

National Park Service  
US Department of the Interior



# Denali National Park and Preserve Long-Range Transportation Plan

March 2018

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Photography by: NPS/Jacob W. Frank

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# United States Department of the Interior

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Denali National Park and Preserve  
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IN REPLY REFER TO:  
PEPC# 49953

## Memorandum

To: Regional Director, Alaska Region, National Park Service  
From: Superintendent, Denali National Park and Preserve  
Subject: Request Acceptance of Denali National Park and Preserve Long-Range Transportation Plan

Denali National Park and Preserve (Denali) requests Regional Director acceptance of the park's Long-Range Transportation Plan (LRTP). I have first-hand knowledge of the contents, and attest to the completeness of the document. This document meets the requirements and guidance for long-range transportation plans established by the National Park Service (NPS). The LRTP is an implementation strategy for the transportation components of Denali's General Management Plan as amended. The Washington Support Office (WASO) has determined that the LRTP is a strategy document and is not subject to the National Environmental Policy Act.

The document was prepared with participation of an interdisciplinary team comprised of representatives from Denali, Alaska Regional Office, WASO, Denver Service Center (DSC), Federal Highway Administration, and U.S. Department of Transportation Volpe Center, who support its acceptance. The document underwent multiple reviews and this public version addresses all comments received.

Don Striker

*Enclosures (1): Denali National Park and Preserve Long-Range Transportation Plan*

Concurrence:

Superintendent, Denali National Park and Preserve

4/19/18

Date

Accepted

Director, Alaska Region

5/4/2018

Date

# Summary

The Denali National Park and Preserve (Denali) Long-Range Transportation Plan (LRTP) guides the next 20 years of transportation planning and decision-making. The plan sets forth actions and processes to ensure that decisions made on behalf of the park’s transportation system are the most beneficial to the National Park Service’s (NPS) mission and Denali’s vision for achieving the mission. This is accomplished by defining long-range transportation goals, which serve as the basis for determining existing conditions, transportation needs, data gaps, and implementation actions. Long-range transportation goals are also the organizing principles upon which performance measures are established. These performance measures are the basis for tracking progress in meeting the long-range goals over time.



## RESOURCE PROTECTION GOAL:

*Understand and protect Denali’s fundamental park resources and values as they relate to the transportation system.*

### Monitor Resources Objective:

*Identify and maintain critical monitoring for park resources affected by transportation.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Number of vehicles at a wildlife stop	Vehicle Management Plan (VMP) standard, 75/90/95 percent success rate	2016 VMP standard met
Sheep gap spacing	VMP standard, 90/95 percent success rate	2016 VMP standard not met
Nighttime traffic	VMP standard, 95 percent success rate	2016 VMP standard met
Natural Sound Disturbance	2006 Backcountry Management Plan standards for each management area	Standard not met

### Collaboration Objective:

*Collect and disseminate transportation-related resource information.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Park Transportation Investment Needs Analysis (PaTINA) updated and accessible to contributors and users	PaTINA is updated and accessible to contributors and users	PaTINA is updated and accessible to contributors and users



## CLIMATE CHANGE GOAL:

*Plan for climate change impacts to the park’s transportation system.*

### Adaptation and Mitigation Objective:

*Recognize the impacts of global climate change on the park’s resources and minimize Denali’s transportation systems emissions.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Complete Asset Vulnerability Assessment	Complete Asset Vulnerability Assessment	Denali Park Road Risk Assessment Utilizing the Unstable Slope Management Program Completed

### Communication Objective:

*Support climate change research to inform transportation system management and park users.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Complete Climate Friendly Parks Plan (per Green Parks Plan initiatives)	Complete Climate Friendly Parks Plan	Complete Climate Friendly Parks Plan not yet completed



## USER EXPERIENCE GOAL:

*Provide a quality, multimodal park experience for users.*

### User Data Objective:

*Manage the user experience through information and education.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Apply results from original 2016 Collaborative Visitor Transportation Survey (CVTS) to improve experience by completing survey again at Denali to show improvement to CVTS baseline	Results from original CVTS have been applied to improve experience by completing survey again at Denali to show improvement to CVTS baseline	Has not been completed
Reduce visitor confusion about the park's transportation system (i.e., Entrance area circulation plan)	Reduced confusion as reported in visitor experience surveys	Improvement needed
Denali website provides all nine elements of essential traveler information	All nine elements are represented on the website	Parking lot, congestion, and alternative fuel information is missing

### Multimodal Transportation Objective:

*Provide appropriate, effective, and efficient multimodal opportunities.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Number of vehicles in a viewscape	VMP standard, 80/90/95 percent success rate	2016 VMP standard met
Hiker waiting time	VMP's standard met	2016 VMP standard met



## ACCESS GOAL:

*Provide safe, efficient, and appropriate park access for all users.*

### Safety Objective:

*Provide safe access to and within Denali National Park and Preserve.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Complete and update Unstable Slope Management Program and implement its recommendations	Complete and update Unstable Slope Management Program and implement its recommendations	Denali Park Road Risk Assessment Utilizing the Unstable Slope Management Program Completed

### Access Objective:

*Provide appropriate and efficient access for inspiration, education, research, recreation, and other uses as provided for in the Alaska National Interest Lands Conservation Act (ANILCA).*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Complete Kantishna area master plan	Complete Kantishna area master plan	Not yet written



## SYSTEM OPTIMIZATION GOAL:

*Develop a long-term transportation system to appropriately satisfy current and future park needs.*

### Asset Management Objective:

*Maintain and manage all critical transportation assets for current and future conditions.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Segments of the unpaved Park Road that meet or exceed constrained condition targets	All segments of the unpaved Park Road meet or exceed constrained condition targets	Not yet available

### Asset Investment Planning Objective:

*Strategically invest in transportation assets.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Complete asset vulnerability assessment	Complete asset vulnerability assessment	An asset vulnerability assessment has been completed
Measure deviation from LRTP invest strategy (optimizer bands, CIS, etc.)	25 percent difference in project cost	Not yet available



## PARTNERSHIP GOAL:

*Maintain formal and informal partnerships to provide a viable transportation system.*

### Commercial Partners Objective:

*Manage formal commercial partnerships to provide essential transportation services.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Complete community transit plan to determine what commercial partnerships may develop	Complete community transit plan to determine what commercial partnerships may develop	Not yet available

### Project Champions Objective:

*Empower Project Champions to inform and educate the public on key issues that focus on both transportation and resources.*

Performance Measure	2022 Performance Target	Existing/Baseline Condition
Partner investment in transportation that benefits Denali	10 percent of Denali projects	Not yet available







## 1. Introduction

Denali National Park and Preserve (Denali) encompasses six million acres of wild land in interior Alaska. It is home to North America's tallest mountain, extensive mountain glaciers, dramatically carved canyons, broad braided river valleys, sweeping tundra, robust wildlife populations, rich cultural histories, and unsurpassed scenic beauty. Denali receives more than a half-million visitors each year. Visitation routes and travel modes to and within Denali are varied and diverse and often require extensive planning that can be complex for first-time users. It is an issue that requires carefully balancing the tenets embodied in the National Park Service (NPS) mission statement. It is to this end that the Denali Long-Range Transportation Plan (LRTP) was developed.

## 1.1 Plan Purpose

This Denali LRTP guides the next 20 years of transportation planning and decisions to support efforts that are the most beneficial to the NPS mission and Denali’s vision for achieving the mission. This is accomplished by defining long-range transportation goals for the park that respond to the NPS vision and mission. LRTP goals serve as the basis for determining existing conditions, transportation needs, data gaps, and unifying concepts for long-range scenario planning.

Each component of this plan has been developed for the purpose of creating a useful document to guide transportation decision making. When used over the long term, this plan:

- Highlights actions that do the most to further the NPS mission and park vision
- Provides information for spending limited funds to maintain the highest transportation needs
- Strengthens Denali’s ability to partner with other agencies and organizations
- Better positions Denali for competitive funding opportunities
- Provides options for responding to future scenarios
- Addresses direction on long-term issues such as climate change and sustainability
- Strengthens Denali’s defensible structure for sound transportation planning and decision making
- Identifies knowledge gaps and provides recommendations for overcoming these gaps

### NPS Mission Statement

*“The [National Park] Service thus established shall promote and regulate the use of federal areas known as national parks, monuments and reservations...by such means and measures as conform to the fundamental purpose of the said parks, monuments and reservations, which purpose is 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.”*

- Supports performance monitoring
- Ensures that transportation management continues to protect resources and support visitor experiences

A vision statement guides the development of this LRTP to ensure that the described purposes are met and the end product is a useful and utilized document. The Denali LRTP vision statement is:

*“Protect intact the globally significant Denali National Park and Preserve ecosystems, including their cultural, aesthetic, and wilderness values, and ensure appropriate access to opportunities for inspiration, education, research, recreation, and subsistence for this and future generations.”*

## 1.2 How to Use this Plan

The use and benefit of this plan focuses on several audiences, including Denali managers, regional program management, national-level decision makers, local and regional partners from governmental or non-governmental organizations, and the visiting public. Depending on the audience, knowledge of Denali transportation goals, conditions, funding strategies, performance management, and/or implementation steps may be used to inform decision making, understand needs, communicate priorities, and outline transportation-related actions to be taken that are most effective in furthering Denali's mission over a long-term timeframe. The Denali LRTP audiences benefit from using the plan as described below.

### Denali

The primary beneficiaries of the LRTP are Denali managers and staff with program-management and decision-making responsibilities concerning the park's transportation systems. Use of the plan supports better decision outcomes, streamlines decision-making processes, and ensures that actions undertaken by Denali management further the NPS mission and the park's vision. Specific benefits of using this plan for Denali managers and staff with program-management and decision-making responsibilities are detailed in Section 1.1, Plan Purpose.

### Potential Partners

Potential partners may use this LRTP to identify improvement strategies of mutual interest. Denali managers recognize the value of partnerships and seek to leverage available funding and expertise by actively working with park stakeholders and user groups. The objective is to achieve the greatest benefit for the shared goals held by multiple agencies, organizations, and interested parties on common projects.

This LRTP is a tool for fostering partnerships with Denali's gateway and local communities, local governments, the Alaska Department of Transportation and Public Facilities (ADOT&PF), Federal Aviation Administration (FAA), Federal Transit Administration (FTA), Federal Railroad Administration (FRA), Alaska Railroad Corporation, Alaska Native and Tribal entities, and other state and federal land management agencies.

### Alaska Region

At the regional level, this LRTP is used to communicate long-term Denali-specific transportation needs, gaps, and opportunities. The plan enables the NPS Regional Transportation Program Manager to affirm that Denali's long-term transportation strategies align with national and regional long-range strategies, thereby enabling direct funding to the most beneficial and highest priority transportation projects. Furthermore, use of the LRTP enables the Regional Transportation Program Manager to seek out or recommend alternative funding from sources external to the NPS.

## NPS Programs

NPS program managers may use the LRTP to determine how transportation affects program-level goals, project-level funding opportunities, and specific project outcomes throughout Denali National Park. The LRTP also serves as a springboard for program managers to incorporate transportation into their respective strategies for managing assets, facilitating protection of resources, and providing visitor services. Other programs may use transportation as a catalyst to partner with outside agencies or organizations and discuss project needs of mutual interest, such as sharing resources, improving safety, evaluating alternative transportation systems, and addressing climate change.

## The Nation

This LRTP supplements the development of national-level plans and programs by outlining long-range transportation goals, objectives, and proposed strategies in Denali while also documenting the relevance of this park-level vision in furthering NPS-wide mission and goals. This and other national-level planning efforts help communicate mission-critical transportation needs to Congress, the White House, the Department of the Interior (DOI), the U. S. Department of Transportation (USDOT), and the general public. This plan also helps communicate the park's unique access and transportation challenges resulting from multiple uses and dramatic seasonal variation in transportation modes. Ultimately, the LRTP illustrates the NPS's foresight and commitment to mission-critical goals that are dependent upon or enhanced by transportation while jointly pursuing transportation improvements with other agencies and organizations.



Photography by: NPS/Jay Elhard

## 1.3 Background

This Denali LRTP responds to the call for facility planning in Denali’s VMP, as well as NPS national and region-level recommendations to conduct park-level long-range transportation planning for units with complex or expansive multimodal systems. This LRTP also complies with the 2015 highway authorization, Fixing America’s Surface Transportation Act (FAST Act) § 1119-1120; 23 U.S.C. 201, 203.

This LRTP is consistent with, and builds upon the conclusions, recommendations, and policy documented in approved plans and studies. Specific resources used as a basis for this LRTP are:

- Air Tour Operators Best Practices (2012)
- Alaska Federal Lands LRTP (2012)
- Alternative Funding Opportunities for NPS Transit (2014)
- Denali Community Transportation Study (2006)
- Denali Foundation Statement (2014)
- Denali Bus Shuttle System Analysis (2013)
- Denali Entrance Area Environmental Assessment (EA) (2001)
- Denali General Management Plan (GMP), Consolidated (2008)
- Denali Transportation Needs Assessment (2006)
- Denali Winter Plowing EA & Finding of No Significant Impact (FONSI) (2013)
- Denali Park Road Visitor Survey (2010)
- Needs Assessment and Feasibility Study for a Community Transportation System (2006)
- NPS Alaska Region LRTP (2012)

- NPS National LRTP (2017)
- Proposed Entrance Station Report (2008)
- VMP (2012)
- Visitor Satisfaction with Transportation Services and Wildlife Viewing Opportunities in Denali (1998)

These documents address a wide range of transportation and access planning and help identify and prioritize construction and maintenance of developed roads, primitive roads, trails, rail, and aircraft facilities that provide access to and within Denali. These plans also consider restrictions and closures to protect sensitive resources and meet management concerns. While the GMP and other plans are developed for localized planning areas and specific delineated travel management areas, this LRTP is inclusive of all transportation facilities and access to lands managed by the NPS. The issues addressed in this LRTP are similar to those addressed in the GMP. The Denali LRTP builds upon work completed through the cited park documents without creating redundancy with other plans.

Implementation of GMPs and other plans involving transportation and travel management decisions are achieved through project plans completed for specific on-the-ground actions. This is not the focus of the Denali LRTP. These other plans address exact route and facility locations and construction methods proposed to complete the project. Such project-level plans follow all necessary National Environmental Policy Act (NEPA) requirements. This LRTP is not a NEPA document. It is a high-level strategy plan and does not make site-specific decisions about projects; therefore, it is exempt from NEPA requirements.

## 1.4 Vision, Goals, and Objectives

This plan is structured around six long-range transportation goal statements, which embody the values of the NPS mission and Denali vision statements. These goal statements ensure that this plan guides transportation decisions in a manner that is supportive of overarching agency and park values.

### Denali Long-Range Transportation Goals and Objectives

**Resource Protection Goal:** Understand and protect Denali’s fundamental park resources and values as they relate to the transportation system.

**Monitor Resources Objective:** Identify and maintain critical monitoring for park resources affected by transportation.

**Collaboration Objective:** Collect and disseminate transportation-related resource information.

**Climate Change Goal:** Plan for climate change impacts to the park’s transportation system.

**Adaptation and Mitigation Objective:** Recognize the impacts of global climate change on Denali’s resources and minimize Denali’s transportation systems emissions.

**Communication Objective:** Support climate change research to inform transportation system management and park users.

**User Experience Goal:** Provide a quality, multimodal park experience for users.

**User Data Objective:** Manage the user experience through information and education.

**Multimodal Transportation Objective:** Provide appropriate, effective, and efficient multimodal opportunities.

**Access Goal:** Provide safe, efficient, and appropriate park access.

**Safety Objective:** Provide safe access to and within Denali National Park and Preserve for all users.

**Access Objective:** Provide appropriate and efficient access for inspiration, education, research, recreation, and other uses as provided for in the Alaska National Interest Lands Conservation Act (ANILCA).

**System Optimization Goal:** Develop a long-term transportation system to appropriately satisfy current and future park needs.

**Asset Management Objective:** Maintain and manage all critical transportation assets for current and future conditions.

**Asset Investment Planning Objective:** Strategically invest in transportation assets.

**Partnership Goal:** Maintain formal and informal partnerships to provide a viable transportation system.

**Commercial Partners Objective:** Manage formal commercial partnerships to provide essential transportation services.

**Project Champions Objective:** Empower Project Champions to inform and educate the public on key issues that focus on both transportation and resources.

## 1.5 Plan Structure

This LRTP consists of six chapters, as well as supporting appendices. Each chapter builds on the information and conclusions derived in the previous chapter(s). The document examines the park's existing transportation system, conditions, funding programs, performance management, and offers recommendations for the future.

### Chapter 1, Introduction

This chapter introduces the purpose, benefits, goals, objectives, and audiences for this plan.

### Chapter 2, Baseline Conditions

This chapter summarizes Denali's present-day transportation system, including its existing conditions. These baseline conditions build on the findings of accepted plans, studies, and research related to Denali transportation.

### Chapter 3, Funding Plan

This chapter describes a variety of funding programs currently available to transportation projects. It discusses transportation funding needs and availability, and presents the gaps between the two.

### Chapter 4, Project Selection

This chapter describes the process used by park managers to prioritize and select transportation projects. Denali uses a process that is consistent with the 2012 Alaska Region LRTP, reflects project prioritization tenets outlined in the NPS National LRTP, and is based on goals and objectives of this LRTP.

### Chapter 5, Performance Management

The Denali LRTP is consistent with NPS national and regional transportation program performance measures for tracking success as a part of fulfilling its mission through its transportation system. The plan ensures that progress is tracked through performance measures and recommendations that respond to the needs and gaps identified for each long-range goal. Performance measure baselines, or starting points, are defined in this plan and are consistent with USDOT recommendations.

### Chapter 6, Implementation

Chapter 6 identifies implementation actions of the Denali LRTP. Implementation actions are specific activities that the park will use to address needs and achieve goals and objectives set forth by this plan. Implementation actions are prioritized to help management understand the relative importance of each action.

### Appendices

Appendices provide the technical information and data that support the observations and conclusions expressed in Chapters 1 through 6.





## 2. Baseline Conditions

Baseline conditions are centered on findings from an LRTP-focused literature review, as well as park staff input gathered through LRTP outreach efforts. The literature review included more than 16 Denali plans, studies, and reports, as well as notes from meetings conducted during the early stages of the LRTP process. The results of the literature review focused on 90 baseline criteria related to six LRTP goal areas and 12 objectives within those goals, presented in Section 1.4. A summary of the literature sources and the literature review is provided in Appendix A. Park conditions are supplemented with insights provided by park staff and obtained through the LRTP engagement process. The NPS performed a Park Transportation Investment Needs Analysis (PaTINA) for Denali to identify potential needs.

The following sections provide details about each goal's existing conditions and desired future conditions, and identify the gaps between existing and desired conditions.



## 2.1 Resource Protection

The Resource Protection goal states: *Understand and protect Denali's fundamental park resources and values as they relate to the transportation system*. The goal statement is related to sound management and wise investment of the park's assets, as well as efficient protection and monitoring of the environment. Resource Protection objectives reflect a desire to prioritize assets, projects, needs, and funding. The objectives for the Resource Protection goal are:

- **Monitor Resources:** Identify and maintain critical monitoring for park resources affected by transportation.
- **Collaborate:** Collect and disseminate transportation-related resource information.

Table 1 summarizes Resource Protection goal conditions as determined through the literature review process and expert input from park staff. Details about existing conditions and the gaps between existing and desired future conditions follow the Table 1 summary.

### Park Transportation Investment Needs Analysis

The NPS performed a Park Transportation Investment Needs Analysis (PaTINA) for Denali to identify potential needs. This data-driven analysis is the subject of Section 2.7. The analysis evaluated 24 spatial datasets directly relating to LRTP long-range transportation goals. Of the datasets reviewed, 14 relate to the Resource Protection goal.





Table 1. Goal Summary

<b>Monitor Resources Objective:</b> "Identify and maintain critical monitoring for park resources affected by transportation."	
<b>Desired Condition</b>	Critical monitoring of park resources affected by transportation has been identified, is being performed, and is regularly maintained.
<b>Existing Condition</b>	The park monitors resources and transportation impacts through the 2012 <i>Vehicle Management Plan</i> (VMP), NEPA studies, and topically focused studies (e.g., acoustic resources).
<b>Existing Condition Summary</b>	<p>Ongoing research to identify cultural resources and educating the public about their value is a priority. This has led to ongoing protection of historic resources within the park.</p> <p>The Denali Park Road should be monitored for Historic Character (Road Character). This is a fundamental park resource and the implementation of the <i>Cultural Landscapes Report</i> (CLR) treatment recommendations should be the measure for success.</p> <p>Indirect disturbances to wilderness include noise from motorized vehicles and human-altered viewsheds. Direct impacts include fugitive dust, social trails, and trampled vegetation near transportation hubs. Park staff are currently monitoring soundscapes to better understand impacts of motor vehicles and aircraft.</p> <p>Environmental protection is the top priority of Denali in terms of appropriate and effective visitor access. Any and all improvements to transportation facilities, infrastructure, and systems are subject to strict environmental considerations.</p>
<b>Collaborate Objective:</b> "Collect and disseminate transportation-related resource information."	
<b>Desired Condition</b>	Transportation system monitoring data and findings related to resources are shared in ways that are meaningful and usable by others.
<b>Existing Condition</b>	While sharing of information does occur, greater collaboration is needed between internal and external stakeholders to apply research outcomes, develop park projects, and create opportunities for visitor interaction/interpretation.
<b>Existing Condition Summary</b>	<p>Through the increase in shoulder season visitation, there is a gap in understanding about visitor impacts in and around the entrance area and along the Park Road corridor. Near-term completion of the three- to five-year environmental study will provide information about the feasibility of continuing to provide visitor access in the shoulder seasons and potentially during the winter.</p> <p>Recently documented acoustic research could be used as a collaboration tool for improving the effectiveness of Denali Overflights Advisory Council best practices.</p> <p>Information about resource protection is shared with visitors at several locations in the entrance area and through interpretation along the Park Road. Opportunities for visitor education can be found at wayfinding locations and during the backcountry permitting process, and at Denali Visitor Center, Murie Science and Learning Center, Wilderness Access Center, and campgrounds.</p> <p>Resource information is available through the Denali website, thereby providing an opportunity for internal collaboration between resource protection and interpretation specialists.</p>



### 2.1.1 Monitor Resources

Protection and preservation of natural and cultural resources are fundamental to the park’s purpose. Indirect disturbances to wilderness include noise from motorized vehicles, fugitive dust, and human-altered viewsheds. As the *Denali Foundation Statement* iterates, fundamental resources and values include:

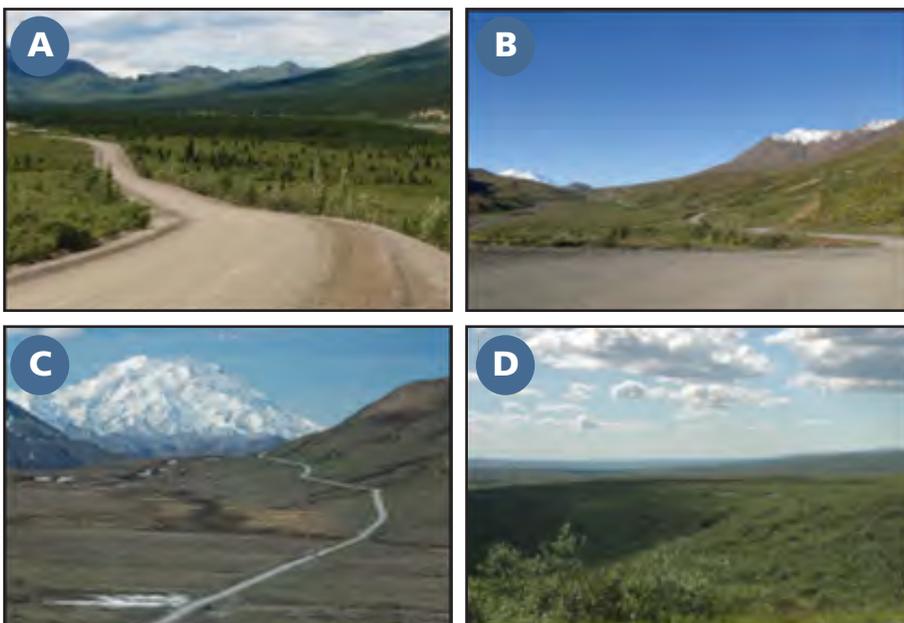
- Wildlife populations, wildlife habitat, and the process and components of the park’s natural ecosystem
- Wilderness character and values, and wilderness recreational opportunities
- The scenic and geologic values of Denali and the surrounding mountain landscape
- Visitor enjoyment and inspiration from observing wildlife in its natural habitat and other natural features

Other important resources and values include:

- Historic, archaeological, and ethnographic resources
- Paleontological resources
- Air quality
- Subsistence resources and opportunities
- Scientific research, education, and interpretation about natural ecosystems and geologic features and processes

Programs that promote a better understanding of transportation-related impacts on these resources support appropriate management of transportation facilities, infrastructure, and systems. Current programs for monitoring resources include wildlife movement; aesthetic issues associated with sound and visual impacts (Figure 1); cultural and historic studies; and geology, hydrology, and climatological

Figure 1. Monitored visual impacts on the Park Road (NPS, 2013)



Four viewsheds being monitored for number of vehicles visible at one time are:

- A. Teklanika Flats (Mile 26)
- B. West of Toklat (Mile 55)
- C. Stony Overlook (Mile 62)
- D. Grassy Pass (Mile 68)



research. Detailed discussions of baseline conditions for climate change can be found in Section 2.2. Other resource-monitoring programs are discussed below.

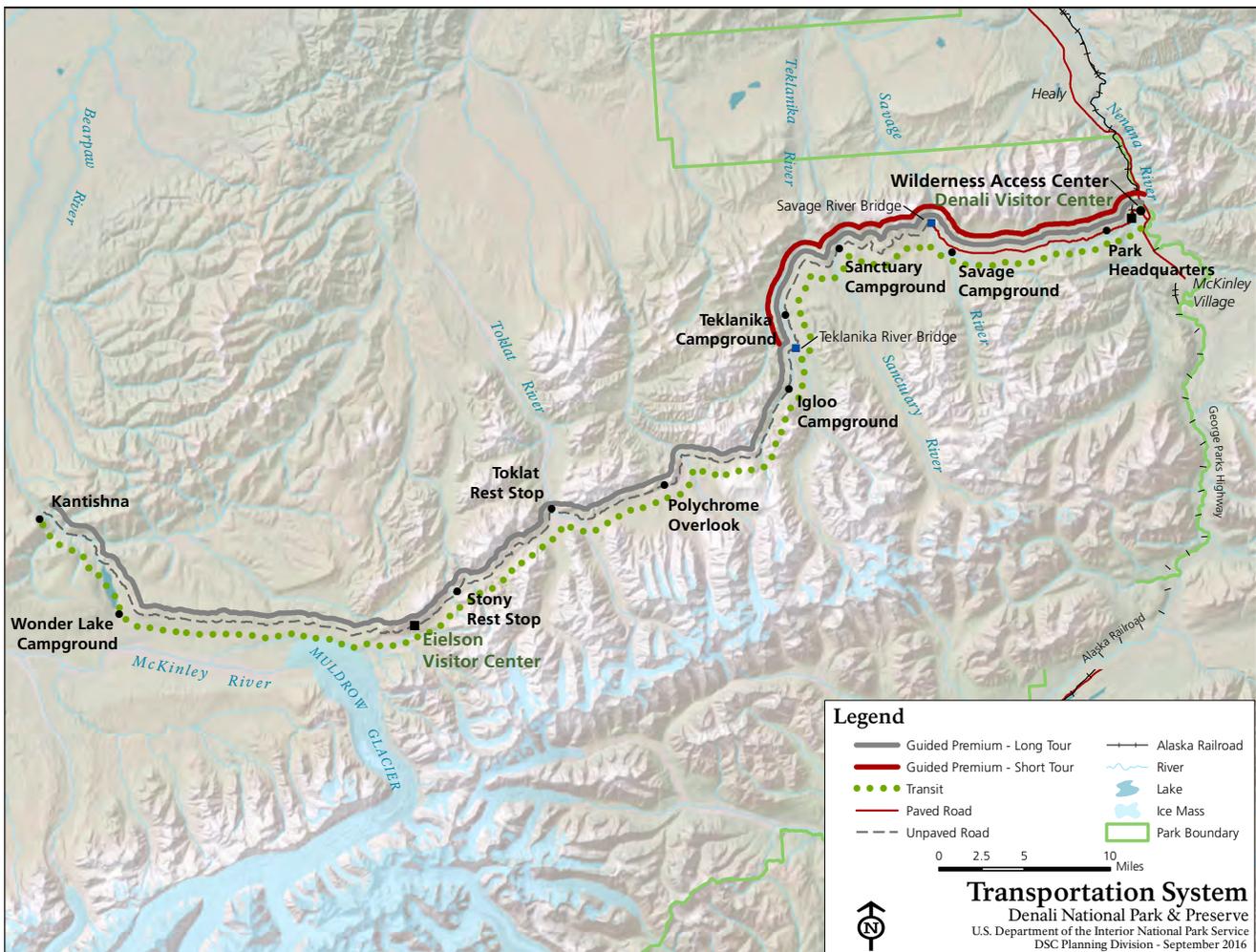
### Natural Resources

As shown in Figure 2 and Figure 3, the VMP establishes transportation system descriptions and road use management zones for the Denali Park Road (Park Road). These zones are defined based on road character and wildlife viewing opportunities, and are therefore split and not sequential on the park road. For further explanation, reference Appendix A and the 2012 Final VMP EIS. The VMP documents an intention to monitor impacts on wildlife through

a Before-After Condition Change Assessment (BACCA) study method to be conducted within the first five years of the VMP’s implementation. The study is designed to affirm the selection of key resources and user indicators, which then will be used to determine impacts due to any changes in current traffic patterns and traffic levels. The transportation system included in the VMP includes transit service as well as guided premium short and long tours, as depicted in Figure 2.

Using the BACCA method, park managers can link resource impacts to a specific management action and can better monitor effects of those actions. As stated in the VMP, monitored resources potentially include the following parameters:

Figure 2. Vehicle Management Plan Transportation System



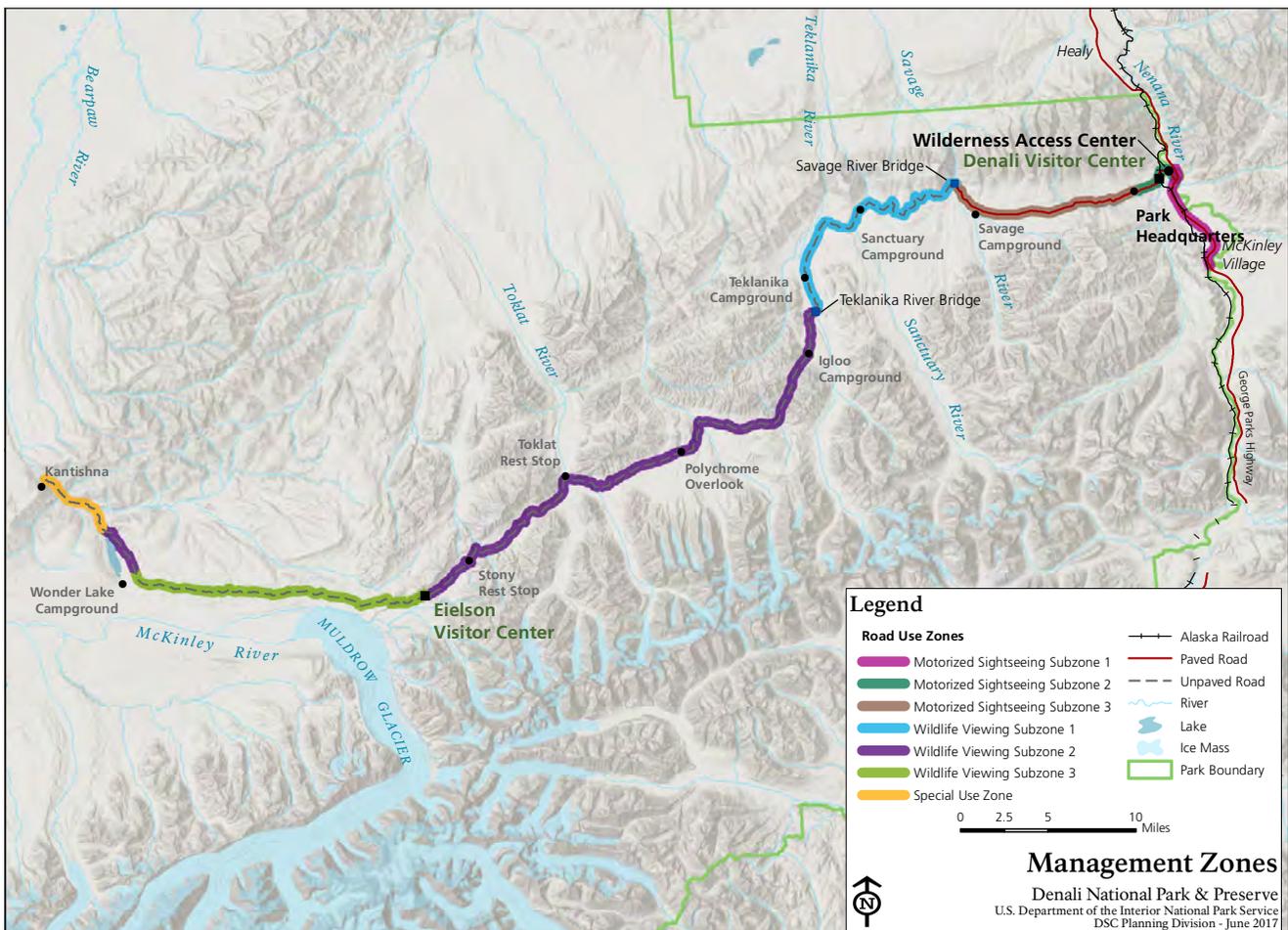


- Distribution, number, and type of wildlife sightings, including distance from road (based on ongoing park staff and bus driver observation)
- Discrete studies of Grizzly bear and Dall sheep movement rates when crossing the Park Road, distribution of bear inactivity periods relative to the road, and the probability and timing of the sheep crossings (all based on GPS data)
- Ongoing population surveys for caribou, moose, Dall sheep, and wolves, along with the collection of certain demographic data

The VMP presents a baseline condition for wildlife sightings for the five major mammal species in locations along the Park Road, as shown in Figure 4.

Ongoing monitoring of these conditions is expected through further research. The literature review process and related engagement with park staff during the LRTP process reveals a policy to use carrying capacity science to make transportation management decisions about the appropriate level of allowed vehicle activity on the Park Road. Future monitoring indicators and standards for resources

Figure 3. Vehicle Management Plan Road Use Management Zones





are related to the following issues identified by road use management zone locations (Figure 3):

- Sheep gap spacing
- Nighttime traffic levels
- Natural resource condition (wildlife sightings, soundscape preservation, ecological health, etc.)

Natural resources and user experience are intrinsically related and interdependent in Denali. Both the ability to view wildlife and the quality of users' experiences are impacted by the intensity of transportation activities occurring in and near wildlife viewing areas. Monitored indicators from the VMP have standards related to both resource protection and user experience (Table 2). These standards are developed to respond to potential increases in visitor demand; therefore, some standards have incremental thresholds to respond to changes in visitor demand. For a detailed discussion of user experience baseline conditions, see Section 2.3, User Experience.

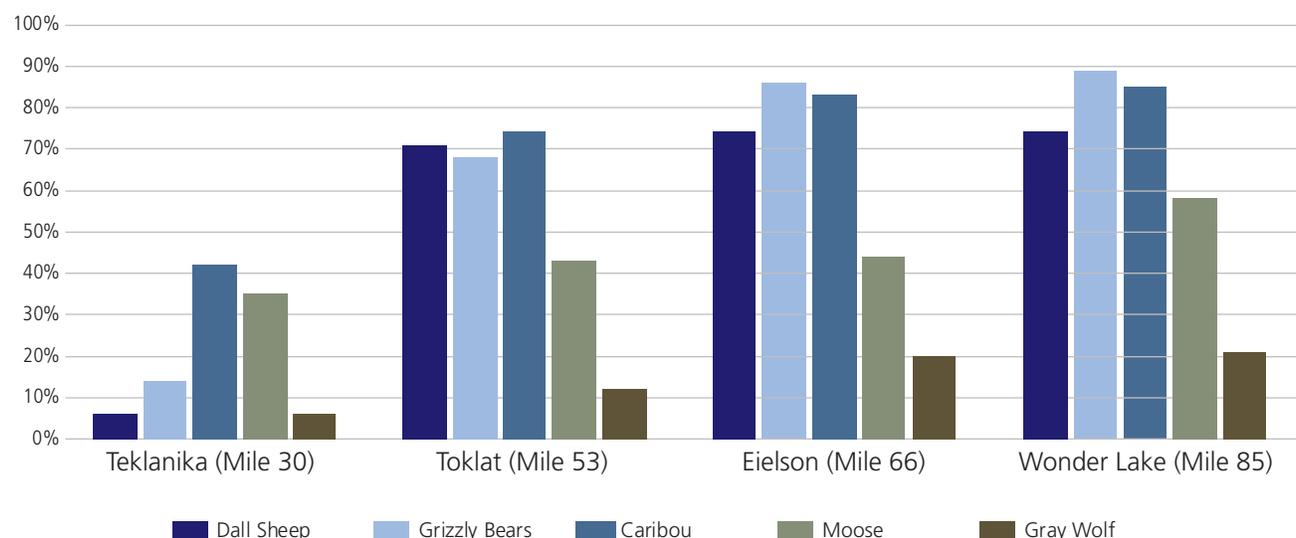
In addition to monitoring vehicle disturbances through the VMP, the park has taken steps to

anticipate impacts to resources using modeled simulations in the Behavior-Based Traffic Model and Scheduling Tool. This tool assists park managers understand and test impacts to resources using multiple scenarios. The model is currently in the validation stages, but is anticipated to be useful for meeting VMP performance standards and for transit system scheduling.

### Acoustic Resources

Denali staff has conducted extensive research to better understand impacts of anthropogenic sounds, predominantly motor vehicles and aircraft, on acoustic resources. The NPS is dedicated to protecting places where current and future generations have the ability to experience undisturbed soundscapes. The park has documented noise disturbances related to transportation and other human activities through spatial analysis of sound and audible human disturbances. This research identifies analysis techniques that can be used for long-term management of acoustic resources and provides a foundation for collaboration with private overflight tour operators and park management. These findings are

Figure 4. Probability of sighting a "Big 5" species by bus destination along the Park Road



Source: VMP (2012)



Table 2. Standards for Visitor Experience and Resource Indicators (VMP, 2012)

		Standard		
		Wildlife Viewing Subzone 1	Wildlife Viewing Subzone 2	Wildlife Viewing Subzone 3
<b>Indicator:</b>				
<b>Number of vehicles at a wildlife stop</b>				
<b>Standard 1</b>	At least 75% of wildlife stops will have three or fewer vehicles, averaged over five years.	At least 75% of wildlife stops will have two or fewer vehicles, averaged over five years.	At least 75% of wildlife stops will have one or fewer vehicles, averaged over five years.	
	No one year will have less than 70% of wildlife stops with three or fewer vehicles.	No one year will have less than 70% of wildlife stops with two or fewer vehicles.	No one year will have less than 70% of wildlife stops with one or fewer vehicles.	
<b>Standard 2</b>	At least 90% of wildlife stops will have four or fewer vehicles, averaged over five years.	At least 90% of wildlife stops will have three or fewer vehicles, averaged over five years.	At least 90% of wildlife stops will have two or fewer vehicles, averaged over five years.	
	No one year will have less than 85% of wildlife stops with four or fewer vehicles.	No one year will have less than 85% of wildlife stops with three or fewer vehicles.	No one year will have less than 85% of wildlife stops with two or fewer vehicles.	
<b>Standard 3</b>	At least 95% of wildlife stops will have five or fewer vehicles, averaged over five years.	At least 95% of wildlife stops will have four or fewer vehicles, averaged over five years.	At least 95% of wildlife stops will have three or fewer vehicles, averaged over five years.	
	No one year will have less than 90% of wildlife stops with five or fewer vehicles.	No one year will have less than 90% of wildlife stops with four or fewer vehicles.	No one year will have less than 90% of wildlife stops with three or fewer vehicles.	
<b>Indicator:</b>				
<b>Number of vehicles in a viewscape</b>				
<b>Standard 1</b>	At least 85% of the time during bus operating hours, there will be three or fewer vehicles visible in the mile 26 viewshed.	At least 85% of the time during bus operating hours, there will be two or fewer vehicles visible in the miles 55 and 62 viewsheds.	At least 85% of the time during bus operating hours, there will be one or fewer vehicles visible in the mile 68 viewshed.	
	No one year will have less than 80% of the time during bus operating hours having three or fewer vehicles visible in the mile 26 viewshed.	No one year will have less than 80% of the time during bus operating hours having two or fewer vehicles visible in the miles 55 and 62 viewsheds.	No one year will have less than 80% of the time during bus operating hours having one or fewer vehicles visible in the mile 68 viewshed.	
<b>Standard 2</b>	At least 95% of the time during bus operating hours, there will be four or fewer vehicles visible in the mile 26 viewshed.	At least 95% of the time during bus operating hours, there will be three or fewer vehicles visible in the miles 55 and 62 viewsheds.	At least 95% of the time during bus operating hours, there will be two or fewer vehicles visible in the mile 68 viewshed.	
	No one year will have less than 90% of the time during bus operating hours having four or fewer vehicles visible in the mile 26 viewshed.	No one year will have less than 90% of the time during bus operating hours having three or fewer vehicles visible in the miles 55 and 62 viewsheds.	No one year will have less than 90% of the time during bus operating hours having two or fewer vehicles visible in the mile 68 viewshed.	



Table 2. Standards for Visitor Experience and Resource Indicators (VMP, 2012) (continued)

Standard		
Wildlife Viewing Subzone 1	Wildlife Viewing Subzone 2	Wildlife Viewing Subzone 3
<b>Indicator:</b> <b>Number of vehicles parked at one time at Teklanika Rest Stop</b>		
No more than 12 buses at one time with a total of no more than 16 vehicles.	Not Applicable	Not Applicable
<b>Indicator:</b> <b>Number of vehicles parked at one time at Toklat Rest Stop</b>		
Not Applicable	No more than 11 buses at one time with a total of no more than 16 vehicles.	Not Applicable
<b>Indicator:</b> <b>Number of vehicles parked at one time at Eielson Visitor Center</b>		
Not Applicable	No more than 10 buses at one time with a total of no more than 19 vehicles.	Not Applicable
<b>Indicator:</b> <b>Hiker wait time</b>		
<b>Standard 1</b>	At least 75% of hikers will have wait times of less than 30 minutes for pickup by a bus, averaged over five years. No one year will have less than 70% of hikers with wait times of less than 30 minutes.	
<b>Standard 2</b>	At least 95% of hikers will have wait times of less than 60 minutes for pickup by a bus, averaged over five years. No one year will have less than 93% of hikers with wait times of less than 30 minutes.	
<b>Standard 3</b>	At least 99% of hikers will have wait times of less than 90 minutes for pickup by a bus, averaged over five years. No one year will have less than 98% of hikers with wait times of less than 90 minutes.	
<b>Indicator:</b> <b>Sheep gap spacing</b>		
Milepoint 21.6 will have at least a 10-minute gap in traffic every hour with a 95% success rate (23 of 24 hours with gaps), averaged over five years.  No one year will have less than a 90% success rate (22 of 24 hours).	Milepoints 37.6, 52.8, and 60.6 will have at least a 10-minute gap in traffic every hour with a 95% success rate (23 of 24 hours with gaps), averaged over five years.  No one year will have less than a 90% success rate (22 of 24 hours).	Milepoint 68.5 will have at least a 10-minute gap in traffic every hour with a 95% success rate (23 of 24 hours with gaps), averaged over five years.  No one year will have less than a 90% success rate (22 of 24 hours).



Table 2. Standards for Visitor Experience and Resource Indicators (VMP, 2012) (continued)

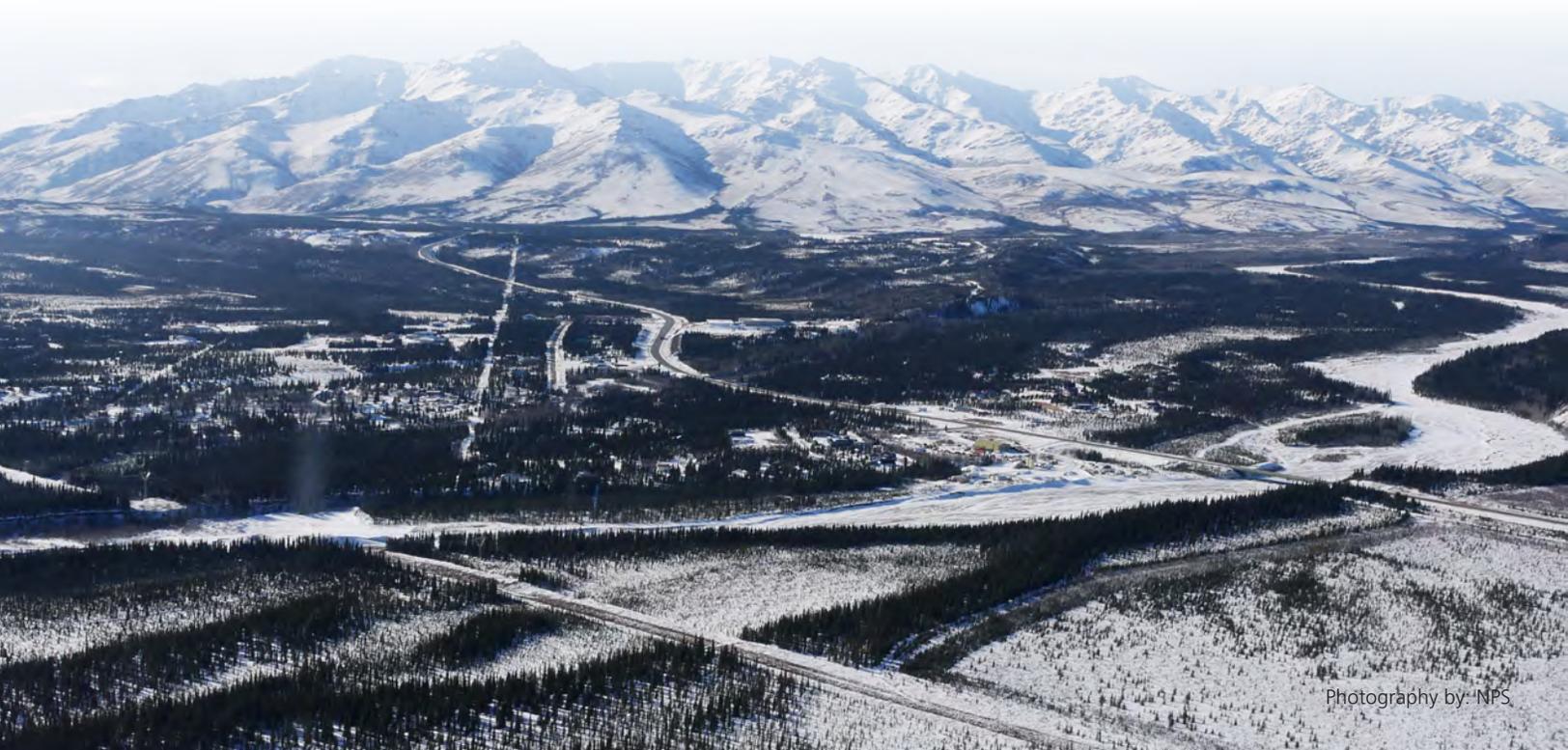
Standard		
Wildlife Viewing Subzone 1	Wildlife Viewing Subzone 2	Wildlife Viewing Subzone 3

**Indicator:**  
**Nighttime traffic**

There will be an average of three vehicles or fewer per hour (total westbound and eastbound) passing any of the traffic counters west of Savage between 10:00 p.m. and 6:00 a.m., with a 95% success rate, and with never more than six vehicles in any one hour, also with a 95% success rate. This limit will undergo further analysis to ensure it does not impact wildlife sightings the following morning and will be lowered if an impact is detected. To further understand the relationship between nighttime traffic and wildlife sightings the following morning, for the first two years following implementation of the plan only, there may be brief exemptions from this standard for periods not to exceed two weeks and no more than two exemption periods in an operating season for the purpose of experimental increases in traffic.

**Indicator:**  
**Large vehicles**

There will be no more than four vehicles (total westbound and eastbound) larger than 80,000 pounds gross vehicle weight rating (GVWR) in any one hour passing any of the traffic counters west of Savage. This limit will undergo further analysis to ensure it does not impact wildlife sightings the following morning and will be lowered if an impact is detected. These limits will undergo further analysis to ensure they do not impact wildlife sightings the following morning and will be lowered if an impact is detected.





documented in Appendix B, Denali Long-Range Transportation Planning and Acoustic Resources.

## Cultural and Historic Resources

Monitoring of resource conditions also include studies that document cultural and historic resources. Humans have been present in what is now Denali for more than 13,000 years. An inventory of historic resources was developed by the NPS in 1983, which led to ongoing protection of cultural resources within the park. As a result, the specific objective is outlined in the 2012 VMP to protect and promote historic character. Ongoing research continues to monitor impacts and discover new impacts to cultural and historic resources. The most recent of these include the following:

- *Denali Park Road National Register of Historic Places Nomination (pending)*
- *Denali Park Road Historic District National Register of Historic Places Nomination (2017)*
- *McKinley Park Hotel Power House National Register of Historic Places Nomination (2016)*
- *Archaeological Exploration in Denali National Park and Preserve, 2006-2009, Vol.I&II (2010, Wygal and Krasinski)*
- *Cultural Landscape Report for Park Headquarters, Denali National Park and Preserve (2008)*

Despite these efforts, it is estimated that only 1 percent of all land in the park has been surveyed for cultural resources and there are likely to be thousands of sites in the park that are not yet identified. Without adequate inventory of these resources, the ability of the NPS to monitor and reduce impacts is limited.

The Denali Park Road is identified as a cultural resource and has been determined eligible for listing

in the National Register of Historic Places (NRHP) as the Mount McKinley Park Road Historic District. The road also is part of the Denali Park Road Historic District Cultural Landscape. Currently under development, a Cultural Landscape Report for the Denali Park Road Historic District will provide treatment recommendations for historic preservation, maintenance, and repair activities that seek to preserve historic character while also taking into account traveler safety and many other factors. While the Denali Park Road is a historic feature, the bridges within the corridor do not contribute to the historic significance of the district and are, therefore, non-contributing features. However, park and regional staff have identified the possible risks to the character of the road through bridge conversion projects similar to the 2015 Rock Creek crossing (Mile 3) project that converted a bridge to a culvert. Both the NRHP nomination and the Cultural Landscape Inventory (CLI) provide the baseline character-defining features of the historic road that need to be taken into account prior to any proposed road corridor development or changes. In addition, the CLI identifies factors and vulnerabilities that could cause stress to the historic road character and offers some condition monitoring.

## Air Quality and Fugitive Dust

Air quality in Denali with regard to health conditions and environmental impacts was monitored from 2000 to 2003 as part of a requirement of the Alaska Department of Environmental Conservation (ADEC) to track airborne particulate transport from the Anchorage metropolitan area to Denali. Results from a monitored location within the park were used to establish background concentrations for the State of Alaska. This study found ambient particulate levels to be well below the National Ambient Air Quality Standards (NAAQS) at the monitor located at the park headquarters (ADEC, 2012). NAAQS are established by the Clean Air Act and are based on



concentrations that are determined to be safe by the U.S. Environmental Protection Agency (EPA).

Air quality conditions along the Park Road are influenced by exhaust and re-entrained dust emissions from passing vehicles. Currently, there are no monitors to assess concentrations of particulate emissions from these sources in locations away from the entrance area. As noted by park staff through the LRTP engagement process, visible dust created by moving vehicles impacts wildlife and vegetation and also creates aesthetic problems. Dust and mud that collects on bus windows is a visual detriment to wildlife viewing. As a result, a dust palliative agent typically has been applied to processed gravel that is used to amend the road surface, thereby mitigating some impacts of airborne particulates. The park has identified a need to understand (and monitor) the impacts of palliative application on vegetation adjacent to Denali Park Road as well as exposure and ingestion by wildlife.

### Invasive Species

The introduction of invasive species is increasing as climate change effects emerge and human activity increases in high latitudes. One known aquatic plant species, American or Canadian Waterweed or Pondweed (*Elodea Canadensis*), is of known concern to Denali. The most common method for transporting these species is through aquatic aircraft flotation devices. Unlike the spread of invasive species through terrestrial means—as facilitated by motorized transportation activity along the Park Road—there is limited mitigation for reducing impacts of airborne aquatic transfer of invasive species, particularly in remote locations of the park. Park staff have identified the need to monitor *Elodea* and other invasive species.

### 2.1.2 Collaborate

Past resource protection and conservation efforts specifically include cooperative discussions with air tour operators about measures to protect wilderness character and ecosystems, and to minimize conflicts with land activities. Through the Denali Overflights Advisory Council, from 2007 to 2012, best practices were developed to mitigate acoustic impacts of aircraft and motorized vehicles, as discussed in the section pertaining to acoustic resources. Also, the park has documented techniques for collaborating with park managers to improve soundscapes mitigation efforts.

In 2012, the NPS Alaska Region LRTP made coordination with neighboring land and transportation managers a regional objective for all parks in the state. The Alaska Federal Lands LRTP established an ongoing transportation project coordination working group to address such concerns—at a regional scale. Although there is currently no similar working group for Denali-specific coordination, some efforts can be conveyed through the regional planning work group.

Currently, formal collaboration processes used to protect resources within the context of transportation issues occur during project development processes, and typically are mandated through NEPA-level compliance planning. Other methods of collaboration include sharing interpretive information about cultural and natural resources. The NPS Interpretation Division (Interp Division) prepares materials in a variety of media that are distributed along the Park Road at developed areas. The Interp Division coordinates with outside organizations, inholders, and concessioners to share information about park resources.



### 2.1.3 Needs and Gaps

Desired future conditions for Denali are identified for each objective. Needs and gaps are expressed as the difference between the baseline condition and the desired future condition.

#### Monitor Resources

The desired future condition of this objective is: *“Critical monitoring of park resources affected by transportation has been identified, is being performed, and is regularly maintained.”* Given the baseline conditions documented above, this LRTP concludes that the park collects relevant resource and transportation data necessary to monitor indicators found within the VMP and elsewhere through research regarding impacts to cultural and natural resources. Monitoring these and other indicators through applied research is a high priority. The gap between the existing and desired conditions lies in the process for developing routine management and maintenance of this research and then establishing a decision-making platform by which to adapt transportation improvements to identified resource protection needs. While wildlife monitoring has well-documented processes and is incorporated into transportation management through the VMP, the most recently established research programs—soundscapes, geologic hazard and debris flow studies, and assorted documentation of cultural resources—are not yet incorporated into those processes for a comprehensive evaluation of transportation facilities, infrastructure, or systems.

An exposure-based threshold is a resource management method used to provide objective measures of a policy or management strategy. In the case of the Park Road, the VMP establishes appropriate levels of exposure of vehicle traffic for specific wildlife and human experience tolerances. Exposure thresholds are articulated in standards that measure the levels of exposure. The VMP only dictates the maximum number of vehicles permitted on the road and does not yet incorporate

an exposure-based threshold based on vehicle-miles-traveled within the permitted areas of the Park Road. Measuring vehicle impacts based on exposure could allow the VMP to be flexible to changes in the tour packages offered by concessioners.

#### Collaborate

The desired future condition of this objective is: *“Transportation system monitoring data and findings related to resources are shared in ways that are meaningful and usable by others.”* Given the baseline conditions documented above, this LRTP concludes that while sharing of information does occur, greater collaboration is needed between internal and external stakeholders to apply research outcomes, develop park projects, and create opportunities for visitor interaction/interpretation. Park staff has identified a need for increased interpretation, explicitly for the purpose of natural and cultural resource protection.

The gap between the existing and desired conditions is evident by the ongoing need to improve information sharing between internal resource managers, while also improving how natural and cultural resource information is shared publicly with users of the transportation facilities, infrastructure, and systems. Current programs that exemplify this type of coordination include cooperation between geohazard scientists and road ecologists working with Park Road maintenance staff to monitor and report changes to the road and its surrounding environment. The NPS wants to replicate these types of coordination efforts so that science can better influence management decisions. Similarly, with emerging techniques for measuring acoustic impacts of aircraft and motorized vehicles developed by park staff, there is an opportunity to enhance collaboration concerning the management of corridors for aircraft operations. Current efforts to provide interpretive information about cultural resource protection also have been identified as a particular need.

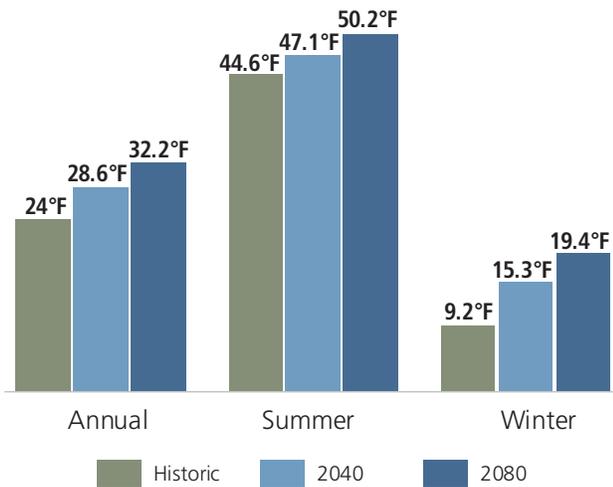


## 2.2 Climate Change

The Climate Change goal states: *Plan for climate change impacts to the park’s transportation system*. The purpose of the goal statement is to minimize the negative impacts of future climate change to Denali through research, education, adaptation, mitigation, and action. Climate Change objectives reflect a desire to reduce the park’s carbon footprint and demonstrate to the public the relationship between transportation activities and climate change. The objectives for the Climate Change goal are:

- **Adaptation and Mitigation:** Recognize the impacts of global climate change on the park’s resources and minimize the park’s transportation system’s emissions.
- **Communication:** Support climate change research to inform transportation system management and park users.

Figure 5. Magnitude of predicted temperature change in Denali (°F)



Source: Alaska Region Climate Change Response Strategy (2010-2014)

Table 3 summarizes Climate Change goal conditions determined through the literature review process within the context of the goal’s objectives and desired future conditions. Input from park staff also informs condition determinations. Details about existing conditions and the gaps between existing and desired future conditions follow the Table 3 summary.

### 2.2.1 Adaptation and Mitigation

The Denali LRTP responds to climate change through adaptation and mitigation. Adaptation refers to strategies that focus on management and planning efforts to help design infrastructure and programs that will accommodate future climate change-related impacts. Mitigation refers to efforts that attempt to reduce the park’s contributions to climate change, such as reducing greenhouse gas (GHG) emissions.

#### Adaptation

To effectively adapt to climate change, Denali has begun identifying specific climate change risks. Data from the *Alaska Region Climate Change Response Strategy 2010-2014* predicts average temperatures within Denali will rise approximately 4.6 degrees Fahrenheit by 2040 and 8.2 degrees Fahrenheit by 2080. These changes are expected to be greatest during the winter months (Figure 5). This increase in average temperatures is expected to have a major impact on transportation resources within the park.



Table 3. Goal Summary

<b>Adaptation and Mitigation Objective:</b> "Recognize the impacts of global climate change on the park's resources and minimize Denali's transportation systems emissions."	
<b>Desired Condition</b>	Denali assesses critical transportation assets for climate change-related risk while also minimizing transportation-related emissions.
<b>Existing Condition</b>	The park is in the process of assessing the Park Road for climate change-related risks and is minimizing transportation-related emissions.
<b>Existing Condition Summary</b>	<p>The Unstable Slope Management Program has identified Park Road vulnerabilities to climate change.</p> <p>Regional planning objectives call for increased hazard risk assessments for strategic decision making.</p> <p>Current mitigation activities include using employee carpool vehicles and reducing energy use. Future opportunities include converting gasoline and diesel vehicles to natural gas and hybrid vehicles.</p>
<b>Communication Objective:</b> "Support climate change research to inform transportation system management and park users."	
<b>Desired Condition</b>	Denali continues to conduct and use climate change research to inform transportation system management and provide scientific information as a basis for interpretive messaging to park users.
<b>Existing Condition</b>	The park consistently supports climate change science through a range of activities, including staff research support and outreach activities. Climate change science also is supported at NPS's regional and national levels.
<b>Existing Condition Summary</b>	<p>Recent Denali climate change-related research includes the Unstable Slope Management Program Park Road assessment.</p> <p>The park consistently supports climate change science through a range of activities, including staff research support and outreach activities. Climate change science also is supported at NPS's regional and national levels.</p>



Table 4. Potential climate change risks to the transportation system

Climate Change Risk	Impact to the Transportation System
<b>Changes to visitation patterns</b>	Mild autumn and spring weather patterns will increase off-peak visitation and will create new demands for transportation and visitor services
<b>Surging glaciers and glacial outbursts</b>	Airstrip, road, and trail washouts and overtopping
<b>Thawing permafrost</b>	Heaving, cracking, and subsidence of roads, trails, and airstrips. Severe events could cause damage to road base and surface, and possible overtopping of trails, roads, and other structures
<b>Increasing number and severity of wildland fires</b>	Reduced visibility from smoke for operation of motor vehicles and aircraft
<b>Increasing frequency of riverine flooding</b>	Road washouts and overtopping causes damage to bridges, culverts, ditch lines, and road surfaces
<b>Altering water quality</b>	Submerged hazards to boats and floatplanes with changing channels and increases in turbidity
<b>Timing of surficial water flow</b>	Shifting winter and summer river travel seasons result in safety hazards or cause boat groundings; variable seasonal road opening and closing reduces efficient operations and maintenance
<b>Increasing number and severity of avalanches and landslides</b>	Overtopping, structural damage, and possible failure of trails, roads, bridges, and airstrips; mid- to long-term interruption of transportation system and visitor services
<b>Proliferation of invasive plants</b>	Invasive plants conveyed by motor vehicles are more prevalent along transportation corridors

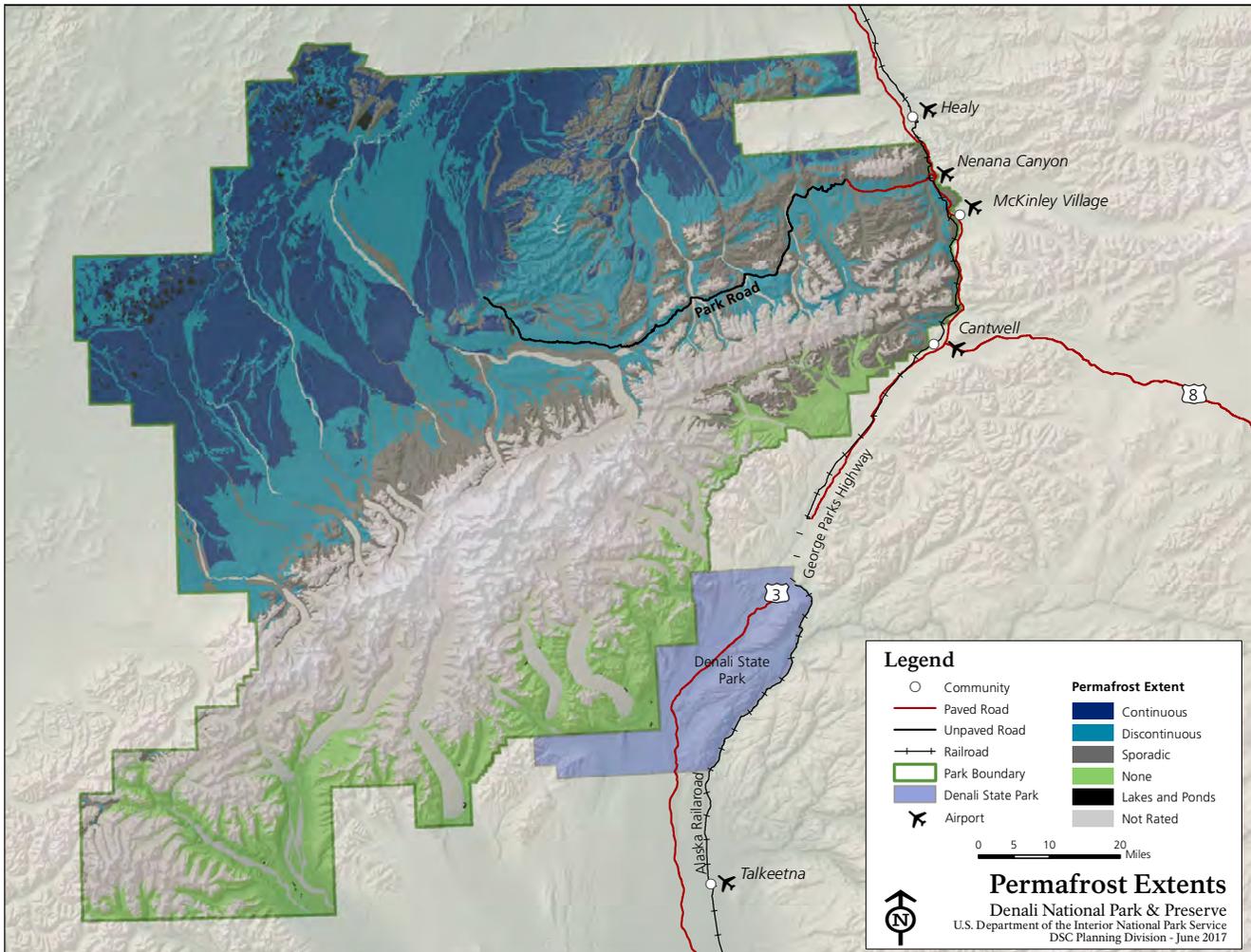
Source: National Park Service Alaska Region Long-Range Transportation Plan (2012)

Climate change is affecting a variety of Denali resources, including those related to or influenced by the efficient transportation of park users. Although the exact extent of these changes over time still is unknown, engagement with park staff through the LRTP planning process indicates a desire to actively monitor and understand the potential impacts of climate change. Climate change impacts expected could include surging glaciers and glacial

outbursts, thawing permafrost, increasing number and severity of wildland fires, increasing frequency of riverine flooding, altering water quality, timing of surficial water flow, increasing number and severity of avalanches and landslides, and proliferation of invasive plants. Table 4 demonstrates these potential climate change risks to the park and their potential impacts to the transportation system.



Figure 6. Denali Permafrost Extents (2016)



Since Denali is located at the boundary between continuous and discontinuous permafrost (Figure 6), many of these impacts are likely to stem from shifting and reducing the frozen state. As temperatures rise, the boundary between continuous and discontinuous permafrost is expected to migrate north. This will expose the Park Road to an increasing chance of subsidence-related damage, other associated aforementioned risks, and resulting maintenance needs.

To identify risks to specific transportation assets, staff researchers conducted a risk assessment of the Park Road, focusing on unstable slope management. Several of the contributing factors in this risk assessment are likely to be caused or exacerbated by climate change. The Unstable Slope Management Program is a collaboration between the Federal Highway Administration (FHWA) and other federal, local, and private agencies to provide a risk ranking associated with sites along the



Park Road. As illustrated in Figure 7, preliminary findings of the program show that, of the 141 sites identified along the Park Road, 24 percent are in “poor condition.” This means that the sites have the highest risk—depending on the geologic conditions—for landslides, debris flow changes, rock fall, frost heaves, and erosional undercutting. This program also identifies 9 percent of sites to be in good condition and 67 percent of sites to be in fair condition. As this program continues, more sites will be identified and included in the ranking. A technical memo prepared by park researchers details the methodology and early results of the

program (Deterministic Geologic Risk Assessment of the Denali Park Road Utilizing the Unstable Slope Management Program [USMP], 2016), Appendix C.

The park also has identified climate change risks at the Toklat rest area and alternative destinations are being assessed. Climate change-related risks expressed in terms of hazard vulnerability will be considered in the Toklat rest area among other important factors (e.g., visitor experience and operational costs) as evaluation continues.

Figure 7. Unstable Slope Management Program Site Rankings

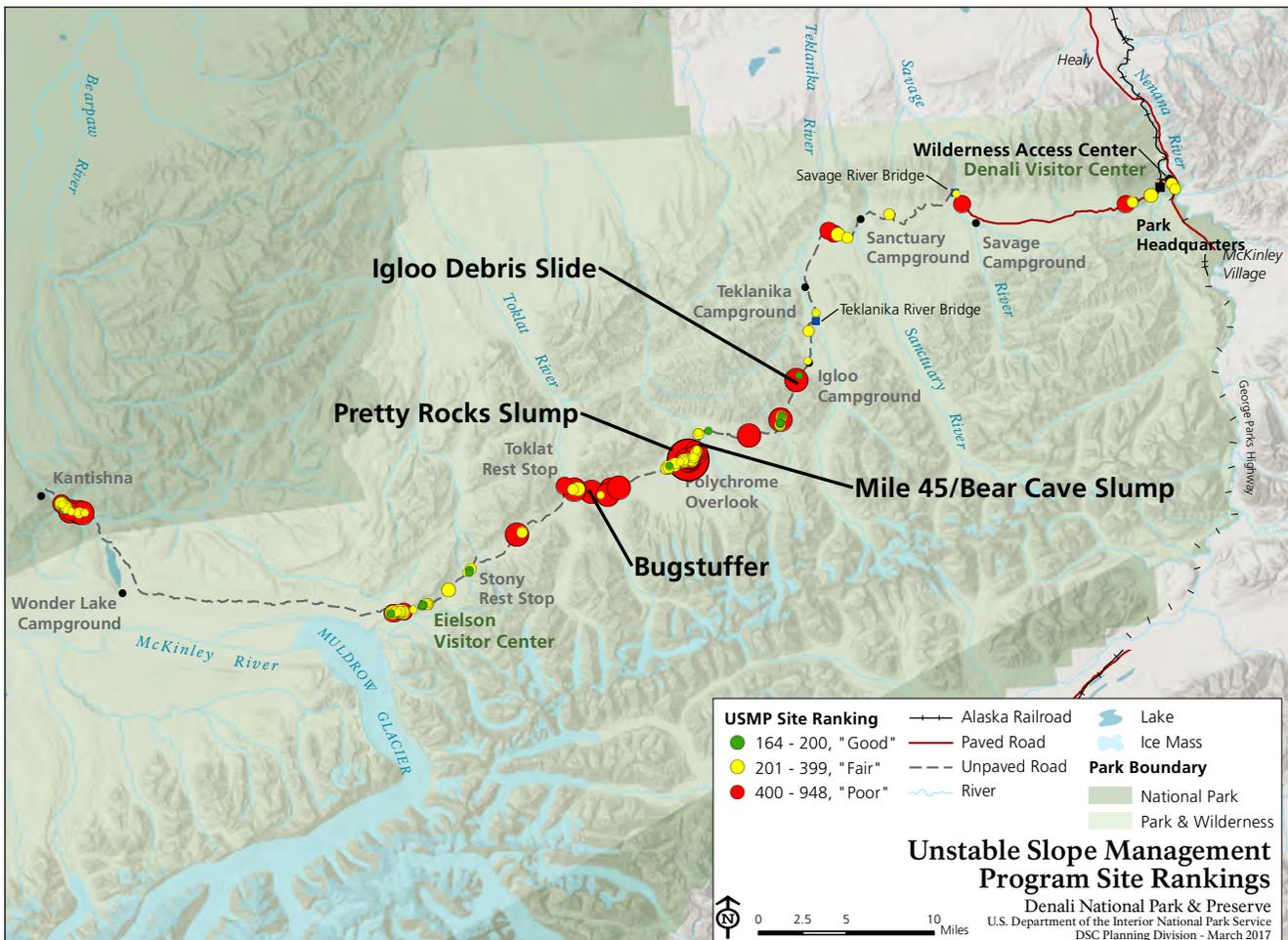
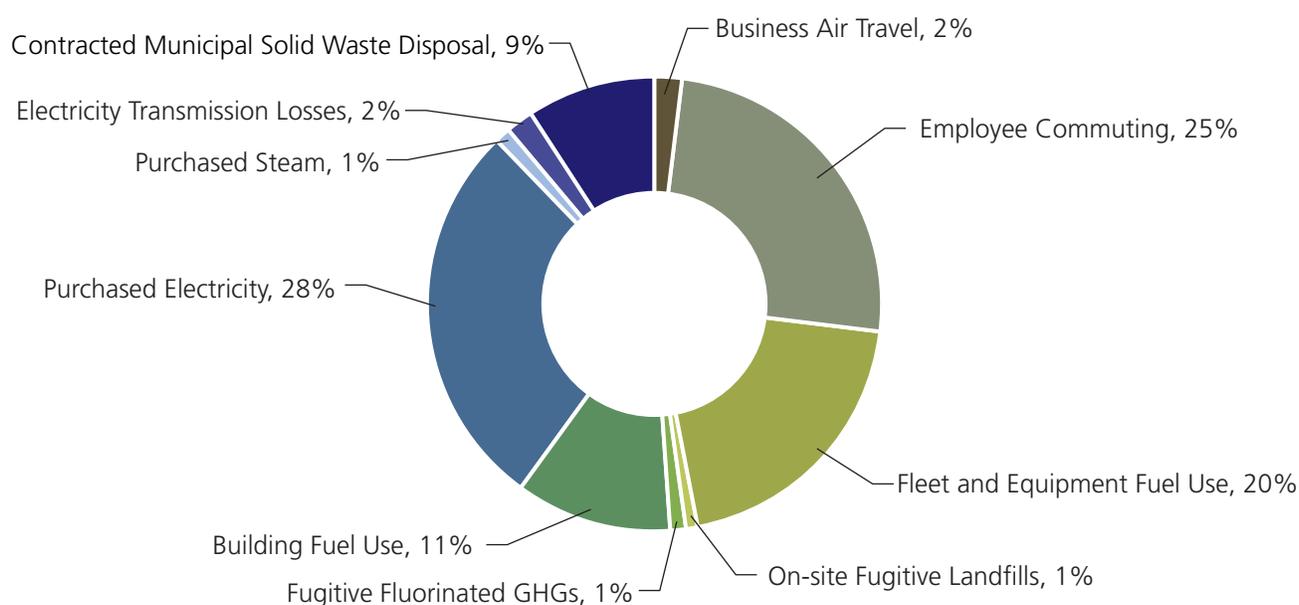




Figure 8. NPS 2012 Greenhouse Gas Inventory



Source: NPS Green Parks Plan: One-Year Review

As part of the NPS’s ongoing commitment to address climate change, a series of memoranda and policy guidebooks have been created to help guide the parks’ plans for climate change when programming projects. Per the 2015 *NPS Policy Memorandum 15-01*, NPS managers currently are required to address three key questions related to climate change adaptation when planning a project. These include:

1. What natural hazards apply at this location?
2. How important are these assets to the park?
3. What measures are going to be taken to promote resilience?

## Mitigation

In addition to predicting future conditions and attempting to adapt to them, Denali also is taking a proactive approach with regard to transportation to mitigate any influence it might have on a changing

climate. According to the 2012 NPS GHG emissions inventory, approximately 47 percent of all GHG emissions generated by the NPS are related to transportation. Transportation-related GHG emissions are summarized in Figure 8. To reduce the amount of GHG emissions caused by transportation sources, Denali has instituted a number of policies and programs, including transit services, carpooling programs, and winter vehicle idling reductions. Additionally, the park has piloted the use of a number of low emissions vehicles and buses.

## 2.2.2 Communication

Currently, there is no formal Denali climate change communication program. There are, however, several interpretive programs within Denali that demonstrate the impacts of climate change on the environment. Denali concessioners offer trips into the park on tour buses that feature a trained naturalist who narrates along the route. Effects of climate change



are incorporated into the information communicated to visitors. This type of interaction promotes visitor thought and reaction to suggested links between transportation choices and the possible effects on changing climate, as well as broader climate change impacts to Denali.

Continued support and participation in science-based climate change research provides opportunities for sharing additional information with park users while also improving data used to make system management decisions. Opportunities for Denali to expand climate research include the funding programs listed in Alaska’s climate action plans; the National Academies of Sciences, Engineering, and Medicine Transportation Research Board; partnerships to test green technologies; and regional support for the Climate Friendly Parks certification. Additionally, the Alaska Federal Lands LRTP sets an objective of participating in at least one climate change adaptation or mitigation effort per year. Denali may propose multi-agency climate initiatives to be considered as a result of completing this LRTP.

### 2.2.3 Needs and Gaps

Desired future conditions for Denali are identified for each objective. Needs and gaps are expressed as the difference between the baseline condition and the desired future condition.

#### Adaptation and Mitigation

The desired future condition for the adaptation and mitigation objective is: *“Denali has assessed critical transportation assets for climate change-related risk while also minimizing transportation-related emissions.”* Given the baseline conditions documented above, this LRTP concludes that Denali is positioned to have positive impact on this desired future condition since it has established

programs for the assessment of the Park Road for climate change-related risks and is minimizing transportation-related emissions. Specifically, the Unstable Slope Management Program has identified Park Road elements that are vulnerable to climate change. Current transportation-specific mitigation activities range from maintenance activities—such as thawing culverts to improve drainage—to fleet specifications—such as the use of low emissions buses.

The gap between the existing and desired conditions centers on continuing or expanding adaptation and mitigation efforts. Future adaptation efforts cited through this LRTP’s engagement process include expanding the inventory of risk areas through the Unstable Slope Management Program, and collecting anecdotal information from the transit system (previously called visitor transportation service [VTS]) drivers and park staff. The park seeks to better integrate results of the Unstable Slope Management Program with asset management and Park Road maintenance programs. Additionally, forecasted changes and impacts could ideally be incorporated more formally into the park’s planning processes to understand the relationship between climate change and other LRTP goal areas, such as user experience, resource protection, and system optimization.

To ensure continued progress with regard to climate change mitigation, Denali has several performance standards set in place by the Climate Friendly Parks certification in support of reducing the park’s carbon footprint. Future actions include upgrading park vehicles from gasoline and diesel engines to natural gas and hybrid engines.



## Communication

The desired future condition for the communication objective is: “*Denali continues to conduct and use climate change research to inform transportation system management and provide scientific information as a basis for interpretive messaging to park users.*” Given the baseline conditions documented above, this LRTP concludes that Denali is currently conducting climate change research to inform transportation system management decisions and park users. Climate change research is illustrated through the park’s Unstable Slope

Management Program Park Road assessment and regional and national-level NPS climate change research initiatives. Input gathered through LRTP outreach reflects park aspirations to use climate change research findings and data to influence park transportation asset maintenance and operations decision making. Sharing climate change information with park users is illustrated in the park’s interpretive programs, which explain to users the impacts of climate change on the environment.





## 2.3 User Experience

The User Experience goal states: *Provide a quality multimodal park experience for users.* The goal statement is related to the modes of transportation used to access and travel within Denali, the types and extent of transportation facilities provided, the transportation infrastructure in place to support multimodal use, and the transportation systems in place to move large numbers of people in the most efficient manner possible. User Experience objectives reflect a desire to provide the best information available to improve transportation for all users. The objectives for the User Experience goal are:

- **User Data:** Manage the user experience through information and education.
- **Multimodal Transportation:** Provide appropriate, effective, and efficient multimodal opportunities.

Baseline conditions are centered on the findings from an LRTP-focused literature review. Table 5 summarizes User Experience goal conditions determined through this literature review process within the context of the goal's objectives and desired future conditions. Park conditions are supplemented with use patterns and management insights provided by park staff and obtained through the LRTP engagement process. Details about existing conditions and the gaps between existing and desired future conditions follow the Table 5 summary.

### 2.3.1 User Data

Much of the data collection needs within Denali stem from the access controls used to ensure the protection of natural resources. These access controls, initially created under the 1986 GMP, are now governed by the 2012 VMP. The VMP established six goals, each containing numerous objectives. These goals include:

1. Protect the exceptional condition of the park's resources and values through informed, proactive, and transparent management.
2. Provide high-quality and appropriate visitor opportunities on the bus.
3. Provide access to recreational and educational opportunities along the Park Road.
4. Make the park transit/access system understandable and user friendly.
5. Provide a transportation system that meets visitor access needs.
6. Provide access for subsistence use and inholders.



Table 5. Goal Summary

<b>User Data Objective:</b> "Manage the user experience through information and education."	
<b>Desired Condition</b>	User experience-related decisions and performance-monitoring processes are entrenched in the use of readily available data.
<b>Existing Condition</b>	More user experience-related data are being collected, but these data are not yet entrenched in decision-making processes.
<b>Existing Condition Summary</b>	<p>Visitation data collected at visitor centers and other travel waypoints are used to track user characteristics and behavior.</p> <p>Permits collected for the purpose of managing access for private vehicles with right-of-way authorization, backcountry hiking, or commercial aircraft are useful for tracking visitation to the most protected areas of the park.</p> <p>Data are collected on park transit system vehicles about the types of specific stops (wildlife stops, rest stops, hiker pick-ups including hiker wait times), which is of high importance to the park. Miles traveled is not currently being collected.</p> <p>Safety data are reported through the Incident Management, Analysis and Reporting System (IMARS) and Fatal Analysis Reporting System (FARS).</p> <p>Denali's website provides six of nine elements of essential traveler information as outlined by the NPS National LRTP.</p>
<b>Multimodal Transportation Objective:</b> "Provide appropriate, effective, and efficient multimodal opportunities."	
<b>Desired Condition</b>	All modes of the park's transportation system are easy for users to navigate, free of conflicts, and operate in accordance with park values.
<b>Existing Condition</b>	Data and user feedback indicate satisfaction with the park's multimodal opportunities and alignment with park values, but there are opportunities for navigation improvements and reduction of conflicts.
<b>Existing Condition Summary</b>	<p>Congestion occurs along the Denali Park Road and in Nenana River Canyon just outside the park entrance, at wildlife stops and rest stops within the park, along narrow roadways that include bicycling and hiking in the frontcountry, and at particular locations east of Savage River.</p> <p>Confusion exists on the part of the public about navigating within the entrance area between various public facilities and transportation services, such as between the bus and train boarding areas. Efficient transportation services connecting core visitor services do not currently exist.</p> <p>Improved and more efficient connections between the park, local communities, and visitor accommodations are needed.</p> <p>Safety, comfort, and quality of transit service for users is desired.</p> <p>Pedestrian facilities are lacking in the entrance area and signage is needed to improve wayfinding and interpretation.</p>



To support these goals and objectives, a variety of data collection methods are used to monitor existing conditions and guide future decision making, including:

- Visitor surveys, which are used to gauge visitor satisfaction as well as the quality and efficiency of transportation system performance. The most recent transportation-specific survey information was collected in 2016.
- Static visitation collection points at the visitor centers and other travel waypoints, which are used to track user characteristics and behavior.
- As of 2013, by bus drivers on park transit system vehicles. They collect and input data in support of the VMP.
- Permits collected for the purpose of managing access for private vehicles with right-of-way authorization, backcountry hiking, or commercial aircraft, which are used for tracking visitation to the most protected areas of the park.
- Safety information, which currently is collected in the IMARS and FARS databases, designed for recording vehicular accidents.
- Backcountry Information Center Statistics, which are available from 2002 through the current year and are used to track permits issued, number of people in the backcountry, and total number of nights and user nights in the backcountry.

### 2.3.2 Multimodal Transportation

From the beginning of the park's existence, there have always been robust multimodal connections within the park. Bus services within the park, beginning as early as 1923, were used to give visitors

guided access to the park. In the late 1930s the Denali Park Road was finished, allowing for increased access. This service was greatly expanded in 1972, following the completion of the George Parks Highway that linked the park with the Municipality of Anchorage and the City of Fairbanks. Following the rise in visitation resulting from the improved highway in the same year, park managers made bus use compulsory for all visitors in an attempt to limit the impacts of growing visitation on the park's natural resources. In 1986 the park instituted the GMP, which limited the number of vehicles allowed past Mile 15 of the Park Road.

Since this time, visitation has continued to grow (Figure 9) and access into the park has continued to evolve and change to meet the new demands. However, with record-breaking visitation and continued forecasting of visitation growth, the existing access plans and systems may not be able to keep pace with the existing bus system structure and operating standards. As the systems approach their capacity, there are emerging and persistent negative impacts to the user experience.

Appropriate multimodal transportation service generally is defined in the Denali VMP as the ability to make the park accessible to a wide range of users with overarching consideration for the wilderness character within which the system operates. Increased visitor access is desirable if it does not cause negative impacts to the natural environment. At locations within the park where the natural setting is still substantially intact, even small increases in visitation or changes in modes of access can have dramatic impacts on natural systems. This definition of appropriate access relates closely to the park's purpose and mission as stated in Denali Foundation Statement:



*“[Park staff] protect intact, the globally significant Denali ecosystems, including their cultural, aesthetic, and wilderness values, and ensure opportunities for inspiration, education, research, recreation, and subsistence for this and future generations.”*

## Transit System Operations

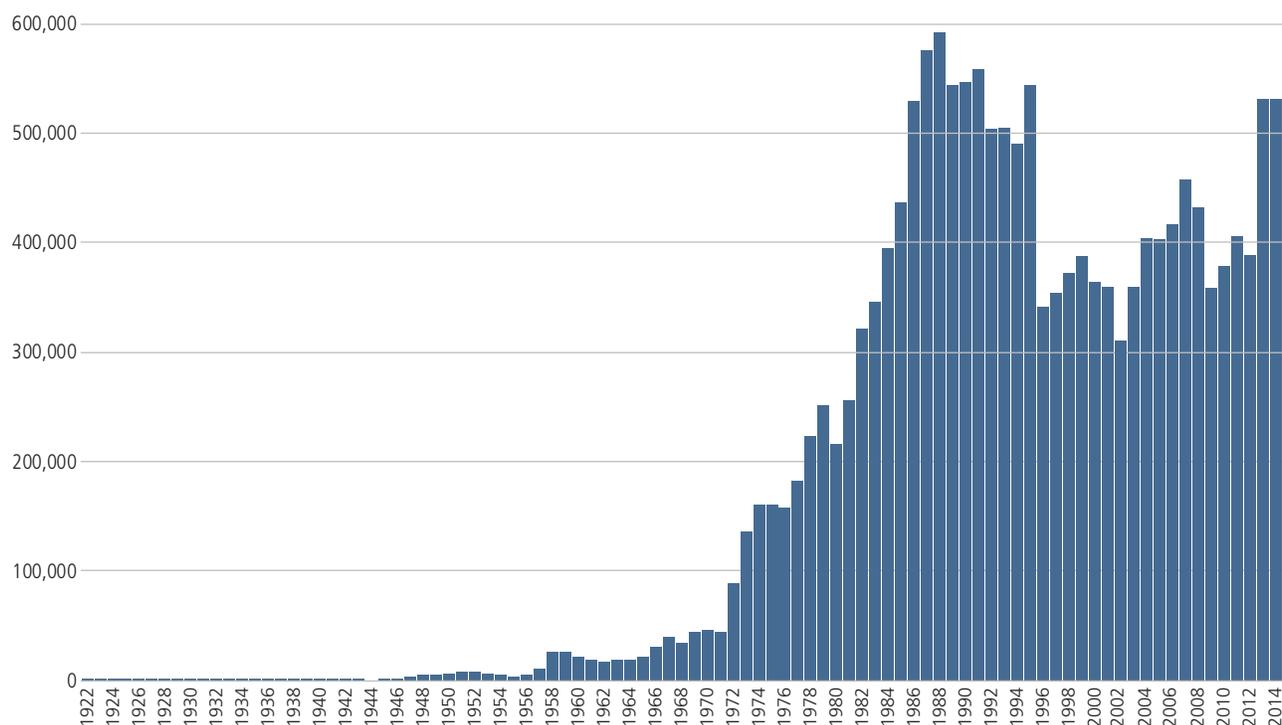
Because most users access the park via a scheduled bus system, the experience with regard to access pivots on how a majority of users perceive their transit system experience while in the park. Categories of concerns related to users’ transit experience within the park, identified within the literature review, generally can be categorized into three topics, including: (1) lack of information about transit system operations; (2) lack of connections between the park and surrounding communities and visitor accommodations; and (3) safety, comfort, and

quality of the experience while using transit. These three topics are detailed in the following discussions.

**1. Lack of information about transit service operations.** There are currently three types of transit service offered to park users. In addition to the multiple private shuttles from hotels outside of the park, concessioner transit service includes tour buses, transit buses, and courtesy buses. The park has recently simplified this terminology to refer to all bus transportation as the “transit system.” Each one of these provide a different type of service, pick up and drop off from a variety of locations, and vary in monetary cost (many privately operated buses are free to hotel guests and are not allowed past the Savage River check station at Mile 15).

This variety in transit services is critical to providing a more appropriate experience for the individual user, but it also leads to confusion for those who

Figure 9. Denali Visitation (1922 to 2015)\*



\* It should be noted that visitor quantification methods changed over time and with increasing accuracy. New counting instructions were introduced in 1991, 1997, 2002, and 2010.

Source: Annual Park Recreation Visitation Graph (1904-2016)



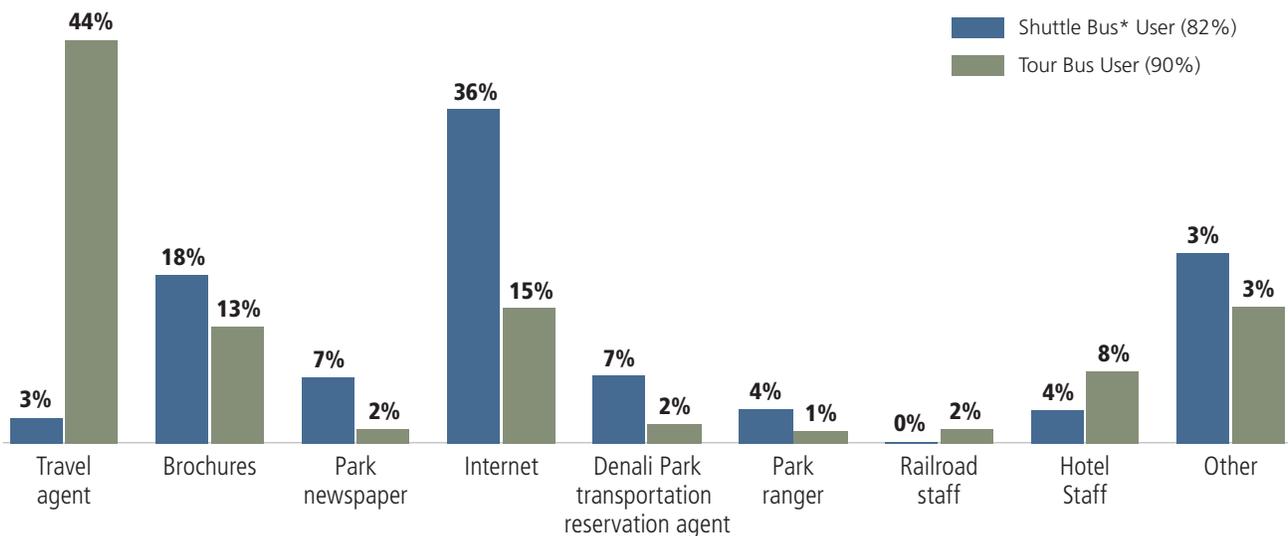
are not familiar with how the transit system works. Based on survey results reported in the 2010 Denali Park Road Visitor Survey Report, 82 percent of people surveyed were first-time visitors to the park. This results in many visitors being unfamiliar with the park’s transportation system. Most visitors reported obtaining information about the park’s transportation systems either from a travel agent or from the Internet (see Figure 10). This can result in visitor confusion because the transit system schedule can change based on demand, weather conditions, and wildlife activity. Figure 11 shows the level of difficulty visitors reported in obtaining information about the transit system (*Denali Park Road Visitor Survey, 2010*).

In the 2010 *Denali Park Road Visitor Survey*, visitors were asked if they would prefer fewer bus services to make it easier to understand what bus service is provided, or if they felt the benefits to expanding future service would outweigh the possible increase in confusion. In general, visitors felt that existing confusion about transit services should not stop expansion of the transit system. Approximately

35 percent of tour bus users and 44 percent of shuttle bus users had an interest in expanding transit services at the risk of creating more visitor confusion. This compares with 31 percent and 28 percent, who had less of an interest in the expansion of transit services. The results of the survey questions are shown in Figure 12.

**2. Lack of Connections between the Park and Surrounding Communities and Visitor Accommodations.** Getting between the park and surrounding attractions can be difficult for the many users who do not have access to a private vehicle. There is no existing public transit service in the area. The only connections between the surrounding hotels/lodges and the park are private shuttle services run by local businesses. Typically, these only serve patrons of the particular business that provides the service. Based on the *Denali Transportation Needs Assessment and Feasibility Study (2006)* and input from park staff during LRTP coordination, there is a strong desire for improved transit options between the park and surrounding communities and commercial businesses.

Figure 10. Visitor information sources



\* "Shuttle Bus" refers to a prior transit service provided by the park, now similar in operations to the Transit Bus.  
 Source: 2010 Denali Road Visitor Survey



**3. Safety, Comfort, and Quality of the Experience while using Transit.** Most visitors to the park spend a majority of the visit on one of the transit services provided within the park. This is due in part to transit buses reaching further into the park than tour buses. Summarized in Table 6, the average transit users spend approximately eight hours on the Denali Park Road during their trip into the park. This means most of their experience is influenced by how they perceive the transit experience.

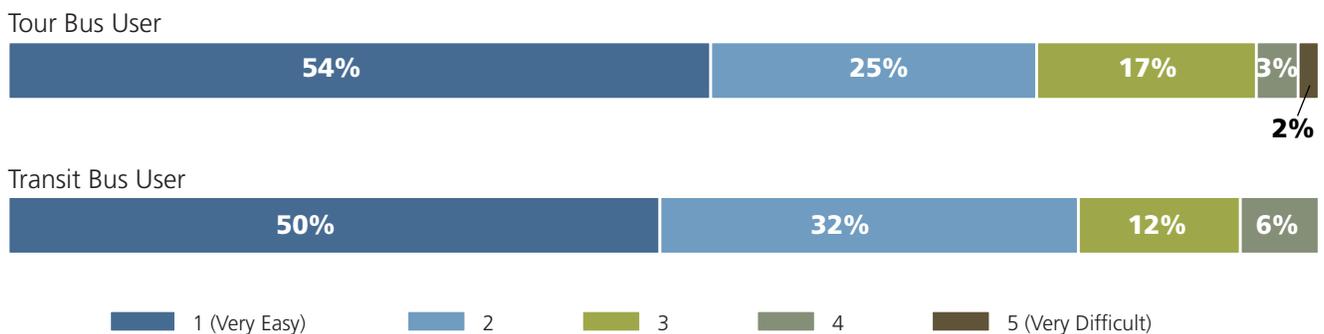
Table 6. Time spent on the Park Road by transit system service type

Type of Service	Average Time Spent on the Park Road
Transit Bus	8.7 hours
Tour Bus	6.2 hours

Source: 2010 Denali Park Road Visitor Survey

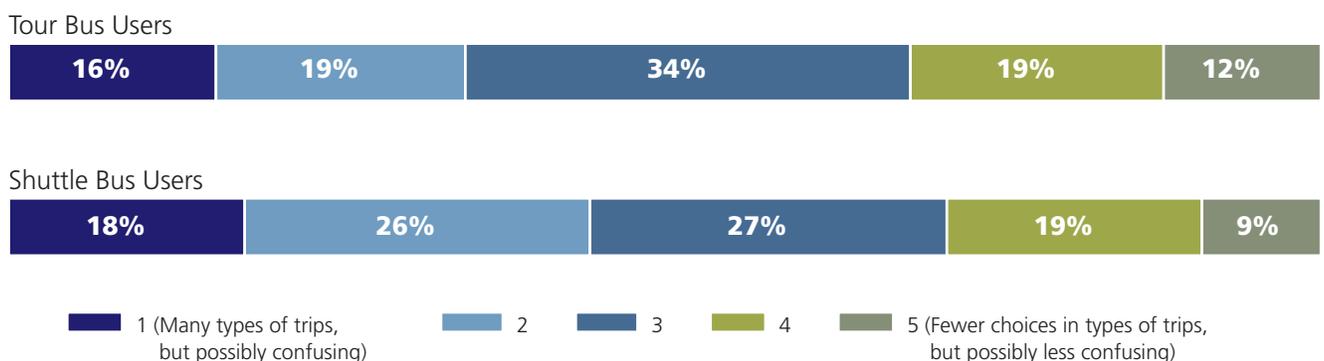
A major factor in a visitor’s experience while using transit within the park is the ability to experience the natural surroundings without visual impedance or distraction. The most reported annoyance on

Figure 11. Perceived difficulty obtaining information about transit



Source: 2010 Denali Road Visitor Survey

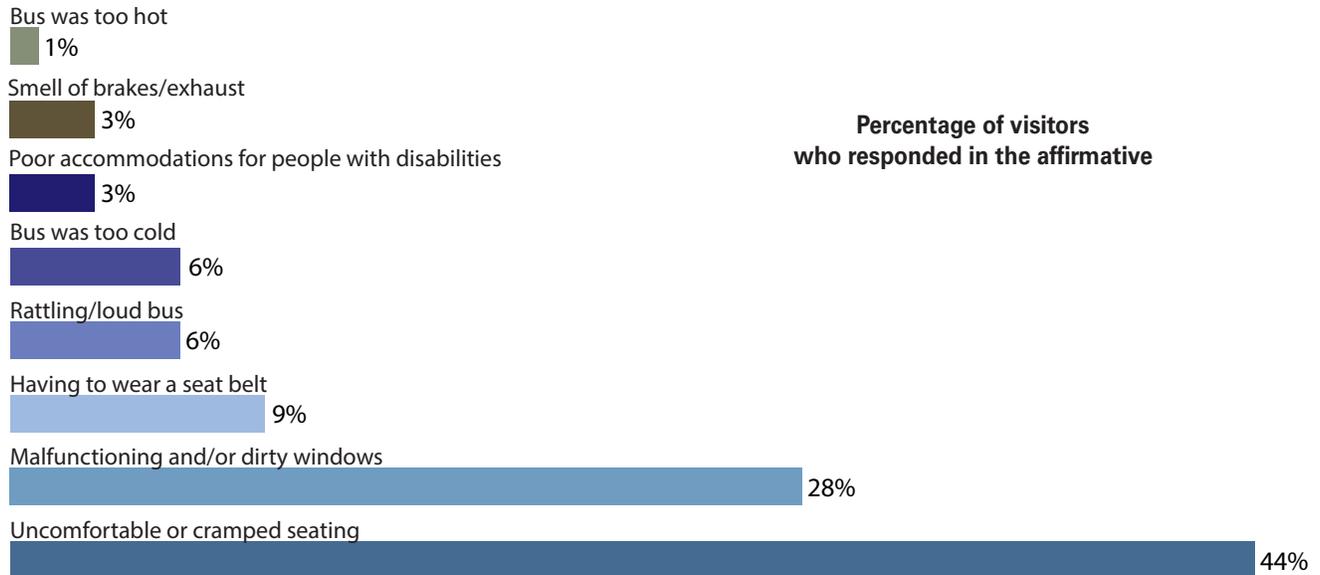
Figure 12. Expansion of transit services versus visitor confusion



Source: 2010 Denali Road Visitor Survey



Figure 13. Visitor annoyances with transit service



Source: *Indicators and standards of quality for the visitor experience on the Denali Park Road (2006)*

transit vehicles was uncomfortable or cramped seating followed by malfunctioning and/or dirty windows (UVM, 2006). Figure 13 shows the reported annoyances from visitors about the transit services.

In addition to comfort while on the vehicles, information collected from the 2006 *Indicators and Standards of Quality for the Visitor Experience on the Denali Park Road* report also shows that the number of buses and vehicles can have a negative impact on visitor experience. Thirty-nine percent of transit system users felt that the number of vehicles on Denali Park Road detracted from their experience. The specific reasons for the detractions are shown in Figure 14.

### Non-Motorized Experience

Denali provides a unique opportunity for visitors to explore pristine wilderness areas. Much of this experience is dependent upon traveling in areas that show few or no traces of human presence or activity. In recent years, this type of experience has been hindered by increasing visitation to the park and the

increasing use of vehicles and aircraft to explore the park. This section discusses the impacts different activities have on visitors who choose to explore the park without motorized vehicles.

### Soundscapes

A major impact to those users traveling without a vehicle is the soundscape around them. One of the most important elements to the park's purpose, according to *Denali Foundation Statement*, is to preserve the opportunity for current and future generations to explore a wilderness experience. This type of experience is threatened by the increasing use of aircraft and snow machines (snowmobiles) to explore and access remote portions of the park. To address this, the 2006 *Denali Backcountry Management Plan* set explicit thresholds for the soundscape within the wilderness areas of the park. For the Old Park One (OP1) management area (see Figure 15), the limit was set at backcountry visitors hearing no more than two motorized sound events per day. In Management Area B (Area B), the limit



was set at backcountry users hearing no more than 10 motorized sound events per day. These two areas represent the majority of the backcountry land around the Denali Park Road and eastern portions of the park and represents locations where the soundscape is likely to be impacted and where visitors are likely to observe those impacts. The Old Park Two (OP2) management area is intended to provide opportunities for extended expeditions that are remote with limited opportunities to motorized access. Figure 15 shows a map of the backcountry management areas as presented in the 2006 *Denali Backcountry Management Plan*.

As part of this management plan, periodic visitor surveys are conducted to monitor the changing conditions within the park. Based on the latest survey data reported in the *Denali National Park and Preserve State of the Backcountry – 2012* report, only 59 percent of visitors in OP1 reported meeting the soundscape threshold. This percentage was slightly

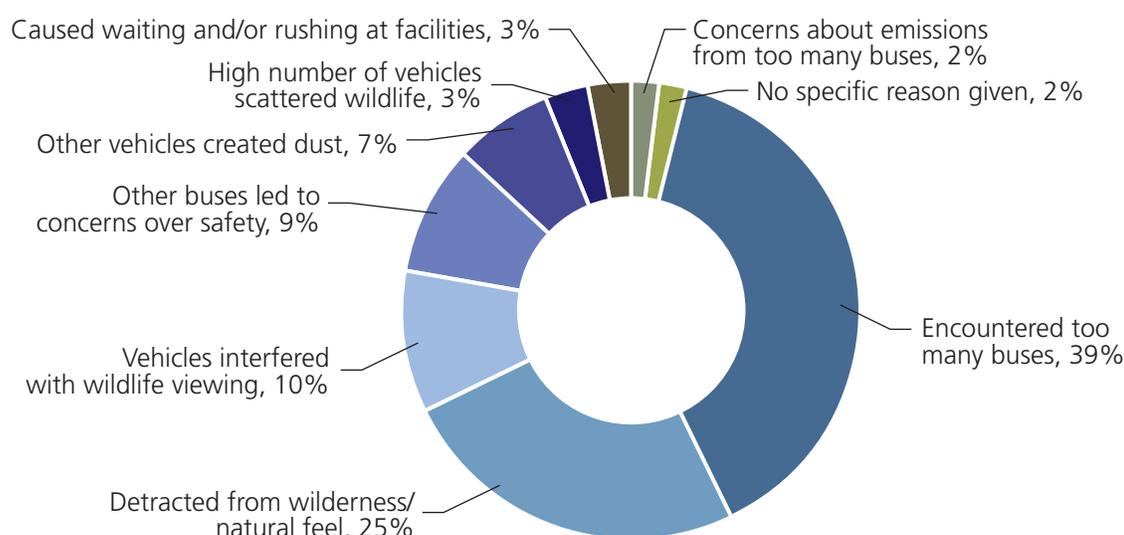
higher for Area B visitors, with 73 percent reporting that they met the threshold.

### Disturbances to the Natural Environment

Noticeable disturbances to the natural environment can detract from the non-motorized user experience. These disturbances, usually caused by increased visitor activities, can include noticeable informal trail use, broken/disturbed foliage, campsite remnants, and other similar disturbances. These changes to the natural environment remind visitors of human presence, activities, and development in the area and impede on the park’s goal of preserving an undisturbed wilderness experience for current and future generations.

A sign of human disturbances to the natural environment can come in the form of increasing informal trails. Informal trails can concentrate human activity through an area and begin to erode the feeling of a natural environment. Within Denali,

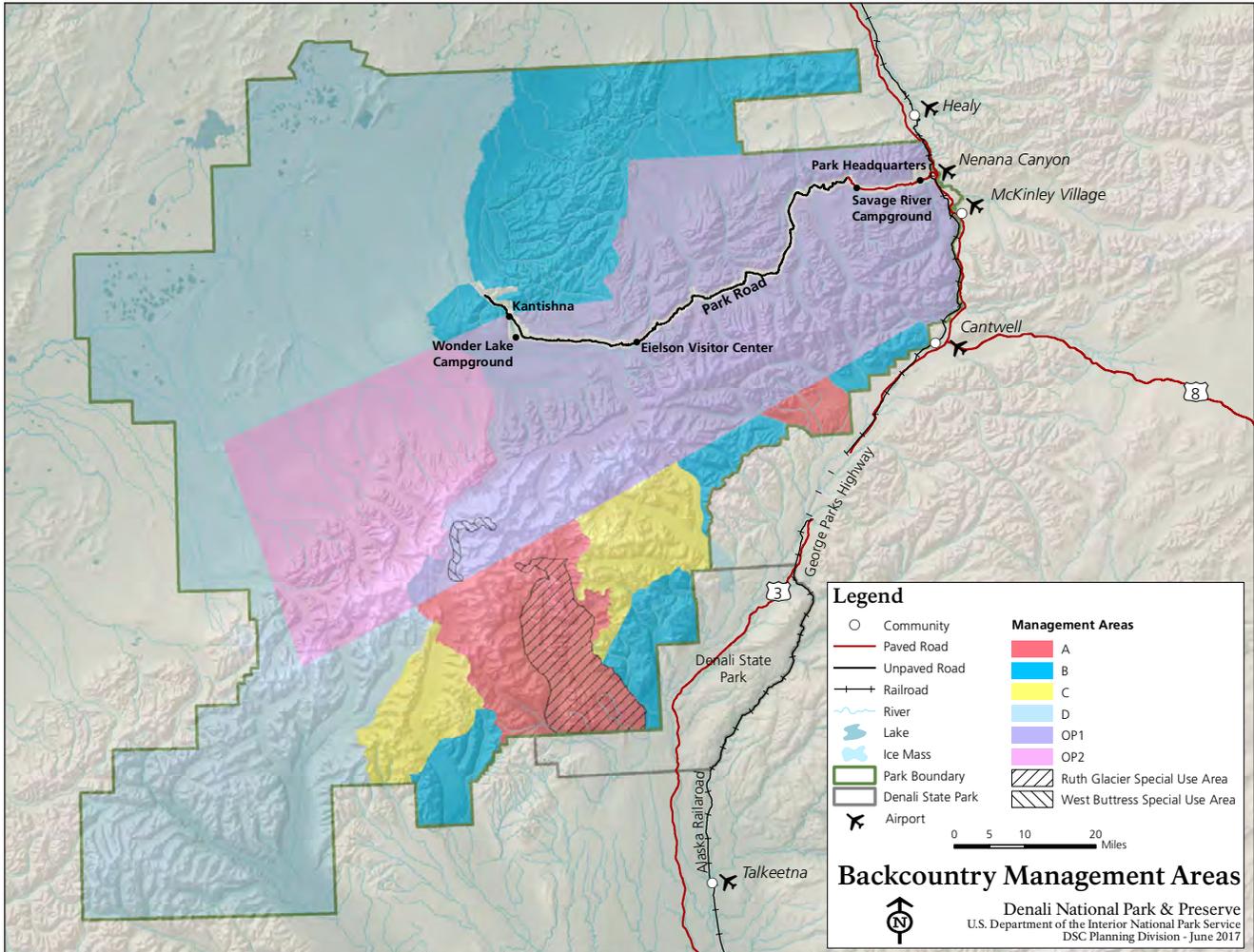
Figure 14. Negative impacts of too many other vehicles



Source: *Indicators and standards of quality for the visitor experience on the Denali Park Road (2006)*



Figure 15. Backcountry management areas



Source: Denali Backcountry Management Plan (2006)



this type of disturbance is concentrated around the Park Road. This is likely a result of visitors using the shuttle bus system to gain access into the park and then hiking into the wilderness areas from specific locations along the Park Road that are conducive or inviting to foot traffic.

Data collected in the 2012 *Denali National Park and Preserve State of the Backcountry* report show that informal trails in units around the Park Road have increased between 1997 and 2012. Units are subdivisions of the park used by the NPS to monitor changes within different sections of Denali. Table 7 shows the growth of informal trails within the units close to the Park Road.

In addition to increases in the number and extent of informal trails, the *Denali Backcountry Management Plan* also specifies acceptable numbers of encounters with modern equipment and with other people. For encounters with modern equipment, this includes any time backcountry visitors see modern communication facilities, structures, research equipment, motorized vehicles, or any other form of modern equipment. For OP1 and Area B, the acceptable limit is one encounter with modern equipment per day. Eighty-two percent of visitors

in OP1 and 75 percent of visitors in Area B reported meeting this threshold.

The threshold for encounters with other people is set at no more than two encounters with other groups per day for both OP1 and Area B. There is also special consideration for encounters with groups larger than six people, although they are not differentiated by the threshold. Seventy-six percent of visitors in OP1 and 82 percent of visitors in Area B reported encountering two or fewer other people—or groups of people—per day. Of all people in both OP1 and Area B, 14 percent reported encountering groups larger than six people (*Denali National Park and Preserve State of the Back Country, 2012*).

### 2.3.3 Needs and Gaps

Desired future conditions for Denali are identified for each objective. Needs and gaps are expressed as the difference between the baseline condition and the desired future condition.

#### User Data

The desired future condition for user data is: “*User experience-related decisions and performance-monitoring processes are entrenched in the use of readily available data.*” Given the baseline conditions documented above, this LRTP concludes that user experience-related data are being collected, but the data are not yet entrenched in decision-making processes. The identified gap includes the need for user data collection activities to include specific user experience benchmarks and at a frequency that ensures that data are relevant to decision makers. In the 2010 Visitor Experience Survey, users of the park bus system were asked to rank the relative importance of six factors in their overall enjoyment of their visit to the park. The results, ordered by importance from one to six, are shown in Table 8.

Table 7. Informal trail growth around the Park Road

Area	1997	2012	Change
Cathedral main trail	7,363 ft	8,918 ft	21%
Upper West Stony Creek	5,544 ft	5,944 ft	7%
Fish (Krier) Creek	2,057 ft	2,709 ft	32%
Grassy View Overlook	1,583 ft	4,216 ft	166%

*Note: Data was not collected for all units. Only units for which both 1997 and 2012 data is available is reported.*

*Source: Denali National Park and Preserve State of the Backcountry (2012)*



Table 8. Significance of some elements to the overall visitor experience

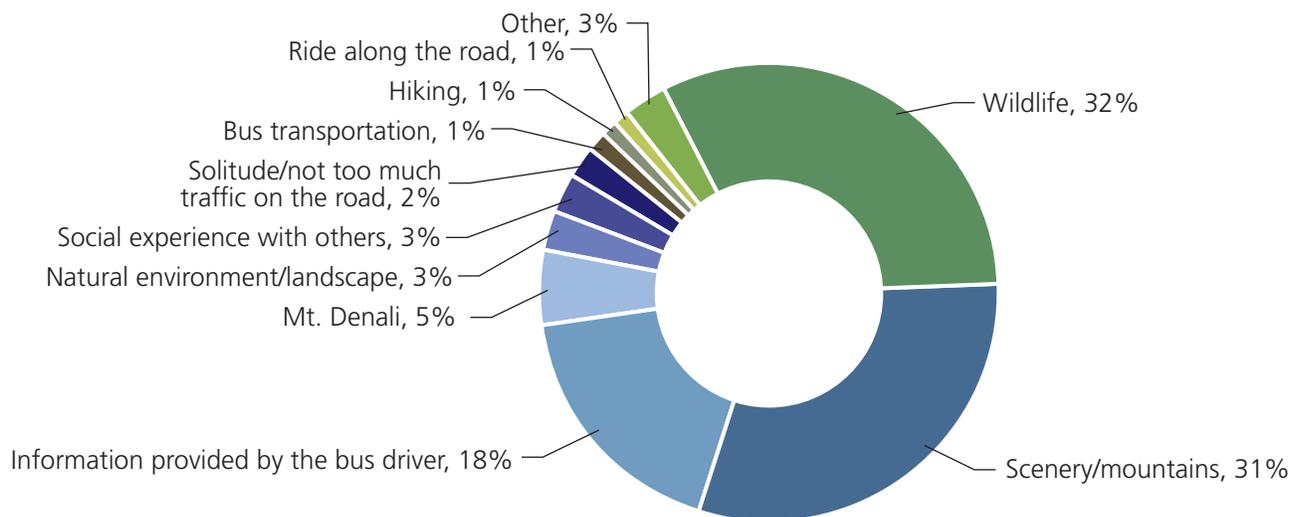
Shuttle Bus Users	Tour Bus Users
1. Chance of seeing a grizzly bear	1. Chance of seeing a grizzly bear
2. Number of buses seen at rest stops	2. Number of buses seen at rest stops
3. Wait time to get on a bus	3. Attainment of an advanced reservation
4. Number of buses seen at wildlife stops	4. Number of buses seen at wildlife stops
5. Overall length of the trip	5. Number of buses seen on the road
6. Number of buses seen on the road	6. Overall length of the trip

In addition to this information, a University of Vermont study, *Indicators and Standards of Quality for the Visitor Experience on the Denali Park Road* (2006), asked visitors to the park to rank the three things they enjoyed most and three things they enjoyed least about their visit to the park. Similar to the results from the Visitor User Survey, the most frequently cited element for enjoyment was the chance to see wildlife and the most frequently cited detractor from the visitor’s experience was the long ride on a bus. The summarized results of this survey are shown in Figure 16 and Figure 17.

### Multimodal Transportation

The desired future condition for multimodal transportation is: “*All modes of Denali National Park and Preserve’s transportation system are easy for users to navigate, free of conflicts, and operate in accordance with park values.*” Given the baseline conditions documented above, this LRTP concludes that data and user feedback indicate satisfaction with the park’s multimodal opportunities and alignment with park values, but there are opportunities for navigational improvements and

Figure 16. Most frequently cited positive factors to the visitor experience



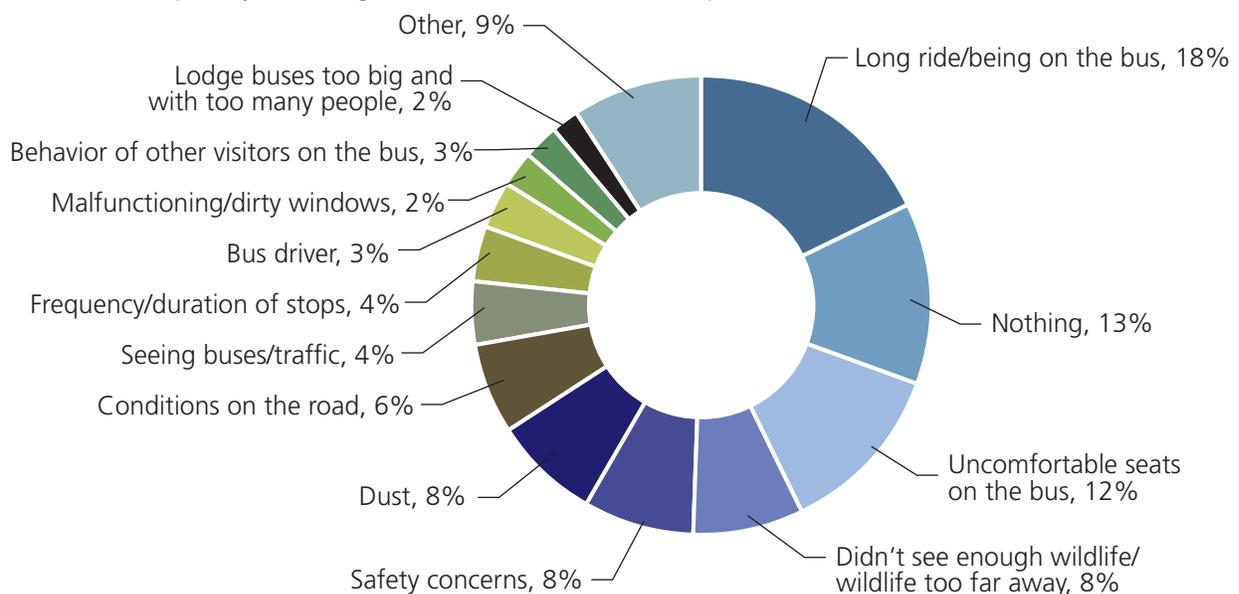
Source: *Indicators and standards of quality for the visitor experience on the Denali Park Road* (2006)



conflict reductions. There are some anticipated changes to multimodal conditions already under consideration by the park. Park managers are using indicators to measure performance of the transit system and gauge overall user experience. These include hiker wait times, number of vehicles at wildlife stops, number of vehicles in viewsheds, number of vehicles at rest stops, nighttime traffic levels, bus traffic, and gaps in traffic that allow for the free movement of animals from one side of the Park Road to the other. Modifications to the general management of the Park Road could improve protection of natural habitats beyond Savage River. For example, a third wildlife viewing subzone with tighter experiential standards has been added west of Eielson Visitor Center. The VMP discusses desired uses in the wildlife viewing subzones. These desired uses have implications for the types of travel modes that should be allowed in those areas.

There is an opportunity to gain efficiency in transit operations by improving consistency in transit seating and consolidating transit services in the entrance area and canyon. Also, expanding transit service north to Healy and south to Carlo Creek and Cantwell in addition to adding shuttle service between the entrance area and McKinley Village is desired (*Needs Assessment and Feasibility Study for a Community Transportation System, 2006*). One current plan and one current project will address multimodal connections to and within the park entrance area. These include the Trails Plan and the Milepost 231 Wayside project.

Figure 17. Most frequently cited negative factors to the visitor experience



Source: *Indicators and standards of quality for the visitor experience on the Denali Park Road (2006)*



## 2.4 Access

The Access goal states: *Provide safe, efficient, and appropriate park access*. The goal statement is related to the quality of accommodation provided to all users of Denali transportation facilities, infrastructure, and systems in the way of safety, accessibility, and traveler experience. Access objectives reflect a desire to provide safe and efficient access for all users to areas within the park and access to interpretive or wayfinding information about the park. The objectives for the Access goal are:

- **Safety:** Provide safe access to and within Denali National Park and Preserve for all users.
- **Access:** Provide appropriate and efficient access for inspiration, education, research, recreation, and other uses as provided for in the ANILCA.

Access baseline conditions are centered on the findings from an LRTP-focused literature review, and supplemented with insight provided by park staff and obtained through the LRTP engagement process. Table 9 summarizes Access goal conditions determined through this literature review process within the context of the goal's objectives and desired future conditions. Details about existing conditions and the gaps between existing and desired future conditions follow the Table 9 summary.

### 2.4.1 Safety

As identified in the VMP, transportation safety issues are associated primarily with road travel along the Park Road. The historic nature of the road may, in some locations, limit sight distance, restrict width for passing vehicles, and provide inadequate road surface friction (VMP, 2012). Driver behavior is most likely a contributing factor in vehicular crashes, particularly for private vehicles traveling the Park Road during off-peak seasons. The impact of severe weather events and geological hazards is another safety consideration.

#### Vehicle Crashes

Due to high visitation, most vehicular crashes (216 crashes, or about 13.5 crashes each year) in NPS's Alaska Region occurred in Denali between 1990 and 2006, with 58 percent of these crashes occurring on the Park Road (NPS Alaska Region LRTP, 2012). Of the other crashes reported within Denali, 19 percent were located on the George Parks Highway within the park boundaries. The remaining portion of vehicular crashes occurred near the visitor parking areas or in campgrounds. The George Parks Highway is the direct road connection between the Municipality of Anchorage and the City of Fairbanks and serves as the primary travel corridor for Denali visitors. According to historic National Transportation Safety Board data, six fatal aviation crashes have occurred within Denali's boundaries ever since aviation crashes began to be recorded by the Board in 1962.



Table 9. Goal Summary

<b>Safety Objective:</b> "Provide safe access to and within Denali National Park and Preserve for all users."	
<b>Desired Condition</b>	Travelers are offered safe access to and within Denali National Park and Preserve.
<b>Existing Condition</b>	Travelers currently are offered safe access to and within the park, but safety issues persist and also are emerging with regard to winter travel.
<b>Existing Condition Summary</b>	<p>Between 1990 and 2006, 95 percent of all vehicular crashes in NPS's Alaska Region occurred in Denali, with 58 percent of these crashes occurring on Denali Park Road (NPS Alaska Region LRTP, 2012).</p> <p>According to the visitor survey highlighted in the VMP, the public indicates that they feel safe while using Denali's transportation system.</p> <p>The historic nature of the Denali Park Road may, in some locations, limit sight distance, restrict width for passing vehicles, and provide inadequate road surface friction (VMP, 2012). Risks of geological hazards and debris flow have been identified at multiple locations along the Park Road.</p> <p>With increased opportunities for vehicular winter access, emerging safety improvements related to winter travel are a growing need.</p> <p>Visitors are using roads to walk on in the entrance area instead of using designated walking paths.</p>
<b>Access Objective:</b> "Provide appropriate and efficient access for inspiration, education, research, recreation, and other uses as provided for in the ANILCA."	
<b>Desired Condition</b>	All options and costs for travel to and within the park are known to travelers.
<b>Existing Condition</b>	Options and costs for travel to and within the park are available, but not always known or easy to obtain by travelers.
<b>Existing Condition Summary</b>	<p>Visitors typically arrive to the park by private vehicle, bus, or train. Many visitors arriving by bus or train are cruise ship passengers and are traveling with fellow passengers as part of cruise ship packages.</p> <p>Of visitors who traveled beyond Mile 15, 71 percent were part of organized tours (e.g., the long or short tours).</p> <p>Marketing and development of traveler information for Denali often is championed by non-NPS organizations, such as the Alaska Railroad, concessioners, and other area businesses.</p> <p>As identified by a goal of the VMP, the most common need in planning documents is the necessity for better wayfinding and user information about the transit system (previously called VTS) in hopes of reducing visitor confusion about the park's transportation system. This has been identified as a key enhancement to transportation in the Denali area (<i>Denali Transportation Needs Assessment, 2006</i>).</p> <p>Employees without a vehicle must live close to the Park entrance and associated amenities to access their jobs.</p> <p>The park has been working with its concessioner to expand bicycle options for bicycle use and has been experimenting with programs to expand access to cyclists during the summer and in the shoulder seasons.</p>



A recently initiated trial program to increase winter plowing of the Park Road from the entrance area to the Mountain Vista Rest Area (Mile 12) beginning in the early spring has allowed for expanded access to the frontcountry. Feedback from the LRTP engagement process indicates that vehicular winter access is desired by the public and is, therefore, increasing. Because of this increase, safety improvements related to winter and shoulder season travel are a growing need. To quantify emerging winter and shoulder season safety conditions, safety will be monitored during the extended winter and early spring periods as part of the trial winter plowing underway for the first 12 miles of the Park Road. Commercial operators also provide multimodal access to the park during winter months. Denali staff are working with commercial operators to implement safety measures for winter operation, such as the required use of emergency communication devices during their operations.

### Natural Hazards

Travel along the Park Road is subject to geologic hazard risks from rock falls and roadway slumping, as well as flooding and debris flows from severe storm events. Road-blocking debris flows have been identified as a safety issue. When large debris flows reach the Park Road, they sometimes block culverts and deposit materials on the upstream side, causing debris to overflow on to the road and block passage. This causes not only direct safety risks, but also indirect safety issues due to stranded visitors.

In 2015, staff scientists identified 141 locations where natural hazard risks are evident, with 33 of the sites rated as “poor” in condition, or sites that have persistent and/or more serious problems than other identified locations. The staff risk analysis considers several factors, including roadway characteristics, slide/erosion effects, length of road mileage affected by a hazard, rock fall history, impacts to use of the road, annual precipitation, and thaw stability.

### Air Travel

Safety is the top priority for flight operations. For example, recommended flight tour routes are subject to weather conditions, and aircraft may be forced to deviate from planned routes if safety is at risk (*Air Tour Operations Best Practices*, 2012). Another safety consideration for air travel is related to backcountry landing strips. With long-term climate warming trends, traditionally stable glacial landing areas are changing and surface conditions that may cause access and safety concerns are elevated. According to historic National Transportation Safety Board data, six fatal aviation crashes have occurred within Denali’s boundaries ever since aviation crashes began to be recorded in 1962.

### Public Perception

According to the visitor survey highlighted in the VMP, the public indicates that they feel safe while using Denali’s transportation system. The most notable safety consideration perceived by the public is related to travel over Polychrome Pass where the Park Road is narrow, winding, and has steep drop-offs. Park management requires drivers to obey standards from the Road Use Handbook, which dictate vehicle spacing and right-of-way guidance to address safety issues on the road.



## 2.4.2 Visitor Access

As stated in the park's 2008 GMP, the primary historic purpose of access to Denali is to accommodate viewing of Denali and the park's wildlife. As documented in the plan, appropriateness of access is defined by the balance between visitor accommodations and active protection of wilderness character. The NPS, therefore, uses management tools that provide the most access possible while maintaining and promoting the cultural and natural resources protected by the area (Consolidated General Management Plan, 2008).

Park management desires to provide efficient access to visitors arriving by all modes of travel, while also providing for accessibility as delineated for federal facilities by the Architectural Barriers Act (ABA). For areas of the park with additional travel requirements, this means ensuring transportation facilities, infrastructure, and systems that provide a meaningful, high-quality opportunity for viewing scenic landscapes and wildlife, primarily through transit services (VMP, 2012). Access to the park is authorized through ANILCA, which includes special access provisions for traditional transportation uses including the use of snowmobiles, motorboats, and other traditional means of surface transportation within the park by specifically defined subsistence users (§ 811, 1110(a) and 1110(b)). In the following sections, the park's current ability to provide efficient access for inspiration, education, research, recreation, and other uses as provided for in the

ANILCA are summarized for the purpose of establishing baseline conditions for the Access objective.

### Traveling in the Park

To limit the impacts to the natural character of the park, the NPS prudently manages access within the park boundaries. Much of this management is exhibited along the Park Road, which serves as the primary access route through the park. The appropriate types of access and levels of access vary along the Park Road; accordingly, the park staff use Wildlife Viewing Subzones to distinguish appropriate levels of access for different areas. Figure 3 shows the designated zones along the Park Road, as seen in the Denali VMP.

In addition to prescribing extents and levels of access, Denali also defines the number of vehicles allowed past Mile 15 of the Park Road as no more than an annual limit of 10,512 vehicles (VMP, 2012). This is done to protect the natural resources and character of the park and the Park Road and to maximize visitor experience by preventing overuse. This level of access was determined through extensive study as part of the VMP and is monitored to ensure that the park's complimentary goals are being met. Most visitors to the park (97 percent) agree that a limit on the number of vehicles is a good management strategy and 62 percent believe that the current number is appropriate (UVM, 2006).



## Transit Access

Transit access on the Park Road is available to visitors from Memorial Day through Labor Day. Non-motorized travel—by foot, bicycle, skis, or dog sled—is allowed past Mile 15, otherwise travelers beyond this point must have a special use permit. Most visitors use the transit system to access areas of the park beyond Mile 15.

Currently, there are three types of transit service within the park, including:

**1. Tour buses** (Figure 18) provide the most programmed experience for visitors. The driver provides a fully narrated tour throughout the trip and makes stops for wildlife viewing. Additionally, tour buses provide either snacks or a full lunch as part of the trip. Passengers on tour buses typically remain with the same bus for the entire tour, but they are not required to do so. The number of tour buses per day is scheduled based on demand, meaning the number of tour buses on the Park Road varies from day to day. The typical number of tour bus trips ranges between 14 and 53 buses per day.

Figure 18. Tour bus on the Park Road



**2. Transit buses** (Figure 19) provide more flexibility for travelers within the park. Transit buses allow riders on or off the bus at any point along the road by simply requesting to stop. Ticketed riders then are allowed to re-board any transit bus that passes by going in either direction. As part of this service, there are special camper buses that are designed to accommodate visitors traveling with overnight backpacks. These buses have their rear seats removed to provide storage space within the vehicle. Typically, no more than 36 roundtrip transit buses are allowed on the road per day, with up to five of these being camper buses.

Figure 19. Transit bus





**3. Frontcountry** (Figure 20) courtesy buses provide access to specified facilities throughout the first 15 miles of the park. Offered free of charge and without reservations, these routes connect various facilities, such as campgrounds and day-use areas. In addition to buses operated by the park concessioner, Doyon/Aramark Joint Venture, many courtesy shuttles and private inholder buses are authorized under the ANILCA to use the Park Road for access to private inholdings located in Kantishna.

Figure 20. Frontcountry Courtesy bus



Park users note that the existing range of transportation services is confusing to them, but due to characteristics of the park (lack of visibility of the bus arrival area from the Wilderness Access Center, lack of shelters at bus stops, and difficulties providing reliable service to the multiple guest accommodations), there are challenges for consolidating services. Regardless of these challenges, alternatives for consolidation have

been presented in the *Denali Transportation Needs Assessment and Feasibility Study*.

According to the Denali visitation statistics, bus ridership grew from 1996 to 2004, but has declined as a percentage of total visitors in recent years. In 2004, bus ridership reached 287,000 passengers. This represents 71 percent of all visitors for that year. In 2016, bus ridership was 272,000 passengers, 45 percent of total visitors. Figure 21 shows the comparison of the quality of ridership on each service provided. Note that bus tour service models changed in 2012 with the implementation of the VMP.

Based on information presented in *Visitor Satisfaction with Transportation Services and Wildlife Viewing Opportunities in Denali*, most visitors consider the quality of bus service within the park to be good. This survey asked respondents to evaluate each type of bus service for its overall quality and give it a score of poor, fair, good, or excellent. Shuttle bus service received the highest scores on quality of service, with 22 percent of respondents considering the service quality as excellent. Tour bus service received the lowest ratings, with three percent of respondents considering the service poor. Figure 21 shows the results for each service provided. No data were collected for the courtesy bus service.

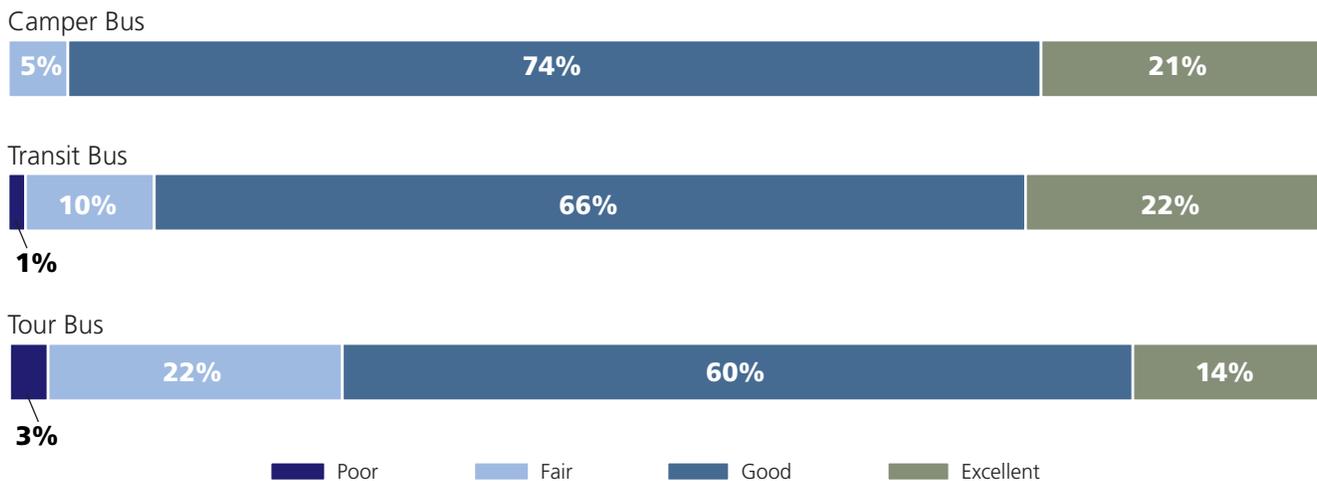
Data and results from the LRTP engagement process demonstrate that a major concern for Denali is the ease in which visitors can obtain information about the different bus services. Eighty percent of respondents to the *Visitor Satisfaction with Transportation Services and Wildlife Viewing Opportunities* survey who had previously visited the park stated that they had no prior experience using the Denali transportation services. As part of the survey, visitors were asked how easy or difficult it was to obtain information about transportation services within the park. Respondents scored the



ease of obtaining information on a one to five scale, with one being very easy to obtain information and five being very difficult to obtain information. The results showed that only 6 percent of shuttle bus users and only 5 percent of tour bus users found obtaining information about their travel options to be somewhat or very difficult. Figure 22 shows the results of the survey question.

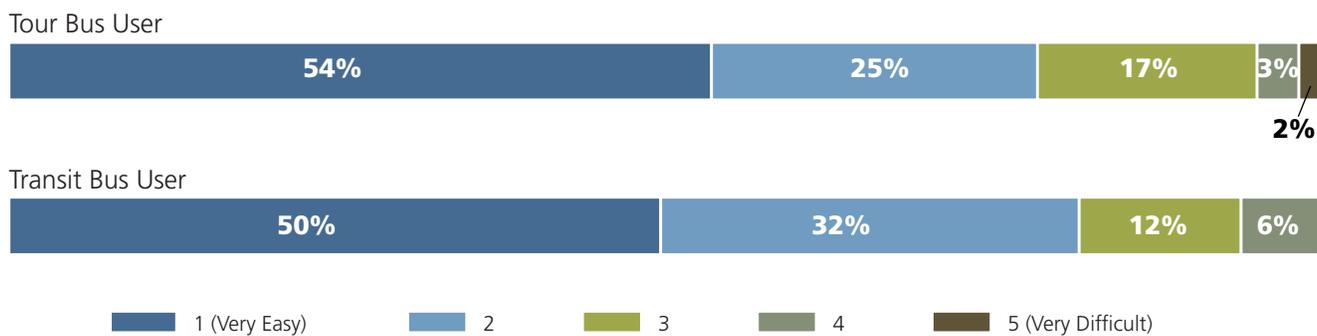
Currently, there are several different ways visitors obtain information about the existing transportation services offered within Denali. These methods differ slightly depending on the type of bus service users choose. For tour buses, the largest number of visitors, 44 percent, obtain information from travel agents. This is different than visitors using the transit bus service, where the majority of visitors, 36 percent, obtain information about the service from the Internet. Additional sources of information include

Figure 21. Quality of existing bus services



Visitor Satisfaction with Transportation Services and Wildlife Viewing Opportunities in Denali (1998)

Figure 22. Ease of obtaining information about transit services



Visitor Satisfaction with Transportation Services and Wildlife Viewing Opportunities in Denali (1998)



brochures, park newspapers, Denali transportation reservation agents, park rangers, railroad staff, hotel staff, and others. Figure 23 shows the percentage of people obtaining information from each source by bus service type. No information was collected for courtesy bus service and data were not separated out between shuttle bus service and camper bus service.

### Private Vehicle Access

For most of the year (roughly mid-May through early September), private vehicles are restricted beyond Mile 15 of the Park Road and count toward the 160 vehicle-per-day and 10,512 vehicle-per-year maximum. From mid-March to mid-May, weather and road conditions permitting, the road is open to permitted private vehicles to the Teklanika rest stop (Mile 30.3). The park is currently exploring a trial period from mid-February to mid-March, during which the road is open to Mile 12.6, Mountain Vista Rest Area.

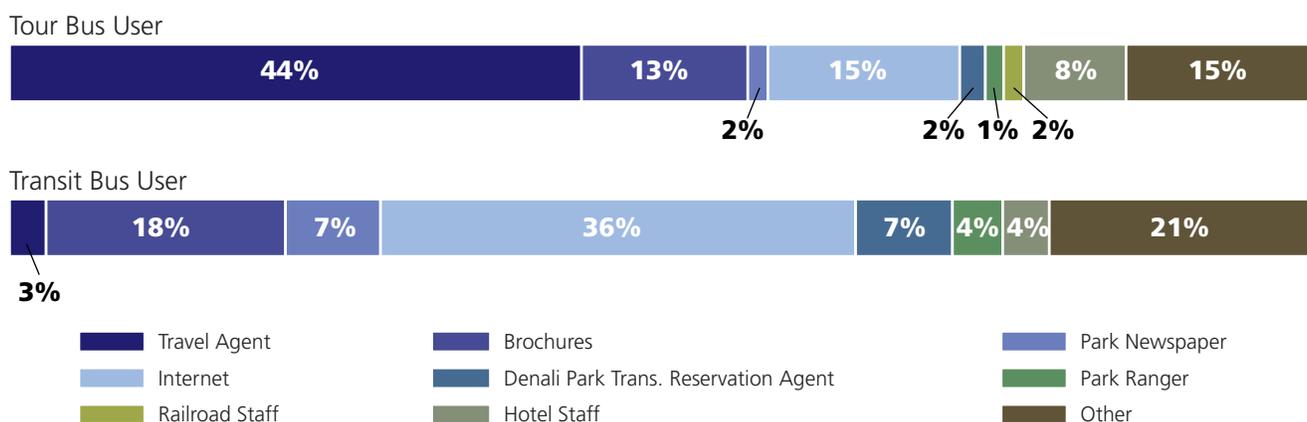
Past Mile 15 of the Park Road, vehicle access is restricted and each vehicle passing Savage River westward counts toward the 160 vehicle-per-day maximum. To ensure adequate access for different user groups, different access control techniques are used, depending on the type of traveler (VMP, 2012).

**1. Administrative vehicles** are used by park staff to access duty stations and other park facilities beyond Mile 15 of the Park Road. Administrative vehicular traffic also is limited per the VMP and counts toward the annual and daily limits for vehicles on the Park Road. Park staff are encouraged to use carpooling or the transit services provided to visitors.

**2. Professional Photography and Commercial Filming** permits are available on an open lottery system. These permits allow one vehicle carrying a maximum of two people past Mile 15 of the Park Road, but black-out dates apply during periods of high demand. The number of permits available per day typically ranges between one and five depending on the level of visitation at the park.

**3. Campers at Teklanika River Campground** are allowed to drive into and out of the restricted area of the park only to access the campground upon arrival to the park and to exit the park at the end of their stay. There is a minimum three-night stay to limit entrances and exits of vehicles. The total number of permits available for these campers is limited by the number of available campsites.

Figure 23. How information about transit is obtained



Source: Visitor Satisfaction with Transportation Services and Wildlife Viewing Opportunities in Denali (1998)



#### 4. Private land owners with inholdings in

**Kantishna** are given a set amount of right-of-way permits for the Park Road that are authorized each year in the Superintendent’s Compendium.

**5. Subsistence users** are allowed into the restricted areas of the park during the fall hunting season for individuals that qualify for subsistence hunting access. There are no limits to the number of these permits available each year.

**6. Unrestricted access** for people with disabilities that can’t be accommodated on the transit system. These count toward the 160 vehicle-per-day maximum.

**7. Special Use Permits** for private and school researchers, state troopers, and tow trucks are authorized by the Superintendent.

### Bicycle Access

Based on input received through LRTP-related public and park engagement activities, understanding how to best accommodate the emerging trend in bicycling is a priority for Denali. All transit service buses used in the park are equipped with bicycle racks (Figure 24), and space may be reserved for bicyclists using the transit bus heading west. Despite support for cycling on the Park Road, some challenges persist. Although cyclists can reserve space on westbound buses, there is no guarantee that space will be available for bicyclists with a desire to use the buses for the return trip to the park entrance area. This can lead to long wait times for bicyclists during peak return trip hours later in the day. Additionally, because bicycling is a relatively new activity for visitors, there are unknown considerations for bicyclist-wildlife interaction as it relates to safety and ability to view wildlife.

### Pedestrian/Hiker Access

Based on visitor surveys and backcountry permits, there is a strong desire for pedestrian access within the park. Pedestrian users within the park can be summarized into two categories: trail users and off-trail users.

Because much of the park is designated as wilderness, there are very few developed trails. Most developed trails are located near the park entrance and in motorized sightseeing subzone 2 (see Figure 18). Additional developed trails are located around the Eielson Visitor Center near Mile 66 of the Park Road. Trails near the park entrance area do not require the use of the transit system. Because there are a limited number of developed trails within the park, providing access to the few that do exist is an important part of providing a diverse spectrum of access opportunities. Based on the 2010 *Denali Park Road Visitor Survey Report*, 69 percent of transit bus users and 90 percent of tour bus users reported they would prefer to hike on a trail rather than hiking off-trail (Figure 25).

Figure 24. Bicycle rack on transit bus

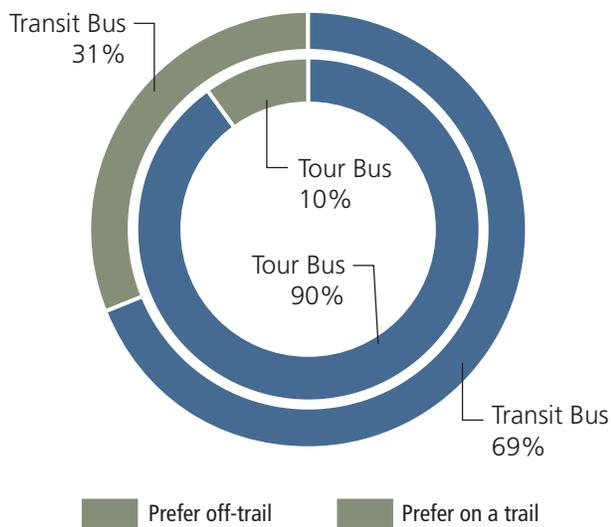




Although bus users show a strong preference for on-trail opportunities, off-trail hiking plays a major role in the park’s mission. Currently, there are few restrictions on where visitors are allowed to hike on their own. Many visitors choose to access the backcountry by simply riding a transit bus along

the Park Road, asking for a stop, getting off, and beginning their hike. It is estimated that 65 percent of Denali’s overnight wilderness visitors access the backcountry from the Park Road using the bus system (VMP, 2012).

Figure 25. On-trail vs off-trail preferences



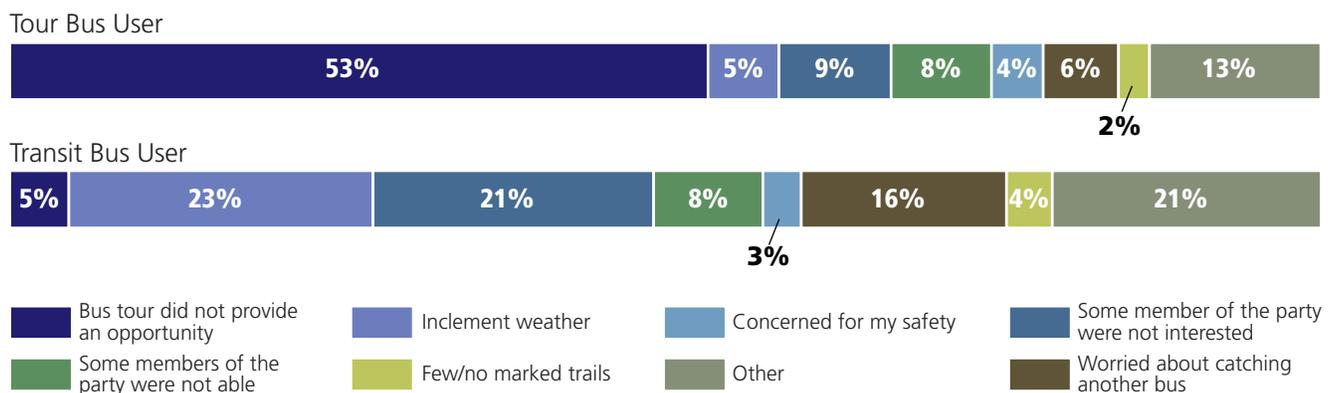
Source: 2010 Denali Road Visitor Survey

While providing primary access for visitors beyond Mile 15, the bus system sometimes poses barriers to pedestrian access within the park. Two of the most commonly cited reasons why visitors did not go for a hike while in the park are that they felt that they were unable to take the opportunity to hike while on a Tour Bus, and visitors were concerned about being able to get on another bus later in the day. Figure 26 summarizes the most common reasons visitors did not leave the bus to go for a hike.

### Aviation Access

Glacial landings provide backcountry access via aircraft; however, they are difficult to monitor and maintain. Because of the changing climate, pilots are forced to look for other, sometimes new, landing areas. Due to the difficulty in monitoring aviation activity, historical access has been unrestricted within the park. Since the release of the 2006 Denali Backcountry Management Plan, there has been an increasing effort to identify best management

Figure 26. Reasons visitors did not get off the bus to go for a hike



Source: 2010 Denali Road Visitor Survey



practices for pilots to follow to control the impact aircraft have on park resources. Refer to Section 2.3, User Experience for more information on the impacts that aircraft noise has on the park.

### Winter Access

A three- to five-year trial program, approved in 2013 through the Winter Plowing Environmental Assessment, opens the Park Road to the Mountain Vista Rest Area about one month earlier in the spring than the traditional opening date. This has allowed better access deeper within the park and away from frontcountry facilities. Since 2014, shoulder season access generally has increased, recently as much as 25 percent from 2015 to 2016, with more than 900 private vehicle trips past Mile 3 of the Park Road. Park staff is monitoring impacts to wildlife sightings as it relates to winter visitor activities.

### Access Fees

A key piece of information for visitors attempting to access the park is the monetary cost of entry. Because most of the park is only accessible by the transit system, the cost to the visiting public can be a greater impediment than at some other national parks. The Denali VMP estimates that a family of four visiting the park for one day and taking the Denali Natural History Tour can expect to pay about \$200. A group of two adults entering the park, taking a shuttle bus to the Wonder Lake campground, and spending one night can expect to pay around \$100. Table 10 shows the fees associated with accessing the park as of 2017.

### Getting to the Park

Visitors typically travel to the park by private vehicle, bus, or train, many after arriving from outside the state by aircraft, cruise ship, or ferry. This includes visitors arriving from attractions surrounding the park, such as river rafting trips, flightseeing excursions, and shopping/dining outings. Passengers arriving from cruise ships usually are traveling with fellow passengers as part of a package tour involving cruise ship, train, aircraft, and/or bus.

Table 10. Denali access fees (2017)

Fee Type	Amount
<b>Entrance Fee</b>	\$10/person (children 15 and younger, Denali Pass holders, and America the Beautiful Pass holders do not pay the daily entrance fee)
<b>Shuttle Bus Ticket</b>	\$26-\$51/adult (\$34 camper), under 15 free (rates dependent on destination)
<b>Denali Natural History Tour Ticket</b>	\$70.75/adult, \$35.50 children 15 and younger
<b>Tundra Wilderness Tour Ticket</b>	\$120.25/adult, \$60.25 children 15 and younger
<b>Kantishna Experience Ticket</b>	\$184.00/adult, \$92.00 children 15 and younger
<b>Campground Fees</b>	\$10-\$30 (dependent on campground and type and size of site)



As visitation has increased over time, so has the number of buses arriving at the park. According to the *Needs Assessment and Feasibility Study for a Community Transportation System* (2006), during peak times there were approximately 12 buses arriving at the entrance of Denali every hour. In 2015, nearly 7,500 buses carried more than 270,000 passengers compared with a total park visitation of 560,000 in the same year. Aside from people using a transit vehicle multiple times during their stay, these statistics show that nearly half of the visitors use buses to travel within the park.

In addition to bus travel, according to 2011 visitor estimates conducted by the NPS, approximately 175,000 visitors arrive to the park by train each year. Most of these visitors are cruise ship passengers. For visitors arriving by train who are not part of a larger tour group, transporting large amounts of luggage and/or camping equipment is challenging. Currently, it is difficult for these visitors to transfer their luggage from one travel mode to the next, especially since many are unfamiliar with the transportation options in and around the park. Denali staff have identified the need for lockers at the Riley Creek Campground, the Wilderness Access Center (WAC), the Savage River Campground, and the Savage River/Mountain Vista Rest Area. This service could potentially be programmed as a baggage claim for visitors moving through the entrance area and those visiting areas east of the Savage River Bridge.

Adding to the access concerns around the park entrance area is the estimated 75 percent of employees in the area who do not own private vehicles. Improving the regional transportation options could make land farther away from the park entrance more viable for use as employee housing.

### 2.4.3 Needs and Gaps

Desired future conditions for Denali are identified for each objective. Needs and gaps are expressed as the difference between the baseline condition and the desired future condition.

#### Safety

The desired future condition of this objective is: *“Travelers are offered safe, park-appropriate access to and within Denali National Park and Preserve.”* Given the baseline conditions documented above, this LRTP concludes that travelers are currently offered safe access to and within the park, but considerations for safety will persist and are emerging with regard to winter travel. The gap between the existing and desired conditions resides primarily in providing continued traveller accommodations on the Park Road. Historically, most recorded crashes occur along the road. The status of the road as a cultural resource and its relationship to the surrounding natural resources complicates the implementation of additional safety improvements. Other safety gaps include the lack of bicycle and pedestrian access in the frontcountry and along sections of the George Parks Highway. New risks also may emerge with increased opportunities for winter access and during shoulder seasons. The LRTP literature review process and engagement activities also revealed needs to address inconsistencies in safety data reporting.

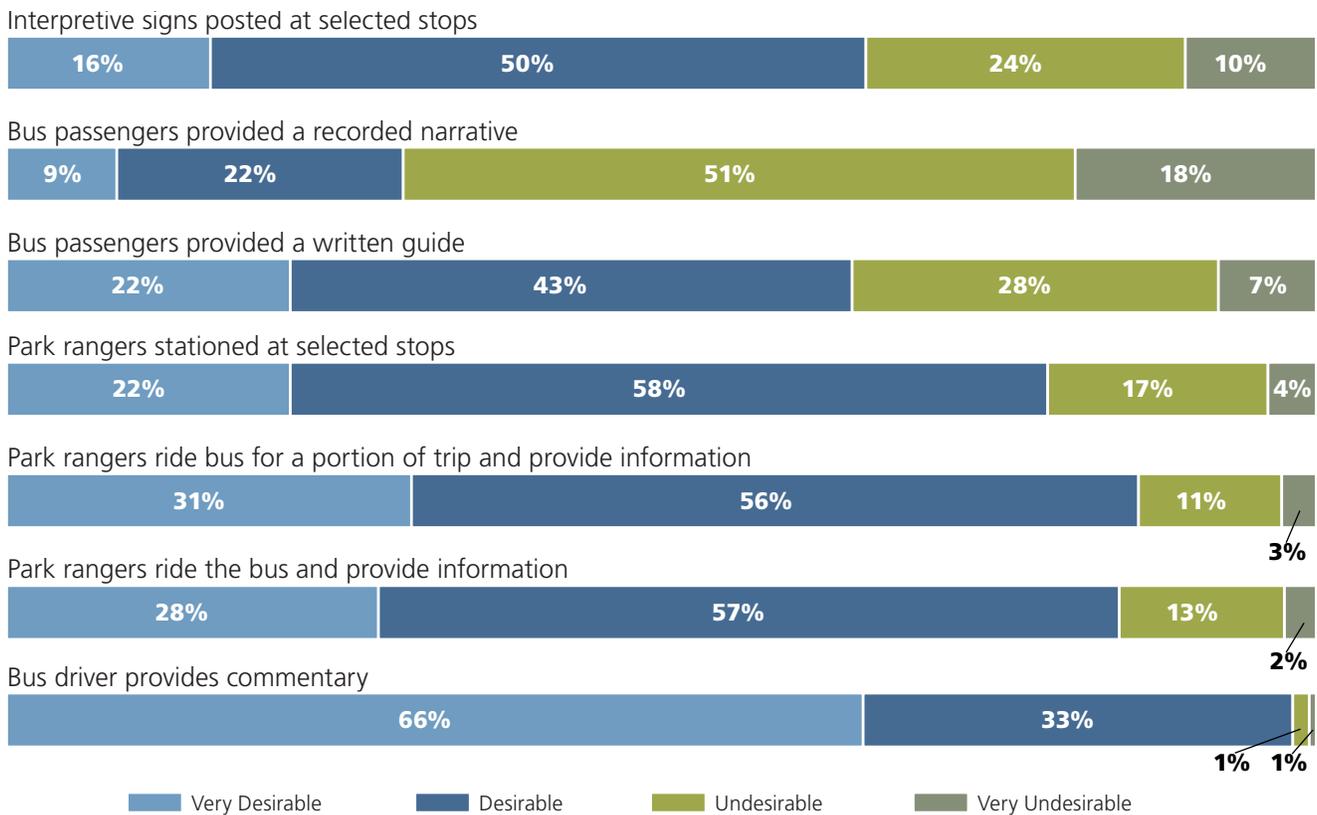


## Access

The desired future condition of this objective is: “*All options and costs for travel to and within the park are known to travelers.*” Considering the entirety of the conditions documented in this LRTP, there is evidence that options and costs for travel to and within the park are available to travelers, but not always known to travelers or easy to obtain. The gap between the existing and desired conditions is most apparent in equipping travelers with the knowledge needed to make informed trip-planning and on-site decisions. The most common need identified in planning documents is the necessity for better wayfinding and user information about the transit system in hopes of reducing visitor confusion

about the park’s transportation system. According to the VMP, an objective of Denali management is to “clearly communicate information about the system through a variety of means.” Without an entrance station, sharing information consistently is particularly challenging because visitors who travel to the park in a private vehicle may not have the same opportunity to obtain basic travel and interpretive information as visitors using a commercial tour. Potential options for sharing information include improving the availability of traditional methods such as maps, brochures, and signs. The Alaska Region also is interested in newer media options, such as implementing intelligent transportation systems linked with websites, mobile devices, and other

Figure 27. Desirability of future forms of information/education along the Park Road for transit bus users



Source: Denali Park Road Visitor Survey Report, 2010



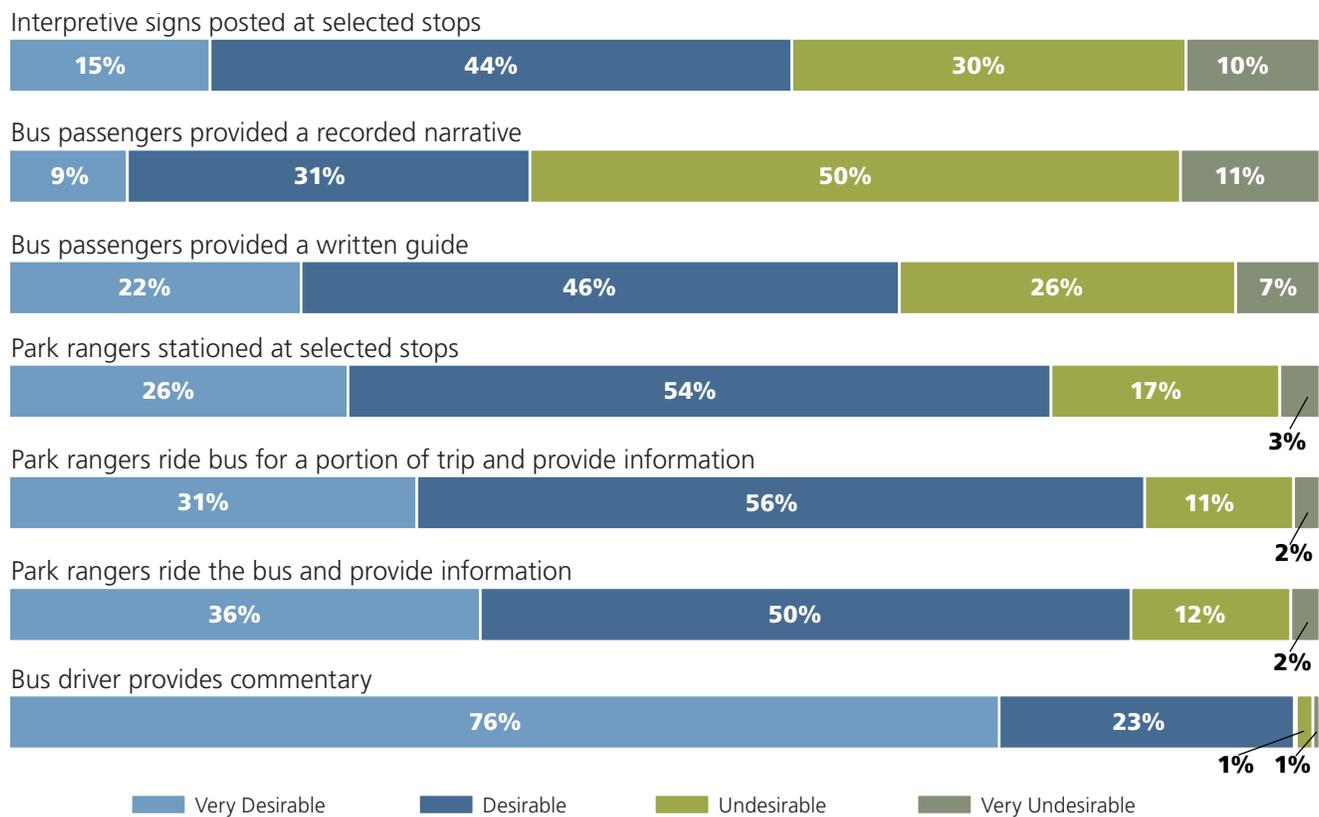
personal communication technology. According to a survey in 2010, transit bus users were not interested in receiving information from a recorded narrative about traveling Denali Park Road. Very similar responses were given when visitors were asked about desired future forms of interpretation and education between transit bus and tour bus services. Information delivered by bus drivers was preferred over prerecorded methods. Figure 27 and Figure 28 show the full results of this survey (*Denali Park Road Visitor Survey Report, 2010*).

In the future, visitation is expected to grow, with a large portion of visitors arriving as part of organized

tour companies or organizations. Considerations for access are, therefore, a topic of long-range concern as Denali is committed to providing access to the public while protecting natural resources.

Using the transportation infrastructure to move employees around the area also is a key component to future park access needs. Employment around the park is expected to increase as visitation increases. Results from park staff engagement conducted through the LRTP planning process suggests that consolidating the existing private business shuttle services would better connect employees to their work places.

Figure 28. Desirability of future forms of information/education along the Park Road for tour bus users



Source: *Denali Park Road Visitor Survey Report, 2010*



## 2.5 System Optimization

The System Optimization goal states: *Develop a long-term transportation system to appropriately satisfy current and future park needs.* The goal statement is related to sound management and wise investment of the park's assets, as well as efficient operation of the park's transit system. System Optimization objectives focus on effectively managing and investing in transportation assets. The objectives for the System Optimization goal are:

- **Asset Management:** Maintain and manage all critical transportation assets for current and future conditions.
- **Asset Investment Planning:** Strategically invest in transportation assets.

Baseline conditions are centered on the findings from an LRTP-focused literature review and supplemented with insight provided by park staff and obtained through the LRTP engagement process. Table 11 summarizes System Optimization goal conditions determined through this literature review process within the context of the goal's objectives and desired future conditions. Details about existing conditions and the gaps between existing and desired future conditions follow the Table 11 summary.

### 2.5.1 Asset Management

The asset management objective represents two system optimization principals: asset conditions and priority. The asset management discussion is, therefore, structured around conditions and priorities.

#### Conditions

Within the Alaska Region, Denali transportation assets are some of the most challenging (and costly) assets to maintain. This is largely due to high visitation levels and the critical roles served by assets such as the singular Park Road and the visitor transit system that help to meet the park's mission and goals. Addressing these needs is challenging due to funding shortfalls and the complex nature of park transportation assets. For example, Park Road improvement needs frequently are the direct result of the road's original construction. Built in the 1920s and 1930s, the Park Road was constructed with the intention of carrying very low vehicle volumes of modest weight traveling at very low speeds. Due to these criteria, and the lack of available resources in this remote area at the time, builders used local materials and native soils to construct the road. Since then, vehicle traffic volumes and vehicle types have changed dramatically, but the road has not, due in part to the desire to maintain its historic character. Today, the Park Road carries a moderate number of buses and some of the roadway lacks commonly recognized design elements such as adequate road sub-base or drainage capacity. In general, the constructed surface east of Teklanika River ranges between four inches and eight inches in thickness; to the west, it is between two inches and six inches.



Table 11. Goal Summary

<b>Asset Management Objective:</b> "Maintain and manage all critical transportation assets for current and future conditions."	
<b>Desired Condition</b>	All critical transportation assets (optimizer bands one and two) are well maintained while all other transportation assets are appropriately maintained, closed, or disposed of in accordance with asset management strategies.
<b>Existing Condition</b>	\$12.42 million is needed to return the Denali transportation system to good condition and maintain it at that condition.
<b>Existing Condition Summary</b>	Asset conditions reflect recent reporting from NPS's Facility Management Software System (FMSS). The Current Replacement Value (CRV) of all transportation assets is \$223.1 million, or 49 percent of the total (\$460.0 million) Denali asset portfolio.
<b>Asset Investment Planning Objective:</b> "Strategically invest in transportation assets."	
<b>Desired Condition</b>	Use of sustainability principles in investment planning yields appropriately maintained assets while new assets are responsibly planned and kept shelf ready.
<b>Existing Condition</b>	Sustainable asset management principles are being used currently for investment decisions; long-term investment planning will ensure that assets are appropriately maintained well into the future.
<b>Existing Condition Summary</b>	The park currently follows DOI and NPS asset management methodologies for prioritizing and investing in critical assets. Accepting and committing to practice those asset investment strategies documented in a Financial Report demonstrates the park's commitment to sustainable and sound transportation investments. The park is committed to considering total cost of facility ownership (TCFO).



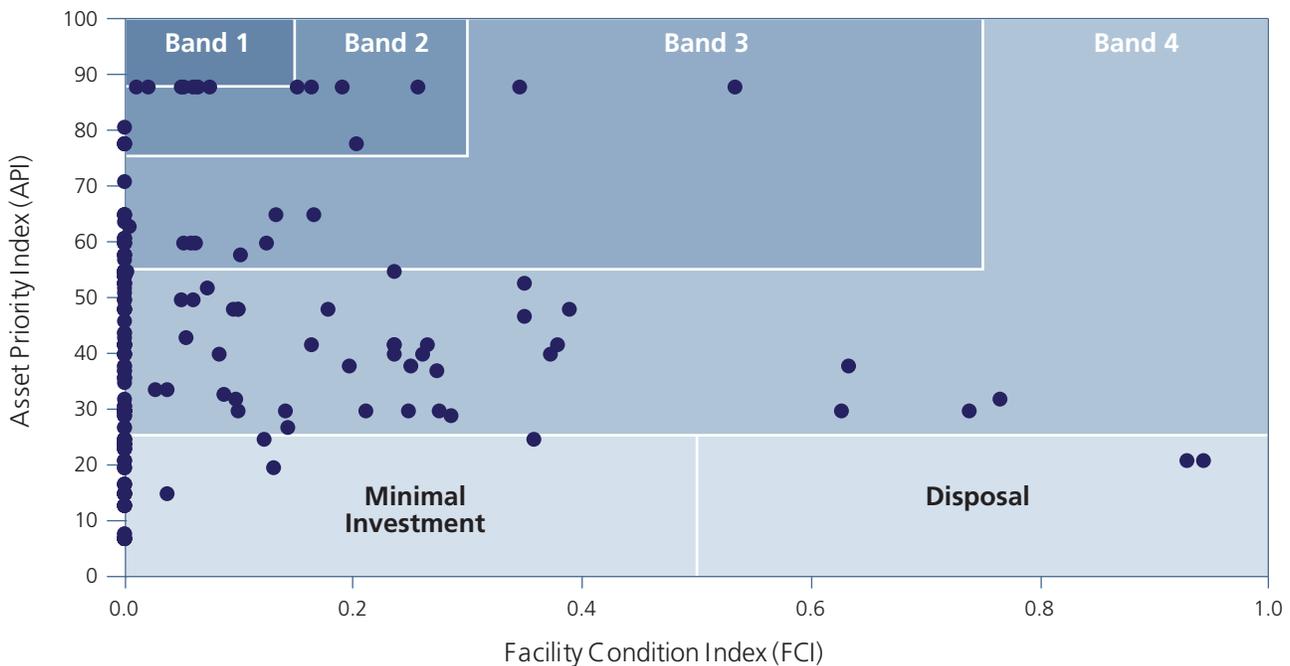
Figure 29 summarizes the state of transportation assets by priority and condition according to the 2012 NPS Alaska Region Federal Lands LRTP, System Optimization Technical Report. The Facility Condition Index (FCI) describes transportation asset condition using a numeric rating system, where zero (0.0) represents excellent condition (no repairs are needed) and 1.0 represents assets beyond repair (the cost of repairs equals an asset’s replacement value). The FCI also factors in a prioritization methodology that uses “optimizer band” based asset management and asset investment planning. As illustrated in Figure 29, optimizer bands divide assets into one of five categories, which represent the level of maintenance that an asset should receive based on NPS Park Facility Management Division guidance. Optimizer band parameters can be adjusted by individual parks to accommodate unique requirements, priorities, and funding capabilities. The management implications of these conditions

and the significance of optimizer bands is discussed in the following Priorities and Asset Investment Planning sections of this report.

### Priorities

Denali adheres to the DOI and NPS practices that are considered consistent asset management methodologies for prioritizing and investing in critical assets. The NPS FMSS contains an Asset Priority Index (API) value for all assets. The API describes the extent to which assets are important, and sometimes vital, in accomplishing the agency’s mission. High-priority assets are those with an API of 75 or greater (on a scale of 1 to 100). Low priority assets have API values less than 75. API for Denali transportation assets are noted in Figure 29. Together, API and FCI are the basis for the NPS “optimizer band” approach to asset management, as discussed earlier.

Figure 29. Transportation Asset Condition, Priority, and Optimizer Bands\*



\*Points represent the Park’s transportation assets. Colors represent optimizer bands, categories of optimal condition.

Source: Financial and Business Management System (2014)



In addition to the FMSS-based transportation prioritization, Denali identifies needs through comprehensive planning efforts. Specifically, the 2008 General Management Plan identifies specific road improvement needs. These needs were categorized into three priority levels, as follows:

**Priority 1—Correct Safety Concerns.** Needs in this category represent the highest priority improvements that are critical to maintaining user safety on the Park Road. Needs in this category include improvements to sight distance, passing opportunities, road surface friction, culvert crossings, and curve super-elevations. Table 12 lists the sections of the Park Road that have Priority 1 improvements identified. It is important to note that only specific needs within the road segment identified are planned. To maintain the natural character of the Park Road, the NPS does not intend

to fully repair or rebuild any section of roadway identified as part of this prioritization process. Future needs for roadway re-routing and/or realignment may be assessed to fulfill the intent to keep the road intact. New road construction would be conducted in a manner that maintains the natural character of the road to the greatest degree possible.

**Priority 2—Repair Structural Failures and Sections in Imminent Danger of Structural Failure.** Improvements at this priority level represent the need to repair underlying deficiencies within the road. These types of repairs include fixing shear failures, slumps, active pumping of the road surface, road surface rutting, inadequate subgrade drainage, and surface cracking. Table 13 lists the sections of the Park Road that have Priority 2 improvements identified.

Table 12. Identified Priority 1 Park Road Improvements

Identified Concern	Location (mile point along the Park Road)
Sight distance and safe vehicle passing areas	38.0, 43.5, 68.0, 68.8, 73.0, 74.8 to 74.9, 77.6 to 77.7, 77.9, 79.4, 79.6, 80.3, 81.1, 81.3, 81.8, 83.2, 84.5, 87.1 to 87.2, 87.8
Road surface friction	67.0 to 69.0
Curve super-elevations	41.0 to 43.0

Source: 2008 General Management Plan: Appendix C

Table 13. Identified Priority 2 Park Road Improvements

Identified Concern	Location (mile point along the Park Road)
Shear failures and slumps	37.5 to 38.0
Active road surface pumping and road surface rutting	17.0 to 18.0, 31.5 to 34.0, 38.0 to 40.0, 48.0 to 49.0, 50.0 to 52.0
Subgrade drainage	17.0 to 18.0, 23.0 to 25.0, 31.5 to 34.0, 45.5, 50.0 to 52.0, 61.0 to 63.0, 68.0 to 76.0, 85.0 to 88.0

Source: 2008 General Management Plan: Appendix C



**Priority 3—Repair Documented Structural Problems.** The needs included at this priority level represent areas of the Park Road where structural problems are known to exist or are suspected to exist, but do not pose an immediate safety concern. Repairs in this category include surface cracking and grade raises. Table 14 lists the sections of the Park Road that have Priority 3 improvements identified.

Chapter 3 details several investment strategies for achieving the system optimization asset management objective (“Maintain and manage all critical transportation assets for current and future conditions.”).

### 2.5.2 Asset Investment Planning

As detailed in Chapter 3, Funding Plan of the Denali LRTP, the transportation budget for road assets is approximately \$1.9 million, and assets within the park generally are considered to be in good condition. Through the use of the NPS Capital Investment Strategy (CIS) and optimizer band-based asset management, transportation funds are effectively directed to assets that are in need of improvements and of high priority. Lower-priority asset investment decisions include other important variables that demonstrate necessity. Chapter 3 and the Financial Report appendix to the Denali LRTP documents the park’s asset investment plan for existing assets.

### New Challenges

Elimination of the Paul S. Sarbanes Transit in Parks (TRIP) program will further complicate park funding, specifically with regard to the park’s transit system. Denali’s transit system is operated by a for-profit organization, making it ineligible to receive transportation funding through Fixing America’s Surface Transportation Act (FAST Act). However, FHWA funding and grants are available and partnerships with local governments can further augment funding eligibility. These types of alternative funding opportunities are critical to Denali because 21 percent of the transportation assets within the park are not owned by NPS (NPS Alaska Region LRTP, System Optimization Technical Report, 2011). This limits the funding available for these assets.

In addition to investment planning for existing assets, Denali is exploring new ways to do more with those assets. Wintertime operation improvements and new vehicle management strategies are two examples of how the park has focused on maximizing its current assets. Additionally, Denali is actively investigating more efficient methods to manage the park’s transit system. Real-time monitoring of the buses allows managers to track vehicle occupancy and dispatch

Table 14. Identified Priority 3 Park Road Improvements

Identified Concern	Location (mile point along the Park Road)
Surface cracking	17.0 to 18.0, 23.0 to 25.0, 31.5 to 34.0, 38.0 to 40.0, 45.5, 48.0 to 49.0, 50.0 to 52.0, 61.0 to 63.0, 68.0 to 76.0, 85.0 to 88.0
Grade raises	31.5 to 34.2, 36.0 to 37.0, 70.4 to 72.1

Source: 2008 General Management Plan: Appendix C



additional vehicles during peak demand. However, to effectively meet visitor expectations, there also must be a constant balance between maintenance and operations with environmental conservation.

In addition to sound investment in existing assets, there is also a need to invest in new facilities and enhance transportation operations to keep pace with the expected continued increase in visitation. In light of the NPS CIS, this effort needs to thoughtfully consider offsetting needs because funding will not likely increase into the future. The park is committed to considering Total Cost of Facility Ownership (TCFO) when new facilities are proposed. NPS has developed helpful calculators to quantify operation and maintenance needs. The goal of Denali's transportation assets is to maintain a system that will not create any unanticipated or unsustainable costs to Denali's inventory. There are several proposed or piloted investments intended to increase access and transportation user experience throughout the park that will have to be considered for TCFO. Proposed investments include right-sizing parking facilities, constructing new multimodal trails, enhancing transit system services, and extending shoulder and winter season visitor opportunities.

### 2.5.3 Needs and Gaps

Desired future conditions for Denali are identified for each objective. Needs and gaps are expressed as the difference between the baseline condition and the desired future condition.

#### Asset Management

The desired future condition for asset management is: *“All critical transportation assets (optimizer bands one and two) are well maintained while all other transportation assets are appropriately maintained, closed, or disposed in accordance with asset management strategies.”* Given the baseline conditions documented above, this

LRTP concludes that critical transportation assets (optimizer bands one and two) are in fair to good condition and that the park is following accepted DOI and NPS asset management methodologies for prioritizing and investing in critical assets. Through the acceptance of this LRTP, the park also broadens its asset management strategies to include the investment strategies presented in the Funding Plan of the Denali LRTP. Closing the gap between existing and desired future conditions hinges on the park's ability to meet the end goals of the Financial Report and practice sound asset investment planning.

#### Asset Investment Planning

The desired future condition for asset investment planning is: *“Use of sustainability principles in investment planning yields appropriately maintained assets while new assets are responsibly planned and shelf ready.”* Given the baseline conditions documented above, this LRTP concludes that sustainable asset management principles are currently being used for investment decisions, while long-term investment planning (the Financial Plan) will ensure that assets are appropriately maintained well into the future. This conclusion is based on the park's longstanding use of DOI and NPS consistent asset management methodologies for prioritizing and investing in critical assets. Furthermore, accepting and committing to practice the asset investment strategies documented in the Financial Report demonstrates the park's commitment to sustainable and sound transportation investments. Finally, the park is committed to considering TCFO for all new assets.

Closing the gap between existing and desired future conditions hinges on the park's ability to meet the end goals of the Financial Report and practice sound asset investment planning—including TCFO when considering new assets.



## 2.6 Partnership

The Partnership goal states: *Maintain formal and informal partnerships to provide a viable transportation system.* The goal statement is related to identifying existing and future opportunities for cooperation between Denali and agencies, groups, and individuals for the mutual benefit of all parties. Partnering objectives reflect a desire to leverage commercial partnerships and to identify those exceptional partners that will reflect the mission and values of the NPS. The objectives for the Partnership goal are:

- **Commercial Partners:** Manage formal commercial partnerships to provide essential transportation services.
- **Project Champions:** Empower Project Champions to inform and educate the public on key issues that focus on both transportation and resources.

Table 15 summarizes Partnership goal conditions determined through this literature review process within the context of the goal's objectives and desired future conditions. Park conditions are supplemented with insight provided by park staff and obtained through the LRTP engagement process. Details about existing conditions and the gaps between existing and desired future conditions follow the Table 15 summary.

### 2.6.1 Commercial Partners

Denali relies on partnerships with commercial companies to move people to, from, and within the park. The park's main transportation concessioner, Joint Venture (JV), operates bus tours and transit buses. These services move people within the park's interior region, including along the Park Road. Bus tours include the Denali Natural History Tour (to Mile 27), Tundra Wilderness Tour (to Mile 62), and the Kantishna Experience Tour (to Mile 92). Also provided are free courtesy shuttles that only operate in the park's frontcountry area. These include the Riley Creek Loop, Savage River Shuttle (to Mile 15), and the Sled Dog Demonstration Shuttle.

The partnership between NPS and JV is primarily structured on the existing contract for concessioner services. This contract communicates expectations of the services to be delivered to visitors, as well as standards for those services as they relate to park user experience objectives. Performance measures from the VMP are identified in the contract for hiker wait times and passenger counts. Other transportation operation standards documented in the contract include vehicle inspection requirements, driver qualification and training, safety, vehicle replacement programs, and communication protocols.



Table 15. Goal Summary

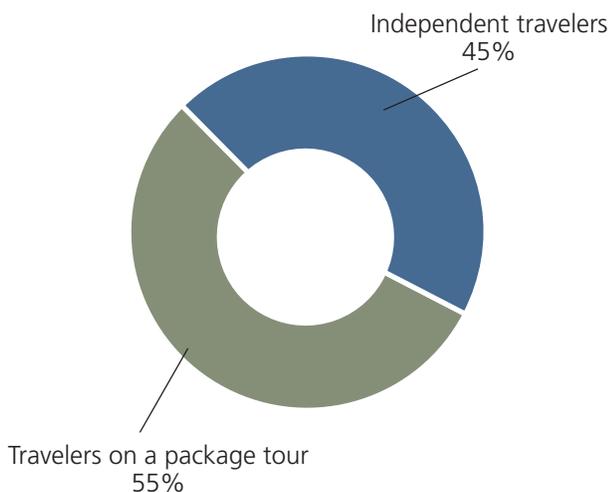
<b>Commercial Partners Objective:</b> "Manage formal commercial partnerships to provide essential transportation services."	
<b>Desired Condition</b>	The partnership with transit concessioners and tourism companies is leveraged to advance the mission of Denali.
<b>Existing Condition</b>	The park currently manages its partnership with commercial entities through concessioner contracts. However, expanded partnerships with other businesses, particularly those that provide transportation services, is desired as a means to meet park goals.
<b>Existing Condition Summary</b>	<p>The park currently relies on a partnership with Doyon/Aramark Joint Venture (JV) to operate transit service in the entrance area and along the Park Road. This partnership is managed through the Denali Commercial Services Division.</p> <p>Two primary travel companies, Holland America and Princess Cruise Lines, provide transportation and other visitor services to the park. Many travelers using travel companies arrive by train, and transportation services provided by these companies are operated independently of park concessioners.</p> <p>Many of the lodging and visitor service businesses provide transportation to and within the park or to the nearby communities. Opportunities exist to coordinate some of these services.</p>
<b>Project Champions Objective:</b> "Empower Project Champions to inform and educate the public on key issues that focus on both transportation and resources."	
<b>Desired Condition</b>	Project champions, both internal and external, advocate for key issues facing the park and are resources of information.
<b>Existing Condition</b>	Project champions exist during various planning processes and infrastructure projects in the region.
<b>Existing Condition Summary</b>	<p>Denali staff use partnerships with travel companies to further NPS priorities of resource protection through interpretive programs.</p> <p>Local boroughs and municipalities create area plans that include transportation elements. These plans are opportunities to coordinate with the park.</p> <p>When projects are planned in the vicinity of the park, there are opportunities to coordinate with others involved in those projects.</p> <p>The former Denali Overflights Advisory Council was an important partner to the park because it influenced the development of best practices for air flight operators toward mitigation of impacts to park resources, such as soundscapes and visitor experience.</p>



As shown in Figure 30, most of the visitors entering Denali arrive as part of a commercial tour package. The partnership between the park and tour companies can have an impact on other priorities of the park, such as visitor experience and resource protection. One such example of this coordination is an existing agreement with Holland America/ Princess Cruise Line to provide support for visitor programming and interpretive services via a lodge program and passenger train interpretive program in 2016.

Air tour operators have been identified as commercial partners because most operate commercial tour services and have an interest in improvements to aviation infrastructure in the park. Air tour operators also are key stakeholders in managing visitor experience and protecting natural resources as it relates to management of soundscapes in the Denali backcountry.

Figure 30. Visitor types. Independent vs. Package Tour



Source: Denali Park Road Visitor Survey Report (2010)

## 2.6.2 Project Champions

Project champions include those agencies, organizations, and individuals, within or external to the NPS, that are involved with regional projects and coordinate with the agency to support the mission of the park. Currently, the primary project champions are Denali staff, regional communities, researchers, citizen scientists, park volunteers, and partnerships made through infrastructure projects and planning processes. Project champions are categorized as funding, research, operational, commercial, or educational partners to the park. Current and potential partners are listed by project champion category in Table 16. By design, some partnering agencies are identified in multiple project champion categories.

The Denali Interpretation Division is a project champion for the park as it actively builds and maintains partnerships with non-NPS organizations. The Division has partnerships with the University of Alaska Fairbanks, Alaska Geographic, Denali Borough School District, and Denali Education Center. The Denali Interpretive Division also has an agreement with JV, to provide an interpretive program for the Kantishna Experience. The Kantishna Experience is an all-day visitor package that includes travel to the end of the Park Road, interpretation, meals, and hotel pick-up/drop-off.

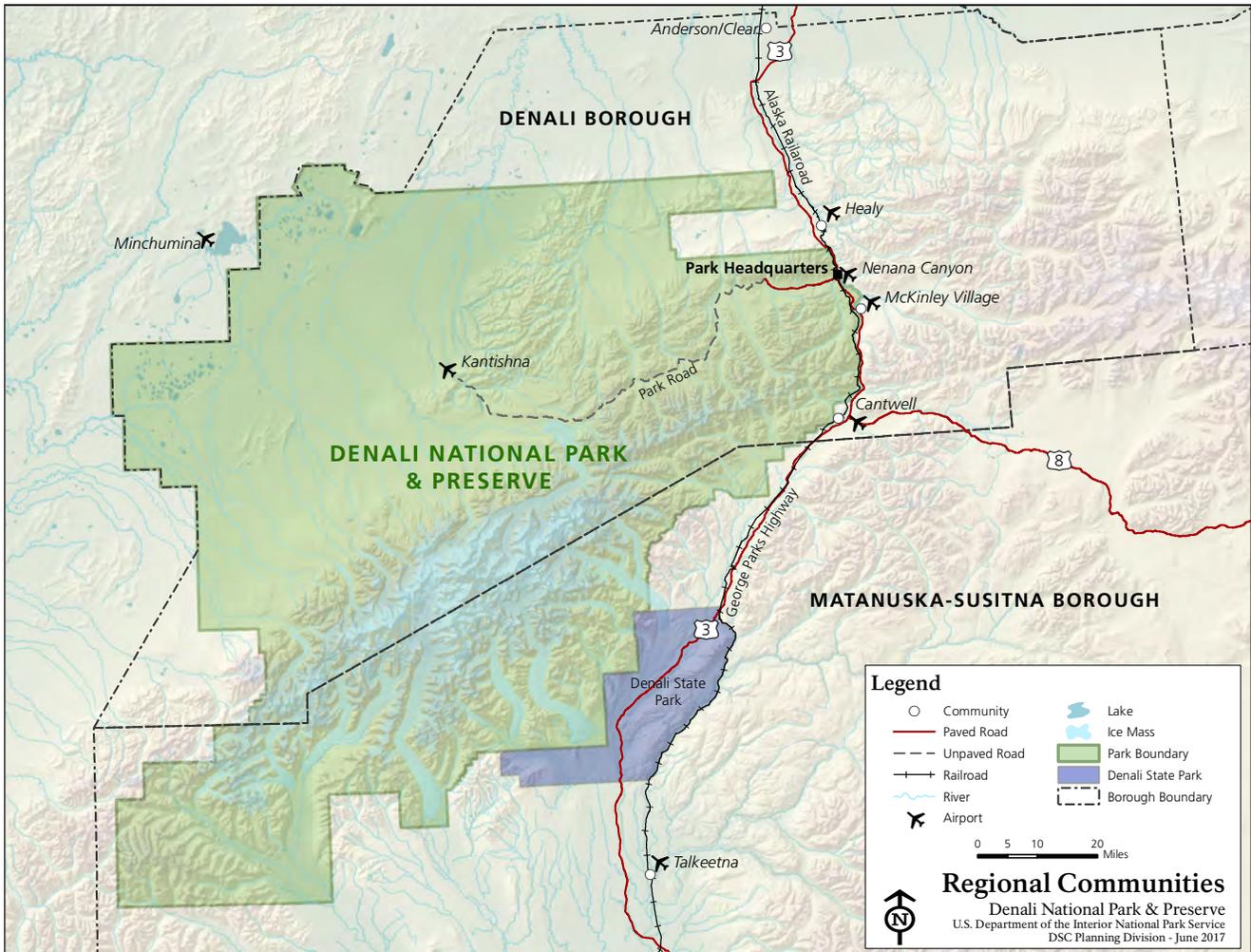


Table 16. Denali Project Champions

Project Champion Category	Agency/Partners	
<b>Funding</b>	FHWA, Federal Lands Access Program Holland America/Princess Cruise Line	Joint Venture, Doyon/Aramark ADOT&PF
<b>Research</b>	Unstable Slopes Management Plan University of Alaska System NPS Natural Sounds and Night Skies Division University	United States Geological Survey (USGS) Zero Landfill Initiative Central Alaska Network and Arctic Network
<b>Operational</b>	Transportation Scholars Program, National Park Foundation Overflights council AK Railroad ADOT&PF Alaska State Parks Road and Trails Conservation Association Liquid Natural Gas (LNG)/Alaska Stand Alone Pipeline (ASAP)	Tribes, Native Corporations, Native Communities Zero Landfill Initiative Joint Venture, Doyon/Aramark Holland America/Princess Cruise Line Denali Borough Matanuska-Susitna Borough Denali Citizens Council
<b>Commercial</b>	Holland America/Princess Cruise Line Joint Venture, Doyon/Aramark Alaska Tourism Industry Association	Kantishna inholders Miscellaneous commercial operators Alaska Geographic
<b>Education</b>	Denali Education Center Murie Science and Learning Center Zero Landfill Initiative	Denali Borough and Matanuska-Susitna Borough school districts Alaska Geographic



Figure 31. Communities and Boroughs in relation to Denali



Denali is located within two regional community champions, Denali Borough and Matanuska-Susitna Borough, as shown in Figure 31. Depending on their organizational structure, boroughs (like counties in other parts of the United States) facilitate regional-level governmental services such as land planning, fire protection, road maintenance, school board administration, and waste management. Denali coordinates with the lead agencies on projects in these boroughs, as well as gateway communities such as Healy and Nenana Canyon, north of the Park Road, and McKinley Village and Cantwell, south of the Park Road.

While boroughs are seldom the lead agency for projects adjacent to the Park, projects that occur within boroughs must be consistent with their comprehensive plans. Accordingly, there is regular coordination with Denali staff with regard to planning efforts. Based on discussions with Denali Borough as part of this LRTP's outreach efforts, representatives have expressed a desire for increased opportunities to coordinate with Denali such as coordination with Matanuska-Susitna Borough through the development of their long-range transportation plan.



Opportunities for partnerships occur during planning or implementation of projects in the park’s vicinity. These projects include roadway improvements to the George Parks Highway and potential oil and gas pipelines in the region. Table 17 shows a list of current and future projects that may involve NPS coordination with the agencies participating in these projects. Additional information about these projects are available in Appendix D of the Denali LRTP.

### Overflights Advisory Council

Between 2007 and 2012, the Denali Overflights Advisory Council was an important partner to the park because it influenced impacts to park resources, such as soundscapes and visitor experience, and instituted a set of best practices for air tour operators to follow as guidelines for operations. The Overflights Advisory Council was established to consider resource conflicts between aircraft tours and park visitors on the ground. The group was charged with advising the NPS on ways to reduce

Table 17. Current and Future Projects

Project	Cooperating Agencies
<b>Alaska Stand Alone Pipeline (ASAP)</b>	Alaska District, U.S. Army Corps of Engineers, U.S. Bureau of Land Management, National Park Service, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, and the Alaska Department of Natural Resources State Pipeline Coordinator’s Office
<b>Alaska Liquid Natural Gas pipeline (Alaska LNG)</b>	State of Alaska, represented through Alaska Gasline Development Corporation
<b>Alaska Department of Transportation (DOT) Statewide Plan</b>	ADOT&PF
<b>George Parks Highway Projects</b>	ADOT&PF
<b>ADOT&amp;PF Area Plans</b>	ADOT&PF
<b>ADOT&amp;PF Mile 231 Proposed Wayside Project</b>	ADOT&PF
<b>Alaska Railroad—Healy Canyon between Denali Park Station and Healy</b>	Alaska Railroad
<b>Proposed Susitna-Watana Dam</b>	Alaska Energy Authority
<b>Denali State Park/Southside new facilities</b>	Denali State Park
<b>Regional Energy Projects (Wind, Coal, Natural Gas exploration)</b>	Various
<b>Riley Creek Bridge Replacement (completed 2015)</b>	ADOT&PF, Alaska Division of the Federal Highway Administration (FHWA)



sound impacts from aircraft flights over the park; developing voluntary measures for assuring the safety of passengers, pilots, and mountaineers; and achieving desired resource conditions at Denali as outlined in the Backcountry Management Plan (2006).

### 2.6.3 Needs and Gaps

Desired future conditions for Denali are identified for each objective. Needs and gaps are expressed as the difference between the baseline condition and the desired future condition.

#### Commercial Partners

The desired future condition for commercial partners is: *“The partnership with transit concessioners and tourism companies is leveraged to advance the mission of Denali.”* Given the baseline conditions documented above, this LRTP concludes that while the park currently manages its partnerships with commercial entities through concessioner contracts to meet the park mission and goals, expanded partnerships with other businesses, particularly those that provide transportation services, is desired. The identified gap between existing and desired conditions resides primarily with the need for increased coordination with tourist companies to expand interpretive programs and

increase the efficiencies of transit services between nearby communities and the park. Specifically, there is a partnership-related gap with respect to expanding transit service north to Healy and south to Carlo Creek and Cantwell in addition to increasing shuttle service between the entrance area and McKinley Village (Needs Assessment and Feasibility Study for a Community Transportation System, 2006).

#### Project Champions

The desired future condition for project champions is: *“Project champions, both internal and external, advocate for key issues to the park and are resources of information.”* Given the baseline conditions documented above, this LRTP concludes that internal staff project champions effectively use internal partnerships to increase coordination internally. The most common partnerships are made during planning and project improvements outside of the park. There are opportunities to increase the frequency of coordination, particularly with local boroughs and municipalities.



## 2.7 Park Transportation Investment Needs Analysis

In addition to the literature review-based and goal-focused baseline conditions presented in Sections 2.1 through Sections 2.6, the NPS performed a Park Transportation Investment Needs Analysis (PaTINA) to identify data-derived needs. The PaTINA spatially models areas of potential investment need by using a Geographic Information System to overlay spatial data. The data overlays are weighted values derived by NPS and Denali staff, and added together where they spatially overlap. The results of the PaTINA depict where those areas of potential investment needs may be located. The PaTINA provides useful benefits compared with transportation facility data to inform investment strategies. A detailed PaTINA methodology, data inputs related to goal areas, and results summary is provided in Appendix E of this LRTP. The PaTINA uses the following data inputs:

### Resource Protection

- Sheep Gaps
- Exotic Species
- Stream/Road Intersections
- Vegetation Monitoring Marker
- Sheep
- Moose
- Bear
- Wolves
- Caribou (Aug-Sep)
- Caribou (July-Aug)
- Caribou (May-June)
- Wetlands
- National Register Structures
- Historic Districts

### User Experience

- Viewscapes
- Visitor Services
- Social Trails
- Visitor Pattern
- High Visitor Use Area

### Access

- Safety Areas of Concern
- Railroad Depot
- Bus Stops

### Climate Change

- Geohazards
- Permafrost

### 2.7.1 Findings

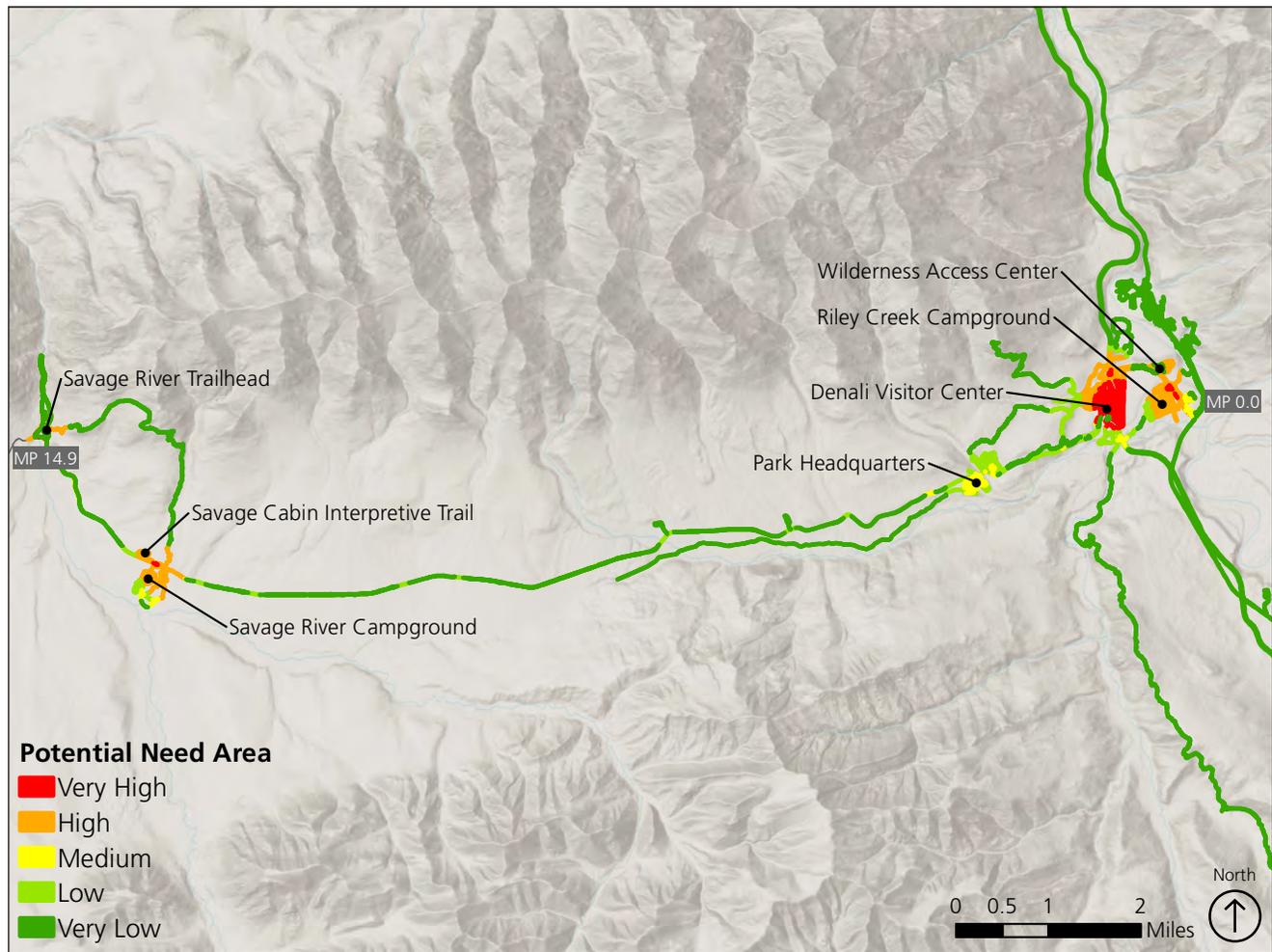
PaTINA outcomes are presented in terms of potential investment and/or management needs. Findings from the PaTINA cover potential need areas for the Motorized Paved Zone segment and Wildlife Viewing Subzones (previously illustrated in Figure 3) of the Park Road. These results are summarized by zone in the following sections.

## Motorized Paved Zone

The motorized paved zone starts at the Denali entrance at milepost 0 and ends at milepost 14.9 (Figure 32). This segment has the greatest amount of very high potential need concentrated around the Denali Visitor Center. High potential need areas are

located just east of the visitor center, surrounding the Riley Creek Campground. Findings also show the Park Headquarters and Savage River to be potential need areas with values of medium and high.

Figure 32. Motorized Paved Zone Potential Need Areas

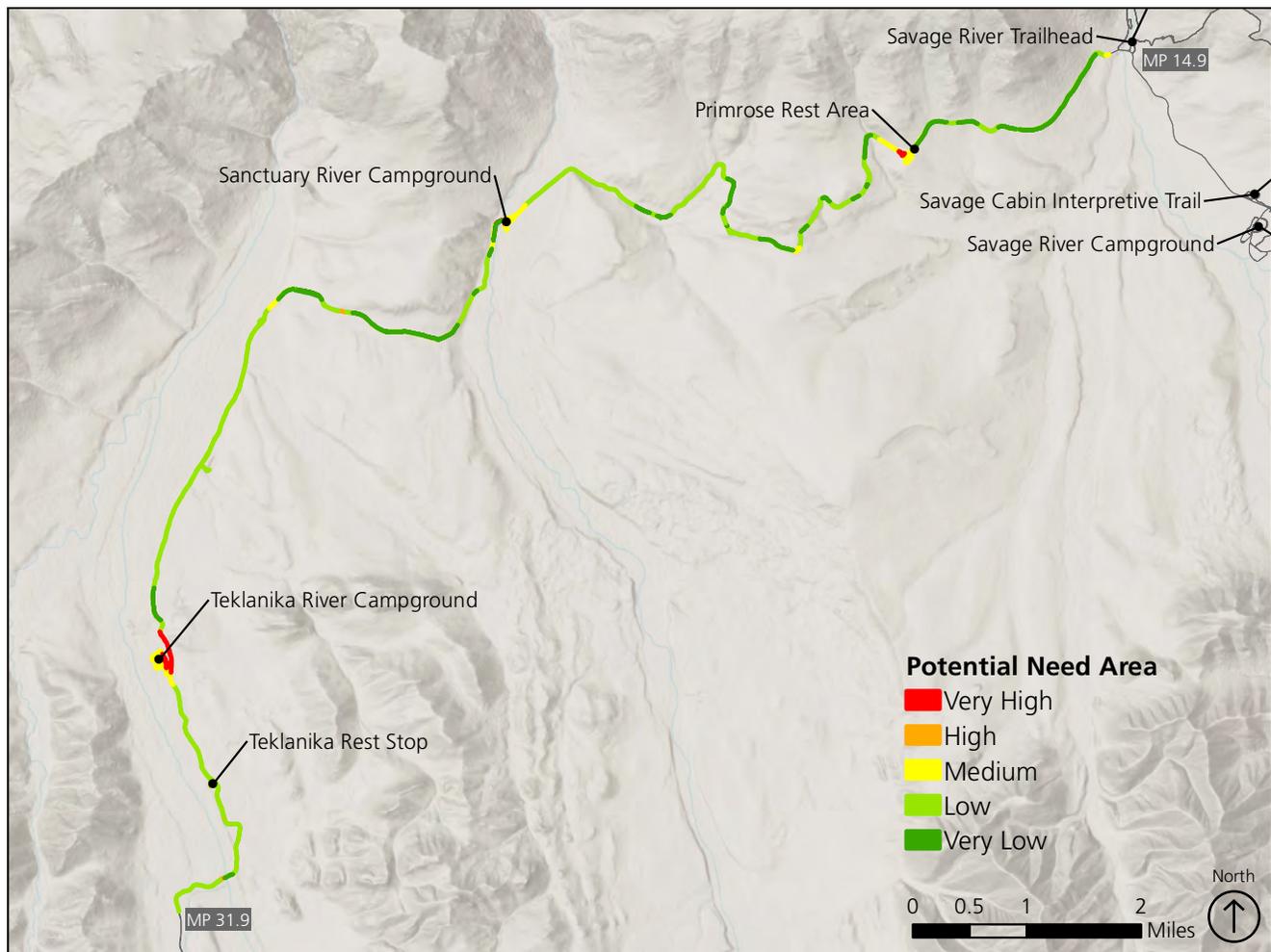


### Wildlife Viewing Subzone 1

The wildlife viewing subzone 1 spans the distance between milepost 14.9 to milepost 31.9 (Figure 33) and includes the Sanctuary River campground and the Teklanika River campground and rest stop. The

Teklanika River campground shows the largest very high potential need area. Findings also show the Sanctuary River campground and the Primrose Rest Area to be very high potential need areas although the spatial areas are smaller compared to the Teklanika River campground.

Figure 33. Wildlife Viewing Subzone 1 Potential Need Areas

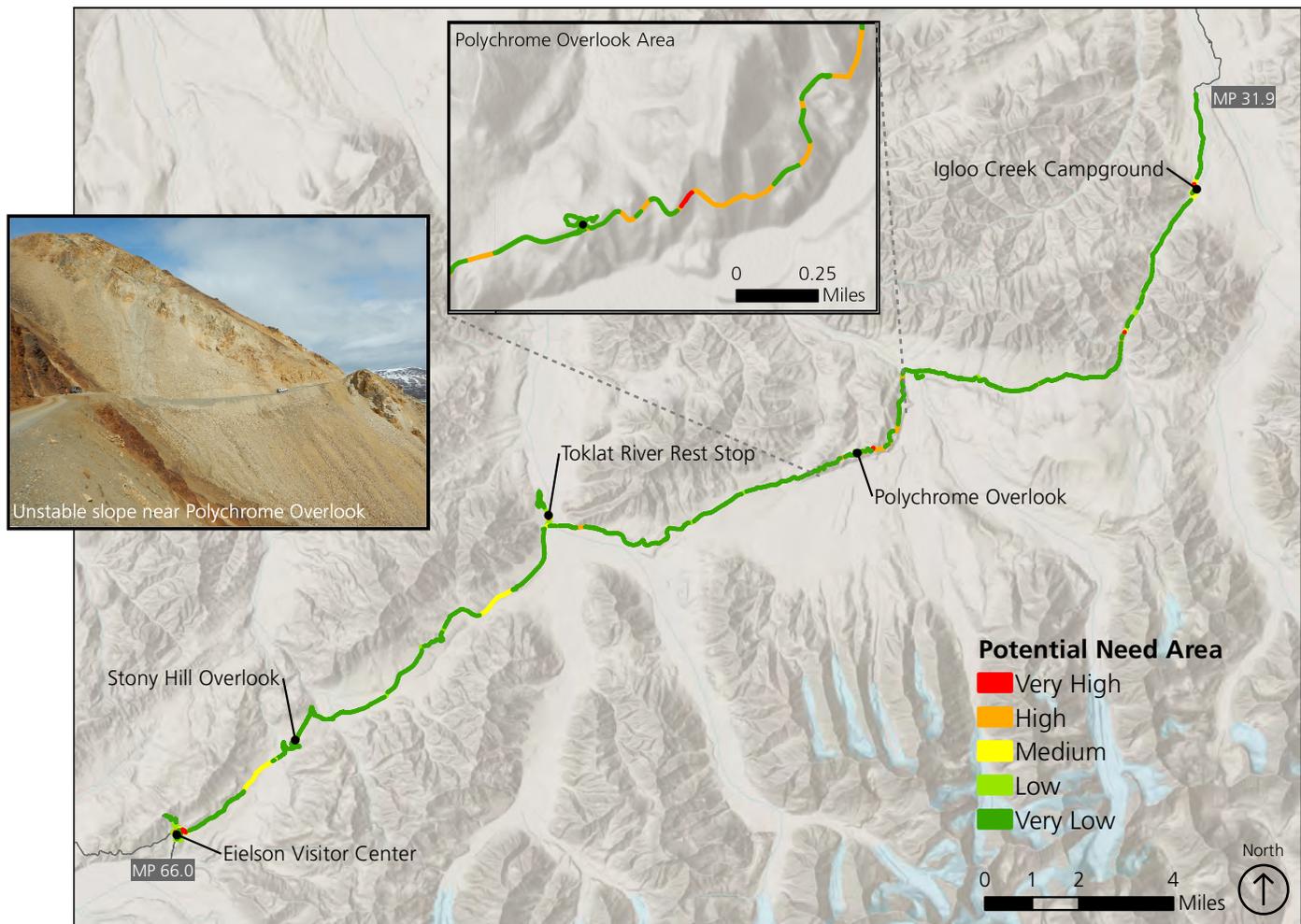


### Wildlife Viewing Subzone 2a (milepost 31.9 to milepost 66)

The wildlife viewing subzone 2a ranges from milepost 31.9 to milepost 66 (Figure 34) and includes locations from Igloo Creek campground to Eielson Visitor Center. The findings suggest that there are many high potential need areas along this segment

of road. The most prominent areas are located before and after Polychrome Overlook, particularly due to unstable slope conditions at Pretty Rocks (milepost 45). The Eielson Visitor Center also shows very high potential need areas. These findings may suggest future investment at these locations due to high use at the visitor center.

Figure 34. Wildlife Viewing Subzone 2a Potential Need Areas

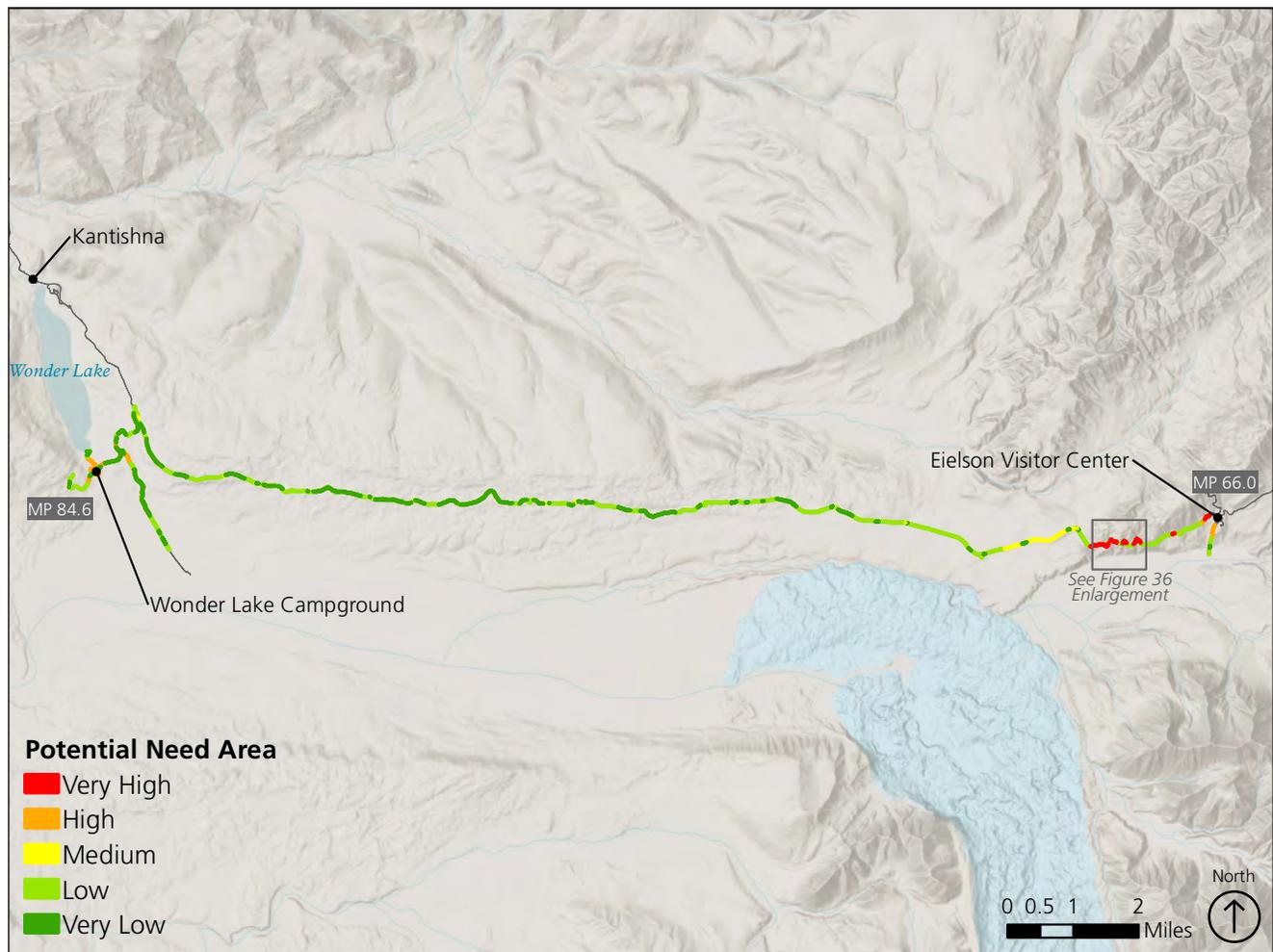


### Wildlife Viewing Subzone 3

Milepost 66 to milepost 84.6 is the wildlife viewing subzone 3 segment (Figure 35), which begins east of the Eielson Visitor Center and goes to the Wonder Lake campground. Results show west of the Eielson Visitor Center with the greatest concentration of

very high potential need areas. Most of this segment ranges from very low to medium potential need areas until farther west near Wonder Lake. Wonder Lake campground consists of up to 10 input layers from three goal areas.

Figure 35. Wildlife Viewing Subzone 3 Potential Need Areas

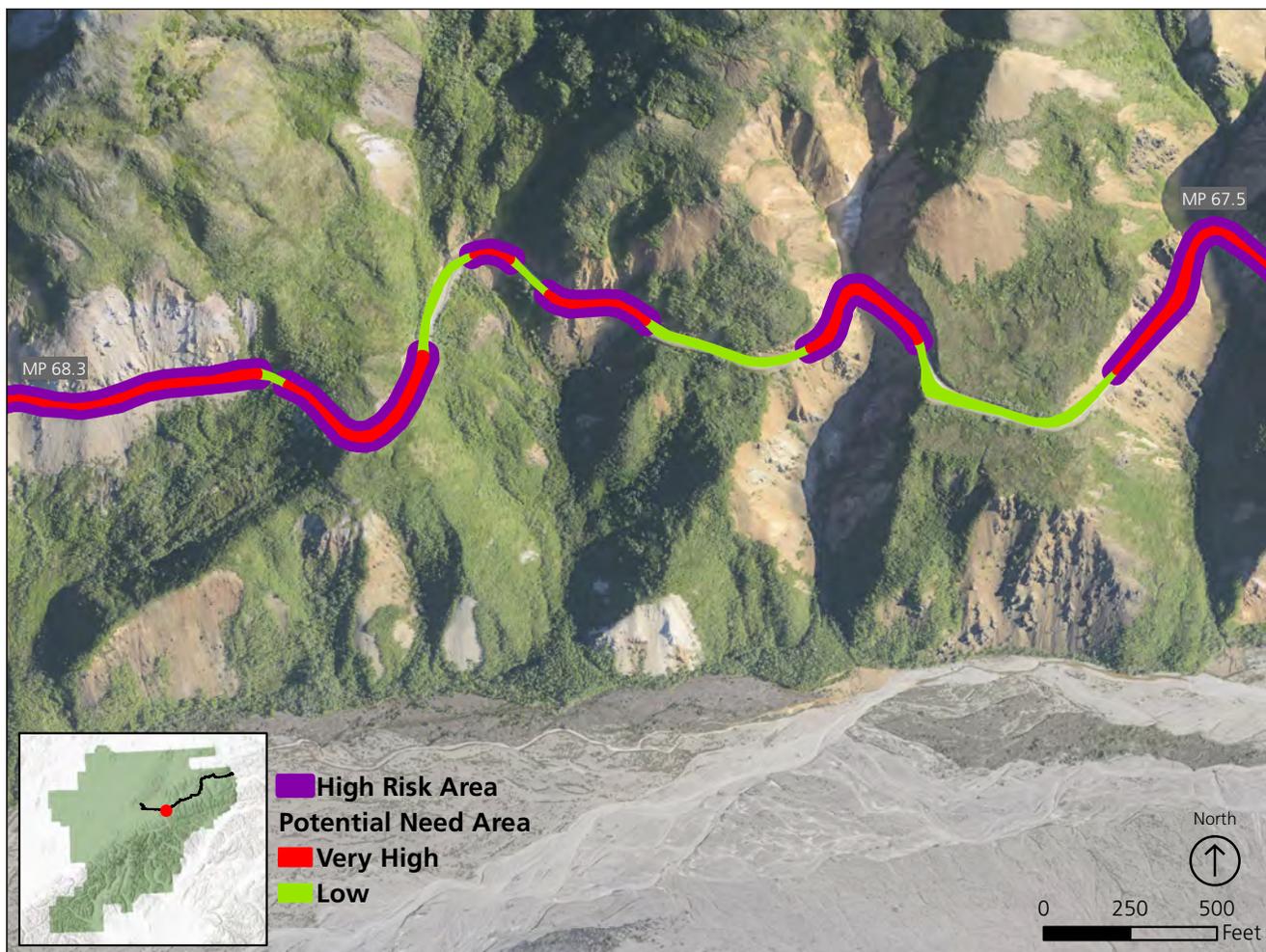


A particularly high-risk area is located within Wildlife Viewing Subzone 3, milepost 67.5 to milepost 68.3, as shown in Figure 36. Risk determinations resulted from a 2016 NPS and FHWA workshop conducted to determine risk assessment levels for Denali. The purpose was to identify risk types and areas to mitigate risk and provide recommendations to park management. There were a total of 28 identified risk types that were prioritized from low to high. Because of the importance of understanding where risk occurs and to mitigate future events, this information was included as spatial data into the PaTINA analysis. Only the high-risk category was added to the analysis due to the significance of these risks on Denali’s resources, visitors, and staff. In total, there

were eight high-risk types identified, only three of which could be used in the PaTINA due to data limitations. These data are: inholder access, culverts, and unstable slopes.

Figure 36 shows the very high potential need areas of the PaTINA process with an overlay of the Risk Assessment workshop’s identified highest risks. The correlation between “High Risk Areas” and “Very High” potential need areas is explained by the inclusion of geohazard data in both the climate change analysis—to determine potential need areas—and high risk area analysis. This data overlay highlights locations that may be considered for financial investment.

Figure 36. High Risk Areas in Wildlife Viewing Subzone 3



### Wildlife Subzone 2b and Special Use Zone (milepost 84.6 to milepost 87.8)

The wildlife viewing subzone 2b starts at milepost 84.6 to milepost 92.0, and it is the farthest west of all road segments (Figure 37). In this area there are

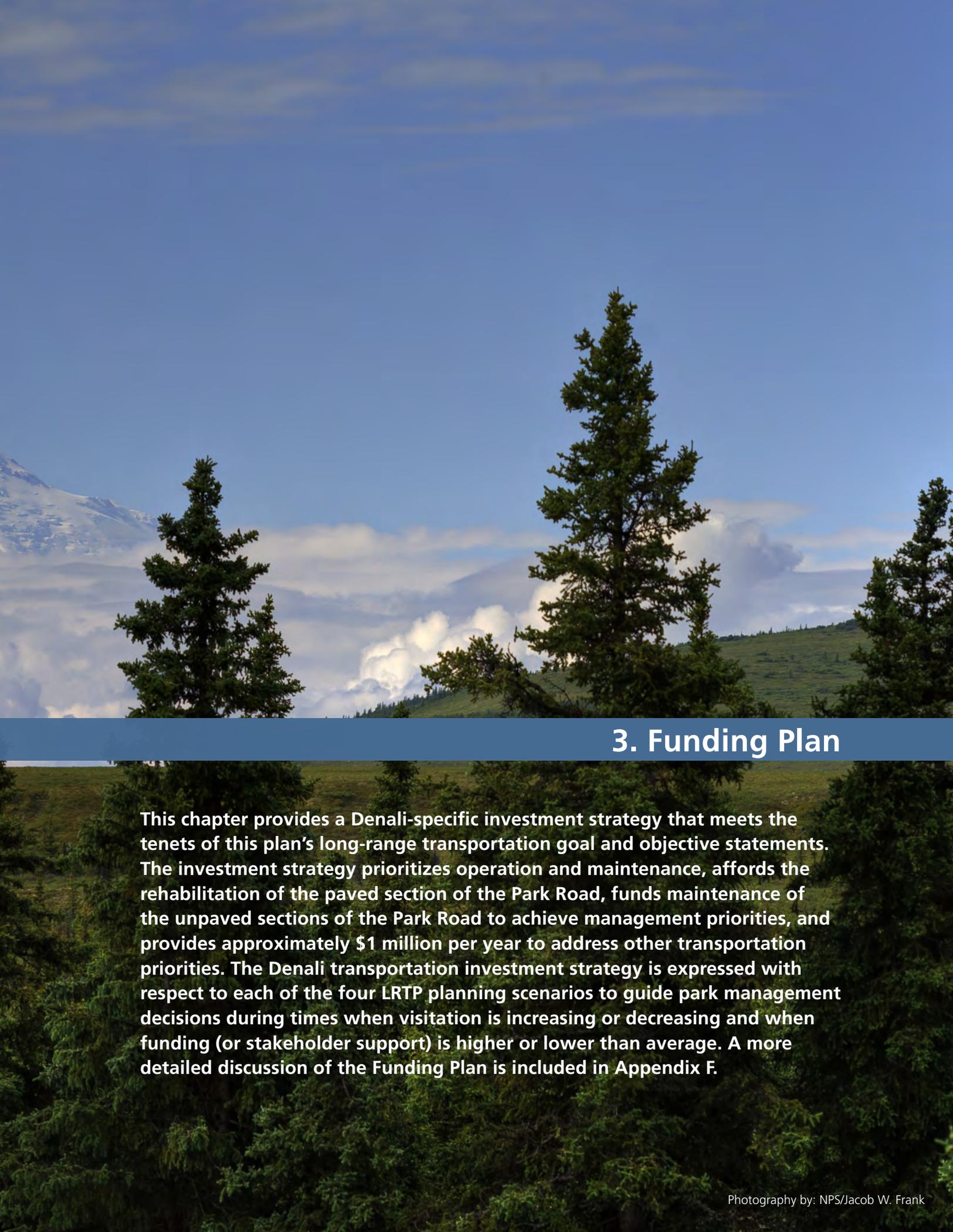
potential needs identified west of Kantishna with the highest need areas to the north of Wonder Lake.

Figure 37. Wildlife Viewing Subzone 2b Potential Need Areas









## 3. Funding Plan

**This chapter provides a Denali-specific investment strategy that meets the tenets of this plan’s long-range transportation goal and objective statements. The investment strategy prioritizes operation and maintenance, affords the rehabilitation of the paved section of the Park Road, funds maintenance of the unpaved sections of the Park Road to achieve management priorities, and provides approximately \$1 million per year to address other transportation priorities. The Denali transportation investment strategy is expressed with respect to each of the four LRTP planning scenarios to guide park management decisions during times when visitation is increasing or decreasing and when funding (or stakeholder support) is higher or lower than average. A more detailed discussion of the Funding Plan is included in Appendix F.**

This funding plan chapter includes a retrospective of transportation funding from 2006 through 2013, transportation funding projections for the plan's 20-year planning horizon, and a summation of the resources required to achieve ideal conditions for the Denali transportation facilities.

*The amount of funding that is needed for transportation at Denali exceeds the amount that will be available in coming years.*

This plan's investment strategy emphasizes the highest priority needs. Funding shortfalls mean that

the condition of all transportation assets cannot be improved, but progress can be made toward addressing the park's highest priorities.

The funding plan chapter builds from Denali's cornerstone transportation document and the transportation investment principles contained within the VMP, as well as findings from Chapter 2, Baseline Conditions. The chapter also communicates Denali's place in the Alaska Region transportation funding scheme and the expected increase in funding needs due to climate change impacts.



## 3.1 Funding Denali Transportation Facilities

As a best practice and formal policy, the NPS incorporates strategic facility planning into its asset management decision-making processes, including those set forth in this and other LRTPs. The CIS and TCFO are two fundamental strategic facility planning concepts of Denali LRTP investment planning and decision making.

### 3.1.1 The NPS Capital Investment Strategy

The CIS is an NPS strategy for prioritizing project investment to ensure effective and responsible project funding. The CIS includes a scoring framework that decision-makers at all levels of the NPS have available to them to inform project investments and other asset management needs.

The purpose of the CIS is to help prioritize investments, emphasize mission-critical assets, manage operations and maintenance, and ensure that the greatest beneficial impact can be made with available capital and operational funds. The CIS scoring tool evaluates projects on four different criteria, including financial sustainability, visitor experience, resource protection, and health and safety. The four criteria are weighted using a predefined and NPS-approved algorithm to arrive at an overall project score where the greater the score, the higher the priority. Scored projects can be compared with each other. The scoring strategy emphasizes maintenance of key assets and reducing the estimated value of their deferred maintenance.

The CIS also requires that the park maintain funds for operation and maintenance activities as related to its optimizer band (OB)-based management strategies. Minimum performance standards for bands are as follows:

- OB1 – 55 percent
- OB2 – 50 percent
- OB3 – 25 percent
- OB4 – No minimum
- OB5 – No minimum

Key objectives of the *Financial Sustainability* strategy are to build only what can be maintained, right-size the asset portfolio, reduce liabilities, reduce resource consumption, and eliminate non-essential development. The *Visitor Experience* strategy includes investment in assets or resources that enable recreation and serve as park gateways, contact stations, and interpretation channels. The *Resource Protection* strategy focuses on historic, cultural, and natural resources that the NPS is tasked with protecting and preserving. The *Health and Safety* strategy places an emphasis on correcting unsafe or hazardous conditions that pose a threat to visitors or staff. The types of projects supported by the CIS could include preservation, repair, and restoration of assets. Different parts of the Denali LRTP address these four strategies, which are used by program managers to allocate limited funding.

### 3.1.2 Total Cost of Facility Ownership

Applying the concept of TCFO is considered by the NPS to be a vital part of a financially sustainable infrastructure strategy and practice to truly address transportation asset management.<sup>1</sup> The concept aligns with the intent of the CIS, especially the CIS's Financial Sustainability component. TCFO describes the full life-cycle cost of planning, maintaining, and operating an asset until it needs complete replacement or disposition. This concept recognizes that assets require investment throughout their service lives until they need replacement or disposition and that preventive maintenance and facility operations activities are key to minimizing long-term costs and extending lifespans.

Implementation of the TCFO concept involves holistic planning, generating cost estimates, and making decisions that consider not just the deferred maintenance (DM) of an asset but also the ongoing

operation and maintenance need over its service life, the need for eventual replacement, and ultimately disposition of the asset.

Denali LRTP plan development embedded CIS and TCFO concepts into all of the analyses and then carried the concepts forward in the planning activities that were used to shape the plan. Therefore, the resulting investment strategy selected by Denali staff is consistent with the accepted approaches and practices used across the NPS (e.g., the National LRTP and other park or regional LRTPs).

<sup>1</sup> For example, reference "Memorandum: Guidance for Addressing Facilities in Planning Documents", Associate Director, Park Planning, Facilities, and Lands, National Park Service, US Department of the Interior, January 4, 2016.



## 3.2 Denali LRTP Funding Baseline

The Denali LRTP funding plan and investment strategy rely on a well-defined baseline of funding inputs and investment needs. This baseline not only provides understanding about the Denali needs and the ability of the park to fund those needs, but also serves as the basis on which long-term funding forecasts and investment scenarios are based.

### 3.2.1 Financial Analysis Inputs

The financial analysis methodology for the Denali LRTP is based on the data and methods developed for the NPS LRTP Program. This section will cover the basic approach used by Denali to adapt the financial analysis methodology to a park scale.

#### Historical Investments

Denali transportation investment from all funding sources combined averaged \$9.23 million per year between fiscal years 2006 and 2013. To develop this baseline for the LRTP, all of the funding sources that had been used for transportation investments at Denali from fiscal year 2006 through fiscal year 2013 were analyzed. Using financial data extracted from NPS financial and project management information systems (NPS Administrative Financial System and Park Roads and Parkways Transportation Allocation and Tracking System), the Denali LRTP financial analysis:

- Identifies historical expenditures, awards, and authorizations for transportation assets
- Adjusts prior-year dollar values to equivalent 2014 values using GDP inflation factors

- Removes data anomalies and one-time extraordinary funding (e.g., American Recovery and Reinvestment Act)
- Adds data attributes related to funding authorizations, funding programs, and asset types
- Calculates an annualized average transportation funding expenditure rate for fiscal years 2006 to 2013
- Excludes transportation investments by third parties such as the Alaska Railroad, bus concessioners, Denali Borough, and the Alaska Department of Transportation and Public Facilities

A more detailed technical summary is included with the National LRTP and generally is applicable to the Denali LRTP.

#### Forecasted Transportation Funding

Financial forecasts developed as part of this plan conclude that approximately \$7.75 million per year will be available to Denali for transportation purposes over the next six years. The forecast of available funding provides the principal financial constraint for future investment plans and represents the result of the most likely funding scenario for each funding source that Denali has used recently for transportation. The Denali financial forecast follows the methodology applied in the NPS National LRTP. Accordingly, the NPS Budget Office and regional funding programs are the main sources of information used to develop the financial forecasts. The forecasts do not project any future grant awards due to changes in eligible programs (e.g., elimination

of the Paul S. Sarbanes Transit in the Parks Program). Similarly, the forecast does not include work done by other parties, such as the State of Alaska or Denali Borough, which may benefit Denali. It also does not include any unforeseen additional funding that may result in a “Popular Park” scenario (increased funding and support with an increase in visitation) or “Surplus of Money” scenario (increased funding and support with a decrease in visitation) when compared to the historical average. For the purposes of the investment strategy in this plan, the funding forecast is considered to be at the center of “Management Strategies of No Regret”—those actions that make sense given a normal variation in expected support, funding, and visitation levels.

The Denali LRTP financial forecast concludes that funding for Denali is expected to decline unless additional funding sources are found, through partnerships or otherwise, or funds are redirected from other critical areas. The declining funding environment coupled with historically high visitation may result in a “Losing Ground” scenario (decreased funding and support with an increase in visitation) when compared with historical averages. These conditions are not dissimilar from recent years (e.g., 2013 through 2015).

A more detailed description of the Denali financial analysis methodology is provided in Appendix F.

### **Transportation Investment Needs**

The financial analysis estimates \$12.42 million is needed annually to keep the Denali transportation system in good condition considering remaining transportation asset life. At this level, the estimated annual transportation investment needs exceed the annual transportation funding amount by \$4.67 million per year (or in other words, projected funding will only cover about 62 percent of the projected annual need). Furthermore, transportation

investment needs are TCFO-focused, and while they may coincidentally benefit other long-range goals, the system optimization goal is the primary concern of the transportation investment needs analysis.

The transportation investment needs analysis follows the methodology applied in the NPS National LRTP, but is adapted to the park scale and the unique needs data available at Denali. The investment needs methodology pulls data from a variety of sources that best capture an investment need such as trail maintenance or aviation construction.

The total \$12.42 million in annual need covers all transportation assets at Denali throughout their lifecycle from planning through construction, operation, maintenance, and rehabilitation. Because not enough funding has been available in past years to keep up with maintenance needs, a significant amount of maintenance has been deferred. Addressing this \$21 million backlog is incorporated in the annual needs figure. However, it should be noted that because of Denali’s nature as a predominately seasonal and remote NPS unit, it is likely that the park would not be able to complete \$12.42 million of improvements per year. Any major increases in investment must be paired with efforts to ensure that staff capacity, worker housing and transportation, and visitor and resource impacts of construction work are considered.

### **3.2.2 Transportation Funding**

This section discusses the current and near future transportation funding outlook for Denali. It covers where funds have come from and how they have been used in terms of what type of transportation facility was funded, what type of work was funded, and how transportation funding is prioritized.

## Investments by Funding Source

From 2006 to 2013, the NPS used more than 60 different funding programs and accounts to fund transportation activities, but only 10 programs funded investments at Denali. Table 18 shows how much money each funding program provided to Denali in the past, how much it is expected to provide in the future, and how much would be needed from each funding program to cover Denali's total transportation need each year if past investment patterns were continued.

Each of the funding programs noted in Table 18 have different legislative authorization and project eligibility criteria. Title 54 programs are those

authorized by Title 54 of the U.S. Code (National Park Service-specific programs). Title 16 includes other relevant DOI programs (i.e., Recreation Fee Program). Title 23 includes programs overseen by the FHWA, and the "Other/External" category includes other funding sources, such as the discontinued TRIP program, as well as reimbursable agreements, donations, partnerships, and other less-common sources.

The Title 23 Federal Lands Transportation Program (FLTP) is the single largest source of transportation funding for the NPS and other federal land management agencies. Denali has been the largest recipient of FLTP funding in Alaska historically, in part because 20 of the Region's 27 miles of paved

Table 18. Denali Transportation Investments and Needs by Funding Source (in millions of 2014 dollars)

Investments by Funding Source	Historical Average Annual Investment	Forecasted Annual Average Investment	Estimated Annual Needs
<b>Title 54 Non-Fee</b>	<b>\$1.75</b>	<b>\$1.01</b>	<b>\$3.35</b>
Cyclic Maintenance	\$0.63	\$0.04	\$0.01
Line Item Construction	\$0.34	\$0.32	\$0.07
Operational Base	\$0.64	\$0.55	\$2.70
Other NPS Programs	\$0.07	\$0.07	\$0.19
Repair/Rehab	\$0.07	\$0.02	\$0.39
<b>Title 54 / Title 16 Fee</b>	<b>\$1.34</b>	<b>\$2.11</b>	<b>\$2.61</b>
Concessions Franchise Fees	\$0.67	\$1.44	\$0.51
Recreation Fee	\$0.67	\$0.67	\$2.10
<b>Title 23</b>	<b>\$6.01</b>	<b>\$4.62</b>	<b>\$5.86</b>
FLTP	\$6.01	\$4.62	\$5.86
<b>Other/External</b>	<b>\$0.14</b>	<b>\$0.01</b>	<b>\$0.60</b>
FTA TRIP/ATPPL	\$0.12	—	—
Reimbursable Agreements	\$0.01	\$0.01	\$0.60
<b>Grand Total</b>	<b>\$9.23</b>	<b>\$7.75</b>	<b>\$12.42</b>

roads are within the park. Maintenance of the unpaved Park Road also may be funded by FLTP. NPS regional staff indicate that Denali has in the past received all funding from the program by default, unless another NPS Alaska Region park has eligible needs (which is rare), at which point that project moves to the top priority of the regional FLTP program. This means that FLTP will likely be a sustainable funding source for major investments at Denali into the future. The next three years of FLTP investment at Denali will be used primarily to rehabilitate the 15-mile paved section of the Park Road, from the park entrance to the Savage River checkpoint.

### Investments by Facility Type

Denali maintains a diverse system of transportation facilities, including roads, bridges, parking areas, transportation trails, transit facilities, developed airstrips, and support infrastructure, such as a gravel quarry. Table 19 shows historical investments, forecasted investments, and the estimated annual investment needs for each of the Denali’s transportation facility types.

Of all historical Denali investments in transportation, about 55 percent went to the Park Road and associated structures, and 18 percent supported park-wide operations that include the Park Road.

Less than a third of transportation investment was used for separate transportation facilities, such as trails and access roads. Traditionally, Park Road funding focused on unpaved segments, which require frequent repairs to remain in even fair condition in light of extreme weather conditions and heavy vehicles.

### Investments by Asset Lifecycle Stage

As discussed in the TCFO section above, different types of work are needed at different points in a transportation facility’s lifespan, from planning through to rehabilitation or disposition. Table 20 shows historical and forecasted annual investments, as well as estimated annual investment needs for each lifecycle stage, for all asset types combined.

Denali’s greatest area of transportation investment need is in heavy repair and rehabilitation work or potential realignment. Insufficient funding often leads to smaller, routine maintenance work being deferred, which causes transportation facilities to fall out of a state of good repair. This discrepancy is illustrated in the differences between historical and forecasted investments and the estimated annual investment needs. Historic and forecasted investments range from \$7.75 million to \$9.23 million, while annual needs are estimated at \$12.42 million. Significant needs at the park include

Table 19. Denali Transportation Investments and Needs by Asset Type (in millions of 2014 dollars)

Asset Type	Historical Average Annual Investment	Forecasted Average Annual Investment	Estimated Annual Needs
Unpaved Roads	\$3.86	\$2.35	\$5.27
Road Bridges	\$1.84	\$0.42	\$1.35
Trails and Transit	\$1.47	\$0.66	\$1.37
Paved Roads	\$1.44	\$2.91	\$2.97
Other*	\$0.51	\$0.53	\$0.66
Parking	\$0.11	\$0.89	\$0.81
<b>Grand Total</b>	<b>\$9.23</b>	<b>\$7.75</b>	<b>\$12.42</b>

\*Other category includes aviation, buildings that support transportation, equipment, and multimodal facilities. Trails and Transit notably excludes investments and operation and maintenance spending made by the transit contractors who operate within Denali, but does include Denali’s own investment in bus transit facilities such as buildings, parking lots, and experimental hybrid buses.

annual operation and maintenance of transportation facilities, making improvements to culverts to improve fish passage, and building aviation facilities.

### Investments by Asset Priority

Each future investment need at Denali is associated with an asset or project priority. Denali differs from other parks and the NPS as a whole due to the lack of transportation assets in Optimizer Band 1. This reserves funding for the activities and assets that support resource protection, science, and other areas before transportation and broader visitor use. This decision reflects Denali’s unique intact ecosystems and reinforces the goals set out in the Denali Foundation Statement.

For the purposes of this plan, fully funding routine transportation operations and maintenance and keeping the paved Denali Park Road in a good state of repair are considered to be the highest priority transportation needs as recommended in the Denali Investment Strategy. After the highest priority, other needs associated with Optimizer Band 2 transportation assets are considered to be high priority, and other needs associated with Optimizer Bands 3 through 5 are “other priority.” The amount of annual need associated with the three priority groups is shown below in Table 21.

Denali is able to cover its highest priority transportation needs without drawing funds away from other critical activities. The \$7.75 million

Table 20. Average Annual Investments by Lifecycle Stage (in millions of 2014 dollars)

Lifecycle Stage	Historical Average Annual Investment	Forecasted Average Annual Investment	Estimated Annual Needs
Planning and Administration*	\$0.58	\$0.57	Not quantified
Capital Investment	\$1.34	\$2.59	\$1.30
Operation and Preventive Maintenance	\$0.45	\$0.48	\$1.86
Recurring Maintenance	\$1.42	\$0.83	\$3.74
Component Renewal	\$5.27	\$2.59	\$5.08
<b>Grand Total</b>	<b>\$9.23</b>	<b>\$7.75</b>	<b>\$12.42</b>

*\*Routine planning and administration needs are not included in NPS facilities management data systems, but can be assumed to continue at historical levels. Additional unquantified planning needs are likely in the LRTP’s horizon, including work in the park’s entrance area, coordination with private shuttle services and the Alaska Railroad, and transportation planning to maintain park operations in the face of climate change impacts.*

Table 21. Estimated Annual Needs by Priority

Priority	Estimated Annual Transportation Needs	Optimizer Band Equivalent
<b>Highest Priority</b>	\$4.8 million	Operation and maintenance and paved Park Road repair
<b>High Priority</b>	\$6.0 million	Work associated with Band 2 assets
<b>Other Priority</b>	\$1.7 million	Work associated with Bands 3, 4, 5 assets

per year in forecasted transportation funding is enough to cover all of the highest priority needs as recommended in the Denali Investment Strategy. Approximately 72 percent of the combined highest and high priority transportation needs can be covered with forecasted funding. However, there are still high priority transportation needs that will remain unmet unless additional funding is found, and no lower banded asset would be funded if priority is the only factor used to prioritize projects. This means that maintenance for some assets will continue to be deferred, and making improvements to meet emerging challenges will come at the expense of other transportation projects at Denali.

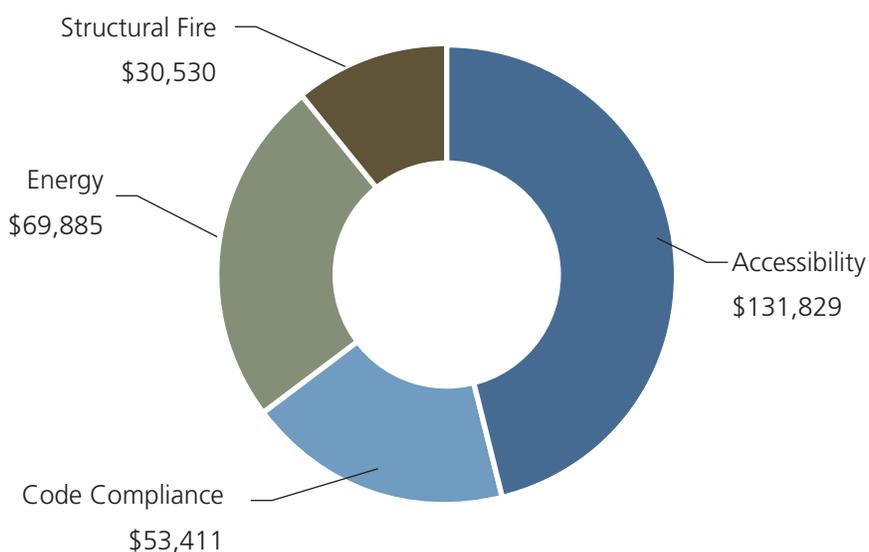
### Programmatic Needs

Some of the lifecycle stage needs noted in Table 20 also are considered programmatic needs for Denali transportation facilities. Programmatic needs include work necessary to meet standards set by safety, accessibility, environmental, and fire safety requirements. Programmatic needs generally are analogous to code compliance work that would

be the responsibility of a facilities manager or an architect hired by a private business.

Figure 38 summarizes estimated programmatic needs for the Denali transportation asset portfolio, which total less than \$300,000. Transportation facilities can include structures that have a primary use for transportation, such as a hangar or roadway maintenance garage, in addition to traditional transportation assets (e.g., roads, bridges, etc.). Transportation facilities generally have relatively small programmatic needs compared to facilities such as visitor centers, housing, and offices. Although not broken out in the historical and forecast data, transportation projects are included in FMSS as needs. Denali’s programmatic needs are included in the \$12.42 million per year transportation needs as capital investment or component renewal needs cited in the Transportation Investment Needs section above. These needs are classified as capital investment if plans are to proactively address them as individual projects, or as component renewal when addressed through a rehabilitation project that focuses on a facility with a low condition rating.

Figure 38. Denali Transportation Programmatic Needs\*



\* Transportation Programmatic Needs are comprised of all assets that have a primary transportation purpose including structures (e.g., hangars, maintenance facilities, material storage, etc.)

## 3.3 Investment Strategies

The Denali LRTP investment strategy is a combination of the plan’s long-range goals and objectives, already formulated projects, and other transportation-related needs, including considerations for funding constraints. This section briefly describes the process used to identify several potential investment strategies. A detailed description of the investment strategy methodology is provided in Appendix F. Discussions also include the rationale for selecting the preferred investment strategy, called the “Denali LRTP Investment Strategy.” The LRTP investment strategy section also includes alternatives that Denali management may consider if future funding or visitation deviates significantly from the LRTP financial forecast.

### 3.3.1 Strategy Development

Because transportation needs exceed the forecasted \$7.75 million of annual transportation funding available and because moving funds from other purposes deprives those projects of needed funding, all investment strategies shift funds from one set of priorities to another. The “operation and maintenance” strategy focuses on annual operations and preventive maintenance at the expense of larger repair projects.

Workshops with NPS stakeholders and partners were used to identify candidate strategies and to select the Denali LRTP Investment Strategy. Internal NPS stakeholders included Denali staff, Alaska Region staff, and Washington Support Office (WASO). Partner input included expertise from FHWA Western Federal Lands Highway Division and USDOT Volpe Center staff familiar with the NPS

LRTP financial planning process. Potential candidate strategies were developed in accordance with CIS and TCFO policies, best practices, and historic investment patterns. The entirety of investment strategies developed and evaluated are discussed in detail in the appendix.

### Unpaved Denali Park Road Analysis

Investment strategies evaluated for the LRTP tested whether transportation funds allocated to the unpaved portion of the Park Road in a “business as usual” strategy approach could be shifted to other purposes. Five options for unpaved road condition targets that could be modeled to estimate costs of different sets of conditions were developed. Table 22 summarizes the six sets of condition targets. The “Plan A” and “Plan B” strategies in Table 22 were not achievable given projected funding levels and established higher priorities.

None of the unpaved Park Road condition targets could be met if Denali was to reserve \$1 million per year for making improvements elsewhere in the park. Even without reserving \$1 million per year, projected funding is insufficient to meet the good to fair conditions proposed under Table 22 “Plan A” and “Plan B” for the unpaved Park Road without scaling back commitments to operations and maintenance, planned repaving of the paved sections of the Park Road, and all other Denali transportation facilities. Nevertheless, additional funding could make “Plan A” and “Plan B” possible. About \$1.3 million more per year in transportation funding would allow for “Plan A” to be achieved and \$0.7 million more per year would allow “Plan B” to be achieved.

Table 22. Unpaved Park Road Conditions

Strategy	Goals	Annual Cost (millions)	Achievable?
<b>Plan A</b>	Maintain all Park Road segments in good condition.	\$4.3	No
<b>Plan B</b>	Maintain all Park Road segments in fair condition.	\$3.7	No
<b>Plan C</b>	Set Park Road conditions from segment to segment, recognizing that some segments are costlier to maintain in good condition than others.	\$2.9	Yes
<b>Plan D</b>	Follow the VMP’s “telescoping” approach by keeping conditions good in the first part of the road, fair in the middle part, and poor at the western end.	\$2.5	Yes
<b>Plan E</b>	Follow the VMP’s “telescoping” approach by keeping conditions good to fair in the first and middle parts of the road and poor at the western end.	\$2.7	Yes
<b>Plan F</b>	Follow the VMP “telescoping” approach as in Plan E, but with further lowered condition targets for two of the most expensive areas: MP 43-47 and MP 88-92.	\$2.0	Yes

“Plan F” was ultimately selected by park management as the condition target for the Denali LRTP. This option reduces condition targets for two sections, which are particularly challenging and expensive to maintain. Under this plan, Polychrome Pass would be improved slightly (but nonetheless remain in poor condition) while the last segment of the Park Road would be allowed to decline to further poor condition. These two changes free about \$0.6 million per year for use elsewhere on the road and in Denali. More information about these two segments is provided in Appendix F of this LRTP.

### Denali LRTP Investment Strategy

The Denali LRTP Investment Strategy put forth in this LRTP reflects refinements in the strategy results described in the Strategy Development section above, and further honed to include policy options for the unpaved Park Road. The Denali LRTP Investment Strategy reflects the best fiscally constrained option for meeting the long-range transportation goals and objectives of the plan. This strategy would invest Denali’s forecasted

\$7.75 million per year in four categories, as shown in Table 23 and Figure 39.

The Denali LRTP Investment Strategy strikes a balance between several different transportation priorities and aligns with the “Management Actions of No Regret” described in Section 6.1. The strategy proposes to fully fund operations and maintenance needs to slow the decline of facilities and ensure a better visitor experience. It continues planned investments on the paved section of the Park Road to achieve a good condition rating, and continues to make funding available to address deferred maintenance on the unpaved sections of the road. However, the strategy sets lower condition targets for unpaved sections of the Park Road, which are farther west into the park and less traveled by visitors. This allows the park to reserve funding for other segments of the Park Road, and for entrance area transportation facilities (e.g., aviation, parking areas, emerging priorities). This approach is consistent with the Vehicle Management Plan, which envisions lower traffic volumes and a more rustic experience the farther the road extends from the park entrance area.

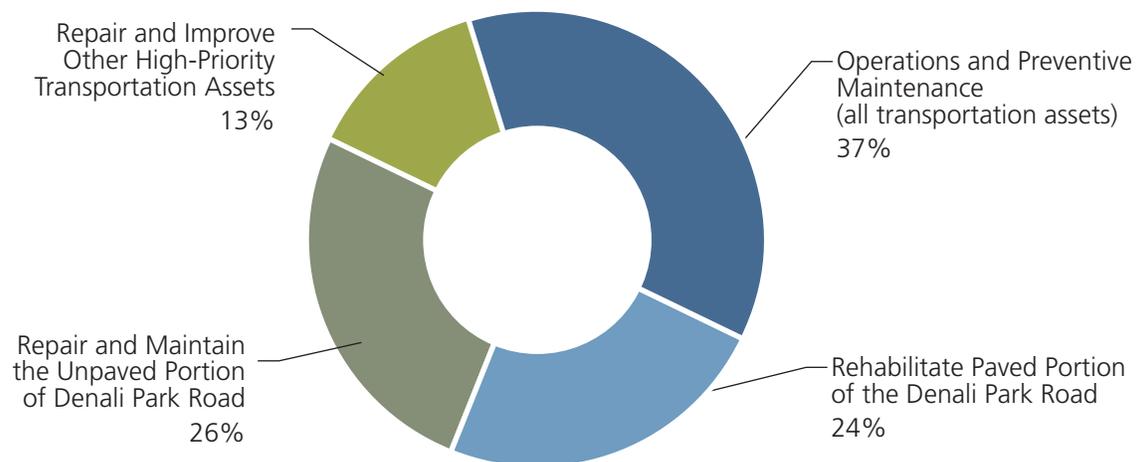
Table 23. Denali LRTP Investment Strategy

Category	Estimated Share of Annual Funds	Estimated Annual Investment (millions)	Percentage of Needs Met
Operations and Preventive Maintenance (all transportation assets)	37%	\$2.9	100%
Rehabilitate Paved Portion of the Denali Park Road	24%	\$1.9	100%
Repair and Maintain the Unpaved Portion of the Denali Park Road	26%	\$2.0	46%
Repair and Improve Other High-Priority Transportation Assets	13%	\$1.0	24%
<b>Totals</b>	<b>100%</b>	<b>\$7.8</b>	<b>63%</b>

Ultimately, because funding needs exceed available resources, the condition of transportation facilities at Denali is expected to decline overall even under the Denali LRTP Investment Strategy. FCI ratings across the Denali transportation system today are modeled at 0.148, or the low end of fair condition.

Continued scarce funding for transportation will reduce conditions to 0.185 by 2021 . However, higher-priority transportation facilities are expected to remain in fair condition overall.

Figure 39. Denali LRTP Investment Strategy







# 4. Project Selection



Denali prioritizes and selects transportation projects in a manner that is consistent with the 2012 Alaska Region LRTP, as well as the project prioritization tenets outlined in the NPS National LRTP. The Denali LRTP formalizes and improves upon the park's previous transportation project selection process by aligning project evaluation criteria around the four key elements noted below. The project selection process guarantees that transportation projects seeking funding are documented to show

their benefit to Denali through their furthering of LRTP goals, adherence to this LRTP's financial strategy, response to identified risk, impact on operations and maintenance, and support of productive partnerships. Consideration of these four key elements is ensured through the use of a Denali project selection criteria checklist, available in Appendix G of this LRTP.

**1. Denali Long Range Transportation Plan** – a project generally adheres to the following:

- National Long Range Transportation Plan's Goals and Objectives
- Alaska Regional Long Range Transportation Plan's Goals and Objectives
- Denali Long Range Transportation Plan's "actions of no regret"

**2. Financial Strategy** – a project meets the following:

- Has an optimizer band value, 1 through 5
- Consistent asset investment based on scenario quadrant position
- Consistent with proportionate investment within road management zones
- Consistent with one or more of the following: operations and maintenance, rehabilitated paved road, repair and maintain the unpaved road, repair and improve other high-priority transportation assets

**3. Risk Priority** – a project generally addresses the following:

- Current high priority risks based on documented assessment of unstable slopes, river and stream flooding, permafrost subsidence, culvert operations and maintenance, gravel production, processing, or purchase
- Relevance or proximity to mapped hot spots

**4. Operations and Maintenance** – this is a new investment that offsets operations and maintenance costs, a replaced investment that offsets operations and maintenance costs, or an eliminated investment that offsets operations and maintenance costs







## 5. Performance Management

Denali transportation performance measures are rooted in the LRTP's goals and objectives. Performance measures embody elements set in the NPS National LRTP, but are adapted and expanded upon to reflect the park-specific needs of Denali. Performance management ensures that progress in fulfilling long-range goals is tracked through performance measures and implementation actions (Chapter 6) that respond to the needs and gaps identified for each long-range goal. Table 24 documents Denali transportation performance measures, targets, and existing conditions for each long-range goal and objective. In some cases, where data are not currently available to measure performance, a baseline will be determined following formal acceptance of this LRTP. Annual review and periodic reporting of conditions in relation to 2022 performance targets will take place.

Table 24. Denali Long-Range Transportation Performance Measures

Long-Range Transportation Goals and Objectives	Performance Measure	2022 Performance Target	Existing/Baseline Condition
 <b>Resource Protection:</b> <i>Understand and protect Denali’s fundamental park resources and values as they relate to the transportation system.</i>			
<b>Monitor Resources:</b> <i>Identify and maintain critical monitoring for park resources affected by transportation.</i>	Number of vehicles at a wildlife stop	VMP standard, 75/90/95 percent success rate	2016 VMP standard met
	Sheep gap spacing	VMP standard, 90/95 percent success rate	2016 VMP standard not met
	Nighttime traffic	VMP standard, 95 percent success rate	2016 VMP standard met
	Natural Sound Disturbance	2006 Backcountry Management Plan standards for each management area	Standard not met
<b>Collaborate:</b> <i>Collect and disseminate transportation-related resource information.</i>	PaTINA is updated and accessible to contributors and users	PaTINA is updated and accessible to contributors and users	PaTINA is updated and accessible to contributors and users
 <b>Climate Change:</b> <i>Plan for climate change impacts to the park’s transportation system.</i>			
<b>Adaptation and Mitigation:</b> <i>Recognize the impacts of global climate change on the park’s resources and minimize the park’s transportation systems emissions.</i>	Complete Asset Vulnerability Assessment	Complete Asset Vulnerability Assessment	Denali Park Road Risk Assessment Utilizing the Unstable Slope Management Program Completed
<b>Communication:</b> <i>Support climate change research to inform transportation system management and provide scientific information as a basis for interpretive messaging to park users.</i>	Complete Climate Friendly Parks Plan (per Green Parks Plan initiatives)	Complete Climate Friendly Parks Plan	Complete Climate Friendly Parks Plan not yet completed

Table 24. Denali Long-Range Transportation Performance Measures (continued)

Long-Range Transportation Goals and Objectives	Performance Measure	2022 Performance Target	Existing/Baseline Condition
 <b>User Experience:</b> <i>Provide a quality, multimodal park experience for users.</i>			
<b>User Data:</b> <i>Manage the user experience through information and education.</i>	Apply results from original 2016 Collaborative Visitor Transportation Survey (CVTS) to improve experience by completing survey again at Denali to show improvement to CVTS baseline	Results from original CVTS have been applied to improve experience by completing survey again at Denali to show improvement to CVTS baseline	Has not been completed
	Reduce visitor confusion about the park's transportation system (i.e., Entrance area circulation plan)	Reduced confusion as reported in visitor experience surveys	Improvement needed
	Denali website provides all nine elements of essential traveler information	All nine elements are represented on the website	Parking lot, congestion, and alternative fuel information is missing
<b>Multimodal Transportation:</b> <i>Provide appropriate, effective, and efficient multimodal opportunities.</i>	Number of vehicles in a viewscape	VMP standard, 80/90/95 percent success rate	2016 VMP standard met
	Hiker waiting time	VMP's standard met	2016 VMP standard met

Table 24. Denali Long-Range Transportation Performance Measures (continued)

Long-Range Transportation Goals and Objectives	Performance Measure	2022 Performance Target	Existing/Baseline Condition
 <b>Access:</b> Provide safe, efficient, and appropriate park access.			
<b>Safety:</b> Provide safe access to and within Denali National Park and Preserve for all users.	Complete and update Unstable Slope Management Program and implement its recommendations	Complete and update Unstable Slope Management Program and implement its recommendations	Denali Park Road Risk Assessment Utilizing the Unstable Slope Management Program Completed
<b>Access:</b> Provide appropriate and efficient access for inspiration, education, research, recreation, and other uses as provided for in the ANILCA.	Complete Kantishna area master plan	Complete Kantishna area master plan	Not yet written
 <b>System Optimization:</b> Develop a long-term transportation system to appropriately satisfy current and future park needs.			
<b>Asset Management:</b> Maintain and manage all critical transportation assets for current and future conditions.	Segments of the unpaved Park Road that meet or exceed constrained condition targets	Segments 9 and 11	Segments 6 and 11
<b>Asset Investment Planning:</b> Strategically invest in transportation assets.	Complete asset vulnerability assessment	Complete asset vulnerability assessment	An asset vulnerability assessment has been completed
	Measure deviation from LRTP invest strategy (optimizer bands, CIS, etc.)	25 percent difference in project cost	Not yet available

Table 24. Denali Long-Range Transportation Performance Measures (continued)

Long-Range Transportation Goals and Objectives	Performance Measure	2022 Performance Target	Existing/Baseline Condition
 <b>Partnership:</b> <i>Maintain formal and informal partnerships to provide a viable transportation system.</i>			
<b>Commercial Partners:</b> <i>Manage formal commercial partnerships to provide essential transportation services.</i>	Complete community transit plan to determine what commercial partnerships may develop	Complete community transit plan to determine what commercial partnerships may develop	Not yet available
<b>Project Champions:</b> <i>Empower Project Champions to inform and educate the public on key issues that focus on both transportation and resources.</i>	Partner investment in transportation that benefits Denali	10 percent of Denali projects	Not yet available





## 6. Implementation

Whereas Chapter 5 outlines performance measures and targets that will guide and gauge progress in meeting long-range goals, this chapter presents the specific actions and management strategies that should be used to achieve long-term performance targets. Actions and management strategies are recommended for periods of particularly greater/lesser demand (represented by visitation) and more/less support (represented by level of funding) as expressed through scenarios as well as implementation actions which should be addressed regardless of visitation and funding levels.

## 6.1 Scenarios

This LRTP relies on a scenario planning approach because Denali management is influenced by factors it cannot control outright (i.e., funding amounts and visitation levels), as well as the long-range (20-year planning horizon) nature of this plan. The scenario process uses a series of workshops to determine positive and negative characteristics of funding and support-based scenarios. The approach follows the successful scenario building process documented in *Climate Change Scenario Planning for Central Alaska Parks* (Natural Resource Report NPS/AKSP/NRR–2014/829). Scenario drivers for the Denali LRTP are “support” and “demand.” “Support” describes the degree to which Denali receives funding and stakeholder backing (e.g., ADOT&PF, local communities, USDOT, DOI, WASO, etc.). “Demand” describes the number of users arriving at Denali, as well as the level of interest in the park by commercial entities. The scenario quadrants were identified according to their temporal characteristics and conditions: higher demand but lower support (“Losing Ground”), lower demand and lower support (“Turn Out the Lights”), higher demand and higher support (“Popular park”), and lower demand and higher support (“Surplus of Money”). Figure 40 shows the scenario drivers and quadrants.

### 6.1.1 Management Actions of No Regret

A key outcome of the Denali scenario planning process is “Management Actions of No Regret”—or actions that should occur regardless of support and funding levels. Shown in Figure 42, these

management actions are always prudent, even if the factors influencing park scenarios (demand and support) are extreme. For example, Management Action of No Regret #14, “celebrate reduced carbon footprint and be creative in making low-carbon, low-cost transportation opportunities for park users,” is a reasonable action regardless of whether funding and/or visitation is high or low. Management Actions of No Regret were devised through planning workshops conducted over the course of the long-range plan’s development. Actions may or will transcend scenario quadrants, and Park Management should apply as deemed prudent in whatever scenario the park finds itself in at the time of making decisions. Management Actions of No Regret are listed by goal area in Figure 41.

Figure 40. Scenario Drivers and Quadrants

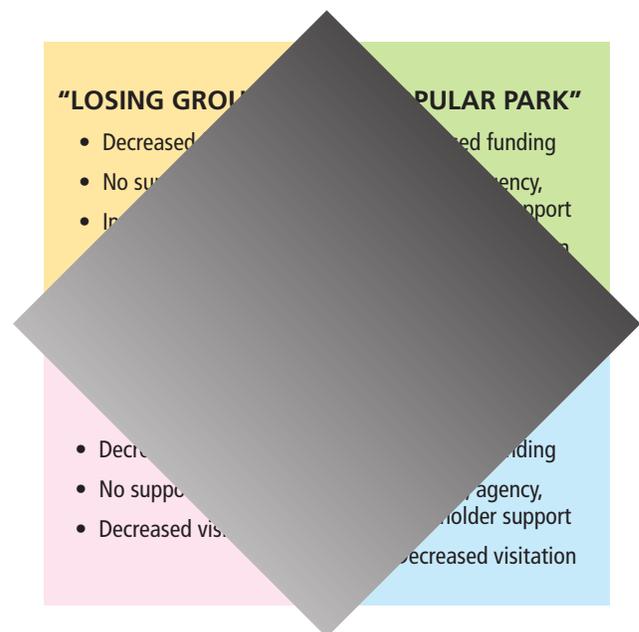
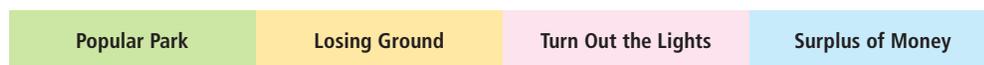


Figure 41. Management Actions of No Regret



### Resource Protection

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- 1. Expand monitoring and data collection for emerging resource issues.
- 2. Collaborate with partners to provide greater understanding of the relationship between park resources and transportation services.
- 3. Retain access to continue baseline monitoring for fundamental park resources.
- 4. Identify and document impacts incurred during this period so as to be mitigated/restored when funding is available.
- 5. Close access to protect resources when needed, while educating park users on why this is happening.
- 6. Use sustainable research methods (appropriate cost, technologies, and staffing) to maintain baseline monitoring (social media/citizen science).
- 7. Advance any efforts ahead of schedule on performance measures related to monitoring for park resources.
- 8. Support and participate in emerging resource issues that affect transportation.

### Climate Change

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- 9. Establish framework for research on climate change that will allow for data collection by Park Champions.
- 10. Educate visitors about climate change from the standpoint of thinking globally and acting locally, including the use of mass transit in the face of increased emission and carbon footprint.
- 11. Be creative in using citizen science and Park Partners in maintaining research on climate change that will allow for data collection by Park Champions.
- 12. Remain cautious of technological experimentation (through pressure from outside entities); manage messaging on low-carbon activities.
- 13. Encourage outside-the-box park management strategies. Encourage diverse and dispersed park experiences (e.g., using non-motorized modes of transportation).
- 14. Celebrate reduced carbon footprint and be creative in making low-carbon, low-cost transportation opportunities for park users.
- 15. Explore and implement new transportation technologies that reduce emissions related to park operations and visitation.
- 16. Eliminate inefficient and ineffective transportation assets to reduce influences on climate change.
- 17. Establish framework for monitoring soils, vegetation, and other resources in the park that serve as the indicators of climate change.

Figure 41. Management Actions of No Regret (continued)

Popular Park	Losing Ground	Turn Out the Lights	Surplus of Money
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### User Experience

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- 18. Conduct visitor/user research and develop understanding of the different visitor/user groups and their transportation needs. Create a community-focused transportation system.
- 19. Increase opportunities for staff contact with visitors and stakeholder groups to share information and provide education.
- 20. Consider non-traditional transportation methods for minimizing impacts to visitor/users from reduced agency operations.
- 21. Manage for user expectations for providing core transportation services (e.g., with messaging about limited services or new creative and yet-to-be-determined opportunities).
- 22. Frame multimodal opportunities such that simple and inexpensive forms of transportation remain open and are communicated to visitors. Maintain only essential services.
- 23. Provide essential transportation information and education through low-cost methods.
- 24. Explore new methods for sharing Denali information.
- 25. Invest in targeted educational outreach and projects that support transportation initiatives.

### Access

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- 26. Use transportation modeling software to maximize safety of multimodal access. Increase opportunities for staff contact with visitors and stakeholder groups to share information and provide education.
- 27. Focus educational programs to ensure park users across the spectrum are well informed.
- 28. Maintain vigilance to ensure appropriate levels of access are not surpassed due to increased visitation.
- 29. Scale back services and access; instead focus on the critical needs of health and safety.
- 30. Manage access to minimize user demand and “right-size” facilities along with realistic expectations.
- 31. Use transportation modeling software to maximize efficiency of multimodal access.
- 32. Fully implement current management plans related to appropriate and efficient access.

Figure 41. Management Actions of No Regret (continued)

Popular Park	Losing Ground	Turn Out the Lights	Surplus of Money
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### System Optimization

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- 33. Proactively understand and prioritize transportation assets and services.
- 34. Maintain priority transportation assets and services.
- 35. The focus will be on short-term “fixes,” but attempts should be made to make decisions with knowledge of the existing prioritization of assets.
- 36. Mothball non-essential transportation facilities.
- 37. Scale service to only focus on the highest priorities.
- 38. Experiment with new transportation technologies.
- 39. Properly plan for a fully implementable transportation system with prioritized assets that fulfill the park’s current and future needs.

### Partnership

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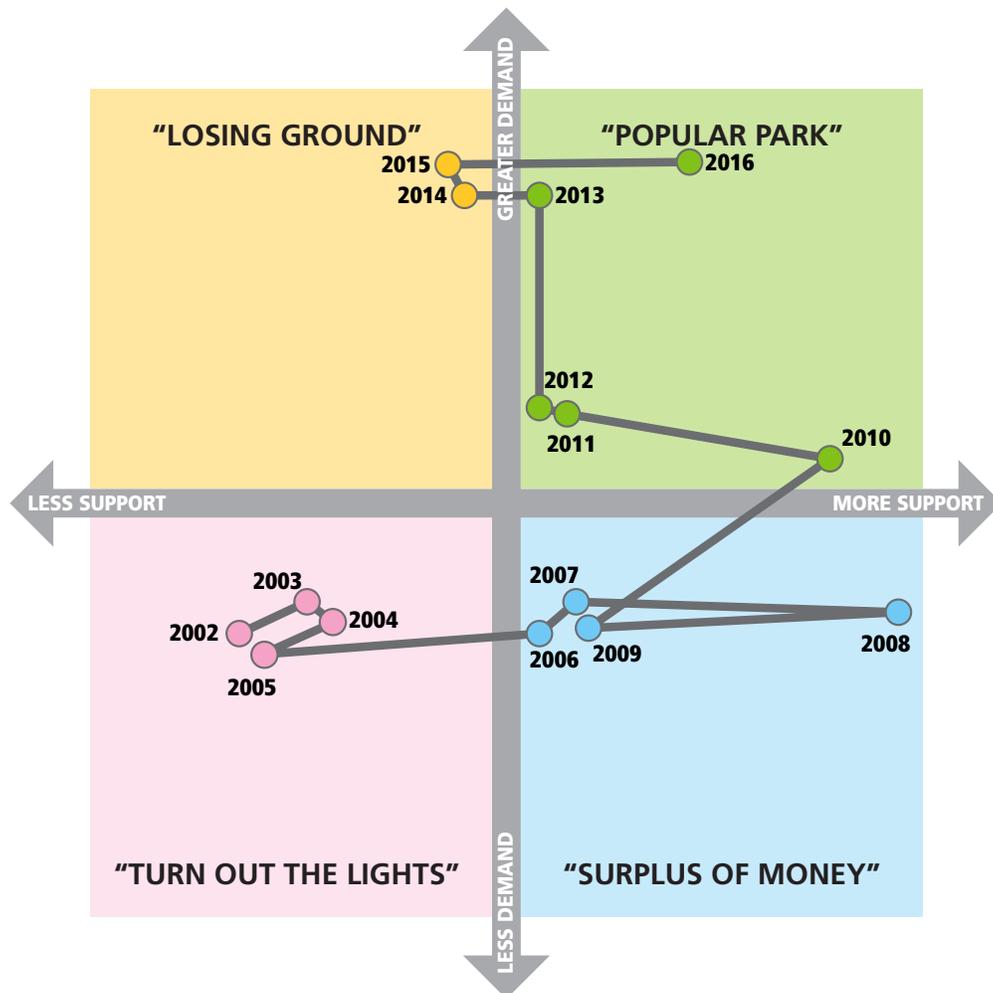
- 40. Strengthen existing partnerships.
- 41. Invest in new partnerships.
- 42. Develop independently mobile citizen science programs.
- 43. Leverage pressure of increased visitation to improve coordination with partners (in managing visitor expectations, collecting fees, dispersing users, etc.).
- 44. Turn to existing partners to assist with data collection and monitoring activities.
- 45. Turn to Park Champions for sharing information and educating the public on key transportation issues.
- 46. Use state-of-the-art technologies and durable transportation materials and products suitable for the region. In cooperation with commercial partners, test and implement functional tools and services that are sustainable during more lean times (e.g., upgrading fleet buses, visitor wayfinding information).
- 47. Invest funding, research, and energy in sustainable transportation tools and educational outreach/curricula so that when there is eventually a need to scale back, effective partnering can be maintained.

All of the funding strategies discussed in Section 3.3 fall within the “Management Actions of No Regret” area on the scenario planning graphic reproduced in Figure 42. This area represents a balance between times of high and low visitation, and high and low funding for Denali. The years plotted are calibrated based on an average of funding and visitation over time. It is noteworthy that within a 12-year period, all quadrants were evident, which means that both

funding and visitation can dramatically affect park management.

The funding forecast in the Denali LRTP is only the most likely scenario for each program, and—in reality—the amount of annual transportation funding will vary, as will visitation. Figure 43 lists management actions for when funding and visitation levels take Denali out of the area of Management

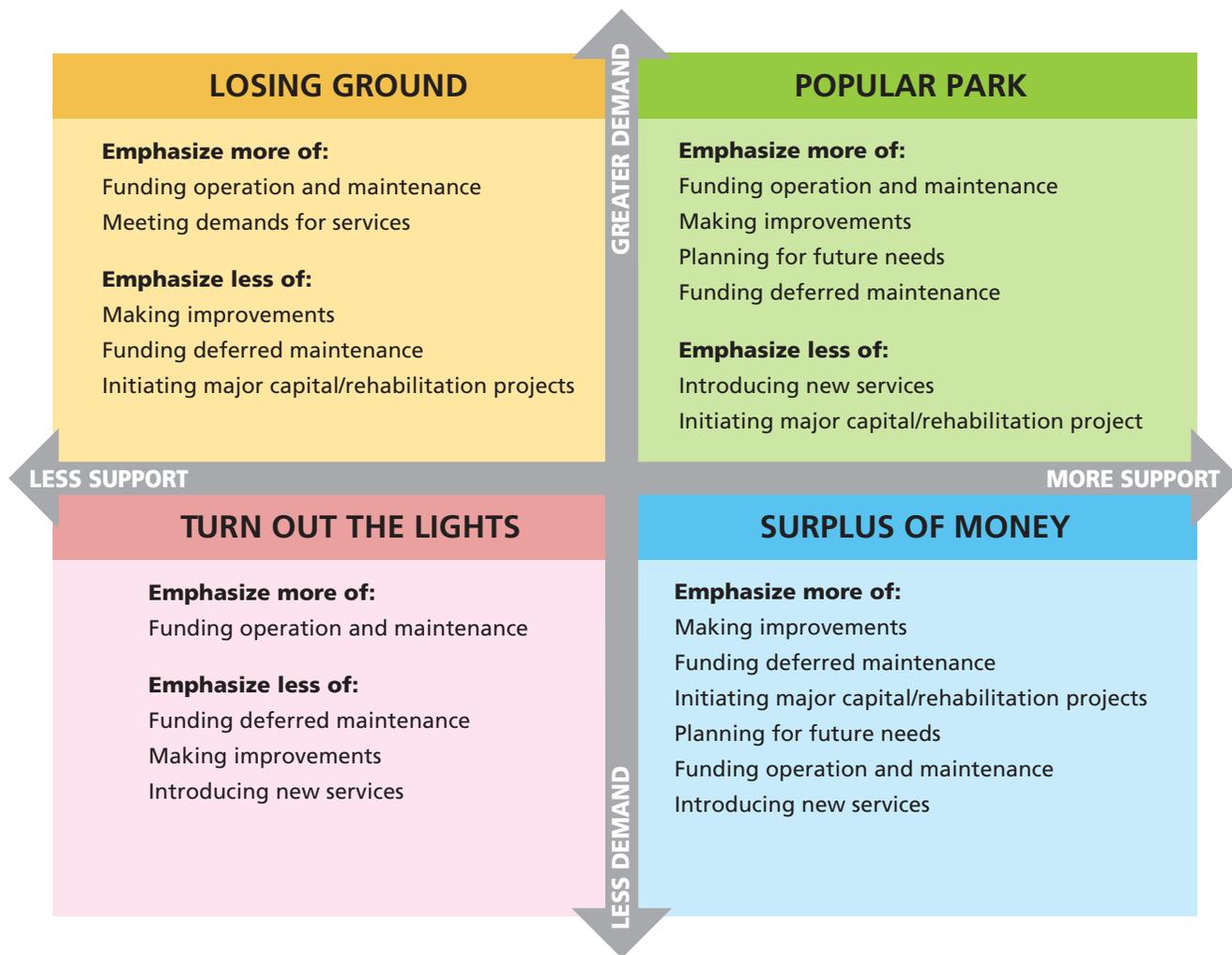
Figure 42. Historical Denali LRTP Scenario Tracking\*



\* Plotted points are based on an average of funding and visitation travels each year.

Actions of No Regret. Times of high visitation call for more investment in operations and maintenance and new services to meet emerging visitor needs. When funding prospects are good, then more money is available to make improvements, catch up on deferred maintenance, and prepare plans for the future. When funding is short, then many necessary improvements have to be delayed, and park staff can only fund core operations and critical repair work.

Figure 43. Potential Management Actions by Scenario



## 6.2 Implementation Actions

Each long-range transportation goal’s Chapter 2 baseline condition assessment concludes with identified needs and gaps. “Needs” articulate gaps between desired future conditions and baseline conditions. “Implementation actions” are specific activities that fulfill needs, once they are fully implemented. By committing to the implementation actions listed in Table 25, Denali will close gaps between existing and desired transportation system conditions and fulfill aims of the park’s long-range transportation goals.

The following categories of “Highest Priority,” “High Priority,” “Medium Priority,” and “Other Priority” designate the park’s current organization of actions by level of importance. This allows management to address important or timely planning, management, and investments decisions. The order of prioritization does not necessarily dictate the order of which actions are to be implemented. And as priorities of the park change or new needs and opportunities emerge, implementation actions may shift between priority categories.

Table 25. Implementation Actions

Implementation Action	Description
<b>Highest Priority</b>	
<b>Develop park road failure response plan</b>	<ul style="list-style-type: none"> <li>• Conduct internal scoping with Inter-disciplinary Team members</li> <li>• Identify staff and funding needs</li> <li>• Draft a two-year forward plan</li> </ul>
<b>Develop a winter and shoulder season response plan</b>	<ul style="list-style-type: none"> <li>• Complete compliance on open environmental reviews</li> <li>• Prepare a document to design, construct, maintain, and manage facilities in keeping with winter or shoulder season use</li> <li>• Review and adjust operation and maintenance, life expectancy, and other functions based upon TCFO</li> <li>• Facilitate determination of “traditional activities” for Denali as it impacts winter travel</li> </ul>
<b>Fill or update gaps in Denali data</b>	<ul style="list-style-type: none"> <li>• Identify and prioritize data needs</li> <li>• Determine staff and funding resource needs</li> <li>• Seek funding</li> <li>• PaTINA has identified the following data gaps: visitor use (visitation counts by area, changing demographics with changes to climate), permafrost degradation, flood events, traffic counts, wildlife interactions, fly over locations, mapping partner activities, mapping where maintenance activities are occurring, and location of inholdings</li> </ul>
<b>Implement the VMP</b>	<ul style="list-style-type: none"> <li>• Monitor indicators and maintain standards using rigorous data per the VMP’s direction</li> <li>• Use the Behavior Based Traffic Model and Scheduling Tool to evaluate anticipated effects of future vehicle management decisions</li> </ul>

Table 25 Implementation Actions (continued)

Implementation Action	Description
<b>High Priority</b>	
<p><b>Continue updates to PaTINA and use it to support decision making</b></p>	<ul style="list-style-type: none"> <li>• Include additional data as it is collected or updated</li> <li>• Generate new models as needed</li> <li>• Update PaTINA periodically, but at least every five years</li> </ul>
<p><b>Establish procedures and develop systematic use of Unstable Slope Management Program (USMP)</b></p>	<ul style="list-style-type: none"> <li>• Complete Task 5 of the USMP to provide analysis to Denali management over the next decade</li> <li>• Determine staff and funding resource needs</li> <li>• Incorporate USMP elements into project selection process as a criterion</li> </ul>
<p><b>Evaluate frontcountry circulation to improve and inform development</b></p>	<ul style="list-style-type: none"> <li>• Update entrance area plan (last completed in 1997) and incorporate multimodal circulation as a key factor</li> <li>• Include specific elements such as traffic counter mechanisms to understand vehicle, bicycle, and pedestrian movements</li> </ul>
<p><b>Address inholder location/status and five-year forecast for development or intent to access while also evaluating traffic to inholdings that are accessed from Park Road</b></p>	<ul style="list-style-type: none"> <li>• Map all inholdings by ownership and evaluate projected development</li> <li>• Outreach to inholders to see what plans are in development</li> <li>• Monitor and document all inholder correspondence and communiques</li> <li>• Conduct inholder traffic counts and analyze a user fee assessment on incoming shuttles, other vehicles, and individuals entering or departing the Kantishna area</li> </ul>
<p><b>Update Denali transportation financial analysis bi-annually</b></p>	<ul style="list-style-type: none"> <li>• Extract data from FMSS and other sources to inform decision making and update the transportation financial analysis</li> </ul>
<p><b>Map flood and debris flow events in all drainages crossing the Park Road</b></p>	<ul style="list-style-type: none"> <li>• Monitor all flood and debris flow events</li> <li>• Create and maintain a dataset of all events past and future</li> </ul>
<p><b>Evaluate and update the Denali LRTP</b></p>	<ul style="list-style-type: none"> <li>• Review conditions in relation to 2022 performance targets each year</li> <li>• Build on annual review assessment to make updates to the LRTP every five years</li> </ul>

Table 25 Implementation Actions (continued)

Implementation Action	Description
<b>Medium Priority</b>	
<b>Implement project selection process/business practices</b>	<ul style="list-style-type: none"> <li>• Project selection process is completed as a part of the LRTP; PaTINA and implementation actions may be used to inform updates to this process</li> </ul>
<b>Annually update the LRTP scenario quadrants</b>	<ul style="list-style-type: none"> <li>• Apply previous year visitation and funding levels to further plot scenario status (e.g. Figure 42)</li> </ul>
<b>Facilitate development of a community transit plan</b>	<ul style="list-style-type: none"> <li>• Determine staff and funding resource needs</li> <li>• Commit time to initiate and complete a comprehensive stakeholder process</li> <li>• Support non-NPS entities to apply for funding from such programs as the Federal Lands Access Program</li> </ul>
<b>Develop a master plan for the Kantishna development zone</b>	<ul style="list-style-type: none"> <li>• Address Park Road Mile 75 to Mile 92 as it contributes to the maintenance, operations, management, and historic character of the Park Road</li> </ul>
<b>Other Priority</b>	
<b>Create a formal culvert management plan</b>	<ul style="list-style-type: none"> <li>• Identify all culvert locations and develop timeframe for inspections, maintenance, and replacement</li> </ul>
<b>Update the Gravel Acquisition Plan (GAP)</b>	<ul style="list-style-type: none"> <li>• Determine the need and application of gravel sources to inform funding decisions, including a more detailed assessment of risk to Denali resources, visitors, and administration</li> </ul>
<b>Use CVTS results from Denali to assess visitor and user experience and establish an update cycle</b>	<ul style="list-style-type: none"> <li>• Apply 2016 CVTS results and follow up with a CVTS tailored to Denali in ensuing years</li> <li>• Use CVTS results to inform future park decisions related to improving visitor experience and/or satisfaction</li> </ul>
<b>Complete Google’s “street view” inventory of the Park Road</b>	<ul style="list-style-type: none"> <li>• Invite Google to complete field work in fiscal year 2018 or beyond</li> </ul>
<b>Continue to implement findings of the Denali Aircraft Overflights Advisory Council and evaluate effectiveness of best management practices</b>	<ul style="list-style-type: none"> <li>• Implement findings of the Denali Aircraft Overflights Advisory Council through the identification and use of effective best management practices</li> </ul>
<b>Comply with strategies to reduce deferred maintenance</b>	<ul style="list-style-type: none"> <li>• Monitor and document progress on reducing transportation asset deferred maintenance and the use of CIS to prioritize deferred maintenance needs</li> </ul>

Table 25 Implementation Actions (continued)

Implementation Action	Description
<b>Other Priority (continued)</b>	
<b>Complete analysis of new visitor destinations related to Climate Change</b>	<ul style="list-style-type: none"> <li>• Capture emerging recreational opportunities due to change in conditions (i.e. open or closed lakes)</li> </ul>
<b>Analyze visitor use response to Climate Change</b>	<ul style="list-style-type: none"> <li>• Collect data on time, location, and reason for attraction</li> </ul>
<b>Update the administrative fleet management plan, including a response to reductions in fleet size which will be required over the next three to four years</b>	<ul style="list-style-type: none"> <li>• Evaluate equipment and vehicle inventory in response to needed maintenance of transportation facilities, including TCFO</li> </ul>



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## Denali National Park and Preserve Long-Range Transportation Plan

# Appendix A: Literature Review Summary Report



## Denali National Park and Preserve Long-Range Transportation Plan

### **Appendix B: Denali Long-Range Transportation Planning and Acoustic Resources**



## Denali National Park and Preserve Long-Range Transportation Plan

### **Appendix C: Denali Park Road Risk Assessment Utilizing the Unstable Slope Management Program**



## Denali National Park and Preserve Long-Range Transportation Plan

### Appendix D: Current and Future Partner Projects



## Denali National Park and Preserve Long-Range Transportation Plan

### Appendix E: Park Transportation Investment Needs Analysis



## Denali National Park and Preserve Long-Range Transportation Plan

### Appendix F: Denali Funding Plan



## Denali National Park and Preserve Long-Range Transportation Plan

### Appendix G: Project Selection Checklist



## Denali National Park and Preserve Long-Range Transportation Plan

### Appendix H: Public Comment Summary

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