

Chapter 3

The Affected Environment



CHAPTER 3:

INTRODUCTION

SCOPE OF ANALYSIS

The “Affected Environment” chapter describes the existing environment and the current condition of those resources and values that would be affected by implementing the actions considered in this environmental impact statement. These include visitor use and experience, the transportation system and traffic, wildlife and wildlife habitat, wilderness, park management and operations, and socioeconomics. Because the alternatives in this plan and environmental impact statement relate to the management of vehicles along the Park Road, the discussion of the affected environment is generally limited to those resources within or near the road corridor. Exceptions include the topics of visitor use and experience and socioeconomics, which, of course, extend beyond the road corridor.

GENERAL SETTING

Denali National Park and Preserve is dominated by three physiographic provinces in central Alaska: the Alaska Range, northern foothills of the Alaska Range, and the Tanana-Kuskokwim Lowlands, while small portions of the park extend into the Cook Inlet-Susitna Lowlands, the Broad Pass Depression, and the Kuskokwim Mountains. The Park Road corridor itself passes through the mountains and tundra on the northern slopes of the Alaska Range, which forms the northernmost portion of the Pacific Mountain System. The Alaska Range is one of the great mountain uplifts in North America, rising to the pinnacle of Mount McKinley at 20,320 feet. Mount Foraker is the second highest peak, rising to 17,400 feet, while nearby Mount Hunter, the third highest, is 14,573 feet high. In addition, numerous peaks in the vicinity of Mount

McKinley stand at elevations of 10,000-13,000 feet.

The northern foothills of the Alaska Range consist of a series of east-west trending ridges, starting with the Kantishna Hills and running eastward. Summit altitudes generally range between 2,000 to 6,200 feet. The foothills vary from 3 to 7 miles in width and from 5 to 20 miles in length (NPS 2005). They are separated by broad flat valleys, which range from 2 to 10 miles in width.

Another prominent feature of the geology of the area is extensive glaciation in the Alaska Range. The range is perpetually snowclad above approximately 7,500 feet on the north and 6,000 feet on the south. Glaciers are numerous and tend to be larger and longer on the south side of the range than on the north. The larger glaciers range between 35 to 45 miles in length and include the Kahiltna (the largest), Ruth, Eldridge, Tokositna, Yentna, and the Muldrow. On the north side of the Alaska Range beyond the existing glaciers, morainal and glacial outwash deposits extend into the foothills belt and cover large areas of bedrock. Except for some valleys, the foothills section was never glaciated.

Denali National Park and Preserve straddles two of the four major climatic zones of Alaska: the transitional maritime zone south of the Alaska Range and the continental zone in the interior north of the range. The Alaska Range exerts a major influence on the climate of the interior by blocking much of the moisture that sweeps inland from the Gulf of Alaska. Therefore, the north side of the park and preserve is characterized by less precipitation and greater fluctuations in temperature (hotter in summer and colder in winter) than the south side.

Winters are cold, particularly north of the Alaska Range where temperatures at park headquarters have reached -52°F. Average maximum temperature for January is 13°F, while the average minimum is -5°F. During summer, up to 20 hours of daylight provide many opportunities to enjoy the park, and temperatures have been as high as 90°F. The average maximum temperature for July is 66°F, the average minimum is 44°F.

Precipitation at park headquarters averages about 15 inches annually with an average snowfall of 76 inches. However, the total precipitation exceeds 80 inches in some locations (e.g., the south side of the Alaska Range and higher elevations), and snowfall exceeds 400 inches. Rainfall occurs on an average of 21 days each month during June, July, and August at the McKinley Park recording station. Sudden showers and thunderstorms occur occasionally and flash floods can occur throughout the region.

VISITOR USE AND EXPERIENCE

Hundreds of thousands of people visit Denali National Park each year. Approximately 75% of those visitors experience the park via the unpaved portion of the Denali Park Road. The Denali Park Road—a 92-mile path into six million acres of wild lands—is the route of most visitors’ only glimpse into the vast landscape of Denali. What follows is a description of the current state of visitor access, use, and experience on the Denali Park Road.

THE DENALI PARK ROAD VISITOR

Visitation to Denali National Park as a whole has ranged from approximately 350,000 to over 450,000 annual visitors during the past five years, with a high of 463,149 visitors in 2007. The table below shows annual Denali visitation from 2005 to 2010.

Table 6. Total Recreation Visits for Denali National Park and Preserve, 2005-2010

Year	Total Recreation Visits to the Park
2005	403,520
2006	415,935
2007	463,149
2008	432,309
2009	358,041
2010	377,686

These general visitation figures tell us the number of recreational visitors coming to the entire park annually. Some of those visitors, however, include people visiting only southern areas of the park, south of the Alaska Range that effectively divides the park in half. Typical visitors to these areas away from the Park Road include visitors on scenic air tours and mountaineers on expeditions into Mount McKinley and the Alaska Range.

To examine more specifically how many people visit the Park Road area, the focus of this analysis, a subset of the visitation data is used. Table 7 describes the number and type of users that are in the Park Road area of Denali.

The typical visitor to the Denali Park Road corridor is a retiree traveling in a cruise land tour package. This visitor portrait is in striking contrast to the profile of the average visitor to other parts of Denali. According to visitor surveys conducted in the summer of 2006, 48% of survey respondents are retirees. These numbers, however, include all summer visitors, including mountaineering and other non-road visitors. The percentage would likely be higher when examining retirees as a percentage of road visitors only. In addition, 59% of the total visitor base is part of a land excursion from a major cruise ship company such as Holland America, Princess, or Royal Celebrity cruise lines.

This average visitor to the Park Road area is transported to the park by either the Alaska Railroad or a cruise company motor coach, and arrives at their cruise company's hotel, typically either in Nenana Canyon or in McKinley Village, outside the park entrance. Independent travelers may arrive in the park via private vehicle, by hotel courtesy shuttle, or by train on the Alaska Railroad. Train passengers disembark at the train depot, next to the Denali Visitor Center. As most visitors, both independent travelers and package tour visitors, arrive in Alaska without a private vehicle, transportation modes such as the Alaska Railroad are key to Denali visitation. In 2007, for example, approximately 173,500 visitors arrived in Denali by train. Approximately 30% of those visitors arrive from Anchorage, 42% arrive from Fairbanks, and smaller percentages arrive from Talkeetna and Whittier.

Most visitors to the Denali Road Corridor area are pre-booked into their method of exploring the park: either on a transit bus (also called the Visitor Transportation System (VTS)) bus or on a tour bus—the Denali Natural History Tour, the Tundra Wilderness Tour, or the Kantishna Experience. Most tour passengers are picked up by their bus at their hotel. Visitors who are not part of packaged tours join a bus at the Wilderness Access Center. Only Denali Natural History Tour visitors visit the Wilderness Access Center, however; visitors joining the Tundra Wilderness Tour or Kantishna Experience use the Wilderness Access Center only as a transportation hub. In comments received during the scoping phase of the transportation plan, visitors expressed interest in having shuttle buses or some type of community transportation system available to transport all visitors from their lodging to the park.

DENALI PARK ROAD USE

As table 7 indicates, Park Road use generally falls into one of several categories. The vast majority of Park Road visitors travel the road on either a transit (VTS) bus or a tour bus. Private vehicle use past the paved section of the road at Mile 15 (Savage River check station) is limited to administrative traffic, access to private inholdings in the Kantishna area, and a limited number of permitted special use vehicles such as professional photographers and campers driving to Teklanika River Campground. Bus-riding visitors include transit (VTS) riders, camper bus riders, and bus tour visitors. Current bus tours available to visitors, as mentioned above, are the Tundra Wilderness Tour, the Denali Natural History Tour, and the Kantishna Experience. Some visitors using the Park Road remain in the entrance area only, visiting facilities such as the Denali Visitor Center, the Murie Science and Learning Center, or the multiple miles of developed, accessible trails in the entrance area.

The visitor's experience on the Park Road corridor is in part guided by park

management direction, which sets visitor experience expectations for different areas in the park. In the 1996 *Entrance Area and Road Corridor Development Concept Plan* amendments to the general management plan, the road corridor was divided into several zones. The primary zones that guide visitor experience expectations in the road corridor are Wildlife Viewing Sub-Zone 1, which extends from the Savage River Bridge to the Teklanika River Bridge; and Sub-Zone 2, which extends from the Teklanika River Bridge to the "Old Park" boundary west of Wonder Lake. The following excerpts from the general management plan describe these zones:

Wildlife Viewing Sub-Zone 1 includes part of the gravel section of the park road on which the primary purposes include wildlife and scenery viewing. Visitors travel on one of the bus systems and private vehicles are restricted. The only facilities present include the park road and generally one rest area for every hour of travel. Visitors can expect a greater level of traffic in this sub-zone than in wildlife viewing sub-zone 2.

Wildlife Viewing Sub-Zone 2 includes the gravel section of the park road on which greater restrictions (rules of the road) apply. Buses are given the right-of-way and the primary purposes include wildlife and scenery viewing. Visitors must use one of the bus systems and private vehicles are restricted. The only facilities include the park road, one or two visitor contact stations, and generally one rest area for every hour of travel. Visitors can expect a lower level of traffic than in wildlife viewing sub-zone 1. (NPS 1986, 1996)

Table 7. Seasonal Recreation Visitors to the Denali Park Road¹

	NUMBER OF PEOPLE, 2005-2010					
	2005	2006	2007	2008	2009	2010 ²
Bus Riders						
Visitor Transportation System	83,786	76,965	84,590	82,833	66,798	73,989
Tundra Wilderness Tour	123,675	97,347	127,668	121,695	91,857	98,473
Denali Natural History Tour	67,280	105,540	88,274	74,684	79,080	65,445
Kantishna Experience	Not Applicable	Not Applicable	Not Applicable	3,667	3,316	3,776
Lodges (overnight lodge visitors, lodge employees, and support vehicles)	16,517	18,037	21,807	21,797	15,854	17,509
People Visiting Entrance Area Only	72,815	74,472	80,585	76,169	65,149	64,747
Visitors in Private Vehicles Past Savage ³	1,626	2,053	1,888	1,744	1,700	4,028
Total Seasonal Recreation Visitors Using Park Road	365,699	374,414	404,812	382,589	323,754	327,967

¹ "Seasonal Recreation Visitors" includes only recreational visitors during the season plus shoulder season. It does not include nonrecreational road users, such as professional photographers, researchers, contractors, or administrative users.

² Methodological adjustments were made in 2010; these adjustments produced an increase in total recreation numbers of approximately 8-10%.

³ Visitors in private vehicles past Savage includes Kantishna Right-of-Way permits, road lottery visitors, Teklanika River Campground campers, and visitors traveling on handicap permits. The National Park Service began a new data collection method in 2010 and believes that this is a better reflection of visitors in private vehicles past Savage than in previous years.

To further understand the visitor's experience on the Park Road, the National Park Service undertook a visitor survey specific to the Park Road experience, as part of an overall study of road capacity. This visitor experience component of the road study provides important foundational information for the road planning effort. In 2006 and 2007, researchers from the University of Vermont administered a series of qualitative and quantitative social science surveys aimed at better understanding what is important to visitors in making their Denali park road experience a positive one.

Results of the studies shed light on visitors' experiences and preferences regarding such elements as wildlife sightings, crowding at rest areas, and encounters with other vehicles.

The experience of a visitor on Denali's Park Road is unique in Alaska, as well as in the national park system. The true meaning of that experience is in making an awe-inspiring landscape accessible to a wide range of people. To travel the Denali Park Road is to be able to get on a bus at age 8 or 80, and, with cooperative weather, experience the thrill and majesty of Mount McKinley rising up out of the clouds. The

visitor's experience is also defined by traveling up to 92 miles each way on a narrow, primitive road winding through mountain valleys, and to have the possibility of seeing a grizzly cross the road around the next bend, or watch caribou moving through a nearby river valley.

Viewing wildlife from the Park Road is an important part of the overall Denali experience; part of the allure of the Park Road trip is that most visitors are able to see compelling wildlife species. For example, a 2006 study found a vast majority of respondents saw grizzlies (82%), Dall sheep (81%), and caribou (87%) on their trip. Park data indicates that the likelihood of seeing caribou, Dall sheep, or grizzlies has averaged over 70% over the last ten years, while the chance of seeing wolves or moose has averaged between 10% and 50% over the last 10 years. Visitors, however, have also reported that, while they typically see one of the "big five" wildlife species on their visit, 59% are disappointed in not seeing that wildlife at close range (UVM 2009).

What follows is a brief description of various components of the current Park Road visitor's experience, organized by different categories of use.

Visitor Use of Courtesy Shuttle Buses

As the majority of Denali's visitors arrive in the area without a private vehicle, courtesy shuttle buses provide an important visitor service, particularly to the independent visitor. There are several types of courtesy buses available to visitors in the entrance area. One is the Riley Creek Loop Shuttle. Visitors wishing to explore the entrance area can use this courtesy shuttle to travel around the various visitor facilities, such as the Denali Visitor Center and the Murie Science and Learning Center. In addition, a shuttle service is also provided to the Savage River area at Mile 15. This courtesy shuttle serves visitors who do not have time to travel farther on the Park Road, and who do not have a private vehicle at the park or who would prefer to park their vehicle and take a bus. A Sled Dog Demonstration courtesy

shuttle is also available to visitors. This courtesy shuttle starts at the Denali Visitor Center and goes to the sled dog kennels, at mile marker 3. As there is limited parking at the kennels, the courtesy shuttle is the primary alternative to walking for visitors interested in the sled dog demonstration.

Visitor Use of Visitor Transportation System (VTS) Bus

Visitors who experience the park via the transit system, also called the Visitor Transportation System (VTS), comprised approximately 20% of the total number of visitors to Denali in 2009. This system is run by the park concessioner, and essentially moves people around the park, allowing visitors to get on and off buses at their own pace to explore areas along the Park Road. The primary intention of the system is to provide economical access to all areas of the Park Road for the independent traveler.

Transit (VTS) tickets are destination based, and can be purchased in advance or at the Wilderness Access Center. From the Wilderness Access Center, transit riders board a bus bound for one of four points along the 92-mile Park Road: Toklat River, Eielson Visitor Center, Wonder Lake, or Kantishna. The most common destination for transit riders is the Eielson Visitor Center, at Mile 66. Other visitors choose a transit bus to day hike.

Once aboard the bus, food and beverages are not available, so transit users must provide their own. In addition, transit drivers do not provide interpretation during the drive, so the transit experience is more self-directed than that of the tour buses. Drivers will, however, provide safety and other basic information, as well as answer questions and stop for wildlife seen along the route.

These elements of the transit bus system combine to make the typical transit trip best suited for the visitor seeking a more independent, self-directed park experience: those who want to hike, those who want the freedom of spending time off a bus, or those seeking a more minimal on-bus interpretive

experience. Several recent visitor studies support this portrait of the transit visitor. A recent visitor study asked transit bus riders and tour bus riders if they would have liked to get off the bus to hike that day. Fifty-nine percent of transit riders answered yes, compared to 44% of tour bus riders (44%) (Manning, 2010 preliminary data) Additional studies have indicated that the majority of visitors taking a transit bus did so because they wanted to participate in an activity such as hiking or camping (UVM 2009)¹. Furthermore, recent study data indicates fewer transit visitors think that “Most bus trips would include a stop at the park visitor center” is a good idea than Tour Bus visitors,² indicating the typical transit passenger may be seeking a more minimal interpretive experience.

Currently, visitors generally do not find transit buses to be crowded; a majority of survey respondents have stated that they did not sense crowding on their transit bus. What transit riders have identified as a concern is being assured a seat on a bus if they choose to get off (NPS Summary of Scoping Comments). Transit riders do not have to stay on the bus in which they originally started their trip; they can flag down any other shuttle bus going in their desired direction and re-board on a seat-available basis. However, visitors are warned to be prepared to wait up to an hour for a bus with available seating. According to comment cards collected by the park staff, wait times over an hour result in frustration and a less than desirable park experience.

While the system provides visitors with a degree of freedom and flexibility to explore beyond the confines of a tour schedule, visitors have indicated that they would like a greater degree of flexibility. People may not

¹ Respondents who chose a VTS bus answered why they chose VTS. The most common response to the question was “They had to because of the activity they wanted to participate in (e.g., hiking camping.)”

² Manning 2010 study preliminary results. Mean VTS score 0.28, mean Tour score .92 (1.0= stopping for interpretation a good idea).

feel as free to get off the bus and explore if they do not feel confident they can get back on and get “home” in a timely manner.

Visitor Use of Tour Buses

In addition to the transit buses, visitors can choose to take a tour bus on the Park Road. As are all drivers, including transit drivers, bus tour drivers are employed by the park's primary concessioner, Doyon/ARAMARK Joint Venture³ (Joint Venture). These drivers provide the formal interpretation on the bus trips (although on the Kantishna Experience, an NPS ranger also boards the tour bus at Wonder Lake). More information about the interpretive experience that visitors receive on these tours is provided in the following section. Reservations for tour buses are generally made in advance, although walk-in reservations are available at the Wilderness Access Center. Visitors traveling on tour buses are more likely than transit riders to find their buses crowded, although the majority surveyed still find that too many people on buses is not a problem. One challenge currently facing the park is the pressure on tour capacities posed by large package operators. These operators have the ability to fill buses to capacity and potentially edge out independent visitors (NPS 2009h). Finding and maintaining the right balance is a challenge that will be key to future visitors' tour bus experience.

Denali Natural History Tour. The Denali Natural History Tour is a 4.5-hour tour that

³ Doyon Limited is a native regional corporation authorized by Congress in 1971 as part of the Alaska Native Claims Settlement Act (ANCSA). Doyon is the largest private landowner in Alaska and one of the state's 10 largest Alaska-owned companies. Its mission includes promoting the economic and social well-being of its current and future native shareholders, to strengthen the native way of life, and protect and enhance its land and resources (<http://www.doyon.com>). Aramark is a global professional services company, providing food services, facilities management, and uniform and career apparel to health care institutions, universities and school districts, stadiums and arenas, and businesses around the world (<http://www.aramark.com/default.aspx>).

begins at the Wilderness Access Center and turns around at Mile 17 (Primrose Ridge). Approximately 22% of Denali visitors experience the park through the Denali Natural History Tour. This tour focuses on the park's rich natural and cultural heritage. During the tour, drivers take visitors to several interpretive stops to enhance the experience. When they arrive at the Wilderness Access Center, they view the film "Across Time and Tundra" which depicts early visitor experiences in the same area they are about to travel through. After boarding the bus, Denali Natural History Tour travelers are then driven approximately 13 miles to the Savage Cabin, where they receive a living-history glimpse of past cabin use. Visitors then re-board their bus and travel a few more miles to the Primrose Ridge turnaround point. There they experience an Alaskan Native presentation interpreting the history of native land use in the area. On the Denali Natural History Tour, a snack and hot beverages are provided, but not lunch.

Tundra Wilderness Tour. Approximately one-third of all Denali visitors experience the park through the Tundra Wilderness Tour. The focus of this tour is to provide in-depth information about the history of the park, while watching for wildlife and other photography opportunities. Variations of this tour have been offered at Denali since 1923. Visitors who have booked the Tundra Wilderness Tour are typically picked up at their hotel, although the tour makes a stop at the Wilderness Access Center to pick up independent travelers. Visitors will then spend 7 to 8 hours on their excursion into the park. Visitors on this tour are provided a lunch. Tour leaders are the Joint Venture bus drivers. The Tundra Wilderness Tour typically travels to the Stony Hill Overlook (Mile 62) if the weather is favorable for mountain viewing. Along the way, drivers will periodically stop at rest areas and along the road where wildlife is visible. In addition, Tundra Wilderness Tour buses are equipped with video cameras and monitors that drivers use to zoom in on distant wildlife and display to passengers. Sales of DVD's from

the bus cameras are then available for visitor purchase.

Kantishna Experience. In 2007, the park began offering the Kantishna Experience. This tour, the longest available, picks up visitors at their hotels, although independent travelers can board at the Wilderness Access Center. The Kantishna Experience takes visitors on an 11-12 hour trip out to Kantishna. Nearly 7,000 visitors have taken the Kantishna Experience since its inception. The emphasis of this tour is to provide visitors with a tour that gets them out to the end of the road, while learning about the historic gold mining district of Kantishna. In addition to the interpretation provided by the Joint Venture drivers along the 92-mile route, the Kantishna Experience is the only tour providing NPS interpretation. NPS rangers join the tour at the Wonder Lake Ranger Station, and provide an immersive interpretive experience in the historic mining district. During their day-long bus trip, visitors are provided with a lunch, snack, and beverages.

Visitors' Interpretive Experience

On-Vehicle Interpretive Facilities. The visitor's experience while traveling on the Park Road is significantly influenced by the on-bus interpretation they receive. Whether the visitor boards a transit bus or a tour bus, a majority of their experience in the park is on that vehicle. Consequently, the educational and interpretive experience they receive on that bus is a significant component in their overall park experience. The level of on-bus interpretation varies between transportation types: tour bus drivers provide interpretation to visitors, while transit bus drivers do not. All drivers are employees of Joint Venture, who has held the concession contract for transportation services at Denali since 2003. The mean experience level for Joint Venture drivers is 12 years. Seventeen percent of Joint Venture drivers have 20 + years of experience as drivers and guides in the park. Joint Venture maintains an interpretive training program that includes training for transit and tour drivers, interpretive

coaching staff, and a resource library. While this interpretive system has benefits, it also presents challenges to ensure the delivery of desired park messages through a commercial operator (Denali Education Plan, 2009).

Transit bus drivers provide limited narration, rather than interpretive services. Drivers of transit buses are not required to provide full narration. Visitors will have their questions answered by drivers, but will not typically receive a narrated ride, unless a particular driver chooses to provide one.

Visitors on tour buses receive a full interpretive experience. The Denali Natural History Tour, the Tundra Wilderness Tour, and the Kantishna Experience are conducted by certified driver-naturalists who provide a guided, informative trip for visitors. The type of interpretation provided varies across tours. On the Denali Natural History Tour, the focus is the tour's theme of Denali's natural and cultural history. Interpretation on the Tundra Wilderness Tour will typically include Denali history, anecdotes and stories and education about park wildlife. Use of the video screen also enhances some visitors' interpretive experience on this tour by providing them a closer view of wildlife than they would otherwise be able to see. It should be acknowledged, however, that viewing wildlife on a screen is a different experience than viewing wildlife directly. Interpretation on the Kantishna Experience includes park history as well as a glimpse of the history of the Kantishna Mining District. As mentioned above, the interpretive experience of Kantishna Experience visitors is enhanced by this tour being the only tour where NPS rangers join the bus.

Park Road Interpretive Services.

Interpretation off the buses is provided by both NPS and concessioner staff. Joint Venture provides living history interpretive programming at Savage Cabin as well as Native Alaskan history at the Primrose Overlook as part of the Denali Natural History Tour. Joint Venture also provides

exhibits and displays at the Wilderness Access Center and interpretive outreach programming in the area hotels. Interpretive services provided by NPS staff include the following:

Visitor Center Facilities. Visitors have opportunities for contact with NPS staff at both the Denali Visitor Center and the Eielson Visitor Center. The Denali Visitor Center, although it is centrally located at the park entrance, is estimated to currently receive only 50% of all Denali visitors (NPS 2009h). This facility is intended to be the primary provider of visitor information services in the entrance area, as the Wilderness Access Center is intended as a transportation hub. These distinctive roles are likely not distinguished clearly enough for visitors. The Toklat Rest Stop has a visitor contact station that serves the majority of tour passengers. The Eielson Visitor Center also has ranger-provided visitor information services. This facility, however, is only accessed by the percentage of park visitors who reach Eielson by a transit bus or on the Kantishna Experience bus. Buses going to the private lodges in Kantishna also stop at Eielson.

Campground Interpretive Talks. Evening educational campground programs are presented by NPS rangers at the Riley Creek, Savage River, Teklanika River, and Wonder Lake campgrounds. This service provides visitors the opportunity to learn about anything from glaciers to grizzlies in a 30-45 minute program. The frequency of this interpretive programming has varied due to budgetary constraints.

Backcountry Discovery Hikes and Ranger-led Walks. As described below in the "Accessing Wilderness" section, the Park Road provides an important route into Denali's wild landscape. Visitors wishing to travel into the backcountry on an off-trail day hike guided by NPS staff can sign up for a discovery hike at the Denali Visitor Center. Discovery hikes are limited to 11 visitors per hike. Participants in this activity leave on a

bus at 8 am from the Wilderness Access Center, and are led by experienced NPS rangers anywhere in the trailless backcountry. One to two hikes are offered daily, depending on budget and staffing. They can be strenuous or moderate. Visitors have expressed interest in increased interaction with NPS rangers through expansion or improved marketing of the discovery hike opportunities, or by otherwise stationing NPS rangers along the road.

For less strenuous guided walks, NPS staff provides trail-based guided hikes on trails around the two visitor centers. A morning and an afternoon hike starting at the Denali Visitor Center are typically offered each day. A daily afternoon hike is usually offered at the Eielson Visitor Center, which visitors can access by taking the transit bus.

Visitor Access

Understanding the visitor's ability to access a variety of features via the Park Road is an important part of understanding the current visitor experience at Denali. Through a trip on the park road, visitors have access to a variety of different experiences and facilities, including remote backcountry wilderness adventures, developed RV and tent campgrounds, visitor centers, and rest areas.

Currently, one basic element of visitor access is the limit on vehicles in the road corridor imposed by the 1986 general management plan. In 1986, a use limit of 10,512 annual seasonal vehicle trips was imposed on the road corridor, which applies to the native gravel surface sections of the road past the Savage River check station. Managing to this vehicle limit influences the types and frequency of shuttle and tour bus offerings available to visitors.

Another component of visitor access is the potential for crowding on the Park Road, which can affect visitors' ability to obtain quality access to the natural and cultural features they have come to see. Crowding on the road can be manifested in several ways, including the number of vehicles at parking

areas or rest areas, or the number of vehicles stopped on the road at a "wildlife stop." Fifty-five percent of respondents recently mentioned "Too many buses on the Denali Park Road" as either a small (45%) or big (10%) problem. The issue of potential crowding at rest areas is discussed further below. The issue of potential crowding at wildlife stops and in viewsheds is a concern. The issue of "Other buses blocking views" was considered to be a problem by 35% of visitors (UVM 2009). "Too many buses at wildlife stops" was considered to be a problem by 43% of visitors. As wildlife viewing and scenic vistas are vital parts of a high quality visitor experience at Denali, managing vehicle crowding to maintain those views is essential.

Cost of Access

An additional factor in visitor's ability to access the Denali Park Road is the cost to the visitor. Currently there are several components of the affordability of a park experience. Entrance fees, costs of bus tickets, and other costs—including those associated with food and beverages—contribute to the affordability of the visitor's park experience. Table 8 displays the fees associated with experiencing the Park Road area.

A family of four coming to Denali for a day and taking the Denali Natural History Tour, for example, would pay \$202.50 for the experience. Studies show that 41% of visitors are in groups of two; as a sample trip, the cost for two adults to enter the park, take the transit camper bus to the Wonder Lake campground and tent camp for the night would be \$103.90. These are just a few examples of the current affordability of the park experience for different types of visitors.

Accessing Wilderness

Many of the visitors using the Park Road are using it to access the vast tracts of wild lands that comprise the majority of the land base in Denali National Park. Although some

Table 8. 2010 Denali Park Road Fees

Type of Fee	Amount of Fee
Entrance Fee ¹	\$10/person, \$15/motorcycle, or \$20/vehicle (exceptions for Denali Pass and America the Beautiful Pass holders)
Bus Fees ²	
Visitor Transportation System Bus Ticket	\$24 - \$46/adult (\$31.45 camper), \$12 - \$23/teens, under 14 free; rates are dependent on destination
Denali Natural History Tour Ticket	\$60.75/adult, \$30.50 children 14 and under
Tundra Wilderness Tour Ticket	\$67.00 - \$103/adult, \$33.50 - \$51.50 children 14 and under; rates are dependent on destination
Kantishna Experience Ticket	\$155/adult, \$77.50 children 14 and under
Campground Fees ³	\$9 - \$40 ⁴ , dependent on campground and type and size of site

1 Majority of fee collected by concessioner, Joint Venture

2 Fee collected by concessioner, Joint Venture

3 Fee collected by concessioner, Joint Venture

4 \$40 is for a group campsite

visitors to Denali, including mountain climbers and backpackers, access the wilderness via the southern areas of the park, others use the transit bus as a way to get into the Denali backcountry. Wilderness permits are required for overnight travel in the old park section of Denali. Denali's vast tracts of wild lands with virtually no trails offer adventurous visitors unique opportunities for a self-sufficient wilderness experience. Backcountry use off the Park Road can be considered in two categories: day hiking and overnight backpack trips. There is little data currently available on the extent of day hiking in the park. Day hikers will often use a transit bus to get into the backcountry; they will either start their hike from a chosen spot along the Park Road or use a transit bus to get to their starting point and hike into the backcountry from there.

Visitors traveling into the Denali wilderness for an overnight trip must obtain a backcountry camping permit from the Backcountry Information Center (BIC). As backcountry permit data in table 9 show, some overnight wilderness visitors then travel the Park Road to access their backcountry unit. These backcountry permit data suggest approximately 65% of Denali's

overnight wilderness visitors are using backcountry units accessed from the Park Road. (The majority of backcountry user nights, however, take place on Mount McKinley and the south side of the park, reflecting the longer visits necessary for mountaineering.)

A significant number of Denali backpacking visitors visit the "Old Park," and use the camper bus service to be dropped off and picked up along the Park Road corridor. One important role of the transit system, therefore, is to provide access into wilderness for many Denali backcountry visitors.

Due to this heavy reliance on the Park Road, and, more specifically, the Visitor Transportation System, for accessing the Denali backcountry, the schedule, accessibility, and general ease of use of the system is an important component of backcountry access in Denali.

Accessing Park Features

Visitor Facilities. Visitors have access to two visitor facilities along the restricted section of the Park Road. At Mile 53, there is a visitor contact station at Toklat River. The

Toklat River Contact Station is a fabric-walled structure that offers park information and a bookstore, which is operated by Alaska Geographic. This contact station is accessible to visitors via the transit buses, the Tundra Wilderness Tour and Kantishna Experience buses, and lodge buses.

The primary visitor center other than the entrance area facilities is the Eielson Visitor Center at Mile 66. The facility, which opened in 2008, is home to a variety of interpretive displays, and is the base for both indoor and outdoor ranger-led programs. The Eielson Visitor Center is accessed via the transit as well as the Kantishna Experience bus, and by the private Kantishna lodge buses. The Eielson Visitor Center provides many “off-bus” opportunities for visitors, including guided hiking opportunities and some developed trails that visitors can explore on their own. As the vast majority of the Denali landscape is trailless, these developed trail and guided hiking opportunities are a valuable resource for many visitors.

Rest Areas. In addition to visitor centers, the Park Road provides access to various different rest areas. Rest areas are an important component of the visitor experience for several reasons. Not only do rest stops provide an opportunity to use a

restroom facility and get off the bus, they also are strategically located at key vistas, providing visitors with quintessential Denali viewing opportunities. In addition, rest stops allow bus passengers to interact with each other, enhancing their experience.

In addition to the facilities provided at the Eielson Visitor Center, rest areas are provide at various places along the Park Road, including at Mountain Vista, Savage, Primrose Ridge, Teklanika, Toklat, and Wonder Lake. The Stony Hill Overlook is also a place for buses to stop, albeit one without facilities. Since all buses use rest areas, there is the potential for less than desirable visitor access and experience at these areas. Multiple buses can and do stop at one rest area at the same time. This has the potential to negatively impact the visitor’s experience by creating pulses of activity during which access to facilities and viewsheds can be impaired, and the visitor’s general sense of crowding can increase. Multiple buses at rest areas can present management challenges.

In a qualitative study conducted in 2006 (UVM 2009), however, researchers found a high degree of visitor satisfaction with the current access to rest areas on the Park Road. In an analysis of visitor-perceived

Table 9. Backcountry Visitors to Denali

Backcountry Destination	Number of Visitors					
	2005	2006	2007	2008	2009	2010
Mount McKinley	1,298	1,107	1,218	1,272	1,161	1,222
Mount Foraker	32	24	21	16	15	9
Other Mountaineering	519	553	486	638	576	608
Backcountry- North Side ¹	3,861	3,411	3,396	2,790	3,080	3,673
Total Backcountry & Mountaineering	5,710	5,095	5,121	5,716	4,832	5,512

NOTES:

1 Backcountry reflects users who obtained permits at the Backcountry Information Center for overnight backcountry use via the north side, primarily in the Denali Wilderness and Kantishna (MPUR 2010)

problems on the Park Road, “lack of visitor facilities” was among the least problematic issues for Denali visitors. The same study also analyzed visitors’ perception of crowding at those rest areas. Respondents found crowding at rest facilities to be only slightly more problematic for them than the supply of those facilities. The average visitor surveyed rated “Too many buses at rest stops” at 1.4 on a scale of 1 to 3, with 1 meaning “not a problem” and 3 meaning “a big problem.”

Campgrounds and Day Use Areas. There are six designated campgrounds in Denali National Park. All six of these are accessible from the Park Road; accessing Denali's campgrounds is a component of visitor use of the road. The campgrounds are

Riley Creek. The Riley Creek Campground is located just inside the Park Road entrance. Use of this tent and RV campground, the largest in the park at 147 sites, does not impact a significant portion of Park Road use.

Savage River. The Savage River Campground is located at mile 13 on the Park Road, and has 33 sites. It is accessible by private vehicles or by transit bus. Also available in the Savage River area are group campsites as well as two day-use areas with picnic tables and facilities, at Mile 15. The Savage River Trail runs through the area, following the Savage River downstream, crossing on a footbridge, and returning by the river to the other day use area. The Mountain Vista Trailhead is also accessible in the Savage River vicinity, providing additional hiking opportunities. This collection of visitor amenities, along with the area's accessibility, makes the Savage River area a destination for visitors.

Sanctuary River. The Sanctuary River Campground is located at Mile 22 on the Park Road and has 7 sites. It is accessible only by camper bus. Visitors camping at this primitive, tents-only campground utilize a camper bus to reach their site.

Teklanika River. The Teklanika River Campground is located at Mile 29 on the Park Road and has 53 sites. As it is an exception to the “no private vehicles past Savage” restriction, visitors wishing to camp at Teklanika have the option of accessing this campground with their own vehicle; however, they must reserve the site for a minimum of three nights. Other visitors to the Teklanika River Campground utilize camper buses for access.

Igloo Creek. The Igloo Creek Campground is located at Mile 35 on the Park Road and has 7 sites. Visitors camping at this primitive, tents-only campground utilize a camper bus to reach their campsite. Igloo Creek was closed between 2001 and 2007 and reopened in 2008.

Wonder Lake. The Wonder Lake Campground is located at Mile 85 on the Park Road and has 28 sites. It requires the longest access trip of any of Denali's developed campgrounds. Visitors wishing to camp at this tents-only campground board a camper bus and travel nearly the length of the Park Road to access their camp site.

Although accessing campgrounds does not comprise a significant proportion of Park Road use, visitors' ability to access Denali's six developed campgrounds remains a consideration in Park Road planning.

Table 10 includes campground visitation figures for the years 2005 to 2010.

Trails. There are approximately 27 miles of trails accessible from the Park Road in Denali National Park. Table 11 displays existing maintained trails in the park.

As table 11 indicates, the majority of the mileage of maintained trails in Denali are located in or accessible from the entrance area, and do not require use of the park transportation system. While the Park Road and the Visitor Transportation System provide access to designated hiking trails in the park, this use is not currently a large

Table 10. Campground Visitation, 2005-2010, in Number of Overnight Stays

Campground	2005	2006	2007	2008	2009	2010
Riley Creek	48,647	40,267	44,620	33,744	30,054	35,062
Savage River ¹	14,011	9,444	14,186	12,064	10,619	11,374
Sanctuary River	929	732	988	502	257	327
Teklanika River	14,810	14,629	15,966	9,740	13,555	14,662
Igloo River ²	NA	NA	NA	752	645	1,003
Wonder Lake	6,165	6,062	6,637	5,441	4,846	5,055

NOTES:

1 Includes Savage River group site

2 Data for Igloo Creek Campground is unavailable from 2005-2007, as the campground was closed temporarily from 2001 through 2007

proportion of Park Road use. As the majority of the park is either trailless backcountry or a road corridor, these relatively scarce trail resources are an important part of providing visitors a diverse spectrum of recreation opportunity.

Visitor Safety and Comfort

Components of the visitor experience related to safety and comfort are important parts of the overall visitor experience at Denali. Some of the more significant issues related to visitor safety and comfort at Denali are 1) safety of road travel; 2) comfort of bus seats and ride itself; and 3) dust generated by buses. The safety of visitors traveling the road is largely addressed through the implementation of the park's "Rules of the Road." These safety procedures cover issues such as rights-of-way and vehicle yielding procedures. In general, these policies provide protocols for meeting and passing vehicles on the Park Road, which is a primary safety concern given the narrow nature of the majority of the historic road (NPS 2007). Other visitor safety issues on the Park Road are generated by the road's historic character and are addressed by park management. For example, the narrow, winding, restricted section of the road could have problems with sight distance and adequate road width

for passing vehicles if not addressed. The road could also have safety problems resulting from inadequate surface road friction if not addressed. Correcting road safety concerns is a top priority of the park's general management plan.

Studies show visitors do not perceive safety to be a significant issue on the Park Road (UVM 2009). One exception to this, however, is perceived danger associated with Polychrome Pass. Some visitors traveling through Polychrome Pass do have safety concerns due to the steep drop-offs and narrow, curving nature of the road in that location (UVM 2009). While the park management addresses this potential safety concern with a system of driver spacing and wait times, visitors appear to be unaware of this management policy and perceive a safety issue there.

Visitor comfort is influenced by two primary factors: dust generated by road traffic on an unpaved road, and the comfort of the bus. The park currently addresses dust generation in several ways, depending on the road section; these methods include water dispersal, distribution of calcium chloride, and imposing speed limits for construction vehicles in unpaved areas.

Table 11. Existing Maintained Trails

Trail Name	Length in Miles	Surface Type	Location/ Access From
Horseshoe Lake	0.8	Crushed Stone	Entrance Area
Jonesville	0.4	Crushed Stone	Entrance Area
Mount Healy Overlook	2.2	Native material	Entrance Area
Roadside	2.2	Crushed Stone	Entrance Area
Rock Creek	2.4	Crushed Stone	Entrance Area
Taiga	1.5	Native material	Entrance Area
Triple Lakes	7.6	Native material	Entrance Area
Spring dog/ski trail ¹	4.3	Native material	Entrance Area (kennels)
Primrose	0.2	Crushed Stone	Primrose
Savage Cabin	0.3	Crushed Stone	Savage
Savage River	1.7	Native material	Savage
Savage River Bar	0.2	Native material	Savage
Polychrome	0.5	Native material	Polychrome Overlook (Mile 47)
McKinley Bar	2.2	Native material	Wonder Lake
Blueberry Hill	0.2	Native material	Wonder Lake
Alpine Trail	1.0	Native material	Eielson Visitor Center
Eielson Tundra Loop	0.4	Crushed Stone	Eielson Visitor Center
Eielson Tundra Spur	0.2	Crushed Stone	Eielson Visitor Center
Gorge Creek	0.2	Native material	Eielson Visitor Center
TOTAL MILES:	27.3		

¹ Trail is unimproved and is available for use only during snow cover.

See *Environmental Assessment for Dust Abatement Activities on the Denali Park Road, 1999*, for more information on management of Park Road dust issues. Dust generated by the road has been shown to be a factor negatively influencing the Park Road experience for some visitors. Qualitative studies have found some visitors comment that “Being on a gravel road [was] uncomfortable. There was lots of dust and dirt.” (UVM 2009) Some road travelers also comment on the comfort and nature of the buses themselves. Visitor studies have shown the condition of the windows and the comfort of bus seats to be a concern for some visitors. Some survey respondents point out uncomfortable or cramped seating and windows that were dirty or did not

function properly as “annoying” features of the bus, although when asked what factors influenced the quality of their visitor experience, most did not mention bus quality issues (UVM 2009). Similarly, a 2006 study found that while a large majority of respondents rated the quality of transit and tour buses as “very good,” the few respondents ranking transportation as “poor” or “very poor” did so partly for reasons related to an “uncomfortable bus ride” or “bus design.” (NPS 2007)

Finally, the character of the Park Road itself and the road's relationship with the landscapes through which it passes are integral parts of the visitor experience. The primitive character of the road is to be

preserved for its historic as well as esthetic value. The National Park Service maintains the road to provide for visitor safety and an adequate degree of visitor comfort while preserving the road's historic character.

Climate Change and Visitor Experience

Present and future landscape alterations due to climate change in the region are expected and could alter viewsheds and visitor experience at various points along the Park

Road. For example, data indicates the warming Alaskan tundra is currently trending towards a brushier landscape that may succeed to taller vegetation such as white spruce on landscapes that are currently open viewsheds. This could decrease sightlines as visitors travel the Park Road, making it more difficult to see the open landscape and associated resources (e.g., wildlife) at long distances.

TRANSPORTATION SYSTEM AND TRAFFIC

In addition to the concessioner-operated buses, three businesses in Kantishna operate their own transportation services to bring visitors to their facilities for either day trips or overnight stays. Commercial traffic other than that associated with the park concessioner or the Kantishna businesses can travel no farther than the Alaska Railroad depot at Mile 1.3 of the Park Road, with the exception of those using the group camp site at Savage River Campground. Private vehicle traffic is allowed on the Park Road under specific circumstances, including employee access to duty stations and residences at Toklat, Wonder Lake, or Kantishna, as well as inholder access to Kantishna. Additionally, the National Park Service uses vehicles for administrative purposes, and provides access to contractors working on park projects.

Each of these components of the transportation system is described in more detail below.

ENTERING THE PARK

Park visitors arrive at the park via railroad, on tour buses (that load passengers at lodging facilities outside the park with stops in the entrance area as needed), concessioner courtesy buses, or private vehicles. Short-term and long-term parking is provided for private vehicles at the Wilderness Access Center.

TRANSPORTATION SERVICES

Visitor Transportation System

The Visitor Transportation System (VTS) buses provide basic transportation for park visitors in lieu of personal vehicle access. Operated by the park concessioner, these transit buses transport passengers on a regular schedule, which is adjusted prior to

each new summer season to anticipate visitor demand. The majority of these passengers are not on package tours. A fee is charged for riding on these buses, and all buses start their journey at the Wilderness Access Center near the park entrance (see figure 2). While the purpose of the transit buses is to provide transportation and access for opportunities in the park, the buses stop to view wildlife and scenery.

The park's general management plan specifies no more than 36 round-trip transit bus trips per day, with a maximum of 3,394 round trips per allocation season. Around five buses a day are designated "camper" buses which transport backpackers and visitors staying at the roadside campgrounds (Sanctuary River, Teklanika River, Igloo Creek, and Wonder Lake), and also pick up returning day hikers. Initial boarding for these buses takes place at the Wilderness Access Center and the Riley Creek Campground, which is also near the park entrance and is accessible via shuttle service (see 'Entrance area Shuttles' later in this section). Two camper buses remain at Wonder Lake overnight and travel back east the following morning.

Visitor Transportation System buses generally seat 36 to 48 passengers, depending on whether or not they are equipped with wheelchair lifts. The camper buses have seats removed in the back to accommodate backpacks, other camping gear, and bicycles, which reduces seating capacity to 28.

Tour Services

Three tours are offered in the park: the Tundra Wilderness Tour, the Denali Natural History Tour, and the Kantishna Experience. The majority of the passengers on Tundra Wilderness and Denali Natural History tours who are traveling as part of a

cruise-land tour package are booked on one of these tours as part of their package. These tours board at lodge properties in the Nenana Canyon or McKinley Village areas outside the park or at the park's Wilderness Access Center (see figure 2).

Tundra Wilderness Tour. Buses are assigned to this tour depending upon the demand on each day. For that reason, the number of tours fluctuates day-to-day (in 2010, the number of Tundra Wilderness Tours at the Savage River check station fluctuated from a minimum of 8 to a maximum of 29 per day). However, Tundra Wilderness Tours generally depart in two clusters, one leaving in the early morning to allow a return in time for the afternoon train; the other in the afternoon to carry passengers who arrived in Denali on the noon train. During the spring shoulder season or if the road is otherwise closed further west, the Tundra Wilderness Tour goes only to Teklanika Rest Stop at Mile 29. The Tundra Wilderness Tour buses seat either 48 or 53 passengers depending on whether or not they are equipped with a wheelchair lift.

Denali Natural History Tour. Buses are assigned to this tour depending upon the demand on each day (in 2010, the number of Denali Natural History Tours at the Savage River check station ranged from 5 up to 23 per day). The purpose of the Denali Natural History Tour is to interpret the cultural history of the area; wildlife viewing is not its primary focus, but the bus stops when wildlife is sighted and the driver provides information on the commonly viewed species. The Denali Natural History Tour buses seat either 44 or 52 passengers depending on whether or not they are equipped with a wheelchair lift.

Kantishna Experience. This tour lasts for 12 hours, and as a result, it is offered only once per day. Kantishna Experience buses seat 41 passengers and include refrigeration for lunches.

Current Guidance on Tour Services

As noted, the park's general management plan specifies no more than 30 Tundra Wilderness Tours per day and no more than 2,089 during the allocation season. In addition, the plan specifies 400-550 "annual" buses, replacing a former higher quota of professional photographer permits, which can be allocated to either the Visitor Transportation System or Tundra Wilderness Tours; in recent years these have generally been allocated mostly to the Tundra Wilderness Tour system, with some used for the Murie Science and Learning Center.

The Denali Natural History Tour is not subject to the seasonal allocation limit, since the buses only travel two miles past the Savage River check station. However, the general management plan and successive agreements limit the Denali Natural History Tour to no more than 23 buses per day. The Kantishna Experience is a new service initiated in 2007, and has no specific guidance in the general management plan. However, it is counted as a transit bus for the purpose of allocation limits. (NPS 2009g.)

Kantishna Lodges

Kantishna lodge buses are operated independently by each of the three privately owned businesses at the end of the Park Road in Kantishna—Camp Denali/North Face Lodge, Denali Backcountry Lodge, and Kantishna Roadhouse—to transport guests to their facilities for overnight stays or day trips. These buses stop at the rest stops and the Eielson Visitor Center en route to their destination (see figure 2). Kantishna lodge buses transporting overnight guests are usually timed to meet the noon trains for drop-off and pick-up. Because Camp Denali/North Face Lodge requires a three night minimum stay, this lodge uses the road to the east end only twice per week.

Kantishna Roadhouse and Denali Backcountry Lodge day trip buses depart early (7 am or earlier) to complete their

lengthy journeys into the park. The lodges also use smaller vehicles to transport visitors to hikes and interpretive opportunities throughout the Kantishna area north of the former Mt McKinley National Park (Old Park) boundary—where NPS road restrictions do not apply—and, in a more limited fashion, along the restricted portion of the road within the Old Park. Travel into the Old Park for hiking is governed by stipulations in the lodges' concession permits.

A fourth business, Kantishna Air Taxi/Skyline Lodge has a small number of rooms for overnight accommodations, and offers “flightseeing” services that include fly/drive packages, in addition to offering flightseeing services to all Kantishna lodge guests. These packages involve a one-way trip using either the transit shuttle or Kantishna Lodge buses joined to a one-way air taxi flight. Kantishna Air Taxi/Skyline Lodge does not generally use its own vehicle permits to transport guests along the Park Road.

Kantishna business traffic is included within the general management plan limit of 1,360 vehicles per allocation season. The season is shorter in Kantishna, since the road is not typically ready for traffic until the first or second week in June. Denali Backcountry Lodge and Camp Denali/North Face have 315 permits each for the season and the Kantishna Roadhouse is allocated 420 permits. These allocations include any non-bus service or employee vehicles going to the lodges. Separate limitations apply to vehicles re-entering the Old Park from Kantishna for day-hiking, which presently are not counted against the road capacity limit. (NPS 2009g.)

Entrance Area Shuttles

In addition to the tour buses and the buses that provide a variety of transportation services along the Park Road west of Savage River, there are a variety transportation options for visitors moving around the park entrance area east of Savage River and to the communities outside of the park. This

portion of the Park Road is open to all vehicle traffic; however, commercial vehicles may travel no further than the Alaska Railroad depot at Mile 1.3 (the exception is the use of commercial vehicles to transport employees). All entrance area shuttles and courtesy transportation services are offered free of charge. There are no policy limits on vehicle traffic associated with these shuttles as all operate outside of the restricted area of the Park Road. See Figure 2 for details on entrance area destinations.

The **Savage River Shuttle** is a park concession-operated service that transports visitors from the park entrance to the Savage River (Mile 15). All Savage shuttles stop at the Denali Visitor Center/Train Depot, Park headquarters (Mile 3), Murie Science and Learning Center, Mountain Vista Trailhead (Mile 12.5), Savage River Campground (Mile 13) and the Savage River parking lot. This shuttle operates on a fixed schedule and runs continuous loops from the Visitor Center once each hour.

The **Dog Sled Demonstration Shuttle** is a park concession-operated service that transports visitors to the sled dog demonstrations presented daily at the park kennels in the Headquarters Historic District. The shuttle departs from the Denali Visitor Center. In the peak season, the Dog Sled Demonstration Shuttle departs three times daily, 30 minutes before each dog sled demonstration. Buses remain at the Headquarters Historic District until the conclusion of the demonstration to transport visitors back to the visitor center area.

The **Riley Creek Loop Shuttle** is a park concession-operated service that begins at Riley Creek Campground and includes stops at the Park Headquarters, Murie Science and Learning Center, Denali Visitor Center/Train Depot, Wilderness Access Center, and Horseshoe Lake Trailhead. This shuttle operates on a fixed schedule and runs continuous loops from the visitor center once each half hour.

Lastly, **courtesy vans and buses** operated by local businesses transport visitors from their establishments in the surrounding area to the park. These buses and vans stop at the Wilderness Access Center and the Denali Visitor Center/Train Depot. They are not regulated by the National Park Service; however the Park Service has designated a drop-off area at the visitor center for these buses and vans. The courtesy vans and buses are all operated by different hotel and tour companies. Some operate on a fixed, posted schedule while others provide service on demand.

Private Vehicles

Private vehicles may drive without a permit as far as the Savage River check station, located at the Savage River Bridge at approximately Mile 15 of the Park Road (Figure 2); the check station marks the beginning of the restricted portion of the Park Road. This is the point at which vehicles are counted toward the vehicle capacity limit (see chapter 1). Unrestricted travel is also possible on the road in Kantishna, north of the boundary of Old Park, but vehicles must have a pass through the restricted portion of the road to reach Kantishna.

The private vehicle traffic allowed on the restricted portion of the Park Road is broken down into the following categories:

- Campers at Teklanika River Campground. They are allowed to drive only once into the campground and once out, with a minimum 3-night stay; their vehicle must remain parked at the campground during their stay; vehicles traveling to Teklanika River Campground are limited only by the number of campsite permits available and the requisite 3-night minimum stay.
- Owners of private land in the Kantishna area. Each private landholder in Kantishna is given a set number of entries each year. Collectively there is a limit of 1,360

vehicles going to Kantishna, including lodge and all other traffic.

- Professional photographers and film crews. Permits for these users are limited to five per day, with more photographers than film crews (NPS 2009g). Two individuals are allowed in one vehicle with a permit, and permits are good for up to 9 days.
- Qualified subsistence hunters who use the Park Road to access Kantishna during the fall hunting season. There are no limits on hunter vehicle passes, but the population of hunters interested in hunting in Kantishna is limited and few road permits are given out annually (NPS 2009g).
- People with disabilities who are unable to use the buses, including those with wheelchair lifts.
- Staff participating in Murie Science and Learning Center programs.
- Private and school researchers.
- Others (state troopers, wreckers, and guests of employees living in the park).

NPS, Concession, Partner, and Contractor Vehicles

The National Park Service uses government vehicles along the road for the purpose of managing the park. Vehicle uses include ranger patrols, employee travel to duty stations or interpretive programs, research and resource management activities, building and road maintenance, and contractor oversight, among others. Employees and volunteers who reside in government housing at Toklat, Wonder Lake, or Kantishna also obtain limited road travel permits to reach their residences. In addition, the National Park Service hires contractors to perform various tasks on its behalf, particularly road and facility construction. Contractors require access to the Park Road and are provided permits.

Similarly, the park concessioner requires some vehicle use past Savage to staff and maintain the Primrose pullout, turnaround point for the Denali Natural History Tour.

The Murie Science and Learning Center, jointly operated by the National Park Service and nonprofit educational partners, has road permits to transport its staff and program participants to activities along the Park Road and to its field camp at Teklanika River Campground.

The 1986 general management plan limits the National Park Service to 1,754 vehicle trips per allocation season. Contractor vehicles have not been counted toward this limit. The number of contractor vehicles varies widely from year-to-year depending

on the number and type of contracted projects. The Murie Science and Learning Center has up to 150 buses that have been allocated to it from the “annual bus” category (NPS 2009g).

In addition, bus trips used for training drivers do not count against bus limits, but do count against seasonal limits if used within the allocation season (i.e., the Saturday of Memorial Day weekend through the second Thursday following Labor Day or September 15, whichever comes first).

WILDLIFE AND WILDLIFE HABITAT

As described in chapter 1, wildlife and wildlife habitat issues have been identified for five individual species (Dall sheep, grizzly bear, caribou, moose, and gray wolf) because of their relationship to the park's purpose and significance and because they are all prominent attractions for the park visitors who use the transportation system to view wildlife. As a result, these species are described separately in the following section. In addition, because other wildlife species, including those of management concern, use habitat along the road corridor and play important roles in the park's ecological system, they are described collectively at the end of the section.

DALL SHEEP (OVIS DALLI DALLI)

The Dall sheep population in Denali has always been a notable issue for park staff, as the protection of Dall sheep was the primary catalyst in the creation of Mount McKinley National Park in 1917 (NPS 2009b). Today, the sheep population garners additional attention. Since the Dall sheep is a high altitude species with very particular habitat requirements, its population may be sensitive to, and an indicator of, climate and vegetation change (NPS 2009b).

Most of the mountainous terrain on the north side of the Alaska Range throughout the park provides habitat for Dall sheep, particularly the mountains in the easternmost and westernmost areas of the park. The deep snows on the south face of the Alaska Range preclude sheep from inhabiting that area. On the north side, some sheep migrate across the Park Road to and from the Alaska Range and the Outer Range each year (Dalle-Molle, J. and Van Horn, J. 1991, NPS 2006a). Since the Denali Park Road corridor meanders through several areas of sheep habitat north of the Alaska Range, close attention must be given to the

use of the road so it doesn't fragment sheep habitat or sever movement routes (daily or seasonal) (Putera and Keay 1998).

In 2007, park staff closely monitored 20 Dall sheep with global positioning system (GPS) radio collars to gather information on the effects of park road use on the sheep. This monitoring showed evidence that the sheep generally move farther away from the road as traffic volume increases. Thus, road use affects when and where the Dall sheep are able to forage, and in turn could limit the area and locations of available sheep habitat during certain times of year (particularly in spring when the sheep are more dependent on vegetation at lower elevations) (Putera and Keay 1998). Given these effects, under the two action alternatives for this plan, the park would manage traffic on the road to allow for gaps for the sheep to approach or cross the road, unimpeded by vehicle presence.

Dall sheep populations tend to fluctuate as a result of many environmental variables. Sudden population declines may occur following severe winters, summer droughts, or stochastic severe weather events. Regardless of these environmental variables, the sheep's naturally low birth rate and vulnerability to predation tend to keep population growth rate low (NPS 2009b, ADF&G 2008b). The population within the original park boundary is of special interest to wildlife managers because it is one of the few Dall sheep populations that is not currently hunted and still shares its range with a natural diversity and number of large predators. This population is also the same population group that is regularly viewed by visitors on the Park Road (NPS 2009b).

In the summer of 2008, NPS staff conducted aerial and ground surveys of Dall sheep in various population concentration areas of the park (east of the Muldrow Glacier and

west of the Nenana River). The aerial survey counted 1,526 sheep (NPS 2009b). This survey result was remarkably similar to an aerial survey of the same area in 1996 (1,563 sheep). This monitoring over time reveals that the Denali sheep population may be relatively stable. By extrapolating from this and other survey information, NPS staff have estimated the parkwide Dall sheep population to be approximately 2,500 (NPS 2009a). Along the Park Road corridor, the highest concentrations of Dall sheep were noted on the slopes of Polychrome Mountain (near Polychrome Overlook) and on both sides of the road on the slopes of Igloo Mountain, Sable Mountain, and Cathedral Mountain (between Igloo Creek and Sable Pass).

The 2008 surveys also revealed that the average size of a Dall sheep group is 7.7 individuals, with the largest group containing 48 sheep. The ground-based study in 2008 also provided information on the age and sex of the surveyed sheep. Approximately 30% of the sheep were sub-curl and full-curl rams and about 41% were “ewe-like” (i.e., adult female sheep or young male sheep with smaller horns). About 16% of the surveyed sheep were lambs. Like the overall population estimate in the park, these sex and age statistics are also similar to the previous surveys in 1996 (NPS 2009b).

Dall sheep are prevalent throughout the mountains of Denali National Park and Preserve, between 3,000 and 6,000 feet in elevation and on the north side of the Alaska Range (NPS 2009b). Dall sheep are found in relatively dry country and they frequent a special combination of open alpine ridges, meadows, and steep slopes with extremely rugged “escape terrain” in the immediate vicinity. They use the ridges, meadows, and steep slopes for feeding and resting. When danger approaches they flee to the rocks and crags to elude pursuers (ADF&G 2008b, NPS 2009b).

The following table provides information on the likelihood that Park Road travelers going

to various destinations would see at least one Dall sheep. For example, a visitor who plans to travel as far as Toklat has a 71% chance of seeing one or more Dall sheep somewhere along the way. This information was gathered using various methods, such as having bus drivers document where and when they see wildlife while driving along the road.

Table 12. Probability of Sighting Dall sheep along the Denali Park Road, by Trip Destination

Destination	Probability of Sighting at least one Dall sheep
Teklanika	6%
Toklat	71%
Eielson	74%
Wonder Lake	74%

Source: NPS 2011
(based on wildlife sighting data from 2007 and 2008)

Male Dall sheep (rams) are distinguished from females (ewes) by their large curling horns, which grow larger as the animal ages. Adult ram horns reach a full circle or “curl” after about seven or eight years. The horns of the adult ewe are shorter, thinner, and only slightly curved (NPS 2009b).

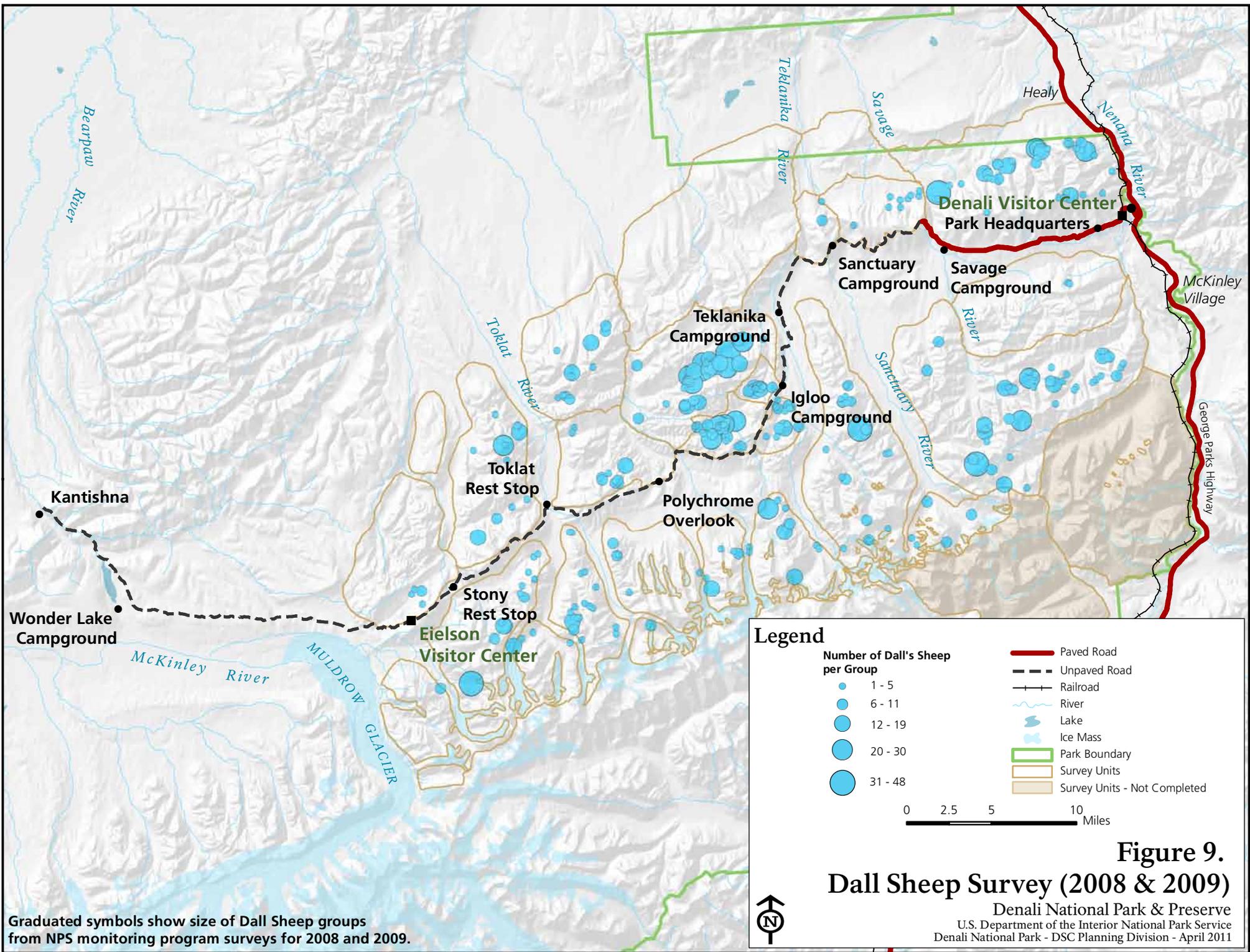
The social system of the Dall sheep is quite structured. Adult rams live in bands that seldom associate with ewe groups except in late November and early December during the mating season. Throughout the year (with and without females present), adult rams engage in horn clashes with each other to establish or maintain order and dominance rank in the male bands (ADF&G 2008b). The rams are able to breed after about 18 months, but typically do not breed successfully until they attain full-curl horns and reach a dominant rank. Adult ewes typically have their first lamb after three years, and yield one lamb each year. Before ewes give birth to lambs in late May or early

June, they seek isolation and protection from predators by migrating to the most rugged and steep terrain in their spring range (ADF&G 2008b). After remaining in the steep terrain for a few days, the ewe and lamb move back to areas where the lamb can start feeding on spring vegetation (typically after one week). Lambs are usually weaned off the ewe milk by October.

Through summer, adult sheep and lambs rely on a wide variety of vegetation in their summer range. However, during winter, Dall sheep are forced to feed on dry, frozen grasses and sedges and other hardy vegetation that can be found sticking out through the snow cover in their winter range. And aside from their dietary dependence on vegetation, Dall sheep also

eat soil around localized mineral licks. Since many different bands of sheep may congregate at any one particular mineral lick, these areas also serve as a medium to maintain genetic diversity. This is when and where young rams may leave their ewe and nursing band to join another random ram band that may also be present at the lick (ADF&G 2008b).

The following map shows the sizes of various Dall sheep groups along the Park Road corridor. The data were derived from NPS Dall sheep monitoring conducted in the park in 2008 and 2009. Larger colored circles indicate larger sheep group sizes. Areas with congregations of several sheep groups (colored circles) identify where high concentrations of sheep are often found.



Graduated symbols show size of Dall Sheep groups from NPS monitoring program surveys for 2008 and 2009.

Legend

- | | |
|---|------------------------------|
| Number of Dall's Sheep per Group | Paved Road |
| 1 - 5 | Unpaved Road |
| 6 - 11 | Railroad |
| 12 - 19 | River |
| 20 - 30 | Lake |
| 31 - 48 | Ice Mass |
| | Park Boundary |
| | Survey Units |
| | Survey Units - Not Completed |
- 0 2.5 5 10 Miles

Figure 9.
Dall Sheep Survey (2008 & 2009)

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CARIBOU (RANGIFER TARANDUS)

Caribou are members of the deer family (*Cervidae*) that live in the arctic tundra, mountain tundra, and northern forests of North America, Russia, and Scandinavia (caribou are called reindeer in Europe). Caribou are the only member of the deer family in which both sexes grow antlers. The caribou and reindeer population throughout the world is estimated at 5 million (ADF&G 2008c). All caribou and reindeer are considered to be the same species, although several subspecies exist. The Denali herd belongs to one of the barren-ground subspecies of caribou.

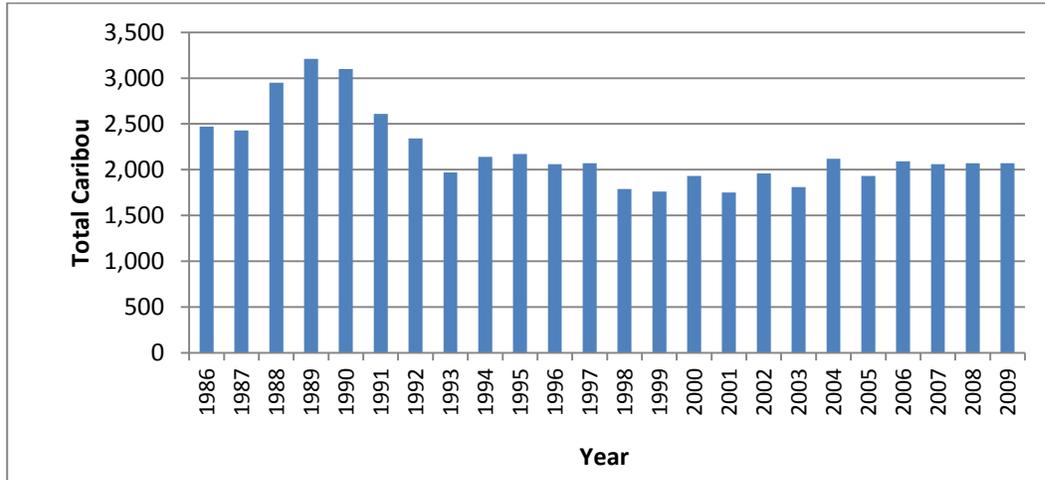
Alaskan caribou are distributed across 32 herds (or populations). Each herd uses its own unique calving areas, although different herds may mix together on their winter ranges (ADF&G 2008c). There are approximately 900,000 wild caribou in Alaska. However, caribou populations are somewhat cyclic, and the timing of cycles and degree of herd growth are quite unpredictable. Collectively, the population trends are dependent on climate and weather changes, population density, predation by wolves and grizzly bears, disease, and hunting.

The Denali caribou herd receives particular attention from wildlife biologists because it is the only barren-ground caribou herd in North America of such a large size class that is currently not subject to hunting. In addition, the Denali caribou share their range with a complement of large predators in a predator/prey system that is still intact and naturally regulated (NPS 2006a).

Like the Dall sheep, the Denali caribou herd has been a focus of attention for many years. Over the past 100 years, many changes to the herd have occurred. In the early decades of the 20th century, the Denali herd may have reached 20,000 animals (Murie 1944, NPS 2006a). The herd declined to about 10,000 caribou in the mid-1940s and maintained that size until the mid-1960s. Like other Alaskan caribou herds at that time, the Denali caribou herd population started dropping again in the mid-1960s due to a series of severe winters that increased adult mortality and lowered calf recruitment into the herd (Adams et al. 1989, NPS 2006a). Calf recruitment into the herd is affected by both birth rates and survival rates of caribou calves. In 1975, there were an estimated 1,000 animals in the herd (Troyer 1977, NPS 2006a).

Since the population low of the 1970s, the Denali herd has rebounded slightly due to various stretches of mild winters in the 1980s, reaching a population of about 3,200 caribou in 1990 (Adams and Mech 1995, NPS 2006a). However, subsequent years of severe winters and high calf predation reduced the herd to its present level of about 2,000 animals. As of the fall of 2009, the Denali caribou herd size was estimated at 2,070, which shows little variation in size over the past five years (Adams and Roffler 2009). This population is dispersed over about 3,900 square miles that include most of the park north of the Alaska Range and some areas south of the range and east of Mount McKinley (NPS 2006a). The following graph shows the changes in the fall Denali caribou herd size over the past 25 years.

Table 13. Fall Denali Caribou Herd Size, 1986-2009



Source: NPS 2006a; data provided by park staff for 2007-2009.

The following table provides information on the likelihood that Park Road travelers going to various destinations would see at least one caribou. For example, a visitor who plans to travel as far as Toklat has a 74% chance of seeing one or more caribou somewhere along the way. Park staff gathered this information by using various methods, such as having bus drivers document where and when they see wildlife while driving along the road.

Table 14. Probability of Sighting Caribou along the Denali Park Road, by Trip Destination

Destination	Probability of Sighting at least one Caribou
Teklanika	42%
Toklat	74%
Eielson	83%
Wonder Lake	85%

Source: NPS 2011 (based on wildlife sighting data from 2007 and 2008)

Since calf recruitment is often correlated to herd size, park staff closely monitors the herd’s calf:cow ratio. In September 2009, the Denali herd contained 23 calves per every 100 cows (Adams and Roffler 2009). This figure has been relatively stable over the past five years, which is notably higher than the rate during the severe winters in the 1990s, when it dropped to 12:100. Generally, cow caribou do not breed until they are 28 months old. Most adult cows are pregnant every year and give birth to one calf (ADF&G 2008c). Over the past five years, on average, only 29% of caribou calves survive their first summer through September. Predation is the primary threat to calves (Adams and Roffler 2009). In particular, wolves, grizzly bears, and golden eagles kill many newborn calves. To protect young from predation, and to escape insects, the caribou typically collect in large “postcalving aggregations” (ADF&G 2008c).

Since caribou are migratory herd animals, the Denali herd shifts in geographic distribution across the landscape throughout the year. The migrations coincide with their life cycle and climate conditions, from calving to summer foraging to autumn breeding. Caribou movements are often triggered by changing weather, such as the

onset of cold weather or snowstorms. Once they decide to migrate, caribou can travel up to 50 miles a day (ADF&G 2008c).

Most cows in the Denali caribou herd bear their calves in the northern foothills of Mount McKinley, from the Muldrow Glacier to the Straightaway Glacier. A smaller number disperse farther north and west to calve in isolated areas, and even fewer cross the Alaska Range to calve in the Cantwell area. Historically, areas on the south side of the Alaska Range provided the primary calving grounds for the herd (NPS 1989).

After calving, caribou typically move to higher elevations (above 4,000 feet) for the first half of the summer. Throughout the summer visitation months in the park, caribou are quite common along the Park Road, particularly above treeline. During this time, caribou are usually visible foraging in the morning or evening hours, and are also seen while bedding down during the afternoon hours. During summer months, caribou typically eat willow leaves, sedges, flowering tundra plants, and mushrooms (ADF&G 2008c). Since the caribou are often harassed by insects during warm summer days, they commonly bed on snow fields or windy ridgelines to avoid insects (NPS 2006a). These higher altitude areas also provide ample forage.

As temperatures begin to drop and precipitation begins to increase by mid-summer, the Denali caribou usually disperse across the lower mountains and foothills of the park to forage until breeding season begins in mid-September. This is also when the bull caribou lose their antler velvet and begin to fight with other bulls. Most fights are brief and benign. However, occasional violent fights occur, leaving bulls killed or injured and prone to wolf and bear predation (ADF&G 2008c).

Once the rut begins with the onset of autumn, the caribou congregate into rutting groups along foothills of Mount McKinley,

north through the Upper Moose Creek drainages and into the Toklat, East Fork, and Sushana River drainages (NPS 2006a). During this time, caribou typically switch their diet to lichens, dried sedges, and small shrubs (e.g., blueberry). Unlike most members of the deer family, bull caribou do not control a harem of cows. Instead, they control a space around themselves, and prevent other bulls from breeding females within their space (ADF&G 2008c).

After the breeding season, the Denali herd typically winters on the tussock flats and adjacent foothills north of the Outer Range. They may also inhabit other winter ranges in the park, depending on how mild the winter is in a given year.

The following three maps show the average density ranges, or concentrations of radio-collared caribou along the Park Road corridor during three periods of the park visitation season: May 15 – June 30, July 1 – August 15, and August 16 – September 30. The data graphics were derived from NPS caribou monitoring programs conducted in the park from 1986 through 2008. On all three maps, the darker shadings indicate areas where the highest concentrations of caribou occurred during the respective time periods from May through September. Also, one should note that many of the caribou seen along the Denali Park Road are bulls, which have different distributions and movement patterns from those of cows. Thus, these maps do not present a complete picture of caribou movements and how those movements may affect wildlife viewing.

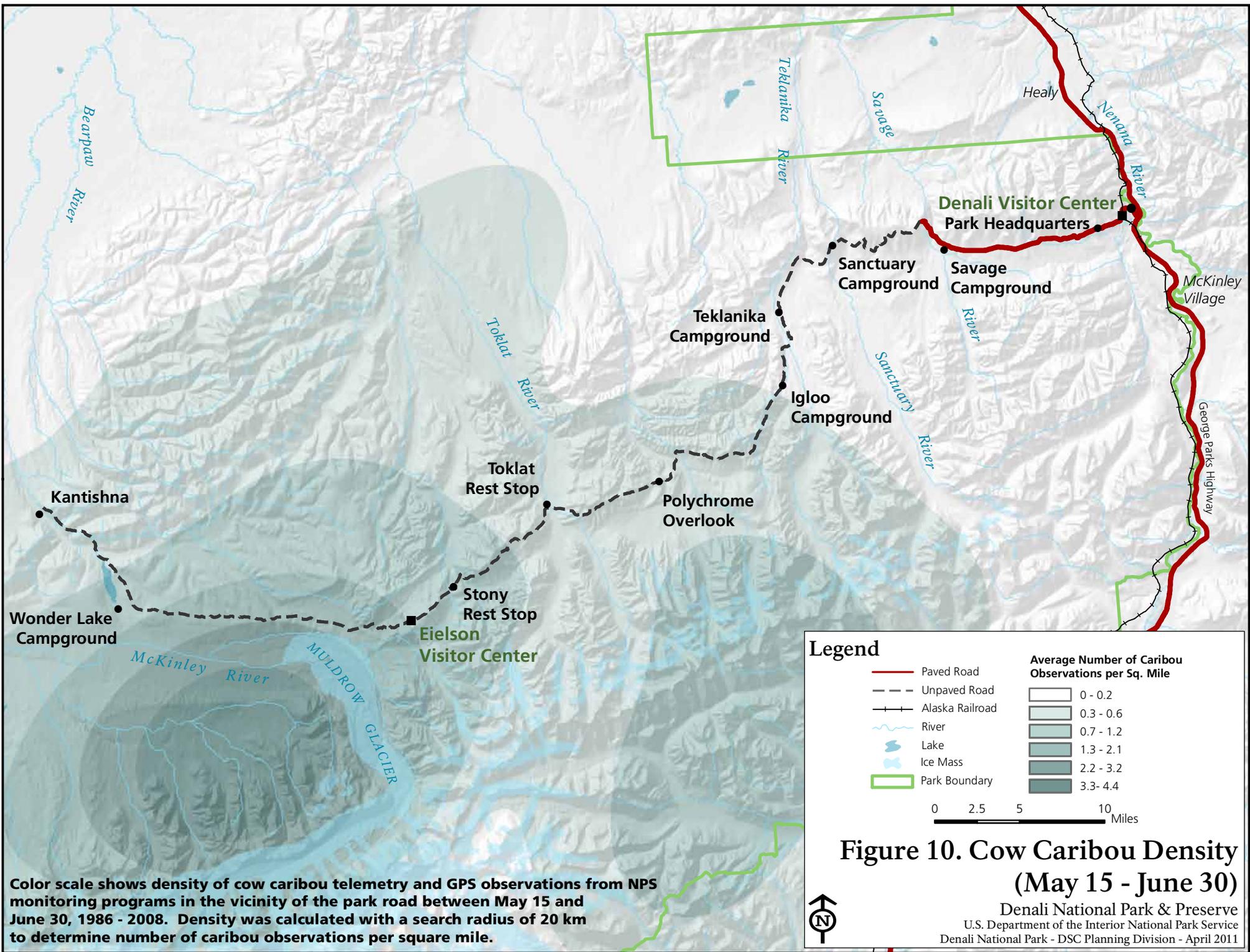
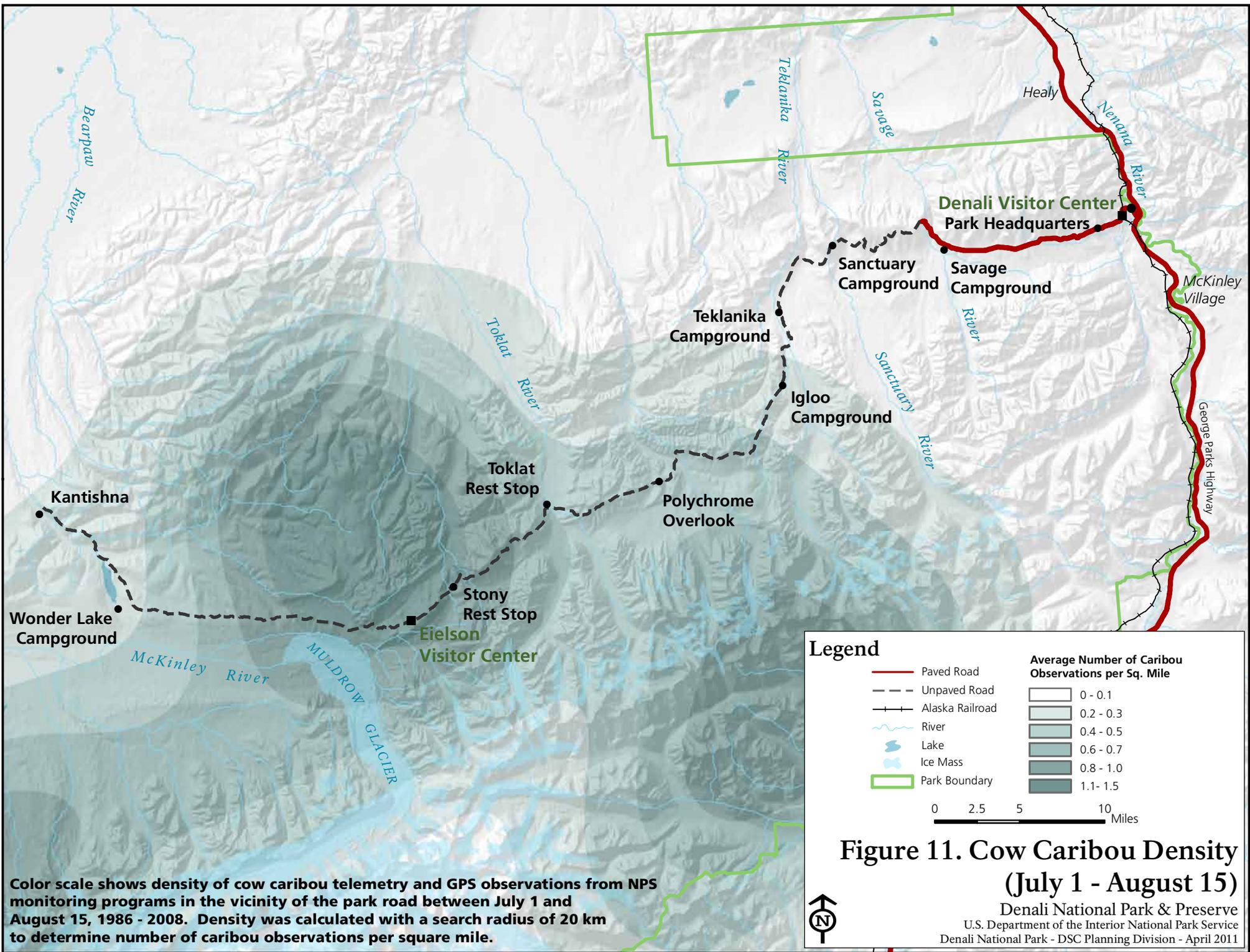
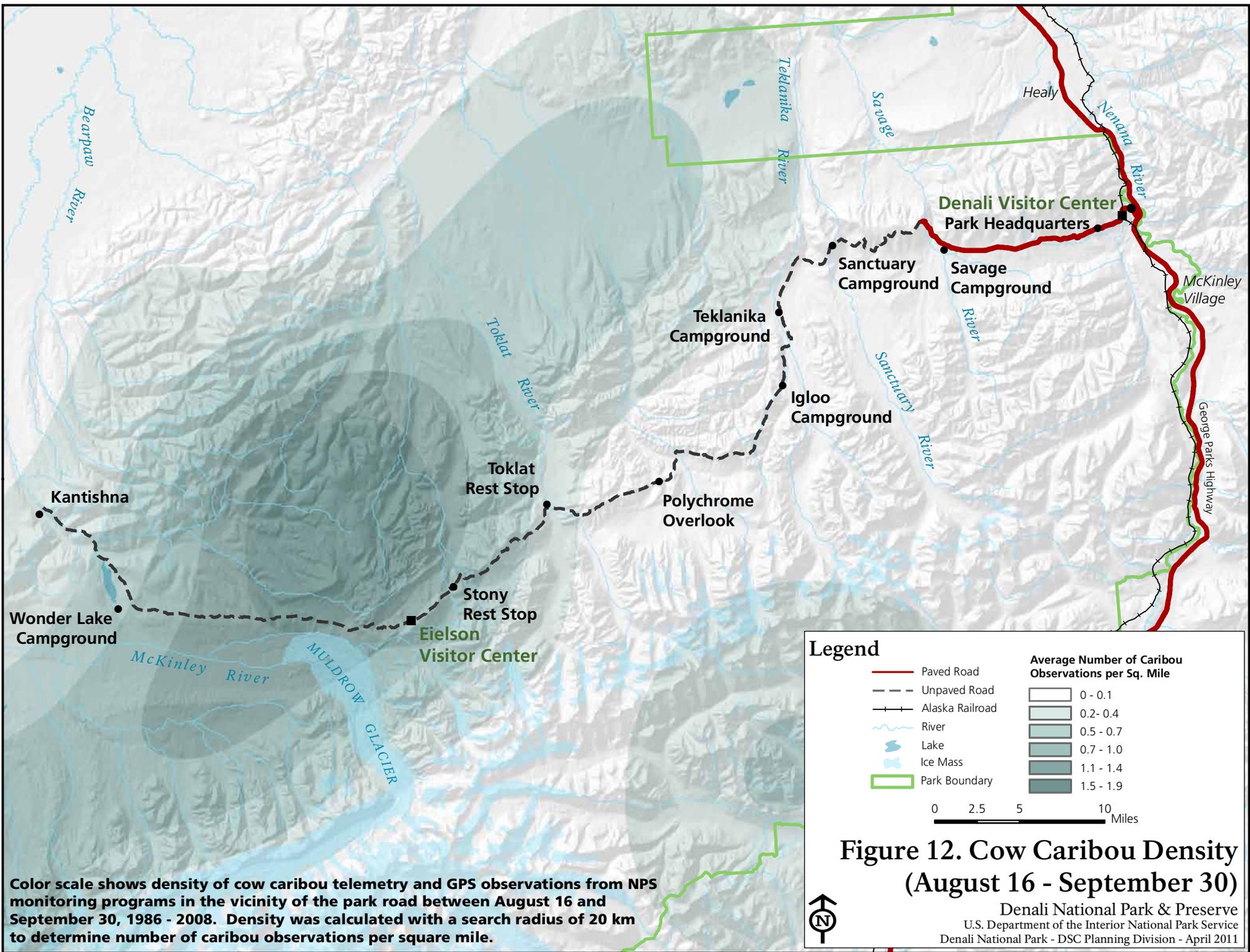


Figure 10. Cow Caribou Density (May 15 - June 30)

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GRIZZLY BEAR (URSUS ARCTOS HORRIBILIS)

The grizzly bear (*Ursus arctos horribilis*) is a common and vital member of the overall Alaskan ecosystem. In the lower 48 states, the grizzly bear is listed as “threatened” under the Endangered Species Act. However, given its higher population in Alaska, the bear is classified as a game animal in Alaska with established regional hunting regulations. It is important to note the distinction between the common names “grizzly bear” and “brown bear,” which refer to two separate subspecies of *Ursus arctos*. In Alaska, brown bear typically refers to the bears that occupy the coastal regions of the state; whereas, grizzly bear refers to the bears that occupy the northern, interior areas such as Denali National Park and Preserve (ADF&G 2008a). Today, population estimates indicate that more than 30,000 grizzly and brown bears live in Alaska. For the sake of comparison, more than 25,000 grizzly and brown bears live in Canada (USFWS 2007a).

Grizzly bears occupy a large range throughout the park, but are most common in the higher elevation habitat of shrub and tundra (NPS 2006a). Recent NPS bear monitoring studies at Denali have revealed a grizzly bear density of roughly 27 bears per 1,000 square kilometers (70 bears per 1,000 square mile) on the north side of the Alaska Range. This translates to 300-350 grizzly bears in the park to the north of the range. This population density is considerably lower than the density on the south side, presumably due to higher salmon availability on the south side (NPS 2009a).

The following table provides information on the likelihood that Park Road travelers going to various destinations would see at least one grizzly bear. For example, a visitor who plans to travel as far as Toklat has a 68% chance of seeing one or more grizzly bears somewhere along the way. Park staff gathered this information by using various methods, such as having bus drivers document where and

when they see wildlife while driving along the road.

Table 10. Probability of Sighting Grizzly Bears along the Denali Park Road, by Trip Destination

Destination	Probability of Sighting at least one Grizzly Bear
Teklanika	14%
Toklat	68%
Eielson	86%
Wonder Lake	89%

Source: NPS 2011 (based on wildlife sighting data from 2007 and 2008)

The grizzly bear has a very large home range of 50 to 300 square miles for females and 200 to 500 square miles for males. The average lifespan of a grizzly bear is 15 to 20 years, with some living over 30 years (USFWS 2007a). Grizzly bears usually spend spring and summer at the lower elevations of their range, and search for dens at higher elevations on isolated mountain slopes in autumn for winter hibernation. The bears typically enter the dens in October or November. When grizzlies emerge from their dens in spring (males in March-April, females in April-May), they often immediately seek carrion of other animals that succumbed to the winter. After regaining some strength, the bears then travel to the lower elevations of their range to areas that are wet, with greening herbaceous cover (USFWS 2007a).

For the most part, grizzly bears are solitary animals; most of their time is spent foraging independently. With the exception of interacting with other bears in concentrated feedings areas, the only times that grizzly bears associate closely with other bears is during mating season and when they are tending their young (USFWS 2007a). The mating season typically runs from May through July and the bears have one mate at a time, but several each year. Cubs are born

in midwinter in the den; an average litter size is two cubs. Grizzly bear cubs rely on their mother's milk for up to a year, and stay with their mother for two to three years. After separation, female cubs generally stay near their nursing grounds, whereas male cubs typically disperse (ADF&G 2008a).

The diet of the grizzly bear consists of both plants and animals, making it the largest omnivore in North America. Over 80% of the grizzly bear diet is plant based (e.g., roots, fruits, nuts, and green vegetation). In addition to feeding on plant material, grizzly bears also opportunistically feed on carrion, small mammals, young or weak moose and caribou, salmon, and adult insects or insect larvae (USFWS 2007a). During springtime, the Denali grizzly bears often prefer peavine roots (*Hedysarum alpinum americanum*), which grow on lower elevation slopes in the park (Murie 1981). By mid-summer, the grizzly bears in the region typically feed on grasses and sedges until late July, when various berries begin to ripen, particularly soapberries (*Shepherdia canadensis*) that grow on floodplain gravel bars (NPS 2006a) and blueberries (*Vaccinium uliginosum*). When herbaceous vegetation or fruits become limited in the fall, the bears revert to relying on roots as a primary food source.

Grizzly bears must travel widely across their range and habitat types to meet their life cycle needs that include foraging, mating, and raising their young (Weaver et al. 1996, Servheen et al. 1998). If the connections between various grizzly bear habitats are severed by roads and road use, the bears can become at risk from smaller populations and lower population viability (Chruszcz et al. 2003). In an attempt to ensure the protection of bear movement through the park, the National Park Service has recently studied the effects of the Park Road on grizzly bear habitat and patterns of bear movement (Mace et al. 2009). This study revealed several different behavioral trends that vary relative to seasonality, habitat type, and sex.

Most notably, NPS researchers discovered that the bears in the study were most active and closest to the Park Road during high traffic, daytime hours, which suggests that they are maintaining their normal diurnal behavioral patterns during summer months. Similarly, the bears crossed the Denali Park Road at all times of day, but the highest frequency of crossing also occurred during the highest traffic periods. These observations may be an indication that grizzly bears are not measurably changing the timing of activity to avoid human disturbances along the road (Mace et al. 2009).

However, researchers involved in the study also noted that bears moved faster when crossing the road, as compared to their rate of travel immediately before and after the crossing. And, bears tended to rest in an inactive state for longer periods of time farther from the road, which indicates that grizzly bears might not be comfortable enough to rest for long periods near the road. Also, the research data revealed that female bears moved substantially slower when in the road corridor, while males moved notably faster in the corridor. This observation could suggest that male Denali bears are more apprehensive around human/road activity than females. It could also suggest that female grizzlies and their cubs use the road corridor as passive protection from the threats of the male adult bears (Meier, pers. comm. 2010).

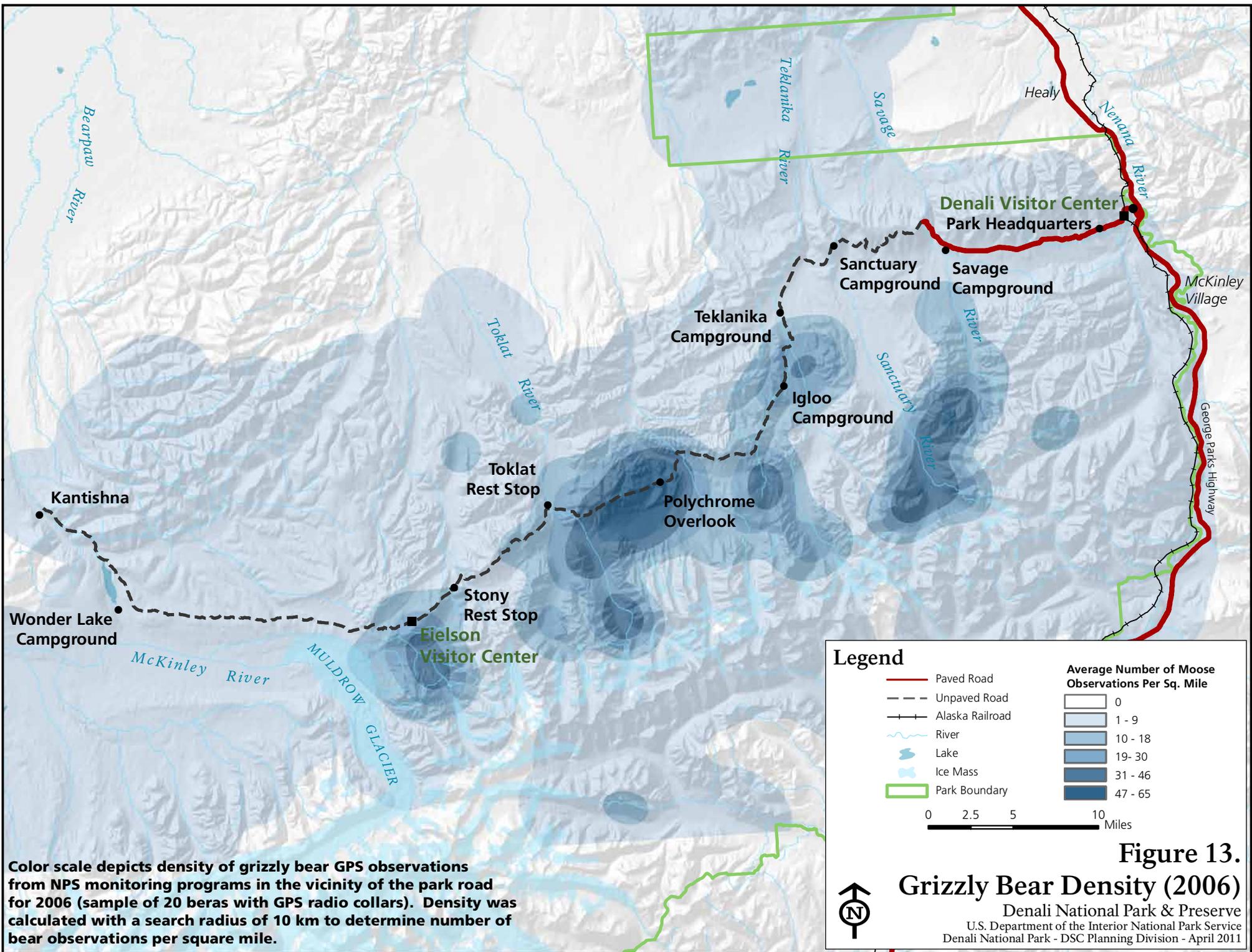
Human habituation is another factor to consider when assessing bear behavior at Denali. Habituation is "the waning of a response to a repeated, neutral stimuli" (Whittaker and Knight 1993). Bear habituation to human activity results as bears adapt to the presence of humans in a nonthreatening atmosphere (Smith et al. 2005). Although it is assumed that Denali grizzlies generally become habituated to human presence over time, some variation in the level of human habituation exists from individual to individual (Mace et al. 2009). Overall, the Denali bear study findings

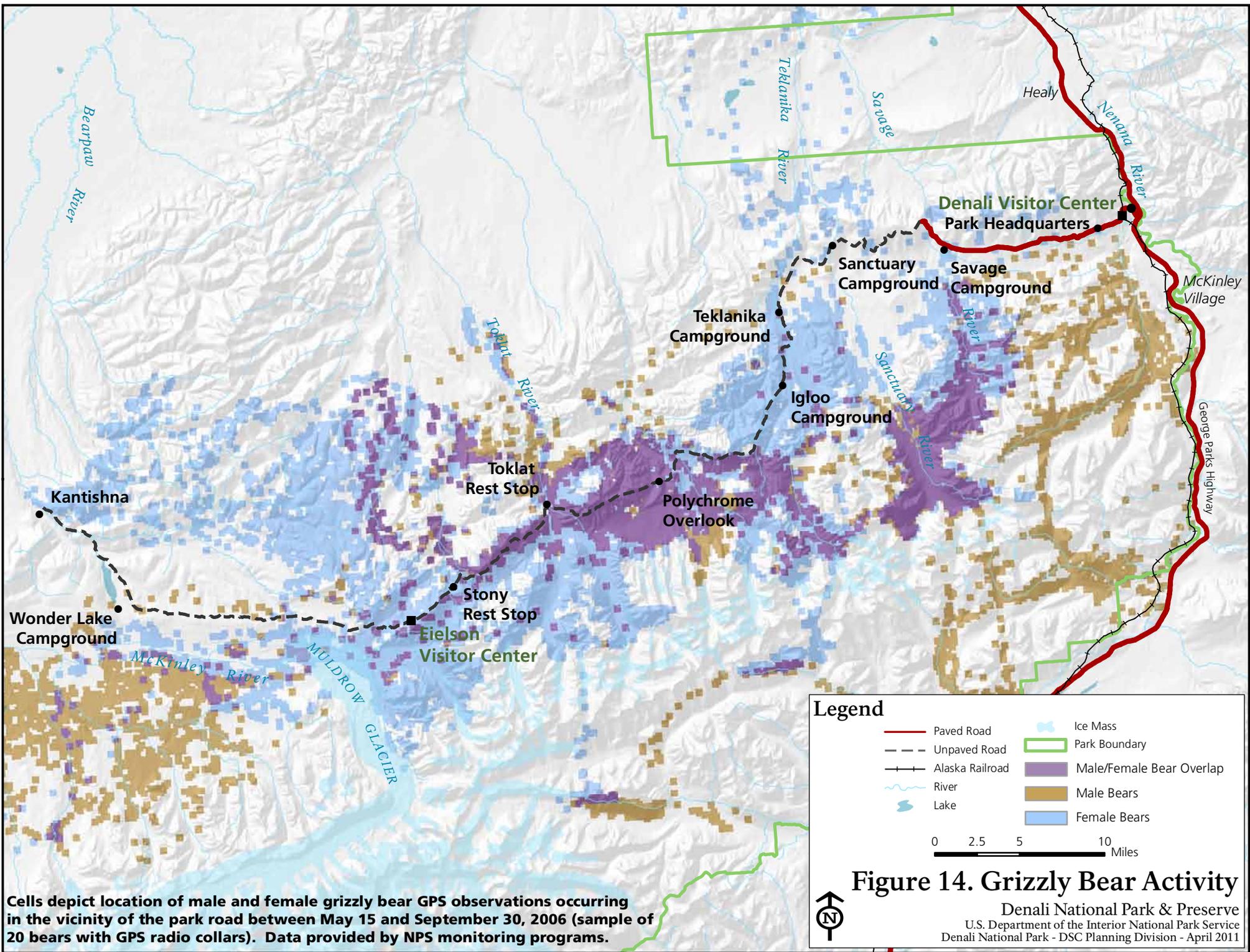
corroborate previous research efforts that concluded that some individual bears may react negatively to vehicular traffic at specific places or times even though the bears generally are not altering the timing of their activities to avoid human disturbances along the road (Mace et al. 2009).

The following two maps provide information on the distribution and concentration of activity by a sample of grizzly bears along the Park Road corridor. The first map shows the average density ranges, or concentrations, of grizzly bears during the park visitation season. The data were obtained from a sample of 20 grizzly bears that were fitted with GPS radio collars that recorded hourly locations between May 15 and September 30, 2006. The darker

shadings indicate areas where the highest concentrations of grizzly bear activity occurred during this time period. Not all of the bears in the study area were collared, so the data do not show overall bear activity, just the activity of these particular bears.

The second map identifies specific locations of male and female grizzly bear GPS observations during the same monitoring period in 2006. As discussed earlier, in general, female bear activity (shown in blue) tends to occur in areas closer to and along the park road corridor, while male bear activity (shown in brown) appears to be more dispersed and farther from the road. However, multiple areas exist where both male and female bears were observed (shown in purple).





Cells depict location of male and female grizzly bear GPS observations occurring in the vicinity of the park road between May 15 and September 30, 2006 (sample of 20 bears with GPS radio collars). Data provided by NPS monitoring programs.

GRAY WOLF (*CANIS LUPUS*)

The gray wolf inhabits much of Alaska's mainland and several of its islands. This range includes about 85% of Alaska's 586,000 square-mile area. Over this range, an estimated 6,000 to 7,000 wolves exist (USFWS 2007b). Although the geographic distribution of wolves across Alaska has remained relatively constant in recent years, their population estimate has varied considerably due to variations in weather, prey availability, disease, and harvest levels (ADF&G 2008d). Regardless, while the wolf is listed as endangered and threatened under the Endangered Species Act throughout the lower 48 states (depending on location), this Alaskan population of wolves is not protected by the act.

Wolves are members of the family *Canidae*. Most adult male wolves in interior Alaska weigh from 85 to 115 pounds, but they occasionally reach 145 pounds. Female adult wolves are smaller than males and typically do not weigh more than 110 pounds. Wolves reach adult size by about one year of age (ADF&G 2008d). Wolves can live up to 13 years and reproduce past 10 years of age (USFWS 2007b).

Through extensive wolf monitoring programs over the past 24 years, NPS staff have been able to closely track wolf populations, movements, and behavior at Denali National Park and Preserve. On the north side of the Alaska Range, staff have used radio-collaring of wolves from up to 16 different packs at any given time to gather the necessary data. When the monitoring began in 1986, the park had a very low spring wolf population estimate of 61 wolves (with a density of 3.5 wolves per 1,000 square kilometers). During that time, the population was likely affected by poaching and a series of mild winters that made it difficult for the Denali wolves to obtain food in winter (NPS 2009c, Meier 2009). Since then, the Denali spring wolf population estimate peaked at 134 in 1991, and averaged about 100 wolves in the park north of the Alaska Range. Generally, this population

density range is considered quite low when compared to more temperate climates with more abundant food (NPS 2009c).

Via continued monitoring, NPS staff estimated the 2010 spring wolf population in Denali to be 60 wolves (3.46 wolves per 1,000 square kilometers) (Meier, pers. comm. 2010). This is the lowest wolf density observed since 1986. Only three packs in the park contained more than five wolves. Unfortunately, the cause of the low wolf population trend is difficult to discern, as prey numbers are stable or increasing and the recent winters appear to have been severe enough to provide ample vulnerable prey. Park staff also haven't identified any evidence of widespread disease or wolf harvest (Meier, pers. comm. 2010).

The size of the park's wolf population is primarily dependent on the abundance and vulnerability of ungulate prey species. During mild winters, prey—such as caribou, moose, or sheep— can move about freely in shallow snow cover and tend to be in good nutritional condition, which limits the number of kills the wolves are able to make. As a result, wolf numbers tend to be relatively low because of high dispersal rates of young adults, mortality of older wolves, and low pup production and survival (Adams and Mech 1995, Mech et al. 1998, NPS 2006a). Conversely, when winters are severe, the wolf population can rebound due to more vulnerable prey. In addition, wolf monitoring in the park has revealed that the wolf population can rebound quite rapidly. From 1987 to 1991 (from a period of mild winters to a period of severe winters), the park's estimated population more than doubled from 53 wolves in the spring of 1987 to 134 wolves in the spring of 1991 (Meier 2009, NPS 2006a).

Denali National Park and Preserve is one of the few areas in the world where humans are not the primary cause of wolf mortality. The park's monitoring program involved the collaring of over 350 wolves since 1986, with approximately 20 to 30 individual wolves

collared at any given time. Since the program's inception, park biologists have examined 190 collared wolves that have died. Of these mortalities, approximately 20% were killed by humans (primarily legal harvest outside park boundaries). Over 40% were killed by neighboring wolf packs, generally in winter when packs roam beyond their usual territories. The remaining 40% died of other natural causes (e.g., avalanche, starvation, drowning, old age, disease) (NPS 2009c).

The overall Denali wolf population is made up of territorial packs. Fourteen different packs are currently being monitored in the park. Wolf packs can include anywhere from 2-30 individuals, and typically consist of a breeding pair (or alpha pair), the pups of the year, and possibly a few yearling or adult wolves from earlier litters (Mech et al. 1998, NPS 2006a). On average, wolf packs typically include 6 to 7 individuals. However, as noted earlier, only three of the packs in Denali contained more than five wolves as of 2010.

The pack territories range in size depending on how much prey is available and seasonal prey movement. The packs typically use their traditional area and defend it from other wolves (USFWS 2007b). Their ability to cover large areas to seek out vulnerable prey makes wolves effective hunters. For example, wolves may travel as far as 30 miles in one day. Although their average travel speed may be a 5 mph trot, wolves are capable of reaching speeds of 40 mph while in pursuit over short distances (USFWS 2007b).

Four of Denali's wolf packs inhabit lands along the Park Road corridor and have dens in relatively close proximity to the road. These packs include the Nenana River pack, the East Fork pack, the Grant Creek pack, and the McKinley Slough pack. Monitoring has revealed that all four of these packs apparently had pups in 2010. Like the ranges of other wolf packs, the ranges occupied by these four packs have varied over time, with boundary shifts and varying degrees of

overlap between pack territories. There have been other packs occupying these areas, with other names, in the past. Park staff has noted that the East Fork pack has been observed to be the most persistent pack in the Park Road corridor (Meier, pers. comm. 2010)

Since all four current packs have dens that are near the road and physically accessible by humans, the park has established closure areas to minimize disturbance to the den activity. These closure areas range in size from a half-mile to a mile radius around the dens. The park has historically applied this proactive approach to wolf habitat protection, by preventing human disturbances to wolf dens and summer rendezvous areas. In turn, park staff haven't documented any notable effects of humans on denning. However, staff have observed some variation in the levels of human habituation in various wolf packs.

In recent years, wolves from the Grant Creek pack have provided the most wolf sightings for visitors along the road, presumably because of their tolerance of humans (Meier, pers. comm. 2010). The Grant Creek wolves are typically seen along the road corridor west of the Toklat River.

The following table provides information on the likelihood that Park Road travelers going to various destinations would see at least one wolf. For example, a visitor who plans to travel as far as Toklat has a 12% chance of seeing one or more wolves somewhere along the way. Park staff gathered this information by using various methods, such as having bus drivers document where and when they see wildlife while driving along the road.

At Denali, wolves generally inhabit the areas of the park that also support ungulate prey (where the elevation is less than 6,000 feet). Throughout most of the year, wolves roam throughout their territory in search of prey, and occasionally extend their hunt into territories of adjacent packs (NPS 2006a).

Table 15. Probability of Sighting Gray Wolves along the Denali Park Road, by Trip Destination

Destination	Probability of Sighting at least one Gray Wolf
Teklanika	6%
Toklat	12%
Eielson	20%
Wonder Lake	21%

Source: NPS 2011
(based on wildlife sighting data from 2007 and 2008)

Wolves that are very dependent on migratory caribou in particular often abandon their territories for short time periods and travel long distances for prey, if necessary (ADF&G 2008d). Several packs in Denali have overlapping territories, most likely from territory shifts that result from following migratory prey from year to year (Mech et al. 1998, NPS 2006a).

The breeding season for Denali wolves is in February, and litters averaging about five pups are born in dens in May. For the first six weeks, pups are reared in dens and are cared for by the entire pack (USFWS 2007b). In most cases, one adult female in each pack will produce one litter for the pack. However, multiple litters (from multiple adult females) per pack have been documented in the park (Meier et al. 1995).

From May to September, movements of yearling and adult wolves in a pack generally radiate from a central point, where the young pups remain because they are too small to travel with the adults. Initially, this point is typically the den. However, as the summer progresses, pups may also be moved to a rendezvous site away from the den. The adults in the pack continue to hunt from this central location throughout the remainder of the summer. By mid-September, pups are usually large enough to travel with the adults and the pack resumes nomadic hunting into

winter (Mech et al. 1998, NPS 2006a). Just as overall pack territories are determined by prey movement and locations, the seasonal habitat selection of wolves is largely dictated by their prey's seasonal habitat use patterns (Mech et al. 1998).

Wolves are opportunistic carnivores, and their primary food sources include moose, caribou, and Dall sheep. However, during summer months, small mammals such as voles, ground squirrels, snowshoe hares, beavers, birds, and fish may supplement their diet (ADF&G 2008d). The amount and frequency of killing large prey is often dependent on prey availability and environmental conditions; a wolf pack may eat regularly by killing a caribou or moose every few days. Or, if conditions are limiting, they may go several days without eating.

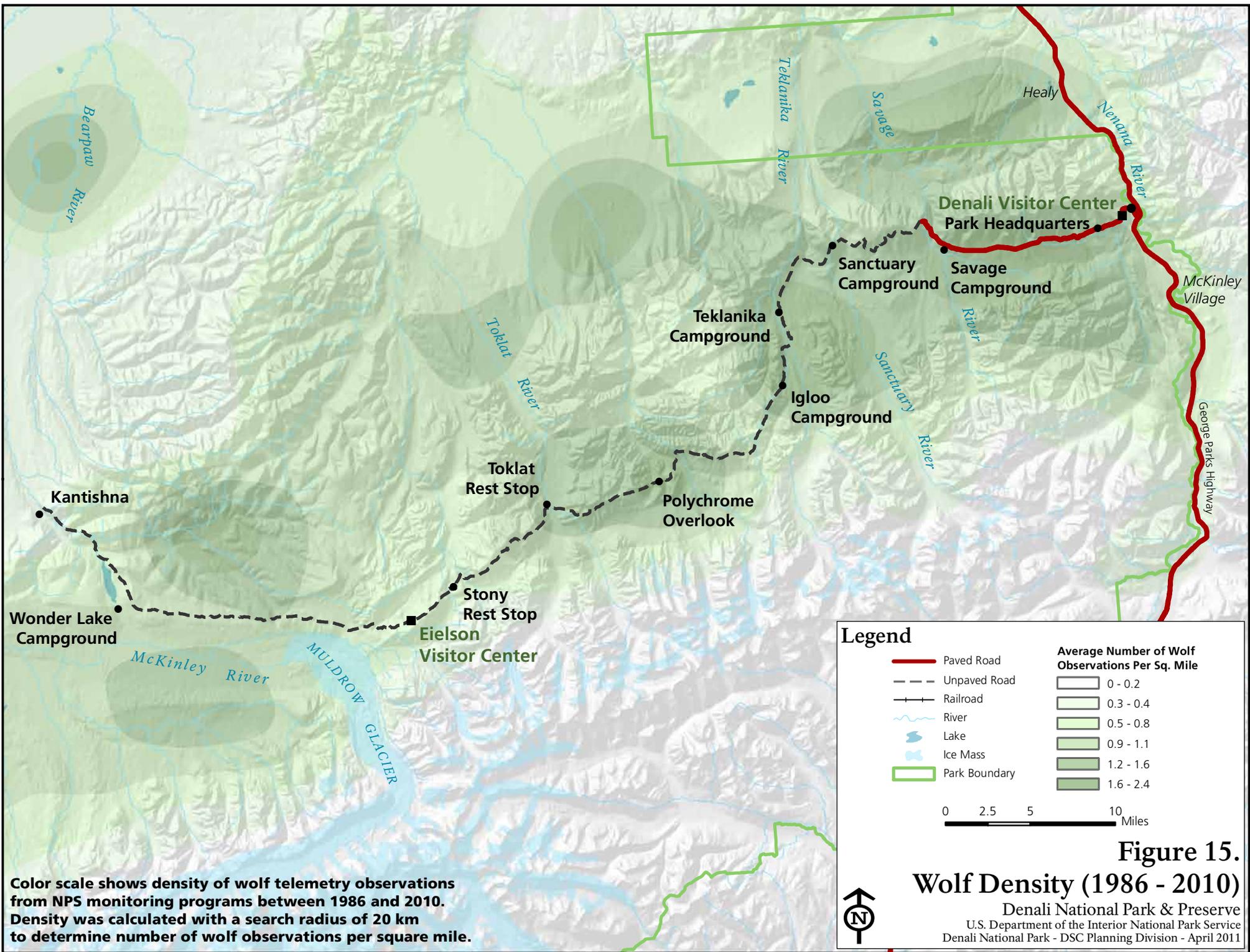
According to an analysis of kill sites in the Denali wolf monitoring program, wolves typically kill many moose and caribou calves and Dall sheep lambs, as well as many older animals. However, the study indicates that wolves rarely kill healthy young adults of caribou, moose, or sheep. The results also indicate that wolves mainly feed on moose during mild winters with little snow. During severe, snowy winters, the Denali wolves tend to feed more on caribou. And, some Denali wolf packs were found to seek and learn locations of concentrated Dall sheep use and find ways to gain a reliable food source from them as well (NPS 2009c).

Lastly, it is important to note the secondary roles that these predatory kills play in the Alaskan ecosystem. The remains of large mammals killed by wolves also provide a relatively consistent food source for a wide variety of other animal populations, including foxes, wolverines, ravens, and bears. In addition, wolves help regulate the balance between ungulates and their herbaceous food supply (USFWS 2007b).

The following two maps provide information on the distribution and concentration of gray wolf activity along the

Park Road corridor. The first map shows the average density ranges, or concentrations, of wolf activity along the road corridor. The data graphics were derived from the NPS wolf monitoring that was conducted between 1986 and 2010. The darker shadings indicate areas where the highest concentrations of wolf activity occurred

during this time period. The second map identifies specific locations of wolf activity observations from April 2008 through April 2010. The estimated geographic ranges of the various wolf pack territories in the area are overlaid on the map. The wolf pack names and spring pack sizes are also shown within each pack territory.



Color scale shows density of wolf telemetry observations from NPS monitoring programs between 1986 and 2010. Density was calculated with a search radius of 20 km to determine number of wolf observations per square mile.

Legend

	Paved Road		Average Number of Wolf Observations Per Sq. Mile 0 - 0.2
	Unpaved Road		0.3 - 0.4
	Railroad		0.5 - 0.8
	River		0.9 - 1.1
	Lake		1.2 - 1.6
	Ice Mass		1.6 - 2.4
	Park Boundary		

0 2.5 5 10 Miles

Figure 15.
Wolf Density (1986 - 2010)
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 Denali National Park - DSC Planning Division - April 2011

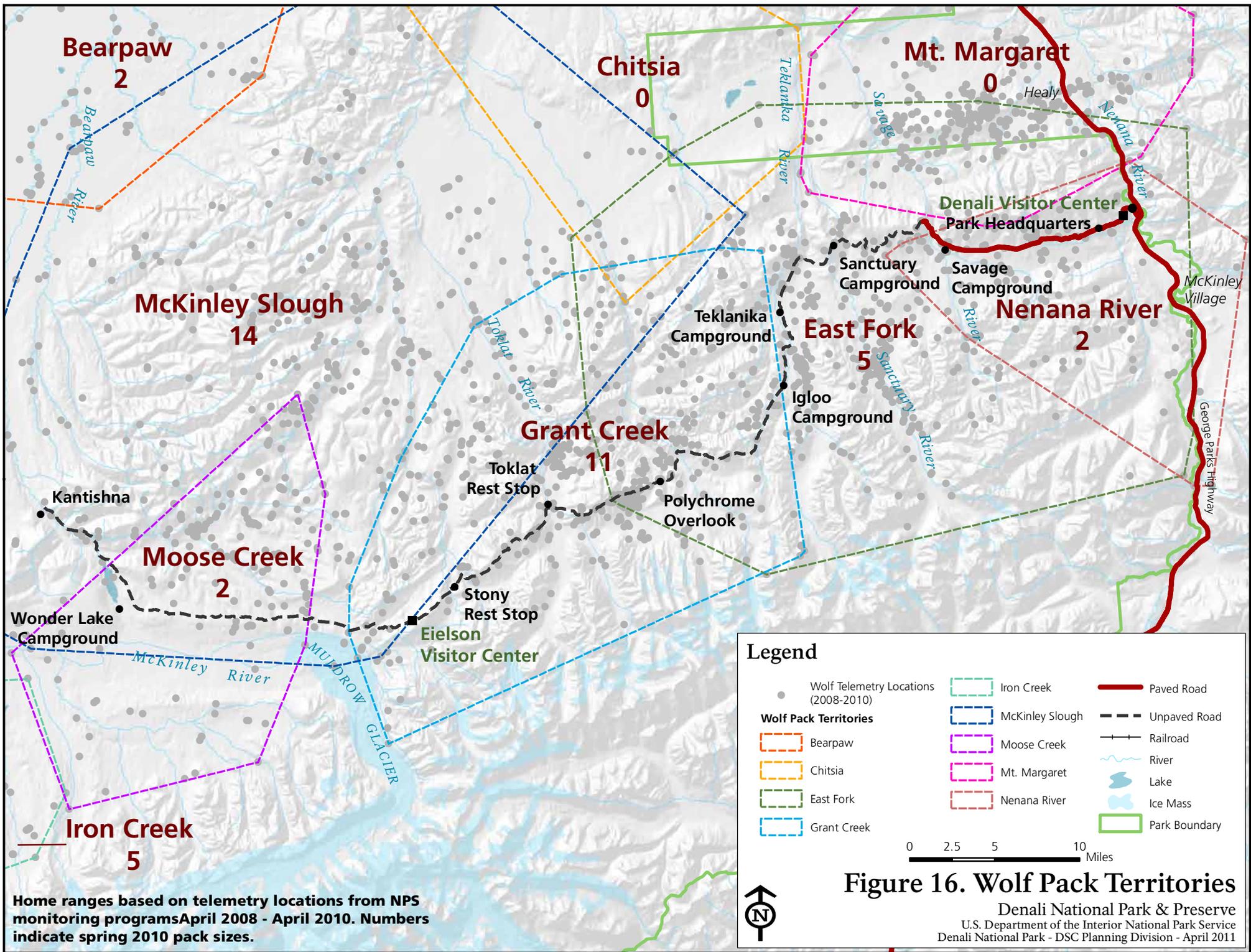


Figure 16. Wolf Pack Territories

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MOOSE (ALCES ALCES)

The moose is a relatively common sight for Denali visitors traveling along the park road. As the world's largest member of the deer family (*Cervidae*), moose are generally associated with northern forests around the world in North America, Europe, and Russia. Adult male moose weigh from 1,200 to 1,600 pounds at maturity, while adult females typically weigh from 800 to 1,300 pounds. The lifespan of a moose is typically less than 16 years. Like most other members of the deer family, only the males (bulls) have antlers that are grown each summer and shed each winter. As for social behaviors, moose communicate with each other through vocalizations, other noises, body posturing, and odors. (ADF&G 2008e)

In the autumn of 2008, NPS staff conducted moose surveys in the park north of the Alaska Range to continue a moose monitoring program that updates population data for a predetermined survey area every three years. As of 2008, staff estimated 1,279 moose in the 10,004-square-kilometer area (approximately one moose for every eight square kilometers). This population estimate is higher than the 2004 estimate of 1,104 moose in the same area (Owen and Meier 2009, NPS 2009d). When populations in areas south of the Alaska Range are incorporated, NPS staff estimate that the parkwide moose population is likely to be between 2,000 to 2,500 moose (NPS 2009a). Although the moose population in the park has been relatively stable over the years, the moose population along the Park Road corridor (at least from Headquarters to Teklanika), has declined by about half since the early 1970s, as has the number of moose sighted from the Park Road (Burson et al. 2000, NPS 2006a).

The 2008 moose survey also yielded a calf:bull:cow ratio of 24:54:100. This translates to calves, bulls, and cows making up about 13%, 31%, and 56% of the overall population, respectively. Although the overall 2008 population estimate was relatively similar to the 2004 estimate, this

2008 ratio varied more from the 2004 ratio. In 2004, the calf:bull:cow ratio was estimated at 39:88:100 (17%, 39%, and 45% of the estimated population, respectively) (Owen and Meier 2009, NPS 2009d).

The importance of monitoring moose populations is heightened by the animal's high reproductive potential. Moose can quickly overpopulate a range if their survival and reproduction are encouraged by mild winters and a lack of predation and hunting (ADF&G 2008e). In Denali, moose are primarily preyed on by wolves and grizzly bears. These predators often target moose calves as prey; however, they are also opportunistic in taking adult moose as well. In addition to natural predation, changes in the Denali moose population also correlate to winter weather patterns. Deep, crusted snow can result in malnutrition and subsequent death of large numbers of moose. This often leads to a decrease in both the birth rate and the survival of calves in the following year (ADF&G 2008e). And, as winter snow depths increase, moose also become more prone to winter predation by wolves due to their weakened state and their difficulty in traversing deep snow to escape.

Moose inhabit the entire vegetated planning area in the park except the highest tundra communities (NPS 2006a). Moose concentrations vary seasonally throughout the park. Like the caribou, moose make seasonal movements to calving, breeding, and wintering areas. They can travel anywhere from a few miles to as many as 60 miles during these seasonal migrations (ADF&G 2008e). During winter months, the location of moose with the park is dependent on the timing and depth of snow.

The following table provides information on the likelihood that Park Road travelers going to various destinations would see at least one moose. For example, a visitor who plans to travel as far as Toklat has a 43% chance of seeing one or more moose somewhere along the way. Park staff gathered this information by using various methods, such as

having bus drivers document where and when they see wildlife while driving along the road.

Table 16. Probability of Sighting Moose along the Denali Park Road, by Trip Destination

Destination	Probability of Sighting at least one Moose
Teklanika	35%
Toklat	43%
Eielson	44%
Wonder Lake	58%

Source: NPS 2011
(based on wildlife sighting data from 2007 and 2008)

Cow moose typically breed for the first time at the age of 28 months. After a gestation period of about 230 days, the cows typically seek areas within their home range that provide low predator densities (such as islands in rivers) or improved visibility (NPS 2006a). The calves are usually born from mid-May to early June. Once young are born, the cow moose defends her newborn(s) vigorously through the first summer. After calving, moose typically move to higher elevations. When the cows are ready to begin breeding again in the autumn, the calves are usually weaned from the mother. However, the calf remains with the mother for its entire first year until the mother is ready to give birth to the following year’s calf, at which point the mother aggressively chases off her one-year-old offspring (ADF&G 2008e).

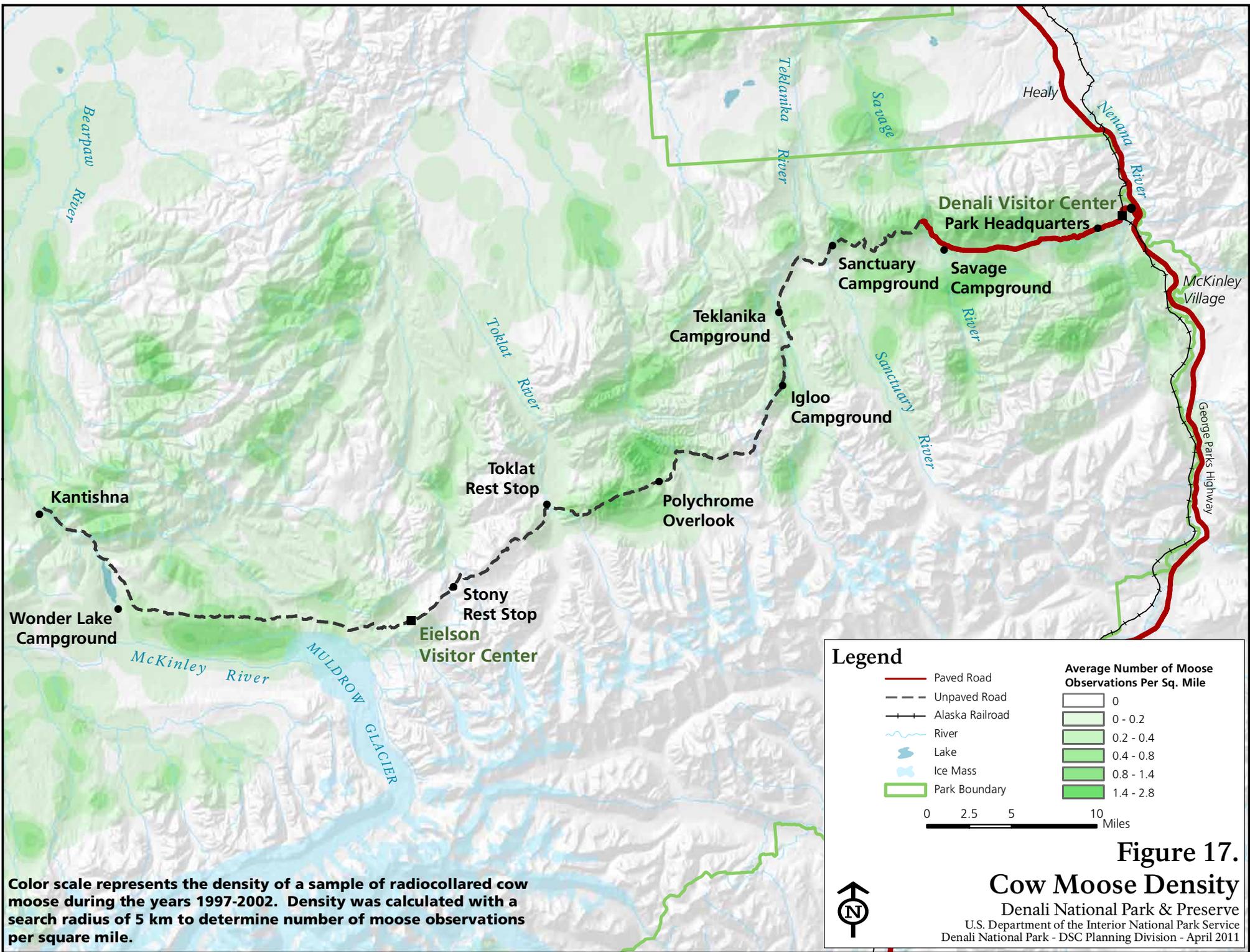
Moose breed in autumn with the peak of the “rut” coming in late September and early

October. During this time, bull moose compete for breeding females by bringing their antlers together and pushing. Serious battles are rare, but bulls often receive injuries from such bouts (ADF&G 2008e).

The area of the park from the park headquarters to the Savage River often supports a relatively high density of moose for interior Alaska. During early autumn, large rutting congregations occur between Mile 6 and Mile 15 of the Park Road. Fall rutting congregations can reach sizes of 50 or more moose, and it may be possible to witness bulls sparring to determine dominance. The autumn breeding and post-breeding concentrations typically occur in subalpine habitats. When winter sets in with increasing snow depths, the moose return to lower elevations (ADF&G 1992, NPS 2006a).

Moose typically consume large quantities of willow, birch, and aspen twigs in autumn and winter. In concentrated foraging areas, moose are known to establish a browse line or “hedge” six to eight feet above the ground by trimming off the top branch and shoots of shrubs. As ground vegetation becomes green in spring, moose typically forage on sedges, horsetail, aquatic plants, and grasses. During summer, moose feed on vegetation in shallow ponds, forbs, and the leaves of birch, willow, and aspen (ADF&G 2008e).

The following map provides information on the distribution and concentration of moose activity along the Park Road corridor. The data graphics were derived from NPS cow moose monitoring efforts that were conducted between 1997 and 2002. The darker shadings indicate areas where the highest concentrations of moose activity occurred during this time period.



OTHER WILDLIFE

The Denali Park Road crosses several different natural communities as it traverses the park from the eastern boundary to Kantishna. In addition to crossing habitat for the five large mammals of Denali—Dall sheep, wolf, caribou moose, and grizzly bear (as described in other parts of this Affected Environment section)—the road also passes through habitat for a wide variety of other wildlife. Each wildlife species that occupies areas along the road corridor plays a role in the park's food web and ecological system. Many of the small mammal herbivores assist in the control and distribution of vegetation across the landscape, and also serve as prey to the larger mammals of the park such as the grizzly bear or wolf. Thus, it is equally important to consider the habitat condition for these other wildlife species in addition to the habitat condition for the five prominent mammals of Denali.

The park's terrain, soils, climate, and history are the attributes that determine the plant and animal communities that inhabit Denali's varied landscape. Plant ecologists and wildlife biologists for the park have identified three distinct natural community types in the park: boreal lowland, subalpine, and alpine. Some of the wildlife species in Denali occupy only one community type, whereas other species are more opportunistic or migratory, and inhabit different natural communities at different times of year.

Denali park staff have documented 39 mammal species, 169 avian species, one amphibian species, and 15 fish species that inhabit these natural communities of the park. In addition, the biological community of the park also includes a vast array of insects, bacteria, and algae (NPS 2009f, Meier, pers. comm. 2010).

Mammals

A wide variety of small mammals inhabit the park, including the areas in the vicinity of the Park Road corridor. Some of these mammal

species are frequently seen by park visitors traveling the Park Road due to their large populations, daytime activity, habitat elevation range, and/or tolerance or adaptation to human presence along the road. Red squirrels (*Tamiasciurus hudsonicus*), Arctic ground squirrels (*Spermophilus parryii*), and snowshoe hares (*Lepus americanus*) are examples of small mammals that are very prevalent and viewable along the road corridor. Red foxes (*Vulpes vulpes*) are quite adaptable to varying natural communities and elevations are also commonly seen along the Park Road in most years (NPS 2009f).

In addition to the squirrels and snowshoe hares, other small mammal herbivores and insectivores inhabit the lower elevations of the road corridor (e.g., boreal lowlands), including the northern flying squirrel (*Glaucomys sabrinus*), shrews (*Sorex* spp.), lemmings (*Lemmus* sp. and *Synaptomys* sp.), and voles (*Clethrionomys* sp. and *Microtus* spp.). In addition to the fox, other small- and medium-sized mammal carnivores depend on these smaller mammals as a food source, including the marten (*Martes americana*), lynx (*Lynx canadensis*), coyote (*Canis latrans*), wolverine (*Gulo gulo*), ermine (*Mustela erminea*), least weasel (*Mustela nivalis*), and mink (*Mustela vison*) (NPS 2009f, NPS 2006a). The beaver (*Castor canadensis*) is also a common herbivore in the boreal lowlands of the park, and plays an essential role in the riparian corridors and wetland complexes of the park's taiga.

As the Park Road meanders through the landscape into the subalpine community, Arctic ground squirrels, snowshoe hares, porcupines, and red foxes are a few of the most common small- to medium-sized mammals that occupy habitat along the road corridor (NPS 2009f, NPS 2006a). The Arctic ground squirrels are very prevalent during summer months, though they hibernate for seven months of the year. The snowshoe hare generally inhabits the lower, forested communities. However, when their cyclical populations are high, they are also very

common in the higher, subalpine areas of the park. The snowshoe hare is an important food source for other wildlife in the park, such as the lynx, coyote, or golden eagle. So, when hare populations are high, these other wildlife species benefit substantially. According to park staff monitoring efforts, the snowshoe hare population has recently risen to its highest levels in over 20 years. However, this abundance of snowshoe hares also has negative effects on vegetation, as the hare is known to chew the bark off of willows and dwarf birch. This causes shrub die-off along the viewshed of the Park Road (NPS 2010a).

The collared pika (*Ochotona collaris*) and hoary marmot (*Marmota caligata*) are common mammals that inhabit the rocky terrain in the higher subalpine and alpine areas of the road corridor. Hoary marmots typically develop loosely formed colonies and hibernate for up to eight months of the year. The pika are active year round; however, to get through the winter, a pika depends on seeds and grasses it collected and stored during the summer months. (NPS 2009f, NPS 2006a).

Birds

Of the 169 avian species documented in the park, most are migratory visitors that occupy the park during breeding season (April – October); only 25 of the bird species are year-round residents of Denali. However, over 116 of the bird species have been documented to breed in the park (NPS 2006a). Some of the bird species in the park are quite selective in habitat use and may occupy only one general plant community (e.g., boreal lowlands). Other avian species in the park may have broader resident or migratory ranges. These birds may occupy the boreal lowlands, subalpine areas, or alpine areas at different times or for different purposes (e.g., nesting vs. foraging).

The greatest diversity of Denali's resident and migratory bird species inhabit the park's boreal lowlands community. Some of the common species that occupy these lower

forested areas include northern goshawk (*Accipiter gentilis*), sharp-shinned hawk (*Accipiter striatus*), great horned owl (*Bubo virginianus*), boreal owl (*Aegolius funereus*), various woodpeckers (*Picoides* spp.), spruce grouse (*Falcapennis canadensis*), black-capped and boreal chickadees (*Poecile atricapilla* and *P. hudsonica*), ruby-crowned kinglet (*Regulus calendula*), yellow-rumped warbler (*Dendroica coronata*), white-crowned sparrow (*Zonotrichia leucophrys*), and white-winged crossbill (*Loxia leucoptera*). Woodpeckers are quite prevalent in the woodlands, in both diversity and numbers; all species are resident, except for the northern flicker (*Colaptes auratus auratus*). The boreal riparian areas are home to kingfishers (*Ceryle alcyon*) and American dippers (*Cinclus mexicanus*). And, the wetland complexes and other open water areas of the boreal lowlands are nesting grounds and foraging grounds for sandhill cranes (*Grus canadensis*), trumpeter swans (*Cygnus buccinator*), common loons (*Gavia immer*), mew gulls (*Larus canus*), Arctic tern (*Sterna paradisaea*), northern waterthrush (*Seiurus noveboracensis*), rusty blackbirds (*Euphagus carolinus*), and many species of migratory waterfowl (NPS 2009f, NPS 2006a).

Some of the common birds of the sub-alpine zone (both resident and migratory) include willow ptarmigan (*Lagopus lagopus*), northern harrier (*Circus cyaneus*), merlin (*Falco columbarius*), short eared owl (*Asio flammeus*), northern hawk-owl (*Surnia ulula*), Arctic warbler (*Phylloscopus borealis*), olive-sided flycatcher (*Contopus cooperi*), gray-cheeked and Swainson's thrushes (*Catharus minimus* and *C. ustulatus*), fox sparrow (*Passerella iliaca*), golden-crowned sparrow (*Zonotrichia atricapilla*), blackpoll warbler (*Dendroica striata*), and orange-crowned warbler (*Vermivora celata*) (NPS 2009f). Various subalpine open water bodies in Denali provide important breeding habitat for the arctic tern and long-tailed jaeger (NPS 2006a). Other shorebirds that nest in subalpine open water, wetlands, or riparian habitats include the whimbrel (*Numenius*

phaeopus), upland sandpiper (*Bartramia longicauda*), surfbird (*Aphriza virgata*), semipalmated plover (*Charadrius semipalmatus*), yellowlegs (*Tringa* spp.), solitary sandpiper (*Tringa solitaria*), and wandering tattler (*Heteroscelus incanus*) (NPS 2006a). Also of note, an index of the abundance of willow ptarmigan is calculated annually by park staff. Since 1988, the park staff has used the index to track the different phases (high, low) of the ptarmigan cycle (McIntyre, pers. comm. 2010). And in recent years, the ptarmigan's population has been quite stable and healthy (NPS 2010a).

At higher elevations, in the alpine vegetation community, several bird species are found during certain times of year. These species make use of this high, open landscape particularly for summer foraging. Some species that are known to inhabit the alpine areas of Denali include golden eagle (*Aquila chrysaetos*), gyrfalcon (*Falco rusticolus*), white-tailed ptarmigan (*Lagopus leucurus*), American golden-plover (*Pluvialis dominica*), surfbird, long-tailed jaeger (*Stercorarius pomarinus*), horned lark (*Eremophila alpestris*), northern wheatear (*Oenanthe oenanthe*), and gray-crowned rosy finch (*Leucosticte tephrocotis*) (NPS 2009f).

As noted in the mammal section above, the snowshoe hare population has spiked to very high levels in recent years (NPS 2010a). This population boom also results in a spread of snowshoe hares at higher elevations. This benefits raptors such as the golden eagle that prey on small mammals on the landscape at or above the tree line.

Two bird species at Denali are considered federal species of concern (formerly federal candidate Category 2 species): the harlequin duck (*Histrionicus histrionicus*) and olive-sided flycatcher. The species of concern status does not provide protection under the Endangered Species Act. However, NPS policy directs the park to manage such species as threatened or endangered until additional data on their population sizes and

distributions show otherwise. The olive-sided flycatcher nests in low, wet, and open areas of the park's boreal forests. Harlequin ducks are known to inhabit fast-moving clear streams and rivers. Harlequins have been documented in the park, and park staff estimates that some of the clear water streams in the park support breeding populations (NPS 2006a).

Also, the olive-sided flycatcher, gray-cheeked thrush (*Catharus minimus*), and blackpoll warbler are on the State of Alaska species of special concern list (ADF&G 2010, McIntyre, pers. comm. 2010). The olive-sided flycatcher is also listed as a bird of conservation concern by the U.S. Fish and Wildlife Service's Migratory Bird Program. This listing establishes management priorities for species such as the olive-sided flycatcher to "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973" (USFWS 2008, McIntyre, pers. comm. 2010).

Amphibians

The wood frog (*Rana sylvatica*) is the only species of amphibian that is known to inhabit Denali. This amphibian occupies woodlands and wetland areas of the boreal lowland forests in the park. The wood frog survives the harsh Alaskan winter by hibernating in the upper layer of the previous year's dead vegetation (NPS 2006a).

Natural Communities

The following map shows general distribution of the three primary natural community zones along the park road corridor: boreal lowland, subalpine, and alpine. The natural community boundary estimations were derived from a detailed NPS vegetation survey conducted by park staff in 2008.

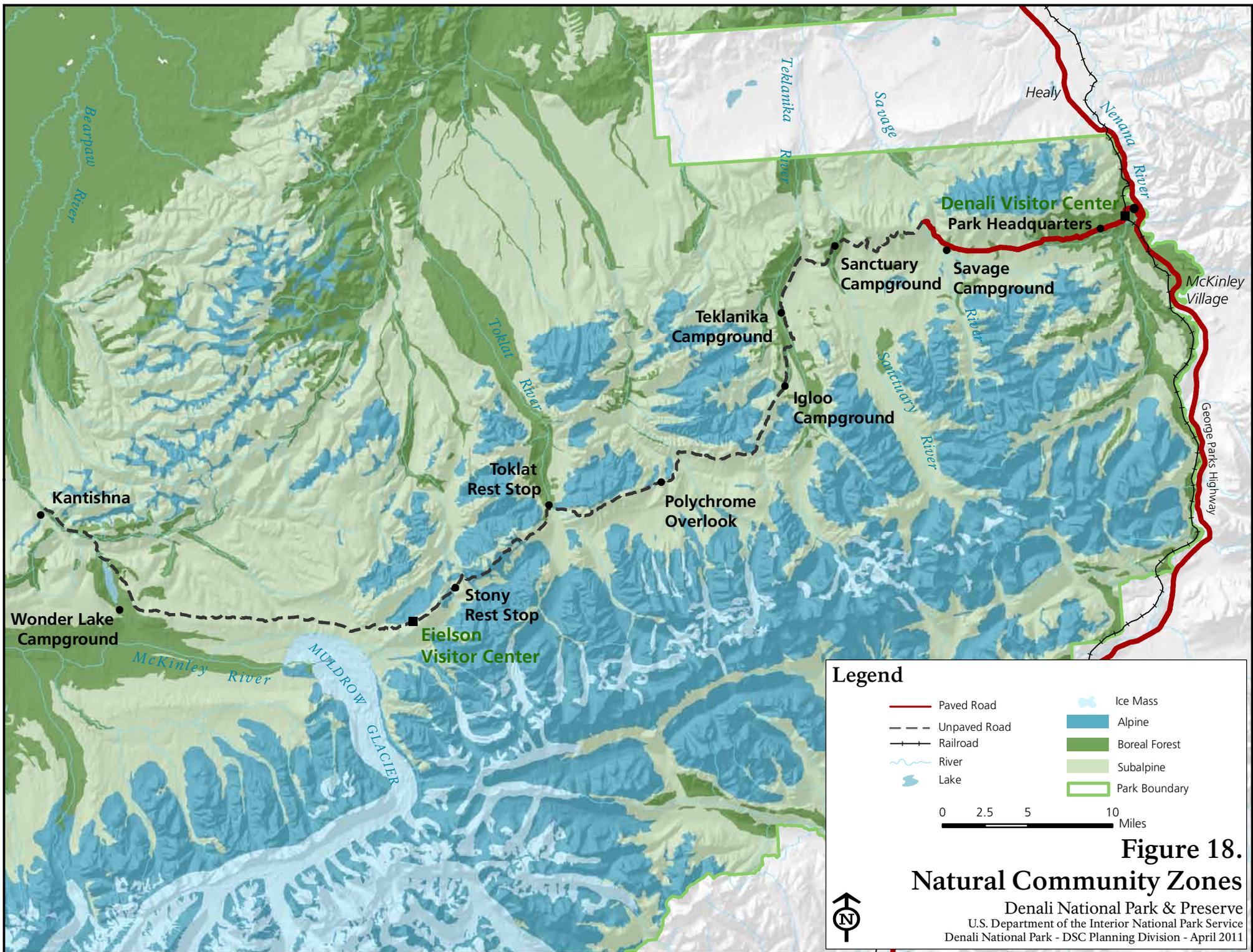


Figure 18.
Natural Community Zones

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WILDERNESS

THE WILDERNESS ACT

The Wilderness Act of 1964 established the definition of wilderness that is applied to applicable federal lands throughout the U.S. The act states

“A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.” (Public Law 88-577 (16 U.S. C. 1131-1136)).

DESIGNATED WILDERNESS IN DENALI NATIONAL PARK

The vast majority of the land within Denali National Park and Preserve satisfies the criteria of this wilderness definition even though much of the land has not yet been officially designated as wilderness. The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) tripled the size of the park, designated much of it as wilderness, and called for the Secretary of

the Interior to assess the suitability of other lands for subsequent wilderness designation (NPS 1986).

More specifically, Section 701 of ANILCA formally designated roughly 99% of the former Mount McKinley National Park as wilderness to be managed in accordance with the Wilderness Act of 1964. Various wilderness use provisions were also set forth via ANILCA (e.g., use of snowmachines, motorboats, and airplanes for traditional activities or subsistence). With the exception of the last few miles of the Park Road near its terminus in Kantishna, the entire Park Road corridor runs through this designated Denali Wilderness. However, since the uses of the road do not comply with wilderness management criteria, the road itself and buffers on each side of it were excluded from the designated wilderness lands.

The designated wilderness boundary along the Park Road corridor begins 150 feet from the centerline of the Park Road (measured perpendicularly from the centerline on both sides of the road). The boundary also begins 150 feet from any existing borrow pits and waysides; lands east of the railroad right-of-way are excluded from designation (NPS 1986). Typically, a 300-foot buffer separates the wilderness boundary from any park facility or development.

Therefore, although the activities and disturbances on the Park Road do not occur on designated wilderness lands, the wilderness may be affected by road corridor use given its immediate proximity to wilderness. Some of these effects could include, but are not limited to, noise from motorized vehicles, human voices, fugitive dust, obstructed viewsheds (e.g., vehicles or road in viewsheds), social trails, vegetation trampling near transportation hubs (from people who wander beyond the facilities), or increased signage or facility development

near hubs. Thus, the volume, timing, and type of vehicle use on the Park Road and the location, size, and use levels of transportation nodes may affect wilderness character in the park.

Since wilderness character is also defined by the opportunity for solitude, and since the park's wilderness is in such close proximity to the park road, the mere presence of other humans along the Park Road could affect wilderness character in the park. Whether these other visitors travel by foot, bicycle, personal motorized vehicle, or visitor buses, their presence (and their ability to access areas deep inside the park via the Park Road) could detract from one's opportunity to experience solitude.

In addition to the wilderness areas along the Park Road corridor (and beyond the boundaries of the former Mount McKinley National Park), Denali National Park and Preserve also includes millions of acres of land that are not yet designated wilderness, but are still managed for wilderness values. Activities along the Park Road do not affect most of these other lands. The legal and administrative status of these lands was established by Section 1317 of ANILCA, which required the Secretary of the Interior to conduct a wilderness suitability review for the lands added to the park and preserve under ANILCA.

This review was included in the 1986 general management plan. The review concluded that approximately 3.73 million additional acres of the nondesignated lands in the park and preserve were suitable for wilderness designation. An area within the Kantishna Hills was determined to be unsuitable for designation as wilderness because of persistent disturbance caused by past mining activity. Since that determination, many of the private inholdings have been acquired, and much of this land has been restored, so these lands now share similar values with the rest of the park additions.

NPS policy and the park's current *Backcountry Management Plan* call for the wilderness values of these lands to be preserved, pending future action by the Secretary of the Interior, President, and Congress (NPS 2006a).

Working from the wilderness definition that was established by the Wilderness Act of 1964, the *Denali Backcountry Management Plan* sets forth several criteria that guide how the wilderness values in the park will be managed and preserved (NPS 2006a). Designated wilderness lands and recommended lands at Denali, including the areas beyond 150 feet of the Park Road centerline, are managed in a way that protects wilderness character.

WILDERNESS CHARACTER

Wilderness character is not specifically defined in the 1964 Wilderness Act, nor is its meaning discussed in the act's legislative history. However, the Wilderness Act identifies the following qualities that unify wilderness areas regardless of their size, location, or any other feature. The four qualities of wilderness character are the following:

Undeveloped – “an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation” This refers to areas that are essentially without permanent structures, enhancements, or modern human occupation. To retain its primitive character, a wilderness ideally is managed without the use of motorized equipment or mechanical transport.

Natural – “protected and managed so as to preserve its natural conditions” This means areas that are largely free from effects of modern civilization. It also refers to maintenance of natural ecological relationships and processes, continued existence of native wildlife and plants in largely natural conditions, and absence of

distractions (e.g., large groups of people; mechanization; and evidence of human manipulation, unnatural noises, signs, and other modern artifacts.)

Untrammeled – “an area where the earth and its community of life are untrammeled by man” and “generally appears to have been affected primarily by the forces of nature. . .” This refers to ecosystems that are unhindered and free from human control or manipulation. In other words, this wilderness quality can be degraded by human actions that control or manipulate components or processes of ecological systems within the wilderness area.

Outstanding Opportunities for Solitude or Unconfined Recreation – the area “has outstanding opportunities for solitude or a primitive and unconfined type of recreation . . .” Solitude means encountering few, if any, people, and experiencing privacy

and isolation. Primitive and unconfined recreation refers to freedom to explore with few restrictions, and the ability to be spontaneous. It means self-sufficiency without support facilities or motorized transportation, and experiencing weather, terrain, and other aspects of the natural world with minimal shelter or assistance from devices of modern civilization.

The preservation of the above qualities of wilderness character is dependent on the management of the Park Road, particularly for wilderness areas that are immediately adjacent to the road corridor. Therefore, careful consideration to the effects on these qualities should be given when selecting appropriate vehicle management options.

PARK MANAGEMENT AND OPERATIONS

The park is staffed by approximately 377 positions, including seasonal employees but excluding vacancies that are organized into eight divisions. The divisions include the Superintendent's Office; Administration; the Center for Resources, Science, and Learning (including the Interpretation Division); Visitor and Resource Protection; Commercial Services; Planning; and Maintenance. The staff is located at the park's headquarters and, in summer, at various developed areas along the Denali Park Road. In addition, nine permanent park staff are located in Talkeetna, two in Fairbanks, and one in Anchorage. The park's budget for fiscal year 2010 was \$32,864,000. This was a higher than normal budget due to a large volume of construction in the park.

SUPERINTENDENT'S OFFICE

The Superintendent's Office, based at the park's headquarters, is staffed by 7 individuals: the superintendent, 2 assistant superintendents, a public information officer, a seasonal public information officer assistant, 2 administrative assistants, and 1 safety officer. In addition to overseeing the day-to-day operations of the park, the Superintendent's Office facilitates dignitary visits, which include trips out on the Park Road. The office also coordinates ANILCA subsistence rights and land access assignments with inholders. The office oversees the permitting of commercial filming in the park. The division's main use of the road is for personal transportation and orientation trips for visiting dignitaries.

ADMINISTRATION DIVISION

The Administration Division is responsible for the park budget, fiscal and real property management, contracting, information technology (IT) services, and human resources. The division is staffed by 16

positions (13 permanent and 3 seasonal positions): a chief of administration, a supervisory IT specialist, 2 IT specialists, a seasonal IT specialist, 2 human relation specialists, a program analyst, a Volunteers-in-Park coordinator, 2 budget specialists, and 6 administrative assistants. The division has no specific duties relating to the road, other than using it for travel within the park and to support the other divisions. The IT staff regularly provides support services to the Eielson Visitor Center and Toklat.

CENTER FOR RESOURCES, SCIENCE, AND LEARNING

The Center for Resources, Science, and Learning is responsible for natural and cultural resource management, fire management, aviation, scientific research, and interpretation carried out in the park and regionally. The center is staffed by 29 permanent and 27 seasonal positions, which include physical, cultural, and biological resource specialists, fire specialists, and a social scientist. Along the Park Road, the center conducts natural resource monitoring and field research. The center also responds to wildfires and conducts hazard fuel treatments in developed areas and around historic structures; maintains aviation facilities; and coordinates field trips, education, and public outreach. The center oversees agreements with the state of Alaska regarding access to impaired waterways, fire management, sport hunting, fishing and trapping in the Preserve, and access to earthquake monitoring seismometers. The center coordinates with the Bureau of Land Management in regional fire plans, the U.S. Geological Survey for access to research sites, and with private individuals regarding access for Kantishna and subsistence hunting and gathering uses.

A part of the Center for Resources, Science, and Learning, the Interpretation Division prepares interpretive programs and interpretive materials in a variety of media that are distributed along the road at developed areas. The division is staffed by 53 positions consisting of 8 permanent, 5 term, 29 seasonal (seasonal staffing figures vary annually according to budget), 6 interns, and 1 intermittent position. Interpretive staff are located at the park headquarters, the park's entrance area, Toklat, Wonder Lake, and Talkeetna. The division coordinates special programs such as the Artist-in-Residence Program and Teacher-to-Ranger-to-Teacher Program, develops and maintains two visitor centers, the Murie Science and Learning Center, the Toklat Visitor Contact Station, runs the park kennels operation, and maintains wayside exhibits, as well as a wide range of daily interpretive services. The division works with inholders and special interest groups to provide guided hikes and tours of park resources.

Park interpreters use the Denali Park Road extensively in providing these services and in making interpretive visitor contacts. Approximately 17.5 full-time equivalent positions are expended on road-related activities or working with visitors who use the road to visit the park (one full-time equivalent position represents a full year of work, whether performed by one full-time employee or multiple part-time employees.). The division has agreements with the University of Alaska Fairbanks, Alaska Geographic, Denali Borough School District, and Denali Education Center for educational programs and a memorandum of understanding with the Central Michigan University for a photojournalism intern. The division also has an agreement with Joint Venture, the park's primary concessioner, to provide an interpretive program for the Kantishna Experience. The park also has an agreement with Princess Cruise Line and Holland America Line to provide support for programming (e.g., rangers on the train and the Denali Visitor Center auditorium). Interpretive staff also provide training,

coaching, and program evaluation to primary partners who provide in-park services.

COMMERCIAL SERVICES DIVISION

Based at the park's headquarters, this division is staffed by a chief of commercial services, 3 concession management specialists, 1 supervisory revenue and fee business manager, and 9 seasonal visitor use assistants. The Commercial Services Division bears the primary responsibility for the transportation system. The division manages a Category I contract (DENA003-01) that authorizes Doyon/ARAMARK Joint Venture to operate in the park. This responsibility entails ensuring that the concessioner adheres to the requirements in the contract. The requirements are many, and include responsibilities such as bus replacement, preventive maintenance protocols and documentation, driver training, bus cleanliness, adherence to Department of Transportation regulations, break-down and repair documentation, pre-trip inspections by drivers and documentation, etc. The division approves all ticket pricing on an annual basis, and NPS staff work intimately with concession managers to develop schedules for the shuttle bus portion of the contract. The division interacts with Joint Venture managers and other staff on a nearly daily basis during the busy operating season, and regularly communicate during the balance of the year. The division dedicates approximately 1.5 full-time equivalent positions and 24% of the division's annual budget to these oversight duties. In addition to the transportation contract, the division also oversees 18 special use contracts such as mountain guides, air taxi, interpretive guided hiking, sport hunting, dog sled passenger, dog sled freight, and approximately 50 commercial use authorizations.

PLANNING DIVISION

The Planning Division is distributed among 3 duty stations: park headquarters, the Talkeetna Ranger Station, and the Alaska Regional Office in Anchorage. Staffed by a chief of planning, 2 environmental protection specialists, and 1 seasonal planning assistant, the division is responsible for planning, environmental compliance, and plan implementation (such as coordinating a Federal Advisory Commission Act group that looks at aviation impacts on the natural soundscape). Compliance with national environmental protection laws tends to be a major emphasis for the division. The division also ensures mitigation measures are carried out on construction projects. Approximately 2 full-time equivalent positions are dedicated to the current vehicle management plan.

VISITOR AND RESOURCE PROTECTION DIVISION

The Visitor and Resource Protection Division is located at the park's headquarters, with rangers stationed at various developed areas along the road, including Talkeetna. The division is staffed by 27 positions (18 full-time, 6 seasonal, and 3 temporary or term) with responsibilities that include law enforcement, traffic enforcement, motor vehicle accident investigations, emergency medical services, search and rescue, wildlife management, wilderness management, administration of special park uses and right-of-way permits, and subsistence management. Of the 27 positions, approximately 4 full-time equivalent positions are dedicated to activities along the road. Approximately 20% of the division's annual funding was directed toward services along the road. The division has a memorandum of understanding with Alaska State Troopers to provide law enforcement services on nonfederal lands in Kantishna. The division also manages right-of-way permits for 15 inholders in Kantishna and oversees a special agreement with Professional Photographers (a NPS Program

designed to promote visitation to parks by allowing photographs to be taken for commercial use).

MAINTENANCE DIVISION

The Maintenance Division is the largest division in the park. The division is staffed by 35 permanent, 13 term, 138 seasonal, and 14 intern positions having responsibilities relating to engineering, administration, roads, trails, buildings and utilities, and the auto shop. Approximately 65% of the division budget is directed to road activities. The chief of maintenance and most roads, trails, engineering, auto shop, and building and utilities staff are located in a separate area near park headquarters. Other maintenance staff are located at Toklat, Eielson, and Wonder Lake. The division is responsible for maintaining reliable access in the park for visitors, inholders, emergency vehicles, and park staff. The division also carries out routine maintenance such as replenishment of road surfacing materials, brush cutting and shoulder maintenance, rockfall and mudslide removal, trash pick-up, fuel delivery, and restroom maintenance.

Through special project funds, the division has overseen the rehabilitation construction of historic patrol cabins and construction of Sweet Smelling Toilets, bus shelters, and other structures along the road. Non-road-related duties include trail planning, construction, and maintenance; condition assessments; Occupation Safety and Health Administration and construction inspections; maintenance of the park headquarters, visitor center, and other buildings; vehicle and equipment maintenance and repair; maintenance of the photovoltaic system at Eielson; engineering studies and energy audits; supervision of work crews; and support of park emergencies and search and rescue operations.

The division has an agreement with Alaska Department of Transportation for maintaining the Kantishna portion of the road and works cooperatively with AKDOT staff in maintaining the Kantishna airstrip.

CHAPTER 3: THE AFFECTED ENVIRONMENT

The division has agreements with special interest groups and nonprofits for snow plowing and road maintenance, maintenance of portable toilets at Kantishna Airstrip and East Fork Cabin, and maintaining the Toklat River Rest Visitor Center bookstore.

SOCIOECONOMICS

INTRODUCTION

The opening of the George Parks Highway in 1972 dramatically improved vehicular access to the park, which in turn triggered strong growth in visitor use. Between 1972 and 1984, annual visitation to Denali climbed by nearly 350%, to 395,099. Historically, as well as currently, the overwhelming majority of visitor use is associated with the Denali Entrance area and the Park Road corridor into the interior of the original Mount McKinley National Park. The first exposure to the park for many visitors, however, would be views of the Alaska Range and Mount McKinley as they travel northward on the Alaska Railroad or along the George Parks Highway. The southern expansion of Denali National Park created an opportunity to strategically plan for expanded and diversified visitor use while concurrently protecting significant resource values in the Denali Park Road corridor.

This section addresses baseline socioeconomic conditions for the planning area potentially affected by the proposed alternative vehicle management plan for the northern portion of Denali Park Road. For purposes of this assessment, the planning area encompasses in-park concessions, private enterprises operating within inholdings in the park, the Denali Borough¹

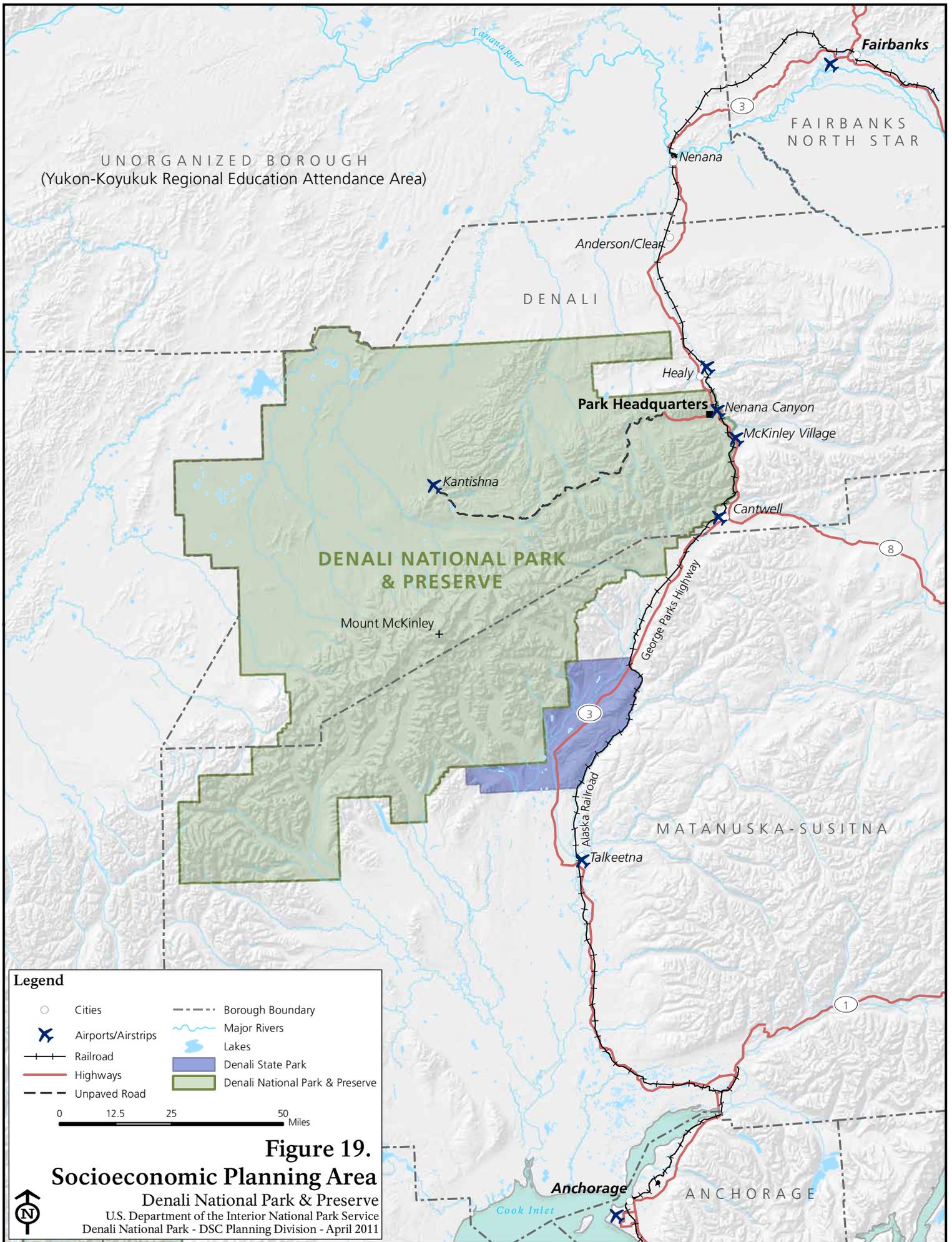
¹ Boroughs and cities are the two types of municipal government in Alaska. Although both types of municipalities can exercise similar powers and duties, a fundamental difference is that cities are community-based, while boroughs are regionally based. Denali Borough is one of 18 organized boroughs in Alaska, each having boundaries generally conforming to natural geographic boundaries/features and embracing areas and resident populations with common interests. Organized boroughs encompass less than half of the state's total geographic area, virtually all of the remaining area being located in a single unorganized borough. (Alaska DCED, 2000) Boroughs are reasonably analogous to county governments in the lower 48 states.

(as a governmental entity), and the “communities” located in the Denali Borough. These communities include Healy (the borough seat), McKinley Village, and Nenana Canyon², all of which are unincorporated and collectively serve as a “gateway” to the northern portion of the park (see figure 19). Denali Borough covers approximately 12,750 square miles of land area, including most of land area within Denali National Park and Preserve (U.S. Census Bureau 2010a). Other communities in the borough include Cantwell, Ferry, and Anderson. The Clear Air Force Station is located within the boundaries of Anderson. Cantwell is located approximately 27 miles south of the Park Road, near the borough's southern boundary; the other three communities are located north of the Park Road: Ferry is 22 miles north and Anderson is 53 miles north.

Denali Borough was formed in 1990. It is bordered by the Matanuska-Susitna Borough to the south and to the east, west, and along most of its northern border by areas that are not currently part of an “organized” borough. The Fairbanks-North Star Borough abuts the Denali Borough along the remainder of its northern border (see figure 19).

Fairbanks, the nearest regional trade and service center, is approximately 110 miles north of the park on the George Parks Highway. Talkeetna, which serves as a base for mountain climbing, backcountry use, and air taxi/scenic flight tours in the southern portion of the park, is roughly 125 miles

² Nenana Canyon refers to an area of lodging and retail development, located east of the Nenana River, just to the north of the main entrance road to the park along the George Parks Highway (a nationally designated scenic byway).



Legend

○ Cities	--- Borough Boundary
✈ Airports/Airstrips	~ Major Rivers
—+— Railroad	☪ Lakes
— Highways	■ Denali State Park
--- Unpaved Road	■ Denali National Park & Preserve

0 12.5 25 50 Miles

Figure 19.
Socioeconomic Planning Area

Denali National Park & Preserve
 U.S. Department of the Interior National Park Service
 Denali National Park - DSC Planning Division - April 2011



south of park headquarters. Anchorage, Alaska's largest city is about 240 miles to the south.

Baseline conditions addressed in this section include the regional economy (employment, labor force, unemployment, major employers, and the role of tourism and park operations), population, and selected community services and fiscal links between the park and communities.

REGIONAL ECONOMY

The borough's economy is comprised of several key employers that combine to create a relatively stable and diverse foundation, coupled with travel and tourism activity driven by the strong seasonal influence of the park. Changes in the total employment in the borough mirror changes in the travel and tourism-related employment, which in turn generally tracks with park visitation. Thus, employment increased from 2003 through 2006, stabilized in 2007 and 2008, then declined sharply in 2009 in concert with the 17% decrease in total recreational visitation to the park.

The key employers responsible for the stable economic base include the Usibelli coal mine, a coal-fired generating plant operated by the Golden Valley Electrical Association, the Clear Air Force Station, the NPS, and state and local government and public education agencies. Together these entities support year-round employment for about 1,000 residents of the borough, Fairbanks, and other nearby areas.

Superimposed on the year-round employment is a strong seasonal employment effect created by park operations, including concession activities in the park and the myriad of activities associated with visitor services outside the park. Within the park, the National Park Service maintains around 125 permanent and term positions, adding approximately another 250 seasonal and temporary jobs during the summer visitor season (May to

September). The Kantishna Roadhouse, Denali Backcountry Lodge, and jointly owned and operated Camp Denali and North Face lodges are located on private in-holdings approximately 90 miles from the Denali Visitor Center; these facilities operate seasonally and collectively employ about 150 people. In addition, concession operations employ 300 to 350 individuals to operate the park's bus transit system (including the Wilderness Access Center), in-park food service, and Riley Creek and Savage River campgrounds. Alaska Geographic, an official partner of the national parks in Alaska, staffs and operates retail outlets selling books, educational materials, pictures and other miscellaneous merchandise at the Denali Visitor Center campus and the Toklat River Contact Station/Rest Area (Mile 53 of the Park Road).

Business establishments catering to the market demands associated with visitors to the park, temporary employees, and to a lesser extent, needs associated with commercial and leisure traffic along the George Parks Highway create a similar, even more pronounced seasonal economic expansion outside the park, particularly in the "gateway" area. The hospitality and retail establishments located in the gateway include: six major corporate-owned lodges or hotels¹; several smaller motels, bed and breakfasts, RV parks, and rental cabin operations; numerous restaurants, coffee shops, and fast food outlets; and, miscellaneous apparel, souvenir, and convenience stores. A variety of recreational outfitters, guides and service establishments are also located in the area, offering guided fishing, hiking, rafting and jeep tours; motorcycle and trail bike rentals; horseback riding; and other outdoor activities.

Scenic air tour and air taxi operators flying from airstrips and airports in and near the park offer visitors a unique Denali experience, providing opportunities for "flightseeing" tours over the park and

¹ Several of the lodges and hotels are under common ownership and management.

around Mount McKinley, glacier landings, access to the Kantishna area, and for mountain climbing and backcountry camping. Air tour and air taxi flights in the northern area operate from the McKinley Park airstrip in the park and airstrips near Kantishna, Healy, and McKinley Village. However, capitalizing on advantages afforded by proximity to Anchorage and to Mount McKinley, flight services based in Talkeetna carry the majority of the passengers on flights into and over the park. Several of the Talkeetna-based operators have affiliates serving the northern areas of the park.

The lodges and other tourism-related business establishments typically staff up, open in mid-May, and close shortly after Labor Day. The majority of employees of these establishments are seasonal migrants from the “lower 48,” some of whom return year after year.

Transportation is yet another dimension of the seasonal economy workforce. Although independent travelers represent an estimated 45% of all visitors to the park, 55% arrive as part of package tour, typically involving a cruise as part of the larger itinerary. Travel from the port to the park is via a scenic rail journey on the Alaska Railroad, motor coach tour, or rental vehicle, creating yet additional seasonal jobs. Although most of the employees affiliated with these jobs are based elsewhere, they contribute to the seasonal expansion of employment in the region.

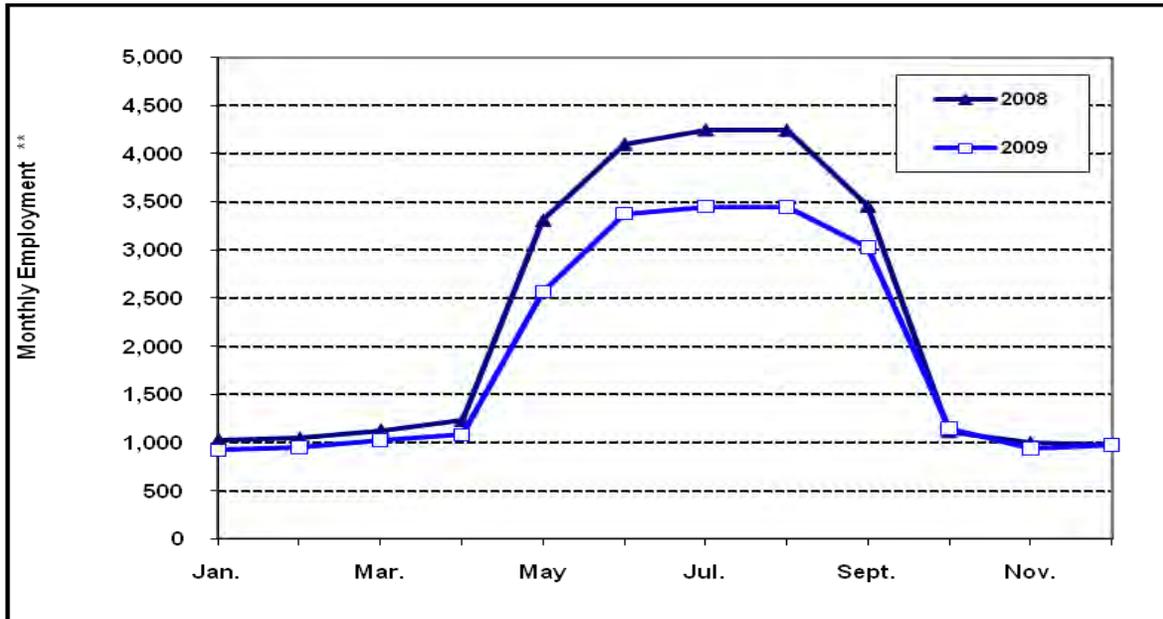
The net result of the seasonal visitation to the park, increase in park staffing, and tourism and other traffic on the George Parks Highway is a dramatic and pronounced 250% to 300% increase in employment in Denali Borough during June, July, and August (see figure 20). Figure 20 also highlights the sharp year-to-year decline of approximately 750 jobs between 2008 and 2009 that occurred in conjunction with a decline in total recreation visitor use at the park.

A corollary to the seasonal spike in employment is a seasonal decline in unemployment among residents. Data for calendar year 2009 reported that local unemployment declined from approximately 175 to 180 in the winter to a low of 80 to 90 during the summer (Alaska DLWD 2010). In fact, anecdotal information suggests that a number of residents of the area work full-time during the tourism season as their primary means of economic support, saving a portion of their earnings and then seeking part-time work or choosing to not work the remainder of the year.

More than 75% of the seasonal employment gains are concentrated in the overnight accommodations and food service industries, with those gains further concentrated in the large hotels and motels located in Nenana Canyon and McKinley Village that collectively serve the visitors to Denali who spend one or more nights in the area. Marked seasonal employment gains also occur in transportation, retail trade and federal employment, again tied to demands associated with the tourists (see figure 21).

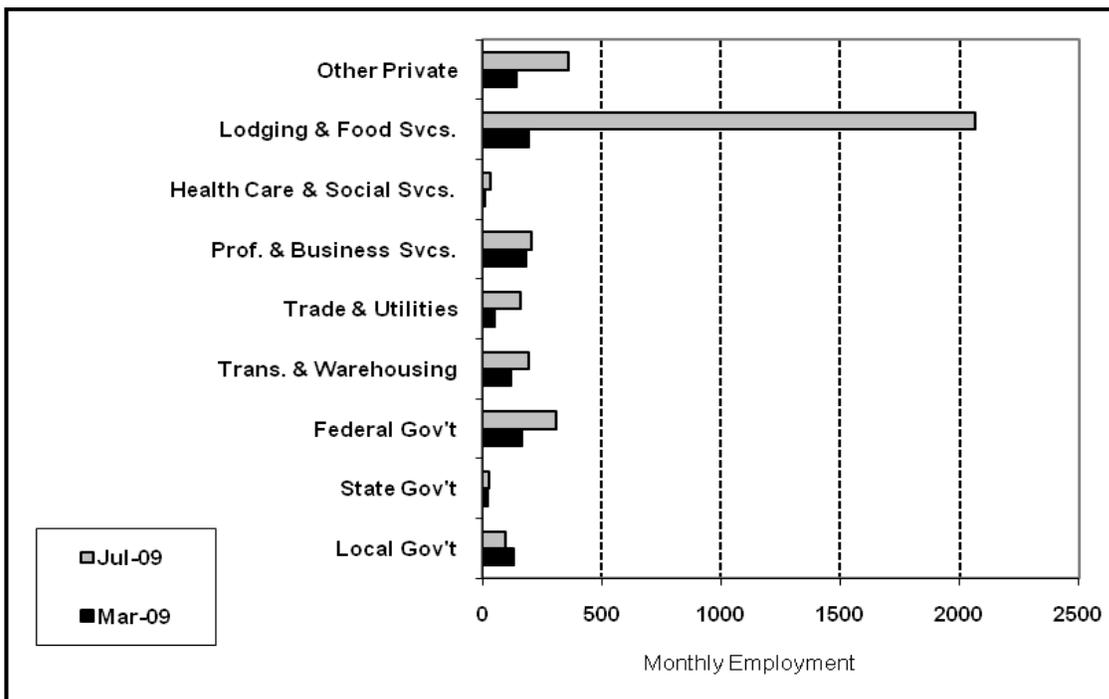
Of particular relevance to this analysis is the seasonal transportation concession operating in the park. The concession, operated by the Doyon/ARAMARK Joint Venture, consists of a staff of approximately 300 to 350 bus drivers and mechanics; sales and support staff at the Wilderness Access Center; and other support staff associated with employee housing and dining, maintenance facilities, and offices. The bus system is inextricably linked to visitor use and the local tourism economy, as it offers the sole means of access into the interior of the park for the overwhelming majority of all visitors. The annual bus ridership of 304,676 and 260,594 in 2008 and 2009, respectively, represented more than 70% of the total annual recreation visitation.

Figure 20. Monthly Employment in Denali Borough, 2008 and 2009



** Excludes self-employed, fishers, domestic workers, unpaid family workers, and nonprofit volunteers.
 Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section, 2010a.

Figure 21. Employment in Denali Borough, In March and July 2009, by Major Industry



Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section, 2010a

The four private lodges in the Kantishna area operate private shuttles that carried 21,797 and 15,894 guests and staff in 2008 and 2009, respectively (NPS 2010c).

Amplifying the critical role served by the park's bus transit system for the recreation visitor is the understanding of the importance of the Denali excursion for Alaska's \$3.0+ billion (estimated total economic impact) summer tourism industry. Even as the number of destinations, attractions, and "add-ons" offered to cruise guests has increased over time, a visit to Denali ranks as one of the primary attractions or destinations among tourists to Alaska, particularly for the cruise industry (Alaska DCED 2007 and 2010). The strong ties between Denali and the tour cruise industry is evident in the correlation between summer passenger capacity provided by the cruise lines; the capacity and schedules of passenger rail and bus service connecting Anchorage, Denali, and Fairbanks; the capital investment in lodging infrastructure in Nenana Canyon and McKinley Village; and, ridership on the park's bus transit system. Due to these interdependencies, the economic links tied to recreation visitor use at Denali National Park and Preserve extend beyond those evident in the Nenana Canyon and elsewhere in Denali Borough to more distant communities including Anchorage, Fairbanks, Seward, and Whittier.

A recent study of the impact of visitor spending on the local economy associated with Denali National Park and Preserve estimated total direct spending of approximately \$107 million in the Denali region in 2008, not including the base outlays for cruises or airfares to and from Alaska. That total includes \$52 million for overnight lodging, \$24 million in restaurants and bars, \$25 million on scenic tours and local transportation, and \$6 million for miscellaneous goods and services. In addition, approximately \$34 million in spending by those visitors was on rail, bus, air transportation, and vehicle rental

expenses in Alaska that accrued outside the local economy (Stynes and Ackerman 2010).

Talkeetna, which serves as the southern gateway to the park, captures a portion of the park-related visitor spending. Some of that spending results from day visits emanating from the Anchorage area, the principal purpose of which is experiencing the views of the Alaska Range and Mount McKinley. Additional spending is derived with mountaineering activity focused on Mount McKinley and other nearby destinations use Talkeetna as a base, supported by park staff at the Talkeetna Ranger Station. As described above, several scenic air tour and air taxi operations are based in Talkeetna. The Alaska Railroad serves Talkeetna, offering passenger service on the Anchorage-Denali-Fairbanks route. While visitor use and spending in the Talkeetna area is relatively low in comparison to what occurs in the northern portion of the park, both are expected to increase over time as the *South Denali Implementation Plan* (NPS 2006c) progresses.

In general, residents of the Denali Borough benefit from favorable economic circumstances that provide them with relatively high personal income. This is due to the combination of the many year-round jobs in mining, government, and utilities, combined with the economic stimulus associated with the strong seasonal economy. Local private and public sector employers paid \$121.6 million in wages, salaries, and proprietor earnings in 2008. However, \$42.4 million of that total (35%) was paid to nonresidents of the Denali Borough, presumably temporary seasonal workers for the most part. Adding in interest, dividends and other sources of non-labor income yielded total personal income of \$96.8 million for the borough's residents, or \$53,131 per capita. The comparable personal income measures for the state and nation were \$43,922 and \$40,416, respectively (U.S. BEA 2010).

In 2008, just 5.4% of the borough's residents were estimated to live at or below the federal poverty thresholds; substantially lower than the corresponding 9.2% across the state and 13.2% of the nation's population that were living in poverty. As with per capita personal income, the median household income for Denali Borough residents was substantially higher than the corresponding statewide or national norms: \$ 70,720, \$67,332 and \$52,029, respectively, albeit unadjusted to reflect differences in the cost of living (U.S. Census Bureau 2009).

POPULATION AND DEMOGRAPHICS

The year-round resident population of the Denali Borough, estimated at 1,851 in 2009, has been stable over the past decade, ranging between 1,805 (2007) and 1,896 (2004). (U.S. Census Bureau 2010b) The overwhelming majority of the borough's residents live along the George Parks Highway corridor. Healy, with approximately 1,000 permanent residents, is the borough's largest community. The estimated populations of the other communities include Anderson: 275, including personnel and dependents assigned to the Clear Air Force Station; McKinley Park: 168; Cantwell: 200; and Ferry: 36 (Alaska DCED 2010).

Population in the Denali Borough, like employment, has a strong seasonal component associated with visitation to Denali National Park. During the summer season, visitors to the area staying overnight in the 3,300 hotel and motel rooms, cabins, and RV/tent camping sites in the area can add upwards of 7,500 individuals to the area's population (Denali Borough 2009 and Alaska DLWD 2010). Seasonal employees add as many as 3,500 additional temporary residents. Many of the latter are housed in employer provided dormitories, cabins, and apartments. When these temporary population groups are considered, the borough's effective service population rises to approximately 13,000 during the peak season.

Demographic characteristics of the borough's resident population indicate a median age near 40, more than 6 years older than the statewide average. The difference is attributed to a relatively large number of baby boomers (ages 44 to 62), which is also associated with fewer and older children. As compared to the state as whole, the borough's population is comprised of relatively more men than women. The borough's population is less racially diverse than that of the state, whites accounting for 87 % of the borough's residents in 2006 compared to 72% across Alaska. Native Americans were 9% of the borough's residents, approximately half the corresponding share statewide (Alaska DLWD 2009a).

Available information indicates the following characteristics for the seasonally employed workforce:

- As many as 10% come from the ranks of the unemployed/underemployed residents in Denali Borough, or individuals who join the labor force seasonally.
- Approximately 25% are residents from other locales in Alaska.
- The remainder are from the lower 48 states or are international guest workers, many of whom come from eastern Europe.
- Many, if not the majority, are college-aged and not married.

PUBLIC FACILITIES AND SERVICES AND LOCAL GOVERNANCE

Denali Borough is a home-rule borough; this form of local governance provides broad authority with respect to services provided. The borough presently exercises statutorily required planning and taxation authority and provides for public education. It also provides for solid waste management under the discretionary authority granted to home-rule boroughs. Planning and taxation and

finance are provided through the borough's administration functions, housed in Healy.

The borough's annual operating expenditures budget was \$2.9 million in fiscal year 2009, with \$3.3 million budgeted for fiscal year 2010 expenditures. The adopted budget for current fiscal year 2011 is \$4.1 million. Borough administration, which encompasses the assembly, mayor's office and planning commission functions, accounts for approximately \$1,000,000 in budgeted expenditures. Current expenditures exclude a substantial contingency reserve established in recent years by the borough, setting aside surplus revenues during periods of favorable fiscal conditions (Denali Borough 2009 and 2010).

Outlays to support public education average about \$1.7 million annually, accounting for the borough's largest category of expenditures. The Denali Borough School District operates three "brick and mortar" schools, one each in Anderson, Healy, and Cantwell, using advanced technology and distance learning to provide students access to educational options not typically available in smaller, rural schools. The district also operates Denali PEAK, a statewide correspondence/home school program using online curriculum and computer technology to support families choosing to educate their children at home. The district is among the largest employers in Denali Borough.

Overnight accommodations tax receipts (commonly known as the bed tax), derived from a locally imposed 7.0% tax levy, are the single largest revenue source for the borough. In fiscal year 2009, the borough derived more than \$2.7 million in revenue from this source. The borough was anticipating lower bed tax receipts in 2010 because these revenues are sensitive to the levels of overnight tourist visitation and the average overnight lodging rates, both of which were expected to be lower due to the effects of the economic recession on travel and tourism. Denali Borough levies neither a

general sales tax nor an ad valorem/property tax. Consequently, the borough realizes no tax receipts from visitor purchases of merchandise, food, and beverages, or from the residential, industrial, or commercial development in the borough, the latter including the hotels and retail developments in Nenana Canyon and McKinley Village (Denali Borough 2009 and 2010, and Talerico 2010).

Intergovernmental revenue from the state and federal governments account for most of the borough's remaining revenue. Such revenues include basic revenue-sharing from the state and the borough share of a statewide tax on electrical and telephone co-ops. Payments-in-lieu-of-taxes from the federal government, based primarily on the location of most of Denali National Park within the borough's boundaries are another major source of operating funds for the borough. Locally derived revenues include a severance tax on produced minerals, gravel and coal, and tipping fees at its landfill. The latter cover a substantial portion of the direct operating costs, but are insufficient to cover equipment replacement, repairs, and expansion and closure contingency funds.

The borough operates a single landfill, located near Anderson in the northern portion of the borough. The landfill operates on an enterprise basis, serving the general waste disposal needs of households, hotels, campgrounds, employee housing, and the park. A transfer station serving the southern portion of the borough is located in Cantwell. A locally based licensed solid waste disposal company provides contract pick-up and disposal service for households and local businesses. Opened in 1997 with an expected life of 30 years, the landfill has experienced higher than anticipated fill rates, triggering efforts by the borough to consider a Phase II expansion adjacent to the current site (Talerico 2010).

In addition to services provided directly, Denali Borough provides discretionary funding support to locally based nonprofit

organizations, libraries, fire protection, and EMS entities. The Tri-Valley Volunteer Fire Department (Tri-Valley VFD), based in Healy, is a frequent recipient of such funds. One of four such departments in the borough, the Tri-Valley VFD provides coverage for structural and wildland fire suppression, emergency medical response and initial patient transportation in Healy, Nenana Canyon, and along the section of the George Parks Highway midway between McKinley Village on the south and Milepost 274, about 26 miles north of Healy, on the north. The Tri-Valley VFD provides support coverage in the frontcountry area of the park under a cooperative agreement with the National Park Service. Seasonal demands

associated with the large number of visitors to the park and highway accidents on the George Parks Highway comprise the largest share of calls for service received by the Tri-Valley VFD. The Tri-Valley VFD coordinates with air-based medivac service providers to transport seriously ill or injured patients to Fairbanks (Talerico 2010).

The McKinley Village Volunteer Fire Department is responsible for initial fire suppression in the McKinley Village area and supports the Tri-Valley VFD on structural fire response calls in the Nenana Canyon area.

