Delaware
STRATEGIC HIGHWAY SAFETY PLAN:
Toward Zero Deaths

NHTSA
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U.S. Department of Transportation
Federal Highway Administration

DelDOT
Delaware Department of Transportation

Delaware Office of EMS
EMERGENCY MEDICAL SERVICES

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Delaware STRATEGIC HIGHWAY SAFETY PLAN:

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Mission and Vision

Although Delaware's fatality rates have experienced a significant decline since the original *Delaware Strategic Highway Safety Plan* was implemented in 2006, decreasing the three-year average fatality rate from 1.49 between 2004 and 2006 to 1.31 between 2007 and 2009, Delaware must continue to actively strive to reduce fatalities in order to reach the national goal of 1.0 fatality per 100 million vehicle miles traveled. To continue to decrease fatalities on Delaware's roadways, the State of Delaware adopts the "Toward Zero Deaths" national strategy on highway safety as the overall mission of the *Delaware Strategic Highway Safety Plan*.

MISSION STATEMENT: *The Delaware Strategic Highway Safety Plan: Toward Zero Deaths aims to eliminate fatalities on Delaware's roadways through a multi-agency approach that utilizes education, enforcement, engineering and emergency services strategies.*

To achieve the mission of the *SHSP*, Delaware has adopted the following vision statement in an effort to work toward elimination of fatalities on Delaware's roadways:

VISION STATEMENT: *The goal of the Delaware Strategic Highway Safety Plan: Toward Zero Deaths is to achieve a fatality rate of 1.0 per 100 million vehicle miles traveled by 2018.*

The vision statement and overall *SHSP* goal of reaching a 1.0 fatality rate by 2018 was established based on the current downward trend in fatality rates in Delaware, which indicates that the fatality rate will reach 1.0 by 2018 if Delaware continues to make significant progress in reducing traffic fatalities.

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2010 DELAWARE STRATEGIC HIGHWAY SAFETY PLAN: TOWARD ZERO DEATHS

Enhancing highway safety is critical to the health and well being of the citizens of Delaware and to others who travel on Delaware's roadway system. The results of crashes can be devastating, both in terms of loss of life and economically. While Delaware has been successful in reducing fatality rates in recent years, from 1.49 fatalities per 100 million vehicle miles traveled between 2004 and 2006 to 1.31 fatalities per 100 million vehicle miles traveled between 2007 and 2009, continued highway safety efforts are necessary to further reduce the number of fatalities and injuries resulting from crashes on Delaware's roadways.

In 2006, Delaware developed and adopted the first *Delaware Strategic Highway Safety Plan (SHSP)* through a data-driven collaborative approach among Delaware's safety partners. The plan was designed to be a "living document" and a framework within which roadway safety programs and initiatives can be evaluated and selected based on their consistency with the goals of the *SHSP*. In 2010, Delaware's coordinating agencies jointly developed the *2010 Delaware Strategic Highway Safety Plan: Toward Zero Deaths* to update Delaware's emphasis areas based on current crash data, establish performance-based goals, identify strategies and countermeasures for immediate and longer-term implementation, and evaluate the progress of the *SHSP*. The overall mission of the plan is to work to eliminate fatalities on Delaware's roadways through a multi-agency approach that utilizes education, enforcement, engineering and emergency services strategies.

The success of the *Delaware SHSP* depends on its acceptance and support by highway safety stakeholders and the extent to which strategies and countermeasures are implemented. Implementation requires strong advocacy, coordination among safety partners, and the commitment of resources from various sources. The purpose of this plan is to develop a comprehensive statewide safety program that will guide Delaware's existing safety programs and facilitate the implementation of the recommended strategies and countermeasures. Goals and strategies included in this plan should be incorporated into other safety programs and projects should be prioritized based on their consistency with the *SHSP* goals.

Carolann D. Wicks, P.E.
Secretary, Department of Transportation

Lewis D. Schiliro
Secretary, Department of Safety and Homeland Security

Colonel Robert M. Coupe
Superintendent, Delaware State Police

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INTRODUCTION

BACKGROUND

The American Association of State Highway and Transportation Officials (AASHTO) initiated the *Strategic Highway Safety Plan* (*SHSP*) in 1998, after noticing that efforts to reduce highway fatalities were stalling. The *SHSP* encouraged various state agencies involved in highway safety to collaboratively develop a plan of innovative strategies to reduce fatalities on America's highways. A state *SHSP* is currently a requirement of *SAFETEA-LU* and is a key component of a state's Highway Safety Improvement Program (HSIP). The purpose of an *SHSP* is to identify the state's key safety needs through a review of statewide crash data and guide investment decisions to achieve significant reductions in highway fatalities and incapacitating injuries on public roads.

In September 2003, the U.S. Department of Transportation set a goal to reduce the nationwide fatality rate to 1.0 per 100 million vehicle miles traveled by the year 2008. This rate-based benchmark was established to provide a comparison of crash rates between states, although the nation did not meet the 2008 goal. According to the Fatality Analysis Reporting System (FARS), the 2009 national fatality rate was 1.16 fatalities per 100 million vehicle miles traveled (VMT), which indicates significant progress from 1.58 in 1998. As shown in Figure 1, the nation has experienced a steady decline in fatality rates since the *SHSP* was initiated.

Delaware established their first *SHSP* in September 2006 as a statewide coordinated safety plan to provide a comprehensive framework to reduce fatalities, identify specific goals and objectives, and integrate the four E's - engineering, education, enforcement and emergency medical services (EMS). An update to the plan was prepared in September 2008 and this document serves as the *2010 Delaware SHSP*. Delaware's coordinating agencies include Delaware Department of Transportation (DelDOT), Federal Highway Administration (FHWA), National Highway Traffic Safety Administration (NHTSA), Delaware Office of Highway Safety (OHS), Delaware State Police (DSP), Department of Justice (DOJ), and Delaware Office of Emergency Medical Services (OEMS). Based on committee discussions and a review of crash data, both the 2006 and 2008 versions of the plan included nine emphasis areas to reduce fatalities. This document provides a summary of updated crash data, identifies new emphasis areas, evaluates Delaware's progress in implementing strategies to address each emphasis area, and provides a comprehensive framework of goals, objectives, and strategies to guide the commitment of agency resources for the next several years.

While Delaware's fatality rates slightly increased in 2008 and 2009 partially due to a decrease in statewide vehicle-miles traveled (VMT), Delaware's 2007 fatality rate was the lowest fatality rate experienced in Delaware since 1999. Delaware's 2007 to 2009 fatality rates per 100 million VMT ranged from 1.25 to 1.36, exceeding the nationwide goal. As shown in Figure 2, statewide travel decreased significantly in 2008; however, travel increased marginally in 2009. Future growth in travel and the congestion it brings to Delaware's roadways will make providing safer transportation more challenging.

Figure 1 - Fatality Rates

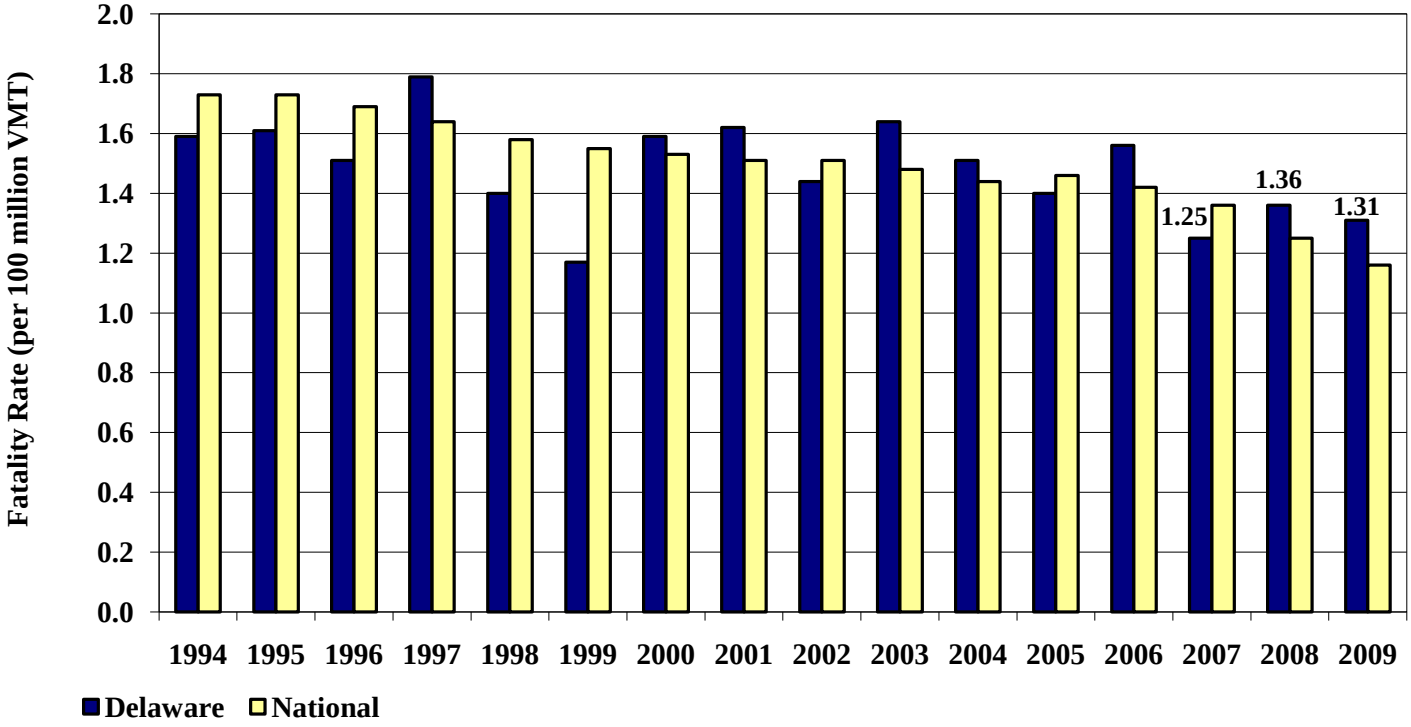
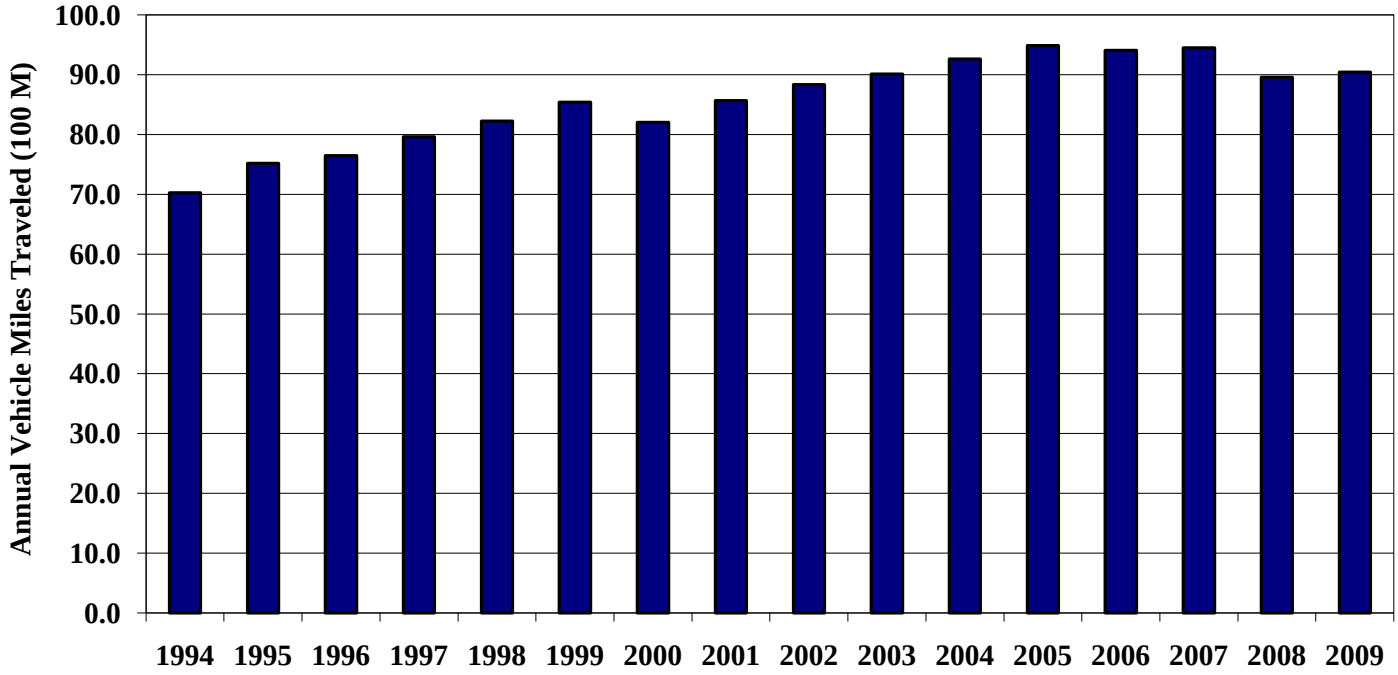


Figure 2 - Delaware Vehicle Miles Traveled



FEDERAL LEGISLATION AND PROGRAMS

Several federal laws and programs have supported the conception of the *Strategic Highway Safety Plan.* The *Highway Safety Act of 1966*, enacted by Congress on September 9, 1966, was the first major effort at the federal level to reduce the number and severity of highway-related crashes. The primary purpose of this legislation was to provide for a coordinated national highway safety program through financial assistance to the states to accelerate highway traffic safety programs. Subsequently, the *Highway Safety Act of 1973* established categorical funding for five specific program areas: highway-rail crossings, high hazard locations, pavement marking demonstration programs, elimination of roadside obstacles, and the Federal-aid safer roads demonstration. The *Surface Transportation Assistance Act of 1978* consolidated these programs into the Highway-Rail Grade Crossings and Hazard Elimination Programs. To ensure that these programs are carried out in an organized, systematic manner where the greatest benefits can be achieved, a formalized Highway Safety Improvement Program (HSIP) was established.

NHTSA administers the State and Community Highway Safety Grant Program (U.S.C. Title 23, Section 402) which is funded through the Highway Trust Fund. This program provides funding for highway safety programs that are determined to be effective in reducing crashes, injuries, and fatalities.

The *Transportation Equity Act for the 21st Century (TEA-21)* was enacted June 9, 1998. *TEA-21* authorized the federal surface transportation programs for highways, highway safety, and transit. In July 2005, Congress enacted the *Safe, Accountable, Flexible, and Efficient Transportation Equity Act - A Legacy for Users (SAFETEA-LU),* and President Bush signed it on August 10, 2005. *SAFETEA-LU* extends most of the current structure of federal highway safety funding as outlined in the *TEA-21*. The legislation provides federal funding for a variety of behavioral highway safety priority areas in addition to the Section 402 State and Community Highway Safety Grant Program, including occupant protection, traffic records, impaired driving, motorcycle safety, and other priority areas.

SAFETEA-LU requires that each state establish a *Strategic Highway Safety Plan* by October 1, 2006 in order to be eligible for full funding apportionments. As part of the requirements, crash data must be used to identify safety problems and identify countermeasures. The plan should identify and analyze highway safety problems on all public roadways and address engineering, management, operation, education, enforcement, and emergency services to prioritize programs and strategies to reduce the identified safety problems. A strategic goal should be adopted by the *SHSP* coordinating agencies and performance-based goals for each key emphasis area should be established. The plan must be evaluated regularly to ensure data accuracy and priority of improvements.

DEVELOPMENT

PLAN STRUCTURE

The coordinating agencies including DelDOT, OHS, DSP, FHWA, NHTSA, OEMS, and DOJ, as well as other safety stakeholders, jointly developed the *Delaware 2010 SHSP* by following the basic steps outlined by AASHTO's *Strategic Highway Safety Plan Model Implementation Process* and FHWA's *Strategic Highway Safety Plan (SHSP) Implementation Process Model* and reviewing the HSIP Final Rule that became effective in January 2009. Data analyses were performed to develop the program's mission and vision statements and identify the plan's emphasis areas and priorities. The group reviewed existing Delaware programs, potential solutions proposed in the *National Cooperative Highway Research Project (NCHRP) 500-series Reports,* countermeasures and best practices recommended in NHTSA's *Countermeasures that Work, A Highway Safety Countermeasure Guide for State Highway Safety Offices,* solutions proposed by other states, and other safety resources, and selected a list of solutions and countermeasures, programs, and strategies to address Delaware's emphasis areas. Emphasis was placed on cost effective and proven countermeasures. Additionally, the plan evaluates the status and progress made toward achieving the goals and discusses implementation strategies and goals for future years.

The first Delaware *SHSP* was implemented in 2006 and initially the plan was to be updated biannually. However, to continue to update the plan biannually, only two years of crash data will be available for each subsequent update. Because Delaware is a smaller state, a small sample of two years of crash data could skew the results of the crash data analyses. Therefore, the stewardship agreement with FHWA will be revised to indicate that updates to the plan will be performed every three years in order to evaluate three years of crash data and progress made toward achieving the plan goals during each update. Accordingly, the coordinating agencies will rewrite the *SHSP* every six years, as part of every other plan update. This document serves as Delaware's second *SHSP*.

DATA REVIEW

Although the national and statewide overall *SHSP* goals are based on fatality rates rather than fatal crash rates, Delaware's coordinating agencies agreed to base Delaware's data analyses and performance-based goals for each emphasis area on the number of fatal crashes rather than the number of fatalities for all data-driven emphasis areas, except for the emphasis area dedicated to Increasing Seat Belt Usage. When the data analyses are based on fatalities, one fatal crash can result in multiple fatalities and skew the results; therefore, the *Delaware SHSP* focuses on eliminating each fatal crash, which will result in eliminating all fatalities associated with that crash. However, the group decided that the emphasis area dedicated to Increasing Seat Belt Usage should target each individual fatality not wearing a seat belt because restraint usage may be the determining factor if a crash has zero, one or multiple fatalities.

2006 Plan: For the initial 2006 *SHSP*, Delaware's crash statistics for a three year period, January 2001 through December 2003, were reviewed to narrow AASHTO's 22 emphasis areas to a reasonable number for further consideration. National statistics were obtained from 2003 FARS data. Emphasis areas with a higher corresponding fatal crash or fatality percentage in Delaware as compared to the national averages were selected for inclusion in the *Delaware SHSP*. Additional areas were then selected where data was missing or where agencies knew problems existed based on recent experience. Once the emphasis areas were selected, additional data analyses including both fatal and incapacitating injury crashes were conducted to identify potential solutions.

2008 Update: In 2007, the *SHSP* coordinating agencies met to review updated crash data available for AASHTO's data-driven emphasis areas. Updated Delaware crash data for the three year period between January 2004 and December 2006 was compared to 2005 national crash data obtained from FARS and to the previous three-year period of crash data (January 2001 through December 2003). Each emphasis area was then reevaluated based on the updated crash data. Although the data indicated a reduction in fatal crash or fatality percentages in several current Delaware emphasis areas, the *SHSP* coordinating agencies decided to keep all current emphasis areas to continue these downward trends. Additional data analyses including both fatal and incapacitating injury crashes were conducted to update the potential strategies and solutions to address each emphasis area.

2010 Plan: In 2010, the *SHSP* coordinating agencies reconvened to rewrite the *SHSP*. Both national and statewide fatal crash and fatality data for each of AASHTO's data-driven emphasis areas were obtained from FARS for the two year period between January 2007 and December 2008. These percentages were compared to new data queried from FARS for the previous two three-year periods of crash data (January 2001 through December 2003 and January 2004 through December 2006) in order to make sure all data was queried in the same manner to provide an accurate comparison. Detailed crash data for 2009 was not available on FARS at the time of the update; therefore, 2009 crash data was not included in the process to establish Delaware's emphasis areas.

Each emphasis area was then reevaluated based on the updated crash data. The coordinating agencies selected emphasis areas with a higher corresponding fatal crash or fatality percentage in Delaware as compared to the national averages (e.g., Curbing Aggressive Driving, Reducing Impaired Driving, etc.), an emphasis area with one of the highest fatal crash or fatality percentages in Delaware even if Delaware's percentage is actually lower than the national percentage (i.e., Increasing Seat Belt Usage), or an emphasis area that is likely to become a concern in the near future (i.e., Sustaining Proficiency in Older Drivers). Although the data indicated a reduction in fatal crash and fatality percentages in several current Delaware emphasis areas, the *SHSP* coordinating agencies decided to keep all current emphasis areas to continue these downward trends. However, the 2010 plan includes both primary and secondary emphasis areas. Primary emphasis areas represent higher percentages of Delaware's fatal crashes and fatalities; however, secondary emphasis areas are still focus areas in Delaware. The 2010 plan, unlike previous versions of the plan, prioritizes the emphasis areas based on Delaware's fatal crash and fatality data (i.e., Primary Emphasis Area One: Reducing the Frequency and Severity of Roadway Departure Crashes represents the highest percentage (47 percent) of Delaware's fatal crashes). Once the emphasis areas were finalized, additional data analyses of Delaware's fatal crash and fatality data were conducted to identify target groups, behaviors, times, locations, etc., when implementing strategies for each emphasis area. This data analyses is based on crash data for all public roadways within Delaware collected by Delaware State Police and local law enforcement agencies.

Table 1 summarizes both national and Delaware crash percentages based on FARS data for each of Delaware's data-driven emphasis areas. Both Delaware's current eight data-driven emphasis areas (i.e., those included in both the 2006 and 2008 *SHSP*s) and Delaware's ten 2010 primary and secondary data-driven emphasis areas are noted. It should be noted that as part of the 2010 plan, the two emphasis areas related to roadway departures (i.e., Keeping Vehicles on the Roadway and Minimizing the Consequences of Leaving the Road) were combined and Delaware's current and 2010 non data-driven emphasis area (Improving Traffic Records) is not shown in Table 1. As shown, Delaware's fatal crash percentage for the Ensuring Safer Bicycle Travel emphasis area increased very slightly based on 2007 and 2008 fatal crash data, marginally exceeding the national average; however, because this emphasis area experiences such low raw numbers of fatal crashes, the coordinating agencies decided not to add this as an emphasis area at this time.

DELAWARE'S EMPHASIS AREAS

As described above, Delaware's data-driven emphasis areas were selected based on safety needs identified by crash data review. However, Delaware's non-data-driven emphasis area (i.e., AASHTO's Improving Traffic Data) was selected based on discussions with the coordinating agencies. As part of these discussions, AASHTO's non-data-driven emphasis areas were reviewed and the group decided to keep the emphasis area related to Improving Traffic Data in the 2010 plan but not to add any additional non-data-driven emphasis areas.

2010 Performance-Based Goals: In addition to the overall vision of the *SHSP*, shorter-term performance-based goals for each emphasis area have been identified as part of the 2010 plan. Intermediate (i.e., 2012, 2015, and 2018) performance-based goals for each of Delaware's primary emphasis areas were calculated based on the overall goal of 1.0 fatality per 100 million VMT by 2018, which requires reducing the total number of fatalities from 118 in 2009 to 102 in 2018 (i.e., a 5 percent reduction in the number of fatal crashes every three years). Intermediate (i.e., 2012, 2015, and 2018) goals will be used to evaluate the progress of the *SHSP* during the 2013, 2016, and 2019 plan updates. Additionally, there are factors outside the control of the *SHSP* coordinating agencies that can impact fatality rates. Increases or decreases in vehicle miles traveled significantly affect fatality rates in Delaware due to the low raw number of fatalities in the state. On the other hand, technological improvements to vehicles and to emergency medical services can certainly reduce the risk of traffic fatalities.

The *SHSP* establishes goals for each primary emphasis area based on a percent reduction in the number of fatal crashes and the corresponding reduction in the number of fatal crashes (e.g., reduce the number of fatal crashes involving aggressive driving factors by 5 percent every three years to achieve 38, 36, and 34 total fatal crashes involving aggressive driving factors by 2012, 2015, and 2018, respectively). Additionally, the group reviewed the goals in other Delaware safety plans including OHS's *FY 2010 Highway Safety Plan*, the *Delaware Traffic Safety Information System Strategic Plan*, and DSP's *FY 2010 Motor Carrier Safety Assistance Program Commercial Vehicle Safety Plan*, to ensure that the goals of the *SHSP* are consistent with the goals of other statewide initiatives.

STRATEGY SELECTION AND IMPLEMENTATION

A list of general strategies to mitigate crashes in each of the emphasis areas was considered by combining *NCHRP 500-series Reports*, countermeasures and best practices recommended in NHTSA's *Countermeasures that Work, A Highway Safety Countermeasure Guide for State Highway Safety Offices*, solutions proposed by other states with existing *Strategic Highway Safety Plans*, and many other safety resources. These strategies were then compared to the current *SHSP* and existing Delaware programs and a combination of strategies was selected to address each of Delaware's emphasis areas. A comprehensive list of strategies is included in the emphasis area discussions that follow this section in the plan. These strategies, along with a detailed summary of specific crash data and an evaluation of Delaware's status are discussed within each emphasis area. Strategies were selected based on their cost-effectiveness, potential rate of return, and proven effectiveness. Strategies included in this plan focus on addressing the four "E's" of Education, Enforcement, Engineering, and Emergency Services.

The purpose of this plan is to develop a comprehensive statewide safety plan; therefore, the goals and strategies included in this plan should be incorporated into other safety programs and projects, such as the Highway Safety Improvement Program and other statewide safety programs and projects should be prioritized based on their consistency with the *SHSP* goals. Additionally, Implementation Teams for each emphasis area, or combination of emphasis areas, will be developed, consisting of members from the SHSP coordinating committee and other safety stakeholders appropriate for each emphasis area. These teams will meet on a quarterly or semi-annual basis to review the implementation strategies for each respective emphasis area.

PERFORMANCE MEASURES AND EVALUATION

It is critical that FHWA and DelDOT are able to demonstrate that the *SHSP* is being effectively carried out and that the projects being implemented are achieving results. The ultimate measure of success is a significant nationwide decline in the number of crash-related fatalities. To ensure that the *Delaware SHSP* is being implemented as intended and that it is achieving its purpose, progress toward reaching the established goals will be evaluated. The implementation teams discussed above will meet on a quarterly or semi-annual basis to monitor and evaluate safety initiatives to ensure they are being implemented as intended. These quarterly or semi-annual reviews will be used to evaluate the progress of the *SHSP* on a three-year basis.

The diverse and complex nature of the strategies makes it difficult to determine which strategy or strategies most effectively reduce the number of fatal crashes, particularly because crashes may fall into several different emphasis areas and strategies. For example, a fatal crash may involve an impaired driver not wearing a seatbelt who drove off the roadway and struck a tree. This example of a crash may have been addressed by several different strategies from several different emphasis areas. Recognizing the diversity of the critical strategies, the coordinating agencies review overall fatality rates and reductions in fatal crashes or fatalities for each emphasis area to measure the overall effectiveness of the implemented strategies for each emphasis area.

Table 1 – Data-Driven Emphasis Areas

Previous DE Emphasis Area	2010 DE Emphasis Area	Emphasis Area	Data Description	2001 - 2003		2004 - 2006		2007-2008	
				National Percentage[1]	Delaware Percentage[1]	National Percentage[1]	Delaware Percentage[1]	National Percentage[1]	Delaware Percentage[1]
-	-	Instituting Graduated Licensing for Young Drivers	Driver Under 21	21%	22%	19%	22%	17%	16%
-	Secondary EA 1	Sustaining Proficiency in Older Drivers	Driver Over 64	16%	16%	15%	20%	15%	12%
1	Primary EA 2	Curbing Aggressive Driving	Aggressive Driving Factors	58%	51%	56%	51%	53%	55%
2	Primary EA 4	Reducing Impaired Driving	BAC level 0.08 or higher	31%	33%	31%	31%	31%	37%
-	-	Keeping Drivers Alert	Driving Factors: Inattentive, Distracted, or Fatigued Driving	15%	17%	14%	13%	17%	13%
3	Primary EA 3	Increasing Seat Belt Usage	Not Using Restraint System[2]	54%	59%	51%	49%	50%	40%
4	Primary EA 6	Making Walking and Street Crossing Safer	First Harmful Event Involves a Pedestrian	12%	14%	11%	13%	12%	17%
-	-	Ensuring Safer Bicycle Travel	First Harmful Event Involves a Pedacyclist	1.8%	2.3%	1.9%	2.4%	2.0%	2.9%
-	Primary EA 7	Improving Motorcycle Safety and Increasing Motorcycle Awareness	Motorcycle Involved	9%	7%	11%	11%	14%	15%
5	Secondary EA 2	Making Heavy Vehicle Travel Safer	Heavy Vehicle Involved	12%	13%	12%	13%	12%	9%
-	-	Reducing Vehicle-Train Crashes	First Harmful Event Involves a Train	0.6%	0.6%	0.5%	0.0%	0.5%	0.0%
6 & 7	Primary EA 1	Reducing the Frequency and Severity of Roadway Departure Crashes	Sequence of Events Involves a Roadway Departure[3]	42%	37%	52%	39%	53%	47%
-	Primary EA 5	Improving the Design and Operation of Highway Intersections	Occurred at an Intersection	23%	25%	22%	26%	22%	25%
-	-	Reducing Head-on and Across-Median Crashes	Head-on Crashes	10%	7%	9%	7%	9%	7%
8	Secondary EA 3	Designing Safer Work Zones	Occurred within a Construction/Maintenance/Work Zone	2.5%	2.2%	2.4%	1.6%	2.0%	1.9%

[1]National and Delaware percentages of fatal crashes related to the emphasis area compared to the total number of fatal crashes (based on FARS data)
[2]Includes percentages of fatalities of passenger vehicle occupants rather than fatal crashes
[3]Query method differs from 2004 to 2008, due to a modified database format

DELAWARE STRATEGIC HIGHWAY SAFETY PLAN

PRIMARY EMPHASIS AREAS

EMPHASIS AREA ONE: REDUCING THE FREQUENCY AND SEVERITY OF ROADWAY DEPARTURE CRASHES

BACKGROUND

According to FHWA, a roadway departure crash is a non-intersection crash which occurs after a vehicle crosses an edge line, a center line, or otherwise leaves the traveled way. Frequently, a roadway departure results in an injury or fatal crash when the departing vehicle strikes another vehicle or one or multiple fixed objects located outside the travel way such as trees, utility poles, ditches, and bridge abutments, after the initial roadway departure. In many cases, roadway departure crashes involve a single vehicle; therefore, strategies should first address keeping vehicles on the roadway and secondly address the consequence of leaving the roadway.

To reduce the severity of roadway departure crashes, it is necessary to determine why the vehicle left the roadway (e.g., speeding, asleep at the wheel, inattentiveness) and then determine the first harmful event that occurred as a result of leaving the roadway (e.g., striking a utility pole, overturning, etc.) and implement strategies to address both the primary and secondary events. In many cases, the first harmful event will involve a vehicle striking a tree or utility pole. AASHTO's *Roadside Design Guide* prioritizes how to address roadside obstacles as follows:

- Remove the obstacle
- Redesign the obstacle so it can be safely traversed
- Relocate the obstacle to a point where it is less likely to be struck
- Reduce impact severity by using an appropriate breakaway device
- Shield the obstacle with a longitudinal traffic barrier designed for redirection or use a crash cushion
- Delineate the obstacle if the above alternatives are not appropriate

Roadway departures represent a significant percentage of fatal crashes throughout the country and in the state; therefore, reducing roadway departures is a critical factor in reducing nationwide and statewide fatalities. Based on DelDOT's crash data, roadway departures represent the largest percentages (47 percent) of fatal crashes in Delaware for the 2007 to 2009 time period.

DATA REVIEW

Based on 2007 to 2009 fatal crash data, driving under the influence of alcohol and/or drugs represents 50 percent of roadway departure fatal crashes. Additionally, 31 percent of fatal roadway departure crashes occurred as the result of speeding. Speeding includes drivers traveling above the posted speed limit or traveling too fast for conditions; therefore, motorists may be driving at or under the posted speed limit, but weather conditions or poor visibility could cause drivers to lose control and create a collision.

Fifty-seven percent of fatal roadway departure crashes occurred on rural roadways even though rural roads account for only 29 percent of vehicle-miles traveled in 2007, 2008 and 2009. Additionally, 40 percent of fatal roadway departure crashes occurred on collector roadways; however, only 16 percent of vehicle-miles traveled in 2007, 2008 and 2009 occurred on collector roadways. Further analysis shows that 77 percent of drivers who were involved in fatal roadway departure crashes were male. The 15 to 24 years old age group represents the highest number of drivers involved in fatal roadway departure crashes. The time period that has the highest number of fatal roadway departure crashes is midnight to 3 AM. The day of week that represents the highest number of fatal roadway departure crashes is Sunday. The majority of fatal roadway departure crashes involved a first harmful event of striking a tree or another vehicle. Figures 3 through 11 summarize fatal roadway departure crash data.

Figure 3 - Roadway Depature Fatal Crashes by Year

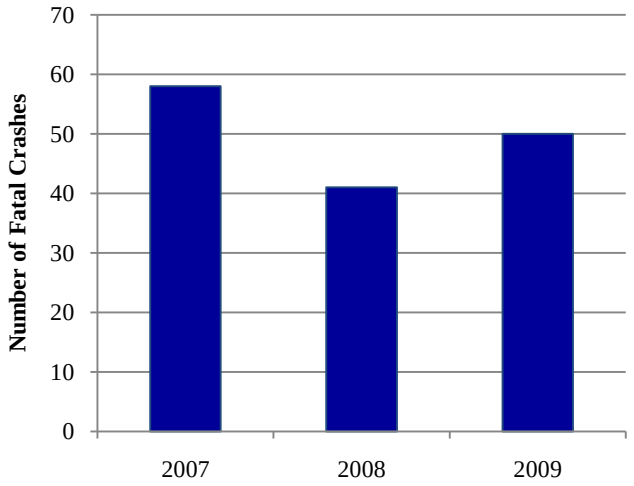


Figure 4 - Roadway Departure Fatal Crashes by Time of Day

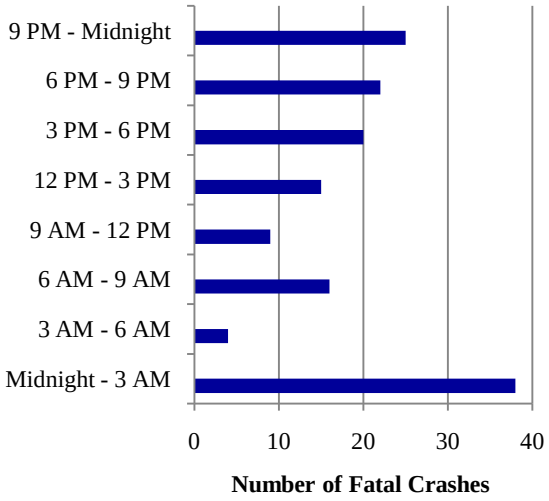


Figure 5 - Roadway Departure Fatal Crashes by Surface Condition

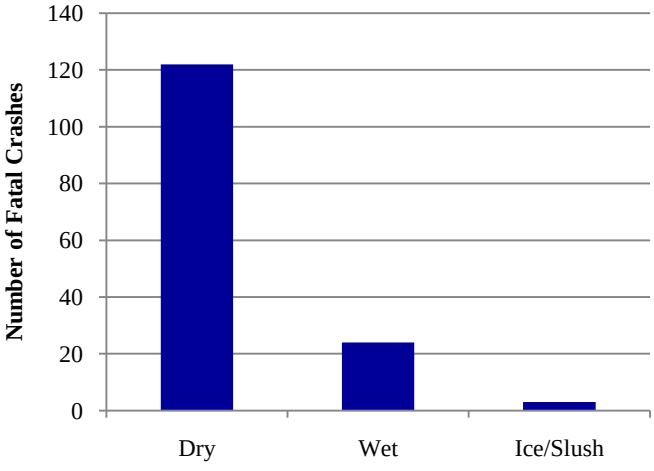


Figure 6 - Roadway Departure Fatal Crashes by First Harmful Event

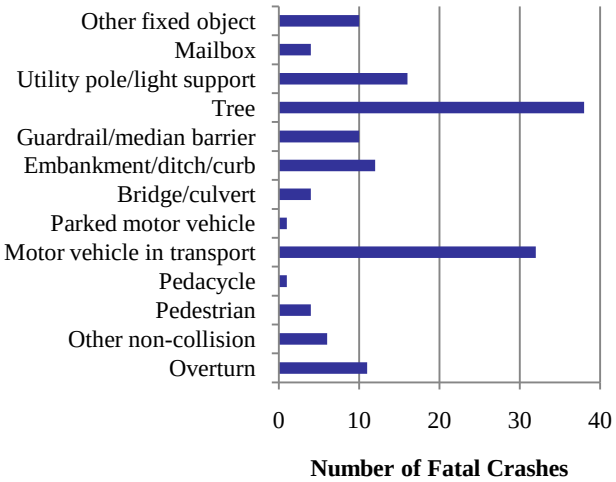


Figure 7 - Roadway Departure Fatal Crashes by Gender

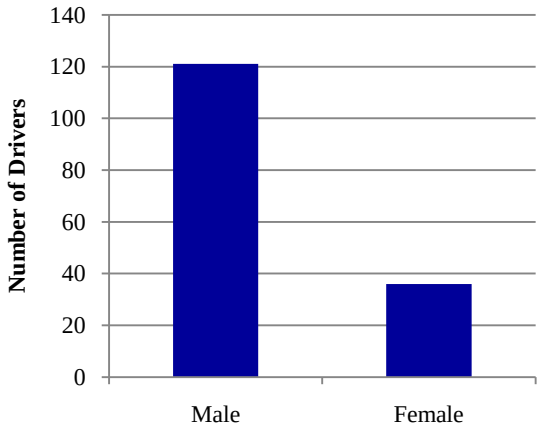


Figure 8- Roadway Departure Fatal Crashes by Age

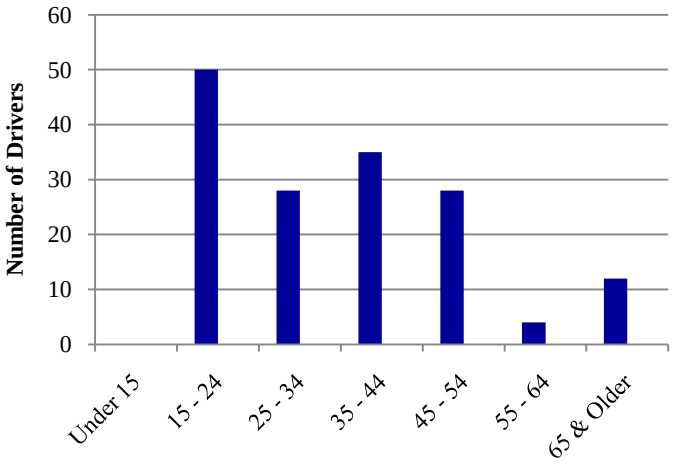


Figure 9 - Roadway Departure Fatal Crashes by Roadway Functional Classification

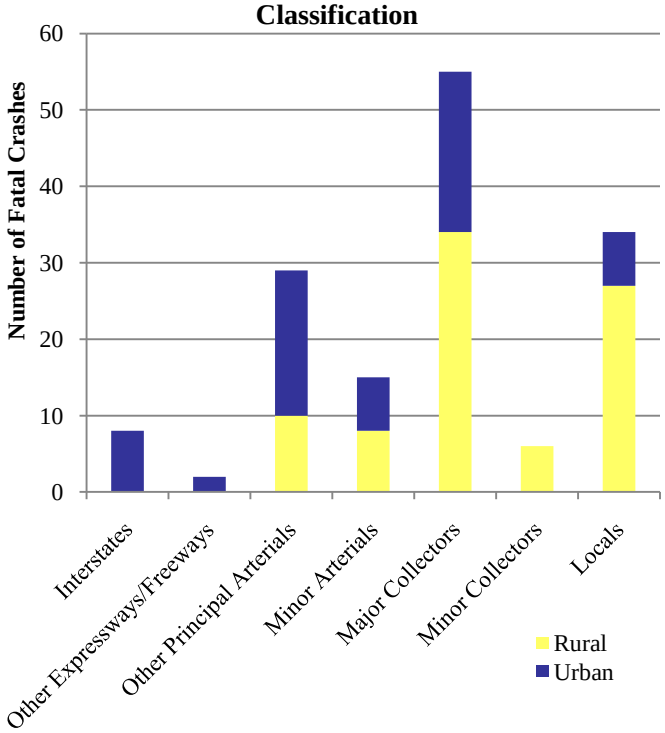


Figure 10- Roadway Departure Driver Contributing Circumstances

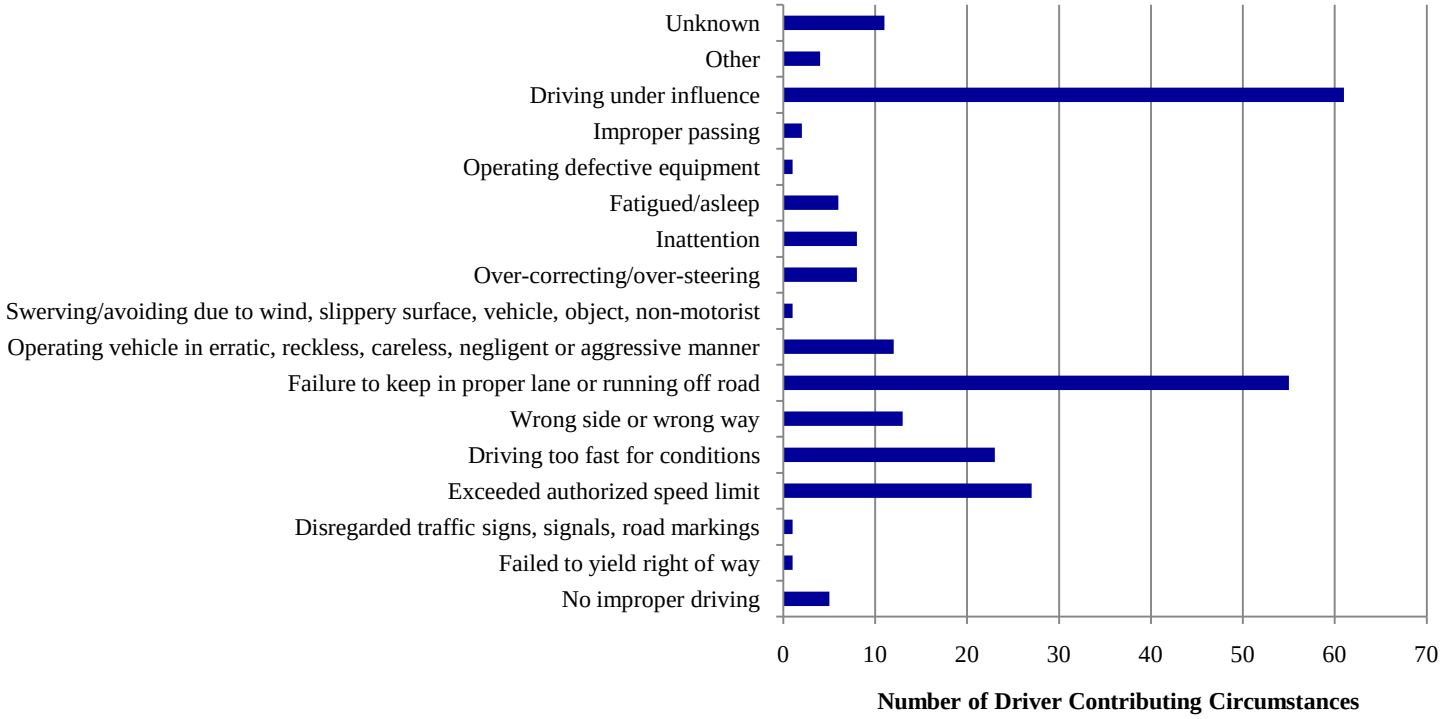
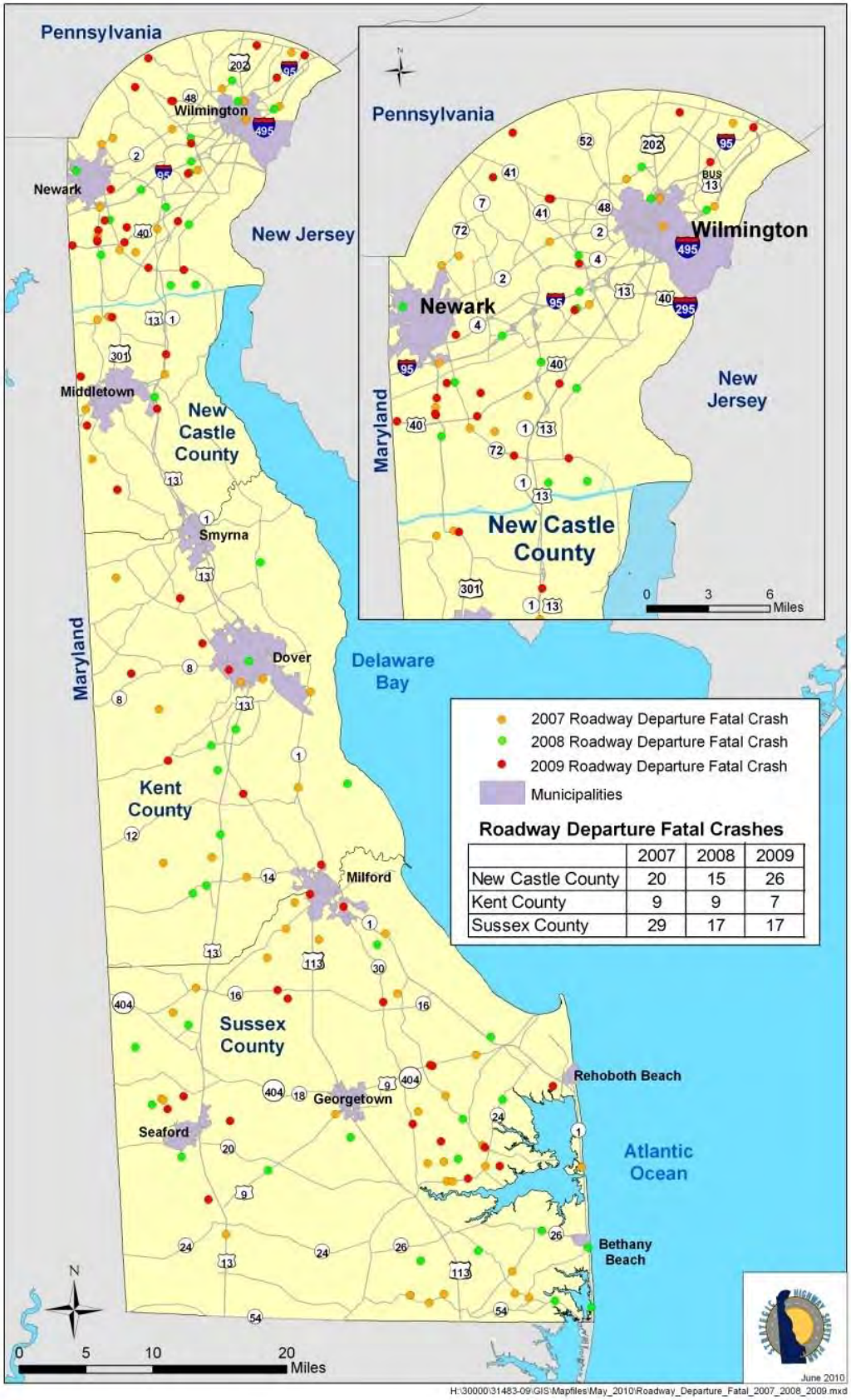


Figure 11 – Map of Roadway Departure Fatal Crashes



Roadway Departure Fatal Crashes	2007	2008	2009
New Castle County	20	15	26
Kent County	9	9	7
Sussex County	29	17	17

GOAL

Reduce the number of fatal roadway departure crashes by 5 percent every three years to achieve 48, 45, and 43 total fatal crashes involving a roadway departure by 2012, 2015, and 2018, respectively in order to achieve the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

STRATEGIES AND IMPLEMENTATION

By identifying the location, time of day, day of week, and other patterns that characterize roadway departure crashes, focus can be placed on target areas, driver behaviors and time periods. As shown in the data review, strategies should target 15 to 24 year old males, rural roadways, major collectors, Saturdays, and midnight to 3 AM. Additionally, the first harmful event after the roadway departure most frequently involves vehicles striking trees or other vehicles; therefore, focus should be placed on these consequences of the roadway departures.

Impaired driving and unrestrained passenger-vehicle occupants represent a significant portion of fatal crashes involving a roadway departure; therefore, addressing those emphasis areas will likely reduce fatal crashes involving a roadway departure. Improving driver behavior will continue to be an important factor in preventing fatal roadway departure crashes. By implementing effective strategies to address these emphasis areas, the behavioral issues that result in a roadway departure will be reduced. In addition, applying engineering strategies, such as installing rumble strips and raised pavement markers, can further decrease the potential for a vehicle to leave the roadway. Due to continuous development in the rural areas of the state and the increase in the number of people traveling on rural roadways, installing rumble strips on these types of roadways must be a priority.

Although preventing vehicles from departing the roadway is the ideal solution, roadway departure crashes will continue to occur. Therefore, the second part of this emphasis area identifies strategies and countermeasures that can be implemented to reduce the severity of roadway departures, such as removing or relocating roadside obstacles, so vehicles are able to recover prior to striking another vehicle or a roadside object.

ENGINEERING: Delaware's plan includes the following engineering strategies to reduce the frequency and severity of roadway departure crashes. Several of the strategies and countermeasures listed below require the identification of corridors and segments of roadways with a high frequency of roadway departure crashes and performing road safety audits to determine the most effective solution for the particular location. Additionally, system initiatives geared towards the development of policies and guidelines should be implemented to address roadway departure crashes on a broader level.

- System and policy initiatives
    - Prevent roadway departure crashes
        - Develop a consistent design and maintenance of shoulders
        - Implement guidance to use wider edge lines in known high-crash locations
        - Develop standards for using skid resistant surfaces, including how and when to test pavement
        - Implement guidelines for the use of safety edge
        - Develop a system-wide procedure for installing rumble strips, raised pavement markers, skid resistant pavement, or other improvements based on crash data

- Reduce the severity of roadway departure crashes
  - Maintain clear zone guidelines whenever possible
  - Develop, revise, and implement planting and mowing guidelines to prevent vegetation from growing in hazardous locations
  - Require utility companies to delineate utility poles as part of the permit process and improve guidelines for when to use guardrail, attenuators, or delineators for utility poles
  - Develop new guardrail repair and maintenance guidelines

- Spot or target location improvements
  - Prevent roadway departure crashes
    - Widen and/or pave shoulders in target locations
    - Install pavement grooving within high-crash curves
    - Install skid resistant pavement
    - Install center line or shoulder rumble strips in known locations with a high incidence of head-on or roadway departure crashes
    - Install raised pavement markers to address a high frequency of roadway departure crashes that occur at nighttime and/or during wet weather
    - Reduce pavement edge drop-offs
    - Apply traffic calming measures to reduce speeds
    - Improve signing and pavement markings approaching horizontal curves (e.g., install in-lane markings for sharp curves, rumble strips, etc.)
    - Install hazard identification beacons to warning motorists of roadway obstacles
    - Flatten horizontal and vertical curves
    - Install roadside delineators
  - Reduce the severity of roadway departure crashes
    - Remove, relocate, delineate or protect trees, utility poles, and other fixed objects within the clear zone and/or hazardous locations (utility poles within the clear zone should be relocated to the edge of the right-of-way whenever possible)
    - Coordinate with land owners to trim or remove trees within the clear zone
    - Install roadside barrier, where appropriate
    - Decrease the number of utility poles along a corridor
    - Design safer slopes and ditches to prevent rollovers
    - Improve the design of roadside hardware (e.g., bury utilities, upgrade guardrail, install breakaway supports and poles, use crash cushions in front of hazardous immovable objects, etc.)

EVALUATION AND STATUS

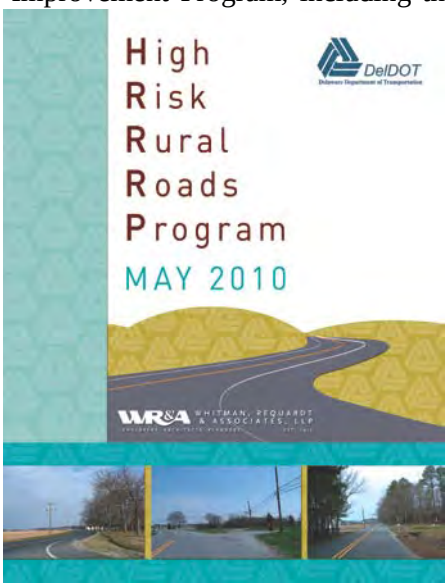
Delaware has made some progress in reducing fatal roadway departure crashes in recent years; however additional progress remains a priority. The number of fatal roadway departure crashes has declined from 58 fatal crashes in 2007 to 41 fatal crashes in 2008 and 50 fatal crashes in 2009. However, roadway departures still represent the greatest percentage of all statewide fatal crashes; therefore, Delaware must focus on implementing strategies to further reduce roadway departures and address driver behavioral issues that are a factor in many roadway departure crashes (i.e., aggressive driving, impairing driving, not wearing seat belts), in order to reach the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

The following improvements have been implemented to address roadway departure crashes in Delaware in recent years:

ENGINEERING

- System and policy initiatives
    - DelDOT is currently updating their Design Guidance Memorandum (DGM) for installing rumble strips to include a 3/8 inch depth rumble strip on long bridge segments or viaducts. The DGM will include requirements to install rumble strips on all entrance and exit ramps to and from freeways and expressways. Additionally, all rumble strips are now being designed to be bicycle-friendly, except on freeway segments.
    - DelDOT is currently revising the *Delaware MUTCD* in response to the federal *2009 MUTCD*. Additionally, DelDOT is training their staff on the application and practices in the *MUTCD*. Documentation and training regarding the installation of traffic control devices, such as proper signing, markings, and the installation of delineators, will assist in keeping vehicles on the roadway.
    - DelDOT is in the process of developing a DGM for the installation of the safety edge asphalt paving technique to reduce pavement edge drop-off issues.
    - Several strategies designed to reduce deer-vehicle crashes are being explored by DelDOT and other agencies; however, strategies implemented to prevent deer-vehicle crashes should also potentially reduce roadway departure crashes that occur as a result of motorists swerving to avoid a deer in the roadway.

- Spot or target location improvements
  - Each year, as part of the annual Highway Safety Improvement Program, including the High Risk Rural Roads Program, Hazard Elimination Program, and the Transparency Report, DelDOT implements numerous cost-effective signing, pavement marking, maintenance, and surface treatment improvements to potentially reduce roadway departure crashes at locations identified as having a statistically higher than average crash rate than other similar roadways in the state. These types of improvements include:



    - Installing roadside delineators through horizontal curves
    - Installing center line raised pavement markers (RPMs)
    - Providing skid-resistant pavement surfaces
    - Installing new warning signs or upgrading existing signs to larger sizes or fluorescent yellow sheeting
    - Installing hazard identification beacons (HIBs) with warning signs
    - Installing pavement grooving through horizontal curves to warn and slow motorists navigating the curve
    - Installing edge line and center line pavement markings
    - Removing and/or trimming trees
    - Delineating utility poles
    - Removing or relocating other fixed objects
    - Repairing and upgrading guardrail sections and end treatments
    - Installing median barrier
    - Installing delineators on roadside or median barrier
  - DelDOT installed center line and edge line rumble strips along several corridors:
    - SR 1 from US 113 to Christiana Mall
    - US 301
    - SR 1 between Dewey Beach and Fenwick Island
    - I-495 in the vicinity of the US 13 (Claymont) interchange
  - DelDOT installed median barrier along sections of SR 1:
    - High tension cable barrier was installed along SR 1 from SR 299 to north of SR 896
    - W-beam guardrail was installed within the median of SR 1 from north of SR 273 to Tybouts Corner

PRIMARY EMPHASIS AREA TWO: CURBING AGGRESSIVE DRIVING

BACKGROUND

The NHTSA defines aggressive driving as, "when individuals commit a combination of moving traffic offenses so as to endanger other persons or property." Although the terms aggressive driving and road rage are often used interchangeably, it is important to note the differences between the two driving behaviors. Aggressive driving is a traffic violation; however, road rage is a criminal violation. Aggressive driving is a contributing factor in a significant percentage of fatal crashes throughout the country and in Delaware; therefore, addressing aggressive driving behaviors is a critical factor in reducing nationwide and statewide fatalities. Aggressive driving represents one of the largest percentages (45 percent) of fatal crashes in Delaware for the 2007 to 2009 time period. Delaware State Law Title 21, Chapter 41 defines aggressive driving as violating three or more of the following sections of the Delaware Code:

- Obedience to traffic control devices
- Traffic control signals
- Overtaking on the right
- Driving within a traffic lane
- Following too closely
- Yielding to the right-of-way
- Vehicles entering the roadway
- Failure to use turn signals
- STOP signs and YIELD signs
- Overtaking and passing school buses
- Speed restrictions
- Specific speed limits

If a driver commits three of these offenses in a single incident, that person will be charged with aggressive driving. To identify crashes attributed to aggressive driving, fatal crash data was reviewed for the following driver contributing circumstances (any crash where at least one driver contributing circumstance indicated aggressive driving was included):

- Exceeded authorized speed limit
- Driving too fast for conditions
- Following too closely
- Improper turn
- Unsafe lane change
- Improperly passing
- Disregarded traffic signs, signals, road markings
- Failing to yield right-of-way
- Operating vehicle in erratic, reckless, careless, negligent or aggressive manner

DATA REVIEW

Based on 2007 to 2009 fatal crash data, speeding is the most prevalent cause of aggressive driving-related crashes, representing 52 percent of aggressive driving fatal crashes. Speeding includes drivers traveling above the posted speed limit or traveling too fast for conditions; therefore, motorists may be driving at or under the posted speed limit, but weather conditions or poor visibility could cause drivers to lose control and create a collision. Additionally, failing to yield the right-of-way represents 11 percent of fatal crashes that involved aggressive driving factors. Disregarding traffic signs, signals, and road markings represents 10 percent of fatal crashes involving aggressive driving factors.

Forty-four percent of fatal crashes involving aggressive driving factors occurred on rural roadways, although rural roads account for only 29 percent of vehicle-miles traveled in 2007, 2008 and 2009. Additionally, 46 percent of fatal crashes involve aggressive driving factors occurred on collectors and local roads; however, only 33 percent of vehicle-miles traveled in 2007, 2008 and 2009 occurred on these classifications of roadways. Further analysis shows that 82 percent of drivers who demonstrated aggressive driving behaviors in a fatal crash were male. The 15 to 24 years old age group represents the highest number of drivers involved in fatal crashes involving aggressive driving. The time period that has the highest number of fatal crashes involving aggressive driving is 3 PM to 6 PM. The day of week that represents the highest number of fatal crashes involving aggressive driving is Saturday. Additionally, 36 percent of drivers exhibiting aggressive driving factors are also driving under the influence of alcohol and/or drugs, 40 percent of fatal crashes involving aggressive driving were roadway departure crashes, and 39 percent of fatal crashes involving aggressive driving also involved an unrestrained passenger-vehicle fatality. Figures 12 through 20 summarize fatal aggressive driving-related crash data.

Figure 12 - Aggressive Driving Fatal Crashes by Year

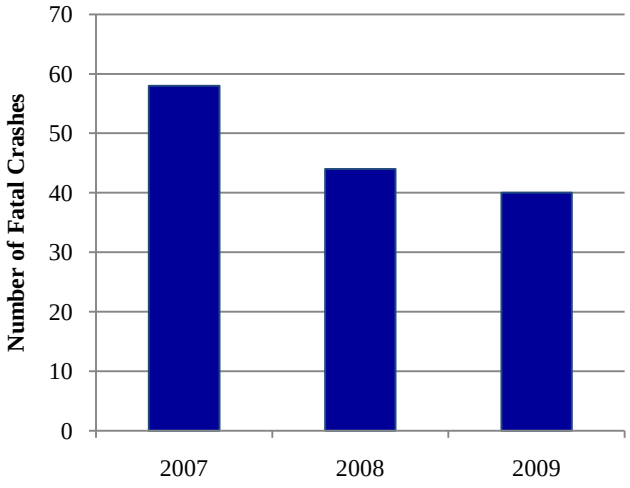


Figure 13 - Aggressive Driving Fatal Crashes by Time of Day

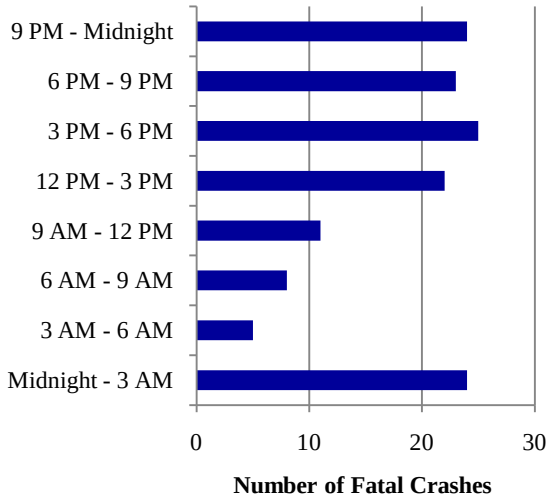


Figure 14 - Aggressive Driving Fatal Crashes by Day of Week

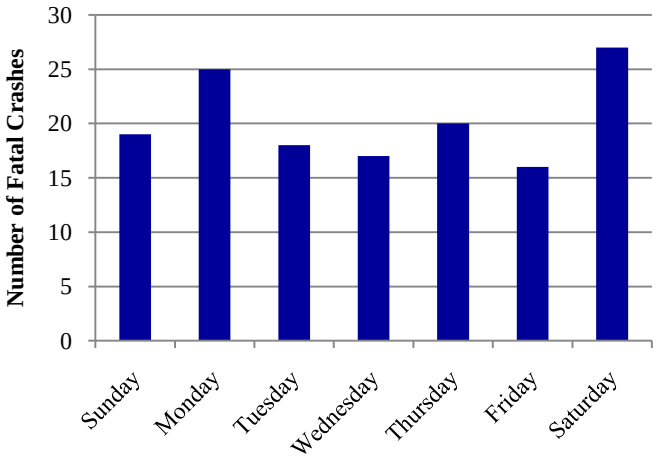


Figure 15 - Aggressive Driving Fatal Crashes by Month

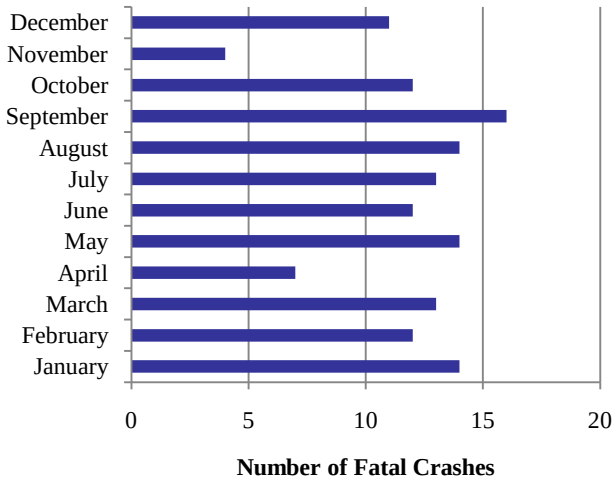


Figure 16 - Aggressive Driving Drivers by Gender

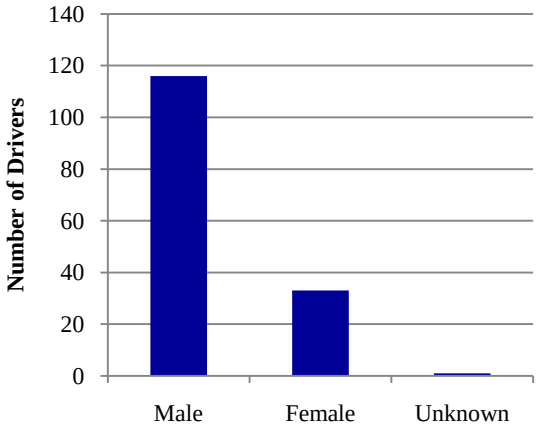


Figure 17 - Aggressive Driving Drivers by Age

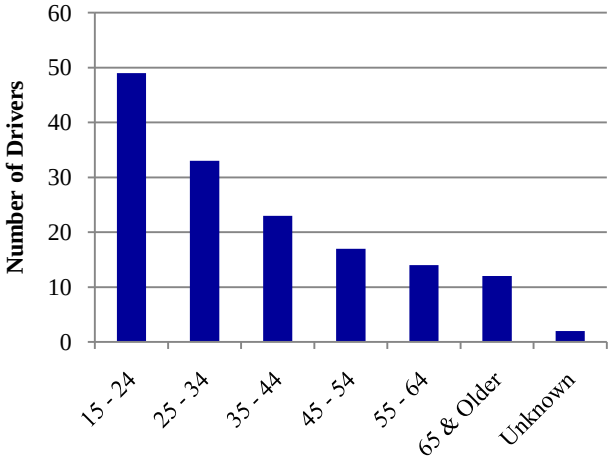


Figure 18 - Aggressive Driving Fatal Crashes by Roadway Functional Classification

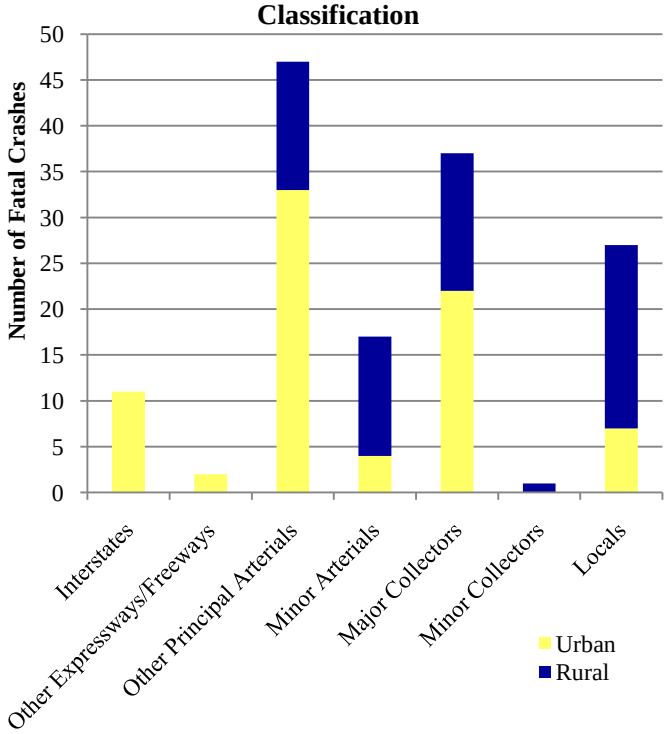


Figure 19 - Aggressive Driving-Related Driver Contributing Circumstances

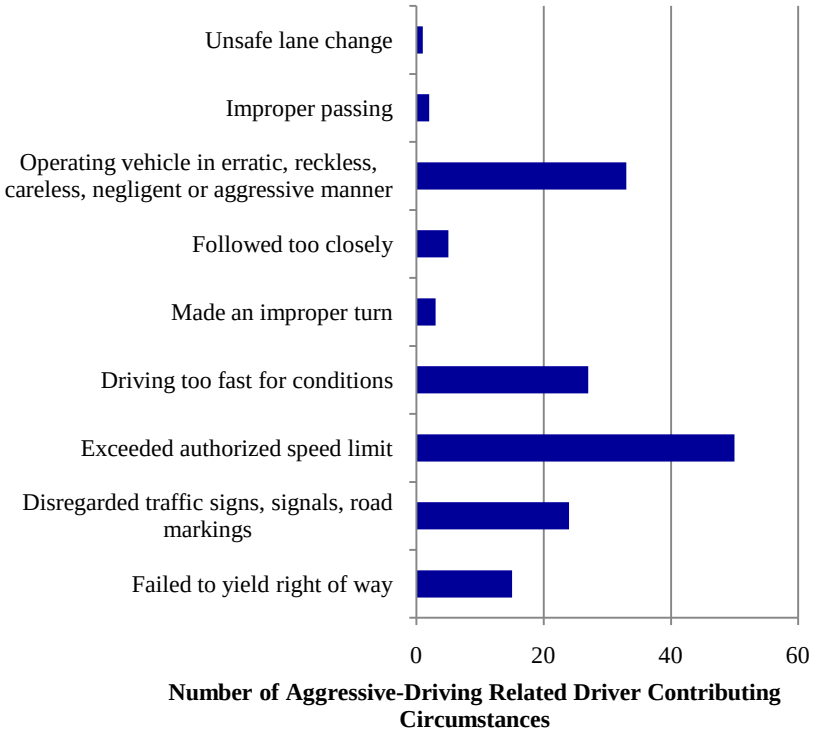
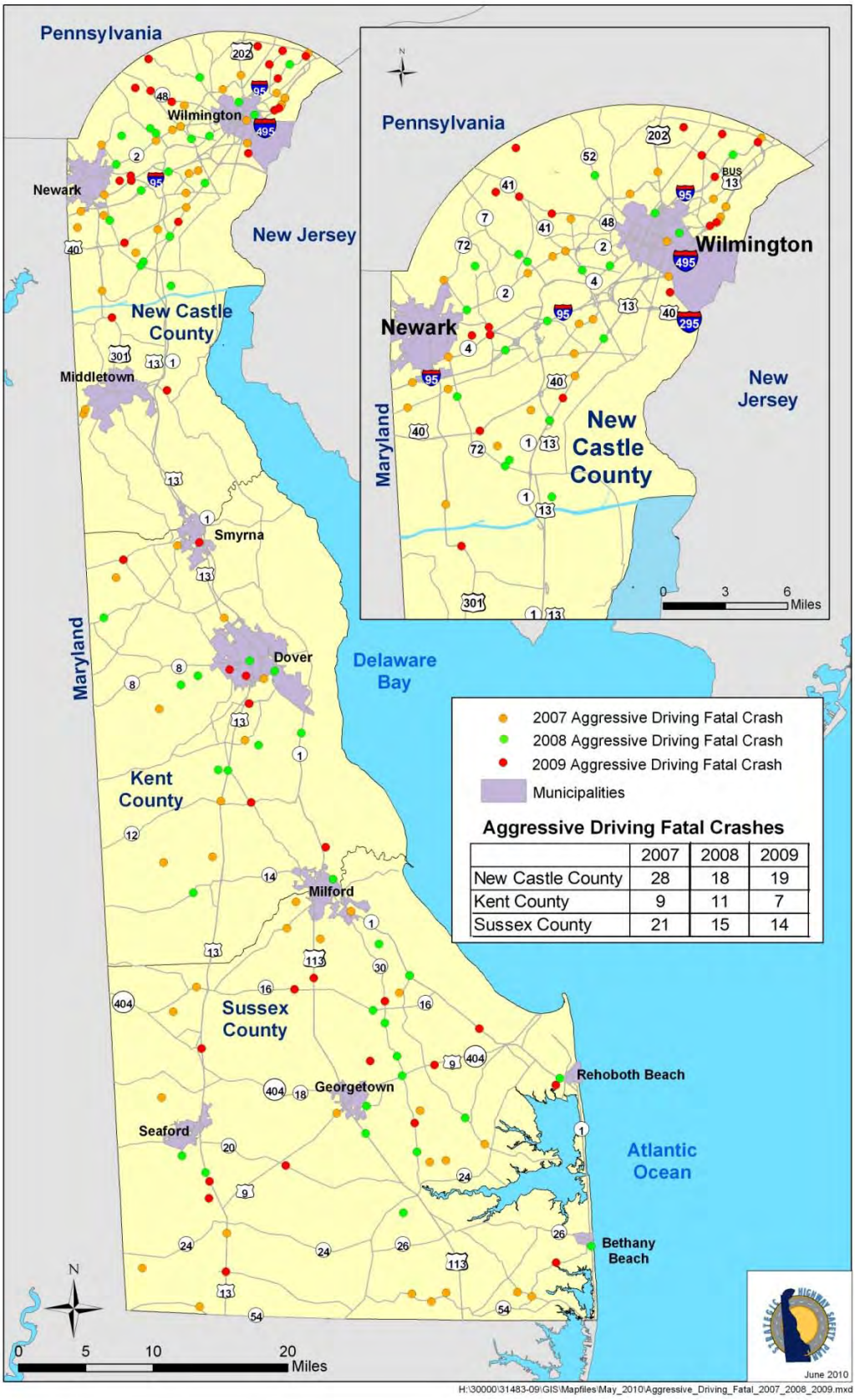


Figure 20 – Map of Fatal Aggressive Driving Crashes



GOAL

Reduce the number of fatal crashes involving aggressive driving factors by 5 percent every three years to achieve 38, 36, and 34 total fatal crashes involving aggressive driving factors by 2012, 2015, and 2018, respectively in order to achieve the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

STRATEGIES AND IMPLEMENTATION

In many cases, aggressive driving behaviors result from interaction between the driver and the driving environment. Therefore, education, enforcement, and engineering strategies can all be implemented to address crashes involving aggressive driving. By identifying the location, time of day, day of week, and other patterns that characterize aggressive driving-related crashes, focus can be placed on target areas and time periods. Additionally, new policies may need to be developed to identify aggressive driving corridors and the most effective response.

As shown in the data review, strategies should target 15 to 24 year old males, rural roadways, collectors and local roadways, Saturdays, and 3 PM to 6 PM. Additionally, impaired driving, unrestrained passenger-vehicle occupants, and roadway departures represent a significant portion of fatal crashes involving aggressive driving; therefore, addressing those emphasis areas will likely reduce fatal crashes involving aggressive driving as well. Outreach efforts should emphasize the consequences of aggressive driving at intersections (e.g., red light running crashes) and at curves (e.g., roadway departures), the more severe effects of aggressive driving while impaired, on a motorcycle, or not wearing a seat belt, and how motorists should react when encountering an aggressive driver.

Delaware's plan includes strategies to reduce aggressive driving for each of these three "E's":

EDUCATION: Public information and education campaigns can significantly increase awareness of and help reduce aggressive driving behaviors. These types of campaigns have been proven to be more effective when used in combination with targeted enforcement strategies. Delaware's strategies include:

- Conduct media outreach to increase public awareness, convey how to make Delaware's roadways safer, and identify the consequences of aggressive driving
    - Develop consistent public information messages to maximize public awareness of aggressive driving
    - Increase high visibility education, especially among high-risk groups
    - Emphasize aggressive driving factors separately (e.g., speeding, red light running, etc.)
    - Use billboard, radio and television advertisements to develop a visual to convey the extensive nature of the problem and establish memorable slogans or phrases to enhance awareness and promote tolerant or non-aggressive driving behaviors
    - Create an online survey to assess the public's understanding of the safety risks associated with aggressive driving

- Educate young and high-risk drivers of the risks and consequences of aggressive driving by establishing effective lines of communication with the Department of Education, Insurance Commissioner's Office, and Division of Motor Vehicles
    - Ensure driver education instructors incorporate aggressive driving traits, factors, and risks into their lesson plans
    - Combine classroom safety education and behind-the-wheel education pertaining to aggressive driving
    - Strengthen the graduated driver's licensing program through legislative action
    - Ensure that defensive driving classes address all aggressive driving traits, factors, and risks
    - Emphasize aggressive driving factors separately (e.g., speeding, red light running, etc.)

ENFORCEMENT: Understaffed and underfunded law enforcement agencies are often forced to reduce traffic enforcement efforts; therefore, by providing additional funding for traffic enforcement, law enforcement officers can prevent crashes by targeting aggressive driving behaviors and by apprehending offenders before a crash occurs. With continual and visible law enforcement, traffic behaviors have been shown to improve, thereby, potentially reducing aggressive driving crashes in the targeted areas and corridors of enforcement. In order for this strategy to be effective, the public must be educated on the importance of the high levels of traffic enforcement efforts that target aggressive driving. Additionally, by increasing the penalty and/or fine structure associated with aggressive driving offenses motorists will be deterred from driving aggressively. However, laws must be strictly enforced to be effective at deterring aggressive driving behavior; otherwise, aggressive driving behaviors are unlikely to improve. Delaware's strategies include:

- Improve compliance with traffic laws by providing adequate resources to allow state and local law enforcement agencies to perform targeted traffic enforcement to address aggressive driving
    - Increase enforcement funding to better address aggressive driving problems at high crash locations and for high-risk driving populations
    - Promote the use of 911 to report aggressive driving
    - Provide law enforcement with training and tools, such as radar, necessary to reduce aggressive driving
- Limit occurrence by supporting legislative action to strengthen aggressive driving laws and deter aggressive driving behaviors by increasing penalties for violators
    - Conduct judicial outreach to promote consistency in verdicts and sentencing
    - Increase the point structure and penalties for aggressive driving
    - Educate the public regarding any changes in the driving laws

ENGINEERING: Engineering and infrastructure improvements, such as traffic calming devices and speed feedback signs, can deter motorists from speeding and driving aggressively. Additionally, encouraging the use of mass transit and ridesharing and by using new and existing intelligent transportation systems effectively, Delaware can relieve congestion and driver frustration (e.g., coordinating traffic signals along congested corridors will reduce travel times and delays). Reducing frustration caused by the driving environment will potentially eliminate or lessen a major contributor to aggressive driving and speeding. However, for this strategy to be successful, it is necessary to ensure law enforcement, the Office of Emergency Medical Services (OEMS), and DelDOT coordinate their efforts to improve incident management and to obtain adequate personnel to address issues and maintain consistent traffic control devices. Delaware's strategies include:

- Reduce driver frustration by providing consistent driver expectations, which increases driver consistency and manages the highway system more efficiently
    - System and policy initiatives
        - Provide real-time information to drivers to keep motorists informed of roadway conditions and delays to allow them to make appropriate decisions
        - Provide uniform traffic control devices including signing, signal timing, and pavement markings
        - Avoid artificially low speed limits
        - Manage traffic impacts from highway work zones to reduce delays approaching and within the work areas
    - Spot or target location improvements
        - Coordinate traffic signals and improve signal timing, especially along heavily traveled corridors, to reduce vehicle delay and driver frustration
        - Install traffic calming devices and speed feedback signs to deter speeding

EVALUATION AND STATUS

Delaware has made significant progress in reducing fatal crashes involving aggressive driving factors. The number of fatal crashes involving aggressive driving factors has declined from 58 fatal crashes in 2007 to 40 fatal crashes in 2009. However, Delaware will continue to implement strategies to further reduce these types of crashes in order to reach the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

The following programs have been implemented to address aggressive driving crashes.

EDUCATION AND ENFORCEMENT

- OHS launched the first "Stop Aggressive Driving" campaign with a focus on speed enforcement in 2008. The 2009 and 2010 campaigns continued to be speed-focused. As part of this program, enforcement is conducted in each county by the Delaware State Police and municipal law enforcement agencies, as identified by crash data. Enforcement targets roadways where crash data reveals an above-average number of speeding-related crashes. To support the enforcement efforts, the "Stop Speeding Before It Stops You" public awareness campaign reminds drivers about the dangers of speeding. Through billboards, posters, table tents, fliers, and radio spots, drivers are encouraged to slow down and to curb aggressive driving behaviors such as tailgating, running red lights, and failing to yield the right-of-way. In addition to the potential loss of life, the "If Speeding Doesn't Kill You the Points Will" message demonstrates how speeding will cost the offender money from citations, higher insurance rates from points on their license, and more money for gas.
    - As part of the "Stop Aggressive Driving" Campaign, motorists are encouraged to call 911 to report aggressive drivers. Dispatchers will broadcast a "Be on the Lookout" message to officers in that area who will attempt to locate the aggressive driver.

  - The "Stop Aggressive Driving" campaign is one component of the "120 Days of Summer HEAT (Highway Enforcement of Aggressive Traffic) Campaign," an annual statewide effort to unify three safety campaigns ("Click It or Ticket," "Checkpoint Strikeforce," and "Stop Aggressive Driving"), specifically during the summer months.

- The Driver Personality Survey was created and posted on the OHS Aggressive Driving homepage in 2010 to aid drivers in identifying their driving personality (safe or aggressive) and learn more about aggressive driving.
- The SmartDrive program is implementing a phase aimed at encouraging teens to make responsible decisions about driving, including using seat belts, not drinking and driving, and reducing speeds.
- The 2008 and 2009 Delaware Office of Highway Safety Annual Highway Safety Conferences included sessions regarding speeding and reducing aggressive driving.

- DelDOT launched a statewide campaign in 2008 to educate drivers about the dangers of speeding in neighborhoods and residential areas. The central message of the campaign was simple and straightforward: "a pedestrian hit at 20 mph has a five percent chance of dying, a pedestrian hit at 30 mph has a 45 percent chance of dying, and at 40 mph the chances of death are 85 percent." DelDOT, state elected officials, school leaders, emergency responders and local officials joined residents on a "barnstorming tour" to promote this message throughout neighborhoods.
- DelDOT has been successful in reducing the number of red light running crashes by 45 percent at the first 20 intersections within the state that currently have red light cameras installed as part of the Electronic Red Light Safety Program (ERLSP).

ENGINEERING

- System and policy initiatives
  - DelDOT is currently revising the *Delaware MUTCD* in response to the federal 2009 *MUTCD*. Additionally, DelDOT is training their staff on the application and practices in the *MUTCD*. Proper documentation and training regarding the installation of traffic control devices will assist in providing drivers with a consistent driving environment.
  - DelDOT has implemented many improvements that will improve driver expectancy and potentially reduce aggressive driving throughout the state:
    - Implementing real-time detection to provide traveler information, improve incident management, and increase efficiency of the roadway network
    - DelDOT's video monitoring system allows DelDOT to detect traffic incidents and assist in coordinating emergency response units
    - Aerial monitoring flights allows DelDOT to monitor roadway conditions during the AM and PM peak periods and during special events
    - Provides travel time messages on dynamic message signs (fixed and portable)
    - Utilizes WTMC 1380 AM radio station to provide real time traveler information to the public
    - Utilizes Real Time Travelers Advisory (RTTA) to provide a listing of current roadway conditions

  - Motorist Assistance Patrol (MAP) trucks patrol Delaware roadways to assist disabled motorists
  - DelDOT is considering the implementation of "511," where motorists can use their phones to access current travel information, such as roadway conditions and traffic delays, that is currently provided on DelDOT's website and via WTMC

- Spot or target location improvements
  - As part of the annual Highway Safety Improvement Program, including the High Risk Rural Roads Program, Hazard Elimination Program, and the Transparency Report, DelDOT has implemented numerous cost-effective traffic signal timing and phasing, signing, and pavement marking improvements to potentially reduce speeding and other aggressive driving behaviors at locations identified as having a statistically higher than average crash rate than other similar roadways in the state.
  - DelDOT has implemented many improvements that will improve driver expectancy and potentially reduce aggressive driving, including coordinating traffic signals along congested corridors in the state, providing traffic responsive signals, and adding numerous signals to DelDOT's ACTRA signal system

PRIMARY EMPHASIS AREA THREE: INCREASING SEAT BELT USAGE

BACKGROUND

Wearing a seat belt is the most effective way to prevent serious injuries and death during a crash. Seat belts provide the best defense against poor drivers on the roadway by keeping motorists safe and secure inside their vehicle during a crash and preventing motorists from being ejected from their vehicle due to the force of the impact.

Secondary seat belt usage laws were established in the 1980s. Under this law, law enforcement officers were able to enforce seatbelt use only if the vehicle was pulled over for another traffic violation. In 2003, Delaware joined many other states in establishing a primary seat belt enforcement law, which allows law enforcement officials to stop a vehicle for a seatbelt use violation alone. Since the primary seat belt law became effective, Delaware's seat belt usage rate has significantly increased. *NCHRP Report 500: Volume 11* states that primary seatbelt laws are more effective than secondary seatbelt laws.

According to NHTSA's National Occupant Protection Use Survey (NOPUS), nationwide seatbelt usage was up to 84 percent in 2009. Based on the Annual Statewide Observational Seat Belt Use Survey, Delaware's 2009 statewide seat belt usage was at 88 percent, indicating a decrease from 91 percent reported in 2008. However, in 2010, Delaware's seat belt usage rate rose again to 91 percent. Although Delaware's usage rate exceeds the nationwide rate, additional public awareness and heightened enforcement may further increase the rate of seat belt usage and, in doing so, contribute to a reduction in statewide traffic fatalities. Lack of seat belt usage represents one of the largest percentages (44 percent) of passenger vehicle fatalities in Delaware for the 2007 to 2009 time period.

DATA REVIEW

Based on 2007 to 2009 fatal crash data, 53 percent of unrestrained passenger-vehicle fatalities (i.e., does not include motorcycle fatalities) occurred on rural roadways, although rural roads account for only 30 percent of vehicle-miles traveled in 2007, 2008 and 2009. Additionally, 63 percent of unrestrained passenger-vehicle fatalities occurred on collectors and local roads; however, only 33 percent of vehicle-miles traveled in 2007, 2008 and 2009 occurred on these classifications of roadways. Further analysis shows that 68 percent of unrestrained passenger-vehicle fatalities were male. The 15 to 24 years old age group represents the highest number of unrestrained passenger-vehicle fatalities, representing 24 percent of fatalities. One unrestrained passenger-vehicle fatality was under the age of 7 and the child should have been restrained in a child safety seat. The time period that has the highest number of unrestrained passenger-vehicle fatalities is midnight to 3 AM, representing 30 percent of fatalities. Additionally, 72 percent of unrestrained passenger-vehicle fatalities also involved a roadway departure. Aggressive driving behaviors were associated with 43 percent of unrestrained passenger-vehicle fatalities and impaired driving was a factor in 40 percent of unrestrained passenger-vehicle fatalities. Figures 21 through 26 summarize crash data for fatalities not wearing a seat belt.

GOAL

Reduce the number of unrestrained passenger-vehicle fatalities by 5 percent every three years to achieve 39, 37, and 35 total unrestrained passenger-vehicle fatalities by 2012, 2015, and 2018, respectively in order to achieve the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

Figure 21 - Fatalities Not Wearing a Seat Belt

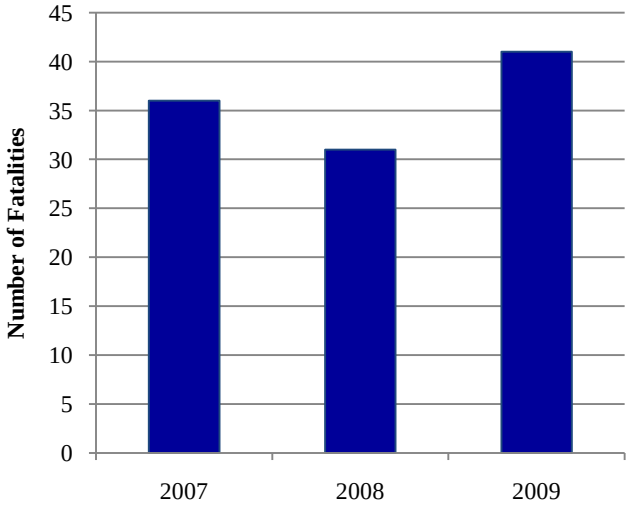


Figure 22 - Fatalities Not Wearing a Seat Belt by Time of Day

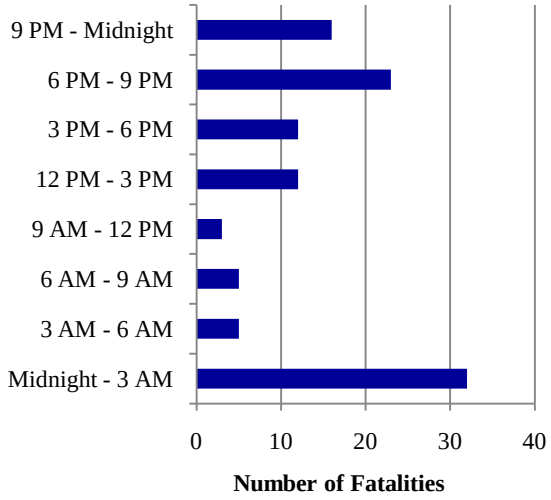


Figure 23 - Fatalities Not Wearing Seat Belts by Gender

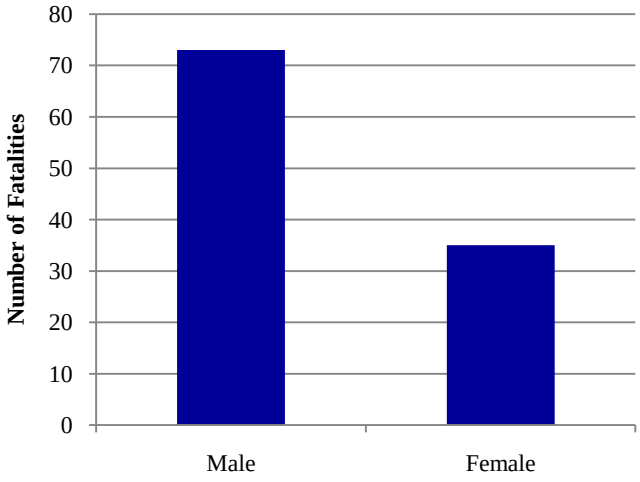


Figure 24 - Fatalities Not Wearing a Seat Belt by Age

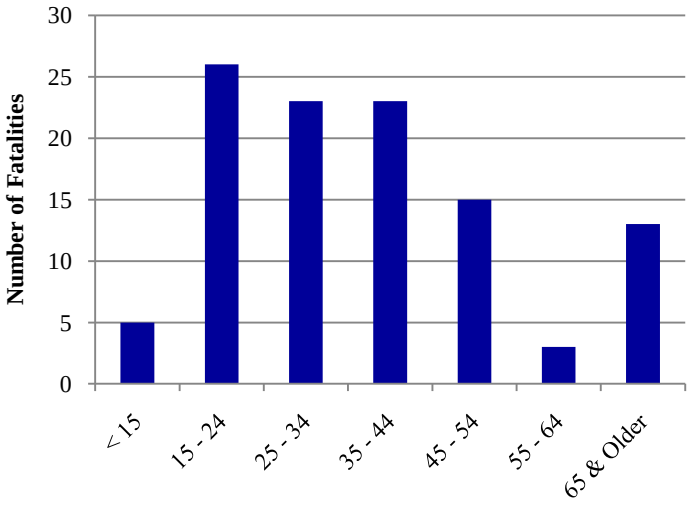


Figure 25 - Seat Belt Usage Fatalities by Roadway Functional Classification

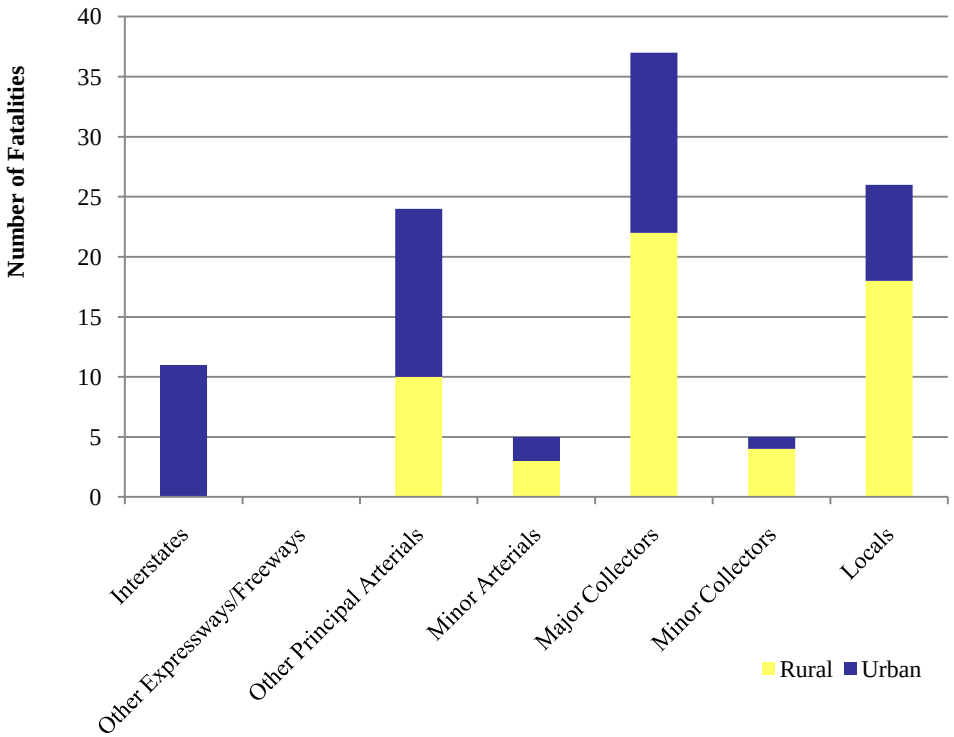
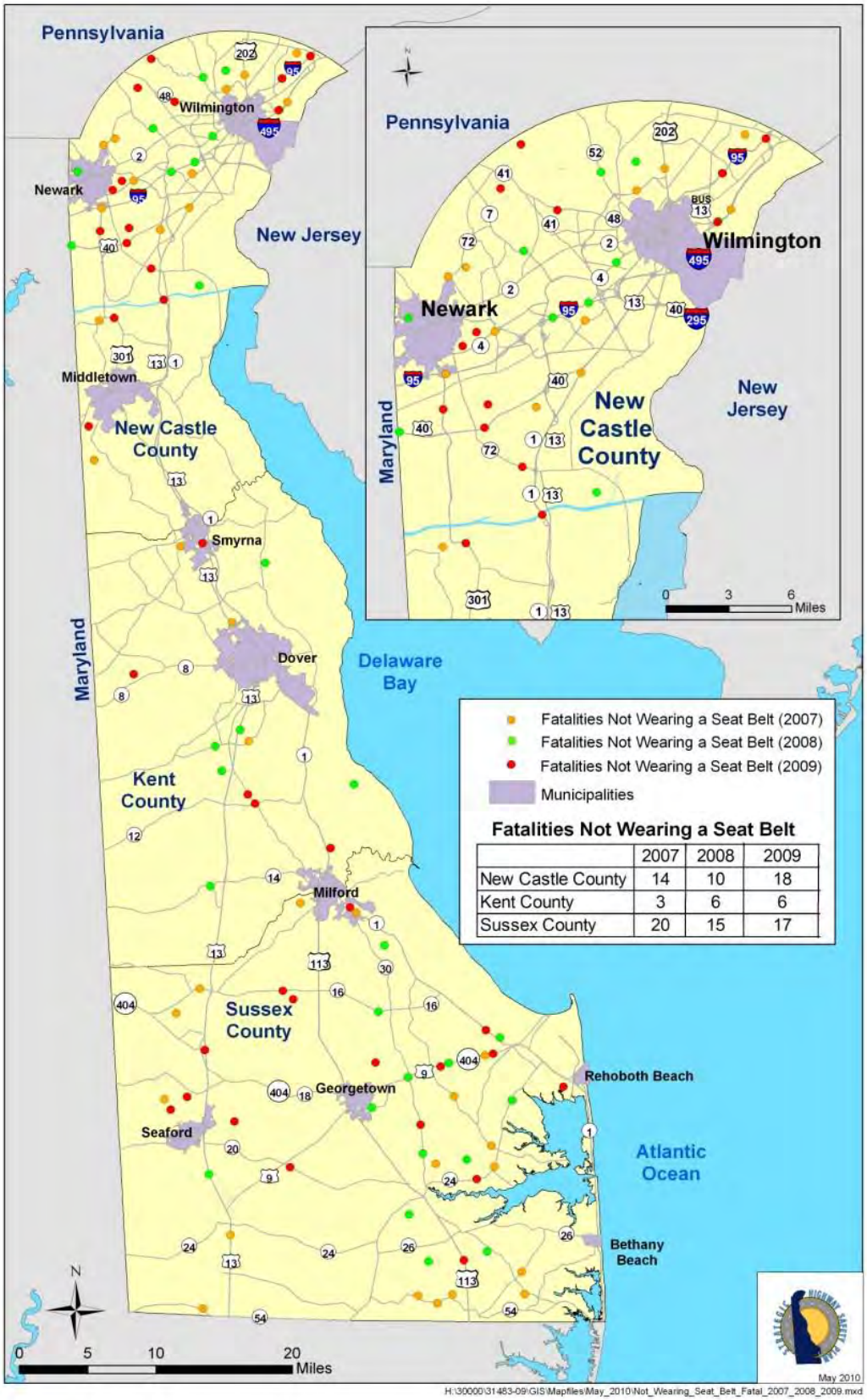


Figure 26 – Map of Fatalities Not Wearing a Seat Belt



STRATEGIES AND IMPLEMENTATION

Strategies to reduce fatalities involving unrestrained passenger-vehicle occupants involve educational and enforcement campaigns to inform the public of the safety benefits of wearing a seat belt. By identifying the age, time of day, gender, location and other patterns that characterize unrestrained passenger-vehicle fatalities, focus can be placed on target populations and times. As shown in the data review, strategies should target 15 to 24 year old males, rural roadways, and midnight to 3 AM. Additionally, aggressive driving, impaired driving, and roadway departures represent a significant portion of unrestrained passenger-vehicle fatalities; therefore, addressing those emphasis areas will likely reduce unrestrained passenger-vehicle fatalities. Outreach efforts should emphasize the more severe consequences of not wearing a seatbelt while driving aggressively or impaired or on the roadways with other motorists who are driving aggressively or impaired.

Delaware's plan includes strategies to increase seat belt usage for each of these two "E's":

EDUCATION: Public information and education campaigns can significantly increase seat belt usage within targeted groups. These types of campaigns have been proven to be more effective when used in combination with targeted enforcement strategies. Delaware's strategies include:

- Conduct media outreach and educational programs to increase public awareness, convey how to make Delaware's roadways safer, and identify the consequences of not wearing a seat belt when involved in a crash
    - Develop consistent public information messages to maximize public awareness of the law and safety benefits related to seat belt usage
    - Increase high visibility education, especially among high-risk groups
    - Increase risk perception by publicizing information about enforcement initiatives
    - Use billboard, radio and television advertisements to develop a visual to convey the extensive nature of the problem and establish memorable slogans or phrases to enhance awareness and promote seat belt usage
    - Ensure driver education instructors incorporate the laws and benefits related to seat belt usage into their lesson plans
    - Create an online survey to assess the public's understanding of the safety risks associated with not wearing a seat belt

ENFORCEMENT: Understaffed and underfunded law enforcement agencies are often forced to reduce traffic enforcement efforts; therefore, by providing additional funding for traffic enforcement, law enforcement officers can target seat belt usage and apprehend offenders before a crash occurs. With continual and visible law enforcement, traffic behaviors have been shown to improve, thereby, potentially increasing seat belt usage. In order for this strategy to be effective, the public must be educated on the importance of the high levels of traffic enforcement efforts that target seat belt usage. Additionally, by increasing Delaware's civil penalty and/or fine structure associated with seat belt offenses, motorists will be deterred from not wearing a seat belt and drivers will ensure that their passengers are buckled. However, laws must be strictly enforced to be effective at encouraging seat belt usage; otherwise, seat belt usage is unlikely to improve. Furthermore, driving laws must be upheld to maximize their effectiveness. Delaware's strategies include:

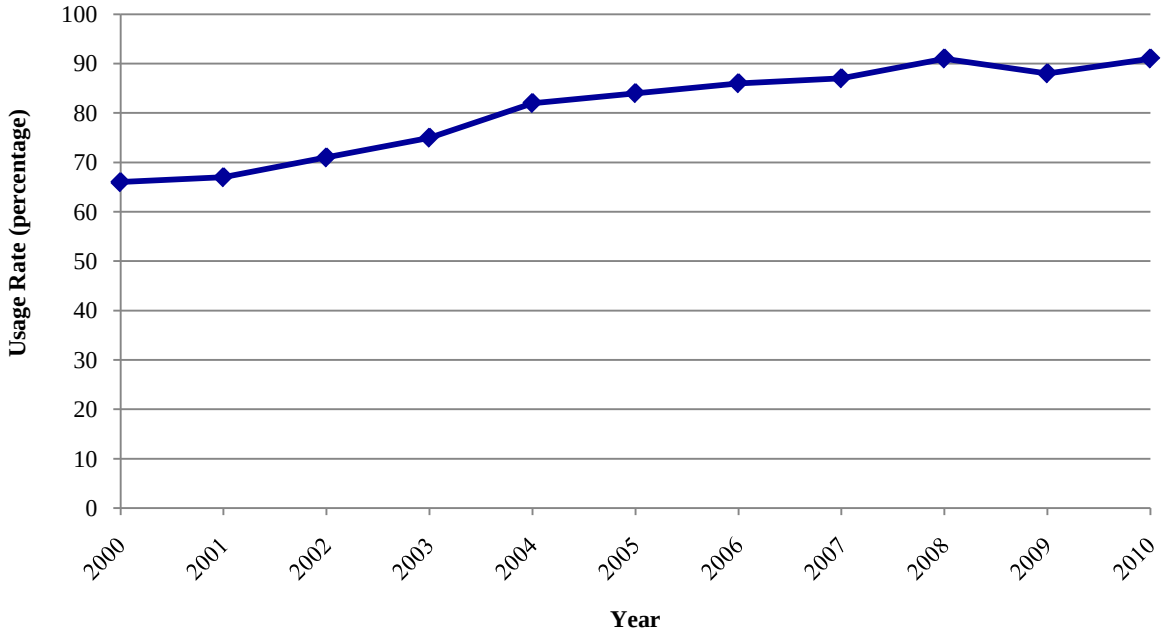
- Improve compliance with traffic laws by providing adequate resources to allow state and local law enforcement agencies to perform targeted traffic enforcement to address seat belt usage
    - Increase enforcement funding to better address seat belt usage problems at high crash locations and for high-risk driving populations
    - Conduct high visibility enforcement campaigns to maximize seat belt use
- Limit occurrence by supporting legislative action to strengthen seat belt laws and increase penalties for violators
    - Conduct judicial outreach to promote consistency in verdicts and sentencing
    - Increase the fines for seat belt violations
    - Educate the public regarding any changes in the driving laws
    - Restructure the penalty, including fines, to increase compliance
    - Remove the seatbelt "assessment" provision, which can reduce the penalty for multiple seat belt violations in one vehicle

EVALUATION AND STATUS

Delaware seat belt usage rates continue to be higher than the national seat belt usage rate; however, both Delaware's seat belt usage rate and the percentage of unrestrained passenger-vehicle fatalities increased in 2009. Delaware's historical seat belt usage rates are shown in Figure 27.

The number of fatal crashes involving a driver or passenger not wearing a seat belt has increased from 36 fatal crashes in 2007 to 41 fatal crashes in 2009. Delaware will continue to implement strategies and countermeasures to reduce these types of crashes in order to reach the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

Figure 27 - Delaware Seat Belt Usage Rates



Source: Delaware OHS FY 2011 Highway Safety Plan

EDUCATION AND ENFORCEMENT

- In 2002, OHS launched the first "Click It or Ticket" campaign in Delaware, a nationwide seat belt enforcement and awareness campaign aimed at saving lives by increasing the number of passenger vehicle drivers and passengers who consistently wear seat belts. Daily enforcement in the form of seat belt checkpoints and saturation patrols begin in May to identify both unrestrained drivers and passengers. Enforcement is conducted in each county by the Delaware State Police and municipal law enforcement agencies, targeting locations, populations and other patterns as identified by crash data. To support the enforcement efforts, the public awareness campaign reminds drivers about the dangers of not wearing a seat belt through billboards, posters, table tents, fliers, internet, television and radio spots, and messages printed on coffee sleeves and pizza boxes. Additionally, educational materials are distributed to businesses and schools statewide.

  - The "Click It or Ticket" campaign is the first component of the "120 Days of Summer HEAT (Highway Enforcement of Aggressive Traffic) Campaign," an annual statewide effort to unify three safety campaigns ("Click It or Ticket," "Checkpoint Strikeforce," and "Stop Aggressive Driving"), specifically during the summer months.
  - In 2009, approximately 30 participating agencies issued 1,973 seat belt citations; in comparison, in 2008, officers issued 2,347 citations
  - OHS coordinated a mini "Click it or Ticket" campaign in February 2009 aimed specifically at increasing seat belt use at night.
- As a result of the seat belt usage rate decline reported as a result of observational surveys performed in 2009, OHS launched a statewide enforcement and awareness mobilization program to conduct traffic safety patrols looking for unbuckled drivers and passengers. Public awareness efforts include radio, billboards, print ads, and messages on gas pumps. As part of these efforts, the 'tween' population was targeted by launching a "Be a Backseat VIP" campaign.
- The SmartDrive program is implementing a phase aimed at encouraging teens to make responsible decisions about driving, including using seat belts, not drinking and driving, and reducing speeds.
- The 2008 and 2009 Delaware Office of Highway Safety Annual Highway Safety Conferences included sessions regarding increasing seat belt usage.

PRIMARY EMPHASIS AREA FOUR: REDUCING IMPAIRED DRIVING

BACKGROUND

In Delaware, a driver is considered legally impaired when their blood alcohol concentration (BAC) is 0.08 percent or higher. Additionally, the presence of any illegal drug is enough evidence to convict a driver of driving under the influence (DUI). Drivers can also be charged with a DUI if their BAC is below the 0.08 limit and they are under the influence of legal medications but they appear to be impaired enough to pose a threat to others. Drivers under the age of 21 can be arrested for driving under the influence of alcohol with a BAC of 0.02 or higher. The penalties and consequences of a DUI arrest and conviction increase based on the driver's alcohol concentration level and the number of previous DUI convictions. Delaware's "implied consent" law requires drivers to submit to some form of impairment testing, if suspected of DUI. If a driver refuses to submit to testing, implied consent laws carry penalties such as mandatory suspension of a driver's license. In Delaware, impaired driving was a factor in 35 percent of all fatal crashes that occurred between January 2007 and December 2009.

DATA REVIEW

Based on 2007 to 2009 fatal crash data, 54 percent of fatal crashes involving impaired driving occurred on rural roadways, although rural roads account for only 29 percent of vehicle-miles traveled in 2007, 2008, and 2009. Additionally, 56 percent of fatal crashes involving impaired driving occurred on collectors and local roads; however, only 33 percent of vehicle-miles traveled in 2007, 2008, and 2009 occurred on these classifications of roadways. Further analysis shows that 81 percent of impaired drivers involved in a fatal crash were male. The 15 to 24 and 25 to 34 years old age groups represent the highest number of drivers involved in fatal crashes involving impaired driving. The time period that has the highest number of fatal crashes involving impaired driving is midnight to 3 AM, representing 35 percent of fatal crashes. Additionally, 69 percent of fatal crashes involving impaired driving also involved a roadway departure. Further analysis shows that 28 percent of fatal crashes involving impaired driving occurred on Saturday. Additionally, 46 percent of impaired drivers also exhibited aggressive driving behaviors and 49 percent of fatal crashes involving aggressive driving also involved an unrestrained passenger-vehicle fatality. Figures 28 through 35 summarize fatal impaired driving-related crash data.

GOAL

Reduce the number of fatal crashes involving impaired driving by 5 percent every three years to achieve 27, 25, and 24 total fatal crashes involving impaired driving by 2012, 2015, and 2018, respectively in order to achieve the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

Figure 28 - Impared Driving Fatal Crashes by Year

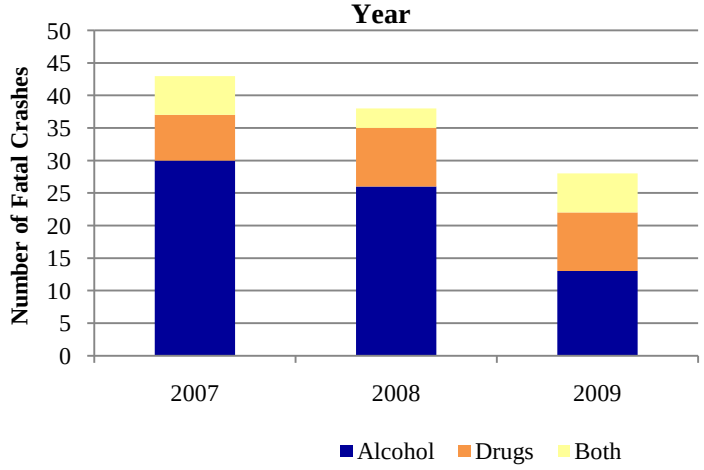


Figure 29 - Impaired Driving Fatal Crashes by Time of Day

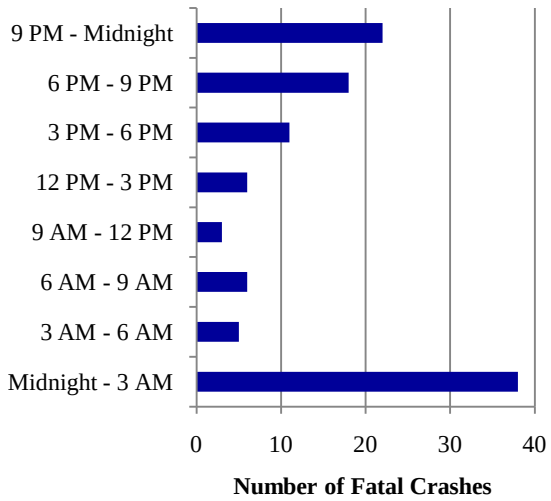


Figure 30- Impaired Driving Fatal Crashes by Day of Week

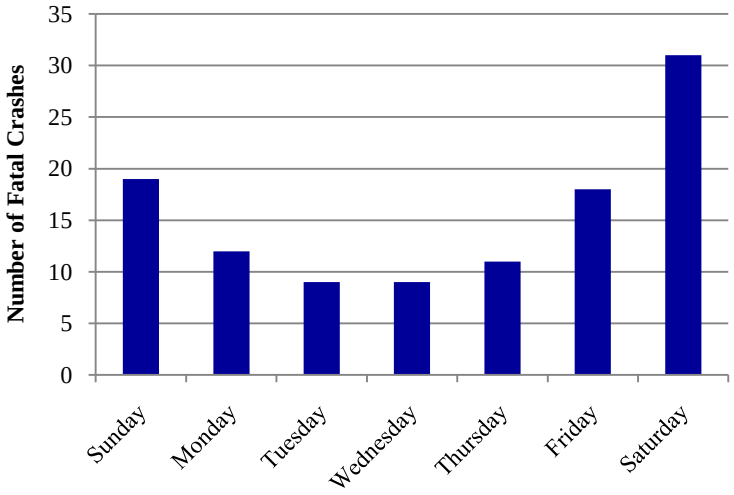


Figure 31 - Impaired Driving Fatal Crashes by Month

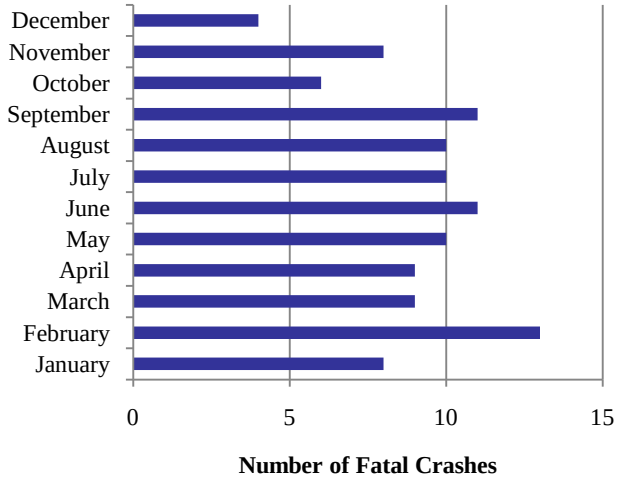


Figure 32 - Impaired Driving Fatal Crashes by Gender

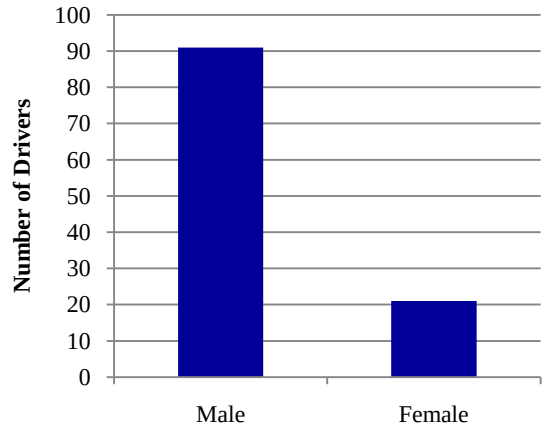


Figure 33 - Impaired Driving Fatal Crashes by Age

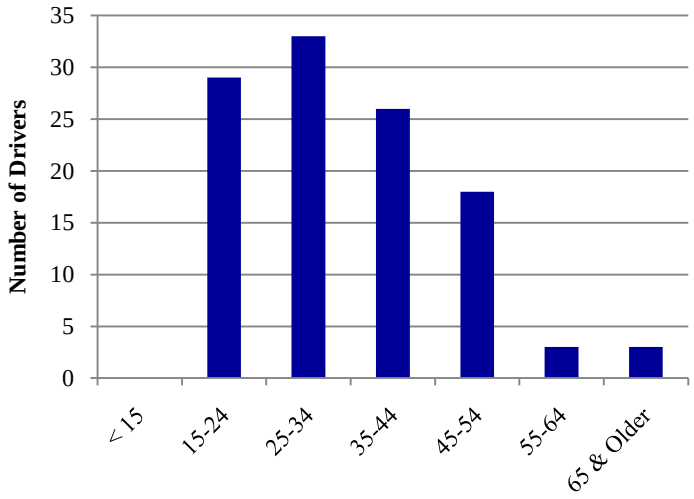


Figure 34 - Impaired Driving Fatal Crashes by Roadway Functional Classification

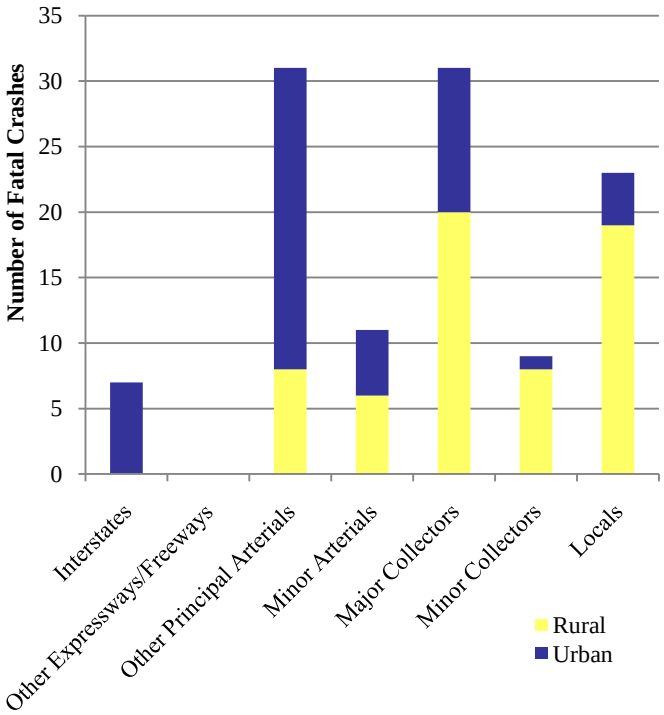
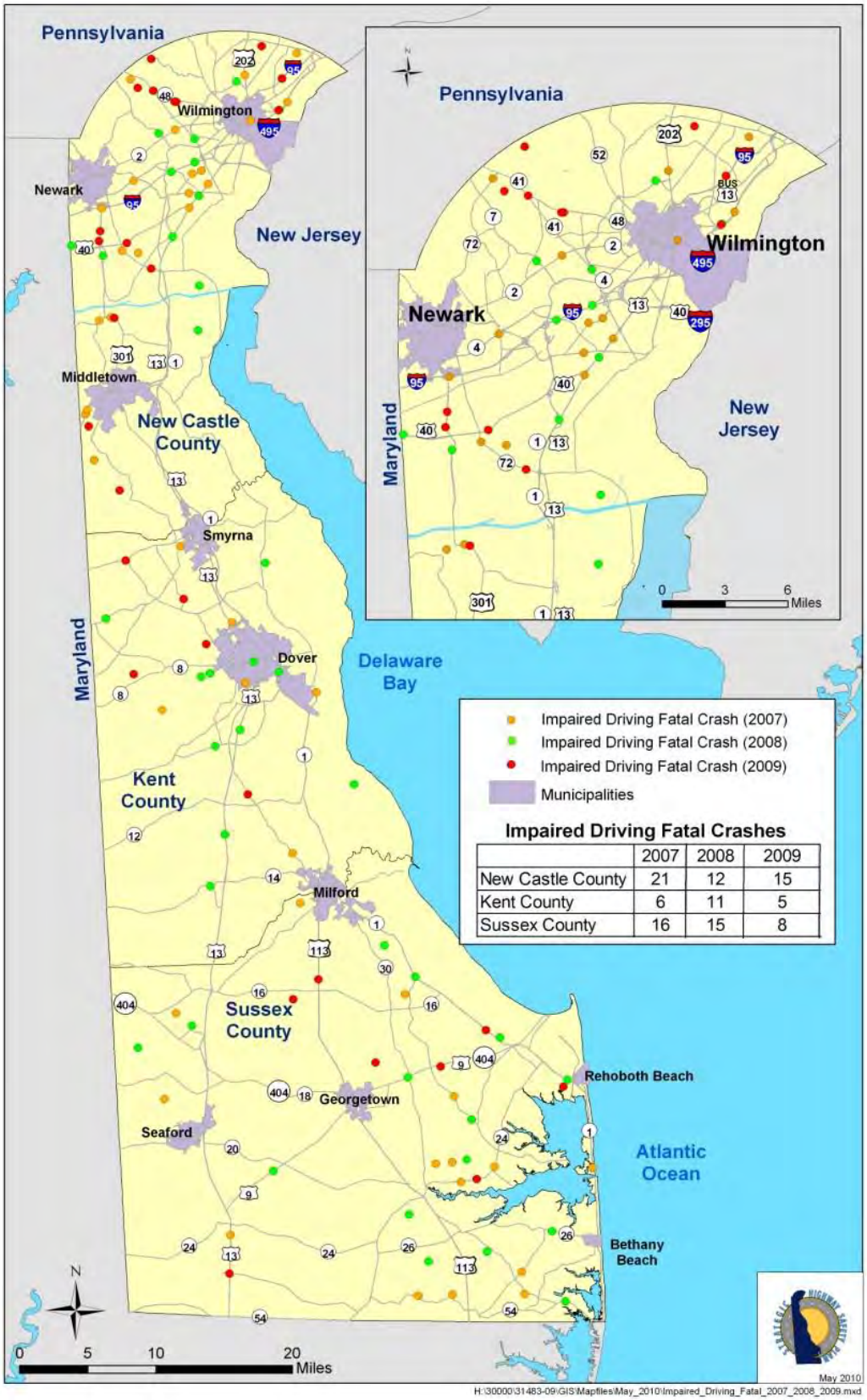


Figure 35 – Map of Fatal Impaired Driving Crashes



STRATEGIES AND IMPLEMENTATION

Delaware's strategic plan to reduce crashes involving impaired driving involves both educational and enforcement strategies and countermeasures. By identifying the location, time of day, day of week, and other patterns that characterize impaired driving-related crashes, focus can be placed on target locations, times, and driver populations. As shown in the data review, strategies should target 15 to 24 year old males, rural roadways, collectors and local roadways and midnight to 3 AM. Additionally, aggressive driving and roadway departures represent a significant portion of fatal crashes involving impaired driving; therefore, addressing those emphasis areas will likely reduce fatal crashes involving impaired driving as well. Outreach efforts should emphasize the consequences of impaired driving, which is frequently a roadway departure, the more severe effects of impaired driving while speeding, on a motorcycle, or not wearing a seat belt, and how motorists should react when encountering an impaired driver.

EDUCATION: Public information and education campaigns can significantly increase awareness of and help reduce impaired driving behaviors. These types of campaigns have been proven to be more effective when used in combination with targeted enforcement strategies. Delaware's strategies include:

- Conduct media outreach and educational programs to increase public awareness, convey how to make Delaware's roadways safer, and identify the consequences of impaired driving
    - Increase high visibility public information and education, especially among high risk groups
    - Use billboard, radio and television advertisements to develop a visual to convey the extensive nature of the problem and establish memorable slogans or phrases to enhance awareness and deter impaired driving
    - Develop consistent public information messages to maximize public awareness of impaired driving
    - Increase high visibility education, especially among high-risk groups
    - Educate servers and liquor store workers on identifying impaired persons and discouraging such persons from driving
    - Advertise the Designated Driver Program in bars
    - Create an online survey to assess the public's understanding of the safety risks associated with impaired driving
    - Educate young and high-risk drivers of the risks and consequences of impaired driving by including impaired driving awareness in the driver's education curriculum

ENFORCEMENT: Many drivers do not recognize the dangers of driving while impaired. Therefore, continual and visible law enforcement and sobriety checkpoints are intended to compel drivers to reconsider their actions before driving while impaired by emphasizing the dangers they impose on the traveling public and the consequences offenders face once they are caught. Although targeted enforcement and checkpoints have been successful in reducing impaired driving in target corridors, understaffed and underfunded law enforcement agencies are often forced to reduce traffic enforcement efforts; therefore, additional funding for impaired driving enforcement is essential. Additionally, in order for this strategy to be effective, the public must be educated on the importance of the high levels of traffic enforcement efforts that target impaired driving.

Unlike other traffic violations, violators of DUI offenses tend to hire attorneys and prepare rigorous defense cases for impaired driving offenses and law enforcement officers often face significant challenges prosecuting impaired driving cases in court. When courts suspend, reduce, or eliminate penalties and consequences for impaired drivers, the public tends to consider these types of actions as tolerable and law enforcement officers become discouraged from pursuing DUI cases. Therefore, consistent verdicts and simpler DUI case processing are both needed to improve driver compliance. Additionally, increasing the penalty and/or fine structure associated with impaired driving offenses should deter motorists from driving under the influence of alcohol and/or drugs.

Currently, Delaware has an Alcohol Exclusion Law, which permits insurers to deny coverage to people injured while driving under the influence of alcohol. This law can be used to deny medical payment to doctors and hospitals. As a result, medical facilities are discouraged from performing alcohol screening. According to the Coalition of Behavioral Health Services, in 2001, the National Association of Insurance Commissioners unanimously recommended that states repeal the Alcohol Exclusion Law, recognizing that alcohol addictions are treatable, making impaired driving crashes preventable. Providing the opportunity for alcohol and drug treatment at the time the person is being treated for injuries related to an impaired driving crash is necessary.

Delaware's strategies and countermeasures to address impaired driving include:

- Improve compliance with traffic laws by providing adequate resources to allow state and local law enforcement agencies to perform targeted traffic enforcement to address impaired driving
    - Increase enforcement funding to better address impaired driving problems at high crash locations and for high-risk driving populations
    - Promote the use of 911 to report impaired driving
    - Provide impaired driving equipment and technology in all law enforcement vehicles
    - Provide specialized impaired driving enforcement training
- Limit occurrence by supporting legislative action to strengthen DUI laws and deter impaired driving behaviors by improving the judicial process and increasing penalties for violators
    - Enhance prosecutors' ability to present the strongest case for impaired driving offenses, including the use of a strong evidence presentation
    - Maintain contracts with private substance abuse prevention agencies for impaired driving offenses
    - Increase the point structure and penalties for impaired driving
    - Seize offenders' vehicles administratively upon arrest
    - Require ignition interlocks as a condition for license reinstatement
    - Educate the public regarding any changes in the driving laws
    - Enact the open container law
    - Conduct judicial outreach to promote consistency in verdicts and sentencing
- Reduce excessive drinking and monitor convicted offenders to minimize the incidence of impaired driving
    - Employ screening and brief interventions to identify and treat drug or alcohol problems in health care settings
    - Screen all convicted offenders for alcohol and/or drug problems and require treatment
    - Monitor all convicted offenders closely to ensure required treatment is completed

EVALUATION AND STATUS

Delaware has targeted impaired driving for many years and as a result, has made significant progress in reducing the number of fatal crashes involving an impaired driver. The number of fatal crashes involving impaired driving has declined from 43 fatal crashes in 2007 to 28 fatal crashes in 2009. However, Delaware will continue to implement strategies to further reduce these types of crashes in order to reach the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

The following programs have been implemented in recent years to address impaired driving crashes:

EDUCATION AND ENFORCEMENT

- In 2009, the General Assembly passed legislation to toughen penalties for those convicted of driving under the influence in Delaware. House Bill 152 created increased penalties for all DUI offenses, in particular those convicted of their fifth and subsequent offenses. Senate Bill 177 strengthened penalties for first time offenders with a blood-alcohol content of 0.15 or higher.
- Currently in its ninth year, Checkpoint Strikeforce is a regional sobriety checkpoint campaign that features an increased number of DUI checkpoints and patrols every week from July through December and monthly checkpoints from January through June. Delaware, Maryland, Virginia, West Virginia, and the District of Columbia make up Region III of NHTSA and are committed to preventing impaired driving through the multi-state area. The campaign focuses on arresting DUI offenders and using high visibility enforcement to deter other motorists from driving while under the influence.
    - Messages on billboards, television and radio spots, brochures, fliers, websites, and restroom and movie theater ads reinforce the legal, financial and personal consequences of driving under the influence of alcohol

    - Checkpoint Strikeforce is one component of the "120 Days of Summer HEAT (Highway Enforcement of Aggressive Traffic) Campaign," an annual statewide effort to unify three safety campaigns ("Click It or Ticket," "Checkpoint Strikeforce," and "Stop Aggressive Driving"), specifically during the summer months
    - As part of the 2009 campaign, 22 participating agencies conducted 98 sobriety checkpoints and made 472 DUI arrests; in comparison, in 2002, 8 participating agencies conducted 44 sobriety checkpoints and made 108 DUI arrests
    - Additionally, 163 people were arrested for DUI as part of the 2008 Safe Family Holiday campaign, which ran from Thanksgiving to New Year's Day. Similar campaigns were performed for the 2009 NFL playoff games, the Super Bowl and Saint Patrick's Day
- The SmartDrive program is implementing a phase aimed at encouraging teens to make responsible decisions about driving, including using seat belts, not drinking and driving, and reducing speeds.
- The Underage Drinking campaign is an educational campaign geared toward educating students on the consequences of underage drinking. The program also aims to educate adults on the consequences of providing alcohol to minors. The educational campaign includes the distribution of materials such as posters, brochures, and incentive items with alcohol prevention information at schools.

- Delaware's Cops-In-Shops program places undercover officers in package stores to catch minors attempting to buy alcohol. The program educates minors and adults on the fines and penalties of underage drinking and driving.
- The Hero campaign is dedicated to preventing impaired driving fatalities by promoting the use of designated drivers. This program includes educational materials such as billboards, television commercials, and the distribution of posters, car window decals, brochures and wristbands at bars and restaurants near the University of Delaware.
- The DUI Tracking System provides real-time data related to the post-arrest processing of a DUI offender. The system tracks progress from arrest through license reinstatement and includes court disposition information, Division of Motor Vehicles (DMV) hearing data, and detailed treatment information.
- Delaware's First Offense Election program allows violators to admit guilt in lieu of standing trial. As part of the program, the driver's license is suspended for one year; however, violators may be permitted to take the First Offense Election - IID Diversion option, which prohibits driving for one month but allows driving with an ignition interlock device for the remaining portion of the suspension.
- Any individual arrested for DUI must schedule an evaluation with the Delaware Evaluation and Referral Program (DERP), which identifies and requires the appropriate treatment (e.g., education program, outpatient, mental health, etc.).
- Delaware's Drug Recognition Expert (DRE) program was initiated in 2005. This program provides training for law enforcement officers in identifying drug users.
- In FY 2008, Deputy Attorney General Sean Lugg assumed the responsibilities of the Traffic Safety Resource Prosecutor in Delaware. His role is to provide training, education and technical support throughout the prosecution of traffic crimes.
- The 2008 and 2009 Delaware Office of Highway Safety Annual Highway Safety Conferences included sessions regarding addressing impaired driving.

PRIMARY EMPHASIS AREA FIVE: IMPROVING THE DESIGN AND OPERATION OF HIGHWAY INTERSECTIONS

BACKGROUND

Although intersections only constitute a small percentage of the overall roadway system in Delaware, intersections are one of the most complex traffic situations that motorists encounter and should be considered a priority area in addressing fatal crashes in the state and nationwide. Both signalized and unsignalized intersections involve multiple turning and crossing maneuvers that create numerous conflict points and crash potentials between vehicles, pedestrians, and bicyclists. Intersection fatalities have been increasing in Delaware in recent years; therefore, the *2010 Delaware SHSP* includes intersection safety as an emphasis area to reduce overall fatal crashes. Although improving intersection safety was not included as an emphasis area in previous versions of the *Delaware SHSP*, DelDOT has several established safety programs in place to identify safety and operational improvements at high crash locations, many of which include intersections.

DATA REVIEW

Based on 2007 to 2009 fatal crash data, 74 percent of fatal intersection crashes involve aggressive driving behaviors and 20 percent of fatal intersection crashes involved impaired driving. Of the fatal intersection crashes, 18 percent of crashes occurred from 3 PM to 6 PM and 16 percent of crashes occurred from 6 PM to 9 PM. The majority of the crashes occurred during daylight; however, 33 percent of the crashes occurred during nighttime, on unlit roadways. Angle crashes and single-vehicle crashes (e.g., roadway departure crashes, vehicle rollover crashes, etc.) represent 75 and 18 percents of fatal intersection crashes, respectively. Eight fatal intersection crashes involved pedestrians. The driver contributing circumstance for 33 percent of drivers involved in fatal intersection crashes was disregarding traffic signs, signals and/or road markings. Additionally, the driver contributing circumstance for 21 percent of drivers involved in fatal intersection crashes was failure to yield the right-of-way. Thirty-three percent of fatal intersection crashes occurred on rural roadways, which account for 29 percent of vehicle-miles traveled in 2007, 2008 and 2009. Forty-three percent of fatal intersection crashes occurred on other principal arterial roadways; however, only 33 percent of vehicle-miles traveled in 2007, 2008 and 2009 occurred on other principal arterials. The majority of fatal intersection crashes occurred on dry pavement. Forty percent of fatal intersection crashes occurred at signalized intersections. Figures 36 through 44 summarize fatal intersection-related crash data.

GOAL

Reduce the number of fatal intersection crashes by 5 percent every three years to achieve 17, 16, and 15 total fatal intersection crashes by 2012, 2015, and 2018, respectively in order to achieve the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

Figure 36 - Intersection Fatal Crashes by Year

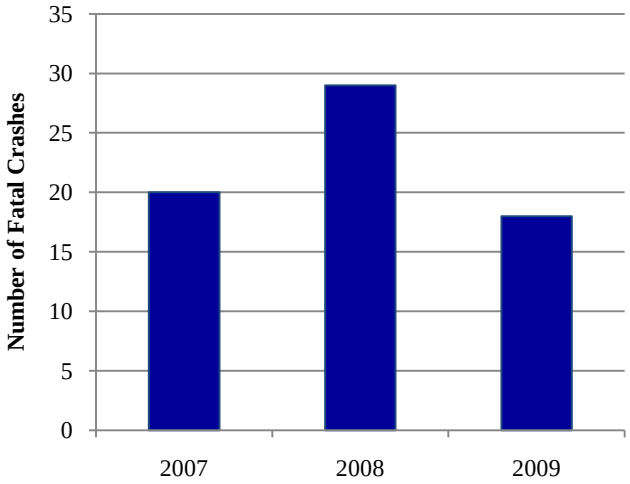


Figure 37 - Intersection Fatal Crashes by Time of Day

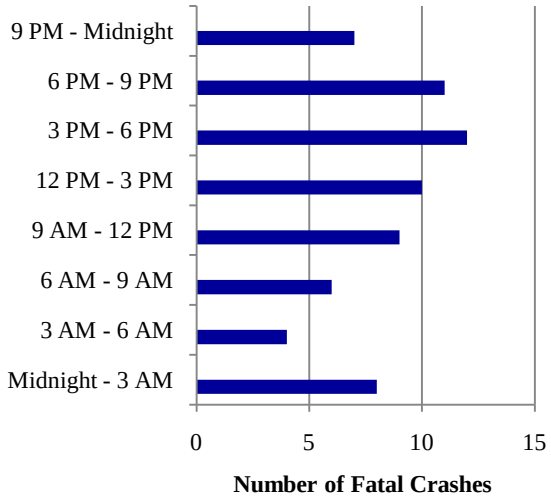


Figure 38 - Intersection Fatal Crashes by Ambient Lighting

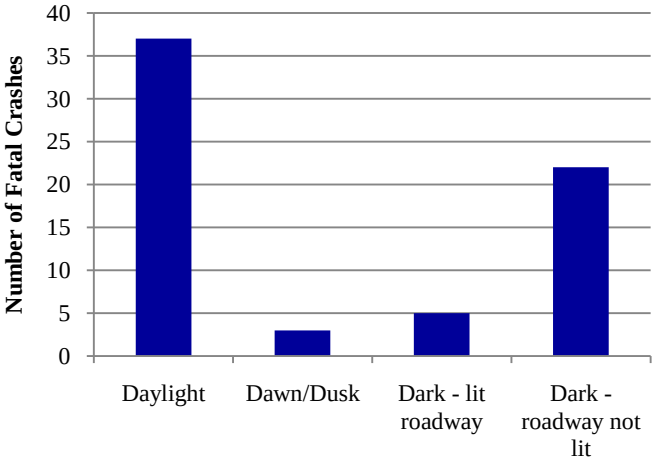


Figure 39- Intersection Fatal Crashes by Manner of Impact

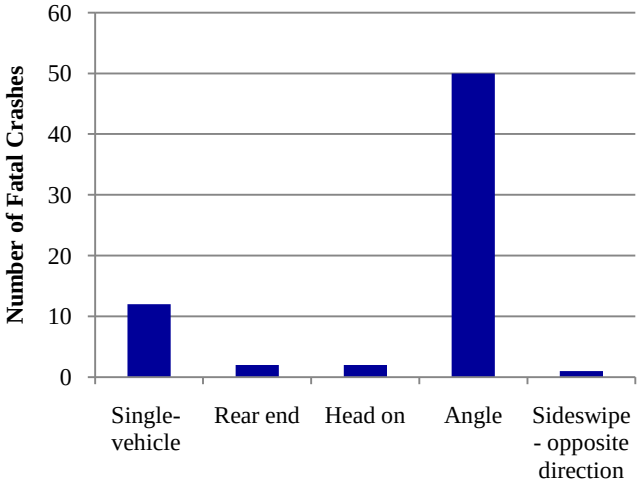


Figure 40 - Intersection Fatal Crashes by Surface Condition

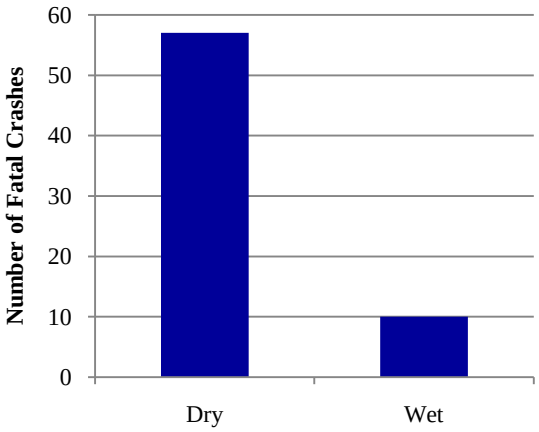


Figure 41 - Intersection Fatal Crashes by Roadway Functional Classification

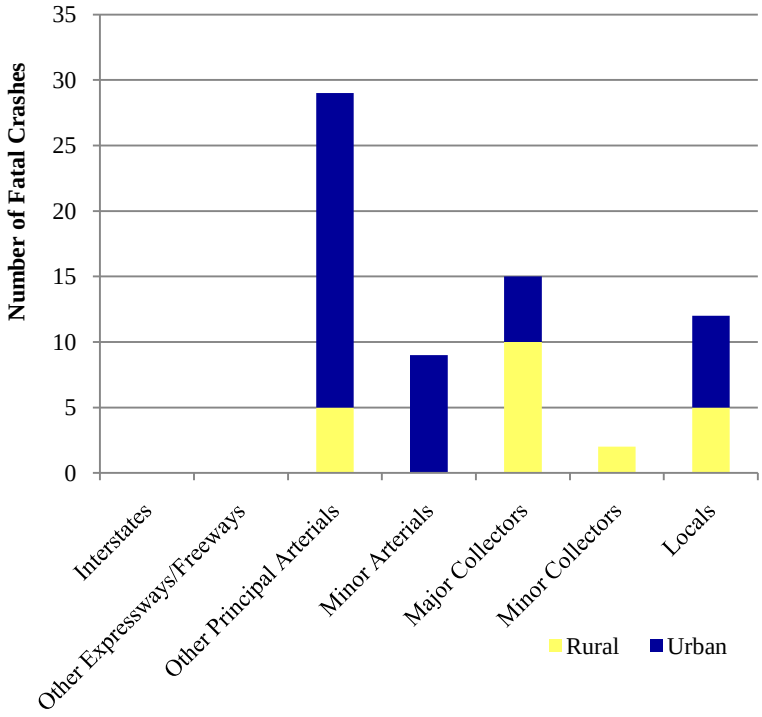


Figure 42 - Intersection Fatal Crashes by Traffic Control Type

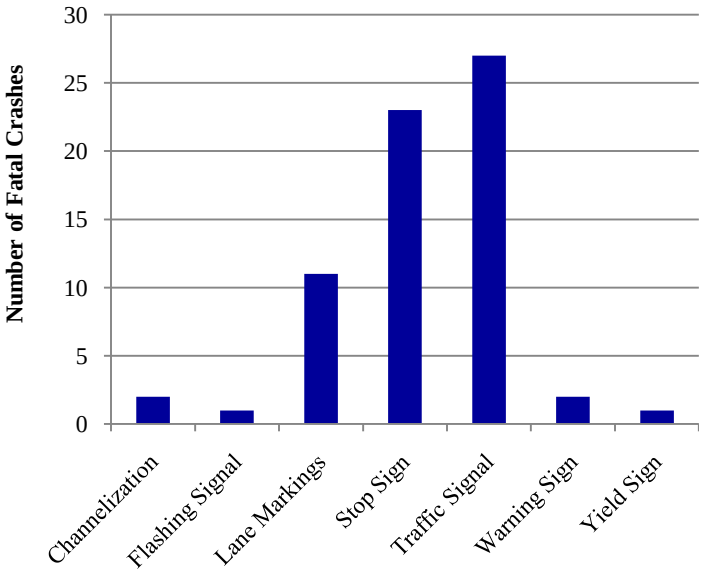


Figure 43 - Intersection Driver Contributing Circumstances

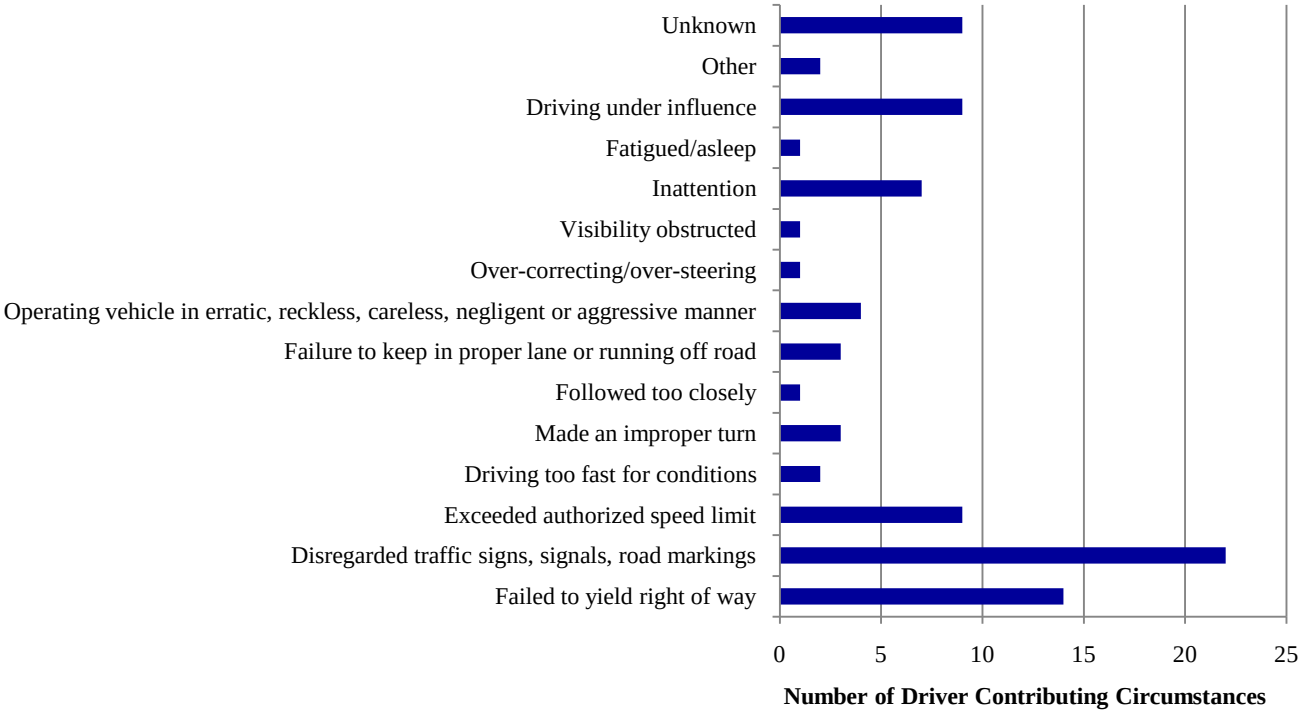
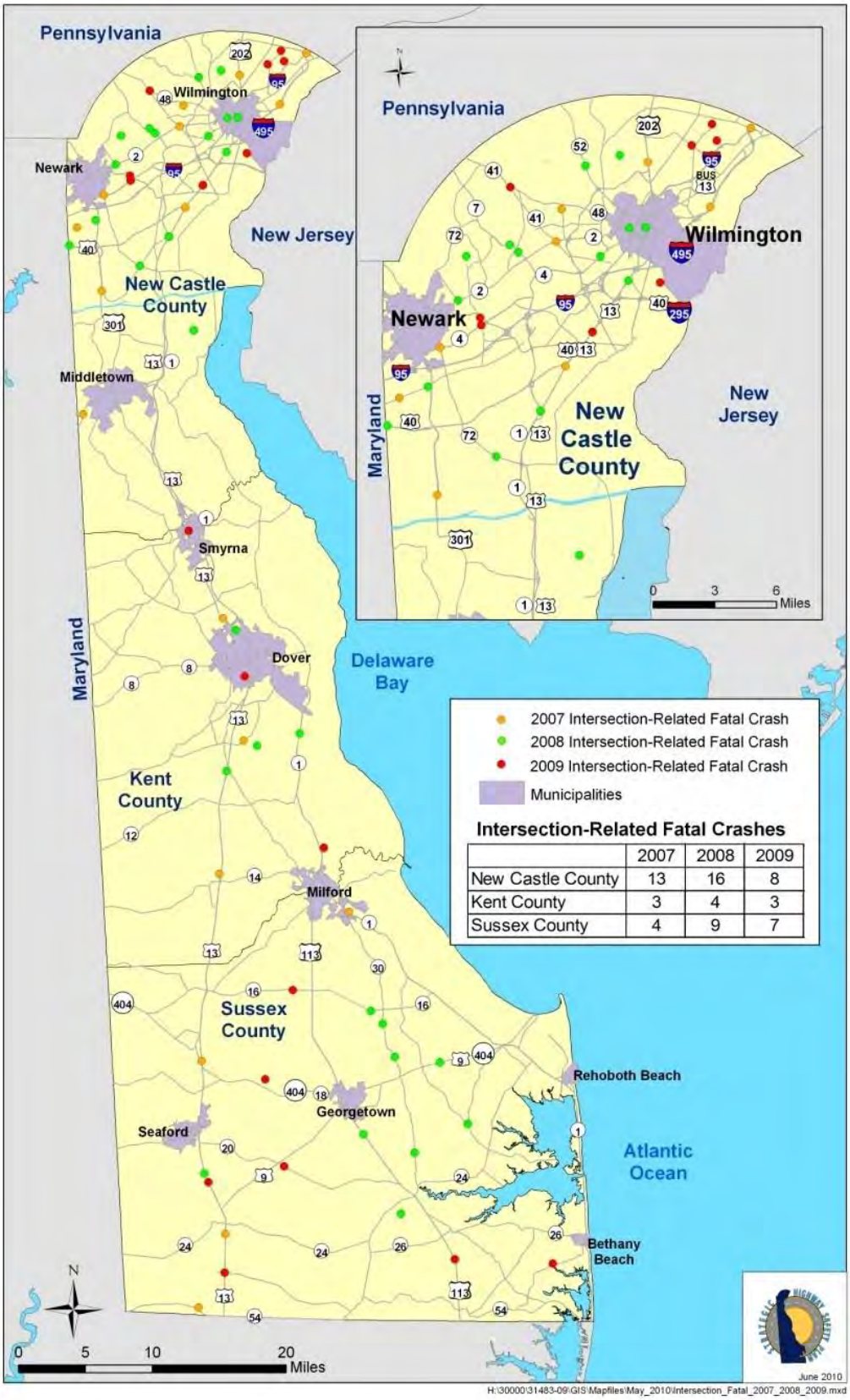


Figure 44 – Map of Intersection Fatal Crashes



STRATEGIES AND IMPLEMENTATION

By identifying the location, time of day, traffic control device, and other patterns that characterize fatal intersection crashes, focus can be placed on target areas, driver behaviors and time periods. As shown in the data review, strategies should target principal arterials, aggressive driving, 3 to 9 PM, and angle crashes. Although the majority of fatal intersection crashes occurred during daylight, 33 percent of fatal intersection crashes occurred during nighttime and on unlit roadways; therefore, lighting should be considered as a potential strategy at appropriate intersections.

EDUCATION AND ENFORCEMENT: Aggressive driving behaviors, such as disregarding traffic signs, signals, and markings or failing to yield the right-of-way represent a significant portion of fatal intersection crashes. Therefore, education and enforcement strategies associated with the aggressive driving emphasis area should potentially address a significant portion of fatal intersection crashes. To address intersection safety, these strategies should focus on educating the public on traffic laws at intersections and the risks and consequences of not stopping at STOP signs, failing to yield the right-of-way, and running red lights. Additionally, traffic law enforcement at target intersections should be employed to reduce these poor driving behaviors. Outreach efforts should include educating the public on new traffic control devices and intersection operations and improving driver awareness of high-crash intersections through emails, brochures, posters, or other materials. In addition, the 2009 Delaware Office of Highway Safety Annual Highway Safety Conferences included a session regarding intersection safety.

ENGINEERING: As shown in *NCHRP Report 500*, there are numerous engineering improvements that can be used to improve intersection safety and decrease the potential for fatal intersection crashes, such as installing intersection lighting, protected-only left-turn phases, and geometric improvements. Maintaining consistent traffic control devices will increase a driver's ability to safely navigate through an intersection. Delaware has selected the following engineering strategies at signalized and unsignalized intersections based on the NCHRP reports and other safety materials and practices. In addition, greater enforcement of DelDOT's Subdivision Manual is critical in improving intersection safety.

SIGNALIZED INTERSECTIONS

- Traffic Control and Operational Improvements
  - Install protected left-turn phasing
  - Provide optimal clearance interval timings
  - Restrict turning movements
  - Coordinate traffic signals
  - Install emergency vehicle preemption
  - Install pedestrian and bicycle improvements
- Geometric Improvements
  - Improve channelization
  - Install or lengthen turn bays
  - Improve left-turn lane offsets
  - Improve pedestrian and bicycle facilities
  - Improve intersection alignment
  - Construct special solutions (e.g., jug handles, channelize median crossovers)
- Improve Driver Awareness
  - Improve visibility (e.g., install warning signs, lighting, back plates, pavement markings, etc.)
  - Install rumble strips
- Improve Access Management
  - Consolidate and/or remove driveways (especially within 250 feet of intersections)
- Other Improvements
  - Improve drainage at intersections
  - Improve skid resistance of pavement
  - Relocate signal hardware and other fixed objects outside the clear zone
  - Install ITS improvements
  - Clear sight distance obstructions

UNSIGNALIZED INTERSECTIONS

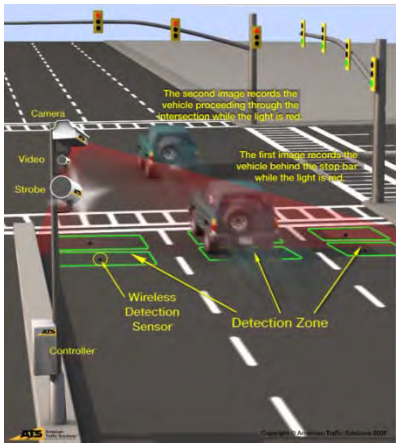
- Improve Access Management
- Geometric Improvements
  - Provide adequate left-turn and right-turn lanes
  - Provide bypass lanes at T-intersections
  - Offset turn lanes
  - Provide adequate acceleration lanes for both right and left-turning vehicles
  - Provide full-width paved shoulders
  - Restrict turning movements to minimize conflict points
  - Close or relocate high-crash intersections
  - Realign intersections
  - Improve pedestrian and bicycle facilities
- Improve Sight Distance
  - Clear sight triangles
  - Restrict parking
- Improve Availability of Gaps in Traffic and Assist Drivers in Judging Gaps
  - Install automated real-time devices to inform drivers of available gaps
  - Retime adjacent signals to create gaps at unsignalized intersections
- Improve Driver Awareness
  - Improve signing, striping, and delineation
  - Install intersection lighting
  - Install channelizing islands
  - Install stop lines
  - Install rumble strips
  - Install left and right edge line extensions
  - Install supplemental overhead STOP signs
  - Improve pavement markings
  - Install intersection control beacons (ICBs) or hazard elimination beacons (HIBs)
- Choose Appropriate Intersection Traffic Control
  - Avoid traffic signalization when possible
  - Consider all-way STOP control
  - Consider roundabouts at appropriate locations
- Guide motorists more effectively on approaches
  - Provide turn path markings
  - Install a double yellow centerline within the median of a divided highway
  - Provide lane assignment signing or markings

EVALUATION AND STATUS

The number of fatal intersection crashes in Delaware slightly decreased from 2007 to 2009 (20 fatal intersection crashes were reported in 2007 and 18 fatal intersection crashes were reported in 2009); however, the number of fatal intersection crashes peaked in 2008 with 29 crashes. Although this emphasis area is new to the *Delaware SHSP*, Delaware has implemented many strategies and countermeasures to reduce these types of crashes. Because intersection crashes account for a significant portion of statewide fatal crashes, this emphasis area was added to the 2010 plan in order to reach the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

EDUCATION AND ENFORCEMENT

- DelDOT has created brochures, fliers, and/or e-mails to educate the public on how to use pedestrian count-down signals, HAWK signals, and roundabouts.
- As stated in the previous section of this plan related to the aggressive driving emphasis area, DelDOT has been successful in reducing the number of red light running crashes by 45 percent at the first 20 intersections within the state that currently have red light cameras installed as part of the Electronic Red Light Safety Program (ERLSP).



ENGINEERING

- As part of the annual Highway Safety Improvement Program, including the High Risk Rural Roads Program, Hazard Elimination Program, and the Transparency Report, DelDOT has identified high-crash locations in the state, many that include intersections, and implemented numerous cost-effective improvements to potentially reduce intersection crashes. Specific improvements include:
    - Installing rumble strips
    - Installing stop lines
    - Installing raised pavement markers (RPMs)
    - Installing intersection lighting
    - Installing and lengthening turn lanes
    - Modifying signal phasing and/or timings
    - Improving signal coordination and adding traffic signals to ACTRA (DelDOT's statewide traffic signal system)
    - Constructing channelization to reduce conflict points
    - Tree trimming and other sight distance improvements
    - Signing, pavement marking, and maintenance improvements
    - Installing ICBs and HIBs
    - Implementing all-way STOP control
    - Installing signal back plates
    - Implementing access management strategies
    - Providing skid resistant pavement

- Pedestrian and bicycle improvements, such as installing and upgrading pedestrian countdown signals, crosswalks and bike lanes, are being implemented at intersections throughout the state.
- DelDOT has implemented many improvements that will improve the operation and safety of traffic signals:
    - Coordinating traffic signals along congested corridors in the state and upgrading signal operations to traffic responsive
    - Adding numerous traffic signals to ACTRA so DelDOT can monitor and control signal operations from the Transportation Management Center (TMC)
    - Reconstructing traffic signals to replace diagonal span signal heads with box spans to improve signal visibility
    - Considering the adoption of the new federal guidelines for protected-only left-turn phasing, which are more conservative from a safety standpoint than Delaware's existing guidelines
    - Replacing 8 inch signal indications with 12 inch signal indications
- Other intersection safety improvements have been implemented by DelDOT in recent years:
    - Rounded-curb radii is considered on a case-by-case basis during the intersection design process
    - Realigning skewed intersections is considered where appropriate; however, the cost of realignment projects is high
    - Advance lane use signs are often installed as part of intersection upgrade projects
    - DelDOT is currently installing street name signs on mast arms at traffic signals and is testing the use of street name signs on span wire
    - DelDOT plans to revaluate their current warrants for lighting
    - DelDOT considers restriping and minor widening, major widening, or road diets to provide separate left-turn lanes
    - DelDOT requires developers to install separate left-turn lanes whenever warranted by the Subdivision Manual
    - DelDOT roundabout guidelines were adopted in June 2009 and a section of DelDOT's website is dedicated to roundabout education
    - DelDOT's Roundabout Committee continues to keep abreast of the latest developments in roundabout design, specifically signalized roundabouts
- DelDOT is currently revising the *Delaware MUTCD* in response to the federal *2009 MUTCD*. Additionally, DelDOT is training their staff on the application and practices in the *MUTCD*. Proper documentation and training regarding the installation of traffic control devices will assist in providing drivers with a consistent driving environment through intersections.
- DelDOT's Flashing Red Arrow Study was completed in February 2009. As a result, four out of the 42 flashing red arrow locations statewide, were converted to protected-only left-turn phasing by May 2010. DelDOT is considering if signal modifications are necessary at the remaining locations, based on the 2009 *MUTCD* and updated guidance on left-turn phasing provided by ITE.

PRIMARY EMPHASIS AREA SIX: MAKING WALKING AND STREET CROSSING SAFER

BACKGROUND

Pedestrians must consider safety, in addition to infrastructure and proximity of destination, when deciding to walk to their destination as a transportation alternative. Therefore, improving pedestrian safety has the potential to increase pedestrian activity and reduce congestion on national and statewide roadways. Providing livable communities, communities that provide safe and convenient transportation choices for all citizens, including pedestrians, bicyclists, transit users, and motorists, are a high priority on both a national and statewide level.

In addition to engineering safer transportation solutions for pedestrians, educating and enforcing the public on pedestrian laws and improving driver awareness of pedestrians are also critical strategies to advance pedestrian safety. With the recent rise in pedestrian fatal crashes in Delaware, there is concern that the increased usage of iPods, cell phone texting, and other distracting devices are contributing to pedestrians' inattentiveness to traffic and resulting in crashes. Typically, pedestrian fatalities are the result of pedestrian error rather than motorist error. Additionally, these crashes are occurring as a result of pedestrians crossing midblock and not at signalized crossings.

DATA REVIEW

Based on 2007 to 2009 fatal crash data, 79 percent of fatal crashes involving pedestrians occurred on urban roadways. Additionally, 67 percent of fatal crashes involving pedestrians occurred on principal arterial roadways. Further analysis shows that 62 percent of pedestrian fatalities were male. The 45 to 54 years old age groups represent the highest number of pedestrian fatalities. The time period that has the highest number of fatal crashes involving pedestrians is 9 PM to midnight, representing 35 percent of fatal crashes. Twenty-one percent of fatal crashes involving pedestrians occurred on Saturday. A significant cluster of the pedestrian fatal crashes occurred along US 40 and US 13 in New Castle County, roadways that have a high density of commercial properties on both sides of the roadway. Approximately 85 percent of the pedestrian fatal and incapacitating injury crashes occurred mid-block and only 13 percent of the fatal and incapacitating injury crashes involving pedestrians occurred at intersections. Additionally, 42 percent of pedestrian fatal crashes involved an impaired pedestrian; however, the pedestrian sobriety was unknown in 23 percent of pedestrian fatal crashes. Sixty-five percent of pedestrian fatal crashes involved no improper driving on behalf of the driver. Figures 45 through 52 summarize fatal pedestrian crash data.

GOAL

Reduce the number of fatal crashes involving pedestrians by 5 percent every three years to achieve 13, 12, and 11 total fatal crashes involving pedestrians by 2012, 2015, and 2018, respectively in order to achieve the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

Figure 45 - Pedestrian Fatal Crashes by Year and Pedestrian Impairment

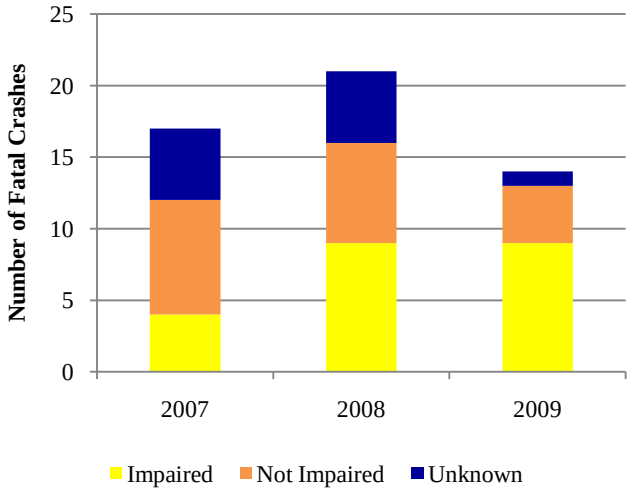


Figure 46 - Pedestrian Fatal Crashes by Time of Day

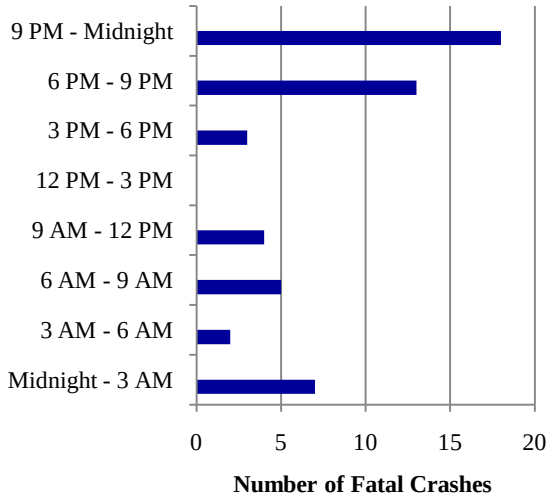


Figure 47 - Pedestrian Fatal Crashes by Month

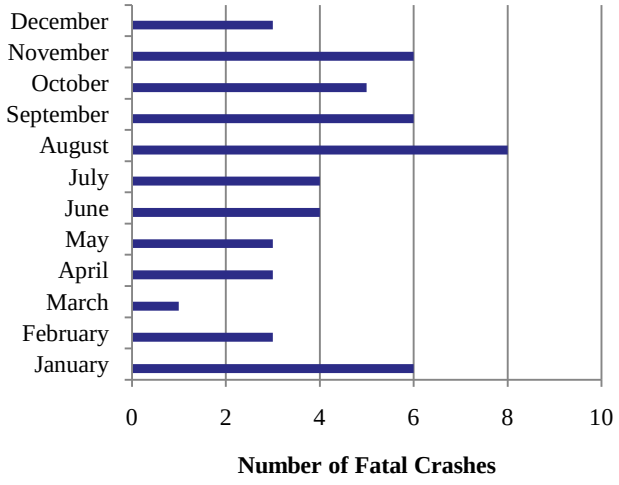


Figure 48 - Pedestrian Fatalities by Pedestrian Gender

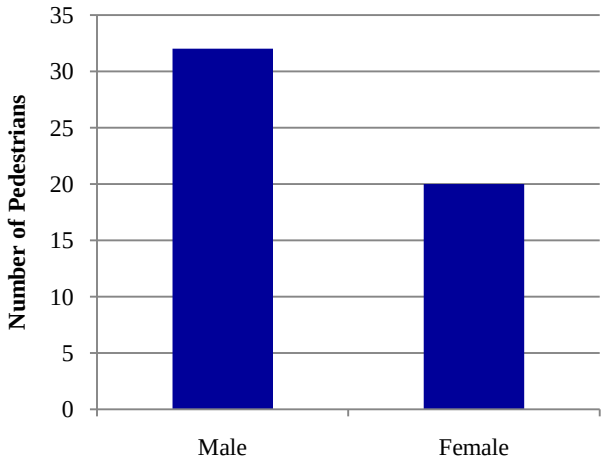


Figure 49 - Pedestrian Fatal Crashes by Pedestrian Age

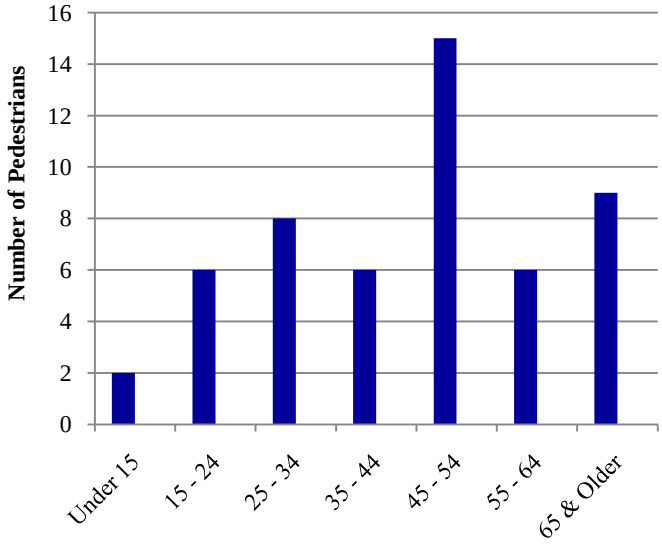


Figure 50- Pedestrian Fatal Crashes by Roadway Functional Classification

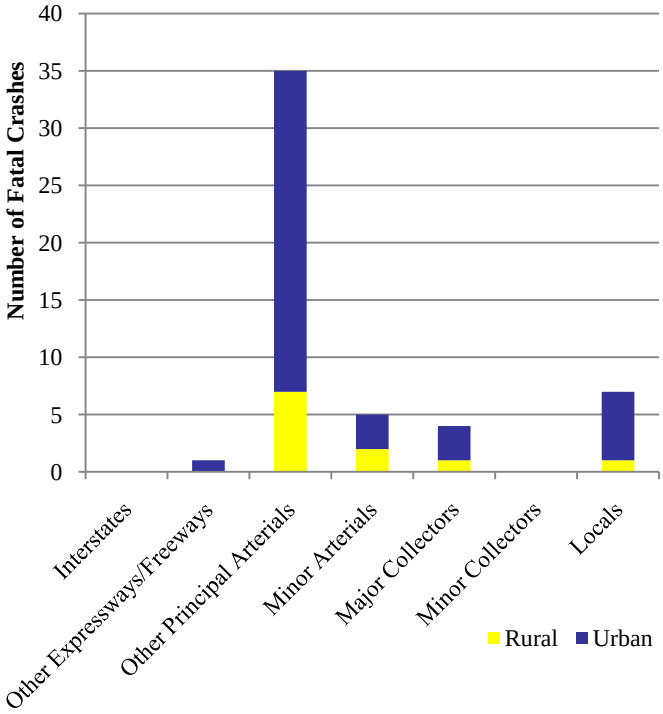


Figure 51 - Pedestrian Fatal Crashes by Crash Location

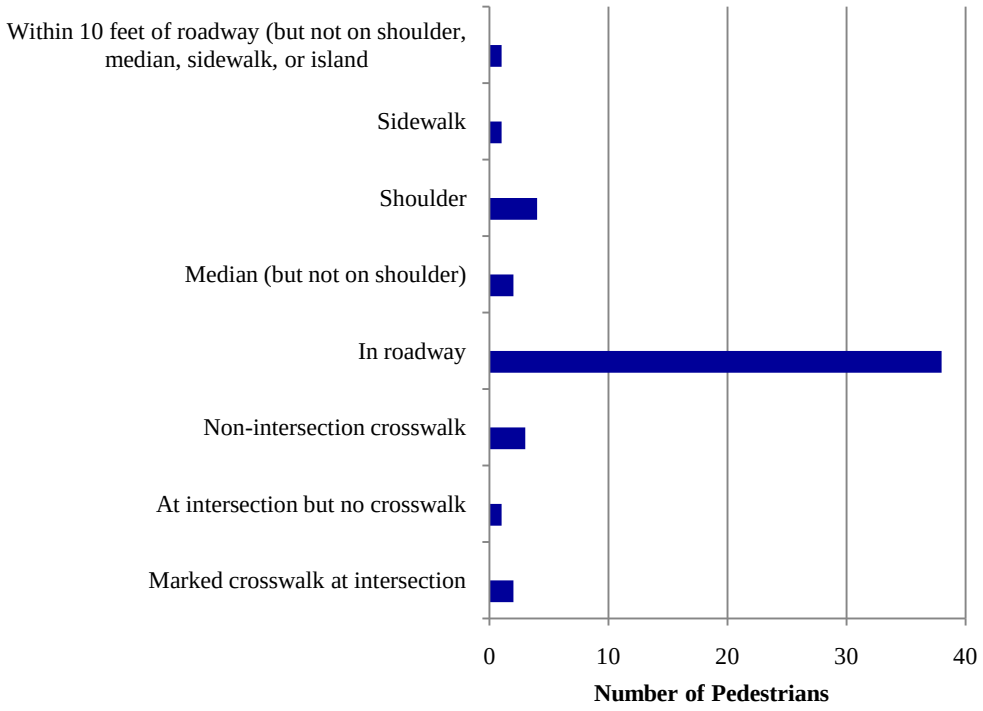
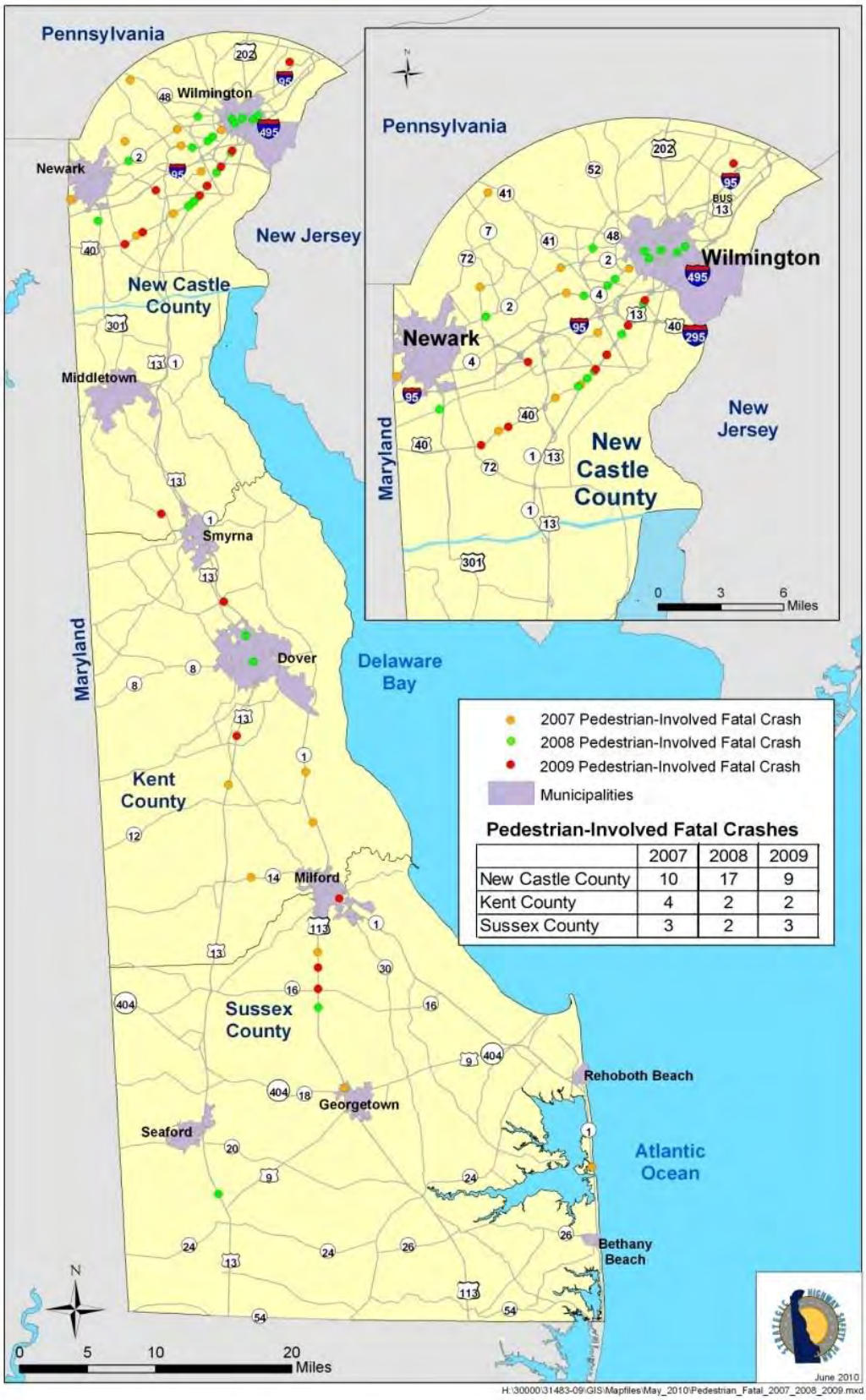


Figure 52 – Map of Pedestrian Fatal Crashes



	2007	2008	2009
New Castle County	10	17	9
Kent County	4	2	2
Sussex County	3	2	3

STRATEGIES AND IMPLEMENTATION

In many cases, pedestrian crashes occur when a pedestrian fails to use the provided facility or when no facility is provided. Therefore, education, enforcement, and engineering strategies can all be implemented to address crashes involving pedestrians. By identifying the location, time of day, day of week, and other patterns that characterize pedestrian fatal crashes, focus can be placed on target areas and time periods. As shown in the data review, strategies should target 45 to 54 year old male pedestrians, urban roadways, principal arterials, Saturdays, 9 PM to midnight, US 40 and US 13, midblock locations, and impaired pedestrians. Additionally, it is important that countermeasures are tailored to diverse populations and persons who may or may not speak or read English.

Delaware's plan includes strategies to reduce pedestrian-related crashes for each of these three "E's".

EDUCATION: Public information and educational campaigns can significantly increase awareness of and help reduce pedestrian fatal crashes. These types of campaigns have been proven to be more effective when used in combination with targeted enforcement strategies. Active participation and buy in from both drivers and pedestrians is essential for this strategy to be effective. Pedestrians need to be urged to not jeopardize their safety by crossing roadways at locations outside of intersections and crosswalks out of convenience. Delaware's strategies include:

- Conduct media outreach to increase public awareness, convey how to make Delaware's roadways safer, and identify the risk of pedestrian crashes
    - Emphasize pedestrian safety, vehicle-pedestrian right-of-way, pedestrian responsibilities and the dangers of walking while impaired
    - Participate in health and safety fairs
    - Develop consistent public information messages to maximize public awareness of the law and safety benefits related to pedestrian safety, such as wearing reflective clothing or carrying a light at nighttime
    - Increase high visibility education, especially among high-risk groups
    - Increase risk perception by publicizing information about enforcement initiatives
    - Use billboard, radio and television advertisements to develop a visual to convey the extensive nature of the problem and establish memorable slogans or phrases to enhance awareness and promote pedestrian safety
    - Encourage drivers to slow down and look for pedestrians, particularly in commercial and residential corridors
    - Educate pedestrians on the dangers of walking along or crossing roadways while under the influence of alcohol and/or drugs
- Implement driver's education improvements to emphasize vehicle-pedestrian right-of-way and laws

ENFORCEMENT: Traffic behaviors have been shown to improve with visible and consistent pedestrian law enforcement in combination with increased public awareness. However, police enforcement of pedestrian laws is often very challenging and it is difficult to obtain support from law enforcement agencies. In order for this strategy to be effective, law enforcement and the general public must be educated on the importance of high level traffic enforcement efforts that target pedestrians and pedestrian safety laws must be strictly enforced. Additional funding for pedestrian enforcement will assist law enforcement in apprehending violators before a crash occurs. Delaware's strategies include:

- Improve compliance with traffic laws by providing adequate resources to allow state and local law enforcement agencies to perform traffic enforcement of pedestrian safety laws
    - Increase enforcement funding to better address pedestrian problems at high crash locations and for high-risk driving populations
    - Conduct high visibility enforcement campaigns to ensure pedestrians and drivers alike are obeying pedestrian safety laws
- Evaluate the use of automated speed enforcement in school zones, if allowable under Delaware Code
- In August 2010, Governor Jack Markell signed Senate Bill 269, which increases penalties for drivers convicted of inattentive or careless driving resulting in the injury of a "vulnerable user". A "vulnerable user" includes pedestrians, roadway workers, cyclists, skateboarders, roller or inline skaters, scooters, mopeds, motorcycles, farm vehicles, and those riding on animals. The bill allows Delaware courts to impose additional penalties, such as a mandatory traffic safety course or community service for drivers found guilty of inattentive driving resulting in the injury or death of a vulnerable user.

ENGINEERING: Engineering and infrastructure improvements, such installing crosswalks and pedestrian signals, can reduce the risk of pedestrian crashes by providing pedestrians with a safe means to cross Delaware roadways. This strategy aims to reduce pedestrians' exposure to traffic and to increase their visibility when crossing roadways. Delaware's strategies include:

- System and policy initiatives
    - Consider pedestrian accommodations in the early planning stages for all new projects and review pedestrian crossings at existing locations (e.g., installing sidewalks, crosswalks, pedestrian signals, pedestrian refuges within medians, etc.)
    - Provide consistent pedestrian crossing design
    - Improve design to focus on sight distance to crosswalks and warning signs
    - Provide adequate crossing times for older pedestrians
    - Improve maintenance of pedestrian accommodations
    - Consider revising DelDOT's guidance on the installation of street lighting to include guidance for installing street lighting to address pedestrian concerns
- Spot or target location improvements
    - Eliminate the conflict between pedestrians and left-turning vehicles by installing protected-only left-turn phasing
    - Install traffic calming devices, where appropriate
    - Install raised crosswalks
    - Install pedestrian-hybrid signals (e.g., HAWK)
    - Provide leading pedestrian phases to enhance visibility
    - Install curb extensions to improve visibility and reduce pedestrian crossing time
    - Perform pedestrian safety audits for roadways and intersections
    - Install street lighting at locations with a high number of nighttime pedestrian crashes

EVALUATION AND STATUS

Delaware has seen a decline from 17 fatal pedestrian crashes in 2007 to 14 fatal pedestrian crashes in 2009; however, 21 fatal pedestrian crashes were reported in 2008 and preliminary 2010 crash data indicates an increase in fatal pedestrian crashes. Therefore, Delaware's plan must increase focus on implementing strategies to address pedestrian crashes to reach the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

The following programs have been implemented to address fatal pedestrian crashes:

EDUCATION AND ENFORCEMENT

- DelDOT launched a pedestrian safety campaign in fall 2008 focusing on pedestrian safety issues such as how to use pedestrian signals and crosswalks and the meaning of the "WALK", flashing "DON'T WALK", and "DON'T WALK" indications. Additionally, DelDOT has distributed brochures, fliers, and e-mails to educate the public on how to use pedestrian count-down signals and HAWK signals.
- Delaware's OHS leads the annual Walk Smart campaign, designed to educate the public about safe walking practices through a combination of enforcement and public awareness activities. Pedestrian safety brochures, posters, informational emails, and reflective lights are distributed throughout the state, concentrating on high pedestrian areas. Pedestrian safety messages are also spread through billboards along high crash routes such as US 40, US 13, US 113 and SR 1, and through radio messages and signing on city and county DART buses. The public awareness campaign is designed to educate both the English and Spanish speaking public. Additionally, police agencies conduct enforcement of the state's pedestrian safety laws at high pedestrian crash locations as part of this effort. The campaign focuses on educating pedestrians on the following pedestrian laws:

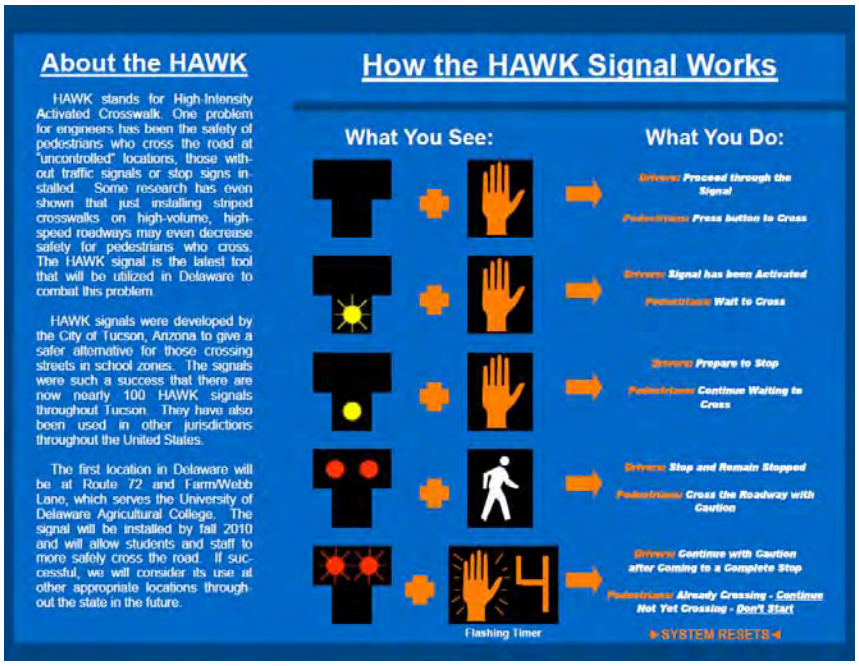
    - Obey traffic-control devices, unless otherwise directed by a police officer or crossing guard
    - Do not leave the curb unsafely or run into a vehicle path
    - Yield to vehicles at an intersection if not in a marked crosswalk; do not cross between intersections or diagonally
    - Use the right half of the crosswalk
    - Do not walk in the roadway if a sidewalk is provided; if no sidewalk is provided, walk on the outside edge of the roadway facing traffic and yield to vehicles
    - Carry a light or reflector from sunset to sunrise or when there is insufficient lighting
    - Do not walk on a highway while impaired

- Delaware's Safe Routes to School (SRTS) program was established in September 2002 when the 141st General Assembly passed Senate Bill 353. In 2005, the federal government endorsed SRTS under SAFETEA-LU. The purpose of this program is: (1) to enable and encourage children to walk and bicycle to school; (2) to make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age; and, (3) to facilitate the planning, development and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools. In 2008, DelDOT's SRTS program received special recognition from the national Center for Safe Routes to School through its James L. Oberstar award program. DelDOT's program was recognized for its innovative development of a state SRTS program. Delaware is one of only two states that allow schools and communities to complete the comprehensive planning process at their own pace.
- The 2008 and 2009 Delaware Office of Highway Safety Annual Highway Safety Conferences included sessions regarding pedestrian safety.
- In August 2010, Governor Jack Markell signed Senate Bill 269, which increases penalties for drivers convicted of inattentive or careless driving resulting in the injury of a "vulnerable user". A "vulnerable user" includes pedestrians, roadway workers, cyclists, skateboarders, roller or inline skaters, scooters, mopeds, motorcycles, farm vehicles, and those riding on animals. The bill allows Delaware courts to impose additional penalties, such as a mandatory traffic safety course or community service for drivers found guilty of inattentive driving resulting in the injury or death of a vulnerable user.

ENGINEERING

- As part of the annual Hazard Elimination Program, DelDOT has implemented numerous cost-effective improvements to potentially reduce fatal pedestrian crashes at locations identified as having a statistically higher than average crash rate than other similar roadways in the state, such as installing and upgrading pedestrian crosswalks and signals and eliminating the conflict between pedestrians and free right-turns.
- DelDOT has implemented significant pedestrian improvements along several corridors, such as US 40, US 13, SR 273, and SR 4 and is currently considering median barrier and other countermeasures along US 13 to address pedestrian crash problems throughout that corridor. These pedestrian upgrades are the result of pedestrian safety audits performed on roadways with an identified need for safety improvements.
- In addition, DelDOT has implemented numerous system-wide improvements to improve pedestrian safety:
    - DelDOT adopted countdown pedestrian signals as their standard; countdown pedestrian signals are being installed at new signalized pedestrian crossings and at crossings where pedestrian signals are modified and/or reconstructed
    - DelDOT implemented their Complete Streets policy to ensure that transportation facilities are routinely planned, designed, constructed, operated and maintained in a way that enables safe and efficient access for all users
    - DelDOT has been reviewing all unsignalized crosswalks to determine the safety of the crossing and the proper treatment (i.e., remove, relocate, or consolidate the crossing)

- Audible pedestrian signals are being installed on an "as-requested" basis (five intersections have audible pedestrian signals to date) and development of a draft policy for their installation has been completed
- The first High-Intensity Activated Crosswalks (HAWK) is being installed this year at an intersection in Newark



PRIMARY EMPHASIS AREA SEVEN: IMPROVING MOTORCYCLE SAFETY AND INCREASING MOTORCYCLE AWARENESS

BACKGROUND

According to Delaware State Police's 2009 statistical report, the death rate for motorcyclists was 5.71 per 10,000 registrations, whereas the death rate for all registered vehicles was 1.43. Motorcycles were involved in 14 percent of statewide fatal crashes from 2007 to 2009.

Motorcycle fatalities have been steadily increasing both in Delaware and nationwide in recent years; therefore, the *2010 Delaware SHSP* includes motorcycle safety as an emphasis area to reduce overall fatal crashes in the state. Because motorcycles are more difficult to operate and more unstable than other passenger vehicles, and they are not as visible to other motorists on the roadway, motorcycle riders are at a greater risk for being involved in a crash than passengers in other vehicle types. Additionally, motorcycles provide virtually no protection to their riders, particularly when riders are not wearing helmets, which significantly increases the chance of crashes resulting in injuries or fatalities. Roadway departure crashes represent a significant portion of fatal motorcycle crashes; however, guardrail installed to minimize the severity of crashes involving other vehicle types causes significant harm to motorcyclists.

Under Delaware's law, motorcycle riders are required to obtain a special endorsement on their drivers' licenses. The endorsement can be obtained by testing or by taking a training class. Drivers under 18 who desire a motorcycle endorsement require parental approval and completion of a motorcycle training class. Law enforcement impounds motorcycles of riders who are caught driving without a motorcycle endorsement. Additionally, Delaware's helmet law requires that only those under the age of 19 wear a helmet when riding a motorcycle; however, all motorcycle riders are required to have a helmet on the vehicle if they are not wearing one.

DATA REVIEW

Based on 2007 to 2009 fatal crash data, 33 percent of fatal motorcycle crashes occurred on rural roadways (rural roads account for 30 percent of vehicle-miles traveled in 2007, 2008 and 2009). Additionally, 36 percent of fatal motorcycle crashes occurred on principal arterials (34 percent of vehicle-miles traveled in 2007, 2008 and 2009 occurred on principal arterials). Further analysis shows that 98 percent of motorcycle drivers involved in fatal crashes were male. The 45 to 54 years old age group represents the highest percentage of motorcycle drivers (28 percent) involved in a fatal crash. Twenty-eight percent of fatal motorcycle crashes occurred in August. The time period that has the highest number of fatal motorcycle crashes is 3 PM to 6 PM, representing 25 percent of fatal crashes. Additionally, 38 percent of fatal motorcycle crashes also involved a roadway departure. Motorcycle speeding was associated with 42 percent of fatal motorcycle crashes and 60 percent of motorcycle riders that died were not wearing a helmet. Seventeen percent of motorcycle drivers involved in fatal crashes were under the influence of alcohol and/or drugs at the time of the crash. Additionally, based on 2007 to 2009 fatal crash data, all fatal crashes that involved a motorcycle occurred on dry pavement. Thirty-seven percent of motorcycles involved in fatal crashes were a Harley Davidson. Figures 53 through 63 summarize fatal motorcycle crash data.

Figure 53 - Motorcycle Fatal Crashes by Year

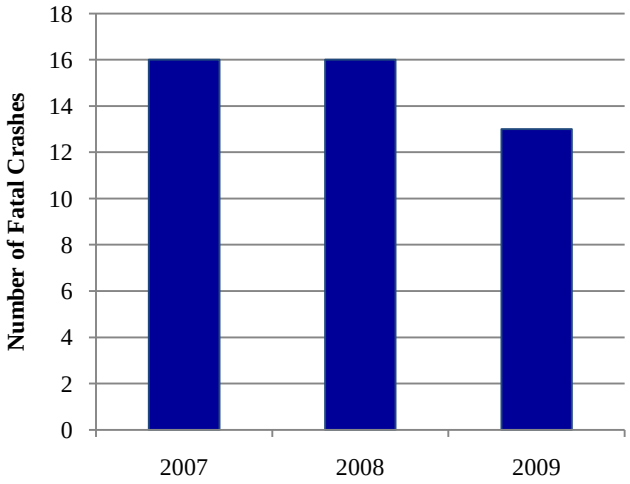


Figure 54 - Motorcycle Fatal Crashes by Time of Day

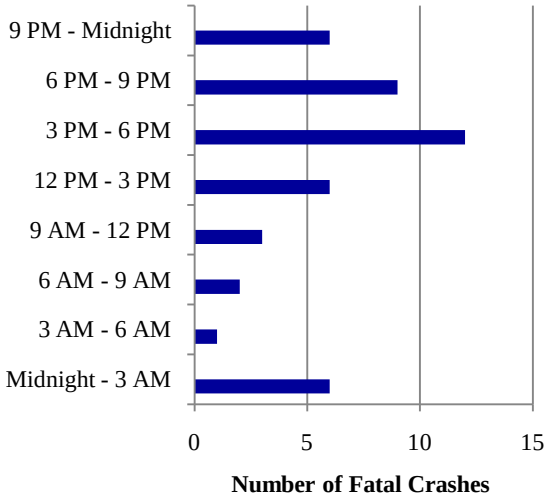


Figure 55 - Motorcycle Fatal Crashes by Intersection Relation

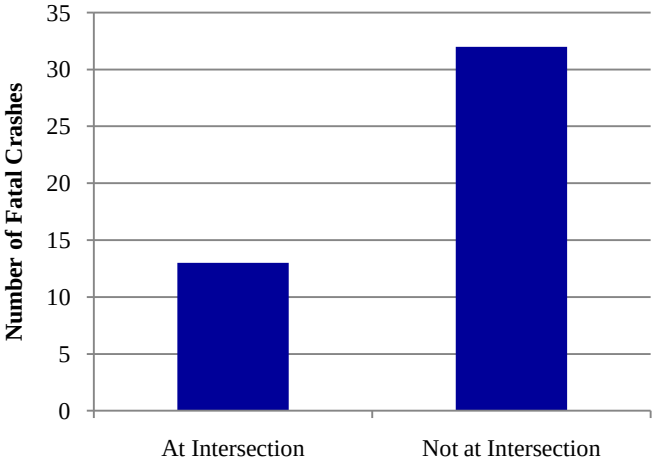


Figure 56 - Motorcycle Fatal Crashes by Month

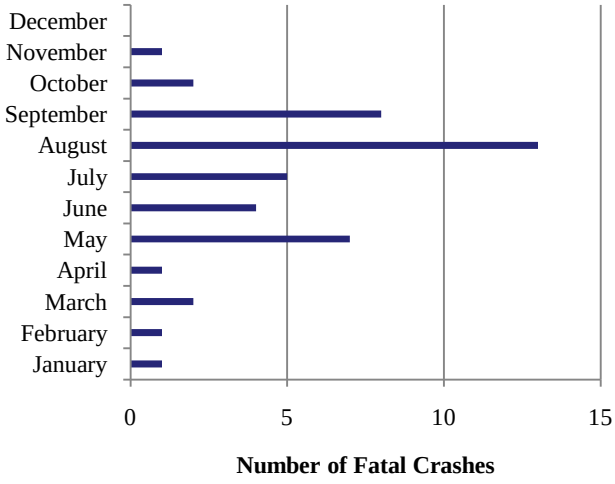


Figure 57 - Motorcycle Fatal Crashes by Gender

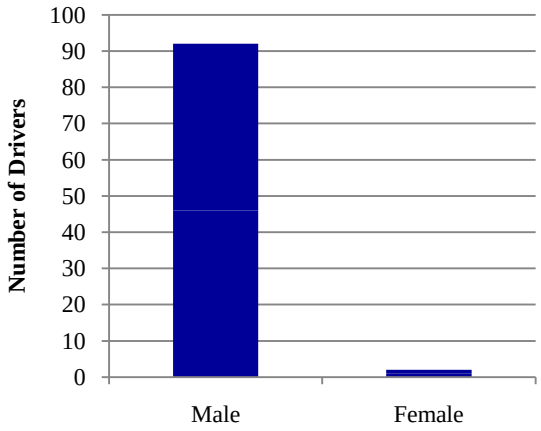


Figure 58 - Motorcycle Fatal Crashes by Driver Age

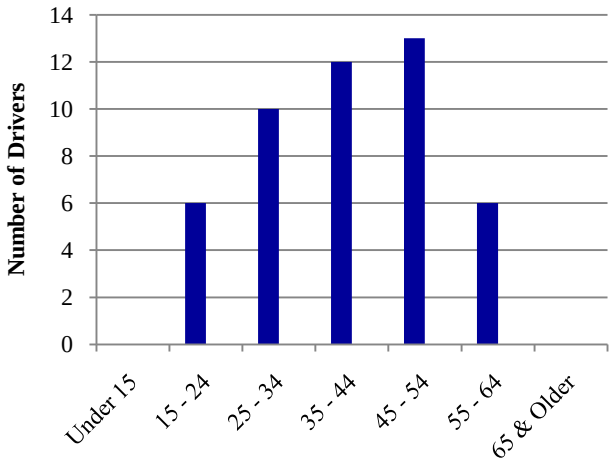


Figure 59 - Motorcycle Fatal Crashes by Roadway Functional Classification

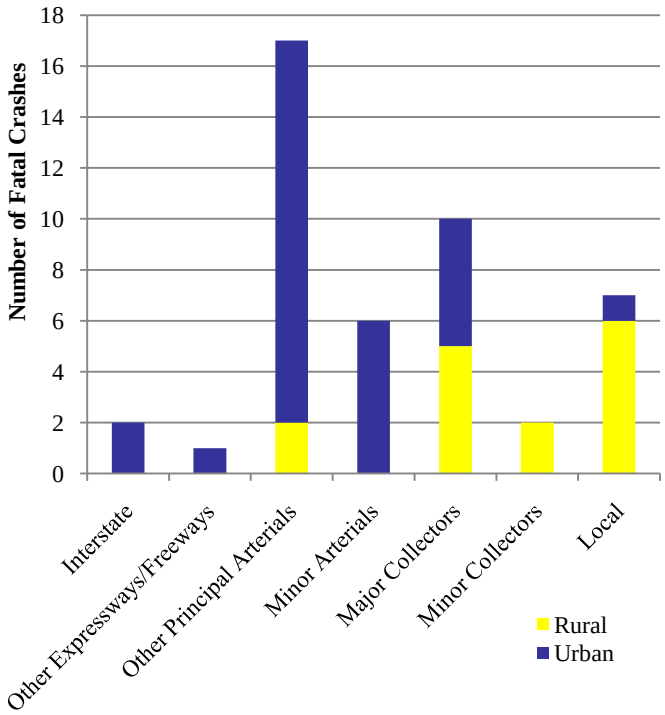


Figure 60 - Motorcycle Fatal Crashes by Manner of Impact

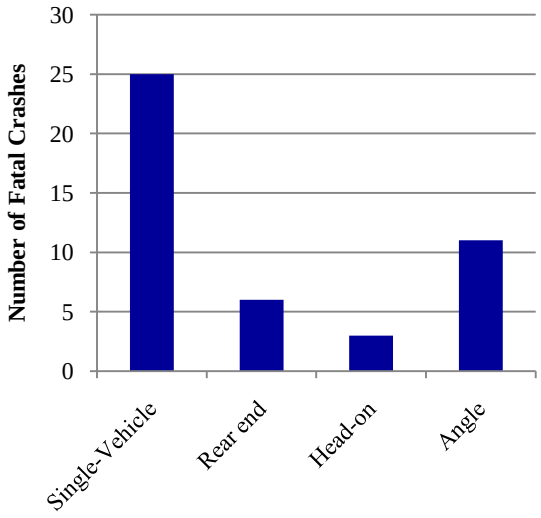


Figure 61 - Motorcycle-Involved Driver Contributing Circumstances

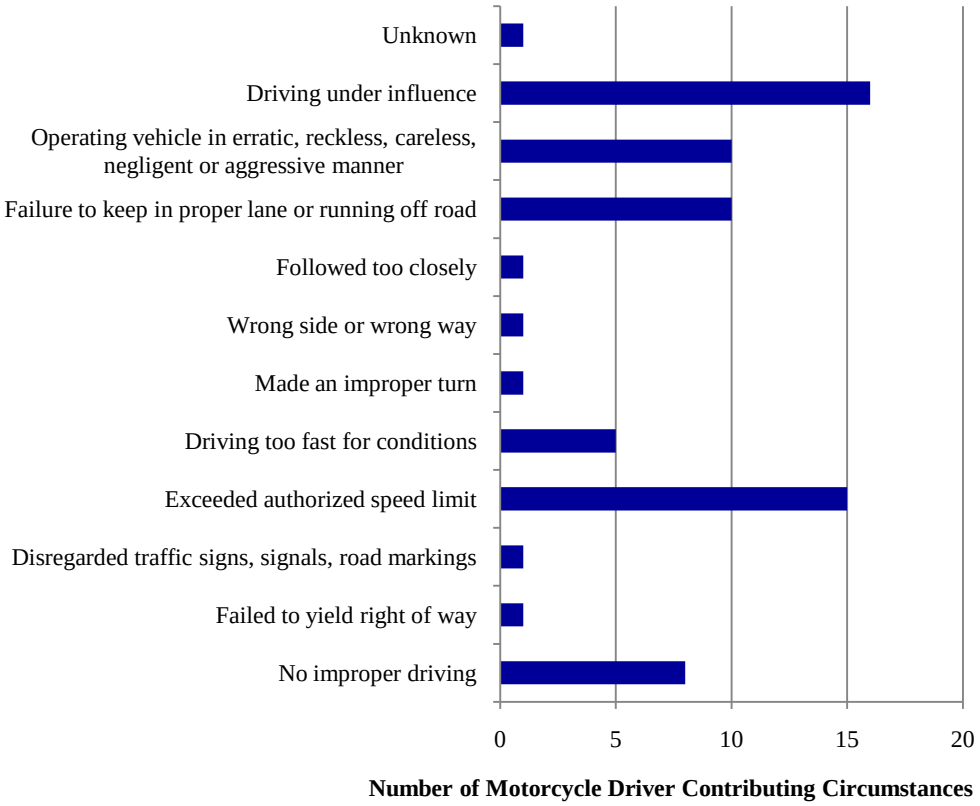


Figure 62 - Motorcycle Fatal Crashes by Make

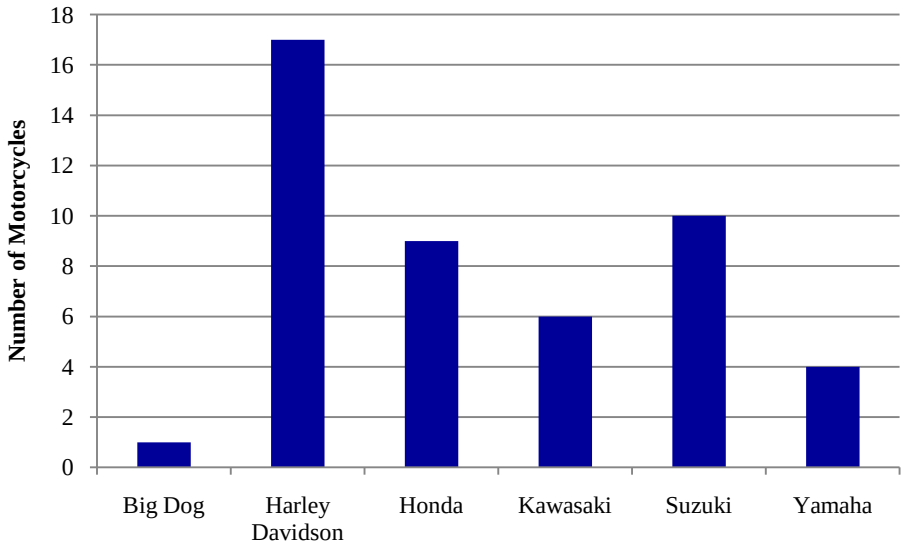
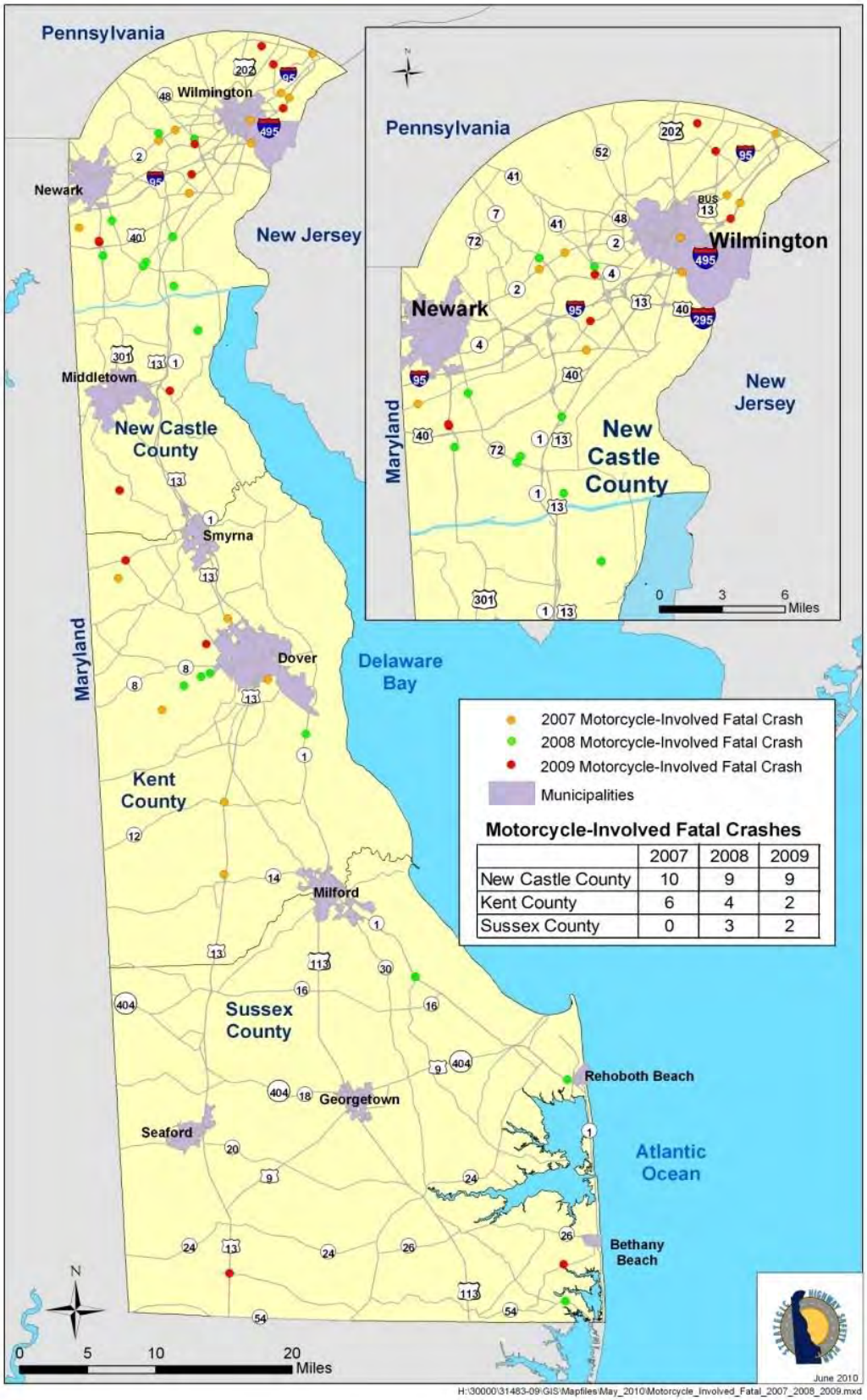


Figure 63 – Map of Motorcycle Fatal Crashes



	2007	2008	2009
New Castle County	10	9	9
Kent County	6	4	2
Sussex County	0	3	2

GOAL

Reduce the number of fatal crashes involving motorcycles by 5 percent every three years to achieve 12, 11, and 10 total fatal crashes involving motorcycles by 2012, 2015, and 2018, respectively in order to achieve the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

STRATEGIES AND IMPLEMENTATION

By identifying the location, time of day, contributing circumstances and other patterns that characterize fatal crashes involving motorcycles, focus can be placed on target areas, driver behaviors and time periods. As shown in the data review, strategies should target 45 to 54 year old males, principal arterials, aggressive driving, 3 PM to 6 PM, and the month of August. Additionally, in many fatal crashes involving motorcycles, aggressive and/or impaired driving behaviors are contributing factors leading to the crash. Therefore, education, enforcement, and engineering strategies to address speeding and impaired driving should potentially address a significant portion of fatal crashes involving motorcycles. Outreach efforts to the motorcycle community should emphasize these poor driver behaviors and the increased severity of aggressive and impaired driving when riding on a motorcycle, particularly for inexperienced riders. Strategies should focus on educating the public on motorcycle safety and performing target enforcement at "high risk" locations.

EDUCATION AND ENFORCEMENT: Public information and education campaigns can significantly increase awareness of and help reduce the risk associated with riding a motorcycle. These types of campaigns have been proven to be more effective when used in combination with targeted enforcement strategies. However, because speeding motorcycles can travel at speeds much higher than police officers are able to travel without jeopardizing their safety and the safety of others, enforcement is difficult. Delaware's strategies include:

- Conduct media outreach to increase public awareness
    - Increase awareness of motorcycle safety, including the consequences of aggressive riding, fatigued or impaired riding, and other unsafe riding behaviors
    - Educate other road users to be more conscious of the presence of motorcyclists
    - Educate motorcycle riders to be conscious of other vehicles' blind spots
    - Form strategic alliances with the motorcycle community to promote safety and accountability
- Licensing and training
    - Teach and measure skills and behaviors required for defensive driving and crash avoidance
    - Increase awareness of the risks of unlicensed and untrained riders
    - Increase the capacity of motorcycle training classes
    - Educate new drivers to share the road with motorcycle riders through the drivers' education curriculum
- Perform targeted enforcement of Delaware's law and poor motorcycle driver behaviors
    - Perform target enforcement at known "high-risk" locations
- Promote use of reflective and protective clothing and helmets
    - Enact a helmet law in Delaware that applies to all motorcycle riders

ENGINEERING: Engineering and infrastructure improvements, such as providing paved shoulders, installing safety edges, and increasing the responsiveness of maintenance programs can help reduce the risk of motorcycle-related crashes and fatalities. Additionally, by considering motorcycle riding throughout the roadway design phase, various design features that promote motorcycle safety can be incorporated into new and existing roadways. Some of the types of roadway improvements included as part of Delaware's strategies include:

- System and policy initiatives
  - Consider motorcycles when installing roadside barriers
  - Use high-traction materials for pavement and markings
  - Minimize uneven surfaces and reduce roadway debris
  - Promote the use of safety edge
  - Patch pot holes promptly
  - Consider motorcycle safety in work zones
- Spot or target location improvements
  - Construct paved shoulders
  - Install motorcycle hazard warning signs where needed

EVALUATION AND STATUS

The number of fatal crashes that involved motorcycles remained the same from 2007 to 2008 at 16 fatal crashes; however, the number of fatal crashes that involved motorcycles decreased to 13 fatal crashes in 2009. Although this emphasis area is new to the *Delaware SHSP*, Delaware has been implementing many strategies and countermeasures to reduce these types of crashes. Additional strategies and efforts are needed to further reduce these types of crashes in order to reach the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018. Several of the strategies in place in Delaware to address roadway departures also address motorcycle crashes.

The following programs have been implemented to address motorcycle-related crashes.

EDUCATION AND ENFORCEMENT

- Corresponding with May's Motorcycle Safety Awareness Month, Delaware's OHS launched the 2009 "Ride Safe. Ride Smart." campaign at the end of April, which continued through the end of October. The campaign included a combination of enforcement and awareness activities:
  - Public awareness efforts encouraged motorcycle riders to "Ride Smart. Stay Safe." and other motorists to "Share the Road." These messages reached the public through posters, billboards, radio messages, brochures, window decals, internet ads, and bumper stickers targeting both motorcyclists and passenger vehicle drivers. The campaign emphasized two main goals: (1) encouraging drivers of passenger vehicles to share the roadway and be aware of motorcyclists and their vulnerability and (2) motorcycle drivers are reminded not to speed or ride while under the influence of alcohol and/or drugs. Posters with alcohol prevention messages on them were distributed to bars and restaurants where motorcycle riders are known to visit.

  - Target enforcement involving DSP, Fenton Police, Middletown, Newark, and New Castle County Police Departments were conducted on high-crash roadways targeting both motorcyclists and passenger vehicle drivers violating motorcycle laws. Particular attention was paid to speeding and impaired motorcyclists.

- OHS formed a partnership with motorcycle advocacy groups through Delaware's Motorcycle Rider Education Advisory Committee (other members include the DMV, Dover Air Force Base, motorcycle businesses, and members of motorcycle rider groups). This committee sponsors Motorcycle Awareness Day, which includes a main event with vendors, displays, judging and presentation of awards, a parade, and a bike show. With continued open lines of communication between organizations, a reduction in the number of fatal motorcycle crashes becomes more attainable.

- Delaware currently offers motorcycle training courses administered through the DMV. The course is 15 hours (5 hours of classroom training and 10 hours of riding). In addition educating students regarding basic riding skills, motorcycle laws, and crash avoidance maneuvers, the class also emphasizes the dangers of impaired driving.
- In 2007, the DMV started a program to mail license endorsement requirement materials to registered owners of motorcycles who do not have an endorsement.
- The 2008 and 2009 Delaware Office of Highway Safety Annual Highway Safety Conferences included sessions regarding motorcycle safety.
- In August 2010, Governor Jack Markell signed Senate Bill 269, which increases penalties for drivers convicted of inattentive or careless driving resulting in the injury of a "vulnerable user". A "vulnerable user" includes pedestrians, roadway workers, cyclists, skateboarders, roller or inline skaters, scooters, mopeds, motorcycles, farm vehicles, and those riding on animals. The bill allows Delaware courts to impose additional penalties, such as a mandatory traffic safety course or community service for drivers found guilty of inattentive driving resulting in the injury or death of a vulnerable user.

ENGINEERING

- System and policy initiatives
  - DelDOT is currently revising the *Delaware MUTCD* in response to the federal 2009 *MUTCD*. Additionally, DelDOT is training their staff on the application and practices in the *MUTCD*. Proper documentation and training regarding the installation of traffic control devices will assist in providing all drivers, including motorcyclists with a consistent driving environment.
  - DelDOT is developing a DGM for the installation of safety edge, an asphalt paving technique, to reduce pavement drop-off issues
  - DelDOT has developed motorcycle friendly standards for vertical differences in work zones

- Spot or target location improvements
    - As part of the annual Highway Safety Improvement Program, including the High Risk Rural Roads Program and Hazard Elimination Program, DelDOT has implemented numerous cost-effective traffic signing, pavement marking, and surface treatment improvements to improve safety at high-crash locations and potentially reduce motorcycle-related crashes.
    - DelDOT continues to strive to construct motorcycle-friendly roads by implementing the following:
        - Constructing paved shoulders, wherever possible; however, these improvements can be particularly impactive and expensive in some locations
        - Installing skid resistant pavement overlays
        - Installing motorcycle hazard warning signs, such as Bump, Dip, etc., where needed
        - Installing new warning signs or upgrading existing signs to larger sizes or fluorescent yellow sheeting

DELAWARE STRATEGIC HIGHWAY SAFETY PLAN

SECONDARY EMPHASIS AREAS

SECONDARY EMPHASIS AREA ONE: SUSTAINING PROFICIENCY IN OLDER DRIVERS

BACKGROUND

Delaware's population is getting older, increasing the number of senior drivers on our roadways. According to the "2009 Delaware Population Consortium Report", 15 percent of Delaware's population will be persons 65 and older in 2010 and 24 percent of Delaware's population will be persons 65 and older in 2030. Impaired vision and hearing and reduced cognition and reflexes often decrease driving abilities in older drivers, which increases the potential for a crash. Additionally, older drivers are at greater risk of being killed or seriously injured in a crash because of increased frailty and other medical issues associated with aging. Therefore, as the percentage of older persons in Delaware's population grows over the next couple of decades, strategies and countermeasures to address crashes and driving behaviors of older drivers becomes increasingly important. For these reasons, the *2010 SHSP* includes strategies to address fatal crashes involving older drivers. This emphasis area pertains specifically to older drivers; however, strategies to address fatal crashes involving older pedestrians are discussed in the previous portion of this plan dedicated to the emphasis area specific to pedestrians.

According the Delaware's Older Driver Task Force, which includes members from OHS, DMV, DelDOT, AAA, AARP, and other coordinating agencies, a major concern for this emphasis area is older motorists who have been diagnosed with Alzheimer's disease but continue to drive for several more years. Some senior drivers will self-assess their driving abilities and voluntarily limit themselves to daylight and dry weather driving only, as needed; however, not all drivers recognize their decreased driving abilities and the safety risks. Additionally, Delaware's senior drivers have voiced their concerns with drivers today - other drivers are demonstrating increasing impatience, tailgating, aggressive driving, lack of signaling, and cell phone use, all of which are concerns of older drivers.

The DMV has the following licensing requirements specific to older drivers:

- Self-evaluation – Each person applying for or renewing a driver's license is required to affirm that they do not have a physical or mental disability that interferes with their driving ability
- Vision exam – Each person is required to pass a vision screening (if vision is 20/50 or worse, daylight only driving is allowed)
- Re-examination (written and/or driving skills tests) if the DMV receives a written request from family, law enforcement, or a physician, or the driver experienced two or more crashes within two years. When appropriate, persons may be required to obtain a doctor's consent to drive and/or complete a driver rehabilitation class.

DATA REVIEW

Based on 2007 to 2009 fatal crash data, 37 percent of fatal crashes involving older drivers occurred on rural roadways (rural roads account for 30 percent of vehicle-miles traveled in 2007, 2008 and 2009). Additionally, 46 percent of fatal crashes involving older drivers occurred on collector or local roads; however, only 33 percent of vehicle-miles traveled in 2007, 2008 and 2009 occurred on these roadway classifications. Further analysis shows that 66 percent of older drivers involved in a fatal crash were male. The time period that has the highest number of fatal crashes involving an older driver is 12 PM to 3 PM, representing 35 percent of fatal crashes, which may indicate that older drivers are avoiding peak hours and traffic congestion. Unlike several other emphasis areas, only 8 percent of older drivers involved in a fatal crash were under the influence of alcohol and/or drugs at the time of the crash. Additionally, based on 2007 to 2009 fatal crash data, 87 percent of fatal crashes that involved older drivers occurred on dry pavement. Forty-nine percent of driver contributing circumstances for older drivers involved in fatal crashes was no improper driving, indicating that almost half of fatal crashes involving an older driver were not the fault of the older driver. Figures 64 through 71 summarize fatal older driver-related crash data.

Figure 64 - Fatal Crashes Involving Older Drivers by Year

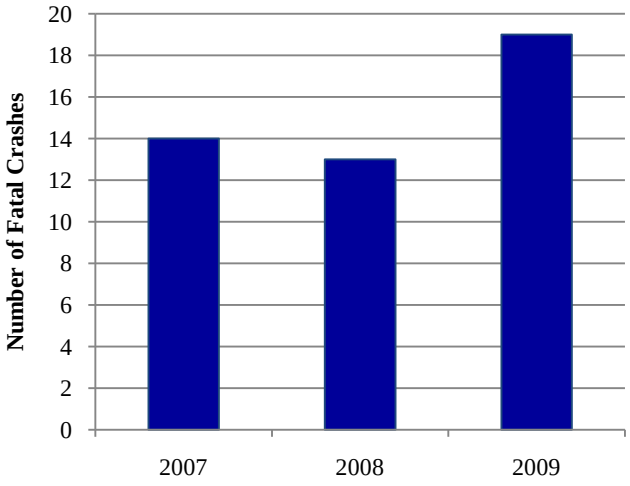


Figure 65 - Fatal Crashes Involving Older Drivers by Time of Day

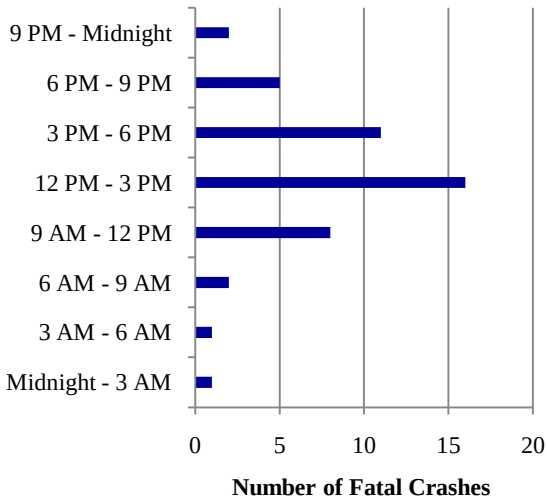


Figure 66 - Fatal Crashes Involving Older Drivers by Surface Condition

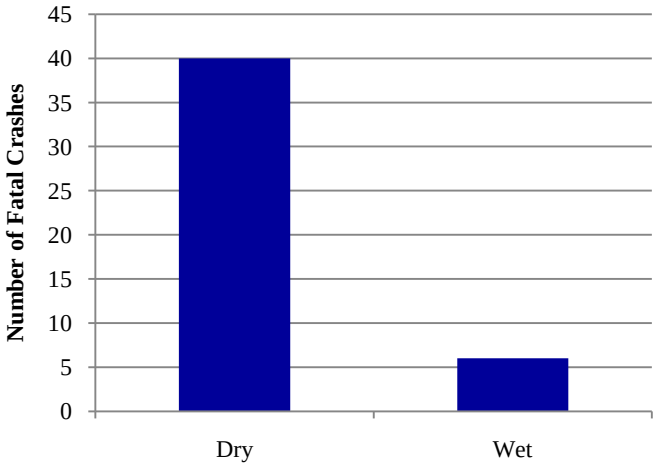


Figure 67 - Older Driver Fatal Crashes by Gender

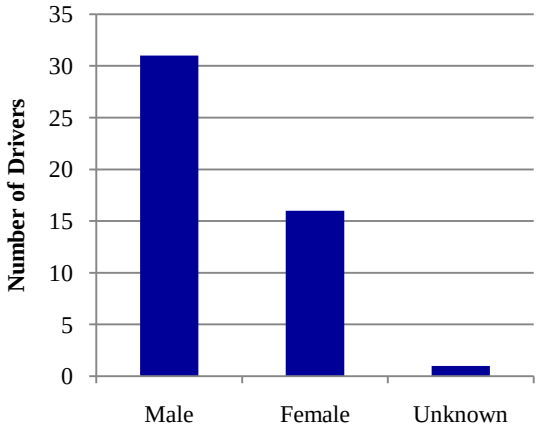


Figure 68 - Fatal Crashes Involving Older Drivers by Time of Day

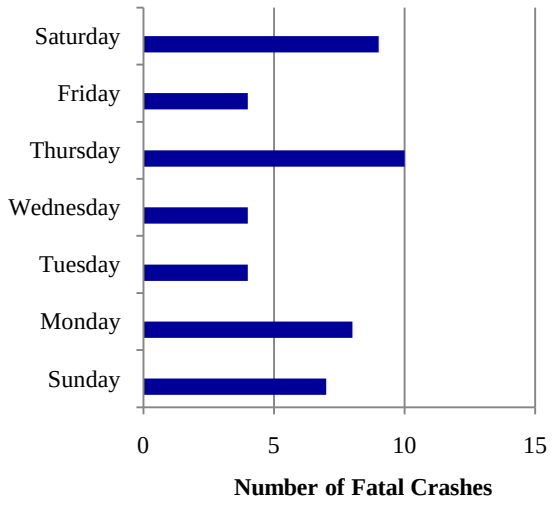


Figure 69 - Fatal Crashes Involving Older Drivers by Roadway Functional Classification

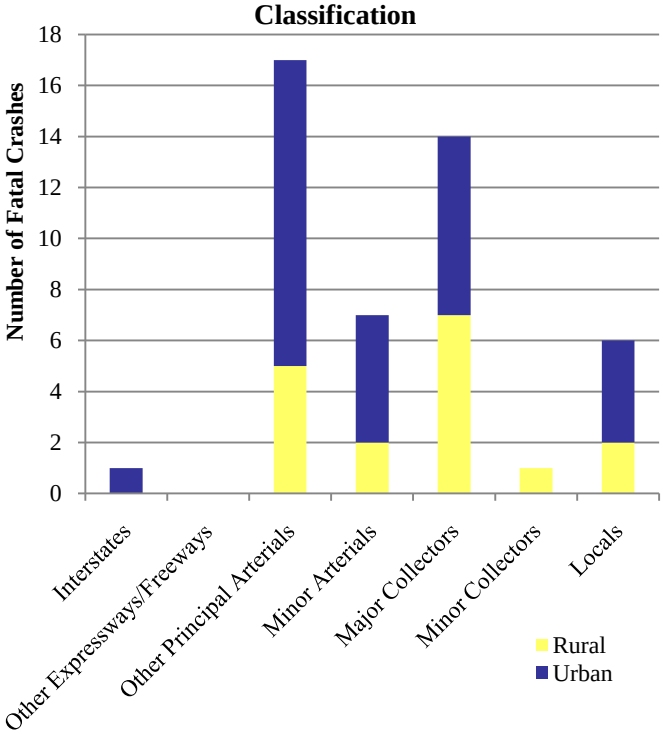


Figure 70 - Driver Contributing Circumstances of Older Drivers Involved in Fatal Crashes

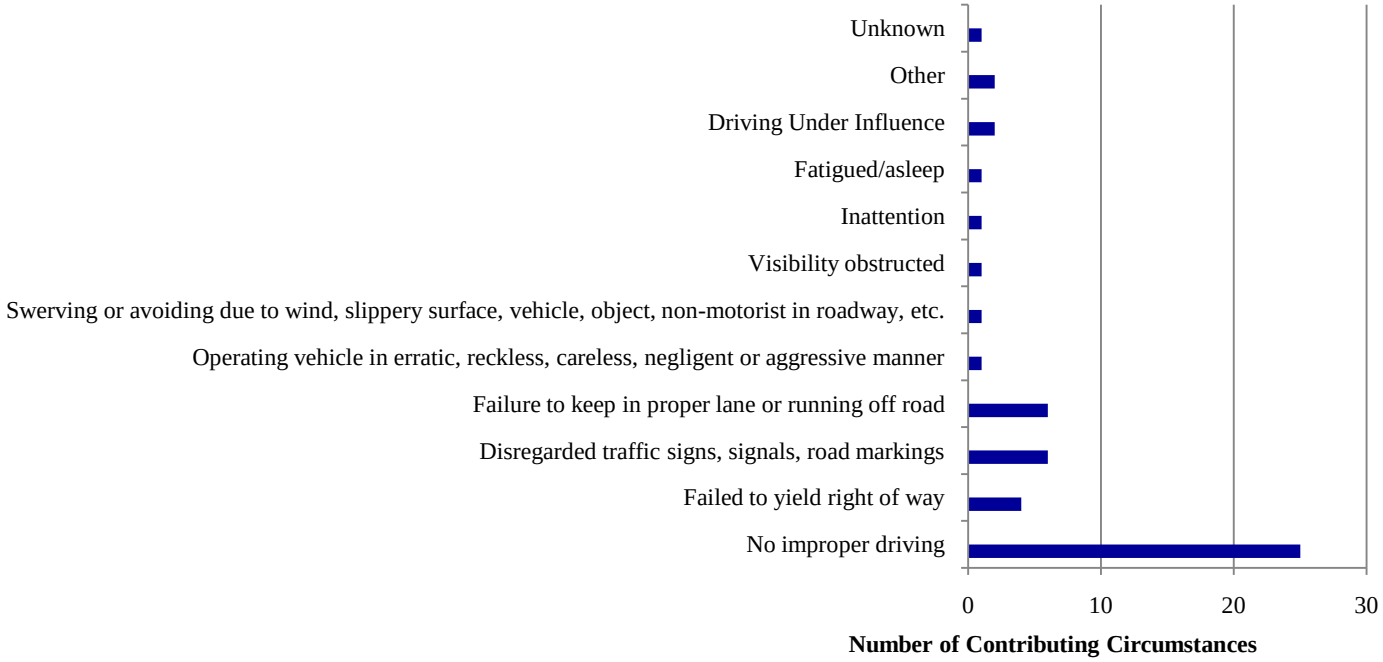
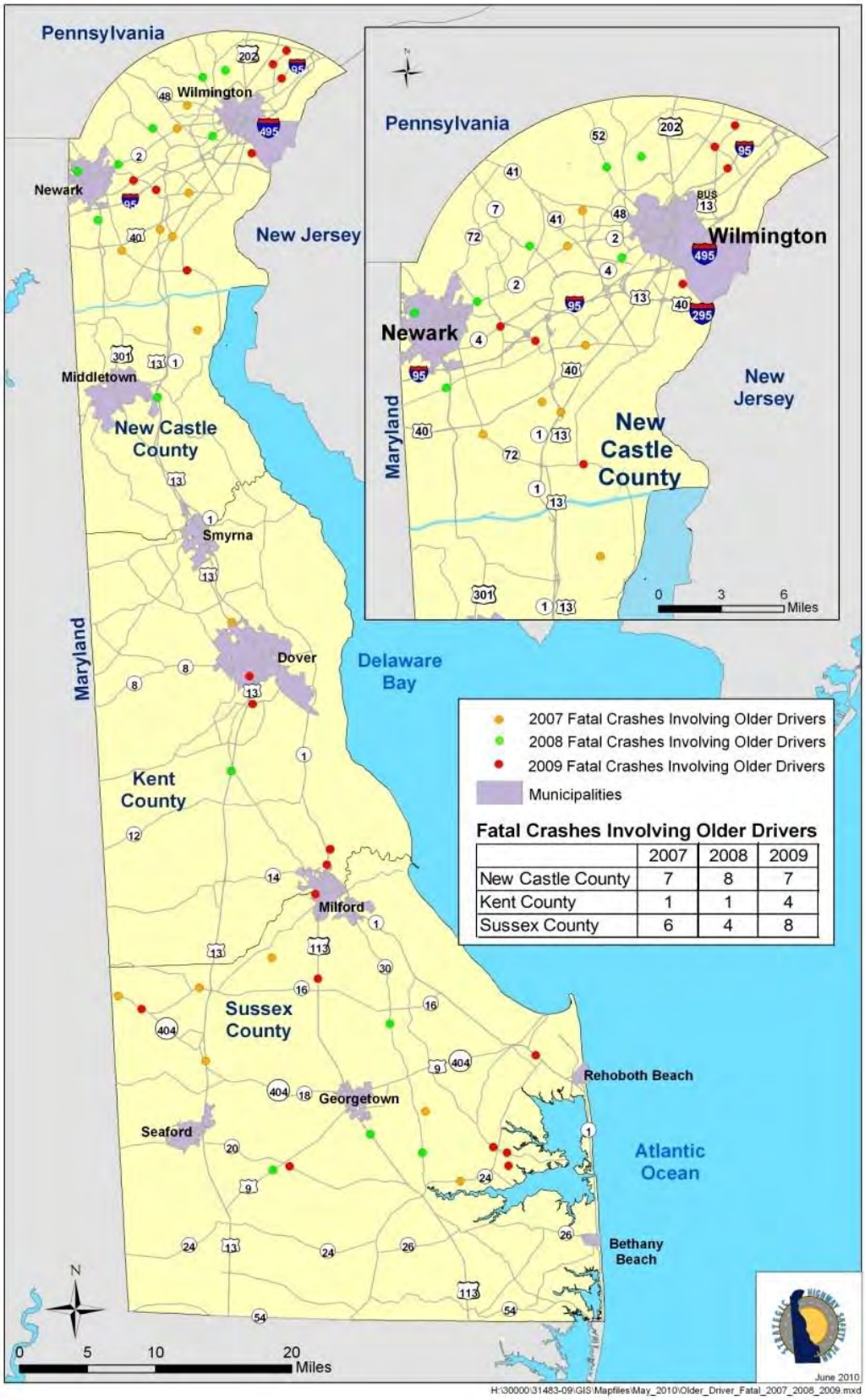


Figure 71 – Map of Fatal Crashes Involving Older Drivers



STRATEGIES AND IMPLEMENTATION

By identifying the location, time of day, contributing circumstances and other patterns that characterize fatal crashes involving older drivers, focus can be placed on target areas, driver behaviors and time periods. As shown in the data review, strategies should target males, collector and local rural roads, and 12 to 3 PM. Given the importance of driving to maintain independence and preserve health and quality of life and considering older driver behaviors result from the interaction between the driver and the driving environment, education and engineering strategies can be implemented to address crashes involving older drivers. Although older drivers often experience decreased driving abilities that need to be addressed, it should also be noted that almost half of fatal crashes involving older drivers were the fault of the other driver (i.e., not the older driver); therefore, strategies to address the other drivers and other emphasis areas, such as aggressive driving, impaired driving, etc., should reduce fatal crashes involving older drivers as well.

EDUCATION: Public information and older driver counseling and education can significantly increase awareness of older driver concerns and help older drivers to identify their disabilities and potential solutions. Assistance from law enforcement officers, physicians, the medical advisory board, the DMV, and others, is critical in assisting older drivers in recognizing and address their declining driving abilities in the most appropriate manner. These types of strategies include:

- Continue to plan for Delaware's aging population through the Older Driver Task Force to address older adults' transportation needs
- Identify and address at-risk older drivers
    - Strengthen the role of medical advisory boards in identifying and treating older drivers with decreased driving abilities
    - Continue to update procedures for evaluating medical fitness to drive and re-verification of driving skills and restrictions at the DMV, as needed
    - Provide remedial assistance to help functionally impaired older drivers, such as installing additional mirrors or new vehicle technologies such as back-up warning devices or completing occupational therapy geared toward driving functionality
    - Provide a self-assessment tool for older drivers to determine their capabilities
    - Encourage the use of Delaware's well-established paratransit services
- Improve the driving competency of older adults
    - Expand senior resource centers within communities to promote safe mobility choices
    - Provide educational and training opportunities to the older driver population
    - Provide a website with information and educational materials specific to older drivers

ENGINEERING: Engineering and infrastructure improvements, such as installing larger signs and advanced street name signs, can be implemented to better accommodate older drivers. Several of the strategies listed below overlap with strategies to address intersection fatal crashes. Additionally, strategies to address older pedestrians can be found within the section of this report dedicated to the pedestrian emphasis area. In addition to these infrastructure countermeasures, it is necessary to ensure law enforcement, OEMS, and DelDOT coordinate their efforts to improve emergency response and to obtain adequate personnel to address issues and maintain consistent traffic control devices. Strategies to improve the roadway and driving environment include:

- Signing Improvements
    - Provide advance signing, including advance street name signs
    - Increase size and letter height of roadway signs
- Pavement Marking Improvements
    - Improve retroreflectivity of certain pavement markings
- Intersection Improvements
    - Provide adequate all-red clearance intervals
    - Provide protected left-turn phasing
    - Use standard signal head sizes and designs at all intersections
    - Install advance traffic signal warning signs
    - Post advance lane use signs
    - Post overhead advance street name signs
    - Provide offset left-turn lanes
    - Replace painted channelization with concrete islands
    - Reduce intersection skew
    - Replace conventional intersections with modern roundabouts
    - Add auxiliary left-turn lanes at intersections
- Other Roadway Improvements
    - Improve lighting at intersections, horizontal curves, and railroad grade crossings
    - Improve roadway delineation
    - Improve temporary traffic control in work zones

EVALUATION AND STATUS

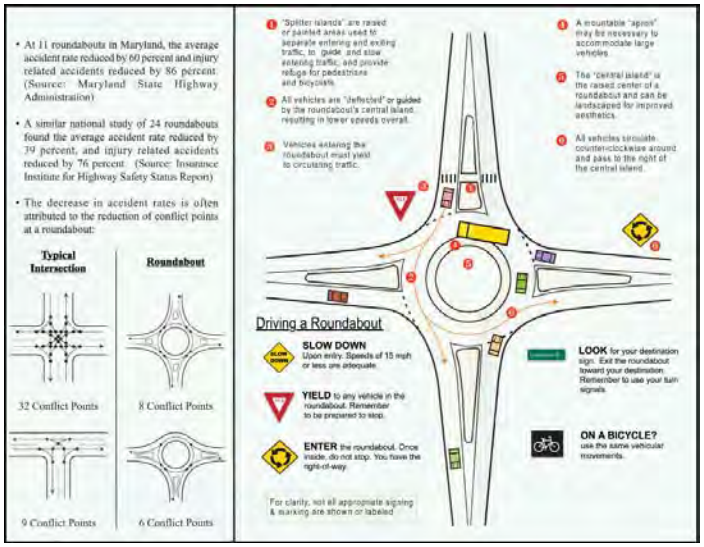
The number of fatal crashes that involved older drivers increased from 14 and 13 fatal crashes in 2007 and 2008, respectively, to 19 fatal crashes in 2009. The peak in 2009 indicates the need for strategies and countermeasures to reduce fatal crashes involving older drivers in order to reduce nationwide and statewide fatality rates and explains why the coordinating agencies agreed to add this emphasis area to the 2010 strategic plan. Although this emphasis area is new to the *Delaware SHSP*, Delaware has implemented many strategies and countermeasures in recent years to reduce these types of crashes in recent years. However, additional strategies and efforts are needed to reach the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018. Several of the strategies in place in Delaware to address fatal crashes at intersections also address older driver crashes.

Established in early 2010, Delaware's Older Driver Task Force is actively engaged in addressing the needs of older drivers in the state. Recognizing the increase in older persons in the state's population and an increase in the number of fatal crashes involving older drivers, the task force was created to determine what additional steps Delaware can take to ensure that older drivers are accommodated.

The following programs have been implemented to address older driver-related crashes.

EDUCATION

- Education and outreach efforts geared toward older drivers have significantly advanced in recent years
  - DelDOT has created brochures, fliers, and/or e-mails to educate the public on how to use pedestrian count-down signals, HAWK signals, and roundabouts.
  - The University of Delaware and Roadway Safety Foundation's Safer Roads initiative "Safe and Mobile Delaware" campaign was launched in January 2010 to educate older drivers on Delaware's programs and policies specific to older drivers. As part of this campaign, a website with educational materials for older drivers and their families was created. Additionally, public service announcements and a 30-minute video documentary explain safety and transportation needs of older drivers.



  - Delaware's Older Driver Task Force was created in early 2010 and includes members from OHS, DMV, DelDOT, AAA, AARP, and other coordinating agencies. Currently, the task force is developing a website for older drivers to assess all their transportation needs in one location. The website (www.seniordriver.dmv.de.gov) provides driving tips for seniors, reaction time games, general health information and other services. Additionally, the group is discussing several other programs and initiatives for implementation.
  - The University of Delaware's "Assessing the Needs of Delaware's Older Drivers" report was prepared in 2007 to identify strategies and countermeasures to address older driver and pedestrian needs.
  - Delaware's Certified Driver Rehabilitation School assesses and improves an older driver's ability to drive on Delaware's roadways.
  - The 2008 and 2009 Delaware Office of Highway Safety Annual Highway Safety Conferences included several sessions regarding speeding and reducing aggressive driving.
  - The DMV's "Senior Driver Day" event will be launched at DelDOT's DMV office in Dover on October 2, 2010. The event will include safety tips for older drivers, assistance from the AARP CarFit program, which aids motorists to ensure they "fit" their vehicles properly, and assistance with other services such as vehicle inspection, registration, driver license, handicap placards, and self assessments.

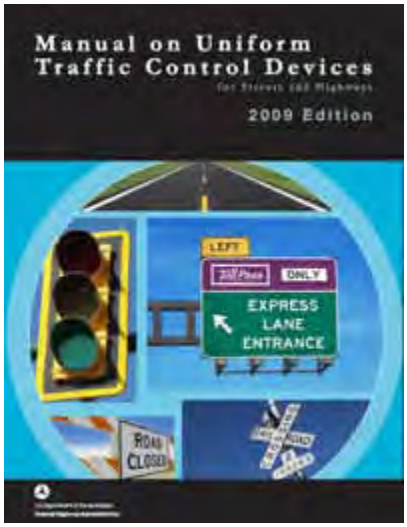
ENGINEERING

The following programs and improvements have been implemented to accommodate older drivers and improve overall safety:

- DART's paratransit services provide transportation for persons unable to independently use the fixed route system. Once approved, a person can make transportation reservations online or via phone. Additionally, the Elderly and Disabled Transit Advisory Committee (EDTAC) is a working group established to discuss paratransit plans and issues impacting disabled riders and the public. EDTAC is comprised of paratransit users, DART staff, and representatives from agencies working with the elderly and disabled. EDTAC helps define paratransit rider issues, reviews policies for clarification, and develops public policy changes.
- Signing Improvements
    - Installing larger signs
    - Installing overhead Street Name signs
    - Using Clearview font on roadway signs
    - Install signing improvements at midblock crosswalks
- Pavement Marking Improvements
    - Delaware will soon implement a striping management program to ensure proper retroreflectivity of certain pavement markings
- Intersection Improvements (many of these improvements are included in the emphasis areas related to pedestrians and intersections)
    - Installed High Intensity Activated crossWalk (HAWK) at SR 72 at Farm Lane
    - Installing countdown pedestrian signals at intersections (as of July 2010, approximately 100 intersection statewide have countdown pedestrian signal heads)
    - Installing accessible (audible and vibrotactile) pedestrian signals (APS) at intersections on a case-by-case basis (currently, five intersections have APS)
    - Implementing longer crossing times for pedestrians based on a 3.5 foot/second walking speed
    - Installing signal back plates to improve signal visibility
    - Installing rumble strips approaching STOP controlled intersections
    - Installing stop lines at unsignalized intersections
    - Provide medians and refuge islands for pedestrians navigating large or complex intersections
    - Rounded-curb radii is considered on a case-by-case basis during the intersection design process
    - Realigning skewed intersections is considered where appropriate; however, the cost of realignment projects is high
    - Advance traffic signal warning signs and street name plaques are recommended and implemented through the annual Highway Safety Improvement Program
    - 8 inch signal indications have been replaced with 12 inch signal indications
    - Reconstructing traffic signals to replace diagonal span signal heads with box spans to improve signal visibility

- DelDOT's Flashing Red Arrow Study was completed in February 2009. As a result, four out of the 42 flashing red arrow locations statewide, were converted to protected-only left-turn phasing by May 2010. DelDOT is considering if signal modifications are necessary at the remaining locations, based on the 2009 *MUTCD* and updated guidance on left-turn phasing provided by ITE.
- Advance lane use signs are often installed as part of intersection upgrade projects
- DelDOT is currently installing street name signs on mast arms at traffic signals and is testing the use of street name signs on span wire
- DelDOT plans to revaluate their current warrants for lighting
- Add auxiliary left-turn lanes at intersections, particularly on high-speed, high volume roadways
  - DelDOT considers restriping and minor widening, major widening, or road diets to provide separate left-turn lanes
  - DelDOT requires developers to install separate left-turn lanes whenever warranted by the Subdivision Manual
- Roundabout installation and outreach
  - DelDOT roundabout guidelines were adopted in June 2009 and a section of DelDOT's website is dedicated to roundabout education; however, public outreach regarding the use of roundabouts needs to continue
  - DelDOT's Roundabout Committee continues to keep abreast of the latest developments in roundabout design, specifically signalized roundabouts

- DelDOT is currently revising the *Delaware MUTCD* in response to the federal 2009 *MUTCD.* Additionally, DelDOT is training their staff on the application and practices in the *MUTCD*. Proper documentation and training of traffic control devices will assist in providing drivers with a consistent driving environment. Changes to the *2003 MUTCD* specifically related to senior driver research and/or recommendations from the *Highway Design Handbook for Older Drivers and Pedestrians*, include:
  - Signing
    - Updated guidance and standards for sign sizes are provided for various roadway classifications
    - Minimum specific ratio for letter height should be 1 inch of letter height per 30 feet of legibility distance
    - Minimum letter heights are provided for logo sign panels consisting of only word legends that are displayed on freeways, expressways, conventional roads and ramps. A new table is provided that includes sizes for Specific Services, logo panels, and logo panel supplemental messages.
    - Mixed lettering for names of places, streets, and highways has been adopted to increase legibility
    - Larger sign sizes are standard for critical signs (e.g., YIELD signs, DO NOT ENTER signs, ONE WAY signs, etc.)



- DO NOT ENTER and WRONG WAY signs may be mounted at lower heights when an engineering study indicates that it would address wrong-way movements at freeway/expressway exit ramps
- Improved signing standards (e.g., ONE WAY and Divided Highway Crossing signs) for divided highway crossings at signalized and unsignalized intersections
- Updated the traffic signal signing section to recommend the locations of individual signs including those adjacent to traffic signal faces and the use of the AT SIGNAL supplemental plaques
- Updated considerations for the installation of No Turn on Red signs at locations where the skew of the intersection makes it difficult for older drivers to see traffic approaching from their left
- Use Advance Street Name signs with Signal Ahead signs
- Improved the design of Overhead Arrow-per-Lane Guide Signs for option lanes
- A Type 1 object marker is permitted below an Exit Gore sign to improve visibility

o Pavement Markings

- Retroreflective raised pavement markers can be used in the roadway immediately adjacent to curbed raised medians and curbs of islands, or on top of such curbs

o Signals

- All new signal installations require the use of 12-inch (previously 8-inch) indications (Delaware has been installing 12-inch signal indications for several years; any remaining 8-inch indications will be upgraded as part of full signal rebuilds)
- Updated guidance that signal back plates should be installed on any approach with a posted or 85th percentile speed of 45 miles per hour or higher, and should be considered on any approach with speeds less than 45 miles per hour
- An optional leading pedestrian interval may be used when a high volumes of pedestrians and turning volumes are present

SECONDARY EMPHASIS AREA TWO: MAKING HEAVY VEHICLE TRAVEL SAFER

BACKGROUND

Due to the disparity in size and weight of heavy vehicles versus passenger vehicles, crashes involving these types of vehicles are more likely to result in incapacitating injuries or fatalities. According to *NCHRP Report 500*, truck drivers are cited less often in crashes than other motorists for vehicle driver errors. Crash data in Delaware supports this research, indicating that the majority of truck drivers are not at fault in fatal crashes involving heavy vehicles. Additionally, studies indicate that truck drivers exceed posted speed limits by fewer miles per hour than other drivers. For the purposes of the *Delaware SHSP*, single-unit trucks with two or three axles, tractor trailers, tractors (e.g., bobtail), motor homes, and buses are considered heavy vehicles.

Delaware's Motor Carrier Safety Assistance Program Commercial Vehicle Safety Plan is a collaborative effort led by DSP to enhance highway safety by preventing crashes involving commercial motor vehicles and "ensuring the safe, secure transportation of persons and property by commercial motor vehicles on our highways." The FY 2010 Safety Plan includes two goals: a one-year goal (by 2011) to maintain the state's 3-year average rate of 0.16 commercial motor vehicle crash fatalities per 100 million vehicle miles traveled, which is equivalent to FMCSA's goal, and (2) a one-year goal (by 2011) to reduce the 3-year average rate of total injury crashes to a rate of 2.0 total injury crashes per 100 million vehicle miles traveled.

DATA REVIEW

Based on 2007 to 2009 fatal crash data, 54 percent of fatal crashes involving heavy vehicles occurred on rural roadways, even though rural roads account for only 30 percent of vehicle-miles traveled in 2007, 2008 and 2009. Additionally, 57 percent of fatal crashes involving heavy vehicles occurred on principal arterials (56 percent of vehicle-miles traveled in 2007, 2008 and 2009 occurred on this roadway classification). Further analysis shows that 86 percent of heavy vehicle drivers involved in fatal crashes were male. The 35 to 44 years old age group represents the highest percentage of heavy vehicle drivers (31 percent) involved in a fatal crash. The time period that has the highest number of fatal crashes involving heavy vehicles is 12 PM to 3 PM, representing 20 percent of fatal crashes. Additionally, in 71 percent of fatal crashes involving a heavy vehicle, the driver of the heavy vehicle was demonstrating no improper driving at the time of the crash, indicating that truck drivers are generally not at fault in fatal crashes in Delaware. Twenty-nine percent of fatal crashes involving a heavy vehicle involved aggressive driving behaviors on behalf of the driver of the other vehicle (i.e., not the heavy vehicle driver). Forty-three percent of fatal crashes involving a heavy vehicle were angle crashes and 26 percent of fatal crashes involving a heavy vehicle were single vehicle crashes. Of the 44 fatalities that occurred as a result of crashes involving heavy vehicles, 40 (91 percent) were not occupants of the heavy vehicle. Figures72 through 79 summarize fatal heavy vehicle crash data.

Figure 72 - Heavy Vehicle Fatal Crashes by Year

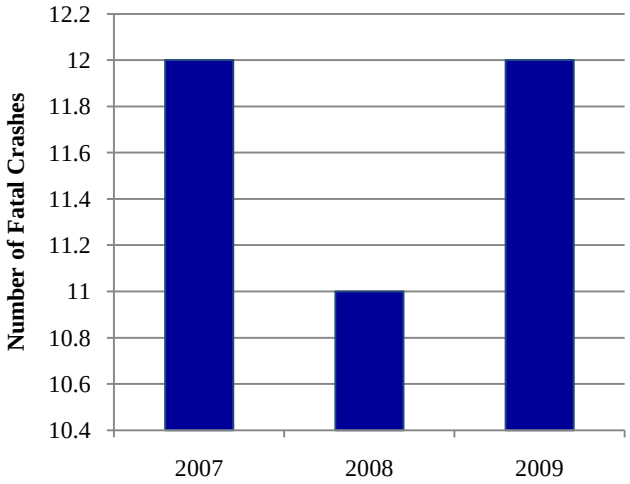


Figure 73 - Heavy Vehicle Fatal Crashes by Time of Day

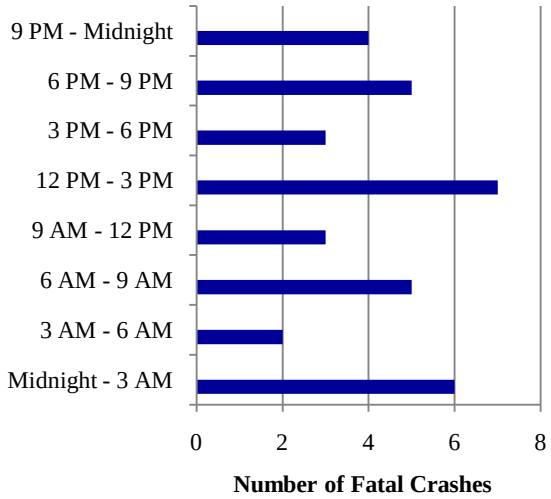


Figure 74 - Heavy Vehicle Fatal Crashes by Driver Age

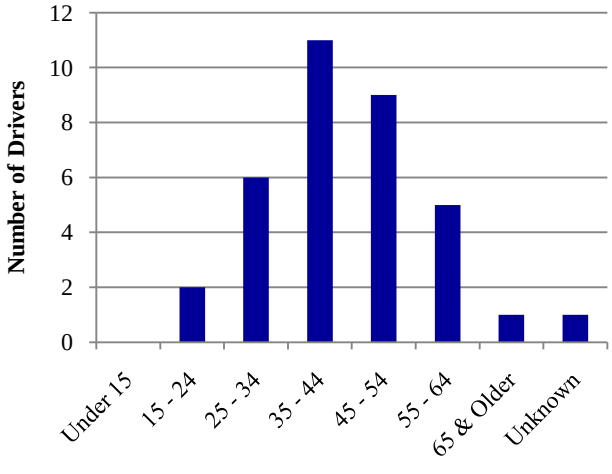


Figure 75 - Heavy Vehicle Fatal Crashes by Roadway Functional Classification

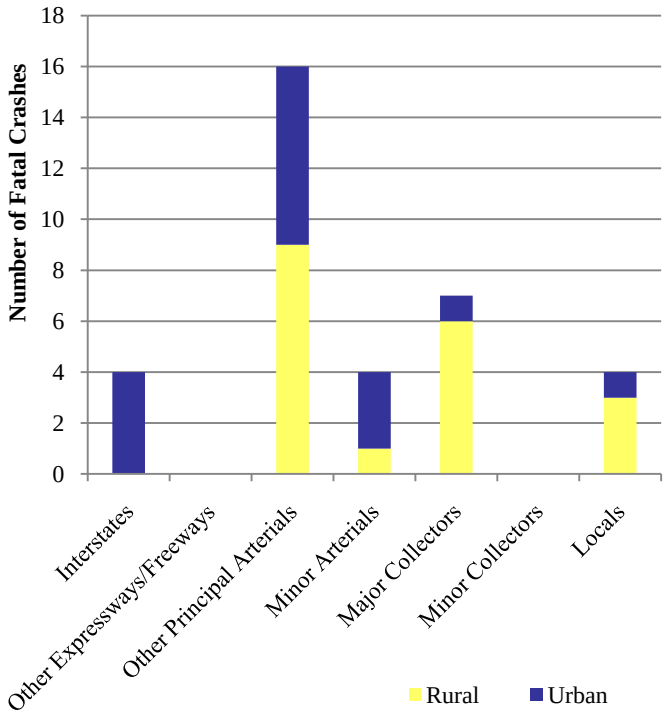


Figure 76 - Heavy Vehicle Driver Contributing Circumstances

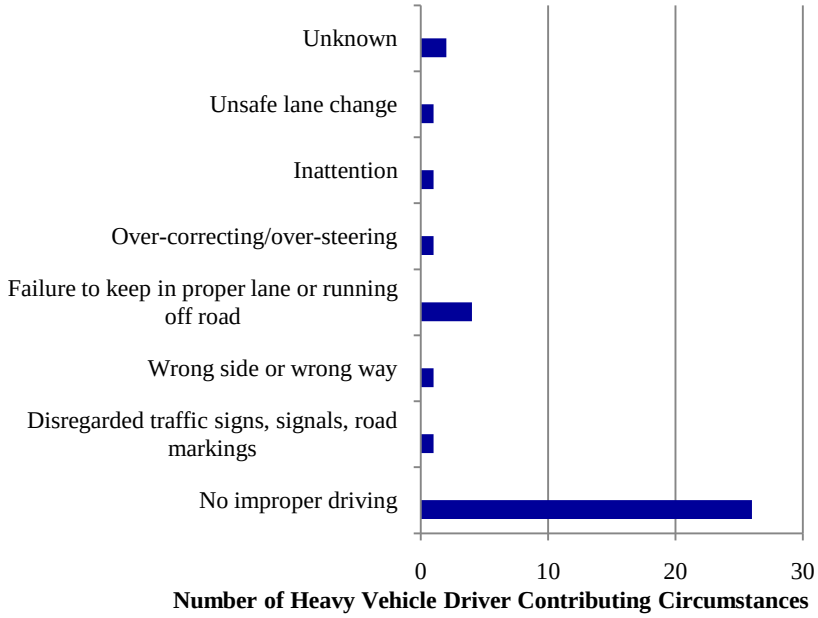


Figure 77 - Heavy Vehicle Fatal Crashes by Month

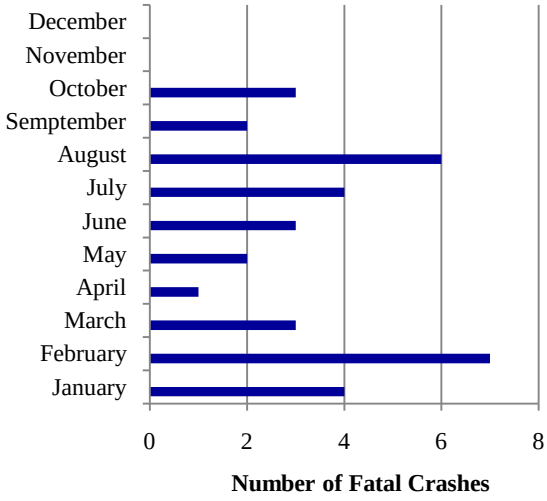


Figure 78 - Heavy Vehicle Fatal Crashes by Manner of Impact

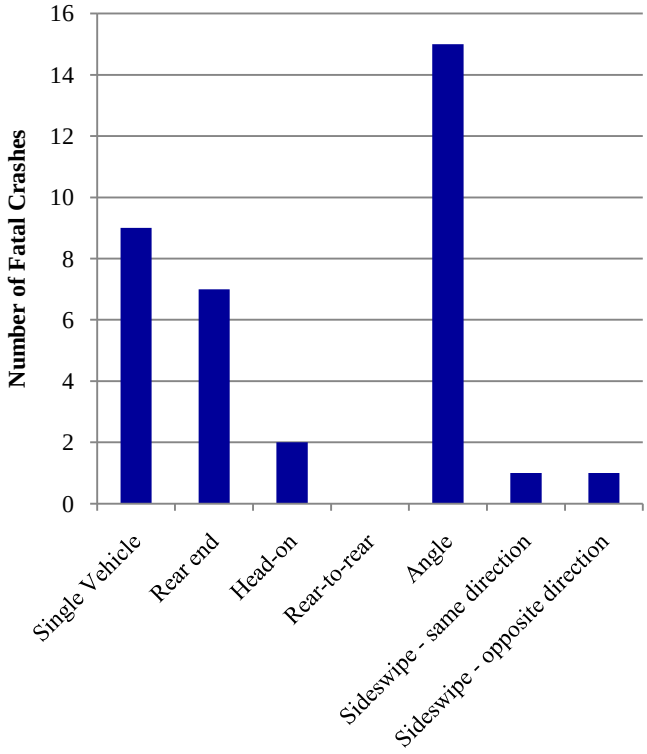
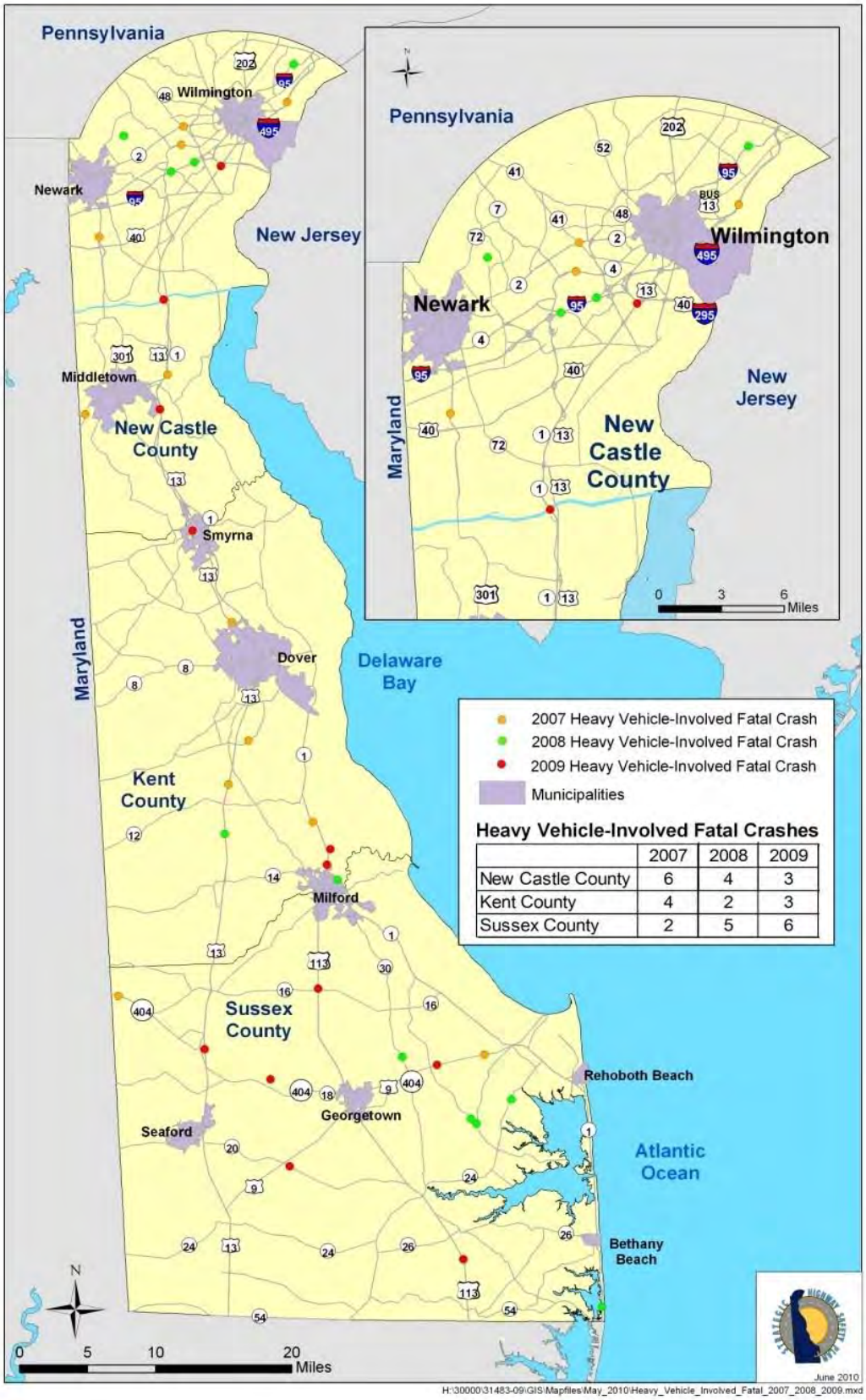


Figure 79 – Map of Heavy Vehicle Fatal Crashes



	2007	2008	2009
New Castle County	6	4	3
Kent County	4	2	3
Sussex County	2	5	6

STRATEGIES AND IMPLEMENTATION

Because the drivers of heavy vehicles are generally not at fault in fatal crashes involving heavy vehicles in Delaware, strategies implemented to address other emphasis areas (e.g., aggressive driving, impaired driving, roadway departures, etc.) will be effective in reducing fatal crashes involving a heavy vehicle. However, education, enforcement, and engineering strategies to target heavy vehicles and the interaction between heavy vehicles and other passenger vehicles have been identified as part of this plan.

By identifying the location, time of day, day of week, and other patterns that characterize fatal crashes involving a heavy vehicle, focus can be placed on target areas, driver behaviors and time periods. As shown in the data review, strategies should target principal arterials, rural roads, 12 PM to 3 PM, roadway departure crashes, and angle crashes.

EDUCATION AND ENFORCEMENT: Public information and education campaigns can significantly increase awareness of large trucks in the driving environment and potential safety measures to avoid crashes involving heavy vehicles, such as demonstrating tolerant, or non-aggressive driving, avoiding blind spots, etc. The campaigns should emphasize that driving aggressively in the vicinity of a heavy vehicle can lead to a more serious crash because heavy vehicles cannot stop as quickly as other vehicle types. Delaware's strategies to address fatal crashes involving heavy vehicles include:

- Conduct media outreach to increase public awareness of truck travel and truck blind spots
    - Emphasize to the public that crashes involving heavy vehicles are usually not the fault of the heavy vehicle driver
    - Identify opportunities to provide "No Zone" presentations at local high schools and other public venues
- Establish uniform data reporting requirements for truck crashes, inspection records, and enforcement data
- Improve driver compliance
    - Strengthen commercial vehicle laws and penalties for violating these laws
    - Meet with judicial leaders to stress the importance of consistent verdicts for heavy vehicle violations
    - Increase compliance with hours of service requirements through education, enforcement and collaboration with the trucking industry
    - Allocate resources to provide portable truck inspection equipment and safe areas for temporary inspection/weigh stations
    - Construct weigh-in-motion detectors along heavily traveled truck routes
    - Perform targeted enforcement of truck laws
    - Continue to expand inspection officer training and motor coach inspection training
    - Enhance communications with the trucking industry
    - Identify trucking companies involved in crashes resulting from defective equipment and conduct audits of those companies
    - Promote electronic, in-cab monitoring of commercial vehicles
    - Increase the number of inspections and enforcement officers

- Strengthen Commercial Drivers License program
    - Improve test administration for the CDL
    - Increase fraud detection by state and third-party testers
- Improve maintenance of heavy trucks
    - Increase and strengthen truck maintenance programs and inspection performance
    - Conduct post crash inspections to identify major problems and problem conditions
- Promote industry safety initiatives
    - Perform safety consultations with carrier safety management
    - Promote development and deployment of truck safety technologies

ENGINEERING: Engineering and infrastructure improvements, such as installing rumble strips or signing improvements, can potentially address an identified crash problem involving heavy vehicles. However, because the heavy vehicle driver is generally not at fault in fatal crashes, many of the strategies should aim to address poor driving behaviors on behalf of the other vehicle involved in the crash (i.e., not the heavy vehicle driver). For these strategies, refer to the section of this plan that addresses aggressive driving. Delaware's engineering strategies to reduce fatal heavy vehicle crashes include:

- Reduce fatigue-related crashes
    - Increase efficiency of use of existing truck parking spaces
    - Create additional parking spaces and truck pull off areas
    - Incorporate rumble strips into new and existing roadways
- Identify and correct unsafe roadway infrastructure and operational characteristics
    - Identify and treat truck crash roadway segments (e.g., install signing improvements, rumble strips, etc.)
    - Install interactive truck rollover signing
    - Modify speed limits appropriately and increase enforcement to reduce truck and other vehicle speeds

EVALUATION AND STATUS

Fatal crashes involving heavy vehicles have remained relatively the same during the three-year study period; 12, 11, and 12 fatal crashes involving heavy vehicles were reported in 2007, 2008 and 2009, respectively. Delaware will continue to implement strategies in an effort to reduce these types of crashes in order to reach the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018.

The following programs and improvements have been implemented to address heavy vehicle-related crashes:

EDUCATION AND ENFORCEMENT

- Delaware State Police Commercial Vehicle Enforcement Unit (CVEU) has made significant progress aimed at improving truck travel safety
    - Commercial vehicle inspections are being performed regularly and those vehicles in violation of Federal Motor Carrier Safety Regulations are declared "out of service" until violations are corrected
    - Size and weight enforcement is performed to ensure that trucks are not over capacity

- Traffic enforcement targeting truck drivers that are committing aggressive driving violations and/or not wearing seat belts are being performed along roadways identified as a high crash corridor for commercial vehicles. These target enforcement efforts are combined with vehicle and driver inspections.
    - MCSAP continues to participate in the "Click It or Ticket" campaign and performs various checkpoints to enforce seat belt laws
- The MCSAP Unit maintains portable alcohol detection machines to identify heavy vehicle drivers who are operating their vehicle while under the influence of alcohol. Additionally, DSP's K-9 dogs are available to assist in drug detection; however, impaired driving violations on behalf of a commercial vehicle operator are rare.
- DSP troopers identify carriers who are operating without authority or while placed "out of service" and violations are reported
- CVEU attends motor carrier safety meetings and educates young drivers and others on how to drive safely around trucks and the location of trucks' "No Zones" (blind spots)
- Educational safety presentations are given to Delaware-based carriers that have a poor inspection history and/or crash history and to carriers who demonstrate an interest in attending a safety presentation
- In addition to the fixed inspection station located in Townsend, a second scale house was constructed on US 301 in Middletown in June 2009
- Several identified pull-off locations are provided throughout the state for off-site inspections
- Additional inspectors have been trained in HazMat inspections
- Currently, the state works with Harrington Fairgrounds and Casino and the Tanger Outlets to schedule and complete point of destination motor coach inspections
- Motor coach enforcement is performed on I-95, US 13 and US 113
- Continued improvements are being made to data collection, quality, and reporting

ENGINEERING

- As part of the annual Highway Safety Improvement Program, including the High Risk Rural Roads Program, Hazard Elimination Program, and the Transparency Report, DelDOT has implemented numerous cost-effective improvements such as installing warning signs to indicate appropriate ramp speeds, installing rumble strips, pavement markings, and surface treatment improvements to potentially reduce the risk of heavy vehicle crashes.
- DelDOT is currently revising the *Delaware MUTCD* in response to the federal 2009 *MUTCD*. Additionally, DelDOT is training their staff on the application and practices in the *MUTCD*. Proper documentation and training regarding the installation of traffic control devices will assist in providing drivers with a consistent driving environment.

SECONDARY EMPHASIS AREA THREE: DESIGNING SAFER WORK ZONES

BACKGROUND

At any given time, numerous work zones are located along Delaware's roadways, including both construction and maintenance operations necessary to provide safe and efficient means of travel. Nationally and in Delaware, safe and efficient flow of traffic through work zones is a major concern to transportation officials, industry, the public, businesses, and commercial motor carriers. Work zones demand an increase in attention by drivers to avoid conflict between both motorists and workers. However, many motorists may become impatient when encountering a work zone along their travel route that increases their delay, which may result in aggressive driving behaviors and increased potential for a crash. Therefore, Delaware strives to reduce the number, duration, and impact of work zones whenever possible.

Although only three fatal crashes occurred within work zones in Delaware in 2007, 2008, and 2009, Delaware wants to continue to reduce fatalities and improve traffic operation and safety within work zones. Due to the inherent dangers and complexity of work zones, drivers need to be more cautious and aware of their surroundings when traveling through work zones. Even with the decreasing trend of work zone-related fatal crashes, DelDOT continues to make work zone safety a priority in its planning process. For strategies to be successful, coordination between DelDOT, contractors, and law enforcement is essential. Additionally, maintaining safe pedestrian and bicycle access through and/or around work zones needs to be considered in roadway projects.

DATA REVIEW

Based on 2007 to 2009 fatal crash data, all fatal crashes that occurred within work zones occurred during nighttime and occurred in 2008. Fortunately, no workers were present during any of the three fatal work zone crashes. Two of the three fatal crashes that occurred within work zones occurred on I-95 and one fatal crash that occurred within a work zone occurred on a principal arterial roadway, SR 141. Failure to keep in the proper lane or running off-the-road was a contributing circumstance in two of the three fatal crashes that occurred within a work zone. Additionally, two fatal crashes involved a driver who was driving under the influence, one fatal crash involved a pedestrian under the influence, and one fatal crash involved speeding. A map of the fatal crashes is shown in Figure 80. The following summarizes the fatal crashes that occurred in work zones.

- One crash occurred on Monday, January 28, 2008 at 12:19 AM and involved a passenger vehicle traveling southbound on I-95 near the off-ramp to Churchmans Road. The vehicle rear ended a tractor-trailer after weaving in and out of traffic at a high rate of speed. The crash occurred on dry pavement and at nighttime. The driver of the passenger vehicle was under the influence of alcohol at the time of the crash.
- One crash occurred on Friday, August 1, 2008 at 11:43 PM and involved two passenger vehicles traveling southbound on I-95 in the vicinity of SR 141. One of the vehicles drifted off the roadway and struck construction barrels before reentering the roadway and striking the second vehicle. The crash occurred on dry pavement and at nighttime. The at-fault driver was under the influence of alcohol at the time of the crash.

- One crash occurred on Wednesday, August 6, 2008 at 9:01 PM on northbound SR 141 involving a pedestrian who was struck by a northbound SR 141 vehicle. The pedestrian was attempting to cross SR 141 south of Faulkland Road and was under the influence of alcohol at the time of the crash.

STRATEGIES AND IMPLEMENTATION

By identifying the location, time of day, and other patterns that characterize fatal crashes that occurred within work zones, focus can be placed on target areas and time periods. As shown in the 2007 to 2009 crash data review, strategies should target interstates and principal arterials in New Castle County and 9 PM to 3 AM, when workers are typically not present. Additionally, aggressive driving and/or impaired driving represent each of the reported fatalities; therefore, addressing those emphasis areas will likely reduce work zone fatal crashes.

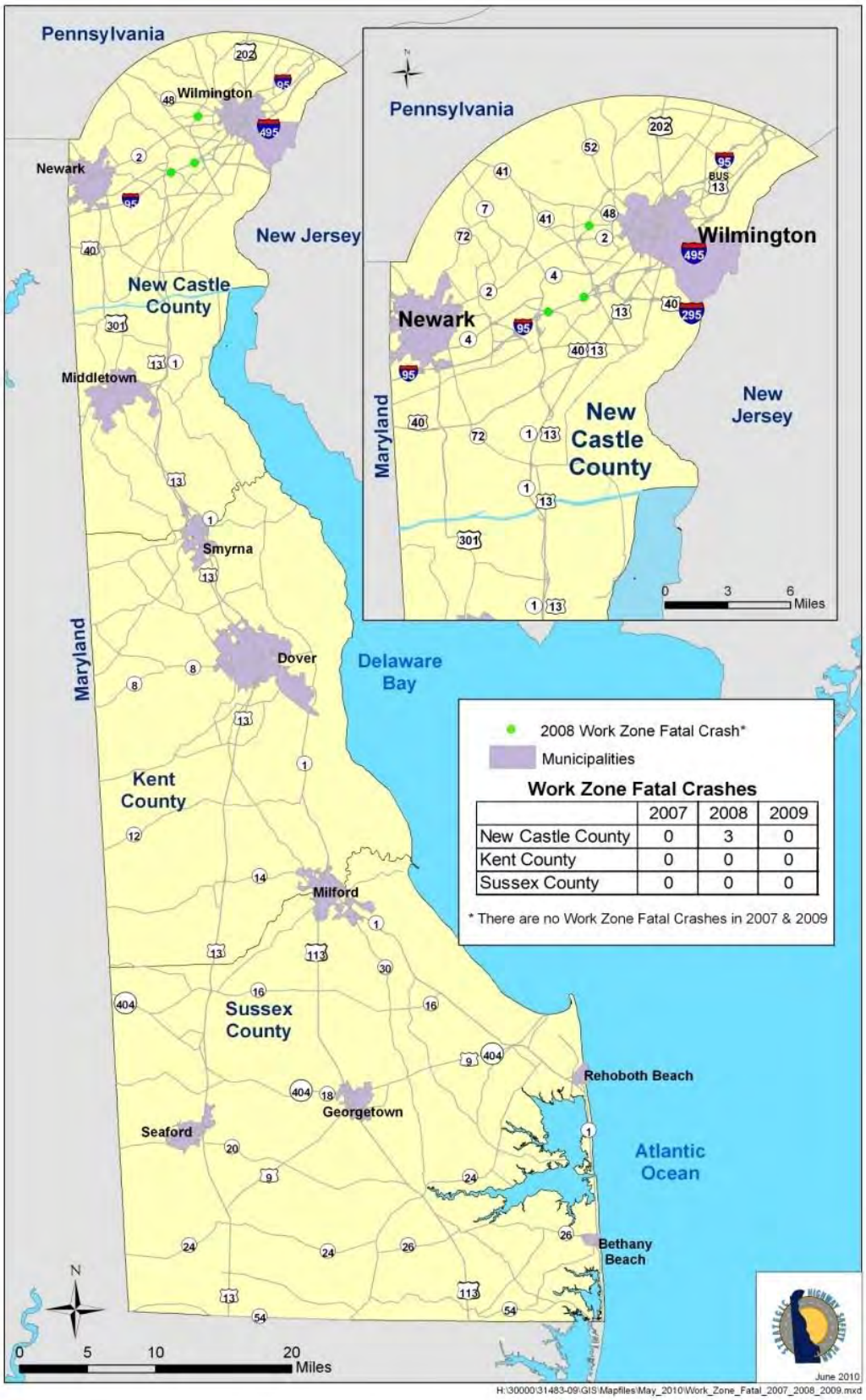
Delaware's plan includes strategies to reduce work zone fatal crashes for each of these three "E's":

EDUCATION AND ENFORCEMENT: Although workers were not present during any of the three crashes reported during the three-year study period, outreach efforts should emphasize that motorists must slow down and pay attention in order to safely navigate a work zone, particularly due to the vulnerability of workers who may be present just feet from the travel way. Public information and education campaigns can significantly increase awareness of the potential for fatal crashes within work zones. Outreach efforts should emphasize the more severe consequences of aggressive and impaired driving within a work zone. These types of campaigns have been proven to be more effective when used in combination with targeted enforcement strategies.

With continuous and visible law enforcement, traffic behaviors have been shown to improve; therefore, in combination with public educational campaigns, targeted enforcement within work zones should potentially reduce poor driving behaviors leading to crashes. However, in order for this strategy to be effective, the public must be educated on the importance of the high levels of traffic enforcement efforts within work zones. By increasing or doubling the penalty and/or fine structure associated with driving offenses within work zones, compared to the same driving offenses outside of work zones, motorists will recognize the importance of extra safety precautions within work zones. Furthermore, driving laws must be strictly enforced to maximize their effectiveness. Delaware's strategies include:

- Improve work zone awareness by conducting media outreach to increase public awareness of work zone safety
    - Utilize billboards and radio and television advertisements to develop a visual and convey a message to enhance awareness and promote work zone safety
- Improve driver compliance with existing laws
    - Increase law enforcement and police presence within work zones
    - Continue to double the penalty for driving offenses within work zones
    - Meet with judicial leaders to stress the importance of consistent verdicts for traffic violations within work zones
- Ensure driver education instructors incorporate work zone safety into their lesson plans
- Continue to improve work zone operations by training workers, inspectors, and law enforcement on work zone procedures to achieve consistency

Figure 80 – Map of Fatal Work Zone Crashes



ENGINEERING: To enhance driver awareness, standard and consistent work zone treatments are necessary to notify drivers that they are approaching and are within work zones. In addition, reducing the number, duration, and impact of work zones should be considered as part of the temporary traffic control plans or transportation management plans. Reducing frustration caused by the driving environment will potentially eliminate or lessen a major contributor to aggressive driving and speeding within work zones. However, for this strategy to be successful, it is necessary to ensure law enforcement, OEMS, and DelDOT coordinate their efforts to improve incident management and to obtain adequate personnel to address issues and maintain consistent temporary traffic control devices. Delaware's strategies include:

- Improve temporary traffic control design and operations
    - Increase contractor penalties for non-compliance with the *Delaware MUTCD* and other safety requirements
    - Continue to implement work zone safety guidelines as mandated by FHWA's Final Rule
    - Improve work zone temporary traffic control devices, work zone design practices, and maintenance of traffic safety issues (e.g., equipment, materials, and specifications, training) as needed.
    - Implement effective work zone operations review procedures for both day and night work zone operations
    - Design "pull over" areas into roadway construction projects
    - Utilize advanced technology applicable to work zones where applicable
    - Avoid artificially low speed limits within work zones
    - Ensure that pedestrians and bicyclists are accommodated within work zones appropriately
    - Ensure multiple parallel routes are not under construction concurrently
- Improve driver expectancy and public information
    - Develop public information guidelines for work zones
    - Provide motorists with real-time work zone information on traffic conditions and delays to allow drivers to make appropriate decisions in advance of their trip
    - Coordinate traffic signals and improve signal timing approaching and within work zones to reduce vehicle delay and driver frustration
    - Provide uniform temporary traffic control devices including signing, signal timings, and pavement markings
    - Install speed feedback signs to deter speeding within work zones
    - Manage traffic impacts from highway work zones to reduce delays approaching and within the work areas
    - Utilize portable detection equipment to remotely monitor traffic conditions approaching and within work zones

EVALUATION AND STATUS

Only three fatal crashes were reported within work zones during the 2007 to 2009 study period, all of which occurred in 2008. Additionally, workers were not present during any of the three crashes. However, in order to reduce the number of fatal crashes that occur in work zones further in order to reach the overall goal of 1.0 fatality per 100 million vehicle-miles traveled by 2018, Delaware will continue to implement the strategies listed above.

The following programs and improvements have been implemented in recent years to address work zone-related crashes:

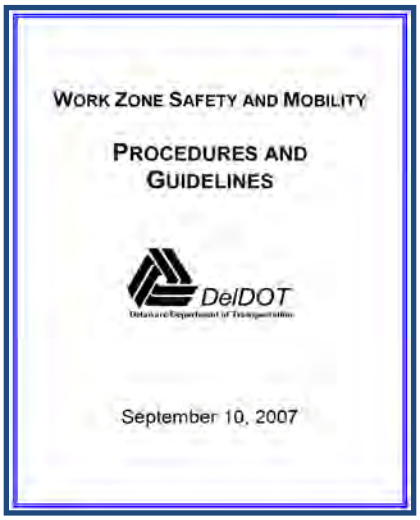
EDUCATION AND ENFORCEMENT

- Every April, DelDOT emphasizes work zone safety during Work Zone Safety Awareness Week. Radio ads, billboards, fliers, DART bus advertisements, and newspaper messages are designed to improve work zone safety and awareness. Fliers emphasize the following messages: expect the unexpected, slow down, don't tailgate, obey flaggers, don't wait to merge, pay attention, and be patient.
    - In April 2008, in efforts to bring public awareness of work zone safety for state and city workers, DelDOT introduced the "vesting" of various statues across the state, including William Penn, Caesar Rodney, and Judy Johnson. State legislators and City of New Castle officials were also "vested" with work zone vests. The campaign stresses that when traveling through a work zone, motorists must pay careful attention to the traffic control devices present.
    - As part of the 2009 campaign, the victims and families of work zone crashes have discussed their experiences in an effort to encourage motorists to pay attention when driving through work zone areas. Church bells across Delaware tolled 32 times at 11 AM on April 8, 2009 for state transportation employees that have lost their lives in the line of duty since 1933 in honor of Work Zone Safety Awareness Week. The message is that for every person killed or injured in a work zone crash, there is a mother, father, sister, brother, daughter, son or friend whose life also changes forever. Particularly now, when states throughout the country, including Delaware, are in the midst of revitalizing the nation's roads, ramps and bridges, all motorists must exercise patience and follow work zone safety rules.

- Speed enforcement was present during the I-95 Fifth Lane mainline widening project and during hauling operations for the I-95 Toll Plaza project and for the SR 1 Frederica Grade Separated Intersection project.
- Delaware City took the lead in promoting the "Move Over" law in Delaware, which became effective January 1, 2007. This law requires any driver approaching a stopped emergency vehicle that has its lights activated, to either move over into a lane that is not adjacent to the emergency vehicle, or to reduce their speed to a "safe speed" while passing the emergency vehicle if and when changing lanes would be impossible or unsafe. The law applies to roadway approaches with at least two travel lanes in the same direction.

ENGINEERING

- In September 2004, FHWA amended its regulations governing traffic safety and mobility in highway work zones. The changes required states to perform comprehensive consideration of the broader safety and mobility impacts of work zones across project development stages and to adopt additional strategies that help manage these impacts during project implementation. States were required to comply with all the provisions of the Final Rule by October 12, 2007. In response to the Final Rule, DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines* became effective October 12, 2007. These guidelines identify significant projects and provide requirements and guidance for developing a Transportation Management Plan to systematically address work zone safety and mobility impacts and develop strategies to help manage impacts.



- DelDOT continues to monitor traffic conditions approaching and within work zones, provide real-time work zone information to travelers, and mitigate observed traffic problems appropriately
    - DelDOT's monitoring system (via video, aerial, portable detection equipment, field units, etc.) allows DelDOT to detect traffic conditions within work zones and make necessary adjustments to the Transportation Management Plan to mitigate unfavorable conditions
    - Travel time messages are provided on dynamic message signs (fixed and portable)
    - WTMC 1380 AM radio station provides real time traveler information to the public
    - Real Time Travelers Advisory (RTTA) provides a listing of current roadway conditions
    - Motorist Assistance Patrol (MAP) trucks patrol Delaware roadways to assist disabled motorists
    - DelDOT is considering the implementation of "511," where motorists can use their phones to access current travel information
- DelDOT is currently revising the *Delaware MUTCD* in response to the federal 2009 *MUTCD*. Part 6 of the *MUTCD* pertains specifically to temporary traffic control devices in work zones. Additionally, DelDOT is training their staff on the application and practices in the *MUTCD*. Proper documentation and training regarding the implementation of temporary traffic control devices will assist in providing drivers with a consistent driving environment through work zones.
- To improve visibility within work zones, channelizing devices shall have fluorescent orange and white prismatic retroreflective sheeting for contracts awarded after December 31, 2009.
- In response to the FHWA's Traffic Control Devices Final Rule approved in December 2008 to supplement the work zone safety and mobility regulations, DelDOT adopted the following guidelines/policies:
    - *Guidelines for the Use of Uniformed Law Enforcement Officers in Work Zones*. This document addresses when law enforcement involvement in work zone traffic control may be needed or beneficial, interagency communications and procedures for obtaining law enforcement personnel, reimbursement for law enforcement services, and training requirements for law enforcement officers.

- Design guidance memorandum (DGM) regarding the *Use of Temporary Traffic Barrier in Work Zones*. This DGM provides guidance on the use of positive protection devices to decrease the likelihood of fatalities and injuries to road users and workers.
- ATTSA's *Quality Guidelines for Work Zone Traffic Control Devices*

SECONDARY EMPHASIS AREA FOUR: IMPROVING TRAFFIC RECORDS

BACKGROUND

Traffic safety data is the primary source of information about the traffic safety environment, human behavior and vehicle performance. Therefore, in order to address safety problems, timely, accurate, complete, uniform, integrated and accessible data is required. The effectiveness of informed decision making requires sound research, programs and policies, and is directly dependent on data availability and quality. The Traffic Records Coordinating Committee (TRCC) is the primary point of leadership, planning, policy setting and accountability for Delaware's Traffic Safety Information System. The TRCC was established to coordinate actions among state agencies and to commit the resources necessary for the integration and sharing of safety-related data. In June 2007, the TRCC approved the Delaware Traffic Safety Information System Strategic Plan to set a framework for improving all aspects of traffic safety data. In June 2010, the TRCC updated Delaware's Traffic Information System Strategic Plan to reflect the current goals and objectives of the TRCC.

The lack of an integrated data traffic crash collection system has hampered Delaware's ability to utilize comprehensive traffic safety data when making resource allocation decisions. In February 2008, the TRCC approved the implementation of a new crash system, named E-Crash, to replace the Traffic and Criminal Software (TraCS) system. E-Crash was implemented by Delaware Judicial Information System (DELJIS) in December 2009. The new E-Crash system has many advantages over the previous TraCS system and is a component of DELJIS's Law Enforcement Investigative Support System (LEISS) program, which handles all criminal reporting. The development of E-Crash has allowed Delaware to customize the crash system to meet Delaware's needs and will allow for linkage with other traffic safety information systems.

GOALS

The TRCC's Memorandum of Understanding (MOU) and Traffic Safety Information System Strategic Plan include the follow general goals and mission statement:

GOALS

- Facilitate the comprehensive collection, maintenance, and dissemination of traffic safety related data in order to set the direction for traffic safety improvement measures.
- Improve the timeliness, accuracy, completeness, uniformity, and accessibility of data that is needed to identify priorities for transportation and traffic safety programs.
- Strive to ensure that all Traffic Safety Information System projects funded by and under the direction of the TRCC, move forward on schedule and within budget. For projects outside of this scope, use the authority of the TRCC to ensure that these projects move forward in a timely manner, recognizing budgetary and staffing constraints.

MISSION: Make information needed to effectively manage transportation safety available to the transportation safety community

In addition, the annual update to the Strategic Plan establishes performance goals for each of the six information systems (e.g., Crash, Roadway, Vehicle, Driver, Enforcement/Adjudication, and Injury Surveillance). These goals relate to the six data quality categories established by NHTSA (e.g., timeliness, consistency, completeness, accuracy, accessibility, and data integration).

STRATEGIES AND IMPLEMENTATION

Accurate and consistent traffic data is vital to allow all agencies involved to make informed decisions to meet the overall goal of 1.0 fatality per 100 million vehicle miles traveled by 2018. By streamlining data collection efforts and standardizing traffic data, various agencies will be able to more effectively use the available information.

Delaware's Traffic Safety Information System Strategic Plan includes the following projects and strategies to improve information and decision support systems:

- **E-Crash Users Manual/Data Dictionary:** An E-Crash Users Manual and Data Dictionary will be developed to improve the accuracy of crash data collection.

- **Crash Analysis Reporting System (CARS) Development – Phase 2:** In response to the new E-Crash system developed by DELJIS, DelDOT is expanding CARS to support DelDOT's statewide safety programs including the Highway Safety Improvement Program. The new system will allow users to identify locations with high crash rates based on specific crash characteristics (e.g., wet weather, nighttime, run-off-the-road, fixed object, etc.) and support the *SHSP*.

- **DMV Data Analysis Tool:** A secure data mining tool will be developed by DMV to enable Department of Safety and Homeland Security staff to analyze various DMV data scenarios that may occur multiple times throughout the year. DMV Inspectors will also use this tool to query specific data for their various investigations. This tool will reduce the time spent by DMV application programmers in developing "one time only" data retrieval applications in order to support the Department of Safety and Homeland Security requirements.

- **Delaware Information Management for Emergency Services (DIMES):** This project will upgrade the statewide EDIN system from its PowerBuilder platform to support the longevity and sustainability of statewide injury data collection. The new EMS data system will have an open, scalable architecture and support standards which are key to streamlined processing and data exchange. The EMS data system will further provide a secure method of collecting pre-hospital data, extracting existing data, and exporting or sharing data for strategic planning and process improvement initiatives.

- **E-Crash Validation Project:** This project will establish documented procedures and establish a validation program to ensure the accuracy of key fields in traffic crash reports. Currently, there are numerous edit checks in the E-crash application; however, many times the users either find "holes" in the system or manipulate data to avoid the necessary and required fields. The validation program will consist of staff that will be trained to review the data and check for completeness. As data abnormalities are discovered, staff will review the pattern of the errors to determine if the error is a result of the program or user misunderstanding or manipulation. Errors will be logged into categories to determine which changes are needed in the next release of the application. Program "bugs" that are causing major disruptions in the data quality will be immediately identified and corrected. The validation staff will "test" the changes made by the developers which are released to correct data abnormalities. Furthermore, the staff will field calls from the officers to both assist them with E-Crash questions while learning what their concerns are with the applications and building those questions into the validation routines.

- **LEISS/Alcohol Influence Investigation Report (AIIR) Linkage:** This project will incorporate the Alcohol Influence Investigation Report (AIIR) into LEISS and will provide law enforcement officers and prosecutors with timely and improved access to AIIR reports for prosecution of offenders.

EVALUATION AND STATUS

Delaware has continued to make progress in improving its information and decision support systems. The following projects and programs have been implemented in recent years to improve the timeliness, consistency, completeness, accuracy, accessibility, and integration of traffic data.

- **E-Crash System:** This electronic crash reporting system within the Law Enforcement Investigative Support System (LEISS) was developed by DELJIS to replace the Traffic and Criminal Software (TraCS) system. E-Crash allows for customization of the crash system to meet Delaware's needs, allows for daily updates to software, allows for linkage with citation information through E-Ticket, and incorporates edit checks for common mistakes made during collection of data.

- **Incident Locator Tool:** A new Incident Locator Tool (ILT) based on the DelDOT road inventory files was developed to enable law enforcement officers to open a map of the state and "drill down" to the location of the incident. The ILT identifies the latitude and longitude of the location and extracts the X, Y coordinates, mile points, and the literal description of the roadway into the incident report.

- **CARS (Crash Analysis Reporting System) – Phase 1:** In response to the new E-Crash system developed by DELJIS, DelDOT developed CARS to support DelDOT's statewide safety programs. The map-based system has replaced the Safety Data Management (SDM) system, allowing for crash data queries using several "buffer tools" (e.g., intersection, roadway, radius, etc.).

- **CHAMPS (Criminal and Highway Analysis Mapping for Public Safety):** This GIS-based tool enables highway safety and law enforcement personnel to analyze, plot, and export crash data for accurate problem identification and resource allocation.

- **E-Ticket System:** This system is an automated traffic ticket module within the Law Enforcement Investigative Support System (LEISS) that captures citation information electronically in the field and is used by all law enforcement agencies statewide.

APPENDIX A: GLOSSARY OF TERMS

AAA	American Automobile Association
AARP	American Association of Retired Persons
AASHTO	American Association of State Highway and Transportation Officials
AIIR	Alcohol Influence Investigation Report
BAC	Blood Alcohol Content
CARS	Crash Analysis Reporting System
CDL	Commercial Drivers License
CHAMPS	Criminal and Highway Analysis Mapping for Public Safety
CVEU	Commercial Vehicle Enforcement Unit
DelDOT	Delaware Department of Transportation
DelJIS	Delaware Judicial Information System
DERP	Delaware Evaluation and Referral Program
DGM	Design Guidance Memorandum
DIMES	Delaware Information Management for Emergency Services
DMV	Division of Motor Vehicles
DOJ	Department of Justice
DRE	Drug Recognition Expert
DSP	Delaware State Police
DUI	Driving Under the Influence
EDTAC	Elderly and Disabled Transit Advisory Committee
EMS	Emergency Medical Services
ERLSP	Electronic Red Light Safety Program
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
HAWK	High-Intensity Activated Crosswalks
HEAT	Highway Enforcement of Aggressive Traffic
HEP	Hazard Elimination Program
HIBs	Hazard Identification Beacons
HRRRP	High Risk Rural Roads Program
HSIP	Highway Safety Improvement Program
ICBs	Intersection Control Beacons
ILT	Incident Locator Tool
ITE	Institute of Transportation Engineers

LEISS	Law Enforcement Investigative Support System
MAP	Motorist Assistance Patrol
MCSAP	Motor Carrier Safety Assistance Program
MOU	Memorandum of Understanding
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Comprehensive Highway Research Project
NHTSA	National Highway Traffic Safety Administration
NOPUS	National Occupant Protection Use Survey
OEMS	Office of Emergency Medical Services
OHS	Office of Highway Safety
RPM	Raised Pavement Marker
RTTA	Real Time Travelers Advisory
SAFETEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Equity Act- A Legacy for Users (Enacted August 10, 2005)
SHSP	Strategic Highway Safety Plan
SRTS	Safe Routes to School
TEA-21	Transportation Equity Act for the 21st Century
TMC	Transportation Management Center
TraCS	Traffic and Criminal Software
TRCC	Traffic Records Coordinating Committee
VMT	Vehicle Miles Traveled

Questions or requests for copies of this document should be directed to:

Delaware Department of Transportation
dot-public-relations@state.de.us
P.O. Box 778
Dover, DE 19903


DELAWARE STRATEGIC HIGHWAY SAFETY PLAN