NADO Research Foundation Technical Assistance Summary Report: Escambia County

Executive Summary

The NADO Research Foundation provided targeted technical assistance to the South Alabama Regional Planning Commission (SARPC) to advance transportation planning in Escambia County, Alabama, a rural community of 37,000 residents facing mobility gaps and challenges. Through collaboration with county stakeholders and the Poarch Band of Creek Indians, the project produced transit demand analyses, historical safety data analysis, research on emerging off-highway vehicle concerns, and hands-on GIS coaching. Funding for this research and technical assistance was provided by the US Department of Agriculture Rural Development office. The technical assistance equipped SARPC staff with analytical tools and data to support mobility investments and pursue future federal funding opportunities.

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Founded in 1988, the NADO Research Foundation is the nonprofit research affiliate of the National Association of Development Organizations (NADO) that identifies, studies, and promotes regional solutions and approaches to improving local prosperity and services through the nationwide network of regional development organizations. The NADO Research Foundation shares best practices, offers professional development training, analyzes the impact of federal policies and programs on regional development organizations, and examines the latest trends in small metropolitan and rural America. In addition, the Research Foundation helps bridge the communications gap among practitioners, researchers, and policymakers. Learn more at www.NADO.org and www.RuralTransportation.org.

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Section 1: Introduction

The purpose of this project is to provide the South Alabama Regional Planning Commission (SARPC) and local partners in Escambia County with targeted technical assistance to support transportation planning and decision-making. In addition to support from NADO RF staff and the Western Transportation Institute at Montana State University, the project also included support from the University of Alabama Extension Center and other technical assistance partners. The project assistance included the development of a historical transportation safety data analysis, preparation of public transit demand memos, evaluation of off-highway vehicle travel issues, and hands-on geographic information system (GIS) coaching to strengthen local analytical capacity.

Collectively, these efforts were intended to inform data-driven strategies that expand mobility options throughout the county, with a particular focus on public transit and active transportation. The project seeks to improve safe, reliable, and affordable access to jobs, services, and community destinations while supporting economic development, downtown vitality, and overall quality of life. Enhancing mobility and access serves as a core strategy for strengthening workforce participation and improving connections between residents and essential community resources.

Over the course of the project, the team reviewed relevant planning documents and existing conditions, conducted a site visit, engaged with community leaders and interested residents, and gathered insights from peer communities and academic researchers.

Figure 1 summarizes the timeline for this project, from the kickoff in January 2025 to the project completion in Fall 2026.

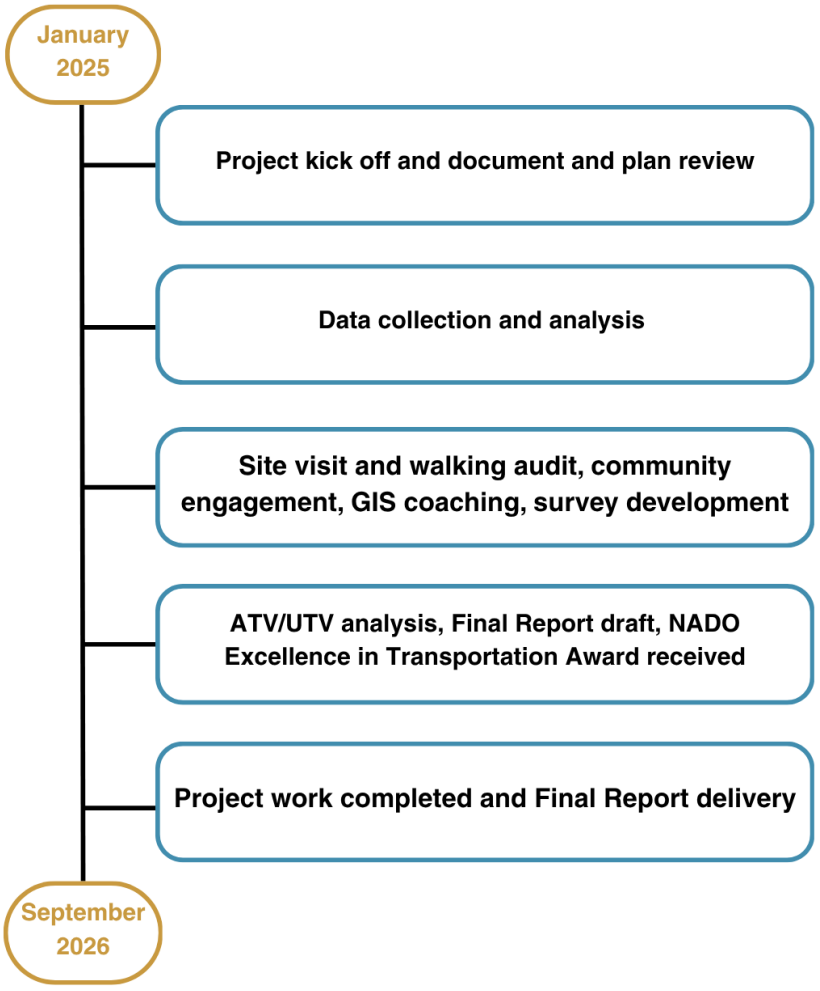


Figure 1: Project Timeline

Section 2: Background Information

The South Alabama Regional Planning Commission (SARPC) is a locally controlled regional planning organization in Southeast Alabama.[1] SARPC serves the three counties of Mobile, Baldwin, and Escambia and twenty-nine municipalities. The primary responsibilities of SAPRC are community development, employment and economic development, grant administration, senior and social services, and transportation planning.

Through the transportation planning program, SARPC administers various planning activities required by the State of Alabama and the Federal Government. This work occurs

[1] South Alabama Regional Planning Commission, "Who We Are" https://www.sarpc.org/

through SARPC's designation as a Metropolitan Planning Organization (MPO) and Rural Planning Organization (RPO). While SARPC engages in planning across their three-county region, this technical assistance project focused primarily on Escambia, the westernmost county in the region.

Escambia County is located in rural south Alabama between Mobile and the Alabama/Florida state line. Escambia County is the smallest of three counties served by the South Alabama Regional Planning Commission. Escambia County has a total land area of 954.4 square miles, making it the 12th largest county in Alabama by size. The county has a population of about 37,000 people (62% White, 31% Black, and 3.6% American Indian). The Census Bureau estimates that there is an even split of males and females in Escambia County. About 85% of county residents have a high school degree or higher, and about 16% of county residents under the age of 65 identify as having a disability.[2]

Escambia County is home to portions of the Conecuh National Forest and the Poarch Creek Indian Reservation, the only federally recognized Tribe in the state of Alabama. Five small, incorporated communities make up the population centers and major destinations within the county.[3]

SARPC also provides transportation planning services to the region, including through a Rural Planning Organization program in partnership with the Alabama Department of Transportation. SARPC serves Escambia County and its local communities, as well as the rural portions of neighboring Mobile and Baldwin Counties. Through the RPO, SARPC supports statewide and local rural planning efforts for multimodal transportation and maintains relationships with agencies that have a role in transportation, including the Escambia County Alabama Transit System (ECATS).

Transportation options are limited within Escambia County. ECATS provides public demand-response transit service within the county on weekdays, generally 8 a.m. – 4 p.m., mostly to older adults and individuals with disabilities. Four percent of workers in Escambia County do not have a vehicle available.[4] Although many residents do own a car, some households may have more driving-age adults than the number of vehicles available, and private vehicles are expensive to operate and maintain.

As a result, many rural residents still have mobility gaps to get to work, school or training, appointments, essential services, or social and community events. Active transportation is

[2] U.S. Census Bureau, American Community Survey, 2024 5-year Estimates, Escambia County, https://censusreporter.org/profiles/05000US01053-escambia-county-al/
[3] Escambia County, "Welcome to Escambia County, Alabama!" https://www.escambiacountyal.gov
[4] U.S. Census Bureau, American Community Survey, 2021 5-year Estimates, https://data.census.gov/table?t=Commuting&g=050XX00US01053&tid=ACSST5Y2021.S0802

an identified priority within the county, both to provide a safe, low-cost mobility option for residents, as well as an opportunity for physical opportunity to support recreation and health.

Escambia County is also home to two communities that are participating in active downtown development activities, including Main Street programming (Atmore) or Alabama Communities of Excellence (Atmore and Brewton). Developing alternative transportation options including pedestrian and cycling assets has traditionally been connected with successful and sustained downtown development and redevelopment efforts.[5]

The ongoing local development efforts highlight the importance of supporting connectivity throughout Escambia County. Understanding demographics of residents and where gaps exist for them to access essential services is critical to align investment with mobility needs. The following section builds on this context by examining transit usage and estimating demand for public transportation across Escambia County.

Section 3: Estimating Public Transit Demand

Transit Demand Memos

Escambia County Alabama Transit Systems, or ECATS, provides demand response transit throughout Escambia County serving all residents, especially the elderly and handicapped. In 2024, ECATS reported 18,339 annual unlinked passenger trips through the Federal Transit Authority's (FTA) National Transit Database (NTD) report. ECATS offers a robust service to residents. But, like many rural transit operations, driver shortages, aging vehicles, and increasing demand put strains on the system.[6]

As a component of the technical assistance provided under this grant, NADO Research Foundation provided research assistance to help quantify the need for public transportation services in Escambia and Baldwin Counties. The result of this research were Transit Demand Memos, produced for ECATS and neighboring provider Baldwin Regional Alabama Transit System (BRATS). These brief memos were created to assist agency staff, stakeholders, and SARPC staff in understanding the general need and demand for transportation services in the counties, as compared to the services provided as reported to the National Transit Database. The methodology utilized for these analyses

[5] Main Street America, Transportation Matters For Main Streets, https://www.mainstreet.org/howwecanhelp/navigatingmainstreets/transportationmatters/community.
[6] National Transit Database, 2024 Annual Agency Profile – Escambia County Commission (NTD ID 40926), https://www.transit.dot.gov/sites/fta.dot.gov/files/transit_agency_profile_doc/2024/40926.pdf

is based on research published in the 2013 report entitled 'Methods for Forecasting Demand and Quantifying Need for Rural Passenger Transportation.[7]' The report was authored by Vanhasse Hangen Brustlin (VHB), LSC Transportation Consultants, and Erickson Consulting. The report provides a methodology that utilizes demographic data, existing transportation service data like boardings and service miles, and gap travel factors calculated by the research authors. The outcome is a repeatable calculation of need and demand that could be updated anytime there is updated information or a need for new estimates. A spreadsheet with all data and calculations was provided with the memo documents.

Based on the results of the demand memos, ECATS is currently meeting 75% of the estimated demand, while BCATS meets over 100% of the estimated demand. The Transit Demand Memos provide a high-level overview of a system's ability to meet the estimated demand by county and can also serve as a foundation for discussions regarding future funding and service levels. Appendix A of this report includes the memos and calculation spreadsheets.

Poarch Band of Creek Indians Tribal Transit

Poarch Band of Creek Indians (PCI) make up a significant portion of Escambia County's population. The Poarch Creek Reservation is also home to many of the county's major destinations, including the Wind Creek Casino and Resort, which is a major employer for the area, and Calvin McGhee Cultural Center. The Poarch Creek Indians are governed by a Tribal Council and led by an executive and supporting staff. The Tribe operates many successful programs related to health, community, and economic development. Over the last several years, Poarch Creek has made efforts to improve transportation infrastructure in the area, especially focusing on projects related to community safety and access.

Tribal engagement was an important component of the Escambia County technical assistance process. During the 2025 site visit, NADO RF and SARPC staff met with Tribal staff to review transportation needs and provide targeted support. During discussions with COO Terry Sweat and Transportation and Roads Manager Amber Alvarez, the group discussed several ongoing and future transportation projects, including discussion on public transit.

The tribe currently operates a limited on-demand public transit service with a focus on PCI Tribal citizens "aged 55 and older, disabled or have a chronic medical condition requiring frequent treatments, and need assistance traveling to scheduled appointments with

[7]The National Academies Press, Methods for Forecasting Demand and Quantifying Need for Rural Passenger Transportation, https://www.nationalacademies.org/publications/22619

medical providers."[8] According to the USDOT National Transit Database, PCI Transit provided 618 rides in 2024.[9]

Following discussions with Tribal staff, the NADO team explored high-level approaches for expanding tribal public transit. This research effort culminated in a tribal transit one-pager that outlines the steps for developing and expanding public transit services, with a focus on accessing Federal Transit Administration (FTA) funding. The one-pager can be found in Appendix B.

Section 4: Safe Access Analyses and Planning

In addition to transit-focused research, safety considerations play a critical role in creating effective and accessible transportation systems. Identifying where serious crashes occur and understanding risk factors help improve mobility and support safety and accessibility improvements. The analyses outlined below use an analytical approach to identify and assess safety conditions across Escambia County and are used to inform potential interventions.

High Injury Network Analysis

During the technical assistance effort, SARPC staff informed the NADO RF research team that local communities were interested in pursuing USDOT Safe Streets for All (SS4A) funding for improvements that would increase multimodal access and safety. To be eligible for funding consideration, a Safety Action Plan is required as one component of the application material. SARPC staff requested direct assistance in developing the historical safety data analysis for Escambia County. The research team was able to assemble publicly available crash information and other supporting information and produce a historical safety data analysis document covering data from 2018 to 2023. The report includes numerous maps, figures, and illustrations that represent analysis of fatal and serious injury incidents across the county. Central to this analysis was the creation of a High Injury Network, which provides spatial analysis of fatal injury and serious injury incidents and attributes them to roadway segments. This allows SARPC staff and other transportation safety stakeholders to identify potential countermeasures that could improve traveler safety. Optimally, these countermeasures could be considered as potential targets for funding support in an upcoming SS4A implementation project or other transportation safety funding program.

[8] Poarch Creek Indians, Community Services, https://pci-nsn.gov/our-government/community-services/
[9] National Transit Database, 2024 Annual Agency Profile – Poarch Band of Creek Indians (NTD ID 44919), https://www.transit.dot.gov/sites/fta.dot.gov/files/transit_agency_profile_doc/2024/44919.pdf

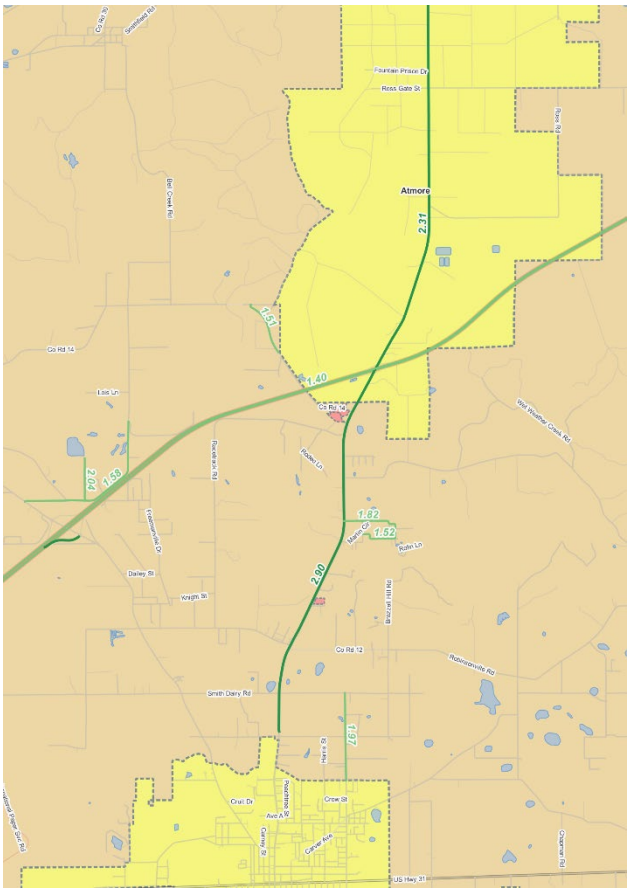


Figure 2: HIN Scoring Example - Atmore area

Following the completion of this analysis, SARPC staff were positioned to support the completion of the remaining portions of the Safety Action Plan on behalf of Escambia County.

Additional Safe Access Planning

In addition to support with the High Injury Network analysis, the NADO RF research team supported SARPC in numerous other initiatives that aimed at improving safety and access across Escambia County, especially related to non-car travel.

The NADO RF team conducted research related to near miss reporting tools used by localities and other regional organizations across the country. Usually using an online platform to collect information, near Miss reporting is a community engagement tactic used to identify locations where accidents were nearly missed through resident reporting, generally using an online survey tool such as GIS or Microsoft forms. This information can be used to supplement reported crash data and identify road segments of concern. A variety of examples were provided, with various technological involvement, including tools

developed by PlanRVA[10], The City of Rockville[11], and The Cumberland Valley Volunteers Firefighters Association.[12] Should SARPC choose to implement a near miss reporting tool, the documented examples are available to inform future consideration or pilot efforts.

Walk Audit

NADO staff engaged with various stakeholders during a site visit in June 2025. A list of stakeholders can be found in Appendix C attached. One tool used to engage stakeholders in person is a walk audit allowing for a hands-on evaluation of how safe, accessible, and comfortable an area is for walking and biking, used to identify improvements and inform planning decisions. This walk audit was conducted using the AARP Walk Audit Toolkit, which provides a structured approach to evaluating pedestrian safety, accessibility, and overall walkability. NADO and SARPC staff conducted the walk audit in downtown Atmore—one of the most populous cities in Escambia County.



Figure 3: SARPC staff visit local business during 2025 Walk Audit

Primary themes from the walk audit included:

- Accessibility was a concern for residents
- The appearance and aesthetics of the corridor were concerns at multiple locations

[10] PlanRVA, Near Miss Dashboard, https://nearmiss.planrva.org/
[11] The City of Rockville, Vision Zero Near Miss Survey, https://survey123.arcgis.com/share/76e278c504d34d829ee07fc20bf1f67a
[12] The Cumberland Valley Volunteers Firefighter Association, Report a Struck by Incident, https://www.respondersafety.com/struck-by-near-miss/report-a-struck-by-incident

- Sidewalk conditions such as broken pavement, tripping hazards, overgrown sidewalks created challenges for pedestrians
- Creating space for people to gather and come downtown is a priority
- Vacant lots and run-down buildings pose unique issues for managing safety
- Placemaking efforts and improvements to livability are important priorities
- Engaging property owners and community members is important to the successful implementation of any future projects
- Events of multiple types are important for supporting community engagement and downtown activity

The results from the walk audit are included in Appendix D.

Bicycle and Pedestrian Survey

In addition to using the walk audit as a tool to understand walking and biking safety in Escambia County, the NADO RF team also helped with developing the bike and pedestrian survey for the SARPC team. The main goal of the bike and pedestrian survey was to collect input from residents and users to understand barriers, safety concerns, and opportunities for improving walking and biking conditions.

The SARPC team created QR code for the public to complete the survey and hosted an open house where members of the local governments and the public were invited to gain knowledge about several different active transportation plans. The full survey can be found in Appendix E.

Section 5: ATV/UTV Travel Considerations

During the site visit, the SARPC team and community members highlighted ATV and UTV travel as a concern. In particular, the growing use of UTVs by teenagers for everyday trips, such as accessing grocery stores, was highlighted as an emerging safety risk and the need for more comprehensive planning.

NADO RF team collaborated with the University of Nebraska Medical Center (UNMC) Central States Center for Agricultural Safety and Health and the Western Transportation Institute at Montana State University to produce resources related to this topic. Research Assistant Professor Ellen Duysen and Associate Professor Aaron Yoder developed and held a virtual presentation highlighting ATV and UTV risks and offering safety resources for stakeholders and users. A link to the presentation, including the full recording, can be found here, or please find the PowerPoint in full in Appendix F. NADO RF team also

developed the ATV and UTV Safety Resource Guide, attached in Appendix G, highlighting safety best practices and ordinances from local, regional, state and tribal areas.

Escambia County: Analysis of All-Terrain Vehicle Crash Data

Crash reports from 2016 – 2025 involving recreational off-highway vehicles (ROVs), all-terrain vehicles (ATVs), and utility task vehicles (UTVs), more generally referred to as off-highway vehicles (OHVs), were extracted for Escambia County, Alabama. Eighteen total OHV crashes on public roadways were found. Overall, with an annual average of 2, there are few annual crashes involving OHVs in Escambia County. This is to be expected, considering that legally, OHVs are not allowed on roadways within the county. However, while few in number, crashes involving these vehicle types are severe: about 45% (2016-2025) involve a fatality or incapacitating injury, compared with 7% of all crashes in Escambia County (2018-2023). Note: Crash data for Escambia County from 2018-2023 was easily available for comparison as a result of the development of the Safety Action Plan. All the crashes occurred in the western and central part of Escambia County. The majority of these crashes (94%) were considered “rural” crashes, meaning that transport for any crash victim to a medical facility may take more time. Many reported OHV roadway crashes were single vehicle incidents rather than a collision of multiple vehicles, with most occurring on either a horizontal or vertical curve.

OHVs are not designed to be operated on roadways, whether paved or unpaved, as recommended by the makers of OHVs. Yet, the majority of these crashes (77.8%) occurred on an asphalt roadway. Consequently, considering their intended design purpose coupled with the legal restriction of these vehicles from public roadways in Alabama, there is a need to ensure compliance with their restricted use. More than half of the OHV crashes involve individuals under the age of 18 (61.1% of crashes) either as drivers or passengers, and those driven by youth often have other underage passengers in tow (e.g., a 9-year-old was driving a 10-year-old). Over half (61%) of crashes involved an unlicensed OHV driver. Four of the OHV crashes, three involving adults and one involving someone under the age of 18, had a driver under the influence of alcohol or drugs. These crashes were some of the most severe, accounting for two of the three fatal crashes and two injuries, one possible and one serious. This statistic highlights the significant risk factor involved in operating an OHV while under the influence of alcohol or drugs.

A full report on the findings was provided to SARPC can be found in Appendix H.

Section 6: Geographic Information Systems Coaching

Geographic Information Systems (GIS) are an important component of regional planning, rural transportation development, and public engagement. GIS is used to visualize transportation infrastructure and other items impacting the built environment. The ability to visualize information is critical to supporting strong decision-making processes within local governments and partner organizations.



Figure 4: NADO and SARPC staff review railroad crossing conditions during 2025 Site Visit

While the SAPRC team does have dedicated planning staff who utilize GIS frequently during their day-to-day work, the NADO RF team was able to offer additional support and GIS coaching related to transportation planning processes and techniques. The support provided by the NADO RF research team included research around Activity Density, Bicycle Level of Traffic Stress, Active Transportation Analysis, Railroad Crossing Analysis, and High Injury Network Crash Data Analysis. Copies of applicable reports and materials can be found in Appendices I and J. These items were uniquely crafted to support SARPC staff and their existing responsibilities related to regional transportation planning and community development. As part of this effort, NADO RF staff produced process documents and worked directly with planning staff via online meeting sessions to review data, illustrate software processes, and answer questions.

In addition to completing and delivering the analysis above, the NADO RF team also offered coaching related to these topics, working one on one with SARPC staff to deliver "how-to" training. Each of these analyses offer a unique perspective on road use activity, and other transportation infrastructure, and will be useful to SAPRC planners in understanding use and planning for future developments. These types of GIS analyses are particularly useful when considering access and economic development because they reveal how and why people move through a particular geographic area. By visualizing and measuring connectivity, barriers, and patterns, SARPC is positioned to support stakeholders to make more informed decisions that support equitable and sustainable development.

Section 7: Conclusion and Recommendations

Escambia County benefits from an engaged regional planning organization, active transportation providers, and a network of community partners committed to improving transportation access. The technical assistance work completed under this grant has strengthened that foundation, providing SARPC and their partners with expanded data, analysis, and planning tools to support progress. Analyses completed under this project show that there is an opportunity to build on existing programs, such as ECATS, and that targeted improvements on priority corridors will improve safety, accessibility, and mobility options for Escambia County residents.

SARPC has recently completed an Escambia County Safe Streets and Roads for All (SS4A) Safety Action Plan in hopes of applying for implementation funding through the same program.[13]

Beyond sustaining current partnerships and advancing existing transportation priorities, SARPC may consider the following next steps:

- Develop safety related implementation-ready projects to accelerate funding opportunities
- Include ATV/UTV use and safety considerations in local and regional transportation plans
- Convene local governments, law enforcement, schools, parents, and community organizations to discuss ATV/UTV safety concerns and promote ATV/UTV safety materials
- Consider policy updates and enforcement strategies to improve ATV/UTV safety
- Continue collaboration with ECATS to align regional transportation priorities and investments
- Expand engagement with the Poarch Band of Creek Indians to support inclusive planning and mobility solutions
- Maintain ongoing coordination among local governments, transit providers, and community stakeholders
- Utilize GIS analyses developed through the project to inform planning and decision-making
- Integrate data-driven approaches into future transportation plans and grant applications

[13] SARPC, Escambia County Safety Action Plan, https://mobilempo.org/RPO/FY2026/2026%20Escambia%20County%20Safety%20Action%20Plan_Draft.pdf

Appendix A: ECATS + BCATS Transit Demand Memos

Escambia County Transit Need and Demand Analysis Memo

Background

Escambia County Alabama Transit System (ECATS) provides demand response transportation services throughout the entire county. Services are available Monday through Friday, 8:00 a.m. to 4:00 p.m. with a separate medical route operating Monday, Wednesday, and Friday from 6:00 a.m. to 1:30 p.m. Fares range from $5.00 to $10.00 per trip based on the origin and destination. Rides must be requested 24 hours in advance, with limited same day trips available.

In the sections below the terms 'need' and 'demand' are used frequently. Please consider 'need' to mean the universe of all trips, many of which are completed using any means available, including rides provided by other people and services. 'Demand' is meant to illustrate a number of trips required by persons in need that could be facilitated through a public transportation service specifically.

Note: The methodologies and calculations utilized here are greatly simplified for the purposes of brevity in this memo. Please review the full text of TCRP 161 for complete details on the factors, calculations, and concepts utilized in this document.

Service Need

Applying publicly available research from Transit Cooperative Research Program (TCRP) Report 161 – 'Methods for Forecasting Demand and Quantifying Need for Rural Passenger Transportation: Final Workbook'[1], it is possible to estimate the number of residents that require public transportation services, and the General Public Demand on the transit system. This data is generated by evaluating data from the American Community Survey (ACS) including household size by vehicles available, poverty status in the previous 12 months, those 60 years old and older, and those with ambulatory or independent living disabilities[2].

In Escambia County, there were 890 total households without a vehicle, and an estimated 1,479 individuals living in those households. There were also 7,238 persons reported as living below the poverty level at some point within the previous 12 months.

[1]Methods for Forecasting Demand and Quantifying Need for Rural Passenger Transportation: Final Workbook (2013) http://nap.nationalacademies.org/22619.

[2] TCRP 161 only calls for the use of independent living disabilities, NADO RF staff included ambulatory disabilities in this calculation as well.

The data also accounted for 9,392 individuals aged 60 or older and 3,398 individuals with ambulatory or independent living disabilities.

As a result of these calculations, it was estimated that in 2023 there were a total of **8,717** individuals in need of passenger transportation services. Compared to a total county population in 2023 of 36,695, this represents over **23%** of Escambia County's population that is likely to require some form of passenger transportation service.

Mobility Gap

Going further, TCRP 161 provides a method for estimating a 'mobility gap' or a number of trips per day or per year, that are not taken by households due to mobility challenges. For Escambia County this is estimated for 2023 to be **1,246** trips per day. Over the course of a year (300 days) the annual trip need is estimated to be **373,800**. (Note that this is a total universe of trips needed, where many are filled by other services, friends, family, etc.) TCRP 161 states that on average approximately 20% of these trip needs were met by public transportation services at the time of publishing in 2013.

Trip Demand

To estimate the rural public transportation demand, TCRP 161 recommends factors that apply to the values retrieved for the population over 60, those age 18-64 with mobility limitations, and households with no vehicles available. Utilizing these factors as illustrated in the table below, it is estimated that Escambia County has a general public demand of approximately **39,719** trips per year. These are defined as trips not related to any other social service or public programming and would be trips eligible for reporting to the Rural NTD if provided.

Escambia County Totals		
Estimated Demand - Trips	**Persons**	**Factor***
Age 60+	9,392	2.2
Mobility Limited Age 18-64	3,398	5.21
Household with No Vehicle Available	890	1.52
Estimated Trip Demand (Sum)		**39,719**

*These factors are utilized as recommended in TCRP 161.

To calculate the estimated annual demand on rural transportation services, the annual mobility gap found above as well as the reported revenue miles for ECATS (102,342 in 2023) are utilized. The calculation from page 24 of TCRP 161 yields a result of **19,768** trips. It is noted here that there were a total of 14,806 boardings in Escambia County during 2023 which yields a value **lower** than the expected demand.

Conclusion

In conclusion, this information highlights an interesting point to be used in further discussions and storytelling. Based on the estimates provided here, ECATS is performing a high level of service when compared to the estimated demand on the system. Meeting 75% of the estimated demand is a compelling argument to funders and other supporters that while the system is performing well, there is opportunity to improve service function in the pursuit of satisfying 100%

of the demand. This information can also be used as evidence to support current funding levels if expansion is not possible..

Whether the goal is to maintain current service levels or expand to better serve the community, this data provides a compelling foundation for future planning, funding requests, and service enhancements. Understanding the levels of need and demand can help not only improve access to essential services for vulnerable populations but also contribute to the creation of a more equitable and efficient transportation system for all residents of Escambia County.

Baldwin County Transit Need and Demand Analysis Memo

Background

Baldwin County provides transit services through the Baldwin Regional Area Transit Service (BRATS). This service is a demand response transit service providing trips to residents who schedule on their website, over the phone, or through the BRATS app. Service is provided Monday through Friday 7 a.m. to 5 p.m. and fares start at $2 per ride for the first 5 miles and then 50 cents per additional 5 miles. Rides can be booked 7 days in advance, but availability is dependent on ride volume.

In the sections below the terms 'need' and 'demand' are used frequently. Please consider 'need' to mean the universe of all trips, many of which are completed using any means available, including rides provided by other people and services. 'Demand' is meant to illustrate a number of trips required by persons in need that could be facilitated through a public transportation service specifically.

Note: The methodologies and calculations utilized here are greatly simplified for the purposes of brevity in this memo. Please review the full text of TCRP 161 for complete details on the factors, calculations, and concepts utilized in this document.

Service Need

Applying publicly available research from Transit Cooperative Research Program (TCRP) Report 161 – 'Methods for Forecasting Demand and Quantifying Need for Rural Passenger Transportation: Final Workbook'[1], it is possible to estimate the number of residents that require public transportation services, and the General Public Demand on the transit system. This data is generated by evaluating data from the American Community Survey (ACS) including household size by vehicles available, poverty status in the previous 12 months, those 60 years old and older, and those with ambulatory or independent living disabilities[2].

In Baldwin County, there were 2,039 total households without a vehicle, and an estimated 3,405 individuals living in those households. There were also 24,819 persons reported as living below the poverty level at some point within the previous 12 months.

[1]Methods for Forecasting Demand and Quantifying Need for Rural Passenger Transportation: Final Workbook (2013) http://nap.nationalacademies.org/22619.

[2] TCRP 161 only calls for the use of independent living disabilities, NADO RF staff included ambulatory disabilities in this calculation as well.

The data also accounted for 70,201 individuals aged 60 or older and 11,906 individuals with ambulatory or independent living disabilities.

As a result of these calculations, it was estimated that in 2023 there were a total of **28,224** individuals in need of passenger transportation services. Compared to a total county population in 2023 of 239,945, this represents **11.76%** of Baldwin County's population that is likely to require some form of passenger transportation service.

Mobility Gap

Going further, TCRP 161 provides a method for estimating a 'mobility gap' or a number of trips per day or per year, that are not taken by households due to mobility challenges. For Baldwin County this is estimated for 2023 to be **2,855** trips per day. Over the course of a year (300 days) the annual trip need is estimated to be **856,380**. (Note that this is a total universe of trips needed, where many are filled by other services, friends, family, etc.) TCRP 161 states that on average approximately 20% of these trip needs were met by public transportation services at the time of publishing in 2013.

Trip Demand

To estimate the rural public transportation demand, TCRP 161 recommends factors that apply to the values retrieved for the population over 60, those age 18-64 with mobility limitations, and households with no vehicles available. Utilizing these factors as illustrated in the table below, it is estimated that Baldwin County has a general public demand of approximately **219,572** trips per year. These are defined as trips not related to any other social service or public programming and would be trips eligible for reporting to the Rural NTD if provided.

Baldwin County Totals		
Estimated Demand - Trips	**Persons**	**Factor***
Age 60+	70,201	2.2
Mobility Limited Age 18-64	11,906	5.21
Household with No Vehicle Available	2,039	1.52
Estimated Trip Demand (Sum)		**219,572**

*These factors are utilized as recommended in TCRP 161.

To calculate the estimated annual demand on rural transportation services, the annual mobility gap found above as well as the reported revenue miles for Baldwin County (851,744 in 2023) are utilized. The calculation from page 24 of TCRP 161 yields a result of **98,925** trips. It is noted here that there were a total of 100,167 boardings in Baldwin County during 2023 which yields a value **greater** than the expected demand.

Conclusion

In conclusion, this information highlights three critical points. First: BRATS appears to be meeting a large portion of the county's transit requirements, demonstrating the effectiveness of the existing system, second: while BRATS is exceeding the demand for those that need transit services, they are currently meeting less than half of the estimated general public demand,

suggesting there could be potential to expand services in order to meet these needs; and lastly: further research is needed to understand who is utilizing these services in Baldwin County. Additional research could include daily trip and route density, as well as direct rider surveys. These are important in identifying true use of the system and to prioritize high demand destinations for those using the service most frequently. Broad community outreach can help identify potential riders with demonstrated transportation needs that are not accessing available services. This information could be used to modify service offerings to attract new users, helping to address the unmet estimated general public demand for transit in the county.

Whether the goal is to maintain current service levels or expand to better serve the community, this data provides a compelling foundation for future planning, funding requests, and service enhancements. Understanding the levels of need and demand can help not only improve access to essential services for vulnerable populations but also contribute to the creation of a more equitable and efficient transportation system for all residents of Baldwin County.

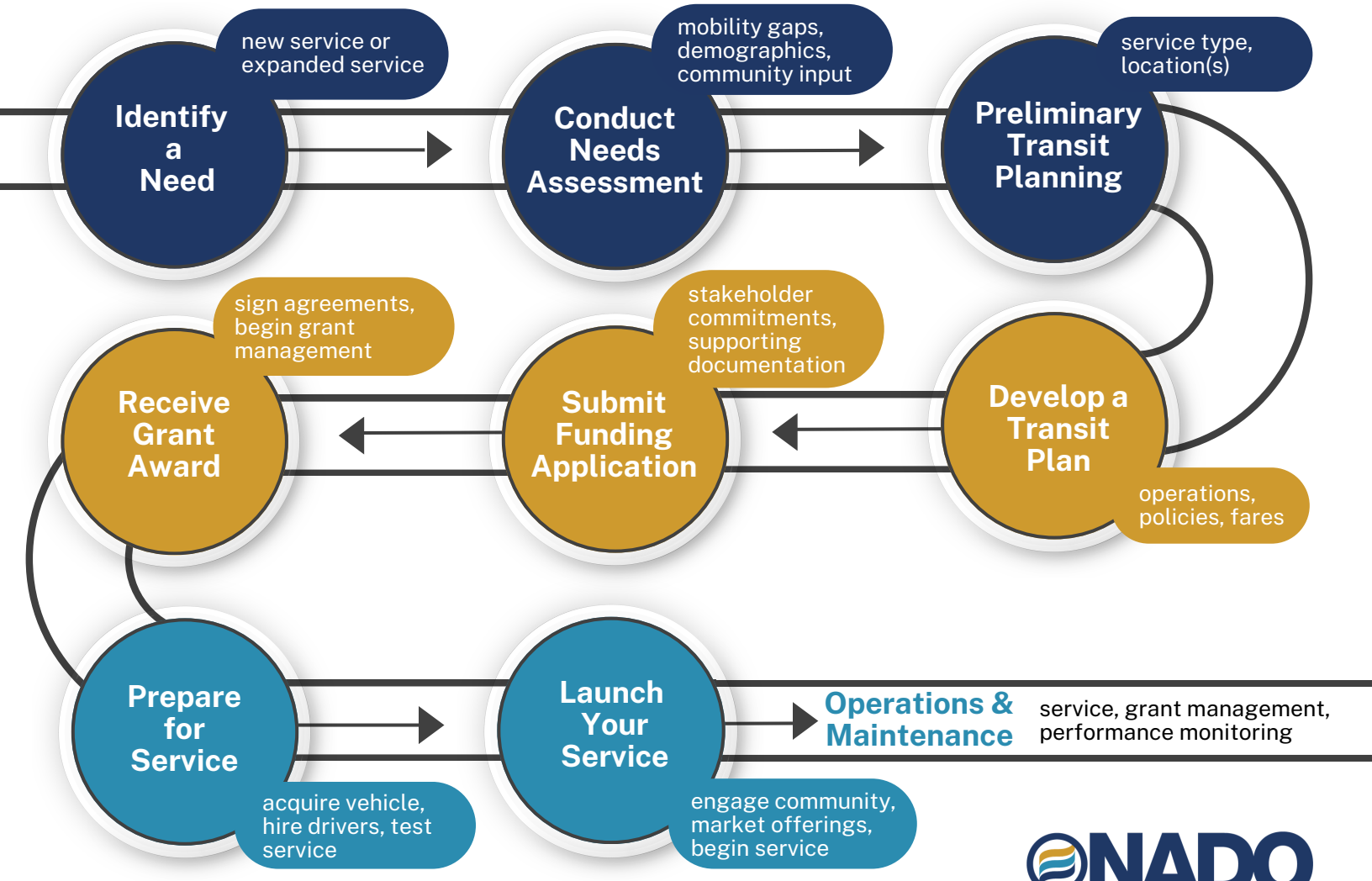
Appendix B: Tip Sheet: Steps to Establish a Tribal Transit Program

STEPS TO ESTABLISH A TRIBAL TRANSIT PROGRAM (OVERVIEW)

Tribal transit systems play a vital role in enhancing mobility for Tribal communities, particularly those in rural areas. These systems are typically planned, operated, and managed by Tribal governments and are shaped by community needs.

Federal programs from agencies such as the Federal Transit Administration or U.S. Department of Agriculture can provide important funding and technical assistance, though early development can be challenging.

To assist, the National Association of Development Organizations (NADO) Research Foundation created this high-level guide outlining key steps to establish tribal transit services. While each Tribe's approach will differ, this resource serves as a starting point for planning effective transportation solutions.



This document was created with support from the U.S. Department of Agriculture Rural Development. USDA is an equal opportunity provider.

Additional Resources:

Federal Transit Administration Tribal Liaisons

FTA Tribal Funding Information

Webinars: Navigating USDOT Funding and Technical Assistance

National RTAP Tribal Transit Resources

NADO Tribal Transportation Resource Library

Technical Assistance Coordination Library (TACL)

Appendix C: Escambia County Stakeholders List

Name	Position	Email	Phone	
Ron Cink	County Administrator	rcink@co.escambia.al.us	251-867-0300	
pross@co.escambia.al.us	County Engineer	pross@co.escambia.al.us	251-867-0236	
Yank Lovelace	Mayor Brewton	Ylovelace@cityofbrewton.org		
East Brewton City Clerk	East Brewton City Clerk	kristyedwards.2012@gmail.com		
Jess Nicholas	Economic Development	jnicholas@centerfireeconomic.com	800-601-0340	
Kristy Edwards City Clerk (e	East Brewton City Clerk	eastbrewton@gmail.com		
mayorstaff@cityofatmore.c	Mayor Atmore	mayorstaff@cityofatmore.com		
Flomaton	Flomaton City Clerk	cmoore@flomatonal.org		
Brewton Planning	Brewton Planning	bholt@cityofbrewton.org	251-809-1773	
Amber Alvarez	Poarch Creek	aalvarez@pci-nsn.gov	(251)368-9136, ext 2639	
Lawrence Wilson	Poarch Creek	lwilson@pci-nsn.gov	251-359-2280	
Brad Solomon	Asst County Enigineer	bsolomon@co.escambia.al.us	251-867-0236	
Gwen Grimes	ECATS	ggrimes@co.escambia.al.us	251-446-9681	
Flomaton Mayor	Flomaton Mayor	jjohnson2278@yahoo.com; jjohnson@flomatonal.org		
Connie Baggett	Safe Bicycling	cbaggett@cityofbrewton.org	251-604-4256	
Jerry Kelly, Jr	Safe Bicycling	jerrykellyjr@bankofbrewton.com		
Scott Hillman, Jr.	Safe Bicycling	shillman9@hotmail.com		
Greg Vaughn		gregv@cityofatomore.com	251-368-2253	
Chris Walker		cwalker@cityofatmore.com	251-368-0807	
Calvin Grace	City of Atmore	Street department?	251-368-4043	
Shinora Redmond	Main Street	mainstreetatmore@gmail.com	251-253-9787	
Chuck Brooks (Police Chief)		chiefcbrooks@atmorepolice.us	251-359-3835	
Anna Lee	Town of Flomaton	annamlee17@gmail	251-363-5510	

Appendix D: Walk Audit Summary Notes

This document is intended to serve as a high level summary of the Walk Audit completed June 2025. Participants included NADO staff and SARPC staff.

<u>Name of the street: Atmore City Hall to E Ridgeley St</u>

First Impression Average Score: 4

Key Takeaways:

No sidewalks along the entire block.

Land use/destinations:

Atmore Village apartments
Atmore City Hall
Atmore family dental

Network connectivity:

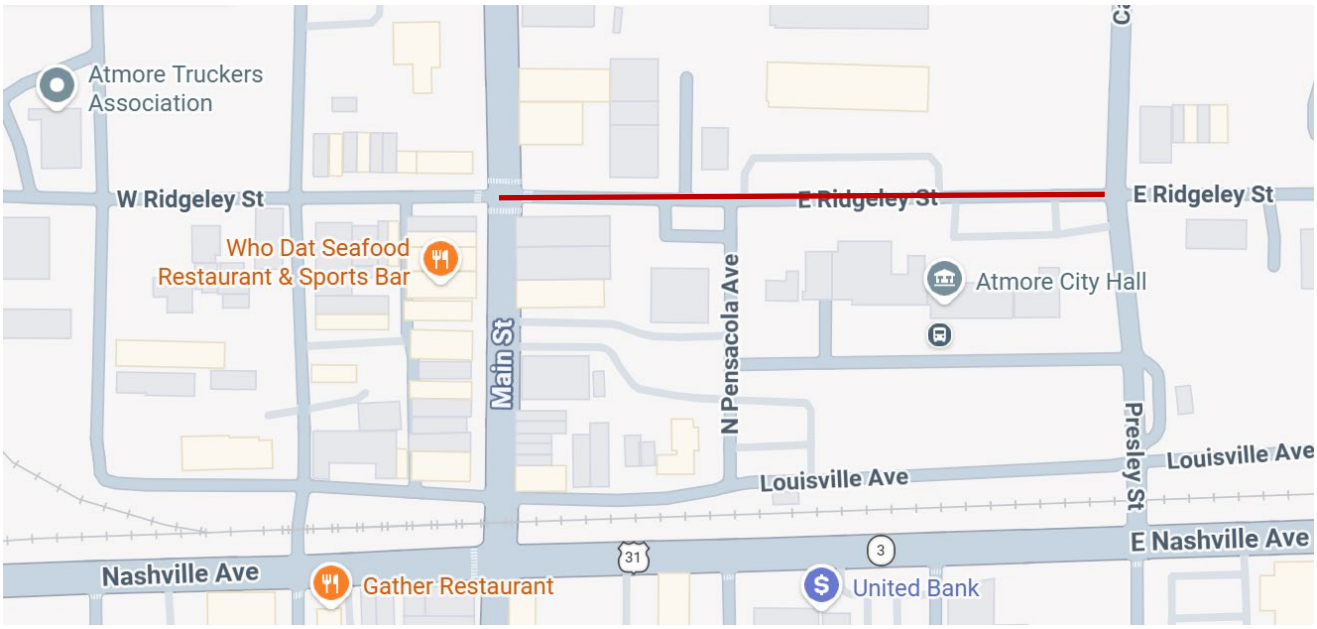
No proper connectivity along the city hall as there was no sidewalk

Safety and accessibility:

Travel by any mode is not safe

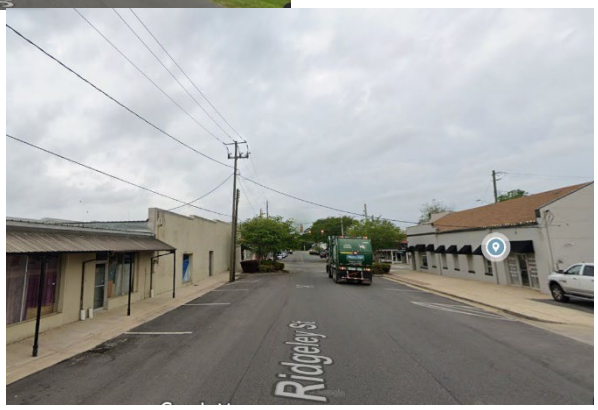
Design:

Future Vision: Need for sidewalks









<u>Name of the street: S Main and E Louisville Ave (1 block)</u>

First Impression Average Score: 6

Key Takeaways:

Land use/destinations:

Atmore Chamber of Commerce
USPS
Mixed retail

Network connectivity:

Good connectivity

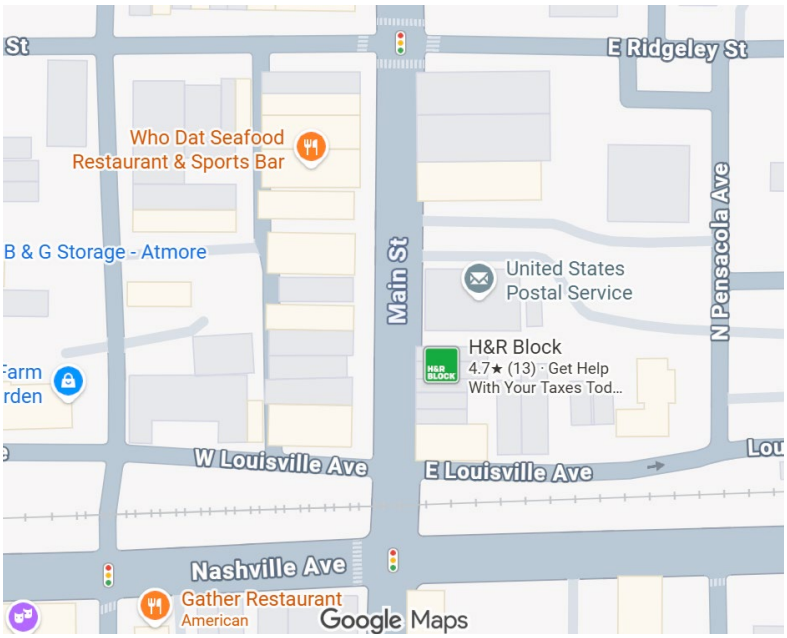
Safety and accessibility:

Pedestrian safe

Wheel chairs and scooters not safe with irregular slopes

Design: Transparency is decent, visibility is good

Future Vision: Pedestrian push button not visible as it is located on an electric box








Main St
Google Maps

Appendix E: Bicycle and Pedestrian Survey Draft

Bike and Pedestrian Needs Assessment Survey

Where do you live (city name or zip code)

What is your age group?
- Under 18
- 18–24
- 25–44
- 45–64
- 65+

How often do you walk/bike for the following purposes (never, rarely, sometimes):

- Work/School
- Recreation
- Errands
- Transit connections

What modes of transportation do you use most frequently?
(Select all that apply)
- Walking
- Biking
- Public Transit
- Driving
- Rideshare

Are there any alternative methods of transit do you use?
- Electric bikes
- Atv/Utv
- Other:

What motivates you to choose walking or biking? *(Select all that apply)*

- Health/fitness
- Environmental concerns
- Cost savings
- Convenience
- Lack of alternatives
- Enjoyment
- Other:

How safe do you feel when walking or biking in your area?

- Very safe
- Somewhat safe
- Not safe

How would you rate the condition of sidewalks and bike lanes in your area

- Excellent
- Average
- Poor

What are the biggest barriers to walking or biking in your community?
(Select all that apply)
- Lack of sidewalks/bike lanes
- Poor lighting
- High traffic speeds
- Unsafe crossings
- Lack of bike parking
- Other (please specify)

Are there specific locations where you feel unsafe or would like to see improvements?

What types of improvements would encourage you to walk or bike more?
(Select top 3)
- Protected bike lanes
- Wider sidewalks
- Better lighting
- More crosswalks
- Slower traffic speeds
- More bike racks
- Education/awareness campaigns
- Visible pedestrian crossing button

Would you be interested in participating in community events or workshops related to biking and walking?

Do you have any additional comments or suggestions?

Appendix F: Understanding ATV and UTV Risks Slides

Understanding ATV and UTV Risks
Data-Driven Safety Solutions for Alabama



Aaron Yoder, PhD
Ellen Duysen, MPH

University of Nebraska Medical Center
Central States Center for Agricultural Safety and Health

Objectives

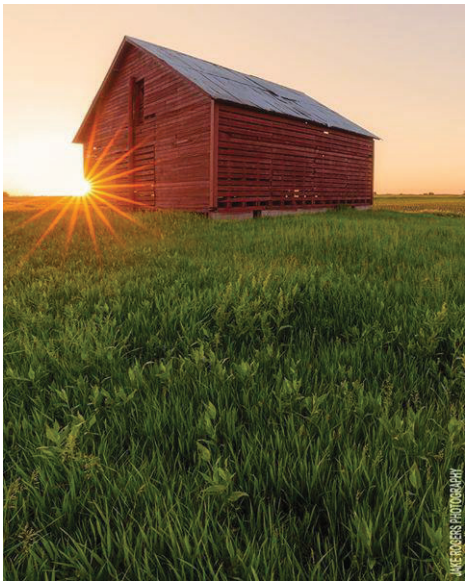
- Understand the injury statistics, demographics and types of injuries associated with ATV and UTV incidents focusing on Alabama.
- Discuss barriers to preventing ATV incidents and possible solutions.
- Review recent policy changes regarding ATV/UTV road use.
- Identify local and national ATV injury prevention resources that are available to safety professionals and to the public.



Central States Center for Agricultural Safety and Health (CS-CASH)

Funding - National Institutes for Occupational Safety and Health (NIOSH)

- 11 US Ag Centers
- 7 States CS-CASH Region
- Research
- Prevention
- Education
- Outreach



All Terrain and Utility Vehicles

Valuable tool on the farm and ranch

Checking on fields, sprinklers, livestock, etc.

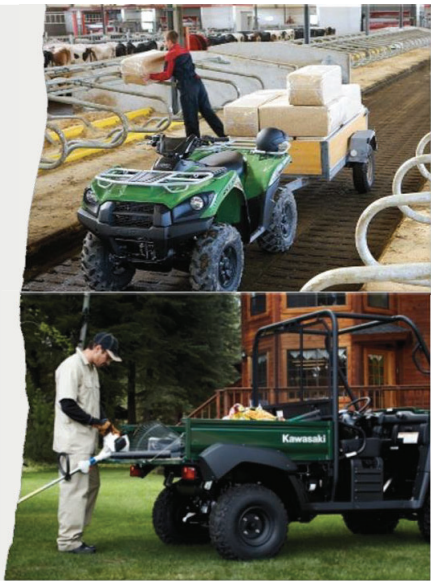
Minimal fuel use & ability to perform on diverse terrains

Sports activities – mountains, trails

- Families ride for fun
- Hunting

Search and Rescue/Military

Inexpensive and convenient



Utility Vehicles (UTV)

Similar to golf carts, except some are fitted with cargo boxes to carry materials

- Four, Five, or Six wheels
- Designed for WORK
- Can be diesel, gasoline, electric or hydrogen fuel cell powered
- Likely to have roll-over protection and seat belts
- Low-pressure tires are NOT designed for pavement
- Popular for recreational use.





All Terrain Vehicles (ATV)

More stable than three-wheelers

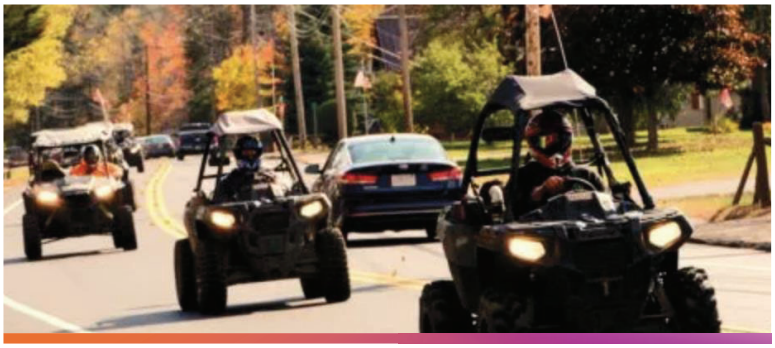
Sales of three-wheelers were banned in the U.S. in 1988 due to high injury rates, especially among children.

Same factors that impact all vehicle roll-overs impact ATVs. Slope, speed, centrifugal force, bumps

Unlike most vehicles, the center of gravity can be affected by the rider. And the CG changes can change quickly.

Recreational Off-Road Vehicle (ROV)

Made for recreational use, not hauling or work.
Speed is a factor in most incidents.
Use is prevalent on hard-surfaced roads.
Some states allow these to be licensed if modified.



Power and Speed

70 to over 800 cc
Can exceed 75 mph

A 450 cc ATV weighs 520 lbs

They are now bigger, faster, heavier and can cause greater physical damage.





Operation and Safety

Manufacturers recommended engine size by age:

- >16 years ATV >90 cc
- 12 – 15 years ATV between 70-90 cc
- 6 – 12 years ATV use 70 cc and less

Manufacturers cannot knowingly sell an ATV >90cc for use to anyone under 16 years of age.



The Statistics – Consumer Product Safety Commission

https://www.cpsc.gov/Safety-Education/Safety-Education-Centers/ATV-Safety-Information-Center#:~:text=ATVs%20accounted%20for%20more%20than,percent%20of%20the%20OHV%20injuries.

United States Consumer Product Safety Commission

2023 Report of Deaths and Injuries Involving Off-Highway Vehicles with More than Two Wheels

May 2024

Chao Zhang
Directorate for Epidemiology
Division of Hazard Analysis
U.S. Consumer Product Safety Commission
4330 East West Highway
Bethesda, MD 20814

OHV = Off-Highway Vehicles

Roadway Use Laws Differ by State

- **Alabama ATV/ UTV Laws**

STATE OF ALABAMA ATV OPERATION

The following laws establish how an ATV may be legally operated within the state of Alabama, on both private and public/state owned property. While ATVs do have 4 wheels, they are designed for off-road use and typically do not meet federal safety guidelines. As such, the state created laws to limit their use and protect the public from accidents. Failure to abide by these laws will typically result in costlier fines and potentially jail time depending on the offense.

Required Equipment in Alabama

The following items are required by Alabama law to be installed upon an ATV or worn by an operator during use.

- **Helmet** — Not Required.
- **Headlight(s)** — Required if operated within the period of one half hour before sunset or one half hour after sunrise.
- **Tail Light** — Required if operated within the period of one half hour before sunset or one half hour after sunrise.
- **Muffler** — Not Required.
- **Spark Arrestor** — Not Required.
- **Brakes** — Not Required.
- **Other**

What is the Minimum Age to Operate an ATV in Alabama?

NA - As ATVs may only be operated on private property in Alabama there exists no law which restricts the age at which a person can operate an ATV.

Can I Drive my ATV on Public Roads in Alabama?

No - § 32-1-7 - Alabama strictly prohibits the use of ATVs on public roads and property, including beaches and sand dunes. Legal operation is only allowed on property in which you own or have permission to use, which can include beaches.

Alabama ATV Rules of the Road

- **Excessive Speed** - ATV operators may not travel at a speed that is greater than reasonable for the conditions.
- **DUI/DWI** - It is illegal in every state to operate a motor vehicle on public roads or property while under the influence of alcohol. Most states also employ a zero tolerance approach to ATVs and more strict penalties for excessive blood alcohol concentrations (BAC).

ATV Deaths by State 2022 Alabama #4

The information below includes data from January 1, 2022 to May 1, 2022

Table 6 ATV Fatalities by State

	Count	Percentage
Florida	8	13.3%
Pennsylvania	6	10.0%
Texas	4	6.7%
Alabama	3	5.0%
Arizona	3	5.0%
Kentucky	3	5.0%
Oklahoma	3	5.0%
South Carolina	3	5.0%
California	2	3.3%
Georgia	2	3.3%
Minnesota	2	3.3%
Mississippi	2	3.3%
North Carolina	2	3.3%
Ohio	2	3.3%
Colorado	1	1.7%
Illinois	1	1.7%

Consumer Product

ATV Deaths by State 2023
Alabama #5

The information below includes data from January 1, 2023 to Dec 31, 2022

Table 6 ATV Fatalities by State

	Count	*Percentage*
Florida	20	6.9%
Wisconsin	18	6.2%
Kentucky	16	5.5%
Texas	14	4.8%
Alabama	13	4.5%
California	13	4.5%
Ohio	13	4.5%
Pennsylvania	13	4.5%
Minnesota	12	4.1%
Georgia	11	3.8%
New York	11	3.8%
Missouri	10	3.4%
Louisiana	9	3.1%
South Carolina	8	2.7%
Mississippi	7	2.4%
Virginia	7	2.4%
Illinois	6	2.1%
Indiana	6	2.1%

Consumer Product



Vigil for 8-year-old who died in ATV Crash

/AAY 31 News
59K subscribers
Subscribe
8 Share Ask Download

Fatalities for Children Under 16 and 12 Years of Age

Table 5: Reported OHV-Related Fatalities for All Ages and Children's Age Groups, 2018–2020

	All Ages	Under 16 Years of Age		Under 12 Years of Age		
Year	Deaths	Deaths	Percent of All Deaths	Deaths	Percent of All Ages	Percent of Deaths under 16
2018	714	71	10%	38	5%	54%
2019	744	94	13%	43	6%	46%
2020	990	123	12%	46	5%	37%
Total	**2,448**	**288**	**12%**	**127**	**5%**	**44%**

Source: CPSRMS.

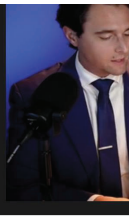
Continued

September 2025



MOBILE COUNTY

Juvenile killed in ATV accident: Mobile police

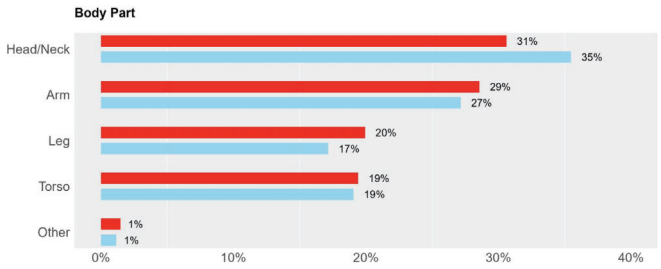


by: Pat O'Donnell
Posted: Dec 3, 2024 / 07:23 PM CST
Updated: Dec 3, 2024 / 07:23 PM CST

SHARE

MOBILE, Ala. (WKRG) — A juvenile was killed in an all-terrain vehicle accident on Tuesday, according to the Mobile Police Department.

Continued
December 2024



Body Part Affected – ATV Incidents

National Statistics - Injuries

In 2023, there were an estimated 102,000 emergency room visits related to ATV injuries



2024 Report of Deaths and Injuries Involving Off-Highway Vehicles with More than Two Wheels May 2025 U.S. Consumer Product Safety Commission (CPSC).

Behaviors Associated with Fatalities

92%+ ATV-related fatalities involve one or more unsafe behaviors

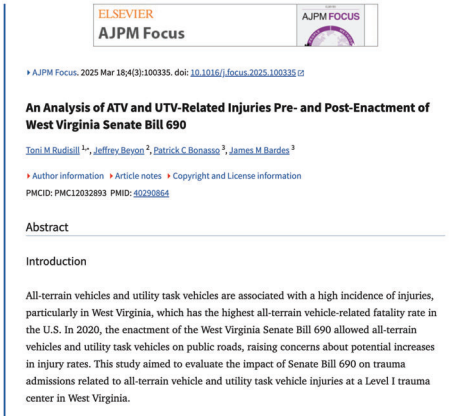
- No PPE – specifically a helmet
- Riding on paved surfaces
- Extra Passengers (25% of those killed)
- Riding ATV larger than recommended
- Speeding
- Use of alcohol/drugs

Approx. 90% of ATV-related injuries and deaths to youth under 16 occur on adult-sized machines

Injury Prevention

- Size Matters!
- No Passengers
- Personal Protective Equipment
- Knowing the environment
- Pre-ride Inspections
- Training and Education for parents and youth riders

Policy



ELSEVIER
AJPM Focus

AJPM Focus. 2025 Mar 18;4(3):100335. doi: 10.1016/j.focus.2025.100335

An Analysis of ATV and UTV-Related Injuries Pre- and Post-Enactment of West Virginia Senate Bill 690

Toni M Rudisill [1,*], Jeffrey Beyon [2], Patrick C Bonasso [3], James M Bardes [3]

Author information · Article notes · Copyright and License information

PMCID: PMC12032893 PMID: 40290864

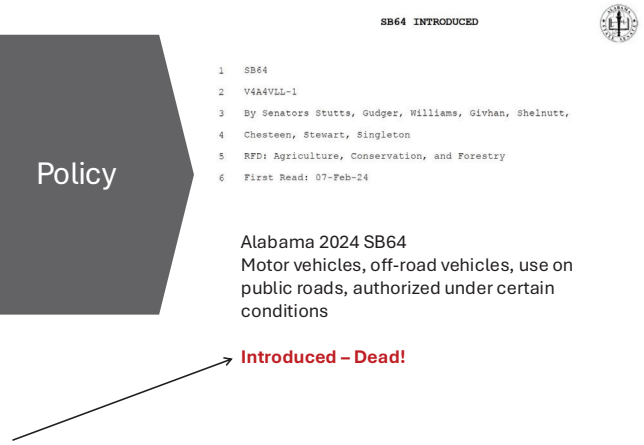
Abstract

Introduction

All-terrain vehicles and utility task vehicles are associated with a high incidence of injuries, particularly in West Virginia, which has the highest all-terrain vehicle-related fatality rate in the U.S. In 2020, the enactment of the West Virginia Senate Bill 690 allowed all-terrain vehicles and utility task vehicles on public roads, raising concerns about potential increases in injury rates. This study aimed to evaluate the impact of Senate Bill 690 on trauma admissions related to all-terrain vehicle and utility task vehicle injuries at a Level I trauma center in West Virginia.

Significant increase in injuries and fatalities following passage of this legislation allowing ATV/UTVs on roadways.

Policy



SB64 INTRODUCED

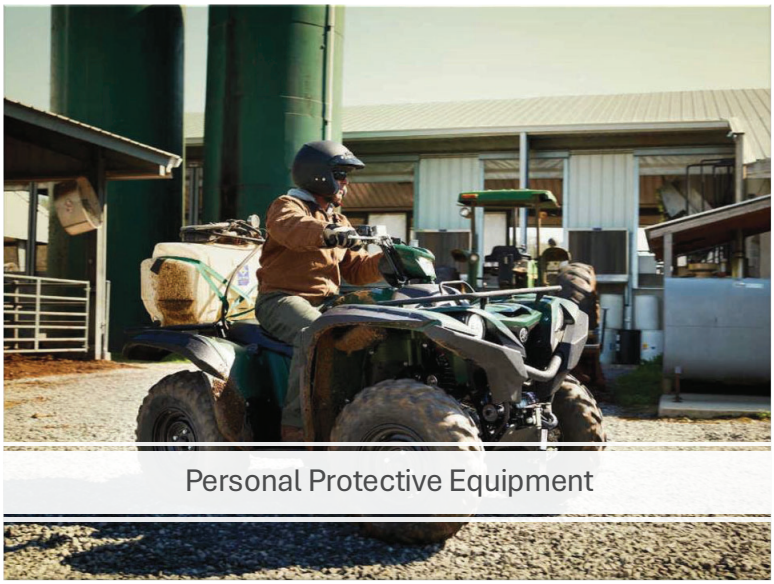
SB64
V4A4VLL-1
By Senators Stutts, Gudger, Williams, Givhan, Shelnutt, Chesteen, Stewart, Singleton
RFD: Agriculture, Conservation, and Forestry
First Read: 07-Feb-24

Alabama 2024 SB64
Motor vehicles, off-road vehicles, use on public roads, authorized under certain conditions

Introduced – Dead!



Demonstration of how speed and terrain can affect handling.



Personal Protective Equipment



Long Sleeves, Boots and Gloves

Importance of Wearing a Helmet

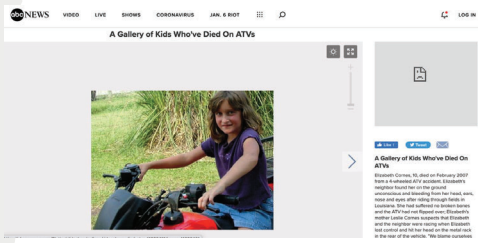
- **Larger ATV engine size correlates with an increased rate of traumatic brain injury.**
- Butts CC, Rostas JW, Lee YL, Gonzalez RP, Brevard SB, Frotan MA, Ahmed N, Simmons JD.mInjury. 2015 Apr;46(4):625-8. doi: 10.1016/j.injury.2014.11.007. Epub 2014 Nov 24. PMID: 25527458.
- **The burden of unhelmeted and uninsured ATV drivers and passengers.**
- Merrigan TL, Wall PL, Smith HL, Janus TJ, Sidwell RA. Traffic Inj Prev. 2011 Jun;12(3):251-5. doi: 10.1080/15389588.2011.561455. PMID: 21660891.
- ***Conclusions:*** *Helmets are frequently not worn by ATV riders. Helmets protect ATV drivers and passengers and decrease societal costs associated with ATV crashes.*

Elimination (a favorite)

Children under 16 never operate or ride on an ATV over 70cc.

Barriers to elimination

- Requires adults to eliminate the risk
- Parents, guardians see ATVs as toys/recreation
- Parents, guardians may not understand the hazards
- Children don't have the mental capacity to understand the hazards



Substitution

Options include

- Lighter, lower power ATVs (<70 cc)
- Provides children with the opportunity to "ride" while eliminating the risk of speed and weight (crushing)

Barriers

- Cost
- Lack of understanding regarding the risk of full-sized ATVs



Administrative Controls

Legislation

- Laws regarding the use of an ATV >70 cc before age 16.
- Laws regarding insuring ATVs
- Laws regarding use of PPE while riding, specifically helmets.
- Education – we more need

Example of Indiana law passed in 2017:

In accordance with Indiana law, beginning July 1, 2017 all children under 18 years are required to wear a helmet on or in any Off-Road Vehicle (ORV). This applies to all ORVs, including but not limited to ATVs, UTV, side-by-side vehicles, and dirt bikes. The law applies both to public and private property.

Engineering Controls

Crush protection device "Quad Bar"

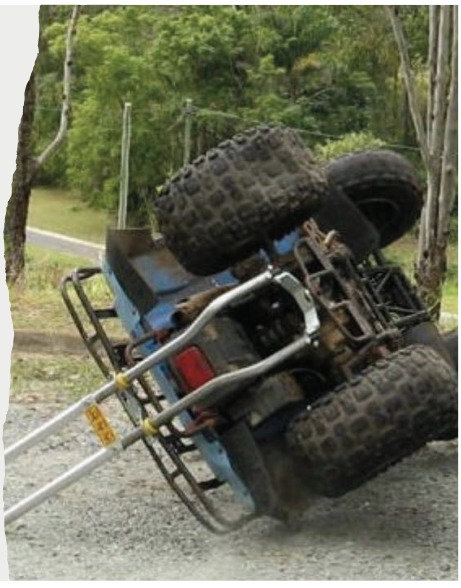
ATVs without this device can no longer be sold for agricultural use in Australia

Barriers in the U.S

Cost

This is an aftermarket device so installation required

Acceptance – "not cool"



Talking Point

Insurance Coverage

ATV insurance usually covers riders who are at least 16 years old and have a valid driver's license.

However, some insurance policies may explicitly exclude young operators. Additionally, state and provincial regulations may restrict the age of operators. For example, Safeco's minimum operator age is 14, and they don't cover vehicles made for or used by young children.

The death of a young rider on an ATV or UTV that you own can cost you your farm, home and other resources.

Innovation in PPE and Safety Initiatives

A brilliant example of a manufacturer doing the right thing – even before they are "mandated" to do it....



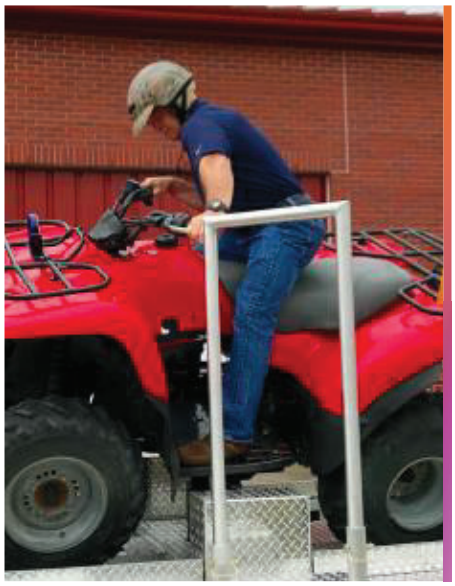
Industry-leading Safety Features

Enjoy peace of mind knowing all Polaris Youth SxS come with key safety features including safety nets, adjustable speed limiter, geofencing, helmet aware technology, and industry-exclusive safety kit.

ATV Simulator

Demonstrates:

- Correct body position
- Why the size of the rider and the machine matter
- How to react in an overturn
- Why PPE matters
- ....



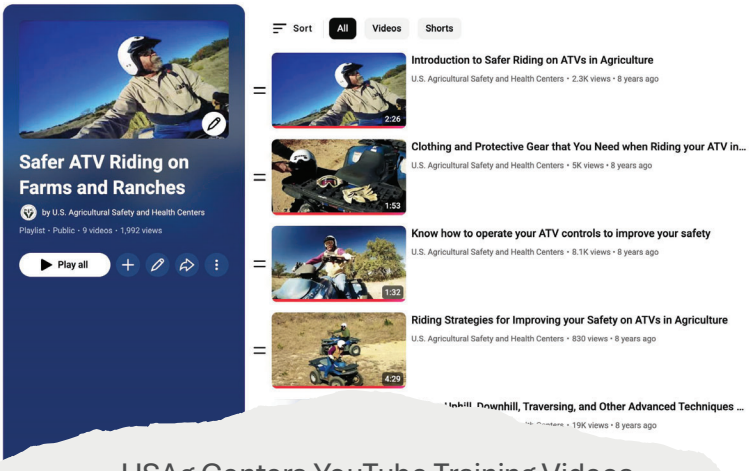
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Training Videos

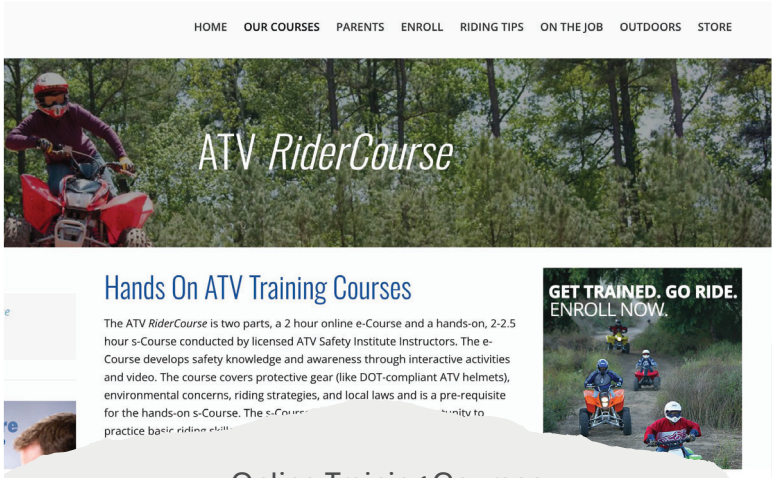
https://www.youtube.com/watch?v=3q43E4lQdBQ&t=56s





USAg Centers YouTube Training Videos

https://www.youtube.com/playlist?list=PLY7XQBihZRNvnrjKCGm9yoYjcQpT1yjnd



Online Training Courses



Include EMS and Fire Personnel in Trainings



Partner with Alabama Motorsports Dealers

CS-CASH ATV Resources:
https://www.unmc.edu/publichealth/cscash/resources/resources-atv-utv-safety.html

Print

Co-brand

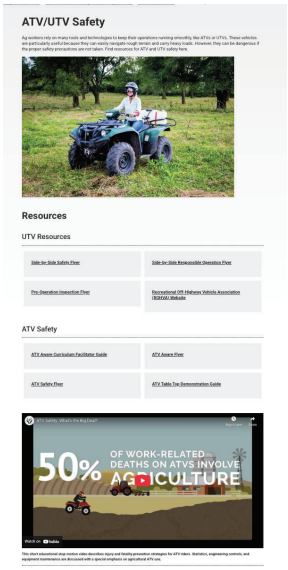
Rebrand

Request hard copies

Share the link

Add your resources to our page

Let's partner!





Tabletop Simulation

Demonstrates concepts regarding center of gravity, hitching and hauling loads

Resource Page

- **Let's Collaborate!**

CS-CASH Resource Page - https://www.unmc.edu/publichealth/cscash/resources/index.html

All materials can be co-branded and are free of charge.

Photo Sharing Website – Free Agricultural Safety and Health photos that can be used to create educational materials: https://www.surveymonkey.com/r/9NWCML2

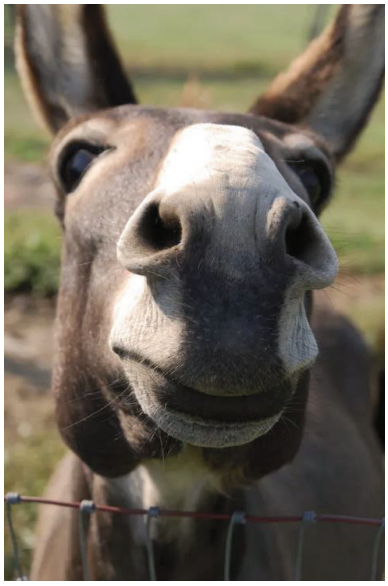
USAgCenter YouTube Channel – Ag Safety and Health Videos https://www.youtube.com/user/USagCenters

ATV Information by State - https://www.cpsc.gov/Safety-Education/Safety-Education-Centers/ATV-Safety-Information-Center/State-ATV-Information/

Let's Talk!

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Appendix G: ATV and UTV Safety Resource Guide

ATV and UTV Safety Resource Guide

Prepared by: National Association of Development Organizations Research Foundation

Off-highway vehicles (OHVs) are widely used in rural communities for recreation, work, and transportation, but their growing use also brings significant safety challenges. This resource guide introduces key safety considerations and practical tools to help regional planners and safety advocates reduce OHV-related injuries. Whether the reader is a rider themselves or interested in local OHV safety practices, this guide introduces essential safety and training resources and highlights various stakeholders' roles for ensuring safer OHV experiences for riders.





Photo Source: UNMC Central States Center for Agricultural Safety and Health

About this Resource Sheet

This resource does not provide an exhaustive list of potential sources. Any mention of a specific company, product, service, or website in this publication does not constitute or imply an endorsement by the research team. This resource was authored by Program Manager Haley Schultheis and Senior Program Manager Krishna Kunapareddy and published by the National Association of Development Organizations (NADO) Research Foundation with support from the U.S. Department of Agriculture Rural Development through a contract to provide technical assistance to rural communities. USDA is an equal opportunity provider. The University of Nebraska Medical Center (UNMC) Central States Center for Agricultural Safety and Health played a key role in developing this resource guide and remains a leading advocate for ATV/UTV safety. Any opinions, findings and conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the funding agency.

Founded in 1988, the NADO Research Foundation is the nonprofit research affiliate of the National Association of Development Organizations (NADO) that identifies, studies, and promotes regional solutions and approaches to improving local prosperity and services through the nationwide network of regional development organizations. The NADO Research Foundation shares best practices, offers professional development training, analyzes the impact of federal policies and programs on regional development organizations, and examines the latest trends in small metropolitan and rural America. In addition, the Research Foundation helps bridge the communications gap among practitioners, researchers, and policymakers. Learn more at www.NADO.org and www.RuralTransportation.org.

Off-Highway Vehicle Basics

Off-Highway Vehicles (OHVs) are powerful machines that support recreation, work, and transportation across a variety of landscapes, but are especially in popular in rural areas. OHVs include various types of vehicles including All Terrain Vehicles (ATVs), Utility Task Vehicles (UTVs), and Recreational Off-Highway Vehicles (ROVs).

Feature	 ATV	 ROV	 UTV
Primary Use	Recreation	Recreation/Work	Work
Steering	Handlebar	Steering Wheel	Steering Wheel
Seating	Straddle	Bucket/Bench	Bucket/Bench
Cargo Bed	No	Sometimes	Yes (Standard)
Roll Cage	No	Yes	Yes

Credit: Consumer Federation of America

OHVs versatility makes them popular for various uses; however, their power and off-road capability also come with significant risks, especially when operated without proper knowledge or equipment. In 2024, the Consumer Federation of America documented **632 OHV fatalities** and **injuries generally exceed 100,000 per year.**

Each state defines the off-road vehicle types in their own way and may have different laws and regulations regarding lawful use.

Riders should always follow the manufacturer's guidelines for minimum age and riding conditions.

The biggest risk factors for OHV related injuries and deaths include:

-rollovers
-collisions
-occupant ejections
-carrying passengers on single-rider vehicles
-riding on paved roads
-alcohol use
-excessive speeds
-improperly trained operators



Photo Source: UNMC Central States Center for Agricultural Safety and Health

Outreach Materials + Information

Riders lower their risk for preventable injuries and fatalities when they better understand machine capabilities, wear appropriate protective gear, and follow established safety guidelines. The following materials and information support public outreach, safety planning, and evidence-based intervention for Off-Highway Vehicles.

NADO Rural Transportation Webinar: Understanding ATV and UTV Risks with UNMC Central States Center for Agricultural Safety and Health
(https://tinyurl.com/mumdbewy)

This virtual webinar explores trends in ATV + UTV crash data in the state of Alabama, and highlights various techniques to promote safe use of these vehicles in recreational and agricultural settings.

UNMC Central States Center for Agricultural Safety and Health: ATV/UTV Safety and Operation Resources
(https://tinyurl.com/47dzp8nd)

UNMC Central States Center for Agricultural Safety and Health ATV/UTV Safety page provides educational resources that highlight the risk of ATV and UTV use. The resources also offer practical guidance for preventing injuries.

United States Consumer Product Safety Commission: OHV & ATV Safety Resources and Crash Data
(https://tinyurl.com/yc7n22da)

The CPSC ATV Safety Information Center offers guidance on ATV risks and provides practical safety tips in training, age-appropriate use, and protective gear. It serves as a centralized resource to help riders, and advocates, make informed decisions and reduce preventable injuries.

ATV/UTV Safety in Local, State, Regional, and Tribal Planning

Cass County, MN: Regulating ATV Use on County Highways and Public Right-of-Ways
(https://tinyurl.com/ywur7p4w)

Oconto County, WI: ATV and UTV Ordinances
(https://tinyurl.com/yjh4w6yv)

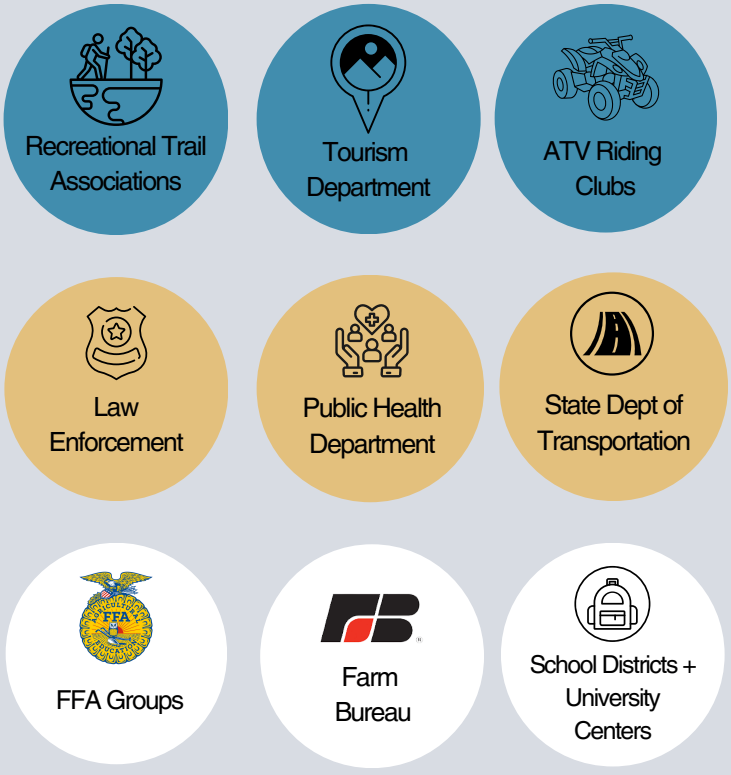
Park Hills, MO: UTV and ATV Ordinances on City Streets
(https://tinyurl.com/5be335j4)

Menominee Indian Tribe, WI: ATV Regulations
(https://tinyurl.com/yhzs3xt4)

Association of Central Okolona Governments Regional Safety Action Plan (pg. 120)
(https://tinyurl.com/yc8hzp5d)

Iowa DOT: Regulations for Driving on Iowa Public Roads
(https://tinyurl.com/3m4fjmfw)

Potential OHV Safety Stakeholders



Appendix H: Analysis of All-Terrain Vehicle Crash Data

Escambia County, Alabama: Analysis of Recreational Off-Highway Vehicle & All-Terrain Vehicle Crash Data

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June 2026

About WTI & the NADO Research Foundation

Montana State University's (MSU) Western Transportation Institute (WTI) is the nation's largest institute focusing on rural transportation and has been designated as both a National and Tier 1 UTC by the United States Department of Transportation. WTI has managed the National Center for Rural Road Safety (a designated FHWA Center of Excellence) since 2016 as well as led and developed NCHRP Research Report 988, Rural Transportation Issues: Research Roadmap (published in 2022) to assist departments of transportation and public agencies in improving policy–driven decisions. WTI's research includes projects at the local government levels. At the heart of WTI's expertise, the Mobility and Public Transportation program focuses on how various modes (transit, pedestrians, and bicycling) interact, and how individual and public mobility can improve the link between various modes.

Founded in 1988, the NADO Research Foundation is the nonprofit research affiliate of the National Association of Development Organizations (NADO). The NADO Research Foundation identifies, studies, and promotes regional solutions and approaches to improving local prosperity and services through the nationwide network of regional development organizations (RDOs). The Research Foundation shares best practices, offers professional development training, analyzes the impact of federal policies and programs on RDOs, and examines the latest developments and trends in small metropolitan and rural America. Most importantly, the Research Foundation is helping bridge the communications gap among practitioners, researchers, and policymakers. Learn more at www.NADO.org and www.RuralTransportation.org.

Disclaimer

Any opinions, findings and conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the South Alabama Rural Planning Organization (SARPC), NADO, or the United States Department of Agriculture (USDA). USDA is an Equal Opportunity Provider.

The authors and sponsoring agencies do not endorse products of manufacturers. Trademarks or manufacturers' names appear herein only because they are considered essential to the subject of this document.

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1 Introduction

For the Technical Assistance project, Expanding Mobility Options in Escambia County, Alabama, the National Association of Development Organizations (NADO) Research Foundation, with support from the Western Transportation Institute at Montana State University, analyzed crash data to support the South Alabama Rural Planning Organizations' (SARPC's) effort to develop a Safety Action Plan for Escambia County. Once complete, Escambia County is enabled to apply for implementation funds as a part of the Safe Streets and Roads for All (SS4A) Grant Program. As a part of a more narrow effort within the crash data analysis, the researchers conducted a detailed analysis of off-highway vehicles (OHVs), which include recreational off-highway vehicles (ROVs), all-terrain vehicles (ATVs), and utility task vehicles (UTVs). While legally, OHVs are not allowed on roadways in Alabama (see 32-1-7 (1)), these vehicle types are still represented in crash reports (Figure 1, photos courtesy of Neil Hetherington).



Figure 1: Examples of an all-terrain vehicle (ATV), left, and a utility task vehicle (UTV), right.

The next section analyzes the OHV data. Then after, conclusions and recommendations are presented.

2 Data Analysis

To analyze crash data for OHVs, crash reports specific to Escambia County that included the codes Unit Type 21 (4-wheel off road ATV) and Unit Type 30 (Low speed vehicles) from the Alabama Uniform Traffic Crash Report (AUTCR) for 2016 through 2025 (10 years) were extracted. Historically, OHVs operated at lower speeds (less than 25 miles per hour (mph)). More contemporary OHVs, on the other hand, may have engine sizes exceeding 1000 cubic centimeters (cc), providing them with the capability to move at much faster speeds (e.g., 75 mph). A review of the vehicle identification numbers (VINs), also called product identification numbers (PINs) in the context of OHVs, associated with the vehicles involved in the crashes determined that seven crashes involved agricultural equipment and one a delivery truck, not OHVs. These 7 crashes were removed from the subsequent analysis. Therefore, of the 25 original crashes, only 18 were determined to be OHVs.

An average of just under two annual OHV-involved crashes are occurring on the roadways in Escambia County, Alabama. At the low end, in 2019, there were no reported crashes involving these vehicle types on public roadways (Figure 2). At the high end, in 2017 and 2022, three crashes involving these vehicle types were reported, suggesting little variation from the average. Therefore, if no strategies are pursued to address these crashes, SARPC can expect that on average, two crashes will occur annually on Escambia County roadways. (Note: Any improvements in safety practices (e.g., children wearing a helmet) associated with OHVs can be expected to positively impact safety regarding the use of these vehicles on private and public lands within Escambia County, not just those represented in the AUTCR data.)

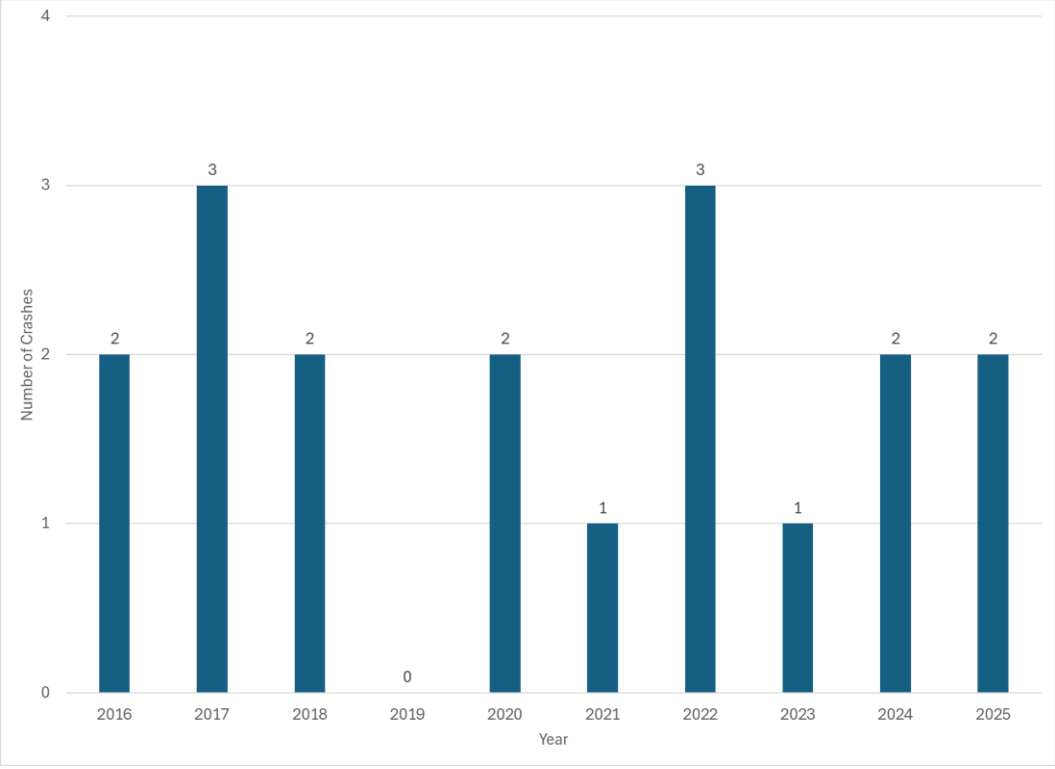


Figure 2: Frequency of OHV Crashes in Escambia County, Alabama, by Year (2016-2025)

Alabama uses the KABCO injury classification scale for crashes, where K = fatality, A = incapacitating injury, B = non-incapacitating injury, C = not visible, but complaints of pain, and O = property damage only (2). More details regarding the definition of each category can be found in the Appendix. From 2016 through 2025, the following overall crash counts were reported for each crash severity level:

- Fatality (K): 3,
- Incapacitating injury (A): 5,
- Non-incapacitating injuries (B): 5,
- Not visible, but complaints of pain (C): 1, and
- Property damage only (O): 4.

This means that just under 45% (n=8) of crashes involving OHVs involved death or required the transport of a victim from the scene of the crash to a hospital (i.e., K or A crashes). Comparably, considering all crash data within Escambia County from 2018 through 2023, only 7% of crashes were fatal or involved an incapacitating injury. (Note: The comparable time frame (e.g., 2018-2023 vs. 2015-2025) was more restrictive, as this data was taken from the analysis used to develop the Safety Action Plan.) Therefore, while quantitatively the number of OHV crashes are small, the severity of OHV crashes is notable and a primary reason why crashes involving OHVs should be addressed by agencies interested in eliminating severe injury and fatal crashes. Reporting of OHV crashes in Escambia County is believed to be limited to when the crash is severe or involves another vehicle. This underreporting is potentially partly because drivers know these vehicles are legally restricted from public roadways. Additionally, it may reflect an OHV culture where minor crashes are simply seen as a normal part of the experience.

Figure 3 orders the severity of OHV crash occurrence from 2016 through 2025. An OHV fatality occurring on the roadway was reported in 2016 and 2017 as well as in 2025.

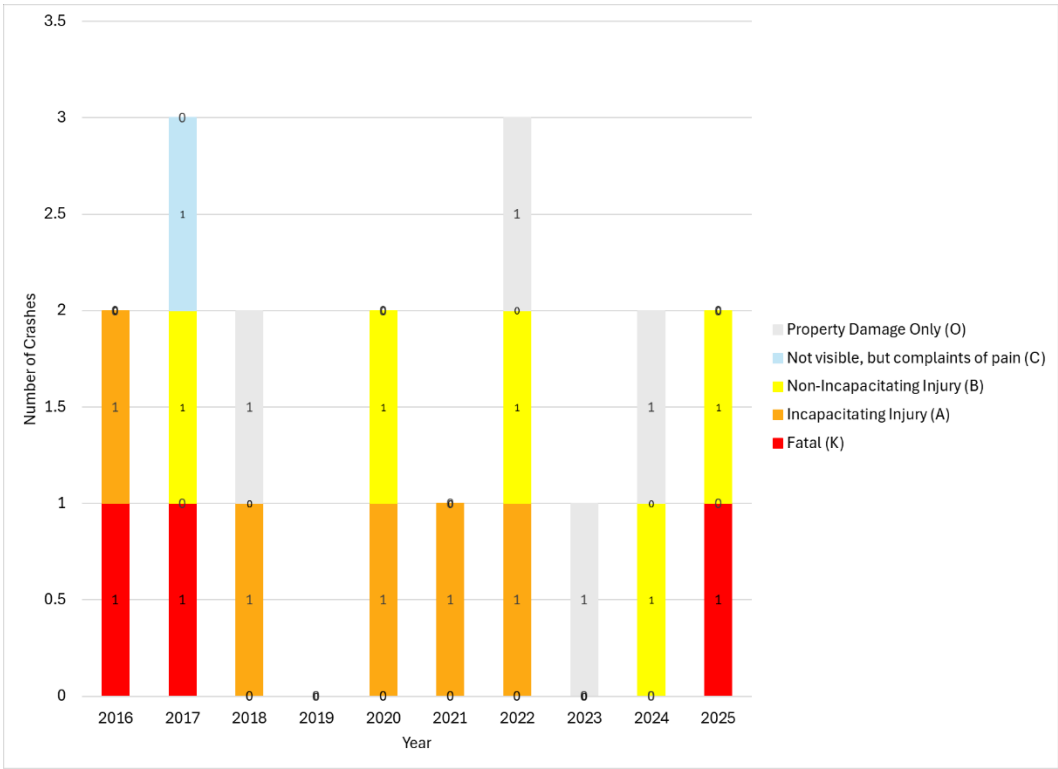


Figure 3: Severity of Crashes in Escambia County by Year (2016-2025)

On December 2, 2025, NADO held a webinar entitled *Understanding ATV and UTV Risks* (3). Aaron Yoder and Ellen Duysen with the Central States Center for Agricultural Safety and Health (CS-CASH) and the National Institute for Occupational Safety and Health (NIOSH) at the University of Nebraska Medical Center presented on the general topic of ATVs/ROVs/UTVs, with some data representative of the entire state of Alabama (3). In the webinar, data on the number of ATV fatalities for Alabama, obtained from the United States Consumer Product Safety Commission (CPSC), was referenced. Whereas CPSC identified three ATV-related fatalities as occurring in Alabama in 2022 and 13 in 2023, zero fatal OHV crashes were reported in Escambia County for both 2022 and 2023. (Note: Historically, CPSC was only concerned with ATV crashes. More recently, they have started to expand their data to include UTV and ROV crashes. Since the cited statistic in the webinar specifically identified ATVs, it is presented here as such. Since Escambia County had no fatal crashes in both years, it is irrelevant if they were ROVs, ATVs, or UTVs.)

There are two differences between the data discussed within this analysis and the data referred to in the webinar. First, CPSC data includes crashes occurring on both public and private lands. Second, the CPSC data is statewide, whereas this analysis is only for Escambia County. So, either all of the fatal OHV crashes are occurring at locations outside of Escambia County, or one or more of the fatal OHV crashes represented within the CPSC data are not occurring on public roadways within Escambia County.

The webinar suggested that 92% of OHV fatalities could be attributed to six factors (3):

1) not using personal protective equipment (PPE) (e.g., helmet),

2) riding on paved surfaces,

3) carrying extra passengers,

4) riding an OHV larger than is recommended,

5) speeding, and

6) using alcohol or drugs.

All of the fatal crashes identified within Escambia County from the data for public roadways were found to have at least two of the six attributes, highlighted in yellow in Table 1.

Table 1: Six Factors Contributing to OHV Fatalities

Factor	Crash #1 (2016)	Crash #2 (2017)	Crash #3 (2025)
No Personal Protective Equipment (PPE)	None used	None used	None used
Riding on paved surfaces	Yes (asphalt)	Yes (asphalt)	Yes (asphalt)
Extra passengers	Not applicable; single rider	Not applicable; single rider	Not applicable; single rider
Riding an ATV larger than recommended	No, 19-years-old	Yes, 16-years-old, 196 cc	No, 34-years-old
Speeding	No	No	No
Use of alcohol or drugs	No	Yes, drug use	Yes, alcohol use

Therefore, messaging could be tailored to highlight these risk factors (e.g., riding on paved surfaces, not using helmets) as potentially contributing to a fatal OHV crash. Furthermore, at present, Alabama does not have any legislation that requires children, regardless of where the OHV is operated, to wear helmets. Such legislation could be introduced.

Considering location, all of the crashes occurred around or west of Brewton (Figure 4). The eastern part of the county did not have any OHV crashes. (Note: The crashes identified in red did not have a latitude and longitude reported in the crash report. Therefore, the location identified was based on the description of road on which the crash occurred, combined with reviewing the crash diagram in the crash report.)

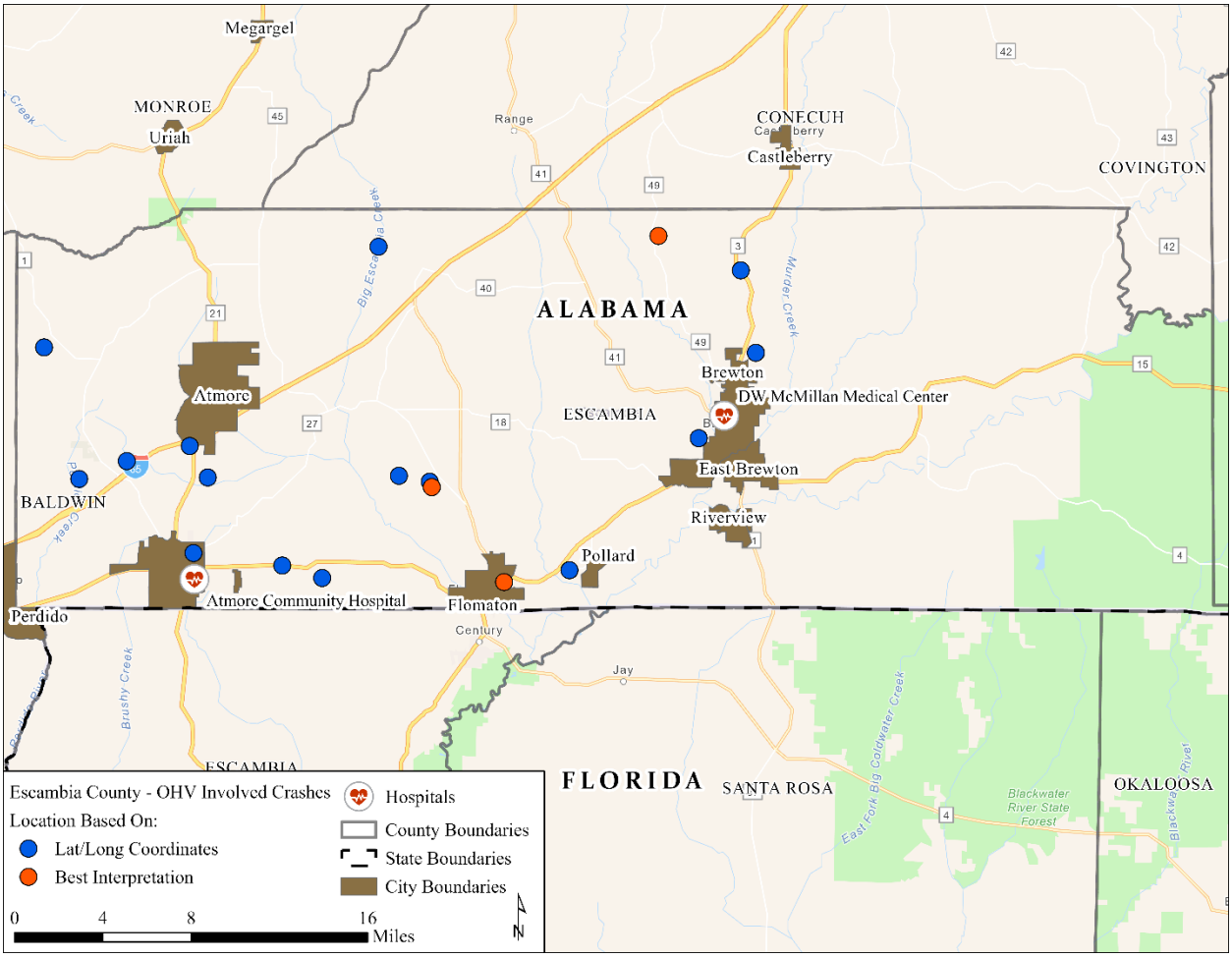


Figure 4: Location of OHV Crashes in Escambia County (2016-2025)

The crash report includes data on whether the crash occurred within a city or a rural part of the county. Fifteen of the crashes were "Rural" (83%), one was in Atmore, one was in Brewton, and one was in Flomaton. All of the fatal crashes occurred in "rural" locations. The following crash severities were represented within each of the communities: 1) Atmore (O), 2) Brewton (A), and 3) Flomaton (B). When considering the detection of a crash and the ultimate treatment of any individuals injured in a crash, proximity to communities and ultimately, treatment centers, can have an impact on injury outcome (i.e., post-crash care).

By far, the majority of crashes (n=10, or 56%) involving OHVs occurred on a Saturday (Figure 5). This might suggest that if enforcement efforts were enacted to address OHV crashes, conducting them on Saturdays would make the best use of resources.

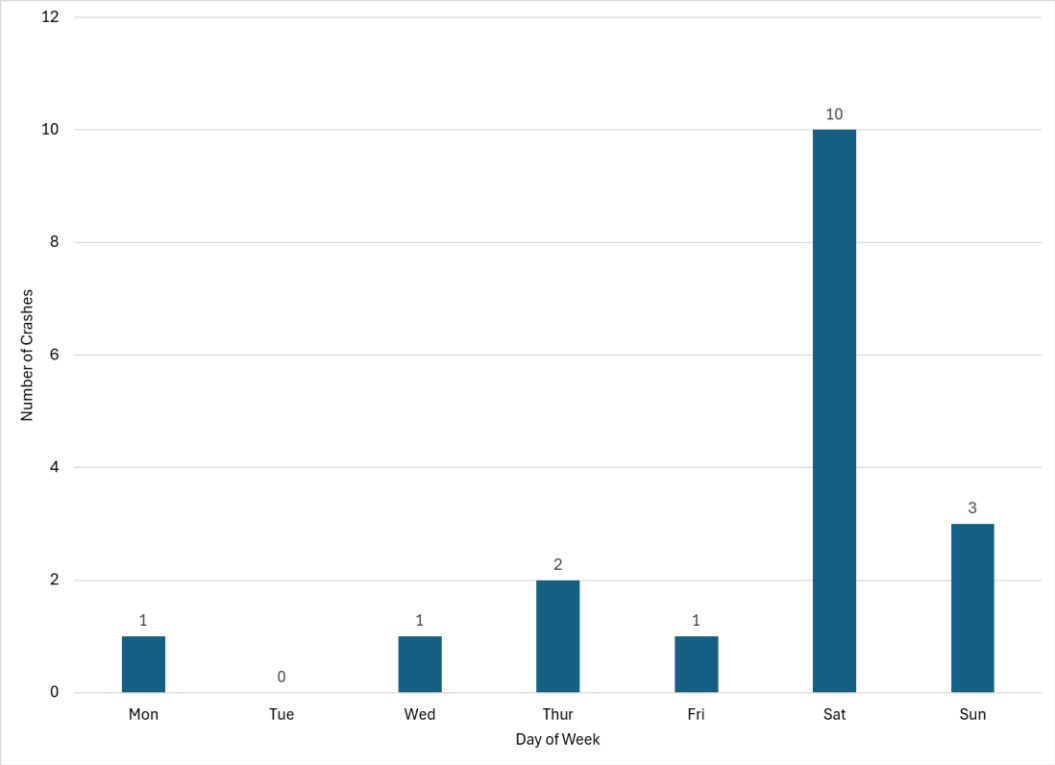


Figure 5: Crash Occurrence in Escambia County by Day of Week (2016-2025)

Considering time of day, the majority of crashes occurred between 11am and 10pm (Figure 6). Furthermore, while the data is limited, there seems to be a greater suggestion of crash occurrence around lunch (e.g., 11am-1pm) and dinner (e.g., 5-7pm).

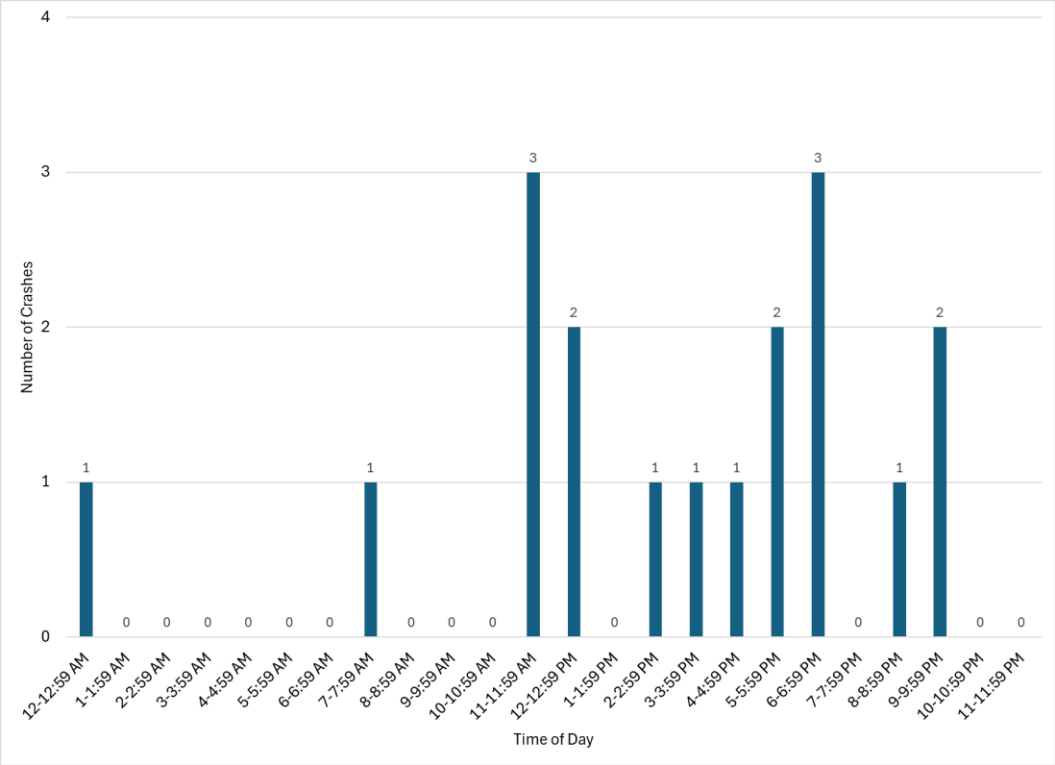


Figure 6: Crash Occurrence in Escambia County by Time of Day (2016-2025)

Therefore, if law enforcement activities associated with OHVs were conducted, it would be better if it was later in the day (e.g., not early morning).

No crashes occurred in the months of January, February, and November (Figure 7). The peak month was June, with the next greatest frequency of crashes occurring in October.

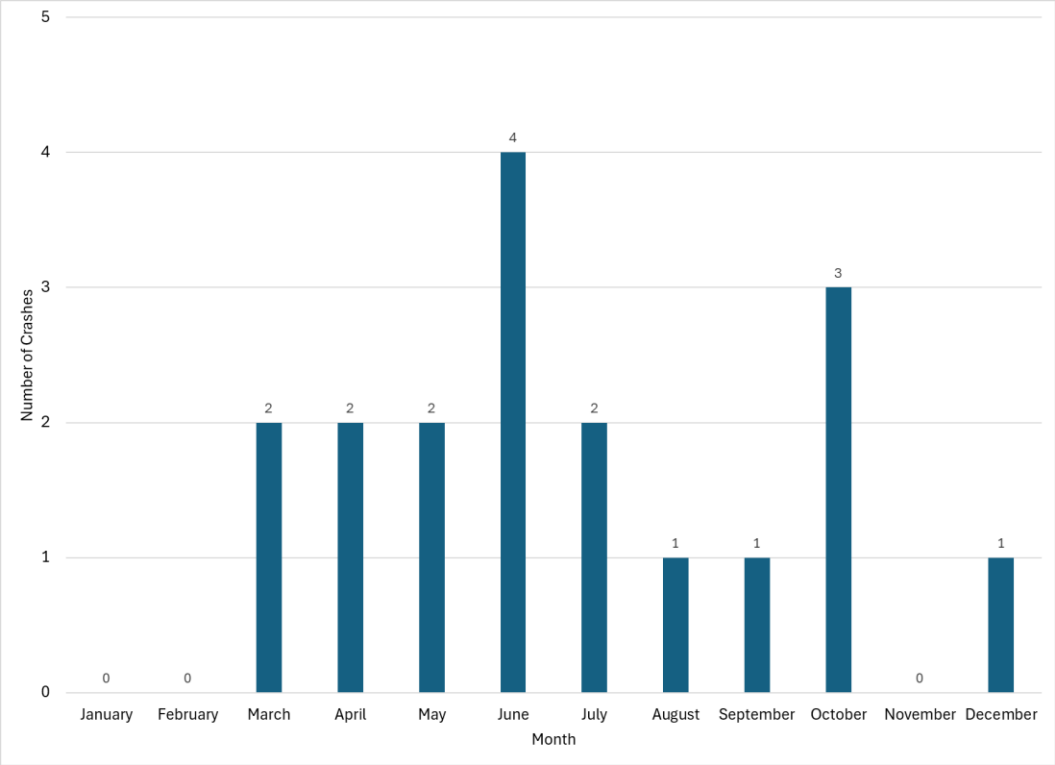


Figure 7: Frequency of OHV Crashes in Escambia County, Alabama, by Month (2016-2025)

Therefore, if law enforcement activities were conducted, they would likely be best timed for June and perhaps October. June is expected to have a greater frequency of crashes because it is likely based on the weather that more people are riding. (Note: No known exposure data is available for OHVs in Escambia County or Alabama.) The data was reviewed to determine when the three October OHV crashes occurred, to see if the shorter days may have had an influence. The three October crashes occurred during the following one-hour time blocks: 10-10:59am, 11-11:59am, and 5-5:59pm. As the lighting for the late crash was identified as "Daylight," the shorter days in October does not appear to influence crash occurrence. If educational activities were conducted, they would likely have the most influence if conducted just prior to when crash frequency is expected to increase in June, and perhaps again just prior to October.

Twelve of the 18 crashes (67%) were single vehicle OHV crashes. Therefore, for this small sample from Escambia County, there is a bias towards single vehicle crashes, which is not consistent with what was shared during the webinar (3), where it was suggested that a lot of crashes on the roadway involve collisions with other vehicles. This difference could potentially reflect the small sample size or regional differences. A roadway with a horizontal curve was related to five of the single vehicle OHV crashes. A roadway with a vertical curve was related to five of the single vehicle OHV crashes as well. Crashes did not involve both a horizontal and vertical curve. Curvature, whether horizontal or vertical, were only influential in single vehicle OHV crashes. Consequently, a large portion of single vehicle OHV crashes (10 of 12, or 83%) are suggested to have occurred as a result of a loss of control of the OHV due to geometric curvature on a roadway.

Crashes had as few as one person involved with as many as four people involved. The average number of people involved in a crash was two.

The majority of crashes (n=15 or 83%) occurred when the roadway was dry. The remaining crashes occurred when the roadway was wet. Of the three OHV crashes occurring when the roadway was wet, two were single vehicle OHV crashes and the crash that involved multiple vehicles were both OHVs.

The majority of crashes (n=14 or 77.8%) occurred on roadways paved with asphalt. The remaining crashes (n=4) occurred on unpaved roadways. OHV manufacturers have made it clear themselves or through their member organizations that they do not recommend the operation of OHVs on roadways (see webinars, *Wisconsin ITE Safety Council February 2026 Meeting* (4) and *Powersports Industry Provides Free "Safe and Responsible Use" Tools and Messaging* (5)). In fact, in a few cases, they almost emphatically emphasize this point. Furthermore, while a smaller number, it is important to highlight crash occurrence on unpaved roadways, as there is believed to be a misconception by some in the OHV community that operating on unpaved roadways is "safer." OHVs are intended for off-road operation, as implied by their name.

Three lighting conditions were reported in the data: daylight; "dark, spot illumination, both sides of roadway"; and "dark, roadway not lighted." The majority of the crashes (n=13, 72.2%) occurred during daylight. One occurred on an illuminated roadway and four occurred in the dark. Of those crashes occurring during dark conditions (n=5), whether with or without illumination, three were single vehicle crashes and two were multiple vehicle crashes. This suggests that the lack of detection of OHVs by other vehicles, while potentially contributory, is not the only cause of crashes during dark conditions.

All but three of the crashes (n=15) occurred on two-lane roadways. The remaining crashes occurred on a one-way, three-way, and four-way roadway.

Of the six multi-vehicle crashes, one involved two OHVs. The other five were between an OHV and a typical highway vehicle.

Eleven of the 18 crashes (61.1%) involved someone under the age of 18. Ten of the 11 crashes were operated by someone under the age of 18. Of the 10 crashes, 5 of these under aged drivers had passengers. Stage I (Learner's Permits) require a teen 15-years-old or older to be accompanied by a parent, legal guardian, or a licensed driver 21-years-old or older, riding in the front seat beside the teen driver (6). The Stage II (Restricted License) allows a non-relative to ride as a passenger, for teenagers 16-years-old or older. Stage III (Unrestricted or Regular License) must be 17-years-old and have had a Stage II license for at least six months before applying for a Stage III license. Of the 5 crashes with an underage driver (e.g., 17, 15, 15, 14, and 9), only the 17-year-old driver could have a Stage II or Stage III license that would allow that driver to have a passenger. As the driver's license status provided in the crash report indicated that their license is current and valid, the 17-year-old is allowed to have a passenger. Since the other four crashes involve drivers under the age of 16-years-old, which is required for a Stage II (Restricted License), and all of the passengers range in age from 4-years-old to 17-years-old, the drivers in these four crashes are not operating the OHV within the requirements for a Stage I Learner's Permit. Therefore, even if the OHVs were legally allowed on the road (which they are not), the majority of the youth drivers of these vehicles are operating them outside of the licensing requirements.

Only one crash (5.6%) involved someone 70-years-old or older.

Five of the six multi-vehicle crashes reported the "First Harmful Event" as, "Collision with vehicle in traffic." The last one was reported as "Collision with vehicle in (or from) other roadway." For the single vehicle crashes, Table 2 identified the "First Harmful Event" reported.

Table 2: First Harmful Event for Single Vehicle Crashes

First Harmful Event Reported for Single Vehicle Crashes	Number of Crashes
Overturn/rollover	5
Collision with ditch	2
Collision with sign post	1
Ran off road, right	2
Fell/jumped from motor vehicle	1
Other non-collision (explain in narrative)	1

The webinar (3) discussed concerns regarding overturn/rollover crashes as potentially crushing the driver or occupant(s). One of the overturn/rollover crashes resulted in a fatality (K), two in a serious injury (A), one in a minor injury (B) and one in a possible injury (C). Therefore, while one crash did result in a fatality, and all of the crashes resulted in injuries of some level of severity, there was some variation regarding the level of severity of the injuries. A challenge with OHV crashes is that crash reports do not capture information regarding whether or not the vehicle could be attributed to crushing the driver or any occupants. Therefore, the only place that this information could be provided is in the narrative. Only one of the narratives clearly described the final location of the driver and the vehicle in separate final resting locations.

None of the crashes occurred within a construction or work zone.

2.1 OHV Crash Contributions

The researchers were interested in determining if factors described in the narrative and elsewhere within the crash report, but those not necessarily represented in a checked box within the crash report, may show trends contributing to OHV crash occurrence. In many cases, this information was found within the narrative of the crash report. In other cases, it may be represented in a contributing circumstance. For example, overdriving or driving too fast for conditions may be listed in a contributing circumstance or it may be described in the narrative. Yet, regardless of how speed was suggested as contributing to the crash, it is of interest to know how many OHV crashes involved drivers reported as traveling too fast. Therefore, to more comprehensively understand OHV crash contributing factors, the entire crash report was reviewed for indicators of interest. These indicators of interest were identified in other OHV data analyses or through the review of literature. Therefore, they may or they may not necessarily be represented in the data for Escambia County (i.e., crash count is 0). What follows are a listing of these indicators:

1) was **intersection-related**,
2) was related to OHVs **turning onto or from a field approach, access, or driveway**,

3) was the result of the OHV operator **not yielding**,
4) occurred on a **narrow roadway**,
5) involved an **animal**,
6) resulted from an OHV **failing to navigate a turn**,
7) resulted in an **OHV landing on the driver or occupant(s)**,
8) resulted in a **driver or occupant(s) being thrown, ejected, tossed, pitched, or someone that jumped, fell or flew from the OHV**,
9) involved an OHV that **rolled, flipped, turned, or tipped onto its side**,
10) involved an OHV that **struck a fixed object(s)**,
11) identified **speed** as a contributing factor,
12) involved an OHV being **ridden in the ditch**,
13) involved an OHV making a **U-Turn**,
14) involved the OHV losing control as a result of **ruts or potholes**, or
15) suggested **equipment failure** contributed.

The following are the counts and percentages for each of these situations (Table 3).

Table 3: Counts & Percentages of Contributory Situations

#	Issue Identified	Number of Crashes	%
1	Intersection-related	2	11%
2	Turning onto or from a field approach, access, or driveway	2	11%
3	Not yielding	1	6%
4	Narrow roadway	0	0%
5	Animal	1	6%
6	Failing to navigate a turn	4	22%
7	OHV landing on the driver or occupant(s)	0	0%
8	Driver or occupant(s) thrown, ejected, tossed, pitched, jumped, fell, flew from OHV	4	22%
9	Rolled, flipped, turned, tipped onto its side	7	39%
10	Struck a fixed object(s)	4	22%
11	Speed	5	28%
12	Ridden in the ditch	0	0%
13	U-Turn	0	0%
14	Ruts or potholes	0	0%
15	Equipment failure	1	6%

Four crashes (22.2%) were described as occurring when the OHV driver failed to navigate a turn. Recall that five of the crashes occurred on horizontal curves. Two of the crashes where a driver failed to navigate a turn were on a horizontal curve. The other two crashes were on roadways identified as being straight and level and were multi-vehicle crashes.

Five of the crashes (27.8%) reported speed as a contributing factor. The webinar (3) suggested that ROVs may be more strongly associated with crashes that resulted from speeding, perhaps because people who are operating ROVs are doing so to have fun. However, while the data suggests that there is a slight bias towards ROVs, as compared with ATVs and UTVs, two of the crashes involving ROVs specifically identified speed as contributory, two of the crashes involving ATVs, and one crash involved either an ROV or an UTV (the vehicle type could not be determined). It is likely that the unassigned ROV or UTV vehicle was an ROV, suggesting a bias towards ROVs, but not by much.

The narratives were reviewed to determine if there was some suggestion of head trauma. Two (11.1%) of the narratives provided some suggestion of head trauma.

2.2 OHV Vehicle

Crash reports provide VINs or PINs for vehicles involved in crashes. Sometimes, VINs or PINs are not recorded by the law enforcement officer filling out the crash reports. OHVs can be challenging because the location of these numbers is highly variable, and in some cases, difficult to find. Nineteen OHV vehicles were identified in the 18 crashes (note: Recall that one of the crashes involved two OHVs). Seven makes were identified (with one crash not providing make information) (Table 4).

Table 4: OHV Makes Involved in Escambia County, Alabama OHV Crashes

OHV Makes	Number of Vehicles
ARCTIC CAT	1
CAN-AM	2
HONDA	3
KAZUMA	1
POLARIS	6
TAOTAO	1
YAMAHA	4
Not identified	1
TOTAL	19

Not all model information could be discerned. Where model information was deduced or provided, the engine displacement of the vehicles involved in the crashes ranged from 125 cc to 999 cc (Table 5).

Table 5: OHV Crash Injury Severity & Engine Displacement

OHV Crash Injury Severity	Engine Displacement (cc)
Property Damage Only (PDO)	125, 475
Possible Injury	999
Suspected Minor Injury	348, 570, 999
Suspected Serious Injury	421, 425, 999
Fatal	196

Plotting the information that is available (Figure 8) (1 = Property Damage Only; 2 = Possible Injury; 3 = Suspected Minor Injury; 4 = Suspect Serious Injury; 5 = Fatality), suggests that a very slight, but potentially present increase in crash injury severity is associated with increasing engine displacement. Overall, the data points are limited (for two of the fatal crashes, engine displacement could not be deduced). However, considering the categories where more than one data point was available (e.g., property damage only, suspected minor injury crashes, and suspected serious injury crashes), the lowest engine displacement value increases across the categories and the highest engine displacement value increases from the crashes without an injury (e.g., property damage only) to those with some injury. More data is necessary (e.g., an analysis of OHV crash severity in relationship to engine displacement) to draw any definitive conclusions.

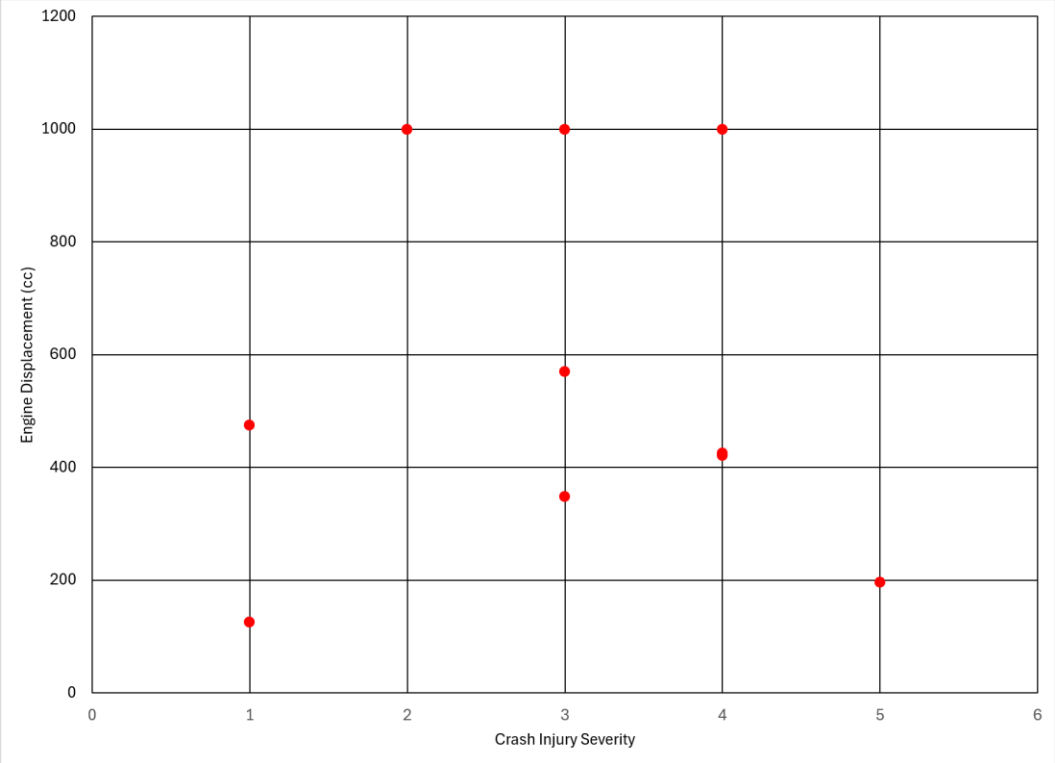


Figure 8: Crash Injury Severity vs. Engine Displacement (cc)

The webinar reported maximum engine displacements of 800 cc (3). Yet three of the crashes involved OHVs in excess of this value, at 999 cc. A statistic cited during the webinar stated that 90% of all OHV-related injury and deaths involving children were on adult-sized OHVs. There exists variation regarding what may be classified as an adult-sized OHV. CPSC recommendations for child appropriate ATVs were previously based on engine size (Table 6). However, in 2017 the CPSC adopted the American National Standards Institute (ANSI)/Specialty Vehicle Institute of America (SVIA) standards which go by "maximum unrestricted speed capability – without a [speed] governor" or "maximum limited speed capability-with speed governor" (7). (Note: Both of these sources still specifically only reference ATVs, although youth are operating ROVs, ATVs, and UTVs.) Since the engine size can be more easily discerned than speed capacity, a review of the vehicles driven by youth (e.g., younger than 18-years-old) suggested that three of the seven OHVs with an engine size that could be deduced could be deemed acceptable. The engine sizes of three OHVs operated by children could not be deduced based on gaps in data, including one OHV driven by a nine-year-old. If one used the more stringent 90 cc identified in the webinar (3), none of the vehicles operated by children were appropriately sized, including a 14-year-old who was driving a 999 cc vehicle, with two passengers, one aged 13 and the other 4-years-old.

Table 6: Age of Operator and Recommended ATV Engine Size Based on Previous CPSC Recommendations (7).

Age of Operator	ATV Engine Size
Under age 6	Not recommended
Age 6-11	Under 70 cc
Age 12-15	70-90 cc
16 years & older	Over 90 cc

Year of vehicle was available for 16 of the 19 OHVs. The oldest OHV was from 1983, with the newest from 2021. On average, OHVs were manufactured in 2012. No information could be obtained for the OHV from 1983, other than that it was made by HONDA. Therefore, it is possible that the vehicle was a 3-wheeled ATV, as manufacturing of 3-wheeled ATVs did not cease until 1988 (3).

Eight of the OHVs had two total people riding them. Two of these eight were determined to be able to carry the two people (termed "2-Up" by at least two manufacturers ((8), (9))) identified in the crash report. The other six are undetermined, in large part because not enough information about the model of the vehicle could be deduced. For example, while in some cases the researchers can determine that the vehicle was a POLARIS Ranger, there are many Ranger versions. Some allow for multiple passengers, and some do not.

By determining the vehicle information, most often a vehicle could be determined to be an ROV, an ATV, or a UTV. It is believed that these sub-types of OHVs may behave differently regarding the likelihood of a crash and crash severity. For example, owners and operators of OHVs seem to believe that a UTV with a roof may be able to protect its occupants better than an ATV. To the researchers' knowledge, no detailed analysis of the crash experience of these OHVs has been conducted, so more information is needed. At this point, the belief is speculative. OHV types were deduced to include nine ATVs, four

ROVs, one UTV, and one OHV that was either an ROV or UTV. The three fatalities involved the vehicle that was manufactured in 1983, which is believed to be an ATV, as well as an ATV and an ROV. This suggests a bias towards fatalities being associated with ATVs. Since no UTV was associated with a fatality, there seems to be some measure of improved safety. Again, the sample size is small. However, the experiences of the data from Escambia County could be combined with the experiences of other agencies as the data and information regarding crash experience of OHVs is better understood.

Seventeen of the 18 crashes provided information on vehicle ownership of the OHVs. Since one crash involved two OHVs, there were 19 instances where ownership was considered. Ownership was not provided for one of the OHVs. (Note: The driver's age was 34.) For the remaining 18, the results were split, with a bias towards owners operating their vehicles (n=10, 56%). There is definitely a bias towards those who own their vehicles as being older individuals, with an average of 27 years of age (54, 50, 28, 27, 19, 19, 17, 15, and 15). However, with two 15-year-old individuals reportedly owning their vehicles, it is unclear, based on the webinar and CPSC documentation suggesting that manufacturers cannot sell OHVs to children under the age of 16, how these children were able to purchase them ((3), (10)). It is possible that someone purchased the vehicle for the child and transferred the title to the child. It is also possible that perhaps the law enforcement officer miscoded the information. The average age of OHV drivers who did not own the vehicle they were operating was 16 (26, 22, 16, 16, 15, 14, 13, and 9). Four of the 8 people (50%) that did not own the OHV they crashed were under the age of 16.

2.3 OHV Driver

All of the drivers of first vehicle recorded in the crash reports were OHV drivers. The first listed vehicle/driver is often considered to be "at fault." Consequently, the following analysis represents this data. The oldest driver was 54-years-old. The youngest was 9-years-old. On average, the age of an OHV operator involved in a crash in Escambia County over the period of evaluation was 23 years old.

While not as biased towards male operators as other analyses ((11), (12)), almost 67% of OHV drivers were male.

The majority of OHV drivers (n=15, 83%) involved in crashes in Escambia County reported a city of residence within Alabama (Atmore = 8; Brewton = 3; Flomaton = 3; and Frisco City = 1). The other three drivers reported their residency within Florida, within the communities of Cantonment and Century (n=2). Residency information could influence any public service announcement focus-areas.

Sixty-one percent (n=11) of the OHV drivers were licensed. The other seven OHV drivers were unlicensed or it was not applicable. Of the seven unlicensed OHV drivers, only one was from Florida. All of the unlicensed drivers were under the age of 18 (ages = 9, 13, 14, 15, 15, 16, and 16). (Note: three of the licensed drivers are under the age of 18: 15, 17, and 17). Furthermore, the 9-year-old OHV operator had a 10-year-old occupant. A 4-year-old had a suspected serious injury when falling out from an OHV, reportedly because of a door somehow opening. This child was in a vehicle driven by a 28-year-old. A 14-year-old was operating a vehicle with a 13-year-old and 4-year-old passenger. To the researchers' knowledge, a car seat is not designed to be secured within any of these vehicle types, which suggests that both 4 year-olds were riding improperly in the vehicles. (Note: As the 4-year-old in the vehicle driven by the 28-year-old was reportedly standing before they fell out, they definitely were not properly secured.) In fact, Khorsandi et al. (7) highlighted that children under six years of age should not be a

passenger in an ATV. Furthermore, with recommendations that those under 13 are not to sit in the front seat of typical highway vehicles, the 9- and 10-year-olds should not be operating or riding in these vehicle types. There were three other instances where a teenager was operating these vehicles with a teenage passenger.

Considering all of the above, there is a suggestion that these vehicles are being used for the mobility of youth who are unable or have not yet obtained their driver's licenses. Alabama law does not specifically call-out OHVs regarding requirements for child passenger restraints (11). However, regardless of whether an OHV is driven illegally on the road or off-road or in a private setting, there is a need for Alabama to clearly state their requirements regarding the age of children riding in or operating OHVs, and the requirements to do so (e.g., wear a helmet and perhaps other PPE).

Almost all of the information provided in the crashes suggested that safety equipment was used in only one of the crashes. For the other crashes, the law enforcement officer either chose "No motorcycle helmet" (n=1); "None used – motor vehicle occupant" (n=7); "Other (explain in narrative)" (n=1); "Not applicable" (n=7); or "Unknown" (n=1). Helmets are not required for OHV use in Alabama, although again, they are not legally allowed on public roadways. Many of the instances where "Not applicable" was chosen was when a vehicle was operated by someone under the age of 18. At a minimum, helmets, whether one is driving an ROV, ATV or UTV, are recommended. As highlighted in the aforementioned webinar (3), medical professionals can help address injuries to legs, arms, and often the torso, but injuries to the head have few to no remedies dependent upon the severity of the injury. A shoulder and lap belt was used by a 27-year-old driver, where the severity of the crash was property damage only. With most of the OHV crashes occurring in Escambia County being severe, the use of safety equipment (e.g., helmets) could bring safety benefits, reducing the severity of OHV crashes. Interestingly, reviewing the instances of crashes where a second vehicle was involved that was not a dirt bike or an OHV, only one of the drivers and occupants did not use their safety equipment (e.g., seatbelt). A review of the broader data for Escambia County suggests the need to address drivers and passengers not using safety equipment (e.g., seat belts). So, it is interesting that those who were operating the OHVs generally did not make use of safety equipment, whereas those who were operating typical highway vehicles in the crashes generally did.

Thankfully, none of the children were identified as being suspected of operating the OHV under the influence of alcohol. In the three instances where a driver was listed as being under the influence of alcohol, all three were male, whose ages were 54, 50 and 34. One of the crashes resulted in a fatality, a second in "possible serious injury" and the third in a "possible injury." Therefore, while the dataset is small, there is a suggestion that middle aged men operating these vehicles only ended up in the data if they were doing so while under the influence of alcohol. Unfortunately, where one child under the age 18 died, she was operating the vehicle under the influence of drugs. She was the only person identified in the crash reports as operating an OHV under the influence of drugs. Clearly, even though it is a small amount of data, it suggests that operating these vehicles under the influence of alcohol or drugs is very likely to result in a serious crash.

2.4 Treatment Hospital & Air Transport

Four hospitals were identified as treating victims in 13 of the OHV crashes:

1) USA Medical Center in Mobile, Alabama (also called University Hospital (Mobile, AL)) (n=4);

2) D.W. McMillan Hospital in Brewton, Alabama (n=6);

3) Atmore Community Hospital in Atmore, Alabama (n=1); and

4) Ascension Sacred Heart in Pensacola, Florida (n=2).

Alabama's crash reporting form provides information regarding if a victim is transferred by an air flight to the hospital. Four of the crashes (22.2%) indicated that such a transfer was conducted. These four victims were all transferred to either of the more remote hospitals in Mobile, Alabama or Pensacola, Florida. The only instances where a victim was not transferred to a hospital was for one of the three fatalities (suggesting perhaps a death at the scene of the crash) and for all four of the property damage only crashes. This suggests that hospital treatment is needed if an OHV vehicle driver or passenger ends up in all non-property damage only OHV crashes. It is possible that minor injuries are resulting from the operation of these vehicles but do not generate crash reports. Information would have to be sought from the healthcare system, particularly from the hospitals local to Escambia County (e.g., D.W. McMillan Hospital and Atmore Community Hospital) to determine if other OHV crashes are occurring on the roadways in Escambia County that are not represented in the Alabama crash data.

3 Conclusions & Recommendations

The number of annual OHV crashes occurring on public roadways in Escambia County which result in crash reports is small, at an average of two. Unfortunately, this number should be zero, as these vehicle types are legally restricted from using roadways. From a severity perspective, with just under 50% resulting in a fatality or incapacitating injury compared with 7% of all crashes, OHV crashes on public roadways within Escambia County tend to be severe.

As discussed in the webinar (3), six contributing factors were reported in 92% of fatal OHV crashes: 1) not using PPE (e.g., wearing a helmet), 2) riding on paved surfaces, 3) carrying extra passengers, 4) riding an OHV larger than is recommended, 5) speeding, and 6) using alcohol or drugs. Two of these six contributing factors were found in all three fatal crashes on public roadways in Escambia County: not using PPE, particularly helmets; and operating the OHV on paved roads, specifically asphalt.

The majority of the OHV crashes in Escambia County were single vehicle crashes. Eighty-three percent of these single vehicle crashes were associated with some form of roadway curvature, whether horizontal or vertical. This suggests that the curvature may have contributed to loss of control of the OHV.

All of the OHV crashes occurred on paved (e.g., asphalt) or unpaved roadways. Two webinars with representatives from manufacturers or associations representing manufacturers have emphasized that they do not support the operation of OHVs on paved or unpaved roadways.

Eleven of the 18 OHV crashes involved someone under the age of 18 either as the operator or as a passenger. Of these 11, five involved more than one person under the age of 18. With the significant representation of youth-use of OHVs, they are implied to provide youth with a form of transportation or perhaps fun. However, OHVs should be viewed no differently than a typical highway vehicle when considering passengers. It is not appropriate to allow youth to transport other unrelated youth before achieving the appropriate driving experience warranted by licensing requirements. Similarly, very young youth (e.g., 4-years-old) should be required to be properly restrained (e.g., use of child car seats) in the OHVs.

Other contributing factors found with other OHV datasets were investigated to determine if they were represented in crashes in Escambia County. Five of the factors were represented: 1) rolled, tipped, flip or the like (n=7), 2) speed (n=5), 3) failed to navigate a turn (n=4), 4) OHV rider tossed or ejected (n=4), and 5) striking a fixed object (n=4). The most interesting variable not represented was an OHV landing on top of a driver or occupant. Therefore, it was either not well detailed in the crash reporting, or for some reason, it was not an issue for Escambia County.

Compared to other crash data reviewed by the researchers, overall, the engine size of the OHVs represented in the crash data is on the lower end, ranging from 125 cc to 999 cc. However, if all OHVs over 90 cc are too large for children (as suggested by the webinar), 100% of the vehicles being driven by children under the age of 16 are adult-sized. In fact, the 9-year-old was driving one of the largest vehicles represented in the data: an engine with 999 cc. The problem with OHVs with larger engines is not just the high rates of speeds that they can achieve but also their weight. As discussed earlier, rolling or flipping the OHV is well-represented in the data, and that data likely underrepresents the issue, as this information was only discerned from a more comprehensive reading of the crash report. An understanding of the crash mechanisms is in this sense a representation of how much information the

law enforcement officer completing the form is willing to provide. The weight of these larger vehicles could crush the child operator or their passengers.

The majority of vehicles being operated by children are owned by someone else. This suggests that there needs to be more information about the risks of operating OHVs by children disseminated to the adults who are providing them to children. Furthermore, two of the OHVs were reported as being owned by 15-year-olds. One was a CAN-AM, where information on its engine size could not be deduced. The second was a TAOTAO ATV, with a 125 cc engine. Manufacturers are not allowed to sell adult-sized OHVs to children under the age of 16, historically based on engine size (10). Therefore, either someone bought the vehicle and transferred ownership to the child after the purchase, or the law enforcement mis-coded the information. If it is the former, then adults who are providing OHVs to children need to be educated that they cannot do so. There is also the possibility that legislation could be enacted to make it illegal to transfer ownership to someone under the age of 16. If this information was mis-coded, it would be worth working with law enforcement to understand the importance of why one needs to determine if an OHV was owned by someone under the age of 16.

While most of the crashes occurred in rural areas of Escambia County, the residence of the majority of the users were within Atmore, Alabama (n=8). Therefore, if educational efforts were focused on one location within Escambia County to begin with, it would be within this community.

The oldest individuals involved in OHV crashes on public roadways in Escambia County all were operating the OHVs under the influence of alcohol, and all were male. This suggests a lack of understanding of the active riding required when operating an OHV, which can be expected to be impacted when the operator is under the influence of alcohol. If there are any public service announcements reminding vehicle operators not to drive under the influence of alcohol, these public service announcements should include OHVs as represented in the vehicle type.

All OHV crashes that were not property damage only crashes (except for one fatality, which was likely a fatality on scene) resulted in a transfer to a hospital. It suggests a level of severity with OHV crashes, that one needs to be transferred to a hospital. In addition to the survivability concern, there is an economic impact that many users likely do not consider. Health care costs are significant, especially when one needs care within a hospital. Perhaps a public service announcement could include a relationship of the crash outcomes with the cost burden.

3.1 Recommendations

Almost none of the OHV riders or passengers involved in crashes on public roadways in Escambia County used PPE. Consequently, there is a need to educate the public about the importance of PPE. While it would be desirable to have OHV riders wear close-toed shoes, gloves, and eye protection, by far, the most important PPE is a helmet for any aged driver or passenger. Consequently, the researchers recommend that SARPC develop messaging that can be disseminated to OHV riders to emphasize the importance of helmets for OHV riders. In addition to messaging, another approach that could encourage helmet use is to provide a credit for a helmet purchased at a local motorsports dealer in Escambia County (e.g., Kenny's Motor Sports, Inc.). A similar approach was successfully used in Colorado (14). Other examples of entities that have created programs to encourage helmet use come from Garrett County in Maryland (15) or Bristol Bay Area Health Corporation in Alaska (16). Furthermore, SARPC

should consider working with their legislators to require individuals under the age of 18 to wear helmets.

If law enforcement activities were conducted, the data suggests that conducting them in June and/or October, on a Saturday, and later in the day (e.g., after 11am) would be most effective.

There is a need to better disseminate motorsport manufacturer recommendations to not operate OHVs on paved or unpaved roadways. This could perhaps be conducted through social media or short radio or television announcements. It could also be disseminated through 4H groups or schools (e.g., Escambia County Middle School, Escambia County High School), local or state fairs where demonstrations could be provided similar to what was shared in the webinar (3), or via user group enthusiasts.

While the crashes on public roadways in Escambia County are relatively few, it is expected that these crashes are just an indicator of a larger problem. This is expected because legally, OHVs cannot be ridden on public roadways in Alabama. So, it is likely that unless more serious medical attention is needed or if there is a collision with an object or motor vehicle that would warrant a crash report, many OHV crashes may go unreported. The true magnitude of the problem could be better uncovered by speaking with health care institutions within the county (e.g., Atmore Community Hospital, D.W. McMillan Hospital). Two hospitals were identified as accepting some of the less severe patients. Furthermore, it is anticipated that other issues represented in the public road crash data, like the lack of helmet use, is represented in the use of OHVs on private land. Therefore, educational efforts or recommended policy changes (e.g., requiring helmets for individuals under the age of 18) would be expected to reduce the crash severity outcomes of OHV crashes on the roadway as well as those on private lands. Consequently, the impact of such efforts would be greater.

The majority of crashes provided the VIN/PIN of the OHV. It would be useful to inform law enforcement about the benefits of providing information about the specific model if not via a VIN/PIN, with additional descriptive information in the narrative. If the model cannot be identified, providing notes on the number of people recommended for the vehicle and the engine size, would be vitally important for future OHV safety analyses.

The OHVs carried two, 4-year-old occupants and one 10-year-old occupant. For typical highway vehicles, children of these ages are required to have car seats or required to be in a specific location within the vehicle (e.g., in a back seat). There is a need to consider if further guidance or policy is needed regarding youth passengers of OHVs, whether on or off-road.

Citation information was not available within the crash reports. In the future, law enforcement should be encouraged to cite drivers or their responsible adult for crashes occurring on public roadways that violate these laws. This would reaffirm Alabama's restriction of OHVs from the roadway.

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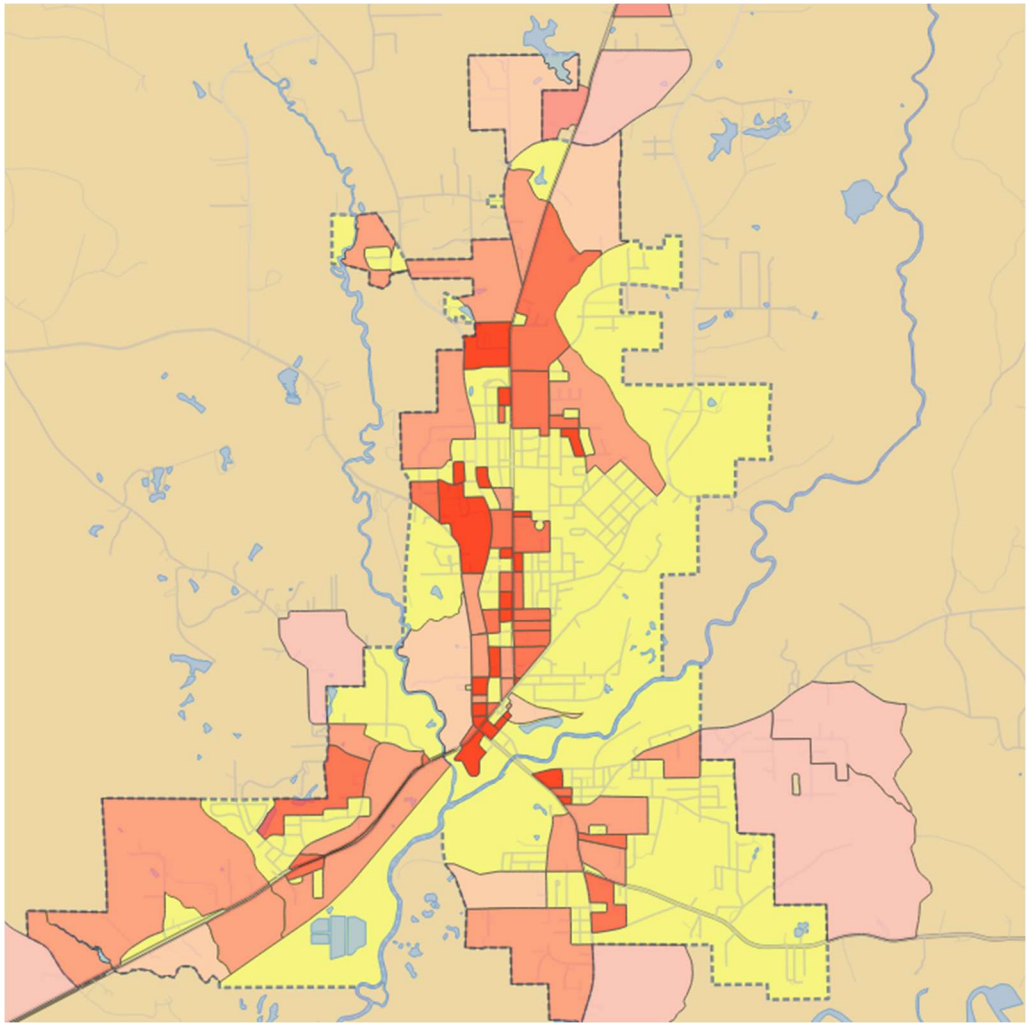
Appendix

From the Federal Highway Administration (2):

1. Fatal – "This code will be entered if a victim is pronounced dead at the scene or before the report is completed. If not, one of the other codes will apply. However, if a victim dies later as a result of the crash this code will need to be updated according to the following directions. The Department of Public Safety uses a thirty (30) day counting period for traffic fatalities. If a person dies as a result of injuries received in a traffic crash within thirty days of the date of the crash, that victim is considered to be a traffic fatality, and the victim injury type must be updated to Code 1 in this data item."
2. Incapacitating injury – "This means that the victim must be carried or otherwise helped from the scene. If the victim needs no help, then either a code 3 or 4 applies even though medical assistance may have been administered at the scene."
3. Non-incapacitating injury – "If the victim has visible signs of injury, either in a physical or mental sense (e.g. had passed out), but is judged able to walk away from the scene without help, 97 this code applies. The difference between this code and code 4 is strictly in the external evidence of injury."
4. Not visible but complaints of pain – "If the victim complains of pain, but there are no visible signs of it, and he or she is able to walk away from the scene of the crash, then this code applies."

Appendix I: Activity Density Analysis Basic and Data Creation Process

Activity Density Analysis Basics and Data Creation



NADO Research Foundation

November 2025

Acknowledgements

This document was created as part of a United States Department of Agriculture Rural Development (USDA RD) technical assistance grant award made to NADO as part of the Rural Business Development Grant (RBDG) program. This process and document was developed during the course of this project for the benefit of the South Alabama Regional Planning Commission in Mobile Alabama.

Background

Rural communities and their planning partners across the country are working to create and update regional transportation planning documents that support mobility for residents in communities of all sizes. As part of this planning effort, these stakeholders are often working to identify locations where non-automotive related transportation is currently being utilized or is needed to increase accessibility to critical local destinations including education, government services, schools, health care, shopping, and entertainment. The concept of utilizing data for activity density analysis can assist in these efforts and has been implemented by planning organizations across the country.

Activity density is the concept of considering land use and the density of population or jobs on that land and within a specific area as a proxy for active transportation use and demand. This can be especially useful when direct counts of pedestrian or biking activity in an area are not available.

The activity density concept is often related to the concept of transect zones, frequently referenced in traditional urban planning texts and materials. Transect zones are discreet sequential categories of the built environment that account for increasing density and intensity as they approach urban areas.[1] Each transect zone has unique characteristics and qualities that separate them from the other zones.

For the purposes of this guide, the general formula utilized to calculate activity density will be:

(Jobs+Population)/Area in Square Miles

The reference geography that this calculation will be applied to are Census Blocks. Readers are encouraged to modify this formula and the reference geography to best suit their specific use case needs and data availability conditions.

[1] Center for Applied Transect Studies; https://transect.org/transect.html.

Reference Examples

Many early implementations of the activity density concept were focused on efforts to identify optimal locations for transit developments so that they might be well utilized and compatible with nearby land uses. One example is the 2015 paper published by the Puget Sound Regional Council entitled "Transit-Supportive Densities and Land Uses[2]." This paper provides descriptions of land uses and estimated densities that may support various modalities of transit service. Other topics include a literature review focused on land use classifications and corresponding transit utilization.

The Victoria Transport Policy Institute has also published the "Transportation Demand Management (TDM) Encyclopedia" which contains a chapter entitled "Land Use Impacts on Transport[3]." This is another resource that provides informative background information on land use impacts in transportation planning efforts, conversation about suitable conditions for active transportation, and other topics that assist the reader in establishing a baseline of information that can support effective planning efforts.

Regional development organizations (RDOs) have implemented activity density analysis in transportation planning efforts in a number of ways, including as a component of long range transportation plans, or as a contributing factor in more specialized planning documents including bike and pedestrian plans or specific active transportation plans. Examples of these implementations are offered below:

- New River Valley MPO (VA) – Bicycle & Pedestrian Master Plan, 2014: https://nrvrc.org/nrvmpo/resources/NRVMPO_BikePedPlan_Draft.pdf.

- Buckeye Hills Regional Council (OH) – Long Range Transportation Plan 2020-2045: https://buckeyehills.org/wp-content/uploads/2024/02/BHRC2020-2045LRTPFINALWAPPENDICES.pdf.

- Roanoke Valley Transportation Planning Organization (VA) – Roanoke Valley Transportation Plan: https://rvarc.org/wp-content/uploads/2023/12/RVTP-approved-1-26-23.pdf and https://rvarc.org/wp-content/uploads/2023/12/RVTP_Needs-Prioritization.pdf.

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[2] Transit-Supportive Densities and Land Uses, Puget Sound Regional Council, February 2015; https://www.psrc.org/sites/default/files/2022-03/tsdluguidancepaper.pdf.

[3] Land Use Impacts on Transport, TDM Encyclopedia, Victoria Transport Policy Institute, September 2019; https://www.vtpi.org/tdm/tdm20.htm#:~:text=For%20example%2C%20a%20reduction%20from,Handy%202008;%20Cervero%202007)..

Data and Software Specifications

The analysis described here requires access to a desktop GIS software application package capable of general geoprocessing tasks and display of mapping information. The processes described in this process document are able to be completed in common GIS software packages (i.e. ArcGIS Pro, QGIS), without the requirement of extensions or other additional purchases. Access to a spreadsheet application, such as Microsoft Excel, may be required depending on data utilized by the reader to complete the outlined processes.

The data utilized for this process is available for all locations in the United States and is freely available from the U.S. Census Bureau.

Three specific pieces of information are required to complete an activity density analysis as outlined here: population values, number of jobs (employment), and geographic boundaries in which to constrain and symbolize these values.

Geography

This analysis is most effective when working at the lowest (smallest) level of geography for which data is available. The smaller the geographic unit of analysis utilized, the more detailed the final analysis will be. Typically, this analysis is used at the city/town or neighborhood level, to allow for sufficient detail. In the example described in this document, Census Block level geography is used as the basis for the analysis.

Census Block GIS data is available from the U.S. Census Bureau as part of the TIGER/Line data available here: https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html. It is recommended to utilize the version of the TIGER/Line shapefiles that most closely match the year of the population and employment data used later.

Population

Population data can be obtained a number of ways, it is recommended that the reader utilize a data format that will support joining the values to geographic data within a GIS software package. This can be accomplished by accessing block level population from the U.S. Census Bureau at http://data.census.gov. It is also possible to access block level GIS data that is pre-populated with population information across many vintages from the IPUMS National Historical GIS website at https://www.nhgis.org/.

Employment

Employment data utilized here is retrieved from the U.S. Census Bureau Longitudinal Employer-Household Dynamic (LEHD) OnTheMap tool available at: https://onthemap.ces.census.gov/. The data is accessed through the following steps.

- Select the geographic area of focus using the 'Search' tool.
- Click 'Perform Analysis on Selection Area.'
- Ensure the following selections are made on the following dialog window; 'Work', 'Area Profile', most recent year available, 'Private Primary Jobs'. (See screenshot below.)

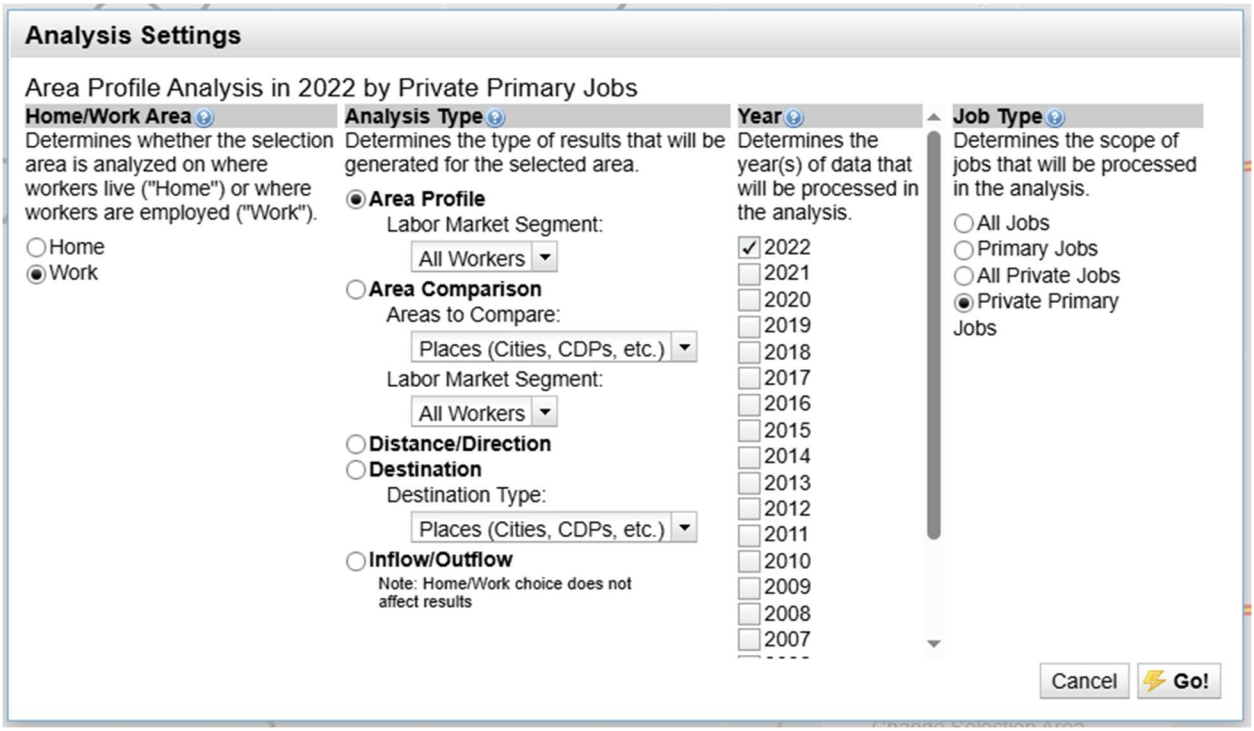


Figure 1: LEHD OnTheMap Analysis Settings

- Once the analysis process completes, click the 'Export Geography' link in the left panel.
- Select 'ShapeFile (Results, All Years)' in the dialogue box.
- The download should include two files, one called 'points_2022' and one called 'thermals_2022.' (The year suffix here will change if a different year is selected in the analysis settings dialogue.)
- Later the reader will add the 'points_2022' layer to the map.
- In the attributes for 'points_2022' locate the field labeled 'c000,' this is the jobs value that will be utilized in the activity density analysis.

Map Creation and Analysis Process

Once the necessary data and software have been collected, the data and map creation process can commence. Below are outlined the key steps of the process as utilized by the NADO Research Foundation.

1. Prepare the new map document.

Create a new map document and add the Census Block and 'points_2022' data that will inform the Activity Density map. Add any other base layers that may be necessary for display. The resulting map will look similar to the image below.

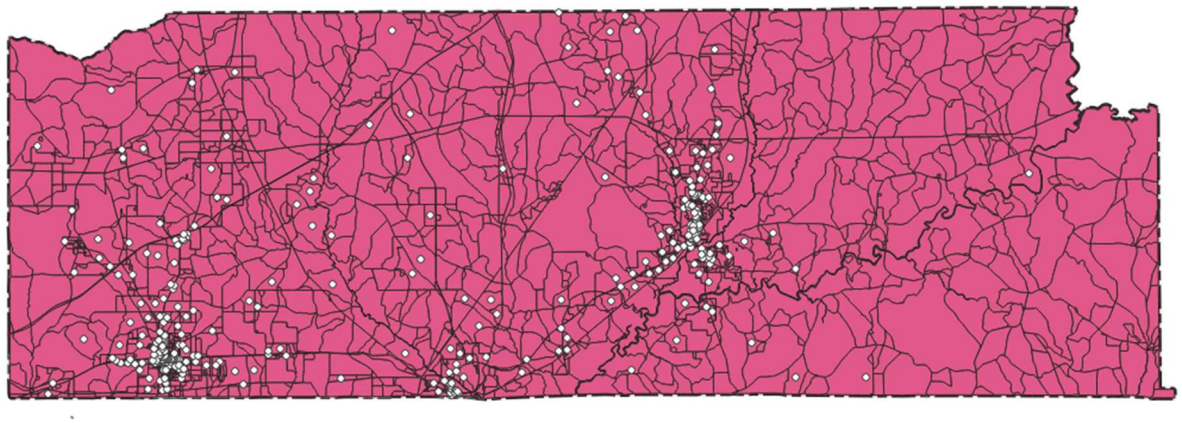


Figure 2: Example Map Displaying Census Blocks and Employment Data

1a. Join the population information.

If using Census Block data that does not already contain population information, perform a 'join' between the tabular data representing the population of each Census Block, and the Census Block GIS data layer. To complete a join in QGIS add the spreadsheet/csv to the map as a table, then right click the Census Block layer and select Properties>Joins (left panel)> click the '+' sign. Follow the dialog prompts. In ArcGIS Pro right click the Census Block layer in the contents panel and select Joins and Relates > Add Join and follow the prompts.

With the join complete, export the Census Block data layer to create a new version of the data with the population information included. Rename any fields as necessary for readability during the export process.

2. Calculate the areas in square miles.

The Census Block data contains area values measured in square meters. Add a new field to the attribute table that will contain the area in square miles. The values for this new field

can be calculated by using the 'field calculator' tool in either QGIS or ArcGIS Pro. To calculate the area in square miles multiply the 'ALAND20' value by .0000003861. If you prefer the area of measure to be acres, follow the same steps and multiply the 'ALAND20' value by .000247105. (*Note: The field 'ALAND20' may have a different suffix depending on the vintage year of the data, for example 2010 data would have 'ALAND**10**' as the field name.*)

At the conclusion of this step the exported Census Block layer should contain population information and area values in square miles.

3. Join the employment information.

Add the employment information to the Census Block layer by completing a spatial join.

In ArcGIS Pro click the Census Block layer in the contents panel, click Joins and Relates > Add Spatial Join. In the resulting dialog box select the Census Block layer for 'Target Features' and 'points_2022' for the 'Join Features.'

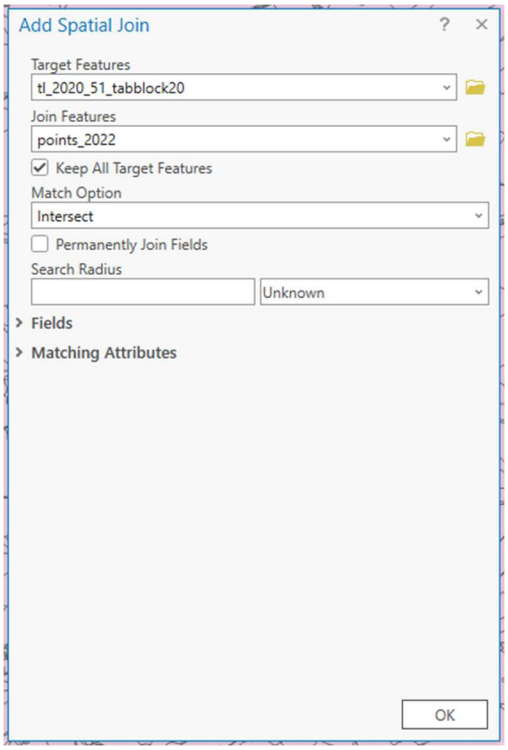


Figure 3: ArcGIS Pro Spatial Join Dialogue Box

In QGIS click Processing > Toolbox > and in the search box look for 'Join Attributes by Location.' In the dialogue box the input features (top option) should be the Census Blocks layer, the join features (second option) should be the 'points_2022' layer.

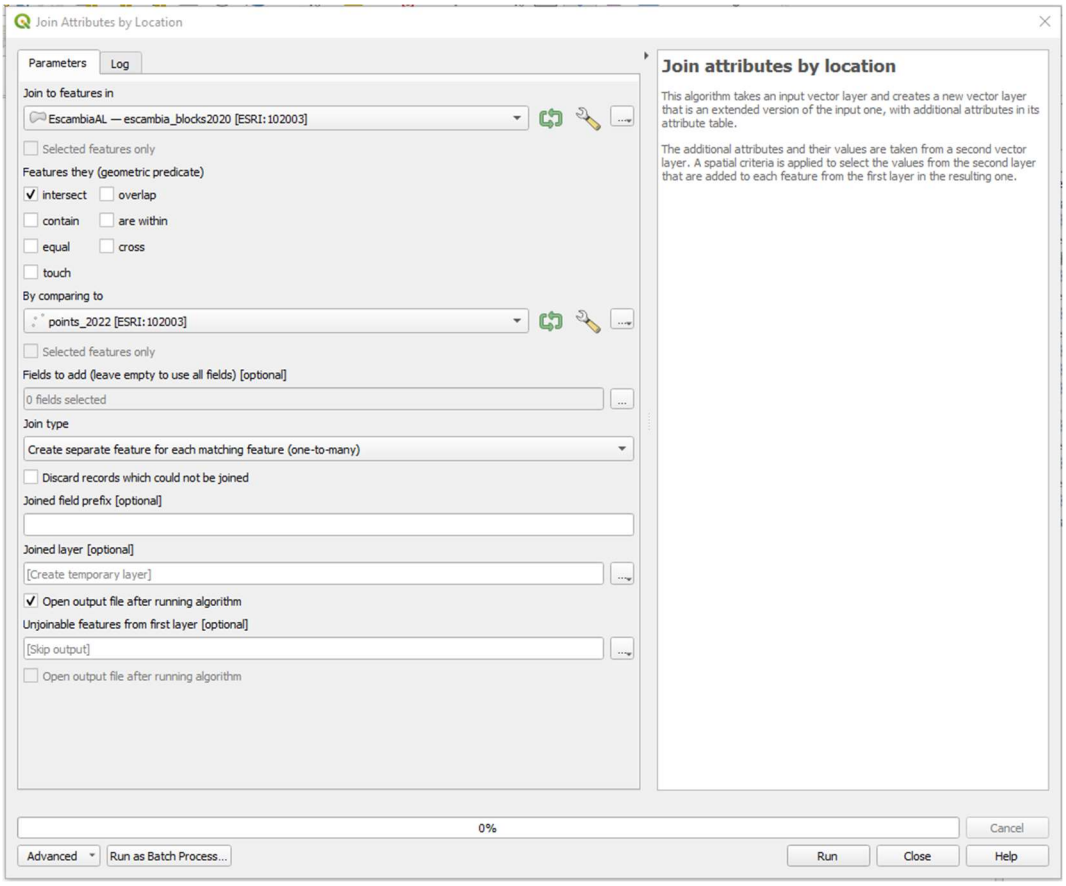


Figure 4: QGIS Join By Location Dialogue Box

Following the completion of the spatial join, export a new version of the Census Block data with the employment information included (field 'c000' from the points2022 layer). It is recommended at this step to delete any unused or unnecessary fields from the attribute table.

4. Calculate the activity density values.

Calculate the activity density values by using the field calculator.

In the Census Block data layer exported in the previous step, identify the population field, the employment field, and the square miles field. These will be utilized to complete the final calculation. Add a new field in the attribute table that will hold the Activity Density values.

In the field calculator tool (ArcGIS Pro or QGIS) create an expression that will utilize the values referenced above to create the final activity density value. The general expression is:

([population field] + [employment field]) / [square acres field]

The resulting calculation should populate the new field you created earlier in this step.

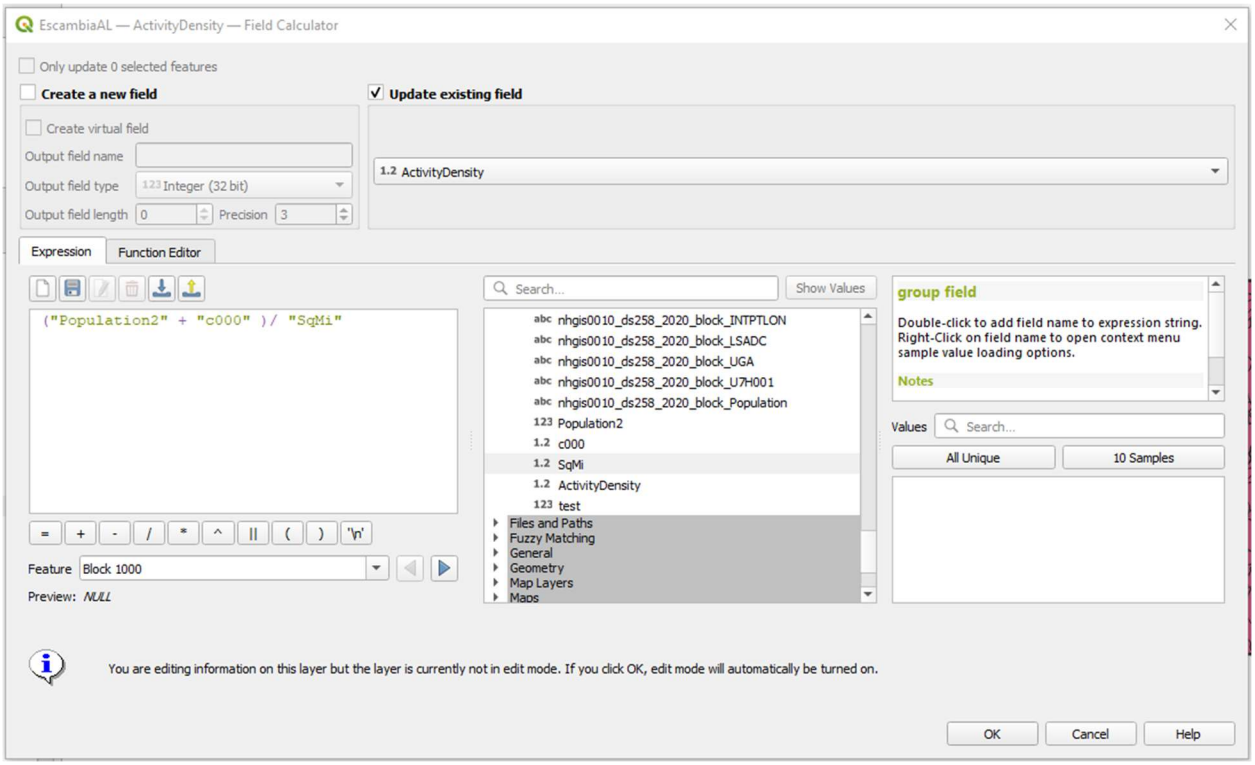


Figure 5: QGIS Field Calculator Dialogue Box for Activity Density Calculation

5. Symbolize the resulting data utilizing the Activity Density attribute values.

With the final version of the Census Blocks data layer visible, symbolize the layer utilizing the calculated Activity Density value. Use your discretion on the method of classifying the data for display. When working in QGIS, the NADO RF staff often utilizes the 'Equal Count (Quantile)' or 'Natural Breaks (Jenks)[4]' classification methods for displaying this data.

[4] Data Classification Methods; https://pro.arcgis.com/en/pro-app/latest/help/mapping/layer-properties/data-classification-methods.htm.

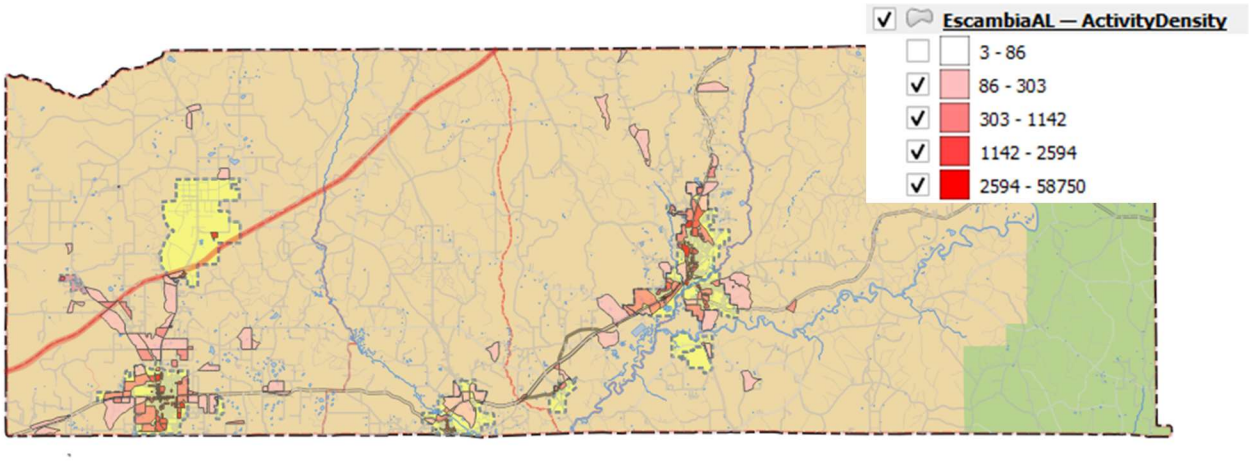


Figure 6: Activity Density Map with Data Classifications

It may be desirable to hide specific categories of classified data, to create a more focused output. In figure 6 above, note that the data category of values from 3 to 86 is not displayed on the map. The reader should modify both the classification values and the categories displayed to best match the conditions being represented. Also note that all Census Blocks with null/zero values have been omitted from the map. (The Activity Density values in the data range from a low value of 3 to a high value of 58,750.)

When reviewing the numerical Activity Density values, keep in mind these are mathematical totals for illustration purposes. There is no actual location with a real-life value of 58,750 jobs and population per acre. Likely this is a small (area) Census Block with a relatively 'high' value of jobs and population, the exact number value is not of great value, as the goal is to provide a value that can be compared to all other locations for which data is available. These can be thought of as a continuum of values on a scale from low to high. Areas with higher Activity Density values can be reasonably understood to exhibit conditions where higher levels of active transportation use and demand are expected, due to the existence of people living and working in those areas.

Appendix J: Escambia County: Historical Safety Data Analysis

Escambia County - Historical Safety Data Analysis

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June 2025
Draft v2.0

About WTI & the NADO Research Foundation

The Western Transportation Institute (WTI) was founded in 1994 by the Montana and California Departments of Transportation, in cooperation with Montana State University. WTI concentrates on rural transportation research; as stewards and champions of rural America, WTI also has a strong interest in sustainability. WTI research groups create solutions that work for clients, sponsors, and rural transportation research partners. WTI Research Centers include the Montana Local Technical Assistance Program, the National Center for Rural Road Safety, the Small Urban, Rural and Tribal Center on Mobility, the Federal-Public Lands Transportation Institute, and the West Region Transportation Workforce Center.

Founded in 1988, the NADO Research Foundation is the nonprofit research affiliate of the National Association of Development Organizations (NADO). The NADO Research Foundation identifies, studies, and promotes regional solutions and approaches to improving local prosperity and services through the nationwide network of regional development organizations (RDOs). The Research Foundation shares best practices, offers professional development training, analyzes the impact of federal policies and programs on RDOs, and examines the latest developments and trends in small metropolitan and rural America. Most importantly, the Research Foundation is helping bridge the communications gap among practitioners, researchers, and policymakers. Learn more at www.NADO.org and www.RuralTransportation.org.

Disclaimer

Any opinions, findings and conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the South Alabama Regional Planning Commission (SARPC), the National Association of Development Organizations, or the United States Department of Agriculture (USDA). USDA is an Equal Opportunity Provider.

The authors and sponsoring agencies do not endorse products of manufacturers. Trademarks or manufacturers' names appear herein only because they are considered essential to the subject of this document.

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1 Introduction

The purpose of this document is to provide a historic (5 year) and baseline roadway safety analysis for Escambia County in rural Alabama. This effort is being support by the National Association of Development Organizations (NADO) and the Western Transportation Institute (WTI) at Montana State University, and in partnership with the Southern Alabama Regional Planning Commission (SARPC) as part of an ongoing technical assistance project funded by the United States Department of Agriculture (USDA). This safety analysis is intended to be one component of a larger safety action plan document that can be utilized to apply for funding to improve transportation conditions in Escambia County. These improvements will be especially beneficial for vulnerable road users and those utilizing active modes of transportation including walking and biking.

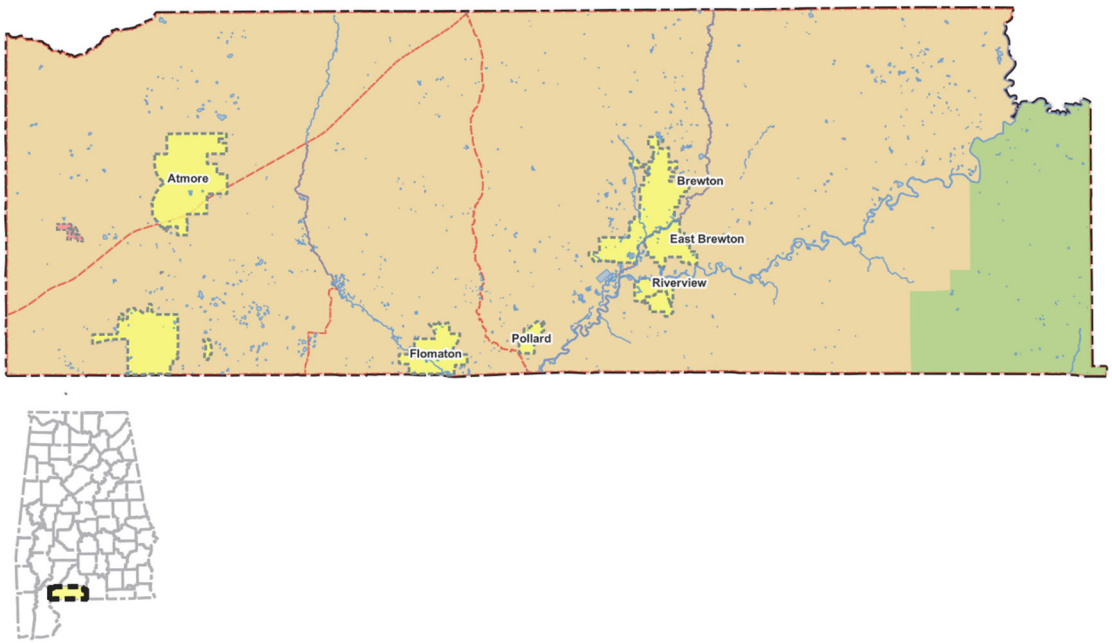


Figure 1: Study Area

Figure 1: Study Area

2 Safety Action Plan Creation Process

The United States Department of Transportation (USDOT) has outlined eight key components of a safety action plan document.

1. Leadership and Goal Setting
2. Planning Structure
3. Safety Analysis
4. Engagement and Collaboration
5. Equity
6. Policy and Process Changes
7. Strategy and Project Selections
8. Progress and Transparency

This document created by the research team contains items and discussion related to number three – safety analysis. The guiding language[1] offers these descriptions of what the material content should contain.

> Safety analysis is analysis of existing conditions and historical trends that provides a baseline level of crashes involving fatalities and serious injuries across a jurisdiction, locality, Tribe, or region.
>
> It includes an analysis of locations where there are crashes and the severity of the crashes, as well as contributing factors and crash types by relevant road users (e.g., motorists, pedestrians, transit users).
>
> Analysis of systemic and specific safety needs is also performed, as needed (e.g., high-risk road features, specific safety needs of relevant road users, public health approaches, analysis of the built environment, demographics, and structural issues).
>
> To the extent practical, the analysis should include all roadways within the jurisdiction, without regard for ownership. Based on the analysis performed, a geospatial identification of higher-risk locations is developed (a high-injury network or equivalent).

All remaining sections of the safety action plan as described will be completed by SARPC staff, with assistance from the research team as requested.

2.1 High Injury Network - Data Creation Methodology

This section contains the methodology utilized to create the High Injury Network (HIN) data that reflects specific road segments and intersection locations that could be considered for future investment and improvement in order to advance safety goals set forth by SARPC and local member governments. The overall purpose of developing the HIN locations (road segments and intersections) is to determine eligible locations where future investments through discretionary funding programs like SS4A and others

[1] U.S. Department of Transportation – Comprehensive Safety Action Plans. https://www.transportation.gov/grants/ss4a/comprehensive-safety-action-plans#nofo-table-1.

could be programmed, as well as enhancing overall transportation safety planning efforts across the region.

High Injury Network – Road Segments

This safety action plan was created using data obtained from SARPC which originated from State of Alabama crash data in conjunction with the CARE (Critical Analysis Reporting Environment) software package developed by the University of Alabama College of Engineering – Center for Advances Public Safety.[2] Data utilized in this report for Escambia County represents crash incidents reported between 2018 and 2023. This data was imported into a GIS environment utilizing the latitude and longitude attribute values populated within the data sets. Once imported this data was analyzed in reference to U.S. Census Bureau TIGER Road Data (2017) retrieved from the Alabama Open Data Portal, hosted by the Alabama Geographic Information Office.[3] No other identifiable high quality GIS road data suitable for this type of analysis was available for the purposes of this safety action plan.

With the spatial data loaded for analysis, NADO Research Foundation staff completed the creation of a High Injury Network data layer based on information found in the spatial data. The process utilized was based on review of other similar analyses done by planning organizations across the country for the purposes of creating safety action plans. Some of the plans reviewed included the following: *(Please note that many of these are urban plan documents, and they were selected because they offered detailed information on the methodology used to generate various data that was used in the overall high injury network and safe streets analysis.)*

AMATS - Akron Ohio - https://amatsplanning.org/safe-streets-4-all/
City of Toledo Ohio - https://cdn.toledo.oh.gov/uploads/documents/Public-Service/Transportation/2023-Toledo-Vision-Zero-Plan-Draft.pdf
CORPO - Columbus Ohio - https://www.morpc.org/programs-services/corpo-safety-action-plan/
City of Richmond - Richmond RTPO – Richmond, Virginia - https://planrva.org/wp-content/uploads/RRTPO_VZ2022_DRAFT_2022February.pdf
Mid Region COG – Albuquerque, New Mexico - https://www.mrcog-nm.gov/570/High-Fatal-and-Injury-Network
Indianapolis MPO – Indianapolis, Indiana - https://www.indympo.org/resources/safety
City of Fort Collins - https://www.fcgov.com/traffic/visionzero
Pinellas County Florida - https://forwardpinellas.org/safestreets/wp-content/uploads/2021/03/6-Safe-Streets-Pinellas-Action-Plan-High-Injury-Network.pdf

The first step of the HIN creation process was to identify the fatal and suspected serious injury crashes in the data for Escambia County between 2018 and 2023. In total there were 340 incidents. The second step was to separate crash events that were related to intersections. This was completed by filtering on the attributes based on the values for 'At Intersection' and 'Intersection Related,' all events with a 'yes' value in either of these categories were removed from the analysis for road segments to be used later in intersection specific considerations. The third step was to relate the remaining crash incidents to road segments in the GIS road data. A process called 'join attributes by nearest' utilizing the 'nearest neighbor' processing calculation available in most GIS software packages, was used to complete this step. The fourth step was to create a scoring criterion for the road segments. With the crashes joined to

[2] CARE Software - https://www.caps.ua.edu/software/care/.
[3] AGIO Alabama Open Data Portal - https://data-algeohub.opendata.arcgis.com/.

segments, the number of related events per segment was added to the attributes as a 'Total' value. A 'HIN_Pts' (HIN Points) value was added that added a weighted scoring for fatal events. The calculation for 'HIN_Pts' is:

(Fatal Incidents*2) + Serious Injury Incidents = HIN Points

To illustrate, for Escambia County these calculations yielded values between 0 and 39 points. Based on these values, the GIS mapping software was utilized to create classifications of these values based on Jenks natural breaks optimization method. For both counties this created five classifications. Guidance suggested in the case study 'California's High Injury Network and Planning For Zero' completed in 2022 suggests that high injury networks should generally represent 5 to 20 percent of total mileage in a road network. [4] In the cases presented here and as illustrated in map images later, the lowest two categories of HIN scoring have been omitted from the map to ensure that the amount of mileage up for consideration here remains within the recommendations provided by the aforementioned case study. In this scenario 205 miles of road segments were identified (7.3% of total mileage) for Escambia County as part of what can be called the high injury network.

A note on joined crash incidents: many road segments in GIS datasets contain coincident features (i.e. features that are on top of each other). When using the process outlined above to locate crash incidents and relate them to road segments for the purposes of creating the high injury network, crash incidents will be duplicated due to these coincident features. While this is technically correct and accurate, without this description the changing number of total incidents used in the various calculations may be confusing to some.

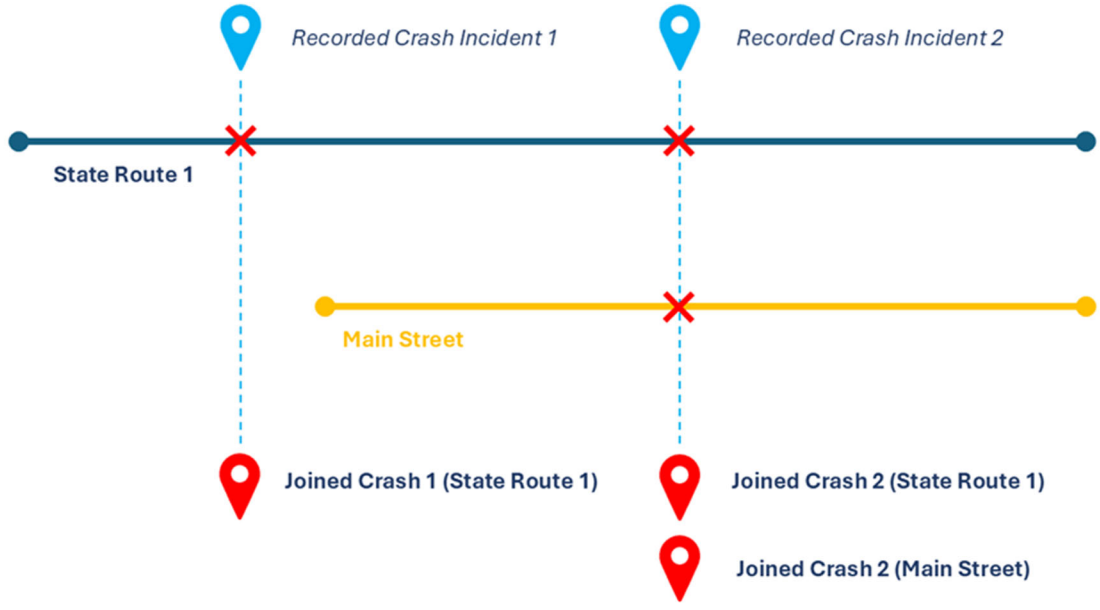


Figure 2: Crash Incidents on Coincident Road Features

[4] California's High Injury Network and Planning For Zero – FHWA Office of Safety, Roadway Safety Data Program https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-10/California%20HIN_Case%20Study_Final%20Draft.pdf.

High Injury Network – Intersections

As stated earlier, all fatal and suspected serious injury incidents that were recorded via attribute to have occurred 'at an intersection' or were 'intersection related' were removed from the previous analysis. In summary these totaled 97 events in Escambia County. No existing road intersection data was available for Escambia County for use in this project. For the purposes of this analysis, road intersection data was created by the NADO RF team by executing an 'intersect' operation on the TIGER road data, creating a point layer as the output. Following this a 'clean' operation was executed on the previously created point layer to eliminate duplicate points that were geographically coincident. This produced over 5,000 intersection locations in Escambia County. It is important to note that the NADO RF team is unable to verify the real-world status of these intersections, meaning verification that they are vehicular intersections, the presence of any travel direction or turn restrictions, they are signed, they have existing counter measures in place, or any other physical conditions that may or may not be present in these locations. Next, each fatal or serious injury intersection related event was buffered by 100 feet. All created intersection points found within the 100-foot buffer areas of these events were exported as 'HIN_Intersections.' In total this resulted in the identification of 67 intersections in Escambia County. These intersections were not scored or ranked in any way but could be in the future as a method to add greater detail to the analysis. The intersections are labeled on the maps in the order they exist in the data tables, the enumeration is not indicative of any data or information.

3 Safe System Approach

According to the National Highway Traffic Safety Administration (NHTSA) in May of 2024, a review of nation-wide crash statistics for 2021 indicated that 40% of all motor vehicle traffic accident fatalities occurred in rural areas.[5] This report also highlights that traffic fatalities in rural areas increased by 5% between 2020 and 2021. These unfortunate trends highlight the need for continued focus on safety in rural areas of the United States. One approach to addressing these concerns is known as the 'Safe System Approach' and includes five key concepts: safer people, safer vehicles, safer speeds, safer roads, and post-crash care.[6]

[5] NHTSA Traffic Safety Facts – 2021 Data, May 2024, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813488.
[6] U.S. Department of Transportation – Safe System Approach, https://www.transportation.gov/safe-system-approach.



Figure 3: U.S. Department of Transportation - Safe System Approach Concepts

By undertaking an analysis of existing conditions and a review of existing crash statistics and information for rural southern Alabama, local elected officials and transportation officials can work collaboratively to implement countermeasures that will effectively reduce the number of serious and fatal injury crashes across the transportation network. The goal of the analysis in this document is to provide information that will assist in decision making in three of the five areas highlighted above; safer people through the encouragement of responsible driving behavior, safer speeds by gaining understanding about events currently taking place on local roads, and safer roads by analyzing available data that will provide guidance toward consideration of effective and appropriate countermeasures.

To assist local communities in these efforts, the U.S. Department of Transportation – Federal Highway Administration has provided guidance on safety countermeasures that have been proven to be effective against serious and fatal injury crashes and appropriate for all types of roadway configurations.[7] These countermeasures are organized into five categories with additional information and images of examples available for each item listed below.

Speed Management
- Appropriate Speed Limits for All Road Users
- Variable Speed Limits

Pedestrian/Bicyclist
- Bicycle Lanes
- Medians and Pedestrian Refuge Islands
- Road Diets (Roadway Reconfiguration)
- Crosswalk Visibility Enhancements
- Pedestrian Hybrid Beacons
- Walkways

[7] U.S. Department of Transportation – Federal Highway Administration, https://highways.dot.gov/safety/proven-safety-countermeasures.

- Leading Pedestrian Interval
- Rectangular Rapid Flashing Beacons (RRFB)

Roadway Departure
- Enhanced Delineation for Horizontal Curves
- Roadside Design Improvements at Curves
- Longitudinal Rumble Strips on Two-Lane Roads
- SafetyEdge
- Median Barriers
- Wider Edge Lines

Intersections
- Backplates with Retroreflective Borders
- Reduced Left-Turn Conflict Intersections
- Yellow Change Intervals
- Corridor Access Management
- Roundabouts
- Dedicated Left and Right Turn Lanes at Intersections
- Systemic Application of Multiple Low-Cost Countermeasures at Stop Controlled Intersections

Crosscutting
- Local Road Safety Plans
- Pavement Friction Management
- Road Safety Audit

4 Existing Conditions

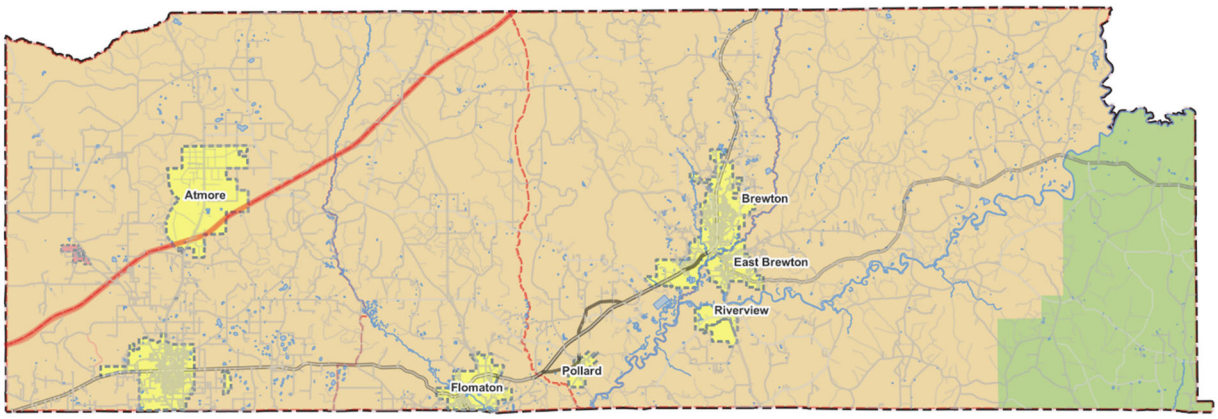


Figure 4: Existing Conditions

Escambia Counties is a rural county located in southern Alabama, immediately north and west of the Florida border. Escambia is a member of the South Alabama Regional Planning Commission (SARPC) in Mobile Alabama, which provides regional community and economic development services to local communities. These services also include transportation planning activities that serve the Mobile

Alabama metropolitan area as well as other non- metropolitan rural areas. Escambia County encompasses the only federally recognized Tribal entity within the State of Alabama, The Poarch Creek Indians located near Atmore, Alabama.

Escambia County is home to over 2,800 miles of roadways. These roadways include interstates, U.S. routes, state routes, county roads, municipal roads, as well as other features including private and service roads.

Table 1: Roadway Mileage by Classification in Escambia County

Roadway Classification	Escambia County Mileage
Interstate	56
U.S.	113
State	114
County	333
Common/Muni.	1,350
Other	2
*Null**	*837*
*Tribal***	*23*
*BIA***	*21*
Total	2,805

Note: Mileages rounded to the nearest mile.
**Null values in the U.S. Census Bureau TIGER road data file provided by the Alabama Geographic Information Office include local neighborhood roads, rural roads, city streets, ramps, 4wd vehicle trails, service drives, and private/service roads. This was ascertained by examining the MTFCC attribute and comparing these with the values in the MAF/TIGER Feature Class Code Definitions for 2022 found at: https://www2.census.gov/geo/pdfs/reference/mtfccs2022.pdf.*

***Tribal and BIA values were generated by NADO staff after attempting to digitize road features that were highlighted in the 2024 Parch Creek Indians Long Range Transportation Plan, page 17[8]. Best efforts were made to duplicate the values indicated in Figure 6, but some details were not visible at the scale presented. These values are also not included in the total calculation as presented since they were not identified separately in the source data from the U.S. Census Bureau, but are included in other categories.*

Highway infrastructure and mobility via automobile is critical to the economy Escambia County. According to American Community Survey data for 2022, 91% of Escambia County workers 16 years of age and older drove alone for work. This is eight percent greater than the corresponding state average, and 19% greater than the corresponding national average. The mean travel time to work for these individuals was 21.6 minutes, which is lower than both state and national averages.[9]

[8] Poarch Creek Indians Long Range Transportation Plan 2024; https://www.qk4.com/wp-content/uploads/2024/03/PBCI-LRTP-202403-publicComments-web.pdf.
[9] U.S. Census Bureau – American Community Survey – 2022 5 Year Estimates; Escambia County, Alabama,Table B08006 – Sex of Workers by Means of Transportation to Work.

According to 2021 data produced by the U.S. Census Bureau as part of the LEHD On the Map product, over 5,900 residents leave Escambia County each day for work, while 3,875 enter the county.

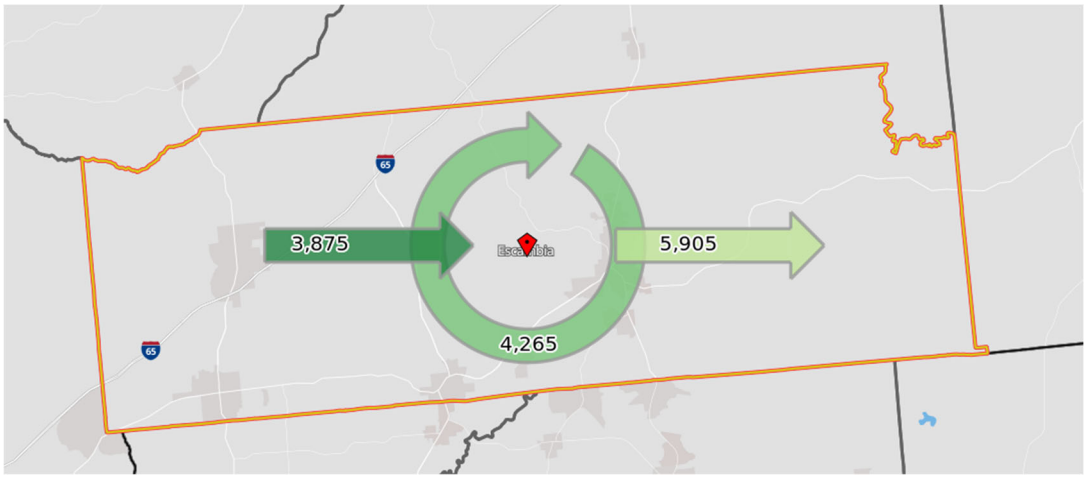


Figure 5: Inflow/Outflow Data for Escambia County

Annual average daily traffic (AADT) data provided by the Alabama Department of Transportation for 2022 illustrates the volume of vehicle traffic for Escambia County in relation to the heavy vehicle travel conditions that have been described above.

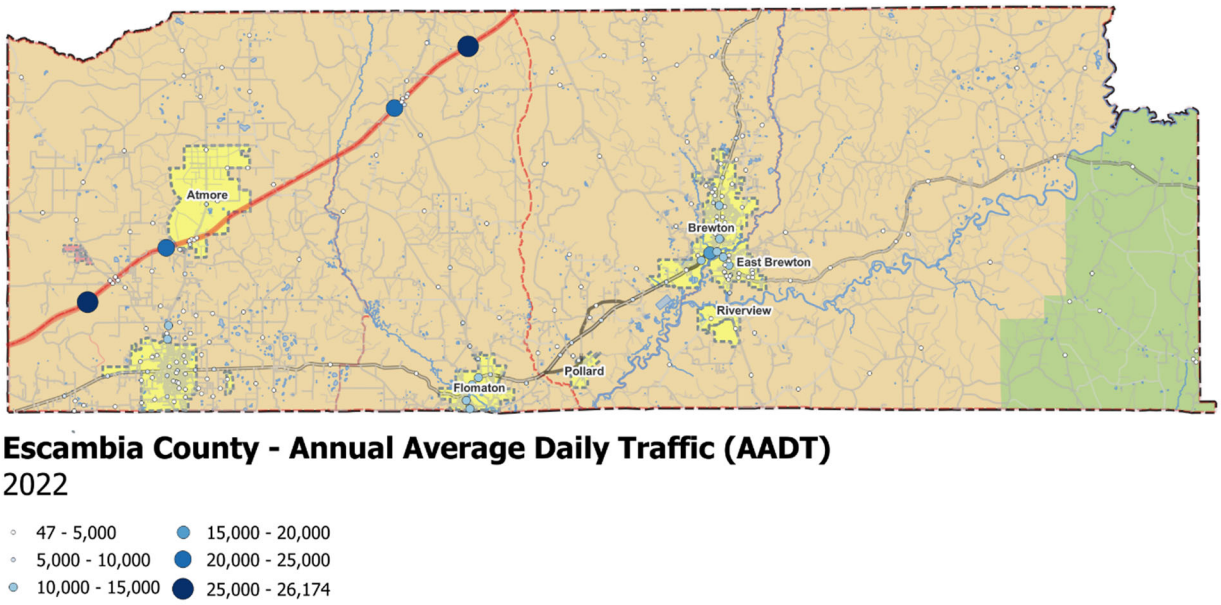


Figure 6: AADT Data for Escambia County, 2022

In Escambia County the highest AADT values for 2022 were recorded on interstate 65 which passes through Atmore in the northwest portion of the county. Other concentrations of elevated traffic volumes can be seen in Brewton, East Brewton, Flomaton, and on State Route 21 south of Atmore. AADT values in the county ranged from a low of 47 vehicles per day, to a high of 26,174.

With this context in mind, the historical vehicle crash information for Escambia County between 2018 and 2023 provides information that can help implement the safe systems approach to safety described

earlier in this document. As illustrated below, crash incidents were dispersed across the county, with higher rates of crashes shown in general proximity to segments with higher reported AADT values.

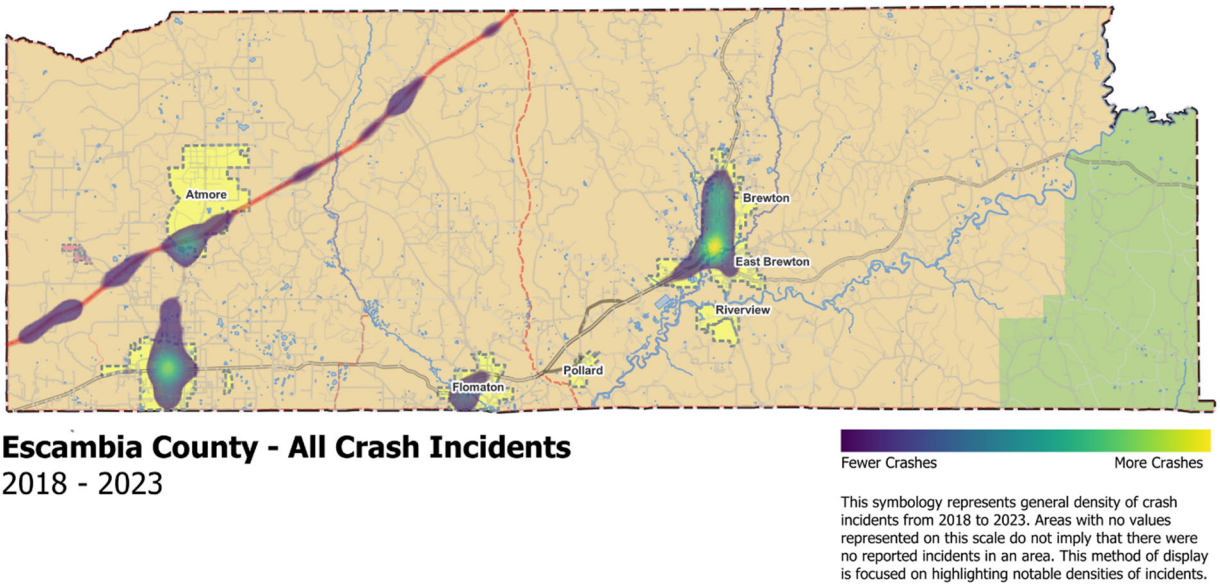


Figure 7: All Escambia County Crash Incidents, 2018 - 2023

Overall, total crashes in Escambia County are down between 2018 and 2023 (-51), after a two-year rise in 2021 and 2022. There was an average of 816 crash incidents per year during this period. Additional information about the severities, contributing factors, and other data will be provided in subsequent sections.

5 Safety Analysis

Crash data for Escambia County was provided to the research team from Alabama's Critical Analysis Reporting Environment (CARE) for the years 2018 through 2023. In Escambia County, a total of 4,897 crashes were reported over this time period, with 1% resulting in at least one fatality and 6% resulting in a suspected serious injury.

Table 2: Number & Percentage of Crashes by Severity in Escambia County

Level of Severity	**Escambia County**	
	Number	Percentage
Fatal Injury (K)	48	1.0%
Suspected Serious Injury (SI)	292	6.0%
Possible Injury	341	7.0%
Non-Incapacitating Injury	448	9.1%
Property Damage Only (PDO)	3,526	72.0%
Unknown	242	4.9%
Total	4,897	100%

The data suggests that while Escambia County has a relatively low number of crash incidents, when they do occur, they are severe. Severe incidents comprised approximately 6.0% of all incidents in Escambia County. In total Escambia County experienced 340 incidents resulting in a fatality or serious injury during this period.

Over the six-year period from 2018 through 2023, most crashes in Escambia County occurred in 2022, with the fewest occurring in 2020. In 2020, people were encouraged to stay home during the coronavirus pandemic, resulting in less vehicle miles traveled and explaining the overall reduced frequency of crashes.

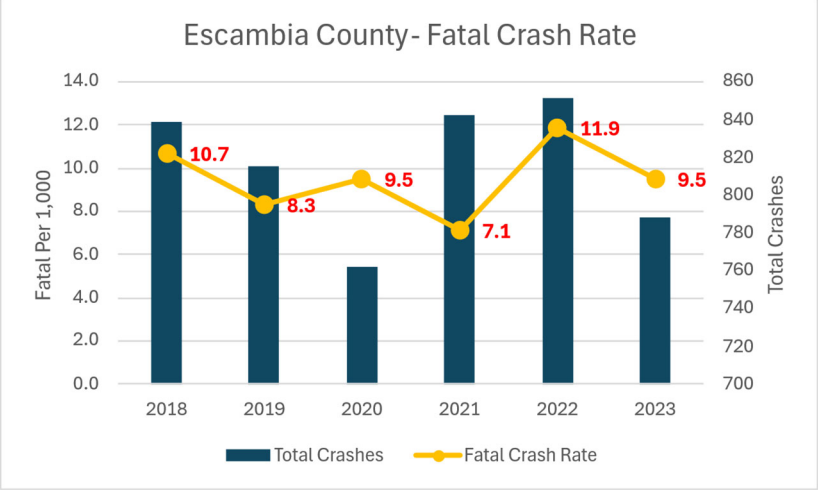


Figure 8: Escambia County Fatal Crash Rate, 2018 - 2023

The geographic distribution of all fatal and serious injury crash incidents reported in Escambia County between 2018 and 2023 is illustrated in the map image below.

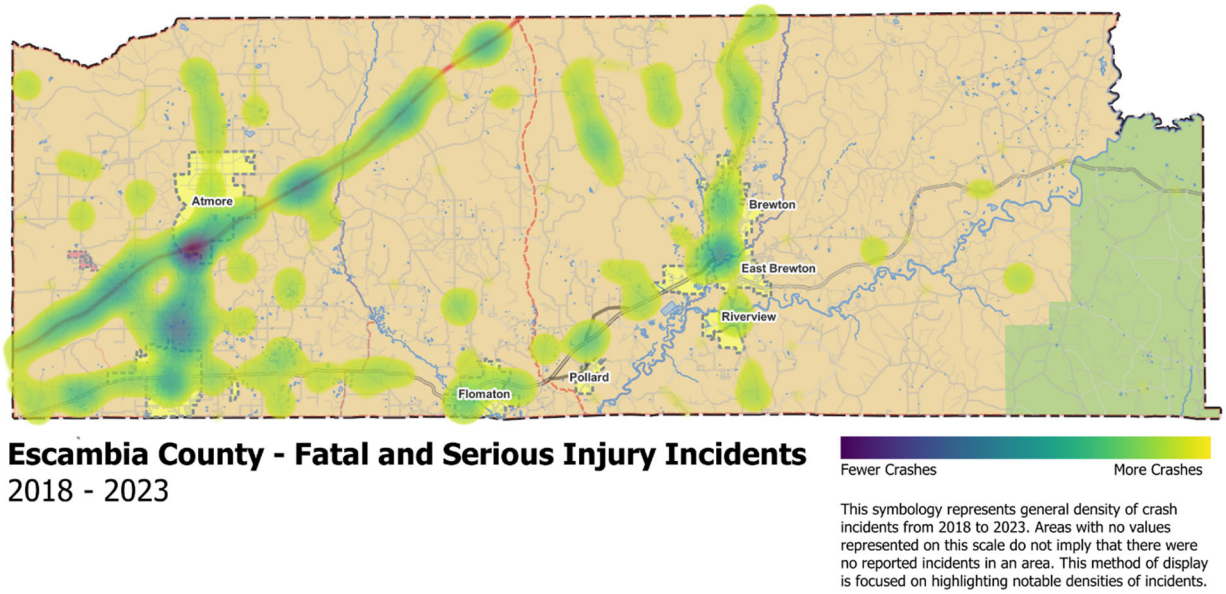


Figure 9: Escambia County Fatal and Serious Injury Incidents, 2018 - 2023

Year	Number of Crashes
2018	839
2019	815
2020	762
2021	842
2022	851
2023	788
Average	816
Total	4,897

Table 3: Frequency of Crashes by Year in Escambia County

When investigating the influence of the month of the year on the frequency of crashes, for Escambia County, the average monthly frequency of crashes is 408, with April having the fewest at 357 and November has the most at 466.

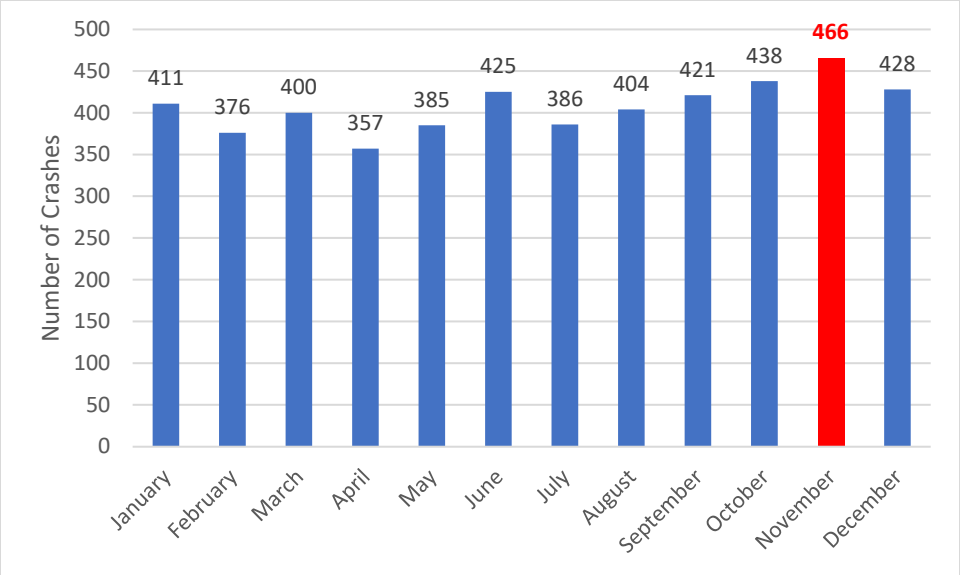


Figure 10: Frequency of Crashes in Escambia County by Month, 2018 - 2023

When considering the day of the week, Friday has the greatest frequency of crashes and Monday the fewest over the five-year period for both Escambia County.

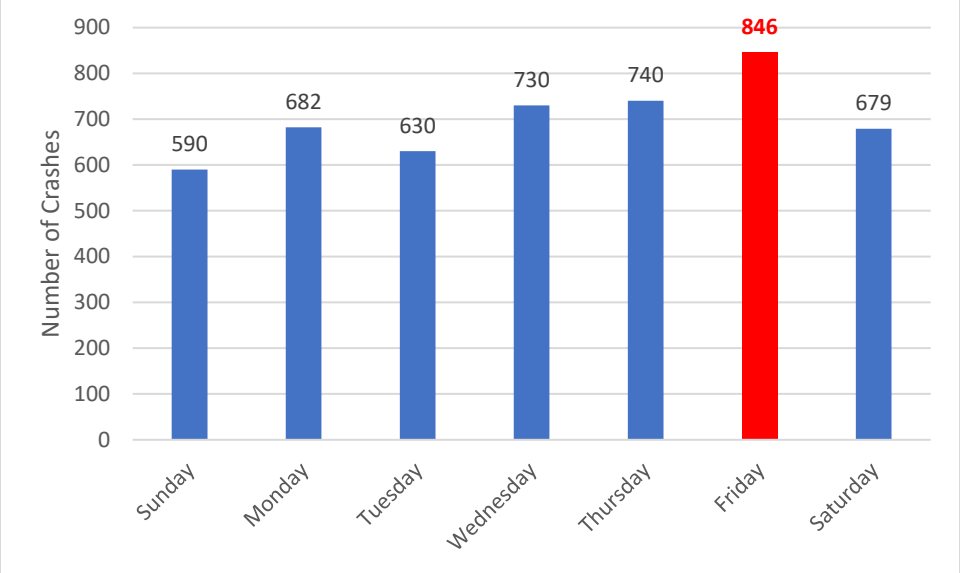


Figure 11: Frequency of Crashes in Escambia County by Day of Week

The two crash types that were reported as accounting for more than fifty percent of all crashes in Escambia County are single vehicle and rear end crashes. Specific attention should be paid to the single vehicle crashes identified in both counties, as these are the types of crashes most readily addressed by the systemic approach to roadway improvements. This approach maximizes the use of widespread and low-cost countermeasures that can be implemented for significant benefit to the travelling public.

Crash Type	Escambia County	
	Number	Percentage
Single Vehicle (all types)	1,860	38.0%
Rear End (front to rear)	1,206	24.6%
Side impact (angled)	414	8.5%
Side Impact (90 degrees)	311	6.4%
Sideswipe – Same Direction	292	6.0%
Angle (front to side), Opposite Direction	151	3.1%
Angle (front to side), Same Direction	138	2.8%
Angle Oncoming (frontal)	93	1.9%
Head-On (front to front only)	83	1.7%
Sideswipe – Opposite Direction	82	1.7%
Non-Collision	61	1.2%
Causal Vehicle Backing: Rear to Side	49	1.0%
Causal Vehicle Backing: Rear to Rear	11	0.2%
Other	138	2.8%
Unknown	8	0.2%
Total	4,897	100%

Table 4: Number & Percentage of Crash Type in Escambia County

5.1 Vulnerable Road Users

For Escambia County, twenty crashes (0.4%) involved a pedestrian; six crashes (0.1%) involved a bicyclist; and seventy-two crashes (1.5%) involved a motorcyclist. Of the recorded bicyclist incidents, no fatalties or serious injuries were reported, while three injuries were reported overall. For the twenty pedestrian incidents, four were reported as fatal, resulting in four deaths. Nine serious injuries were also reported related to pedestrian incidents.

The geographic distribution of crashes in Escambia County is notable, in that the southern section of Atmore, Alabama seems to constitute the majority of bicycle and pedestrian crashes (**Error! Reference source not found.**).

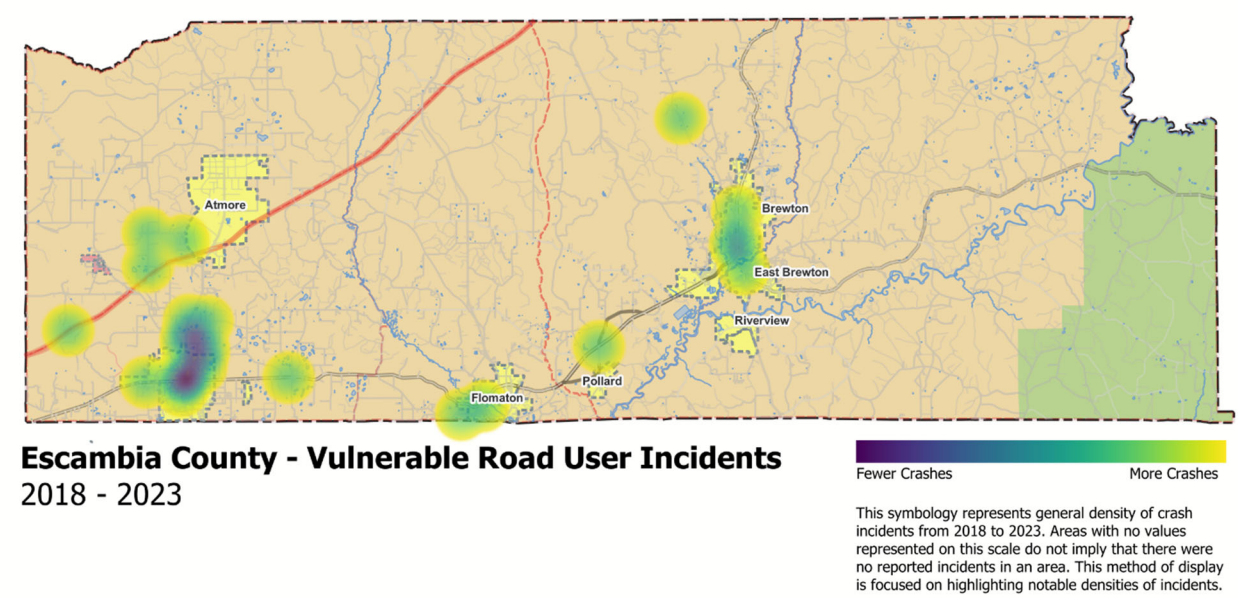


Figure 12: Bicycle & Pedestrian Crashes in Escambia County

Looking closer at the Atmore area, it appears at least three pedestrian crashes occurred along Alabama State Route 21 near Pleasant Hill in the vicinity of housing and commercial locations including a restaurant. A review of the location utilizing aerial photography shows limited shoulders and a high posted speed limit (65 mph); speeds in excess of 45 mph are known to be attributed with a high likelihood of mortality for pedestrians and bicyclists.

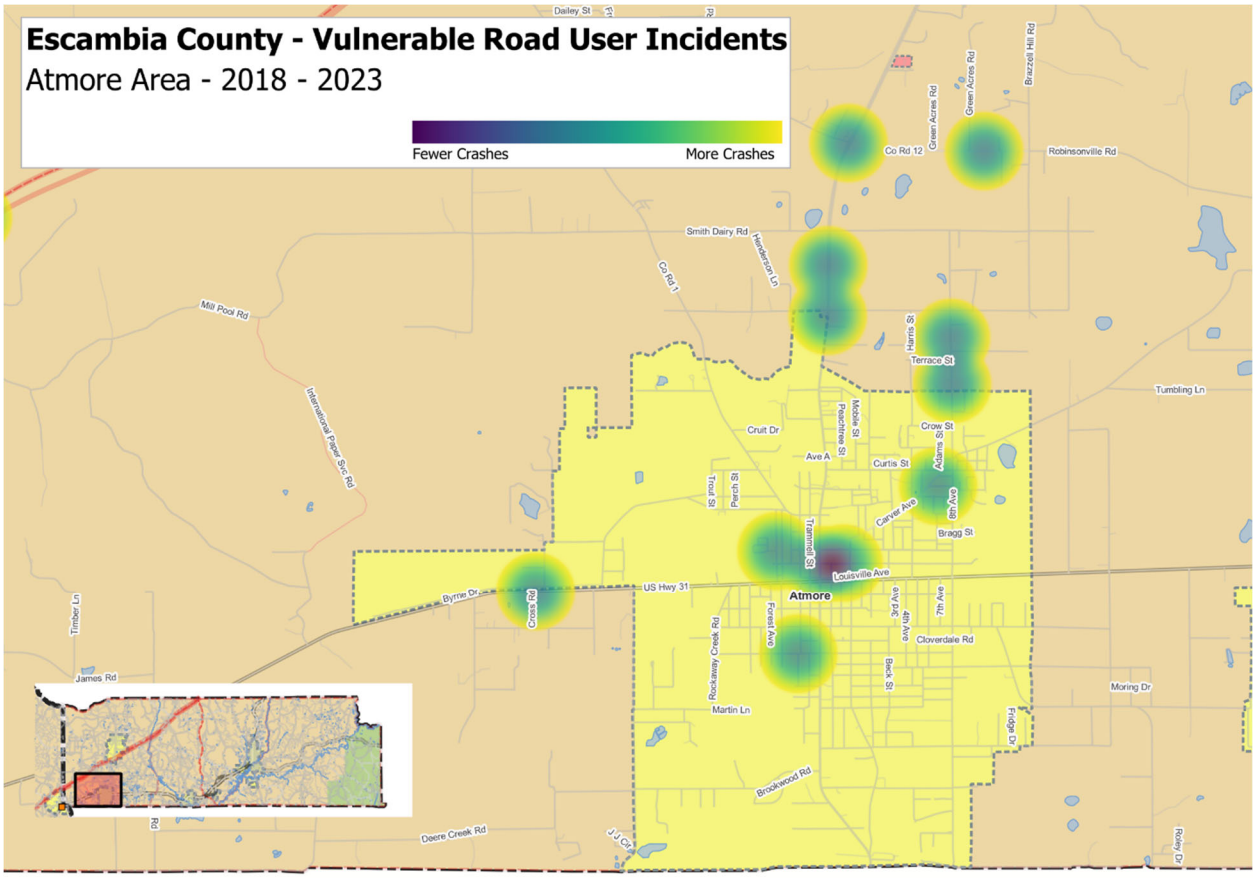


Figure 13:Bicycle & Pedestrian Crashes in Escambia County near and within Atmore (south), Alabama

While only a few bicycle crashes occurred in Brewton, Alabama, two of the three were also on a state route. Furthermore, the pedestrian crash in East Brewton was on a state roadway (Figure 14). All three bicycle-related incidents in the Brewton area on the map image below appear to have taken place in areas with very narrow shoulder areas where bicycles and vehicles can share the road.

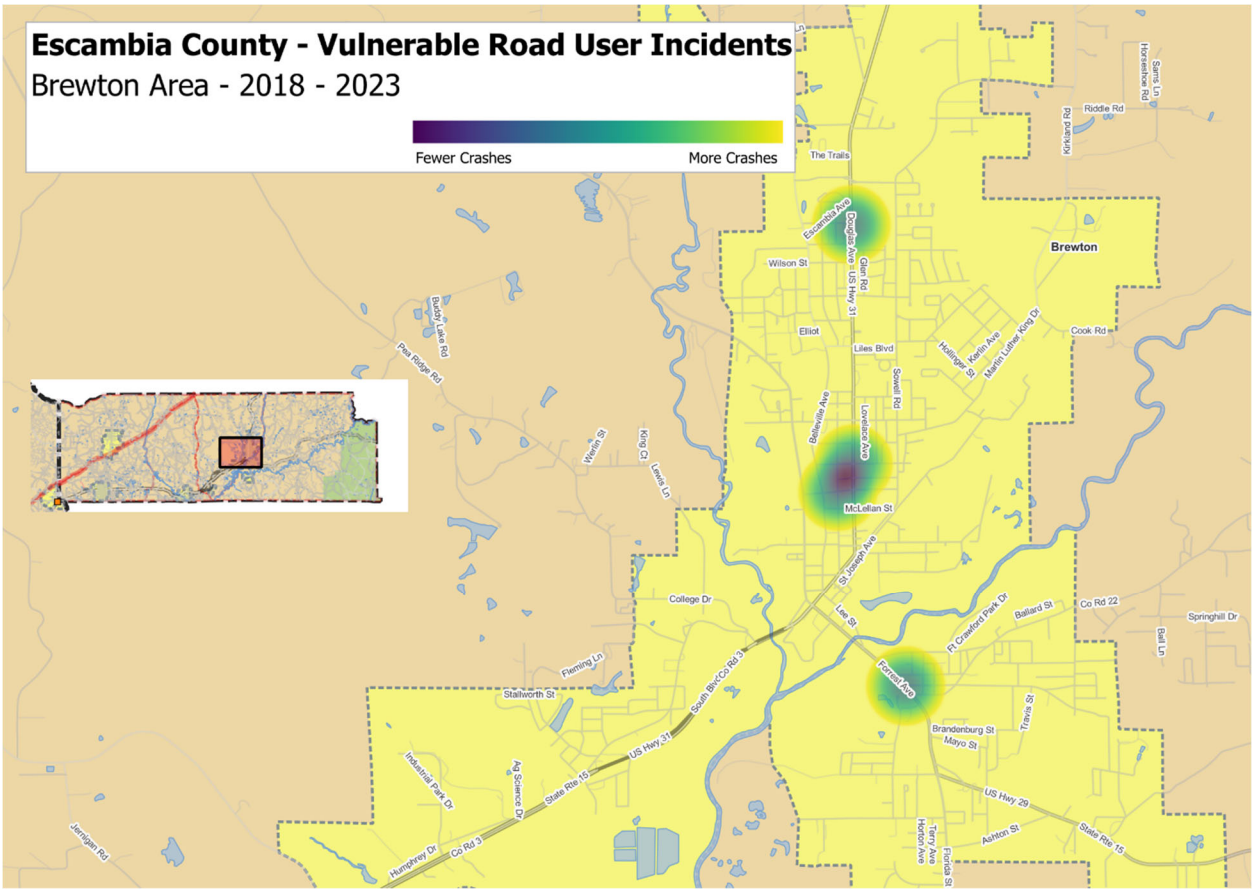


Figure 14: Bicycle & Pedestrian Crashes in Escambia County within Brewton, Alabama

5.2 Rail Related Incidents

According to 2024 U.S. Census Bureau data, Escambia County is home to over 300 miles of railroad. The provided crash data includes two attributes for train related crash events; 'number of trains involved' and 'has railroad crossing number.' For these two classifications there were 12 and 67 incidents respectively. Of the 12 classified as having a train involved, no fatalities were reported, however 7 incidents reported injuries (19 total people injured) with one reported as serious. Of the 67 incidents reported as having a railroad crossing number, no fatalities were reported, and 14 reported injuries. In total 23 people were injured, 6 seriously. It is noted that some of the incidents reported as 'trains involved' were included in the second category related to railroad crossings.

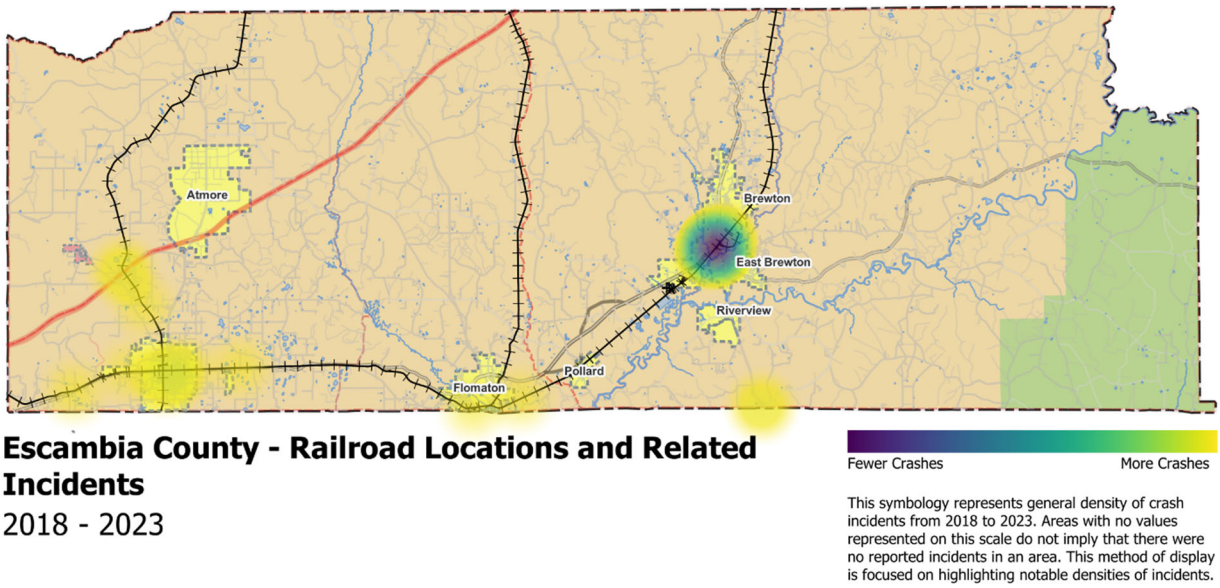


Figure 15: Railroad Locations and Related Incidents

Of the incidents across these two categories, two significant location clusterings near crossing locations were apparent, both located in Brewton; Lee Street at US 31 as well as US 29 at US 31. A third location near East Street and St. Joseph Avenue also indicates an area of concern.

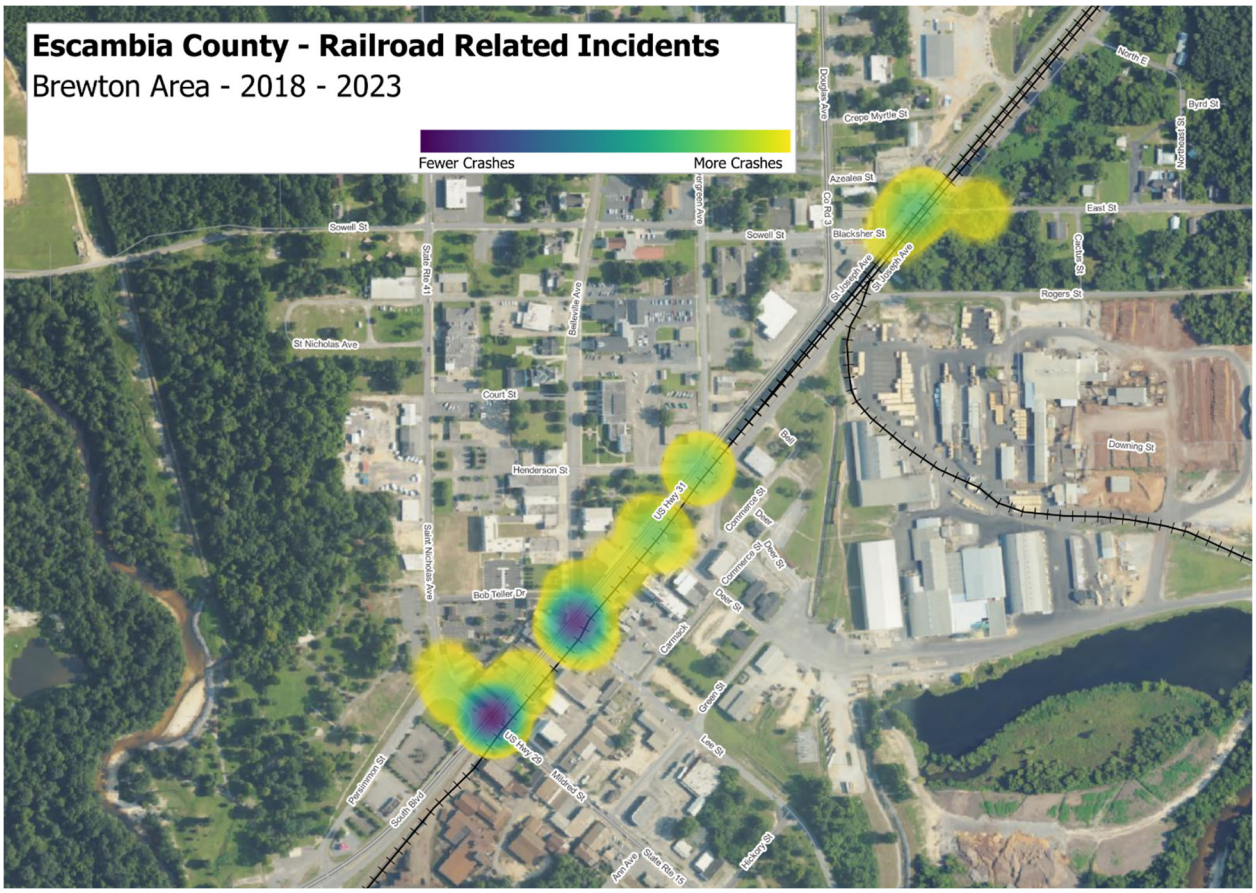


Figure 16: Railroad Incidents - Brewton Area

The intersection of Lee Street at US 31 had 12 total rail related incidents reported within 160 feet of the intersection. The intersection of US 29 at US 31 had 11 total rail related incidents reported within 300 feet of the intersection. East Street at St. Joseph Avenue had a total of 6 reported incidents within approximately 200 feet of the intersection. Remaining incidents in the county (indicated in Figure 15) appeared to be individual events without obvious locational correlation.

5.3 High Injury Network

As a result of the existing conditions analysis, specifically focusing on fatal and serious injury motor vehicle accidents across Escambia County – a High Injury Network (HIN) comprised of both highway segments and intersections has been created. The methodology for identifying the segments and intersections illustrated in the following map images has been outlined in section 2.1 above. The purpose in identifying these areas is to begin the conversation regarding future project considerations and countermeasures that could be considered to address the occurrence of fatal and serious injury incidents in these areas.

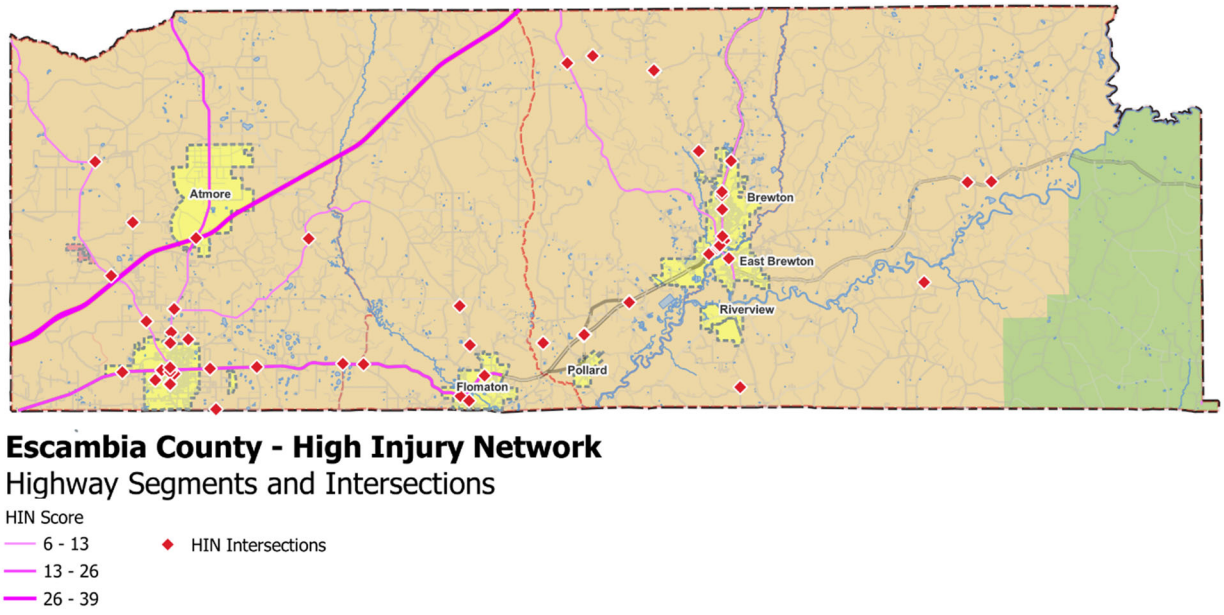


Figure 17: High Injury Network Locations in Escambia County

It is important to note, highway segments that had a 'HIN Score' of less than 6 were omitted from the map, in order to keep the total percentage of identified high injury segments within the percentage ranges suggested by the U.S. Department of Transportation. As illustrated, of the 2,805 miles of roadway in Escambia County, 166 miles have a HIN Score of 6 or greater. This comprises approximately six percent of the highway mileage in the county. The highest scoring locations were Interstate 65, US 31, and State Route 21.This version of the HIN does not include consideration for the number of events per mile of roadway. The version in Figure 17 is provided to provide more general areas of concern that SARPC and local officials could recommend for improvements or treatments broadly that may improve safety conditions. Figure 18 below is the same contributing information, but calculated for segment length, providing a higher resolution analysis for identifying more specific locations of concern. (Intersections are not included.)

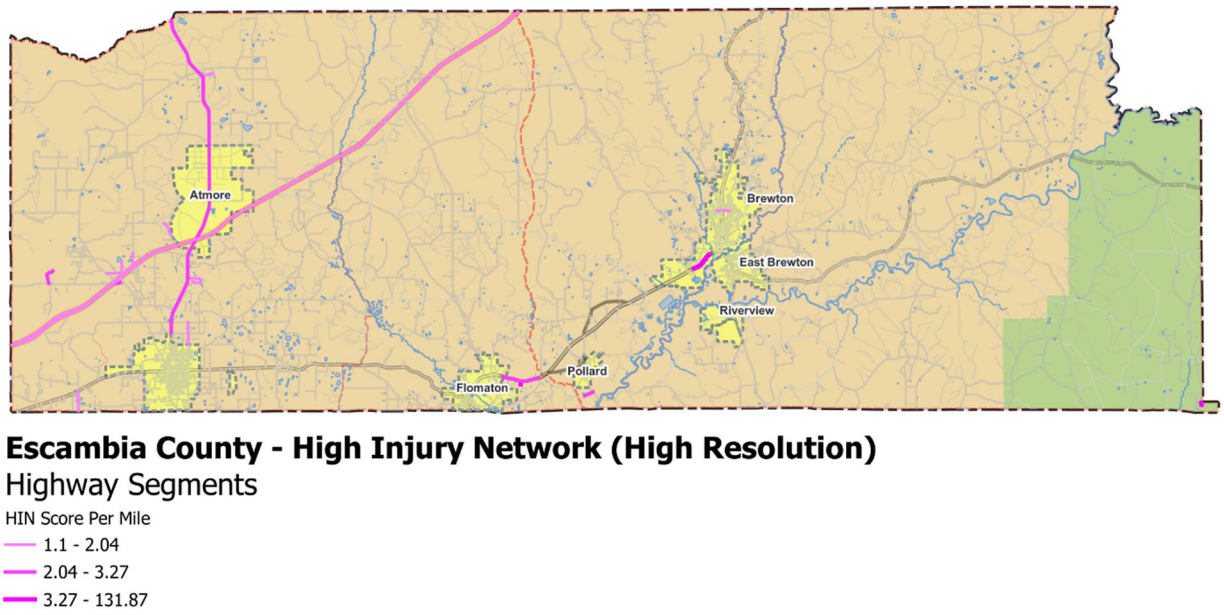


Figure 18: High Injury Network Locations in Escambia County - High Resolution

5.4 Primary Contributing Circumstances

In total for the nearly 5,000 crash incidents recorded in Escambia County between 2018 and 2023, over 60 discrete and individual primary contributing circumstances were identified. Of those 60 categories, the top primary contributing circumstances were: following too closely, unseen object/person/vehicle, misjudged stopping distance, failure to yield, DUI, fatigue/asleep, and driving too fast for conditions; each of these circumstances was connected to over 200 incidents. (Omitted here were 'unknown' and 'other' which comprised nearly 800 incidents.)

Of the 340 reported fatal or serious injury incidents in Escambia County during this period, the top primary contributing circumstances were: DUI (37), aggressive operation (30), driving too fast for conditions (25), over the speed limit (23), and fatigued/asleep (21). Each of these is primarily a driver behavior condition, best addressed through awareness and training efforts.

When comparing the findings of the statewide analysis of primary contributing circumstances for fatal crashes to those observed in Escambia County, there appears to be an overrepresentation of driving under the influence (DUI) and speeding and aggressive driving, and distracted driving crashes occurring within Escambia County.

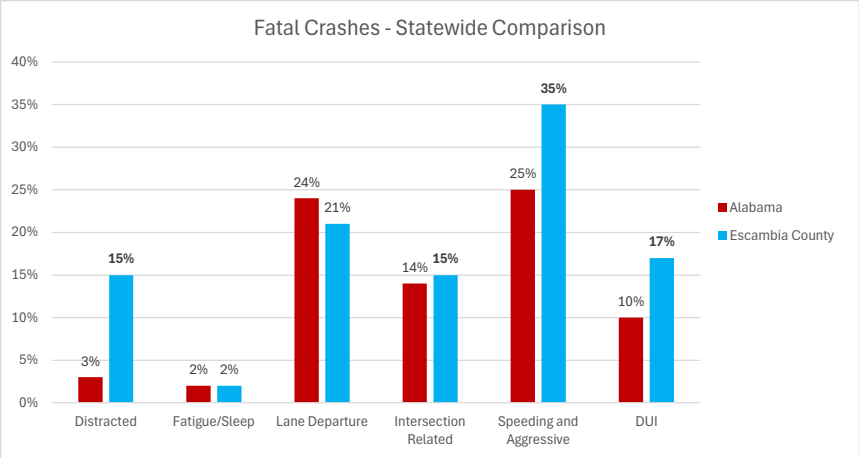


Figure 19: Fatal Crashes, Statewide Comparison

Note: 'Distracted' and 'Intersection Related' incidents for Escambia County are represented in multiple contributing factors and may cause the totals in the Figure 19 to exceed 100%. This calculation was utilized to best match the fatal crash data used for reference here from the Alabama Strategic Highway Safety Plan – 4th Edition, December 2022.

The use of safety equipment including seat belts is also an emerging concern impacting crash incidents in Escambia County. When considering only the number of fatal crashes where the "CU Driver Safety Equipment" factor was indicated as "None Used – Motor Vehicle Occupant," 46% of the fatal crashes can be attributed to safety belts not being used. However, if similar to Alabama's SHSP, fatal crashes were the "CU Driver Equipment" was identified as "Unknown," "CU is Unknown," "Not Applicable," or "CU is Not a Vehicle" were removed, resulting in 11 such crashes being removed, 59% of the fatal crashes can be attributed to safety belts not being used, similar to that reported at the state level.

When comparing the findings of the statewide analysis of primary contributing circumstances for serious injury crashes to those in Escambia County, the rate of incidents related to DUI, aggressive operation, and speeding are elevated. According to the 2022 Crash Facts report published by the Alabama Department of Transportation, speeding was the primary contributing factor in 2% of fatal crash incidents, the corresponding rate for Escambia County between 2018 and 2023 was 15% for 'driving too fast for conditions' and 13% for 'over speed limit.'[10] This trend was even higher for DUI events, with state averages being a contributing factor in 2.5% of fatal crashes statewide, while the rate was 17% for fatal incidents in Escambia County.

[10] 2022 Crash Facts – Alabama Department of Transportation
https://www.dot.state.al.us/publications/Design/pdf/safetyPlanning/2022FactsBook.pdf

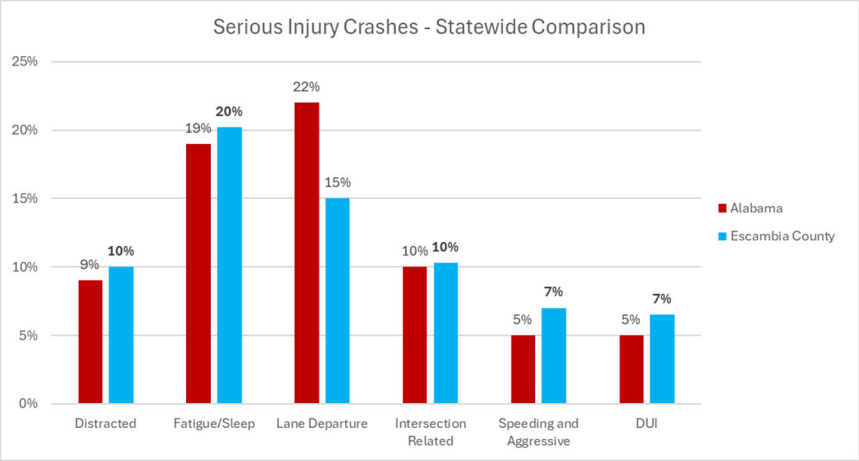


Figure 20: Serious Injury Crashes, Statewide Comparison

Note: 'Intersection Related' incidents for Escambia County are represented in multiple contributing factors and may cause the totals in the Figure 20 to exceed 100%. This calculation was utilized to best match the fatal crash data used for reference here from the Alabama Strategic Highway Safety Plan – 4th Edition, December 2022.

An additional observed contributing factor for crash events in Escambia County was age. In Escambia County, a total of 993 crashes (20.2%) involved drivers sixty-five years of age or older. A total of 1,618 crashes (33.0%) involved drivers fifteen to twenty-five. One driver involved in a serious injury crash was thirteen and another driver was nine.

When comparing the percentages of licensed drivers by age group to the percentage of those involved in fatal and serious injury crashes, for Escambia County, there appears to be an overrepresentation by drivers younger than twenty-five, particularly the age group twenty-one through twenty-four, where almost twice the severe and serious injury crashes are occurring.

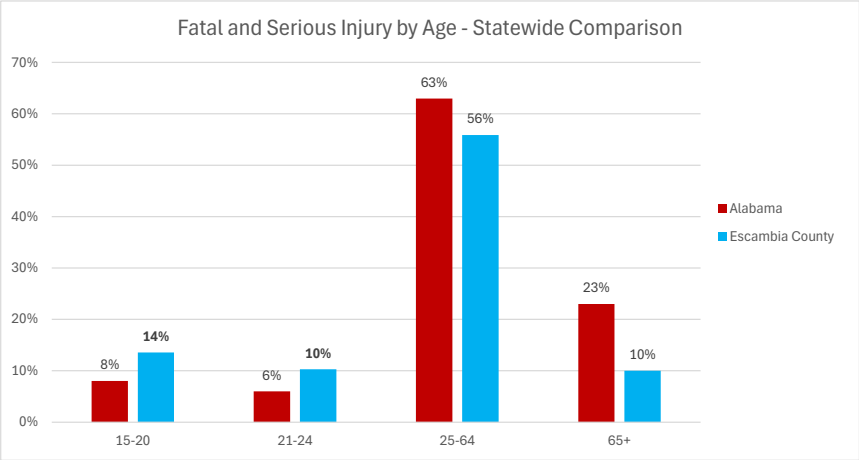


Figure 21: Fatal and Serious Injury by Age, Statewide Comparison

6 Analysis Summary

Distracted driving is overrepresented in fatal crashes within Escambia County. Therefore, if still possible, one potential solution to consider would be to educate those within Escambia County about the dangers of distracted driving by engaging University of Alabama at Birmingham's researcher, Dr. Despina

Stavrinos, to bring the lab's portable simulator to high schools and libraries within the Poarch Creek Indians, Atmore, Canoe, Flomaton, Pollard, Brewton, and Riverview communities, should the schools and libraries within these communities be receptive of this opportunity (Rohan, 2020). As the intent is to result in a behavior change, this approach should be repeated annually, over the course of five years, where the data is reviewed over the life of the approach to determine if it has an impact on beliefs regarding cell phone use while in a vehicle.

The data in Escambia County suggested that there is a need to review the infrastructure in and around Atmore, Alabama and Brewton, Alabama, particularly the state roadways within these communities for possible countermeasures. In fact, from a systemic safety perspective, for any of the rural communities within Escambia County, the existing infrastructure within and connecting to more immediate "bedroom" communities or the like should be reviewed. Furthermore, active transportation counts should be conducted based on the current infrastructure and after any changes are made.

With an overrepresentation of young drivers (including those younger than 15 years of age) in serious and fatal injury crashes, there is a need to improve the skills of these drivers. One potential approach is to bring to Escambia County, Ford Driving Skills for Life – A Safe Driving Solution.

7 References

Erol, O., Sarah, S., Blythe, C., Chris, V., Chris, C., Craig, B., & Aaron, H. (2021). *State-of-the-Art Approaches to Bicycle and Pedestrian Counters.* North Carolina Department of Transportation.

Rohan, A. (2020, Februrary 7). *Researcher awarded BBJ's Top 40 Under 40 for efforts to make roads safety*. Retrieved April 16, 2024, from The University of Alabama at Birmingham: https://www.uab.edu/news/people/item/11079-researcher-awarded-bbj-s-top-40-under-40-for-efforts-to-make-roads-safer