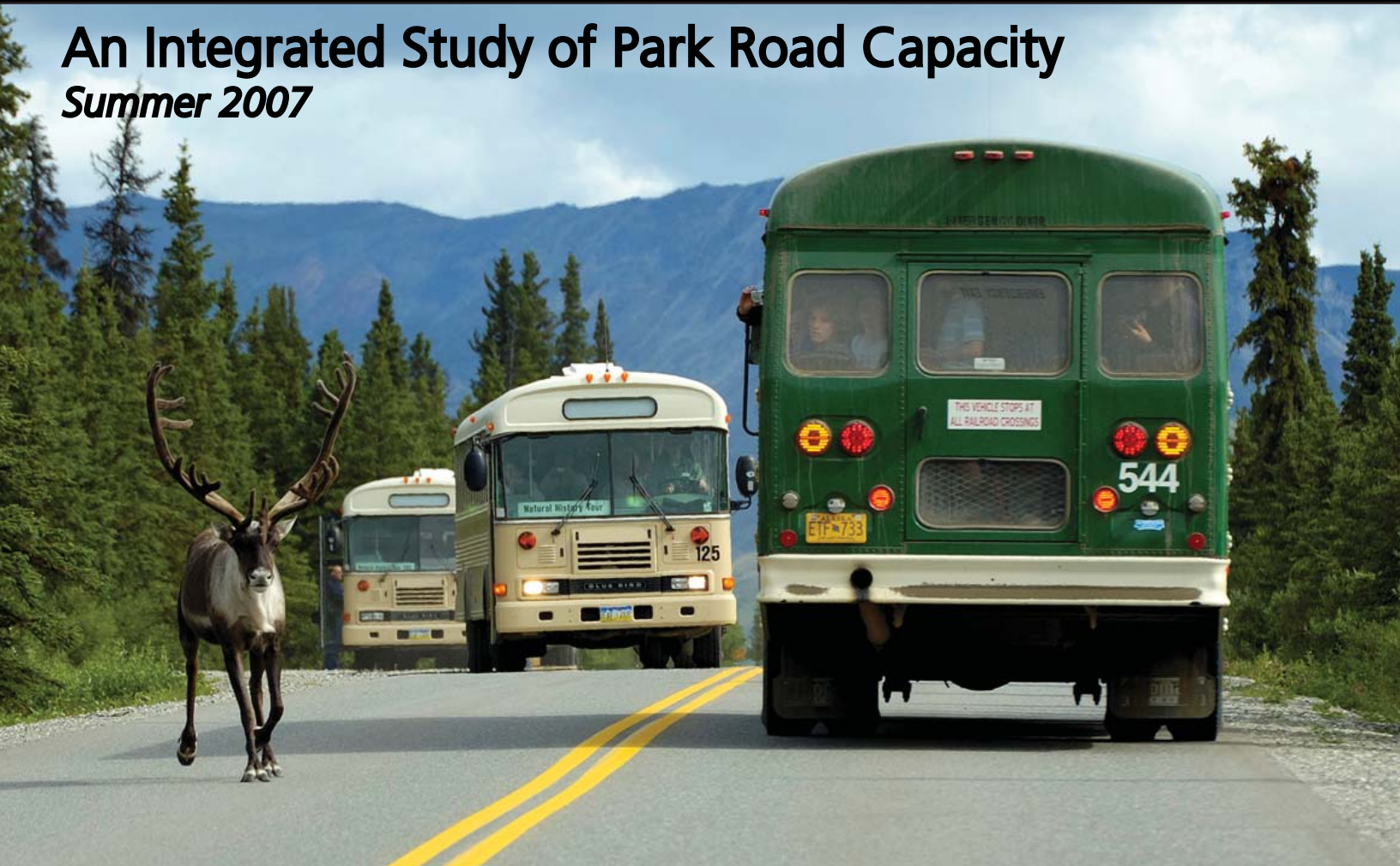




# An Integrated Study of Park Road Capacity

## Summer 2007



**What makes for a good visitor experience on the Denali park road without negative impacts on wildlife (e.g., caribou)?**

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*...Well, because the road is not paved. The bus goes slow. There's just nature as far as you can see.*  
— Visitor #88

[in reply to the question "why did you feel you were in wilderness during your trip on the park road?"]

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Managers at Denali are always challenged to stay in step with both major missions of the National Park Service—protecting park resources and providing for visitor enjoyment. Questions raised at Denali by the tension between the two sometimes-conflicting park missions include... What is it about the trip on the 90-mile ribbon of road that makes park visitors happy and satisfied with their experience? How does traffic on the park road affect wildlife activity? Ultimately, the big question is, what should be the limit to traffic on the park road, so it doesn't interfere with either protection of park resources or visitor enjoyment?

Faced with increasing park visitation and pressure to defend or change (increase) the current limit of 10,512 trips annually on the park road, Denali's park managers want to know how traffic patterns affect the park's social, biological, and physical environment. To study this complex road issue, researchers are studying its various components (e.g., visitor experience along the park road, wildlife movements, and traffic patterns), and will integrate these components into a synthetic and predictive model.

### Visitor experiences

In 2006, researchers interviewed over 120 park visitors, to find out what is important in making their

Denali park road experience a good one. The visitors interviewed came into the park one of four ways: (1) a shuttle bus, (2) a tour bus, (3) a bus from a lodge in Kantishna, or (4) a recreational vehicle (RV) headed to Teklanika Campground. Visitors responded to such questions as "What are the three things you enjoyed most [and least] about your time on the Denali park road today?" Other questions asked for visitors' views about the impact of various things on their experience.

The three things enjoyed most by visitors along the park road were wildlife (69 percent of respondents), scenery (65 percent), and the information provided by the bus driver (39 percent). Visitors surveyed were generally satisfied with their wildlife viewing experiences along the Denali park road, but some mentioned the negative impacts that multiple buses at wildlife stops had on their trip (feeling crowded, delays in travel time, or interference with the view).

Other variables important to visitors include the number of vehicles seen, number of encounters with other vehicles, length of the wildlife stops, distance of wildlife from the road, dust generated by vehicle traffic, number of visitors at rest stops, and the condition and maintenance of buses.



Based on a survey in 2006, a few of the many variables that are important to visitors and the quality of their park road experiences are the distance of grizzly bears and other wildlife from the park road (top), the number of buses at rest stops such as Polychrome (middle), and the amount of dust from vehicles (bottom).

Results from these interviews were used to create a written survey for 2007. Visitors are asked to describe their park road experiences, including their sightings of grizzly bears and other wildlife. Visitors also respond to three panels of photos that represent different traffic levels along the park road, stopped for wildlife, or at a rest stop. Each panel contains 8 photographs that are identical except for the number of vehicles (i.e., 0-12 buses). The intent is to learn when a visitor's experience on the park road is no longer enjoyable because of high traffic volume.

### Wildlife movements

To track the movements of wildlife that frequents the park road corridor relative to traffic volumes, researchers placed GPS radio-collars on 20 grizzly bears (in 2006) and 20 Dall's sheep (in 2007). This type of collar records the location of an animal once every hour between May and September when the collar is programmed to fall off so it can be retrieved.

In September 2006, park staff retrieved 19 of the 20 bear collars which yielded over 40,000 locations (see map below). The collared grizzly bears crossed the park road 466 times between May and September 2006. Individual bears crossed the road anywhere from 0 to 144 times. Differences among bears in their propensity for crossing the road was likely due to where the bear's home range was relative to the park road. The fewest crossings for all bears occurred in September. Preliminary results suggest that bears may not be hampered by periods of moderate traffic early and late in the day as they crossed the road frequently during these time periods (see graph below).

Researchers considered a bear inactive when the bear moved less than about 35 feet (11 meters) in an hour. Bears were most likely to be inactive in the early morning hours between 3 and 4 am. Anyone who has observed a napping bear from the park road will not be surprised to learn that, on average, bears were inactive about 3.5 hours a day (not all at one time) across the entire season.

### Traffic patterns

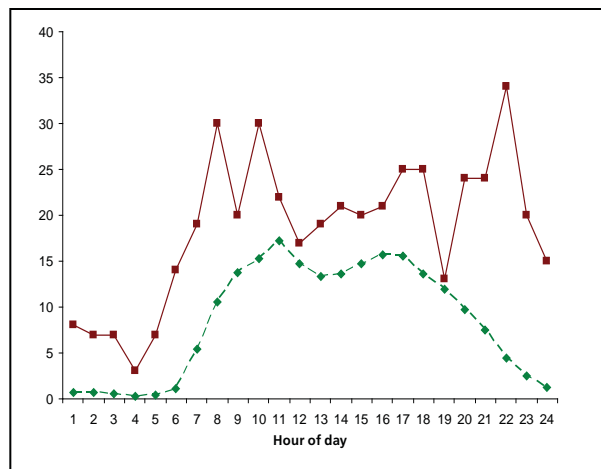
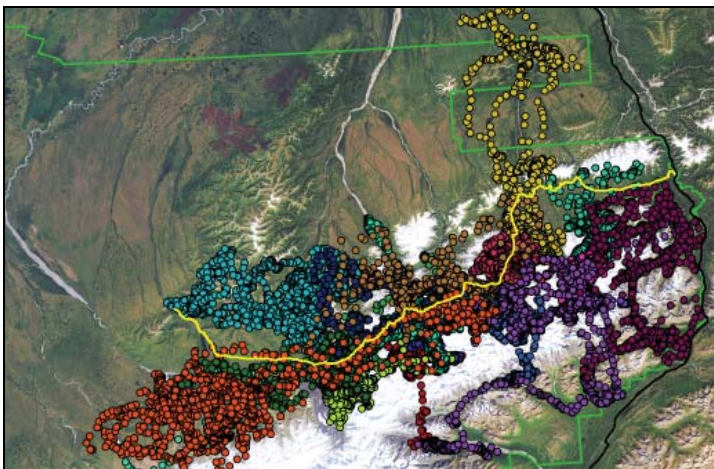
Traffic patterns on the park road are affected by many things, including the number and type of buses (shuttle and tour), where and when they stop on the road for wildlife sightings; what the weather is like; and where and when road maintenance is occurring. To account for these factors, researchers have installed GPS units on vehicles to track their movements in 2006 and 2007. Bus drivers on 20 buses use touch-screen panels to record wildlife sightings and stop data.

All this information will be used to create a traffic model to simulate changes in traffic patterns when various factors are manipulated. For example, what happens to traffic if the spacing of buses at wildlife stops is changed or if dust plumes increase bus following distances? Some of the road logistical scenarios or modeling "rules" relate to travel times, bunching, and following distances for buses. With the model, the total number of vehicles on the road can be experimentally increased, to predict what would happen to traffic patterns if such an increase were actually made on the park road.

If the model and an environmental impact statement suggest that a traffic increase is feasible, an experimental increase in traffic volume may be tested. It would be timed to maximize what is learned about any impacts. Before any permanent increase was approved, a Before-After-Control-Impact (BACI) study would be completed and results carefully evaluated for any impacts to wildlife or visitor experiences. The goal of the road study is to provide park managers with a tool to make well-informed decisions about traffic on the park road.

### For More Information

Laura Phillips  
Denali National Park and Preserve  
Box 9, Denali Park, AK 99755  
laura\_phillips@nps.gov, (907) 683-5761  
[www.nps.gov/dena/naturescience/denali-park-road-capacity-study.htm](http://www.nps.gov/dena/naturescience/denali-park-road-capacity-study.htm)



Bears move around a lot! The colored dots on the partial map of Denali (left) are the hourly locations of 19 GPS-collared bears during the summer of 2006. Individual bears are represented by dot color. The park road is shown in yellow, the park boundary in green. The graphs (right) summarize the average number of vehicles on the park road (green) and the number of bear road crossings (red) by hour during the summer of 2006.