

ARIZONA DEPARTMENT OF TRANSPORTATION

# **Comparative Analysis of Motor Vehicle Crashes on American Indian Reservations in Arizona with Findings in the Arizona Strategic Highway Safety Plan**

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Final Report

Prepared by the Inter Tribal Council of Arizona, Inc.

August 1, 2010

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### SUMMARY

This study analyzed data from 27,382 motor vehicle crashes (MVCs) on tribal lands in Arizona over the period 1997-2006. The data were available from the Arizona Accident location Identification Surveillance System. The analysis focused on the following five emphasis areas included in the Arizona Strategic Highway Safety Plan (SHSP) approved in August, 2007.

- Restraint Usage
- Young Drivers
- Speeding
- Impaired Driving
- Roadway/Roadside

The purposes of the study were to:

- Determine the importance of each of the emphasis areas as contributing factors in MVCs on tribal lands.
- Assess the appropriateness of the countermeasures identified in the SHSP and identify other countermeasures for use on tribal lands in reducing the number and severity of MVC crashes.

#### Restraint Usage Emphasis Area

Forty-two percent of motor vehicle crash (MVC) fatalities and thirty-four percent of MVC incapacitating injuries on tribal lands involved unrestrained vehicle occupants. Seven of nine countermeasures identified in the SHSP for increasing seat restraint use would have application on tribal lands. No additional countermeasures were recommended.

#### Young Drivers Emphasis Area

Twenty-six percent of MVC fatalities and thirty-six percent of MVC incapacitating injuries on reservations occurred in crashes involving young drivers. Seventeen countermeasures were identified in the SHSP to address this emphasis area. Nine of the countermeasures could likely be used on tribal lands. Six of the countermeasures have questionable value for use on tribal lands because of cost and other factors. Two of the countermeasures do not apply for tribal lands. No additional countermeasures were recommended.

#### Speeding Emphasis Area

Thirty-two percent of MVC fatalities and forty-four percent of MVC incapacitating injuries on reservation lands involved speeding by one or more drivers involved in the crashes. Nine of ten countermeasures identified in the SHSP could have application on tribal lands. One additional countermeasure is recommended and involves providing increased enforcement with high-visibility targeting pick-up truck and truck tractor speeders.

## **Comparative Analysis of the Emphasis Areas**

### **Impaired Driving Emphasis Area**

Thirty percent of MVC fatalities and twenty-five percent of MVC incapacitating injuries on reservation lands involved impairment with one or more drivers involved in the crashes. Fifteen of the sixteen countermeasures identified in the SHSP could have application on tribal lands. One additional countermeasure is recommended and involves reducing the risk of MVCs occurring at locations where impaired driving related fatalities and incapacitating injuries have occurred.

### **Roadway/Roadside Emphasis Area**

#### **Lane Departure Sub-area**

Fifty-four percent of MVC fatalities and fifty-four percent of MVC incapacitating injuries on reservation lands involved vehicle lane departure. Twelve of thirteen countermeasures identified in the SHSP could have application on tribal lands. The remaining countermeasure that involves median treatment has limited application. Three additional countermeasures for tribal lands are recommended that involve expanding the use of road safety assessments, widening roadways and improving roadway maintenance.

#### **Intersections Sub-area**

Nine percent of MVC fatalities and twenty-two percent of MVC incapacitating injuries on reservation lands involved intersection crashes. The twelve countermeasures identified in the SHSP could have application on tribal lands. Four additional countermeasures are recommended and involve identifying measures to address intersection safety in rural locations; developing an action plan to address crashes at driveways and alleys; developing an education program focusing on passenger safety; and providing increased weekend enforcement.

### **Conclusions**

Seven conclusions regarding the study are provided and include the importance of data; the importance of the study; and the validity of the countermeasures identified in the SHSP for use on tribal lands.

### **Recommendations**

Four recommendations are listed and address the distribution of the study final report; holding a traffic safety conference based on the study; and incorporating the results of the study into the formal Arizona Department of Transportation - Tribes government-to-government consultation process.

## STUDY OVERVIEW

### Introduction

In order for state departments of transportation to access the federal funds within a core safety engineering program, a Strategic Highway Safety Plan (SHSP) is required to be developed by each state. This Highway Safety Improvement Program requirement is contained in the 2005 federal surface transportation act: Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users.

A SHSP is a comprehensive statewide safety plan for reducing motor vehicle crash (MVC) fatalities and injuries occurring on all public roads. In 2008, the Arizona SHSP (for the Plan development) was approved. The Plan established:

- A traffic safety vision of Every One Counts - zero fatalities on Arizona roads, your life depends on it;
- A goal of no fatalities by 2050; and
- Six data-driven emphasis areas
  - Restraint Usage
  - Speeding
  - Young Drivers
  - Impaired Driving
  - Roadway / Roadside (lane departures and intersections)
  - Data Improvement

Based on an examination of available crash data, the six emphasis areas were selected as mutual issues for jurisdictions across Arizona. The related strategies and performance measures were designed to achieve the reduction of fatalities and injuries sustained from motor vehicles crashes (MVCs), and to monitor the effectiveness of the strategies.

However, crash data for Arizona's plan lacks comprehensive data information from Indian reservations. Indian Reservations comprise about 28 percent of Arizona and state, county and Federal roads cross Indian lands, as well as roads built and maintained by the Bureau of Indian Affairs and Indian Tribal communities.

### Purpose of the Analysis

The purpose of this analysis is to:

- Determine the importance of each of the emphasis areas as contributing factors in MVCs on tribal lands.
- Assess the appropriateness of the countermeasures identified in the SHSP and identify other countermeasures for use on tribal lands in reducing the number and severity of MVC crashes.

## **Comparative Analysis of the Emphasis Areas**

For each emphasis area, similar formats to those in the SHSP have been prepared.

- Recommendations will be made to the Arizona Department of Transportation (ADOT) for implementing the SHSP strategies with the tribal governments.

Implementation of the strategies should consider the diversity of the State and be tailored to address geographical, cultural and program differences.

### **Crash Data**

- Available crash data from ADOT's Accident Location and Identification Surveillance System (ALISS) was used in developing the analysis for restraint usage and young drivers.
- According to the crash data for 1997 to 2006, on Indian reservations in Arizona, there were:
  - 1,228 fatalities, and
  - 2,352 incapacitating (serious) injuries

## RESTRAINT USAGE EMPHASIS AREA

### 1.1 Problem Statement

During the ten years from 1997 to 2006, 516 fatalities, 42 percent of the total MVC fatalities on reservations, occurred to persons not using restraints. During the same period, 803 incapacitating injuries, 34 percent of the total, occurred to persons not using restraints. The following analysis is based on this ten year period.

Chart 1A shows the number of MVC fatalities and incapacitating injuries by year involving lack of restraint use.

- The chart shows a general rise in the number of fatalities over the ten year period, with a steep increase of about 27 percent since 2004.
- The increase in lack of restraint usage fatalities is consistent with the statewide findings in the SHSP.
- Conversely, the number of incapacitating injuries shows a relatively flat ten-year trend, although again there has been an increase of about 28 percent since 2004, which is consistent with the findings in the SHSP.

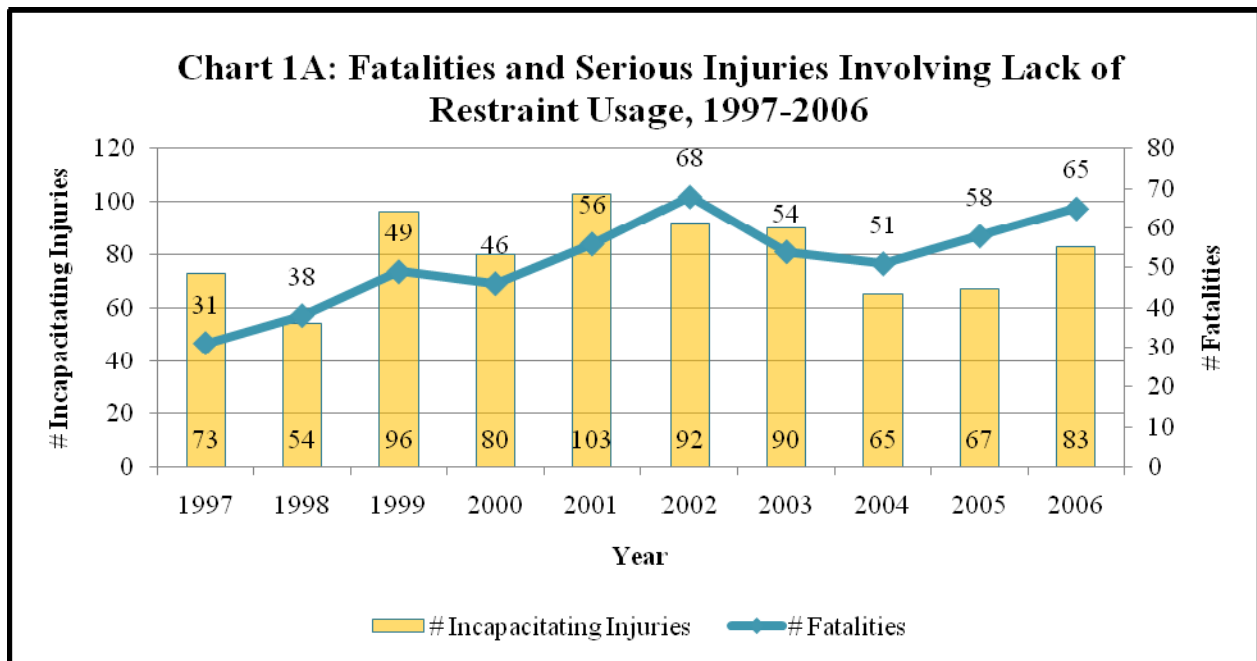


Table 1A compares fatalities and incapacitating injuries by urban, rural and not reported locations.

- Although nearly all locations were reported for fatal MVCs, only about 50 percent were reported for incapacitating injury MVCs.
- Many of the incapacitating injury MVCs would have involved fatalities as well.

## Comparative Analysis of the Emphasis Areas

- This leads to the conclusion that less than 50 percent of locations of non-fatal incapacitating injury MVCs were reported.
- The data indicate that over 90 percent of the MVC fatalities on tribal lands occur in rural areas, compared to 60 percent for statewide data.
- The data suggest that a high percentage of MVC incapacitating injuries occur on tribal lands in rural areas, while about 66 percent of the incapacitating injuries occur in urban areas statewide.
- The rural dominance of fatal and incapacitating injuries would be expected because of the rural location of most reservations.

County level data are not provided to avoid identification of specific tribal information.

<b>Table 1A: Urban vs. Rural Lack of Restraint Usage Fatalities and Incapacitating Injuries, 1997-2006</b>						
<b>Roadway</b>	<b>Incapacitating Injuries</b>		<b>Fatalities</b>		<b>Total</b>	
	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>
<b>Urban</b>	23	2.9	29	5.6	52	3.9
<b>Rural</b>	382	47.6	480	93.0	862	65.4
<b>Not Reported/Unknown</b>	398	49.6	7	1.4	405	30.7
<b>Totals</b>	803	100	516	100	1319	100

## 1.2 Considerations for Strategy Development

### 1.2.1 Drivers, Vehicles, and Collision Manner

Table 1B provides information about the person type who sustained fatal and incapacitating injuries when not being restrained.

- Drivers and passengers sustained about the same number of fatal injuries.
- Passengers sustained considerably more incapacitating injuries than drivers.
- The SHSP shows that drivers experienced almost twice the number of fatalities and incapacitating injuries than passengers statewide.
- The difference between tribal and statewide data could be attributable to a number of factors including:
  - Passengers use restraints less frequently than drivers.
  - Restraints are not available to all passengers such as in the back of pick-up trucks.
  - The vehicle occupancy rate is higher on tribal lands than statewide.
- Pedestrians and bicyclists account for a substantial percentage of the MVC fatalities on tribal lands.

## Comparative Analysis of the Emphasis Areas

<b>Table 1B: Lack of Restraint Usage Fatalities and Incapacitating Injuries by Person Type, 1997-2006</b>						
<b>Casualty</b>	<b>Incapacitating Injuries</b>		<b>Fatalities</b>		<b>Total</b>	
	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>
<b>Driver</b>	319	39.7	231	44.8	550	41.7
<b>Passenger</b>	466	58.0	239	46.3	705	53.4
<b>Pedestrian</b>	14	1.7	41	7.9	55	4.2
<b>Pedacyclist</b>	4	0.5	5	1.0	9	0.7
<b>Totals</b>	803	100	516	100	1319	100

Table 1C describes the distribution of MVC fatal and incapacitating injuries on the basis of gender.

- Male fatalities on tribal lands are about twice those for females, which is consistent with data for statewide MVC fatalities.
- Females account for about 36 percent and males account for about 64 percent of the MVC incapacitating injuries on tribal lands.
- The percentage of incapacitating injuries for females is about 29 percent and for males are about 71 percent statewide.
- The difference in percentages could be due to a number of factors, including a higher percentage of males in vehicles; location of males in vehicles; and lower percentage of males using proper restraints.

<b>Table 1C: Lack of Restraint Usage Fatalities and Incapacitating Injuries by Gender, 1997-2006</b>						
<b>Casualty</b>	<b>Incapacitating Injuries</b>		<b>Fatalities</b>		<b>Total</b>	
	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>
<b>Female</b>	288	35.9	167	32.4	455	34.5
<b>Male</b>	512	63.8	349	67.6	861	65.3
<b>Unknown</b>	3	0.4	0	0.0	3	0.2
<b>Totals</b>	803	100	516	100	1319	100

Table 1D shows the distribution of lack of restraint usage by age group.

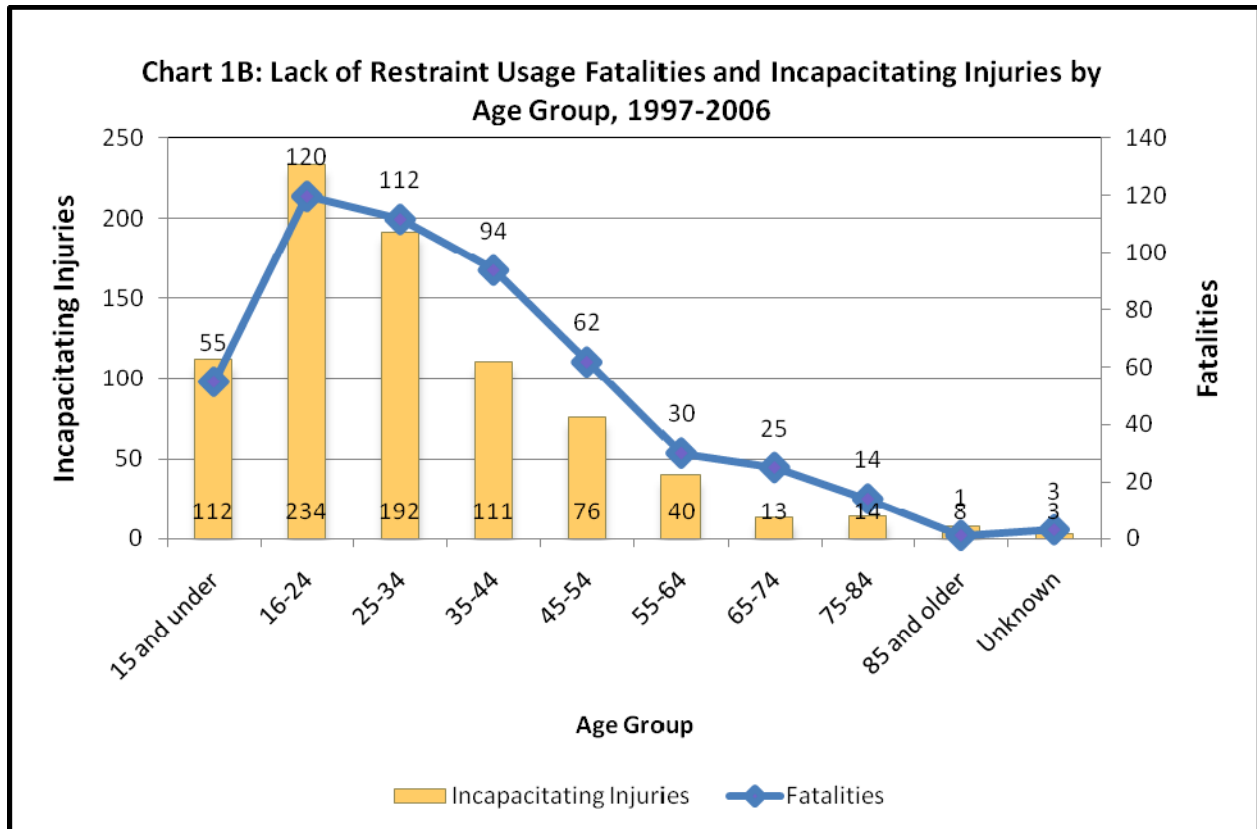
- The highest percentage of incapacitating injuries and fatalities on tribal lands fall in the 16-24 age group, which is also the case with statewide statistics.
- The percentages of incapacitating injuries and fatalities for the 15 and under age group on tribal lands are more than 50 percent higher than statewide.
- This could be the result of a higher percentage of children in vehicles involved in injury MVCs on tribal lands, or it could be that a lower percentage of children are properly restrained.

## Comparative Analysis of the Emphasis Areas

Table 1D: Lack of Restraint Usage Fatalities and Incapacitating Injuries by Age Group, 1997-2006						
Age Group	Incapacitating Injuries		Fatalities		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
15 and under	112	13.9	55	10.7	167	12.7
16-24	234	29.1	120	23.3	354	26.8
25-34	192	23.9	112	21.7	304	23.0
35-44	111	13.8	94	18.2	205	15.5
45-54	76	9.5	62	12.0	138	10.5
55-64	40	5.0	30	5.8	70	5.3
65-74	13	1.6	25	4.8	38	2.9
75-84	14	1.7	14	2.7	28	2.1
85 and older	8	1.0	1	0.2	9	0.7
Unknown	3	0.4	3	0.6	6	0.5
<b>Total</b>	<b>803</b>	<b>100</b>	<b>516</b>	<b>100</b>	<b>1319</b>	<b>100</b>

Chart 1B shows graphically by age group the number of incapacitating injuries and fatalities resulting from MVCs on tribal lands from 1997 to 2006.

- The peak number occurs in the 16 to 24 age group.





## Comparative Analysis of the Emphasis Areas

Table 1E presents information on the lack of restraint usage fatalities and incapacitating injuries resulting from MVCs on tribal lands by collision manner.

- Clearly single vehicle collisions dominate, accounting for more than 67 percent of the fatalities and more than 62 percent of the incapacitating injuries.
- Statewide data show that 54 percent of the fatalities and only 40 percent of the incapacitating injuries are a result of single vehicle collisions.
- Statewide, angle collisions are involved in 21 percent of the incapacitating injuries and 12 percent of the fatalities – substantially higher rates than on tribal lands.
- Head-on and rear-end collisions injury percentages are approximately equivalent for tribal lands and statewide.
- A likely conclusion is that on tribal lands crashes involving turning vehicles at intersections are much less important from an injury standpoint than run-off-the-road crashes involving single vehicles when compared to statewide data.

<b>Table 1E: Lack of Restraint Usage Fatalities and Incapacitating Injuries by Collision Manner 1997-2006</b>						
<b>Collision Manner</b>	<b>Incapacitating Injuries</b>		<b>Fatalities</b>		<b>Total</b>	
	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>
<b>Single Vehicle</b>	500	62.3	346	67.1	846	64.1
<b>Sideswipe (same)</b>	35	4.4	11	2.1	46	3.5
<b>Sideswipe (opposite)</b>	25	3.1	11	2.1	36	2.7
<b>Angle</b>	64	8.0	17	3.3	81	6.1
<b>Left Turn</b>	25	3.1	4	0.8	29	2.2
<b>Rear-End</b>	71	8.8	35	6.8	106	8.0
<b>Head-On</b>	52	6.5	72	14.0	124	9.4
<b>Backing</b>	1	0.1		0.0	1	0.1
<b>Other</b>	25	3.1	19	3.7	44	3.3
<b>Driveway/Alley Related</b>		0.0		0.0	0	0.0
<b>Non-Contact (mc)</b>		0.0		0.0	0	0.0
<b>Non-Contact (not mc)</b>	3	0.4	1	0.2	4	0.3
<b>U-Turn</b>	2	0.2		0.0	2	0.2
<b>Total</b>	803	100	516	100	1319	100

### 1.2.2 Seasonality

The SHSP states that knowing the time when fatal and incapacitating injury MVCs occur can be useful in developing education and enforcement programs.

Chart 1C displays the number of lack of restraint usage MVC fatalities and incapacitating injuries on tribal lands by month of year.

### Comparative Analysis of the Emphasis Areas

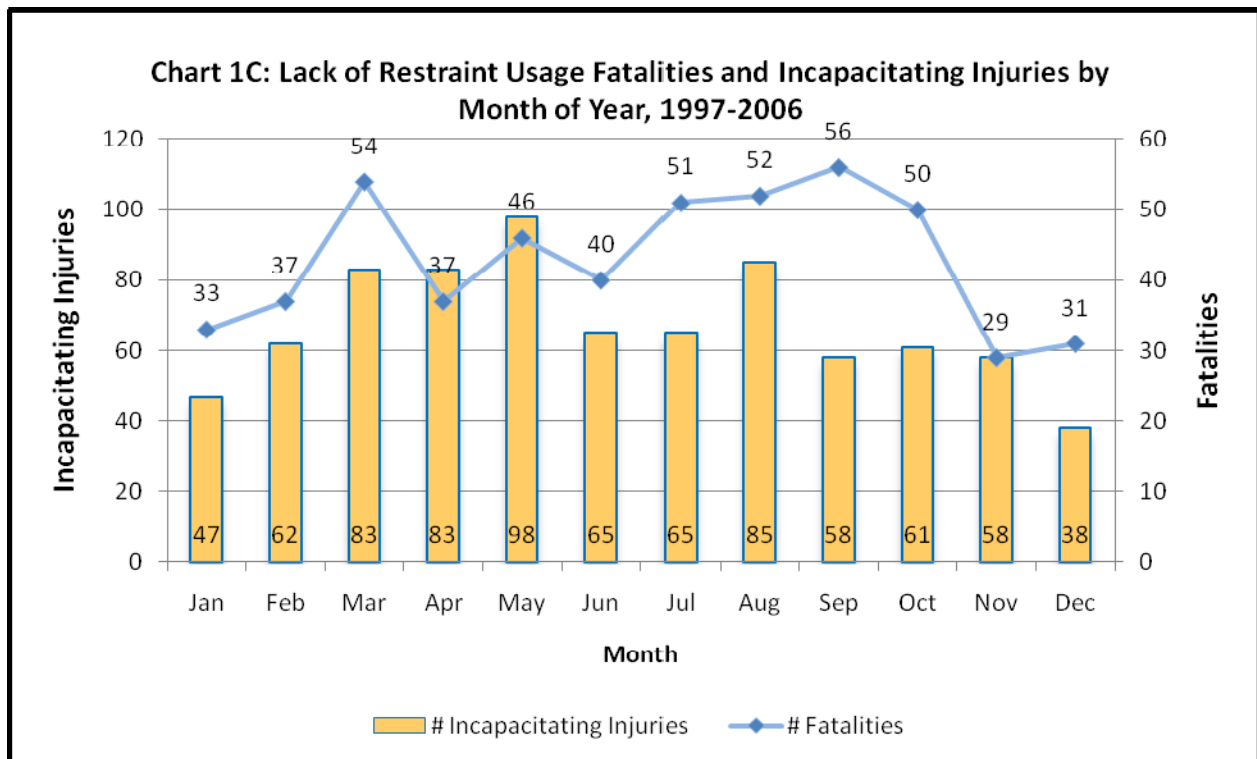
- The data indicate that the spring months of March through May and August are the peak periods for incapacitating injuries.
- The peak fatality periods are March and July through October.
- These findings are relatively consistent with statewide data - spring and fall are peak periods for incapacitating injuries, and late summer and early fall are peak times for fatal MVCs.

Chart 1D shows the distribution of lack of restraint usage MVC fatalities and incapacitating injuries on tribal lands by day of week.

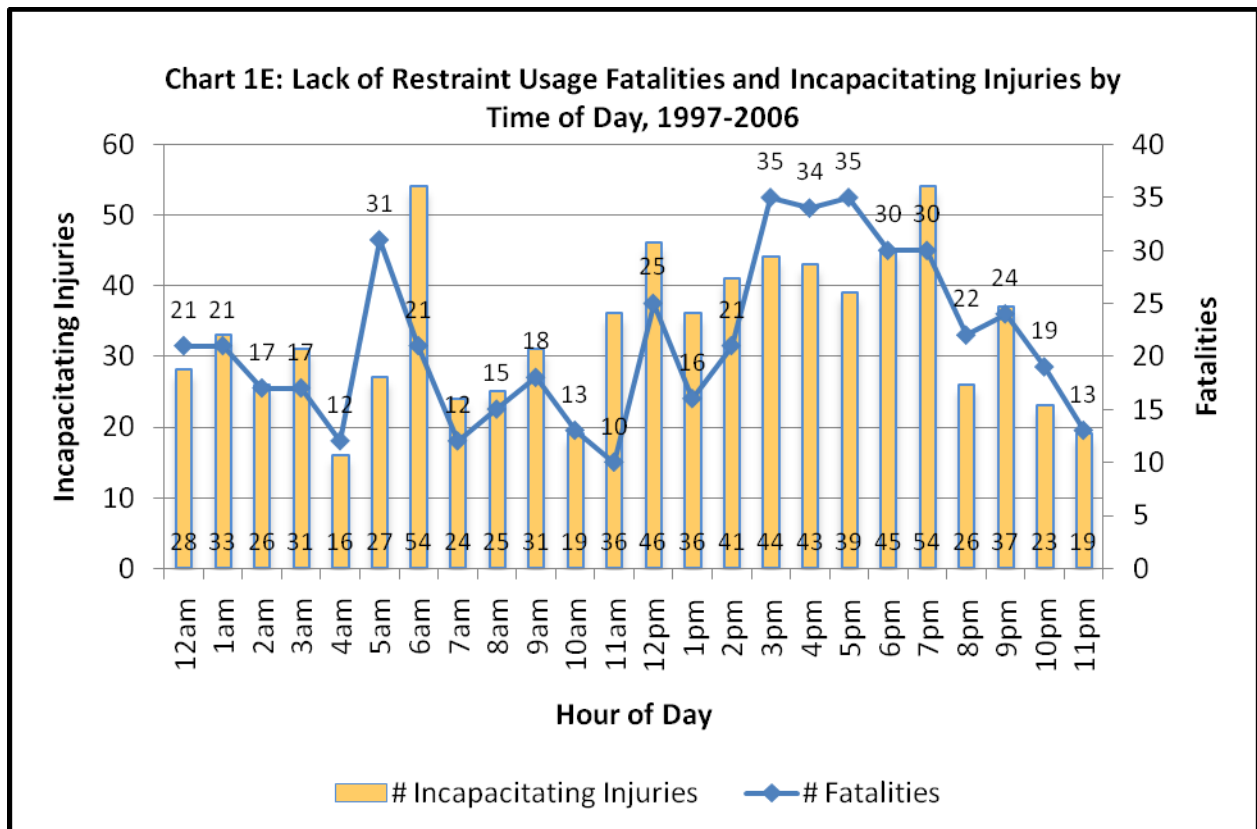
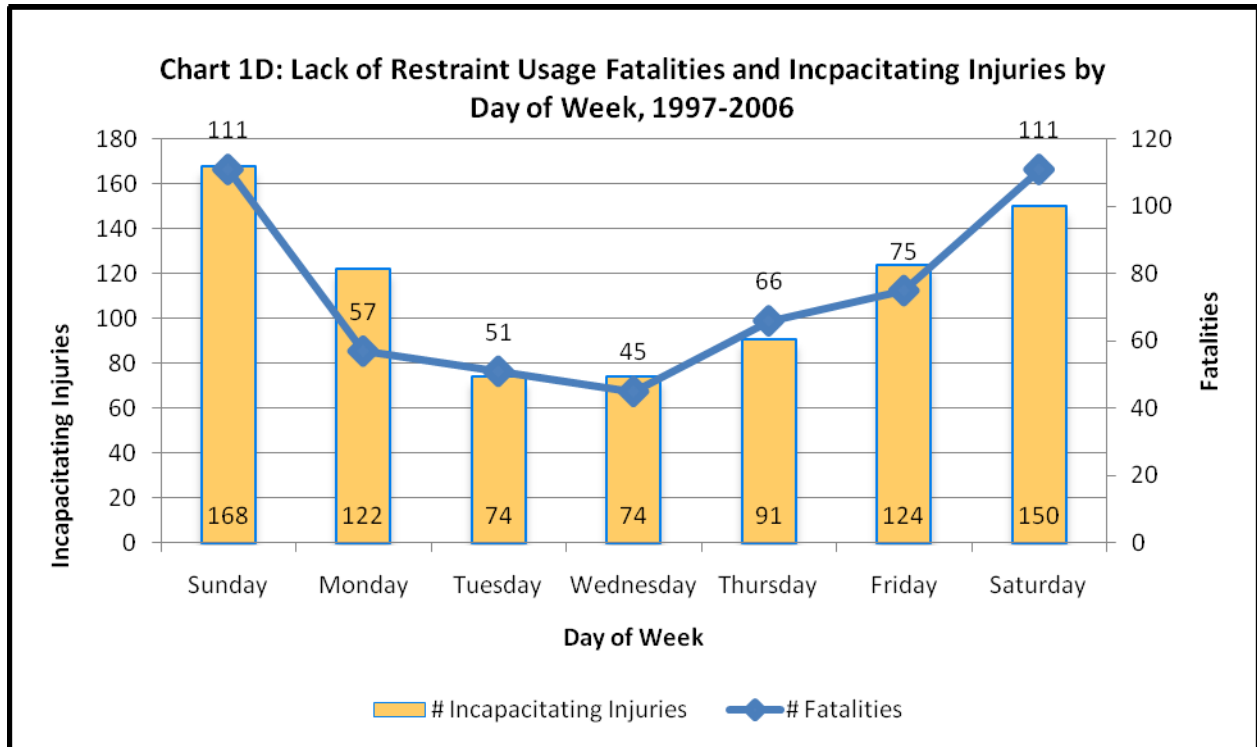
- The data for tribal lands mirrors statewide results - both fatalities and incapacitating injuries peak on weekends and are low during midweek.

Chart 1E displays the distribution of lack of restraint usage MVC fatalities and incapacitating injuries on tribal lands by time of day.

- The peak fatality period occurs between 3 p.m. and 7 p.m., with smaller peaks at 5 a.m. and noon.
- The afternoon incapacitating injury peak extends from noon to 7 p.m., with a single morning peak at 6 a.m.
- The statewide data show similar trends - afternoon peaks dominant.
- There is a stronger peak statewide from 11 p.m. to 1 a.m. than during the 5-6 a.m. period.



## Comparative Analysis of the Emphasis Areas



### **1.2.3 Conclusions Regarding Fatalities and Incapacitating Injuries Involving the Lack of Restraint Usage during MVCs on Indian Reservations in Arizona**

- The annual number of fatalities has increased at a reasonably constant rate over the 10-year period from 31 in 1997 to 65 in 2006. A similar pattern does not exist for incapacitating injuries that peaked in the period from 1999 through 2003.
- Rural dominates urban fatalities and incapacitating injuries when reported.
- Contrary to statewide statistics more passengers than drivers incur fatal or incapacitating injuries indicating a need to place considerable emphasis on passenger safety in restraint usage programs. Additional analysis is needed to determine the locations of injured passengers in vehicles to assist in determining appropriate strategies to reduce the number of injured passengers.
- About twice as many males as females receive fatal or incapacitating injuries when not using restraints, suggesting the need to place heavy focus on males in developing restraint usage strategies.
- Nearly 2/3 of the fatalities and incapacitating injuries occur with unrestrained vehicle occupants between the ages of 16 and 45. Another 13 percent occur with children 15 and under. Since the first group contains virtually all of the parents for the children group, it is responsible for seat restraint usage about 75 percent of all of the unrestrained fatal and incapacitating injuries. Restraint usage programs should place heavy emphasis on targeting the 16 to 44 age group.
- Single vehicle crashes account for about 2/3 of lack of restraint usage fatal and incapacitating injuries, indicating that strategies are needed to reduce the frequency and severity of these types of crashes.
- June and the winter months of November through February have a relatively low incidence of fatal and incapacitating injuries among vehicle occupants not using restraints. The remainder of the year is a peak time for either fatalities or incapacitating injuries.
- Friday through Sunday are peak days of the week for unrestrained occupants MVC fatalities and incapacitating injuries, suggesting that severe MVCs occur more often during leisure time than during work periods.
- Time of day peaks for lack of restraint use fatalities or incapacitating MVC injuries occur between 5 a.m. and 7 a.m., mid day and from late afternoon through to early evening. These peaks could be associated with many factors such as work and school traffic, driver fatigue, driving under the influence, and horizon sun.

### **1.3 Countermeasures to address Fatalities and Incapacitating Injuries Involving the Lack of Restraint Usage during MVCs on American Indian Reservations in Arizona**

The SHSP countermeasures for restraint use fall into two strategy areas:

- Maximize restraint use by all vehicle occupants
- Educate the public on the proper use of child restraints

## Comparative Analysis of the Emphasis Areas

The following recommendations for countermeasures on tribal lands build on those identified in the SHSP.

### 1.3.1 Strategy: Maximize Restraint Use by All Vehicle Occupants

<b>1.3.1 Strategy: Maximize Restraint Use by All Vehicle Occupants.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Enact a primary seat belt law to increase restraint usage.</b>	Each American Indian tribe in Arizona should consider implementing this countermeasure, which a 2006 study* showed results in increased restraint usage on Reservations. Three tribes in Arizona – Navajo Nation, Tohono O’odham Nation, Fort McDowell Yavapai Nation - have already implemented a primary seat belt law.
<b>2. Increase penalties for the non-use of restraints.</b>	Penalties for non-use of restraints are important for motivating vehicle occupants into the habit of using restraints. Monetary penalties could be appropriate for non-tribal members. However, many tribal members live at the poverty level and below and would not be able to pay monetary penalties. Alternative penalties, such as community service could be more appropriate for tribal members.
<b>3. Conduct short-term high visibility seat belt law enforcement campaigns at selected locations.</b>	This countermeasure has been effectively used by some tribes in Arizona and should be considered as a restraint countermeasure by other tribes in the state.
<b>4. Ensure sustained enforcement in counties with 10 percent or more of the state’s fatalities attributed to non-use of occupant restraints.</b>	This countermeasure would not generally be applicable to tribes. However, by agreement with a tribe, state or county law enforcement personnel could use sustained enforcement on state and county roads crossing tribal lands.
<b>5. Increase the perception that violators will be caught and pay the consequences. Use public relations programs and the media to increase the perception.</b>	This countermeasure was included in the restraint use plan for at least one tribe in Arizona and could be effective tool for tribes.

\*Chaffe, R.H.B., Soloman, M.G., Leaf, W.A., “2006 Seat Belt Use Estimate for Native American Tribal Reservations”, National Highway Traffic Safety Administration, Report Number DOT HS 810 967, May, 2008.

## Comparative Analysis of the Emphasis Areas

<b>1.3.1 Strategy: Maximize Restraint Use by All Vehicle Occupants. (continued)</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<p><b>6. Develop educational and public information campaigns for different audiences to support enforcement strategies on restraint usage. The programs should be multi-lingual. One program element should target 16-24 year olds. The programs should be developed so they can be used by employers, schools and other organizations.</b></p>	<p>Restraint use educational and public information campaigns have been used by some tribes in Arizona and their broader use is encouraged. The 16-24 age group element could be incorporated into a broader program of traffic safety for young drivers. Since 75 percent of the MVC fatalities and incapacitating injuries occur with people less than 45 years of age, educational and public information programs on reservations should place heavy focus on people from 16 to 44 who also control the actions of children in the vehicle. One way to achieve this focus is to emphasize the responsibility of the driver for the safety of people in the vehicle. It would also be important to place a focus on demonstrating to males the importance of restraint usage since 66 percent of the fatalities and incapacitating injuries occur to unrestrained male occupants of vehicles. MVC statistics for tribal lands need to be reviewed to identify the seat positions where most of the fatalities and incapacitating injuries are occurring, and the findings should be incorporated into the educational and public information campaigns.</p>

### 1.3.2 Strategy: Educate the Public on the Proper Use of Child Restraints

<b>1.3.2 Strategy: Educate the Public on the Proper Use of Child Restraints.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<p><b>1. Conduct high-profile child restraint inspection events at various locations across each community.</b></p>	<p>This strategy has been used successfully by at least one tribe in Arizona and is a valid measure for use by other tribes.</p>
<p><b>2. Train law enforcement and others to check for proper child restraint usage.</b></p>	<p>This is an ongoing Indian Health Service (IHS) program, and numerous tribes have also incorporated this type of service within in Women, Infant and Children, law enforcement, fire and emergency medical services programs.</p>
<p><b>3. Develop a restraint usage intervention program, and determine venues for most appropriate implementation (e.g. trauma centers and parenting classes).</b></p>	<p>This is an ongoing IHS program.</p>

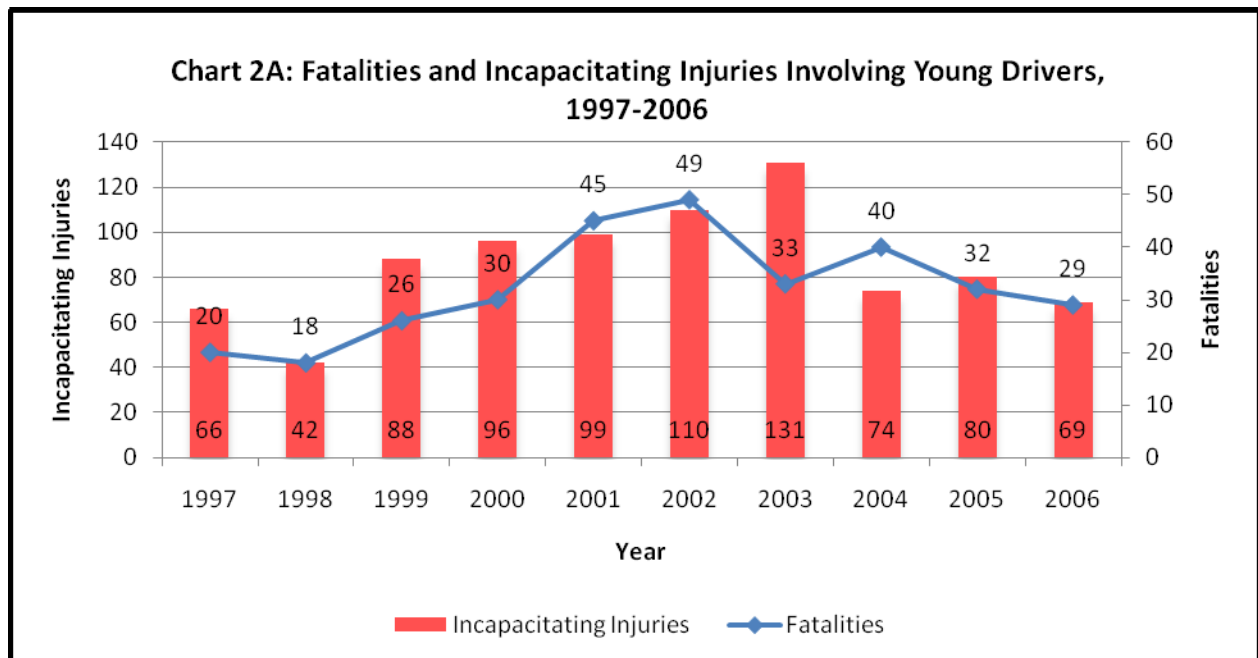
## YOUNG DRIVER (Less than 25 Years of Age) EMPHASIS AREA

### 2.1 Problem Statement

During the ten years from 1997 to 2006, 322 fatalities, 26 percent of the total MVC fatalities on reservations, occurred when a young driver was involved in the crash. During the same period, 855 incapacitating injuries, 36 percent of the total, occurred when a young driver was involved in the crash. The following analysis is based on this ten year period.

Chart 2A shows the number of fatalities and incapacitating injuries in MVCs on tribal lands involving young drivers.

- MVC fatalities involving young drivers increased steadily from 1998 to 2002 and then declined.
- MVC incapacitating injuries involving young drivers increased steadily from 1998 to 2003 and then declined.
- Over the ten year period, annual numbers of both MVC fatalities and incapacitating injuries involving young drivers increased only slightly.
- The statewide data covered only a five-year period from 2001 to 2005; however, the fatalities showed an annual variation during corresponding years similar to that found on tribal lands.
- Incapacitating injuries were relatively low in 2004 and 2005 for both tribal lands and statewide, but 2002 and 2003 did not correlate well.



## Comparative Analysis of the Emphasis Areas

Table 2A compares fatalities and incapacitating injuries involving young drivers by urban, rural and not reported locations.

- Ninety percent of the MVC fatalities on tribal lands involving young drivers occur in rural areas.
- Although the location of incapacitating injuries was reported in only 42 percent of the incapacitating MVC injuries, 89 percent of those reported occurred in rural areas.
- These percentages stand in stark contrast to statewide statistics that indicate 50 percent of the fatalities and 76 percent of the incapacitating injuries involving young drivers occur in urban areas.

County level data are not provided to avoid identification of specific tribal information.

<b>Table 2A: Urban vs. Rural Young Drivers Involved Fatalities and Incapacitating Injuries, 1997-2006</b>				
<b>Location</b>	<b># Incapacitating Injuries</b>	<b>% Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Fatalities</b>
<b>Urban</b>	39	4.6	29	9.0
<b>Rural</b>	318	37.2	291	90.4
<b>Unknown or Not Reported</b>	498	58.2	2	0.6
<b>Total</b>	855	100	322	100

## 2.2 Considerations for Strategy Development

### 2.2.1 Drivers, Vehicles and Collision Manner

Table 2B describes the distribution of fatalities and incapacitating injuries by Person Type for MVCs involving young drivers on tribal lands.

- Drivers suffered about 52 percent of both fatalities and incapacitating injuries.
- Vehicle passengers experienced about 46 percent or almost all of the remaining incapacitating injuries.
- In the case of fatalities, a significant 7 percent were incurred by pedestrians and pedacyclists, leaving about 41 percent of the fatalities for vehicle passengers.
- Comparing only drivers and passengers injuries, the percentage of drivers experiencing fatal injuries on tribal lands is about 56 percent compared to 59 percent statewide.
- Drivers experienced 53 percent of the incapacitating injuries on tribal lands compared to 64 percent statewide.
- The heavier toll on passengers of MVCs involving young drivers on tribal lands compared with statewide is consistent with the findings for lack of restraint use.



## Comparative Analysis of the Emphasis Areas

<b>Table 2B: Young Drivers Involved MVC Fatalities and Incapacitating Injuries by Person Type, 1997-2006</b>				
<b>Casualty</b>	<b># Incapacitating Injuries</b>	<b>% Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Fatalities</b>
<b>Driver</b>	447	52.3	169	52.5
<b>Passenger</b>	395	46.2	131	40.7
<b>Pedestrian</b>	9	1.1	20	6.2
<b>Pedalcyclist</b>	4	0.5	2	0.6
<b>Total</b>	855	100	322	100

Table 2C provides information about the gender of those persons suffering fatal and incapacitating injuries in MVCs involving young drivers on tribal lands.

- Males experienced 68 percent of the fatalities and 58 percent of the incapacitating injuries.
- These percentages compare reasonably well with statewide statistics in which 67 percent of the fatalities and 53 percent of the incapacitating injuries occurred to males in MVCs involving young drivers.

<b>Table 2C: Young Drivers Involved Fatalities and Incapacitating Injuries by Gender, 1997-2006</b>				
<b>Gender</b>	<b># Incapacitating Injuries</b>	<b>% Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Fatalities</b>
<b>Female</b>	363	42.5	111	34.5
<b>Male</b>	492	57.5	211	65.5
<b>Unknown</b>	0	0.0	0	0.0
<b>Total</b>	855	100	322	100

Table 2D provides information about the types of vehicles involved in fatal and incapacitating injury MVCs involving young drivers on tribal lands.

- Passenger cars and pick-up trucks dominate the vehicle type involved in these crashes.
- When compared with statewide data, the percentages of pick-up trucks and truck tractors are considerably higher for young driver involved fatal and incapacitating injury MVCs on tribal lands, while the percentages of passenger cars and motorcycles are considerably lower.
- It is noteworthy that the vehicle type was not reported in almost 11 percent of the fatal crashes, while this percentage was less than 1 percent for incapacitating injury crashes.

## Comparative Analysis of the Emphasis Areas

<b>Table 2D: Young Driver Fatal and Incapacitating Injury Crashes by Vehicle Type, 1997-2006</b>				
<b>Vehicle Type</b>	<b># Veh in Incap Injury MVCs</b>	<b>% Veh in Incap Injury MVCs</b>	<b># Veh in Fatal MVCs</b>	<b>% Veh in Fatal MVCs</b>
<b>Not Reported</b>	4	0.4	42	10.9
<b>Passenger Car</b>	611	62.5	199	51.7
<b>Pick-Up Truck</b>	286	29.2	114	29.6
<b>Truck Tractor</b>	33	3.4	17	4.4
<b>Bus (Including School)</b>	5	0.5	1	0.3
<b>Motorcycle</b>	18	1.8	7	1.8
<b>RV or Motorhome</b>	6	0.6	1	0.3
<b>Emergency Vehicle</b>	3	0.3	1	0.3
<b>Other Vehicle</b>	12	1.2	3	0.8
<b>Total</b>	978	100	385	100

Table 2E provides data on the manner of collision for young driver involved fatal and incapacitating injury MVCs on tribal lands.

- Fifty six percent of the fatalities and 40 percent of the incapacitating injuries occur in single vehicle crashes.
- This contrasts with 40 percent of the fatalities and 22 percent of the young driver involved incapacitating injuries occurring in single vehicle MVCs statewide.
- Conversely, the combined percentage of fatal angle and left turn crashes on tribal lands involving young drivers is only 6 percent, compared to 27 percent statewide.
- Similarly, the combined percentage of incapacitating injury angle and left turn MVCs involving young drivers on tribal lands is 17 percent compared to 44 percent statewide.
- Although head-on fatalities involving young drivers have about the same percentage on tribal lands (20%) as statewide (18%), incapacitating injury percentages are about double on tribal lands (13%) compared to statewide (7%).

## Comparative Analysis of the Emphasis Areas

Table 2E: Young Driver Fatalities and Incapacitating Injuries by Collision Manner, 1997-2006				
Collision Manner	# Incapacitating Injuries	% Incapacitating Injuries	# Fatalities	% Fatalities
Single Vehicle	343	40.1	182	56.5
Sideswipe (same)	55	6.4	9	2.8
Sideswipe (opposite)	15	1.8	4	1.2
Angle	106	12.4	13	4.0
Left Turn	42	4.9	7	2.2
Rear-End	147	17.2	21	6.5
Head-On	114	13.3	66	20.5
Backing		0.0		0.0
Other	31	3.6	19	5.9
Driveway/Alley Related		0.0		0.0
Non-Contact (mc)		0.0		0.0
Non-Contact (not mc)		0.0	1	0.3
U-Turn	2	0.2		0.0
Total	855	100	322	100

### 2.2.2 Seasonality

The SHSP states that knowing the time when fatal and incapacitating injury MVCs occur can be useful in developing education and enforcement programs.

Chart 2B displays the number of MVC fatalities and incapacitating injuries involving young drivers on tribal lands by month of year.

- Fatalities peak during the summer with their highest level in August and decline to their lowest levels in the late fall.
- Incapacitating injuries are at their highest levels during the spring and summer with the peak in August.
- These findings are relatively consistent with statewide data in that summer is the peak time for fatal MVCs involving young drivers.

Chart 2C shows the distribution of MVC fatalities and incapacitating injuries involving young drivers on tribal lands by day of week.

- The data for tribal lands mirrors statewide results that show both fatalities and incapacitating injuries peaking on Friday through Sunday and experiencing low points midweek.

## Comparative Analysis of the Emphasis Areas

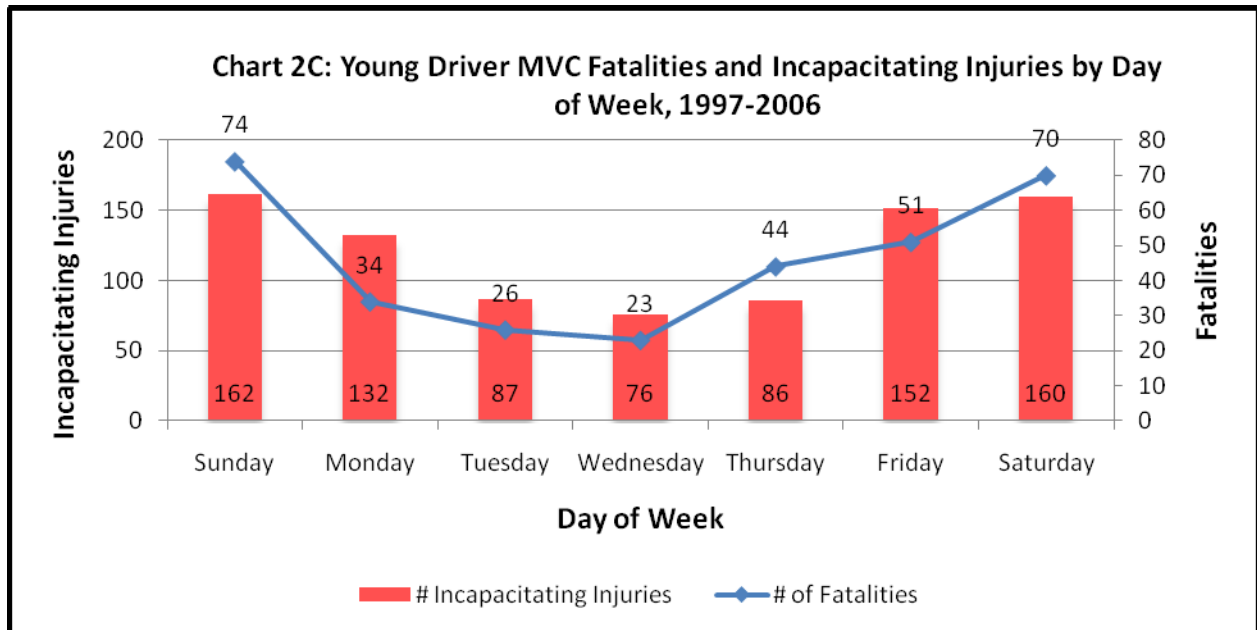
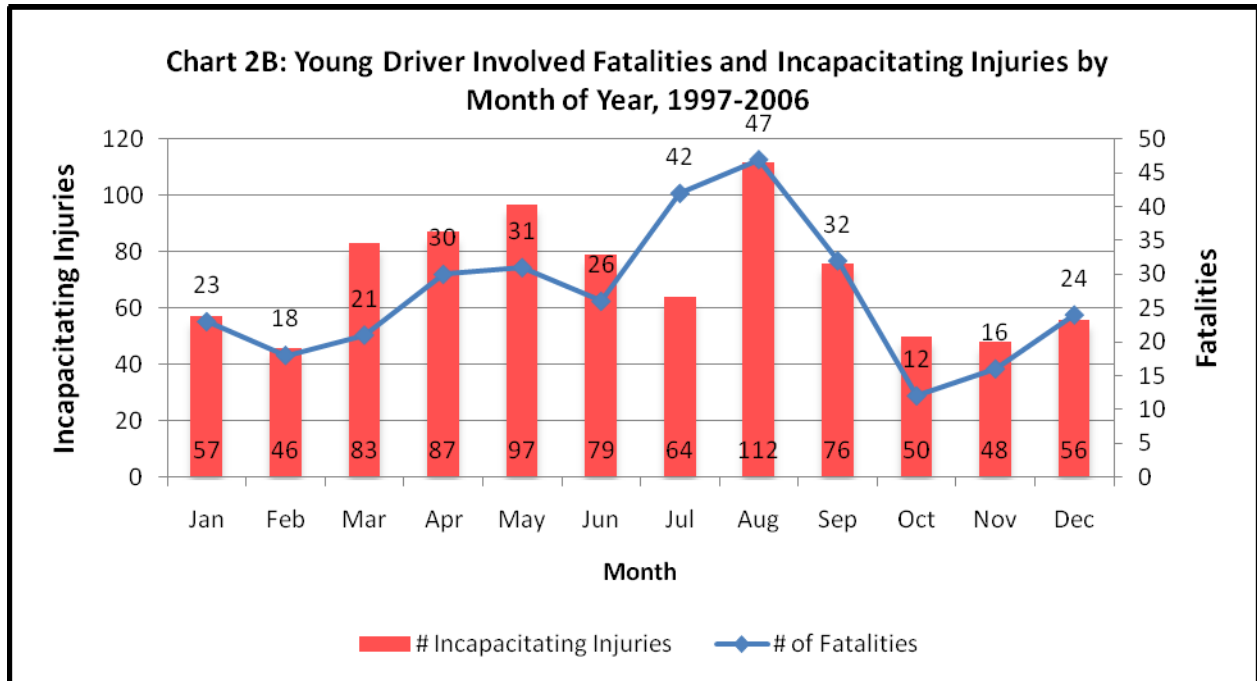
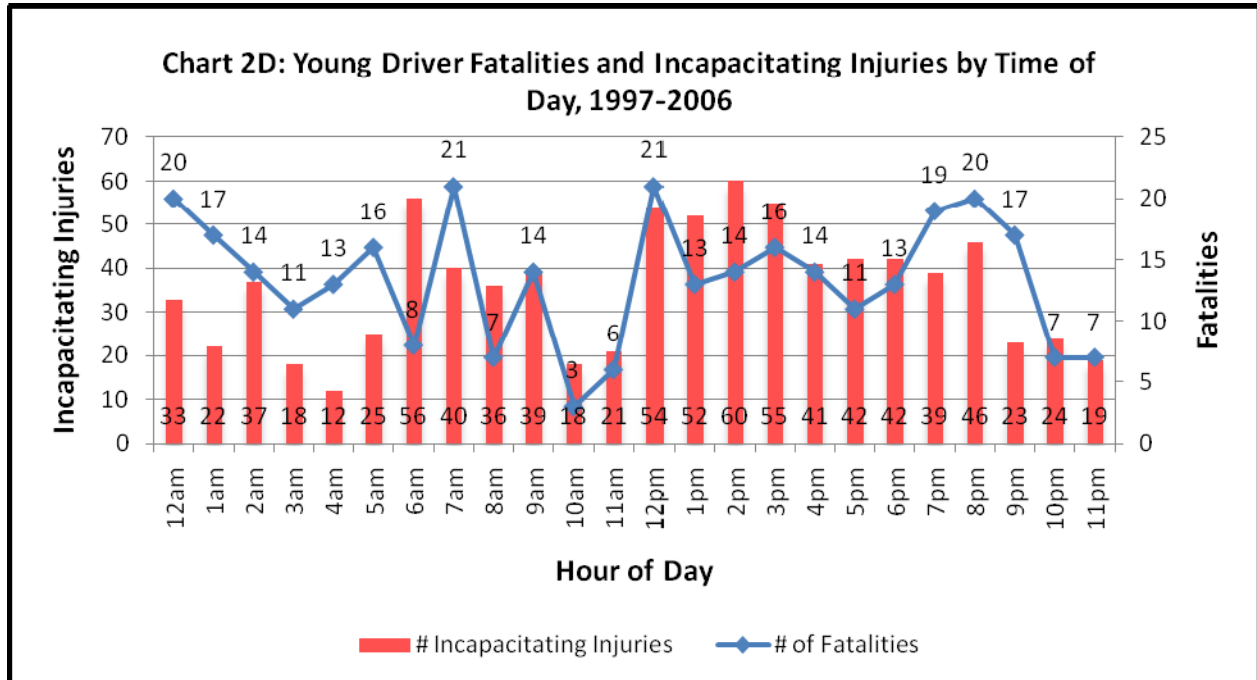


Chart 2D displays the distribution of MVC fatalities and incapacitating injuries involving young drivers on tribal lands by time of day.

- The peak fatality periods occur in the first two hours after midnight, 7 a.m., noon, and between 7 p.m. and 9 p.m.
- Minimum fatality periods occur on both sides of the 7 a.m. peak, mid morning and just before midnight.

### Comparative Analysis of the Emphasis Areas

- The afternoon incapacitating injury peak extends from noon to 7 p.m., with a single morning peak at 6 a.m.
- The statewide data show similar trends with afternoon peaks dominant.
- There is a stronger peak statewide from 11 p.m. to 1 a.m. than during the 5-6 a.m. period.
- Incapacitating injuries peak in the 6 a.m. hour and from noon to 4 p.m., with minimums from about 9 p.m. to 5 a.m. and 10 a.m. to noon.



### 2.2.3 Conclusions Regarding Fatalities and Incapacitating Injuries from MVCs Involving Young Drivers on American Indian Reservations in Arizona

- Total fatalities and incapacitating injuries resulting from MVCs involving young drivers peaked in the 2002-2003 time period and have been declining since. This trend contradicts that found for unrestrained fatalities and incapacitating injuries, which have increased since 2003.
- The rural to urban ratio for fatalities is 10:1 and for incapacitating injuries is 8:1 for MVCs involving young drivers indicating the need for rural oriented strategies for reducing fatal and incapacitating injury MVCs involving young drivers on tribal lands.
- The largest percentage of fatalities and incapacitating injuries occur to drivers in MVCs involving young drivers. However the difference in the driver/passenger percentages is not great. Since the only person in the vehicle is the driver in many cases, no strong conclusion can be drawn regarding whether the driver or passenger is more at risk without additional analysis of vehicle occupancy.

## Comparative Analysis of the Emphasis Areas

- Male vehicle occupants are twice as likely as females to be fatally injured in MVCs involving young drivers. The ratio for incapacitating injuries is slightly less. These findings could be a result of males exercising more unsafe behavior or there could be a larger percentage of males in the vehicles involved. An analysis should be made of what percent of the young drivers involved in these crashes are male and the position and gender of the persons receiving fatal or incapacitating injuries.
- About 60 percent of the fatalities and incapacitating injuries in MVCs involving young drivers involve passenger cars and about 30 percent involve pick-up trucks. Although truck tractors are involved in only about 4 percent of the fatalities and incapacitating injuries, this percentage is about 4 times greater than statewide.
- Single vehicle and head-on collisions account for more than 75 percent of the fatalities and about 53 percent of the incapacitating injuries in MVCs involving young drivers. These types of collisions suggest running off the road or out of lane are primary causes of fatalities and incapacitating injury MVCs involving young drivers. An analysis of prior harmful, sequence of events, first harmful and sub-harmful data is needed to provide a clear understanding of collision types. Strategies need to be developed to address these young driver actions.
- Spring and summer months are peak times for young driver involved MVC fatalities and incapacitating injuries. This could be associated with spring energy and summer leisure time, but additional analysis would be required.
- Friday through Sunday are peak days of the week for combined fatalities and incapacitating injuries, suggesting association with leisure time.
- Hour of day fatality peaks occur in the 12 a.m., 7 a.m., noon and the 7-10 p.m. hours. The 7 a.m. and noon hours could be associated with travel to work or school. Leisure time driving could account for the 7-10 p.m. peaks. DUI could be a factor in the 12 a.m. peak. Incapacitating injury peaks occur in the 6 a.m. hour and during the afternoon and early evening. The 6 a.m. peak could be associated with travel to work or school. The afternoon and early evening peak could be associated with travel from work or school and weekend leisure travel. Additional analysis would be required to confirm these conclusions.

### **2.3 Countermeasures to address Fatalities and Incapacitating Injuries in MVCs Involving Young Drivers on American Indian Reservations in Arizona**

The SHSP countermeasures for restraint use fall into four strategy areas:

- Strengthen Legislative and Administrative Requirements
- Reduce Young Drivers' Involvement in Fatal and Incapacitating Injury Crashes
- Introduce Training Support for Parents of Young Drivers
- Increase Young Drivers' Safety Awareness

The following recommendations for countermeasures on tribal lands build on those identified in the SHSP.

### 2.3.1 Strategy: Strengthen Tribal Legislative and Administrative Requirements

<b>2.3.1 Strategy: Strengthen Tribal Legislative and Administrative Requirements.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
1. Establish a Study Committee to evaluate the success of the graduated license law.	The Study Committee should include tribal representation to present American Indian and tribes' perspectives on the graduated driver license law.
2. Require drivers' licenses to be renewed every five years with a written test and require a written test to move from class G license to class D license.	This countermeasure could be valuable; however, testing stations travel distance and hours of operation and the cost for taking the tests will be issues for reservation residents.
3. Implement mandatory defensive driving classes as a part of the graduated licensing program.	The cost and location of classes will be an issue for reservation residents, who are often financially constrained.
4. Align the Arizona Driver's Manual with the SHSP goals, objectives and strategies.	This countermeasure does not apply to tribes.
5. Remove conflicting directives such as air quality directive encouraging carpooling, whereas graduated licensing requirements do not encourage young drivers to have passengers.	This countermeasure does not apply to tribes.

### 2.3.2 Strategy: Reduce Young Drivers Involvement in Fatal and Incapacitating Injury Crashes

<b>2.3.2 Strategy: Strengthen Tribal Legislative and Administrative Requirements.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
1. Introduce enforcement campaigns that are tailored to enforce and enhance awareness of graduated licensing conditions, zero-tolerance (alcohol/DUI) laws, and life-saving benefits of wearing a safety belt.	Training and supporting material will be required for tribal law enforcement officials to carry out the campaigns. Some tribes might have insufficient law enforcement staff to conduct the campaigns. In these cases the potential should be explored for developing agreements between tribes and state or local government agencies to provide for external law enforcement agencies, such as Arizona Department of Public Safety (DPS) or sheriff departments, to conduct enforcement campaigns on tribal lands.

### 2.3.3 Strategy: Introduce Training Support for Parents of Young Drivers

<b>2.3.3 Strategy: Strengthen Tribal Legislative and Administrative Requirements.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
1. Enlist support of parents to teach driving skills and manage the driving behavior of their children. Link to existing programs, e.g. the AAA program Dare to Prepare.	A study done with young male American Indian drivers on a reservation in Arizona showed that the parents are not the only group that can influence the behavior of young males. This countermeasure should be tailored to provide the most effective influence on the target audience.
2. Develop and implement a website that acts as a parent and young driver safety clearinghouse by providing easy access to various driver safety sites for parents and young drivers.	Many American Indians living on reservations do not have access to the Internet. Alternative methods for delivering this information in rural Arizona should be considered.
3. Provide teens and parents with an information package that includes tools and resources that will assist parents who are teaching teens to drive, and that informs teens and their parents of the website implemented under Countermeasure 2.	This information package should be made available to other people who influence teens and young drivers.

### 2.3.4 Strategy: Increase Young Drivers' Safety Awareness

<b>2.3.4 Strategy: Increase Young Drivers' Safety Awareness.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
1. Develop a new, or promote an existing model Driver Improvement Program (Traffic Survival School/Defensive Driving) along similar lines to the Mesa Defensive Driving Program for teenagers.	From a tribal perspective the questions about this countermeasure will be who will provide this program, will it be available in rural Arizona and how much will it cost for participants?
2. Develop a master young driver (non-mandatory) program that addresses both standards and curriculum and can be used by all Arizona Driver and Safety Education learning institutions.	Methods for delivering this type of program in rural Arizona should be developed. Possibly the program could be made a part of mandatory high school curriculum, even where driving programs are not offered.
3. Require all driver education instructors to participate in continuing education specific to driver education.	This countermeasure is valid for use on reservations.



## Comparative Analysis of the Emphasis Areas

<b>2.3.4 Strategy: Increase Young Drivers' Safety Awareness. (continued)</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>4. Coordinate efforts with other emphasis areas. Ensure programs developed for restraints usage, impaired driving, and speeding have components that specifically address young drivers.</b>	This counter measure is definitely needed, since the emphasis areas overlap in their impacts on traffic safety.
<b>5. Develop and implement a safe driving outreach program targeted to young drivers who are between the ages of 19 and 24 and who are no longer in high school.</b>	Although the concept is good, the practicality for implementing it on tribal lands could be difficult. Once drivers are out of school, they will spread out, and it will be difficult to bring them together into any central setting. The program would need to be focused in community centers and distributed media. It should be coordinated with IHS programs.
<b>6. Examine existing defensive driving courses, and/or safe driving record programs and promote suitable courses and programs for reduced car insurance premiums. Appropriate crash data will have to be collected and analyzed to arrive at saleable recommendations.</b>	Consider incorporating these programs as mandatory in high school curricula.
<b>7. Link restraint usage, speeding and impaired driving educational and outreach programs to educational and outreach programs for young drivers.</b>	As with countermeasure 4 this countermeasure is definitely needed, since these areas overlap in their impacts on traffic safety.
<b>8. Market safe driving during vehicle registration using multi-media to target young drivers, and require the successful completion of a safe driving test prior to young drivers receiving their vehicle registration.</b>	This countermeasure could be valuable; however, testing stations travel distance and hours of operation and the cost for taking the tests will be issues for reservation residents.

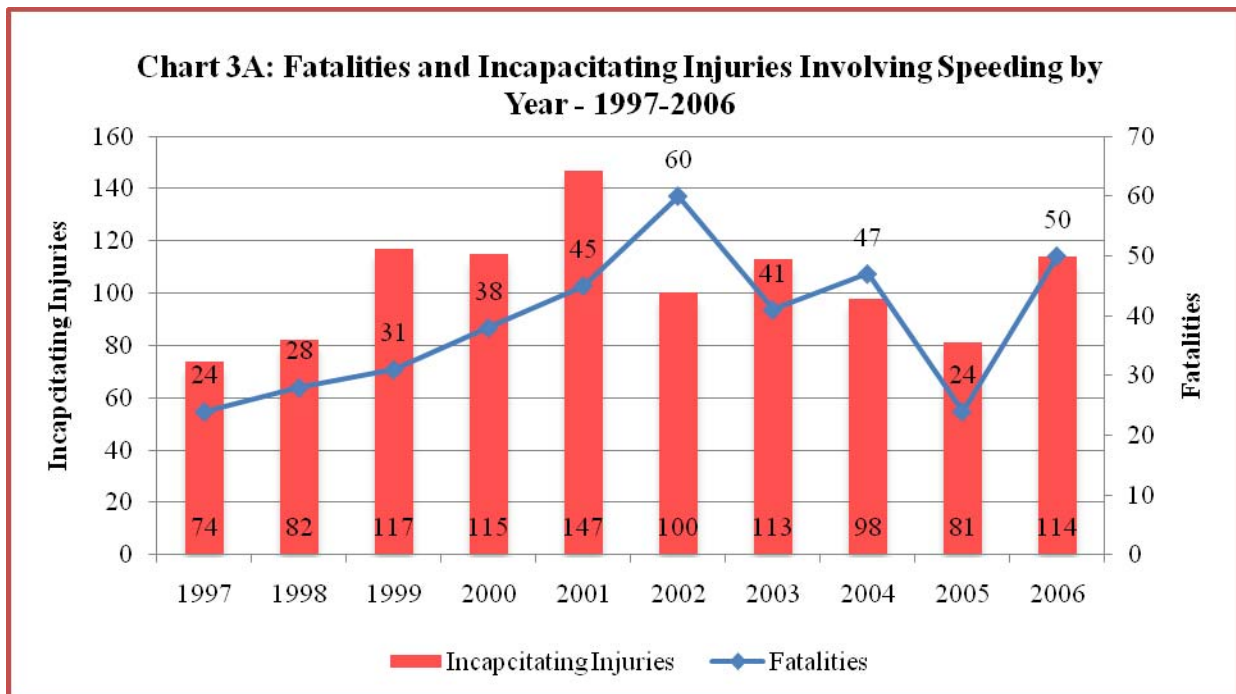
## SPEEDING EMPHASIS AREA

### 3.1 Problem Statement

During the ten years from 1997 to 2006, 388 fatalities, 32 percent of the total MVC fatalities on reservations, occurred to persons in crashes that involved speeding. During the same period, 1,041 incapacitating injuries, 44 percent of the total, occurred to persons in crashes that involved speeding. The following analysis is based on this ten year period.

Chart 3A shows the number of MVC fatalities and incapacitating injuries on reservations by year for crashes involving speed.

- The chart shows a general rise in the number of fatalities from 1997 through 2002, followed by a decline from 2003 to 2005. In 2006, a sharp rise in fatalities occurred.
- Data in the SHSP shows that speed-related fatalities increased modestly statewide over the period from 2001 through 2005, which does not match the pattern found on reservation lands.
- The number of speed-related incapacitating injuries on reservation lands shows a pattern similar to fatalities, with the peak coming in 2001 rather than 2002. The incapacitating injuries pattern is consistent with the findings in the SHSP that show a gradual decline in speed-related incapacitating injuries from 2001 through 2005.



## Comparative Analysis of the Emphasis Areas

Table 3A compares the locale of fatalities and incapacitating injuries by urban, rural and not reported locations.

- Although all locations were reported for fatal MVCs, only about 47 percent were reported for incapacitating injury MVCs.
- Many of the incapacitating injury MVCs would have involved fatalities as well, indicating that less than 47 percent of locations are reported for incapacitating injury MVCs not involving fatalities.
- This finding suggests the conclusion that reporting on reservations for incapacitating injury MVCs, not involving fatalities, is less complete than those involving fatalities.
- The data show that 92 percent of the speed-related MVC fatalities on tribal lands occur in rural areas, compared to 59 percent for statewide data.
- The data suggest that more than 90 percent of speed-related MVC incapacitating injuries occur on tribal lands in rural areas, while about 64 percent of the incapacitating injuries occur in urban areas statewide.
- The rural dominance of speed-related MVC fatal and incapacitating injuries would be expected, because of the rural location of most reservations, and because speeds are likely higher in rural areas.

**County level data are not provided to avoid identification of specific tribal information.**

<b>Table 3A: Urban versus Rural Speeding Fatalities and Incapacitating Injuries, 1997-2006</b>				
<b>Location</b>	<b># Incapacitating Injuries</b>	<b>% Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Fatalities</b>
<b>Urban</b>	43	8.7	30	7.7
<b>Rural</b>	450	91.3	358	92.3
<b>Unknown or Not Reported</b>	548		0	
<b>Total Reported</b>	493		388	100

## 3.2 Considerations for Strategy Development

### 3.2.1 Drivers, Vehicles, and Collision Manner

Table 3B provides information about the person type who sustained fatal and incapacitating injuries when involved in a speed-related MVC.

- Drivers and passengers sustained a nearly equal number of fatal injuries.
- Drivers sustained considerably more incapacitating injuries than passengers.
- The SHSP shows that drivers experienced about two-thirds more fatalities than passengers statewide.

### Comparative Analysis of the Emphasis Areas

- The difference between tribal and statewide data could be attributable to a number of factors including:
  - A higher vehicle occupancy rate on tribal lands than statewide.
  - Unrestrained passengers.
  - Passengers located in areas of the vehicle providing exposure to passenger ejection, such as the beds of pickup trucks.
- Pedestrians and pedacyclists account for only a small percentage of the MVC fatalities and incapacitating injuries involving speed on tribal lands.

<b>Table 3B: Speeding Fatalities and Incapacitating Injuries by Person Type, 1997-2006</b>						
<b>Casualty</b>	<b>Incapacitating Injuries</b>		<b>Fatalities</b>		<b>Total</b>	
	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>
<b>Driver</b>	573	55.0	192	49.5	765	53.5
<b>Passenger</b>	461	44.3	189	48.7	650	45.5
<b>Pedestrian</b>	6	0.6	7	1.8	13	0.9
<b>Pedacyclist</b>	1	0.1	0	0.0	1	0.1
<b>Totals</b>	1,041	100.0	388	100.0	1429	100.0

Table 3C describes the gender distribution of speed-related MVC fatal and incapacitating injuries.

- Speed-related male fatalities (69 percent) on tribal lands are about twice those for females (31 percent), which is consistent with data for statewide MVC fatalities – 71 percent for males and 29 percent for females.
- Females account for about 41 percent and males account for about 59 percent of the speed-related MVC incapacitating injuries on tribal lands. These percentages are consistent with the statewide speed-related statistics of about 42 percent for females and about 58 percent for males.
- The similarities between reservation and statewide statistics suggest that male drivers are more likely to speed and adopt other unsafe vehicle occupant habits, such as not using seat restraints.

<b>Table 3C: Speeding Fatalities and Incapacitating Injuries by Gender, 1997-2006</b>				
<b>Gender</b>	<b># Incapacitating Injuries</b>	<b>% Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Fatalities</b>
<b>Female</b>	424	40.7	122	31.4
<b>Male</b>	617	59.3	266	68.6
<b>Unknown</b>	0	0.0	0	0.0
<b>Total</b>	1,041	100	388	100

## Comparative Analysis of the Emphasis Areas

Table 3D shows the age group distribution of fatalities and incapacitating injuries in MVCs involving speeding.

- The highest percentage of incapacitating injuries and fatalities on tribal lands fall in the 16-24 age group by a substantial margin, which is also the case with statewide statistics.
- The percentage of incapacitating injuries on tribal lands is more than 80 percent higher than the statewide percentile for the 15 and under age group. The percentage of fatalities on tribal lands for this age group is 70 percent higher than the statewide percentile. These higher percentages might be related to the finding in an earlier section of this report that children involved in MVCs on tribal lands are less likely to be properly restrained in their seats. The higher percentages of child injuries and fatalities in speed-related MVCs on tribal lands might also be expected, if there is a higher average number of children per vehicle or if children are being placed in locations within the vehicle that are more vulnerable to an injury result.

Table 3D: Speeding Fatal and Incapacitating Injury Crashes by Age Group, 1997-2006				
Age Group	# of Incapacitating Injuries	% of Incapacitating Injuries	# of Fatal Injuries	% of Fatal Injuries
15 and Under	114	11.0	33	8.5
16 to 24	301	28.9	109	28.1
25 to 34	218	20.9	72	18.6
35 to 44	155	14.9	72	18.6
45 to 54	116	11.1	40	10.3
55 to 64	68	6.5	26	6.7
65 to 74	29	2.8	20	5.2
75 to 84	20	1.9	11	2.8
85 and Older	7	0.7	2	0.5
Unknown	13	1.2	3	0.8
Totals	1,041	100.0	388	100.0

### Comparative Analysis of the Emphasis Areas

Chart 3B shows graphically by age group the number of speed-related incapacitating injuries and fatalities resulting from MVCs on tribal lands from 1997 to 2006.

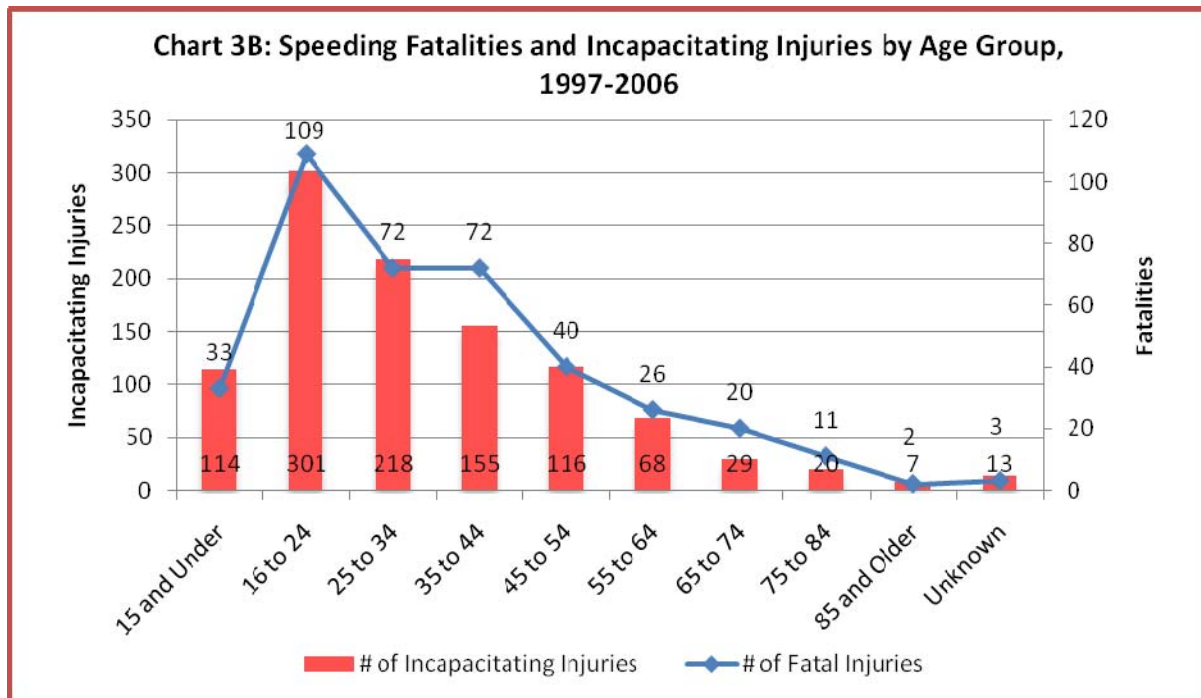


Table 3E presents vehicle-type information on speed-related fatalities and incapacitating injuries resulting from MVCs on tribal lands.

- Slightly more than 50 percent of the vehicles involved in fatal and incapacitating injury MVCs on tribal lands are passenger cars. This is somewhat less than statewide where the SHSP shows that more than 60 percent are passenger cars.
- The percentages of motorcycle fatalities and incapacitating injuries on tribal lands are also considerably lower than the statewide values of 11 percent for incapacitating injuries and eight percent for fatalities.
- Pickup trucks account for more than 30 percent of the injuries and fatalities on reservations compared to more than 20 percent statewide.
- Truck tractors speed-related incapacitating injury and fatality rates are about five times higher than statewide.

## Comparative Analysis of the Emphasis Areas

<b>Table 3E: Speeding Fatal and Incapacitating Injury Crashes by Vehicle Type, 1997-2006</b>				
<b>Vehicle Type</b>	<b># of Speeding Vehicles in Incapacitating Injury MVCs</b>	<b>% of Speeding Vehicles in Incapacitating Injury MVCs</b>	<b># of Speeding Vehicles in Fatal MVCs</b>	<b>% of Speeding Vehicles in Fatal MVCs</b>
<b>Not Reported</b>	5	0.7	1	0.3
<b>Passenger Car</b>	406	55.1	169	53.8
<b>Pick-Up Truck</b>	229	31.1	114	36.3
<b>Truck Tractor</b>	41	5.6	18	5.7
<b>Bus (Including School)</b>	2	0.3	1	0.3
<b>Motorcycle</b>	41	5.6	6	1.9
<b>RV or Motorhome</b>	5	0.7	0	0.0
<b>Emergency Vehicle</b>	2	0.3	1	0.3
<b>Other Vehicle</b>	6	0.8	4	1.3
<b>Total</b>	737	100.0	314	100.0

### 3.2.2 Seasonality

The SHSP states that knowing the time when fatal and incapacitating injury MVCs occur can be useful in developing education and enforcement programs.

Chart 3C displays the month of year of the speed-related MVC fatalities and incapacitating injuries.

- The data indicate that the spring months, March through May, and September are the peak periods for incapacitating injuries on reservations.
- The fatality peak occurs in September, with smaller peaks in March and July.
- The strongest statewide peak for speed-related fatalities occurs in August, with a smaller peak in March.
- March and August are also the peak months for incapacitating injuries statewide, but the March through May peaking is less prominent than on tribal lands.

## Comparative Analysis of the Emphasis Areas

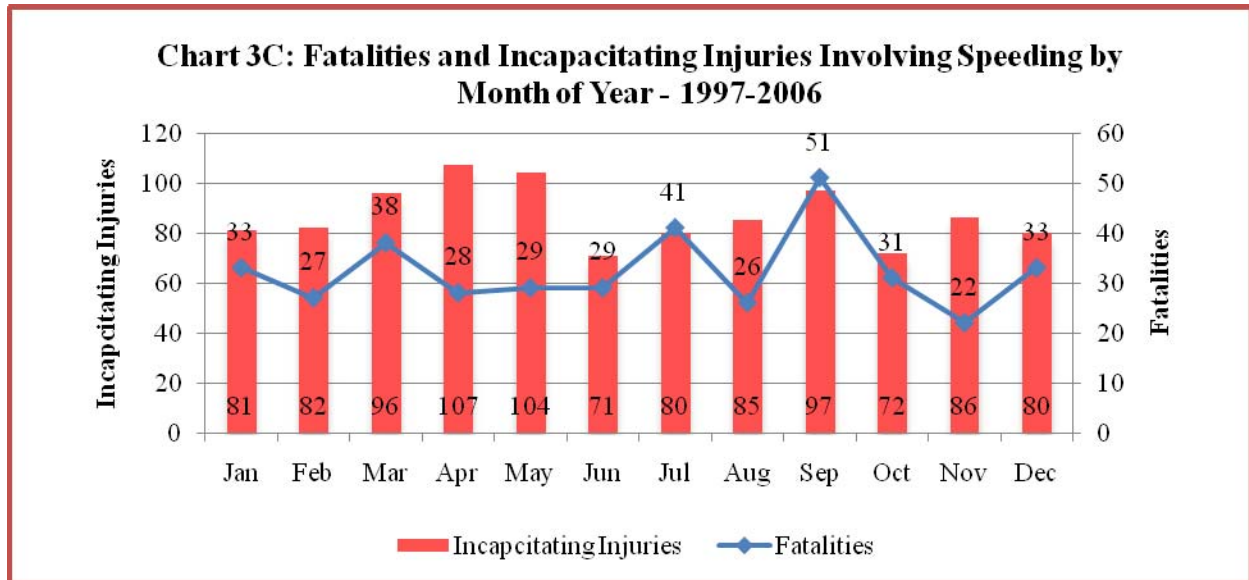
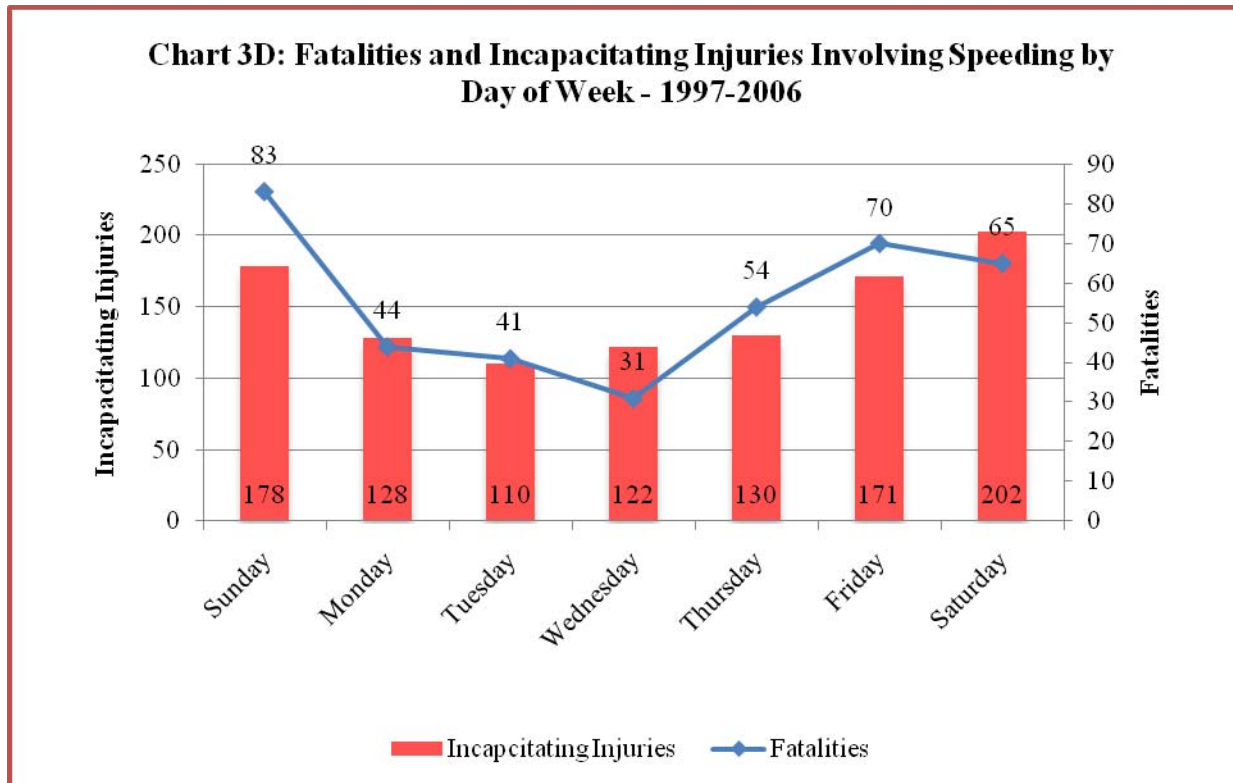


Chart 3D shows the day of week distribution of speed-related MVC fatalities and incapacitating injuries.

- The data for tribal lands mirrors statewide results - both fatalities and incapacitating injuries peak on weekends and are low during midweek.

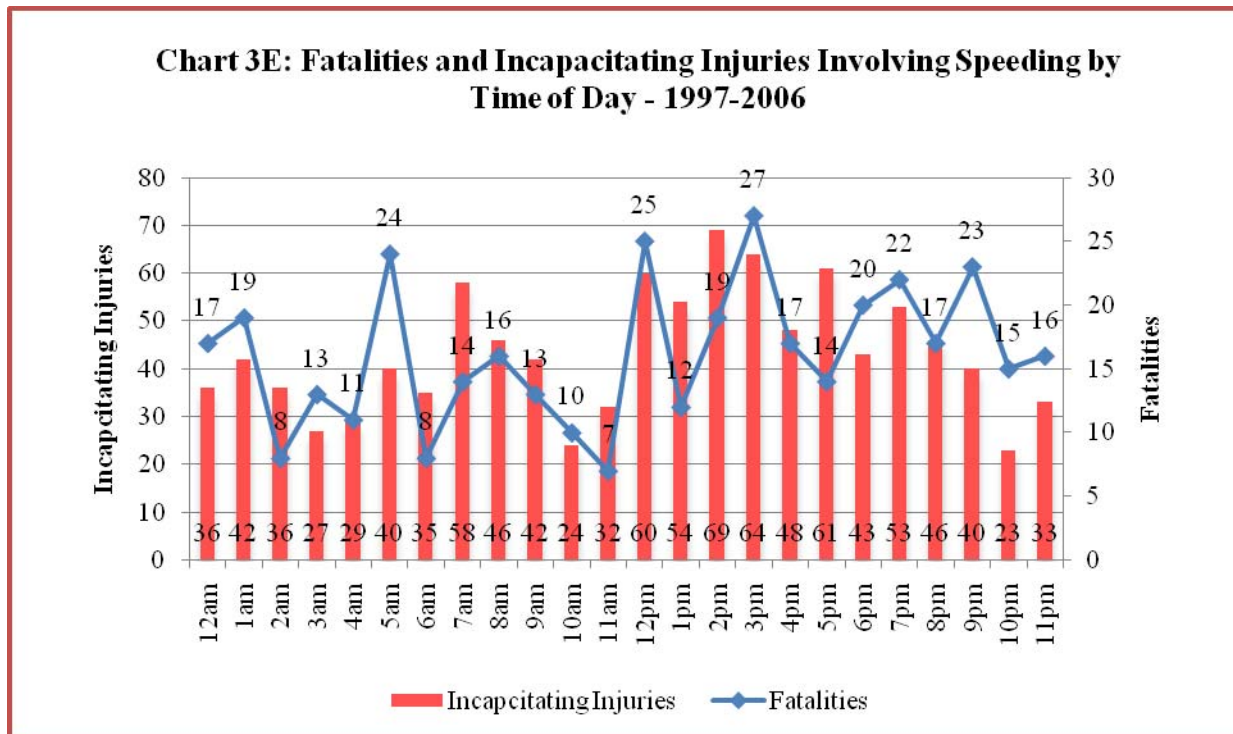




### Comparative Analysis of the Emphasis Areas

Chart 3E displays the time of day distribution of MVC fatalities and incapacitating injuries.

- The peak speed-related fatality periods on tribal lands occur during the 5 a.m., noon and 3 p.m. hours. Fatalities statewide start peaking at about 2 p.m. and continue at a high level until about 2 a.m. The highest rate of speed-related fatalities statewide occurs between midnight and 2 a.m.
- Incapacitating injuries peak from noon to about 6 p.m., with a single morning peak during the 7 a.m. hour. There is a similar afternoon peaking of statewide incapacitating injuries, coupled with a small peak during the 7 a.m. hour.



### 3.2.3 Conclusions Regarding Fatalities and Incapacitating Injuries Involving Speed-related MVCs on Indian Reservations in Arizona

- The annual number of fatalities has increased at a reasonably constant rate over the first six years from 24 in 1997 to 60 in 2002. The fatalities then declined irregularly to 24 in 2005 and spiked again at 50 in 2006. The annual number of incapacitating injuries followed a similar pattern, beginning with 74 in 1997, peaking at 147 in 2001 and declining to 81 in 2005, before spiking at 114 in 2006. Rural dominates urban fatalities and incapacitating injuries when reported. The incapacitating injury pattern on tribal lands is consistent with statewide statistics, but the fatality pattern varies from the slight increase in the 2001-2005 statewide fatalities.

## Comparative Analysis of the Emphasis Areas

- Speed-related incapacitating injuries and fatalities reservations are much more skewed to rural locations than the statewide data. Over 90 percent of incapacitating injuries and fatalities occur in rural areas on tribal lands, compared to 59 percent of fatalities and 36 percent of incapacitating injuries occurring in rural areas statewide. The percentages of drivers and passengers fatally injured in speeding MVCs on reservations are about equal at 49 percent. Drivers experience 60 percent of the fatalities statewide and passengers suffer 36 percent of the fatalities. Drivers incur about 55 percent of the speed-related incapacitating injuries on tribal lands, while passengers experience about 44 percent of the injuries.
- Males incur more than twice the fatalities and nearly 50 percent more incapacitating injuries than females in crashes on reservations involving speeding. These are similar to statewide statistics.
- Nearly 2/3 of the fatalities and incapacitating injuries involving speeding occur with vehicle occupants between the ages of 16 and 45. Nearly 30 percent of the fatalities and incapacitating injuries occurred in the 16 to 25 age group. The SHSP reported similar age-related MVC statistics.
- The percentages of speeding pick-up trucks and truck tractors are significantly higher in fatal and incapacitating injury crashes on reservations than reported statewide in the SHSP. The percentages of speeding passenger cars and motorcycles involved in fatal and incapacitating injury MVCs are significantly lower on reservations than statewide.
- The month-of-year speed-related incapacitating injuries and fatalities on reservations are consistent with those statewide. Incapacitating injuries peak in the spring and fatalities peak in the late summer.
- Friday through Sunday are peak days of the week for speed-related MVC fatalities and incapacitating injuries on tribal lands. This pattern is consistent with statewide data published in the SHSP. However, there is a high Sunday spike in fatalities on reservations, suggesting the possibility of excessive speeding in returning home from weekend travel.
- Definite time-of-day peaks for speed-related fatalities on reservations occur during the 5 a.m., noon and 3 p.m. hours, with a relatively high plateau of fatalities from 6 p.m. through 10 p.m. The plateau is longer statewide, running from 2 p.m. through 10 p.m. A significant difference is that the hours with the highest number of fatalities statewide are between midnight and 2 a.m., which could be associated with the closure of establishments serving liquor. This peak is not as evident on reservations. The time-of-day pattern is similar for incapacitating injuries on reservations and statewide, with a small early morning peak during the 7 a.m. hour and a broad peak occurring from noon into the early evening. These peaks could be associated with many factors, such as peak travel times, driver fatigue, driving under the influence, and horizon sun.

### 3.3 Countermeasures to Address Fatalities and Incapacitating Injuries Involving Speeding during MVCs on American Indian Reservations in Arizona

The SHSP countermeasures for speeding fall into three strategy areas:

- Reduce the incidence of speeding.
- Reduce the number of chronic speeders.
- Reduce the effects of speeding related crashes.

The following recommendations for countermeasures on tribal lands build on those identified in the SHSP.

#### 3.3.1 Strategy: Reduce the Incidence of Speeding

<b>3.3.1 SHSP Strategy: Reduce the Incidence of Speeding.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Identify high crash locations where many crashes are attributed to speeding and use established guidelines to review the speed limit to ensure that the limit is appropriate to the location.</b>	Each American Indian tribe in Arizona should develop an analysis of the MVC locations on its tribal lands and determine where speed is considered a significant factor in the crashes. Where speed is a significant factor, the tribe should work with the jurisdiction owning the road to determine if the existing speed limit is reasonable or if a lower limit should be established.
<b>2. Provide increased enforcement with high-visibility at high crash locations in Maricopa and Pima Counties.</b>	Fort McDowell Yavapai Nation, Gila River Indian Community, Pascua Yaqui Tribe, Salt River Pima Maricopa Indian Community and Tohono O'odham Nation reservations are located within the Maricopa and Pima Counties. These tribes should review their MVC data to determine whether there are times and locations when high-visibility enforcement should be considered as a countermeasure to reduce speed-related crashes. Tribes outside Maricopa and Pima Counties should also consider high-visibility enforcement, if MVC data suggests this countermeasure could be effective in reducing speed-related MVCs at high crash locations. Tribes should work with law enforcement of other jurisdictions as appropriate to provide high-visibility law enforcement.

## Comparative Analysis of the Emphasis Areas

<b>3.3.1 SHSP Strategy: Reduce the Incidence of Speeding. (continued)</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>3. Install automated detection and enforcement systems at high crash locations where speeding is a problem.</b>	As a supplement to officer enforcement, this countermeasure could be effective on high-volume reservation roads with a significant number of speed-related MVCs. Mobile speed reading equipment with digital displays, coupled with speed warning signs, could be effective in slowing traffic in the absence of enforcement. Many high volume roads on reservations are State Highways or county roads, and automated detection and enforcement systems installed on these roads would require cooperation with the agency administering the road.
<b>4. Work towards making speeding enforcement consistent, impartial and uniform for all speeding violators in Arizona.</b>	This countermeasure might have limited application on tribal lands that are governed in part by tribal laws that might differ from state laws. The location, size, characteristics and road users are specific to each reservation and could dictate some divergence from a standard statewide speed enforcement policy.
<b>5. Develop educational and public speed management and outreach campaigns for various target audiences to support the strategies on speeding.</b>	Education and speed management and outreach campaigns could be useful. However, they are also expensive to develop making it difficult for tribes, particularly small tribes, to implement. It would be valuable for the State to develop the basic programs and materials so they could be adapted to specific tribes' use.
<b>6. Increase the perception that violators will be caught and will have to pay the consequences (using public relations programs and the media).</b>	Although individual tribes could participate in such a program, the program should be developed on a statewide basis and not by individual tribes because of cost.
<b>7. Additional Tribal Countermeasure: Provide increased enforcement with high-visibility targeting pick-up truck and truck tractor speeders.</b>	The percentage of pick-up truck speeders involved in fatal and incapacitating injury crashes on reservations is between 30 percent and 40 percent greater than the statewide average. The percentage of truck tractor speeders involved in fatal and incapacitating injury crashes on reservations is about 500 percent greater than the statewide average. A program of high-visibility enforcement targeting pick-up truck and truck tractor speeders should be considered by tribes experiencing a high number of crashes involving these vehicles. Tribes should work with DPS to provide high-visibility enforcement of truck tractor speeders.

### 3.3.2 Strategy: Reduce the Number of Chronic Speeders

<b>3.3.2 SHSP Strategy: Reduce the Number of Chronic Speeders.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Increase penalties for repeat offenders.</b>	This countermeasure could be useful on tribal lands, but could require changes in tribal laws.
<b>2. Work with members of the court system to develop and deliver educational packages that deliver a structured curriculum to repeat offenders.</b>	This countermeasure could be valuable for use with reservation speeders. The program should be developed by the state because of cost and be adaptable for use on reservations that have their own court systems. Educational packages for American Indian speeders would need to be developed with an understanding of their culture.
<b>3. Develop educational and outreach programs and tools to address street racing.</b>	Analyze individual tribal MVC data to determine if street racing is a significant problem on some reservations. If so, the programs should be developed by the state with the ability for adaptation by tribes experiencing a street racing problem.

### 3.3.3 Strategy: Reduce Effects of Speeding Related Crashes

<b>3.3.3 SHSP Strategy: Reduce Effects of Speeding Related Crashes.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Improve EMS response times to locations identified as high crash rural locations related to speeding.</b>	This countermeasure has significant application for reservations in Arizona, because most are rural and have parts of the reservation at a considerable distance from EMS responders. On the reservation level, each tribe needs to assure that there is an effective interagency voice communication system through dispatch and radio between law enforcement and EMS responders. A statewide communication and dispatching system needs to be developed that reaches all parts of the state and can effectively dispatch the best responder for the MVC location. Tribes should be incorporated into the statewide system.

## IMPAIRED DRIVING EMPHASIS AREA

### 4.1 Problem Statement

Only alcohol-related impairment is used in this analysis, so it is consistent with the impaired driving fatality data used in the SHSP. Consequently, the data underestimates the total impairment problem that would also include drugs, fatigue, drowsiness and other factors. During 1997 to 2006 on tribal lands, impaired drivers were involved in 366 fatalities or 30 percent of the total MVC fatalities, and 593 incapacitating injuries or 25 percent of the total MVC incapacitating injuries. The following analysis is based on this ten year period.

Chart 4A shows the number by year of fatalities and incapacitating injuries in MVCs.

- There is a general increasing trend in MVC fatalities involving impaired driving over the 10-year period from 1997 to 2006 with significant lows in 1999 and 2004-2005.
- MVC incapacitating injuries involving impaired driving on reservations peaked from 2001 to 2003, with substantially lower levels for the years 1997 to 2000 and 2004 to 2006.
- The statewide data shown in the SHSP covered only the five-year period from 2001 to 2005. However, the fatalities showed a similar annual variation on reservations during corresponding years with the exception of the 2005 peak year statewide.
- Although statewide incapacitating injuries were at a peak in 2001, as they were on tribal lands, the statewide decline through 2005 was much more moderate than that on tribal lands.

## Comparative Analysis of the Emphasis Areas

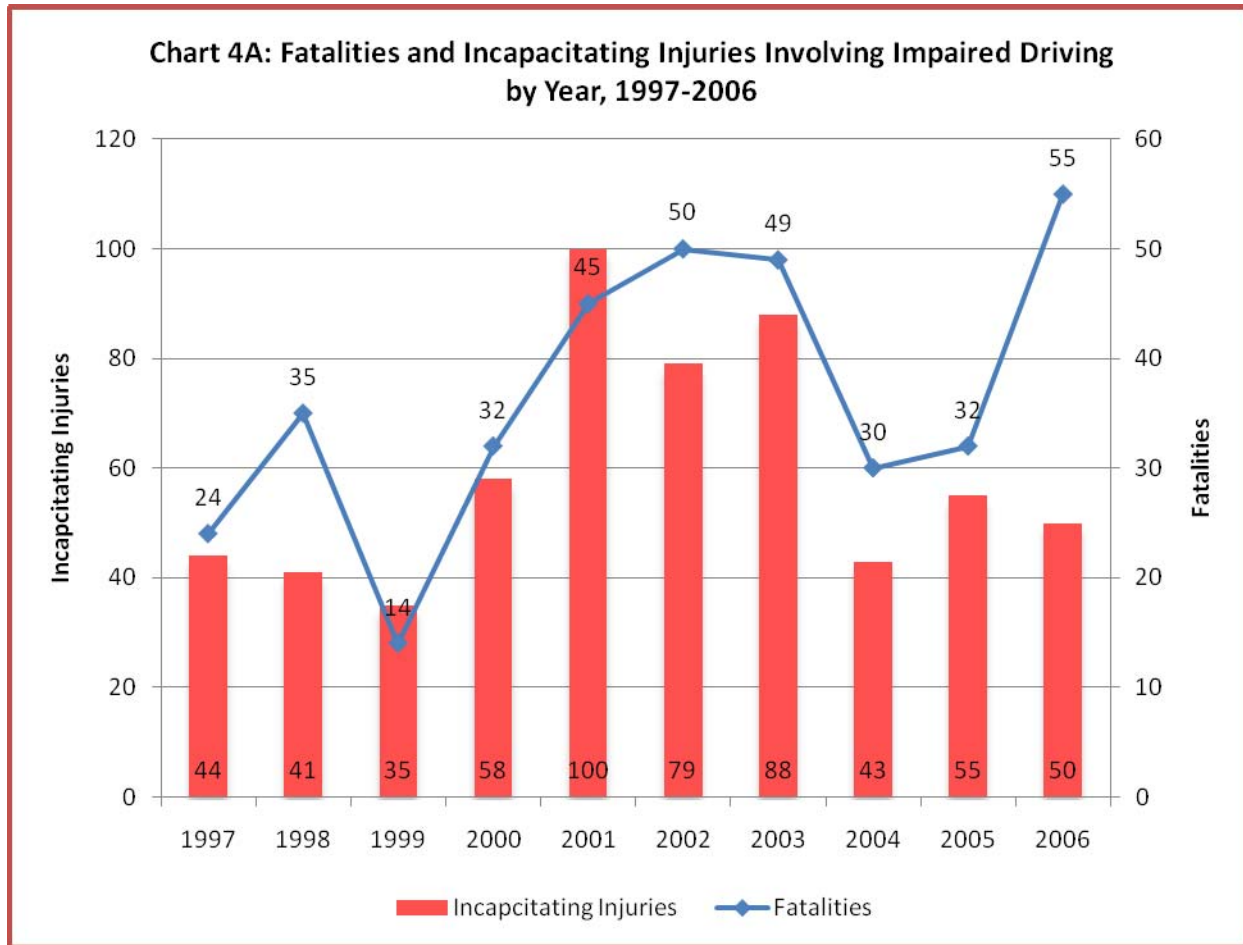


Table 4A compares the locale of fatalities and incapacitating injuries involving impaired driving by urban, rural and not reported locations.

- More than 94 percent of the MVC fatalities and incapacitating injuries on tribal lands involving impaired driving occur in rural areas.
- These percentages stand in stark contrast to statewide statistics that indicate 45 percent of the fatalities and 64 percent of the incapacitating injuries involving impaired driving occur in urban areas.
- It is noteworthy that the rural/urban location is reported for 98 percent of MVC fatalities on reservations, but only 45 percent of incapacitating injuries.

**County level data are not provided to avoid identification of specific tribal information.**



## Comparative Analysis of the Emphasis Areas

<b>Table 4A: Urban versus Rural Impaired Driving Fatalities and Incapacitating Injuries, 1997-2006</b>				
<b>Location</b>	<b># Incapacitating Injuries</b>	<b>% Reported Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Reported Fatalities</b>
<b>Urban</b>	15	5.6	20	5.6
<b>Rural</b>	253	94.4	339	94.4
<b>Unknown or Not Reported</b>	325		7	
<b>Total Reported</b>	268		359	100

## 4.2 Considerations for Strategy Development

### 4.2.1 Drivers, Vehicles and Collision Manner

Table 4B describes the person-type distribution of fatalities and incapacitating injuries for MVCs involving impaired driving.

- Drivers suffered about 49 percent of both fatalities and incapacitating injuries. Statewide, drivers experienced 60 percent of the fatalities and 64 percent of the incapacitating injuries.
- Vehicle passengers experienced about 48 percent or almost all of the remaining incapacitating injuries, but only 37 percent of the fatalities.
- A significant 14 percent of the fatalities were incurred by pedestrians and pedacyclists, but only 3 percent of the incapacitating injuries were suffered by these groups.
- The statewide toll on pedestrians and pedacylists involved in impaired driving MVCs was much less significant, representing only two percent of the incapacitating injuries and five percent of the fatalities.
- The data shows that collectively motor vehicle passengers, pedestrians and pedacyclists are significantly more at risk than drivers in MVCs involving impaired driving on tribal lands than statewide.

<b>Table 4B: Impaired Driving Fatalities and Incapacitating Injuries by Person Type, 1997-2006</b>				
<b>Casualty</b>	<b>Incapacitating Injuries</b>		<b>Fatalities</b>	
	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>
<b>Driver</b>	289	48.7	181	49.5
<b>Passenger</b>	286	48.2	134	36.6
<b>Pedestrian</b>	18	3.0	48	13.1
<b>Pedacyclist</b>	0	0.0	3	0.8
<b>Totals</b>	593	100.0	366	100.0



## Comparative Analysis of the Emphasis Areas

Table 4C provides information about the gender of those persons suffering fatal and incapacitating injuries in MVCs involving impaired driving.

- Males experienced 76 percent of the fatalities and 63 percent of the incapacitating injuries.
- These percentages compare reasonably well with statewide statistics in which 73 percent of the fatalities and 67 percent of the incapacitating injuries occurred to males in MVCs involving impaired driving.

<b>Table 4C: Impaired Driving Fatalities and Incapacitating Injuries by Gender, 1997-2006</b>				
<b>Gender</b>	<b># Incapacitating Injuries</b>	<b>% Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Fatalities</b>
<b>Female</b>	220	37.1	89	24.3
<b>Male</b>	372	62.7	277	75.7
<b>Unknown</b>	1	0.2	0	0.0
<b>Total</b>	593	100.0	366	100.0

Table 4D shows the age group distribution of fatalities and incapacitating injuries in MVCs involving impaired driving.

- The highest percentage of incapacitating injuries and fatalities on tribal lands fall in the 16-24 age group, which is also the case with statewide statistics.
- The percentage of incapacitating injuries on tribal lands is about 50 percent higher than statewide for the 15 and under age group, but the fatality percentages are the same.
- About 70 percent of the impaired driving related incapacitating injuries and fatalities occur in ages 16 through 44.

<b>Table 4D: Impaired Driving Fatal and Incapacitating Injury Crashes by Age Group, 1997-2006</b>				
<b>Age Group</b>	<b># of Incapacitating Injuries</b>	<b>% of Incapacitating Injuries</b>	<b># of Fatal Injuries</b>	<b>% of Fatal Injuries</b>
<b>15 and Under</b>	61	10.3	18	4.9
<b>16 to 24</b>	161	27.2	113	30.9
<b>25 to 34</b>	137	23.1	88	24.0
<b>35 to 44</b>	109	18.4	68	18.6
<b>45 to 54</b>	67	11.3	37	10.1
<b>55 to 64</b>	40	6.7	20	5.5
<b>65 to 74</b>	11	1.9	10	2.7
<b>75 to 84</b>	1	0.2	5	1.4
<b>85 and Older</b>	2	0.3	3	0.8
<b>Unknown</b>	4	0.7	4	1.1
<b>Totals</b>	593	100.0	366	100.0

### Comparative Analysis of the Emphasis Areas

Chart 4B clearly shows the peaking in both fatalities and incapacitating injuries in the 16-24 age group and the skewed distribution of fatalities and incapacitating injuries across age groups.

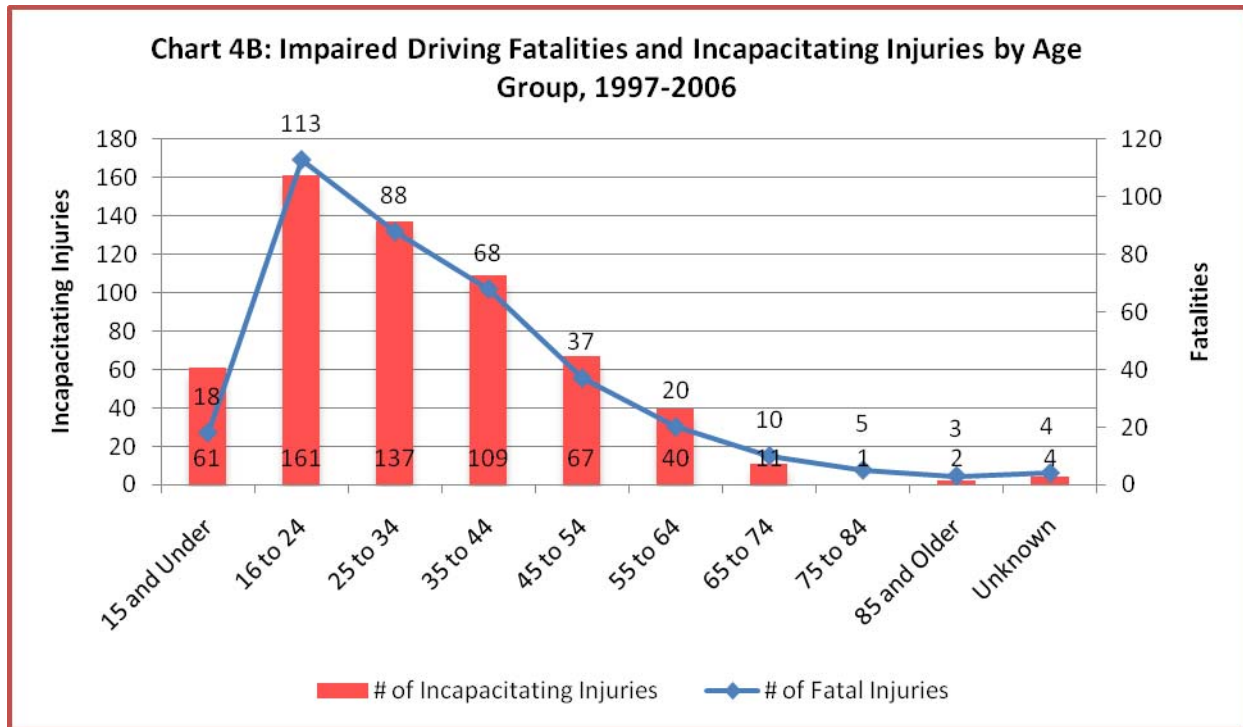


Table 4E provides information about the types of vehicles involved in fatal and incapacitating injury MVCs involving impaired driving.

- When reported, passenger cars and pick-up trucks dominate the vehicle type involved in impaired driving crashes.
- Compared with statewide data, the percentage of pick-up trucks involved in impaired driver involved fatal and incapacitating injury MVCs is substantially higher on tribal lands, while the percentages of passenger cars and motorcycles are considerably lower.
- It is noteworthy that the vehicle type was not reported in 19 percent of the fatal crashes, but less than four percent for incapacitating injury crashes. Non-reporting of vehicle type occurred statewide in only two percent of fatal crashes and in zero percent of incapacitating injury crashes.

## Comparative Analysis of the Emphasis Areas

<b>Table 4E: Impaired Driving Fatal and Incapacitating Injury Crashes by Vehicle Type, 1997-2006</b>				
<b>Vehicle Type</b>	<b># of Vehicles with Impaired Drivers in Incapacitating Injury MVCs</b>	<b>% of Vehicles with Impaired Drivers in Incapacitating Injury MVCs</b>	<b># of Vehicles with Impaired Drivers in Fatal MVCs</b>	<b>% of Vehicles with Impaired Drivers in Fatal MVCs</b>
<b>Not Reported</b>	22	3.7	70	19.1
<b>Passenger Car</b>	338	57.0	165	45.1
<b>Pick-Up Truck</b>	219	36.9	124	33.9
<b>Truck Tractor</b>	0	0.0	0	0.0
<b>Bus (Including School)</b>	1	0.2	0	0.0
<b>Motorcycle</b>	6	1.0	1	0.3
<b>RV or Motorhome</b>	1	0.2	1	0.3
<b>Emergency Vehicle</b>	0	0.0	0	0.0
<b>Other Vehicle</b>	6	1.0	5	1.4
<b>Total</b>	593	100.0	366	100.0

Table 4F provides data on the manner of collision for impaired driving involved fatal and incapacitating injury MVCs.

- More than 62 percent of the fatalities and 50 percent of the incapacitating injuries occurred in single vehicle crashes involving impaired driving.
- These percentages are similar to the 57 percent of the fatalities and 46 percent of the incapacitating injuries occurring in single vehicle impaired driving involved MVCs statewide.
- The combined percentage of fatal angle and left turn crashes on tribal lands involving impaired driving is only five percent, compared to 16 percent statewide.
- Similarly, the combined percentage of incapacitating injury angle and left turn MVCs involving impaired driving on tribal lands is 11 percent compared to 23 percent statewide.
- Head-on crashes involving impaired driving are a more serious problem on reservations. About 19 percent of the fatalities and incapacitating injuries on tribal lands involve head-on crashes, compared to 14 percent of the fatalities and nine percent of the incapacitating injuries statewide.

## Comparative Analysis of the Emphasis Areas

Table 4F: Impaired Driving Fatalities and Incapacitating Injuries by Collision Manner, 1997-2006				
Collision Manner	# Incapacitating Injuries	% Incapacitating Injuries	# Fatalities	% Fatalities
Single Vehicle	300	50.6	229	62.6
Sideswipe (same)	15	2.5	2	0.5
Sideswipe (opposite)	21	3.5	7	1.9
Angle	52	8.8	14	3.8
Left Turn	16	2.7	5	1.4
Rear-End	58	9.8	22	6.0
Head-On	114	19.2	70	19.1
Backing	1	0.2		0.0
Other	13	2.2	16	4.4
Driveway/Alley Related	0	0.0	0	0.0
Non-Contact (mc)	0	0.0	0	0.0
Non-Contact (not mc)	0	0.0	0	0.0
U-Turn	3	0.5	1	0.3
Total	593	100	366	100

### 4.2.2 Seasonality

The SHSP states that knowing the time when fatal and incapacitating injury MVCs occur can be useful in developing education and enforcement programs.

Chart 4C displays the month of year for the number of MVC fatalities and incapacitating injuries involving impaired driving.

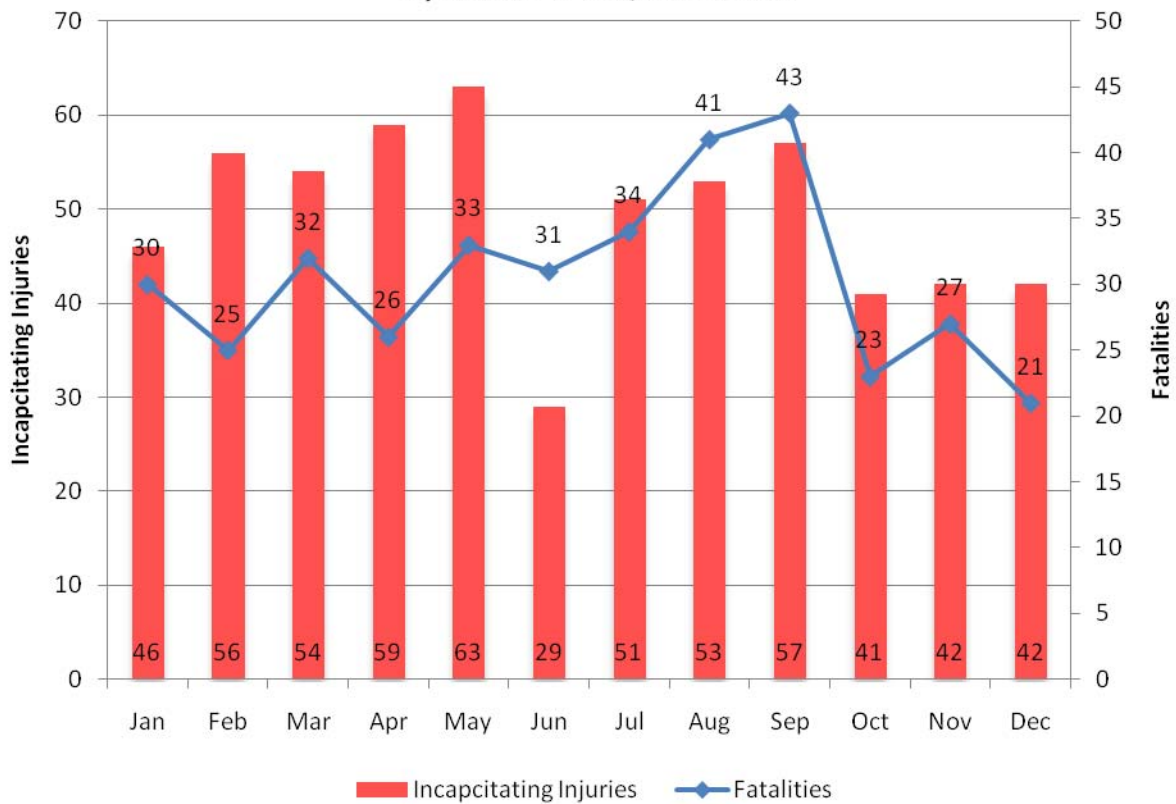
- Fatalities peak during the summer with their highest level in September and decline to their lowest levels in the late fall.
- Incapacitating injuries are at their highest levels from February through May and again from July through September. June injuries are significantly lower than any other month.
- These findings are relatively consistent with statewide data in that summer is the peak time for fatal MVCs involving impaired driving and spring is the peak for incapacitating injuries. The June injury drop on tribal lands is incongruous with statewide data.

Chart 4D shows the day of week distribution of MVC fatalities and incapacitating injuries involving impaired driving.

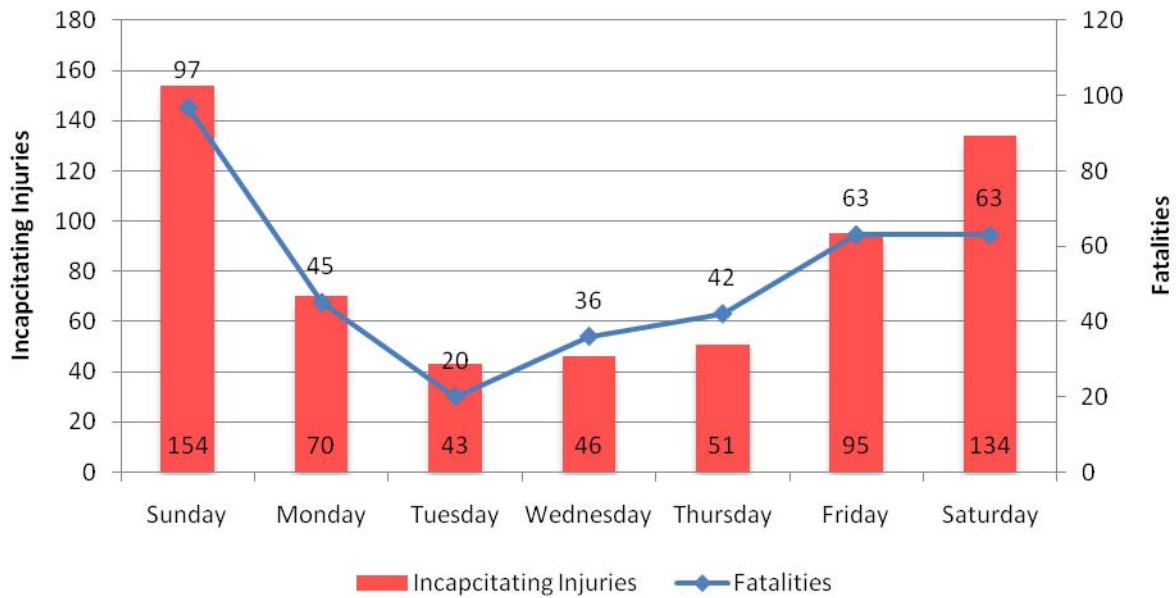
- The data for tribal lands mirrors statewide results that show both fatalities and incapacitating injuries peaking on Friday through Sunday and experiencing lows during midweek.

## Comparative Analysis of the Emphasis Areas

**Chart 4C: Fatalities and Incapacitating Injuries Involving Impaired Driving by Month of Year, 1997-2006**



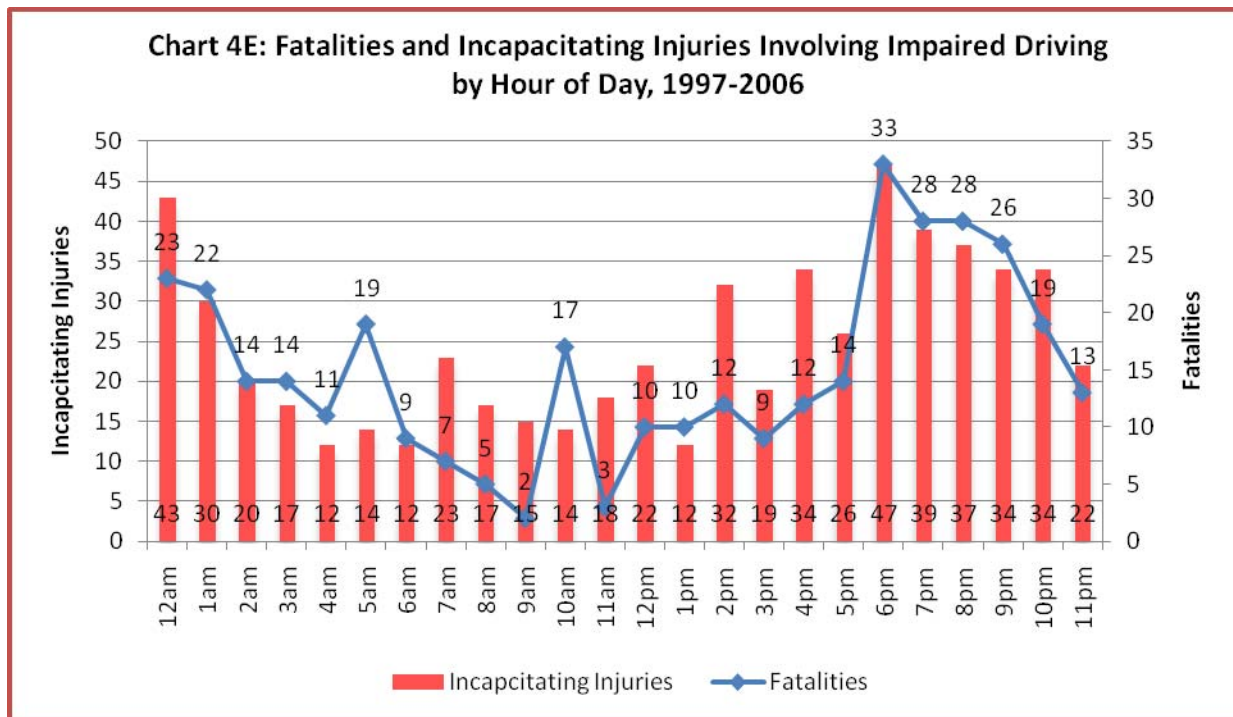
**Chart 4D: Fatalities and Incapacitating Injuries Involving Impaired Driving by Day of Week, 1997-2006**



## Comparative Analysis of the Emphasis Areas

Chart 4E displays the distribution of MVC fatalities and incapacitating injuries involving impaired driving on tribal lands by time of day.

- The peak fatality periods occurred from 6 p.m. to 10 p.m. There is a lower peak from midnight to 2 a.m. There are hourly spikes during the 5 a.m. and 10 a.m. hours.
- Minimum fatality periods occur on both sides of the 10 a.m. peak.
- The incapacitating injury pattern follows the fatality pattern from 6 p.m. to about 11 p.m. and during the 12 a.m. hour. There are two mid-afternoon spikes in incapacitating injuries.
- The statewide data show similar trends with evening peaking, but the daily statewide peak occurred from midnight to 2 a.m. The statewide data also show a small 5 a.m. peak in fatalities.



### 4.2.3 Conclusions Regarding Fatalities and Incapacitating Injuries from MVCs Involving Impaired driving on American Indian Reservations in Arizona

- Total fatalities and incapacitating injuries resulting from MVCs involving impaired driving experienced a three-year peak from 2001 through 2003. Incapacitating injuries fell to about one-half these peak levels during the final three years of data. Fatalities also declined substantially from these peak levels for the following two years, but in 2006 reached the highest level for the 10-year period. The drop in fatalities and injuries in 2004 and 2005 could be related to changes in impaired driving laws, DUI campaigns and increased enforcement, but

## Comparative Analysis of the Emphasis Areas

the near doubling of fatalities in 2006 from 2005 is difficult to explain without detailed analysis.

- The rural to urban ratios of nearly 20:1 for fatalities and incapacitating injuries in MVCs involving impaired driving indicates the need for rural oriented strategies for reducing fatal and incapacitating injury MVCs involving impaired driving on tribal lands.
- Although drivers experience a high percentage of the fatalities and incapacitating injuries in MVCs involving impaired driving, the risk to vehicle passengers and pedestrians is higher on reservations than statewide. Possibly more emphasis on campaigns/programs, such as designated driver, and seatbelt use could reduce the collateral damage to vehicle passengers and pedestrians, while at the same time reduce the number of drivers killing themselves.
- Male vehicle occupants are three times as likely as females to be fatally injured in MVCs involving impaired driving. The ratio for incapacitating injuries is slightly less. These findings could be a result of males exercising more unsafe behavior, or there could be a larger percentage of males in the vehicles involved. An analysis should be made of what percent of the impaired drivers involved in these crashes are male and the seat position and gender of the persons receiving fatal or incapacitating injuries.
- Young people are the most susceptible to impaired driving related MVC fatalities and incapacitating injury, as is the case statewide. Clearly, this age group needs to be targeted in programs to reduce MVC fatalities and injuries
- About 42 percent of the fatalities and 39 percent of the incapacitating injuries in MVCs involving impaired driving involve pick-up trucks. These percentages are considerably higher than statewide. Pick-up trucks present different injury exposure problems than passenger cars. Programs emphasizing the safe occupant positioning and proper restraint use in pick-up trucks could reduce these fatalities and injuries. Although truck tractors involvement in speed-related MVC fatalities and injuries is important, there were no such impaired driver crashes involving truck tractors on tribal lands during the 10-year period. Motorcycle rider impairment was also very minor compared to statewide statistics.
- Single vehicle and head-on collisions account for more than 82 percent of the fatalities and about 70 percent of the incapacitating injuries in MVCs involving impaired driving. These percentages are 68 percent and 55 percent statewide. These types of collisions suggest running off the road or out of lane are primary causes of fatalities and incapacitating injury MVCs involving impaired driving. An analysis of prior harmful, sequence of events, first harmful and sub-harmful data is needed to provide a clear understanding of collision types. Strategies need to be developed to reduce or mitigate these types of crashes.
- Spring and summer months are peak times for impaired driver involved MVC fatalities and incapacitating injuries. These peaks could be associated with school activities, such as proms and graduation, better travel weather and summer leisure time, but additional analysis would be required. The reasons for the June minimum should also be analyzed for possible clues in reducing fatal and incapacitating injuries throughout the year.



## Comparative Analysis of the Emphasis Areas

- Friday through Sunday are peak days of the week for combined fatalities and incapacitating injuries, suggesting association with leisure time. Since this pattern is a statewide phenomenon, statewide strategies could be useful in reducing these peaks.
- The evening and early morning peaks for impaired driving related MVC fatalities and incapacitating injuries suggest a relationship with leisure time and operating hours for establishments serving alcohol. The time of day pattern on reservations is similar to that statewide, suggesting that statewide strategies addressing this pattern could have application on reservations.

### 4.3 Countermeasures to Address Fatalities and Incapacitating Injuries in MVCs Involving Impaired Driving on American Indian Reservations in Arizona

The SHSP countermeasures for impaired driving fall into four strategy areas:

- Deter Impaired Driving Through Effective Enforcement
- Reduce Excessive Drinking and Underage Drinking
- Prosecute and Impose Sanctions on DUI Offenders
- Control and Reduce the Number of Repeat Offenders

The following recommendations for countermeasures on tribal lands build on those identified in the SHSP.

#### 4.3.1 Strategy: Deter Impaired Driving Through Effective Enforcement

<b>4.3.1 SHSP Strategy: Deter Impaired Driving Through Effective Enforcement.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Continue to encourage the greater use of sobriety check points and saturation patrols.</b>	Sobriety check points have been used widely in Arizona and have been an effective tool for apprehending impaired drivers. Tribes experiencing substantial impaired driving violations should consider the use of this tool.
<b>2. Increase police and community awareness of current laws prohibiting driving under the influence of prescription and over-the-counter drugs.</b>	This countermeasure could be valuable for use on reservations. However, research should be conducted to determine whether there are effective programs of this nature that could be adapted to a tribal environment.
<b>3. Continue to support efforts by the Department of Public Safety's DUI/Special Enforcement Squad (e.g. Phoenix program).</b>	This program would need to be researched to determine if it has application for tribes.



## Comparative Analysis of the Emphasis Areas

<b>4.3.1 SHSP Strategy: Deter Impaired Driving Through Effective Enforcement. (continued)</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<p><b>4. Expand and enhance educational and public information campaigns for various audiences to support enforcement strategies for impaired driving, including a campaign targeting young people aged 16-24.</b></p>	<p>This countermeasure would be of definite benefit to tribes since the 16 to 24 age group has the highest percentages of impaired driving related incapacitating injuries and fatalities on tribal lands.</p> <p>These educational and public information campaigns should also have a focus on vehicle passengers and pedestrians, since they are a high risk group for impaired driving related fatalities and incapacitating injuries on reservations.</p> <p>Pick-up truck drivers is another group that should be targeted, because of the high percentage of impaired driving related fatalities and incapacitating injuries associated with this group and the vulnerability of the vehicle occupants to injury.</p>
<p><b>5. Increase the perception that violators will be caught and will have to pay the consequences.</b></p>	<p>This countermeasure should be used by tribes. The state should consider the adaptability of any programs it develops to implement this countermeasure for tribal use.</p>

### 4.3.2 Strategy: Reduce Excessive Drinking and Underage Drinking

<b>4.3.2 SHSP Strategy: Reduce Excessive Drinking and Underage Drinking.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<p><b>1. Support and encourage current programs and new programs designed to educate agencies, court personnel, academy staff and recruits, students, parents, and the public of the importance about the problem of excessive drinking and underage drinking, and how to reduce the problem of underage alcohol consumption.</b></p>	<p>Tribal governments should consider adopting these programs, if they are developed with sensitivity to Arizona's tribal communities as stated in the SHSP. Since there is a 20:1 rural/urban ratio of impaired driving related fatalities and incapacitating injuries on reservations some programs developed under this countermeasure need to be specifically oriented towards rural areas.</p>

## Comparative Analysis of the Emphasis Areas

<b>4.3.2 SHSP Strategy: Reduce Excessive Drinking and Underage Drinking. (continued)</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
2. Work with the Department of Liquor and License control to reduce the availability of alcohol to those under 21. Use well-publicized compliance checks on alcohol retailers. Support Arizona's Strategic Prevention Framework for Underage Drinking, Prevention/Reduction Committee's legislative efforts. Coordinate all actions related to this countermeasure and ensure that all actions are consistent with the efforts of associated groups such as MADD and SADD.	Tribal governments should carefully watch the actions being taken under this countermeasure to determine if administrative rules and legislation implemented have application for tribal use.
3. Encourage alcoholic beverage industry, specifically retailers, to implement more effective enforcement practices.	This countermeasure could have limited application on reservations, since many tribes do not permit the sale of packaged alcoholic beverages on tribal lands.

### 4.3.3 Strategy: Prosecute and Impose Sanctions on DUI Offenders.

<b>4.3.3 SHSP Strategy: and Impose Sanctions on DUI Offenders.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
1. Administratively suspend driver license of individuals arrested for impaired driving.	This countermeasure, if well publicized, could be a strong deterrent to impaired driving. Tribes should consider supporting state actions to implement this countermeasure. Tribes could also consider implementing tribal laws or administrative procedures that would suspend a driver's privilege to operate a motor vehicle on the reservation, if convicted of a DUI.
2. Introduce stronger penalties for refusing Blood Alcohol Content (BAC) testing.	Tribes should consider incorporating penalties in tribal laws for drivers refusing BAC testing.
3. Work with legal system to improve conviction rate of offenders.	This countermeasure should be adopted by tribes.

#### 4.3.4 Strategy: Control and Reduce the Number of Repeat Offenders.

<b>4.3.4 SHSP Strategy: Control and Reduce the Number of Repeat Offenders.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
1. Administratively seize the vehicle or license plate of repeat offenders who have suspended licenses and continue to drive without a valid license. Store and immobilize the vehicle on offender's property.	This countermeasure could have application on reservations. Towing to a location other than the offender's property could be another option on reservations if storage space is available.
2. Install an alcohol interlock in the vehicles of all offenders to prevent a vehicle being started if the driver has been drinking.	This countermeasure could have application on reservations.
3. Identify repeat offenders and refer them to a program with appropriate treatment.	This countermeasure could be valuable for repeat offenders on reservations. However, the cost for individual tribes to develop such a program could be excessive. It is recommended that tribes work with the state to develop a program that could either be adapted for tribal use, or would be available to tribes for making referrals.
4. Monitor repeat offenders to ensure they comply with the conditions of their sentences.	Tribes should consider developing a program to monitor repeat offenders.
5. Enact legislation for a lower BAC limit for repeat offenders.	A progressively stricter definition of BAC limits for repeat offenders could be effective on reservations, if implemented in conjunction with the other countermeasures identified under this strategy.

#### Tribal Strategy: Reduce the Number of MVCs Involving Impaired Drivers

<b>Tribal Strategy: Reduce the Number of MVCs Involving Impaired Drivers.</b>	
<b>Tribal Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
1. Reduce the risk of MVCs occurring at locations where impaired driving related fatalities and incapacitating injuries have occurred.	Tribal crash data should be reviewed to identify locations where impaired driving related crashes have occurred, with particular emphasis on run-off-the-road and head-on crashes. Safety roadway projects should be developed and implemented at these locations to reduce the probability of MVCs or to mitigate the severity of the crashes.

## ROADWAY/ROADSIDE EMPHASIS AREA

### LANE DEPARTURE SUB-AREA

#### 5.1 Problem Statement

The definition of lane departure used for this sub-area analysis are crashes involving vehicles leaving the roadway, head-on crashes and sideswipe crashes. Other collision manners, such as angle and rear-end collisions, can involve lane departure; however, lane departure for these collision manners can only be determined from ALISS data if one or more of the vehicles leave the roadway.

During the ten years from 1997 to 2006, 54% (n = 664) of the total MVC fatalities on reservations occurred to persons in crashes that involved lane departure. Also, 54% (n = 1,259) of the total MVC incapacitating injuries during this period occurred to persons in crashes that involved lane departure.

Table 5A shows how these lane departure fatalities and incapacitating injuries are distributed among run-off-road, head-on and sideswipe crashes. Subsequent analysis for the lane departure sub-area uses only the total lane departure fatalities (664) and incapacitating injuries (1,259), except for the collision manner analysis.

<b>Table 5A: Lane Departure Fatalities and Incapacitating Injuries Involving Leaving the Roadway, Head-on, and Sideswipe MVCs, 1997-2006</b>				
<b>Collision Manner</b>	<b># of Incapacitating Injuries</b>	<b>% of Incapacitating Injuries</b>	<b># of Fatalities</b>	<b>% of Fatalities</b>
<b>Run-off-road (ROR) only</b>	854	67.8	462	69.6
<b>Head-on only</b>	213	16.9	149	22.4
<b>Sideswipe only</b>	169	13.4	29	4.4
<b>Head-on and ROR</b>	11	0.9	20	3.0
<b>Sideswipe and ROR</b>	12	1.0	4	0.6
<b>Totals</b>	1,259	100.0	664	100.0

Chart 5A shows by year the number of MVC fatalities and incapacitating injuries on reservations for crashes involving lane departures.

- The chart shows generally increasing trends in the numbers of fatalities and incapacitating injuries from 1997 through 2006. A sharp peak in fatalities occurred in 2002, while in the same year incapacitating injuries neared a ten-year low.
- Data in the SHSP shows that lane departures-related fatalities and incapacitating injuries statewide also experienced a general increasing trend over the period from 2001 through 2005, which matches the pattern found on reservation lands.

### Comparative Analysis of the Emphasis Areas

There was a similar low point for incapacitating injuries in 2002, but only a minor peak in statewide fatalities for that year.

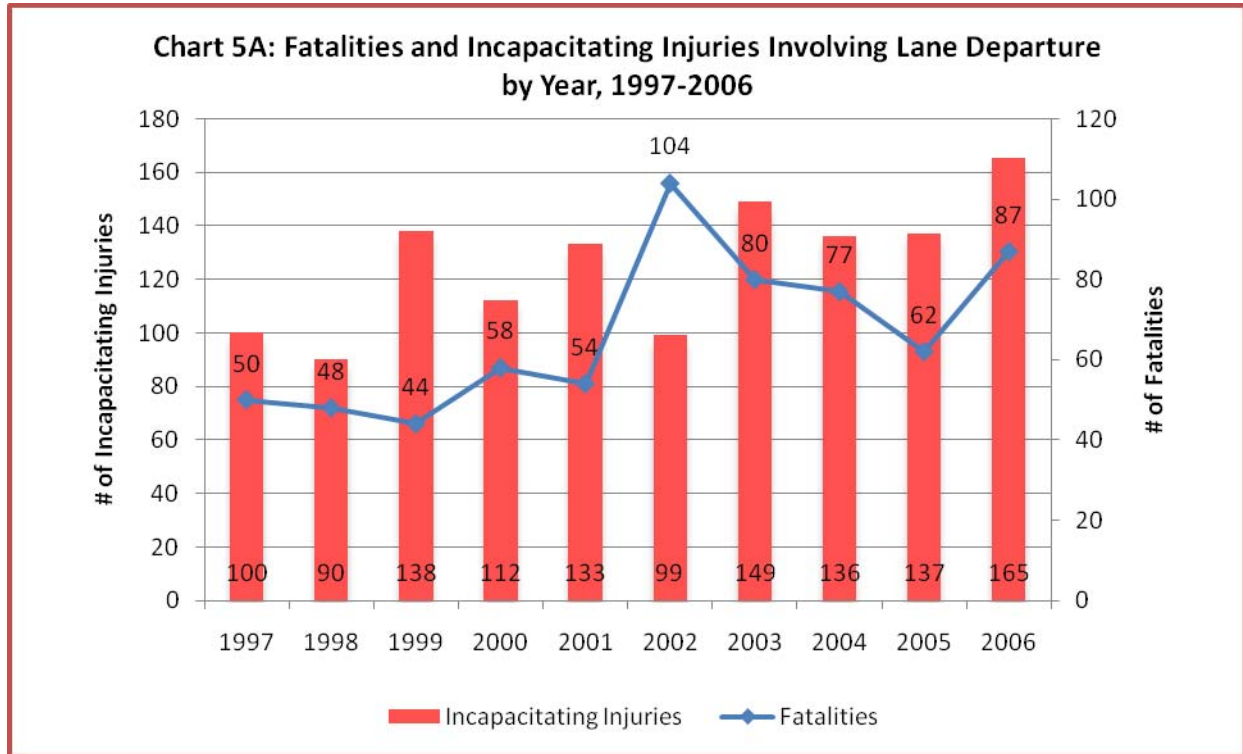


Table 5B compares the locale of fatalities and incapacitating injuries by urban, rural and not reported locations.

- The locale for more than 99 percent of fatalities involving lane departure was reported, while the locale was reported for only about 50 percent of the incapacitating injuries involving lane departure.
- Many of the incapacitating injury MVCs would have involved fatalities as well, indicating that less than 50 percent of locations are reported for incapacitating injury MVCs not involving fatalities.
- These data suggest that reporting on reservations for incapacitating injury MVCs is less complete than those involving fatalities.
- The data show that 94 percent of the lane departures-related MVC fatalities on tribal lands occur in rural areas, compared to 68 percent for statewide data.
- The data suggest that nearly 95 percent of lane departures-related MVC incapacitating injuries occur on tribal lands in rural areas, while about 49 percent of the incapacitating injuries occur in rural areas statewide.
- The rural dominance of lane departures-related MVC fatal and incapacitating injuries is expected, because of the rural location of most reservations.

## Comparative Analysis of the Emphasis Areas

County level data are not provided to avoid identification of specific tribal information.

Table 5B: Urban versus Rural Lane Departure Fatalities and Incapacitating Injuries, 1997-2006				
Location	# Incapacitating Injuries	% of Reported Incapacitating Injuries	# Fatalities	% of Reported Fatalities
Urban	32	5.1	36	5.5
Rural	600	94.9	624	94.5
Unknown or Not Reported	627		4	
Total Reported	632		660	100.0

## 5.2 Considerations for Strategy Development

### 5.2.1 Drivers, Vehicles, and Collision Manner

Table 5C provides information about the person type who sustained fatal and incapacitating injuries when involved in a lane departures-related MVC.

- Drivers sustained about 25 percent more fatalities than passengers.
- Drivers and passengers sustained a nearly equal number of incapacitating injuries.
- The number of pedestrian incapacitating injuries and fatalities were relatively minor for lane departure MVCs. There were no pedacyclist incapacitating injuries or fatalities on reservations.
- The SHSP shows that drivers experienced about 70 percent more fatalities and 75 percent more incapacitating injuries than passengers statewide.
- The difference between tribal and statewide data could be attributable to a number of factors including:
  - A higher vehicle occupancy rate on tribal lands than statewide.
  - Unrestrained passengers.
  - Passengers located in areas of the vehicle providing exposure to passenger ejection, such as the beds of pickup trucks.

Table 5C: Lane Departure Fatalities and Incapacitating Injuries by Person Type, 1997-2006				
Casualty	Incapacitating Injuries		Fatalities	
	Number	Percentage	Number	Percentage
Driver	620	49.2	368	55.4
Passenger	635	50.4	294	44.3
Pedestrian	4	0.3	2	0.3
Pedacyclist	0	0.0	0	0.0
Totals	1,259	100.0	664	100.0

## Comparative Analysis of the Emphasis Areas

Table 5D describes the gender distribution of lane departures-related MVC fatal and incapacitating injuries.

- The percentage of lane departure-related male fatalities on tribal lands is nearly twice those for females, which is consistent with data for statewide MVC fatalities – 68 percent for males and 32 percent for females.
- Females account for about 41 percent and males account for about 59 percent of the lane departures-related MVC incapacitating injuries on tribal lands. These percentages are consistent with the statewide lane departures-related statistics of about 38 percent for females and about 62 percent for males.
- The similarities between reservation and statewide statistics suggest that male drivers are more prone to lane departures and assuming other unsafe vehicle occupant habits, such as not using seat restraints.

<b>Table 5D: Lane Departure Fatalities and Incapacitating Injuries by Gender, 1997-2006</b>				
<b>Gender</b>	<b># Incapacitating Injuries</b>	<b>% Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Fatalities</b>
<b>Female</b>	515	40.9	215	32.4
<b>Male</b>	738	58.6	449	67.6
<b>Unknown</b>	6	0.5	0	0.0
<b>Total</b>	1259	100.0	664	100.0

Table 5E shows the age group distribution of fatalities and incapacitating injuries in MVCs involving lane departures.

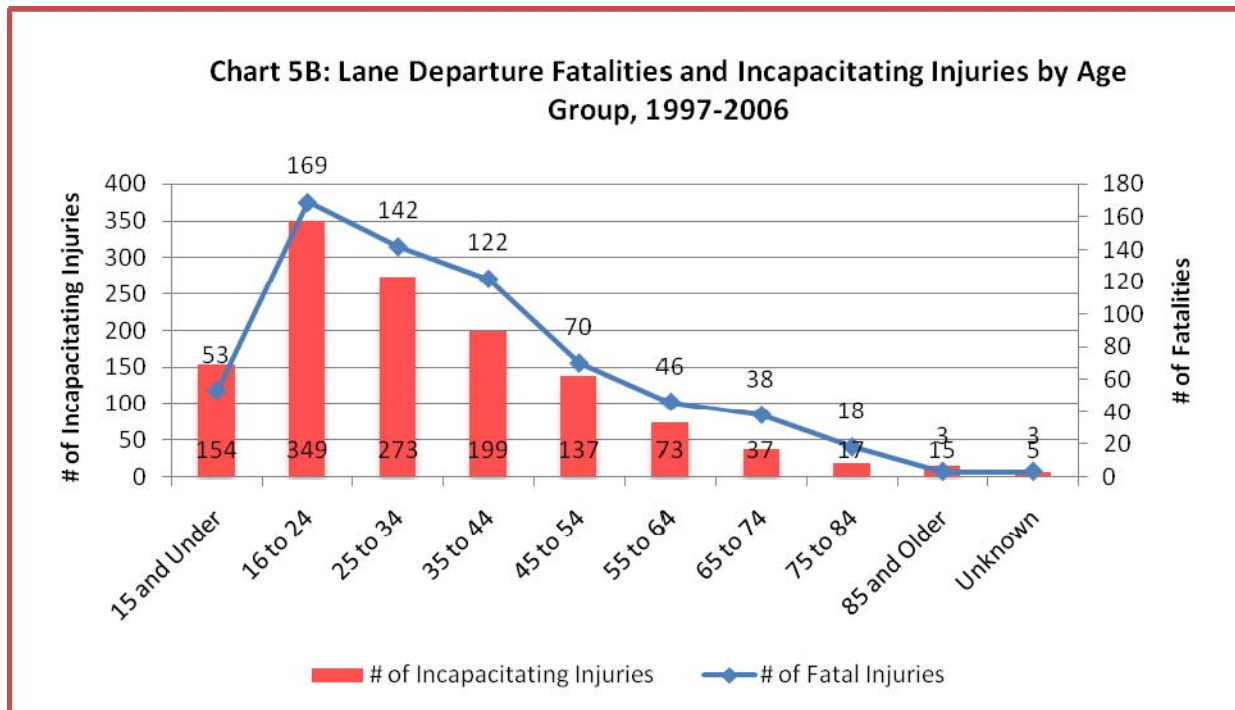
- The highest percentage of incapacitating injuries and fatalities on tribal lands fall in the 16-24 age group, which is also the case with statewide statistics, although the 25-34 age group also shows a high percentage. Together these age groups account for nearly 50% of the total lane departure incapacitating injuries and fatalities on reservations.
- The percentage of incapacitating injuries on tribal lands is more than 50 percent higher than the statewide percentile for the 15 and under age group. This higher percentage might be related to the finding in an earlier section of this report that children involved in MVCs on tribal lands are less likely to be properly restrained in their seats. The higher percentage of child injuries in lane departures-related MVCs on tribal lands might also be expected, if there is a higher average number of children per vehicle or if children are being placed in locations within the vehicle that are more vulnerable to an injury result.



## Comparative Analysis of the Emphasis Areas

Table 5E: Lane Departure Fatalities and Incapacitating Injuries by Age Group, 1997-2006				
Age Group	# of Incapacitating Injuries	% of Incapacitating Injuries	# of Fatal Injuries	% of Fatal Injuries
15 and Under	154	12.2	53	8.0
16 to 24	349	27.7	169	25.5
25 to 34	273	21.7	142	21.4
35 to 44	199	15.8	122	18.4
45 to 54	137	10.9	70	10.5
55 to 64	73	5.8	46	6.9
65 to 74	37	2.9	38	5.7
75 to 84	17	1.4	18	2.7
85 and Older	15	1.2	3	0.5
Unknown	5	0.4	3	0.5
<b>Totals</b>	<b>1259</b>	<b>100.0</b>	<b>664</b>	<b>100.0</b>

Chart 5B shows graphically by age group the number of lane departures-related incapacitating injuries and fatalities resulting from MVCs on tribal lands from 1997 to 2006.





## Comparative Analysis of the Emphasis Areas

Table 5F describes vehicle-type information on lane departures-related fatalities and incapacitating injuries resulting from MVCs on tribal lands.

- The vehicle type is not reported in nine percent of the lane departure fatal crashes on tribal lands. The vehicle type in lane departure fatal crashes statewide is not reported in only one percent of the fatal crashes statewide. Non-reporting of vehicle crashes for incapacitating injury crashes does not show this disparity, and only in between zero and one percent of these crashes on reservations and statewide is vehicle type not reported.
- For crashes that the vehicle type was reported, about 52 percent of the vehicles involved in fatal and about 57 percent of incapacitating injury lane departure MVCs on tribal lands are passenger cars. This is somewhat less than statewide where the SHSP shows that more than 60 percent of the vehicles were passenger cars.
- Two percent of the fatal and less than four percent of the incapacitating injury lane departure MVCs on tribal lands involved motorcycles. These percentages are considerably lower than the statewide values of six percent for fatal crashes and 11 percent for incapacitating injury crashes.
- Pickup trucks are involved in more than 37 percent of the fatal and more than 32 percent of the injury lane departure crashes on tribal lands, compared to 30 percent of the fatal MVCs and 24 percent of the injury statewide.
- Truck tractors lane departures-related incapacitating injury and fatality rates are about five times higher than statewide.

<b>Table 5F: Lane Departure Fatal and Incapacitating Injury Crashes by Vehicle Type, 1997-2006</b>				
<b>Vehicle Type</b>	<b># of Vehicles Involved in Incapacitating Injury Crashes</b>	<b>% of Vehicles Involved in Incapacitating Injury Crashes</b>	<b># of Vehicles Involved in Fatal Crashes</b>	<b>% of Vehicles Involved in Fatal Crashes</b>
<b>Not Reported</b>	12	1.1	62	9.0
<b>Passenger Car</b>	636	56.3	328	47.5
<b>Pick-Up Truck</b>	363	32.1	236	34.2
<b>Truck Tractor</b>	49	4.3	34	4.9
<b>Bus (Including School)</b>	5	0.4	2	0.3
<b>Motorcycle</b>	40	3.5	14	2.0
<b>RV or Motorhome</b>	9	0.8	5	0.7
<b>Emergency Vehicle</b>	3	0.3	1	0.1
<b>Other Vehicle</b>	13	1.2	9	1.3
<b>Total</b>	1,130	100.0	691	100.0

## Comparative Analysis of the Emphasis Areas

Table 5G presents information about the type of collision involved in lane departures-related MVC fatalities and incapacitating injuries on tribal lands.

- More than 67 percent of the lane departure MVC fatalities on reservations and more than 63 percent of the incapacitating injuries involve a single vehicle only. These percentages are consistent with those from the SHSP, which indicate 61 percent of the lane departure fatalities and 63 percent of the incapacitating injuries involve a single vehicle.
- Head-on crashes produce the second highest tolls for lane departure fatalities and incapacitating injuries on tribal lands. These percentages are also consistent with statewide percentages shown in the SHSP.

<b>Table 5G: Lane Departure Fatalities and Incapacitating Injuries by Collision Manner, 1997-2006</b>				
<b>Collision Manner</b>	<b># Incapacitating Injuries</b>	<b>% Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Fatalities</b>
<b>Single Vehicle</b>	802	63.7	448	67.5
<b>Sideswipe (same)</b>	119	9.5	20	3.0
<b>Sideswipe (opposite)</b>	62	4.9	13	2.0
<b>Angle</b>	3	0.2	0	0.0
<b>Left Turn</b>	0	0.0	0	0.0
<b>Rear-End</b>	6	0.5	0	0.0
<b>Head-On</b>	238	18.9	169	25.5
<b>Backing</b>	1	0.1	0	0.0
<b>Other</b>	28	2.2	14	2.1
<b>Driveway/Alley Related</b>	0	0.0	0	0.0
<b>Non-Contact (mc)</b>	0	0.0	0	0.0
<b>Non-Contact (not mc)</b>	0	0.0	0	0.0
<b>U-Turn</b>	0	0.0	0	0.0
<b>Total</b>	1,259	100.0	664	100.0

### 5.2.2 Seasonality

The SHSP states that knowing the time when fatal and incapacitating injury MVCs occur can be useful in developing education and enforcement programs.

Chart 5C displays the month of year of the lane departures-related MVC fatalities and incapacitating injuries.

- The data indicate that the spring months, March through May, and summer months of July and August are the peak periods for incapacitating injuries on reservations.
- Fatalities peak during the summer months of July through September.
- A strong fatality peak occurs in July on reservations, which is also the peak month of the year for incapacitating injuries.

### Comparative Analysis of the Emphasis Areas

- The strongest statewide peak for lane departures-related fatalities occurs in August, with a smaller peak in March.
- March and August are also the peak months for incapacitating injuries statewide, but the March through May peaking is less prominent than on tribal lands.

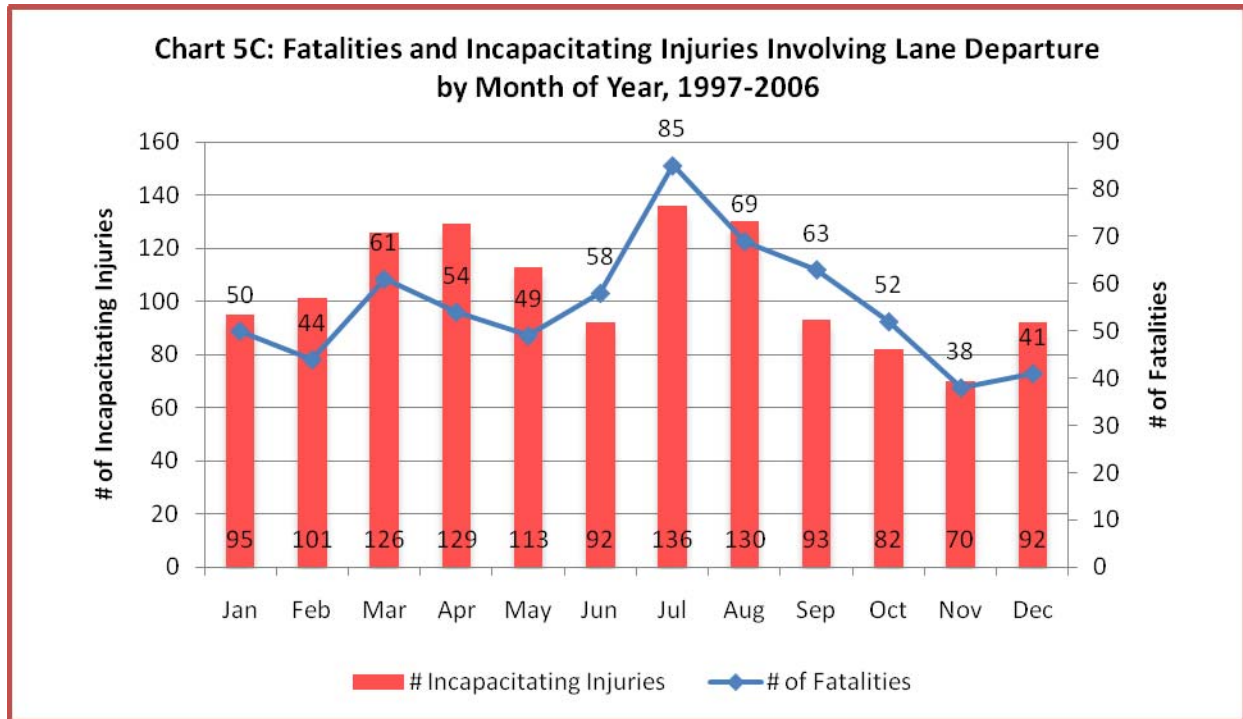


Chart 5D shows the day of week distribution of lane departures-related MVC fatalities and incapacitating injuries.

- The data for tribal lands mirrors statewide results with both fatalities and incapacitating injuries peak on weekends and are low during midweek.
- Sunday is the peak day of week for both fatalities and incapacitating injuries on reservations, with Saturday being the peak day statewide.

## Comparative Analysis of the Emphasis Areas

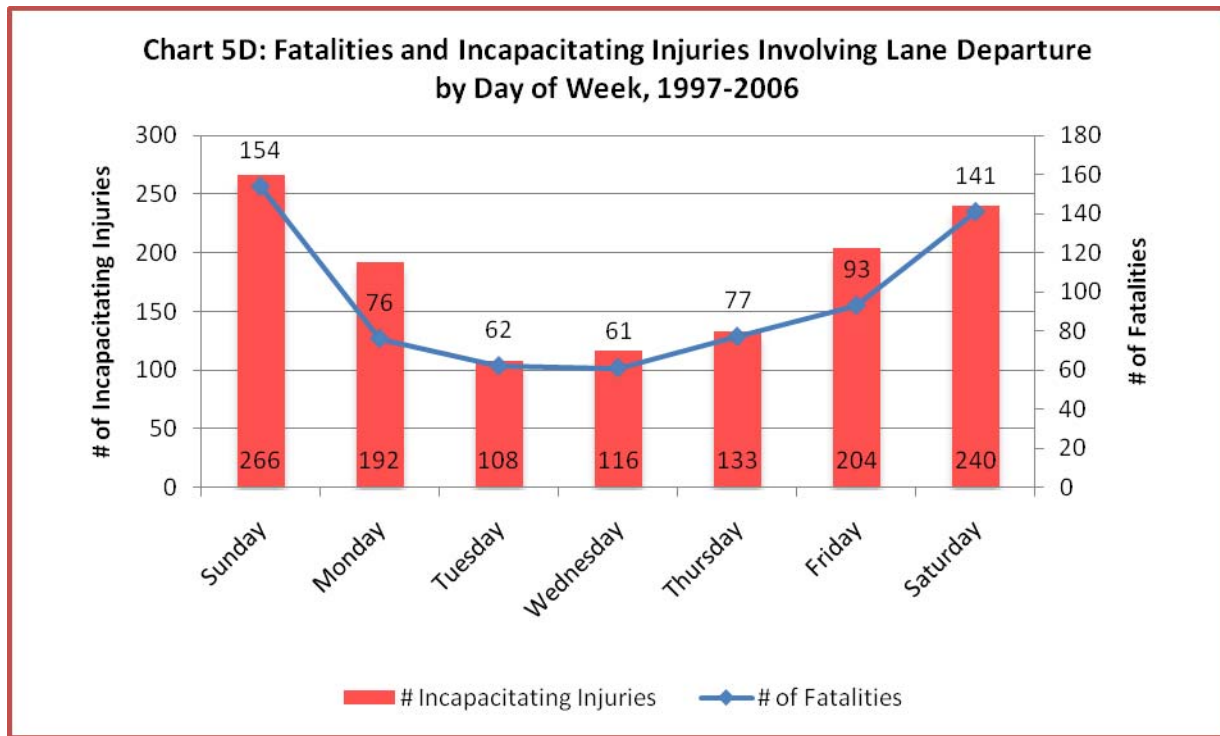


Chart 5E displays the time of day distribution of MVC fatalities and incapacitating injuries.

- The peak lane departures-related fatality periods on tribal lands occur during the afternoon hours, with the most prominent hourly peak occurring in the 3 p.m. hour. Other peak hours include 1 a.m., which might be associated with the closure of alcohol serving establishments and 5 a.m., which could be associated with early morning work traffic. These trends are consistent with statewide data shown in the SHSP.
- Incapacitating injuries peak from 1 p.m. to about 4 p.m.; however, the 9 a.m. hour was the single highest hour of the day. It is informative to note that all but five of the 50 incapacitating injury crashes occurring during that hour happened between late October and early March, which coincides with the icy roads and winter visitors season. There were smaller single peaks during the 6 a.m. and 7 p.m. hours. There was similar afternoon peaking of statewide incapacitating injuries. However, the statewide data showed incapacitating injuries to be more prominent during the late evening and early morning hours than on tribal lands.

## Comparative Analysis of the Emphasis Areas

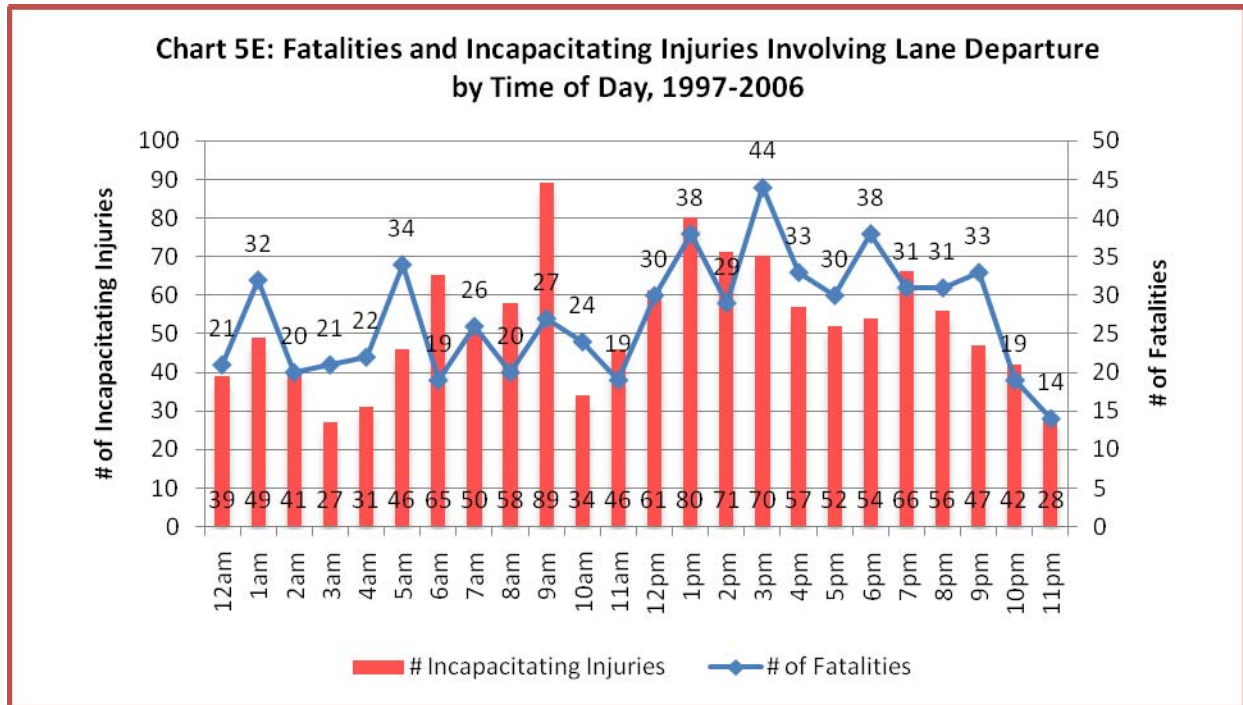


Table 5H provides information about the light conditions that existed at the time of crashes involving fatalities and incapacitating injuries.

- The percentages of fatalities and incapacitating injuries occurring by light conditions on tribal lands were very near those found on a statewide basis, with the exception that percentage of fatalities occurring at dawn or dusk was about 40 percent higher, and the percentage of incapacitating injuries at dawn or dusk was about 20 percent higher on tribal lands.

Light Condition	# of Incapacitating Injuries	% of Incapacitating Injuries	# of Fatalities	% of Fatalities
Not Reported	4	0.3	8	1.2
Daylight	713	56.6	330	49.7
Dawn or Dusk	92	7.3	56	8.4
Darkness	450	35.7	270	40.7
<b>Totals</b>	<b>1259</b>	<b>100.0</b>	<b>664</b>	<b>100.0</b>

### 5.2.3 Conclusions Regarding Fatalities and Incapacitating Injuries Involving Lane Departures-related MVCs on Indian Reservations in Arizona

- For the period 1997-2006, more than one-half of all MVC fatalities and incapacitating injuries involved lane departures. Nearly three-quarters of the lane

## Comparative Analysis of the Emphasis Areas

departure fatalities and nearly 70 percent of the lane departure incapacitating injuries involved vehicles running-off-the-road.

- There were generally increasing trends in the numbers of fatalities and incapacitating injuries from 1997 through 2006. A sharp peak in fatalities occurred in 2002, while in the same year incapacitating injuries neared a ten-year low. These findings are consistent with the statewide data in the SHSP.
- The ratios of rural to urban fatalities and incapacitating injuries on tribal lands were about 20:1 for crashes that had locale reported. This pattern is very different from statewide data that show a 2:1 ratio for fatalities and a 1:1 ratio for incapacitating injuries.
- Passengers are more at risk than drivers on tribal lands than statewide for both fatalities and incapacitating injuries. The percentages of drivers and passengers experiencing incapacitating injuries in lane departures MVCs on reservations are nearly equal. Drivers account for about 55 percent of the fatalities on tribal lands. Drivers incur over 60 percent of the lane departures-related fatalities and incapacitating injuries statewide.
- Males incur more than twice the fatalities and nearly 50 percent more incapacitating injuries than females in crashes on reservations involving lane departures. These are similar to statewide statistics.
- Nearly 2/3 of the fatalities and incapacitating injuries involving lane departures occur with vehicle occupants between the ages of 16 and 45. More than one-fourth of the fatalities and incapacitating injuries occurred in the 16 to 25 age group. The SHSP reported similar age-related MVC statistics.
- The percentages of lane departures pick-up trucks and truck tractors are significantly higher in fatal and incapacitating injury crashes on reservations than reported statewide in the SHSP. The percentages of lane departures passenger cars and particularly motorcycles involved in fatal and incapacitating injury MVCs are significantly lower on reservations than statewide.
- The month-of-year lane departures-related incapacitating injuries and fatalities on reservations are consistent with those statewide with both peaking in the summer months.
- Friday through Sunday is the peak period of the week for lane departures-related MVC fatalities and incapacitating injuries on tribal lands. This pattern is consistent with statewide data published in the SHSP. However, Sunday is the peak individual day for fatalities and incapacitating injuries on reservations, whereas Saturday is the peak day statewide.
- Time-of-day peaks for lane departures-related fatalities on reservations occur during the 1 a.m. 5 a.m., 9 a.m. and 3 p.m. hours, with a relatively high plateau of fatalities from 1 p.m. to 7 p.m. The peak time-of-day hours and afternoon plateau for fatalities is similar to that shown in statewide data. The time-of-day pattern is similar for incapacitating injuries on reservations and statewide, with a significant exception. The daily peak for incapacitating injuries is a sharp spike during the 9 a.m. hour. During the rest of the day, there are small peaks in incapacitating.

## Comparative Analysis of the Emphasis Areas

injuries during the 1 a.m. 6 a.m. and 7 p.m. hours and a wider peak from 1 p.m. to 4 p.m. These peaks could be associated with many factors, such as peak travel times, driver fatigue, driving under the influence, and horizon sun.

- About 57 percent of the incapacitating injuries and 50 percent of the fatalities on tribal lands occurred during daylight hours, nearly exactly matching statewide statistics. The percentages for incapacitating injuries and fatalities during daylight and dusk on tribal lands were both higher than those statewide, suggesting the possibility that sun-in-the-eyes might be a more significant problem on reservation lands.

### 5.3 Countermeasures to Address Fatalities and Incapacitating Injuries Involving Lane departures during MVCs on American Indian Reservations in Arizona

The SHSP countermeasures for lane departures fall into three strategy areas:

- Reduce the incidence and severity of head-on collisions.
- Reduce the number of vehicles leaving the roadway.
- Reduce the effects of vehicles leaving the roadway.

The following recommendations for countermeasures on tribal lands build on those identified in the SHSP.

#### 5.3.1 Strategy: Reduce the Incidence and Severity of Head-on Collisions

<b>5.3.1 SHSP Strategy: Reduce the Incidence and Severity of Head-on Collisions.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Consider installing centerline rumble strips/rumble strips on rural two-lane roads to deter vehicles from crossing into the opposite lane.</b>	This countermeasure should be considered for paved roads on tribal lands, particularly for roadway sections where head-on crashes have occurred.
<b>2. Consider the installation of median treatments at appropriate locations, e.g. median cable barrier at accident prone locations.</b>	There are few medians on roads on tribal lands, so this countermeasure, as stated, has limited application. However, constructing a median to separate opposing traffic at locations where head-on collisions have occurred should be a consideration.
<b>3. Consider a systematic approach to installing centerline raised pavement markings (RPMs), and rumble strips on roadways with narrow shoulders.</b>	This countermeasure should be considered for paved roads on tribal lands, particularly for roadway sections where head-on crashes have occurred.



## Comparative Analysis of the Emphasis Areas

<b>5.3.1 SHSP Strategy: Reduce the Incidence and Severity of Head-on Collisions. (continued)</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>4. Consider better delineation of guardrails and the elimination of edge drop-offs.</b>	This countermeasure should be considered for all roads on tribal lands. Additionally, the guardrail should be constructed to current standards and placed so as not to redirect vehicles into oncoming traffic.

### 5.3.2 Strategy: Reduce the Number of Vehicles Leaving the Roadway

<b>5.3.2 SHSP Strategy: Reduce the Number of Vehicles Leaving the Roadway.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. On rural roadways with narrow paved shoulders or no paved shoulders, consider widening the shoulders and/or installing edgeline profile markings and/or edgeline rumble strips.</b>	Road owners in consultation with tribes should consider using this countermeasure. Also, see a proposed broader use of the widening concept under 5.3.4 below.
<b>2. Consider low cost safety improvements for horizontal curves and installing countermeasures for the outside of curves.</b>	Road owners in consultation with tribes should consider using this countermeasure including improved signing, delineators and roadway markings.
<b>3. Consider enhanced roadway curves and tangents.</b>	Road owners in consultation with tribes should consider using this countermeasure, including improved sight distance, reduced roadway curvature and wider pavement on curves.

### 5.3.3 Strategy: Reduce Effects of Lane Departures-related Crashes

<b>5.3.3 SHSP Strategy: Reduce Effects of Lane Departures-related Crashes.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Improve the design of slopes and ditches to prevent rollovers.</b>	Road owners in consultation with tribes should consider using this countermeasure, including slope flattening
<b>2. Coordinate with land owners and appropriate agencies to trim trees and/or remove trees to improve the roadside clear zone.</b>	Road owners in consultation with tribes should consider using this countermeasure. This should include other road owners. Period meetings with road owning agencies to discuss reducing lane departure and other roadway safety issues should be considered.



## Comparative Analysis of the Emphasis Areas

<b>5.3.3 SHSP Strategy: Reduce Effects of Lane Departures-related Crashes. (continued)</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>3. Promote the education of designers and landscape architects regarding the importance and requirements of traversable roadsides, particularly in urban areas.</b>	This countermeasure should be administered by ADOT or the Federal Highway Administration (FHWA), with input and participation by the tribes and BIA.
<b>4. Educate drivers on the dangers of unsecured loads that could fall off and create obstacles for other drivers.</b>	This should be a statewide or national program administered by ADOT, DPS, FHWA, BIA or IHS with tribal involvement.
<b>5. Improve EMS response times for rural lane departure crashes.</b>	Tribal and other EMS providers serving tribal lands should consider implementing this countermeasure for all types of vehicle crashes.
<b>6. Establish a multi-disciplinary highway safety group that will identify cost effective countermeasures designed to minimize the effects of vehicles leaving the roadway in lane departure crashes. ADOT is establishing or has established a Highway Safety Issues Group (HSIG) to address this countermeasure.</b>	ADOT should include tribal representation on the Highway Safety Issues Group.

### 5.3.4 Tribal Strategy: Reduce the Number of Lane Departure Crashes

<b>5.3.4 Tribal Strategy: Reduce the Number of Lane Departure Crashes.</b>	
<b>Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Expand the use of Road Safety Assessments (RSAs).</b>	There are often many features on existing roadways that contribute to MVCs. Tribes should consider the use of RSAs as a method for identifying roadway safety issues and solutions for eliminating them or mitigating the impacts of crashes at locations where the problem cannot be completely eliminated.
<b>2. Widen existing roadways.</b>	Wide roadways will not only reduce the number of incidences of running off the road. They can also reduce the number of head-on and sideswipe crashes by providing for the opportunity for more separation between vehicles. Road owners in consultation with tribes should consider widening both paved and unpaved roadways at locations where lane departure crashes are an issue.

## Comparative Analysis of the Emphasis Areas

<b>5.3.4 Tribal Strategy: Reduce the Number of Lane Departure Crashes. (continued)</b>	
<b>Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>3. Improved maintenance of roadways</b>	Tribally administered maintenance programs and BIA should identify maintenance oriented issues, such as black ice, low pavement friction, and rock falls that could contribute to roadway departure crashes and develop a maintenance program to reduce the exposure to these hazards.

## INTERSECTIONS SUB-AREA

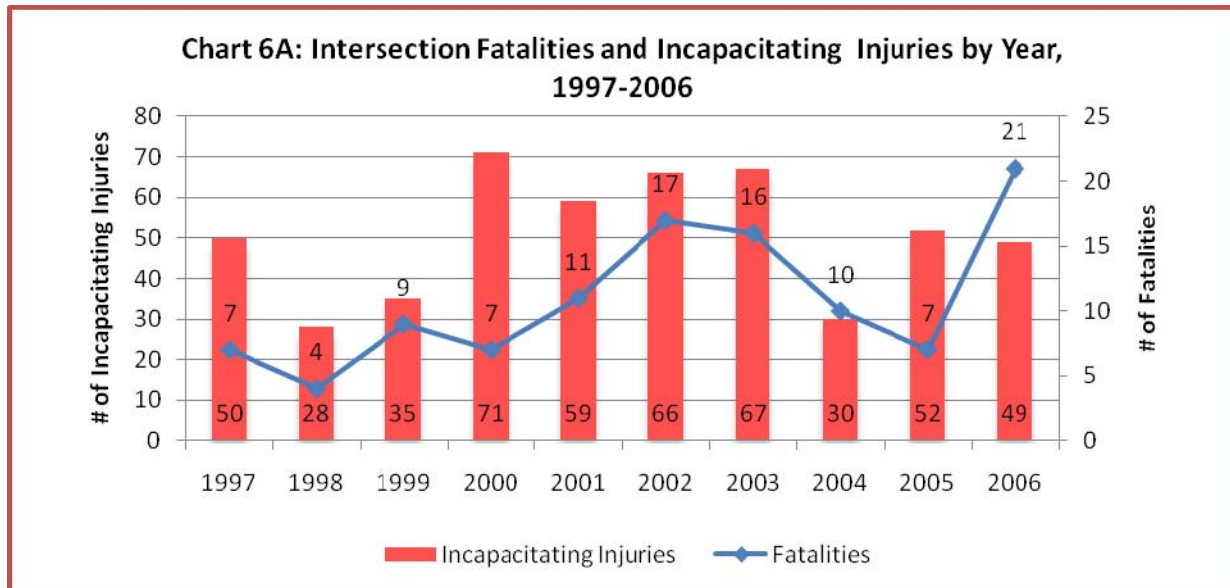
### 6.1 Problem Statement

The definition of intersections used for this sub-area analysis is crashes involving vehicles at the intersections of public roadways. Also, the definition is expanded from that in the SHSP to include the intersections of public roadways with driveways and alleys, because they are likely to be a relatively important crash location in rural areas where much of the tribal land is located.

During the ten years from 1997 to 2006, nine percent (n = 109) of the total MVC fatalities on reservations occurred to persons in crashes that involved intersections. Also, 22 percent (n = 507) of the total MVC incapacitating injuries during this period occurred to persons in crashes that involved intersections.

Chart 6A shows the number by year of intersection fatalities and incapacitating injuries in MVCs.

- There is a general increasing trend in MVC fatalities involving intersections over the 10-year period from 1997 to 2006. However, there was a significant dip in this trend in 2004 and 2005.
- MVC incapacitating injuries involving intersections on reservations peaked from 2000 through 2003.
- The statewide data shown in the SHSP covered only the five-year period from 2001 to 2005. Statewide fatalities decreased from 2001 to a low in 2003 and then trended back up through 2005.
- Statewide incapacitating injuries declined from 2001 and leveled off in 2003.



## Comparative Analysis of the Emphasis Areas

Table 6A compares the locale of fatalities and incapacitating injuries involving intersections by urban, rural and not reported locations. This is the only graphic in the analysis that distinguishes between crashes involving two or more public road intersections and intersections between public roads and driveways or alleys.

- About 87 percent of the MVC fatalities on tribal lands involving intersections occur in rural areas. More than 14 percent of the rural intersection fatalities involve driveways or alleys. Nearly 30 percent of the urban intersection fatalities involve driveways or alleys, although with only 14 total urban intersection fatalities, this percentage is questionable.
- About 77 percent of the reported intersection-related incapacitating injuries occur in rural areas. More than 25 percent of these rural intersection injuries occur at driveways or alley.
- These percentages stand in stark contrast to statewide statistics that indicate 75 percent of the fatalities and 85 percent of the incapacitating injuries involving intersections occur in urban areas.
- It is noteworthy that the rural/urban location is reported for 97 percent of MVC fatalities on reservations, but only 43 percent of incapacitating injuries.

**County level data are not provided to avoid identification of specific tribal information.**

<b>Table 6A: Urban versus Rural Intersection Fatalities and Incapacitating Injuries, 1997-2006</b>				
<b>Location</b>	<b># Incapacitating Injuries</b>	<b>% of Total Reported Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% of Total Reported Fatalities</b>
<b>Urban</b>				
Road Intersections	37	17.0	10	9.4
Driveway and Alleys	12	5.5	4	3.8
<b>Subtotals</b>	<b>49</b>	<b>22.5</b>	<b>14</b>	<b>13.2</b>
<b>Rural</b>				
Road Intersections	130	59.6	79	74.5
Driveways and Alleys	39	17.9	13	12.3
<b>Subtotals</b>	<b>169</b>	<b>77.5</b>	<b>92</b>	<b>86.8</b>
<b>Total Reported</b>	<b>218</b>	<b>100.0</b>	<b>106</b>	<b>100.0</b>
<b>Locale Unknown or Not Reported</b>				
Road Intersections	255		0	
Driveways and Alleys	34		3	
<b>Total Not Reported</b>	<b>289</b>		<b>3</b>	

## 6.2 Considerations for Strategy Development

### 6.2.1 Drivers, Vehicles and Collision Manner

Table 6B describes the person-type distribution of fatalities and incapacitating injuries for MVCs involving intersections.

- Drivers suffered about 46 percent of intersection MVC fatalities and 61 percent of the incapacitating injuries. Statewide, drivers experienced 56 percent of the fatalities and 62 percent of the incapacitating injuries.
- Vehicle passengers experienced about 37 percent or almost all of the remaining incapacitating injuries, and 48 percent of the fatalities.
- A significant six percent of the intersection fatalities were incurred by pedestrians and pedacyclists, but only two percent of the incapacitating injuries were suffered by these groups.
- The statewide toll on pedestrians and pedacylists involved in MVCs at intersections was much more significant, representing eight percent of the incapacitating injuries and 15 percent of the fatalities.
- The data show that drivers are more at risk than passenger for incapacitating injuries but are about equal for fatalities involving intersection crashes on tribal lands.

<b>Table 6B: Intersection Fatalities and Incapacitating Injuries by Person Type, 1997-2006</b>				
<b>Casualty</b>	<b>Incapacitating Injuries</b>		<b>Fatalities</b>	
	<b>Number</b>	<b>Percentage</b>	<b>Number</b>	<b>Percentage</b>
<b>Driver</b>	307	60.6	50	45.9
<b>Passenger</b>	188	37.1	52	47.7
<b>Pedestrian</b>	8	1.6	5	4.6
<b>Pedacyclist</b>	4	0.8	2	1.8
<b>Totals</b>	507	100.0	109	100.0

Table 6C presents information about the gender of those persons suffering fatal and incapacitating injuries in MVCs involving intersections.

- Males experienced about 62 percent of the fatalities and 54 percent of the incapacitating injuries.
- These percentages compare reasonably well with statewide statistics in which 66 percent of the fatalities and 51 percent of the incapacitating injuries occurred to males in MVCs involving intersections.

## Comparative Analysis of the Emphasis Areas

<b>Table 6C: Intersection Fatalities and Incapacitating Injuries by Gender, 1997-2006</b>				
<b>Gender</b>	<b># Incapacitating Injuries</b>	<b>% Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Fatalities</b>
<b>Female</b>	230	45.4	42	38.5
<b>Male</b>	275	54.2	67	61.5
<b>Unknown</b>	2	0.4	0	0.0
<b>Total</b>	507	100.0	109	100.0

Table 6D shows the age group distribution of fatalities and incapacitating injuries in MVCs involving intersections.

- The highest percentage of incapacitating injuries on tribal lands fall in the 16-24 age group and decline with age from that point. This trend is also the case with statewide statistics.
- A strong peak appears in intersection-related fatalities on tribal lands with the 45-54 age group. This is very different than the pattern statewide for fatalities, which is more consistent with the incapacitating injury trends.
- The percentages of fatalities and incapacitating injuries on tribal lands are about 35 percent higher than statewide for the 15 and under age group, but the fatality percentages are the same.
- About 57 percent of the intersection-related incapacitating injuries occur in ages 16 through 44. However, only about 41 percent of the fatalities occur in this age range.

<b>Table 6D: Intersection Fatalities and Incapacitating Injuries by Age Group, 1997-2006</b>				
<b>Age Group</b>	<b># of Incapacitating Injuries</b>	<b>% of Incapacitating Injuries</b>	<b># of Fatal Injuries</b>	<b>% of Fatal Injuries</b>
<b>15 and Under</b>	62	12.2	9	8.3
<b>16 to 24</b>	107	21.1	19	17.4
<b>25 to 34</b>	98	19.3	12	11.0
<b>35 to 44</b>	82	16.2	14	12.8
<b>45 to 54</b>	51	10.1	23	21.1
<b>55 to 64</b>	46	9.1	14	12.8
<b>65 to 74</b>	25	4.9	4	3.7
<b>75 to 84</b>	24	4.7	8	7.3
<b>85 and Older</b>	7	1.4	6	5.5
<b>Unknown</b>	5	1.0	0	0.0
<b>Totals</b>	507	100.0	109	100.0

### Comparative Analysis of the Emphasis Areas

Chart 6B clearly shows the peaking in fatalities in the 45-54 age group and the peaking in incapacitating injuries in the 16-24 age group. The more skewed distribution of incapacitating injuries across age groups is also evident.

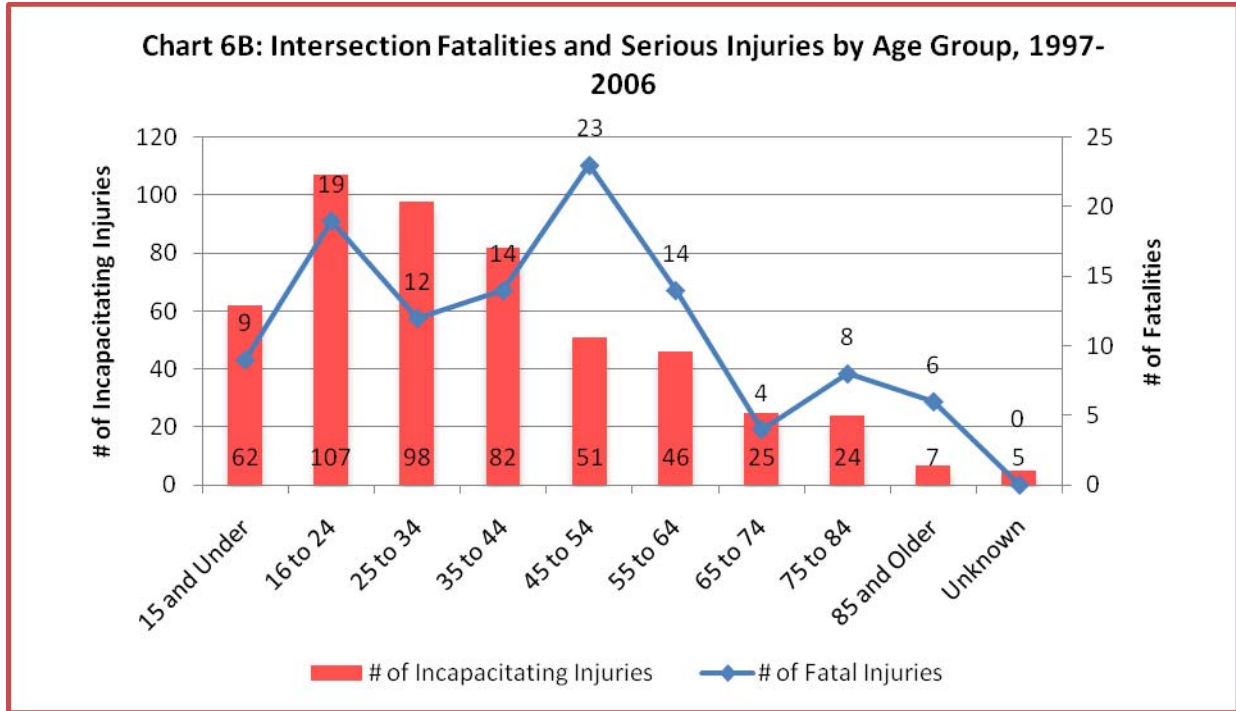


Table 6E provides information about the types of vehicles involved in fatal and incapacitating injury MVCs involving intersections.

- Passenger cars and pick-up trucks dominate the vehicle type involved in intersection-related crashes.
- Compared with statewide data, the percentage of pick-up trucks involved in intersection involved fatal and incapacitating injury MVCs is more than 50 percent higher on tribal lands, while the percentages of passenger cars and motorcycles are considerably lower.
- Statewide data indicate that the percentage of truck tractors involved in incapacitating injury and fatal crashes is essentially zero. On reservation lands more than three percent of the vehicles involved in incapacitating injury crashes and almost six percent of the vehicles involved in fatal crashes are truck tractors.

## Comparative Analysis of the Emphasis Areas

<b>Table 6E: Intersection Fatal and Incapacitating Injury Crashes by Vehicle Type, 1997-2006</b>				
<b>Vehicle Type</b>	<b># of Vehicles Involved in Incapacitating Injury Crashes</b>	<b>% of Vehicles Involved in Incapacitating Injury Crashes</b>	<b># of Vehicles Involved in Fatal Crashes</b>	<b>% of Vehicles Involved in Fatal Crashes</b>
<b>Not Reported</b>	4	0.6	7	4.0
<b>Passenger Car</b>	379	57.3	90	51.1
<b>Pick-Up Truck</b>	218	32.9	54	30.7
<b>Truck Tractor</b>	22	3.3	10	5.7
<b>Bus (Including School)</b>	7	1.1	1	0.6
<b>Motorcycle</b>	15	2.3	5	2.8
<b>RV or Motorhome</b>	2	0.3	1	0.6
<b>Emergency Vehicle</b>	1	0.2	1	0.6
<b>Other Vehicle</b>	14	2.1	7	4.0
<b>Total</b>	662	100.0	176	100.0

Table 6F provides data on the manner of collision for intersection involved fatal and incapacitating injury MVCs.

- More than 42 percent of the incapacitating injuries and 44 percent of the fatalities occurring at intersections were angle crashes.
- These angle crash percentages at intersections on tribal lands are nearly the same as the 41 percent of incapacitating injuries and 45 percent of fatalities statewide.
- The combined percentage of fatal angle and left turn crashes on tribal lands involving intersections is about 66 percent, compared to 72 percent statewide.
- Similarly, the combined percentage of incapacitating injury angle and left turn MVCs involving intersections on tribal lands is about 62 percent compared to 67 percent statewide.
- Head-on and rear-end crashes involving intersections are a more serious problem on reservations. About 11 percent of the intersection fatalities and 16 percent of the intersection incapacitating injuries on tribal lands involve head-on or rear-end crashes, compared to six percent of the fatalities and 12 percent of the incapacitating injuries statewide.



## Comparative Analysis of the Emphasis Areas

<b>Table 6F: Intersection Fatalities and Incapacitating Injuries by Collision Manner, 1997-2006</b>				
<b>Collision Manner</b>	<b># Incapacitating Injuries</b>	<b>% Incapacitating Injuries</b>	<b># Fatalities</b>	<b>% Fatalities</b>
<b>Single Vehicle</b>	52	10.3	19	17.4
<b>Sideswipe (same)</b>	22	4.3	3	2.8
<b>Sideswipe (opposite)</b>	5	1.0	0	0.0
<b>Angle</b>	216	42.6	48	44.0
<b>Left Turn</b>	117	23.1	20	18.3
<b>Rear-End</b>	63	12.4	5	4.6
<b>Head-On</b>	19	3.7	7	6.4
<b>Backing</b>	0	0.0	0	0.0
<b>Other</b>	9	1.8	6	5.5
<b>Driveway/Alley Related</b>	0	0.0	0	0.0
<b>Non-Contact (mc)</b>	0	0.0	0	0.0
<b>Non-Contact (not mc)</b>	0	0.0	0	0.0
<b>U-Turn</b>	4	0.8	1	0.9
<b>Total</b>	507	100.0	109	100.0

### 6.2.2 Seasonality

The SHSP states that knowing the time when fatal and incapacitating injury MVCs occur can be useful in developing education and enforcement programs.

Chart 6C displays the month of year for the number of MVC fatalities and incapacitating injuries involving intersections.

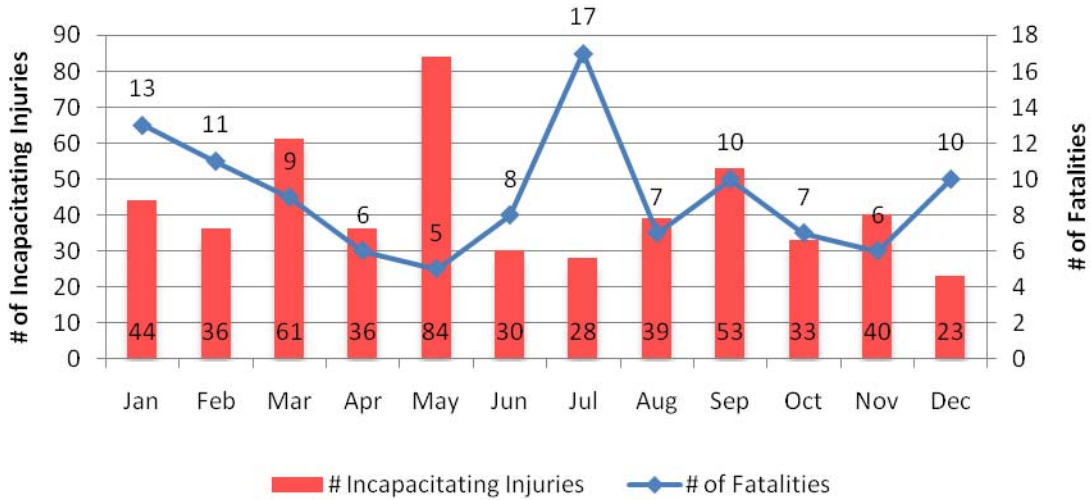
- Fatalities exhibit a strong peak in July and a lesser peak in January. Their lowest levels occur in May and November. Incapacitating injuries show a strong peak in May and lesser peaks in March and September. It is noteworthy that when fatalities are at their highest peak, incapacitating injuries are near their low and vice versa.
- These findings for tribal lands do not compare well with statewide statistics that show a relatively even monthly distribution of fatalities and incapacitating injuries.

Chart 6D shows the day of week distribution of MVC fatalities and incapacitating injuries involving intersections.

- Friday is the peak day for both fatalities and incapacitating injuries for intersection MVCs. Incapacitating injuries are at relatively constant levels for the rest of the week. Sunday is also a strong fatality day. Friday is also the peak day for statewide intersection-related incapacitating injuries. Weekends are the peak period for fatalities statewide, but both statewide fatalities and incapacitating injuries are more evenly distributed throughout the week than on tribal lands.

## Comparative Analysis of the Emphasis Areas

**Chart 6C: Intersection Fatalities and Incapacitating Injuries by Month of Year, 1997-2006**



**Chart 6D: Intersection Fatalities and Incapacitating Injuries by Day of Week, 1997-2006**

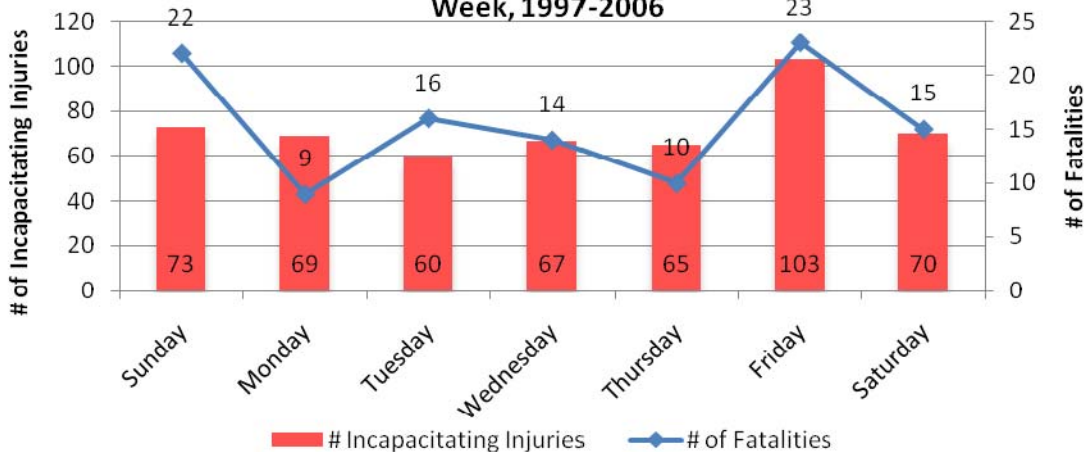
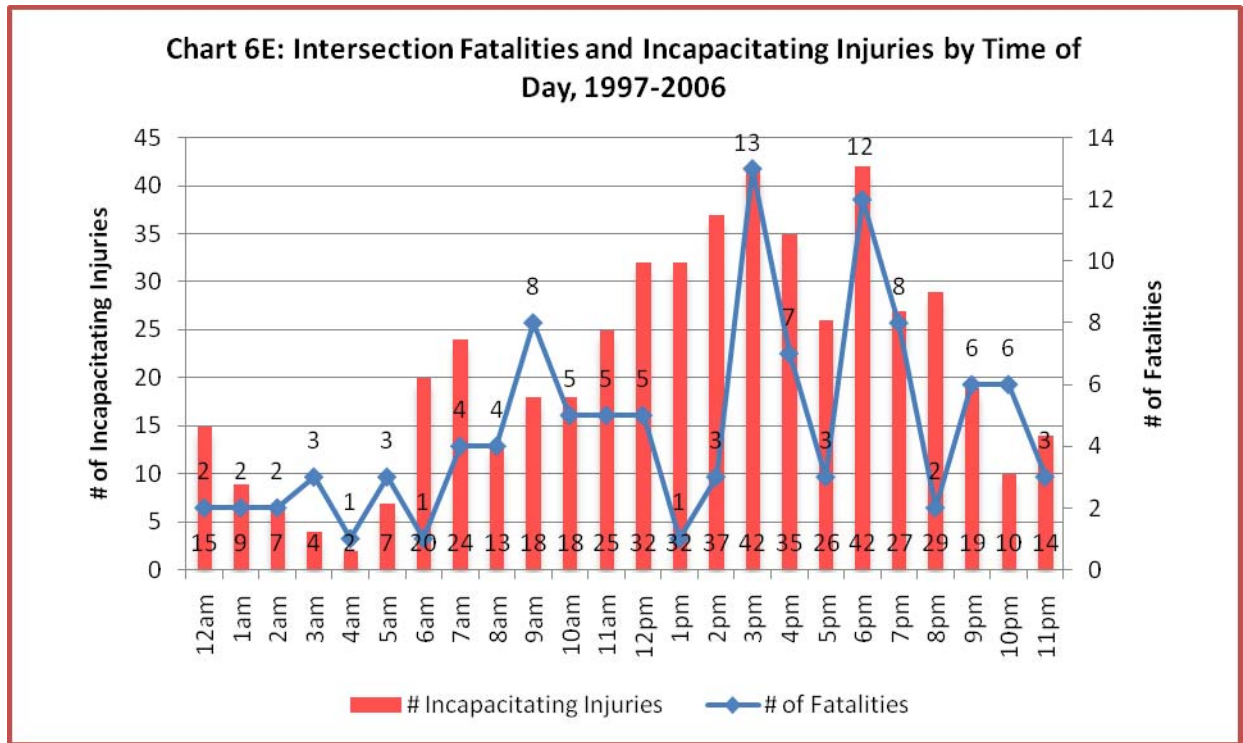


Chart 6E displays the distribution of MVC fatalities and incapacitating injuries involving intersections on tribal lands by time of day.

- Strong fatality and incapacitating injury spikes occurred during 3 p.m. and 6 p.m. hours, with a lesser fatality peak during the 9 a.m. hour.
- The fatality graph is quite erratic, except from about 11 p.m. to 7 a.m. when there are relatively few intersection fatalities. The incapacitating injury pattern demonstrates a more consistent peak period during the afternoon hours.
- The statewide data show a similar spiking of fatalities and incapacitating injuries during the 6 p.m. hour. The statewide data also show the afternoon as the peak

### Comparative Analysis of the Emphasis Areas

period for both incapacitating injuries and fatalities and the early morning hours as the low periods for both fatalities and incapacitating injuries.



#### 6.2.3 Conclusions Regarding Fatalities and Incapacitating Injuries from MVCs Involving Intersections on American Indian Reservations in Arizona

- Intersection-related MVC fatalities trended upward during the 10-year period from 1997 through 2006; however there was a significant reduction in fatalities in 2004 and 2005. Incapacitating injuries showed a four-year peak from 2000 through 2003, with a significant reduction in 2004. The numbers of statewide intersection-related fatalities and incapacitating injuries were also near their five-year low in 2004 and 2005, suggesting that there might be value in researching the causes of these reduced numbers during those years.
- The rural to urban ratios of about 8:1 for fatalities and 3:1 for incapacitating injuries in MVCs involving intersections indicate the need for rural oriented strategies for reducing fatal and incapacitating injury MVCs involving intersections on tribal lands.
- Considerable percentages of the MVC fatalities and incapacitating injuries at intersections on tribal lands involve the intersections of public roads with driveways and alleys. These locations should be considered in the strategy development for reducing intersection fatalities and incapacitating injuries.
- There is poor reporting of locale for incapacitating injury MVCs at intersections.

## Comparative Analysis of the Emphasis Areas

- Although drivers experience a high percentage of the fatalities and incapacitating injuries in MVCs involving intersections, the risk to vehicle passengers is higher on reservations than statewide, particularly for fatalities. Pedestrians and pedacyclists are not nearly as much at risk on tribal lands. Possibly more emphasis on campaigns/programs, such as passenger safety and seatbelt use could reduce the collateral damage to vehicle passengers, while at the same time reduce the number of drivers killing themselves.
- Male vehicle occupants are about 60 percent more likely to be fatally injured and about 20 percent more likely to receive incapacitating injuries in MVCs involving intersections. The ratio for incapacitating injuries is slightly less. These findings could be a result of males exercising more unsafe behavior, or there could be a larger percentage of males in the vehicles involved.
- Young adults are the most susceptible to intersection-related MVC incapacitating injuries on tribal lands, as is the case statewide. However, middle-aged adults are more vulnerable to fatalities at intersections, which is not the case statewide.
- The percentages of pick-up trucks and truck tractors involved in fatal and incapacitating injury crashes at intersections on tribal lands are considerably higher than the statewide percentages. Conversely, the percentages for passenger cars and motorcycles are lower. Pick-up trucks present different injury exposure problems than passenger cars. Programs emphasizing the safe occupant positioning and proper restraint use in pick-up trucks could reduce these fatalities and injuries. Truck tractors are obviously very dangerous to occupants of other vehicles involved in crashes, and yielding to truck tractors at intersections could be an important element of traffic safety training on reservations.
- Angle and left turn crashes result in the most fatalities and incapacitating injuries from intersection crashes on reservations, as they do statewide. Rear-end and head-on crashes are more significant on tribal lands. This could be the result of high speeds on reservation roads in the vicinity of intersections.
- Fatalities exhibit a strong peak in July and a lesser peak in January. These peaks could be weather or tourist related. The lowest levels of fatalities occur in May and November. Incapacitating injuries show a strong peak in May and lesser peaks in March and September. It is noteworthy that when fatalities are at their highest peak, incapacitating injuries are near their low and vice versa. These findings for tribal lands do not coincide well with statewide statistics that show a relatively even monthly distribution of fatalities and incapacitating injuries.
- Friday and Sunday are peak days of the week for intersection-related fatalities, and Friday is the peak day for incapacitating injuries, suggesting association with leisure time. Since this pattern is a statewide phenomenon, statewide strategies could be useful in reducing these peaks.
- Afternoons and early evening are clearly the most dangerous time for intersection-related fatal and incapacitating injury MVCs. The time of day pattern on reservations is similar to that statewide, suggesting that statewide strategies addressing this pattern could have application on reservations.

### 6.3 Countermeasures to Address Fatalities and Incapacitating Injuries in MVCs Involving Intersections on American Indian Reservations in Arizona

The SHSP countermeasures for impaired driving fall into four strategy areas:

- Reduce the Number of Intersection Related Fatalities Through Improved Operations and Traffic Control.
- Reduce the Number of Intersection-related Fatalities Through Improved Geometric Configuration.
- Reduce the Number of Intersection-related Fatalities by Increasing Driver Compliance with Traffic Control Devices.
- Reduce the Number of Potential Conflicts at Intersections Through Improved Access Management.

The following recommendations for countermeasures on tribal lands build on those identified in the SHSP.

#### 6.3.1 Strategy: Reduce the Number of Intersection Related Fatalities Through Improved Operations and Traffic Control.

<b>6.3.1 SHSP Strategy: Reduce the Number of Intersection Related Fatalities Through Improved Operations and Traffic Control.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Evaluate the operation of signalized intersections by examining the timing, phasing, cycle time, and progression of signals.</b>	Road owners in consultation with tribes in or adjacent to urban areas should consider using this countermeasure. The countermeasure has little application in rural areas.
<b>2. Improve the operation of pedestrian and bicycle facilities and promote the implementation of the Statewide Pedestrian Safety Action Plan.</b>	Road owners in consultation with tribes should consider this countermeasure at intersections where there is considerable pedestrian and pedacycle traffic on roads with high traffic volumes or high speeds.

**6.3.2. Strategy: Reduce the Number of Intersection-related Fatalities through Improved Geometric Configuration.**

<b>6.3.2 SHSP Strategy: Reduce the Number of Intersection-related Fatalities through Improved Geometric Configuration.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Provide and improve channelization, signage, and signal operation for turning traffic.</b>	About 19 % of fatalities and 23% of incapacitating injuries at intersections on tribal lands result from left turns. Road owners in consultation with should consider improving channelization, signage and signal operation at locations with the potential of crashes or where left turns have resulted in MVCs.
<b>2. Improve sight distances at both signalized and unsignalized intersections. For example, remove parking that restricts sight distance, and clear sight distance triangles of shrubs and trees.</b>	Road owners in consultation with tribes should consider implementing this recommendation at locations where sight distance is insufficient for the speed of traffic traveling through the intersection.
<b>3. Consider replacing signalized intersections with roundabouts, and promote the benefits of roundabouts in traffic safety.</b>	Road owners in consultation with tribes should consider utilizing roundabouts and other traffic calming measures at intersections where there is a history or the potential of MVCs. ADOT should consider developing a promotional and training program on the use of roundabouts that can be used to inform residents of reservations.

**6.3.3 Strategy: Reduce the Number of Intersection-related Fatalities by Increasing Driver Compliance with Traffic Control Devices.**

<b>6.3.3 SHSP Strategy: Reduce the Number of Intersection-related Fatalities by Increasing Driver Compliance with Traffic Control Devices.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Provide lighting to improve the visibility of unsignalized intersections during nighttime conditions.</b>	Road owners in consultation with tribes should consider providing lighting at unsignalized intersections that have the potential of nighttime crashes or where there has been a history of nighttime crashes. Other devices as mentioned in the next countermeasure should also be considered, either separately or in conjunction with intersection lighting.



## Comparative Analysis of the Emphasis Areas

<b>6.3.3 SHSP Strategy: Reduce the Number of Intersection-related Fatalities by Increasing Driver Compliance with Traffic Control Devices. (continued).</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>2. Consider installing advance warning traffic devices on rural unsignalized intersection approaches.</b>	Road owners in consultation with tribes should consider using this countermeasure, which should be expanded to include regulatory and advisory signing, pavement markings and roadside delineation.
<b>3. Promote the use of automated enforcement devices at intersections to deter red light running and speeding. Develop and distribute educational/promotional materials on the role of automated enforcement technologies in intersection safety.</b>	This countermeasure could have application for tribes in and adjacent to urban areas, but would likely have little application in rural areas. Development and distribution of promotional materials should be handled by a large central organization, such as ADOT or DPS.
<b>4. Consider the use of speed feedback signs at intersections to inform drivers of their operating speeds.</b>	Road owners in consultation with tribes should consider implementing this countermeasure at intersections where speeding is a problem.
<b>5. Ensure improved compliance with laws regarding running red lights and stop signs by using sustained enforcement based upon local enforcement experience and the latest data on crashes and fatalities.</b>	Tribes should consider using this countermeasure and should consider combining it with other compliance issues such as use of seat restraints and impaired driving.

### **6.3.4 Strategy: Reduce the Number of Potential Conflicts at Intersections through Improved Access Management.**

<b>6.3.4 SHSP Strategy: Reduce the Number of Potential Conflicts at Intersections Through Improved Access Management.</b>	
<b>SHSP Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Implement the access management plan being developed by ADOT.</b>	Road owners in consultation with tribes should review the access management plan for application on tribal lands. If applicable, consideration should be given to implementing it. If not applicable Tribes should consider developing their own access management plan.
<b>2. Promote the use of good access management strategies to local and tribal governments.</b>	ADOT should conduct training for tribes to provide information on the principles of access management and how access management strategies can be used to improve roadway safety.

### 6.3.5 Tribal Strategy: Reduce the Number of Intersection MVCs.

<b>6.3.5 Tribal Strategy: Reduce the Number or Mitigate the Harmful Effects of Intersection Crashes.</b>	
<b>Countermeasures</b>	<b>Tribal Countermeasure Recommendations</b>
<b>1. Work with ADOT and FHWA to identify strategies and countermeasures specifically tailored to address intersection safety on tribal lands and rural Arizona.</b>	The ratio of rural to urban intersection fatalities on tribal lands is 8:1 and the ratio for incapacitating injuries is 3:1. Many of the countermeasures in the SHSP are specifically oriented towards resolving intersection safety in urban areas. A similar approach needs to be focused on rural areas.
<b>2. Develop an action plan for reducing crashes at the intersections of driveways and alleys with public roads.</b>	Sixteen percent of the intersection fatalities and 23 percent of the intersection incapacitating injuries on tribal lands occur at driveways and alleys. Road owners in consultation with tribes should consider creating an action plan to address these crashes.
<b>3. Develop a drivers' education program focusing on vehicle passenger safety.</b>	Vehicle passengers on tribal lands involved in intersection MVCs experience a higher rate of fatalities and incapacitating injuries than passengers do statewide. ADOT should offer the drivers' education program to tribes and possibly include a drivers' training element that is not currently available to most tribes. The education program could also include promotional materials and signing along roadways. Special focus might be placed on pickup truck drivers because of the high percentage of pickup trucks involved in MVCs on tribal lands.
<b>4. Increase weekend enforcement of traffic laws.</b>	Weekends are peak times for crash fatalities and incapacitating injuries on tribal lands involving intersections and other emphasis areas. Tribal and BIA law enforcement in cooperation with county sheriffs and DPS should consider increasing enforcement on Friday through Sunday.



## CONCLUSIONS

1. Data from the ALISS was shown to be a valuable resource for collectively analyzing traffic safety issues on American Indian reservations in Arizona.
2. The ALISS did not contain MVC data for all reservations in Arizona.
3. The Arizona SHSP includes many strategies for reducing the number and severity of MVCs that have application on tribal lands in Arizona.
4. Some of the countermeasures identified in the SHSP for reducing the number and severity of MVCs have limited or no application on tribal lands in Arizona.
5. Nine additional strategies were identified for reducing the number and severity of MVCs on tribal lands beyond those identified in the SHSP.
6. The results of this study can be a valuable tool for use by tribes and agencies dealing with tribes in Arizona in reducing the number and severity of crashes on tribal lands.
7. The results of this study might have application on tribal lands outside Arizona.

## RECOMMENDATIONS

1. Provide tribes in Arizona copies of the final report with an accompanying letter recommending their review of the report and consideration in using the recommended strategies and countermeasures for reducing the number and severity of MVCs on tribal lands.
2. Make the final report available to the FHWA, BIA and the National Highway Traffic Safety Administration for their use in improving traffic safety on tribal lands throughout the United States.
3. Hold a traffic safety conference for tribes in Arizona using this study as a basis for bringing to tribes attention the importance of addressing the five emphasis areas covered by the study and potential for using the strategies and countermeasures identified in the study to reduce the number and severity of MVCs on tribal lands.
4. Incorporate the results of the study into the formal ADOT-Tribal government-to-government consultation process for the purpose of identifying and implementing approaches for reducing the number and severity of MVCs on tribal lands.