



NORTH AMERICA'S GREAT
CO₂
carbon ocean

PROTECTING PRAIRIE GRASSLANDS KEEPS CARBON IN THE SOIL
AND SLOWS THE PACE OF CLIMATE CHANGE.

BY John H. Davidson



AND CONSERVATION PRIORITIES HAVE FAVORED visually dramatic resources—mountains, lakes, forests and shores. As a result, we enjoy national seashores, public forests and parks in every mountain range, along with an industry-sized effort built around protecting rainforests. These conservation achievements have, however, overshadowed a more visually humble but no less vital resource in meeting the challenge of global climate change: grasslands of the North American prairie.

Prairie is one of the most subtle and complex of ecosystems, and to those who have taken the time to get to know it, there is nothing comparable. What to the untrained eye may seem to be a simple monoculture is in fact one of our most diverse sources of plant, soil, insect and animal life. Untold numbers of prairie species have evolved to take advantage of a massive continuum of habitat, and are, as a result, especially vulnerable as prairie is fragmented and converted to cropland and other land uses. Prairie is also home to a rich traditional culture and economy based on cattle grazing. But in today's world, prairie needs to be recognized for its capacity to help reduce climate change by sequestering heat-trapping carbon from the atmosphere.

Native grasses are a stable repository of carbon (see Figure 1). They create organic carbon below ground, much as trees create it above. Grasses store carbon quickly, providing an immediate mitigation against global warming, and the carbon is safely underground, secure from catastrophic events such as fire. Plowing releases carbon, however, adding significantly to greenhouse gas concentrations while eliminating habitat used by hundreds of species.

When prairies and other grasslands such as rangeland are protected, however, an “ocean of carbon” is secured. We must ask whether it makes sense to spend fortunes on attempts to control releases of carbon from coal-based energy plants and cutting of tropical forests while simultaneously releasing an immeasurable ocean of carbon by plowing up our prairie.

Going Fast

One of the most daunting challenges is being met in the middle of the country, where our remaining native grasslands are in peril. In Nebraska and South Dakota, less than 2% of tallgrass prairie remains, and the mixed and shortgrass prairies that lie to the west of it are now being plowed up at an alarming pace.

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KEEPING CARBON WHERE IT SHOULD BE

QUICK TAKE

✓ Soils and plant biomass are the two largest biologically active stores of terrestrial carbon, together containing [as much as] 2.7 times more carbon than the atmosphere.*

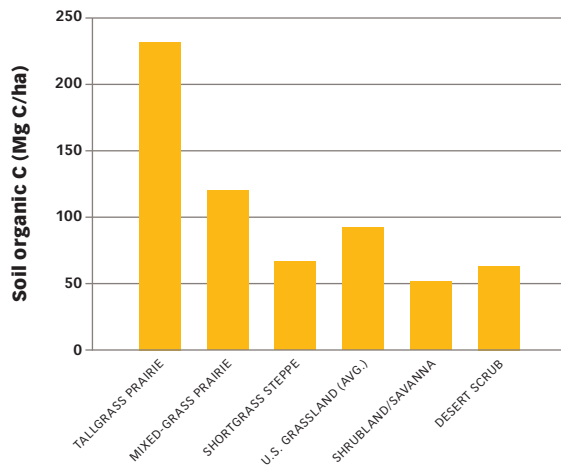
2 It is estimated that a loss of only 1% of the soil organic carbon in the top 10 cm of private grazing lands would be equivalent to the total annual carbon emission from all cropland in the U.S.**

3 Experts suggest that clearing prairies and other carbon-rich habitats, even for production of biofuels, will have a net effect of increasing carbon emissions for decades or centuries.*

*JOSEPH FARGIONE ET AL., “LAND CLEARING AND THE BIOFUEL CARBON DEBT,” 319 SCIENCE 1235 (2008)

**RONALD F. FOLLETT ET AL., THE POTENTIAL OF U.S. GRAZING LANDS TO SEQUESTER CARBON AND MITIGATE THE GREENHOUSE EFFECT, LEWIS PUBLISHERS, 401–430 (2001)

FIG. 1: Soil Organic Carbon



Soil organic carbon (SOC) to 1 m in different rangeland ecosystems in North America. Various sources noted in M.A. Liebig et al., "Greenhouse gas contributions and mitigation potential of agricultural practices in northwestern USA and western Canada," *Soil & Tillage Research* 83, 25–52 (2005).

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Grasslands loss is the result of a combination of forces, including urbanization, conversion to cropland, concentration of land ownership, spread of non-native species and overgrazing.

We have lost nearly 250 million acres of tallgrass prairie alone, which once supported at least 1,500 types of plants and grasses, and stored vast amounts of carbon. An estimated 80% of shortgrass prairie has been converted to crops as well. This conversion of prairie that began with the tallgrass and shortgrass is now carving into the mixed and remaining shortgrass. Nearly 300,000 acres—2.2% of the remaining native prairie—were converted to cropland between 2002 and 2005 alone, and the rate of conversion is increasing each year. The current rate of conversion in the Dakotas and eastern Montana, compounded annually, means that 77% of the prairie grasslands in existence today will be lost in the next 99 years.

Numerous incentives encourage the plowing of native grasses. The federal system of financial payments to corn and grain farmers encourages conversion as do the subsidies for corn ethanol and biofuel production. The resulting increase in grain prices encourages livestock growers to plow prairie in order to grow crops and to forsake grazing in favor of the industrial confinement methods of meat production. Genetically modified seeds now allow corn and soy production in semi-arid regions that heretofore have been hospitable only to ranching. On top of these incentives is the consolidation of farming along industrial lines, relying on the corporate model in which annual profits provide the only measure of success.

There is more at stake here than the loss of grasslands alone. Wetlands and headwaters are closely associated with prairie, and when the prairie is plowed, prairie wetlands are destroyed as well. Of the 80,000 wetland acres lost across the country each year, the largest type lost is prairie wetlands. This also explains why prairie birds are on a steeper plane of decline than any other birds in North America [www.stateofthebirds.org], and why the magnitude of inland floods increases steadily.

With the loss of both prairie grasslands and prairie wetlands, with their carbon-storing properties, we are losing one of

our best means of removing carbon from the atmosphere and slowing the pace of climate change for future generations.

Protecting What's Left

Prairie conservation is a particular challenge because its value is not perceived clearly by the larger public, and there is no great reservoir of public lands upon which to found conservation, attract visitors and make the case for preservation.

At least 95% of the land in key prairie states such as Nebraska, the Dakotas and Kansas is in private ownership. In contrast, for example, 64% of land in Montana is in private ownership. Although there is a modest conservation response from the federal government—mostly in the form of Farm Bill programs—and while national conservation groups have acquired representative samples, in the Great Plains only 1.5–2% of lands are managed for conservation purposes. The World Wildlife Fund has described the Northern Great Plains as “one of the least protected places on earth.” For now, this means that the emphasis is on incremental local initiatives, and there appears to be a general agreement that a keystone to prairie conservation is a ranching economy that is economically sustainable.

Recognizing that no single response can adequately address the threats to grasslands, the regional Northern Prairies Land Trust has expanded the land trust model and developed an innovative program that works with private ranchers and other landowners in eastern Nebraska and South Dakota to protect native grasses on a landscape scale. The purpose is to help landowners manage their properties for increased grassland production and improved native habitat.

Prescribed fire is an effective way to control eastern red cedar, eradicate shrubs and improve forage quality of rangelands.

“To date, Northern Prairies has well over 100 active projects covering nearly 20,000 acres of unbroken tallgrass prairie,” says field biologist Kent Pfeiffer. “A variety of techniques are employed, including





prescribed fire, burn-driven grazing, grazing deferments, interior fencing and invasive species control. Conservation easements are just one part of an imaginative and diverse conservation toolkit. In total, Northern Prairies biologists, in partnership with private landowners, have implemented many hundreds of conservation actions extending to entire landscapes and including working lands and working people.”

Northern Prairies’ projects have improved rare native habitats, but what makes the projects sustainable is that they also improve the production of native prairies for livestock and hay production, thus increasing the incomes and economic security of ranchers. To be successful, Northern Prairies’ conservation projects must combine increased profitability for the landowner, because the key to prairie conservation is the sustainability of the ranching economy and culture.

Jon Immink, a Nebraska rancher, reinforces this point: “The projects Northern Prairies Land Trust and Nebraska Game and Parks Commission helped us with really improved our pastures, forage quality *and* production. The [Greater Prairie] Chickens are back!”

However, advances in native prairie management techniques are slow to trickle down to rural landowners. Most prairie management on private lands actually mirrors practices implemented during European settlement, when the understanding of prairies was poor at best. But Northern Prairies’ habitat projects have incorporated ecologically sustainable practices such as burn-driven grazing, plant community management and native ecotype reseeding. These practices were largely novel to south-east Nebraska in 2003 but have started to catch on.

In addition to habitat work, Northern Prairies sponsors regular tallgrass prairie management seminars, reinforcing innovative and sustainable prairie management techniques. Its field biologists give presentations to the general public, covering a variety of prairie topics such as proper prairie management, landscaping with prairie plants, developing creative conservation partnerships, and building a prairie culture.

The grassroots efforts by Northern Prairies Land Trust and other local groups are both admirable and innovative; in some areas, especially southeast Nebraska, conservation is occur-

ring on a landscape scale. Until these efforts merge into a broad regional and national initiative, an incalculable amount of prairie may be lost.

Rethinking the Dramatic

America’s conservation and resource management choices are too often driven by the visually dramatic. Perhaps that is a natural result of the time during which those decisions were made. National parks like Yellowstone and Yosemite were described by the aesthetic impact they had on early visitors. Today, however, science teaches that it is often the more subtle and less dramatic resources—grasslands, wetlands and headwaters—that contribute the most to the public interest. Were we to revisit the early 19th century, knowing what we now do, we would create a Prairie Pothole National Park, and a Great Central Grasslands National Park!

The lesson here repeats what environmental managers have experienced so often in the past: pollution control and wise resource management are essential parts of the same whole, and to ignore one in favor of the other is to invite failure. The Intergovernmental Panel on Climate Change reports that warming of the climate is unequivocal, and that this warming is most likely due to human activities. The largest contributor to CO₂ emissions is the burning of fossil fuels. However, if we reduce the generation of greenhouse gases while at the same time releasing more carbon into the atmosphere through the destruction of native grasslands, we will have been rowing in opposite directions. Serious efforts to address climate change should consider both reduction of emissions *and* preservation of ecosystems. 🌱

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TOP LEFT: Northern Prairies Land Trust works with private ranchers to protect native prairie.

ABOVE: Greater Prairie Chickens and rabbit tracks on the prairie.