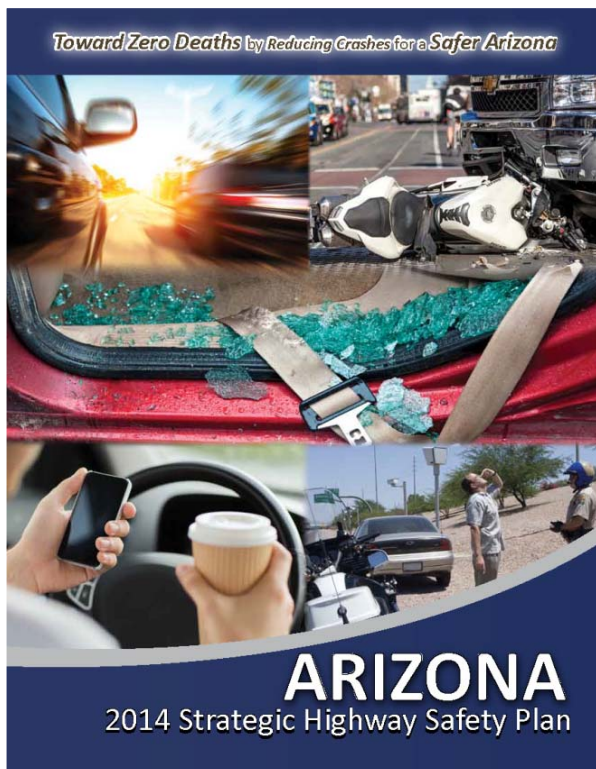


# CRASH MAPPING APPLICATIONS - GIS



## NAVAJO NATION

## 2017 Strategic Highway Safety Plan

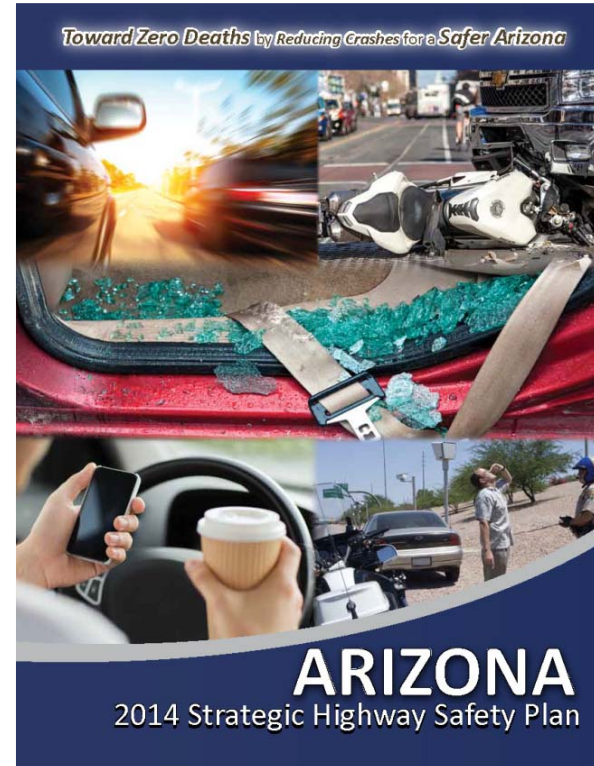
*Presented by:*

**Jim Townsend, AICP, Principal  
Transportation Planning Manager**

**Wilson & Company, Inc., Engineers & Architects**

# INTRODUCING THE ARIZONA 2014 SHSP

Data Driven  
All Public Roads  
Collaborative Process  
Multidisciplinary  
A Program of Strategies  
Coordinated  
Goal, Objective, and Performance Measures

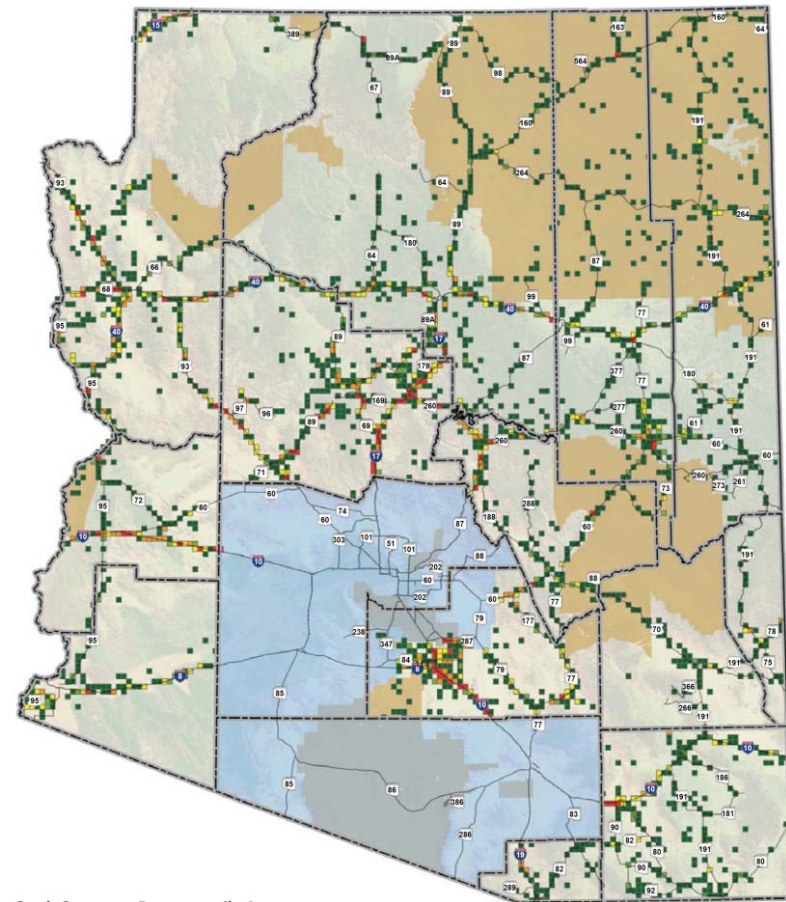


# THE PROCESS



# IDENTIFY AND ACCESS AVAILABLE DATA

- State crash/roadway database
- Regional/local crash database
- Generated Crash Reports
- Local law enforcement
- LTAP/TTAP
- Local safety agencies/organizations (MADD)
- Safety Planning Documents
- Qualitative data (surveys)



# ANALYZE DATA

High Crash Locations and Crash Clusters

Spatial Analysis

Crash Frequency

Trend Analysis

Crash rates

Crash Types and Contributing Factors

Systemic Analysis

Network Screening

## Example Methods

**Spatial Analysis** – GIS has been used to rank schools by severe and speeding-related crashes, and to rank road sections with crashes on/near curves.

**County Level Analysis** – Frequency tables using crash data variables have been used to identify countywide trends and general crash factors associated with speeding-related crashes.

**Network Screening** – Identified routes where severe and/or speeding-related crashes are over represented compared with other similar routes.

# Arizona Strategic Highway Safety Plan



## Appendix C Crash Characteristic Data Map Book

**Crash Characteristic Data Map Book**

Characteristics		Description
Geographic	Urban	Count of crashes within an urban boundary based on the 2010 U.S. Census designation of urbanized areas
	Rural	Count of crashes not within an urban boundary based on the 2010 U.S. Census designation of urbanized areas
	Highway	Count of crashes on the state highway system, which includes all Interstate, U.S. Highways, and State Routes
	Other Road	Count of crashes on a road other than the state highway system, usually local jurisdictions
	Tribal Land	Count of crashes within tribal reservation lands, including portions of highways or interstate freeway sections within a reservation boundary
Geometry	Intersection Related	Count of crashes involving an intersection location
	Lane Departure	Count of crashes involving a vehicle departing the travel lane into adjacent or opposing lanes or off the roadway
	Work Zone	Count of crashes involving a work zone
Person Type	Young Driver (13-24)	Count of crashes involving at least one driver age 13 through 24 years old
	65 and Older	Count of crashes involving at least one senior driver or senior pedestrian or cyclist
	Pedalcyclist Involved	Count of crashes involving a pedalcyclist (bicyclist) and a motor vehicle
	Pedestrian Involved	Count of crashes involving a pedestrian and a motor vehicle
Behavior	Aggressive Driver	Count of crashes involving a driver that was indicated on the crash report as speeding <i>and</i> one of several other aggressive violations at the time of the crash
	Alcohol Involved	Count of crashes involving an alcohol impaired driver, pedestrian or bicyclist
	Distracted Driver	Count of crashes involving a driver where Inattention/Distraction was indicated on the Violation/Behavior portion of the crash report
	Drug Involved	Count of crashes involving a drug impaired driver, pedestrian, or bicyclist
	Impaired Driver	Count of crashes involving a driver that was impaired with alcohol, drug, fatigue or sleepiness, medication or a physical disability
	Unhelmeted Motorcyclist	Count of crashes involving an unhelmeted motorcyclist
	No Restraint Used	Count of crashes involving at least one unrestrained motorist (Restraint Usage)
	Sleepy or Fatigued	Count of crashes involving a sleepy or fatigued driver, pedestrian, or bicyclist
Speeding Involved	Count of crashes where at least one driver was indicated on the crash report as exceeding lawful speed or going too fast for conditions	
Vehicle	Motorcycle Involved	Count of crashes involving a motorcycle
	Train Involved	Count of crashes involving a railway or light-rail train
	Truck Involved	Count of crashes involving at least a truck, bus or other vehicle greater than 10,000 pounds, seating nine or more persons, or carrying hazardous material
	Multiple Vehicle	Count of crashes involving two or more parties, including crashes between a vehicle and a pedestrian or bicycle
Environmental	Dust Related (Windy)	Count of crashes involving dusty or windy conditions
	Wildlife/Animal Involved	Count of crashes involving wildlife, livestock or other animals
	Wet Weather	Count of crashes involving wet weather conditions
	Dusk/ Dawn	Count of crashes during dusk or dawn light conditions
	Dark - No Light	Count of crashes during night at unlit locations

## User Guide to Understanding the Crash Summary

Updating the Arizona State Highway Safety Plan (SHSP) required a data-driven process. Statewide crash data were provided by the Arizona Department of Transportation (ADOT) for each of the previous eight years: January 1, 2005, through December 31, 2012.

Each Crash Summary for a given characteristic—in this case, Young Driver Involved—shows the total number of serious injury crashes, i.e., those resulting in a Fatality or Incapacitating Injury, associated with the characteristic. Each Crash Summary relates this crash information to 29 other crash characteristics grouped into six categories that describe specific attributes of the crashes, such as location (Geographic) and condition of the persons involved (Behavior). This cross-tabular relationship reveals the number and percentage of crashes that involved the subject characteristic and one or more of the other characteristics.

### What Crashes are Included?

The severity of a crash event is identified in the police crash report by the most severe injury to take place using the KABCO severity scale, which is defined as follows:

- K) Fatal Injury crashes, resulting in at least one fatality
- A) Incapacitating-injury, but non-fatal, crashes
- B) Nonincapacitating Injury crashes
- C) Possible-injury crashes
- O) Property-damage-only crashes

Crashes accounted for in this Summary include only those normally classified as Serious Injury, which includes Fatal (K) and Incapacitating Injury (A). Other injury and property-damage-only crashes are not shown.

### What are we counting?

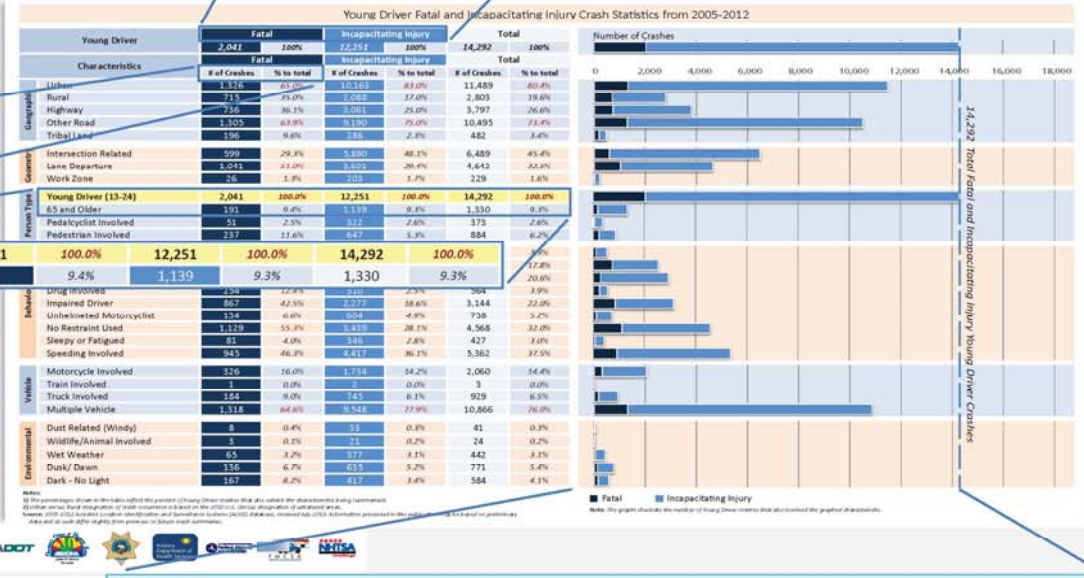
The number of crashes shown corresponds to the number of collision events and not the number of persons who may have been involved. Crashes are multi-faceted, resulting from varying combinations of circumstances categorized here by 30 separate characteristics. The objective of this summary is aid in pinpointing the characteristics (or potential causes or factors) contributing to crashes that occur most frequently.

The example here shows 2,041 Young Driver Involved crashes resulting in one or more Fatalities and 12,251 of the Young Driver Involved crashes resulted in one or more persons experiencing Incapacitating Injuries. We can also see that, of these Young Driver Involved Fatal and Incapacitating Injury crashes, 191 (9.4%) Fatal and 1,139 (9.3%) Incapacitating Injury crashes also involved persons 65 years in age and Older. The potential influence or association of all other characteristics, such as Impairment, Speeding, or Motorcycle can also be seen.

# of Crashes | % to total

Characteristic	# of Crashes	% to total	# of Crashes	% to total
<b>Young Driver (13-24)</b>	<b>2,041</b>	<b>100.0%</b>	<b>12,251</b>	<b>100.0%</b>
65 and Older	191	9.4%	1,139	9.3%

### Arizona Strategic Highway Safety Plan Young Driver Crash Summary | 2005-2012



### Visual Comparison

These Bar Charts display the cumulative total number of Fatal and Incapacitating Injury crashes involving each characteristic relative to the subject characteristic—Young Driver Involved. These bars provide a visual comparison, contrasting the magnitude of involvement of the various characteristics associated with the subject characteristic. In this example the bars reveal that the majority of serious crashes involving Young Drivers take place in Urban areas and involved Multiple Vehicles.



## User Guide to Understanding Crash Distribution

Updating the Arizona State Highway Safety Plan (SHSP) required a data-driven process. Statewide crash data were provided by the Arizona Department of Transportation (ADOT) for each of the previous eight years: January 1, 2005, through December 31, 2012.

The data driven process included identifying where and when Serious Injury crashes have occurred during the reporting period. The maps shown on this page (sometimes referred to as Heat Maps or Hot Spot Maps) are presented to reveal the geographic distribution of high concentrations or densities of Serious Injury crashes (i.e., Fatalities and Incapacitating Injuries) associated with a given crash characteristic – in this case, Young Driver Involved.

### Crash Trend

The data table shows the number of Serious Injury crashes involving Young Drivers by year for the period 2005 to 2012. These annual counts show the trend in the number of Fatalities and Incapacitating Injuries and demonstrate whether the occurrence of Young Driver involved crashes are increasing, staying the same, or decreasing. The crash data for the give crash characteristic – Young Driver Involved – is compared to the overall trend of all serious crashes for the State.

### What is being Mapped?

#### Density of Crashes

The Density (or concentration) of crashes was determined by counting the number of Serious Injury crashes within a 5-square-mile area (length of each side being 2.2 miles). Each square on the maps represents a 5-square-mile area with at least one crash, and the color of the square shown in the legend indicates the number of Serious Injury crashes that occurred within the square.

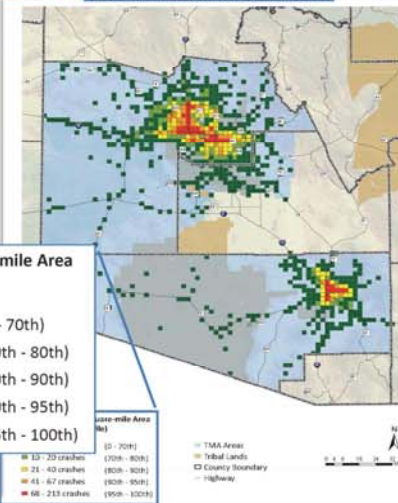
### Understanding the Map Legend

Visual comparison of densities, as shown on the maps, helps to readily identify locations within the State where crashes are most prevalent. The map legend identifies the percentile rank of all 5-square-mile areas shown in the maps. In this example 70% or less of the squares shown involved at least one but no more than 9 serious crashes, and the highest 5% of the areas – the 95<sup>th</sup> Percentile, shown in red – involved between 68 and 213 serious crashes. These are the “Hot Spots.”

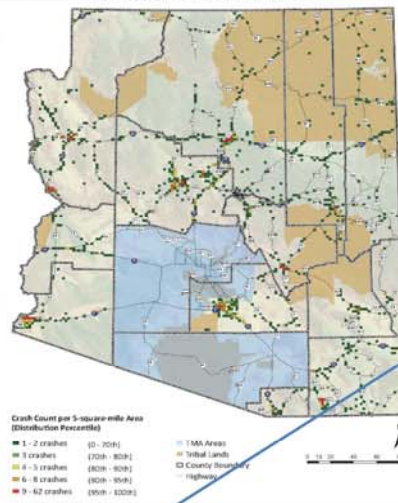
## Arizona Strategic Highway Safety Plan

### Young Driver Crash Distribution | 2005-2012

Density of Crashes in MAG/PAG TMA Regions



Density of Crashes in non-TMA Regions



#### Crash Count per 5-square-mile Area (Distribution Percentile)

- 1 - 9 crashes (0 - 70th)
- 10 - 20 crashes (70th - 80th)
- 21 - 40 crashes (80th - 90th)
- 41 - 67 crashes (90th - 95th)
- 68 - 213 crashes (95th - 100th)

- 0 - 70th
- 70th - 80th
- 80th - 90th
- 90th - 95th
- 95th - 100th

- 1 - 2 crashes (0 - 70th)
- 3 crashes (70th - 80th)
- 4 - 5 crashes (80th - 90th)
- 6 - 8 crashes (90th - 95th)
- 9 - 62 crashes (95th - 100th)

- TMA Areas
- Tribal Lands
- County Boundary
- Highway

Notes:  
 1) Crash statistics include all fatal and incapacitating injury crash incidents occurring between January 1, 2005 and December 31, 2012.  
 2) Transportation Management Area (TMA) currently exists in the Maricopa Association of Governments (MAG) Region and Pinal Association of Governments (PAG) Region.

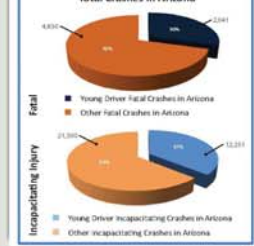
#### Total Crashes Involving Young Drivers by Year 2005-2012

Year	Fatal	Incapacitating Injury
2005	371	2,113
2006	346	1,855
2007	308	1,880
2008	308	2,484
2009	183	1,256
2010	147	1,255
2011	212	1,183
2012	206	1,125
<b>Total</b>	<b>2,041</b>	<b>12,211</b>

#### Total Crashes in Arizona by Year 2005-2012

Year	Fatal	Incapacitating Injury
2005	1,049	5,212
2006	1,126	4,934
2007	952	4,860
2008	843	4,133
2009	709	3,738
2010	695	3,576
2011	735	3,589
2012	742	3,509
<b>Total</b>	<b>6,771</b>	<b>38,551</b>

#### Percent of Young Driver Crashes Compared to Total Crashes in Arizona



### Comparison of Crash Characteristic with Statewide Crashes

The Pie Charts provide a direct comparison of the number of severe crashes involving the specific characteristic—Young Drivers—and all serious crashes statewide for the period 2005–2012. It is clear from these Pie Charts that Young Drivers are involved in just under one-third (30%) of all Fatal crashes, and over one-third (37%) of all Incapacitating Injury crashes.

# Arizona Strategic Highway Safety Plan

Total Crash Count Summary | 2005-2012

Total Fatal and Incapacitating Injury Crash Statistics from 2005-2012

		Fatal		Incapacitating Injury		Total		Number of Crashes	
Total		6,871	100.0%	33,551	100.0%	40,422	100.0%	0 10,000 20,000 30,000 40,000 50,000	
Characteristics		Fatal		Incapacitating Injury		Total			
		# of Crashes	% to total	# of Crashes	% to total	# of Crashes	% to total		
Geographic	Urban	3,746	54.5%	26,277	78.3%	30,023	74.3%		
	Rural	3,125	45.5%	7,274	21.7%	10,399	25.7%		
	Highway	2,979	43.4%	9,713	28.9%	12,692	31.4%		
	Other Road	3,892	56.6%	23,838	71.1%	27,730	68.6%		
	Tribal Land	872	12.7%	945	2.8%	1,817	4.5%		
Geometry	Intersection Related	1,638	23.8%	14,967	44.6%	16,605	41.1%	40,422 Total Fatal and Incapacitating Injury Crashes	
	Lane Departure	3,514	51.1%	10,566	31.5%	14,080	34.8%		
	Work Zone	95	1.4%	555	1.7%	650	1.6%		
Person Type	Young Driver (13-24)	2,041	29.7%	12,251	36.5%	14,292	35.4%		
	65 and Older	1,248	18.2%	5,273	15.7%	6,521	16.1%		
	Pedalcyclist Involved	191	2.8%	1,770	5.3%	1,961	4.9%		
	Pedestrian Involved	1,176	17.1%	2,908	8.7%	4,084	10.1%		
Behavior	Aggressive Driver	282	4.1%	920	2.7%	1,202	3.0%		
	Alcohol Involved	2,265	33.0%	4,868	14.5%	7,133	17.6%		
	Distracted Driver	981	14.3%	7,289	21.7%	8,270	20.5%		
	Drug Involved	678	9.9%	714	2.1%	1,392	3.4%		
	Impaired Driver	2,342	34.1%	6,184	18.4%	8,526	21.1%		
	Unhelmeted Motorcyclist	572	8.3%	2,426	7.2%	2,998	7.4%		
	No Restraint Used	3,219	46.8%	8,533	25.4%	11,752	29.1%		
	Sleepy or Fatigued	207	3.0%	860	2.6%	1,067	2.6%		
	Speeding Involved	2,524	36.7%	10,944	32.6%	13,468	33.3%		
Vehicle	Motorcycle Involved	1,109	16.1%	5,920	17.6%	7,029	17.4%		
	Train Involved	12	0.2%	10	0.0%	22	0.1%		
	Truck Involved	853	12.4%	2,788	8.3%	3,641	9.0%		
	Multiple Vehicle	4,034	58.7%	24,550	73.2%	28,584	70.7%		
Environmental	Dust Related (Windy)	40	0.6%	117	0.3%	157	0.4%		
	Wildlife/Animal Involved	22	0.3%	146	0.4%	168	0.4%		
	Wet Weather	211	3.1%	994	3.0%	1,205	3.0%		
	Dusk/ Dawn	439	6.4%	1,773	5.3%	2,212	5.5%		
Dark - No Light	608	8.8%	1,261	3.8%	1,869	4.6%			

Notes:

- 1) The percentages shown in the table reflect the percent of Total crashes that also exhibit the characteristics being summarized.
- 2) Urban versus Rural designation of crash occurrence is based on the 2010 U.S. Census designation of urbanized areas.
- Source: 2005-2012 Accident Location Identification and Surveillance Systems (ALISS) database, received July 2013. Information presented in this publication may be based on preliminary data and as such differ slightly from previous or future crash summaries.

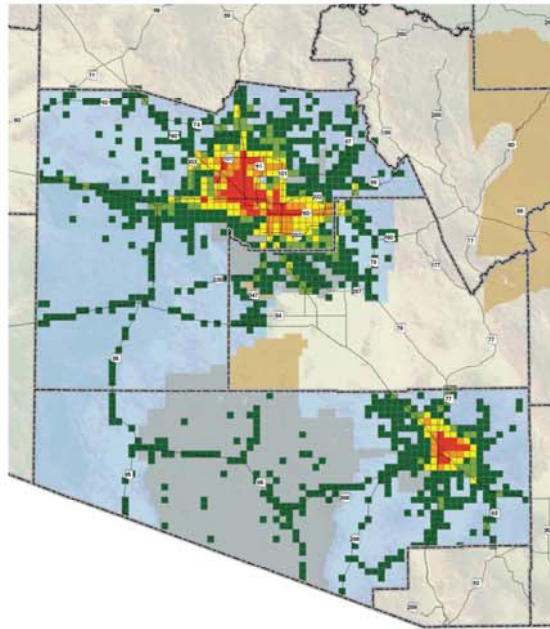
■ Fatal ■ Incapacitating Injury  
 Note: The graphs illustrate the number of Total crashes that also involved the graphed characteristics.



# Arizona Strategic Highway Safety Plan

Total Crash Distribution | 2005-2012

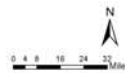
Density of Crashes in MAG/PAG TMA Regions



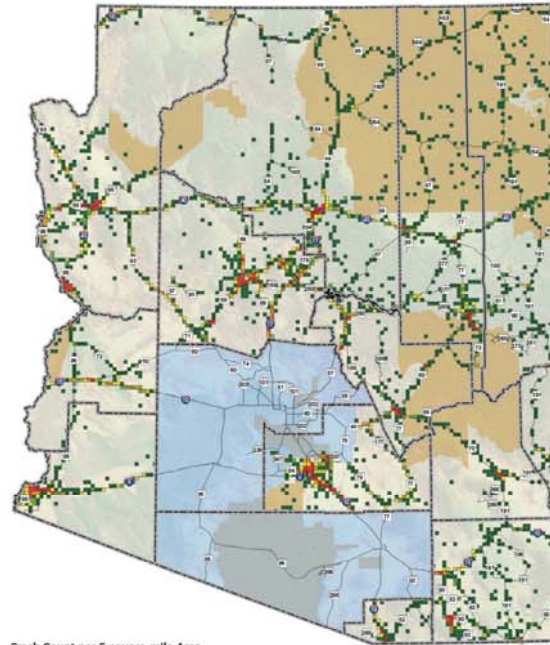
**Crash Count per 5-square-mile Area (Distribution Percentile)**

- 1 to 13 crashes (0 - 70th)
- 14 to 25 crashes (70th - 80th)
- 26 to 78 crashes (80th - 90th)
- 79 to 138 crashes (90th - 95th)
- 139 to 650 crashes (95th - 100th)

- TMA Areas
- Tribal Lands
- County Boundary
- Highway



Density of Crashes in non-TMA Regions



**Crash Count per 5-square-mile Area (Distribution Percentile)**

- 1 to 3 crashes (0 - 70th)
- 4 to 5 crashes (70th - 80th)
- 6 to 8 crashes (80th - 90th)
- 9 to 14 crashes (90th - 95th)
- 15 to 143 crashes (95th - 100th)

- TMA Areas
- Tribal Lands
- County Boundary
- Highway



**Notes:**

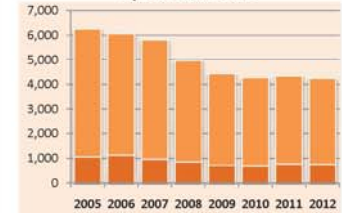
- 1) Crash statistics include all fatal and incapacitating injury crash incidents occurring between January 1, 2005 and December 31, 2012.
  - 2) Transportation Management Areas (TMAs) currently exist in the Maricopa Association of Governments (MAG) Region and Pima Association of Governments (PAG) Region.
- Source: 2005-2012 Accident Location Identification and Surveillance Systems (ALISS) database, received July 2013. Information presented in this publication may be based on preliminary data and as such differ slightly from previous or future crash summaries.



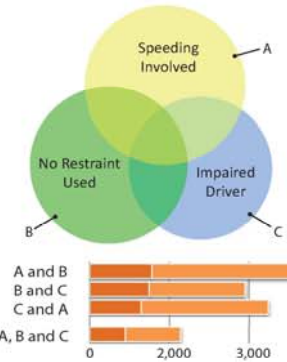
Total Serious Crashes in Arizona by Year 2005-2012

Year	Fatal	Incapacitating Injury
2005	1,049	5,212
2006	1,126	4,934
2007	952	4,860
2008	843	4,133
2009	709	3,738
2010	695	3,576
2011	755	3,589
2012	742	3,509
<b>Total</b>	<b>6,871</b>	<b>33,551</b>

Annual Trend in Total Serious Crashes by Year 2005-2012



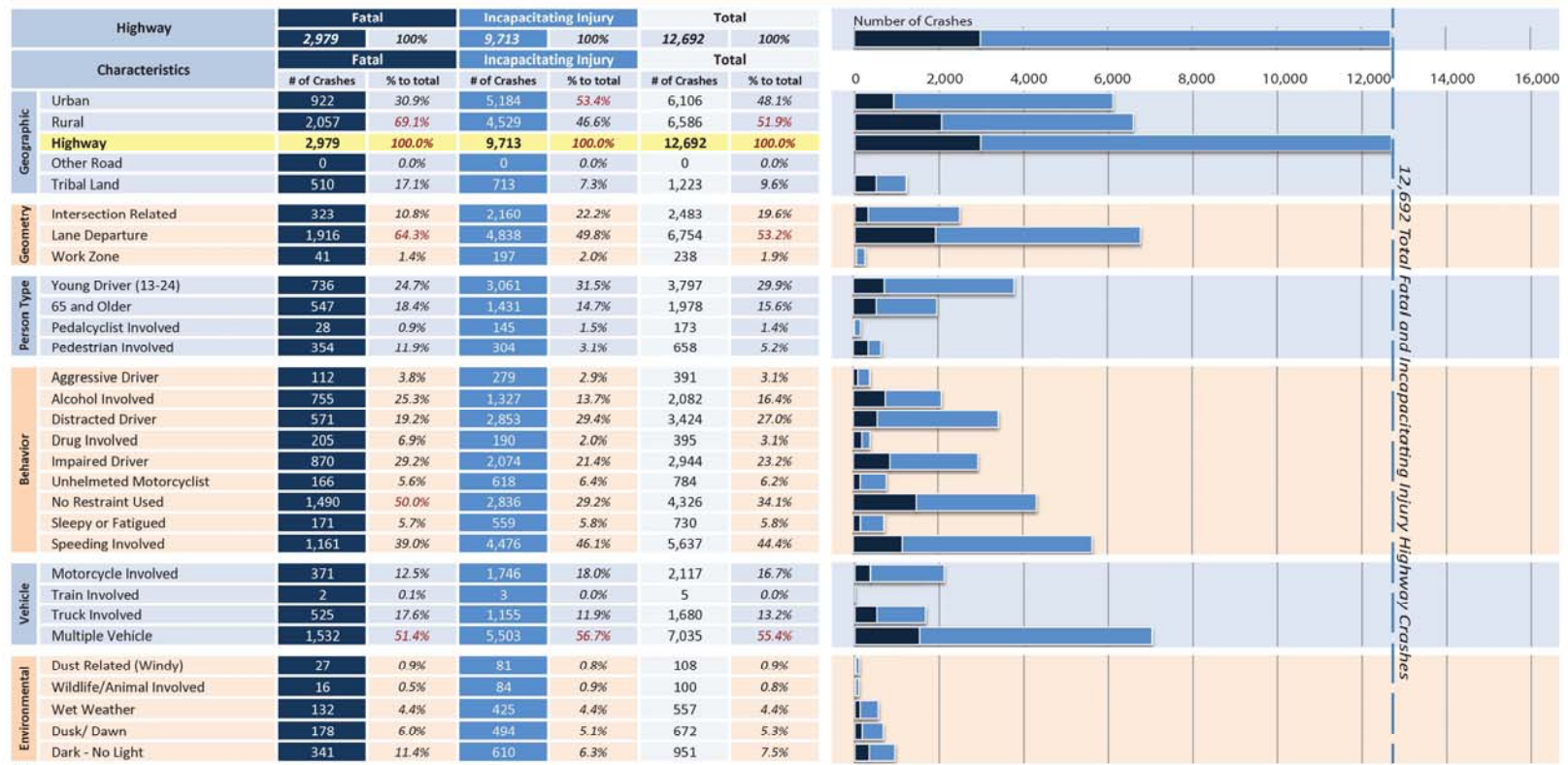
Interaction of Most Common Behavioral Characteristics in Fatal and Incapacitating Injury Crashes



# Arizona Strategic Highway Safety Plan

Highway Crash Summary | 2005-2012

Highway Fatal and Incapacitating Injury Crash Statistics from 2005-2012



Notes:  
 1) The percentages shown in the table reflect the percent of Highway crashes that also exhibit the characteristics being summarized.  
 2) Urban versus Rural designation of crash occurrence is based on the 2010 U.S. Census designation of urbanized areas.  
 Source: 2005-2012 Accident Location Identification and Surveillance System (ALISS) database, received July 2013. Information presented in this publication may be based on preliminary data and as such differ slightly from previous or future crash summaries.

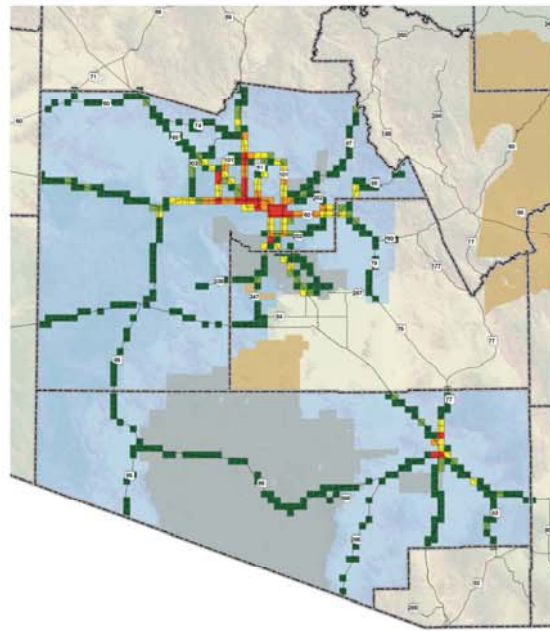
Note: The graphs illustrate the number of Highway crashes that also involved the graphed characteristic.



# Arizona Strategic Highway Safety Plan

Highway Crash Distribution | 2005-2012

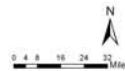
Density of Crashes in MAG/PAG TMA Regions



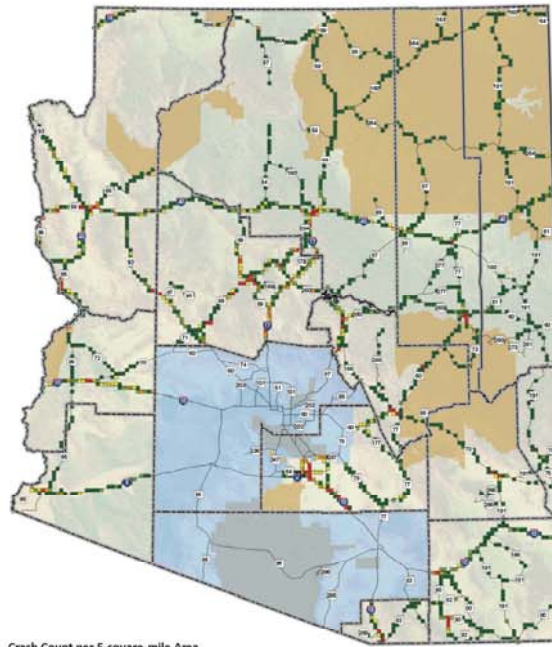
Crash Count per 5-square-mile Area (Distribution Percentile)

- 1 to 12 crashes (0 - 70th)
- 13 to 18 crashes (70th - 80th)
- 19 to 32 crashes (80th - 90th)
- 33 to 47 crashes (90th - 95th)
- 48 to 137 crashes (95th - 100th)

- TMA Areas
- Tribal Lands
- County Boundary
- Highway



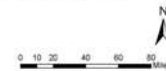
Density of Crashes in non-TMA Regions



Crash Count per 5-square-mile Area (Distribution Percentile)

- 1 to 4 crashes (0 - 70th)
- 5 to 6 crashes (70th - 80th)
- 7 to 9 crashes (80th - 90th)
- 10 to 13 crashes (90th - 95th)
- 14 to 77 crashes (95th - 100th)

- TMA Areas
- Tribal Lands
- County Boundary
- Highway



Notes:  
 1) Crash statistics include all fatal and incapacitating injury crash incidents occurring between January 1, 2005 and December 31, 2012.  
 2) Transportation Management Areas (TMAs) currently exist in the Maricopa Association of Governments (MAG) Region and Pima Association of Governments (PAG) Region.  
 Source: 2005-2012 Accident Location Identification and Surveillance Systems (ALISS) database, received July 2013. Information presented in this publication may be based on preliminary data and as such differ slightly from previous or future crash summaries.



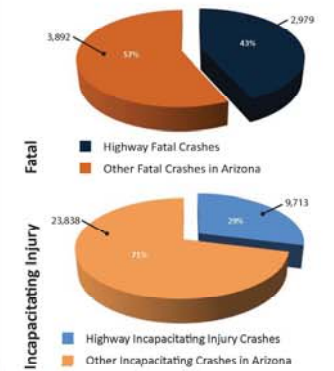
Total Highway Serious Crashes by Year 2005-2012

Year	Fatal	Incapacitating Injury
2005	457	1,377
2006	487	1,426
2007	411	1,511
2008	369	1,240
2009	319	1,090
2010	298	1,022
2011	316	1,009
2012	322	1,038
<b>Total</b>	<b>2,979</b>	<b>9,713</b>

Total Crashes in Arizona by Year 2005-2012

Year	Fatal	Incapacitating Injury
2005	1,049	5,212
2006	1,126	4,934
2007	952	4,860
2008	843	4,133
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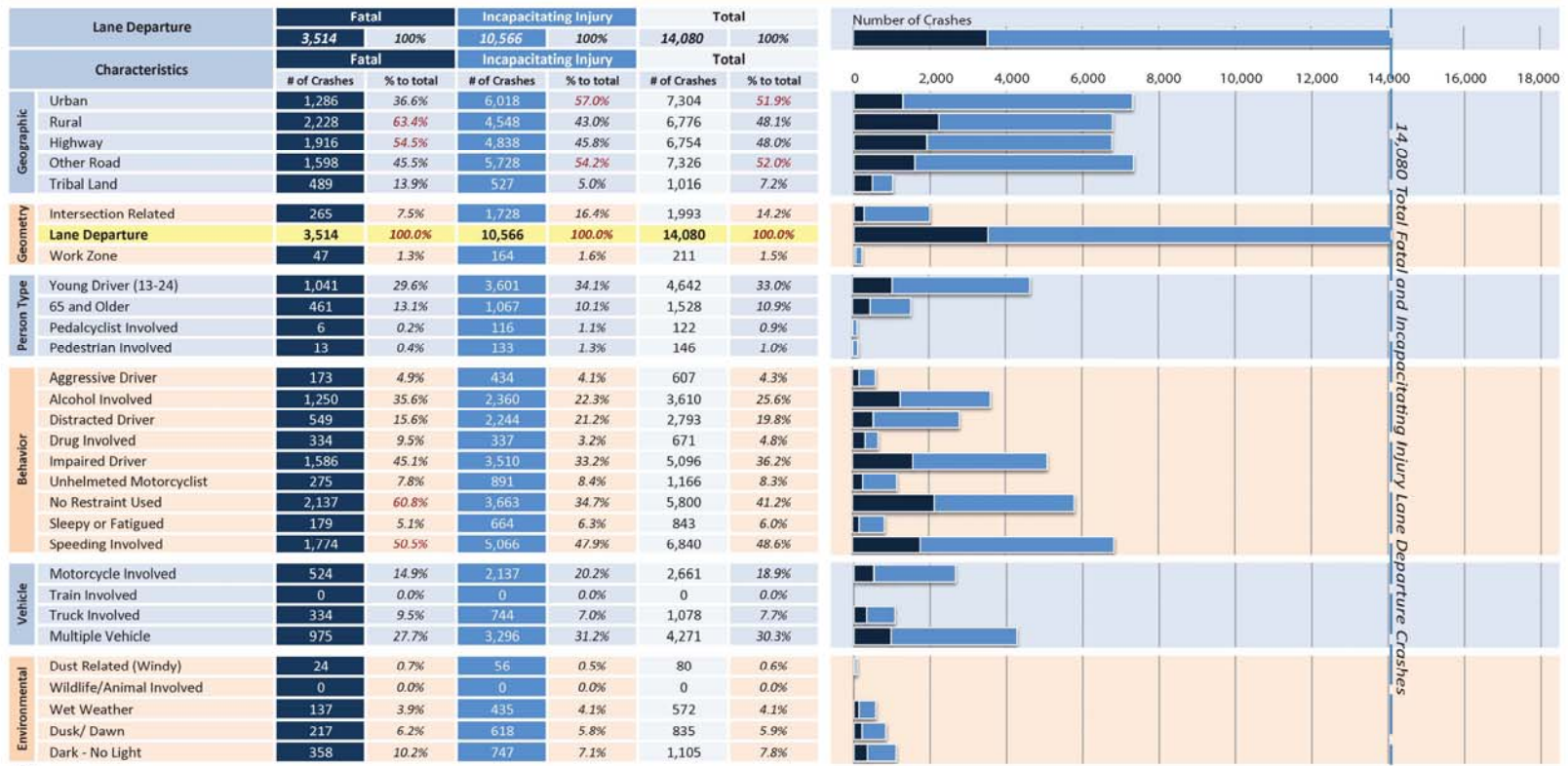
Highway Crashes Compared to Total Crashes in Arizona



# Arizona Strategic Highway Safety Plan

Lane Departure Crash Summary | 2005-2012

Lane Departure Fatal and Incapacitating Injury Crash Statistics from 2005-2012



Notes:  
 1) The percentages shown in the table reflect the percent of Lane Departure crashes that also exhibit the characteristics being summarized.  
 2) Urban versus Rural designation of crash occurrence is based on the 2010 U.S. Census designation of unincorporated areas.

Source: 2005-2012 Accident Location Identification and Surveillance Systems (ALISS) database, received July 2013. Information presented in this publication may be based on preliminary data and as such differ slightly from previous or future crash summaries.

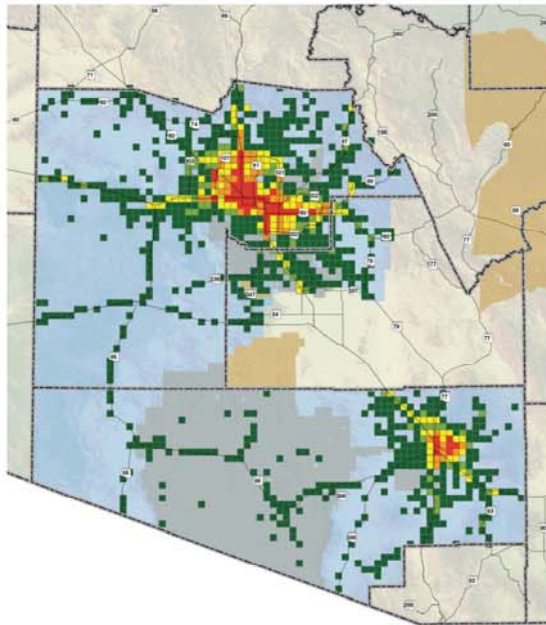
Note: The graphs illustrate the number of Lane Departure crashes that also involved the graphed characteristic.



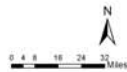
# Arizona Strategic Highway Safety Plan

Lane Departure Crash Distribution | 2005-2012

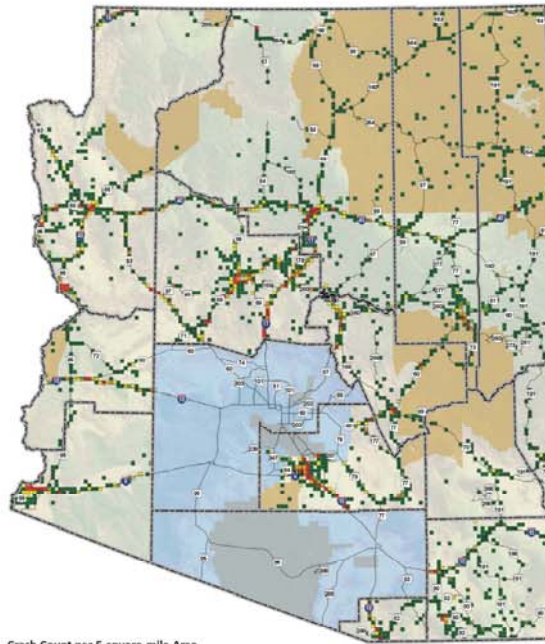
Density of Crashes in MAG/PAG TMA Regions



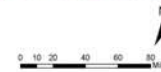
Crash Count per 5-square-mile Area (Distribution Percentile)



Density of Crashes in non-TMA Regions



Crash Count per 5-square-mile Area (Distribution Percentile)



Notes:  
 1) Crash statistics include all fatal and incapacitating injury crash incidents occurring between January 1, 2005 and December 31, 2012.  
 2) Transportation Management Area (TMA) currently exist in the Maricopa Association of Governments (MAG) Region and Pima Association of Governments (PAG) Region.  
 Source: 2005-2012 Accident Location Identification and Surveillance Systems (ALISS) database, received July 2013. Information presented in this publication may be based on preliminary data and as such differ slightly from previous or future crash summaries.



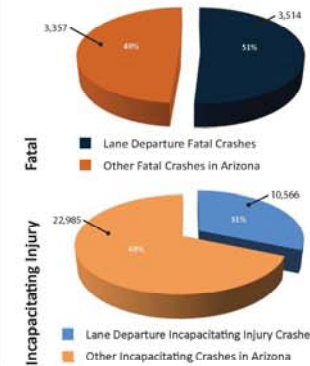
Total Lane Departure Serious Crashes by Year 2005-2012

Year	Fatal	Incapacitating Injury
2005	522	1,492
2006	552	1,504
2007	508	1,523
2008	449	1,259
2009	392	1,383
2010	339	1,225
2011	364	1,106
2012	388	1,074
<b>Total</b>	<b>3,514</b>	<b>10,566</b>

Total Crashes in Arizona by Year 2005-2012

Year	Fatal	Incapacitating Injury
2005	1,049	5,212
2006	1,126	4,934
2007	952	4,860
2008	843	4,133
2009	709	3,738
2010	695	3,576
2011	755	3,589
2012	742	3,509
<b>Total</b>	<b>6,871</b>	<b>33,551</b>

Lane Departure Crashes Compared to Total Crashes in Arizona





**NAVAJO NATION**

**2017 Strategic Highway  
Safety Plan**



# CRASH DATA

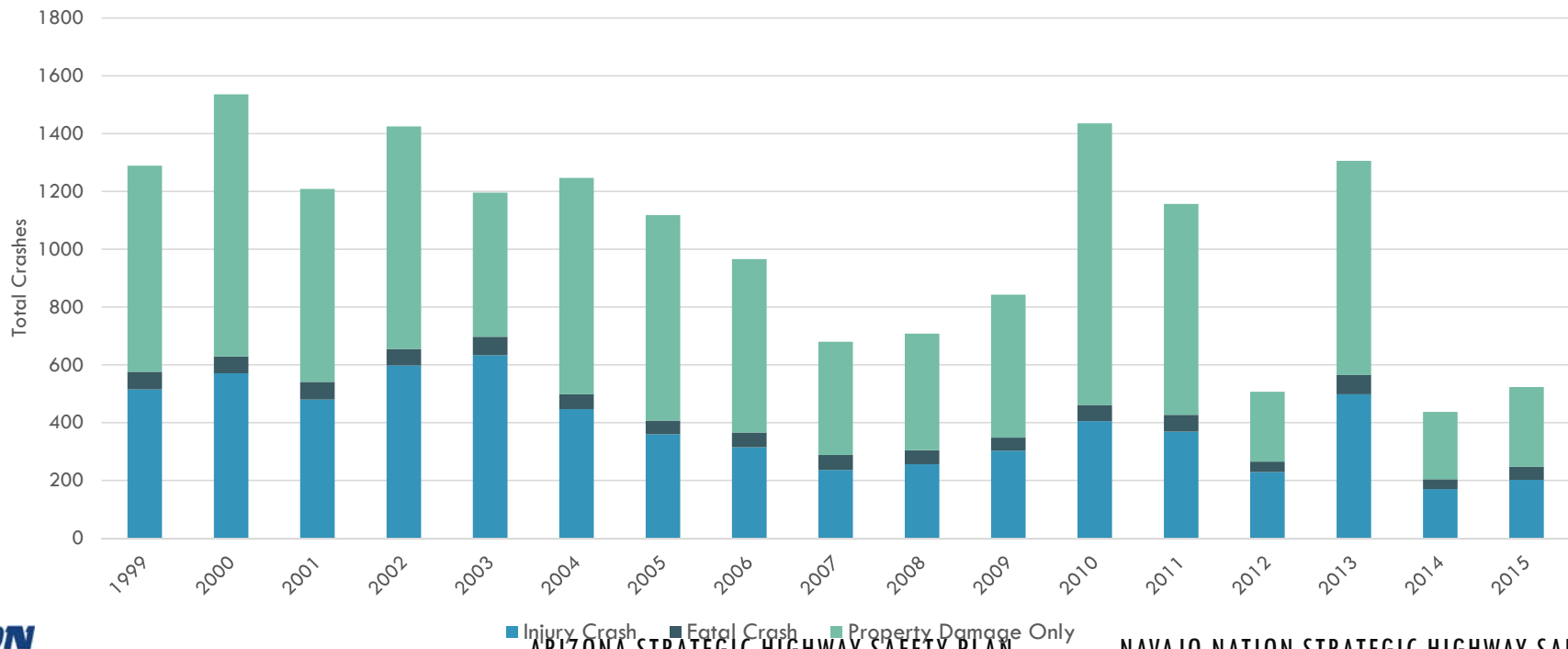


1999-2015

- **17,583** Recorded Crashes within Navajo Nation
- **7,480 (43%)** are Fatal and Serious Injury Crashes
- Of the Fatal and Serious Injury Crashes:
  - **43% (3,185)** are within 7 areas; and
  - **57% (4,295)** are located outside those areas.

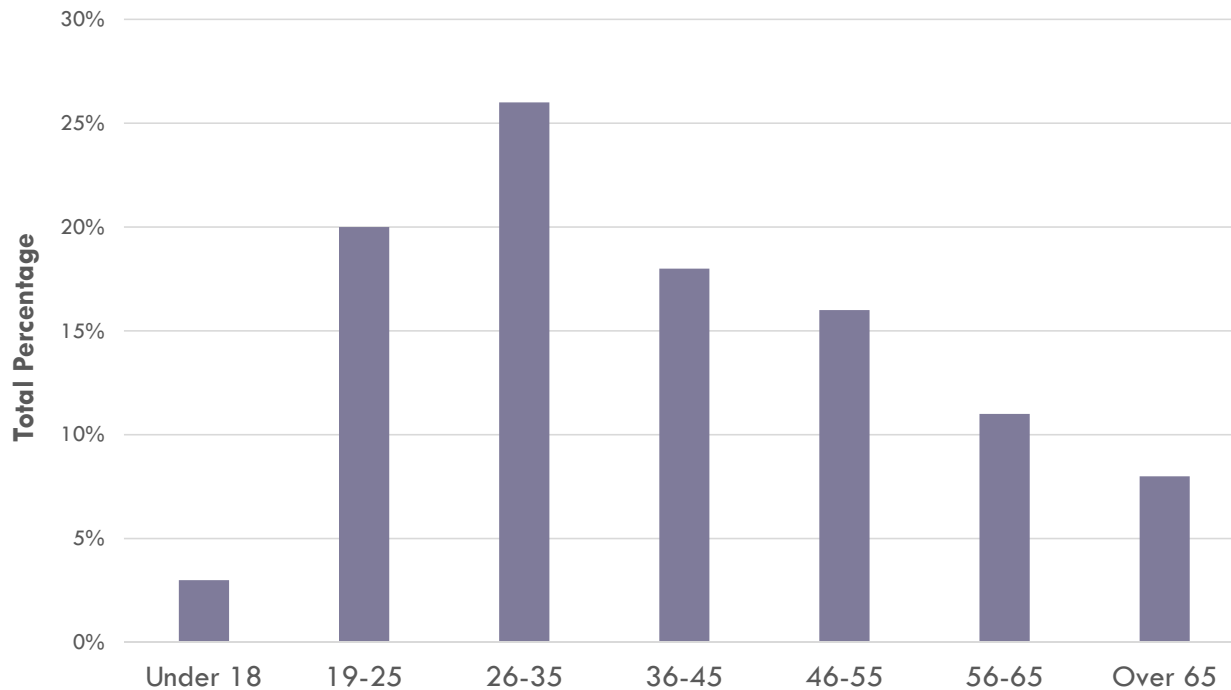
# CRASH DATA

## Crash Severity 1999-2015



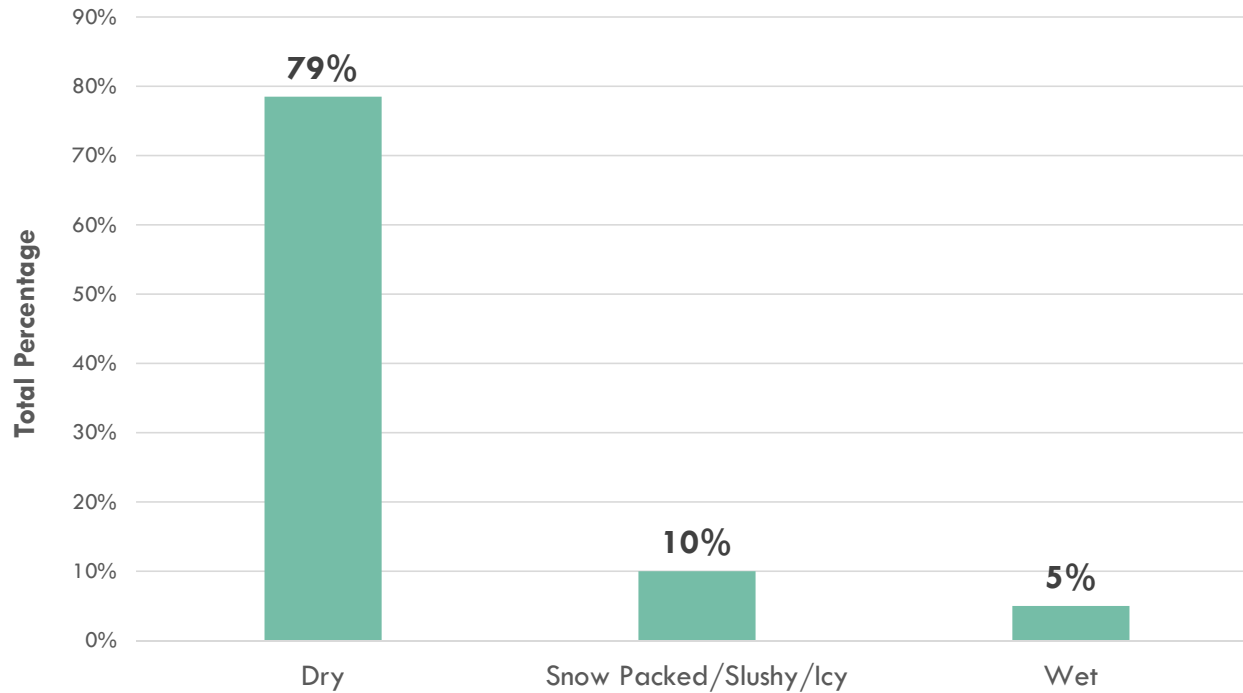
# CRASH DATA – OVER 17 YEARS...

## Most Common Crash Age by Age Cohort



# CRASH DATA – OVER 17 YEARS...

## Top 3 Crash Road Condition



# STATE EMPHASIS AREAS

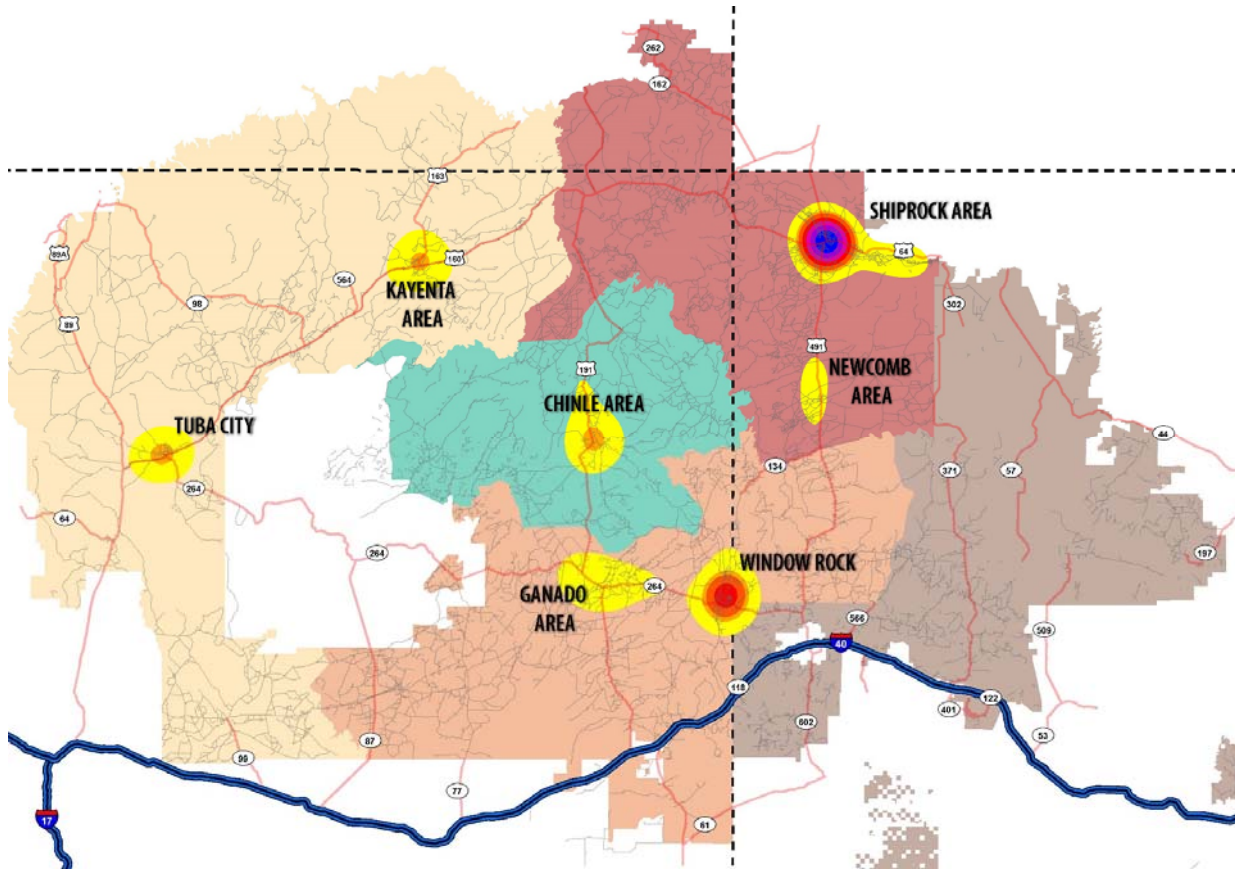


## Emphasis Areas common to all Three States include:

- *Speeding/Aggressive Driving*
- *Impaired Driving*
- *Distracted Driving*
- *Occupant Protection*
- *Age Related*

Arizona, New Mexico, & Utah State Emphasis Areas			
	Arizona	New Mexico	Utah
Speeding/Aggressive Driving	X	X	X
Impaired Driving	X	X	X
Distracted Driving	X	X	X
Intersection Crashes		X	X
Motorcycles	X		X
Lane Departure Crashes		X	X
Occupant Protection (Restraints)	X	X	X
Nonmotorized Users (Bike/Pedestrian)	X		X
Public Info/Education		X	X
Age Related	X	X	X
Traffic Records/ Data Improvements	X	X	
Policy Initiatives	X		
Drowsy Driving			X
Emergency Services Response		X	
Infrastructure and Operations	X		
Native Americans		X	
Heavy Vehicles/Transit	X		
Natural Risks	X		
Special Users		X	
Traffic Incident Management	X		
Interjurisdictional	X		

**Navajo Nation  
Crash Data Analysis  
Injury and Fatal Crashes Only  
(1999-2015)**



Agency

- Chinle
- Eastern
- Fort Defiance
- Northern
- Western
- BIA/Tribal Route
- Interstate
- US/State Highway

Kernel Density Analysis of Fatal and Injury Crashes

Value

- High : 7
- Low : 1

# NAVAJO NATION HIGHEST CRASH AREAS

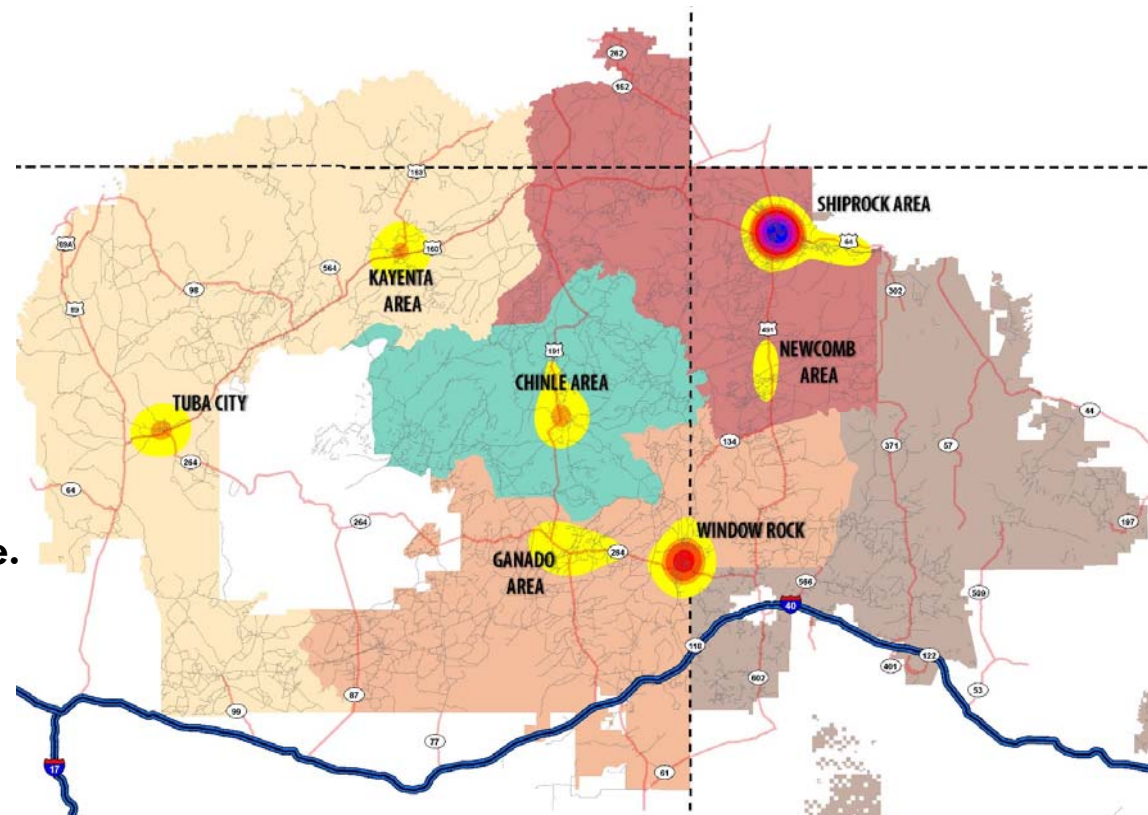
1. Shiprock Area
2. Window Rock
3. Tuba City
4. Kayenta Area
5. Chinle Area
6. Ganado Area
7. Newcomb Area

# HIGH CRASH AREAS

The 7 highest crash areas comprise:

- 41% of all Fatal/Injury Crashes
- 52% of all Pedestrian Involved Crashes
- 60% of all Intersection Related Crashes

**But only make up 4.1% of road mileage.**



## SEVERE CRASHES IN THESE SEVEN AREAS ACCOUNT FOR...:

**63%** of all **INTERSECTION** Related Crashes

**70%** of all **PEDESTRIAN** Involved Crashes

**79%** of **Behavior** Crash Types in these areas were **RIGHT-OF-WAY/YIELD** Related Crashes

**37%** of **Environmental** Crash Types in these areas were **WILDLIFE/ANIMAL** Involved Crashes



# SHIPROCK AREA

9% of all Fatal/Injury Crashes

## Highest Crash Factors:

- Under the Influence of Alcohol
- Driver Inattention
- Failed to Yield to ROW

## 648 Severe Crashes:

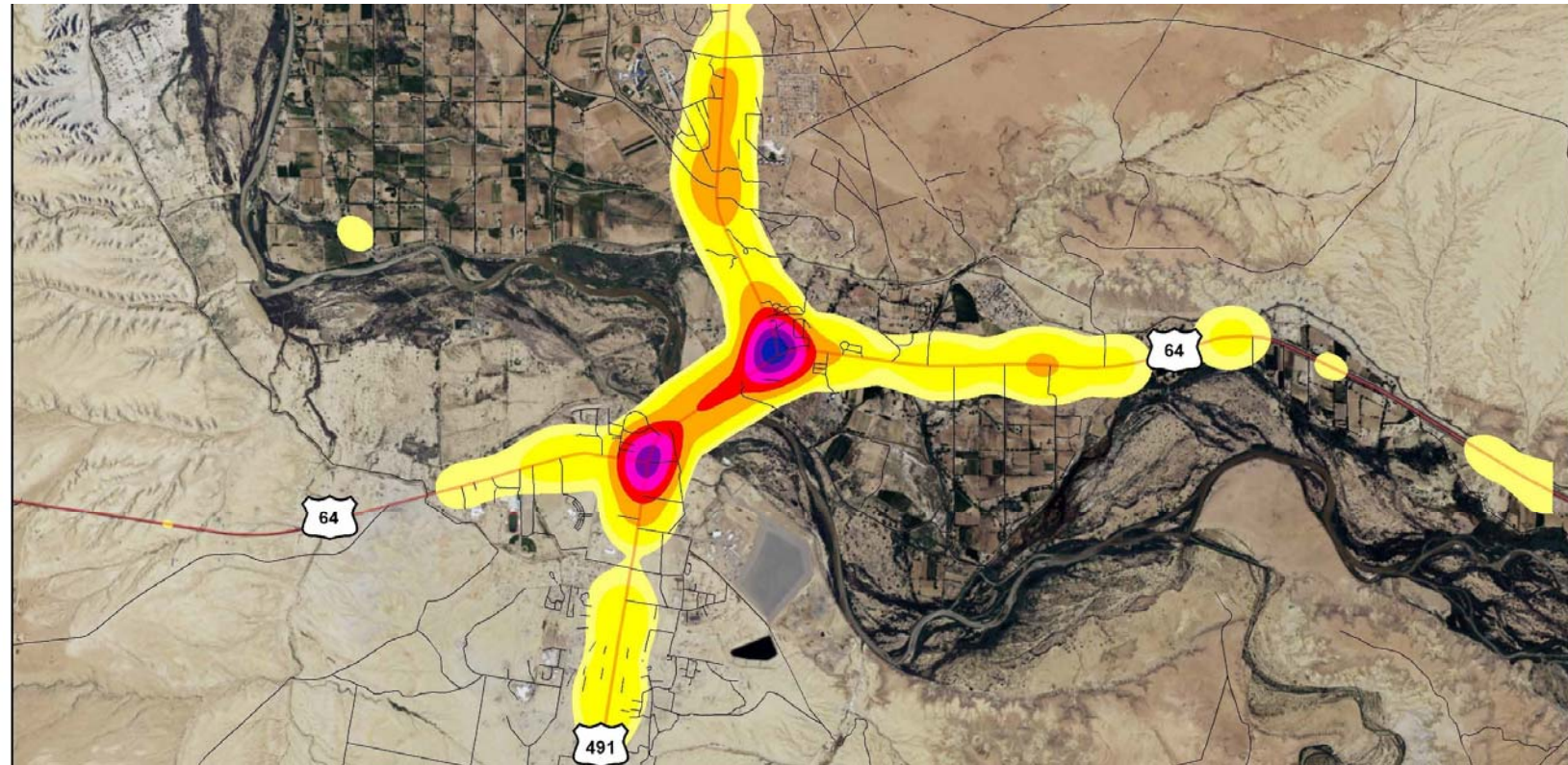
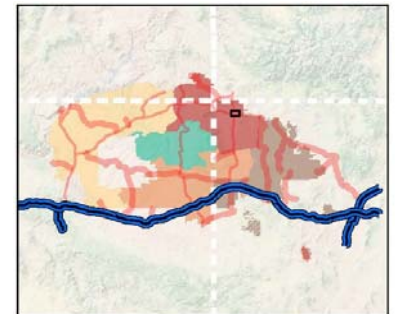
- 93% Crashes with Injuries
- 7% Crashes with Fatalities

## Common Collision Types:

- Rear Ended
- Other Vehicle
- Sideswipe

**Navajo Nation  
Crash Data Analysis  
(Injury and Fatal Crashes Only)  
(1999-2015)**

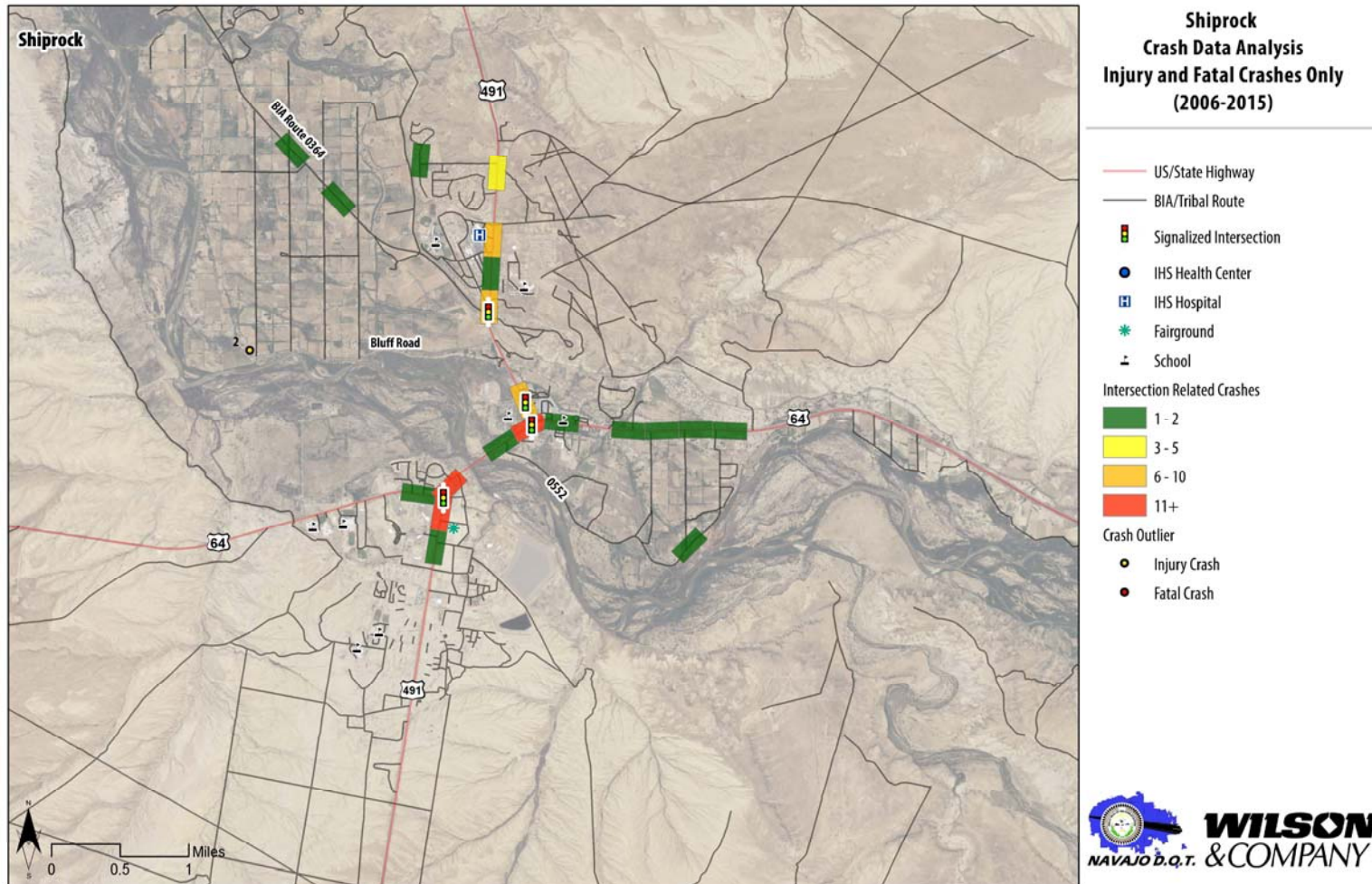
- BIA/Tribal Route
  - Interstate
  - US/State Highway
- Kernel Density Analysis of Fatal and Injury Crashes
- Value
- High : 1088.88
  - Low : 50



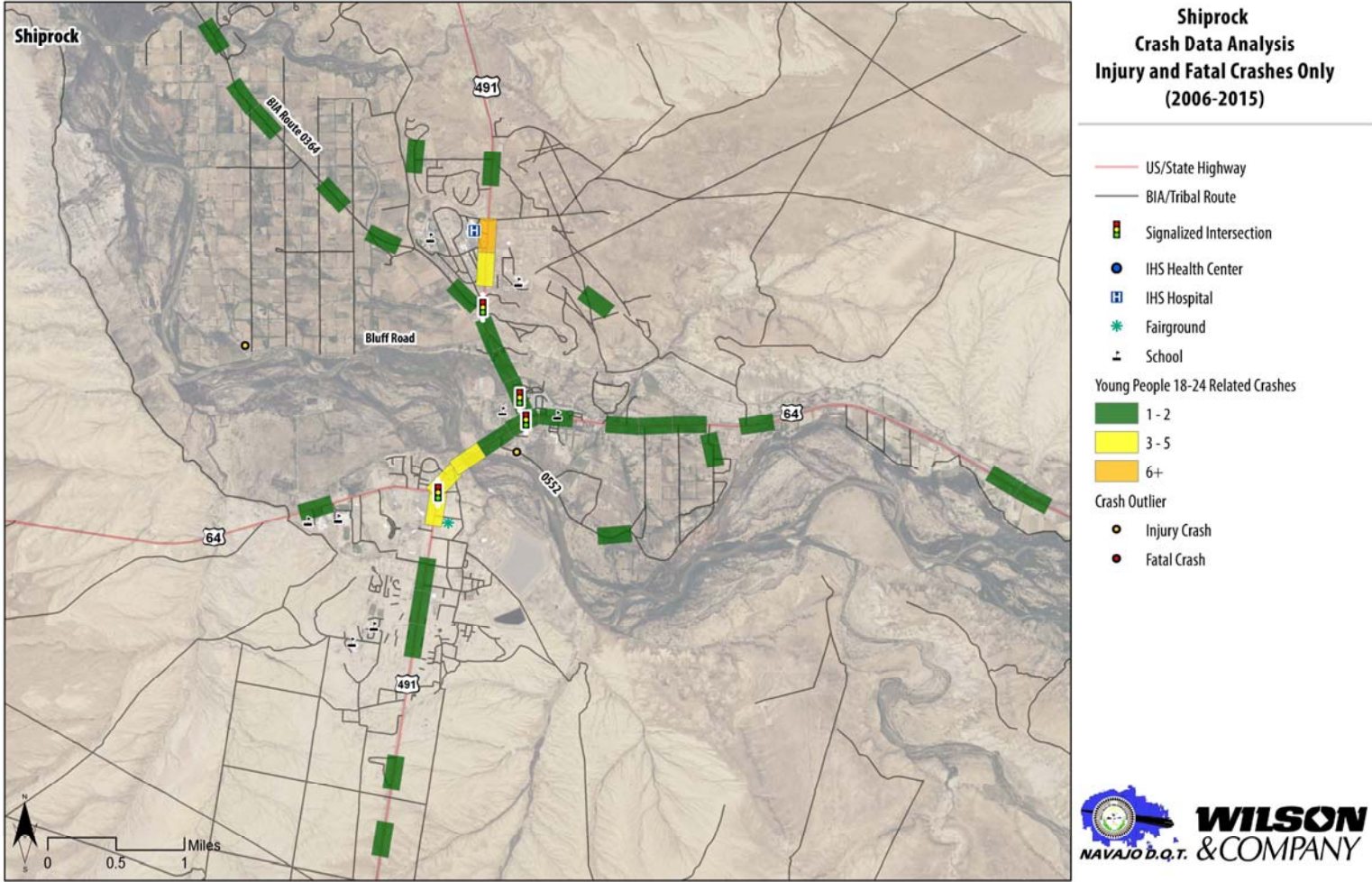
# SHIPROCK AREA

Fatal/Injury Crash Density

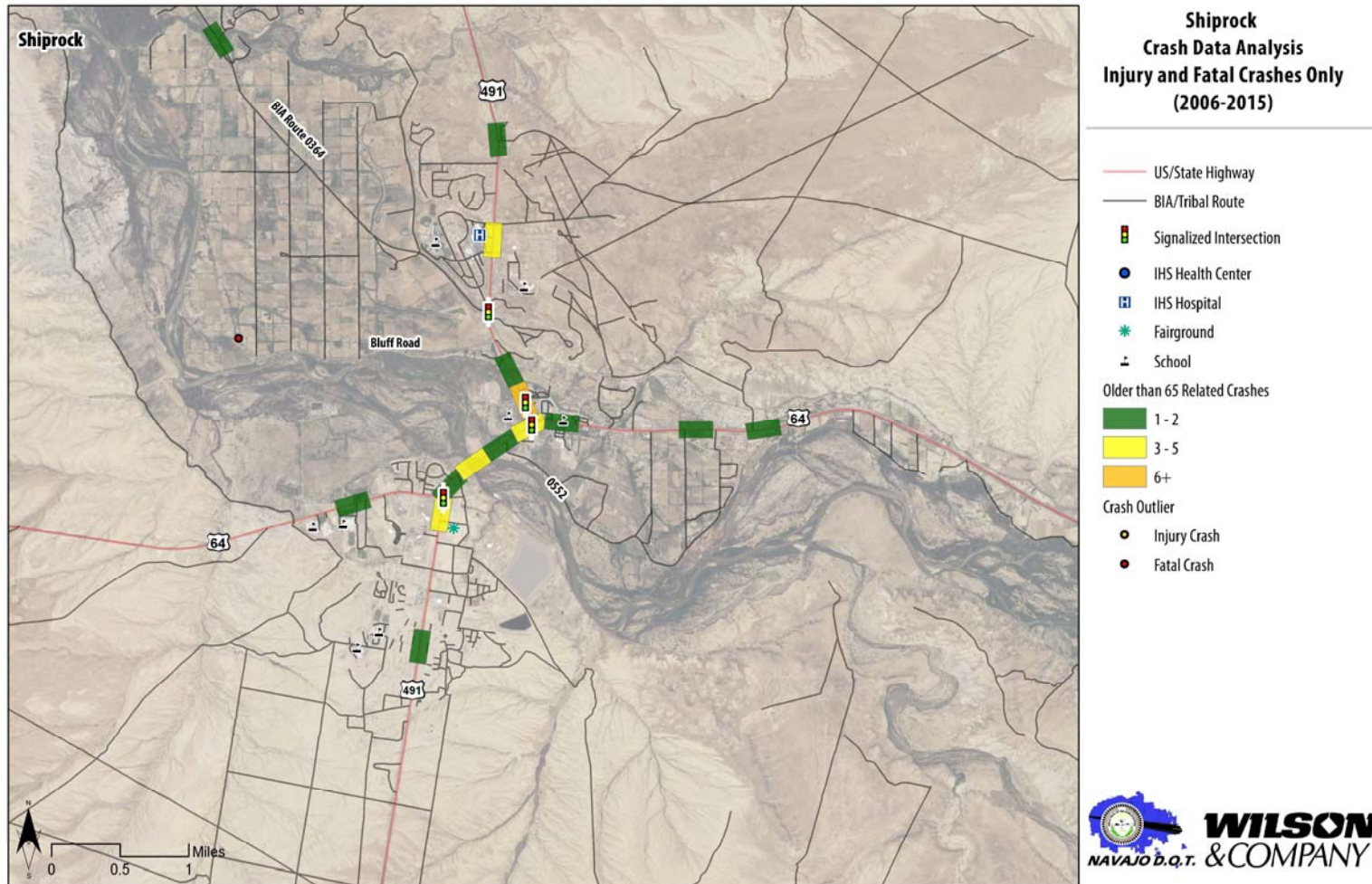
# INTERSECTION CRASHES



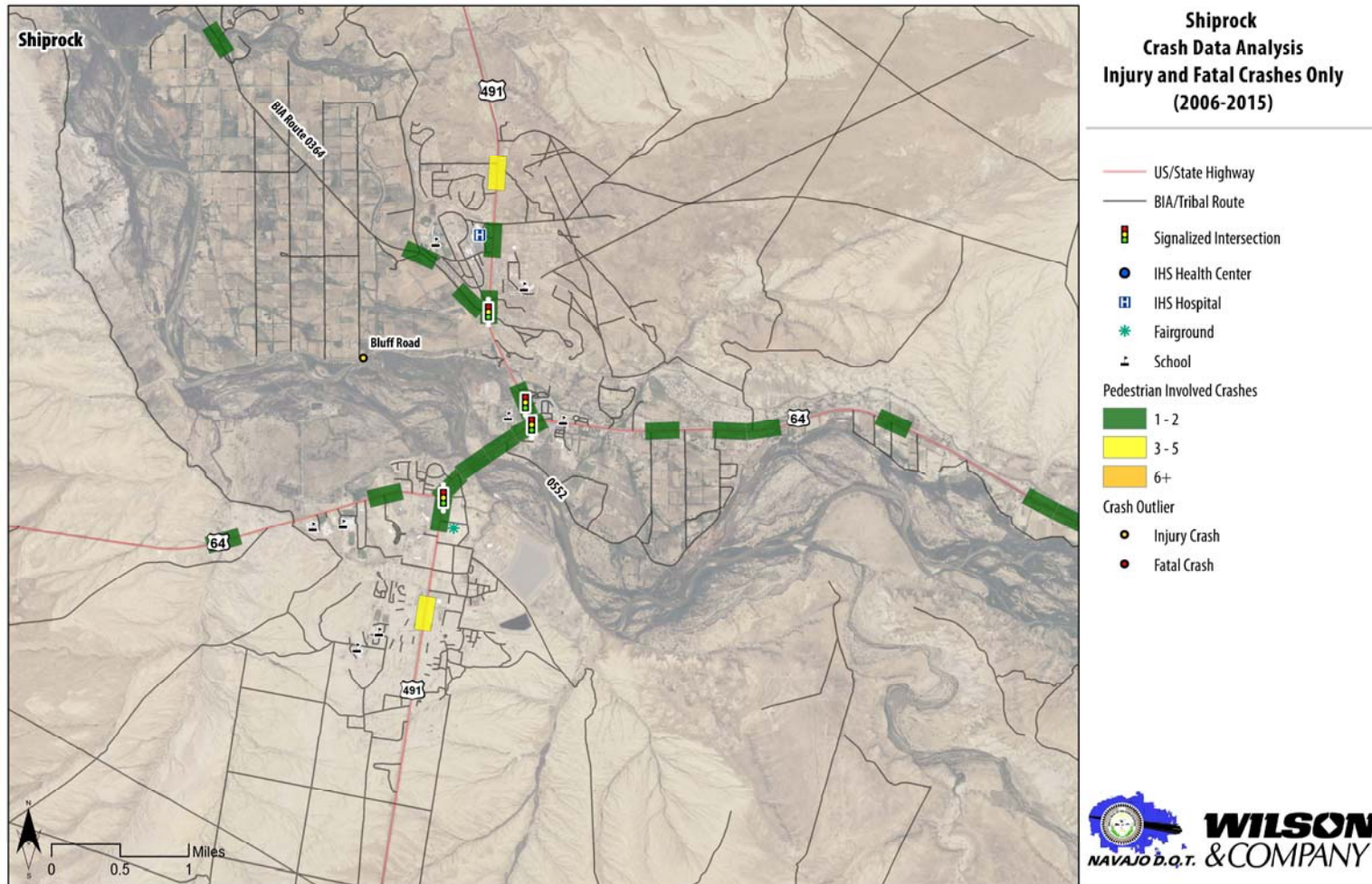
# YOUNG PEOPLE 18-24 CRASHES



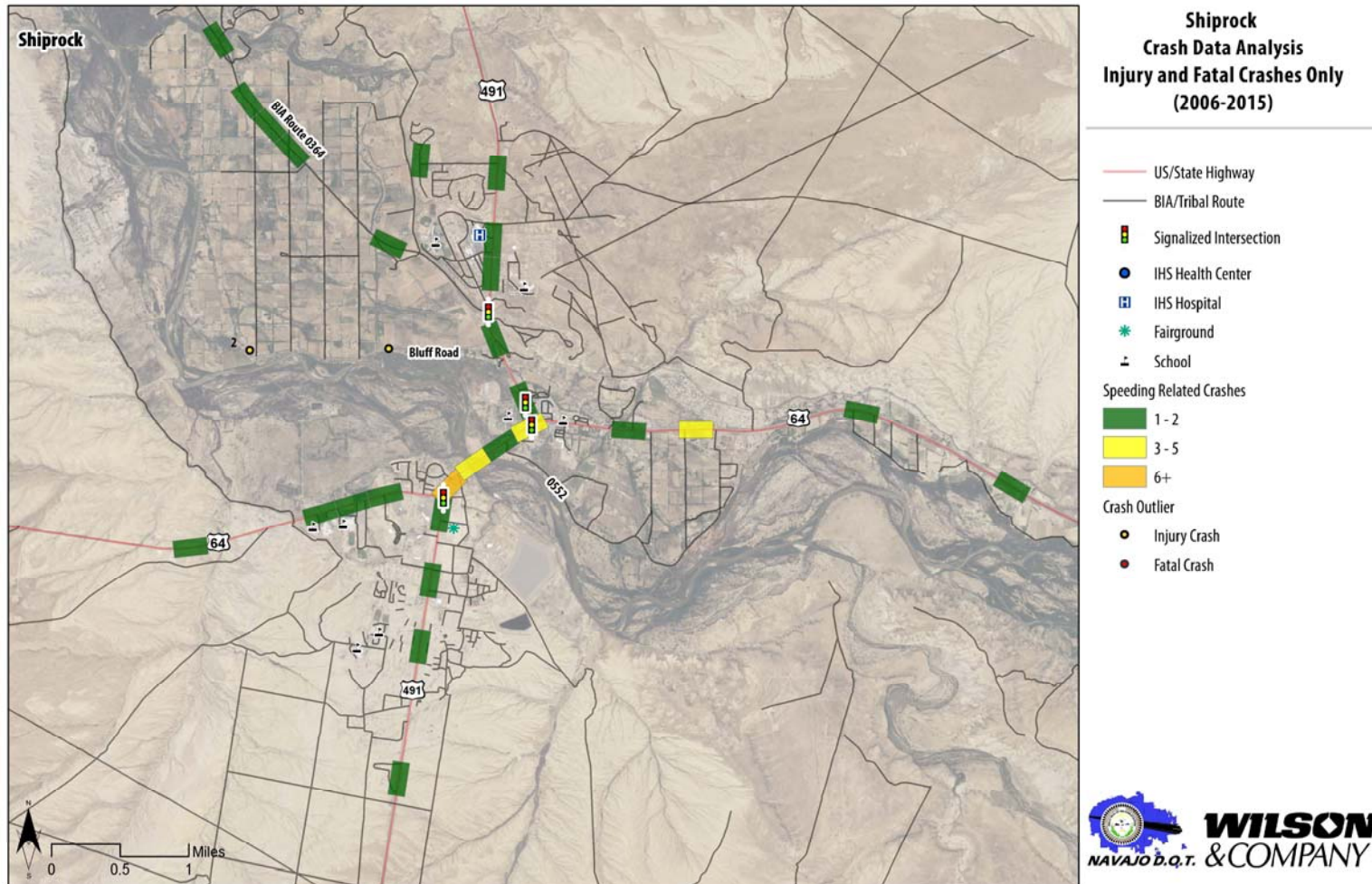
# OLDER THAN 65 CRASHES



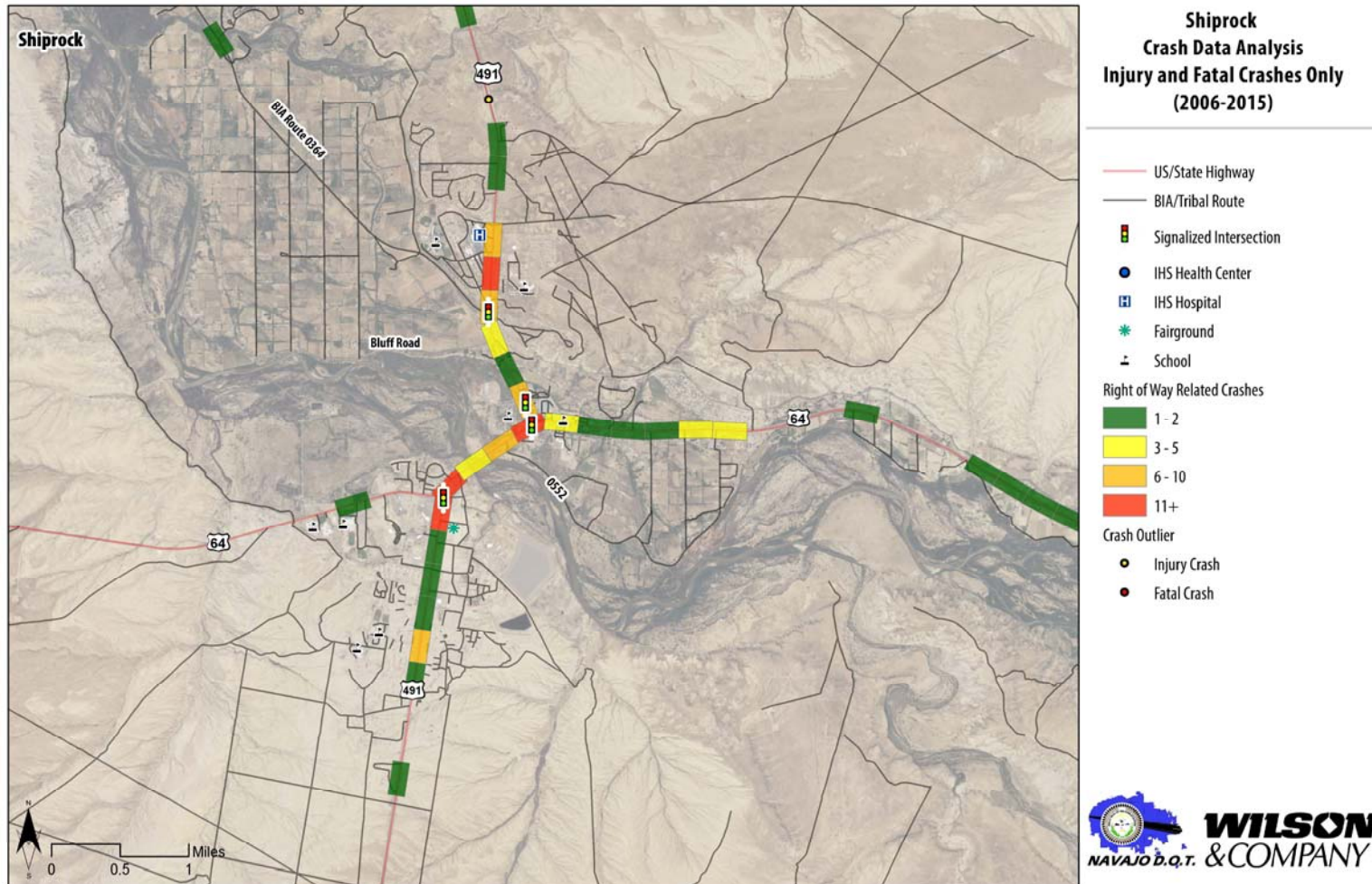
# PEDESTRIAN INVOLVED CRASHES



# SPEEDING RELATED CRASHES

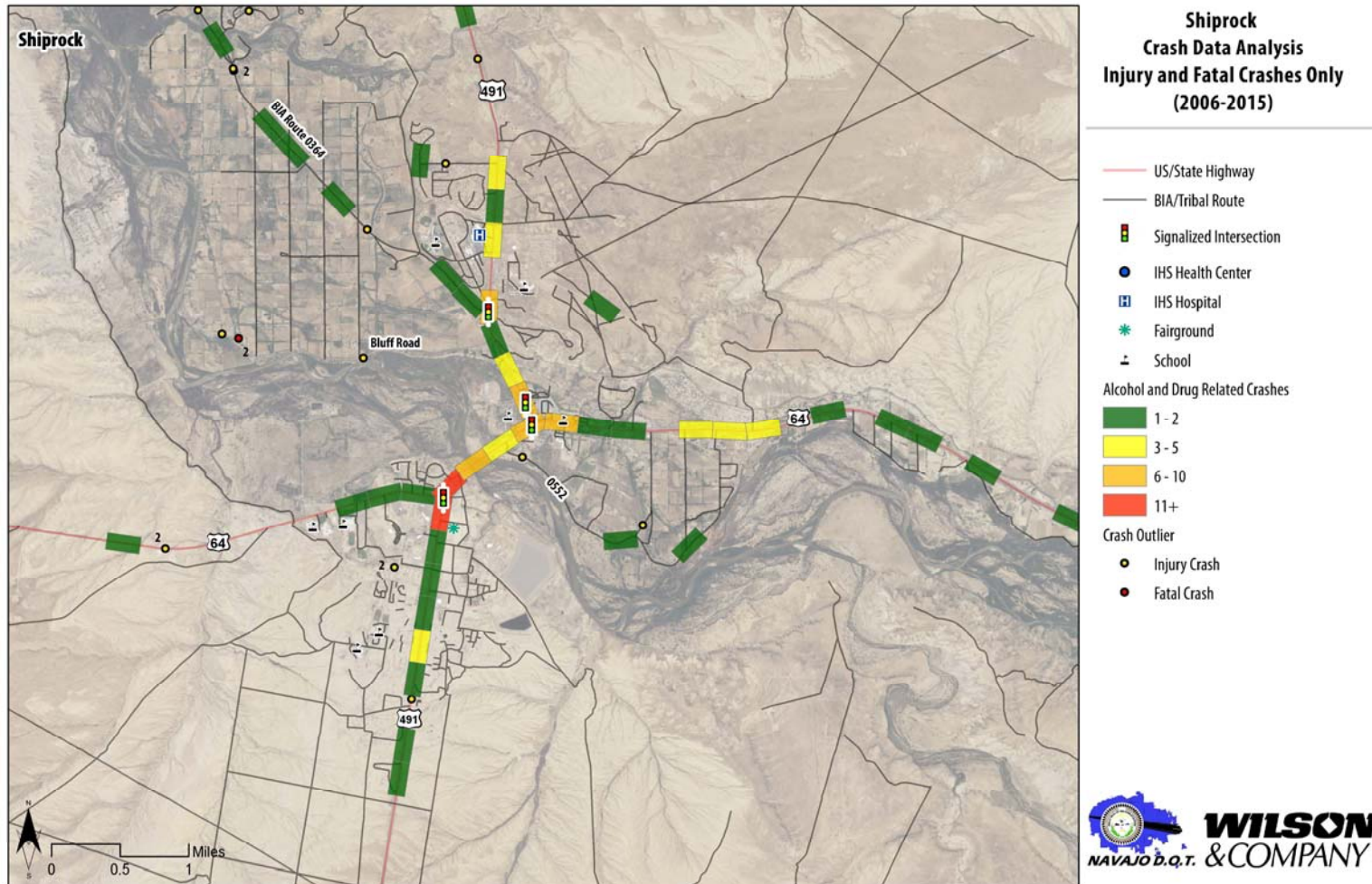


# RIGHT OF WAY RELATED CRASHES

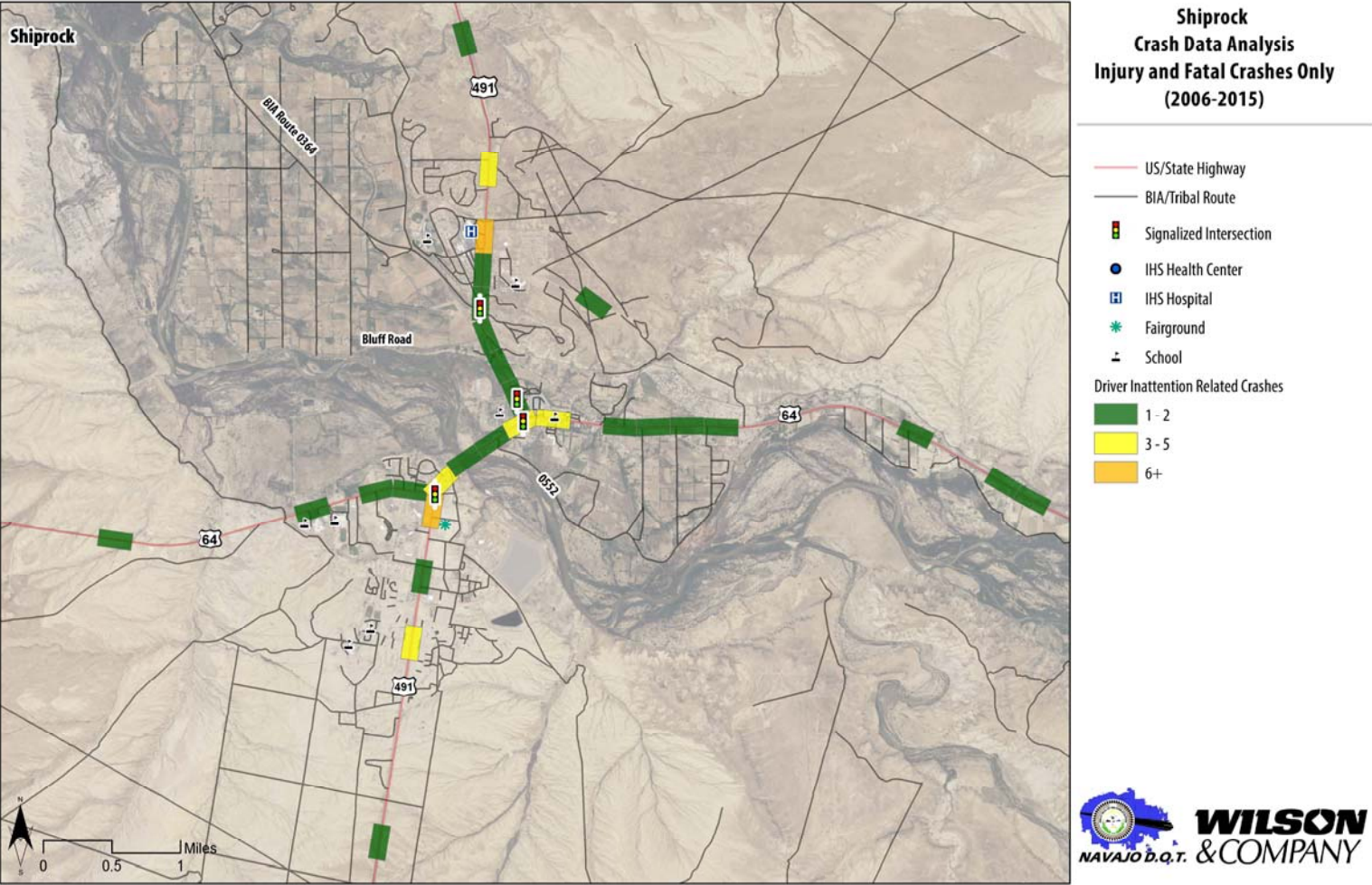




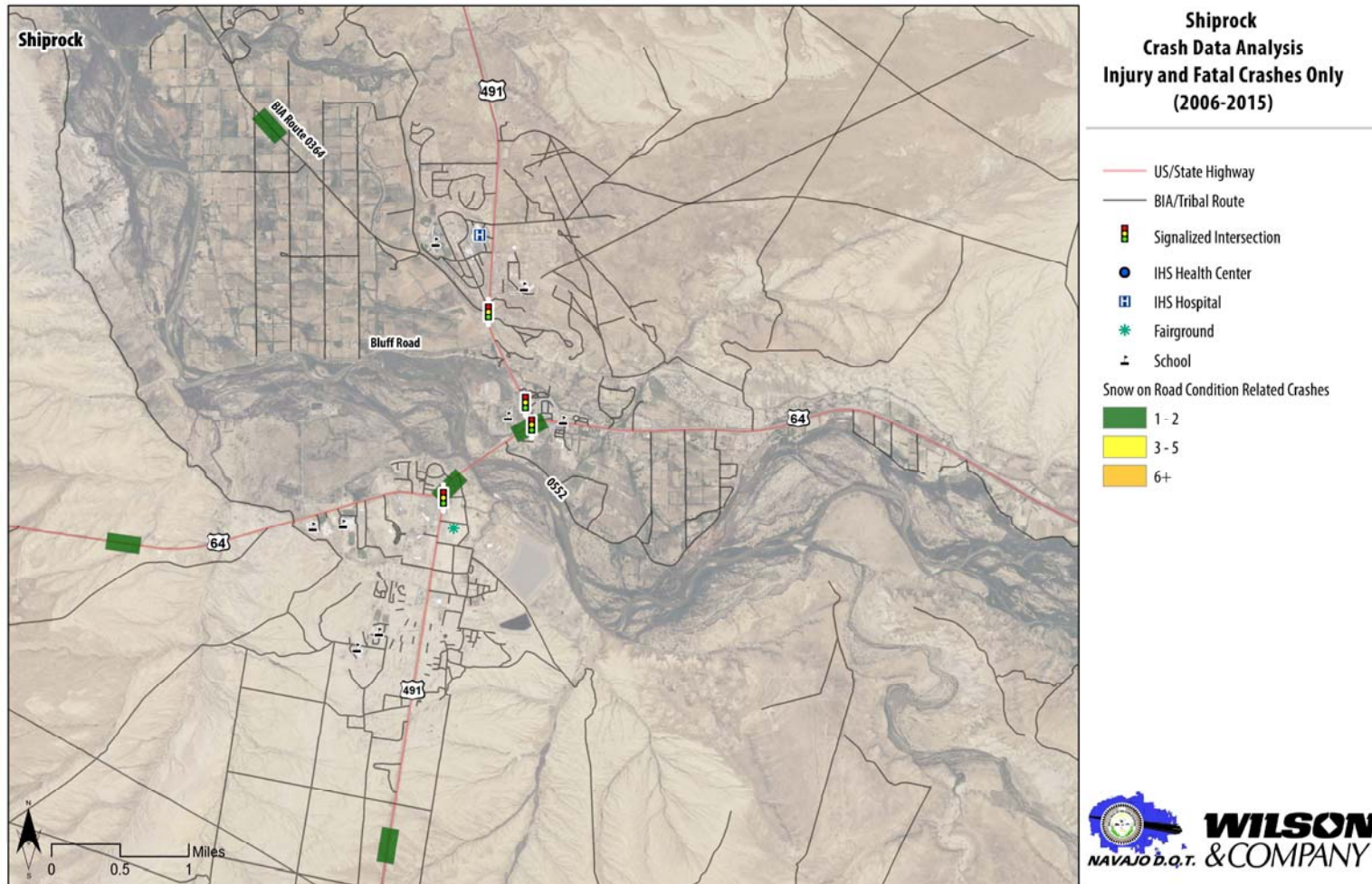
# ALCOHOL AND DRUG RELATED CRASHES



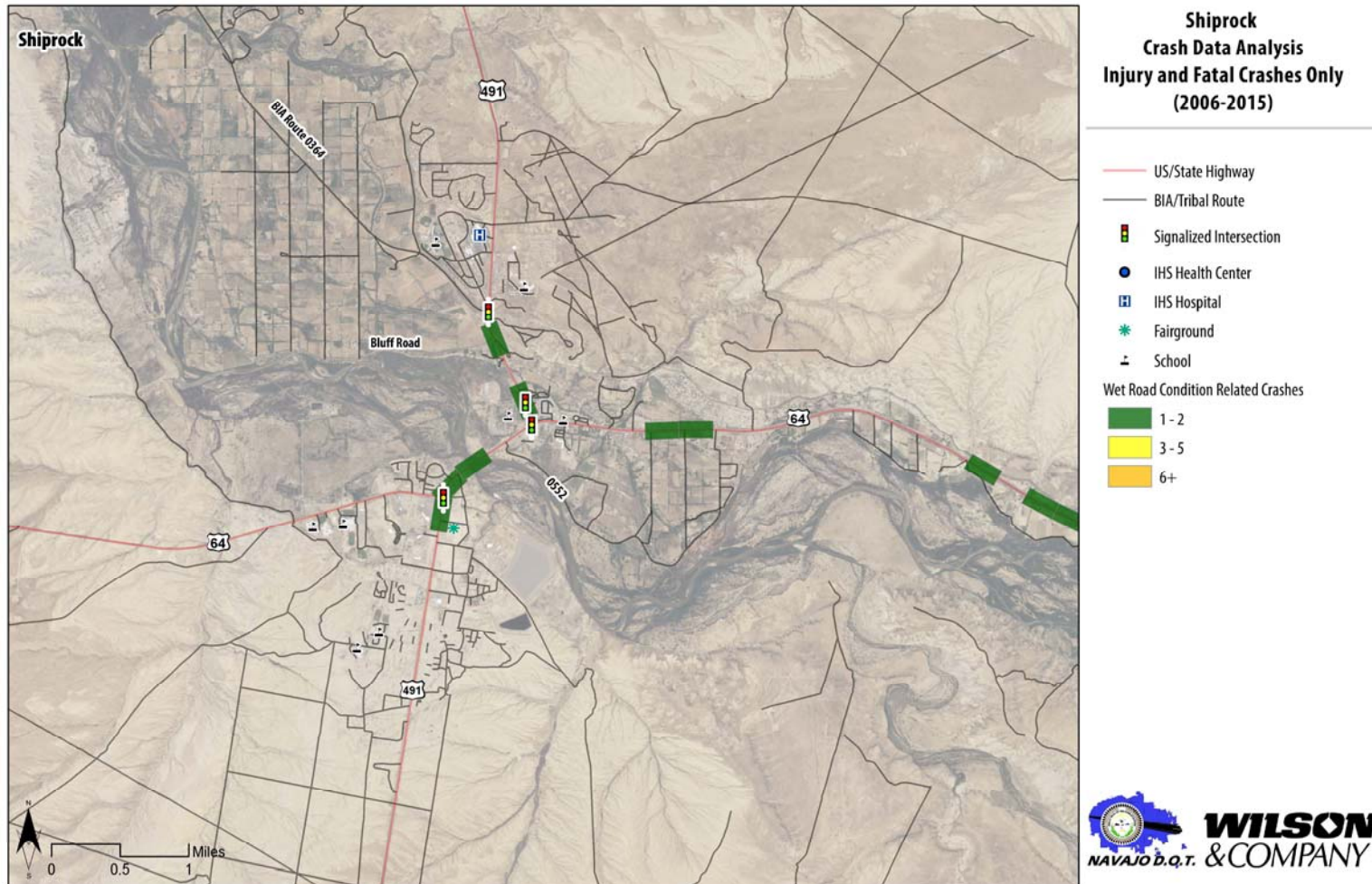
# DRIVER INATTENTION RELATED CRASHES



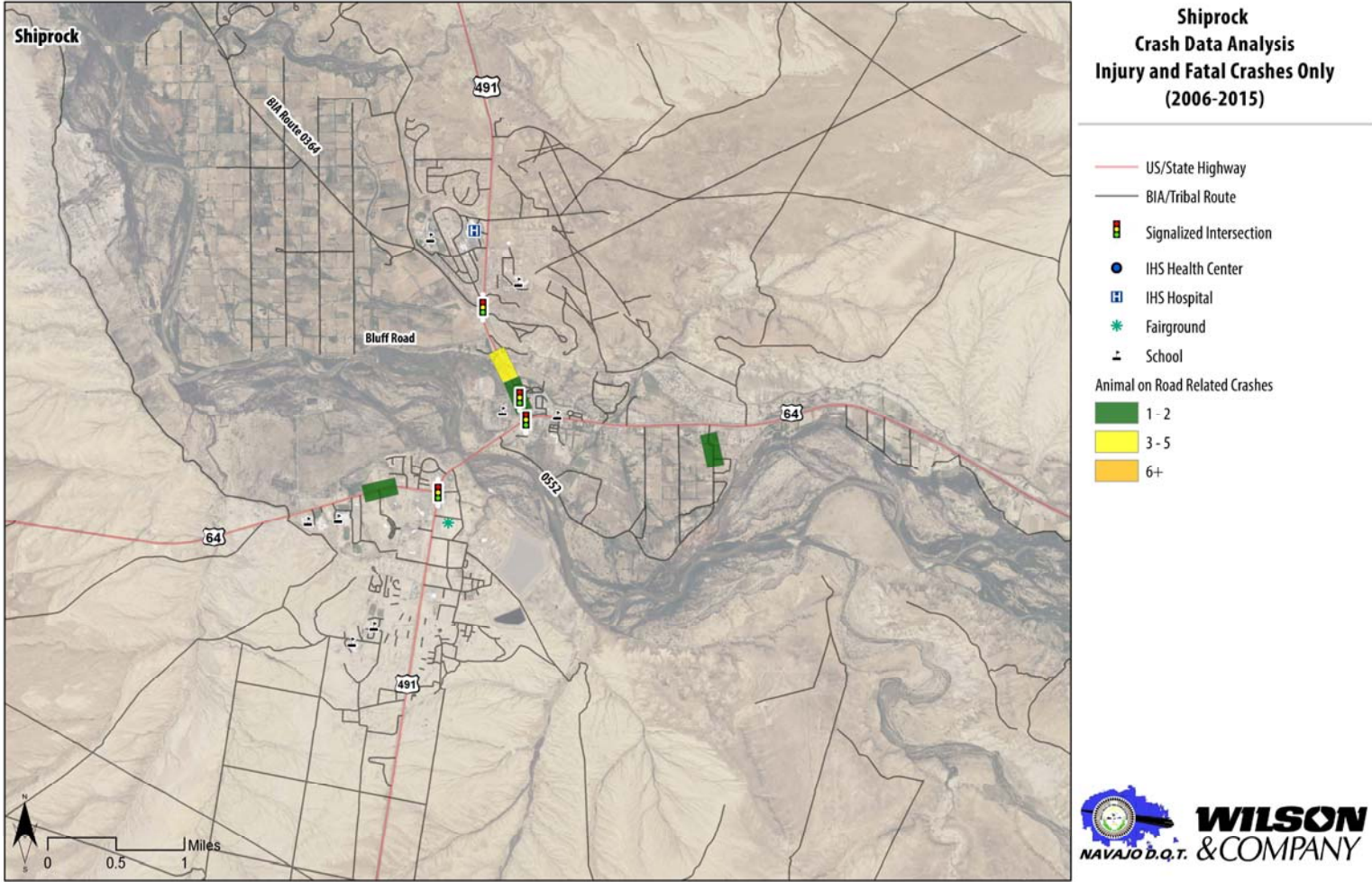
# SNOW ON ROAD CONDITION CRASHES



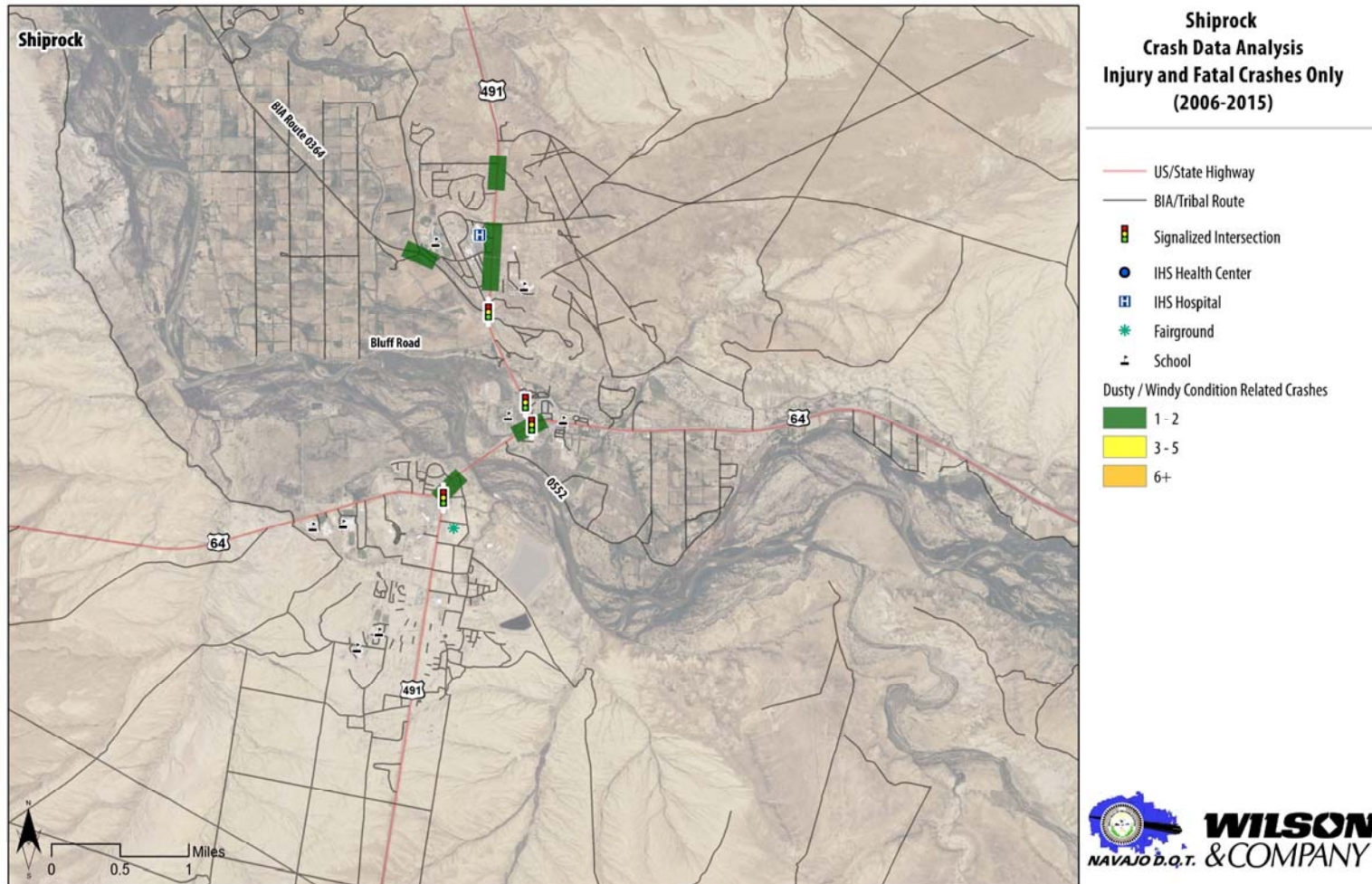
# WET ROAD CONDITION CRASHES



# ANIMAL ON ROAD CRASHES

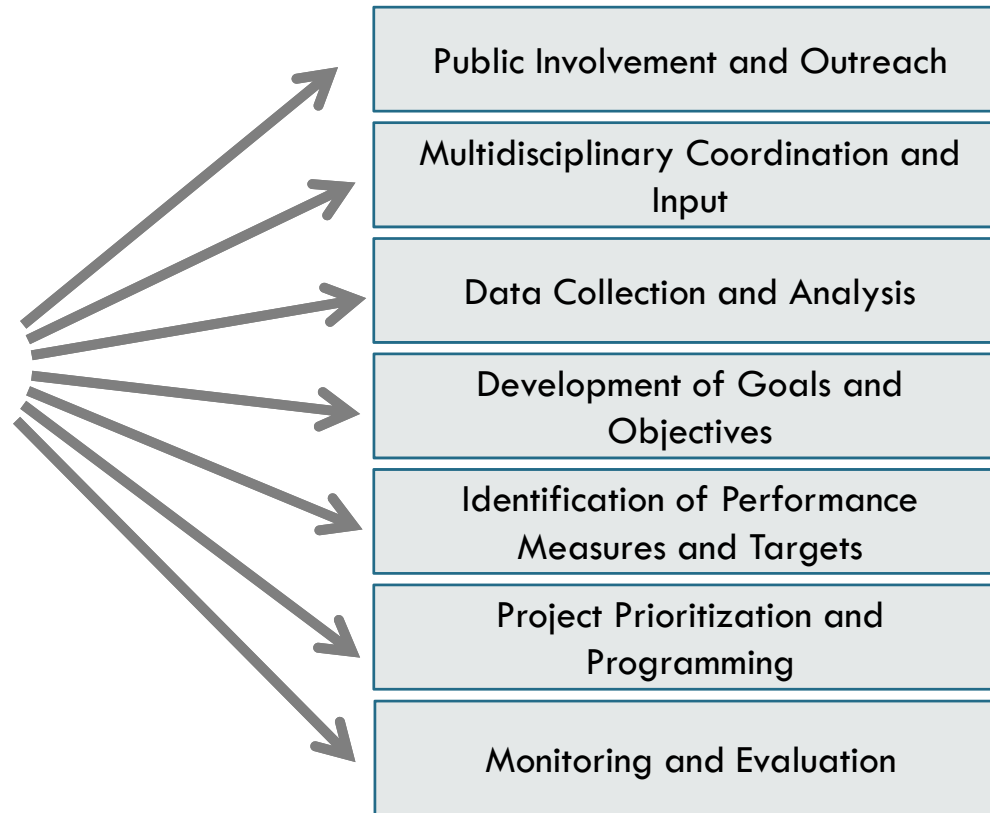


# DUSTY/WINDY CONDITION CRASHES



# SAFETY INTEGRATION

**SAFETY**



# COMMUNICATING THE MESSAGES

- **Practitioners have varying interests.**
- **Make the data relevant to the user.**
- **Keep it simple for the “Lay Person.”**
- **Allow people to help themselves by understanding the data we use.**