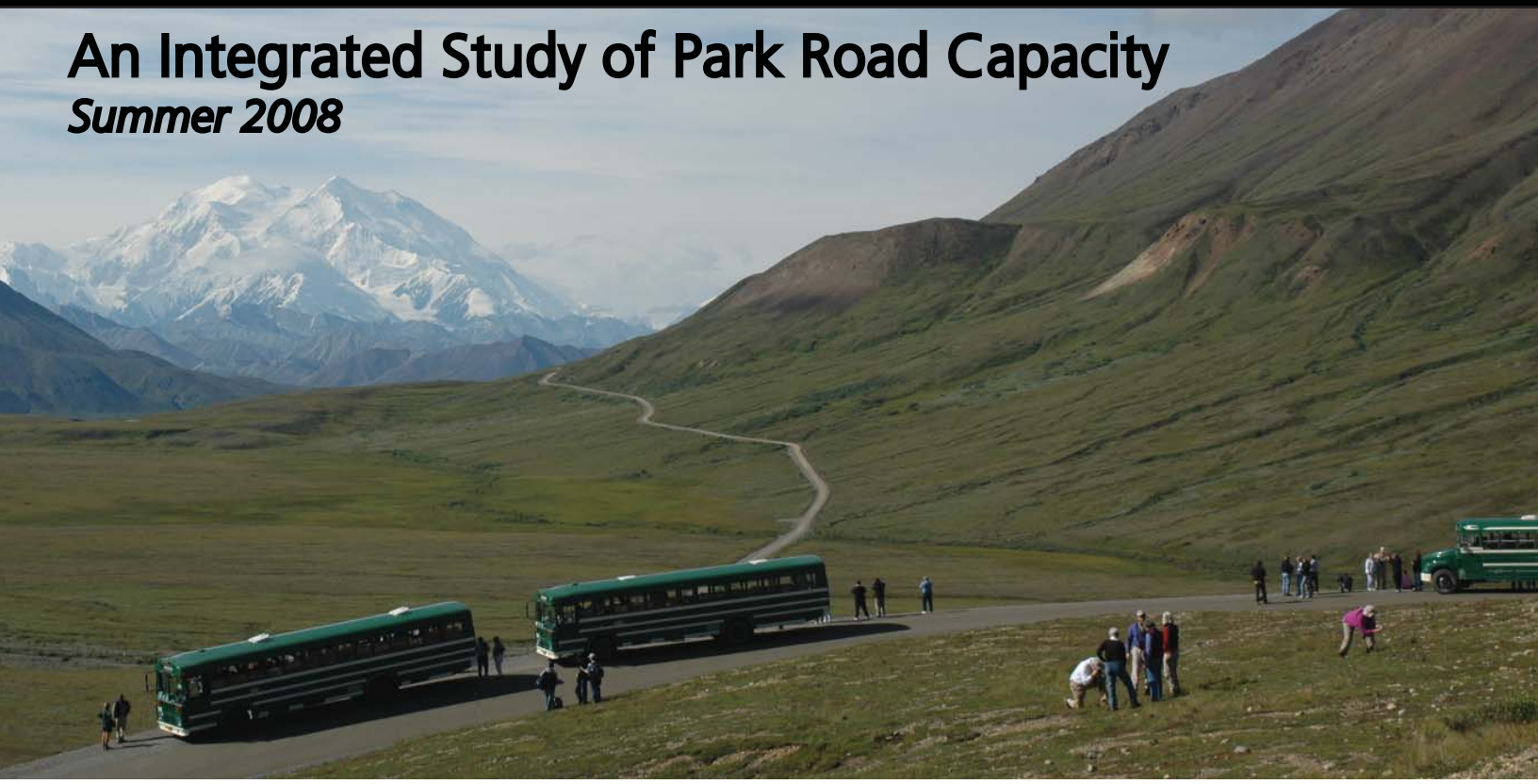
National Park Service
U.S. Department of the Interior

Denali National Park and Preserve

An Integrated Study of Park Road Capacity
Summer 2008



The goal of the road capacity study is to optimize visitor experience along the 92-mile park road while protecting wildlife.

...An automobile road, 89 miles long, leads from the railroad to a little beyond Wonder Lake. This road passes through the heart of the sheep ranges.

— Adolph Murie
Wolves of Mount McKinley

Since 1972, traffic on the Denali Park Road has been limited mostly to buses, and since 1986, a use limit of 10,512 vehicle trips annually has been in effect. Faced with increasing visitation and pressure to defend or change the limits to road traffic, Denali managers initiated a study in 2006 to develop a greater understanding of the impacts of traffic volume and traffic patterns on the physical, biological, and social environment of the park. This fact sheet provides an update of results from 2007.

Visitor experience

Throughout July and August 2007, researchers from the University of Vermont administered a social science survey to *quantify* the importance of key indicators of visitor satisfaction (e.g., wildlife seen along the road and amount of traffic) that had been identified during *qualitative* interviews with visitors in 2006.

Visitors were asked a series of questions including the extent to which issues (e.g., the number of buses seen, dust, or not seeing enough wildlife) were problematic during their experience on the park road. Visitors rated the issues using a scale from 1 (not a problem) to 3 (a big problem). Visitors also looked at photo panels (see photo on reverse)of simulated traffic scenarios (photos with varying numbers of vehicles) and were asked to rate how acceptable the crowing level portrayed in each photo was to them and then chose the photo that represented their preferred level of use, the level they typically saw on the road, and the level of use that would be unacceptable.

Of the 710 completed questionnaires (75% return), only a few issues even approached the "small problem" level—too many buses on the park road, not seeing enough wildlife, not seeing enough wildlife close to the road, and dust along the road Responses from the five types of visitors (e.g., camper bus users, general VTS buses, Denali Natural History Tours) differed only slightly.

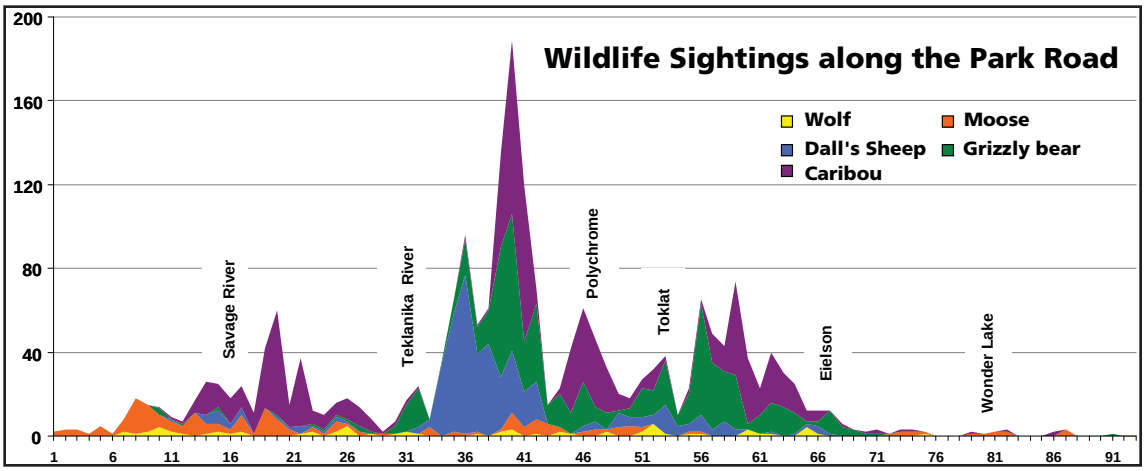
A social norm curve (standards of acceptability for crowding indicators) was derived from the visitors' acceptability ratings for each photo. For example, visitors from all user groups expressed similar opinions that 5-6 vehicles in view along the park road was the break point above which the crowding became unacceptable.

Wildlife movements

To track movements of wildlife near the park road corridor, researchers placed GPS radio-collars on 20 grizzly bears in 2006 and 20 Dall's sheep in 2007. The sheep were captured between the Teklanika and Toklat rivers. These collars recorded each animal's location once every hour between May and September, giving an average of 3,014 locations per sheep for the 18 collars that were retrieved (see map below). Based on their GPS locations, sheep were considered either "Polychrome" or "Igloo" sheep.

Collectively, the collared Dall's sheep crossed the park road 121 times during the study. Rams (male sheep) crossed only in spring (May 15 - June 30), while ewes (female sheep) crossed in all seasons.

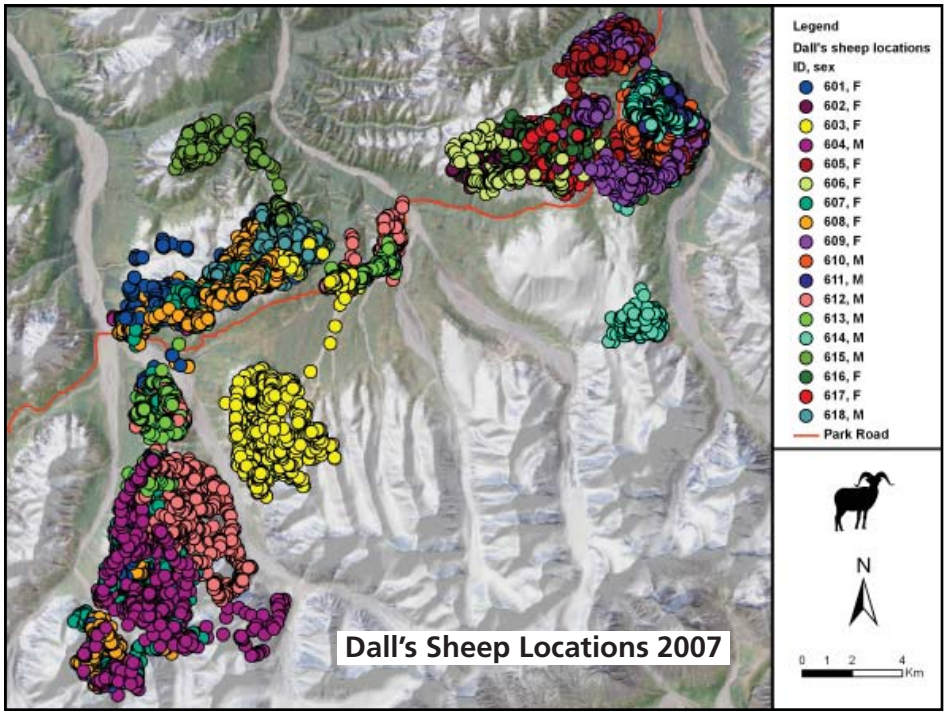
Visitors viewed panels (top) and rated the acceptability of traffic along the park road, at rest stops (bottom), and at wildlife stops. The panel photo of Polychrome rest area shown in the bottom photo illustrates potential crowding when nine buses are at the rest area.



Distribution of wildlife sightings recorded by bus drivers along the park road during summer 2007 (see road miles from 1-92). The total sightings for 20 buses over the season are displayed separately by wildlife species (see color key). Many wildlife were seen in the vicinity of Sable Pass (Mile 39).

While sheep crossings occurred during all hours of the day and night, most (>80%) crossings occurred during the day when traffic volumes were highest. Most GPS-collared sheep crossed the park road between Mile 45 to 47 (see map for other crossing miles).

The probability that a Dall's sheep would cross the park road varied by sex and area. While crossings rarely occurred, rams in the Polychrome area had the highest probability of crossing the park road. Most crossings by rams at Polychrome occurred within a 4-mile section of road during the spring season when traffic volumes were low and plant growth had yet to occur at higher elevations.



The colored dots on the partial map of Denali (between the Teklanika and Toklat rivers) show the hourly locations of 18 GPS-collared sheep during the summer of 2007. Individual sheep are represented by dot color. The park road is shown in red. Dall's sheep crossed the park road at Miles 33 to 38, 44 to 48, and 51 to 53.

When traffic volume was higher, Dall's sheep had lower probabilities of crossing the park road and increased movement rates when approaching the park road. At 50 vehicles per hour, the predicted probability of sheep crossings declined to less than half the probability at 0 vehicles/hr. In 2007, the maximum hourly traffic volume on the park road was 43 vehicles/hr (except during road lottery in mid-September when it was 147 vehicles/hr).

Traffic patterns

Traffic patterns on the park road are affected by many things, including the number and type of buses, where and when they stop on the road for wildlife sightings, and where and when road maintenance is occurring. To measure these variables, researchers installed GPS units and touch screen data logging panels on selected vehicles.

Bus drivers recorded information on touch screen panels about the kind of stops buses made on the park road, including wildlife viewing information. In 2007, wildlife sightings were distributed along the length of the park road, with greatest numbers of large mammals spotted near Sable Pass (see graph above). Based on GPS information combined with touch screen data from 20 buses, stops to view grizzly bears were longer than other wildlife stops.

Researchers will create a traffic model that will simulate what the effect would be—on traffic congestion, vehicle travel time, wildlife road crossings, and visitor crowding—when various factors are manipulated (schedules, volume of traffic). The simulation model will be a tool that park managers can use to make informed decisions about the best way to transport visitors into Denali.

For more information

Laura Phillips
Denali National Park and Preserve
Box 9, Denali Park, AK 99755
laura_phillips@nps.gov
www.nps.gov/dena/naturescience/denali-park-road-capacity-study.htm