Can Cows and Conservation Mix?

Conservationists, ranchers, and scientists attempt to preserve biodiversity and the cowboy way of life

BY MARI N. JENSEN

In the 1990s, many a discouraging word was heard on the range.

Figure 1. Livestock graze the wide-open spaces of the Gray Ranch in New Mexico's Animas Valley. The ranch, owned by the nonprofit Animas Foundation, is one example of ongoing efforts to combine ranching and conservation. Ranch managers are experimenting with different grazing and fire management strategies to learn their ecological impacts. Photo: Charles Curtin, Arid Lands Project.

Scientists and environmentalists criticized livestock for causing a host of ecological ills, from crushing the delicate microbial crusts that coat desert soils and boost nutrient cycling to destroying stream habitats by stomping the banks and muddying the waters. Three professional scientific societies—the American Fisheries Society, the Society for Conservation Biology, and the Wildlife Society—issued policy statements about the need to improve grazing management and restore what the Wildlife Society calls "lands degraded by many years of livestock grazing that damaged soils, water, and plant diversity" (*www.wildlife.org/cp5.html#26,* last accessed 8 February 2001). And in the August 1998 issue of this magazine (*BioScience* 48: 607–615), grazing was indicted for contributing to the endangerment of one-third of the imperiled plant species in the United States.

But now some ecologists and conservation organizations, most notably the Nature Conservancy (TNC), are saying that working cattle ranches can be compatible with conservation. In fact, the Ecological Society of America's (ESA) annual meeting in 2000 included a half-day symposium entitled "Cattle and Conservation: A Role for Ranching in Protecting Biodiversity."

What gives?

One big threat to biodiversity preservation in the American West is the subdividing of the landscape's vast open spaces that happens whenever an individual ranch is chopped up into the many smaller parcels known as ranchettes. More and more people want to make their homes on a little piece of the once-open range, so the deer and the antelope have to play elsewhere. Some ecologists believe that keeping large ranches intact, thereby preventing subdivision of the land, is one way to protect the biodiversity still present on many rangelands.

Fences make bad neighbors

Long before any houses dot an ex-ranch's rolling hills, the subtle changes that come with subdivision make the area less hospitable to wildlife and begin altering the ecosystem, says Peter Warren, a plant ecologist with TNC in Tucson, Arizona. The first changes—constructing roads to the new lots and fencing their perimeters—create a net-

Figure 2. An advertisement for a rural subdivision sits along a dirt road in southeastern Arizona. Breaking up large ranches in the American West into smaller parcels of land known as ranchettes reduces the amount of open space in the landscape, thus limiting wildlife movement and creating a significant threat to biodiversity. Photo: James H. Brown, University of New Mexico, © July 1998.

work of barriers that "really restrict wildlife movement," he says, adding that putting in roads increases runoff of water and initiates erosion. As soon as the first buildings go up, fire—an essential, natural part of any grassland ecosystem—is artificially suppressed. Later, as people move in with their dogs, cats, horses, and maybe even a few cows, more destruction takes place, Warren says. Although to any city dweller a 40-acre ranchette can feel like wild, wide-open country, he says such fragmenting of grasslands dooms much of the ecosystem's natural processes and native biological diversity, components that "have existed side by side with ranching for a long time on well-managed ranches."

Conservation organizations like TNC are actively acquiring conservation easements on ranches to keep them from being subdivided, says Richard L. Knight, a conservation biologist at Colorado State University in Fort Collins. Such easements usually involve landowners selling or donating development rights on their land to nonprofit groups interested in preserving open space. Once the development rights are gone, the assessed value of the land drops, reducing the owner's tax burden and hence the economic pressure to sell. However, whether an intact ranch is better for biodiversity preservation than a collection of ranchettes has not been tested, Knight says. So he and Jeremy Maestas, a wildlife biology graduate student at Colorado State, are studying which birds and carnivores frequent three different types of land—protected areas, ranches, and 35-acre ranchettes—in the shrub grassland of north-central Colorado's Laramie Foothills. Maestas says, "No one has looked at bird uses of these new exurban areas as compared to the existing ranches and protected areas."

The researchers' first year of study has already turned up some significant differences in bird communities. Ranchette developments have fewer vesper sparrows and more of what Maestas calls "human-adapted species" like the black-billed magpie, European starling, American goldfinch, and barn swallow. Green-tailed towhees prefer the protected areas over either ranches or ranchettes. Although Maestas needs another season of data to understand how native carnivores use the different areas, the trend for domestic animals is clear: Dogs are 60 percent more frequent and cats 20 percent more common in ranchette developments than on ranches or in protected areas. "On almost every property out there you have these subsidized predators," Maestas says. He suspects that the comparatively high numbers of dogs and cats on those properties are having a substantial impact on the bird community.

The Malpai Borderlands Group

Just because ranchettes and conservation don't mix does not mean that ranching and conservation do. However, some organizations are showing how cattle ranching can coexist with, and even enhance, conservation efforts. As an example, TNC's Warren points to a group he works with closely, the Malpai Borderlands Group (MBG) outside Douglas, Arizona. The group of ranchers and local residents, with the cooperation of scientists, government agencies, and conservation organizations, is working to preserve open space, biological communities, and traditional livelihoods like ranching in an area encompassing 800,000 acres, of which about 57 percent is private land and the rest a mix of state and federal lands. The remote region in southeastern Arizona and southwestern New Mexico boasts 48 sensitive species, some federally listed as endangered or threatened. Rancher Bill McDonald, MBG's executive director, says the area, ranging from desert grasslands in the valleys to pine–oak woodlands in the mountains, is continuous open space, with "nothing but cattle ranches and some wildlife preserves."

MBG's members started meeting on the front porch of Warner and Wendy Glenn's Malpai Ranch in 1991, because they were concerned about the future of their livelihood, the public's attitude toward grazing, and the potential for fragmentation of the landscape, says McDonald, who was awarded a MacArthur Fellowship in 1998 for his work establishing the group. He told the audience at ESA's August 2000 cattle and conservation symposium that the group was certain that "government wasn't the answer."

In the 7 years since MBG became a nonprofit organization, McDonald says, the group has reintroduced fire to

the landscape, started a dialogue with nearby Mexican ranchers to expand conservation-minded planning in the region, and, by arranging conservation easements, has permanently protected about half of the private land in the area from subdivision. In addition, the group developed a "grassbank": grasslands that can be used for grazing while ranchers rest their own land and let it recover from stresses such as overgrazing or drought. The arrangement keeps ranchers in bad straits from having to sell off their cattle and maybe even their ranches. Ranchers who use the grassbank must perform some kind of conservation action in return, McDonald says. All Malpai Borderlands Group members who used the grassbank have given MBG a conservation easement on their private ranch lands, thereby forever protecting those lands from development. McDonald also says the group has had a major influence on the Nature Conservancy, by encouraging it to work with private landowners.

James H. Brown, a community ecologist at the University of New Mexico in Albuquerque who has done ecological research in the Malpai Borderlands region for the last quarter-century, says there's no doubt that poorly managed ranching can be destructive. "In some cases, if grazing is done badly, you not only damage the vegetation, you get erosion and soil loss so that it can be difficult to restore areas that have been overgrazed." However, Brown, a member of MBG's science advisory board, does not think that well-managed cattle operations damage the land. He says, "I would challenge anybody to go onto Bill McDonald's ranch, especially his lease holdings in the Coronado National Forest, and find any evidence that he's doing anything that's damaging to that particular ecosystem."

In fact, Brown's research shows that some of the region's vegetation changes are not due to grazing, as many researchers had thought, but to climatic changes. By analyzing aerial photos and comparing the grazed and ungrazed areas on either side of a fence, Brown and his colleagues found that the "shrubification" of the region since 1977 had nothing to do with cattle grazing, but rather is linked to long-term increases in rainfall that have given shrubs a competitive edge over grasses. Moreover, he says, people are too quick to label as "good" the changes that occur when cattle are removed. He's not so sure that the way those ecosystems look after grazing ceases is the way they are "supposed" to look. At least in the region around the Malpai, the ecosystem did evolve with large grazing herbivores, Brown says, referring to the mastodons, mammoths, camels, bison, and ground sloths of 12,000 years ago. Grazing continued to be a natural part of the landscape, suggests his colleague Charles G. Curtin, who says that bison herds may have occasionally wandered through the region as recently as a few hundred years ago.

Figure 3. The original board of directors and advisers for the Malpai Borderlands Group gather in the hay barn of Warner and Wendy Glenn's Malpai Ranch. The group of ranchers and local residents works to preserve open space, biological communities, and traditional livelihoods like ranching in an 800,000-acre area of open space in southeastern Arizona and southwestern New Mexico. Photo: Jay Dusard, ©1995.

But getting scientific answers to questions about grazing requires even more research, Brown says. That's why Curtin, an ecologist who directs the nonprofit Arid Lands Project, is setting up what he says is one of the continent's largest ecological experiments examining interactions between cattle grazing, fire, and prairie dogs and other native herbivores. Located on a portion of New Mexico's Gray Ranch (the same ranch MBG has been using as a grassbank), the research site itself, a 14-square-mile chunk of Chihuahuan desert grassland, has been ungrazed for almost a decade and without prairie dogs for close to 50 years. The Animas Foundation, which owns and manages the ranch, has reintroduced black-tailed prairie dogs into the area. And a natural fire in 1998 provided the perfect pre-experiment treatment by resetting the entire research area to the same starting point, Curtin says. The fire reduced the number of weedy shrubs, and native grasses increased, he says, forming "beautiful stands of blue grama and black grama grasses."

About 200 head of cattle were introduced to the site in September 2000. Curtin plans to use a traditional, four-pasture grazing system, whereby the cattle are rotated through three pastures a year while the fourth goes ungrazed for an entire year. Each 2200-acre pasture contains four research

plots, each of which receives one of four treatments: grazed only, burned only, grazed and burned, or neither grazed nor burned. In addition, some parts of each pasture have ingeniously designed fences (high, low, with ground-level barriers or without) that exclude various combinations of native animals such as deer, antelope, rabbits, and javelina. Such exclosures will let the researchers track how the vegetation responds to various combinations of cows and native herbivores.

Curtin says the experiment will run at least a decade, but he hopes it will continue indefinitely. "We'd like to see four El Niño events" during the study, he says, pointing out that means at least 16–20 years. He says the experiment's grand size and long duration is key for determining whether grazing affects biodiversity and for examining the interactions between grazing and fire.

Working with scientists like Brown and Curtin has several benefits for the Malpai Borderlands Group, Bill McDonald says. For one thing, it gives the group credibility outside the ranching and range science community. Such collaborations also "help keep the [government] agencies honest, because they tend to respond to political pressure and don't always have the funds to do the monitoring and scientific research." But the most important benefit, McDonald says, "is for our own knowledge, so we can find out more about this country we live in."

The Nature Conservancy rides the range

Longtime ranchers like McDonald are not the only folks trying to do conservation-minded ranching. The Nature Conservancy stocks its Red Canyon Ranch outside of Lander, Wyoming, with as many as 800 head of cattle during the summers. Like many Western ranches, the Red Canyon Ranch's 35,000 acres is mostly public land. Only 5000 acres are private land; TNC holds grazing leases on the remaining 30,000, which are a mix of state and federal land.

The ranch is used to demonstrate the compatibility of ranching and conservation and as a place to learn about good grazing management, says

Australian Farmer Learns to Biograze

Trying to combine cattle ranching with conservation is an issue in Australia as well as in the United States. As in the United States, about 100 years ago Australia's ranchers overstocked their ranges—with devastating ecological effects. Now Australia's public is concerned about the negative impacts of livestock grazing, says Craig James, an arid zone ecologist with Australia's CSIRO (Commonwealth Scientific and Industrial Research Organisation) in Alice Springs. About 7 years ago, he and two colleagues began studying how grazing affects native flora and fauna, including plants, birds, ants, lizards, small mammals, and various invertebrates.

In Australia, livestock generally depend on artificially supplied water sources, such as wells or dams across ephemeral creeks. So at eight sites across the continent, the team sampled the biota at distances from an artificial water source ranging from 500 meters to 15 kilometers. Although about three-quarters of all species found were present at all sites, some species—among them the hooded robin, several lizards, and a plant called bandicoot grass—fared less well in the sites closer to water. As long as water sites are far apart, those species will have refuge from grazing. However, the best management for livestock means putting in additional watering spots and spreading them evenly across the landscape. As that occurs, James says, safe places for the more sensitive species will disappear.

To address the problem, James has developed a project called Biograze, which couples a certification system for environmentally friendly rangeland products such as meat, leather, and wool with the protection of about 10 percent of Australian rangeland. Those protected lands, he says, would be far from current watering points and therefore still retain a good complement of grazing-intolerant species. Because the costs of such conservation should be distributed throughout society, James says, livestock industry members should be monetarily compensated for the income they might otherwise have gotten from those sites. Such monies would be a "stewardship salary." (Almost all grazed lands in Australia are owned by the government and leased to individuals or grazing companies for their exclusive use.) He says one of the largest livestock companies in Australia is implementing the certification program because the company wants "a squeaky green image" for its products.

Mark Ritchie, environmental officer for the North Australian Pastoral Company Pty. Limited (NAP) in Brisbane, is working with James on the certification system for "green" rangeland products. NAP's grazing leases for its 145,000 head of cattle cover about 14.5 million acres spread out over several different parts of Australia. Ritchie believes that selling rangeland products certified as environmentally friendly is good business—even if such products do not command a higher price—because such products "will certainly be more attractive to consumers," and therefore sell well. Verifying that the manner in which the goods are produced is "conservation minded," he says, "is as important as telling them that the cattle are healthy." He adds, "Being involved with the Biograze project will allow us to do that."

Bob Budd, former executive vice president of the Wyoming Stock Growers Association and current manager of Red Canyon Ranch. Managing for multiple goals that include ecological values such as maintaining rare plants and neotropical migrant birds like Lazuli buntings requires doing much more that just focusing on the number of cattle on the ranch. He says the key is how the cattle are managed, not how many head there are. He moves the ranch's cattle so as to mimic the movements of native herbivores, such as mule deer and elk, that "follow the green line" up the mountain as spring deepens into summer. "We're trying to control the time and timing of when [the cattle] are in a given place and how long—trying to think a little like a native animal would have," he says. Rather than using fences to control cattle movement in the summer, Budd hires riders to herd the animals.

Since Budd started managing the ranch for TNC 7 years ago, the number of calves produced on the ranch has increased by 50 percent and the condition of the ranch's rangelands has improved. Although TNC wants to get more than just money from the ranch, demonstrating that conservation pays is important, and 50 percent more calves means 50 percent more income. If ecologically sound management helps a rancher rear more calves, Budd says the rancher "has a much better chance of making a living and a smaller incentive to sell." Because people don't ranch to make the maximum profit, but because they love the land, Budd calls ranching "an irrational act." After all, he says, a rancher could make far more money by selling the land and investing the proceeds.

From a broader conservation standpoint, it's important that ranches not be sold, Budd points out, because the land ranchers actually own (as opposed to the government land they lease) generally contains the best wetlands and riparian areas—habitats that in the arid West are crucial for maintaining biodiversity.

Figure 4. Fire from a prescribed burn moves across arid grasslands in the US–Mexico borderlands. In the late 1800s, heavy grazing by cattle disrupted the region's natural fire regime by eliminating the fine fuels needed to sustain fires. Increasingly, public and private land managers and researchers are reintroducing fire into the landscape and also letting natural fires burn. Photo: Charles Curtin, Arid Lands Project.

Cattle—and wildlife, too

Another way to make conservation-minded ranching economically viable is to market the wildlife on the land as well as the cattle. On about one-quarter million acres of private land in northeastern Utah's sagebrush country, Deseret Land and Livestock runs cattle and also does a brisk business in hunting, fishing, and wildlife watching. Management's economic goal for the ranch, which has been owned by the Church of Jesus Christ of Latter-day Saints since 1983, is to generate a yearly profit equal to at least 5 percent of the land's appraised value. Although profits vary with cattle prices, the ranch can clear more than $1 million per year. Wildlife accounts for about 30–40 percent of the yearly income, so there is an incentive to maintain healthy populations of native game animals. In addition to supporting approximately 6000 cow–calf pairs and 2000 domestic sheep, the ranch also has about 3500 mule deer, 2200 elk, and 600 pronghorn antelope, says wildlife biologist Michael L. Wolfe of Utah State University in Logan. As many as 100 different bird species can be seen there in a day, and more than 250 bird species can be found over the course of a year. Furthermore, the ranch's sage grouse population is increasing, although the species' numbers are dropping elsewhere in the state. "Cattle don't so much promote biodiversity," Wolfe says, "but if managed properly, they are compatible [with it]."

To examine the different impacts of wildlife and livestock on the Deseret's vegetation, in 1992 Utah State ecologist Mark E. Ritchie and his colleagues fenced a series of 90-by-90 meter plots in the ranch's native sagebrush area. Some fences kept out just cattle, others excluded both cattle and rabbits, and yet others kept out everything—cattle, rabbits, deer, elk, and pronghorn. Surprisingly, no matter what animals grazed a plot, it grew the same number of plant species—albeit different ones—in the open spaces between sagebrush plants. Plots without cows shifted toward having more species of grasses and fewer herbs and wildflowers, plants referred to as forbs. Areas where cattle grazed had less grass and more forbs. "It's a nice little balancing thing," Ritchie says. "The pattern has been sustained for 8 years; it's not just a blip on the radar screen." At least on native sagebrush sites, he says, cattle and wildlife are "highly compatible" because they tend to choose different foods. The wildlife eat the plants that cattle refuse,

which fosters the growth of grass. And by eating the grass, cattle promote the growth of the plants wildlife like. Ritchie says, "You can actually sustain a greater production of meat by having all those different species rather than focusing on one, like livestock."

Cattle are still an exotic species

But even researchers who have found grazing benign in some places would not want to see it everywhere. Thomas J. Stohlgren, an ecologist with the US Geological Survey in Fort Collins, Colorado, says that in regions like the Great Plains, which evolved with thundering herds of bison, grazing is probably fine. However, his current research in Utah's Grand Staircase–Escalante National Monument makes him suspect that grazing is damaging in regions like the Great Basin, where large grazing herbivores were not present historically and the soil is covered by biologically active cryptobiotic (microbial) crusts. Cattle ranching is compatible with conservation only if rare habitats are conserved, he says. "For cows and conservation to mix, we have to know where those hot spots are and protect them—and I don't think we've done a very good job of that."

Environmental advocate Joy Belsky, a grassland ecologist with the Oregon Natural Desert Association in Portland, states the case more strongly. To the question of whether cows and conservation can mix, she replies, "In the United States, no. Especially in the arid West—the Intermountain West, the Southwest." Because cattle evolved in cool, wet areas of Europe and Asia, she says, in the Great Basin and the Southwest they search for the wettest areas they can find. That is why, she continues, "you hear so much about damage to riparian areas." And like Stohlgren, she notes that cattle crush cryptobiotic crusts, a key component of Great Basin ecosystems.

Whether ranching should continue in the American West is ultimately not a scientific question but one of cultural values, says Thomas L. Fleischner, a conservation biologist who chaired the Society for Conservation Biology's public lands grazing committee. He's suspicious of anybody who "has a blanket answer that grazing is totally good or totally bad across the board," he says. Whether ranching and conservation are compatible is an unanswerable question "until grounded in a particular landscape—and it depends what you mean by conservation." However, letting an alien species like cattle remain smack in the middle of Western ecosystems does not fit his definition of restoring native biological diversity. Although Fleischner, who teaches at Prescott College in Arizona, would choose well-managed ranches over thousand-home subdivisions any day, "that doesn't mean that ranching is compatible in a long-term sense with maintenance of biological diversity—it just means it's a lesser of evils." Presuming that cows must be part of the solution when figuring out how to preserve Western landscapes and biodiversity will end up generating a biased answer, he says, rather than a scientifically objective one.

When it comes to preserving open space so the buffalo can roam and the deer and the antelope can play, the forecast is uncertain. Even though many conservationists and ranchers agree that cows are preferable to condos, the cow as a conservation tool is not a solution everyone can accept. The Nature Conservancy's Peter Warren says the big pieces of land needed to preserve connections between the remaining wide-open spaces are owned and managed by ranching families. If he's right about that, it's hard to disagree when he says, "This conservation solution has got to work for them." ❑

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