

# **Studying Travel Patterns in National Parks**

by

**Patrick McGowen, Assistant Professor  
Montana State University  
406 994 6529  
patm@coe.montana.edu**

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## ABSTRACT

The Western Transportation Institute at Montana State University has done a number of studies on how visitors to various National Parks travel. Most recently a study was completed in Grand Teton National Park which included license plate surveys (to track vehicle paths), visitor surveys, mode use counts (e.g., bicycle, taxi, SOV, etc.), and traffic counts. This report summarizes the results of this data collection with some supplemental data from studies in other parks in an attempt provide some general characteristics of park travelers. Understanding these general characteristics will help national parks in their transportation planning to accommodate visitors.

## 1. INTRODUCTION

According to the National Park Service (NPS), 2006 saw a total visitation to NPS-managed lands of over 272 billion visitors (NPS 2006). As National Parks deal with this large number of visitors, it is beneficial to consider characteristics of a typical visitor's travel. In the summer of 2006, data was collected in Grand Teton National Park (GTNP) to assist with management decisions. Data included license plate surveys (to track vehicle paths), visitor surveys, mode use counts (bicycle, taxi, SOV, etc.), and traffic counts.

Many results of the data collected were helpful in making local management decisions in Grand Teton National Park, however, may not be of national interest. However, some of the data revealed travel characteristics of GTNP visitors that are of interest in understanding how people generally travel in national parks. This report contains a summary of these general travel characteristics.

## 2. DATA SOURCES

Data was primarily collected on a narrow (i.e., width ranging from 18-20 feet) two-lane roadway, known as Moose-Wilson Road, located on the southern boundary of Grand Teton National Park. This roadway is not as heavily traveled as other roads in the park, and such may not be representative of all GTNP travelers. Numerous data were collected:

- Traffic Counts were collected continuously at four locations from June-October 2006. This was accomplished using pneumatic tubes. The traffic count data was checked for errors and fixed using numerous quality control methods.
- A license plate survey was conducted to determine travel paths. Turning movements and partial license plate numbers were recorded at several intersections for four hour periods. The license plate numbers were then matched to construct paths. The match rate averaged 43%. Data were collected during peak hours of travel during the following times:
  - Friday, August 18, 2006 from 6 a.m. to 10 a.m. and from 3 p.m. to 7 p.m.;
  - Sunday, August 20, 2006 from 6 a.m. to 10 a.m. and from 3 p.m. to 7 p.m.;
  - Friday, October 13, 2006 from 7 a.m. to 11 a.m. and from 3 p.m. to 7 p.m.; and
  - Sunday, October 15, 2006 from 7 a.m. to 11 a.m. and from 3 p.m. to 7 p.m.
- A visitor survey was conducted where drivers, bikers and hikers were interviewed about their travel patterns. Surveys were conducted during the following times:
  - Saturday, August 19, 2006 from 7 a.m. to 7 p.m. (northbound and southbound);
  - Monday, August 21, 2006 from 8 a.m. to 12 p.m. (northbound only);
  - Tuesday, August 22, 2006 from 1 p.m. to 5 p.m. (southbound only);
  - Wednesday, August 23, 2006 from 8 a.m. to 12 p.m. (southbound only);
  - Thursday, August 24, 2006 from 1 p.m. to 5 p.m. (northbound only);
  - Saturday, October 14, 2006 from 7 a.m. to 7 p.m. (northbound and southbound);
  - Monday, October 16, 2006 from 8 a.m. to 12 p.m. (northbound only);
  - Tuesday, October 17, 2006 from 1 p.m. to 5 p.m. (southbound only);
  - Wednesday, October 18, 2006 from 8 a.m. to 12 p.m. (southbound only); and
  - Thursday, October 19, 2006 from 1 p.m. to 5 p.m. (northbound only).
- At the same time the traveler survey was conducted, the mode of every vehicle (or person) was recorded manually. Every vehicle, bicycle and hiker was recorded (this included visitors that did not take the survey).
- Some of the data referenced in this report refers to data collected in a 2002 visitor survey in Golden Gate National Recreation Area (GGNRA) and Sequoia and Kings Canyon National Parks (SEKI).

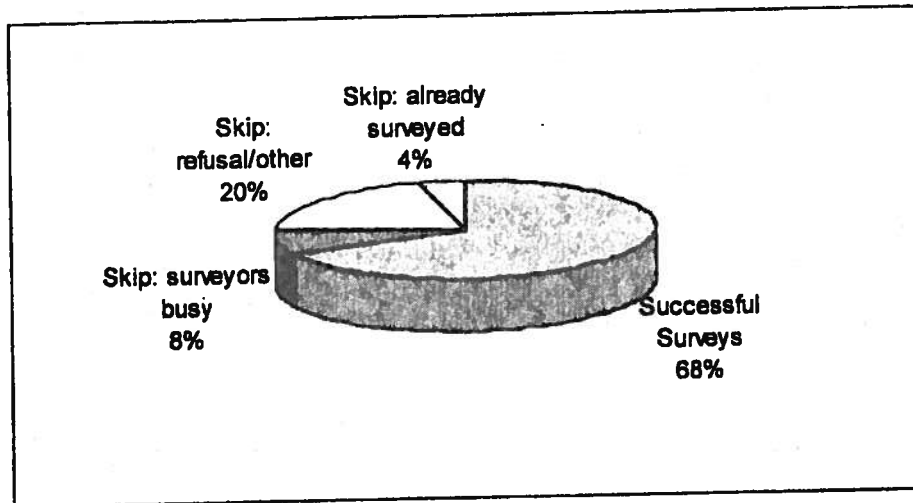
## 2.1. A Unique Survey Approach

In order to conduct the survey, a somewhat unique strategy was employed. It was felt that a higher response rate might be achieved if visitors were interviewed (as opposed to being handed a mail-back survey). Such interviews typically are done in a parking lot, rest area, or visitor center where people are already stopped. However, in this project, in order to get a truly random sample of users of the roadway, vehicles were stopped while traveling on the road and asked to pull over and take a survey. In order to do this, one person (the nearest person in Figure 1) would stop a random selection of vehicles. Depending on the anticipated traffic flow for the day, either every vehicle was asked to participate in the survey, every other vehicle, or every third vehicle. This proportion was kept constant for the whole day in order to not over-sample vehicles during lighter traffic. All bicycles and hikers were asked to participate in the survey. For each vehicle the flagger stopped, he/she would ask the driver turn into the pullout and take a survey. In the pullout, surveyors were available to interview the drivers.



Figure 1: Operation of Visitor Survey in GTNP

As with any survey, a certain portion of the visitors refused to participate. However, this group comprised only 20 percent of the random sample (Figure 2). Another reason for skipping vehicles that were part of the random sample was that the surveyors were all occupied. If both surveyors were currently interviewing a visitor, the flagger would skip the vehicle and wave them past (8 percent of random sample). Four percent refused the survey because they had already taken it at an earlier time.



**Figure 2: Response Rate for Visitor Survey**



### 3. SUMMARY OF TRAVEL CHARACTERISTICS

This chapter discusses the results of the data collection that provide general travel characteristics. Again, the primary data source is from Moose-Wilson Road in Grand Teton National Park which may not be representative of all park travelers.

#### 3.1. Travel Patterns are Seasonal

As with most national parks, traffic flows on Moose-Wilson Road have a significant increase in the summer (Figure 3). Moose-Wilson Road, where this data was collected, is located in a northern climate and part of the roadway is closed for the winter. As seen in Figure 3, traffic flows gradually increase in early summer, peaking at about 2,000 vehicles per day in early August, after which they begin to decrease. A few special weekends are identified (red circles in Figure 3) where there is increased traffic, including Independence Day weekend (July 2-3), Labor Day weekend (September 2-4), peak Fall color (September 30), and Murie Chocolate Moose Festival (October 14).

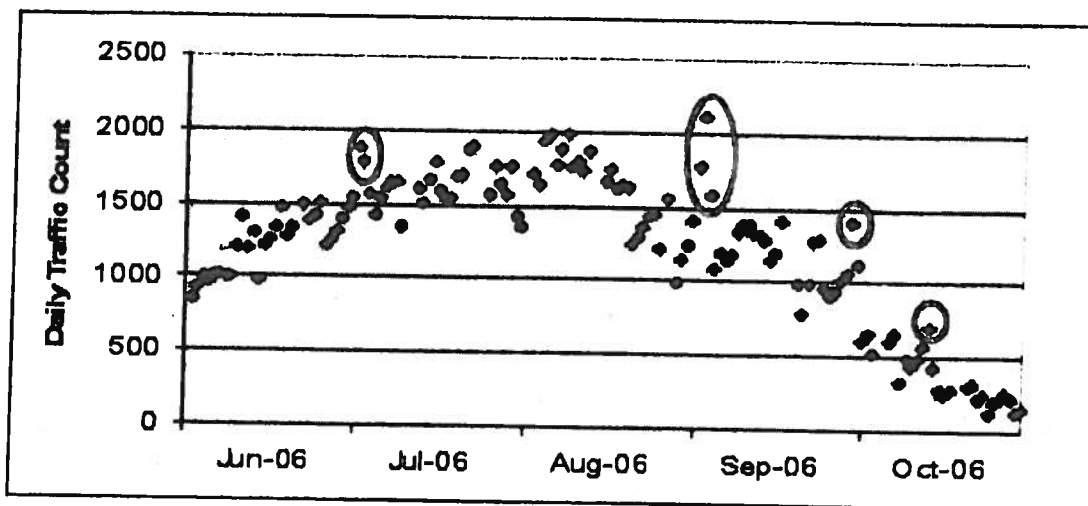


Figure 3: Traffic Volumes by Time of Year

#### 3.2. There is a Directional Difference

Although daily northbound and southbound traffic volumes are almost equal, they occur at different times of the day. The distribution shown in Figure 4 may be typical for a roadway on the south end of a national park. Northbound traffic peaks mid-morning at around 10 a.m. and southbound traffic peaks in the late afternoon at 4 p.m. A roadway on the north boundary would likely be opposite (i.e., southbound peaking in the morning and northbound peaking in the afternoon).

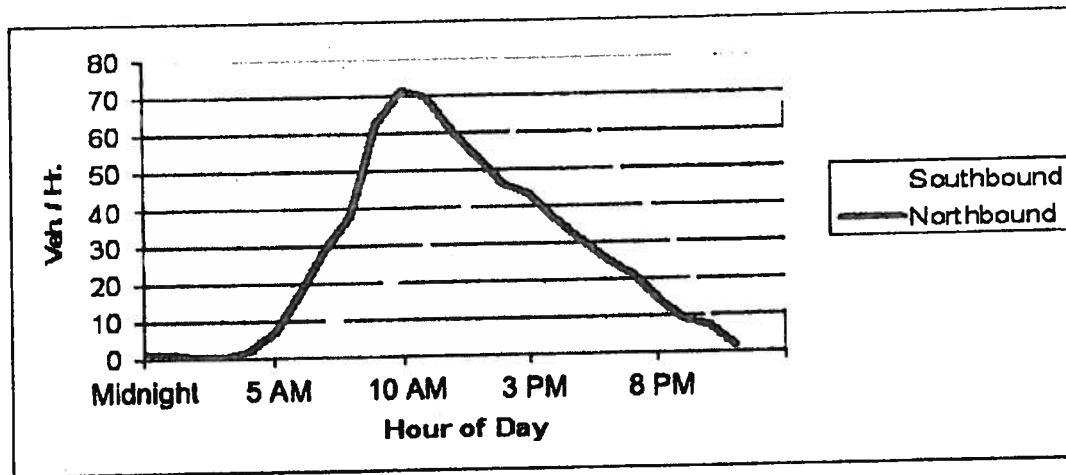


Figure 4: Hourly Distribution of Traffic

### 3.3. Traffic is Higher on the Weekends

The average daily two-way traffic volume for three locations was calculated by the day of the week and is shown in Figure 5. Traffic levels are fairly uniform across each of two periods each week, namely Monday through Wednesday, and Thursday through Sunday. Traffic later in the week (Thursday through Sunday) is 21 percent greater than earlier in the week. The largest traffic day is Sunday.

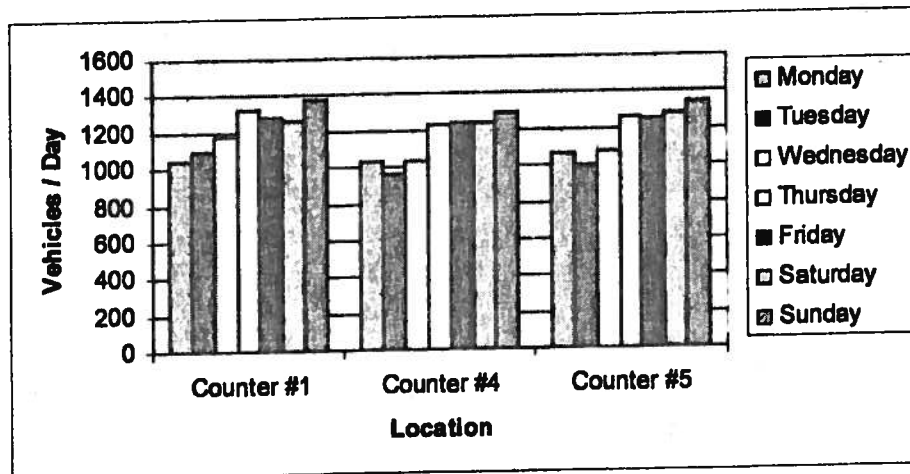


Figure 5: Traffic by Day of Week

### 3.4. Many Travelers do not Enter and Exit at the Same Location

Paths of northbound vehicles identified by the license plate survey are shown in Figure 6. The matching rules and data challenges would require significant discussion, not appropriate for this summary. Note that 21 percent of the vehicles heading northbound on Moose-Wilson Road

return southbound on US 26/89/191. These vehicles are essentially making a loop and exiting the park at a different location than where they entered. Vehicles were only tracked through these intersections for a short time period, so it is unclear where those heading further north into the park ultimately exited. From the motorist survey we know that only 36 percent of visitors planned to exit at the same location they entered (note that Grand Teton National Park has essentially four entrance points).

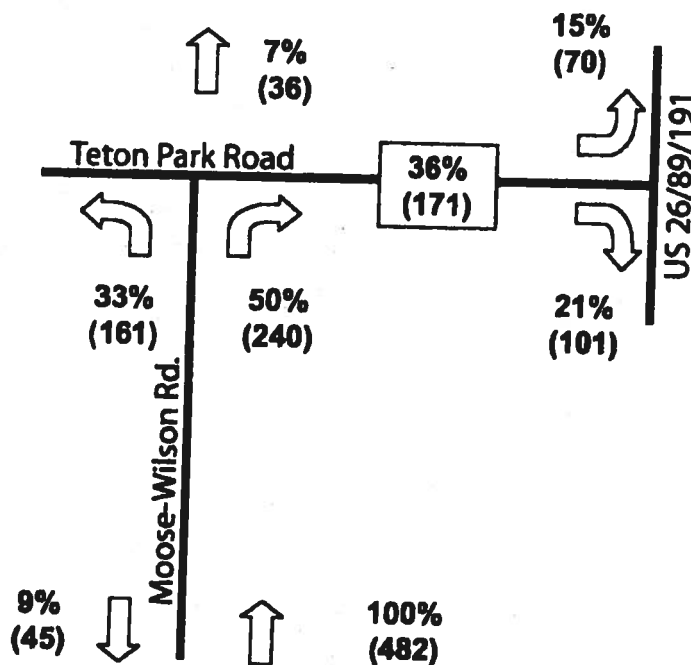


Figure 6: License Plate Survey

### 3.5. Mode split

The percentage of various modes can be seen in Figure 7. Although there are some people walking into Grand Teton National Park it is less than one percent. Most visitors travel the park in a personal car. The average occupancy rate (people per car) is well over 2, much higher than typical city traffic.

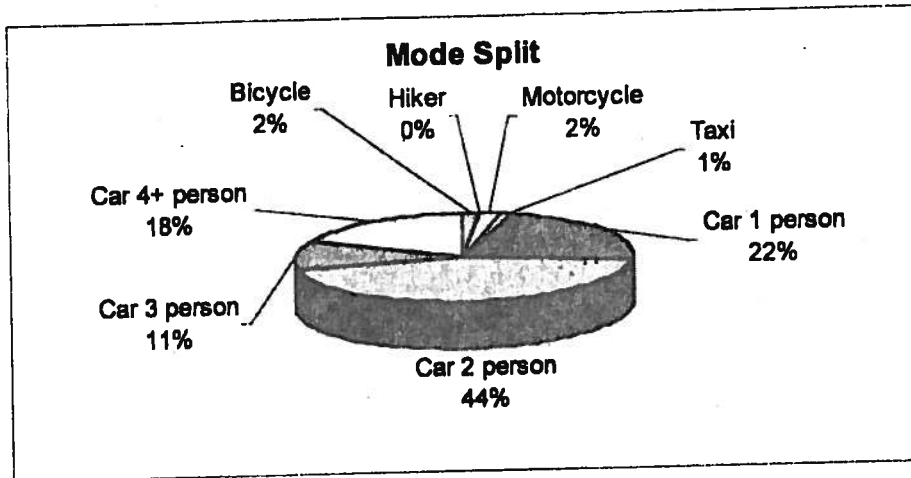


Figure 7: Mode Split

Another survey conducted in Golden Gate National Recreation Area (GGNRA) and Sequoia and Kings Canyon National Parks (SEKI) provides further insight into mode use (Figure 8). Notice that 20 to 40 percent of visitors are using rented automobiles.

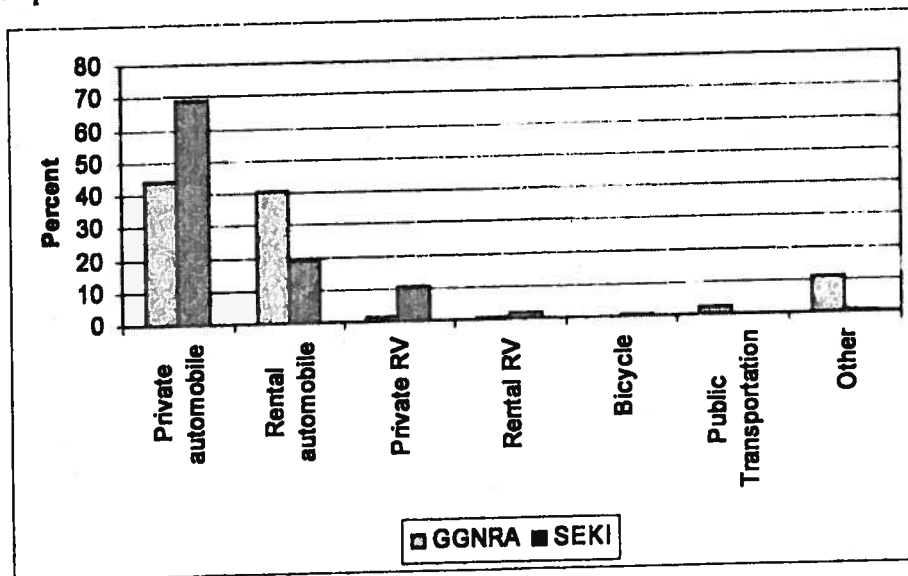
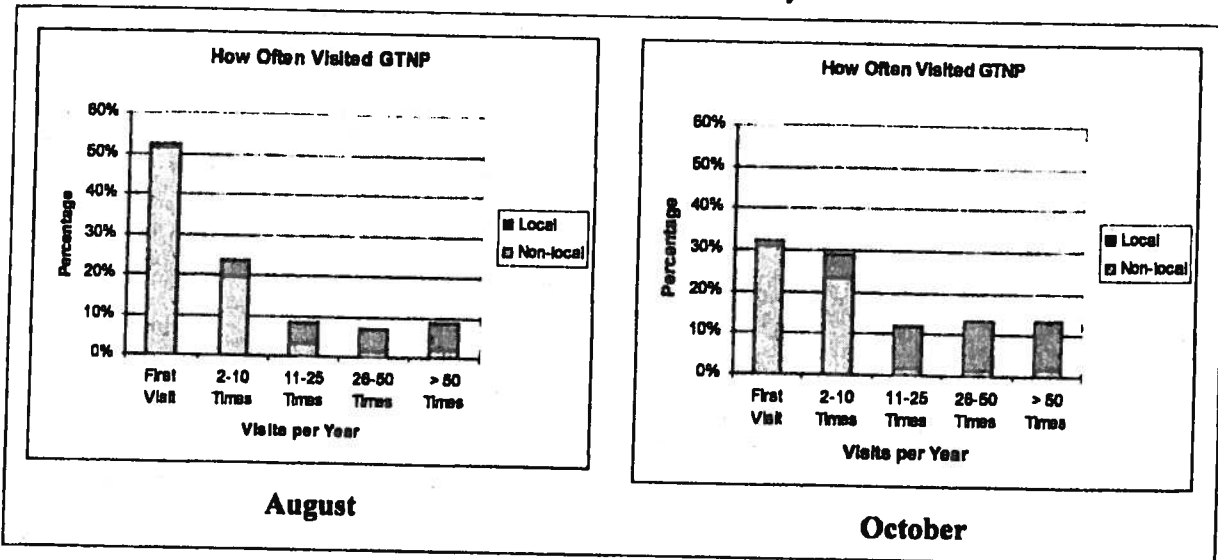


Figure 8: Mode Split from Another Survey in Two National Parks in California

### 3.6. Many are First Time Visitors

A sizable portion of visitors are in the park for the first time. Note that there are fewer unfamiliar motorists in peak season (52 percent in August) than in off-peak season (32 percent in October). Also notice that first time visitors are almost entirely non-locals.



### 3.7. Many Day Trips

Figure 9 shows the distribution of the duration of the visits to Grand Teton Park. Over half of the visits to the park are less than one day. Further nearly 40 percent are less than six hours.

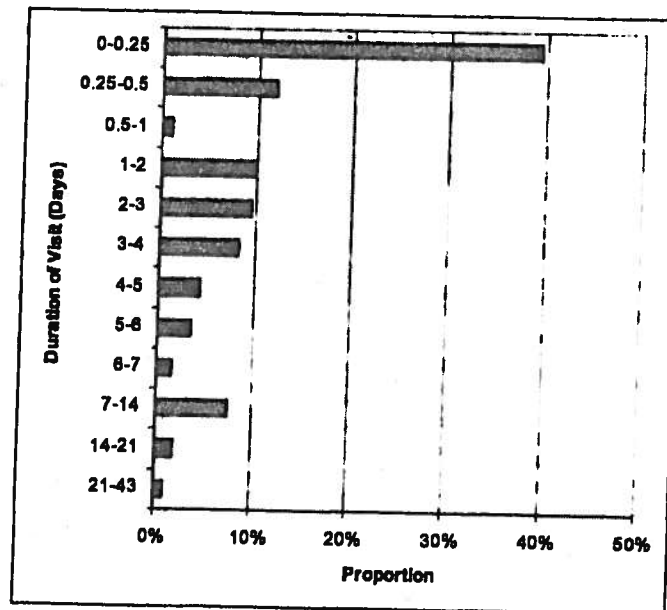


Figure 9: Duration of Visits

### **3.8. There are Differences Between Locals and Non-Locals**

One common question is the difference in travel patterns between locals and non-locals. Providing public information to these two different groups can require different techniques (e.g., local news media for locals vs. brochures at the airport for non-locals). Also, most parks are consider their national charter and are careful to balance the needs of both groups. From the data it was found that locals (based on primary residence zip code being in Teton County, WY; Lincoln County, WY, or Teton County, ID) were:

- more often weekday travelers,
- more often in single occupant vehicles,
- more frequent visitors, and
- more likely visiting with the primary purpose of hiking.

#### 4. CONCLUSIONS

The data contained in this report provides insight into some of the travel characteristics of travelers within national parks. These characteristics should help with management decisions. Some insights are discussed here:

- Transit and park-and-ride lots may be less effective because a majority of travelers do not exit the park where they entered.
- When capacity is an issue, the time-of-day directional split may make reversible lanes seem appealing. However, note that the total traffic (northbound plus southbound) is highest when the lane would be reversed at mid-day
- Parks typically have many first time visitors, who are naturally unfamiliar with the roads. Roads in national parks should be designed to minimize unexpected events, and have clear, understandable signing. Some unexpected events cannot be minimized (such as animals on the roadway). In this case, public information can be used to inform unfamiliar motorists.

## 5. REFERENCES

National Park Service (2005) Public Use Statistics Office. <http://www2.nature.nps.gov/stats/>. Accessed May 22, 2007.