Appendix C: Data Memo

Communities and agencies across the nation are developing Safety Action Plans that meet the requirements of the United States Department of Transportation (USDOT) and implement safety initiatives like Toward Zero Deaths (TZD), Vision Zero (VZ), and Road to Zero (RTZ) with the goal of eliminating all traffic-related fatalities and severe injuries. Weld County is participating in this effort by developing a Safe Streets for All (SS4A) Safety Action Plan (SAP).

Based on Safe System strategies, the SAP will:

- Assess current roadway safety issues through the development of high-risk networks (HRNs) and key crash trends
- Incorporate community and stakeholder input gathered from outreach and engagement
- Recommend new or revised policies, guidelines, and standards
- Identify strategies, countermeasures, and implementation actions to mitigate safety issues
- Include the next steps for measuring performance and sharing responsibility for safety

As a part of the Weld County planning efforts, the project team undertook a comprehensive data analysis of a ten-year period (2014-2023). This data underwent a cleaning process prior to developing crash trends, a systemic analysis, and crash maps; crashes were filtered by those which involved someone killed or seriously injured (KSI) within Weld County and excludes crashes on interstates. The data analysis looked at findings through three different categories:

- All Weld County
- Jurisdictions in Action Plan
- Unincorporated Weld County

These categories allow for emphasis areas and countermeasures to be identified and tailored to the different contexts that exist across Weld County. This memorandum provides a summary of understanding and overview of the data analysis that guides the further development of Weld County's SS4A Safety Action Plan.

Crash Trends

From 2014-2023, Weld County experienced (Figure 1):

- 434 fatal crashes
- 1,394 serious injury crashes

Fatal crashes have had a slightly increasing trend; serious injury crashes have shown a similar trend over the same period, with a jump in crashes starting in 2021.

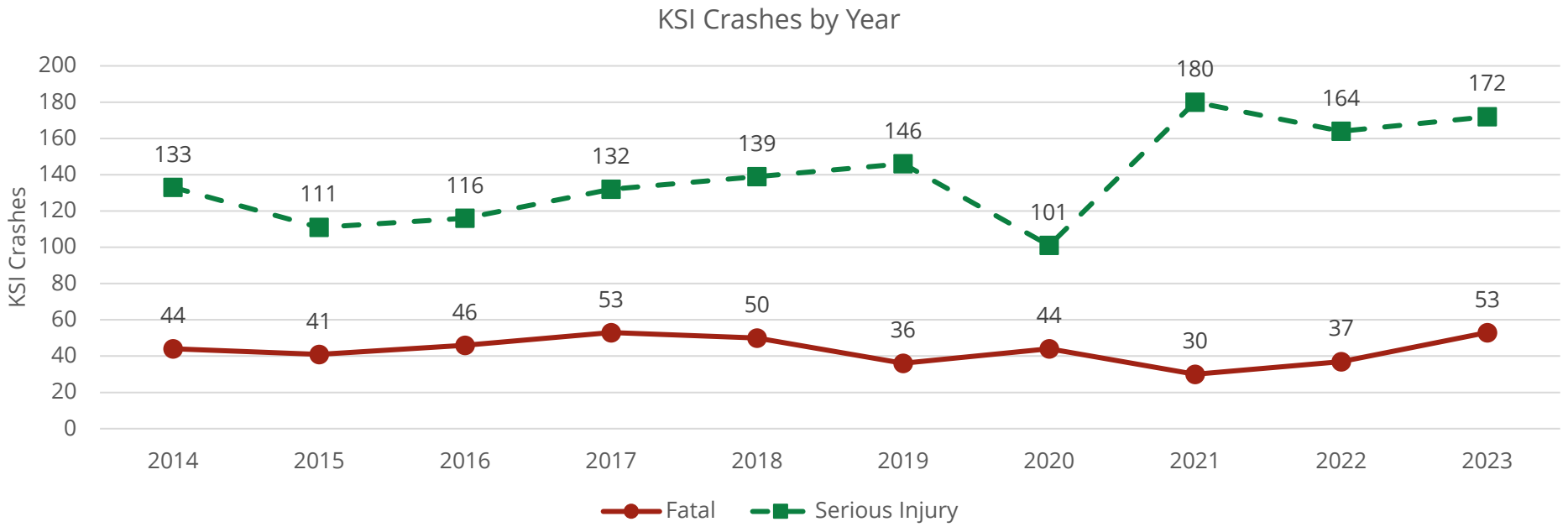


Figure 1: KSI Crashes by Year (All Weld County)

When these KSI crashes are subdivided (Table 1), KSI crashes within jurisdictions included in the action plan and within unincorporated Weld County account for 68% of all crashes within Weld County.

Table 1: KSI Crashes by Category

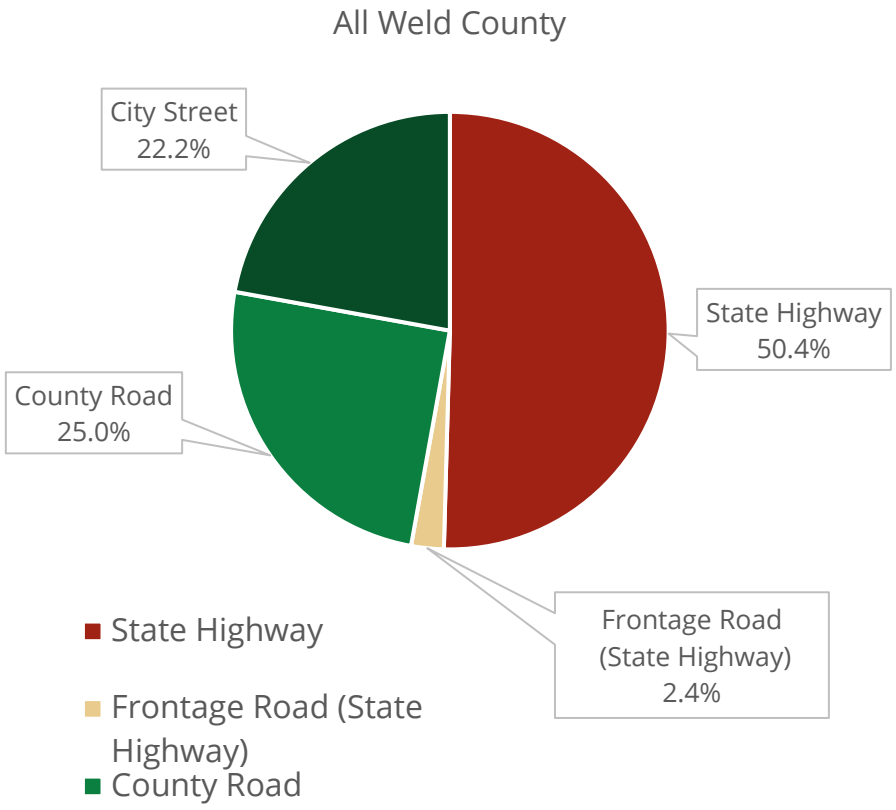
Category	# of KSI Crashes	% of KSI Crashes
Jurisdictions in Action Plan	428	23%
Unincorporated Weld County	819	45%
Jurisdictions not in Action Plan	581	32%
All Weld County	**1,828**	**100%**

Roadway Characteristics

Roadway characteristics data, such as roadway condition, type, lighting, and location, can be used to identify patterns which can then be used to help prioritize improvements, safety measures, and guide future planning.

Roadway Type

State highways account for the largest portion of KSI crashes by roadway type for all of Weld County and for jurisdictions included in the plan (Figure 2). Similarly, state highways account for the largest portion of KSI crashes by roadway type for unincorporated Weld County; however, this is closely followed by county roads.



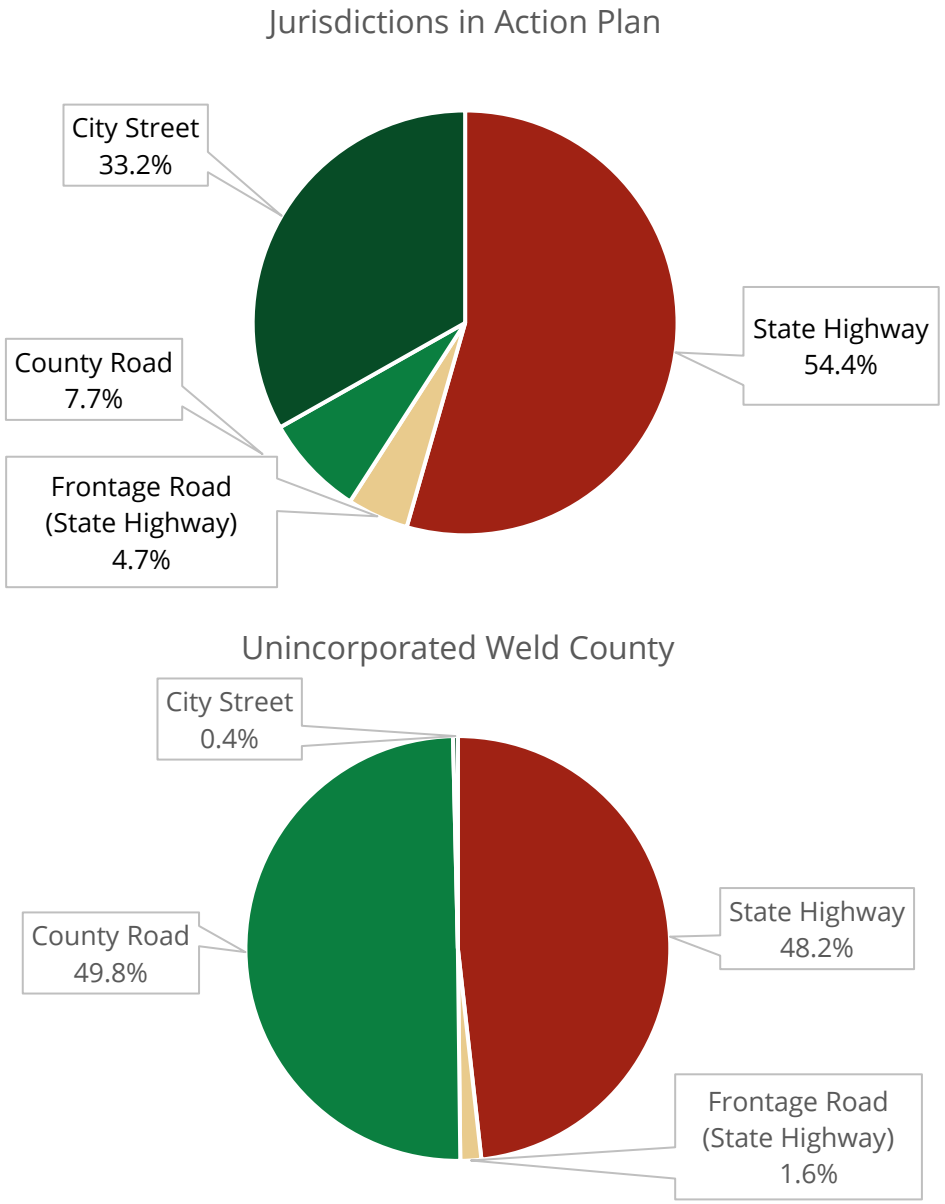


Figure 2: KSI Crashes by Roadway Type

Crash Location

More than half of KSI crashes occur at segments (i.e., between intersections) across all three categories—51.6% for all of Weld County, 52.6% for jurisdictions included in the plan, and 57.8% for unincorporated Weld County (Figure 3).

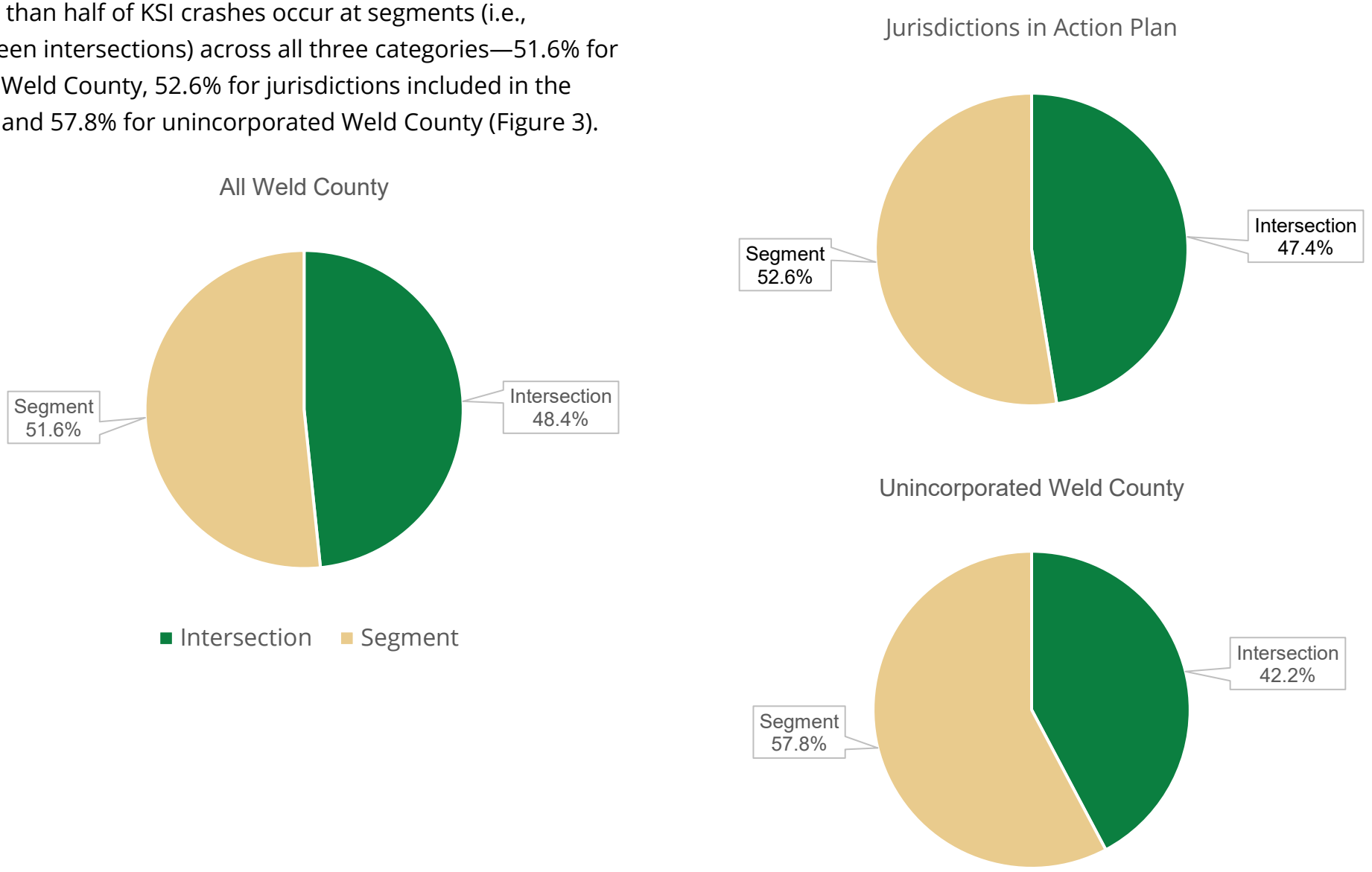
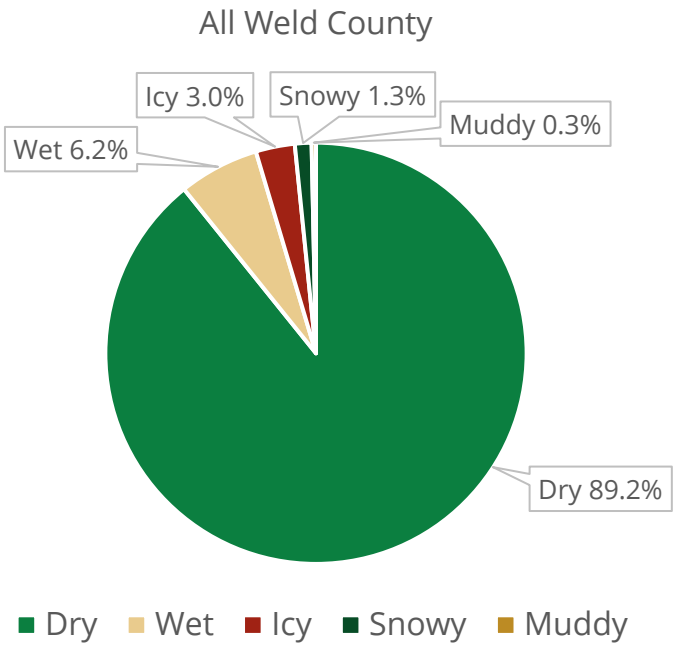
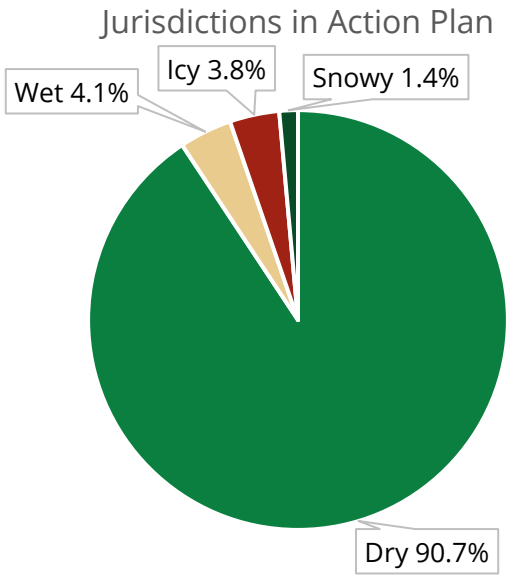


Figure 3: KSI Crashes by Location

Roadway Condition

The majority of KSI crashes occur on dry roadways—89.2% for all of Weld County, 90.7% for jurisdictions included in the plan, and 87.5% for unincorporated Weld County (Figure 4).





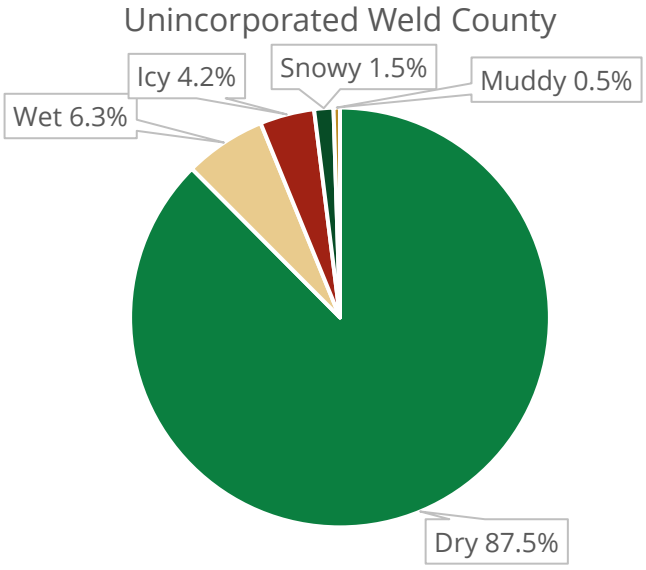
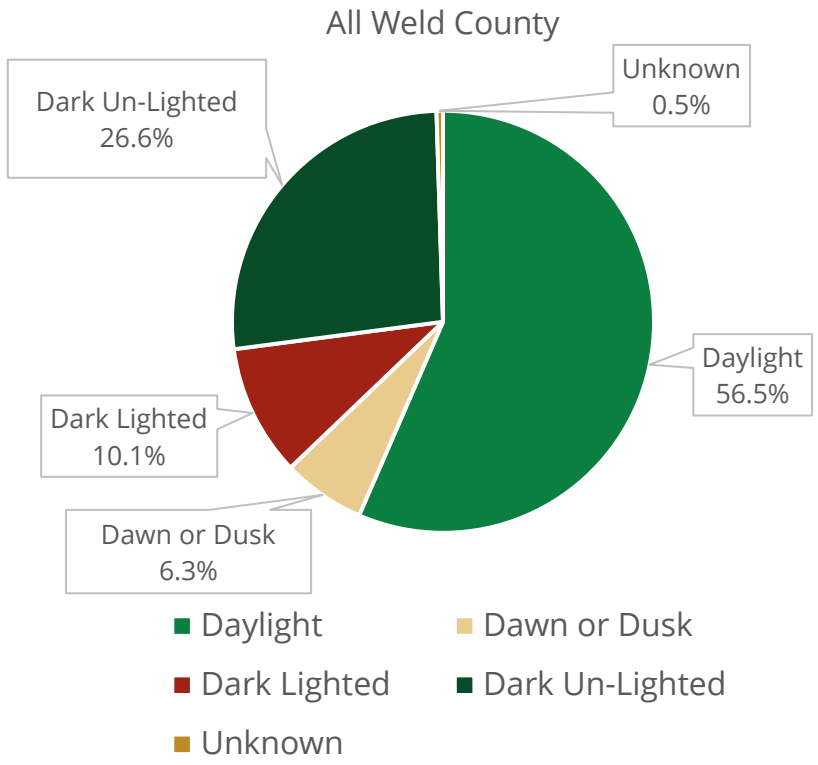
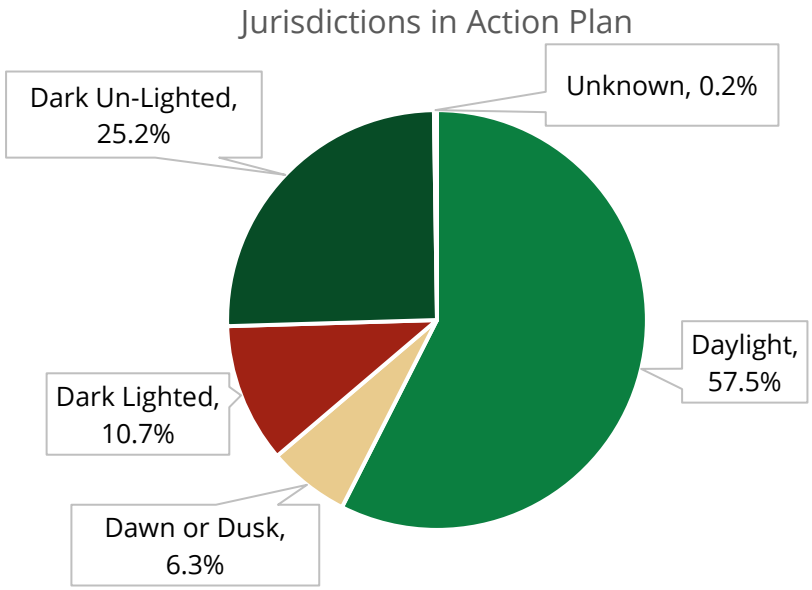


Figure 4: KSI Crashes by Roadway Condition

Lighting Condition

More than half of KSI crashes occur in daylight—56.5% for all of Weld County, 57.5% for jurisdictions included in the plan, and 57.5% for unincorporated Weld County (Figure 5). More than a quarter of all KSI crashes occur in dark, unlit portions of the county.





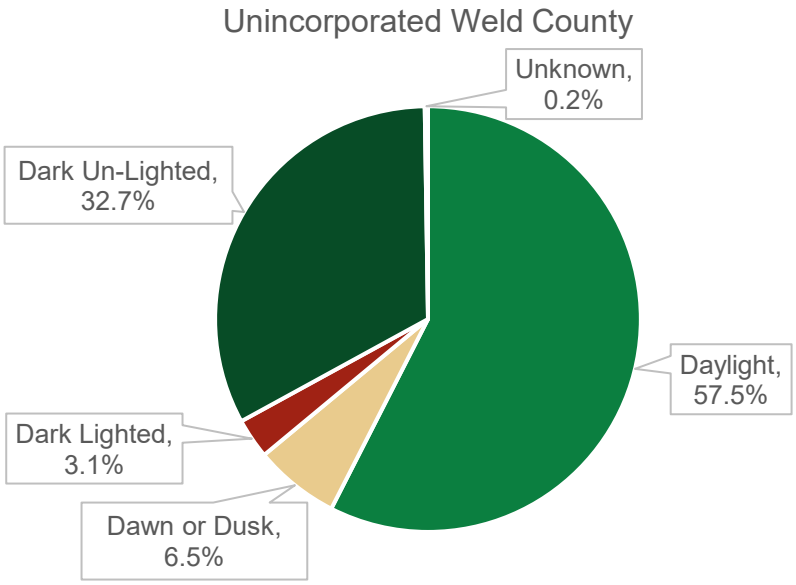


Figure 5: KSI Crashes by Roadway Lighting Condition

Construction Zones

The vast majority of crashes (98.6% or higher) occur outside of construction zones (Figure 6).

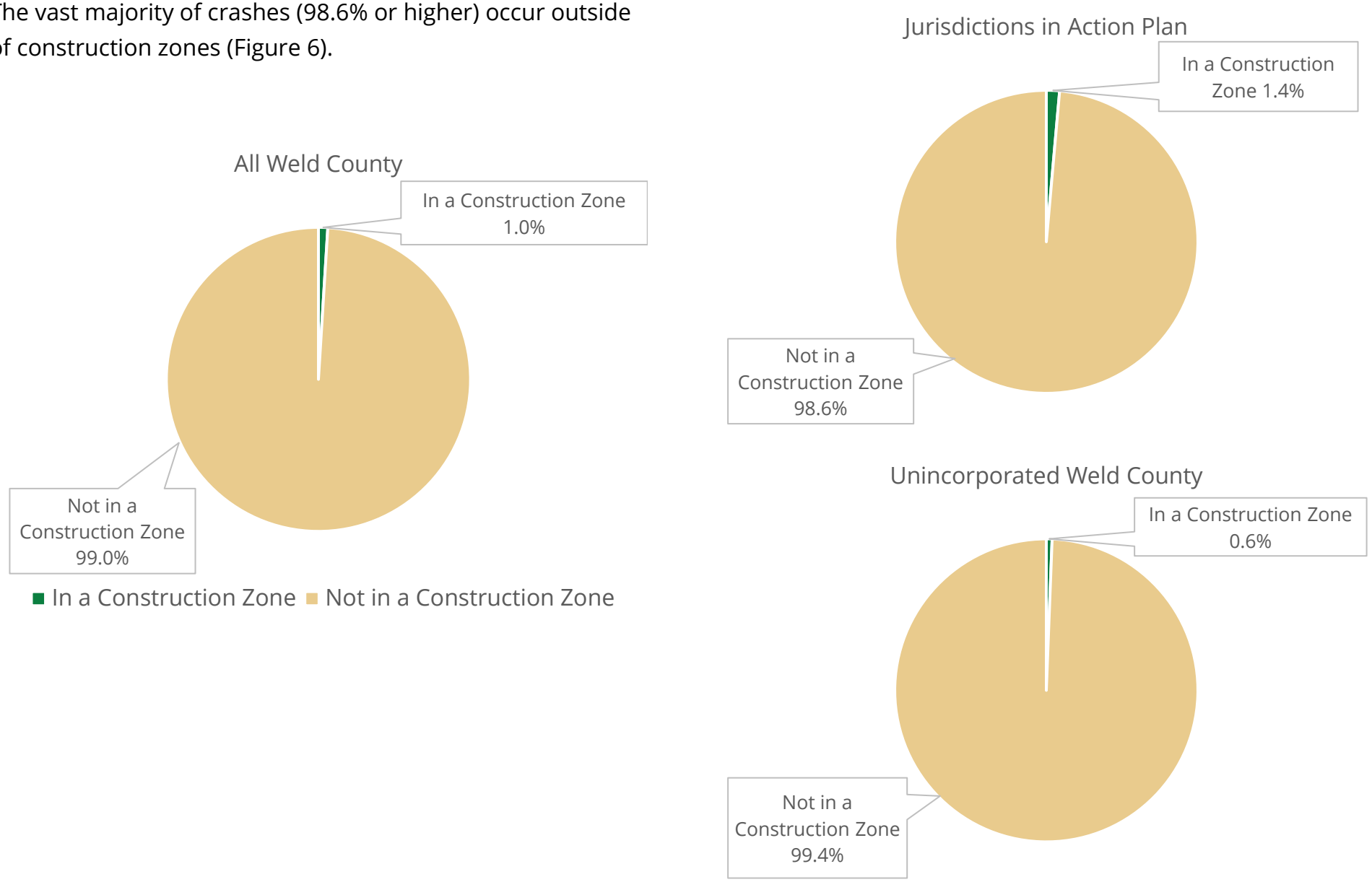


Figure 6: KSI Crashes in Construction Zones

User Factors

User factors show how individual characteristics, such as age and impairment, can influence road safety; they can be used to inform targeted interventions and safety measures. For user factors, statistics have been broken down by the road user type: drivers—i.e., motorists and motorcyclists—and vulnerable road users (VRU)— i.e., pedestrians and bicyclists.

Age

Age plays a role in transportation safety, as experience influences how drivers behave on the roadway. Younger drivers are often more inexperienced than other age groups, which influences risk-taking behavior. Drivers over 80 are the least likely to be involved in a fatal or injury crash; this could be due to there generally being a lower number of drivers in the age group on the road (Figure 7). Regarding VRUs, the most impacted age group based on age are those aged 20-39 (Figure 8).

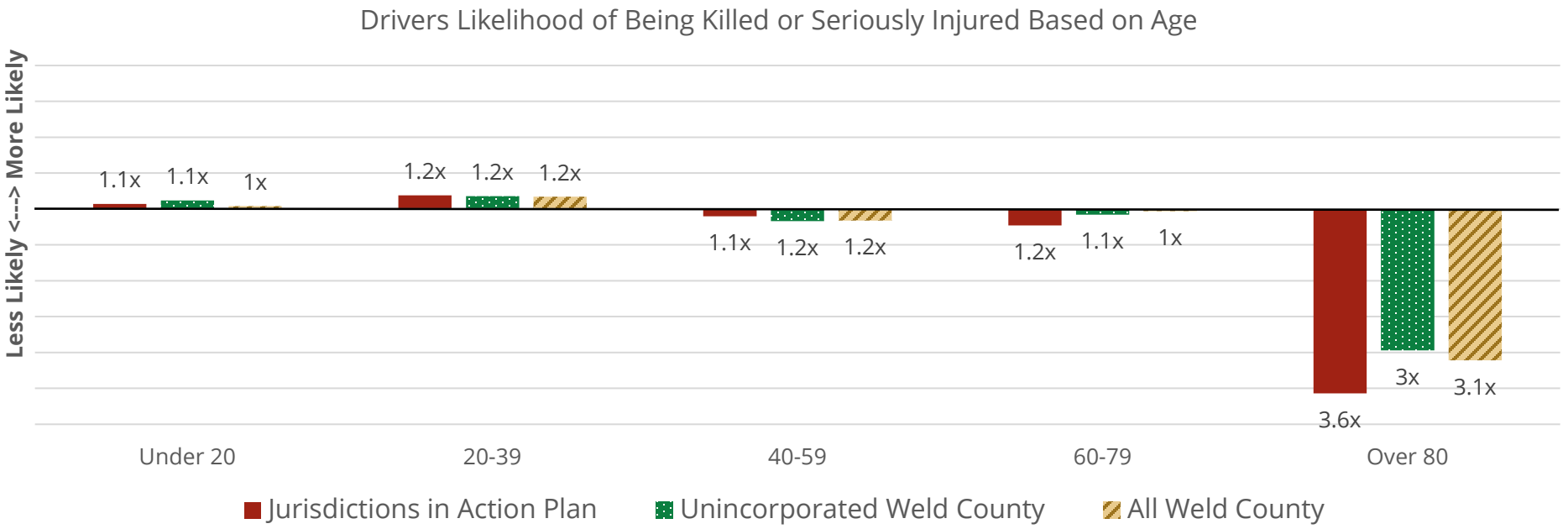


Figure 7: Drivers Likelihood of Being Killed or Seriously Injured Based on Age

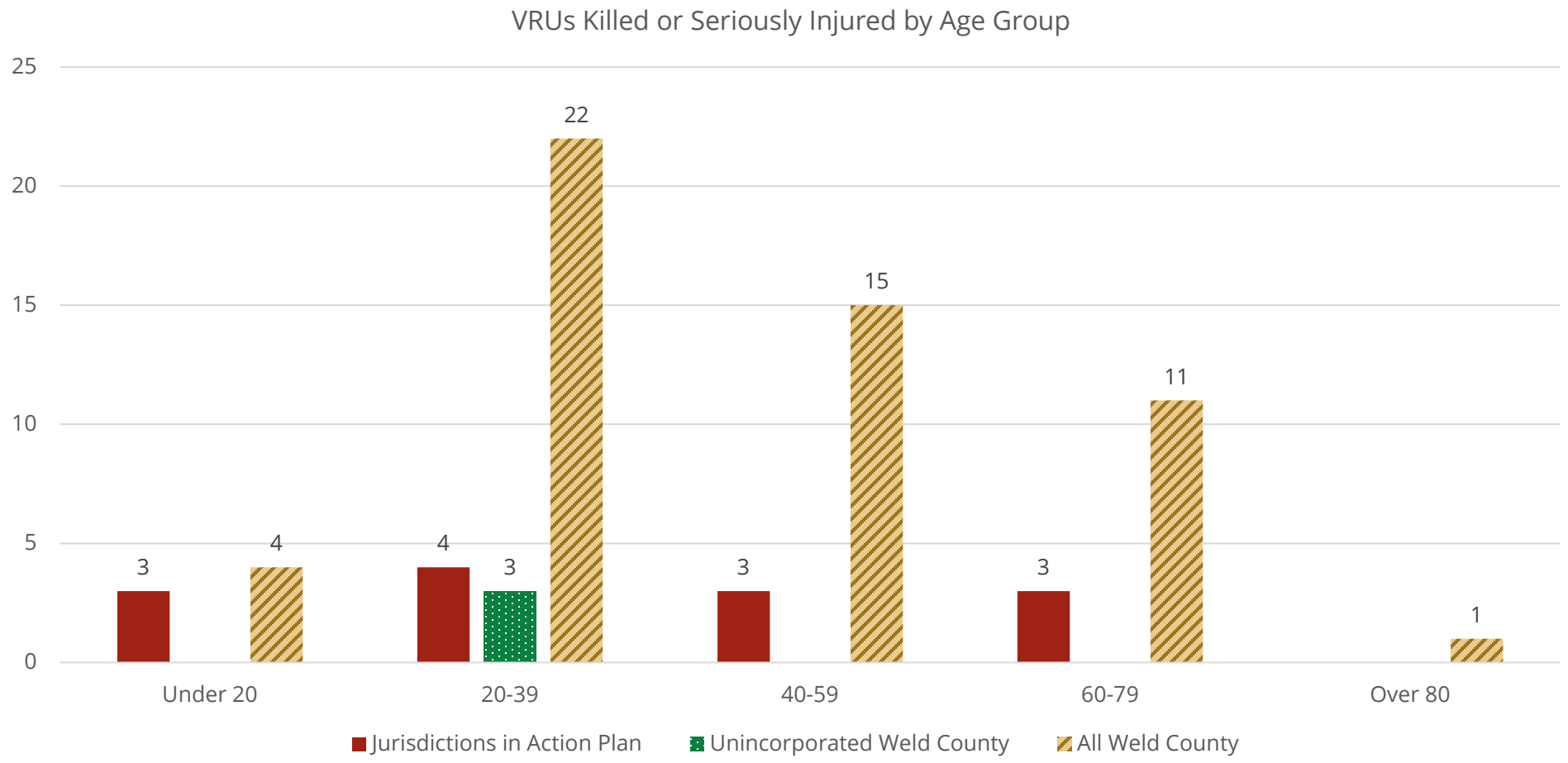
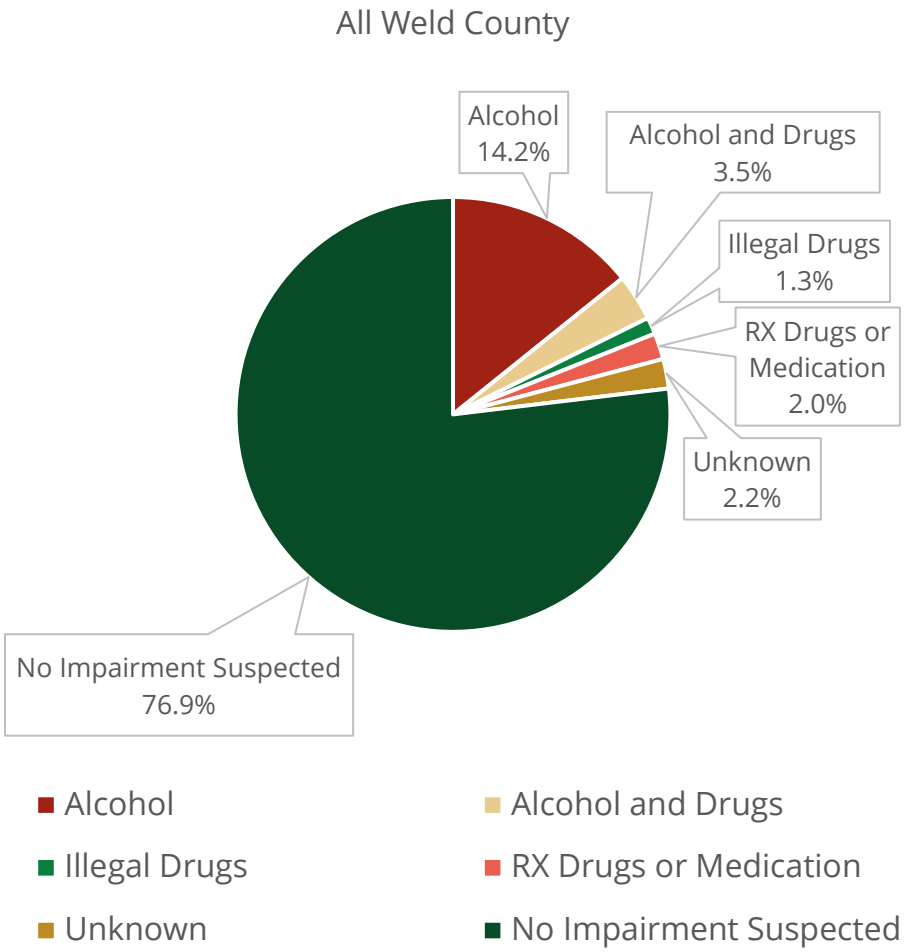


Figure 8: Number of VRUs Killed or Seriously Injured by Age Group

Impairment

The majority of drivers killed or seriously injured in a crash (75.2% or more) were not impaired (Figure 9). Similarly, vulnerable road users (VRUs)—pedestrians and bicyclists—killed or serious injured in a crash (73.3% or more) were not impaired (Figure 10).



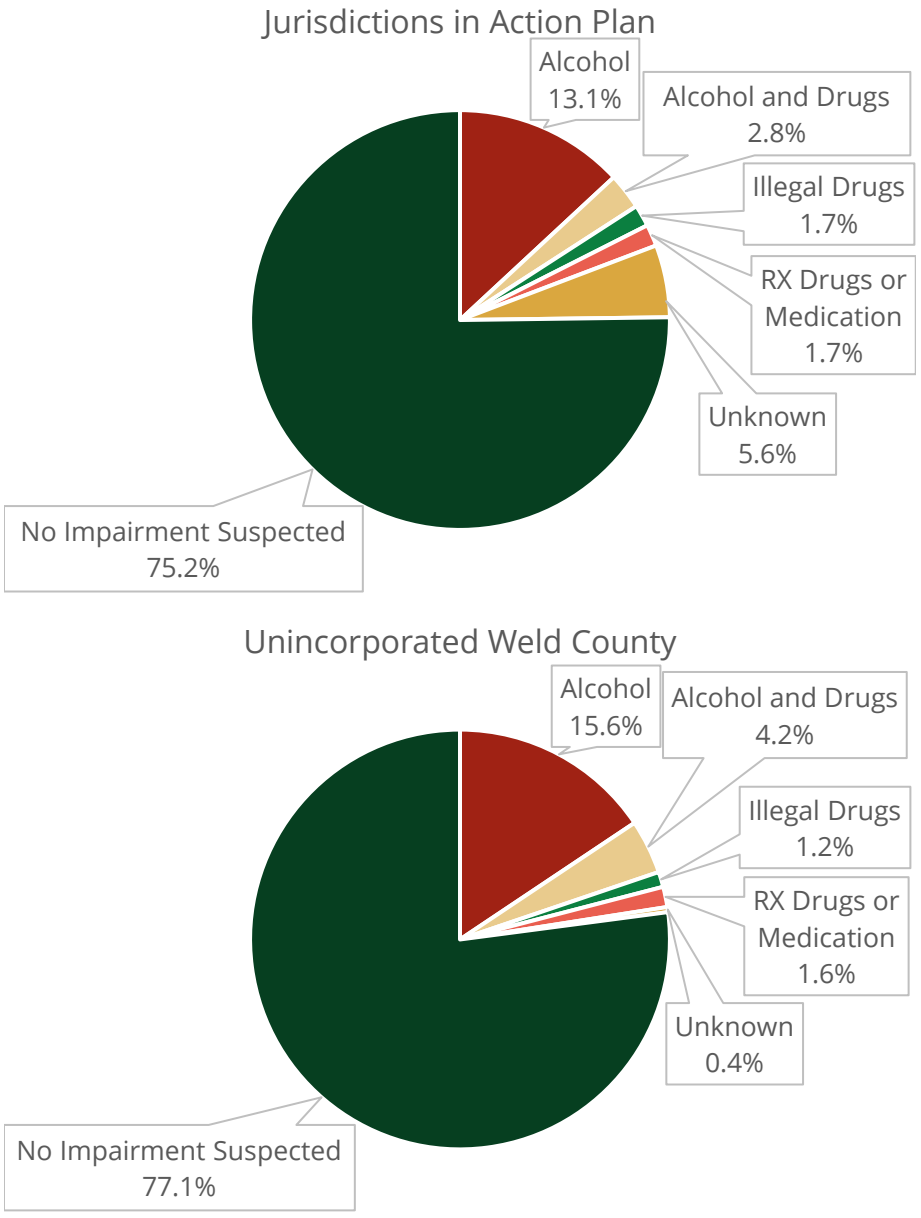


Figure 9: Drivers Killed or Seriously Injured by Impairment

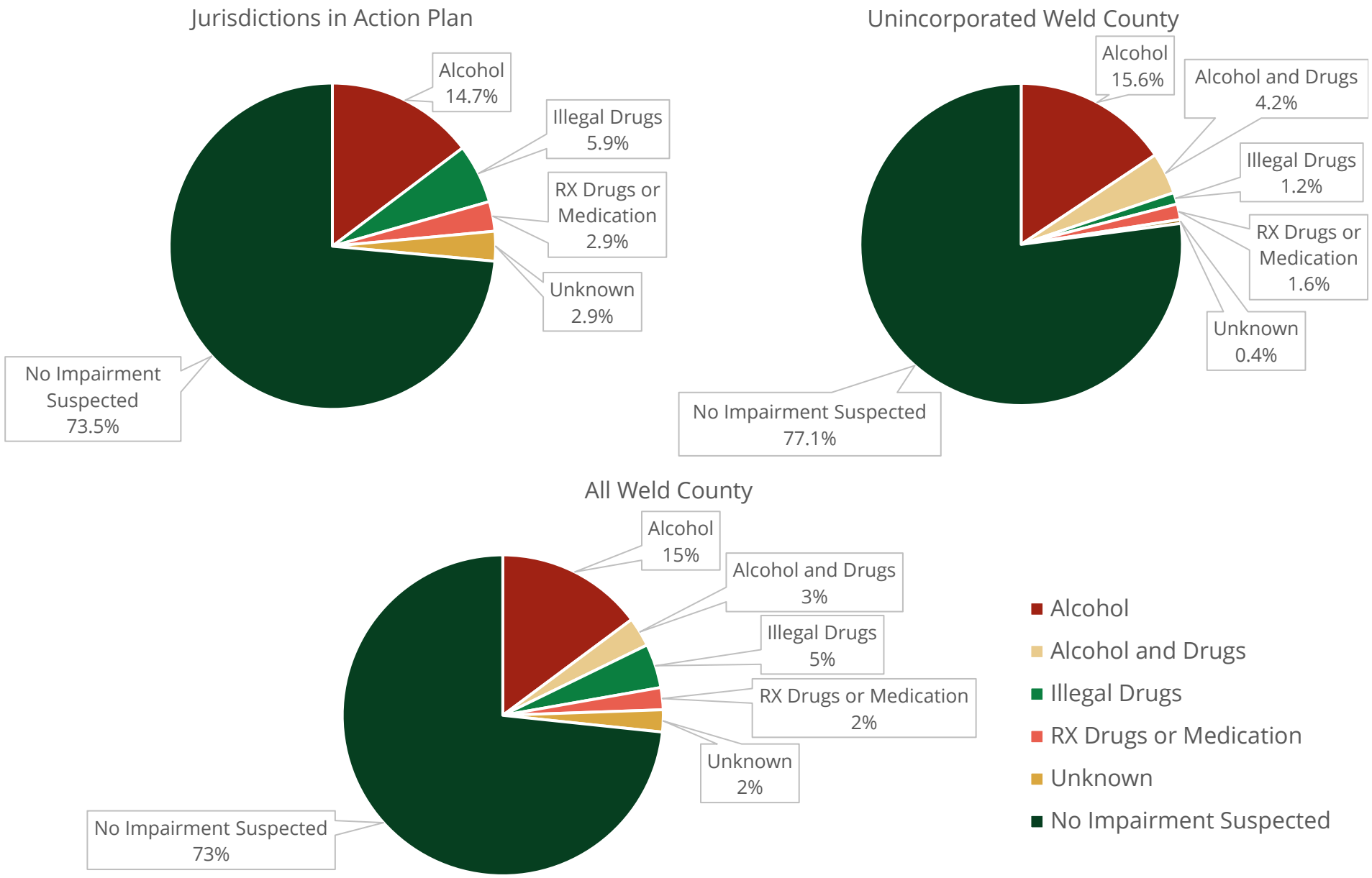


Figure 10: VRUs Killed or Seriously Injured by Impairment

Crash Types

Crash Types investigate the relationship between the mode of transportation, vehicle type, and the crash type involved in crashes; analyzing these factors helps identify common crash patterns and contributing factors, enabling the development of more effective safety strategies.

Mode Type

Mode type refers to the mode of transportation residents in Weld County use to get around; 96.6% of the county travels as motorists (Figure 11). Looking at KSI crashes by mode (Figure 12):

- Most crashes (78.8% or more) involve crashes between motorists, regardless of category.
- Motorcyclists are the second largest mode group involved in KSI crashes (9.4% of crashes or more).

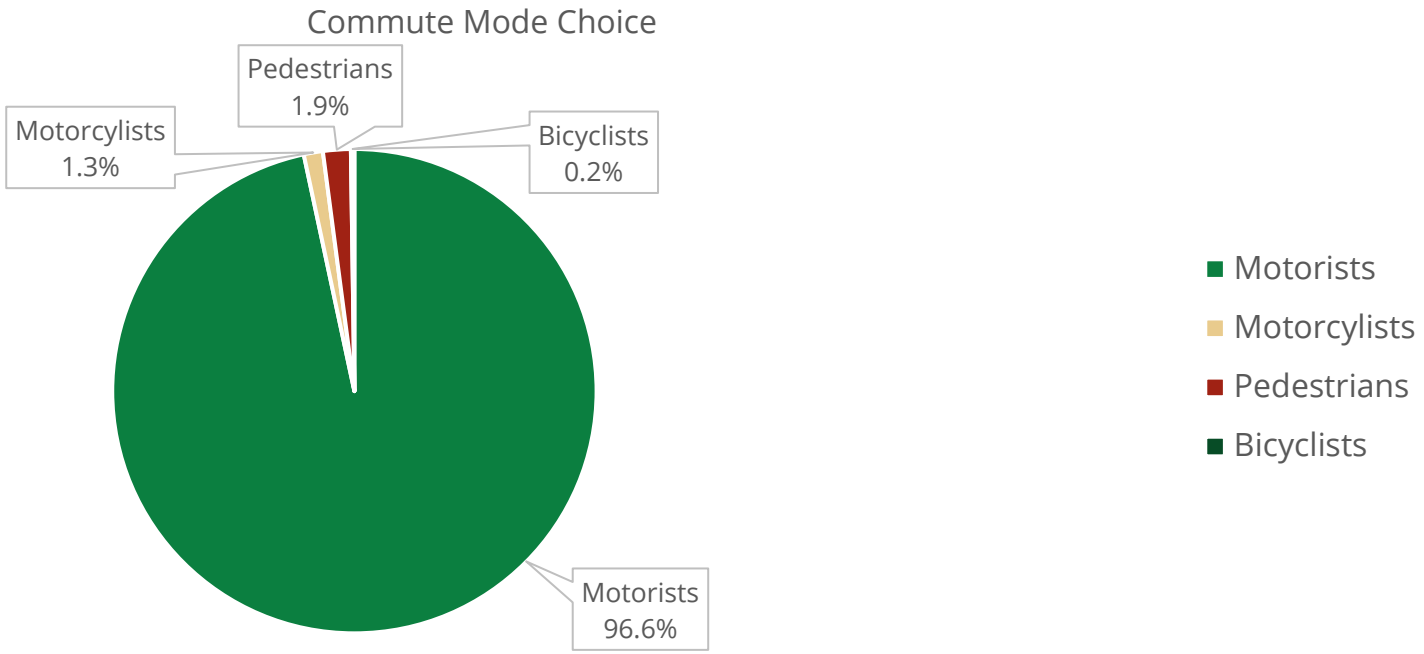


Figure 11: Commute Mode Choice (All Weld County). ***Source: American Community Survey 5-Year Estimates (2023)***

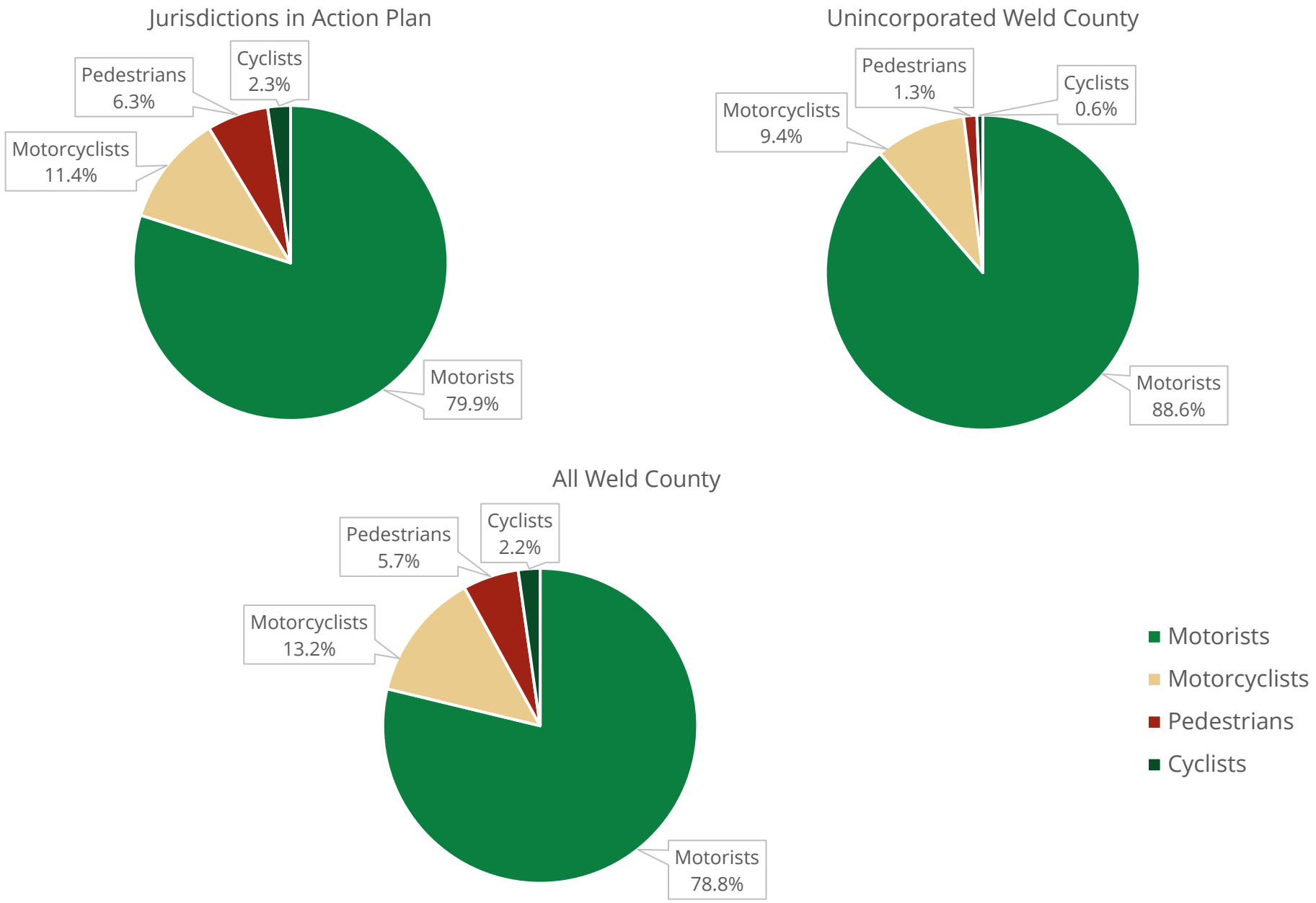


Figure 12: KSI Crashes by Mode

Crash Types

Broadside and overturning crashes are the largest crash type contributing to KSI crashes in Weld County, regardless of category (Figure 13); approach turn, rear end, head on, embankment or ditch, and sideswipe (opposite direction) also are top crash types across all categories. However, pedestrian crashes are one of the top crash types for all of Weld County and jurisdictions included in the plan, but not for unincorporated Weld County; bicycle or pedal cycle crashes are a top crash type for all of Weld County.

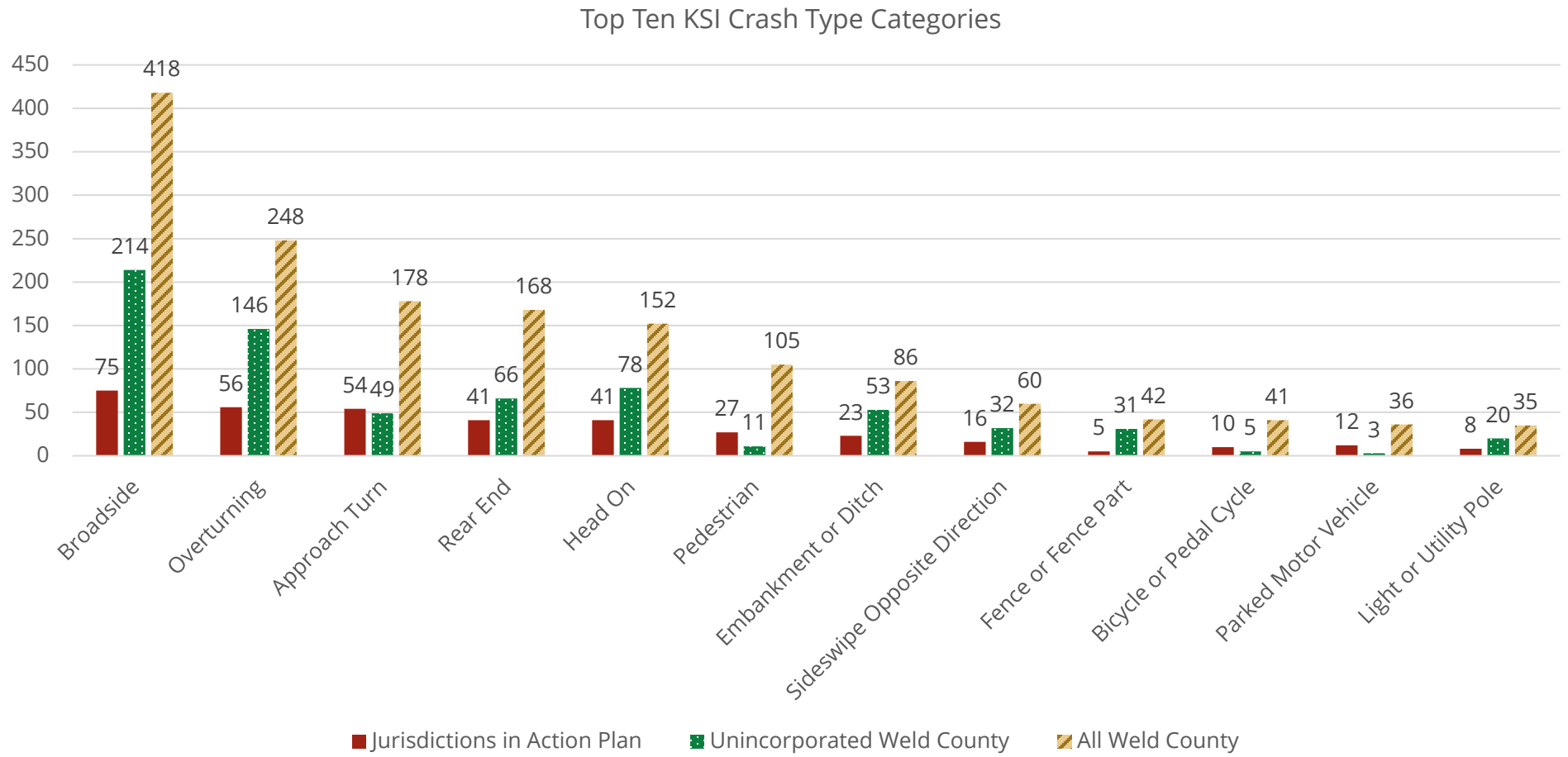


Figure 13: Top Ten KSI Crash Types Categories

Vehicle Types

SUVs and Pickup Trucks/Utility Vans account for nearly the same amount or more of persons killed or seriously injured as passenger vehicles (Figure 14):

- **All Weld County:** 39.5% of persons killed or seriously injured involved passenger cars while 41.3% involved SUV/pickup truck/utility van.
- **Jurisdictions in Action Plan:** 34.6% of persons killed or seriously injured involved passenger cars while 42.1% involved a SUV/pickup truck/utility van.
- **Unincorporated Weld County:** 37.4% of persons killed or seriously injured involved passenger cars while 45.7% involved a SUV/pickup truck/utility van.

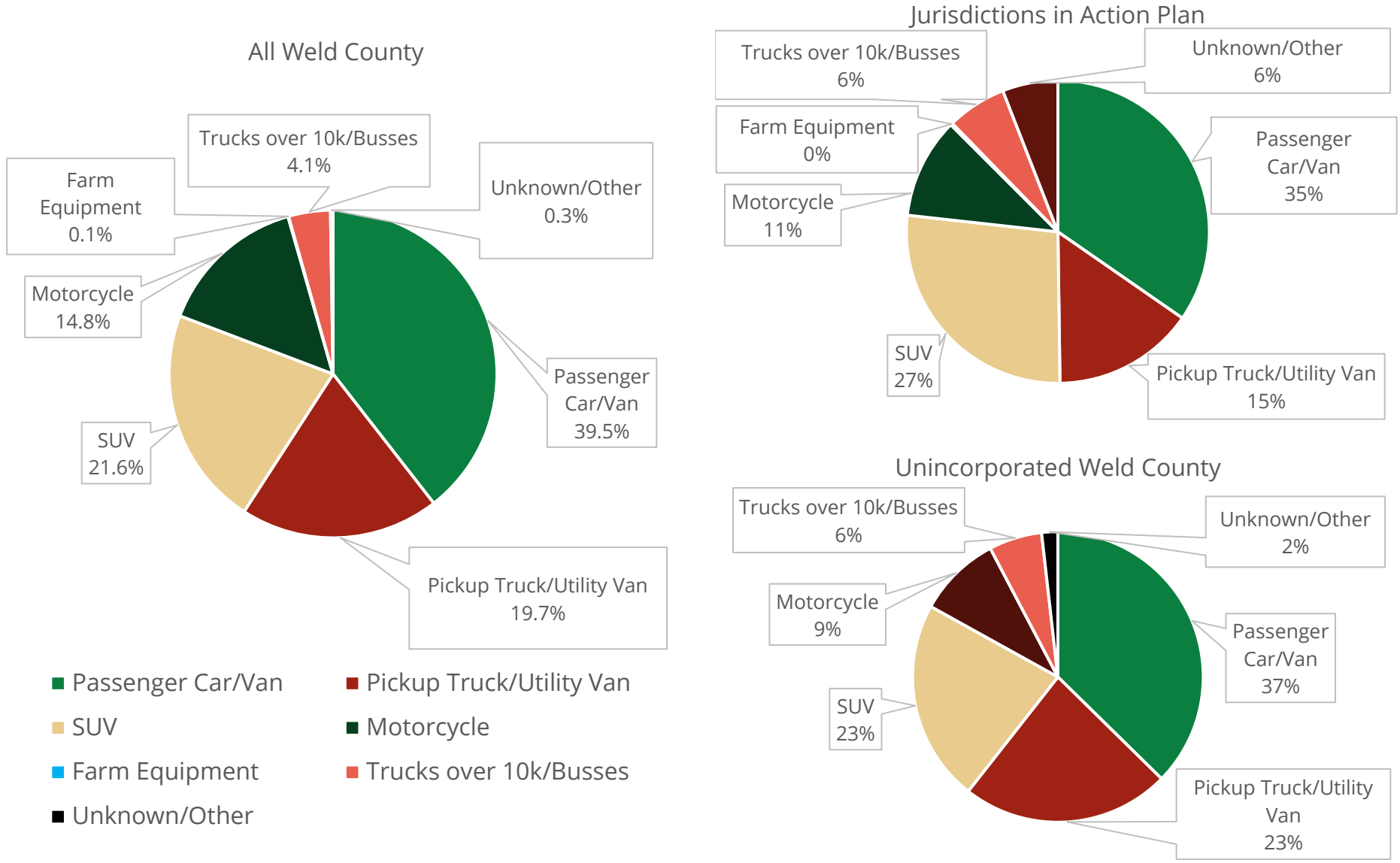
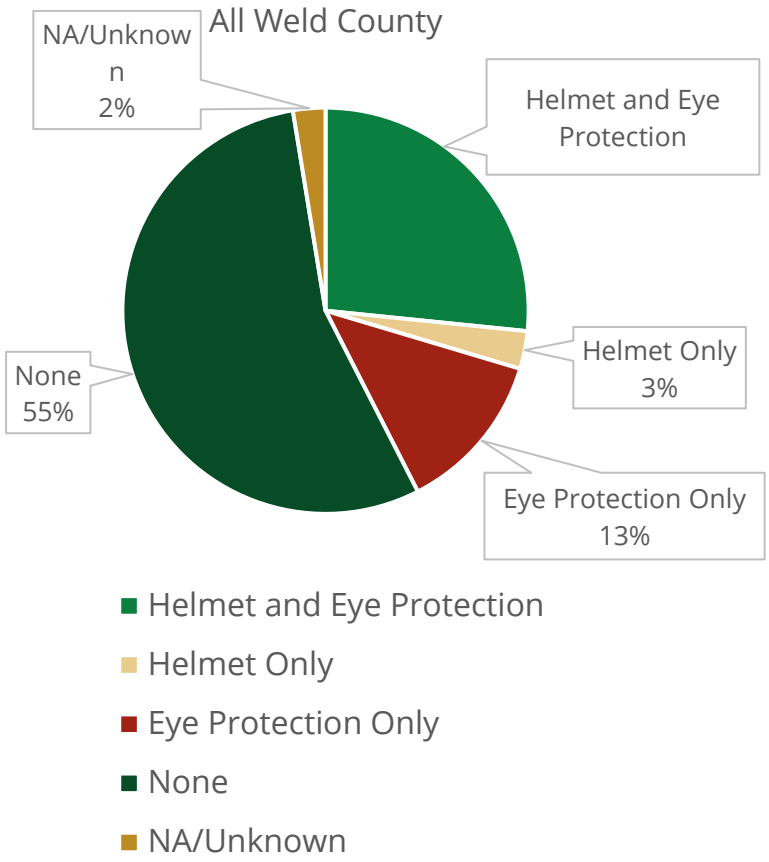
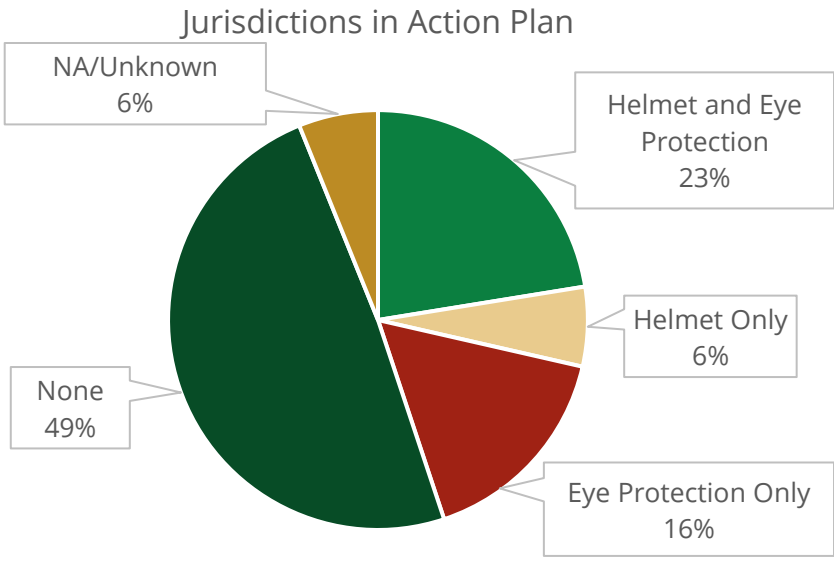


Figure 14: Persons Killed or Seriously Injured by Vehicle Type

Safety Equipment Usage

Nearly half (55.1% or more) of motorcyclists killed or seriously injured in all Weld County wore no kind of safety equipment and in jurisdictions included in the plan (Figure 15). This trend may be similar in unincorporated Weld County, but nearly half of the crashes have a "not available" or "unknown" classification of safety equipment usage.





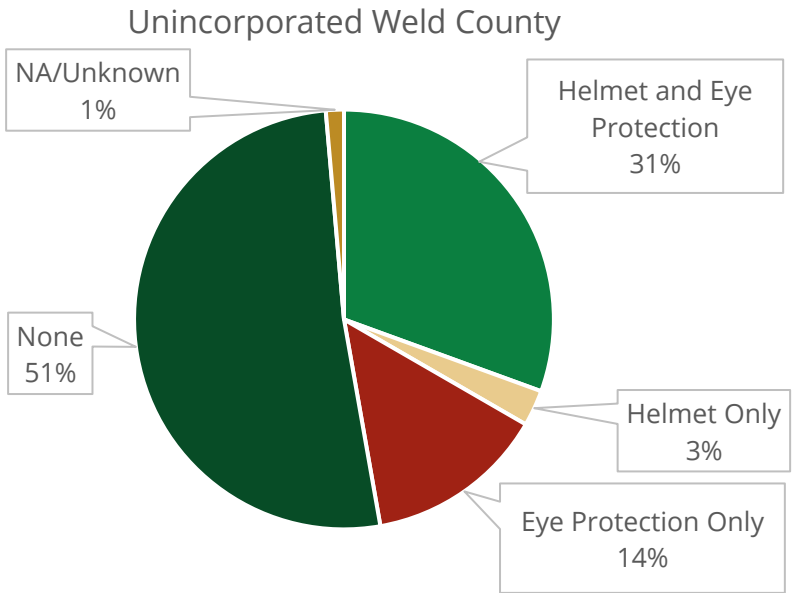


Figure 15: Motorcyclists Killed or Seriously Injured by Safety Equipment Used

Time of Year

Month of the Year

Analyzing time trends show seasonal differences in KSI crashes. Across all of Weld County, KSI crashes tend to peak in the summer and early fall:

- KSI crashes in all of Weld County peak in June, July, August, and September (Table 2).
- KSI crashes in jurisdictions included in the action plan peak in May, June, July, and October (Table 3)
- KSI crashes in unincorporated Weld County peak in June, July, and September (Table 4)

Table 2: KSI Crashes by Month of the Year (All Weld)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
January	1.1%	0.8%	0.7%	0.4%	0.5%	0.9%	0.7%	0.5%	0.7%	0.3%	**6.7%**
February	0.4%	0.7%	0.4%	0.6%	0.7%	0.7%	0.5%	0.7%	0.7%	1.1%	**6.5%**
March	0.8%	0.9%	0.4%	0.4%	1.1%	0.7%	0.5%	0.5%	1.0%	1.0%	**7.3%**
April	0.8%	0.3%	0.7%	0.7%	0.6%	0.9%	0.4%	0.7%	0.8%	0.7%	**6.6%**
May	0.8%	0.8%	0.7%	1.0%	0.8%	1.1%	0.7%	1.0%	0.7%	0.9%	**8.5%**
June	0.8%	0.6%	1.1%	1.2%	1.3%	0.5%	0.7%	1.1%	1.3%	1.1%	**9.8%**
July	1.0%	1.0%	1.0%	1.0%	1.3%	1.1%	0.7%	1.3%	1.0%	1.4%	**10.8%**
August	0.5%	0.9%	0.8%	1.1%	0.8%	1.1%	0.7%	1.1%	1.3%	0.9%	**9.2%**
September	0.9%	0.6%	0.9%	0.8%	1.0%	0.7%	1.2%	1.0%	1.0%	1.6%	**9.7%**
October	0.9%	0.5%	0.8%	0.9%	0.7%	0.8%	0.6%	1.5%	0.9%	0.9%	**8.6%**
November	1.0%	0.9%	0.7%	0.8%	0.8%	0.4%	0.6%	1.1%	0.9%	1.0%	**8.2%**
December	0.7%	0.4%	0.8%	1.1%	0.8%	0.9%	0.6%	0.8%	0.8%	1.1%	**8.0%**
Total	**9.7%**	**8.3%**	**8.9%**	**10.1%**	**10.3%**	**10.0%**	**7.9%**	**11.5%**	**11.0%**	**12.3%**	**100%**

Table 3: KSI Crashes by Month of the Year (Jurisdictions in Action Plan)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
January	1.4%	1.4%	1.2%	0.5%	0.2%	0.9%	0.7%	0.7%	0.9%	0.2%	**8.2%**
February	0.7%	1.2%	0.2%	0.5%	1.2%	1.6%	0.5%	0.9%	0.5%	1.2%	**8.4%**
March	0.2%	0.7%	0.2%	0.7%	0.7%	0.5%	0.2%	0.5%	0.7%	0.9%	**5.4%**
April	0.5%	0.5%	0.5%	0.7%	0.0%	0.9%	0.2%	0.5%	0.5%	0.7%	**4.9%**
May	0.2%	1.2%	0.5%	0.9%	1.2%	0.2%	1.4%	1.9%	1.2%	0.7%	**9.3%**
June	1.4%	0.5%	1.4%	0.9%	2.1%	0.2%	0.7%	0.9%	0.9%	0.5%	**9.6%**
July	0.5%	0.9%	1.2%	0.9%	0.7%	1.9%	0.9%	0.7%	1.2%	1.6%	**10.5%**
August	0.2%	0.7%	0.5%	1.2%	0.9%	1.2%	0.9%	0.5%	1.4%	1.2%	**8.6%**
September	0.2%	0.9%	1.4%	0.2%	0.7%	1.2%	0.9%	0.5%	1.6%	1.2%	**8.9%**
October	0.9%	0.5%	1.2%	0.7%	0.5%	0.9%	0.9%	1.9%	1.9%	0.7%	**10.0%**
November	0.5%	0.7%	0.7%	0.7%	0.7%	0.5%	0.5%	2.6%	0.7%	1.4%	**8.9%**
December	0.5%	0.5%	0.7%	1.4%	0.9%	1.2%	0.2%	1.2%	0.5%	0.2%	**7.2%**
Total	**7.2%**	**9.6%**	**9.6%**	**9.3%**	**9.8%**	**11.2%**	**8.2%**	**12.6%**	**11.9%**	**10.5%**	**100%**

Table 4: KSI Crashes by Month of the Year (Unincorporated Weld)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
January	1.1%	0.6%	0.2%	0.6%	0.5%	0.7%	0.7%	0.6%	1.0%	0.5%	**6.6%**
February	0.4%	0.4%	0.7%	0.7%	0.5%	0.4%	0.5%	0.7%	1.0%	0.9%	**6.1%**
March	1.0%	1.0%	0.4%	0.2%	1.7%	0.7%	0.6%	0.5%	0.9%	0.7%	**7.7%**
April	1.0%	0.0%	0.7%	0.6%	0.9%	1.3%	0.5%	0.6%	1.0%	0.6%	**7.2%**
May	0.9%	0.6%	0.9%	1.1%	0.6%	1.6%	0.7%	0.7%	0.4%	1.0%	**8.4%**
June	0.6%	0.4%	1.1%	1.5%	1.3%	0.5%	0.7%	1.6%	1.2%	1.0%	**9.9%**
July	1.3%	1.2%	1.0%	1.0%	1.3%	1.1%	0.5%	1.0%	1.2%	1.7%	**11.4%**
August	0.6%	0.6%	0.9%	1.1%	0.7%	1.2%	0.5%	0.6%	1.1%	0.6%	**7.9%**
September	1.1%	0.7%	1.1%	1.0%	0.7%	0.5%	1.3%	1.3%	1.2%	1.8%	**10.9%**
October	1.1%	0.6%	0.6%	1.0%	0.6%	0.7%	0.4%	1.2%	0.5%	0.7%	**7.4%**
November	1.2%	1.2%	0.4%	1.0%	0.7%	0.6%	0.5%	0.9%	1.0%	0.6%	**8.1%**
December	0.9%	0.5%	1.0%	0.6%	0.7%	0.9%	0.6%	1.0%	1.1%	1.2%	**8.4%**
Total	**11.1%**	**7.8%**	**8.9%**	**10.4%**	**10.4%**	**10.3%**	**7.6%**	**10.7%**	**11.5%**	**11.4%**	**100%**

Day of the Month

KSI crashes tend to occur more on weekend versus weekdays (Friday through Sunday) throughout all of Weld County (Table 5); however:

- KSI crashes in jurisdictions included in the action plan see a higher percentage of crashes on Tuesdays than Sundays (Table 6).
- KSI crashes in unincorporated Weld County see a higher percentage of crashes on Wednesdays and Thursdays than Fridays and Sundays (Table 7).

Table 5: KSI Crashes by Day of the Month (All Weld)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Sun	0.9%	0.6%	1.3%	0.7%	1.2%	1.4%	1.5%	1.4%	1.3%	1.0%	1.1%	1.0%	**13.3%**
Mon	0.7%	0.8%	1.1%	0.7%	1.1%	1.3%	1.1%	1.3%	1.5%	0.9%	1.0%	1.1%	**12.5%**
Tue	0.8%	1.0%	1.2%	0.7%	0.9%	1.1%	1.3%	1.0%	1.5%	1.2%	1.6%	0.8%	**13.0%**
Wed	1.3%	0.8%	1.0%	0.9%	1.8%	1.6%	1.8%	1.4%	1.4%	0.9%	1.0%	1.0%	**14.8%**
Thu	1.0%	1.1%	0.8%	1.4%	0.8%	1.3%	1.5%	0.9%	1.5%	1.5%	0.8%	1.7%	**14.2%**
Fri	0.8%	1.0%	1.0%	1.1%	1.2%	1.3%	1.8%	1.5%	1.0%	1.7%	1.3%	1.5%	**15.2%**
Sat	1.3%	1.3%	0.9%	1.2%	1.6%	1.8%	1.9%	1.6%	1.6%	1.5%	1.3%	0.9%	**17.0%**
Total	**6.7%**	**6.5%**	**7.3%**	**6.6%**	**8.5%**	**9.8%**	**10.8%**	**9.2%**	**9.7%**	**8.6%**	**8.2%**	**8.0%**	**100%**

Table 6: KSI Crashes by Day of the Month (Jurisdictions in Action Plan)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Sun	0.7%	0.9%	0.7%	0.5%	1.6%	1.2%	1.4%	1.4%	0.7%	0.9%	0.9%	0.7%	**11.7%**
Mon	0.5%	1.4%	0.7%	0.5%	1.2%	1.4%	1.6%	1.2%	1.6%	0.7%	1.2%	1.2%	**13.1%**
Tue	0.9%	1.6%	1.6%	0.9%	1.2%	1.4%	2.3%	0.2%	2.3%	1.9%	1.2%	0.7%	**16.4%**
Wed	1.6%	1.2%	0.5%	0.2%	1.2%	0.9%	1.2%	1.9%	1.4%	1.2%	1.4%	0.9%	**13.6%**
Thu	1.9%	1.6%	0.5%	0.9%	0.9%	0.7%	1.6%	0.2%	1.2%	0.9%	0.7%	0.9%	**12.1%**
Fri	0.2%	0.7%	0.9%	0.9%	1.2%	2.1%	1.2%	1.9%	0.7%	2.3%	1.9%	1.6%	**15.7%**
Sat	2.3%	0.9%	0.5%	0.9%	2.1%	1.9%	1.2%	1.9%	0.9%	2.1%	1.6%	1.2%	**17.5%**
Total	**8.2%**	**8.4%**	**5.4%**	**4.9%**	**9.3%**	**9.6%**	**10.5%**	**8.6%**	**8.9%**	**10.0%**	**8.9%**	**7.2%**	**100%**

Table 7: KSI Crashes by Day of the Month (Unincorporated Weld)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Sun	1.1%	0.4%	1.3%	0.7%	1.2%	0.9%	1.7%	1.0%	1.1%	0.7%	1.2%	1.1%	**12.5%**
Mon	0.9%	0.9%	1.5%	0.9%	1.6%	0.9%	0.9%	1.5%	1.7%	0.9%	0.9%	1.0%	**13.2%**
Tue	0.5%	0.7%	0.7%	0.6%	1.1%	1.3%	1.1%	1.1%	1.1%	0.7%	1.8%	0.5%	**11.4%**
Wed	1.3%	1.0%	0.9%	1.3%	1.6%	2.1%	1.7%	1.2%	1.6%	1.0%	0.7%	1.1%	**15.5%**
Thu	0.7%	1.1%	1.0%	1.5%	0.9%	1.7%	1.5%	0.7%	2.1%	1.6%	0.9%	2.4%	**16.0%**
Fri	1.2%	1.0%	1.1%	1.1%	0.7%	1.1%	2.1%	0.7%	1.3%	1.3%	1.2%	1.5%	**14.4%**
Sat	0.9%	1.1%	1.2%	1.1%	1.3%	2.0%	2.4%	1.7%	2.0%	1.2%	1.3%	0.9%	**17.1%**
Total	**6.6%**	**6.1%**	**7.7%**	**7.2%**	**8.4%**	**9.9%**	**####**	**7.9%**	**10.9%**	**7.4%**	**8.1%**	**8.4%**	**100%**

Time of Day

KSI crashes tend to peak in the late afternoon/early evening (3 pm to 6 pm) across all of Weld County (Table 8); however:

- KSI crashes in jurisdictions included in the action plan also see a spike in crashes at 6 am and 1 pm (Table 9)
- KSI crashes in unincorporated Weld County also see a spike in crashes at 6 am (Table 10).

Table 8: KSI Crashes by Time of Day (All Weld)

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Grand Total
12 AM	0.4%	0.4%	0.3%	0.4%	0.4%	0.5%	0.4%	**2.9%**
1 AM	0.8%	0.3%	0.4%	0.1%	0.1%	0.2%	0.8%	**2.6%**
2 AM	0.8%	0.1%	0.1%	0.2%	0.3%	0.2%	0.4%	**2.1%**
3 AM	0.7%	0.2%	0.1%	0.3%	0.1%	0.1%	0.4%	**1.8%**
4 AM	0.2%	0.3%	0.3%	0.1%	0.1%	0.2%	0.5%	**1.7%**
5 AM	0.3%	0.3%	0.5%	0.4%	0.4%	0.5%	0.4%	**2.9%**
6 AM	0.4%	0.9%	1.1%	1.1%	1.1%	0.6%	0.4%	**5.7%**
7 AM	0.2%	0.7%	0.6%	0.9%	1.0%	0.8%	0.6%	**4.9%**
8 AM	0.1%	0.6%	0.4%	0.9%	0.8%	0.5%	0.3%	**3.6%**
9 AM	0.4%	0.7%	0.4%	0.3%	0.4%	0.5%	0.4%	**3.2%**
10 AM	0.5%	0.4%	0.3%	0.4%	0.4%	0.7%	0.8%	**3.6%**
11 AM	0.3%	0.4%	0.7%	0.4%	1.1%	0.5%	0.4%	**3.9%**
12 PM	0.5%	0.4%	0.3%	0.5%	0.6%	0.7%	0.6%	**3.8%**
1 PM	0.6%	0.6%	0.8%	0.3%	0.6%	0.7%	0.9%	**4.6%**
2 PM	0.8%	0.8%	0.7%	0.7%	0.8%	0.6%	0.5%	**4.8%**
3 PM	1.0%	0.7%	1.2%	1.1%	0.8%	0.9%	0.7%	**6.3%**
4 PM	1.0%	0.6%	1.0%	1.1%	0.8%	1.0%	1.3%	**6.9%**
5 PM	0.8%	1.2%	0.8%	1.1%	1.4%	1.5%	1.6%	**8.3%**
6 PM	0.5%	1.0%	1.1%	1.1%	1.0%	0.8%	1.1%	**6.6%**
7 PM	0.7%	0.5%	0.5%	0.6%	0.5%	0.8%	0.8%	**4.6%**
8 PM	0.5%	0.3%	0.4%	0.7%	0.3%	0.9%	0.8%	**3.9%**
9 PM	0.8%	0.7%	0.3%	0.7%	0.7%	0.9%	0.7%	**4.7%**
10 PM	0.5%	0.3%	0.3%	0.7%	0.3%	0.6%	1.0%	**3.8%**
11 PM	0.4%	0.2%	0.3%	0.5%	0.2%	0.5%	0.8%	**3.0%**
Total	**13.3%**	**12.5%**	**13.0%**	**14.8%**	**14.3%**	**15.2%**	**17.0%**	**100%**

Table 9: KSI Crashes by Time of Day (Jurisdictions in Action Plan)

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
12 AM	0.5%	0.7%	0.2%	0.2%	0.0%	0.5%	0.9%	**3.0%**
1 AM	0.5%	0.7%	0.5%	0.2%	0.5%	0.0%	1.4%	**3.7%**
2 AM	1.2%	0.0%	0.2%	0.9%	0.0%	0.0%	0.9%	**3.3%**
3 AM	0.7%	0.0%	0.2%	0.0%	0.0%	0.0%	0.5%	**1.4%**
4 AM	0.0%	0.0%	0.2%	0.0%	0.0%	0.2%	0.5%	**0.9%**
5 AM	0.0%	0.0%	0.7%	0.0%	1.2%	0.5%	0.2%	**2.6%**
6 AM	0.0%	0.7%	1.9%	1.2%	0.9%	0.7%	0.5%	**5.8%**
7 AM	0.5%	0.9%	0.7%	0.9%	0.2%	0.9%	0.5%	**4.7%**
8 AM	0.0%	0.7%	0.5%	0.7%	1.4%	0.2%	0.5%	**4.0%**
9 AM	0.5%	0.7%	0.7%	0.2%	0.0%	0.5%	0.5%	**3.0%**
10 AM	0.5%	0.0%	0.2%	0.5%	0.0%	0.5%	0.5%	**2.1%**
11 AM	0.5%	0.2%	0.9%	0.0%	0.7%	0.5%	0.2%	**3.0%**
12 PM	0.5%	1.2%	0.0%	0.2%	1.2%	0.7%	0.2%	**4.0%**
1 PM	0.7%	0.7%	1.4%	0.2%	1.2%	0.9%	0.9%	**6.1%**
2 PM	0.5%	0.7%	0.9%	0.5%	0.2%	0.7%	0.9%	**4.4%**
3 PM	0.9%	0.7%	0.9%	0.9%	0.5%	1.4%	0.7%	**6.1%**
4 PM	1.4%	0.7%	0.5%	0.7%	0.9%	1.4%	0.9%	**6.5%**
5 PM	0.5%	1.4%	1.6%	0.9%	1.2%	1.9%	2.1%	**9.6%**
6 PM	0.5%	1.9%	1.9%	1.6%	0.5%	0.2%	0.9%	**7.5%**
7 PM	0.5%	0.7%	1.2%	0.7%	0.7%	1.2%	0.5%	**5.4%**
8 PM	0.2%	0.0%	0.0%	0.7%	0.2%	0.7%	0.5%	**2.3%**
9 PM	0.9%	0.2%	0.7%	1.2%	0.5%	0.9%	0.7%	**5.1%**
10 PM	0.5%	0.0%	0.2%	0.2%	0.2%	0.5%	0.9%	**2.6%**
11 PM	0.0%	0.2%	0.0%	0.7%	0.0%	0.7%	1.2%	**2.8%**
Total	**11.7%**	**13.1%**	**16.4%**	**13.6%**	**12.1%**	**15.7%**	**17.5%**	**100%**

Table 10: KSI Crashes by Time of Day (Unincorporated Weld)

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
12 AM	0.2%	0.2%	0.2%	0.5%	0.4%	0.4%	0.1%	**2.1%**
1 AM	0.9%	0.1%	0.1%	0.1%	0.0%	0.4%	0.7%	**2.3%**
2 AM	0.2%	0.0%	0.1%	0.0%	0.5%	0.0%	0.5%	**1.3%**
3 AM	0.7%	0.2%	0.0%	0.4%	0.1%	0.1%	0.4%	**2.0%**
4 AM	0.2%	0.2%	0.4%	0.2%	0.1%	0.1%	0.6%	**2.0%**
5 AM	0.4%	0.4%	0.6%	0.6%	0.1%	0.7%	0.9%	**3.7%**
6 AM	0.9%	1.5%	1.0%	1.3%	1.5%	0.5%	0.5%	**7.1%**
7 AM	0.0%	0.6%	0.6%	1.1%	1.2%	0.9%	0.6%	**5.0%**
8 AM	0.0%	1.0%	0.4%	1.5%	0.9%	0.9%	0.2%	**4.8%**
9 AM	0.6%	0.7%	0.2%	0.4%	0.2%	0.6%	0.2%	**3.1%**
10 AM	0.7%	0.4%	0.4%	0.4%	0.5%	0.9%	1.1%	**4.3%**
11 AM	0.0%	0.9%	0.9%	0.1%	1.3%	0.6%	0.5%	**4.3%**
12 PM	0.5%	0.0%	0.5%	0.6%	0.2%	0.9%	0.6%	**3.3%**
1 PM	0.6%	0.9%	0.5%	0.4%	0.7%	0.5%	0.7%	**4.3%**
2 PM	0.5%	1.0%	0.5%	0.7%	1.0%	0.4%	0.6%	**4.7%**
3 PM	0.7%	0.5%	1.1%	1.5%	0.7%	0.7%	0.5%	**5.8%**
4 PM	0.6%	0.2%	1.1%	1.1%	0.9%	1.1%	1.5%	**6.5%**
5 PM	1.1%	1.3%	0.5%	1.0%	1.3%	1.1%	1.6%	**8.0%**
6 PM	0.5%	1.0%	1.0%	1.1%	2.0%	1.0%	1.2%	**7.7%**
7 PM	0.6%	0.5%	0.4%	0.1%	0.6%	0.5%	0.6%	**3.3%**
8 PM	0.4%	0.6%	0.2%	0.5%	0.4%	0.7%	1.1%	**3.9%**
9 PM	0.5%	0.5%	0.1%	0.2%	0.7%	0.7%	0.7%	**3.5%**
10 PM	0.6%	0.2%	0.1%	1.0%	0.4%	0.7%	1.0%	**4.0%**
11 PM	0.9%	0.2%	0.5%	0.6%	0.2%	0.1%	0.6%	**3.2%**
Total	**12.4%**	**13.2%**	**11.4%**	**15.4%**	**16.0%**	**14.4%**	**17.1%**	**100.0%**

Systemic Analysis

A systemic risk analysis assesses how factors that are not typically recorded in crash data impact the relative risk of crashes. For this analysis, databases of crash data, roadway data, and demographic data were joined and analyzed together. This involved summing all crashes categorized under KABCO. KABCO, the categorization system used by officers when reporting the severity of a crash, includes the following severity classifications: K=fatal, A=serious injury, B=non-incapacitating injury, C=possible injury, and O=property damage only. The systemic analysis included assigning weighted values to each category based on severity (excluding property damage only crashes): K-15, A-5, B-2, and C-1. By summing these weighted values, an injury score was generated for each factor under examination. The following trends were identified:

- **Proximity to K-12 Schools:** For all of Weld County and for unincorporated Weld County, fatal or injury crashes are more likely to happen near a K-12 school (i.e., within a half mile); however, jurisdictions included in the action plan are more likely to happen outside of these school areas (Figure 16).
- **Posted Speeds:** Fatal or injury crashes are most likely to occur in areas with a posted speed limit between 60-75 (Figure 17).
- **Roadway Functional Classifications:** Fatal and injury crashes are most likely to occur on principal arterials when looking at roadways based on their Colorado Department of Transportation (CDOT) functional classification (Figure 18); when looking at roadways based on Weld County functional classifications, fatal and injury crashes are the most likely to occur on county highways.
- **Number of Through Lanes:** For all of Weld County, roadways with five or more through lanes have the highest likelihood of a fatal or serious injury crash occurring (Figure 19); for jurisdictions included in the action plan and unincorporated Weld County, roadways with three or four through lanes have the highest likelihood of a fatal or injury crash occurring (Figure 20).
- **Average Annual Daily Traffic (AADT):** As roadway volumes increase, so does the likelihood of a fatal or injury crash (Figure 21).

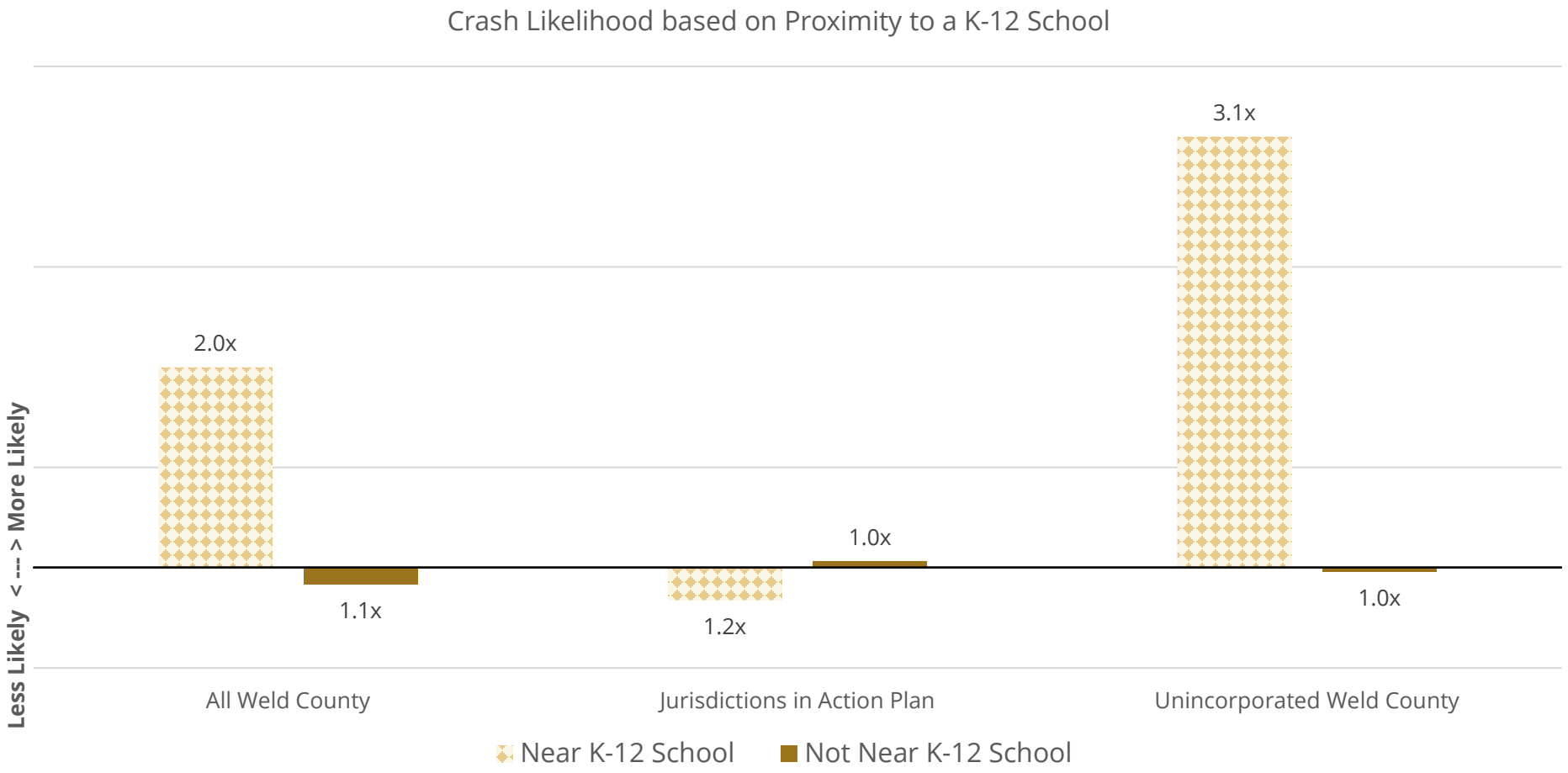


Figure 16: Crash Likelihood based on Proximity to a K-12 School

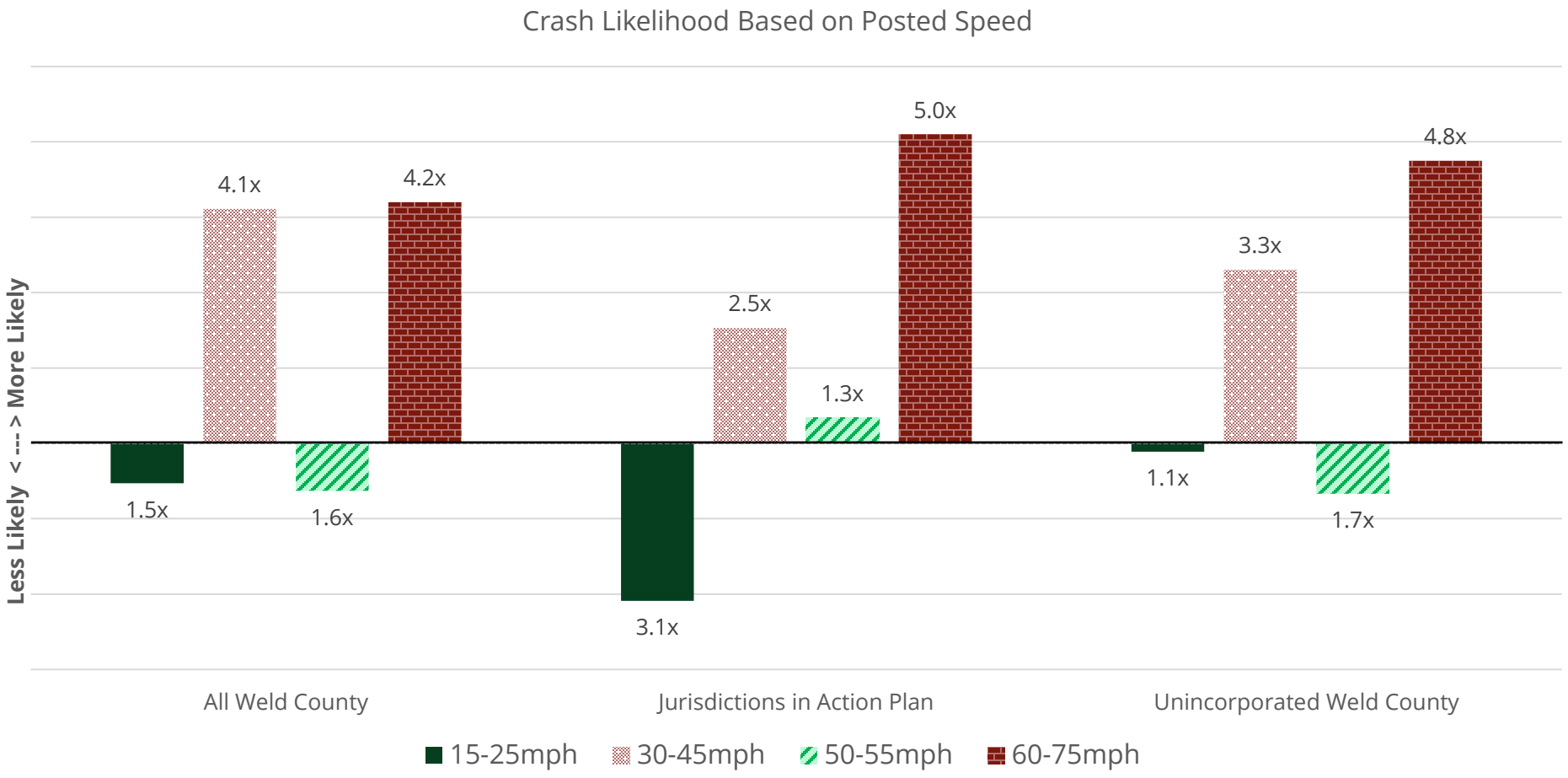


Figure 17: Crash Likelihood Based on Posted Speed

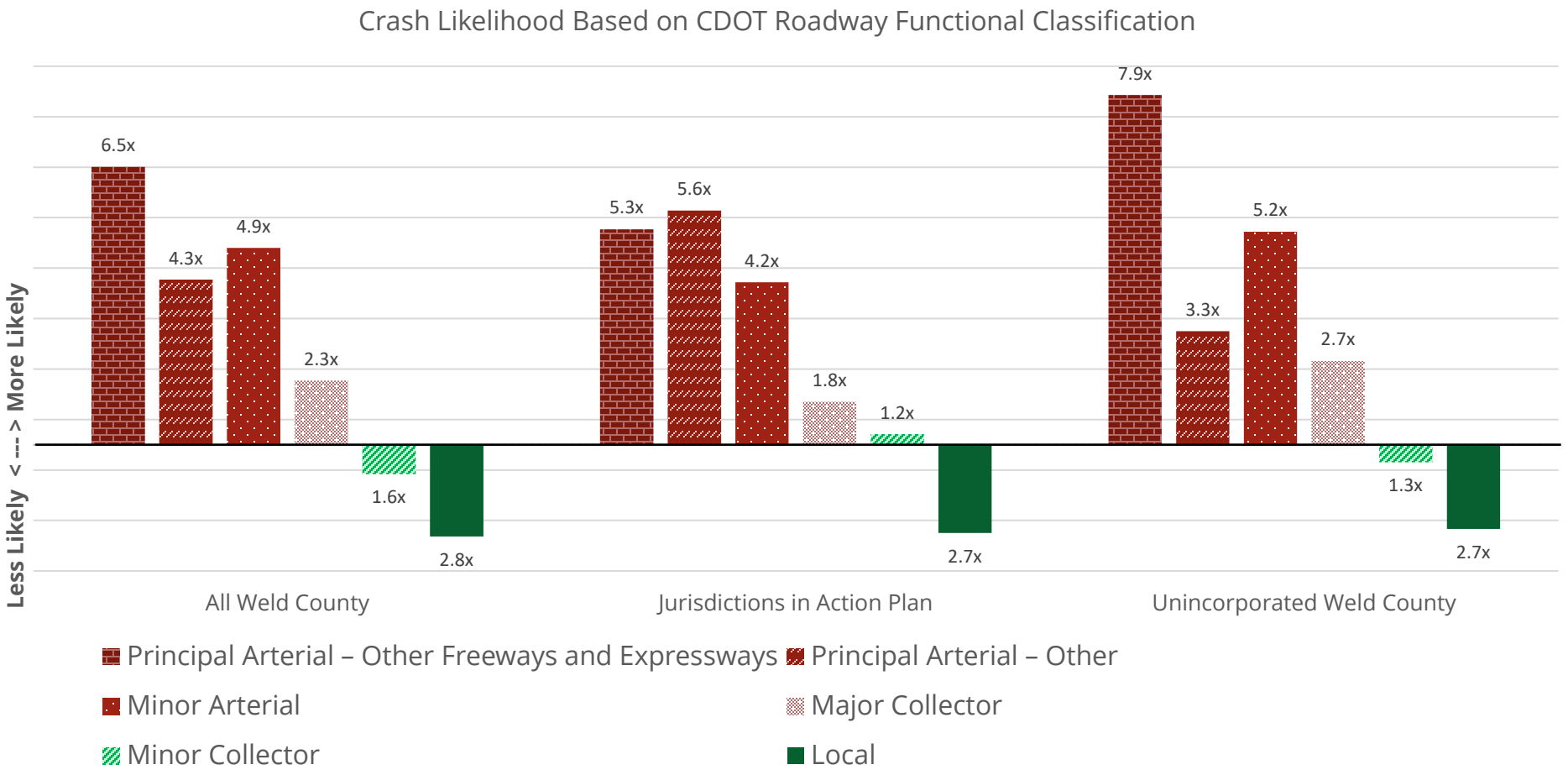
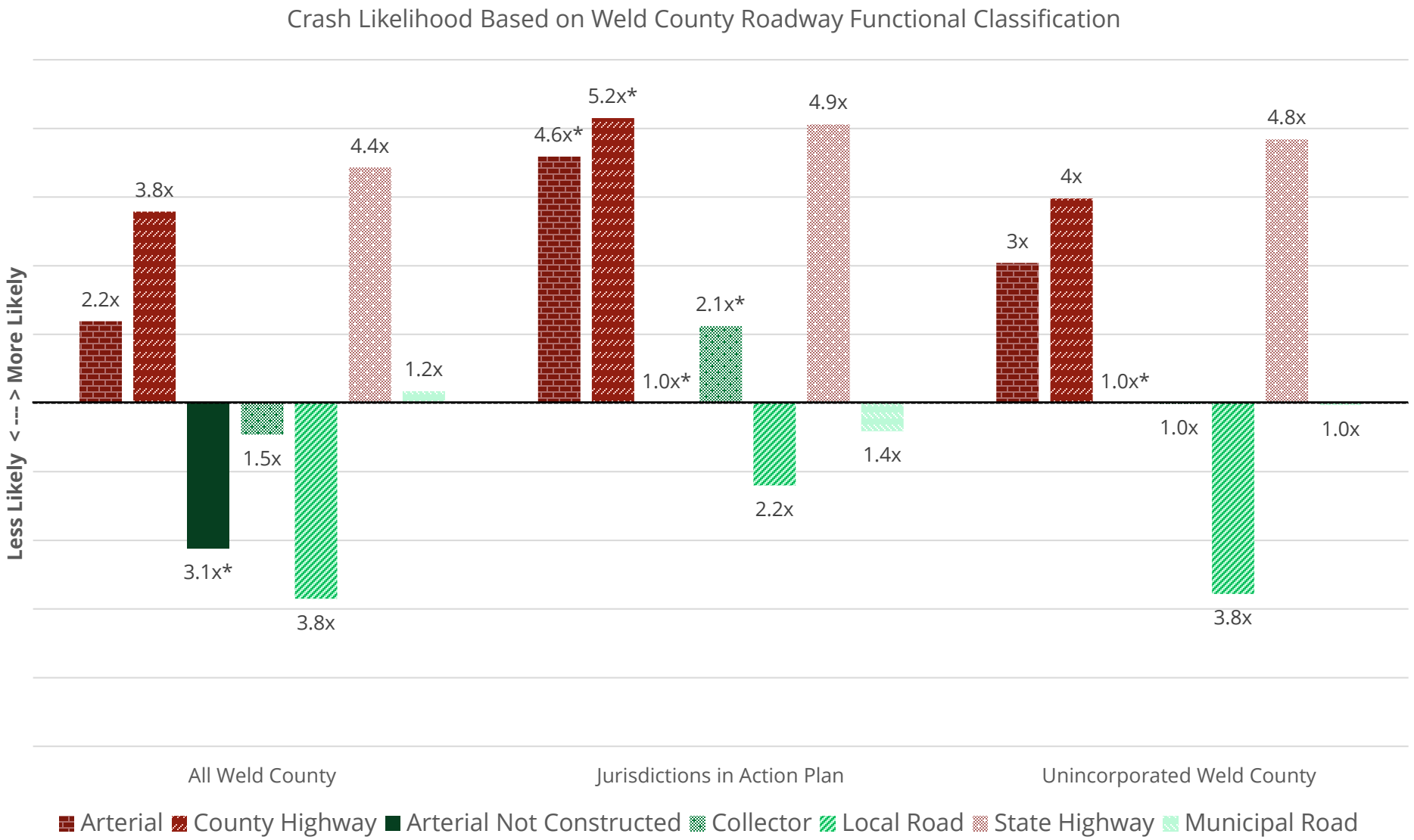
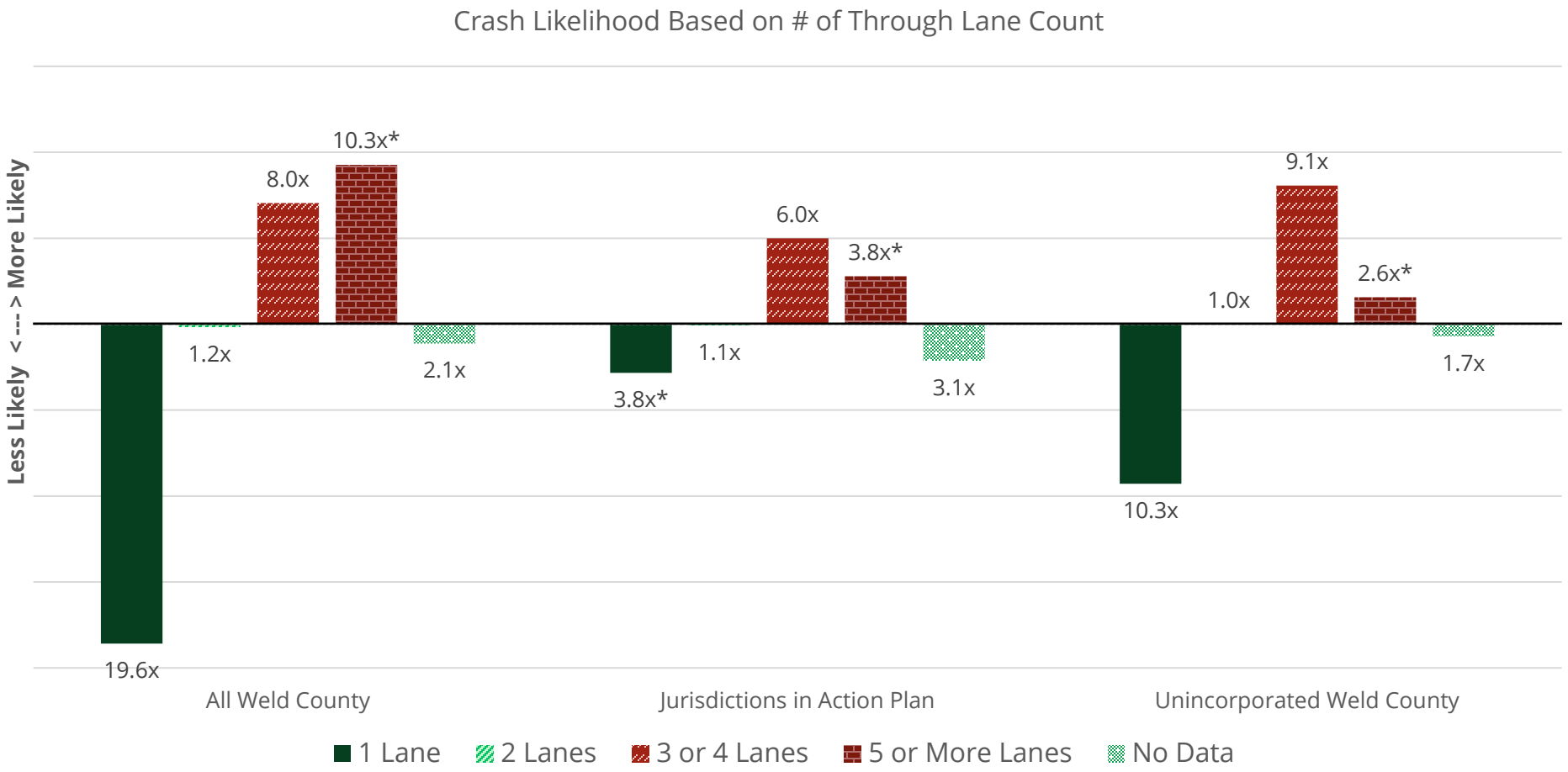


Figure 18: Crash Likelihood Based on CDOT Roadway Functional Classification



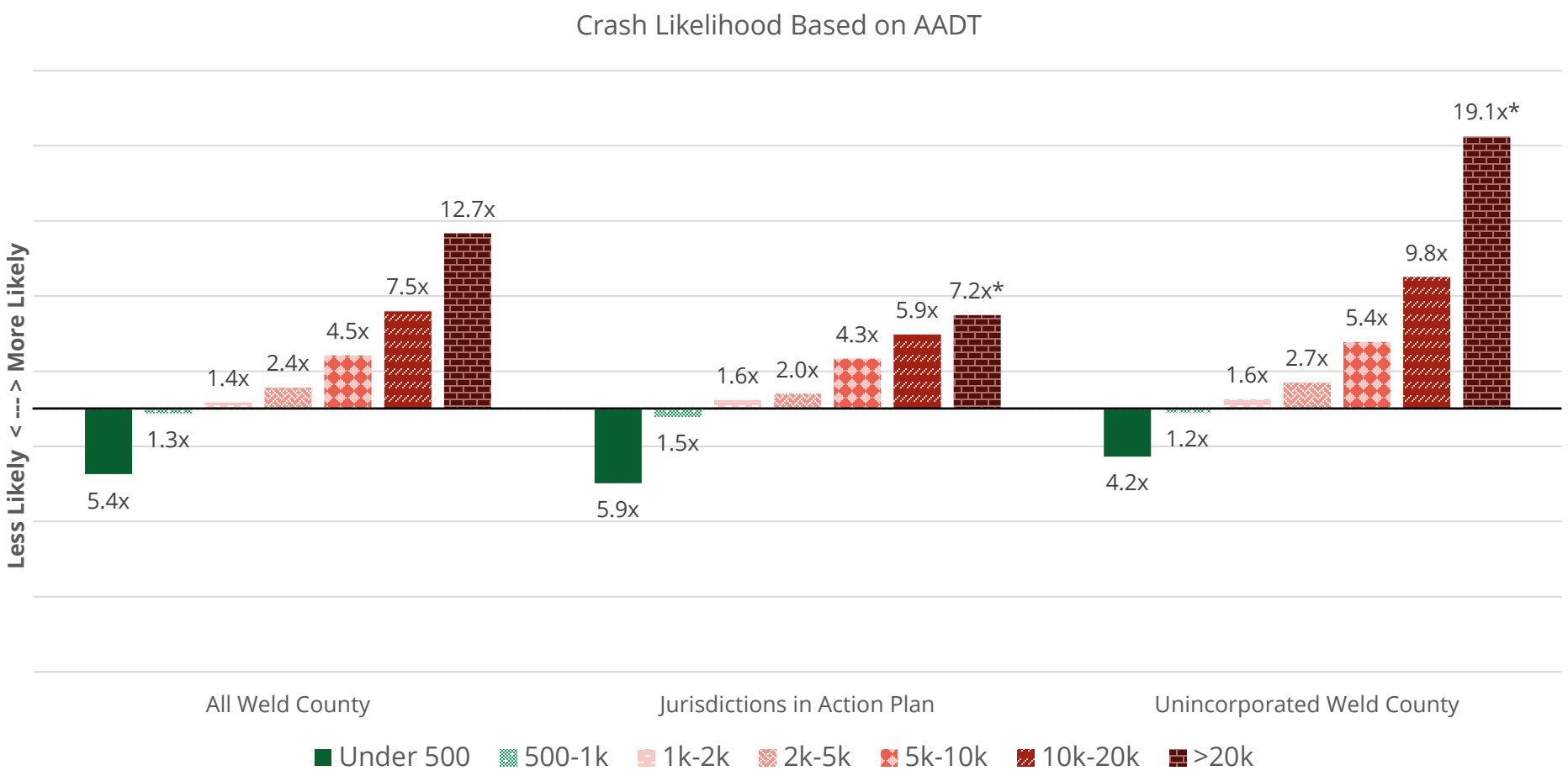
*Crash ratios developed using Weld County functional classification looks at 13% of all of Weld County's total roadway miles, as the remainder of the roadways do not have an attributed functional roadway classification. The remainder were classified using the CDOT roadway functional classification.

Figure 19: Crash Likelihood Based on Weld County Roadway Functional Classification



*There is limited data for roadways with five or more through lanes.

Figure 20: Crash Likelihood Based on Number of Through Lanes



*There is limited data for roadways within unincorporated Weld County with an AADT of 20,000+.

Figure 21: Crash Likelihood Based on AADT

Driving Events

Two years (2023-2024) of driving safety event data from the proprietary data vendor AirSage were used to complement crash data in this analysis. This dataset, obtained from connected vehicles (CV) and location-based services (LBS), provided information on driving events such as:

- Harsh Braking: A sharp deceleration of a vehicle via the brakes. (Referred to as simply "braking" henceforth.)
- Harsh Cornering: A sharp turn (left or right) of a vehicle. (Referred to as simply "cornering" henceforth.)
- Harsh Acceleration: A sharp acceleration of a vehicle via the gas pedal. (Referred to as simply "acceleration" henceforth.)

These events help identify locations where near-misses are likely to occur across Weld County and complement crash data to identify safety improvement needs in areas with lower density. Weld County experienced 58,932 driving events; Table 11 shows the different types of driving events per category of Weld County. In 2023, Weld County experienced 34,269 driving events; this dropped to 24,663 driving events in 2024 (Figure 22). Looking at these driving events broken down by event type (Figure 22 and Figure 23) or by speed group (Figure 24):

- Most driving events (83%) are cornering; of these events, more than half (56%) are turning right.
- Only four driving events were considered harsh acceleration.
- Speed by events show similar speeds clustering with braking events occurring at a higher average speed than Cornering or Speedup.
- Events at speeds between 10-20 mph occur at nearly three times the rate of next closest speed group (20-30 mph).
- 79.2% of driving events occurred at an intersection while the remaining 20.8% occurred on roadway segments.

Table 11: Driving Events by Category

Category	# of Braking Events	# of Cornering Events	# of Acceleration Events	Total Events
All Weld County	10,319	48,609	4	58,932
Jurisdictions in Action Plan	3,297	13,552	1	16,850
Unincorporated Weld County	1,330	6,036	0	7,366

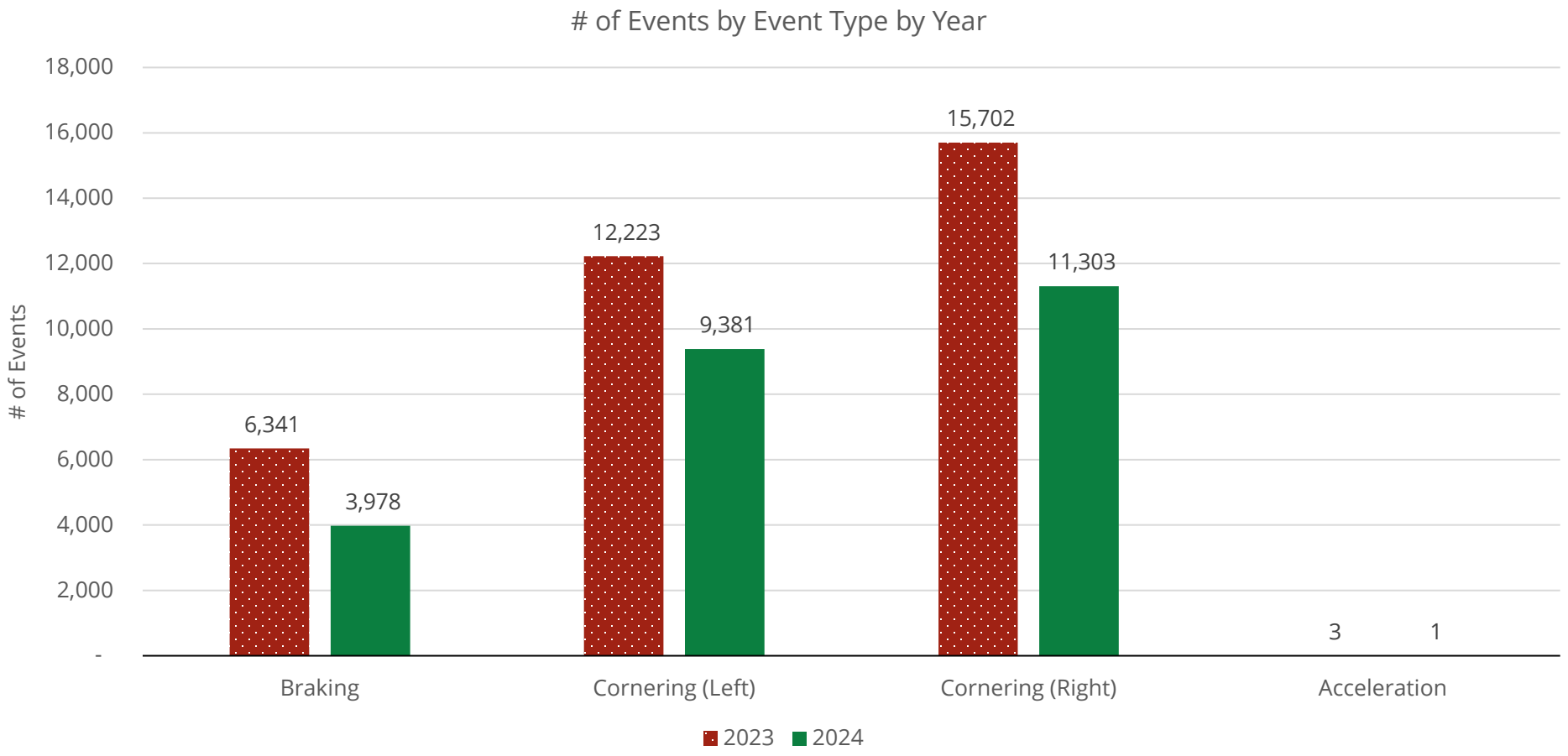


Figure 22: Number of Events by Event Type by Year

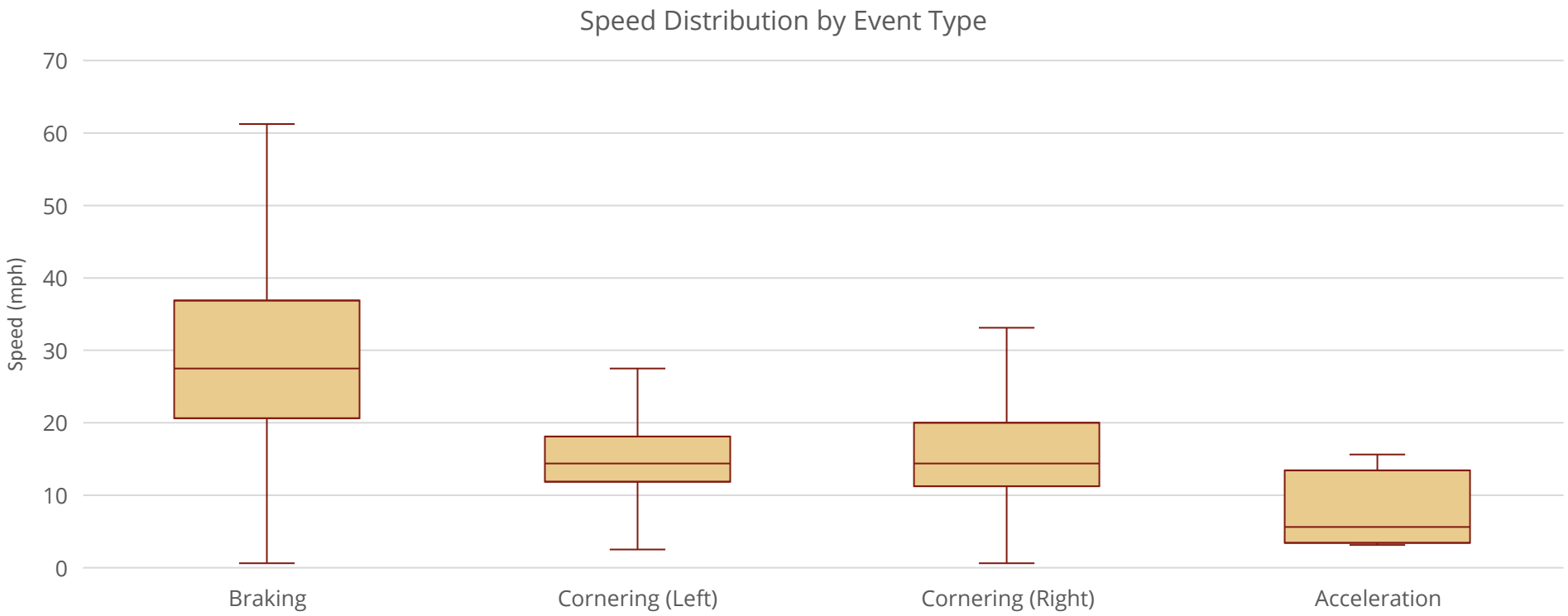


Figure 23: Speed Distribution by Event Type

Figure 23 shows that the median speed for braking events occurs at ~27 mph and 50% of all braking events occur between 21 mph and 36 mph. Cornering events typically occur at 15 mph with 50% of cornering events occurring between 10-20 mph. Acceleration events happened at the lowest speed with a median speed of 5 mph.

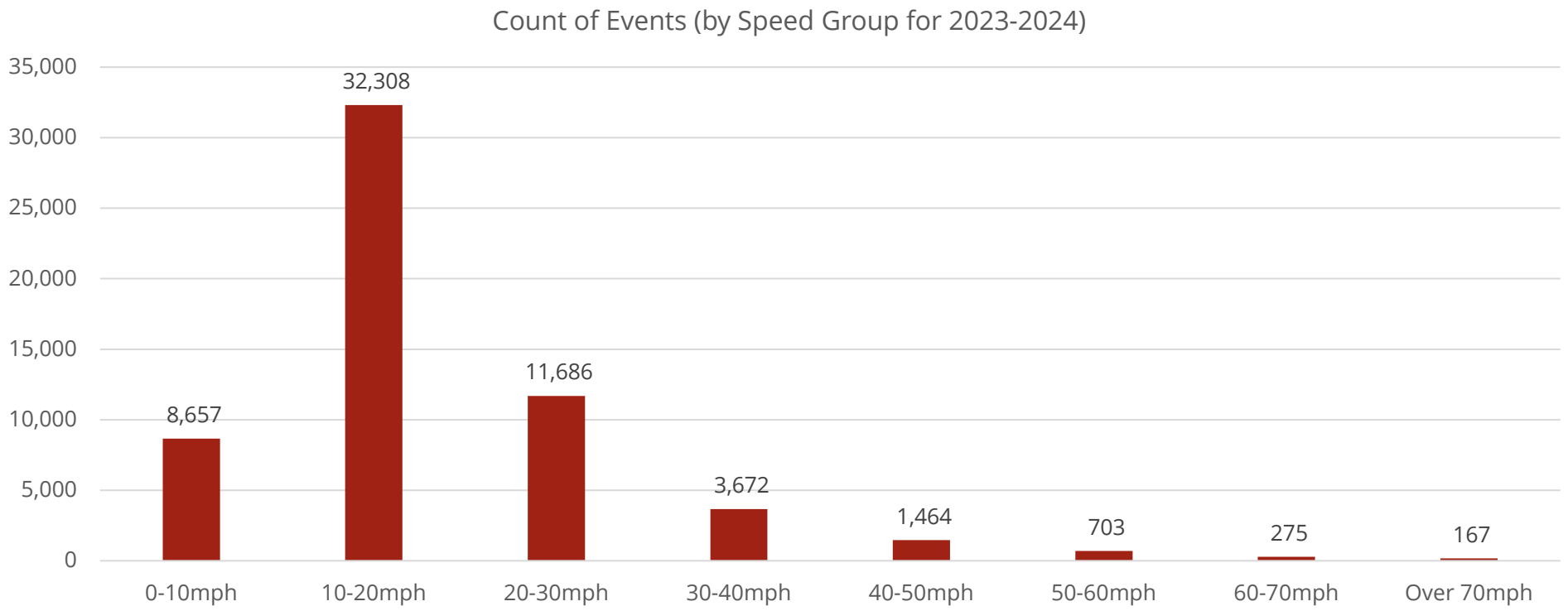


Figure 24: Count of Events by Speed Group for 2023-2024

High Event Network

The High Event Network (HEN) is a mapping tool aimed at identifying the roadway segments where a disproportionately high number of driving events occur. The HEN analyzes all intersection-related driving events between 2023 and 2024 in Weld County. Segments are identified by taking non-intersection events and calculating events per mile for each roadway segment. The top 10% of roadway segments by event per roadway mile is shown for "All Weld County", "Jurisdictions in Action Plan", and "Unincorporated Weld County" as the HEN in Figure 25, Figure 26, and Figure 27, respectively. An event is associated with a roadway segment if the event occurs within 50 feet of the roadway.

Municipality boundaries were provided by the Colorado Department of Local Affairs. Areas excluded from the project scope, hatched pink the following maps; are:

- Ault
- Berthoud
- Brighton
- Erie
- Garden City
- Greeley
- Grover
- Johnstown
- Kersey
- Lochbuie
- Longmont
- New Raymer
- North Glenn
- Nunn
- Timnath
- Windsor

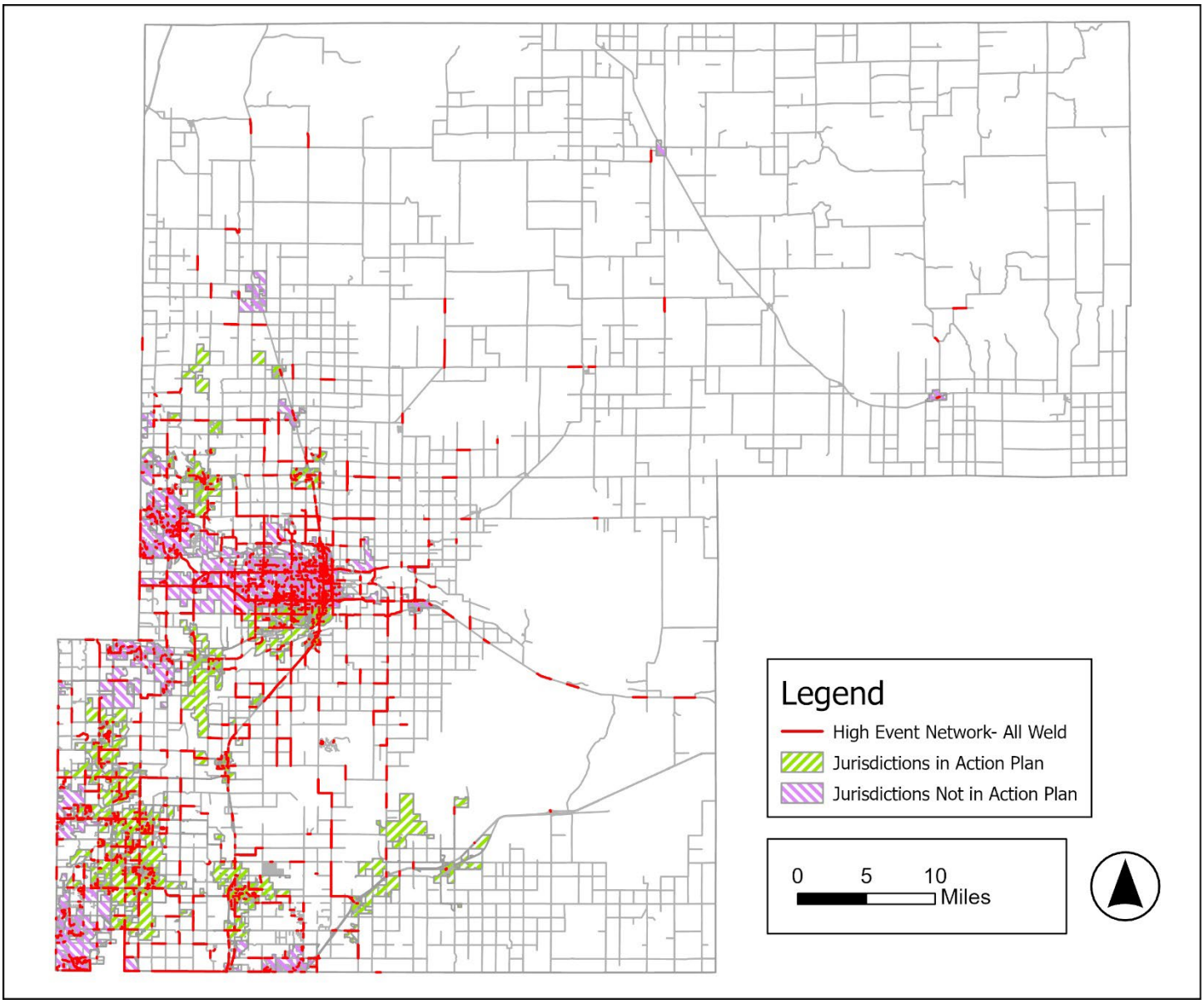


Figure 25: High Event Network (All Weld County)

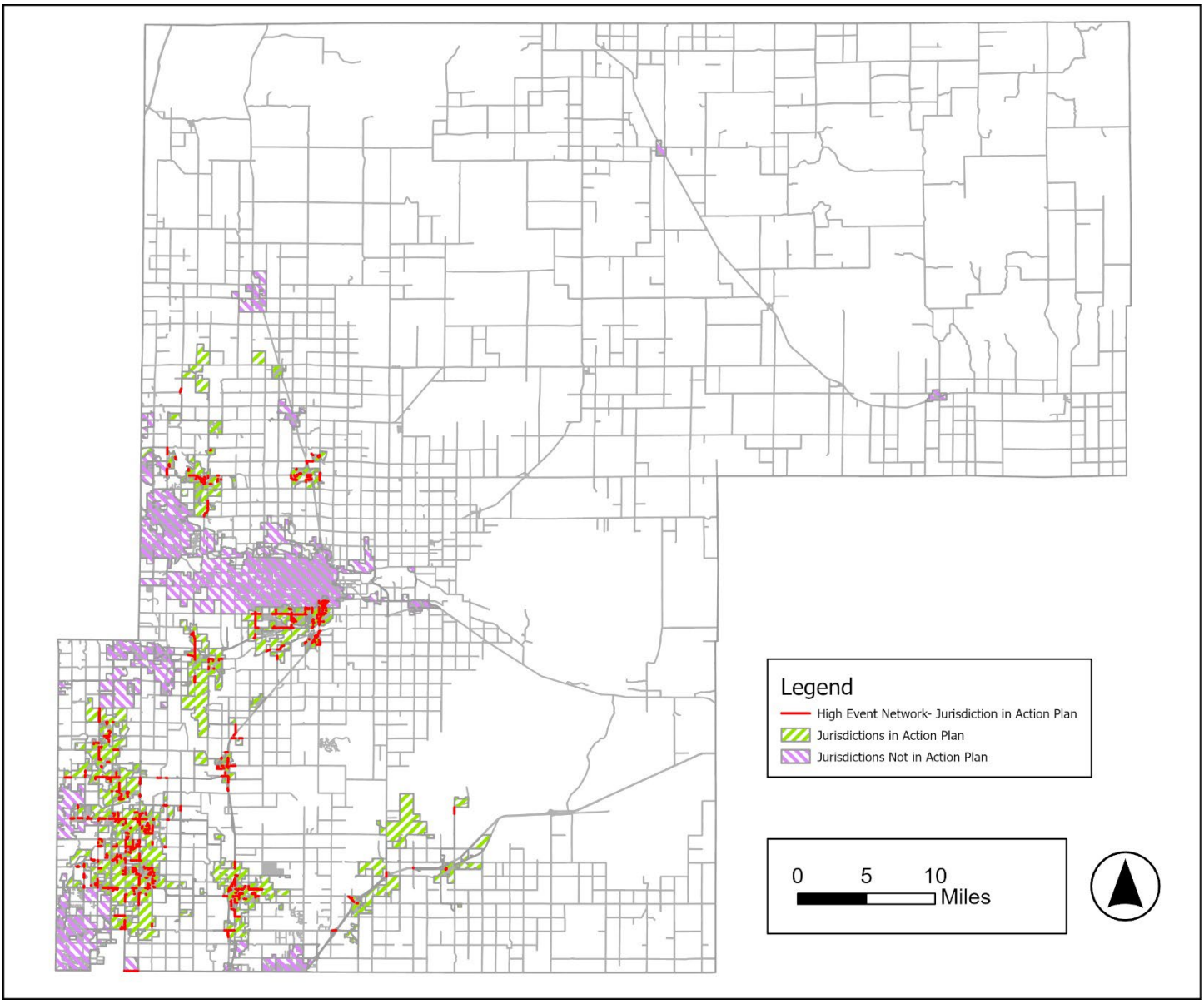


Figure 26: High Event Network (Jurisdictions in Action Plan)

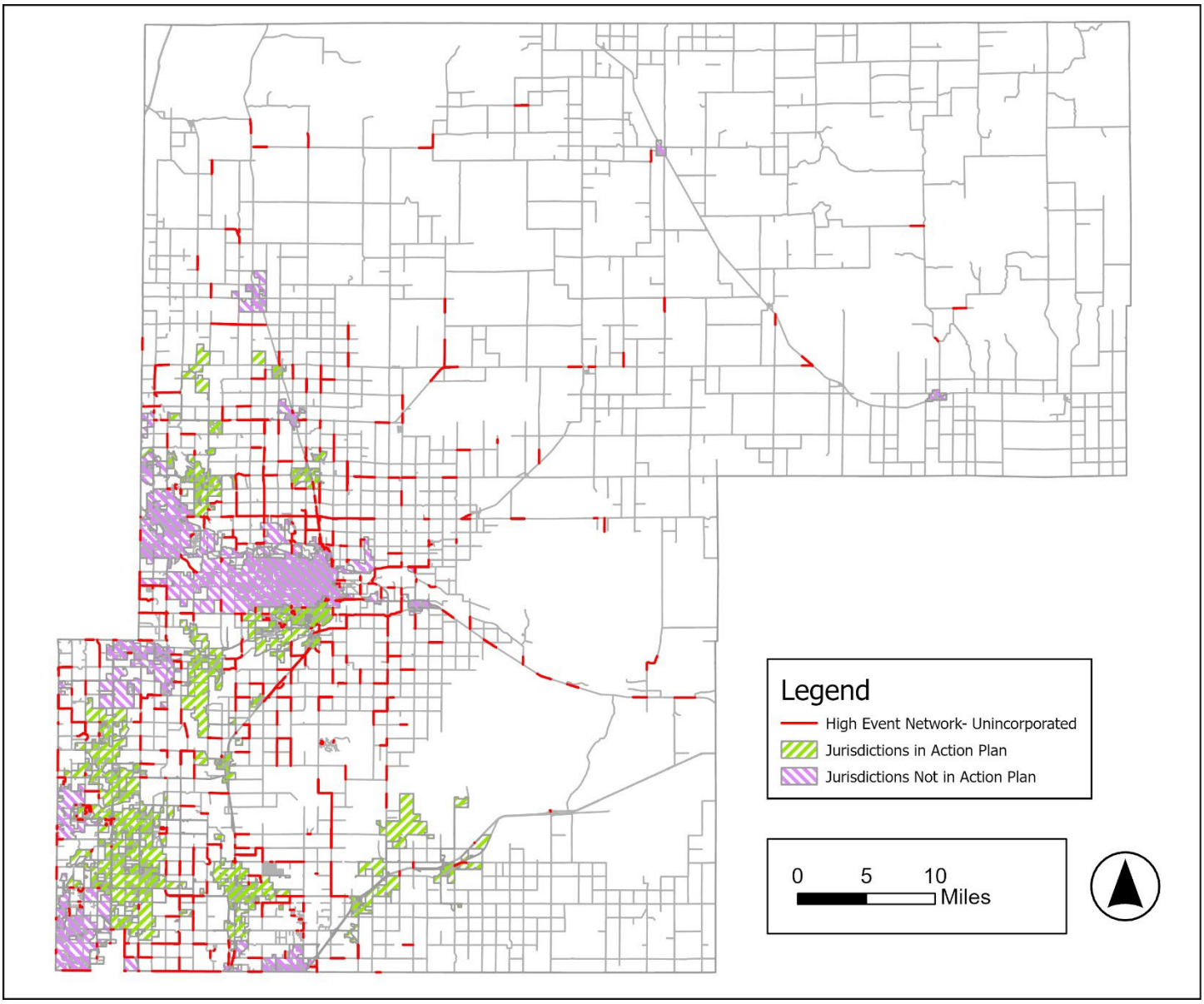


Figure 27: High Event Network (Unincorporated Weld County)

High Event Intersections

The High Event Intersections (HEI) is a mapping tool aimed at identifying the intersections where a disproportionately high number of driving events occur. The HEI analyzes all intersection-related driving events between 2023 and 2024 in Weld County. Each event type is weighted equally, and the top 100 intersections by event type is shown for “All Weld County”, “Jurisdictions in Action Plan”, and “Unincorporated Weld County” in Figure 28, Figure 29, and Figure 30, respectively. An event is associated with an intersection if the event occurred within 150 feet of the intersection point.

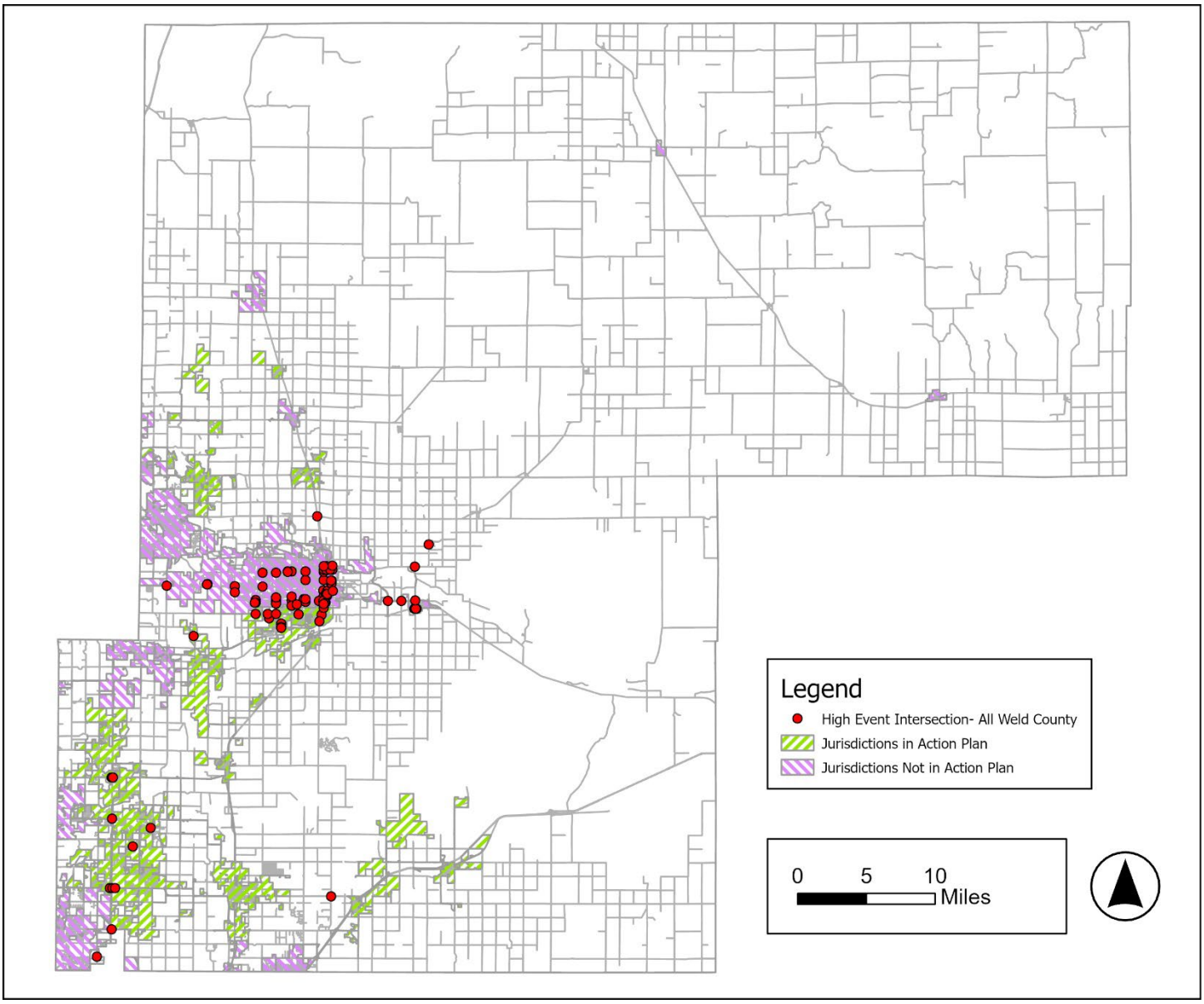


Figure 28: High Event Intersections (All Weld County)

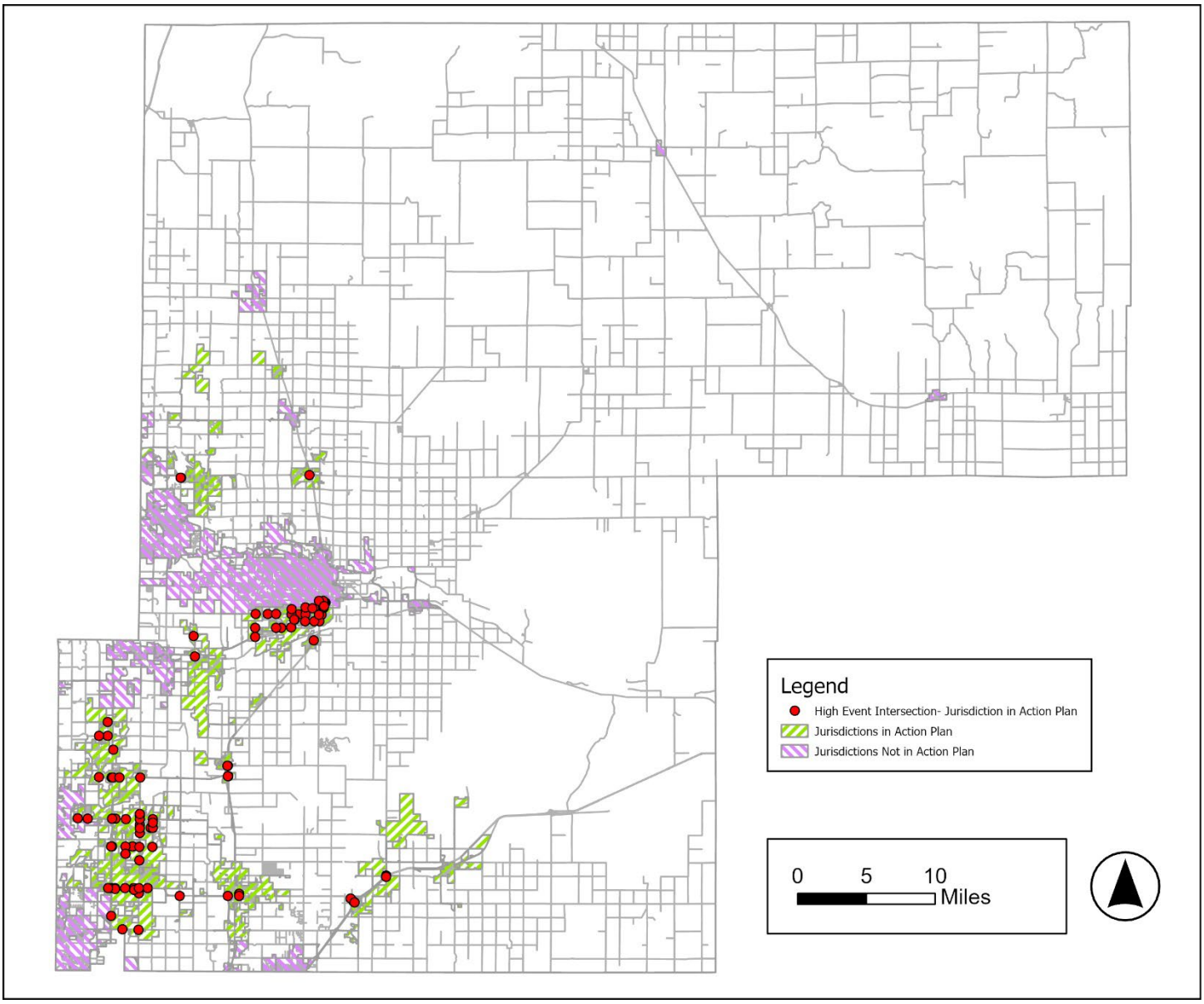


Figure 29: High Event Intersections (Jurisdiction in Action Plan)

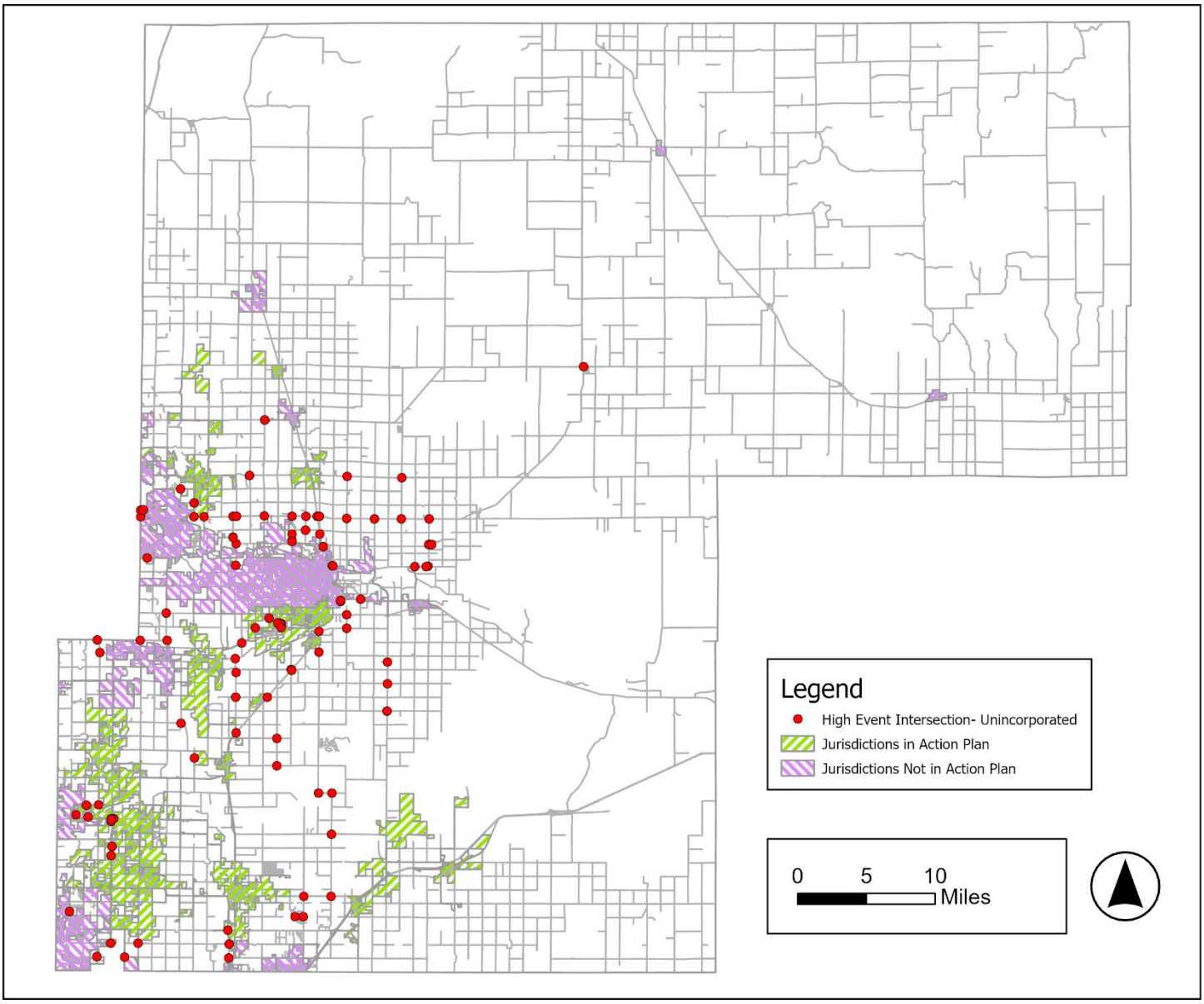


Figure 30: High Event Intersections (Unincorporated Weld County)

Crash Mapping

Figure 31 displays where KSI crashes occurred within Weld County. By mapping all fatal and serious injury crashes in Weld County from 2014 through 2023, Weld County can better identify how to make the most impactful changes in a more efficient manner.

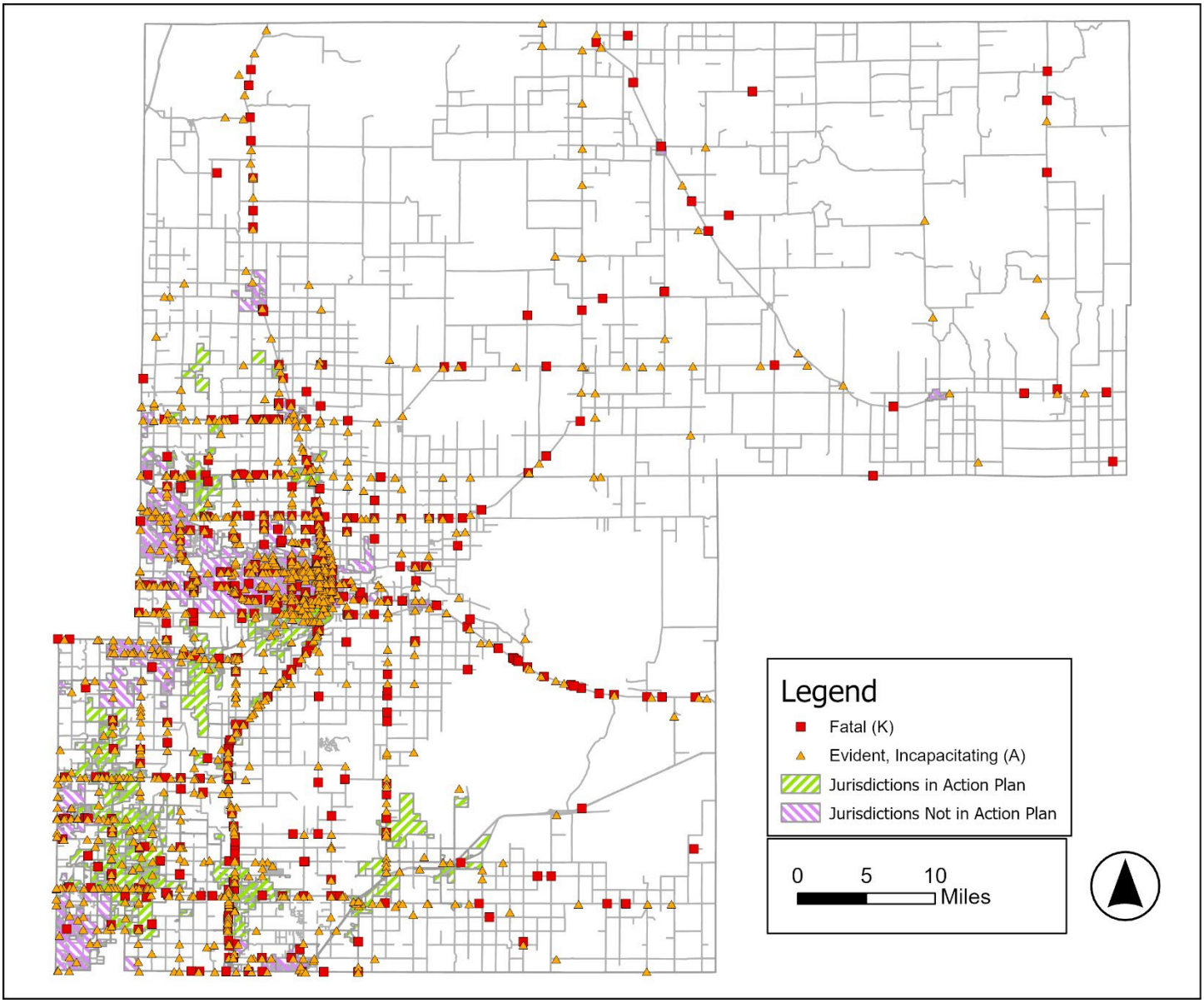


Figure 31: KSI Crashes (All Weld County)

Figure 32 depicts KSI crashes that occurred in incorporated areas included in the Action Plan (hatched green).

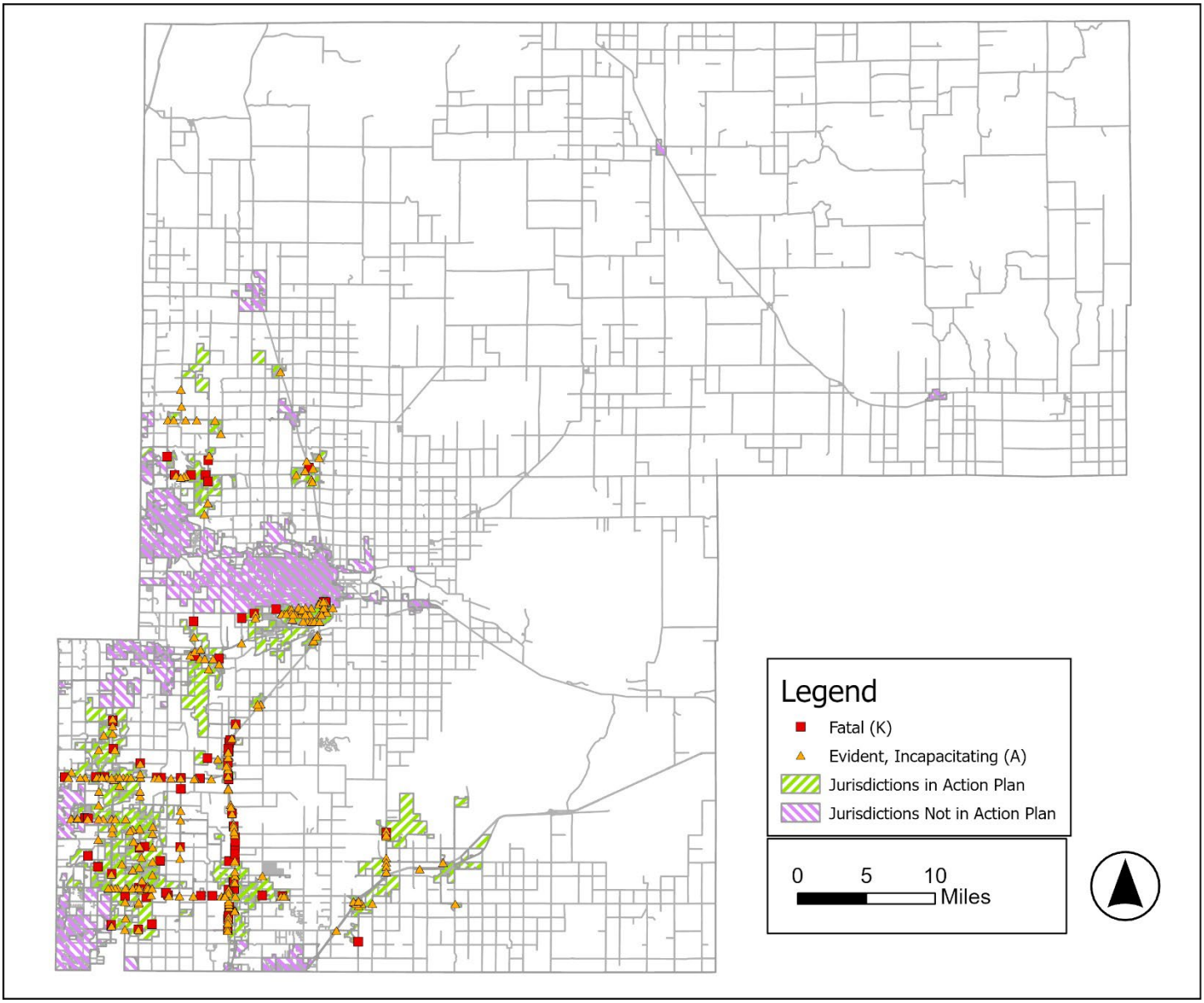


Figure 32: KSI Crashes (Jurisdictions in Action Plan)

Figure 33 shows KSI crashes within unincorporated Weld County.

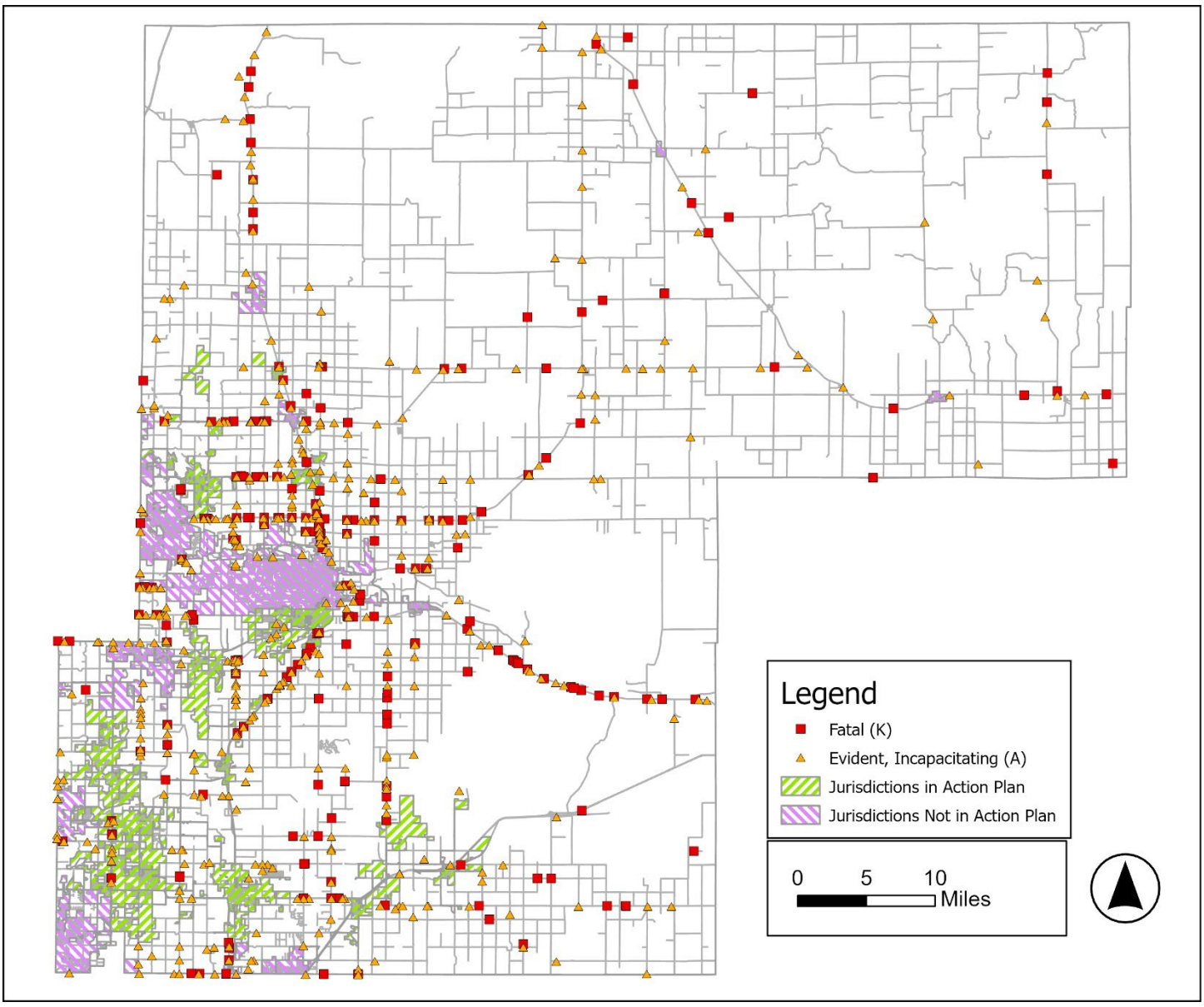


Figure 33: KSI Crashes (Unincorporated Weld County)

High Injury Network

The High Injury Network (HIN) is a mapping tool aimed at identifying the street segments where a disproportionately high number of fatal and injury traffic crashes occur. For the methodology, WSP adopted a data-driven approach, analyzing all injury crashes between 2014 and 2023 in Weld County. Crashes are weighted based on severity: fatal crashes (K) are assigned 15 points, suspected serious injury crashes (A) 15 points, suspected minor injury crashes (B) 2 points, and possible injury crashes (C) 1 point.

Table 12 summarizes the HIN for "All Weld County," "Jurisdictions in Action Plan," and "Unincorporated Weld County" identified and shown in Figure 34, Figure 35, and Figure 36, respectively. For each category:

- **All Weld County:** This HIN accounts for 63.2% of all crashes within all of Weld County while only representing 7.9% of all roadway miles; fatal and serious injury crashes are more than 8 times as likely to occur on an HIN segment compared to an average roadway segment in Weld County.
- **Jurisdictions in Action Plan**: This HIN accounts for 68.4% of all crashes within jurisdictions included in the action plan while only representing 7.9% of jurisdiction roadway miles; fatal and serious injury crashes are more than 7 times as likely to occur on an HIN segment compared to an average roadway segment within these jurisdictions.
- **Unincorporated Weld County**: This HIN accounts for 63.5% of all crashes within unincorporated Weld County while only representing 9.4% of jurisdiction roadway miles; fatal and serious injury crashes are more than 6 times as likely to occur on an HIN segment compared to an average roadway segment in the unincorporated area.

Table 12: Comparison of High-Injury Network Statistics

Category	# of KSI Crashes	% of KSI Crashes	# of Roadway Miles	% of Roadway Miles	Rep. Ratio
HIN (All Weld County)	602	63.2%	445	7.9%	8.01
HIN (Jurisdictions in Action Plan)	143	68.4%	102	9.8%	7.00
HIN (Unincorporated Weld County)	304	63.5%	324	9.4%	6.77

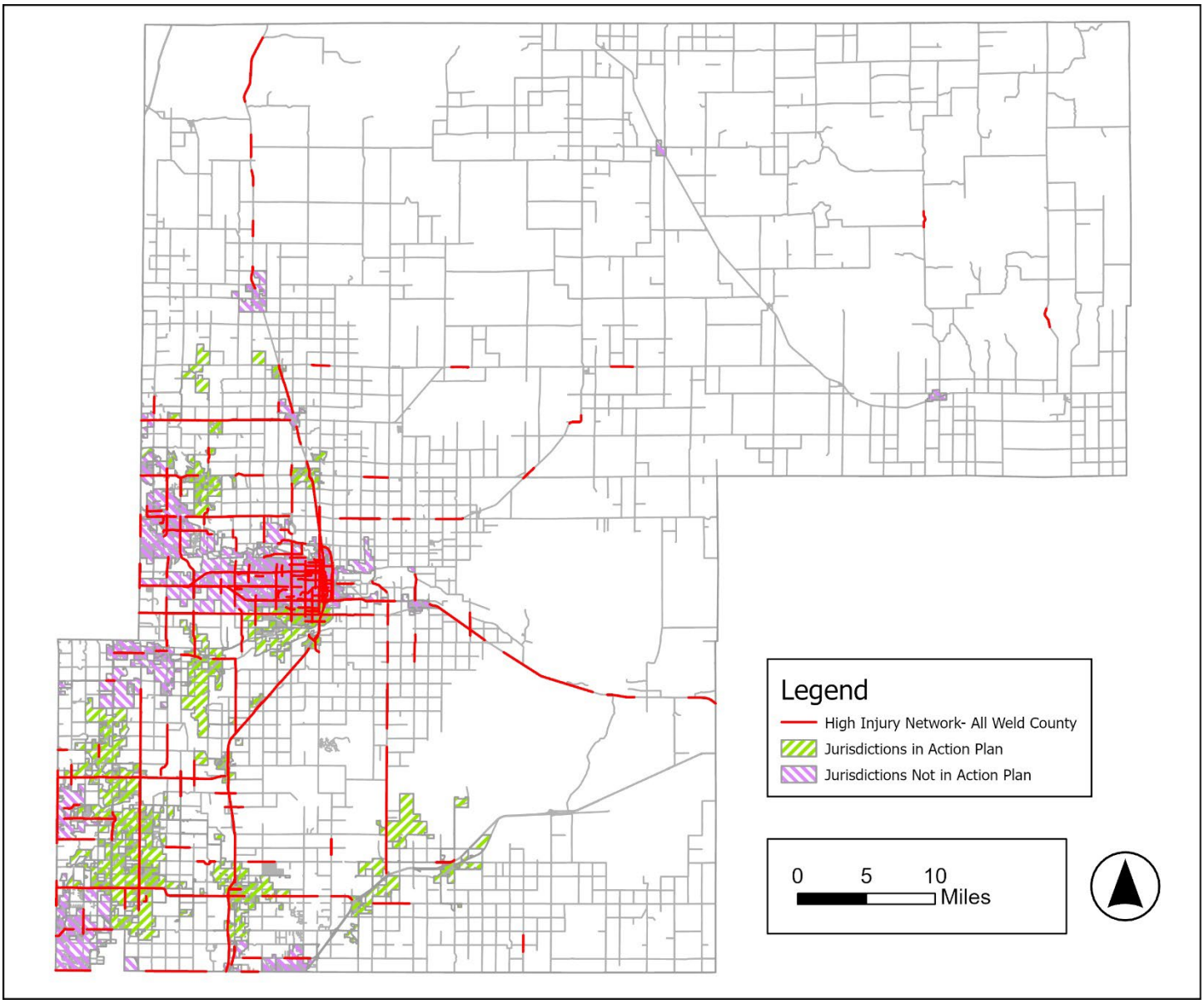


Figure 34: High Injury Network (All Weld County)

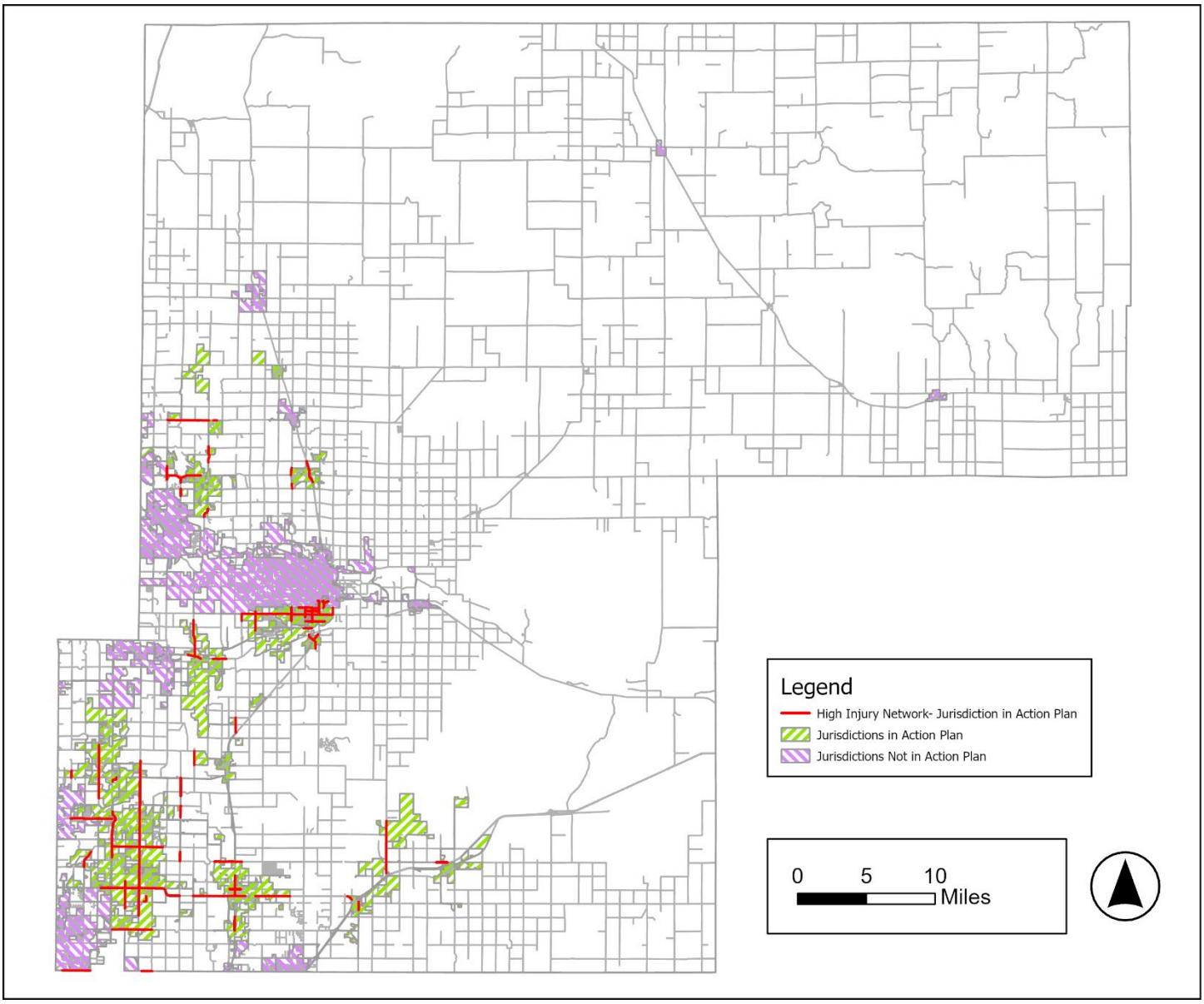


Figure 35: High Injury Network (Jurisdictions in Action Plan)

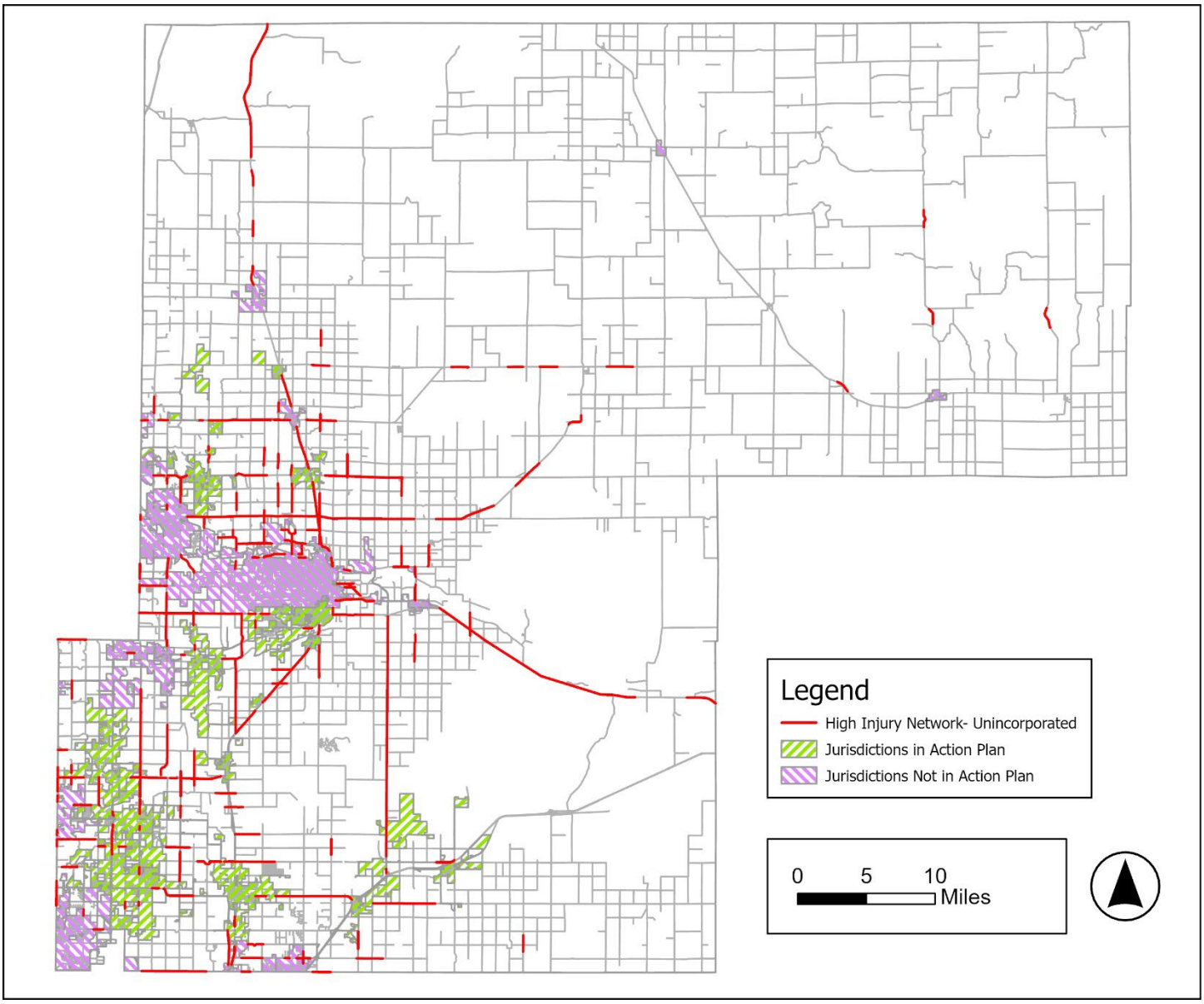


Figure 36: High Injury Network (Unincorporated Weld County)

High Injury Intersections

The High Injury Intersections (HII) is a mapping tool aimed at identifying intersections where a disproportionately high number of fatal and injury traffic crashes occur. Like the HIN, the HII analyzes all intersection-related injury crashes between 2014 and 2023 in Weld County with weights based on severity: fatal crashes (K) are assigned 15 points, suspected serious injury crashes (A) 15 points, suspected minor injury crashes (B) 2 points, and possible injury crashes (C) 1 point. Intersection-related crashes are crashes that were classified in the crash dataset as "at Intersection" or "intersection related."

Table 13 summarizes the HII for "All Weld County," "Jurisdictions in Action Plan," and "Unincorporated Weld County" identified and shown in Figure 37, Figure 38, and Figure 39, respectively. For each category:

- **All Weld County:** This HII accounts for 43.7% of all intersection-related crashes within all of Weld County while representing only 0.7% of all intersections; fatal and serious injury crashes are more than 60 times as likely to occur at an HII compared to an average intersection in Weld County.
- **Jurisdictions in Action Plan:** This HII accounts for 62.6% of all intersection-related crashes within jurisdictions included in the action plan while representing only 1.0% of jurisdiction intersections; fatal or serious injury crashes are more than 63 times as likely to occur at an HII compared to an average intersection in those jurisdictions.
- **Unincorporated Weld County:** This HII accounts for 56.6% of all crashes within unincorporated Weld County while representing only 1.9% of all unincorporated intersections; fatal or serious injury crashes are more than 29 times as likely to occur at an HII compared to an average intersection in the unincorporated area.

Table 13: Comparison of High Injury Intersections Statistics

Category	# of KSI Crashes	% of KSI Crashes	# of Intersections	% of Intersections	Rep. Ratio
HII (All Weld County)	385	43.7%	100	0.7%	60.2
HII (Jurisdictions in Action Plan)	149	62.6%	50	1.0%	63.3
HII (Unincorporated Weld County)	196	56.6%	50	1.9%	29.7

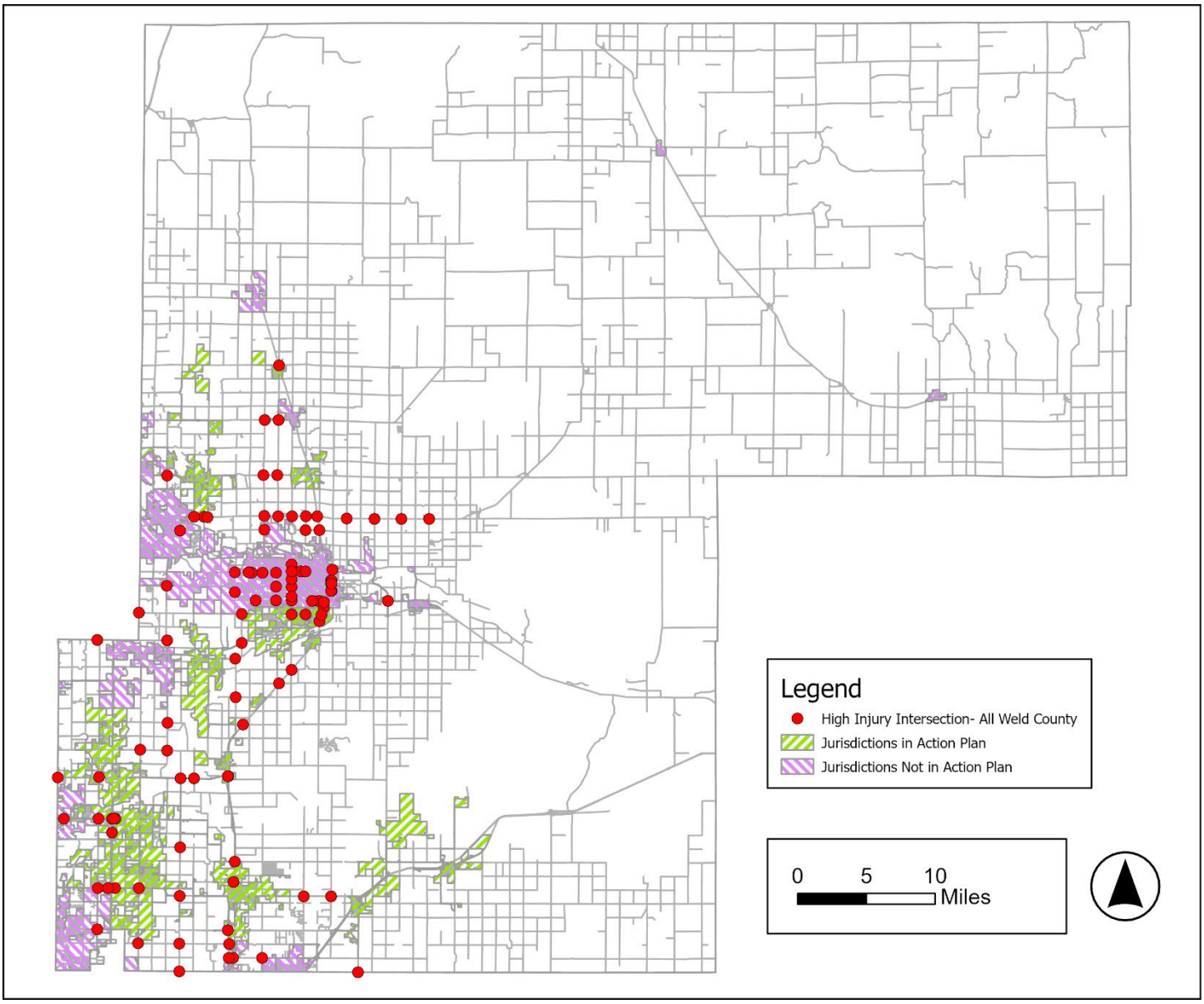


Figure 37: High Injury Intersections (All Weld County)

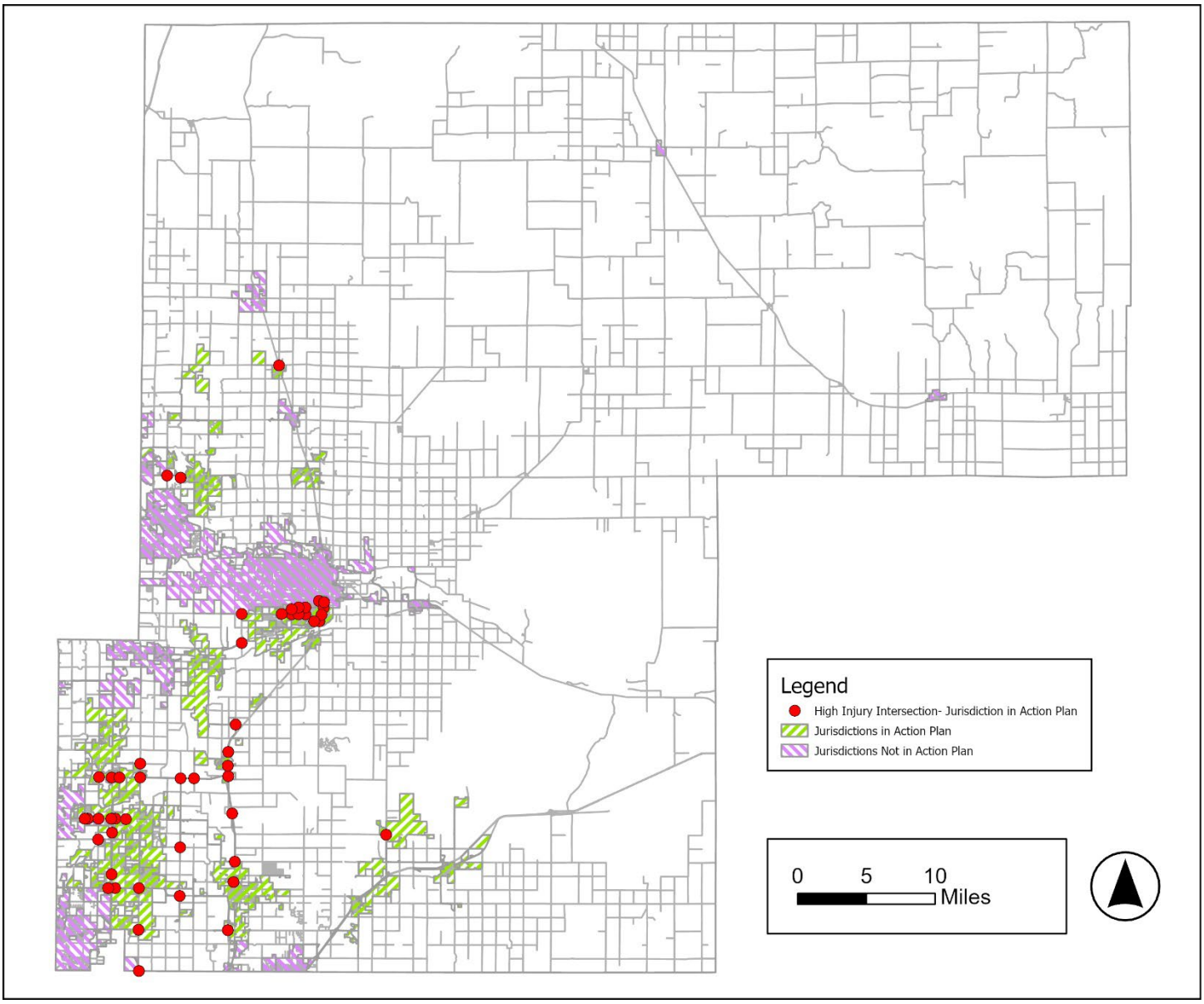


Figure 38: High Injury Intersections (Jurisdictions in Action Plan)

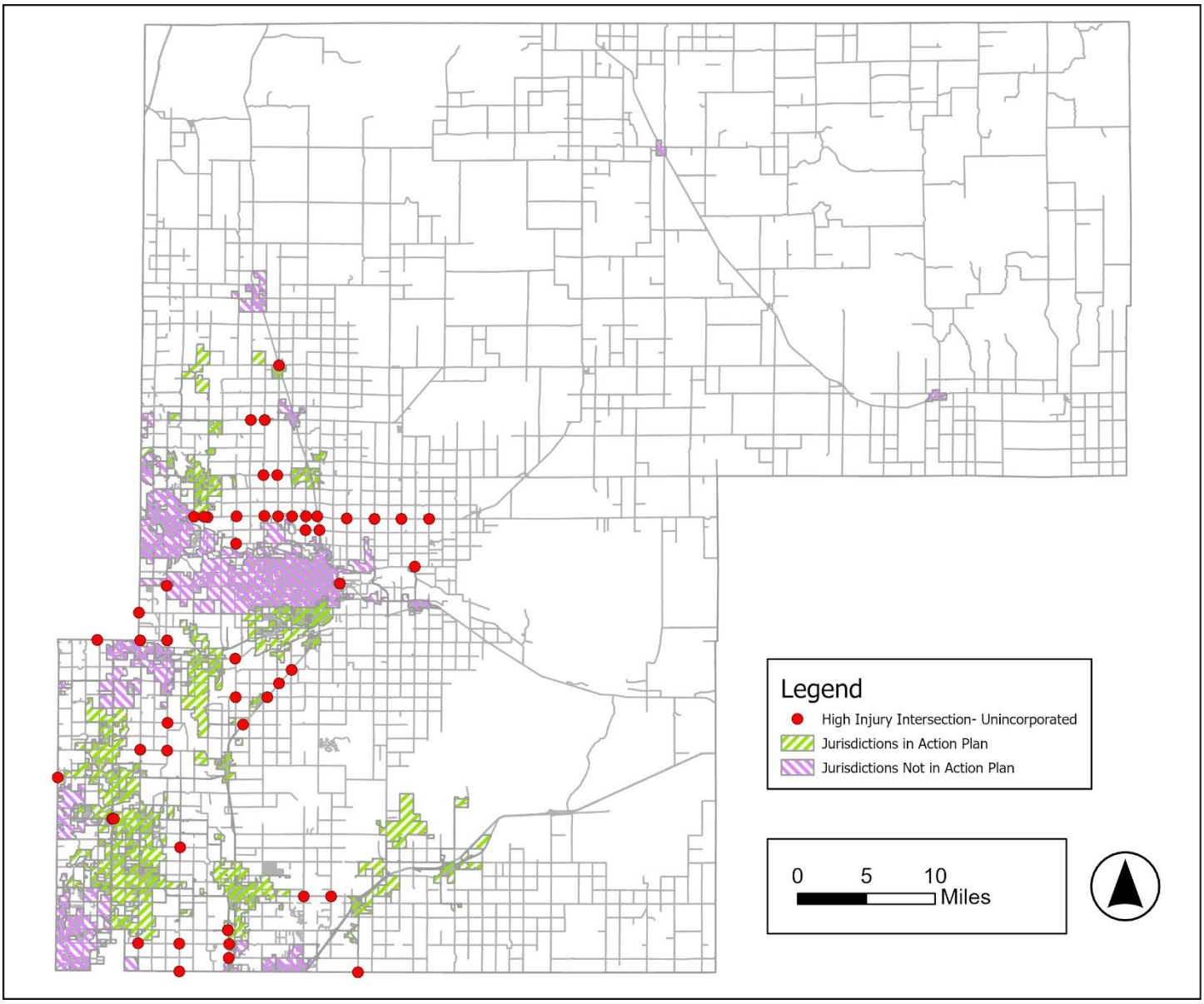


Figure 39: High Injury Intersections (Unincorporated Weld County)

High Risk Network

The High Risk Network (HRN) is a mapping tool aimed at identifying the street segments with a higher potential for fatal and injury traffic crashes. Unlike the High Injury Network (HIN), which is based on crash history, the HRN is developed using the risk factors identified in the systemic analysis that indicate an elevated crash risk.

Table 14 summarizes roadways classified as high risk in the HRN for "All Weld County," "Jurisdictions in Action Plan," and "Unincorporated Weld County" identified and shown in Figure 40, Figure 41, and Figure 42, respectively.

Table 14: Comparison of High Risk Network Statistics

Category	# of Roadway Miles	% of Roadway Miles
HRN (All Weld County)	634.0	11.2%
HRN (Jurisdictions in Action Plan)	138.8	14.6%
HRN (Unincorporated Weld County)	350.2	9.7%

As outlined in the scoring criteria in Table 15, Table 16, and Table 17, risk factors, along with driving events data, are assigned points based on their relative representation ratios as indicated by the systemic analysis. Each road segment is then given a total risk score by summing the associated with its attributes. The approximately top 10% of road segments with the highest risk scores are classified as "High Risk", forming the HRN.

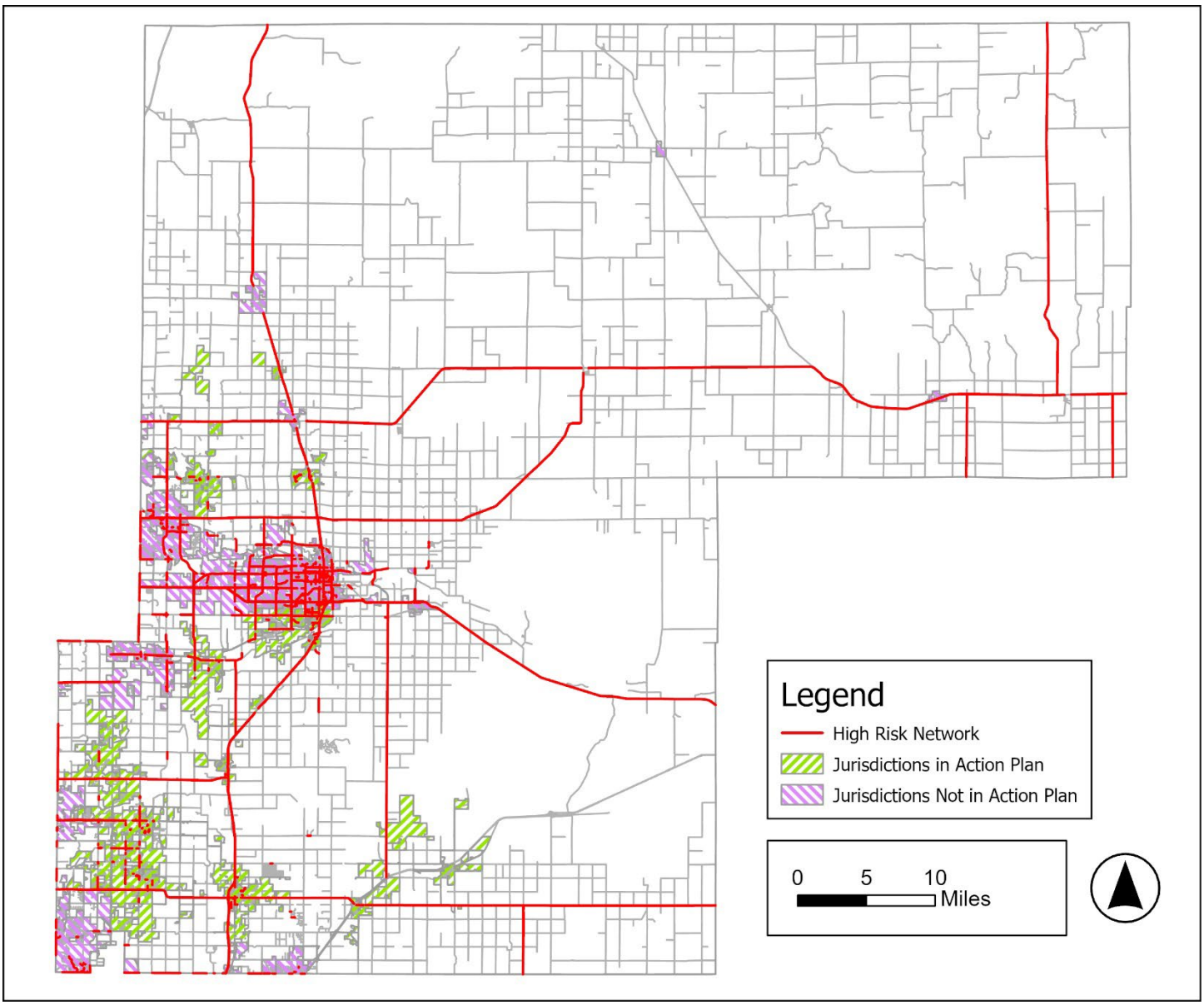


Figure 40: High Risk Network (All Weld County)

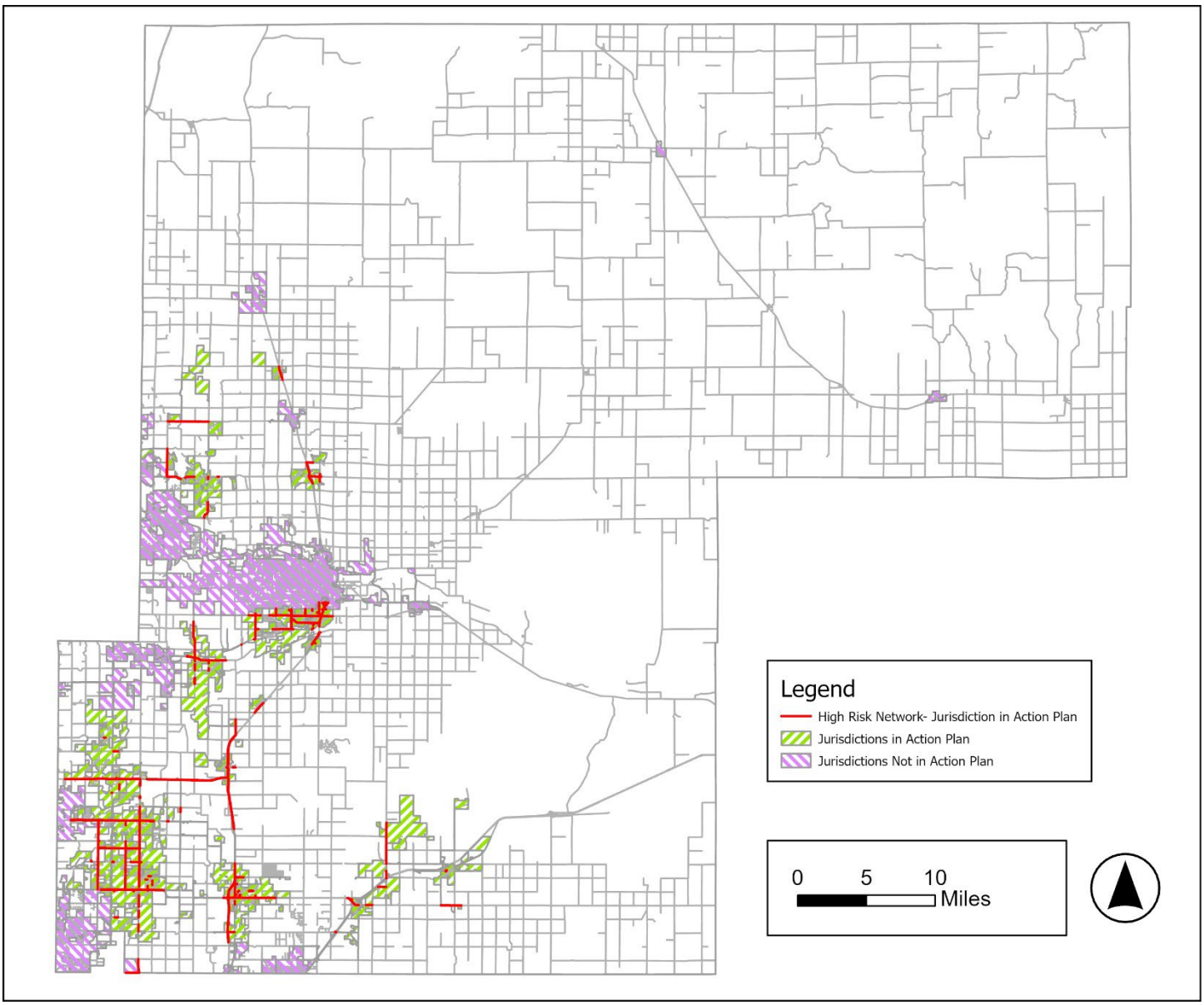


Figure 41: High Risk Network (Jurisdiction in Action Plan)

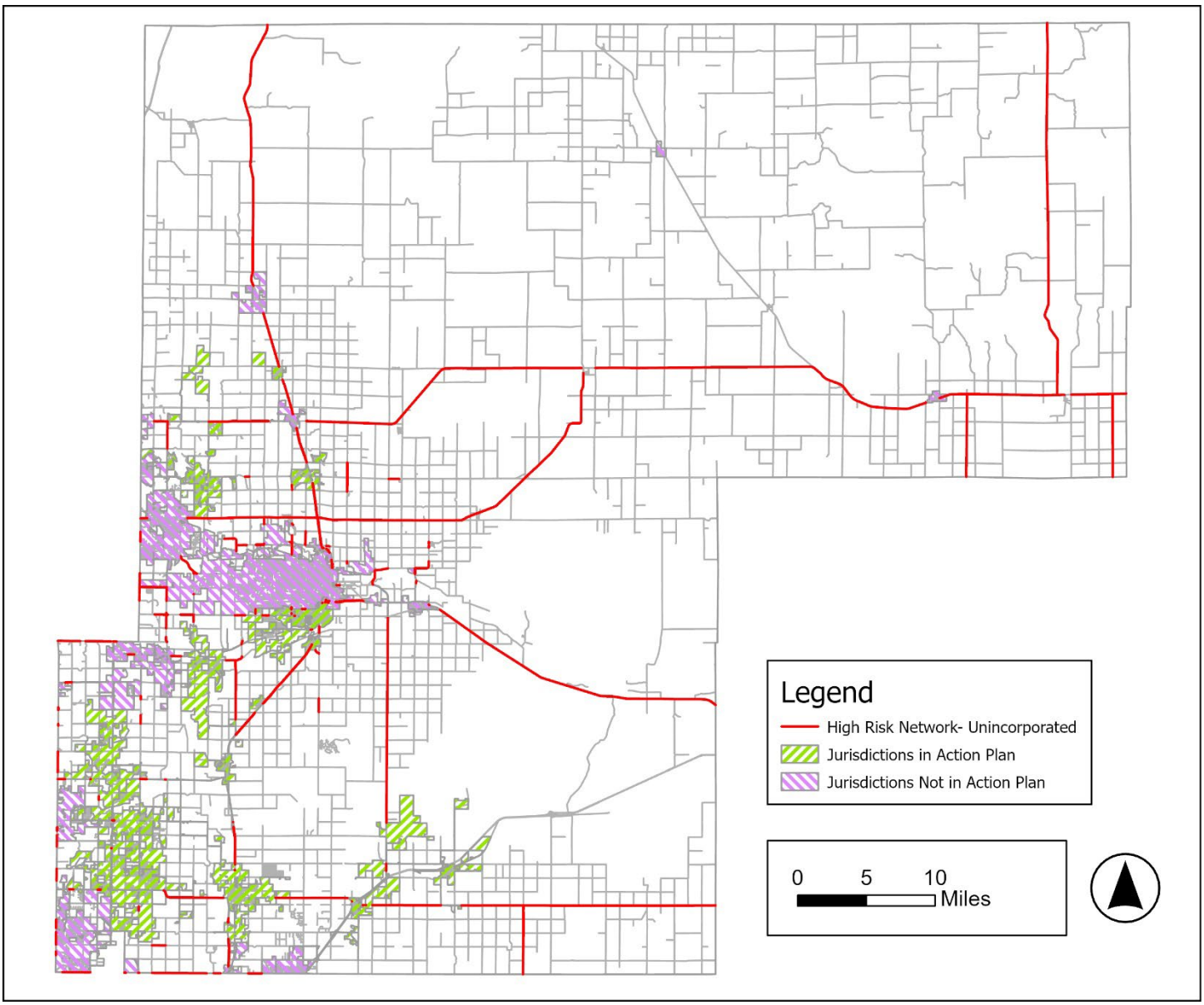


Figure 42: High Risk Network (Unincorporated Weld County)

Table 15: Risk Scores Used in HRN (All Weld County)

Risk Factors	Category	Rep. Ratio	Proposed Risk Points	Max. Possible Points
Traffic Operation	Two-way	0.85	1	5
	One-Way	6.30	5	
	No Data	0.00	0	
Functional Class	Principal Arterial – Other Freeways and Expressways	6.51	5	5
	Principal Arterial – Other	4.27	3	
	Minor Arterial	4.90	4	
	Major Collector	2.27	2	
	Minor Collector	0.63	0	
	Local	0.35	0	
Number of Through Lanes	1 Lane	0.05	0	5
	2 Lanes	0.85	0	
	3 or 4 Lanes	8.04	4	
	5 or More Lanes	10.27	5	
	No Data	0.47	0	
Surface	Asphalt	1.84	2	5
	Asphalt over Concrete	1.30	1	
	Concrete	5.42	5	
	Concrete over Asphalt	0.00	0	
	Other	0.23	0	
	Primitive	0.04	0	
	Unimproved	0.06	0	
	Graded & Drained	0.12	0	
	Soil, Gravel or Stone	0.15	0	
	No Data	0.32	0	
AADT Class	Under 500	0.19	0	5
	500-1k	0.77	0	
	1k-2k	1.43	1	
	2k-5k	2.40	1	
	5k-10k	4.55	2	
	10k-20k	7.49	3	
	>20k	12.67	5	
Speed Limit	15-25mph	0.65	1	5
	30-45mph	4.11	5	
	50-55mph	0.61	1	
	60-75mph	4.20	5	
K-12 School Proximity	Yes	2.00	5	5
	No	0.93	2	
AirSage Event Occurrence	High		5	5
	Moderate		3	
	Low		1	
Total Possible Points				40

Table 16: Risk Scores Used in HRN (Jurisdictions in Action Plan)

Risk Factors	Category	Rep. Ratio	Proposed Risk Points	Max. Possible Points
Traffic Operation	Two-way	0.80	1	5
	One-Way	4.72	5	
	No Data	0.00	0	
Functional Class	Principal Arterial – Other Freeways and Expressways	5.27	5	5
	Principal Arterial – Other	5.64	5	
	Minor Arterial	4.22	4	
	Major Collector	1.85	2	
	Minor Collector	1.21	1	
	Local	0.36	0	
Number of Through Lanes	1 Lane	0.26	0	5
	2 Lanes	0.93	1	
	3 or 4 Lanes	6.00	5	
	5 or More Lanes	3.78	3	
	No Data	0.32	0	
Surface	Asphalt	1.15	1	5
	Asphalt over Concrete	0.00	0	
	Concrete	8.58	5	
	Concrete over Asphalt	1.00	1	
	Other	0.00	0	
	Primitive	0.00	0	
	Unimproved	0.03	0	
	Graded & Drained	0.13	0	
	Soil, Gravel or Stone	0.35	0	
	No Data	0.22	0	
AADT Class	Under 500	0.17	0	5
	500-1k	0.65	0	
	1k-2k	1.60	1	
	2k-5k	2.00	1	
	5k-10k	4.34	3	
	10k-20k	5.94	4	
	>20k	7.24	5	
Speed Limit	15-25mph	0.32	0	5
	30-45mph	2.53	2	
	50-55mph	1.34	1	
	60-75mph	5.10	5	
K-12 School Proximity	Yes	0.86	4	5
	No	1.03	5	
AirSage Event Occurrence	High		5	5
	Moderate		3	
	Low		1	
Total Possible Points				40

Table 17: Risk Scores Used in HRN (Unincorporated Weld County)

Risk Factors	Category	Rep. Ratio	Proposed Risk Points	Max. Possible Points
Traffic Operation	Two-way	0.88	1	5
	One-Way	8.59	5	
	No Data	1.46	1	
Functional Class	Principal Arterial – Other Freeways and Expressways	7.93	5	5
	Principal Arterial – Other	3.25	2	
	Minor Arterial	5.22	3	
	Major Collector	2.66	2	
	Minor Collector	0.74	0	
	Local	0.37	0	
Number of Through Lanes	1 Lane	0.10	0	5
	2 Lanes	1.00	1	
	3 or 4 Lanes	9.06	5	
	5 or More Lanes	2.57	1	
	No Data	0.58	0	
Surface	Asphalt	2.75	3	5
	Asphalt over Concrete	0.00	0	
	Concrete	4.63	5	
	Concrete over Asphalt	0.00	0	
	Other	0.00	0	
	Primitive	0.05	0	
	Unimproved	0.13	0	
	Graded & Drained	0.07	0	
	Soil, Gravel or Stone	0.18	0	
	No Data	0.48	1	
AADT Class	Under 500	0.24	0	5
	500-1k	0.80	0	
	1k-2k	1.64	0	
	2k-5k	2.74	1	
	5k-10k	5.44	1	
	10k-20k	9.77	3	
	>20k	19.12	5	
Speed Limit	15-25mph	0.90	1	5
	30-45mph	3.30	3	
	50-55mph	0.60	1	
	60-75mph	4.75	5	
	No Data	1.46	2	
K-12 School Proximity	Yes	3.15	5	5
	No	0.98	2	
AirSage Event Occurrence	High		5	5
	Moderate		3	
	Low		1	
Total Possible Points				40