Gallatin County Safe Streets For All Action Plan

BASELINE DATA SUMMARY

January 27, 2025

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Baseline Data Summary

1. Introduction

Gallatin County was awarded funds from the Safe Streets and Roads for All (SS4A) discretionary grant program to complete an Action Plan identifying the most significant safety concerns in the community with implementation steps for projects and strategies to address those issues and reduce fatalities and serious injuries within the county. Completion of the *Gallatin County SS4A Action Plan* will enable the county to apply for other grant funds under the SS4A program to complete supplemental planning, future demonstration activities, or project implementation as needed to fulfill the identified needs of the Action Plan.

Figure 1.1: Safe Systems Approach

The purpose of this document is to identify safety problems within Gallatin County by summarizing a data-driven analysis conducted using historic crash data and other relevant information to help the county understand safety concerns, key trends, and contributing factors in crashes, with an added emphasis on fatalities and serious injuries. A combination of location-based and systemic safety analysis methods were used to help identify high-risk areas, analyze potential system-wide safety issues, and investigate behavioral trends. In addition to investigating past crashes, the planning team engaged the public and multiple stakeholders to understand perceived and experienced safety concerns within the community to proactively address priority locations and behaviors. Another important component of the analysis also included consideration of underserved and underrepresented segments of the community to ensure the needs of all community members and road users are identified and addressed.

1.1. National Guidance

The SS4A discretionary grant program was established by the Bipartisan Infrastructure Law (BIL) in 2021. The program was established to fund regional, local, and Tribal initiatives through grants to prevent roadway deaths and serious injuries through planning and implementation efforts. The SS4A program supports the US Department of Transportation's Vision Zero – a goal of zero roadway deaths – using the Safe System Approach (SSA) (illustrated in **Figure 1.1**) which aims to address the safety of all road users, with specific focus on improving safety culture, increasing stakeholder collaboration, and considering the human element in crash severity reduction[i].

In alignment with the Vision Zero and SSA initiatives, the SS4A program provides funding to localities to help develop tools to strengthen the community's approach to roadway safety for all roadway users including vulnerable road users (pedestrians, bicyclists, other cyclists, and

personal conveyance and micromobility users), public transportation users, motorcyclists and motor vehicle users, and commercial vehicle operators. Top priorities for the SS4A program include the following:

- Safety promotion to reduce roadway fatalities and serious injuries
- Low-cost, high-impact strategies
- Equitable investment in underserved communities
- Evidence-based and innovative projects and strategies
- Public and stakeholder engagement
- Alignment with the US Department of Transportation (USDOT) mission and priorities (equity, climate and sustainability, quality job creation, economic strength and global competitiveness)

1.2. Planning Area

Bozeman and Belgrade are each conducting their own SS4A planning efforts, focusing on their respective city limits as the study areas. As a result, the broader Gallatin County SS4A plan excludes the city limits of Bozeman and Belgrade, as these areas are being addressed separately through the cities' individual planning processes. The planning area for this effort coincides with the Gallatin County boundaries, excluding the areas within Bozeman and Belgrade city limits. Since city boundaries are subject to change, this plan will use the boundaries of Bozeman as of August 27, 2024, and Belgrade as of April 3, 2024. This approach avoids overlap and allows for a more focused effort on rural areas of the county. Ongoing coordination will occur between Gallatin County and the cities of Bozeman and Belgrade to ensure consistency and alignment across all SS4A planning efforts.

A geospatial exercise was conducted to select all crashes occurring within the planning area. The crash locations are based on the reports filed by the responding officer and crash reports were not reviewed to verify crash location. **Figure 1.2** provides a map of the planning area. Note that the land annexed into the cities of Bozeman and Belgrade are excluded from the planning area.

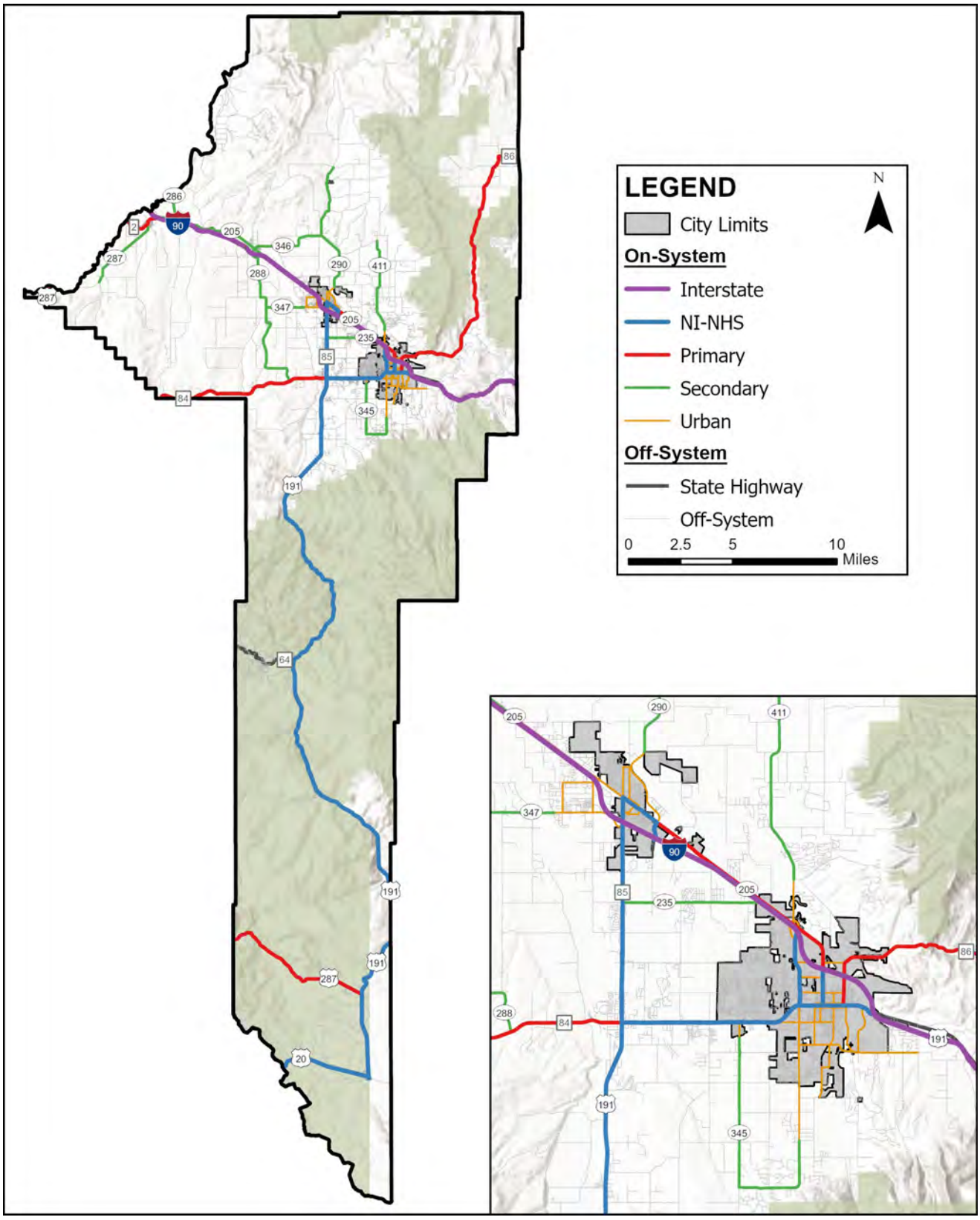


Figure 1.2: SS4A Planning Area

1.3. Relevant Supporting Documents

As an initial step in the process, a review of the county's past planning efforts was conducted to ensure the Action Plan aligns with the community's overall safety goals and priorities and addresses any previously identified safety concerns. A detailed review of each document is provided in the following sections.

Greater Triangle Area Transportation Plan (2022)

In 2022, Gallatin County updated its 2007 *Greater Bozeman Transportation Plan* with the adoption of the *Greater Triangle Area Transportation Plan*[ii]. Building on transportation recommendations from the 2017 *Bozeman Transportation Master Plan* and the 2018 *Belgrade Long Range Transportation Plan*, the updated plan evaluates growing areas that are expected to see continued population increases.

The area included in the plan encompasses the region between Four Corners, Belgrade, and Bozeman, and extends south to Gallatin Gateway. The focus is on lands where suburban development has occurred or is anticipated to occur in the future, while excluding the urban boundaries of Bozeman and Belgrade.

As part of the planning effort, a comprehensive safety analysis was conducted using crash records from the years 2017 through 2019. Over this 3-year period, 1,042 total crashes were reported with 3 crashes resulting in fatalities and 25 crashes resulting in serious injuries. Of the reported crashes, 3 involved pedestrians and 2 involved bicyclists. The plan identified 10 high-risk areas warranting further consideration.

The planning team also conducted a robust public engagement effort to understand the community's perspective on transportation issues and opportunities within Gallatin County. Based on the feedback received, the top concerns included safety for all roadway users, increased traffic control to accommodate increasing traffic volumes, and expanded multimodal transportation options.

The plan identifies several Transportation System Management (TSM) projects which include several lower-cost improvements that can be quickly implemented to address targeted safety or operational concerns. The safety-related TSM projects recommend adding additional signage, widened shoulders, flattening sharp curves, and evaluating speed limits in crash hot spots. The plan also highlights Major Street Network (MSN) projects that focus on more extensive, long-term infrastructure improvements, many of which are specifically aimed at enhancing safety for all road users, including pedestrians and bicyclists. Additional considerations include strategies for managing speeds and improving safety by installing signage on horizontal curves, especially those with crash histories or substandard designs.

Triangle Area Trails Plan (2021)

The *Triangle Area Trails Plan*[iii] focuses on the triangle area of Gallatin County, which is generally the area between Bozeman, Four Corners, and Belgrade. In 2016, Gallatin County, the City of Belgrade, and the City of Bozeman created the Planning Coordination Committee (PCC) to focus on issues and opportunities within the triangle area, understanding that each jurisdiction's transportation decisions affect the others. This plan was created as an extension to the *Belgrade Parks and Trails Master Plan* and the soon-to-be-created *City of Bozeman Parks, Recreation, and Active Transportation Plan*. The plan aims to create a vision for guiding future trail development and connectivity by identifying key corridor connections within the area and propose implementation strategies to guide in the completion and maintenance of the proposed trail network.

There are four aspects of the trail system that are emphasized: connectivity between places, consistency in and between jurisdictions, safety, and inclusivity. Research of trail typology, current conditions, and standards and guidelines combined with community engagement produced the following recommendations:

- Adopt trail design standards and specifications to ensure uniformity across the system.
- Develop a comprehensive wayfinding plan.
- Establish a template for maintenance of trails and establish minimum standards.
- Coordinate policies between all jurisdictions to review proposed trail locations.

Safety was a main topic during community engagement with discussion about trails separated from traffic, standards for road crossings (adequate sight distance and lighting), maintenance including regular sweeping and snow removal, and safe trails for all demographics.

Gallatin County Growth Policy (2021)

The 2021 Gallatin County Growth Policy Update, *Envision Gallatin*[iv], serves as the county's overarching land use policy document, replacing the previous Growth Policy completed in 2003. The growth policy is intended to guide other plans and regulations such as neighborhood plans, zoning districts, and subdivision regulations. The policy also provides a vision, goals, and policy statements to guide identification, evaluation, and mitigation of impacts resulting from new development as the county grows. Goals, policies and values relevant to the Gallatin County SS4A initiative include the following:

- Transportation Goal 1: Plan for a safe and efficient transportation system.
- Value land use and development patterns that ensure and prioritize public safety.
- Multi-modal transportation facilities, including pedestrian and bicycle safety measures.
- Encourage developers to document general safety measures.
- Explore the use of roundabouts to improve safety and efficiency at appropriate intersections.

Triangle Community Plan (2020)

The *Triangle Community Plan*[v] was developed by the PCC to coordinate land use development patterns, deliver community services and infrastructure, and protect important environmental resources in the triangle area in a manner that supports community values and vision while responding to rapid growth pressures.

The goals and policies in the community plan encourage future transportation planning and infrastructure that will support the existing transportation plans of Belgrade, Bozeman and Gallatin County. The plan envisions well-planned transportation systems, consistent with the overall growth management vision, which supports the development of multimodal and public transportation networks. The plan recognizes that maintaining a connected grid system of roadways is an important goal for delivering essential services, expanding infrastructure, and managing increasing traffic volumes. The plan also prioritizes the development of a non-motorized transportation system with three levels: neighborhood trails, connector trails, and commuter pathways. The following goals related to transportation in the triangle area have been identified:

- Provide an efficient transportation system for all users and modes.
- Promote and develop design standards that ensure the safety of all road users.
- Provide for improved connectivity.

- Support and improve opportunities for trail development and active transportation infrastructure for a variety of uses and users, from avid cyclists to pedestrians, and from children to the elderly.
- Support public transportation systems in the triangle to reduce traffic congestion, contribute to community sustainability goals, and support affordability.

City Planning Efforts

The 2017 *Belgrade Long Range Transportation Plan*[vi] covers the entire Belgrade urban boundary limits as well as a small portion of the Bozeman urban boundary. The 2017 *Bozeman Transportation Master Plan*[vii] includes the entire Bozeman urban boundary as well as areas that may be annexed by the city in the next 20 years. Both plans address existing and future traffic and safety conditions in the cities. These plans will be referenced for any relevant projects occurring within the Gallatin County SS4A analysis boundary but are generally considered to be outside the scope of this effort.

2. Crash Record Overview

For this effort, the MDT Traffic and Safety Engineering Bureau provided crash data for the 5-year period from January 1, 2019, to December 31, 2023. The data included all crashes that occurred within Gallatin County but outside the city limits of Bozeman and Belgrade. This information includes data from crash reports submitted by Montana Highway Patrol (MHP) officers and local city, county, and federal law enforcement officials. The crash reports are a summation of information from the scene of the crash provided by the responding officer. Some of the information contained in the crash reports may be subjective.

Crash records were analyzed to determine contributing factors, high-risk areas, and behavioral characteristics. User behavior, such as the use of proper safety equipment (i.e., seatbelts or helmets), impairment, and adherence to traffic laws, is analyzed only when a crash is reported. There are likely many other instances in which these and other improper behaviors occur without resulting in a reported crash. The purpose of this analysis is only to analyze the circumstances of reported crashes to identify trends and contributing factors so that the county, in coordination with local stakeholders, can address these issues and improve safety on the community's roadways.

2.1. Data Challenges and Limitations

Although historic crash data can help identify trends in behavioral and circumstantial contributors to crashes within Gallatin County, there are several challenges and limitations that should be acknowledged and considered when drawing conclusions from the data.

- **Underreported Data:** Many crashes, especially those where individuals and vehicles are unharmed, do not get reported to the police. Underreporting can limit the ability to properly and effectively manage road safety, since crash analyses can only be based on reported crash data. Similarly, near-miss occurrences often are not reported due to lack of property damage or injury. Although near-misses do not result in a reportable crash, these experiences can indicate significant safety issues that should be proactively addressed so a crash does not occur in the future.
- **Unknown Data:** For many crash records, various fields are left blank by the reporting officer. Occasionally, a report will have "unknown" listed rather than a blank field. Without this information, it may be difficult to capture a complete understanding of what happened before, during, and after a crash.
- **Inconsistent Data:** Inconsistencies in reporting, either by the reporting officer or by the individual entering data into the MHP or state database, can also lead to misrepresentation of crash details. Although protocols have been established and training for completing crash reports is provided to law enforcement, there may still be inconsistencies or errors in the reporting.
- **Abbreviated Data:** Often times the abbreviated crash data provided by MDT does not provide a full account of the crash circumstances. Without reading the detailed crash reports by the investigating officer which contain narratives of the crash occurrence, statements from the individuals involved and witnesses, crash diagrams, citations, and officer opinions as to cause of the collision, a clear picture of the crash may be unattainable.

In addition to the standard challenges and limitations associated with crash data analysis, this report also acknowledges potential discrepancies and inconsistencies arising from the

simplified crash records provided by MDT. Slight differences in reported crash volumes may be due to crashes that occur on public versus private property (since crashes on private property are not reported by MDT). Additionally, MDT shared that substantial staffing turnover occurred during the 5-year analysis period, which resulted in a significant loss of knowledge among data entry staff. Furthermore, all crash records received from local jurisdictions around the state are entered manually into MDT's crash record database. With a volume of over 10,000 crashes per year paired with staffing turnover, the risk of data loss or inconsistencies is high.

3. Crash Characteristics

MDT's crash records included a total of 6,739 crashes reported within Gallatin County but outside the city limits of Bozeman and Belgrade over the 5-year analysis period. The following sections summarize crash details and other characteristics associated with these crashes that occurred over the analysis period. The characteristics summarized in this section were evaluated as reported by the responding officer, and no efforts have been made to correct inconsistencies or fill in missing fields.

3.1. Severity

Crash severity is categorized based on the most severe injury resulting from the crash. For example, if a crash results in a possible injury and a suspected serious injury, the crash is reported as a suspected serious injury crash. A suspected serious injury is defined as an observed injury, other than a fatality, which would prevent the injured individual from walking, driving, or normally continuing the activities they were capable of performing before the injury. The term "suspected" references an officer's observation at the time of the crash without follow-up confirmation of the nature of the person's injury. The term "severe injuries" is used to refer to the combined total of fatal and suspected serious injuries.

During the 5-year analysis period, a total of 6,739 crashes occurred involving 13,116 individuals. As shown in **Figure 3.1**, about 20 percent of those crashes resulted in some level of injury, and less than 3 percent were severe. There were 33 fatal crashes, resulting in 38 total fatalities, and 168 suspected serious injury crashes, with 192 total suspected serious injuries. A total of 1,806 of the 13,116 individuals involved in crashes, about 14 percent, were injured to some degree (suspected minor or possible injury) as a result of a crash. Approximately 80 percent of crashes were reported as causing property damage only (PDO) or as unknown severity.

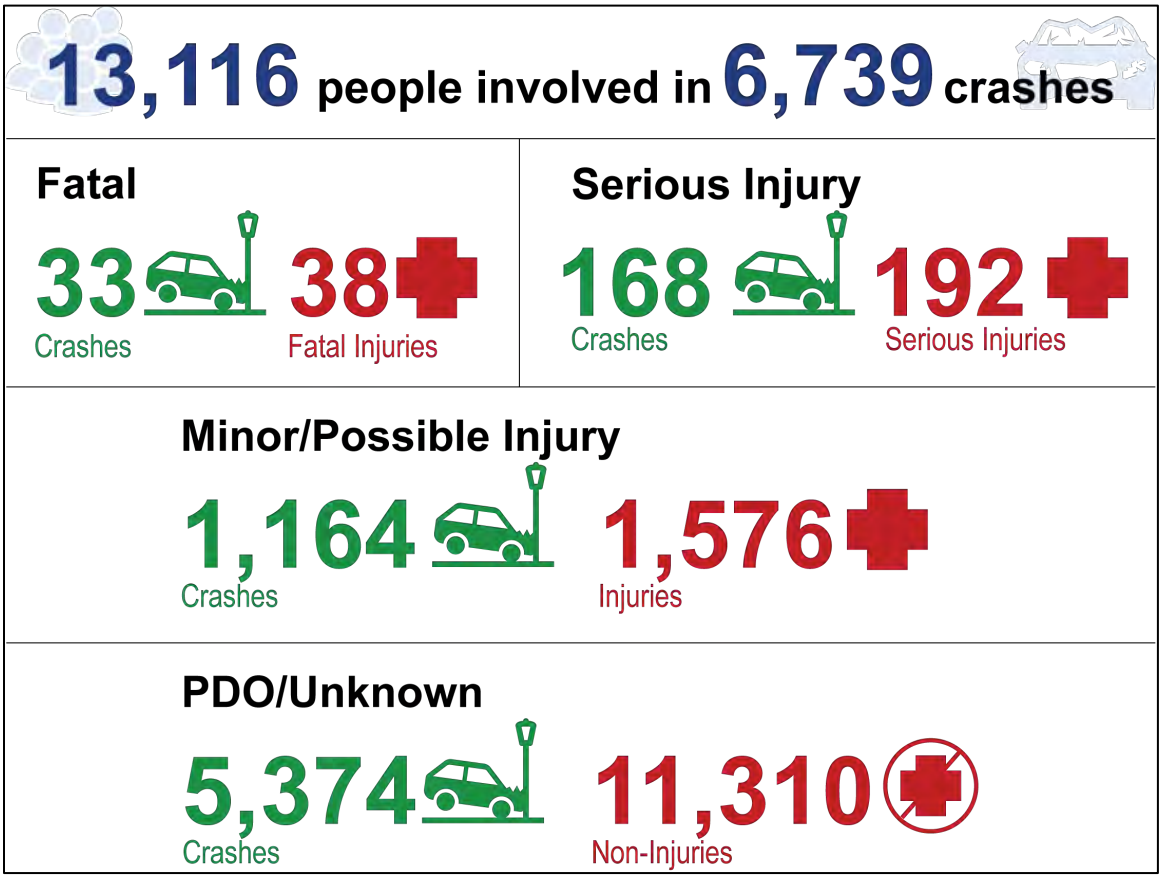


Figure 3.1: Crash Severity

3.2. Crash Period

Crash data were evaluated based on the period of time when the crash occurred, as summarized in the following sections. This analysis helps identify temporal trends such as day of the week, month, or hour of the day as well as providing a comparison year over year.

Crash Year

The number of total and severe injury crashes reported per year by MDT is presented in **Figure 3.2**. The crash records indicate a dip in total crashes between 2019 and 2020, with an increase back to 2019 levels over 2021 and 2022. The drastic decrease in crashes in 2020 is likely attributed to decreased driving activity during the COVID-19 pandemic. The number of reported crashes returned to 2020 levels in 2023. The number of fatal crashes steadily increased over the 5-year period, with a small decrease in 2022. Meanwhile, serious injury crashes rose from 2019 to 2021, then decreased from 2021 to 2023.

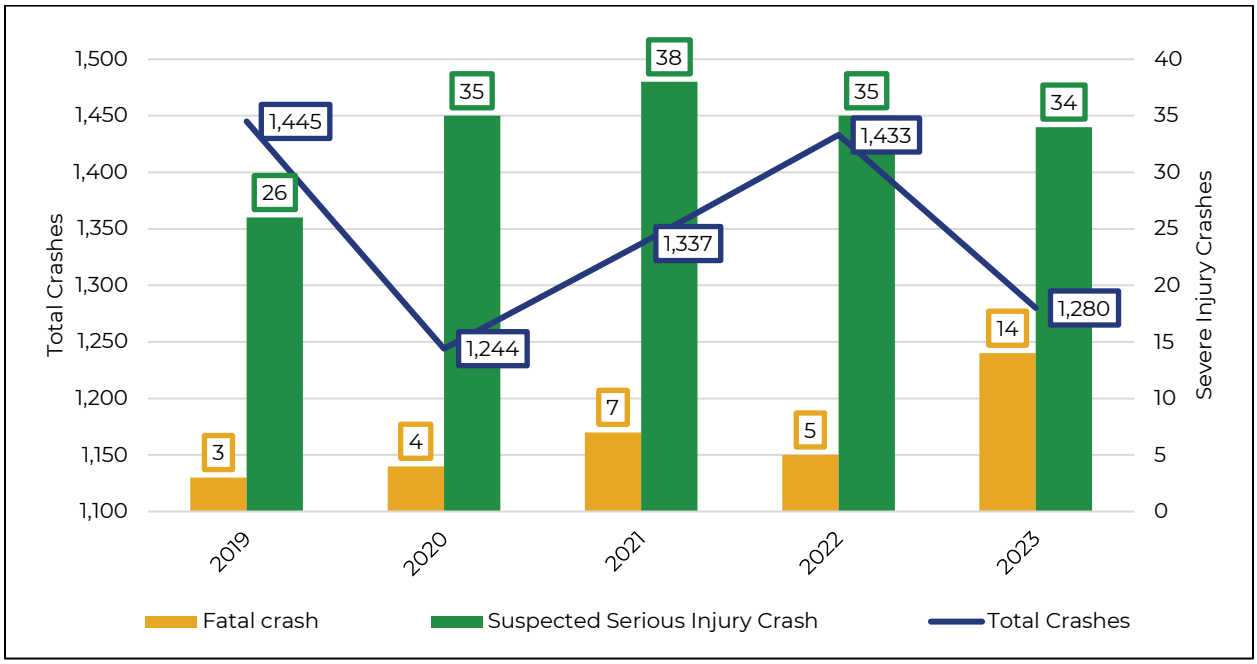


Figure 3.2: Crashes by Year

Day of the Week

The distribution of crashes based on the day of the week on which the crash occurred is presented in **Figure 3.3**. When evaluating all crashes, a higher number of crashes occurred on weekdays (75 percent) compared to weekends with the most crashes occurring on Friday. This suggests a possible trend with regular commuting patterns and generally higher traffic exposure on weekdays. However, severe crashes occurred more often on weekends.

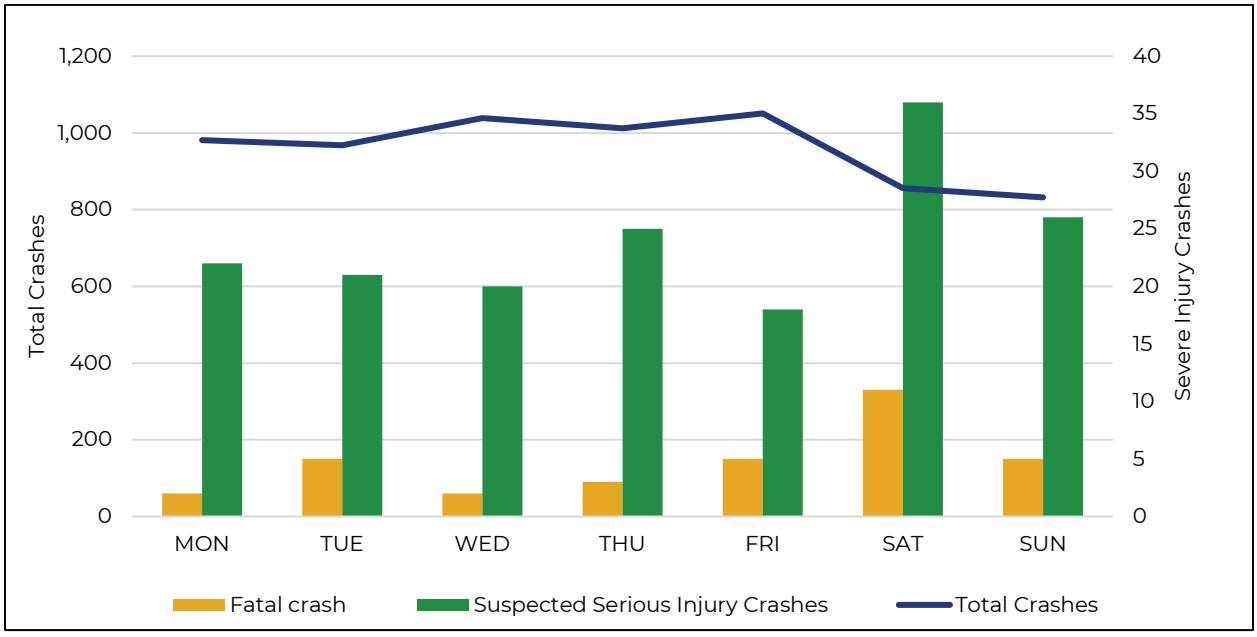


Figure 3.3: Crashes by Day of the Week

Crash Month

Figure 3.4 shows the distribution of reported crashes based on the month of the year in which the crash occurred. Approximately 27 percent of crashes occurred in the fall months (September through November), while 31 percent occurred in the winter months (December through February). Although crashes were lowest in the spring and summer, more severe crashes occurred in fall (30 percent) and summer (30 percent) over the 5 years. The highest number of total crashes was recorded in December, possibly due to winter weather conditions, while the highest number of severe crashes was recorded in September.

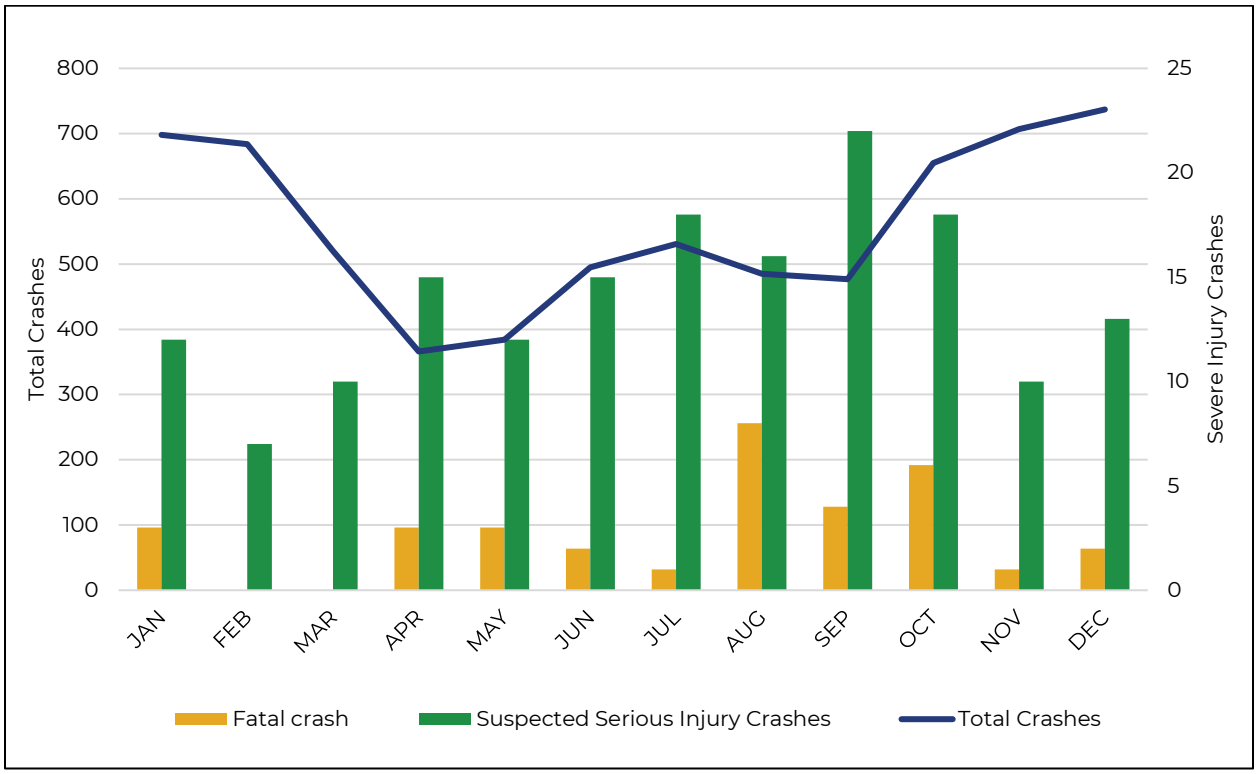


Figure 3.4: Crashes by Month

Time of Day

The time-of-day distribution for crashes is presented in **Figure 3.5**. Prominent peaks can be seen at two points throughout the day, with one around 8:00 AM, and the other at 5:00 PM, with the second peak being higher than the first. Severe crashes generally follow the same pattern with a more distinct peak occurring between 3:00 PM and 6:00 PM. These timeframes likely correspond to morning and evening commutes, and school start and release times when traffic volumes are typically higher, and roadways are generally more congested. Crashes that occur during the evening, late night, and early morning hours (between 7:00 pm and 7:00 am) make up about 25 percent of all reported crashes. However, these time periods are disproportionately represented in severe crashes, accounting for 34 percent of all severe incidents.

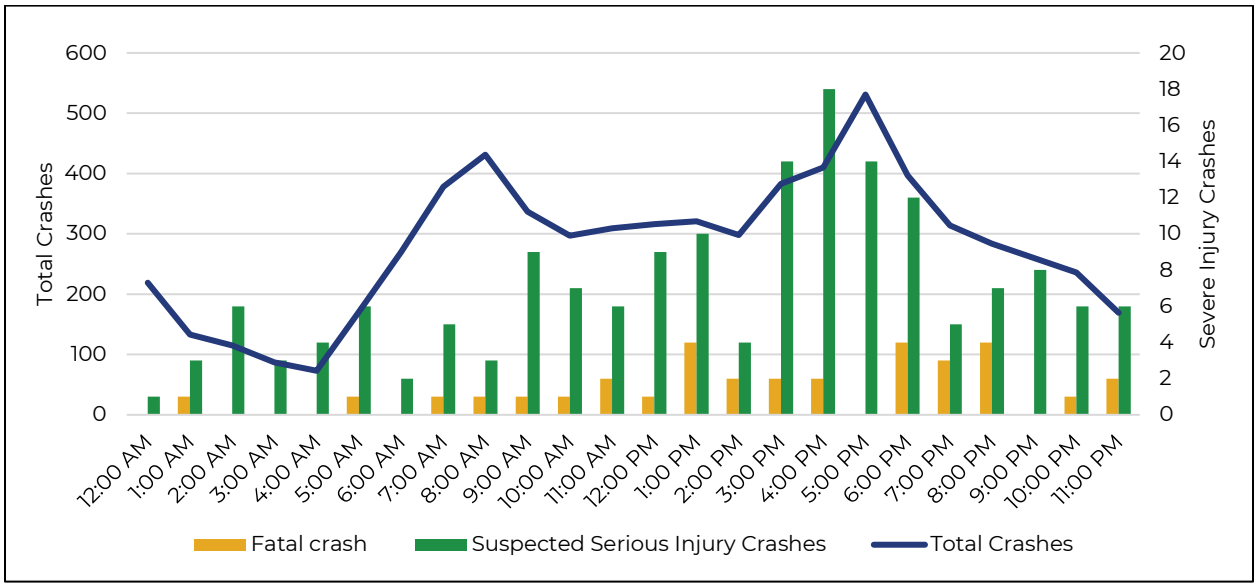


Figure 3.5: Crashes by Hour

3.3. Location

Evaluating crash location can help identify concentrations or area characteristics corresponding to a higher risk of occurrence. **Figure 3.7** on the following page shows the density of crashes across Gallatin County as well as the location of severe crashes within the study area. This map shows higher concentrations of crashes in the area just west of Bozeman city limits, in Four Corners where US 191 intersects with MT 84 and MT 85, as well as on I-90 just south of Belgrade city limits. These areas have higher traffic volumes and are typically more congested than other areas of the county, leading to greater traffic exposure and a higher risk of conflicts. Similarly, 42 percent of severe crashes occurred on I-90 or US 191, which carry the highest traffic volumes and have the highest speed limits contributing to both a higher risk of conflicts as well as a higher risk of injury when a crash occurs.

Intersection Relation

As shown in **Figure 3.6**, approximately 13 percent of all crashes occurred at an intersection and an additional 9 percent of crashes were related to an intersection (i.e., rear-end crashes related to congestion at an intersection). About 4 percent of crashes occurred at a driveway or other access type, while 73 percent occurred at a non-junction location.

In terms of severity, 76 percent of severe crashes occurred at non-junction locations. The distribution of total versus severe crashes occurring at non-junctions is very similar. This indicates that intersections do not appear to significantly influence the occurrence of crashes within the study area.

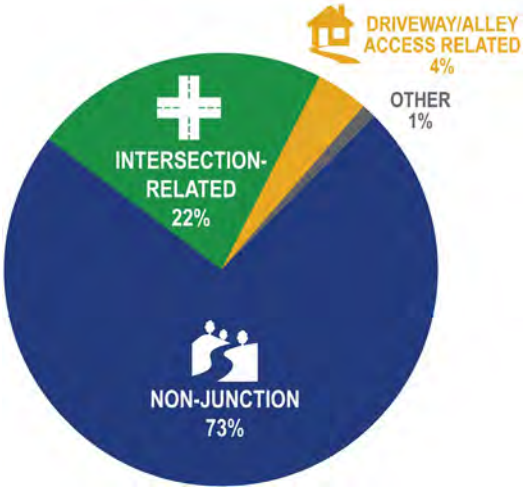


Figure 3.6: Intersection Relation

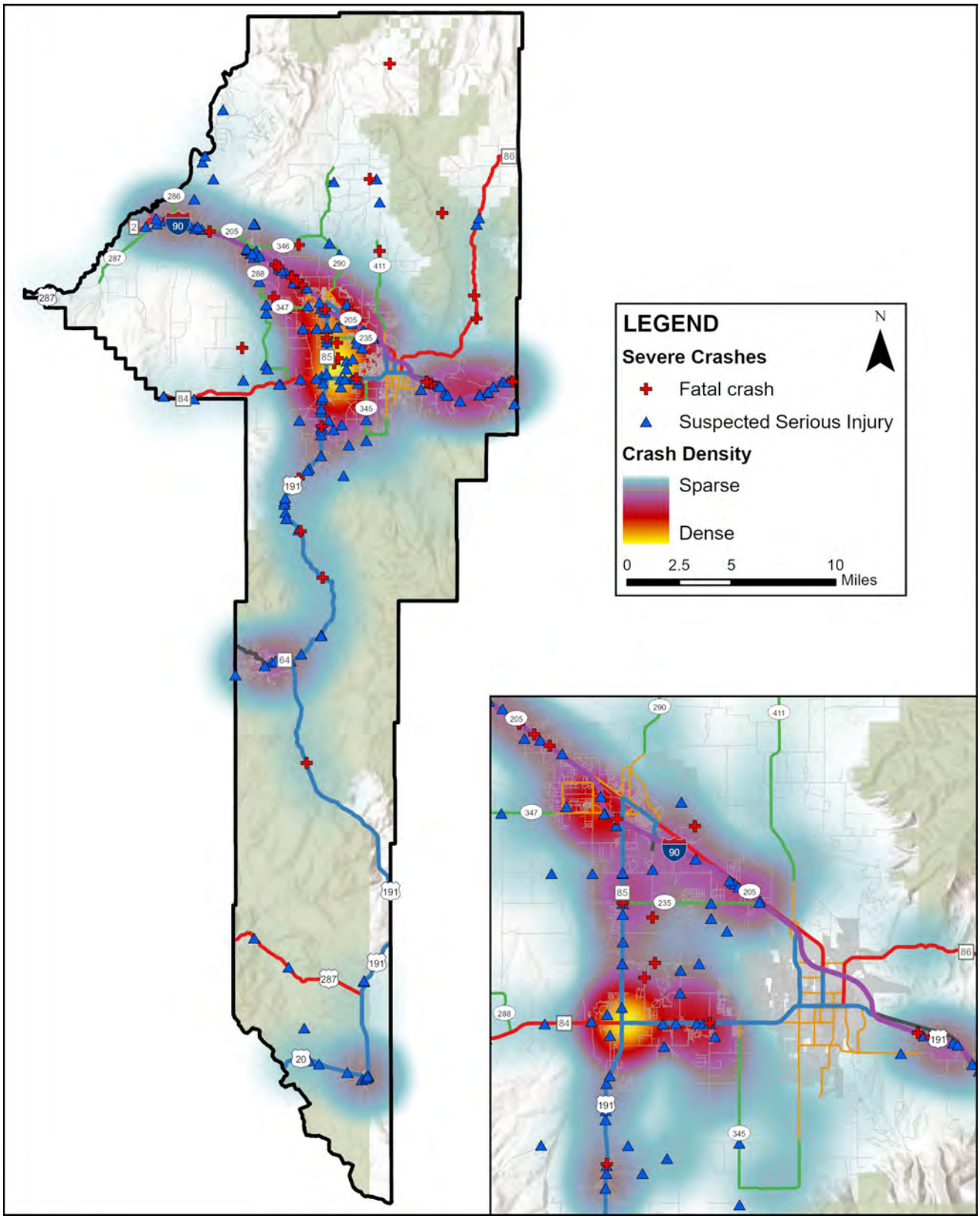


Figure 3.7: Crash Density and Severity

3.4. Crash Type

Crashes can be categorized as either single-vehicle or multi-vehicle crashes. Multi-vehicle crashes accounted for 41 percent of all reported crashes with a total of 2,749 crashes. The most common multi-vehicle crashes were rear-end (14 percent), right-angle (9 percent), and sideswipe crashes (7 percent). Single-vehicle crashes represented 59 percent of crashes with 3,990 total crashes. Fixed-object crashes were the most common single-vehicle crash type, accounting for 47 percent of those crashes, and 28 percent of crashes overall. Fixed objects involved in crashes included utility poles/sign supports, guardrails and bridge rails, curbs, ditches, trees, and fences. Rollover crashes were the next most frequent, comprising 24 percent of single-vehicle incidents, while collisions with wild animals accounted for 21 percent. **Figure 3.8** presents the distribution of both multiple-vehicle and single-vehicle crashes within the study area.

Rollovers accounted for the most severe crashes, making up 35 percent of all severe crashes. Although fixed-object crashes made up the highest percentage of all crashes (28 percent), they were responsible for only 15 percent of severe crashes. Rear-end collisions contributed to 12 percent of severe crashes while right-angle collisions made up 9 percent. It is also notable that 27 percent of pedestrian and bicycle crashes were severe.

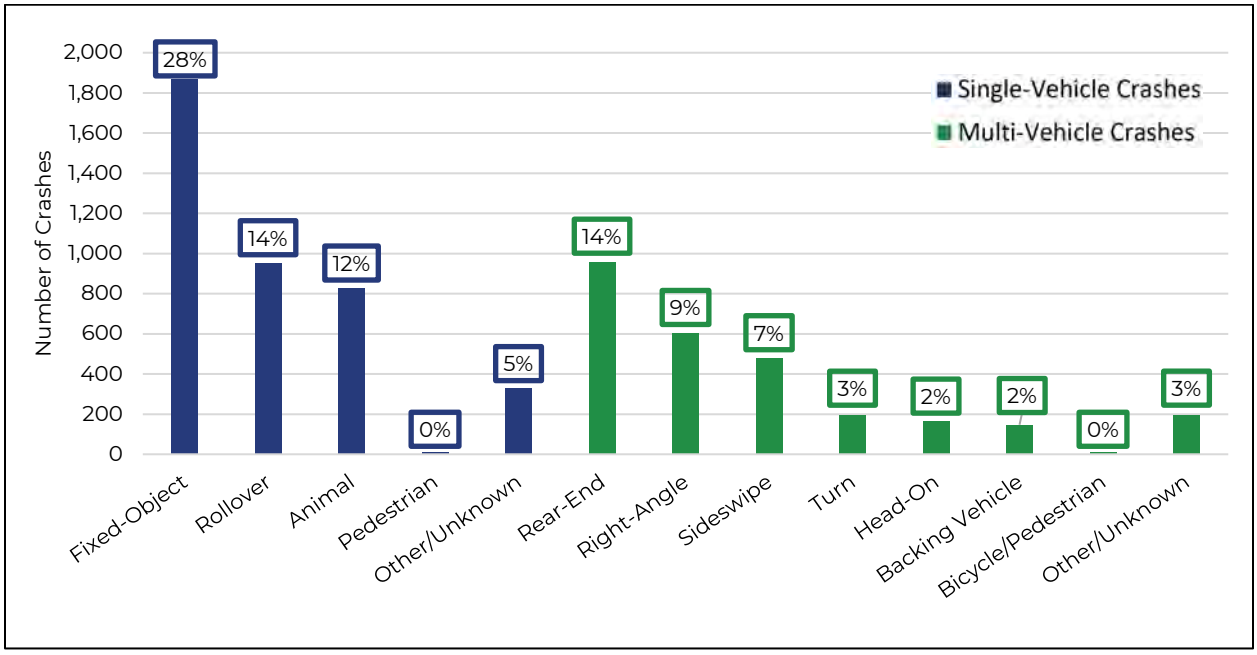


Figure 3.8: Crash Type

Vulnerable Road User Crashes

Of the 6,739 crashes that occurred during the 5-year analysis period, just under 0.5 percent involved vulnerable road users. A total of 11 bicycle and 13 pedestrian related crashes occurred within the analysis period. Nine of the crashes involved severe injuries. Of all the people involved in crashes, 36 or about 0.25 percent were categorized as non-motorists. Interestingly, many of the non-motorists were reportedly involved in other crash types (besides pedestrian or bicycle involved crashes) such as railway vehicle, rear-end, and fixed-object crashes. This indicates that a non-motorist may have been the cause of a crash but not directly involved in the collision. For example, a rear-end crash may occur when a vehicle stops for a pedestrian in a crosswalk, but the following vehicle does not see the pedestrian and does not expect the

vehicle in front to stop. Similarly, a fixed-object collision could occur if a vehicle swerves around a non-motorist into a fixed object such as a ditch or parked car.

3.5. Road Characteristics

At the location of a crash, the data point is matched spatially to the roadway on which the crash occurred and select characteristics of the route are drawn from various MDT databases and tied to each crash record. A summary of the route characteristics for each crash is provided in the following sections.

Route Ownership

Figure 3.9 summarizes the owner of the roadway on which the crashes occurred. Understanding route ownership can help identify jurisdictions that are responsible for the maintenance and improvement of the route. Approximately 59 percent of crashes occurred on routes owned and maintained by MDT, with Gallatin County as the next most common owner at 23 percent. City-owned routes accounted for 11 percent of crashes, while federally-owned routes (i.e., Forest Service or National Park Service) contributed 3 percent, making up the remaining incidents. Where a crash occurs at the intersection of state and local routes, such as Jackrabbit Lane/Cameron Bridge Road, the crash location could be coded as a crash on either a locally owned street or an MDT route depending on the officer's report. Of the severe crashes, 66 percent occurred on MDT routes, while 31 percent occurred on locally owned routes. These findings point out the importance of interagency coordination since it is not just a single agency that is responsible for the roadways where crashes occur.

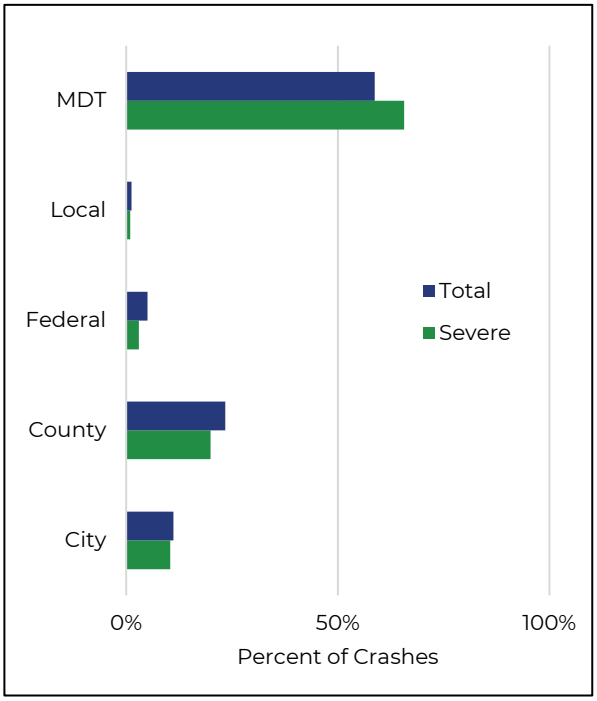


Figure 3.9: Route Owner

Functional Classification

The transportation system is made up of a hierarchy of roadways classified by parameters such as traffic volumes, speed, geometric configuration, spacing in the community's transportation grid, and adjacent land uses. The method by which these roles are defined is widely known as functional classification, which designates roadways as interstates, principal arterials, minor arterials, collector streets, and local streets.

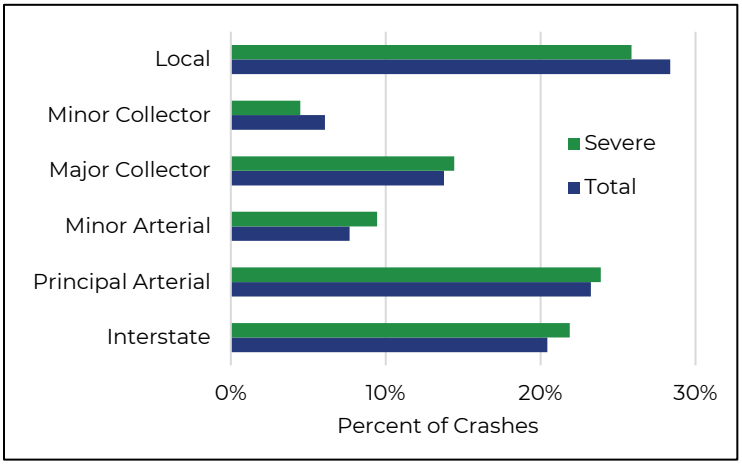


Figure 3.10: Roadway Functional Classification

The total and severe crashes for each classification are shown in **Figure 3.10**. The majority of crashes occurred on local streets (28 percent), principal arterials (23 percent), and interstate highways (20 percent). Local roads, including Madison Avenue and Thorpe Road, had the highest proportion of severe crashes at 26 percent. Principal arterials (Huffine Lane, Jackrabbit Lane, and US 191) accounted for 24 percent of severe crashes, while interstates (I-90) contributed 22 percent. Although local roads make up a higher percentage of severe crashes, crashes on routes with higher functional classifications are more likely to be severe, likely due to higher speeds and the presence of more traffic.

Traffic Volumes

Traffic volumes for the roadway on which a crash occurred can point to the level of exposure to vehicle traffic. Higher traffic volumes typically indicate a heightened risk of conflict and therefore a higher frequency of crashes. **Figure 3.11** shows a heat map of crashes overlaid with Annual Average Daily Traffic (AADT) counts for 2023. These counts are collected by MDT for primary routes across the state and represent the average number of vehicles traveling a certain route on an average day. As shown in the figure, the highest crash densities occur on higher volume roadways, such as I-90, US 191, and Jackrabbit Lane. Notably, despite higher traffic volumes, US 191 through the Gallatin Canyon has a lower crash density. In contrast, the intersection of US 191 and Jackrabbit Lane stands out with a higher concentration of crashes, suggesting that this specific intersection may have high-risk characteristics contributing to a disproportionate number of incidents compared to other sections of US 191.

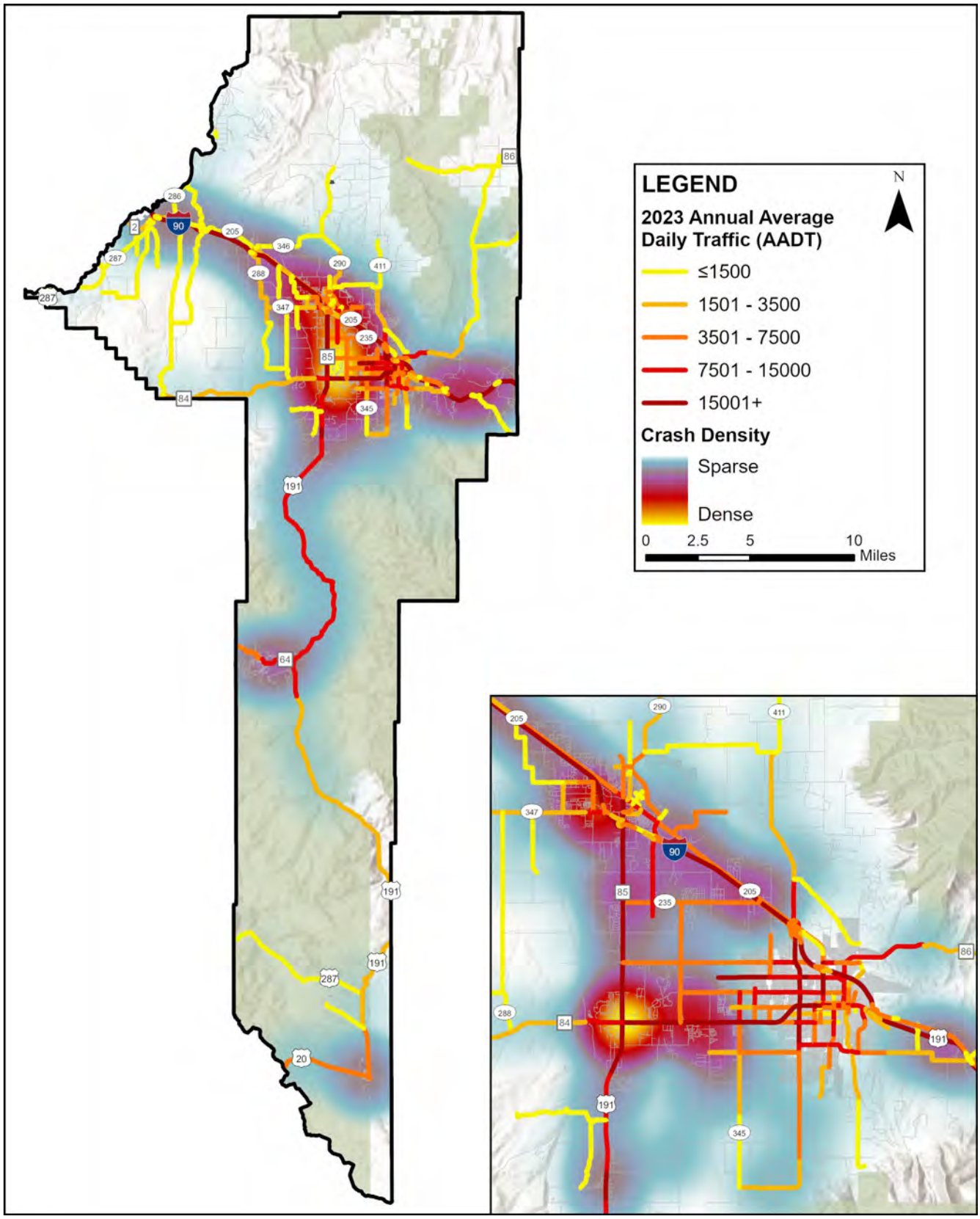


Figure 3.11: Crash Density vs. Roadway Volume

Speed Limit

The speed limit of the roadway on which crashes occurred is provided in the MDT crash data. While the posted speed limit doesn't necessarily indicate the speed at which a vehicle was traveling at the time of the crash, it is generally a good indication. **Figure 3.12** shows the total and severe crashes for various speed limits. Approximately 15 percent of crashes occurred on roadways with a posted speed limit of 25 miles per hour (mph) or less, which is typical for local, neighborhood streets. Around 27 percent of crashes took place on roads with speed limits between 30 and 45 mph, common for collector roads, while about 28 percent occurred on principal arterials or highways with speed limits ranging from 50 to 65 mph. The highest percentage, 29 percent, involved crashes on highways or interstates with speed limits of 70 mph or above.

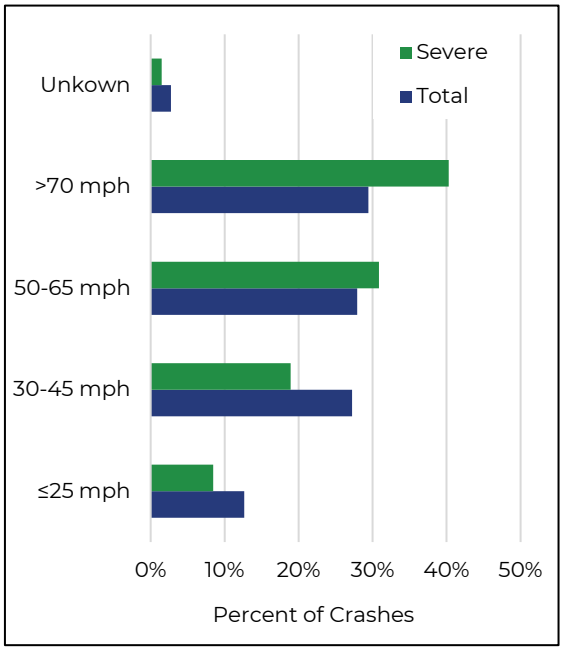


Figure 3.12: Speed Limit

As shown in the figure, crashes occurring at 70 mph or more were much more likely to be severe than crashes occurring at any other speed. Crashes on roads with a speed limit of 70 mph or above were found to be more than twice as likely to result in a serious injury compared to crashes on roads with a speed limit of 25 mph or below. This draws attention to the dangers of high-speed crashes.

3.6. Other Factors

In addition to characteristics described in previous sections, other factors contribute to the occurrence and severity of a crash. These factors may include weather conditions, road surface conditions, lighting conditions, or the type of vehicle involved in the crash. The following sections summarize these circumstances for crashes over the 5-year analysis period.

Environmental Conditions

Figure 3.13 illustrates the percentages of crashes that occurred under various weather, road surface, and lighting conditions over the 5-year crash period. The majority of crashes occurred when the weather was clear (46 percent) or cloudy (33 percent). Approximately 16 percent of crashes occurred when it was snowing, and 3 percent occurred when it was raining. Severe crashes were most likely to occur on clear roads, with 54 percent happening under clear conditions. In contrast, they were less likely to happen in adverse weather, with only 8 percent occurring in snow and 3 percent in rain.

Although the majority of crashes occurred when the road surface was dry (56 percent), about 41 percent occurred under adverse road conditions. About 13 percent of crashes occurred on snow-covered roads, 22 percent on ice, or frost-covered roads, and 6 percent on wet roads. Of the severe crashes, 73 percent occurred on clear roads, while only 24 percent took place on wet, snowy, or ice- and frost-covered roads. Crashes occurring under adverse road or weather conditions could indicate a lack of maintenance of roadway facilities or a lack of skill, experience, or care driving in adverse conditions, however, this finding is inconclusive.

Overall, 62 percent of crashes in Gallatin County occurred during daylight conditions. About 34 percent of crashes occurred when it was dark outside, with about 85 percent of those crashes occurring in locations where street lighting was not present. The remaining 5 percent of crashes occurred at dusk or dawn. Of the severe crashes, 64 percent occurred under daylight conditions. Dark lighting conditions accounted for 28 percent of severe crashes, with 24 percent occurring on unlit roads and 4 percent on lighted roads.

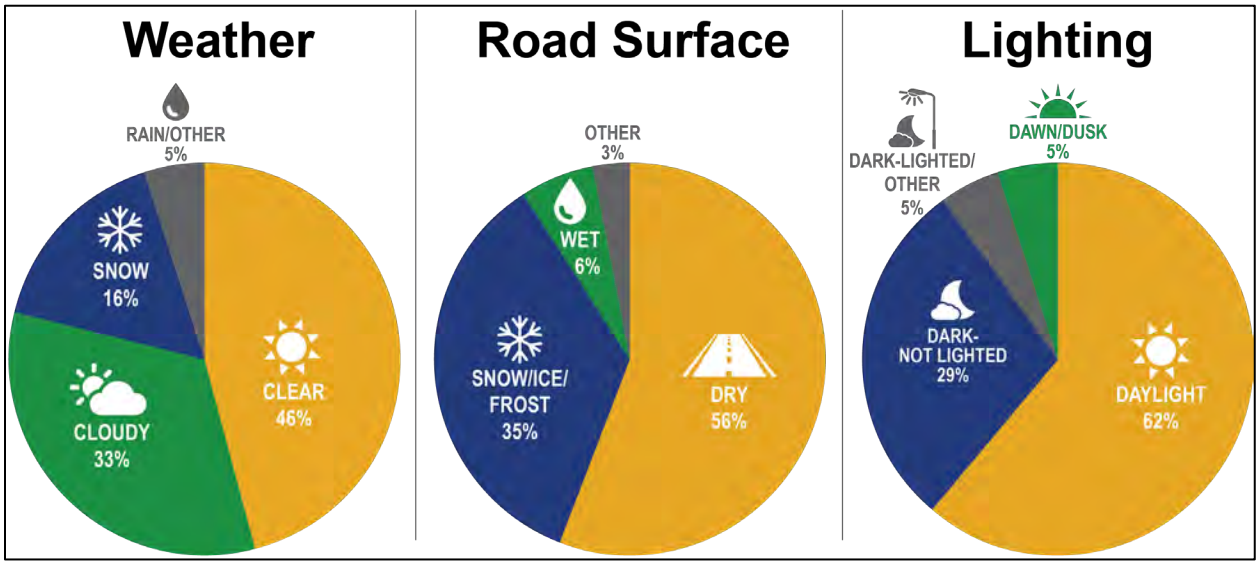


Figure 3.13: Weather, Road, and Lighting Conditions

Vehicle Type

When a crash is reported, the responding officer typically documents details about the types of vehicles involved in each crash. In total, 9,726 vehicles were involved in the 6,739 crashes within the study area over the 5-year analysis period, accounting for multiple vehicles involved in a single crash. **Figure 3.14** shows the total and severe crashes for different vehicle types. The majority of reported vehicles involved in crashes (89 percent) were passenger vehicles, including cars, vans, pickups, and SUVs. Medium and heavy trucks made up 6 percent of vehicles involved in crashes, and motorcycles/mopeds accounted for 1 percent over the 5-year period. Additionally, buses, motor homes, ATVs, snowmobiles, snowplows, cargo vans, and low speed vehicles (bikes) each made up less than 1 percent of vehicles involved in crashes. Approximately 1 percent of vehicles were classified as unknown and 0.25 percent were classified as "other" which may include farm equipment or heavy machinery.

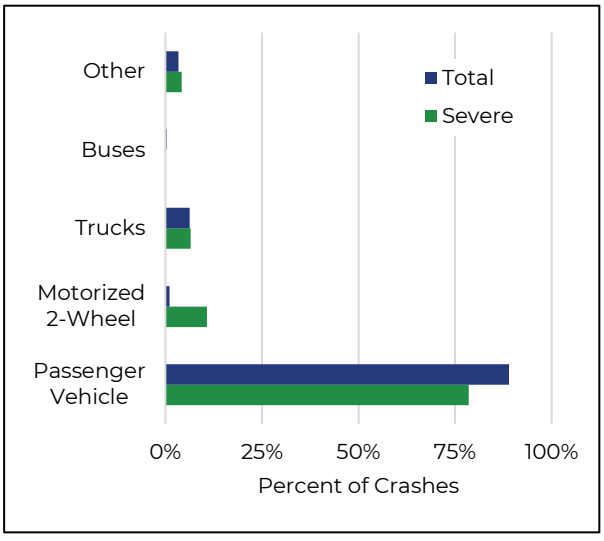


Figure 3.14: Vehicle Type

Of the 307 vehicles involved in severe crashes in the study area, the majority were passenger vehicles, comprising 79 percent. Although motorized two-wheeled vehicles represented only 1 percent of vehicles involved, they accounted for 11 percent of severe crashes. Crashes in the

study area involving motorcycles or mopeds were found to be more than 8 times more likely to result in serious injuries or fatalities than any other vehicle type. Trucks accounted for 7 percent of vehicles involved in severe crashes, while the final 4 percent included ATVs, snowmobiles, motorhomes, and cargo vans. Notably, no buses were involved in severe crashes.

Driver Condition

Driver conditions at the time of the crash can point to driver behavior issues that may need to be addressed. The crash records indicate whether each crash involved fatigued, distracted, and/or impaired drivers. These behaviors are determined and reported based upon the reporting officer's assessment or driver admission. The crash records indicate that 0.8 percent of drivers were fatigued at the time of the crash and approximately 4.4 percent of drivers were distracted at the time of the crash. Distractions can include cell phones, passengers, GPS units, stereos or radios, eating and drinking, distractions outside the vehicle, and anything else that takes the driver's attention away from the task of safe driving. Distractions are typically only recorded when officers can conclusively determine that the driver was distracted, including by driver admission.

Impaired driving is defined as operating a vehicle while under the influence of drugs or alcohol. In Montana, driving under the influence is when the driver's blood alcohol concentration (BAC) is 0.08 percent or higher, as indicated by grams (g) of alcohol per 100 milliliters (ml) of blood or grams of alcohol per 210 liters of breath. Impairment of marijuana in Montana is defined as exceeding a 5 nanogram (ng)/ml threshold for tetrahydrocannabinol (THC) in blood for anyone operating a motor vehicle. In the study area, approximately 12 percent of all crashes involved an impaired driver, compared to 42 percent of severe crashes. Within the study area, crashes with impaired drivers were over five times more likely to be severe.

Contributing Circumstances

Responding officers can indicate whether there was a road or environmental circumstance that contributed to the crash occurring. Up to 3 contributing environmental and 3 contributing road condition factors can be listed for each crash. In the majority of cases, contributing circumstances are not reported by local enforcement officers, however, when reported can indicate whether the crash was due to driver error or a circumstance outside the driver's control. Over the 5-year analysis period, contributing environmental circumstances were only included in about 22 percent of crash reports, while contributing road condition circumstances were noted 36 percent of the time; in all other crashes, these fields were left blank or recorded as "none". Blank fields may or may not indicate that weather or road conditions were a contributing factor to crashes.

In terms of environmental circumstances, weather conditions were a contributing factor in 7 percent of crashes while animals in the roadway or physical obstructions were noted as factors in 14 percent of crashes. Glare was noted as a factor in less than 1 percent of crashes. In terms of roadway circumstances, road surface conditions, such as wet, icy, or snow-covered surfaces, were a factor in 34 percent of crashes. Debris and obstructions in the roadway were listed as a contributing circumstance in 1 percent of crashes. Uneven road surfaces, poor shoulders, work zones, and missing or inoperative traffic control devices were each recorded as contributing circumstances in less than 1 percent of crashes.

Contributing Actions

Up to 4 driver contributing actions can be reported for each driver involved in a crash. These are actions that occurred which led to the occurrence of a crash. When the driver had no contributing action, or the drivers actions were unknown, all fields are left blank or "no

contributing action" is listed in 1 or more fields. When calculating the top contributing actions by drivers, the sum of the occurrences of each contributing action in all 4 fields was divided by the total number of reported records in the first field. When reporting the number of unreported contributing actions, the number of blank records in the first field was divided by the total number of driver records. Since a driver can have up to 4 contributing actions, the percentages do not add up to 100 percent. **Figure 3.15** shows the top contributing factors in crashes within the 5-year analysis period.

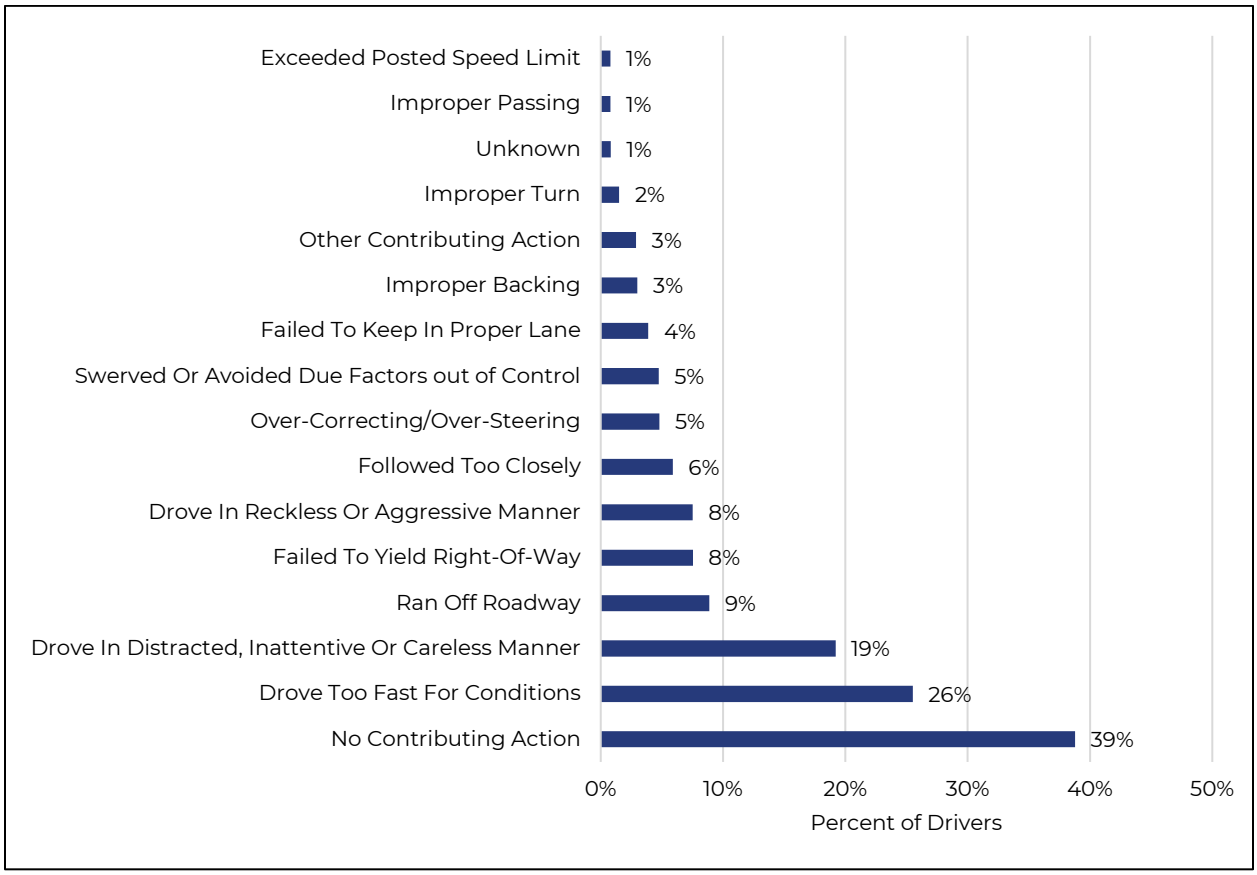


Figure 3.15: Driver Contributing Actions

The most common contributing action was driving too fast for conditions, accounting for 26 percent of drivers. This does not necessarily indicate the driver was speeding, rather it could mean the driver was driving too fast for the road conditions, such as snow-covered roads, work zones, or congestion. Driving in a distracted, inattentive or careless manner was the second most common contributing factor at about 19 percent. Running off the roadway, failing to yield, and driving in a reckless or aggressive manner each accounted for 8 to 9 percent of crashes. About 39 percent of drivers were found to have no contributing action in the crash. Running a stop sign or red light, disregarding other road markings, improper parking, disregarding other traffic signals, driving the wrong way, failing to use proper signals, and driver license restrictions each accounted for less than half a percent of crashes.

4. Demographics

An important component of the crash data analysis includes consideration of demographics in terms of both the demographics of the individuals involved in crashes as well as the demographic characteristics of Gallatin County as a whole. This analysis helps identify disparities of people involved in crashes as well as potential disadvantaged populations that may be disproportionately affected by crashes or at a higher risk of involvement in crashes due to economic or social circumstances. The following sections include an analysis of demographic details provided in crash data as well as an analysis of demographics data sourced through the US Census Bureau.

4.1. Demographics of Individuals Involved in Crashes

Understanding the characteristics of individuals involved in crashes may help identify populations for educational campaign focus or identify groups chronically involved in crashes that may need special consideration during project design. The following sections discuss the available person demographics reported in the crash data. Race and ethnicity information is not provided in the crash data.

Gender

Overall, about 37 percent of individuals involved in crashes were female including 33 percent of drivers. Males accounted for 62 percent of all individuals involved in crashes, including 67 percent of drivers. For approximately 1 percent of people involved in crashes, the gender type was listed as unknown. Male drivers accounted for 69 percent of severe crashes while female drivers made up the remaining 33 percent.

Age

The age distribution for drivers involved in crashes generally follows a typical bell curve, but skews slightly older, as shown in **Figure 4.1.** The highest proportion of drivers involved in crashes were in the 22- to 35-year age range. In general, all the age groups had about two times more males than females. About 1 percent of drivers were aged 16 years and younger. The legal driving age in Montana is 14.5, and 10 drivers involved in crashes were under that age. Approximately 8 percent of drivers involved in crashes were over the age of 65, and less than 1 percent of drivers were over the age of 80.

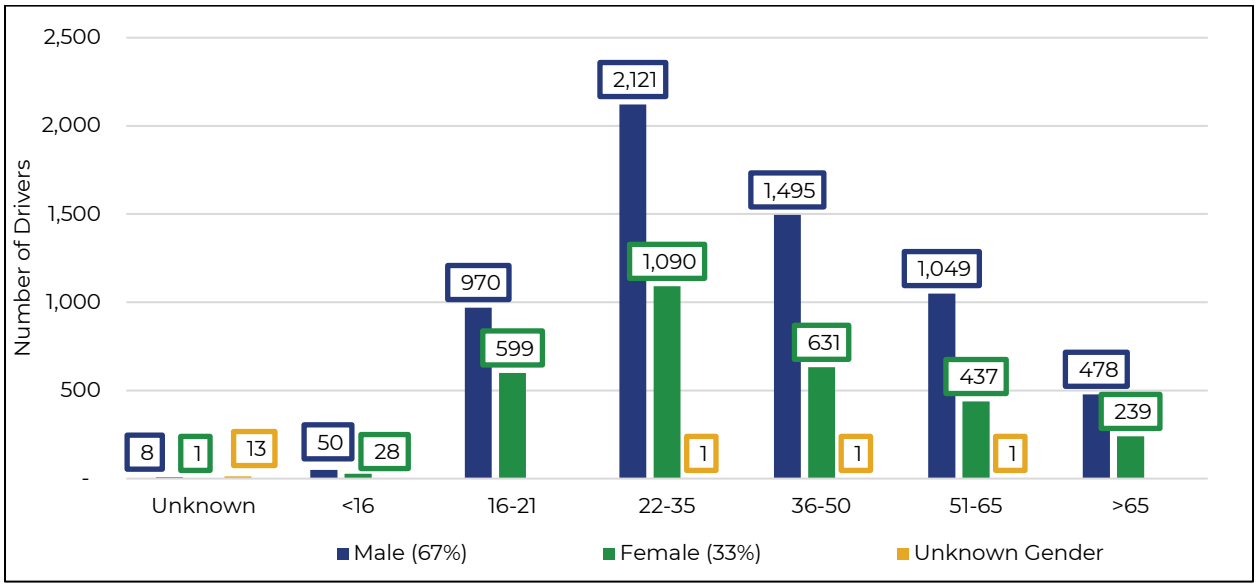


Figure 4.1: Driver Demographics

Driver's License State

Although not specifically a demographic characteristic, the state in which a driver's license is registered can generally indicate whether a driver is a visitor or resident. The driver's license state was listed for about 98 percent of drivers involved in crashes. Of those reported, 72 percent of driver's licenses, or 6,551, were from the State of Montana. Drivers with licenses from California (262), Washington (217), Idaho (205), and Colorado (142) made up the next highest shares of drivers involved in crashes within Gallatin County over the 5-year period. Of the out-of-state drivers, 73 percent were between the ages of 18 and 27, likely representing college students in the area. Non-residents may struggle with driving in winter weather conditions due to unfamiliarity with icy roads, changing weather patterns, and local driving practices. About 42 percent of drivers without a Montana license were involved in crashes when roads were icy, snowy, or slushy, in contrast to 33 percent of drivers with Montana licenses. In general, the majority of drivers involved in crashes were from Montana, though that number likely includes non-residents who live outside of Gallatin County.

4.2. Demographics of Gallatin County

Table 4.1 presents various demographic and economic characteristics as reported by the 2020 Decennial Census or 2018-2022 American Community Survey (ACS). The data are estimates based on annual samples of the population and are based on self-reported demographic and economic characteristics. The table includes data for all of Gallatin County as well as for Gallatin County excluding the cities of Bozeman and Belgrade, aligning with the study area boundary. To identify demographics in the study area, data from Gallatin County outside of the cities will be used primarily, except when comparing it to countywide data to gain a better understanding of the demographics of the entire population in the area. The table indicates that the population in Gallatin County identifies as primarily white, while about 10 percent of the population is of a minority race, with Asian and American Indian being the most prevalent. The table also shows that 4 percent of the population identifies as Hispanic or Latino.

The overall population of Gallatin County is primarily younger, with the largest age group being 21 to 34 years old. However, the population outside the cities has the highest representation in the under 21 age group and the second highest in the 35-49 age group. This suggests that

there may be more families with young children in the areas outside the cities, while the cities themselves likely have a higher concentration of college students and young adults. Outside of the cities, residents under the age of 21 make up 26 percent of the population and account for 15 percent of drivers involved in crashes. People aged 65 and over make up 17 percent of the population but only 9 percent of drivers involved in crashes. These statistics indicate that older and younger drivers are not disproportionately involved in crashes in Gallatin County. Drivers aged 21 through 34 make up 36 percent of drivers involved in crashes in the study area, despite composing only 16 percent of the population. In terms of gender, females comprise 48 percent of the population while males make up 52 percent. However, 67 percent of drivers involved in crashes were male, indicating a large disparity.

In Gallatin County, about 8 percent of the population outside of the cities is reported as living with a disability. About 4 percent report an auditory/hearing difficulty, 1 percent report a vision difficulty, and 3 percent report an ambulatory/mobility difficulty. To ensure equal participation in transportation for these residents, specific accessibility measures may be needed such as accessible pedestrian signals, curb ramps, and sidewalks. Overall, about 3.4 percent of the population reportedly walks to work on a daily basis. Although less than 0.5 percent of all crashes specifically involved pedestrians or bicyclists, safe accommodations for these users is important to help promote increased use of these modes. The use of active transportation modes may be a lifestyle choice or may be a necessity due to lack of access to a vehicle, since about 1.3 percent of workers in the county outside the cities do not have a vehicle.

The majority of the Gallatin County population is employed, with about 1 percent of residents being reported as unemployed. Reported income levels in the county are generally higher than other parts of the state, however, nearly 6 percent of the population is reported as living below the poverty line. These lower-income residents may also rely on the use of active transportation modes, such as walking, biking, or public transit, which could have implications for transportation planning and safety in the area.

Table 4.1: Select Demographic Characteristics

Demographics	Gallatin County Total		Excluding Bozeman & Belgrade	
	Population	Percent	Population	Percent
Race (2020 Census)				
White Alone	105,886	89.0%	49,779	90.2%
Black or African American Alone	526	0.4%	146	0.3%
American Indian and Alaska Native Alone	1043	0.9%	305	0.6%
Asian Alone	1413	1.2%	389	0.7%
Native Hawaiian and Other Pacific Islander Alone	99	0.1%	37	0.1%
Some Other Race Alone	2184	1.8%	1,009	1.8%
Two or More Races	7809	6.6%	3,542	6.4%
Total Population (2020)	**118,960**	**100%**	**55,207**	**100%**
Ethnicity (2020 Census)				
Hispanic or Latino	5,895	5%	2,476	4%
Not Hispanic or Latino	113065	95%	52,731	96%
Total Population (2020)	**118,960**	**100%**	**55,207**	**100%**
Age (2018 – 2022 ACS)				
<21	31,137	26%	14,302	26%
21-34	31,166	26%	8,592	16%
35-49	23,363	20%	11,960	22%

Demographics	Gallatin County Total		Excluding Bozeman & Belgrade	
	Population	Percent	Population	Percent
50-64	18,437	15%	11,205	20%
65+	15,582	13%	9,185	17%
Total Population (2022)	**119,685**	**100%**	**55,244**	**100%**
Gender (2018 – 2022 ACS)				
Male	62,534	52%	28,808	52%
Female	57,151	48%	26,436	48%
Total Population (2022)	**119,685**	**100%**	**55,244**	**100%**
Disability Status (2018 – 2022 ACS)				
Hearing Difficulty	4110	3.4%	2,216	4.0%
Vision Difficulty	1635	1.4%	593	1.1%
Cognitive Difficulty	4580	3.8%	1,728	3.1%
Ambulatory Difficulty	4158	3.5%	1,899	3.4%
Self-Care Difficulty	1744	1.5%	721	1.3%
Independent Living Difficulty	3265	2.7%	1,147	2.1%
Total Civilian Non-Institutionalized Population (2022)	**119,216**	**100%**	**55,125**	**100%**
Total Population with a Reported Disability (2022)	**10,311**	**9%**	**4,268**	**8%**
Means of Transportation to Work (2018 – 2022 ACS)				
Drove Alone	46,980	69.1%	17,095	64.6%
Carpooled	5,968	8.8%	3,131	11.8%
Public Transportation	335	0.5%	229	0.9%
Walked	3,012	4.4%	907	3.4%
Taxicab, Motorcycle, Bicycle, or Other Means	2,096	3.1%	606	2.3%
Worked from Home	9,597	14.1%	4,494	17.0%
Total Workers 16 Years and Over (2022)	**67,988**	**100%**	**26,462**	**100%**
Workers in Households with No Vehicle (2022)	**1,182**	**1.74%**	**347**	**1.31%**
Employment Status (2018 – 2022 ACS)				
Employed	69,104	98%	29,883	99%
Unemployed	1,457	2%	423	1%
Population in Labor Force (2022)	**70,516**	**100%**	**30,261**	**100%**
Economic Characteristics (2018 – 2022 ACS)				
Median Household Income	$83,434	--	$93,157	--
Population Below Poverty Level	--	10.60%	--	5.79%

Source: 2020 Decennial US Census, and 5-year American Community Survey estimates (2018 – 2022)

4.3. Transportation Equity

To address underinvestment in disadvantaged communities, the USDOT developed the Justice40 Initiative (J40). The initiative helps transportation agencies identify and prioritize projects that benefit communities facing barriers to affordable, equitable, reliable, and safe transportation. In accordance with J40, the USDOT developed the Equitable Transportation Community (ETC) Explorer which provides data that allows agencies to understand how a community is experiencing transportation disadvantage based on five components of disadvantage including the following.

- **Transportation Insecurity** occurs when people are unable to get to where they need to go to meet the needs of daily life regularly, reliably, and safely. Research indicates that transportation insecurity is a significant factor in persistent poverty.
- **Environmental Burden** measures factors such as pollution, hazardous facility exposure, and water pollution. These environmental burdens can have far-reaching consequences such as health disparities, negative educational outcomes, and economic hardship.
- **Social Vulnerability** is a measure of socioeconomic conditions that have a direct impact on quality of life including lack of employment, educational attainment, poverty, housing tenure, access to broadband, and housing cost burden as well as identifying household characteristics such as age, disability status, and English proficiency.
- **Health Vulnerability** assesses the increased frequency of health conditions that may result from exposure to air, noise, and water pollution, as well as lifestyle factors such as poor walkability, car dependency, and long commute times.
- **Climate and Disaster Risk Burden** reflects sea level rise, changes in precipitation, extreme weather, and heat which pose risks to the transportation system. These hazards may affect system performance, safety, and reliability. As a result, people may have trouble getting to their homes, schools, stores, and medical appointments.

The ETC Explorer calculates the cumulative impacts of each disadvantage component across each census tract and uses percentile rankings to determine each census tracts' component score against all other census tracts both nationally and on a statewide basis. USDOT considers a census tract to be experiencing transportation disadvantage if the overall index score places it in the top 65 percent of all census tracts, nationally or at the statewide level.

Figure 4.2 illustrates the ETC Explorer results for Gallatin County identifying disadvantaged census tracts, based on both national and statewide comparisons. The county is classified as transportation disadvantaged on a national level. However, while Bozeman and Belgrade are included in this area, they are not a part of the study area. To understand the characteristics of the county's population outside the cities, tracts identified as disadvantaged at the state or national level are listed individually in **Table 4.2** to determine their location relative to the cities. Values highlighted in red surpass the 65th percentile, indicating potentially disadvantaged populations within the census tract. All of, or the large majority of, tracts 0704, 0600, 0900, and 1101 are located within Bozeman city limits. Tracts 0104 and 0105 are located in Belgrade while tract 0101 is partially located within Belgrade city limits. Only 2 of the 9 tracts identified as disadvantaged, tracts 0201 and 1200, are located in the county entirely outside city limits. Tract 1200 is south of the cities along US 191 encompassing the Gallatin Gateway area and is considered transportation disadvantaged on the national level. Tract 0201, situated south of I-90 and west of Belgrade, is identified as transportation disadvantaged on both the state and national levels as well as environmentally disadvantaged on the state level. On a national scale, both of these tracts are identified as transportation disadvantaged due to factors such as auto-dependency, lack of access to public transportation, or long walking distances between key destinations such as medical services, grocery stores, parks, schools, and higher education.

Table 4.2: USDOT ETC Explorer - Transportation Disadvantages

Census Tract	Transportation Insecurity (%)		Environmental Burden (%)		Social Vulnerability (%)		Health Vulnerability (%)		Climate and Disaster Risk (%)		Overall Disadvantage (%)	
	State	Nation	State	Nation	State	Nation	State	Nation	State	Nation	State	Nation
Entire County												
TOT	36.4	75.9	61.9	32.6	26.0	39.0	42.1	22.1	58.7	26.6	23	12
Census Tracts Identified as Disadvantaged												
0101	57.5	96.7	59.1	24.7	7.2	20.8	56.9	26.4	54.7	10.3	100	0
0104	40.6	93.4	80.2	45.8	52.8	61.9	15.7	7.0	57.5	26.1	0	100
0105	43.1	93.8	97.8	82.5	25.5	35.7	18.6	7.7	75.2	49.1	0	100
0201	65.4	98.9	69.5	30.0	4.1	14.2	5.7	3.0	20.1	6.9	100	0
0600	11.3	52.5	92.5	75.0	86.8	77.5	61.3	30.1	78.3	45.6	0	100
0704	15.4	44.3	70.4	35.9	41.5	49.9	56.6	27.9	81.8	52.9	100	0
0900	3.1	20.0	82.4	54.2	59.4	73.8	80.8	52.1	97.2	77.9	100	0
1101	5.7	24.3	69.8	35.8	67.6	72.3	79.2	51.6	98.7	74.2	100	0
1200	62.6	98.0	31.8	3.4	19.8	32.9	53.5	24.8	50.6	6.1	100	0

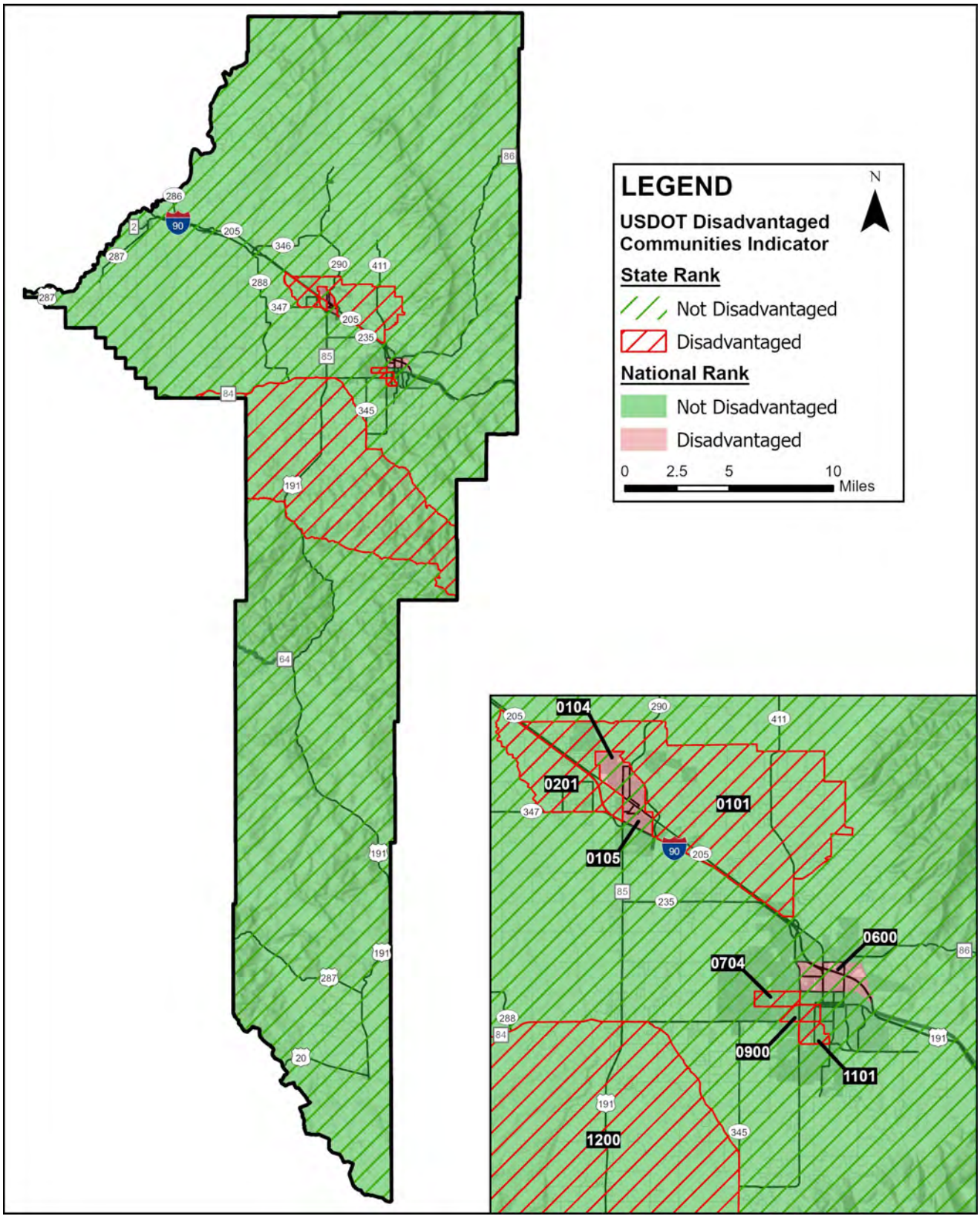


Figure 4.2: USDOT Transportation Disadvantages

5. High-Injury Network

A high injury network (HIN) is a screening methodology that identifies areas within the transportation system with the greatest safety concerns. Jurisdictions across the country use various methodologies to develop local HINs depending on the availability of data in their jurisdiction. A HIN was created for the Gallatin area by weighing the frequency of crashes and severity of injuries resulting from crashes. This method helps identify and prioritize locations with high crash occurrences or especially severe crashes for further investigation. An understanding of circumstances surrounding crashes is also important to determine whether crashes occurred due to problematic infrastructure conditions, repeated improper driver behaviors, or chance circumstances that could not have otherwise been prevented.

5.1. Intersections

The intersection HIN analysis calculated a safety score for each intersection in the county by selecting crashes occurring within 250 feet of an individual intersection as shown in **Figure 5.1**. In general, a higher frequency of crashes is expected at intersections with higher volumes due to increased exposure; an intersection with a high crash frequency with comparatively low traffic volumes could be cause for concern.

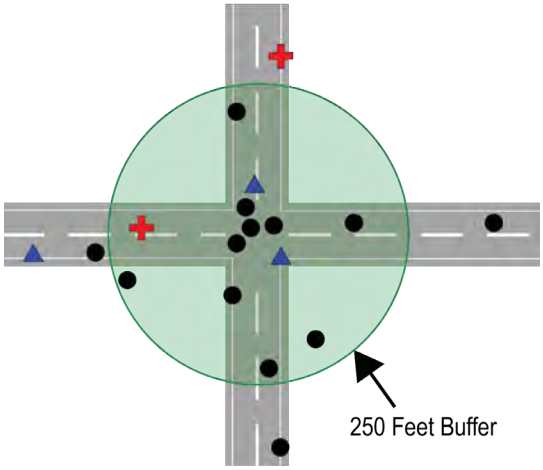


Figure 5.1: Intersection HIN Analysis

Table 5.1 presents characteristics of the intersections with the highest intersection safety scores. The intersection HIN was calculated in four different ways to analyze a combination of all roads compared to off-system roads both with and without crash rates. The off-system network analysis was conducted to place added emphasis on roads within the county's primary jurisdiction. The analyses that included a crash rate calculation were conducted only for parts of the network where traffic data, characterized by AADT, was available. By using four different methods to visualize the HIN, intersections that show up multiple times (highlighted in red in **Table 5.1**) can be identified as possible problems. **Figures 5.2, 5.3, 5.4,** and **5.5** highlight intersections with the highest safety scores for each set of parameters and the circled intersections correspond with **Table 5.1**.

The highest scoring and most frequently occurring intersection in the HIN analyses was Stucky Road and Gooch Hill Road which is configured as a 3-leg intersection with stop control on Stucky Road. This intersection was the location of 27 crashes over the 5-year period but resulted in no severe injuries. The intersection of Love Lane and Durston Road also appeared three times scoring slightly lower than the previous intersection. This 4-leg intersection is all way stop controlled and was the site of 26 crashes over the 5 years resulting in 1 severe injury. The other three intersections that presented more than once in the HIN scenarios were Durston Road and Gooch Hill Road, Gibbon Ave and Dunraven Street in West Yellowstone, and the Frontage Road and Heeb Road, all of which are all two-way stop controlled.

Table 5.1: Top Intersection Safety Scores

Rank	Intersection	Control Type	# of Crashes	# of Severe Injuries	AADT
Off System Only with Crash Rate					
1	Stucky Rd / Gooch Hill Rd	TWSC	27	0	2,669
2	Love Ln / Durston Rd	AWSC	26	1	3,560
3	Axtell Anceny Rd / Axtell Gateway Rd	Uncontrolled	4	0	140
4	Durston Rd / Gooch Hill Rd	TWSC	19	0	3,560
5	Spooner Rd / Jackpot Ln	None	1	0	79
Off System only without Crash Rate					
1	Gibbon Ave / Dunraven St	TWSC	2	2	N/A
2	Love Ln / Durston Rd	AWSC	26	1	N/A
3	Stucky Rd / Gooch Hill Rd	TWSC	27	0	N/A
4	Durston Rd / Gooch Hill Rd	TWSC	19	0	N/A
5	Gooch Hill Rd / Chapman Rd	TWSC	16	0	N/A
All Roads with Crash Rate					
1	Frontage Rd / Heeb Rd	TWSC	3	1	2,274
2	Valley Center Rd / Jackrabbit Rd	Signal	46	4	6,192
3	Stucky Rd / Gooch Hill Rd	TWSC	27	0	2,669
4	Bridger Canyon Rd / Brackett Creek Rd	TWSC	7	0	354
5	Love Ln / Durston Rd	AWST	26	1	3,560
All Roads without Crash Rate					
1	Gibbon Ave / Dunraven St	TWSC	2	2	N/A
2	Jackrabbit Ln / Huffine Ln	Signal	74	0	N/A
3	Gooch Hill Rd / Huffine Ln	Signal	59	4	N/A
4	Valley Center Rd / Jackrabbit Rd	Signal	46	4	N/A
5	Frontage Rd / Heeb Rd	TWSC	3	1	N/A

**TWSC = Two Way Stop Controlled, AWSC = All Way Stop Controlled*

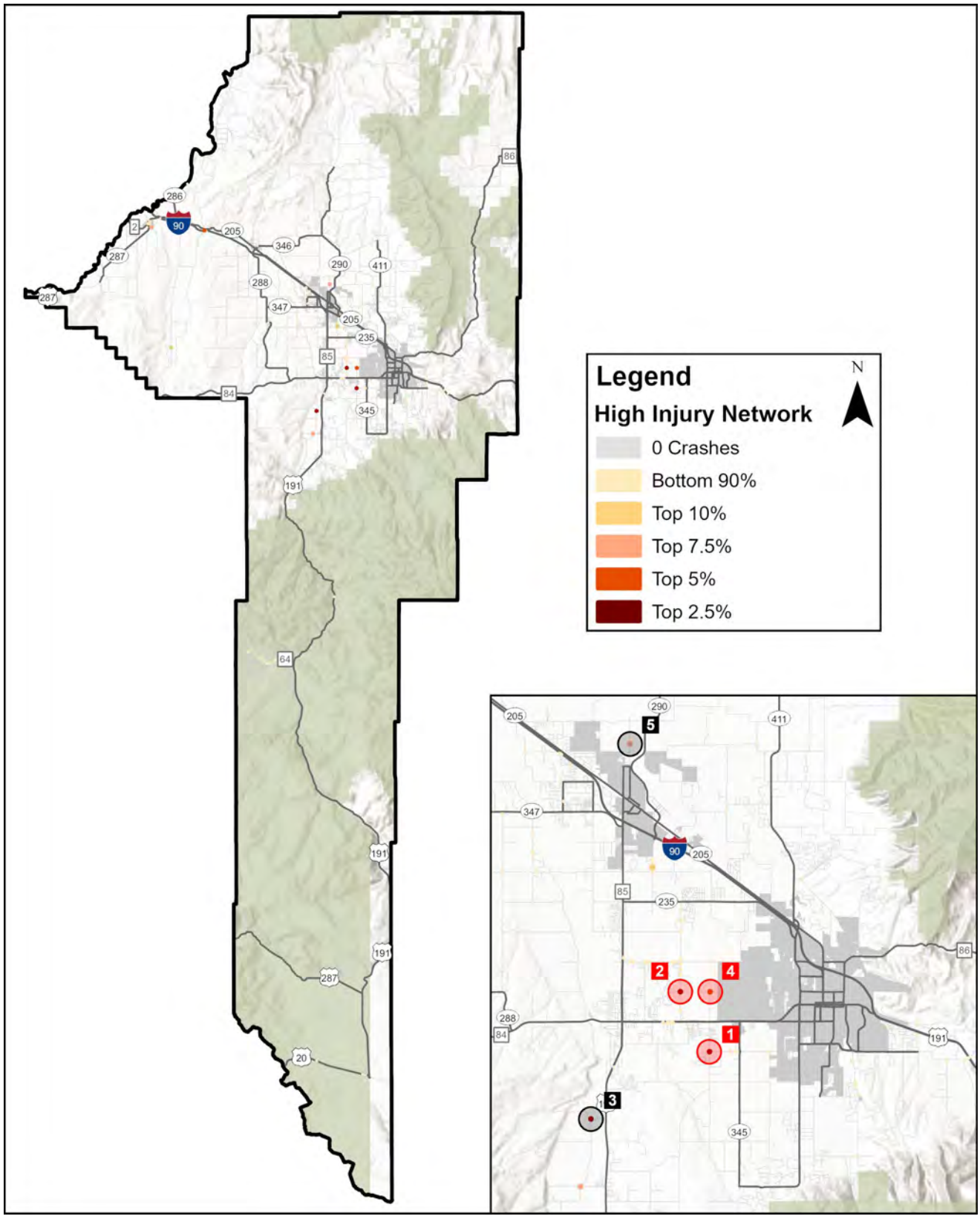


Figure 5.2: Off System Intersection Safety Scores with Crash Rates

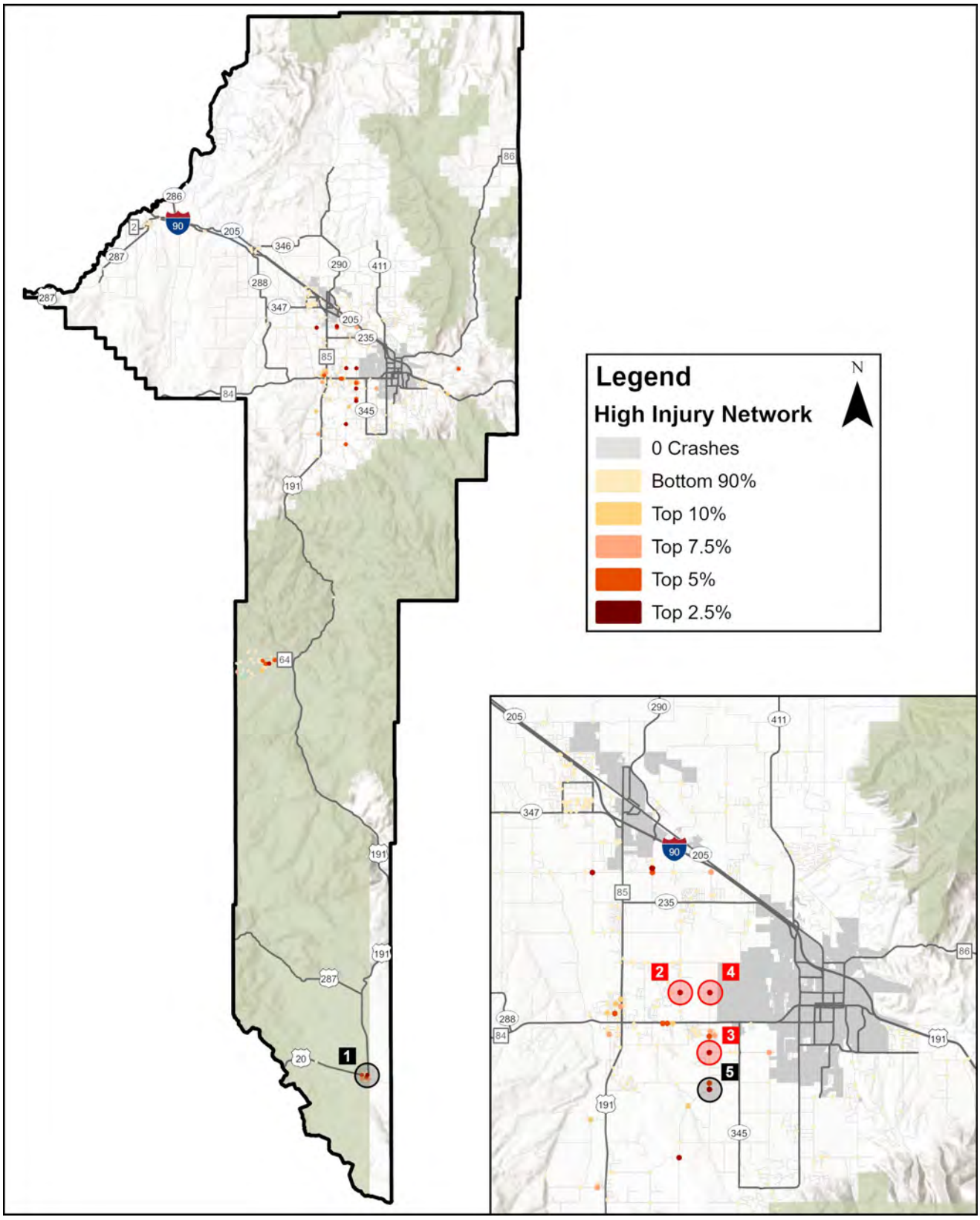


Figure 5.3: Off System Intersection Safety Scores without Crash Rates

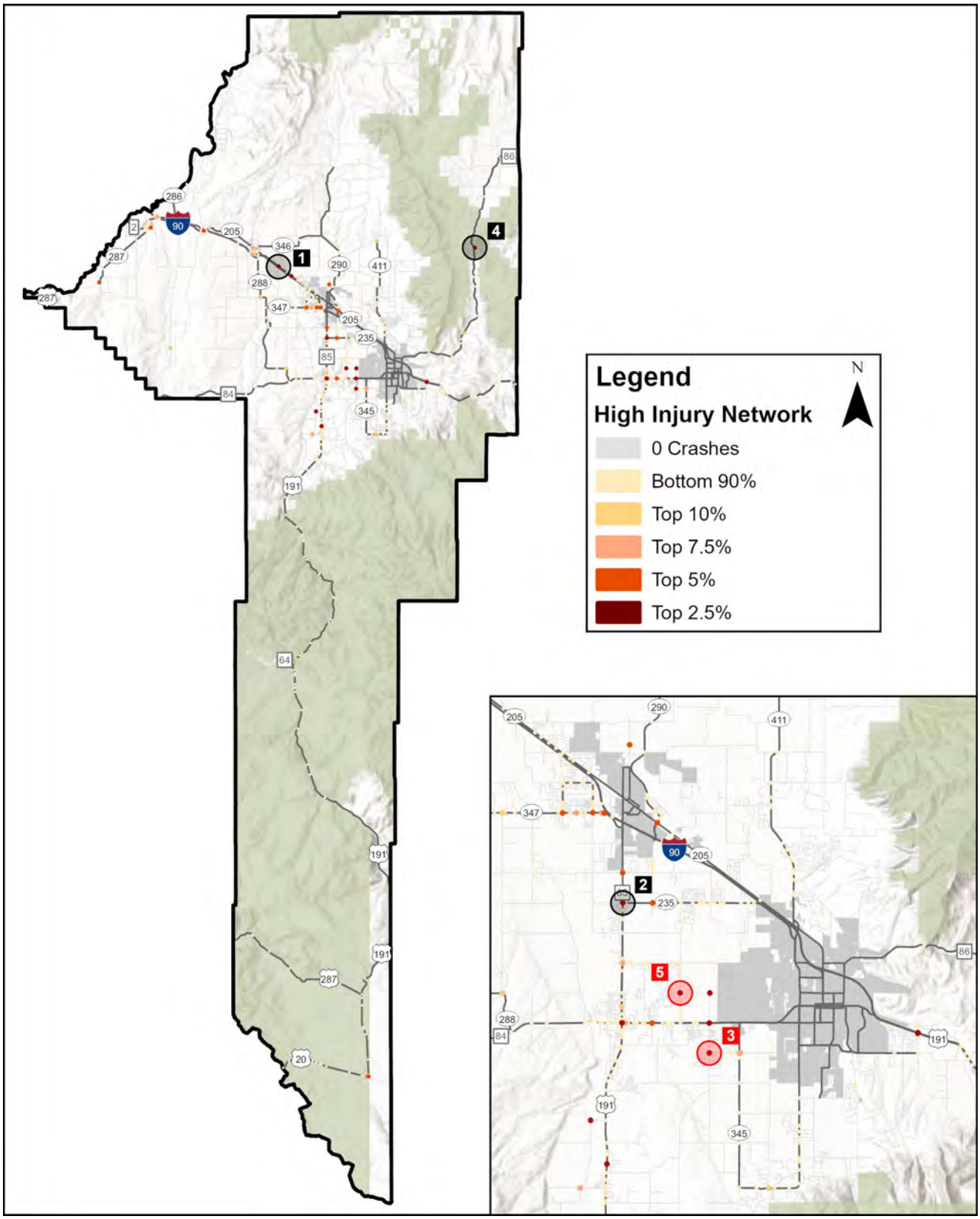


Figure 5.4: All Intersection Safety Scores with Crash Rates

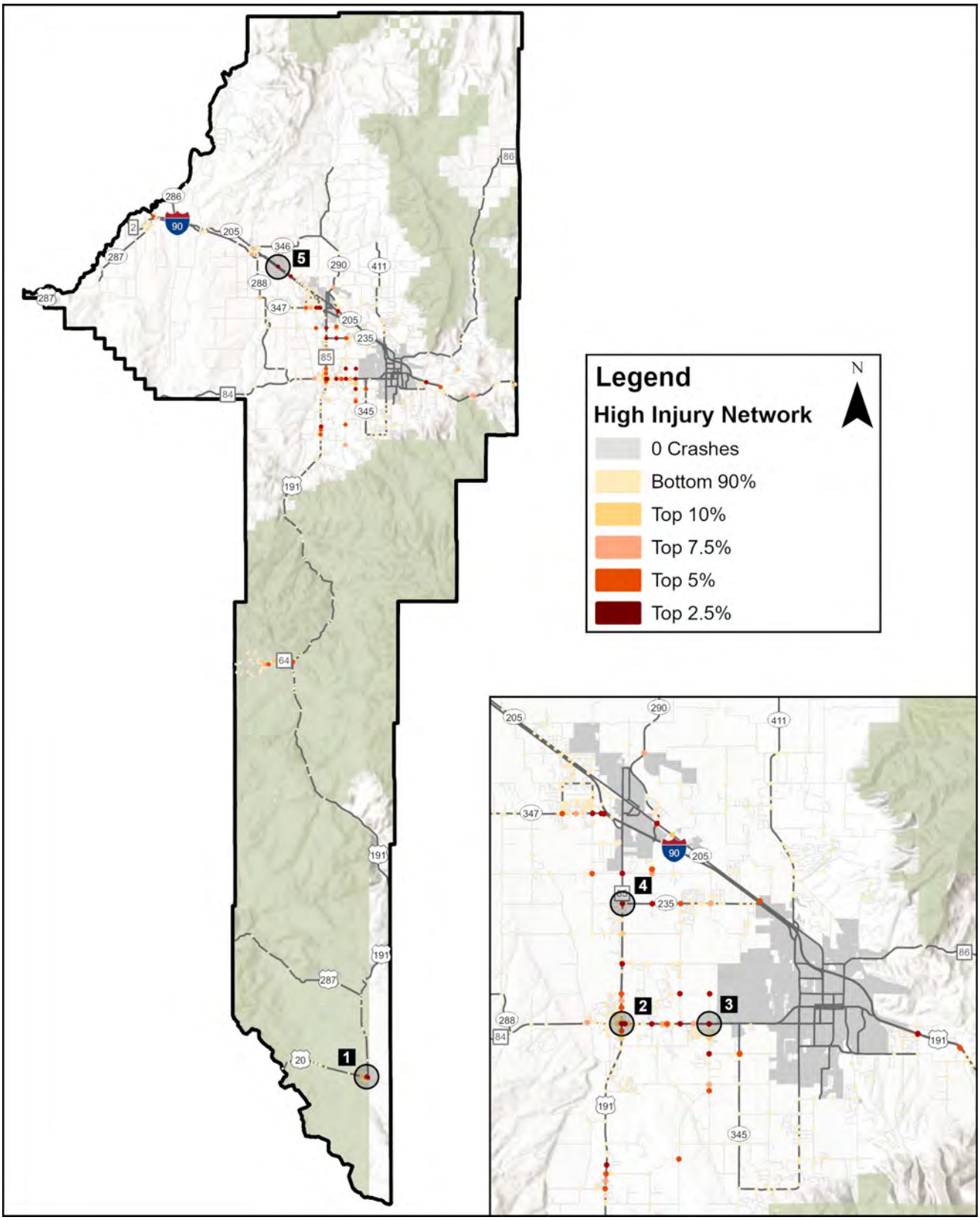


Figure 5.5: All Intersection Safety Scores without Crash Rates

5.2. Roadway Segments

The roadway segment HIN analysis evaluated the roadway network using a sliding window method, as recommended by the *Highway Safety Manual*, to effectively compare roadway segments of equal length. The sliding window method calculates crash scores by evaluating crashes and injuries occurring in 0.5-mile segments (i.e., “windows"), and then sliding the window along the roadway 0.1-mile at a time, as demonstrated in **Figure 5.6**. The crashes evaluated in the intersection HIN were not included in the roadway segment HIN analysis. This method helps identify locations with the highest concentrations of crashes and/or severe injuries and reduces the possibility of splitting locations with high concentrations of crashes into separate segments, which would reduce the safety score for segments that start and end in high-crash spots.

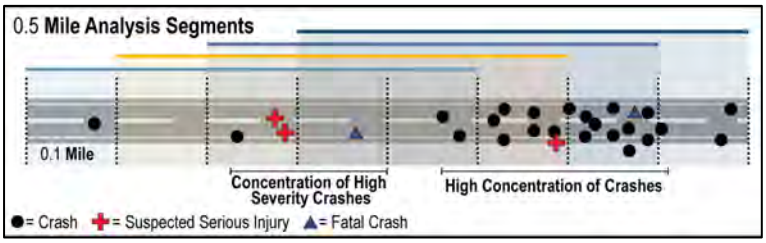


Figure 5.6: Sliding Window Method

Similar to the intersection HIN analysis, the segments were scored based on four different scenarios, using a combination of all roads compared to off-system roads, both with and without crash rates. **Table 5.2** tabulates the characteristics of the segments with the highest scores. Segments that showed up in multiple scenarios were identified as possible problem areas and are recorded in red in the table. **Figures 5.7, 5.8, 5.9,** and **5.10** depict roadway segments with the highest safety scores, and the circled segments correspond to **Table 5.2** for each scenario. Where several consecutive segments were identified with high scores, a sum of the total crashes and severe injuries as well as an average of the corresponding frequency, severity, and combined safety scores was considered. When applicable, the eastbound and westbound segments of I-90 were combined.

As shown in the figures and table, segments that consistently ranked the highest in crash frequency typically feature sharp turns, with those appearing most frequently having 90-degree turns. The segment of Thorpe Road between Richman Road and the I-90 underpass appears in all four scenarios, experiencing 24 crashes, resulting in 2 severe injuries over the analysis period. Bozeman Trail Road experienced 36 crashes, but no severe injuries, and features a similar 90-degree turn. Axtell Anceney Road appears in two scenarios, with a sharp turn and uncommon intersection configuration occurring along the segment, resulting in 11 crashes with no severe injuries. One segment of I-90 within the Bozeman Pass appears in multiple scenarios and accounts for 100 crashes, one of which resulted in a severe injury. A few other segments were observed in multiple scenarios due to factors such as low AADT or a higher ratio of severe injuries to total crashes, but these do not necessarily align with a noticeable crash trend or safety concern. In general, the highest-scoring segments tend to be rural, off-system routes featuring sharp 90-degree turns.

Table 5.2: Top Segment Safety Scores

Rank	Roadway	Extent	# of Crashes	# of Severe Injuries	AADT
Off System Only with Crash Rate					
1	Baxter Ln	Monforton School Rd - Black Bull Trail	5	1	3,839
2	Thorpe Rd	Richman Rd - I-90 Underpass	24	2	941
3	Axtell Anceney Rd	River Rd – Axtell Gateway Rd	11	0	227
4	Bozeman Trail Rd	Fort Ellis Rd – Mount Ellis Rd	36	0	2,211
5	Madison Rd	North of Norris Rd	3	0	126
Off System Only without Crash Rate					
1	Stagecoach Trail Rd	Springhill Rd – Heeb Rd	1	1	N/A
2	Baxter Ln	Monforton School Rd – Black Bull Trail	5	1	N/A
3	Thorpe Rd	Richman Rd – I-90 Underpass	24	2	N/A
4	Fairy Lake Rd	FS 6983 – Top of Road	5	1	N/A
5	Bozeman Trail Rd	Fort Ellis Rd – Mount Ellis Rd	31	0	N/A
All Roads with Crash Rate					
1	Thorpe Rd	Richman Rd - I-90 Underpass	24	2	941
2	Axtell Anceney Rd	River Rd – Axtell Gateway Rd	11	0	227
3	Madison Rd	North of Norris Rd	3	0	126
4	Bozeman Trail Rd	Fort Ellis Rd – Mount Ellis Rd	36	0	2,211
5	I-90	RP 315 – RP 316	84	1	19,638
All Roads without Crash Rate					
1	Huffine Ln	Jackrabbit Ln – Caramel Ct	31	0	N/A
2	Thorpe Rd	Richman Rd – I-90 Underpass	24	2	N/A
3	I-90	RP 315 – RP 316	100	1	N/A
4	I-90	RP 293 – RP 294	18	2	N/A
5	US 191	North of Spanish Creek Rd	26	0	N/A

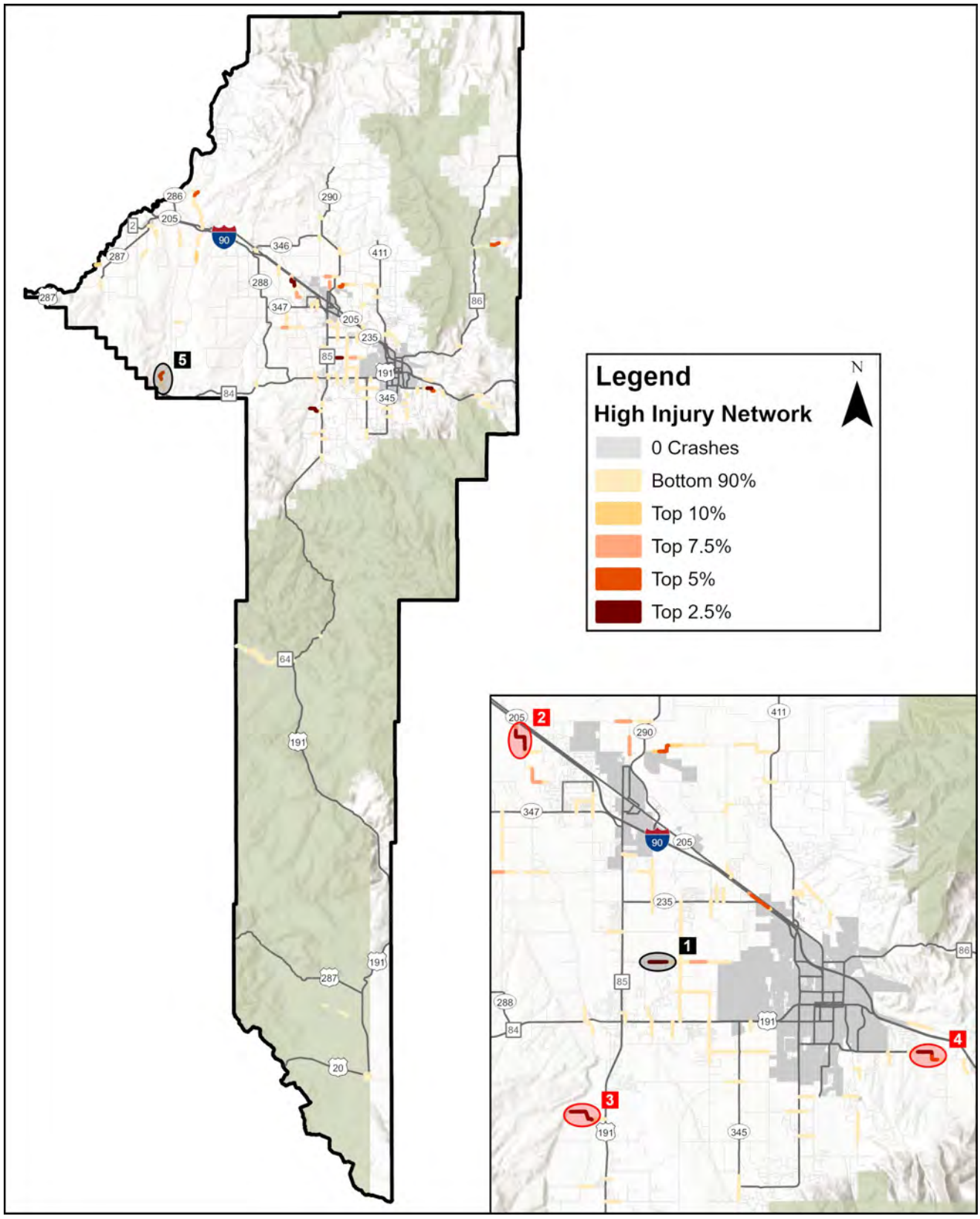


Figure 5.7: Off System Segment Safety Scores with Crash Rates

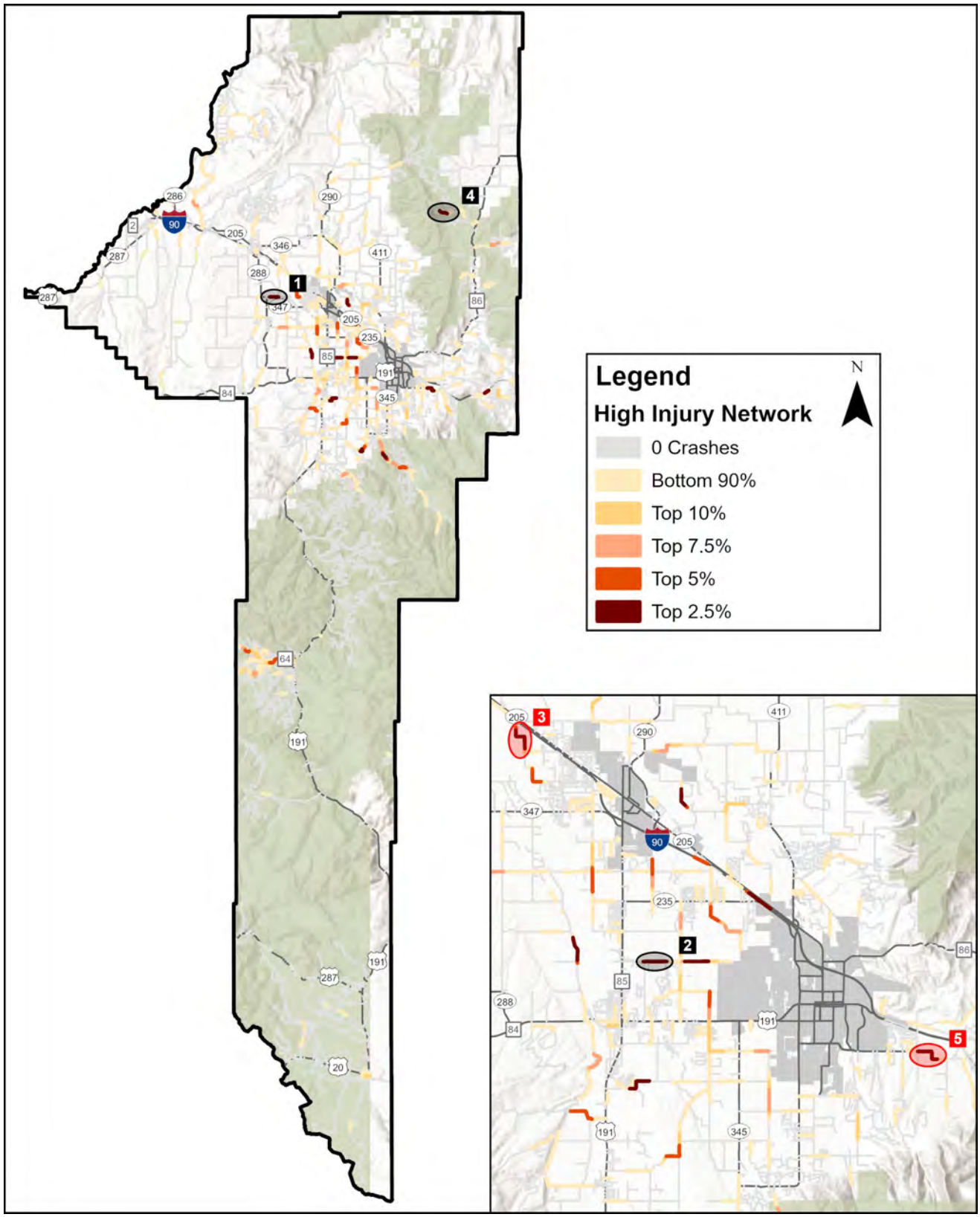


Figure 5.8: Off System Segment Safety Scores without Crash Rates

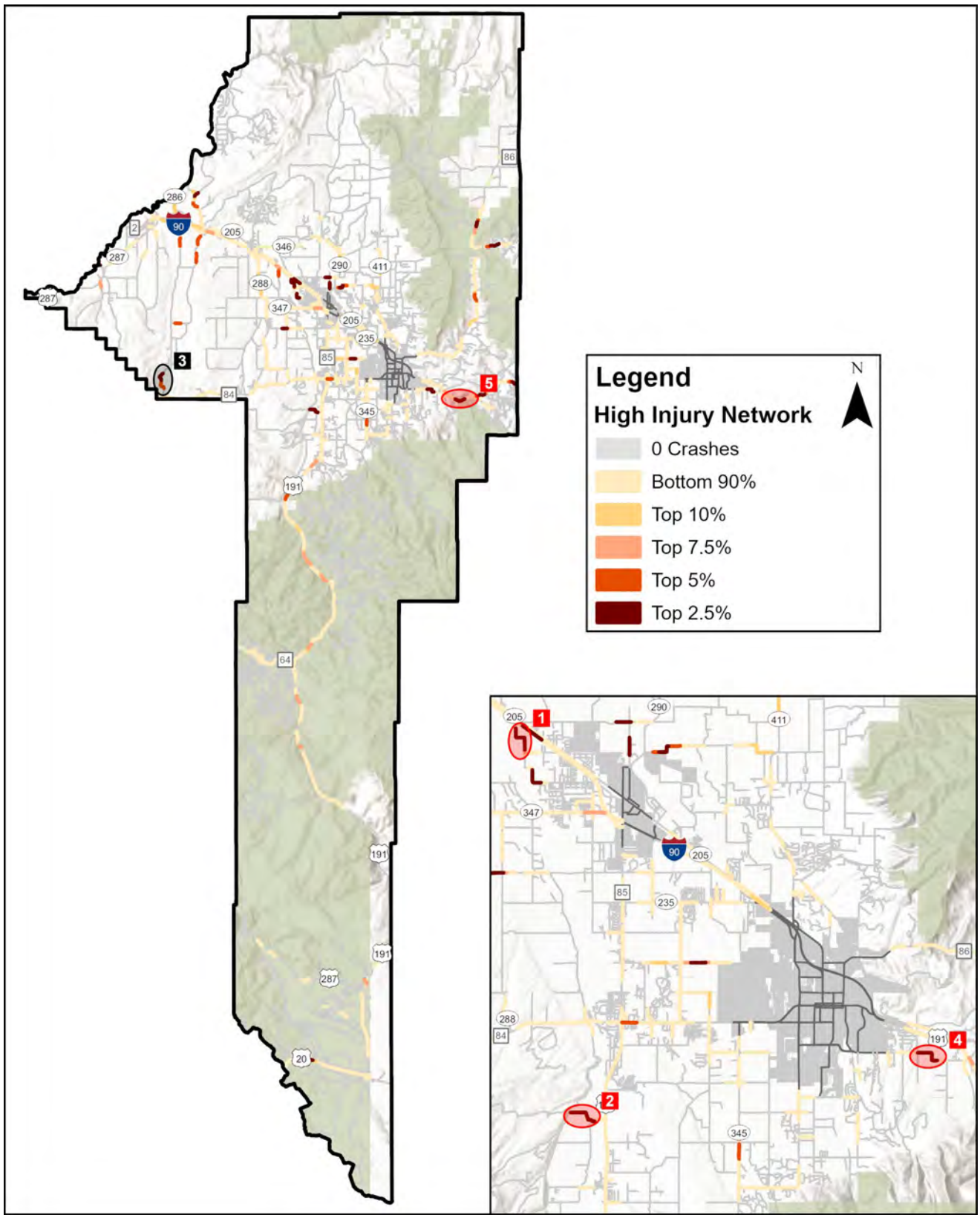


Figure 5.9: All Segment Safety Scores with Crash Rates

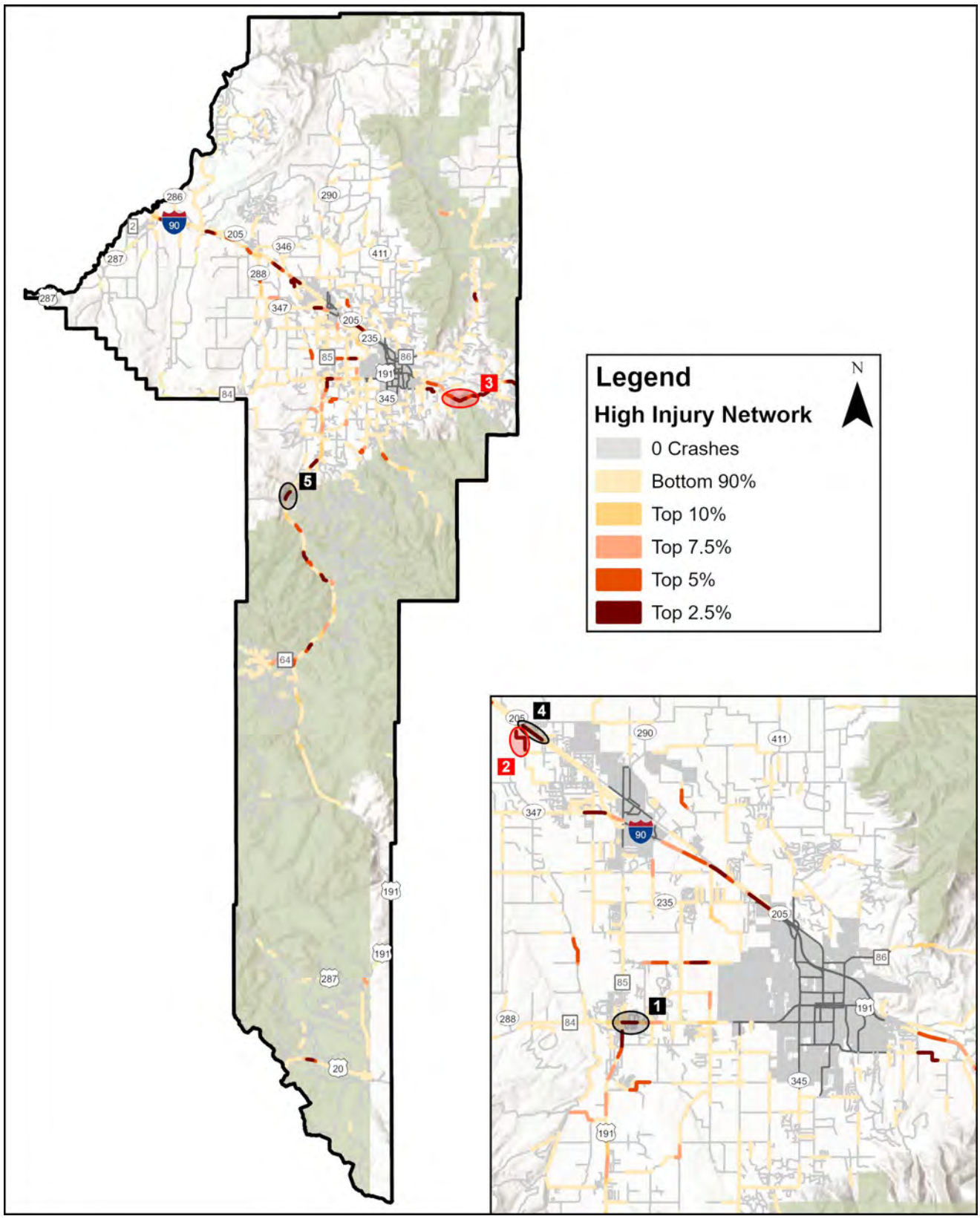


Figure 5.10: All Segment Safety Scores without Crash Rates

6. Additional Safety Data Review

In addition to investigating the crash data provided by MDT, several other data sources were reviewed to understand other factors in crashes and general safety concerns. The data sources described in this section include MHP issued citations, MDT collected animal carcasses, and comparative data from other jurisdictions.

6.1. Citation Data Review

Citation data was obtained from the MDT Traffic and Safety Bureau for the same 5-year analysis period (2019-2023). This data includes citations issued primarily by MHP for violations reflecting state and federal traffic codes. Citations for city code violations, such as the unlawful use of cell phones while driving, are generally not reflected in this dataset. **Figure 6.1** shows the locations of citations issued within the study area. As shown, the citations were primarily issued on highways, though some citations on local streets are also observed. The Four Corners intersection (US 191/MT 84/85) and the Jackrabbit Lane / Valley Center Road intersection exhibit the highest concentration of citations issued. I-90 between Belgrade and Bozeman also has a high concentration of citations.

Table 6.1 summarizes the types of violations issued over the 5-year period. The table also denotes unlawful behaviors that could directly contribute to a crash or have the potential to result in severe injuries if a crash were to occur. A total of 18,677 citations were issued with the greatest number being speed related violations. The next most common violation types included registration or insurance violations and failure to use a seatbelt, accounting for 15 and 13 percent of citations, respectively. Of the 18,677 citations, 4,353 were reportedly issued as the result of a crash.

Table 6.1: Types of Violations Issued (2019-2023)

Violation Type	Potential to Contribute to Crash/Severe Injury	Number of Citations	Percent of Citations
Speed Related Violation	X	6,560	35%
Registration/Insurance Violation		2,850	15%
Seatbelt Violation	X	2,359	13%
License Related Infraction		1,567	8%
Careless/Reckless Driving	X	1,539	8%
Other Violation		1,297	7%
Driving Under the Influence	X	933	5%
Failure to Obey Signs/Signals	X	566	3%
Other Drug/Alcohol Related	X	431	2%
Improper Following/Passing	X	403	1%
Commercial Vehicle Violation		172	1%
TOTAL	--	**18,677**	**100%**

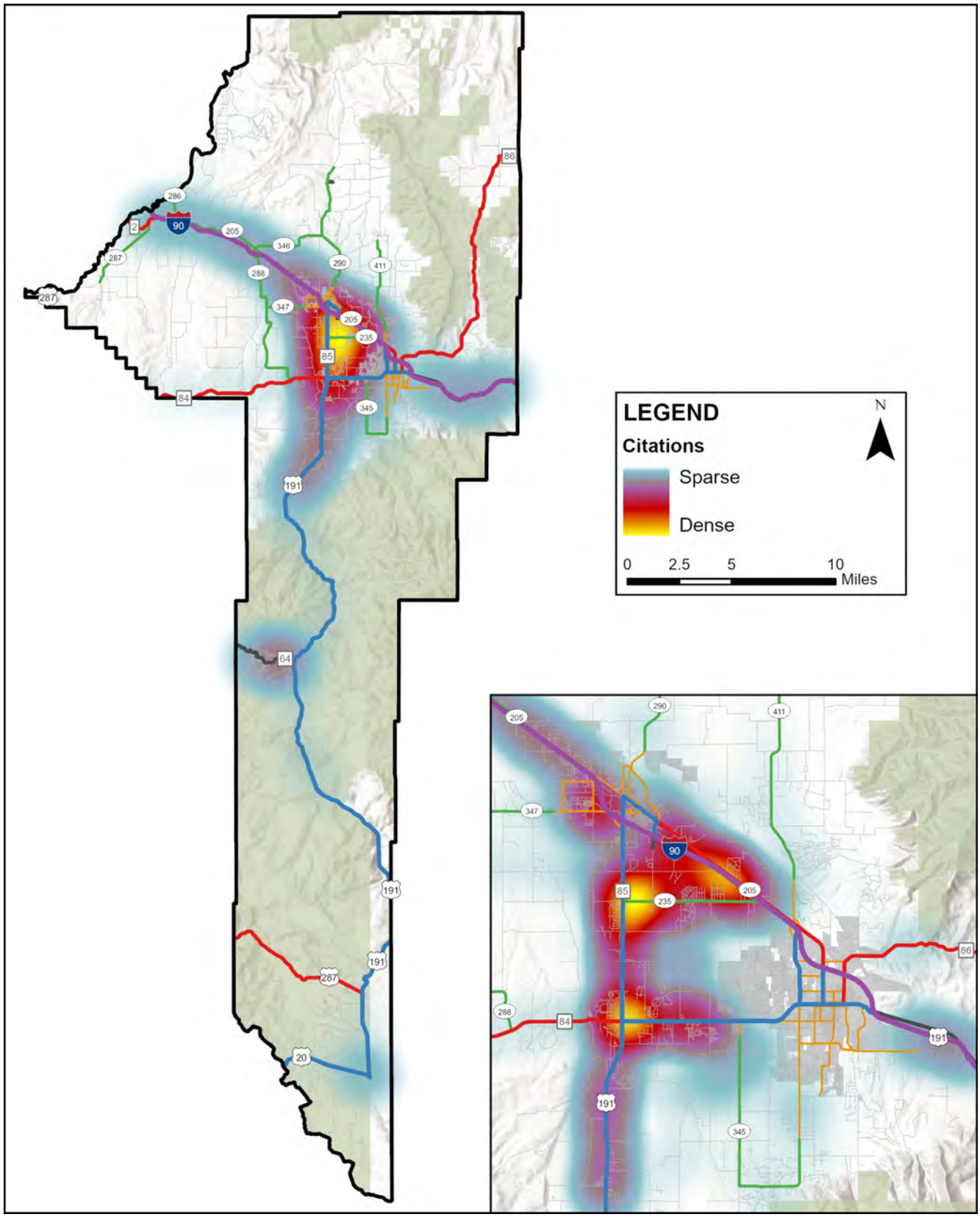


Figure 6.1: Density of Citations Issued

Figure 6.2 summarizes when the citations were issued, including the year, month, day of the week, and time of day. As shown, there was a significant decrease in the number of citations issued in 2020, but the number of citations issued per year has steadily increased in years since. This could indicate a higher emphasis on enforcement, an increase in unlawful driving behaviors, or both. The most citations were issued in July followed closely by September. Saturdays and Sundays were the most common days for citations, with Mondays composing the highest number of weekday citations. The greatest number of citations were issued during the 10:00 PM hour. Other common times included the early afternoon hours (2:00 PM – 4:00 PM) and late night hours (8:00 PM – 12:00 AM). The number of citations issued is generally lower during typical commuting and working hours.

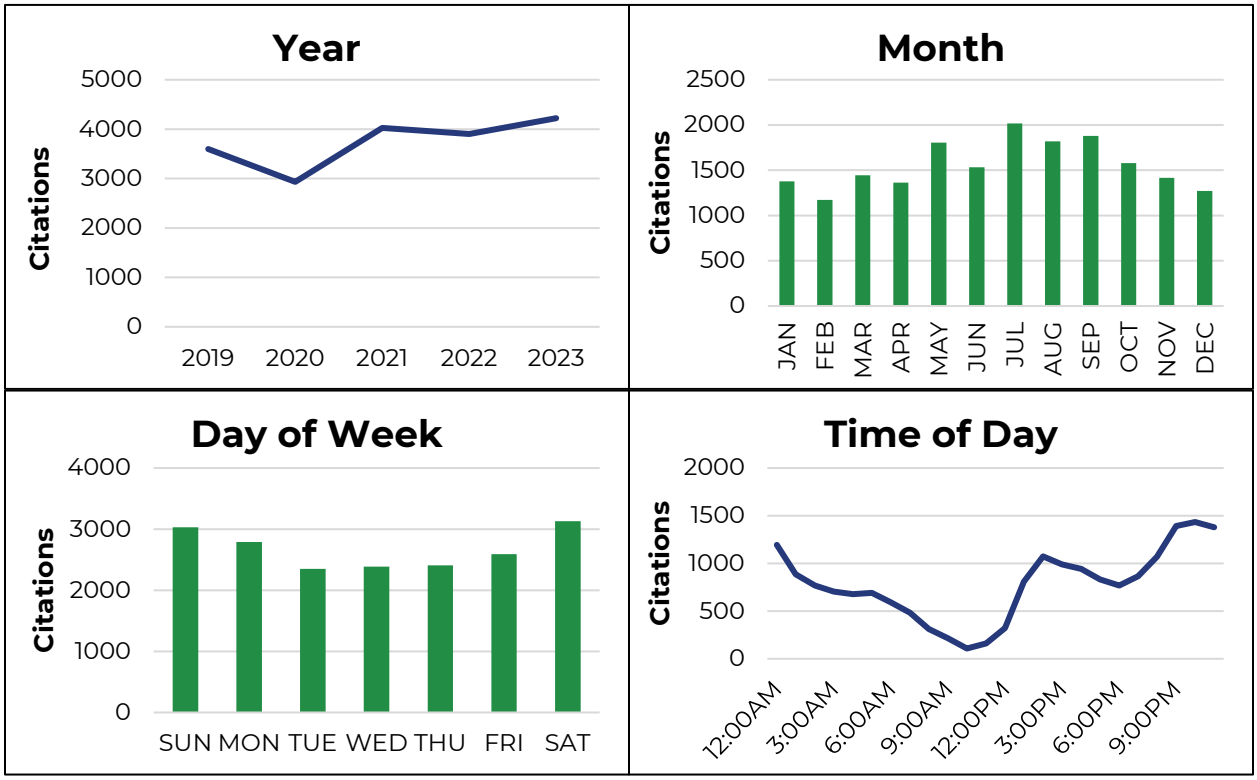


Figure 6.2: Citation Temporal Trends

6.2. Carcass Data Review

Carcass data from the MDT Maintenance Animal Incident Database was provided from January 1, 2008 to June 31, 2024, which offers valuable insights into trends over time in the area. The database contains information on carcasses collected by MDT maintenance personnel on MDT-maintained routes only. However, not all carcass collection is reported consistently or on a regular schedule. This makes the information useful for pattern identification, but it is not statistically valid. **Figure 6.3** shows a general decline in the number of carcasses collected since 2008. This could be due to increased development in the area, which may alter the wildlife habitat. Additionally, stakeholders have noted an increase in chronic wasting disease among wildlife in the area, potentially contributing to a reduction in the wildlife population.

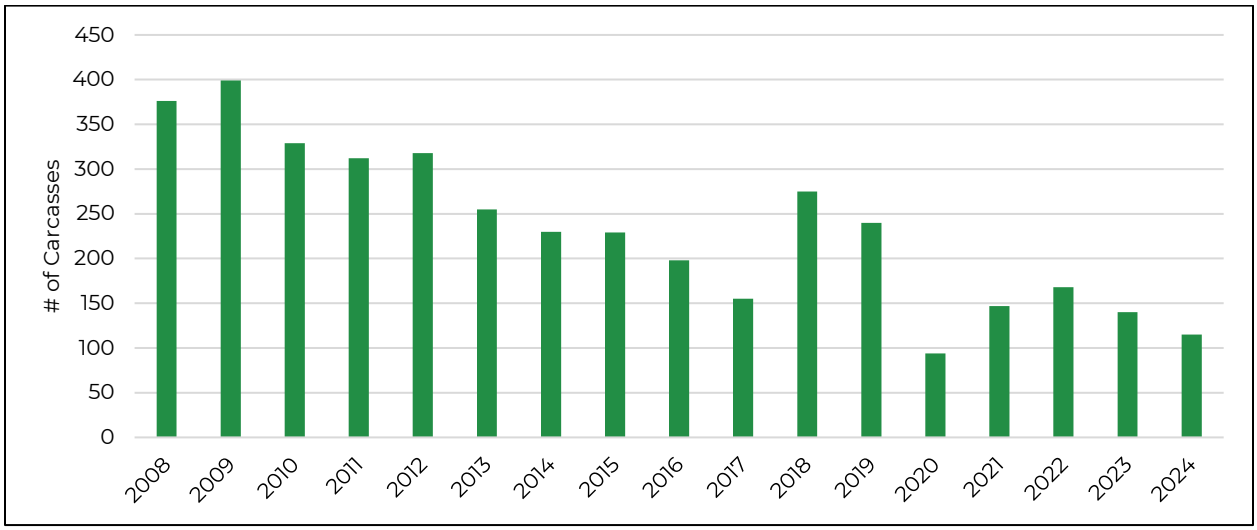


Figure 6.3: Carcass Collection Over Time

For consistency, carcass data covering the 5-year analysis period used for the other parts of this report (January 1, 2019 to December 31, 2023) was reviewed in more detail. During this time period, a minimum of 789 animal carcasses were collected and documented along MDT routes within the study area.

Figure 6.4 shows the proportion of collected carcasses for each type of animal. Of the reported carcasses, the majority were deer accounting for 74 percent. The second most reported were elk at 14 percent and the rest was made up of bison, moose, and bears.

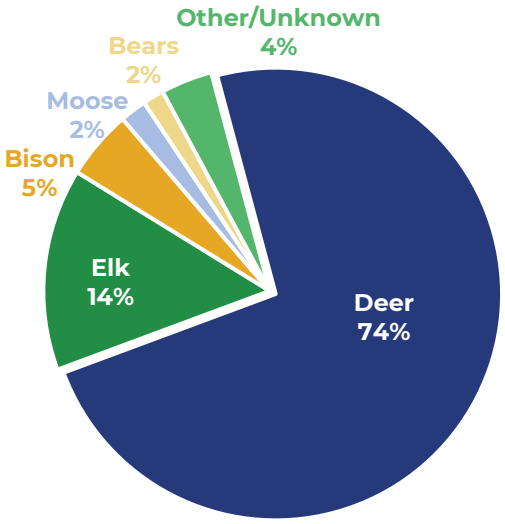


Figure 6.4: Animal Type

Figure 6.5 shows that the number of collected carcasses by year and by month. The figure shows that there was a significant drop in carcasses collected in 2020 followed by an increase in 2021 and 2022 with a small drop again in 2023. The carcasses were most commonly collected in the late fall and early winter months (October through January) and least commonly collected in the late spring and early summer months (April through July).

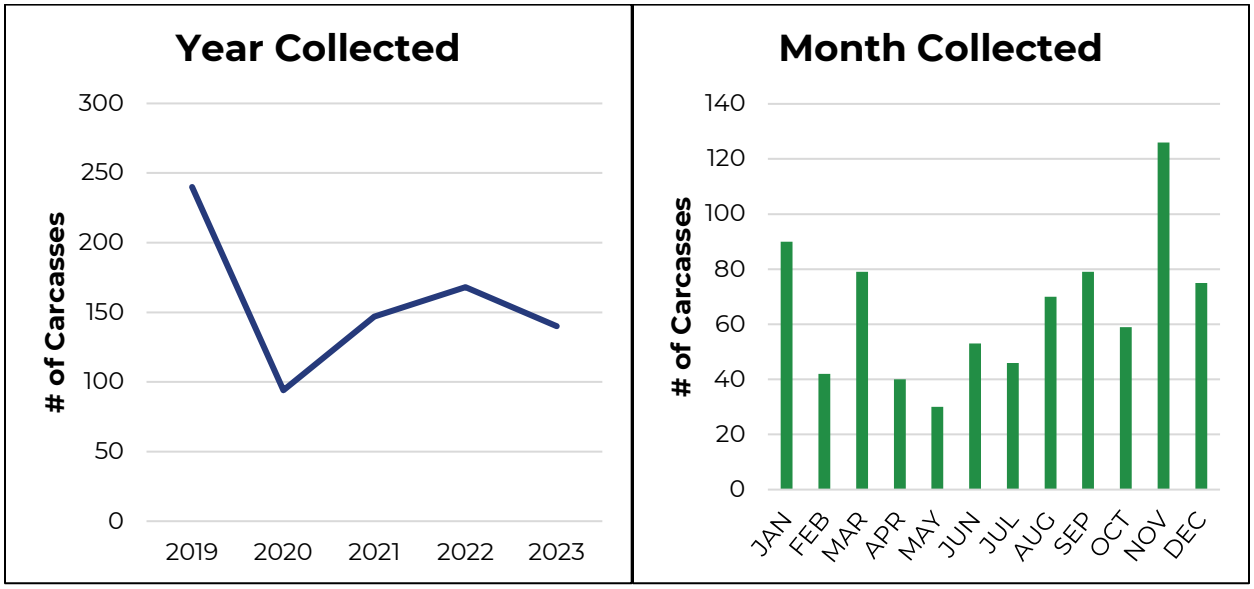


Figure 6.5: Carcass Collection Time Periods (2019-2023)

Overall, there were 807 wild animal crashes reported within the study area, while at least 789 carcasses were collected over the same time period. **Figure 6.6** shows the animal carcass collection density from 2019 to 2023. Concentrations of carcasses were collected on US 191 between Four Corners and the mouth of Gallatin Canyon. However, the available carcass and wild animal crash data is likely an underrepresentation of actual conflicts. Reports of carcasses being found outside the roadway or scavenged by community members or other animals indicate that vehicle-wildlife collisions may have occurred but were not reported. In these cases, carcasses would not be included in the MDT database.

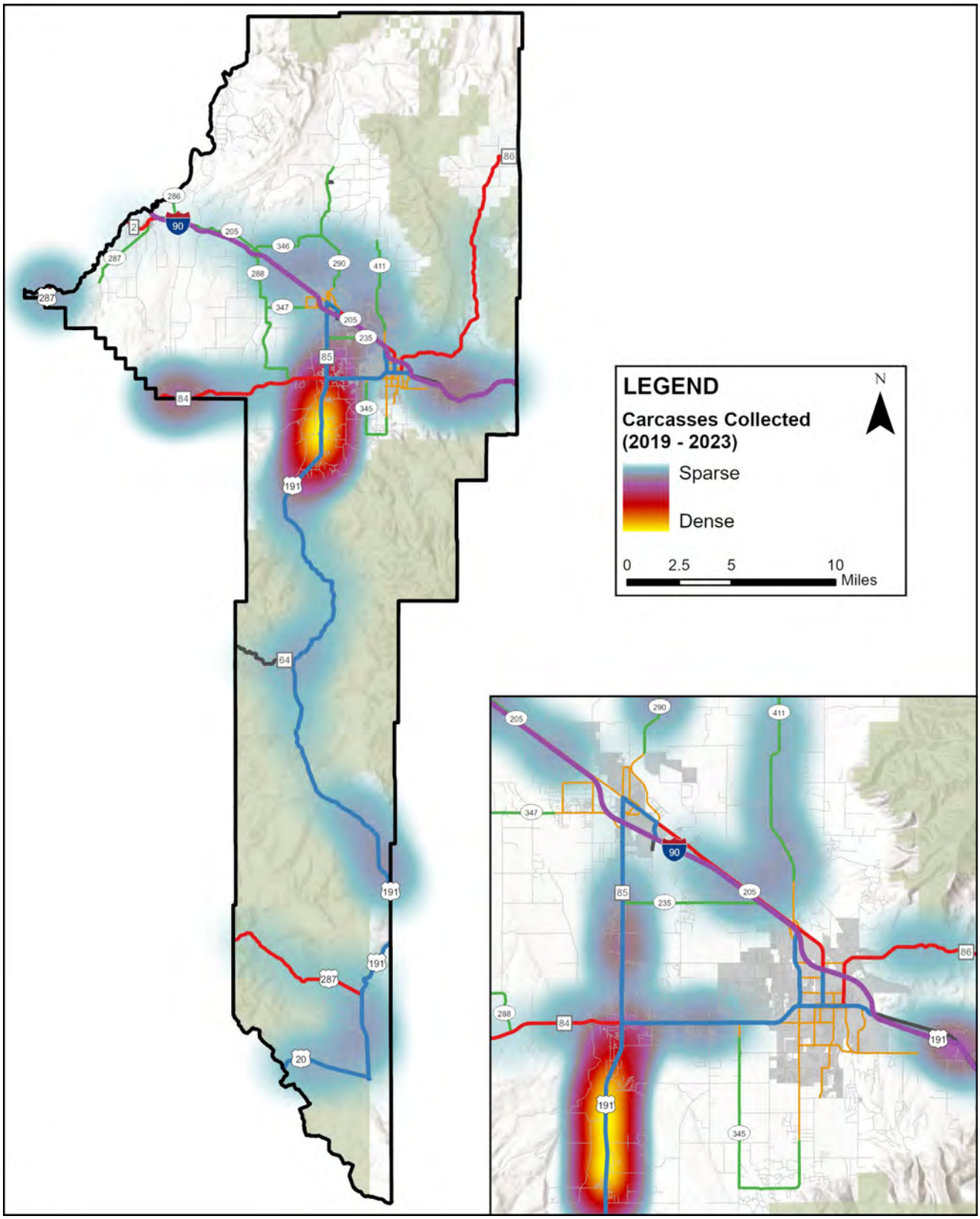


Figure 6.6: Animal Carcass Collection Density

7. Focus Areas

Identifying the types of crashes predominantly contributing to community safety problems can help in effectively expending resources. The American Association of State Highway Transportation Officials (AASHTO) *Strategic Highway Safety Plan: A Comprehensive Plan to Substantially Reduce Vehicle-Related Fatalities and Injuries on the Nation's Highways*[viii] identified 22 safety focus areas on a national level. The development of focus areas represents a standard approach to roadway safety by evaluating high-risk populations, crash types, infrastructure/hazards, behavior, and transportation modes. MDT has further refined the list of 22 focus areas to include 16 focus areas that are relevant to Montana. Those focus areas are listed below.

- Animal Crashes
- Bicycle Involved
- Drowsy Drivers
- Impaired Drivers
- Inattentive Drivers
- Intersection Crashes
- Large Truck Involved
- Motorcycle Involved
- Native Americans
- Older Driver Involved
- Pedestrian Involved
- Run-off-the-Road
- Speed Related
- Train Involved
- Unrestrained Occupants
- Young Driver Involved

7.1. Comparison of All Focus Areas

In order to determine which of the focus areas are the most prevalent in Gallatin County, the number of total and severe injury crashes occurring within each focus area over the 5-year analysis period from 2019 to 2023 were totaled. **Figure 7.1** compares the total number of crashes as well as the number of severe crashes in each focus area over the past 5 years (2019 – 2023). For ease of analysis and comparison purposes, the "Pedestrian Involved" and "Bicycle Involved" focus areas were combined to be the "Non-Motorist Involved" focus area, and the "Native Americans" focus area was excluded from the analysis due to lack of complete and reliable ethnicity data. The sum of all focus areas is greater than the total number of crashes because a single crash may fall within multiple focus areas. For example, a crash involving a young, inattentive driver at an intersection would be counted in 3 focus areas.

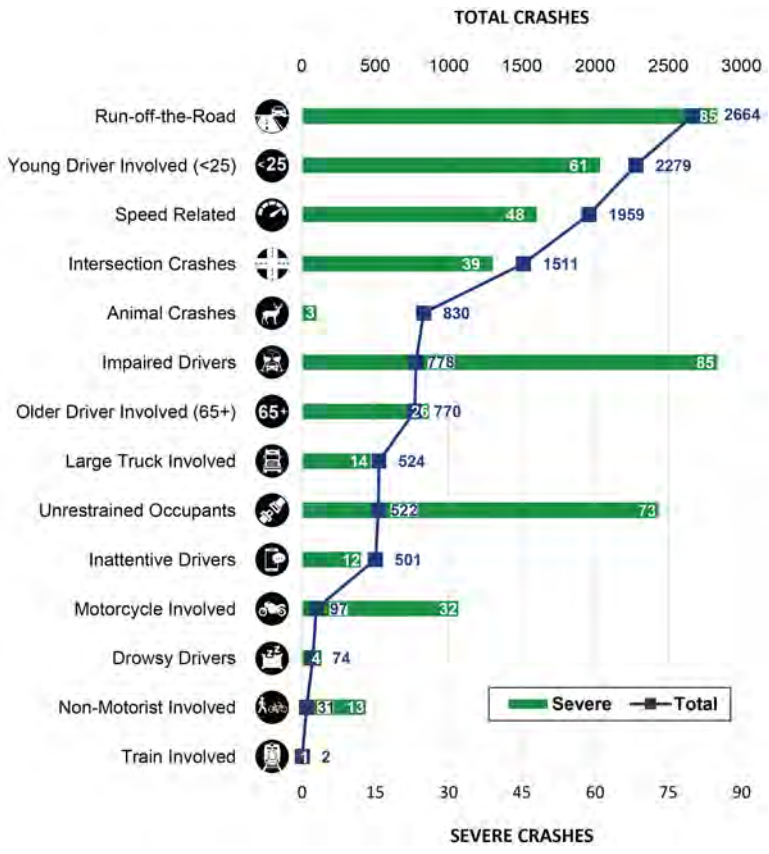


Figure 7.1: Crash Totals by Focus Area

In addition to total occurrences, it is also important to consider the number of severe crashes within each focus area. For example, although fewer crashes involved impaired drivers, a high number of severe injuries resulted from crashes involving impaired drivers. Although it is desirable to reduce the total

number of crashes, the SS4A program highlights the importance of decreasing the number of severe injuries resulting from crashes.

Table 7.1 tabulates the total crashes, percent of all crashes, fatalities, serious and other injuries, and total people involved for each focus area. A single crash may have multiple contributing factors, and thus a single crash or injury could appear within multiple focus areas.

Table 7.1: Crash and Injury Totals by Focus Area

Focus Area	Total Crashes	% of All Crashes	Fatality	Suspected Serious Injury	Minor Injury	Possible Injury	PDO/ Unknown	Total People Involved
Run-off-the-Road	2,664	40%	27	108	574	170	3,686	4,565
Young Driver Involved (<25)	2,279	34%	7	65	445	162	4,118	4,797
Speed Related	1,959	29%	13	40	354	133	3,294	3,834
Intersection Crashes	1,511	22%	5	39	325	124	3,237	3,730
Animal Crashes	830	12%	0	3	35	10	1,188	1,236
Impaired Drivers	778	12%	22	77	237	61	853	1,250
Older Driver Involved (65+)	770	11%	3	26	154	41	1,579	1,803
Large Truck Involved	524	8%	5	12	97	30	953	1,097
Unrestrained Occupants	522	8%	23	65	266	56	839	1,249
Inattentive Drivers	501	7%	2	13	123	44	900	1,082
Motorcycle Involved	97	1%	4	28	51	11	59	153
Drowsy Drivers	74	1%	4	4	24	10	96	138
Non-Motorist Involved	31	0%	5	8	13	2	45	73
Train Involved	2	0%	1	0	1	0	2	4
TOTAL	**12,542**	**100%**	**38**	**192**	**1,165**	**411**	**11,310**	**13,116**

As shown in **Table 7.1**, the top 5 focus areas by total crashes include run-off-the-road crashes, young driver involved, intersection crashes, animal crashes, and impaired drivers. By severity, the unrestrained occupants, impaired drivers, non-motorist involved, and motorcycle involved focus areas had the highest ratio of severe injuries to total crashes.

7.2. Analysis of Key Focus Areas

Based on the baseline data analysis, it was determined that 4 focus areas would be selected to investigate in further detail. Due to similarities in the strategies to address certain focus areas, some of the focus areas were combined into broader categories. The focus areas aligning with the total number of crashes and the highest severities were selected as the focus areas that could have the greatest impact on safety within the community. The selected focus areas include the following:

- **Run-off-the-Road Crashes**
- **Intersection Crashes**
- **Driver Age** *(Younger and Older Driver Involved)*
- **High Risk Behaviors** *(Speed Related, Unrestrained Occupants, Impaired Drivers, Inattentive Drivers)*

Note that there may be overlap between the focus areas. For example, a young, impaired driver crashing at an intersection would fall into at least three focus areas. Strategies addressing the

selected focus areas will likely help address crash trends identified in other focus areas. The following sections contain a more detailed analysis of the key focus areas to assist with the identification of strategies and projects to address concerns.

7.2.1. Run-off-the-Road Crashes

There are multiple ways to sort and define run-off-the-road crashes in the MDT crash database. The first is to sort the crash records by the relation to the roadway. Selecting crashes that occurred on roadside right or left yields a total of 2,664 crashes as shown in **Table 7.1.** However, it is likely that several of these crashes resulted in a car landing off the roadway, but wasn't a true run-off-the-road crash. For example, a vehicle being rear-ended and consequently pushed off the road. Likewise, the filter precludes crashes where a vehicle ran off the roadway into a center median, for example.

FHWA defines a run-off-the-road crash as a crash which occurs after a vehicle crosses an edge line or a center line, or otherwise leaves the traveled way. Other terms used to describe these crashes include roadway departure or lane departure. To capture this broader definition, the crash data can be filtered by driver action to include circumstances where the driver "ran off the roadway," "failed to keep in proper lane," or "wrong side or wrong way." This analysis yields a total of 2,745 crashes and is more representative of roadway departure crashes. For this reason, the following analysis is based on this definition and selection methodology.

Figure 7.2 shows these run-off-the-road crashes within the study area. Key takeaways regarding the 2,745 crashes are summarized below.

- The top crash types were fixed-object (49 percent), rollover (26 percent), sideswipe (8 percent), head-on (4 percent), and right-angle (3 percent).
- The majority of crashes caused property damage only (75 percent), 5 percent resulted in possible injuries, 16 percent led to minor injuries, and 4 percent of crashes were severe.
- Environmental factors, specifically road and lighting conditions, appeared to play a role in run-of-the-road crashes. About 23 percent of crashes occurred when it was raining or snowing with the remaining 77 percent occurring on clear or cloudy days. Nearly 55 percent of crashes occurred on wet, icy, snowy, or frost-covered roads, while the remaining 45 percent took place on dry roads. Additionally, 38 percent of the crashes occurred when it was dark outside, and street lighting was present in only 7.5 percent of those crashes.
- The most crashes occurred during the winter (December – February [36 percent]) when the road conditions are often snow or ice-covered. However, a fair amount occurred during the fall (September – November [26 percent]) as well.
- Crashes were reported at all hours of the day, with the crashes occurring most frequently in the morning (8 AM – 10 AM, [12 percent]) and evening commutes (5 PM – 7PM, [12 percent]).
- Driving too fast for conditions was reported as a contributing action for 34 percent of people involved in run-off-the-road crashes. Additionally, 22 percent of the drivers involved in the crashes were reported to have been driving in a distracted, inattentive, or careless manner at the time of the crash.
- Driver demographics closely aligned with those observed for all crashes in the study area, with male drivers responsible for 68 percent of the crashes and drivers aged 22 to 35 accounting for 38 percent of the crashes.

- Impaired drivers were overrepresented making up 21 percent of run-off-the-road crashes compared to just 12 percent of all crashes.
- About 46 percent of drivers were moving straight ahead when the crash occurred, while 35 percent were negotiating a curve. The remaining 19 percent were turning, slowing, stopped, or changing lanes.

Run-off-the-road crashes in the study area are largely driven by weather conditions and driver behavior. Winter weather, including icy, snowy, and wet roads, significantly increases crash risk, particularly when drivers fail to adjust their speed to conditions. Distractions can further exacerbate the issue, as drivers often neglect to react to hazards or changing road conditions. Crashes are also more frequent during commuting hours when drivers may speed or rush, and nighttime driving poses additional risks due to reduced visibility, especially in areas with insufficient lighting. Alcohol impairment is also a significant factor, highlighting the ongoing issue of impaired driving. While weather and road conditions play a major role, addressing driver behaviors like speeding, distraction, and impairment is essential to reducing run-off-the-road crashes in Gallatin County.

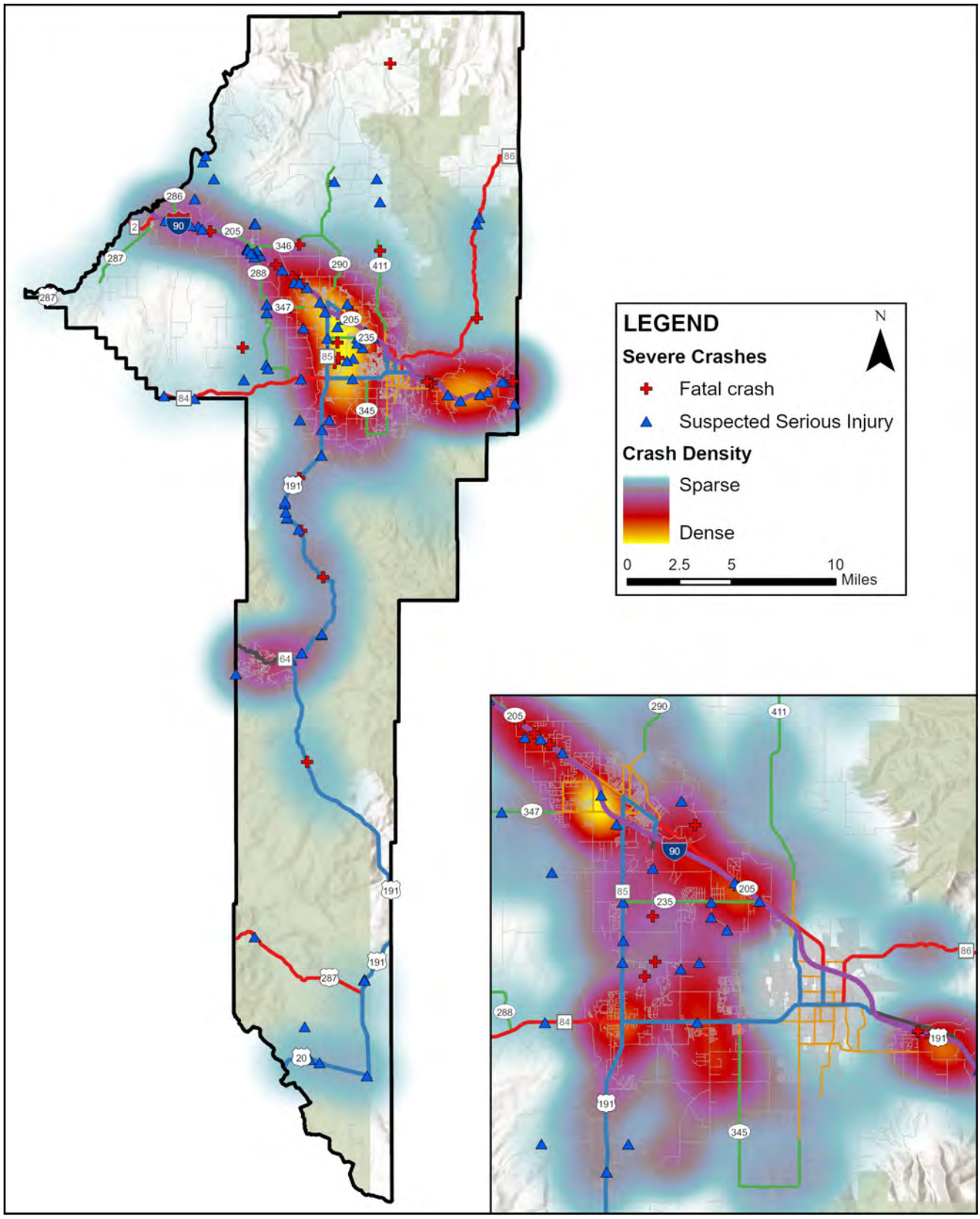


Figure 7.2: Run-off-the-Road Crashes

7.2.2. Intersection Crashes

About a quarter of all crashes that occurred within the study area over the 5-year analysis period occurred at an intersection (876) or were related to an intersection (635). **Figure 7.3** shows the locations of intersection crashes. The following summarizes some key takeaways regarding the 1,511 reported intersection crashes.

- The most common crash types included rear-end (30 percent), right-angle (29 percent), and fixed-object (16 percent) crashes.
- Of the intersection crashes, 4 resulted in fatalities and 35 resulted in suspected serious injuries, accounting for 3 percent of all crashes. Overall, 75 percent resulted in property damage only.
- Adverse weather conditions played a minor role in intersection crashes, with 12 percent occurring while it was snowing or blowing snow and 3 percent occurring in the rain. Similarly, 30 percent of crashes occurred on snowy, icy, or frost-covered roads while 8 percent occurred on wet roads.
- Overall, 77 percent of intersection crashes occurred during daylight hours while 20 percent occurred at night. Of the crashes occurring at night, more than two thirds were on roads without street lighting.
- Intersection crashes occurred most commonly during the winter months (December to February [32 percent]). Crashes were most common during the afternoon and evening (1:00 PM to 7:00 PM [45 percent]).
- The demographics of drivers involved in intersection crashes is very similar to the demographics of all drivers involved in crashes in the study area. Male drivers accounted for 65 percent of those involved in crashes, with drivers in the working-age group (22-50) making up 56 percent.
- About 10 percent of intersection crashes involved an impaired driver.
- Top contributing actions included distracted/inattentive driving (23 percent), failure to yield right-of-way (16 percent), and driving too fast for conditions (12 percent).
- About 41 percent of vehicles involved in intersection crashes were moving straight ahead while 16 percent were making left turns, and 9 percent were making right turns. About 25 percent were slowing or already stopped in traffic.
- About 37 percent of intersection crashes occurred on local roads while 28 percent occurred at intersections on principal arterials.

An analysis of intersection versus intersection-related crashes was also conducted, and no pertinent differences were discovered. However, distinctions were noted, including more rear-end collisions associated with intersection related crashes while intersection crashes resulted in more right-angle crashes with higher severities. Only 15 percent of intersection crashes involved vehicles that were slowing or stopped, compared to 39 percent of intersection-related crashes. Also, a higher proportion of intersection related crashes involved distracted driving and impaired drivers. In terms of location, there were no obvious distinctions between intersection and intersection related crashes. Four Corners, the Belgrade accesses to I-90, Gooch Hill/Stuck Road, and Love Lane/Durston Road intersections were all hot spots for intersection and intersection related crashes. These are all high-volume intersections with significant traffic volumes and turning movements.

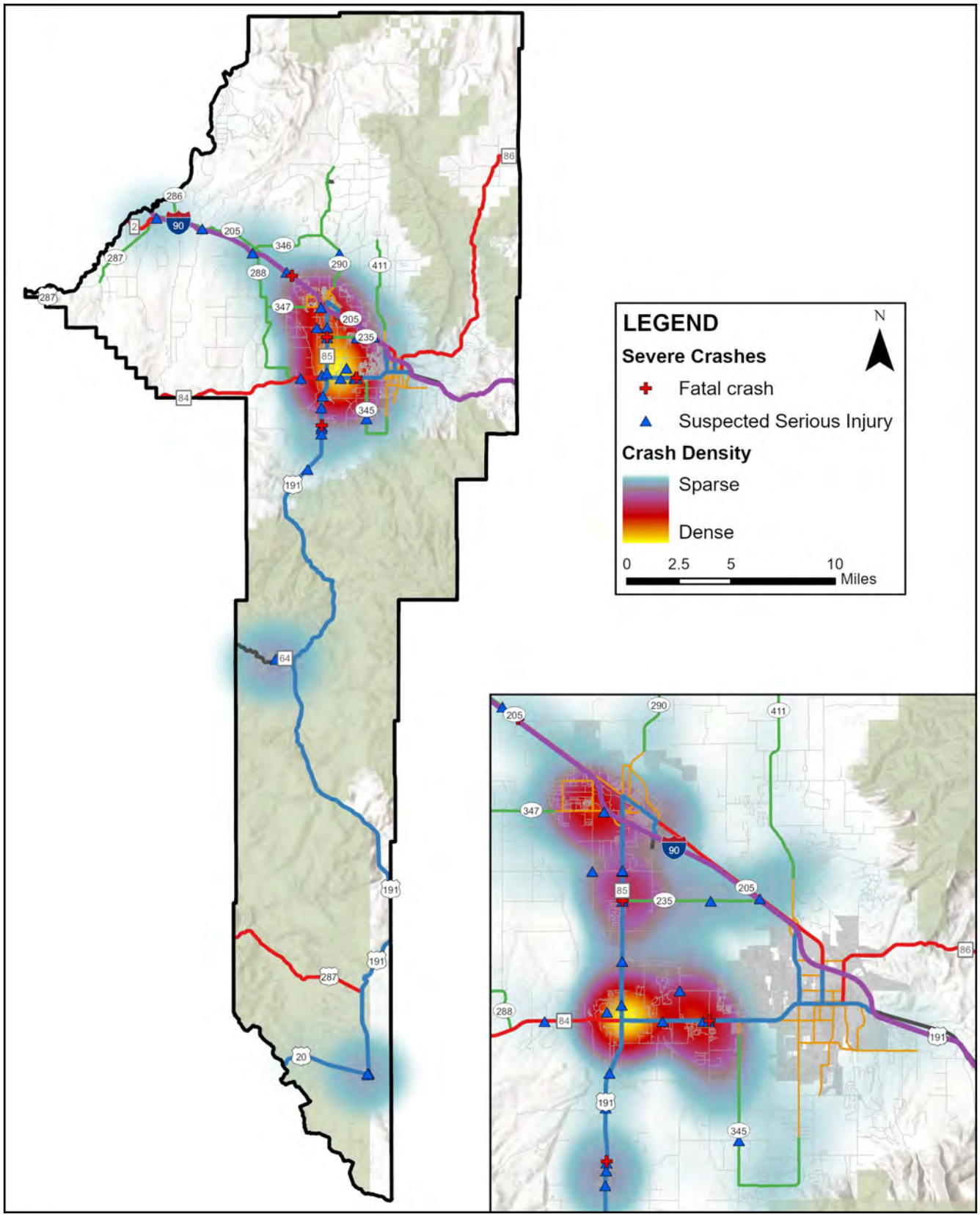


Figure 7.3: Intersection and Intersection Related Crashes

7.2.3. Driver Age

Crashes involving younger drivers, or those under the age of 25, accounted for about a third of all crashes within the study area (2,279) while crashes involving older drivers, or those over the age of 65, accounted for about a tenth of the crashes (770). Younger drivers are often involved in crashes due to inexperience or risky driving behaviors, while older drivers are often involved in crashes as a result of age-related loss in driving capabilities and reaction times.

Younger Drivers (<25)

Over the 5-year analysis period, 2,438 drivers under the age of 25 were involved in crashes within the study area. An additional 22 drivers were reported as age "0", however, it is assumed that zero, in this case, represents an unknown age and these crashes were therefore excluded. Likewise, a driver listed as age 1 was involved in a crash with the contributing factors of following too closely and exceeding the posted speed limit. This was assumed to be another case of unknown age and was excluded. Of the younger drivers, 62 percent were male and 38 percent were female. The youngest male driver was age 11, and the youngest female driver was age 8. **Figure 7.4** shows a heat map of crash locations with drivers under the age of 25. Given available crash data, the following trends were observed regarding the 2,279 crashes involving younger drivers.

- Of the younger driver involved crashes, 6 resulted in fatalities, and 55 (2 percent) resulted in suspected serious injuries. The majority, 77 percent, of these crashes resulted in property damage only.
- Most crashes (68 percent) occurred at non-junctions, while 27 percent took place at intersections or were intersection related.
- The most common types of crashes included fixed-object (26 percent), rear-end (18 percent), rollover (16 percent), and right-angle (12 percent).
- Environmental factors in crashes involving younger drivers closely mirror the trends seen in the overall dataset, suggesting that weather conditions may contribute to these incidents. Approximately 18 percent of crashes occurred in rain or snow, while 82 percent happened on clear or cloudy days. Nearly 45 percent of crashes took place on wet, icy, snowy, or frost-covered roads, with the remaining 55 percent occurring on dry roads. Furthermore, 32 percent of crashes occurred at night, and in 88 percent of those cases, there was no street lighting present.
- Crashes involving younger drivers were most frequent during the winter months (December to February [31 percent]), with a notable increase in the fall months (September to November [27 percent]). Most of these crashes occurred during school release and evening commuting hours, from 3:00 PM to 7:00 PM (28 percent).
- Approximately 10 percent of younger driver crashes involved impaired drivers. The main contributing factors were running off the roadway (31 percent), distracted or inattentive driving (27 percent), and driving too fast for conditions (27 percent).
- The most common speed limits on roadways where young driver crashes occurred were 45 mph (21 percent) and 55 mph (12 percent). About 32 percent of crashes took place on local roads, while 21 percent occurred on principal arterials.

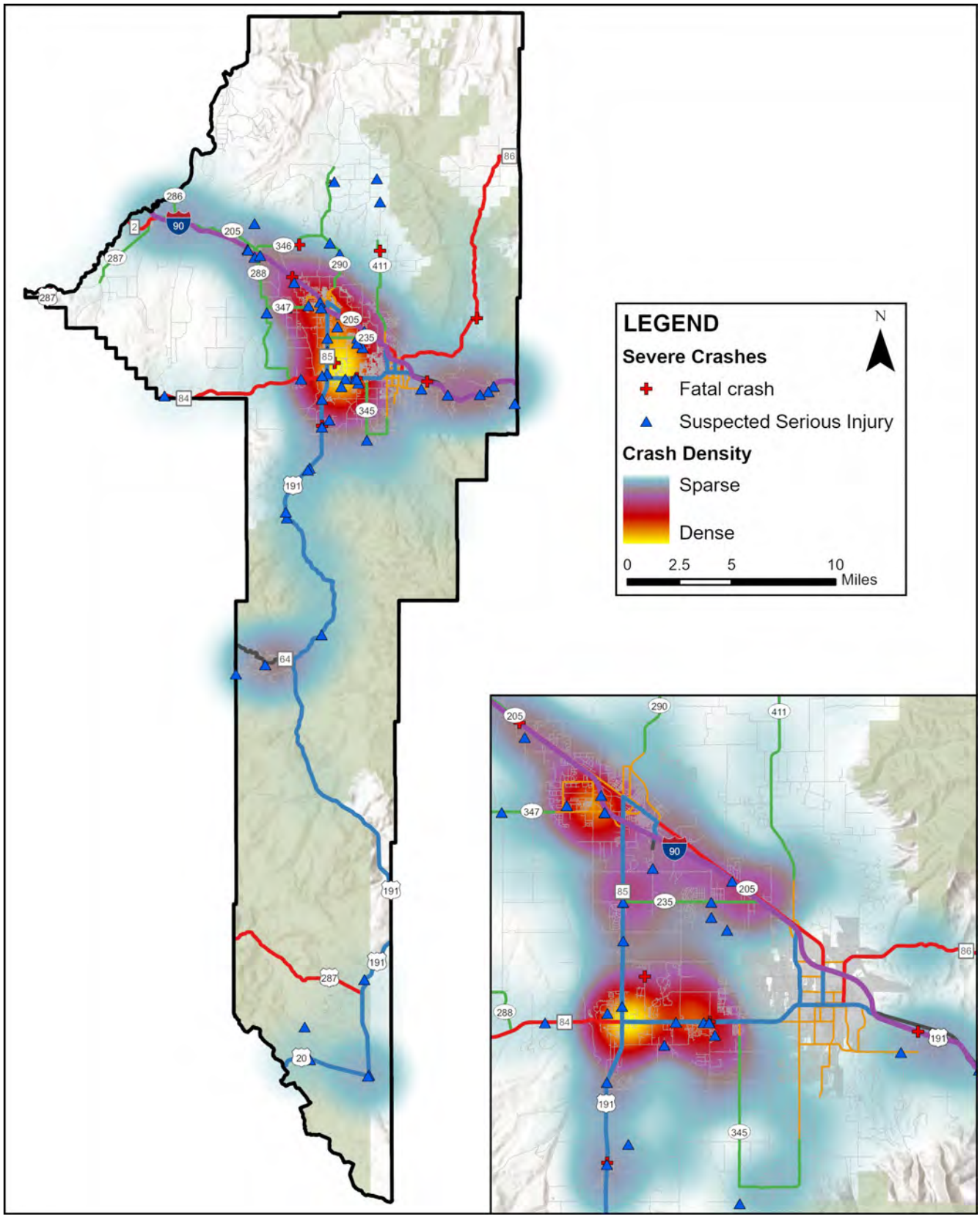


Figure 7.4: Younger Driver Involved Crashes

Older Drivers (65+)

Over the 5-year analysis period, 801 drivers aged 65 and older were involved in crashes within the study area. Of the older drivers, 67 percent were male and 33 percent were female. The oldest male driver was age 95, and the oldest female driver was age 92. **Figure 7.5** shows a heat map of crash locations with drivers aged 65 and older. Given available crash data, the following trends were observed regarding the 770 crashes involving older drivers.

- Of the older driver involved crashes, 2 resulted in fatalities, and 24 (3 percent) resulted in suspected serious injuries. The majority, 78 percent, of these crashes resulted in property damage only.
- Most crashes (56 percent) occurred at non-junctions, while 36 percent took place at intersections or were intersection-related.
- The most common types of crashes included rear-end (22 percent), right-angle (18 percent), fixed-object (14 percent), and sideswipe (13 percent).
- Environmental factors in crashes involving older drivers, compared to overall trends, suggest that weather conditions play a smaller role in these incidents. Approximately 11 percent of crashes occurred while it was snowing or blowing snow and 4 percent occurred in the rain/freezing rain. Similarly, 28 percent of crashes occurred on snowy, icy, or frost-covered roads while 8 percent occurred on wet roads.
- Overall, 84 percent of older driver crashes occurred during daylight hours while 13 percent occurred at night. Street lighting was present at the crash site in about 11 percent of the nighttime crashes.
- Crashes involving older drivers were most frequent during the winter months (December to February [29 percent]), with a notable increase in the summer months as well (June to August [27 percent]). The majority of these crashes occurred in the middle of the day, from 10:00 AM to 4:00 PM (50 percent).
- Approximately 5 percent of older driver crashes involved impaired drivers.
- The main contributing factors were distracted or inattentive driving (21 percent), failing to yield right-of-way (13 percent), driving too fast for conditions (13 percent), and running off the road (12 percent).
- The most common speed limits on roadways where older driver crashes occurred were 45 mph (21 percent) and 55 mph (12 percent). About 28 percent of crashes took place on local roads, while 27 percent occurred on principal arterials.

While there are similarities, notable differences are observed for crashes involving younger and older drivers. Younger drivers are more prone to crashes involving fixed objects, while older drivers are more likely to experience rear-end and right-angle collisions. Younger drivers also face more weather-related challenges, with a higher proportion of crashes occurring in rain, snow, or ice-covered roads, whereas older drivers tend to have fewer weather-dependent incidents. Additionally, older drivers are more likely to be involved in daytime crashes, especially during the middle of the day, while younger drivers have a higher occurrence of crashes during commuting hours. Distracted driving is a common cause for both groups, though it is more prevalent among younger drivers, who also show a higher rate of impaired driving.

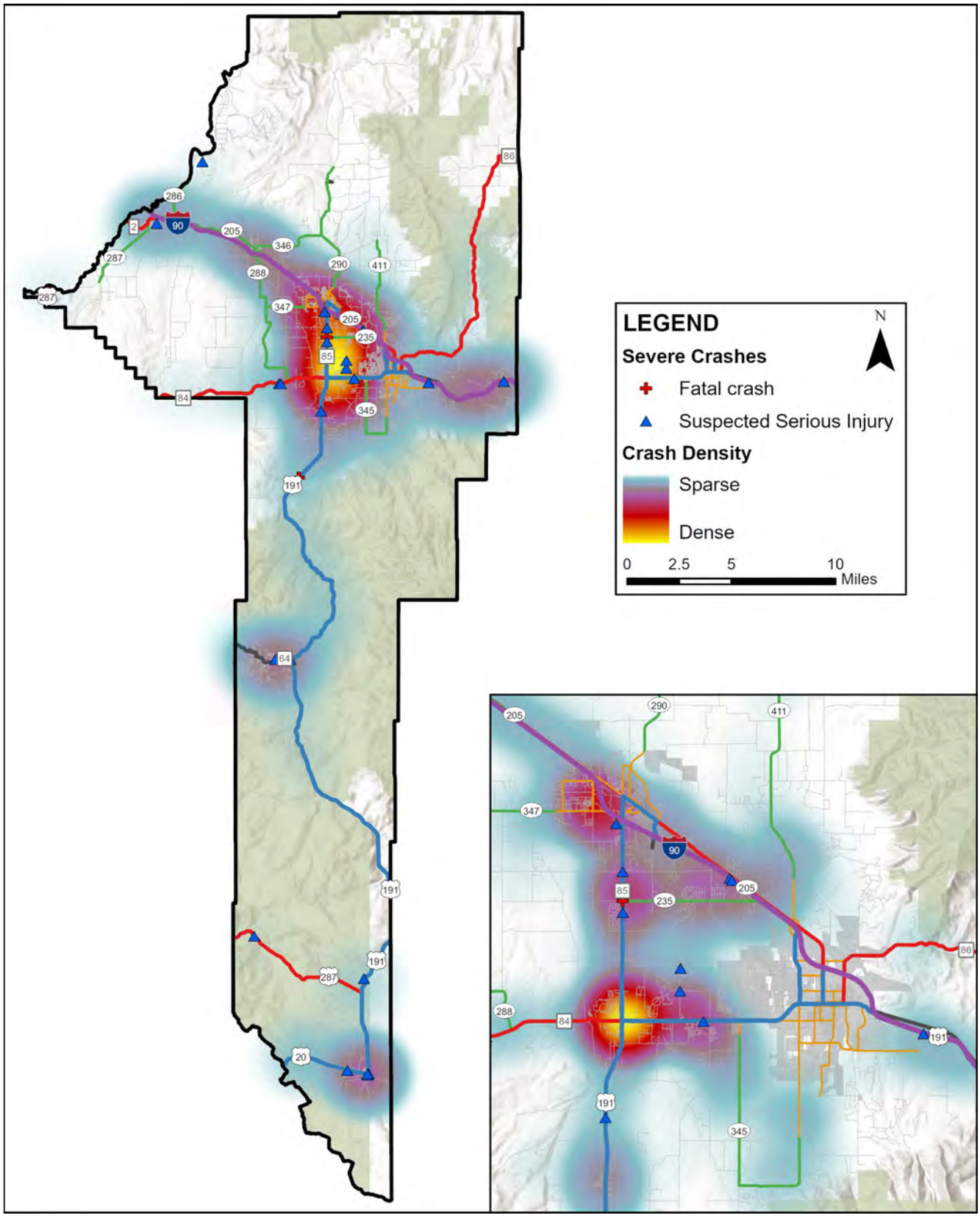


Figure 7.5: Older Driver Involved Crashes

7.2.4. High Risk Behaviors

High-risk driving behaviors are a major contributor to crashes and severe injuries within the county. Speeding, failure to wear a seatbelt, driving under the influence of alcohol or drugs, and distracted or inattentive driving all increase the likelihood of a severe injury occurring as the result of a crash. Speeding reduces driver reaction time and makes it harder to control the vehicle, while impairment affects driver judgment and coordination. Distracted driving, such using a phone or eating, diverts driver attention away from the road, and not wearing a seatbelt compromises the safety of occupants in the event of a crash. Research indicates that drivers who engage in one risky driving behavior are significantly more likely to engage in other poor driving behaviors, which is often referred to as "clustering" of risky behaviors where multiple unsafe driving habits occur together in the same individual. Together, or separately, these high-risk behaviors create dangerous driving conditions that can lead to severe consequences.

Speed Related

Crashes considered to be speed related were based on the reported driver actions at the time of the crash. Drivers with contributing actions listed as “Drove Too Fast For Conditions” or “Exceeded Posted Speed Limit” were considered to be involved in speed related crashes. In this case, 1,981 individuals, including 1,966 drivers and 15 unknown person types, were reported as driving in this manner. On a crash basis, these individuals were involved in 1,959 total crashes.

Speed was considered a contributing action in about one third of all crashes in the study area over the 5-year analysis period. Over the same period, 6,560 speed related violations were also recorded, accounting for 35 percent of all citations, as discussed in **Section 6.1**. **Figure 7.6** shows a heat map of crash locations with an individual who “Drove Too Fast For Conditions” or “Exceeded Posted Speed Limit” was listed as contributing action(s). The speed related citations are shown as yellow dots. Given available crash data, the following trends were observed regarding the 1,959 crashes involving drivers reported as driving too fast for conditions (96 percent) or exceeding the posted speed limit (4 percent).

- About 79 percent of the speed related crashes occurred at non-junction locations while the remaining crashes occurred at an intersection (13 percent) or were related to an intersection (8 percent).
- The most common crash types involving speeding drivers were fixed-object (41 percent), rollover (22 percent), rear-end (11 percent), and right-angle (7 percent).
- Speed related crashes resulted in 12 fatalities (1 percent), 36 suspected serious injuries (2 percent), and 79 percent overall resulted in property damage only.
- Poor weather and road conditions appeared to be a factor in speed related crashes with 34 percent occurring when it was snowing or blowing snow, 28 percent occurring on snow-covered roads, and 54 percent occurring on icy or frost-covered roads. Accordingly, 50 percent of the speed related crashes occurred in winter months (December through February) while only 7 percent occurred during summer months (June through August) suggesting that driving too fast for road conditions is more prevalent than speeding on dry roads.
- About 64 percent of the speed related crashes occurred during daylight hours, while 31 percent occurred while it was dark outside (street lighting was present for 12 percent of the crashes that occurred at dark). Accordingly, about 52 percent of the crashes occurred during the hours of 8:00 AM and 5:00 PM, which generally corresponds with winter daylight hours.

- Drivers aged 16 to 35 were over-represented in speed related crashes, accounting for 62 percent of offending drivers. Gender, however, was similar to that observed for all crashes in the study area.
- Of the speed related crashes, 7 percent also involved an impaired driver. Contributing actions in crashes (besides speeding) included running off the road (43 percent), over-correcting (25 percent), failure to stay in proper lane (23 percent), and distracted/inattentive driving (19 percent).
- Half of the speed related crashes occurred on roadways with speed limits of 60 mph or more.
- Citations were primarily issued on I-90, Frontage Road, E Valley Center Road, and MT 85 between Bozeman and Belgrade. Speed-related crashes followed a similar pattern, primarily occurring on I-90 through the Bozeman Pass and along I-90 between Bozeman and Belgrade. In addition, there were several speed-related crashes at the intersection of US 191, MT 85, and MT 84. The similarity in citation and crash locations may indicate consistent speed enforcement or suggest that citations are helping prevent speed-related crashes.
- Of the speeding drivers involved in crashes, 62 percent had Montana driver's licenses. Similarly, 65 percent of drivers cited for speeding had Montana driver's licenses.

Speed-related crashes in Gallatin County are primarily non-junction incidents, with many occurring on high-speed roads like I-90. These crashes often involve fixed-object collisions and rollovers, with adverse weather conditions, particularly snow, ice, and frost, playing a significant role. Winter months see a higher frequency of these crashes, while crashes during daylight hours are more common than those at night. Younger drivers, particularly those aged 16 to 35, are frequently involved, with common contributing factors including running off the road, over-correcting, and distraction. The data suggests that consistent speed enforcement may be occurring, as citation and crash locations align, particularly on I-90 and state highways.

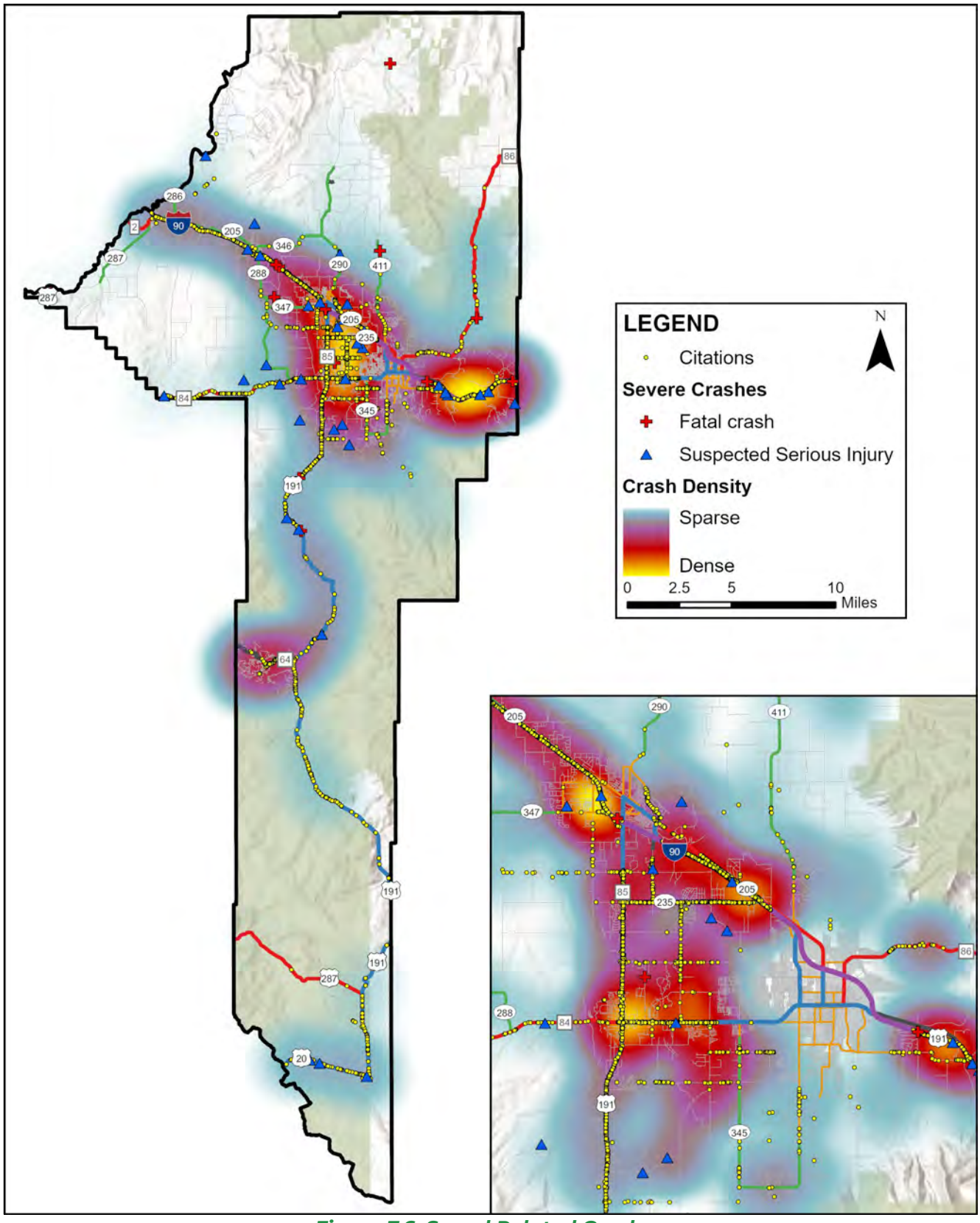


Figure 7.6: Speed Related Crashes

Unrestrained Occupants

The restraint type was listed for about 96 percent of individuals involved in crashes within the county. Drivers and passengers who were not using a restraint, or were using a restraint improperly were considered to be unrestrained. A total of 537 occupants were not using a restraint while 103 occupants were using only a lap or shoulder belt, or were otherwise improperly using a restraint. About 69 percent of unrestrained occupants were drivers while the other 31 percent were passengers. On a crash basis, these individuals were involved in 522 total crashes.

Unrestrained occupants were involved in about 8 percent of all crashes in the study area over the 5-year analysis period. Over the same period, 2,359 restraint related violations were also recorded, accounting for 13 percent of all citations, as discussed in **Section 6.1**. **Figure 7.7** shows a heat map of crash locations with an individual who did not use a restraint, or improperly used a restraint. The restraint related citations are shown as yellow dots. Given available crash data, the following trends were observed regarding the 522 crashes involving unrestrained occupants.

- The most common crash types involving unrestrained occupants included fixed-object (26 percent), rollover (26 percent), rear-end (13 percent), and right-angle (10 percent).
- Of the crashes involving unrestrained occupants, 4 percent were fatal and 10 percent resulted in suspected serious injuries. Overall, 47 percent resulted in property damage only.
- Crashes involving unrestrained occupants were less likely to occur in adverse weather conditions compared to the overall data set. About 11 percent of these crashes occurred during snowfall or blowing snow, and 4 percent occurred in the rain. Similarly, 26 percent of the crashes took place on snowy, icy, or frost-covered roads, while 8 percent occurred on wet roads.
- Overall, 61 percent of crashes with an unrestrained occupant occurred during daylight hours while 26 percent occurred at night. Street lighting was not present at the crash site in about 91 percent of the nighttime crashes.
- These crashes occurred most commonly during the fall months (September to November [29 percent]) but also experienced a spike in the summer months (June to August [25 percent]). There was no clear pattern in the time of day for crashes involving unrestrained occupants.
- Impaired drivers were over-represented in unrestrained occupant crashes, accounting for 31 percent of drivers.
- Of the unrestrained or not properly restrained occupants, 69 percent were male and 31 percent were female. Occupants ages 22 to 35 were the most likely to be unrestrained or improperly restrained.
- Other common contributing factors included running off the road (43 percent), distracted or inattentive driving (28 percent), and reckless driving (24 percent).
- Pickup trucks were involved in a higher percentage of unrestrained occupant crashes compared to the overall data, accounting for 39 percent. It is important to note that this does not necessarily mean the pickup trucks themselves had an unrestrained occupant, but rather that they were involved in crashes where at least one vehicle had an unrestrained occupant.
- About half of the crashes occurred on roadways with a speed limit of 55 mph or more (51 percent). About 33 percent occurred on local roads while 21 percent occurred on principal arterials.

- Citations were primarily issued along MT 85 at the intersections with US 191 and E Valley Center Road. There was also a small concentration of citations along I-90 and the frontage road between Bozeman and Belgrade, as well as in Big Sky and West Yellowstone. Crashes involving unrestrained occupants followed a similar pattern, primarily occurring at the intersection of US 191, MT 85, and MT 84, in Big Sky, and in West Yellowstone. There were also a few crashes on I-90 through the Bozeman Pass. The overlap in citation and crash locations may indicate that targeted enforcement is effectively addressing unrestrained occupant-related crashes or that the issuance of citations is helping to reduce their frequency.

Unrestrained occupants are notably more likely to be involved in crashes with impaired drivers, reflecting an increased risk and apparent behavior clustering. Risky behaviors, such as distraction and reckless driving, were also observed in crashes involving unrestrained occupants. Males and younger adults were the most common groups of unrestrained occupants. The injury severity of unrestrained occupants is significantly higher compared to other focus areas, with a greater likelihood of fatal or serious injuries. Additionally, about half of these crashes occurred on roadways with a speed limit of 55 mph or higher, suggesting that higher-speed environments may contribute to the severity of these crashes. Citations and crashes involving unrestrained occupants were concentrated in similar locations, primarily along MT 85, and in Big Sky and West Yellowstone, suggesting that targeted enforcement may be reducing such crashes.

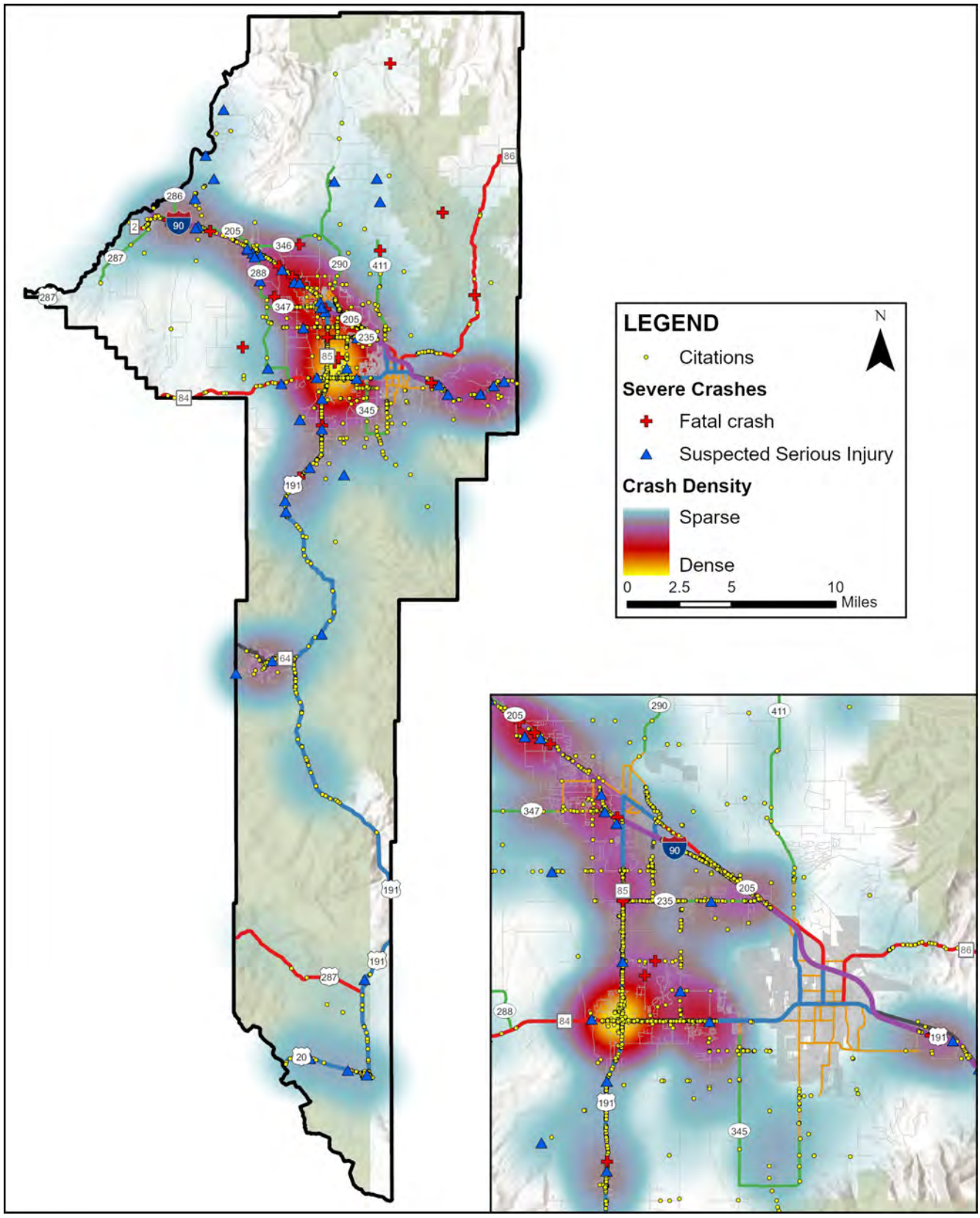


Figure 7.7: Unrestrained Occupant Crashes

Impaired Drivers

There are multiple ways to sort and define impaired driver crashes in the MDT crash database. The first is to sort the crash records by driver condition at the time of the crash. Selecting drivers that were "Under the Influence Of Medications/Drugs/Alcohol" yields a total of 625 drivers and 3 non-motorists.

Another filter can be applied to the impairment description attribute in the person details. A total of 782 drivers and 3 non-motorists were reported as being impaired. Of those 785 individuals, 67 percent were impaired by alcohol, 12 percent were impaired by drugs, 18 percent were impaired by drugs and alcohol, and the remaining 2 percent did not list the source of impairment.

A final filter can be applied to the crash details. When an impaired driver is involved in a crash, MDT fills a field indicating an impaired driver crash. This filter yields a total of 778 crashes and is assumed to be most representative of impaired driver crashes. For this reason, the following analysis is based on this definition and selection methodology.

Overall, impaired drivers were involved in about 12 percent of all crashes in the study area over the 5-year analysis period. Over the same period, 933 citations were issued for driving under the influence (DUI) and 431 citations were issued for other drug or alcohol possession violations, accounting for about 7 percent of citations overall, as discussed in **Section 6.1**. **Figure 7.8** shows a heat map of crash locations with an individual who was impaired by drugs or alcohol at the time of the crash. The DUI related citations are shown as yellow dots. Given available crash data, the following trends were observed regarding the 778 crashes involving impaired drivers.

- Approximately 76 percent of impaired driver crashes occurred at non-junction locations, while 15 percent took place at intersections and 9 percent were related to intersections.
- The most common crash types involving impaired drivers were fixed-object (46 percent), rollover (25 percent), and rear-end (8 percent). Additionally, 76 percent of these crashes only involved one vehicle.
- Impaired driver related crashes resulted in 19 fatalities (2 percent), 66 suspected serious injuries (8 percent), while 59 percent resulted in property damage only.
- Poor weather and road conditions appeared to have no significant impact on impaired driver crashes, which were observed to occur more often under ideal weather and road conditions compared to the overall crash dataset. Only 6 percent occurred when it was snowing or blowing snow, 8 percent occurred on snow covered roads, and 9 percent occurred on icy or frost-covered roads.
- The majority of crashes occurred during the fall (September – November [27 percent]) and summer (June – August [26 percent]).
- About 59 percent of the impaired driver crashes occurred while it was dark outside, while 36 percent occurred during the daytime (street lighting was present for 14 percent of the crashes that occurred at dark). Accordingly, half of the crashes occurred between the hours of 8:00 PM and 3:00 AM.
- Drivers aged 22 to 35 were over-represented among impaired drivers, accounting for 46 percent of offenders. Male drivers were also over-represented, making up 75 percent of all impaired drivers.

- Contributing actions in crashes included driving in a reckless or aggressive manner (53 percent), running off the road (47 percent), and failure to stay in proper lane (29 percent).
- Half of vehicles involved in impaired driver crashes were moving straight ahead, while 27 percent were negotiating a curve.
- Citations for impaired driving and impaired driver crashes largely occurred in the same areas, with the most common location being the intersection of MT 84, MT 85, and US 191 in Four Corners. A few crashes and citations also took place on US 191 west of Bozeman and near the I-90 highway ramps in Belgrade. One notable difference was a concentration of citations in Big Sky, though there were fewer crashes in this area compared to others.

Impaired drivers, particularly young males aged 22 to 35, are over-represented in crashes, which tend to be more severe compared to other incidents, often resulting in fatal or serious injuries. These crashes occurred more frequently under ideal weather and road conditions, indicating, perhaps, that the decision to drive impaired may be deterred by adverse environmental conditions. While certain locations, like the intersection of MT 84, MT 85, and US 191, see higher rates of both impaired driving citations and crashes, areas like Big Sky show more citations than crashes. This difference may indicate a variation in the level of impaired driving enforcement or suggest that the issuance of citations is having a preventative effect on impaired driving-related crashes.

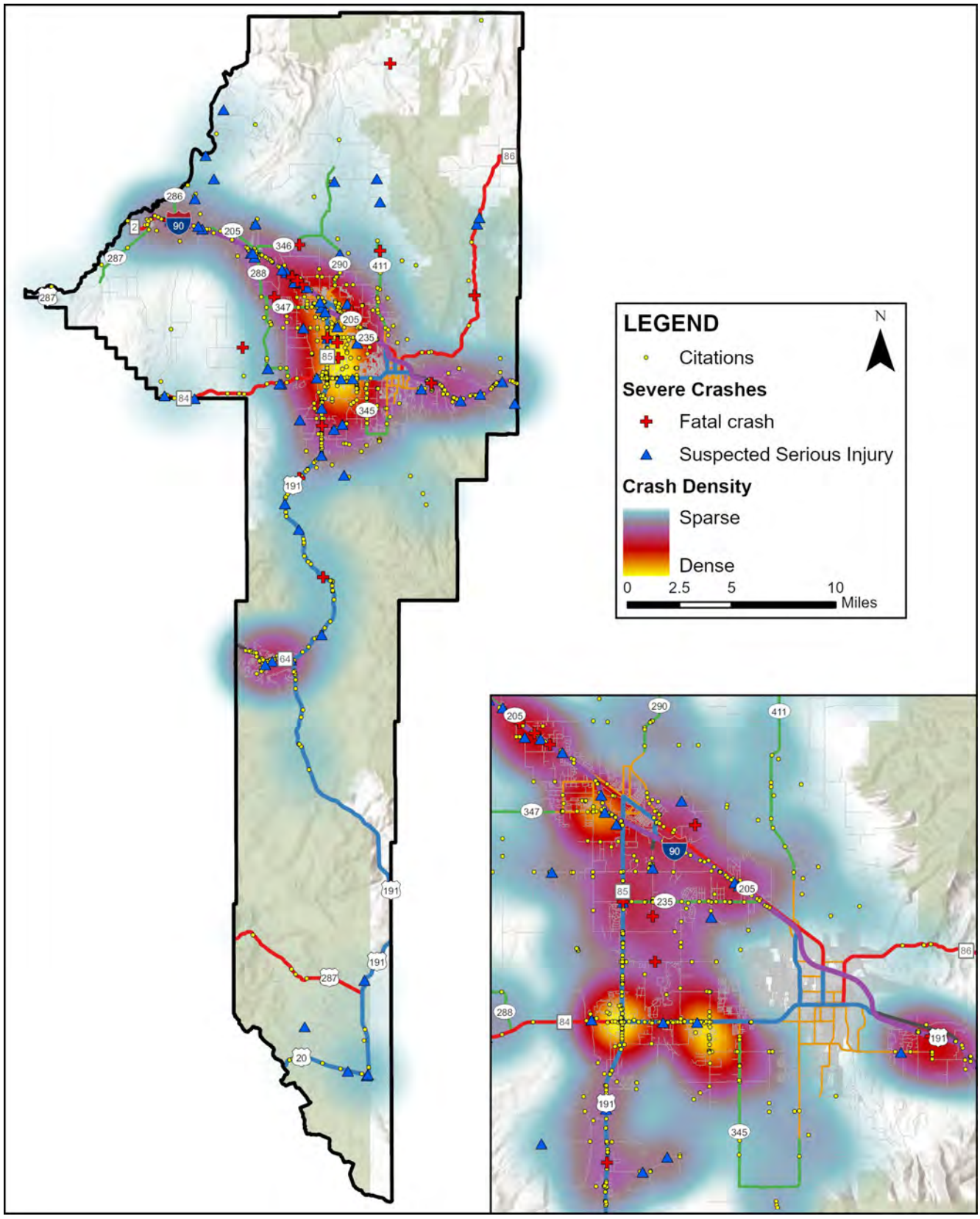


Figure 7.8: Impaired Driver Crashes

Inattentive Drivers

The involvement of a distracted or inattentive driver can be coded in crash records in many ways. First, under the individual person records, the individual's actions at the time of the crash could be listed as "Drove in Distracted, Inattentive Or Careless Manner". A total of 1,834 individuals, including 1,814 drivers and 20 unknown person types, were reported as driving in this manner. On a crash basis, these distracted individuals were involved in 1,817 total crashes, indicating more than 1 distracted individual was involved in some crashes.

Another attribute field in the crash records indicates whether the driver was specifically noted as a distracted driver. In this case, 506 individuals in 501 crashes were coded in this manner. Interestingly, 161 of these individuals (32 percent) did not have "Drove in Distracted, Inattentive Or Careless Manner" listed as a contributing action at the time of the crash. It is hypothesized that distracted drivers is much less than the total number of individuals who were reportedly driving in a distracted, inattentive, or careless manner because the latter is inclusive of many other behaviors besides distractions. Additionally, it can be difficult to prove distractions, unless phone records are obtained via warrant, or the driver self-reports distractions.

Based on the large differences between these totals, it is difficult to determine exactly how many of the crashes within the county involved distracted or inattentive drivers. However, it is reasonable to conclude that distracted driving is prevalent in the county and is a contributing factor in many of the area's crashes. **Figure 7.9** shows a heat map of crash locations reported to have involved an individual who had "Drove in Distracted, Inattentive Or Careless Manner" listed as a contributing action. The 501 crashes specifically denoting a distracted driver are shown as green dots. Key takeaways regarding the 1,817 crashes involving drivers reported as driving in a distracted, inattentive, or careless manner are summarized below. The filter used for this analysis includes careless drivers, which may not necessarily mean the driver was distracted.

- About 60 percent of the distracted driver crashes occurred at non-junction locations while 23 percent occurred at intersections and 17 percent were related to intersections.
- The most common crash types resulting from distracted drivers included rear-end (29 percent), fixed-object (28 percent), rollover (12 percent), and right-angle (10 percent).
- Of the crashes involving distracted drivers, 6 were fatal, and 52 (3 percent) resulted in serious injuries. Overall, 72 percent resulted in property damage only.
- The majority of crashes occurred during the summer (June – August [28 percent]) and winter (December – February [27 percent]) months. The time of day trends for distracted driver crashes were very similar to those of all crashes within the study area, with increases during commuting hours.
- About one-third of the distracted driver crashes occurred on roads that were wet (7 percent), snowy (12 percent), or icy/frost-covered (15 percent). The weather was clear (49 percent) or cloudy (37 percent) for most crashes.
- About 7 percent of the distracted driver crashes also involved an impaired driver. Of all impaired drivers, 13 were reported as driving in a distracted, inattentive, or careless manner.
- There were no obvious trends regarding age of the distracted drivers, though it did skew slightly younger compared to overall crashes. About 39 percent of distracted drivers were over the age of 35, which is slightly lower than the 47 percent of all drivers involved in crashes who were also in this age group.

- Other common contributing factors (besides distracted/inattentive driving) included running off the road (29 percent of drivers), driving too fast for conditions (18 percent), and failure to stay in proper lane (17 percent).
- About 10 percent of vehicles involved in distracted driver crashes were turning right or left while 8 percent were slowing, and 12 percent were stopped in traffic. About half of the vehicles were moving straight ahead (46 percent). The data does not relate individual vehicle records to individual drivers, therefore it is impossible to indicate which movement was made by the distracted driver versus the impacted driver. It is also impossible to indicate which driver was deemed at fault in the collision.

Distracted driver crashes primarily involve rear-end and fixed-object collisions, with some also resulting in rollovers and right-angle crashes. Distracted drivers are typically younger than those in the general crash population, with many being under the age of 35. While most crashes resulted in property damage, a small percentage led to serious or fatal injuries. Impaired driving is a contributing factor in some distracted driving crashes. Regarding vehicle movements, many crashes involve vehicles moving straight ahead, while others occur when vehicles are slowing or stopped in traffic, suggesting possible increased distractions during congested traffic conditions.

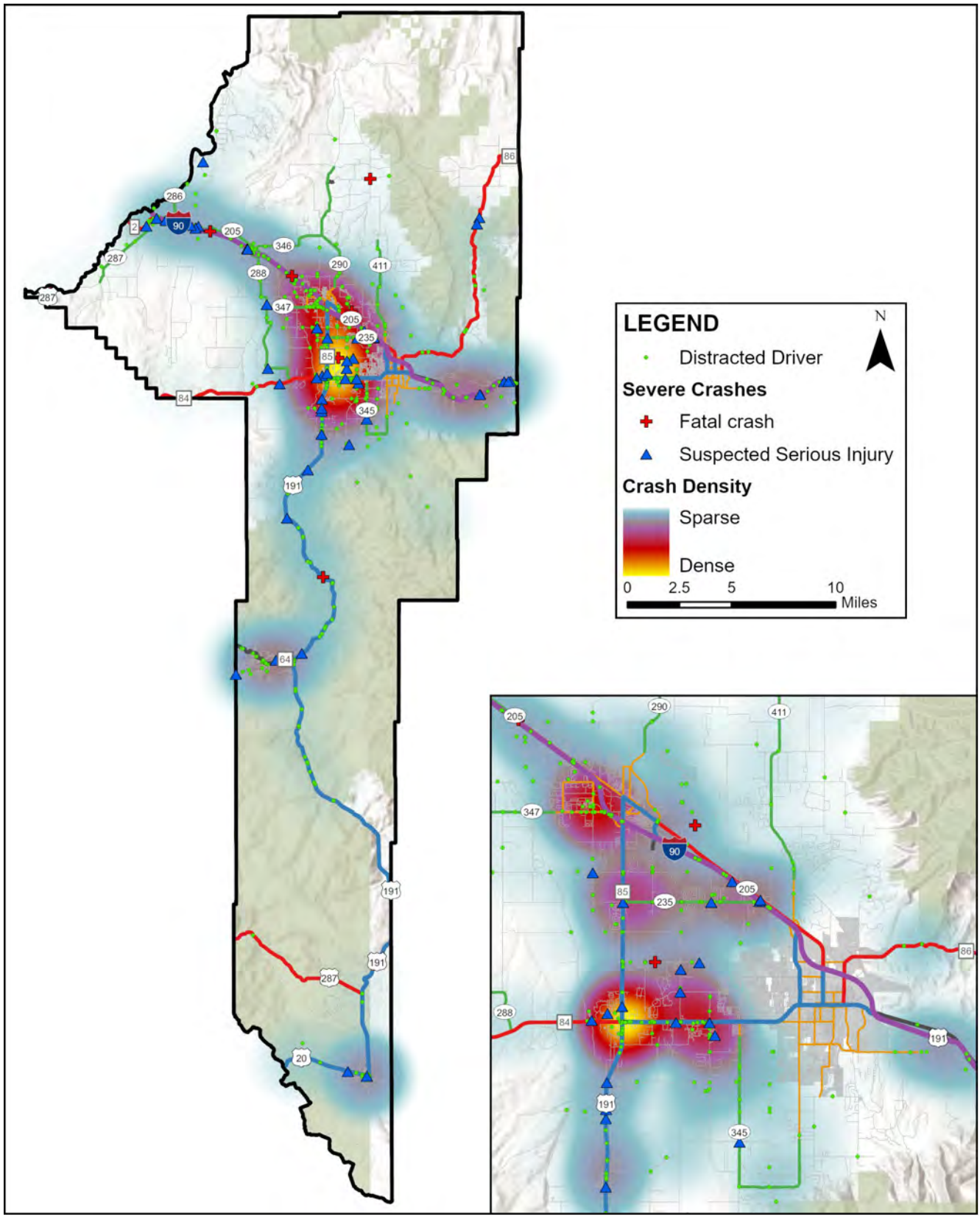


Figure 7.9: Inattentive Driver Crashes

7.3. Relationship Between Focus Areas

Table 7.2 summarizes the relationships between each of the focus areas. For additional detail, the intersection crashes, driver age, and high risk behaviors focus area categories were separated into individual focus areas. The N/A column represents the number of crashes within a given focus area that did not have any overlap with the other focus areas.

Table 7.2: Relationship Between Focus Areas

Focus Area	Run-off-the-Road	Intersection	Intersection Related	Younger Driver	Older Driver	Speed Related	Unrestrained Occupants	Impaired Drivers	Inattentive Drivers	N/A	TOTAL
Run-off-the-Road	--	155	191	989	189	1,152	283	566	713	312	**2,745**
Intersection	155	--	-	357	167	196	79	81	305	124	**876**
Intersection Related	191	-	--	258	114	163	46	70	300	50	**635**
Younger Driver	989	357	258	--	135	752	191	232	749	364	**2,279**
Older Driver	189	167	114	135	--	167	42	38	263	163	**770**
Speed Related	1,522	196	163	752	167	--	147	144	371	236	**1,959**
Unrestrained Occupants	283	79	46	191	42	147	--	162	169	31	**522**
Impaired Drivers	566	81	70	232	38	144	162	--	124	40	**778**
Inattentive Drivers	713	305	300	749	263	371	169	124	--	166	**1,817**
N/A	312	124	50	364	163	236	31	40	166	--	**--**
TOTAL	**2,745**	**876**	**635**	**2,279**	**770**	**1,959**	**522**	**778**	**1,817**	**--**	**6,739**

Based on this analysis, 54 percent of crashes with unrestrained occupants were run-off-the-road crashes, while only 10 percent of run-off the-road crashes involved unrestrained occupants. Likewise, only 21 percent of run-off-the-road crashes involved impaired drivers, while 73 percent of impaired drivers were involved in run-off-the-road crashes. Impaired driving did not appear to have a correlation with older drivers or intersection crashes. Of crashes involving younger drivers, 16 percent were intersection crashes and 11 percent were intersection related crashes, while 41 percent of both intersection and intersection related crashes involved younger drivers. Younger drivers involved in crashes were unrestrained 8 percent of the time, while 37 percent of crashes with unrestrained occupants involved younger drivers. Intersection related crashes involved inattentive drivers 47 percent of the time and intersection crashes involved inattentive drivers 35 percent of the time, while of the crashes involving inattentive drivers, 17 percent were intersection related and 17 percent were at an intersection. There did not appear to be correlation between inattentive drivers and speed related crashes. However, 59 percent of speed related crashes were run-off-the-road crashes and of the run-off-the-road crashes, 42 percent were speed related.

8. Goal Setting

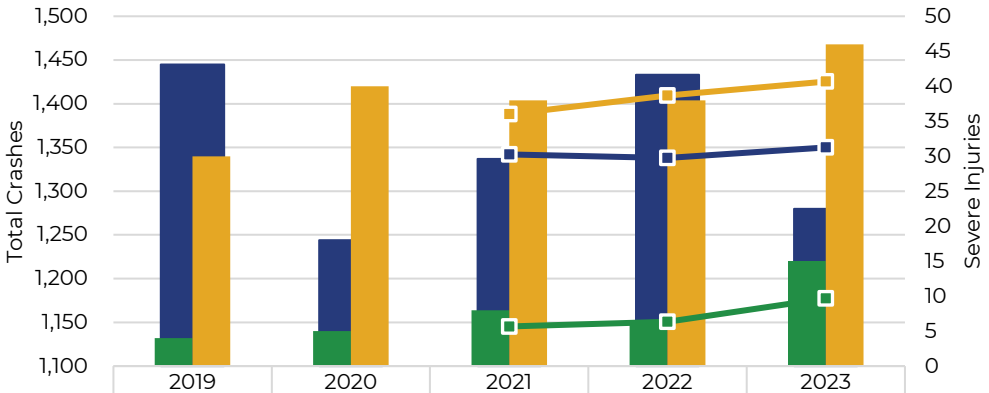
The overarching goal of the SS4A program is to zero out roadway fatalities and serious injuries. Accordingly, a requirement of the grant program is for the entity receiving funding to make an official public commitment to an eventual goal of zero roadway fatalities and serious injuries.

The commitment must include a goal and timeline for eliminating roadway fatalities and serious injuries achieved through one, or both, of the following:

(1) the target date for achieving zero roadway fatalities and serious injuries, OR
(2) an ambitious percentage reduction of roadway fatalities and serious injuries by a specific date with an eventual goal of eliminating roadway fatalities and serious injuries.

It is common practice in safety performance tracking to set goals, or targets, based on multi-year rolling averages of fatalities and serious injuries. The rolling average provides a better understanding of the overall data over time without eliminating outlier years with significant increases or decreases and provides a mechanism for accounting for regression to the mean or moving closer to an average value. If a particularly high or low number of fatalities and/or serious injuries occur in 1 year, a return to a level consistent with the average in the previous year may occur.

This analysis only includes 5 years of data, so it is difficult to discern trends based on a 5-year rolling average. Accordingly, **Figure 8.1** shows the 3-year rolling averages for the total number of crashes and total severe injuries. For comparison purposes, over the 5-year analysis period, there were an average of 7.6 fatalities, 38.4 suspected serious injuries, and 1,348 crashes. Given the data presented in **Figure 8.1**, the average number of fatalities, suspected serious injuries, and crashes are increasing year over year in Gallatin County.



	2019	2020	2021	2022	2023
Total Crashes	1,445	1,244	1,337	1,433	1,280
Fatal Injury	4	5	8	6	15
Suspected Serious Injury	30	40	38	38	46
Total Crashes (3 Yr Avg)			1,342	1,338	1,350
Fatal Injuries (3 Yr Avg)			5.7	6.3	9.7
Serious Injuries (3 Yr Ag)			36.0	38.7	40.7

Figure 8.1: Crash and Severe Injury Trends

The SS4A program requires a commitment to the eventual goal of zero roadway fatalities and serious injuries. Given this initiative, it is appropriate to set a goal for the reduction of the combined number of fatalities and suspected serious injuries. When setting annual targets, FHWA recommends using the average of the most recent 5 years of data. The analysis period for the plan spans the 2019 to 2023 time period and, at the time of writing, 2024 data is not available. Accordingly, the 5-year average number of combined fatalities and serious injuries

from the 2019 to 2023 period was used as a starting point for goal setting. A target of 46 combined fatalities and suspected serious injuries will be set for 2025.

Given the starting point of 46 fatalities and suspected serious injuries, combined with an overall increasing trend in total crashes and severe injuries, it may be unrealistic to set a specific target date for the specific goal of zero fatalities and suspected serious injuries. Instead, it is considered more appropriate to set an ambitious percentage reduction in severe injuries by a specific target date. The county can choose to either set an annual percentage reduction (i.e., 5 percent annual reduction), or a percentage reduction over a specific period (i.e., the state's interim safety goal is to half the number of fatalities/serious injuries from 952 in 2018 to 476 in 2030). The goal should be ambitious, but still realistic considering resource limitations.

To put these potential goals into perspective, **Figure 8.2** presents scenarios for 5, 10, 15, and 20 percent reduction goals. As shown in the figure, with a continual 20 percent annual reduction, the county could theoretically reach "0" by 2050. To set a similar goal to the State of Montana, it would take an approximate 7.5 percent annual reduction to half the number of fatalities and suspected serious injuries over the next 10 years, from 46 in 2025 to 23 in 2034.

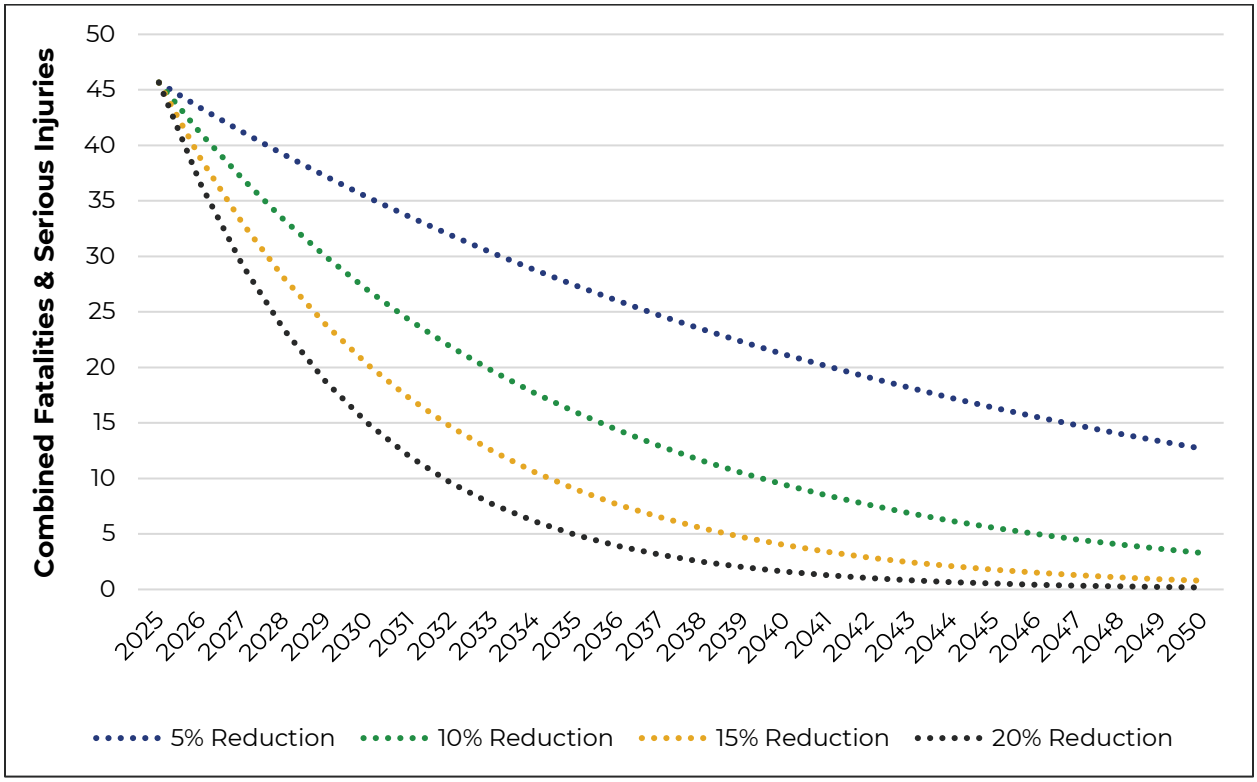


Figure 8.2: Conceptual Annual Percentage Reduction Goals

Goals setting, and the commitment to an eventual goal of "0," is a requirement of the SS4A program. The county will be required to report on its progress annually and can re-evaluate its goal(s) on a periodic basis if appropriate. While there are no programmatic or funding consequences for not achieving these goals, the consequences of fatalities and suspected serious injuries for the individuals impacted are insurmountable.

The next step in the planning process will involve the identification of potential strategies, projects, programs, and policies to make progress towards the goal of zero. These

recommendations should focus on the crash circumstances that have contributed to the highest severity crashes in the county. If desired, the county could also adopt a set of goals which can help track progress towards addressing individual areas of focus, such as a goal to reduce the number of impaired driver crashes. These types of goals will be considered and discussed by the county and task force members as the plan progresses.

8.1. Preliminary Goal

Given the information presented in the previous sections, the planning team recommends the following goal:

> ***Reduce the number of combined fatalities and suspected serious injuries on Gallatin County's roadways by half, from 46 in 2025 to 23 in 2034, by implementing the SS4A Action Plan.***

This goal will be discussed and considered by the Task Force and the public with a final commitment from the Gallatin County Commission.

9. Summary

This *Baseline Data Summary* for the Gallatin County *SS4A Action Plan* identifies multimodal transportation safety problems within Gallatin County through a data-driven analysis of available crash, citation, carcass, and demographic data covering the 5-year period from January 1, 2019, to December 31, 2023. The data presented in this report is a summary of details ascertained from crash reports submitted to the MHP from patrol officers and local law enforcement officials. The information from the crash reports is conveyed as recorded in the report, with no attempts to correct or modify the data.

The purpose of this analysis was to identify contributing factors in traffic fatalities and serious injuries as well as other circumstances that impact roadway safety across the county. Additionally, comprehensive analyses were performed for 4 key focus areas including run-off-the-road crashes, intersection crashes, driver age (younger and older drivers), and high risk behaviors (speed related, unrestrained occupants, impaired drivers, and inattentive drivers). This effort included a review of the spatial relationship between crashes and their locations, as well as a detailed analysis of contributing factors and crash trends specific to each focus area, insights that may not be apparent from a high-level review of all crash records.

Analyses summarized in this report will assist Gallatin County and its partners in identifying and implementing projects or strategies to focus on the county's most high-risk and prevalent transportation safety issues. Findings will also help the county tailor any potential strategies to specific areas and contextual situations. A summary of generalized takeaways from the baseline safety analysis is provided below.

- Data indicated that 6,739 crashes involving 13,116 individuals occurred within Gallatin County but outside of the Bozeman and Belgrade city limits during the 5-year analysis period spanning 2019 to 2023. The area experienced a decline in the total number of crashes between 2019 and 2020, with a large spike in crashes in 2022. About 20 percent of crashes resulted in some level of injury and about 3 percent were severe (38 total fatalities and 192 total serious injuries).
- Temporal trends indicated a possible trend with regular commuting patterns and generally higher traffic exposure on weekdays. However, more severe crashes occurred

on weekend days. Approximately 27 percent of crashes occurred in the fall months (September through November) while 31 percent occurred in the winter months (December through February), potentially due to winter weather and road conditions or fewer daylight hours.

- About 41 percent of crashes occurred under adverse road conditions (snowy, icy, frost-covered, or wet roads) and 17 under adverse weather conditions (snow or rain). Crashes that occurred under adverse road or weather conditions could potentially indicate a lack of maintenance of roadway facilities or a lack of skill, experience, or care driving in adverse conditions. About 34 percent of crashes occurred when it was dark outside, with only 14 percent of those crashes occurring in locations where street lighting was present.
- Geospatial mapping showed higher concentrations of crashes in the triangle area between Bozeman, Belgrade, and Four Corners. This area had greater traffic volumes and was typically more congested than other areas of the county, leading to greater traffic exposure and a higher risk of conflicts. Similarly, about a quarter of severe crashes occurred on I-90 which carried the highest traffic volumes and had the highest speed limits, contributing to both higher risks of conflicts as well as higher risks of injury when a crash occurred.
- Single-vehicle crashes accounted for 59 percent of all reported crashes, while multi-vehicle crashes made up the remaining 41 percent. The most common types of crashes were fixed-object collisions, rollovers, and rear-end collisions.
- Approximately 59 percent of crashes occurred on routes owned and maintained by MDT, while 23 percent occurred on routes owned by Gallatin County. Of the severe crashes, 66 percent occurred on MDT routes while 20 percent occurred on locally owned routes. These findings point out the importance of interagency coordination.
- Four key focus areas (run-off-the-road, intersection crashes, driver age [younger and older], and high risk behaviors [speed related, unrestrained occupants, impaired drivers, and inattentive drivers])) were selected to investigate in greater detail to understand potential crash trends.
    - **Run-off-the-Road Crashes:** Run-off-the-road crashes in the study area were mainly driven by weather conditions and driver behavior. Winter weather, including icy and wet roads, increased crash risk, especially when drivers didn't adjust their speed. Distractions and inattentiveness worsened the problem, as did speeding and rushing during commuting hours. Nighttime crashes were more common due to reduced visibility, particularly in poorly lit areas. Alcohol impairment also contributed significantly. Reducing run-off-the-road crashes in Gallatin County requires addressing driver behaviors like speeding, distraction, and impairment, alongside managing weather-related risks.
    - **Intersection Crashes:** Crashes at intersections present a significant concern, particularly at high-traffic locations with heavy turning movements. These crashes often involved a higher proportion of right-angle collisions, which tended to be more severe. Distracted and impaired driving were also prevalent in intersection crashes. High-volume areas such as Four Corners and the Belgrade I-90 accesses were identified as key hotspots for these types of crashes, underscoring the need for targeted safety measures at busy intersections with complex traffic patterns.
    - **Driver Age**

- Ħ ï ź ė ŮŸ" G Ÿ ŲŸη Crashes involving younger drivers often involved risky driving behaviors and environmental factors. Most resulted in property damage, with fewer leading to serious injuries or fatalities compared to other focus areas. These crashes were more common at non-junction locations, in poor weather conditions, and at night. Spikes in crashes occurred during winter months and commuting hours. Male drivers were more frequently involved, and key contributing factors included impairment, distraction, and speeding. These crashes typically occurred on roads with moderate speed limits, particularly on local roads and principal arterials.
- ¸ ŲŲŸ" G Ÿ ŲŸη Crashes involving older drivers were mostly rear-end, right-angle, or fixed-object collisions, with most resulting in property damage only. These incidents often occurred at non-junction locations, during daylight hours, and between 10 AM and 4 PM. Weather played a smaller role in these crashes compared to other focus areas, with fewer occurring in snow or rain. Impairment was a minor factor, and crashes typically happened on local roads or principal arterials with moderate speed limits.

o **High Risk Behaviors**

- Ê Ï ŮŲŲ" Á ŲŲ Ç χŲŲ Speed related crashes in Gallatin County were mostly non-junction incidents, often occurring on high-speed roads like I-90. These crashes frequently resulted in fixed-object collisions and rollovers, with winter weather, especially snow, ice, and frost, often playing a key role. Speed related crashes were more common in winter and during daylight hours. Younger drivers, particularly those aged 16 to 35, were most often involved, with contributing factors like running off the road, over-correcting, and distraction being common.
- á ź ŸŲηχŸÇ Ÿ ŲŲ" ¸ ŅŅï Ï Ç ź χη Unrestrained occupants were more likely to be involved in crashes with impaired drivers, a trend linked to clustered high risk behaviors. These crashes often involved male and younger adult occupants, with distraction and reckless driving as common contributing factors. The severity of injuries to unrestrained occupants was notably higher than those to restrained occupants.
- vỳ Ï Ç Ÿ ŲŲ" G Ÿ ŲŸη Impaired drivers, especially young males aged 22 to 35, were over-represented in severe crashes, often resulting in fatal or serious injuries. These crashes were more common under ideal weather and road conditions, suggesting, perhaps, that the decision to drive impaired may have been deterred by adverse environmental conditions. Certain areas, like the Four Corners intersection, had higher rates of both impaired driving crashes and citations, while places like Big Sky saw more citations than crashes, potentially indicating more effective enforcement or a preventative impact.
- vź Ç χχŲź χŸ Ŭ" G Ÿ ŲŸη Distracted driving crashes often resulted in rear-end and fixed-object collisions, with some resulting in rollovers or right-angle crashes. Drivers in these crashes were typically younger, with many under 35. Most crashes resulted in property damage only, though a few led to serious or fatal injuries. Impaired driving was also a factor in some inattentive driver crashes. The majority of crashes occurred when vehicles were moving straight, slowing, or stopped in traffic.

References

[i] FHWA Highway Safety Programs, *Zero Deaths and Safety System*, August 2, 2024, https://highways.dot.gov/safety/zero-deaths

[ii] Gallatin County, G*reater Triangle Area Transportation Plan*, April 21, 2022, https://gallatincomt.virtualtownhall.net/sites/g/files/vyhlif606/f/pages/gtatp_04-21-22.pdf

[iii] Gallatin County, *Triangle Trails Plan*, November 23, 2021, https://gallatincomt.virtualtownhall.net/sites/g/files/vyhlif606/f/pages/triangle_trails_plan_adopted_112321.pdf

[iv] Gallatin County, *Envision Gallatin: Gallatin County Growth Policy*, September 21, 2021, https://gallatincomt.virtualtownhall.net/sites/g/files/vyhlif606/f/pages/growth_policy_-_final_full_document_9.1.21.pdf

[v] Gallatin County Planning Coordination Committee, *Triangle Community Plan*, July 28, 2020, https://gallatincomt.virtualtownhall.net/sites/g/files/vyhlif606/f/pages/triangle_community_plan_final.pdf

[vi] City of Belgrade, *2017 Belgrade Long Range Transportation Plan*, October 17, 2018, https://www.mdt.mt.gov/publications/docs/brochures/belgrade-tranplan.pdf

[vii] City of Bozeman, *Bozeman Transportation Master Plan*, April 25, 2017, https://www.bozeman.net/home/showpublisheddocument/12020/638603542807630000

[viii] American Association of State Highway and Transportation Officials, *Strategic Highway Safety Plan: A Comprehensive Plan to Substantially Reduce Vehicle-Related Fatalities and Injuries on the Nation's Highways,* February 2005.