

# CRASH ANALYSIS

Understanding the factors that contribute to unsafe traveling conditions is the first step in achieving zero traffic fatalities in Cortez. This crash analysis examines all crashes within the City of Cortez over the past five years for which data are available (2018 – 2022). Particular attention is given to crashes that resulted in fatalities or serious injuries, also known as killed and serious injury crashes (KSI crashes).

## METHODOLOGY

Crash data were obtained from the Colorado Department of Transportation, which maintains a crash database for the state from police reports. Colorado crash data use the KABCO severity rating, which was developed by the National Safety Council to rate the injury level of those involved in a crash. The KABCO scale is used nationwide and is included in the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual (HSM). KSI crashes included crashes rated K (Fatal) and A (Suspected Serious Injury) on the KABCO scale. Other Injury Crashes include those listed as B (Suspected Minor Injury) and C (Possible Injury). Crashes rated O resulted in property damage only without any injuries.

## LIMITATIONS

**Crash data are collected via police reports and are subject to variation in reporting based on the responding officer.** KABCO ratings are subjective and determined by a non-medically trained officer. Furthermore, officers may have varying opinions on driver actions or other factors that contributed to a crash. Crash data are also limited to crashes that were reported to police officers.

**Crash location data is subject to data entry errors.** Some crash coordinates did not match the cross streets listed in the crash database. The CSAP team examined KSI crashes for coordinate errors and adjusted coordinates to match the cross streets. However, for crashes that occurred at mid-block locations rather than intersections, crashes may not be mapped in the exact location where they occurred. The project team included all crashes within the City of Cortez and within one quarter mile of City limits in order to include crashes that may have imprecise location data.

**Crash data are not normalized by traffic volumes or the number of trips taken.** For example, most crashes occur during the day, but most trips are also taken during the day. The crash data have not been adjusted to show the relative risk of traveling at night vs during the day.

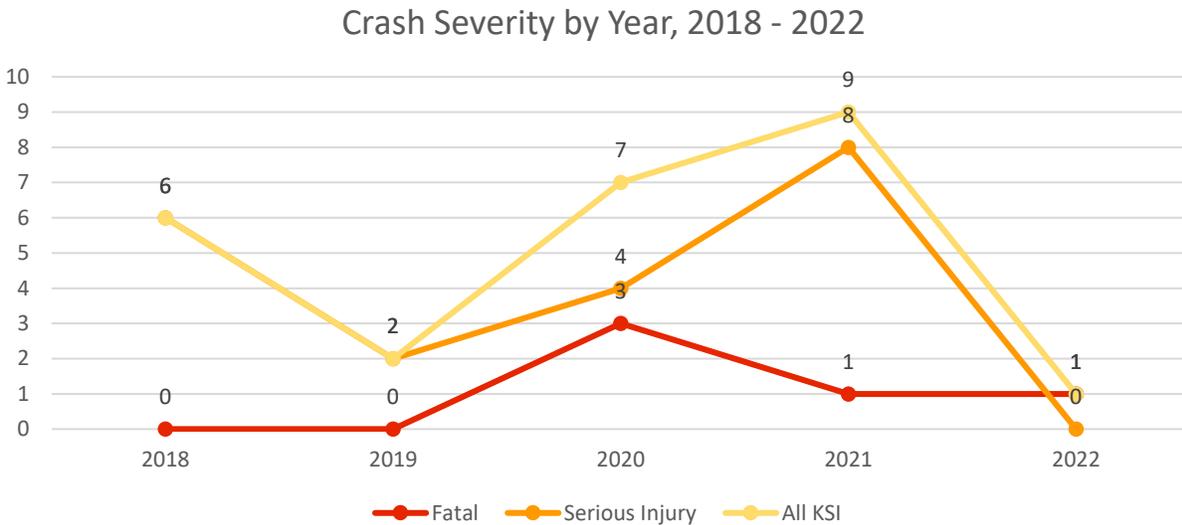
Finally, the study area and number of KSI crashes are relatively small. From an analysis perspective, **the small number of KSI crashes poses difficulties in confidently identifying crash hotspots and contributing factors**, and trends in small datasets may be caused by chance and not indicative of larger patterns.

This CSAP will examine crash data in tandem with other analysis factors such as roadway conditions data, public input, and industry best practices in order to account for limitations in crash data.

## WHAT ARE THE RISKS?

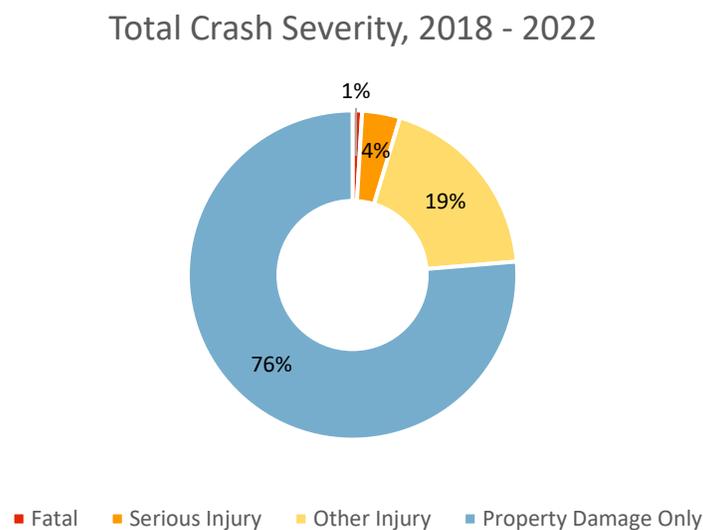
Figure 1 shows KSI crashes by year since 2018. Crashes spiked in 2020 and 2021, which is consistent with national trends. Decreased traffic volumes during the COVID-19 pandemic are thought to have contributed to increased speeding and KSI crashes. While 2022 saw only one KSI crash, there are not enough data points after the pandemic to determine if lower KSI crashes post-pandemic are a trend.

Figure 1: Crash Severity by Year, 2018 - 2022



From 2018 – 2022, Cortez experienced 536 total crashes. Of these, five crashes resulted in five fatalities and 20 crashes resulted in 21 people seriously injured. Figure 2 depicts the percentage of crashes that resulted in fatalities, serious injuries, other injuries, or property damage only from 2018 – 2022.

Figure 2: Total Crash Severity, 2018 – 2022



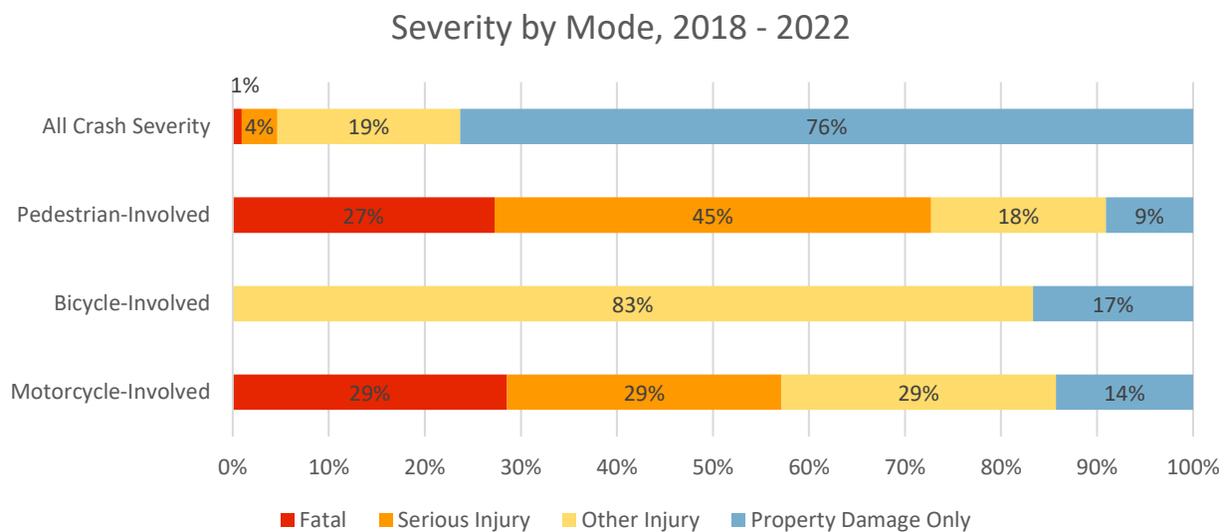
## WHO IS AT RISK?

Pedestrians, bicyclists, and motorcyclists are less protected from injury in crashes and are at higher risk for death or serious injuries. These types of crashes are known as Vulnerable Road User (VRU) crashes. Table 1 shows how many crashes involve VRUs. Figure 3 shows the severity of crashes for pedestrian, bicyclist, and motorcyclist-involved crashes.

Table 1: Crashes by Mode, 2018 – 2022

	All Crash Severity	Pedestrian-Involved Crashes	Bicycle-Involved Crashes	Motorcycle-Involved Crashes
<b>Fatal</b>	5	3	0	2
<b>Serious Injury</b>	20	5	0	2
<b>Other Injury</b>	102	2	5	2
<b>Property Damage Only</b>	409	1	1	1
<b>Total</b>	536	11	6	7

Figure 3: Crash Severity by Mode, 2018 – 2022

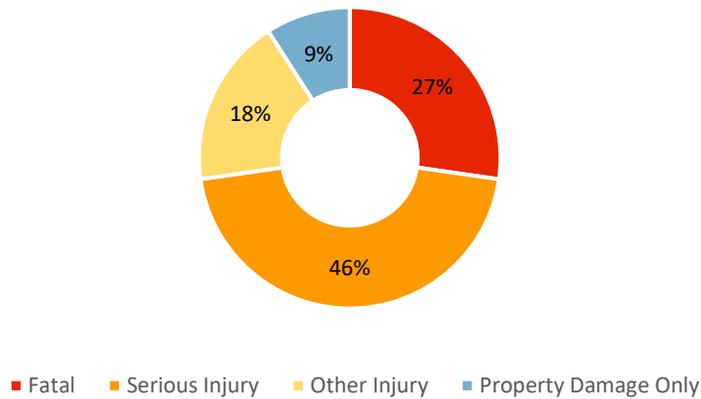


## PEDESTRIANS

**Pedestrians are at the highest risk; 3 of the 5 fatal crashes in Cortez resulted in a pedestrian fatality.** While only 2% of crashes involve a pedestrian, 32% of KSI crashes involve a pedestrian. 5% of all crashes in Cortez result in a fatality or serious injury; however, for pedestrian-involved crashes, the risk jumps to 73% (see Figure 4).

Figure 4: Crash Severity for Pedestrian-Involved Crashes, 2018 - 2022

### Pedestrian Involved Crash Severity, 2018 - 2022

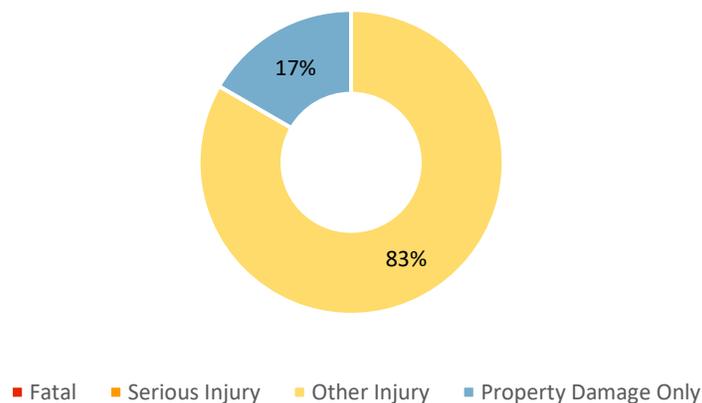


## BICYCLISTS

While no bicyclist-involved crashes resulted in fatalities or serious injuries, **only 17% of bicyclist-involved crashes *did not* result in an injury**, which is substantially higher than the overall rate of non-injury crashes (76%). However, bicyclist-involved crashes made up a small percentage of overall crashes in Cortez, and the small sample (six crashes) creates difficulties in drawing broader conclusions about bicycling safety in the city with crash data alone.

Figure 5: Crash Severity for Bicyclist-Involved Crashes, 2018 - 2022

### Bicycle Crash Severity, 2018 - 2022

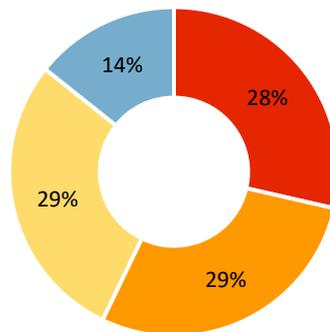


## MOTORCYCLISTS

Motorcyclists are also more at risk with 57% of crashes involving a motorcyclist resulting in a fatality or serious injury. Two of the five fatal crashes between 2018 – 2022 involved a motorcyclist. While motorcycle crashes were only a small portion of total crashes (seven crashes from 2018 – 2022), they accounted for 40% of fatal crashes in the same time period.

Figure 6: Crash Severity for Motorcyclist-Involved Crashes, 2018 – 2022

### Motorcycle Involved Crash Severity, 2018 - 2022



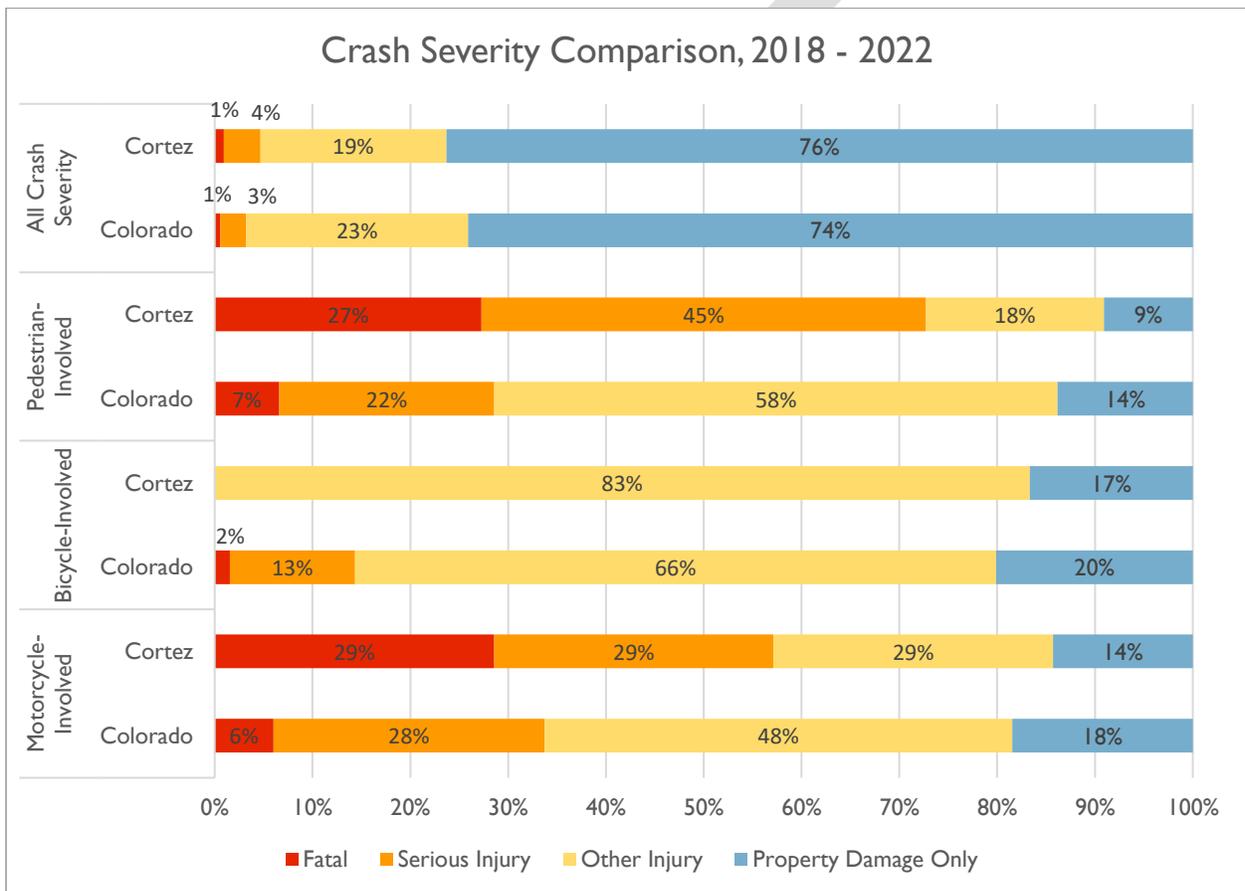
■ Fatal ■ Serious Injury ■ Other Injury ■ Property Damage Only

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## STATE COMPARISON

Severity data for Colorado crashes can be used to see how Cortez compares to the rest of the state (see Figure 7). Crash severity levels in Cortez for all crashes are similar to Colorado's (5% KSI crashes in Cortez; 4% in Colorado). However, pedestrian-involved crashes are more severe in Cortez. 29% of pedestrian-involved crashes in Colorado are KSI crashes, while 73% of pedestrian-involved crashes in Cortez are KSI crashes. Motorcycle-involved crashes also tend to be more severe: 57% of motorcycle-involved crashes in Cortez are KSI crashes vs 34% for Colorado. Bicycle-involved crashes in Cortez are more likely to result in injury, but those injuries tend to be less severe than in Colorado as a whole.

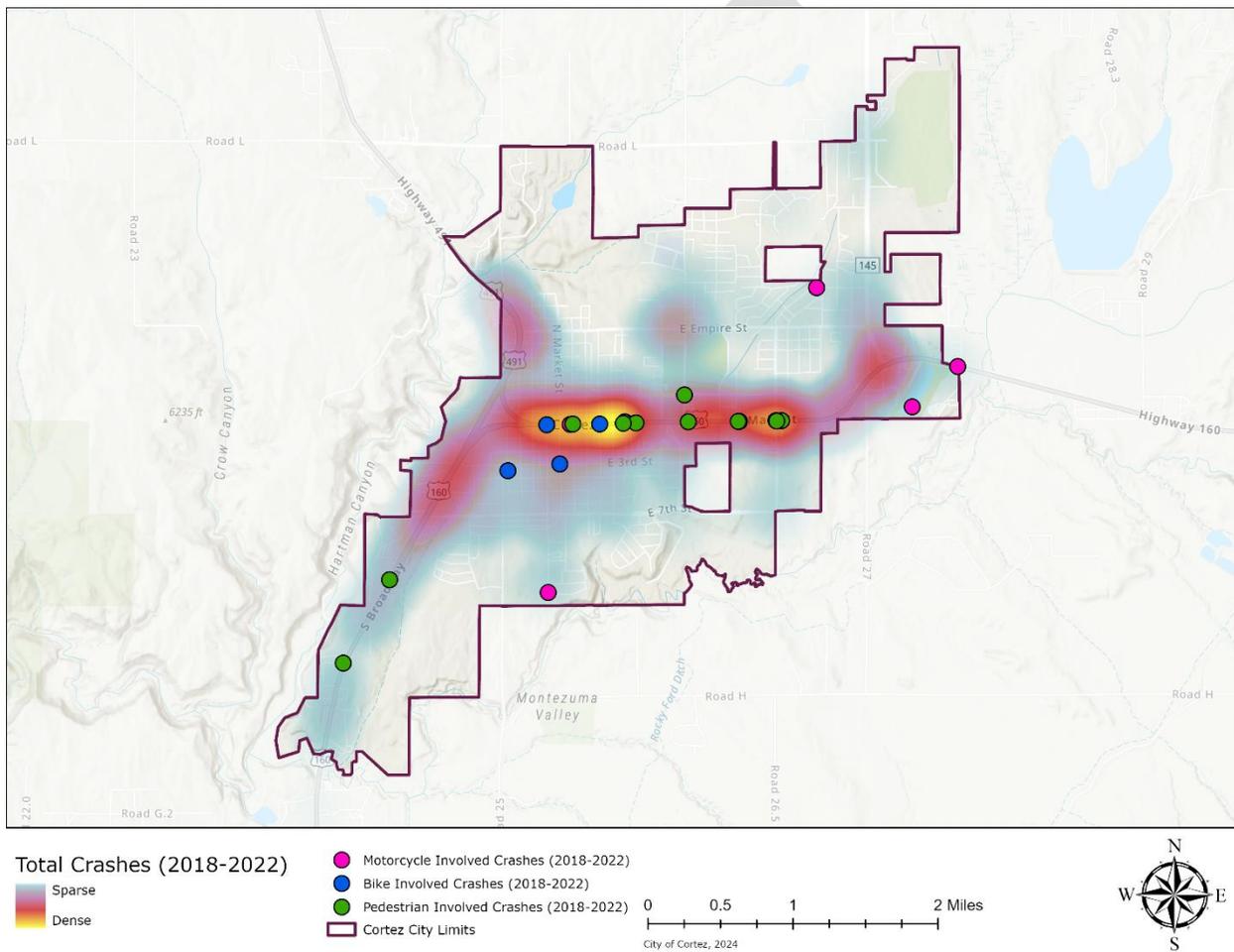
Figure 7: Colorado Crash Severity by Mode, 2018 - 2022



## WHERE DO CRASHES OCCUR?

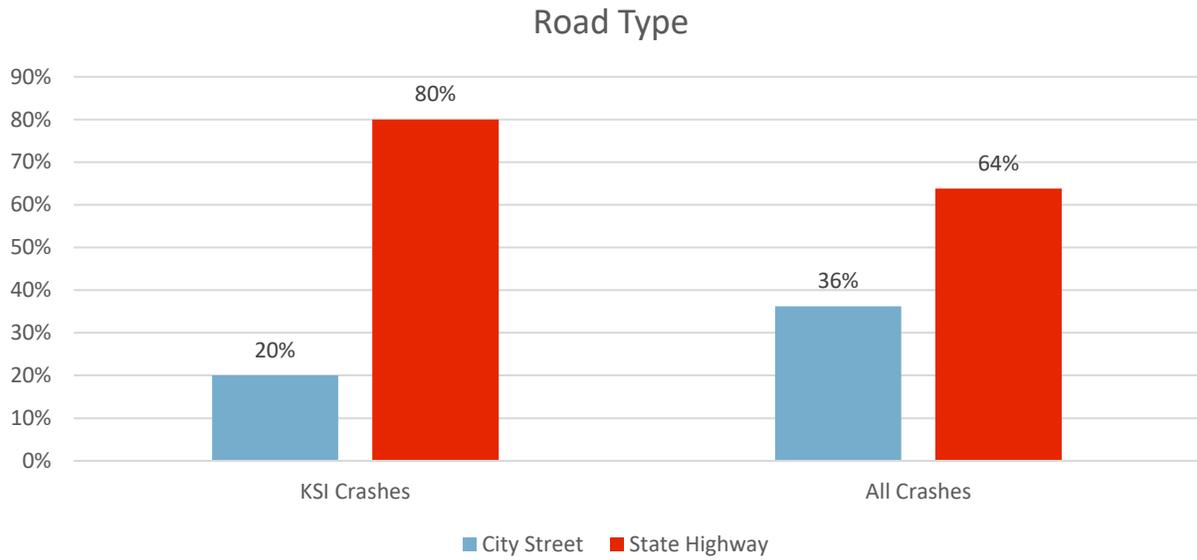
Most crashes occurred on State Highway 491 near the 491 and State Highway 160 interchange as well as along E Empire Street and Main Street through Downtown Cortez. VRU crashes, which include pedestrians, bicyclists, and motorcyclists, were mostly concentrated on Main Street in Downtown Cortez (State Highway 160). A high number of pedestrian-involved crashes occurred on E Main Street, potentially due to conflicts between pedestrians attempting to cross and vehicles traveling through on the highway. Main Street has high levels of pedestrian activity and many pedestrian destinations on both the north and south side of the highway. Figure 8 shows crash hotspots for all crashes and the location of VRU crashes.

Figure 8: Crash Hotspots, All Crashes 2018 - 2022



**Most crashes, both KSI crashes and less severe crashes, occur on the state highways running through Cortez (State Highway 491 and State Highway 160). 80% of KSI crashes occurred on state highways and 64% of all crashes occurred on state highways (see Figure 9). State highways have the highest traffic volumes in Cortez.**

Figure 9: Road Type, 2018 – 2022



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Figure 10 shows the top crash corridors and location of KSI crashes. There were only two corridors with multiple KSI crashes: E Main Street/Highway 160 and Highway 491 (also known as N Broadway and S Broadway), which are both state highways. **Of the total number of KSI crashes, 69% occurred on these two corridors.**

The total number of miles of all roads within the Cortez city limits equals to 73.3 miles. **The total road miles of the top two KSI crash corridors was 4.6 miles, equaling to about 6.3% of the total Cortez road miles.**

Figure 10: KSI Crashes and Top Crash Corridors, 2018 - 2022

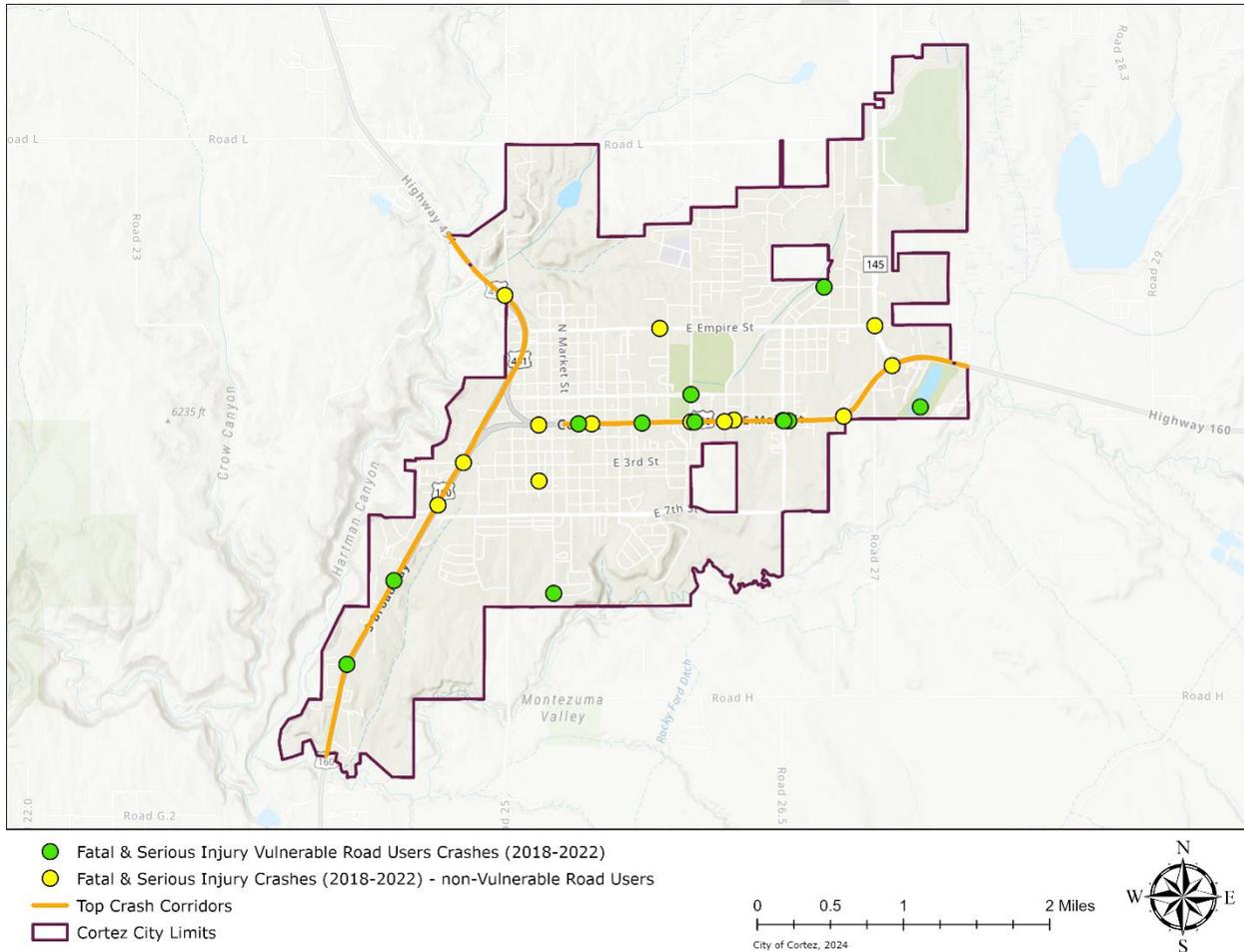
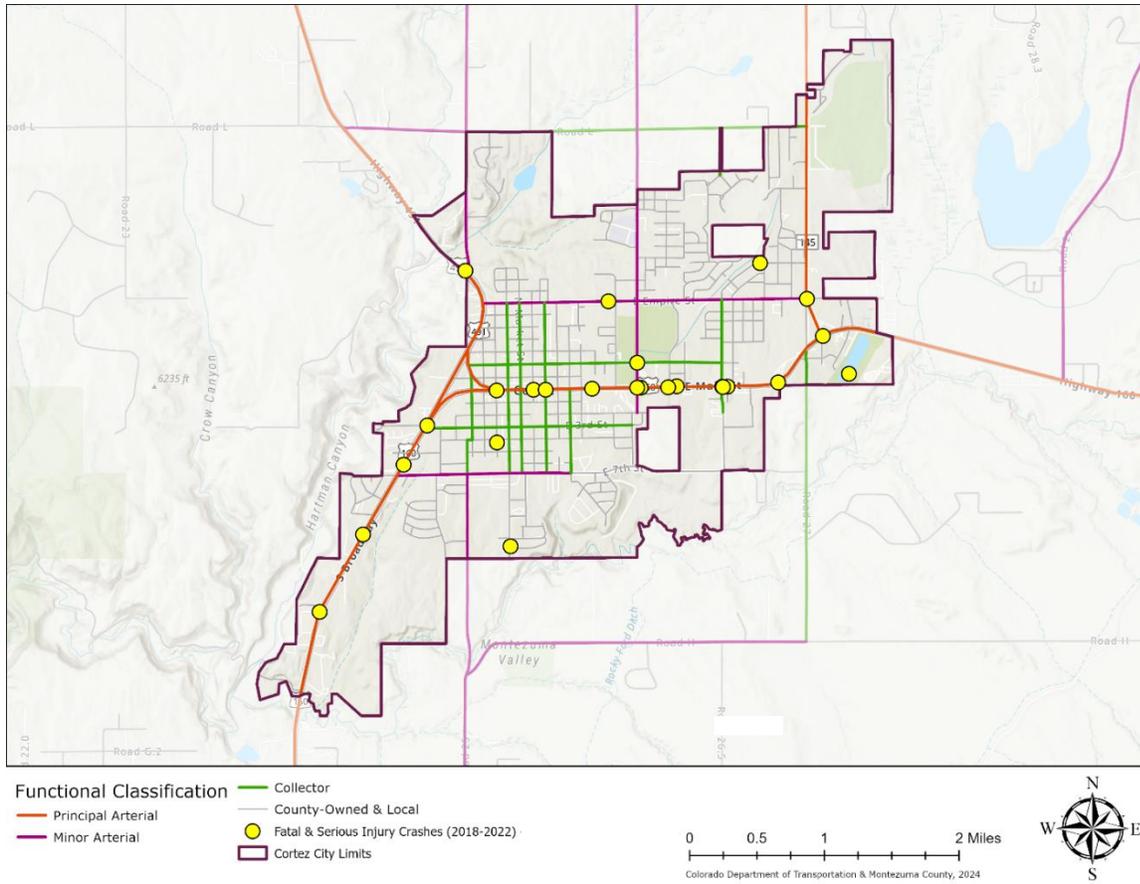


Figure 11 depicts KSI crashes and roadway functional classification. **Almost all KSI crashes are located on principal arterials.**

Figure 11: KSI Crash Map by Functional Classification



Speed limits vary significantly along the principal arterials. For example, Main Street has speeds ranging from 25 mph to 45 mph. Table 2 depicts the speed limits of road segments where KSI crashes occurred. **68% of crashes occurred on segments with speed limits between 25 – 35 mph, while 32% occurred on roads with speed limits of 35 mph or above.**

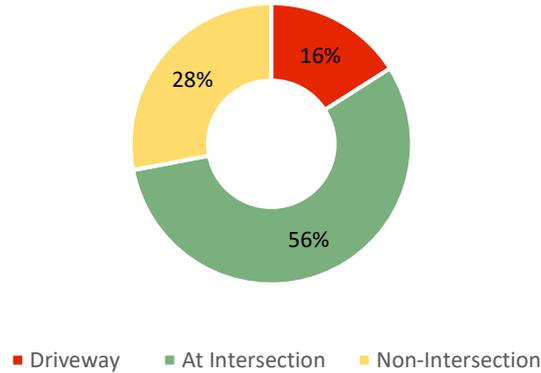
Table 2: KSI Crashes by Speed Limit on Principal Arterials

Speed Limit	Number of KSI Crashes	Percent
25 - 35 MPH	17	68%
35 MPH – 45 MPH	4	16%
> 45 MPH	4	16%

**About half of KSI crashes occurred at intersections, 29% at mid-block locations, and 17% at driveways.** On Highway 491, all KSI crashes occurred at unsignalized intersections and commercial driveways.

Figure 12: Crash Locations for KSI Crashes, 2018 – 2022

### Crash Location for KSI Crashes, 2018 - 2022



## WHAT CONTRIBUTES TO CRASHES AND CRASH SEVERITY?

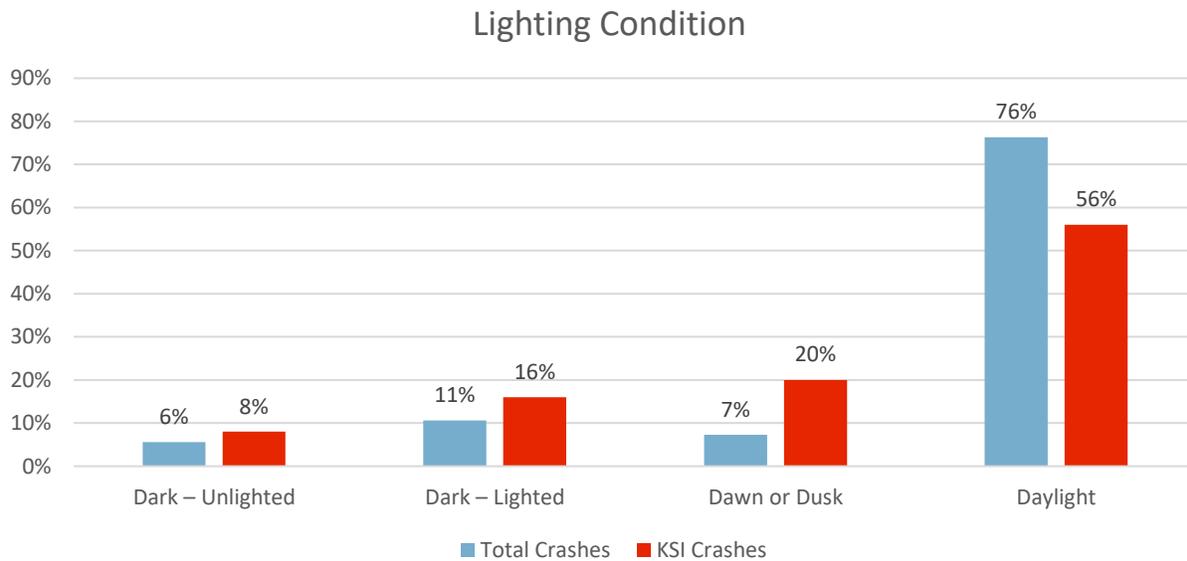
Table 3 depicts driver actions related to KSI crashes. Careless driving was a common issue, as was failure to yield. “Unknown” and “No Contributing Factor” were listed for 12 of the crashes. More thorough crash documentation at crash scenes could improve future crash analyses, as almost half of the serious crashes do not have data for driver actions.

Table 3: Driver Actions for KSI Crashes, 2018 – 2022

Driver Action	KSI Crashes
Unknown	8
Careless Driving	4
Failed to Yield ROW	4
No Apparent Contributing Factor	4
Driver Inexperience	2
Driver Unfamiliar with Area	1
Failed to Stop at Signal	1
Over-Correcting/ Over-Steering	1
<b>Total</b>	<b>25</b>

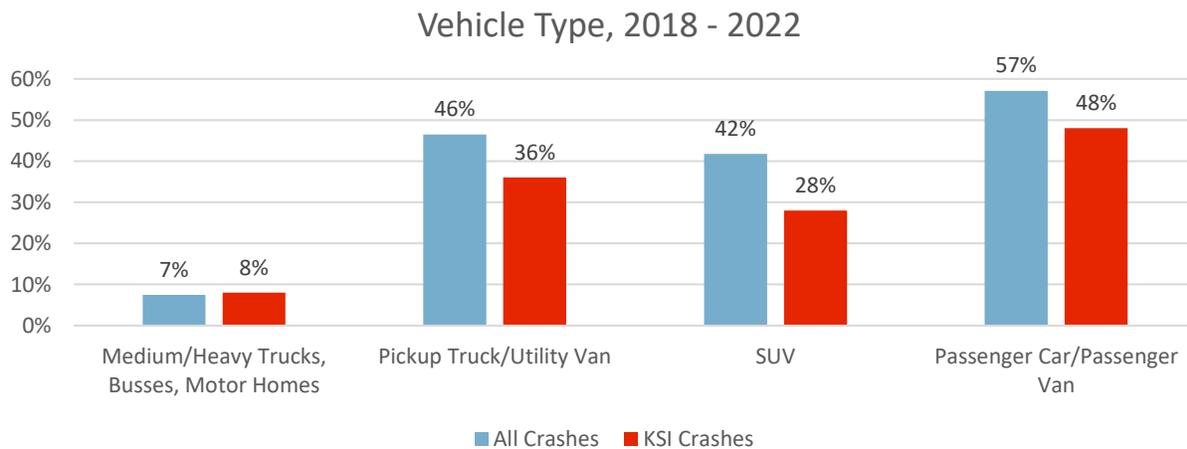
**Fatal and severe injury crashes occur at higher rates in dark conditions and at dawn or dusk.** 20% of KSI crashes occurred at dawn or dusk, over twice as high as the overall crash rate in these conditions. A larger percentage of KSI crashes also occurred in dark conditions both with lighting and without lighting. While 28% of total crashes occurred under dark, unlit conditions or at dawn/dusk, 37.5% of pedestrian-involved crashes occurred under these conditions.

Figure 13: Lighting Condition, 2018 – 2022



Vehicle type does not appear to play a strong role in crash severity. No VRU crashes involved large vehicles (medium/heavy trucks, buses, or motor homes). Mode appears to play a much stronger role in crash severity than the type of vehicle involved in a crash.

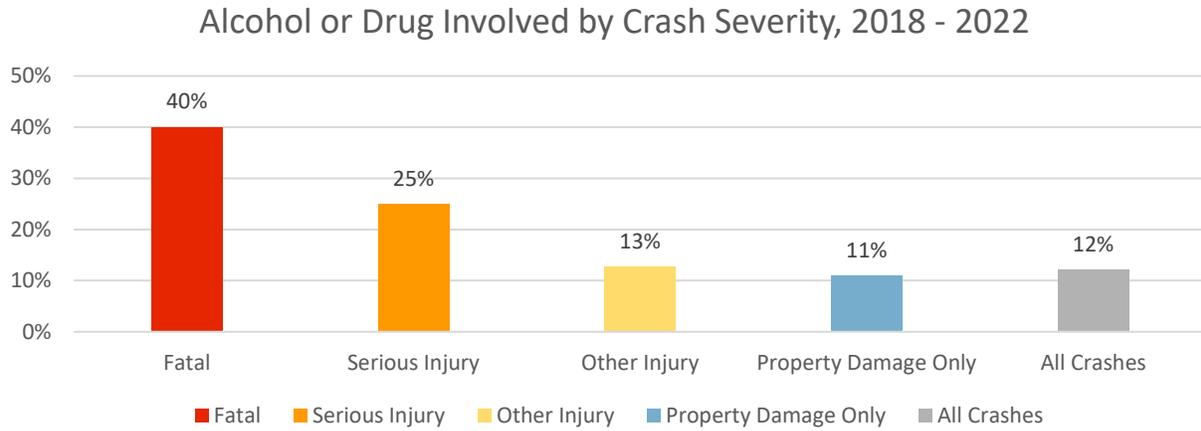
Figure 14: Vehicle Type, 2018 – 2022



*\*Vehicle type totals exceed 100% as most crashes involve multiple vehicles*

**Alcohol or drug involvement may worsen crash severity.** While alcohol/drugs are involved in 12% of all crashes, they are present in 40% of fatal crashes and 25% of serious injury crashes.

Figure 15: Alcohol or Drug Involved Crashes by Severity, 2018 - 2022



**Wild animals do not appear to be a significant contributor to crashes in the City of Cortez.** None of the KSI crashes involved wild animals.

Table 4: Wild Animal Involvement, 2018 - 2022

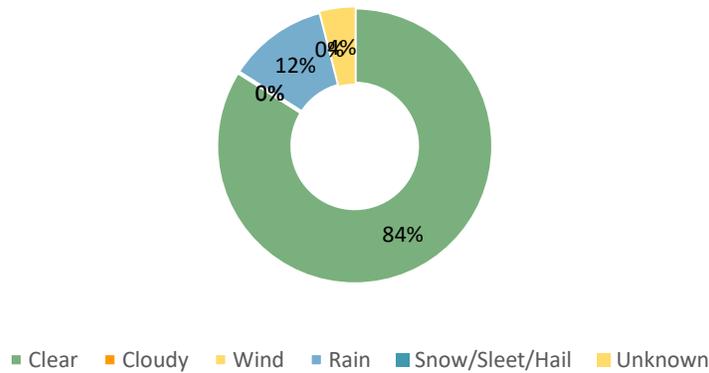
	KSI Crashes		All Crashes	
	Count	Percent	Count	Percent
<b>Deer</b>	0	0%	18	3%
<b>None/Unknown</b>	25	100%	518	97%

## WEATHER AND ROAD CONDITIONS

Weather conditions during KSI crashes were mostly clear, with about 12% of KSI crashes occurring during adverse weather conditions.

Figure 16: Weather Conditions for KSI Crashes, 2018 - 2022

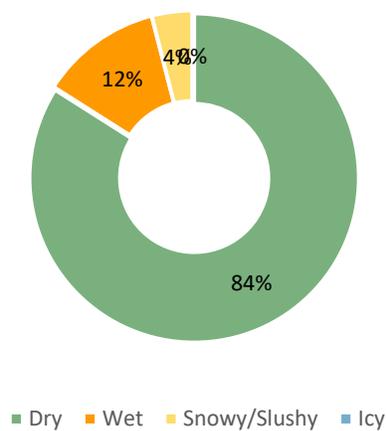
### Weather Condition for KSI Crashes, 2018 - 2022



Similarly, road conditions during KSI crashes were generally dry, with about 16% of KSI crashes occurring on wet, snowy, or slushy roadways. **Overall, it appears that poor driving conditions are not a major factor in most KSI crashes, although they may play a role in some crashes.**

Figure 17: Road Conditions for KSI Crashes, 2018 - 2022

### Road Conditions for KSI Crashes, 2018 - 2022



## WHEN DO CRASHES OCCUR?

Crash rates in Cortez vary by month for KSI crashes and crashes as a whole. Both KSI and total crashes spike in September. KSI crashes dipped in July, August, and November, but were otherwise fairly consistent across months.

As summer is the highest-trafficked season in Cortez and nearby Mesa Verde National Park, **it appears that higher numbers of visitors did not contribute to increased crashes** in the past five years.

Figure 18: KSI Crashes by Month, 2018 - 2022

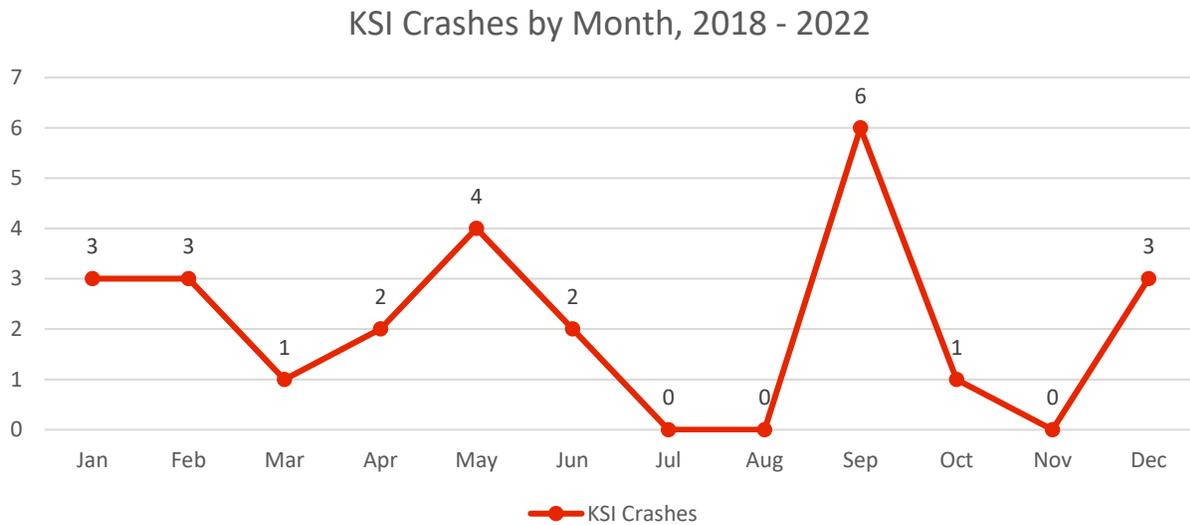
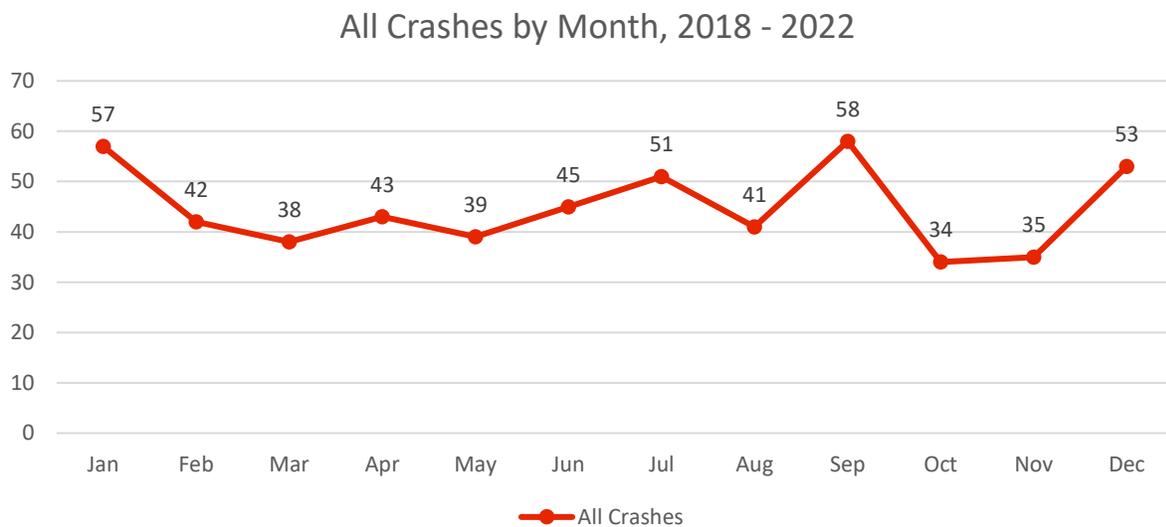


Figure 19: All Crashes by Month, 2018 - 2022



## CONCLUSION

A review of Cortez's crash history over the past five years reveals which factors may or may not contribute to fatalities or serious injuries.

- Factors that **play a strong role** in worst crash outcomes include:
  - **Mode:** Pedestrians and motorcyclists are highly at-risk if they are involved in a crash. Bicyclists are also at a higher risk of being injured in a crash.
  - **Type of roadway:** State highways have much higher overall crash rates and KSI crash rates than City roads. The top two crash corridors are both state highways. 69% of KSI crashes occur on these corridors, which represent just 6.3% (4.6 miles) of the City's road miles.
  - **Intersections and driveways:** Crashes occur more frequently at intersections or driveways than midblock locations.
  - **Lighting:** KSI crashes are more likely than non-KSI crashes to occur in dark conditions or at dawn/dusk.
  - **Alcohol or drugs:** Alcohol or drugs are involved in 12% of all crashes but 40% of fatal crashes and 25% of serious injury crashes.
- Factors that **may play a role** in worst crash outcomes include:
  - **Weather conditions:** Most KSI crashes occurred during clear and dry conditions, although weather may contribute to about 16% percent of KSI crashes.
- Factors that **do not appear to have a role** in worst crash outcomes include:
  - **Vehicle type:** Large vehicles did not appear to play a strong role in contributing to crash severity.
  - **Wild animals:** No KSI crashes were caused by striking a wild animal.
  - **Increase in tourism over the summer months:** Crashes did not spike in the summer months when the number of out-of-town visitors is highest.