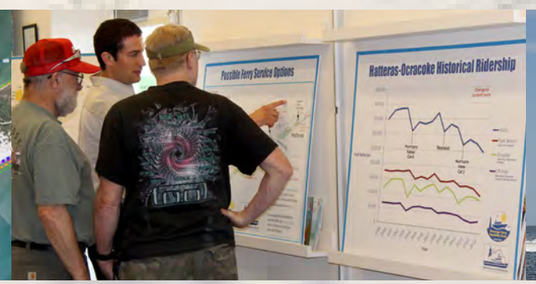
Report of the Ocracoke-Hatteras Passenger Ferry Feasibility Study



Passenger Ferry Feasibility Study
OCRACOKE-HATTERAS

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

NORTH CAROLINA FERRY SYSTEM

VOLKERT ATKINS ITRE

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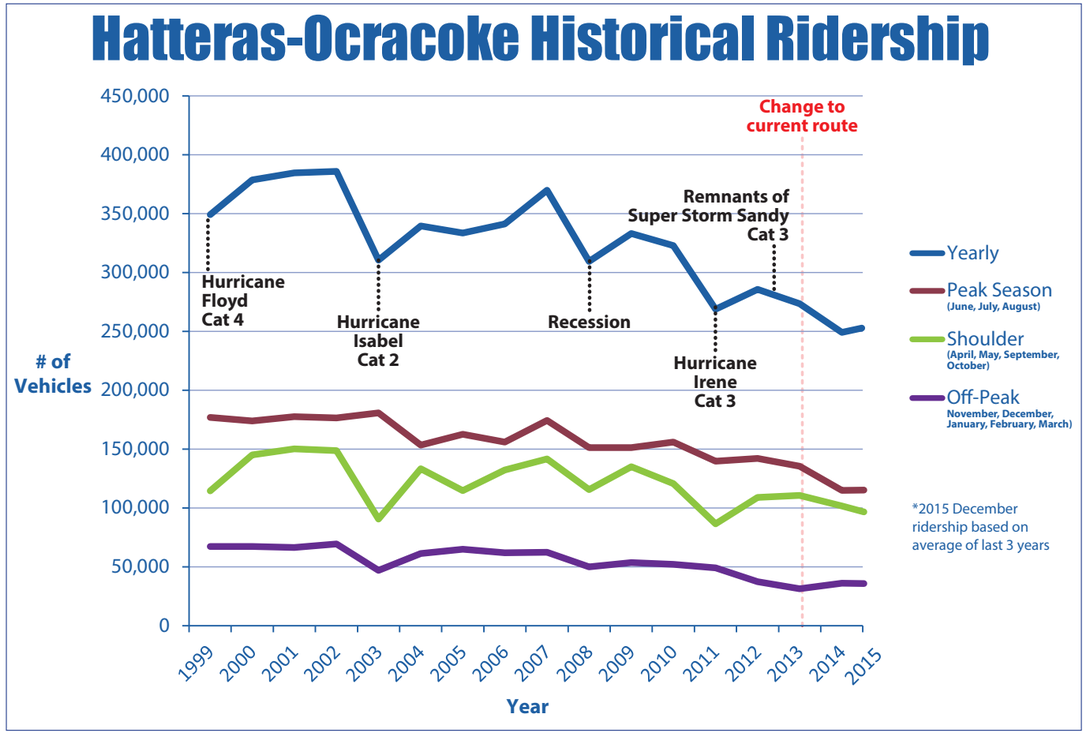
Executive Summary

In 2013, shoaling in the Hatteras Inlet forced the North Carolina Department of Transportation Ferry Division (Ferry Division) to use a longer, deeper route between Hatteras and Ocracoke, which increased crossing times from approximately 40 minutes on the original short route to 60 minutes on the current long route. The impacts of using the longer route have been dramatic–decreasing daily crossings in each direction to from 53 to 36, increasing fuel and labor costs, creating long queues at the ferry terminal, and making it extremely difficult for visitors to the Outer Banks to make a day trip to Ocracoke. Local business owners have indicated that many have seen a 20 to 25 percent loss in revenue, which most attribute to fewer "day-trippers." The projected loss of between 31,000 and 50,000 visitors to Ocracoke in the peak months could be attributed to the lower levels of service caused by the longer route.



The purpose of this study is to examine the feasibility of options to meet the current and forecasted demand for visitors to Ocracoke and to increase the level of service on the Hatteras-Ocracoke route. Aided by a steering committee consisting of NCDOT and local representatives, the ferry study team identified five alternatives for improving ferry services between Hatteras and Ocracoke:

1. Return to the original route
2. Increased departures on the current route
3. Encouragement of walk-on traffic on current ferries
4. Passenger ferry to South Dock
5. Passenger ferry to Silver Lake

The analysis of each alternative was based on a myriad of data sources. The Ferry Division provided information on current vessels and their characteristics, crew requirements, historical yearly, monthly, and daily ridership data, and access to all Ferry Division facilities for assessment by the study team. The study team surveyed local businesses owners via an online survey, implemented a passenger survey on Thursday, June 11th through Sunday, June 14th, and collected wait time and turnaround data on June 11th and June 13th. The Ferry Division also arranged a trial run of the Provincetown III, a 149-passenger diesel-powered catamaran, to test the operating characteristics of the vessel in the waters between Hatteras and Ocracoke. The analysis was guided by a series of five steering committee meetings and two public meetings.

Alternative 1: The study team found that returning to the original route is problematic due to the unstable channel and limited funds for dredging. The team recommends that the Ferry Division continue to monitor the channel and pursue returning to the original route if environmental conditions change.

Alternative 2: To return to 2012 departure levels, the Ferry Division would need to add 17 departures to the current schedule, which represents three additional vessels and $45 million in capital costs, and would add additional vessels to the already congested channel.

Alternative 3: The Ferry Division would need to add 50,000 passengers per year one way to get back to 2012 levels, and the current vessels have limited passenger amenities to support pedestrian-only travelers. It is feasible to place charter buses on existing vessels to increase the passenger capacity of each run, with the charter buses picking up travelers at the Hatteras Terminal and discharging passengers in Ocracoke Village. This alternative would require terminal improvements at Hatteras and Sliver Lake. The study team considers this to be a feasible option but recognizes that passenger demand would likely be much lower than a passenger ferry, as it is a less attractive and convenient service.

Alternative 4: A passenger ferry to south dock would involve operating one or more dedicated passenger ferries along the existing Hatteras-Ocracoke Route. Additional terminal facilities would be needed at the Hatteras and South Dock terminals. The trial run of the Provincetown III indicated that this route would not take advantage of the vessel's speed, resulting in a similar crossing time to the current vehicle ferry. This option would also create concerns with additional vessels in the current channel and would require a lengthy transit connection to Ocracoke Village.

Alternative 5: A single passenger ferry has the capability of returning passenger counts to 2010 levels and passengers can be moved between Hatteras and Ocracoke at a much cheaper per-passenger cost than on a vehicle ferry. The option of running to Silver Lake separates the passenger ferry traffic from the vehicle ferry traffic, increasing safety. Based on the survey and wait time data, the study team estimates that 25% of current ferry riders would take the passenger ferry and would be willing to pay approximately $15 per round trip for the service. This option would require terminal improvements at Hatteras and Ocracoke and transit infrastructure to accommodate passengers without cars. Based on the economics of operating the passenger ferry and the strong public support for the ferry, the steering committee recommended that this option be studied further.

Based on the steering committee's recommendation, the study team performed a comprehensive analysis of a passenger ferry, examined the potential ridership and revenue, and developed recommendations for vessels, staffing, and infrastructure. The study team recommends the following:

Recommendations Summary

In summary the study team recommends the following:

- **Two approximately 100-passenger ferries** capable of cruising at approximately 25 knots.
- Using **Rollinson Channel** to access the Pamlico Sound and **Big Foot Slough** to access Silver Lake.
- **Eight round trips per day** with the first departure from Hatteras at 8:00 AM with the last departure from Ocracoke at 8:30 PM May through September.
- A **$15 round trip fare** per passenger.
- **Online and application-based ticketing.**
- Construction of an **open-sided terminal immediately adjacent to the existing Hatteras Terminal.**
- **Parking and passenger drop off** in the existing lot adjacent to the Hatteras Terminal. **Additional parking** located in the existing Graveyard of the Atlantic Museum parking or in a newly constructed lot adjacent to this facility with shuttle service to the Hatteras Terminal.
- **A system of signage**, including a variable message sign, at the approach to the Hatteras Terminal.
- **A floating platform** that allows for berthing of two vessels and side loading/unloading at Hatteras and Ocracoke.
- **Ocracoke docking** immediately adjacent to the existing Sound Class ferry docks.
- **A temporary terminal** located immediately adjacent to the National Parks Service Ocracoke Visitors Center.
- **A permanent terminal** in this same location that will accommodate the Ferry Division, NPS, and Hyde County.
- **A comprehensive signing package** to disperse passengers from the Ocracoke Terminal.
- **A loop transit system on Ocracoke** with 20-30 minute headways.
- **An LTV transit system** to connect the Ocracoke Terminal with the South Dock terminal and provide access to attractions outside of Ocracoke Village.
- **Pedestrian improvements** in the curve along NC 12 just south of Water Plant Road.
- **Coordination with local businesses** to provide golf cart and bicycle rental.

Based on these recommendations, the study team developed a 25-year implementation time frame that calls for an initial two-vessel service with an expansion to additional vessels in Year 5 and Year 12, and developed a 20-year business plan of capital and operating costs that include approximately $8.35 million in capital and vessel procurement costs in Years 1 and 2 to begin service, which would carry an annual ridership of approximately 74,800 round-trip passengers.

In summary, the study team finds that a passenger ferry between Hatteras and Ocracoke provides the capacity to return ridership to the levels seen before the switch to the current long route, and can do so at a significantly lower cost to the Ferry Division than through the use of vehicle ferry. With appropriate infrastructure on Hatteras and Ocracoke, many visitors to the island can accomplish their trip without the need for a vehicle, which will provide environmental benefits, increase safety on the island by removing cars, and increase the economic vitality of the island.

Introduction

Eastern North Carolina's seemingly endless landscape of rivers, inlets, and sounds have meant that maritime transportation has been a part of life as long as people have lived here. The current North Carolina Ferry System traces its roots back to the mid-1920s, when Captain J.B. "Toby" Tillett began a tug and barge service across Oregon Inlet.

In 1934, the North Carolina Highway Commission began subsidizing Tillett's business in order to keep tolls affordable to the ever-increasing number of residents and visitors in the area. Beginning eight years later, the Highway Commission fully reimbursed Tillett in order to eliminate the tolls. This continued until Tillett's business was sold to the state in 1950.

The first "official" route of the North Carolina Ferry System (NCFS) was established in 1947, when a private ferry across Croatan Sound between Manns Harbor and Roanoke Island was purchased from T.A. Baum.

Today, the NCFS runs 2 boats on seven regular routes across five bodies of water: Currituck and Pamlico Sounds, and the Cape Fear, Neuse, and Pamlico Rivers. North Carolina ferries transport about 850,000 vehicles and two million passengers a year, making it the second largest state-run ferry system in the United States, carrying visitors, residents, commuters, and school children. Two of the routes (Hatteras-Ocracoke and Ocracoke-Cedar Island) are officially part of The Outer Banks Scenic Byway.

Coastal North Carolina is a unique place. Once a remote region whose waters were home to both pioneers and pirates, the Outer Banks is now a place famous for sunny stretches of sandy beaches, world-class fishing, charming coastal towns, and remarkable scenic beauty. The NCDOT Ferry System makes this area much more accessible for visitors. The island village of Ocracoke has no roadway accessibility and can only reached by air or water. Scheduled water transportation to the island is provided exclusively by the NCFS. The increased ease of access provided by the NCFS to these otherwise remote coastal North Carolina areas has allowed tourism on the Outer Banks to thrive.

Purpose of This Study

In 2013, shoaling in the Hatteras Inlet forced the North Carolina Department of Transportation Ferry Division (Ferry Division) to use a longer, deeper route between Hatteras and Ocracoke, which increased crossing times from approximately 40 minutes on the original short route to 60 minutes on the current long route. While the Ferry Division is continuing to work with the Army Corps of Engineers to dredge the original channel, efforts since 2013 to permanently open the channel have been futile.

The impacts of using the longer route have been dramatic. The number of daily crossings in each direction has decreased to 36, down from 53 when the short route was in use. During most of the summer of 2014, only six vessels were available, meaning that any downtime directly affected schedules, as there was no backup vessel. The longer route also added an additional $7,000+ in fuel and labor costs per day. The M/V Ocracoke was recently reintroduced into service after an engine refit, which added a backup vessel, however the number of berthing facilities and the width of the channel limit the total number of vessels that can be made available to the route. The reduction in total number of crossings has severely decreased the level of service on the Hatteras–Ocracoke route, the most heavily used route in the NCFS, and has drastically reduced the opportunity for visitors to the Outer Banks to make a day trip to Ocracoke.

Discussions with local business owners have indicated that many have seen a 20 to 25 percent loss in revenue, which most attribute to fewer "day-trippers" due to decreased ferry service.

The purpose of this study is to examine the feasibility of options to meet the current and forecasted demand for visitors to Ocracoke and to increase the level of service on the Hatteras–Ocracoke route. This study examines the economic and fiscal impact of ferry-related activities and forecasts demand and revenue for the Hatteras–Ocracoke route utilizing a system of vehicle and, potentially, passenger ferries. This study examines land and waterside options for providing a passenger ferry and provides capital and O&M costs over a 20-year time period for assets that would be developed and owned by NCDOT as well as assets that would need to be provided by local governments and private entities to ensure the success of the recommended option. The study provides guidance on implementation strategies, including any legislative changes that would need to be made, and provides prioritized recommendations in a 20-year business plan. The development of this plan was guided by a steering committee, composed of NCDOT staff, a diverse stakeholder committee of local governments and regulatory agencies, and the public by way of a robust public involvement program.

Vehicles queued to board the ferry at Hatteras

1. Context

This portion of the report details the existing conditions surrounding the current Hatteras – Ocracoke ferry route. It covers current and historical ridership data, user profiles based on a ridership survey conducted by the study team, results from a wait time analysis at the Hatteras ferry terminal, details on infrastructure at the Hatteras and Ocracoke terminals, environmental conditions in the ferry operating areas, the economic contribution of the ferry operations to the local economy, information on operating costs, a review of existing plans, and an analysis of peer systems.

A. Schedules

The Ferry Division currently varies the Hatteras-Ocracoke schedule seasonally, reflecting ridership demand, with fewer departures during the winter months and greater departures during the summer months. The summer schedule utilizes a fleet of 6 vessels to provide 36 round trips

NORTH CAROLINA FERRY SYSTEM

North Carolina
Ferry System 2015 Schedule

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Hatteras	Ocracoke
Jan. 1 – March 30, 2015 April 14– May 5, 2015 November 10– December 31, 2015 Departures	
5:00 a.m.	4:30 a.m.
6:00	6:30
7:00	7:30
8:00	8:30
9:00	9:30
10:00	10:30
11:00	11:30
Noon	12:30 p.m.
1:00 p.m.	1:30p.m.
2:00	2:30
3:00	3:30
4:00	4:30
5:00	5:30
6:00	6:30
—	7:30
8:00	—
9:00	9:30
—	10:30
11:00	—
Midnight	12:30 a.m.

Fare: Free
Crossing: 60 Minutes; Hatteras Inlet

Hatteras	Ocracoke
March 31—April 13, 2015 September 22-November 9, 2015 Departures	
5:00 a.m.	4:30 a.m.
6:00	6:30
7:00	7:30
8:00	8:30
8:30	9:30
9:00	10:00
9:30	10:30
10:00	11:00
—	11:30
11:00	—
11:30	12:30 p.m.
Noon	1:00
12:30 p.m.	1:30
1:00	2:00
—	2:30
2:00	—
2:30	3:30
3:00	4:00
3:30	4:30
4:00	5:00
—	5:30
5:00	—
5:30	6:30
6:00	7:00
6:30	7:30
8:00	8:00
9:00	9:30
11:00	10:30
Midnight	12:30 a.m.

Hatteras	Ocracoke
May 12– September 21, 2015 Departures	
5:00 a.m.	5:00 a.m.
6:15	6:10
7:20	7:25
8:35	8:30
9:00	9:45
9:15	10:10
9:40	10:25
10:00	10:50
10:45	11:10
10:55	11:55
11:20	12:05 p.m.
11:35	12:30
12:00 p.m.	12:45
12:20	1:10
1:05	1:30
1:15	2:15
1:40	2:25
1:55	2:50
2:20	3:05
2:40	3:30
3:25	3:50
3:35	4:35
4:00	4:45
4:15	5:10
5:00	5:25
5:30	6:10
5:45	6:45
6:20	6:55
6:35	7:30
6:45	7:45
7:20	8:00
8:05	8:30
8:15	9:15
9:15	9:30
10:45	10:30
Midnight	Midnight

B. Ridership

Figure B-1 illustrates the historical vehicular loadings on the Hatteras – Ocracoke route from 1999 to 2014, including the loadings for each of the three seasons. Key events that caused a decrease in ridership include:

- September 1999, Hurricane Floyd, Category 4 hurricane
- September 2003, Hurricane Isabel made landfall on the Outer Banks as a Category 2 hurricane
- November 2011, remnants of Hurricane Irene (August 2011), Category 3 hurricane
- November and December 2012, remnants of Super Storm Sandy (October 2012), Category 3 hurricane

This data shows a steady decline in Hatteras-Ocracoke ridership of approximately 20 percent from 1999 to 2012.

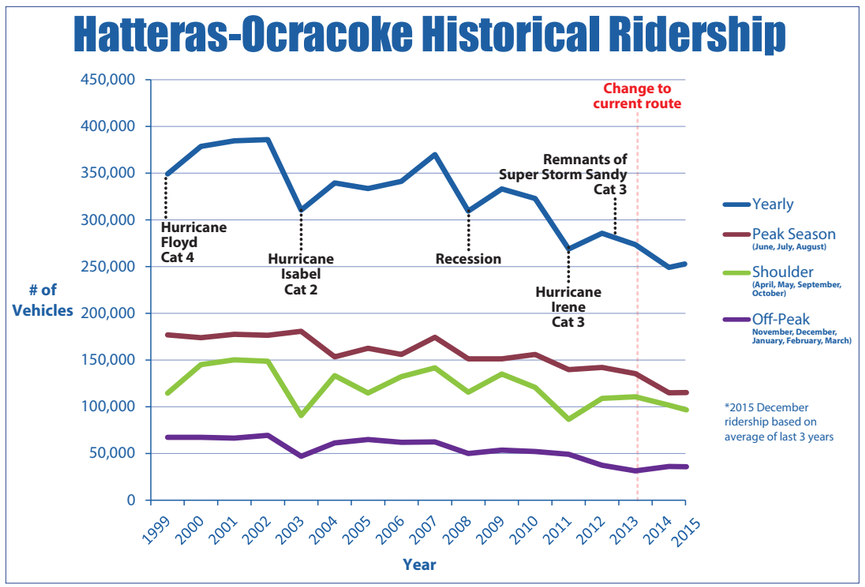
While this data indicates that overall ridership on the Hatteras-Ocracoke ferry has been decreasing, this overall decrease is consistent with the general trend of decreasing ridership on the ferry system. In the late 90s and early 2000s the ferry system was carrying between 1 and 1.2 million vehicles per year, but has now decreased to approximately 815,000 vehicles per year.

A more telling indicator of the effects of the switch to the longer route is the peak season ridership. This time period is most affected by the decrease in capacity, when many of the ferries are running with a full load during a large portion of the day. Between 2009 and 2013, ferry ridership decreased approximately 2.2 percent per year. Therefore, if the original route was being utilized in 2014 and 2015, the following volumes could be expected in the months of June, July, and August:

Year	Expected (vehicles)	Actual (vehicles)	Difference
2014	132,385	114,938	17,447
2015	129,459	118,532	10,927

The Ferry Division reports an average of 2.9 passengers per vehicle during the peak months, therefore this represents a loss of between 31,000 and 50,000 visitors to Ocracoke just during the peak months that could be attributed to the lower levels of service caused by the longer route.

Figure B-1



B. Ridership (continued)

Figures B-2 and B-3 show monthly vehicle and passenger ridership for the 2014-2015 fiscal year. The seasonality of traffic, particularly the difference in off-peak and peak ridership, is very apparent when viewing ridership at this level .

Figure B-4 shows passenger ridership for July of 2015. Of note in this figure is the variation in weekdays. This variation is primarily due to the schedule for rental properties in Hatteras. Turnover in rentals occurs on Saturday, so the majority of day trips occur several days after visitors to Hatteras arrive. Similarly, ridership declines on Friday, the day before checkout.

Figure B-2

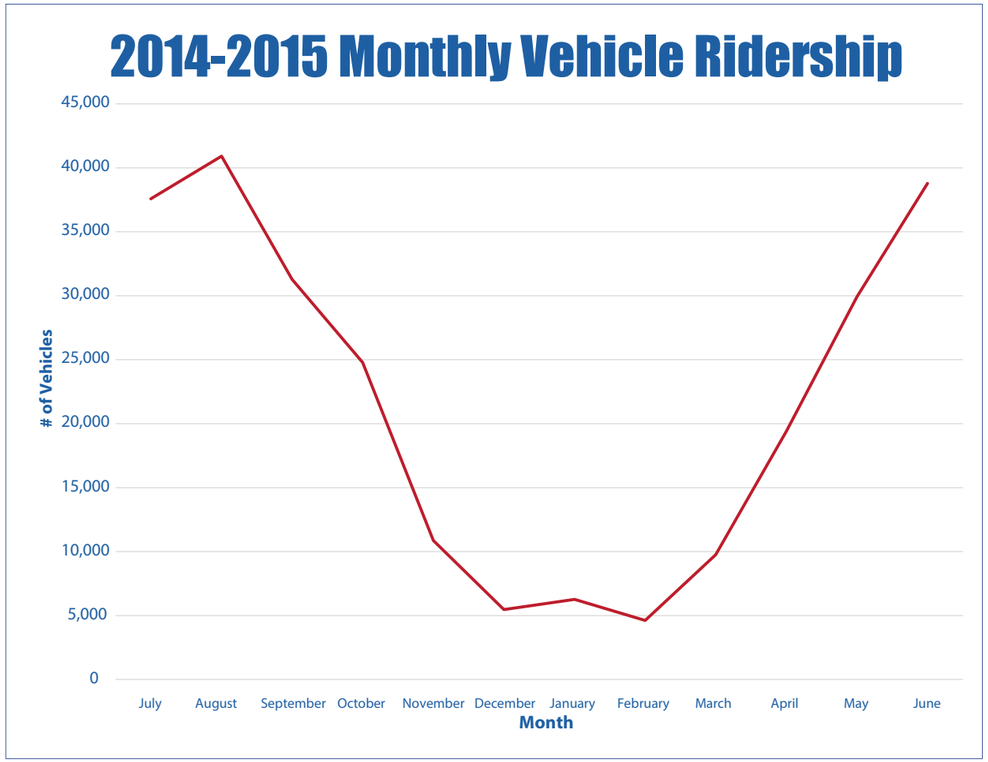


Figure B-3

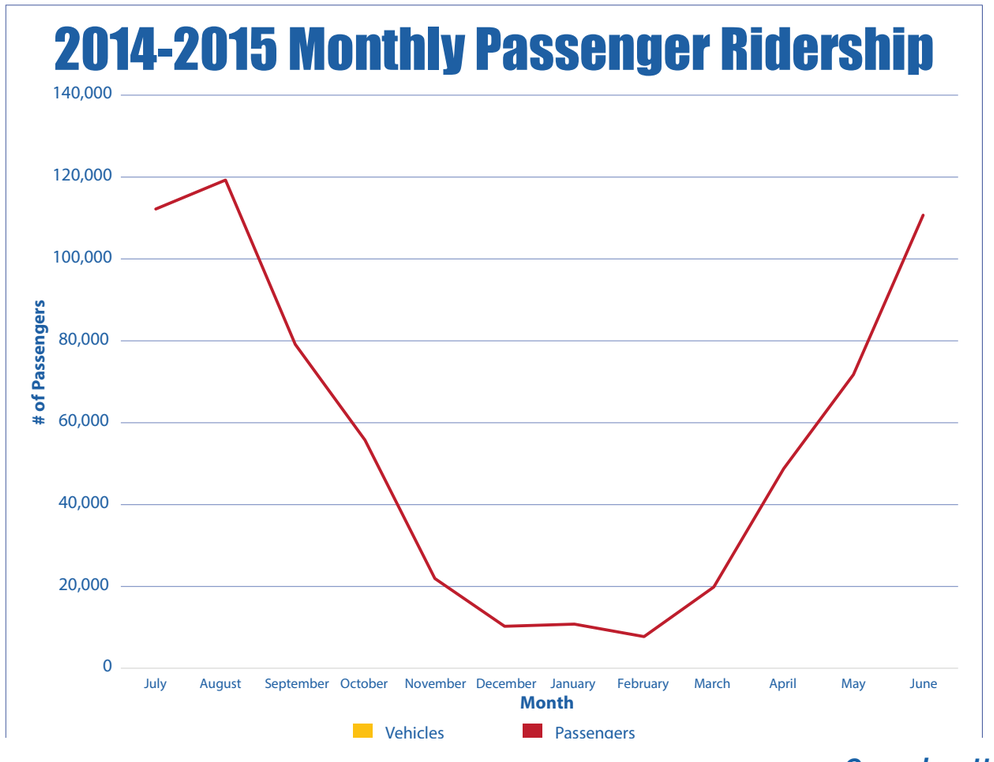
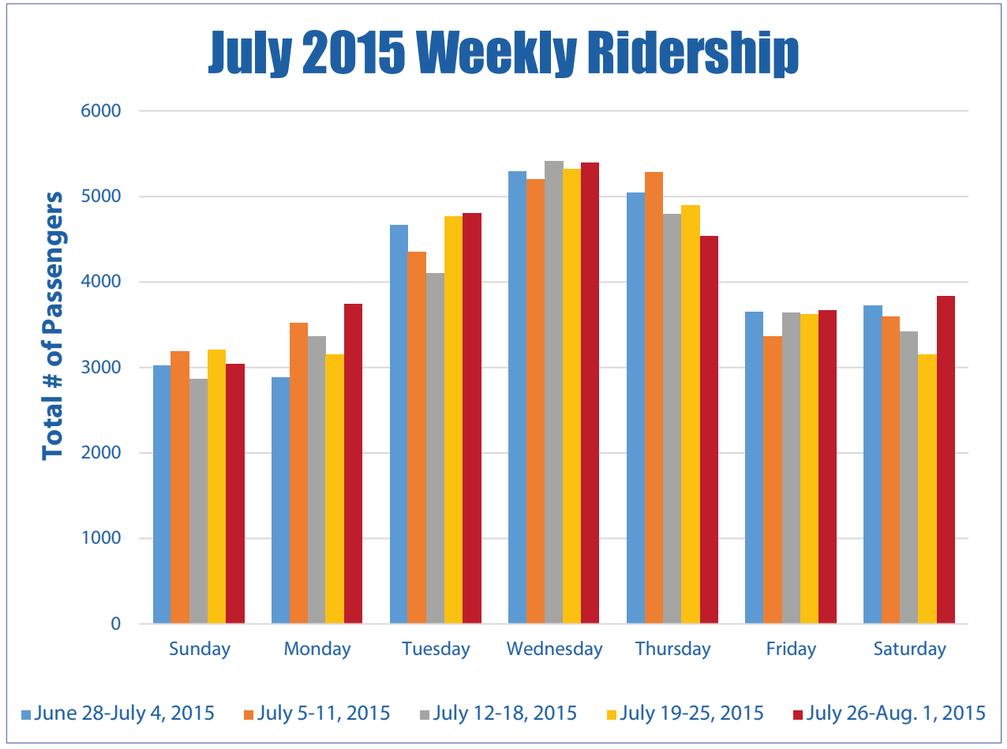
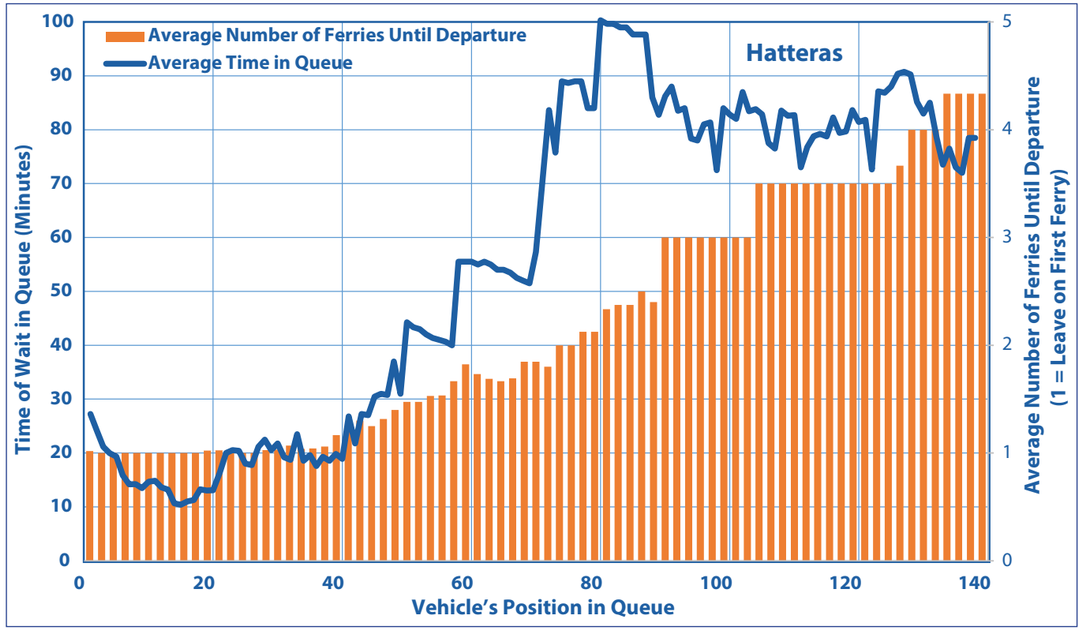


Figure B- 4



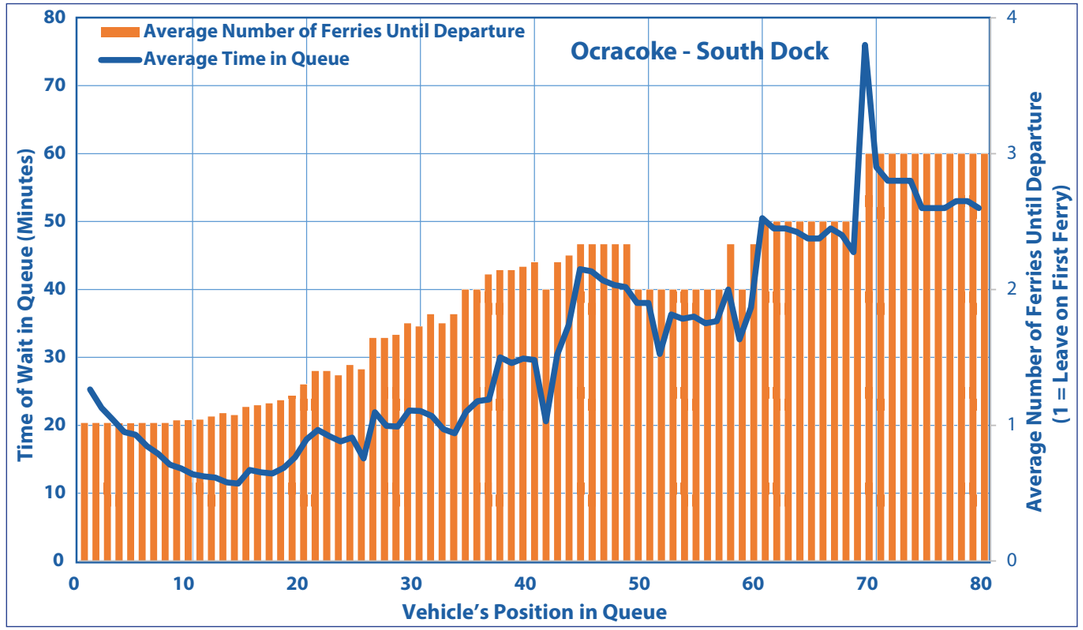
C. Wait Times and Unmet Demand

Figure C-1: Wait Time and Ferry Departures based on Vehicle Position in Queue at Hatteras



Source: ITRE

Figure C-2: Wait Time and Ferry Departures based on Vehicle Position in Queue at Ocracoke



Source: ITRE

Wait Time Study on Hatteras-Ocracoke Passenger Ferry Route

Wait times

A wait time study was conducted at each terminal on the Hatteras-Ocracoke route from June 11 to June 13, 2015 (6:30 AM on June 11 to 5:30 PM on June 13). For this study, the project team determined the wait time for each vehicle entering the queue at the terminals and evaluated how a vehicle's position in line would affect its wait time to board a ferry. The data demonstrated that a vehicle's initial number in the queue can be multiplied by 45 seconds to determine that vehicle's expected wait time (excluding the first dozen vehicles which are governed by their arrival time; R-squared of 0.87). For instance, vehicle 60 can expect to wait 45 minutes (60 vehicles x 45 seconds per vehicle).

The research team also analyzed how many ferries that vehicle would be required to wait for prior to making it through the line and getting onboard. Figure C-1 depicts the average wait time a vehicle experiences in the queue, based on its position. The blue line (on the left vertical axis) shows the average time in queue, while the vertical bars (on the right vertical axis) show the average number of ferries until departure. The exhibit also shows the average number of ferries a visitor sees depart before getting onboard.

An example of the details shown in the graph for vehicle number 100 (the 100th vehicle to enter the back of the waiting queue at the terminal) predict that the vehicle could expect to wait approximately 80 minutes before boarding a ferry and would likely depart on the third ferry. Figure C-2 displays similar information for Ocracoke's South Dock facility.

Unmet Travel Demand

During peak season there is sometimes a demand by tourists wishing to travel to Ocracoke that goes unmet by the current level of ferry service provision. This results in longer wait times and, in some instances, tourists abandoning their travel plans to visit Ocracoke. Among the 1,850 vehicles recorded at Hatteras waiting for the ferry to Ocracoke, 41 vehicles (2.2 percent) left the queue. Over the course of peak season in 2014, 57,428 vehicles traveled to Ocracoke from Hatteras. Assuming 2.2 percent of the total vehicles abandoned their trip (as demonstrated in the data collected) this results in approximately 1,273 vehicles not making the trip.

Approximately 9% of vehicles left the queue at Hatteras during the peak times. This loss of ridership directly results in lost visitor spending on Ocracoke.

However, the peak periods experience much higher wait times than off-peak times of the day. A total of 398 vehicles were present during the peak hours at Hatteras (Thursday from 8:55 AM to 2:25 PM). During that time period 37 vehicles (9.3 percent of the total) turned around and left the ferry terminal or left the queue. The queue spilled back beyond the range of the video cameras during a portion of the morning period, so the estimate of vehicles turning around is conservative. This loss of ridership directly results in lost visitor spending on Ocracoke.

D. Economic Activity

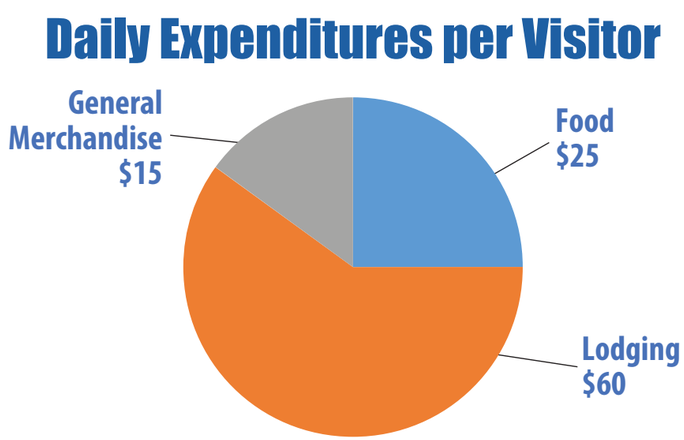
Introduction

North Carolina's Ferry Division is a key facilitator for economic activity in coastal communities. North Carolina ferries transport approximately 850,000 vehicles and two million passengers a year, making it the second largest state-run ferry system in the United States carrying visitors, residents, commuters, and school children.[1] The NCFS provides critical support for Ocracoke's economy, as the island is not served by any roads connecting to the mainland and transportation to the island is provided almost exclusively by ferry. There are three ferry routes that provide service to Ocracoke (Hatteras, Swan Quarter, and Cedar Island) with the Hatteras route transporting the majority of passengers (approximately 80 percent) to the island in 2014.

Economic Activity Supported

Ocracoke requires predictable and consistent ferry service to maintain a stable economy, and determining the relationship between ferry service provision and Ocracoke's economic activity was a component of this study. To estimate how ferry service supports economic activity, visitors using the Hatteras route were surveyed for their spending habits on Ocracoke Island and in the region. This route was chosen for surveys because it transports the vast majority of visitors to the island and is the focus of the overall study. Visitors were asked about lodging, food, and general merchandise expenditures that they may have made during their trip to Ocracoke. As Figure D-1 illustrates, the following daily expenditures were made by each person on average during the peak season:

Figure D-1



Source: ITRE

- $25 for food
- $60 for lodging
- $15 for general merchandise

Tourism expenditures directly support many businesses on the island and also contribute general economic activity for the larger economy of the island of Ocracoke. For example, an expenditure made at a restaurant directly supports wait staff earnings, indirectly supports the earnings of suppliers of food and beverages sold at that restaurant, and if the wait staff or food and beverage suppliers spend their earnings, it helps support the earnings of other workers on the island. For this study, survey data was paired with NCDOT ridership data and input into the Transportation Economic Development Impact System (TREDIS) to estimate the economic activity at the county level supported through tourism expenditures. Tourism expenditures supported approximately 850 jobs, $20 million in earned wages, and $32 million gross regional product for Hyde County in 2014 (see Figure D-2). In comparison, Hyde County's economy in 2014 consisted of approximately 2,230 jobs, $47.7 million in wages, and $58.4 million in gross regional product. [2]

Figure D-2: Hyde County Economic Activity Supported by Ocracoke Tourism Expenditures in 2014

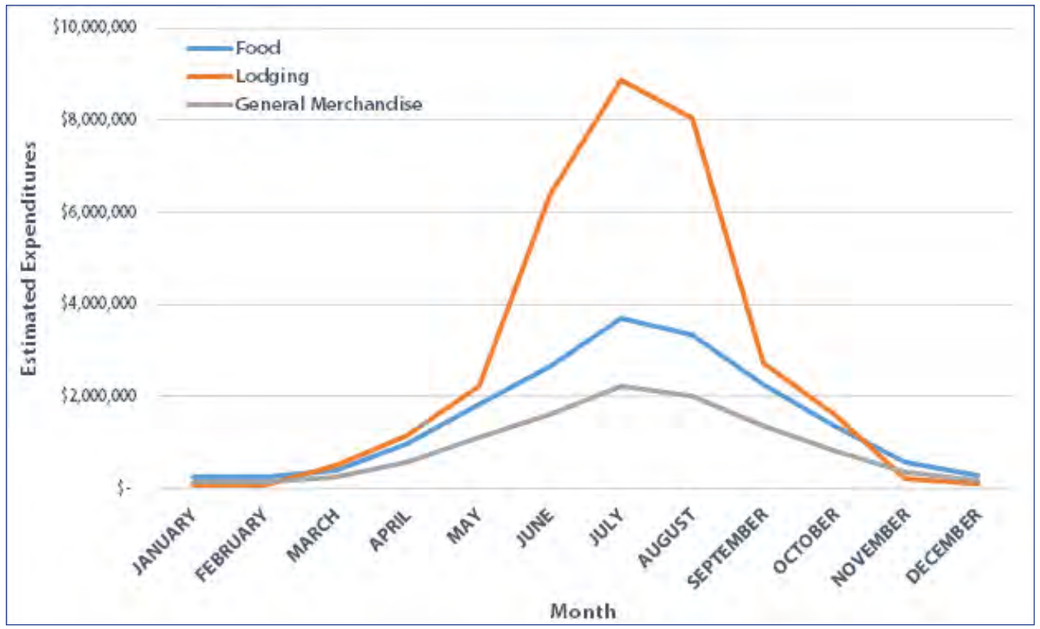
Jobs	Wages	Gross Regional Product
850	$20 million	$32 million

Source: TREDIS

Seasonality

Ocracoke island experiences "peak", "shoulder", and "off-peak" tourist seasons, where economic activity is greatest during peak season and lowest during off-peak season. Figure D-3 shows how seasonality affects the island's economic activity.

Figure D-3: Estimated 2014 Tourism Expenditures by Month



During peak season (June-August), food, lodging, and general merchandise expenditures were estimated to be approximately $38.9 million; during shoulder season (March-May and September-October) expenditures were approximately $19.2 million; and during off-peak season (November-February) expenditures were approximately $2.7 million.

As discussed in the previous section, assuming that 2.2 percent of vehicles totally abandoned their trip, this results in approximately 1,273 vehicles not making their trip, or approximately 3,700 people, which equates to approximately $370,000 in lost tourism expenditures over the course of a season just from visitors who arrived at the terminal planning to go to Ocracoke and then decided not to make the trip.

[1] "About the Ferry Division," NCDOT, http://www.ncdot.gov/ferry/about/ [2] North Carolina Department of Commerce employment levels were used as inputs into TREDIS.

E. Vessels

The NCFS's 21 vessels consist of five Sound Class vessels that serve the two longest ferry routes:

1. Cedar Island – Ocracoke
2. Swan Quarter – Ocracoke

Nine River Class vessels serve four river crossings:

1. Currituck – Knotts Island
2. Bayview – Aurora
3. Cherry Branch – Minnesott Beach
4. Southport – Fort Fisher

Seven vessels serve the Hatteras – Ocracoke route.

Sound Class vessels have a vehicle capacity of approximately 50 vehicles, River Class vessels have a vehicle capacity of approximately 40 vehicles, and Hatteras class vessels have a vehicle capacity of approximately 30 vehicles. Hatteras and River Class vessels are often used interchangeably on the Hatteras-Ocracoke ferry route based on demand. The vessel names, classification, and ages are listed at right.

	Name	Age (years)	Capacity (vehicles)
Sound Class			
	Silver Lake	50	50
	Carteret	26	50
	Cedar Island	21	50
	Swan Quarter	4	46
	Sea Level	3	50
River Class			
	Governor James B. Hunt	31	20
	Governor Daniel Russell	22	38
	Southport	19	38
	Neuse	17	38
	Floyd Lupton	16	38
	Ft. Fisher	15	38
	Stanford White	12	38
	Croatoan	12	38
	Hatteras	9	38
Hatteras Class			
	Kinnakeet	26	26
	Ocracoke	25	26
	CapePoint	25	26
	Chicomacomico	25	26
	Frisco	25	26
	Roanoke	22	26
	Thomas Baum	20	26

River Class Ferry

Hatteras Class Ferry

Sound Class Ferry

F. Facilities

Shipyard

The Manns Harbor shipyard is the largest state-owned and operated shipyard in the U.S. and is located on 17.25 acres along the Croatan Sound in Manns Harbor, NC. The shipyard is totally self-sufficient with its own electrical generating power plant and water system, and has the capabilities to work around the clock in any weather conditions. The shipyard is capable of conducting all maintenance, from basic dry docking to making any repairs required to meet U.S. Coast Guard regulations. The facility can also paint a vessel from top to bottom.

F. Facilities (continued)

Walkway to Hatteras Landing

Hatteras Terminal

Interior of Hatteras Terminal

Hatteras Ferry Terminal

The Hatteras Ferry Terminal is located on the southern end of Hatteras Island. The terminal consists of two main buildings. The terminal facility houses a small waiting area with vending machines, restroom facilities, an ATM, and an informational section. The terminal also houses administrative offices and crew facilities. The second building houses a maintenance shop. A pedestrian pathway provides access to the adjacent Hatteras Landing shopping center. Passengers are separated from the secure portions of the facility by a chain link fence. Approximately 90 parking spaces are located immediately adjacent to the terminal for employees and short-term visitors. Approximately 30 additional spaces are located within the secured area on the water side of the terminal, adjacent to the maintenance facility. The terminal provides berths for 8 vessels, and docks for 3 vessels for loading/unloading.

F. Facilities (continued)

Ocracoke Silver Lake Terminal

The Ocracoke Silver Lake Terminal is located on the southern end of Ocracoke Island immediately adjacent to Silver Lake. The terminal currently serves the sound class ferries going to/from Swan Quarter and Cedar Island and consists of two main buildings. Similar to the Hatteras Terminal, the terminal facility houses a small waiting area with vending machines, restroom facilities, and ATM, and an informational section. The second terminal building houses crews quarters and administrative facilities. Approximately 16 parking spaces are provided immediately adjacent to the terminal building. The terminal provides a dead slip for one sound class ferry and docks for two vessels for loading/unloading. The Ocracoke Silver Lake Ferry Terminal is immediately adjacent to the Cape Hatteras National Seashore Ocracoke Visitor Center and public docks.

Ocacoke Terminal

South Dock Restroom Facility

Ocracoke South Dock Terminal

The Ocracoke South Dock Terminal is located on the northern end of Ocracoke Island. The terminal consists of two main buildings. On the south side of the terminal is restroom facility with vending machines and a small amount of outdoor seating. The second building is a small facility for Ferry Division staff and crew. Approximately 25 parking spaces are located next to the restroom facilities. The terminal provides berths for two vessels, and docks for three vessels for loading/unloading.

Vehicles queueing at South Dock

G. Environmental Conditions

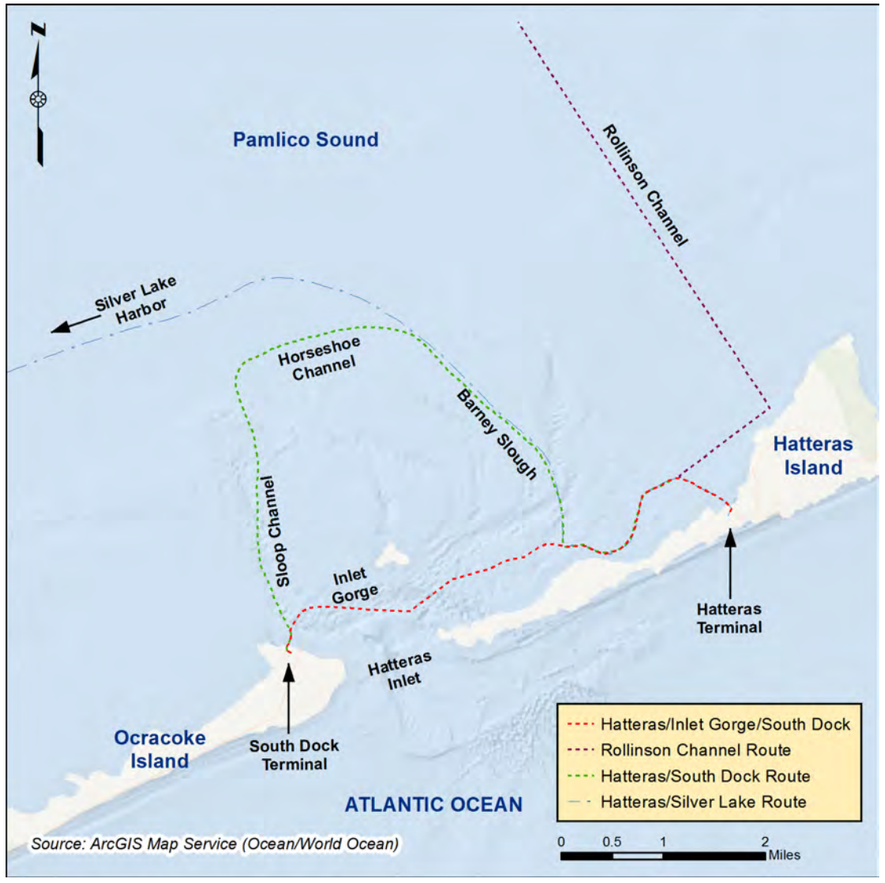
Existing Channels

Hatteras/Inlet Gorge/South Dock

Historically, vessel traffic between the Hatteras Ferry Terminal and Ocracoke's South Dock Ferry Terminal transited an extension of Rollinson Channel, paralleling the western shoreline of Hatteras Island, crossing Hatteras Inlet through Inlet Gorge and on to South Dock. Recreational boaters and commercial vessels headed to the Atlantic from Hatteras would transit the Inlet Gorge and then east to the Atlantic, leaving the remainder of the channel to Ocracoke primarily for state vehicle ferry traffic.

Maintenance dredging of the Ocracoke Ferry Terminal marine basin and approach channel to a depth of 12 feet and a width of 150 feet falls under the responsibility of the State of North Carolina. The U.S. Army Corps of Engineers (USACE) maintains the approach and the boat basin at Hatteras Harbor six feet deep and approximately 150 feet by 1,200 feet. The Rollinson Channel extension described above falls under the jurisdiction of the USACE and was maintained to a depth of 10 feet and a width of 100 feet.

Natural coastal processes have caused an accretion of sand on the northeastern end of Ocracoke Island and erosion of the southwestern tip of Hatteras Island. Major storms have resulted in avulsion, the dramatic widening of Hatteras Inlet, and the subsequent widespread shoaling of the Inlet Gorge to Hatteras Channel.



Horseshoe Channel

After numerous attempts to reopen the channel failed, the channel was abandoned in favor of a natural channel coursing in a horseshoe-like fashion north through Barney Slough towards Pamlico Sound and then returning south via Sloop Channel to the South Dock Terminal.

The benefits of the new horseshoe channel are that much of it remains open without the need for constant maintenance dredging. However, due to its utilization for not only for the state vehicle ferries but also recreational boaters and commercial vessels wishing access to and from the Atlantic Ocean, Horseshoe Channel is heavily trafficked; the route requires a much longer transit and is circuitous. Ferry boat speeds are reduced due to the need to slow when passing competing vessel traffic, particularly in the narrow reaches of the channel, including those near markers 12A, 13A, 14 and 15.

Hatteras/Pamlico Sound

Vessel access from Hatteras Island to Pamlico Sound is via Rollinson Channel, a USACE maintained 12-foot deep and 100-foot wide channel running from east/west from Hatteras to the sound. With its east/west extension through Inlet Gorge, Rollinson Channel provided good access between the islands, the Atlantic and the sound for commercial and recreational vessels. In addition to the loss of navigable waters from Inlet Gorge, recent surveys of the north/south portion of the channel conducted by the USACE found depths as shallow as 5 feet, indicating maintenance dredging is needed.

The benefits of this portion of the Rollinson Channel are its straight and direct course to Pamlico Sound and, after maintenance dredging, accessibility for deeper drafting vessels. It also provides an alternative to the Horseshoe Channel for accessing the sound, thereby further dispersing vessel traffic.

Hatteras/Silver Lake Route

Traditionally, vessel traffic between Hatteras and Silver Lake was either accomplished via the oversea, Atlantic Ocean transit or by traversing the calmer waters of Pamlico Sound. Due to the extreme shallows near Ocracoke Island, boaters must first transit to the sound, either via Rollinson Channel, Barney Slough, or Sloop Channel. Once in Pamlico Sound, most vessel types are accommodated with water depths of 13 feet or greater. Access into Silver Lake is federally maintained, including a 12-foot-deep marine basin, a 12-foot-deep by 60-foot-wide entrance channel and a 12-foot-deep by 150-foot-wide channel across Big Foot Slough bar just inside Ocracoke Inlet.

Submerged Aquatic Vegetation

Submerged aquatic vegetation or SAV is generally defined as submerged lands that are vegetated with one or more species of submerged aquatic vegetation or have been vegetated by one or more species of submerged aquatic vegetation within the past 10 annual growing seasons, and that meet the average physical requirements of water depth (six feet or less), average light availability (secchi depth of one foot or more), and limited wave exposure that characterize the environment suitable for growth of SAV. (NC Marine Fisheries Commission (NCMFC) (15A North Carolina Administrative Code (NCAC) 03I.0101(4)(i)). The NC Division of Marine Fisheries (NC-DMF) and Atkins mapped the coastal submerged aquatic vegetation, portions of which are shown in Figures G-4 to G-6.

SAV is an important indicator of environmental health because of its sensitivity to aquatic stressors. Factors affecting SAV distribution include the hydrodynamic characteristics of water velocity, depth, waves and the water's ability to transport sediments. Boating operations cause direct impacts to SAV as a result of increased wave action, propeller damages, and by reduced light due to the suspending of bottom sediments and man made overhangs and structures (i.e. piers). Indirectly, the construction and maintenance of channels by dredging may suspend sediments leading to decreased light transmissivity and burial of the vegetation. Consequently, the mapping of SAV allows for their avoidance during the planning and design of new vessel channels and marine basins.

As illustrated in the figures, the existing and proposed transit routes avoid SAV beds, therefore, vessel traffic should cause minimal adverse effects. Dredging operations, if conducted with the appropriate methodologies, can minimize potentially damaging transport and deposition of sediments on the beds.

G. Environmental Conditions (continued)

Marine Basin Benthics

Benthic habitat types are sampled for the presence of shellfish and SAV. Estuarine benthic habitat types and classified as soft, firm or hard; vegetated or non-vegetated; and with or without shell. This work was conducted by the North Carolina Division of Marine Fisheries. They are further broken down by whether or not they lie within zones influences by tides. These classifications help delineate habitats for SAV and productive shellfish.

- Intertidal Hard Vegetated w/o Shell
- Intertidal Hard Non-vegetated w/o Shell
- Subtidal Hard Vegetated w/o Shell
- Subtidal Hard Non-vegetated w/o Shell
- Subtidal Firm Non-vegetated w/o Shell
- Subtidal Firm Vegetated w/o Shell
- Subtidal Soft Non-vegetated w/o Shell

Substrate within subtidal zones is located below mean low low water, hence, is continuously covered with tidal water, whereas intertidal zones lie above, where they are flooded and exposed by tides.

Benthic habitat within the Silver Lake system at Ocracoke are non-vegetated and without shell (Figure G-5). This is the case for both the intertidal as well as the subtidal zone. Consequently, it may be concluded that Silver Lake does not provide habitat conducive to productive shellfisheries and submerged aquatic vegetation.

Similarly, benthic habitat within the Hatteras Ferry Terminals marine basin are also non-vegetated and without shell (Figure G-6).

Figure G-1

Figure G-2

Figure G-3

Figure G-4

Figure G-5

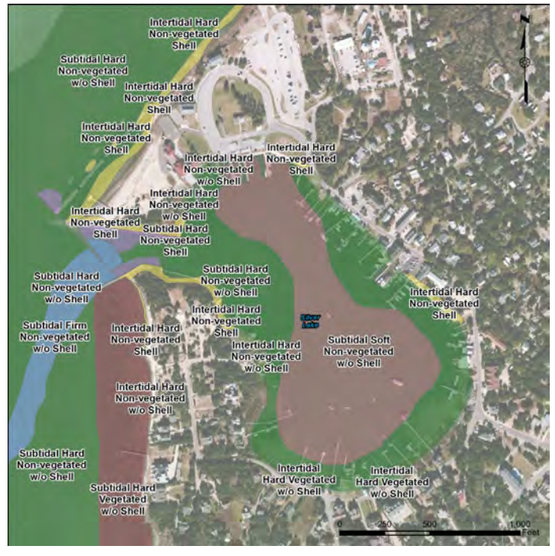
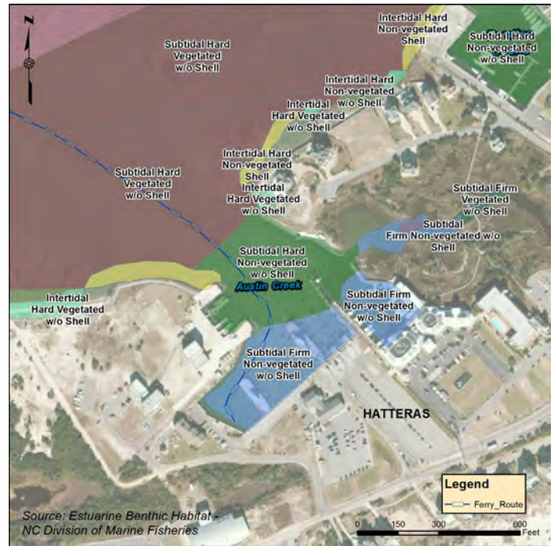


Figure G-6



H. Existing Plans

There are a multitude of planning documents at the statewide and local level that could potentially affect the options for increased ferry service between Hatteras and Ocracoke. These plans are detailed below:

Statewide Plans

NCDOT Strategic Transportation Initiative Prioritization

Several projects are included in the Strategic Transportation Initiative Prioritization 3.0:

- Replacement of the M/V Baum at $12,000,000
- Funding of $85,500 for 6 LTV and 3 trams to support Hyde County Transit in Ocracoke
- Funding of $7,600 for 2 shelters and 20 benches to support Hyde County Transit in Ocracoke
- Construction of a tug for statewide support at $1,725,000

NCDOT 2040 Transportation Plan

The NCDOT 2040 Transportation Plan graded the Ferry Division's performance in 2012 as an LOS C for statewide and regional tier services for mobility and health, based on the system's ability to serve passenger demand and to meet safety and environmental regulations. The report lists the Ferry Division's 30-year needs at $1.59 billion and states that to accommodate future ridership increases, particularly in peak periods, the needs include new vessels for expanded service or vessel replacements with larger capacity terminal infrastructure improvements.

Dare County Plans

The Hatteras ferry terminal is located within Dare County. The following Dare County plans could potentially affect the options for future ferry service:

Dare County Land Use Plan

The NC 12 frontage in Hatteras Village has been designated with a transition corridor classification along those portions of NC 12 zoned C-2H on the Hatteras zoning map (see Figure H-1). Commercial uses are small-scale developments serving the year-round population with some commercial development aimed at the seasonal visitors, especially near the NCDOT ferry facilities at the terminus of the village.

Dare County Comprehensive Transportation Plan

The Dare County Comprehensive Transportation Plan (CTP) includes several recommendations relevant to this study.

The CTP recommends a passenger ferry park and ride facility along NC 12 near the existing ferry dock location in order to accommodate individuals traveling via a passenger ferry from Hatteras Island to Ocracoke Island (Figure H-2).

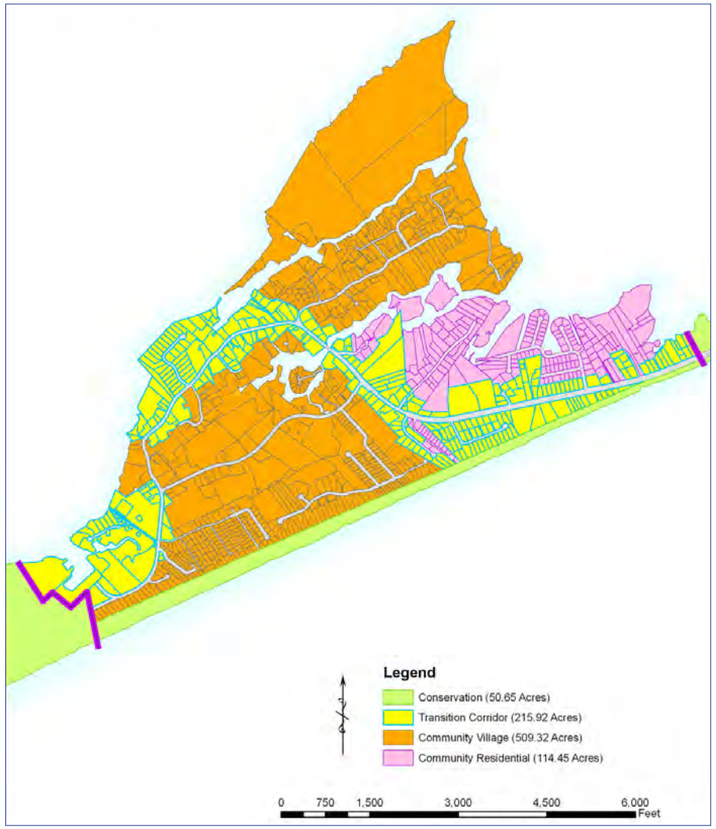


Figure H-1 (Dare County – 2009 Land Use Plan Update pdf page 241)

The CTP also recommends bicycle, pedestrian, and multi-use path improvements along NC 12 in the vicinity of the Hatteras Ferry Terminal and along the entirety of Eagle Pass Road.

Hyde County Plans

Ocracoke Island is located within Hyde County. The following Hyde County plans could potentially affect the options for future ferry service:

Hyde County Transit Community Transportation Service Plan

The Hyde County Non-Profit Private Transportation Corporation, doing business as Hyde County Transit (HCT), is a non-profit public transit network headquartered in Swan Quarter, North Carolina. HCT has provided public transportation services to Hyde County residents since 1987.

Ocracoke Island services by HCT include the following:

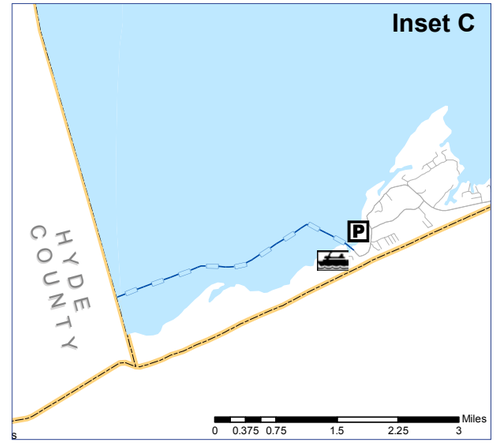


Figure H-2

- Once a month from Ocracoke Island to Avon. This service is free to anyone over the age of 60 and available to all else for $3.20 round trip.
- Once a month from Ocracoke to the northern Outer Banks for the day. This trip is also free to citizens over the age of 60 and $5.00 round trip for everyone else.

The proposed Five-Year plan recommendations focus mainly on improving the efficiency and quality of existing HCT services as well as expanding its services by focusing on increasing rural general public ridership, employment-related ridership, service to the elderly and youth. Hyde County's CTSP Five-Year Service and Implementation Plan calls for:

- Identifying in-county coordination opportunities including coordination with NCDOT Ferry Division for seasonal riders.
- Reevaluating the trolley/tram service concept on Ocracoke Island. Implementation would include a park and ride facility on Hatteras Island and modified beach route concept with potential funding coming from the Livability Initiative Transportation Community and System Preservation Program, shared farebox revenue with NCDOT Ferry Division (would require legislative approval), and public/private partnerships and sponsorships. This project is slated in the CTSP to be beyond 2018. The CTSP estimated the capital costs of such a service to be approximately $540,000 and the operating costs of $237,000 annually.

Hyde County Comprehensive Transportation Plan

The Hyde County Comprehensive Transportation Plan (CTP) includes several recommendations relevant to this study.

The CTP recommends a 4' paved shoulder for bicycle on NC 12 from Old Beach Road to the Silver Lake Ferry Terminal. However, the CTP does acknowledge that due to right of way constraints it could be difficult to improve this facility.

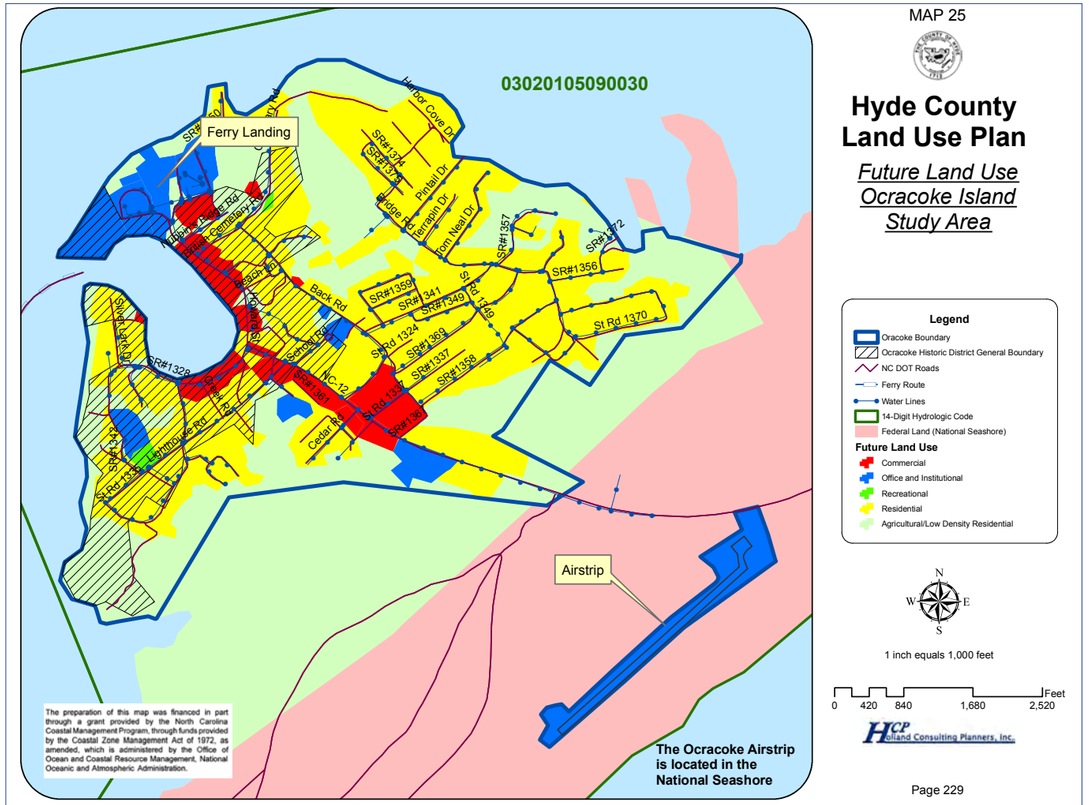


Figure H-3

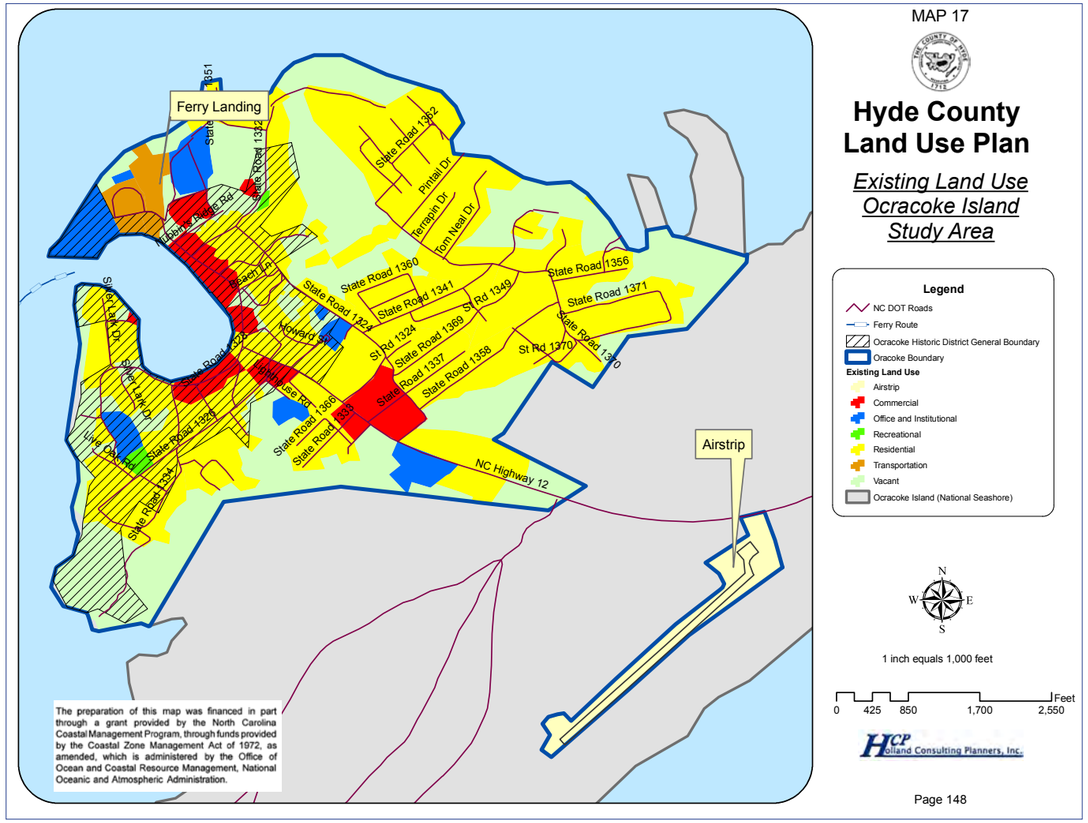


Figure H-4

The CTP also recommends sidewalks along NC 12 from Lighthouse Road to Old Beach Road.

The CTP recommends a multi-use path on NC 12 from the Pony Pen to the South Dock Ferry Terminal, to tie into the existing multi-use path.

Finally, the CTP identifies the public's interest in a "high speed ferry" in the recommendations section, but does not provide recommendations for the service, stating that "the ridership will need to justify the cost."

Hyde County CAMA Land Use Plan

The Hyde County CAMA Land Use Plan establishes the vision for Ocracoke Island as being "a community that ensures livability and economic viability by offering the discerning vacationer a preferable alternative to the over commercialized beach destinations while providing improved attention to Ocracoke residents". One of the missions of county government outlined in the plan is to facilitate and support cooperative efforts with the community, NPS, and DOT to maintain access to the Island and provide necessary amenities.

The Hyde County CAMA Land Use Plan includes recommendations for Ocracoke Village as shown in Figure H-3. For reference, the existing land use map is shown in Figure H-4.

The land use plan calls for the redevelopment of the area around the Silver Lake Ferry Terminal to office and institutional uses from the current transportation uses as well as the expansion of commercial uses along Silver Lake and NC 12.

Albemarle Regional Bicycle Plan

The 2012 Albemarle Regional Bicycle Plan included several recommendations in the Hatteras and Ocracoke areas as shown in Figure H-5. These recommendations are generally in line with the Comprehensive Transportation Plans of Dare and Hyde Counties. The study does recommend that the Albemarle RPO complete a study examining bicycle and pedestrian access to the Hatteras – Ocracoke Ferry in the 2015-2018 timeframe.

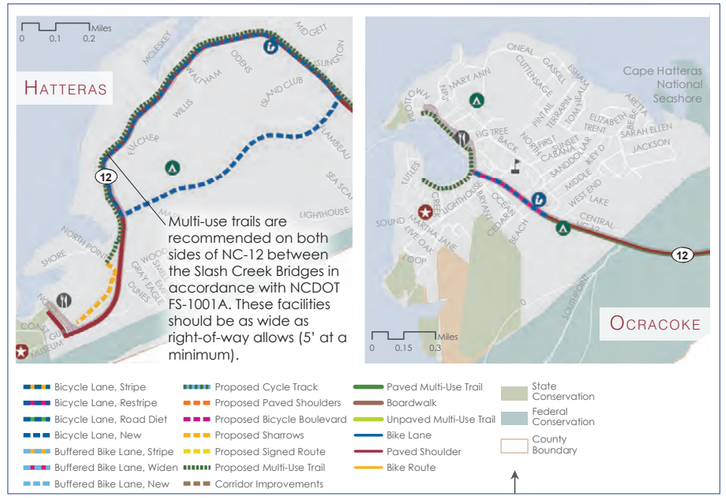


Figure H-5

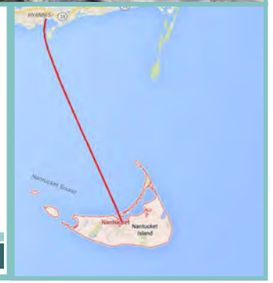
I. Peer Systems

The study team surveyed eight existing passenger ferry operations to gain insight into their operating characteristics. The results are summarized below.

Steamship Authority
Hyannis, MA to Nantucket, MA

Cost	$69 (round trip)
Distance	26 miles
Time	60 minutes

Parking lots with free shuttle to terminal
Snack bar on vessel
First sailing (peak period): 8:15am
Last sailing (peak period): 9:45 pm
Number of daily round trips (peak month): 5



King County Water Taxi
Vashon Island, WA to Seattle, WA

Cost	$5.50 (one-way)
Distance	7 miles
Time	22 minutes

Free parking near terminal
Vending machines in terminal; restaurant near dock
First sailing (peak period): 5:30 am
Last sailing (peak period): 6:58 pm
Number of daily round trips (peak month): 6

Blue & Gold Fleet
San Francisco, CA to Angel Island, CA

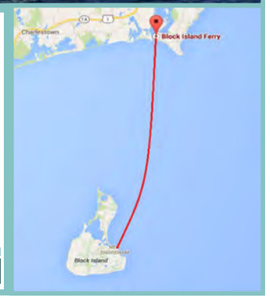
Cost	$18 (round trip)
Distance	5 miles
Time	25-40 minutes

24/7 parking garage (capacity 900)
Snack bars on vessel and Pier 41
First sailing (peak period): 9:45 am
Last sailing (peak period): 4:30 pm
Number of daily round trips (peak month): 3

Block Island Ferry
Point Judith, RI to Block Island, RI

Cost	$12.90 (one-way)
Distance	15 miles
Time	30 minutes

Parking across street
Full concession stands on vessel
First sailing (peak period): 7:15am
Last sailing (peak period): 7:35 pm
Number of daily round trips (peak month): 6



Blue & Gold Fleet
San Francisco, CA to Sausalito, CA

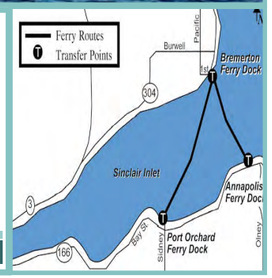
Cost	$11.50 (one-way)
Distance	5 miles
Time	20-25 minutes

24/7 parking garage (capacity 900)
Snack bars on vessel and Pier 41
First sailing (peak period): 9:45am
Last sailing (peak period): 8:40 pm
Number of daily round trips (peak month): 5

Kitsap Foot Ferry
Bremerton, WA to Port Orchard, WA

Cost	$2 (one-way)
Distance	2 miles
Time	12 minutes

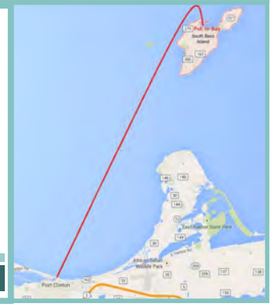
Paid parking available downtown Port Orchard
First sailing (peak period): 4:30 am
Last sailing (peak period): 8:45 pm
Number of daily round trips (peak month): 33



The Jet Express
Port Clinton, OH to Put-in Bay, OH (South Bass Island)

Cost	$18 (one-way)
Distance	12.5 miles
Time	20 minutes

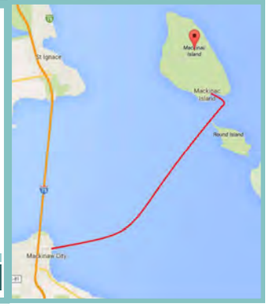
Parking adjacent to dock with attendant on duty
Bar at dock; restaurants on island
First sailing (peak period): 8:45am
Last sailing (peak period): 12:15 am
Number of daily round trips (peak month): 21



Star Line
Mackinaw City, MI to Mackinac Island, MI

Cost	$25 (round trip)
Distance	7 miles
Time	18 minutes

Free day and overnight parking
Restaurants near terminal
First sailing (peak period): 7:30am
Last sailing (peak period): 12:00 am
Number of daily round trips (peak month): 24



Provincetown III test run, May 4, 2015

2. Public engagement

A. Steering Committee

The Ferry Division of North Carolina Department of Transportation (NCDOT) assembled a Steering Committee (SC) comprised of representatives from NCDOT and other local and regional government and planning agencies.

The Steering Committee is comprised of the following members:

- Ed Goodwin, Director, NCDOT Ferry Division
- Jed Dixon, Deputy Director, NCDOT Ferry Division
- Sterling Baker, Division Maintenance Engineer, NCDOT Division 1
- Cheryl Leonard, Assistant Director, NCDOT Mobility Development – Eastern Region
- Lauren Blackburn, Director, NCDOT Bicycle and Pedestrian Division
- Bill Rich, County Manager, Hyde County
- Patrick Norman, Director, NCDOT Transportation Planning
- Keith Weatherly, Deputy Secretary, Transit

Steering Committee Meeting #1

The Steering Committee's kickoff meeting was held on April 1, 2015. Goals and scope of the study were reviewed. Brief discussion took place on study efforts that are currently underway such as the business survey and analysis of historical vehicular demand.

Final details and expectations for the public meetings to take place May 4 and 5, 2015 were discussed and several action items developed to ensure the success of this first public outreach.

Timing and method for disseminating information on the activities of the SC were discussed. Release of information must be coordinated through the NCDOT communications office to ensure consistent message.

Determination of unmet demand of ferry traffic due to the new operating route was a concern. NCDOT does not track queue wait times or cars that may turn away due to long wait times. Cameras at the ferry terminals will be used to try to capture this information.

A copy of the meeting minutes can be found in Appendix A.

Steering Committee Meeting #2

The second Steering Committee meeting was held on June 3, 2015. This meeting was used to mainly discuss the business and general survey responses, the ferry trial run results, and options for the terminal and future transit services. The vision and goals for this project were also reviewed and discussed. It was determined that a multi-modal service was needed to support the visitors coming to Ocracoke.

Steering Committee Meeting #3

On August 11, 2015, the third Steering Committee meeting was held. During this meeting, the five potential route options were reviewed. A 20-year timeline was determined for implementing the passenger vessel system. The capital and operating costs and the revenue were discussed. The upcoming steps were determined during this meeting which including meeting with the Park Service and the Graveyard of the Atlantic Museum. Additional upcoming steps to take are to develop cost estimates for both Hatteras and Ocracoke, as well as developing funding strategies and prioritization.

Steering Committee Meeting #4

The fourth steering committee meeting was held on February 10, 2016. This meeting included a review of the final report as well as the prioritization, implementation, and business plan elements of the plan.

B. Public Meetings

Public meetings were an integral part of the study process and allowed members of the public to interact one-on-one with the study team. Two sets of public meetings were held during the study, with each set including a meeting on Hatteras and another on Ocracoke.

First Public Meetings

A pair of public meetings was held on Hatteras and Ocracoke in early May of 2015 respectively. In conjunction with the public meetings, a trial run of the passenger ferry Provincetown III was conducted to determine how a vessel of a similar design would operate in the area between Hatteras and Ocracoke. Public tours of the Provincetown III were also conducted on both Hatteras and Ocracoke.

The public meeting on Hatteras was held at the Graveyard of the Atlantic Museum on May 4, 2015, from 5:00 to 7:00 p.m. There were 18 members of the public in attendance for this meeting. The public meeting on Ocracoke was held at the Ocracoke School on May 5, 2015, from 5:00 to 7:00 p.m., and 20 members of the public were in attendance. At these meetings, a summary of the problem was presented where the effects of Hurricane Sandy have caused shoaling in the Hatteras Inlet necessitating a change in the route of the Hatteras-Ocracoke ferry to a longer route. The current issues surrounding the impact of decreased ferry service between Hatteras and Ocracoke were also presented and which are well known to the area public. The goals and objectives of this project and a vision for the ferry user experience were shared with area residents and business owners.

Feedback from the public was solicited at these meeting in several forms. Business cards were handed out with the link to two online surveys: the Business Owner Survey for Ocracoke business

owners and a more general public comment survey covering issues related to tourism on Ocracoke Island. In addition, a paper copy of the public comment form was available which could be completed at the meeting and turned in for manual entry into the online survey.

Also discussed was the future involvement of the local communities of Hatteras and Ocracoke to develop ideas for the pedestrian, bicycle, and supportive transit service that will be needed to realize the established vision. Overall, there was widespread desire to return to the original route, but the majority of participants realized that attempts to dredge the channel have been expensive and futile. Many participants stated the desire to improve the ferry service, but also for Ocracoke to be a destination for people who appreciate the beauty, quiet, and history of the island.

Provincetown III

The NCDOT Ferry Division arranged a trial run of the Provincetown III owned by Bay State Cruise Company to coincide with the public meetings on Hatteras and Ocracoke. The Provincetown III is an aluminum hulled diesel-powered catamaran passenger vessel. It is 98 feet long and 30 feet wide with a maximum draft of 5 feet. It is capable of speeds up to 28 knots and can carry 149 passengers with a crew of three, including one captain and two deckhands. It is currently used to provide passenger ferry service from Boston to Provincetown, Massachusetts, during the summer months. The vessel was open to the public for tours from 4:00 to 7:00 p.m. Staff from Bay State Cruise Company were available for questions.

Second Public Meeting

The second pair of public meetings was held on August 31 and September 1, 2015, on Ocracoke Island and Hatteras Island respectively. The public meeting on Ocracoke was held at the Ocracoke Community Center on August 31, 2015, from 5:00 to 7:00 p.m and 40 members of the public were in attendance. The public meeting on Hatteras was held at the Graveyard of the Atlantic Museum on September 1, 2015, from 5:00 to 7:00 p.m and 18 members of the public were in attendance. The purpose of these meetings was to share the findings from the alternatives analysis, the recommendations for future passenger ferry service, and the proposed timeline for implementation. Feedback from the public was solicited verbally and through comment forms that could be completed at the meeting or returned to the study team after the meeting.

Overall, attendees at this set of meetings supported the idea of the passenger ferry and realize that going back to the original route is not feasible at this time. However, the majority of attendees do wish to return to the original route as environmental conditions permit. One of the main concerns attendees had with the passenger ferry is that Ocracoke may lose its small town feel. Nevertheless, most people want tourism to increase on the island and think more public restrooms are needed for visitors. Other amenities such as water fountains, benches, sidewalks, a boardwalk, public transportation, and parking for golf carts at popular sights were also suggested. While many people want to get the original route back, a passenger ferry from Hatteras to Silver Lake has the most support from the public. Attendees stressed that it is very important for everything to be ready when the passenger ferry has its first run so that it does not start out with a bad reputation. Some people feel that a later departure time should be considered so that tourists can experience the nightlife on the island. People also think that there should be a discounted rate for children riding the passenger ferry so that it is not too expensive for a whole family.

Online and Social Media

NCDOT developed and maintained a Passenger Ferry Feasibility Study website that provided information on the ferry study. Public meetings and other information were also distributed through the Ferry Division's Twitter and Facebook pages and through multiple news releases.

C. Ocracoke Island Business Survey

As part of the public engagement for this study, business owners with businesses located on Ocracoke Island were invited to complete a survey about the impact of the recent ferry service changes on their businesses. Seventy-five business owners completed the survey.

Business owners reported that longer wait times for ferry transport deter visitors from coming to the island. Almost all of survey respondents (96 percent) reported that long wait times at ferry docks are a major challenge to their business. Many participants reported that they have seen many potential visitors turn around at the Hatteras ferry dock upon discovering that it would be at least a two hour wait to board a ferry. As one business owner stated, "*they turn around and leave, frustrated and probably not ever returning to the island.*" Fewer people come to the island for a day trip because the ferry commute takes so much time. As one respondent noted, "*with dramatically increased wait times at the Hatteras Ferry Terminal, many tourists get tired of waiting 3-4 hours in long ferry lines and turn around, canceling their plans to visit Ocracoke.*" Several business owners reported that they rely on day-trippers for the majority of their business throughout the year. As one respondent reported, "*my business depends on day-trippers ... the bulk of their day trip is spent waiting.*" Business owners are concerned that frustrations with the ferry service will discourage many visitors from returning. One business owner reported that "*I constantly hear from customers that they won't do this again, because they sat in line or because the ferry didn't run.*" Eighty-six percent of survey participants reported that the length of time to commute to Ocracoke Island is a major challenge for their businesses.

Almost all of survey respondents reported that long wait times at ferry docks are a major challenge to their business.

Since the ferry service changes, nearly half of respondents (48 percent) reported that they could see a difference in their businesses as early as April and May 2014. As shown in Figure K-1, 82 percent of business owners have seen a decrease or a substantial decrease in their business or sales since the ferry service changes. Eighty-six percent reported that the decrease in visitors (since December 2013) has been a major challenge to business. Over half (57 percent) of respondents reported that there is not enough business on the island to make a profit all year long.

Eighty-six percent reported that the decrease in visitors has been a major challenge to business.

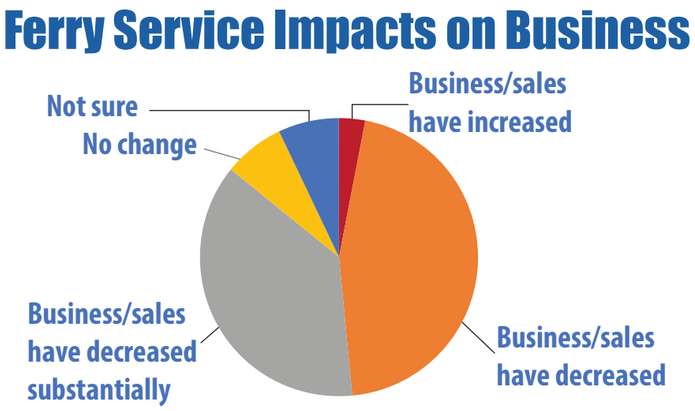


Figure K-1: Impact on business since reduced number of ferry sailings

	Major Challenge	Minor Challenge
Not enough business to make profit all year	57%	35%
Not enough business to make profit during Off-season	76%	16%
Traffic congestion on Ocracoke Island	6%	35%
Not enough parking close to my business	4%	27%
Not enough parking for customers on island	33%	31%
Lack of transportation to island for customers	67%	18%
Lack of transportation to island for employees	4%	14%
Lack of transportation on island for customers	22%	27%
Lack of transportation on island for employees	2%	4%
Wait times at ferry dock for employees to commute to work on Ocracoke Island	14%	8%
Length of time to commute to Ocracoke Island	86%	8%
Decrease in # of visitors (since Dec 2013)	86%	12%
Wait times at ferry dock for customers to get to Ocracoke Island	96%	2%

Figure K-2: Challenges to businesses on Ocracoke Island

Business Information

Businesses represented in the survey have been open an average of 21 years. As seen in Figure K-4, many of the businesses represented in this survey are open year-round. However, peak season typically brings the most business to the island. Over 93 percent of participants consider June, July, and August to be the peak season for their business. May (68 percent) and September (63 percent) are also included as peak season for many businesses. Seventy percent of business owners reported that some customers walk, bike, or ride a golf cart to access their business. Over sixty percent of respondents reported that most of their customers drive and park to access their business.

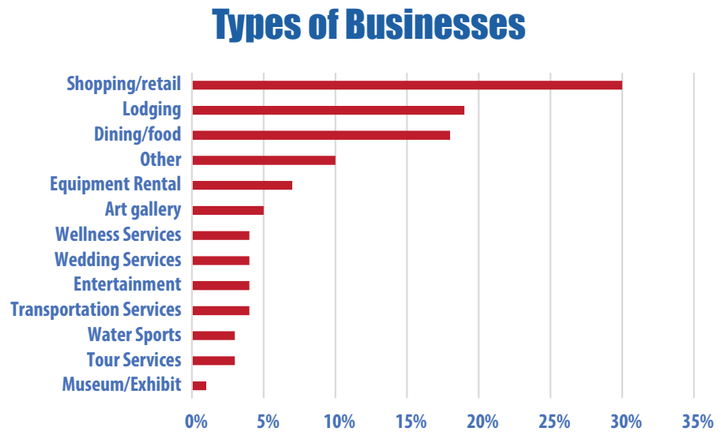


Figure K-3: Type of businesses represented in survey

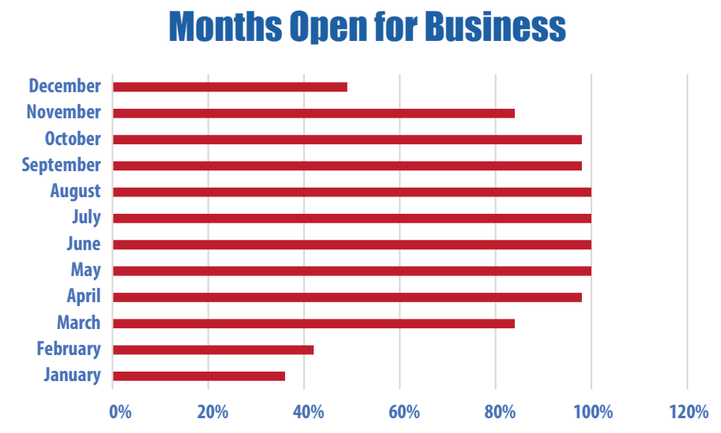
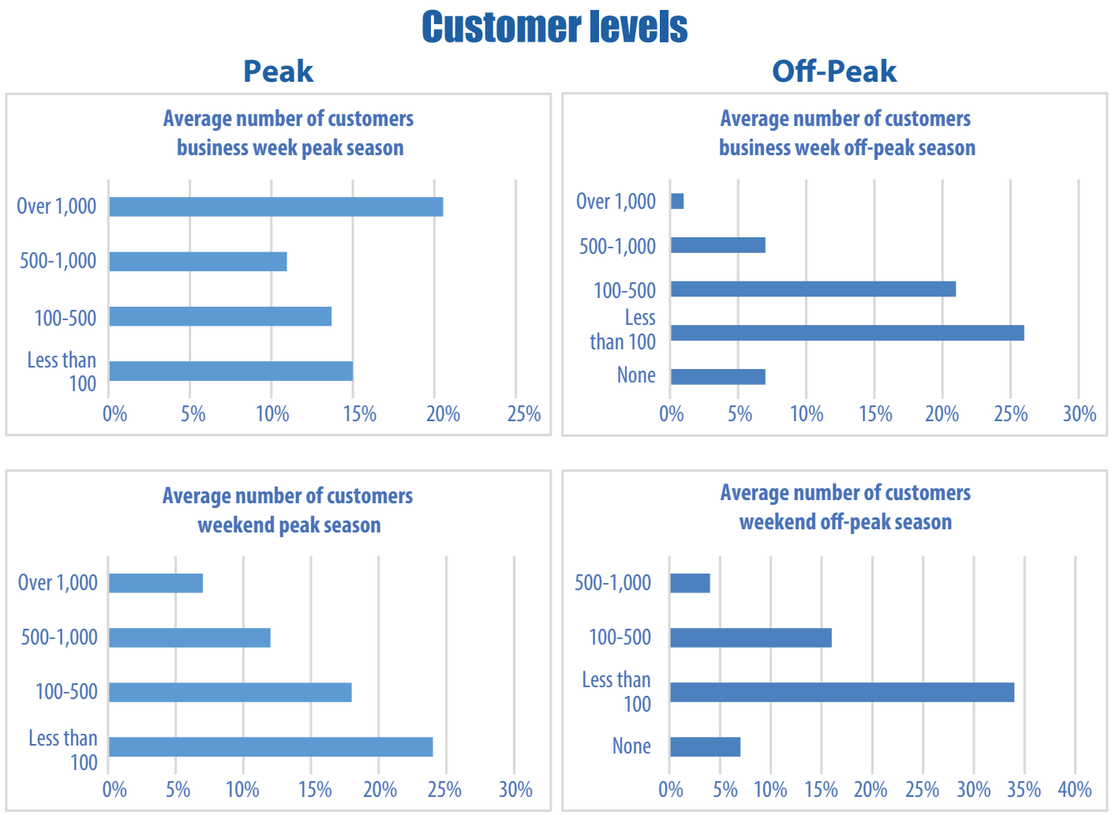


Figure K-4: Months Open for Business

C. Ocracoke Island Business Survey (continued)

Business owners reported that the bulk of their customers visit during the business week in peak season. In off-peak season, over half of respondents reported having less than 100 customers each week.



Peak Season
Average of 7 full-time employees
Average of 4 part-time employees
17 hours per week average for part-time employees

Off-peak Season
Average of 4 full-time employees: 4
Average number of part-time employees: 1
8 hours per week average for part-time employees

Figure K-5: Peak and off-peak season customer levels

Future Passenger Ferry Service

Sixty-seven percent of respondents predict that adding a passenger ferry between Ocracoke Island and Hatteras would be beneficial to their businesses. As one business owner noted, "*the bottom line is that the current ferry situation has reduced the amount of visitors to the island. Any added ferry be it passenger or vehicle would increase the number of visitors to the island. Any increase would contribute to restoring what former business volumes existed.*" Another respondent commented that "*(a passenger ferry) would cut down on traffic around the island, making it safer for pedestrians and people on bikes, and it would be very beneficial to all businesses and services on the island because it would increase sales and more people would have access to the island.*" Another responded that "*passenger ferries would be a fantastic way to increase visitation to the island for the sole purpose of day visits. If we do not take action soon, both Hatteras and Ocracoke will suffer a huge economic decline...*" Several participants reported that they were willing to make changes to their businesses with the addition of a passenger ferry service to Ocracoke Island. Proposed changes included increasing hours, adding more employees, increasing inventory, and adding pick-up services or shuttles. Seventy-three percent of business owners would be willing to buy books of transit tickets to use as loyalty rewards for customers.

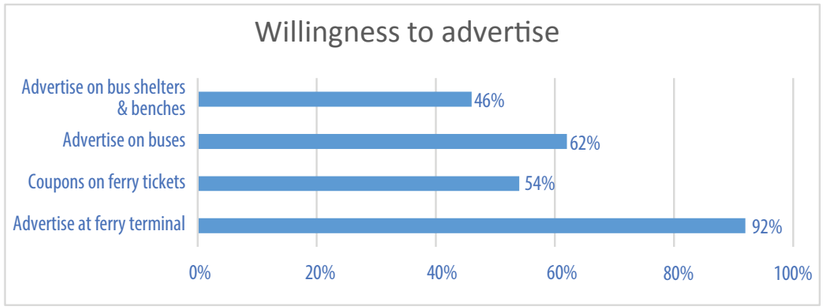


Figure K-7: Businesses willingness to advertise

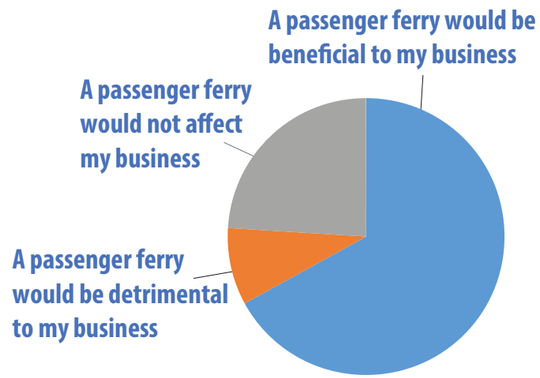


Figure K-6: Impact of passenger ferry to business

Some business owners voiced concerns about the potential of a passenger ferry to change the character of the island. As one participant wrote, "*passenger ferries will clog our small roads with people and not create the kind of personal customer service and relationships we are known for on Ocracoke.*" Lack of transportation on Ocracoke Island was also cited as a potential challenge to visitors. As one business owner replied, "*infrastructure needs to be in place to handle visitors without cars.*" Others were concerned that a passenger ferry drop-off at Silver Lake would negatively impact businesses located further away. One business owner remarked that "*without having a vehicle, I believe most visitors would not explore the entire island.*"

	Positively Affected	Negatively Affected	Not Affected
Amount of business/sales during PEAK SEASON would be...	69%	9%	22%
Amount of business/sales during OFF SEASON would be...	55%	4%	41%
Number of employees would be...	28%	2%	70%
Hours of operation during PEAK SEASON would be...	41%	2%	57%
Hours of operation during OFF SEASON would be...	30%	2%	68%
Parking availability in vicinity to my business would be...	19%	9%	72%
Number of customers during PEAK SEASON would be...	69%	9%	22%
Number of customers during OFF SEASON would be...	54%	2%	44%
Community of Ocracoke Island would be...	70%	19%	11%
Commute time for employees would be...	17%	2%	81%
Commute times for customers would be...	61%	7%	32%

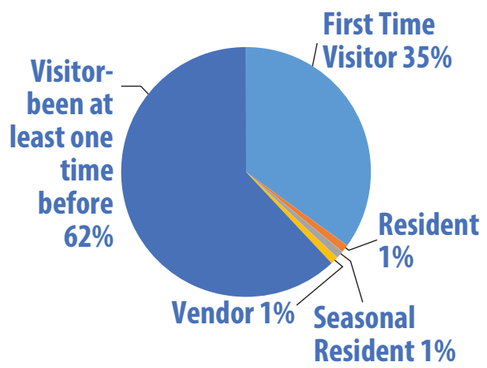
Figure K-8 Passenger Ferry Predicted Effects on Business

D. Passenger Survey

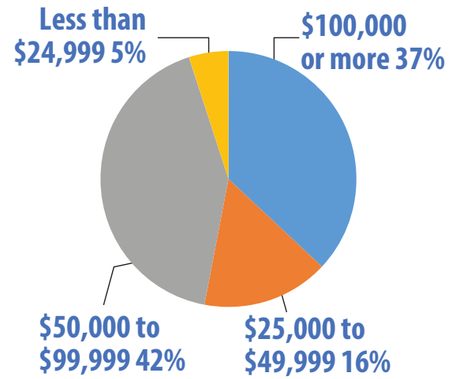
The study team surveyed passengers on the Hatteras – Ocracoke ferry on Thursday June 11th through Sunday June 14th. Surveys were handed to drivers waiting in line at the Ocracoke South Dock ferry terminal. Surveying passengers at this location allowed the study team to ask questions regarding what they "did" on Ocracoke, as opposed to what they "planned" to do. In total the team surveyed 754 vehicles representing over 2,500 passengers from 39 states and five countries. Of these respondents, 35 percent were first-time visitors and 83 percent had visited Ocracoke just for the day. Overall, satisfaction with the visit to Ocracoke was high, with 94 percent of visitors ranking their experience as good or excellent. Twenty-nine percent of visitors said they experienced a long wait time at the ferry terminal and 18 percent said they experienced a lack of parking availability on the island. Key findings from the surveys are summarized in the figures at right.

Study team members hand out surveys to riders of the Hatteras-Ocracoke ferry

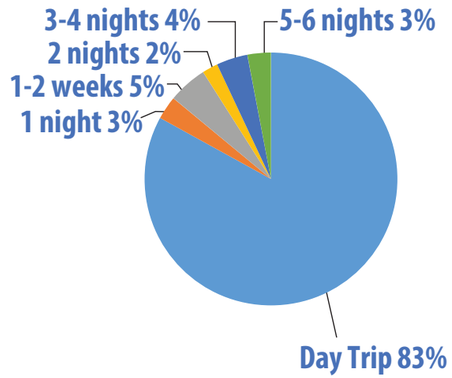
Type of Participant



Annual Household Income



Number of Nights in Ocracoke

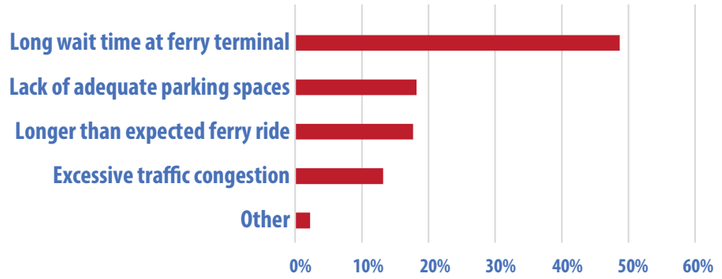


58% of respondents would rate their visit to Ocracoke as "Excellent"

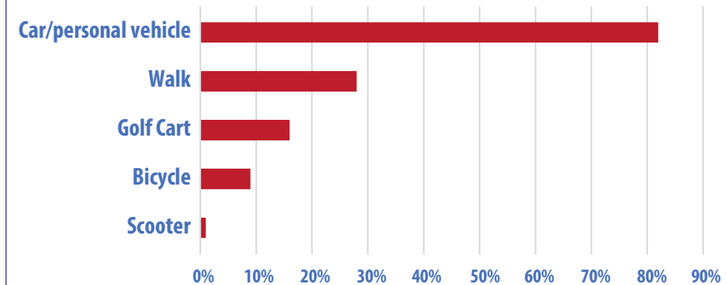
94% of respondents would recommend Ocracoke Island to a friend

17 of the 20 respondents who would not recommend this trip to a friend experienced a long wait time for a ferry

Difficulties during visit



Mode of Transportation on Island



TOP 5 Ocracoke Activities

- Dining
- Shopping in village
- Visiting Beach
- Visiting Lighthouse
- Visiting Historic Sites

TOP 5 Areas Visited on Ocracoke

- Ocracoke Village
- Seaside Beaches
- Beaches surrounding Ocracoke Village
- Pony Pen
- Pamlico Sound south of Pony Pen

Visitors spend

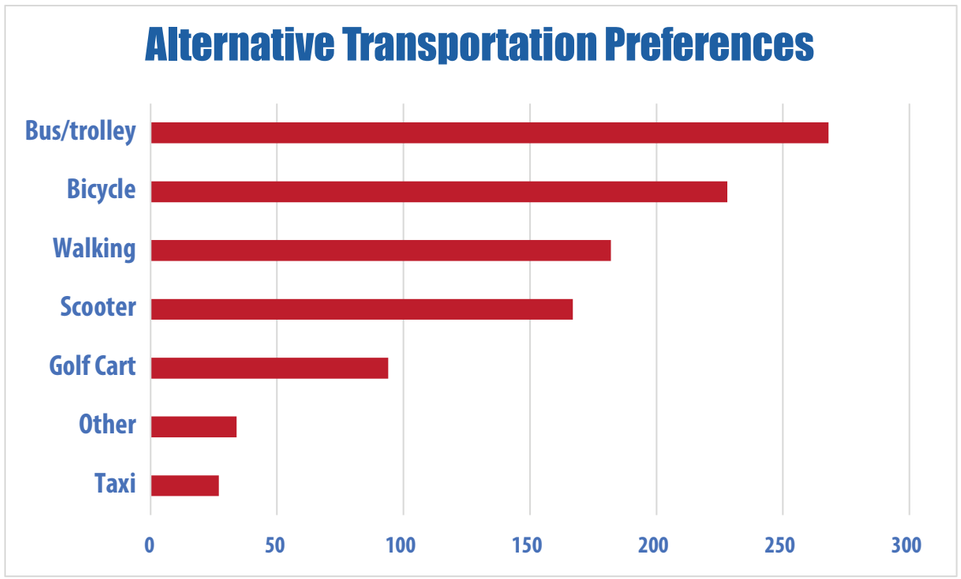
an average of

$25/day on food

$60/day on lodging

(does not include day-trippers)

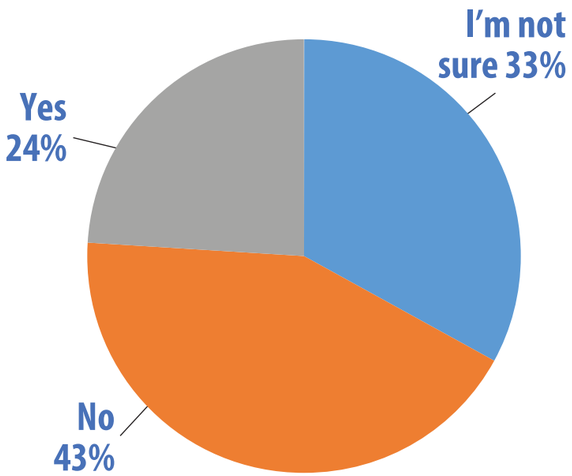
$15/day on goods



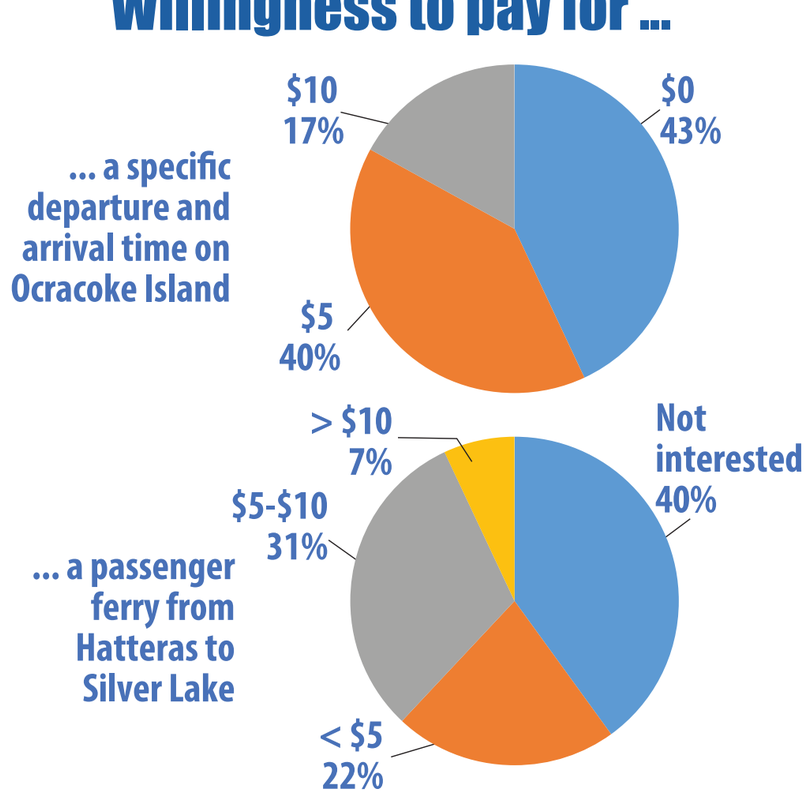
TOP 6
Passenger ferry features
which appeal to participants

- **Shorter wait time than vehicle ferry**
- **Faster one-way trip than vehicle ferry**
- **Option to make ferry reservations prior to travel**
- **Food and drinks available onboard passenger ferry**
- **Bus/trolley services available in close proximity to dock**

Would you make more trips with a passenger ferry?



Willingness to pay for ...



E. Public Comments Survey Summary

In addition to public meetings, residents and visitors of Ocracoke Island were invited to provide comments regarding ferry services and transportation needs in an open survey. Twenty-six people participated in the survey. Common themes from the survey responses are outlined below.

Maintaining Character of Island

When asked about their personal vision for the future of Ocracoke Island, many respondents were concerned about maintaining the character and "quaintness" of Ocracoke Island. As one participant wrote, the desired vision is to "*keep the charm and unique character of Ocracoke, while at the same time improving quality of life issues for Island residents and visitors.*" One visitor who completed the survey noted that, "*one of the reasons I like vacationing on Ocracoke is the lack of crowds of people.*"

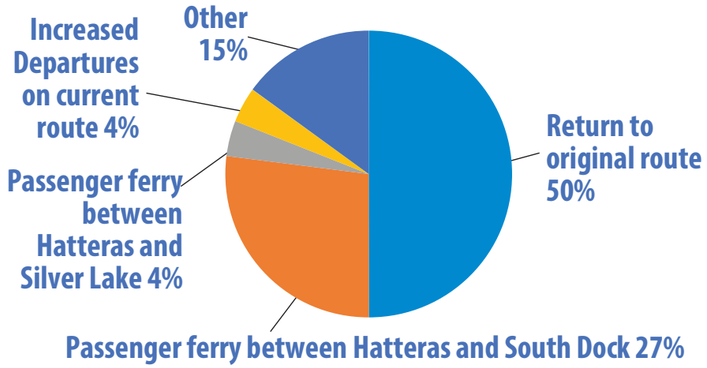
Adequate Facilities and Transportation Options

Several respondents mentioned the need for public restrooms on the island. Other requests included green spaces, walking lanes, and more parking areas.

Public transportation options, including shuttle services, carts, and trams, were mentioned as a possible solution to transportation and crowding issues.

"We, the residents, are desperate for dependable transportation for ourselves and the tourists we depend on for our incomes."

Passenger Survey Preferred Options



Note: Two of the participants who responded "other" clarified that they wanted a combination of the above options, with a passenger ferry to Silver Lake for day-trippers and maintaining the vehicle ferry for visitors with vehicles.

F. Media

The project and public engagement initiatives prompted coverage and discussion in regional media. A selection of headlines is highlighted below.

The Virginian-Pilot
PilotOnline.com

Hatteras-Ocracoke passenger-only ferry to get test run

January 16, 2015

N.C. tests passenger ferry to fix Ocracoke tourism drop

May 11, 2015

A new ferry option for 2017: Ditch the car, and take the quick boat to Ocracoke

September 8, 2015

NEWS CHANNEL abc 12
Getting The Facts Right

Public meeting to be held on passenger-only ferry service

September 1, 2015

Island Free Press
HATTERAS AND OCRACOKE ISLAND NEWS • UP TO DATE AND DOWN TO EARTH

Passenger ferry trials will include boat tours, open houses

April 16, 2015

Are passenger-only ferries in our future?

September 4, 2015

ocracoke observer

Passenger ferry study to begin in March

February 10 , 2015

Passenger ferry visits Ocracoke

May 6, 2015

Passenger ferry meeting provides important updates

September 3, 2015

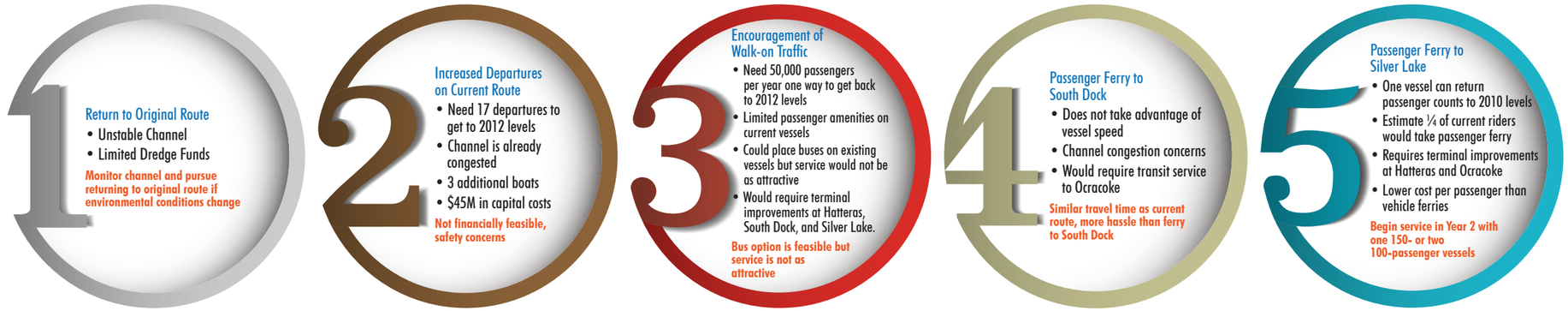
MARINELOG

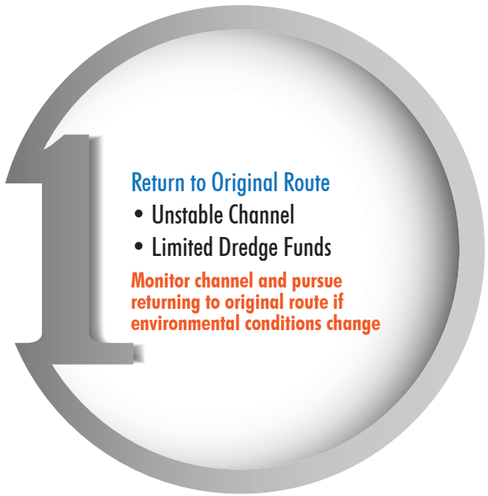
North Carolina DOT looks at adding passenger-only ferry

September 3, 2015

3. Alternatives

Five alternatives for improving ferry service between Hatteras and Ocracoke were identified by the Steering Committee. These alternatives were vetted through the public involvement process and confirmed to be reasonable alternatives that match with the community's vision:





Returning to the original route was a strong preference of the public, expressed throughout the public meetings. Fifty percent of the respondents to the online public survey indicated that they preferred that the ferry return to the original route. It is clear that a return to the original route would allow for a return to previous departure levels of 50+ departures per day during the peak season by decreasing crossing time to approximately 30 minutes. This would also decrease fuel, labor, and maintenance costs by upwards of over $2,000,000 per year.

Maintenance dredging of the Ocracoke Ferry Terminal marine basin and approach channel to a depth of 12 feet and a width of 150 feet falls under the responsibility of the State of North Carolina. The U.S. Army Corps of Engineers (USACE) maintains the approach and the boat basin at Hatteras Harbor 6-feet deep and approximately 150 feet by 1,200 feet. The Rollinson Channel extension also falls under the jurisdiction of the USACE and was maintained to a depth of 10 feet and a width of 100 feet.

The table in Figure 1 shows that regular federal appropriations for Hatteras ferry channel dredging has been decreasing. In 2014 North Carolina spent $440,000 to dredge the channel.

However, due to the consistent erosion of the Hatteras shoreline, and deposit of sand in the channel, returning to the original route is currently not feasible. The study team recommends that the channel should continue to be monitored and the Ferry Division should pursue returning to the original route if environmental conditions change.

Figure 1: Dredging appropriations

Fiscal Year	Regular Federal Appropriations	Supplemental Fed. Appropriations/ Hurricane Relief	Non Federal Contributions
2009	$210,000	$191,000	$0
2010	$50,000	$142,000	$0
2011	$50,000	$0	$0
2012	$49,000	$2,000,000	$1,433,000
2013	$49,000	$2,000,000	$0

Figure 2: Inlet shoaling

2 Increased Departures on Current Route

- Need 17 departures to get to 2012 levels
- Channel is already congested
- 3 additional boats
- $45M in capital costs

Not financially feasible, safety concerns

Increasing departures on the current route has the potential to alleviate congestion at the Hatteras and South Dock terminals by providing additional capacity. To return to 2012 departure levels, 17 additional departures would be needed. Based on the current transit times and crew work limitations, this would mean an additional three vessels would be needed.

Currently, Sound Class vessels are being programmed in the NCDOT STIP at $18 million per vessel. River Class vessels are currently projected to cost approximately $12 million per vessel. But future vessels will be programmed at $15 million per vessel. Therefore three additional vessels would represent between $45 and $54 million in capital costs and approximately $8 million per year in operating cost. An analysis of the current capital, operation, and maintenance costs indicates that the current ferry operations cost approximately $28 per passenger for a one-way trip on the Hatteras-Ocracoke Route.

The addition of three vessels to the existing Horseshoe Channel also raises safety concerns. Currently, the channel is heavily trafficked with ferry vessels, recreational boaters, and commercial vessels. Ferry boat speeds are reduced due to the need to slow when passing competing vessel traffic, particularly in the narrow reaches of the channel, including those near markers 12A, 13A, 14 and 15. Adding additional large vessels to this route will increase conflicts, and increase overall transit times.

Adding additional vessels and more cars to the island also does not match the community vision. The study team routinely received comments regarding the desire to maintain the small-town feel of Ocracoke and the desire to have fewer cars on the island. Eighteen percent of visitors also responded in the passenger survey that they experienced a lack of parking availability.

The study team finds that this alternative is not financially feasible, that there are safety concerns with adding additional vessels to this route, and that this alternative does not match the community vision.

3 Encouragement of Walk-on Traffic

- Need 50,000 passengers per year one way to get back to 2012 levels
- Limited passenger amenities on current vessels
- Could place buses on existing vessels but service would not be as attractive
- Would require terminal improvements at Hatteras, South Dock, and Silver Lake.

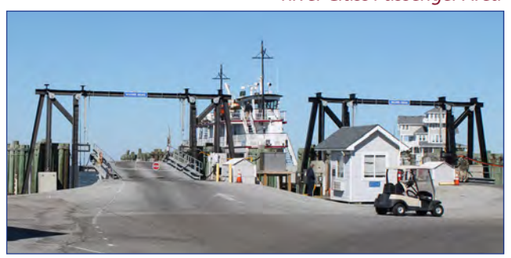
Bus option is feasible but service is not as attractive

While the Hatteras class vessels have a vehicle capacity of 26 vehicles, they have a passenger capacity of 149 people. Similarly, river class vessels have a vehicle capacity of 38 vehicles, but a passenger capacity of 300 passengers. The passenger survey indicated an average vehicle occupancy of 3.5 passengers per vehicle. As such, it could potentially be possible to increase the number of passengers on the Hatteras–Ocracoke ferry, either by having passengers park and walk on to the vessel, or by taking a motor coach.

The main impediment to passengers walking on to the ferry is the lack of passenger amenities and pedestrian accommodations. Hatteras class vessels have a very small passenger area that can seat approximately 8-10 passengers. River Class vessels have a passenger area that can seat approximately 30 passengers. These accommodations are on an elevated level of the ferries and are not ADA accessible.

River Class Passenger Area

The vehicle gantries and terminal areas are also not configured for pedestrian access, but pedestrians could potentially be accommodated with revised loading/ unloading procedures.



Hatteras Terminal Vehicle Gantries

A more feasible solution could be the usage of motor coaches to accommodate more passengers on a single ferry run. Such a system would involve picking up passengers at the Hatteras terminal and having the passengers ride on the motor coach to South Dock. The motor coach would then travel the length of Ocracoke and offload passengers in Ocracoke Village, likely in the vicinity of the current Silver Lake terminal. Total transit time for passengers would be approximately one hour and twenty minutes. The motor coach would then return to South Dock and deadhead to Hatteras. In all cases the motor coach would use the priority lane to bypass vehicles queued for the ferry.

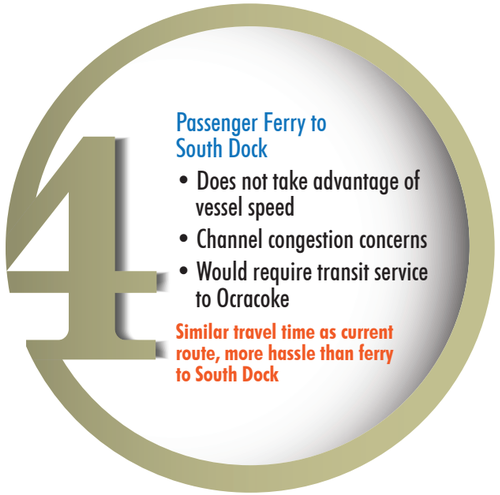
Motor coaches seat between 36 to 61 passengers and typically seat approximately 55 passengers and can contain amenities such as restrooms and wi-fi. At a cost of approximately $500,000 per motor coach, the ferry division could have the option to buy or lease vehicles during the peak season. Based on the current ferry schedule, a minimum of three vehicles would be needed to provide service during the peak periods, which would provide round trip accommodations for approximately 330 passengers per day, or between five and seven ferry runs.

Coach bus in Ocracoke

The use of motor coaches would require additional terminal and parking improvements at the Hatteras terminal, including reconfiguration of the current parking lot adjacent to the terminal, provision of additional employee parking in the vicinity of the maintenance building, provision of a passenger waiting area, and ticketing infrastructure. On Ocracoke, a passenger waiting area would need to be constructed to accommodate passengers waiting for the return trip.

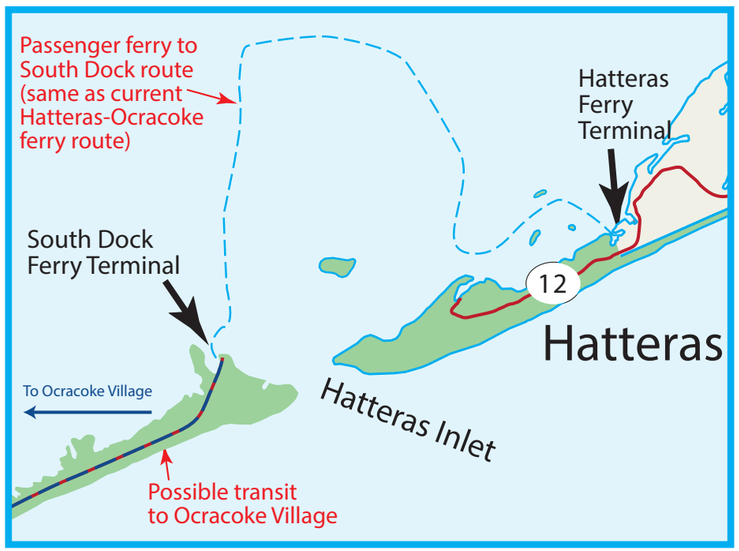
The advantages to this service are that it can be implemented with relatively low capital and operating costs and meets the community's vision of having a more pedestrian oriented village. The disadvantages to this service are that it is not as attractive an option as a passenger ferry service due to the additional transit time and lower level of amenities, and would likely have lower total ridership with a lower opportunity for cost recovery.

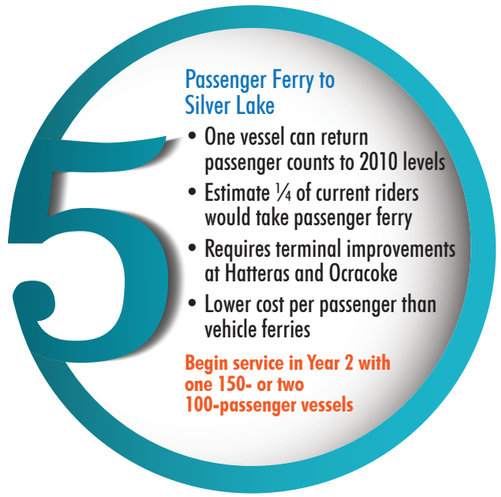
The study team considers this to be a feasible but less attractive option for increasing ferry service between Hatteras and Ocracoke. It would likely have lower demand than a passenger ferry.



The study team examined two options for a passenger ferry. The first option was to for the passenger ferry to travel between the Hatteras terminal and the Ocracoke South Dock terminal. This option would require the passenger ferry to travel along the existing ferry route, increasing congestion and limiting the ferry's speed due to limited opportunities for passing vehicle ferries in the current channel. Passengers would then unload and take a transit bus to Ocracoke Village. This would require parking, terminal, and ticketing infrastructure improvements at the Hatteras terminal, a transfer facility at the Ocracoke South Dock terminal, and a passenger waiting area in Ocracoke Village, similar improvements to those required for the previous option.

There are very limited advantages to this option. The travel times would be the same for the option of providing motor coaches and the capital costs would be higher due to the need for a transfer facility at the Ocracoke South Dock terminal and the cost of the passenger ferry. Based on these factors the study team does not consider this to be a feasible option.





The provision of passenger ferry service from the Hatteras terminal to Silver Lake is a paradigm shift for ferry service along the Outer Banks. Working with the Steering Committee, Stakeholders, and the Public, the study team developed the following outline for passenger ferry service:

- One or more vessels with a capacity of between 50 and 200 passengers
- Multiple round trips per day, with peak ridership from the Hatteras terminal in the morning and the Ocracoke Silver Lake terminal in the afternoon
- Utilization of a separate route than the vehicle ferries to avoid conflicts
- Passenger terminals at the Hatteras and Ocracoke Silver Lake terminals
- Parking improvements at the Hatteras terminal
- Online ticketing infrastructure with guaranteed departure times
- Transit service on Ocracoke
- Pedestrian and bicycle improvements on Ocracoke

The study team investigated multiple items related to passenger ferry service to determine if such service is feasible. They are discussed in the following subsections.

Demand

The passenger survey indicated that approximately 97 percent of the riders in the peak demand periods were visitors to Ocracoke, with 83 percent of those visitors taking a day trip to the island. Twenty-five percent were visitors who were on a day-trip from Hatteras and spent time solely in Ocracoke Village.

The unmet travel demand also plays a role in estimating the future demand for passenger ferry service. As discussed previously, conservatively 9 percent of the total vehicles that arrived at the ferry terminal during the peak period turned around and left the terminal or queue. Presumably some of these individuals would consider passenger ferry service if guaranteed departure times were provided.

Based on the survey data and the unmet travel demand information, the study team developed demand estimates based on 25 percent of the current ridership. We feel that this number represents an appropriately conservative estimate of future demand for planning purposes. The actual demand could be slightly lower at the start of service, but is likely to be higher after the service has been in place and has been appropriately advertised. This demand level would represent approximately 125,000 passengers during the peak months of May through September.

Vessels

A variety of vessel sizes and types are available for passenger ferry service, ranging in size from 50 passengers to upwards of 200 passengers. Lead times for construction are approximately 1-2 years, depending on the size and complexity. The trial run of the Provincetown III yielded several key findings

- At a cruising speed of slightly less than 30 knots a passenger ferry takes slightly less than 1 hour to travel from the Hatteras terminal to the Ocracoke Silver Lake Terminal.
- Given the constantly changing nature of the channels in the vicinity of the Hatteras terminal, jet drive is preferable to prop drive to avoid prop damage in the event shallow water is encountered.
- Bicycles can be easily accommodated on a passenger ferry with deck mounted bicycle racks.
- Side loading is preferable to bow loading to allow for expedient ingress and egress.
- A passenger ferry of a similar size has sufficient room to operate in the existing Hatteras basin and in Silver Lake.

Operating Cost

Assuming a capital cost of approximately $5.3 million per vessel (for a 150 passenger ferry) with a 20-year lifespan, fuel, a three-person crew, maintenance, and other miscellaneous costs, the Ferry Division can expect a cost per passenger of approximately $13 per trip. This is much lower than the approximately $28 per trip of the current vehicle ferry. This cost does not include the other infrastructure costs required to implement a passenger ferry service.

Water Side Infrastructure

The trial run of the Provincetown III indicated that side loading can be accommodated within the current Hatteras terminal basin, and that this type of loading is preferable when loading/unloading two vessels and for expedient ingress and egress. Commercially available floating docks could be procured by the ferry division

Continued on next page

Passenger Ferry to Silver Lake (continued)

that would accommodate a passenger ferry, but some rearrangement of the current dolphins would be required.

The Ferry Division currently owns a dead slip in Silver Lake that is used for tieup of the sound class ferries. This space is of a sufficient size to allow for docking of a passenger ferry vessel. Discussions with the National Park Service have indicated that they may be willing to rearrange some of the public dock space to allow for the passenger ferry to dock in closer proximity to the current Sound Class ferries and allow for better separation between vessels of different size.

Land Side Infrastructure

The primary concern for land side infrastructure is room for terminal facilities and for parking. At the Hatteras Terminal, room exists north of the existing terminal building adjacent to the vessel basin for construction of a covered passenger waiting area. This area would provide good connectivity to the adjacent parking lot and would allow use of the current restroom and vending facilities. Parking at the Hatteras Terminal can be provided in the adjacent parking lot, with overflow parking in the Graveyard of the Atlantic Museum or in a new lot constructed north of the Graveyard of the Atlantic Museum parking served by shuttle service to the Hatteras Terminal.

All lands in the vicinity of the Ocracoke Silver Lake Terminal are currently owned by the National Park Service. There are multiple options in this area for the placement of a passenger waiting area, including immediately adjacent to the current ferry terminal building and adjacent to the current National Park Service Visitors Center.

Within Ocracoke Village, sidewalks currently exist in some locations along NC 12. There are multiple locations where improvements would be needed to allow for an increased amount of pedestrian travel.

Transit

At the Hatteras Terminal, the majority of passengers would be expected to arrive by private vehicle. On Ocracoke, transit service will be an integral part of ensuring that a passenger ferry service can be successful. The Hyde County Transit CTSP includes a discussion of a transit circulator on Ocracoke. One challenge to providing such a service will be the limited amount of right-of-way for transit stops within the village.

Summary

Based on the preliminary analysis, there do not appear to be any project-stopping issues related to the provision of passenger ferry service between Hatteras and Ocracoke. However, there are specific challenges, including parking at the Hatteras Terminal, the location for a passenger terminal on Ocracoke, and locations for transit stops within Ocracoke Village. Based on the survey responses and the feedback from the public, there appears to be sufficient demand and support for a passenger ferry service.

Selection of Preferred Alternative

The analysis of the various alternatives yielded two feasible alternatives

- Provision of motor coaches on the current vehicle ferries
- Passenger ferry service between the Hatteras Terminal and the Ocracoke Silver Lake Terminal

While the provision of motor coaches alternative can be implemented with a lower cost, the ridership estimates and revenue from such a service are expected to be lower than a passenger ferry. Therefore the ability of this service to provide a higher level of service to visitors to the Outer Banks is questionable. In contrast, passenger ferry service has the ability to provide a more upscale user experience at a lower per-passenger cost than current ferry service and could represent a new way of doing business for the Ferry Division. Based on these factors, and the public and stakeholder support for passenger ferry service, the Steering Committee directed the study team to further consider passenger ferry service and to develop recommendations for the implementation of such a service. This analysis and recommendations are discussed in detail in the following chapter.

4. Passenger Ferry Analysis and Recommendations

As discussed in the Alternatives section the study team has the following overall recommendations:

- Continue monitoring the Hatteras ferry channel and return to the original route if environmental conditions change
- Increasing departures on the current route is infeasible due to high cost and safety concerns with additional traffic in the current ferry channel
- Encouraging additional walk-on traffic on the current ferries is infeasible due to limited passenger amenities, but utilizing coach buses could be a cost-effective, but less attractive option for moving more passengers between Hatteras and Ocracoke
- A passenger ferry to South Dock does not take advantage of a potential passenger ferry's speed, would require transfer of passengers to a transit vehicle, and there are safety concerns with additional traffic in the current ferry channel
- A passenger ferry to Silver Lake is the most attractive option and is more cost effective than existing ferry service

Based on the selection of passenger ferry service as the preferred alternative by the Steering Committee and the public and stakeholder support for such service, the study team developed recommendations for such a service. This chapter details the various issues surrounding the implementation of passenger ferry service and offers recommendations on vessel types and sizes, routes, schedules, fares, ticketing, terminal facilities, parking, transit, and pedestrian and bicycle improvements needed to ensure successful operation of a passenger ferry service. This chapter also presents costs for the individual elements that will be further discussed in the following chapter.

Ridership

As previously discussed, over the course of three days in June 2015, Volkert and ITRE distributed surveys amongst ferry-goers leaving Hatteras bound for Ocracoke. The surveys were collected and analyzed to gain insight into potential ridership, scheduling, and willingness to pay a fare for a passenger ferry service. The study team analyzed the survey data and primarily focused on those who were visitors to the island. This study assumes that the majority of potential passenger ferry users will be visitors who are making day trips from Hatteras to Ocracoke (surveys show this number to be approximately 8 percent of total ferry ridership).

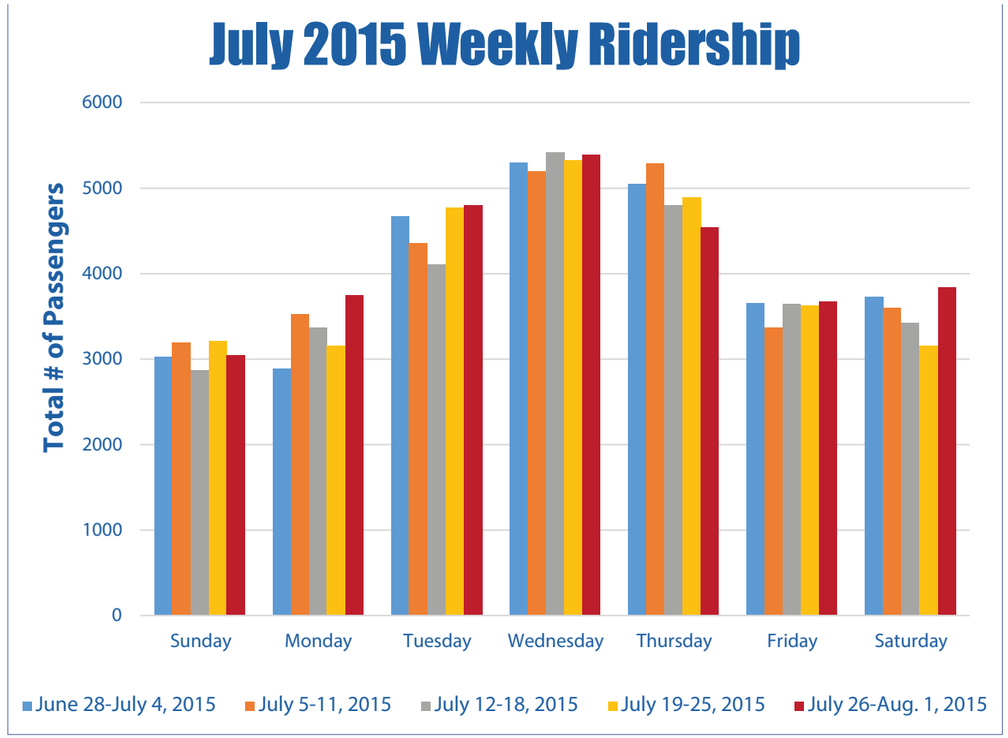
Of those who completed the survey

- 17 percent were visitors who said they thought they could have made the trip without a car;
- 17 percent were visitors who used any means of transportation other than a car/personal vehicle to get around Ocracoke during their visit;
- 25 percent were visitors who were on a day-trip from Hatteras and spent time solely in Ocracoke Village; and
- 23 percent were visitors who said they would likely make more trips between Hatteras and Ocracoke if there was a passenger ferry available.

The study team also analyzed video footage to assess the number of vehicles that waited en queue for an extended period of time before ultimately getting out of the ferry queue, turning around, and leaving. This amounted to approximately 9 percent of all vehicles during peak.

Based on these results, the study team estimates that 25 percent of current ferry passengers would use a passenger ferry between Hatteras and Silver Lake. All calculations, figures, and data quoted hereinafter are based on said 25 percent of total ridership. However, since visitors are assumed to be the primary ridership of the passenger ferry, total ridership is calculated based on peak and shoulder seasons (April through October). It is assumed that passenger ferry service will be ceased or drastically reduced in the off-season as the current ferry service sufficiently meets the travel demand during these times.

The study team analyzed daily ridership data provided by the Ferry Division to determine the variations in ferry ridership across weekdays. Ferry ridership typically is the highest on Tuesday, Wednesday, and Thursday, is slightly lower on Friday and Monday, and is the lowest on Saturday and Sunday. This is primarily due to the check-in schedules of local rental homes, as Saturday is the turnover day.



Volkert also analyzed the number of vehicles on individual ferry runs across June and July 2015 to determine the variability within each day. Based on this data, Volkert developed a draft departure schedule based on operation of a single vessel and for two vessels with ninety minute turnaround times. Using this schedule, Volkert developed ridership estimates for a variety of vessel sizes; 50, 75, 100, 150 passengers on a monthly basis utilizing the 25 percent demand and limiting the ridership when it exceeded the vessel size. The resulting annual volumes per ferry size for operation of one vessel are approximately:

Annual Ridership (Passengers)

Vessel Size (passengers)	50	75	100	150
Single Vessel	30,000	40,650	52,400	62,500
Two vessels	51,915	60,185	74,800	78,100

It should be noted that during peak months, the demand for a single vessel, regardless of supply, will exceed capacity.

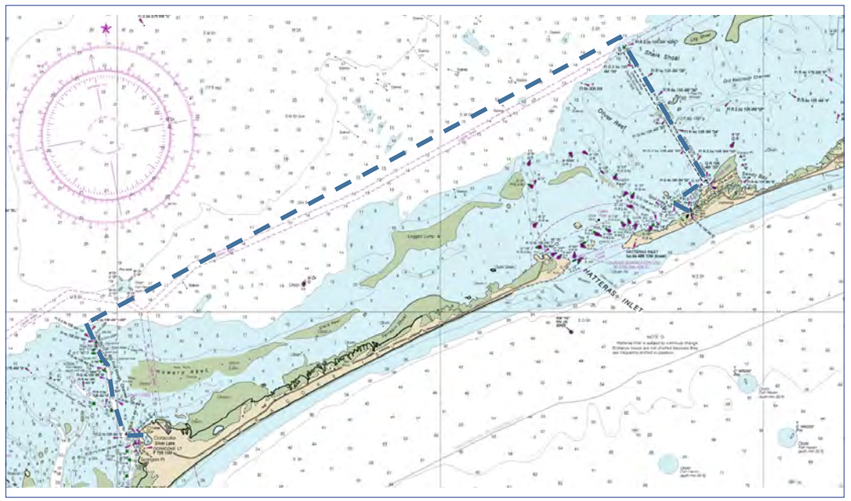
Operating two vessels provides a number of benefits, including a more flexible schedule by having more departure times, and a second vessel in the event that one vessel needs repairs. However, the ridership projections indicate that there are diminishing returns to having service with two vessels, as two 150 passenger vessels are expected to be full on only the peak days during the peak months, whereas two 100 passenger vessels are expected to be full on a more consistent basis.

Based on these projections, the study team recommends that the Ferry Division implement a two-vessel schedule with a vessel size of approximately100 passengers, depending on the availability of vessels from local or national shipbuilders.

It is also important to note how these ridership estimates translate into vehicles, both for planning of parking facilities, and for comparison to vehicular ferry service. Based on data from the passenger survey, there were an average of 3.79 passengers per vehicle. However, the Ferry Division's ridership data for the peak season on the Hatteras-Ocracoke route over the last five years indicates an average of 2.74 passengers per vehicle Therefore, a two 100-passenger vessel system would equate to between approximately 20,000 and 27,000 cars per year. On a peak day during July, this would equate to between 153 and 212 vehicles, or between four and six full runs of a river class vessel.

Routes

As discussed previously, opportunities to pass along the existing vehicular ferry route are limited. As such, the introduction of a passenger ferry along that route that would travel at a higher speed would both limit the vessels speed and create safety concerns with passing. The existing Rollinson Channel provides a straight and direct course to the Pamlico sound. The study team recommends that the passenger ferry exit the Hatteras Terminal, turn eastward and take Rollinson Channel to the Pamlico Sound and travel the length of Ocracoke to intersect with Big Foot Slough route for entrance into Silver Lake. This route is approximately 21.9 nautical miles. Some minor maintenance dredging will be required along Rollinson Channel in the vicinity of the northbound turn.



Vessels

There are several concerns relative to the selection of an appropriate vessel design for the provision of future passenger ferry service between Hatteras and Ocracoke.

Speed

To ensure the feasibility of a passenger ferry service between Hatteras and Ocracoke, the Steering Committee identified the need for the total transit time from Hatteras to Ocracoke Village to be less than the current ferry service. Currently, the vehicle ferry takes approximately 60 minutes to transit the approximately 8.3 nautical miles between Hatteras and Ocracoke. Visitors to the island then must drive an additional approximately 13 miles to the heart of Ocracoke Village, which takes approximately 15-20 minutes. As the proposed route between Hatteras and Silver Lake is approximately 21.9 nautical miles, a vessel will have to cruise at approximately 25 knots, to make the Hatteras to Silver Lake route in approximately an hour, accounting for the slower speeds in the vicinity of each terminal and while turning.

Coast Guard regulations identify a passenger vessel in domestic service operating at speeds of 30 knots or more as a High-Speed Craft, subject to additional safety criteria outlined in the International Code of Safety for High-Speed Craft. Based on this, and the desired transit time, the study team recommends that a vessel be selected that cruises between 25 and 29 knots.

Size

The vessel size needed for passenger ferry service is largely a function of the desired overall ridership. As discussed previously, the optimum size vessel based on a 25 percent ridership level and a desire to have vessels operating reasonably full, is a 100-passenger vessel. A vessel of this size should be approximately 75-80 feet long and should be able to operate well within the waters of the Pamlico sound, whereas a vessel of a smaller size may not.

Ferry Vessel Acquisition Costs

Estimated costs for construction of a new ferry vessel for the Project were derived from the National Transportation Systems Center's Ferry Lifecycle Cost Model for Federal Land Management Agencies, 2011. The model was prepared by the John A. Volpe Transportation Systems Center, Cambridge, Mass., a federal agency which is part of the U.S. Department of Transportation.

The model was developed to estimate costs for twelve vessel categories including passenger-only and vehicle carriers, breaking down each category to include passenger and vehicle capacities, maximum speed, horsepower, and hull type. Quoted prices, obtained for approximately 80 vessels, were collected from newspaper archives, marine industry magazines, ferry studies, and direct discussions with ferry operators.

Two categories most closely matching the Project are the 51 to 100 passenger and the 101 to 150 passenger vessels with catamaran hull types. New vessel costs were a low of $450,000, a high of $8,000,000. Table 1 illustrates these figures.

Table 1 – Vessel Costs by Selected Category

PAX Capacity	Maximum Speed	Horsepower	Hull Type	Cost Low	Cost High	Cost Average
51-100	23-38	525 - 2,100	Catamaran	$450,000	$3,000,000	$1,725,000
101-150	21-35	900 - 4,000	Catamaran	$700,000	$8,000,000	$4,350,000

Source: Volpe, Ferry Lifecycle Cost Model, 2011

For purposes of the project's conceptual estimate, the average cost was used and then escalated by 10 percent to bring it its cost to the present year (2015). The figure is then shown at its mid-point, high (+20 percent), and low (-20 percent) costs (Table 2).

Table 2 – Vessel Costs Escalated from 2010 to 2015

	Range Point	Cost 51–100 PAX	Cost 101–150 PAX
Total Vessel Cost	Low end cost (-20%)	$1,518,000	$3,828,000
	Mid-point cost	$1,897,500	$4,785,000
	High end cost (+20%)	$2,277,000	$5,742,000

It is anticipated that the vessel selected for the Project would include certain enhancements not included in the Volpe study such as advanced engine design and hydrofoils, likely bringing the cost point somewhere between the mid-point and high end. It is recommended that, for the 51-100 passenger vessel, a cost of $2,000,000 and for the 101-150 passenger vessel, a cost of $5,200,000 be utilized for the Project's study purposes with consideration for adding further escalation where appropriate. An average vessel cost, derived from the above is approximately $3,600,000.

Discussions with local and national shipbuilders indicated that a100-passenger vessel with the amenities desired by the Ferry Division can be procured for approximately $3,300,000. Therefore this number was used for subsequent planning purposes. Passenger ferry vessels of the type being considered for the Hatteras to Ocracoke route have a typical useful life of 25 years.

Vessel Operation Costs

The study team analyzed the costs of a single vessel for labor, insurance, fuel and lubricants, and maintenance. Insurance costs were calculated on an annual basis, while labor and fuel and lubricants were calculated based on daily use and then multiplied by 214 days assuming an April through October operating timeframe.

Maintenance

Based on the Volpe study annual maintenance is approximately 3.5 percent of the vessel value. Assuming a 100 passenger vessel costing $3.3 million this would equate to $115,500 per year or $231,000 for a two-vessel system.

Labor

Labor costs assume a three person crew of a ferry master and two deck hands who are responsible for operating and docking the vessel. The labor rates assumed below were based on labor rates from the North Carolina State Office of Human Resources and do not include overtime compensation.

Vessel Day	Round trips/day	4
	Hours per trip	3
	Total Hours	12
Crew	Ferry Master	1
	Ferry Crew Member II	2
Crews per Day	Hours per shift	8
	Vessel day (hours)	12
	Shifts per day	1.5

			Quantity	Rate	Total
Crew Rates	Ferry Master	Annual compensation with benefits[1]	1	$79,334.00	$79,334.00
		Hourly (annual/2080 hrs/ year)	1	$38.14	$38.14
		Daily (8-hr day)	1	$305.13	$305.13
	Ferry Crew Member II	Annual compensation with benefits[1]	2	$51,113.00	$102,226.00
		Hourly (annual/2080 hrs/ year)	2	$24.57	$49.15
		Daily (8-hr day)	2	$196.59	$393.18
	Crew Rate per Shift	Daily (8-hr day)	2	$501.72	$698.31

[1] *North Carolina State Office of Human Resources*

Total Labor Cost	Daily	$1,047.46
	Yearly (214 days)	$224,156.77

Therefore for a two vessel system labor costs would be $448,314.00.

Fuel and Lubricants

Fuel and lubricants information was based on two 1350 bhp Cummins diesel engines and using fuel and lubricants costs from the US Energy Information Administration assuming a 214 day schedule.

Fuel Consumption; Calculated vs Published Literature

Published Literature	Power Produced per engine	1350	BHP
	Assumed SFC	0.4	lbs/hr/HP
	Fuel Specific Weight	7.2	lbs/GAL

Engine	**Calculated**	Idle	5 kts	20 kts	30 kts
	Single Engine	5%	20%	75%	100%
	GPH - Gallons Per Hour	**3.8**	**15.0**	**56.3**	**75.0**
	Calculated	Idle	5 kts	20 kts	30 kts
	Twin Engines	5%	20%	75%	100%
	GPH - Gallons Per Hour	**7.5**	**30.0**	**112.5**	**150.0**
Gallons per hour	**from Cummins Literature**	Idle	5 kts	20 kts	30 kts
	Single Engine	5%	20%	75%	100%
	GPH - Gallons Per Hour	**3.3**	**13.1**	**49.0**	**65.3**
		Idle	5 kts	20 kts	30 kts
	Twin Engines	5%	20%	75%	100%
	GPH - Gallons Per Hour	**6.5**	**26.1**	**98.0**	**130.6**

Trip Assumptions Based on Cummins Published Data

Idle	Idle Time per Leg	0.5	HRS
	Idle GPH	6.5	GPH
	Idle Fuel	3.3	Gallons
No Wake 5 knots	No Wake Speed Legs	3.0	Per Trip
	No Wake GPH	26.1	GPH
	Time of No Wake Legs	0.1	HRS
	No Wake Speed Fuel	7.8	Gallons
Full Speed 30 knots	Full Speed Leg	1.0	Per Trip
	Full Speed GPH	130.6	GPH
	Number of legs	0.7	HRS
	Full Speed Fuel	91.4	Gallons
	One Way Trip Time	1.5	HRS
	One Way Trip Fuel	102.5	Gallons
Trip Summary	Round Trip (2 Legs) Time	3.0	HRS
	Round Trip (2 Legs) Fuel	205.0	Gallons
	Round Trips Per Day	4	Ea
	Hours of Operation Per Day	12	HRS/Day
	Daily Fuel Consumption	820.2	Gallons/ Day
Lubricants	Daily lubricants Consumption (0.4% of daily fuel consumption)	3.3	Gallons/ Day
Fuel Cost	Diesel No. 2 (low sulfur) Lower Atlantic region, August, 2015	$2.654	per Gallon[1]
	With 5% bulk discount	$2.521	per Gallon
	Daily fuel cost	$2,067.89	per Day
Lubricants Cost	Cost per gallon	$8.000	per Gallon[2]
	Daily lubricants cost	$26.25	per Day
Total Fuel and Lubricants Cost		$2,094.13	Daily
		$448,144.88	Yearly

[1] U.S. energy Information Administration, Independent Statics & Analysis; http://www.eia.gov/dnav/pet/pet_pri_gnd_a_epd2d_pte_dpgal_w.htm

[2] Volpe, Ferry Lifecycle Cost Model, 2011.

Total

The total yearly operating cost for a two-vessel schedule is:

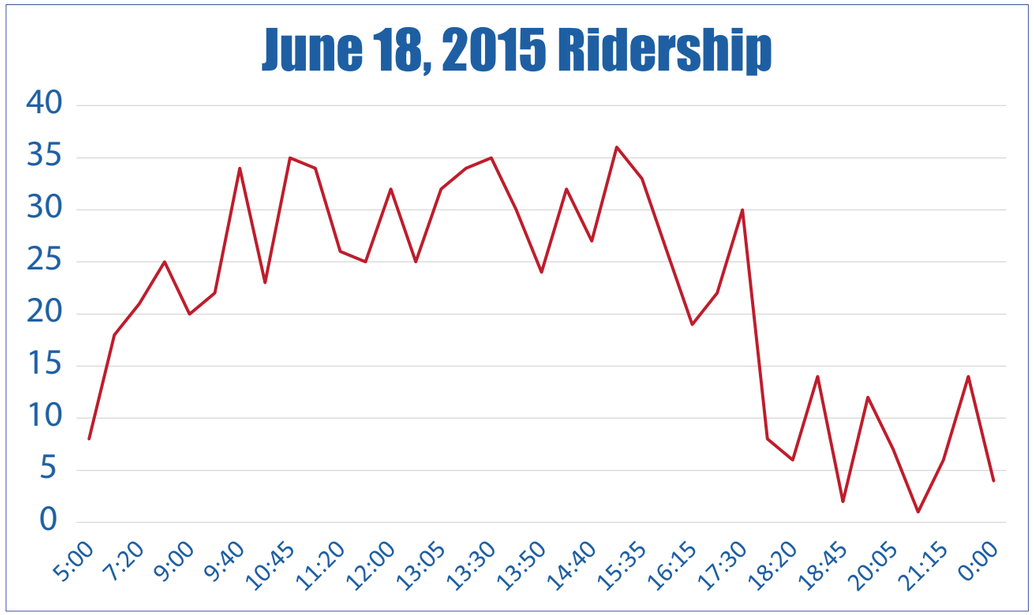
Maintenance	$273,000
Labor	$231,000
Fuel and Lubricants	$448,144
Total	**$903,300**

Schedule

The recommended passenger ferry schedule was developed based on several criteria

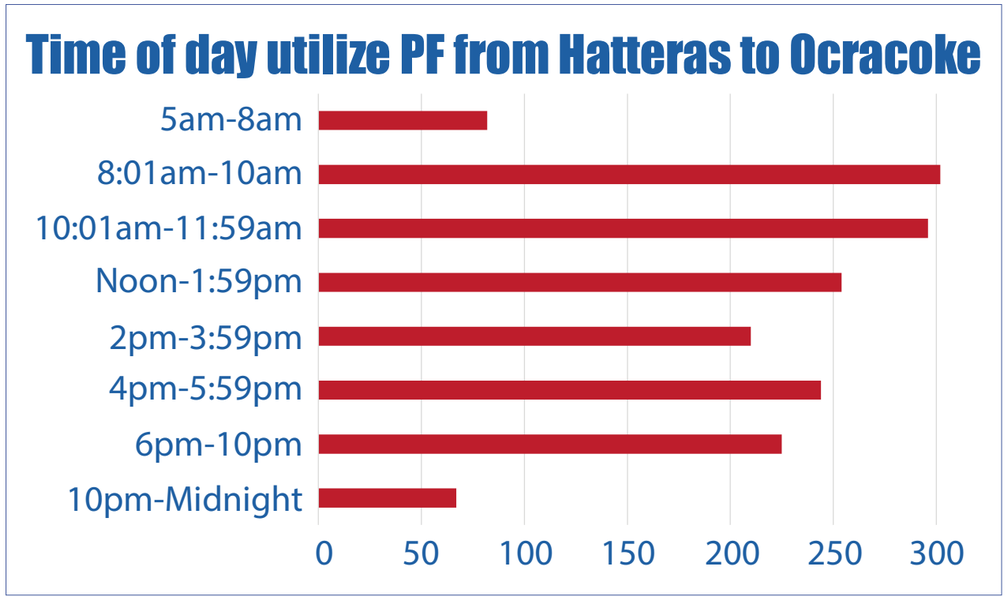
1. A one-hour transit time from terminal to terminal
2. A 30-minute turnaround time at each terminal
3. Limit of a 12-hour workday for ferry crew members
4. Analysis of peak ridership times on the current vehicle ferries
5. Passenger survey responses regarding departure time preference

The chart below shows the vehicle ferry ridership from the Hatteras Ferry Terminal on Thursday, June 18, 2015.



It should be noted that all ferry runs leaving Hatteras between 6:15 AM and 4:00 PM were full.

The graph below shows the responses from the passenger survey indicating the times that passengers would prefer to leave Hatteras.



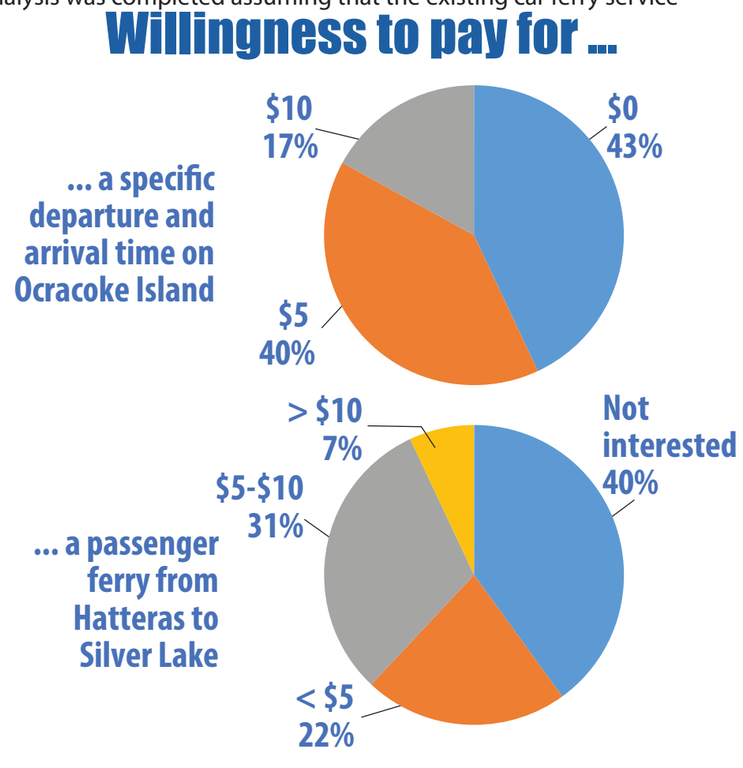
Based on this information and the previously discussed constraints, the study team recommends the following departure schedule for a two-vessel system. Vessel 1 is highlighted in yellow, vessel two is highlighted in green.

Hatteras	Ocracoke
8:00	9:30
10:00	11:30
11:00	12:30
1:00	2:30
2:00	3:30
4:00	5:30
5:00	6:30
7:00	8:30

Fares and Revenue

The passenger survey indicated that 57 percent of respondents were willing to spend between $5 and $10 for a specific, guaranteed departure and arrival time. Thirty one percent of respondents were willing to pay between $5 and $10 per passenger for passenger ferry service with 7 percent saying they would spend more than $10 and 22 percent saying they would spend less than $5. Based on these results, the study team recommends that a $15 toll rate be used for the passenger ferry service. This would result in approximately $1,122,000.00 in toll revenue. It should be noted that at a $15 fare, using the assumed operating cost, the passenger ferry service will run at approximately $200,000 deficit per year.

It should also be noted that this analysis was completed assuming that the existing car ferry service remains free. As a passenger ferry is a premium service, it is the study team's opinion that riders will be willing to pay a per passenger fee for a guaranteed departure and arrival time in order to not have to wait in line for car ferry service, particularly given that the wait time study indicated that riders routinely wait in excess of an hour at both the Hatteras and Ocracoke terminals. The difficulty of visitors to Ocracoke to find parking, as well as the walkability of the village itself will contribute to the attractiveness of the passenger ferry service. Any changes to the car ferry service in terms of an increased (or decreased) amount of departures, or the installation of tolls could affect the utilization of the passenger ferry service and the subsequent revenue gained from the service.

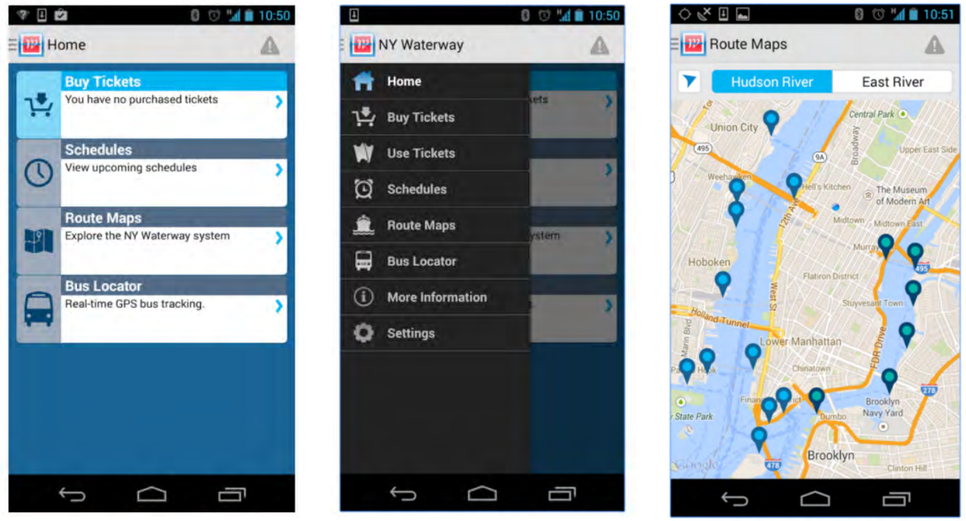


Ticketing

Ticketing is an integral part of providing an upscale and seamless user experience.

The study team recommends that tickets be available for purchase in-person at the ferry terminal, online via a web portal, and via a mobile device application and should be paper and paperless. Tickets should be available to be purchased for the round trip only, with the round trip allowed to span multiple days.

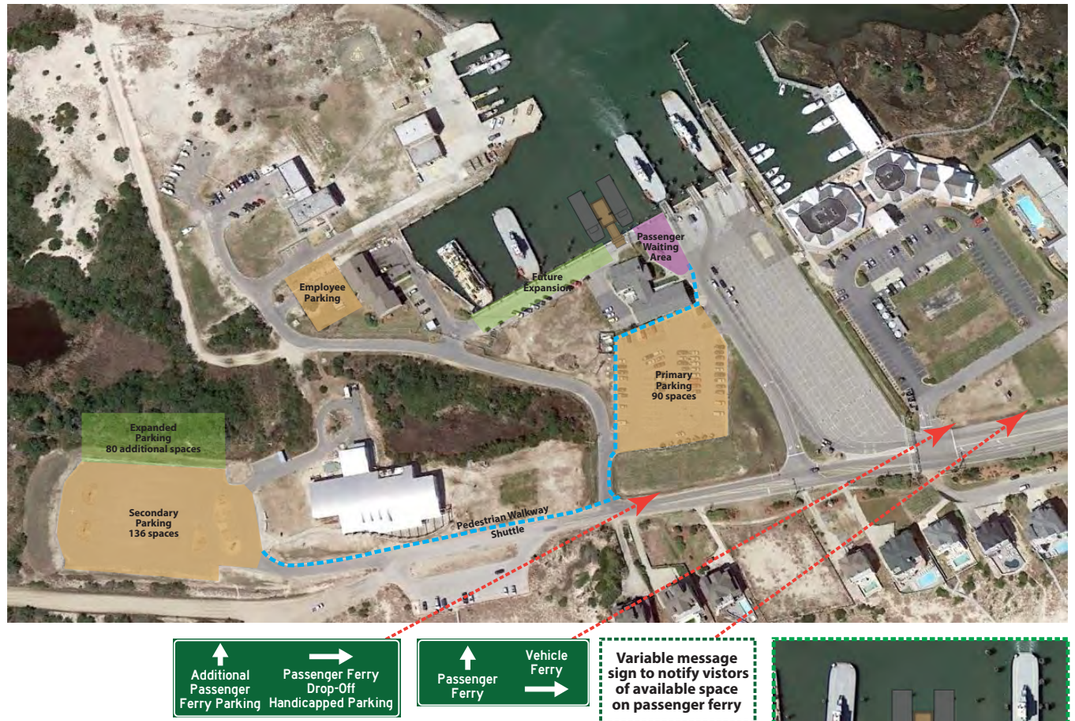
The peer review of other ferry systems identified several ticketing options. The NY Waterway app provides an excellent template for a mobile application that provides a wealth of information, including vessel location, and allows for the purchase and use of online tickets. This application could be populated with the entire ferry system's information to provide additional information and could include information on the recommended transit system for Ocracoke and the existing reservation system could be integrated into this application.

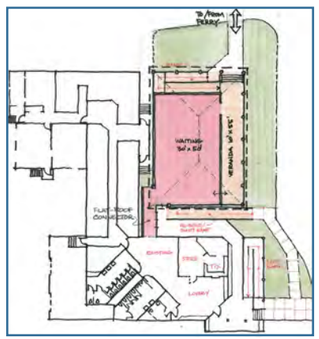


The study team estimates that the ticketing system development, including application development, website development, and ticket collection technology will cost approximately $150,000.

Hatteras Terminal

The Hatteras Terminal will be the origin for most visitors' trips to Ocracoke and the vast majority of passengers are expected to arrive by private vehicle. The following image identifies the improvements proposed for the Hatteras Terminal. These improvements include the following:





Terminal

The existing terminal building contains restrooms and vending facilities that are suitable for use by passenger ferry riders. There is currently an area located just north of the existing terminal building that is currently unused, where a terminal addition could be constructed.

This addition is recommended to be a semi-detached building adjoining the existing ferry terminal and housing the waiting room and veranda, developed in a manner that incorporates the existing ramp. The basis of design provides the following functions:

- Waiting Room
- Veranda (stairs and ramp up to building)
- Interconnect with existing:
  - Terminal lobby
  - Administration
  - Ticketing
  - Restrooms

The suggested architectural style should match/complement the existing terminal building.

Hatteras ferry terminal

The main waiting area should be open-air and have the capacity to comfortably accommodate 115 persons and more than 150 during adverse weather conditions with fold down storm curtains. The veranda provides additional capacity when weather conditions permit.

With a gross building area of approximately 2,400 square feet, the appropriate cost would be $360,000. As the passenger ferry service expands this structure could be converted to a fully enclosed structure with additional restrooms.

Possible Hatteras ferry terminal addition

Parking

Parking will be a key consideration at the Hatteras Terminal, as the vast majority of passengers are expected to arrive by private vehicle. The existing parking lot immediately adjacent to the terminal currently contains approximately 90 spaces.

The study team recommends that this lot be converted to passenger ferry parking and restriped to allow for dropoff adjacent to the passenger ferry terminal. Access should be provided via Museum Drive and Coast Guard Road to separate passenger ferry traffic from vehicular ferry traffic.

As discussed in the Ridership section, a two vessel system with 100 passenger vessels can be expected to generate between 153 and 212 passenger vehicles, leaving a deficit of between 63 and 122 parking spaces necessary outside of the current lot.

The Graveyard of the Atlantic Museum is located adjacent to the ferry terminal and is accessible to the terminal via Museum Drive and Coast Guard Road. This facility is operated by the North Carolina Department of Cultural Resources but is located on land owned by the National Parks Service. This lot currently contains approximately 141 parking spaces. Visual observations by the project team indicate that this lot is currently heavily underutilized. However, observations were not made during the very peak of the tourist season when Graveyard of the Atlantic Museum staff indicate that the lot approaches capacity. The study team recommends that the Ferry Division implement a parking study on this lot in the third quarter of Year 1 to determine the occupancy of this facility over the course of several peak days to determine the number of spaces that could potentially be utilized for patrons of the passenger ferry. If this analysis indicates that spaces are available in this facility, the Ferry Division should work with the North Carolina Department of Cultural resources to designate a section of this lot for passenger ferry passengers and provide shuttle service from the lot to the passenger ferry terminal via Museum Drive and Coast Guard Road. Utilization of this lot by passenger ferry patrons would likely increase visitation to the museum by increasing the visibility of the museum and offering opportunities for additional cultural markers between the parking lot and the ferry terminal.

Possible parking expansion at Graveyard of the Atlantic Museum

Hatteras Landing shopping center parking option

GIS analysis of the environmental conditions surrounding the ferry terminal, as well as physical observations by the study team indicate that the existing Graveyard of the Atlantic Museum parking lot could be expanded to the north to provide additional parking. A preliminary layout of this lot indicates that 84 additional spaces could be provided without any wetland impacts, which would very likely meet the overall parking requirements for two 100 passenger ferries without any utilization of the Graveyard of the Atlantic Museum Parking lot. NCDOT has already begun the environmental analysis associated with this parking facility.

A final parking option would be to purchase or lease land from the Hatteras Landing shopping center to provide additional overflow parking. A preliminary layout on the existing septic area for the facility indicates that 89 spaces could be provided at this location. This lot would need to be constructed of pervious pavement to allow for the continued operation of the septic system. A parking lot in this location is the least attractive from a vehicular and pedestrian flow standpoint, as it would require passenger ferry passengers to cross the vehicle ferry queueing lanes. However, a parking facility at this location would provide greater access to shopping and other amenities in Hatteras Landing.

Hatteras staff parking option

Signage

Signing will be a critical component of ensuring that patrons of the passenger ferry arriving to park get safely and efficiently to their destination. Currently, there is an overhead sign assembly located approximately ¼ mile from the entrance to the ferry terminal that provides direction to the Graveyard of the Atlantic Museum, US Coast Guard Facility, beaches, ferry, and Hatteras Landing. Approximately 400 feet from the overhead sign, NC 12 is split by a center median island and additional signage is provided in the median. Signage to the passenger ferry should be added to the overhead sign assembly on the left-most side along with the Graveyard of the Atlantic Museum and USCG-Beaches sign and the NC 12 Ferry sign should be modified to read NC 12 Vehicle Ferry. The sign in the median should also be modified to provide direction to the vehicle and passenger ferry. One additional sign should be added just east of the existing traffic control signal at the entrance to the vehicle ferry queue lanes to direct passenger ferry patrons to continue straight. A sign directing visitors to the passenger ferry parking and to additional passenger ferry parking should be placed on Museum Drive just east of Coast Guard Road to direct passengers onto Coast Guard Road.

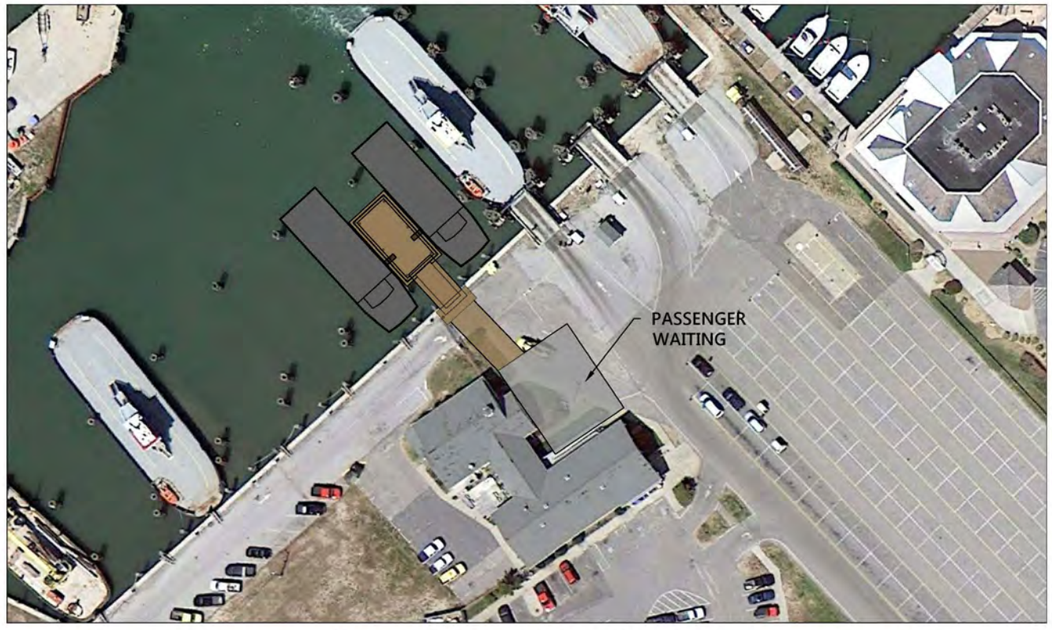
Above: Overhead sign assembly near Hatteras Ferry terminal entrance.

Right: Signage on median of NC 12

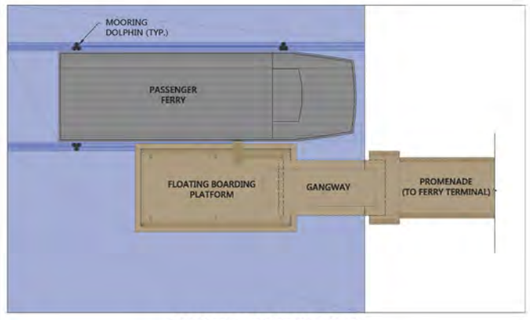
The Ferry Division may also want to consider installation of a variable message sign east of the existing overhead sign assembly that can inform visitors when there are walk-up tickets available for the passenger ferry. This signage should increase ridership during peak times by informing potential vehicle ferry passengers that they have a choice of methods to travel to Ocracoke and that they can board a vessel with a limited wait.

Vessel Loading/Unloading

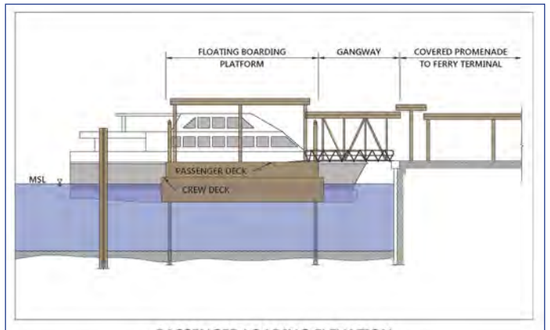
Based on interviews with Bay State Cruises, operators of the Provincetown III, and the literature review, the study team recommends that side loading be used for passenger loading and unloading operations. The advantages of this system are that it allows for simultaneous loading and unloading of two vessels and provides a wide platform for bicycles and other gear that may be carried on to the ferry. A floating boarding platform should be utilized to normalize the loading height with the height of the vessel regardless of tides and the platform should be connected to the terminal by a gangway and covered promenade. The following engineering sketches show the approximate location and design of the boarding platform. A floating boarding platform has a typical lifespan of 15 years.



HATTERAS FERRY LANDING
SITE PLAN TWO VESSEL BERTH



PASSENGER LOADING PLAN



PASSENGER LOADING ELEVATION

The gangway and floating platform is expected to have the following costs.

Hatteras Landing	
Description	**Totals**
Demolition	$45,000
Sitework	$50,000
Gangway and Floating Platform	$202,000
Canopy	$65,000
Floating Dock Mooring Piles	$16,000
Cluster of Timber Piles for Mooring Dolphins	$20,000
Fendering for Mooring Dolphins	$20,000
Fixed Dock	$32,5000
On-Board[1]	$100,000
TOTAL—Low-end Cost (-20%)	**$462,800**
TOTAL—Midpoint Cost	**$578,500**
TOTAL —High-end cost (+20%)	**$694,200**

[1] On-board equipment + utility service (ladders, life ring cabinet, firehouse cabinet, cleats, power module, power pedestals, signage) electrical service + potable water service

Ocracoke Terminal

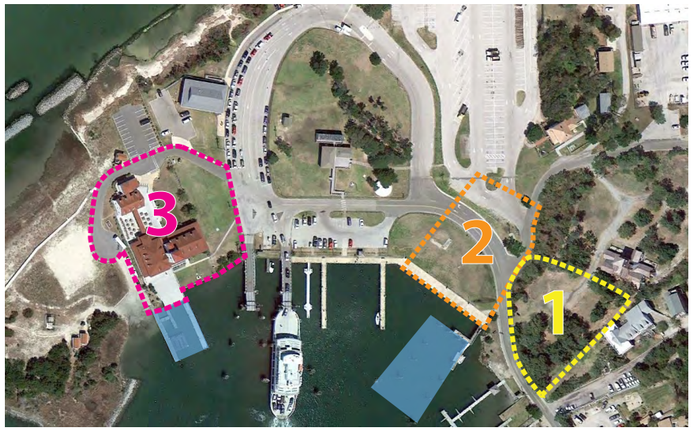
The Ocracoke Terminal will serve as a gateway to Ocracoke Village and will be the first impression that visitors have when arriving to the island and the last impression when leaving. As such, the design and functionality of the terminal is extremely important. The terminal should be designed to disperse passengers disembarking from the ferry in a variety of directions and using a variety of travel modes and must also provide information so that visitors to the island can make informed choices.

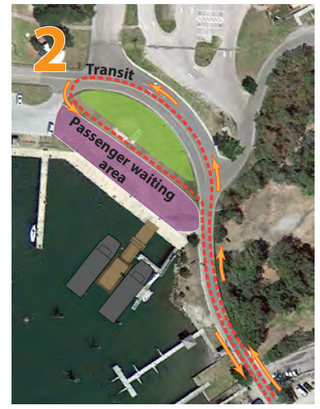
All lands in the terminal area are owned by the National Parks Service and are to CAMA regulations and include items of historical significance. The study team analyzed a variety of options, including

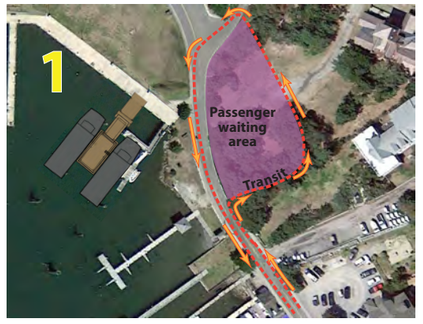
1. Berkley Manor Property
2. National Parks Service Dock Area
3. North Carolina Center for the Advancement of Teaching (NCCAT) Facility

Each of these facilities presented special challenges that prevented them from being the ideal location for a future terminal. The Berkley Manor property was extremely expensive, the NPS Public Dock Facility was greatly complicated by required CAMA setbacks, and the NCCAT facility is on the National Register of Historic Places and would potentially conflict with NCCAT's programs.

Given that the National Parks Service is the primary landowner in the Ocracoke Silver Lake Terminal area, the study team and Ferry Division staff met with National Parks Service staff on September 1, 2015 to discuss possible terminal options. NPS staff indicated that their current visitors center was not meeting their needs and they were interested in partnering on a future terminal at this location that could meet the needs of the NPS, Ferry Division, and Hyde County. This location presents an ideal arrangement for a passenger terminal as it is in close proximity to the ferry docks, there is an existing circulating roadway system that provides access for a future transit system, and there is reasonably convenient pedestrian access into Ocracoke Village.







Short-Term Solutions

To allow for expedient implementation of passenger ferry service, the study team recommends that the Ferry Division work with the NPS to install a temporary covered facility immediately adjacent to the NPS Visitors Center. The architectural style should match/complement the existing NPS building.

The main waiting area should be open air and a minimum of 30'x50, which would comfortably accommodate 115 persons and more than 150 during adverse weather conditions with fold down storm curtains.

With a gross building area of approximately 2,400 square feet, a rough order of magnitude cost would be $225,000. If possible, temporary restrooms should be provided, or signage should be provided to direct patrons to the existing ferry terminal building for restrooms. Signage should also be provided to direct patrons to the existing ferry terminal building for vending and ticket sales. A pullout from the existing parking lot should be provided for transit vehicles and other private shuttles.

The NCDOT is currently developing an environmental analysis for this facility.

Long Term Solutions

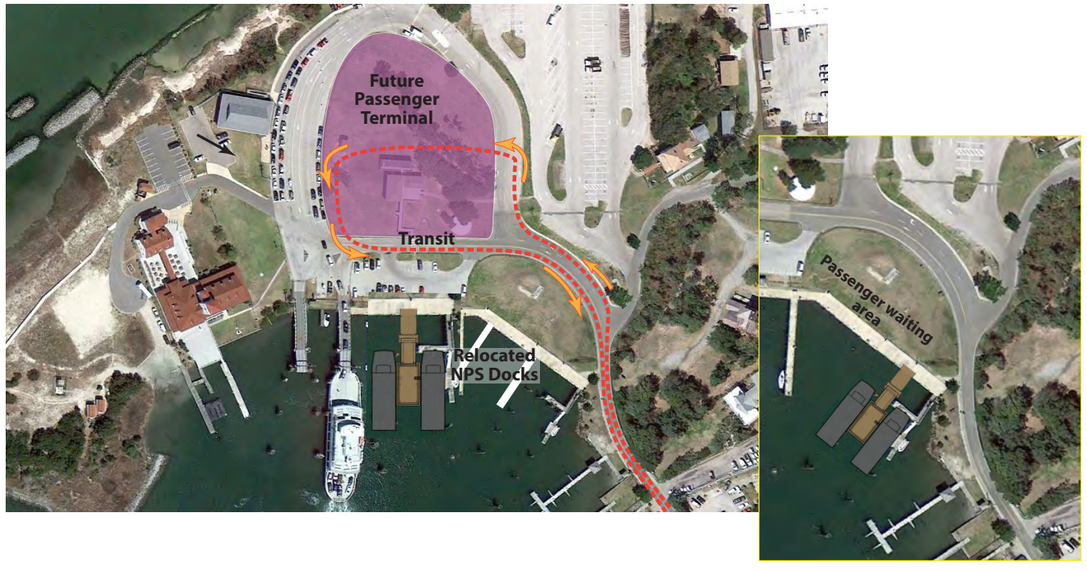
The location of the temporary terminal also provides the ideal location for a permanent facility. The study team recommends that the Ferry Division work with the NPS and Hyde County to develop a programmatic study for a future terminal facility that can accommodate all three entities. For the ferry operations the terminal should contain

- Lobby with small restrooms
- Ticketing & Administration
- Main Waiting with Veranda/Terrace
- Concession/Vending
- Main restrooms
- Main waiting area to accommodate 115 persons and more than 150 during adverse weather conditions
- Separate loading zones for smaller vehicles (golf carts, bicycles, etc) and larger vehicles (cars, trams)

Vessel Loading / Unloading

Similar to the Hatteras Terminal, the study team recommends that side loading be used for passenger loading and unloading operations. There are two options for future docking areas. The first option is to utilize the area in the vicinity of the Ferry Division's current dead slip. The disadvantages to this are that the Ferry Division will lose access to the dead slip, which is occasionally used to tie up sound class ferries or smaller Ferry Division vessels. This arrangement will also put small craft accessing the NPS docks between the sound class and passenger ferries, which if operating simultaneously could cause issues for small craft docking. The second option would be to locate the passenger ferry docking area immediately adjacent to the vehicle ferry and to relocate the NPS floating docks to the east to provide better separation between smaller craft and the larger ferry vessels.

The study team recommends that the Ferry Division work with the NPS to locate the future docking area adjacent to the existing vehicle ferry docking area and to relocate the NPS floating docks to the east.



Costs for the Ocracoke passenger ferry docks are:

Ocracoke Townside Landing	
Description	**Totals**
Gangway and Floating Platform	$202,000
Floating Dock Mooring Piles	$16,000
Cluster of Timber Piles for Mooring Dolphins (3 pilings)	$48,000
Fendering for Mooring Dolphins	$20,000
Fixed Dock	$32,5000
On-Board[1]	$100,000
TOTAL—Low-end Cost (-20%)	**$568,800**
TOTAL—Midpoint Cost	**$711,000**
TOTAL —High-end cost (+20%)	**$853,200**

[1] On-board equipment + utility service (ladders, life ring cabinet, firehouse cabinet, cleats, power module, power pedestals, signage) electrical service + potable water service

Ocracoke Transit

Passenger ferry service will create a scale of demand for public transit that did not exist before. With the multiple transportation options being proposed for the deboarding ferry passengers, the study team estimates that transit would accommodate 45 percent of the immediate departure of passengers. Transit will also accommodate other visitors to the island that arrive via the current vehicle ferry service, which will assist with funding of the transit system.

The study team recommends two types of future transit service:

- The Tram is an open sided shuttle bus that seats approximately 16 people per vehicle. The study team recommends that this service travel a loop route that takes about 20 minutes and serves most of the village attractions. The service should be hop-on-hop-off such that visitors can embark-disembark at any stop. These trams are expected to have a 10-year lifespan.

- A second small light transit vehicle (LTV) is recommended for longer trips to the further areas along the way to South Dock Ferry Terminal ; i.e. village limits/ police station, pony pens, life guard beach, airport etc. This 16-passenger bus is equipped with two wheel chair stations and a lift to assist persons with disabilities that make boarding difficult. The capacity is reduced to 12 when both wheelchair stations are occupied. These LTVsare also expected to have a 10-year lifespan.

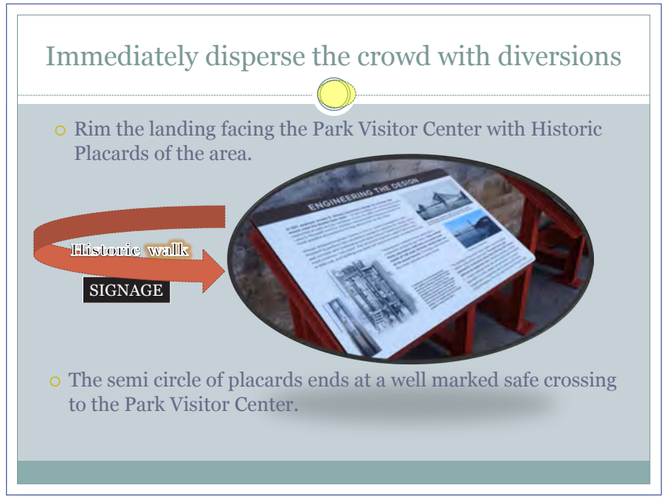
The loop route features 12 stops in the village boundaries. The LTV route is approximately 14 miles long and will provide access to erries on both ends of the Ocracoke Island. This vehicle will also provide for the ability to walk on to the existing vehicle ferry in the event that a passenger misses their passenger ferry departure and no space is available on the next departure.

Given the limited right-of-way in Ocracoke Village, transit stops for the tram will likely be limited to a sign, bench, and trash receptacle. At some locations where additional right-of-way is available a shelter may be feasible. The study team recommends that the loop route operate only during the peak months.

Operations cost estimates range from $185,000 per year with peak-only services to $231,000 per year with slightly expanded service.

Ocracoke Signage and Wayfinding

In a situation where large crowds are all exiting a ferry boat, it is necessary to immediately disperse the crowd. The study team recommends that strategically located directional signs be installed to help to quickly separate the group.



The group that is most familiar with the Island will want to walk immediately towards the restaurants and shops located within 8-10 minutes from the Port (e.g. ¼ mile distance). This group should be guided safely away from the wharf with adequate warning about the narrow sidewalks and will be pointed towards safe roadway crossings.

The passenger ferry also presents the opportunity to install historic placards in the vicinity of the terminal area to inform visitors of the history of the island. A smaller group of people will be attracted to these historic walk placards and will be guided slowly off the landing site by following a ring of historic placards placed along the rim of the National Park property; these historic placards end at a safe crossing point to the National Park Visitor Center and terminal area.

After seeing the Visitors Center, the visitors should be guided by signage to the Ocracoke Preservation Society Museum. This leaves this group ready to catch the second loop of public transportation services. Visitor kiosks filled with brochures and micro scale vending machines (i.e. single shot sun screen); should be installed in the terminal area to occupy visitors that are awaiting transit service.

The NPS parking lot is open to public parking and could accommodate a limited number of pick-ups for hotel shuttles and rental choices that are not best staged immediately at the pier, i.e. off-road-vehicles, horses, etc. The public parking lot is also the logical place for pick-up by friends and neighbors who have their own private cars on the Island.

A large number of people will be attracted to the personal transport options like scooters, golf carts, and bicycles. Those who have pre-booked one of these transport options while still on the ferry should be instructed during the booking to gather at the curbside staging location for pickup.

Ocracoke Pedestrian and Bicycle Improvements

Due to right-of-way constraints, a variety of roadway cross sections exist within Ocracoke Village, with most roadways having dirt shoulders or 3 feet of sidewalk as shown in the figure below. East of Silver Lake Road, NC 12 does have wide paved shoulders.

Due to the limited right-of-way it will be extremely difficult to install new or expanded pedestrian or bicycle facilities. In fact, the biggest improvement to pedestrian and bicycle mobility and safety will be to remove vehicles from the island by use of a passenger ferry.

However, one area is of critical importance. The existing curve on NC 12 just south of Water Plant Roadcurrently has dirt shoulders and has vegetation growing close to the roadway. This area also occasionally experiences higher volumes of vehicular traffic when a sound class ferry is loading or unloading. With the implementation of passenger ferry service, this area will have one of the highest concentrations of pedestrian traffic.

The study team recommends that NCDOT and Hyde County work with the local property owners to install as wide a sidewalk as possible (ideally 5 feet) on both sides of the roadway in this area and trim the existing vegetation to accommodate pedestrians to connect with the future passenger ferry terminal and to provide better visibility between pedestrians and drivers. This sidewalk should connect to the existing sidewalk along NC 12 north of British Cemetery Road.

Bicycle and golf cart rental will also be increasingly important as more visitors come to the island without a vehicle. NCDOT and Hyde County should work with local business owners to promote rental companies in the Hatteras ferry terminal and to arrange for a system for picking up renters at the ferry terminal that disperses travelers and does not interfere with transit operations.

Wide paved shoulders near Old Beach Road

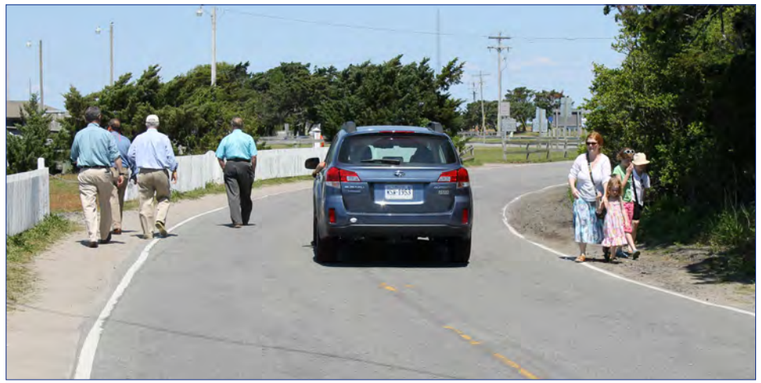
Three-foot sidewalks near Community Square

Recommendations Summary

In summary the study team recommends the following:

- **Two approximately 100-passenger ferries** capable of cruising at approximately 25 knots.
- Using **Rollinson Channel** to access the Pamlico Sound and **Big Foot Slough** to access Silver Lake.
- **Eight round trips per day** with the first departure from Hatteras at 8:00 AM with the last departure from Ocracoke at 8:30 PM May through September.
- A **$15 round trip fare** per passenger.
- **Online and application-based ticketing.**
- Construction of an **open-sided terminal immediately adjacent to the existing Hatteras Terminal.**
- **Parking and passenger drop off** in the existing lot adjacent to the Hatteras Terminal. **Additional parking** located in the existing Graveyard of the Atlantic Museum parking or in a newly constructed lot adjacent to this facility with shuttle service to the Hatteras Terminal.
- **A system of signage**, including a variable message sign, at the approach to the Hatteras Terminal.
- **A floating platform** that allows for berthing of two vessels and side loading/unloading at Hatteras and Ocracoke.
- **Ocracoke docking** immediately adjacent to the existing Sound Class ferry docks.
- **A temporary terminal** located immediately adjacent to the National Parks Service Ocracoke Visitors Center.
- **A permanent terminal** in this same location that will accommodate the Ferry Division, NPS, and Hyde County.
- **A comprehensive signing package** to disperse passengers from the Ocracoke Terminal.
- **A loop transit system on Ocracoke** with 20-30 minute headways.
- **An LTV transit system** to connect the Ocracoke Terminal with the South Dock terminal and provide access to attractions outside of Ocracoke Village.
- **Pedestrian improvements** in the curve along NC 12 just south of Water Plant Road.
- **Coordination with local businesses** to provide golf cart and bicycle rental.

The capital and operating costs, as well as the prioritization of the recommendations are discussed in detail in the following chapter.



Sidewalk is needed in this area

Golf cart rentals will be increasingly important

Bicycle rentals will be increasingly important

5. Implementation

This section of the report details the long-term plan for passenger ferry service and details the parties responsible for implementation of the various recommendations along with a recommended implementation timeline. This section also enumerates the capital and operating costs for each element and presents a 20-year business plan for the NCDOT elements included in the plan.

Responsible Parties

As shown in the Recommendations section, there are many elements that have to come together and operate as a seamless system for passenger ferry service between Hatteras and Ocracoke to be successful. It is important to remember that a passenger choosing to take passenger ferry service is not concerned with who owns the parking lot or operates the transit system, just that they have safe, efficient, convenient, and seamless experience. This will require the participation from many agencies. The following is a list of the recommendations and the responsible parties:

Task	Primary Responsible Party	Secondary Responsible Party(s)
Procure/operate/maintain ferry vessels	NCDOT Ferry Division	
Develop environmental document for Hatteras/Ocracoke improvements	NCDOT PDEA	NCDOT Ferry Division, NCDOT Division 1
Construct Hatteras terminal building	NCDOT Ferry Division	NCDOT Division 1
Procure/install Hatteras signing	NCDOT Ferry Division	NCDOT Division 1
Repave/restripe Hatteras terminal parking lot	NCDOT Ferry Division	NCDOT Division 1
Perform Graveyard of the Atlantic Museum Parking Study	NCDOT Ferry Division	NCDOT Division 1 , NCDCR
Construct new Hatteras parking lot	NCDOT Ferry Division	NCDOT Division 1, NC Department of Cultural Resources (Current Lot Operator), NPS (Landowner)
Construct new Hatteras employee parking	NCDOT Ferry Division	NCDOT Division 1
Procure Hatteras shuttle	NCDOT Ferry Division	NCDOT Division 1
Procure and Install floating dock and dolphins at Hatteras and Ocracoke	NCDOT Ferry Division	
Develop ticketing system	NCDOT IT	
Dredge of Rollinson Channel	US Army Corp of Engineers	
Construct Ocracoke terminal building	NCDOT Ferry Division	NCDOT Division 1 , NPS (landowner)
Develop/Install Ocracoke wayfinding	NCDOT Ferry Division	NCDOT Division 1, NCDCR (historical markers), NPS (landowner), Hyde County
Procure transit vehicles	NCDOT Ferry Division	NCDOT Division 1, Hyde County Transit (operator)
Install transit stops	NCDOT Ferry Division	NCDOT Division 1, Hyde County Transit (operator)
Operate transit system	Hyde County Transit	
Design/construct pedestrian improvements	NCDOT Ferry Division	NCDOT Division 1
Coordinate with local bicycle and golf cart rental companies	Hyde County	
Develop/Implement Advertising Plan	NCDOT Communications Office	NCDOT Ferry Division

Implementation Timeline

There is a wide variety of tasks that are necessary to complete before a passenger ferry service can be implemented. The study team worked with the Ferry Division and the Steering Committee to develop an implementation timeframe with a target of beginning service in the spring of Year 2. The graphic on the following page details that timeline.

It should be noted that the timeframe for increasing the number of vessels on the route depends on a number of factors. As previously discussed, while this analysis developed ridership estimates based on Hatteras-Ocracoke vehicle ferry remaining toll-free, the implementation of tolls on that route could increase the potential ridership of the passenger ferry. Additionally, any other changes to the vehicle ferry service, such as a change in the number of departures could increase or decrease the ridership on the passenger ferry, primarily due to the changes in wait times at the Hatteras and Ocracoke South Dock terminals.

The study team recommends that the Ferry Division evaluate the ridership on the passenger ferry service after two years and look to expand service with additional vessels approximately three years after the start of service, as ridership at that point should be stable enough to make an assessment of the size of additional vessels that should be procured.

The study team recommends that the Ferry Division evaluate the ridership on the passenger ferry service after two years and look to expand service with additional vessels approximately three years after the start of service, as ridership at that point should be stable enough to make an assessment of the size of additional vessels that should be procured, as the current ridership analysis indicates that the recommended 100-passenger vessel will be full on multiple departures during the peak months. The Ferry Division may very well wish to procure a 150-passenger vessel when expanding service to allow for additional capacity, as the recommended facilities in this report are capable of accommodating a vessel of that size and 150 passengers in a single run.

Pedestrian Ferry Implementation Timeline

Year 1
Complete environmental documentation and permitting for docks and temporary terminal facilities
Begin planning and environmental documentation for permanent terminals and parking facility expansion
Design and construct docks, signing, parking lot resurfacing, relocated employee parking, and temporary terminals
Design and construct transit stops
Design and construct sidewalk improvements on Ocracoke
Procure transit vehicles
Develop web and kiosk based ticketing infrastructure
Begin advertisement of future service

Complete Feasibility Study

Year 2
Begin service spring of Year 3
Begin transit service on Ocracoke
Complete planning and environmental documentation for permanent terminals
Begin design for permanent terminals and parking facility expansion

Year 3
Complete design for permanent terminals
Bid construction of permanent terminals

Year 4
Begin construction on permanent terminals
Construct parking facility expansion
Upgrade ticketing infrastructure to handle additional departures

Year 5
Expand service to additional vessels
Expand transit service on Ocracoke with additional vehicles
Complete construction of permanent terminals

Year 9
Begin planning and design for additional Hatteras terminal parking

Year 11
Construct additional Hatteras terminal parking

Year 12
Expand service to additional vessels
Expand transit service with additional vehicles

Year 22
Expand service to additional vessels
Expand transit service with additional vehicles

5-year Critical Path Schedule

	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Year 1																				
Environmental documentation and permitting for docks and temporary terminal facilities																				
Design docks, signing, parking lot resurfacing, relocated employee parking, and temporary terminals																				
Construct docks, signing, parking lot resurfacing, relocated employee parking, and temporary terminals																				
Design transit stops																				
Construct transit stops																				
Design sidewalk improvements on Ocracoke																				
Construct sidewalk improvement on Ocracoke																				
Procure transit vehicles																				
Develop web and kiosk based ticketing infrastructure																				
Advertisement of future service																				
Planning and environmental documentation for permanent terminals and parking facility expansion																				
Year 2																				
Begin ferry service																				
Begin transit service on Ocracoke																				
Design for permanent terminals and parking facility expansion																				
Year 3																				
Bid construction of permanent terminals																				
Construction on permanent terminals																				
Year 4																				
Upgrade ticketing infrastructure to handle additional departures																				
Construct parking facility expansion																				
Year 5																				
Expand ferry service to additional vessels																				
Expand transit service on Ocracoke																				
	16				17				18				19				20			

Capital and Operating Costs

While capital and operating costs were detailed for the specific elements in Recommendations section, the table below summarizes these costs.

Capital Costs

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
100 Passenger Ferry (1)	$3,300,000																				
100 Passenger Ferry (2)		$3,300,000																			
100 Passenger Ferry (3)					$4,011,170																
100 Passenger Ferry (4)												$5,644,000									
Ticketing Application and Infrastructure	$150,000																				
Hatteras Terminal Building	$360,000																				
Terminal Parking Lot Overlay and Restriping	$60,000																				
Graveyard of the Atlantic Museum Parking Lot Overlay and Restriping		$90,000																			
Construction of Additional Parking Lot		$65,000																			
Parking Lot Shuttle		$5,000										$8,550									
Construction of Employee Parking	$45,000																				
Hatteras Docks	$578,500															$578,500					
Hatteras Signage		$20,000																			
Ocracoke Temporary Terminal	$225,000																				
Ocracoke Docks	$418,500															$418,500					
Ocracoke Signage		$10,000																			
Ocracoke Transit Vehicles	$240,000				$145,860							$615,700*									
Ocracoke Transit Stops	$33,000																				
Ocracoke Ped/Bike Improvements		$50,000																			
Total	**$5,410,000**	**$3,540,000**	**$-**	**$-**	**$4,157,030**	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**	**$6,268,250**	**$-**	**$-**	**$-**	**$997,000**	**$-**	**$-**	**$-**	**$-**	**$-**
Non Vessel Costs	$2,110,000	$240,000			$145,860							$624,250				$997,000					

Does not include construction of permanent Ocracoke Terminal. Costs after Year 2 escalated by 5 percent per year. *Includes transit vehicle addition and replacement

Based on the infrastructure needs to start the new service, the capital costs are heavily front-loaded. After the initial two years of investment, the only additional capital costs are the purchase price for new vessels and the expansion in the number of transit vehicles on Ocracoke to accommodate the additional visitors without vehicles. Additional expansion of parking facilities will also be needed prior to the implementation of a fourth passenger ferry. These capital costs do not include construction of a permanent Ocracoke terminal, as a programmatic study of terminal facilities is recommended to be performed which will identify the needed uses in the passenger ferry terminal across all of the participating users and can help identify costs attributable to each user.

The following operating costs table shows operating costs for NCDOT, which are primarily limited to additional vessel operation costs, staffing for the terminals and a shuttle, driver. Some additional utilities costs may be incurred due to the expanded facilities, but these will be limited. The Ocracoke Transit System costs are expected to be borne by Hyde County Transit.

Ferry Division Operating Costs

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
Ferry																					
Maintenance		$231,000	$231,000	$231,000	$346,500	$346,500	$346,500	$346,500	$346,500	$346,500	$346,500	$462,000	$462,000	$462,000	$462,000	$462,000	$462,000	$462,000	$462,000	$462,000	$462,000
Labor		$224,156	$224,156	$224,156	$336,234	$336,234	$336,234	$336,234	$336,234	$336,234	$336,234	$448,312	$448,312	$448,312	$448,312	$448,312	$448,312	$448,312	$448,312	$448,312	$448,312
Fuel and Lubricants		$448,144	$448,144	$448,144	$672,216	$672,216	$672,216	$672,216	$672,216	$672,216	$672,216	$896,288	$896,288	$896,288	$896,288	$896,288	$896,288	$896,288	$896,288	$896,288	$896,288
Total Ferry		$903,300	$903,300	$903,300	$1,354,950	$1,354,950	$1,354,950	$1,354,950	$1,354,950	$1,354,950	$1,354,950	$1,806,600	$1,806,600	$1,806,600	$1,806,600	$1,806,600	$1,806,600	$1,806,600	$1,806,600	$1,806,600	$1,806,600
Employee Shuttle Operation		$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000	$22,000
Terminal Attendent (4)		$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888	$129,888
Total Cost		**$1,055,188**	**$1,055,188**	**$1,055,188**	**$1,506,838**	**$1,506,838**	**$1,506,838**	**$1,506,838**	**$1,506,838**	**$1,506,838**	**$1,506,838**	**$1,958,488**	**$1,958,488**	**$1,958,488**	**$1,958,488**	**$1,958,488**	**$1,958,488**	**$1,958,488**	**$1,958,488**	**$1,958,488**	**$1,958,488**
Cost Escalation		**1**	**1.04**	**1.07**	**1.11**	**1.15**	**1.19**	**1.23**	**1.27**	**1.32**	**1.36**	**1.41**	**1.46**	**1.51**	**1.56**	**1.62**	**1.68**	**1.73**	**1.79**	**1.86**	**1.92**
Total Cost		**$1,055,188**	**$1,092,120**	**$1,130,344**	**$1,670,658**	**$1,729,131**	**$1,789,651**	**$1,852,289**	**$1,917,119**	**$1,984,218**	**$2,053,666**	**$2,762,641**	**$2,859,333**	**$2,959,410**	**$3,062,989**	**$3,170,194**	**$3,281,151**	**$3,395,991**	**$3,514,851**	**$3,637,870**	**$3,765,196**
Revenue																					
Annual Ridership		74,800	74,800	74,800	120,000	120,000	120,000	120,000	120,000	120,000	120,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000
		15	15	15	16	16	16	17	17	17	18	18	18	19	19	19	20	20	20	21	21
Fare		$1,122,000	$1,122,000	$1,122,000	$1,920,000	$1,920,000	$1,920,000	$2,040,000	$2,040,000	$2,040,000	$2,160,000	$2,880,000	$2,880,000	$3,040,000	$3,040,000	$3,040,000	$3,200,000	$3,200,000	$3,200,000	$3,360,000	$3,360,000
Total Operating Cost		**$66,812**	**$29,880**	**$(8,344)**	**$249,342**	**$190,869**	**$130,349**	**$187,711**	**$122,881**	**$55,782**	**$106,334**	**$117,359**	**$20,667**	**$80,590**	**$(22,989)**	**$(130,194)**	**$(81,151)**	**$(195,991)**	**$(314,851)**	**$(277,870)**	**$(405,196)**

As indicated in the operating costs analysis, assuming a $15 per round trip fare, the Ferry Division will incur a yearly per-passenger operating cost of approximately $2.45, or approximately $183,548 per year for the first few years of service.

Funding

Based on the capital costs table above there are expected to be $2,350,000 in non-vessel capital costs in Year 1 and Year 2 and $7,800,000 in vessel costs for a total of $10,150,000 in total capital costs. Funding for the passenger ferry capital and operations costs are expected to come from a variety of sources. These sources could include:

- Eastern Federal Lands Access Program (EFLAP), which provides $5,370,288 for capital improvements in North Carolina and is matched by $1,342,572 in state and local monies
- Transportation Investment Generating Economic Recovery (TIGER) discretionary grant program which funds capital investments in surface transportation nationwide
- Fixing America's Surface Transportation Act (FAST Act), which provides an additional $13 million per year nationwide, for a total of $80 million per year in funding for construction of ferry boats and terminal facilities
- NCDOT's Strategic Prioritization Process, which prioritizes transportation funding in North Carolina for capital expenditures for all modes

Transit Cost and Funding

This section attempts to convey four essential points:

1. There is a cost analysis model that can be adjusted once actual arrival data is tabulated,
2. There are still some unknowns therefore a range of shortfall was considered (minimum verse intense service),
3. The Ferry Division is confident that the money can be found to cover the transit shortfall,
4. Neither Federal Transit Administration (FTA) nor State Rural Assistance (ROAP) funds are required to support the island transit circulation operations.

The cost of the transit service was based on operations only during the tourist season, e.g. specifically to serve the passenger ferry service schedule. The study team considered how the expected 125,000 passengers might be distributed by trip to ensure this demand could be served adequately by the recommended 8 ferry trips per day (see appendices). The transit ridership table below matches the details of those ferry passenger arrivals estimates. The only difference is that 34% of the deboarders are expected to choose personal transportation options (i.e. walking, bicycles, golf carts, etc.), so the numbers in the table below represent the passenger seats needed each time we "meet (the) ferry."

Transit Ridership - Seats to accommodate 66% of deboarding ferry passengers

Seats made available		*358*	*660*	*744*	*744*	*744*	*660*	*593*
Transit Rider	**arrive**	**April**	**May**	**June**	**July**	**August**	**September**	**October**
Meet ferry	9:00	15	22	33	46	42	28	17
Circulator	10:00	12	17	25	35	32	21	13
Meet ferry	11:00	20	29	44	60	55	36	22
Circulator	11:30	19	27	40	50	50	33	21
Meet ferry	12:00	39	57	66	66	66	66	44
Circulator	12:30	12	17	25	35	32	21	13
Circulator	13:00	19	27	40	50	50	33	21
Circulator	13:30	12	17	25	35	32	21	13
Meet ferry	14:00	24	36	53	66	66	44	27
Circulator	14:30	12	17	25	35	32	21	13
Meet ferry	15:00	37	54	66	66	66	66	41
Circulator	16:00	12	17	25	35	32	21	13
Meet ferry	17:00	15	22	33	46	42	28	17
Circulator	17:30	19	27	40	50	50	33	21
Meet ferry	18:00	12	17	25	35	32	21	13
Circulator	19:30	39	57	66	66	66	66	44
Last ferry	20:00							

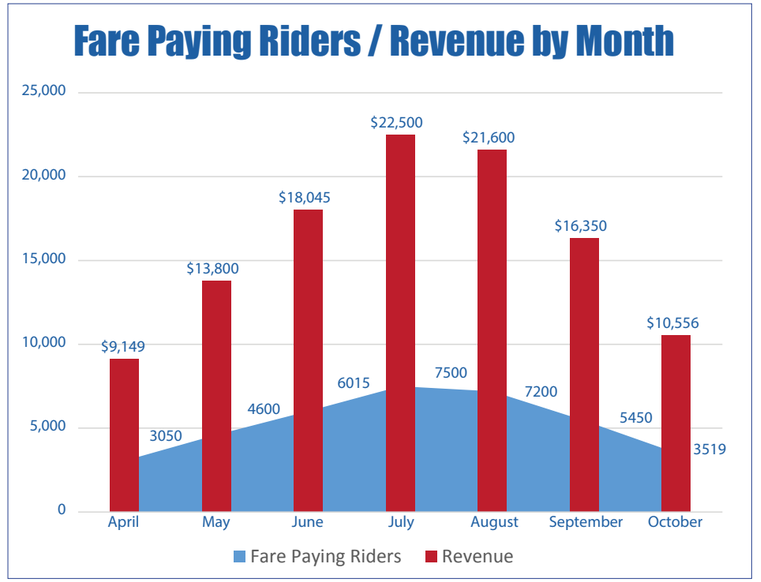
Color code for vehicle configuration

Tram only (white cell)	Tram + 1 trailer	2 Trams + 1 trailer	2 Trams + 2 trailers	Tram + trailer + LTV	2 Trams + 1 trailer + LTV
16 seats	33 seats	49 seats	66 seats	50 seats	66 seats

The seat volume then determines the vehicle configuration that best serves the 66 percent of the deboarders, and the vehicle configuration is what drives the cost of operation. The table above also shows "circulator" trips throughout the day on roughly a 30-minute headway; vehicles for these trips must be configured to seat passengers returning for ferry departure, as well as seats to carry people to other attractions throughout the island.

To be family friendly the transit would allow small children to ride for free while teens and adults would purchase a $3.00 button good for unlimited trips throughout the day. Buttons rather than tickets are recommended to eliminate the need for fare box collection.

Based on 37,333 fares being collected during the April to October period, the annual fare revenue contribution towards operating cost is $112,000.



In order to establish a cost estimate for the needed level of service, two separate scenarios were modeled; a "minimum service" with a long season plus the use of special trailers designed to double the seating capacity, and three motorized trams but no trailers, "circulates continuously" over a slightly shorter season, as recommended by the Hyde County Transit Director. The "minimum service" uses a $53.42 cost per hour (rate suggested in the most recent Hyde County Transit five-year plan) applied to the vehicle trips shown in the ridership table above. The "minimum service" of 3,300 annual operating hours would cost approximately $185,000 annually. After the $112,000 in fare revenue is applied, the annual shortfall becomes roughly $73,000. The Hyde County Transit Director took a different approach in estimating cost. She calculated the various inputs needed to "start-up" an intense "continuous loop service," which would deliver 5,260 operating hours at an estimated annual cost of about $231,000 (see appendices for line-by-line considerations). After the $112,000 in fare revenue is applied, the annual shortfall of this more expensive scenario is about $119,000.

The Ferry Division is very confident such levels of shortfall in annual transit funds would be accommodated in some fashion either by the department or through some combination of local and state support. Some possible revenue sources discussed included:

- Lodging fee of $3 per room/cottage (~$85,000 annually),
- Advertising on the vehicles per year (~$1,500 annually),
- Dedicated fund from the Hyde County annual budget (TBD).

At this time, the project is not anticipating FTA operations or capital funding. Further is it recommended, by the Hyde County Transit Director, that Rural General Public funding not be used for seasonal Ocracoke service, because this funding is completely depleted by the existing Hyde County transit services.

Next Steps

As shown in the implementation timeline, there are many tasks that must be completed by a variety of organizations during Year 1 to begin ferry service in the spring of Year 2. The study team has broken down the immediate next steps into the following timeframes:

First and Second Quarter of Year 1

Given the demonstrated need for additional ferry service between Hatteras and Ocracoke, and the variety of sources available for funding the capital improvements necessary, the study team recommends that the Ferry Division continue the environmental documentation process that is being performed by the NCDOT Project Development and Environmental Analysis unit and NCDOT Ferry Division should immediately begin the planning and design process for the Hatteras and Ocracoke terminal and other infrastructure improvements, minus the new Hatteras parking facility. Additionally the team recommends that the Ferry Division begin the process of procuring a passenger ferry, as the lead times for such vessels are often in excess of one year, and begin coordination with the USACE on dredging of Rollison Channel. Finally, Hyde County should begin to work with local landowners to locate transit stops, as the process to secure transit easements or land purchases could be well in excess of a year, and begin to work with NCDOT on any legislative changes necessary to allow the Ferry Division to collect a surcharge on each ticket to fund the Ocracoke Transit system.

Third and Fourth Quarter of Year 1

In the third quarter of Year 1 the NCDOT Ferry Division should perform a parking study on the Graveyard of the Atlantic Museum facility to determine the amount of parking that could be available for passenger ferry riders. After this study is completed decisions can be made regarding the need for additional parking. If additional parking is needed, the planning and design for an additional lot should begin immediately. NCDOT should also initiate an architectural planning study for a permanent terminal on Ocracoke along with the NPS and Hyde County. In this timeframe, NCDOT should also begin development of the ticketing infrastructure to allow ample time for beta testing. Hyde County transit should initiate procurement of the transit vehicles to allow for sufficient lead time for delivery. Construction of the terminal facilities, including the waterside facilities, should begin in the third quarter of Year 1.

First Quarter of Year 2

Construction of the terminal facilities, signage, and transit stops should be completed in first quarter of Year 2. The Ferry Division should also perform trial runs of the newly delivered passenger ferry during this period to ensure smooth operations in the second quarter of Year 2. NCDOT should also begin promotion of the passenger ferry service to make future travelers to Ocracoke aware of the service.

Second and Third Quarter of Year 2

Passenger ferry service will begin in the second quarter of Year 2. Depending on the procurement of a second passenger ferry vessel, this vessel may be placed in to service later than the first vessel, preferably before the end of the second quarter.

Fourth Quarter of Year 2

In the fourth quarter of Year 2 the Ferry Division, Hyde County, and the other stakeholders should convene a meeting to discuss the operations of the passenger ferry to determine if any additional changes to the service are needed for it to run more smoothly and efficiently. The architectural study of the future permanent Ocracoke terminal should also be completed during this time period and the design of the structure can be started.

The tasks outlined above will carry the Ferry Division through the implementation and first season of operation. After this time period future activities will be focused on refining and expanding the service as per the implementation timeline included at the beginning of this chapter.

Passenger Ferry Feasibility Study

OCRACOKE-HATTERAS

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

NORTH CAROLINA FERRY SYSTEM

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