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The Road Less Trampled

Scientists thought groomed roads helped lead bison out of Yellowstone National Park, but new work shows the animals may prefer natural trails

By Harald Franzen

The winter of 1996–97 was a bad time for bison in Yellowstone National Park. The season was particularly harsh and snowy—and for some reason, scores of the massive animals began to leave their normal stomping grounds. As they crossed into non-parkland, they were killed by the Montana Department of Livestock. The agency needed to protect the state's livestock from the infectious diseases bison sometimes carry—but they ultimately shot dead more than 1,000 of the estimated 3,500 bison living in Yellowstone at the time. The tragic event led several scientists to ask the same question: why did so many bison decide to leave the park?



Image: courtesy of DAN BJORNLIE

THOUGH HARDLY DAINTY, bison in Yellowstone National Park travel away from deep snow, which makes it harder for them to forage.

Mary Meagher, then an animal ecologist at Yellowstone National Park, had been working in the park and with the bison for almost 40 years. When she looked into the mysterious mass exodus, she decided to place at least part of the blame on groomed roads. These cleared paths, she concluded, made it easier for the bison to move around within the park and, on occasion, led them on mass migrations out of the park as well.

"Pieces of roads—suddenly available in the harsh conditions of winter—became easier, energy-saving travel routes," she explains. "Life is 50-50. It's what you take in, that's the calories, but the other half, especially in a harsh environment like this, is the energy it costs. Energy saving is really crucial in this environment. That means that any energy that an animal saves—especially if, in saving that energy, it gets to slightly more forage—is going to tip the balance of survival."

Meagher says the bison eventually left the park due to a domino effect: populations of bison from one valley moved westward, pushing the population there farther west and so on—until some bison were ultimately pushed out of the park altogether. "The first time I know that I had bison use a section of road to move to a new foraging site was in February of 1980," Meagher adds. "The next year they had moved another quarter of a mile further west. [Animals](#) learn too."

But not everyone reached the same conclusion. In 1997 Dan Bjornlie, then a graduate student in ecology at Montana State University, also set out to determine exactly how and why the bison had migrated. Over the course of two winters, Bjornlie and his graduate advisor Robert Garrott—working with several technicians and other graduate students—monitored Yellowstone's bison populations. They recorded where the animals were and if they were feeding, traveling or resting. The group came up with some surprising results, which put many traditional ideas about bison behavior in question.



Image: courtesy of DAN BJORNLIE

TRAVEL PATHS the bison take include river corridors and thermal features—natural trails that man-made roads also frequently follow.

Indeed, earlier observations indicated that the bison population lived primarily in two regions: one at the northern end of the park, and one in the center. For the most part, the animals had not moved from these neighborhoods. In recent years, though, researchers had noticed an increased migration of the bison to different pastures during different seasons. Meagher and others attributed this movement to the bison's natural migratory drive, and to man-made changes in the ecosystem of the park, including groomed roads.

Bjornlie, however, saw another possible explanation—namely the steady growth of the park's bison population. In 1967 there were only 397 bison counted in Yellowstone; today there are nearly 3,000. "So really with the population expanding 10 times, they've got to move somewhere, and they expanded their range by going to the western side of the park in the winter time," Bjornlie notes. The bison had followed these same paths in the past, but simply stopped due to human intervention. "The herd was managed so heavily, it was treated almost like a ranching operation in the early part of the century," Bjornlie says. "So a lot of the natural migratory behavior was stopped because of that, and then as we let the population come back, these behaviors are starting to show up again."

This round of research established that the migration was a natural phenomenon, but the question of whether bison preferred traveling along groomed roads remained. "Part of the assertions about bison using roads was that they did it to save energy by not displacing snow while they traveled," Bjornlie explains. "So we decided to record what proportion of their total activity was in traveling or foraging or resting, and then of those, what proportion was actually displacing snow."

As it turned out, Bjornlie and his colleagues discovered that the bison travel very little, less than 10 percent of the time. Furthermore only a very small percentage of that travel was on the groomed roads. "The bison don't use roads that often because they can find other places to travel where they don't have to displace snow," Bjornlie says. Among the natural trails they choose are stream corridors and thermal features, where the snow is naturally thin or nonexistent.

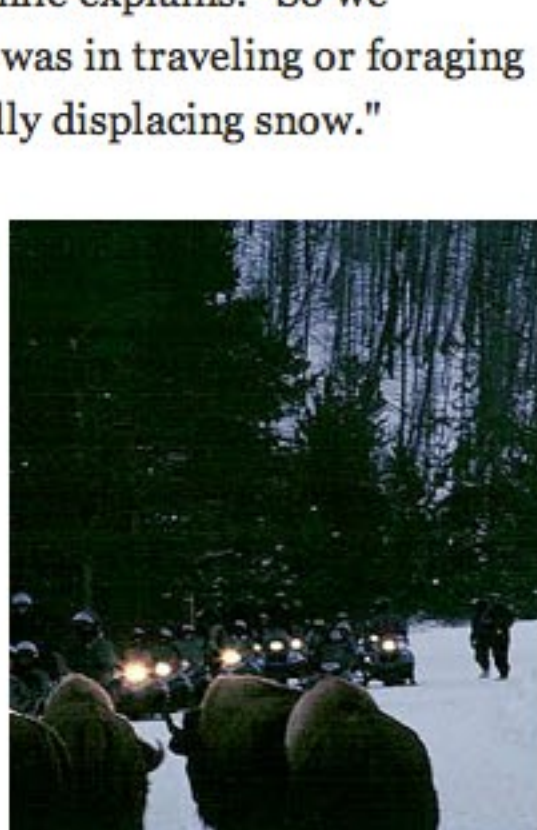


Image: courtesy of DAN BJORNLIE

BISON MIGRATION in Yellowstone was stilted earlier this century by human intervention. Now that the population has grown in size, the natural tendency to travel is returning.

When the bison do travel on roads, it is mainly by coincidence, Bjornlie adds. "A lot of the roads—actually all the roads in my study area—follow river corridors that cut through the mountains and those are the natural places to travel," he explains. "That's why the roads were put there in the first place. The bison travel in those areas, regardless if they are on the road or not. I'd see them traveling along the riverbank, 10 feet from the road. They are going the same direction, just not on the road."

So what makes bison move, if not roads? Deep snow, Bjornlie says. The bison seek out those parts of the park where forage is most accessible—places with little snow. He found that the bison were migrating towards the thermal features for which Yellowstone is so renowned. There, the heat keeps the snow melted, which in turn gives the bison easy access to the vegetation. It's this search for accessible food that most likely drives the bison out of the park during winters with a lot of snow.

"Roads just aren't a major influence in where bison go and when," Bjornlie concludes. "They would most likely go to the same places in and out of the park, no matter if the roads were there or not."

Because Meagher and Bjornlie conducted very different research studies, it is hard to compare their results. Bjornlie, for instance, collected specific data on the number of bison in one research area and on their distribution, movement and activity through direct observation in the field. His research was thorough, but limited to a comparatively small section of the park in which most of the bison affected by groomed roads were concentrated. Meagher, on the other hand, looked at the park as a whole to understand the entire ecosystem. She conducted aerial surveys of the park for several decades, but recorded only general trends.

Even if groomed roads influence where the bison go, the park department's position is clear: "We've groomed since the early 1980s and have continued to groom the roads through the study," says John Varley, Director for the Yellowstone Center for Resources. For the time being, there are no plans to stop grooming