Travel Market Analysis

For the Centralina Regional Council

12/15/2020

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Introduction

Our region is growing and developing at an immense rate. This growth raises important questions about the future of mobility, accessibility, and connectivity for the 12 counties in and around the Charlotte metropolitan area.

Transportation is critical for keeping a region moving. Transportation and transportation options help enhance the quality of life for area residents and visitors by providing greater access to education, healthcare, and recreational activities. These options impact economic development and the availability of goods and services by bringing more jobs within reach of the greater region. Areas that are seamlessly interconnected by a variety of transportation methods are far more likely to attract people, business, investment, and new opportunities.

To help address the issues of seamless transportation connections, the region embarked on a project called CONNECT Beyond. CONNECT Beyond is a two-state, 12-county regional mobility initiative coordinated by the Centralina Regional Council and the Metropolitan Transportation Commission to create a unified regional transit vision and plan.

Purpose

The purpose of this memorandum is to summarizes the methods used to develop and analyze transit markets within the Project Study Area (Figure 1) and provide a comparative estimate of the number of trips made within the Project Study Area today and in the future. The travel market analysis completed for the CONNECT Beyond initiative (hereafter "the Project") was conducted with data from the Metrolina Regional Model[1] and the NC Statewide Travel Model[2], and in cooperation with representatives from Centralina Regional Council and the regional partners contributing to the Project.

Project Background

Over the past two decades, the greater Charlotte metropolitan region has experienced unprecedented growth. Strategic public infrastructure investments such as the Blue Line light rail system coupled with the region's diversified economic and industry base have helped attract and retain a rich mixture of residents and workers. This has helped the region remain resilient through turbulent national economic cycles and most recently through the COVID-19 pandemic.

Transportation has been regularly identified by residents as a top priority for regional leaders to address. Past planning efforts including CONNECT Our Future, an initiative focused on developing a comprehensive regional growth framework across 14 counties in North Carolina and South Carolina, established core values to help guide the region's growth and development.

Transportation remains a central feature of the ongoing CONNECT Our Future effort. With 1.8 million additional residents projected to arrive in the region by 2045, or the equivalent of adding

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[1] MRM2001, Working Version, August 8, 2020
[2] NCSTM, Version 3.0

the total population of Raleigh to our area, regional and community leaders realized that a variety of mobility options would be needed to support all travelers. As economic conditions, financial outlooks, transportation system trends, and land use environments change, it is important that plans be updated to account for them. As the Charlotte region continues to compete on the global stage, access to a safe, reliable, affordable, and well-connected transportation network using a variety of transportation modes that connect the region's cities, towns, and counties is one of the most important means of ensuring equitable participation and benefits to social and continued economic prosperity.

The Project Study Area, shown on Figure 1, includes Anson, Cabarrus, Cleveland, Gaston, Iredell, Lincoln, Mecklenburg, Rowan, Stanly, and Union counties in North Carolina and the urbanized areas of Lancaster and York counties in South Carolina.

SOURCE: NCDOT, SCDOT, HDR 2020
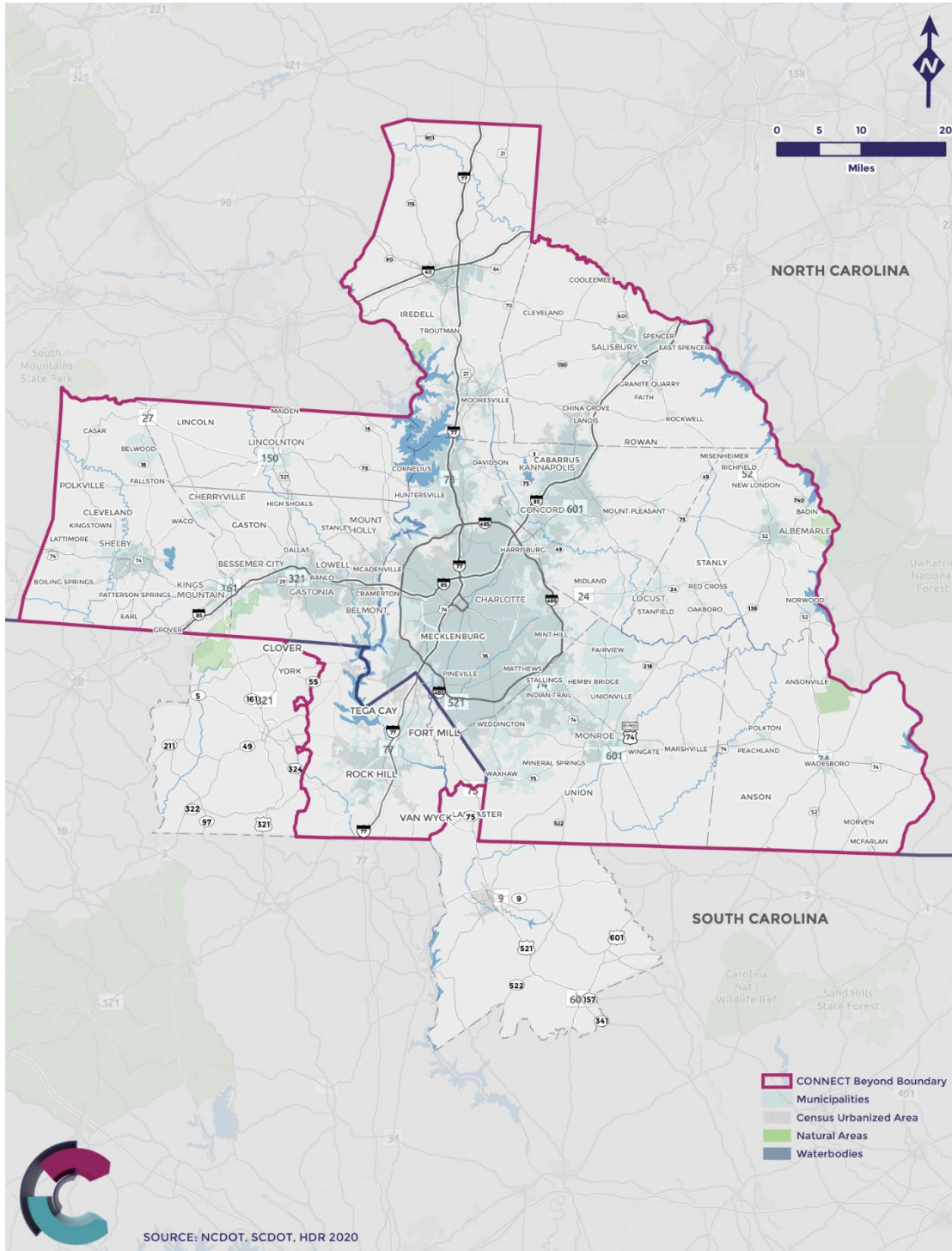
Source: HDR, Inc., 2020

Travel Market Analysis

Intent of the Travel Market Analysis

The primary intent of the travel market analysis effort is to understand where the greatest number of trips are occurring in the Project Study Area, and to identify where the trips start and where they end. This effort is achieved by analyzing current transportation system user characteristics and area-wide socioeconomic and demographic characteristics that shed light on the likelihood of an individual to use public transit.

An important tool in understanding where trips begin and end in the study area is travel forecasting. Travel forecasting is a statistical exercise that attempts to understand average travel behaviors based on observed data from statistically relevant travel survey information which is collected periodically. While it is one of several analytical tools used to understand travel patterns, travel forecasting is an important planning tool used to identify and evaluate current and future demands on a region's existing transportation system, and to help decision-makers plan for future investments to the transportation network.

Understanding travel markets helps to identify the various layers of needed mobility, from high capacity transit corridors and areas for fixed route service to areas that may be candidates for flexible transit services and more. Figure 2 shows the various layers of mobility for the Project.

FIGURE 2: CONNECT BEYOND LAYERS OF MOBILITY
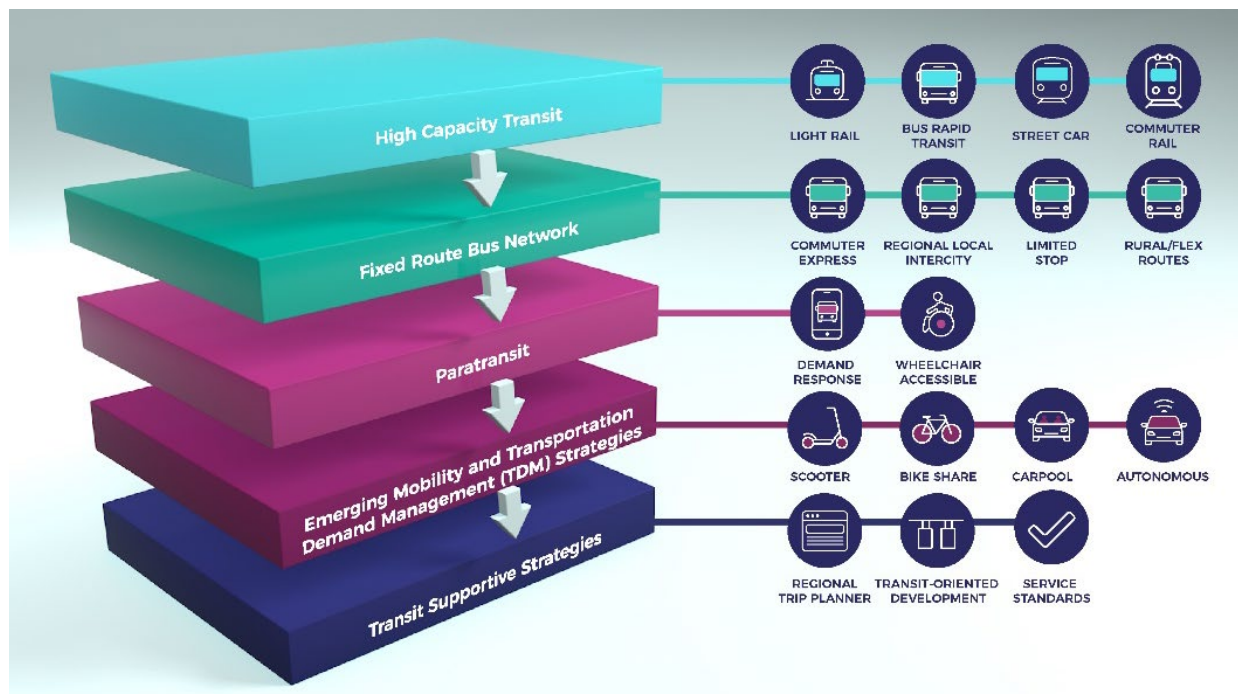
Source: HDR, Inc., 2020

Report Organization

This technical memorandum is organized around the methods used to develop and analyze the travel markets (more specifically, transit markets), the results and determinations of the analysis, and concluding comments along with identification of next steps. The report is structured as follows:

- The Travel Market Analysis Methodology section of this report provides a detailed explanation of the methodology used to develop and analyze the travel markets.
- The Analysis Results section discusses the key themes and initial determinations from the travel forecasting and transit market identification effort. The results of this effort help to inform subsequent phases of the Project, such as the identification of initial candidate High-Capacity Transit (HCT) corridors, consideration of the interplay between local fixed route networks, human service/Americans with Disabilities Act (ADA) transportation services, and overall mobility.
- Finally, the Conclusions and Next Steps section provides a general summary of the travel market analysis effort, and thoughts on the next steps for travel forecasting to be completed in subsequent planning efforts.

Travel Market Analysis Methodology

As previously mentioned, the primary intent of the travel market analysis effort is to understand where the greatest number of trips are occurring in the Project Study Area and to identify where the trips start and where they end. The identification and analysis of travel markets and associated travel projections are intended to serve as the basis not only for forming decisions regarding transit system improvements, but also for considering current corridor deficiencies and future capacity needs. The goals of this effort included the following:

1. Identify unserved or underserved transit areas[3]
2. Identify transit-ready areas[4].
3. Assess the needs and opportunities of the current transit market and identify future opportunities.

For CONNECT Beyond, the study utilized data from the Metrolina Travel Demand Model (TDM), more specifically from the latest tour based Metrolina Regional Model (MRM2001, Working Version, August 8, 2020) and the NC Statewide Travel Model (NCSTM, Version 3.0). The Metrolina TDM covers 11 of the 12 counties within the Project Study Area and includes approximately 3,490 traffic analysis zones (TAZs).[5] The TAZs are a special area delineated by state and/or local transportation

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3 The unserved or underserved transit areas refer to those places and neighborhoods that are transit deserts where people can be stranded due to inadequate or infrequent transit services. In essence, living in these areas makes it hard to access jobs, health care, and other services, and consequentially hinders upward mobility. In other words, these are places where demand for transit services exceeds supply.

4 The transit-ready areas refer to those places and neighborhoods where transit services can readily attract enough riders due to amenable socio-economic and infrastructure conditions such as walkable streets, dense mixed-use neighborhoods, zero-car households, young adult populations, workers with longer commutes, and major work sites.

5 The Metrolina TDM does not cover Anson County, therefore the project team utilized the North Carolina Department of Transportation (NCDOT) Statewide Model to cover Anson County using a similar process as described above.

officials for tabulating traffic-related data (based on trip purpose such as journey-to-work and place-of-work).[6] The TAZs from the Metrolina TDM are populated with current (year 2015) and forecasted (year 2045) population and employment data. The TAZ data is used in the TDM to estimate and project travel patterns within the 11-county modeled region. The projected travel patterns for Anson County, which is not in the Metrolina TDM, was adapted from the North Carolina Statewide Travel Model. Figure 3 depicts the 3,490 TAZs of the Metrolina Regional Model, shown with a grey outline. The market areas are illustrated with the various colors.

There are four main trip purposes generated from the models. The following trips represent most of all trips originating (productions) or ending (attractions) within the Metrolina TDM region:

- **Home Based Work (HBW) Trips**: HBW trips are those that either begin at home and end at the respondent's workplace or begin at the respondent's workplace and end at home.
- **Home Based Other (HBO) Trips**: HBO trips are those that either begin or end at a home but do not involve a stop at the workplace.
- **At Work (ATW) Trips**: NHB trips are those that do not involve a stop at home.
- **Home-Based Shopping (HBS) Trips**: HBS trips are those that involve shopping to/from a zone with retail employment.

However, analyzing and visualizing trip origin and destination for 3,490 TAZs is difficult and would not clearly delineate strong regional travel patterns. To analyze and make sense of trip origin and trip destination within the Project Study Area, the TAZs were clustered; i.e. one or more TAZs were combined into manageable Transit Market Analysis areas. The following factors were taken into consideration in the clustering of the TAZs:

- Population density
- Employment density
- Trip productions and attractions densities
- Jurisdictional boundaries
- Physical barriers
- Existing major transportation network

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[6] Source: easidemographics.com

FIGURE 3: METROLINA REGIONAL MODEL TAZs AND MARKET AREAS
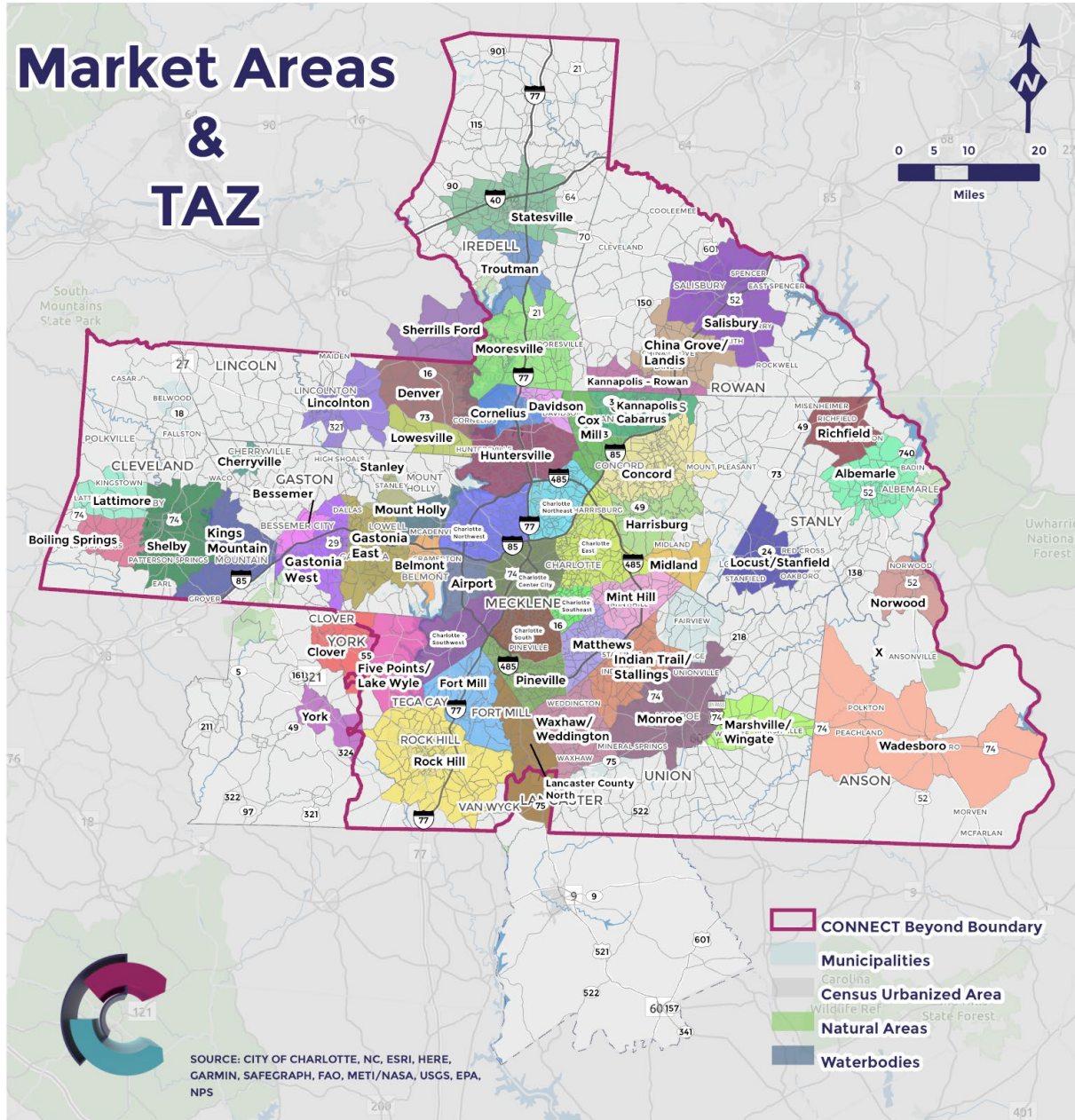
Sources: Metrolina Regional Model (MRM2001, Working Version, August 8, 2020) and the NC Statewide Travel Model (NCSTM, Version 3.0)

Travel Market Identification Methodology

A draft set of market areas was created using select TAZ level input and output data for horizon year 2045 from the Metrolina TDM. The input data included population and employment and the output data included trip productions and trip attractions. Because TAZs vary in size, the input and output data were normalized by TAZ area in square miles. Other factors such as jurisdictional boundaries, physical boundaries, and the existing major transportation network were considered. The following density criteria were used to identify the various market areas. Three levels of density were used in order to identify places where different types of transit services could be supported.

Level 1

The first level of the density criteria used the following parameters to identify market areas:

- 1,000 persons per square mile
- 1,000 employees per square mile
- 2,000 productions per square mile
- 2,000 attractions per square mile

A TAZ that met any of the above criteria fell under Level 1. An example of TAZs in Gaston County captured under Level 1 is shown on Figure 4 below. Looking at the table on Figure 4, over 66 percent of Gaston County's total population and productions are captured and over 80 percent of Gaston County's employment and attractions are captured under Level 1. Figure 4 shows all TAZs in Gaston County that meet at least one of the Level 1 density thresholds. Figure 4 also shows a summary table which provides the breakdown of the underlying data related to population, employment, productions, and attractions for the TAZs (i.e., Market Area Total) and for the whole county. For Gaston County, the Level 1 density thresholds adds to 173,733 people and 104,127 jobs.
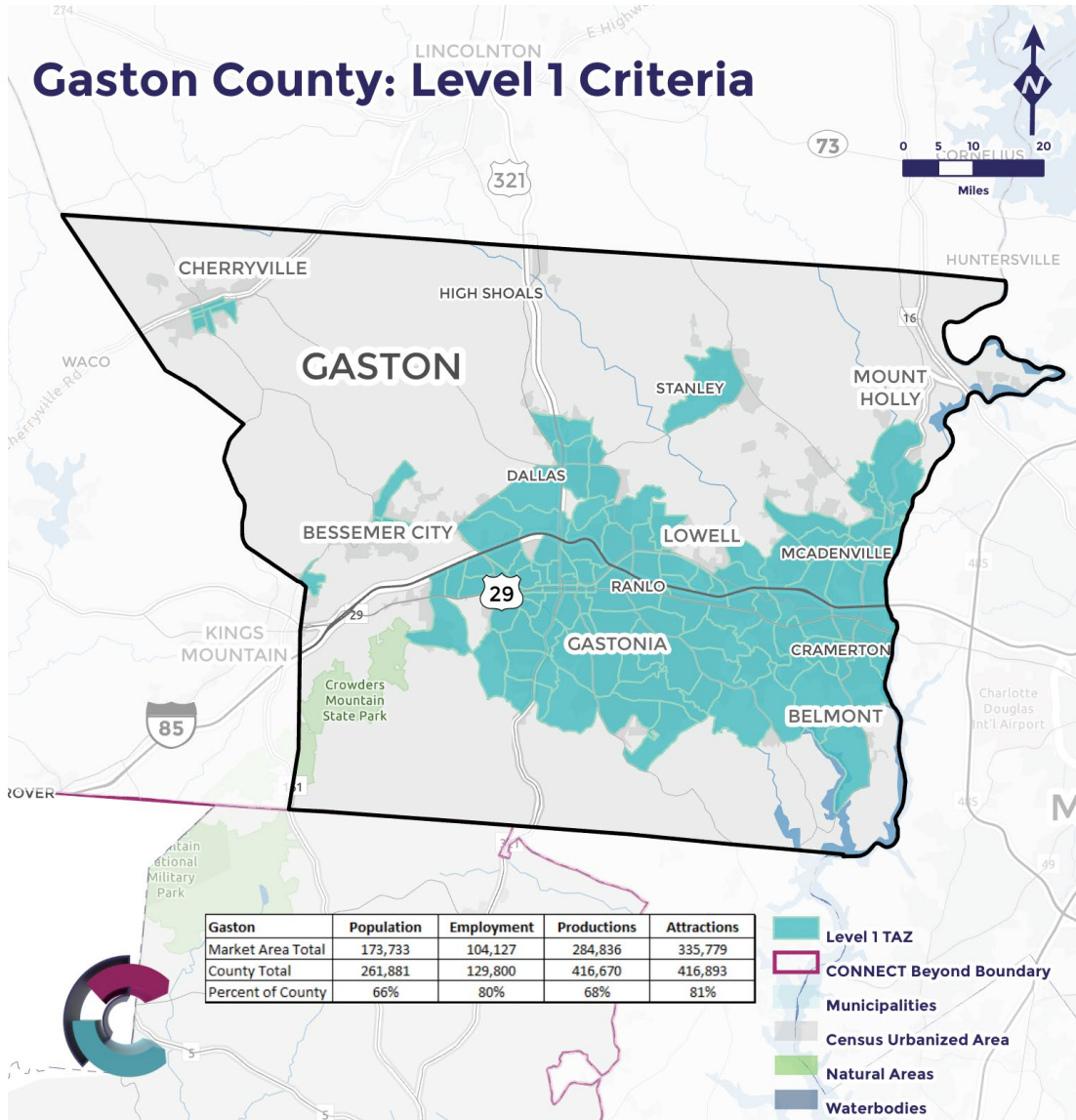
Gaston	Population	Employment	Productions	Attractions
Market Area Total	173,733	104,127	284,836	335,779
County Total	261,881	129,800	416,670	416,893
Percent of County	66%	80%	68%	81%

Sources: Metrolina Regional Model (MRM2001, Working Version, August 8, 2020) and the NC Statewide Travel Model (NCSTM, Version 3.0)

Level 2 Density

The Level 2 criteria used half the density levels of Level 1. The objective is to identify edge cities and suburban places where transit as a mode of transportation could be competitive with auto travel. This also expands the number of TAZs that can be used to form market areas and increases the representation of input and output data from the model.

- 500 persons per square mile

- 500 employees per square mile
- 1,000 productions per square mile
- 1,000 attractions per square mile

The TAZs captured under Level 1 and 2 in Gaston County are illustrated on Figure 5. Note that over 79 percent of the county's total population, productions, and over 90 percent of employment, and attractions are captured under Levels 1 and 2.

FIGURE 5: GASTON COUNTY LEVEL 1 AND LEVEL 2 TRAVEL MARKET AREA IDENTIFICATION

Gaston	Population	Employment	Productions	Attractions
Market Area Total	207,393	119,119	338,604	375,033
County Total	261,881	129,800	416,670	416,893
Percent of County	79%	92%	81%	90%
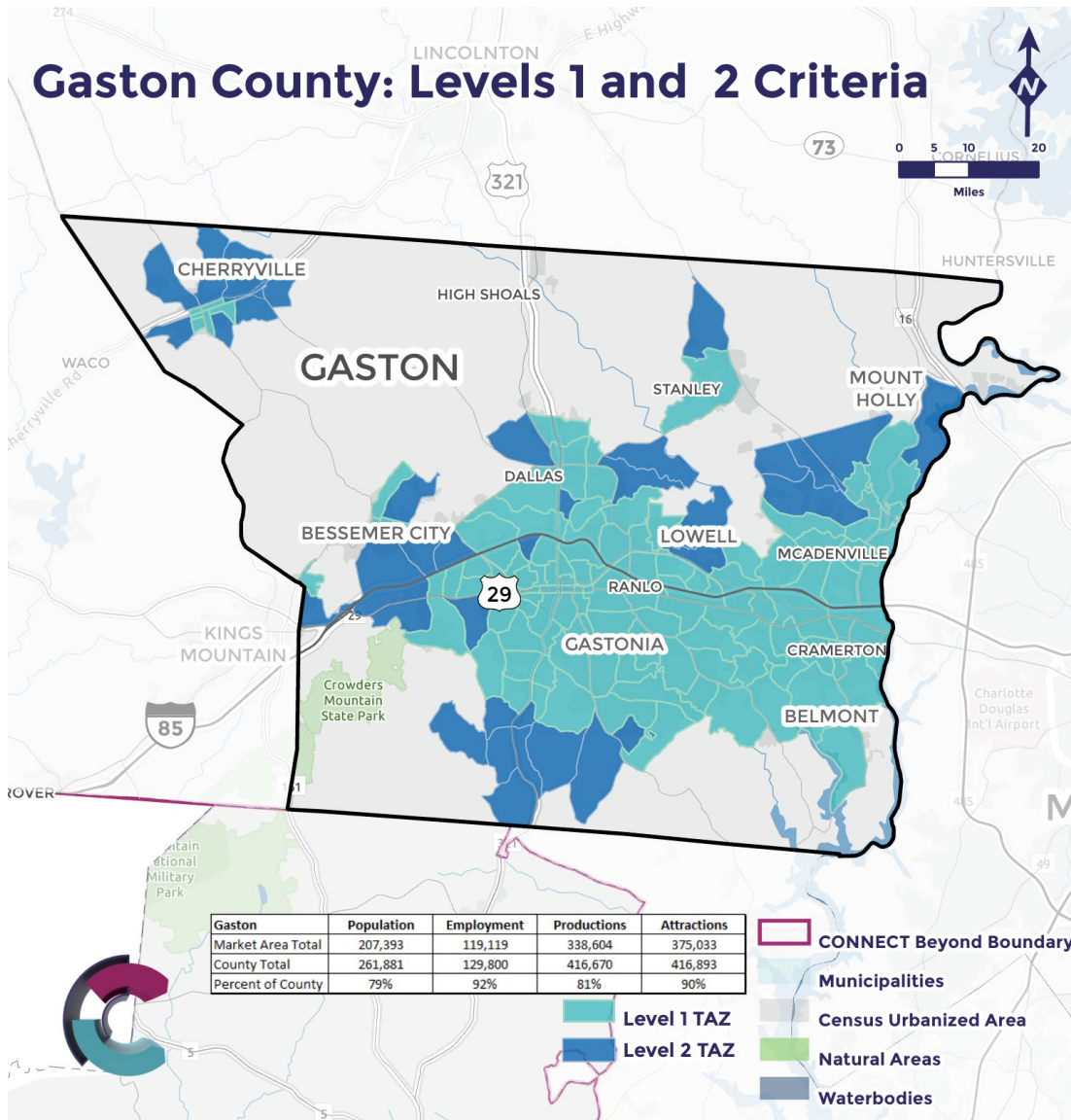
Source: Metrolina Travel Demand Model, 2020

Level 3 Density

The TAZs selected under Level 3 are not data driven. This level is used to fill gaps within the areas captured under Levels 1 and 2. For some counties, it is used to increase the percentages of input and output data represented within the market areas. The general threshold used as a minimum representation for all criteria was 75 percent of the county totals.

Figure 6 shows an example of TAZs selected under Levels 1, 2, and 3. Note that once a minimum threshold of 75 percent is reached for all input and output data, adding TAZs under Level 3 would not significantly change the results of the origin and destination analysis.

FIGURE 6: GASTON COUNTY LEVEL 1, LEVEL 2, AND LEVEL 3 TRAVEL MARKET AREA IDENTIFICATION
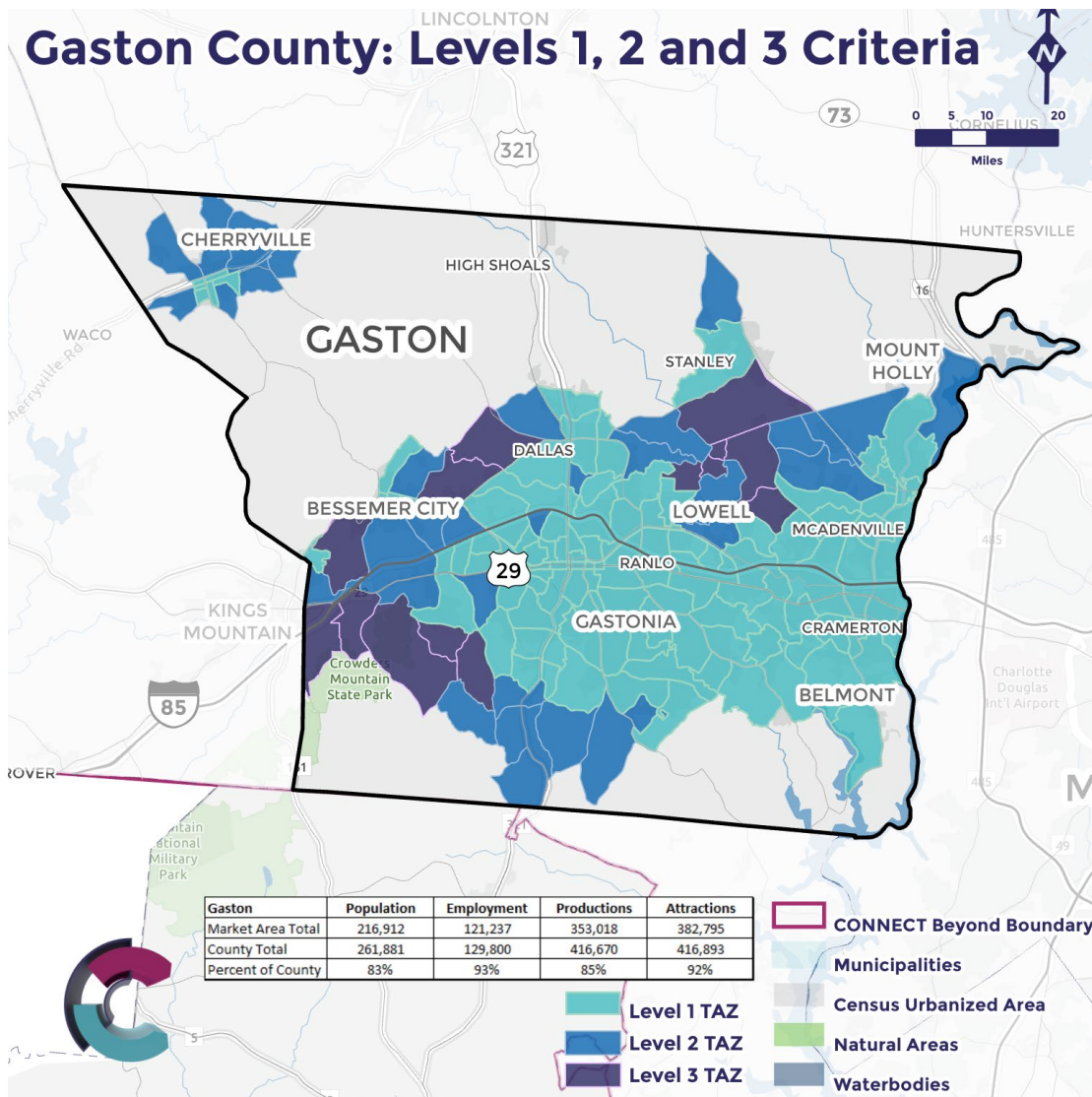
Gaston	Population	Employment	Productions	Attractions
Market Area Total	216,912	121,237	353,018	382,795
County Total	261,881	129,800	416,670	416,893
Percent of County	83%	93%	85%	92%

Sources: Metrolina Regional Model (MRM2001, Working Version, August 8, 2020) and the NC Statewide Travel Model (NCSTM, Version 3.0)

The TAZs selected under Levels 1, 2, and 3 were subsequently clustered into market areas. Most of the market areas were focused around the larger communities within the region, as these attract more people and jobs. Some areas may represent a combination of communities or subareas of a county. Larger communities may be split in order to help in the analysis of origin-destination trips.

Figure 7 provides an example of a draft set of travel market areas created in Gaston County. Because of its geographic size, the City of Gastonia was split into east and west market areas to better reflect travel pattern, accessibility pattern, and travel shed.

The above methodology of applying three levels of density filters to identify TAZs for transit markets was used for all counties in the Project Study Area except for Mecklenburg County. In Mecklenburg County, nearly all TAZs fall within the Level 1 and 2 criteria used for creating market areas for the surrounding counties. This is naturally associated with Mecklenburg County being the most populous county in North Carolina, with nearly one million residents. The market areas created in Mecklenburg County were based on physical boundaries (roads or rivers) and jurisdictional boundaries (municipalities). Information from the North Carolina Strategic Statewide Transportation Plan[7] was also used to help define the market areas.

Figure 8 provides a map showing the draft set of 14 travel market areas for Mecklenburg County.

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[7] Source: https://www.ncdot.gov/divisions/public-transit/statewide-strategic-plan/Documents/december-2018-strategic-plan.pdf

Sources: Metrolina Regional Model (MRM2001, Working Version, August 8, 2020) and the NC Statewide Travel Model (NCSTM, Version 3.0)

FIGURE 8: MECKLENBURG COUNTY TRAVEL MARKET AREAS
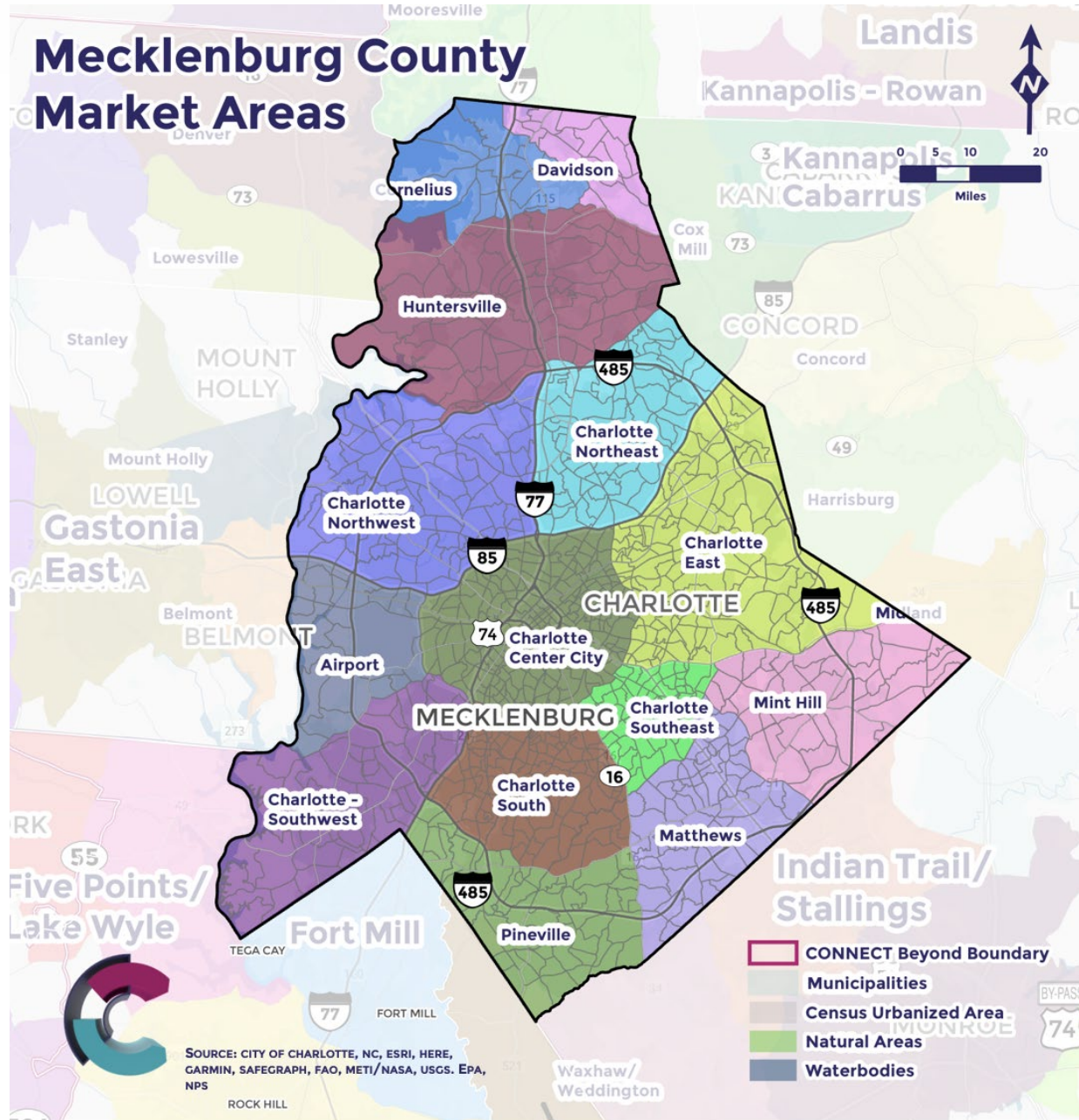
Sources: Metrolina Regional Model (MRM2001, Working Version, August 8, 2020),the NC Statewide Travel Model (NCSTM, Version 3.0), and North Carolina Public Transportation Strategic Plan

Based on the feedback from the CONNECT Beyond Project Management Team (PMT), the market analysis areas were adjusted slightly based on observations of common travel behaviors that statistical models may not anticipate. After the analysis, a total of 55 market areas resulted for the Project.

Once the market analysis areas were defined, a cross reference table was created between the TAZs and the market areas. This allowed the TAZ level origin-destination trips to be collapsed into origin-destination trips between market areas because the TDM provides origin-destination trips by trip type/category, such as HBW, HBO, ATW, and HBS.

Conducting the Travel Market Analysis

With the travel markets identified, the next step was to analyze anticipated trip behaviors within the Study Area and specific counties. This also enabled a look at potential transit markets with respect to travel flows. The travel flow analysis focused on measuring the likelihood of individuals using public transit in TAZs based on population, employment, and trip activity densities only. The analysis suggested that transit ridership will be more likely in TAZs with higher overall trip densities. The results of the analysis showed urban areas having a greater inclination for transit use, as well as densely populated suburban and rural areas having moderate to high levels of potential transit ridership. In the travel market analysis, the focus shifted to projecting trip origins and destinations and estimating the relative size of the commuting, shopping, and other trip flows among the identified market areas. The following steps were used to analyze the transit market areas with regards to the goals for this task.

- **Step 1**: Review the market analysis areas with the PMT and refine as necessary.
- **Step 2**: Create summary origin-destination trips between market analysis areas as a matrix by trip purpose and for total trips.
- **Step 3**: Develop an origin-destination summary matrix for the base year (2015) and horizon year (2045).[8]
- **Step 4**: Graphically depict internal and external flows for each travel market area.

Analysis Results

This section discusses the key themes and results of the travel forecasting and transit market area analysis developed and conducted for the Project. It is important to note that the results of the analysis were reviewed on several occasions by the PMT as a matter of routine review and quality check regarding the data used and interpreted.

Travel Market Areas

During the data analysis phase, the consultant team in coordination with the PMT identified 55 different travel market areas throughout the Project Study Area (Figure 9). These market areas

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[8] Travel demand data for Anson County was only available from the NC Statewide Travel Model, with a projected year of 2040. The project team worked to incorporate, and in some cases establish conversion factors, that enabled the data to be merged with the data from the Metrolina Regional Model as best it could.

represent 91 percent of the population and 97 percent of the employment within the Project Study Area for the horizon year 2045.

Mecklenburg County by far has the most population and employment. The 14 market areas created for Mecklenburg County represent 1.7 million in population and 1.3 million in employment for the horizon year 2045. Collectively, the 41 market areas outside Mecklenburg County represent 2 million in population and 1 million in employment.

FIGURE 9: CONNECT BEYOND TRAVEL MARKET AREAS
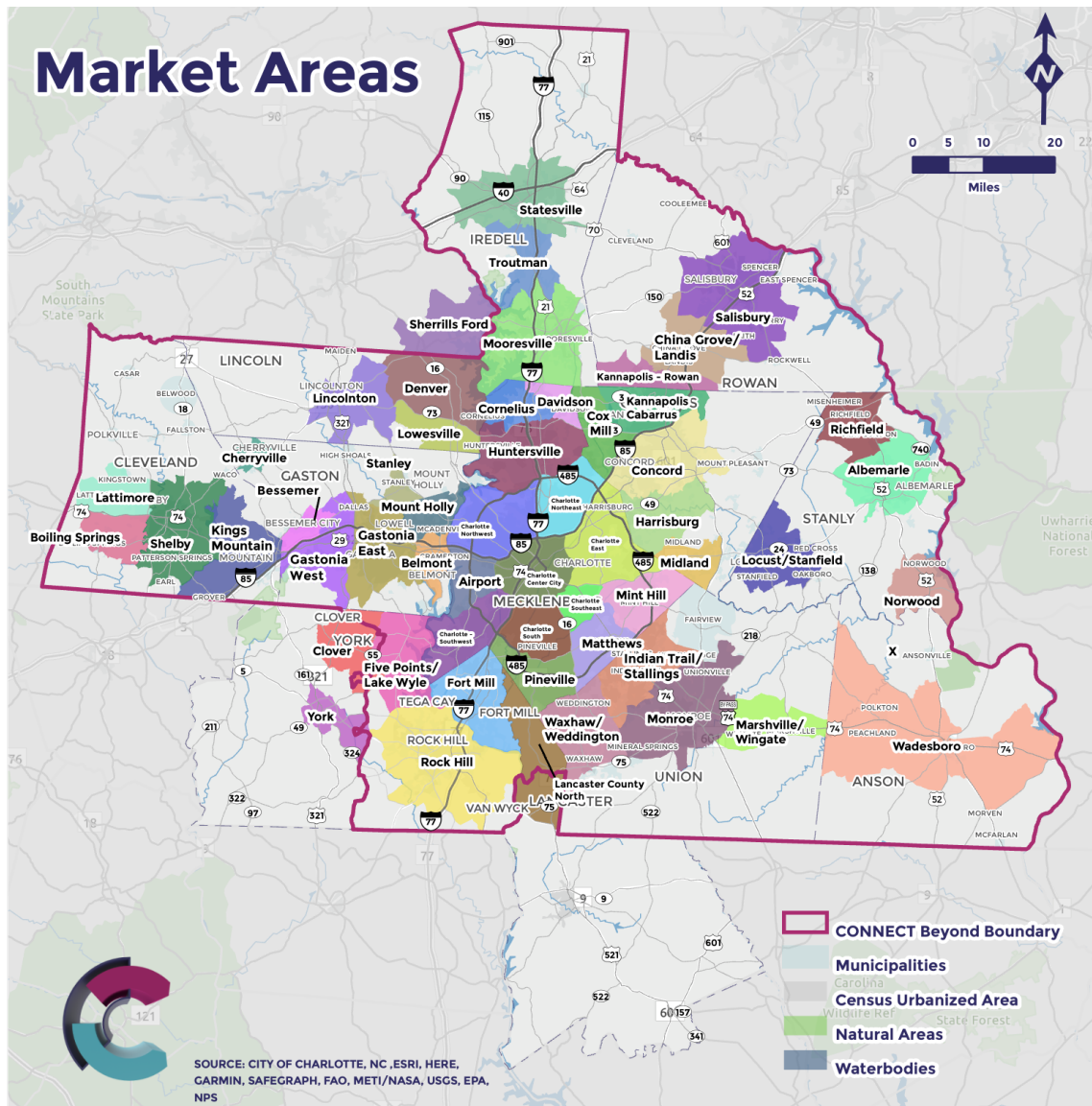
Source: Metrolina Regional Model (MRM2001, Working Version, August 8, 2020), the NC Statewide Travel Model (NCSTM, Version 3.0), and the Statewide Commuter Bus Study

Project Study Area Observed Travel Patterns

Generally, travel activity within the greater Charlotte metropolitan region revolves around the City of Charlotte in Mecklenburg County, and subsequently spreads out across the ten surrounding counties in North Carolina, namely Anson, Cabarrus, Catawba (partial), Cleveland, Gaston, Iredell, Lincoln, Rowan, Stanly, and Union, along with two counties in South Carolina, namely Lancaster (partial), and York. The Charlotte region is projected to grow significantly in the future due to the low cost of living and high quality of life metrics, the same two trends that are driving population growth in the Piedmont-Atlantic mega-region that stretches from Atlanta to Raleigh.

The Piedmont-Atlantic megaregion is part of the eleven mega-regions in the United States that are projected to accommodate half of the nation's population growth and two-third of its economic growth by year 2050[9]. The macro-economic trends of the Piedmont-Atlantic mega-region as well as local economic drivers in financial services, healthcare, sports, and advanced manufacturing sectors are influencing population and employment growth in the Charlotte region. This projected growth in land use is driving the increased mobility needs for commuting, shopping, school, and business trips.

The Charlotte region's travel demand model[10] shows that the region will become home to 4.1 million people, 1.6 million households, and 2.3 million jobs by year 2045. These regional growth projections are depicted in Figure 10. These growth projections reflect 53 percent growth in population and households, and 46 percent growth in jobs when compared to the model's baseline year 2018 estimates of 2.7 million people, 1.1 million households, and 1.6 million jobs.
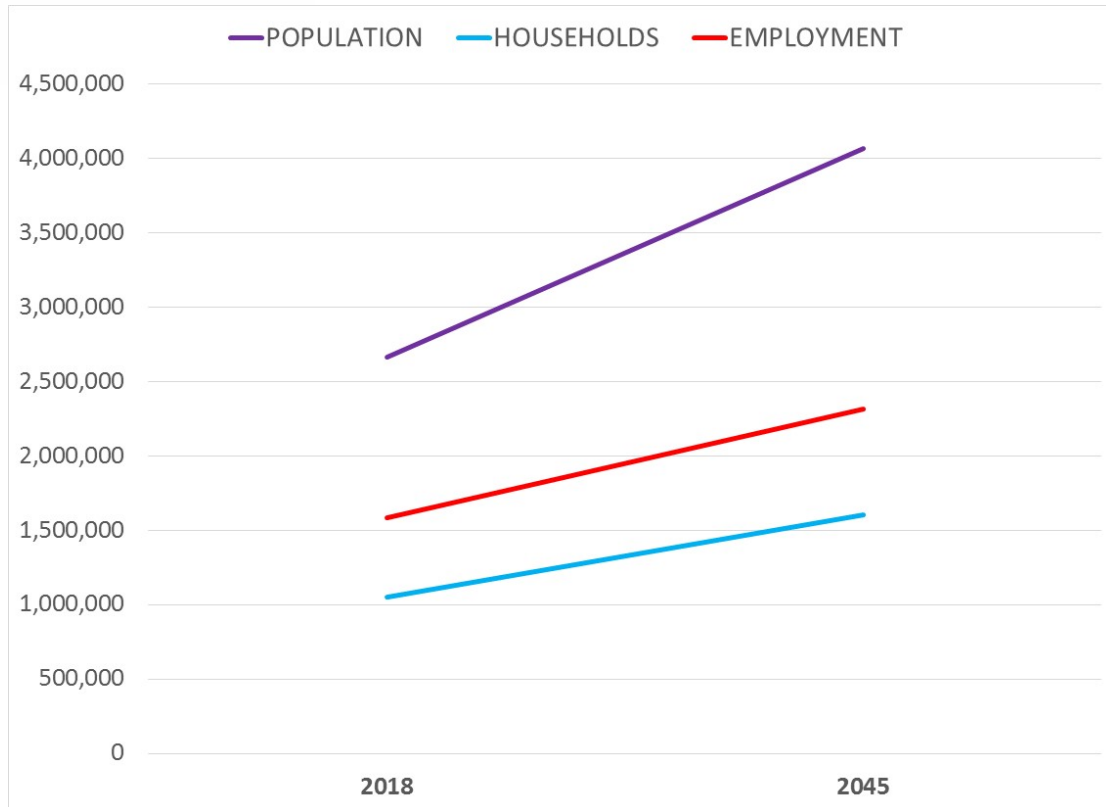
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[9] America 2050, A Prospectus, Regional Plan Association (Retrieved from https://rpa.org/uploads/pdfs/2050-Prospectus.pdf)
[10] Metrolina Regional Model, Working Version MRM2001, August 2020

FIGURE 10 REGIONAL GROWTH PROJECTIONS

The regional travel demand model also shows that the Charlotte region will generate approximately 1.4 million one-way commuter trips every weekday (HBW), 1.2 million one-way shopping trips (HBS), and 2.9 million other household one-way trips HBO) by the year 2045. These household-based trip demands add approximately 5.5 million one-way daily trips, which do not include school trips, university trips, or trips to and from work locations.

In this study, the patterns of 5.5 million one-way trips were analyzed for transit market assessment in terms of their origins and destinations. Figure 11 shows the distribution of 5.5 million one-way trips throughout the Project Study Area counties. Mecklenburg County is expected to be the primary travel market with projected trips exceeding one million every weekday. Mecklenburg County is anticipated to generate the highest demand with 2.4 million one-way household trips, or 44 percent of the total regional trips. This level of activity is followed by York and Cabarrus counties respectively as secondary travel markets, each generating between 0.5 to 1.0 million trips. Union, Iredell and Gaston counties comprise the rest of travel market, each generating between 0.25 to 0.5 million trips.
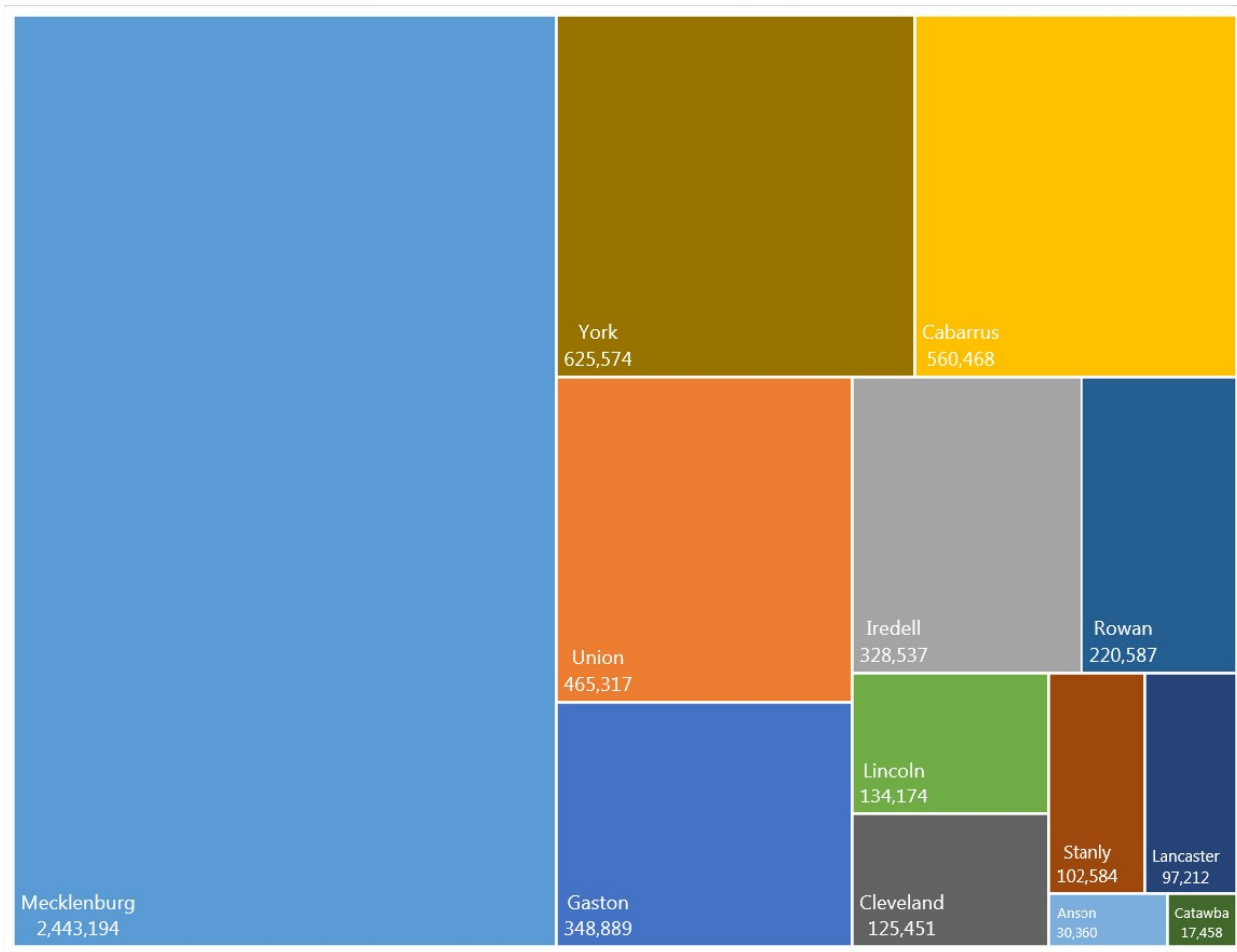
Figure 11 displays the relative size of the travel market for the four trip-making categories in year 2045.

Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The data for Catawba County is for partial county. The data for Anson County was estimated from the Statewide Travel Model to combine with the data from the Metrolina Regional Travel Demand Model.

The trip market analysis included preparation of chord charts to illustrate the relative size of trip flows from one area to another area with the chords connecting the geographic areas. As mentioned above, the Project defined travel markets within the Project Study Area counties. Trip origins and destinations were mapped first among the market areas and then among the counties (illustrated in Figure 12 for Mecklenburg County). The width of the chords reflects the relative amount of trip origins and destinations. The chords that start and end in the same market area indicate internal trips. The circular scale on the chord chart indicates relative size of trip activities. Additional information and chord charts regarding the daily trip flows can be found in Appendices A and B.

As shown in Figure 12, Mecklenburg County's trip activities are almost all (approximately 92 percent) within the county with some interactions with Union, Cabarrus, Iredell, Gaston, and York counties that range from 1 to 2 percent of Mecklenburg County's trip total.
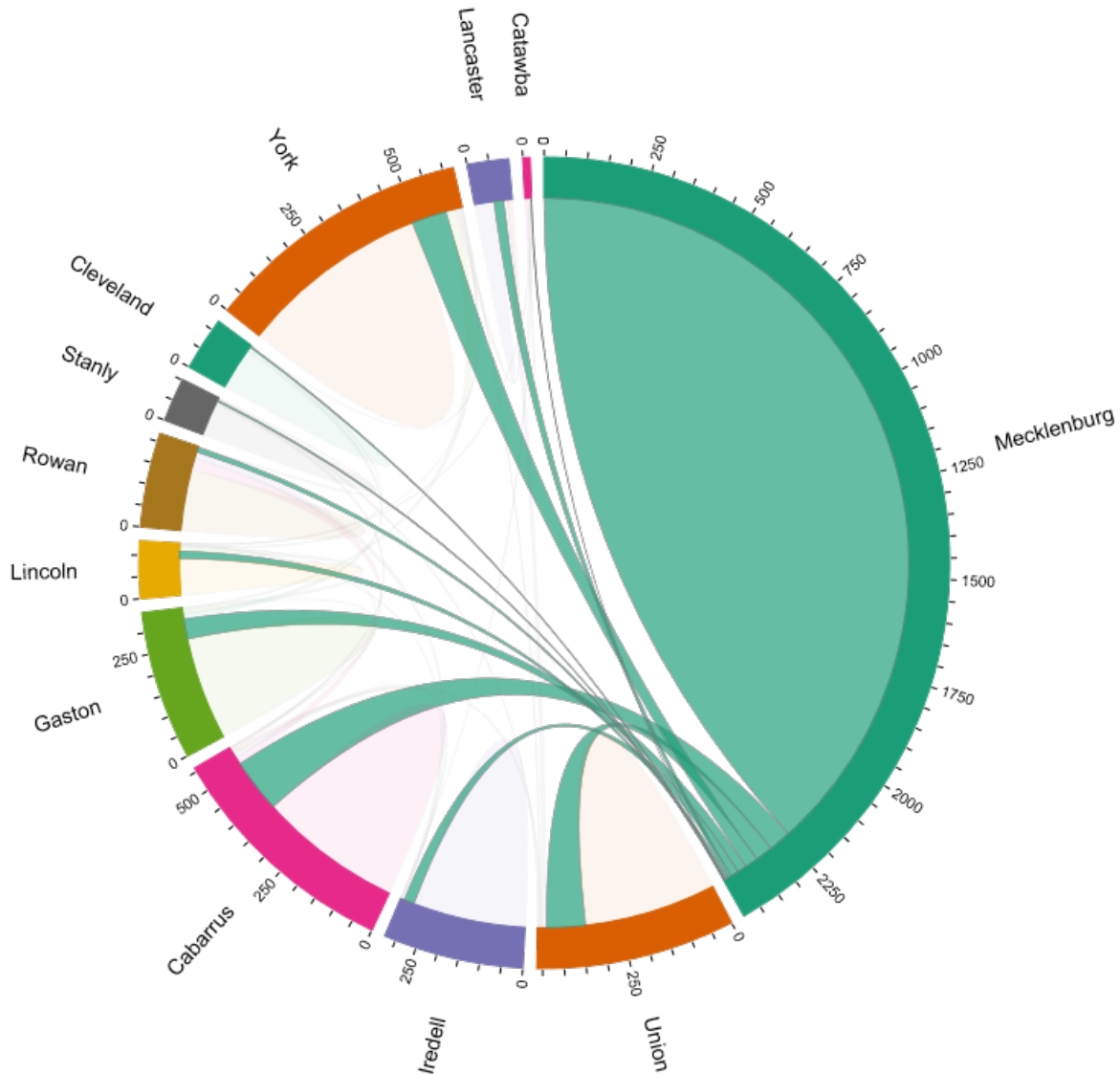
Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips.

Figure 12 helps to display the relative volume of daily trips between the counties. However, as shown, there is more to the story than can be seen at first glance. Figure 13 illustrates the same data for trip flows between counties, but centers on trips between the travel market areas. As shown, the stronger the trip flow, the darker and thicker the line is. The black circles with arrows reflect the number of trips that originate and are destined for locations within the same travel market area. Similar to the flows, the size of the circles indicates how many internal trips are occurring in the market area.
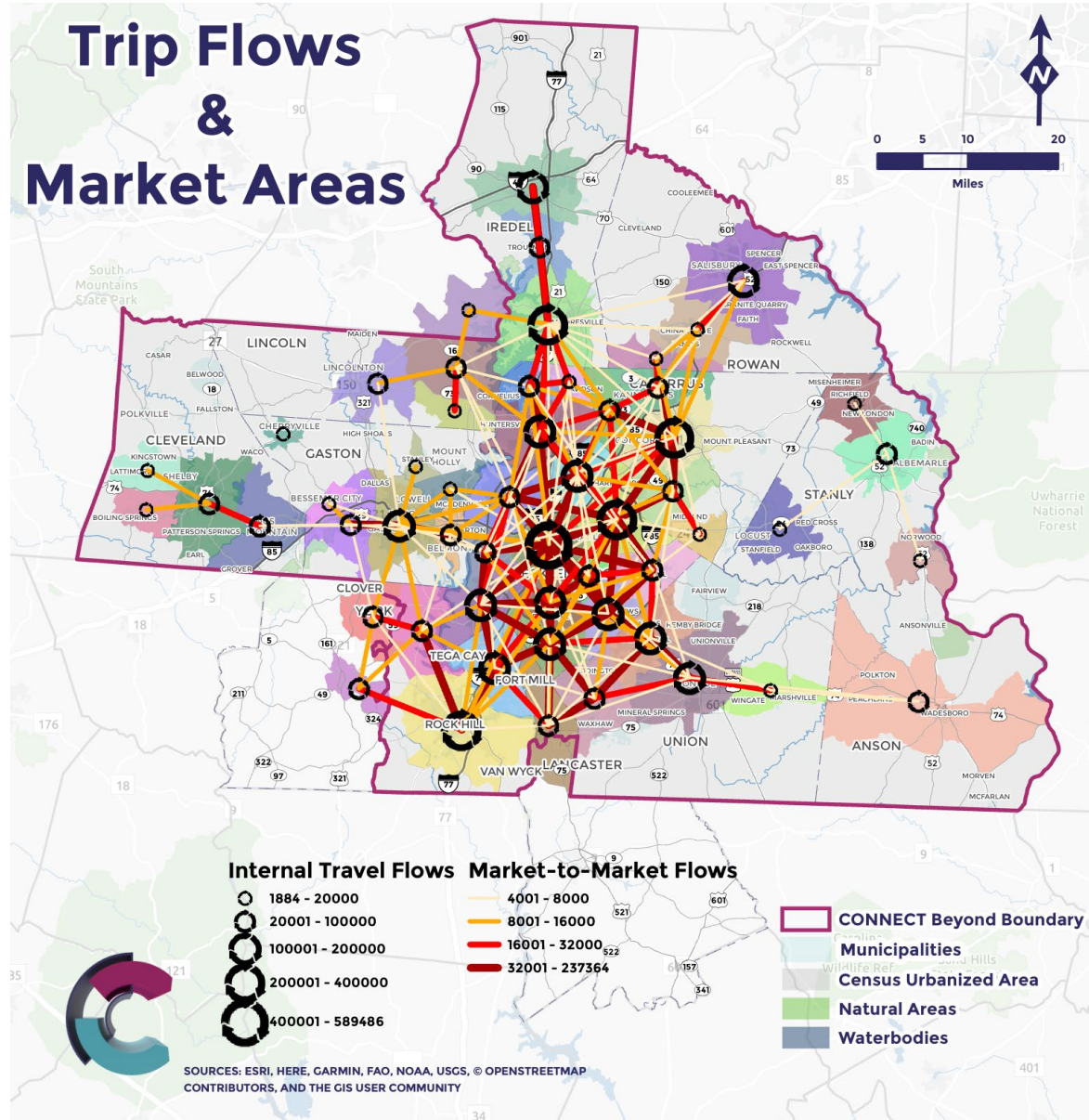
Source: Metrolina Regional Model, Working Version MRM2001, August 2020

Excluding trips made from Mecklenburg County, the data suggests that Charlotte and Mecklenburg County will continue to receive a significant number of trips (Figure 14). The data also suggests that a strong volume of trips are originating and/or destined for portions of Cabarrus County, Northeast Charlotte, Southeast Charlotte, and York County.
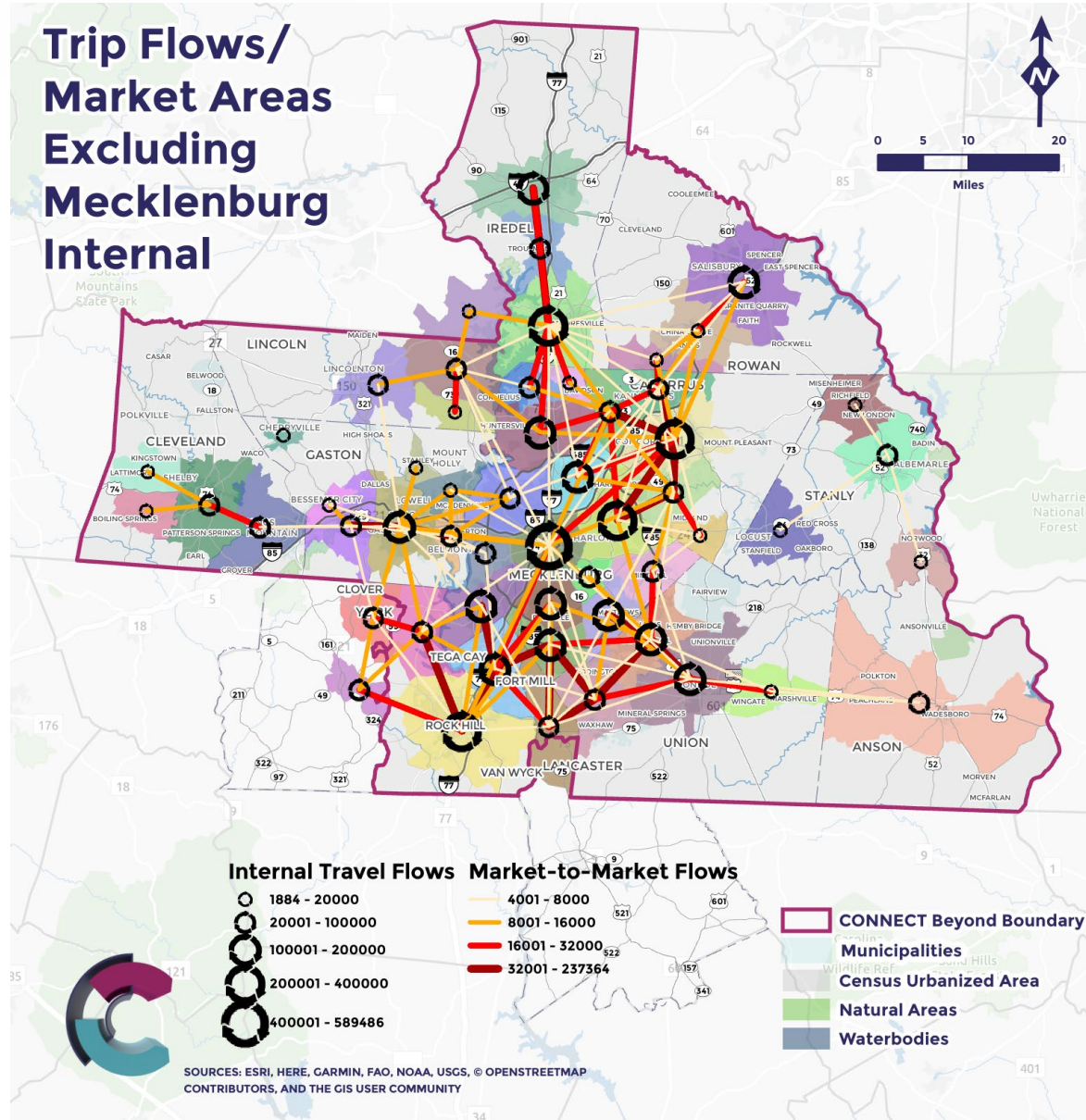
Source: Metrolina Regional Model, Working Version MRM2001, August 2020

Mecklenburg County Observed Travel Patterns

The transit market analysis also considered 55 smaller market areas within the Project Study Area, which included 14 market areas within Mecklenburg County. Out of the 14 market areas within Mecklenburg County, the following 10 market areas were within the top 25 market areas for potential transit usage:

- Charlotte - Center City
- Charlotte - South
- Charlotte - Northeast
- Charlotte - Northwest
- Charlotte - Southwest
- Charlotte - East
- Huntersville
- Matthews
- Mint Hill
- Pineville

The trip flows of these ten high market areas in Mecklenburg County are depicted in Figure 15 with a series of chord charts to illustrate the travel flow patterns. For example, the first chord chart depicts the trip flow pattern of the Charlotte-Center City market area, which shows a series of chords of different widths connected to the Center City. This indicates that trip inflows are predominantly coming into the Center City and are a significant portion of internal trips that stay within the Center City. The chart also shows the highest trip exchange for the Center City is with the Charlotte-East market area, as reflected by the wider chord.

**FIGURE 15: YEAR 2045 DAILY TRIP FLOWS FOR CHARLOTTE - CENTER CITY**
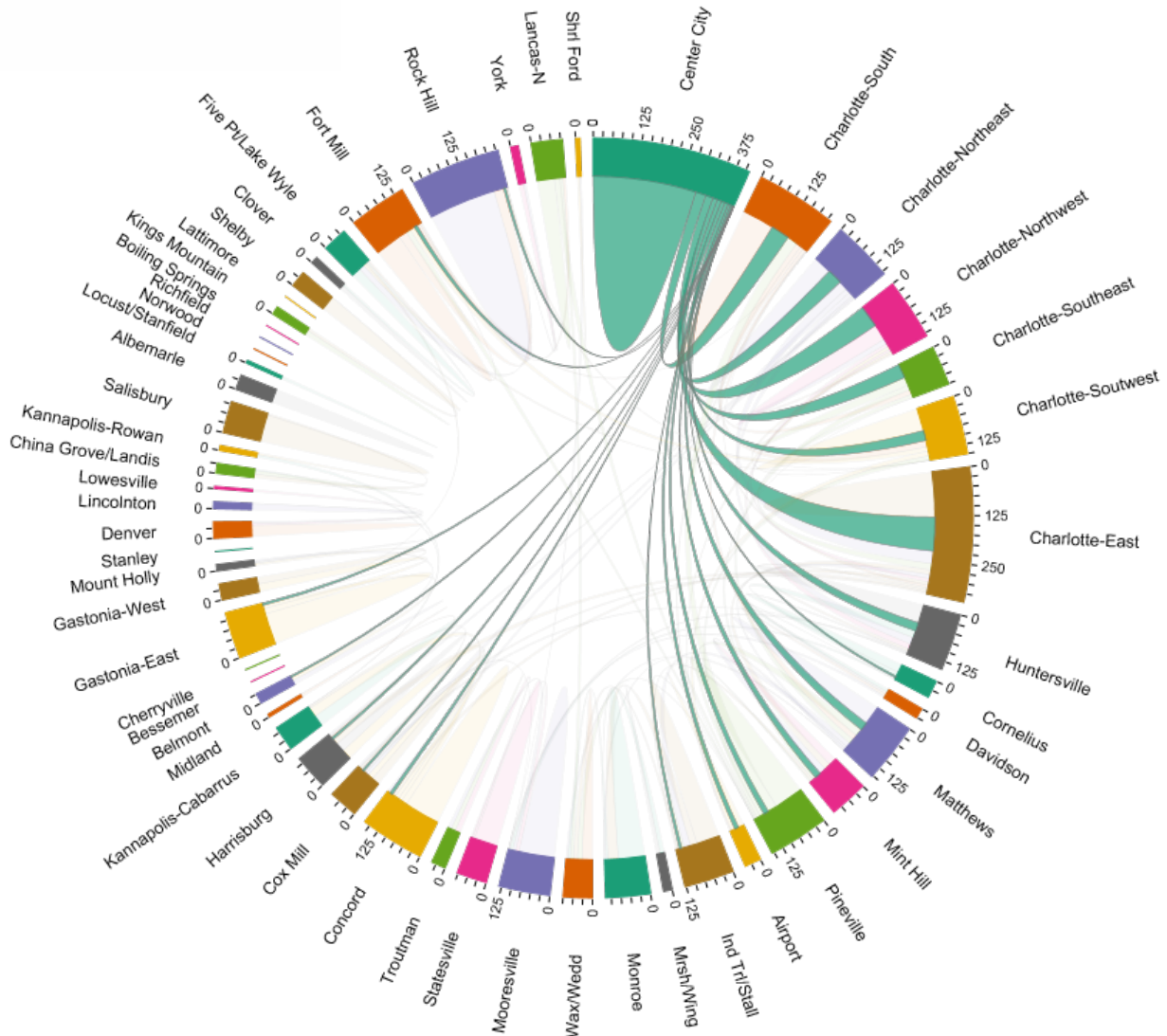
Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 25 thousand trips.

As with the trip flows between market areas for the Project Study Area, Figure 16 illustrates trip flows between market areas within Mecklenburg County. Appendices A and B of this report provides detailed information and additional chord charts of observed daily trip flows made within the Project Study Area and within Mecklenburg County specifically.

FIGURE 16: YEAR 2045 TRIP FLOWS BETWEEN TRAVEL MARKETS IN MECKLENBURG COUNTY
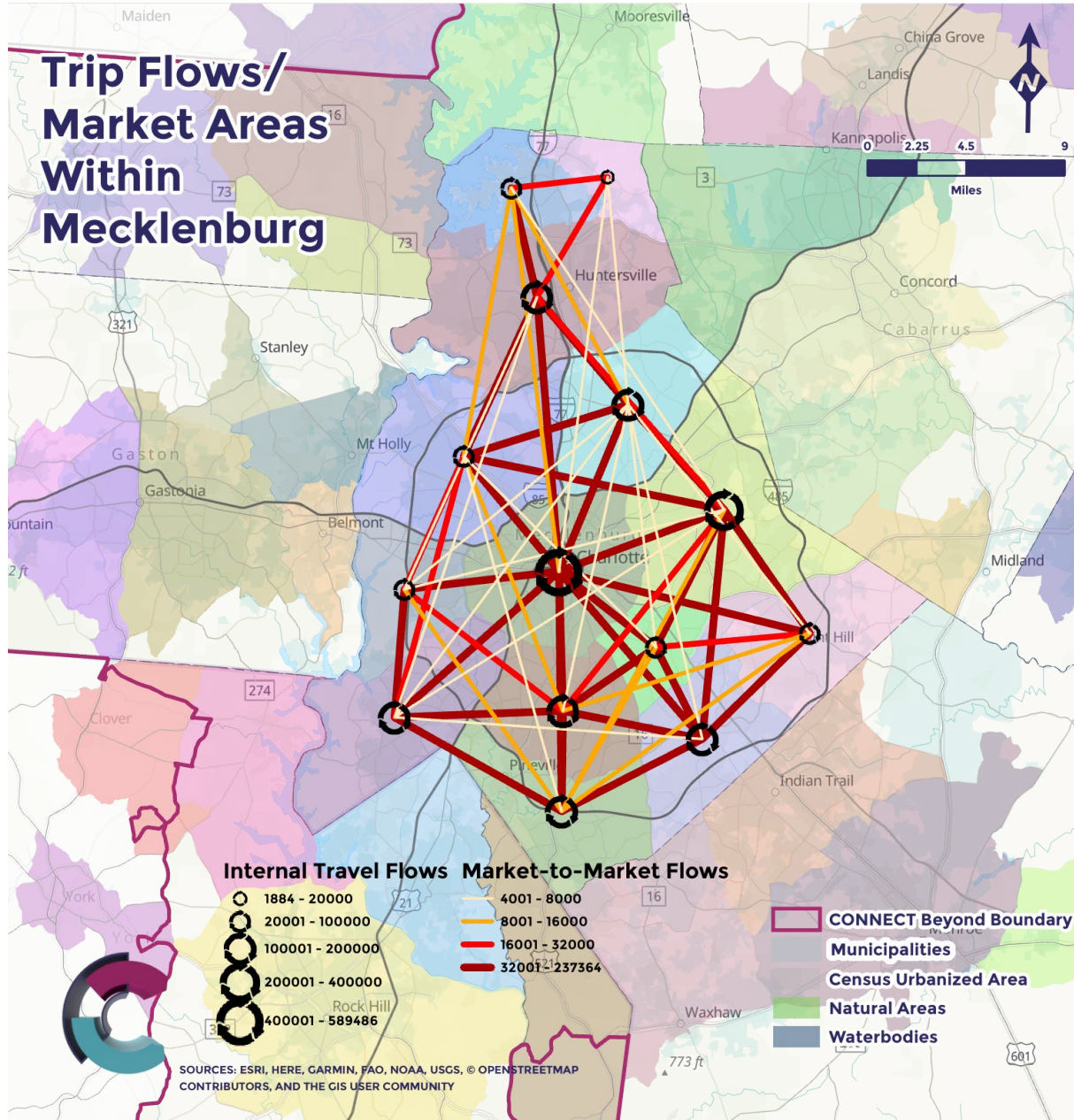
Source: Metrolina Regional Model, Working Version MRM2001, August 2020

Key Themes

The identification of travel market areas helps to understand anticipated daily trip flows within the greater Charlotte metropolitan region. As discussed, this is an important macro-level step in the identification of future high-capacity transit corridors. This identification also helps with understanding how local fixed-route transit networks that are currently disaggregated from one another may one day be more integrated as the region continues to grow. Regional mobility is better served with interconnected networks, and operating costs of localized networks are better maintained as a result of shared resources and a more integrated system. The themes that emerged from this analysis are summarized below:

- **Uptown Charlotte Remains the Primary Trip Destination**: As noted, the predominant travel pattern within the Project Study Area are trips made to and from Charlotte, and more specifically Charlotte's City Center. A look at the observed travel pattern data currently and in 2045 suggests that Charlotte and Charlotte City Center will continue to receive the highest volume of daily trips in the region. Maintaining circulation within City Center will be vital to the continued economic and social prosperity of the greater region.

- **Future Growth Radiating Outward from Uptown Charlotte**: While Mecklenburg County will continue to be a focal point of travel within the region, other counties are expected to absorb future regional growth. Like growth rings on a tree, Iredell, Cabarrus, Gaston, Rowan, York, and Union counties are likely to experience significant future growth. Naturally, the presence of the region's arterial highway network contributes to expanded growth outward toward these counties. Still, the counties of Cleveland, Lincoln, and Stanly, as well as the urbanized area of Lancaster County are also anticipated to grow, and therefore warrant consideration of potential high capacity transit (HCT) services.

- **Connected Nodes and Crosstown Travel Patterns Emerging**: Within Mecklenburg County, the spatial distribution of key activity centers such as Charlotte-Douglas International Airport, the University of North Carolina-Charlotte, Charlotte City Center, and South End/South Park, coupled with strong town centers in Charlotte, Matthews, Pineville, Mint Hill, Huntersville, Cornelius, and Davidson contributes to a strong diversity in trip making behavior. Naturally, the circular and radial orientation of the highway network helps move people within and around the county. While Charlotte City Center and its concentration of employment is anticipated to continue to attract the majority of trips, the data suggests an emerging need for cross-town circulation among those travel markets surrounding City Center. Effectively, a ring pattern of travel within the Interstate 485 beltway.

- **Opportunity for Freeway-Based Transit Services**: As growth radiates concentrically in and outside Charlotte and Mecklenburg County, the data suggest circular travel patterns emerging between the surrounding counties and communities. This travel pattern is speculative based on the data used and may occur be further into the future than this plan can project, but congested travel on corridors beyond the I-485 beltway are beginning to emerge. As growth inside the I-485 beltway continues, travelers are seeking relief from congested arterial roadways by traveling longer distances around congested roadways to

keep moving, even if it means additional travel time incurred. With the expected growth of outer-ring counties, roads that are not designed to a level of service commensurate with the future volumes projected will be increasingly burdened with the addition of traffic for these trips. More investigation of this is suggested.

- **Incorporation of Human-Service and ADA Trips**: The region benefits from the availability of public transportation services. Fixed-route services are located in a decent number of urbanized centers, while human service-oriented transportation services are located in more rural areas of the Project Study Area. As the region looks to the future, connecting and coordinating these services will be critical for mobility, particularly for access to important human service centers such as universities and hospitals/medical centers. It is also possible that the region could consider multiple travel hubs – distinct transit transfer centers with expedient connections between other transfer centers and systems.

- **Importance of Technology for Future Travel Patterns**: Given that funding limitations and constraints will likely exist into the foreseeable future, efforts should be made to look at options which more efficiently use existing roadway capacity in corridors to extend the useful life of current facilities from an operational standpoint. Public transportation is one of the most effective options for adding capacity on urban and urbanizing corridors, coupled with the use of coordinated Intelligent Transportation Systems (ITS).

Conclusions and Next Steps

The travel market analysis conducted for the CONNECT Beyond project reflects an initial look at anticipated trip making behaviors in the horizon year of this planning effort (2045). Generally, the data suggests that the City of Charlotte and Mecklenburg County will continue to be a focal point of future growth and development. Still, all counties and communities within the Project Study Area are anticipated to grow. Perhaps most interestingly, the travel market analysis helps to illustrate the interdependencies between the counties and communities of the region. As such, strategic investments in transportation infrastructure and systems will be necessary in all counties and communities to handle increases in population.

This analysis is beneficial for several reasons. Understanding trip flows helps the public, project stakeholders, and decision makers understand where future investments are warranted and identify the right-sizing of those investments based on anticipated needs. The key themes described above that emerged from this analysis should not be considered final. In fact, they serve as the basis for future planning investigations to better understand travel dynamics within more concentrated geographies. Furthermore, travel forecasting efforts help provide perspective on the immediacy of needs to help guide and plan recommendations for future investment.

As the CONNECT Beyond project advances, and individual projects are identified, travel forecasting will continue to play an important role. As transit and mobility investments identified through CONNECT Beyond take better definition, more detailed travel forecasting work will be required to look comprehensively and locally at travel within corridors and within the region at-large. Similarly, these outputs will also be needed as part of systems coordination.

Appendix A – Observed Trip Flows

Observed Travel Patterns across the Project Study Area

Mecklenburg County

As shown on Figure A 1, Mecklenburg County's trip activities are almost all (approximately 92 percent) within the county, with some interactions with Union, Cabarrus, Iredell, Gaston, and York counties that range from 1 to 2 percent of Mecklenburg County's trip total.
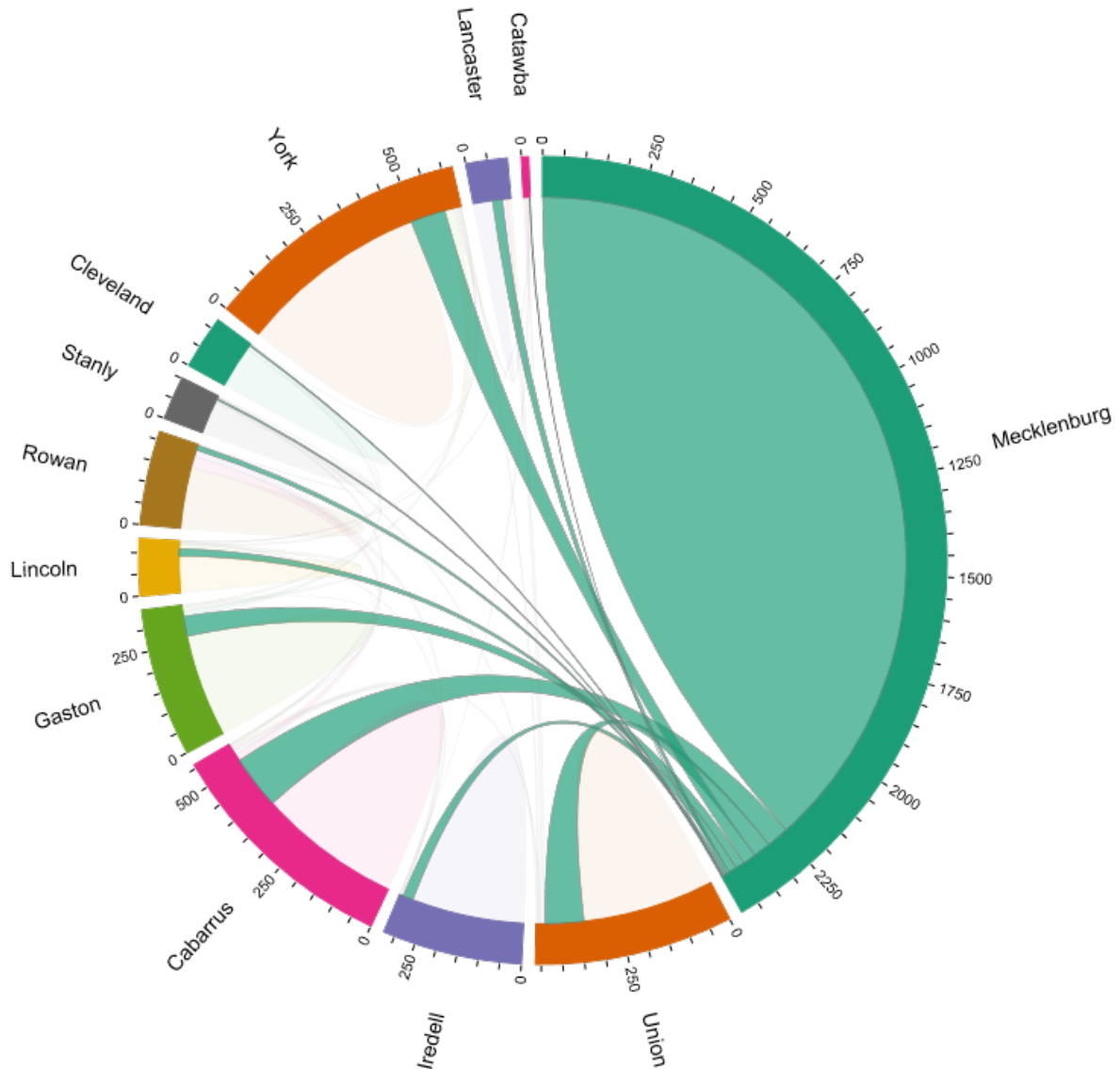
Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips.

York County

As shown Figure A 2, York County's trip activities are significantly internal (approximately 78 percent) with the highest trip interaction with Mecklenburg County (approximately 14 percent). The remaining trip flows are with Gaston County (approximately 4 percent), Cleveland County (approximately 1 percent), and Lancaster County (approximately 1 percent).

Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips.

Cabarrus County

As shown in Figure A 3, Cabarrus County's trip activities are significantly internal (approximately 66 percent) with the highest trip interaction with Mecklenburg County (approximately 25 percent). The remaining trip flows are with Rowan County (approximately 3 percent), Iredell County (approximately 2 percent), Union County (approximately 1 percent), and Stanly County (approximately 1 percent).

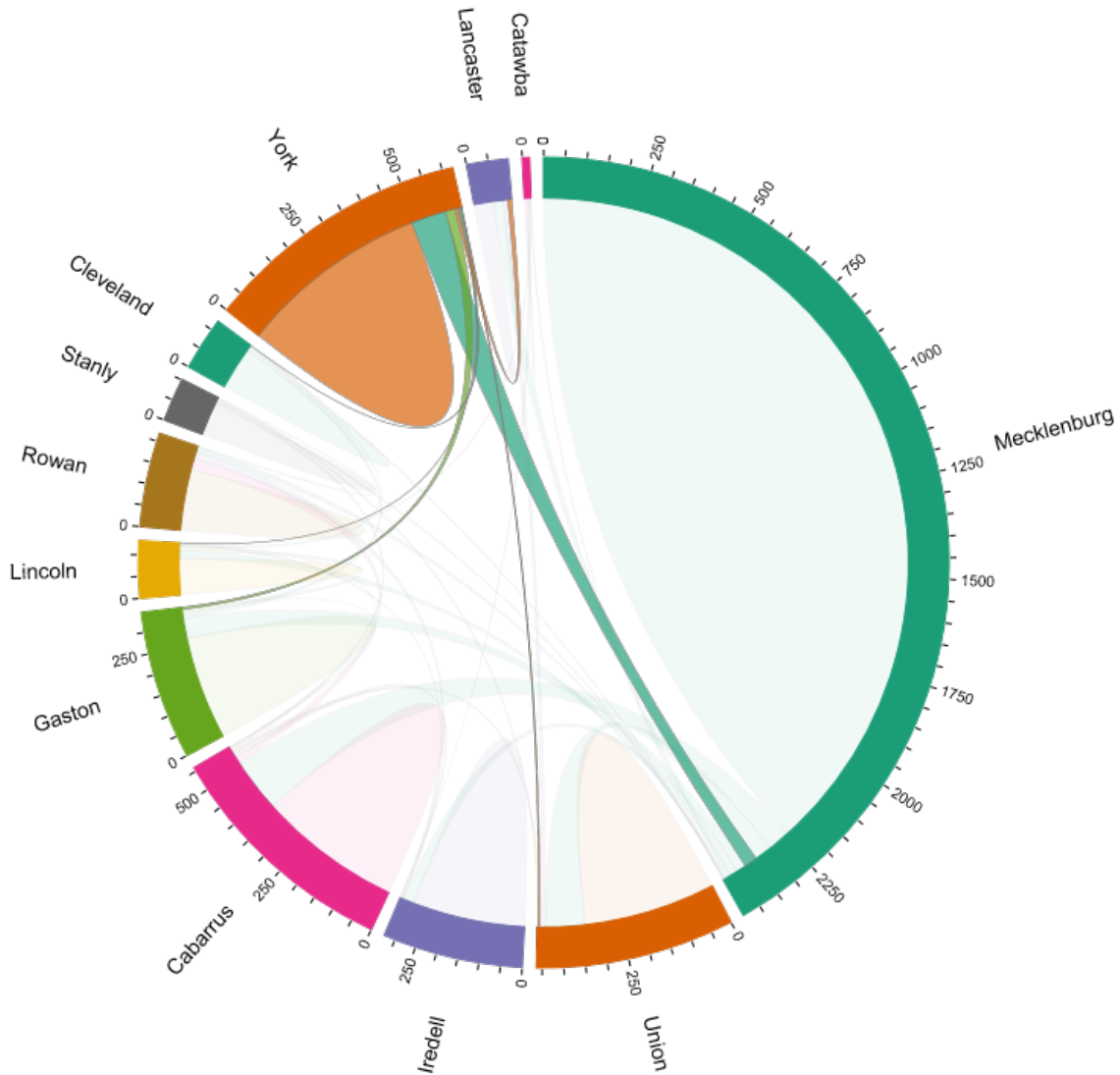*Source: Metrolina Regional Model, Working Version MRM2001, August 2020*
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips.

Union County

As shown in Figure A 4, Union County's trip activities are significantly internal (approximately 73 percent) with the highest trip interaction with Mecklenburg County (approximately 22 percent). The remaining trip flows are with Lancaster County (approximately 3 percent), and Cabarrus County (approximately 1 percent).
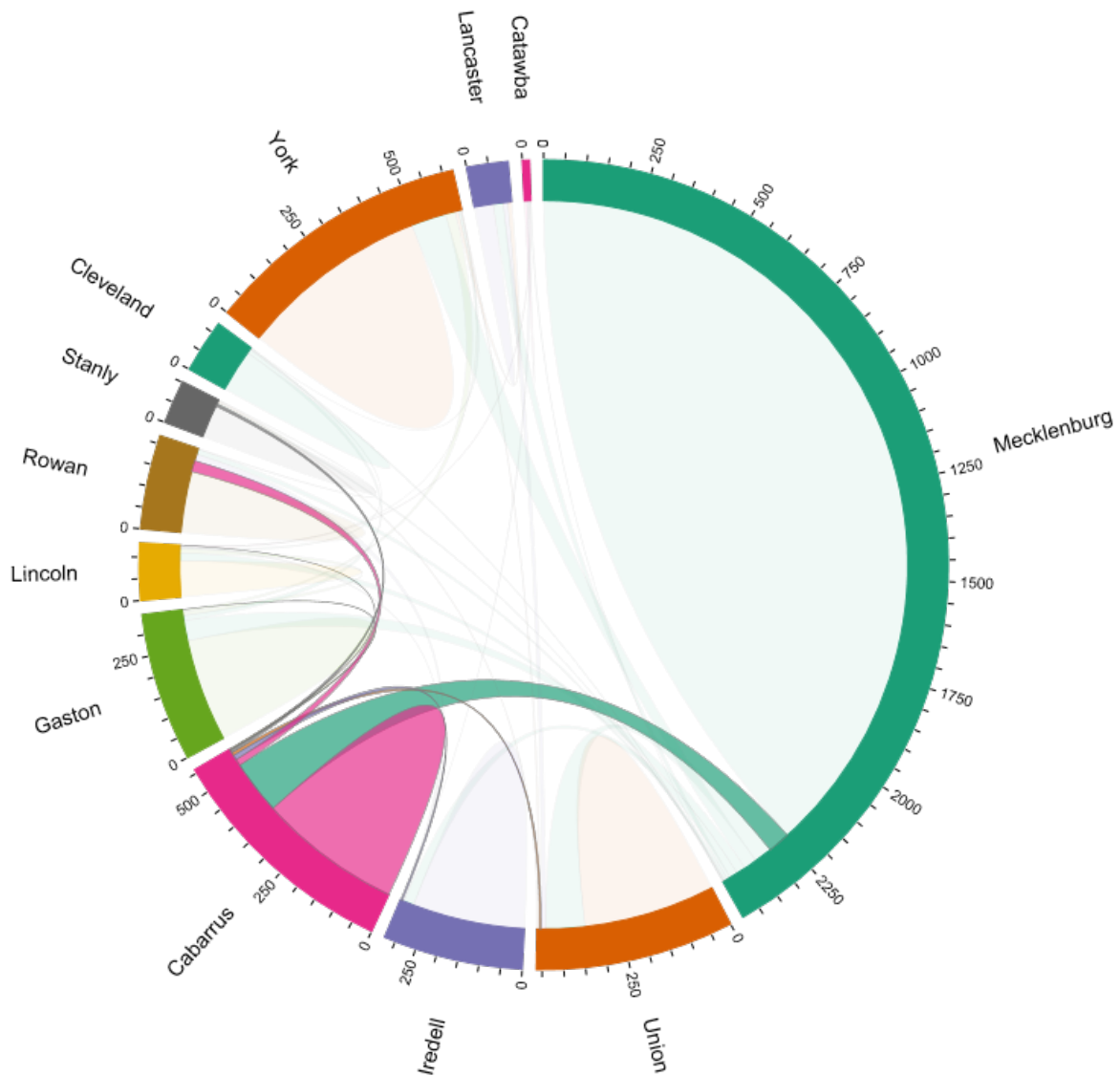

Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips

Gaston County

As shown in Figure A 5, Gaston County's trip activities are significantly internal (approximately 76 percent) with the highest trip interaction with Mecklenburg County (approximately 15 percent). The remaining trip flows are with Cleveland County (approximately 4 percent), Lincoln County (approximately 3 percent), and York County (approximately 2 percent).

Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips

Iredell County

As shown Figure A 6, Iredell County's trip activities are significantly internal (approximately 88 percent) with the highest trip interaction with Mecklenburg County (approximately 8 percent). The remaining trip flows are with Cabarrus County (approximately 1 percent), and Rowan County (approximately 1 percent).
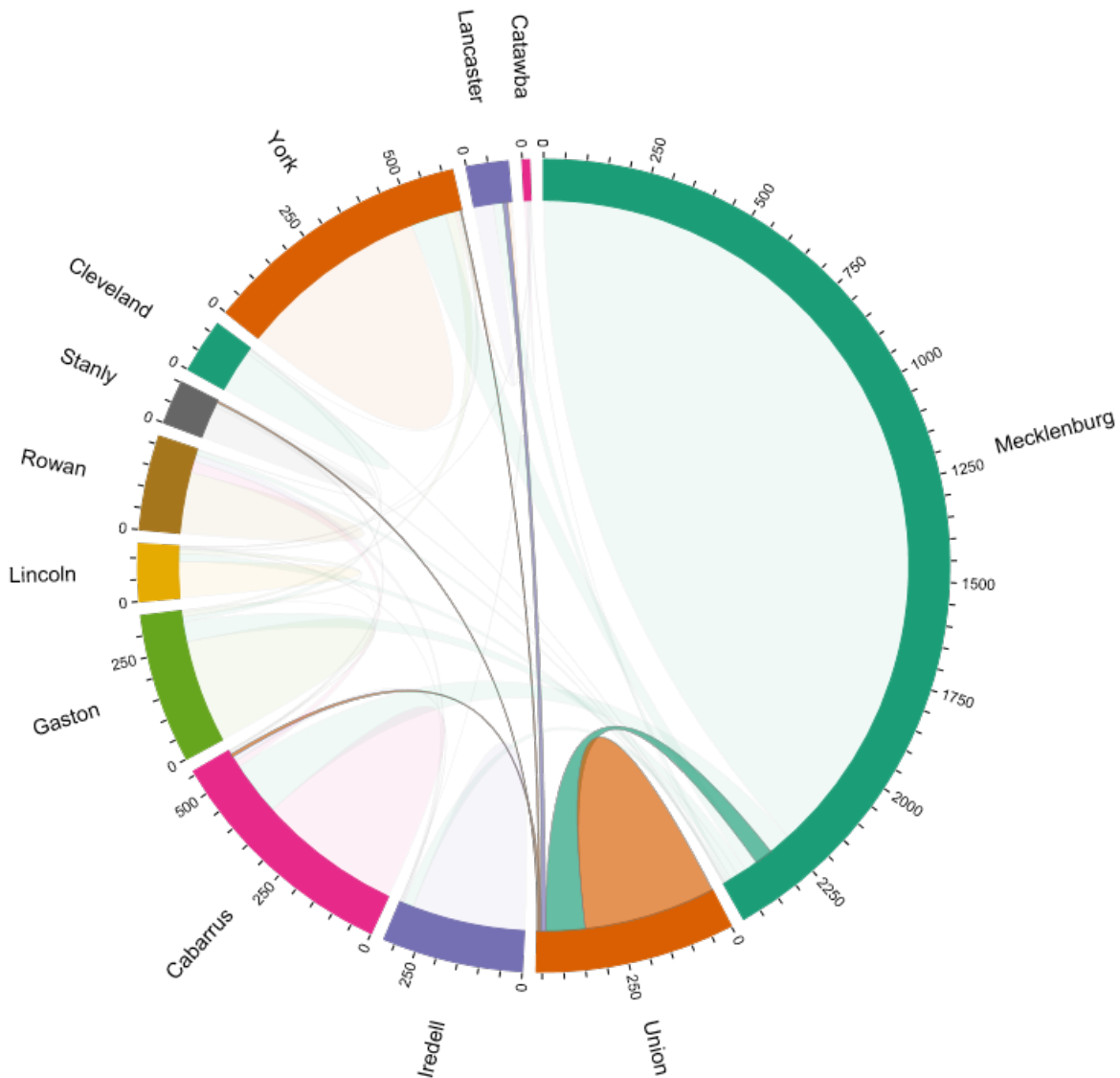

Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips

Mecklenburg County Observed Travel Patterns

Trip flows within Mecklenburg County are predominantly concentrated in Charlotte, and clustered particularly within ten market areas including Charlotte–Center City, Charlotte–South, Charlotte-Northeast, Charlotte–Northwest, Charlotte–Southwest, Charlotte–East, Huntersville, Matthews, Mint Hill, and Pineville. The trip flows of these ten market areas in Mecklenburg County are depicted below on Figure A 7 with a series of chord charts to illustrate the travel flow pattern.
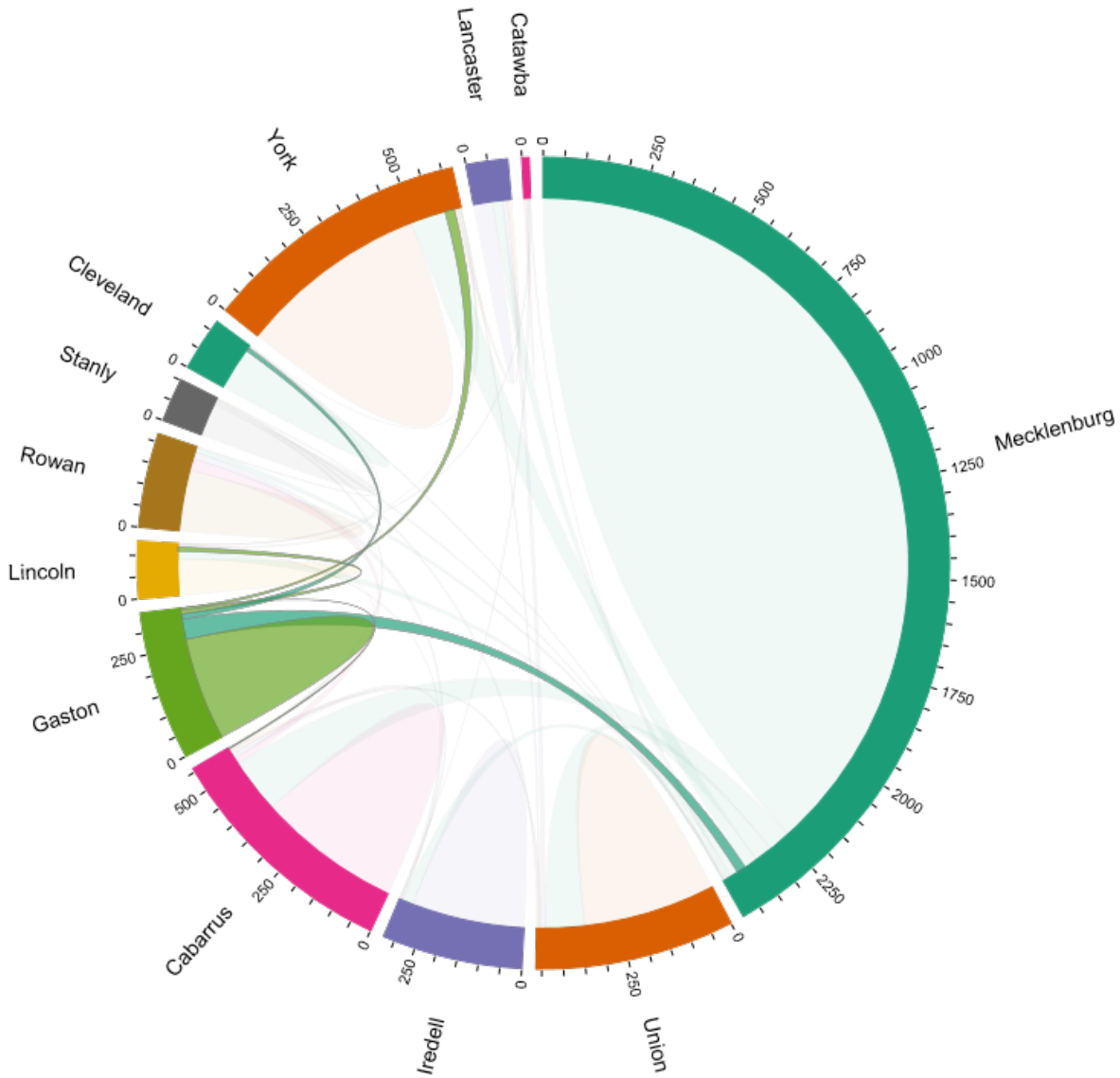
Charlotte – City Centers
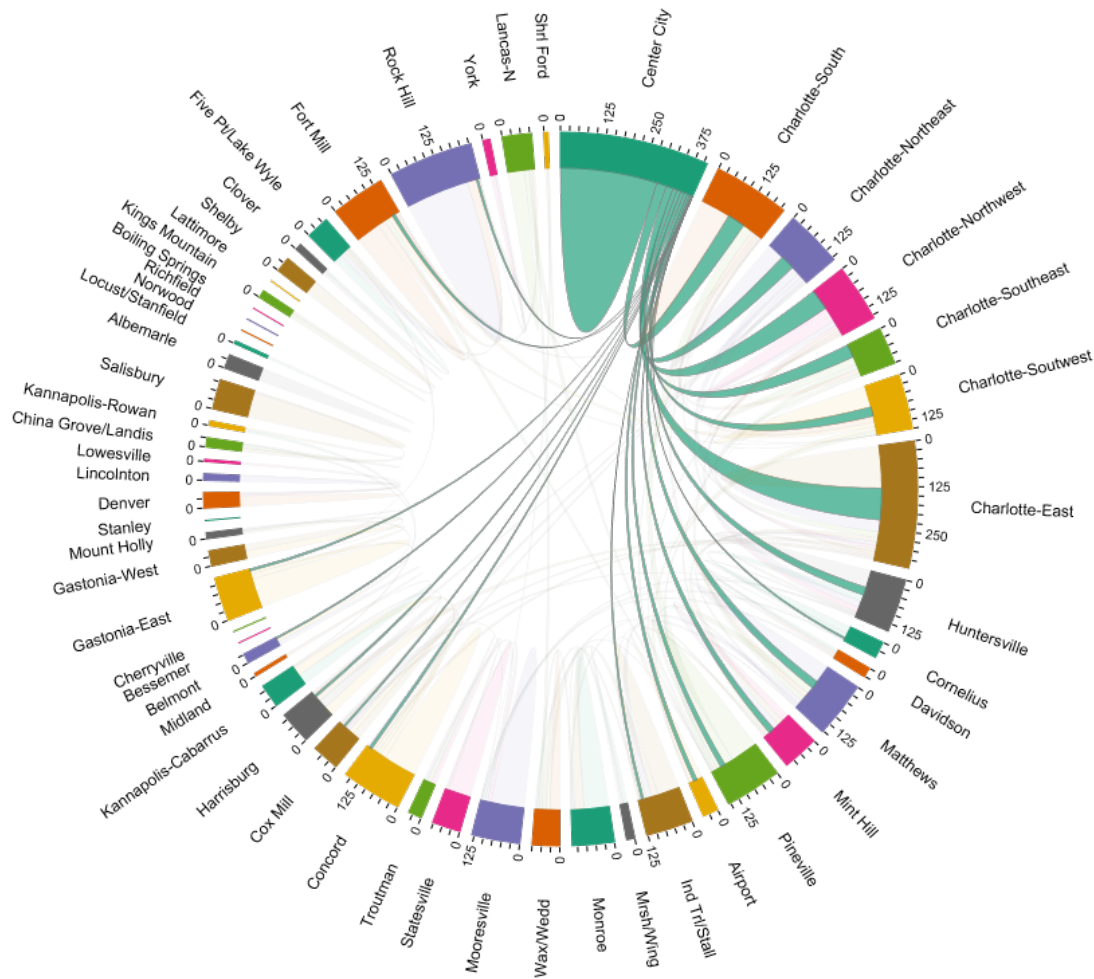
Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips

The following pages detail trip flows for the respective geographies and jurisdictions identified above.

Charlotte - South
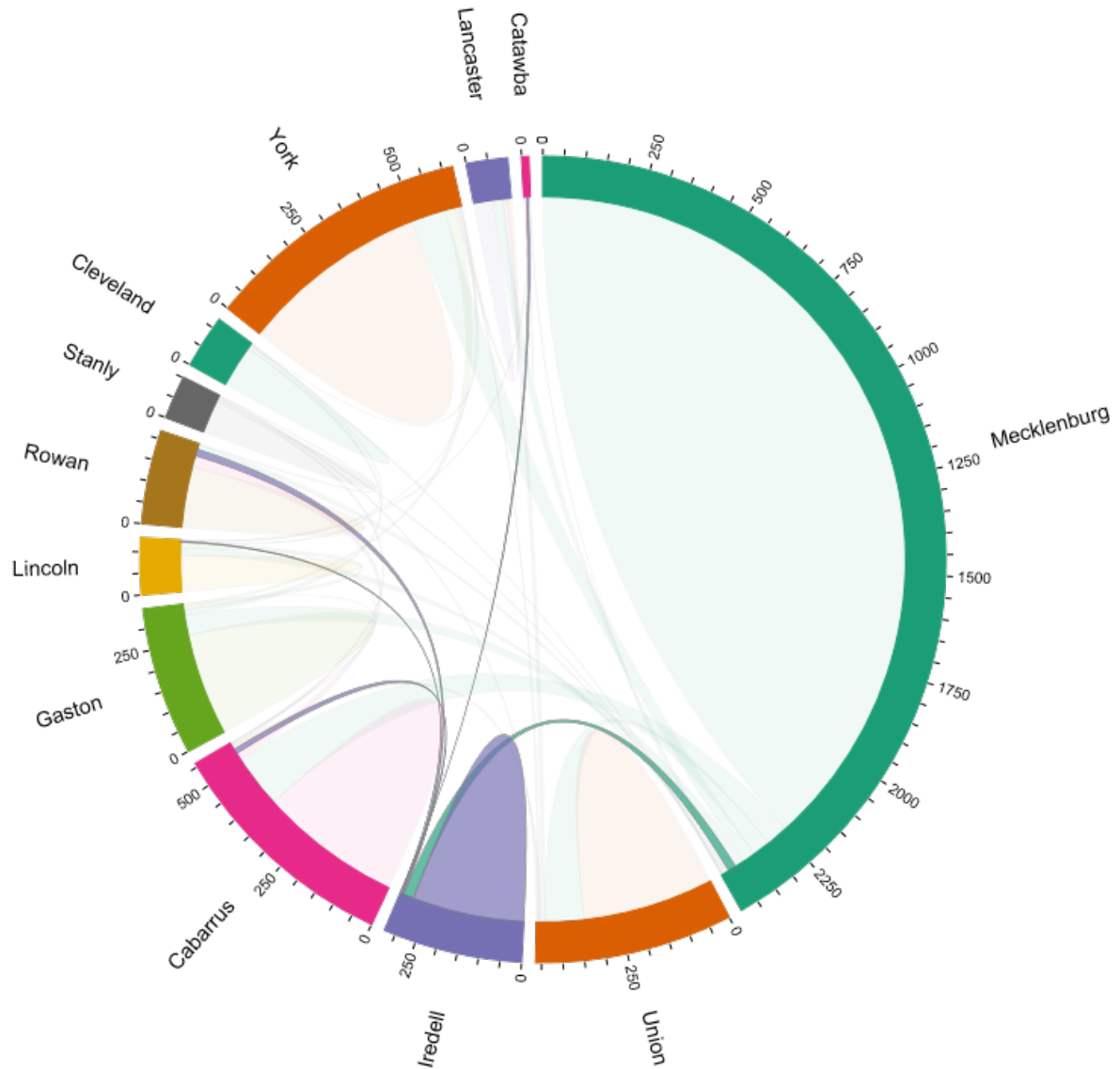
CONNECT
Beyond
A Regional Mobility Initiative

Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips

Charlotte – Northeast

Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips

Charlotte - Northwest

Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips

Charlotte - Southwest
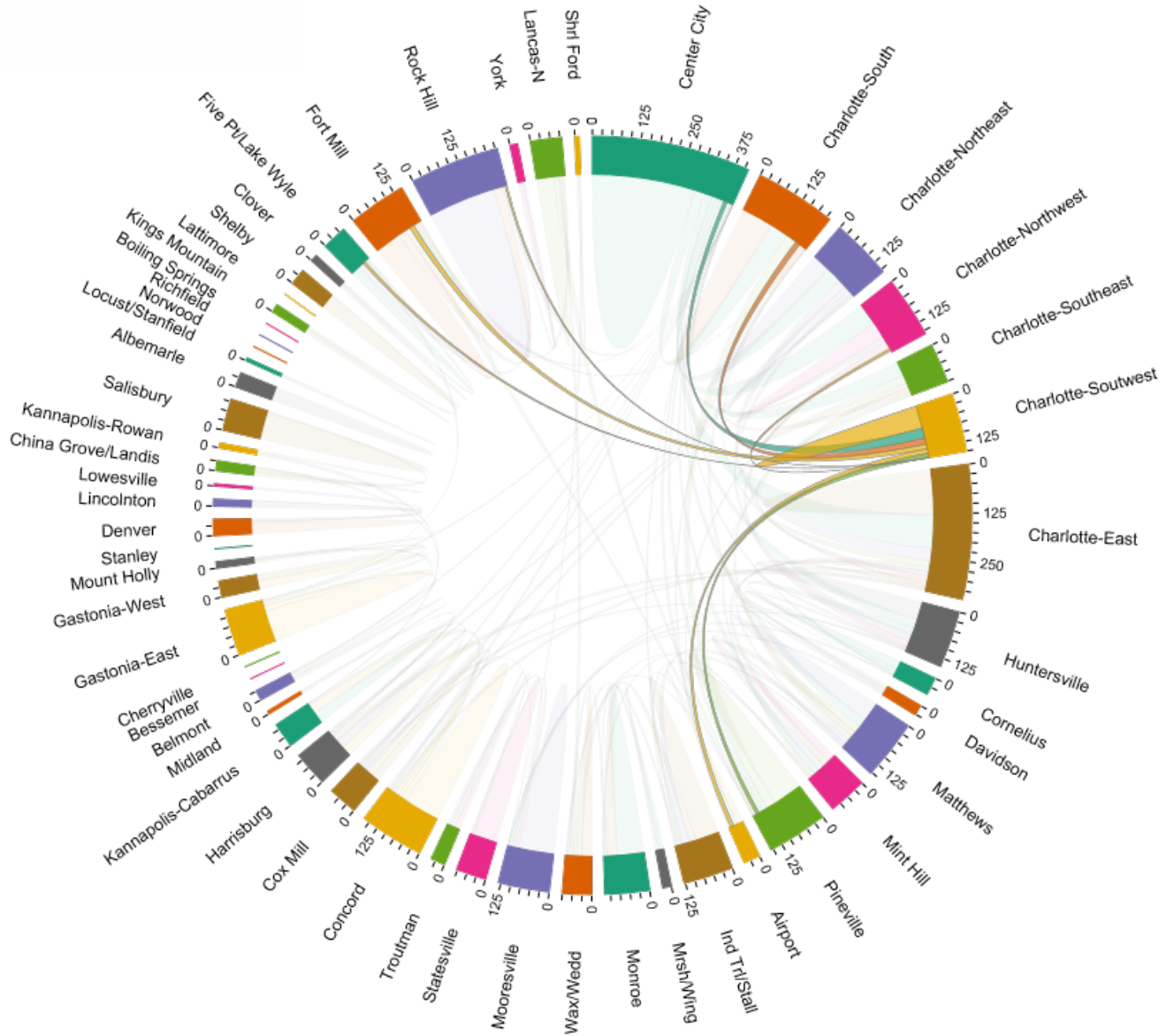
Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips

Charlotte - East
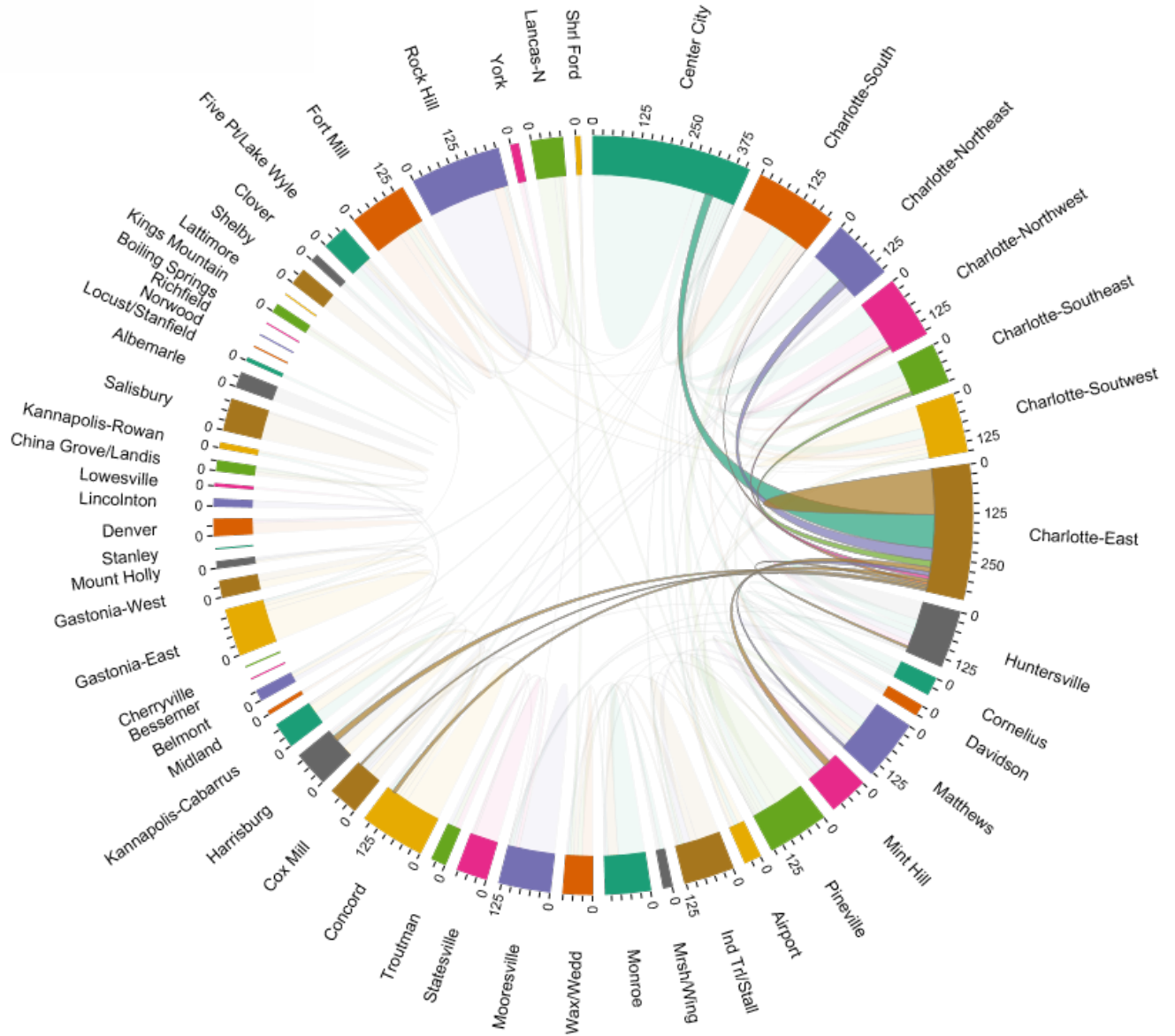
Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips

Huntersville
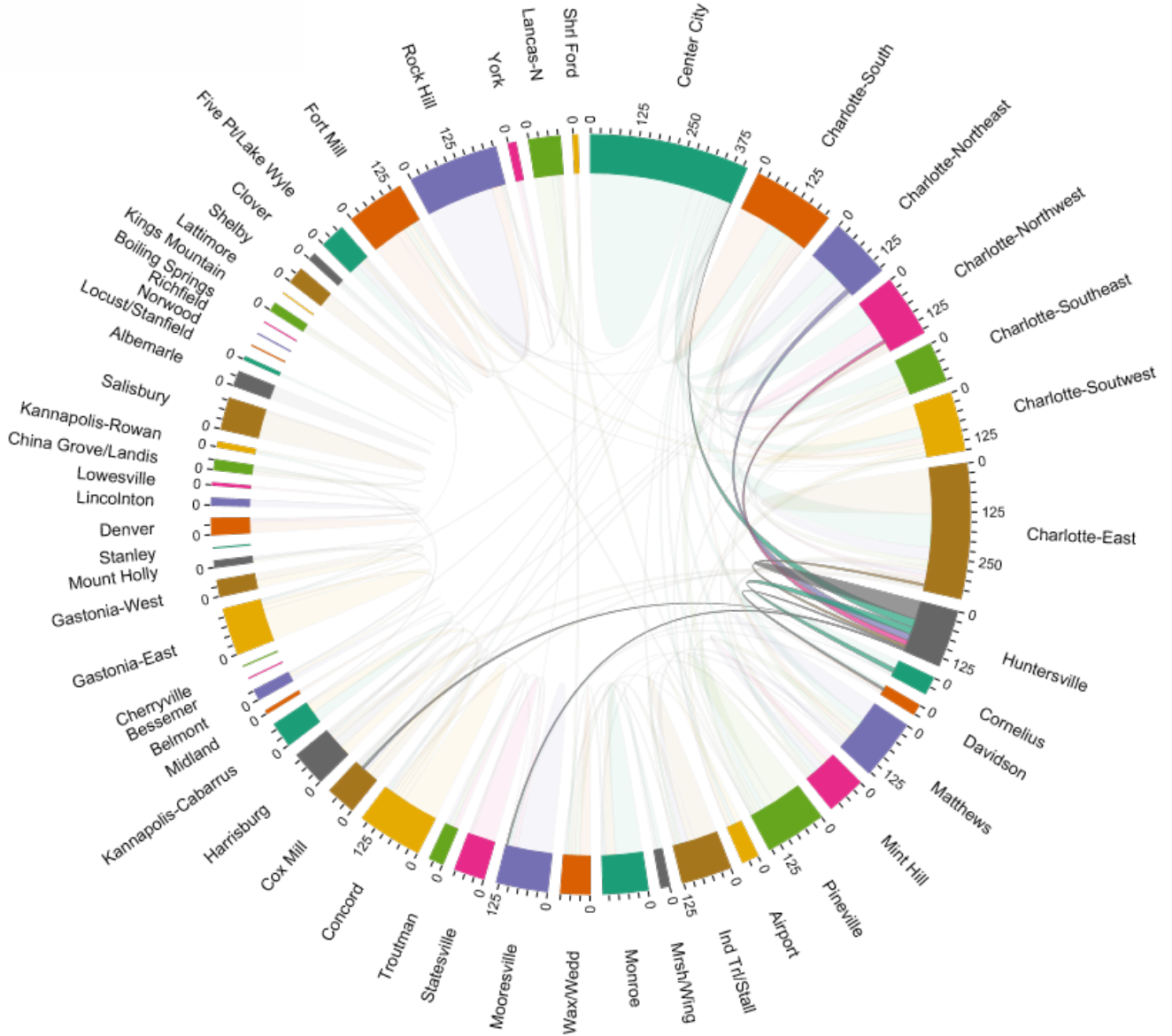
Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips

Matthews

Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips
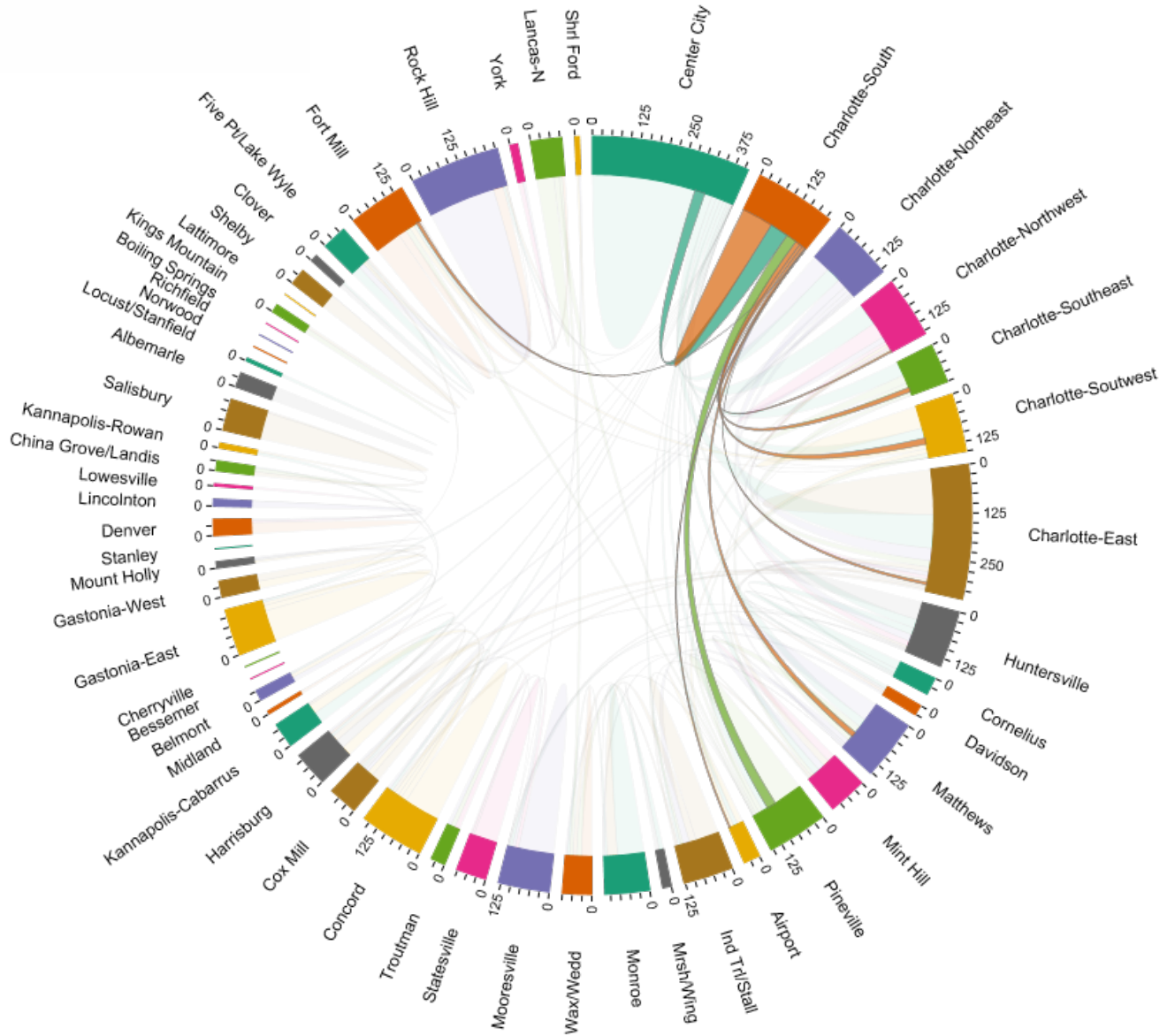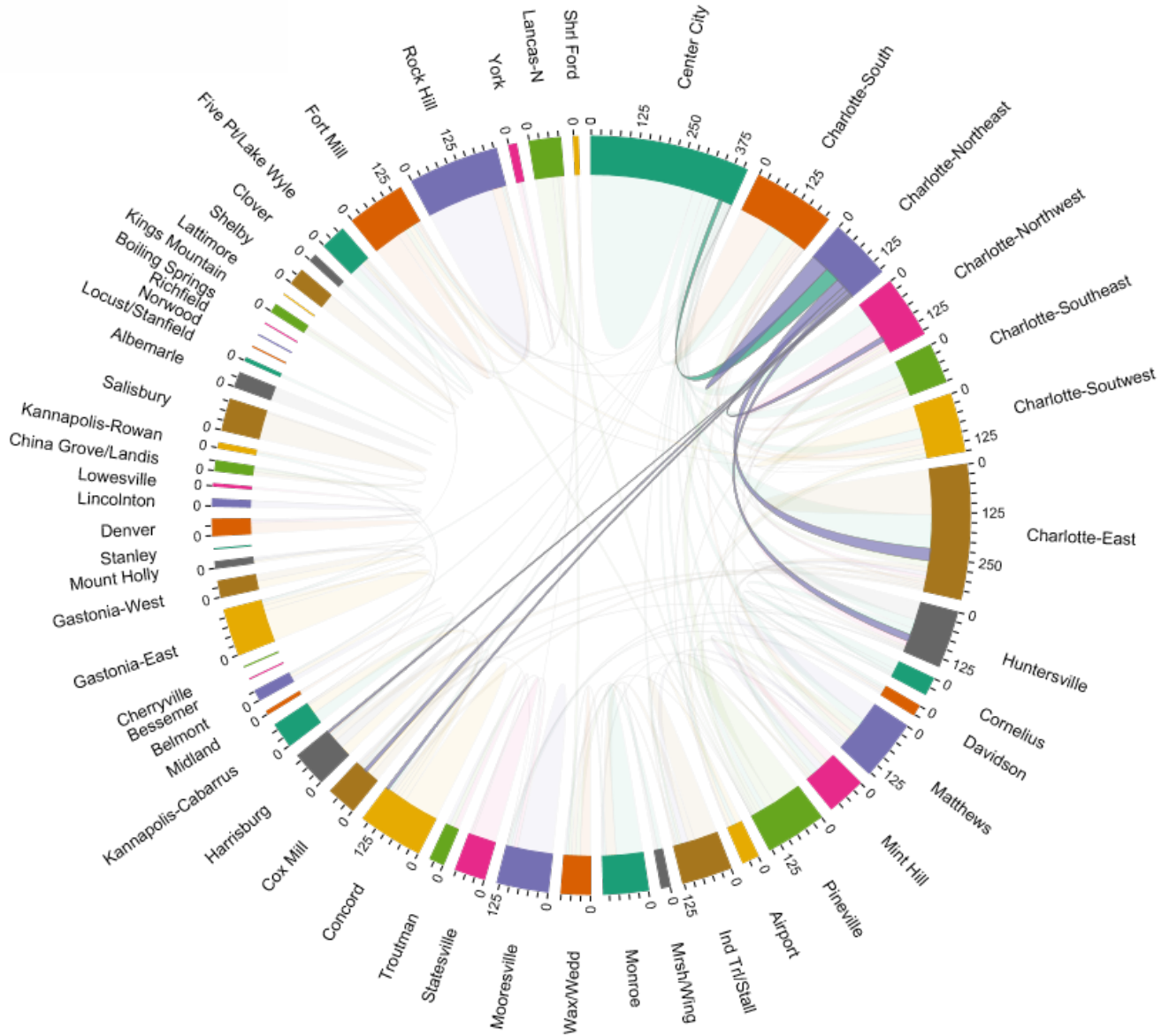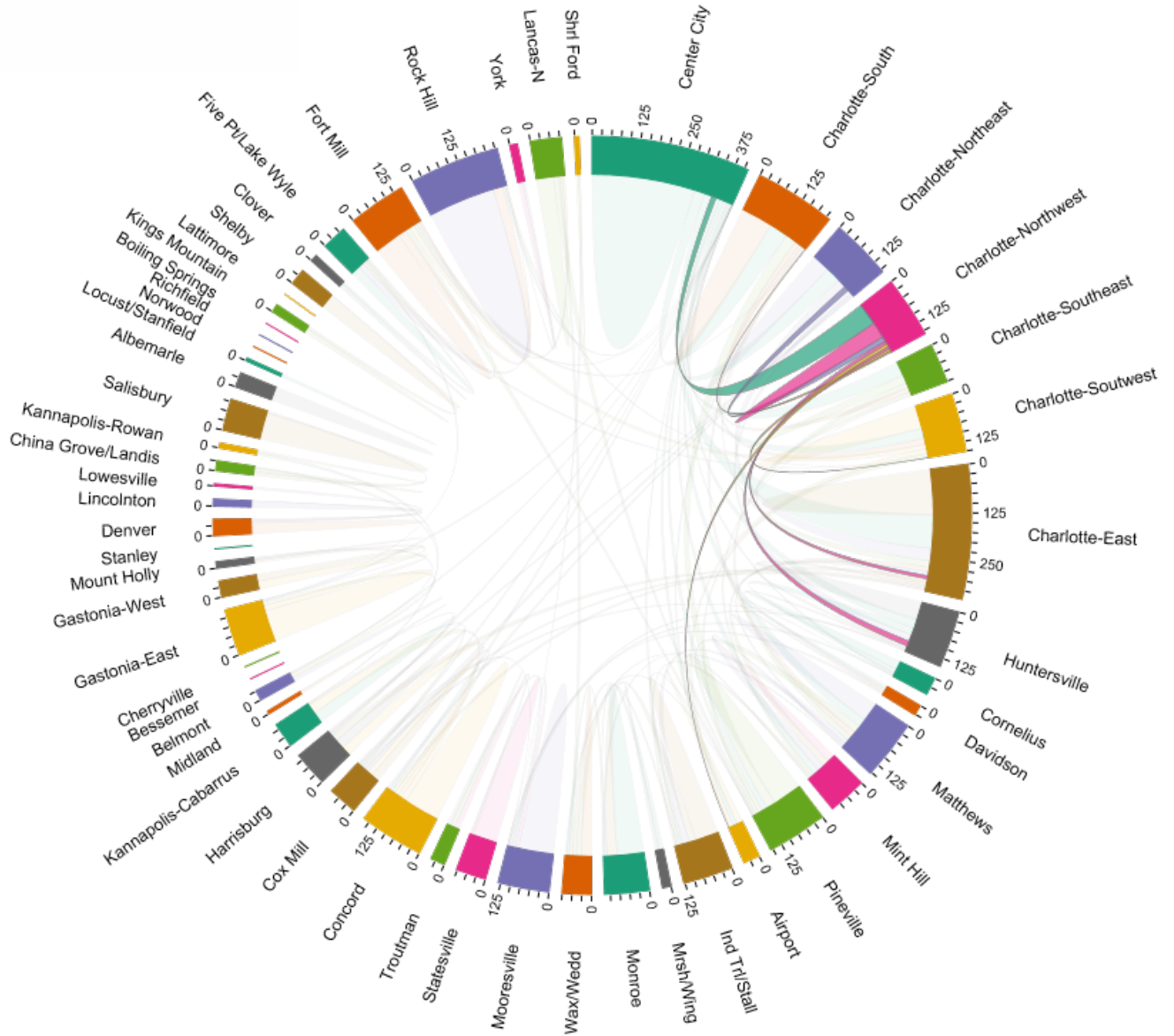
Mint Hill

Source: Metrolina Regional Model, Working Version MRM2001, August 2020
Note: The circular scale is in thousand trips, and each tick mark represents 50 thousand trips
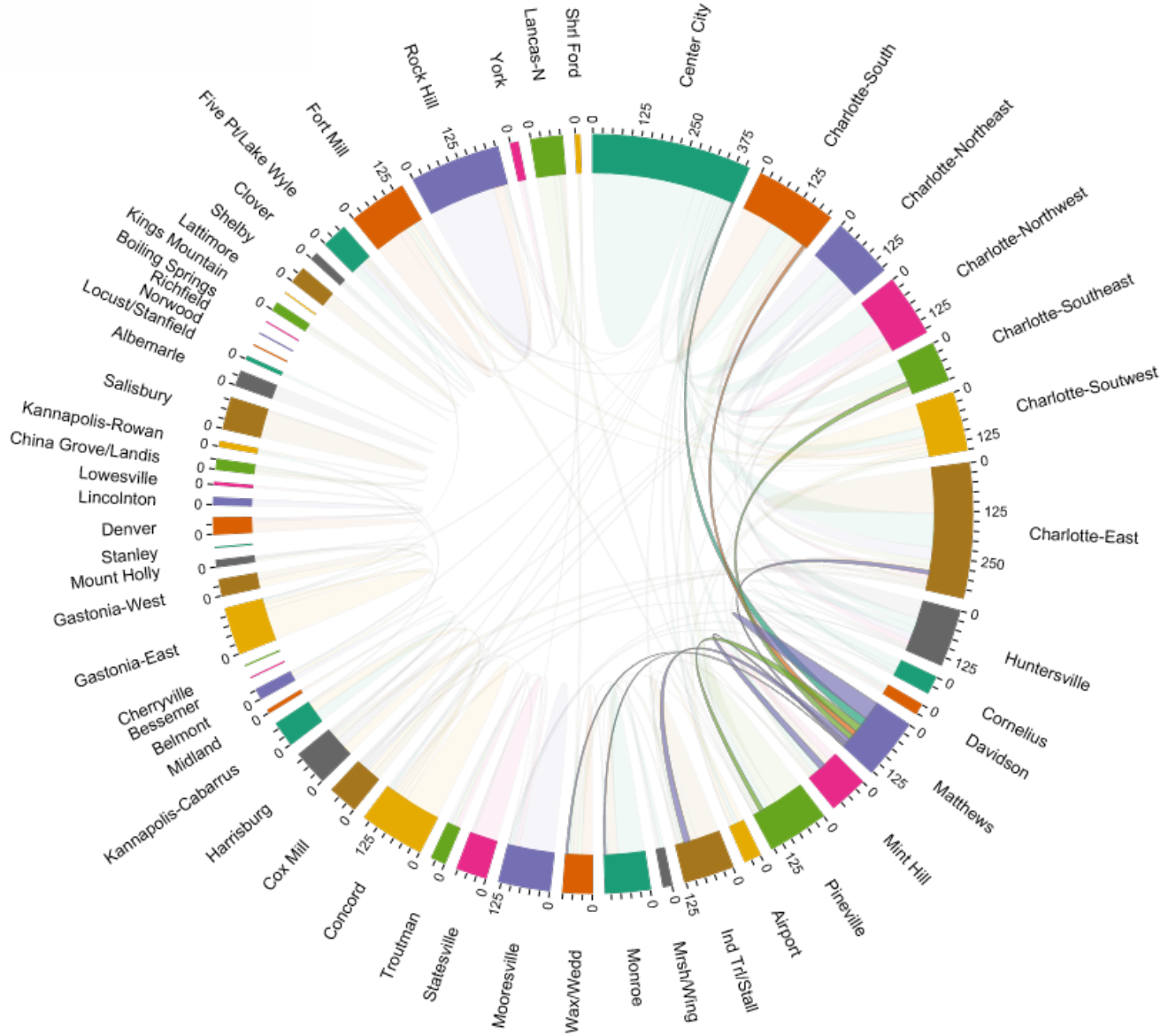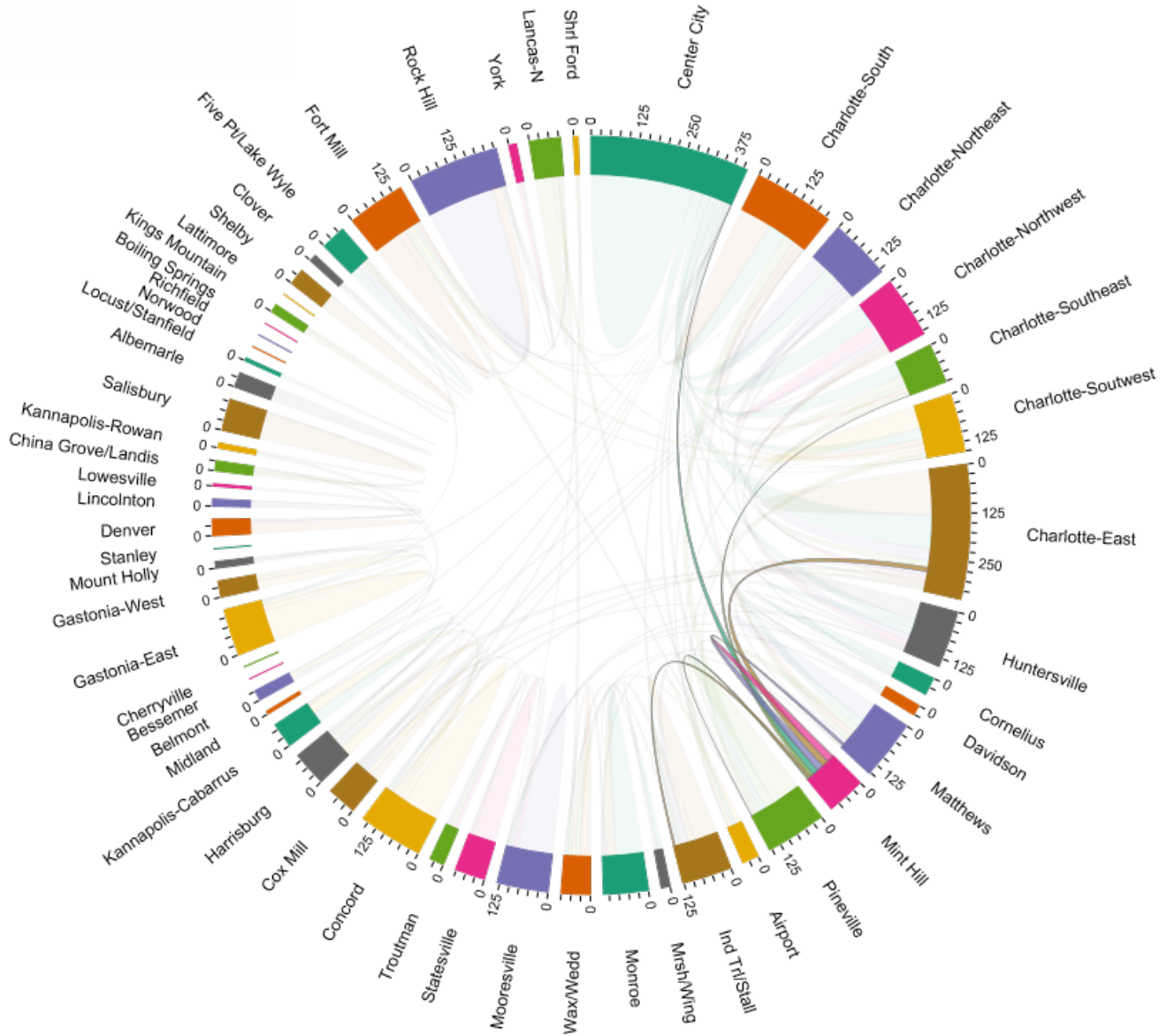
Pineville

Appendix B – Trip Tables

TABLE B-1 TRIP TABLE FOR ANSON COUNTY – LEVELS 1, 2 AND 3

Anson	Market Area	Population	Employment	Productions	Attractions
	Wadesboro	21,879	10,979	-	-
	Market Area Total	21,879	10,979	-	-
	County Total	30,177	12,423	-	-
	Percent of County	73%	88%	0%	0%

Source: NC Statewide Travel Model (NCSTM), Version 3.0

TABLE B-2 TRIP TABLE FOR CABARRUS COUNTY – LEVELS 1, 2 AND 3

Cabarrus	Market Area	Population	Employment	Productions	Attractions
	Concord	134,091	77,159	226,846	248,288
	Cox Mill	65,170	17,594	111,716	77,443
	Harrisburg	82,914	10,825	139,933	66,456
	Kannapolis - Cabarrus	63,466	22,153	105,957	99,185
	Midland	18,991	9,506	31,327	25,811
	Market Area Total	364,632	137,237	615,779	517,183
	County Total	402,345	145,798	671,272	554,004
	Percent of County	91%	94%	92%	93%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-3 TRIP TABLE FOR CATAWBA COUNTY – LEVELS 1, 2 AND 3

Catawba	Market Area	Population	Employment	Productions	Attractions
	Sherrills Ford	16,064	2,536	24,787	16,038
	Market Area Total	16,064	2,536	24,787	16,038
	County Total	16,064	2,536	24,787	16,038
	Percent of County	100%	100%	100%	100%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-4 TRIP TABLE FOR CLEVELAND COUNTY – LEVELS 1, 2 AND 3

Cleveland	Market Area	Population	Employment	Productions	Attractions
	Boiling Springs	9,930	4,532	12,444	15,842
	Kings Mountain	26,348	11,910	38,408	37,027
	Lattimore	4,673	5,728	6,117	8,535
	Shelby	43,604	31,637	67,891	89,871
	Market Area Total	84,555	53,807	124,860	151,275
	County Total	111,654	58,100	160,215	172,923
	Percent of County	76%	93%	78%	87%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-5 TRIP TABLE FOR GASTON COUNTY – LEVELS 1, 2 AND 3

Gaston	Market Area	Population	Employment	Productions	Attractions
	Belmont	27,930	18,518	45,927	56,482
	Bessemer	8,584	2,395	13,651	10,580
	Cherryville	6,809	3,427	10,764	10,139
	Gastonia - East	102,455	61,330	169,523	202,170
	Gastonia - West	40,920	25,877	64,442	74,713
	Mount Holly	22,313	9,163	36,179	23,319
	Stanley	7,901	527	12,532	5,392
	Market Area Total	216,912	121,237	353,018	382,795
	County Total	261,881	129,800	416,670	416,893
	Percent of County	83%	93%	85%	92%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-6 TRIP TABLE FOR IREDELL COUNTY – LEVELS 1, 2 AND 3

Iredell	Market Area	Population	Employment	Productions	Attractions
	Mooresville	110,765	61,466	185,664	199,614
	Statesville	65,850	65,138	104,091	155,602
	Troutman	31,606	19,000	51,201	44,577
	Market Area Total	208,221	145,604	340,956	399,793
	County Total	259,629	159,209	409,803	451,459
	Percent of County	80%	91%	83%	89%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-7 TRIP TABLE FOR LINCOLN COUNTY – LEVELS 1, 2 AND 3

Lincoln	Market Area	Population	Employment	Productions	Attractions
	Denver	46,279	18,352	76,836	59,998
	Lincolnton	25,238	15,728	37,607	45,351
	Lowesville	11,985	5,369	20,023	16,720
	Market Area Total	83,502	39,449	134,466	122,069
	County Total	108,537	44,800	167,758	143,762
	Percent of County	77%	88%	80%	85%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-8 TRIP TABLE FOR MECKLENBURG COUNTY – LEVELS 1, 2 AND 3

Mecklenburg	Market Area	Population	Employment	Productions	Attractions
	Airport	41,826	68,023	66,393	85,918
	Charlotte - Center City	345,210	513,024	482,338	1,024,667
	Charlotte - East	258,277	84,222	430,456	345,577
	Charlotte - Northeast	117,277	88,503	206,922	206,885
	Charlotte - Northwest	123,007	47,392	209,499	164,988
	Charlotte - South	159,956	105,254	264,615	295,345
	Charlotte - Southeast	82,088	34,480	133,619	127,505
	Charlotte - Southwest	113,946	91,130	196,237	193,162
	Cornelius	40,509	30,638	70,175	93,081
	Davidson	27,285	11,639	45,547	32,496
	Huntersville	109,945	43,168	194,591	159,006
	Matthews	112,247	57,124	194,708	194,035
	Mint Hill	76,455	15,507	135,434	81,875
	Pineville	118,353	93,518	204,342	259,659
	Market Area Total	1,726,381	1,283,622	2,834,876	3,264,199
	County Total	1,726,381	1,283,622	2,834,876	3,264,199
	Percent of County	100%	100%	100%	100%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-9 TRIP TABLE FOR ROWAN COUNTY – LEVELS 1, 2 AND 3

Rowan	Market Area	Population	Employment	Productions	Attractions
	China Grove/Landis	31,235	7,614	49,940	33,077
	Kannapolis - Rowan	23,316	3,659	36,846	20,794
	Salisbury	82,362	44,945	125,950	136,068
	Market Area Total	136,913	56,218	212,736	189,939
	County Total	181,099	66,386	272,682	224,633
	Percent of County	76%	85%	78%	85%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-10 TRIP TABLE FOR STANLY COUNTY – LEVELS 1, 2 AND 3

Stanly	Market Area	Population	Employment	Productions	Attractions
	Albemarle	38,390	20,663	58,982	61,804
	Locust/Stanfield	15,527	5,504	22,916	20,186
	Norwood	6,654	2,436	9,692	9,856
	Richfield	6,080	2,210	7,741	9,303
	Market Area Total	66,651	30,813	99,331	101,149
	County Total	88,694	34,263	128,960	117,234
	Percent of County	75%	90%	77%	86%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-11 TRIP TABLE FOR UNION COUNTY – LEVELS 1, 2 AND 3

Union	Market Area	Population	Employment	Productions	Attractions
	Indian Trail/Stallings	108,234	59,810	181,832	180,676
	Marshville/Wingate	28,005	9,146	39,750	30,188
	Monroe	106,580	68,432	171,482	166,489
	Waxhaw/Weddington	66,636	20,150	112,074	86,574
	Market Area Total	309,455	157,538	505,138	463,927
	County Total	368,241	168,354	587,163	507,249
	Percent of County	84%	94%	86%	91%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-12 TRIP TABLE FOR LANCASTER COUNTY – LEVELS 1, 2 AND 3

Lancaster	Market Area	Population	Employment	Productions	Attractions
	Lancaster County - North	68,068	39,763	114,817	90,189
	Market Area Total	68,068	39,763	114,817	90,189
	County Total	68,984	39,789	116,014	90,555
	Percent of County	99%	100%	99%	100%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-13 TRIP TABLES FOR YORK COUNTY – LEVELS 1, 2 AND 3

York	Market Area	Population	Employment	Productions	Attractions
	Clover	29,219	5,377	46,736	29,544
	Five Points/Lake Wyle	57,113	12,552	94,007	50,264
	Fort Mill	110,666	53,421	187,921	182,338
	Rock Hill	194,040	94,131	318,676	309,530
	York	22,042	12,202	34,672	38,108
	Market Area Total	413,080	177,683	682,012	609,784
	County Total	474,025	182,802	765,275	643,908
	Percent of County	87%	97%	89%	95%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020

TABLE B-14 TRIP TABLES FOR ALL COUNTIES – LEVELS 1, 2 AND 3

All	Market Area	Population	Employment	Productions	Attractions
	Market Area Total	3,716,313	2,256,486	6,042,776	6,308,340
	County Total	4,097,711	2,327,882	6,555,475	6,602,857
	Percent of County	91%	97%	92%	96%

Source: Metrolina Regional Model, Working Version MRM2001, August 2020