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Geographic Analysis of Alcohol-Related Crashes in Nine High-Need Louisiana Parishes

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About the Authors

The Social Research and Evaluation Center (SREC) is a multidisciplinary research center that supports the development of healthy social systems at the intersection of healthcare, education, public safety, and community development. Located in the Louisiana State University (LSU), College of Human Science and Education, SREC is a full-service research unit that provides evaluation, program design and implantation, data collection, and capacity development within our areas of focus. LSU SREC is contracted to fill the role of the State Epidemiological Workgroup (SEW) analyst to support the efforts of the workgroup and provide additional research and evaluation for nine high-need communities through the "Partnership for Success II" (PFS II) grant.

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Land Acknowledgement Statement

Louisiana State University and A&M College, as a land, sea, and space-grant institution, built on lands of Indigenous people acknowledges, honor, and affirm Indigenous culture, history, and experiences. At the heart of LSU's campus are two earthen mounds – LSU Campus Mounds – architectural remnants created by Native Americans. By preserving these mounds, LSU pays respect to the past and recognizes the First Peoples. As a university, we thank them for their strength and resilience as stewards of this land and are committed to creating and maintaining a living and learning environment that embraces individual differences, including the Indigenous peoples of our region (LSU Office of Diversity and Inclusion, 2023).

Contents

Introduction

This report examines nine Louisiana communities and their alcohol availability concerns from a public health perspective. The nine communities are part of The Louisiana Partnership for Success II (LPFS ll), a 5-year Substance Abuse and Mental Health Services Administration (SAMHSA) grant. The LPFS ll grant is focused exclusively on addressing underage drinking behaviors, consequences, and risk factors among 9 to 20-year-olds in nine high-need, parish-level communities (HNCs) (Louisiana Department of Health [LDH], 2020a).

Communities were selected through a data-driven, participatory process and supported to form a cross-sector coalition to implement interventions within those communities. The process for choosing the high-need communities included seven indicators from the Caring Communities Youth Survey (CCYS) (LDH, 2020b), alcohol-related crash reports, and student alcohol-related suspensions. Three additional indicators were taken from the 2018 County Health Rankings (University of Wisconsin Population Health Institute, 2018) and The Centers for Disease Control and Prevention (CDC) 1991-2017 High School Youth Risk Behavior Survey Data (CDC, 2018). In order to assist these communities with high rates of alcohol-related public health issues, this research project examined the interaction of alcohol outlets, alcohol-related motor vehicle crashes (MVC), and associated demographics and time variables using GIS mapping in order to help with planning the most appropriate and impactful interventions.

Purpose of Study

- To research the extent of the problem of alcohol-related MVCs in high need communities
- To suggest evidence-based interventions based on trends in community data

LDH's Office of Behavioral Health has identified nine parishes (county equivalent) that feature the largest disparities among youth alcohol consumption within the State. Each of the parishes has a parish-level community coalition dedicated to addressing this disparity. During meetings with each coalition perceptions, availability, and community impact were key issues. The Louisiana Drug Policy Board's State Epidemiological Workgroup (SEW) Analyst Team (LSU SREC) through the Louisiana Strategic Prevention Framework (SPF) and Partnership for Success (PFS) analyzed crash data and provided recommendations for evidence-based interventions.

Significance of Research and Extent of the Problem

In 2018, Louisiana ranked 9th in alcohol-related crashes, with 4.64 deaths per 100,000 residents. In 2019, alcohol-impaired driving fatalities accounted for 30% of the total fatalities recorded in Louisiana (NHTSA, 2020). This report will illuminate areas where efforts can be focused on decreasing alcohol related MVCs in Louisiana, around alcohol outlet density, high-risk locations, and other aspects of the physical environment. Additionally, we hope to 1) improve alcohol prevention education within Louisiana's nine high-need parishes, 2) develop harm-reduction messaging for youth and young adults around safer consumption and transportation practices, and 3) decrease economic and social costs to communities. The SEW Analyst team has a significant opportunity to impact and inform community members, local leaders, and state substance-use policymakers due to the team's official capacity within the SPF network, LDH Office of Behavioral Health, and the Louisiana Governor's Drug Policy Board.

According to the Center for Analytics and Research in Transportation Safety (CARTS), in 2019, the nine communities in this report had the following rates of alcohol-related crashes per 100,000 licensed drivers: Ouachita – 8.29, Tangipahoa – 8.39, St. Landry –19.65, Avoyelles – 3.93, Evangeline – 14.24, Jefferson Davis – 9.76, Sabine – 12.77, Franklin – 19.06, and West Feliciana – 12.98 (Schneider, 2020). By comparison, the rate for the State of Louisiana is 7.5 per 100,000, and the national rate is 3.2 per 100,000. Table 1 (below) demonstrates the high rate of alcohol-related crashes in the nine high need Louisiana parishes as compared to the statistics for the United States as a whole

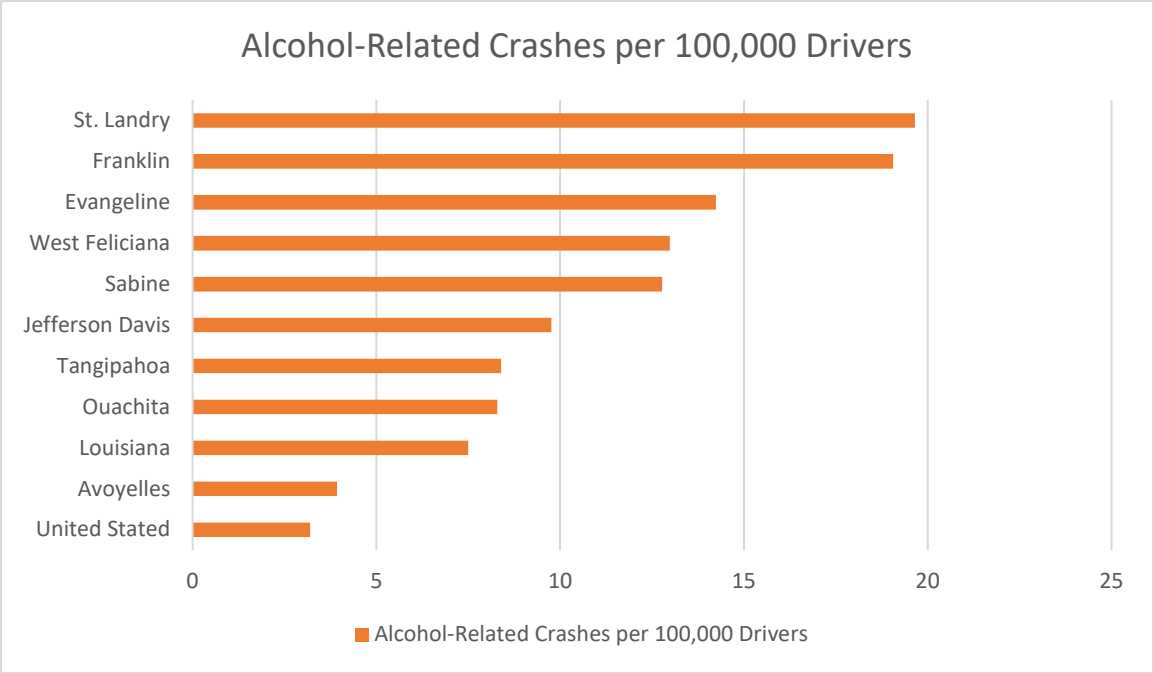

Table 1: Alcohol-related crash rates for communities of interest

Numerous studies have established that among the policies that impact crash rates, alcohol outlet density exerts a significant albeit complicated influence (Esser et al., 2020; Schonlau et al. 2008; Scribner, MacKinnon, & Dwyer, 1995; Treno et al., 2007). Alcohol outlet density refers to the number of physical locations with alcoholic beverages for sale per area or population, distance from populated areas to clusters of alcohol outlets, or time necessary to reach these outlets. The type of measurement used is dependent on what questions need to be answered and the availability of data (Reboussin, Song, & Wolfson, 2011). The efforts of the community coalitions for the nine parishes are aimed at youth risk.

Even with the youth focus, it is valuable to look at alcohol-related MVCs and alcohol policies for the entire community. Some research demonstrates that aiming policy at the general population is effective for all community members. For example, Reboussin et al. (2011) found that for underage drinkers, riding with a drinking driver (181 children under 16 in this sample were passengers in alcohol-related MVCs), making an alcohol purchase attempt, and making a successful alcohol purchase were all more likely in census tracts with a higher density of off-premises alcohol availability. Many of our parishes have a high number of these. Communities with college towns in our sample had the greatest number of these. On-premise drinking, however, was associated with more frequent underage drinking (Reboussin et al., 2011). Given the dynamics of alcohol-related MVCs in the State and these high need communities, we seek to understand the relationship between alcohol availability (alcohol outlet density), high-risk locations, alcohol-related crashes, and associated demographics specific to the nine high need Louisiana parishes to develop targeted alcohol education and harm prevention programs for the youth.

Methodology

To investigate the specific contexts of each high-need community, we collected and combined multiple data sets. Alcohol-related MVCs for the years 2018-2019 as well as relevant details were compiled and de-identified from police reports by LSU Center for Analytics Research and Transportation Safety (CARTS). Because alcohol levels are often unavailable at the time of the MVC, we requested all incidents where alcohol use was known or suspected. The data from LSU CARTS included address locations of alcohol-related crashes along with immediate outcome (fatal VS nonfatal), date and time of incident, as well as age, gender, and role in the crash. The data included all parties involved in the crashes, at least one of whom was impaired at the time of the crash. This might include multiple automobiles and people in some MVCs and a single individual in others. These included drivers with or without alcohol or drug impairment, passengers with or without alcohol or drug impairment, and pedestrians with or without alcohol or drug impairment. Population statistics for each parish were obtained from the U.S. Census website (U.S. Census Bureau, 2020). Locations for alcohol outlets both on and off-premises for the years 2018 and 2019 were obtained using Data Axle online business directory (https://www.data-axle.com/) available at no cost through the East Baton Rouge Parish Library. Louisiana state laws and individual parish and city ordinances for opening and closing times were also examined. Outlet and crash locations, road density and intersection count were geocoded, mapped and outlets and MVCs analyzed for clustering using ArcGIS Pro 2.8.

A key decision included defining alcohol outlet density. Alcohol outlet density may be container-based (number of outlets within a defined space), distance-based (how far people must travel to get to an outlet), or spatial access-based (how physically accessible the outlets are). Each of these measures has limitations. Because we are examining each parish individually, we chose a container-based method. The downfall of this choice is the problem of artificial boundaries and the unlikely assumption that people do not cross parish lines to go to an alcohol outlet. Additionally, the number of outlets per parish does not tell us whether the locations are evenly spread throughout the parish or grouped together in just a few blocks. As this, along with other contextual factors, affects the risk of alcohol-related MVCs, we also mapped the locations of the crashes and calculated statistically significant geographic clusters. This allows communities to visually examine areas with high numbers of outlets. The CDC provides an excellent guide for helping communities measure outlet density which was helpful in making measurement decisions (CDC, 2017). We also analyzed clusters of MVCs to visually examine whether these were in areas with high outlet density.

Overall Statistics for the Nine Parishes

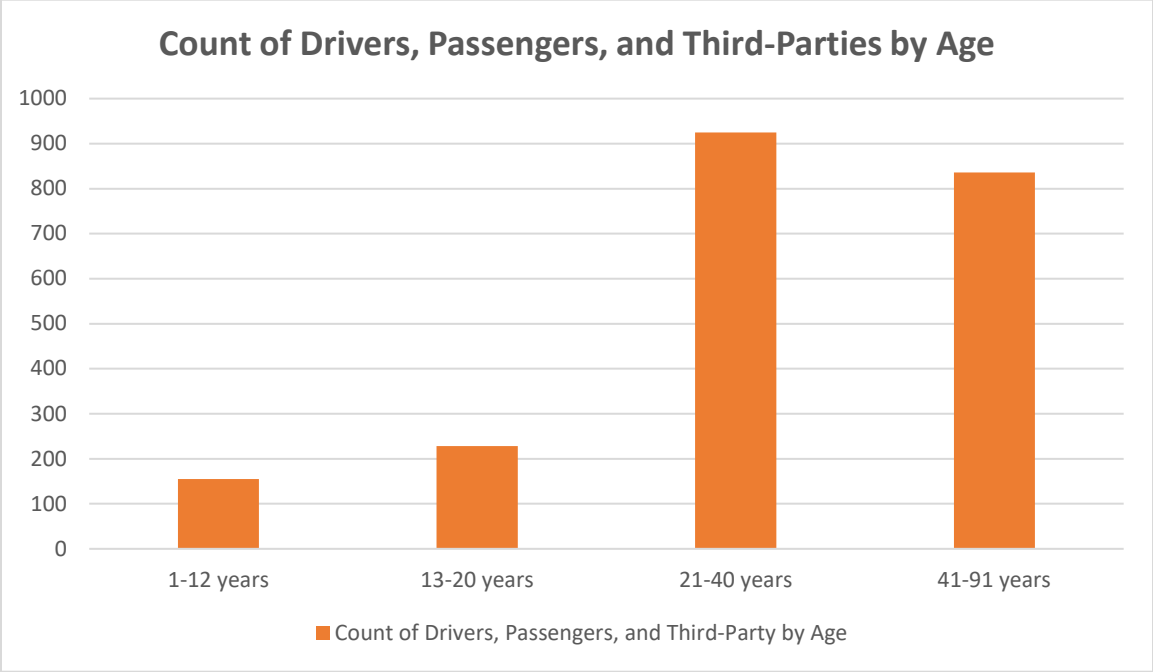

Table 2: Age distribution among those involved in alcohol related MVCs (driver or passenger)

A total of 2,221 MVCs occurred between January 2018 and October 2019. A distribution of those involved included 155 children (1-12yrs) (6.98%), 228 adolescents (13-20yrs) (10.27%), 836 adults (41-91yrs) (37.64%), and 925 young adults (21-40yrs) (41.65%). The majority were classified in police reports as White (56.28%), with African Americans making up 38%, and a small percentage listed as other. In terms of gender, more males (61.91%) were involved in these crashes compared to females (35.3%). Individuals 21 years of age and older made up most involved individuals: however, young children and adolescents made up over 17% of the individuals involved in the crashes.

Density and Restrictions

Parish	Road Density	Population Density	Alcohol Outlet Density	Restrictions	Intersection Count*
Avoyelles	2.83	50.2	0.04	Hours/location	146,000
Evangeline	2.9	51.3	0.03	Hours/location	887,000
Franklin	3.18	33.2	0.03	Hours/location	165,000
Jefferson Davis	2.67	48.5	0.01	Hours/location	881,000
Ouachita	4.05	251.8	0.2	Hours/Location	574,000
Sabine	2.27	28	0.08	Hours/Location	167,000
St. Landry	2.67	90.3	0.08	Hours/Location/Noise	336,000
Tangipahoa	3.44	153	0.13	Hours/SLU/location/noise/type of store	365,000
West Feliciana	2.57	38.8	0.03	Hours/location	402,000

Table 3: Parish Road, Population, and Outlet Density per square mile
**Intersection counts are rounded for simplicity*

The nine parishes have variations in road density (a proxy for traffic volume), intersection counts (a proxy for increased risk of MVCs), population density, outlet density, and alcohol restrictions. All of these have been shown to be correlated with alcohol related MVCs in previous research. Road density refers to the concentration of roads in an area. The relationship is complex and related to location and traffic flow as well as the type of outlet (Gruenewald & Johnson, 2010). While intersections make up a small portion of the roadway, they increase the risk of MVCs due to the need for focused attention to safely pass through them. More than half of all car accidents in the U.S. occur at or near intersections (Federal Highway Administration, 2021). In Louisiana, crashes with injuries are even more likely (64%) to occur at or near intersections (CARTS, 2019).

All parishes have restrictions on locations for alcohol outlets as well as times for opening and closing, and all require alcohol permits. Individual cities also have some leeway in determining their own ordinances, and there are variations in open container laws and other regulations. We have not detailed these variations at levels lower than the parish level. Table 3 displays various characteristics of the study parishes.

The important terms from the table that may not be clear are listed below:

- **Alcohol Outlet Density**: how many retail locations sell alcohol per square mile
- **Road Density**: length of road network per square mile of land in the parish
- **Intersection count**: number of places two or more roads in the parish intersect within the parish boundary per square mile of land in the parish
- **Restrictions** include the type of data that we could not use in our outlet analysis due to ease of access for that data

Time and Day

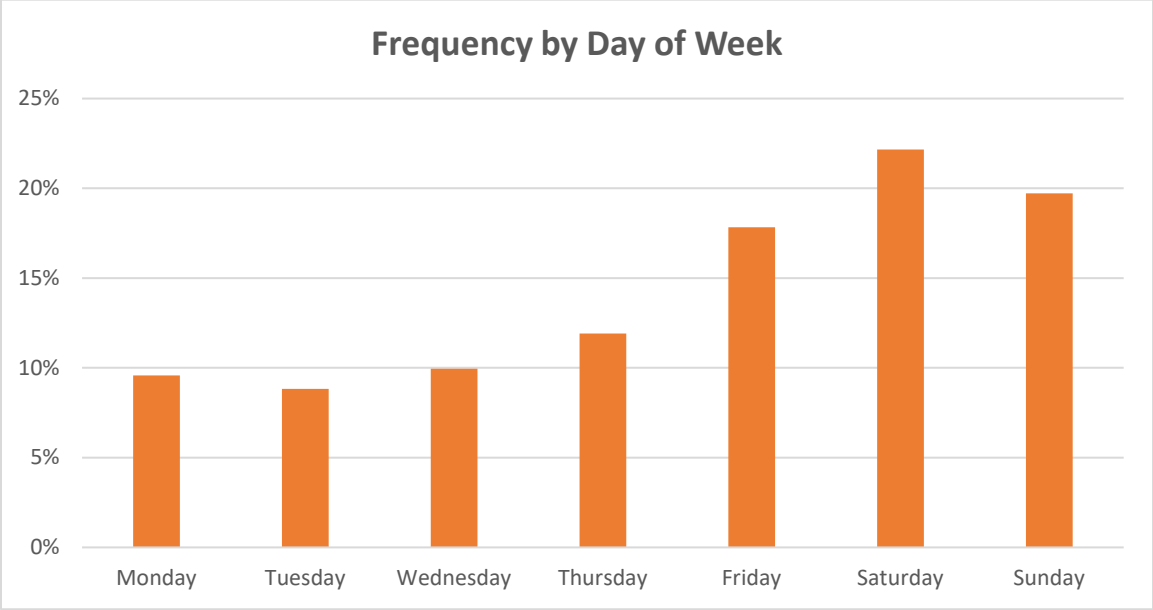

Table 4: MVC Distribution, Day of Week

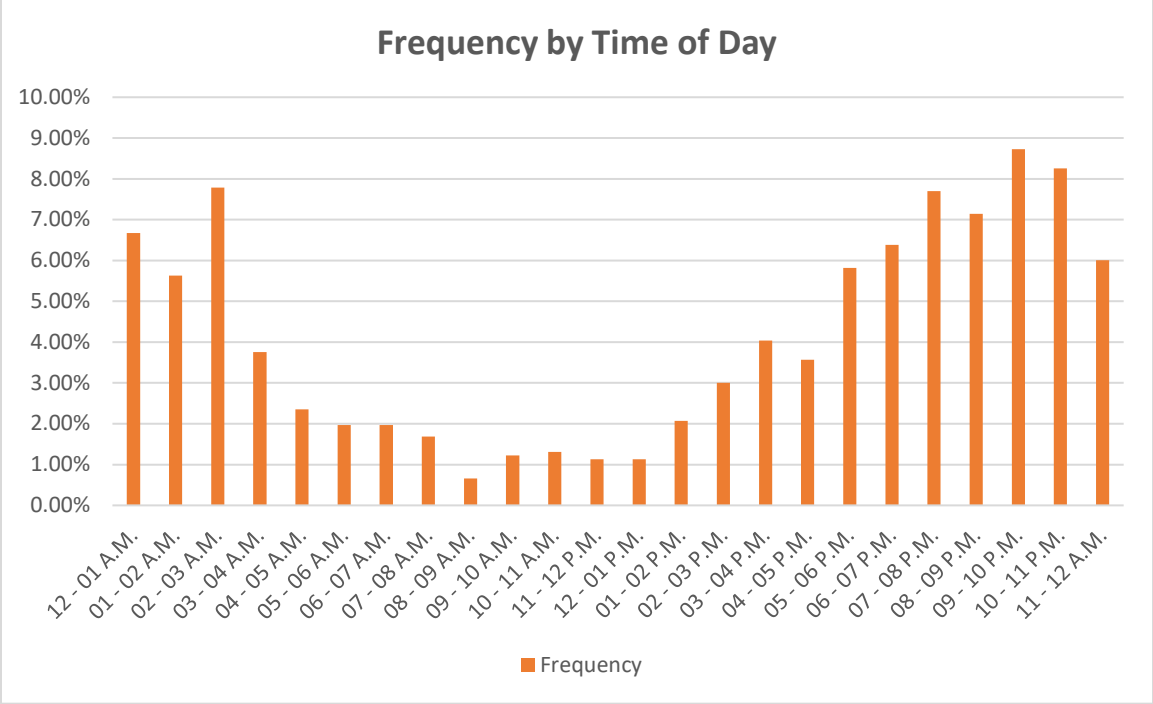

Table 5: MVC Distribution, Time of Day

Estimates from the CARTS revealed that a substantial number of crashes occurred during the weekend – Saturdays (22.16%), Sundays (19.72%), and Fridays (17.84%). Peak times for crashes were nighttime hours between 8:00 and 11:00 p.m. with a peak between 9:00 p.m. and 10:00 p.m. and another peak between 1:00 a.m. and 2:00 a.m. The quietest hours were 8:00 a.m. to noon. This resonates with the National Highway Traffic Safety Administration's (NHTSA) finding that most crashes occur during the weekends between the hours of 6:00 p.m. and 5:59 a.m. (National Center for Statistics and Analysis, 2021).

Street conditions

Two-way undivided roads or streets were the sites for majority of the crashes (76.81%), and many occurred on state roads (43.47%). The smallest percentage occurred on local roads and streets (5.92%). Roadway conditions were reported as contributing to the crashes only 2.63% of the time, and 74.8% of the crashes occurred in clear weather conditions. MVCs were most common on dark streets with no lighting (43.88%) or in daylight (29.48%), followed by continuous streetlights in nighttime conditions (15.63%).

Driver Condition

The condition of the drivers (52.11%) and violations (40%) accounted for the primary contributory factors to these crashes. Data included all incidents where alcohol was either known or suspected. Most drivers (49.35%) involved in the crashes were presumed to have used alcohol and were impaired at the time of the incident. However, 29.43% of the drivers were in a normal state despite the presence of alcohol, while 7.44% were considered non-attentive while driving.

Severity of Injuries

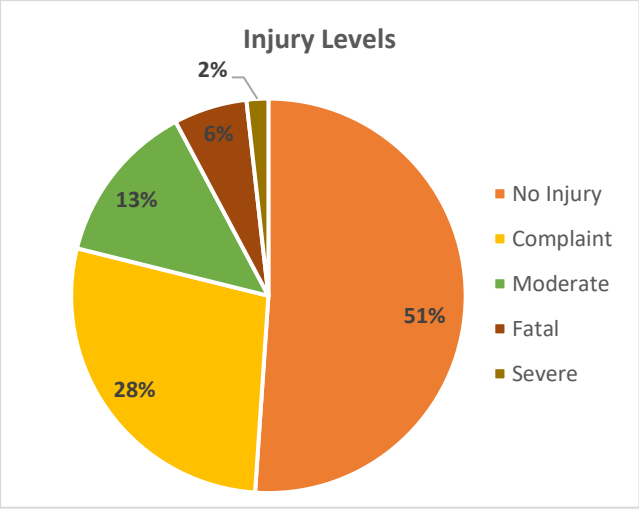

Table 7: Injury Levels, All Ages

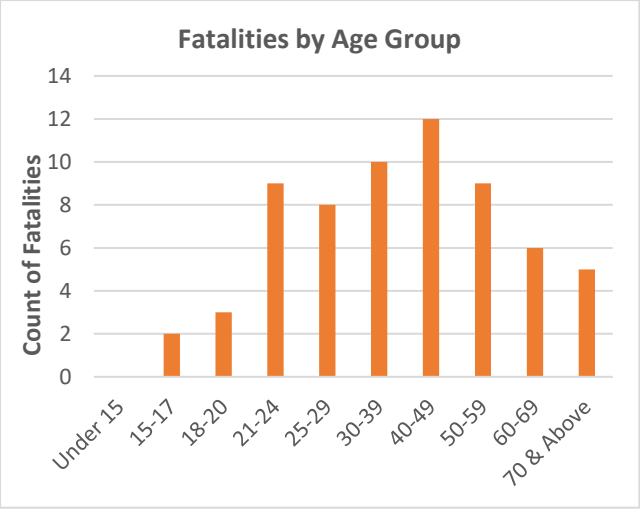

Table 8: Fatalities, Age Groups

Nearly half of individuals involved in the crashes had no injuries reported. Moderate injuries made up 14%. Severe injuries occurred in 3%, and fatal crashes made up approximately 9% of crashes among all HNCs. These numbers include both drivers and passengers.

Among the crashes resulting in fatalities, there were no children under 15. Fatalities rose sharply between the ages of 20 and 29, and another sharp increase occurred in the 40 to 49-year-old age group and again in those older than 80.

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Drivers and Passengers by Age Group

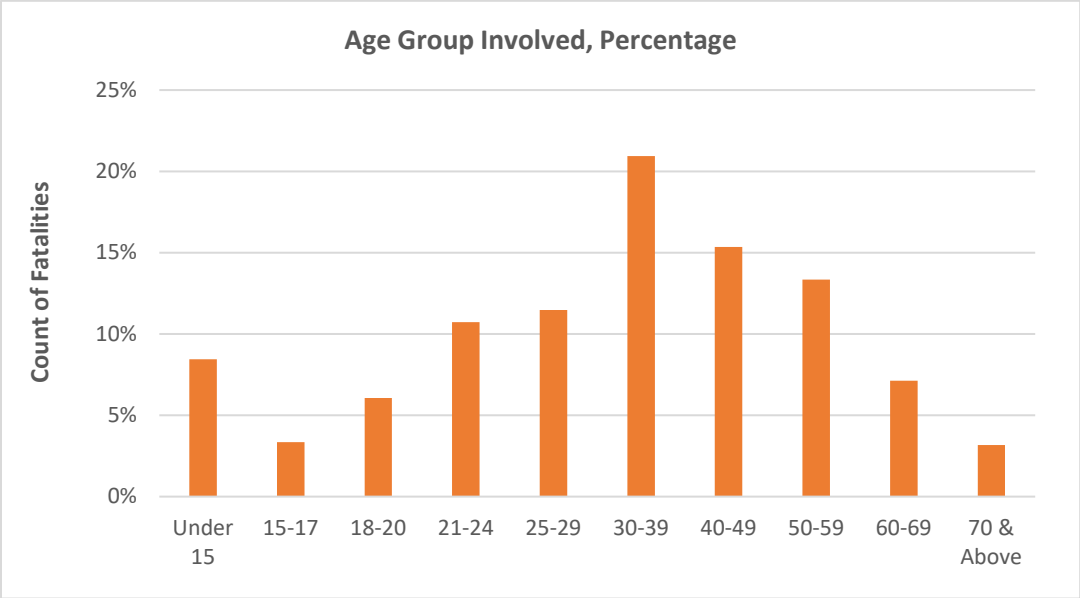

Table 6: Age Group Involved by Percent

The average age of all parties was 36 years, 26 years for passengers, and 41 years for pedestrians. The largest percentage of drivers involved in the crashes were ages 31-40 (20.5%). But compared to the 2019 Louisiana Traffic Records Data Report, there were slightly more adolescent drivers (1.3%) involved in alcohol-related crashes in the HNCs compared to that of the entire State, where 15-17-year-olds make up 0.4% of all drivers involved in alcohol-related crashes. In this sample, 5.3% of 18-20-year-olds were drivers. Statewide, 18–20-year-olds constituted 3.97% of drivers (Schneider, 2020). In terms of the young adult population, there were more young adult drivers (21-40yrs) (52.1%) in the HNCs involved in the crashes compared to the 21–24-year-olds (27%) in the National Center for Statistics and Analysis (2021) report. The majority of the drivers were male (66.3%) and White (58.6%) with African Americans making up 34.67%.

A sizable proportion of passengers involved in these incidents were children (1-12yrs) (155), although young adults (21-40yrs) made up the largest proportion (193) and adolescents (13-20yrs) the smallest proportion (126). Many of the passengers were White (50.65%) and female (50.32%) with African Americans accounting for 46.44%. Most pedestrians involved in the crashes were adults (41-91yrs) (54.55%), followed by young adults (21-40yrs) (38.18%) and adolescents (13-20yrs) (5.45%). The majority of the pedestrians were male (74.55%) and White (52.73%). African Americans constituted 45.45% of the total number of pedestrians involved in the crashes.

Alcohol Outlet Density and Availability

The density of alcohol outlets in communities has been strongly implicated in increasing excess drinking as well as alcohol-related MVCs (Xuan et al., 2015). This is important because the more people who are exposed to a high concentration of outlets, the greater the risk of harm from related automobile MVCs (Escobedo & Ortiz, 2002; Gruenewald, Johnson, & Treno, 2002). Despite the support for this finding, the relationship between alcohol availability and related crashes is complex. For example, driving distances to alcohol outlet locations and the related contexts of population, road conditions, and surrounding neighborhoods may serve to moderate the actual risk for those using alcohol as well as those simply driving from one location to another without using alcohol (Lipton, Ponicki, Gruenewald, & Gaidus, 2018). Alcohol

outlet density can be measured in one of several ways: container-based (e.g., by parish), distance-based (e.g., distance from a specific location to the nearest outlet), or by access according to distance based on road, sidewalk, or other transportation measures. We have chosen to look at density within the parish overall as well as clustering of outlets which we have defined as statistically large groups of outlets as compared to the presence of these locations over the entire parish. High concentrations of retail facilities providing either on-premises or off-premises access to alcohol is a known risk factor for excessive drinking and, by extension, related harm. This occurrence may have many contributing factors; however, the outcomes are similar when reviewed across geographic regions. These motor vehicle collisions are commonly mediated by available alternative modes of transportation such as ridesharing or public transport, distance to the individual's residence, and road density.

Many parishes within our analysis feature concentrations of motor vehicle collisions around areas with large densities of alcohol outlets. Often, these de facto "drinking districts" are within populated urban areas with many street intersections (another high-risk area), highly dense roadways, and often feature heavier crime or other socioeconomic factors that decrease overall investment in nearby infrastructure (like streetlights and other public safety tools).

National Comparison to Louisiana Alcohol-impaired Driving

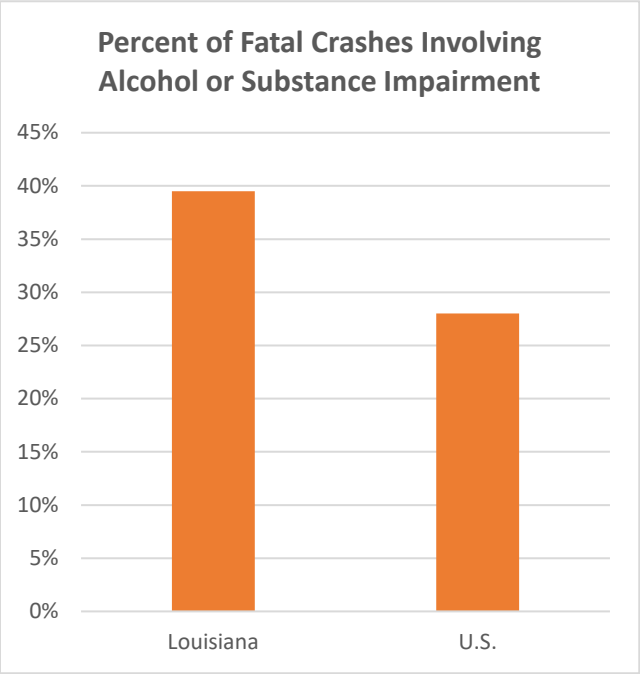

Table 7: Percent Fatal MVC, Louisiana vs. U.S.

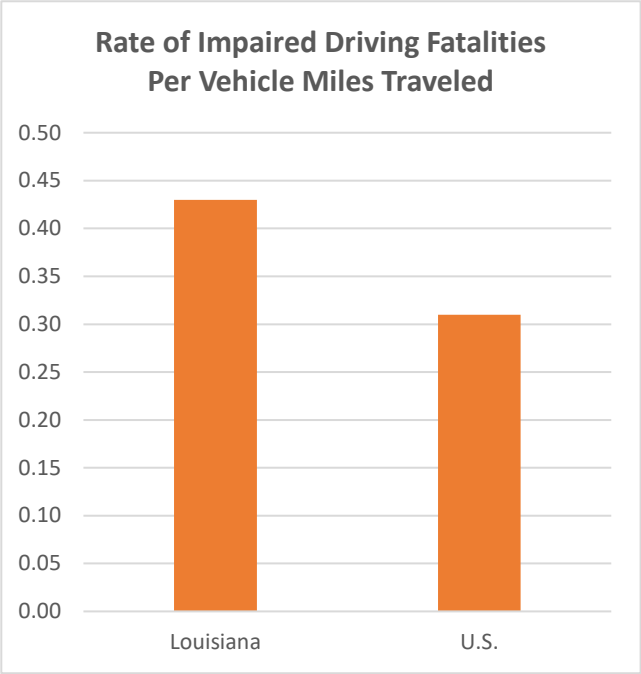

Table 8: Rate of Impaired Driving Fatality per Vehicle Miles Traveled, Louisiana vs. U.S.

Overall, Louisiana's rate of impaired driving fatalities per vehicle miles traveled is higher (.43 per 100 million VMT) than the national rate (.31 per 100 million VMT). Nationally, the highest rates of alcohol-impaired driving occur in 21–34-year-old men (National Center for Statistics and Analysis, 2021). This closely mirrors rates for the high need parishes with some variation among parishes, possibly because of the parish demographic profiles. In 2019, 28% of all MVCs nationwide that resulted in fatalities involved alcohol impairment. In 2020, 39.5% of fatal crashes in Louisiana involved alcohol impairment. This is part of a decreasing trend, having gone down over 4% since 2016 (CARTS 2021). Also of note is the fact that 49% of all crashes in Louisiana involved alcohol.

Nationally, 68% of alcohol-impaired fatal crashes occurred in dark lighting conditions. Similarly, approximately 65% of all crashes in Louisiana occurred in dark lighting conditions. Alcohol impairment in fatal crashes is higher on the weekends in both national and State level data, representative of the increase in leisure activities such as sporting events and social gatherings on the weekends (U.S. Bureau of Labor Statistics, 2021). Across the nation, more alcohol-related fatal crashes occurred in September and July. In Louisiana, the highest number of alcohol-related fatal crashes occurred in June (33), August (32), and November (32) (CARTS 2021). While there is nothing immediately significant about these months, June and November often coincide with the end of college semesters. Both nationally and in Louisiana, most fatal crashes involving alcohol occurred on non-interstate roads. Rainy roadway conditions were also low factor conditions to fatal crashes nationally and within the State. Louisiana appears to be above the national average on key metrics related to alcohol-impaired driving. Given the cultural role of alcohol, the abundance of post-secondary education institutions throughout the State (over 30), and the easy availability of alcohol outside of traditional establishments, these higher-than-average numbers are not surprising.

Intervention Strategies

Interventions to reduce alcohol-impaired drunk driving have been more likely to be effective when implemented at multiple systems levels within a community by stakeholders within that community (Hingson et al. 1996, Holder et al. 2000, Shultz et al. 2001, Shultz et al. 2009). The high-needs communities in this report currently participate in the "Louisiana Partnerships for Success," a SAMHSA-funded cross-sector coalition to develop and implement interventions around the reduction in problematic alcohol use and alcohol-related public health issues.

Each of these communities is tasked to develop interventions based on the socio-ecological model that focuses on four key areas of intervention: the individual, individual relationships, community settings and norms, and societal factors (e.g., laws, policing, economic) (SAMHSA, 2019). We have proposed interventions for decreasing the number of alcohol-related motor vehicle collisions within this framework to support existing efforts in these communities.

It is important to note the significant role local culture and norms may play both in alcohol use and the implementation and impact of the interventions. The relationship between drinking and cultural norms is strongly documented. White Americans are more likely to express more liberal drinking attitudes than members of minority communities (Caetano and Clark, 1999; LaBrie et al., 2012).

Neighborhood norms also have a strong influence on drinking. Individuals who live in neighborhoods in which the members are generally disapproving of alcohol use will be less likely to engage in binge drinking (Ahern et al., 2008). In short, more work understanding cultural norms surrounding drinking in high-need communities could aid in understanding how interventions may be implemented with the highest chance of success.

We have provided a sample selection of evidence-informed practices that could potentially be implemented in each community. This 'menu' is not exhaustive or directive; however, it is meant to give inspiration as to the types of practices that can impact impaired driving within their communities.

Multi-Level Intervention Options

Individual		
Intervention Name / Description	***Prevention Type****	***Sources***
Brief Motivational Interventions Structured harm-reduction conversations that have evidence to reduce the likelihood of individuals engaging in risky behavior. These interventions have shown to be impactful regarding drunk driving regardless of who is delivering, enabling implantation in multiple settings (School guidance counselors, nurses at doctors' offices, or peer delivery options).	Primary	CDC (2020); Teeters, Borsari, Martens, & Murphy (2015)

* Prevention types are Primary, Secondary, and Tertiary prevention. Primary prevention intervenes before the onset of the public health concern; secondary prevention identifies instances of the public health concern once it has occurred but before negative outcomes happen; and tertiary prevention intervenes once the public health concerns has happened with the goal of reducing the negative outcomes (Simeonson, 1991; Wallace, 2006).

Individual (continued)		
Intervention Name / Description	***Prevention Type****	***Sources***
Ignition interlocks A small, handheld breathalyzer attached to the ignition of a car. The device prevents the car from starting when it detects alcohol. Evidence suggests implementation among individuals with prior DWI or DUI convictions; this would take working with local LEOs, prosecutors, and the court system to include this as an intervention for individuals who continue to drive within the community.	Primary / Tertiary	CDC (2020); Richard, Magee, Bacon-Abdelmoteleb & Brown (2018)
Interpersonal Intervention Training Teaching Individuals how to intervene with family and friends who may be tempted to drive while intoxicated or are soon-to-drive while intoxicated; These interventions may discuss healthy drinking practices and habits like designated drivers and staying hydrated; peer-delivered SBIRT; direct intervention techniques when someone is about to drive while intoxicated.	Primary	Newcomb, Rabow, Hernandez, & Monto (1997); Hingson et al. 1996; Shults et al. (2009)
Formation of Student and Youth Associations ("Students Against Drunk Driving") Peer-lead opportunities to provide education, programming, and a potential feedback mechanism have a greater impact on students and young adults.	Primary	Newcomb, Rabow, Hernandez, & Monto (1997); Toomey & Lenk (2011); Hingson et al. (1996)
Relational		
Intervention Name / Description	***Prevention Type***	***Sources***
Formal or Informal Personal Interventions This is a broader category that incorporates interventions mentioned elsewhere, such as interpersonal interventions, motivational interventions, and drunk driving programs. We include this here because the human-to-human factor is the most relevant variable in reducing an individual's likelihood to drive while intoxicated.	Primary / Secondary	Hernández, Newcomb & Rabow (1995); Richard, Magee, Bacon-Abdelmoteleb & Brown (2018); Newcomb, Rabow, Hernandez, & Monto (1997); Toomey & Lenk (2011)
Designated Driver Programs These programs typically include strategically placed marketing materials and coordinated service-worker training for high-consumption locations. We have also seen this implemented as interpersonal skills training for students and young adults. There is little research on the actual effectiveness of DDPs; however, consumers report the willingness and desire to have DDPs and DDs available implies potential impacts. This can include encouraging alternative transportation methods.	Secondary / Tertiary	Rivara et al. (2007); Watson & Watson (2009)

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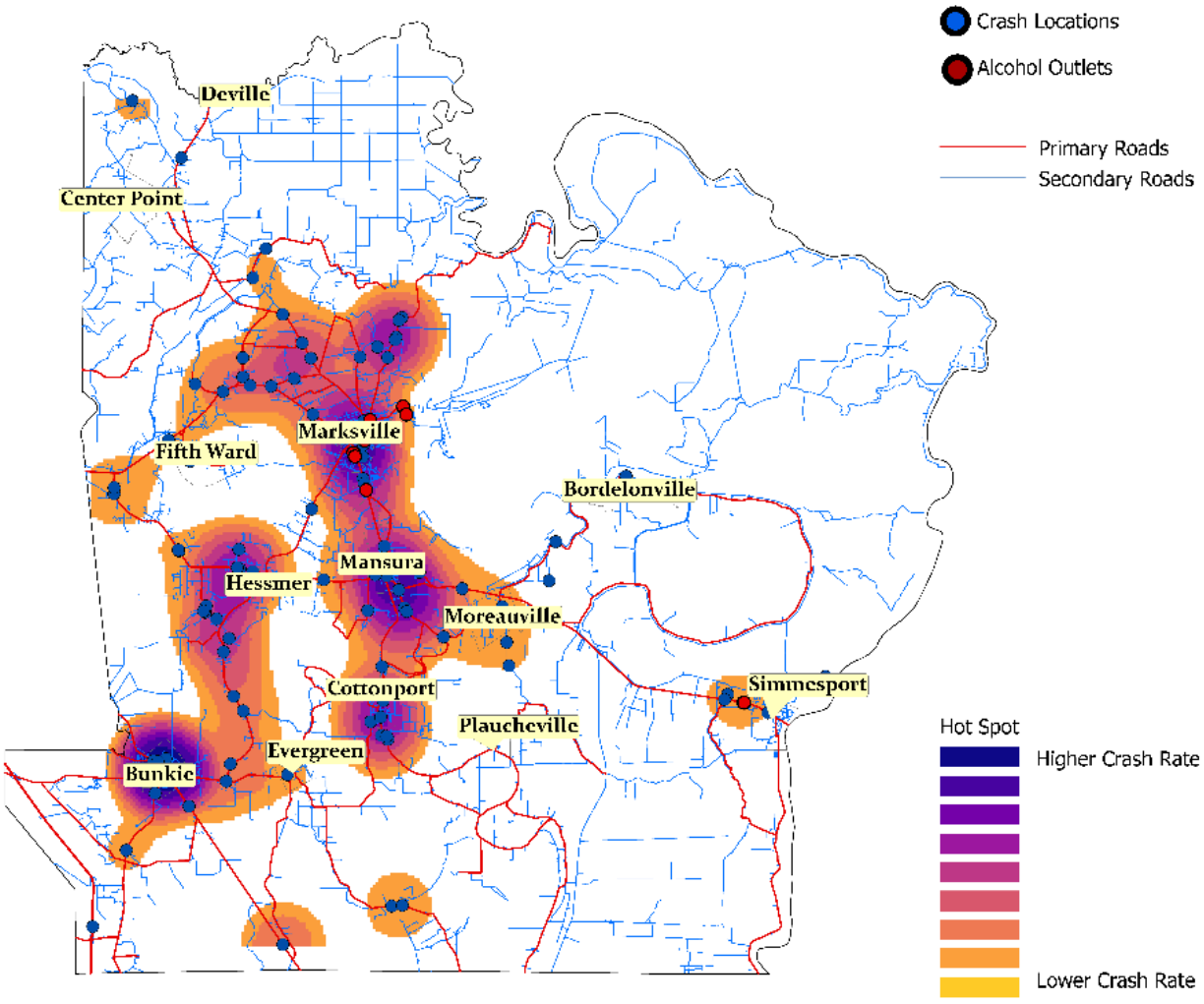
Relational (continued)		
Intervention Name / Description	***Prevention Type***	***Sources***
Social Marketing Activities (community events, canvassing, social media)	Primary	Toomey & Lenk (2011); Gorman & Speer (2007)
Community		
Intervention Name / Description	***Prevention Type***	***Sources***
Traditional Media Marketing Local Broadcast PSAs, Billboards, Social Media marketing	Primary	Gorman & Speer (2007) ;Richard, Magee, Bacon-Abdelmoteleb & Brown (2018); Toomey & Lenk (2011)
Vendor Staff Training Training bartenders, servers, and other vendor staff on their role in reducing drunk driving through limiting over-service/over-consumption, the 'last drink' conversation, or even identifying when someone may need medical assistance	Primary	Richard, Magee, Bacon-Abdelmoteleb & Brown (2018); Shults et al. (2001); Shults (2009); Saltz (1987) ;Toomey & Lenk (2011);
"Last Drink Programs" Law Enforcement/Public Safety officers, emergency room workers, or other responders formally or informally document the last consumption location of individuals stopped for DUI/DWI or present in an emergency care setting (ER, Mental Health Center) for treatment.	Secondary	Berger, Solomon, Chamberlin & Murie (2013); Goodwin et al. (2015); Scott, Livingston, Reporter, & Dietze (2017)
Community Self-Regulation Training (Media, Community Events, or Both) Teaching community members about safe consumption habits through paid media, community events, or other larger initiatives. One factor here is the 'community approval' factor. Events that promote public health topics get buy-in due to the adjacency to other community members ("I see Ms. Brown from church" or "My kids' football coach is here too – they must be supporting the cause")	Primary	Gorman & Speer (2007) ;Worden et al. (1989);

Society (i.e., Law Enforcement, Macro)		
Intervention Name / Description	***Prevention Type***	***Sources***
Targeted sobriety checkpoints and increased patrols Create negative incentives to drive while intoxicated in high-danger areas. Areas of high road- and outlet-density have a huge impact on overall rates of MVCs under the influence. Dispersing drivers away from some of the highest concentration areas reduces risks before the crash and removes unsafe drivers from the road altogether at the checkpoint.	Tertiary	Richard, Magee, Bacon-Abdelmoteleb & Brown (2018), Shults et all (2001 & 2009) ;Toomey & Lenk (2011)
Increased prosecution (& limited plea agreements) for DUI offenders This category generally encourages the justice system to use evidence-based judicial interventions like interlocks and increased monitoring for first-time offenders and escalating severity and duration for each subsequent charge.	Tertiary	Richard, Magee, Bacon-Abdelmoteleb & Brown (2018), Toomey & Lenk (2011)
Deterrence laws such as license revocation and penalties for blood alcohol test refusal	Secondary	Richard, Magee, Bacon-Abdelmoteleb & Brown (2018); Shults et al. (2001 & 2009) ;Toomey & Lenk (2011);
Interventions Targeting Concentrated Areas of Alcohol Permits Areas with a higher density of alcohol service facilities (especially on-premise permits) have an increased likelihood of MCVs related to intoxicated driving. Specifically targeting interventions at these high-concentration areas could yield increased results. These can also include limiting the number of new or existing establishments or creating specific policies around 'drinking zones' to reduce the impact on the surrounding community (think Beale Street in Memphis, TN vs. Bourbon Street in New Orleans, LA)	Primary	Farley, T. A., Theall, K., Bluthenthal, R. N., Scott, M., & Cohen, D. A. (2008);Reboussin, B. A., Song, E.-Y., & Wolfson, M. (2011); Schonlau, M., Scribner, R.,
Increased Alternative Transportation Opportunities These include opportunities like a 'tipsy taxi,' rideshare services, private shuttle services, and public transport in areas of high outlet and road density. Rideshare subsidies tend to be the least impactful among this category, while direct-administration programs have a larger cost-benefit impact.	Primary	Decina, Foss, Tucker, Goodwin, & Sohn (2009); Miller, Courser, Shamblen, Lange, Tippetts, & Ringwalt (2020)

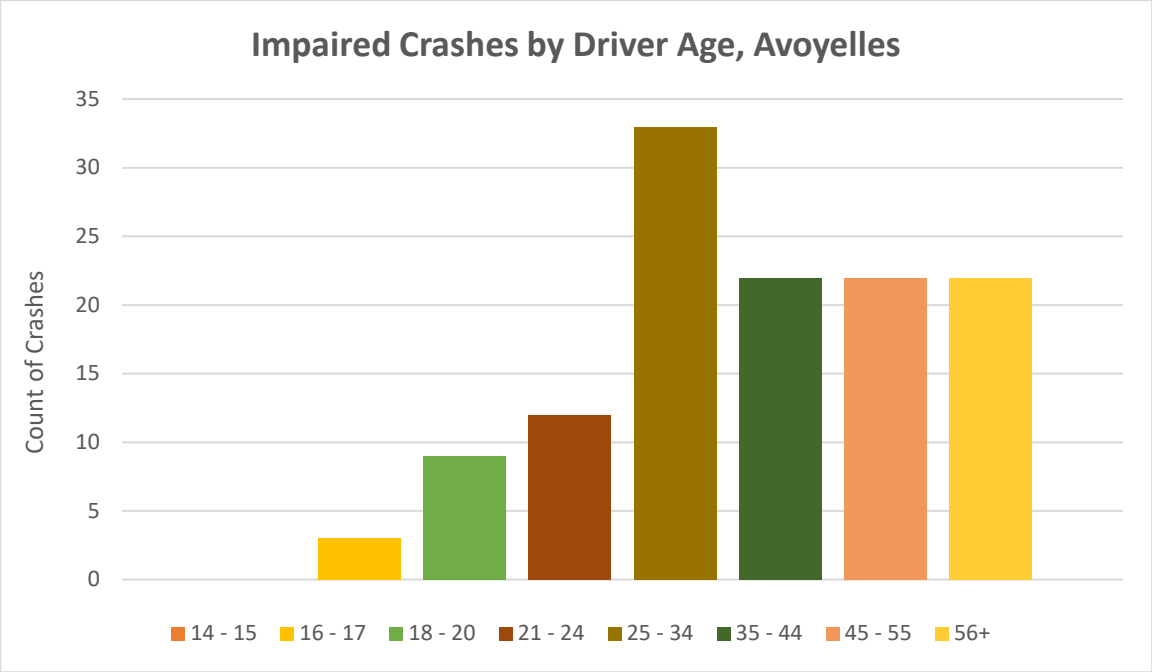
Individual Communities

Avoyelles

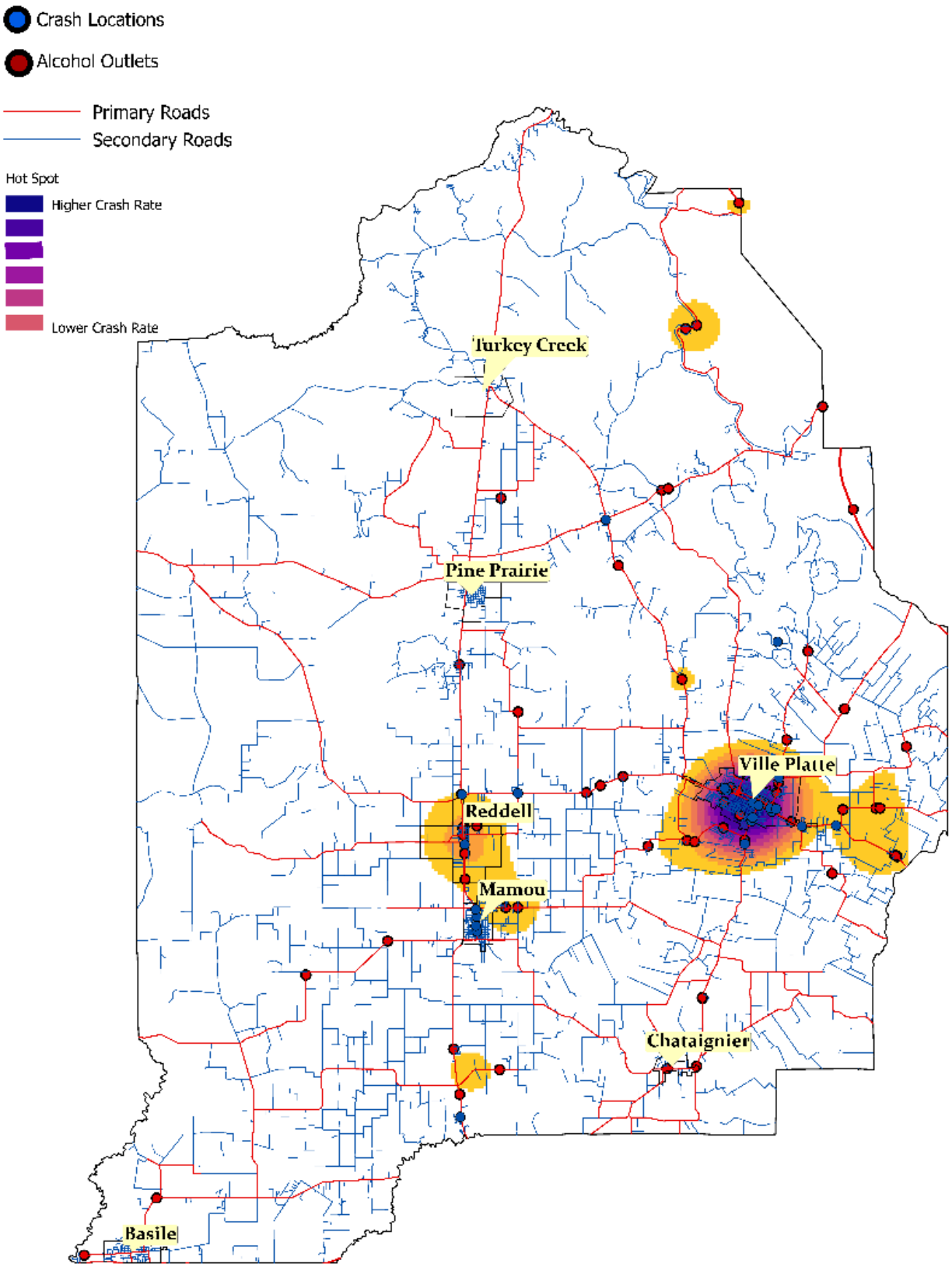


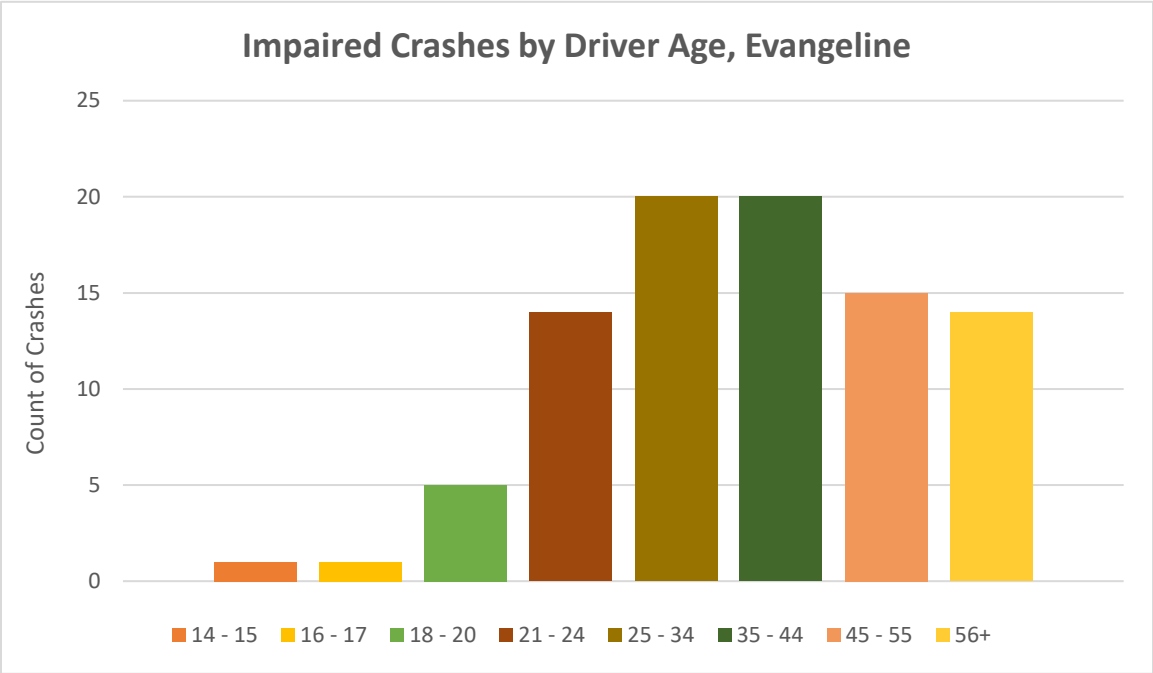
Avoyelles Parish, located in central Louisiana, includes the cities of Marksville and Bunkie. Avoyelles Parish has a mean population density of 50.2, which is right at the median for the nine parishes and a median age of 38.2 years. The road density in the parish is 2.83 miles/sq mile, and the alcohol outlet density is .04. Alcohol outlets are located along the LA 1 corridor, while reported crashes appear throughout the parish. Notably, a large casino is located in the city of Marksville, along LA 1. Over 50% of crashes occurred on Fridays and Saturdays. Alcohol impairment was evident in 56% of drivers involved in crashes. This is higher than the state percentage (24.52%) of alcohol-involved crashes. Violation and the condition of the driver were the two largest contributing factors in crashes. Most drivers in Avoyelles Parish crashes were male, white, and between the ages of 41-91. Overall, however, young adults between the ages of 21-40 comprised 42% of all individuals involved in crashes in Avoyelles Parish. A total of 3.8% of reported crashes in Avoyelles parish were fatal.

As alcohol impairment appears to be a significant factor in crashes, and over half of all crashes occur on weekend evenings, suggestions would include increasing checkpoints along major roadways, including LA-1 on Friday and Saturday nights. Another strategy to reduce impairment-related crashes could be to implement and encourage the use of alternative sources of transportation such as rideshare services, cabs, or public transport options. There seem to be opportunities to partner with local businesses to provide a shuttle between entertainment venues and nearby accommodations.



Evangeline

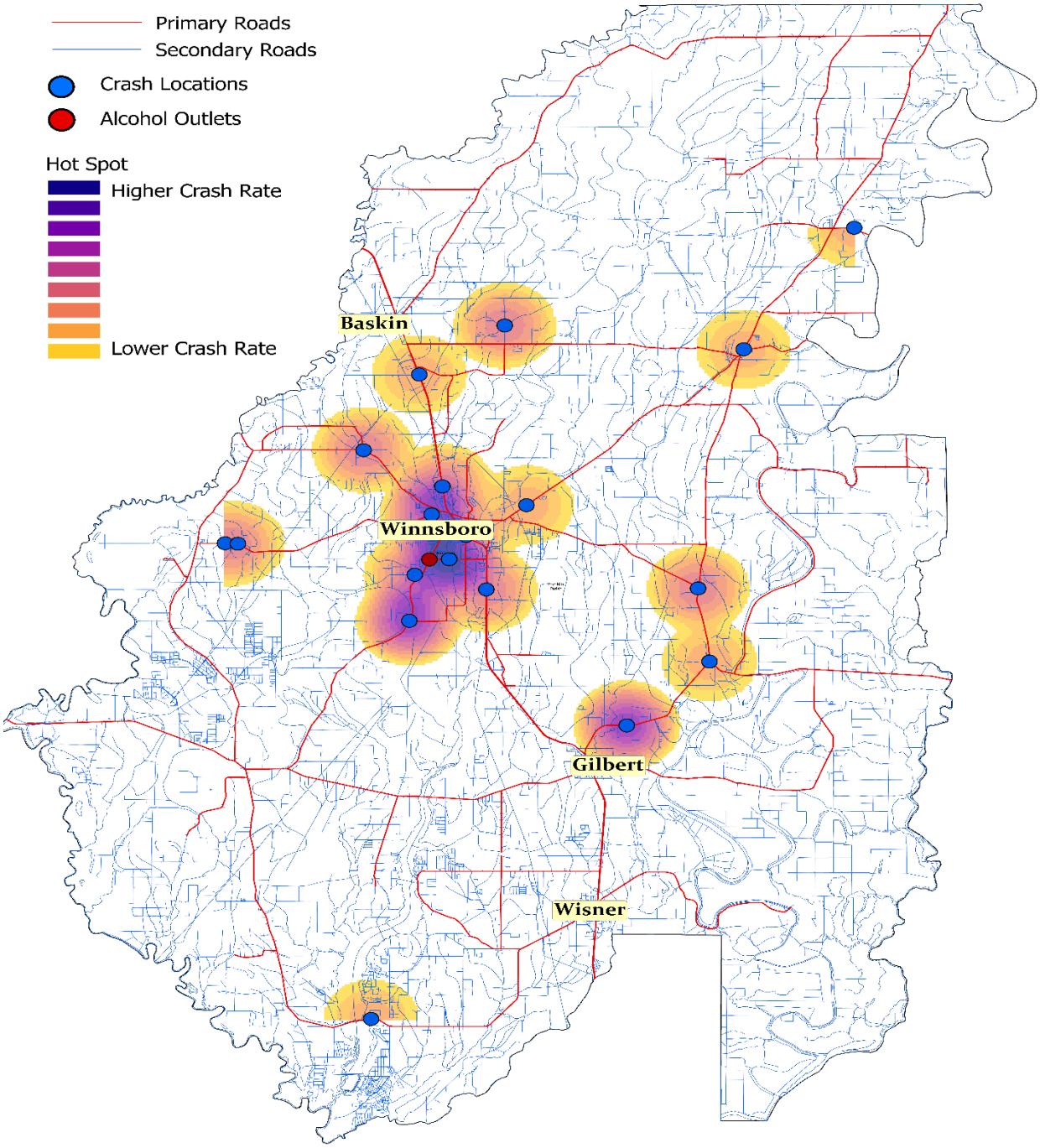

Crash Locations
Alcohol Outlets
Primary Roads
Secondary Roads
Hot Spot
Higher Crash Rate
Lower Crash Rate
Turkey Creek
Pine Prairie
Ville Platte
Reddell
Mamou
Chataignier
Basile



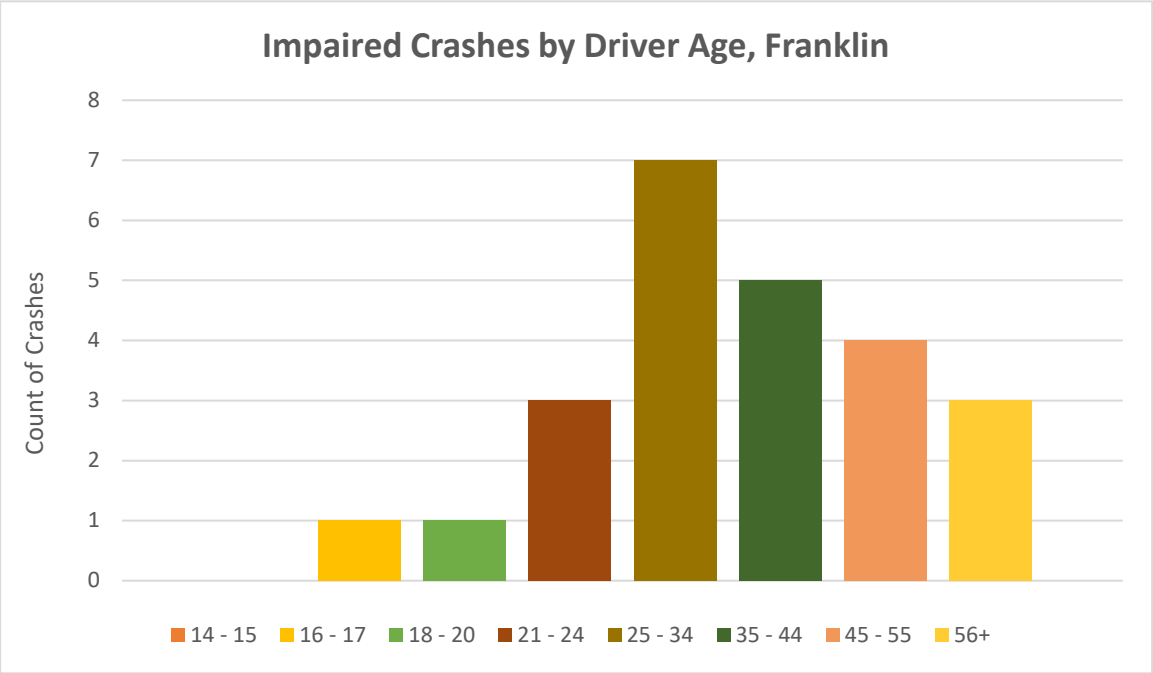
Evangeline Parish is in central Louisiana. There is one city in the parish, Ville Platte, and several smaller settlements. Evangeline Parish is largely rural, and Interstate 49 skirts the eastern edge of the parish between the cities of Opelousas and Alexandria. The parish has a mean road density of 2.90 miles/sq mile, with an alcohol outlet density of 0.03 and a population density of 51.3. Alcohol outlets are in the incorporated areas of Ville Platte and Mamou, with only one outlet being outside these two areas. Crash data suggests, however, that crashes were not concentrated only in the alcohol outlet areas. Most crashes were attributed to violations, and 44.7% of drivers in crashes were clearly impaired due to alcohol. 47.3% of drivers involved in crashes were between the ages of 21-40 years. Approximately 49% of crashes occurred between Saturday and Sunday. In Evangeline Parish, most drivers involved in crashes were white and male. 9.9% of crashes in Evangeline were fatal.

Given the fact that alcohol outlets and crashes are dispersed throughout the parish, parish-wide initiatives for responsible beverage server training should be encouraged. Many crashes occur in the Ville Platte and Mamou areas. Police checkpoints, particularly on Saturdays, could be initiated to deter impaired drinking or other roadway behaviors that could lead to violations. We also encourage “place of last drink” to be implemented in Evangeline parish, specifically through the Ville Platte, as drivers are known to use the town as a method to bypass interstate patrols. Understanding the flow of intoxicated drivers should increase the effectiveness of future interventions.

Franklin


Primary Roads
Secondary Roads
Crash Locations
Alcohol Outlets
Hot Spot
Higher Crash Rate
Lower Crash Rate
Baskin
Winnsboro
Gilbert
Wisner

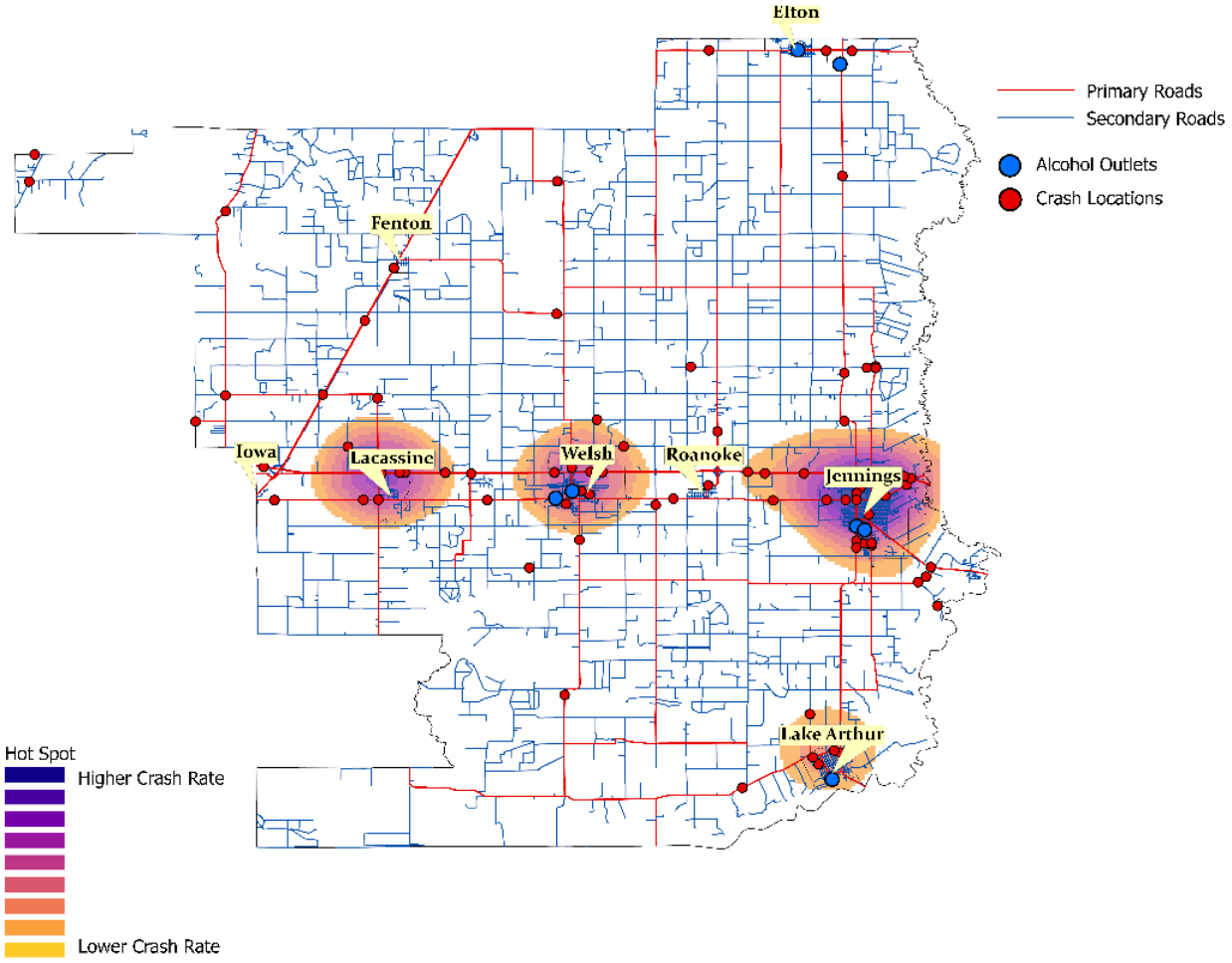
north to south. Driver violations were the leading contributing factor in crashes. Drivers involved in

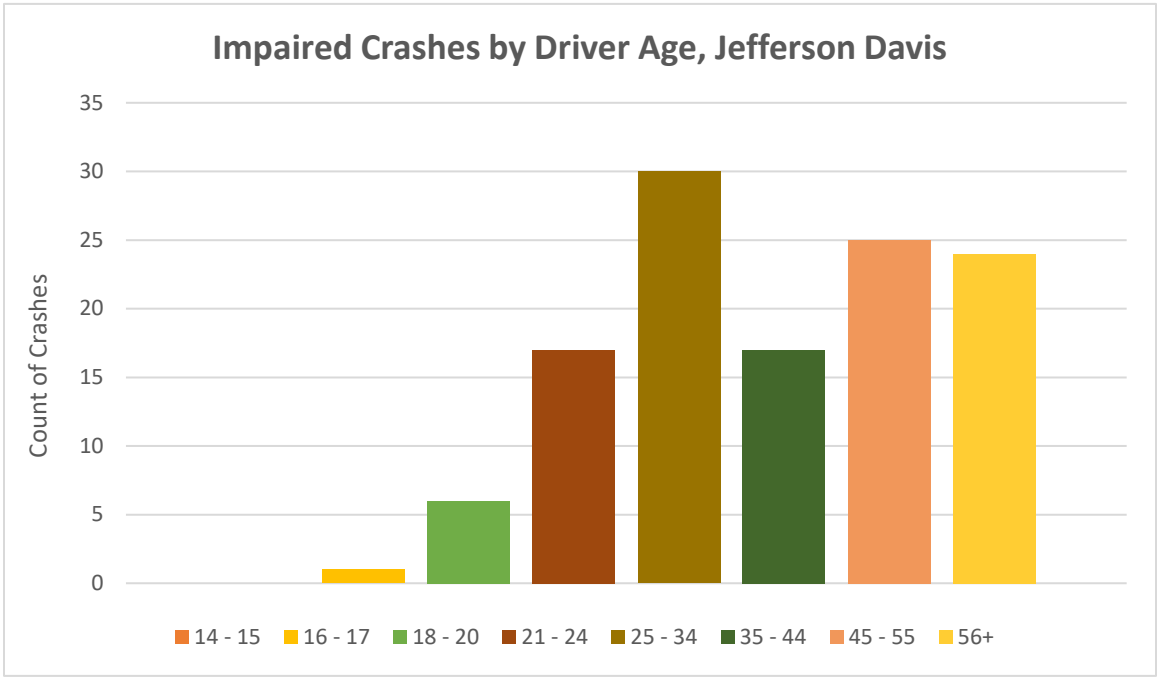


Franklin Parish is in northeast Louisiana, with the nearest metropolitan area being the city of Monroe. Franklin Parish has a mean population density of 33.2 and a median age of 38.4 years, which is an older population relative to other high needs communities; drivers were younger than the average at 27.5 years. The mean road density in the parish is 3.18, and the alcohol outlet density is 0.03. Most of the crashes were centered in the general area of the alcohol outlet(s). 54.17% of crashes involved clearly impaired drivers. No crashes were reported on local or city roads or streets, while 72.2% of crashes were on a state road. US 425/LA 15 intersects the parish from crashes in Franklin Parish were primarily male and Caucasian. 45.8% of drivers in crashes were between the ages of 21-40 years. Approximately 25% of crashes in Franklin Parish resulted in a fatality.

The highest percentage of crashes occur around weekend days, namely Friday and Sunday. Responsible beverage server training could be offered to alcohol outlets, and a public information and awareness campaign could be used to target drinking and driving. Coordinating with state enforcement officials could alleviate pressure and limited resources on rural law enforcement.

Jefferson Davis

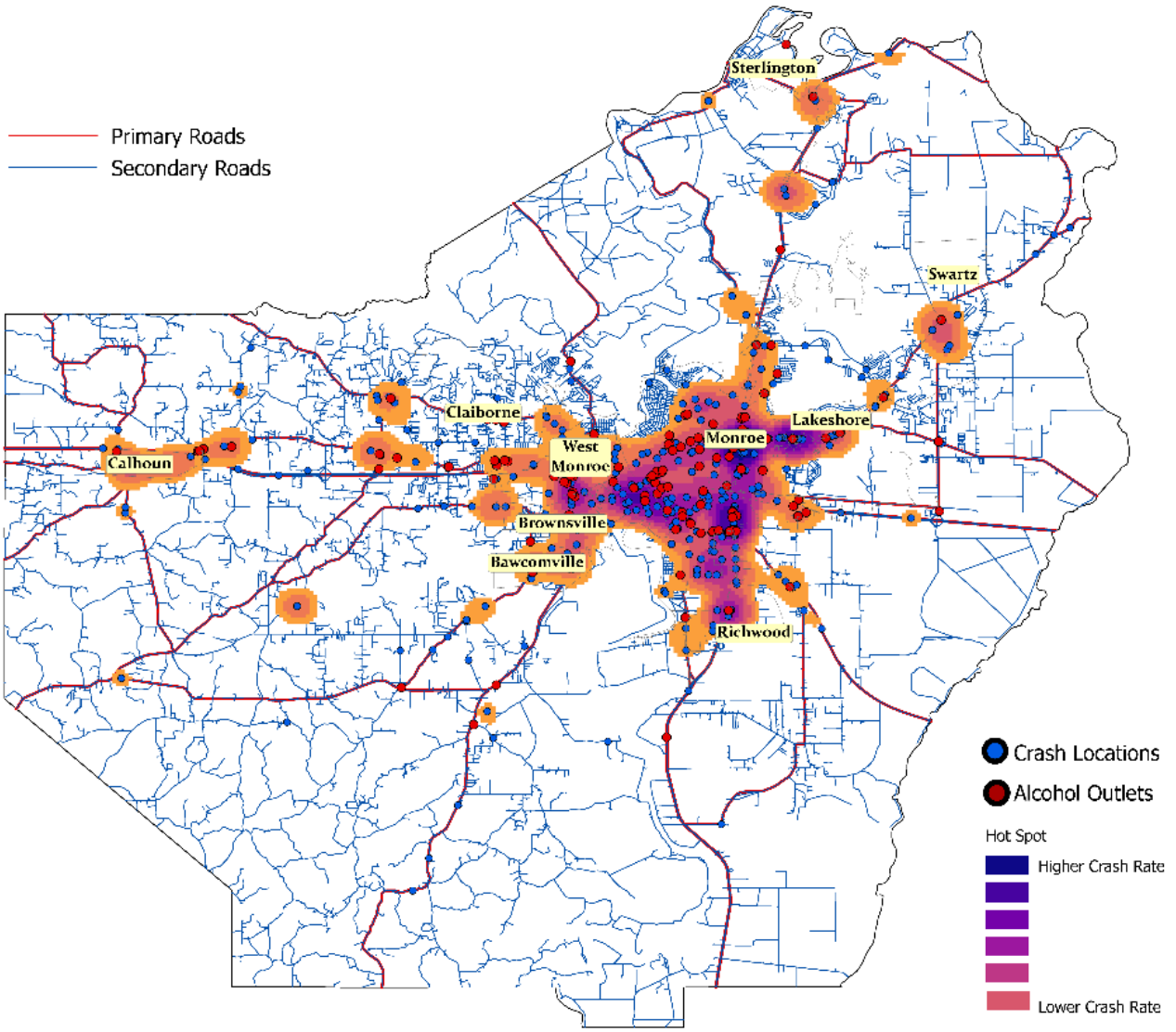




Jefferson Davis Parish is in Southwest Louisiana and includes the city of Jennings. The population density of Jefferson Davis Parish is 48.5, which is close to the 9-parish median. The average population age is 37.7 years which is close to the state average. The mean road density is 2.67 miles/sq mile, also close to the state average, and the alcohol outlet density is 0.01, which is on the low end. Interstate 10 runs through Jefferson Davis Parish as a major thruway between the cities of Lafayette and Lake Charles, LA. Of note, however, only 38.2% of all crashes occurred on the interstate. 60% of crashes occurred on a two-way road or street. Most of the alcohol outlets are located along the Interstate 10 corridor, with a few found in the extreme northern (town of Elton) and southern (Lake Arthur) regions of the parish. 55.2% of crashes in Jefferson Davis Parish were the result of the condition of the driver, and 55.3% of drivers involved in crashes in Jefferson Davis Parish were impaired by alcohol. 20% of crashes occurred on Saturdays; however, the day of the week with the highest percentage of crashes was Sunday at 29%. Over 70% of drivers involved in crashes were male and white, and 47.9% of crash drivers were between the ages of 41-91 years. Jefferson Davis saw a relatively small number of crash fatalities (4.85%), while 55.51% of crashes resulted in no injury.

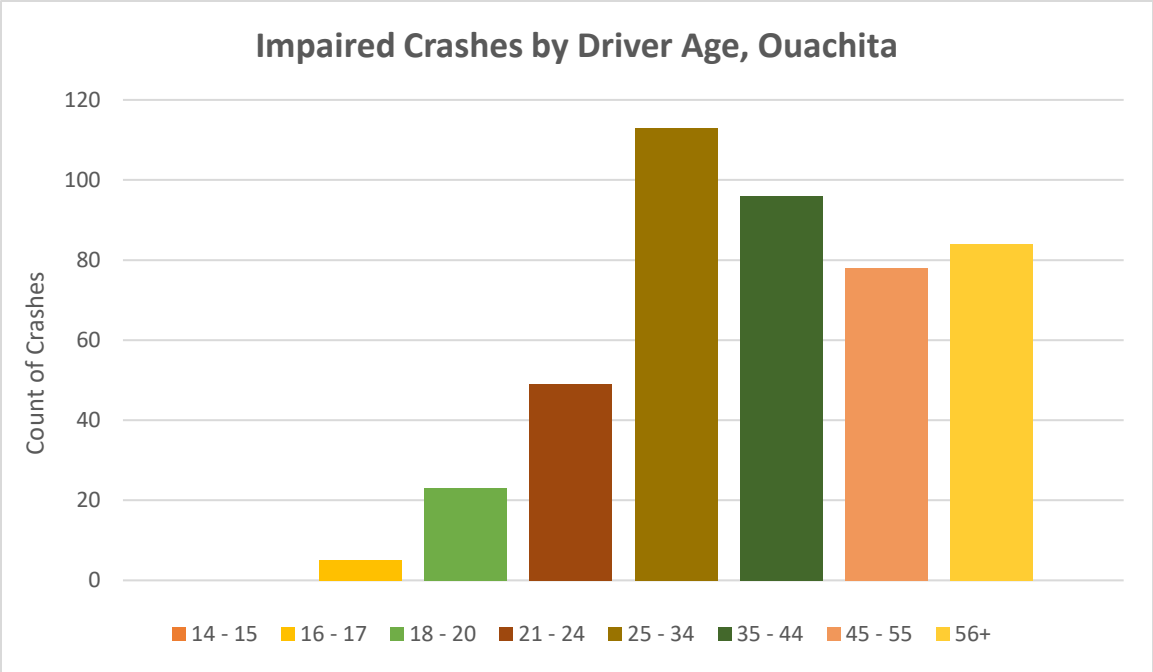
As Jefferson Davis has a relatively low alcohol outlet density and crashes are widespread throughout the parish, strategies to reduce crashes related to impairment would be to offer responsible beverage server training to outlet employees, as well as to increase police patrols on crash-dense roadways on Saturdays and Sundays.

Ouachita



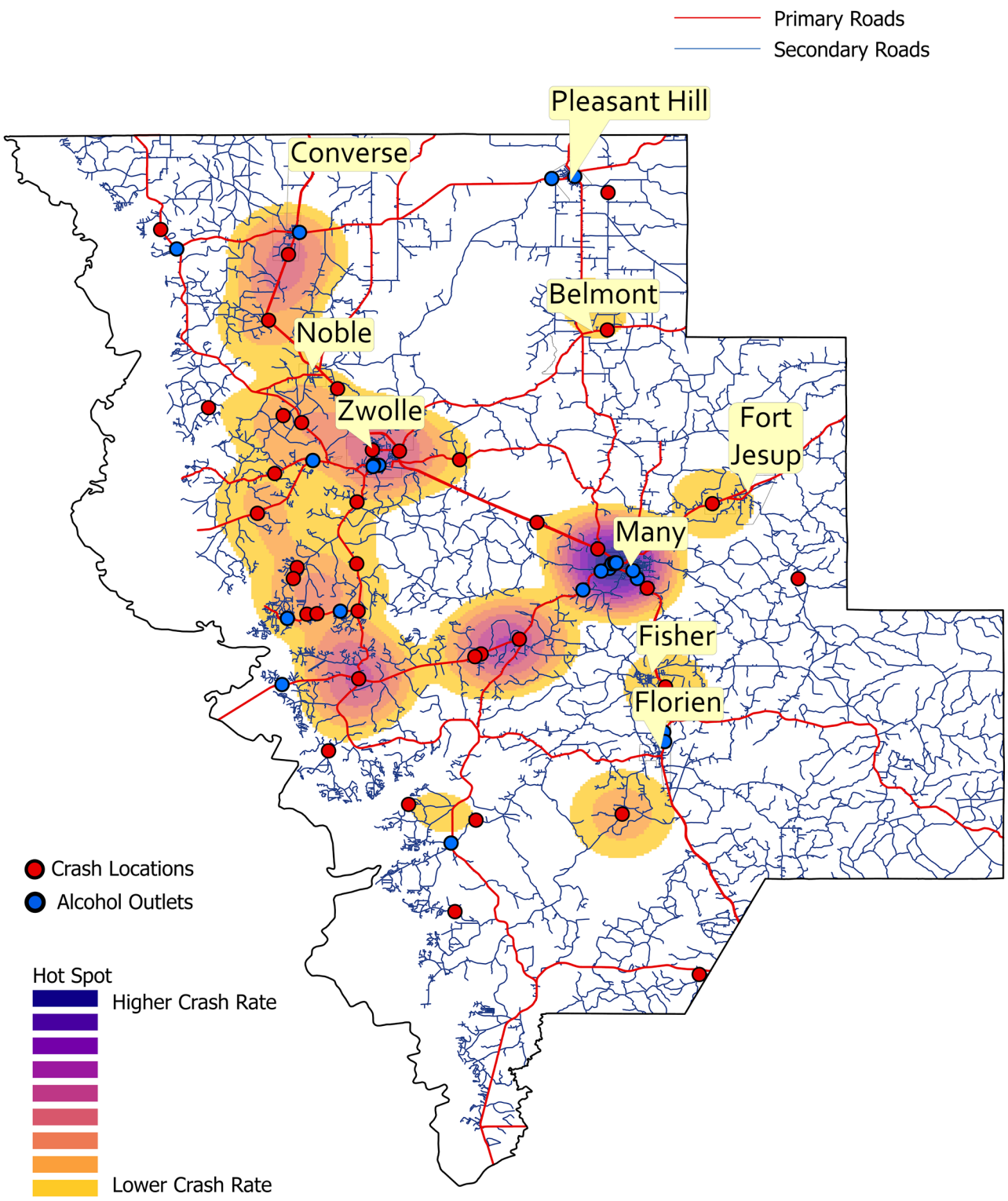
Ouachita Parish is in northeast Louisiana and includes the Monroe Metropolitan area as well as the University of Louisiana at Monroe. Ouachita Parish has a median age of 35.4 years, a population density of 251.8, a road density of 4.05 miles/sq mile, and an alcohol outlet density of .20. The alcohol outlet density is notably higher than neighboring parishes. This may be explained by the presence of the university; however, the alcohol outlet map shows very few outlets located near the university. The lowest percentage of crashes occurred at midday, followed by a spike between 12 a.m. to 1 a.m. A possible explanation for this spike could be related to bar/outlet closures. 44.87% of crashes involved driver impairment, and 33.76% of crashes involved drivers not clearly impaired but with alcohol present. Additionally, the two days with the highest crash percentages were Saturday and Sunday. 53.42% of drivers in crashes were white, and 39.96% of drivers were African American. Most of the drivers in crashes in Ouachita Parish were males between the ages of 21-40 years. 4.77% of crashes resulted in fatalities, while 52.6% of crashes in Ouachita Parish resulted in no injury.

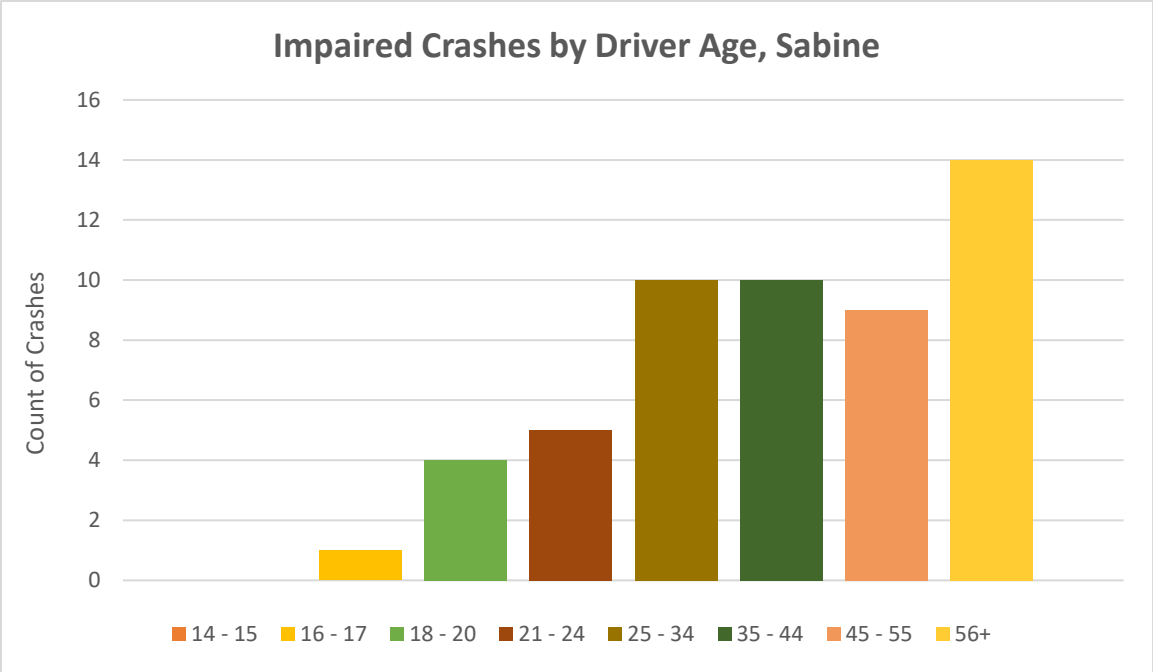
Crashes in Ouachita Parish are overwhelmingly centered in high alcohol outlet concentration areas. Outlets should be encouraged to participate



in responsible beverage server training to identify underage and highly intoxicated consumers. Evidence-based interventions also suggest local officials may consider the high outlet density as a factor in allowing additional alcohol outlet businesses to come into the community. Another suggestion to curb violations related to impaired drinking would be to increase law enforcement presence on high crash volume days. As Ouachita seems to have some of the densest outlet, road, and crash data, increased data collection may be a priority to truly have an impact on drunk driving, as well as implementing novel programs like “Place of Last Drink” or GPS-based interlock systems.

Sabine

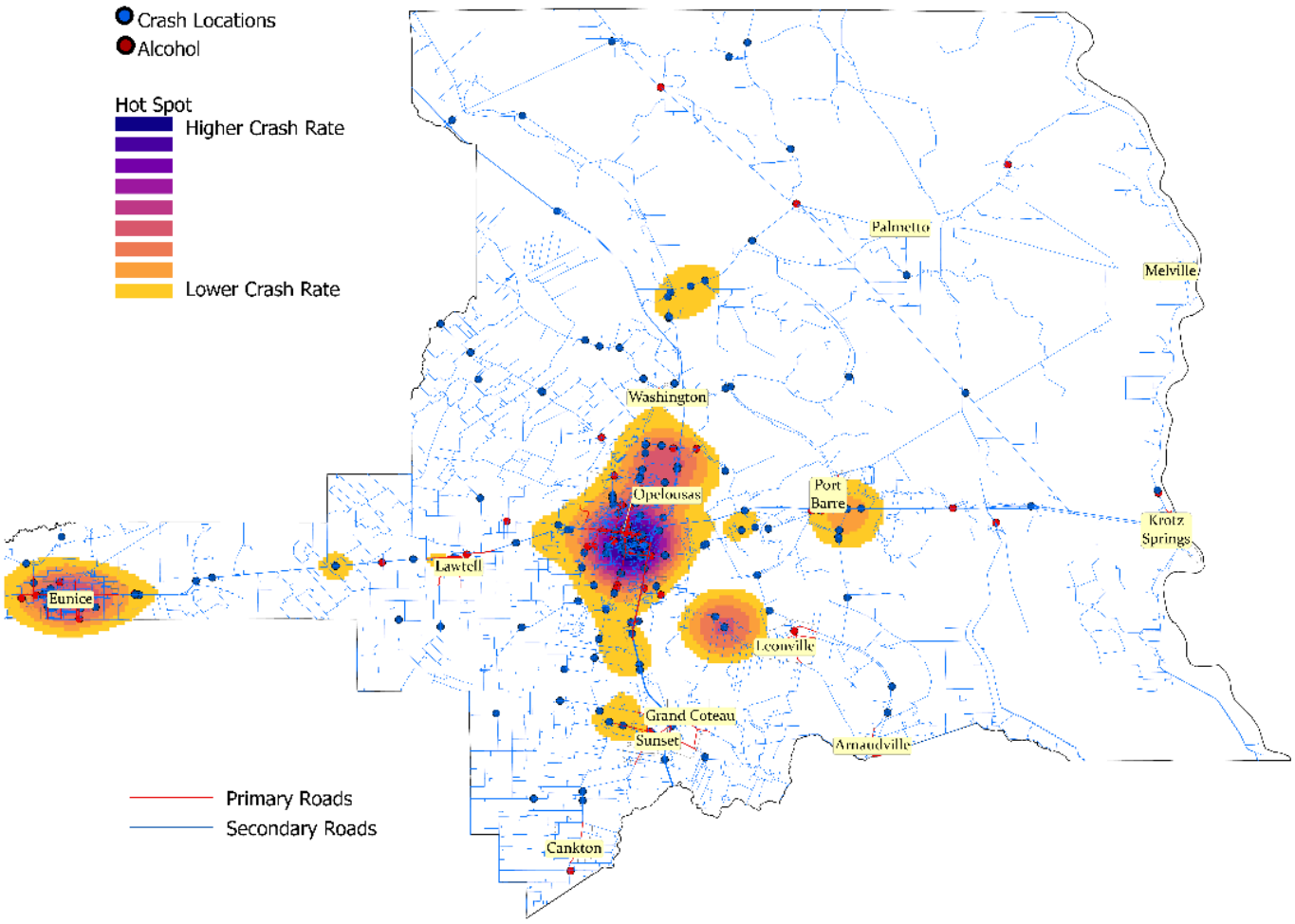

Primary Roads
Secondary Roads
Pleasant Hill
Converse
Belmont
Noble
Zwolle
Fort Jesup
Many
Fisher
Florien
Crash Locations
Alcohol Outlets
Hot Spot
Higher Crash Rate
Lower Crash Rate



Sabine Parish is in west-central Louisiana along the Toledo Bend Reservoir on the Louisiana-Texas border. The parish has two incorporated towns, Many and Zwolle. Sabine has a mean road density of 2.27miles/ sq mile, a low population density of 28, and an alcohol outlet density of 0.02, which is also one of the lowest among the high need parishes. Alcohol outlets were concentrated in the town of Many and along the shores of Toledo Bend Reservoir, and there was only one on-premises outlet listed. There are no major interstates that intersect Sabine Parish. Crash percentages were highest on Saturdays and Thursdays, with Sundays close behind; however, high-risk times were spread throughout the evening and early morning hours. In the towns of Zwolle and Many, Saturdays were particularly high risk. Most crashes occurred on two-way, undivided state roads. Violations were the primary contributing factor in 53% of crashes.

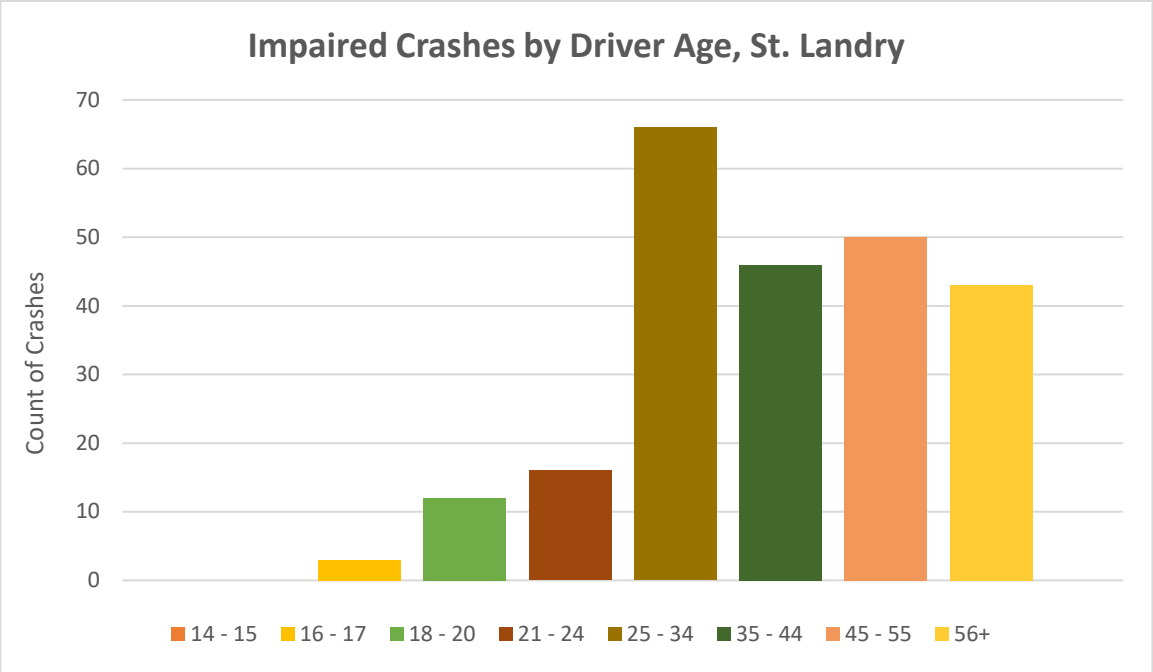
Alcohol impairment was overwhelmingly present in Sabine Parish MVCs (56.6%). Characteristics of drivers involved in these incidents in Sabine Parish include males, white, and over the age of 56. Three out of 42 crashes in Sabine Parish resulted in a fatality. Sabine had a larger number of older drivers involved in alcohol-related crashes than other parishes; however, this parish has a high median age which may have contributed to this anomaly. To target the older population and reduce the number of violations resulting in an increased risk of alcohol-impaired crashes, one suggestion is to increase law enforcement patrols around Toledo Bend Reservoir and the town of Many on high-risk days. With community feedback that much of the drinking is done at informal or unlicensed outlets, we suggest “place of last drink” policies to better understand the unique impaired driving patterns within the community.

St Landry



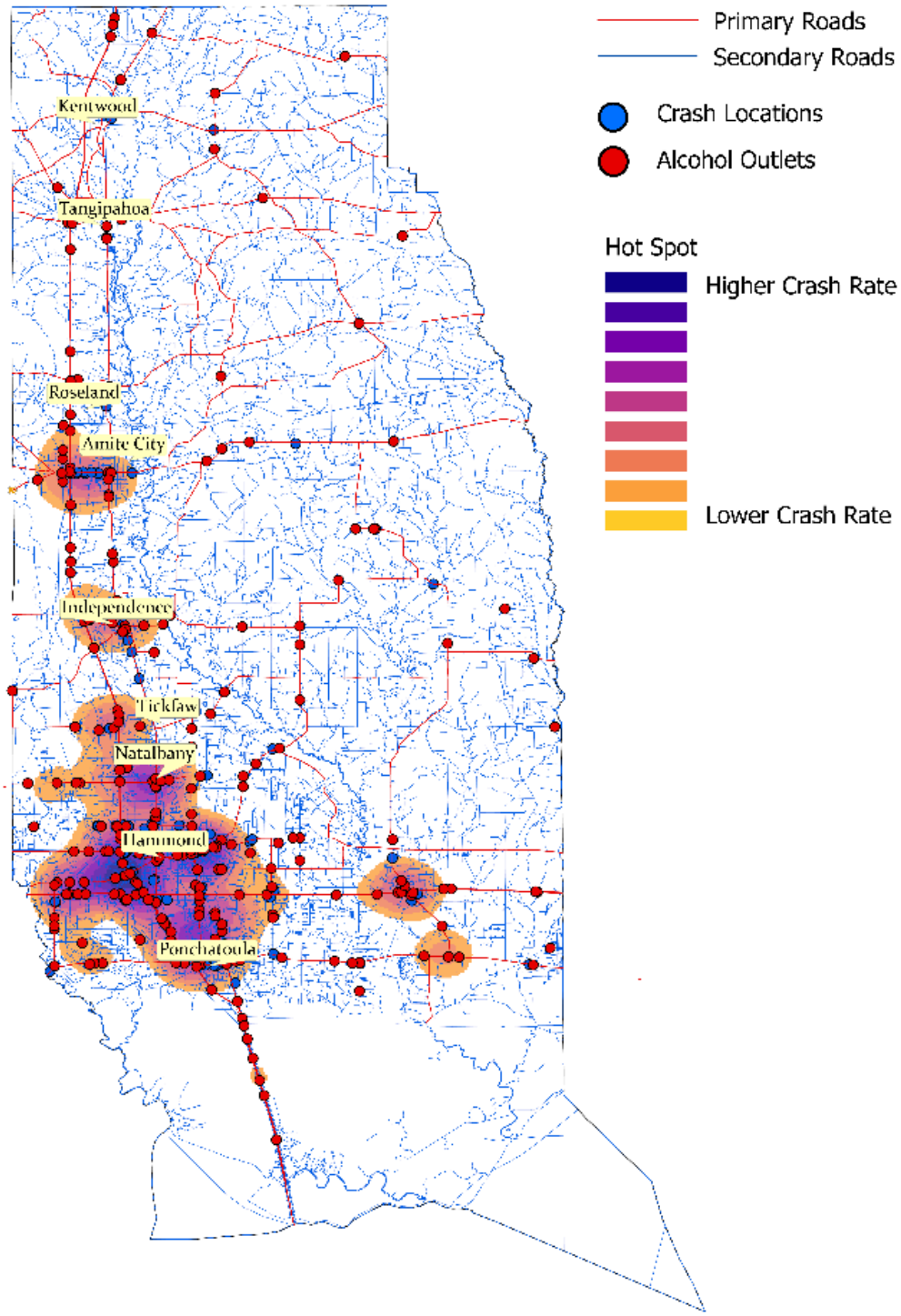
St. Landry Parish in central Louisiana has two incorporated cities, Opelousas and Eunice. The road density for the parish is 2.67/sq mile, just below the average for the nine parishes. The population density is 90.3 persons per square mile, which makes it the third most crowded. Alcohol outlet density per square mile is 0.08, which is close to the average; however, this parish has the highest alcohol-related crash rate of the nine parishes. The median age of drivers was 38 years which is on par with the median age of the Louisiana population.

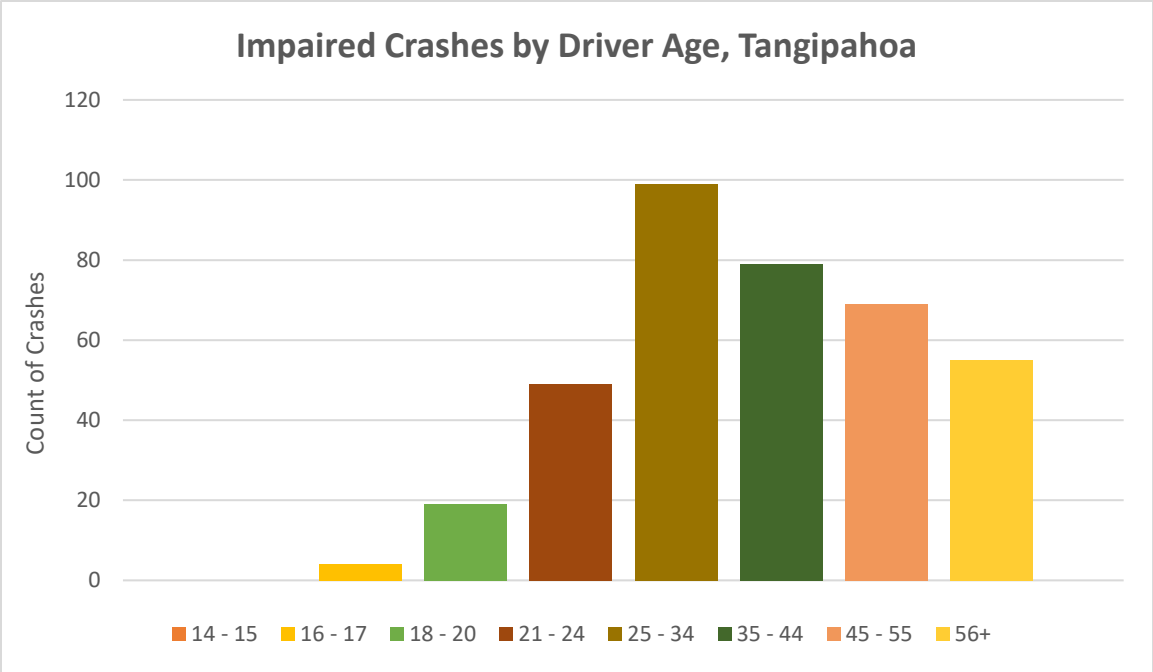
St. Landry Parish is intersected by US Hwy 190 and Interstate 49 in the city of Opelousas, the largest settlement in the parish. Eunice, the second-largest city, is at the western edge of the parish. Both have clusters of alcohol outlets as well as crash hotspots. The highest risk days in St. Landry Parish were Friday, Saturday, and Sunday, with Sunday's crashes occurring in the very early hours of the morning following typical bar closure hours. The condition of the driver was the highest contributing factor relative to crashes, and 54% of drivers in crashes were impaired by alcohol. 48% of crashes happened in areas with dark unlit streets or roadways. The drivers involved in the crashes were predominantly male and evenly divided between white and African American drivers. Over 25% of drivers involved in alcohol-related crashes were between the age of 25-34.



To address the alcohol impairment crash issues relative to St. Landry Parish, sobriety checkpoints could be implemented particularly on high-risk days and times along the Hwy 190 corridor and areas with crash hot spots, as well as providing responsible server training. Using social marketing and other forms of direct communication to the university campus could provide a high return on investment.

Tangipahoa

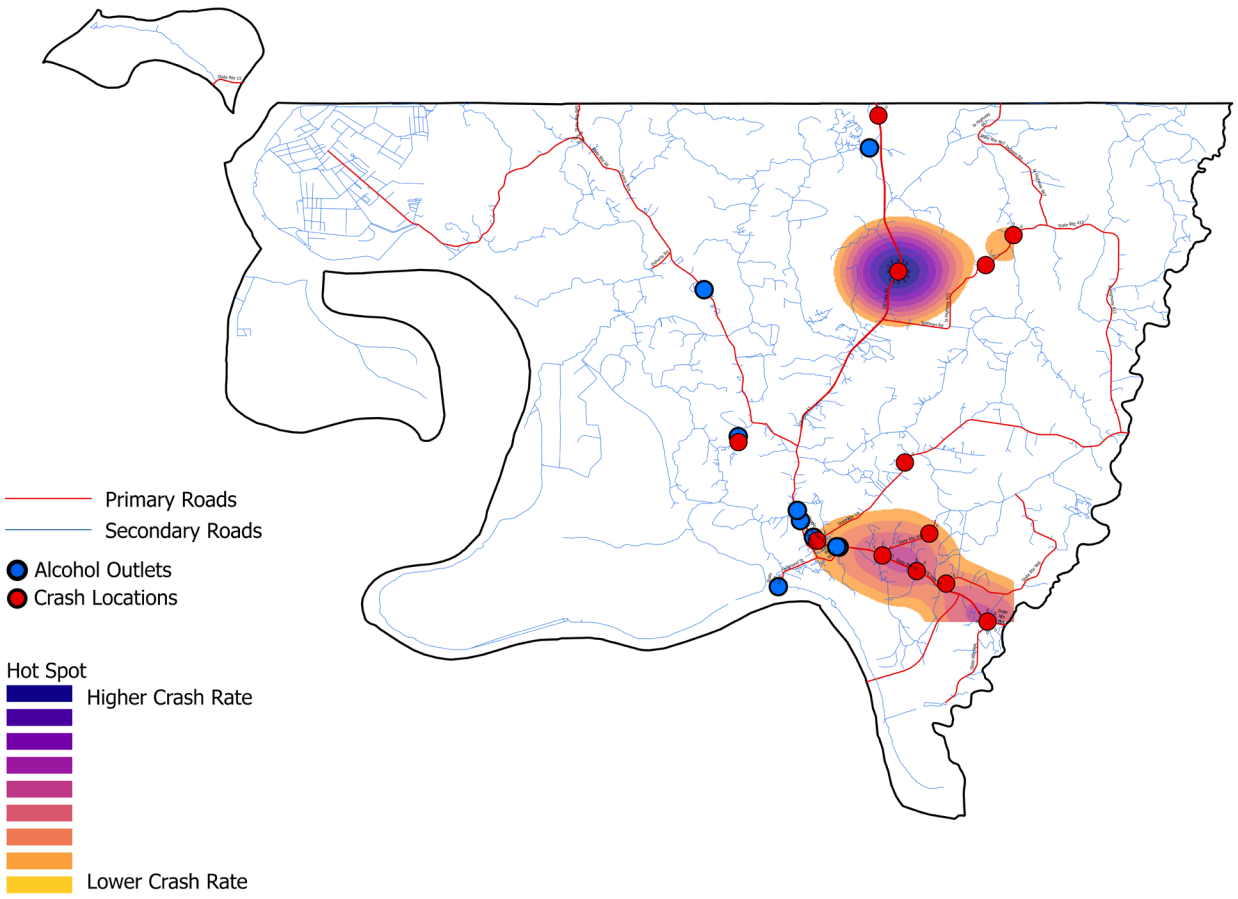

Primary Roads
Secondary Roads
Crash Locations
Alcohol Outlets
Hot Spot
Higher Crash Rate
Lower Crash Rate
Kentwood
Tangipahoa
Roseland
Amite City
Independence
Tickfaw
Natalbany
Hammond
Ponchatoula



Tangipahoa Parish in southeast Louisiana includes the city of Hammond and Southeastern Louisiana University. Tangipahoa is a geographically long parish bordered by Pike and Amite Counties in Mississippi to the north and Lake Pontchartrain to the south. The median age in Tangipahoa Parish is 35.3 years, younger than the state population average of 37.7. Population density is the second highest at 153 persons per square mile. The road density is also the second highest at 3.44 miles/sq mile, and the alcohol outlet density per square mile is 0.13, which is higher than the average of .06 for the nine parishes. Notable is the fact that Interstate 10 and Interstate 55 intersect in the city of Hammond in Tangipahoa Parish. A sizable portion of the alcohol outlets are centered around the Hammond/Southeastern University area. The remainder are located along the Interstate-55 corridor. Most crashes occurred along the I-10/I-55 corridor in the Hammond area. 49% of crashes in Tangipahoa Parish occurred on Friday and Saturday, which may reflect the proximity of alcohol outlets to the university population. 61% of drivers involved in crashes were white; 66% were male; and 49% of drivers were between the ages of 21-40 years. 9.3% of crashes (4 total) resulted in fatalities, while 51% (24 total) of crashes resulted in no injury.

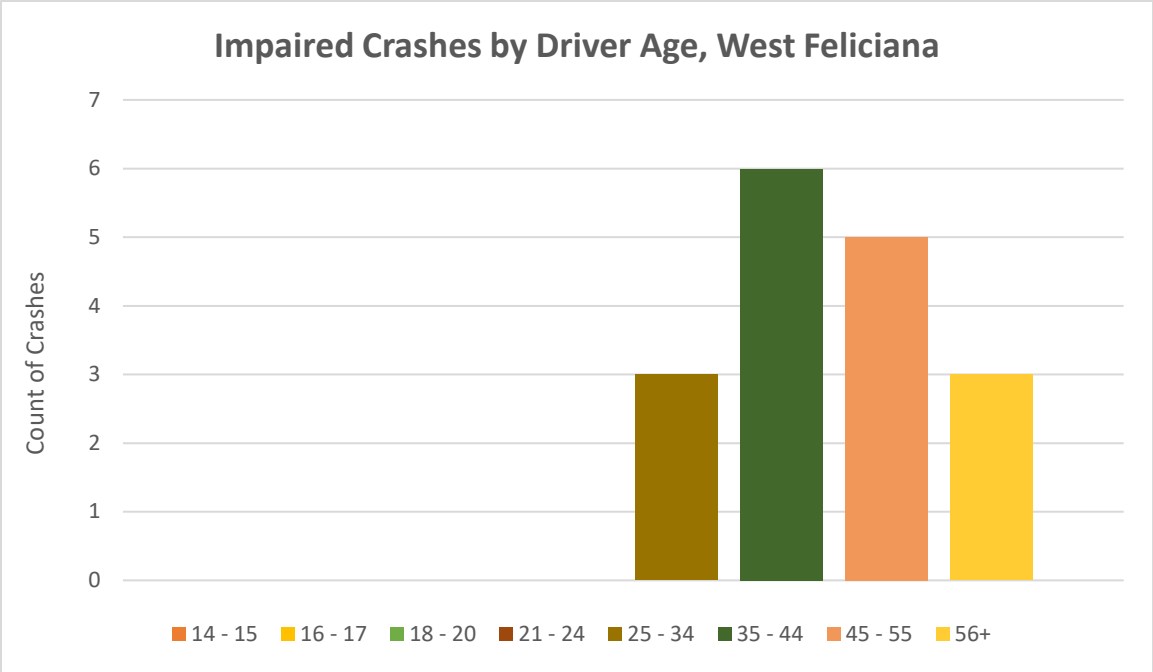
Given the density of alcohol outlets near the university area, responsible beverage server training should be offered, particularly to establishments frequented by young adults. Alcohol outlet regulation along with university-based information programs could also be useful in curbing drinking to impairment in general. Increased law enforcement presence and checkpoints on Fridays and Saturday nights in the Hammond area might also mitigate some of the impaired driver crashes.

West Feliciana



West Feliciana Parish is in southeast Louisiana. The parish is geographically located between the Mississippi River, Wilkinson County in Mississippi, and East Feliciana Parish. The only incorporated municipality in the parish is the town of St. Francisville. Additionally, West Feliciana is home to the Louisiana State Penitentiary at Angola, which houses over 6,000 incarcerated men. The median age of residents in West Feliciana Parish is 41.4 years, which is higher than the other high-need communities. The road density is 2.57 miles/sq mile, which is close to average for the nine parishes. Population density is low at 38.8, and the alcohol outlet density is below the average at .03. All but one crash occurred on state roads and U.S. highways in West Feliciana Parish. It should be noted that U.S. Highway 61, which is a major thoroughfare from Baton Rouge to the Mississippi state line, intersects the parish from south to north, running directly through the town of St. Francisville.

Violations constituted the largest contributing factor in crashes, and alcohol impairment was a factor in 35% of crashes. The gender of drivers involved in the crashes was evenly divided between male and female given the reported numbers; however, the gender was not reported in 26% of crashes. The majority of reported driver race was white (48%), though driver's race was not reported in 26% of crashes. The drivers in alcohol



related MVCs had a broad range of ages from 27-79 years in this parish.

To curb driving violations related to alcohol-impaired driving, checkpoints should be used leaving the town of St. Francisville in both north and south directions, given that this highway is the major thoroughfare in and out of the parish. Monitoring of alcohol outlets along this highly traveled corridor may also be useful in curbing impaired driving.

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Glossary

Alcohol Outlet Density: the number of retail locations that sell alcohol per square mile within the parish (or another specified geographic area)

Heat Map: a data visualization technique that shows magnitude of a phenomenon as color in two dimensions

Intersection Count: number of places two or more roads in the parish intersect within the parish boundary per square mile of land in the parish (or another specified geographic area)

Motor Vehicle Collision: the technical term for a crash or 'accident' for precision

Prevention, Primary: intervening before health effects occur, through measures such as vaccinations, altering risky behaviors (poor eating habits, tobacco use), and banning substances known to be associated with a disease or health condition

Prevention, Secondary: screening to identify diseases in the earliest stages, before the onset of signs and symptoms, through measures such as mammography and regular blood pressure testing

Prevention, Tertiary: managing disease post diagnosis to slow or stop disease progression through measures such as chemotherapy, rehabilitation, and screening for complications

Restrictions, Data Analysis: this listing includes the type of data that cannot be used when compiling data. These could be missing due to the data being unavailable or being unfeasible to collect within the scope of the project

Road Density: length of road network per square mile of land in the parish (or another specified geographic area)

Spatial Analysis: process of examining the locations, attributes, and relationships of features in spatial data through overlay and other analytical techniques