Are Ranches an Environmental Hazard?

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"Grass as high as a horse's belly." "Streams as pure as a mountain spring." This picture of the west was spread by land agents promoting settlement in the mid-late1800s. Today these myths fuel the environmental concerns of those who blame ranchers for any deterioration of ranchland.

Early explorers had a different opinion than the land agents and dubbed the Louisiana Purchase area the "Great American Desert." Were conditions "better" before the arrival of white man and his ranching industry? In the rush to point fingers and condemn, have the environmental concerns neglected "the big picture"?

Is Overgrazing Needed to Maintain the Ecosystem?

Range researchers may cause concern when they study overgrazing as an unnatural event. But wasn't pristine range overgrazed by 60 million bison and probably as many other herbivores? Fremont (1845) reported on June 30, 1842, that his party was in the midst of bison which had left scarcely a blade of grass. They saw 700 or 800 bison at one place and 11,000 at another. Bison were used for food on their trek from west of Kansas City, northwest to the Platte River, and then to the Rocky Mountains. Mr. Pruess' group with Fremont fed their horses cottonwood boughs, an Indian practice when grass was scant. Ashley (Dale 1918) made many references to feeding cottonwood branches to horses in the winter. Donaldson (1914) described areas along the South Dakota boundary north of the Black Hills where grass was nearly absent when the Custer expedition traveled to the Hills. Thornthwaite et. al. (1942) reported early travelers found that grass was sparse or absent in some places in New Mexico and Arizona.

A rancher at the 1969 South Dakota Section Range Management Society meeting had settled near Kelton, S.D., around 1900. He indicated range consisted of light-colored bands with shortgrasses and dark-colored bands where bison had trampled and destroyed the shortgrasses. Clayton (1975) in North Dakota and Harksen (1968) in South Dakota described landscape erosional grooves formed from bison trails that went across ridges and drainageways. These may be the buffalo paths that William Clark asked Biddle to explain in letters collected by Jackson (1962, p. 553 and 564).

Range trampling may have killed the shortgrasses in the bison trails, but generally modern grazing causes the shortgrasses to increase and taller grasses to decrease in abundance. At the Cottonwood Field Station in the 1950s, shortgrasses increased in lightly grazed pastures because soil moisture was not adequate for the early spring growth of western wheatgrass. Long- and short-term climate cycles cause changes in the kinds and abundance of the vegetation. Drought in the central Great Plains decreased the vegetation basal coverage from 5 to 20% in the 1930s and the decrease was greater than 90% in 1952–1956 (Tomanek and Hulett 1970). One species can increase or decrease in competition with other species because of grazing or climate. Grazing apparently has had a role in the evolution of the grasslands. Intense wind erosion occurred prehistorically in local areas and likely will occur today regardless of ranching practices.

Past Climate and Vegetation Changes.

Pollen trapped in lake- and swamp-bottom sediments shows the kinds of plants that once grew in the area. Webb et. al. (1983) concluded from pollen in a bog near Rosebud, S.D., that the post-glacial period in the Great Plains opened with an abrupt change from spruce forest to grassland without the period of deciduous forest found in the east. At this time, the Great Plains climate was dominated by dry, warm Pacific air rather than air cooled by the glaciers. Vegetation-temperature zones, that had moved south as the glaciers advanced, now moved back north very rapidly in this area. Data from the post-glacial period also show that vegetation is very adaptable to climate change. Droughts caused the boundary between shortgrasses and taller grasses to shift from western to eastern North Dakota about 8,000 years ago and back west about 5,000 years ago (Bluemele and Clayton 1982). The eastern border of the grasslands and forest also has moved during the post-glacial period (Webb et al. 1969) likely because precipitation decreased and now has increased. Weaver and Albertson (1956) described changes in range vegetation during and after the 1930s drought. A small area northeast of the Black Hills was too dry one year in the 1950s for grass to grow; the next year, after adequate precipitation, western wheatgrass growth was luxuriant but blue grama

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Contribution from South Dakota Agric. Exp. Sta. Journal Series 2859.

recovery was slower. Through natural selection the aggregate of range plants has the capacity to adjust rapidly to changing conditions. *Should ranches be managed to preserve spruce forests or any other kind of plant or animal species just because it once was adapted to the area? Which plant community is the proper one for today?*

Has Wind Erosion been Increased by Ranching?

The Great Plains has been subjected to wind erosion probably for at least several hundred thousand years (Crandell 1958). Small creeks and drainageways in the shale area of west-central South Dakota are oriented NW-SE in the prevailing wind direction (White 1961). Streams with this alignment do not collect wind-eroded soil, so they elongate more rapidly than drainages aligned in some other direction. Streams in areas with more resistant rock cannot be diverted by the wind-deposited soil so they are not aligned. Thornburg (1965) reported that wind-aligned landscapes occur in western Nebraska and Kansas, eastern Wyoming and Montana, and parts of Texas and New Mexico.

If grazing in drainageways were responsible, wouldn't bison have grazed where vegetation was most succulent?

Wind likely eroded pristine areas because of drought, prairie fires, or overgrazing. Deflation basins and other evidence of localized wind erosion have been reported in the Northern Great Plains by Crandell (1958), Smith (1965), Ahlbrandt et al. (1983), and White (1973, 1989). Wind erosion was most intense in the Southern Great Plains about 17,000 and 6,500 to 5,000 years ago (Reeves and Parry 1969) and in the Northern Great Plains about 5,000 to 8,000 years ago and during several climatic cycles after 3,500 years ago (Bluemle and Clayton 1982).

Malin (1946) summarized the early accounts concerning wind erosion particularly in burned grasslands of Kansas but with some references to other areas of the United States. Visibility was reduced to a few feet by the dust, ashes, and bits of plant parts. In western South Dakota, the fill in unaligned drainageways after prairie fire consists mainly of surface soil aggregates and some partially burned plant fragments. Lewis and Clark (Coues 1893) frequently observed burned prairie areas along the Missouri River. Wells (1970) summarized reports that fire had kept trees from invading prairie in Iowa, Wisconsin, Kentucky, Missouri, Kansas, central Texas, and Long Island. Prairie fires were nearly an annual event caused either by Indians or by lightning. Higgins (1986) summarized historical fire accounts of the Northern Great Plains. Most fires set by Indians were from March to April and July to early November. Fire was used to aid food gathering over small areas. Wild fires during moist climatic cycles removes herbage and exposes soil surface to wind erosion. *Was wind erosion nearly as active during moist climatic cycles as during droughts?*

Effect of Prairie fires on Slope Erosion.

Prairie fires destroy or reduce the protective plant canopy. The canopy intercepts and slows raindrops so they do not break up the granular surface structure. The energy in flowing water can be used in turbulence, friction with the soil surface, or in erosion and transport of soil. A thick layer of water flows rapidly and can erode shallow rill gullies. Thus, slopes erode more after prairie fires. Most drainageways have soils that have more plant-available water than soils on slopes so that either the grass does not burn completely or can grow rapidly after the fire. Soil washed from slopes can collect in this grass to increase the fill in the drainageway. When fire is controlled, relatively clean water collects in the drainageway and has the energy to erode a gully as it runs off. Thus, many gullies in channel-less drainageways after ranching began may have formed because prairie fires were controlled (White and Lewis, 1967). These gullies may form at the same time and in consortium with gullies formed in natural geological erosion cycles. *If grazing in drainageways were responsible, wouldn't bison have grazed where vegetation was most succulent?*

Friedrich (1955) stated "Erosion once started on a grassland following a fire frequently continues for many years." A sparse mulch layer usually takes about three years to accumulate after a fire. Others have concluded a longer period is needed before the mulch accumulates to its original thickness. *Has ranching increased the average protective mulch and litter layer on the soil?*

Does Ranching cause Gullies?

Erosion caused by man and natural geological erosion are often confused. In the late 1950s, a school teacher and I were having our cars serviced in Rapid City. He had driven across South Dakota via the Badlands which really showed what happens when the wrong "stuff" was farmed. He was skeptical that the Badlands were there when the first French explorers arrived. What was he telling his students?

The Badlands have had many cycles of gully cutting and gully filling with material eroded from Badland walls. A drainageway a few miles from the White River had a gully formed in bedrock that was partly filled with sediment from 11,500 to 5,000 years ago, party eroded from 5,000 to 2,500 years ago, filled again from 2,500 to 800 years ago, and currently is being eroded again (White and Hannus 1985). The numerous reports of post-glacial stream erosion and filling in the United States have been summarized by Knox (1983).

Gully cutting in creeks and drainageways in western South Dakota appears to start from the mouth and progress up the valley (White 1964). Thus, the lower part of a stream

may have undergone several cycles of cutting and filling before the upper part has had any gully cutting. By selecting the right (?) part of the stream, ranching could appear to be responsible for gully cutting. Most gullies in South Dakota would have formed regardless of man's activities. Except for using dams or contour ripping and furrowing to control runoff, little can be done to stop natural cycles of gully cutting.

Gullying in a drainageway increases runoff so the former drainageway area becomes drier. The various kinds of depressions (White 1972a) also became drier because they eventually fill with sediment and overflow to erode a drainageway. The soil in a depression gradually changes from one found in a wetland to one with characteristics of an upland soil (White 1972b). A former wetland area should be managed for what it is today, not what someone says it was previously.

How many ranchers would leave an animal carcass to decay in the livestock water supply?

Has Ranching Decreased Stream and Lake Water Quality?

The quality of surface water likely has been improved by modern ranching with dams and dugouts. Hueg (1969) summarized early Minnesota history that tells of hoards of buffalo and streams and wallows that ran yellow and putrid from buffalo excretions. Bison bones are sometimes found when dugouts for stock watering are excavated in depressions in South Dakota. Bones are also found in sediment exposed in stream banks. The bones likely indicate many animals died, decayed, and polluted the water. *How many ranchers would leave an animal carcass to decay in the livestock water supply?*

Pristine lakes in the north-central part of the United States are perceived by some as having sand and gravel bottoms that have been buried by silt eroded from agricultural land. Studies of bottom sediments at Lake Okaboji in northwestern Iowa, Pickarel and Cottonwood lakes in northeastern and east-central South Dakota, as well as many other lakes in the north-central United States have dated the sediment as older than settlement of the area (Webb et al., 1983). Geologically, all lakes are short lived because they fill with sediment and develop outlets and drain.

What is an Endangered Species?

All life is in danger of extinction, like the fate of dinosaurs, mammoths, sabertooth tigers, and passenger pigeons. Man is a new kid on the block, around for only 2 million vs. the cockroaches 300 million years. Species must adapt to changing conditions or give up their space to a more efficient species. *Man is "just another species" but shouldn't our large brain be used to enhance our niche in the ecosystem?* Obviously, man will continue to replace species that can't compete for "space".

Will man be engendered more by using resources to find either a cure for cancer and AIDS or to save some species that is on the verge of extinction? The national budget shows funds aren't available for everything. Should ranches give up "space" for prairie dogs and blackfooted ferrets as they migrate from restocked federal lands? Most agree they have aesthetic value. Could they best be appreciated by placing them and other endangered species in enclosed natural zoo-like areas where they could be viewed by all?

An alternative wold be to restock the endangered animal across its entire original range. A few black bears and wolves in New York City's Central Park would certainly add to the aesthetics. Grizzly bears in Denver, Los Angeles, and Portland would be nice for residents. Obviously the city residents would give up "space" the same as non-urban residents are doing.

Ranchers may find a sympathetic view in Eldredge's (1987) concluding statement in his book. "Thus extinctions, in the abstract considerations of life's entire history, have paved the way for the truly new, including of course, ourselves. But now that we are here, it is not inconsistent at all to want to see our own species survive. To hell with innovations, lets try to stick around."

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