National Park Service
US Department of the Interior

National
Long Range Transportation Plan

July 2017

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Back Cover Photo: Yellowstone National Park

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Prologue

In this, the 100th year of the National Park Service, we are pleased to present our first National Long Range Transportation Plan.

This plan charts a dynamic path leading us into our second century for one of America's most significant and diverse transportation portfolios. Our systems extend beyond the beauty and heritage of historic corridors like the Blue Ridge Parkway, Kings Canyon Scenic Byway, or Glacier's Going-to-the-Sun Road, to the opportunities found in multi-use trails, transit services, alternative fuel vehicles and mobile technologies. The plan helps us face some of our biggest challenges in climate change and fiscal constraint, and it covers the full breadth of National Park Service transportation issues. It marks the beginning of a new era of commitment and focus in sustaining the legacy of access to, and enjoyment of, our National Parks.

The National Long Range Transportation Plan sets forth a performance-based 20-year vision for providing access to our nation's most special and treasured places. It establishes goals, objectives, and performance measures for how we will move toward that vision. It provides a strategy for using our existing transportation funding to ensure the most important transportation assets remain in good condition to support our highest priority mission objectives in resource stewardship, visitor enjoyment, and safety.

The National Park Service recognizes that transportation systems are the backbone on which all visitor experiences rely. Roads, bridges, trails, transit systems, watercraft, and the variety of other transportation modes and services the National Park Service provides are a crucial part of visitor enjoyment. Without them, few could ever hope to find themselves at the roaring lower falls of Yellowstone, at the precipice of the Grand Canyon, or anywhere within the millions of acres of natural and cultural landscapes that we preserve and protect. While the majority of visitors reach national park units by private automobile, alternative transportation options are increasingly important to addressing contemporary challenges such as changing demographics, traffic congestion, and air pollution, and enhancing resource protection. The multimodal experience of visiting a national park unit is an important dimension of this plan, and of our future.

The plan recognizes a key challenge: that transportation investment needs significantly outpace current and forecasted funding levels; this is a challenge that all land management agencies, states, and metropolitan areas face. As a result, the plan includes a prioritized investment strategy that calls upon the many National Park Service programs that support our multimodal transportation system to coordinate investments even more effectively. In addition, to meet the needs of the future, the plan acknowledges the importance of continuing to seek additional resources through a combination of appropriated funds, fees, partnerships, and other sources.

We are proud to say that the National Park Service welcomed over 325 million visitors in 2016, the highest total ever, demonstrating that the experiences available in National Parks remain a sought after and relevant part of American culture. We look to the future secure in the knowledge that the National Park Service will continue to be a leader in connecting people to the great outdoors and to our national heritage.

Thank you for your interest in our National Long Range Transportation Plan. We look forward to working together with you, our visitors, and our partners in advancing the goals and objectives of this plan to secure a better, brighter future for transportation in our National Parks!

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Grand Teton National Park

Summary of Goals, Objectives and Performance Measures

See Glossary for definitions of acronyms

ASSET MANAGEMENT

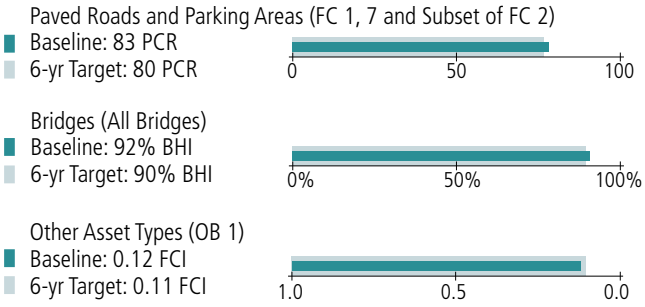
Goal – Sustainably manage NPS transportation assets and services

Objectives

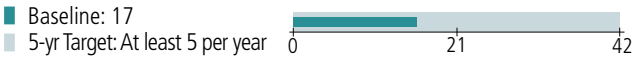
- Maintain critical assets and services in good operating condition through targeted investment
- Adapt transportation systems to climate change impacts

Performance Measures*

Condition of Highest Priority Transportation Assets



Number of Park Units That Have Completed a Transportation Infrastructure Vulnerability Assessment



* Arlington Memorial Bridge and other large-scale projects which cannot be addressed with annual transportation funding are not included in the asset management performance measures.

TRANSPORTATION FINANCE

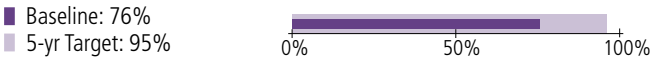
Goal – Allocate available transportation funding wisely

Objectives

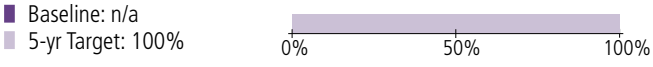
- Identify and prioritize investments based on the NPS mission, anticipated life-cycle costs and consideration of likely available future funding
- Maintain flexible use of transportation funding sources while improving identification of investments and needs

Performance Measures

Percentage of Transportation Funds Invested in Highest Priority Transportation Assets



Percentage of Park Units that Meet Preventive Maintenance Targets for Highest Priority Transportation Assets



RESOURCE PROTECTION

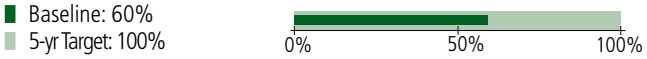
Goal – Protect and preserve natural and cultural resources

Objectives

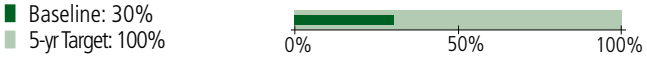
- Incorporate natural and cultural resource considerations into all aspects of transportation decision making and operations to avoid, minimize or mitigate negative impacts on these resources
- Minimize and mitigate the greenhouse gas emissions of the NPS transportation system

Performance Measures

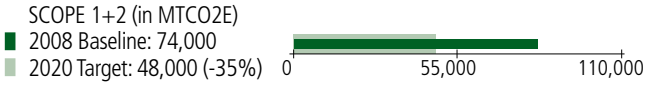
Completion of the INSTEP Tool

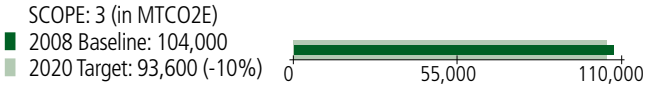


Develop a System for Tracking and Forecasting the Condition of Culturally Significant Transportation Assets



Percentage Decrease in NPS Transportation System Emissions





VISITOR EXPERIENCE

Goal – Maintain and enhance the quality of visitor experiences

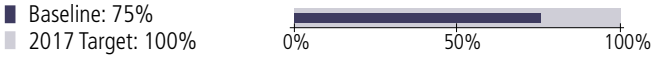
Objectives

- Improve ease of access to and within national park units for all people
- Create a range of appropriate transportation options that support a network of seamless connections within each park unit and to surrounding communities
- Provide state-of-the-art traveler information and wayfinding and, where appropriate, interpretation and education opportunities that complement transportation options

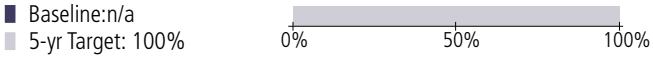
Performance Measures

Percentage of Park Unit Websites that Provide Nine Elements of Essential Traveler Information

Completion of Phase II of the NPS Congestion Management Program



Percentage of Transportation Contracts and Projects that Include Accessibility Language and Are Compliant with Accessibility-Related Laws, Regulations and Policies



SAFETY

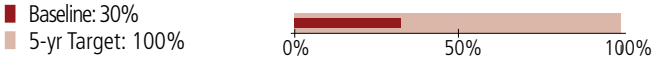
Goal – Provide a safe transportation system for all users

Objectives

- Institute a comprehensive, performance-based transportation safety program that addresses engineering, education and enforcement
- Reduce serious and fatal transportation-related injuries
- Maximize safety without impairing park resources and values
- Enable effective emergency response

Performance Measure

Completion of the NPS Transportation Safety Management System



Denali National Park & Preserve

Introduction

National Long Range Transportation Plan

The Role of Transportation in the National Park Service

Transportation systems play a critical role in fulfilling the National Park Service (NPS) mission by providing people access to America's national treasures. Transportation planning in the National Park Service is fundamentally about providing sustainable, appropriate, enjoyable visitor access while also protecting resources and visitor safety. These goals are ingrained in the NPS mission, and they are part of what makes the National Park Service a unique agency.

The NPS transportation landscape is diverse and includes an extensive inventory of transportation assets:

- Roadway systems, including approximately 5,500 miles of paved roads, 7,000 miles of unpaved roads, 1,460 bridges and tunnels and 6,100 parking areas
- Nonmotorized systems, including approximately 4,600 miles of bicycle and pedestrian multiuse trails and 950 trail bridges
- Approximately 130 transit systems, including buses, trolleys, trains, streetcars, snowcoaches and maintenance facilities
- Marine systems, including ferries, boats, docks, marinas and waterfronts, representing more than 1,000 individual assets
- Intelligent transportation systems (ITS), such as variable message signs and traveler information systems
- Transportation management systems, including systems for managing congestion, safety, roadway and bridge condition and facilities.

The NPS Mission

The National Park Service preserves unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

Rocky Mountain National Park

What Is the National Long Range Transportation Plan?

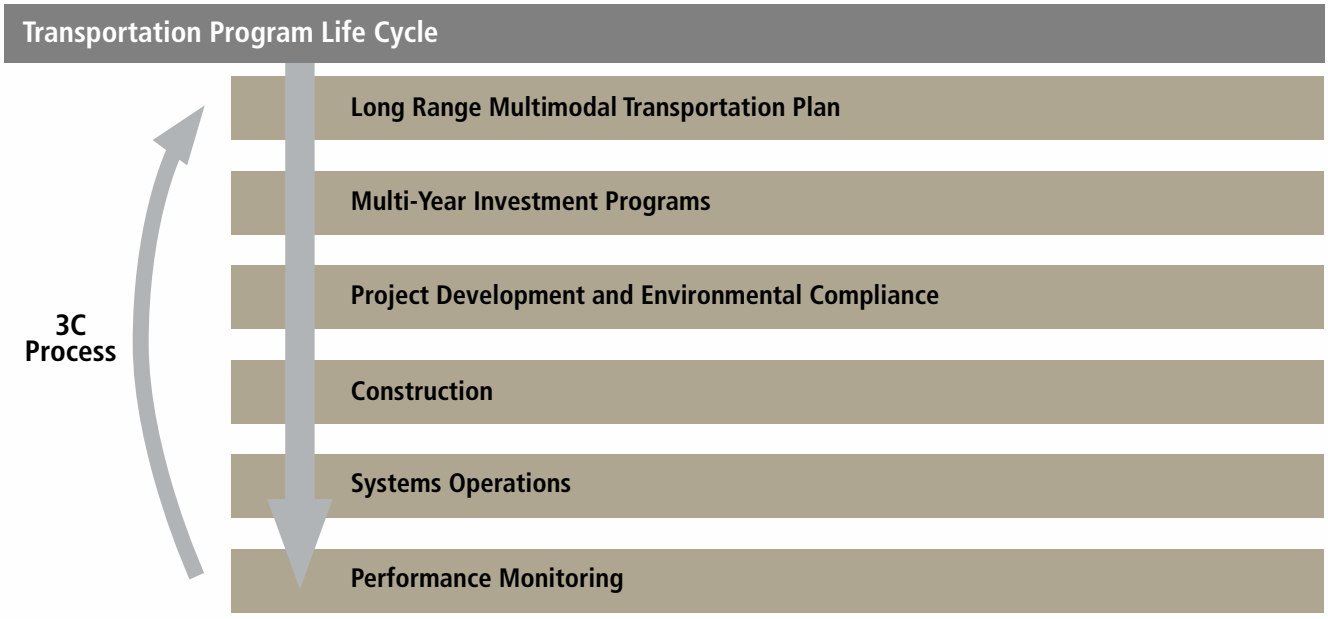
The NPS National Long Range Transportation Plan (LRTP) establishes a strategic framework for transportation investment servicewide over the next 20 years. It provides guidance to regional and park unit staff who make transportation investment and maintenance decisions every day. Because transportation touches all directorates and program areas, the National LRTP reflects the input of subject matter experts from across the agency, our partners and the public. It defines common goals that transcend traditional NPS administrative program boundaries. These goals are reflected in the overall vision for NPS transportation.

The National LRTP Vision

The National Park Service provides a mission-focused transportation system that is safe and seamless, enabling high-quality access to essential park unit experiences. The agency responsibly plans and effectively manages the transportation system to accommodate changing environmental, social and financial conditions.

The National LRTP is consistent with statewide and metropolitan transportation planning practices as part of a continuing, comprehensive and cooperative (3C) transportation planning process. The LRTP is the first step in the transportation life cycle as shown in Figure 1-1, guiding the investment decisions program managers make and document in multiyear investment programs. Funded projects are developed and engineered according to best management practices, and environmental reviews are performed when needed, followed by construction and systems operations. The National LRTP also establishes a framework for performance monitoring, which as part of the 3C process, feeds into future LRTP updates, informing future planning priorities.

Figure 1-1. The Life Cycle of a Transportation Program



National LRTP Development Process

This National LRTP was developed through a servicewide, multidisciplinary effort. A wide variety of NPS staff, including more than 80 subject matter experts at the directorate, region, park unit and program levels, as well as external stakeholders and the general public, provided critical input to the development of this plan. The National LRTP was developed in six phases (Figure 1-2).

Figure 1-2. The National LRTP Development Process

PHASE 1: ESTABLISH VISION, GOALS AND OBJECTIVES

The planning team, with input from NPS staff, established a 20-year vision for the NPS transportation system and developed associated goals and objectives (page iv–v). The vision, goals and objectives serve as the organizational framework for the National LRTP planning process; each future phase is aligned to these elements to ensure that this plan achieves the desired outcomes.

PHASE 2: IDENTIFY BASELINE CONDITIONS AND MACRO TRENDS

The current performance level and condition of the NPS transportation system, in terms of transportation asset management, financial condition, resource protection, visitor experience and safety, was established. The planning team also considered macro-level trends that affect the management and delivery of the transportation system, such as demographics, climate change and technology. The baseline and macro trends assessment highlighted the critical areas of focus and provided a foundation for the subsequent phases.

PHASE 3: IDENTIFY TRANSPORTATION NEEDS

The findings from the baseline conditions and macro trends stage were used to identify the most crucial needs in meeting the transportation vision, goals and objectives.

PHASE 4: DEVELOP STRATEGIES

Short- and long-term actions and strategies were identified to address the transportation needs and meet the stated goals and objectives. As part of this step, the National Transportation Investment Strategy was also developed to articulate a framework for how limited transportation funding can be best aligned with the goals and objectives of the plan, based on rigorous modeling and analysis of potential options.

PHASE 5: ESTABLISH PERFORMANCE MEASURES

National-level performance measures and targets were developed to monitor the progress of the National LRTP over time. The performance measures were developed in coordination with the particular NPS directorates and program areas that will ultimately implement the strategies to achieve the plan's goals and objectives. The National LRTP does not include performance measures for each specific objective; rather, it includes a limited set of measures that the National Park Service will use to monitor progress and gauge whether the plan is on track to achieving established goals and objectives.

PHASE 6: CONDUCT OUTREACH AND FINALIZE PLAN

Drafts of the National LRTP were shared broadly with NPS staff and the public. As part of the outreach process, the team created a page on the Planning Environment and Public Comment website, which made general information and plan documents available for review. The team also conducted numerous presentations with NPS subject matter experts to collect feedback on the plan. The team made iterative revisions in response to subject matter expert feedback and public comments.

National LRTP Goals

The goals of the National LRTP are rooted in the NPS mission. The National LRTP sets goals that address both traditional transportation topics, such as asset management, transportation finance and safety, and broader mission-focused topics, such as visitor experience and natural and cultural resource protection.

Goal Areas and Goal Statements of the National LRTP

ASSET MANAGEMENT
Sustainably manage NPS transportation assets and services

TRANSPORTATION FINANCE
Allocate available transportation funding wisely

RESOURCE PROTECTION
Protect and preserve natural and cultural resources

VISITOR EXPERIENCE
Maintain and enhance the quality of visitor experiences

SAFETY
Provide a safe transportation system for all users

Alignment with Planning Requirements and Existing Plans

Consistency with State and Metropolitan Plans

Federal surface transportation legislation, as reauthorized in the FAST Act, requires federal land management agencies such as the National Park Service to develop LRTPs that are consistent with the 3C planning processes required of state departments of transportation (DOTs) and metropolitan planning organizations (23 United States Code [USC] §201; 23 USC §134 and §135). This plan is consistent with those processes and legal requirements. Table 1-1 demonstrates how the National LRTP aligns with US Department of Transportation (USDOT) planning factors.

Table 1-1. Comparison of NPS and USDOT Planning Factors

	National LRTP Goal Areas				
USDOT Planning Factors[1]	**Asset Management**	**Transportation Finance**	**Resource Protection**	**Visitor Experience**	**Safety**
Economic Vitality	●	●	●	●	
Safety				●	●
Security					●
Accessibility & Mobility	●			●	●
Environment	●		●		
Connectivity	●	●		●	
Efficiency	●	●		●	
System Preservation	●	●			
Resiliency & Reliability	●		●		●
Travel & Tourism				●	

[1] 23 USC §134(h) and §135(d).

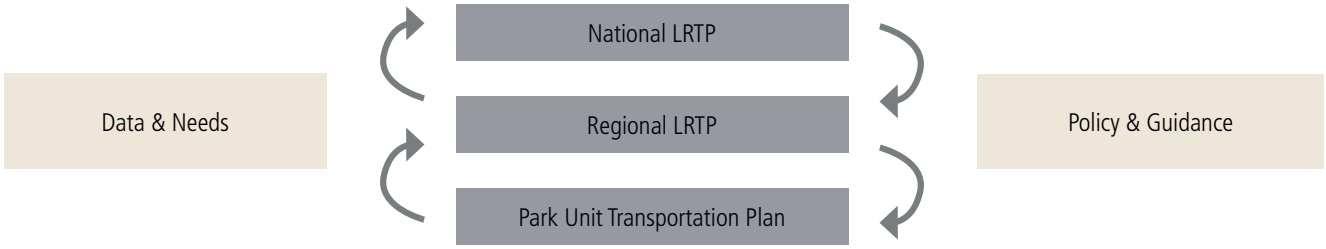
Alignment with Other Plans

The National LRTP is also aligned with other NPS and Department of the Interior (DOI) plans, policies and management tools, such as the *NPS Management Policies 2006* (NPS 2006) and others including the following:

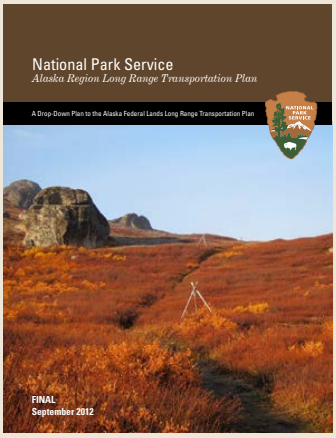
- *A Call to Action* (NPS 2015)
- *NPS Capital Investment Strategy* (NPS 2012a)
- *Healthy Parks Healthy People Strategic Action Plan* (NPS 2011a)
- *Green Parks Plan* (NPS 2012b)
- *America's Great Outdoors* (CEQ et al. 2011).

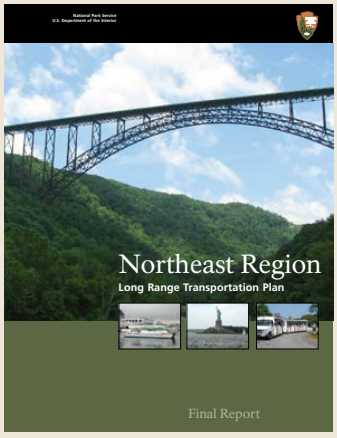
The National LRTP also serves as a strategic guide to inform long range transportation planning at the regional and park unit levels. Future regional and unit LRTPs will be consistent with the goals and objectives established in the National LRTP but customized to evaluate and respond to regionally unique needs and challenges and to identify more detailed strategies to support NPS shared goals, objectives, strategies and performance measures. Iterative feedback among the national, regional and park unit levels will inform and strengthen future updates to each plan (Figure 1-3).

Figure 1-3. The Iterative Feedback Loop of NPS LRTPs



The National LRTP aligns with existing NPS regional LRTPs, such as the Alaska, Northeast and Intermountain Region LRTPs. Other regional LRTPs already developed or under development will similarly be aligned with the National LRTP.





A Comprehensive, Fiscally Constrained Plan

The National LRTP includes the most comprehensive analysis of NPS transportation finance ever completed (Figure 1-4). The plan cuts across NPS programs, offices and disciplines to look at all assets, fund sources and stages in the transportation life cycle. It is a fiscally constrained plan, meaning that only funds reasonably expected to be available for transportation are included[2] (Figure 1-5). The plan looks at all stages in the life cycle of investment needs for transportation assets and all programs that have historically contributed to planning, building, operating and maintaining the transportation system. It is multimodal, including every mode of transportation in the financial analysis. The result of this in-depth, comprehensive examination of NPS transportation finance is the National Transportation Investment Strategy. This framework articulates how the National Park Service can make the best use of limited funding, focusing on the most important parts of the system and making smart, long-term investments in operations and maintenance activities to extend the life of transportation investments.

Figure 1-5. Illustration of NPS Estimated Annual Transportation Funding Gap

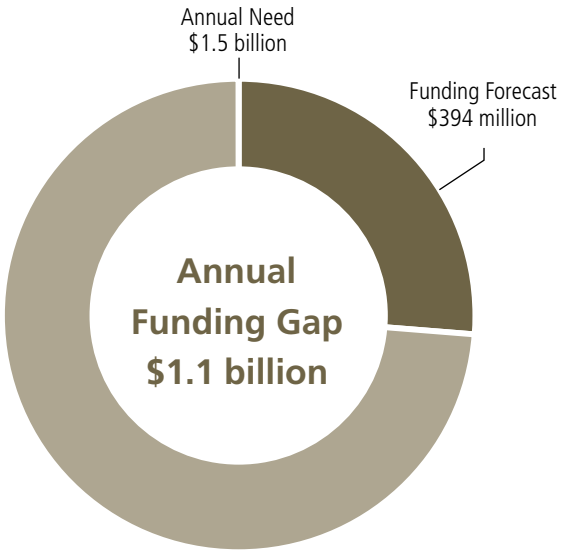


Figure 1-4. Illustration of Comprehensive National Park Service Long Range Transportation Planning Approach

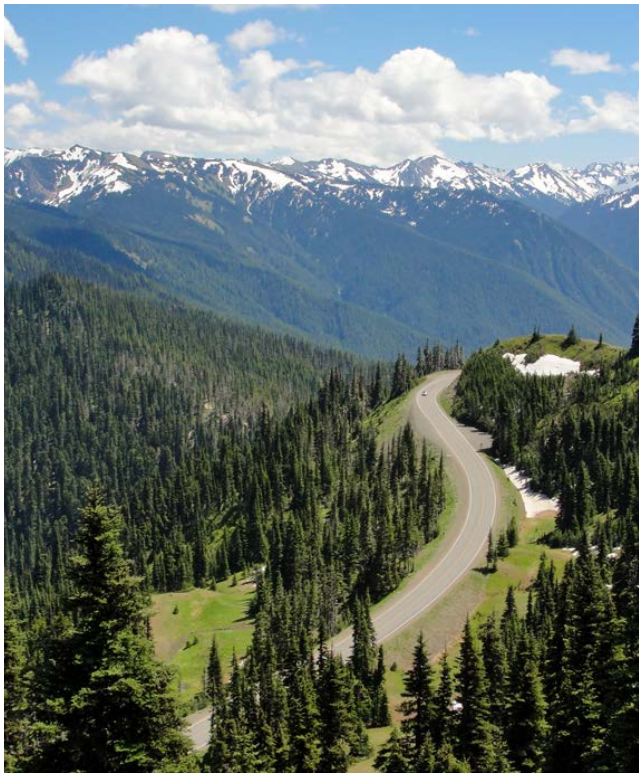
*Historical focus of many transportation plans

[2] The financial analysis for the National LRTP was completed before the passage of the Fixing America's Surface Transportation (FAST Act) and the fiscal year (FY) 2016 Consolidated Appropriations Act, both of which increased future available funding for NPS transportation assets. Although these increases will help the National Park Service care for its transportation system, they are not large enough to cover even the highest priority investment needs identified in this plan.

Putting the Plan into Action

The National LRTP is a strategic, long-range plan that provides guidance to programs and managers throughout the National Park Service. It does not replace decisions made at the directorate, regional, park unit or program levels. The National LRTP will be implemented through the actions of existing programs and managers in alignment with their priorities and procedures.

Following the plan's release, the National Park Service will organize action planning and reporting teams and establish performance monitoring protocols. A performance report will be published approximately two years after the plan is released, with a second performance report after four years. These reports will inform the first National LRTP update, which will be an opportunity for the National Park Service to re-examine and re-evaluate transportation priorities servicewide. The first National LRTP update is targeted for release five years after this plan is published.



Olympic National Park

How to Read the Plan

The National LRTP begins by presenting the National Transportation Investment Strategy. This chapter articulates how limited transportation funding can be best applied to meet the goals of the National LRTP and describes the anticipated outcomes of following the investment strategy.

The following five chapters are organized around the five strategic goal areas:

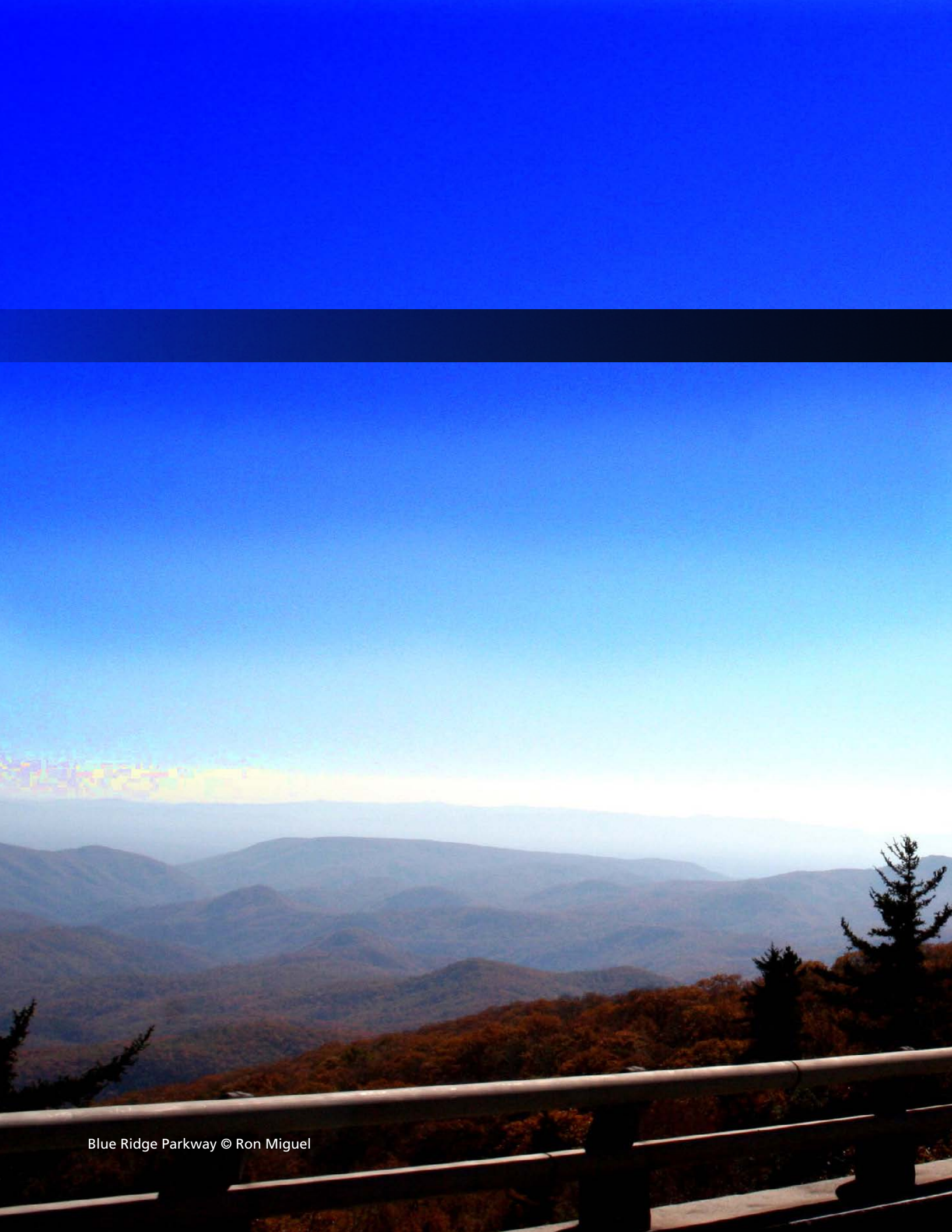
- **Asset Management**
- **Transportation Finance**
- **Resource Protection**
- **Visitor Experience**
- **Safety**

Each goal area chapter follows the same format:

- Goal area chapters begin with a brief overview and **introduction** to the chapter.
- Next, the chapters present the **baseline conditions and macro trends**, providing context and introducing key concepts in transportation related to the goal.
- The chapters discuss the **objectives** of the goal area and lay out **recommended strategies** for achieving them.
- The chapters conclude by listing the **performance measures** and targets that the National Park Service will use to gauge progress in the goal area.

The Conclusion closes the National LRTP, discussing next steps for putting the plan into action, monitoring and reporting progress and releasing future plan updates.

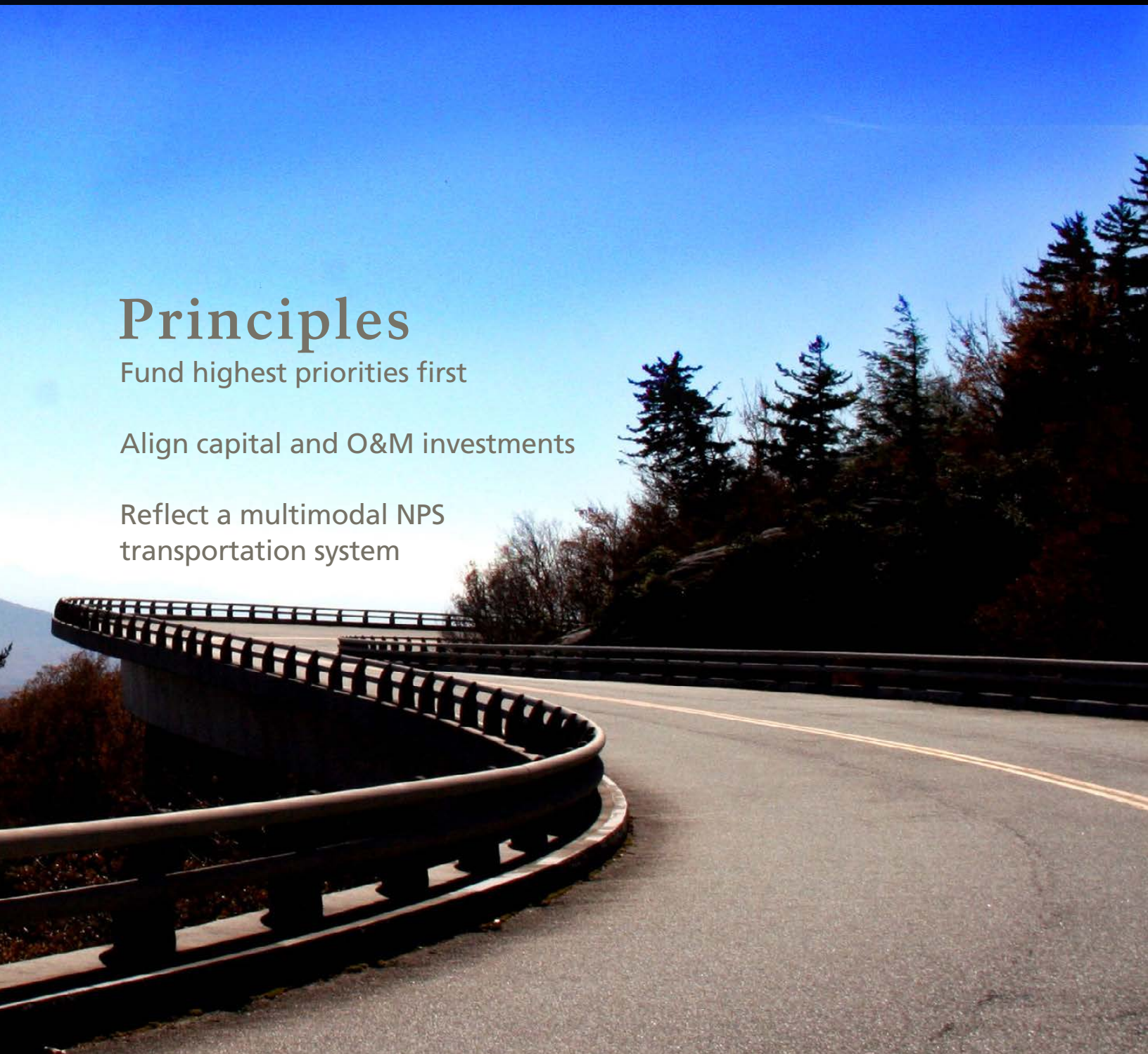
Technical reports and methodology are available on request. For more information, please visit the National Park Service LRTP website.



Blue Ridge Parkway © Ron Miguel

National Transportation Investment Strategy

National Long Range Transportation Plan



Principles

Fund highest priorities first

Align capital and O&M investments

Reflect a multimodal NPS transportation system

Investment Strategy Principles

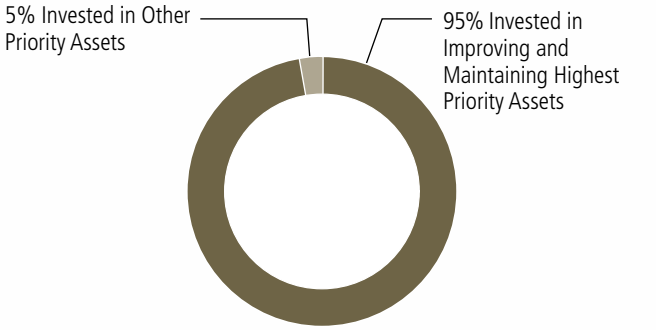
The NPS Transportation Investment Strategy is the first of its kind for the service. It addresses the goals and diverse transportation needs identified in this plan. It encourages the service to expand internal coordination across all transportation funding programs and organizational units, align management objectives and continue responsible financial investment in a fiscally constrained environment. This investment strategy, which is driven by the NPS Capital Investment Strategy (CIS), consists of three principles as shown in Figure 2-1. These principals describe how transportation funding can be aligned with the CIS in terms of 1) asset priority, 2) activities in the asset management life cycle, and 3) investments in roads and bridges versus multimodal systems.

Figure 2-1. Principles of the NPS National Transportation Investment Strategy

1) ASSET PRIORITY

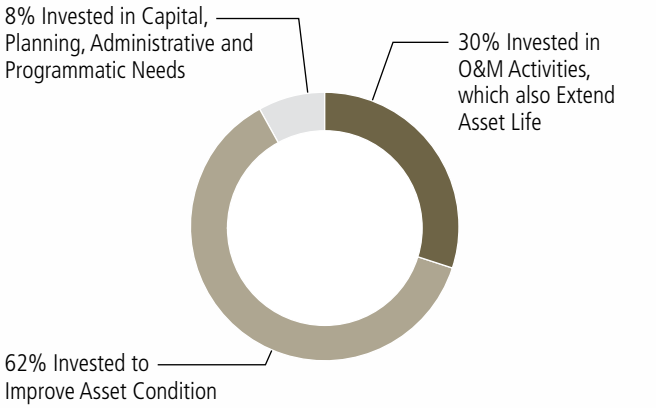
The strategy focuses funding on highest priority transportation needs. It addresses the deferred maintenance (DM) on highest priority assets, which are typically most crucial to meeting the agency mission. Highest priority assets include the following:

- All functional classification (FC) 1 and 7 and selected FC 2 paved roads and parking
- All bridges
- All transit
- Other assets in optimizer band (OB) 1.



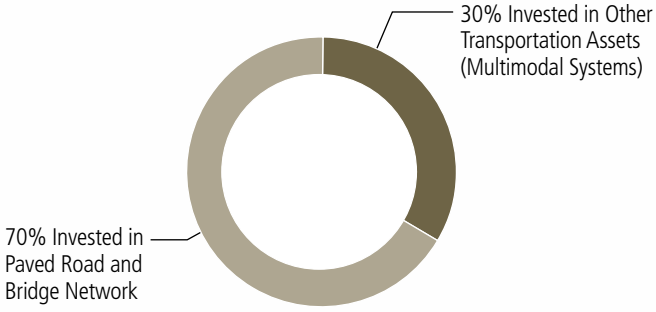
2) ACTIVITIES IN THE ASSET MANAGEMENT LIFE CYCLE

The strategy emphasizes operations and maintenance (O&M) activities that keep assets in good condition longer, focusing on the highest priority assets. It stresses that capital and O&M investments align to the same portfolio of highest priority transportation assets.



3) INVESTMENTS IN ROADS AND BRIDGES VS. MULTIMODAL SYSTEMS

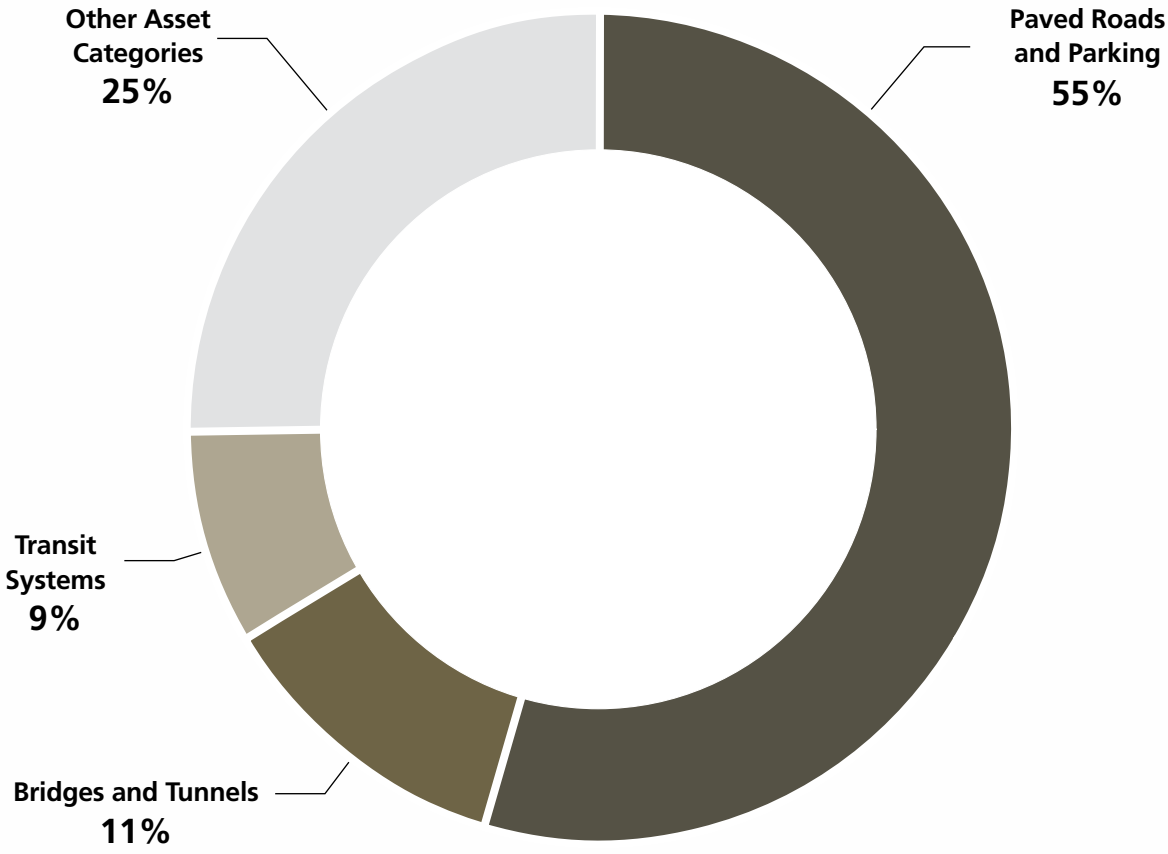
The strategy focuses a modest amount of funding that might have been spent on low-priority roads to highest priority Other Transportation Assets, including transit, trails and other multimodal assets.



National Transportation Investment Strategy

The National Transportation Investment Strategy provides funding for all categories of transportation assets. Paved roads and parking areas receive the highest share—55 percent—because they comprise the largest portion of the NPS transportation portfolio, are used by the greatest number of visitors and have accumulated the greatest amount of deferred maintenance. Bridges and transit systems receive 11 and 9 percent respectively. The remaining 25 percent is reserved for other asset types (e.g., unpaved roads, multi-use trails, waterways) which comprise a significant portion of the diverse NPS transportation asset portfolio. Figure 2-2 illustrates this distribution.

Figure 2-2. Annual Average Distribution of Investments by Asset Category in the National Transportation Investment Strategy



Six-Year Expected Outcomes

The National Transportation Investment Strategy is fiscally constrained. Because financial needs exceed available resources, the strategy balances competing NPS investment priorities to meet the performance goals of this plan. It not only achieves asset condition goals by devoting 92% of forecasted funding to improving and maintaining transportation assets, but also makes funds available for planning, administrative and programmatic needs. Those funds will make it possible for the National Park Service to address Resource Protection, Visitor Experience, and Safety goals by continuing to develop systems and tools to improve the management of its diverse transportation system.

The vast majority of the annually forecasted funding ($394 million) over the next six years will be invested to maintain and improve the condition of the service's highest priority transportation assets.[3] Examples of activities include:

- Repaving of roads, parking areas and paved trails
- Repairing or replacement of bridges
- Preventive and routine maintenance to extend asset service life
- Operations such as plowing and salting
- Recapitalization of transit system rolling stock.

Golden Gate National Recreation Area

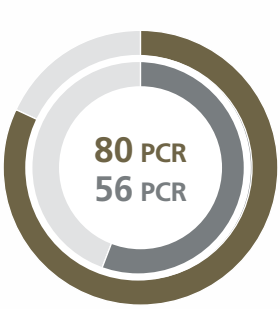
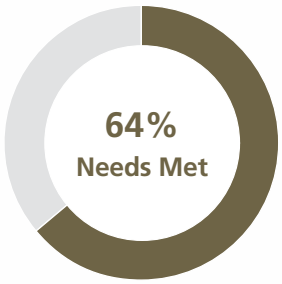
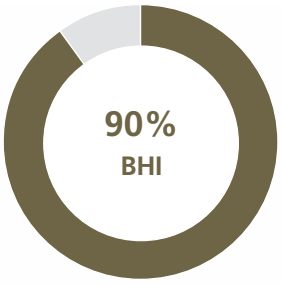
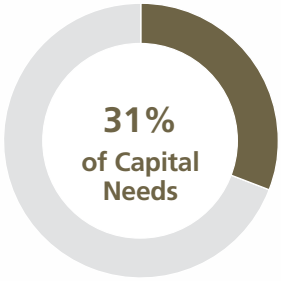
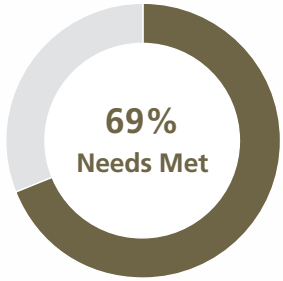
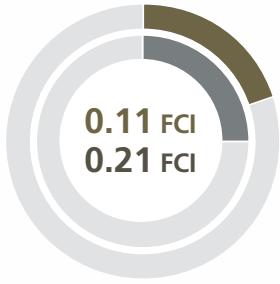
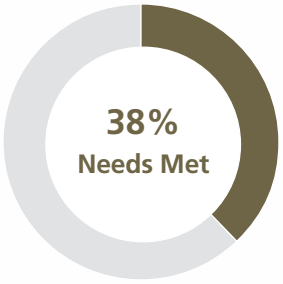
The remaining funding will be invested in long-range planning, plan implementation strategic improvements and management systems that support improved decision making. Completing and testing these management systems will allow the National Park Service to better understand and address Resource Protection, Safety, and Visitor Experience goals.

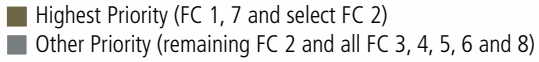
- Improving existing pavement and bridge management systems
- Completing the NPS Transportation Safety Management System
- Completing the second phase of the NPS Congestion Management Program
- Piloting the Innovative and Sustainable Transportation Evaluation Process and Guidance (INSTEP) tool.

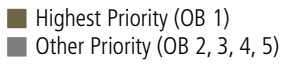
By implementing the National Transportation Investment Strategy, the National Park Service can best balance the condition and O&M needs of the multimodal transportation system across all regions and park units. Figure 2-3 shows modeled six-year condition outcomes based on the National Transportation Investment Strategy, using NPS pavement, bridge and asset management modeling systems.

[3] The National LRTP Investment Strategy was completed before recent funding increases were included in the FAST Act and the FY 2016 Consolidated Appropriations Act. The condition and O&M modeling results shown in this plan are likely conservative estimates in light of the FY 2016 funding.

Figure 2-3. National Transportation Investment Strategy Expected Six-Year Outcomes, by Asset Category

Asset Category	Condition Outcomes	O&M Outcomes
PAVED ROADS AND PARKING The National Transportation Investment Strategy results in an 80 Pavement Condition Rating (PCR) for the highest priority (all FC 1, 7 and select FC 2) paved roads and parking areas. By addressing the DM on these highest priority assets, they can be maintained in fair condition. However, because the strategy focuses almost all transportation resources on highest priority assets, other roads and parking areas (remaining FC 2 and all FC 3, 4, 5, 6 and 8) will decline to poor condition (56 PCR). Under the strategy, all paved roads and parking areas will receive 64 percent, nearly two-thirds, of the O&M funding needed to sustain these assets over their life cycles, a significant increase from past investment trends.		
BRIDGES All bridges under this plan have been classified as highest priority assets. Accordingly, NPS bridges will also receive 100 percent of expected needed O&M to ensure their long-term health and functionality. The National Transportation Investment Strategy results in a 90 percent Bridge Health Index (BHI) for the entire NPS bridge portfolio, which is fair/good condition.		
TRANSIT The National Transportation Investment Strategy provides for 31 percent of all capital needs for NPS transit systems over the next six years, an increase over past trends. In addition, targeted funding will cover 69 percent of ongoing O&M needs for all those systems. In part due to the discontinuation of major federal programs that funded NPS transit systems, the National Park Service will have difficulty replacing aging buses and other transit capital assets as they reach the end of their useful lives.		
OTHER ASSETS The National Transportation Investment Strategy will result a Facility Condition Index (FCI) of 0.11 (fair/good condition) for highest priority (OB 1) transportation assets in other categories. However, due to a significant gap between funding and investment needs, assets not classified as highest priority will decline to poor condition. O&M funding for these other facilities will achieve 38 percent of identified need, an increase over past trends.		

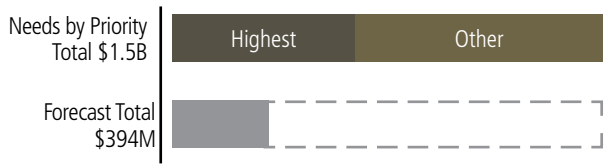




Strategy Development

The Park Facility Management Division leadership team, which represents a diverse group of program managers responsible for NPS facility management, critically examined six potential investment strategies. Each strategy invested forecasted funding in different ways according to the three strategic principles described on page 12. Through research, analysis and discourse, the leadership team evaluated the outcomes of each strategy according to four broad trends and related trade-offs.

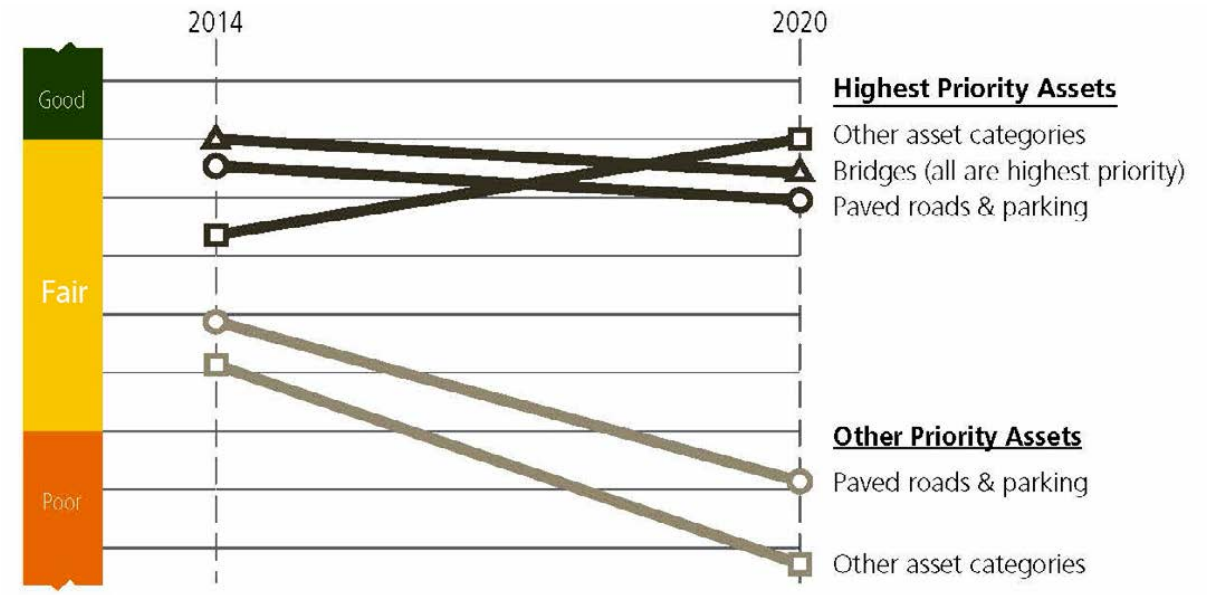
Figure 2-4. Comparison of Annual Needs to Forecasted Available Funding



FINANCIAL NEEDS FAR OUTWEIGH AVAILABLE FUNDING

The National Park Service is focusing on its highest priority assets at the expense of lower priority assets. FC 1, 7 and select FC 2 roads are arguably the service's most important roads, and they can be maintained near their current conditions with available funding. Other functional classifications cannot. Segmenting the asset portfolio into "Highest" and "Other" priority groupings will enable the National Park Service to demonstrate results for both the assets it can afford to maintain, as well as those it cannot, as illustrated by the shortfall in the funding forecast relative to total needs (Figure 2-4). Figure 2-5 shows that when 95 percent of all transportation funds are invested in the highest priority transportation assets, the condition of other priority assets are forecasted to quickly decline. The condition of highest priority assets are nevertheless forecast to experience a modest decline, remaining in fair/good condition.

Figure 2-5. Relative Forecasted Changes in Transportation Asset Condition under the National Transportation Investment Strategy

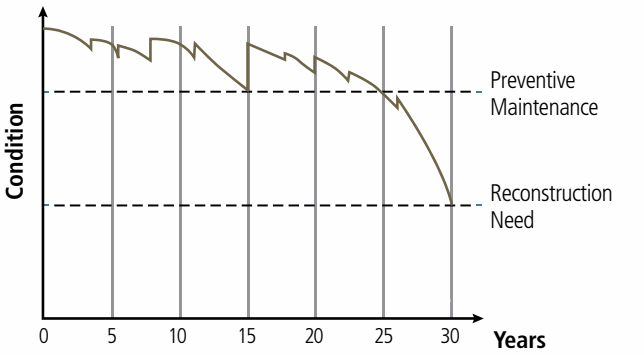


Note: Chart not to scale. Units adjusted to show relative good/fair/poor condition equivalents.

PARK UNITS DO NOT HAVE ENOUGH FUNDING TO MEET PREVENTIVE MAINTENANCE REQUIREMENTS

Shifting a modest amount of funding from activities that improve condition, such as recurring maintenance (RM) and component renewal (CR), to activities that maintain condition, such as preventive maintenance and facility operations (FO), enables park units to take better care of the assets they have. Asset management principles suggest proper preventive maintenance can keep assets in better condition longer and at lower cost, as shown in the illustration of the optimal asset management life cycle (Figure 2-6). Although DM may rise in the short term, investing in activities that maintain condition will yield longer useful service life and will reduce long-term RM and CR needs.

Figure 2-6. Illustration of an Optimally Managed Asset Life Cycle



VISITORS AND PARK MANAGERS VALUE TRANSPORTATION OPTIONS

Shifting funding from lower priority roads to other higher priority assets is consistent with CIS principles. This shift trades the lowered condition of lower priority roads with an improved condition for higher priority Other Transportation Assets, including transit systems. Park managers demonstrate the value of their transit systems by annually funding their operations; however, their transit fleets, purchased a decade ago and still in high demand (Figure 2-7), are nearing the end of their service lives. Recapitalization of these fleets typically costs more than a unit or even a region can support. Other Transportation Assets are also important, but they have historically received significantly fewer resources than roads.

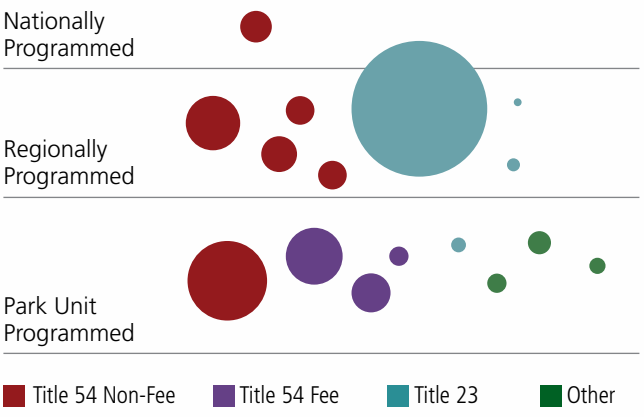
Figure 2-7. National Park Service Transit Supply and Demand

In 2013, 131 NPS transit systems carried a total of 26.9 million passenger boardings

COORDINATION IS NECESSARY

Despite the time and effort required, coordinating across funding programs and organizational levels will be the only way to implement the National Transportation Investment Strategy. Transportation decision makers accept that they will need to work together, in some cases painstakingly, to align financial needs with eligibility criteria. Park units, regions and national offices each have different missions, needs and daily challenges. As shown by the programming responsibilities of those offices across all the funding sources (Figure 2-8), they will need to seek others' perspectives as they attempt to align capital and O&M investments.

Figure 2-8. Illustration of NPS Fund Source Programming Responsibility Overlap



Implementation

The NPS National Transportation Investment Strategy reflects a major milestone in the service's transition to a performance-based 3C transportation planning process. With a strategy selected, the National Park Service must now put it into practice. Plan stakeholders acknowledge the challenging nature of implementing this strategy and ultimately how it will change the way transportation funding is spent.

The National Park Service has created a working group to implement the financial strategy. It will accomplish the following:

- Convene NPS transportation finance stakeholders
- Identify tactics to coordinate investments on highest priority assets
- Develop complementary, multiyear programs of projects
- Identify and address outstanding data collection and reporting needs
- Manage performance to ensure that the investment strategy results in intended outcomes
- Communicate financial needs and outcomes to inform the budgeting process.

The National Transportation Investment Strategy establishes a framework for comprehensively addressing NPS transportation needs. It sets a high bar, requiring enhanced coordination across multiple funding programs and between park unit, regional and national offices. Implementing the strategy will be hard work, but the National Park Service is committed to working through challenges and adopting new program management approaches. Doing so will result in a more sustainable, safe and effective transportation system that both meets the needs of a new generation of NPS visitors and continues the service's commitment to resource conservation.

Zion National Park

Yellowstone National Park

Asset Management

National Long Range Transportation Plan

Goal

Sustainably manage NPS transportation assets and services

Objectives

Maintain critical assets and services in good operating condition through targeted investment

Adapt transportation systems to climate change impacts

Introduction

The NPS transportation system is defined as all surface transportation assets and services that accommodate roadway, nonmotorized, transit and waterborne modes. For the purpose of this LRTP, these assets are grouped into two primary categories: the Paved Road and Bridge Network, which includes paved roads and parking areas, bridges and tunnels; and Other Transportation Assets, which includes unpaved roads and parking, trails, waterways, docks, marinas and railroads. These assets, which represent a combined $38 billion public investment, support a core mission of the National Park Service: to provide visitor access to America's greatest natural and cultural treasures. The system also includes nearly 4,000 historic and culturally significant assets (discussed in detail in the Resource Protection chapter), which the National Park Service manages to preserve their historical character and integrity, as well as their continuing important transportation functions.

Maintaining transportation assets in good operating condition is critical to the NPS mission. However, with current and anticipated future budget constraints, the National Park Service will not be able to sustain all transportation assets in their current condition. In response to this challenge, the National Park Service is working to direct increasingly scarce funds to the most mission-critical assets and to enable a long-term commitment from park units to perform required maintenance on these assets.

Total cost of facility ownership (TCFO) is a life-cycle accounting concept at the heart of NPS transportation asset management. TCFO is the full life-cycle cost of building, maintaining and operating an asset until it needs replacement. This concept recognizes that assets require investment throughout their service lives and that preventive maintenance and facility operations activities are key to minimizing long-term costs.

Reduced funding is not the only asset management challenge the National Park Service is facing; adapting to the effects of climate change is also a present and growing challenge. NPS transportation assets were built to withstand historical climatic conditions. However, changes in air and water temperature, precipitation and sea level have already been observed and are projected to become more significant as climate change progresses. Changes in extreme weather events (e.g., very high temperatures, floods, extended droughts) are expected to increase in many regions and will likely lead to new transportation asset management challenges that must be systematically considered and accounted for when making transportation decisions.

Baseline Conditions and Macro Trends

NPS Transportation Asset Inventory

Zion National Park

The NPS transportation system is extensive and essential to meeting the NPS mission. The NPS Paved Road and Bridge Network includes approximately 5,500 centerline miles of paved roads, 120 million square feet of paved parking areas and more than 1,400 bridges and tunnels. These roadway assets are at the core of the NPS transportation inventory because a majority of visitors use them and because they often facilitate access to other transportation modes. Other Transportation Assets include numerous transit systems, trails, unpaved roads and parking areas and marine and waterway assets (Table 3-1), which provide essential access to park units and experiences.

The NPS Paved Road and Bridge Network includes approximately 5,500 centerline miles of paved roads, 120 million square feet of paved parking areas and more than 1,400 bridges and tunnels.

A key accomplishment of this planning effort was the development of a consistent definition and a more comprehensive inventory of NPS transportation assets spanning all transportation modes and multiple systems of record. This multimodal inventory enables more holistic transportation planning by making it possible to evaluate strategies across modes. The National Park Service is now working to integrate the inventory into NPS asset management systems of record, which will ease analysis, reporting and future planning related to transportation assets.

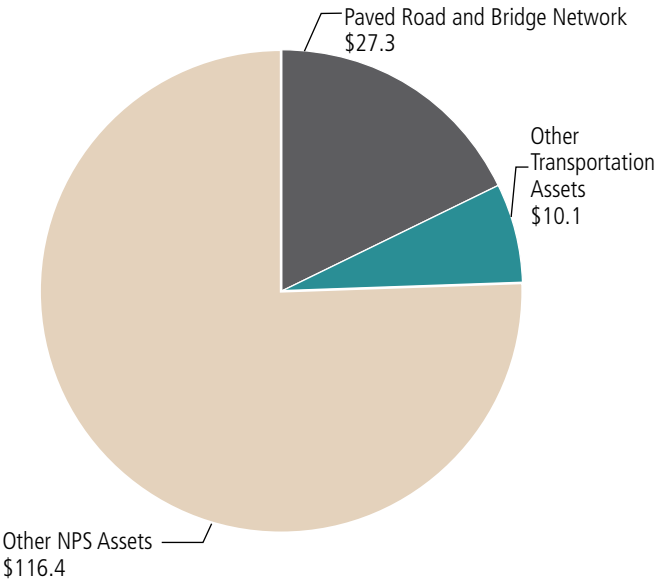
In the aggregate, the NPS transportation inventory represents a substantial public investment. Transportation assets work in concert with a much larger NPS portfolio of visitor and operational assets, representing a combined current replacement value (CRV) of $154 billion. The CRV of all transportation assets is more than $37 billion and represents nearly 25 percent of the CRV of all NPS assets (Figure 3-1). Roads, parking areas and bridges represent more than 80 percent of the total portfolio of transportation assets by CRV (18 percent of all NPS assets), with other asset categories making up the remaining 20 percent.

NPS transportation assets vary significantly across park units and by region, accounting for different visitation patterns and geographical, historical and cultural characteristics. The overall inventory of transportation assets is extraordinarily diverse (Table 3-1), but paved roadway and parking assets are by far the most common means of providing access to NPS park units in all regions. The notable exception is the Alaska Region where many park units are not accessible by road and instead must rely on boats, airplanes, snowcoaches and other alternative modes of transportation.

The NPS transportation asset inventory is not evenly distributed across NPS regions or park units. For example, the Intermountain, Pacific West and Southeast regions support approximately 1,500 miles of paved roads each, consistent with the expansive and remote nature of many western park units and the long parkways and corridors of the southeast. The Northeast, National Capital and Midwest regions maintain fewer miles of paved roads, consistent with the more densely developed settlement patterns of these areas of the United States. However, these three regions make up a significantly larger share of paved parking areas. Also of note, the Southeast Region is home to more than 800 bridges, more than half of all NPS bridges.

Figure 3-1. Transportation Share of Total NPS Asset Portfolio (CRV $ in Billions)

Source: Facility Management Software System FY 2014 Year-End Data[4]



Dry Tortugas National Park

[4] Final FY 2014 asset-level data, which are used to develop the "OMB Eight Major Industry Standard Assets Report", 11/12/2014.

Table 3-1. Inventory of NPS Transportation Assets

Sources: Facility Management Software System FY 2014 Year-End Data, National Park Service Transit Inventory, 2013 (NPS 2014a) and Transportation Reauthorization Resource Paper (NPS 2013a)

Category	Asset Count	Quantity	CRV ($ in Billions)	DM ($ in Billions)
Paved Road and Bridge Network				
Paved Roads	3,900	5,500 Miles	$19.1	$4.2
Paved Parking Areas	6,100	120 Million Square Feet	$2.9	$0.8
Road Bridges and Tunnels	1,460*	8.5 Million Square Feet	$5.3	$0.5
Total	**11,460**		**$27.3**	**$5.6**
Other Transportation Assets				
Unpaved Roads	3,800	7,000 Miles	$3.1	$0.3
Unpaved Parking Areas	1,800	25 Million Square Feet	$0.2	<$0.1
Trails	2,250	4,600 Miles	$2.2	$0.2
Trail Bridges	950	900,000 Square Feet	$0.4	<$0.1
Trail Tunnels	40	500,000 Square Feet	$0.2	<$0.1
Transit Systems**	130	130 Systems	n/a	n/a
Constructed Waterways	30	130 Miles	$0.1	<$0.1
Docks, Marinas and Waterfront Assets	950	2.3 Million Linear Feet	$3.0	$0.8
Railroad Assets	250	700,000 Linear Feet	$0.9	<$0.1
Total	**10,200**		**$10.1**	**$1.5**
All Transportation Assets	**21,660**		**$37.4**	**$7.1**

* Includes those bridges tracked in the Federal Highway Administration Pontis modeling application and publicly accessible tunnels.
** Transit Systems refers to both physical infrastructure assets as well as rolling stock, which the National Park Service manages differently than infrastructure assets.

Transportation Asset Condition

The National Park Service uses industry-standard metrics to assess asset condition and to estimate investment needs. For the most common transportation asset categories—paved roads, paved parking areas and bridges—the National Park Service partners with the Federal Highway Administration (FHWA) to inspect these assets and assess their condition using automated tools and engineering expertise. For other asset categories (e.g., docks, trails, unpaved roads, unpaved parking areas), the National Park Service uses the FCI, which represents the estimated cost of DM divided by the asset's CRV. DM for all NPS assets is tracked in the Facility Management Software System (FMSS), an industry-standard software package the National Park Service customized.

FMSS fiscal-year-end reports are the official sources for most NPS asset information, including DM, replacement value, and condition when measured in FCI. Unless otherwise stated, the National LRTP uses 2014 FMSS year-end data, the same source used to develop the 2014 Asset Inventory Summary and other official reports.

Deferred Maintenance

DM is defined as "maintenance that was not performed when it should have been or was scheduled to be and which, therefore, is put off or delayed for a future period." Continued deferment of required maintenance results in impaired asset performance.

Facility Condition Index

$$\text{Facility Condition Index} = \frac{\text{Deferred Maintenance}}{\text{Current Replacement Value}}$$

Appomattox Court House National Historical Park

PAVEMENT CONDITION

Poor pavement quality can be uncomfortable or even jarring for visitors, can impose increased wear and tear on vehicles, can decrease vehicle fuel economy and can reduce roadway safety. Through regular inspection and proactive maintenance of paved assets, the National Park Service seeks to minimize total life-cycle ownership costs, while keeping those roads and parking areas in good condition.

The National Park Service and the FHWA jointly monitor paved roads and parking areas through the Roadway Inventory Program (RIP). The FHWA inspects paved surfaces using automated, industry-standard equipment and provides inputs to pavement management models that project RM and CR needs, helping managers identify projects that will make the biggest improvements to system pavement condition per dollar spent.

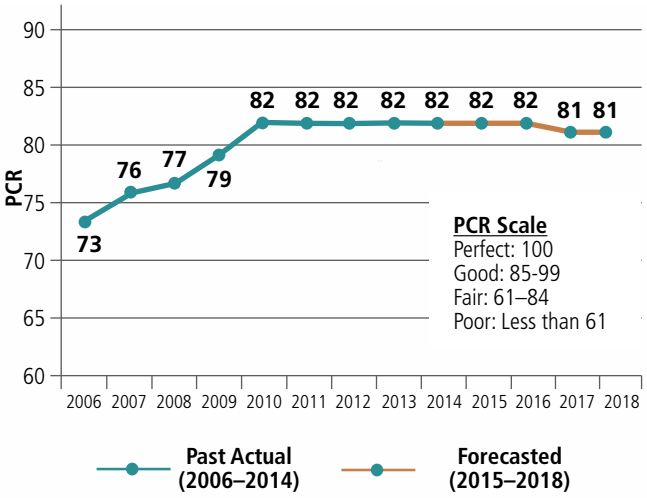
PCR is an industry-standard condition metric the National Park Service uses for paved roads and parking areas. PCR values range from 0 to 100 with higher numbers indicating pavement in better condition. The National Park Service has historically sought to achieve and sustain a servicewide average PCR of 85 for all paved roads and parking areas, which is "good" condition. This approach would be ideal as it would allow efficient condition management using less expensive pavement preservation techniques and would reduce the frequency of much more costly CR and capital investment (CI) projects. However, despite recent progress toward the 85 PCR target, funding has not been sufficient to achieve it (Figure 3-2).

Because available funding is insufficient to maintain all paved assets in good condition, the National Park Service prioritizes investments so that the highest priority paved assets are kept in as close to good condition as possible. As discussed later in this chapter, the CIS is changing the way transportation projects are selected to respond to fiscal constraints while minimizing impacts on resources, visitors and essential park unit functions.

Refer to the National Transportation Investment Strategy chapter for a more detailed analysis of roadway investment needs.

Figure 3-2. NPS Pavement Condition Rating, 2006–2018

Source: 2015 NPS Pavement Condition Report (NPS 2016)



The National Park Service's efficient allocation of American Recovery and Reinvestment Act (ARRA) funding to "shovel ready" projects was a significant contributor to road condition improvement in 2009 and 2011.

BRIDGE CONDITION

The National Park Service inspects and analyzes the condition of its approximately 1,400 public roadway bridges through the FHWA Bridge Inspection Program (BIP). The FHWA performs bridge inspections on a two-year cycle, assigning a BHI rating to each bridge based on models that consider structural condition, erosion around bridge piers and abutments and rate of deterioration. The BHI values range between 0 percent and 100 percent, with 100 percent indicating perfect condition.

BHI was held in average good condition from 2006 to 2013, with the servicewide average declining slightly from 93 to 92 percent. However, an increase in the number of aging bridge structures, combined with forecasted increases in rehabilitation and reconstruction costs, will make maintaining average good condition more difficult in the future. The National Park Service forecasts that $120 million in annual investments are needed to maintain a BHI of 92 percent (Figure 3-4). Lower levels of investment may result in a gradual decline in average BHI. The National Transportation Investment Strategy chapter provides more information on forecasts of future bridge condition.

Nearly three quarters of NPS bridges are classified in good condition (Figure 3-3), and the systemwide BHI average also falls in the good range, at 92 percent.

Figure 3-3. Condition of NPS Bridges

Source: NPS Structure Data Management System Database (2011)

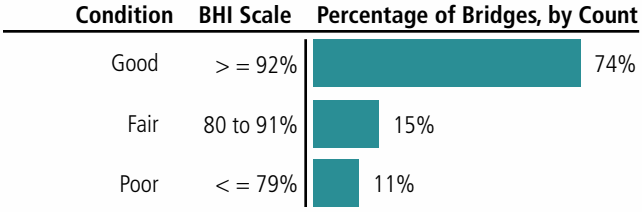
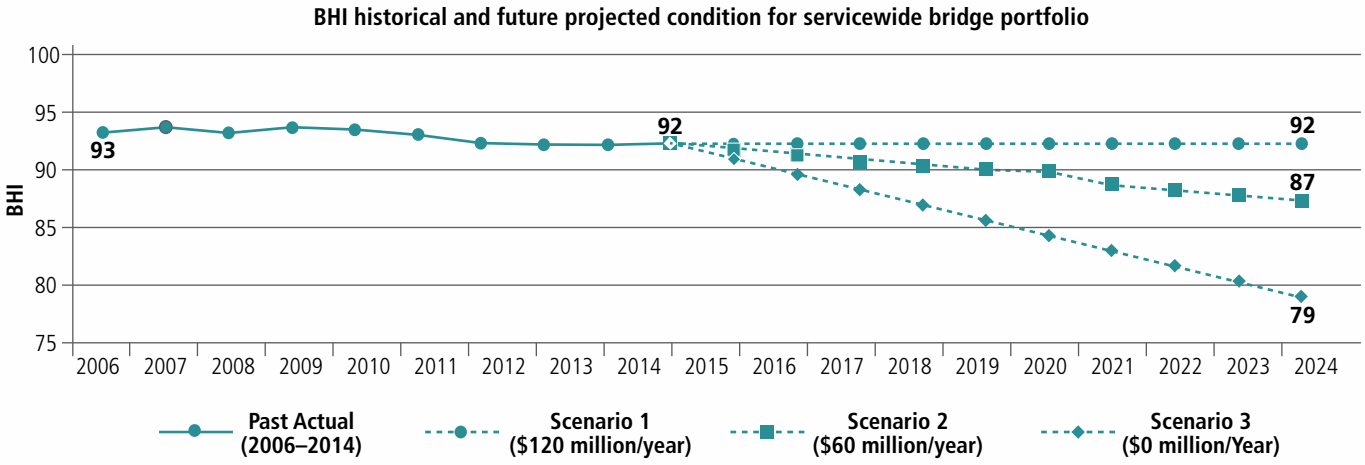


Figure 3-4. Future NPS BHI Ratings Under Three Scenarios

Source: Transportation Branch Reauthorization Resource Paper (NPS 2013a)



CONDITION OF OTHER TRANSPORTATION ASSETS

The NPS Paved Road and Bridge Network constitutes the majority of NPS transportation assets. However, Other Transportation Assets (e.g., unpaved roads and parking areas, trails, docks, constructed waterways and alternative transportation systems) are also essential parts of the NPS transportation system.

These assets provide critical transportation services, provide alternatives for users and may serve as the primary or sole mode of access to some park units. Servicewide, the majority of assets in these categories are in good condition (Figures 3-5 and 3-6). However, as with the Paved Road and Bridge Network, there are significant numbers of Other Transportation Assets in need of reinvestment. In particular, fewer trails and waterfront assets (e.g., docks, marinas) are in good condition than other asset categories.

Comprehensive historical analysis of condition information is not available for Other Transportation Assets. However, like the Paved Road and Bridge Network, their condition improved in recent years as a result of ARRA funding, and their average condition is projected to steadily decline in the years to come resulting from an overall reduction in transportation funding, even as individual assets are improved.

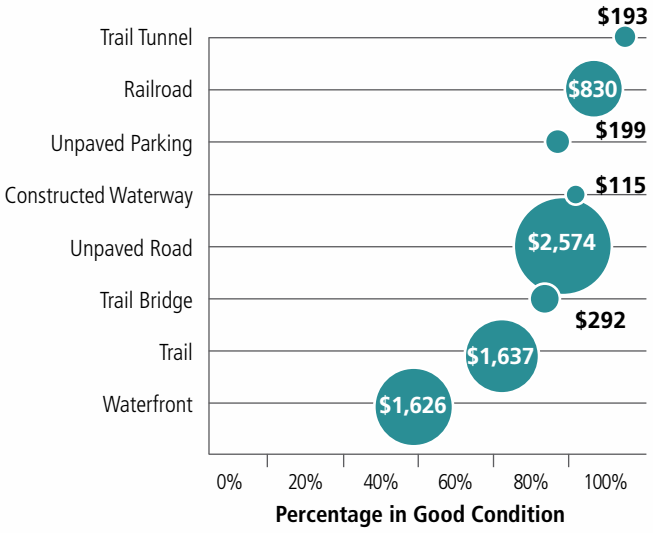
Figure 3-5. Condition of NPS Other Transportation Assets (CRV $ in Billions)

Source: FMSS FY 2014 Year-End Data

Condition	FCI Scale	Percentage by CRV	
Good	0.000 – 0.109	74%	$7.5
Fair	0.110 – 0.149	4%	$0.4
Poor	0.150 – 0.499	15%	$1.5
Serious	0.500 +	7%	$0.7

Figure 3-6. Percentage of NPS Other Transportation Assets in Good Condition, by Category and CRV ($ in Millions)

Source: FMSS FY 2014 Year-End Data



Operations and Maintenance

O&M activities are a critical part of sustaining transportation investments and minimizing TCFO. These activities do not improve the condition of assets; rather, they are the day-to-day work required to keep assets open and functioning and the preventive maintenance projects designed to make sure capital investments are sustained for as long as possible. When fully funded and executed, O&M activities, which include the FO, PM and RM activities described at right, can significantly extend the useful life of transportation assets, reducing future needs for CR and CI investments and minimizing long-term life-cycle costs.

Park units define O&M priorities and schedules for their assets in park asset management plans (PAMPs) and prioritize activities when funding is insufficient to perform all recommended work. At present, there is no aggregation of actual O&M expenditures at a national level. However, the National Park Service estimates that nearly $475 million is required annually to operate and maintain all transportation assets. A detailed discussion of FO, PM and RM needs and resources can be found in the Transportation Finance chapter of this plan.

A mismatch between CI or CR projects that improve asset condition and PM or FO activities that maintain asset condition can result in a pattern of "run to failure," where new and recapitalized assets deteriorate faster than they should and have a shorter lifespan. When these conditions occur, TCFO increases. The National Park Service is working to prevent such mismatches, in part, through the CIS.

Transportation Life-Cycle Work Types[5]

Planning and Administration (PA)
Activities to identify challenges, needs and alternative solutions prior to implementing a solution

Capital Investment (CI)
Construction of new assets, as well as major reconstruction projects that incorporate new functions into existing assets

Facility Operations (FO)
Activities that ensure the day-to-day operation of transportation systems (e.g., plowing, transit operations, mowing)

Preventive Maintenance (PM)
Maintenance tasks performed on an annual or more frequent basis (e.g., cleaning culverts, inspections, vegetation control)

Recurring Maintenance (RM)
Less frequent maintenance tasks performed on a cycle of 1 to 10 years (e.g., chip seals, mill and overlays, restriping)

Component Renewal (CR)
Infrastructure replacement projects that do not expand the asset portfolio or liabilities for O&M activities

[5] The decommissioning of transportation assets is also a significant stage in the life cycle of transportation investments. However, this phase is not analyzed in the National LRTP.

Capital Investment Strategy

Because future budgets are expected to increase significantly relative to the recent past, the National Park Service will not be able to maintain all assets at the current condition level or meet desired condition targets for all assets. To address this challenge, the National Park Service has adopted a comprehensive approach to linking FO and PM priorities set at the unit level, with CR and rehabilitation decisions at the regional level. The CIS, which covers transportation as well as other asset categories, will help the National Park Service focus investment on its highest priority assets, with a particular emphasis on assets that park units have committed to maintain over the long term. Successful implementation of the CIS is critical to making the most of limited funding, minimizing TCFO and ensuring that important assets are kept in good condition.

The CIS scores projects across four elements: (1) financial sustainability, (2) resource protection, (3) visitor use and (4) health and safety. Currently, the NPS transportation community uses the CIS financial sustainability score as a screening tool in the project selection process. Final prioritization and selection is managed by the NPS regional offices, which incorporate local sources of data for the other elements.

CIS Scoring Elements

1. Financial Sustainability
2. Visitor Use
3. Resource Protection
4. Health and Safety

Park units identify O&M priorities and maintenance schedules for their assets in PAMPs.

Grand Teton National Park

OPTIMIZATION OF ASSETS

Using a combined ranking of asset importance and condition known as the OB, NPS park units prioritize assets for investment and O&M funding. OBs range from 1 to 5. They identify the highest priority (OB 1) and high-priority (OB 2) assets for capital investment. OB 3, 4 and 5 are considered lower priority for CI. The same rankings also specify per NPS CIS guidance the relative level of O&M funds a park unit plans to dedicate to a particular asset.

When a park unit assigns assets to OB 1 or 2, it is a commitment by the park unit to fund a minimum amount of PM needed for those assets to be sustained in good condition. This commitment to provide ongoing PM funding lets regional fund managers know that CR and CI investments in these assets will be maintained by the park unit.

Assets assigned to OB 1 and 2 account for 64 percent of NPS transportation assets (by CRV) and 69 percent of the DM. Prioritizing investments in these assets as required by the CIS is projected to reduce the DM backlog and improve the condition of highest and high-priority assets over time.

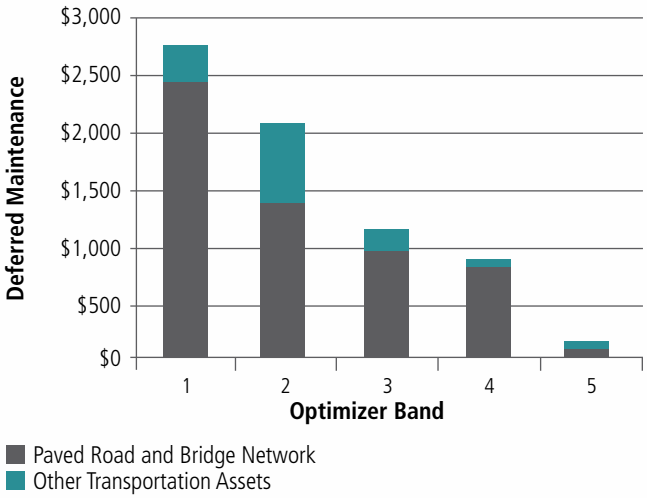
DEFERRED MAINTENANCE

Because of funding shortfalls, not all necessary or recommended maintenance can be performed for all transportation assets in each year. This reality leads to DM, a measure of the accumulated total costs necessary to correct deficiencies resulting from unaccomplished past recommended maintenance and repairs. The Paved Road and Bridge Network accounts for $5.63 billion[6] of DM, while Other Transportation Assets account for $1.49 billion of DM (Figure 3-7).

NPS transportation inventory assets accounted for 62 percent of the total NPS DM backlog of $11.5 billion as of 2014.[7]

Figure 3-7. 2014 Transportation Asset Deferred Maintenance by OB ($ in Millions)

Source: FMSS FY 2014 Year-End Data



[6] This figure of $5.63 billion is sourced from the 2014 NPS Asset Inventory Summary "Paved Roads" line item and includes paved roads and parking, bridges and tunnels.

[7] This figure is sourced from the Final FY14 asset-level data, which are used to develop the "OMB Eight Major Industry Standard Assets Report", 11/12/2014.

Transportation Asset Adaptation and Resilience

Global climate change presents new challenges for transportation asset management. Typically, transportation infrastructure has been designed to withstand a range of historical seasonal fluctuations in temperature and precipitation, as well as occasional extreme weather. However, if future conditions continue to exceed historical norms on a more frequent basis, the condition, function and longevity of transportation facilities may be adversely affected. Changes in temperature, precipitation and sea levels may accelerate degradation of physical assets and, in the most extreme cases, may result in catastrophic damage or loss. Extreme weather and severe storms will continue to disrupt transportation systems, with the potential for major impacts to safety, visitor access and resource protection.

Impacts of climate change have already been observed, and they are expected to increase in severity over time. It will become increasingly necessary to adapt existing transportation assets to be resilient to changing conditions. Table 3-2 summarizes the range of projected climate change impacts presented in the 2014 National Climate Assessment (Melillo, Richmond and Yoge 2014), and their probable implications for transportation assets (Transportation Research Board 2008).

Facility Adaptation and Resilience

To mitigate climate change impacts on its transportation portfolio, the National Park Service is proactively pursuing two asset management strategies: facility adaptation and resilience.

Adaptation

Adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects.[8]

Resilience

A capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment.[9]

[8] From U.S. Global Change Research Program. 2014. Climate Change Impacts in the United States; U.S. National Climate Assessment.

[9] From U.S. Global Change Research Program. 2014. Climate Change Impacts in the United States; U.S. National Climate Assessment.

Table 3-2. Projected Climate Change Impacts and Implications for Transportation Assets

Sources: Third National Climate Assessment (Melillo, Richmond and Yoge 2014), Potential Impacts of Climate Change on US Transportation (Transportation Research Board 2008)

Projected Impacts	Implications for Transportation
Temperature	
Changes vary by region, but average annual temperature is expected to continue to rise. **Heat waves are projected to become more intense.** **The number of extreme hot days is projected to increase.** **Cold waves are projected to become less intense.** **Length of the frost-free season is projected to increase.** **Ice volumes on land, lakes and seas are projected to decline, including increased melting of permafrost.**	Accelerated degradation of infrastructure Increased maintenance and rehabilitation needs Increased safety and accessibility concerns for nonmotorized transportation Increased incidence of wildfire-related closures and maintenance Reduced seasonal operations for over-snow/ice systems Reduced need for plowing and salting Changes in visitation patterns from summer to spring and fall Changes in visitor usage of transportation assets Changes in water levels and stream flow timing in waterways used for transportation
Precipitation	
Changes vary by region, and the direction of change is uncertain. **Frequency and intensity of extreme precipitation events is projected to increase.** **Hurricane-associated storm intensity and rainfall rates are projected to increase.** **Droughts in the southwestern United States are projected to become more intense.** **More winter and spring precipitation is projected for the northern United States and less in the southern United States.**	Increased damage to infrastructure due to flooding Increases in closures due to flooding Increased maintenance and rehabilitation needs Bridges, culverts and soil systems more frequently washed out, eroded or damaged from scour Potential that bridges, culverts and drainage will be unable to accommodate higher peak stream flows and that wildlife migration paths through them will narrow or disappear
Sea Level	
Sea level is projected to rise 1 to 4 feet by 2100. **More severe storm surge during extreme events is expected.**	Increased inundation of low-lying coastal areas Increased damage to coastal infrastructure during storm events Temporary or permanent closure of critical transportation assets, possibly limiting accessibility to coastal areas

IDENTIFYING VULNERABLE ASSETS

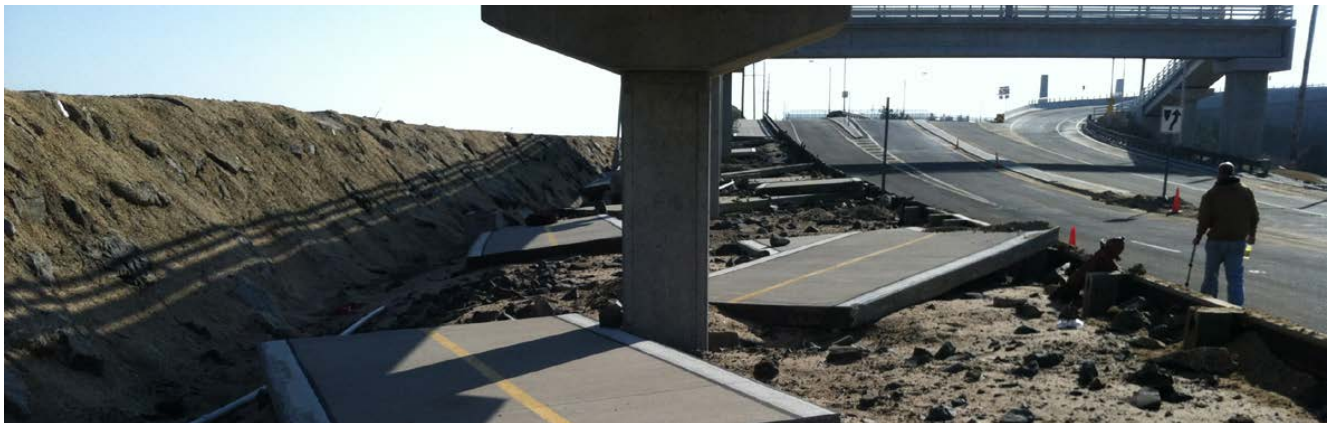
Analyzing and identifying assets vulnerable to climate change will be a significant challenge for the National Park Service in the coming years. The FHWA and others have developed frameworks and tools for identifying transportation infrastructure at increased risk of damage or loss as a result of the impacts of climate change, and the National Park Service has participated in several pilot efforts to begin assessing asset vulnerability. However, the field of transportation climate change adaptation is evolving at a rapid pace, as are approaches to infrastructure vulnerability analysis. There is not yet an industry consensus on best practices, and it is likely that the unique conditions and values of the National Park Service may require somewhat modified or unique approaches to vulnerability analysis.

Even after vulnerable infrastructure is identified, standard methods do not yet exist for integrating consideration of these risks into asset management and design practices. Nevertheless, pilot efforts to better understand and respond to climate threats are underway nationally and in selected park units and regions. Many state and regional transportation agencies are moving forward as well. The National Park Service has an opportunity to learn from these pilot efforts and to collaborate with partners attempting to deal with the challenge of climate change. Without effective consideration of climate change hazards, transportation assets may be more frequently damaged or destroyed.

PREPARING FOR AND RESPONDING TO CLIMATE CHANGE

The National Park Service takes climate change seriously and is working both to reduce transportation emissions (Resource Protection chapter) and to prepare for and respond to a changing world. The service is helping to address this challenge with several pilot efforts at the NPS park unit or regional levels (Table 3-3) and with offices and programs dedicated to climate change science, mitigation, adaptation and education.

Without effective consideration of climate change hazards, transportation assets may be more frequently damaged or destroyed.



Gateway National Recreation Area

Table 3-3. Selected NPS Climate Change Adaptation Pilot Efforts

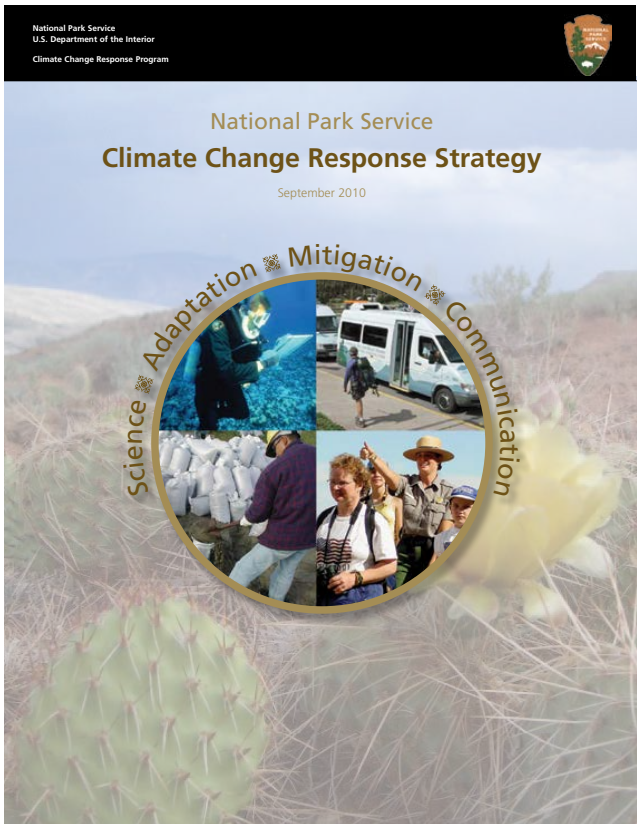
Sources: Alaska Federal Lands Long Range Transportation Plan (BLM et al. 2011); Assateague Island National Seashore General Management Plan Update (NPS 2013b); Cape Cod Climate Change Scenario Planning Project (USDOT Volpe Center 2012a); Central New Mexico Climate Change Scenario Planning Project (USDOT Volpe Center 2014)

Office/Region/Park Unit	Description
Alaska Region	Started an analysis of vulnerability to climate change in 2014, focusing on coastal erosion and permafrost thaw. The project is an outgrowth of the Alaska Federal Lands LRTP, which identified adaptation to climate change as a key objective for the region.
Assateague Island National Seashore	Incorporating climate change and sea-level rise considerations into an update of the park unit's general management plan.
Cape Cod National Seashore	Participated in an interagency transportation, land use and climate change scenario planning pilot project. Completed in 2012, the project informed the park unit's climate action plan and provided information for use in land use and transportation planning partner agencies on Cape Cod.
Intermountain Region and Climate Change Response Program	Participating in a Central New Mexico interagency transportation, land use and climate change initiative. Launched in July 2013, the initiative seeks to develop regional climate futures that can inform transportation and land use planning by the NPS park units, other federal land management agencies and regional/local agencies in central New Mexico.
Natural Resource Stewardship and Science Office	Partnered with Western Carolina University to analyze the vulnerability of assets to a 1-meter rise in average sea level. The project examined 40 selected coastal park units. Partnered with the University of Colorado to provide sea level and storm surge projections for 105 coastal park units.
Northeast Region	Conducting an analysis of the vulnerability of transportation assets, focused on flooding. Started in 2013, the project is an outgrowth of the National Park Service Northeast Region LRTP, which identified adaptation to climate change as a key objective. In addition to the vulnerability analysis, the study will also develop recommendations for how to systematically address current and future flood vulnerabilities in the region's transportation planning and programming processes.
Southeast Region, FHWA, National Park Service, and US Fish and Wildlife Service	Collaborated on the development of a tool for use in assessing the vulnerability of transportation assets in the Southeast Region. The tool was piloted by two park and two refuge units. The spreadsheet-based tool will help park unit and regional managers make more informed decisions about where and how to spend transportation funds, either to enhance the resiliency of vulnerable assets or to adapt their design to be resilient in the face of more extreme events.
Sustainable Operations and Climate Change Branch	Developed and applied a high-level risk screening tool and approach to assess risks posed by sea-level rise to assets within coastal parks. The tool was piloted at Pu'uhonua O Honaunau National Historical Park in Hawaii and Assateague Island National Seashore in Maryland and Virginia.

The NPS Sustainable Operations and Climate Change (SOCC) branch of the Park Facility Management Division is focused on ensuring that all NPS assets (transportation or otherwise) are sustainable in the face of climate change and on mitigating the impacts of NPS transportation on the climate. The SOCC branch is currently working to develop improved data and tools to help park managers identify climate-related risks and to make educated adaptation decisions. One notable effort is the branch's work to develop and apply a high-level risk screening tool and approach to assess risk posed by sea-level rise to assets within coastal parks. The tool was piloted at Pu'uhonua O Hōnaunau National Historical Park in Hawaii and Assateague Island National Seashore in Maryland and Virginia. The SOCC also led the development of the NPS *Green Parks Plan* (NPS 2012b), a key policy document that establishes priorities for climate change mitigation and adaptation.

The NPS Climate Change Response Program (CCRP) is a cross-disciplinary program that provides guidance, training, technical expertise, project funding and educational products that support actions to preserve the natural and cultural resources and values of the National Park Service. As part of its overall response to the threats of climate change, the CCRP developed the NPS *Climate Change Response Strategy* (NPS 2010) and *Climate Change Action Plan 2012–2014* (NPS 2012c), which outline a long-term strategy and short-term actions for combating climate change servicewide. The program supports park units in many aspects of planning for climate change that are relevant to transportation, including understanding the range of potential future climate projections, assessing the vulnerability of assets to climate change and identifying potential adaptation solutions. The program also provides detailed guidance to park units in mitigating their impacts on the climate through the Climate Friendly Parks Program (Resource Protection chapter) and helps units keep abreast of evolving best management practices and new materials that are better adapted to climate change effects.

The National Park Service takes climate change seriously. As part of its overall response to the threats of climate change, it has developed the *NPS Climate Change Response Strategy* and *Climate Action Plan 2012–2014*, which outline a long-term strategy and short-term actions for combating climate change servicewide.



NPS Climate Change Response Strategy

Meeting Asset Management Objectives

Objective: Maintain Critical Assets and Services in Good Operating Condition Through Targeted Investment

The National LRTP established the first multimodal, servicewide inventory of all transportation assets. To enable efficient and comprehensive asset management analysis, planning and investment, the National Park Service will work to integrate the inventory into relevant systems of record, providing a foundation for tracking and managing asset condition into the future.

The National Park Service continues to face significant challenges in effectively managing its extensive, diverse transportation assets in the face of funding constraints. While a majority of transportation assets are currently in good condition, the accumulated DM backlog of $5.63 billion for the Paved Road and Bridge Network and $1.49 billion for Other Transportation Assets illustrates the gap that exists between necessary and available resources. Despite recent successes in raising the average condition of assets in the NPS transportation inventory as a result of ARRA, average condition is likely to plateau short of traditional condition goals and then decline steadily if funding remains at historical levels. Faced with these shortfalls, the National Park Service will direct its available resources to its most operationally critical assets, as described in the National Transportation Investment Strategy.

The National Park Service will continue work to integrate TCFO principles into the transportation project selection and programming processes for all relevant fund categories. The National Transportation Investment Strategy will help NPS regions and park units target transportation investments to highest priority assets and prioritize the O&M activities needed to sustain those investments over the long term.

Recommended Strategies

- Define and capture the national transportation asset inventory in NPS systems of record and ensure that all transportation asset categories are included
- Implement the National Transportation Investment Strategy in project prioritization and programming decisions for all fund categories to ensure that the highest priority transportation assets are brought up to and remain in good condition

Objective: Adapt Transportation Systems to Climate Change Impacts

The challenge of climate change requires an adaptive approach to transportation asset management. As with other transportation agencies, NPS asset management practices are currently grounded in the traditional approach, which assumes that future years will be the same as previous ones. Climate change adaptation requires the National Park Service to learn from the past, but be looking forward, anticipating plausible and sometimes unprecedented conditions. This approach may include revisiting park unit management goals and desired conditions because these frequently describe expectations based on historical conditions.

To adapt to climate change, the National Park Service will need to identify transportation assets that are vulnerable to a changing climate. Furthermore, asset management and planning processes must account for projected future conditions to remain efficient and to mitigate increasing exposure to climate change impacts.

Efforts to define guidance and tools to better equip transportation asset managers to address and prepare for the effects of climate change are already underway. Continued experimentation, research and partnerships will help the National Park Service better understand what does and does not work for specific asset categories, as well as regional variations in past and projected future climate. Learning and working with state and regional partners will be an important source of information in these efforts. Finally, it will be important to find effective ways to alter standard management practices to institutionalize a proactive approach to climate change adaptation that incorporates best practices and innovations.

Recommended Strategies

- Expand and refine efforts to identify infrastructure most at risk from the impacts of climate change, while working with partners to prevent duplication, share lessons learned and minimize costs
- Integrate climate change into transportation asset management, planning and investment processes
- Use industry best practices in sustainable transportation construction and O&M to adapt transportation assets to the effects of climate change

Measuring Performance

Performance Measure: Condition of Highest Priority Transportation Assets

The intent of the National Transportation Investment Strategy is to allocate funds to the most important assets, which will best position the National Park Service to meet its mission. Tracking the average servicewide condition of highest priority transportation assets over time measures the overall effectiveness of NPS transportation asset management in implementing the strategy. The National Park Service has identified condition targets for all its highest priority transportation assets.

Definitions of Priority

The National LRTP defines "highest priority transportation assets" as follows:

- Paved Roads: FC 1, 7 and select FC 2
- Bridges: All road bridges
- Other Asset Categories: OB 1.

Baseline

The baseline for this performance measure, as noted in Figure 3-8, is as follows:

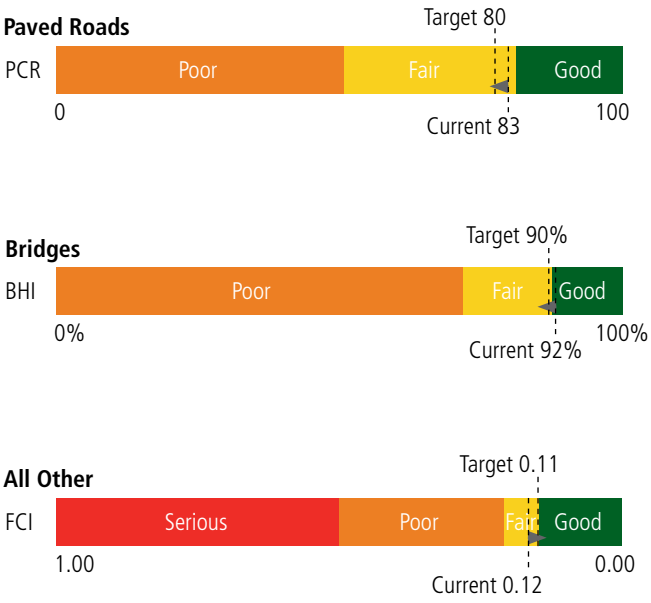
- PCR of 83 for highest priority paved roads and parking lots
- BHI of 92% for highest priority bridges
- FCI of 0.12 for all other highest priority transportation assets.

Targets

The National Park Service aims to achieve the following condition levels over a five-year period:

- PCR of 80 for highest priority paved roads
- BHI of 90% for bridges, all of which are highest priority assets
- FCI of 0.11 for all other highest priority transportation assets.

Figure 3-8. Condition of Highest Priority Transportation Assets Performance Measure



Performance Measure: Number of Park Units that Have Completed a Transportation Infrastructure Vulnerability Assessment

Understanding which assets are vulnerable to the projected effects of climate change is essential to effective long-term asset management. Several efforts, led by NPS regions, the CCRP, the SOCC branch and partners are moving ahead to address climate change adaptation. In some cases, pilot projects have identified transportation assets that may be vulnerable either now or as climate change progresses. The National Park Service will continue and accelerate these efforts to ensure that park unit and regional managers have adequate information to invest transportation funds in ways that account for climate change.

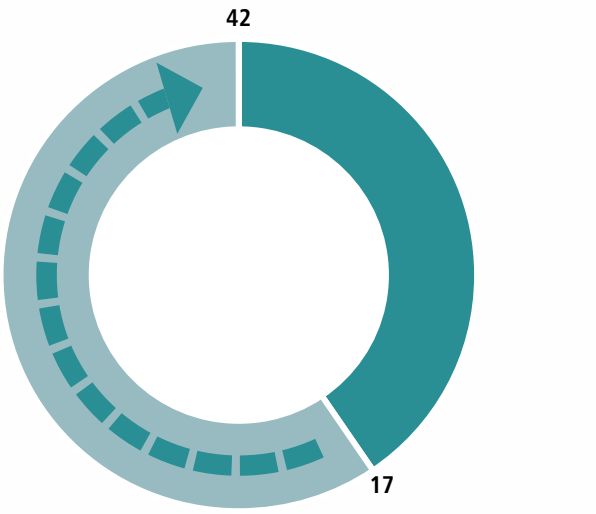
Baseline

17 park units have completed transportation infrastructure vulnerability assessments.

Target

The National Park Service aims to complete transportation infrastructure vulnerability assessments for at least five park units per year over the next five years (Figure 3-9).

Figure 3-9. Transportation Infrastructure Vulnerability Assessments Performance Measure



Colonial National Historical Park

Transportation Finance

National Long Range Transportation Plan

Goal

Allocate available transportation funding wisely

Objectives

Identify and prioritize investments based on the NPS mission, anticipated life-cycle costs and consideration of likely available future funding

Maintain flexible use of transportation funding sources while improving identification of investments and needs

Introduction

The National Park Service invests in, operates and maintains a transportation system that provides safe travel options for visitors and protects America's spectacular natural and cultural resources. Responsibility for transportation investment decision making rests with many individuals who oversee various funding programs, geographic areas and organizational levels of the National Park Service. Priorities and input from every unit guide the investment decision-making process, and the DOI and the USDOT are stakeholders as well. The FHWA Federal Lands Transportation Program (FLTP) is the largest and most well-known program that funds NPS transportation. However, several additional funding sources play critical roles as well. This chapter presents a holistic summary of transportation investments from all funding programs. This analysis forms the basis of the National Transportation Investment Strategy on page 11.

Between FY 2006 and FY 2013, the National Park Service invested a total of $3.7 billion in transportation assets and services, an average of $461 million each year.[10] With this funding, the National Park Service improved more than 2,500 centerline miles of paved roads, rehabilitated 232 bridges, constructed or improved 29 nonmotorized trails, completed 104 transit planning studies and improvement projects, completed 10 water-based transportation infrastructure projects and continually updated road and bridge inventory condition data (NPS 2013a).

Blue Ridge Parkway

[10] Consists of gross obligations for the FLTP and NPS non-fee programs, collected revenue for NPS fee programs and awards from discretionary programs.

Yet, the financial health of the NPS transportation system is in decline. Despite a demonstrated capacity to obligate funding and improve the network, funding for the most significant NPS transportation programs has not kept pace with increasing needs. Funding levels for several important programs have decreased or been eliminated entirely in recent years.[11] Considering these changes, the National Park Service forecasts average annual financial resources of $394 million for its transportation investments for FY 2015 through FY 2020.

The National Park Service estimates that an average of $1.5 billion per year is needed to address all transportation needs servicewide over a period of 6 to 10 years (adjusted for inflation). This estimate includes all activities in the transportation asset lifecycle, from planning through construction, operation, maintenance and rehabilitation, and will be adjusted during LRTP updates as actual funding levels are applied. Given forecasted resources of $394 million per year, the National Park Service forecasts an average funding gap of $1.1 billion per year over the life of this plan, thus resources will not be available to resolve the full deferred maintenance backlog on transportation-related assets. Furthermore, because $676 million of the total estimated annual needs are for the highest priority assets and services alone, if every dollar were spent on highest priorities there would still be a $282 million gap in meeting highest priority needs alone.

These fiscal realities are not unique to the National Park Service. Like nearly all state and local governments throughout the country, the National Park Service is improving its capabilities to strategically manage available funding and to make the most of every dollar. The National Transportation Investment Strategy aims to align transportation decision making across all regions and park units with the CIS, which seeks to focus investment on the highest priority assets and align investment decisions across funding programs and stages in the asset life cycle. The National Park Service is also developing management systems and reporting tools to facilitate data-driven decision making. As an outcome of this plan, the National Park Service will seek additional funding sources for transportation funding and explore options for reducing the inventory of lower priority transportation assets.

[11] The recently passed FAST Act and FY 2016 Consolidated Appropriations Act reverse this trend and increase NPS transportation funding. The forecast presented here does not take into account the funding increases from those acts. While these increases will be beneficial, they are not expected to substantially change the overall financial baseline; NPS transportation investment needs will still greatly exceed available funding.

Baseline Conditions and Macro Trends

Overview

This section presents transportation investments, needs and funding gaps from four perspectives: by funding source, by asset category, by asset priority and by asset life-cycle stage. The discussion that follows incorporates findings across all major funding sources for transportation investments, drawing data from a variety of management systems. All historical funding numbers are based on investments between FY 2006 and FY 2013. Historical and forecasted funding amounts are all represented in 2014 dollars.

Between FY 2006 and FY 2013, the National Park Service invested an average of $461 million per year in its multimodal transportation network.

Great Smoky Mountains National Park

NPS Transportation Success with ARRA

The National Park Service has demonstrated an ability to quickly and efficiently put transportation funding to use to make transportation system improvements. In 2009 and 2010, it obligated $745 million of ARRA funds for 550 transportation projects. ARRA-funded projects were completed in 166 park units, across 46 states and seven NPS regions and enabled the National Park Service to repair or rehabilitate more than 1,100 miles of roads. Some examples of major investments accomplished with ARRA funds include the following:

Grand Canyon National Park

Using ARRA funds, Grand Canyon National Park was able to dramatically improve pavement condition on approximately 130 miles of its roads, purchase 6 alternative fuel transit buses, improve the safety and functional operations of the Historic Grand Canyon Village Depot and rehabilitate or reconstruct 13 miles of nonmotorized trails. The park was awarded approximately $18 million in ARRA funds, of which slightly more than $12 million was spent on multimodal transportation projects. In addition to improving asset conditions, safety, operations and visitor experience, these projects stimulated regional economies and provided construction jobs amidst a national recession.

Grand Canyon National Park

Joshua Tree National Park

Joshua Tree National Park received more than $5.3 million in ARRA funds, part of which went to address the park's deferred maintenance needs for its roads, parking lots and trails. Approximately 58 miles of the park's 91 miles of paved roads received preservation treatments, such as chip seals and application of traffic markers. Additionally, 35 parking areas were resurfaced. These treatments prolonged the life of those roads and parking areas. In addition to pavement treatments, about half of the 1.5-mile 49 Palms Oasis Trail was renovated to repair sections that were previously damaged. Other trails within the park also had maintenance work performed to clear brush and install erosion-control features.

Joshua Tree National Park

Point Reyes National Seashore

ARRA funds were awarded to Point Reyes National Seashore for several transportation projects around the park unit, such as the challenging rerouting of the Muddy Hollow Trail. The project consisted of a 3,000-foot, side-hill trail reroute that completed the lower portion of the Muddy Hollow Trail. The rerouted trail section included several large new constructions: (1) 2,200 feet of new trail with rock base, adding rock to 150 feet of the existing base; (2) a 20-foot long by 6-foot wide wooden bridge with handrails; (3) 400 feet of new retaining wall on a steep side-hill to support new trail tread above wetland habitat; and (4) 60-foot long by 6-foot wide raised boardwalk reroute over steep slopes and sensitive wetland and riparian habitat. This project was just one of many toward which Point Reyes dedicated its $3.2 million ARRA funds.


Point Reyes National Seashore

Investments by Fund Source

The National Park Service receives transportation funding from four main sources, which together averaged $461 million in FY 2006–FY 2013 (Figure 4-1). Over this same period, the National Park Service invested 70 percent of transportation funding in the Paved Road and Bridge Network, with the remaining 30 percent invested in all Other Transportation Assets.

The FHWA has historically provided the majority of annual funding ($266 million or 58 percent) for transportation investments via programs authorized under Title 23 of the USC.

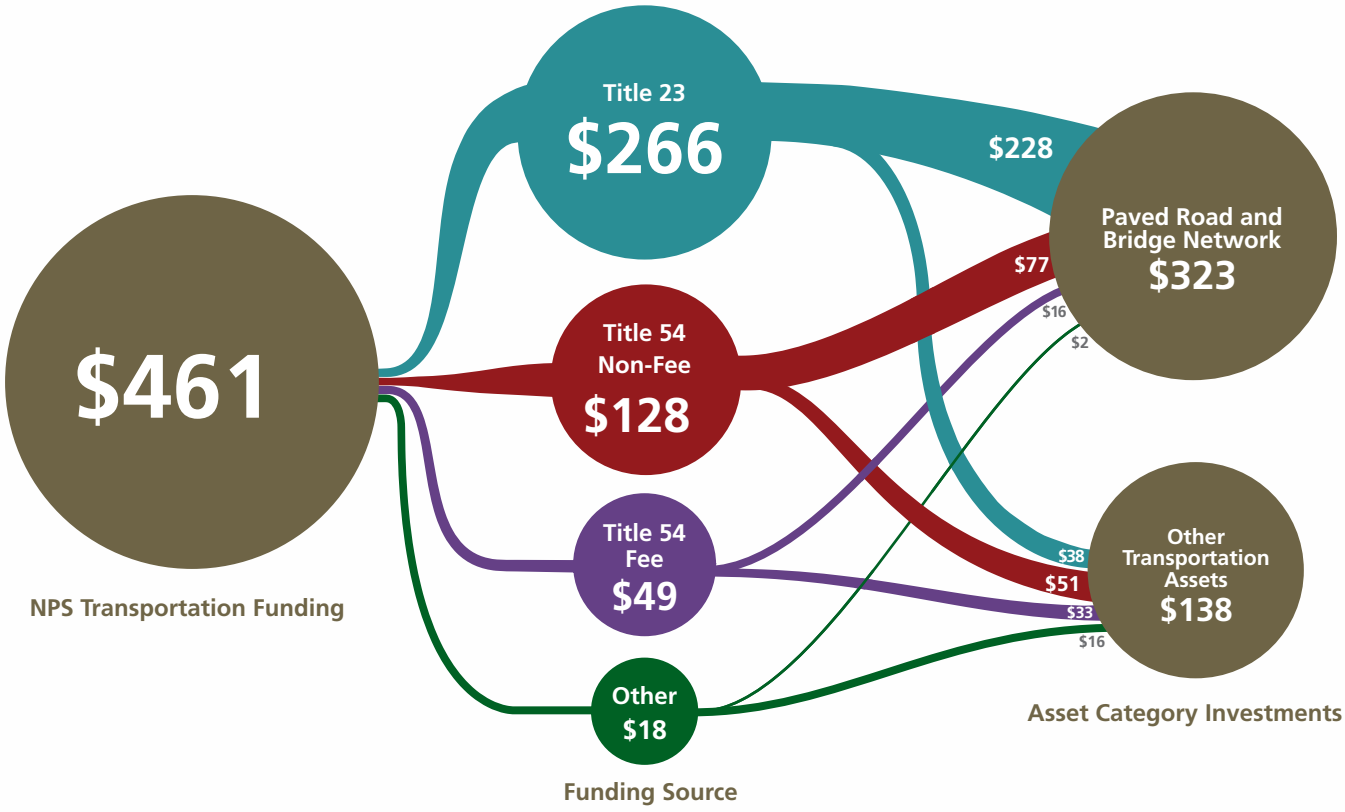
The National Park Service and the DOI, via Titles 16 and 54 of the USC, has provided the next largest share of annual funding for transportation: $177 million, or 38 percent. These funding sources can be considered in two categories: "non-fee" programs, which are funded by congressional appropriations, and "fee" programs, which are funded by fees charged to visitors and concessioners at certain NPS units.

Programs administered by the Federal Transit Administration and funding from other public and private sources made up the remaining $18 million, or 4 percent of historical annual average transportation funding.

The National Park Service estimates that an average of $1.5 billion per year is needed to address all transportation needs servicewide; large-scale projects, such as the Arlington Memorial Bridge, represent $200 million of that annual need.

Arlington Memorial Bridge

Figure 4-1. FY 2006–FY 2013 Average Annual NPS Transportation Investments, by Fund Source ($ in Millions)



Ninety-seven percent of NPS transportation funding has historically come from 19 funding programs, shown in Table 4-1. Notably, the FLTP historically provided 49 percent of all transportation funding. Title 54 Operational Park Base funds provided the second largest share of transportation funding at 13 percent, and the Recreation Fee and Cyclic Maintenance programs provided 7 and 6 percent, respectively. The remaining 25 percent was provided by a mix of funding sources, none of which contributed more than 4 percent.

Although historically the National Park Service achieved positive outcomes with its transportation investments, several issues related to the complex mix of programs created uncertainty for asset managers seeking to plan long-term improvements. Programs were controlled by different people at different levels of the National Park Service. Most of the programs not controlled by the park units were discretionary, competitive programs. Most of the Title 54 programs were not dedicated to transportation, and almost all were competitively programmed against projects in other mission-critical areas, such as visitor services or resource protection.

Table 4-1. FY 2006–FY 2013 Average Annual Transportation Investments, by Fund Source and Program ($ in Millions)

Sources: NPS Administrative Finance System

Fund Source and Program	Transportation Primary Intent of Funds?	Project Programming Responsibility	Paved Road and Bridge Network[12]	Other Transportation Assets	Grand Total	% of Grand Total
Title 54 Non-Fee	-	-	**$76**	**$51**	**$128**	**28%**
Operational Base	-	Park Unit	$43	$18	$61	13%
Cyclic Maintenance	-	Region/National	$19	$10	$29	6%
Repair/Rehab	-	Region/National	$5	$7	$12	3%
Line Item Construction	-	Region/National	$3	$7	$10	2%
Other NPS Programs	-	Region/National	$2	$6	$8	2%
Emergency Storm & Flood Damage	-	Region/National	$4	$3	$7	2%
Title 54 Fee	-	-	**$16**	**$33**	**$49**	**11%**
Recreation Fee[13]	-	Park Unit	$15	$16	$32	7%
Transportation Fee	Yes	Park Unit	<$.5	$15	$15	3%
Concessions Franchise Fees	-	Park Unit	<$.5	$2	$3	1%
Title 23	-	-	**$228**	**$38**	**$266**	**58%**
FLTP	Yes	Region/National	$203	$21	$224	49%
Earmarks	Yes	Not Applicable	$13	$5	$18	4%
Public Lands Highway - Discretionary	Yes	Region/National	$5	$8	$12	3%
Other FHWA Programs	Yes	Region/National	$5	$3	$8	2%
Emer. Relief for Federally Owned Roads	Yes	Region/National	$2	<$.5	$2	<.5%
Scenic Byways	Yes	Region/National	$1	$1	$1	<.5%
Transportation Alternatives	Yes	Park Unit	<$.5	$1	$1	<.5%
Other/External	-	-	**$2**	**$16**	**$18**	**4%**
TRIP	Yes	Park Unit	<$.5	$8	$8	2%
Southern Nevada Public Land Management Act	-	Not Applicable	<$.5	$4	$4	1%
Reimbursable Agreements	-	Park Unit	$1	$2	$3	1%
Donations	-	Park Unit	<$.5	$2	$2	<.5%
Total	-	-	**$323**	**$138**	**$461**	**100%**

Note: All numbers presented are rounded to the nearest million. Some numbers may not add up as presented due to rounding.

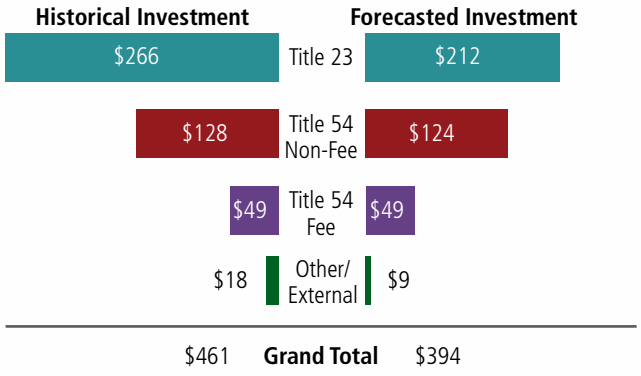
[12] Using the definition provided on page 25 with the inclusion of unpaved parking lots.

[13] Recreation Fee authorization falls under Title 16 as it is part of the Federal Lands Recreation Enhancement Act.

Between FY 2015 and 2020, the National Park Service forecasts annual transportation financial resources of $394 million per year, a decline of $66 million per year, or 14 percent (Figure 4-2). This forecast is based on past funding availability, current and proposed transportation legislation and input from NPS managers and the NPS Budget Office.[14]

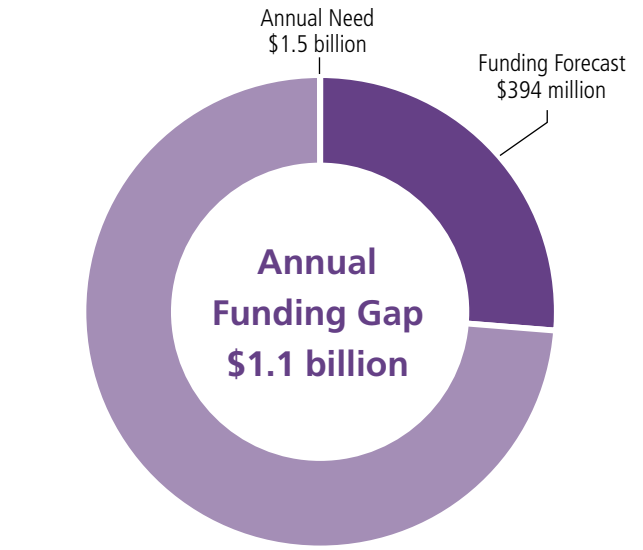
The Title 23 forecast presented in this plan is based on the assumption that FLTP would remain flat at MAP-21 funding levels and discretionary programs eliminated under MAP-21 would remain eliminated. The Title 54 Non-Fee forecast reduced historical funding levels by 3 percent based on projections by the NPS Budget Office. As visitation, policies and authorizations are expected to remain constant, Title 54 Fee funds are forecasted to remain flat. Other/External funding sources are forecasted to decrease by $8 million from the elimination of the Paul S. Sarbanes Transit in Parks Program (TRIP).

Figure 4-2. Comparison of FY 2006–FY 2013 Average Annual Investments and Annual Forecasted FY 2015–FY 2020 Resources ($ in Millions)



The National Park Service estimates its total annual transportation funding needed to address all transportation needs servicewide over a period of 6 to 10 years (adjusted for inflation) to be $1.5 billion. This estimate is based on asset condition models and management system records for paved roads and bridges, as well as needs documented in NPS project and management systems of record. This needs estimate includes all activities in the transportation asset lifecycle, from planning through construction, operation, maintenance and rehabilitation, and will be adjusted during LRTP updates as actual funding levels are applied. Based on forecasted funding of $394 million, the resulting annual funding gap is $1.1 billion (Figure 4-3).

Figure 4-3. Annual Estimated NPS Transportation Funding Gap



[14] This forecast does not include funding increases provided by the FY 2016 Consolidated Appropriations Act, which increased Title 54 NPS funding for FY 2016, or the FAST Act, which increased Title 23 FLTP funding for the National Park Service by approximately 18 percent over the life of the five-year authorization. The National Park Service will revise the financial baseline analysis presented here in 2017.

Investments by Asset Category

The National Park Service operates and maintains a complex portfolio of transportation assets and services (Asset Management chapter). As shown in the figures below, the National Park Service historically invested the majority of transportation funding in paved roads, at $273 million per year (59 percent). Trails received the next largest investment at $52 million per year (11 percent), and transit systems received $34 million per year (7 percent). The remaining 23 percent of historical investments were in assets such as bridges, parking lots, marinas and other categories (Figure 4-4).

Between FY 2006 and FY 2013, the National Park Service invested an annual average of $323 million (70 percent) in the Paved Road and Bridge Network and an annual average of $138 million (30 percent) in all Other Transportation Assets (Figure 4-5). Title 54 programs contributed 29 percent of the funding for road and bridge network investments and 61 percent of the funding for investments in Other Transportation Assets.

If the National Park Service continued this 70/30 split in the future, there would be an estimated annual funding gap of $766 million per year for the Paved Road and Bridge Network and $346 million per year for Other Transportation Assets (Figure 4-6).

Figure 4-4. FY 2006–FY 2013 Average Annual Investment by Asset Category ($ in Millions)

Source: NPS Administrative Financial System

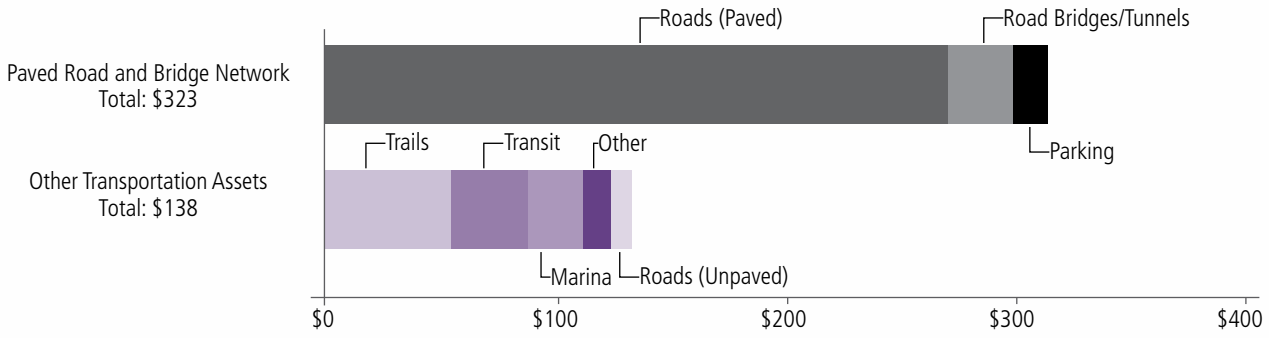


Figure 4-5. FY 2006–FY 2013 Average Annual Investment by Funding Authorization ($ in Millions)

Source: NPS Administrative Financial System

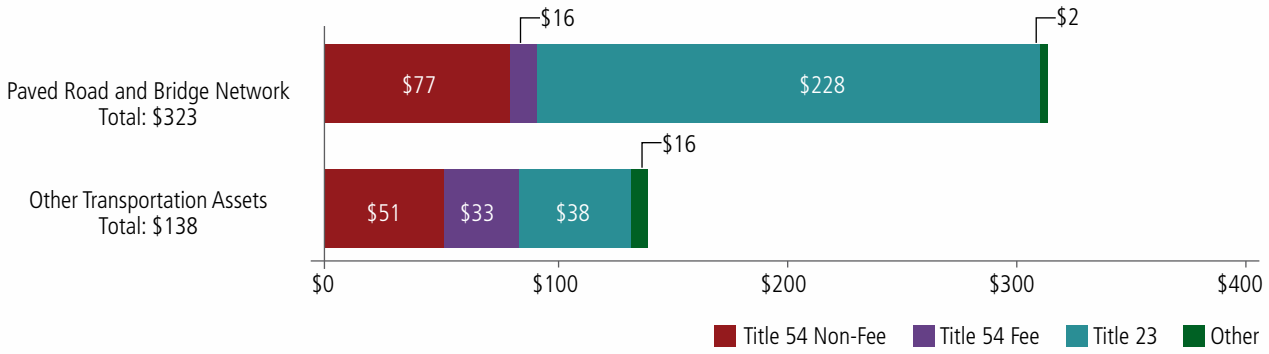
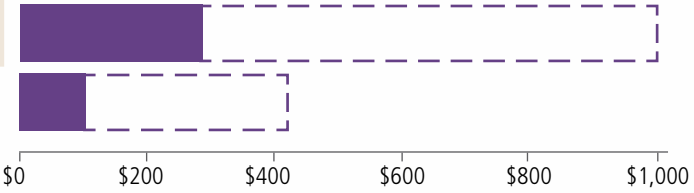


Figure 4-6. FY 2015–FY 2020 Average Annual Needs and Gaps by Asset Category Based on Historical Investment Patterns ($ in Millions)

Asset Category	Total Needs	Met Needs	Unmet Needs	% of Needs Met
Paved Road and Bridge Network Needs	$1,050	$284	$766	27%
Other Transportation Assets Needs	$457	$111	$346	24%



Between FY 2006 and FY 2013, the National Park Service invested 70 percent of transportation funding in the Paved Road and Bridge Network, with the remaining 30 percent invested in Other Transportation Assets.

George Washington Memorial Parkway

Investments by Asset Priority

The National Park Service defines asset priority categories differently for different kinds of transportation assets. Table 4-2 defines the asset priority definitions for highest priority, high priority and other priorities.

Table 4-2. LRTP Asset Priority Definitions, by Asset Category

Asset Categories	Highest Priority	High Priority	Other Priorities
Paved Roads and Parking	FC 1, 7 and select FC 2	-	Remaining FC 2 and all FC 3, 4, 5, 6 and 8
Bridges	All	-	-
Transit	All	-	-
All Other	OB 1	OB 2	OB 3, 4, 5

The National Park Service estimates that an annual average of 76 percent ($350 million) of transportation funding was historically invested in highest priority assets.[15] As shown in Figure 4-7, high-priority and other priority assets received 11 percent ($51 million) and 13 percent ($60 million) of total transportation investments, respectively. The National Park Service invested the majority of its transportation funding in highest priority assets, but these estimates show that there remains room to shift additional resources to highest priority and high-priority assets.

Needs for highest priority transportation assets alone account for $676 million per year, 45 percent of the total $1.5 billion annual need (Figure 4-8). Even if all $394 million of forecasted resources were applied to highest priority assets, the National Park Service would still be more than $282 million per year short of meeting all forecasted needs for its highest priority assets.

[15] Priority was not available for historical investments, but a study of historical spending on roads at the 16 largest parks was used to estimate investments by priority (NPS 2013c).

Figure 4-7. FY 2006–FY 2013 Average Annual Estimated Transportation Investment by Asset Priority ($ in Millions)

Source: NPS Administrative Financial System

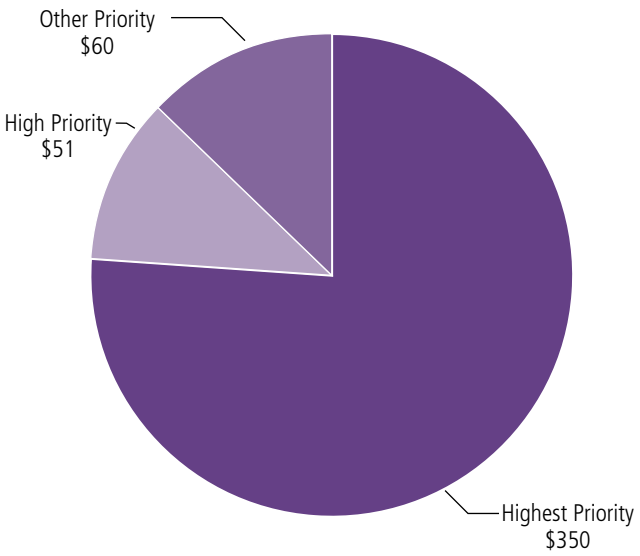
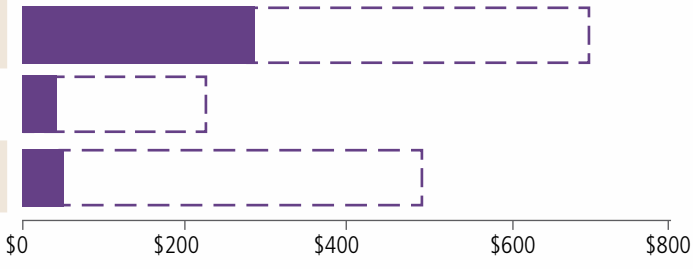


Figure 4-8. FY 2015–FY 2020 Annual Needs and Gaps by Asset Priority Based on Historical Investment Patterns ($ in Millions)

Asset Priority	Total Needs	Met Needs	Unmet Needs	% of Needs Met
Highest Priority Needs	$676	$300	$376	44%
High Priority Needs	$234	$43	$191	19%
Other Needs	$595	$51	$544	9%



Investments by Asset Life Cycle

Asset life-cycle stages (introduced in the Asset Management chapter and reviewed in the sidebar) play an important role in transportation investment decision making. Between FY 2006 and FY 2013, the National Park Service primarily used Title 23 funds for CI, CR and RM projects, while most PM and FO activities were funded using its Title 54 funds (Figure 4-9).

The use of different funding sources for various asset life-cycle stages can be partially explained by examining the programming responsibility of the funding sources (Figure 4-10). For example, paved roads typically involve "3R" projects (resurfacing, restoration and rehabilitation) that are captured in the following asset life-cycle stages: CI, CR and RM. These activities usually require special expertise and equipment and are funded through nationally and regionally administered fund programs (such as the FLTP and Cyclic Maintenance). Historically, PM and FO were almost entirely programmed at the park unit level using Title 54 funds. Because of the routine and small-scale nature of PM and FO work, park units determine how and when to make those investments.

NPS Transportation Life-Cycle Work Types

Planning and Administration (PA)
Activities to identify challenges, needs and alternative solutions prior to implementing a solution

Capital Investment (CI)
Construction of new assets, as well as major reconstruction projects that incorporate new functions into existing assets

Facility Operations (FO)
Activities that ensure the day-to-day operation of transportation systems (e.g., plowing, transit operations, mowing)

Preventive Maintenance (PM)
Maintenance tasks performed on an annual or more frequent basis (e.g., cleaning culverts, inspections, vegetation control)

Recurring Maintenance (RM)
Less frequent maintenance tasks performed on a cycle of 1 to 10 years (e.g., chip seals, mill and overlays, restriping)

Component Renewal (CR)
Infrastructure replacement projects that do not expand the asset portfolio or liabilities for O&M activities

Figure 4-9. FY 2006–FY 2013 Average Annual Investments, by Asset Life-Cycle Stage and Funding Source ($ in Millions)

Source: National LRTP Financial Analysis

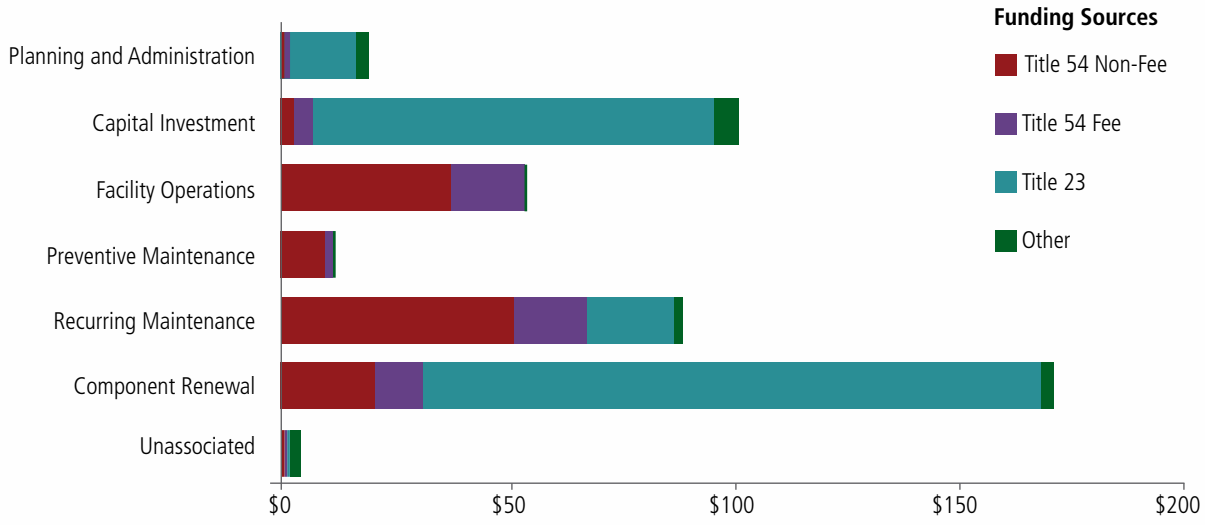
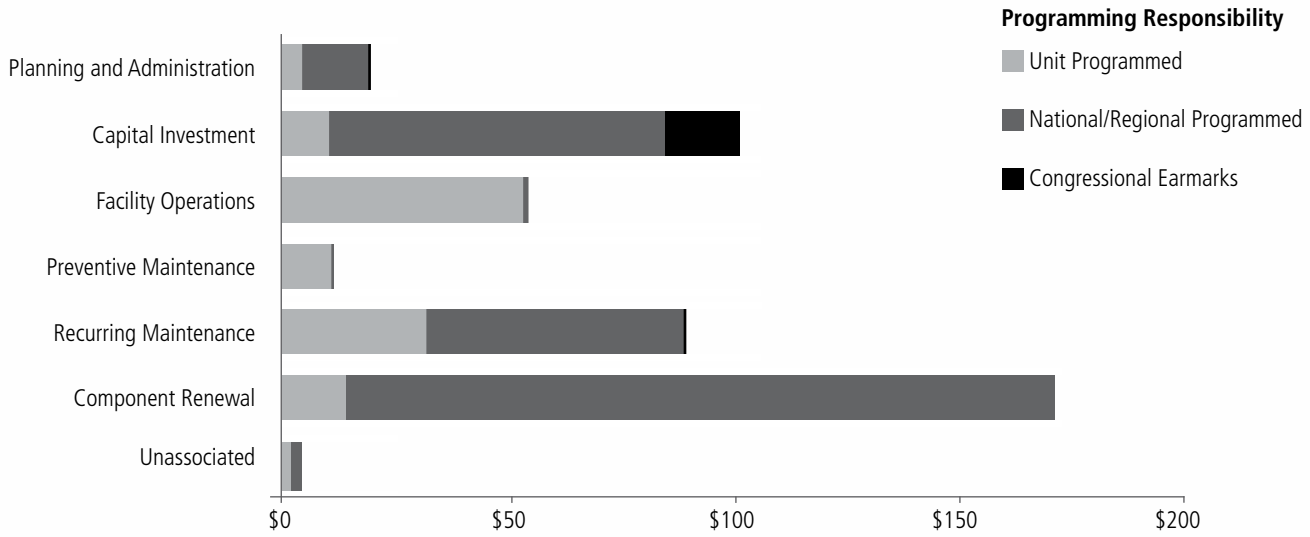


Figure 4-10. FY 2006–FY 2013 Average Annual Investments, by Asset Life-Cycle Stage and Programming Responsibility ($ in Millions)

Source: National LRTP Financial Analysis



The CIS attempts to closely coordinate among funding programs and asset life-cycle stages to ensure that new, replaced or refurbished assets are properly maintained. As explained in detail in the Asset Management chapter, when a park unit assigns assets to OBs 1 and 2, it is a commitment by that park unit to fund a minimum prescribed share of recommended PM for those assets; it also sends a message to regional fund managers that CR and CI investments in these assets will be maintained by the park unit. Even with the best intentions to coordinate funding across life-cycle stages, units are challenged to strictly follow the CIS because they do not have the funding necessary to maintain all their highest priority transportation assets.

Forecasts show that, if future investments are made following past spending patterns, no single asset life-cycle stage can be funded adequately, as shown in Figure 4-11. The gaps for FO and PM deserve particular attention. As discussed above, because of funding constraints and competing priorities for park unit-level funding, the National Park Service has traditionally underinvested in FO and PM, resulting in an accelerated decline of assets in good condition and the eventual accrual of DM. If investment patterns continue as in the past, park units would require an additional $79 million ($53 million for FO, $26 million for PM) from Operational Park Base and/or fee programs to properly operate and perform annual routine maintenance on transportation assets. The National Park Service may choose alternative spending strategies in the future, subject to applicable laws, regulations, policies and funding program eligibility criteria.

The National Park Service Invests Less per Lane Mile on Road O&M than State DOTs Invest

The National Park Service invests less per lane mile on road O&M, both in actual dollars and as a percentage of requirements, than its state counterparts.

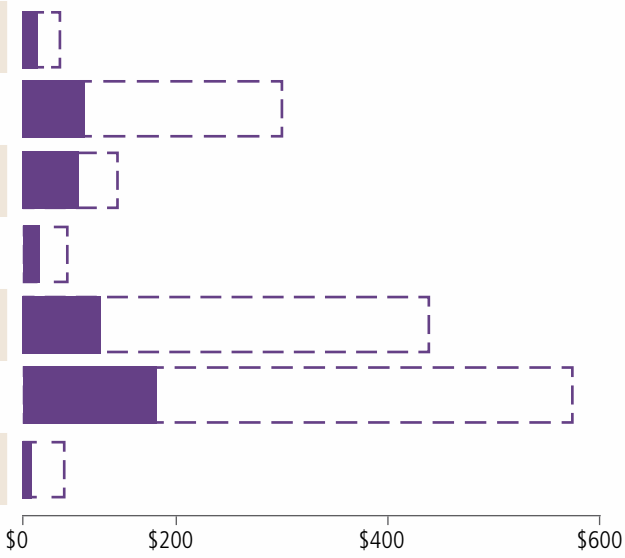
In the near future, park facility managers plan to spend $3,000 to $4,500 per lane mile, roughly 50 to 75 percent of the $6,000 per lane mile that is required to maintain park paved roads in good condition (NPS 2013d). Reasons for this underinvestment include limited budgets relative to needs and competition for limited funding with nontransportation needs.

In comparison, the FHWA estimates that state DOTs invest between $5,000 and $10,000 per lane mile (excluding surface overlays, chip seal or deep base repairs that would normally be covered during major surface rehabilitation projects). And state DOT investments only meet an estimated 90 percent of actual needs (USDOT Volpe Center 2012b; FHWA 2010). Increased focus on the operations and PM of NPS roads should minimize condition decline and slow the accrual of DM.

Figure 4-11. FY 2015–FY 2020 Annual Needs and Gaps by Asset Life-Cycle Stage Based on Historical Investment Patterns ($ in Millions)

Source: National LRTP Financial Analysis

Asset Life-Cycle Stage	Total Needs	Met Needs	Unmet Needs	% of Needs Met
Planning	$27	$12	$15	45%
Capital Investment	$305	$63	$242	21%
Facility Operations	$109	$56	$53	51%
Preventive Maintenance	$37	$11	$26	31%
Recurring Maintenance	$429	$83	$346	19%
Component Renewal	$565	$164	$401	29%
Administrative	$34	$3	$32	8%



Deferred Maintenance and Programmatic Needs

Transportation funding needs must also be considered from two additional perspectives: DM and programmatic needs. Existing DM for the Paved Road and Bridge Network is $5.63 billion. If all ongoing RM and CR needs, shown in Figure 4-11, were met on time, DM would not grow, and the National Park Service would address its existing DM backlog.

Similarly, the National Park Service has identified a $760 million backlog of programmatic needs that address non condition issues, such as safety, code compliance and resource protection. Programmatic needs are the wide range of activities required by law and regulation to make the NPS transportation system safe, accessible and environmentally sound. If all needs were met, this programmatic backlog would not grow, and transportation programmatic needs would be addressed over time.

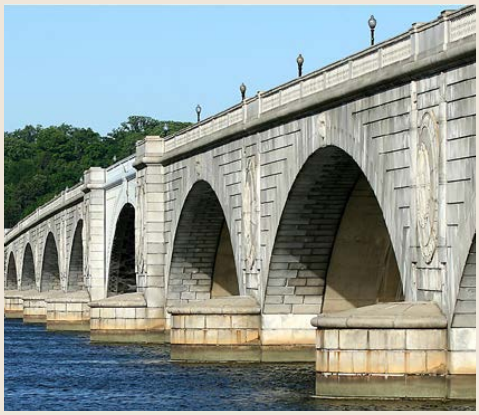
Under forecasted funding levels, however, DM and programmatic needs will grow. And because the National Park Service has little ability to reduce these backlogs in the aggregate, the best the service may hope to do is address DM and programmatic needs for highest priority assets first, resulting in greater DM backlog and unaddressed programmatic needs for assets not classified as highest priority.

Large-Scale Projects

Of the $1.5 billion in annual need, $200 million per year represents large-scale project needs that are beyond the capacity of the funding sources that have historically been available for NPS transportation. These large-scale projects address key mission and safety needs. Attempting to complete large-scale projects with the annual servicewide forecast of $394 million is a difficult task.

Arlington Memorial Bridge Repair and Reconstruction
Estimated Project Cost: $250 million

The Arlington Memorial Bridge is an iconic bridge located in Washington, DC that is maintained and managed by the National Park Service. The Memorial Bridge was built in 1932 and is in severe need of repair and reconstruction. It is one of only five bridges crossing the Potomac River into the District of Columbia. The bridge carries more than 68,000 vehicles each day, along with thousands of pedestrians and bicyclists who use the bridge both for commuting and visiting other sites in the National Mall. In June 2015, two lanes of traffic were closed and a weight restriction of 10 tons was mandated because of accelerated deterioration.



Arlington Memorial Bridge © stevehdc

Mount Rainier National Park Roadway Rehabilitation
Estimated Project Cost: $84.9 million

The Sunrise Area is the highest point that can be reached by vehicle in Mount Rainier National Park and is the second most visited site in the park unit. With deteriorating roadways and bridges, worsened by increasing intensity of storms, the east-side roadways leading to Sunrise are in severe need of rehabilitation. This four-phase project would take place over a six-year period to ensure that public vehicular access is maintained to this beautiful and popular site.

Mount Rainier National Park © John Chao

Natchez Trace Parkway Multiuse Trail Construction
Estimated Project Cost: $102 million

The Natchez Trace Parkway is a 444-mile route from Natchez, Mississippi to Nashville, Tennessee that follows the original pathways of the Natchez, Chickasaw, and Choctaw Indian tribes; French and Spanish explorers; and American settlers along the Mississippi River and Tennessee River Valley. In June 2003, a Multiuse Trail Feasibility Study recommended constructing 42.2 miles of trails along three sections of the historic parkway that would provide non motorized transportation options for visitors and neighboring residents.

Natchez Trace Parkway © Marc Muench

Meeting Transportation Finance Objectives

Objective: Identify and Prioritize Investments Based on the NPS Mission, Anticipated Life-Cycle Costs and Consideration of Likely Available Future Funding

The National Park Service developed the CIS to focus NPS investments on its highest priority assets and services and to align capital investments with O&M investments. The National Transportation Investment Strategy incorporates CIS principles by focusing the majority of funding on highest priority assets and increasing the percentage of O&M needs met, which research shows should lead to lower overall life-cycle costs.

For the National Transportation Investment Strategy to be effective, funding program managers will need to work together to build this approach into project identification, prioritization and programming practices. In support of the National Transportation Investment Strategy, the National Park Service needs more robust analyses of outcomes of PM spending to support increased funding for road maintenance activities, such as crack sealing and joint repair, brushing and culvert cleaning. These activities will allow the National Park Service to maintain its roads at higher standards and maximize their useful service lives.

The forecasted funding scenario is not a foregone conclusion. The National Park Service can close the gap between available funding and needs by seeking new sources of revenue. By actively expanding partnerships with other federal land management agencies and state and local governments, the National Park Service will improve outcomes of regional planning and may gain access to nontraditional funding sources. In addition, to reduce transportation costs, the National Park Service could systematically seek to decommission low-priority assets and services.

Recommended Strategies

- Implement the National Transportation Investment Strategy for all funding programs
- Research the benefits and costs of PM
- Seek out new transportation planning partners and funding sources
- Decommission the lowest priority transportation assets

Objective: Maintain Flexible Use of Transportation Funding Sources While Improving Identification of Investments and Needs

Improving the coordination of transportation investments across funding programs presents an opportunity to reduce TCFO. The FLTP provides a dedicated fund source for almost 50 percent of NPS transportation investments. The remaining 50 percent comes from more than 60 funding programs, including multiple fee programs, discretionary programs the USDOT administers and NPS discretionary programs administered by offices at all organizational levels. The Paved Road and Bridge Network, which represents 73 percent of the value of the NPS asset portfolio and 50 percent of DM, competes with all other types of needs from NPS funding programs. Consistent, reliable and targeted coordination of funding would ensure that transportation assets meet or exceed their design service lives while minimizing TCFO.

Coordination of transportation investments across funding programs will require evaluating assumptions, cultural attitudes, policies and funding program eligibility criteria. Good data will be needed to explore these ideas and facilitate future transportation finance analyses. Currently, transportation assets are not identified as such in the Financial and Business Management System (FBMS). Additionally, not all transportation assets are in the FBMS, the FBMS does not yet associate obligations with specific assets and there is no system of record for planned maintenance investments. Addressing data issues and improving information systems will enable faster, more timely reporting and more meaningful financial analyses.

Recommended Strategies

- Improve the coordination of transportation investments across multiple funding programs in keeping with the National Transportation Investment Strategy and CIS emphasis on highest priority assets and services
- Identify transportation assets in the FBMS and incorporate NPS transit systems into the FBMS
- Associate obligations with specific transportation assets in the NPS financial system
- Produce a biennial report of planned and actual preventive maintenance spending

Measuring Performance

Performance Measure: Percentage of Transportation Funds Invested in Highest Priority Transportation Assets

This performance measure extends the NPS focus beyond DM to all investments in highest priority transportation assets and services.

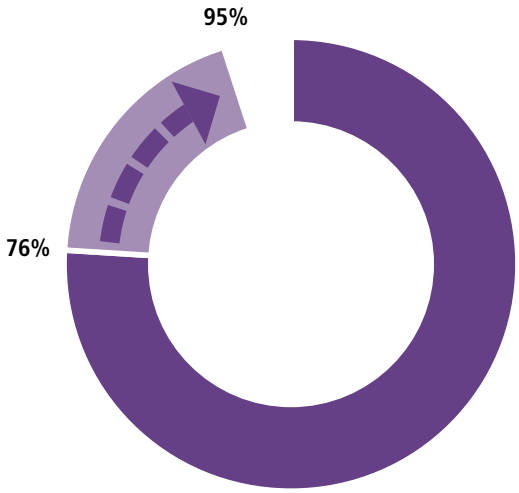
Baseline

The baseline for this performance measure is 76 percent.

Target

The target for this performance measure is 95 percent within five years (Figure 4-12).

Figure 4-12. Percentage of Transportation Funds Invested in Highest Priority Assets



Performance Measure: Percentage of Park Units that Meet Preventive Maintenance Targets for Highest Priority Transportation Assets

This performance measure is directly related to the CIS requirement that park units complete at least 55 percent of planned PM activities on OB 1 assets.

Baseline

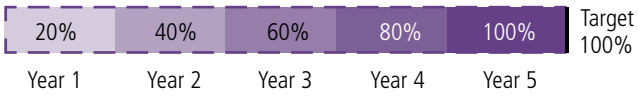
Not available.

Target

The targets for this performance measure are as shown in Figure 4-13 and are as follows:

- 20 percent of park units in year 1
- 40 percent in year 2
- 60 percent in year 3
- 80 percent in year 4
- 100 percent in year 5 and subsequent years.

Figure 4-13. Percentage of Park Units Meeting PM Targets



Blue Ridge Parkway

Resource Protection

National Long Range Transportation Plan

Goal

Protect and preserve natural and cultural resources

Objectives

Incorporate natural and cultural resource considerations into all aspects of transportation decision making and operations to avoid, minimize or mitigate negative impacts on these resources

Minimize and mitigate the greenhouse gas emissions of the NPS transportation system

Introduction

The National Park Service is a global leader in environmental stewardship and historic preservation. In this role, it protects unparalleled natural and cultural resources of great importance to the nation and, increasingly, the international community. Within many park units, park roads and parkways were designed to "lie lightly on the land," preserving scenic, aesthetic, historical and environmental resources. In some cases, a park unit's transportation system itself is nationally recognized for remarkable engineering feats, technological advances and landscape architecture designs that impinge as little as possible on their spectacular settings.

While the National Park Service is a leader in using science, technology and design to provide visitor access to resources with a minimal footprint, much of its transportation infrastructure was built prior to the modern environmental conservation and historic preservation movement. Consequently, resource impacts may not have been fully considered or analyzed when the infrastructure was originally built. In some cases, park roads were built directly on top of or adjacent to significant resources to provide visitor access. However, the maintenance and operation of these legacy transportation systems can perpetuate impacts on mission-critical natural and cultural resources. As an additional challenge, a large part of the NPS transportation portfolio is itself historic and thus requires management considerations beyond that of typical transportation infrastructure.

NPS transportation policy is grounded in commitments to environmental excellence and historic preservation. The National Park Service uses context-sensitive design and best management practices to address impacts on natural and cultural resources and to reduce contributions to climate change from greenhouse gas (GHG) emissions that its transportation systems and users cause.

This chapter identifies some of the primary areas where transportation infrastructure impacts the quality and integrity of the natural and cultural resources the National Park Service is charged with protecting. The chapter also addresses the role that the NPS transportation system plays in the agency's GHG emissions.

Baseline Conditions and Macro Trends

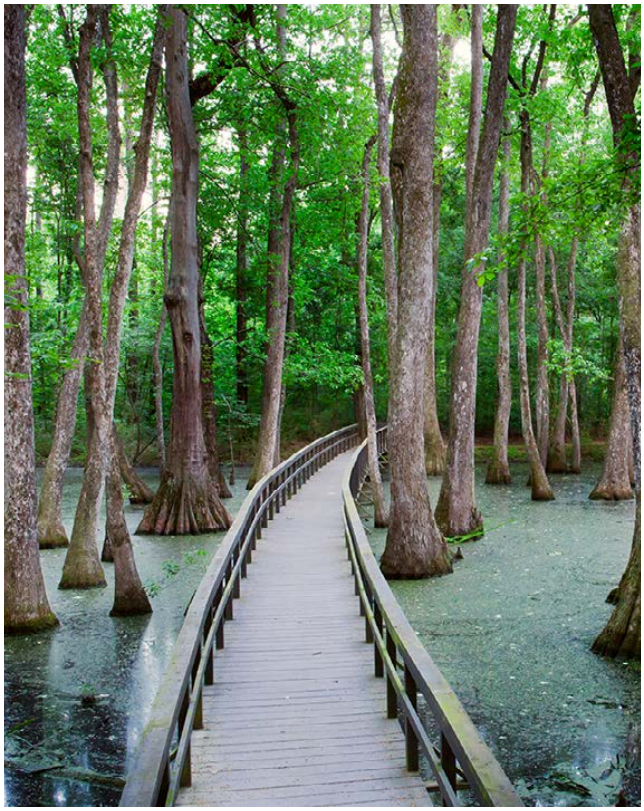
Natural Resource Stewardship

The National Park Service manages more than 84 million acres of land and water that encompass an enormously diverse range of life, ecosystems and habitats. The effect transportation systems and users have on natural systems and processes depends largely on site-specific conditions, such as the location and design of a facility, traffic volumes and the degree of sensitivity of the surrounding environment. This plan identifies the types of resource impacts that are observed in many park units across all regions.

Natural resource data that the National Park Service and partners collect for resource management and activities, combined with expertise and scientific support, enables the National Park Service to fulfill its core resource protection mission and values. When integrated into internal and external planning and management processes, natural resource data and analysis allows for informed decision making. NPS program support for data includes the Natural Resource Stewardship and Science Directorate (NRSS), which provides scientific, technical and administrative support to national park units systemwide. Related to transportation, the NRSS can provide frameworks and tools to assess transportation impacts to natural resources at the project level and ecosystem scale.

To understand the status and trends of natural resources within NPS park units, the Inventory and Monitoring Program collects, analyzes and synthesizes natural resource data and presents findings in useful formats, as well as provides guidance for data collection and integration. Managed by the NRSS, the Integrated Resource Management Application is a web-based system for searching for NPS natural and cultural resource data and information. In addition to internal efforts, the National Park Service works with the FHWA and other partners to collect data and information that can inform resource issues related to transportation planning and operations. While the National Park Service has extensive natural resource inventories, they are not fully integrated with facilities or law enforcement databases, making specific analysis on the resource impacts from transportation within the NPS system limited. Additionally, NPS park units exist in a matrix of other land uses and activities, so in many cases data on transportation-related resource impacts and improvements cannot be isolated from the confounding influences of the surrounding environment.

Several key issues where transportation impacts natural resources can be identified as servicewide issues in spite of the challenges with quantifying transportation-specific impacts on NPS resources. These issues fall into the following resource areas: air quality and scenic views, acoustic environment and soundscape, night sky resources, habitat fragmentation and wildlife-vehicle collisions, non-native species and vegetation management, geologic resources, water resources and erosion.



Natchez Trace Parkway © Mark Muench

AIR QUALITY AND SCENIC VIEWS

Air pollution, even in relatively low levels, affects ecological health, visibility, scenic views, visitor experience and human health. Motorized transportation use, on both paved and unpaved roads, and visitation are directly linked to air quality in parks. Highway vehicles, off-highway vehicles, marine engines, aircraft engines and other motorized vehicles all contribute to air pollution in gaseous and particulate form. The US Environmental Protection Agency (EPA) has established national ambient air quality standards for ground-level ozone and other air pollutants. Areas that fail to achieve these standards are classified as nonattainment areas. Once a nonattainment area achieves these air quality standards, it receives a "maintenance" classification and must maintain good air quality for 25 years.

As of 2012, 70 NPS park units were located in ozone nonattainment areas and 37 were in particulate matter nonattainment areas. These park units are generally located near or downwind from urban or industrial areas. When NPS park units fall within a nonattainment area, all proposed transportation and road construction projects must undergo an evaluation to assess whether the project-related activity would contribute to air quality violations or potentially delay attainment of air quality standards.

While the National Park Service strives to improve the air quality of its park units, the regional nature of air quality creates additional challenges in doing so. Because ozone and particulate matter are regional pollutants, their origin and atmospheric movement are often beyond the control of park managers. Air pollution can also limit the visibility and negatively impact scenic views at park units. Degradations in visibility affect how far and how well visitors can see from scenic outlooks. Dust, which some park roads running through soils sensitive to wind erosion can generate, is one form of air pollution that, in particular, impairs scenic views. This dust impacts park air quality by introducing particulate matter. And, while transportation systems provide the access for visitors to enjoy scenic views, those systems also have the potential to impair scenic viewsheds if they are improperly located, designed or maintained.

ACOUSTIC ENVIRONMENT AND SOUNDSCAPES

Natural sounds are vital to the natural functioning of park unit ecosystems and the visitor experience. Natural acoustic conditions are important in park units for reasons ranging from intraspecies communication and predation and predator avoidance to the effective use of habitat. In particular, noise affects wildlife such as breeding birds and amphibians. Transportation, in addition to surrounding land uses, is a major contributor to noise in the environment, which in turn impacts the acoustic environment of park units. Congestion and pavement surfaces alone can greatly add to the noise volume that automobile traffic generates. The NPS Natural Sounds and Night Skies Division offers guidance on minimizing noise impacts from transportation, such as using quiet pavement technology, lower speed limits and soundscape outreach.

Noise from aircraft overflights also impacts NPS resources and the visitor experience. When aviation is considered in transportation planning and system upgrades, attention is given to the elevation, time of day and routing of flights. The National Park Service continues to work with other agencies to reduce the park unit impacts from overflights.

NIGHT SKY RESOURCES

The quality of the nighttime environment is relevant to nearly every park unit in the National Park System, stemming from its importance in ecosystem functions, wilderness character and aesthetics. Since 2001, the National Park Service has systematically inventoried night sky quality in approximately 100 park units. That data shows that nearly every park unit measured exhibits some degree of light pollution. Transportation infrastructure and systems are major contributors to light pollution from their use of unmitigated artificial lighting. Vehicle headlights and artificially lit parking lots, roads and other transportation fixtures can impact the natural lightscape, reduce the ability to see celestial objects and negatively affect wildlife. Artificial lighting from transportation systems and users can often be seen for many miles.

Since 2001, the National Park Service has systematically inventoried night sky quality in approximately 100 park units.

Arches National Park © Dave Beedon

HABITAT FRAGMENTATION AND WILDLIFE–VEHICLE COLLISIONS

Roadways and other transportation systems present a significant barrier to movement for many aquatic and terrestrial species. These movement barriers, related to both the presence of the road itself and associated vehicular noise, in turn have multiple adverse and compounding ecological impacts, including on threatened and endangered species. When habitat areas are bisected by a roadway, abrupt edge conditions are created. Such areas, in addition to wildlife–vehicle collisions, can encourage wildlife to exhibit road avoidance behaviors and can lead to a loss of diversity within a given population or species.

Wildlife–vehicle collisions present a direct impact of transportation on park unit resources. Some species face serious reductions in population survival probability as a result of wildlife–vehicle collisions alone. Populations of threatened or endangered species, wide-ranging species and migratory species are especially vulnerable to road mortality. A review of federally listed threatened and endangered species identified 21 species for which direct road mortality is among the major threats to its survival in the United States (Huijser et al. 2008) (Table 5-1). These species and other sensitive species are currently found within 32 parks units (NPS 2005). Many other species, including additional threatened or endangered species and other sensitive species, are also at risk of fatality as a result of conflicts with vehicles, such as eagles (golden and bald) and owl.

The National Park Service uses best management practices to help minimize transportation impacts on wildlife, including incorporating design features, such as culverts or bridges that allow for aquatic species passage.

Everglades National Park

The National Park Service collects limited data on wildlife–vehicle collisions occurring on roads within NPS boundaries. Data is largely acquired through a department-wide law enforcement records management system known as the Incident Management and Reporting System (IMARS). When accidents are reported, law enforcement officers record details on the Motor Vehicle Accident Report Form. On this form, a classification for the type of incident includes a coding for "collision with animal." In some cases, the species involved is recorded in the accident detail section of the form. Many wildlife–vehicle collisions go unreported, especially those involving smaller wildlife species, because the collision does not involve property damage or human injury. Consequently, the impacts to small mammals and amphibians are generally unknown. In addition, animals may leave the roadway after a collision occurs and thus go uncounted.

Although the National Park Service does not systematically collect road-related wildlife mortality data, a 2007 servicewide survey of resource managers indicates that road-caused mortality significantly affects wildlife populations (Ament et al. 2008). In addition, the most recent available NPS crash data indicate a higher rate of crashes involving wildlife as compared to all public roadways nationally. From 1990 to 2005, wildlife–vehicle collisions were the leading cause of single-vehicle crashes in the NPS system and accounted for 10 percent of total vehicle crashes, which was more than double the 4.6 percent national average (NPS 2009, Huijser et al. 2008). Wildlife–vehicle collisions were the most common crash type in the Intermountain, Northeast and Southeast regions (NPS 2009).

Despite expressed concerns of the 106 park unit resource managers who responded to the 2007 survey, only one-third employed some form of mitigation to reduce road impacts on wildlife in their park (Ament et al. 2008). This low rate of implementation reflects the reality that the efficacy of any implementation strategy is dependent on the context of the site and area. Another deterring factor is the availability of funding to establish and maintain the mitigation strategy. The most common mitigation techniques currently in use within NPS park units include the use of wildlife signs, speed reduction and public education. Other measures such as wildlife crossings and associated fencing have been installed along non-NPS roads traversing national parks with high traffic densities, such as Big Cypress National Preserve and Glacier National Park. To date, wildlife crossings have not been installed on NPS-managed roads. Although often the most costly solution initially, wildlife crossings may reduce long-term operational costs for the National Park Service (Huijser et al. 2009).

Table 5-1. Known Threatened and Endangered Species at Risk as a Result of Road Mortality in NPS Park Units

Species Class	Species Common Names
Mammals	Lower Keys marsh rabbit, Key deer, bighorn sheep (peninsular California), San Joaquin kit fox, Canada lynx, ocelot, Florida panther, red wolf
Reptiles	American crocodile, desert tortoise, gopher tortoise, Alabama red-bellied turtle, bog turtle, copperbelly water snake, eastern indigo snake
Amphibians	California tiger salamander, flatwoods salamander, Houston toad
Birds	Audubon's crested caracara, Hawaiian goose, Florida scrub jay

VEGETATION MANAGEMENT

The transportation system and its users are a primary source for the introduction and spread of non-native species (plants and animals). This introduction and spread is a significant concern for the National Park Service because non-native species can disrupt natural processes and ecosystem functions and can dominate park unit aquatic and terrestrial areas. In some cases, non-native species can also block sight lines along transportation corridors and can cause safety and maintenance problems.

Vegetation management is an important but often overlooked aspect of transportation construction and maintenance projects. It not only supports healthy ecosystems and addresses climate change adaptation, but also it helps preserve and protect infrastructure investments and improves safety conditions. Vegetation management activities range from roadside mowing, tree trimming and hazardous tree clearing to native plant revegetation (maintaining biological integrity), non-native species control and proper movement and staging of heavy construction equipment.

GEOLOGIC RESOURCES AND HAZARDS

The National Park Service recognizes the importance of protecting geologic resources while making decisions about transportation. These geologic resources include natural landforms, such as canyons and valleys, unique rock formations, dunes, caves and karst systems, fossils and other paleontological resources, volcanoes, geothermal features, shorelines, glacial features, mineral deposits and abandoned mineral lands.

Aside from resource protection, a comprehensive understanding of geologic and environmental hazards is important to avoiding potential loss of life, assets and natural and/or cultural resources. Such hazards may result from many of the aforementioned resources, as well as other natural and human-made geologic hazards. For instance, natural geologic hazards can include mass movement (e.g., rockfall, landslides, debris flows, snow avalanches), earthquakes and associated slope instability and/or liquefaction, erosion related to coastal zones and hydrologic and weather-related hazards, such as hurricanes and floods. Human-made geologic hazards include weighting and/or undercutting of slopes, oil and gas wells, introduction or existence of hazardous materials, abandoned mineral lands and roadways built in geologically sensitive areas. Human-caused environmental hazards, such as hazardous material spills from freight movement, for example, are an important but often overlooked aspect of transportation construction and maintenance projects.

Although the National Park Service has resource inventories with data potentially relevant to transportation planning efforts, these inventories are not specifically designed to provide information on transportation system impacts or vulnerabilities related to geologic resources and environmental hazards. In most cases, additional data and studies are needed to answer site-specific, transportation-related questions and to evaluate the impacts associated with a specific (existing or proposed) transportation development.

WATER RESOURCES AND EROSION

Transportation systems impact water resources pervasively throughout the National Park Service. Surface transportation systems impinge on water resources in many ways, including surface water and groundwater flow modification, water quality degradation, degradation or loss of wetlands, drainage and impacts on marine organisms. Similarly, marine transportation systems can also affect water resources. For example, marine transportation systems can disturb fish and wildlife, modify habitat, destroy marine plants and introduce non-native species and lead to propeller contact and water pollution. Such impacts to water resources are particularly salient when affecting a wild and scenic river or designated study river, as they have special legal protections related to water quality, free-flowing condition, and the outstandingly remarkable values for which the river was set aside.

Because many transportation assets are sited next to rivers, streams, lakes and coastal environments, wetlands mitigation can become a significant component of NPS transportation construction activities. The National Park Service has a "no net loss of wetlands" policy, meaning that if construction within or adjacent to a wetland cannot be avoided by any practicable alternative, the disturbed areas' equivalent must be equally reclaimed as a wetland area in another location (NPS 2006). Additionally, management policies direct the agency to restore previously degraded or destroyed wetlands for a long-term net gain of wetlands across the National Park System (NPS 2006).

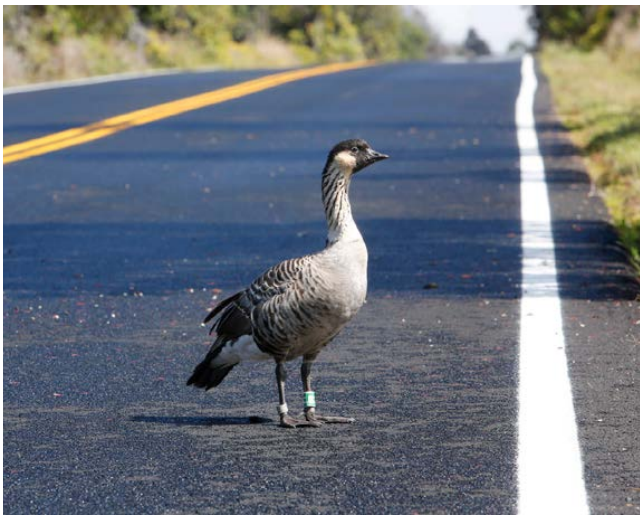
Erosion and shoreline modifications resulting from transportation infrastructure within riparian areas and alongside waterways also affect water resources and natural ecosystem processes. For example, with culverts and bridges, heavy precipitation can lead to scouring and the transport of sediments. The resultant influx of sediments into a waterway can degrade water quality, and erosion can create safety concerns for bridges. In some cases, erosion control and shoreline preservation measures are necessary for these roadways and transportation infrastructure, particularly where stream banks and retaining walls are in constant danger of being undermined. For this reason, erosion control measures, such as clearing roadside drains and ditches and fixing or replacing (e.g., resizing) culverts, are incorporated into a large number of transportation projects. Similarly, shoreline treatments, such as using appropriate vegetative covers, mitigate shoreline hardening and erosion and its effects on natural resources.

The INSTEP database will be used to inform cost-benefit discussion and will offer a source of best practices and sustainability guidance.

NATURAL RESOURCE CONSIDERATIONS IN TRANSPORTATION PROJECTS

The NPS Transportation Branch is currently developing the INSTEP tool for use in the planning, design, construction, operations and maintenance of transportation assets and systems. The INSTEP tool will involve scoring new transportation projects at various phases of a project—ranging from planning and predesign to construction and operations—to rate the project's ability to avoid, minimize or mitigate negative environmental impacts that assets and users cause. The score will help inform decision making and may uncover opportunities to create more sustainable transportation assets and operations and to incorporate innovative strategies. Such strategies may include implementing approaches informed by FHWA's Eco-Logical framework to coordinate landscape-scale ecosystem planning with transportation planning.

The INSTEP tool will enable the creation of a long-term, performance-based database containing project-level data. This database will be used to inform cost-benefit discussions. It will also offer a source of best practices and sustainability guidance and give the National Park Service a greater ability to monitor resource conditions identified in projects over a period of time. The INSTEP tool is currently in the pilot phase.



Hawai'i Volcanoes National Park

Cultural Resource Stewardship

NPS properties preserve a fundamental link between the past and present, and access to these resources ensures that individuals can learn about and appreciate their own history and the American story. Many NPS transportation assets are themselves cultural resources for park unit visitors to enjoy. These assets include national parkways, national scenic byways, national historic trails and national historic civil engineering landmarks. Assets may also be culturally significant because of their age, architectural or engineering significance, historical role or designation. Most of these culturally significant assets are in active use, such as the Blue Ridge Parkway and the Cuyahoga Valley Scenic Railroad, and in some cases, they are among the most used or heavily traveled parts of the NPS transportation network.

Culturally significant transportation assets are, by definition, different from other elements of the NPS transportation system. Culturally significant transportation assets are defined in NPS Director's Order 80: Real Property Asset Management. This directive describes these assets as having "an importance and significance above and beyond their originally intended functions, they are generally expected to be preserved indefinitely, and a primary part of the NPS mission is to protect and preserve their importance and significance." This mandate is well documented in the NPS Organic Act and in other bureau policies and guidance.

The relationship between cultural resources and the transportation system is not limited to transportation assets themselves. Several other cultural resource types both affect—and are affected by—the NPS transportation system. These cultural resource types include ethnographic resources, archeological resources, historic landscapes and United Nations Educational, Scientific and Cultural Organization World Heritage Sites. Because of the importance of cultural resources to the service, all transportation decisions should consider possible impacts to such resources.

Many NPS transportation assets are themselves cultural resources to be enjoyed by park visitors.

Cuyahoga Valley National Park

IDENTIFICATION OF CULTURALLY SIGNIFICANT TRANSPORTATION ASSETS

The National Park Service maintains inventories for many types of cultural resources, but most of these inventories are only documented at the regional or park unit level. Compilation of that data at a national level is often complicated by varying methods of data collection and storage. Cultural resource inventories also are not fully integrated with the asset databases that track asset condition.

The FBMS is the system of record for real property in the National Park Service. This database tracks asset inventory and historic status and works in conjunction with the FMSS to track asset condition and DM. The FBMS also provides the foundation on which transportation funding is prioritized as part of the CIS. Resource protection is a key consideration for funding prioritization at the regional level, and as such, the historic status of culturally significant assets, as reported in the FBMS, may grant them some priority over other assets. Consequently, it is important that these assets are consistently and correctly categorized in the FBMS.

The National Park Service has identified 3,935 culturally significant transportation assets servicewide, which represents approximately 18 percent of all NPS transportation assets (Table 5-2).[16] This number originates from two cultural resource databases—the List of Classified Structures and the Cultural Landscape Inventory. Collectively, these databases contain the most comprehensive, national-level list of culturally significant transportation assets in the service.

Table 5-2. Historic Transportation Assets, by Asset Category

Source: FMSS FY 2014 Year-End Data

Category	Federal Real Property (FRP) Historic Status	Total NPS Inventory	Percentage of NPS Inventory
Roads	1,338	7,700	17%
Parking Areas	893	7,900	11%
Road Bridges and Tunnels	817	1,460	56%
Trails	466	2,250	21%
Trail Bridges	115	950	12%
Trail Tunnels	25	40	63%
Constructed Waterways	16	30	53%
Marina/Waterfront	49	950	5%
Railroad Systems	137	250	55%
Transit Systems	N/A	130	N/A
Total	**3,856**	**21,660**	**18%**

[16] This FMSS data is reported by federal real property historic status, which includes four resource tiers: (1) National Historic Landmarks (NHL), (2) National Register Listed (NRL), (3) National Register Eligible and (4) Contributing to an NHL or NRL asset.

The National Park Service works to ensure consistency between the FBMS and cultural resource databases, but challenges remain. The primary challenge to data consistency is that cultural significance/historic status is not tracked to the same degree in both databases. In the FBMS, historic status is only noted at the location level (e.g., a roadway), not at the asset level (e.g., a feature associated with a location, such as a guardrail). Assets on the List of Classified Structures that are not associated with a List of Classified Structures listed location do not reflect that designation in the FBMS for asset prioritization purposes. For example, a historic stone guardrail (asset level) along a nonhistoric roadway (location level) would not automatically be recognized as having a historic status in the FBMS; that determination resides at the location level only. Currently, the FMSS database does not include all cultural landscapes listed in the Cultural Landscape Inventory; however, a four-year effort is underway to enter nationally significant cultural landscapes into the FMSS database. Accurate identification of all culturally significant transportation assets in the FBMS is critical for effective CIS prioritization.

CONDITION OF CULTURALLY SIGNIFICANT TRANSPORTATION ASSETS

The preservation of culturally significant assets is at the core of the National Park Service mission, and this holds true for transportation assets as well.

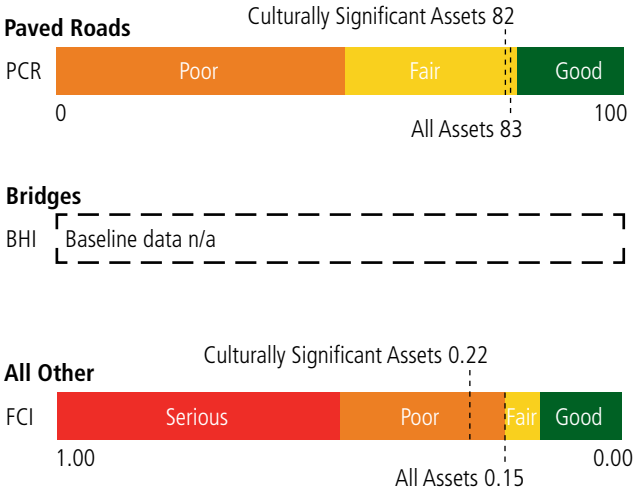
Due to ongoing efforts to better capture the condition of these assets in servicewide systems of records, baseline conditions data are not available for all asset categories. Efforts to compile a comprehensive baseline are underway and will be complete before the first update of this plan.

Based on available data, the National Park Service estimates that culturally significant roads and parking areas are in nearly equal condition to those not classified as culturally significant. However, culturally significant Other Transportation Assets are in average poor condition, in contrast to those not classified as culturally significant, which are in average fair condition. Servicewide data is not available for bridges (Figure 5-1).

For more information on transportation asset condition, refer to the Asset Management chapter.

Figure 5-1. Baseline Conditions of Culturally Significant Transportation Assets as Compared with All Transportation Assets

Sources: FMSS FY 2014 Year-End Data, 2015 NPS Pavement Condition Report



Climate Change Mitigation

GHG emissions, most notably carbon dioxide (CO2), contribute to the warming of the Earth's atmosphere. And a warming atmosphere significantly contributes to global climate change, which has implications both for the resources the National Park Service seeks to protect and the transportation systems that support visitation and other important park functions.

The National Park Service is taking action to address climate change by actively reducing its carbon footprint (volume of GHG emissions), reducing its criteria pollutant emissions and by raising public awareness of the causes and effects of climate change. In 2010, the service developed its *Climate Change Response Strategy* (NPS 2010) and an associated *Climate Change Action Plan 2012–2014* (NPS 2012c). The action plan sets the service's goals, objectives and actions related to climate change science, adaptation, mitigation and communication.

To formally address the GHG mitigation component of the climate change response strategy, the National Park Service developed the *Green Parks Plan* in 2012 (NPS 2012b). The *Green Parks Plan* establishes goals for energy conservation and GHG reductions servicewide.[17]

In addition to generating GHG emissions, the burning of gasoline and diesel fuels in cars and trucks results in the release of air quality pollutants, such as ozone, carbon monoxide, nitrogen dioxide and fine particulate matter, regulated under the Clean Air Act. Therefore, efforts to reduce GHG emissions from transportation in park units are likely to lead to reductions in these related air quality pollutants as well.

National Capital Parks-East

[17] Executive orders issued by the President on March 28, 2017, and by the Secretary of the Interior (Secretarial Order 3349), call for review of current mitigation policies to ensure they do not interfere with achieving energy independence.

NPS GHG EMISSIONS

NPS transportation activities account for roughly 35 percent of servicewide GHG emissions, but these emissions have increased slightly in recent years. In 2015, total transportation system emissions were estimated to be 132,000 metric tons of CO2 equivalent (MTCO2E), a reduction of 25 percent from the 2008 baseline.[18] Scope 1 and 2 emissions accounted for approximately 58,000 MTCO2E, while employee travel (Scope 3) accounted for 74,000 MTCO2E (Figure 5-2). Scopes 1 and 2 combined declined by approximately 22 percent from the 2008 baseline, while Scope 3 declined by approximately 28 percent.

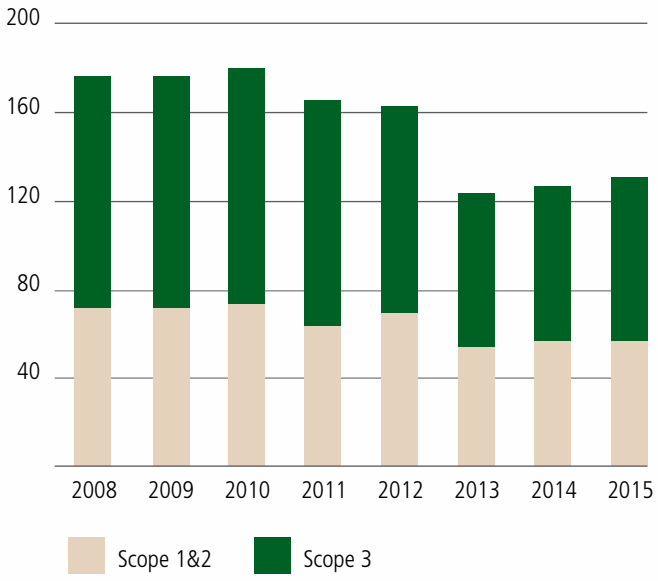
Scope 1
Emissions from sources that the National Park Service owns or directly controls. For transportation, Scope 1 consists of NPS fleet vehicles and equipment.

Scope 2
Indirect emissions from purchased electricity and heating, cooling and steam generation. For transportation, Scope 2 deals only with energy use in buildings that primarily serve a transportation system function.

Scope 3
Emissions from sources that the National Park Service does not directly control or own, but that are attributable to agency activities. For transportation, this scope includes employee travel (business travel and employee commuting).

Figure 5-2. Transportation GHG Emissions Estimates, 2008–2015 (In MTCO2E)

Source: National Park Service, Sustainable Operations and Climate Change Branch

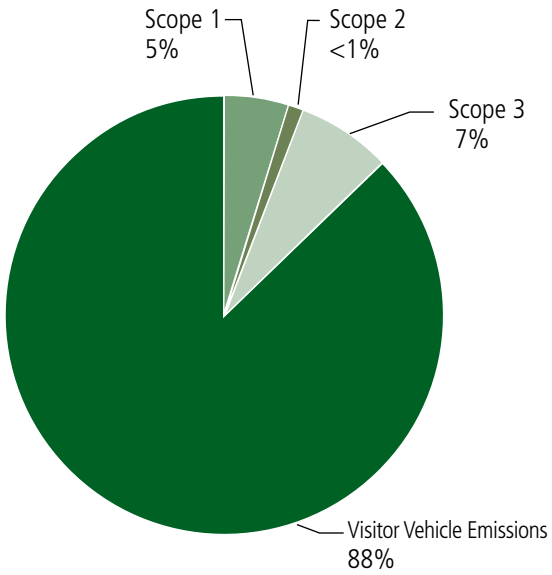


[18] Note: The federal government shutdown, which lasted from October 1 through 16, 2013, tightened agency travel restrictions, and natural disasters such as Hurricane Sandy contributed to a greater than expected rate of decline in transportation emissions in 2013.

VISITOR VEHICLE EMISSIONS

In addition to the GHG emissions from agency activities, visitors generate emissions when they use personal vehicles within park boundaries. Visitor vehicles are by far the largest source of GHG emissions within park unit boundaries. They were estimated to account for 890,000 MTCO2E in 2013 (Figure 5-3). Consistent with federal guidelines, the National Park Service does not include visitor vehicle emissions in its national GHG emissions reporting. However, the service is currently exploring methods to more accurately and comprehensively estimate, model and reduce visitor emissions without restricting access, including efforts to quantify the emissions savings that result from public transportation systems in place at many park units. Many units also provide nonmotorized transportation trails that support zero-emissions active transportation and traveler information systems that enable visitors to get around park units more easily and efficiently.

Figure 5-3. Estimated 2013 NPS Transportation Emissions, by Scope, Including Visitor Vehicle Emissions



The National Park Service is taking action to address climate change by actively reducing its carbon footprint.

National Capital Parks-East

GREENHOUSE GAS EMISSIONS MITIGATION

The *Green Parks Plan* sets objectives for addressing and reducing GHG emissions via park unit operations and planning. The plan establishes servicewide mitigation targets, which apply equally to transportation and other sectors. *Green Parks Plan* emissions targets address emissions that derive from direct and indirect NPS activities; the targets do not currently include visitor vehicle emissions.

The *Green Parks Plan* articulates the following transportation emissions reduction targets:

- By 2020, reduce Scope 1 and 2 GHG emissions by 35 percent from the 2008 baseline
- By 2020, reduce Scope 3 GHG emissions by 10 percent from the 2008 baseline.

Transportation emissions declined by approximately 22 percent for Scope 1+2 and by approximately 28 percent for Scope 3 from 2008 to 2015, demonstrating significant progress toward meeting the transportation sector's share of the *Green Parks Plan* reduction targets. However, it is notable that (1) the federal government shutdown (October 1 through 16, 2013), which tightened agency travel restrictions, and (2) natural disasters, such as Hurricane Sandy, contributed to a greater than expected rate of decline in transportation emissions in 2013.

Many NPS park units have begun to reduce their carbon footprint and to communicate the consequences of climate change through interpretive programs and educational materials. One hundred twenty park units participate in the Climate Friendly Parks program (NPS 2014b). This program, which the service initiated in collaboration with the EPA in 2002, aims to reduce park-related GHG emissions and inform the public about the climate-friendly actions each park unit is taking. As part of this program, park units develop and implement their own GHG emissions inventories and mitigation strategies. The program also provides park units with an opportunity to build a ground-up emissions inventory that could include more detailed estimates of visitor vehicle emissions.

Transportation emissions declined by approximately 22 percent for Scope 1+2 and by approximately 28 percent for Scope 3 from 2008 to 2015, demonstrating significant progress toward meeting the transportation sector's share of the *Green Parks Plan* reduction targets.

Although visitor emissions are not included in *Green Parks Plan* reduction targets, the plan seeks to encourage visitors to reduce their environmental impacts. Many park units have implemented practices to reduce both NPS and visitor transportation emissions without restricting access, including providing public transportation shuttles and nonmotorized transportation trails, using alternative fuels, purchasing more fuel-efficient vehicles and minimizing work-related travel. Park units also employ environmental management systems to systematically link environmental goals with park unit operations plans and activities. Expanding and encouraging these kinds of actions are important to the continued progress in reducing NPS transportation emissions.

Educating visitors and the NPS workforce about how their individual actions affect the environment is an important part of the service's approach to reducing transportation emissions. The My Green Parks website encourages NPS employees to take actions to conserve energy and decrease their carbon emissions (NPS 2012d). The service is also inspiring visitors to reduce their environmental impacts within and outside park unit boundaries. For example, the National Park Service developed a training program for interpretive rangers that provides tools to successfully educate visitors on the impacts of climate change and the role they can play in individual emission reductions. The service has also prepared the GreenRides Toolkit to assist park rangers in educational and outreach efforts to reach sustainability goals, including climate change mitigation. Through these efforts, visitors may be inspired to change their transportation habits both during their visit and afterward in their daily lives.

Yellowstone National Park

Meeting Resource Protection Objectives

Objective: Incorporate Natural and Cultural Resource Considerations into All Aspects of Transportation Decision Making and Operations to Avoid, Minimize or Mitigate Negative Impacts on These Resources

The National Park Service is committed to using context-sensitive solutions in planning and implementing its transportation systems to ensure that transportation assets impact as little as possible of their natural and cultural surroundings. Such context-sensitive solutions enable the service to preserve cultural and natural resources, while at the same time maintaining safety and mobility. Despite NPS efforts, its transportation infrastructure can have negative impacts on the quality and integrity of the natural and cultural resources that it is charged with protecting.

Improvements in the availability, consistency and use of natural and cultural resource data, including GIS-based spatial data, are needed to make informed decisions about transportation investments as part of the CIS. Several inventories exist for different types of natural and cultural resources; however, a lack of national-level guidance for data collection and management of these inventories often results in disconnected databases with limited utility for transportation planning.

Developing guidance for the effective management of natural and cultural resources is needed to maintain the long-term integrity of NPS transportation assets. In addition to consistent data, transportation planners also need best management practices to minimize and mitigate transportation impacts on natural and cultural resources, working at both local and landscape scales.

Yosemite National Park

Recommended Strategies

Natural Resource Stewardship Strategies

- Complete development of the INSTEP tool for planning, design, construction and O&M of transportation facilities and systems
- Coordinate existing NPS resource, law enforcement and facilities data systems to improve critical data collection and analysis gaps and develop guidance on how to collect, input and find relevant data
- Reduce wildlife–vehicle collisions and improve reporting of data to capture species type and locations of incidents
- Use geographic information systems-based natural and cultural resource data in the early stages of transportation planning and project development to identify areas of potential concern
- Implement approaches informed by FHWA's Eco-Logical framework to coordinate landscape-scale ecosystem planning with transportation planning
- Build and strengthen collaborative partnerships with state transportation agencies, regional planning organizations, and universities to coordinate mitigation measures, including design and placement of wildlife crossing infrastructure, and assist with improving air, sound and light quality within NPS park units and the surrounding areas
- Identify case studies and develop and disseminate guidance on best management practices to minimize and mitigate transportation impacts on natural resources

Cultural Resource Stewardship Strategies

- Improve cultural resource data collection and data management processes. Create servicewide guidance for data collection, along with a recognized cultural resource transportation asset definition to ensure proper collection and identification of those assets. In addition, create a direct link between the FMSS database and both the List of Classified Structures database, including both locations and assets, and the Cultural Landscape Inventory
- Develop and disseminate guidance on best management practices for preserving culturally significant transportation assets. This guidance should include special contract requirements and compatible design solutions for the treatment of culturally significant transportation assets.

Objective: Minimize and Mitigate the Greenhouse Gas Emissions of the NPS Transportation System

The National Park Service is taking action to address climate change by reducing its carbon footprint and by raising staff and public awareness through educational avenues. Transportation sources contribute 35 percent of overall NPS GHG emissions. Although the service has made significant gains in recent years at reducing GHG emissions from the transportation sector, further efforts to reduce emissions and sustain these cuts will be necessary for the National Park Service to meet its overall GHG emission reduction goals.

The National Park Service estimates total servicewide GHG emissions for national reporting and has started developing detailed park-level inventories through the Climate Leadership in Parks program. Over time, the service seeks to complete a comprehensive emissions inventory at the park unit level. Such an inventory will not only provide information for national reporting, but also detailed data for action at the park unit level.

Currently, the NPS GHG emission reduction targets do not account for visitor vehicle emissions. Although not directly under NPS control, visitor travel within park units is the greatest source of GHG emissions servicewide. The National Park Service seeks to better understand the factors that affect visitor vehicle emissions within park units and will continue and expand its interpretive efforts, investments and O&M decisions designed to reduce the carbon intensity of visitor travel.

Recommended Strategies

- Formalize a process for monitoring and reporting NPS transportation system emissions beginning with servicewide estimates and moving toward a comprehensive, bottoms-up inventory generated at the park unit level
- Set reduction targets for visitor vehicle emissions and pursue solutions to achieve those targets without restricting visitor access
- Gather and communicate successful actions that NPS park units or regions are taking to reduce NPS transportation system emissions

Measuring Performance

Performance Measure: Complete All Components of the INSTEP Tool for Use in the Planning, Design, Construction, Operations and Maintenance of Transportation Facilities and Systems

The National Park Service is committed by mission, agency best practices and federal law to provide visitor access to park units in a way that preserves resources for future generations. The INSTEP tool will help decision makers identify opportunities to create and manage more sustainable transportation assets and to incorporate innovative strategies to avoid, minimize or mitigate the negative environmental impacts that assets and users cause. When operationalized, the INSTEP tool will give the National Park Service a greater ability to conduct long-term, performance-based monitoring of resource conditions.

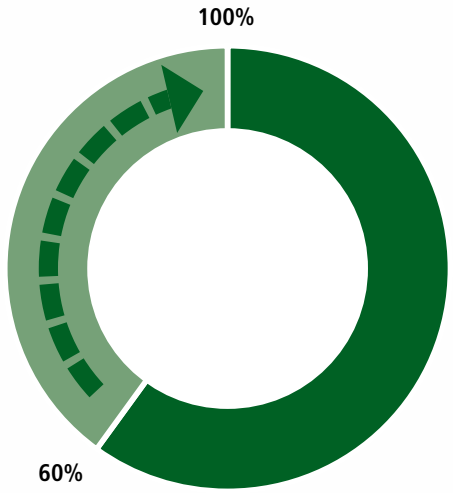
Baseline

The INSTEP process tool is currently 60 percent complete.

Target

100 percent completion of the INSTEP tool within 5 years (Figure 5-4). As transportation projects begin to use this tool, the National Park Service can review data collected through the tool and evaluate possible quantitative targets.

Figure 5-4. Illustration of the INSTEP Tool Performance Measure



Performance Measure: Develop a System for Tracking and Forecasting the Condition of Culturally Significant Transportation Assets

Preserving cultural resources and values for the enjoyment, education and inspiration of this and future generations is at the core of the NPS mission. Comprehensive information on the condition of these assets is not available at a national scale, but preliminary analysis suggests that they are at times in worse condition than the overall NPS transportation asset portfolio. Developing a system to comprehensively track and forecast condition of culturally significant transportation assets will enable the service to better gauge its performance in preserving these important resources (Figure 5-5).

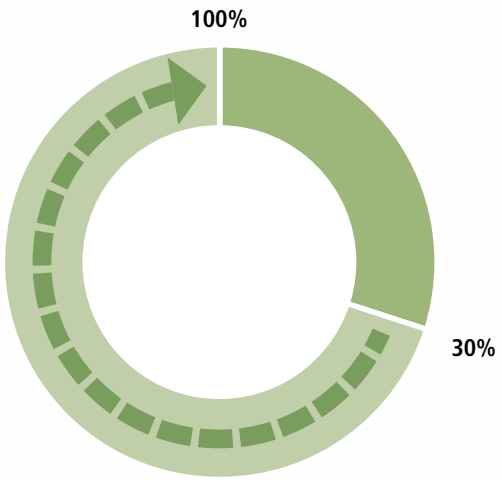
Baseline

30 percent complete.

Target

100 percent complete within five years.

Figure 5-5. Develop System to Track and Forecast Condition of Culturally Significant Transportation Assets Performance Measure



Performance Measure: Percentage Decrease in NPS Transportation System Emissions

As part of the NPS commitment to being a climate leader and in support of Executive Orders 13514 and 13693, the National Park Service is taking steps to reduce its GHG emissions. It is actively measuring, inventorying and reporting aggregate statistics for GHG emissions—from all sources—through servicewide reports. Individual NPS park units have also started creating their own GHG inventories using the Climate Leadership in Parks tool, and these park-level inventories often include estimates of visitor vehicle emissions.

Baseline

The performance measure, depicted in Figure 5-6, uses a 2008 baseline, which is consistent with required federal agency reporting under Executive Orders 13514 and 13693:

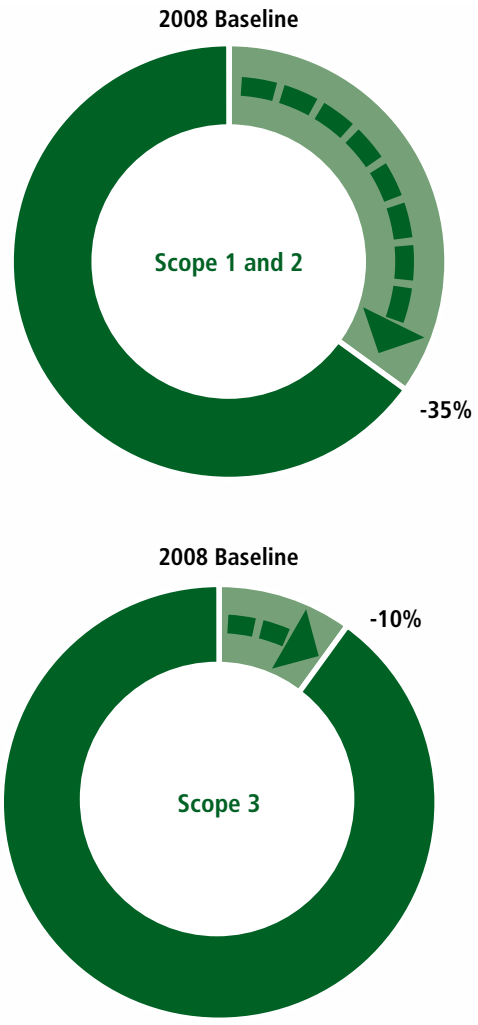
- Scope 1 and 2: 74,000 MTCO2E
- Scope 3: 104,000 MTCO2E.

Target

As shown in Figure 5-6, meet or exceed *Green Parks Plan* targets for Scopes 1, 2 and 3 for overall NPS greenhouse gas emissions:

- Scope 1 and 2: By 2020, reduction of 35 percent from the 2008 baseline
- Scope 3: By 2020, reduction of 10 percent from the 2008 baseline.

Figure 5-6. Transportation System Emissions Performance Measure



Glacier Bay National Park & Preserve

Visitor Experience

National Long Range Transportation Plan

Goal

Maintain and enhance the quality of visitor experiences

Objectives

Improve ease of access to and within national park units for all people

Create a range of appropriate transportation options that support a network of seamless connections within each park unit and to surrounding communities

Provide state-of-the-art traveler information and wayfinding and, where appropriate, interpretation and education opportunities that complement transportation options

Introduction

Transportation-related visitor experience is the perceptions, feelings and reactions a person has before, during and after a visit to a park. Visitors' experiences with transportation begin before visitors come into contact with transportation elements at park units, and they continue after trips are completed in the form of visitor recollections. When analyzing transportation-related visitor experience, it is important to consider the entire visitor experience cycle (Figure 6-1).

Everything about a transportation system—from its location, type and design—can strongly influence the quality of visitors' experiences. These experiences are also influenced by how visitors view available transportation opportunities and the quality of services provided at a park site. Visitor experience is an essential, albeit intangible resource to manage, maintain and enhance within every national park unit.

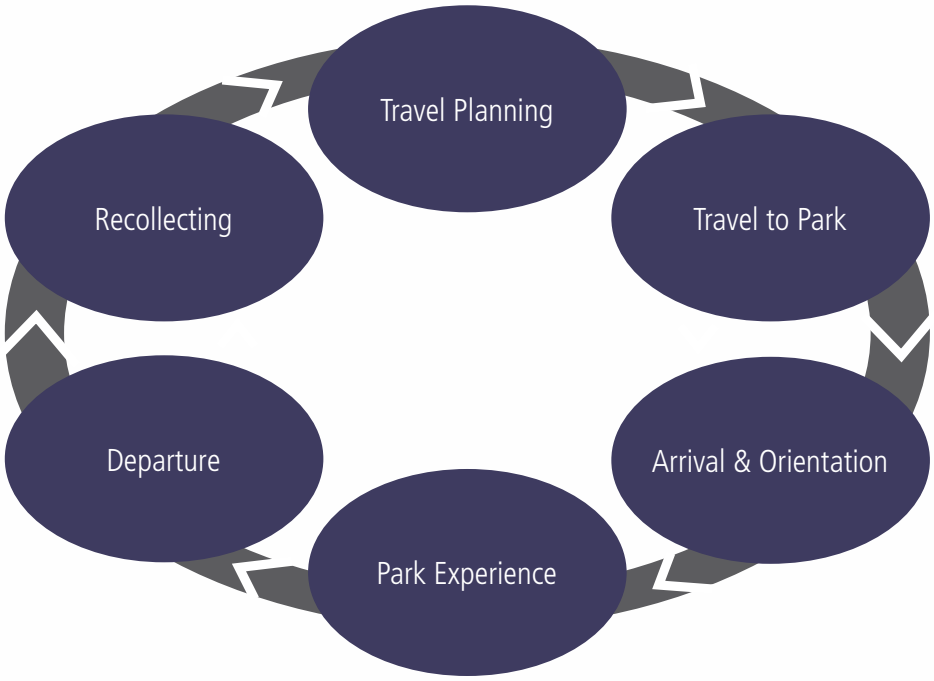
For many visitors, roads are a central part of the transportation-related visitor experience, and in turn, visitor experience is an essential element of roadway design. Unlike federal and state roads, park unit roads are not intended to provide fast and convenient transportation. Instead, they are designed to enhance the visitor experience. At the same time, they safely and efficiently accommodate park visitors and serve essential management access needs (NPS 1986). Yet roads are only one part of most park units' transportation network. Understanding the transportation-related visitor experience in its entirety requires understanding the NPS transportation network as a complete multimodal system.

While NPS transportation networks are primarily intended to serve park units and the visitors to those units, implications from these networks extend beyond park unit boundaries. Populations residing in gateway communities are uniquely tied to their neighboring park units and are directly affected by their day-to-day operations, including their transportation systems. Transportation can play a critical role in enhancing the economic and social well-being of gateway communities. Creating and maintaining a safe, reliable, integrated and accessible transportation network enhances choices for transportation users, provides easy access to employment opportunities and other destinations and promotes positive effects on the surrounding community.

The National Park Service is committed to developing and maintaining transportation assets and services that improve access to park units for all users and contribute to the enjoyment of park unit resources and values. This chapter addresses some of the topics that affect transportation-related visitor and user experience, including visitor use characteristics, demographic trends, transportation barriers to visitation, traveler information, transportation system usage and congestion management.

Figure 6-1. Visitor Experience Cycle

Source: NPS Public Use Statistics Office



Baseline Conditions and Macro Trends

Visitation and Visitor Use Characteristics

Characteristics of visitor use, which include the amount, type, timing and distribution of visitor activities and behaviors, help in understanding traveler trends, user transportation needs and influences on the experiences of visitors. The National Park Service has a great deal of information related to visitor use characteristics and visitation levels.

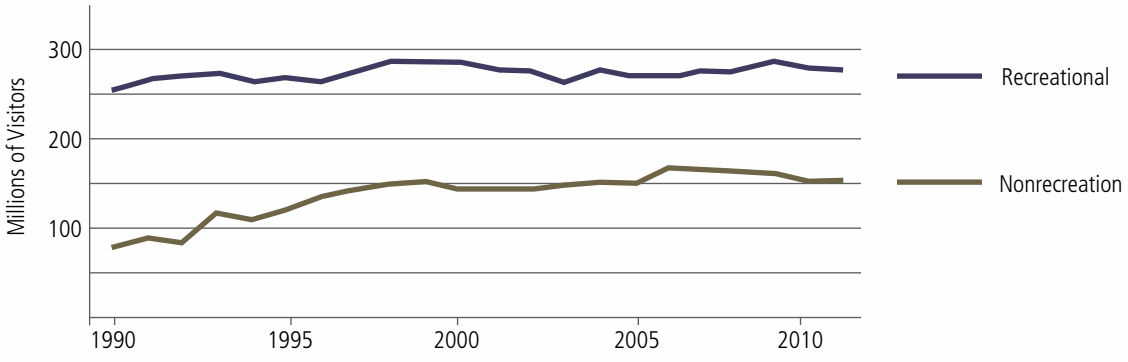
TOTAL VISITATION

The nation at large and the majority of states are experiencing significant growth in total population, as well as dramatic shifts in urbanization. At the same time, the US population is aging and diversifying. Amid this ongoing growth and change, total annual visits to federal and state parks have held steady over the past 20 to 30 years but have declined slightly on a per capita basis. NPS visitation mirrors these trends: It has had roughly constant visitation nationally over the last 20 years, but with notable differences between recreation and nonrecreation visitation (Figure 6-2). In 1990 total visitation to NPS park units, including recreation and nonrecreation visits was 335.2 million. Total visitation increased to 431 million in 2011. Over this time frame, recreation visits increased by 9 percent, while nonrecreation visits increased by nearly 92 percent (with much of the increase occurring before 2000). This increase in nonrecreation visits is largely the result of an increase in adjacent residential development and commuter traffic flows.

Recreation Visit
A recreation visit is the entry of a person onto lands or waters that the National Park Service administers for recreational purposes, excluding government personnel, through-traffic (commuters), trades persons or persons residing within park boundaries.

Nonrecreation Visit
A reportable nonrecreation visit includes commuters and other through-traffic, persons going to and from inholdings, including subsistence users, tradespeople with business in a park unit and government personnel (other than NPS employees) with business in a park.

Figure 6-2. Annual Visitation, 1990–2011
Source: NPS Public Use Statistics Office



Visitation trends over the past 20 years also differ across NPS regions. For example, the Alaska and National Capital regions have experienced substantial recreation visitation growth since 1990 (although much of the increased visitation in the National Capital Region is attributable to new monuments). The Pacific West and Southeast regions experienced stable recreation visitation over the same period, while the Intermountain and Midwest regions experienced declining visitation (Table 6-1).

Table 6-1. Change in Visitation by Region (1990–2011)
Source: NPS Public Use Statistics Office

Region	Recreation (in Thousands)	% Change	Nonrecreation (in Thousands)	% Change
Alaska	1,206	107%	9	1%
Intermountain	–1,648	–4%	1,756	24%
Midwest	–1,364	–7%	–182	–5%
National Capital	12,089	36%	52,089	413%
Northeast	6,742	15%	–360	–61%
Pacific West	110	0%	550	16%
Southeast	2,463	4%	24,788	52%

The quality of a user's experience specific to transportation depends on the needs of the individual or group using the transportation system or asset. Parks understand that different user types have different transportation needs. Recreation and nonrecreation visitors also have varying transportation requirements. For example, recreation visitors may value access to specific resources, such as trailheads and day-use areas, and because of this use pattern, they often need more traveler information and wayfinding guidance than nonrecreation visitors. In contrast, while nonrecreation visitors may also value scenic vistas, they primarily require efficient access through NPS lands. The different needs between these two user groups can, at times, create conflict, particularly on parkways and commuting routes where interactions between the two groups is most common.

VISITOR PROFILES

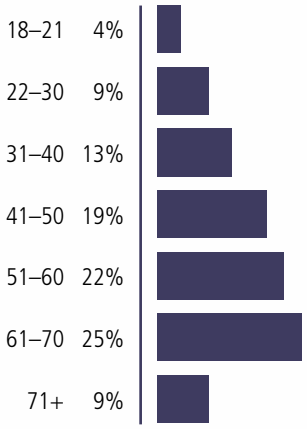
According to 2013 survey data from 330 park units, the majority of adult visitors are more than 50 years old (Figure 6-3) and a higher percentage are female (55 percent). In addition, national park unit visitation is not uniform across racial and ethnic groups. The majority of visitors are non-Hispanic and white (approximately 80 percent), with African Americans and Hispanic Americans visiting park units at lower rates (NPS 2011b). Expanding use of park units by diverse communities and young people is a key tenet in the NPS *A Call to Action* initiative and its *Healthy Parks, Healthy People* plan. Both plans outline specific strategies that the service will implement to improve awareness of and access to national parks units from these populations.

While the National Park Service collects a great deal of information related to visitor use characteristics and visitation levels, the data collected and the collection methodologies vary by park unit and tend to change over time. Having more detailed and accurate information about visitors and how they use park units—including visitor origins, the timing of visits, visitor patterns of use, visitor distribution throughout the park units and the information sources they use to plan their visits—would help the service ensure that transportation investment decisions are closely aligned with visitors' needs and desires.

Demographic Trends

Figure 6-3. Visitor Age Distribution*

Source: University of Idaho Parks Studies Unit 2013



*Because of to the data collection method, data for visits by persons under the age of 18 were not captured.

Age, race, and ethnicity—separately and together—have implications for transportation, resource protection and visitor experience. The United States is becoming multigenerational, with four generations active in the workforce and at least one additional generation on either side. The nation is becoming more multicultural as well, with Hispanics, Latinos and Asians growing at the fastest rates. The continued aging and diversification of the US population will in turn drive the future demands and needs of the NPS transportation system. For example, older visitors are more likely to have mobility and visual impairments than are younger visitors (Brault 2012).

Transportation infrastructure and associated travel information must be planned to meet the needs of all visitors. The nation's growing diversity may necessitate the use of more inclusive communication methods, while the increasing number of older visitors may require new accessibility considerations. Access improvements may also increase the likelihood of visitation from extended, multigenerational family groups.

Rocky Mountain National Park

Barriers to Visitation

TRANSPORTATION BARRIERS

Lack of transportation is an oft-cited obstacle to participation in outdoor activities, such as park unit visits. It is also a well-documented constraint for young people and especially young people of color (Payne et al. 2002). Studies show that children and youth under 16 take fewer trips, travel fewer miles and spend less time each day in vehicles. Compared to previous generations, fewer young adults are getting driver's licenses or buying cars. Instead, more are opting to share vehicles or use multimodal and alternative transit systems (Dutzik and Baxandall 2013). Similarly, adults over 65 take fewer daily trips, drive fewer miles and spend less time each day in vehicles. Understandably, a smaller percentage of senior adults drive and own vehicles than other adult age groups. Older adults also typically walk and cycle less and prefer closer and more accessible parking. Furthermore, findings from the second NPS Comprehensive Survey of the American Public (CSAP2) (NPS 2011c) indicate that the length of time it takes to travel to National Park System units acts as a deterrent to visitation. Lack of transportation can be a barrier to park visitation particularly for those parks that have limited transportation options. Efforts to remove or mitigate transportation barriers to NPS units and improve access, in combination with other outreach efforts, could lead to increased visitation from these fast-growing population segments.

ACCESSIBILITY BARRIERS

The National Park Service is required to comply with the Architectural Barriers Act (ABA) Accessibility Standards related to transportation. Yet because the standards for accessibility compliance have changed over the years, elements that may have formerly been compliant may now be considered noncompliant. Because of this change, NPS managers are being encouraged to apply the principles of universal design—the design of products and environments to be usable by all people to the greatest extent possible, without adaptation or specialized design.

According to a survey conducted in 2010 for the National Organization on Disability, people with disabilities are more likely than those without disabilities to consider inadequate transportation to be a problem in daily life (34 percent versus 16 percent) (Harris Interactive 2010). That statistic is inclusive of all forms of disabilities, including not only mobility impairments but also seeing, hearing and speech impairments; emotional or mental disabilities; and learning disabilities. Findings from the CSAP2 indicate that the accessibility of a park unit for people with disabilities does act as a physical barrier to visitation. Sixteen percent of people surveyed either "strongly agree" or "somewhat agree" that NPS park units are not accessible to persons with physical disabilities, and 13.9 percent neither agreed nor disagreed.

ADDITIONAL BARRIERS

Additional barriers beyond transportation, some of which are influenced by social and cultural factors, limit visitation to park units. CSAP2 respondents from racially and ethnically diverse backgrounds reported barriers and constraints at higher levels than their non-Hispanic white counterparts. While few non-Hispanic white visitors identified NPS units as unsafe, unpleasant or places where poor service was received, visitors from racially and ethnically diverse backgrounds were more likely to do so. Nonvisitors from diverse racial or ethnic backgrounds were even more likely to identify such factors as obstacles to visitation. Additional factors that play a role in nonvisitation to park units is a decline in nature-based play among youth and an increased fascination with video games and electronic media (Pergams and Zaradic 2006, 2008).

Traveler Information

Traveler information, wayfinding and signage are key transportation features that facilitate visitor travel to and within a park unit. Providing improved traveler information to potential visitors in advance of their trips may help to increase the public's awareness of NPS park units and ease their access when visiting a park unit. Effective traveler information and wayfinding signage improves visitor experiences because it helps visitors navigate a park unit with ease. In addition, providing information on traffic, available transit options and parking via websites or through variable message signs may help visitors avoid crowded locations and mitigate congestion.

Visitor traveler information needs may differ based on a park unit's location (e.g., rural, urban), environmental or geographic setting and the types of visitors it serves. Regardless of these differences, traveler information must satisfy a wide range of visitors. NPS partners, including gateway communities and tourism partners, play a critical role in providing traveler information to visitors.

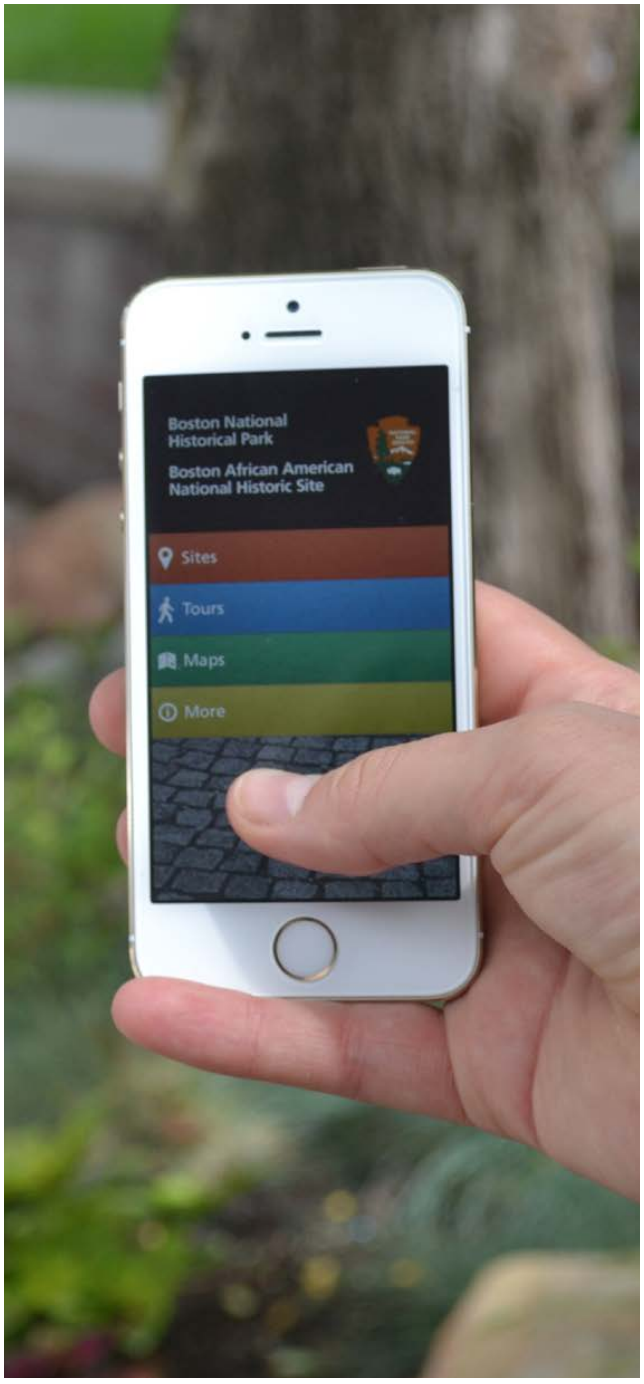
Park unit visitors receive traveler information via several methods, all of which may make planning a trip or navigating resources within a park unit easier. Roadside signs and park unit brochures are some of the most frequently used methods of communicating transportation information to NPS transportation system users. In addition, the service provides some traveler information to potential visitors electronically. For example, all NPS park unit websites have a "Plan Your Visit" section targeting visitors. This web page typically includes directions, maps and other information needed to plan a park unit visit. Currently, the NPS Office of Communications is updating these "Plan Your Visit" pages on park units' websites to drive consistency of content. It is also converting park unit websites to a new platform that will enable optimal viewing on mobile devices.

Advances in communication technologies are changing the way people access travel information. The traveling public continues to use global positioning system (GPS)-enabled smartphones in greater numbers. The ability of these mobile devices to provide on-demand, just-in-time, personalized information is approaching a cultural standard. Nearly 75 percent of smartphone users access real-time information, such as public transit schedules, current traffic conditions and directions to locations, on their devices (Pew Research Center 2012). These statistics suggest that potential visitors and visitors en route to NPS sites may want to use mobile devices to access park unit-related information or to receive pushed data for real-time routing, location data and visitor and emergency information. This increased reliance on obtaining directions or location information from GPS devices, especially smartphones, poses a certain level of risk for visitors within national park units. Because some GPS-enabled devices do not have accurate data for road systems or site locations within NPS park units, visitors can get lost if they rely solely on these devices for navigation. Cell reception and cellular data networks may also be unavailable or inconsistent in park units, so visitors may feel stranded if cut off from their main source of directions. In rare cases, these limitations have posed severe safety issues for visitors who need emergency assistance but cannot identify their location or contact help. For these reasons, many park units unit websites and maps (which are distributed at entrance stations) instruct visitors not to rely on GPS devices for navigation. Parks may also provide specific coordinates or names to enter into a GPS device to improve location accuracy. Park unit websites usually note a lack of cell reception if applicable.

In light of the rising use of smartphones and other mobile devices, a growing number of NPS park units are employing new technologies, such as mobile device applications and quick response codes, to distribute information to mobile devices and to integrate interpretation into the transportation system. In partnership with Great Smoky Mountains National Park, the Great Smoky Mountains Association created the nation's first NPS app. This free

app contains park unit guidebooks, road maps, (including off-line park unit road and route maps for use when a cellular signal or wi-fi is not available) and other material. Apps are available for both large park units, such as Zion National Park, Grand Teton National Park, the National Mall and Gettysburg National Military Park, and smaller units, such as the Cane River Creole National Historical Park. Several of these apps provide visitors with historical, cultural or environmental interpretation at NPS park units. The National Park Service is also partnering with Amtrak, which provides access to more than 237 park units, to develop free podcasts for select train routes. These podcasts provide interpretation on the history and sites of interest along the route.

A growing number of NPS units are employing new technologies, such as mobile device applications and quick response codes, to distribute information to mobile devices.



Boston National Historical Park/
Boston African American National Historic Site

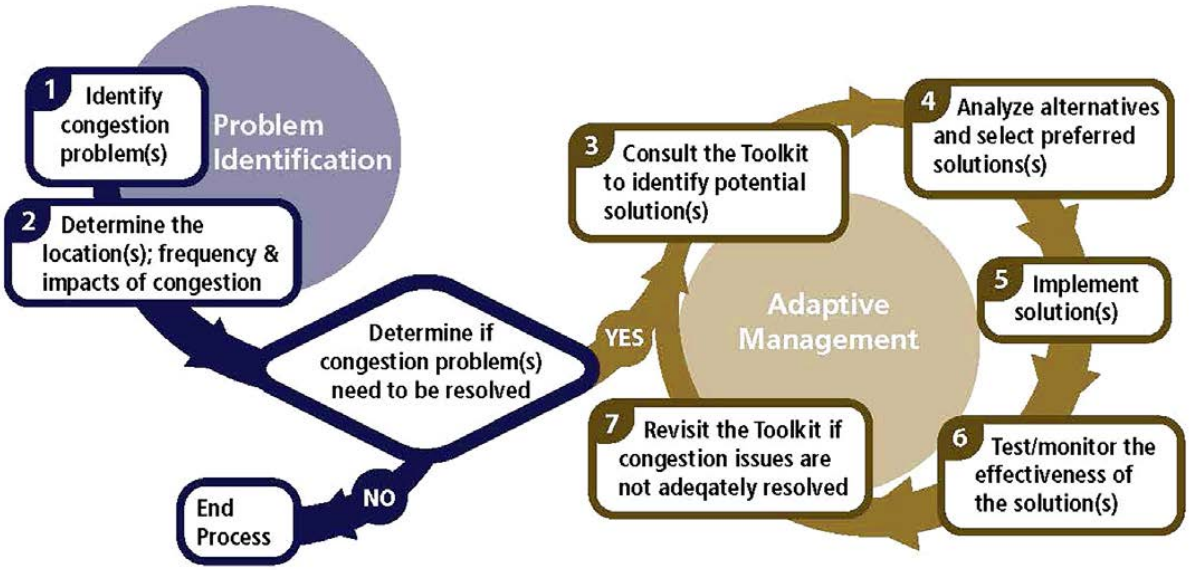
Congestion Management

Traffic congestion in some park units is a concern, particularly during peak daytime hours or peak tourist season. Congestion can be defined as a situation where the travel demand for an asset or service exceeds the capacity of that asset/service to handle the demand at performance levels considered acceptable to the asset/service users (Institute of Transportation Engineers 1997) or for the National Park Service, a situation where travel patterns negatively impact visitor experiences or park resources. The National Park Service recognizes that managing congestion produces benefits that help the agency fulfill its missions, including improved visitor experiences, reduced resource impacts and the opportunity to invest transportation funding more wisely.

Congestion is managed individually by park managers. NPS park units implement a variety of projects and management actions to reduce congestion based on the specific issues or challenges surrounding the causes of traffic congestion at a park unit. This approach of managing congestion, however, often does not look broadly at NPS transportation as a whole—regionally or subregionally— and can lead to less than optimal allocation of resources across the service. To address this issue, the National Park Service is developing a servicewide congestion management program in phases. This program will enable NPS managers at all levels to allocate resources more effectively to address congestion-related problems, starting with changes in operational and management strategies rather than large investments in additional parking and/or expensive shuttle systems (Figure 6-4).

The National Park Service is developing a servicewide congestion management program.

Figure 6-4. NPS Congestion Management Process



PHASE I

Phase I laid the foundation for the program, with technical memoranda documenting available data, users and needs and results from a 2010 servicewide park unit congestion survey. According to the 2010 survey, the most common strategies used to manage congestion are employing park rangers to manage traffic, managing special events, changing traffic circulation and adding remote parking lots with shuttle service.

The 2010 servicewide congestion management survey (NPS 2011d) provides information on the most important congestion-related issues throughout the entire National Park System. Of the 178 park units that completed the survey, nearly one half (49 percent) reported that they were currently experiencing congestion. The survey results documented congestion occurring in all park population centers (from rural to urban) and in all regions. Parks experience traffic congestion at a variety of times, including weekdays (including commuter peaks), peak season and weekends. Both recreational and non-recreational travel contributes to congestion.

NPS managers who responded to the survey identified specific types of locations where congestion was present in a park unit. The most frequent area of concern was parking areas, where 70 percent of park units are experiencing congestion (Table 6-2). The managers also identified specific time periods of congestion. The most frequently reported congested time period was the midday tourist period, followed by commuter peak periods.

Table 6-2. Location of Congestion in Park Units

Source: NPS 2011d

Location of Congestion	Percentage of Park Units (N=178 Park Units)
Parking areas	70%
Roadways providing access to park unit	41%
Visitor centers	34%
Park unit entrance stations	29%
Primary park unit vehicle tour routes	28%
Pedestrian loading areas	25%
Pedestrian paths/trails	23%
Other park unit attractions	21%
Trail heads	18%
Scenic overlooks	16%
Transit stops	13%

PHASE II

Using the results from the 2010 survey, Phase II of the congestion management program developed a congestion management toolkit for park and regional managers, with a new problem solving framework and a wide range of management and build solutions.

In addition to the toolkit Phase II also includes pilot congestion assessments (short-term technical support to relieve congestion conditions), an analysis of how existing data related to congestion can be used to manage and possibly predict congestion, and stakeholder outreach to the National Park Service, FHWA and other federal land management agencies. The identification of potential qualitative and quantitative performance measures will conclude the Phase II work.

Transportation System Usage

Many NPS units offer multimodal forms of transportation both to and within their boundaries; however, the private automobile remains the primary form of transportation visitors use to access most park units. The FHWA estimates that vehicles travel more than 2.4 billion miles on NPS roads each year.[19] This mileage equates to approximately 22 miles per vehicle based on 2010 visitation levels.

Despite the large role of the private automobile, the National Park Service supports alternative transportation systems and encourages multiple modes of transportation to and within park units. While it may not be appropriate or possible for all NPS park units to accommodate access to or travel within the park unit by multiple modes, NPS Management Policies 2006 (NPS 2006) states that "depending on a park unit's size, location, resources, and level of use, the [National Park] Service will, where appropriate, emphasize and encourage alternative transportation systems, which may include a mix of buses, trains, ferries, trams, and—preferably—nonmotorized modes of access to and moving within parks." To meet this requirement and provide access to diverse populations, the service maintains numerous alternative transportation systems, including shuttle/bus/van/tram systems, boat/ferry systems, planes, snowcoaches and trains/trolleys.

The National Park Service has also formed strong partnerships with local transit agencies and the private sector to provide connections between park units and gateway communities. Presently, 131 transit systems serve 66 park units. Of these systems, 85 percent are operated by non-NPS entities under an agreement or contract, where the National Park Service shares in the O&M costs of these systems.

In 2013, there were 26.9 million passenger boardings[20] across all transit systems serving NPS park units. More than half of all passenger boardings (67.5 percent) were on a shuttle/bus/van/tram and 29.5 percent were on a boat/ferry. Notably, boardings seem to be concentrated on a small number of transit systems. For example, approximately 80 percent of all boardings in 2013 were associated with only 10 transit systems. In contrast, the vast majority of the transit systems (71 percent) had fewer than 100,000 passenger boardings in 2013 (NPS 2014a).

The National Park Service has formed strong partnerships with local transit agencies and the private sector to provide connections between park units and gateway communities.

Grand Canyon National Park

[19] Extrapolated from a subset of 33 park units representing 63 percent of paved road miles for which vehicle miles traveled figures are available (FHWA 2008).

[20] A "passenger boarding" occurs each time a passenger boards a vehicle. This industry-standard measure is also known as an "unlinked trip" and is used in the Federal Transit Administration's National Transit Database.

Trends in Data Collection

Traditionally transportation planners rely on quantitative data about travelers and their transportation patterns. While the National Park Service collects a great deal of information related to visitor use characteristics, visitation levels and transportation-specific data, the data is neither consistent nor comprehensive across all park units.

For example, visitation data collection methodologies vary by park unit and tend to change over time. Collection methods include both direct visitor counts and proxies, such as vehicle counts. As part of the NPS Traffic Monitoring Program, there are permanent traffic counters at 34 park units; the Visitor Use Statistics Office uses traffic counters at an additional 206 park units. There are known inaccuracies with some traffic counters; the agency is currently developing guidance on how to improve traffic data collection. In addition, data is inconsistent across all park units on visitor origins, the timing of visits, their patterns of use and distribution throughout park units or the information sources they use to plan their visits. Similarly, although some individual park units and their respective local and state transportation partners collect transportation-specific data, there are no comprehensive data at the national level exists for automobile travel, such as vehicle miles traveled, level of service, time spent in congestion and parking occupancy. No comprehensive data on bicycle and trail use is available. Having more detailed and accurate information about visitors and how they use park units would help the National Park Service ensure that transportation investment decisions are closely aligned with visitors' needs and desires.

The increasing availability of innovative technologies to collect data could provide the National Park Service with a more efficient means for collecting more data to strengthen its transportation planning. Gathering basic information on traffic frequency and speed is becoming easier and less costly because of new traffic-counting devices. Likewise, with the growing use of GPS-enabled smartphones, a new method is emerging for collecting traveler information. These devices can accurately provide location and traffic data, such as travel time, speed, acceleration, direction of travel and mode of travel. Agencies are increasingly using crowdsourcing—the practice of obtaining needed services, ideas or content by soliciting contributions from a large group of people—to gather data and inform transportation planning and programming decisions. In addition, advances in ITS and connected vehicle technologies are improving the collection and management of real-time, multimodal transportation data. These new technologies and crowdsourcing methods could provide the National Park Service with the ability to collect consistent and comprehensive transportation-related data.

Yellowstone National Park

Meeting Visitor Experience Objectives

Objective: Improve Ease of Access to and Within National Park Units for All People

Poor accessibility for people with disabilities and older visitors acts as a barrier to visitation. In addition, many park units experience traffic congestion during peak periods, which can negatively influence visitor experiences and impede visitor access to resources.

Improving access to park units, particularly for urban residents, minority communities and people with disabilities, is a key goal outlined in several NPS plans and initiatives, including *A Call to Action*[21] and the *Healthy Parks Healthy People* plan. By reducing transportation barriers and managing congestion, the National Park Service can, at the same time, increase access to opportunities for enjoyment, education and inspiration of this and future generations.

Recommended Strategies

- Further develop a congestion management program that provides a programmatic approach to understanding and alleviating the highest priority congestion issues
- Implement Phase II of the congestion management program
- Identify specific challenges and opportunities associated with connecting communities to park units, particularly for urban residents, minority communities and people with disabilities
- Encourage and support NPS regions in developing cluster plans to promote transportation linkages between urban park units in close proximity
- Build partnerships with gateway communities and partners to ensure that the transportation systems within and adjacent to NPS boundaries are accessible to mobility-restricted individuals and persons with disabilities
- At the discretion of regional transportation programs, support park units in conducting assessments of the physical and programmatic barriers to using the transportation system and preparing self-evaluation and transition plans to address those barriers. These self-evaluation and transition plans will include identification of barriers, solutions for barrier-removal, prioritization and associated time frames for removing those barriers
- Develop and deliver a comprehensive education and training program to all NPS staff, their USDOT partners responsible for transportation contracts and relevant stakeholders on accessibility compliance and the principles of universal design. The education program will include the development of suggested contract language

[21] *A Call to Action* objectives that are relevant include In My Back Yard, Parks for People, Follow the Flow and Stop Talking and Listen.

Objective: Create a Range of Appropriate Transportation Options that Support a Network of Seamless Connections Within Each Park Unit and to Surrounding Communities

The mode(s) of transportation used to reach and explore a park unit plays a major role in visitors' experiences. Each transportation mode offers a unique kind of experience to visitors, and visitors make travel mode choices based on a wide variety of individual considerations—from desired activities and time available to past experiences with alternative transportation. Providing a range of transportation options, as appropriate for a particular park unit, has value to visitors, regardless of whether those options also serve other purposes, such as reducing congestion, lowering emissions and preserving natural resources. While management strategies can influence mode choice in visitors, providing the highest possible degree of choice to visitors can enhance the quality of their experiences.

The National Park Service strives to provide an efficient transportation system that consists of well-designed roadways, transit operations, and pedestrian and bicycle connections, with convenient linkages to regional road networks, transit, and pedestrian and bicycle systems. However, in doing so, the service needs to also meet the asset management and transportation finance objectives outlined in this report. As such, when creating any new transportation option, the service must consider the anticipated life-cycle costs of new investments and ensure that it has the capacity to maintain the asset in good operating condition.

Currently, a lack of data about visitors and their use of the NPS transportation system is constraining the service in its transportation planning abilities. In an attempt to gain additional visitor information, the National Park Service, in coordination with other federal land management agencies, developed questions to help park units collect qualitative and quantitative information on the public's perceptions, experiences and expectations related to transportation conditions, services and recreation opportunities on federal lands. Having more detailed and accurate information about visitors, their perceptions and expectations of NPS transportation systems and their travel patterns and behaviors will help park units make better investment decisions and measure the impacts of their transportation planning and programming decisions. It will also improve visitor experiences by ensuring that park unit transportation investment decisions are closely aligned with visitors' needs and desires, as appropriate.

Recommended Strategies

- Define and implement a consistent servicewide methodology for collecting data on visitor and employee transportation usage, including use of transit, pedestrian and bicycle trails, vehicle traffic volumes and vehicle miles traveled within park boundaries
- Coordinate with gateway communities and partners to identify existing transportation gaps and to provide multimodal options to improve connectivity to park units
- Support regions and park units in pursuing discretionary funding opportunities, such as Federal Transit Administration grant programs, to address gaps in nonmotorized connections and between modes
- Develop and disseminate best practice examples of methods to safely turn pedestrian or bicycle access into viable transportation options, such as improving infrastructure and signage

Objective: Provide State-of-the-Art Traveler Information and Wayfinding and, Where Appropriate, Interpretation and Education Opportunities that Complement Transportation Options

Comprehensive, reliable and accessible traveler information enhances recreational access and promotes travel and tourism to NPS park units. Traveler information is also an important tool for connecting with visitors during several phases of the visitor experience cycle. Because visitor satisfaction is strongly tied to expectations, disseminating traveler information prior to visitor arrival can prepare visitors for satisfying experiences. In addition, technology and social media are playing a vital role in interpretation and education and can enhance the transportation experience and support visitors' recollection of a positive park unit experience.

The traveling public's increasing reliance on GPS-enabled smartphones is changing social expectations for accessing real-time, accurate and relevant information. The NPS *A Call to Action* acknowledges the need to use leading-edge technologies and social media to effectively communicate with the public. In doing so, it calls for transforming the NPS digital experience to offer rich, interactive, up-to-date content from every park unit and program. Similarly, the *America's Great Outdoors: A Promise to Future Generations* report and the *National Travel and Tourism Strategy* (Task Force of Travel Competitiveness 2012) speak about the important role that comprehensive, reliable and accessible traveler information can play in enhancing recreational access and promoting travel and tourism to national park units.

Currently, the National Park Service does not fully understand how visitors to national park units prefer to receive information. Gaining a better understanding of how visitors use park unit transportation-related information will enable more strategic investments for both information and communication technologies.

Recommended Strategies

- Conduct research to better understand visitor trip planning habits to inform efforts to develop trip planning tools and resources
- Develop a servicewide approach to disseminating traveler information on mobile devices
- Develop guidance for park units on how to use technology to improve traveler information and interpretation for different area classifications and visitor characteristics
- Collaborate with partners to provide park unit traveler information, such as site traffic and road conditions, weather-related delays, facility closures and parking conditions, within local and regional traveler information systems
- Create a standard format for the "Plan Your Visit" section of nps.gov that systemizes the availability of essential traveler information across all park units

Measuring Performance

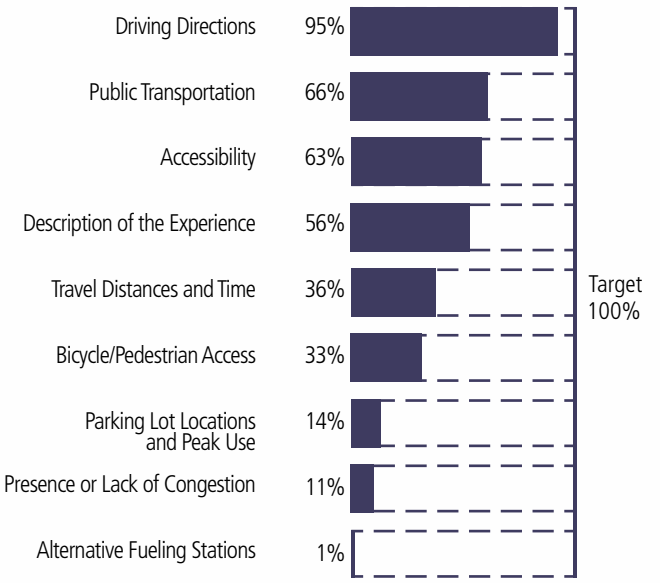
Performance Measure: Percentage of Park Unit Websites that Provide Nine Elements of Essential Traveler Information

Visitor satisfaction is increased when visitors' expectations are met. Providing detailed information about a transportation system and a description of the transportation experiences at a park unit can help establish accurate expectations. An April 2014 review of the Plan Your Visit portion of the then 401 NPS park unit websites indicated that park units do not currently provide the level of comprehensive traveler information recommended. Ensuring that all park units provide essential traveler information (as defined by the elements listed under Baseline below) is a critical milestone in achieving the objective of providing state-of-the-art traveler information.

Baseline

Less than one percent of park unit websites provided information on all nine of the following traveler information elements as of April 2014. Several websites provided one or more of these elements, as shown in Figure 6-5.

Figure 6-5. Park Unit Websites Information Provided



Driving Directions: detailed driving directions to access a site, including recommended address or latitude/longitude coordinates to enter into a GPS-enabled device

Public Transportation: information on how to access the park unit via motorized alternative transportation, as well as alternative transportation modes that are available for travel within the park unit; if the unit is not accessible via alternative transportation, this should be noted on the website

Accessibility: information on whether the transportation system (including both motorized and nonmotorized portions of the system) is accessible to individuals with disabilities

Description of the Experience: description of what a visitor should expect to experience when using the park unit's transportation system

Travel Distances and Times: driving times between sites within the park unit

Bike/Pedestrian Information: information on how to access the park unit via nonmotorized transportation, as well as nonmotorized alternative transportation modes that are available for travel within the park unit; if the unit is not accessible via nonmotorized transportation, this should be noted on the website

Parking Lot Locations and Peak Use: information on parking lot locations and accommodations (e.g., regular spaces, accessible spaces, RV spaces), as well as information on parking lot peak use/availability

Presence of Lack of Congestion: information on the typical presence or lack of congestion at specific locations or at times of the year/week/day

Alternative Fueling Stations: link to the Department of Energy Alternative Fueling Station Locator.

Target

100 percent of park unit websites provide information on all nine of the listed traveler information elements (as appropriate) within five years.

Performance Measure: Completion of Phase II of the NPS Congestion Management Program

Completion of Phase II of the congestion management system will enable the service to develop a programmatic approach to understanding and alleviating the highest priority congestion issues. Applying this programmatic approach at the project and program levels will help the National Park Service better understand how and when to invest funding in congestion management to improve the visitor experience and reduce impacts to natural, cultural, historic and other park resources.

Baseline

75 percent complete.

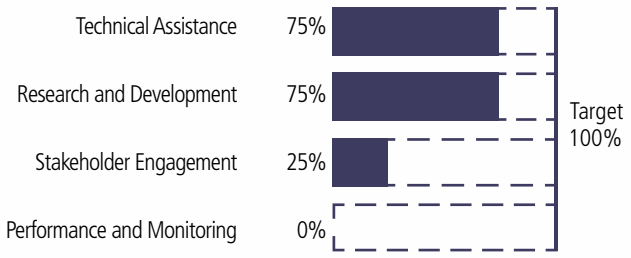
Target

100 percent complete in 2017.

As shown in Figure 6-6, progress toward completion of the congestion management program will be tracked in four categories:

- Technical assistance: diagnostic and treatment help desk (congestion assessments)
- Stakeholder engagement: internal and external communications
- Performance and monitoring: congestion projects evaluation results
- Research and development: congestion performance measures/indicators/thresholds.

Figure 6-6. Congestion Management Program Status



Performance Measure: Percentage of Transportation Contracts and Projects that Include Accessibility Language and Are Compliant with Accessibility-Related Laws, Regulations and Policies

Poor accessibility for people with disabilities can act as a barrier to visitation. The National Park Service is committed to making all practicable efforts to make NPS transportation assets and services accessible and usable by all people. Incorporating accessibility requirements into all transportation-related contracts and ensuring that they comply with accessibility standards and requirements, including the ABA Accessibility Standards and Sections 504 and 508 of the Rehabilitation Act of 1973, will help ensure that NPS transportation infrastructure and systems are designed and constructed to be accessible and usable by all people, thereby improving ease of access to and within national park units.

Ensuring that all new transportation assets and programs, including rehabilitation, upgrade and expansion projects, comply with accessibility standards and requirements, including the ABA Accessibility Standards and Sections 504 and 508 of the Rehabilitation Act of 1973, will help the National Park Service to meet its goal of improving the ease of access to and within park units for all people.

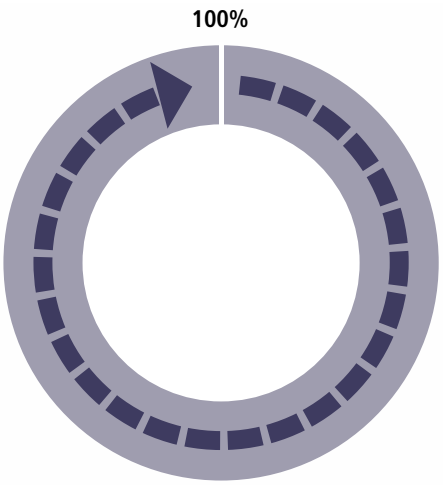
Baseline

Baseline data is not available for this performance measure.

Target

100 percent of transportation projects and contracts in compliance within five years, as shown in Figure 6-7.

Figure 6-7. ABA Accessible Transportation Contracts and Projects



Zion National Park

Safety

National Long Range Transportation Plan

Goal

Provide a safe transportation system for all users

Objectives

Institute a comprehensive, performance-based transportation safety program that addresses engineering, education and enforcement

Reduce serious and fatal transportation-related injuries

Maximize safety without impairing park resources and values

Enable effective emergency response

Introduction

The National Park Service, as the steward of our nation's special places, offers a unique environment for operating transportation systems. Many transportation assets are built, maintained and operated to complement the natural and cultural resources that surround them and to promote the intended visitor experience of the park unit. In this environment, the service must maximize transportation safety within the context of preservation and resource management. In some cases, context-sensitive design deviates from industry-standard safety practices, such as historic stone barriers, lane widths or lighting levels. In its planning, the National Park Service strives to be context sensitive in transportation design and operations while ensuring that appropriate safety mitigation measures are in place.

Visitor and workforce safety are among the highest NPS priorities, and transportation is a significant source of risk to the safety of NPS transportation system users. The most recently compiled safety data shows that an average of 6,900 crashes occur each year on NPS roads, and 20 percent of these crashes resulted in an injury or fatality (NPS 2009). Motor vehicle crashes are a leading cause of death for visitors and a major source of injury for NPS employees.

Although individual park units manage safety for their transportation networks, the National Park Service lacks an effective motor vehicle crash data collection system and comprehensive transportation safety guidance to support planning and programmatic decision making servicewide. Efforts are underway to establish a performance-based approach to transportation safety management; however, gaps in crash data reporting and analysis have slowed this effort. To address this issue, the service is committed to developing an industry-standard transportation safety management system built on improved crash data. Improved data collection and multidisciplinary performance-based planning approaches that consider education, engineering, enforcement, emergency services and resource stewardship will allow the service to improve prevention strategies and increase safety on its transportation networks.

Baseline Conditions and Macro Trends

Improving the Transportation Safety Program

Some of the most important measures of transportation safety are the number and rate of system user fatalities, injuries and crashes. To reduce fatalities, injuries and crashes, transportation safety professionals need modern transportation safety management systems to more effectively target prevention efforts.

The current NPS Transportation Safety Program prioritizes safety projects based on their effectiveness in reducing the number and severity of crashes. The National Park Service is required and directed in NPS Management Policies 2006 (NPS 2006) to use crash data to inform decision making related to transportation, law enforcement, emergency response and other related programs (Code of Federal Regulations, National Park Service Management Systems, Title 23, Section 970.212). Data analysis about where, when and why crashes occur in NPS park units are the foundation to an industry-standard transportation safety program enabling the service to make programmatic, performance-based decisions.

The National Park Service has been collecting crash records to assist in managing roadway safety for decades. The service's most complete, national crash data was compiled between 1990 and 2005 and covers 222 park units. This data was compiled in the legacy Servicewide Traffic Accident Reporting System database. Since 2005, individual park units have continued to collect crash records, but those records had not been compiled into a national dataset until recently. The Traffic Accident Reporter database contains crash records that park units collected between 2006 and 2012. The database contains records from park units and covers more than 90 percent of all crashes during that time period.

The current system of record for crash information is the IMARS. This DOI system is a relatively new system for reporting law enforcement incidents, including motor vehicle accidents in NPS units. However, the IMARS crash module, which contains detailed crash information, has only recently been implemented.

To strengthen its Transportation Safety Program, the service is developing a comprehensive transportation safety management system. This system will bring together data on crashes, traffic volume, roadway features and condition to identify the most cost-effective opportunities to improve safety. Building this comprehensive transportation safety management system is essential to all NPS safety programs. The Transportation Safety Program will use information from the transportation safety management system, along with best practices and safety research, to identify policies and practices to reduce the number and severity of transportation incidents.

The NPS Transportation Safety Management System is the system that will serve as the foundation of the Transportation Safety Program. The system includes the following components:

- A crash data system
- A traffic data system
- A crash analysis system
- A data-driven project programming and delivery system
- A performance measure tracking system.

Together, these systems will provide the critical information needed to support data-driven programmatic safety decisions.

The NPS Transportation Safety Program develops and deploys safety initiatives. This program will use data outputs from the transportation safety management system, best practices and safety research to identify policies and practices to reduce the number and severity of transportation incidents.

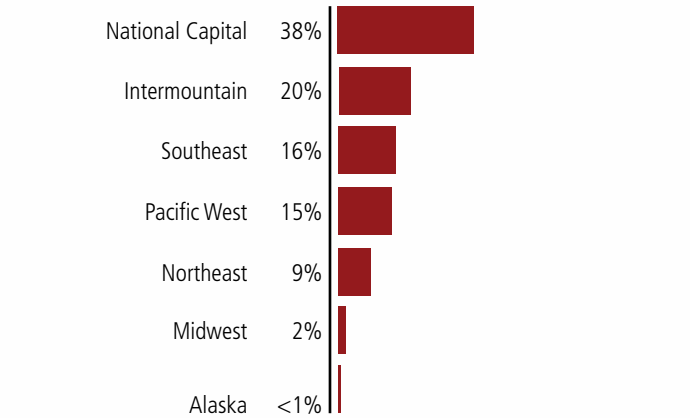
Crash Overview

Between 1990 and 2005, 110,067 vehicle crashes were reported in NPS park units, and more than 20 percent of those crashes resulted in an injury or fatality.[22] During that same period, 21,448 injury crashes resulted in 32,894 injuries, and 673 fatal crashes resulted in 800 fatalities on NPS roads. There were more than 1,600 vehicle crashes involving pedestrians or bicyclists on NPS roads during the same period, and nearly half of those resulted in injury or fatality.[23] Between 1990 and 2005, there was a yearly average of 6,900 vehicle crashes resulting in an average of 50 fatalities and 1,300 injuries on the NPS road network. These statistics make motor vehicle crashes the second leading cause of death among visitors and a major source of employee injury.

Crashes are not evenly distributed across park units and regions (Figure 7-1). Nearly three quarters of all NPS crashes occurred within 33 parks. Regionally, the percentage of total crashes was highest in the National Capital Region, where 38 percent of all NPS vehicle crashes occurred (Figure 7-1). The National Capital Region experiences higher traffic volumes within park units and contains more parkways than other regions, which may explain the higher crash percentages. Commuters in the Washington, DC metropolitan area are the most common travelers on five of the major parkways the service owns and operates, a use that was not intended or anticipated when these parkways were originally designed and built.

Figure 7-2 and Figure 7-3 summarize the types of collisions servicewide from 1990 to 2005 for all crashes and for fatal and injury crashes, respectively.

Figure 7-1. Percentage of Systemwide Crashes, by NPS Region (1990–2005)



Effective, consistent and continuous traffic law enforcement plays an important role in reducing traffic accidents and improving transportation safety.

[22] All crash data is derived from the NPS Servicewide Traffic Accident Reporting System as reported in the 2009 internal NPS report, *NPS Traffic Safety Overview*, unless otherwise noted. Current NPS servicewide crash data is limited to on-road motor vehicle crashes. Some regions collect multimodal crash data, such as the Alaska Region, which is collecting such crash data to implement one of its LRTP performance measures. Multimodal crash data will be incorporated into LRTPs as it becomes available.

[23] Bicycle and pedestrian data were extracted and analyzed from the 1990–2005 Servicewide Traffic Accident Reporting System database. Methodology for the analysis of these data is included in the *National Long Range Transportation Plan Safety Technical Report*.

Figure 7-2. NPS Systemwide Type of Collision for All Crashes (1990–2005)

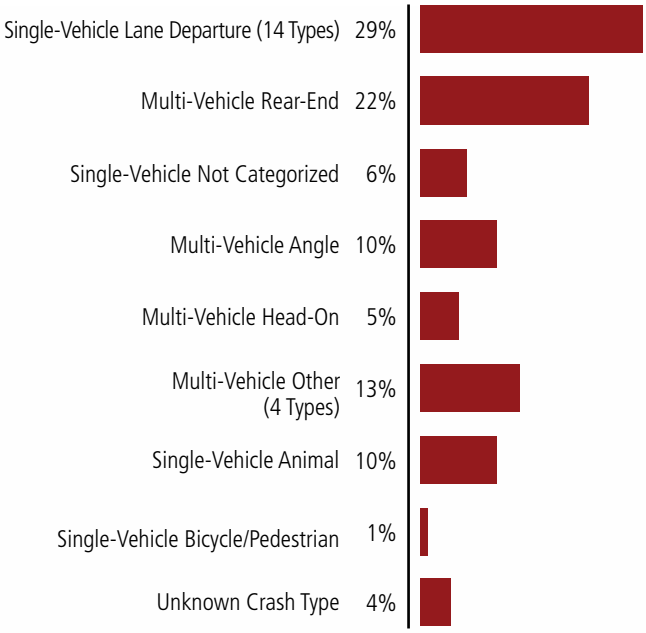
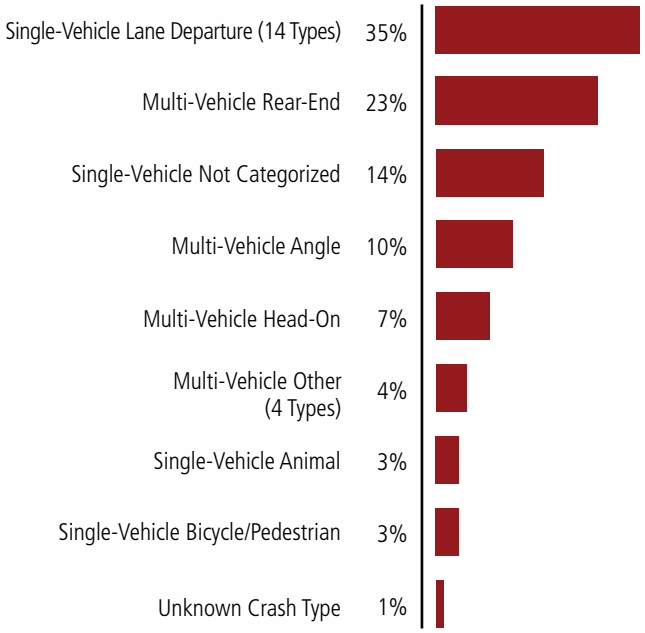


Figure 7-3. Type of Collision for Fatal and Injury Crashes (1990–2005)



Canyonlands National Park

Emergency Response and Evacuation

Timely and proper treatment of transportation incidents is essential for improving victim survival and recovery. Transportation plays an essential role in providing access for emergency response vehicles and a means to evacuate visitors and employees in an emergency situation. On average each year, the NPS Search and Rescue and Emergency Medical Services carry out more than 4,000 search and rescues and respond to more than 14,400 emergency medical events in park units. Coordination, including establishing jurisdictional roles, with outside law enforcement and first responders is essential. Although some larger NPS units employ their own emergency personnel, many NPS units rely on partner organizations (primarily state or local governments) to perform emergency services. For example, sharing road data and maps with well-marked evacuation routes for emergency vehicles improves first responders' ability to locate and rescue visitors in need. Including emergency response and evacuation considerations in park unit transportation plans will also improve response times and help improve the health outcomes for those who suffer injury.

NPS transportation facilities play an essential role in providing access for emergency response vehicles and a means to evacuate visitors and employees in an emergency situation.

Lake Mead National Recreation Area

Example Prevention Strategies from the Four E's of Transportation Safety

Comprehensive safety strategies are developed around four major components of highway safety referred to as the four E's. Effective strategies that address all four components can be tailored to respond to locally identified problems at each park unit. The following example prevention strategies cover each of the four major components of highway safety being employed at NPS park units.

EDUCATION

Safety information helps visitors understand transportation safety risks and comply with posted laws and safety best practices. Safety education, for example, can inform drivers about the rules of the road and roadway conditions or advise them on making good choices, such as not texting while driving and wearing a seat belt. Park units are employing high-visibility educational strategies, including increased or enlarged signage and ITS strategies, such as dynamic message signs, traffic safety checkpoints and public relations campaigns. US Park Police in the Maryland, Virginia and Washington, DC areas participate in the "Smooth Operator" program to combat aggressive driving. As part of this campaign, enforcement waves coincide with media blitzes to inform and educate the public about the dangers of aggressive driving.

ENGINEERING

Engineering incorporates safety countermeasures on roadways to reduce the number of errors drivers make navigating the road, and reduce the severity of crashes if a vehicle leaves the road. Safety countermeasures can be grouped into three areas: highway design, traffic operations and maintenance. Highway design helps keep vehicles on the road through adequate geometric alignments, signs and pavement markings, and can reduce crash severity through use of roadside barriers and breakaway devices. Traffic operation improvements that reduce congestion can reduce the potential for crashes. Routine maintenance helps ensure road surfaces and roadside elements remain in adequate working order to help drivers navigate safely. In response to safety issues identified in a planning study, Blue Ridge Parkway installed rumble strips, median barriers, lighting and additional steel-backed timber guardrails. It is also upgrading its historic guard walls to be crashworthy but to blend in with the parkway's character. Natchez Trace Parkway installed profile edge markings near bridge approaches in lieu of rumble strips to improve night/rain visibility without deterring from the quiet, rural driving experience.

ENFORCEMENT

Effective, consistent and continuous traffic law enforcement plays an important role in reducing traffic accidents and improving transportation safety. Enforcement of traffic laws and a visible police presence tend to deter motorists from engaging in unsafe driving behavior. Park units are employing high-visibility enforcement strategies to combat speeding, improve seat belt usage and encourage safe driving behavior. For example, US Park Police and rangers at Acadia, Zion and Great Smoky Mountains national parks and Delaware Water Gap National Recreation Area used public awareness campaigns and sobriety checkpoints to increase public perception of the high risks and consequences of driving under the influence.

EMERGENCY RESPONSE

Timely and proper emergency response is essential for visitor and workforce safety, as well as the protection of critical park unit resources. Parks can reduce accident response times through training exercises and better coordination with partners. The Delaware Water Gap National Recreation Area is currently analyzing whether emergency medical services response time in the park is sufficient. It is also developing strategies to improve partner coordination. Strategies for addressing the emergency response component include improving the collection and sharing of crash information to produce more accurate crash reports and using GPS technology to improve response time and location information related to emergency medical services. After a large wildfire cleared a significant amount of protective vegetation in 2011, Bandelier National Monument installed a series of automated alert systems to notify NPS rangers and designated first responders of eminent flash flooding risks. These types of roadway mitigation measures are critical for timely emergency response and evacuation, visitor and employee life and safety and the protection of critical infrastructure.

Meeting Safety Objectives

Objective: Institute a Comprehensive, Performance-Based Transportation Safety Program that Addresses Engineering, Education and Enforcement

The National Park Service is committed to addressing transportation safety and is instituting a performance-based, programmatic approach to improving safety within its transportation network. In June 2012, the National Park Service, US Park Police and the FHWA began work on a new servicewide Transportation Safety Program. The framework and charter for this national program include recommendations for actions, coordination and a strengthened agency commitment to transportation safety within the context of the NPS mission to protect valuable natural, scenic, recreational and cultural resources.

The current lack of nationally aggregated NPS crash data has hindered the effective management of NPS safety issues. Continuing and strengthening current NPS efforts to improve the collection, recording, analysis and reporting of crash data will help the new program focus limited funding on the highest priority transportation safety needs. Development of an industry-standard transportation safety management system, which will aggregate safety data, will enable analysis that can be integrated into project prioritization and selection and O&M decision-making processes to make transportation within NPS park units safer.

Continued support and prioritization of the development of the Transportation Safety Program and transportation safety management system is critical to fulfilling NPS commitments to reducing traffic incidents within the park unit transportation system and improving safety outcomes for all users.

Recommended Strategies

- Implement a performance-based Transportation Safety Program to develop safety projects that address safety emphasis areas
- Develop, support and fund the transportation safety management system to provide the critical data and analysis needed to guide performance-based programming and monitor the extent to which emphasis area goals and objectives are being met

Objective: Reduce Serious and Fatal Transportation-Related Injuries

The National Park Service seeks to reduce the number of serious and fatal transportation-related injuries within park units. Implementation of the NPS Transportation Safety Management System, currently under development, will facilitate a data-driven approach to improving transportation safety. The system will allow the Transportation Safety Program to identify locations with disproportionately high incident rates, and tailor engineering, education and enforcement activities in these locations to improve safety and reduce incident rates and severity. This objective includes all transportation modes, including reported injuries involving motorists, transit vehicles, bicyclists and pedestrians.

Recommended Strategies

- Once implemented, use the NPS Transportation Safety Management System to target engineering, education, and enforcement activities to the locations with greatest need for multimodal safety improvements
- Encourage complete and consistent collection of crash records
- Encourage regions and parks to identify the required resources and action steps for implementing appropriate engineering countermeasures to improve safety
- Educate staff and visitors about best practices in transportation safety
- Improve coordination with local law enforcement and pursue enforcement initiatives that reduce fatal and injury crashes through campaigns targeting speeding, distracted driving, drunk driving, and other types of risky driving behavior

Objective: Maximize Safety Without Impairing Park Resources and Values

The National Park Service strives to balance context-sensitive designs that preserve park unit resources and values with maintaining safe conditions. During the project delivery process, the context of important cultural, historic and natural resources and viewsheds is often considered for exceptions to safety design standards (e.g., low lighting along roadways, shorter historic stone barriers). As a result, some existing transportation assets do not meet current engineering standards. Whenever design exceptions are considered, appropriate mitigation measures are also evaluated and applied as needed to help ensure safety.

Coordination between engineering and cultural and natural resource staffs during the project design process is a critical step in developing a safety strategy that accommodates a park unit's setting and supports the visitor experience. Beginning such coordination in the early stages of transportation planning and carrying it throughout the project development process enables staffs to identify design alternatives and mitigation options early. Such early coordination can help to avoid unforeseen environmental or safety issues from arising later in the project development process, when they have greater impacts on project schedules and budgets.

Recommended Strategies

- Establish processes and/or tools that facilitate early and continuous consultation with resource protection and visitation experts during transportation safety planning, programming and project development
- Develop and disseminate guidance on best practices for context-sensitive transportation design and operations that improve safety

Objective: Enable Effective Emergency Response

Park unit emergency evacuation and safety training plans are essential tools for ensuring visitor and workforce safety. Because of transportation's critical role in emergency response, these plans should explicitly identify evacuation routes suitable for emergency response vehicles. However, not all park units have plans in place, and some existing plans have not been updated to factor in changing conditions.

Moreover, having an emergency evacuation and safety training plan is not enough to ensure that visitors and the NPS workforce will be safe. An increased understanding of safety issues by visitors and the NPS workforce is also needed to reduce transportation-related incidents. For example, the National Park Service communicates the limits of navigation technology and encourages visitors to adequately prepare for their visits to remote areas where they may not be able to easily call for help. Enforcement and awareness campaigns have also shown the potential to help raise awareness of safe practices.

Recommended Strategies

- Ensure that all park units have an up-to-date evacuation plan with a transportation component that identifies critical signage and evacuation routes
- Improve the ability of transportation users to notify emergency responders of their locations by installing mileposts, markers and other landmarks

Measuring Performance

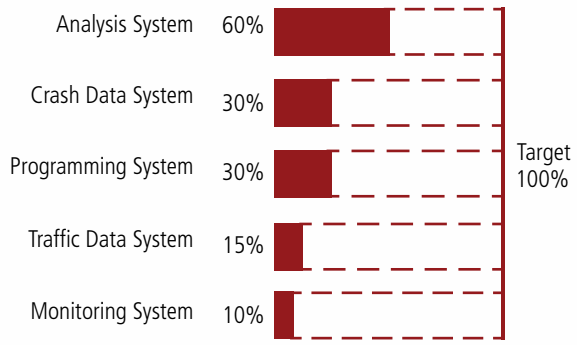
Performance Measure: Completion of the NPS Transportation Safety Management System

Completion of the transportation safety management system is an essential milestone in the implementation of the new NPS performance-based approach to transportation safety. This implementation relies, at least partially, on the continued development of the DOI IMARS.

Baseline

As of spring 2015, the transportation safety management system was approximately 30 percent complete. Progress toward completion of the five elements of the system will be tracked by the five categories listed under Elements of the Safety Management System below and shown in Figure 7-4.

Figure 7-4. Completion of the NPS Transportation Safety Management System



Target

Complete all components of the transportation safety management system within five years.

Elements of the Safety Management System

ANALYSIS SYSTEM MILESTONES

Availability of industry-standard analysis capability, including crash analysis software.
Current Status: 60 percent complete.

CRASH DATA SYSTEM MILESTONES

Crash database (Traffic Accident Reporter database) established; field reporting of incidents; output capability from the Traffic Accident Reporter database; amount of data populated into the Traffic Accident Reporter database.
Current Status: 30 percent complete.

PROGRAMMING SYSTEM MILESTONES

Data-driven project safety evaluation criteria developed; project proposal and evaluation tied to safety performance metrics; project evaluation processes informed by data and analysis and performance metrics. Completion of data portions of the transportation safety management system must precede this milestone.
Current Status: 30 percent complete.

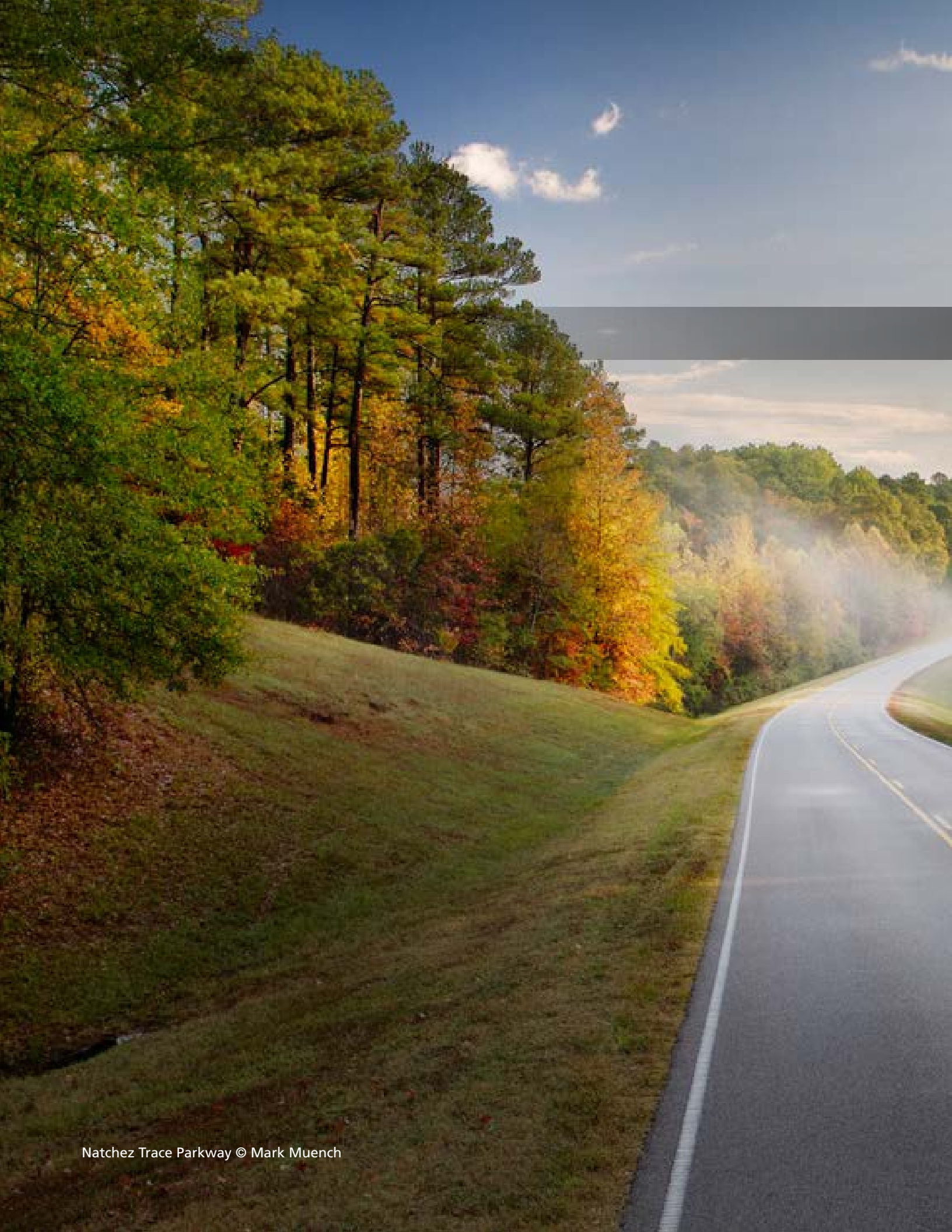
TRAFFIC DATA SYSTEM MILESTONES

Rehabilitation of traffic count stations. The National Park Service currently operates approximately 100 permanent traffic count stations in 35 park units. Of those, 55 are fully operational, 18 are partially working (e.g., one or more lanes may not be working), 23 are not working and 9 do not automatically download and send data to a central office. The service is currently in the first year of a multiyear rehabilitation of all the traffic counters and is also expanding the traffic count program to include approximately 45 additional permanent traffic count stations in 15 parks units.
Current Status: 15 percent complete.

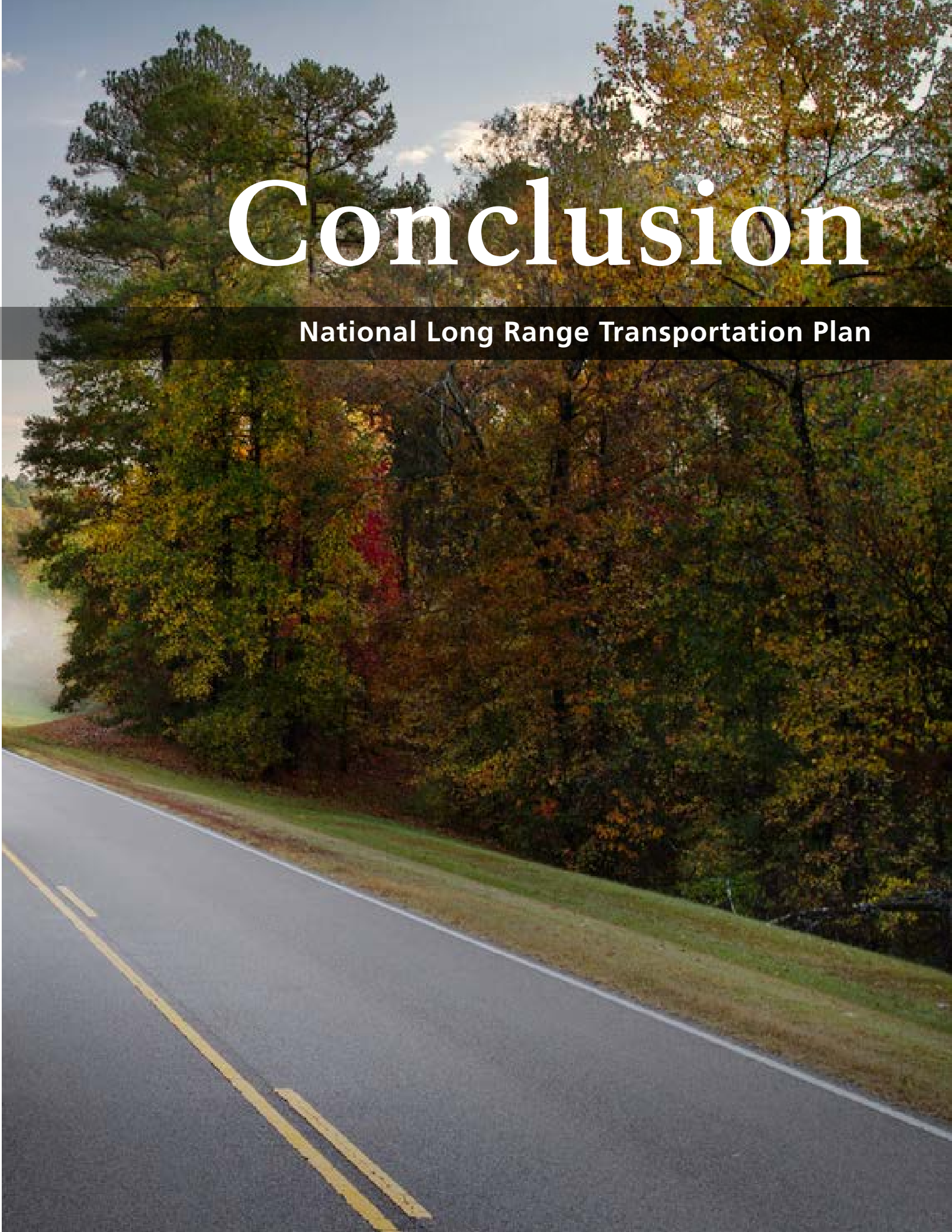
MONITORING SYSTEM MILESTONES

Mitigation efforts and countermeasures evaluated using data and analysis; project delivery and programming are improved based on data and analysis in light of performance goals and metrics.
Current Status: 10 percent complete.

Cape Cod National Seashore



Natchez Trace Parkway © Mark Muench



Conclusion

National Long Range Transportation Plan

Moving Forward

With this National LRTP, the National Park Service provides a framework for moving the NPS transportation system forward into the service's second century. The National LRTP is fiscally constrained, identifying strategies based on forecasted funding levels to shape transportation investments over the next 20 years within a dynamic environment. The National LRTP better aligns transportation planning with all aspects of the NPS mission and recommits the service to both protecting and providing access to the nation's most important, unique and special places. The National LRTP sets goals and objectives that address both traditional transportation topics, such as asset management, financial sustainability and safety, as well as additional NPS mission-focused topics, such as visitor experience, climate change and natural and cultural resource protection.

Visitation to NPS units has grown from 293 million in 2014 to over 325 million in 2016. The NPS transportation system that supports these visitors represents a combined $38 billion in public investment. Maintaining these transportation assets is critical to the NPS mission of preserving unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations.

The National LRTP includes the most comprehensive analysis of NPS transportation finance ever completed. The National Park Service estimates that an average of $1.5 billion per year is needed to address all transportation needs servicewide. Between FY 2006 and FY 2013, the National Park Service invested an average of $461 million per year in its transportation network. Given forecasted resources of $394 million per year, the NPS expects an average funding gap of $1.1 billion per year. Even if every dollar were spent exclusively on highest priorities, there would still be a $282 million gap in meeting those highest priority needs. As a result, resources will not be available to fully resolve the $5.63 billion deferred maintenance backlog for the Paved Road and Bridge Network or the $1.49 billion backlog for Other Transportation Assets. The National LRTP provides a framework for how the National Park Service can make the best use of limited funding.

Transportation planning in the National Park Service does not stop with the release of this landmark document. The service is committed to continuing the broad coordination and collaboration across the agency, with the FHWA and with state, local and agency partners that contributed to the National LRTP. We are using that momentum going forward and will take decisive action to achieve the plan's goals and performance targets.

We will work across the agency and with our partners to put National LRTP strategies into practice and establish performance monitoring protocols. Teams throughout the agency will work through existing programs to advance the goals of the plan. The future of transportation in our national park units depends on everyone's commitment, creativity and enthusiasm for realizing the vision of a sustainable transportation system that is safe and seamless, enables high-quality access to essential park unit experiences and is effectively managed to accommodate changing environmental, social and financial conditions.

In the second century of the National Park Service, transportation systems will increasingly connect people to the outdoors in diverse and engaging ways, supported by modern management systems and programs.

For example:

- Following the National Transportation Investment Strategy will direct funding to the highest priority assets, fulfill more of the O&M needs that keep assets in good condition longer and continue the NPS commitment to multimodal transportation.

- Working with local partners and gateway communities will help the National Park Service address vehicle congestion and expand the range of transportation options to make access to national park units more seamless, fun and convenient.

- Improving the tracking and management of culturally significant transportation assets will help preserve nationally significant and historic structures for generations to come while ensuring that they meet modern safety needs.

- Completing the safety management system will help the National Park Service to better identify and address potential safety concerns on NPS transportation systems.

- Improving integration of natural and cultural resource considerations in transportation decision making will help maintain a critical balance between visitor access and resource protection in new transportation projects.

- Increasing efforts to assess the vulnerability of NPS transportation assets to the impacts of flooding and extreme weather will equip the National Park Service with the information to make smart, forward-looking investments.

Please visit the NPS Long Range Transportation Planning website to stay engaged and for performance reports beginning in 2018. Check out this site for information in the coming years about updates to the National LRTP. With this first National LRTP, the National Park Service is beginning a 3C transportation planning process that will result in regular updates to reflect changing conditions and policies. The first update to the National LRTP is scheduled for 2021.

We invite you to join us on this journey into a new century of stewardship, engagement and enjoyment of America's national parks.

Lowell National Historical Park © James Higgins

Glossary of Selected Acronyms and Terms

3C	Continuing, comprehensive and cooperative. Long range transportation planning is described in federal surface transportation legislation as being a 3C process considering all modes of transportation.
ABA	Architectural Barriers Act of 1968. The ABA requires access be provided to facilities designed, built, altered, or leased with Federal funds. The United States Access Board, an independent federal agency that promotes equality for people with disabilities, develops and maintains accessibility guidelines under this law.
ARRA	American Recovery and Reinvestment Act of 2009. Commonly referred to as the "stimulus package", ARRA provided $3 billion to the Unites States Department of the Interior (DOI). Of that amount, $750 million went to the National Park Service to fund job-creating investments in critical infrastructure and facilities, trail restoration, abandoned mine remediation, and energy efficiency and renewable energy.
BHI	Bridge Health Index. The BHI is a single number indicator of the structural health of bridge assets. This indicator is expressed as a percentage value from 0 percent (worst condition) to 100 percent (best condition).
BIP	Bridge Inspection Program. The BIP is managed by the Federal Highway Administration Office of Federal Lands Highways (FLH) on behalf of the National Park Service. It is responsible for the safety inspection and structural rating of approximately 1,400 NPS structures in accordance with the National Bridge Inspection Standards. The team also manages the NPS structures inventory and collects, maintains, and evaluates data, providing FLH and NPS planners with an annual list of bridge structure rehabilitation and repair priorities.
CCRP	Climate Change Response Program. The CCRP is a cross-disciplinary program that provides guidance, training, technical expertise, project funding and educational products that support actions to preserve the natural and cultural resources and values of the National Park Service.
CI	Capital Investment. CI is a step in the transportation asset life cycle. It is the construction of new assets, as well as major reconstruction projects, that incorporate new functions into existing assets.
CIS	Capital Investment Strategy. The CIS is a servicewide initiative that relies upon universal life-cycle management principles to minimize costs, maximize service life and align capital and maintenance investments.
CR	Component Renewal. CR is a step in the transportation asset life cycle. It includes infrastructure replacement projects that do not expand the asset portfolio or expand liabilities for operations and maintenance (O&M) activities.
CRV	Current Replacement Value. CRV indicates necessary total expenditure in current dollars required to replace a facility to meet current acceptable standards of construction and comply with regulatory requirements.
CSAP2	Second NPS Comprehensive Survey of the American Public
DM	Deferred Maintenance. DM comprises recurring maintenance (RM) or component renewal (CR) needs that are not completed on schedule.
DOI	United States Department of the Interior
DOT	Department of Transportation
EPA	United States Environmental Protection Agency

Glossary (continued)

FAST Act Fixing America's Surface Transportation Act. The FAST Act (Public Law 114-94) is the most recent reauthorization of federal surface transportation authorities and programs. It amends existing and continuing authorities described in the United States Code.

FBMS Financial and Business Management System. The FBMS is an integrated suite of software applications that help the National Park Service manage several business functions, including budget formulation and execution, core financials and acquisition. It serves as the system of record for the real property inventory and interfaces with the Facility Management Software System (FMSS).

FC Functional Classification. FC includes eight categories of routes that comprise the NPS road system.

FC 1: Principal park roads and rural parkways that constitute a main access route, circulatory tour, or thoroughfare for park visitors (public access). Examples include Going-to-the-Sun road in Glacier National Park and the Natchez Trace Parkway.

FC 2: Connector park roads that provide access within a park to areas of scenic, scientific, recreational or cultural interest (public access). Examples include routes to overlooks and campgrounds.

FC 3 and 4: Special purpose and primitive park roads (public access). Examples include routes through campgrounds and undeveloped areas.

FC 5: Administrative access roads (public access). Examples include roads to park administration offices.

FC 6: Restricted access roads (limited/no public access). Examples include roads to utility areas.

FC 7: Urban parkways and city streets that serve high volumes of park and non-park related traffic (public access). Examples include parkways within the National Capital Region around Washington DC.

FC 8: City streets that are extensions of adjoining street systems but owned and maintained by the National Park Service (public access).

FCI Facility Condition Index. The FCI, generated by Facility Management Software System (FMSS) data, provides an indication of the condition of assets. Values are derived from a ratio of the deferred maintenance (DM) divided by the current replacement value (CRV) for each NPS asset.

FHWA Federal Highway Administration. The FHWA is an agency within the United States Department of Transportation (USDOT) that supports state and local governments in the design, construction, and maintenance of the nation's highway system (i.e., the Federal Aid Highway Program) and various federally and tribal owned lands (i.e., the Federal Lands Transportation Program), in addition to other programs and responsibilities.

FLH Federal Highway Administration (FHWA) Office of Federal Lands Highways

FLTP Federal Lands Transportation Program. The FLTP, authorized by the FAST Act (and previous surface transportation bills), provides funds to federal agencies with land and natural resource management responsibilities for transportation infrastructure investment.

Glossary (continued)

FMSS Facility Management Software System. The FMSS is an asset management system used throughout the National Park Service and is the system of record for asset management. Unit staff use a suite of programs including the FMSS to manage, track and prioritize daily operations and maintenance work orders. The FMSS is used to track the condition of some types of assets, to plan for each asset throughout its life cycle, identify deficiencies, bundle projects, and compute current replacement values. Condition data for paved roads and bridges is developed by the Road Inventory Program (RIP) and Bridge Inventory Program (BIP) and is imported into the FMSS.

FO Facility Operations. FO is a step in the transportation asset life cycle. It includes activities that ensure the day-to-day operation of transportation systems (e.g., plowing, transit operations, mowing).

FTA Federal Transit Administration. The FTA is an agency within the United States Department of Transportation (USDOT) that provides financial and technical assistance to public transit systems—including buses, subways, light rail, commuter rail, trolleys and ferries—and oversees safety measures and helps develop next-generation technology research.

FY Fiscal Year. Federal fiscal years begin each October; for example, FY 2016 begins on October 1, 2015 and ends on September 30, 2016.

GHG Greenhouse Gas. A GHG is a gas that contributes to the greenhouse effect, which causes global warming and contributes to global climate change.

GPS Global Positioning System. GPS provides location and time information anywhere on Earth to military, civil, and commercial users around the world.

IMARS Incident Management and Reporting System. IMARS is a department-wide law enforcement records management system used by the National Park Service. The crash module was recently implemented and is now the system of record for NPS traffic safety incidents.

INSTEP Innovative and Sustainable Transportation Evaluation Process and Guidance tool. Currently under development, INSTEP will rate projects' ability to avoid, minimize or mitigate negative environmental impacts that assets and users cause.

ITS Intelligent Transportation Systems. ITS refer to the application of advanced information and communications technology to surface transportation in order to achieve enhanced safety and mobility while reducing the environmental impact of transportation.

LRTP Long Range Transportation Plan. A LRTP is a strategic, long-range plan that provides guidance to programs and managers throughout the National Park Service.

MAP-21 Moving Ahead for Progress in the 21st Century Act. MAP-21 (Public Law 112-141) was a reauthorization of federal surface transportation authorities and programs from July 6, 2012 to July 31, 2015. It amended existing and continuing authorities described in the United States Code, which have been further amended by the Fixing America's Surface Transportation Act (FAST Act).

Mode A mode is a particular form or method of travel distinguished by vehicle type, operation technology, and right-of-way separation from other traffic. Examples include: motorized vehicle, train, streetcar, bus, boat, bicycle, walking or use of an assisted mobility device.

Glossary (continued)

MTCO2E Metric Tons of Carbon Dioxide Equivalent. MTCO2E is a unit used by the United States Environmental Protection Agency (EPA) Pollution Prevention Program to standardize the measurement of global warming potential.

Multimodal Multimodal refers to a transportation network that provides multiple mode choices for some of the same trips. For example, a NPS road between a visitor center and a scenic vista that provides travel lanes for people driving, bus service with bus stops and shelters for people taking transit, and a separated multi-use path for people walking and riding bikes would be a multimodal transportation network. Multimodal may also be used to refer to a transportation plan that jointly considers multiple modes of transportation.

n/a Not available

NAAQS National Ambient Air Quality Standards. The Clean Air Act, which was last amended in 1990, requires the United States Environmental Protection Agency (EPA) to set NAAQS for pollutants considered harmful to public health and the environment. EPA has set NAAQS for six principal pollutants, which are called "criteria" pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particle pollution and sulfur dioxide.

NPS National Park Service. The National Park Service is a bureau of the United States Department of the Interior (DOI). Established in 1916, its fundamental purpose has been "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

OB Optimizer Band. NPS unit management uses OB to rate asset priority from highest priority (OB 1) to lowest priority (OB 5). Every asset in a park unit's asset portfolio is assigned an OB.

O&M Operations and Maintenance. O&M refers to annual and ongoing activities related to the management of transportation assets. O&M includes the preventive maintenance (PM) and facility operation (FO) stages in the transportation asset life cycle, and some recurring maintenance (RM) activities.

PA A stage in the transportation asset life cycle – Planning and Administration is a transportation life-cycle work type that includes activities to identify challenges, needs and alternative solutions prior to implementing a solution.

PAMP Park Asset Management Plan. A PAMP is a strategy and road map for individual park units. A PAMP provides a ten-year asset management strategy for a park unit, allowing for annual updates that coincide with the budget and planning processes already occurring.

Paved Road and Bridge Network The Paved Road and Bridge Network includes all paved roads and parking areas, bridges and tunnels. Other Transportation Assets include unpaved roads and parking, trails, waterways, docks, marinas and railroads.

PCR Pavement Condition Rating. PCR values range from 0 to 100 with higher numbers indicating pavement in better condition. A number of distress factors comprise PCR, including type of cracking, amount of cracking, patches, potholes, rutting and roughness.

Glossary (continued)

Performance Measure

Performance Measures establish a quantitative system to evaluate progress towards the achievement of goals and objectives. They are part of an accountability system to measure the results of project activities, like improvements in pavement and bridge conditions, safety, resource protection, and congestion control, or information to improve the visitor experience.

PM

Preventive Maintenance. A stage in the transportation asset life cycle, PM includes maintenance tasks performed on an annual or more frequent basis (e.g., cleaning culverts, inspections, vegetation control), and is distinguished from recurring maintenance (RM).

RIP

Road Inventory Program. The RIP is managed by the Federal Highway Administration Office of Federal Lands Highways (FLH) on behalf of the National Park Service. It collects data by use of an automated road analyzer, which provides an inventory of maintenance items (pavement type and quantities), point (culverts, etc.), and linear features (ditches, guardrails, etc.). It identifies pavement distress and evaluates the condition of existing park roads. The program uses modeling software to provide NPS transportation staff with recommended pavement treatments and projects and assists the National Park Service in quantifying future pavement investment needs.

RM

Recurring Maintenance. A stage in the transportation asset life cycle, RM includes less frequent maintenance tasks performed on a cycle of one to ten years (e.g., chip seals, mill and overlays, restriping) and is distinguished from preventive maintenance (PM).

Scope 1, 2, 3

Scope 1, 2 and 3 emissions are three categories of emissions that contribute to a park emissions inventory.

Scope 1: Emissions from sources that the National Park Service owns or directly controls. For transportation, Scope 1 consists of NPS fleet vehicles and equipment.

Scope 2: Indirect emissions from purchased electricity and heating, cooling and steam generation. For Transportation, Scope 2 deals only with energy use in buildings that primarily serve a transportation system function.

Scope 3: Emissions from sources that the National Park Service does not directly control or own, but that are attributable to agency activities. For transportation, Scope 3 includes employee travel (employee commuting and business travel).

SOCC

NPS Sustainable Operations and Climate Change Branch of the Park Facility Management Division. The SOCC develops programs to assist parks in implementing sustainable best practices in climate change mitigation and facilities adaptation, energy conservation and water management, sustainable building design and operation, and pollution prevention.

Traffic Accident Reporter

Traffic Accident Reporter is a system-wide crash database developed by the Washington Support Office (WASO) Park Facility Management Division to provide a single, reportable database for storing and querying motor vehicle crash records on NPS roads. This system collected NPS crash records from NPS units from 2006-2012. It has been replaced by the Incident Management and Reporting System (IMARS) crash module.

Glossary (continued)

TCFO	Total Cost of Facility Ownership. TCFO is a method of accounting which includes all costs of acquiring, owning, and disposing of an asset.
Title 23	Refers to Title 23 of the United States Code, which comprises authorizing legislation for the Federal Highway Administration, including funding programs.
Title 54	Refers to Title 54 of the United States Code, which comprises authorizing legislation for the National Park Service, including funding programs.
TRIP	Paul S. Sarbanes Transit in Parks Program. Originally named the Alternative Transportation in Parks and Public Lands program, TRIP was a discretionary grant program administered by the Federal Transit Administration (FTA) that funded transit and other alternative transportation projects for federal public lands. Funding for the TRIP program ended in 2012.
USC	United States Code
USDOT	United States Department of Transportation. The USDOT administers several transportation agencies within the federal government, including the Federal Highways Administration (FHWA) and Federal Transit Administration (FTA).
WASO	Washington Support Office. The WASO is the NPS headquarters office, which provides services to regional offices, park units, program areas, and NPS partners, and coordinates with other agencies and bureaus in the United States Department of the Interior (DOI).

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As the nation's principal conservation agency, the Department of the Interior has 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 national 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 US administration.

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