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

Denali Park Road

Summary of
Final Vehicle Management Plan
and Environmental Impact Statement

Denali National Park and Preserve • Alaska • October 2012

INTRODUCTION

This Record of Decision (ROD) documents the decision by the National Park Service (NPS) to adopt a Vehicle Management Plan for Denali National Park and Preserve. The Vehicle Management Plan addresses management of all motorized vehicles on the restricted section of the Denali Park Road (Mile 15 – Mile 90). This plan amends the vehicle management aspect of the park's General Management Plan (GMP).

This ROD has been prepared by the NPS, pursuant to the National Environmental Policy Act of 1969 and 40 CFR 1505.2. This document details the background of the project, the decision made (selected alternative), other alternatives considered, the basis for the decision, the environmentally preferable alternative, measures adopted to minimize environmental harm, and public involvement in the decision making process.

BACKGROUND OF PROJECT

Vehicle management on the Denali Park Road, the primary means of access into Denali National Park and Preserve, has been based on a GMP from 1986 and the Entrance Area and Road Corridor Development Plan (a GMP amendment) completed in 1997.

The purpose of this Vehicle Management Plan is to provide specific direction for improved vehicle management on the restricted section of the Denali Park Road for the next 20 years. The plan describes how the NPS will manage vehicle use on the Park Road in order to provide future generations with an opportunity for a high quality experience while protecting wilderness resources and values, scenic values, wildlife, and other park resources; and maintaining the unique character of the Park Road.

DECISION (SELECTED ACTION)

The NPS has selected Alternative D (NPS Preferred Alternative) which offers visitors the opportunity to have a high-quality experience using a transportation system that offers predictability, efficiency, and variety.

Description of the Selected Action

With the implementation of this alternative the number of vehicles, their schedules, and behavior will be managed to meet visitor demand while maintaining standards for desired resource conditions and visitor experience . Several times each season, key indicators will be monitored to assess the success of current traffic levels, behavior and patterns to determine whether the set standards are being met.

Comprehensive monitoring will also be conducted at regular intervals to specifically address the impacts of traffic on wildlife, wilderness, and the visitor experience. A Before-After Control Impact (BACI) study will be conducted within the first five years of the plan's implementation to affirm the selection of key indicators and to distinguish impacts due to changes in current traffic patterns and traffic levels. Data from long-term inventory and monitoring programs may also be used to evaluate whether changes in the resource condition are occurring.

In addition to managing for desired conditions, the maximum level of vehicle use on the restricted section of the Park Road will be 160 vehicles per 24-hour period. This limit includes all motor vehicles counted westbound at the Savage River Check Station. The 160-vehicle limit is derived from traffic model simulation results and extensive scientific research on visitor preferences and resource condition.

The NPS will propose a modification to the current park-specific regulations to set the maximum level of daily vehicle use at 160 vehicles per 24-hour period during the GMP-defined visitor season. To meet standards, the number of vehicles allowed could be less than this maximum.

A majority of seats on both transit and tour buses will be available for prebooking by visitors (independent and organized groups) to fully optimize the performance and efficiency of the transportation system. This will allow managers to predict daily vehicle needs and maximize the flexibility of the system to accommodate visitor demand.

To further preserve wilderness resource values and the visitor experience, a new management subzone on the Park Road will be created west of Eielson Visitor Center to Wonder Lake (Wildlife Viewing Subzone 3). This section will be managed for the lowest traffic volume on the Park Road and will not allow for significant growth beyond the current condition.

Continuation of Current Management Practices

- The 2005 Denali National Park Road Maintenance, Repair and Operating Standards and 2007 Denali National Park and Preserve Road Design Standards will continue to apply.
- The NPS will explore the use of alternative energy vehicles and other fuel-saving technologies/practices and/or policies. Such measures could be addressed in the prospectus that will be issued for the new concession contract.
- To reduce the threat of invasive plants, the park's current requirement to regularly wash buses, park vehicles, and construction equipment will continue.
- Use of calcium chloride to control dust on the gravel section of the Park Road will continue unless its use is determined to be harmful to the environment.
- The park will continue to pursue new ways to address dust issues associated with vehicle traffic along the unpaved section of the road (e.g., use of water trucks, controlling traffic volume, and new dust palliative products).
- All visitors, whether they are on a transit or tour bus, will have the opportunity to get off the bus and return east on the transit system.
- There will be no facility capital improvements along the restricted section of the Park Road associated with plan implementation; therefore, no additional costs associated with facility development or operations are anticipated.

Managing for Desired Conditions

Vehicle use on the Park Road will be managed to achieve specific desired conditions. Through the use of indicators and standards, the current visitor experience and resource condition will be maintained or improved. For the restricted section of the Park Road (Savage River to the Old Park Boundary north of Wonder Lake), the following indicators will be used:

- sheep gap spacing
- nighttime traffic levels
- large vehicle traffic
- vehicles at a wildlife stop
- vehicles in a viewscape
- wait time for hikers
- vehicles at rest areas and Eielson Visitor Center

Additionally, comprehensive monitoring and data collection will take place for the following to detect any impacts attributable to changes made to the transportation system:

- natural resource condition
- visitor satisfaction

All vehicles traveling on the restricted section of the Park Road will be required to follow the newly adopted behavior practices for vehicle movement to meet desired conditions.

All bus drivers, including inholder bus drivers, will have the same minimum level of training in order to drive on the Park Road.

Bus Size

The NPS may conduct a study to explore the feasibility and affects of buses larger than the current design that would meet the standards for desired conditions for use in Wildlife Viewing Subzone 1 (Savage River to Teklanika). No structural upgrade to the road will be considered to accommodate these larger vehicles.

Transportation System

Within the transportation system, destinations for tour and transit service may change as long as resource protection and visitor experience standards are met. As changes are made to the transportation system, visitors' perceived value of the transportation system will be assessed over time to guide decision making.

To improve the visitor experience, the NPS will address the potential for using the best technologies for quieter, more comfortable buses through the concession prospectus process.

Transit System

The transit service will provide access along the entire length of the Park Road and offer visitors the opportunity to get off and reboard at any point along the way. Transit buses will be operated to meet the needs of hikers, campers, and visitors who may choose to remain on board. The majority of seats will be available for prebooking, and ticket pricing will be determined by destination. Some open seats will be retained in the reservation system to allow for spontaneous trip planning. Departing buses will have some open seating to facilitate visitor pickup along the Park Road.

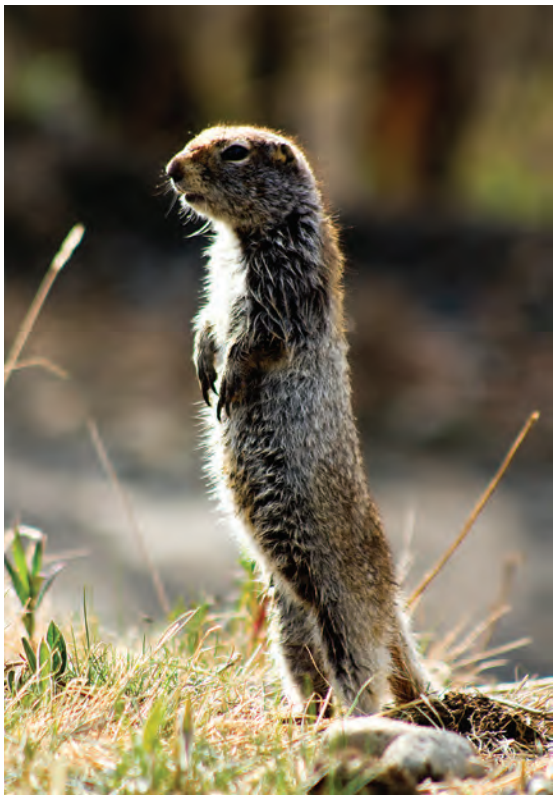
Transit buses will run on regular intervals from the Wilderness Access Center and be scheduled to meet visitor demand. Transit buses will be equipped with external bike racks to better accommodate cyclists and to optimize seating. In addition, transit buses will be configured to accommodate recreation and camping equipment, which may be carried externally. The Denali Visitor Center will be a regular stop on the eastbound transit schedule during operating hours to give visitors the option of disembarking.

Transit drivers will provide key park messages, relevant information, and answers to visitor questions. Self-guided tour materials will be available for purchase to supplement the visitor experience, but a discrete self-guided tour will not be offered. Visitors will be able to use transit for accessing off-bus activities such as Discovery Hikes.

Flexibility and freedom to move throughout the park will be addressed through changes in the transit system schedule and monitoring the indicator for hiker wait time. When allocating vehicle use within the transportation system, the transit service will have priority.

The range of transportation system options available to visitors will be clearly communicated through a variety of means (e.g., electronically, printed materials, and personal communication) by the Park Service and its partners.

Premium Tours



Premium tours will provide visitors with guided interpretation and education, providing enhanced opportunities to understand and appreciate the park's natural and cultural resources. Off-bus activities with professional interpretive programs, guided talks at key locations, and the use of media and technology may be included on premium tours. Premium tours will be offered along the length of the Park Road, with a higher volume of these tours occurring between the Savage and Teklanika rivers. Premium tours will have at least one opportunity to visit an NPS interpretive facility or interact with an NPS interpreter. Premium tours may include food and beverages.

Premium Short Tour: Up to half a day in duration, these tours could be offered to designated locations throughout Wildlife Viewing Subzone 1 (Savage River to Teklanika). Thematic narration and appropriate activities for the short tour may include on- and off-bus activities (i.e., wildlife, park history, wilderness, walks, and educational programs).

Premium Long Tour: These tours will be offered to destinations along the full length of the Park Road, but predominantly operate within Wildlife Viewing Subzone 2 (Teklanika to Eielson Visitor Center). Long tours will be developed for visitors who want a guided experience and have a full day to enjoy the park. Thematic narration, destination, and appropriate activities for tours will be driven by visitor demand. Visitors could expect that long tours will provide more opportunities than the short tour to view wildlife and scenery due to time and distance traveled. Premium long tours will start at the Wilderness Access Center or with a pickup at a local hotel.

In addition to guided premium tours, specialized tours and educational programs on a variety of topics will be provided by the concession contract, through regular park operations, and with park partners at the Murie Science and Learning Center. Educational programs provided directly by the NPS and Murie Science and Learning Center will have preference over commercial tours.

Opportunities for off-bus guided tour activities will be primarily restricted to the developed areas along the Park Road and will comply with the 2006 Backcountry Management Plan. All tours will have at least one opportunity to visit an NPS interpretive facility or interact with an NPS interpreter.

Interpretation

Key park themes and messages will be provided to facilitate visitor understanding and appreciation for the park's natural and cultural resources. This will require all drivers and naturalists to meet minimum standards for interpretation, with Premium Tour bus drivers meeting higher standards for interpretation.

Other Vehicle Use

To maximize the number of visitors who can be accommodated by the transportation system, other vehicle use may be reduced to benefit the transportation system. The following management strategies represent the most restrictive actions that would be taken over the life of the plan.

National Park Service

Contractor and NPS operations will be managed (i.e. after hours travel) to minimize impacts on the visitor experience and to minimize resource impacts.

During periods of low traffic volume, NPS employees may use private vehicles to access duty stations on the restricted portions of the Park Road (Savage River to Wonder Lake). During periods of high traffic volume, employees will use an employee transportation system (i.e., carpool or employee shuttle). Guests of employees could travel with employees or use the transportation system for access.

Professional Photography and Commercial Filming

The professional photography and commercial filming programs will be combined to provide equity in permit distribution and gain efficiencies in administration and oversight. Up to five permits per day will be available for the entire road, as long as photographer vehicles do not displace buses or administrative traffic. Permits will be reduced as necessary to avoid displacement of visitor opportunities and administrative functions.

Permits will include stipulations necessary to ensure standards for desired conditions are met (e.g., no more than one photographer vehicle at a wildlife stop, no parking in sheep crossing zones, and consideration of vehicles in the viewshed on the Park Road).

Kantishna Inholder Access

ANILCA title XI, section 1110(b) provides that inholders shall be afforded adequate and feasible access to their property for economic and other purposes, subject to reasonable regulations. These regulations could include vehicle numbers, timing of road use, vehicle behavior, and use of park facilities. The GMP allocation of 1,360 permits will remain in effect to provide inholders use of the restricted section of the Park Road for transporting overnight guests and for travel necessary for operation of the inholding. Park staff will work with inholders to address access to their inholding while striving to meet the goals of this plan.

Commercial Day Tours to Kantishna Inholdings

Commercial day tours to Kantishna inholdings will be allowed under appropriate authorizations. Such day tours are considered a commercial activity in the park outside the boundary of an inholding and not provided for by ANILCA section 1110(b). Visitor services, including commercial vehicle day tours on the Park Road, will be authorized consistent with this Vehicle Management Plans.

Commercial day tours to Kantishna Lodges will have the same priority as concession operated tours on the Park Road.

Teklanika River Campground

If needed to meet standards, private vehicles driving to and from Teklanika River Campground will travel on the Park Road during periods of low traffic volume.

Management Zoning

Changes to the Park Road subzones will be implemented to achieve desired conditions within specific road sections. These changes are made in part to reaffirm the 2007 Road Design Standards and further support the preservation of character-defining qualities and attributes contributing to the road's eligibility for the National Register of Historic Places. The proposed changes include the following:

1. Creation of Wildlife Viewing Subzone 3 (from the Eielson Visitor Center to the Wonder Lake junction).

   This subzone involves a gravel section of the Park Road that is maintained to a narrower width on which vehicle restrictions (Rules of the Road) continue to apply. Visitors must use one of the bus systems. The use of private vehicles is restricted. Buses are given the right-of-way. The primary purpose of this road segment is for a more wild and remote type of visitor experience along the road.

   Travel to this section of the road requires a significant time commitment by visitors. Those who make the trip will experience a more quiet and contemplative setting and fewer encounters with other vehicles along this section of road than in Wildlife Viewing Subzone 2. Park facilities are highly limited in this zone to minimize any additional footprint on the landscape. No visitor contact stations will be provided along this section of road.

2. Reducing Wildlife Viewing Subzone 2.

   This zone will extend from the Teklanika River Bridge to the Eielson Visitor Center and from the Wonder Lake junction to the Old Park Boundary.

3. Wildlife Viewing Subzone 1 will remain the same.

Implementation

The actions approved in this ROD will be implemented over the life of the plan. Specifically, the standards will be addressed in the operating plan for the new concessions contract. Monitoring will continue with a frequency determined from data gathered in the 2013 and 2014 season. Commercial day tours to Kantishna inholdings will be managed under the appropriate authorization by 2013. The professional photography and commercial filming program will be consolidated by the 2014 season.

MITIGATING MEASURES

Monitoring will inform park managers when mitigative measures are needed. Monitoring will be accomplished through measuring impact indicators linked to natural resources and the visitor experience.

Indicator	Standard		
	Wildlife Viewing Subzone 1	Wildlife Viewing Subzone 2	Wildlife Viewing Subzone 3
Number of vehicles at a wildlife stop	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.
Number of vehicles at a wildlife stop (continued)	No one year will have less than 70% of wildlife stops with three or f ewer 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.
	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.
	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.

Indicator	Standard		
	Wildlife Viewing Subzone 1	Wildlife Viewing Subzone 2	Wildlife Viewing Subzone 3
Number of vehicles in a viewscape	At least 85% of the time during bus operating hours, there will be three or fewer vehicles visible in the mile 26 viewshed, averaged over five years. 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.	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, averaged over five years. 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.	At least 85% of the time during bus operating hours, there will be one or fewer vehicles visible in the mile 68 viewshed, averaged over five years. 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.
Number of vehicles in a viewscape (continued)	At least 95% of the time during bus operating hours, there will be 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 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. 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.	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 two or fewer vehicles visible in the mile 68 viewshed.

Indicator	Standard		
	Wildlife Viewing Subzone 1	Wildlife Viewing Subzone 2	Wildlife Viewing Subzone 3
Number of vehicles parked at one time at:			
Teklanika Rest Stop	No more than 12 buses at one time with a total of no more than 16 vehicles.		
Toklat Rest Stop		No more than 11 buses at one time with a total of no more than 16 vehicles.	
Eielson Visitor Center			No more than 10 buses at one time with a total of no more than 19 vehicles.
Hiker wait time	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.		
	At least 95% of hikers will have wait times 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.		
	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.		

Indicator	Standard		
	Wildlife Viewing Subzone 1	Wildlife Viewing Subzone 2	Wildlife Viewing Subzone 3
Sheep gap spacing	Milepoint 21.6 will have at least one 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 one 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 one 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).
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 to determine whether these increased traffic levels affect day time wildlife sightings.		
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.		

A management toolbox (i.e., strategies for managing vehicle use to meet standards for desired conditions) will be used to manage vehicle use. From the least restrictive to most restrictive actions these strategies will include, but are not limited to:

- adjust vehicle behavior (e.g., through education and contract and permit compliance)
- adjust vehicle timing (e.g., change the schedule to allow for greater vehicle spacing)
- adjust other vehicle use to favor the transportation system (e.g., Teklanika campers travel during low traffic volume and moving administrative traffic to nighttime hours)
- reduce other vehicle use to favor the transportation system (e.g., NPS employees use transit system)
- reduce vehicles in the transportation system

PUBLIC AND AGENCY INVOLVEMENT

This ROD represents the culmination of over four years of concerted planning, analysis, and input provided by the NPS planning team, park staff, Alaska Native groups, other government agencies, and the public. The process of consultation and coordination was vitally important throughout this planning project.

The notice of intent to prepare an environmental impact statement was published in the Federal Register on Tuesday, August 12, 2008 (Vol. 73, No. 156).

Public Scoping

During the summer of 2008, the National Park Service issued a public newsletter announcing the vehicle management plan / environmental impact statement. The newsletter identified the Park Service's intent to evaluate a range of alternatives for managing vehicles on the Park Road, and presented background information to support the decision to undertake the plan. The newsletter invited public comments, concerns, and suggestions to assist the planning team with specific regard to the following topics:

- Alternative approaches and ideas for accomplishing project goals.
- The range of environmental and socioeconomic issues that need to be considered.
- Other potential projects that might affect or be affected by the project.
- Information that needs to be considered (such as related research) and why it should be included.
- Information on how visitors and others use the park, and how the project might affect that use.
- Concerns about conditions or activities in the park related to the planning project, and suggestions for improvement.

The National Park Service also held four public open-house scoping meetings for this plan during September 2008. Meetings were held in Anchorage (September 3, 2008); Susitna Valley (September 4, 2008); Denali Park (September 10, 2008); and Fairbanks (September 11, 2008). The National Park Service provided a brief presentation of the planning project at each meeting. Approximately 58 people attended the meetings.

Planning Workbook and Workshops

The Denali Park Road Planning Workbook provided background information and preliminary concepts for the plan / environmental impact statement. Public review of the workbook occurred between January 1, 2010 and March 1, 2010. A series of public workshops was held in February 2010 to discuss the preliminary concepts, and to provide information on how the alternatives would be developed. Members of the public were invited to discuss the workbook and share their suggestions with park staff. The workshops were held in the park (February 11, 2010); Fairbanks (February 17, 2010); and Anchorage (February 18, 2010). Approximately 80 people attended these meetings.

Draft and Final Environmental Impact Statements/Public Comment

The Notice of Availability for the draft plan / environmental impact statement was published in the Federal Register on August 1, 2011 (Vol. 76, No. 147). A series of public meetings were held in Denali Park (August 23, 2011); Fairbanks (August 31, 2011); and Anchorage (September 7, 2011). Approximately 61 people attended the meetings. Additionally, park staff were invited by stakeholder groups to discuss the draft plan at their regular meetings. Park staff attended and presented at approximately six stakeholder meetings.

The initial 60-day public comment period, August 1 through September 30, 2011, was extended to October 31, 2011 in response to numerous requests from the public and organizations. A total of 324 pieces of correspondence were received, containing 889 comments, during the 90-day comment period.

A preferred alternative was not identified in the draft plan to allow for refinement of the existing alternatives based on public input. The preferred alternative in the final plan addresses many of the comments and concerns that were received on the draft plan.

The Notice of Availability for the final plan/environmental impact statement was published in the Federal Register on June 29, 2012 (Vol. 77, Issue 127)

Agency and Tribal Consultation

Park staff meet on occasion with representatives of federal and state agencies and regional and local governments (as appropriate) on topics of mutual interest and concern, such as operating the park, preserving park resources, and making the park safe and enjoyable for visitors. The NPS informed these groups of the draft plan / environmental impact statement and indicated that discussion topics and planning issues were welcomed.

Park staff communicated with local tribal groups regarding the plan. The planning alternatives were developed with consideration that project actions would avoid or minimally disturb resources or values important to affiliated Alaska Native tribes. The planning alternatives do not entail new construction or ground disturbance, and are not anticipated to impede access to places of traditional religious, ceremonial, or other customary activities.

OTHER ALTERNATIVES CONSIDERED

Alternative A (No Action)

Alternative A represents the existing conditions. Currently, vehicle use on the restricted section of the Park Road is managed to maintain a 10,512 seasonal limit that was set in the 1986 general management plan and then published as a regulation in 2000 (36 CFR 13.932). The regulated season begins on the Saturday of Memorial Day weekend and continues through the second Thursday following Labor Day, or September 15, whichever comes first. Allocation for segments of the transportation system and other vehicle use were modified in the 1997 Entrance Area and Road Corridor Development Concept Plan and the Superintendent's Compendium.

Alternative B (Maximizing Visitor Access)

This alternative would promote maximizing seating on all transit and tour vehicles to offer the largest number of visitors the opportunity to travel the Park Road. Visitors would have access to a highly structured transportation system that offers predictability, efficiency, and greater opportunity to have a park experience of choice, while meeting set standards for natural resource protection and visitor experience.

To fully optimize the transportation system, a majority of seats on both transit and tour buses would be available for prebooking by visitors (independent and organized groups). This would allow managers to predict daily vehicle needs and maximize the flexibility of the system to accommodate visitor demand.

Alternative C (Maximizing Visitor Opportunities)

This alternative would promote a variety of visitor opportunities that range from brief experiences in the park's entrance area, to short and long visits along segments of the Park Road, to multiday experiences in the park's backcountry. Visitors would have opportunities for spontaneity and freedom during their park visit, while set standards for resource condition and visitor experience are met.

The transportation system in this alternative would separate tour and transit functions by developing a self-guided economy tour. Distinguishing the economy tour experience from transit offers benefits to both user groups. Dedicated transit services would provide more seating for eastbound hikers, increasing visitors' freedom of movement. A dedicated economy tour service would provide visitors with a modest tour experience.

BASIS FOR THE DECISION

The basis for the decision stems from management objectives that were developed to comply with applicable Federal laws, regulations, and policies and respond to the issues identified through internal and public scoping. Alternative D best meets the purpose and need of the project according to the objectives identified in the FEIS.

With implementation of Alternative D, the National Park Service will use measurable indicators and standards and comprehensive monitoring to ensure key park resources and values along the Park Road are adequately protected in accordance with desired conditions. The regular monitoring of key indicators will allow a flexible and timely response to impacts on the resource and visitor experience. Comprehensive monitoring will provide for long-term analysis of traffic impacts.

In response to public comment, the alternative includes a maximum level of vehicle use once standards for desired conditions have been met. A daily vehicle capacity ensures that traffic patterns will be regularly maintained.

The traffic scenario used to analyze Alternative D modeled 147 daytime vehicles (6am-10pm). Thirteen nighttime (10pm-6am) vehicles were added to comprise the 160 vehicle limit within 24 hours. This traffic scenario is anticipated to meet set standards for desired conditions. If monitoring shows that standards are not being met, the daily vehicle limit will be lowered and managed at a level that meets standard.

The premium tour service will consist of options for short and long tours and include specialized educational tours offered by the Murie Science and Learning Center. This will provide a range of tour opportunities for visitors.

The creation of Wildlife Viewing Subzone 3 will preserve existing road character and offer a quiet, more contemplative park experience in comparison to other zones along the Park Road.

The professional photography and commercial filming programs will be combined to offer greater equity in permit distribution and administrative efficiency. The number of permits available for the combined program will be up to five per day and dependent on known traffic volume. This will reduce the impact on the visitor experience during the peak visitor season and allow for more permits in the shoulder seasons desired by photographers.

Commercial day tours to Kantishna inholdings will be allowed under appropriate authorizations. Such day tours are considered a commercial activity in the park outside the boundary of an inholding, and are not provided for by ANILCA section 1110(b). Visitor services, including commercial vehicle day tours on the Park Road, will be authorized consistent with this Vehicle Management Plan.

Commercial day tours to Kantishna Lodges will have the same priority as concession operated tours on the Park Road.

Campers will continue to be able to drive their private vehicles to the Teklanika River Campground, but may have to travel during periods of low traffic to reduce impacts on the visitor experience and meet desired conditions.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

Alternatives B, C, and D are similar in terms of impacts on wildlife and other natural resources, consequently, the Park Service has determined that all three action alternatives are environmentally preferable compared to alternative A.

Alternative D best meets the purpose and need of the project according to the objectives identified in the FEIS.

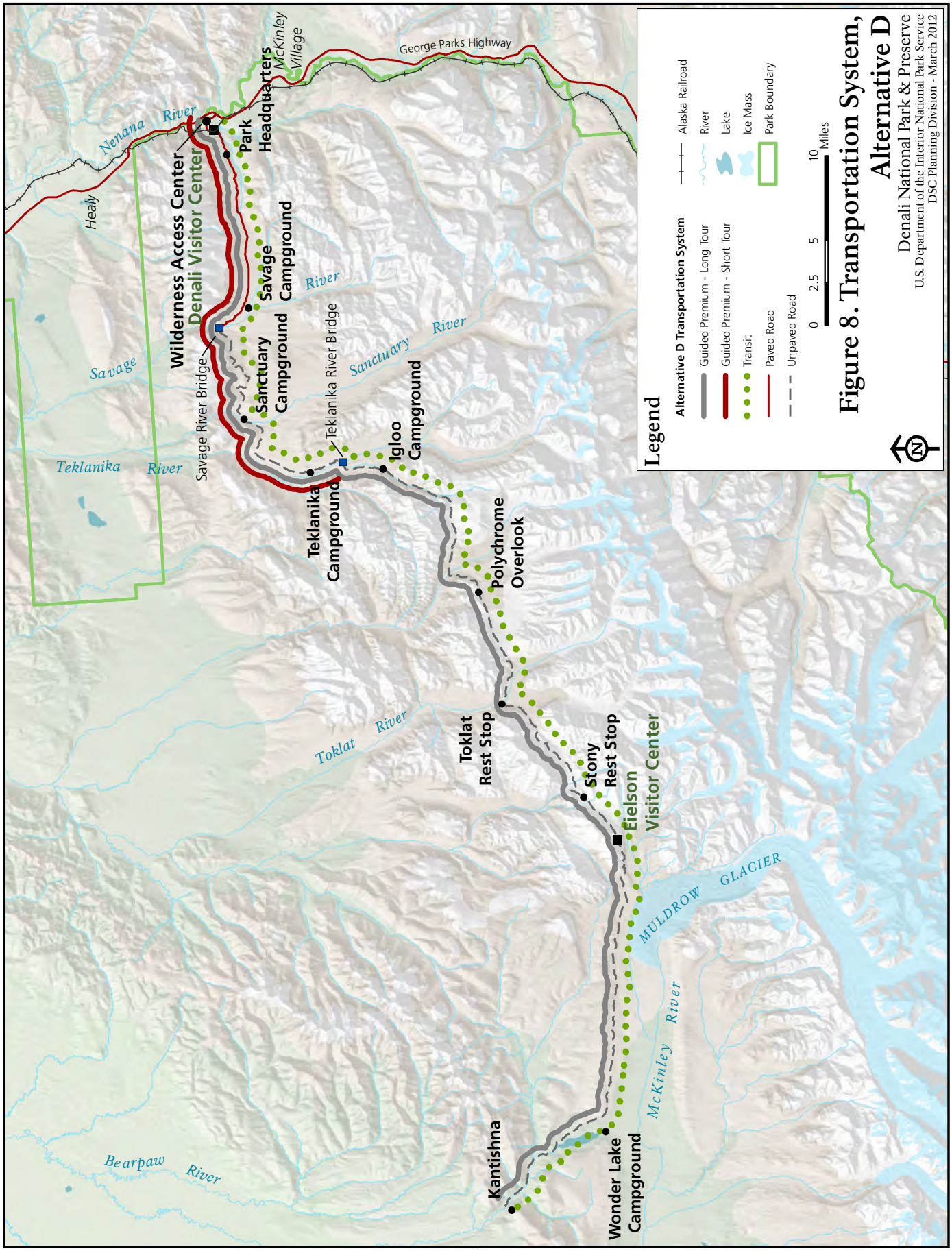
NON-IMPAIRMENT DETERMINATION

Anticipated impacts associated with the implementation of alternative D would not constitute impairment on park resource values. This includes resource values whose conservation is necessary to fulfill the enabling legislation or proclamation of the park, or values identified as significant in the park's general management plan or other relevant NPS planning documents. The non-impairment determination is appended to this ROD as Attachment B.

CONCLUSION

Establishment of a Vehicle Management Plan for the Denali Park Road in Denali National Park and Preserve is a necessary step to address vehicle management and vehicle capacity in light of increasing visitation. The management plan will address and mitigate resource and visitor experience impacts while still providing for a modest increase in vehicle use over the current condition.

All practical means to avoid or minimize environmental harm have been adopted. The action described in this ROD will not impair park resources or values, and will enhance the ability of park users to enjoy the park in a manageable and sustainable manner.


Legend
Alternative D Transportation System
Guided Premium - Long Tour
Guided Premium - Short Tour
Transit
Paved Road
Unpaved Road
Alaska Railroad
River
Lake
Ice Mass
Park Boundary
0 2.5 5 10 Miles
Figure 8. Transportation System, Alternative D
Denali National Park & Preserve
U.S. Department of the Interior National Park Service
DSC Planning Division - March 2012
George Parks Highway
McKinley Village
Park Headquarters
Wilderness Access Center
Denali Visitor Center
Savage River Bridge
Savage Campground
Sanctuary Campground
Teklanika River Bridge
Teklanika Campground
Igloo Campground
Polychrome Overlook
Toklat Rest Stop
Stony Rest Stop
Eielson Visitor Center
Wonder Lake Campground
Kantishna
Nenana River
Healy
Savage River
Teklanika River
Sanctuary River
Toklat River
MULDROW GLACIER
McKinley River
Bearpaw River

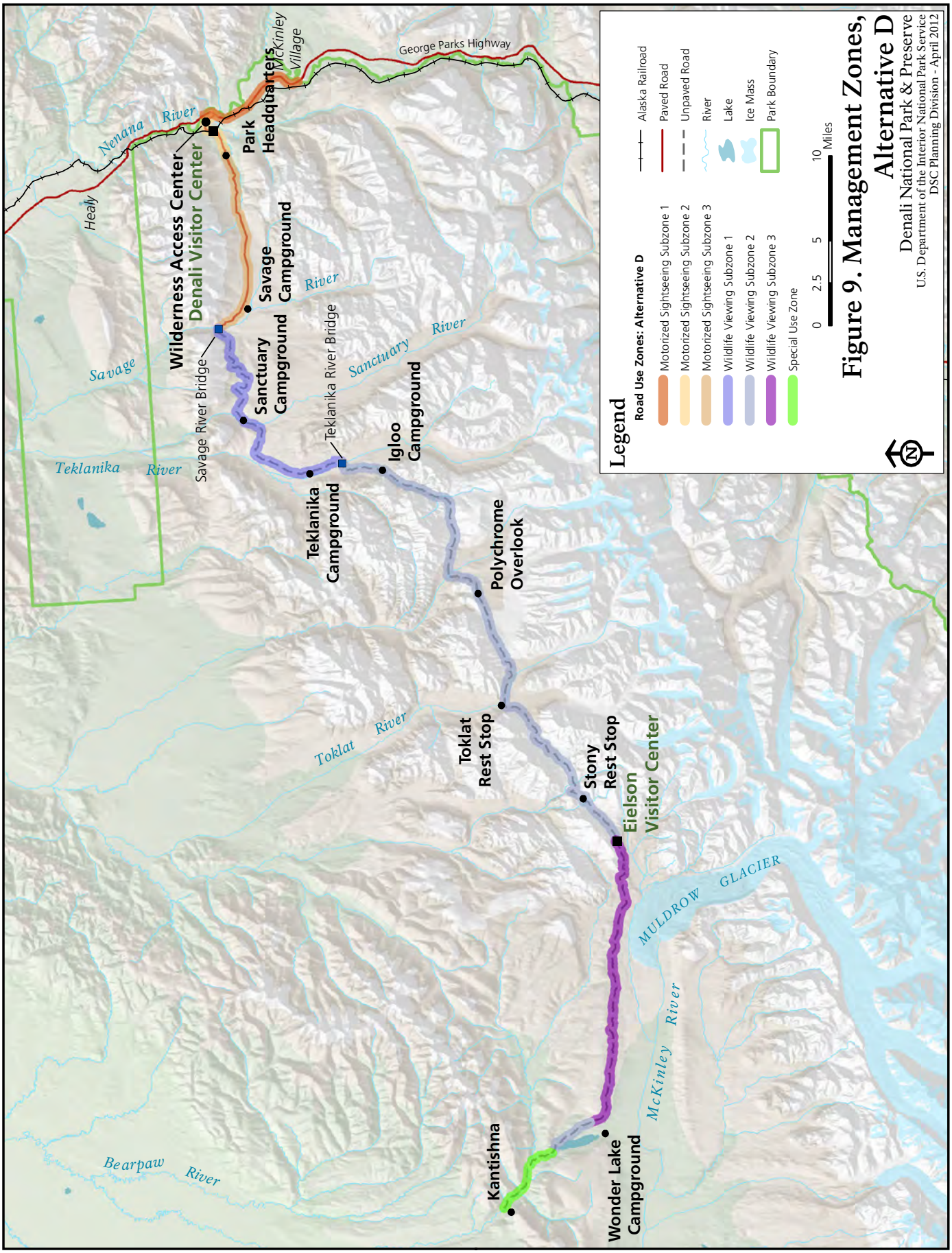


Figure 9. Management Zones, Alternative D
Denali National Park & Preserve
U.S. Department of the Interior National Park Service
DSC Planning Division - April 2012

APPENDIX C:

[redacted]

National Park Service
U.S. Department of the Interior

Denali National Park and Preserve
Alaska

Adaptive Management and Monitoring Strategy for the Vehicle Management Plan and EIS

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Introduction

The goal of the adaptive management strategy for the Denali Park Road Vehicle Management Plan is to protect the exceptional condition of the park's resources and values and to preserve the high quality visitor experience through informed, proactive and transparent management. There are two objectives associated with this goal that relate to management of natural resources: 1) manage the transportation system to ensure protection of wildlife populations, wildlife habitat, and the processes and components of the park's natural ecosystem, and 2) manage the transportation system to ensure protection of wilderness character, wilderness resource values, and wilderness recreational opportunities.

Adaptive management is a process that promotes an experimental approach to management and flexible decision making that can be adjusted as results of management actions are monitored and better understood (Prato 2008). We need adaptive management because the outcomes of most management actions are shrouded in uncertainty and unpredictability due to environmental variability or incomplete knowledge of system dynamics. The action alternatives in the Vehicle Management Plan and Environmental Impact Statement require that an adaptive management strategy be implemented and monitoring studies conducted. The strategy outlined here is designed to detect changes to important resource conditions that may be caused by changing the transportation system on the park road and to provide park managers with a method to adaptively manage traffic to address any effects. The value of an adaptive management strategy to assess resource impacts on the park road is that the expected performance of the managed system may be greatly improved by reducing uncertainty about possible effects on resources. The prospect of substantially improving decision making justifies the cost of monitoring and assessment.

Since 2006, Denali National Park and Preserve has been conducting a series of scientific studies to better understand the relationships between traffic patterns on the park road and the physical, biological and social environment. Collectively called the Road Capacity Study, the purpose has been to provide scientific support for park road traffic levels that would not impede wildlife populations along the park road corridor (Phillips et al. 2010) and would maintain visitor satisfaction (Manning and Hallo 2010). These studies have lead to the development of a four tiered approach to the adaptive management strategy. The first tier includes a set of indicators with quantitative standards associated with them designed primarily to regulate the numbers of vehicles on the park road in such a way that natural resources are protected and the visitor experience is preserved. The other tiers, described in more detail below, are designed to

ensure that the chosen indicators and standards are protecting natural resources and preserving the visitor experience. If results from tiers two, three or four suggest that there are changing conditions for natural resources or the visitor experience attributable to the amount of vehicles on the park road, adaptive management actions may include a range of options from adjusting traffic schedules and vehicle numbers to a return to the previous traffic system. If monitoring detects impacts to the high priority indicators of fundamental park resources, managers may respond with either adjustments to the schedule or a decrease in traffic levels.

An additional part of the Road Capacity Study involved equipping all concessioner buses and many other vehicles traveling the park road with GPS units to collect detailed information on their movement. From these data, a micro-simulation model was developed that would enable the park to test how different schedules may meet the standards set for the indicators (Morris et al. 2010). Any proposed traffic volume or schedule would be first tested in this model and adjusted such that, based on simulations, it appears to meet the standards. Upon implementation of a new traffic volume and schedule, monitoring would be conducted as described below to ensure that the standards are being met. An adaptive management approach would be taken with the initiation of any of the action alternatives involving comprehensive monitoring programs for both resource condition and visitor satisfaction to ensure no degradation in these areas (Fig. 1).

Given the inherent uncertainty in this system, implementation of action alternatives B and C is proposed to be done in phases, building up to the full increase in traffic volume suggested possible by the simulation model. Of the full increase over current levels considered possible, only a portion of that difference in traffic volumes would be realized at any one time, and the impacts monitored and analyzed before additional increases are attempted. Each phase would last at least 2 years to fully understand the impacts of increased traffic to natural resources and visitor experience. For the Preferred Alternative D, the uncertainty in the system would be addressed through a maximum daily vehicle limit, eliminating the need for incremental increases and phases.

A number of social and wildlife parameters will be monitored as part of this strategy. Because natural resource systems operate at multiple temporal and spatial scales and involve interactions among many component systems, the strategies for monitoring and management response actions for indicators will vary. As mentioned above, there are currently four tiers of resource and visitor experience parameters that will be evaluated as part of this process (Table 1). Figure 1 depicts how these parameters fit into the

proposed adaptive management strategy for traffic patterns and volume on the park road.

Overview of four tiers of resource and visitor experience parameters

Tier 1

The first tier includes indicators with specified standards which are associated with traffic levels and traffic patterns on the park road. These indicators and their associated standards will initially limit traffic volumes on the park road, though further limitations may result from the higher-tiered parameters. Monitoring tools will allow resource managers to summarize and assess these indicators frequently (multiple times a season) to adjust traffic levels or schedules in a timely fashion, primarily between seasons but with some ability to respond within a season. Predictive modeling will allow for more informed analysis of potential impacts to these indicators prior to implementation of any transportation changes, so the uncertainty associated with these indicators is relatively low. These indicators include crowding standards for the number of vehicles at wildlife stops, in a viewscape, and at a rest area; the spacing of vehicles to ensure time for sheep crossings, restrictions to night-time traffic volumes, and restrictions to large (construction-related) vehicle traffic. A seventh indicator, amount of time hikers wait along the road for pick-up by a bus, will not impact vehicle numbers specifically but will define the allocation between tour and transit buses.

Tier 2

Second tier parameters assess natural resource/wilderness conditions, and visitor satisfaction that will be monitored long term specifically to address the impacts of traffic on important resources and visitor experience. These are monitoring programs that are not part of the NPS Inventory and Monitoring program but rather are conducted specifically for wildlife along the road corridor and for monitoring visitor satisfaction. Monitoring would occur at intervals appropriate to the scale of the information collected (generally every 1 – 5 years). Data collected may need to be synthesized with additional information (i.e. tier 3 and 4 parameters) to make conclusions about the source of impacts. Tier 2 parameters include the distribution and number of wildlife sightings of large mammals along the road and visitor satisfaction with factors such as vehicle crowding levels and wildlife sightings.

Tier 3

Third tier parameters will be evaluated using an experimental design. A Before-After, Control-Impact (BACI) study design will be employed which is based on the principle that if two locations (control and impact) are monitored before and after a human-caused disturbance (in this case an experimental change in the transportation system) the impact location may show a different pattern after the disturbance than the control site (Underwood 1994, Smith 2002). BACI studies measure the change in the differences among sites between the two time periods (before and after impact) rather than only measuring the overall magnitude of difference between the sites, thereby controlling for differences unrelated to the impact of interest. Consequently, park managers can attribute resource impacts to the management action if after the action, the magnitude of these difference values changes significantly from the observations before the action. Indicators evaluated using this experimental design will be assessed using discrete studies that will be implemented before and after any change in the transportation system and each will be of limited time duration. These parameters will not be subject to long term monitoring. Indicators include movement rates of grizzly bears and Dall sheep when crossing the park road, the distribution of bear inactive periods relative to the road, and the probability and timing of sheep crossings.

Tier 4

Fourth tier parameters are those resources already being monitored by long-term inventory and monitoring programs that may help evaluate trends observed in tier 1-3 indicators and parameters. By following trends seen in wildlife populations monitored throughout the park, managers should be able to better tease apart traffic impacts from other possible factors affecting populations. Parameters include long-term monitoring of wolves, caribou, moose and Dall sheep population numbers and distribution, wildlife-visitor incident records and distribution and number of breeding birds.

Additional studies may be implemented to address the potential confounding effects of climate change. It may be necessary to conduct research or other information gathering to be able to separate the impacts of climate change or other large-scale directional changes from those associated with the transportation plan.

Table 1. Indicators and other metrics being considered to limit vehicles on the Denali Park Road and to monitor natural resource condition following the implementation of the Vehicle Management Plan. A Before-After-Control-Impact study is planned whereby data collected before implementation will be compared to data collected after implementation to ensure that there are no significant changes. Some data would be collected every year (annual frequency) while other data would be collected less frequently. Data are divided into Tiers that describe their source, frequency of collection and how they are used in evaluating the natural resource condition.

TIER 1: indicators with specific mechanistic links and standards associated with traffic levels and scheduling on the park road

Indicator	Description
Sheep gap spacing	Provide gaps in traffic (periods of no traffic) to occur each hour for a minimum duration of time at critical sheep migration corridors.
Night-time traffic	Manage the amount of traffic allowed to travel the road at night to minimize impacts on day-time wildlife sightings.
Number of vehicles at a wildlife stop	Manage the number of vehicles at wildlife stops primarily through traffic volume and scheduling, incorporate driver behavior secondarily.
Number of vehicles in a viewscape	Manage the number of vehicles visible in iconic viewscapes through traffic volume and scheduling.
Number of vehicles at rest stops	Manage the number of vehicles at rest stops based on the design standards and capacity of the individual facilities.
Hiker wait time	Maintain a minimum wait time for hikers along the road to be picked up by a bus by providing adequate transit service.

TIER 2: natural resource and wilderness conditions that will be monitored long term specifically to address the impacts of traffic

on important resources

Metric	Description of data collection
% chance of seeing a grizzly bear on road trip	Data collected by bus drivers using SLCD panels from 2007 – current. Written observation data collected by bus drivers from 1996-2007. From 2010 to current, focused effort by park staff to ride buses and collect wildlife observation data.
% chance of seeing "big 5" on road trip	Data collected by bus drivers using SLCD panels from 2007 – current. Written observation data collected by bus drivers from 1996-2007. From 2010 to current, focused effort by park staff to ride buses and collect wildlife observation data.
Distribution of wildlife sightings (spatially and temporally)	Data collected by bus drivers using SLCD panels from 2007 – current. Written observation data collected by bus drivers from 1996-2007. From 2010 to current, focused effort by park staff to ride buses and collect wildlife observation data.
Visitor Satisfaction	The VSP tool would be used to ensure continued high levels of satisfaction. It would be implemented along with the post-impact BACI study and would continue to be conducted every 2-4 years.

TIER 3: parameters that will be evaluated using a Before-After, Control-Impact (BACI) experimental design.

Metric	'Before' Data	Proposed 'After' Data
Timing and location of Dall sheep and grizzly bear crossings (remote)	GPS collaring studies conducted in 2006 (grizzly bears) and 2007 (Dall sheep). Draft reports are available.	GPS collaring studies will be repeated once the Vehicle Management Plan and new Concession Contract/s are initiated
Timing and location of Dall sheep and grizzly bear crossings (by	Road study staff observations and, from 2010 to current, focused effort by park staff to ride	Road study staff observations and, from 2010 to current, focused effort by park staff to ride buses

observation)	buses and collect wildlife observation data.	and collect wildlife observation data.
Movement rate of bears and sheep when crossing or "near" park road	GPS collaring studies conducted in 2006 (grizzly bears) and 2007 (Dall sheep). Draft reports are available.	GPS collaring studies will be repeated after the Vehicle Management Plan and new Concession Contract/s are initiated
Distribution of bear inactive periods relative to road	GPS collaring studies conducted in 2006 (grizzly bears) and 2007 (Dall sheep). Draft reports are available.	GPS collaring studies will be repeated after the Vehicle Management Plan and new Concession Contract/s are initiated
Probability and timing of sheep crossings	GPS collaring studies conducted in 2006 (grizzly bears) and 2007 (Dall sheep). Draft reports are available.	GPS collaring studies will be repeated after the Vehicle Management Plan and new Concession Contract/s are initiated
Distribution of bears and sheep	GPS collaring studies conducted in 2006 (grizzly bears) and 2007 (Dall sheep). Draft reports are available.	GPS collaring studies will be repeated after the Vehicle Management Plan and new Concession Contract/s are initiated

TIER 4: data collection for resources already being monitored by long-term inventory and monitoring programs

Metric	Description of data collection
Monitoring for population size and demographic parameters for:	
Dall sheep	Prior to 2008, sheep censuses in Denali were irregular and composed primarily of ground surveys obtaining information on age and sex composition as well as population size. These data collection efforts were supplemented with infrequent aerial surveys. Since 2008, the Central Alaska Network has been developing and implementing standardized methods for aerial sheep surveys that will rotate among Denali, Wrangell - St. Elias National Park and Preserve and Yukon – Charley Rivers

	National Preserve (NPS 2009).
Wolves	At least one wolf in each pack of wolves within Denali National Park and Preserve is kept either radio- or GPS/ARGOS collared and the pack's locations and sizes are monitored multiple times throughout the year. Annual population counts are estimated through these data to monitor the population (Meier 2009). In 2011, additional collars were placed on wolves within each pack to provide more detailed information on survival and movements for different age classes. This collaring may be continued.
Caribou	Denali Caribou Herd censuses occur annually for population size, calf production, calf recruitment, adult female survival, herd composition and herd location and distribution. Since 1986, approximately 50 adult female caribou within the herd have carried radio collars to assist in the collection of these data (Adams and Roffler 2009). Since 2007, approximately 50 adult male caribou from the Denali herd have been radio-collared and located periodically throughout the year. In addition, the implementation of 20 GPS collars on Denali caribou from 2010 – 2013 will provide more fine-scale data on caribou distribution and movements.
Moose	Aerial population census surveys for moose are conducted in Denali approximately every 3 years. The most recent survey, conducted in 2008, suggested a population size of 1279 moose in the survey area on the north side of the range (Owen and Meier 2009). Because moose surveys depend on snow cover and are conducted in early winter, they do not provide information on moose distribution during the season when the park road is open.

Figure 1. Flow chart depicting the adaptive management strategy proposed by Denali to manage traffic patterns and volumes along the park road. A set of five indicators and standards will initially limit traffic along the park road (purple boxes). No degradation of natural resource condition (blue and peach boxes) or visitor experience (yellow boxes) would be ensured through proposed monitoring strategies and these may further limit the number of vehicles on the park road.

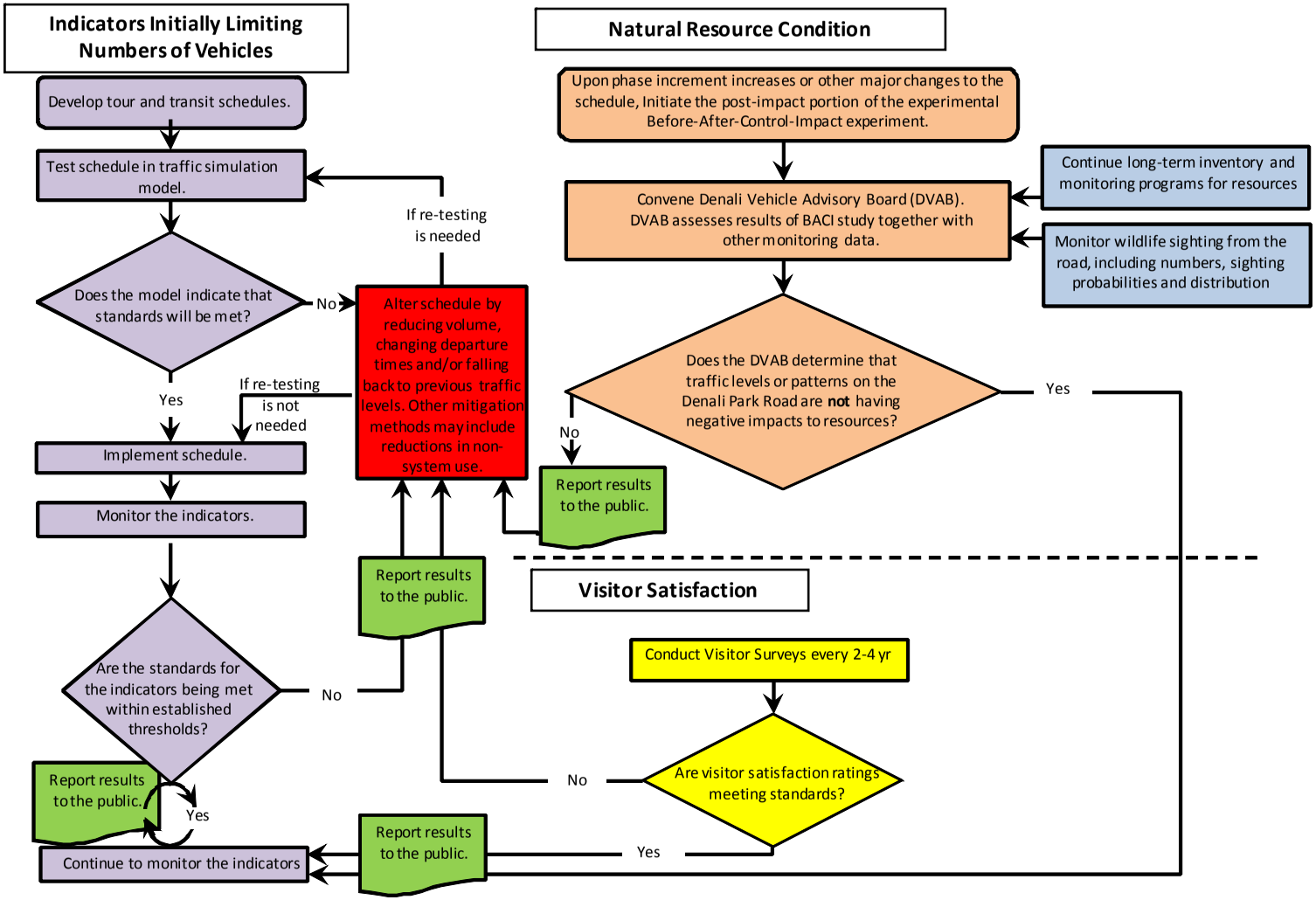

Table 2. Summary of proposed standards for the seven Tier 1 indicators of the Vehicle Management Plan and Environmental Impact Statement. Wildlife viewing subzone 1 extends from the Savage River Check Station to the Teklanika Bridge. In Alternative B, wildlife viewing subzone 2 extends from the Teklanika Bridge to the Old Park Boundary north of Wonder Lake. In Alternatives C and D, wildlife viewing subzone 2 extends from the Teklanika Bridge to the Eielson Visitor Center and from the Wonder Lake Campground 'Y' to the Old Park Boundary north of Wonder Lake. Wildlife viewing subzone 3 is proposed in alternatives C and D, and would extend from the Eielson Visitor Center to the Wonder Lake Campground 'Y'. Bus operating hours are from approximately 6 am to 10 pm. Many of the standards (number of vehicles at wildlife stops and in viewscapes, sheep gaps and hiker wait time) incorporate a 5 year average to allow for aberrant years. Monitoring results will be reported to the public annually, however, for these standards, the park would only be considered out of compliance with the standard if it was below the minimum value reported for each standard, or if a 5 year average was below the desired (higher percentage) condition. For example, for the number of vehicles at a wildlife stop in wildlife viewing subzone 1, the park would be considered out of compliance with the standards if one year had fewer than 70% of stops with 3 or fewer vehicles, or if a 5 year average was less than 75% of stops with 3 or fewer vehicles.

	Standards		
Indicator	Wildlife Viewing Subzone 1	Wildlife Viewing Subzone 2	Wildlife Viewing Subzone 3
Number of vehicles at a wildlife stop	At least 75% of wildlife stops will have 3 or fewer vehicles, averaged over 5 years. No one year will have less than 70% of wildlife stops with 3 or fewer vehicles.	At least 75% of wildlife stops will have 2 or fewer vehicles, averaged over 5 years. No one year will have less than 70% of wildlife stops with 2 or fewer vehicles.	At least 75% of wildlife stops will have 1 or fewer vehicles, averaged over 5 years. No one year will have less than 70% of wildlife stops with 1 or fewer vehicles.
	At least 90% of wildlife stops will have 4 or fewer vehicles, averaged over 5 years. No one year will have less than 85% of wildlife stops with 4 or fewer vehicles.	At least 90% of wildlife stops will have 3 or fewer vehicles, averaged over 5 years. No one year will have less than 85% of wildlife stops with 3 or fewer vehicles.	At least 90% of wildlife stops will have 2 or fewer vehicles, averaged over 5 years. No one year will have less than 85% of wildlife stops with 2 or fewer vehicles.
	At least 95% of wildlife stops will	At least 95% of wildlife stops will have	At least 95% of wildlife stops will

	have 5 or fewer vehicles, averaged over 5 years. No one year will have less than 90% of wildlife stops with 5 or fewer vehicles.	4 or fewer vehicles, averaged over 5 years. No one year will have less than 90% of wildlife stops with 4 or fewer vehicles.	have 3 or fewer vehicles, averaged over 5 years. No one year will have less than 90% of wildlife stops with 3 or fewer vehicles.
Number of vehicles in a viewscape	At least 85% of the time during bus operating hours, there will be 3 or fewer vehicles visible in the Mile 26 viewscape, averaged over 5 years. No one year will have less than 80% of the time during bus operating hours having 3 or fewer vehicles visible in the Mile 26 viewscape.	At least 85% of the time during bus operating hours, there will be 2 or fewer vehicles visible in the Miles 55 and 62 viewscapes, averaged over 5 years. No one year will have less than 80% of the time during bus operating hours having 2 or fewer vehicles visible in the Miles 55 and 62 viewscapes.	At least 85% of the time during bus operating hours, there will be 1 or fewer vehicles visible in the Mile 68 viewscape, averaged over 5 years. No one year will have less than 80% of the time during bus operating hours having 1 or fewer vehicles visible in the Mile 68 viewscape.
	At least 95% of the time during bus operating hours, there will be 4 or fewer vehicles visible in the Mile 26 viewscape, averaged over 5 years. No one year will have less than 90% of the time during bus operating hours having 4 or fewer vehicles visible in the Mile 26 viewscape.	At least 95% of the time during bus operating hours, there will be 3 or fewer vehicles visible in the Miles 55 and 62 viewscapes, averaged over 5 years. No one year will have less than 90% of the time during bus operating hours having 3 or fewer vehicles visible in the Miles 55 and 62 viewscapes.	At least 95% of the time during bus operating hours, there will be 2 or fewer vehicles visible in the Mile 68 viewscape, averaged over 5 years. No one year will have less than 90% of the time during bus operating hours having 2 or fewer vehicles visible in the Mile 68 viewscape.
Number of vehicles parked at one time at:			
Teklanika rest stop	No more than 12 buses at one time with a total of no more than 16 vehicles		

Toklat rest stop		No more than 11 buses at one time with a total of no more than 16 vehicles	
Eielson Visitor Center		No more than 10 buses at one time with a total of no more than 19 vehicles	
Sheep Gap Spacing	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 5 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 5 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 5 years. No one year will have less than a 90% success rate (22 of 24 hours).
Night-time traffic	There will be an average 3 vehicles or fewer per hour (total westbound and eastbound) passing any of the traffic counters west of Savage between 10 pm and 6 am, with a 95% success rate, and with never more than 6 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 night-time 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 2 weeks and no more than two exemption periods in an operating season for the purpose of experimental increases in traffic.		
Large vehicle traffic	There will never be more than 4 vehicles (total westbound and eastbound) larger than 80,000 lbs gross vehicle weight (GVW) 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.
Hiker Wait Time	At least 75% of hikers will have wait times of less than 30 minutes for pick-up by a bus, averaged over 5 years. No one year will have less than 70% of hikers with wait times of less than 30 minutes.
	At least 95% of hikers will have wait times of less than 60 minutes for pick-up by a bus, averaged over 5 years. No one year will have less than 93% of hikers with wait times of less than 60 minutes.
	At least 99% of hikers will have wait times of less than 90 minutes for pick-up by a bus, averaged over 5 years. No one year will have less than 98% of hikers with wait times of less than 90 minutes.

Tier 1: Indicators Limiting the Number of Vehicles on the Park Road

Of the seven tier 1 indicators identified, six of them would ultimately limit the volume of traffic past the Savage Check Station on the Denali park road. Three of them are designed to protect wildlife by controlling sheep gap spacing, night-time traffic and construction traffic volumes. The other three would protect the visitor experience by limiting the numbers of vehicles at wildlife stops, in viewscapes and at rest stops. The seventh indicator (hiker wait time) is designed to ensure a viable transit system and would not ultimately influence the numbers of vehicle allowed on the road but would influence the allocation of those vehicles between tour and transit services. The standards for these indicators are summarized in Table 2.

Numbers of Vehicles at Wildlife Stops, in Viewscapes and at Rest Stops

As part of the Road Capacity Study, researchers from the University of Vermont conducted qualitative visitor surveys in 2006 to identify factors that are important to visitor satisfaction and that would make for readily measurable indicators. While a number of indicators were identified that were important to the visitor experience, three that related specifically to vehicle crowding on the road were considered. The selected factors were the number of vehicles at wildlife stops, in iconic viewscapes and at rest stops. Quantitative surveys were then conducted in 2007 resulting in the development of social norm curves (Manning 2007, Manning and Hallo 2009, Manning and Hallo 2010) to help the park understand how current crowding levels related to visitor perceptions. For these surveys, visitor reactions were discerned to increasing numbers of vehicles. Visitors were shown a series of photos of the same scene with increasing numbers of buses and asked to score each photo from 4 (very acceptable) to -4 (very unacceptable). Social normative curves were fit to the results to identify visitor reactions to different crowding levels and provide guidance to park management in setting standards. For the numbers of vehicles parked at one time at the Teklanika and Toklat rest stop and at the Eielson Visitor Center park management has decided to use

the design standards of those facilities to determine the number of vehicles parked at one time.

Standards

The over-arching goal for setting these standards is to maintain or improve the current condition, or to maintain numbers of vehicles at these locations similar to or less than what they are currently. Several sources of data were considered in developing these standards, including results of visitor surveys (Manning and Halo 2010), staff observations of the park road (Phillips et al. 2012), and results of the traffic model.

Results of the social normative curves developed by Manning and Halo (2010) indicate visitor acceptance of different crowding levels (Table 3). From 2007-2010 the Denali Park Road Capacity Study collected information on numbers of vehicles at wildlife stops, in viewscapes and at rest stops/visitor center. In addition, the Minnesota Traffic Observatory was requested to assess the conditions for the day on which their model is based (July 25, 2007) using a combination of actual GPS location data for the buses and the traffic model.

Table 3. Results from the 2007 quantitative visitor surveys (Manning and Halo 2010). Denali management considered three levels of visitor-perceived crowding to be the range of values to consider for standards. 'Preference' is the level of vehicle crowding visitors reported being what they would prefer to see; 'typically seen' is the level visitors reported as being most representative of that they saw on their trip out the road (based on staged photographs they were shown); and 'acceptable' is the 50th percentile of the distribution of the curves, whereby 50% of people found that level of crowding acceptable and 50% found it unacceptable. The scenic rest stop area for this study was Polychrome, which is no longer in existence as a rest stop.

	Norm Standard Levels (number of buses)		
Crowding Indicator	Preference	'Typically Seen'	Acceptable
Scenic Rest stop Area	2.24	3.57	5.48
Iconic Road	2.43	3.80	5.95
Alternate Road	2.17	3.51	5.68
Wildlife Encounter	1.75	3.06	4.85

Number of vehicles stopped at the same location to view wildlife

The current average number of vehicles stopped at wildlife sightings has ranged from 1.58 to 1.69 over the last 4 years based on staff observations (Table 4). These values represent only stops to observe wildlife with at least one vehicle present (i.e. when road study staff observe wildlife with no other vehicles present, these occurrences are not included). In these observations, typically at least 50% of the wildlife stops have only one vehicle present. 75% of the wildlife stops have one or two vehicles present. The maximum value reported in staff observations is 7 and this value occurs approximately 1 % of the time (Table 4). In their assessment of current condition, the Minnesota Traffic Observatory estimates the average number of vehicles at wildlife stops to be 0.70. Their estimated maximum is 8 vehicles, occurring much less than 1 % of the time (Table 4).

When these results are placed in context with the visitor survey results, the park is generally achieving 'preference' more than 75% of the time, achieving the perceived 'typically seen' more that 90% of the time and 'acceptable' more that 95% of the time (Table 5). With a desire to preserve this distribution, whereby most stops will have 2 or fewer vehicles but some stops will have 3 or more, the park is proposing the gradient of standards as presented in Table 2 (see pages 9 – 11) and achieve these values over a 5 year time period to allow for aberrant years. Monitoring results will be reported to the public annually, however, the park would only be considered out of compliance with the standard if the results are below the minimum value reported for each standard, or if a 5 year average was below the desired (higher percentage) condition (Table 2).

Table 4. Mean and maximum numbers of vehicles at wildlife stops based on the exponential distribution of the data estimated by the Minnesota Traffic Observatory (MTO) and observed Denali National Park and Preserve (DNPP) staff.

	Mean	Maximum	Sample Size
2007 - MTO	0.70	8	30 simulations
2007 – DNPP Staff	1.58	6	65
2008 – DNPP Staff	1.69	6	91
2009 – DNPP Staff	1.64	7	68
2010 – DNPP Staff	1.59	7	333

Table 5. Proportion of wildlife viewing stops that have equal to or fewer vehicles. For example, for the combined data, 89% of observed wildlife stops had 3 or fewer vehicles present. Data in the columns labels 2007 – 2010 are from wildlife stops observed by the Road Capacity Study. Column labeled 'Combined' are an average of the 4 yr of Road Capacity Study data. Column labeled 'Model/GPS' are results of the traffic model for the current condition. Gray lines highlight where the results of the Manning and Hallo (2010) study are in reference to the data collected by the Road Capacity Study or generated by the traffic model, with the assumption that the 'observing bus' was not counted in the visitor surveys (i.e. one bus has been added to the Manning and Hallo (2010) results for comparison purposes).

	# of Vehicles	2007	2008	2009	2010	Combined	Model/GPS
	1	0.52	0.47	0.50	0.54	0.52	0.79
	2	0.77	0.76	0.75	0.77	0.77	0.96
Preference	2.75 including observing bus						
	3	0.92	0.88	0.91	0.88	0.89	0.99
	4	0.97	0.90	0.93	0.95	0.94	1.00
'Typically seen'	4.06 including observing bus						
	5	0.98	0.97	0.96	0.98	0.97	1.00
Acceptable	5.85 including observing bus						
	6	1.00	1.00	0.99	0.99	0.99	1.00
	7			1.00	1.00	1.00	1.00
	8						1.00

Number of vehicles visible at one time in scenic viewscapes

There was good agreement with the Minnesota Traffic Observatory (MOT) results and staff observations for each of the viewscapes (Tables 6, 7 and 8). Both staff observations and MTO results were recorded the same way: every 2 minutes the number of vehicles in the viewscape, from specified start and end points, were recorded, hence zeros are

frequent. However, as zeros occur with high frequency during off-peak times (overnight), their inclusion can bias the average low, so the decision has been made to use data only when there is a vehicle present (Tables 6, 7 and 8). Again, similar to how the standards for wildlife stops were developed, the park is recommending different levels of crowding to protect the predominance of very low levels of crowding currently observed (Table 2, see pages 9-11) and achieve these values over a 5 year time period to allow for aberrant years. Monitoring results will be reported to the public annually, however, the park would only be considered out of compliance with the standard if the results are below the minimum value reported for each standard, or if a 5 year average was below the desired (higher percentage) condition (Table 2).

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Table 6. Proportion of observed time that equal to or fewer vehicles are observed in the Mile 26 viewscape. For example, when there is a vehicle present (excluding 'zero' observations) 97% of the time there are 3 or fewer vehicles in the viewscape. Data are from staff observation by the Road Capacity Study. Gray lines highlight where the results of the Manning and Hallo (2010) study are in reference to the data collected by the Road Capacity Study or generated by the traffic model, with the assumption that the 'observing bus' was not counted in the visitor surveys (i.e. one bus has been added to the Manning and Hallo (2010) results for comparison purposes). The Mile 26 viewscape was not part of the Manning and Hallo (2010) study; however the visitor preference values for the 'alternative road' viewscape were applied here.

	Excluding 'zero' observations	
	Vehicles	STAFF OBS
	1	0.53
	2	0.87
	3	0.97
Preference	3.17 including observing vehicle	
	4	0.99
'Typically seen'	4.51 including observing vehicle	
	5	1.00
	6	1.00
Acceptable	6.68 including observing vehicle	

Table 7. Proportion of observed time that equal to or fewer vehicles are observed in the Mile 55 viewscape. For example, when there is a vehicle present (excluding 'zero' observations) 92% of the time there are 3 or fewer vehicles in the viewscape. Data are from staff observation by the Road Capacity Study. Gray lines highlight where the results of the Manning and Hallo (2010) study are in reference to the data collected by the Road Capacity Study or generated by the traffic model, with the assumption that the 'observing bus' was not counted in the visitor surveys (i.e. one bus has been added to the Manning and Hallo (2010) results for comparison purposes).

	Excluding 'zero' observations	
	Vehicles	STAFF OBS
	1	0.57
	2	0.80
	3	0.92
Preference	3.17 including observing vehicle	
	4	0.97
'Typically seen'	4.51 including observing vehicle	
	5	0.99
	6	1.00
Acceptable	6.68 including observing vehicle	

Table 8. Proportion of observed time that equal to or fewer vehicles are observed in the Mile 62 viewscape. For example, when there is a vehicle present (excluding 'zero' observations) 93% of the time there are 3 or fewer vehicles in the viewscape. Data are from staff observation by the Road Capacity Study. Gray lines highlight where the results of the Manning and Hallo (2010) study are in reference to the data collected by the Road Capacity Study or generated by the traffic model, with the assumption that the 'observing bus' was not counted in the visitor surveys (i.e. one bus has been added to the Manning and Hallo (2010) results for comparison purposes).

	Excluding 'zero' observations	
	Vehicles	STAFF OBS
	1	0.50
	2	0.84
	3	0.93
Preference	3.43 including observing vehicle	
	4	0.96
'Typically seen'	4.80 including observing vehicle	
	5	1.00
	6	1.00
Acceptable	6.95 including observing vehicle	

Number of vehicles parked at any one time at rest stops and at the Eielson Visitor Center

For the Teklanika and Toklat rest stops and the Eielson Visitor Center, park management recommends using the design standards for the parking lots for each of those facilities as the standards for numbers of vehicles parked at any one time (Table 2, see pages 9-11).

Monitoring strategy - Alternative A (no action)

- Vehicles at wildlife stops, in viewscapes and at rest stops. Under this alternative, the current level of 10,512 vehicles per season would be maintained and Denali would not establish indicators and standards. It would be anticipated that the current condition would be maintained and no monitoring for numbers of vehicles at wildlife stops, in viewscapes, or at rest stops and the Eielson Visitor Center would be conducted.

Monitoring strategy - Action Alternatives B, C & D

- Number of vehicles stopped at the same site to view wildlife. This indicator would be monitored both remotely and directly. For remote monitoring, all buses (concessioner and lodge) and NPS vehicles would be equipped with GPS units that will store and transmit data for each trip. In addition, other park road users would be issued GPS units on a voluntary basis. These data would be analyzed at the end of the season to ensure numbers of vehicles at any given wildlife stop do not exceed the standard. For direct monitoring, staff would periodically monitor wildlife stops using set protocols from both government vehicles and concessioner buses to ensure the standard and is not exceeded and/or the success rate is being met. Both the direct and indirect data would be used to determine if the standard is being exceeded. If the standard is not being met, mitigation steps would include changes to the schedule, removal of buses from the schedule, or stepping the system back to the level it was last operating at without exceeding the standards. These changes would occur between seasons.

- Number of vehicles visible at one time in scenic viewscapes. The units of the standard would be the number of vehicles visible in a designated length of the park road at any given time. Four viewscapes have been identified where the viewscape contains one or more miles of the park road. The exact length of road visible for each viewscape varies. These viewscapes occur at approximately miles 26, 55, 62 and 68. These values would be averaged over days, weeks, months and or the season.

  This indicator would be monitored both remotely and directly. For remote monitoring, all buses (concessioner and lodge) and NPS vehicles would be equipped with GPS units that would store and transmit data for each trip. In addition, other park road users would be issued GPS units. For professional photographers, these units would be required as a condition of their permit. These data would be analyzed at the end of the season to ensure numbers of

vehicles visible in scenic viewscapes do not exceed the standard. For direct monitoring, staff would periodically monitor viewscapes using established protocols to ensure the standard is not exceeded. Both the direct and indirect data would be used to determine if the standard is being exceeded. If the standard is not being met, mitigation steps would include changes to the schedule, removal of buses from the schedule, or stepping the system back to the level it was last operating at without exceeding the standards. These changes would occur between seasons.

- Number of vehicles parked at any one time at rest stops and at the Eielson Visitor Center. The units of the standard would be the number of vehicles parked at a rest stop or the Eielson Visitor Center at any given time. The rest stops are Teklanika and Toklat. The standards set will vary between the three sites as each has different design capacities for their facilities. As with wildlife stops, to allow for unexpected events, it is possible the park will set a desired success rate that would allow the standard to be exceeded a small number of times before management action is taken.

  This indicator would be monitored both remotely and directly. For remote monitoring, all buses (concessioner and lodge) and NPS vehicles would be equipped with GPS units that would store and transmit data for each trip. In addition, other park road users would be issued GPS units on a voluntary basis. These data would be analyzed at the end of the season to ensure numbers of vehicles parked at rest stops or at the Eielson Visitor Center at any one time do not exceed the standard. For direct monitoring, staff would monitor parking areas at the rest stops and the Eielson Visitor Center using both government vehicles and by riding concessioner buses to ensure the standard is not exceeded. Both the direct and indirect data would be used to determine if the standard is being exceeded. If the standard is not being met, mitigation steps would include changes to the schedule, removal of buses from the schedule, or stepping the system back to the level it was last operating at without exceeding the standards. These changes would occur between seasons.

Sheep Gap Spacing

Results of the Road Capacity Study (Phillips et al. 2010) combined with earlier studies (Tracy 1977, Singer and Beattie 1986, Burson et al. 2000) suggest that while there is no strong evidence of mechanistic relationships between traffic volumes or patterns and

wildlife distribution or movements that would lead to clear indicators and standards, there are hints of negative relationships that warrant caution before implementing changes to the current traffic levels. The clearest negative impacts detected were in the ability of Dall sheep to move across the park road and reductions in sightings of large mammals along the road corridor following periods of high night-time traffic levels (Phillips et al. 2012).

In 2007, 20 Dall sheep were outfitted with GPS collars and 18 of those provided location data throughout that season (mid-May to mid-September). Results of that study demonstrated that sheep move farther away from the road at higher traffic volumes, suggesting that increases in traffic volume may impede them further. If the sheep maintain farther distances from the road, this could reduce the amount of habitat available for foraging, which is most relevant during the spring when sheep frequently cross the road and vegetation has not yet emerged at higher elevations (Putera and Keay 1998, Dalle-Molle and Van Horn 1991, Phillips et al. 2010). As a result the park is proposing an indicator which would require that a gap in traffic occur each hour for a minimum length of time. There are critical locations along the road corridor that are known crossing points and these would be monitored to ensure that the gap is occurring. Any proposed schedule will first be run through the traffic simulation model to test if it is likely to provide the desired gaps in traffic.

Standard

The results of the 2007 study corroborated what has been shown in other studies: that Dall sheep are inhibited from crossing the road at high traffic levels. Putera and Keay (1998) observed that in periods of no traffic, Dall sheep readily crossed the Park Road. Times to cross the road were 2, 3 and 13 minutes, with an average of 6 minutes (Putera and Keay 1998, their Table 8). Based on these observations, the standard for this indicator is a 10 minute gap in traffic at key sheep crossing locations (miles 21.6, 37.6, 52.8, 60.6, 68.5) with a 95% success rate for each crossing location, in other words, each location will have the gap at least 23 out of every 24 hours, averaged over 5 years to allow for aberrant years. However, no year will have less than a 90% success rate (22

out of every 24 hours). Monitoring will be ongoing and results will be reported to the public annually, however, in a given year, the park will not be out of compliance with the standard unless the success rate is less than 90%, or a 5 year average is less than a 95% success rate. The 10 minute Dall sheep gap spacing offers the best likelihood of balancing the need to not disrupt the migratory pattern of the less habituated sheep groups with the desire to not unnecessarily restrict traffic and thus displace visitors.

While sheep migrations are seasonal, the intention is to maintain the sheep gaps throughout the season. Maintaining these gaps throughout the system is important for ensuring that standards are not violated in the critical migration crossing while maintaining a smooth traffic flow. There are three reasons for maintaining the gaps throughout the season in decreasing order of importance. 1) Uncertainty as to the exact variation in timing of migration or foraging movements especially in the light of climate changes. 2) There are other species that must cross the road and are affected by traffic and they have experienced historically a traffic level which has allowed at least one 10 minute gap in vehicles an hour. Significant uncertainty exists about the relationship between traffic and these species. 3.) Having a system which varies based on the presence of sheep would require significantly increased complexity to maintain and would probably require continual radio-tracking of sheep, which presents unacceptable risks.

Monitoring strategy - Alternative A (no action)

- Sheep Gap Spacing. Under this alternative, the current level of 10,512 vehicles per season would be maintained and Denali would not establish indicators and standards. However, as the Road Capacity Study has highlighted an issue with sheep crossing, it is likely that 10 minute gaps would still be required under this alternative and schedule adjustments would be made to achieve these gaps.

Monitoring strategy - Action Alternatives B, C & D

- Sheep Gap Spacing. This indicator would be monitored both remotely and directly. For remote monitoring, all buses (concessioner and lodge) and NPS vehicles would be equipped with GPS units that store and transmit data for each trip. In addition, other park road users, such as professional photographers, Kantishna inholders and their visitors, researchers, etc., would be issued GPS units on a voluntary basis. These data would be analyzed to ensure that the standard for hourly gaps in traffic is being met. For direct monitoring, staff would periodically monitor critical sheep crossing sites during peak traffic times to ensure the standard is not being exceeded. Both the direct and indirect data

would be used to determine if the standard is being exceeded. If the standard is not being met, mitigation steps would include changes to the schedule, removal of buses from the schedule, or stepping the system back to the level it was last operating at without exceeding the standards. These changes would occur between seasons.

Night-time Traffic Levels

Currently, concession buses are on the restricted section of the road from about 06:00 am to 10:00 pm, with normal night-time traffic levels outside of these hours being very low (0-2 vehicles per hour based on traffic counters). While it is unclear what the exact relationship is between this period of low traffic and wildlife behavior along the road corridor, analyses have shown that unusually high night-time traffic levels have a strong correlation with decreased wildlife sightings the following morning (Phillips et al. 2012). As a result, Denali will limit the numbers of vehicles driving through wildlife sensitive areas during the night-time hours (10 pm to 6 am) to preserve and protect day-time wildlife sightings.

Standard

There will be an average of three or fewer vehicles per hour (total westbound and eastbound) passing any of the traffic counters west of Savage between 10 pm and 6 am, with never more than six vehicles in any one hour.

Monitoring strategy - Alternative A (no action)

- Night-time traffic levels. Under this alternative, the current level of 10,512 vehicles per season would be maintained and the contractor traffic, which operates principally at night, would continue to not be counted within the 10,512 limit. Also under this alternative, Denali would not establish indicators and standards. However, given that the Road Capacity Study has identified that high night-time traffic volumes result in decreased wildlife sightings, it is likely that mitigation efforts would be taken to limit night-time traffic and influence behavior of large vehicles (i.e. reduce speed and brake noise). Wildlife sightings data would continue to be collected from the buses.

Monitoring strategy - Action Alternatives B, C & D

- Night-time traffic levels. This indicator would be monitored remotely using traffic counters at several locations along the park road. These data would be used to determine if the standard is being exceeded.

Large Vehicle Traffic

One of the uncertainties relating to the relationship between night-time traffic and morning wildlife sightings is the specific impact of large vehicles, including both contractor vehicles and NPS maintenance vehicles and there is concern that large vehicles will have a similar impact at any time of day. These impacts may be due to the nature and behavior of these vehicles in that they produce more noise and dust; and likely move more quickly when passing wildlife than do visitor buses that stop to view the wildlife. Thus modifications to vehicle speed and behavior may help to mitigate impacts. However, in addition to any modifications in behavior, Denali will limit the numbers of large vehicles driving through wildlife sensitive areas during all hours of the day to reduce impacts to wildlife and preserve wildlife sighting opportunities.

Due to the uncertainties surrounding the current data, additional studies will be carried out in the upcoming years, and adjustments may be made to the standards based on new information (Table 2).

Standard

For vehicles larger than 80,000 lbs gross vehicle weight (this does not include concessioner buses), there will never be more than six vehicles in any one hour (total westbound and eastbound) passing any of the traffic counters west of Savage at any time of day. 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.

Monitoring strategy - Alternative A (no action)

- Large vehicle traffic levels. Under this alternative, the current level of 10,512 vehicles per season would be maintained and Denali would not establish indicators and standards. However, given that the Road Capacity Study has identified that high night-time traffic volumes, and, potentially, large vehicles in general result in decreased wildlife sightings, it is likely that mitigation efforts would be taken to limit this type of traffic and influence behavior of large vehicles (i.e. reduce speed and brake noise). Wildlife sightings data would continue to be collected from the buses.

Monitoring strategy - Action Alternatives B, C & D

- Large vehicle traffic levels. This indicator would be monitored remotely using traffic counters at several locations along the park road. These data would be used to determine if the standard is being exceeded.

Tier 1: Indicator Monitoring the Effectiveness of the Transit System

Hiker Wait Time

Effectiveness of the transportation system in serving the needs of visitors can be measured by looking at two domains; the ability of visitors entering the park to acquire a seat on a bus and the wait time for hikers reboarding buses to exit the park. Controlling the wait time for hikers requires adequate numbers of buses passing by in a given hour along the full length of the road and for these buses to have room on them to pick up additional passengers. Because of this, wait time for hikers is also an effective indicator for the ability of visitors to acquire a seat into the park.

Hiker wait times that begin to consistently approach or exceed the standard are an indication that there is not adequate transit service and additional buses would be added to the schedule at the times when there is need. Unlike the current General Management Plan and subsequent amendments, this plan will not specify an allocation of concessioner buses between tour and transit (i.e. the current seasonal limits of 2089 tour buses, 3394 transit buses, and 550 annual buses that can be allocated at the Superintendent's discretion). The purpose of not defining this allocation is to maintain flexibility in the system to respond to changing visitor demands. This plan expressly states that transit needs will be prioritized over tours and that transit service will be maintained to a level that meets the standard for hiker wait time. If an increase in transit service is necessary it may be balanced by a decrease in tour services if that is required for compliance with the standards controlling the number of buses on the road.

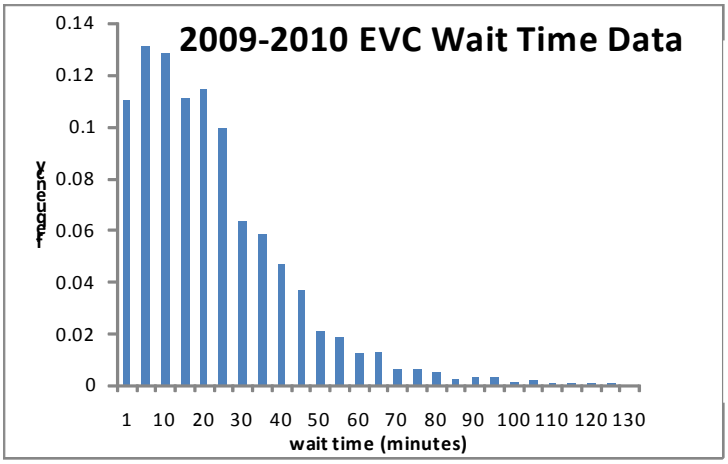
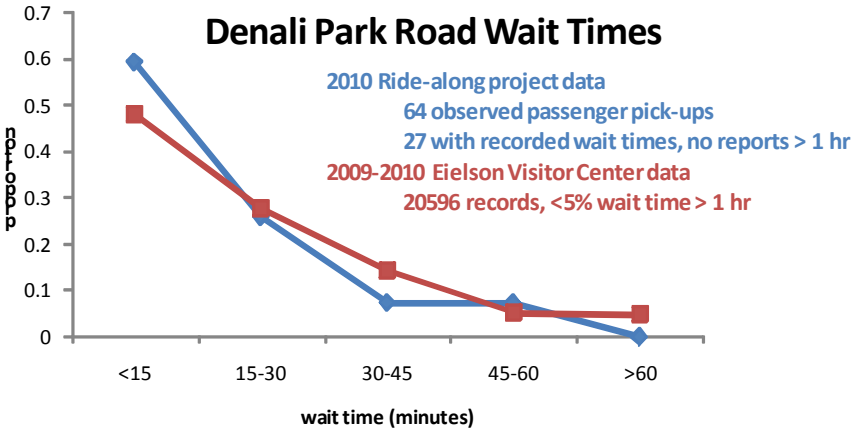


Figure 2. Distributions of wait time for passengers waiting for an east-bound bus at the Eielson Visitor Center. The arithmetic mean of the distribution is 22.5 minutes, the median is 20 minutes.

Figure 3. Comparison of reported wait times from the Eielson Visitor Center data and data collected by NPS staff riding buses.



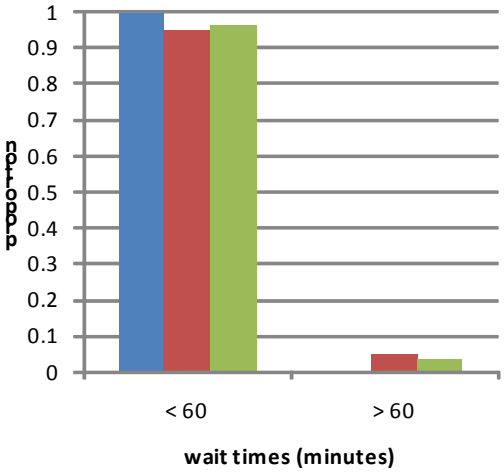


Figure 4. Comparison of reported wait times from the Eielson Visitor Center data (red bar; N = 20596), data collected by NPS staff riding buses (blue bar; N = 27), and data collected by concessioner bus drivers (green bar; N = 5388). Bus driver data is collected only as a yes/no answer to waiting more than one hour.

Standard

Park managers had three sources of data for the current distribution of hiker wait times: data collected by the concessioner at the Eielson Visitor Center (Fig. 2, 3 & 4), data collected by the concessioner bus drivers as they pick up hikers (Fig. 3 & 4); and data collected by NPS staff while riding buses (Fig. 4). As an additional consideration in determining the standard, the current bus transportation contract requires the fleet operator to maintain a one hour or less time period for passengers waiting along the park road west of mile 20. Based on an analysis of the data and the current contract requirement, park management recommends standards as described in Table 2 and achieve these values over a 5 year time period to allow for aberrant years. Monitoring results will be reported to the public annually, however, the park would only be considered out of compliance with the standard if the results are below the minimum value reported for each standard, or if a 5 year average was below the desired (higher percentage) condition (Table 2).

Monitoring strategy - Alternative A (no action)

- Hiker Wait Time. Under this alternative, the current level of 10,512 vehicles per season would be maintained and Denali would not establish indicators and standards. The operating plan of the current concession contract requires that the transit system operate in a demand responsive manner to hikers waiting along the park road for pickup. The NPS standard is to provide transportation within one hour to all passengers waiting along the Park Road west of Mile 20. The Concessioner is required to monitor wait times on an ongoing basis, providing necessary response as needed. The NPS and the Concessioner continually monitor and respond to delays in wait time. When the NPS standard is not expected to be met, the Concessioner may elect to provide additional buses within the parameters of the allocation system. Furthermore, in response to not meeting the NPS standard, the Concessioner may be required to provide additional bus service within 2 hours of notice.

Monitoring strategy - Action Alternatives B, C & D

- Hiker Wait Time. Denali would require the operator of the transportation system to monitor wait times on an ongoing basis along the park road by having bus drivers record how long hikers waited along the road for pick-up. Compliance with this requirement would be tested by the park with spot checks. Data collected through this monitoring would be forwarded to the Commercial Services Division on a regular basis and analyzed for compliance with the

standard. If hiker wait times are not in compliance with the standard, mitigation would include leaving more empty seats on buses leaving the Wilderness Access center and/or adding buses to the schedule. The latter may conflict with the visitor crowding standards and would only be implemented if it would not cause those indicators to be out of compliance with their standards. Mitigation efforts to ensure compliance with the standards controlling the number of buses on the road would include the use of 'deadheads' or empty buses whose behavior would minimize impacts to the crowding standards. If additional buses on the road would negatively impact compliance with the other standards, the park would look to reducing non-system use as specified in Chapter 2 of the EIS. If the standards continue to not be met, as a last resort, allocation may be moved from tours to transit to meet the demand for transit, thereby meeting the wait-time standard, however this can only happen with a two year advanced notice to the concessioner.

Comprehensive Monitoring Strategies to Ensure Traffic Levels Do Not Negatively Impact Natural Resources or Visitor Experience

Natural Resource Condition

The park is proposing a comprehensive monitoring program combined with a formal Before-After-Control-Impact (BACI) study (Underwood 1994, Smith 2002) to ensure that there would be no increased impacts to wildlife along the park road as a result of increased levels of traffic or changes in traffic patterns. The experimental BACI study would involve repeating the satellite telemetry studies of movement and behavior of grizzly bears and Dall sheep to determine if there have been changes attributable to changes in traffic patterns or volume. These data would be combined with the longer-term time series data from the tiers two and four level parameters (Table 1).

Detecting differences attributable to changes in traffic volumes or patterns will be complex and hence Denali is proposing to convene a Denali Vehicle Advisory Board (DVAB) which will be composed of agency and academic scientists. Following the BACI studies, the DVAB will consider all of the available data to determine if there have been detrimental or potentially detrimental impacts on the park's natural resources as a result of traffic volumes or patterns on the park road. Any one metric may show a change after implementation of this plan, but this alone may not be indicative of a problem associated with traffic levels and so the data will be looked at by the DVAB as a

whole. The park will also allow for the flexibility to add or remove metrics to Tiers 2 through 4 parameters (Table 1) based on recommendations by the DVAB.

Monitoring strategy - Alternative A (no action)

- Natural Resource Condition. Under this alternative, the current level of 10,512 vehicles per season would be maintained and Denali would not establish indicators and standards. While ongoing monitoring of some of the metrics listed in Table 1 would continue, they would not explicitly be used to detect impacts to resources.

Monitoring strategy - Action Alternatives B & C

- Tier two parameters. Observations of wildlife along the road corridor would be made on a regular basis by park staff, including information on group size, age and sex composition, and distance from the road. These data will be analyzed to monitor, among other things, wildlife sighting probabilities and distributions along the park road, and distance from the road (Table 1). These data collection efforts would be ongoing.

- Tier three parameters. Upon a major change in traffic volume or patterns, the BACI study would be initiated. This would first occur with implementation of either of the action alternatives and an increase in traffic that is based on what the simulation model indicates is possible over current levels. Simulations currently suggest that an increase of approximately 10% (see Appendix D) of the current allocation of concession buses is possible while still meeting standards, although further modeling may find a more efficient schedule that would allow higher levels of traffic. Given current visitation rates and projections, it is unlikely that the concessioner would be able to realize a 10% increase by implementation in 2015. However, the park would allow up to this 10% increase in 2015. Following the increase in traffic, satellite telemetry studies of grizzly bears and Dall sheep would be reinitiated. Results of this study and the time-series of Tier two and four data would be analyzed by the DVAB to detect detrimental impacts of the traffic on natural resources along the road corridor. Potential detrimental impacts would include evidence of animals increasingly avoiding the road corridor as detected through wildlife sightings data and habitat use studies. Following analysis of results from this study, the DVAB would make recommendations for any further increases in traffic it considered to be possible. The DVAB may also recommend no further increases in traffic or decreases in traffic if detrimental impacts are detected. The BACI study may again be initiated

following additional increases in traffic, with results assessed by the DVAB. Similarly, if no detrimental impacts are detected, additional increases may follow as proposed by the DVAB, potentially accompanied by BACI studies until full implementation of the traffic levels suggested possible by the traffic model. Alternatively, if detrimental impacts are detected at any point in the BACI study, the traffic system would be stepped back to the previous level at which no impact was detected. It is likely that the BACI study would be repeated to determine if the reduction in traffic was effective at mitigation the impact to resources.

- Tier four parameters. These are parameters currently being monitored by the NPS Inventory and Monitoring program and include population surveys for caribou, moose, Dall sheep and wolves along with the collection of certain demographic and distribution data. These data collection efforts would be ongoing.

Monitoring strategy - Action Alternatives D (NPS Preferred Alternative)

- Tier two parameters. Observations of wildlife along the road corridor would be made on a regular basis by park staff, primarily from buses though also from government vehicles, including information on group size, age and sex composition, and distance from the road. These data will be analyzed to monitor, among other things, wildlife sighting probabilities and distributions along the park road, and distance from the road (Table 1). These data collection efforts would be ongoing.

- Tier three parameters. Approximately two years following the implementation of the new concessions contract, including increased tours traveling to Teklanika and the Eielson Visitor Center, the BACI study would be initiated. Satellite telemetry studies of grizzly bears and Dall sheep would be reinitiated. Results of this study and the time-series of Tier two and four data would be analyzed by the DVAB to detect detrimental impacts of the traffic on natural resources along the road corridor. Potential detrimental impacts would include evidence of animals increasingly avoiding the road corridor as detected through wildlife sightings data and habitat use studies. Following analysis of results from this study, the DVAB would make an assessment regarding any impacts of new traffic patterns and any increase in traffic volumes that might have occurred on wildlife. The DVAB may also recommend a decrease in traffic if detrimental impacts are detected. Given current visitation projections, it is possible that following implementation of the new concessions contract, visitation may not increase

substantially, and therefore little increase in traffic levels may be realized. If visitation does increase at some point in the future along with increased traffic volumes higher than the current volumes but less than the 160 daily maximum proposed in this alternative, the BACI study may again be initiated, with results assessed by the DVAB to ensure this level of traffic is not having a negative impact. No increase beyond 160 vehicles per day will be allowed without additional NEPA compliance.

- Tier four parameters. These are parameters currently being monitored by the NPS Inventory and Monitoring program and include population surveys for caribou, moose, Dall sheep and wolves along with the collection of certain demographic and distribution data. These data collection efforts would be ongoing.

Visitor Satisfaction

The Visitors Services Project (VSP) was created to enable parks to detect specific causes of people being satisfied or unsatisfied with their visit to the park. The surveys ask visitors a suite of questions designed to provide managers with scientific information that can then be used to identify issues and improve services. Denali conducted a VSP survey in 2006 and overall 93% of visitors surveyed rated the quality of services, facilities and recreational opportunities as good or very good. It is anticipated that this level of satisfaction will remain the same or increase with the implementation of one of the action alternatives.

Monitoring strategy - Alternative A (no action)

- Visitor satisfaction. Under this alternative, the current level of 10,512 vehicles per season would be maintained and Denali would not establish indicators and standards. While visitor satisfaction surveys would continue to be administered as required, the results would not be compared to standards as an indicator and standards approach is not part of this alternative.

Monitoring strategy - Action Alternatives B, C & D

- Visitor satisfaction.The VSP tool would be used to ensure continued high levels of satisfaction. It would be first initiated along with the post-impact BACI study and would continue to be implemented every 2-4 years. If surveys indicate a decreased satisfaction with crowding levels along the road, the park may initiate

new focused visitor surveys similar to the 2006 and 2007 surveys (Manning et al 2010) to determine if visitor preferences have changed. The park may also remove buses from the schedule, or step the system back to the level it was last operating at with a high level of visitor satisfaction. These changes would occur between seasons.

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As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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