities

Serious Injuries

- 34%
- 66%

■ Speeding-Involved Serious Injuries
■ All Other Serious Injuries

Section 15: Speeding and Aggressive Driving

Where

Speeding-involved fatalities and serious injuries have occurred most often in the highest-traffic-volume locations in the major urban centers. However, the rate of speeding-involved high-severity crashes, relative to traffic volume, is several times higher on rural highway locations.

Crash Count per 5-Square-Mile

- ■ 1 to 3 crashes
- ■ 4 to 5 crashes
- □ 6 to 10 crashes
- ■ 11 to 23 crashes
- ■ 24 to 199 crashes

- ▨ Tribal Lands
- □ County Boundary
- — Highway
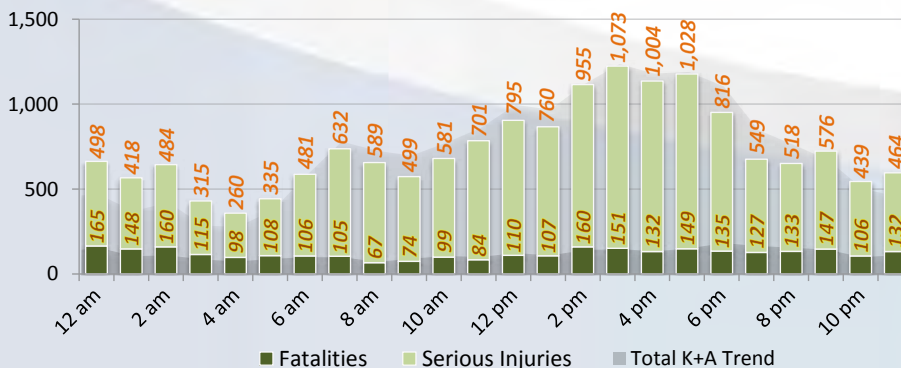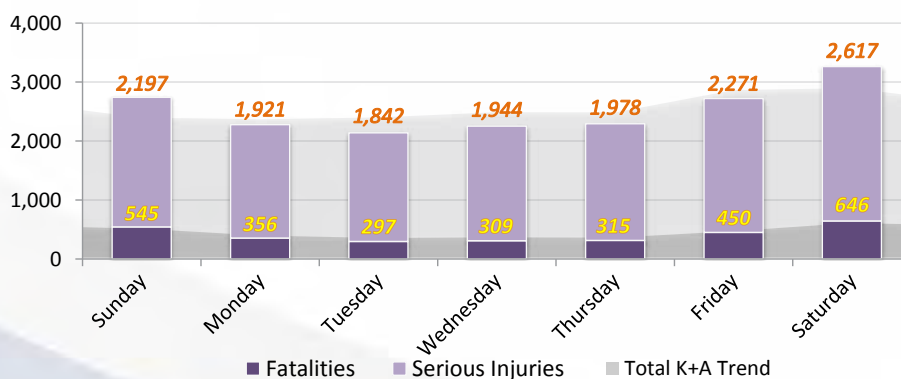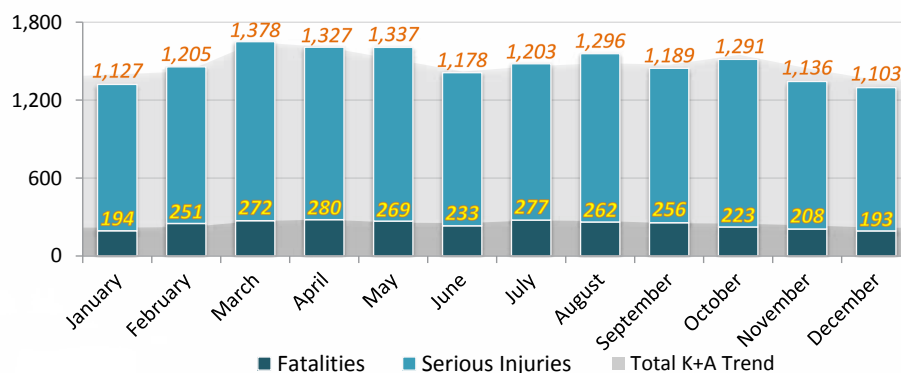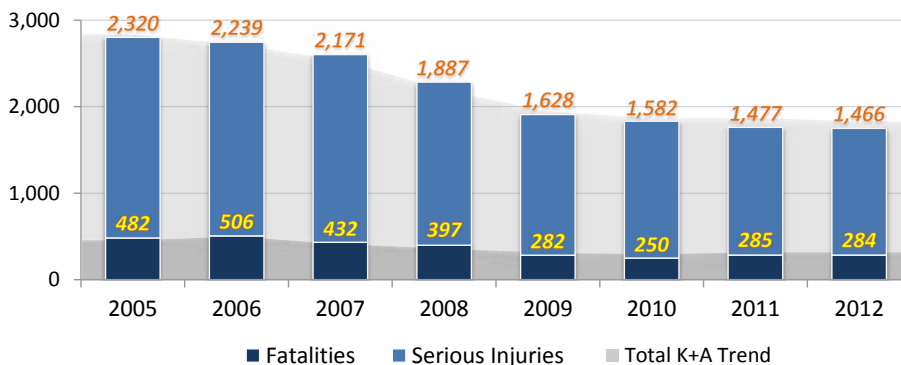
N

0 5 10   20   30   40 Miles
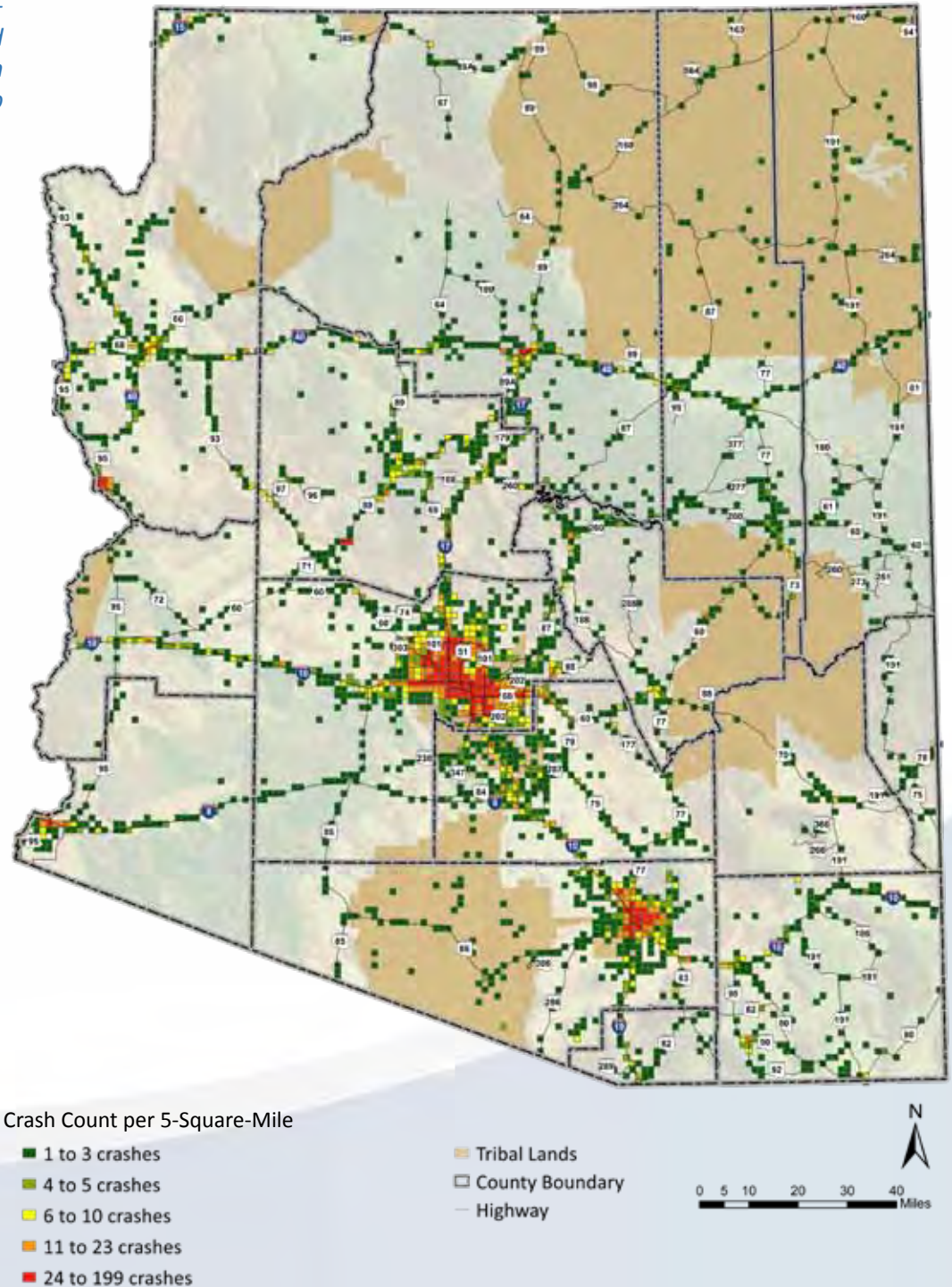
Section 15: Speeding and Aggressive Driving

When

Figure 15.3: Temporal Trends in Speeding-Involved Fatalities and Serious Injuries
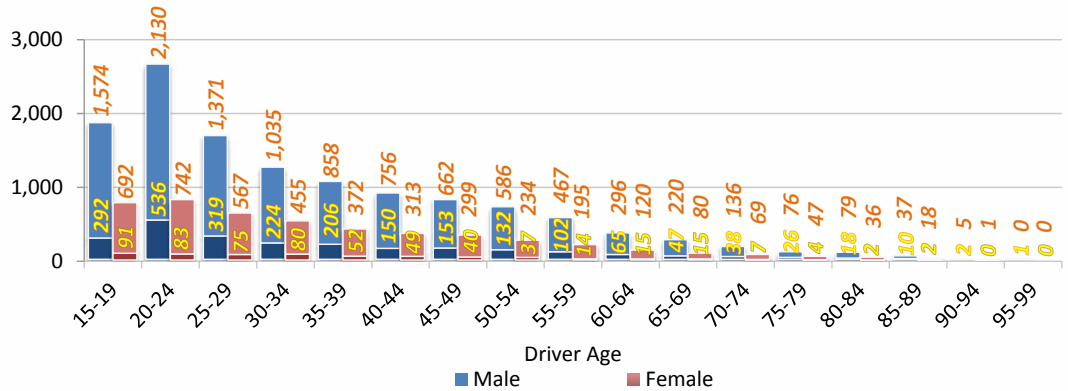
Speeding-involved fatalities have gone down since 2005 by more than 41 percent, and speeding-involved serious injuries have declined by more than 36 percent. High-severity speeding crashes have occurred most often on weekends, and a higher portion of these have taken place during overnight hours than the average for all Emphasis Area categories of crashes.

Chart 1 (by year):
Year	Fatalities	Serious Injuries
2005	482	2,320
2006	506	2,239
2007	432	2,171
2008	397	1,887
2009	282	1,628
2010	250	1,582
2011	285	1,477
2012	284	1,466

Legend: Fatalities — Serious Injuries — Total K+A Trend

Chart 2 (by month):
Month	Fatalities	Serious Injuries
January	194	1,127
February	251	1,205
March	272	1,378
April	280	1,327
May	269	1,337
June	233	1,178
July	277	1,203
August	262	1,296
September	256	1,189
October	223	1,291
November	208	1,136
December	193	1,103

Legend: Fatalities — Serious Injuries — Total K+A Trend

Chart 3 (by day of week):
Day	Fatalities	Serious Injuries
Sunday	545	2,197
Monday	356	1,921
Tuesday	297	1,842
Wednesday	309	1,944
Thursday	315	1,978
Friday	450	2,271
Saturday	646	2,617

Legend: Fatalities — Serious Injuries — Total K+A Trend

Chart 4 (by hour of day):
Time	Fatalities	Serious Injuries
12 am	165	498
1 am	148	418
2 am	160	484
3 am	115	315
4 am	98	260
5 am	108	335
6 am	106	481
7 am	105	632
8 am	67	589
9 am	74	499
10 am	99	581
11 am	84	701
12 pm	110	795
1 pm	107	760
2 pm	160	955
3 pm	151	1,073
4 pm	132	1,004
5 pm	149	1,028
6 pm	135	816
7 pm	127	549
8 pm	133	518
9 pm	147	576
10 pm	106	439
11 pm	132	464

Legend: Fatalities — Serious Injuries — Total K+A Trend

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Section 15: Speeding and Aggressive Driving

Who

Male drivers have been involved in more than four times the number of speeding-related fatal crashes than female drivers. Young drivers, both male and female, are the highest age group contributing to these highest-severity speeding crashes.

How
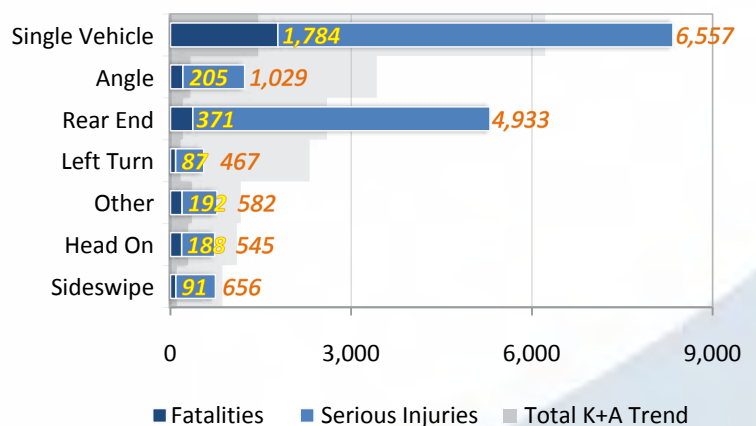
The highest number of speeding-involved fatalities and serious injuries have taken place as single-vehicle and rear-end collisions.

Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from crashes involving speeding and aggressive driving on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 15: Speeding and Aggressive Driving

Strategies and Proposed Action Steps

A. Increase highly visible and effective enforcement to reduce the frequency of crashes associated with speeding and aggressive driving.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
A.1 Encourage community-based enforcement, such as by publicizing the Phoenix area traffic-complaint hotline: 602.534. SPEED.			
A.2 Review obsolete laws and penalties.			
A.3 Encourage courts to implement stricter penalties.			
A.4 Appropriately utilize automatic speed enforcement.			

B. Institute a statewide speed-management strategic initiative.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1 Determine the effects of travel speed on crash risk.			
B.2 Identify trends in travel speeds, crash probability and injury severity.			
B.3 Evaluate the safety benefits of appropriate speed limits.			
B.4 Develop and implement public outreach campaigns to encourage compliance with speed limits.			
B.5 Consider establishing interjurisdictional speed limits and enforcement practices.			

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Section 15: Speeding and Aggressive Driving

Strategies and Proposed Action Steps

C. Educate all road users about the dangers and consequences of speeding and aggressive driving.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
C.1 Involve parents and guardians in driver education.			
C.2 Insert modules into driver education to increase awareness about the dangers of speeding and aggressive driving.			
C.3 Provide incentives for young drivers to keep them aware of the many dangers associated with speeding and aggressive driving.			
C.4 Provide early education about speeding and aggressive driving to "future" drivers; instill messages early on, before children learn to drive.			
C.5 Utilize social media to share information about the dangers of speeding and aggressive driving (target teen-driver demographic).			
C.6 Implement mock-crash programs at high schools; maximize the "shock factor" for young drivers.			
C.7 Engage multiple agencies and the business sectors in developing, supporting and funding campaigns to address speeding and aggressive driving.			
C.8 Establish driver education as a requirement for licensing drivers younger than 18.			

Section 15: Speeding and Aggressive Driving

Strategies and Proposed Action Steps

D. Use engineering design to reduce speeds.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1 Implement traffic-calming features in select high-risk areas.			
D.2 Increase application of well-managed radar speed signs.			
D.3 Utilize well-designed variable speed limits.			

E. Use crash-related data to target enforcement and public information campaigns.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
E.1 Establish well-identified highway safety corridors with increased enforcement.			
E.2 Implement a targeted study to establish statewide criteria for establishing and enforcing speed limits.			
E.3 Use crash-related prehospital car and trauma registry data to target public education campaigns.			

F. Utilize marketing efforts, such as a multimedia approach, to educate drivers.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
F.1 Develop public awareness campaigns to address speeding and aggressive driving.			
F.2 Report year-to-date fatalities on the dynamic message signs.			

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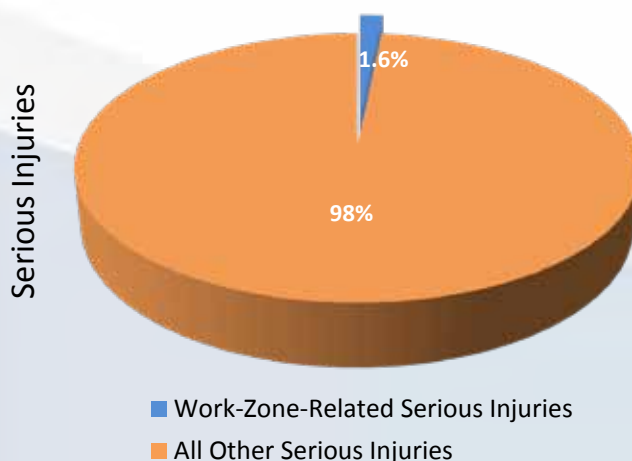# Section 16: Traffic Incident Management

Traffic Incident Management (TIM) is the coordinated process to identify, respond to and clear traffic incidents to prevent secondary collisions and reduce the duration of incident-related congestion. The TIM Emphasis Area includes work-zone safety, where many of the same safety risks exist.

The safety challenge with this Emphasis Area can be measured by the number of secondary collisions and the number of collisions in work zones. The statewide crash report form is being modified to collect data on secondary collisions and other information that have not been collected in the past. While strategies in this section address key areas of TIM, the data graphics rely wholly on information for work zone crashes.

What

Figure 16.1: Work-Zone-Related Portion of All Fatalities and Serious Injuries

Work-zone fatalities and serious injuries are counted from all crashes within, entering or leaving a work zone or any area where workers are present. Of all fatalities, 1.3 percent occurred from work-zone-related crashes. Of all serious injuries, 1.6 percent resulted from a work-zone-related crash.
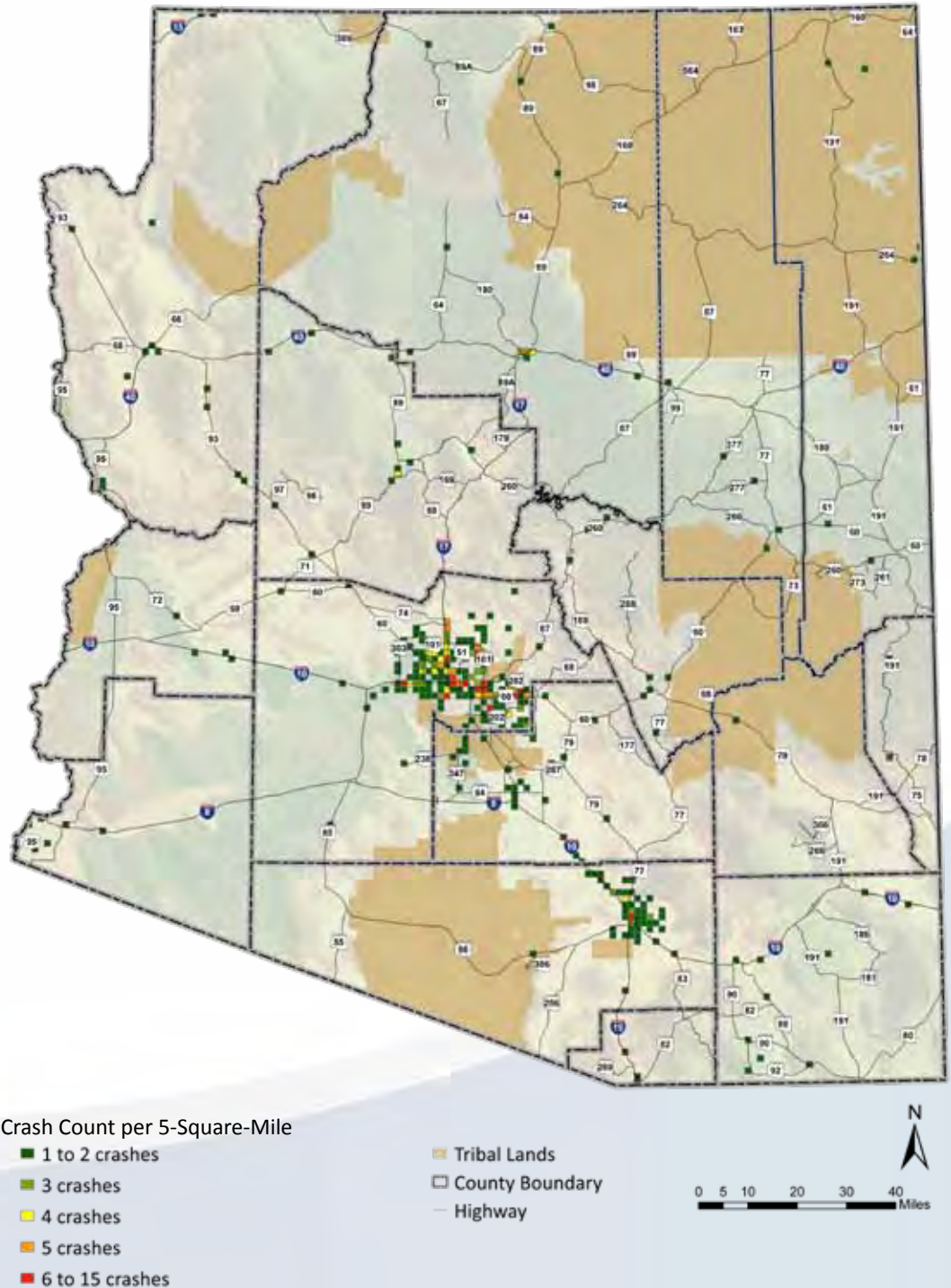

Fatalities

1.3%

99%

- Work-Zone-Related Fatalities
- All Other Fatalities

Serious Injuries

1.6%

98%

- Work-Zone-Related Serious Injuries
- All Other Serious Injuries

Where

Figure 16.2: Work-Zone-Related Fatal and Serious-Injury Crash Density Map

At a statewide level, high-severity work-zone crashes have taken place over the eight-year period most often in the highest-traffic-volume locations in major urban centers. The locations of work zones change as roadway and other projects are started and completed, and many high-density crash locations shown here are not likely to see work-zone related crashes in the near future.

Crash Count per 5-Square-Mile
- 1 to 2 crashes
- 3 crashes
- 4 crashes
- 5 crashes
- 6 to 15 crashes

- Tribal Lands
- County Boundary
- Highway

Section 16: Traffic Incident Management

When

Figure 16.3: Temporal Trends in Work-Zone-Related Fatalities and Serious Injuries

Work-zone-related crashes resulted in 24 and 21 fatalities in 2006 and 2007, respectively. Serious injuries were highest in 2007 with 143. Since 2008, fatalities and serious injuries associated with work-zone crashes have significantly decreased.

The trend in these high-severity crashes during the eight-year period shows the lowest numbers in the month of January. The highest numbers of fatalities have taken place during the month of July and on Saturdays. Some overnight hours, and hours approaching noon, have seen a higher proportion of work-zone crashes than the average for all crashes.
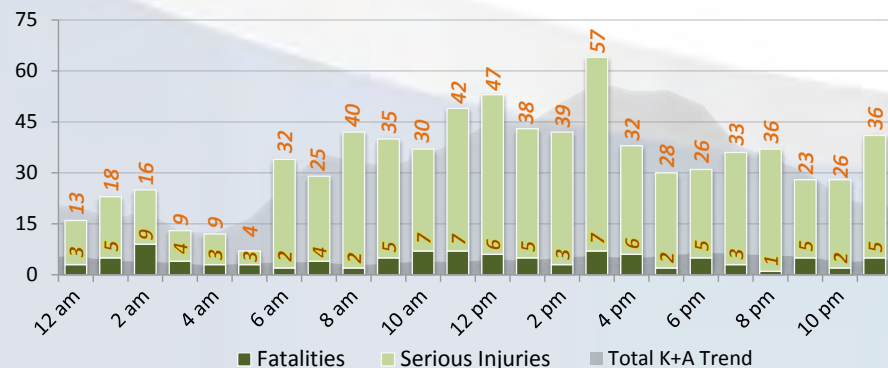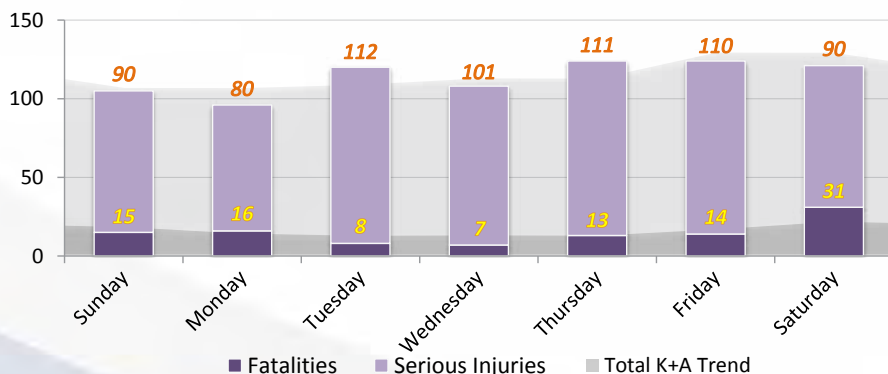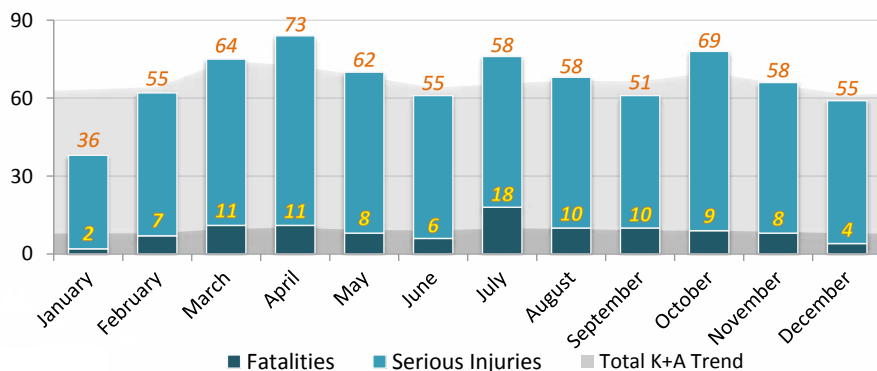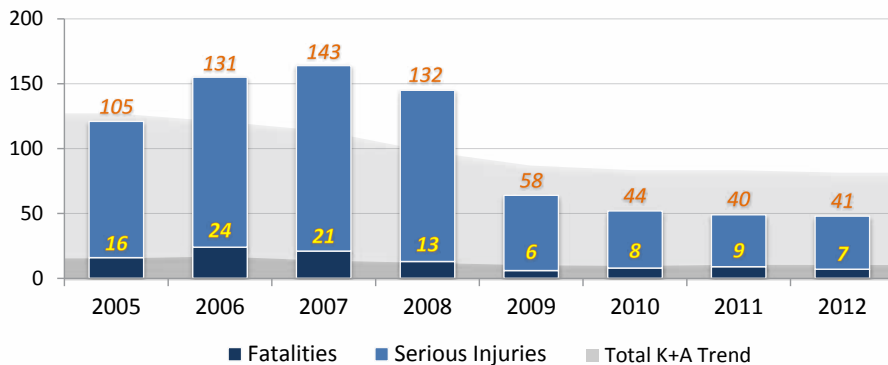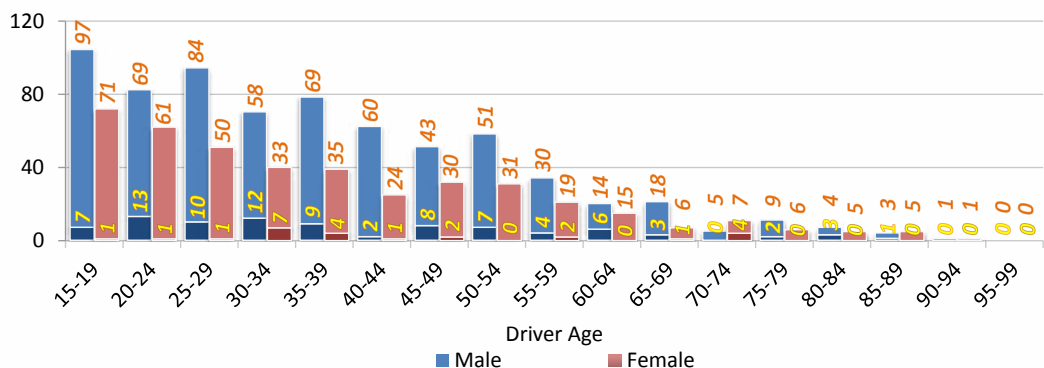
Section 16: Traffic Incident Management

Who

Figure 16.4: Work-Zone-Related Fatalities and Serious Injuries by Driver Age and Gender

Younger drivers have been involved in a higher number of fatal and serious-injury work-zone crashes. Male drivers have been involved more than female drivers in nearly every age group.

How

Figure 16.5: Work-Zone-Related Fatalities and Serious Injuries by Crash Type

Work-zone-related fatalities have resulted from a higher proportion of rear-end and head-on collisions than the average for all Emphasis Area crash categories. The highest numbers of both fatalities and serious injuries have resulted from single-vehicle crashes, but the numbers are lower than the average for all crashes.
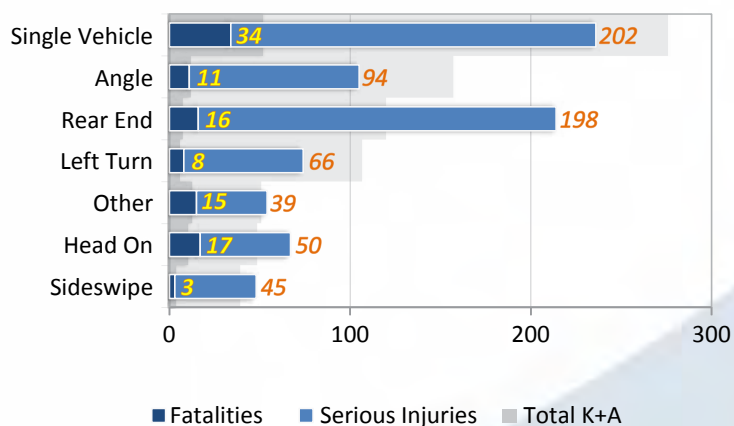
Emphasis Area Goal

Reduce fatalities and the occurrence and severity of serious injuries resulting from crashes in work zones and secondary crashes involving Traffic Incident Management (TIM) activities on all public roadways in Arizona.

Performance Measures and Objectives

To be determined by the Emphasis Area team during the first year of SHSP implementation.

Section 16: Traffic Incident Management

Strategies and Proposed Action Steps: Traffic Incident Management

A. Develop cross-cutting TIM programs that include training, public education, research, evaluation and application of technology.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
A.1 Establish TIM partnerships and programs.			
A.2. Provide continuing multidisciplinary training.			
A.3. Set goals for performance and progress,			
A.4. Utilize TIM technology, and evaluate performance measures.			
A.5 Utilize telemedicine between first responders and emergency rooms.			
A.6 Develop effective TIM policies.			
A.7 Establish awareness and education partnerships.			

B. Develop and implement practices, policies and public education efforts to increase TIM responder safety.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1. Encourage recommended practices for responder safety.			
B.2. Strengthen education on and enforcement of Arizona's Move Over law.			
B.3. Improve driver training and awareness.			

Section 16: Traffic Incident Management

Strategies and Proposed Action Steps: Traffic Incident Management

C. Develop and implement procedures that achieve safe and quick incident clearance.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
C.1. Adopt multidisciplinary TIM procedures.			
C.2. Set response and clearance time goals.			
C.3. Provide 24/7 availability of resources for TIM.			

D. Develop and implement prompt and reliable communications systems that support TIM.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
D.1. Establish multidisciplinary communications practices and procedures.			
D.2. Provide prompt, reliable responder notification.			
D.3. Utilize interoperable voice and data networks to support TIM procedures.			
D.4. Utilize broadband emergency communications systems to support TIM procedures.			
D.5. Provide prompt, reliable traveler information systems.			
D.6. Develop partnerships with news media and information providers.			

Section 16: Traffic Incident Management

Strategies and Proposed Action Steps: Work Zones

A. Develop and improve work-zone design and management practices.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
A.1 Develop a work-zone manual for use by ADOT and local agencies to produce consistent work-zone traffic control practices statewide, which includes consideration of pedestrian and bicyclist safety needs.			
A.2 Create and maintain a statewide and/or regional database that allows for improved coordination of construction scheduling to minimize work zones on a route or area.			
A.3 Create regional committees comprised of engineering, enforcement, EMS and other stakeholders who assist agencies with work-zone traffic-management planning.			
A.4 Implement policies requiring contractors to update/maintain work-zone signing daily.			
A.5 Improve work-zone safety for pedestrians and bicyclists.			

B. Improve driver compliance with work-zone traffic controls.

Strategy Leader:

Supporting Key Partners:

Action Steps	Leader(s) and Partners	Potential Resources	Status
B.1 Increase fines for speeding through work zones.			
B.2 Use speed monitoring / feedback systems in work zones.			
B.3 Increase work-zone enforcement.			
B.4 Consider use of temporary rumble strips to gain driver attention and reduce speeds.			

ARIZONA STRATEGIC HIGHWAY SAFETY PLAN

Section 16: Traffic Incident Management

Strategies and Proposed Action Steps: Work Zones

C. Increase knowledge and awareness of work zones and work-zone safety.			
Strategy Leader:			
Supporting Key Partners:			
Action Steps	**Leader(s) and Partners**	**Potential Resources**	**Status**
C.1 Conduct work-zone awareness campaigns.			