



# Cape Hatteras National Seashore

## Alternative Transportation Study for Bodie Island District:

### *Alternative Transportation Analysis*



Sunset at Bodie Island District (Viewing Platform, Roadside Pull-off along NC 12)  
Source: Volpe Center photograph (August 2010)

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## Report Notes

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## Acronym List

AADT	Annual average daily traffic
AASHTO	American Association of Highway Transportation Officials
ACS	American Community Survey
ADA	American Disability Act
ATPPL	Alternative Transportation in Parks and Public Lands
BID	Business Improvement District
BILH	Bodie Island Lighthouse
CCRTA	Cape Cod Regional Transit Authority
CID	Community Improvement District
CIRS	Case Incident Reporting System
CMP	Corridor Management Plan
CRIMES	Crime Reporting Incident Management Entry System
CTIP	Coordinated Technology Implementation Program
CUA	Commercial Use Authorization
CUYD	Cubic Yards
DCTS	Dare County Transportation System
DOI	Department of Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
FLHP	Federal Lands Highway Program
FLREA	Federal Lands Recreation Enhancement Act
FTA	Federal Transit Administration
FWS	Fish & Wildlife Service
GMP	General Management Plan
HARS	highway advisory radio system
HSIP	Highway Safety Improvement Program
IT	information technology
ITS	intelligent transportation systems
ICPTA	Inter-County Public Transportation Authority
IMARS	Incident Management, Analysis, and Reporting System
LH	Lighthouse
LOS	Level of service
MDT	Montana Department of Transportation
MOU	Memorandum of Understanding
mph	miles per hour

MUTCD	Manual of Uniform Traffic Control Devices
NCDOT	North Carolina Department of Transportation
NEPA	National Environmental Policy Act
NHS	National Historic Site
NM	National Memorial
NPS	National Park Service
NS	National Seashore
NSBP	National Scenic Byways Program
NWR	National Wildlife Refuge
OBSB	Outer Banks Scenic Byway
O&M	Operations and maintenance
ONPS	Operation of the NPS
ORV	Off-road vehicle
PEPC	Planning, Environment, and Public Comment
PLHDP	Public Lands Highway Discretionary Program
PMIS	Project Management Information System
PRP	Park Roads and Parkways
RIP	Road Inventory Program
RPO	Rural planning organization
RTCA	Rivers, Trails, and Conservation Assistance
RTP	Recreational Trails Program
SAFETEA-LU	Safe Accountable Flexible Efficient Transportation Equity Act – A Legacy for Users
SDEIS	Supplemental draft EIS
SR	secondary road
STARS	Service-wide Traffic Accident Reporting System
STIP	State Transportation Improvement Plan
STP	Surface Transportation Program
SQYD	square yards
TAB	Transportation Advisory Board
TAG	Transportation Assistance Group
TE	Transportation Enhancements
TIF	Tax Increment Financing
TMA	transportation management association
TODS	Tourist Oriented Directional Signage (TODS) Program
TRIP	Paul S. Sarbanes Transit in Parks Program
VMS	variable message sign
VSP	Visitor Services Program

# 1. Introduction

This document is the third and final report for the Cape Hatteras National Seashore (NS) Alternative Transportation Study for Bodie Island District. The document builds upon the evaluation of regional and local transportation conditions provided in the Conditions Inventory/Assessment report and the identification of unmet transportation needs in the Needs Assessment report. The purpose of this report is to describe and evaluate proposed alternative transportation strategies, with particular attention to the feasibility of several transit options but also consideration of improvements to policies and roadway, parking, bicycle, pedestrian, marine, wayfinding, and traveler information facilities. This study provides planning-level recommendations and estimates for the staff of Cape Hatteras NS to inform future decision-making, but is not a decision document.

## 1.1 *Report organization*

This report provides the alternative transportation recommendations for the study area, including a discussion of implementation considerations, and provides an implementation plan.

The organization of the Alternative Transportation Analysis report is as follows:

- Section 1.2 presents the overall alternatives analysis study approach, including the criteria employed for evaluating strategies;
- Section 1.3 provides an overview of the public involvement process conducted during the study;
- Section 2 presents descriptions and evaluations of potential strategies, organized into the following categories: transit; planning and programming; roadway; parking; bicycle; pedestrian; marine; wayfinding and traveler information (within each category, the strategies are listed in order from short term, executable, and/or high priority strategies to longer-term strategies, which may require additional considerations and/or may become a priority under future conditions);
- Section 3 provides information on funding sources, the proposed implementation plan regarding timeline and partnership, and a summary of the strategies;
- Section 4 presents overall conclusions and recommendations;
- Appendix A contains documentation of the public outreach effort conducted during the final study phase; and
- Appendix B contains information on transit operational considerations, including management models, financing, vehicle types including fuels, parking, storage and maintenance, and marketing.

## 1.2 *Approach*

Following completion of the Conditions Inventory/Assessment and the Needs Assessment reports, the study team compiled a draft list of 45 potential alternative transportation strategies (see Appendix A). The study team developed the strategies in consultation with Cape Hatteras NS staff and based on stakeholder input solicited during the initial outreach activities in January 2010. The strategies specifically address issues described in the Conditions Inventory Assessment and identified in the Needs Assessment. The study team then revised and refined the list to 38 potential strategies and six potential transit routes based on research and additional input from public outreach in August 2010 (see Section 1.3).

The revised list of potential strategies that are evaluated in this report is presented in Table 1. The study team recognizes that by the time this study was completed, Cape Hatteras NS had already proposed and

in some cases completed parts of the strategies included in this report. These strategies are marked in italics in the table and accompanied by the status of these projects as of the finalization of this report. Their inclusion was made to ensure a complete list and to provide specific recommendations for their implementation and future improvement.

**Table 1**  
**Final List of Proposed Strategies**

Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)
<b>Transit</b> (see Section 2.1 for more details)	
N/A	Explore opportunities for a regional transit system and/or temporary shuttle service from satellite parking as a partnership.
<b>Planning and programming strategies</b>	
1	Encourage the development of a regional transportation committee
2	Participate in Dare County Comprehensive Transportation Plan (to start in 2011 or 2012)
3	Develop a comprehensive signage plan
4	Implement a reservation system for Lighthouse climbing at Bodie Island Lighthouse that includes a management system for motorcoach and school bus visitation
5	Collect alternative transportation visitation information
6	Collect information on parking lot utilization at major parking lots on Bodie Island
7	Conduct a transportation focused visitor survey
8	Conduct a marketing campaign to promote alternative transportation to and through Cape Hatteras NS
9	Implement park-level practices to encourage alternative transportation
10	<b>Prepare for adoption of the Department of Interior (DOI) Incident Management Analysis, and Reporting System (IMARS)*</b>
11	Offer and/or encourage interpretive alternative transportation tours of Bodie Island
12	Offer NPS employees a bicycle share program, combined with volunteer bicycle patrols
<b>Infrastructure strategies</b>	
<b>Roadway</b>	
13	<b>Change outgoing speed limit from 25 mph to 15 mph on Lighthouse Bay Drive (RIP Route #0202)*</b>
14	<b>Add advance information and warning signage at roadside pull-offs*</b>
15	<b>Add share the road/bicycle signs along planned expanded shoulders on NC12*</b>
16	<b>Reduce speed limit along NC 12 near Bodie Island attractions, if a traffic/safety study verifies the need for, and appropriateness of, such a strategy*</b>
17	<b><i>Widen Lighthouse Bay Drive (RIP Route #0202<sup>1</sup>) (project partially complete)*</i></b>
18	<b>Construct southbound and northbound exclusive right turn lanes on NC12 at Lighthouse Bay Drive (RIP Route #0202) intersection, if a traffic/safety study verifies the need for, and appropriateness of, exclusive right turn lanes*</b>
<b>Parking</b>	
19	Add a northern entrance/exit to the Coquina Beach parking lot
20	<b>Add a viewing platform for Bodie Island Lighthouse and pull-off area on the west side of NC 12, parallel to the road, if a traffic/safety study verifies the need for, and appropriateness of, such a strategy*</b>
21	Reconfigure, relocate, and/or expand the capacity of Bodie Island Lighthouse parking, including spaces for motorcoaches and oversized vehicles
22	Designate seasonal satellite shared parking for transit service
23	Develop vehicle parking with bicycle and pedestrian accommodations at northern end of Bonner Bridge
<b>Bicycle</b>	
24	<i>Provide bicycle racks at all Bodie Island District sites (pursuing funding)</i>

<sup>1</sup> Federal Highway Administration, Eastern Federal Lands Highway Division, Road Inventory Program (RIP), Cycle 3

Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)
25	<b>Connect bicycle infrastructure in South Nags Head to NC12 (along South Old Oregon Inlet Road, RIP Route #0011)*</b>
26	Create a bicycle amenity station at Bodie Island Lighthouse and Whalebone Junction
27	<b>Connect NC 12 shoulder to Nags Head multi-use trail at Whalebone Junction*</b>
28	Enhance nonmotorized infrastructure along SR 1243
29	<b>Add a bicycle lane along NC 12*</b>
30	<b>Add a multi-use path parallel to NC 12*</b>
<b>Pedestrian</b>	
31	Install pedestrian infrastructure on NC12 at Bodie Island sites
32	Install pedestrian infrastructure on NC12 at Whalebone Junction
33	Extend the Dike Trail to the intersection of Lighthouse Bay Drive (RIP Route #0202) and NC 12
<b>Marine</b>	
34	Develop formal Sound access for non-motorized watercraft
35	Provide kayak/canoe rental concessions within the Bodie Island District
36	Investigate potential for water taxi/ferry services between Bodie Island and other parts of the Outer Banks
<b>Wayfinding and Traveler Information</b>	
37	Add bicycle/pedestrian directional signage at key locations
38	Provide static and/or real-time transportation information online, by phone, by radio, and or/via variable message sign

The strategies were developed with a focus on the study goals and objectives, which were identified in the Needs Assessment and are listed again in Table 2. The goals and objectives are based on the study proposal, feedback from Cape Hatteras NS staff and stakeholders at the January scoping meeting, and the goals of the Paul S. Sarbanes Transit in Parks Program, which funded this study. Table 31, on page 87, shows which strategies address which goals.

**Table 2**  
**Alternative Transportation Study Goals and Objectives**

Goal	Objective(s)
To conserve natural, historical, and cultural resources	<ul style="list-style-type: none"> <li>To minimize impacts to resources</li> </ul>
To reduce congestion and pollution	<ul style="list-style-type: none"> <li>To decrease vehicle miles traveled</li> </ul>
To improve visitor mobility and accessibility.	<ul style="list-style-type: none"> <li>To improve visitor access and circulation</li> <li>To improve connectivity within area as well as to area from other sites</li> </ul>
To enhance the visitor experience	<ul style="list-style-type: none"> <li>To enhance health, safety, and security</li> </ul>
To ensure access to all, including persons with disabilities	<ul style="list-style-type: none"> <li>To provide access to individuals without access or ability to drive a vehicle</li> <li>To provide infrastructure that can accommodate all users</li> </ul>
To achieve efficient management, operations and maintenance	<ul style="list-style-type: none"> <li>To estimate future visitation for Bodie Island Lighthouse to assess needs of potential future visitation</li> <li>Provide a financially sustainable transportation system in which life -cycle revenue exceeds (or is equal to) life-cycle costs</li> </ul>
To coordinate with NPS and other planning entities and stakeholders as appropriate	<ul style="list-style-type: none"> <li>To identify relevant plans and studies</li> <li>To identify potential conflicts and partnerships</li> </ul>

This study provides an assessment of each strategy according to a set of implementation considerations, or evaluation criteria, shown in Table 3. These considerations are based on best practices from similar

transportation planning efforts and adapted for Cape Hatteras NS. Section 2 describes technical feasibility, cost, and partnerships in more detail for each strategy and if available also provides examples of how other National Park Service sites or other locations have implemented similar strategies. Funding sources are discussed in more detail in Section 3.1, except for funding sources for transit, which are discussed in Section 2.1 and Appendix B. Table 31, on page 87, provides a summary assessment of the strategies for the criteria in Table 3, including funding, as well as indication of which study goals are addressed and the relevant location or scale at which the strategy would take place.

**Table 3**  
**Transportation strategy evaluation criteria**

Goal	Description	Value
Technical feasibility	Identification of key steps that need to be taken to implement the strategy, including any required processes (e.g., environmental impact), and the level of complexity and difficulty.	Minimal difficulty Moderate difficulty High difficulty Unknown difficulty
Timeline	Estimation of the length of time required to implement a strategy.	Short-term (0-5 years) Mid-term (5-10 years) Long-term (10+ years)
Cost	Planning-level capital and annual operations and maintenance (O&M) cost estimates and considerations where such information is readily available and/or significant. Includes qualitative impact on park staff time and park resources.	Low <= \$5,000 Medium - \$5,001 - \$100,000 High - > \$100,000
Funding	Identification of key funding programs available to NPS or partners.	N/A
Partnerships	Potential agencies, organizations, groups, or other entities with which NPS will likely need to coordinate to implement the strategy.	List of entities
Examples	Models of the strategy in other National Park Service (NPS) units, Federal Land Management Agency units, or other locations	N/A

### 1.3 Public involvement

The study team and NPS staff engaged in public outreach activities throughout the duration of the study to encourage full public participation in the transportation planning process. An initial stakeholder meeting was held in January 2010 with identified individuals involved in transportation planning or related efforts in the region.<sup>2</sup> In July and August 2010, additional public outreach was conducted including a public comment period on completed study documents and a public meeting. Materials for this outreach are included in Appendix A. These efforts were not done as part of a formal, National Environmental Planning Act (NEPA) process. For those strategies that NPS decides to pursue and that require environmental impact assessment under NEPA, NPS will conduct the formal NEPA public involvement process.

Between Wednesday, July 21, 2010, and Thursday, August 19, 2010, the NPS solicited input, via its Planning, Environment, and Public Comment (PEPC) website, on the draft study products developed thus far and a draft list of proposed alternative transportation strategies.<sup>3</sup> In addition, a public meeting was held at the First Flight Centennial Pavilion at Wright Brothers National Memorial in Kill Devil Hills, North Carolina, on Wednesday, August 4, 2010, from 3:30 p.m. to 5:30 p.m. The primary purpose of the meeting was to

<sup>2</sup> A full description of this meeting can be found in the Conditions/Inventory Report (Section 1.4 and Appendix A).

<sup>3</sup> For more information see, <http://parkplanning.nps.gov/parkHome.cfm?parkID=358&CFID=34075&CFTOKEN=77874594&jsessionid=d23074314cfac67190fe357261677e727451>



solicit input on the draft potential strategies, provided in Appendix A, although feedback was also solicited for the two draft reports, the Conditions Inventory/Assessment and the Needs Assessment.

NPS staff developed a press release, newsletter, and letter to stakeholders who participated in the January 13, 2010 stakeholder meeting to announce the meeting (see Appendix A). NPS made available these materials as well as draft study materials online and established a public comment period from July 21 to August 19. Four responses were received during the comment period, representing two individuals, an environmental group, and a local municipality. Comments received were positive and supportive of the proposed draft potential alternative transportation strategies. The meeting's PowerPoint presentation and a detailed write-up of the comments received are included in Appendix A.

The public meeting was attended by ten people, including two NPS staff members, an interested resident, and officials from local government, nonprofit, and planning entities, including:

- Nags Head,
- Albemarle Rural Planning Organization,
- U.S. Fish & Wildlife Service (FWS),
- Dare County,
- Oregon Inlet Fishing Center,
- Outer Banks Visitor Bureau, and
- OBSB Committee.

The study team delivered a presentation and answered questions from participants. The presentation covered the study purpose, completed tasks (Conditions Inventory/Assessment and Needs Assessment), and next steps, including the draft list of potential transportation strategies. The presentation also provided information on two national parks that have implemented alternative transportation systems (Acadia National Park and the Cape Cod National Seashore), to include transit, bicycle and pedestrian access, and intelligent transportation systems, which consist of a variety of electronic technologies to collect, process, communicate, and disseminate relevant information to travelers.<sup>4</sup>

During the discussion, the following specific topics were discussed:

- Where kayak and canoe access to the Roanoke Sound would work best;
- Consideration of a bicycle/pedestrian off-road paved or unpaved connection between the end of secondary road (SR) 1243, or Old Oregon Inlet Road, and Coquina Beach;
- The impact of the opening of Bodie Island Lighthouse to climbing and the lighthouse's limited capacity for potential visitation;
- The feasibility of transit in terms of cost, partnerships, and routes/stops; and
- The timeline and next steps for each alternative transportation strategy.

Participants also noted their support for certain strategies, such as the bicycle connections between the Nags Head multi-use trail on SR 1243 with NC 12, a pull-off viewing area for Bodie Island Lighthouse, improved signage, and consideration of transit options.

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<sup>4</sup> For example, systems consisting of variable message signs, traveler information websites, and advisory radio systems, can provide travelers with information on traffic accidents/incidents, weather conditions, road construction or closures, or parking availability, which allows travelers to make better decisions about when, where, and how to travel to minimize both their own inconvenience, or additional impacts on a strained transportation network.

## 2. Identification and evaluation of potential alternative transportation strategies

This section provides a description and assessment of each of the 38 potential strategies listed in Table 1 on page 2 for the criteria described in Table 3 on page 4. Transit strategies are presented differently than the other strategies in that general implementation considerations are discussed first, followed by an analysis of three of the six potential routes. The strategies are organized in subsections by the following mode or topic areas:

- Transit
- Planning and programming
- Roadway
- Parking
- Bicycle
- Pedestrian
- Marine
- Wayfinding and traveler information

Each subsection provides information on technical feasibility, cost, and partnerships and if available also provides examples of how other National Park Service sites or other locations have implemented similar strategies. Within each subsection, the strategies are listed in order from short term, executable, and high priority strategies to longer-term strategies, which may require additional considerations and/or may become a priority under future conditions. Phasing and prioritization of the strategies will be considered further in Section 3.2.

Within this section, aside from transit, two maps are provided that illustrate the location of all strategies except planning and programming, and a few additional strategies that were not assigned specific geographic locations (Strategies 36 – water taxi/ferry and 38 – static and real-time transportation information). Figure 7, on page 43 after Section 2.3 (Roadway), illustrates the location of roadway and parking strategies while Figure 13, on page 61 after Section 2.5 (Bicycle), illustrates the location of bicycle, pedestrian, marine, and wayfinding and traveler information strategies. In addition, one of the potential locations for Strategy 22 (satellite parking) is shown in Figure 2 on page 15.

## 2.1 *Transit*

This section consists of recommendations for transit system operation, an analysis of three sample potential routes to serve the Bodie Island District, and recommendations for how Cape Hatteras NS could consider transit moving forward. Appendix B provides general information on considerations for transit, such as management models, financing and vehicle selection and types. This information is being provided for reference for NPS and transit partners if it is determined that there is sufficient interest and funding to pursue a system in the future. The research and analysis presented draws upon previous transit work that the Volpe Center has conducted for other public land units as well as previous transit work conducted for the Outer Banks region.<sup>5</sup>

### **Transit system operation recommendations**

Cape Hatteras NS staff report that the unit is currently not in a position to provide operations or maintenance funding or management oversight to directly operate a transit service on its own or contract with another entity to provide the service due to staff and resource constraints. As concessions can also require a significant amount of park resources for oversight and administration, at this time it is recommended that Cape Hatteras NS consider cooperative agreement/partnership models, NPS examples of which are listed in Table 4, rather than service contract/concessions or NPS operated models. In a partnership, a range of roles for NPS are possible, from helping with funding and management to participating in planning and providing permissions for the shuttle to serve stops within NPS.

According to NPS guidance,<sup>6</sup> under a cooperative agreement, a written legal instrument is used to document the scope, funding, and other details of a relationship between NPS and a state or local government or other non-federal recipient in which the principal purpose is to transfer money, property, services, or other to the recipient to support an NPS public program or purpose. It assumes substantial involvement by both parties and covers a span of one to five years. A cooperative agreement for transit within NPS usually involves a park unit transferring transit vehicles, purchased with federal funds, to a state department of transportation or local public transit agency, to operate a system that serves the park.

The study recommends that Cape Hatteras NS initiate discussion with Dare County Transportation Services (DCTS), the only nearby public provider of transit, and local towns to investigate an opportunity for partnerships in the future. For funding a system, Cape Hatteras NS should first work with partners to identify a feasible management arrangement and a sustainable funding for operations and maintenance. Once that has been established, Cape Hatteras NS should coordinate with the NPS Southeast Region Office to seek approval for its involvement and to consider funding sources for capital expenses, such as the vehicles and bus shelters. The primary sources of such funding for NPS are the Paul S. Sarbanes Transit in Parks (TRIP) Program of the Federal Transit Administration (FTA) and the Federal Lands Highway Program (FLHP) Park Roads and Parkways Program (PRP) of the Federal Highway Administration. Under this recommendation, there is not currently a need to look at vehicle types and other operations considerations. However, general information, including additional information on funding resources, is provided in Appendix B for future consideration and use in discussions with partners.

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<sup>5</sup> Includes the Outer Banks Transportation Study (2006) and three county studies by the KFH Group: Ocracoke Island Public Transit Implementation Study (2005), Dare County Public Transportation Implementation Plan (2006), and Corolla Public Transit Implementation Study (2006).

<sup>6</sup> National Park Service Agreements Handbook. <http://www.nps.gov/hfc/acquisition/agreements.htm>

**Table 4**  
**Examples of NPS cooperative agreements/partnerships for transit**

Park	Partner	Description of service
Acadia National Park <sup>7</sup> (Island Explorer)	Maine Department of Transportation and Downeast Transportation	NPS purchased the vehicles and leased them to Maine DOT and Downeast Transportation and also funds half of the operational costs. Downeast Transportation operates the service and takes care of all the maintenance and operations.
Cape Cod National Seashore	Cape Cod Regional Transit Authority (CCRTA)	NPS purchased the vehicles and leased them to the CCRTA, who operates services that provide connections within the region, including to the Seashore's Visitor Center.
Glacier National Park <sup>8</sup>	Flathead County's Eagle Transit and Montana Department of Transportation (MDT)	MDT and the park jointly funded the purchase of the vehicles and the park partially funded Eagle Transit's operation of the vehicles. Vehicles are to be used during the summer at the park and elsewhere in Montana the remainder of the year. Note that the park also has two separate, interpretive transit tours operated under concessions contracts.
San Juan National Historic Site <sup>9</sup>	City of San Juan and CODEVISA	Park purchased vehicles that are operated by the City of San Juan and CODEVISA and serve the park's various sites.

### Sample route analysis

The purpose of this section is to provide a preliminary analysis of sample routes so as to inform Cape Hatteras NS and its partners for any consideration of transit for the future. Although this analysis assesses the potential demand, or expected ridership, for and financial feasibility of the sample services, it is limited by the lack of data available for demand and the dependence of cost on ridership and on several other service assumptions. Despite these limitations, this analysis provides a framework and baseline assumptions with which to demonstrate relative costs and benefits of each sample route. The analysis can also be used in the future once more refined data and assumptions are available.

Drawing upon input from Cape Hatteras NS staff and stakeholders who participated in the January 2010 stakeholder meeting and August 2010 public meeting, the study team identified six transit route options for consideration. The six routes are described in Table 5. The list is not intended to be comprehensive but presents a full range of alternatives based on analysis and consideration of public and NPS input. An added value of this service for visitors may be the inclusion of an on-board interpretive program that shares details on the history, area attractions, and wildlife of the region. It is unlikely that the introduction of transit, unless it is at a large scale, would reduce congestion on the roads in the area, and since there is no opportunity for transit vehicles to bypass congestion, transit would not reduce time spent traveling between locations.

For the purposes of this study, the study team and Cape Hatteras NS officials selected three of the six routes for further analysis and potential route scenario development. These three routes (B, D, and E) were selected to provide a good spectrum of transit services in terms of investment and geographic scope and demonstrate the greatest applicability for the needs of the park and region. These routes as presented are intended to provide an example of what a transit system would involve but are not vetted or decided upon routes. It is important to note that the route options presented are not mutually exclusive – it might be possible and desirable to implement one route as a short-term measure while preparing to implement another route in the long term once funding becomes available or there becomes a need or demand for such a route. The other three routes listed in Table 19 could still be considered in the future though they

<sup>7</sup> <http://www.nps.gov/acad/parkmgmt/upload/ie.pdf>

<sup>8</sup> <http://www.nps.gov/glac/parknews/news07-13a.htm>

<sup>9</sup> <http://www.nps.gov/saju/parknews/san-juan-national-historic-site-inaugurates-new-trams.htm>

were considered to be less feasible and of less interest to Cape Hatteras NS and stakeholders than the three selected for further analysis.

**Table 5**  
**Route options**

Route Options		Route description (all are assumed to run seasonally – June through September)	Number and location of stops	Distance of route round-trip (miles and minutes) <sup>10</sup>
A	Coquina Beach-Bodie Island Lighthouse (BILH) Shuttle	Small shuttle or trailer hitched to truck from Coquina Beach to the BILH for parking management control at the LH.	2- Coquina Beach and BILH	2.6 mi (12 min)
B	Bodie Island District Circulator	Small shuttle within the Bodie Island District.	4- BILH, Coquina Beach, Oregon Inlet Fishing Center, and Oregon Inlet Campground	7.6 mi (29 min)
C	NPS connector	Small or medium sized shuttle among three main NPS sites in the northern Outer Banks.	4- Fort Raleigh NHS, Wright Brothers National Memorial (NM), BILH, and Coquina Beach	49.2 mi (104 min)
D	Satellite parking shuttle for BILH	Small or medium sized shuttle from satellite location (e.g., Outer Banks Visitor Center) to the BILH.	3 - Satellite parking, BILH, and Coquina Beach	22.1 mi (50 min)
E	Regional connector	Medium shuttle among major public destinations and the three main NPS sites in the northern Outer Banks.	9 - Fort Raleigh NHS, downtown Manteo, Roanoke Island Festival Park, Outer Bank Welcome Center, Jennette's Pier, Jockey's Ridge State Park, Wright Brothers NM, BILH and Coquina Beach	51.1 mi (113 min)
F	Southern connector	Medium shuttle between Hatteras ferry terminal, Cape Hatteras LH, and BILH.	3- Hatteras Ferry terminal, Cape Hatteras LH, and BILH	113 mi (174 min)

The rest of this section provides assumptions, service characteristics and estimated costs for each of the three sample routes selected for further analysis.

#### *Cost and service assumptions*

The preliminary route scheduling and financial analysis presented here calculates the estimated number of vehicles and cost based on a series of inputs including desired frequency, proposed number of stops along the route, estimated average speed, and estimated hourly operating cost. Total transit costs include both capital and operating costs, which are dependent on management of the service and service characteristics, such as hours of service and type of vehicle. The assumptions used in this approach include the following:

- Vehicles will be leased initially to test the service for long-term feasibility. The flexibility of a lease offers some cost-efficiencies and the ability to adjust service and offer limited seasonal service.
- The vehicle lease cost (see Table 6) is based on a 45-passenger bus with fairly standard features and amenities, such as ADA accessibility and air conditioning. As described in Appendix B, a variety of vehicle types exist and the appropriate vehicle type may differ for each route service. The route analyses below discuss what the appropriate vehicle type may be based on potential

<sup>10</sup> Time of route assumes an average speed of 20, 30, or 40 MPH, 1 minute dwell time per intermediate stop, and 3 minutes layover time between runs.

demand and vehicle capacity (see Table 6) and other route characteristics. This information is provided to inform Cape Hatteras NS and its partners and is not a recommendation for vehicle purchase.

- All three routes are assumed to operate daily, from 9AM to 5PM, over an 18-week (126-day) season spanning June, July, August, and September. It may make sense for some routes to limit operations to 3-4 days per week (either based on visitation patterns with a peak on Wednesday or distributed throughout the week). Such considerations will be discussed by route.
- An examination of the route alignment, in terms of road speeds, was used to estimate the average vehicle speed of the routes, which varies from 20 mph to 30 mph.
- Using these assumptions, the cost is calculated based on the number of vehicles required, the number of days of service, and the number of vehicle operating hours (see Table 6).

In addition, in terms of potential ridership, since transit service would be new to the park, there is little information available to accurately project potential ridership. However, an estimate of the anticipated daily ridership is presented using several assumptions and the best available information. The methodology uses three different capture rates, or percent of visitors visiting the site likely to ride transit, of 3%, 10%, and 25% of the average daily visitation for June, July, August, and September from 2005-2009 for the NPS sites served by each route (see Table 6 for baseline data; visitation data for the entire Cape Hatteras NS is provided for reference only as the analysis instead uses the Bodie Island District visitation data). These percentages are based on estimates used for other NPS transit studies and actual NPS ridership.<sup>11</sup> In addition, another calculation was made based on a capture rate of 10 percent of parking capacity at the stops served on each route, with some exceptions as noted (see the section for each route for data). This estimate assumes that all the parking lots served are full and have no turnover (vehicles are parking there all day). In comparing the two methodologies, the parking-based estimate corresponds to the capture rate of 3% of visitation for the NPS sites served.

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<sup>11</sup> National Park transit use have found capture rates for voluntary transit systems ranging from 3 percent for the Cape Cod Provincetown Shuttle to 40 percent for the Yosemite Area Regional Transit Systems (YARTS) (US DOT Federal Transit Administration. *Transportation Planning Process for Transit in Federal Land Management Areas*. Volume III, Table A-3. April 2008)

**Table 6**  
**Transit service cost and service assumptions and calculations**

Seasonal Capital Cost (lease cost)	(\$225/vehicle-week) <sup>12</sup>	x ( number of weeks) x (number of vehicles)
		+
	(\$6/vehicle-hour)	x (vehicle operating hours)
		+
Seasonal Operating Cost	(\$60/vehicle-hour) <sup>13</sup>	x (vehicle operating hours)
Total Seasonal Cost		

Type of Service	Hours of Operation			Days of Operation	Number of Vehicles	Service Hours
	Begin	End	Total			
Daily	9.00	17.00	8	7	1	56
					2	112

Vehicle Size	Maximum Daily Capacity	
	<i>(assuming 16 runs with 1 vehicle)</i>	<i>(Assuming 16 runs with 2 vehicles)</i>
24-passenger cutaway vehicle / Tram	384	768
45-passenger transit bus / Tram	720	1,440

NPS Site	5-Year Average Daily Visitation for June, July, August, and September (2005-2009)	Estimated Daily Ridership		
		3%	10%	25%
Cape Hatteras NS	10,089	303	1,009	2,522
Bodie Island <sup>14</sup>	9,258	278	926	2,315
Bodie Island Visitor Center	4,511	135	451	1,128
Wright Brothers NM	2,191	66	219	548
Fort Raleigh NHS	1,557	47	156	389

#### Route B: Bodie Island Circulator

Route B, the Bodie Island Circulator, proposes the operation of a local shuttle within the Bodie Island District. The transit service would provide visitors, including campers, with an opportunity to experience the District's three main developed sites without using their personal motor vehicles: the Bodie Island Visitor Center, Coquina Beach, and the Oregon Inlet Fishing Center. Figure 1 shows the route map. Visitors would be attracted to this service because it would eliminate the need to drive between these sites and risk losing a parking space in doing so. Campers may be particularly interested in this service since they are already in the area and it would allow different party members to pursue different activities at the same time without competing for use of the personal motor vehicle.

<sup>12</sup> 2010 GSA vehicle lease rates for full size school and cutaway buses, which include all maintenance and fuel expenses, range from \$675 to \$1,138 per month plus \$0.42 to \$0.58 per mile. \$900 per month plus \$0.50 per mile are assumed as reasonable rates for this analysis. An average of 12 miles per hour is assumed to translate the mileage cost into an approximate hourly cost of \$6 per vehicle-hour.

<sup>13</sup> Federal Transit Administration, Technical Assistance Committee (FTA-TAC) Financial Sustainability Presentation reported operating costs ranging from \$34 to \$80 per vehicle-hour for federal land transit systems, July 2010. \$60/hour was chosen as an average and as also reflecting the assumption used by the KFH Group in its transit studies for Dare County, Currituck County, and Hyde County (\$55/hour in 2006, which adjusted for inflation would be just below \$60/hour).

<sup>14</sup> Visitation by site – other than the Bodie Island Visitor Center – is not available for the Bodie Island District. Thus, total Bodie Island visitation is calculated from an inductive loop traffic counter located on NC 12 south of Whalebone Junction. The traffic count is reduced for non-recreation traffic by multiplying the traffic count by a seasonally-adjusted non-recreation adjustment multiplier. The reduced traffic count is then multiplied by a seasonally-adjusted recreation persons-per-vehicle multiplier.



Beginning at the Bodie Island Visitor Center, this route alignment travels east to Coquina Beach before heading south to the Oregon Inlet Fishing Center and Campground. The route completes its 7.6 mile course back at the Bodie Island Visitor Center. The estimated total running time for this route is 29 minutes, enabling the park to offer a 30 minute service frequency with one vehicle and 15 minute frequency with two vehicles. Operating characteristics for Route B are shown in Table 7.<sup>15</sup>

**Table 7**  
**Operating characteristics: Route B**

Type of Service	Distance (miles)	Number of Stops	Average Speed (mph)	Run Time (Min)	Dwell Time per intermediate stop (Min)	Layover Time (Min)	Total Running Time (Min)
Daily	7.6	4	20	23	1	3	29

As mentioned above, this study is only able to provide a rough estimate of the daily ridership to be expected based on visitation and parking capacities and assumed capture rates. This estimate is provided in Table 8. The standard 10 percent capture rate was assumed for all parking areas served with the exception of the campground as campers may be more likely to take the service. The result is an estimated daily ridership of 221. This estimate corresponds with a 3% capture rate assumption for the average summer daily visitation for the Bodie Island District. Higher capture rates, 10% and 25%, would result in significant increases but are unlikely given the availability of free parking within the site. Based on the vehicle capacity information in Table 6 above, a smaller vehicle, such as the cutaway or tram, would be most appropriate for this route. A cutaway-vehicle is limited by one entrance but would provide air-conditioning and sufficient space for beach and/or camping gear.

**Table 8**  
**Potential estimated ridership: Route B**

Stop	Number of parking spaces	Number of people (assuming 2.7 per vehicle/campsite)	Assumed capture rate (% of people likely to use shuttle)	Number of potential riders (Daily)
Bodie Island Lighthouse	53	143	10	14
Coquina Beach	180	486	10	49
Oregon Inlet Fishing Center	285	770	10	77
Oregon Inlet Campground	120	324	25	81
Total Daily				221
Total Seasonal (126 days)				27,828

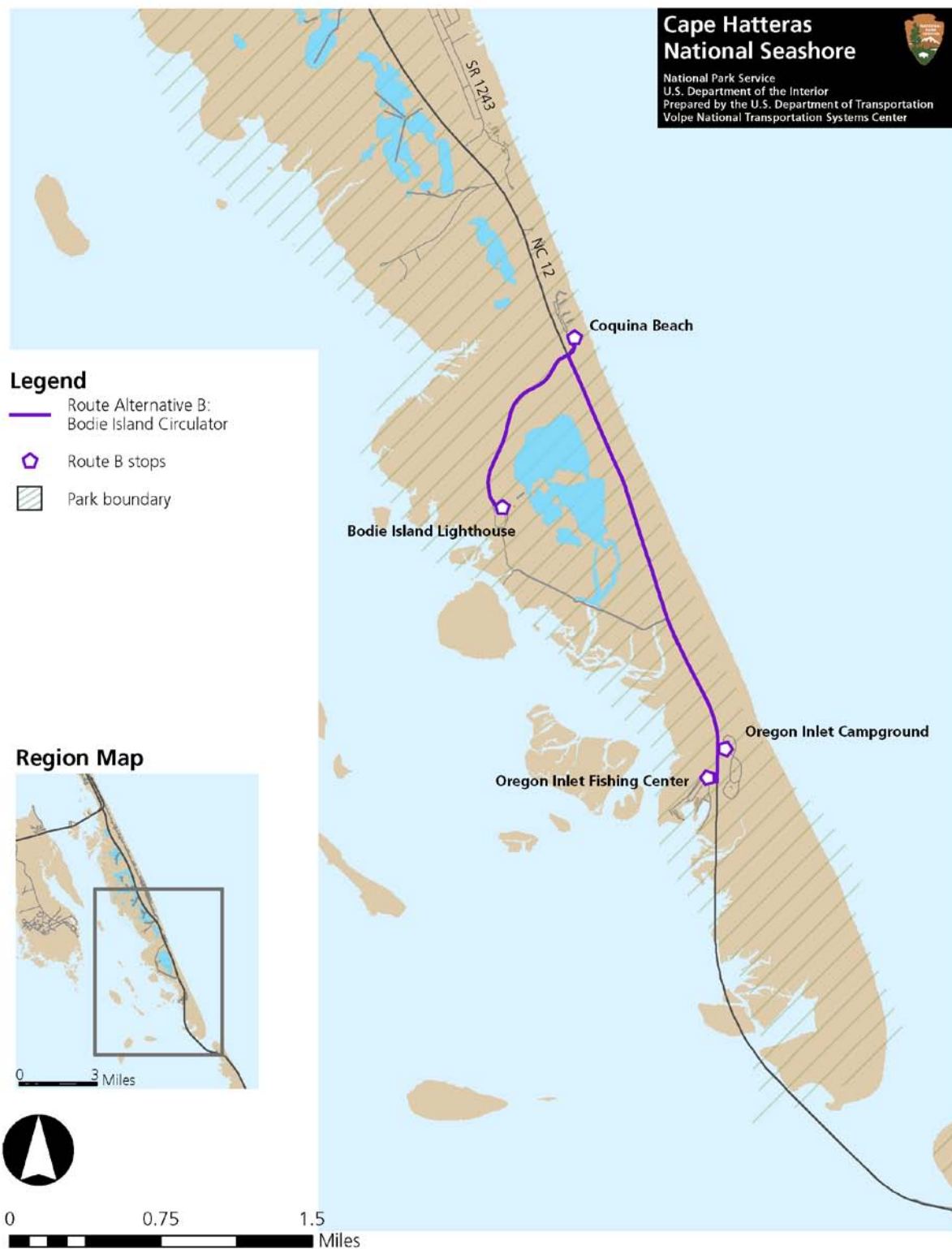
Time Period	Bodie Island <sup>16</sup> Visitation Based on 5-Year Average Daily Visitation for June, July, August, and September (2005-2009)	Estimated Ridership		
		3%	10%	25%
Daily	9,258	278	926	2,315
Seasonal (126 days)	1,166,508	34,995	116,651	291,627

<sup>15</sup> Run Time refers to the time required to travel the distance of the route; Dwell Time refers to the time estimated for each stop other than the first; and Layover Time refers to the time estimated for between runs. Total Running Time is calculated from the Run Time, Dwell Time multiplied by the number of intermediate stops, and Layover Time.

<sup>16</sup> Visitation by site – other than the Bodie Island Visitor Center – is not available for the Bodie Island District. Thus, total Bodie Island visitation is calculated from an inductive loop traffic counter located on NC 12 south of Whalebone Junction. The traffic count is reduced for non-recreation traffic by multiplying the traffic count by a seasonally-adjusted non-recreation adjustment multiplier. The reduced traffic count is then multiplied by a seasonally-adjusted recreation persons-per-vehicle multiplier.



**Figure 1**  
**Route B map**  
 Source: Volpe Center



#### Route D: Satellite Shuttle Parking for BILH

Route D, the Satellite Shuttle Parking for BILH, proposes the operation of a shuttle linking Bodie Island to a satellite parking area. The voluntary transit service would provide the park with an opportunity to minimize traffic to/from Bodie Island, directly linking a designated satellite parking area (Strategy 22) with Bodie Island attractions, and provide additional seasonal access to Bodie Island Lighthouse without providing more parking on-site. Figure 2 shows the route map; for Alternative D, the Outer Banks Welcome Center is assumed to be the designated satellite parking area, though others at a similar distance from Bodie Island Lighthouse may also be able to be identified.

Beginning at the Bodie Island Visitor Center, this route alignment travels north, stopping at Coquina Beach before continuing north along NC 12 to US-64, where the vehicle would head west to the Outer Banks Welcome Center. The route completes its 22.1 mile route returning to the Bodie Island Visitor Center. The estimated total running time for this route is 50 minutes, enabling the park to offer a 60 minute service frequency with one vehicle or 30 minute frequency with two vehicles. Operating characteristics for route D are shown in Table 9.<sup>17</sup>

**Table 9**  
**Operating characteristics: Route D**

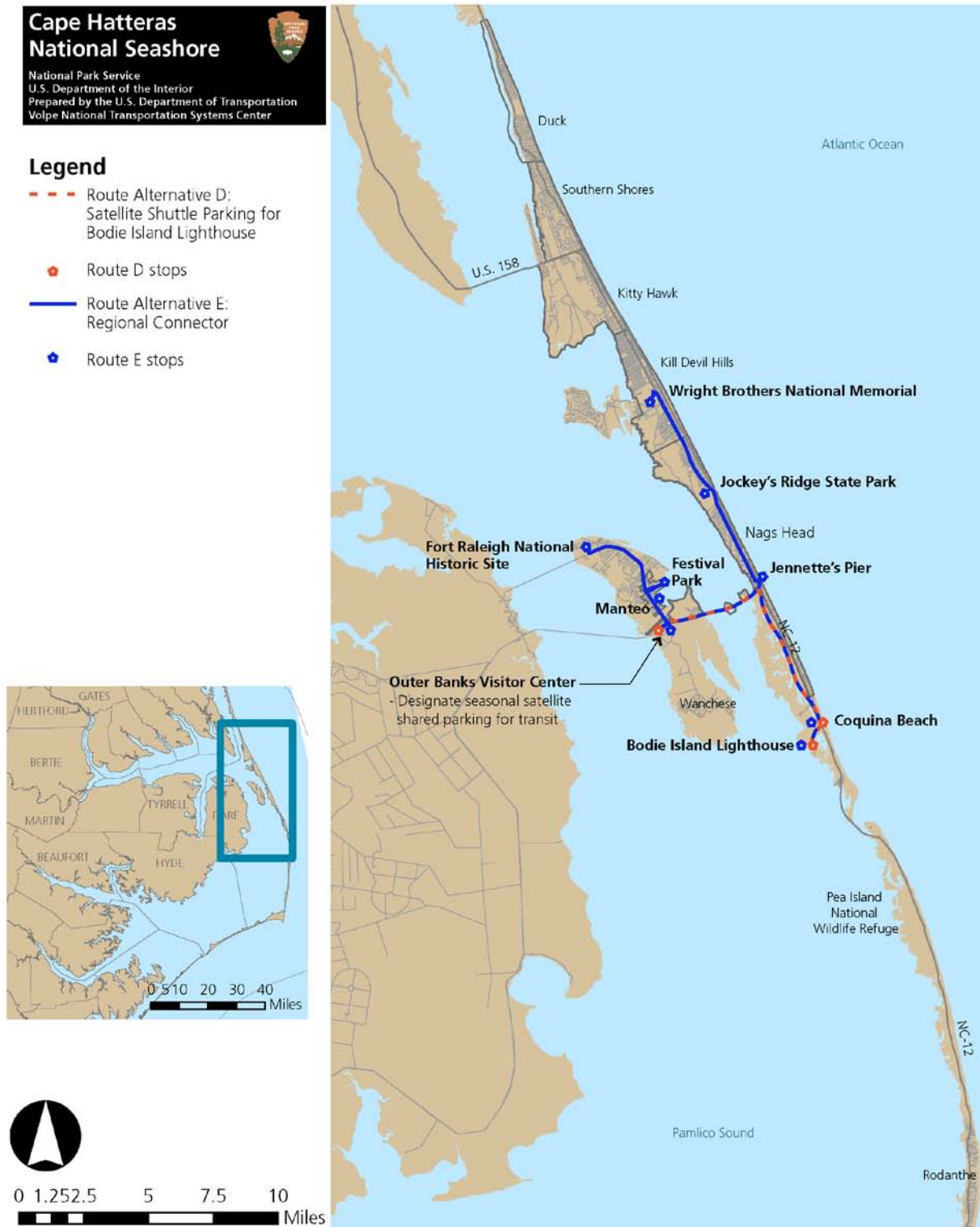
Type of Service	Distance (miles)	Number of Stops	Average Speed (mph)	Run Time (Min)	Dwell Time (Min)	Layover Time (Min)	Total Running Time (Min)
Daily	22.1	4	30	44	1	3	50

Estimated ridership for Route D is shown in Table 10. The standard 10 percent capture rate was assumed for Coquina Beach, as it has a higher capacity and may have visitors interested in visiting Bodie Island Lighthouse, but a higher capture rate was assumed for the Outer Banks Welcome Center, which could be a designated satellite lot, and no riders were expected from Bodie Island Lighthouse. As a result, the potential estimated daily ridership would be 196. This estimate corresponds with the 3% capture rate assumption for the average summer daily visitation for the Bodie Island Visitor Center. Higher capture rates, 10% and 25%, would result in significant increases in ridership but are unlikely unless on-site parking demand is high and/or a parking fee is implemented, which has been determined to be infeasible currently.

Based on the vehicle capacity information in Table 6 above, a smaller vehicle, such as the cutaway, would be most appropriate for this route. A tram is not recommended for application on this route, as it would not be appropriate for operation over this distance and at the travel speeds on NC 12 as discussed under the vehicle types section in Appendix B. Ridership for this service would rely heavily on marketing and communication of information on parking availability and options to the public.

<sup>17</sup> Run Time refers to the time required to travel the distance of the route; Dwell Time refers to the time estimated for each stop other than the first; and Layover Time refers to the time estimated for between runs. Total Running Time is calculated from the Run Time, Dwell Time multiplied by the number of intermediate stops, and Layover Time.

**Figure 2**  
**Route D and E map**  
 Source: Volpe Center



**Table 10**  
**Potential estimated ridership: Route D**

Stop	Number of parking spaces	Number of people (assuming 2.7 per vehicle/campsite)	Assumed capture rate (% of people likely to use shuttle)	Number of potential riders
Bodie Island Lighthouse	53	143	0	0
Coquina Beach	180	486	10	48.6
Outer Banks Welcome Center	60	162	30	48.6
Total Daily				97.2
Total Seasonal (126 days)				12,247

NPS Site	5-Year Average Daily Visitation for June, July, August, and September (2005-2009)	Estimated Daily Ridership		
		3%	10%	25%
Bodie Island Visitor Center	4,511	135	451	1,128
Total Seasonal (126 days)	568,386	17,052	56,839	142,097

#### Route E: Regional Connector

Route E, the Regional Connector, proposes the operation of a shuttle linking three main NPS sites as well as Roanoke Island, Kill Devil Hills, Nags Head, and Bodie Island. This route most closely mirrors those routes presented in Outer Banks Transportation Study (2006) and the accompanying analysis by the KFH Group, Inc. for Dare County. This transit service would provide the park with an opportunity to reduce some of the traffic within the region by directly linking nine regional attractions (see Figure 2). Due to the nature of the stops, some visitors may be able to use the service directly from accommodations in Manteo, Nags Head, and Kill Devil Hills.

The proposed regional connector route would make nine stops. The route, as proposed, begins at the Fort Raleigh National Historic Site, advances south along US 64 to downtown Manteo and the Roanoke Island Festival Park. The route then continues south and then west along US 64 to the Outer Banks Visitor Center. The route then continues eastward along the Virginia Dare Trail (US 64) to NC 12/Beach Road to make the fifth stop at Jennette's Pier (S Virginia Dare Trail) before proceeding north on U.S. 158 to Jockey's Ridge State Park and the Wright Brother's NM in Kill Devil Hills. At this point, the route proceeds south along U.S. 158 and then on to NC 12 for 16 miles to the Bodie Island Visitor Center. The route stops at Coquina Beach before continuing on to the starting point at the Fort Raleigh National Historic Site via NC 12 and US-64.

The estimated total running time for this route is 113 minutes, necessitating the use of two vehicles in order to achieve a 60 minute service frequency and four vehicles for 30 minute service frequency. Since this service is more of a time commitment for visitors, it is likely that visitors would make plans to use it in advance, such that it could be scheduled for only three or four days each week. In addition, since each site would require at least an hour visit, a 60 minute frequency is recommended. Operating characteristics for route E are shown in Table 11.<sup>18</sup>

<sup>18</sup> Run Time refers to the time required to travel the distance of the route; Dwell Time refers to the time estimated for each stop other than the first; and Layover Time refers to the time estimated for between runs. Total Running Time is calculated from the Run Time, Dwell Time multiplied by the number of intermediate stops, and Layover Time.

**Table 11**  
**Operating characteristics: Route E**

Type of Service	Distance (miles)	Number of Stops	Average Speed (mph)	Run Time (Min)	Dwell Time (Min)	Layover Time (Min)	Total Running Time (Min)
Daily	51.1	9	30	102	1	3	113

Estimated ridership for Route E is provided in Table 12. The standard 10 percent capture rate for parking was assumed for all major sites except the three that are expected to have limited parking (Jennette's Pier, Bodie Island Lighthouse, and Coquina Beach). In addition, the study team did not have information to estimate expected ridership for downtown Manteo so that was not included. As a result, the estimated daily ridership expected would be 338-365, depending on whether the grass overflow lot at Wright Brothers NM would be used. This corresponds to the 3% capture rate for visitation. Based on the vehicle capacity information in Table 6 above and the fact that two vehicles would be expected to run daily, either a cutaway or transit vehicle would be appropriate for this route. A small low-floor transit vehicle is recommended as it would provide sufficient capacity while, also, easily facilitating passengers getting on and off at multiple stops.

**Table 12**  
**Potential estimated ridership: Route E**

Stop	Number of parking spaces	Number of people (assuming 2.7 per vehicle)	Assumed capture rate (% of people likely to use shuttle)	Number of potential daily riders
Fort Raleigh	569	1536.3	10%	153.63
Downtown Manteo	Unknown			
Roanoke Island Festival Park	130	351	10	35.1
Outer Banks Visitor Center	60	162	10	16.2
Jennette's Pier	197	531.9	10	53.19
Jockey's Ridge State Park (Nags Head)	196	529.2	10	52.92
Wright Brothers National Memorial (Kill Devil Hills)	100 (plus 100 on grass)	270-540	10	27-54
Bodie Island Lighthouse*	53	143.1	0	0
Coquina Beach*	180	486	0	0
Total Daily Riders				338-365
Total Seasonal Riders (126 days)				42,588-45,990

\* It is assumed these sites would primarily be destinations rather than sites from which visitors would originate.

NPS Site	5-Year Average Daily Visitation for June, July, August, and September (2005-2009)	Estimated Daily Ridership		
		3%	10%	25%
Bodie Island <sup>19</sup>	9,258	278	926	2,315
Wright Brothers NM	2,191	66	219	548
Fort Raleigh NHS	1,557	47	156	389
Total Daily	13,006	391	1,301	3,252
Total Seasonal (126 days)	1,638,756	49,163	163,876	409,689

<sup>19</sup> Visitation by site – other than the Bodie Island Visitor Center – is not available for the Bodie Island District. Thus, total Bodie Island visitation is calculated from an inductive loop traffic counter located on NC 12 south of Whalebone Junction. The traffic count is reduced for non-recreation traffic by multiplying the traffic count by a seasonally-adjusted non-recreation adjustment multiplier. The reduced traffic count is then multiplied by a seasonally-adjusted recreation persons-per-vehicle multiplier.



### Summary and comparison

After assessing estimated service costs, revenues, and ridership for Routes B, D, and E (summarized in Table 13), the study concludes that Route E has the highest feasibility due to the high ridership and partnership potential, given the many sites it serves, and thus the possibility to share costs and resources. Although Routes B and D are smaller systems, thus requiring a lower annual cost, their ridership is also likely to be much lower than that for Route E and the service would involve fewer partners because of the limited sites served. Route D may make sense to pursue as a temporary service for special events, such as the opening of Bodie Island Lighthouse for climbing.

For all routes, the cost per passenger assuming low frequency and low ridership is relatively low but a transit user fee of \$2-6 would need to be implemented to cover all costs (see Table 13). Higher frequencies are recommended to increase ridership and improve the visitor experience but do require additional vehicles and thus increase costs. Higher ridership would lower costs but there is insufficient data to verify the likelihood of higher capture rates. Any type of fee would most likely have a significant negative impact on ridership, especially if parking remains readily available and free at all sites served. If a reduced fee (e.g., \$1) were charged, it would have to be supplemented by other funding sources, such as general funds or tax revenues from local governments or business contributions.

**Table 13**  
Summary comparison of sample transit routes

Desired Frequency (Min)			Number of Vehicles	Service Hours	Weeks in Service per Year (Days)	Seasonal Service Hours	Seasonal Operating Cost <sup>20</sup>	Seasonal Lease Cost <sup>21</sup>	Total Cost
Route B	Route D	Route E							
30	60	-	1	56	18 (126)	1008	\$60,480	\$10,098	\$70,578
15	30	60	2	112		2016	\$120,960	\$20,196	\$141,156
-	15	30	4	224		4032	\$241,920	\$40,392	\$282,312

Route	Number of Vehicles	Total Cost	Low Estimate (parking/3%)		Medium Estimate (10%)		High Estimate (25%)	
			Seasonal Ridership	Cost per passenger <sup>22</sup>	Seasonal Ridership	Cost per passenger	Seasonal Ridership	Cost per passenger
B	1	\$70,578	27,828-	\$2.02-2.54	116,651	\$0.61	291,627	\$0.24
	2	\$141,156	34,995	\$4.03-5.04		\$1.21		\$0.48
D	1	\$70,578	12,247-17,052	\$4.14-5.81	56,839	\$1.24	142,097	\$0.50
	2	\$141,156		\$8.28-11.53		\$2.48		\$0.99
	4	\$282,312		\$16.56-23.05		\$4.97		\$1.99
E	2	\$141,156	42,558-	\$2.87-3.32	163,876	\$0.86	409,689	\$0.34
	4	\$282,312	49,163	\$5.74-6.63		\$1.72		\$0.69

### Findings and recommendations

In the Needs Assessment, the study found that there has been regional and local town interest in transit and that transit would provide another transportation option for visitors, may reduce vehicle use and parking demand, and may have interpretive opportunities. However, transit ridership is unlikely to be high, especially if a user fee were charged, given the availability of parking<sup>23</sup> and the barriers to

<sup>20</sup> Calculated using formula shown in Table 6: (\$60/vehicle-hour) x (vehicle operating hours)

<sup>21</sup> Calculated using formula shown in Table 6: (\$225/vehicle-week) x (number of weeks)x(number of vehicles) + (\$60/vehicle-hour) x (vehicle operating hours)

<sup>22</sup> Cost per passenger calculated by dividing total cost by the seasonal ridership.

<sup>23</sup> Discussed in Section 2. 2 of the Needs Assessment and documented in Section 3.2 of the Conditions Inventory/Assessment.

implementing any type of parking fee. In addition, Cape Hatteras NS staff report that the unit is currently not in a position to provide operations or maintenance funding or management oversight to directly operate a transit service on its own or contract with another entity to provide the service due to staff and resource constraints. As concessions also require a significant amount of park resources for oversight and administration, at this time it is recommended that Cape Hatteras NS consider cooperative agreement/partnership models rather than service contract/concessions or NPS operated models. In a partnership, a range of roles for NPS are possible, from helping with funding and management to participating in planning and providing permissions for the shuttle to serve stops within NPS.

Due to the uncertainties in ridership and funding, especially for operations, it is not immediately apparent that any of the transit services proposed could be financially sustainable at this time. However, the study does conclude that Cape Hatteras NS should increase its participation in regional transit discussions and conduct future analyses to continue to assess the feasibility of a transit system in partnership with others.

It should be noted that according to NPS Management Policies 2006, “before a decision is made to design, construct, expand, or upgrade access to or within a park, nonconstruction alternatives—such as distributing visitors to alternative locations—must be fully explored. If nonconstruction alternatives will not achieve satisfactory results, then a development solution should consider whether the project” meets a number of criteria, including positive net impact on resources and visitor experience and ability to demonstrate financial and operational sustainability.<sup>24</sup> Additionally, current NPS policy is only to advance requests for new alternative transportation systems that can demonstrate long term financial sustainability. Financial proforma and feasibility studies are needed to inform decisions, and implementation of a new transportation system requires the approval of the Director.

With this in mind, the study recommends the following actions:

- Explore opportunities for a regional transit system as a partnership.
  - Outreach to Dare County Transportation System (DCTS) to request participation on their Transportation Advisory Board (TAB) and to coordinate on future transportation planning efforts, such as the recommendation by the County’s Community Transportation Service Plan (2010) to conduct a comprehensive study of a tourist-based transit service.
  - Explore opportunities for a partnership with local (county and city) and state elected officials and governments, other Federal Land Management Agencies, land trusts, chambers of commerce and tourism organizations, local business owners, non-profit organizations and other entities.
- Once a potential partnership opportunity for transit service has been identified, take appropriate steps to coordinate with the NPS Southeast Region Office (SERO) on next steps.
  - Coordinate with the SERO Transportation Program Manager to identify the required steps/studies and approvals and undertake the appropriate planning/analyses to ensure feasibility and long term sustainability of a proposed partnership transit system. This should include consideration of NPS responsibility for capital costs and operating arrangement.
  - Coordinate with the SERO Contracting and Property Management Division and SERO Partnership Coordinator to establish the legal framework in which the partnership must operate and to identify the appropriate way to structure the partnership (e.g. through a Memorandum of Understanding (MOU), Memorandum of Agreement (MOA), Grant Agreement, Cooperative Agreement or other mechanism).
- Identify temporary use of a satellite parking area and partner with DCTS or others to provide shuttle service from a satellite parking area around the opening of Bodie Island Lighthouse for

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<sup>24</sup> NPS Management Policies 2006. “9.2 Transportation Systems and Alternative Transportation.”

climbing, similar to the event planning done in partnership with NCDOT for the Wright Brothers National Memorial Centennial.

If a transit system is implemented in the region and serves Cape Hatteras NS, ensure the following:

- Any vehicle used at Cape Hatteras NS should be compliant with the American with Disabilities Act (ADA), able to accommodate bicycles through bicycle racks or brackets, and have speaker capabilities for interpretive opportunities.
- A marketing plan with identified strategies (see Appendix B of the Alternative Transportation Analysis) should be developed for any service.
- Low-speed vehicles, which include several trams, are not appropriate for operation on NC 12. Low-floor transit vehicles or a cutaway vehicle would be most appropriate for the service conditions.
- Biodiesel, methanol/ethanol or hybrid electric vehicles should be considered if possible.

The main sources of funding for planning and capital for transit for NPS are the Federal Transit Administration's TRIP Program and the Federal Land Highway Program's Park Roads and Parkways (PRP) Category III alternative transportation program<sup>25</sup> (see Appendix B and Section 3.1 (Funding Opportunities of the Alternative Transportation Analysis for more information). Any applications to these programs should be done in coordination with the NPS Southeast Region Office.

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<sup>25</sup> Category III funding is dependent on the determination that the service directly benefits the park and on approval by the NPS Washington Office.



## 2.2 Planning and programming

Planning and programming activities often complement changes in physical infrastructure or the implementation of new services. For example, expansion of the roadway shoulders on NC 12 to accommodate bicycle travel provides an opportunity for Cape Hatteras NS to track the effects of this change (e.g., the potential increase of bicycle travel on the road). Activities like participating in the Dare County Comprehensive Transportation Plan (Strategy 2) allows the park to advocate for regional connections between bicycle facilities in northern areas of the Outer Banks, like Corolla, Kitty Hawk, Kill Devils Hills, and Nags Head and those in the Cape Hatteras NS. This section considers the implementation considerations for each planning and programming strategy in detail.

### Strategy 1: Encourage the formation of a regional transportation committee

#### *Description*

This strategy creates a regional transportation committee for the Cape Hatteras NS. The group could be composed of representatives from the key public entities involved in transportation services and planning for the region, such as Dare County, the Albemarle Rural Planning Organization, and the North Carolina Department of Transportation (NCDOT). Additional representatives could be involved as needed. This strategy is intended to improve the involvement of NPS in ongoing and future regional transportation – including transit – discussions and also to improve overall coordination within the region.

The committee should determine how often to meet but it is recommended that it meet at least quarterly. The committee should also determine its main goals, whether it should function mainly as an advisory group or also as a group that implements projects, and its structure. For example, the committee could:

- Focus on the transportation needs and activities of the Outer Banks, including the Cape Hatteras NS, specifically regarding tourism-related needs;
- Form subcommittees or task forces to address modes (e.g., transit, bicycle), geographic extents (e.g., Roanoke Island), and specific projects for a limited time (e.g., one year).

The nature of the committee is dependent on its participants and on coordination with existing groups, such as the OBSB Committee and the Dare County Transportation System (DCTS) Transportation Advisory Board (TAB), which meets quarterly. The Dare County Community Transportation Service Plan, released in April 2010, recommends reviewing the TAB membership to include others; although NPS was not named, this plan may provide an opportunity to open discussions with TAB and Dare County and the study feels that NPS is an important stakeholder to include. There is also precedence in the region for transit coordination with the Inter-County Public Transportation Authority (ICPTA), a five-county transit provider to the north of Dare County.

#### *Technical feasibility*

The creation of a transportation committee would require identifying a person or entity to be responsible for organizing the group and for planning, outreach, and coordination activities. Cape Hatteras NS may not have the staff resources to fulfill this role so it is recommended that the park ask the Albemarle Rural Planning Organization and NCDOT for their support in bringing together the region's key entities in transportation. To avoid duplication with other efforts, Cape Hatteras NS should first work to introduce themselves to existing groups, such as the DCTS TAB. The committee could be established within months and meetings could commence immediately thereafter.

### *Cost*

Aside from Cape Hatteras NS staff resources for participating in the meetings and assisting in coordination, there are no significant monetary costs to the implementation of this strategy.

### *Partnerships*

- NCDOT
- Albemarle Rural Planning Organization
- Dare County
- OBSB Committee
- local towns (e.g., Nags Head, Manteo, Kill Devil Hills)
- Representatives from the North Carolina Blueways initiative and NPS Rivers, Trails, and Conservation Assistance (RTCA) Program

### *Examples at other parks/locations*

Many different models of regional coordination committees involving NPS or other public land units exist, with varying levels of investment and commitment by the public land unit and other entities. Three examples are provided here.

The NPS Boston Harbor Islands National Recreation Area participates in the Boston Harbor Islands Partnership, a coalition of government and non-profit entities with ownership or significant interest in the islands within the park. The Partnership recently announced the creation of the Operations Committee to provide “leadership in defining the national park-quality visitor experience, including information / orientation, and visitor programs”<sup>26</sup>. The committee will function for a period of five years to consider the day-to-day operations and partnership activities of the Boston Harbor Island and has a subcommittee focused on water transportation. The Operations Committee is an example of an NPS-focused

The Chincoteague National Wildlife Refuge and its partner agency, Assateague Island National Seashore, hold monthly “Community Leaders” meetings in the evening with key representatives of the local community, the town of Chincoteague. The meetings allow for regular communication and discussion of a variety of issues, such as preparation for upcoming events (including hurricanes), evaluation of an incident, or progress on a project. Transportation – specifically parking but also bicycle facilities – is a frequent topic of discussion for the group. The “Community Leaders” group is an example of a fairly informal, evening commitment once a month. Cape Hatteras NS could explore something similar to address a range of topics.

At Valley Forge National Historic Park, the Greater Valley Forge Transportation Management Association (TMA) contracts out a transit service via a Cooperative Agreement between the park and TMA. As mentioned in Section 2.1 (Transit), TMAs are non-profit member organizations that provide and/or coordinate transportation services for a particular area and that usually consist of public-private partnerships. Transportation services can include transit but often include other services, such as vanpool/carpool matching, Guaranteed Ride Home services, and marketing and promotion, among others.

## **Strategy 2: Participate in Dare County Comprehensive Transportation Plan (to start in 2011 or 2012)**

### *Description*

This strategy promotes the inclusion of the Cape Hatteras NS as a stakeholder in the Dare County Comprehensive Transportation Plan to commence in 2011 or 2012. The plan will take a short-term and long-term approach to addressing transportation issues within Dare County. As part of this process, the Cape Hatteras NS will have the opportunity to provide input regarding the park’s own transportation goals and can support measures to improve infrastructure investments and management and land use policies that promote alternative transportation regionally throughout the County. According to NPS

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<sup>26</sup> National Park Service. Boston Harbor Islands National Recreation Area.

<http://www.nps.gov/boha/parkmgmt/partnership-park-operations-committee.htm>

Management Policies 2006, early NPS participation in transportation studies and planning processes that may result in connections to the park or impacts on park resources is expected of all parks.<sup>27</sup>

#### *Technical feasibility*

The participation of the Cape Hatteras NS in the Dare County Transportation Plan would require some staff resources; a park point of contact would need to be designated who would attend Dare County meetings. Establishing the park as a stakeholder in the process allows for decision-making that takes into consideration the direct and indirect impacts of regional transportation-related issues and decisions within the context of the Cape Hatteras NS. Furthermore, involvement in the planning process creates opportunities for partnerships and collaboration with other entities, projects, and programs in support of Cape Hatteras NS transportation planning goals.

#### *Cost*

The costs associated with this strategy involves staff labor for attending meetings, reviewing documents, decisions, and policies, and providing feedback to Dare County.

#### *Partnerships*

- NCDOT
- Albemarle Rural Planning Organization
- Dare County

### **Strategy 3: Develop a comprehensive signage plan**

#### *Description*

A comprehensive signage plan is recommended for enhancing the wayfinding signage throughout the Cape Hatteras NS for interpretation, roadways, trail use, bicycles, and pedestrians and to help visitors find their location and better navigate through the area. Specific safety signage recommendations are discussed in Section 2.3 (Roadway) and specific bicycle and pedestrian wayfinding – as well as traveler information generally – are discussed in Section 2.8 (Wayfinding and Traveler Information). The intent of this strategy is to ensure coordination of all existing and proposed signage within the Bodie Island District as well as regionally, at least throughout Cape Hatteras NS and along the Outer Banks Scenic Byway.

For this region, signage immediately south of Whalebone Junction along NC 12 and the messages displayed on the NCDOT variable message sign (VMS) at Whalebone Junction Information Center may be in need of further examination to determine which information, and in what order and location, would be most useful to visitors. For the former, upon entering Cape Hatteras NS, at Whalebone Junction, visitors come across a series of signs that include information pertaining to designated camp sites, climbing hours for the Cape Hatteras Lighthouse, distances to Rodanthe/Salvo/Ocracoke and ferry options. The signs are presented in no particular order (i.e., they are not presented sequentially in the order in which sites would be encountered). Overall the signs lack a coordinated design as they appear to vary in size, color, letter height, font style, spacing, and reflectivity. In addition, there are no signs, maps or other graphic methods used to convey the locations of and/or directions to the Bodie Island Lighthouse, Bodie Island Visitor Center, Oregon Inlet Fishing Center, Coast Guard Station, Coquina Beach or other destinations within the Bodie Island District; this omission may become more important when the Bodie Island Lighthouse opens for climbing.

A comprehensive wayfinding system should consider existing and new sign locations; the types of signs used in terms of materials, color, dimensions, height, aesthetics; and the information given. For example, a system of signs should provide clear information on direction, destination, distance, route or road names and issues relevant to visitor needs for restroom facilities, water, telephone services, viewing, photography, or hiking opportunities, among others.

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<sup>27</sup> NPS Management Policies 2006. “9.2 Transportation Systems and Alternative Transportation.”

#### *Technical feasibility*

A signage plan should be coordinated with the placement of other sign programs, particularly the OBSB Committee. The plan should be consistent with the NPS UniGuide program for sign policy and placement. New roadway signs should comply with the Manual of Uniform Traffic Control Devices (MUTCD), which is published by the Federal Highway Administration (FHWA) and defines the standards that road managers use for the installation and maintenance of traffic control devices on all public roads and highways. Cape Hatteras NS is currently working with the OBSB Committee to develop a sign plan as the OBSB Corridor Management Plan (CMP) identified the need for a coordinated signage plan for the length of Cape Hatteras NS, including the Bodie Island District. Thus, the park could use this opportunity to develop a complimentary signage plan, for interpretation, trail use, pedestrians, and bicycles with a concentration on signage needs and locations within the Bodie Island District not addressed by the OBSB Committee.

#### *Cost*

Cost estimates for a comprehensive signage plan vary depending on the scope of the project. A signage plan could be tailored to fit specific priorities and needs of the park and region (e.g. bicycle or pedestrian specific). A typical signage plan ranges in cost between \$25,000 and \$50,000.<sup>28</sup>

#### *Partnerships*

- OBSB Committee
- NCDOT
- Towns along the length of Cape Hatteras NS

**Strategy 4: Implement a reservation system for Lighthouse climbing at Bodie Island Lighthouse that includes a management system for motorcoach and school bus visitation**

#### *Description*

The opening of the Bodie Island Lighthouse in 2012 or 2013 will increase the number of visitors to the site seeking to climb the lighthouse. In preparation for this, Cape Hatteras NS staff have begun discussing the development of a climbing reservation system for Bodie Island and Cape Hatteras but are still working through the process and details. This strategy is intended to provide some detailed recommendations and guidance for the system's employment at Bodie Island.

This study recommends the implementation of the climbing reservation system in time for the opening of Bodie Island Lighthouse. Such a system would reduce congestion and parking demand at the Lighthouse, which has sufficient parking to accommodate the climbers allowed in the Lighthouse within any given hour but not to accommodate visitors willing to wait over an hour and a half for entrance to the Lighthouse.

This strategy also recommends that the reservation system include a means to manage motor coach and school bus visitation to guarantee available parking space upon arrival for these vehicles. Space to accommodate over-sized vehicles is currently limited at the Bodie Island Lighthouse. The reservation system would feature time slots based on the time required to climb the lighthouse, assumed to be about 30 minutes by Cape Hatteras NS staff. For each time period, some climbing slots would not be included in the reservation system and would instead be on a first-come, first-served basis, to provide an opportunity for those who may have been unaware or unable to use the reservation system. The reservation system would be accessible online as well as by phone.

The advantage of this strategy is that it manages the limited parking resources at and visitation to the Bodie Island Lighthouse and decreases the potential for long visitor waits, demands on parking, and traffic congestion. The disadvantages of such a system are that it may deter visitors from visiting if their preferred time is unavailable and that it would likely require significant staff time and investment in other resources to initiate and administer.

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<sup>28</sup> Estimate for Comprehensive Sign Plan report preparation by U.S. DOT Volpe Center.

#### *Technical feasibility*

NPS is part of an existing online reservation system<sup>29</sup> for campsites that Cape Hatteras NS uses for the Ocracoke Campground. Because NPS management policy states that this system is the preferred provider for such requests, it is recommended that the park take the necessary steps to see if it can employ this system for climbing reservations. Cape Hatteras NS may use a different system if the servicewide system cannot accommodate the reservation needs and the NPS Director approves the request.<sup>30</sup>

Within a climbing reservation system, the management of school buses and motor coaches could be accommodated by including a vehicle type category, which would calculate the maximum allowable number of “oversized” vehicles on site during any give time period. Currently, visiting school buses request academic fee waivers for the climbing fee for Cape Hatteras Lighthouse. Short of implementing a reservation system, school bus visitation management could be incorporated into the fee waiver process. However, motor coaches do not request waivers.

Additionally, the Cape Hatteras NS website could designate some of the first-come first-served parking spaces to be held in reserve for over-sized vehicles. The park could also post an advisory to motor coach carriers to call the park in advance to reserve a parking space. However, if motor coach visitation is expected to increase over time, an automated management system should be employed and be well advertised to more efficiently manage visitor and parking demand. In addition, if demand for parking continues to rise, the park may want to consider installing signage to alert potential visitors to the Bodie Island Lighthouse of the reservation system and parking availability.

The incorporation of this reservation system into the existing National Recreation Reservation Service or the development of a separate reservation system by a consultant could be completed within 12-18 months.

#### *Cost*

The cost of developing, maintaining, and administering a reservation system would vary based on the technology and complexity of such a system. If the park is to work with the NPS system, some staff resources will be required to coordinate. A separate system would require working with a vendor. Sequoia National Park, located in the southern Sierra Nevada area of California, developed a low-cost on-line reservation system for its shuttle system. The system collects information that would be similar to a climbing and vehicle reservation system for Cape Hatteras NS (e.g., desired times, dates, number of tickets) and allows for on-line purchase of tickets. Sequoia employed a private vendor, VisionOne, Inc., to create the on-line reservation interface. The initial set up fee to provide the on-line reservation system was \$1,500, with a .25¢ fee per transaction. Sequoia also uses a 24-hour call center with a flat fee of \$300 a month to manage phone reservations.<sup>31</sup>

#### *Examples at other parks/locations*

The Sequoia Shuttle (see Cost section above) and reservation system (see Figure 3) were developed in partnership with the gateway community of the City of Visalia. Reservations can be made by telephone and on-line. The relatively simple “choose and purchase” model of this on-line purchase system mimics common electronic commerce models and would be a suitable format for the design of a lighthouse climbing reservation system at Cape Hatteras NS.


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<sup>29</sup> National Recreation Reservation Service. <http://www.recreation.gov/welcome.do?topTabIndex=Home>

<sup>30</sup> National Park Service. Management Policies 2006. “8.2.6.2 National Recreation Reservation System.”

<sup>31</sup> Personal communication with Sequoia Shuttle staff. August 19, 2010.

**Figure 3**  
**Sequoia National Park on-line shuttle reservation system**  
 Source: City of Visalia and National Park Service (<http://reservations.sequoiashuttle.com/>)



**SEQUOIA SHUTTLE**  
 SERVING SEQUOIA NATIONAL PARK

[General Info](#) [Routes / Schedules](#) [Reservations](#) [Media](#) [About the Park](#) [Contact Us](#)

[Ticket Home](#) [Shopping Basket](#) [Your Account](#)

**Shopping Cart**

#	Qty				Price	Conv.Fee*	Total		+	-
<b>Departure From Visalia - Three Rivers - 8am Departure</b> at <a href="#">Sequoia Shuttle</a> (9/18/2010, 8:00 am PST)										
1.	1	7:50 am PST	General Admission (General Admission)	Fairfield Inn (Fair Inn)	\$7.50	\$0.00	<b>\$7.50</b>	<a href="#">buy more</a>	<input type="checkbox"/>	
<a href="#">Apply Discount</a>										
<b>Return Trip From Giant Forest - 4:30 Return</b> at <a href="#">Sequoia Shuttle</a> (9/18/2010, 4:30 pm PST)										
2.	1	7:51 am PST	General Admission (General Admission)	Fairfield Inn (Fair Inn)	\$7.50	\$0.00	<b>\$7.50</b>	<a href="#">buy more</a>	<input type="checkbox"/>	
<a href="#">Apply Discount</a>										
							<b>Processing Fee:</b>	<b>\$0.00</b>	<input type="checkbox"/>	<input type="checkbox"/>
							<b>Total:</b>	<b>\$15.00</b>	<a href="#">Remove</a>	

[< Continue Shopping](#)
[Purchase Return Ticket](#)
[Empty Shopping Cart](#)
[Checkout >](#)

## Strategy 5: Collect alternative transportation visitation information

### *Description*

Information regarding the number of visitors that access Cape Hatteras NS by foot, bicycle, or by boat would provide necessary baseline data to allow Cape Hatteras NS staff to make more informed investments to accommodate these modes through, for example, improving bicycle or dock facilities, increasing walking trails, or providing of bicycle or pedestrian specific signage. This strategy creates a system for measuring alternative transportation visitation to the Cape Hatteras NS.

### *Technical feasibility*

In recognition of the constraints on Cape Hatteras NS staff resources to implement a comprehensive data collection system for bicycle, pedestrian, and boat visitation, staff could consider less intensive approaches to collecting information on visitor modes. For example, Eastern National staff at the Bodie Island Visitor Center currently manually count individuals coming into the center; staff could expand this count to include how each individual accessed the site (e.g., bicycle, pedestrian, boat, personal vehicle, bus) on a daily basis or during a sample set of days. Other possibilities include a park-wide volunteer manual count day or the use of automated counters at selected points. The National Bicycle and Pedestrian Documentation Project provides count methodology instructions, including times, count locations, and equipment, and sponsors an official national count week during the second week of



September as well as optional count dates in the winter, spring, and summer.<sup>32</sup> The NPS Public Use Statistics also offers guidance on methodology for counts. The time required to implement this strategy would depend on the complexity and methodology of data collection plan ultimately chosen.

#### *Cost*

The cost for implementing a system of data collection on pedestrian and bicycle visitation would vary based on the complexity and methodology of the plan. Counts can be done manually by volunteers or staff or could be automated using equipment. Tube counters for bicycles cost approximately \$1,600<sup>33</sup> but it is also possible to hire a vendor or consultant to provide the equipment and data collection services.

#### *Partnerships*

- NPS Public Use Statistics Office
- NCDOT
- Eastern National
- Volunteers/other community groups

### **Strategy 6: Collect information on parking lot utilization at major parking lots on Bodie Island**

#### *Description*

Currently, Cape Hatteras NS staff does not collect parking utilization data for any of its parking lots, including within Bodie Island. Instead, automated road count data, and NPS estimates based on visitation rates provide a proxy for parking lot usage.<sup>34</sup> However, the strategic collection of parking lot utilization information could provide Cape Hatteras NS staff with information regarding peak visitation hours, turnover rates within parking areas (e.g. the average length of a visit), the types of vehicles using parking areas, and potentially other information not revealed in the above methods. Such data could show important trends in parking behavior throughout the Bodie Island District to support park management decisions that could include, for example, expansion or reconfiguration of parking areas or the implementation of a transit system. This strategy would involve creating a system for sampling parking lot utilization in major parking areas on Bodie Island. Such a system could involve manual counts or automated counters for select periods during the year.

#### *Technical feasibility*

Daily or regular collection of parking lot data is not feasible by Cape Hatteras NS staff. However, intermittent, or a semi-annual collection of parking lot utilization data may be feasible. This strategy could be implemented by Cape Hatteras NS staff within a matter of months once a count methodology is devised, and count days, times, and locations are adequately identified. Longer term, automatic counters could be set up at entrance and exits of parking lots on a temporary basis.

#### *Cost*

The cost associated with this strategy would primarily translate into Cape Hatteras NS staff hours devoted to the task though there could be the lease or purchasing of equipment, such as tube counters. Staff would be required to develop a count methodology, tabulation spreadsheets, perform counts, and aggregate and report the data. The maintenance of the data is assumed to be minimal.

#### *Partnerships*

- NPS Public Use Statistics Office
- NCDOT

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<sup>32</sup> National Bicycle and Pedestrian Documentation Project. <http://bikepeddocumentation.org/>

<sup>33</sup> National Bicycle and Pedestrian Documentation Project. "Automatic Count Technology Overview." <http://bikepeddocumentation.org/>

<sup>34</sup> Personal communication with Cape Hatteras NS staff. July 2010.

## Strategy 7: Conduct transportation focused visitor survey

### *Description*

As a means to inform the upcoming Cape Hatteras NS General Management Plan (GMP) and other planning efforts, this strategy is to conduct a visitor's survey to assess travel characteristics (e.g. trip purpose, vehicle occupancy, mode share, origins/destinations etc.) and travel preferences, such as willingness to use alternative transportation. The results could help Cape Hatteras NS staff better understand travel demand and visitor preferences and needs and improve services or design new programs based on a data driven approach.

### *Technical feasibility*

The feasibility, including the complexity and length of time required for developing and administering a survey, varies based on the survey methodology, design, and analysis. Intercept surveys, like those conducted through the University of Idaho's Park Services Unit, Visitor Services Program (VSP); require collaboration with park staff for the development and approval of survey questionnaires, onsite interaction with park visitors over a 7-10 day period, and time for data analysis. Park units must submit their requests for funding surveys through the NPS Project Management and Information System (PMIS) to become eligible for a VSP study. The VSP has a timeline of approximately one year for completion of project planning and approval, data collection, analysis, and report development.<sup>35</sup>

Hatteras NS staff could also consider administering an on-line survey via the park website as a means to collect information from both previous and potential visitors. Flyers could be distributed at the park to encourage visitors to take the survey. The desired information could be solicited through an existing survey, either through the GMP process or as part of another the VSP survey. In either case, Cape Hatteras NS would need to meet all requirements of the Office of Management and Budget (OMB) to implement a public survey<sup>36</sup> and be submitted to OMB for approval by the NPS Social Science Division. It is recommended that Cape Hatteras NS coordinate with the NPS Southeast Region Office and NPS Social Science Division for technical support and to seek the necessary approvals.

### *Cost*

The cost for developing and administering a transportation focused survey varies based on the survey methodology, design, and analysis. Partnering with colleges or local institutions might provide an opportunity for mutually beneficial collaboration and could reduce the cost of data collection. An intercept survey typically ranges between \$20,000 and \$35,000<sup>37</sup>.

### *Partnerships*

- VSP
- a local academic institution, such as the College of the Albemarle or the University of North Carolina, familiar with survey design, data collection, and analysis

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<sup>35</sup> University of Idaho. Park Studies Unit. <http://www.psu.uidaho.edu/>

<sup>36</sup> "Surveys of the public or any other information collection activity conducted, funded, or sponsored by the NPS must be done in compliance with the Paperwork Reduction Act (PRA). Compliance with the PRA and approval of government sponsored surveys is overseen by the Office of Management and Budget (OMB)." Any survey with 10 or more respondents must be OMB approved. National Park Service. Social Science Surveys and Interviews in the National Parks and for the National Park Service. A Guide to NPS and OMB Approvals. July 2002 . P.1  
<http://www.nature.nps.gov/socialscience/pdf/Social%20Science%20Surveys%20and%20Interviews.pdf>

<sup>37</sup> Personal communication with Federal Highway Administration, Central Federal Lands Highway staff. August 10, 2010.



## Strategy 8: Conduct a marketing campaign to promote alternative transportation to and through Cape Hatteras NS

### *Description*

This strategy creates a marketing campaign to promote alternative transportation for travel to/from and within Cape Hatteras NS. Such a campaign would encourage walking, bicycling, and kayaking opportunities to access Bodie Island from nearby population centers. In the future, any land-based or water-based transit, if implemented, could also be promoted. This strategy seeks to encourage visitors to use an alternative to private motor vehicles to travel to or within the Cape Hatteras NS, specifically within the Bodie Island District. The successful promotion of alternative modes could help improve visitor experience by providing a greater array of options to the driving experience, promoting healthy activity, and might contribute to decreasing parking demand, congestion, and automobile emissions.

### *Technical feasibility*

The creation of a marketing plan to promote alternative transportation at Cape Hatteras NS is feasible, and could be completed within a year. Current and future planning efforts by NPS and NCDOT to expand shoulders on NC 12 to improve safety for bicyclists and efforts by groups like North Carolina Blueways to create paddle trails to Cape Hatteras NS represent promising opportunities for viable alternative transportation for Cape Hatteras NS. Cape Hatteras NS staff may consider taking a phased approach to the promotion of these opportunities, by first highlighting bicycling to Bodie Island and later, as water and transit access is developed, adding information on other options such as kayaking or transit. Marketing materials could include hard copy and electronic maps and brochures that detail bicycling and kayaking routes to Bodie Island, connections to regional bicycling and hiking/walking trail systems and ferry services, and information on modal choices for getting around the Cape Hatteras area.

### *Cost*

A marketing outreach plan could be completed by Cape Hatteras NS staff in-house, in collaboration with partners, or through a private marketing firm. Costs for the first two options would include Cape Hatteras NS staff time to develop marketing and outreach materials, collaborate with area stakeholders, and maintain outreach information. A private consultant could tailor a marketing plan to fit the budgetary objectives of the park. Other costs would be for the publication and printing of any hard copy materials.

### *Partnerships*

There are multiple potential partnerships in the Outer Banks to create a mutually beneficial shared marketing approach to alternative travel within the Cape Hatteras NS. Potential partners include:

- Outer Banks Visitors Bureau
- Outer Banks Chamber of Commerce
- Dare County Scenic Byways Committee
- local towns
- Dare County

For example, the website of the Outer Banks Visitors Bureau currently highlights Cape Hatteras NS lighthouses, historical sites, and campgrounds, and provides information on accessing the Outer Banks. As alternative transportation options at Cape Hatteras NS or within the region develop, the park could partner with the Outer Banks Visitors Bureau to provide additional content to the Bureau's website on getting around "car-free" through alternative modes.

## Strategy 9: Implement park-level practices to encourage alternative transportation

### *Description*

Transportation policy decisions can be an effective tool to encourage the use of alternative transportation, and reduce the demands on the current and future transportation network. This strategy proposes the development of practices that align with the transportation goals and objectives of the park to encourage changes in travel behavior. The following three proposed practices are meant to provide examples of potential changes to park management systems that may be appropriate for Cape Hatteras NS to consider at this time.

#### Consider parking fee in the future

One common and effective demand management strategy is charging a fee for parking. A parking fee may lead to a reduction in vehicle traffic, and thus congestion, if alternative transportation access, such as transit or bicycle and pedestrian paths, is provided. In addition, parking fees can be used to generate revenue for other purposes, for example, to cover the costs of parking lot construction and maintenance, or for other facilities expenses. Cape Hatteras NS does not currently charge for parking at any of its NPS sites, and staff does not report significant and recurring demand that overwhelms supply at any of the major parking areas in Bodie Island. Therefore, the acceptance by the public to pay for parking in the area may be low. Furthermore, the costs associated with collection and enforcement of parking fees may be higher than the revenues collected. A preliminary analysis by Cape Hatteras NS staff suggest the cost of an iron ranger safe (non-automated) with associated shelter, signage, and staff combined would be approximately \$30,200.<sup>38</sup> Finally, under NPS policy, parking fees are generally only done as way to implement an entrance fee (e.g., Chattahoochee River National Recreation Area – see Appendix B) and entrance fees require NPS approval and a public process.<sup>39</sup> As an entrance fee may not be feasible or desirable to Cape Hatteras NS, its adjacent communities, or NPS, this study recommends that this strategy be considered in the future if parking demand becomes more problematic and an alternative, namely transit, is provided.

#### Host/promote a “Bike to the Beach” or similar event

### *Description*

Through this strategy, Cape Hatteras NS would host or partner with others to create an event to encourage bicycle travel to Bodie Island and other locations in the Cape Hatteras NS. The event could be timed to coincide with other bicycle related events (and park events), like the National Bike Month<sup>40</sup> held annually in the month of May in coordination with Bike to Work week. The strategy could help to promote, incrementally, the idea and feasibility of bicycling to locations in Cape Hatteras NS.

### *Technical feasibility*

This strategy would require some staff labor for planning, coordination, and any marketing activities associated with the event.

### *Cost*

The costs to promote or host such an event are assumed to be minimal and consist primarily of Cape Hatteras NS staff resources to publicize the event on the website. Free giveaways could be developed by partners that NPS could help distribute.

### *Partners*

- Outer Banks Visitor Bureau
- NCDOT
- local bicycle retailers

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<sup>38</sup> Cape Hatteras NS staff estimate.

<sup>39</sup> Fee & Special Park Use Program, Southeast Region

<sup>40</sup> League of American Cyclists. Accessed August 25, 2010. <http://www.bikeleague.org/programs/bikemonth/>

- Local towns

For example, the town of Nags Head may be interested in a regional event that showcases recent bicycle improvements within their community.

*Examples at other parks/locations*

The Virginia Department of Rail and Public Transportation and several transportation agencies from across the state partner each year to celebrate the statewide “Try Transit Week” event that occurs for four days each September. The event serves as an opportunity to encourage individuals that typically drive to work, to try transit options like buses, trains, car/vanpools, or teleworking.<sup>41</sup> A similar effort could promote and celebrate bicycle travel to Cape Hatteras NS for a specific day, or week as a way to access sites at Cape Hatteras NS like Coquina Beach, Bodie Island Lighthouse, or other attractions in the park.

Consider permeable pavement in new projects where possible

*Description*

This strategy would create a formal procedure by Cape Hatteras NS to consider permeable pavement options for any new projects within the boundaries of the park, whereby new paved areas would be required to be permeable unless it was determined to be infeasible or cost-prohibitive.

*Technical feasibility*

There are a number of permeable pavement types: permeable asphalt, permeable concrete, permeable interlocking concrete pavers, concrete grid pavers, and plastic grid pavers. The application of these pavement types can be costly and potential exists for clogging by sediment, particularly for the permeable asphalt and concrete, without proper maintenance. In addition, they are not always appropriate for high-traffic areas or for use by heavy vehicles. Due to these considerations, the study recommends that Cape Hatteras NS determine the appropriate pavement type on a project-by-project basis but that consideration of a permeable pavement type is made in every major project.

The current paved infrastructure (access roads and parking areas) that Cape Hatteras NS maintains are mostly constructed of impervious materials, with the exception of the newly constructed parking areas at the former Coast Guard facility buildings. The construction of the concrete grid pavers at this location sets a precedent for similar construction elsewhere on Cape Hatteras in the event that other similar facilities are required.

*Costs*

The capital costs of constructing permeable surface facilities range considerably and can cost up to four times traditional construction methods.<sup>42</sup> Maintenance costs also vary.

## Strategy 10: Prepare for adoption of the Department of Interior (DOI) Incident Management, Analysis, and Reporting System (IMARS)

*Description*

The consistent and comprehensive collection, reporting, and analysis of incident data (e.g. traffic information and accidents, security or resource threats, etc.) are a significant challenge for NPS and the entire Department of Interior (DOI). Such data can help the park identify areas of improvement that to increase the safety of all modes, including alternative transportation such as bicycling and pedestrian activity, and thus also encourage use of such modes.

A 2002 study of visitor safety by NPS found “little evidence of systematic accumulation about visitor safety” and recommended the development of an accident reporting system that improves the accuracy

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<sup>41</sup> Try Transit Week Accessed August 24, 2010.<<http://www.trytransitweek.com/why-get-on-board/index.php>>

<sup>42</sup> Toolbase Services. Accessed August 25, 2010.

<http://www.toolbase.org/Technology-Inventory/Sitework/permeable-pavement#initialcost>

and reliability of information.<sup>43</sup> In part as a result of this study, DOI is in the process of procuring a department-wide information collection, analysis, and reporting system for information on law enforcement activities, emergency management, and security. The long-term DOI-wide initiative will create a new information technology (IT) system for incident reporting across all the DOI bureaus to improve data collection, reporting, and sharing. The Incident Management, Analysis, and Reporting System (IMARS) will be fully funded by the year 2018 and is planned to be implemented across all DOI bureaus and NPS Park units.<sup>44</sup>

This strategy creates proactive planning steps to ensure the adoption of IMARS at Cape Hatteras NS in a timely manner and to encourage improved data collection and coordination. Currently, Cape Hatteras NS law enforcement staff use hard copy incident reports to collect data on traffic accidents. In the case of severe accidents, Cape Hatteras NS enforcement officers ensure proper documentation by local and/or state authorities. However, Cape Hatteras NS does not maintain copies of this documentation for its own use and analysis.

#### *Technical feasibility*

In the short term, the study recommends that Cape Hatteras NS request copies of all documentation for incidents that occur within Cape Hatteras NS, including Bodie Island District, on a regular basis (e.g., quarterly). IMARS was implemented as a pilot program at select NPS park sites, for a period of 90 days (July-October 2010). Once the pilot's results have been examined, NPS is expected to initiate the roll out of IMARS to all NPS parks.<sup>45</sup> Cape Hatteras NS staff could work with NPS Headquarters staff to stay apprised of efforts to adopt IMARS at Cape Hatteras NS and to consider how IMARS may interface with state and local documentation practices. The actual timeline for the DOI implementation of this system in the park is unknown and will depend on factors outside of the control of Cape Hatteras NS staff.

#### *Cost*

The cost of coordinating with state and local enforcement agencies would consist of Cape Hatteras NS staff resources for regular check-ins and collection and storage of documentation. The related costs of the IMARS program are currently unknown. However, it is assumed that the full implementation of the IMARS at Cape Hatteras NS will require staff time for coordination, training, potentially migration of information into the system, and implementation.

#### *Partnerships*

- NPS Headquarters
- Local and state law enforcement

### **Strategy 11: Offer and/or encourage interpretive alternative transportation tours of Bodie Island**

#### *Description*

Supplying guided, nonmotorized options as an alternative to personal/private motor vehicle use to visitors for experiencing Cape Hatteras NS could support alternative transportation within the park and provide a sustainable method to managing visitation. Offering or encouraging (e.g., through a partnership) interpretive tours within the Bodie Island District by bicycle, canoe/kayak, or foot is one strategy to reduce the impacts of motor vehicle use on the park. The proposed canoe/kayak tour routes, which need to be developed, could follow the trail designated by the North Carolina Paddle Trails Association and NC Blueways. An approximation of the route for this trail is illustrated in Figure 13 on page 61. Bicycle routes could go from Nags Head or another community to Bodie Island Lighthouse or further south once

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<sup>43</sup> A Comprehensive Study of Visitor Safety in the National Park Service. Tuler and Golding. 2002. P. iii.

<sup>45</sup> Department of Interior. Enterprise Architecture (IEA), DOI Interior Enterprise Architecture. Law Enforcement Modernization Blueprint, Law Enforcement Line of Business. Final – Version 1.1, November 2004. P.27

Bonner Bridge is replaced. Pedestrian routes could follow the Pond Boardwalk or Dike Trail at Bodie Island Lighthouse.

#### *Technical feasibility*

This type of strategy or programming is technically feasible, though the complexity and time required for implementation would vary considerably depending on the scope of services provided (bicycle, canoe/kayak, or pedestrian tours) and the structure and management of the program (NPS managed, concessionaire, non-profit partnership, etc.) chosen for implementation. Walking tours provide a simple tour model that could be managed entirely by Cape Hatteras NS staff and implemented in a short time period. Tours by bicycle or canoe/kayak require a more complex management arrangement and could take up to a year to finalize, either through a contract agreement with a local concessionaire or a memorandum of understanding with a local non-profit. A concessionaire would operate for profit and assume the responsibility for owning and maintaining a fleet of vehicles and related equipment (e.g., bicycles, helmets, kayaks, life jackets), identifying routes, and providing marketing and liability insurance. An agreement with a non-profit would operate similarly, and may align more clearly with park goals and objectives if, for example, the non-profit mission relates to sustainability, historic or resource preservation, etc. Cape Hatteras NS could allow access to parklands and could work cooperatively to provide interpretive services for the tours.

#### *Cost*

The cost of developing, maintaining, and administering interpretive tours utilizing alternative modes of travel would vary considerably depending on the type of program developed. The cost to provide NPS managed interpretive walking tours of the Bodie Island area would include staff time. The cost to provide bicycle or kayak tours of the area could cost significantly more. A partnership model in these cases would make these options more feasible for the park, and actual cost would depend on the type of agreement put in place.

#### *Partnerships*

- concessionaire or non-profit organizations
- North Carolina Paddle Trails Association or similar

#### *Examples at other parks/locations*

The Wichita Mountains Wildlife Refuge located in southwestern Oklahoma provides an interpretive bus tour through a portion of the refuge that is closed to the general public. This bus tour is operated by the Association of Friends of the Wichitas (the Friends), a non-profit organization that provides interpretation on the tours, on a bus that the refuge owns and maintains. The 2.5 hour tours are offered year-round except for mid-November through January 1 on a variable basis (from a few times to several times per month) and require reservations. Refuge staff anecdotally report that the tours often sell out. The Friends group charges \$5 per person for each tour. Under the terms of the Memorandum of Understanding (MOU) between the Friends and the refuge, the Friends contribute a portion of the bus tour revenues to the refuge for environmental education programs. Though this example pertains to a bus tour, the model could easily be adapted to boat, or bicycle tours.

Acadia National Park in Maine began offering an interpretive biking tour during the summer of 2010.<sup>46</sup> The tour was offered once a week for a fee and required a reservation. The fee was \$15 for adults and \$10 for youth ages 14 to 16; youth under the age of 14 were not allowed on the tour. The tour was a 3-hour, 8-mile ride with frequent stops at the historic bridges. The tour took advantage of the park's free transit system, the Island Explorer, so that participants could take the bus back to their vehicles at the end of the tour.

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<sup>46</sup> Personal communication with Acadia National Park interpretive office. October 2010.

## Strategy 12: Offer NPS employees a bicycle share program combined with volunteer bicycle patrols

### *Description*

This strategy creates an employee bicycle share program at Cape Hatteras NS combined with volunteer bicycle patrols. An employee bicycle share program would be voluntary and would provide employees who prefer to bicycle between locations on Cape Hatteras NS with a bicycle, helmet, lock, and storage area to facilitate travel by bicycle. Bicycle share programs provide the opportunity for employees to make short trips by bicycle as opposed to motor vehicle. These programs help to reduce vehicle emissions, the use of fossil fuels, and often promote the stewardship goals of the NPS. In conjunction with such a program, a volunteer bicycle patrol program could be established to provide opportunities for volunteers. Members of the bicycle patrol would travel along popular bicycle routes and provide assistance to anyone looking for directions or in need of repair assistance.

### *Technical feasibility*

This strategy requires the commitment of at least one staff person, ideally a law enforcement officer or ranger, to be the point person for overseeing the employee share program and the volunteer bicycle patrol program. The feasibility of this will depend on staff interest and availability. For the bicycle patrol, the staff person would need to identify interested volunteers, meet with each to provide basic training on expectations, and track how many patrols are made.

A key consideration for this strategy is the safety of employees and volunteers participating in the bicycle share or bicycle patrol program. Currently, there are no known records of serious bicycle accidents on NC 12 through the Bodie Island District or elsewhere within the Cape Hatteras NS. Furthermore, the widening of the roadway shoulders on NC 12 in the vicinity of Bodie Island will improve conditions for bicycling. However, bicycle accidents do occur from time to time on the Outer Banks, and an employee bicycle share or volunteer bicycle patrol program may only be appropriate under certain conditions. For example, these programs may be suitable when weather permits, when distances between locations are relatively short (under five miles), and when travel routes are safe and enjoyable. The use of the share system would be limited to employees as a means to cover liability insurance, assuming that current employee insurance that covers employee operations of motor vehicles extends to non-motorized vehicles as well.

In addition to safety, it is recommended that there be a set policy on use etiquette and system maintenance. Prior to the implementation of such programs, Cape Hatteras NS staff could be surveyed for their level of interest in the ability to use bicycles as a means of travel during the workday. If interest is sufficient, an employee bicycle share program could be implemented within a year.

As an example, a small set of bicycles could be kept at the Bodie Island Visitor Center to be used between that site and sites as far south as Oregon Inlet Fishing Center (approximate distance = 2.9 miles). An employee bicycle share could operate at the Fort Raleigh National Historic site to allow employees to travel to local meetings, business, or lunch in downtown Manteo (distance distance = 3.5 miles)

### *Cost*

An employee based bicycle share program could be implemented with an initial investment of approximately \$5-10,000,<sup>47</sup> which would include both capital and maintenance costs. Capital costs consist of a small fleet (5-10) of bicycles, associated safety equipment (lights, helmets, locks), and maintenance. With regular maintenance, a bicycle can last up to 10 years or more. Helmets need replacement every 5 years<sup>48</sup> or when an impact occurs. Maintenance could be performed on an as needed or on an annual basis at relatively low costs. The total capital cost estimation shown in Table 14 is \$6,150.

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<sup>47</sup> The City of Tucson implemented their City Cycle program, with 20 bicycles, for \$7,590 in capital and maintenance costs for the first year. 2008 City Cycle Report. <http://cms3.tucsonaz.gov/files/bicycle/FinalCityCycle2008Report.pdf>

<sup>48</sup> <http://www.bhsi.org/replace.htm>



**Table 14**  
**Capital cost estimate of employee bicycle share program**

Item	Qty	Cost	Total
Bicycle	10	\$385.00 <sup>49</sup>	\$3850
Helmet	10	\$50.00 <sup>50</sup>	\$500
Bicycle U-lock	10	\$40	\$400
Lights (rear/front)	10	\$40	\$400
Annual Maintenance	10	\$80 <sup>51</sup>	\$800
Basic equipment (bicycle pump, tools, tubes)	Varies	\$200	\$200
Total			\$6,150

Administrative costs would consist of staff time to purchase the equipment, check periodically on the bicycles and attend to any maintenance or replacement needs, and promote use of the program. To make the administration of such a program cost efficient, it would have to be managed internally by a willing Cape Hatteras NS staff person. It is expected that the administration of such a program would include the following: making available a basic written safety operations manual,<sup>52</sup> developing a use etiquette policy, employee bicycle/equipment check out procedures, checking bicycle conditions on a weekly basis, scheduling and transporting bicycles for maintenance/repair, distributing bicycles between locations as needed, or other tasks as needed.

It is assumed a volunteer bicycle patrol would require the volunteers to provide their own bicycle and related safety equipment, thus costs would be confined to the administration of the volunteer program, which should be minimal.

#### *Examples at other parks/locations*

An example of each program – the employee bicycle share and volunteer bicycle patrol – is provided below.

In 2003, Glacier National Park began a Red Bike program for its employees that is still in place.<sup>53</sup> The Glacier Fund, a non-profit arm of the National Park Foundation, awarded \$9,000 for the program to supply 20 red bikes for employees to use to make trips within the park as an alternative to driving. The grant also supplied a tricycle, helmets, baskets, locks, and bike racks.<sup>54</sup> NPS park staff at the National Mall and Memorial Parks in Washington, D.C., “use bicycles to patrol the entire park in order to better engage the public, monitor activities, and care for the cultural and natural resources throughout the park.”<sup>55</sup> At Acadia National Park, volunteer bicycle patrols assist NPS park ranger staff by providing information and

<sup>49</sup> <http://www.californiabikecommute.com/FACTS.pdf>

<sup>50</sup> Helmet cost range from \$10-200 (<http://www.bhsi.org/testbycost.htm>). \$50 is a generous estimate.

<sup>51</sup> Bicycle tune-ups range from \$50-\$80 (<http://www.suite101.com/content/how-to-get-the-best-bicycle-tuneup-a94432>)

<sup>52</sup> For free examples, see: <http://bicyclesafe.com/>

<sup>53</sup> Glacier National Park. “Climate Friendly Park Drives Less and Pedals More.” Green Team Blog – September 2009. September 14, 2009. [http://www.nps.gov/glac/parknews/blogs\\_green\\_0909.htm](http://www.nps.gov/glac/parknews/blogs_green_0909.htm)

<sup>54</sup> Guide to Promoting Bicycling on Federal Lands. Federal Highway Administration. Central Federal Lands Highway Division. September 2008. P. 22

<sup>55</sup> Guide to Promoting Bicycling on Federal Lands. Federal Highway Administration. Central Federal Lands Highway Division. September 2008. P. 26



other assistance as needed to park visitors on the 45 miles of car-free, bicycle friendly carriage roads throughout the park.<sup>56</sup>

For the summers of 2008 and 2009, a law enforcement officer at Acadia National Park organized a volunteer bicycle patrol on the park's unpaved carriage roads.<sup>57</sup> Members of the public had expressed interest, so a press release was issued to solicit volunteers. Approximately a dozen volunteers responded to the request. Volunteers patrolled individually on an intermittent basis, were given vests by NPS to indicate their status, and were equipped by NPS staff with first aid kits, maps, and, on some occasions, park radios. The program ended when the organizing officer transferred to another park. Acadia National Park does do periodic safety checks in which a staffed station is set up at one of the carriage intersections with bicycle tools, maps, and safety promotional materials.

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<sup>56</sup> Acadia National Park. Accessed August 24, 2010. <http://www.nps.gov/acad/planyourvisit/bicycling.htm>

<sup>57</sup> Personal communication with Acadia National Park Volunteer Coordinator. October 2010.

## 2.3 Roadway

The following section includes six strategies to improve roadway travel and safety in the Bodie Island District. Figure 7, located at the end of this section, on page 43, shows the location of these strategies within the study area. These new roadway infrastructure and amenities aim to improve the safety of both motorists and nonmotorized users but the need and overall impact of some of the more significant projects, such as the exclusive right turn lanes (Strategy 18), should be substantiated and verified through proper analysis, such as a safety study or traffic engineering analysis, prior to a project request. The signage strategies in this section are intended to improve safety along Bodie Island roadways. Signage strategies for information purposes only are included in Section 2.8 (Wayfinding and Traveler Information).

### Strategy 13: Change outgoing speed limit from 25 mph to 15 miles per hour (mph) on Lighthouse Bay Drive (RIP Route #0202)

#### *Description*

The Lighthouse Bay Drive (RIP Route #0202) is owned and maintained by Cape Hatteras NS. Currently, the posted outgoing speed limit, from Bodie Island Lighthouse to NC 12, is 25 mph, while the incoming speed limit (for vehicles traveling in the opposite direction) is posted as 15 mph. Speed limits should be consistent on this roadway.

#### *Technical feasibility*

Changing the posted speed limit signs so that ingoing and outgoing speed limits match would require Cape Hatteras NS staff to replace the posted speed limit signs in the outbound direction. Cape Hatteras NS owns and maintains this roadway and the speed limit signs. Park staff report that they will work to make this change in the immediate future and do not see difficulty in matching the speed limits.

#### *Cost*

The cost to replace one of the posted sign posts would include Cape Hatteras NS staff resources to obtain and install a new sign. The cost of a new sign would be minimal (approximately \$25, assuming that the existing post is re-used).<sup>58</sup>

### Strategy 14: Add advance information and warning signage for roadside pull-offs

#### *Description*

This strategy involves the implementation of advance information and warning signs for roadside pull-offs along NC 12. The study team determined that new signs at the three existing pull-offs are needed and would improve safety for motorists on NC 12 and visitor experience. The existing pull-offs serve as access points for hunting trails, and one pull-off includes a viewing platform. New signs would inform motorists of the pull-off locations on the west side of the roadway and warn motorists of merging or turning motorists. Additional signs would be installed to inform visitors of opportunities to pull over to view the scenery, especially where viewing platforms are provided.

#### *Technical feasibility*

Cape Hatteras NS staff could request the installation of three new warning signs from NCDOT to inform motorists of the potential for vehicles entering the road from unmarked pull-off areas. Cape Hatteras NS staff could also work with NCDOT on the placement of information signs, designed and created by NPS, to guide motorists to an upcoming viewing area, photo opportunity, hunting area, and merging traffic.

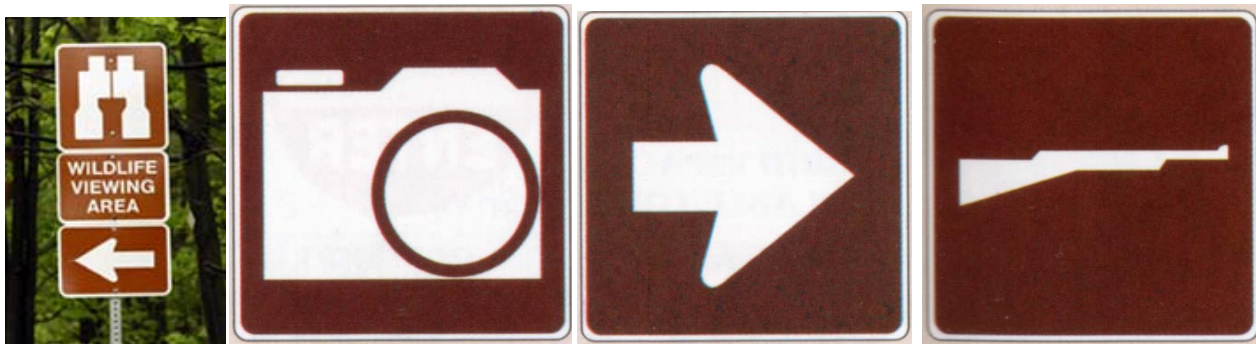
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<sup>58</sup> An 18 inch X 24 inch, speed limit sign. Purchased through GSA.  
[https://www.gsaadvantage.gov/advgsa/advantage/catalog/product\\_detail.do?contractNumber=GS-07F-5924R&BV\\_UseBVCookie=Yes&itemNumber=R2-1-50-18X24HIP](https://www.gsaadvantage.gov/advgsa/advantage/catalog/product_detail.do?contractNumber=GS-07F-5924R&BV_UseBVCookie=Yes&itemNumber=R2-1-50-18X24HIP)

Figure 4 shows sample types of information signs used to identify wildlife viewing, photography, and hunting areas.

**Figure 4**  
**Information signs**

Source: [http://www.mass.gov/dfwele/dfw/recreation/viewing/wildlife\\_viewing.htm](http://www.mass.gov/dfwele/dfw/recreation/viewing/wildlife_viewing.htm) (left) and [http://www.traditioncreek.com/storefront/outdoor-signs-interpretive-c-9\\_21.html?page=3&sort=3d](http://www.traditioncreek.com/storefront/outdoor-signs-interpretive-c-9_21.html?page=3&sort=3d) (right)



#### *Cost*

Sign costs should be minimal (\$100-200 per sign, depending on size and customization) but would require installation and periodic replacement. Cape Hatteras NS would be responsible for the purchase and installation of information signs while NPS could request funding and installation of warning signage from NCDOT.

#### *Partnerships*

- NCDOT

### **Strategy 15: Add share the road/bicycle signs along planned widened shoulders on NC 12**

#### *Description*

In order to improve bicycle and motorist safety along NC 12, the study team identified the need for “Share the Road” signs or pavement markings, sometimes referred to as “sharrows,” along the widened shoulders on NC 12. Cape Hatteras NS staff report that NCDOT will install signs; however, the shoulder surface will not include formal bicycle lane markings. Pavement markings indicate that the lane is intended to be shared by automobiles and bicycles when there is no designated bicycle lane. If the shoulders are widened in the future beyond the current widening project, as proposed in Section 2.5 (Bicycle), additional bicycle lane markings and signs should be installed so that motorists are aware of the designated bicycle lane. An examination of rural bicycle and pedestrian crashes in North Carolina by roadway classification showed that rural two-lane roads had the greatest needs for safety improvements, though the study recommended that only those roads with high use should be targeted.<sup>59</sup> Recommended countermeasures for bicycles included adding paved shoulders, which NCDOT and Cape Hatteras NS are currently in the process of implementing/installing, and providing marked pavement space, as recommended by this strategy.

<sup>59</sup> Carter, D. and Council, F. "Summary Report: Factors Contributing to Pedestrian and Bicycle Crashes on Rural Highways." FHWA Highway Safety Information System. June 2010. <http://www.fhwa.dot.gov/publications/research/safety/10052/10052.pdf>

#### *Technical feasibility*

Cape Hatteras NS staff could work with NCDOT to install share the road signs or paint “sharrows” along NC 12 during roadway widening construction or immediately after the project is complete. There are several options for share the road signs and pavement markings; Figure 5 shows examples of each.

**Figure 5**  
**Bicycle markings and signs**

Source: [www.pedbikeimages.org/HeatherBowden](http://www.pedbikeimages.org/HeatherBowden) (left) [www.pedbikeimages.org/DanBurden](http://www.pedbikeimages.org/DanBurden) (center and right)



#### *Cost*

Depending on the size and type of marking used, sharrow markings can cost \$70 per symbol.<sup>60</sup> These symbols should be re-painted every few years as the paint is worn down. A sign and post should cost approximately \$200 per sign for materials only.<sup>61</sup>

#### *Partnerships*

- NCDOT
- FHWA

**Strategy 16: Reduce the speed limit along NC 12 near Bodie Island attractions, if a traffic/safety study verifies the need for, and appropriateness of, such a strategy**

#### *Description*

The study team identified that reducing the speed limit along NC 12 is a current need for the park. The posted speed limit is 55 mph for northbound and southbound motorists on most of NC 12. The average travel speed is 56 mph and the 85th percentile speed is 63.<sup>62</sup> The high speeds create a risk for pedestrians who cross NC 12, bicyclists traveling along or across NC 12, and motorists turning onto or off of the highway. In addition, the study team expects there to be an increase in overall traffic to Bodie Island Lighthouse once it is open for climbing and an increase in nonmotorized traffic once the expanded shoulders on NC 12 are complete. Nonmotorized traffic may increase more if Cape Hatteras NS installs

<sup>60</sup> Costs-Demands-Benefits Analysis Tool. <http://www.bicyclinginfo.org>

<sup>61</sup> Costs-Demands-Benefits Analysis Tool. <http://www.bicyclinginfo.org/bikecost/>

<sup>62</sup> Project PRA-CAHA 10(2). Cape Hatteras National Seashore Overlay and Replace Culverts on NPS Route 010, NC State Route 12. Description: Feasibility of Improving Vehicle-Bicycle Safety by Adding Bike Lanes. January 2008.

the proposed shoulder or multi-use trail from the intersection of NC 12 and Lighthouse Bay Drive (RIP Route #0202) to the Lighthouse (Strategy 17) or the Dike Trail extension (Strategy 33).

This strategy involves the implementation of two mechanisms that may be effective in reducing speeds along NC 12:

- temporary reduced speed limit signs and
- speed director units (see Figure 6), used to show drivers their current travel speed.

Figure 6 shows example images of each. Both pieces of equipment should be placed in areas where there are intersections and incoming or turning vehicles and areas that receive frequent pedestrian traffic. Cape Hatteras NS could coordinate with NCDOT to install two temporary speed limit signs and/or speed director units to reduce the speed limit at the intersection of NC 12 and Lighthouse Bay Drive (RIP Route #0202). One sign should be placed south of the intersection for northbound motorists and one sign should be placed north of the intersection for southbound motorists prior to traveling through the intersection.

It is important to note that safety strategies, such as this one, were based on limited field observation. As such, the Park Unit will need to perform a safety study or traffic engineering analysis, prior to a project request, to substantiate the recommendation prior to implementation.

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**Figure 6**  
**Roadway speed limit sign trailer (left) and pole-mounted speed director unit (right)**

Source: Millennium Products Inc. Fold-N-Go



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#### *Technical feasibility*

Reducing the speed limit along NC 12 would require the purchase of equipment or use of existing NCDOT equipment if available. Additional costs include park staff time to install and NCDOT/state police/NPS enforcement. NCDOT may not find a reduced speed appropriate for this type of roadway and traffic mix; however, there is precedent for this two miles south of Lighthouse Bay Drive (RIP Route #0202) on NC 12 by Oregon Inlet Fishing Center where the posted speed limit is reduced to 45 mph to provide safer conditions for motor vehicles turning in and out of the Center and pedestrians or equestrians crossing the road to access Ramp 4 from the Center. Cape Hatteras NS could coordinate with NCDOT to install or set up temporary speed limit signs along NC 12 at the beginning of the peak season and remove them at the end of peak season. Alternatively, Cape Hatteras NS staff could work with NCDOT to set up signs at the beginning of peak season weekends and remove signs at the end of the weekend. Existing speed limit signs could be replaced or covered while temporary signs are visible. The reduced speed limit should at least match the limit posted further south at Oregon Inlet Fishing Center (45



mph); however, in the future vehicle and pedestrian traffic and conflicts should be monitored and further reductions in the speed limit should be considered if appropriate and necessary.

Providing visitors with feedback on their actual travel speed would require the installation of pole mounted speed directors. Similar to the speed limit signs, Cape Hatteras NS could work with NCDOT to install speed directors for specific time periods, such as over the summer, when peak visitation occurs. The speed director units could be installed on existing speed limit signs, as shown in Figure 6.

#### *Cost*

The material cost of a temporary speed limit sign is approximately \$3,117 each<sup>63</sup> and the material cost for a speed detector is approximately \$3,345 each.<sup>64</sup>

#### *Partnerships*

- NCDOT

### **Strategy 17: Widen Lighthouse Bay Drive (RIP Route #0202) (project partially complete)**

#### *Description*

Cape Hatteras NS staff have submitted a project in PMIS to widening Lighthouse Bay Drive (RIP Route #0202), an NPS-owned road that connects NC 12 to Bodie Island Lighthouse, along with the re-paving of the Bodie Island Lighthouse parking lot and the construction of either widened shoulders or a separated paved path for bicycle use. In December 2010, funding became available for the repaving and widening of the road but not the other components. The road has been widened to 24 feet, with 10-foot travel lanes and two-foot paved shoulders. Park staff considered the widening necessary because of the current safety hazard that the narrow roadway presents to both vehicular and nonmotorized traffic. The study team confirmed this based on field observations and comparison of the previous nine-foot travel lane width<sup>65</sup> with national standards, which identify nine feet as an absolute minimum but also recommend minimum two-foot shoulders.<sup>66</sup> In addition, road use, in particular by coach buses, is anticipated to increase with the opening of the Bodie Island Lighthouse for climbing, creating increased need for a wider access road. This strategy serves to identify how the completed widening serves alternative transportation, namely improved bicycle access, and how additional improvements should be considered for the future.

#### *Technical feasibility*

Cape Hatteras NS staff is responsible for the funding and construction of the widening for Lighthouse Bay Drive (RIP Route #0202); the project was funded by Recreational Fees. The proposed bicycle shoulder or separated trail was not able to be included in the roadway widening but should be considered for the future.

#### *Cost*

PMIS 47890 includes an estimate of \$1,005,977 to resurface and widen the Lighthouse Bay Drive (RIP Route #0202) and the parking area. The PMIS also includes bicycle infrastructure that could include a widened shoulder or an off-road multi use trail.

#### *Partnerships*

Cape Hatteras NS funded and managed the widening of Lighthouse Bay Drive (RIP Route #0202). Any additional improvements would be similarly conducted but coordination with NCDOT is recommended for any impacts on the intersection of the widened Lighthouse Bay Drive (RIP Route #0202) and NC 12.

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<sup>63</sup> "Fold-N-Go Safety Sign Trailer" Millennium Products Inc. <http://www.millenniumproducts.net/>

<sup>64</sup> "Pole Mounted Speed Director." Millennium Products Inc. [http://www.millenniumproducts.net/product\\_display.php?productid=560](http://www.millenniumproducts.net/product_display.php?productid=560)

<sup>65</sup> Lighthouse Bay Drive is a two-lane, 18-foot wide roadway with no paved shoulders according to Cape Hatteras NS staff and verified by field observations.

<sup>66</sup> See for example, the NCDOT Highway Design Manual. <http://www.ncdot.org/doh/preconstruct/altern/value/manuals/designmanual.html>

**Strategy 18: Construct southbound and northbound exclusive right turn lanes on NC12 at Lighthouse Bay Drive (RIP Route #0202) intersection, if a traffic/safety study verifies the need for, and appropriateness of, exclusive right turn lanes**

*Description*

This strategy involves the implementation of exclusive right turn lanes, also known as separate right turn bays, for Lighthouse Bay Drive (RIP Route #0202) and Coquina Beach. During peak visitation periods, park staff report that motorists line up to enter the Lighthouse Bay Drive (RIP Route #0202) and Coquina Beach parking area and block the through lane. The expected increase in use of Lighthouse Bay Drive (RIP Route #0202) to access the lighthouse would also increase congestion at this intersection.

*Technical feasibility*

The study recommends that the park work with NCDOT to conduct a safety study and an intersection design study to verify the recommendation and assess the impact of the proposed right turn lanes. Funding may be dependent on determination of a safety need. If the strategy is supported by a traffic/safety analysis, additional study is required to determine the design, potential environmental impacts, if any, and the level of NEPA compliance required, since the turn lanes or bays would require widening of the road.

*Cost*

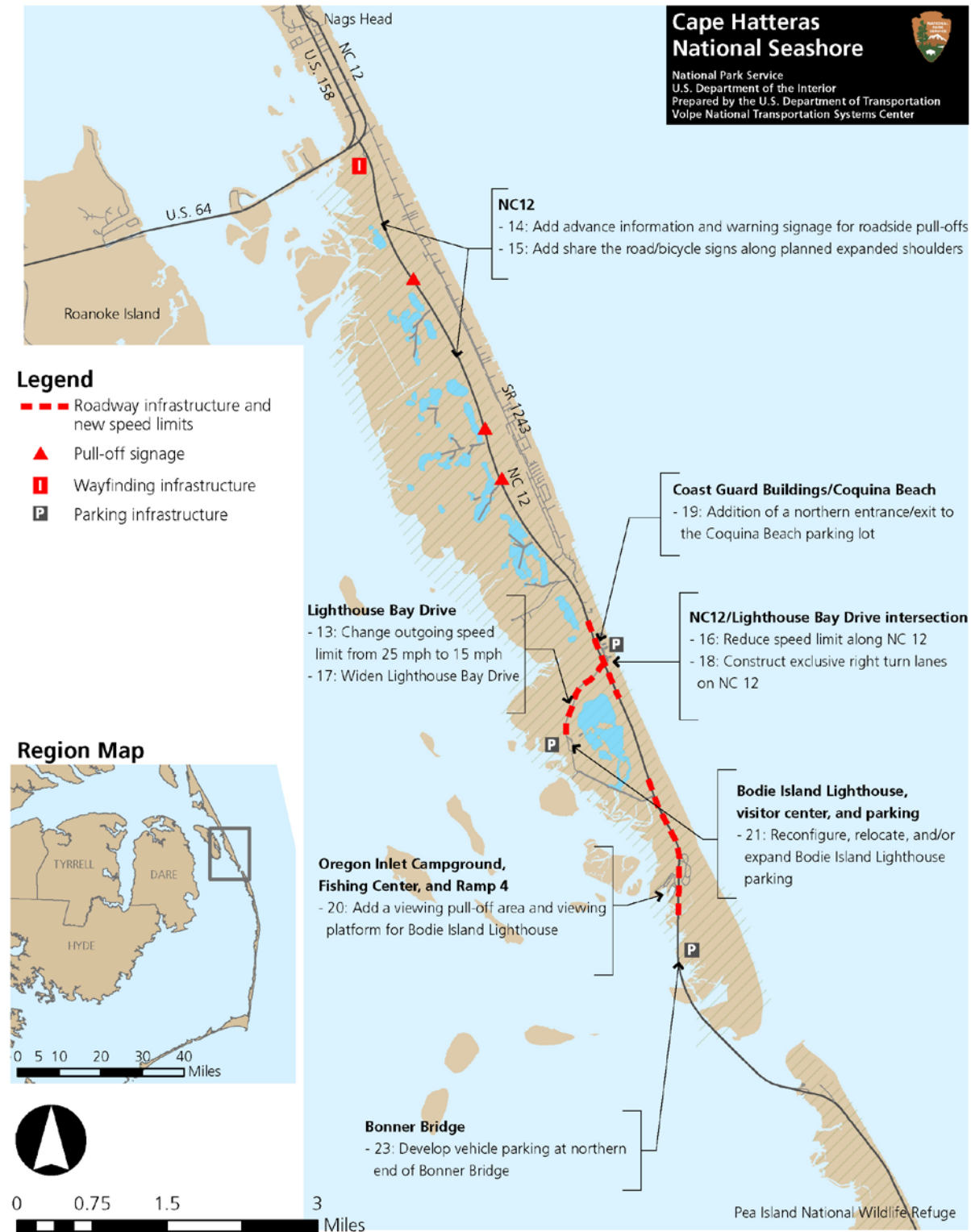
The cost of the right turn lanes would depend on the design in terms of the paved area. Cape Hatteras NS could coordinate with NCDOT on project design and cost because of the overlapping jurisdiction and the positive impact on motorists.

*Partnerships*

- NCDOT



Figure 7  
Roadway and parking strategies map  
Source: Volpe Center



## 2.4 Parking

This section includes four parking-related strategies that can increase access for visitors by all modes of travel, help to manage visitation, and help to protect natural resources. In addition, one of these strategies, constructing a pull-off area from NC 12 (Strategy ), is intended to address safety and improve visitor experience but its overall impact should be studied through proper analysis, such as a safety study or traffic engineering analysis, prior to a project request. Figure 7 on page 43 shows the location of these strategies within the study area.

### Strategy 19: Add a northern entrance/exit to the Coquina Beach parking lot

#### *Description*

According to Cape Hatteras NS staff, the northernmost parking lot at Coquina Beach, which does not have a separate entrance, is underutilized. This strategy provides an additional entrance/exit to the parking area, which would thereby increase access to the area from the north and allow for more efficient circulation of vehicles through the parking area. The distance between the northern and southern end of the parking area is approximately a quarter of a mile.

#### *Technical feasibility*

The addition of a northern entrance to the Coquina Beach depends on the level of NEPA compliance that is required for the disruption and pavement of the land that would be used to create a vehicle passage. The distance between this new access point and the existing access point is over 1000 feet, which is the minimum required distance between driveways for major thoroughfares according to NCDOT policy.<sup>67</sup>

#### *Cost*

The cost to plan and construct an additional vehicle entrance to the Coquina Beach depends on several factors including but not limited to: the level of NEPA compliance required, engineering and design plans, materials used, the total square feet of paved surface, and the provision of signage.

Table 15 provides planning level cost estimates adjusted for inflation<sup>68</sup> to 2010 for the potential project components. Actual project specifications may require additional construction activities, a different selection of materials, or amenities not detailed here.

**Table 15**  
**Capital, construction, and administrative cost estimate of Coquina Beach parking lot entrance**

Description	Quantity*	Unit Cost	Total Cost
Finish Pavement, Subbase	599 SQYD	\$8.00/ Square Yards (SQYD) <sup>69</sup>	\$4,792
Bituminous Base Course	67 tons	\$62.00/Ton <sup>70</sup>	\$4,154
NEPA compliance, Overhead, Miscellaneous (if necessary)	--	---	\$71,000 <sup>71</sup>

\* Based on the size of the current Coquina Beach southern access entrance at roughly 245' x 22'.

<sup>67</sup> NCDOT. Policy on Street and Driveway Access to North Carolina Highways. 2003.

<http://www.ncdot.gov/doh/preconstruct/altern/value/manuals/pos.pdf>

<sup>68</sup> Bureau of Labor Statistics, Consumer Price Index Inflation calculator computes the rate of inflation at approximately 2.5% annually. <http://data.bls.gov/cgi-bin/cpicalc.pl>

<sup>69</sup> Cape Hatteras National Seashore, Project Management Information System 69990, Construct Bodie Island Bike Path.

<sup>70</sup> Ibid.

<sup>71</sup> Ibid.

**Strategy 20:** Add a viewing platform for Bodie Island Lighthouse and pull-off area on the west side of NC 12, parallel for the road, if a traffic/safety study verifies the need for, and appropriateness of, such a strategy.

#### *Description*

This strategy is intended to improve roadway safety and visitor experience by creating a viewing platform for Bodie Island Lighthouse and pull-off area on the west side of NC 12, parallel to the road, between the entrances to the Bodie Island Lighthouse and Oregon Inlet Fishing Center in the Bodie Island District (see Figure 7 on page 43). The exact location should be determined based on safety considerations and identification of the best viewing area of the Lighthouse with input from the OBSB Committee and others. The primary purpose of the pull-off area would be to allow visitors to view the Bodie Island Lighthouse, in particular at sunset, which is a popular activity according to local stakeholders. The pull-off area would provide an alternative to slowing down or pulling onto the unprotected grass shoulder, actions that could have negative safety and resource consequences. In addition, a pull-off area could be located at the terminus of the Dike Trail and potentially provide some limited longer-term parking for use of the trail for recreation and to access the Sound and Lighthouse. The addition of roadside pull-off areas and viewing platforms are typical amenities in park settings with notable vistas.

#### *Technical feasibility*

This strategy requires that a safety study or traffic engineering analysis be conducted to consider all possible impacts, both in terms of NEPA compliance and safety, prior to a request for funding. A new pull-off area and viewing platform on existing vegetation or wetlands may have environmental impacts and need careful consideration of materials, siting, and design. The pull-off also may have the potential of introducing new safety issues.

If a safety or traffic engineering analysis determines the strategy is an appropriate course of action, the park would then need to obtain funding and materials, prepare the design (including the exact location and size), and complete any environmental compliance required. Construction of a pull-off area and viewing platform should take place in the spring or fall<sup>72</sup> and be timed to avoid peak visitation to the Cape Hatteras NS.

#### *Cost*

The cost for the creation of new pull-off areas and the addition of viewing platforms vary based on the existing roadside conditions, the number of pull-off areas and viewing platforms to be constructed, materials used, the size of pull-off areas, and the type of viewing platform. Table 16 provides approximate cost estimates adjusted for inflation to 2010<sup>73</sup> for potential project components. Actual project specifications may require additional construction activities, a different selection of materials, or amenities not detailed here.

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<sup>72</sup> Ibid.

<sup>73</sup> Bureau of Labor Statistics, Consumer Price Index Inflation calculator computes the rate of inflation at approximately 2.5% annually. <http://data.bls.gov/cgi-bin/cpicalc.pl>

**Table 16**  
**Capital and construction costs for parking pull-off and viewing platform**

Description		Unit Cost (2010 \$)	Quantity	Total Cost
Gravel pull-off	Prepare and fill road shoulder	\$15.00 / Cubic Yard (CUYD) <sup>74</sup>	35 CUYD	\$525
	Granite chips	\$156.00 / CUYD <sup>75</sup>	35 CUYD	\$5,460
Stabilized grass pull-off		\$237.00 <sup>76</sup> / SQYD	650 SQYD	\$154,050
Viewing platform				\$20,000- 50,000 <sup>77</sup>
Total				\$180,000-210,000

\* Based on the average size of the three existing pull-off areas at: 300' x 30', 120' x 40', 150' x 25'.

#### *Partnerships*

- NCDOT
- Local community organization (e.g. the North Carolina Audubon Society or the OBSB Committee)

#### *Examples at other parks/locations*

##### Viewing platforms and wildlife blinds

The North American Nature Photography Association (NANPA) in partnership with the U.S. Fish and Wildlife Service shared the cost of developing and installing photography blinds for the Bear River Migratory Bird Refuge, Utah (Figure 8). Figure 8 also illustrates a walk up, wheel chair accessible viewing platform at Balcones Canyonlands National Wildlife Refuge, Texas.

**Figure 8**  
**Photography blind at Bear River Migratory Bird Refuge, Utah (left), and viewing platform at Balcones Canyonlands National Wildlife Refuge, Texas (right)**

Source: North America Nature Photography Association and U.S. Fish and Wildlife Service



<sup>74</sup> Cape Hatteras National Seashore, Project Management Information System 69990, Construct Bodie Island Bike Path.

<sup>75</sup> Heavy Construction Cost Data. RS Means, 21<sup>st</sup> Annual Ed. 2007. P.272

<sup>76</sup> Aggregate estimate of construction costs for various materials: topsoil, paneling, grid, fiberglass grating, etc. based on, Construction of Stabilized Grass Pull-Offs Using Geo-Technology Along the Gatlinburg Spur. Project PRA-FOOT 15A31. Great Smoky Mountains National Park Foothills Parkway. Federal Highway Administration. Eastern Federal Lands Highway Division. November 2004 <http://www.efl.fhwa.dot.gov/files/technology/GRSM-Stabilized-Grass-Pulloffs-report.pdf>

<sup>77</sup> A Guide to Wildlife Viewing and Photography Blinds. Creating Facilities To Connect People With Nature. Colorado Division of Wildlife and Virginia Department of Game and Inland Fisheries.

[http://myfwc.com/docs/RecreationActivities/Guide\\_Viewing\\_Blinds.pdf](http://myfwc.com/docs/RecreationActivities/Guide_Viewing_Blinds.pdf) This document provides a selection of case studies outlining wildlife viewing platforms and photography blinds. The design, construction, and total cost of these facilities vary considerably and are highly context sensitive to the geography, climate, and resource protection issues at the site location.

### Stabilized pull-off areas

The Great Smoky Mountains National Park implemented stabilized turf covered pull-off areas (Figure 9) on the Foothills Parkway using a geotextile fabric, geoblocks and other materials for soil stabilization. The grass shoulders meet the aesthetic design standards for the park service roads and parkways and minimize the impact of the roadway footprint on the environment.

**Figure 9**

**Great Smoky Mountains National Park, Foothills Parkway pull-off area during construction (left) and post-construction (right)**

Source: Federal Highway Administration, Eastern Federal Lands Highway Division



### **Strategy 21: Reconfigure, relocate, and/or expand the capacity of Bodie Island Lighthouse parking, including spaces for motorcoaches and oversized vehicles**

#### *Description*

The opening of the Bodie Island Lighthouse to climbers is anticipated to increase visitation to the site. There is a concern that the current parking lot capacity at Bodie Island Lighthouse may not be able to accommodate the expected increase in visitation. Further, the current parking area does not have clearly delineated parking spaces for larger vehicles such as school buses, coach buses, or recreational vehicles (RVs). Based on the parking demand assessment provided in the Needs Assessment, Cape Hatteras NS may consider the expansion of Bodie Island Lighthouse parking. Additionally, Cape Hatteras NS staff indicated a desire to relocate the current parking area away from the historic structures on the site.

This strategy would result in a designated parking area for buses and over-sized vehicles, increased vehicle capacity, and in the case of relocation, improved historic/view corridors on the site. The designated parking area could be located where buses currently park, along the west edge of the Lighthouse Bay Drive loop (RIP Route #0202), or within the existing parking lots, though that would displace regular vehicle spaces so is not recommended. A new parking area could also be created, such as to the west of the Lighthouse Bay Drive loop (RIP Route #0202), but would need to ensure adequate clearance and turning radius for coach buses.

#### *Technical feasibility*

The complexity of this solution is dependent upon the expansion or complete relocation of the Bodie Island parking lot. Relocation would likely require a higher level of NEPA compliance, time, and cost.

#### **Cost**

According to a Cape Hatteras NS PMIS request for a new parking area, adjusted for inflation to 2010,<sup>78</sup> the cost to construct a 120-space parking area, including exterior lighting, NEPA compliance, management,

<sup>78</sup> Bureau of Labor Statistics, Consumer Price Index Inflation calculator computes the rate of inflation at approximately 2.5% annually. <http://data.bls.gov/cgi-bin/cpicalc.pl>



design and construction is estimated to be \$171,920.<sup>79</sup> Actual project specifications may require additional construction activities, a different selection of materials, or amenities not detailed here. An independent capital cost estimate is provided in Table 17, along with annual operating and maintenance costs that accrue to parking facilities. It is assumed that any new parking at the Bodie Island Lighthouse will be surface parking. Annual operations and maintenance (O&M) costs will depend upon the construction materials used, size of the parking area, and the provision of additional amenities, but are estimated to range from \$200 to \$400 annually per space.<sup>80</sup>

**Table 17**  
**Capital, design, construction, and O&M cost estimate for expanded parking area**

Source: Victoria Transport Policy Institute, Transportation Cost and Benefit Analysis (2009), <http://www.vtpi.org/tca/>

Type of cost	Capital, including design and construction	O&M (20 years)	Total
120-space surface parking lot	\$1.2 million (\$10,000 per space)	\$4,000-8,000	\$1.6 to \$2.0 million

## Strategy 22: Designate seasonal satellite shared parking for transit service

### *Description*

The term “shared parking” is used to describe parking areas that are shared by two or more entities, thereby creating a more efficient use of existing parking spaces. This strategy is considered for addressing future needs for Cape Hatteras NS if a transit shuttle option is implemented. The designation of a shared parking lot facility would allow for a potential park and ride shuttle service to serve the entire Cape Hatteras NS or specific areas like Bodie Island. Due to land use patterns and limited transit, the Outer Banks has few high-density areas that could serve as transit stops that people could access by walking and thus not require parking; therefore the creation of a centralized parking area (a “park and ride” facility) to accommodate potential passengers for transit shuttle services that link populations in the north with Cape Hatteras NS attractions is essential.

### *Technical feasibility*

The successful implementation of a shared satellite parking for a Cape Hatteras NS transit shuttle is dependent upon identifying an appropriate public or private property with significant unused parking spaces, specifically during potential peak transit shuttle operating hours, and parking use patterns that follow predictable daily, weekly, and annual cycles. Characteristics of a prime location, public or private, would include a combination of on-site or proximate uses (e.g., café, restaurants, retail), good vehicular and bus access, pedestrian amenities (such as seating and shelter), and safe and pleasant surroundings.

Throughout the Outer Banks region, there are several public parking areas that could be used as satellite parking lots to serve a transit shuttle system. These sites include the Wright Brothers Memorial and Fort Raleigh National Historic Site (NHS), the Outer Banks Welcome Center on US-64 (see Figure 2 on page 15), Jennette’s Pier in Nags Head, local town public parking areas, schools, and beach access areas. Section 3 in the Conditions Inventory Assessment report of this study outlines a list of potential primary regional public parking areas.

<sup>79</sup> Cape Hatteras National Seashore, Project Management Information System 115679, FY 2006-2011 Implementation of an Alternative Transportation System

<sup>80</sup> Victoria Transport Policy Institute. Transportation Cost and Benefit Analysis II – Parking Costs. <http://www.vtpi.org/tca/tca0504.pdf>. Based on Richard J. Kuzmyak, Rachel Weinberger and Herbert Levinson (2003), *Parking Management and Supply*, TCRP Report 95, Chapter 18, TRB ([www.trb.org](http://www.trb.org)), based on Cambridge Systematics (1998),

Economic Impact Analysis of Transit Investments” TCRP 35, TRB ([www.trb.org](http://www.trb.org)).

Potential locations for satellite shared parking locations on private property include main shopping centers, such as the Tanger Center or the Outer Banks Mall, although the availability of such sites depend on the owner's or occupant's interest and need for parking to meet customer parking demand. Locations with multiple commercial opportunities specific to serving tourists increase the likelihood of a successful partnership. A park and ride located in a commercial area allows visitors to spend the day at destinations within the Cape Hatteras NS and return to the area to shop or dine, thereby creating a mutually beneficial arrangement between the Cape Hatteras NS and area businesses.

The length of time required to implement a satellite shared parking location is dependent upon the management and operations negotiations with the owners of potential shared parking sites, and should be timed to coincide with implementation of a transit solution for the Cape Hatteras NS that would require satellite parking facilities.

An operations agreement between the Cape Hatteras NS and the property owner would be necessary to ensure the proper functioning of a shared parking arrangement. Typical issues that a MOU or a contractual agreement should dictate include<sup>81</sup>:

- The location and number of spaces to be shared.
- The type of sharing agreement in terms of exclusive use, charging for parking, limitations of use by time of day or day of week based on the transit shuttle schedule, and the peak parking demands on the site.
- The party responsible for routine parking lot maintenance and/or the provision of transit location specific amenities like information kiosks, transit shelters, benches, or trash receptacles.
- The provision of information or directional signage to indicate shuttle stop locations, schedules, or the times/days during which shared parking spaces are available for use.
- The party responsible for monitoring and addressing potential parking violations.
- Insurance requirements for the shared facilities.

#### *Cost*

The costs to create a satellite shared parking agreement vary considerably based on physical arrangement and current parking management at the chosen site. Costs increase if capital improvements or maintenance requirements are built into the agreement. Capital improvements could include information kiosks, transit shelters, benches, or trash receptacles. Dependent upon the management model used for the transit system, capital and maintenance costs may be partially recouped through administration of an on-site parking fee, assuming non-NPS management, and transit shuttle fares.

#### *Partnerships*

- publicly-owned parking lots such as NPS sites, Outer Banks Visitors Bureau sites, school parking and/or other town properties

For example, the Outer Banks Visitor Bureau has expressed preliminary interest in such an arrangement at the Outer Banks Welcome Center on US-64 on Roanoke Island. In addition, the Bureau has also recently acquired the Windmill Point property and may be open to considering sharing parking at the location depending on its future use and development; however, the timeline for such development is currently unknown.

#### *Examples at other parks/locations*

Satellite parking facilities exist in many NPS units to complement existing transit shuttle systems. Some are located within the park unit; others can be located in nearby towns. For example, Denali National Park in Alaska has limited parking at its visitor centers and consequently, there is a satellite parking lot at a campground and a free shuttle (Riley Creek Loop Shuttle) to take visitors between the locations.<sup>82</sup> The

<sup>81</sup> Capital Region Council of Governments. Community Development. Ch. 8 Shared Parking. [http://www.crcog.org/publications/CommDevDocs/TCSP/Cho8\\_Technical\\_Part1\\_Parking.pdf](http://www.crcog.org/publications/CommDevDocs/TCSP/Cho8_Technical_Part1_Parking.pdf)

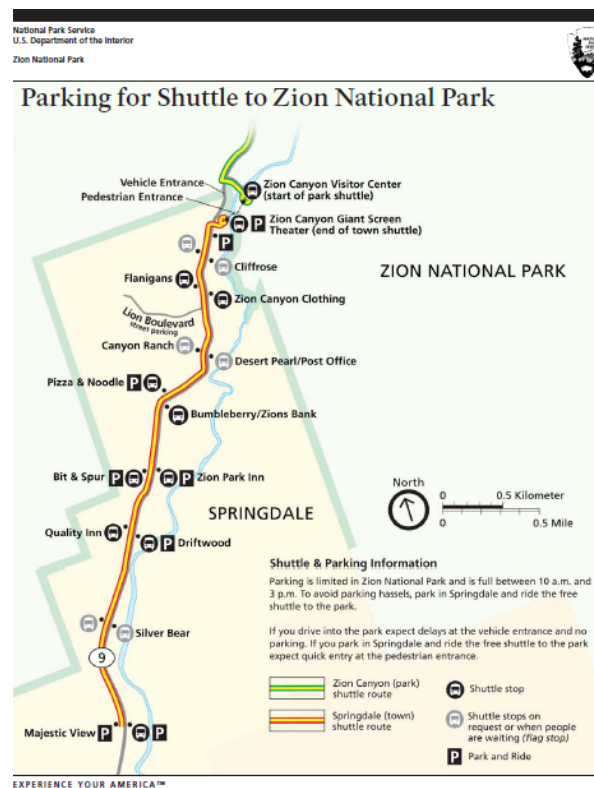
<sup>82</sup> "Courtesy Shuttle Buses," <http://www.nps.gov/dena/planyourvisit/courtesy-shuttle-buses.htm> <http://www.reservedenali.com/entrance-facilities/entrance-area-shuttles.aspx>



free shuttle is provided by the concessionaire, Doyon/ARAMARK Joint Venture, that operates the interpretive bus tours at the park.<sup>83</sup> At Zion National Park in Utah, the adjacent small town of Springdale, which is largely oriented towards visitors to Zion, has approximately 1,000 parking spaces and encourages park visitors to park their cars in town and ride the Springdale Shuttle to the Zion Canyon Visitor Center to transfer to the Zion Canyon Shuttle, which is the only way to access the canyon from April to October. The shuttles are operated by a subsidiary of McDonald Transit Associates and provided free of charge to users through a transportation fee included in the entrance fee to the park. Springdale directly benefits from the park shuttle system, (see Figure 10) which brings visitors to the town to park and provides free transit service to residents.<sup>84</sup>

**Figure 10**  
**Parking for shuttle to Zion National Park**

Source: NPS



<sup>83</sup> "Entrance Area Courtesy," <http://www.reservedenali.com/entrance-facilities/entrance-area-shuttles.aspx>

<sup>84</sup> National Park Service. Zion National Park. Zion National Park. Green Transit - The Zion Shuttle. <http://www.nps.gov/zion/naturescience/green-transit-the-zion-shuttle.htm>

## Strategy 23: Develop vehicle parking with bicycle and pedestrian accommodations at northern end of Bonner Bridge

### *Description*

The current Bonner Bridge Environmental Assessment (EA) indicates that eight-foot shoulders will be included in the new design of the bridge, accommodating a safer bicycle connection from Bodie Island to Pea Island. Assuming that this connection will be developed, this strategy develops a vehicle parking lot with bicycle and pedestrian facilities, including bicycle parking, benches, and trash or recycling receptacles, at the north end of the Bonner Bridge (see Figure 7 on page 43). The intent of this facility is to accommodate potential demand for sightseeing, recreation, and transportation from this site via bicycle or by foot. For example, visitors to the site could drive to the north end of the bridge on bicycle and ride from there to locations to the north like Coquina Beach or to the south like Pea Island National Wildlife Refuge. The study team recognizes that there currently is a parking facility on the south side of Bonner Bridge but that its location may not be ideal for the future alignment of the bridge, since the preferred alternative identified in the EA involves a parallel replacement structure, aligned west of the existing bridge.

### *Technical feasibility*

The installation of vehicle parking with bicycle and pedestrian accommodations near the northern base of the Bonner Bridge would require site design, some level of NEPA compliance, and construction, although low-impact materials and a disturbed site could be chosen to reduce the impact. The development of these facilities could be timed to coincide with the completion of the Bonner Bridge construction.

### *Cost*

The cost of new parking varies depending on size, materials, and site conditions, in terms of environmental impact and construction needs. A definitive detailed cost estimate should be prepared prior to submission of a project request, but for planning reference, surface parking construction costs for urban areas, excluding land acquisition costs, are estimated to be \$10,000 per space, with annual O&M costs of \$200-400 per year.<sup>85</sup> For bicycle accommodations, the estimated total cost of materials and installation of a 10 foot bicycle rack with a capacity of about 10 bicycles is \$617. The estimated capital cost of an 8 foot long wooden bench with fiberglass supports is \$600.<sup>86</sup> The cost of trash or recycling receptacles is expected to be minimal.

### *Partnerships*

- NCDOT
- OBSB Committee
- Outer Banks Visitors Bureau/Dare County Tourism Board
- Local bicycle advocacy groups

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<sup>85</sup> Victoria Transport Policy Institute. Transportation Cost and Benefit Analysis. <http://www.vtpi.org/tca/>

<sup>86</sup> Cost estimates from BNi Public Works 2010 Costbook. Total costs are the sum of material and installation costs, and represents typical contractors' costs including overhead and profit, but does not include markups for the general contractor or construction management fees.

## 2.5 Bicycle

The following section includes seven strategies to improve the bicycle network on Bodie Island including new connections, infrastructure and amenities. Several of the proposed bicycle facilities create safer routes for existing users and help encourage new users and group travel. Even though current bicycle activity is limited, there is potential for increased use especially as new bicycle infrastructure aims to provide a variety of visitor experiences. Figure 13, at the end of this section, on page 61, shows the proposed location of these strategies within the study area.

### Strategy 24: Provide bicycle racks at all Bodie Island District sites (pursuing funding)

#### *Description*

Park staff report that they are currently seeking funds for purchasing and installing bicycle racks. This strategy provides recommendations on locations and design for the bicycle racks. Bicycle racks should be installed at all of the key Bodie Island District attractions including Oregon Inlet, Oregon Inlet Campground, Coquina Beach, Whalebone Junction, and Bodie Island Lighthouse. Additional bicycle racks at the lighthouse will add capacity and will likely require the relocation of the existing bicycle rack. The study team recommends that park staff install bicycle racks to hold a minimum of six bicycles at each site so that new bicycle racks can accommodate small groups of bicyclists. The “Inverted U” bicycle racks (Figure 11) accommodate two bicycles per rack and can be installed close together.

Bicycle racks can be installed on top of existing asphalt or concrete pavement or below grade with mulch, permeable pavers, or decomposed granite for the surface. In addition to bicycle racks, bicycle shelters should be considered during the installation of bicycle racks or they can be installed at a later date. Shelters are typically installed on a concrete base and help protect bicycles from rain or poor weather conditions. A shelter may be most appropriately placed at the proposed amenity station (strategy 25).

**Figure 11**  
**Bicycle racks and shelter**

Sources: bicycle racks at Acadia National Park - Volpe Center (far left), Inverted U and rolling rack from Dero Bike Rack Co <http://www.dero.com/> (center) Bicycle shelter <http://www.dero.com/> (right)



#### *Technical feasibility*

The installation of a minimum of one bicycle rack per site can occur immediately, though future purchases and determinations of locations should be informed by data from bicycle use for Bodie Island sites (Strategy 5). Bicycle racks should be installed on flat and level terrain with clearance to park and lock bicycles. Bicycle storage and sheltered areas should have signed access to nearby bicycle lanes, multi-use trails, and Bodie Island sites.

### Cost

There are several options and installation methods for bicycle racks. Table 18 lists two types and their associated costs. “Inverted U” racks can be placed in a row and fairly close together. The “Rolling Rack Mini” takes up more space, although one rack can hold several bicycles. Table 18 also lists the costs for a bicycle rack shelter.

**Table 18**  
**Capital and construction cost estimates for bicycle racks and shelter**

Source: Volpe Center and Costs-Demands-Benefits Analysis Tool <http://www.bicyclinginfo.org/bikecost/>

Item	Capital	Installation	Number of items	Number of bicycles	Total cost
Inverted U bicycle rack <sup>87</sup>	\$172	Approx. \$540	3	6	\$1,056
Rolling Rack Mini, from Dero Bike Rack Co. <sup>88</sup>	\$177	\$580	1	5-7	\$757
Bicycle rack shelter	\$16,378 (varies on vendor)	varies	1	8-14 bicycles	\$16,378 plus installation

### Strategy 25: Connect bicycle infrastructure in South Nags Head to NC 12 (along South Old Oregon Inlet Road, RIP Route #0011)

#### Description

NC 12 will soon have widened shoulders (from two to five feet) to better accommodate bicyclists, although there are no plans for a designated bicycle lane on NC 12. This strategy involves a 900-foot extension of the existing Nags Head bicycle path from South Nags Head to NC 12 along NPS-owned South Old Oregon Inlet Road (RIP Route #0011) (see Figure 13 on page 61). The proposed connection is recommended to provide bicyclists with a signed and designated route between SR1243 and NC 12. The current lack of bicycle infrastructure is unsafe for bicyclists, because users have to travel along a very narrow roadway shoulder when traveling between NC 12 and SR 1243. Cape Hatteras NS is currently seeking funds through the NPS to extend this infrastructure and intends for it to be an off-road facility that would be an extension of the existing multi-use concrete path on the southeast side of SR 1243. This connection could instead or in the short-term consist of an on-road facility (new bicycle lane or sharrows markings on the existing asphalt roadway). However, depending on the existing width of the roadway, such a strategy may require additional widening of the roadway to meet American Association of State Highway and Transportation Officials (AASHTO) requirements of four feet for a bicycle lane.

#### Technical feasibility

The designated bicycle lane or a concrete pathway is proposed to be entirely within NPS jurisdiction, along South Old Oregon Inlet Road (RIP Route #0202), so no formal coordination is required with other entities, though coordination with NCDOT, Nags Head, and Dare County is recommended. Depending on the design and level of NEPA compliance required, it may take a couple of years to construct an off-road bicycle facility. In the short term, lane striping and/or sharrows markings are recommended because such improvements could be completed faster and at a lower cost than a separate off-road facility. If lane striping is not possible without widening the road, however, that option should not be pursued unless the off-road bicycle facility is infeasible.

### Cost

A new bicycle connection could include a designated bicycle lane or a separate multi-use trail. The latter would include sign posts and bicycle symbols and run parallel to SR1243.<sup>89</sup> Table 19 shows the cost

<sup>87</sup> Dero Bike Rack Co, Hoop Rack, [http://www.dero.com/products/hoop\\_rack\\_hd/hoop\\_rack\\_hd.html](http://www.dero.com/products/hoop_rack_hd/hoop_rack_hd.html)

<sup>88</sup> Dero Bike Rack Co, Rolling Rack Mini, [http://www.dero.com/products/rolling\\_rack\\_mini/rolling\\_rack\\_mini.html](http://www.dero.com/products/rolling_rack_mini/rolling_rack_mini.html)

<sup>89</sup> Costs-Demands-Benefits Analysis Tool. <http://www.bicyclinginfo.org/bikecost/>

estimate for this strategy; the estimate assumes \$142/cubic yard for the concrete path (materials only). Alternatively, as a short-term strategy, a designated bicycle lane or sharrows would include new sign posts and bicycle symbols along this segment of SR 1243.<sup>90</sup> A last alternative, not recommended unless the off-road path cannot be constructed, is expansion of the roadway to accommodate four-foot bicycle lanes. Table 20 shows the cost estimate for these two strategies.

**Table 19**

**Capital, construction, and O&M cost estimate for multi-use concrete trail**

Source: Volpe Center and Costs-Demands-Benefits Analysis Tool <http://www.bicyclinginfo.org/bikecost/>

Item	Quantity	Cost
10' wide concrete path with aggregate base	900'	\$22,800
Sign with post	2	\$400
Bicycle symbol	4	\$285
Construction		\$21,200
O&M		\$1,108
Total cost		\$46,985

**Table 20**

**Capital, construction, and O&M cost estimate for designated bicycle lane**

Source: Volpe Center and Costs-Demands-Benefits Analysis Tool <http://www.bicyclinginfo.org/bikecost/>

Item	Length/number	Cost
Lane striping*	900'	\$557
Sign with post	2	\$400
Bicycle symbol	4	\$285
Construction		\$520
O&M		\$1,108
Total cost		\$2,870.00
* Lane striping may require an extension to the existing roadway shoulder	900' x 10' wide shoulder	\$11,250
Construction		\$10,000
O&M		\$1,108
Total cost		\$22,358.00
Total price range		\$2,870 – \$25,228

*Partnerships*

- Nags Head
- NCDOT

## Strategy 26: Create a bicycle amenity station at Bodie Island Lighthouse and Whalebone Junction

### *Description*

This strategy involves the implementation of bicycle amenity stations at Bodie Island Lighthouse and Whalebone Junction. A bicycle amenity station could include an air station with bicycle tools, lockers, water fountain, bicycle racks, and wayfinding information for bicyclists. As mentioned above in Strategy 24, a sheltered bicycle rack may be most appropriate at this site. Park staff could also provide bicycle tools or visitor maps within the visitor center. Bodie Island Lighthouse and Whalebone Junction already provide public facilities, information, and parking and can serve as starting points for long distance bicyclists.

### *Technical feasibility*

The design and construction of a bicycle amenity station could vary in size and implementation. The station could be installed on an existing concrete or asphalt slab that is wide enough to accommodate the bicycle amenities. The station could also include a covered area with more extensive visitor services (see Strategy 24). A “tool lending library” could be established for bicyclists in need of basic maintenance or repairs (e.g. fixing a flat, adding air to tires, adjustments), whereby the bicyclist provides an I.D. or credit card for the use of the tools and to ensure that they are returned quickly and undamaged. Cape Hatteras NS or Eastern National staff time would be required for the administration of such a station, but would be expected to be minimal. Staff time would be needed for the development of procedures related to the checking in/out of tools by bicyclists, performing monthly checks of tools (visual), and testing air pumps. Tool check out procedures could vary from lending a small set of tools (e.g. 20 pieces) to checking out tools by type (e.g. size of wrench etc.). The maintenance of such a facility is expected to be minimal, and could occur on an as needed basis for acute problems, like a broken pump, or need to purchase a new tool that could be determined if a complaint is made by a bicyclists, or a Cape Hatteras NS notices the need for a new tool during the monthly checks.

### *Cost*

The cost of the bicycle amenity station will vary depending on the number of items, material selection, and design of the station. The estimated costs for the recommended elements of a bicycle amenity station are listed in Table 21 and are shown in Figure 12. In addition to the items listed, a trash receptacle, orientation signage, and bench may be desirable.

**Table 21**  
**Capital and O&M cost estimate for bicycle amenity station**

Source: Volpe Center and Costs-Demands-Benefits Analysis Tool <http://www.bicyclinginfo.org/bikecost/>

Item	Capital	O&M	Number of items	Total cost
Air station and bicycle tools (this would require a concrete slab for construction)	\$1,052-1,194 (galvanized steel or powder coat)	Minor	1	\$1,052-1,194
Bicycle storage locker for two bicycles	\$1,000	\$950	2	\$3,950
Water fountain (freeze resistant and Americans with Disabilities Act (ADA) accessible)		Minor	1	\$2,300
Bicycle racks	\$190	Approx. \$180	4	\$1,480
Wayfinding sign/map				\$100-400
Total				\$9,000-9,500



**Figure 12**  
**Bicycle amenity station items**

Source: Bike repair stand <http://www.dero.com/products/fixit/> (left) Cyclesafe <http://www.cyclesafe.com/LockerPhotos.tab.aspx> (center), Silver Wolf Enterprises ([https://www.gsaadvantage.gov/ref\\_text/GS21F0003N/GS21F0003N\\_online.htm](https://www.gsaadvantage.gov/ref_text/GS21F0003N/GS21F0003N_online.htm)) (right)



#### **Strategy 27: Connect NC 12 shoulder to Nags Head multi-use trail at Whalebone Junction**

##### *Description*

This strategy involves the construction of an on-street designated bicycle lane or a separate multi-use concrete trail on Gulfstream Street that would serve as an extension of the existing path in Nags Head. Both alternatives would connect the expanded shoulder along NC 12 to the existing multi-use concrete trail in Nags Head. Currently, there is no bicycle lane or pedestrian infrastructure on this roadway segment.

##### *Technical feasibility*

Design and construction of the marked bicycle lane will depend on the existing roadway width and the need to expand the roadway shoulder. The required level of NEPA compliance would need to be completed if the bicycle lane requires the construction of additional asphalt shoulder width.

##### *Cost*

A designated bicycle lane on Gulfstream Street varies in cost depending on the need to expand the roadway width. The cost estimate, shown in Table 22, includes striping, a new asphalt shoulder (5' on either side of the roadway), sign posts, bicycle symbols, construction costs, and O&M costs.<sup>91</sup>

<sup>91</sup> Cost analysis of Bicycle Facilities <http://www.bicyclinginfo.org/bikecost/>



**Table 22****Capital, construction, and O&M cost estimates for asphalt bicycle lane**Source: Volpe Center and Costs-Demands-Benefits Analysis Tool <http://www.bicyclinginfo.org/bikecost/>

Item	Length/number	Cost
Lane striping	815'	\$500
10' wide asphalt extension	815'	\$10,200
Sign with post	2	\$400
Bicycle symbol	4	\$285
Construction		\$9,400
O&M		\$1,000
Total cost		\$21,785.00

Alternatively, a separated concrete multi-use trail would match the existing trail in Nags Head. The cost estimate, shown in Table 23, includes the concrete path, new signs, construction, and O&M.

**Table 23****Capital, construction, and O&M cost estimate for concrete multi-use trail**Source: Volpe Center and Costs-Demands-Benefits Analysis Tool <http://www.bicyclinginfo.org/bikecost/>

Item	Length/number	Cost
10' concrete path with aggregate base	815'	\$20,600
Sign with post	2	\$400
Bicycle symbol	4	\$285
Construction		\$19,200
O&M		\$1,000
Total cost		\$41,485.00

*Partnerships*

- Nags Head
- Dare County
- Outer Banks Visitors Bureau

**Strategy 28: Enhance nonmotorized infrastructure along SR 1243***Description*

This strategy includes the improvement of the existing bicycle and pedestrian infrastructure along SR1243 (see Figure 13 on page 61). For the short term, it is recommended that the existing sidewalk be maintained primarily for pedestrian and slow bicycle use and that sharrows markings and share the road signs be added to SR1243. The recommended long-term strategy is to expand and resurface the existing multi-use path on the east side of SR1243 to accommodate pedestrians and bicyclists. The current pathway is six to eight feet in width. AASHTO recommends that to accommodate bi-directional use by bicyclists and pedestrians, multi-use trails should be ten feet in width with twelve to fourteen feet recommended for areas that expect heavy or mixed use.<sup>92</sup> A long-term alternative is to expand the roadway to accommodate two designated bicycle lanes, at a minimum of four feet wide each.

<sup>92</sup> U.S. Department of Transportation Federal Highway Administration and the Pedestrian and Bicycle Information Center at the University of North Carolina. "Principles of Shared Use Path Planning and Design." <http://www.bicyclinginfo.org/engineering/paths-principles.cfm>

### *Technical feasibility*

The expansion of the existing sidewalk or the addition of bicycle lanes will require an analysis of the town's right of way and property ownership of the land adjacent to the existing pathway. The required level of NEPA compliance would also have to be followed. It is recommended if the path is to be expanded, it should be expanded to 10 feet, rather than 12 or 14, for reasons of cost, land feasibility, and demand. Technical feasibility will depend on the preferred pathway design – an expanded multi-use path or the addition of designated bicycle lanes. Maintenance of the sidewalk and the addition of sharrows markings and share the road signs is recommended for a short term solution. For the longer term, expansion of the path is recommended if feasible.

### *Cost*

Cost for the nonmotorized infrastructure will depend on whether property acquisition for the new path or bicycle lane is required. Table 24 shows the cost estimate for recommended short term and long term improvements.

**Table 24**

**Capital, construction, and O&M cost estimates for bicycle infrastructure on SR 1243**

Source: Volpe Center and Costs-Demands-Benefits Analysis Tool <http://www.bicyclinginfo.org/bikecost/>

Recommendation	Item	Length/number	Cost
Short-term recommendation – Add sharrows markings and Share the Road signs to SR1243 for bicycle road use	Sharrows	20 (at \$70 each)	\$1,400
	Sign with post	2 (at \$200 each)	\$400
	Bicycle symbol	4	\$285
	Construction and O&M		Varies
	Total		\$2,085
Long-term recommendation – expand, resurface existing multiuse path from 6' or 8' to 10 ft.	10' wide concrete multi-use path with aggregate	24,500'	<b>Total construction cost</b>
			\$621,000
Alternative long-term recommendation – expand road width to accommodate bicycle lanes	10" asphalt for 2 bicycle lanes	24,500'	<b>Total construction cost</b>
			\$306,350

### *Partnerships*

- Nags Head

Cape Hatteras NS staff would be responsible for assisting Nags Head in the planning, funding, and maintenance for the new bicycle infrastructure. Park staff can also work with Nags Head to determine the demand for a new bicycle lane or wider pathway. However, the proposed strategy would occur on town land and therefore, it would be the decision of Nags Head to approve, plan, design, fund, and maintain the project.

## **Strategy 29: Add a bicycle lane along NC 12**

### *Description*

This strategy involves new designated bicycle lanes along NC 12 for the length of the Bodie Island District, approximately eight miles. NCDOT and NPS are in the process of widening the shoulder on NC 12; however, this expansion will not include a designated bicycle lane. While the current shoulder widening of five feet meets AASHTO minimum (four feet) requirements for a designated bicycle lane, an additional five feet of asphalt to either side of the roadway would be safer for a variety of bicycle user types including groups, beginner, and intermediate bicyclists. As stated in the Needs Assessment, AASHTO recommends a wider bicycle lane on roadways that receive high bicycle use and vehicle speeds that exceed 50 mph, or

that receive bus and truck traffic.<sup>93</sup> Except for a few locations, the posted speed limit along NC 12 is above 50 mph, thus, the roadway should include a wider bicycle shoulder. This bicycle lane should link to the proposed bicycle connection between NC 12 and SR1243 (Strategy 26) as well as the proposed bicycle lanes on the future Bonner Bridge. The study team recognizes that park staff does not expect any further widening of the NC 12 shoulder in the short term because of cost and resource constraints. This strategy can be considered in the future if bicycle use on Bodie Island increases.

#### *Technical feasibility*

The design and construction of a designated bicycle lane on Bodie Island would require NEPA compliance in evaluating the environmental impacts of the expanded shoulder. There are existing wetlands on the west side of NC 12 and sand dunes along the east side of NC 12. The analysis would have to consider the potential long term impact to these surrounding resources.

#### *Cost*

The cost of this strategy would include Cape Hatteras NS staff time to coordinate with NCDOT on the proposed bicycle lane. The capital, construction, and maintenance costs summarized in Table 25, could also be shared by NCDOT and Cape Hatteras NS.

**Table 25**  
**Capital, construction, and O&M cost estimate for designated bicycle lane on NC 12**

Source: Volpe Center and Costs-Demands-Benefits Analysis Tool <http://www.bicyclinginfo.org/bikecost/>

Item	Length/number	Capital/Construction	O&M	Total
2 - 5' wide asphalt expansion	Total length: 8 miles or 42,240'	\$547,500	\$46,800	\$600,000
Sign with post	10	\$2,000		\$2,000
Bicycle symbol	20	\$1,420		\$1,420
Total				603,420

#### *Partnerships*

Cape Hatteras NS staff could coordinate with NCDOT in the planning, maintenance, and funding of the bicycle lane along NC 12. Prior to further construction, a bicycle count and survey as detailed in Strategy 5 are recommended in order to estimate the existing and future demand for a new bicycle lane.

### **Strategy 30: Add a multi-use path parallel to NC 12**

#### *Description*

This strategy involves an eight-mile multi-use trail that is parallel to and separate from NC 12. The study team believes that a separate multi-use trail would promote significant additional bicycle use on Bodie Island. This trail would be safer for inexperienced bicyclists and small groups than a widened shoulder because it would be separate from the motor traffic on NC 12. The multi-use trail should accommodate bicyclists and pedestrians, run parallel to NC 12, and connect Whalebone Junction in the north to Bonner Bridge in the south. The trail would connect to proposed bicycle facilities on Bonner Bridge and the existing multi-use trail in Nags Head. The trail would encourage additional long-distance bicyclists who wish to travel through Bodie Island. This path would be separate from NC 12 with a vegetated buffer between the highway and the trail. The trail could exist along the east or west side of the highway and accommodate both northbound and southbound nonmotorized users on one trail.

<sup>93</sup> Bicyclinginfo.org Paved Shoulders. Accessed July 16, 2010. <http://www.bicyclinginfo.org/engineering/facilities-shoulders.cfm>

### *Technical feasibility*

The proposed multi-use path would require the appropriate level of NEPA compliance to inform NCDOT and park staff of the project's impacts. This assessment may also inform park staff and NCDOT of the optimum trail alignment, width, and material. The corridor is limited in buildable space because there are existing wetlands on the west side of NC 12 and sand dunes along the east side of NC 12. Any consideration of environmental impacts should include the potential long term impact to these resources. The study team recognizes that park staff does not expect any construction of a long distance multi-use path because of cost and resource constraints. However, it may be feasible to identify areas that have the least environmental impact and would serve the highest need for safety and/or connection between sites and implement segments of the facility.

### *Cost*

The pathway could be asphalt or concrete and contain various visitor amenities such as sign posts, bicycle and pedestrian symbols, edging, landscaping, and lighting. The asphalt and concrete trail cost estimates are shown in Table 26. A concrete trail would have higher capital and construction costs; however, it would have a longer lifespan.

**Table 26**  
**Capital, construction, and O&M cost estimate for multi-use path parallel to NC 12**

Source: Volpe Center and Costs-Demands-Benefits Analysis Tool <http://www.bicyclinginfo.org/bikecost/>

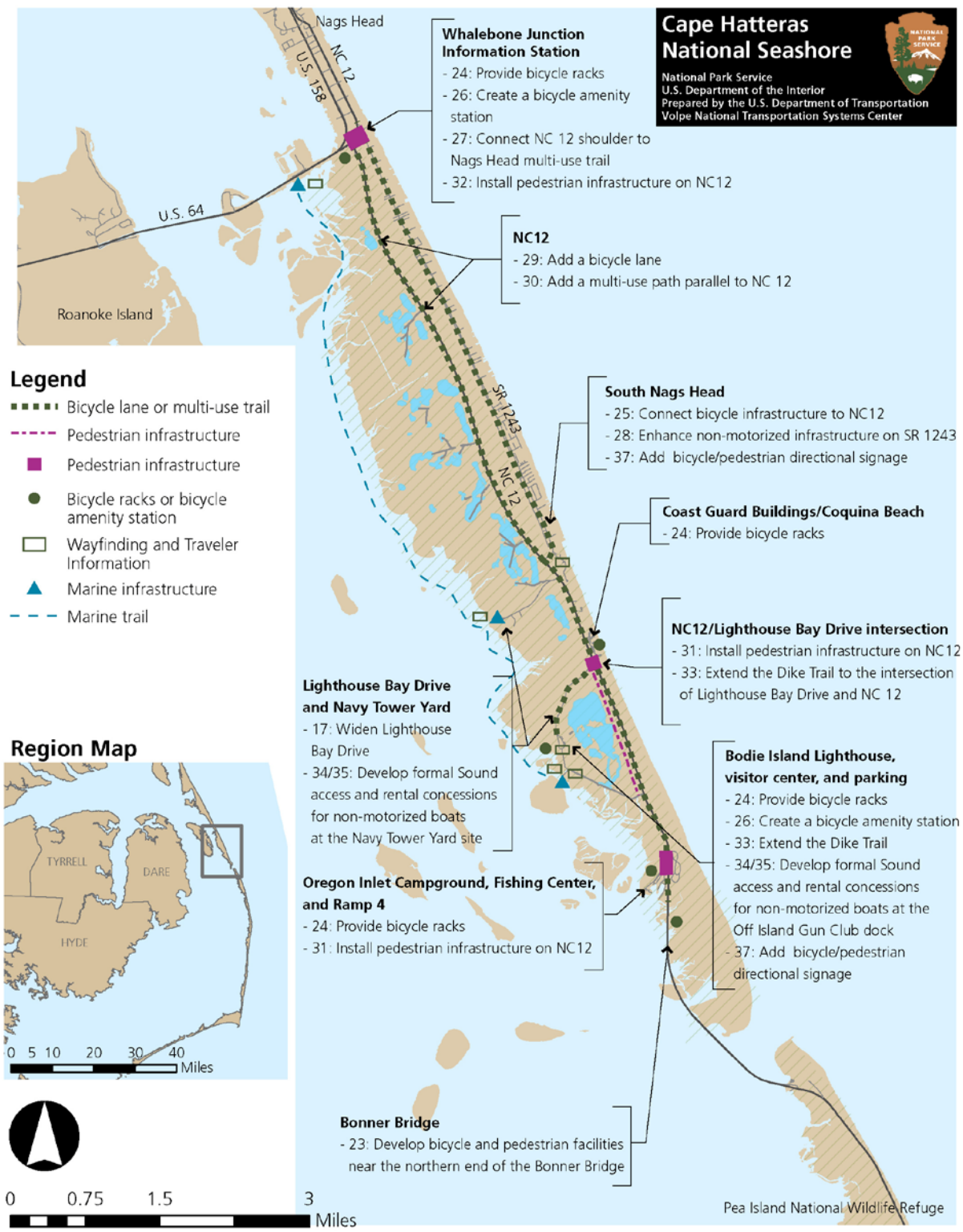
Item	Length/number	Capital/construction	O&M	Total
10' wide asphalt multi-use path	Total length: 42,240'	\$696,000	\$46,800	\$742,800
10' wide concrete path with aggregate base	42,240'	\$1,110,000		\$1.16 million
Sign with post	10	\$2,000		\$2,000
Bicycle symbol	20	\$1,420		\$1,420

In addition to capital, construction, and maintenance costs, this strategy would require Cape Hatteras NS staff resources to coordinate with NCDOT on the proposed bicycle lane. Similar to the current expansion of the NCDOT shoulder, Cape Hatteras NS and NCDOT could coordinate funding support so that NCDOT funds construction for the designated bicycle lane from SR 1243 to Bonner Bridge and Cape Hatteras NS funds the length from SR1243 to Whalebone Junction. The two agencies could share maintenance responsibilities of the bicycle lane.

### *Partnerships*

- NCDOT

**Figure 13**  
**Bicycle, pedestrian, marine, and wayfinding and traveler information strategies map**  
 Source: Volpe Center



## 2.6 Pedestrian

The following section includes three strategies to improve pedestrian safety and the pedestrian network on Bodie Island, including new crosswalks, safety signs, and trails. Figure 13 on page 61 shows the location of these strategies within the study area. Although pedestrian activity is perceived to be limited currently, distances between certain sites, such as Coquina Beach and Bodie Island Lighthouse, are short enough to allow for transportation by foot and thus could accommodate increased activity in the future.

### Strategy 31: Install pedestrian infrastructure on NC 12 at Bodie Island sites

#### *Description*

This strategy proposes new pedestrian infrastructure such as crosswalks, pedestrian-activated signals or blinking lights (in-road or beacon), and pedestrian crossing warning signs at two locations on Bodie Island: the intersection of NC 12 and Lighthouse Bay Drive (RIP Route #0202) at Coquina Beach and between Oregon Inlet Fishing Center and the campground. New pedestrian infrastructure would improve pedestrian safety and may encourage visitors to walk between Bodie Island sites.

#### *Technical feasibility*

Cape Hatteras NS staff should coordinate with NCDOT to conduct an intersection analysis at NC 12 and Lighthouse Bay Drive (RIP Route #0202) and for further analysis of the road segment near Oregon Inlet and the campground. NCDOT does not currently have plans for pedestrian signage and crosswalks on Bodie Island because of the current speed and use. However, a precedence of a crosswalk and pedestrian signage has been set along NC 12 on Pea Island, across from the visitor center (Figure 14).

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**Figure 14**  
**Crosswalk at Pea Island National Wildlife Refuge Visitor Center**  
Source: Volpe Center (January 2010)



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The investment in pedestrian infrastructure, under this strategy, is recommended to respond to the anticipated increase in visitation to the island with the opening of the Bodie Island Lighthouse to climbing. The opening may also cause an increase in the pedestrian activity between Coquina Beach and the Bodie Island Lighthouse if parking near the lighthouse is limited or the proposed Dike trail extension (Strategy 33) is built. Furthermore, the need for pedestrian facilities may increase if the proposed multi-use trail along Lighthouse Bay Drive (RIP Route #0202) from NC 12 to Bodie Island Lighthouse is built.





### Cost

There are several methods to inform motorists of pedestrian crosswalks that can be used in combination with one another. Table 27 presents these methods and their associated costs.<sup>94</sup>

**Table 27**  
**Capital and construction cost estimates for pedestrian infrastructure**

Source: Volpe Center and Costs-Demands-Benefits Analysis Tool <http://www.bicyclinginfo.org/bikecost/>

Item	Construction/installation	Capital cost	Total
Two-way pedestrian/bicycle activated signal	\$2,000	\$1,900	\$3,900
10" yield to pedestrian sign <sup>95</sup>		\$470	\$470
Marked crosswalk with two transverse line <sup>96</sup>	Varies	\$100	\$100
International crosswalk	Varies	\$300	\$300
Patterned concrete crosswalk	Varies	\$20,000	\$20,000
Pedestrian crossing sign <sup>97</sup>		\$150	\$50-\$150 per sign
In-road blinking lights (10) <sup>98</sup>	\$10,000	\$15,000	\$25,000
Rectangular rapid flashing beacon	\$2,500	\$7,500	\$10,000

### Partnerships

- NCDOT

<sup>94</sup> Cost analysis of Bicycle Facilities <http://www.bicyclinginfo.org/bikecost/>

<sup>95</sup> GSA advantage. Seva Technical Services. Yield to pedestrian crosswalk sign. [https://www.gsaadvantage.gov/advgsa/advantage/catalog/product\\_detail.do?contractNumber=GS-07F-0100W&BV\\_UseBVCookie=Yes&itemNumber=159704](https://www.gsaadvantage.gov/advgsa/advantage/catalog/product_detail.do?contractNumber=GS-07F-0100W&BV_UseBVCookie=Yes&itemNumber=159704)

<sup>96</sup> Pedestrian and Bicycle Information Center. Signals and Signs. <http://www.walkinginfo.org/engineering/crossings-crosswalks.cfm>

<sup>97</sup> Pedestrian and Bicycle Information Center. Signals and Signs. <http://www.walkinginfo.org/engineering/crossings-crosswalks.cfm>

<sup>98</sup> Mike Young of Spot Devices ([www.SpotDevices.com](http://www.SpotDevices.com)).



### Strategy 32: Install pedestrian infrastructure on NC 12 at Whalebone Junction

#### *Description*

This strategy involves the construction of a crosswalk and pedestrian signal heads and detectors across NC 12 at Whalebone Junction. Pedestrian infrastructure will be particularly important if the existing Whalebone Junction Information Station is further developed and if a sidewalk or other expanded nonmotorized access is developed from NC 12 to SR 1243 at Whalebone Junction. The connection across NC 12 would link the information center to the existing multi-use path in Nags Head.

#### *Technical feasibility*

It is recommended that Cape Hatteras NS staff coordinate with NCDOT to conduct a traffic analysis at this intersection. The park recognizes that NCDOT does not currently have plans for pedestrian signage and crosswalks on Bodie Island because of the current speed and use along NC 12. The need for pedestrian facilities at this intersection is dependent on the continued use or expansion of the information center and the development of nonmotorized facilities between NC 12 and SR 1243 at Whalebone Junction.

#### *Cost*

See pedestrian infrastructure items and cost in previous strategy.

#### *Partnerships*

- NCDOT
- Nags Head
- Dare County

### Strategy 33: Extend the Dike Trail to the intersection of Lighthouse Bay Drive (RIP Route #0202) and NC 12

#### *Description*

The one-mile extension of the existing Dike Trail to the intersection of Lighthouse Bay Drive (RIP Route #0202) with NC 12 would provide pedestrian and equine access from Bodie Island Lighthouse to the Coast Guard buildings and Coquina Beach along the existing wetlands. The existing trail follows the edge of the wetlands from near the Sound south of the lighthouse to NC 12 where there is currently no trailhead or parking area (see Strategy 20). The extension would provide an alternative to driving between the sites or walking along Lighthouse Bay Drive (RIP Route #0202), which currently has no pedestrian facilities, no shoulder, and just meets the minimum (nine-foot) requirement for lane width. Even after Lighthouse Bay Drive (RIP Route #0202) has been widened and a bicycle lane or separate facility has been added, pedestrian traffic would be better accommodated with along a separate, wider right-of-way.

#### *Technical feasibility*

The study team recognizes that the trail extension is not a high priority to Cape Hatteras NS at this time because of the proposed improvements to Lighthouse Bay Drive (RIP Route #0202) but the trail could provide a safer alternative to pedestrians than an expanded shoulder. Cape Hatteras NS staff can survey Lighthouse and Coquina Beach visitors to measure interest in this trail extension. If park staff decides to pursue this alternative, the design of the trail would have to take into consideration the adjacent wetland area in order to prevent damage to sensitive habitats and to prevent flooding along the trail. Some of the lower elevations of this proposed trail could include a boardwalk that would be more resistant to standing water.<sup>99</sup> The trail segments that require a boardwalk could be similar in design as the Bodie Island Pond Boardwalk, which is ADA accessible.

#### *Cost*

A planning level estimate of the cost of this strategy is presented in Table 28 and includes capital, construction, and O&M costs for a gravel trail with unit costs only for the anticipated boardwalk segment.

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<sup>99</sup> Wetland Trail Design and Construction <http://www.fhwa.dot.gov/environment/fspubs/01232833/found05.htm>

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**Table 28**  
**Capital, design and construction, and O&M cost estimate for Dike Trail extension**

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Item	Length/number	Capital	Design and Construction	O&M	Total
Gravel trail	6,900 feet (\$3/foot)	\$23,700	\$22,000	\$8,500	\$30,500
Boardwalk segments	\$20-\$100 per lineal foot <sup>100</sup> (length unknown)				

*Partnerships*

- NCDOT
- North Carolina Wildlife Resources Commission

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<sup>100</sup> Kusler, John and The International Institute for Wetland Science and Public Policy. Constructing Wetland Boardwalks and Trails.  
[http://www.aswm.org/pub/2\\_boardwalk\\_6\\_26\\_06.pdf](http://www.aswm.org/pub/2_boardwalk_6_26_06.pdf)

## 2.7 Marine

The following section includes three strategies to promote non-motorized and motorized water access to and within Bodie Island District, including investment in non-motorized facilities and encouragement of ferry or water taxi concessions. Figure 13, on page 61, shows the proposed location for the non-motorized strategies within the study area: the Navy Tower Yard site and the Off Island Gun Club dock.

As reported in the Conditions Inventory/Assessment report, an estimated ten percent of all visitors to the Outer Banks participated in canoeing or kayaking activities during their visit<sup>101,102</sup> but it is unknown how many of these visitors kayaked and canoed to or within the Bodie Island District. As reported in the Needs Assessment, there has been previous interest in a water taxi or ferry service.

### Strategy 34: Develop formal Sound access for non-motorized watercraft

#### *Description*

This strategy proposes the development of formal Sound access facilities for non-motorized boats at the Off Island Gun Club dock and the Navy Tower Yard site (see Figure 13). Oregon Inlet Fishing Center was also considered as a potential site, but Cape Hatteras NS staff and stakeholders reported that the access to the Sound at this location was considered inappropriate for nonmotorized craft due to the current motorized boat traffic.

Facilities would most likely differ at the two proposed sites, as the Off Island Gun Club dock would remain a walk-in site with minimal additional amenities due to the Club's right-of-way and own infrastructure, while vehicle parking, restroom facilities, shelter, and picnic areas would be provided at a new facility at the Navy Tower Yard site. Both sites should be designated with signage at the facility and at the main access point to each facility along NC 12. Signage at the facility should include a sign visible from the water that the site is an official, public facility and a map of the recommended route north and south. Signage on NC 12 should indicate that Sound access for nonmotorized craft is available at this site and provide distance to the facility from NC 12.

#### *Technical feasibility*

The Navy Tower Yard facility could face challenges in obtaining permitting for construction of improved vehicular access as it is currently accessed by gravel road and does not have any formal paved parking. However, most of the built facilities could be temporary and mobile to reduce environmental impact and allow for easy relocation. Signage additions should be fairly minor. The Off Island Gun Club site would require few improvements but would need to be coordinated with the Off Island Gun Club.

Demand for the facilities would be dependent on marketing and establishing a designated trail along the Sound side of the Bodie Island District as well as to the north and south. In addition, in order to be eligible for most transportation funding, it would be important to establish this strategy as supporting transportation to or within the park, as part of a larger transportation trail system, rather than only focusing on providing a recreational opportunity from one site. There are currently no designated water trails within the Outer Banks Region but current efforts to improve paddling access along North Carolina's coast include efforts by the NPS Rivers, Trails, and Conservation Assistance (RTCA) Program to develop the Southeast Coast Saltwater Paddling Trail<sup>103</sup> and the North Carolina Blueways (NC Blueways), a cooperative effort by the North Carolina State Parks System, North Carolina State

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<sup>101</sup> Outer Banks Visitors Bureau. Visitor Research: Wave 4 – 2006. September 2006. [http://www.outerbanks.org/pdf/2005\\_2006\\_Year\\_Long\\_Visitor\\_Profile.pdf](http://www.outerbanks.org/pdf/2005_2006_Year_Long_Visitor_Profile.pdf)

<sup>102</sup> University of Idaho. Outer Banks Group Parks Visitor Survey. <http://www.psu.uidaho.edu/>

<sup>103</sup> National Park Service Rivers, Trails, and Conservation Assistance Program Southeast Region. Georgia News. 2009. [www.nps.gov/nrcr/programs/rtca/whatwedo/projects/GA.pdf](http://www.nps.gov/nrcr/programs/rtca/whatwedo/projects/GA.pdf)

University, and North Carolina Paddle Trails Association.<sup>104</sup> Park staff have already engaged with both groups to review potential launching sites and stops along the trail.

#### *Cost*

The cost for a new parking area and improved roadway surface to the Navy Tower Yard site is dependent on the size of the parking area and the materials used but would be significant. Capital cost estimates for some potential facilities for the site are provided in Table 29.

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**Table 29**  
**Capital cost estimate for Sound access site facilities**

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Facility	Capital Cost
Prefabricated vault toilets (One-room)	\$11,000-16,000 <sup>105</sup>
Picnic tables	\$500-1000 <sup>106</sup>
Boat racks (capacity of 6)	\$1,300 <sup>107</sup>
Total	\$12,800-18,300

#### *Partnerships*

The two proposed sites are located within NPS jurisdiction, although any improvements to the Off-Island Gun Club dock area would need to be coordinated with the Club. The NPS RTCA Program and the NC Blueways initiative may have access to funding to establish designated stops along their trail, and the park should continue to coordinate with both efforts. In addition, the park could work with the Wings Over Water Wildlife Festival<sup>108</sup> in the development and subsequent promotion and use of any new facilities.

#### *Examples at other parks/locations*

Nags Head has five designated public sound access sites<sup>109</sup> primarily for non-motorized craft. The southern-most of these is the Nags Head Estuarine Site on the US-64 causeway between Bodie Island and Roanoke Island (see Figure 15, left). This site provides one example of a formal access for non-motorized watercraft, which could be employed at Bodie Island. In terms of facilities at the site that would accommodate the need to relocate in case of flooding or erosion, Assateague Island National Seashore has purchased and installed prefabricated vault toilets (see Figure 15, right) as well as lightweight canvas changing rooms and solar-powered trailers for showers in its Virginia District.<sup>110</sup>

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<sup>104</sup> NC Blueways. Accessed 3/10/10. <[http://www.ncsu.edu/ncblueways/ncblueways\\_faqs.html](http://www.ncsu.edu/ncblueways/ncblueways_faqs.html)>

<sup>105</sup> [www.romtec.com](http://www.romtec.com)

<sup>106</sup> GSA Advantage

<sup>107</sup> :Castle Craft Seitech Storage Racks. [www.castlecroft.com/storage\\_racks.htm](http://www.castlecroft.com/storage_racks.htm)

<sup>108</sup> Wings Over Water. Accessed 4/3/10. <<http://www.wingsoverwater.org/paddling.html>>

<sup>109</sup> [http://www.townofnagshead.net/index.asp?Type=B\\_BASIC&SEC={833101F9-A172-4D3E-A7FE-05263804DC49}](http://www.townofnagshead.net/index.asp?Type=B_BASIC&SEC={833101F9-A172-4D3E-A7FE-05263804DC49})

<sup>110</sup> U.S. Department of Energy: Federal Energy Management Program. "National Park Service's Assateague Island National Seashore Project a Model of Sustainable Design." August 1, 2002. [http://www1.eere.energy.gov/femp/news/news\\_detail.html?news\\_id=7324](http://www1.eere.energy.gov/femp/news/news_detail.html?news_id=7324)

**Figure 15**

**Nags Head estuarine site, on the US-64 Causeway between Nags Head and Roanoke Island, and prefabricated vault toilet at Assateague Island National Seashore, Virginia**

Source: Bing Maps and Volpe Center (August 2010)



### **Strategy 35: Provide kayak/canoe rental concessions within the Bodie Island District**

#### *Description*

This strategy would introduce the possibility of a private concession to rent kayaks and canoes for visitors to access the Sound-side of the Bodie Island District, which is currently inaccessible by vehicle or by foot or bike, and to move between sites within the District and further north.

#### *Technical feasibility*

The strategy would need to be made in accordance with the Cape Hatteras NS commercial service plan and General Management Plan and with consultation with other NPS policies to determine eligibility. The strategy could be implemented through either a concessions contract or commercial use authorization (CUA). CUAs are intended to provide a simple means to authorize suitable commercial services to visitors within a limited set of circumstances. A concession contract is used where the proposed services require additional requirements due to the scope and nature of the services provided.<sup>111</sup>

The study recommends that Cape Hatteras NS consult NPS guidance for commercial use authorization<sup>112</sup> as well as the NPS Southeast Region, including the Concessions Services and Planning and Compliance divisions, to determine feasibility and the steps necessary to gain approval.

#### *Cost*

The concessionaire would incur all operating costs, including the cost for the commercial use permit from NPS and any rental fee collection, and would provide the kayaks/canoes and storage facilities. Cape Hatteras NS may need to provide expanded amenities such as those described in strategy 34 to ensure access to the Navy Tower Yard site. Park staff time would be required to develop, approve, and monitor the commercial use permit or concessions contract.

<sup>111</sup> Commercial Use Authorizations: Interim Guidelines.  
[http://www.nps.gov/akso/concessions/documents/AKRO\\_CUA\\_InterimGuidelines.pdf](http://www.nps.gov/akso/concessions/documents/AKRO_CUA_InterimGuidelines.pdf)

<sup>112</sup> Commercial Use Authorizations: Interim Guidelines.  
[http://www.nps.gov/akso/concessions/documents/AKRO\\_CUA\\_InterimGuidelines.pdf](http://www.nps.gov/akso/concessions/documents/AKRO_CUA_InterimGuidelines.pdf)

### *Partnerships*

There are already a number of private vendors that publicly rent water crafts and conduct water craft tours in the area. These businesses may be interested in offering similar services within the Bodie Island District.

### *Examples at other parks/locations*

At Assateague Island NS, the Maryland Coastal Bays Program operates a canoe, kayak and bicycle rental facility through a CUA (Figure 16). In addition to hourly, daily, and multi-day rentals, the Program offers guided interpretive kayak and canoe tours every Friday afternoon, June through September.<sup>113</sup>

**Figure 16**

**Maryland Coastal Bays Program rental facility at Assateague Island National Seashore**

Source: US DOT Volpe Center photograph (June 2010)



### **Strategy 36: Investigate potential for water taxi/ferry services between Bodie Island and other parts of the Outer Banks**

#### *Description*

This strategy is for investigating the potential for private or regional provision of a water-based transit service in Dare County between Roanoke Island, the Northern Beaches (Nags Head, Kill Devil Hills, Kitty Hawk, Southern Shores, and Duck) and the Bodie Island District of Cape Hatteras NS as well as the Pea Island National Wildlife Refuge.

The first recommended step is to request a Transportation Assistance Group, a form of technical assistance provided by TRIP and NPS, to determine whether further consideration of water service is warranted. A TAG consists of an interagency team of transportation professionals from NPS and other federal agencies that visits the site, park staff, and relevant stakeholders, conducts preliminary analyses, and recommends next steps. Preliminary analyses to determine whether an additional assessment would be worthwhile could identify and assess potential gateway and destination landings, route feasibility and limitations, and market potential.

If the TAG determines that there is potential for service, more detailed analyses would then need to be conducted, including some or all of the following: service plan, demand analysis, financial feasibility assessment, identification of infrastructure needs, environmental compliance, and development of a procurement package for a concessions contract. The service plan should include several scenarios that identify schedule, seasonality of service, boat type(s), amenities, and crew requirements. The financial

<sup>113</sup> Maryland Coastal Bays Program: Rentals. <http://www.mdcoastalbays.org/rentals>



assessment should include calculation of comprehensive annual operating costs and “break even” revenue analysis yielding the minimum ridership requirement.

The study recommends that the park consider this additional study for the future, in particular after the Bodie Island Lighthouse opens for climbing. The study recommends that any additional analysis be done in partnership with local towns that have expressed interest in water service, such as Manteo, and in coordination and consultation with the NPS Southeast Region, including the Concessions Services and Planning and Compliance divisions.

#### *Technical feasibility*

Most water transit services offered at NPS units exist at sites where the only access is by water (e.g., Statue of Liberty National Monument, Alcatraz Island, and Cape Lookout NS). Such services are operated by concessionaires, which provide the vehicles and collect fees to cover their costs. Some additional NPS sites are served by existing private, often publically-subsidized, water taxi services (e.g., Fort McHenry National Monument and Historic Shrine). NPS often provides the landside infrastructure for both types of systems.

Based on the existing models, taxi or water service would likely only be feasible if operated by a private entity and funded primarily by that entity or with subsidies from a consortium of partners of areas served by the service. Although individual towns and the park itself could own and operate a service, this is not recommended as such services require substantial investment and knowledgeable staff and the area has not yet demonstrated a significant need or demand for such a service. Bodie Island Lighthouse is currently only accessible by motorized boat by using the small, privately-owned Off-Island Gun Club dock. Cape Hatteras NS would have to partner with the Club to upgrade the existing dock and develop an agreement for its use or develop a separate dock facility nearby or on another site. Such an improvement would likely take several years to plan, conduct environmental compliance, obtain funding, and construct.

To garner interest in such a service, Cape Hatteras NS staff could work with interested local and regional entities, such as the Town of Manteo, to fund and conduct the feasibility study described above. In terms of feasibility for funding and organization, several of the techniques presented in Section 2.1 (Transit) could be relevant to public support of water-based transit services, such as community improvement districts (CIDs).

#### *Cost*

A water-based transit feasibility study can range in cost from \$100,000 to \$300,000 or more,<sup>114</sup> depending on the number of routes and other factors considered and the complexity of the service. For the service itself, the owner/operator would incur all operating costs, including any concession the landing sites might require for use of its facilities, and also provide the boat(s). Public investment, including construction and environment compliance, by local towns and/or Cape Hatteras NS may be required for landing upgrades depending on boats selected for service and access needs, as discussed above. Park staff time would be required to develop, approve, and monitor a concessions prospectus and contract allowing the taxi or ferry service to serve Cape Hatteras NS sites and use docks.

#### *Partnerships*

As mentioned previously, park staff should work with interested local and regional entities, such as the town of Manteo, which has expressed interest in water taxi service, as well as businesses that may be interested in offering the service. As noted in the Conditions Inventory/Assessment, it appears that one condominium building in Manteo provides free water taxi services to its residents from the building to downtown Manteo.<sup>115</sup>

#### *Examples at other parks/locations*

Two examples are provided of NPS units served by ferries or water taxis.

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<sup>114</sup> The Gulf Island National Seashore ferry planning study was funded by FTA's Transit in Parks (TRIP) Program for \$250,000.

<sup>115</sup> Shallowbag Bay Club. <http://www.digital-art-productions.com/ament.html>



Cape Lookout National Seashore, located just to the south of Cape Hatteras NS, consists of three barrier islands that are only accessible by ferry. Several ferry services currently operate, some via commercial use authorizations while others through a concessions contract. The park recently worked with the Southeast Region, Denver Service Center, and a team of consultants to assess existing passenger ferry services. The park began with a TAG which led to a study that included consideration of landside and dock requirements, NEPA requirements, cost estimates, and concession contract financial feasibility. The study and Cape Lookout NS staff could be a resource for developing a better understanding of the process and costs associated with pursuit of such a service for Cape Hatteras NS and their partners.

Fort McHenry National Monument and Historic Shrine, located outside Baltimore, MD, is served by a private water taxi service from April through September (Figure 17).<sup>116</sup> The City of Baltimore owns and maintains the dock at Fort McHenry that the water taxi service uses.<sup>117</sup> The water taxi company operates a free, more limited commuter water ferry service that is funded by the City of Baltimore through a city parking tax, the American Reinvestment and Recovery Act, a private developer and other donors<sup>118</sup> as part of the Charm City Circulator transit system.<sup>119</sup>

**Figure 17**  
**Ed Kane's Water Taxi routes**  
Source: <http://www.thewatertaxi.com/routes.html>



<sup>116</sup> Ed Kane's Water Taxi. <http://www.thewatertaxi.com/>

<sup>117</sup> U.S. DOT Volpe Center. Fort McHenry National Monument and Historic Shrine. Shuttle Feasibility Study. December 2009.

<sup>118</sup> Duchamp, Cathy, "Water Taxi in Baltimore Spared Budget Cuts," WAMU, <http://wamu.org/news/10/04/12.php> and Suman, Elizabeth, "Best-kept secret in cash-poor Baltimore: free water taxi," *The Baltimore Brew*, <http://www.baltimorebrew.com/2010/05/14/best-kept-secret-in-cash-poor-baltimore-free-water-taxi/>

<sup>119</sup> <http://www.charmcitycirculator.com>

## 2.8 Wayfinding and traveler Information

The following section includes two strategies to improve traveler information and wayfinding for Bodie Island District in Cape Hatteras NS. However, Strategy 14 (Add advance information and warning signage for roadside pull-offs) under Section 2.3 (Roadway) could also be considered under this section since it includes informational signage as well as safety signage. The strategies below include the provision of both static and real-time traveler information through a variety of communication venues. Cape Hatteras NS and other entities are already providing traveler information to visitors, but improvements are recommended, such as participation in the statewide 511 traveler information system or development of a regional traveler information website. Such information would improve safety, promote alternative means to access and travel within Bodie Island District, and inform visitor decisions about when and how to access destinations. Figure 13 on page 61 shows the key locations for Strategy 37 (bicycle/pedestrian directional signage) within the study area while Figure 7 on page 43 references Strategy 38 (provision of transportation information), which is regional. These strategies could be employed throughout Cape Hatteras NS as part of Strategy 3 (Develop a comprehensive signage plan) and in coordination with any wayfinding development by the park.

### Strategy 37: Add bicycle/pedestrian directional signage at key locations

#### *Description*

This strategy involves the installation of bicycle and pedestrian directional signage throughout the Bodie Island District at key locations. Signs indicating walking and bicycling travel times and distances to destinations could provide visitors with valuable information which would enable them to make more informed decisions about how far they are capable of traveling, where to go and by which mode. Such signage is used extensively in Europe in urban settings and as part of rural and intercity trail networks and is increasingly being used in the United States (Figure 18).

**Figure 18**  
**Bicycle distance and travel time sign**

Source: City of Gresham, Oregon



### *Technical feasibility*

The location and content of signage needs to be vetted with stakeholders, such as the OBSB Committee, and entities such as NCDOT. Additional signage locations will need to be identified as new or expanded infrastructure is developed, such as a bicycle facility along Lighthouse Bay Drive (RIP Route #0202) (Strategy 17) and the viewing pull-off and parking at the terminus of the Dike Trail along NC 12 (Strategy 20). From site observations, the study team identified the following locations that could benefit from this signage currently:

- at the gate to the gravel road at Bodie Island Lighthouse to indicate distance to Dike Trail and the Sound;
- at entrance to Dike Trail to indicate length of trail;
- at terminus of Nags Head multi-use trail to indicate distances to lighthouse and beach; and
- at kayak launching sites (e.g., Nags Head Estuarine site on the US-64 causeway and Off-Island Gun Club dock).

To avoid impacts to the natural view shed, implementation of this strategy should be undertaken in a manner that provides information but is not excessive or adds visual clutter to the natural landscape. Where possible, new signage may be added to or co-located with existing structures or signs. At the sites identified below, there is very little signage currently so additional signage would not pose a significant impact.

### *Cost*

A sign and post should cost approximately \$200 per sign without installation,<sup>120</sup> but since the signs would need to be customized, the cost may be higher. With proper materials and graffiti-resistant surfaces, maintenance costs would be low.

### *Partnerships*

- NCDOT
- Nags Head
- OBSB Committee

## **Strategy 38: Provide static and/or real-time transportation information online, by phone, by radio, and/or via variable message sign**

### *Description*

This strategy involves the provision of improved static and/or real-time transportation information to visitors through a variety of communication media.

Static information could include options for accessing and traveling within Bodie Island District, when and where to expect congestion and/or parking shortages, where to go for more information, and general management policies and marketing messages, such as those developed as part of the marketing campaign (Strategy 7). In looking to the future, providing information on transit or other alternative transportation will be critical to its success.

Real-time information could include status of parking and congestion, emergency, weather or special event information, off-road vehicle (ORV) access, and road closure or roadway construction information. Examples of real-time information currently being disseminated for the study area include the following:

- The use by Cape Hatteras NS of Google Earth for ORV closures<sup>121</sup> and Twitter for announcements and updates;<sup>122</sup>

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<sup>120</sup> Costs-Demands-Benefits Analysis Tool. <http://www.bicyclinginfo.org/bikecost/>

<sup>121</sup> <http://www.nps.gov/caha/planyourvisit/googleearthmap.htm>

- NCDOT's pole-mounted variable-message sign (VMS)<sup>123</sup> at the Whalebone Junction Information Center (see Figure 19) and NCDOT's Twitter accounts;<sup>124</sup>
- the 511 traveler information phone system;<sup>125</sup> and
- several webcams that operate throughout the Outer Banks.<sup>126</sup>

In addition, Cape Hatteras NS used to have an AM radio station but there were issues with signal strength, so the system was deactivated.

**Figure 19**

**NCDOT VMS along NC 12 next to the Whalebone Junction Information Center**

Source: US DOT Volpe Center photograph (August 2010)



All of the existing communication systems listed above could be expanded and/or used to provide additional transportation and traveler information. This strategy recommends that Cape Hatteras NS pursue the following improvements:

- Addition of NPS information to the NCDOT VMS at the Whalebone Junction Information Center, which currently provides static information (e.g., distance to ferry) as well as real-time information (e.g., ferry closure information due to weather) but is limited to information on major road issues on NC 12 and ferry information.
- Addition of a separate code for Cape Hatteras NS or the Outer Banks to the NCDOT 511 phone system, which includes specific reports for NC 12, U.S. 64, U.S. 158, Dare County, and major towns (e.g., Nags Head).

<sup>122</sup> Twitter is a social networking and blogging service in which users can send and view short (140 character) messages. Individuals as well as businesses, organizations, and government agencies use Twitter for socializing, news, publicity, advertising, and other purposes. <http://twitter.com/capehatterasnps>

<sup>123</sup> VMS have been used on highways for over 10 years and are also used commercially and by local government to provide information about traffic, weather, special events, and more. Available products typically display 1 to 3 lines of text or graphics and can include multi-screen messaging.

<sup>124</sup> NCDOT offers a number of Twitter feeds specific to Interstates, regions, ferry information, or general information. <http://www.ncdot.gov/travel/twitter/default.html>

<sup>125</sup> 511 is an abbreviated dialing code that was designated nationally for travelers to access highway, multi-modal, and other travel information via phone. It uses an automated voice response system through which callers can ask for information on specific areas. <http://www.ncdot.org/travel/511/>

<sup>126</sup> See <http://www.co.dare.nc.us/webcam/> and [http://www.outerbanks.org/visitor\\_services/beach\\_information/web\\_cams.asp](http://www.outerbanks.org/visitor_services/beach_information/web_cams.asp)

Also for the short term, the study team recommends the following actions to develop new (or re-activated) communication methods:

- Partnership with other entities, such as the OBVB, to develop a regional traveler information website, which can provide one central place for visitors to check for important transportation information as well as information on the various activities, events, and destinations. Some regional sites have developed interactive trip planners, in which visitors can choose sites they want to visit and then the tool provides transportation options for their selected itinerary. Figure 20 shows a screenshot of one such trip planner for the website for the Schuylkill River National and State Heritage Area in Pennsylvania.
- Reactivation of the AM advisory radio system.

**Figure 20**  
**Schuylkill River National and State Heritage Area “Plan Your Visit Wizard” website**  
 Source: Schuylkill River National & State Heritage Area website. <http://www.schuylkillriver.org/VisitPlanner.aspx>



For the long-term, if visitation and demand for parking increases within Bodie Island, the study team recommends the park consider the following:

- Installation of webcams at specific sites, such as the Bodie Island Lighthouse or Coquina Beach, so as to inform staff and visitors of parking availability and encourage visits outside the peak visit time.
- Use of a VMS at the Coquina Beach/Lighthouse Bay Drive (RIP Route #0202) intersection to notify visitors of parking availability.

#### *Technical feasibility*

The implementation of the systems described above varies in complexity and cost and is highly dependent on existing systems and potential partnerships. Some components, such as adding information to existing

systems like the website or 511, could potentially be implemented in the short term, be low cost, and require a small amount of additional staff time relative to other information systems.

Developing new systems, such as the advisory radio or purchasing VMS equipment, would require more upfront investment and training of staff to maintain the systems. Partnerships with others for shared use, such as the NCDOT VMS, or development of new systems would require significant staff time and the development of agreements. Any real-time information provision on a daily or more frequent basis is primarily an issue of staff resources—both for monitoring conditions and for updating the information.

VMS signs are relatively low-cost, portable, and programmable. Messages can be stored, scheduled and displayed; some can be programmed remotely, using a computer or phone. In many cases, VMS include self-contained solar charging systems, obviating the need for an external power supply. Some concerns include the visual impact of products that may be considered unsightly, limited value if used at only one intersection, and the challenge of agreeing upon priority locations. There are certainly maintenance burdens, for example: VMS storage when not in use, equitable use by partners (if a shared asset), generating public support, and identifying acceptable design with limited negative visual impact.

#### *Cost*

As mentioned above, cost varies significantly depending on the technology and whether it is an expansion of an existing system, new, or being pursued with partners. Several of the elements mentioned would require significant staff time, especially the provision of real-time information, and thus may not be feasible or a park priority. In terms of infrastructure, the VMS and a new regional website would require upfront costs as well. VMS signs range in cost based on their size, capabilities, and whether they are permanent or portable. Costs for a portable, trailer-mounted VMS are approximately \$18,000 to \$19,000; portable pole-mounted VMS cost slightly less; and permanent fixed VMS significantly more, from \$35,000–55,000 upwards.<sup>127</sup> There may be a possibility to share portable VMS with another user, such as a local town, that can use the VMS during off-peak times when the park would have less need for it.

A new or updated regional website could require an initial outlay of approximately \$10,000<sup>128,129</sup> and could be expected to cost an additional \$6,000–\$35,000<sup>130</sup> annually for regular update and annual maintenance.

#### *Partnerships*

Due to costs and resource requirements for implementation, it is recommended that the park pursue VMS, regional website development and other recommendations identified under this strategy, in partnership with others. For example, coordination with NCDOT on VMS and 511, and with other entities interested in providing traveler information (such as the Outer Banks Visitor Bureau), is recommended to share costs and improve the information and dissemination.

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<sup>127</sup> RITA ITS. “TMC central hardware costs can exceed \$200,000 if regional communications and system integration are required.” <http://www.itscosts.its.dot.gov/its/benecost.nsf/ID/47C7F45CDAF371EA852573E90068CF64?OpenDocument&Query=CApp> (2004)

<sup>128</sup> “The Cost of Building a Website” AllBusiness. <http://www.allbusiness.com/technology/internet-web-development/479-1.html>

<sup>129</sup> “The Cost of building a website” Webriver. <http://www.toddtturner.com/cost-of-a-website.asp>

<sup>130</sup> “How Much Should a Website Cost?” WebpageFX. <http://www.webpagefx.com/How-much-should-web-site-cost.html>



### 3. Implementation plan

This section provides information on funding opportunities (Section 3.1) and summarizes the recommended phasing and partnerships for the strategies (Section 3.2). Table 31 on page 87 matches the strategies to potential funding sources and also summarizes the expected timeline and potential partners.

#### 3.1 Funding opportunities

There are a number of funding sources for transportation related projects, including non-motorized trail development or enhancements through the NPS, the FHWA, the state of North Carolina, and through potential area partnerships. All grant applications and project proposals should be coordinated with the NPS Southeast Region. Funding opportunities through the FTA for transit are included in Appendix B. Table 30 categorizes funding sources by the main agency that administers the funding programs.

**Table 30**  
**Transportation related funding sources**

Agency / Primary source	Program
NPS	Operation of the NPS
	Federal Lands Recreation Enhancement Act (FLREA) Fees
FTA	Paul S. Sarbanes Transit in Parks Program (TRIP)
FHWA	Park Roads and Parkways Program (PRP)
	Public Lands Highway Discretionary Program (PLHDP)
	Surface Transportation Program (STP)
	Coordinated Technology Implementation Program (CTIP)
	Transportation Enhancements (TE)
	Highway Safety Improvement Program (HSIP)
	National Scenic Byways Program (NSBP)
	Recreational Trails Program (RTP)
State of North Carolina – NCDOT	Bicycle and Pedestrian Funding
	State Trails Program
	Tourist Oriented Directional Signage Program
Sponsorship or partnership	

#### National Park Service

The NPS may be able to provide partial or full funding for some aspects of the transportation strategies detailed in this report. Two main sources of funding for parks are Operation of the NPS and recreational fees, both described below. Other sources include donations and concessions fees. Several NPS offices and programs, including the Rivers, Trails, and Conservation Assistance (RTCA) Program, the Inventory and Monitoring Program, and the Public Use Statistics Office, may provide technical support for different projects.

##### *Operation of the NPS*

Operation of the NPS (ONPS) is annually-appropriated base funding allocated to parks that covers day-to-day operating expenses as well as specific, non-recurring projects. Operating expenses include those for administration, interpretation and education, visitor and resource protection, and facilities management. ONPS project funding supports programs such as Cyclic Maintenance, Repair and Rehabilitation, Inventory and Monitoring, and the Cultural Resources Preservation Program, among others. Thus ONPS may support a number of the proposed strategies. However, where possible, NPS should leverage park funding with other potential funding sources to complete specific projects.



#### *Federal Lands Recreation Enhancement Act Fees*

The Federal Lands Recreation Enhancement Act (FLREA) permits public lands to collect fees to maintain facilities and programs in developed areas of public land. As part of the program, 80 percent of recreation fees stay at the unit to maintain the visitor facilities. The remaining 20 percent of funds can be used by the region to fund projects at other units. Three types of fees can be collected: Entrance Fees, Standard Amenity Fees, and Expanded Amenity Fees. Requests for new, increased/decreased, or discontinued fees must be submitted to the NPS Washington Office for review and approval and usually require a public involvement process. Fees may be used for a variety of activities and projects, including facility repair, maintenance and enhancement directly related to visitor enjoyment, access and safety; interpretation; habitat restoration; law enforcement; recreation fee program administrative costs.

Standard Amenity Fees are generally paid by the general visitor population to a specific area where significant visitor infrastructure such as parking, toilets, interpretation and other amenities have been provided, such as currently exists at the Bodie Island Lighthouse. Parking fees collected at parking lots would fall into this category; however, parking fees are generally only done within NPS as a way to implement an entrance fee (e.g., Chattahoochee River National Recreation Area – see Appendix B) and entrance fees, as mentioned above, require NPS approval and a public process.<sup>131</sup>

Expanded Amenity Fees are used when only a subset of visitors benefit from investments such as developed campgrounds, monitored and maintained swimming areas, and both optional and mandatory transportation systems. Often reservation systems or limited entry to the facilities allow fees to be collected from users of the system. An expanded amenity fee could be collected for a park-service run transportation service, or could be collected through a climbing reservation system, such as that proposed for the Cape Hatteras NS lighthouses, to fund other amenities at these sites.

#### **Federal Transit Administration (FTA)**

FTA offers a number of grant programs for transit, including the Paul S. Sarbanes Transit in Parks (TRIP) Program,<sup>132</sup> which may support capital and planning expenses for new or existing alternative transportation systems in the vicinity of an eligible area. Alternative transportation includes transportation by bus, rail, or any other publicly available means of transportation and includes sightseeing service. It also includes non-motorized transportation systems such as pedestrian and bicycle trails as long as such systems are primarily for transportation rather than recreation. Operating costs, such as fuel and drivers' salaries, are not eligible expenses. Projects can be proposed by the public lands agency or local governments or other partners but must be coordinated with the Southeast Region.

NPS units have been able to take advantage of other FTA grant programs through a partner entity. Section 5311 (Formula grants for other than urbanized areas) provides capital, operating,<sup>133</sup> administrative, and planning assistance to communities with less than 50,000 in population. However, Dare County already receives its full allotment of 5311 funds for the Dare County Transportation System's demand-response services and as such these funds are not available to support a fixed route system at this time.<sup>134</sup>

#### **Federal Highway Administration (FHWA)**

The FHWA makes funds available for highway and other transportation improvements through a number of programs; it specifically funds the NPS through the Federal Lands Highway Program (FLHP) Park Roads and Parkways Program (PRP). Other FHWA administered funding programs include the Public

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<sup>131</sup> Fee & Special Park Use Program, Southeast Region

<sup>132</sup> Federal Transit Administration. Accessed August 24, 2010 [http://www.fta.dot.gov/funding/grants/grants\\_financing\\_6106.html](http://www.fta.dot.gov/funding/grants/grants_financing_6106.html)

<sup>133</sup> Operating assistance is limited to 50 percent of net operating costs (operating costs with operating revenues – fare revenue and other – subtracted). The other 50 percent is required to be a local match but can be funded by other federal agencies, including funding from the FLHP.

<sup>134</sup> Dare County Community Transportation Service Plan (2010). <http://www.ncdot.org/nctransit/download/CTSP/Dare.pdf>

Lands Highway Discretionary Program, the Surface Transportation Program (STP), Transportation Enhancements (TE) funding, the Coordinated Technology Implementation Program (CTIP), and several others that are discussed below. Many of these programs are administered by the state and program details vary by state. Two programs not included here are the Safe Routes to School Program and the Congestion Mitigation and Air Quality Improvement Program, as the study area does not serve as a route to any schools nor is it located in a non-attainment region.

Since the right-of-way on NC 12 through Cape Hatteras NS is owned by the NCDOT, including the Cape Hatteras National Park Road, FHWA programs that are administered through the state or local governments and defined within the statewide transportation planning process are available to finance transportation improvements at Cape Hatteras NS. However, roadway projects on park owned and operated roads like Lighthouse Bay Drive (RIP Route #0202), would only be eligible for funding through the Park Roads and Parkways Program, or through NPS specific funding sources.

#### *Park Roads and Parkways Program (PRP)*

The PRP program administered by the FLHP is the primary funding source provided by the Highway Trust Fund for the road network serving the NPS. Park roads and parkways are public roads that provide access within a National Park unit. The PRP projects are grouped into three categories of funding:

- Category I: Road Rehabilitation (3R) and Road Reconstruction/Realignment (4R) includes funding for rebuilding the existing road and bridge infrastructure, including resurfacing, repair, and rehabilitation of roadways.
- Category II: Congressionally Mandated Parkway includes completion of congressionally authorized projects, e.g., Natchez Trace Parkway, the George Washington Parkway, and others.
- Category III: Transportation Management Program includes planning and capital funding for Alternative Transportation Program projects. Eligible alternative transportation projects must have a direct benefit to an NPS unit and can include nonmotorized trails that have a direct connection to the transportation system but not trails primarily intended for recreation.

The PRP program is jointly administered by the NPS and FHWA. The NPS identifies program and project priorities and is responsible for planning and environment and resource protection. The FHWA provides planning, engineering, and technical support for the NPS.<sup>135</sup>

#### *Public Lands Highway Discretionary Program (PLHDP)*

PLHDP funds a wide variety of project types with broad eligibility requirements but only covers planning and capital, not O&M, costs. Eligible projects include vehicular parking areas, access roads, interpretive signage, pedestrian and bicycle provisions, and roadside rest areas. Only State departments of transportation (DOTs) may apply for the funding but Federal lands agencies can receive funds directly from the FHWA if their projects are submitted through the State and are selected for funding. For FY10, funding was restricted to specific projects identified by Congress, including public lands highways.

#### *Surface Transportation Program (STP)*

The Surface Transportation Program funds projects through the State's Federal-aid program that are detailed in the State Transportation Improvement Program (STIP). States' develop a STIP that includes projects that use this funding category or other programs under Federal-aid highway program.<sup>136</sup>

#### *Transportation Enhancements (TE)*

As described on the FHWA website,<sup>137</sup> TE funding is designed to "expand transportation choices and enhance the transportation experience." There are 12 specific eligible activities focusing on surface transportation including "pedestrian and bicycle infrastructure and safety programs, scenic and historic highway programs, landscaping and scenic beautification, historic preservation, and environmental

<sup>135</sup> Federal Highway Administration. Federal Lands Highways. Accessed August 24, 2010. <http://flh.fhwa.dot.gov/programs/prp/>

<sup>136</sup> Federal Highway Administration. Accessed August 24, 2010. <http://www.fhwa.dot.gov/tea21/factsheets/stp.htm>

<sup>137</sup> Federal Highway Administration. Accessed August 24, 2010 <http://www.fhwa.dot.gov/environment/te/>

mitigation.” Marine transportation is not covered under this program. NCDOT manages the program in the State of North Carolina.<sup>138</sup>

#### *Coordinated Technology Implementation Program (CTIP)*

FHWA also has funding for technology-based projects through the CTIP. With an open and rolling call, projects must meet the following criteria to be considered for funding by CTIP:

- Innovative, unique, or underused transportation technology
- Does not require research
- Adds value
- Meets a specific need
- Supports public roads or facilities
- Costs less than \$200,000
- Time frame less than three years

More information can be found at [http://www.ctiponline.org/submit\\_proposal/](http://www.ctiponline.org/submit_proposal/). Parking management or interpretation may be particularly appropriate for this funding source.

#### *Highway Safety Improvement Program (HSIP)*

The HSIP is a core Federal-aid program administered through state Departments of Transportation. The overall purpose of the program is to reduce traffic fatalities and serious injuries on all public roads through the implementation of infrastructure-related highway safety improvements.<sup>139</sup> At Cape Hatteras NS, roadway improvement projects like adding roadside vehicle pull-offs (Strategy 20) or the construction of a exclusive right turn lanes for Lighthouse Bay Drive (RIP Route #0202) and Coquina Beach (Strategy 18) may be eligible for funding under this program if a safety need is determined. NCDOT does not currently have any locations identified within the study area for HSIP.<sup>140</sup>

#### *National Scenic Byways Program (NSBP)*

The Outer Banks NSB stretches approximately 138 miles predominantly on NC 12 from Nags Head to Harkers Island through the Cape Hatteras NS. The NSBP is a discretionary program that funds several types of initiatives and projects for designated national scenic byways. The program’s eight funding categories include:

- State and Indian Tribe Scenic Byway Programs
- Corridor Management Plan
- Safety Improvements
- Byway Facilities
- Access to Recreation
- Resource Protection
- Interpretive Information
- Marketing Program
- Roadway enhancements or projects that relate to these categories are eligible for funding under the NSBP.

#### *Recreational Trails Program*

The Recreational Trails Program (RTP) provides funds to states for capital and maintenance expenses for both motorized and non-motorized recreational trail use. In North Carolina, RTP is administered by the Division of Parks and Recreation through its State Trails Program. It has a maximum grant award of \$75,000.

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<sup>138</sup> National Transportation Enhancements Clearinghouse. Accessed August 24, 2010  
[http://www.enhancements.org/contacts\\_search.asp?type=TE](http://www.enhancements.org/contacts_search.asp?type=TE)

<sup>139</sup> North Carolina Department of Transportation. Accessed August 24, 2010. NCDOT.  
<http://www.ncdot.org/doh/preconstruct/traffic/tepl/Topics/N-13/N-13.html>

<sup>140</sup> NCDOT Transportation Mobility and Safety Division. 2010 HSIP PH Location Reports.  
<http://www.ncdot.org/doh/preconstruct/traffic/safety/programs/PHReports.html>

## State of North Carolina

NCDOT administers a number of FHWA programs described above, such as TE, STP, and RTP, and provides technical assistance and operational funding for activities such as road maintenance, signage, and ITS applications. The state also has several other relevant funding programs that are described below.

### *Bicycle and Pedestrian Funding*

The NCDOT Division of Bicycle and Pedestrian Transportation provides planning, engineering, education, and training support. It provides oversight for all bicycle and pedestrian projects submitted to the State Transportation Improvement Plan (STIP). It also manages a planning grant, the Bicycle and Pedestrian Planning Grant Initiative, which provides funds to municipalities for comprehensive bicycle or pedestrian plan

### *State Trails Program*

In addition to RTP, the North Carolina Division of Parks and Recreation and its State Trails Program provides a State Adopt-A-Trail Grant Program. This program has a maximum grant award of \$5,000 with funds appropriated through the North Carolina General Fund.<sup>141</sup>

### *Tourist Oriented Directional Signage Program*

The NCDOT Division of Highways Tourist Oriented Directional Signage (TODS) Program<sup>142</sup> provides support for qualifying businesses or facilities that are tourism attractions to be signed on NCDOT rights-of-way, with the intent to provide tourists with information on destinations of interest. Participating entities pay for the physical sign and NCDOT then constructs, installs, and maintains the signs.

## Sponsorship or partnership

Another opportunity for funding would be to look toward public sector and private sector sponsorship. Major businesses or local organizations (e.g. Outer Banks Visitors Bureau) may be potential sponsors of shuttle services. One potential model for such sponsorship is the Island Explorer bus service at Acadia National Park in Bar Harbor, Maine, which is funded in part by L.L. Bean. As there are federal funding opportunities for capital improvements and maintenance, sponsorships and partnerships that support ongoing operating costs such as shuttle services or interpretive programming are most valuable.

Additional public-private partnerships and innovative finance mechanisms are discussed in Appendix B (Transit considerations) and included community or business improvement districts (CIDs/BIDs), tax increment financing (TIF) districts, and transportation management associations (TMAs).

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<sup>141</sup> North Carolina State Parks. Accessed August 24, 2010. [http://www.ncparks.gov/About/grants/trails\\_main.php](http://www.ncparks.gov/About/grants/trails_main.php)

<sup>142</sup> <http://www.ncdot.org/doh/preconstruct/traffic/congestion/SIGN/TODS/> and <http://www.ncdot.org/doh/preconstruct/traffic/congestion/sign/TODS/Todsbroc.pdf>

### 3.2 *Summary of strategy timeline and prioritization*

This section provides a summary of the study team's recommended phasing of the strategies, organized by ownership and partnership.

#### **NPS-only strategies**

Many of the strategies are internal to NPS and can be pursued without close coordination with outside entities, though the study encourages that Cape Hatteras NS continue to inform its partners and local government entities about its projects.

As mentioned in Section 1.1, the study recognizes that Cape Hatteras NS has already started work on the following strategies and encourages the continued pursuit of their implementation and future improvement, with consideration of the research and additional recommendations included in this report:

- Provide bicycle racks at all Bodie Island District sites
- Widen Lighthouse Bay Drive (RIP Route #0202)

The study recommends that Cape Hatteras NS start work on the following strategies in the short term, as they reflect an immediate need, are low cost, and have minimal difficulty:

- Change outgoing speed limit from 25mph to 15mph on Lighthouse Bay Drive (RIP Route #0202)
- Add bicycle/pedestrian directional signage at key locations
- Provide static and/or real-time transportation information – explore AM radio options
- Collect alternative transportation visitation information
- Collect information on parking lot utilization at major parking lots on Bodie Island
- Conduct a transportation focused visitor survey

The last three strategies listed should be practices that are done regularly moving forward and may require time to set up; action can be taken now to get the process started.

In addition, the study recommends that NPS pursue following strategy despite its potential moderate cost and longer term timeline because of the level of park and regional interest:

- Develop formal Sound access for non-motorized watercraft

Strategies that require more significant investment and which may be dependent on increasing use of alternative transportation include:

- Create a bicycle amenity station at Bodie Island Lighthouse and Whalebone Junction
- Offer and/or encourage interpretive alternative transportation tours of Bodie Island
- Offer NPS employees a bicycle share program, combined with volunteer bicycle patrols

Longer-term considerations for Cape Hatteras NS, dependent on the full implementation of other strategies and NPS-level policy, include the following:

- Implement park-level practices to encourage alternative transportation
- Prepare for adoption of the DOI Incident Management, Analysis, and Reporting System (IMARS)
- Provide kayak/canoe rental concessions within the Bodie Island District
- Extend the Dike Trail to the intersection of Lighthouse Bay Drive (RIP Route #0202) and NC 12
- Provide static and/or real-time transportation information – consider webcam and VMS to monitor and communicate parking availability at Coquina Beach and Bodie Island Lighthouse

### NPS-NCDOT strategies

A significant number of the proposed strategies require the involvement of NCDOT due to its relationship with NPS regarding NC 12. Below, the study provides its recommendations for which strategies may be best addressed first. However, the study recommends that representatives from Cape Hatteras NS and NCDOT meet to review the list of strategies and establish a prioritization and timeline that matches both agencies' resources and goals.

The study recommends that Cape Hatteras NS coordinate with NCDOT immediately on the following strategies:

- Add advance information and warning signage at roadside pull-offs
- Reduce speed limit along NC 12 near Bodie Island attractions.
- Add share the road/bicycle signs along expanded shoulders on NC 12
- Add a viewing platform for Bodie Island Lighthouse and a pull-off area on the west side of NC 12, parallel to the road, if a traffic/safety study verifies the need for, and appropriateness of, such a strategy. Install pedestrian infrastructure on NC 12 at Bodie Island sites – Campground
- Add a northern entrance/exit to the Coquina Beach parking lot
- Construct southbound and northbound exclusive right turn lanes on NC 12 at Lighthouse Bay Drive (RIP Route #0202) intersection
- Provide static and/or real-time transportation information – use of VMS and 511 and addition of signage for Bodie Island Lighthouse (and other Bodie Island District) sites along NC 12

If the signage and pavement marking and the addition of the pull-over and/or right turn lanes can be made in coordination with the paving of the shoulders, this could result in efficiencies. Otherwise, the right turn lanes and pull-over area may require additional time for environmental compliance and design.

Pedestrian infrastructure near the Oregon Inlet Campground is prioritized since there already exists pedestrian and equine activity between the Fishing Center and Campground and Ramp 4.

As additional infrastructure is constructed, such as the Bonner Bridge replacement, the study recommends that Cape Hatteras NS work with NCDOT on the following strategy:

- Develop vehicle parking with bicycle and pedestrian accommodations at northern end of Bonner Bridge
- As visitation to sites such as the lighthouse increase and supporting bicycle and pedestrian infrastructure is developed, the study recommends that Cape Hatteras NS keep in mind for future discussion with NCDOT the following:
- Install pedestrian infrastructure on NC 12 at Bodie Island sites – Coquina Beach/Lighthouse Bay Drive (RIP Route #0202)
- Add a bicycle lane along NC 12
- Add a multi-use path parallel to NC 12

Although documenting increased bicycle and pedestrian activity is important and can lead to the prioritization of these projects, the safer and more comfortable facilities that can be provided, the greater number of people will feel comfortable using them. Many people do not feel comfortable bicycling on on-road facilities.

### NPS-Nags Head strategies

There are a couple of strategies included in the study that would only result from a decision by the Town of Nags Head. The study recommends that Cape Hatteras NS ask the town to consider these strategies but defers to the Town's priorities and local knowledge in deciding feasibility and timeline.

- Connect NC 12 to Nags Head multi-use trail at Whalebone Junction
- Enhance nonmotorized infrastructure along SR1243

Both strategies would require moderate financing investment and design and construction. It is assumed that the enhancements to SR1243 would ideally be coordinated with any need to repave the surface of the multi-use trail and could also be done in segments.



### **NPS-regional strategies**

Finally, there are a number of strategies that require close coordination regionally. The study recommends that Cape Hatteras NS begin work with its transportation partners by forming a transportation committee to discuss the following strategies:

- Short-term strategies
  - Develop a comprehensive signage plan
  - Participate in Dare County Comprehensive Transportation Plan
  - Conduct a marketing campaign to promote alternative transportation to and within Cape Hatteras NS
  - Provide static and/or real-time transportation information – regional traveler information website
- Long-term strategies
  - Investigate the potential for water taxi/ferry services between Bodie Island District and other parts of the Outer Banks
  - Promote private provision or pursue partnerships for a transit service

As mentioned in Section 2.1, a transit system is most feasible if multiple partners are involved and a large pool of potential riders is served. Therefore, sample route E may have the highest potential although it may be possible that regional partners would be interested in designating a satellite parking area and sponsoring a shuttle for Bodie Island Lighthouse and Coquina Beach. Route B would require the lowest level of investment and coordination but would only involve stops within the NPS, and currently Cape Hatteras NS is not able or willing to undertake funding or operating of such a system on its own due to staffing and resource constraints.

### **Bodie Island Lighthouse strategies**

In preparation for the opening of the Bodie Island Lighthouse to climbing, the study recommends the following actions for Cape Hatteras NS:

- Work with NCDOT to add signage to NC 12 near Whalebone Junction to indicate the hours of Bodie Island Lighthouse for climbing;
- Set up the reservation system – ideally testing it with Cape Hatteras NS first during the summer of 2011;
- Delay implementation of any large expansion or reconfiguration of the parking until after the first season of climbing, during which the park should collect information on parking lot utilization at the lighthouse, with particular attention to the needs of motor coaches;
- Consider partnering with others to support a small transit shuttle from other parking sites for the first summer that the climbing is opened, similar to the event planning done in partnership with NCDOT for the Wright Brothers NM Centennial. Satellite parking would ideally be located within the Bodie Island District or to the north, but also possibly at the Oregon Inlet South Bridge parking lot.



## 4 Conclusion

The intent of this study was to consider the need and feasibility of alternative transportation strategies for the Bodie Island District of Cape Hatteras NS. Although the study focused on a specific area of Cape Hatteras NS, it took into consideration the regional context and many of the strategies recommended are applicable throughout the region. This study should be viewed as one step forward, building off of previous alternative transportation efforts by NPS and regional partners throughout Cape Hatteras NS and the Outer Banks, and providing a foundation upon which future efforts will be able to draw for ideas and information. This section summarizes the main conclusions of this report by modal section. Table 31 provides a summary of the strategies, which goals they address, and what the key implementation considerations are, including partners, timeline, technical feasibility, cost, and potential funding sources.

### Transit assessment

As stated in the conclusion for Section 2.1 (Transit), implementation of a transit system requires NPS Washington Office review and approval based on the completion of a number of analyses to demonstrate financial and operational feasibility and a positive net impact on resources and visitor experience. This study found that there has been regional and local town interest in transit and that transit would provide another transportation option for visitors, may reduce vehicle use and parking demand, and may have interpretive opportunities. However, transit ridership is unlikely to be high, especially if a user fee were charged, given the availability of parking<sup>143</sup> and the barriers to implementing any type of parking fee. In addition, Cape Hatteras NS is not able or willing to commit to funding or operating a transit service at this time due to staff and resource constraints. Due to the uncertainties in ridership and funding, especially for operations, it is not immediately apparent that any of the transit services proposed could be financially sustainable at this time. However, the study does conclude that Cape Hatteras NS should increase its participation in regional transit discussions and conduct future analyses to continue to assess the feasibility of a transit system in partnership with others. Specifically, the study recommends taking actions to explore partnerships for a regional system and keeping in mind certain considerations regarding transit vehicle and service characteristics.

### Planning and programming assessment

The planning and programming strategies consist primarily of recommendations that encourage coordination by Cape Hatteras NS with other groups; promotion of alternative transportation in public outreach and in activities offered; and data collection and analysis. These actions are as important to providing transportation options to visitors as the infrastructure strategies. These strategies can provide justification and leverage for funding for infrastructure, information that will inform the best design and selection of infrastructure strategies, and increased interest and use of alternative modes.

### Roadway assessment

The roadway strategies focus on improving safety for both motorized and non-motorized users. Short-term improvements in signage, in terms of raising awareness of bicycles, pull-off areas, and the speed limit, can result in a significant increase in safety. Longer term strategies involve the widening of roadways to provide for shared use and fewer conflicts from turning vehicles. It is important for Cape Hatteras NS to coordinate with the North Carolina Department of Transportation (NCDOT) and the Outer Banks Scenic Byway (OBSB) Committee on all of the strategies within this section.

The Alternative Transportation Study for Bodie Island District relied on limited field observations and staff and public input. For this reason, the safety-related strategies identified by this study will need to be

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<sup>143</sup> Discussed in Section 2. 2 of the Needs Assessment and documented in Section 3.2 of the Conditions Inventory/Assessment.

substantiated and verified through proper analysis, such as a safety study or traffic engineering analysis, prior to a project request. Further analysis of these recommendations will be necessary to ensure that all potential impacts are considered and to confirm that the proper strategy is identified.

### **Parking assessment**

The parking strategies focus on improving access to important recreation and viewing areas. Several of the longer-term parking strategies should be delayed until more information is available and/or other strategies are implemented or actions are taken by others. For example, the reconfiguration, relocation, or expansion of the Bodie Island Lighthouse parking area is dependent on information gained from future parking utilization and the successful implementation of a reservation system.

### **Bicycle assessment**

The bicycle strategies focus on providing amenities and facilities throughout the Bodie Island District and providing connections between Nags Head and Bodie Island. Many of the recommended strategies are long-term and set high standards for the level of bicycle facility that could be provided at some point. The study recognizes that there is existing bicycle infrastructure in place and prioritizes filling in gaps between that existing infrastructure. Similar to roadway, it is important for Cape Hatteras NS to coordinate with the NCDOT, and Outer Banks Scenic Byway (OBSB) Committee, on all of the strategies within this section. The Town of Nags Head is also an important partner because of the potential to address gaps in connectivity between Cape Hatteras NS and Nags Head.

### **Pedestrian assessment**

The pedestrian strategies primarily focus on improving safety though they also address making connections between sites by foot. Due to the distance between sites regionally, pedestrian infrastructure is most relevant for crossing NC 12 and within smaller areas, such as between Bodie Island Lighthouse and Coquina Beach, rather than connecting Bodie Island District to residential or commercial areas. Similar to roadway and bicycle strategies, it is important for Cape Hatteras NS to work coordinate with the NCDOT, as well as the Outer Banks Scenic Byway (OBSB) Committee, on all of the strategies within this section.

### **Marine assessment**

The marine strategies focus on improving nonmotorized access primarily for the purpose of transportation and on exploring the possibility for a public-private partnership for motorized water transit services. The study concludes that it is important for Cape Hatteras NS to work regionally on these strategies. For non-motorized, this means linking up with efforts by NPS Rivers, Trails, and Conservation Assistance (RTCA) Program to develop the Southeast Coast Saltwater Paddling Trail and statewide efforts of the North Carolina Blueways (NC Blueways), a cooperative effort by the North Carolina State Parks System, North Carolina State University, and North Carolina Paddle Trails Association. For motorized marine access, this means requesting a Transportation Assistance Group (TAG) to assess whether further exploration of water-based transit is warranted. Such a request and any further actions should be done in coordination with local towns that have expressed interest, such as Manteo, and the NPS Southeast Region, including the Concessions Services and Planning and Compliance divisions.

### **Traveler information and wayfinding assessment**

The traveler information and wayfinding strategies focus on both small-scale improvements that can be done within Bodie Island District and on regional system-wide changes that will require coordination with partners.

**Table 31**  
**Assessment of Final Potential Strategies**

Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)	NPS Transportation Goals								Implementation Considerations					
		<i>To conserve natural, historical, and cultural resources</i>	<i>To reduce congestion and pollution</i>	<i>To improve visitor mobility and accessibility</i>	<i>To enhance the visitor experience</i>	<i>To ensure access to all, including persons with disabilities</i>	<i>To achieve efficient management, operations, and maintenance</i>	<i>To coordinate with NPS and other planning entities and stakeholders as appropriate</i>	<i>Partners</i>	<i>Location</i>	<i>Technical Feasibility</i> <i>Minimal difficulty</i> <i>Moderate difficulty</i> <i>High difficulty</i>	<i>Timeline</i> <i>Short-term (0-2 years)</i> <i>Mid-term (2-5 years)</i> <i>Long-term (5+ years)</i>	<i>Cost</i> <i>Low &lt;= \$5,000</i> <i>Medium - \$5,001 - \$100,000</i> <i>High - &gt; \$100,000</i>	<i>Potential Funding Source(s)</i>	
Transit															
N/A	Explore opportunities for a regional transit system and/or temporary shuttle service from satellite parking as a partnership.	x	x	x	x	x	x	x	NPS / Multiple	Bodie Island District / Regional	Moderate to high difficulty	Short to long term	Medium to High	FTA Transit in Parks (TRIP) / PRP Category III <sup>144</sup> / fares / towns or Dare County / private	
Planning and programming strategies															
1	Encourage the formation of a regional transportation committee.	x	x	x	x	x	x	x	Multiple	Bodie Island District / Cape Hatteras NS / Regional	Minimal difficulty	Short-term	Low	Operation of NPS (ONPS)	
2	Participate in Dare County Comprehensive Transportation Plan (to start in 2011 or 2012)		x	x	x			x	Dare County, NCDOT, and Albemarle RPO	Regional	Minimal difficulty	Short-term	Low	ONPS	

<sup>144</sup> Category III funding is dependent on the determination that the service directly benefits the park and on approval by the NPS Washington Office.

Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)	NPS Transportation Goals							Implementation Considerations					
		<i>To conserve natural, historical, and cultural resources</i>	<i>To reduce congestion and pollution</i>	<i>To improve visitor mobility and accessibility</i>	<i>To enhance the visitor experience</i>	<i>To ensure access to all, including persons with disabilities</i>	<i>To achieve efficient management, operations, and maintenance</i>	<i>To coordinate with NPS and other planning entities and stakeholders as appropriate</i>	<i>Partners</i>	<i>Location</i>	<i>Technical Feasibility</i> <i>Minimal difficulty</i> <i>Moderate difficulty</i> <i>High difficulty</i>	<i>Timeline</i> <i>Short-term (0-2 years)</i> <i>Mid-term (2-5 years)</i> <i>Long-term (5+ years)</i>	<i>Cost</i> <i>Low &lt;= \$5,000</i> <i>Medium - \$5,001 - \$100,000</i> <i>High - &gt; \$100,000</i>	<i>Potential Funding Source(s)</i>
3	Develop a comprehensive signage plan			x	x			x	OBSB Committee, NCDOT, towns	Bodie Island District / Cape Hatteras NS	Minimal difficulty	Short-term	Medium	FHWA National Scenic Byways Program (NSBP)
4	Implement a reservation system for Lighthouse climbing at Bodie Island Lighthouse that includes a management system for motorcoach and school bus visitation		x	x	x		x		-	Bodie Island Lighthouse	Moderate difficulty	Short-term	Medium	ONPS / Recreation Fees (Rec Fees)
5	Collect alternative transportation visitation information						x		NCDOT, NPS Public Use Office, Eastern National, other	Bodie Island District / Cape Hatteras NS	Moderate difficulty	Short-term - Mid-term	Low-Medium	ONPS
6	Collect information on parking lot utilization at major parking lots on Bodie Island			x	x		x		NPS Public Use Statistics Office, NCDOT	Bodie Island District / Cape Hatteras NS	Moderate difficulty	Short-term - Mid-term	Low	ONPS
7	Conduct a transportation focused visitor survey				x		x		VSP, local university	Bodie Island District / Cape Hatteras NS	Moderate difficulty	Short-term - Mid-term	Medium	FTA TRIP / PRP Category III / ONPS

Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)	NPS Transportation Goals							Implementation Considerations					
		<i>To conserve natural, historical, and cultural resources</i>	<i>To reduce congestion and pollution</i>	<i>To improve visitor mobility and accessibility</i>	<i>To enhance the visitor experience</i>	<i>To ensure access to all, including persons with disabilities</i>	<i>To achieve efficient management, operations, and maintenance</i>	<i>To coordinate with NPS and other planning entities and stakeholders as appropriate</i>	<i>Partners</i>	<i>Location</i>	<i>Technical Feasibility</i> Minimal difficulty Moderate difficulty High difficulty	<i>Timeline</i> Short-term (0-2 years) Mid-term (2-5 years) Long-term (5+ years)	<i>Cost</i> Low <= \$5,000 Medium - \$5,001 - \$100,000 High - > \$100,000	<i>Potential Funding Source(s)</i>
8	Conduct a marketing campaign to promote alternative transportation to and through Cape Hatteras NS	x	x	x	x			x	OBVB, OBSB Committee, Dare County, towns	Bodie Island District/Cape Hatteras NS / Regional	Moderate difficulty	Short-term - Mid-term	Medium	ONPS
9	Implement park-level practices to encourage alternative transportation		x	x	x		x		-	Bodie Island District / Cape Hatteras NS	Varies	Varies	Varies	ONPS
10	<b>Prepare for adoption of the Department of Interior (DOI) Incident Management, Analysis, and Reporting System (IMARS)*</b>			x	x		x		NPS Headquarters, local/state law enforcement	Bodie Island District / Cape Hatteras NS	Moderate difficulty	Mid-term	Unknown	ONPS
11	Offer and/or encourage interpretive alternative transportation tours of Bodie Island			x	x				concessionaire / nonprofit, North Carolina Paddle Trails Association	Bodie Island District	Moderate difficulty	Long-term	Low	ONPS
12	Offer NPS employees a bicycle share program, combined with volunteer bicycle patrols	x	x				x		-	Bodie Island District (Cape Hatteras NS / Regional)	Minimal difficulty	Long-term	Medium	ONPS

Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)	NPS Transportation Goals							Implementation Considerations					
		<i>To conserve natural, historical, and cultural resources</i>	<i>To reduce congestion and pollution</i>	<i>To improve visitor mobility and accessibility</i>	<i>To enhance the visitor experience</i>	<i>To ensure access to all, including persons with disabilities</i>	<i>To achieve efficient management, operations, and maintenance</i>	<i>To coordinate with NPS and other planning entities and stakeholders as appropriate</i>	<i>Partners</i>	<i>Location</i>	<i>Technical Feasibility</i> <i>Minimal difficulty</i> <i>Moderate difficulty</i> <i>High difficulty</i>	<i>Timeline</i> <i>Short-term (0-2 years)</i> <i>Mid-term (2-5 years)</i> <i>Long-term (5+ years)</i>	<i>Cost</i> <i>Low &lt;= \$5,000</i> <i>Medium - \$5,001 - \$100,000</i> <i>High - &gt; \$100,000</i>	<i>Potential Funding Source(s)</i>
Infrastructure strategies														
Roadway														
13	Change outgoing speed limit from 25 mph to 15 mph on Lighthouse Bay Drive (RIP Route #0202)*			x	x			x	-	Lighthouse Bay Drive (RIP Route #0202)	Minimal difficulty	Short-term	Low	ONPS
14	Add advance information and warning signage at roadside pull-offs*				x				NCDOT	Bodie Island District (NC 12)	Minimal difficulty	Short-term	Low	ONPS / FHWA Highway Safety Improvement Program (HSIP) or NSBP
15	Add share the road/bicycle signs along planned expanded shoulders on NC12*			x	x				NCDOT, FHWA	Bodie Island District (NC 12)	Moderate difficulty	Short-term	Low	ONPS / FHWA Transportation Enhancement (TE) or NSBP
16	Reduce speed limit along NC 12 near Bodie Island attractions, if a traffic/safety study verifies the need for, and appropriateness of, such a strategy*			x	x				NCDOT	Bodie Island District	Moderate difficulty	Mid-term	Medium	FHWA TE or HSIP / NCDOT
17	Widen Lighthouse Bay Drive (RIP Route # 0202) (project partially complete)*			x	x		x		-	Bodie Island Lighthouse	Moderate difficulty	Mid-term	High	NPS Recreation Fee



Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)	NPS Transportation Goals							Implementation Considerations					
		<i>To conserve natural, historical, and cultural resources</i>	<i>To reduce congestion and pollution</i>	<i>To improve visitor mobility and accessibility</i>	<i>To enhance the visitor experience</i>	<i>To ensure access to all, including persons with disabilities</i>	<i>To achieve efficient management, operations, and maintenance</i>	<i>To coordinate with NPS and other planning entities and stakeholders as appropriate</i>	<i>Partners</i>	<i>Location</i>	<i>Technical Feasibility</i> Minimal difficulty Moderate difficulty High difficulty	<i>Timeline</i> Short-term (0-2 years) Mid-term (2-5 years) Long-term (5+ years)	<i>Cost</i> Low <= \$5,000 Medium - \$5,001 - \$100,000 High - > \$100,000	<i>Potential Funding Source(s)</i>
18	<b>Construct southbound and northbound exclusive right turn lanes on NC12 at Lighthouse Bay Drive (RIP Route #0202) intersection, if a traffic/safety study verifies the need for exclusive right turn lanes.</b> <sup>145</sup> *		x		x				NCDOT, FHWA	Intersection of NC12 and Lighthouse Bay Drive (RIP Route #0202)	Moderate difficulty	Mid-term	High	FHWA HSIP / PRP Category I <sup>146</sup>
<b>Parking</b>														
19	Add a northern entrance/exit to the Coquina Beach parking lot		x	x	x		x		-	Coquina Beach	Moderate difficulty	Mid-term	Medium	ONPS / Rec Fees
20	<b>Add a viewing platform for Bodie Island Lighthouse and a pull-off area on the west side of NC 12, parallel to the road, if a traffic/safety study verifies the need for, and appropriateness of, such a strategy.</b> <sup>145</sup> *		x		x				NCDOT, OBSB Committee, NC Audubon Society, other	Bodie Island District (between Bodie Island Lighthouse and Oregon Inlet Fishing Center) on NC 12)	Moderate difficulty	Mid-term	High	NSBP / FHWA TE or HSIP

<sup>145</sup> This strategy requires that a safety study/traffic engineering analysis be conducted to consider all possible impacts, both in terms of NEPA compliance and safety. Such analysis may be required for funding and ensures the identification of any new safety issues that may be introduced.

<sup>146</sup> To be eligible for Category I, project would need a safety study that determines a safety need for the project.

Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)	NPS Transportation Goals							Implementation Considerations					
		<i>To conserve natural, historical, and cultural resources</i>	<i>To reduce congestion and pollution</i>	<i>To improve visitor mobility and accessibility</i>	<i>To enhance the visitor experience</i>	<i>To ensure access to all, including persons with disabilities</i>	<i>To achieve efficient management, operations, and maintenance</i>	<i>To coordinate with NPS and other planning entities and stakeholders as appropriate</i>	<i>Partners</i>	<i>Location</i>	<i>Technical Feasibility</i> Minimal difficulty Moderate difficulty High difficulty	<i>Timeline</i> Short-term (0-2 years) Mid-term (2-5 years) Long-term (5+ years)	<i>Cost</i> Low <= \$5,000 Medium - \$5,001 - \$100,000 High - > \$100,000	<i>Potential Funding Source(s)</i>
21	Reconfigure, relocate, and/or expand the capacity of Bodie Island Lighthouse parking, including spaces for motorcoaches and oversized vehicles	x			x				-	Bodie Island Lighthouse	Moderate difficulty	Mid-term	High	ONPS / Rec Fees
22	Designate seasonal satellite shared parking for transit service			x	x				Various	Regional	Moderate difficulty	Long-term	Medium-High	ONPS
23	Develop vehicle parking with bicycle and pedestrian accommodations at northern end of Bonner Bridge			x	x				NCDOT, OBSB Committee, Outer Banks Visitors Bureau, other	Bonner Bridge	Moderate difficulty	Long-term	Medium-High	FHWA Recreational Trails Program ( RTP or NSBP
<b>Bicycle</b>														
24	<i>Provide bicycle racks at all Bodie Island District sites (pursuing funding)</i>		x	x	x		x		-	Bodie Island District	Minimal difficulty	Short-term	Low - Medium	ONPS / Rec Fees
25	<b>Connect bicycle infrastructure in South Nags Head to NC12 (along South Old Oregon Inlet Road, RIP Route #0011)*</b>		x	x	x			x	Nags Head, NCDOT	South Nags Head	Moderate difficulty	Short-term	Medium-High	ONPS / FHWA RTP
26	Create a bicycle amenity station at Bodie Island Lighthouse and Whalebone Junction		x	x	x				-	Whalebone Junction and/or Coast Guard buildings	Minimal difficulty	Mid-term	Medium	ONPS / FHWA NSBP

Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)	NPS Transportation Goals							Implementation Considerations					
		<i>To conserve natural, historical, and cultural resources</i>	<i>To reduce congestion and pollution</i>	<i>To improve visitor mobility and accessibility</i>	<i>To enhance the visitor experience</i>	<i>To ensure access to all, including persons with disabilities</i>	<i>To achieve efficient management, operations, and maintenance</i>	<i>To coordinate with NPS and other planning entities and stakeholders as appropriate</i>	<i>Partners</i>	<i>Location</i>	<i>Technical Feasibility</i> Minimal difficulty Moderate difficulty High difficulty	<i>Timeline</i> Short-term (0-2 years) Mid-term (2-5 years) Long-term (5+ years)	<i>Cost</i> Low <= \$5,000 Medium - \$5,001 - \$100,000 High - > \$100,000	<i>Potential Funding Source(s)</i>
27	<b>Connect NC 12 shoulder to Nags Head multi-use trail at Whalebone Junction*</b>		x	x	x				Nags Head, Dare County, Outer Banks Visitors Bureau	Whalebone Junction	Moderate difficulty	Mid-term	Medium	FHWA TE, HSIP, RTP, or NSBP
28	Enhance nonmotorized infrastructure along SR 1243		x	x	x			x	Nags Head	South Nags Head	Moderate difficulty	Mid-term	High	FHWA TE or RTP
29	<b>Add a bicycle lane along NC 12*</b>													
30	<b>Add a multi-use path parallel to NC 12*</b>		x	x	x			x	NCDOT	Bodie Island District between Whalebone Junction and Bonner Bridge	Unknown	Long-term	High	FHWA TE, HSIP, or NSBP / NCDOT RTP / FTA TRIP / PRP Category III <sup>147</sup>

<sup>147</sup> For TRIP and PRP Category III, eligible alternative transportation includes nonmotorized trails that have a direct connection to the transportation system but not trails primarily intended for recreation. For PRP Category III, only the section of road that belongs to NPS (RIP Route #0010) would be eligible.

Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)	NPS Transportation Goals							Implementation Considerations					
		<i>To conserve natural, historical, and cultural resources</i>	<i>To reduce congestion and pollution</i>	<i>To improve visitor mobility and accessibility</i>	<i>To enhance the visitor experience</i>	<i>To ensure access to all, including persons with disabilities</i>	<i>To achieve efficient management, operations, and maintenance</i>	<i>To coordinate with NPS and other planning entities and stakeholders as appropriate</i>	<i>Partners</i>	<i>Location</i>	<i>Technical Feasibility</i> <i>Minimal difficulty</i> <i>Moderate difficulty</i> <i>High difficulty</i>	<i>Timeline</i> <i>Short-term (0-2 years)</i> <i>Mid-term (2-5 years)</i> <i>Long-term (5+ years)</i>	<i>Cost</i> <i>Low &lt;= \$5,000</i> <i>Medium - \$5,001 - \$100,000</i> <i>High - &gt; \$100,000</i>	<i>Potential Funding Source(s)</i>
Pedestrian														
31	Install pedestrian infrastructure on NC12 at Bodie Island sites		x	x	x				NCDOT	Intersection of NC12 and Lighthouse Bay Drive (RIP Route #0202)	Moderate difficulty	Short-term - Mid-term	Low - Medium	NCDOT / FHWA NSBP
32	Install pedestrian infrastructure on NC12 at Whalebone Junction		x	x	x				NCDOT, Nags Head, Dare County	Whalebone Junction	Moderate difficulty	Mid-term	Low-Medium	FHWA TE, HSIP or NSBP / Dare County / Nags Head
33	Extend the Dike Trail to the intersection of Lighthouse Bay Drive (RIP Route #0202) and NC 12		x	x	x				NPS RTCA	Bodie Island Lighthouse	Unknown	Long-term	Medium	ONPS / Rec Fees / NSBP
Marine														
34	Develop formal Sound access for non-motorized watercraft		x	x	x			x	NPS	Bodie Island Lighthouse	Minimal difficulty	Short-term	Low-Medium	ONPS / Rec Fees / FTA TRIP / PRP Category III <sup>148</sup>

<sup>148</sup> For TRIP and PRP Category III, eligible alternative transportation includes nonmotorized trails that have a direct connection to the transportation system but not trails primarily intended for recreation.

Strategy number	Potential strategy (items in <b>red bold</b> with asterisk are safety-related; items already in progress are in <i>italics</i> and status is given)	NPS Transportation Goals							Implementation Considerations					
		<i>To conserve natural, historical, and cultural resources</i>	<i>To reduce congestion and pollution</i>	<i>To improve visitor mobility and accessibility</i>	<i>To enhance the visitor experience</i>	<i>To ensure access to all, including persons with disabilities</i>	<i>To achieve efficient management, operations, and maintenance</i>	<i>To coordinate with NPS and other planning entities and stakeholders as appropriate</i>	<i>Partners</i>	<i>Location</i>	<i>Technical Feasibility</i> Minimal difficulty Moderate difficulty High difficulty	<i>Timeline</i> Short-term (0-2 years) Mid-term (2-5 years) Long-term (5+ years)	<i>Cost</i> Low <= \$5,000 Medium - \$5,001 - \$100,000 High - > \$100,000	<i>Potential Funding Source(s)</i>
35	Provide kayak/canoe rental concessions within the Bodie Island District		x	x	x				NPS/private	Bodie Island Lighthouse and Oregon Inlet Fishing Center	Minimal difficulty	Mid-term	Low	ONPS <sup>149</sup>
36	Investigate the potential for water taxi/ferry services between Bodie Island and other parts of the Outer Banks	x	x	x	x	x	X	x	NPS/Multiple	Regional	Moderate difficulty	Long-term	Low	PRP Category III / FTA TRIP
<i>Wayfinding and Traveler Information</i>														
37	Add bicycle/pedestrian directional signage at key locations		x	x	x		X		OBSB Committee, Nags Head, NCDOT	Bodie Island Lighthouse, South Nags Head, Navy Tower Yard	Minimal difficulty	Short-term	Low	ONPS / FHWA NSBP
38	Provide static and/or real-time transportation information online, by phone, by radio, and or/via variable message sign		x	x	x		x		NCDOT, Outer Banks Visitors Bureau, others	Regional	Minimal to high difficulty	Varies	Medium-High	ONPS / NCDOT / FTA TRIP / FHWA Coordinated Technology Implementation Program (CTIP)

<sup>149</sup> Concessionaire would provide equipment and services.





## Appendix A: August 4, 2010 public meeting materials

- *Press Release*
- *Newsletter*
- *Sample Letter to Public Stakeholder*
- *Draft Potential Strategies*
- *Presentation*
- *Public Comment Report*



**National Park Service**  
**U.S. Department of the Interior**

**Outer Banks Group:**  
· Cape Hatteras National  
Seashore  
· Fort Raleigh National  
Historic Site  
· Wright Brothers National  
Memorial

1401 National Park Road  
Manteo, NC 27954

252-473-2111 phone  
252-473-2595 fax

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**National Park Service News Release**

FOR IMMEDIATE RELEASE: **DATE: July 21, 2010**

CONTACT: Cyndy Holda, Public Information Officer, 252-473-2111, ext. 148

### **Public Input Sought on Bodie Island Alternative Transportation Study**

Superintendent Mike Murray announced today the National Park Service (NPS) will seek public comment on alternative transportation strategies developed for the Bodie Island District at Cape Hatteras National Seashore. The NPS has partnered with the John A. Volpe National Transportation Systems Center of the U.S. Department of Transportation to perform an analysis of transportation strategies for visitors traveling to or between developed sites within the Bodie Island District. The analysis has focused on the potential use of transportation services and non-motorized vehicle options, such as shuttle and local bus, water ferry, and routes for bicycling, hiking, and walking, as well as, their necessary services, equipment, facilities, and infrastructure. The study analyzes the movement of visitors within developed areas of Bodie Island especially in the context of increased visitation to the Bodie Island Lighthouse, but does not include transportation of visitors along the beach or to Bodie Island Spit. The study provides planning-level recommendations and estimates to inform future decision-making, but is not a decision document.

Between Wednesday, July 21, 2010 and Thursday, August 19, 2010, the NPS is soliciting input on proposed alternative transportation strategies developed for Bodie Island. A public meeting will be held at the First Flight Centennial Pavilion at Wright Brothers National Memorial on Wednesday, August 4, 2010 from 3:30 p.m. to 5:30 p.m. Interested persons will have the opportunity to review study products developed thus far, which include a Transportation Needs Assessment and Transportation Conditions Inventory, and provide comment on Proposed Transportation Strategies.

NPS encourages commenting electronically through the park's Planning, Environment, and Public Comment (PEPC) website at <http://parkplanning.nps.gov/caha>. If you wish to submit your written comments in hard copy (e.g. in a letter), you may send them by U.S. Postal Service, other mail delivery service or hand-deliver to: Superintendent, Cape Hatteras National Seashore, 1401 National Park Drive, Manteo, NC 27954. Written comments will also be accepted during the public meeting. To ensure that your comments are included in the process, they must be entered or received by August 19, 2010.

-NPS-



## Alternative Transportation Study – Bodie Island

The National Park Service (NPS) has partnered with the John A. Volpe National Transportation Systems Center of the U.S. Department of Transportation to perform an analysis of transportation strategies for visitors traveling from and destined for sites within the Bodie Island District.



Bodie Island Lighthouse



North Carolina Highway 12

**Study Objective:** The Alternative Transportation Study focuses on the potential use of transportation services and non-motorized vehicle options, such as shuttle and local bus, water ferry, and routes for bicycling, hiking, and walking, as well as, their necessary services, equipment, facilities, and infrastructure. The study analyzes the movement of visitors within developed areas of Bodie Island especially in the context of increased visitation to the Bodie Island Lighthouse, but does not include transportation of visitors along the beach or to Bodie Island Spit. The study provides planning-level recommendations and estimates to inform future decision-making, but is not a decision document.

**Public Input Period:** A public input period opens on Wednesday, July 21, 2010 and closes on Thursday, August 19, 2010. A public meeting will be held in the First Flight Centennial Pavilion at Wright Brothers National Memorial on Wednesday, August 4, 2010 from 3:30pm to 5:30pm. Interested persons will have the opportunity to review study products developed thus far, which include a Transportation Needs Assessment and Transportation Conditions Inventory, and provide comment on Proposed Transportation Strategies.

**Comment Submission:** NPS encourages commenting electronically through the park's Planning, Environment, and Public Comment (PEPC) website at <http://parkplanning.nps.gov/caha>. If you wish to submit your written comments in hard copy (e.g. in a letter), you may send them by U.S. Postal Service, other mail delivery service, or hand-deliver them to: Superintendent, Cape Hatteras National Seashore, 1401 National Park Drive, Manteo, NC 27954. Written comments will also be accepted during the public meeting. To ensure that your comments are included in the process, they must be entered or received by August 19, 2010.

**Questions:** For more information, please contact: Darrell Echols, Deputy Superintendent, (252) 473-2111, extension 148

EXPERIENCE YOUR AMERICA™



# United States Department of the Interior

## NATIONAL PARK SERVICE

Fort Raleigh National Historic Site Wright Brothers National Memorial

Cape Hatteras National Seashore

1401 National Park Drive

Manteo, NC 27954

252-473-2111



IN REPLY REFER TO:  
D2217

July 15, 2010

Dear Sir/Madam,

The National Park Service (NPS) has partnered with the John A. Volpe National Transportation Systems Center (Volpe) of the U.S. Department of Transportation to perform an analysis of transportation strategies for visitors traveling from and destined for sites within the Bodie Island District. In January, a stakeholder meeting was held to solicit input from local, state, and federal entities that have transportation planning responsibilities or activities associated with areas surrounding Bodie Island. Based on that input, input from NPS staff, and observations, Volpe has analyzed the needs and opportunities that exist and proposed strategies for transporting visitors within the developed portions of Bodie Island.

Between Wednesday, July 22, 2010 and Thursday, August 19, 2010, the NPS is soliciting input on proposed alternative transportation strategies developed for Bodie Island. A public meeting will be held at the First Flight Centennial Pavilion at Wright Brothers National Memorial on Wednesday, August 4, 2010 from 3:30pm to 5:30pm, and we would like to invite you or a representative of your agency to attend. The purpose of the meeting is to provide an update on the status of the project and provide an opportunity to review study products developed thus far, which include a Transportation Needs Assessment and Transportation Conditions Inventory, and provide comment on Proposed Transportation Strategies. These products will be posted on the park's Planning, Environment, and Public Comment (PEPC) website on Wednesday, July 21 if you would like to review them prior to the meeting. The website URL is as follows:

<http://parkplanning.nps.gov/projectHome.cfm?parkID=358&projectId=30061>.

The National Park Service appreciates your contributions related to transportation needs and opportunities within Cape Hatteras National Seashore, and looks forward to your continued involvement in the planning process. Please feel free to contact Mr. Darrell Echols, Deputy Superintendent, at (252) 473-2111 ext. 151 with any questions or comments regarding the study.

Sincerely,

Mike Murray  
Superintendent  
Enclosure



# Cape Hatteras National Seashore Bodie Island District Alternative Transportation Study: Draft Potential Strategies

The following list represents preliminary strategies being considered as part of the analysis for the Bodie Island Alternative Transportation study. This list is not final nor does it imply action by Cape Hatteras National Seashore, or any other entity, and is provided for planning and informational purposes only. The strategies will be evaluated on a number of characteristics in the final report, with a focus on improving visitor access and circulation; enhancing health, safety and security; protecting and minimizing impacts to resources; and achieving efficient management, operations and maintenance of the park transportation network.

The list is divided into policy and planning strategies and infrastructure strategies, which are further organized by mode or topic area. For each strategy, the list includes proposed ownership in terms of agencies that would need to take primary action, identification of the relevant location or scale at which the strategy would take place, categorization of each strategy as a current or future need, and indication of the NPS transportation goal(s) that the strategy addresses.

	Potential strategy (items in <b>red bold</b> are safety-related)	Ownership	Location	Current (C) or Future (F) Need	NPS Transportation Goals						
					To conserve natural, historical, and cultural resources	To reduce congestion and pollution	To improve visitor mobility and accessibility	To enhance the visitor experience	To ensure access to all, including persons with disabilities	To achieve efficient management, operations, and maintenance	To coordinate with NPS and other planning entities and stakeholders as appropriate
	Policy and planning strategies										
1	Complete and refine parking demand assessment for Bodie Island Lighthouse	NPS	Bodie Island Lighthouse	C			x	x		x	
2	<b>Collect and track safety data (incident reporting system) for all modes</b>	NPS, NCDOT	Bodie Island District / Cape Hatteras NS	C			x	x		x	
3	Conduct a marketing campaign to promote alternative transportation on the Outer Banks online and in hard copy, to include maps that detail cycling and kayaking routes to Bodie Island and connections to regional systems, carpooling/ridesharing services, and information on modal choices for getting around.	NPS/Multiple	Bodie Island District (Cape Hatteras NS / Regional)	C	x	x	x	x			x
4	Collect data on pedestrian and bicycle activity to measure visitation by these modes	NPS	Bodie Island District / Cape Hatteras NS	C						x	

Cape Hatteras National Seashore Bodie Island District Alternative Transportation Study: Draft Potential Strategies

	Potential strategy (items in <b>red bold</b> are safety-related)	Ownership	Location	Current (C) or Future (F) Need	NPS Transportation Goals						
					To conserve natural, historical, and cultural resources	To reduce congestion and pollution	To improve visitor mobility and accessibility	To enhance the visitor experience	To ensure access to all, including persons with disabilities	To achieve efficient management, operations, and maintenance	To coordinate with NPS and other planning entities and stakeholders as appropriate
11	Offer and/or encourage interpretive tours of Bodie Island District (or specific sections) by bicycle, boat, or foot	NPS	Bodie Island District	F			x	x			
12	Implement a reservation system for Lighthouse climbing at Bodie Island Lighthouse	NPS	Bodie Island Lighthouse	F		x	x	x		x	
6	Participate in Dare County Comprehensive Transportation Plan (to start in 2011 or 2012) and promote alternative transportation through support of infrastructure investments and management and land use policies	NPS / multiple	Regional	F		x	x	x			x
7	Implement policy-level changes to encourage alternative transportation (e.g., pricing/fees, reduction /limits in parking)	NPS	Bodie Island District / Cape Hatteras NS	F		x	x	x		x	
8	Collect information on parking lot utilization at major parking lots (e.g., Bodie Island Lighthouse, Coquina Beach, Oregon Inlet) to inform future efforts	NPS	Bodie Island District / Cape Hatteras NS	F			x	x		x	
9	Develop a comprehensive signage plan (roadway, trail, and interpretive that incorporates wayfinding best practices for all modes - water, pedestrian, bicycle, and auto)	NPS, Outer Banks Scenic Byway Committee, NCDOT, Dare County, local communities	Bodie Island District / Cape Hatteras NS	F			x	x			x

Cape Hatteras National Seashore Bodie Island District Alternative Transportation Study: Draft Potential Strategies

	Potential strategy (items in <b>red bold</b> are safety-related)	Ownership	Location	Current (C) or Future (F) Need	NPS Transportation Goals						
					To conserve natural, historical, and cultural resources	To reduce congestion and pollution	To improve visitor mobility and accessibility	To enhance the visitor experience	To ensure access to all, including persons with disabilities	To achieve efficient management, operations, and maintenance	To coordinate with NPS and other planning entities and stakeholders as appropriate
10	Conduct a visitor survey with transportation questions that determine, for example, mode used, origin and destination, willingness to use alternative transportation (could be incorporated into General Management Plan or other efforts)	NPS	Bodie Island District / Cape Hatteras NS	F				x		x	
13	Develop a management system (including reservations and scheduling) for management of motorcoach and school bus visitation to Bodie Island Lighthouse	NPS	Bodie Island Lighthouse	F		x		x		x	
	Form a transit/transportation committee with local stakeholders	NPS/Multiple	Bodie Island District (Cape Hatteras NS / Regional)	C	x	x	x	x	x	x	x
	<b>Infrastructure strategies</b>										
	<b>Roadway</b>										
14	<b>Widen Lighthouse Bay Drive</b>	NPS	Bodie Island Lighthouse	C			x	x		x	
15	<b>Change outgoing speed limit from 25 mph to 15 mph to match ingoing speed limit on Lighthouse Bay Drive</b>	NPS	Lighthouse Bay Drive	C			x	x			x
16	<b>Reduce speed limit along NC 12 especially where there is pedestrian activity - e.g., lower speed during summer at Coquina Beach/Bodie Island Lighthouse similar to lowered speed at Oregon Inlet Fishing Center</b>	NCDOT	Bodie Island District	C			x	x			



Cape Hatteras National Seashore Bodie Island District Alternative Transportation Study: Draft Potential Strategies

	Potential strategy (items in <b>red bold</b> are safety-related)	Ownership	Location	Current (C) or Future (F) Need	NPS Transportation Goals						
					To conserve natural, historical, and cultural resources	To reduce congestion and pollution	To improve visitor mobility and accessibility	To enhance the visitor experience	To ensure access to all, including persons with disabilities	To achieve efficient management, operations, and maintenance	To coordinate with NPS and other planning entities and stakeholders as appropriate
17	<b>Add share the road/bicycle signs along planned expanded shoulders on NC12</b>	NPS / NCDOT	Bodie Island District (NC 12)	C			x	x			
19	<b>Add advance information and cautionary signs indicating merging traffic for roadside pull-offs for hunting trails and proposed viewing pull-offs</b>	NPS / NCDOT	Bodie Island District (NC 12)	C				x			
20	<b>Construct southbound right-turn lane on NC12 for Lighthouse Bay Drive</b>	NCDOT	Intersection of NC12 and Lighthouse Bay Drive	C		x		x			
21	<b>Construct northbound right-turn lane on NC12 for Coquina Beach</b>	NCDOT	Intersection of NC12 and Lighthouse Bay Drive	C		x		x			
	<b>Parking</b>										
22	<b>Add north- and south-bound viewing pull-off area(s) of Bodie Island Lighthouse (south-bound could provide parking for Dike Trail)</b>	NPS / NCDOT	Bodie Island District (NC 12)	C		x		x			
23	Designate seasonal satellite parking for transit service (at publicly-owned parking lots such as school parking and/or other NPS or town properties)	Multiple	Regional	F	x	x	x	x	x		x
24	Expand capacity of Bodie Island Lighthouse parking to accommodate identified additional demand and motorcoaches										

Cape Hatteras National Seashore Bodie Island District Alternative Transportation Study: Draft Potential Strategies

	Potential strategy (items in <b>red bold</b> are safety-related)	Ownership	Location	Current (C) or Future (F) Need	NPS Transportation Goals						
					To conserve natural, historical, and cultural resources	To reduce congestion and pollution	To improve visitor mobility and accessibility	To enhance the visitor experience	To ensure access to all, including persons with disabilities	To achieve efficient management, operations, and maintenance	To coordinate with NPS and other planning entities and stakeholders as appropriate
25	Reconfigure and/or relocate Bodie Island Lighthouse parking (to designate parking for buses and over-sized vehicles, alter capacity, and improve historic/view corridors)	NPS	Bodie Island Lighthouse	F	x			x			
26	Develop vehicle parking for bicycle and pedestrian users at base of Bonner Bridge if new and/or former bridge includes bicycle and pedestrian facilities (Environmental Assessment indicates a bike lane will be included)	NPS/NCDOT	Bonner Bridge	F			x	x			
	Addition of an entrance/exit to Coquina Beach parking in the north	NPS	Coquina Beach	C		x	x	x		x	
<b>Bicycle</b>											
27	<b>Extend Nags Head multi-use trail from termination in South Nags Head to NC12 and/or add shoulder or bike lane for bicycles</b>	NPS	South Nags Head	C		x	x	x			x
28	<b>Connect NC 12 expanded shoulders to Nags Head multi-use trail at Whalebone Junction through marked bicycle lane</b>	Nags Head	Whalebone Junction	C		x	x	x			
29	Provide bicycle racks at all Bodie Island District sites (including additional capacity at the Lighthouse)	NPS	Bodie Island District	C		x	x	x		x	
30	<b>Designate and/or add a bicycle lane along NC 12</b>	NPS	Bodie Island District	F		x	x	x			x
31	<b>Add off-road multi-use path along NC 12</b>	NPS	Bodie Island District	F		x	x	x			x

Cape Hatteras National Seashore Bodie Island District Alternative Transportation Study: Draft Potential Strategies

	Potential strategy (items in <b>red bold</b> are safety-related)	Ownership	Location	Current (C) or Future (F) Need	NPS Transportation Goals						
					To conserve natural, historical, and cultural resources	To reduce congestion and pollution	To improve visitor mobility and accessibility	To enhance the visitor experience	To ensure access to all, including persons with disabilities	To achieve efficient management, operations, and maintenance	To coordinate with NPS and other planning entities and stakeholders as appropriate
32	Create a bicycle amenity station (or several) with air/pump station, lockers, and information on distances and destinations	NPS/private	Whalebone Junction and/or Coast Guard buildings	F		x	x	x			
33	Widen multi-use trail along SR 1243 and/or provide an on-road designated bicycle lane separate from the off-road facility	Nags Head	South Nags Head	F		x	x	x			x
	<b>Pedestrian</b>										
34	Request that NCDOT install crosswalks and pedestrian crossing warning signs at Intersection of NC12 and Lighthouse Bay Drive	NCDOT	Intersection of NC12 and Lighthouse Bay Drive	F		x	x	x			
35	Request that NCDOT install crosswalks and pedestrian crossing warning signs between Oregon Inlet Fishing Center and campground	NCDOT	Oregon Inlet Fishing Center and campground	C		x	x	x			
36	Request that NCDOT add a crosswalk and pedestrian request/signals at Whalebone Junction (this will be particularly relevant if Whalebone Junction Information Station is further developed)	NCDOT	Whalebone Junction	F		x	x	x			
37	Extend the Dike Trail to connect the existing trail to the intersection of Lighthouse Bay Drive with NC 12 to access the Coast Guard buildings and Coquina Beach		Bodie Island Lighthouse	C		x	x	x			
	<b>Marine</b>										

Cape Hatteras National Seashore Bodie Island District Alternative Transportation Study: Draft Potential Strategies

	Potential strategy (items in <b>red bold</b> are safety-related)	Ownership	Location	Current (C) or Future (F) Need	NPS Transportation Goals						
					To conserve natural, historical, and cultural resources	To reduce congestion and pollution	To improve visitor mobility and accessibility	To enhance the visitor experience	To ensure access to all, including persons with disabilities	To achieve efficient management, operations, and maintenance	To coordinate with NPS and other planning entities and stakeholders as appropriate
38	Develop Soundside vehicle parking and dock, boat rack, and other facilities for nonmotorized access at Bodie Island Lighthouse (e.g., Off Island Gun Club dock site and Bone Yard site)	NPS	Bodie Island Lighthouse	C		x	x	x			x
39	Provide kayak/canoe concessions at Bodie Island Lighthouse Soundside access points and/or Oregon Inlet Fishing Center to facilitate water transportation between sites	NPS/private	Bodie Island Lighthouse and Oregon Inlet Fishing Center	C		x	x	x			
	Promote/encourage water taxi/ferry services from Bodie Island to other parts of the Outer Banks	NPS	Regional	F	x	x	x	x	x	x	x
	<b><i>Transit (all seasonal / additional service characteristics to be developed)</i></b>										
40	Pursue partnership to provide shuttle service between Coquina Beach and Bodie Island Lighthouse	NPS/other	Bodie Island District	F		x	x	x	x	x	
41	Pursue partnership to provide shuttle service between Coquina Beach, Bodie Island Lighthouse, Oregon Inlet Campground, and Oregon Inlet Fishing Center	NPS/other	Bodie Island District	F		x	x	x	x	x	
42	Promote/encourage an interpretive tour and shuttle between Fort Raleigh, Wright Brothers, and Bodie Island Lighthouse	NPS/other	Regional	F		x	x	x	x	x	
43	Pursue partnership to provide shuttle service between satellite parking in Nags Head and Bodie Island District sites	NPS/other	Regional	F		x	x	x	x	x	

Cape Hatteras National Seashore Bodie Island District Alternative Transportation Study: Draft Potential Strategies

	Potential strategy (items in <b>red bold</b> are safety-related)	Ownership	Location	Current (C) or Future (F) Need	NPS Transportation Goals						
					To conserve natural, historical, and cultural resources	To reduce congestion and pollution	To improve visitor mobility and accessibility	To enhance the visitor experience	To ensure access to all, including persons with disabilities	To achieve efficient management, operations, and maintenance	To coordinate with NPS and other planning entities and stakeholders as appropriate
44	Promote/encourage shuttle service between Fort Raleigh, downtown Manteo, Wright Brothers, downtown Kill Devil Hills, downtown Nags Head (Jennette's Pier), and Bodie Island Lighthouse	NPS/other	Regional	F		x	x	x	x	x	x
	<b>Wayfinding and Traveler Information</b>										
45	Add signage for bicycle/pedestrian users that contains information on distance and direction of destinations at key locations (e.g., at gate to gravel road at Bodie Island Lighthouse to indicate Dike Trail)	NPS	Various	C		x	x	x		x	
46	Provide real-time information on ORV / parking lots capacity / weather/other conditions provided online, by phone, by radio, and/or variable message sign	NPS	Various	C		x	x	x		x	
47	Provide static information on ORV / parking lots / other conditions online, by phone, by radio, and/or variable message sign	NPS	Various	C		x	x	x		x	
48	Provide traveler information through state-owned variable message sign	NCDOT	Whalebone Junction	C		x	x	x		x	

National Park Service  
U.S. Department of the Interior  
Cape Hatteras National Seashore



## Transportation Study for Bodie Island

Public Meeting  
August 4, 2010

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### Agenda

- Welcome and Purpose of Public Meeting
- Study Purpose, Area and Background
- Study Process and Results
  - Conditions Inventory/Assessment
  - Needs Assessment
  - Potential Strategies
- Examples of Alternative Transportation in Other Parks
- Opportunity for Public Review and Input
- Questions
- Comments and Discussion

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### Study Purpose

- Identify optimal transportation strategies for serving visitors to sites within the Bodie Island District of the Cape Hatteras National Seashore
- Lay the groundwork for future alternative transportation studies and projects for the rest of the Seashore and the greater Outer Banks region

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## Study Area

Bodie Island District  
of Cape Hatteras  
National Seashore



## Study Area (continued)



Whalebone Junction Information Station, Cape Hatteras National Seashore  
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## Study Area (continued)



Bodie Island District, Cape Hatteras National Seashore  
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## Study Area (continued)



Marina and Oregon Inlet Campground, Cape Hatteras National Seashore

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## Study Background

- Federal Transit Administration's Paul S. Sarbanes Transit in the Parks Program
  - Goals
    - Alternative Transportation Systems
    - Planning and implementation
  - Results
    - Support management decisions (e.g., technology selection)
    - Assess financial feasibility
    - Develop or improve partnerships
    - Guidance on whether or not to purchase, lease, or contract new or enhanced services and/or facilities

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## Study Process

January 12, 2010 to September 30, 2010

- Conditions Inventory/Assessment (**Draft Complete**)
  - Evaluation of the existing transportation network and existing and future project forecasted travel conditions
- Needs Assessment (**Draft Complete**)
  - Assessment of unmet transportation needs (existing and projected)
- Alternative Transportation Analysis (**In progress**)
  - Identification of alternative sustainable integrated transportation strategies to address needs, and
  - Consideration of multimodal and intermodal strategies that promote interconnectivity; this may include new systems or expansion or enhancement of existing systems.

Planning-level recommendations and estimates will be provided to inform future decision-making.

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## Conditions Inventory / Assessment

- Previous studies
- Regional context
- Transportation characteristics
- Ongoing and proposed projects



## Needs Assessment

Planning, policy, and infrastructure:

- Roadway
- Parking
- Transit
- Bicycle and Pedestrian
- Marine
- Wayfinding / Traveler Information
- Intermodal Connections



## Draft Potential Strategies - Examples

- Policy and planning strategies
  - Collect and track safety data and data on pedestrian and bicycle activity
  - Conduct a marketing campaign to promote alternative transportation on the Outer Banks
- Infrastructure strategies
  - Roadway
    - Widen Lighthouse Bay Drive
    - Construct right-turn lanes on NC 12 for Bodie Island Lighthouse and Coquina Beach
  - Parking
    - Add entrance/exit to Coquina Beach parking in north
    - Reconfigure, expand, and/or relocate Bodie Island Lighthouse parking

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## Draft Potential Strategies - Examples (cont'd)

### ■ Infrastructure strategies (continued)

- Bicycle
  - Add facilities to connect Nags Head multi-use trail with NC 12 at Whalebone Junction and southern terminus
  - Provide bicycle racks at all Bodie Island District sites
- Pedestrian
  - Request installation of crosswalks and pedestrian crossing warning signs at Oregon Inlet and Coquina Beach
- Marine
  - Improve nonmotorized access facilities at Bodie Island Lighthouse and Oregon Inlet
  - Promote/encourage water taxi/ferry services to/from Bodie Island

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## Draft Potential Strategies – Examples (cont'd)

### ■ Infrastructure strategies (continued)

- Transit
  - Pursue partnership to provide shuttle service within Bodie Island or externally
- Wayfinding and traveler information
  - Provide static and/or real-time information on traffic and other conditions online and/or by phone, radio, or variable message sign

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## Example Alternative Transportation Systems

Acadia National Park  
Island Explorer



Cape Cod National  
Seashore Coast  
Guard Beach Shuttle

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## Example Alternative Transportation System: Acadia National Park

- Island Explorer Shuttle (1999)
  - Response to concerns about traffic congestion, air and noise pollution, and parking scarcity
  - Made possible by partnership with existing local transit agency and multiple funding sources
    - Federal CMAQ funds
    - Friends of Acadia
    - Park fees
    - ATP funding
    - Federal Lands Highway Program
    - Local towns
    - Business direct service
    - Corporations/Businesses
    - Individual donations
  - Fare free service, propane fueled buses, seasonal service with high frequency
- Extensive bicycle trail network and use of intelligent transportation systems (ITS)

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## Example Alternative Transportation System: Cape Cod National Seashore

- Coast Guard Beach Shuttle (~1980s)
  - Response to 1978 storm that destroyed beach parking
  - Small-scale NPS operated open-air tram suited to beach gear accommodation
- Cape Cod Regional Transit Authority Flex Bus Service and Provincetown-Truro Shuttle
  - Partnership with existing local transit agency to provide seasonal and year-round services to visitors, residents, and seasonal employees
  - Limited beach connections but potential for improved connections
- Extensive bicycle and pedestrian trail network, transit connections to ferries, and use of intelligent transportation systems (ITS)

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## Opportunity for Public Review and Input

- Planning, Environment and Public Comment (PEPC) website:  
<http://parkplanning.nps.gov/projectHome.cfm?parkId=358&projectId=30061>
- Public Comment period July 21 through August 19 2010 – comments can be submitted via PEPC or via mail (see contact information provided below)
- Materials available:
  - Presentation from January 2010
  - Draft Conditions Inventory/Assessment Report
  - Draft Needs Assessment Report
  - Draft list of potential strategies
- Next steps

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## Contact Information for Comments and Questions:

- <http://parkplanning.nps.gov/caha>
- Mike Murray, Superintendent, Cape Hatteras National Seashore, 1401 National Park Drive, Manteo, NC 27954
- Darrell Echols, Deputy Superintendent, (252) 473-2111, extension 148

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## Questions?

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## Comments and Discussion

- Please let us know what you think!
  - Comment cards
  - Interactive, hands-on discussion:
    - Large maps
    - Sticky notes/markers
  - Other needs not yet identified
  - Other potential strategies not yet identified

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## Cape Hatteras National Seashore



National Park Service  
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# Bodie Island Alternative Transportation Study Public Comment Report

## *Background*

A 30-day public comment period was conducted from July 21, 2010 until August 19, 2010 to provide representatives of the public and various transportation stakeholder groups the opportunity to review and comment on the *Alternative Transportation Study for Bodie Island District: Needs Assessment*, *Alternative Transportation Study for Bodie Island District: Condition Inventory/Assessment*, and *Proposed Transportation Strategies*. A public meeting was held at Wright Brothers National Memorial on August 4, 2010 to provide an additional opportunity for comment.

## *Overall Results*

Four responses were received during the comment period representing two individuals, an environmental group, and a local municipality. All comments received were positive and supportive of developing alternative transportation strategies. Several comments offered new ideas for consideration. One comment identified a concern over a proposed strategy.

## *Specific Comments*

### Overall goals of the project:

- *Compliment the National Park Service (NPS) on the work done thus far...*
- *The goals outlined in your Potential Strategies document are appropriate and well-reasoned...*
- *The goal “conserve park resources” should be a high priority in the final plan, as it includes the conservation of wildlife habitat...*
- *We liked the Needs Analysis because it looks at all forms of travel by visitors, with emphasis on alternatives to the private car...*

### Potential Strategies:

- *The alternative transportation strategies proposed in your paper will help Cape Hatteras communities profit from visitors.*
- *Support all the transit concepts listed on page 6, including shuttle services and interpretive tour services.*
- *Support all transportation (pages 5-6) including water taxi/ferry services, and kayak/canoe concessions on the sound side of the island.*
- *Strongly support any strategies that promote pedestrian, bicycle, and in general, non-motorized transportation in the area.*
- *Strongly support any strategies that encourage safety for pedestrian, bicycle, and non-motorized transportation including the use of signs and lower speed limits.*
- *We heartily support the Goals listed in your “Potential Strategies” paper.*
- *We support all the “transit” strategies listed in the table (refer to page 6).*
- *We support improved bicycling opportunities and getting bicycles off NC 12 and onto carefully designed bike paths.*



#### Concerns:

- Suggestion to widen the multi use path already in place on SR 1243 and/or provide an on-road designated bike lane separate from the off-road facility. Commenter's reasoning was that they were concerned that this strategy would encourage bicyclists to move onto the roadway instead of staying on the multi-use path. The NPS and study team recognize this concern and will include it in the document; for the proposed extension of the Nags Head multi-use trail from its terminus to NC 12, the park is actively pursuing funding for an off-road facility in lieu of expanding the road shoulder.

#### Suggestions:

- *We would like to see parking developed outside the national seashore, so visitors can ride a shuttle or ferry to Bodie Island ...* This suggestion is supported by the NPS and community partners and opportunities are being sought to help ensure that parking is available in the event that a shuttle is developed.
- *Bike racks should be provided at key visitor sites.* The NPS agrees that additional bike racks are needed.
- *Buses onto Bodie Island should have bike racks for visitors.* In the event that a shuttle is developed, the NPS believes that bike racks are necessary and should be part of the transit system.
- *Bikes should be made available to rent at concessions or at village businesses.* Bikes are available for rent at numerous locations in the surrounding communities. The NPS has not received any requests for this type of concessionaire nor does it have plans to develop a concessions contract for this service.
- *Have a Police Officer or Park Ranger out on RT 12 to direct traffic at the two entrances.* The NPS has significant safety concerns with respect to stationing an employee on a highly traveled roadway with high speed limits. The objective of providing an easier transition from NC 12 into Coquina Day Use Area and the Bodie Island Lighthouse area could be met with the addition of turning lanes that would provide a transition area and minimize the impact to highway traffic.
- *Make turn lanes that are needed.* The NPS agrees with this suggestion and continues to work with NCDOT to provide these lanes
- *Use oyster and clam shells to expand the sides of RT 12.* The current roadway shoulders of NC 12 are scheduled to be expanded in the fall/winter 2010 and spring 2011 to provide added pavement width that can be used by bicyclists. Shells are difficult and expensive to obtain in the region; however, the NPS does consider porous pavement alternatives when and where appropriate and feasible, as shown by the use of porous pavers for the new parking at the relocated Coast Guard buildings, and the NPS will continue to do so in the future.
- *Add more bike racks.* The NPS agrees with this suggestion.
- *If buses are incorporated, why not run them from the Wright Brothers Monument out and back to make a complete loop.* The NPS agrees that this suggestion should be analyzed in the development of a transit system to ensure that this type of transit system would be feasible, effective, and provide the needed level of transportation.

## Appendix B: Transit system operations considerations

Appendix B provides general information on considerations for transit, such as management models, financing and vehicle selection and types. This information is being provided for reference for NPS and its partners if it is determined that there is a sustainable source of funding for operations and management, a feasible service plan, and an identified operator to pursue a transit system in the future.

### *Management Models*

In considering a transit system, an NPS unit has several options in terms of ownership, operation, and management. Table 1 shows the primary models in use throughout the NPS, with agency-operated models being the least common. Each model has advantages and disadvantages, and the models vary in the level of NPS control and the level of financial and administrative burden on NPS. Commercial use authorizations are another instrument used in providing commercial services within NPS but are intended to provide a simple means to authorize suitable commercial services to visitors within a limited set of circumstances and transit services usually are not eligible.<sup>150</sup>

**Table 32**  
**NPS management models for transit**

Model	Description	Examples
Concessionaire	Privately-operated service and privately-financed equipment and operations with minimal oversight from NPS.	Tourmobile at the National Mall and Memorial Parks (Washington, DC) <sup>151</sup>
Partnership / Cooperative Agreement	NPS partners with transit agency or other nonprofit or government entity wherein each partner provides one or some of the necessary resources: equipment, facilities, and/or labor.	Island Explorer at Acadia National Park (Maine) <sup>152</sup>
Service contract with private assets	Privately-operated service and privately-financed equipment with operations funding and oversight from NPS.	Shuttles at and Rocky Mountain National Park (Colorado) <sup>153</sup>
Service contract with public assets	Privately-operated service with government-provided/financed equipment and facilities, operations funding, and oversight from NPS.	Shuttles at Grand Canyon National Park (Arizona) <sup>154</sup>
Agency	NPS unit owns or leases equipment and facilities and operates service.	Leased vans at Kennesaw Mountain National Battlefield Park (Georgia) <sup>155</sup> and biodiesel van at Scotts Bluff National Monument <sup>156</sup>

### *Financing*

This section provides a brief overview of the primary funding sources for transit in national parks, which consists primarily of user fees, NPS operating budget, and U.S. Department of Transportation programs. There are also a number of funding sources available to potential partners and these are discussed briefly.

<sup>150</sup> Commercial Use Authorizations: Interim Guidelines.

[http://www.nps.gov/akso/concessions/documents/AKRO\\_CUA\\_InterimGuidelines.pdf](http://www.nps.gov/akso/concessions/documents/AKRO_CUA_InterimGuidelines.pdf)

<sup>151</sup> Tourmobile. <http://www.tourmobile.com/>

<sup>152</sup> Island Explorer. <http://www.exploreacadia.com/>

<sup>153</sup> Rocky Mountain National Park. "Shuttle Bus Routes." [http://www.nps.gov/romo/planyourvisit/shuttle\\_bus\\_route.htm](http://www.nps.gov/romo/planyourvisit/shuttle_bus_route.htm)

<sup>154</sup> Grand Canyon National Park. "South Rim Shuttle Bus Routes 2010." <http://www.nps.gov/grca/planyourvisit/shuttle-buses.htm>

<sup>155</sup> Personal communication with Kennesaw Mountain National Battlefield Park. Note that previously the park had contracted with a private company to provide the service.

<sup>156</sup> Scotts Bluff National Monument. "Summit Shuttle." <http://www.nps.gov/scbl/planyourvisit/shuttle.htm>

Transit user fees are often used in public transportation systems to help fund the service, although fares usually only account for 25-30 percent of the total operating budget. Throughout NPS, there are several examples of parks charging a transportation fee for using transit services. In addition, some parks, especially those with mandatory shuttle systems (e.g., Zion National Park and Cape Cod National Seashore's Coast Guard Beach shuttle) incorporate the transit fee into the overall entrance fee. Charging a fee for a voluntary transit service has shown to have significant negative impact on ridership, especially if the alternative - driving and parking - is free or less expensive. At Kennesaw Mountain National Battlefield Park, there is shuttle service on the weekend to the top of Kennesaw Mountain; personal vehicles are only allowed to access the mountain top during the week. Visitors also have the option of walking up the mountain road or a separate trail anytime. When the park implemented a fee to ride the shuttle, ridership decreased by half. The shuttle is funded out of the park's operating budget. Acadia National Park has chosen to provide transit service for free to visitors in an effort to promote ridership and decrease congestion and issues with parking shortages. The park is able to do so through a partnership with the local transit provider and funding from NPS and other federal resources, local towns and businesses, and a Maine-based clothing and outdoor gear retail company (L.L. Bean), among others.

Other types of user fees are a transportation fee charged as part of an entrance fee and a parking fee. A parking fee is used as a parking management strategy in many places to reduce demand on parking in an area, leading to a reduction in vehicle traffic, and thus congestion. Visitation levels would be maintained if such a strategy was paired with alternative transportation access, such as transit or bicycle and pedestrian paths. Parking fees can also be used to generate revenue for other purposes, for example, to cover the costs of parking lot construction and maintenance, or for other facilities expenses. Under NPS policy, parking fees are generally only done as way to implement an entrance fee (e.g., Chattahoochee River National Recreation Area – see below) and entrance fees require NPS approval and a public process.<sup>157</sup>

Chattahoochee River National Recreation Area (NRA), located in Georgia approximately 20 miles north of Atlanta, charges an entrance fee administrated at several parking locations and revenues are used for a variety of park activities. The Chattahoochee River NRA uses pay and display meters, also known as automated fee machines (AFMs) rather than “iron rangers,” a simple fee collection device that takes the place of a NPS ranger. AFMs allow visitors to purchase a pass with quarters or credit card and the pass can then be displayed on the vehicle's dashboard, to be checked randomly by park staff. Vehicles without passes are issued reminders and, if necessary, tickets. The NRA reported that AFMs each cost \$80,000 to install, including wiring, full enclosure, and the machines (\$30-35,000 each). The full enclosure has become necessary because of issues with break-ins.

Funding for transit planning and for capital expenses is more readily available than funding for operations and maintenance. The primary sources of such funding for NPS are the Federal Transit Administration's (FTA) Paul S. Sarbanes Transit in Parks (TRIP) Program and the FHWA's Federal Lands Highway Program (FLHP) Park Roads and Parkways Program (PRP). Parks apply to both programs by submitting requests via PMIS, the NPS servicewide intranet application to manage information about requests for project funding. The NPS regional offices then review the eligibility of each project and its competitiveness with other projects in the region and select projects to be sent to NPS headquarters to be considered for funding.

FTA's TRIP Program funds may support capital and planning expenses for new or existing alternative transportation systems in the vicinity of an eligible area. Alternative transportation includes transportation by bus, rail, or any other publicly available means of transportation and includes sightseeing service. It also includes non-motorized transportation systems such as pedestrian and bicycle trails. Operating costs, such as fuel and drivers' salaries, are not eligible expenses. Projects can be proposed by the public lands agency or local governments or other partners.<sup>158</sup> TRIP resources include:

- The FTA TRIP website: [http://www.fta.dot.gov/funding/grants/grants\\_financing\\_6106.html](http://www.fta.dot.gov/funding/grants/grants_financing_6106.html)

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<sup>157</sup> Fee & Special Park Use Program, Southeast Region

<sup>158</sup> Federal Transit Administration. Accessed August 24, 2010 [http://www.fta.dot.gov/funding/grants/grants\\_financing\\_6106.html](http://www.fta.dot.gov/funding/grants/grants_financing_6106.html)

- The Volpe Center developed guidance and selected best examples of TRIP applications for the U.S. Forest Service. The results of the effort are available online to all and are relevant to all public land agencies. <http://publiclands.volpe.dot.gov/usfs-alternative-transportation/index.shtm>
- The Paul S. Sarbanes Transit in the Park Technical Assistance Center (TAC) has a website with information and resources on the TRIP program. The TAC also offers technical support and training on a wide range of alternative transportation projects and is available to all Federal Land Management Agencies (FLMAs), not only those applying for or receiving funds from the TRIP Program. <http://www.triptac.org/Trip/Default.html>
- The FY10 TRIP application period is over and there have not yet been announcements about FY11. In the past, applications have been due in January or February and selections made in the fall; however, this schedule has changed each year. As of FY10, applications are submitted via a Federal website, Grants.gov. The Volpe Center documented the process in guidance that is available online: [http://www.triptac.org/Documents/TRIP%20Page/FY2010\\_TRIP\\_GRANTSGOV.pdf](http://www.triptac.org/Documents/TRIP%20Page/FY2010_TRIP_GRANTSGOV.pdf)

The FLHP PRP program consists of several categories of funding, one of which covers alternative transportation and provides funding for capital and planning expenses regarding transit and other alternative transportation projects.

NPS units have been able to take advantage of other FTA grant programs through a partner entity. Section 5311 (Formula grants for other than urbanized areas) provides capital, operating,<sup>159</sup> administrative, and planning assistance to communities with less than 50,000 in population. However, Dare County already receives its full allotment of 5311 funds for the Dare County Transportation System's demand-response services and as such these funds are not available to support a fixed route system at this time.<sup>160</sup>

In addition to Federal programs, partner entities can provide access to other funds and innovative financing mechanisms. Three examples are community or business improvement districts (CIDs/BIDs), tax-increment finance (TIF) districts, and transportation management associations (TMAs). A CID or BID is a geographically defined district in which commercial property owners vote to impose a self-tax. Revenues collected from the tax are directed from the local government to the CID/BID to use to provide additional services for the area, such as public safety, cleaning, and transit. Similarly, a TIF has a designated district but instead of charging an extra tax, it captures projected increased tax revenues to use for district projects. According to the "Guide to Business Improvement Districts in North Carolina," which discusses BIDs and TIFs, North Carolina law allows local governments to define special tax areas (districts) in order to assess additional property taxes on properties located within the district to fund projects and services in the districts.<sup>161</sup> The third type of partner entity, TMA, is a non-profit member organization that provides and/or coordinates transportation services for a particular area and that usually consists of a public-private partnership. Transportation services can include transit but often include other services, such as vanpool/carpool matching, Guaranteed Ride Home services, and marketing and promotion, among others.

#### *Vehicle selection and acquisition*

All NPS vehicles (leased or purchased) must comply with Section 504 of the Rehabilitation Act of 1973, the Federal Energy Policy Act (EPACT) of 1992, Federal "Buy America" requirements, Federal Environmental Protection Agency (EPA) regulations (as well as state environmental requirements), and the Federal Motor Vehicle Safety Standards (FMVSS).

<sup>159</sup> Operating assistance is limited to 50 percent of net operating costs (operating costs with operating revenues – fare revenue and other – subtracted). The other 50 percent is required to be a local match but can be funded by other federal agencies, including funding from the FLHP.

<sup>160</sup> Dare County Community Transportation Service Plan (2010). <http://www.ncdot.org/nctransit/download/CTSP/Dare.pdf>

<sup>161</sup> Guide to Business Improvement Districts in North Carolina." <http://sogweb.sog.unc.edu/blogs/localgovt/?p=2146>. See also <http://www.ncga.state.nc.us/Legislation/constitution/article5.html>

In a concessionaire model, the independent operator and its vehicles will be required to meet any relevant regulations. In a partnership model, leasing is recommended for the initial pilot (one to two years) of any service while purchasing is only recommended once a service has been determined to be successful and additional assessment of capacity and other vehicle needs has been completed during the pilot. For leasing, the General Service Administration (GSA) offers a fleet of lease vehicles that include over 80,000 AFVs but it is not a required source and Cape Hatteras NS can instead work with commercial entities, although the policies above still apply.<sup>162</sup> For purchasing, the default procurement process for federal agencies is to purchase vehicles through AutoChoice, a program of GSA. AutoChoice has vehicles that meet federal standards and assures a government discount. If Cape Hatteras NS ultimately chooses to procure a vehicle that GSA does not offer, such as alternative fuel vehicles, there are a number of options:

- If the vehicle is non-standard and does not require any customization, then NPS should request the vehicle through a waiver. If the waiver is approved, no fee would be administered by GSA for the purchase as it would be made directly from the manufacturer. However, waivers do not assure approval and are determined on a case-by-case basis.<sup>163</sup> GSA waivers are *not* required for parks to purchase certain exempt vehicles such as tactical vehicles, experimental vehicles, prototype vehicles, used vehicles, or vehicles equipped with after-market converted engines for use with alternative fuels.
- If the vehicle is non-standard but will require customization, a GSA surcharge of 10% will be applied for the first vehicle (e.g. an example of customization could be a retrofit of the engine to allow a gasoline or diesel-fueled vehicle to run on an alternative fuel/energy source).
- If a vehicle is non-standard and commercially available and NPS prefers to go through GSA, then the GSA surcharge typically ranges from 1-3% for the first vehicle.

The GSA schedule, or list of eligible vehicles, is announced on the FEDBIZOPPS website (<https://www.fbo.gov/>) by the end of each fiscal year, typically at the end of the summer (July/August).

#### *Vehicle types*

This section provides a high-level description of various vehicle types, including alternative fuel vehicles, and a preliminary evaluation of their appropriateness for use at Cape Hatteras NS. This evaluation considers a range of buses, cutaway vehicles, trams, vans, and low-speed vehicles, all of which are compliant with the Americans for Disabilities Act (ADA). It is recommended that any vehicle used at Cape Hatteras NS should be able to accommodate bicycles through bicycle racks or brackets, which have been developed to fit most types of transit vehicles, and have speaker capabilities for interpretive opportunities. School buses, vans, and coach buses are not considered in this review.

Each vehicle style has a number of advantages and disadvantages. The final vehicle choice is highly dependent on the service variables set forth by the recommended concepts. Route frequency, ridership projections, route alignment, and service type are criteria that will influence the final vehicle choice. Cape Hatteras NS staff, its partners, and the transit operator will also need to determine particular vehicle designs and features as well as management/purchasing arrangements in order to meet anticipated service needs. Cost and availability are also important factors. Table 2 shows cost ranges for the vehicle types highlighted below.

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<sup>162</sup> GSA: Vehicle leasing. <http://www.gsa.gov/portal/category/21211>

<sup>163</sup> See Federal Property Management Regulation FPMR 101-26.501(b)(c). [http://www.access.gpo.gov/nara/cfr/waisidx\\_99/41cfr101-26\\_99.html](http://www.access.gpo.gov/nara/cfr/waisidx_99/41cfr101-26_99.html)

**Table 33**  
**Vehicle type cost ranges**

Sources: TRIP Technical Assistance Center "Cost Estimating and Financial Sustainability Analysis" training module and Volpe Center research

Vehicle Type	Capacity	Cost Range
Bus		
<i>Small</i>	30	\$150,000-250,000
<i>Medium</i>	35	\$250,000-350,000
<i>Full-Size</i>	45	\$300,000-450,000
Cutaway Vehicle	10-15	\$60,000-190,000
Tram		
Power car	10-20	\$100,000-200,000
Trailer	25-30	\$50,000-100,000
Low-speed vehicle		\$10,000-20,000

#### Buses

Low-floor transit buses are well suited for circulator service because of seat and door configurations. Transit style buses allow for higher passenger capacities and longer lifespan due to heavy-duty engines and suspension systems. However, transit style buses are not cost effective for low-ridership systems or well suited for high-speed/long-distance travel because of a number of variables, including seat configuration, passenger comfort, vehicle suspension systems, and other general performance concerns.

An example of a low-floor transit bus, the ElDorado EZ Rider II (see Figure 1), a smaller and less expensive medium-duty transit bus, is available in 30, 32, and 35-foot lengths. This vehicle is powered by a Cummins Diesel engine and, depending on the length and options selected, is priced between \$250,000 and \$360,000.

#### Cutaway Vehicles

Cutaway models are buses built on a modified truck chassis and are ideally suited for shuttle and point-to-point passenger service for systems with lower ridership. Unlike traditional transit buses, the drivers of cutaway buses usually sit ahead of the entryway in the cab of the vehicle, allowing for forward control and higher driver visibility. A disadvantage of the cutaway bus is the single entrance point, which is viewed as a hindrance to rapid egress.

Standard Item 341 (Figure 1) is an example of cutaway model available through the GSA. This shuttle is built on a modified Ford E450 truck chassis. The capacity of this vehicle is 12 adults. Standard Item 341 is powered by a six cylinder diesel engine. A parallel hybrid electric variant power train system is available and included in the \$116,271 quoted price.



Figure 21

Transit Bus Example, EZ Rider II (left) and Cutaway Vehicle Example, Standard Item 341 (right)

Sources: ElDorado National website <http://www.enconline.com/CAProducts.cfm> and GSA AutoChoice



### Trams

Trams include any motor vehicle consisting of a tractor unit (with or without passenger accommodations) and one or more passenger trailer units. Rubber-tire trams are typically lighter and shorter than conventional buses and are used to ferry passengers short distances.<sup>164</sup> Trams often have open-air configurations that accommodate gear and create a different experience for the visitor. However, trams often meet the definition of low speed vehicles (see below) and therefore can be limited in the roads on which they can operate and the distances and speeds which they can achieve.

### Low Speed Vehicles

Low speed vehicle (LSV) Federal standards were first established in 1998.<sup>165</sup> These standards defined LSVs as small 4-wheel vehicles with maximum speeds of 20-25mph and established mandatory equipment requirements but also allowed states to set their own regulations. The state of North Carolina restricts LSVs to roads with a maximum speed limit of 35 mph though it permits low-speed motor vehicles to cross higher speed roadways at intersections.<sup>166</sup> Thus, such a vehicle would only be appropriate in Bodie Island District if it were to operate between Bodie Island Lighthouse and Coquina Beach; it would not be appropriate for operation on NC 12.

### Alternative fuel vehicles

The Energy Policy Act of 1992 requires the NPS to use alternative fuel vehicles (AFVs) whenever possible. In addition, NPS Management Policies 2006 states that “Alternative transportation programs and the use of bio-based fuels will be encouraged, where appropriate.”<sup>167</sup> The use of AFVs is often in the best interest of the parks as they reduce vehicle emissions and air pollution. However, the decision to select a particular fuel choice is dependent on several variables: local fuel availability and access, maintenance facilities and staff capabilities, vehicle performance under service conditions, and vehicle availability and cost. Table 3 on the next page provides a brief overview of the primary alternative fuel options that exist: biodiesel, methanol/ethanol, compressed natural gas (CNG), propane, and electric or hybrid electric. Biodiesel, methanol/ethanol or hybrid electric are the recommended fuel technologies for Cape Hatteras NS based on fuel and vehicle availability, cost, and maintenance requirements.

<sup>164</sup> Low-Environmental Impact Tram Vehicle Study, U.S. Department of Transportation Research and Innovative Technology Administration John A. Volpe National Transportation System Center, February 2010.

<sup>165</sup> Available online: <http://www.nhtsa.gov/cars/rules/rulings/lsv/lsv.html>

<sup>166</sup> North Carolina General Statutes 20-121.1. [http://www.ncleg.net/enactedlegislation/statutes/html/bysection/chapter\\_20/gs\\_20-121.1.html](http://www.ncleg.net/enactedlegislation/statutes/html/bysection/chapter_20/gs_20-121.1.html)

<sup>167</sup> National Park Service. Management Policies 2006. “9.1.7 Energy management.”

**Table 34**  
**Overview of alternative fuel types**

Fuel	Description	Vehicle Availability	Fuel Availability/other issues
Biodiesel	Biodiesel is a renewable alternative fuel produced from a wide range of vegetable oils and animal fats. The content of biodiesel can vary widely from a 100% biodiesel fuel containing no petroleum, to a 20% biodiesel and 80% petroleum blend known as B20, to B10, and B5. Operationally, biodiesel blends (B20, B10, and B5) perform similarly to low sulfur diesel in terms of power, torque, and fuel efficiency, without	Diesel engines can operate on a straight biodiesel fuel without significant problems in warm weather, although in colder temperatures a diesel blend may be necessary; an additive can be used to prevent fuel from coagulating.	According to the U.S. Department of Energy (DOE), the nearest accessible biodiesel (B20 and above) refueling station in North Carolina is located at the North Carolina Department of Transportation (NCDOT) Dare County Highway Department Maintenance office (306 Simon St Manteo, NC, 27954). Alternatively, NCDOT also operates a biodiesel refueling station in Currituck County (Lucinda Lane Harbinger NC 27941). In order to use either facility for vehicle refueling, the park would need to formalize
Methanol / Ethanol	Methanol and ethanol are both alcohol-based fuels best suited for light-duty spark-ignition engines. Because of technological advances, these fuels have shown the ability to provide equivalent range and power	Most gasoline engines can operate with an ethanol blend. Every engine can operate with at least an E-10 blend and some can accept up to E-90. E85 capable vehicles are growing in popularity among manufacturers but currently, no domestic bus manufacturer is producing commercial methanol or	A growing number of stations in the United States sell gasoline partially composed of ethanol such as E10 (10% ethanol, 90% gasoline) and E85 (85% ethanol, 15% gasoline). The nearest E85 refueling station is located at the Naval Air Station in Norfolk,
Compressed Natural Gas (CNG)	The interest in natural gas stems mainly from its clean-burning qualities, its domestic resource base, and its commercial availability. CNG can produce significantly fewer harmful emissions than gasoline or diesel when used in natural gas vehicles. A CNG-powered vehicle gets approximately the same fuel economy as a conventional gasoline	CNG bus fleets have become quite common for public transportation systems but there are not many off-the-shelf options for smaller vehicles using CNG, and the availability of fueling stations is limited aside from in California. Gasoline vehicles can be retrofitted to become bi-fuel (gasoline/CNG), although an EPA certificate is required.	The nearest CNG refueling station is 70 miles away from Cape Hatteras NS in Norfolk, VA. According to previous similar Volpe Center reports, building an on-site facility could range from \$4,000, to serve a single vehicle with a slow-fill technique, to \$300,000 to serve a fleet of fast-fill vehicles.
Propane / Liquefied petroleum gas (LPG)	Propane has a high energy density, giving propane vehicles good driving range, and propane fueling infrastructure is generally widespread.	As reported by the DOE, no light-duty propane vehicles are available for sale commercially and according to research done by the US DOT Volpe Center, Detroit Diesel, Caterpillar, and Cummins are all exiting the market for medium duty propane engines. This is an argument against going forward with propane vehicles at park units because of the lack of manufacturing support, advances in technology, or availability of replacement parts for	According to the DOE, the nearest publicly accessible propane refueling station is located in Norfolk, VA, approximately 70 miles from Cape Hatteras NS.
Hybrid-Electric / Electric	While the technology behind full plug-in hybrid electric vehicles has shown limited potential in transit applications, hybrid-electric vehicles have recently become popular alternatives because of their efficient use of fuel.	Several types of electric and hybrid-electric vehicles are available for commercial purchase, including through GSA.	While these vehicles are typically operated on standard gasoline or diesel fuels, they do have the ability to store otherwise lost energy in batteries that power electric motors. Another advantage of is the ability to provide greater fuel economy with standard diesel and gasoline fuels, negating

### *Parking and other characteristics*

For any transit system, parking is an important characteristic. In some places, transit service can be routed through high-density areas where riders can walk to the bus stop from places of accommodation. However, many places, including the Outer Banks, do not have this type of density and therefore would require central parking areas where transit riders could park. Strategy 22 (Designate seasonal satellite shared parking for transit service), in Section 2.4 (Parking) discusses this issue in more detail, including the importance of bus stops, which at a minimum should have good signage, with a route map and schedule. Seating and shelter are also highly recommended to provide a good waiting experience.

### *Fuel, storage, and maintenance*

To minimize the impact of the operating environment on the vehicle life, the operators of the transit service would need to have in place a maintenance plan and vehicle storage facility. The corrosive nature of seaside environments can quickly degrade the useful life of vehicles and cause added maintenance and other associated expenses. An enclosed storage facility would be required to house the vehicle(s) when not in use. As discussed above, some alternative fuel vehicles can require specific maintenance facilities and/or staff expertise.

The federal bus replacement schedules recommend replacing heavy-duty vehicles every 12 years or 500,000 miles and medium duty vehicles every 5 years or 150,000 miles. Buses can also be refurbished as necessary in a heavy use transit environment and then are put back in service for at least another five years.

### *Marketing*

In introducing a transit service, marketing is essential for the success and use of the service. Recommended marketing strategies include making the routes and schedules available online, in hard copy at key tourism destinations (e.g., hotels, restaurants, attractions), and at bus stops. It is also important to clearly mark the vehicles to indicate the name of the service and route. If a specific vehicle (or vehicles) is designated for the route, there may be an opportunity to brand it with a wrap-around (see Figure 2). However, even a vehicle that is used for multiple purposes may still be able to be marked with something more generic, such as “the Outer Banks,” or at the least have a professionally printed sign in the front or side window of the bus. Graphic wraps range in cost from \$500 to \$5,000 per vehicle depending on the extent of the wrap and size of the vehicle while a printed, laminated sign could cost under \$100. These marketing strategies could be required of a concessionaire or shared among partners involved in a transit system.

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**Figure 22**  
**Revolutionary Shuttle at Valley Forge National Historical Park**

Source: Villwock, Natalie, Understanding User Preference for a Shuttle System within Valley Forge National Park, July 2009



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As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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