Researchers use GPS to discover how people are using national parks

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A grizzly bear crossing the road in the Moose-Wilson Corridor in Grand Teton National Park. Credit: National Park Service

Wildlife always has the right of way in the Grand Teton National Park. And in the park's Moose-Wilson Corridor, wildlife is abundant.

Below the towering, snow-capped mountains, moose and elk graze and move along the road within the corridor. Wolves have set up a den

nearby. And there are also rows of hawthorn berry bushes, which happen to be a favorite snack of bears. This can cause problems when the bears—oblivious to cars—set up shop for a leisurely meal, blocking oncoming traffic and causing the road to be temporarily closed.

These types of closures—which aren't uncommon—aren't a huge problem, but they are causing a bit of a dilemma for the park. Along with closures due to meandering wildlife, the road, which is short and narrow with a brief stretch that is unpaved, is also dealing with an influx of people. A new visitors' center and additional bike paths have been built in the area, attracting more traffic along the road.

While the park's management is protective of the resident wildlife, they also want to maximize visitors' experiences, which can sometimes be hampered by a road—especially one as popular as the Moose-Wilson Corridor—being closed.

To better understand how visitors are using this road, a team of Penn State researchers—including Peter Newman, professor and head of the Recreation, Park, and Tourism Management Department—spent time in the park with researchers from Utah State University and Virginia Tech University to study exactly how and why visitors use the road and surrounding areas of the park. The park hopes to use the information to decide how best to manage the Moose-Wilson Corridor.

As a former park ranger in Yosemite National Park, Newman understands the dilemma of balancing people and wilderness. He says in these situations, the more information you have, the better.

"Essentially, what the park wants to know is how many cars are coming and going within the corridor, where people are stopping along the way, and how pedestrians and bicyclists are using the road," said Newman. "They also want to understand the types of experiences people are

seeking from this area to begin with."

While Newman and the other Penn State researchers focused on learning more about why people were visiting the Moose-Wilson Corridor, the team from Utah State University—including Chris Monz, associate professor of recreation resources management—studied exactly where they were going once they were there.

The process required a little strategy. Tracking animals within a park is relatively easy: If scientists want to study deer behavior, they simply fix a tracking collar on them and watch where they go. Perhaps unfortunately for the deer, scientists don't have to ask the animals' permission.

With people, it's a little more complicated.

"You can't just put tracking devices on people, and you can ask them to draw a map, but that's not always that accurate," said Monz. "So prior to GPS, we didn't really have a way to gather this information from visitors."

Lauren Abbott, a graduate research assistant from Penn State, conducts a survey with a park visitor. Credit: Jennifer Newton

Now that the technology does exist, Newman—along with assistant professor Derrick Taff and doctoral candidate Jennifer Newton—is working with Monz, who uses GPS devices to gather information about how motorists, bicyclists and pedestrians move around the park.

Monz and postdoctoral researcher Ashley D'Antonio, who received her bachelor's degree from Penn State in 2006 before going to Utah State University for her master's and PhD, have used GPS in numerous park settings to understand visitor behavior and have collaborated with

Newman on several projects over the past decade.

To gather participants for the study, the team of researchers stood at four locations along the road and flagged down random visitors. Once the visitors agreed to be part of the study, Newman's group gave them a "pre-experience survey."

"We gave the visitors a laminated copy of the survey questions, and then our field technicians entered their answers immediately into the iPad," Newton said. "It made data entry so easy—it was done right on the spot. When we got back, everything was ready to go."

After they answered questions about why they were there—for hiking, perhaps, or just to enjoy the scenery—the visitors were given GPS devices to clip to their bags or keep in their car. The devices, which are accurate to three meters or better, record coordinates every 15 seconds. When the visitors left the Moose-Wilson Corridor, they answered a second survey and returned their GPS devices.

In all, the research group gathered information from 1,705 participants.

"People really wanted to help. Of the people we asked to participate, the acceptance rates were close to 90 percent," said Newman.

Once the data was collected, it needed to be analyzed. The group used a computer program called ArcGIS—the GIS stands for "geographic information system"—to help them make sense of the huge amount of data collected by GPS.

"When you get the data off the GPS devices, it just looks like a bunch of dots, which are all the coordinate points collected by the GPS," said Newton. "Then, we upload the data to ArcGIS, where the dots are overlaid on a map of the area. That's when it all starts to make more

sense."

Once the data was in the system, the researchers were able to start seeing patterns and making conclusions. For example, the researchers found that the parking area connected to the Granite Canyon Trail was more popular than the one outside Death Canyon during one study period.

Additionally, scenery seemed to be a big motivation for why people chose to visit the Moose-Wilson Corridor. Out of the visitors in cars, 83.5 percent cited "scenic driving" as one of the reasons they were there, and 96 percent of cyclists said they were there for "viewing the scenery."

Taff says he was surprised by the how many reasons people had for visiting the park.

"I was not expecting to see the number of different visitor experiences people were looking for in the corridor, like people commuting, seeking a specific hiking destination, or exploring and ending up in the corridor by happy accident," Taff said.

Now that the information is in the hands of the National Parks Service (NPS), it's up to them to decide what to do—if anything—to help visitors get the most out of their time on the Moose-Wilson Corridor.

"When you see spatial data like this about how and why people are using parks, spatial patterns emerge that show how values are manifested on land and the benefits that visitors seek from particular places. And that is important as these are the people's parks," said Newman. "So when the park managers sit down to make a plan or make decisions about what to do, at least now they know where people are going and why they're going there."

Whatever they decide, Monz hopes their work helps NPS maintain parks

sustainably and better manage visitors so they can have great experiences within the park.

"If the number of people in parks is a problem," Monz said, "it's a good problem to have."

More information: Moose-Wilson Corridor Use Levels, Types, Patterns and Impacts in Grand Teton National Park. www.nps.gov/grte/learn/managem … ReportInclAppndx.pdf

Informing Visitor Use Management Strategies for the Moose-Wilson Corridor, Grand Teton National Park. www.nps.gov/grte/learn/managem … eport-and-Review.pdf

Provided by Pennsylvania State University