Section 1

INTRODUCTION, GOALS AND STUDY AREA

1.1 Purpose and Scope

Roads are a serious conflict point between wildlife and vehicles. While roads offer a means for human travel and to move freight, they are often developed through wildlife habitats and corridors, fragmenting ecosystems, creating movable barriers in the form of vehicular traffic – all of which increases the likelihood of a wildlife-vehicle crash (WVC). As humans need a connected transportation network to live, wildlife requires an intact and connected network of habitat and corridors that promote movement to survive and thrive. The Durham-Chapel Hill-Carrboro Metropolitan Planning Organization's (DCHC MPO) Wildlife Crossings Plan aims to eliminate fatalities and serious injury crashes related to WVCs at priority sites throughout its planning area.

North Carolina and the DCHC MPO planning area are growing in both their respective transportation networks and population. North Carolina's extensive transportation network includes approximately 13,600 bridges and nearly 81,000 miles of roadway, the latter of which is the second largest state-maintained highway system in the United States.[1] **By early 2030, North Carolina is expected to become the seventh most populous state with a population of 11.7 million people.**[2] The Research Triangle region – which includes the DCHC MPO planning area – is also experiencing continued growth in both population and industry, and has been the tenth fastest growing region in the U.S. since 2020.[3] As the MPO's planning area, region, and state continue to grow, planning for wildlife crossings will be essential to reduce the likelihood of WVCs as new development, roads, and the number of vehicles on the road continues to grow. Wildlife crossing countermeasures are a proven mechanism to help ensure connected and safe travel networks for both humans and wildlife, and planning for and implementing wildlife crossing countermeasures throughout the road network, now, is an important step to take to increase the safety of both humans and wildlife alike.

Figure 1.1.1: White-tailed Deer. Sandhills Sentinel.

The impacts that roads have on wildlife have been studied for many years. The increasing toll of WVCs to both humans and wildlife led to a national study that was reported to the U.S. Congress in 2008. This report, entitled "Wildlife-Vehicle Collision Reduction Study," found that more than 1,000,000 WVCs occur annually, which present a danger to human safety and wildlife survival, cost over $8 billion, and result in approximately tens of thousands of serious injuries and hundreds of fatalities on U.S. roadways.[4] Since this 2008 report, several local, statewide, and nationwide plans have been developed, reports written, and studies conducted that demonstrate the need for wildlife connectivity and provide a framework for how transportation planning can be used to reduce the likelihood of WVCs. The DCHC MPO has reviewed many of these authoritative documents to develop a background of current wildlife crossing research and countermeasures for this wildlife crossing planning effort. The list of reference documents within this plan can serve as a guide for individuals interested in developing a deeper understanding of the many facets of wildlife connectivity.

1.2 Goals and Objectives

The goal of the DCHC MPO Wildlife Crossings Plan is to improve the safety of drivers and wildlife by eliminating fatalities and serious injuries as a result of WVCs in the MPO's planning area. The following steps were established to help meet this goal:

1. **Establish a Core Technical Team of key stakeholders** to help guide the planning process, provide expertise, and to strengthen communication and partnerships for wildlife crossing planning.

2. **Identify key wildlife crossing sites** in the DCHC MPO planning area.

3. **Visit, evaluate, and develop recommendations for key wildlife crossing sites.** Recommendations include retrofits at existing bridge and culvert infrastructure, strategies to be considered and incorporated into bridge and culvert replacement projects, and the construction of new infrastructure.

4. **Develop an implementation strategy** for funding and delivering wildlife crossing projects at key crossing sites and provide a framework for conducting a cost-benefit analysis for each project to help guide decision-making.

5. **Establish partnerships with a wide range of stakeholders to coordinate and advance wildlife crossing projects and issues.** Partners and stakeholders should include parks & recreation and open space departments, transportation agencies, local land trusts, conservation groups, private entities, and state agencies.

6. **Adopt recommendations in local, state, and MPO transportation plans and processes** – including SPOT, STIP, CTP, MTP and local plans – so that all new road and bridge projects that cross wildlife corridors and core areas are informed by the recommendations from the start. This entails the DCHC MPO Board and NCDOT Board of Transportation adopting relevant projects into the CTP and MTP, and local councils and county board of commissioners adopting relevant changes to local ordinances.

1.3 Study Area Description

The DCHC MPO is the regional organization responsible for transportation planning for the western part of the Research Triangle area in North Carolina. The MPO's planning area is defined by the U.S. Census and includes:

- Durham County (entire county)
- A portion of Orange County including the Towns of Chapel Hill, Carrboro, and Hillsborough
- Northeast Chatham County

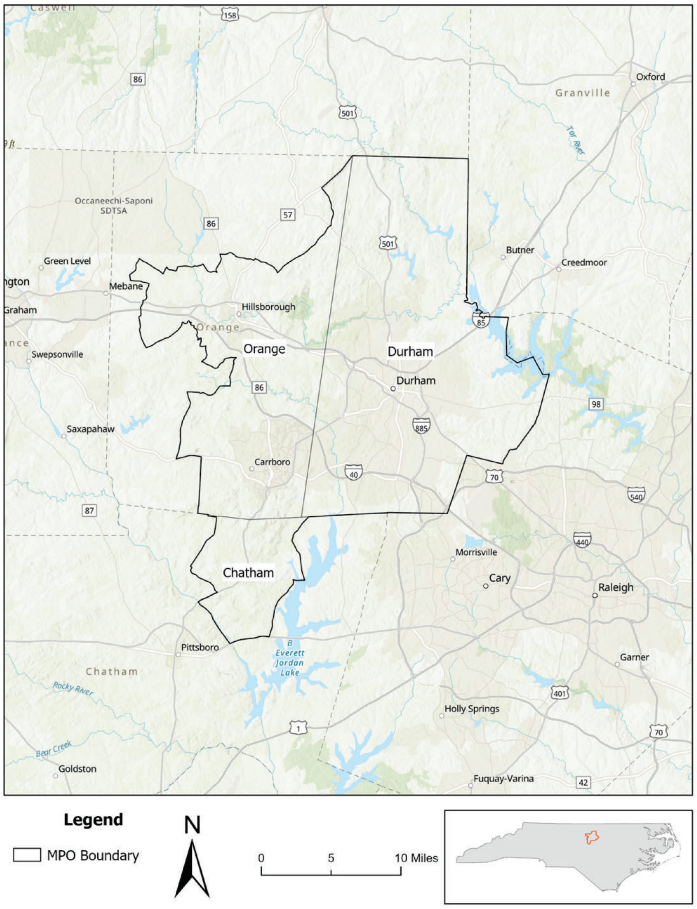

Figure 1.3.1: DCHC MPO Boundary Map.

1.4 Reported Wildlife-Vehicle Crash Data

Wildlife-vehicle crash estimates can come from many sources, including reported WVC data from state DOTs, carcass removal records, and insurance claims. This data can help identify locations of concern that could be improved with wildlife crossing solutions. However, caveats do exist with these datasets, as it is likely they are incomplete and may not show all WVCs for a given area.

Therefore, it must be noted that the absence of animal-vehicle crash reports and data does not indicate the presence of a safe road network for wildlife or drivers.

Reported WVC Data from NCDOT. Reported WVC data for both North Carolina and the DCHC MPO planning area is generated by law enforcement agencies using standard crash report forms. The data from these forms are then shared with NCDOT to develop statewide WVC datasets. In such instances, law enforcement may only be called upon if a vehicle collided with a large animal – such as a white-tailed deer – due to the potential of increased severity of a crash. It is likely that vehicle collisions with small to medium-sized animals – such as turtles, opossum, and snakes – are not included in law enforcement crash reports and thus are not reflected in the actual number of reported WVCs. In addition to documenting what type of injury resulted from the crash in their report, law enforcement generates an on-site estimate of the property damage incurred. This estimate is preliminary and may not coincide with the estimated costs of a WVC as described in NCDOT's 2023 Standardized Crash Cost Estimates for North Carolina. NCDOT's reported WVC data was analyzed as part of the MPO's planning process.

Reported WVCs in North Carolina

NCDOT's reported WVC data is used to develop its Animal Related Crashes: 2020 – 2022 County Rankings and Crash Data report. Table 1.4.1 shows the total number of reported crashes, fatalities, and injury types for North Carolina between 2020 – 2022 from this report. The most recent year from this report, 2022, shows that 20,098 reported wildlife-vehicle crashes occurred statewide.

These reported statewide crashes in 2022 have an estimated comprehensive crash cost estimate of $486,000,000 (based on NCDOT's 2023 Standardized Crash Cost Estimates for North Carolina).[5]

Human injuries are categorized as A, B, or C. As indicated in Table 1.4.1, an A-Injury, referred to as a Suspected Serious Injury, is any non-fatal injury which results in a severe laceration, broken extremities, and/or significant burns. A B-Injury, referred to as a Suspected Minor Injury, is any non-fatal or serious injury that is evident at the scene of the crash that includes abrasions, bruises, or minor lacerations. A C-Injury, referred to as a Possible Injury, is any non-fatal, suspected serious or suspected minor injury that includes momentary loss of consciousness, limping, or complaint of pain.[6]

Table 1.4.1: North Carolina Animal Related Crash Data, 2020-2022.[10]

Total Crashes	Total Fatalities	A Injuries	B Injuries	C Injuries	Total Injuries (A+B+C)
59,644	13	84	785	1,810	2,679

Reported WVCs in Durham, Orange, and Chatham Counties

Referencing the data from the NCDOT Animal Related Crashes: 2020 – 2022 County Rankings and Crash Data report, DCHC MPO's counties of Chatham, Orange and Durham are among the 100 counties in North Carolina that are experiencing the highest number of reported WVCs. Table 1.4.2 shows each county ranking, and the total number of reported crashes, fatalities, injuries and types from its 2020-2022 report. Also included in Table 1.4.2 are the comprehensive crash cost estimates as described in NCDOT's 2023 Standardized Crash Cost Estimates for North Carolina. Elements that go into the comprehensive crash

cost estimate include medical expenses, emergency services, victim work loss, employer costs, traffic delay, property damage, and quality of life. To generate the comprehensive crash cost estimate, the type of injury and number of occurrences, was applied to NCDOT's 2023 Standardized Crash Cost Estimates for North Carolina. Additional information about NCDOT's 2023 Standardized Crash Cost Estimates for North Carolina can be found in Section 2.6: Cost-Benefit Analysis.

Table 1.4.2: Overview of WVC data for Chatham, Orange, and Durham Counties (adapted from NCDOT's North Carolina Animal Related Crashes: 2020-2022 County Rankings and Crash Data[11] and NCDOT's 2023 Standardized Crash Cost Estimates for North Carolina).[12]

County	NCDOT North Carolina Animal Related Crashes: 2020-2022 County Rankings and Crash Data								NCDOT 2023 Standardized Crash Cost Estimates for North Carolina
	County Ranking (Crashes)*	Total Crashes	Total Fatalities	A Injuries	B Injuries	C Injuries	Total Injuries (A+B+C)	Non-injury crashes	Comprehensive Crash Cost Estimates
Chatham	21 / 100	936	0	2	19	10	31	905	$28,456,000
Orange	30 / 100	801	0	2	10	36	48	753	$25,755,000
Durham	35 / 100	638	0	0	10	28	38	600	$20,470,000
TOTAL		**2,375**	**0**	**4**	**39**	**74**	**117**	**2,258**	**$74,681,000**

**Ranking from 1-100; 1 indicating the county with the highest number of animal-vehicle crashes, and 100 indicating the least number of animal-vehicle crashes.*

Carcass Removal Records. Tracking carcass removals along roadways may offer a more complete estimate of the number of WVCs by considering smaller roadkill that may not appear on law enforcement crash reports, though many animals involved in collisions leave crash sites injured, only to perish off the road. While some state DOTs track removal of carcasses along roadways, NCDOT currently does not. Therefore, carcass removal records were unavailable for consideration during the MPO's planning process.

Insurance Claims. Insurance claims pertaining to WVCs can help provide a more complete picture of the number of wildlife involved in vehicle crashes and the costs associated with these claims. The caveats with this data are that WVC claims may not be available for all insurance carriers, and data is often not available at the county and location level. For this planning effort, DCHC MPO was able to obtain the number of WVCs for the state of North Carolina as a whole from one insurance carrier.

Comparison of NCDOT Reported WVCs vs Insurance Claims

While the human and wildlife impact this report details are considerable, it is likely only a fraction of the full impact. A comparison (Table 1.4.3) of the reported WVCs from the NCDOT Traffic Safety Unit's Animal Related Crashes: 2020 – 2022 County Rankings and Crash Data report by year, to a single insurance company's animal collision claims in North Carolina from July 1, 2022 to June 30, 2023[7], shows that **there are at least four times more WVCs and related impacts occurring in North Carolina on an annual basis than what law enforcement records show**.

Table 1.4.3: Comparison of NCDOT Reported Wildlife-Vehicle Crashes and WVC Insurance claims.

	2020 (NCDOT)	2021 (NCDOT)	2022 (NCDOT)	7/22 - 6/23 (Insurance Agency)
Reported WVCs	18,638	20,908	20,098	88,770

Virginia DOT Review of Animal-Vehicle Crash Data

North Carolina and Virginia not only border one another, but they also have high numbers of deer-vehicle collisions (DVCs), and their state DOTs both receive DVC/WVC data from their respective law enforcement agencies through crash reports. In 2017, Virginia DOT published findings from a study examining the quality and cost evaluations of DVC data in Virginia, which indicated an underreporting phenomenon understood to be a nationwide problem. The study found that DVCs represent a considerable safety hazard in Virginia, but the magnitude of this problem exceeds the reported WVC data available. According to Virginia's deer carcass removal records that they track (North Carolina does not currently track carcass removals), **the number of DVCs was up to 8.5 times greater than what was documented in law enforcement reports**.

This underrepresentation of DVCs understates the costs of these types of collisions, and they were estimated to be six times costlier on average than what was indicated in law enforcement agency crash reports.[8] Based on these findings, the potential of the MPO's planning area having 8.5 times more WVCs than what the reported NCDOT data shows is reflected in each project sheet included in this plan.

1.5 Wildlife Species

The DCHC MPO planning area serves as a home and corridor for a variety of wildlife impacted by transportation infrastructure. Common sightings of roadkill along roadways include white-tailed deer (large sized); turkey vulture and gray fox (medium sized); and eastern box turtle, eastern gray squirrel, raccoon, and Virginia opossum (small sized). In terms of navigating roads and crossings, each species has its own challenges based on differences in mobility, speed, defensive tactics, and eating and scavenging habits. Therefore, crossing improvements should consider the variety of wildlife found in the MPO's planning area. While not exhaustive, a list of wildlife (amphibians, birds, mammals, and reptiles) identified in the MPO's planning area that are impacted by crossings can be found in Appendix C.

Figure 1.5.1: White-tailed Deer Fawn. Julie Tuttle.

While numerous species can be found within the MPO's planning area, white-tailed deer are of particular concern in terms of WVCs and the potential for serious injuries and fatalities. According to the white-tailed deer density map developed by the NCWRC, the MPO's counties have among the highest white-tailed deer counts per square mile in North Carolina.[9] Durham County has 41-50 white-tailed deer per square mile, Orange County has more than 50 white-tailed deer per square mile, and Chatham County has 31-40 white-tailed deer per square mile. Due to the high density of white-tailed deer in the MPO's planning area, implementing wildlife crossing solutions at key locations is an essential step to reducing WVCs. Additionally, investigating the structure for evidence of rare, endangered or tracked species should be conducted. The NCWRC is an example of an agency who could be consulted during this process.

Figure 1.5.2: Box Turtle at Smith Level Road. Julie Tuttle.