ECOLOGY

Bison Prime Prairie Biodiversity

Nostalgia may be one good reason for restoring bison to the North American plains, but now there's a scientific incentive as well: Bison appear to help keep grassland ecosystems healthy. Findings from a 10-year study in Kansas linking bison grazing to plant diversity in tallgrass prairie offer hope to land managers trying to preserve the last remnants of native U.S. grasslands. "Potentially there are ecological solutions to some of these biodiversity problems," says study leader Scott Collins of the National Science Foundation.

The study, described on page 745, may also put cattle grazing in a slightly better light. That's a hot-button issue in the U.S. heartland, where environmentalists contend that cattle are driving to extinction native plants on public lands. But some scientists worry that the message might be carried too far. "The danger is that people will manipulate these results into advocating more [cattle] grazing," says Stephen Torbit, a senior scientist with the National Wildlife Federation in Boulder, Colorado.

About 10% of North America's original tallgrass prairie remains in scattered patches from Illinois west to Nebraska and from Texas up to southern Canada. Ecologists know that fires—whether set by lightning or by people—kept the bison-filled prairies from turning into forests for millennia. Land managers now try to mimic those conditions by burning prairies in the spring to check woody growth and exotic species. But civilization poses a new, grave threat to tallgrass ecosystems worldwide: Atmospheric nitrogen from car tailpipes and fertilizers deposited onto prairies is helping some species flourish at the expense of others, on balance lowering the prairies' biological diversity (*Science*, 13 February, p. 988).

Hoping to better tease out the delicate relationship between burning, nitrogen, and grazing, scientists at Kansas State University in 1986 launched an experiment on 20 144-square-meter plots of grassland at the Konza Prairie Long-Term Ecological Research site in northeastern Kansas. They plied some of the plots with heavy doses of nitrogen, torched others once a year, did both to a third set of plots, and left the rest alone. They also mowed two sets of plots each June to simulate grazing by bison, which tend to nibble at a patch for a while then move on.

The team found that by 1994, the burning and added nitrogen had taken a heavy toll. Tallgrass prairie is a mixture of so-called C4 grasses, which grow better in warm, dry conditions, and C3 species, which prefer cooler, wetter digs. Although C4 grasses thrived on the burnt, nitrogen-rich plots, C3 plants were decimated, leaving these plots with roughly 5.6 species per 10 square meters—66% fewer than the control plot.

ALAN K. KNAPP

Home on the range. Study suggests that bison grazing helps maintain plant biodiversity in tallgrass prairie.

The story was much different in plots that had also been mowed, however: The number of species didn't fall off at all. The researchers got similar results when they compared burned and unburned Konza Prairie watersheds where bison had been reintroduced in 1987. The reason, Collins says, seems to be that the taller C4 grasses "form this big, thick canopy in which a lot of the less common species can't survive. Mowing or grazing shaves open that canopy and allows more light to get through, so a lot more species can coexist." That finding "is a significant advance in our understanding of what controls prairie composition," says ecologist David Tilman of the University of Minnesota, St. Paul.

The implications for cattle grazing are unclear, however. Rangeland ecologist William Lauenroth of Colorado State University in Fort Collins says the new findings represent "the first time a group of ecologists with no clear connection to the livestock grazing community" agree with range scientists that grazing can benefit prairie grasslands. But other experts say prairie-reserve managers shouldn't move too quickly to adopt mowing or grazing as a tool to manage biodiversity. For one thing, the impact may differ depending on which big galumph—a bison or a steer—is chewing up your prairie. Bison tend to range more widely than cattle, which if left in a field long enough are more likely to chomp it down to the roots.

Indeed, no one wants to see a stampede to open up protected grasslands to cattle grazing. The problem is that grazing—even by bison—"can be very bad for grasslands" that are already degraded, Collins says. The best approach, he and others say, is to allow moderate bison or cattle grazing on healthy prairies and track how the ecosystems respond.

–Jocelyn Kaiser

PRIMATOLOGY

'Monogamous' Gibbons Really Swing

SALT LAKE CITY—The sex and social lives of gibbons were long thought to be about as exciting as those of June and Ward Cleaver. Like a 1950s-style nuclear family, gibbons were thought to live in stable groups of five or six, in which a mom and pop mate for life and raise their offspring. Family comes first, and the only excitement comes when the group spars with the neighbors. "The impression was they were monogamous and not very social with other groups—therefore, that they were fairly boring," says Thad Bartlett, an anthropologist at Dickinson College in Carlisle, Pennsylvania.

But in a report here last month at the annual meeting of the American Association of Physical Anthropologists, Bartlett showed that gibbons are anything but boring. He and others have found that although many gibbon pairs mate for years on end, like human families of the '90s they have plenty of drama—infidelity, divorce, abandonment, and step-children from other unions, as well as much socializing and kinship among members of different groups. The findings show how important it is to explore what "monogamy" means for primates, and underscore the social complexity of these intelligent animals. "Gibbons really have been the prototype for monogamous primates," says Phyllis Dolhinow, a biological anthropologist at the University of California, Berkeley. "It turns out things just aren't as tightly structured as had been assumed."

T. BARTLETT

Nuclear family? Gibbon family life is more complicated than it looks.