Strengthening Access to NC Ferries to Support Coastal Community Resiliency, Health, and Mobility




NCDOT Project 2022-20
FHWA/NC/2022-20
September 2025

Sarah Worth O'Brien et al.
Highway Safety Research Center
University of North Carolina at Chapel Hill

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

RESEARCH & DEVELOPMENT

Strengthening Access to NC Ferries to Support Coastal Community Resiliency, Health, and Mobility

FINAL REPORT

Submitted to:

North Carolina Department of Transportation
Research and Development Unit
(Research Project No. RP2022-20)

Submitted by:

University of North Carolina at Chapel Hill Highway Safety Research Center

Chapel Hill, NC

Report Authors:

Sarah Worth O'Brien (UNC-HSRC)

Amy Patronella (UNC-HSRC)

Emiley Gurganus (UNC-HSRC)

Laura Sandt (UNC-HSRC)

Kristin Blank (UNC-HSRC)

Katherine Harmon (UNC-HSRC)

Tabitha Combs (UNC-Department of City and Regional Planning)

Nancy Pullen-Seufert (UNC-HSRC)

Laquanda Johnson (North Carolina A&T)

September 30, 2025

Technical Report Documentation Page

1. Report No. **FHWA/NC/2022-20**	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Strengthening Access to NC Ferries to Support Coastal Community Resiliency, Health, and Mobility		5. Report Date September 30, 2025 6. Performing Organization Code
7. Author(s) Sarah W. O'Brien https://orcid.org/0000-0002-2928-7805 Amy Patronella https://orcid.org/0009-0006-7781-7360 Emiley Gurganus Laura Sandt, Ph.D. https://orcid.org/0000-0001-9468-7891 Kristin Blank https://orcid.org/0000-0001-5065-1600 Katherine J. Harmon, Ph.D. https://orcid.org/0000-0003-2330-2645 Tabitha S. Combs, Ph.D. https://orcid.org/0000-0002-0362-7015 Nancy Pullen-Seufert https://orcid.org/0000-0003-4957-3259 Laquanda L. Johnson, Ph.D. https://orcid.org/0000-0001-7545-1453		8. Performing Organization Report No.
9. Performing Organization Name and Address University of North Carolina – Highway Safety Research Center 130 Mason Farm Rd., CB# 3430 Chapel Hill, NC 27514		10. Work Unit No. (TRAIS) 11. Contract or Grant No.
12. Sponsoring Agency Name and Address North Carolina Department of Transportation Research and Development Unit 1549 Mail Service Center Raleigh, North Carolina 276699-1549		13. Type of Report and Period Covered Final Report August 2021-September 2025 14. Sponsoring Agency Code RP2022-20
15. Supplementary Notes		

16. Abstract

This report leverages a broad array of available data and information sources to identify and measure how enhanced transit and multimodal connections at ferry terminals in North Carolina may lead to operational efficiencies and wider community benefits. Through multiple study methods, this report identifies and summarizes studies related to ferry access improvement approaches and evaluation methods, evaluates the content and quality of 23 existing plans in North Carolina in relation to ferry access improvement goals and other metrics, summarizes lessons learned from interviewing peer ferry systems, and describes a geospatial analysis conducted around NC ferry terminals to define and assess 15- and 30-minute walksheds at each terminal. This report also provides tools for state and/or local agencies to conduct additional community engagement activities, including an approach and survey materials to deploy a travel demand survey, to gather broader feedback from people living in and visiting these coastal communities. A compendium Planning Opportunities document prepared as part of this research project offers recommendations and a prioritization framework for short- and long-range actions that would maximize the benefits of enhancing multimodal connectivity with the NC ferry system and describes the existing health, access, and travel conditions in these coastal communities.

17. Keywords *Ferry, ferry terminal, multimodal connection, access, plan quality analysis, walkshed*	18. Distribution Statement		
19. Security Classif. (of this report) unclassified	20. Security Classif. (of this page) unclassified	21. No. of Pages 79	22. Price

Form DOT F 1700.7 (8-72) **Reproduction of completed page authorized**

DISCLAIMER

The contents of this report reflect the views of the authors and are not necessarily the views of North Carolina State University. The authors are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the North Carolina Department of Transportation at the time of publication. This report does not constitute a standard, specification, or regulation.

ACKNOWLEDGEMENTS

This research was sponsored by the North Carolina Department of Transportation and championed by the Ferry Division. It was guided by a Steering and Implementation Committee who gave the research team feedback at various touchpoints along the way. We also appreciate the staff at Casco Bay Lines, Maine State Ferry Service, San Francisco Bay Ferry, Washington State Ferries (WSF), and NY Waterway who provided their time and insights when interviewed about their ferry systems.

Table of Contents

List of Tables

List of Figures

List of Acronyms

ADA	Americans with Disabilities Act
ARPA	American Rescue Plan Act
BART	Bay Area Rapid Transit
CARES	Coronavirus Aid, Relief, and Economic Security Act
CRRSAA	Coronavirus Response and Relief Supplemental Appropriations Act
CTP	Comprehensive Transportation Plan
ESRI	Environmental Systems Research Institute
FTA	Federal Transit Administration
GIS	geographic information system
HOV	high-occupancy vehicle
IRB	institutional review board
MPO	metropolitan planning organization
MSFS	Maine State Ferry Service
NAACP	National Association for the Advancement of Colored People
NAICS	North American Industry Classification System
NC	North Carolina
NCDOT	North Carolina Department of Transportation
PQA	plan quality analysis
RPO	rural planning organization
SIC	Standard Industrial Classification
StIC	Steering and implementation committee
US	United States
USDOT	United States Department of Transportation
WETA	Water Emergency Transportation Authority

Executive Summary

The NC Ferry System, operated by the North Carolina Department of Transportation (NCDOT), is one of the largest state-run ferry services in the United States. It provides critical transportation links across the State's coastal region, connecting mainland communities with island destinations. The system contains seven ferry routes, including Hatteras to Ocracoke, Cedar Island to Ocracoke, Swan Quarter to Ocracoke, Southport to Fort Fisher, Cherry Branch to Minnesott Beach, Bayview to Aurora, and Currituck to Knotts Island. The ferry system covers a vast area along the State's coast, ensuring access to isolated communities that would otherwise be cut off from essential services. The ferries play a vital role for daily commuters, emergency services, and visitors to the Outer Banks and other coastal attractions. This project considers how enhanced transit and multimodal connections to the NC ferry system can lead to operational efficiencies and support the resiliency, health, and mobility of the State's coastal communities. Two deliverables were developed to address that objective: 1) this report, which documents the conduct of research undertaken, and 2) a planning opportunities document that can serve as a roadmap of recommendations for both NCDOT and coastal communities to implement to improve multimodal connections with the State's ferry system.

The study used a conceptual model focused on a typical travel lifecycle that a person moves through for any given trip, and then further honed in on the specific trip stages when using a ferry: getting to the ferry terminal, boarding the ferry, riding the ferry, disembarking, and then leaving the ferry terminal. For each phase of a trip, the research team identified a list of potential barriers or constraints to accessing the ferries. The model guided the study's data collection and analysis, directing focus toward assessing multimodal connectivity and identifying barriers affecting non-motorized access. This framework ensured that the report emphasized evaluating pedestrian, bicycle, and transit connections to ferry terminals, prioritizing efforts to address challenges at the community-to-terminal interface.

A mixed methods approach was used to gather data through:

- Literature review: the team identified and summarized barriers to using ferries and barriers to rural public transit that were found in the literature. These include lack of integration and coordination across modal systems; inconvenient frequency and reliability of operations; poor communication of user information or ease of understanding by tourists; mismatched performance metrics to community values; and financial, organizational, or institutional barriers.
- Plan content and quality analysis: twenty-three plans were reviewed and scored across 5 categories to evaluate how existing plans support and/or integrate with the ferry service.
- Interviews with peer ferry systems: the team interviewed 5 peer ferry systems to explore motivations and approaches that informed their multimodal access policies and practices and glean best practices and recommendations from both public and private ferry service providers.
- Walkshed analysis: using geospatial analysis techniques applied to housing and business data, the research team identified 15-minute and 30-minute walksheds around each ferry terminal and described the opportunity for active travel connections within them.
- Meeting with local stakeholders: representatives from the project's Steering and Implementation Committee (StIC), NCDOT staff, and local and regional partners with connections to coastal transportation and community health planning attended the project closeout meeting and provided feedback on this report and the resultant planning opportunities.

These methods, along with a summary of findings from conducting each, is described in detail. The report also indicates that additional community engagement is needed -and provides the tools to do so - to fine-tune and prioritize the planning opportunities recommended in the second final deliverable.

Background

The motivation for this project was to leverage a broad array of available data and information sources to:

1. Identify and measure how enhanced transit and multimodal connections at ferry terminals may lead to operational efficiencies and wider community benefits.
2. Develop recommendations and priorities for short- and long-range actions that would maximize the benefits of connectivity enhancements and leverage existing and additional funding sources.

Ideally, this effort is intended to support the NC Moves 2050 Plan by offering opportunities for integrating key concepts and initiatives related to ferry access and to foster a more efficient, integrated, accessible, and equitable ferry system.

To achieve these goals, the project team used multiple study methods to:

1. Identify and summarize relevant state, national, and international studies related to ferry access improvement approaches and evaluation methods;
2. Develop a method to summarize and evaluate the content and quality of existing plans in relation to ferry access improvement goals, and perform an assessment of the North Carolina (NC) plans identified; and
3. Document unique local issues, needs, demographics, and historical context that could provide a fact base for short- and long-range planning.

This final report provides background information on the study's conceptual model, the research methods used, and findings from the project tasks implemented during the project. This report complements the other project deliverable, which provides short- and long-range planning opportunities (Gurganus et al., in review).

North Carolina Ferry System Overview

The NC Ferry System, operated by the North Carolina Department of Transportation (NCDOT), is one of the largest state-run ferry services in the US. It provides critical transportation links across the State's coastal region, connecting mainland communities with island destinations. The system contains seven ferry routes, including Hatteras to Ocracoke, Cedar Island to Ocracoke, Swan Quarter to Ocracoke, Southport to Fort Fisher, Cherry Branch to Minnesott Beach, Bayview to Aurora, and Currituck to Knotts Island.

The ferry system covers a vast area along the State's coast, ensuring access to isolated communities that would otherwise be cut off from essential services. The ferries play a vital role for daily commuters, emergency services, and visitors to the Outer Banks and other coastal attractions. The system is also integral to the State's economy, supporting industries like tourism and fishing, and providing transportation alternatives for residents in areas with limited road access.

Study Conceptual Model

The study is based on a conceptual model of the travel lifecycle that each individual experiences:

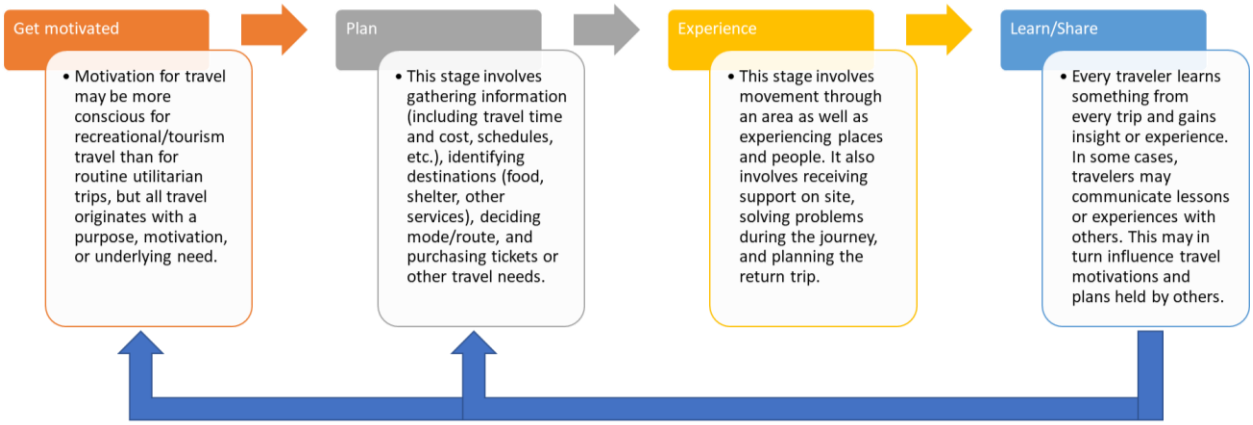


Figure 1. Study Conceptual Model

Within this lifecycle, there are several specific stages of a ferry trip:

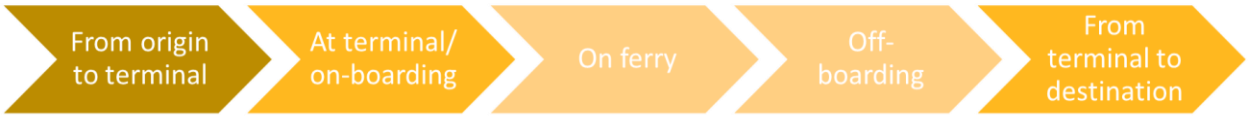


Figure 2. Specific Stages Through the Lifecycle of a Ferry Trip

Barriers or constraints to access can arise within each of these lifecycle phases of ferry-involved travel and stages of a specific trip:

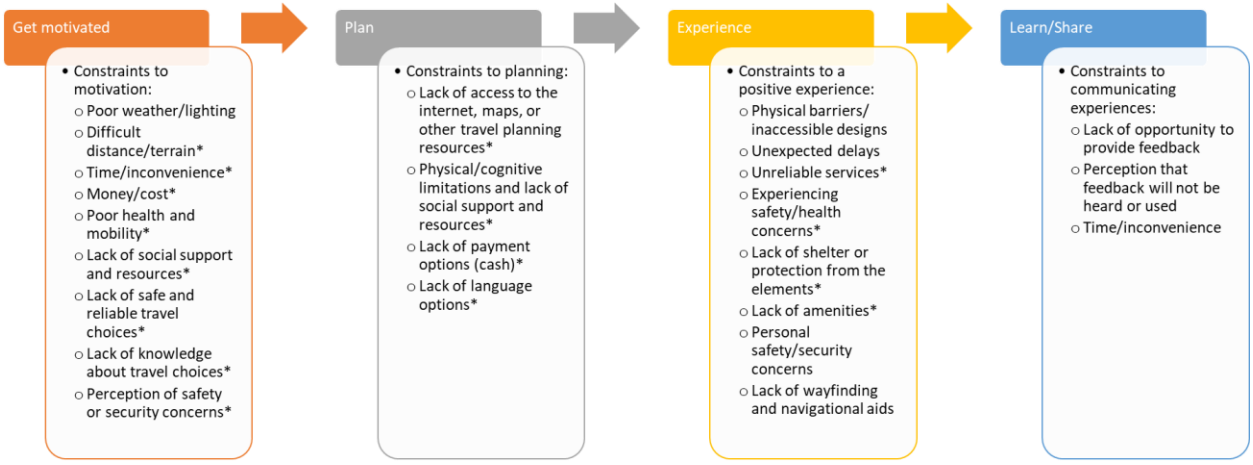


Figure 3. Barriers to Access During the Lifecycle of a Ferry Trip

These constraints are known to be inequitably distributed and contribute to the overall health and transportation disparities experienced in a community. The conceptual model provided the foundation for narrowing the scope of this report by focusing on the key phases of a ferry trip where access barriers are most likely to occur. By identifying critical points in the travel lifecycle—such as motivation,

planning, experience, and learning—the model guided the study's data collection and analysis, directing focus toward assessing multimodal connectivity and identifying barriers affecting non-motorized access. This framework ensured that the report emphasized evaluating pedestrian, bicycle, and transit connections to ferry terminals, prioritizing efforts to address challenges at the community-to-terminal interface.

Summary of Research Conducted

The project team gathered and assessed data from a variety of sources to support its development of the short/long-range plan (Gurganus et al., in review). The team gathered data using mixed methods, including:

- Literature review
- Plan content and quality analysis
- Interviews with peer States
- Descriptive analysis of active travel opportunities for each ferry terminal
- Meeting with local stakeholders
- Development of a Web-based travel demand survey

These methods, along with a summary of findings from conducting each, is described in the following sections.

Considerations for using two additional approaches were developed specifically to collect further data through community engagement efforts: holding a series of regional listening sessions and deploying a travel demand survey. While these two methods were not applied during this research to collect these data, the project team offers suggestions for how each type of outreach could be conducted in the future to enhance NCDOT's plans for prioritizing and implementing the short and long-term recommendations outlined in the compendium document (Gurganus, et al., in review) to this report.

Literature Review

To identify relevant state, national, and international studies, the team performed a scan of:

- Transportation Research Board and other peer-reviewed literature sources
- State and national standards, guidance, and planning documents (via website searches)
- Public health and equity-focused planning studies

The Transport Research International Documentation database was used to find background studies. The following search terms were used:

- "ferry" AND "bike"
- "ferry" AND "bicycle"
- "ferry" AND "walk"
- "ferry" AND "pedestrian"
- "ferry" AND "access"
- "ferry" AND "multimodal"
- "ferry" AND "bikeshare"
- "mobility" AND "hub"

Barriers to Using Ferries

Ferries hold considerable promise for enhancing urban mobility and sustainability, yet many regions struggle to attract ridership due to persistent barriers. The rapid expansion of road infrastructure over the past century has often sidelined ferry transport, leaving many ferry services financially unviable or diminished within transit networks. Roseman (2018) and Tsoi and Loo (2021) note that realizing the potential of ferries requires overcoming a range of obstacles from infrastructural and operational issues to user-perception and equity challenges that currently impede wider ferry use.

Lack of Integration with Other Transit Modes

A primary barrier is the incomplete integration of ferries into the broader public transport system. Payne et al. (2013) emphasize that high levels of ferry-transit integration require several key elements: co-locating ferry docks with bus or rail terminals, coordinating schedules to minimize transfer wait times, unified fare instruments, and integrated passenger information systems. These features create a seamless door-to-door journey, yet in practice, they are often missed. Full fare integration (e.g., free transfers between ferry and bus) is *rare* except in agencies that operate both modes, meaning ferry riders frequently must pay a premium or use separate tickets. Likewise, schedule coordination is inconsistent; a ferry that arrives just after the connecting bus leaves can deter travelers. The physical layout of ferry terminals can also pose challenges. For example, ferry piers are sometimes remote or lengthy, forcing long walks to transit connections, and many terminals lack adequate space for buses to queue or clear signage for wayfinding. When such integration shortfalls make transfers inconvenient, travelers are more likely to opt for the door-to-door comfort of cars, when there is a driving alternative, instead of fragmented trips (Payne et al., 2013).

Service Frequency and Reliability

Another fundamental barrier is the limited frequency and perceived unreliability of many ferry services. Ferries tend to run less frequently than land-based transit, which means long gaps between sailings during off-peak times. In practice, this amplifies the cost of a missed connection or delay, meaning, if a passenger arriving at the dock just misses the ferry, the next boat might be a lengthy wait. Payne et al. (2013) observe that lower-frequency services demand "creative solutions" to facilitate integration, such as carefully matching bus timetables to ferry headways or coordinating operations in real-time. In many areas, such solutions have not been fully implemented, leaving ferries out of sync with customer schedules. Reliability can also be an issue: unlike a bus that can reroute if a road is closed, ferries are more susceptible to weather or water conditions, and mechanical issues can shut down service entirely. On ferry-dependent islands, residents experience what Roseman (2018) frames as "mobility injustice", which is a precarious mobility situation in which daily travel is marked by uncertainty, long queues, and a lack of alternatives. For example, ethnographic evidence from a ferry-reliant community describes commuters often caught in extensive ferry lineups and waiting areas, with any cancellation or capacity limit stranding travelers until the next boat. Such conditions not only inconvenience riders but also raise equity concerns, as certain populations (e.g., island residents or low-income commuters who cannot choose another mode) must bear a disproportionate burden of unreliable service. The effort and uncertainty involved in simply "catching the ferry" can deter regular use and undermine public confidence in ferries as a dependable mode of transit (Roseman, 2018).

User Information, Tourist Perceptions, and Accessibility

A further barrier relates to how travelers perceive and navigate ferry services. Research shows that visitors and infrequent riders often find public transport options confusing or inconvenient at destinations. Le-Klähn and Hall (2015) note that tourists are less likely to use local public transport (like ferries) in rural or leisure contexts unless those services are clearly marketed and easy to understand. A lack of visitor-oriented information, such as multilingual signage, simple fare options, and visible promotion of ferry routes to popular attractions, can therefore become a barrier. Payne et al. (2013) raise the concern that modern smart-card ticketing, while convenient for regular commuters, might discourage infrequent users or tourists who are unfamiliar with the system. If buying a ticket or finding the right ferry requires too much local knowledge, many day-trippers will simply drive to their destination instead. On the other hand, case studies suggest that these perception barriers can be lowered with the right interventions. Lumsdon et al. (2010) describe a United Kingdom (UK) initiative

that introduced a single "Wayfarer" combined ticket in the 1980s, valid for ferry, bus, and train travel to a national park, specifically to encourage day visitors to use public transport. Decades later, the ticket was still in use, having successfully attracted urban residents to travel by ferry and bus for leisure trips they might otherwise have driven. This example illustrates that when transit is made tourist-friendly, through integrated tickets, easy marketing, and a clear appeal to visitors' needs, it can induce a modal shift. Conversely, without such measures, ferries remain a hard sell to travelers who are unfamiliar with the system or worried about getting stranded in an unknown place.

Financial and Organizational Barriers

Many barriers to ferry use are rooted in funding, policy, and organizational issues. Operating ferries is expensive because it involves high fixed costs for vessels, crews, and terminals, and unlike buses that can adjust routes cheaply, ferries require dedicated infrastructure. Tsoi and Loo (2021) observe that numerous ferry services worldwide have become financially unviable, surviving only with government subsidies or by charging high fares. This financial pressure often translates into reduced service levels (e.g., infrequent schedules, aging boats) that make the service less attractive to riders, creating a vicious cycle of low ridership and poor revenue. The business model of ferry operations can thus itself be a barrier: privately operated ferries may prioritize profitable tourist routes over commuter-oriented services, while public agencies may struggle to justify investing in ferry upgrades if ridership is low. In Hong Kong, for example, policy analysis has shown that enhancing landside development and intermodal connectivity around piers is critical to ferry viability, yet such holistic investments may be outside the responsibility or budget of a ferry company alone.

Governance fragmentation is another issue. When different entities operate the ferry versus the buses/trains, coordination on schedules and ticketing can falter. Complete fare integration "predominantly exists only within agencies that operate both land- and water-based modes", implying that divided authorities often fail to offer convenient through-fares (Payne et al., 2013, p. 2). Ceder (2010) likewise argued that demand-responsive route planning and network design are needed for ferries to effectively meet travel needs, but implementing such planning requires coordination and data-sharing across agencies. In many cities, ferry services have historically been planned in isolation, resulting in routes or timetables that do not mesh with dominant travel patterns. Overcoming these institutional barriers often requires strong political will and advocacy. Roseman (2018) documents how community advocates have had to fight for ferry justice by pushing authorities to invest in more reliable boats, better docks, and fairer service provisions for ferry-dependent communities. Without such concerted efforts, ferries can remain under-prioritized in transportation planning, perpetuating the cycle of limited service and limited use.

Broader Impacts and the Need to Address Barriers

The consequence of these barriers is not only fewer people riding ferries, but also a loss of potential societal benefits. Researchers point out that shifting even a portion of trips from private cars to ferries (and other public or active transport modes) can yield significant positive impacts. For instance, public health modeling studies using the Integrated Transport and Health Impact Model show that reducing car travel in favor of active modes leads to measurable improvements in population health outcomes. When more people walk or bike as part of using transit and ferries, rates of chronic diseases decline and avoidable deaths are averted, while cleaner air and lower traffic injuries confer additional benefits. Whitfield et al. (2017) argue that enabling modal shift is therefore not just a transport issue but a public health opportunity, which may be missed if transit options are underutilized. Similarly, system-level analyses, such as one developed by Macmillan et al. (2014), underscore the importance of tackling ferry barriers through comprehensive policy intervention. They developed a system-dynamics simulation for

Auckland's transportation, finding that only bold, coordinated measures could reverse automobile dominance. Their model demonstrated that investing in better infrastructure and policies would yield benefits 10-25 times greater than the costs, by boosting sustainable travel and its associated health and environmental upsides (Macmillan et al, 2014).

Barriers to Accessing Rural Public Transport

Rural public transportation systems face a constellation of challenges that hinder accessibility, especially in regions like the coastal region of NC, where dispersed populations rely on both transit services and State-operated ferries for mobility. A consistent finding in the literature is that funding constraints severely limit rural transit provision. Insufficient operating funds are widely recognized as a primary barrier to service expansion and improvement. In a survey of rural transportation planners following the push in the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy of Users (SAFETEA-LU) for coordinated transit planning, 96% of respondents in Texas identified lack of funding as a strong barrier to implementing planned transit improvements (Smith, 1994). Rigid funding regulations compound this issue. For instance, rules tied to specific programs, such as Medicaid transportation, were cited as major impediments alongside general budget shortfalls (Smith, 1994). These financial and regulatory hurdles often constrain service frequency, geographic coverage, and the ability to maintain assets, directly affecting how easily rural residents can access transit.

Operational and Institutional Factors

By nature, rural areas cover large territories with low densities, making it difficult to provide convenient routes and schedules. Fixed-route buses or ferries in remote NC communities, for example, may run infrequently and require long travel times, discouraging use. Moreover, jurisdictional and service area boundaries can prevent connected travel options. Agencies often cannot cross county lines or deviate from defined routes, even when riders' needs span those borders. Planners in Smith's study (1994) noted that jurisdictional boundaries and limited service hours were hindrances to coordination (over 40% saw these as significant issues). Such constraints mean that a person living just beyond a transit service area might have no easy way to reach a bus or ferry. Coordination "turf" issues and a lack of interagency trust further exacerbate gaps in service. Many rural transit providers are small and operate independently, and collaboration can be stymied by agency protectiveness or fragmented governance, as observed by Martin et al. (2011). They found that nearly half of stakeholders regarded agency "turf" protection as a strong barrier to better coordination, underscoring the need for trust-building and interagency agreements (Martin et al., 2011). Without cooperation, rural residents may face disjointed travel options that fail to get them to critical destinations in a timely manner.

Disconnect Between Values and Metrics

Monast et al. (2019) found that rural transit systems in NC often state core values like safety, customer service, and reliability in their strategic plans, yet their performance metrics do not fully reflect these priorities. Aside from safety indicators, the authors found that agencies tend not to measure service quality factors, like on-time performance or rider satisfaction, which would capture customer service and reliability outcomes (Monast et al., 2019). This disconnect can impede improvements to the rider experience, meaning if reliability is not measured, it may not be systematically addressed. In practice, a rural ferry route might be meeting safety targets but running at inconvenient times. Without metrics or feedback loops focused on scheduling or rider needs, such issues persist unmitigated. The literature suggests that strengthening data collection and performance evaluation around service quality is critical for overcoming barriers to access in rural transit.

Lack of Rural Planning Tools and Frameworks

Limited planning capacity and tools tailored to rural contexts have also historically hampered progress. Comprehensive planning in rural areas has not consistently prioritized transit access or active transportation, in part because available planning frameworks were urban-centric. Charron et al. (2019) highlight that rural environments present unique barriers (e.g., longer distances, fewer infrastructure options) which have been overlooked by traditional planning-for-health and transportation guides. They developed a Healthy Rural Community Design Scorecard to help small communities identify gaps in policies and engage stakeholders on improving local mobility and health outcomes (Charron et al., 2019). The need for such a tool underscores how rural planners often lack guidance to incorporate multimodal transportation and accessibility into their plans. Charron et al. (2019) indicate that a consequence is that many rural comprehensive plans historically did not robustly address public transit integration or walking and biking connectivity, indirectly limiting support for transit access improvements. This situation is gradually changing with newer evaluation instruments (Charron et al., 2019) and knowledge-sharing, but the legacy of weak planning attention is still felt in rural transit provision today.

Equity in Rural Transit Access

Finally, the literature points to equity-related barriers in rural transportation access. Rural public transport is especially important for transportation-disadvantaged groups, including those who may not have personal vehicles, like older adults, people with disabilities, and low-income residents (Smith, 1994). Yet planning processes have not consistently centered these populations. In a content analysis of local comprehensive plans, Loh and Kim (2021) found that most plans gave little attention to equity and included few concrete goals or actions to advance equitable outcomes. Plans seldom identified vulnerable populations or addressed how to equitably distribute services and infrastructure. This lack of explicit equity focus means that the needs of those most dependent on public transit can be underprioritized. For example, if a rural transit plan does not recognize the mobility needs of an isolated older adult community, services like on-demand shuttles or accessible ferries might not be pursued. The absence of equity-driven planning is thus a subtler but significant barrier to access that can lead to service gaps in areas of high need and perpetuate the isolation of already marginalized rural residents. Improving rural mobility in NC's ferry and transit systems will require not only more resources and better coordination, but also purposeful planning to ensure that those who most rely on public transportation are thoughtfully served.

North Carolina Transportation Plans: Review and Quality Analysis

The purpose of this research method was to broaden understanding of the barriers to ferry use across multiple dimensions, starting with how existing plans support and/or integrate with the ferry service. A plan quality analysis (PQA) framework and coding tool were developed to systematically assess relevant plans across several dimensions. PQAs arose in the 1990s based on work (Berke & French, 1994; Berke et al., 1996; Burby & Dalton, 1994) to develop improved approaches to planning for hazard mitigation, with the notion that high-quality plans are more likely to be implemented and lead to outcomes more aligned with community goals (Guyadeen et al., 2021). For more background on PQAs, see Appendix A.

To identify plans to assess, the project team used the NCDOT website to locate transportation-related plans at the State or local level with applicability to the coastal communities within which the NC's ferry system operates. In seeking to identify and review additional relevant existing plans, the team sought to collect the following plan types:

- Economic development plans

- Greenway and trail plans
- Bike and pedestrian plans
- Comprehensive/general transportation plans
- Public transportation plans

The project team used city and State transportation websites to find such plans, reports, or evaluations as well as performed a broader search engine search to find evaluations that may have been conducted by consultants, universities, or other entities.

PQA Framework and Coding Tool Developed

Building on previous PQA methods discussed in Appendix A, the project team developed a mobility-focused framework for evaluating these plans. The Checklist for Vision Zero Plan Development from the *Guide to Developing a Vision Zero Plan* (LaJeunesse et al., 2020) was used in the development of the NC Plan Content Analysis framework. This framework includes multiple components designed to capture the fact base, vision, implementation and monitoring, and integration dimensions through the lenses of multimodal mobility and equity. Specifically, the plan content analysis sought to examine these aspects of the plans:

1. Mission, Goals, and Vision Statement
2. Community Engagement
3. Access, Equity, and Mobility Conditions and Barriers Assessment
4. Evidence-based Performance Metrics
5. Plan Implementation and Evaluation

Appendix B details the questions asked regarding plan content and its quality and procedural integrity. A plan coding tool was developed to evaluate plan quality and process with a focus on ferry services, accessibility, and integration with public transportation. The tool was designed to capture relevant information for each question (shown in Appendix B), which was then used to assign a numerical value based on how well the plan addressed the prompt. The combination of numerical value and qualitative content allowed for high-level summary information as well as detailed examples of how plans were addressing the questions.

For each of these prompts, the coding method includes a rating from 0 to 2, which captures the degree to which the prompt is addressed in the plan. For example, 0 = not present, 1 = the plan partially addresses the prompt, and 2 = the plan fully and completely addresses the prompt. Some questions had a range of 0-1 points while others had 0-2 points, depending on the nature of the prompt. Across the five sections of prompts, there were 44 total possible points to be awarded. The distribution of points across the five sections is shown in Table 1. There is a disproportionate number of points in the Access, Equity, and Mobility Conditions and Barrier Assessment section, given our focus on accessibility and mobility. Notably, the plan review process did not involve an external validation of the information presented in the plan (i.e., the project team did not reach out to agency owners of each plan to confirm our understanding), and we relied on the information presented in each plan for analysis.

During the assessment, we reviewed existing plans to evaluate barriers and opportunities to improve multimodal connectivity in relation to ferries. We included 21 plans at the local, county, and metropolitan planning organization (MPO) level, as well as two Statewide plans. The plans are primarily active transportation and comprehensive transportation plans, as we were unable to locate any ferry-specific plans in NC.

The team reviewed the following plans:

1. Albemarle Regional Bicycle Plan (Alta/Greenways et al., 2013)
2. Beaufort County Comprehensive Transportation Plan (Surti & Davis, 2014)
3. Brunswick County Comprehensive Transportation Plan (Thomas, 2013)
4. Cape Fear Moving Forward 2045 Metropolitan Transportation Plan (Wilmington Urban Area MPO, 2020a and 2020b)
5. Cape Fear Regional Bicycle Plan (Alta Planning + Design, 2017)
6. Cape Fear Locally Coordinated Public Transportation Plan (Wave Transit, 2021)
7. City of Southport Comprehensive Pedestrian Transportation Plan (Kimley-Horn and Associates, Inc., 2014)
8. City of Wilmington Rail Trail Master Plan (Kimley-Horn and Associates, Inc., 2020)
9. Comprehensive Economic Development Strategy (Mid-East Commission, 2020)
10. Comprehensive Greenway Plan Wilmington/New Hanover County (Alta/Greenways, 2013)
11. Craven County Comprehensive Transportation Plan (Connolly et al., 2023)
12. Currituck County Comprehensive Transportation Plan (Morrow, 2012)
13. Dare County Comprehensive Transportation Plan (Morrow & Marshall, 2015)
14. Hyde County Comprehensive Transportation Plan (Nicholls & Watson, 2012)
15. NC Moves 2050 Plan (North Carolina Department of Transportation, 2021)
16. North Carolina Public Transportation Strategic Plan (North Carolina Department of Transportation, 2018)
17. Northeast Regional Locally Coordinated Public Transportation Human Service Transportation Plan (Albemarle Rural Planning Organization et al., 2013)
18. Pamlico County Comprehensive Transportation Plan (Moya-Astudillo et al., 2012)
19. River to the Sea Bikeway Master Plan (City of Wilmington, 2013)
20. Transit Needs Study for the Wilmington Multi-Modal Transportation Center (Martin/Alexiou/Bryson & Moffatt & Nichol, 2009)
21. Walk Wilmington: A Comprehensive Pedestrian Plan (Toole Design Group, 2009)

For each plan reviewed, there was a total of 44 possible points to be awarded across five sections. Table 1 shows the potential points awarded compared to the average points awarded for each section.

Table 1. Reviewed Plans by Potential Points and Average Points Awarded

Plan Part	Total Potential Points in Section	Average Points Awarded
Mission, Goals, and Vision Statement	8	3.2
Community Engagement	9	3.8
Access, Equity, and Mobility Conditions and Barriers Assessment	14	5.2
Evidence-based Performance Metrics	6	1.1
Plan Implementation and Evaluation	7	1.8

Table 2 shows the scores for each plan with the highest point total in each category bolded.

Table 2. Reviewed Plans by Section and Awarded Scores

Plan Name	Mission, Goals, and Vision (8)	Community Engagement (9)	Access, Equity, Mobility (14)	Evidence-based Performance (6)	Plan Implement-ation (7)	Total (44)
Albemarle Regional Bicycle Plan	5	5	8	2	3	23
Beaufort Co. CTP	2	5	5	0	1	13
Brunswick Co. CTP	4	4	6	2	0	16
Cape Fear Moving Forward 2045 Metropolitan Transportation Plan	**7**	**8**	9	3	3	**30**
Cape Fear Regional Bicycle Plan	5	4	5	2	3	19
Cape Fear Locally Coordinated Public Transportation Plan	0	3	7	0	3	13
Southport Comprehensive Pedestrian Transportation Plan	3	3	7	0	3	16
Wilmington Rail Trail Master Plan	2	2	1	0	1	6
Comprehensive Economic Development Strategy	5	1	0	**4**	1	11
Comprehensive Greenway Plan Wilmington/New Hanover Co.	4	5	8	2	**5**	24
Craven Co. CTP	6	6	2	2	1	17
Currituck Co. CTP	3	5	2	0	1	11
Dare Co. CTP	4	2	5	0	1	12
Hyde Co. CTP	4	2	8	0	0	14
NC Moves 2050 Plan	4	7	6	1	2	20
NC Public Transportation Strategic Plan	3	5	3	2	2	15
Northeast Regional Locally Coordinated Public Transportation Human Service Transportation Plan	0	2	**11**	2	2	17
Pamlico Co. CTP	0	5	2	0	1	8
River to the Sea Bikeway Master Plan	1	0	3	0	1	5
Transit Needs Study for the Wilmington Multi-Modal Transportation Center	0	2	5	0	1	8
Walk Wilmington: A Comprehensive Pedestrian Plan	5	3	6	1	3	18

Note: CTP = comprehensive transportation plan

The Cape Fear Moving Forward 2045 Metropolitan Transportation Plan was awarded the most points (30) and was the highest scorer in two of the five sections, in part due to its extensive ferry-specific goals

and policies, as well as detailed community engagement information. The River to the Sea Bikeway Master Plan received the fewest total points (5 points) awarded across the five sections. Details from each of the sections, as well as highlights from the plans, are further discussed below.

Mission, Goals, and Vision Statement

Plans in this section were awarded points based on whether they had a vision statement; the presence of specific goals, policies, and objectives; whether goals, policies, or objectives were linked to each other; and whether they specifically addressed ferry access.

Goal A: Safety Objectives

1. Develop new facilities and support existing facilities at locations along ferry routes not prone to shoaling
2. Reduce conflicts with non-ferry automobile traffic at ferry terminals
3. Ensure adequate security standards and protocols
4. Improve the efficiency of evacuation operations

Goal B: Environmental Responsibility Objectives

1. Minimize environmental disturbance of ferry operations
2. Increase the use of environmentally preferable fuel and renewable energy sources

Goal C: Efficiency and Level of Service Objectives

1. Improve the overall transportation network in terms of congestion management and the efficient use of public infrastructure
2. Improve (widen to broader ridership needs) ADA accessibility and mobility from ferry terminals to adjacent destinations
3. Develop new ferry routes and add express passenger service for commuter and tourism markets
4. Improve the capacity of existing ferry routes to reduce wait times and vehicles left behind

Goal D: Modal Integration Objectives

1. Improve access to and quality of intermodal ferry terminal and marina facilities
2. Increase infrastructure to promote biking to and from the ferry terminals
3. Promote opportunities for bike share at ferry terminals and park and ride locations
4. Improve public transit connections to ferry terminals
5. Provide bike parking and/or storage facilities on ferries
6. Implement preferred loading for bicycles and pedestrians onto ferries
7. Provide additional parking at ferry terminals or offsite park and ride lots

Goal E: Economic Development Objectives

1. Enhance and maintain ferry service to tourist destinations and local employment areas
    a. Incorporate passenger amenities such as shuttles, waiting areas, and sidewalks into future service facility design
2. Expand ferry capacity at rush hour to encourage commuting by ferry

Figure 4. Excerpt of goal categories and goals from the Cape Fear Moving Forward plan (Wilmington Urban Area MPO, 2020a)

The Cape Fear Moving Forward plan was awarded the most points (7) in the section because it has ferry-specific goals and objectives resulting from its Ferry and Water Transportation Subcommittee

(Wilmington Urban Area MPO, 2020a). There were five categories of goals, each with specific goals as they relate to ferries, as shown in Figure 4.

Community Engagement

Plans in this section were awarded points based on the number of partners engaged in the plan development, whether ferry riders or operators were engaged in the plan development, the level of detail on stakeholder engagement provided, the number of different community engagement methods used, and how the draft was shared with the public.

The Cape Fear Moving Forward plan was awarded the most points (8) in the section because it extensively documented how the plan was developed, as well as who was engaged and how (Wilmington Urban Area MPO, 2020a). The plan included specific information on how comments were addressed throughout the community engagement process, demonstrating thorough, transparent engagement efforts. The major difference between the Cape Fear Moving Forward plan and other high-scoring plans in this category was the inclusion of information on how comments were addressed by planning staff who "addressed each comment received and determined which comments warranted changes to the draft plan. If a change was not determined to be needed, an explanation was provided" (Wilmington Urban Area MPO, 2020b, p. 98). Comments and staff responses (an example of which is shown in Figure 5) were included within the plan's technical appendices.

Source	Organization	Comment	WMPO Staff Recommendation/Resolution
David Hollis	Town Manager, Leland / CAC Member	This must be a mistake for the Old Fayetteville Road project. $35 million for widening 2 existing lanes for 1.5 miles. The Town's project will install the multi-use path and widen one side of the road with 2 feet of asphalt and 2 feet of curb and gutter for about a mile of the road. The cost is currently projected at $2.2 million. A similar project on page 317 that is twice as long, to widen and install a bike lane on Blue Clay Road, is $1.4 million.	Utilizing NCDOT's Priortization cost estimation tool, the project cost was estimated to be $2,260,000 in 2020. With the application of a 3% annual inflation rate, project year cost estimate is $3,521,006. This cost amendment resulted in an additional funding available to fiscally constrain additional projects. Per the initial project rankings and the additional funds, the following projects can be added to the fiscally constrained roadway project list: RW-222 Independence Blvd Widening; RW-42 US 17 Access Management Improvements; RW-175 NC 210 and Island Creek Road Intersection Improvements. **Resolution: Update revised cost estimate in tables and cutsheets. Recommend addition of RW-222, RW-42, and RW-175 to fiscally constrained roadway project list.**

Figure 5. Excerpt of Comment and Response Section of Cape Fear Moving Forward Plan (Wilmington Urban Area MPO, 2020b, p. 98)

Access, Equity, and Mobility Conditions and Barriers Assessment

Plans in this section were awarded points based on whether the plan addressed: accommodating people with disabilities, network or connectivity improvements, mobility barriers, connections to the ferry system, fare equity, ferry schedules, and groups burdened or traditionally underserved. Additionally, this section identifies whether the planning process involved a review of relevant local, regional, or state plans and whether it described any connections to existing plans.

The Northeast Regional Locally Coordinated Public Transportation Human Service Transportation Plan earned the most points (11) in this section due in part to its discussion of existing plans, information on accommodating people with disabilities, and references to ferry systems in the plan (Albemarle Rural Planning Organization et al., 2013). The detailed discussion of Americans with Disabilities Act (ADA)-related accessibility issues was a strength of this plan. The plan scored the highest in Part 2, in large part due to its more extensive discussion of ADA and general accessibility issues. For example, the plan discussed low-fare services, services to medical facilities, and removing barriers for mobility-impaired passengers. Additionally, the percentage of people with disabilities in each county was included in the background information (Albemarle Rural Planning Organization et al., 2013).

Ferry and Water Transportation Scoring System

Scale	Goal	Criteria	Attribute	Score
25	Safety	Reduce conflicts with nonferry automobile traffic and multimodal traffic at ferry terminals	Adds waiting/stacking capacity onsite	20
			Adds crosswalk and cyclist crossing for Fort Fisher Blvd and ferry entrance access	
			Adds lights and/or signs calling attention to walkers and cyclists	
		Improve the efficiency of evacuation operations	Connects evacuation routes	5
			Standardizes/expands facilities accessible to ferry	
10	Environmental Responsibility	Minimize environmental disturbance of ferry operations	Study or mitigation plan for shoaling	10
			Study or mitigation plan for environmental impacts	
			Limits impacts to extent of previously disturbed site	
25	Efficiency and Level of Service	Improve the overall transportation network in terms of congestion management and the efficient use of public infrastructure	Connects evacuation routes to detour Congestion Management Area (CMA)	10
			Standardizes/expands facilities accessible to ferry	
			Reduces number of cars traveling to CMA	
			Reduces Vehicle Miles Traveled (VMT)	
			Adds daily or long-term parking at terminal	
		Improve capacity of existing ferry routes to reduce wait times and vehicles left behind	Adds service capacity (per hour/per day)	15
			Adds capacity for commuter "rush hour" traffic	
			Adds capacity for seasonal tourist traffic	
25	Modal Integration	Improve access to and quality of intermodal ferry terminal and marina facilities	Adds pedestrian connection to facility	10
			Completes sidewalk connection route	
			Connects to sidewalk network	
		Increase infrastructure to promote cycling to and from the ferry terminals	Completes continuous bike route to facility	5
			Connects to bike network	
		Improve public transit connections to ferry terminals	Connects to or adds transit infrastructure at terminals	10
			Increases connectivity to existing bus routes	
			Increases connectivity to transit stops	
15	Economic Development	Enhance and maintain ferry service to tourist destinations and local employment areas	Standardize/expand facilities accessible to ferry	5
			Route connects to employment center	
			Route connects to tourism center	
		Incorporate passenger amenities such as shuttles, waiting areas	Completes sidewalk connection route	5
			Improves existing terminals for passengers	

Figure 6. Scoring System to Measure Future Projects Included in The Cape Fear Moving Forward 2045 Metropolitan Transportation Plan (Wilmington Urban Area MPO, 2020b, p.273)

Evidence-based Performance Metrics

Plans in this section were awarded points based on the inclusion of: metrics measuring multimodal ferry access or mobility, plan objectives in accordance with SMARTIE principles (i.e., specific, measurable,

achievable, realistic, timely, inclusive, and equitable), metrics measuring the fair distribution of plan benefits, and performance measures quantifying the results of agency actions.

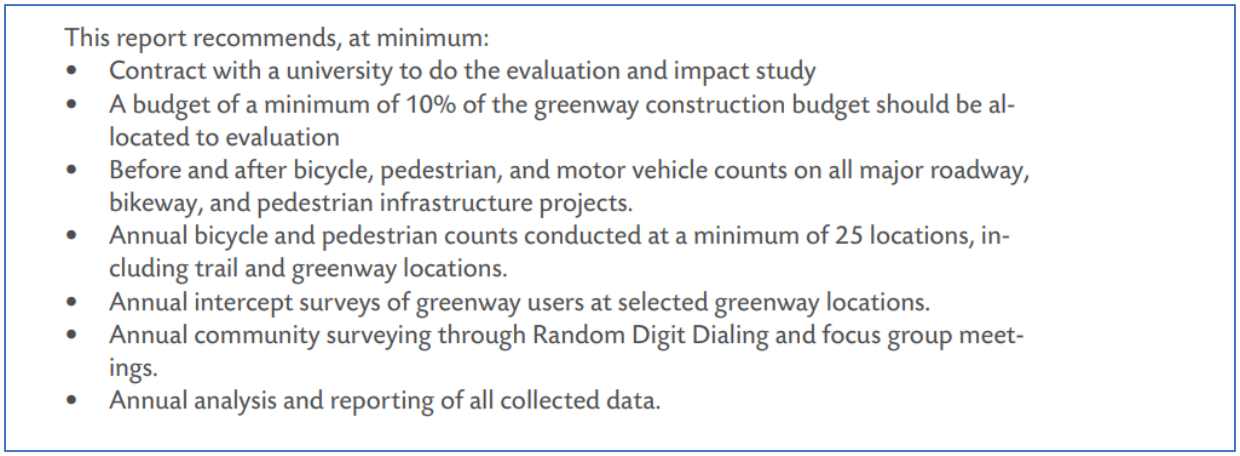
The Comprehensive Economic Development Strategy was awarded the most points (4) for this section because of its clear quantitative metrics framework and alignment with the SMARTIE principles (Mid-East Commission, 2020).

The Cape Fear Moving Forward plan scored the highest in Part 3 (of transportation plans) because its plan objectives appeared to be in accordance with SMARTIE principles, but it also included a detailed scoring system, as shown in Figure 6, to measure future projects. This system was used to score and rank projects based on identified goals and objectives. The ranked project list was then reviewed by relevant stakeholders and formed the basis for the fiscal constraint analysis to determine which projects are anticipated to receive funding (Wilmington Urban Area MPO, 2020a and 2020b).

Plan Implementation and Evaluation

Plans in this section were awarded points based on the plans' inclusion of: implementation strategies, funding strategies related to ferry connections, mechanisms for ongoing coordination with local entities, and methods for continuing community feedback.

The Wilmington/New Hanover County Comprehensive Greenway Plan was awarded the most points (5) for this section because of its clear tasks, timeline, and agency lead, along with a detailed list of project priorities. The plan also outlines a robust annual public evaluation program to include collecting surveys and conducting pedestrian and bicyclist counts, as shown in Figure 7.


This report recommends, at minimum:

- Contract with a university to do the evaluation and impact study
- A budget of a minimum of 10% of the greenway construction budget should be allocated to evaluation
- Before and after bicycle, pedestrian, and motor vehicle counts on all major roadway, bikeway, and pedestrian infrastructure projects.
- Annual bicycle and pedestrian counts conducted at a minimum of 25 locations, including trail and greenway locations.
- Annual intercept surveys of greenway users at selected greenway locations.
- Annual community surveying through Random Digit Dialing and focus group meetings.
- Annual analysis and reporting of all collected data.

Figure 7. Evaluation Program Details Included in the Wilmington/New Hanover County Comprehensive Greenway Plan (Alta/Greenways, 2013, p.c-12)

The Cape Fear Moving Forward plan also scored well in this section in part due to its fiscally constrained project list, which included the project prioritization ranking, the planning year, and cost, as shown in

Figure 8.

Fiscally-Constrained Ferry and Water Transportation Project List

Fiscally-constrained, programmed in 2018-2027 STIP, 2020-2029 STIP

Fiscally-constrained projects

Final Rank	Project ID	Project Name	Planning Year	Planning Year Cost
1	F-5703	Replacement Vessel (support fleet)*	2025	$3,250,000
2	F-2	Southport Additional Mooring Facility	2025	$5,796,370
3	F-24	Fort Fisher Pedestrian Improvements	2025	$39,006
4	F-22	Fort Fisher Mooring Facility	2030	$6,719,582
5	F-3	New River Class Vessel (3rd Ferry)	2035	$18,883,582
6	F-10	New River Class Vessel (4th Ferry)	2035	$18,883,582
7	F-5	Downtown Wilmington Ferry/Taxi Stop	2045	$444,258
8	F-1	Carolina Beach Ferry/Taxi Stop	2045	$444,258
9	F-6	Central Marina/Independence Terminal	2045	$3,331,934
10	F-4	Wrightsville Beach Ferry/Taxi Stop	2045	$444,258

* Not shown on map

Figure 8. Project List Included in Cape Fear Moving Forward 2045 Metropolitan Transportation Plan (Wilmington Urban Area MPO, 2020b, p. 274)

PQA Highlights

Major takeaways from the NC plan review include:

- **Lack of information on how feedback is incorporated**: Plans generally included how community input was solicited, and several plans (6) included detailed breakdowns of the specific comments they received. However, only the Cape Fear Moving Forward plan specifically included information on how community feedback informed the final version of the plan. In the Cape Fear Moving Forward plan, 113 unique comments from the public were addressed by the staff, and board-supported recommended changes were incorporated into the final plan.
- **Plans shy away from quantitative metrics on performance measures:** Just three of the 21 plans reviewed included clear, quantitative performance measures that could be used to assess progress. Other plans, if they included performance measures, relied on vague language that would be difficult to measure. One plan that included clear, quantitative performance measures was the Albemarle Regional Bicycle Plan, which included a flowchart with each of the plan's goals, related objectives, and specific performance measures. For example, under the goal "Increase the quality of bicycling throughout the region," one performance measure was "Percentage of new projects built as Complete Streets with connectivity to surrounding destinations" (Alta/Greenways et al., 2013, p. 7-10).
- **Lack of information on how the public will continue to provide feedback:** Only four of the 21 plans reviewed included specific strategies for continued public engagement beyond the planning phase. These were the Wilmington/New Hanover County Comprehensive Greenway Plan, Cape Fear Locally Coordinated Public Transportation Plan, Hyde County Comprehensive Transportation Plan, and the Mid-East Commission's Comprehensive Economic Development

Strategy. Notable strategies across the plans included annual community surveys, mobility management program updates, and advisory committees. For instance, Cape Fear's plan proposed a mobility management program led by Wave Transit staff and guided by a local advisory group responsible for ongoing community consultation (Wilmington Urban Area MPO, 2020). However, most plans lacked clear mechanisms for gathering public input during implementation, which limits the ability to adapt plans over time in response to community needs or changing conditions.

- **Move toward cashless systems may not be equitable:** Rather than addressing the needs of unbanked users, several plans referenced the potential to move to app-based payment or other electronic payment systems that would disenfranchise underbanked users.
- **Minimal discussion on fare equity issues:** Fare equity is discussed largely as it relates to the half-fare requirement for passengers with disabilities under the Federal Transit Administration (FTA) Urbanized Area grant.
- **Walksheds are largely unaddressed:** Most plans did not explicitly consider ferry terminal walksheds, despite their importance for enhancing multimodal access in rural areas where personal vehicle use is predominant. A few plans, such as the Cape Fear Moving Forward plan and the Hyde County Comprehensive Transportation Plan, mentioned improvements to bicycle, pedestrian, and transit access around ferry terminals.

Insights from the NC plan review meaningfully informed other aspects of the project, including the research team's data collection, evaluation framework, and the recommendations presented in the Planning Opportunities (Gurganus et al., in review) deliverable. For example, the review's finding that performance measures were often missing or too vague also led the project team to highlight specific, actionable goals such as tracking mode of access to terminals, prioritizing access improvements in underserved counties, and integrating ferry access into regional plan scoring criteria as recommendations in the Planning Opportunities deliverable. Additionally, the observation that most plans failed to analyze walkshed conditions prompted the team to fill in this gap by incorporating this analysis into our conduct of research, as summarized later in this report (see Descriptive Analysis of Active Travel Opportunities). This walkshed analysis also ties into first- and last-mile infrastructure and recommendations summarized in the Planning Opportunities deliverable. The critique of fare equity was addressed indirectly as Planning Opportunities recommendations to consider reduced fares and improved fare media options. In this way, the shortcomings identified in existing NC plans helped structure a more grounded, equity-conscious, and actionable planning process described in the Planning Opportunities document. Finally, the project team observed that most local plans lacked clarity on how public input shaped outcomes, and while we were able to glean some feedback from local stakeholders on the recommendations laid out in the Planning Opportunities deliverable, we recognize that more work around community engagement is needed to ensure that real-world practices and community needs refine those recommendations.

Peer Ferry System Interviews

The peer interviews aimed to gather insights on current and planned multimodal access practices in ferry systems, specifically focusing on equity, planning, operational methods, and funding strategies. These interviews were designed to explore motivations and approaches that informed multimodal access policies and practices, providing best practices and recommendations from both public and private ferry service providers.

The team conducted structured outreach via initial emails and calls as needed. Each interview was led by a team member, with a second taking notes and recording the session. Interviewees received questions in advance, covering topics like terminal and vessel access and community engagement. Post-interview notes were documented, and a thank-you message was sent to each participant. Further details on the interview protocol and the question prompt list used are included in Appendix C.

To better inform both NC ferry operations and project outreach and engagement steps within this project, the team conducted interviews with agency leaders in ferry operations in other states and cities with ferry service within the US. The peer systems include:

- Casco Bay Island Ferry Service (Casco Bay Island Transit District, also known as Casco Bay Lines, based in Portland, Maine)
- Maine State Ferry Service (Maine Department of Transportation)
- San Francisco Bay Ferry (Water Emergency Transportation Authority (WETA))
- Washington State Ferries (WSF) (Washington State Department of Transportation)
- NY Waterway (based in Hudson County, New Jersey)

These ferry systems represented areas ranging from dense cities to rural areas, private and/or state-owned systems, and varying fleet sizes and numbers of terminals. The diverse geographic selection provided varied responses across facilities and operations, community engagement practices, goals, planning, funding, and performance measurement.

Table 3 provides an overview of the ferry system peers included in the interviews.

The team selected ferry operations that would provide insight into the processes that guide ferry services, including connections to terminals, ADA accommodations, fare systems, community engagement, and policy coordination. Interviewees shared lessons on performance metrics, adaptive fare policies, climate resilience in infrastructure, and cross-agency collaboration. For instance, Washington State Ferries emphasized the integration of ADA-accessible design, transit, and light rail connections, and seismic upgrades; Maine DOT highlighted fare waivers for medical needs and coordination with island health clinics; and WETA demonstrated how diversifying service offerings post-COVID improved ridership recovery. Several operators described the benefits and limitations of working with shared mobility providers, and how infrastructure and policies shape usability.

These insights were directly applied to the development of the Planning Opportunities' recommendations. For example, it calls for ferry terminals to function as multimodal hubs, with upgraded pedestrian, bicycle, and transit facilities (Gurganus et al., in review). This draws directly from the integrated approaches of WSF and WETA. The Planning Opportunities document also recommends improvements like wayfinding, ADA-compliant paths, and bicycle storage based on best practices seen in Casco Bay Lines and Washington. Additionally, policy suggestions to support fare equity, first/last mile connectivity, and proactive community engagement were modeled after efforts in Maine and San Francisco. Even design-level considerations, like accommodating medical transport and prioritizing walk-on boarding, were informed by peer systems (Gurganus et al., in review). In this way, the peer ferry interviews not only enriched the background research for this report, but also grounded the Planning Opportunities' proposals in tested, transferable strategies for NC's ferry system.

Table 3. Overview of Peer Ferry Systems Represented Through Interviews

System	NC Ferry	Casco Bay Lines	Maine State Ferry	San Francisco Bay Ferry	Washington State Ferry	NY Waterway
Operation model	State owned/ operated	Privately owned with State subsidies	State owned/ operated	State owned/ operated	State owned/ operated	Privately owned; no subsidies
Number of terminals	13	8	6	9	20	18
Total fleet size	23	5	8	18 ferries	21	32
Number of passenger-only ferries	1	3	0	18	0	32
Passengers served annually	1.5 million	1.2 million	200,000	3.2 million	24 million	4.7 million
Vehicles served annually	700,000	35,000	35,000	0	8.9 million	0
Multimodal connections	Limited; no fixed-route transit to terminals, minimal pedestrian or bicycle infrastructure; some demand-response services exist but are not well integrated with ferry times.	Strong walk-on orientation due to Portland's dense, walkable waterfront; bike racks on vessels; limited direct transit connections.	Minimal; connections rely on private vehicles; medical shuttles and informal coordination exist for island residents.	Extensive; terminals connect to regional rail (BART), local buses, bikeshare, and ferry-specific shuttles; Clipper Card fare integration.	Strong; integrated with State highways, regional and local transit, bike infrastructure, and ORCA fare card system.	Moderate; walkable terminals in urban areas with proximity to buses, subways, ferries, and bikeshare systems, though integration varies by operator.

Passengers

One of the key insights that emerged from interviews was the consideration of the types of passengers provided with ferry services. State-run ferry operators who provide service to passengers who maintain residence on islands or off the coast prioritize those specific types of passengers over other types, such as tourist populations. Other service providers, such as recycling trucks, commercial vendors, and their vehicles, are also prioritized for providing services to those island residents from the mainland. This may be due to State funding for ferry services drawing from a tax base, which subsidizes revenue from fares. In other areas, such as along the Hudson River between New York and New Jersey, Manhattan is the top destination with commuters as the main type of ferry passenger. In many places, tourists, as a passenger type, ride along with residents and commuters. Some ferry operators are thinking about destinations that tourists and others can access as destination areas, or areas that offer recreational and other leisure opportunities.

Prioritizing Accessibility and Active Transportation Modes for Ferry Vessel Boarding and Off-Boarding

Across all interviewed ferry operators, boarding and off-boarding procedures followed similar sequences of first boarding passengers with mobility issues or disabilities or who requested additional time or access to vessel services; then people walking or bringing bicycles, e-bikes, scooters, or e-scooters; and finally, passengers driving vehicles. On vessels, there are places to stow bicycles, scooters, or electronic versions near the vehicle parking area. Exiting the vessel usually followed the same pattern.

Some ferry operators see shifts in the types of modes accessing and boarding their vessels depending on the season. In Maine, for example, there are more passengers with bicycles in the summer months accessing areas in Bar Harbor and Acadia National Park. In Seattle, prior to COVID-19 and the new era of working from home, commuters would bring their bicycles to and from the mainland every day.

Accommodating Bicycles and Shared Micromobility

All ferry operators confirmed the ability to stow personal bicycles and scooters on board. The introduction of e-bikes and e-scooters, however, introduces challenges, even when personally owned, since their small motors are battery-powered. Ferry operators had to make sure that they were stowed properly on the vessel.

Shared micromobility also presented a major challenge in most places when first introduced within communities, due to the lack of tracking. One of the major issues that first occurred with bikeshare or scooter-share systems is that passengers using shared mobility would abandon their e-/bike or e-/scooter, and ferry operators would have to treat the situation as a “man overboard” if the property was not claimed, per Coast Guard standard practice. This would also disrupt the schedule. For this reason, the city of Seattle briefly did not allow shared mobility on board. Since this time, they have worked with the Seattle DOT to coordinate with shared mobility vendors to ensure that customers return bicycles or scooters via payment mechanisms and costs associated with improper abandonment.

Further accommodation includes facilities at terminals. Plans for a new terminal in the Seattle area will include a secure bicycle storage cage to accommodate people who want to bicycle to the terminal but not transport their bicycles with them on the ferry.

Modes to Accessing Ferry Services

Passengers reach ferry vessels in different ways, and these modes are context-specific. In northern rural Maine, for example, personal vehicles are the predominant way to reach the mainland and island terminals, as there are few active travel supports or transit services beyond a privately owned bus

system. If the passenger is not ferrying their vehicle, then there are also parking lots available to temporarily store vehicles. In dense cities, such as Seattle or those served by NY Waterways, there are more ways to access the ferry, including transit, light rail, ride share, and even walking or bicycling.

In Hudson County, New Jersey, most neighboring residents do not own personal vehicles, and waterfront ferry terminals are integrated with other modes of transportation. New Jersey Transit operates the bus and rail systems and has conducted surveys about commuting and travel patterns for integrating into terminal access points and ferry schedules.

Plans to renovate a ferry terminal in Seattle include separating the modes accessing the terminal. Currently, pedestrians create an issue when exiting the terminal at a signalized crosswalk as they ignore the "don't walk" signal, creating a steady flow that blocks vehicular traffic deboarding the vessel. The new terminal plans include a grade-separated pedestrian path that will allow pedestrians to cross over a main roadway, separate from vehicular traffic traveling at higher speeds. At the same terminal, currently, bicycle commuters arriving or leaving tend to use the vehicular travel lanes, while tourists will use the separated bicycle lane for comfort.

Connections for Health

For residents on islands and off the coast, ferries provide a vital connection to mainland health care. At least two State-run ferry operators shared anecdotal information about medical needs for passengers and the accommodations that they provide on an ongoing and case-by-case basis. For example, in Maine, island residents in need of ongoing medical care and treatments only available in mainland facilities are provided free with a form from a doctor. In Seattle, ferry operators also work with residents and offer a free fare policy for medical help.

On vessels, ferry operators work with specific passengers to provide access to electrical outlets for medical needs. In Maine, one island resident worked with the State to alter their vehicle to meet the standards of what the Coast Guard would consider an emergency vehicle so that they could idle their vehicle engine on the vessel during transport based on medical needs and frequent use of the ferry.

During the coronavirus pandemic, ferry operators also worked with state health departments as well as the Centers for Disease Control and Prevention to coordinate distribution of tests and vaccines. Ferry operators also prioritized medical and health providers going to islands and offshore areas to reach residents. In some places, such as Seattle, ferry vessels hosted COVID-19 vaccine clinics during their scheduled route.

Customer-Facing Technologies and Integrations

Many of the State-run ferry operators shared that the technology for interacting with passengers and communities, which ranges from communications to fare payments, is lacking. In many cases, ferry systems include one website with information, schedules, and an integrated platform for payment fare. Beyond that, there is limited communication with passengers or potential passengers and surrounding community members.

Ferry fares can be paid through online payment systems, and at many ferry terminals, passengers also have the option to pay their fare in cash or in person by card. During the interview process, at least two State-owned ferry operators shared that they were investigating a possible future integration of handling payment through other State-operated platforms, specifically those associated with vehicle travel for HOV lanes or the equivalent of NC's Quick Pass service to pay tolls. In the Seattle area, regional governmental and transit agencies formed a board to oversee ORCA, a fare card and digital payment

service that integrates transit passes for bus, ferry, monorail, streetcar, light rail, train, and water taxi across the different transit systems and system operators.

Performance Measures

On-time performance and efficiency are the major performance indicators for many ferry operators. In Hudson County, New Jersey, many passengers are commuters to and from New York City. In some cases, ferry travel is more time-efficient than land travel, which would require longer driving routes to access bridges across waterways. In Maine, for example, passages across water via ferry service are shorter than roadway driving to some destinations. One planner associated with ferry operations also cited that building new connections and options for people who are underserved may also be a performance measure. This would include access to opportunities for employment in new or growing areas that had not been accessible before.

Collaboration

All the ferry operators interviewed shared information about collaboration with other departments and organizations. All ferry operators pointed to the need to collaborate to help inform processes that are based on how people use the ferry. These collaborations were also found with other state departments, or internally positioned within an overarching organization, as well as with community and advocacy, and other external organizations. State-operated ferry services worked with their State DOT partners for input on access to ferry terminals as well as coordination of efforts for roadway projects around the ferry terminal. Other internal agency efforts included working with ADA-compliance offices to help inform accessibility standards for accessing the terminal, ferry, and vessel accommodations.

Ferry operators also work with the cities in which they are located, including MPOs and planning and development offices. In San Francisco, the city is responsible for the dockside area of the terminal; WETA is responsible for the waterside. The Metropolitan Transportation Commission sets directives there as well. In Maine, the Maine DOT ferry service operations are included within a new downtown plan on the largest island and already have ties to comprehensive plans.

Given the need for passengers to access ferry services, operators also work with transit authorities to determine modes and schedules. In San Francisco, ferry service points intersect with 30 transit agencies, including bus services, Bay Area Rapid Transit (BART), and Amtrak. A few bus services coordinate their schedules with WETA departures and arrivals, but others' headways are sufficiently frequent so there is no need for coordination.

Community Engagement

Community engagement emerged as a critical component in shaping ferry service operations and planning across all systems interviewed. WSF has a robust history of engagement, including public meetings, digital surveys, and direct collaboration with community organizations such as bicycle advocacy groups and accessibility organizations like Lighthouse for the Blind. During the planning and design phase for the Seattle Multimodal Terminal at Colman Dock, WSF incorporated input from these groups to improve wayfinding, ADA accommodations, and pedestrian and cyclist access.

Similarly, the Maine DOT and Casco Bay Lines emphasize partnerships with island communities, leveraging surveys, advisory boards, and public meetings to inform ferry schedules, terminal designs, and services tailored to the needs of island residents. These partnerships also extend to collaboration with local organizations and agencies during major projects, such as Maine's pilot program for hybrid-electric ferries and improvements to terminal ADA compliance.

In San Francisco, WETA's engagement focuses on partnerships with municipalities, transit agencies, and community stakeholders. WETA has used public events, like the Richmond Ferry Fest, to raise awareness and gather input on ferry services, while also incorporating feedback through digital channels and routine public surveys. Hudson County, NJ, prioritized community outreach during its feasibility study to identify underserved neighborhoods and improve equitable access to ferry services, ensuring that transit connections serve both affluent waterfront areas and inland communities with unmet transportation needs.

Funding

Across all States and cities, ferry services receive funding through a variety of sources and for specific activities. For almost all ferry operators interviewed, except for one, funding has been secured at the federal and state/local levels, as well as via fare-supported means. Restrictions on how funding can be used across the various activities and processes related to ferry services necessitate a need for a diverse portfolio of financing strategies. Additionally, impacts from COVID-19 specifically reduced passenger volumes and thus fares and interrupted forecasted funding planning and revenue, thus pointing to a need for financial aid to maintain and resume normal operations during recovery.

Federal Funding

Federal funding plays a critical role in supporting ferry operations and infrastructure projects. Interviewed operators highlighted the importance of federal funding in maintaining operations and adapting to changing demands, particularly in response to crises such as the COVID-19 pandemic. This funding often bridges gaps where state or local resources fall short, allowing for projects that enhance safety, improve accessibility, and upgrade aging infrastructure. Federal funding sources also help ferry operators implement innovative solutions, such as hybrid vessels and climate resilience measures, which align with broader federal transportation and environmental priorities.

Federal Transit Administration (FTA)

Most notably, ferry operators reported funding from the FTA as a means of financing capital improvements and projects at terminals and other infrastructure-related activities. FTA funding decisions are determined by scalability and alignment with state, local, or programming goals.

For Maine DOT, for example, FTA funding covered the cost of construction and preventative maintenance during COVID-19 as passenger and traffic revenue decreased by an estimated 35-45% at the height of the pandemic. The FTA also offered an innovative pilot program grant of $1 million, which Maine DOT received to purchase a hybrid vessel to support the State's climate goals. Within the same state, Casco Bay Lines also recently received FTA funding for a terminal update.

In Washington State, FTA provided a large portion of funding for the Seattle Multimodal Terminal at Colman Dock. The prioritization of this project was to replace terminal infrastructure, including pillars that had been in place since the early 1900s. Structural and seismic concerns, including safety, were key drivers for funding this project. Ferry operators noted that, from a construction management point, FTA funding introduces further complexity, for instance, the need to source U.S.-made materials.

COVID Relief Funding

Ferry operations and, consequently, financing of operations were disrupted during COVID. WETA was able to receive federal COVID-relief funding to offset pandemic-related revenue shortages. This included Coronavirus Aid, Relief, and Economic Security (CARES) Act funding, Coronavirus Response and Relief Supplemental Appropriations Act (CRRSAA) funding, and American Rescue Plan Act (ARPA) funding relief. This funding is critical to maintaining operations to help offset lower fare revenue due to

decreased ridership. WETA and other regional transit systems are collectively exploring strategies to create new funding streams to preserve service over a prolonged recovery period, as they still rely on these funds today for maintaining service. Additionally, their status as an emergency transportation authority, as well as recipient of COVID-relief funding, allowed WETA to continue to access funds and pay subcontractors during stay-at-home orders. This was important as ferry workers are employed by a subcontractor.

State Funding

Ferry services receive funding via state mechanisms, either directly or via other financing, such as through tolls or taxes. This funding varies by the state budget and legislation or voting referendums. In Washington State, some state budgeting was supplied through the legislative budget. For WETA, pre-pandemic revenue was sourced from fares and bridge tolls.

County and Local Assistance

Ferry services also receive funding via local or regional assistance. Funding situations vary, given the specific needs of ferry operators and the immediate population and priorities that they serve. In King County, Washington, the county aids with the passenger-only ferry facility in Kitsap and the King County water taxi. Casco Bay Lines in Maine works with formula funding from the MPO to determine the amount for ferry operators.

In Hudson County, New Jersey, the local MPO funded a ferry terminal feasibility study. The New Jersey Port Authority also has a subregional studies program that provided assistance, and county staff working on the study provided a match. However, funding from the MPO, like funding from the FTA, is limited to use for infrastructure and not operations, which would potentially impact the long-term sustainability of ferry services.

Fare and Revenue

For most ferry service operators interviewed, passenger fares of all types, including commercial vehicle fares when available, are used to support ongoing operations. During the pandemic, revenue from fares drastically decreased due to stay-at-home orders and limited travel in general. Once these orders were lifted, some ferry operators experienced a sharp increase in vehicular volume and thus revenue as passengers refrained from car-sharing and isolated in their own vehicles during this time. The pandemic disrupted projected revenue from fares and impacted this funding stream based on immediate community situations.

Descriptive Analysis of Active Travel Opportunities

The intention of this analysis was to understand the surrounding land uses of the NC ferry system terminals. Since geographic information system (GIS) zoning maps were not readily available in the terminal municipalities, the project team used Esri Business Analyst's business and housing data within a 15-minute and 30-minute walk of the ferry terminal. This analysis provides insight into how many people live within walking distance of each ferry terminal and the nearby destinations and employment opportunities that individuals may use the ferries to access without the need to drive.

Defining the Walkshed

Each ferry terminal location was entered into Esri Business Analyst. Once the point locations were defined, a walk time map was created around each location. The walk time map uses paths and roads that allow pedestrian traffic with a default walking speed of 5 kilometers per hour (4.6 feet per second). The walking times in this analysis were 15 and 30 minutes with bands. Bands represent the incremental area between each successive walk time, with no overlap. Walk time sites are treated as a sum of the

geographies contained within them, with an apportionment method used for partially contained geographies.

Housing Analysis

The housing analysis was performed using the ferry terminal locations and walk time buffers. Both the 15-minute and 30-minute buffers were used to capture total housing units, renter-occupied units, vacant units, and vacant seasonal units (according to the 2010 Census). US Census data from 2010 was used for the housing subcategories, as the 2020 subcategory of data was not available, but the total housing unit data from the 2020 US Census and Esri's 2022 dataset were also included in the analysis. The combination of sources and time periods allows for the comparison and validation of data.

Business Analysis

Esri Business Analyst's Standard Industrial Classification (SIC) Business data was used to assess the businesses surrounding each ferry terminal. The 2022 SIC business data uses a numerical value to organize industries by their business activities and establish uniformity and comparability in the presentation of statistical data. The SIC data was used instead of the North American Industry Classification System (NAICS) because of the specificity of the SIC types available and the relevance to this research. The data used included totals of 2022 SIC Businesses, 2022 Food Stores, 2022 Eating & Drinking Businesses, 2022 Hotel/Lodging Businesses, 2022 Movie/Amusement Businesses, 2022 Health Services – Businesses, 2022 Education/Library Businesses, and 2022 Government Businesses. These business types were relevant to our analysis as they represent tourism businesses and key services.

Findings

Maps of each walkshed at each terminal used in the housing and business analyses described above are provided in Appendix D.

Additionally, to demonstrate the level of housing and business services within these walksheds, we used their distributions to create low, medium, and high categories (see Table 4). Using 2020 Census data housing totals, the walkshed had a low level of housing if there were under 250 houses, medium if there were 250-499 houses, and high if there were between 500-750 houses. Notably, many of the low-category walksheds had zero houses (see the tables in Appendix D for the housing totals in each walkshed). Secondly, we used the distribution of the 2022 Total Businesses to create the following categories: Under 15 businesses were categorized as low, 15-30 businesses were categorized as medium, and 30 and above were categorized as high.

Table 4. NC Ferry Terminals' Level of Housing and Businesses with Each Walkshed

Site	Housing within Walkshed		Businesses within Walkshed	
	15-Min	30-Min	15-Min	30-Min
Aurora Ferry Terminal	Low	Low	Low	Low
Bayview Ferry Terminal	Low	Low	Low	Low
Cedar Island Ferry Terminal	Low	Low	Low	Low
Cherry Branch Ferry Terminal	Low	Medium	Low	Low
Currituck Ferry Terminal	Low	Low	Low	Low
Fort Fisher Ferry Terminal	Low	Low	Low	Low
Hatteras Ferry Terminal	Low	Medium	Low	High
Knotts Island Ferry Terminal	Low	Low	Low	Low

Minnesott Beach Ferry Terminal	Low	Low	Low	Low
Ocracoke Terminal - Silver Lake	Low	High	High	High
Ocracoke Terminal - South Dock	Low	Low	Low	Low
Southport Ferry Terminal	Low	Medium	Low	Medium
Swan Quarter Ferry Terminal	Low	Low	Low	Medium

The Ocracoke Silver Lake Ferry Terminal map (Figure 9) and its results in Table 4 are highlighted as exemplary. This terminal was the only one with a high level of housing (in the 30-minute walkshed) and a high level of businesses (both walksheds), indicating greater opportunities for multimodal connection.

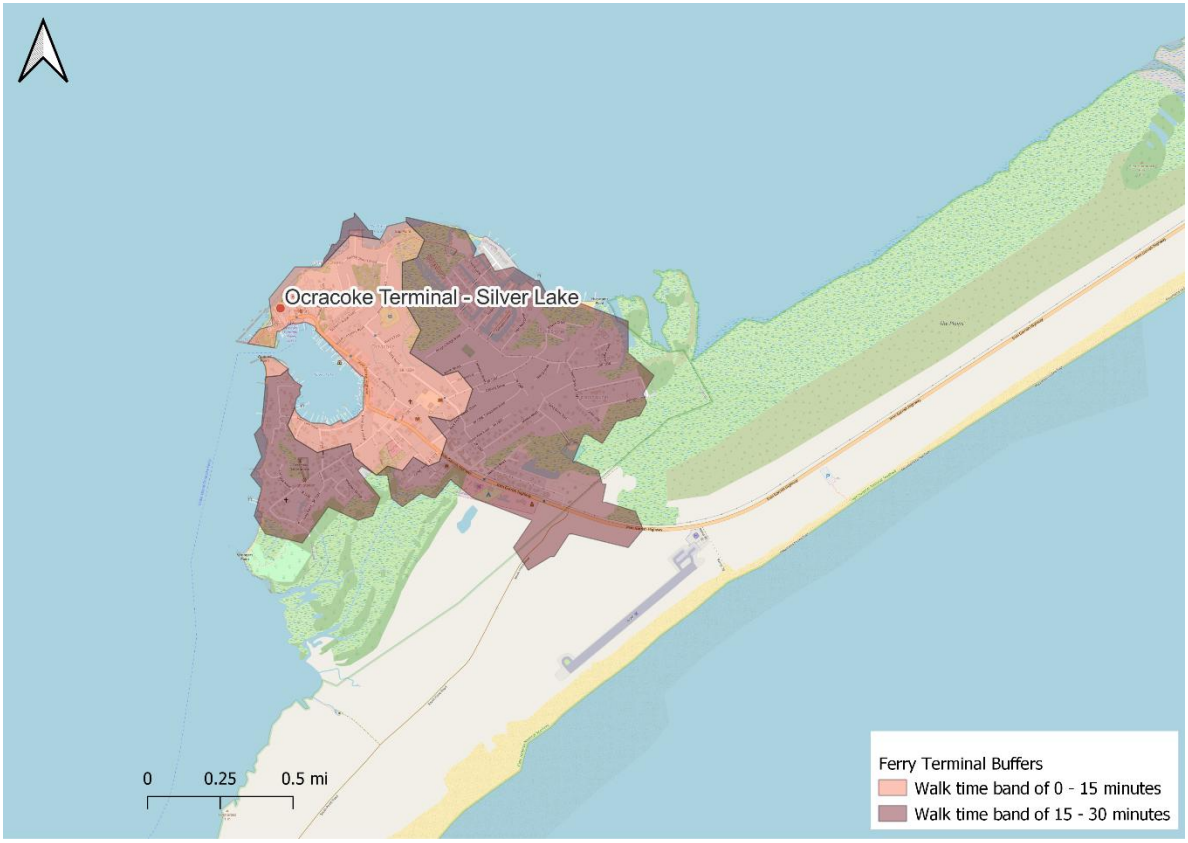


Figure 9. Ocracoke Silver Lake Ferry Terminal Walkshed Buffer Map

Meeting with Local Stakeholders and RP-2022-20 Steering and Implementation Committee

The project team convened a virtual closeout meeting via Zoom for the research project on September 9, 2025. The session brought together the project's Steering and Implementation Committee (StIC) members, NCDOT staff, and local and regional partners with connections to coastal transportation and community health planning. Invitations were sent to 72 individuals including NCDOT Ferry Division staff from districts 1 and 2, Integrated Mobility Division staff, Transportation Planning Division staff, and local or regional agency staff representing county planning, transit, MPO, RPO, and health departments. Of those, twelve participants joined the session (see Appendix E.)

Meeting Proceedings

The meeting provided an opportunity to review the project's key findings, present two final deliverables (this project report and the planning opportunities document) and invite feedback on proposed strategies to improve ferry access and multimodal connectivity. The research team interspersed Poll Everywhere questions throughout the presentation to encourage interaction and engagement with the participants around the project's key findings and recommendations. After introducing the project and reviewing its objectives, the research team presented on the findings included in this report: literature review, plan quality analysis, peer system interviews, and GIS analysis. Attendees noted that many ferry terminals sit in rural areas with no bus or train service, creating "integration gaps." Marshland and environmental constraints limit expansion, while medical access emerged as an important trip purpose. Chat comments also reinforced this point, with Pamlico County noting reliance on rural transit vans booked in advance, primarily for medical appointments.

The second half of the meeting focused on funding and implementation recommendations as laid out in the planning opportunities deliverable. Attendees shared multiple potential funding streams and opportunities. NCDOT noted that in addition to its ridership dashboards, periodic rider surveys are conducted that could inform planning. Throughout the meeting, participants responded to a series of Poll Everywhere questions; compiled results are included as Appendix E. In addition, attendees were asked about their interest in participating in a future working group to continue exploring ferry access, multimodal connectivity, and resilience planning. Several participants expressed support for this idea, noting the value of maintaining a forum for shared learning and coordination.

Stakeholder Engagement Takeaways

Discussion and chat input throughout the meeting highlighted several cross-cutting themes relevant to future investigation and the implementation of strategies. While participants raised a range of issues spanning access, funding, operations, and resilience, three considerations stood out for future planning:

- to plan for changing community conditions,
- to align funding and data with system realities, and
- to frame ferry-served communities in terms of their assets as well as their gaps.

Changing and Evolving Conditions

Participants noted that conditions within counties and ferry service areas in coastal North Carolina are evolving rapidly. Broadband access was one example: Pamlico County reported it now ranks first in broadband access per capita statewide, illustrating how infrastructure investments can reshape opportunities for ferry service and connectivity. At the same time, other rural areas remain underserved, highlighting the need for flexible planning that can adapt as communities change and as services such as bus and rail decline.

Prioritization and Metrics

When asked to rank priorities, participants leaned toward terminal access, ADA compliance, and amenities, while noting that funding is the foundation for any progress. Parking, emergency/resilience functions, and vessel capacity management also surfaced as areas to strengthen. Participants recommended developing performance metrics that reflect changing conditions over time to capture both community needs and available assets.

Framing Opportunities and Local Assets

Participants emphasized the value of highlighting community assets in addition to gaps when considering recommendations and strategies. This includes local amenities such as grocery stores and

gas stations near terminals, as well as broader community strengths. Several comments pointed out that ferry facilities can also function as resilience hubs, supporting disaster response, medical transport, and potential connections with aviation modes. Participants also suggested broadening the potential partner network, suggesting community-based organizations, emergency management, and military installations for inclusion alongside the traditional transportation and economic development partners.

Additional Community Engagement Needed

Additional community engagement activities should be conducted to share the findings summarized from above and gather additional feedback to aid in improving multimodal connectivity to the NC ferry system. This engagement could include two primary approaches to gathering input: listening sessions, travel demand surveys of both existing and potential ferry riders.

Regional Listening Sessions

In a series of group listening sessions, we recommend that NCDOT engage stakeholders on issues pertaining to the following:

- What does access to the ferry mean to you (e.g., easier/more reliable commute; tourism opportunities; ability to connect to more services, people, or natural spaces)?
- How do you measure the "success" of the ferry system? What do you see as the barriers to that success?
- What level of transit and/or bikeshare or micromobility investment do you think is needed to produce a shift in travel behavior in relation to ferry ridership?
- How would a shift in demand to more walk/bike-on passengers affect ferry operations and revenue?
- What would an increase in access to the ferries mean for transportation-disadvantaged people in the region (both in terms of direct and indirect impacts)?
- Are the impacts of expanded access different for local riders versus tourists?

The following groups are suggested to be included in the listening sessions:

- NCDOT Ferry Division, Highway Division 1, Integrated Mobility Division, Transportation Planning Division, and Department of Cultural Resources
- National and State parks services
- Albemarle Rural Planning Organization (RPO), Cape Fear RPO, Down East RPO, Mideast RPO, Wilmington MPO, and other relevant local and regional planning entities
- Local transit agencies (e.g., Brunswick Transit System and other fixed and on-demand systems)
- County health departments, including human services and preparedness coordinators
- Municipal and county staff
- Local civic and business associations (including Chamber of Commerce, Lions Club, etc.)
- Hospital representatives (Vidant, Novant, etc.)
- Foundations, nonprofits, and community groups (e.g., East Coast Greenway, Coastal Horizons, Community Care of the Lower Cape Fear, NAACP, Pamlico Rose Institute for Sustainable Communities)

Travel Demand Survey

To support planning efforts to enhance multimodal access to NC's ferry system, the project team developed survey instruments to gather information from current and potential ferry riders. The survey effort is designed to explore a range of factors related to travel behavior and transportation access to and from ferry terminals, and while aboard the ferry. The surveys will inform future planning by helping identify opportunities for improving multimodal connectivity.

In addition to guiding near-term planning decisions, survey results could support the development of performance measures related to two key dimensions:

- Travel behavior, including total and walk-on ferry boardings, same-day return trips, and transit ridership.
- Economic development and finance, such as revenue from ferry and transit services.

The surveys collect information across several key areas:

- Ferry use and trip purpose, including how often respondents use the ferry, why they are traveling, and whether the ferry influenced their destination.
- Access modes, including how people get to and from the terminal, how easy or difficult it is to use different travel options, and what modes they have used in the past.
- Barriers to ferry use, such as physical distance, lack of facilities, limited schedules, or discomfort using the system.
- Ideas for improvement, including changes to ferry service, better coordination with other travel modes, and desired destinations.
- Amenities and incentives, such as food, seating, information, or programs to encourage walking, biking, micromobility, or transit access.
- Demographic information, including age, zip code, gender, and vehicle access, to help interpret responses and provide additional context.

The survey for current passengers should be used as an interception tool at select ferry terminals, but it can be adapted for other outreach efforts. The finalized survey question sets (see Appendix F) and supporting materials here provide considerations for NCDOT and/or coastal communities to deploy such a data collection effort to aid in future planning and project prioritization needs to improve multimodal ferry access.

Survey Design

The surveys were developed to accommodate a wide range of ferry users and settings. The survey method includes flexibility for tailored pathways for both current ferry passengers and individuals who might consider using the ferry in the future. To encourage participation, the survey is structured with two completion options: a short-form version focused on essential questions and a longer version with additional detail for respondents who have more time or interest, particularly for those completing the survey while riding the ferry.

Recognizing the variability in internet access and technology comfort among participants, the survey can also be built in two formats: a mobile-friendly digital version accessible via QR code or web link (suitable for taking on computers or smartphones), and a paper version available for those who prefer or require a non-digital option. Table 5 summarizes the planned survey pathways and formats.

Table 5. Travel Demand Survey Pathways and Formats

Audience	**Version**	**Format**	**Intended Setting**
Current ferry rider	Short form	Digital	While waiting or boarding
Current ferry rider	Long form	Digital or paper	While riding the ferry
Current ferry rider	Short or long form	Paper	As needed based on connectivity
Potential ferry rider	Short form	Digital	Through broader outreach or intercept efforts at non-terminal locations
Potential ferry rider	Long form	Paper	Through broader outreach at events, visitor centers, etc.

This flexible structure is designed to increase reach and response quality across user groups, locations, and technology access levels. The complete short and long form versions of the survey are included in Appendix F.

Survey Distribution and Implementation

Survey distribution will depend on the setting, audience, and available resources, and must follow appropriate research and agency protocols. The survey may be administered by research staff, agency personnel, or designated partners, with specific procedures adapted to the context of either intercept distribution at ferry terminals or broader outreach to potential ferry users in nearby communities. Key personnel administering the survey choose to simply recruit prospective respondents to access the survey or take a paper form to fill out and then leave it to the respondent to self-report, or they may actively ask respondents the questions to aid those recruited in answering the survey. While allowing respondents to directly answer the questions may be a faster method to achieve a set sample size, the data received may not be as accurate. Actively asking respondents the questions aloud allows for the research staff to probe or clarify a question's intent and interact with respondents, potentially resulting in a richer, more accurate dataset that is less likely to need additional data cleaning before analysis.

Research Protocol and Clearance

Distribution must follow applicable Institutional Review Board (IRB) or administrative review procedures to ensure ethical collection of human subjects' data. The need for IRB clearance will depend on the distributing organization, whether any personal identifying information is to be collected and/or used through recruitment, enrollment, or survey deployment processes, and how the data will be used, even if the intended use is generalizable research for information and planning. If IRB approval is required, survey procedures, including consent language and data privacy safeguards, must be submitted and approved in advance.

Surveys should also follow NCDOT branding, compliance, and review protocols. Materials should include the project number, appropriate logos, and standard disclaimers in alignment with NCDOT requirements. Contact information for the administering agency or lead researcher should be clearly provided.

Sample Survey Introduction Language

The following sample language can be used at the beginning of the survey or spoken by staff during intercept interactions:

> You are invited to complete a survey to help improve transportation access to North Carolina's ferry system. This survey is being conducted by [Agency/Organization Name] in coordination with the North Carolina Department of Transportation. Your responses will help inform long-term transportation planning and decision-making.
>
> The survey takes approximately [5–10] minutes to complete. It is voluntary and anonymous, and you may skip any question or stop at any time. No personally identifiable information is collected.
>
> If you have questions about the survey, please contact [Name, Title, Organization, Phone, Email].
>
> Project Number: [NCDOT -]

This or similar language should appear at the beginning of digital surveys and on printed survey forms or be provided as a handout or placard where the survey is administered verbally.

Modes and Settings for Distribution

Onboard and Terminal Distribution (Current Ferry Riders):

- Surveys can be handed out to passengers while waiting in line, boarding, or riding the ferry.
- Paper surveys should be accompanied by pencils or pens, and staff should collect completed surveys before the end of the ride or at disembarkation.
- Digital versions can be shared via printed QR codes on posters or handouts, with instructions for online access.
- It is recommended that at least two survey staff be present per vessel during distribution periods to ensure adequate engagement, answer questions, and manage collection.

Community and Event-Based Distribution (Potential Ferry Riders):

- Surveys can be shared at local festivals, visitor centers, libraries, or transit hubs in ferry-connected communities.
- Staff or volunteers can offer printed surveys or display QR codes for digital participation.
- Posters or flyers with the QR code and brief instructions may be placed in tourism-oriented businesses or public buildings.
- Events targeting seasonal visitors or regional tourists (e.g., holiday weekends, outdoor expos) provide opportunities to reach future ferry users.

Online and Partner Organization Distribution:

- Links or QR codes can be shared via email newsletters, social media, or websites managed by local governments, tourism boards, or transportation providers.
- Partner organizations (e.g., chambers of commerce, MPOs, RPOs, etc.) can include survey links in their outreach materials through their typical distribution channels for public engagement.

Materials and Logistics

The following materials should be prepared for each distribution effort:

- Printed surveys and writing utensils
- Instruction cards with survey introduction and QR code
- Signage or placards recruiting for and explaining the purpose of the survey
- Collection folders or drop boxes for completed paper forms
- Branded templates consistent with NCDOT requirements
- Scripts or talking points for survey staff or volunteers
- Optional participant incentives, such as entry into a drawing for a gift card or giveaway items, to increase engagement and completion rates

Clear documentation of how, when, and where surveys are distributed will support transparency and consistency. This framework allows for flexible future implementation aligned with project goals, partner capacity, and planning efforts.

Data Collection and Analysis Considerations

This section outlines key considerations for future data collection and how responses may be analyzed after travel demand surveys are collected.

Seasonality and Ferry Operations

NC's ferry system operates on varying schedules throughout the year, with peak service and higher ridership occurring during spring and summer tourism seasons. To capture a representative sample of

ferry users, including both regular riders and seasonal visitors, survey distribution should account for these fluctuations. Targeting high-volume periods may help ensure greater participation and diversity of responses related to trip purpose, access modes, and barriers.

For potential ferry riders, outreach timing should consider community event calendars, vacation seasons and holidays, and regional traffic patterns to engage both residents and tourists who may use the system under different conditions.

Form Length Considerations

The short-form survey is designed to encourage quick participation from riders with limited time, particularly during boarding or short trips. It includes only essential questions focused on ferry use and travel modes. The long-form version collects more detailed insights by including additional questions on amenities, preferences, and improvement ideas, but it may require 10 minutes or more to complete. While the long form yields richer data for analysis, it may have a lower completion rate in high-turnover settings or without providing an incentive to compensate people for their time. Offering both options helps balance data quality and response rates based on the setting and respondent availability.

Sample Size

A larger number of responses will provide more useful and reliable insights across different user types and locations. As a general reference, collecting at least 100–200 responses per terminal, region, specified group, or other category as determined by survey administrators can support more meaningful subgroup comparisons and help identify trends. However, even smaller response sets may yield valuable qualitative findings and could be summarized through descriptive statistics. Clear documentation of response volume by site, group, or timeframe will help contextualize findings.

Anticipated Data and Uses

When implemented, survey responses are expected to provide data on:

- Travel behavior (frequency of ferry use, trip purpose, mode of access)
- Barriers to ferry use and suggestions for improvement
- Preferences for amenities and connections to other travel modes (e.g., local transit use)
- Differences between current users and potential users
- Basic demographic patterns (age, location, vehicle access)

These data can inform:

- Route and terminal improvements
- Planning for multimodal access infrastructure
- Outreach and communication strategies
- Evaluation of seasonal demand and service needs

Analysis Approach

Standard analysis may include:

- Descriptive statistics (such as mode share, most-cited barriers or improvements)
- Crosstabulations to compare responses by user type, geography, or travel purpose
- Qualitative coding of open-ended responses
- Mapping of user-reported access modes or destination choices (if combined with spatial data)

Data collection timing, method (paper vs. digital), and location should be documented carefully to support interpretation. Survey data should be stored securely in accordance with applicable IRB or

agency data management protocols and should not include personally identifiable information. As noted, results will not be statistically representative unless a formal sampling plan is applied, but the data can still provide valuable insight into user experience and priorities.

Conclusion

From the mixed methods approach undertaken to conduct this research, the project team collected and synthesized many pieces of information: from peer-reviewed articles to jurisdictional guidance and reports a different geographic levels, to analyzing the quality of existing plans for NC's coastal communities and producing visualizations of walksheds for each ferry terminal, to gleaning information from peer ferry systems outside of the State, this report encapsulates and documents many findings that ultimately fed into the development of recommendations presented in the Planning Opportunities compendium (Gurganus et al., in review). The Planning Opportunities deliverable synthesizes and documents the existing conditions of the coastal communities impacted by the State's ferry system based on community health, access, and travel concerns; existing conditions of the ferry system, vessels, facilities and operations, and ridership; and compiles relevant policies, funding programs, and planning efforts that—when taken collectively and filtered through what is known from the research documented in this report—results in a number of opportunities to address key barriers to multimodally connected ferries.

Future research efforts should include a broader public involvement process to engage NC's ferry communities and passengers, to learn more about their needs and barriers to accessing the ferry system. While this report includes an approach and sample materials to conduct a travel demand survey, NCDOT and partner agencies within these coastal communities should routinely meet to encourage more intentional collaboration to improve multimodal connectedness. These forums can also serve as the place to further develop a prioritization for project implementation, based on input from the public, for the recommendations to move forward in the near-term (and by what mechanisms and in which jurisdictions) and what projects may be a lower priority or take more work to be able to implement over a longer time horizon.

Technology Transfer Plan

Identify research products.

This research project is unique in that transferring the research outcomes into practice relies heavily upon a host of partners' willingness and desire to work together toward the common goal of multimodal connectivity with the NC Ferry System. Attendees at the closeout meeting generally agreed that establishing a working group to continue conversations around ferry access would be a good way to more intentionally coordinate across jurisdictions and agencies with a goal of improving multimodal connectivity in the region. Half of the attendees felt that it was most feasible for them to set measurable targets and develop action plans, with 33% indicating that integrating ferry connectivity goals into plans and projects was most feasible. Within NCDOT, NC Ferry Division or the Integrated Mobility Division may be most appropriate to convene such a group and help facilitate its work towards both of these objectives, by encouraging agencies to update existing plans or develop new ones with a focus on building multimodal networks across the coastal communities.

As a starting point, the working group - which should be comprised local and regional planning organizations, transit agencies, health departments, and others, along with representation from NCDOT - should closely review the Planning Opportunities document (Gurganus, et al., 2025) and determine which recommendations are immediately actionable, by whom, and how, and which ones may need intermediary steps put in place first in order to build towards longer-term implementation plans. In some ways, the Planning Opportunities document can serve as a the starter plan for "technology

transfer" by laying out the existing conditions, goals, and considerations for a prioritization framework. However, to truly proceed towards implementation, NCDOT needs to do more work around community engagement through listening sessions and the deployment of travel demand surveys, using the playbook and tools provided in this report to undertake both efforts. Data from both outlets can then be applied to the recommendations identified in the Planning Opportunities document as a lens to aid in filtering and prioritizing actions moving forward. Partners from the working group can also support both of these engagement efforts as well to ensure broad representation from residents, visitors, and businesses in shaping a plan for a multimodal system that integrates the ferry system with walking, bicycling, and transit.

References

Albemarle Rural Planning Organization, Mid-East Rural Planning Organization, & Peanut Belt Rural Planning Organization. (2013). *Northeast regional locally coordinated public transportation human service transportation plan*. North Carolina Department of Transportation. http://www.albemarlecommission.org/ac16/wp-content/uploads/2016/04/FINAL-NORTHEAST-REGIONAL-LCP-web.pdf

Alta Planning + Design. (2017). *Cape Fear regional bicycle plan*. Cape Fear Council of Governments. https://capefearcog.org/wp-content/uploads/2016/04/Cape_Fear_Bicycle_Plan_FINAL_Main.pdf

Alta/Greenways. (2013). *Move. Play. Connect: Comprehensive greenway plan, Wilmington/New Hanover County*. Wilmington/New Hanover County. https://www.wmpo.org/wp-content/uploads/2016/05/2013_wilmingtongreenwayplan_mainchapters_optimized.pdf

Alta/Greenways, Kimley-Horn & Associates, Street Plans Collaborative, & North Carolina Department of Transportation. (2013). *Albemarle regional bicycle plan*. Albemarle Commission. https://connect.ncdot.gov/municipalities/PlanningGrants/Documents/Albemarle%20Regional%20Bicycle%20Plan.pdf

Berke, P., & Godschalk, D. (2009). Searching for the good plan: A meta-analysis of plan quality studies. *Journal of Planning Literature*, *23*(3), 227–240. https://doi.org/10.1177/0885412208327014

Berke, P. R., Roenigk, D. J., Kaiser, E. J., & Burby, R. (1996). Enhancing plan quality: Evaluating the role of state planning mandates for natural hazard mitigation. *Journal of Environmental Planning and Management*, *39*(1), 79–96. https://doi.org/10.1080/09640569612688

Berke, P. R., & French, S. P. (1994). The influence of state planning mandates on local plan quality. *Journal of Planning Education and Research*, *13*(4), 237–250. https://doi.org/10.1177/0739456X9401300401

Burby, R. J., & Dalton, L. C. (1994). Plans can matter! The role of land use plans and state planning mandates in limiting the development of hazardous areas. *Public Administration Review*, *54*(3), 229. https://doi.org/10.2307/976725

Ceder, A. (2010). Development of potential ferry routes and analysis of connectivity in Auckland, New Zealand. *TRB 89th Annual Meeting Compendium of Papers*, 10–1222. https://trid.trb.org/view/909851

Charron, L. M., Joyner, H. R., LaGro, J., & Gilchrist Walker, J. (2019). Research note: Development of a comprehensive plan scorecard for healthy, active rural communities. *Landscape and Urban Planning*, *190*, 103582. https://doi.org/10.1016/j.landurbplan.2019.05.013

City of Wilmington. (2013). *River to the sea bikeway: Master plan*. City of Wilmington. https://www.wmpo.org/wp-content/uploads/2016/05/Master-Plan_FINAL-DOCUMENT_reduced-size.pdf

Connolly, C., Shah, H., & Norwozi, B. (2023). *2022 Craven County comprehensive transportation plan*. North Carolina Department of Transportation.

Gurganus, E., O'Brien, S.W., Blank, K., Patronella, A., Harmon, K., & Sandt, L. (in review). *Planning opportunities to strengthen multimodal access to ferries.* North Carolina Department of Transportation

Guyadeen, D., McCain, L., & Henstra, D. (2021). *Evaluating transportation policies and practices in Canada's largest municipalities*. University of Guelph. https://atrium.lib.uoguelph.ca/xmlui/handle/10214/26565

Horney, J., Nguyen, M., Salvesen, D., Dwyer, C., Cooper, J., & Berke, P. (2017). Assessing the quality of rural hazard mitigation plans in the Southeastern United States. *Journal of Planning Education and Research*, *37*(1), 56–65. https://doi.org/10.1177/0739456X16628605

Kimley-Horn and Associates, Inc. (2014). *City of Southport comprehensive pedestrian plan* [Final report]. City of Southport. https://connect.ncdot.gov/municipalities/PlanningGrants/Documents/Southport%20Ped%20Plan.pdf

Kimley Horn and Associates, Inc. (2020). *City of Wilmington rail trail master plan*. City of Wilmington, North Carolina. https://www.wmpo.org/wp-content/uploads/2020/10/Wilmington-Rail-Trail-Master-Plan_October-2020-DRAFT_Spreads.pdf

LaJeunesse, S., Naumann, R. B., Sandt, L. S., Spade, C., & Evenson, K. R. (2020). *Guide to developing a Vision Zero Plan* (Final Report CSCRS-R17). Collaborative Sciences Center for Road Safety. https://www.roadsafety.unc.edu/wp-content/uploads/2020/08/CSCRS_VZGuide_FINAL.pdf

Le-Klähn, D.-T., & Hall, C. M. (2015). Tourist use of public transport at destinations – a review. *Current Issues in Tourism*, *18*(8), 785–803. https://doi.org/10.1080/13683500.2014.948812

Loh, C. G., & Kim, R. (2021). Are we planning for equity? *Journal of the American Planning Association*, *87*(2), 181–196. https://doi.org/10.1080/01944363.2020.1829498

Lumsdon, L., Downward, P., & Rhoden, S. (2006). Transport for tourism: Can public transport encourage a modal shift in the day visitor market? *Journal of Sustainable Tourism*, *14*(2), 139–156. https://doi.org/10.1080/09669580608669049

Macmillan, A., Connor, J., Witten, K., Kearns, R., Rees, D., & Woodward, A. (2014). The societal costs and benefits of commuter bicycling: Simulating the effects of specific policies using system dynamics modeling. *Environmental Health Perspectives*, *122*(4), 335–344. https://doi.org/10.1289/ehp.1307250

Martin, J., Giusti, C., Dumbaugh, E., & Cherrington, L. (2011). *Examining challenges, opportunities, and best practices for addressing rural mobility and economic development under SAFETEA-LU's Coordinated Planning and Human Services Framework* (Final Report UTCM 08-17-09). DOT Research and Innovative Technology Administration. https://utcm.tti.tamu.edu/publications/final_reports/Martin_08-17-09.pdf

Martin/Alexiou/Bryson, & Moffatt & Nichol. (2009). *Transit needs study for the Wilmington multi-modal transportation center* [Final report]. North Carolina Department of Transportation. https://www.wilmingtonnc.gov/home/showpublisheddocument/1250/635976262271270000

Mid-East Commission. (2020). *Comprehensive economic development strategy: Serving Beaufort, Bertie, Hertford, Martin and Pitt counties*. http://www.mideastcom.org/wp-content/uploads/2020/12/Final2020CEDS.pdf

Monast, K., & Stanfield, C. (2019). An analysis of success plans and performance measures for rural transit systems in North Carolina. *Transportation Research Record: The Journal of the Transportation Research Board*, *2673*(3), 97–105. https://doi.org/10.1177/0361198119829410

Morrow, K. (2012). *Currituck County comprehensive transportation plan*. North Carolina Department of Transportation. https://connect.ncdot.gov/projects/planning/TPBCTP/Currituck%20County/Currituck_Report.pdf

Morrow, K., & Marshall, T. (2015). *Dare County comprehensive transportation plan*. North Carolina Department of Transportation. https://connect.ncdot.gov/projects/planning/TPBCTP/Dare%20County/Dare%20County%20CTP%20Report.pdf

Moya-Astudillo, C. E., Upchurch, J. H., & Marshall, T. K. (2012). *Pamlico County comprehensive transportation plan*. North Carolina Department of Transportation. https://connect.ncdot.gov/projects/planning/TPBCTP/Pamlico%20County/PamlicoCTPReport.pdf

Nicholls, L., & Walston, S. (2012). *Hyde County comprehensive transportation plan*. North Carolina Department of Transportation. https://cdm16062.contentdm.oclc.org/digital/collection/p16062coll9/id/20669

North Carolina Department of Transportation. (2018). *North Carolina public transportation strategic plan: Connecting North Carolinians to opportunities*. North Carolina Department of Transportation. https://www.ncdot.gov/divisions/public-transit/statewide-strategic-plan/Documents/december-2018-strategic-plan.pdf

North Carolina Department of Transportation. (2021). *NC Moves 2050 plan: North Carolina's future transportation plan*. https://www.ncdot.gov/initiatives-policies/Transportation/nc-2050-plan/Documents/nc-moves-final-plan.pdf

Norton, R. K. (2008). Using content analysis to evaluate local master plans and zoning codes. *Land Use Policy*, *25*(3), 432–454. https://doi.org/10.1016/j.landusepol.2007.10.006

Payne, T., Rose, D., & Scher, H. (2013). *Integrating passenger ferry service with mass transit*. Transportation Research Board. https://doi.org/10.17226/22624

Safe, accountable, flexible, efficient transportation equity act: A legacy for users, Pub. L. No. 109–59, 119 Stat. 1144 (2005). https://www.congress.gov/109/plaws/publ59/PLAW-109publ59.pdf

Roseman, S. R. (2018). Fighting for ferry justice. In N. Cook & D. Butz (Eds.), *Mobilities, mobility justice and social justice* (pp. 142–156). Routledge. https://doi.org/10.4324/9780815377047-10

Sciara, G.-C. (2015). *Measuring land use performance: Policy, plan, and outcome* [White paper]. National Center for Sustainable Transportation. https://escholarship.org/uc/item/9w64r1qz

Smith, M. F. (1994). *Research agenda for an improved novice driver education program* (Report to Congress DOT HS 808 161). National Highway Traffic Safety Administration. https://rosap.ntl.bts.gov/view/dot/13466

Surti, H. M., & Davis, W. (2014). *2014 Beaufort County comprehensive transportation plan*. North Carolina Department of Transportation.

https://connect.ncdot.gov/projects/planning/TPBCTP/Beaufort%20County/BeaufortCTPReport.pdf

Thomas, E. W. (2013). *2010 Brunswick County comprehensive transportation plan*. NC Department of Transportation. https://digital.ncdcr.gov/digital/collection/p16062coll9/id/2412/rec/35

Toole Design Group. (2009). *Walk Wilmington: A comprehensive pedestrian plan* [Final plan]. City of Wilmington, North Carolina. https://www.wmpo.org/wp-content/uploads/2016/06/2009-08_WalkWilmington_PlanFINAL.pdf

Tsoi, K. H., & Loo, B. P. Y. (2021). Cutting the loss: International benchmarking of a sustainable ferry business model. *Transportation Research Part A: Policy and Practice*, *145*, 167–188. https://doi.org/10.1016/j.tra.2021.01.007

Wave Transit. (2021). *Cape Fear locally coordinated public transportation plan*. Cape Fear Public Transportation Authority. https://www.wmpo.org/plans/

Whitfield, G. P., Meehan, L. A., Maizlish, N., & Wendel, A. M. (2017). The integrated transport and health impact modeling tool in Nashville, Tennessee, USA: Implementation steps and lessons learned. *Journal of Transport & Health*, *5*, 172–181. https://doi.org/10.1016/j.jth.2016.06.009

Wilmington Urban Area MPO. (2020a). *Cape Fear moving forward 2045: Metropolitan transportation plan*. https://www.wmpo.org/wp-content/uploads/2020/11/Cape-Fear-Moving-Forward-2045_ADOPTED-November-2020_Reduced-File-Size.pdf

Wilmington Urban Area MPO. (2020b). *Cape Fear moving forward 2045: Metropolitan transportation plan*. *Technical appendices.* https://www.wmpo.org/wp-content/uploads/2021/04/CapeFearMovingForward2045_TechnicalAppendices_Adopted-Nov-2020.pdf

Appendix A: PQA Background and Rationale

Initial Plan Quality Assessments (PQAs) present three key dimensions of plans that determine its quality (and therefore utility and appropriateness as a guiding framework): the fact basis; vision and goals; and concrete steps—policies, actions, programs—to achieve those goals and visions (Berke & French, 1994; Berke et al., 1996; Burby & Dalton, 1994). Content analysis is used to assess the degree to which plans provide detailed information about existing conditions in their fact bases, present a clear, attainable vision, and include discrete steps to connect existing conditions to desired future conditions, or vision and/or goals (Sciara, 2015; Guyadeen et al., 2021).

Since then, the criteria (dimensions) involved in PQA have expanded to include metrics for monitoring implementation progress (Guyadeen et al., 2021), horizontal and vertical coordination and integration (Berke & Godschalk, 2009), and more recently, the process used to develop the plan (including the degree to which the process relied on robust, inclusive community engagement) (Horney et al., 2017) and the degree to which implementation conforms to the plan (Sciara, 2015; Guyadeen et al., 2021; Berke & Godschalk, 2009). Frameworks have also emerged to assess the quality of plans against an ideal or standard (Sciara, 2015; Norton, 2008; Guyadeen et al., 2021) or the degree to which they will produce outcomes consistent with measurable goals (Sciara, 2015).

While most literature on PQA focuses on hazard mitigation plans and comprehensive land use plans, there has been growing interest in using PQA to evaluate the performance of transportation plans. Most of this effort has focused on identifying and tracking outcomes specifically tied to external performance metrics, rather than on accuracy and robustness of fact base, inclusiveness of community engagement processes, on fidelity to community-derived goals and visions, or on alignment with other relevant ideals (e.g., environmental justice, safety, environmental sustainability, economic development) (Guyadeen et al., 2021).

In a 2021 review of transportation-specific elements of municipal official plans (equivalent to comprehensive plans in the US) in the 30 largest cities in Canada, Guyadeen and colleagues found that “social justice and equity and economic sustainability were rarely discussed in relation to transportation and land use planning,” “there was an absence of rigorous data to inform the fact base of official plans, as well as a lack of data for monitoring and evaluating transportation goals and policies,” and “few [plans] provided details on how, when, and by whom transportation-related policies would be implemented” (Guyadeen et al., 2021, p. 3).

There is evidence that the exclusive focus on external performance metrics is changing, however. In 2016, the NCDOT Public Transportation Division required the State’s rural transit systems to “develop a Success Plan which contained their respective mission, vision, and values as well as performance metrics with measurements that defined success for the upcoming fiscal year" (Monast & Stanfield, 2019, p. 98). Broadening PQA to include internally derived outcomes (i.e., policies and actions that correspond to goals identified through robust community engagement processes) provides a more accurate assessment of the potential for the plan to lead to better outcomes (Monast & Stanfield, 2019).

Appendix B: NC Plan Analysis Coding Tool

The NC Plan content and quality analysis coding tool was designed to assess plan content and quality across the following areas:

- Mission, goals, and vision statement
- Community engagement
- Access, equity, and mobility conditions and barriers assessment
- Evidence-based performance metrics
- Plan implementation and evaluation

The team used a spreadsheet to organize the coding and scoring of each plan evaluated. Below, how each of these areas was assessed is further described along with an explanation of how each area was scored.

Mission, Goals, and Vision Statement

Overall Content

- Does the plan include a vision statement? (If so, extract the vision statement.)
- Does the plan include objectives?
- Does the plan include goals, policies, and/or specific actions?
- Does the plan include a mission? (If so, extract the plan mission.)
- Are goals, policies, and/or specific actions linked to each other? To objectives?

Project-Specific Content

- Does the plan include objectives specifically addressing ferry access? (If so, extract relevant objectives.)
- Does the plan include goals or policies specifically addressing ferry access? (If so, extract relevant goals or policies.)

Scoring Explanation

In this section, plans were scored 0 for not having the content specified in each metric or 1 for having the content specified. The metric "Are goals, policies, and/or specific actions linked to each other? To objectives?" was scored from 0-2 with 0 for not having goals, policies, or specific actions linked to each other, 1 for goals which link to each other and support a vision statement but are not linked further through strategies or policies, and 2 for goals linked with specific objectives or policy actions.

Community Engagement

Content

- What partners were engaged in the development of the plan?
- Were (current or potential) ferry riders or operators specifically involved in the development of this plan? Were any planning events co-located with ferry terminals or community outreach events?

Quality/Procedural Integrity

- Does the plan provide a description and timeline (including frequency and duration) of stakeholder involvement and the composition of key leadership?

- Are engagement strategies well-described in the plan, and are the methods used (such as maps, websites, surveys, open houses, or public meetings) tailored to community needs?
- To what degree do decision-making bodies represent or resemble the community, and to what extent are traditionally underserved communities involved in the process?
- Did the plan outreach involve communications in any languages other than English?
- Is there a description of how the draft plan was shared with the community, what the input and feedback included, and how feedback was received or incorporated into later or final versions?

Scoring Explanation

In this section, plans were scored both on the presence of the specified content in each metric as well as the quantity and variety of partners engaged in the plan development, the number of engagement methods, and a detailed description and timeline of stakeholder engagement and community feedback. Metrics were awarded 0 points if the specified content was not present and 1 point if present, or 0 points if only one to two engagement methods or partners were involved in the project. Two metrics were scored from 0-2: "Does the plan provide a description and timeline (including frequency and duration) of stakeholder involvement and the composition of key leadership?" and "Is there a description of how the draft plan was shared with the community, what the input and feedback included, and how feedback was received or incorporated into later or final versions?" These metrics earned a 0 if the information was not present in the plan, 1 if the information was present but lacking details or key information, and 2 if the information was present and provided key details.

Access, Equity, and Mobility Conditions and Barriers Assessment

Content

- What mobility barriers were described or identified in the plan?
- Were ferry systems (terminals, schedules/operations, routes, policies, programs, or other ferry elements) referenced in the plan? If so, how?
- How were ADA, accommodation of people with disabilities, and general accessibility issues addressed in the plan?
- Was there any discussion of network improvement or connectivity goals in relation to pedestrian, bicycle, or greenway facilities, and do any of the plans relate to ferry terminals?
- For any transit or rideshare plan components, was there a discussion of fare payment mechanisms and equity or access issues? Discounted fares or cash-based programs for unbanked users?
- For transit plans, is there any discussion of headway and departure times syncing with ferry schedules, local/regional employer shifts, or other times where transportation services are in high demand?
- Do any plans describe opportunities for providing cultural/historical connections or programs at the terminal site or on ferries?
- What other plan elements present opportunities (direct or indirect) for enhancing connections to the ferry system?

Quality/Procedural Integrity

- Did the assessment take into account a variety of sources of information to assess mobility concerns and opportunities?

- Did the assessment consider issues with respect to groups that are unfairly burdened or traditionally underserved, and how to equitably address safety concerns or reduce disparities in access to safe mobility options?
- Did the assessment involve review of relevant local, regional, and state plans and describe a connection to any other existing plans, policies, or programs?

Scoring Explanation

Metrics in this section were scored from 0-1 or 0-2. For the metrics scored on the 0-1 scale, plans earned a 0 when the information was not present and a 1 if it was present. For the metrics scored on the 0-2 scale -- "How were ADA, accommodation of people with disabilities, and general accessibility issues addressed in the plan?", "Was there any discussion of network improvement or connectivity goals in relation to pedestrian, bicycle, or greenway facilities, and do any of the plans relate to ferry terminals?", and "What other plan elements present opportunities (direct or indirect) for enhancing connections to the ferry system?" – plans were assigned a 0 if they did not include the specified information, 1 if some information was present but lacked details, and 2 if the information was present and included key information.

Evidence-based Performance Metrics

Content

- Do any plan performance measures appear to relate to measuring multimodal ferry access or mobility? If so, how, and what supporting data are used?
- Are plan activities and agency actions consistent with NCDOT goals related to expanding multimodal access to ferries?

Quality/Procedural Integrity

- Are plan objectives specific, measurable, achievable, realistic, timely, inclusive, and equitable (SMARTIE)?
- Do performance measures quantify the results of activities (i.e., how much, how well, and at what level, do agency actions produce desired results over a given period)?
- Does the plan include measures of fair distribution of the benefits resulting from planned activities?

Scoring Explanation

Metrics in this section were scored from 0-1 or 0-2. For the metrics scored on the 0-1 scale, plans earned a 0 when the information was not present and a 1 if it was present. For the metrics scored on the 0-2 scale -- "Are plan objectives specific, measurable, achievable, realistic, timely, inclusive, and equitable (SMARTIE)?" and "Does the plan include measures of fair distribution of the benefits resulting from plan activities" – plans were assigned a 0 if they did not include the specified information, 1 if some information was present but lacked details, and 2 if the information was present and included key information.

Plan Implementation and Evaluation

Content

- What strategies does the plan put in place to ensure that progress in plan implementation can be made?
- Are there any specific funding strategies related to ferry or ferry connection improvements?
- Does the plan include contingencies for responding to funding or staffing disruption or other circumstances that can compromise progress?
- Is there a mechanism for ongoing coordination with the local ADA coordinator, public health entities, ped/bike/transit coordinator, or other social services?

Quality/Procedural Integrity

- How will the community continually provide feedback following implementation of the plan?

Scoring Explanation

Metrics in this section were scored from 0-1 or 0-2. For the metrics scored on the 0-1 scale, plans earned a 0 when the information was not present and a 1 if it was present. For the metric scored on the 0-2 scale -- "Is there a mechanism for ongoing coordination with the local ADA coordinator, public health entities, ped/bike/transit coordinator, or other social services?" – plans were assigned a 0 if the specified information was not included, 1 if there was coordination with at least one entity, and 2 if there was coordination with two or more entities.

Appendix C: Interview protocol and data collection instruments

Purpose

To interview four to five organizations involved with ferry systems to identify current and planned multimodal access practices, inclusive of equity, planning, operations/maintenance, and funding. Provide opportunity for a more expanded discussion of the motivation and approach used to implement practices that were identified in published planning and policy documents.

Target Interviewees

- Ferry operators or planning staff
- City and regional (MPO, RPO) officials (e.g., planning, engineering, public works, public relations, parking management, communications)
- Transit operators

Interviewee Recruitment

Contact the potential interviewee following the steps below. If/when you receive a response, then work with the respondent to identify a date and time to schedule a one-hour interview on the platform of their choosing (Zoom or Teams, etc.). Send a confirmation email at least one day in advance of the scheduled time.

Contact 1: Send an introductory email, using the following text.
Contact 2: If there is no response within a week after contact 1, then follow up with second email (see below).
Contact 3: If there is no response within three days after contact 2, then follow up with a phone call (leave voicemail if necessary). If no response within three days of contact 3, then stop recruitment of this participant. If a response is received later, within the period of interviews, then conduct the interview.

Introductory Email (Contact 1)

<cc self on email>

Dear <name>,
I am contacting you as part of a North Carolina Department of Transportation research project I am working on related to ferry access. We are gathering information on how both public and private peer entities are addressing multimodal ferry access.

We are contacting you because of your involvement in such programs. We hope you will participate in a telephone interview scheduled at your convenience. The interview is expected to take about an hour and the general questions we ask can be sent to you in advance if you wish. The attached research information sheet provides additional details about the study.

If you would rather not participate in an interview, please let us know and we will not contact you again. If you do not feel you are the best contact, or if you can direct us to a more appropriate contact at your organization, please let us know. If we do not hear back from you, we will try contacting you again in about a week.

Many thanks for your time,
<name>

<research title/role>, sent on behalf of the entire research team

Follow-up Email (Contact 2)

<Reply to the original email><cc self on email>

Dear <name>,
This is a follow-up email to ask if you would be willing to participate in an interview regarding ferry access in the next two weeks. If you would rather not participate in an interview, please let us know and we will not contact you again. If we do not hear back from you, we will try contacting you by phone within the next few days.

Sincerely,
<name>
Graduate Research Assistant, sent on behalf of the entire research team

Follow-up (Contact 3)

Attempt to call the interviewee. If they do not answer and you are confident you have reached their place of employment, please leave a message with a call-back number. Do not call again unless either (1) your call is returned or (2) a message was not left because there was no answering service.

Script for the Call

Hi. My name is <name> and I am calling to talk to you about your work in multimodal transportation related to ferries. I attempted to reach you by email, but it may not have been successful. If you could return this call, my phone number is <phone> and again my name is <name>. Or you could email me at <email>. Thanks for your time.

Interview Process

Pre-Interview:

- Check the project SciWheel to see if there are case studies, pilot reports, or other published studies about the community of interest that provide important background or can be referenced during the call. Can identify a subset of the interview questions most suited to complement already published information.
- Send a reminder email one day in advance of the interview, using the example below.

Reminder Email for those who Agree to be Interviewed

<Reply to the original email>
<cc self on email>
<attach interview questions>

Dear <name>,
I am writing to remind you of our scheduled call on <date, time, time zone>. Please use the following link <insert link>. Please also find attached a copy of the interview questions we will discuss. Thank you for your time. I look forward to speaking with you soon.

Sincerely,

<name>

During interview:

- Two members of the research team will be present during the call. One will primarily lead the interview, using the interview guide, while the other will primarily take notes.
- Interviews will be recorded using Zoom or Teams and note takers will aim to describe key themes in as much detail as possible.
- Try to clarify any acronyms or technical terms referenced during the interview.

Post-interview:

- Fill out excel sheet questions below if any remaining information is missing (see list of fields below).
- Put a copy of the electronic file of the notes saved as the participant's ID on Teams.
- Send a thank you note to the interviewee(s).

Questions for Interviewer to Complete in the Excel File

- Assignment of ID – to use as a unique identifier in the recorded transcript so that names are not included in the transcription
- Dates of sent emails for recruitment
- Date interview guide and reminder email sent
- Agreed to be interviewed (yes or no)
- Date of interview
- Start time of interview
- End time of interview
- Interviewers' names
- Name(s) of interviewee(s)
- Organization(s) interviewee(s) currently work(s) for
- Current job title(s)
- Length of time working on ferry issues
- City
- State
- Email
- Phone number
- Other notes (e.g., if multiple parties attended the same interview, if the call was disrupted for any reason, or any other noteworthy circumstances or issues)

Interview Guide

Thank you for agreeing to this interview. Before we begin, I would like to remind you that we will be taking notes and recording this conversation to help us document your responses, unless you prefer that we do not record the audio. Do you have any questions before we begin? <answer questions>

<If the interview is interrupted and must end before it is complete, please schedule a time to complete the interview before hanging up if possible.>

<Complete or confirm any descriptive questions in the excel file, such as the participant's job title, and how long, if at all, they have been working on any projects or programs related to ferries and multimodal access. Then skip to the set of questions that most relates to their position type.>

Questions

Background

Our first question is meant to give us some background information on you and your role within the ferry system. How long have you worked in your current position, and how would you describe your work?

Existing and Planned Facilities and Operations

The next set of questions will ask about existing and planned ferry facilities and operations.

1. **Network/Terminal Access:** Can you tell me about any work you're doing to enhance connections between your terminals and bike, pedestrian, transit, or greenway infrastructure?
    - For terminals with little or no access, are there changes planned?
    - For people walking, biking, using a wheelchair or other assistive mobility device, or using micromobility (if applicable): Do you offer any wayfinding, priority boarding opportunities (and what does that order look like?), or other incentives or amenities, or do you plan to do so?
2. **Vessel Access:** I'd like to ask you about accessibility for people with disabilities. How are ADA accommodations met within the vessels and in the terminals and loading areas?
    - Has your agency received external funding to bring anything into ADA compliance?
    - How does passenger travel mode and passenger accessibility/ADA needs factor into your vessel purchasing and maintenance plans?
3. **Financial Access**: I've got a few questions about fares. First, how are fares determined?
    - Are there programs intended to support unbanked customers or low-income households? Are these geared toward residents, tourists, or both?
    - Do you offer alternatives to app-based systems, and do you accept cash payments?
    - If yes, what prompted these alternative payment options?
4. **Schedule Access**: The next few questions are about the sailing schedule. How well do ferry headways and departure times sync with local transit operations?
    - Have you found opportunities or barriers to coordinating ferry and transit schedules?
    - What factors influence the departure times and schedules (e.g., shift changes for major employers)
5. **Micromobility Coordination** (for systems with bikeshare/micromobility): What issues arise for use of shared bikes or scooters on your vessels? (Prompt: we've heard others describe issues with device loss, of the need to deal with abandoned bikes, effects of saltwater on bikes and device docking equipment, have you needed to set up any special programs or facilities to address these issues?)
6. **Passenger Health/Comfort/Experience:** Do you allow drivers to idle engines while in the queue or during the ferry ride, or do you have a specific policy against this?
    - Do you have data on the percentage of drivers that idle engines during the passage?
    - Any policies in place to mitigate exposure to pollution from idling vehicles?
7. **Passenger Health/Comfort/Experience:** What are your experiences, if any, with co-locating vendors, services, and community-based events on ferry operation grounds? (COVID vaccines, local foods/goods/art, cultural/historical connections as an example)

Community Engagement Practices

1. **Input Mechanisms:** What are the current practices around community engagement, specifically around the needs of people without cars?
    - Do you or have you conducted any community participation/surveys, or do you have other methods for receiving feedback?
    - Does the ferry system engage with the public at local events, and if so, can you describe some of the ways? (e.g., ped, bike, or transit-related events, open houses, job fairs, bike repair clinics, group ride events).
    - Is there a specific effort to reach residents, tourists, or other community groups?
    - How is community feedback shared and incorporated into your planning documents?
2. **Agency Partnerships:** What mechanisms are there for ongoing coordination with the local ADA coordinator, public health entities, or other social services?

Goals, Planning, Funding, and Performance Measurement

1. What do you see as some of the biggest challenges facing ferry system operations today?
2. For recent improvements in ferry system connectivity and access, what do you think motivated or catalyzed that effort?
3. Can you describe the goals or strategic plans that guide your work?
    - Does the system's objectives or goals vary for different routes? (e.g., what goal is it serving – cost of operations, island access, tourism, etc.)
    - Does your organization have a goal in mind for the proportion of businesses/residents/tourists and/or mode-share using the ferries?
    - How does [agency] balance divergent needs between the local community and tourist needs in the planning and community engagement processes?
4. What are [agency's] goals around wait times, ridership, or other performance measures?
5. Does [agency] collect data on ridership, demographics, access modes, wait times, or passengers denied admittance to the ferry?
6. What funding sources have you found available to support making it comfortable and appealing to walk or bike onto the ferry? FTA funding, other formula programs, etc.

Closing

1. Are there ways [the agency/ferry system] is innovating to improve access, service quality, or anything else?
2. What resources or research do you think are most needed to improve access to ferries by people without vehicles?
3. Is there anything else you would like to add to this interview?
4. Is there another person or organization that you think we should contact during this study?
5. Thank you very much for your time! Please follow up with us if there is anything else you would like to share or ask later.

Appendix D: Active Travel Opportunity Analysis

The Active Travel Opportunity Analysis used walksheds and data from ESRI Business Analyst to understand the potential for active travel surrounding each ferry terminal. Maps of the walksheds and data are provided.

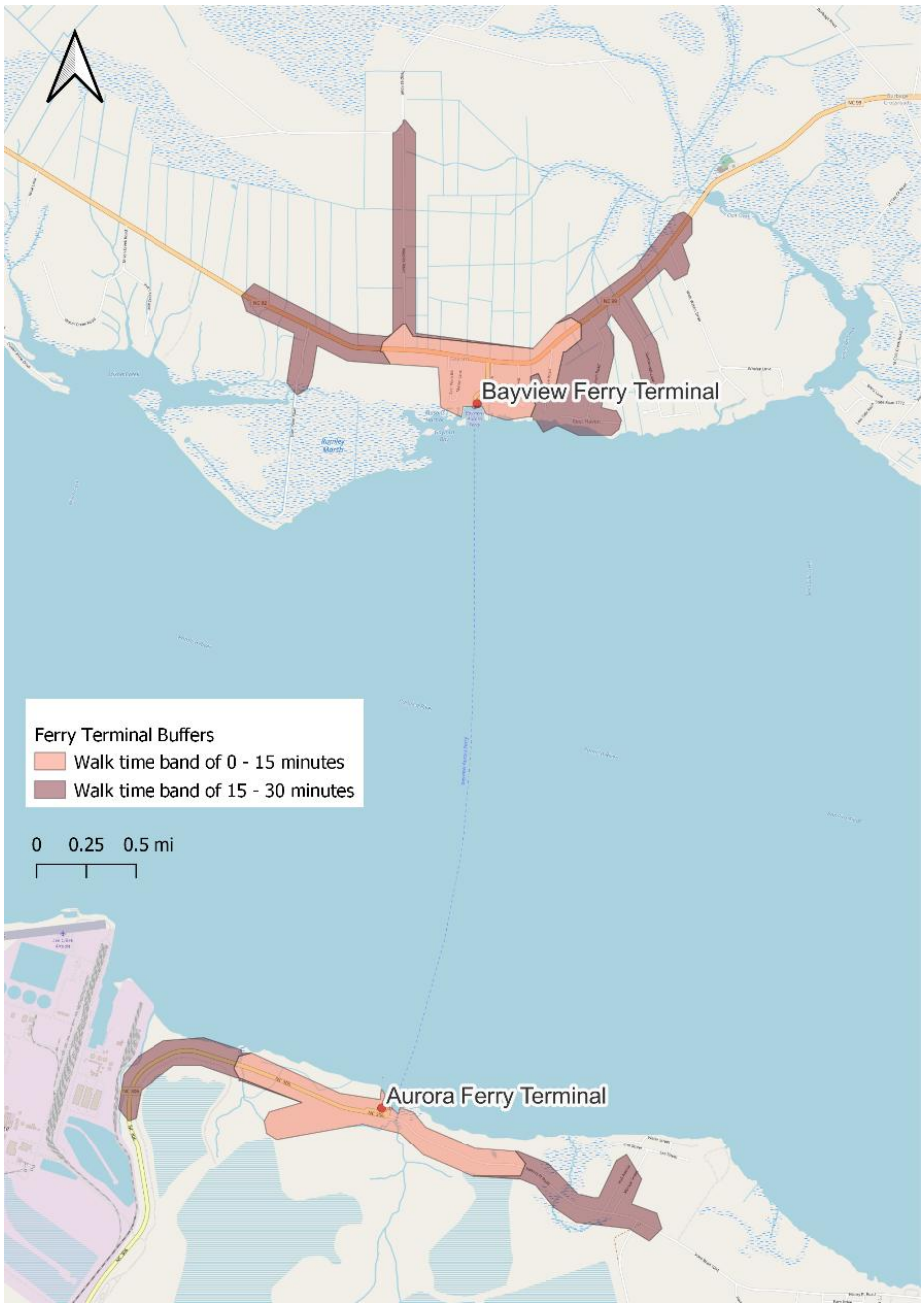


Figure 10. Bayview and Aurora Ferry Terminal Walksheds Buffer Map

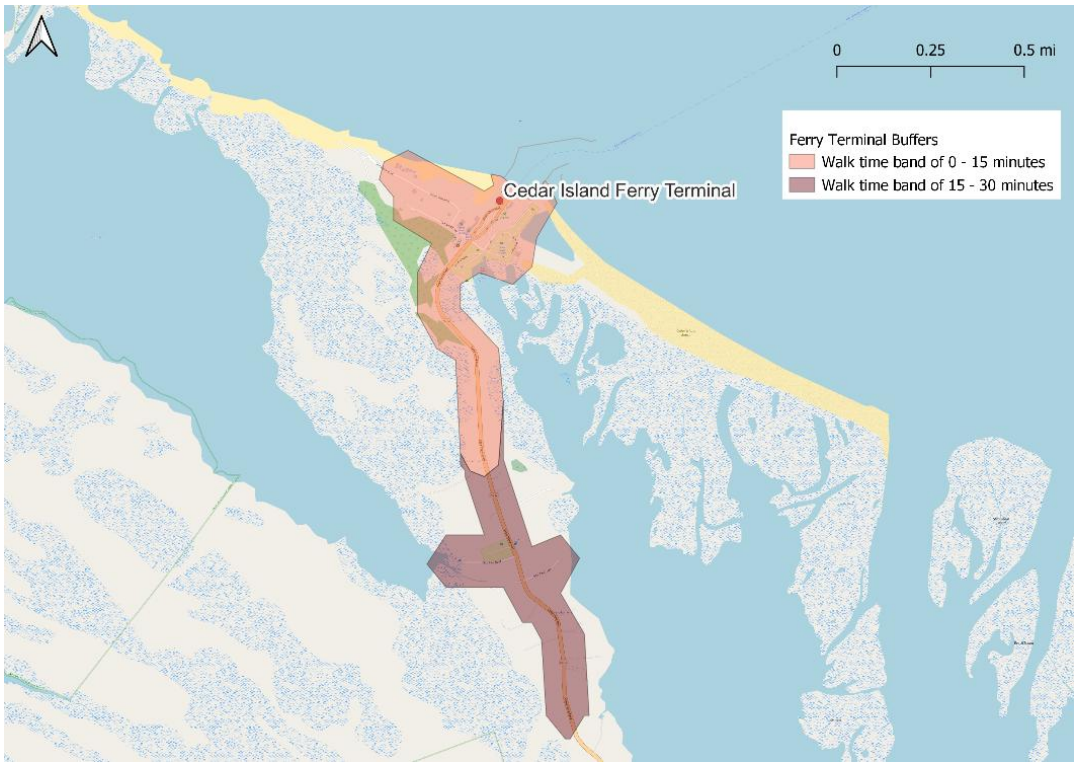


Figure 11. Cedar Island Ferry Terminal Walkshed Buffer Map

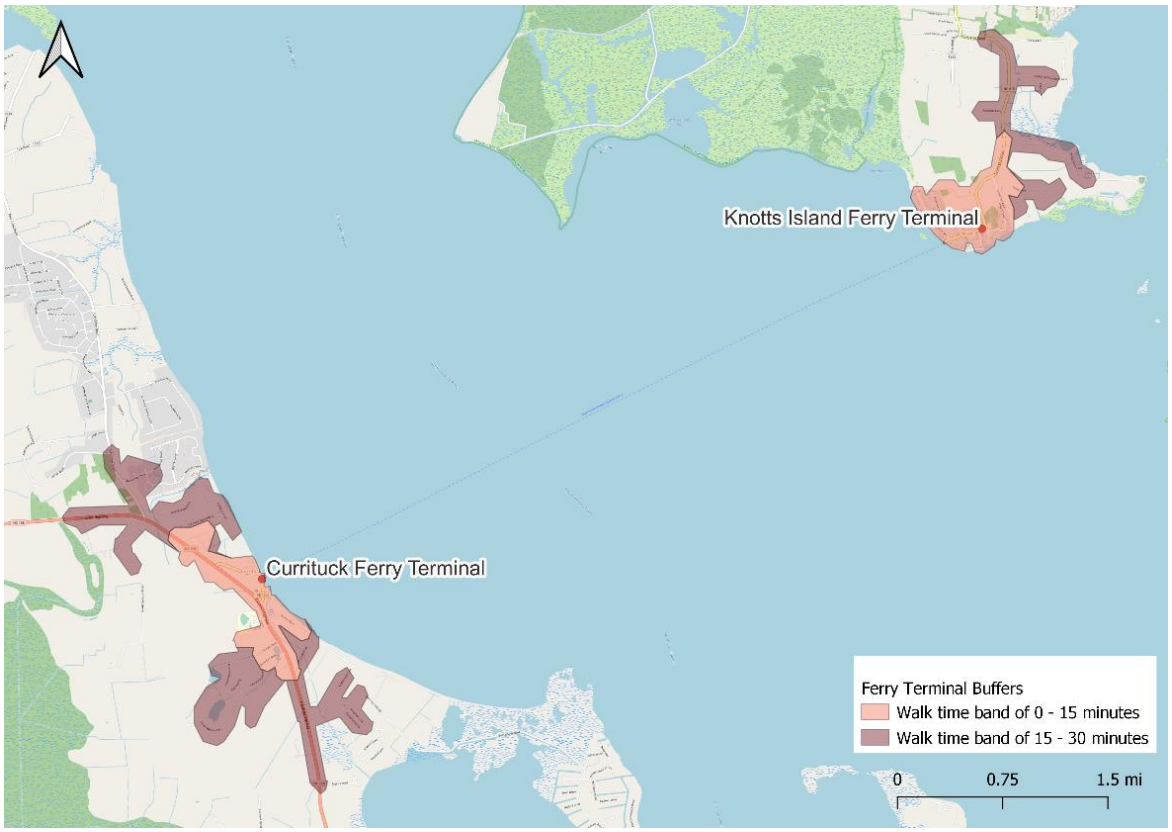


Figure 12. Knotts Island and Currituck Ferry Terminal Walksheds Buffer Map

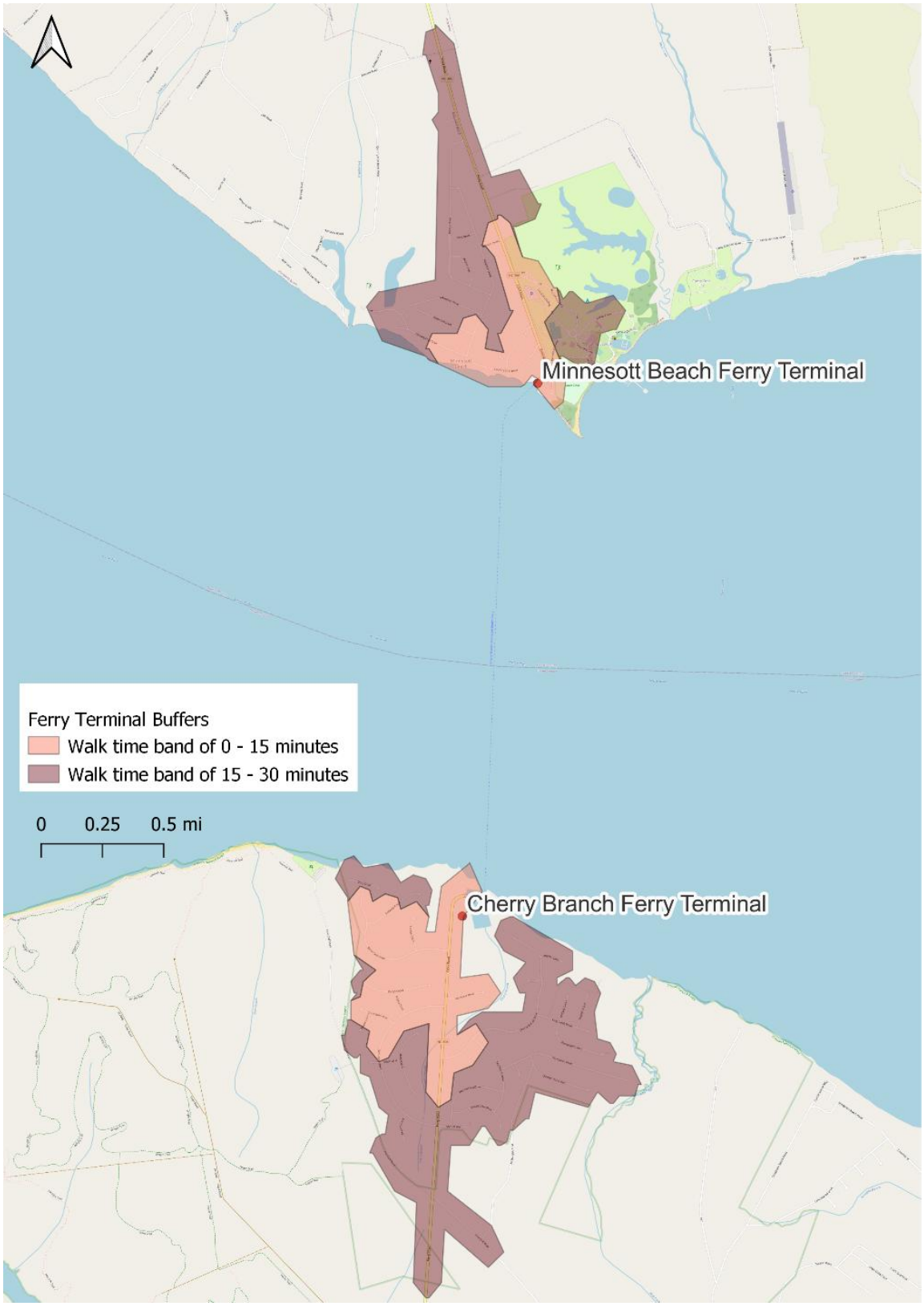


Figure 13. Minnesott Beach and Cherry Branch Ferry Terminal Walksheds Buffer Map

Figure 14. Hatteras and Ocracoke-South Dock Ferry Terminal Walksheds Buffer Map

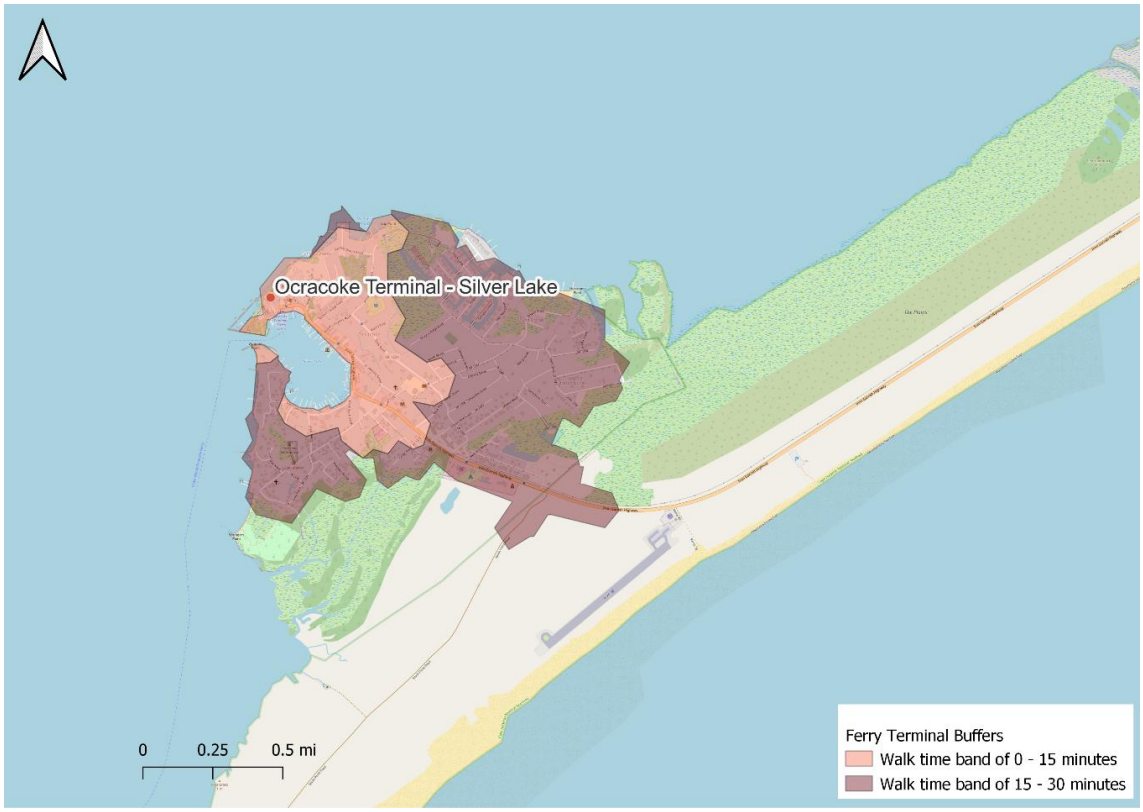


Figure 15. Ocracoke Silver Lake Ferry Terminal Walkshed Buffer Map

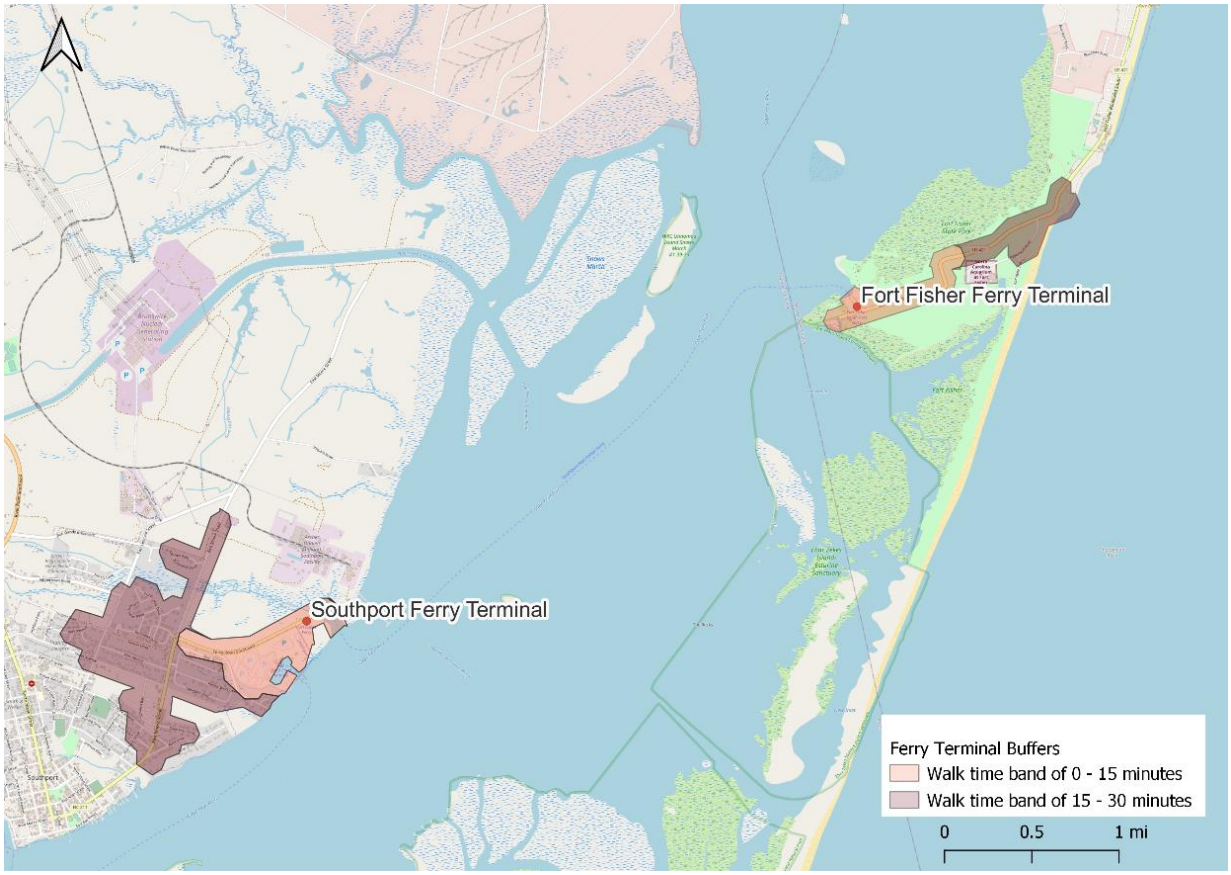


Figure 16. Southport and Fort Fisher Ferry Terminal Walksheds Buffer Map

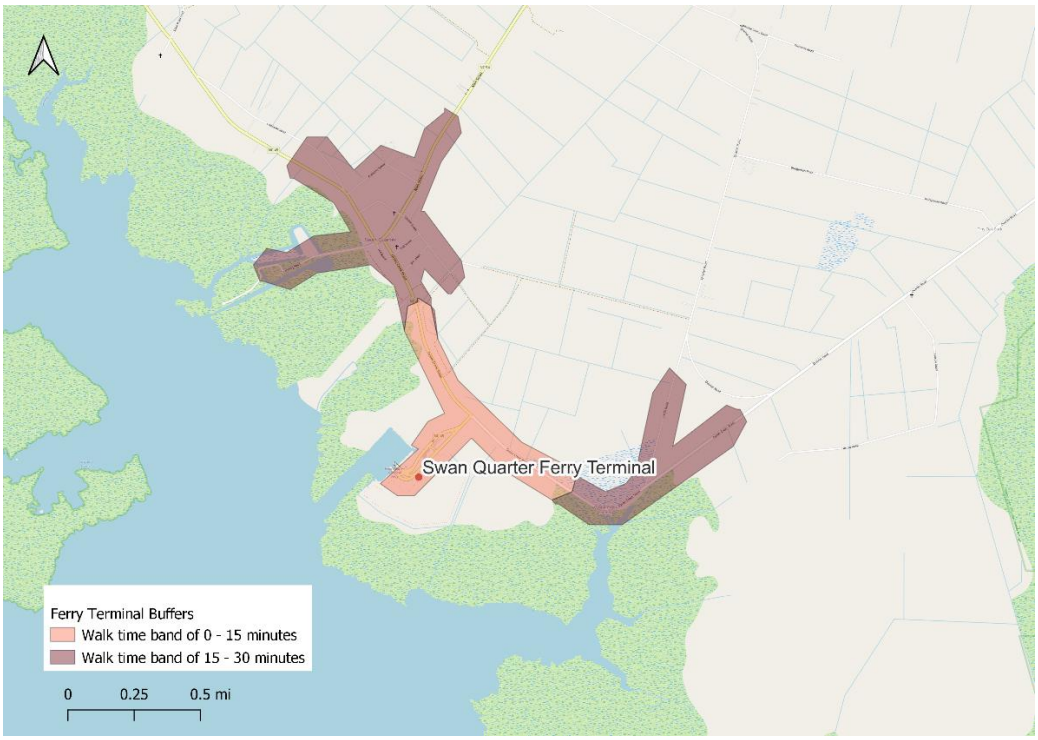


Figure 17. Swan Quarter Ferry Terminal Walkshed Buffer Map

Table 6. Ferry Terminal Walkshed Housing Data (US Census Bureau, 2010)

Terminal	Total Housing Units		Renter-Occupied Housing Units		Owner-Occupied Housing Units		Vacant Housing Units		Vacant Housing Units: Seasonal/Recrea-tional/Occasional	
	15-Min	30-Min	15-Min	30-Min	15-Min	30-Min	15-Min	30-Min	15-Min	30-Min
Aurora	0	11	0	2	0	7	0	2	0	4
Bayview	0	0	0	0	0	0	0	0	0	0
Cedar Island	0	0	0	0	0	0	0	0	0	0
Cherry Branch	177	273	32	46	145	210	1	18	3	4
Currituck	4	87	0	11	4	68	0	8	0	2
Fort Fisher	0	0	0	0	0	0	0	0	0	0
Hatteras	44	447	3	26	6	66	35	355	31	314
Knotts Island	10	0	2	0	8	0	0	0	1	0
Minnesott Beach	21	84	3	9	15	50	3	25	5	18
Ocracoke - Silver Lake	189	736	34	107	60	191	95	438	29	114
Ocracoke - South Dock	0	0	0	0	0	0	0	0	0	0
Southport	0	342	0	66	0	197	0	79	0	38
Swan Quarter	0	33	0	5	0	16	0	12	0	4

Table 7. Ferry Terminal Walkshed SIC Business Data (US Census Bureau, 2020)

Terminal	2022 Total Businesses		2022 Food Stores		2022 Eating & Drinking		2022 Hotel/Lodging		2022 Movie/Amusement		2022 Health Services		2022 Education/Library		2022 Government	
	15-Min	30-Min	15-Min	30-Min	15-Min	30-Min	15-Min	30-Min	15-Min	30-Min	15-Min	30-Min	15-Min	30-Min	15-Min	30-Min
Ocracoke - Silver Lake	42	53	2	2	7	9	6	8	3	3	2	9	6	8	3	3
Hatteras	7	31	0	2	1	4	1	2	1	4	0	4	1	2	1	4
Currituck l	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cherry Branch	3	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fort Fisher	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minnesott Beach	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aurora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bayview l	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cedar Island	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Knotts Island	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ocracoke - South Dock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Southport	0	16	0	0	0	2	0	0	0	0	1	2	0	0	0	0
Swan Quarter	0	17	0	1	0	0	0	0	0	0	5	0	0	0	0	0

Appendix E: Closeout Meeting Details

Meeting Logistics

The meeting was facilitated by UNC Highway Safety Research Center project team members. It was led by Sarah O'Brien, and Kristin Blank served as notetaker.

Date/Time: September 9, 2025, 1:00–4:00 PM (ET)
Format: Virtual (Zoom)
Tools:

- Zoom (meeting platform, recording, transcription)
- PowerPoint (presentations)
- Poll Everywhere (interactive questions)

Agenda

- Housekeeping / Chair comments
- Project need and objectives
- Introductions
- Overview of Final Report
    - Literature Review
    - Plan Quality Analysis
    - Peer Ferry Interviews
    - GIS Findings
- Break
- Planning Opportunities Deliverable
    - community conditions
    - ferry system conditions
    - policies/funding, proposed goals
    - recommendations
    - prioritization framework
- Implementation and technology transfer
- Meeting closeout / next steps

Meeting Invitation (Sent via Email)

Subject: Closeout Meeting and Stakeholder Feedback - NCDOT RP 22-20: Strengthening Access to Ferries to Support Coastal Community Resiliency, Health, and Mobility"

Please join us for the closeout meeting for NCDOT research project Strengthening Access to NC Ferries to Support Coastal Community Resiliency, Health, and Mobility. This meeting will also serve as an opportunity to gather feedback from a broader group of local and regional agency partners in key coastal communities.

You're receiving this invitation because of your connection to the project, whether through the relevance of your current role, your previous work on a plan or Community Health Assessment

referenced in our deliverables, or your participation on the project's Steering and Implementation Committee.

During the session, we will:

- Review the project's key findings and two deliverables (1. final report & 2. planning opportunities document).
- Share strategies designed to improve ferry access and multimodal connectivity.
- Invite your feedback on the proposed planning opportunities to ensure they reflect local needs and feasibility.

The meeting will be fully virtual using the Zoom meeting platform (link to join provided below).

Thanks,
Sarah

Join Zoom Meeting

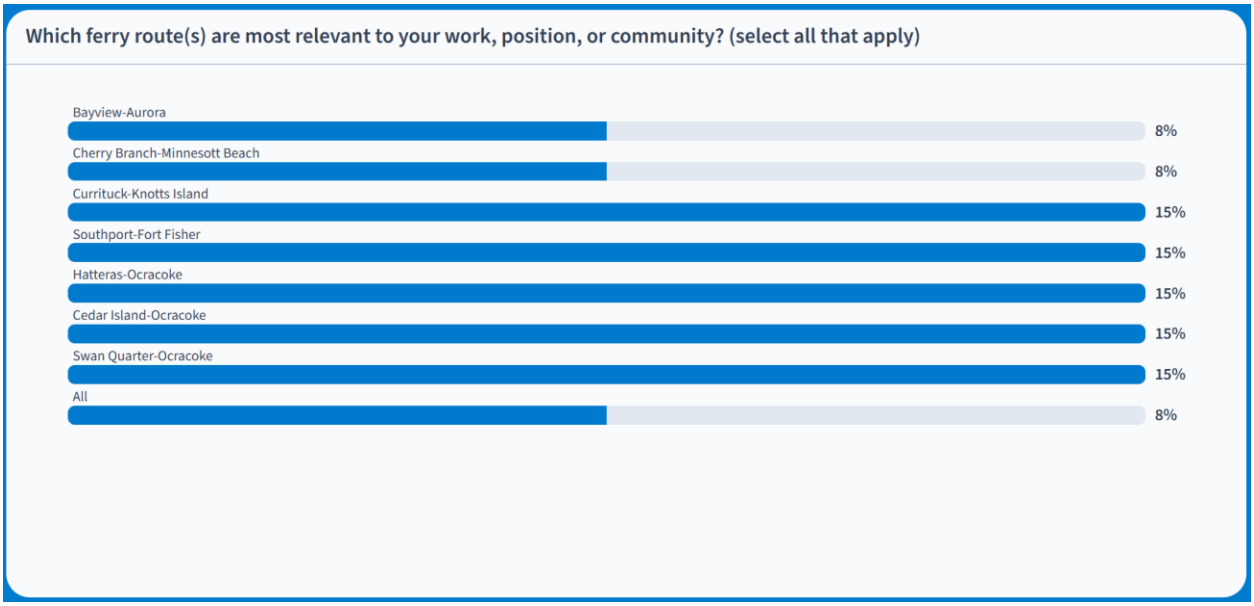
[insert meeting link and join information]

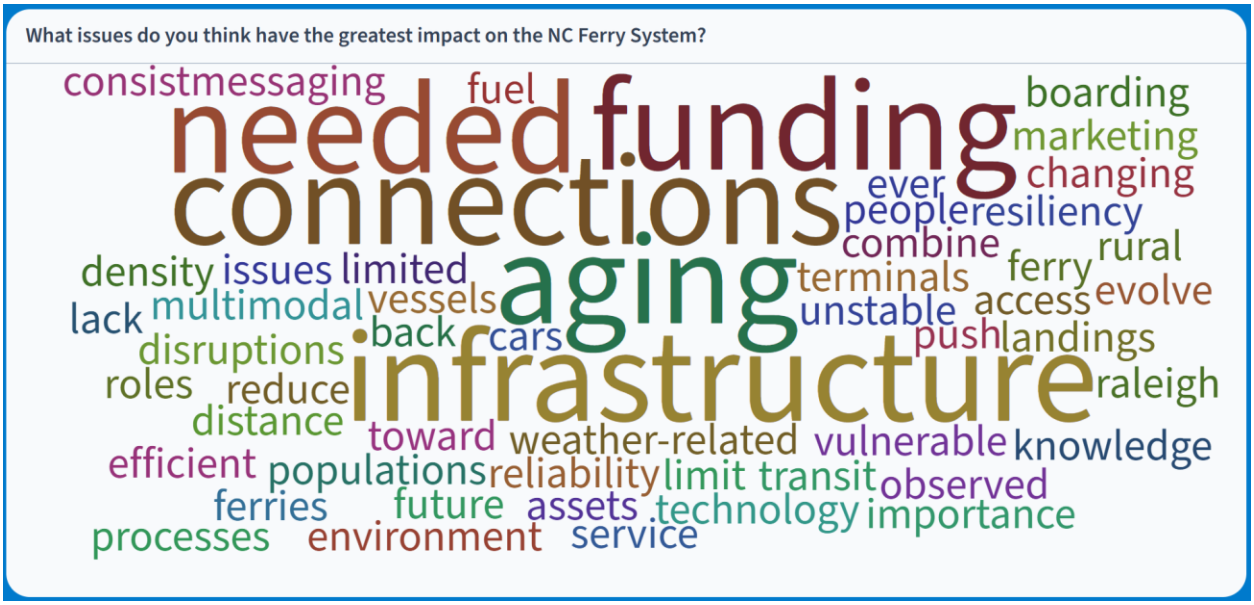
Attendance

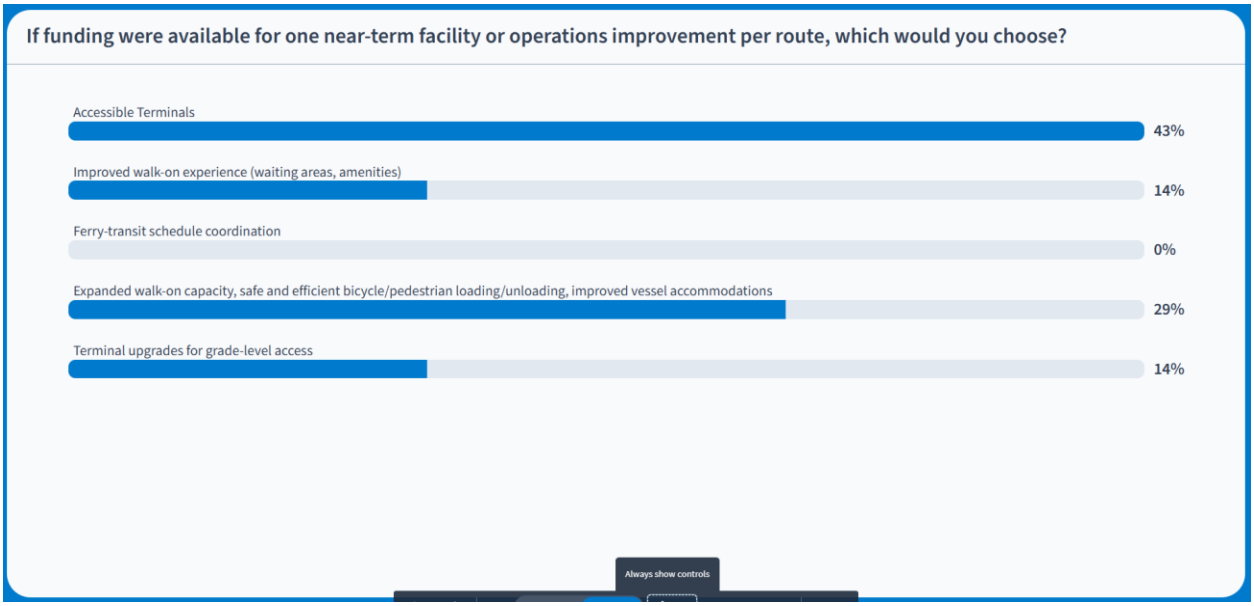
Invitations: Outlook invitations were sent to 72 individuals, including members of the project Steering and Implementation Committee (StIC), NCDOT staff, and local and regional partners. Of the 72 invited, 12 participants joined the session (not including project team members). The following individuals participated in the meeting:

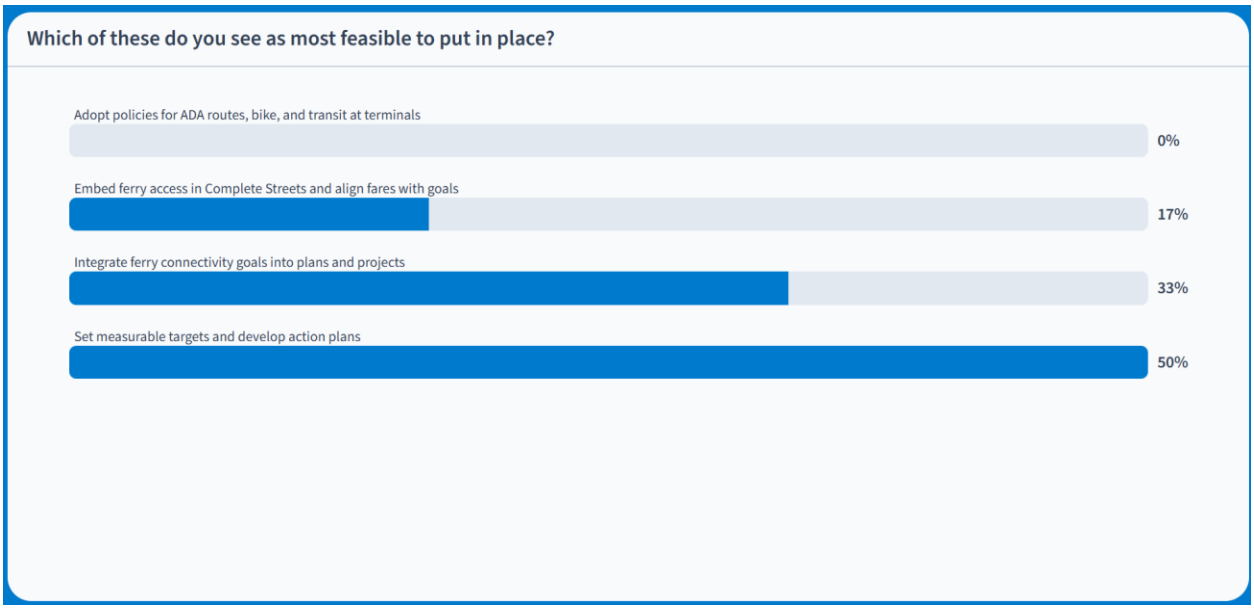
1. Catherine Peele, Deputy Director of Maritime Operations & Programming, NCDOT, chair of the StIC for RP 2022-20
2. Mustansir Kadibhai, Research and Development Engineer, NCDOT, research administrator RP2022-20
3. Ethan Sommers, GIS Application Developer, Craven County, NC, member of the StIC
4. Hemel Shah, Transportation Planning Division, NCDOT
5. Kim Nguyen, Multimodal Regional Planner, Integrated Mobility Division, NCDOT
6. Sheila Davies, Deputy County Manager/Director of Health and Human Services, NCDOT
7. Tim Jennette, Superintendent, District 1, Terminal Operations, NCDOT
8. Beth Bucksot, Economic Development Director, Pamlico County, NC
9. Ken Vafier, Planning Operations Supervisor, New Hanover County, NC
10. Ferguson (Juice) Dale, Owner of Semper Sky LLC
11. Sandra Snipes, Mayor, Town of Vandemere, NC
12. Radcliff Hester, Transportation Program Manager, Dare County, NC

Poll Everywhere Engagement Results






If funding were available for one near-term facility or operations improvement per route, which would you choose?
Accessible Terminals
43%
Improved walk-on experience (waiting areas, amenities)
14%
Ferry-transit schedule coordination
0%
Expanded walk-on capacity, safe and efficient bicycle/pedestrian loading/unloading, improved vessel accommodations
29%
Terminal upgrades for grade-level access
14%
Always show controls


Which of these do you see as most feasible to put in place?
Adopt policies for ADA routes, bike, and transit at terminals
0%
Embed ferry access in Complete Streets and align fares with goals
17%
Integrate ferry connectivity goals into plans and projects
33%
Set measurable targets and develop action plans
50%

Appendix F: Travel Demand Survey

The following includes the full survey instrument developed for this project: the first section presents the short-form version with priority questions, followed by additional questions for the longer-form version for respondents who have more time or interest.

Short Form Survey for Ferry Passengers

1. Which ferry route are you currently riding? (select one)

☐ Aurora to Bayview / Bayview to Aurora
☐ Cedar Island to Ocracoke / Ocracoke to Cedar Island
☐ Swan Quarter to Ocracoke / Ocracoke to Swan Quarter
☐ Cherry Branch to Minnesott Beach / Minnesott Beach to Cherry Branch
☐ Currituck to Knotts Island / Knotts Island to Currituck
☐ Southport to Fort Fisher / Fort Fisher to Southport
☐ Hatteras to Ocracoke Village / Ocracoke Village to Hatteras (passenger ferry)
☐ Hatteras to Ocracoke Village / Ocracoke Village to Hatteras (vehicle ferry)

2. How often do you travel on this ferry route? (select one)

☐ Less than one day per month
☐ 1–4 days per month
☐ 1–2 days per week
☐ 3–4 days per week
☐ 5 or more days per week
☐ This is my first time traveling on this ferry route

3. How did you get to the ferry terminal for this trip? (select all that apply)

☐ Personal or work car
☐ Dropped off (e.g., taxi, rideshare, family/friend)
☐ Motorcycle or scooter
☐ Bus, paratransit, or dial-a-ride
☐ Bicycle (including e-bikes) or other human-powered vehicle
☐ Walking (including wheelchair or mobility scooter)

4. Why are you using this ferry today? (select all that apply)

☐ Commuting to work or school
☐ Other work/school-related travel
☐ Shopping or errands
☐ Healthcare or dental appointments
☐ Vacation
☐ Visiting family or friends
☐ Dining, entertainment, or recreation
☐ Other: _____

5. What transportation mode will you use once you leave the ferry? (select one)

☐ Personal vehicle

☐ Rideshare or drop-off
☐ Bicycle or micromobility
☐ Transit
☐ Walking
☐ Other: _____

6. Zip code where you currently live: _____

Long Form Survey for Ferry Passengers

Includes all questions from the Short Form, plus the following:

7. Think about the ferry terminal where you started your journey today. How easy would it be for you to get there by each of the following modes? (scale response)

- Personal or work car (Scale: Impossible, Very difficult, Somewhat difficult, Not at all difficult, I don't know)
- Taxi/rideshare or drop-off (Scale: Impossible, Very difficult, Somewhat difficult, Not at all difficult, I don't know)
- Motorcycle or scooter (Scale: Impossible, Very difficult, Somewhat difficult, Not at all difficult, I don't know)
- Bus, paratransit, or dial-a-ride (Scale: Impossible, Very difficult, Somewhat difficult, Not at all difficult, I don't know)
- Bicycle or other human-powered vehicle (Scale: Impossible, Very difficult, Somewhat difficult, Not at all difficult, I don't know)
- Walking or wheeling (including mobility scooter) (Scale: Impossible, Very difficult, Somewhat difficult, Not at all difficult, I don't know)

8. What other transportation modes have you used to reach this ferry? (select all that apply)

☐ Personal or work car
☐ Dropped off (e.g., taxi, rideshare)
☐ Motorcycle or scooter
☐ Bus, paratransit, or dial-a-ride
☐ Bicycle or human-powered vehicle
☐ Walking or wheeling

9. Did you choose your destination today because the ferry goes there? (select one)

☐ Not at all (I needed to go there anyway)
☐ Somewhat (I chose the destination partly because the ferry goes there)
☐ Entirely (I chose the destination only because the ferry goes there)
☐ Riding the ferry was the main purpose of my trip

10. Have you used any other NC ferry routes in the past five years (even if not in the past year)? (select one)

☐ Yes
☐ No

☐ Unsure
(Display Q11 if Q10=Yes)

11. What other NC ferry routes have you used in the past year? (select all that apply)

☐ Aurora to Bayview / Bayview to Aurora
☐ Cedar Island to Ocracoke / Ocracoke to Cedar Island
☐ Swan Quarter to Ocracoke / Ocracoke to Swan Quarter
☐ Cherry Branch to Minnesott Beach / Minnesott Beach to Cherry Branch
☐ Currituck to Knotts Island / Knotts Island to Currituck
☐ Southport to Fort Fisher / Fort Fisher to Southport
☐ Hatteras to Ocracoke Village / Ocracoke Village to Hatteras (passenger ferry)
☐ Hatteras to Ocracoke Village / Ocracoke Village to Hatteras (vehicle ferry)
☐ Unsure
(Display Q12 if Q10=Yes)

12. For what purposes have you used the ferry in the past (across any NC routes)? (select all that apply)

☐ Commuting
☐ Other work/school-related travel
☐ Shopping or errands
☐ Healthcare
☐ Vacation
☐ Visiting family or friends
☐ Dining, entertainment, or recreation
☐ Other: _____

13. Please rate your agreement with the following statements about the terminal you departed from today: (scale response)

- Distance makes it difficult to access (Strongly agree → Strongly disagree)
- Road/terrain conditions are challenging (Strongly agree → Strongly disagree)
- Bus/transit service is lacking (Strongly agree → Strongly disagree)
- Terminal design (e.g., parking, sidewalks) is a barrier (Strongly agree → Strongly disagree)
- Building layout is difficult to navigate (Strongly agree → Strongly disagree)
- Bathrooms and other amenities are inadequate (Strongly agree → Strongly disagree)
- Waiting areas are insufficient (Strongly agree → Strongly disagree)

14. Please rate your agreement with the following statements about the ferry system overall: (scale response)

- Ferry design is difficult to use (Strongly agree → Strongly disagree)
- Schedules are inconvenient (Strongly agree → Strongly disagree)
- Fares are too expensive (Strongly agree → Strongly disagree)
- Information is hard to find (Strongly agree → Strongly disagree)
- Weather or water conditions limit use (Strongly agree → Strongly disagree)

- Ferry does not feel safe (Strongly agree → Strongly disagree)
- System is not inclusive for varying abilities (Strongly agree → Strongly disagree)
- I don't like traveling by boat (Strongly agree → Strongly disagree)
- Destinations served are not useful (Strongly agree → Strongly disagree)

15. What additional destinations would you like ferries to serve? (fill in response)

16. What amenities are most important to you at the terminal? (select up to 5)

☐ Food for purchase
☐ Car parking
☐ Bicycle parking
☐ Bus connections
☐ Rideshare/taxi options
☐ Shared bikes or scooters
☐ Pick-up/drop-off space
☐ Information displays
☐ Shelter/shade
☐ Playgrounds or entertainment
☐ Seating
☐ Other: _____

17. What would improve access to the ferry by bus, paratransit, or dial-a-ride? (fill in response)

18. What would improve access to the ferry by bicycle? (fill in response)

19. What would improve access to the ferry by walking or wheeling? (fill in response)

20. How would each of the following changes affect you? (Scale response)

- Faster travel times (Major effect, Minor effect, No effect)
- Improved cleanliness (Major effect, Minor effect, No effect)
- Easier onboarding/offboarding (Major effect, Minor effect, No effect)
- More destinations (Major effect, Minor effect, No effect)
- Better customer service (Major effect, Minor effect, No effect)
- Cheaper fares (Major effect, Minor effect, No effect)
- Coordinated ferry/bus schedules (Major effect, Minor effect, No effect)

21. What is your age? (select one)

☐ Under 18
☐ 18–24
☐ 25–34
☐ 35–44
☐ 45–54
☐ 55–64
☐ 65–74

☐ 75–84
☐ 85 or older

22. What is your race or ethnicity? (select all that apply)

☐ White
☐ Black or African American
☐ American Indian or Alaska Native
☐ Asian
☐ Native Hawaiian or Pacific Islander
☐ My preferred choice is not listed

23. What is your gender? (select one)

☐ Male
☐ Female
☐ Non-binary / third gender
☐ My preferred choice is not listed

Short Form Survey for Potential Ferry Riders (Not Current Ferry Passenger)

1. Have you ever used the North Carolina ferry system? (select one)

☐ Yes, within the past year
☐ Yes, but more than a year ago
☐ No, but I am familiar with it
☐ No, I don't know much about it

2. How likely are you to use a North Carolina ferry in the future? (select one)

☐ Very likely
☐ Somewhat likely
☐ Not very likely
☐ Not at all likely
☐ Not sure

3. Which factors are preventing you from using a ferry? (select all that apply)

☐ It doesn't go where I need to go
☐ I don't know enough about the routes or schedules
☐ Travel takes too long
☐ I prefer driving or other transportation
☐ Cost
☐ Accessibility concerns (e.g., mobility or health)
☐ Weather or water conditions
☐ Other: _____

4. What improvements would make you more likely to use the ferry? (select up to 3)

☐ Faster service
☐ More destinations

☐ Better information or signage
☐ Lower cost
☐ Easier connections to bus, bike, or walking paths
☐ Better parking
☐ Other: _____

5. Zip code where you currently live: _____

Long Form Survey for Potential Ferry Riders (Not Current Ferry Passenger)

6. How far do you live from the nearest NC ferry terminal? (select one)

☐ Less than 10 miles
☐ 10–30 miles
☐ 20–50 miles
☐ More than 50 miles
☐ Not sure

7. How would you most likely travel to a ferry terminal? (select all that apply)

☐ Personal or work vehicle
☐ Taxi or rideshare
☐ Bus or paratransit
☐ Bicycle or e-bike
☐ Walking
☐ I don't know

8. What types of amenities would make a ferry terminal more appealing to you? (select up to 5)

☐ Food or beverages
☐ Seating and waiting areas
☐ Bicycle parking or bike share
☐ Clear signage and wayfinding
☐ Shelter from weather
☐ Restrooms
☐ Access to transit
☐ Play areas or entertainment
☐ Other: _____

9. What types of information would help you decide whether to use the ferry? (select all that apply)

☐ Online schedule or trip planner
☐ Mobile app or real-time updates
☐ Maps and signage at key locations
☐ Word of mouth or personal recommendations
☐ Marketing or travel brochures
☐ Other: _____

10. Have you visited any of the following areas that are served by NC ferries? (select all that apply)

☐ Ocracoke
☐ Hatteras
☐ Southport
☐ Fort Fisher
☐ Cedar Island
☐ Knotts Island
☐ Other: _____
☐ I haven't visited any of these areas

11. What would be your main reason for using the ferry? (select all that apply)

☐ Vacation or sightseeing
☐ Visiting family or friends
☐ Shopping or errands
☐ Dining, entertainment, or recreation
☐ Commuting to work or school
☐ Healthcare appointments
☐ Other: _____

12. What is your age? (select one)

☐ Under 18
☐ 18–24
☐ 25–34
☐ 35–44
☐ 45–54
☐ 55–64
☐ 65–74
☐ 75–84
☐ 85 or older

13. What is your gender? (select one)

☐ Male
☐ Female
☐ Non-binary / third gender
☐ My preferred choice is not listed

14. What is your race or ethnicity? (select all that apply)

☐ White
☐ Black or African American
☐ American Indian or Alaska Native
☐ Asian
☐ Native Hawaiian or Pacific Islander
☐ My preferred choice is not listed