Prairie Tales

What happens when farmers turn prairies into farmland and farmland into prairies

By TINA ADLER

Long ago, farmers plowed up almost all of the United States' prairies. During the last decade, they turned a significant amount of that land back into prairies and also created some new wetlands and forests.

They stopped farming about 10 percent of the country's cropland—36.4 million acres—as part of the Conservation Reserve Program (CRP), a project run by the U.S. Department of Agriculture (USDA) to increase commodity prices and to improve the environment. The program pays about 375,000 farmers to take highly erodible or environmentally important land out of production and to grow only protective grasses, trees, or other plants for at least 10 years.

As a result of these sweeping changes in the landscape, soil erosion in the United States has decreased by about 648 million tons a year, dwindling bird populations have more safe areas for their nests, and less carbon dioxide enters the atmosphere, government and university studies show. Society has saved billions of dollars in environmental cleanup and other activities, USDA contends.

The CRP contracts covering 15.4 million acres are due to expire Sept. 30, 1996, and if the contracts are not renewed, many farmers may try to put these restored prairie lands back into production. But doing so may result in disappointing harvests and soil erosion. To avoid these problems, farmers will have to learn some new tricks, agronomists say.

Scientists are now investigating what has happened to the CRP property during its 10-year sabbatical and how farmers can put it to use again. Ecologists, meanwhile, are tabulating the gains that wildlife and the environment have made. They want to convince Congress to continue funding the program, which is up for reauthorization this year.

About 25 percent of CRP land qualified for the program because it has some environmental virtue that farming threatens. This land may sit in a state conservation preserve, for example, or serve as a buffer between agricultural property and a river or lake. The remaining 75 percent suffers from severe erosion when farmed.

Farmers participating in CRP have planted 21 million acres with what they call "tame grass." Growers normally use such grass for grazing or hay production, but the program forbids both of these activities. On another 8.5 million CRP acres, farmers are growing a few native grasses, including some that grew there before agriculture arrived on the scene. Native grass has proven more expensive and difficult to establish than tame grass, hence its smaller acreage, explains Mike Linsenbigler of USDA's Farm Service Agency.

Farmers have planted trees on 2.3 million CRP acres, while wetlands and miscellaneous plants, including some grown to attract wildlife, cover the remaining 4.6 million acres. Colorado, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, North Dakota, South Dakota, Oklahoma, Texas, and Washington have the most CRP land.

Thanks to its long vacation, even much of the once highly erodible CRP land now looks tempting to farmers. Compared to plowed fields, CRP soil usually has more dead plant or animal matter, which absorbs water well and provides nutrients to crops. It usually has a bigger population of earthworms, which carve channels from the surface deep into the soil. Those channels carry water to plant roots.

Even the most fecund of these newly created prairies are not all worms and other agricultural treats. The dead grass that accumulates on CRP land hides some unpleasant surprises, observes Richard E. Joost of the University of Missouri-Columbia. Plant diseases often pose a problem, and "rodents have been identified as potentially devastating," he says.

He blames such troubles on "lax management practices"—growers should have mowed or burned the fields more often during the sabbatical to keep weeds at bay, he says.

Returning CRP land to cultivation creates additional problems. Plowing can quickly deplete the soil of its abundant carbon supplies and destroy its structure, agronomists say. The program has no plan for helping farmers with their property once the contracts expire, acknowledges C. Timothy Osborn of USDA's Economic Research Service (ERS) in Washington, D.C.

In the early 1990s, USDA and university scientists began studies to figure out what farmers should do with their post-CRP land. The researchers warn that a single how-to manual will never suffice, because soil and climate conditions vary considerably from site to site. However, their studies are now providing some suggestions.

Timing takes on a new importance for growers turning prairies into farmland, explains Doral Kemper of USDA's Agricultural Research Service (ARS) in Beltsville, Md.

To take advantage of the life cycle of microbes in the soil, he recommends that farmers kill the prairie grass in the autumn before planting. Microbes feast on the sugars and proteins that ooze into the soil from the dead plants. With all that good nourishment, the microbes multiply and consume more of the soil's nitrogen than they would in other agricultural fields.

Come spring, the bugs begin to die, releasing the nitrogen and making it available to plants. "You can get great yields [from CRP land] that first year when you do it right," Kemper notes.

Many studies conclude that farmers planning to grow crops on CRP land should use an increasingly common farming technique called no-till, which helps reduce erosion and preserves the soil's nutrients, agronomists say. The strategy involves giving up the plow, leaving dead plants on the land, and controlling weeds with chemical herbicides.

CRP land and no-till cropland often have similar soil qualities, says Douglas L. Karlen of ARS in Ames, Iowa. Since 1993, he and his colleagues have been examining soil in Iowa, Washington, North Dakota, and Minnesota.

Compared with plowed land, both no-till and CRP acres often have more organic matter and nutrients and better water infiltration, their studies show. These researchers have also planted crops on CRP property and find that no-till practices preserve many of the soil's beneficial qualities, whereas tilling diminishes them.

"As soon as you till the soil, it's like shaking logs in your fireplace—the carbon is burned up real quick," Karlen explains.

No-till farming is not necessarily a

simple strategy, warns Randy L. Anderson of ARS in Akron, Colo. No-till requires killing the grass with herbicides, which can prove difficult. Many factors control the effectiveness of glyphosate, the best chemical for killing grass. Carbohydrates in the plants usually transport the herbicide to buds on the roots, where new shoots of grass form. During droughts and in semi-arid regions, however, carbohydrate production in the grass falls markedly, so the herbicide is less effective.

Moreover, Anderson explains, farmers must apply the chemical soon after new grass starts growing, when carbohydrates are traveling from the grass to the roots. This presents a problem, because different grasses in the same field don't start growing at the same time.

Because of the herbicide's price, using no-till to convert CRP land to cropland in dry regions can cost 50 percent more than conventional tilling, he says.

Beneficial alternatives to planting crops exist, USDA agronomists point out. After the CRP contracts expire, property owners could plant grass for cattle grazing or haying, either of which causes less erosion and requires less herbicide.

Patricia Dukes

As part of an Iowa research project, farmers grew crops on CRP land using either no-till or plowing techniques. A framer mows CRP land to prepare the sod for herbicides, which eliminate the need for plowing.

While agronomists are investigating how this 10-year experiment has altered potential farmland, ecologists are tabulating how it has helped the environment and wildlife.

Mark R. Ryan of the University of Missouri-Columbia and his colleagues recently completed a review of studies investigating the use of CRP land by songbirds, waterfowl, and game birds during their breeding seasons. Cropland and CRP property have a similar number of different species, and the birds have similar success at rearing their young, the researchers report in an unpublished paper. However CRP acres have 1.5 to 5 times more individual birds.

"Of particular significance is the high abundance of and nesting by species known to be undergoing population declines," including grasshopper sparrows, vesper sparrows, and dickcissels, they report. Pheasants and mallards often reside on CRP land, and their overall numbers have increased since the program began.

Not only does CRP land provide a home to birds, its soil and plants sequester significant amounts of carbon. Therefore, less carbon dioxide—a greenhouse gas—goes into the atmosphere, report Keith Paustian of Colorado State University in Fort Collins and his colleagues. The team recently measured carbon sequestration at 70 locations on CRP land in 13 states and developed a computer model to estimate carbon storage rates for all CRP land.

Across the United States, CRP acres absorb 14 million metric tons of carbon per year, equivalent to roughly 1.5 percent of total U.S. carbon emissions, they calculate.

Taking farmland out of production reduces the amount of suspended sediment in lakes and streams. Suspended sediment causes numerous problems because it reduces the amount of light and oxygen in the water. In the northern plains of the United States, CRP has reduced suspended sediment by 23 million tons annually, says William L. Baxter of the Nebraska Game and Parks Commission in Lincoln.

Using data collected by various government agencies, he also estimates that CRP has decreased agricultural runoff of nitrogen and phosphorus by 148 million tons.

Because of their location or condition before entering the program, not all CRP areas produce environmental benefits. Also, not all CRP land has blossomed into nutrient-rich prairie, wetland, or forest. A new study by Joost and his colleagues of 12 representative CRP sites in Missouri found that all are rich in weeds and poor in nitrogen. CRP land in other states has similar problems, he notes.

"Botanical diversity on CRP sites throughout Missouri varies from near monocultures of tall fescue [a tame grass] to very diverse mixtures of weedy annual grasses and broadleaves," Joost reported at a Soil and Water Conservation Society conference on converting CRP acres to farmland, held in June 1995 in Lincoln. Farmers had planted legumes and many different forage grasses, but the fescue or weeds from nearby fields ran them out.

CRP acres vary quite a bit in how much they can potentially benefit the environment, contend Bruce A. Babcock and his colleagues at Iowa State University. To determine what areas offer which potential environmental benefits, they examined USDA data describing the erosion potential and other characteristics of U.S. land.

Only 27 percent of CRP acreage is near surface water, so only that fraction can protect waterways from runoff. Similarly, 37 percent is susceptible to wind erosion. Almost 50 percent suffers considerable soil erosion from rainwater or flooding, they report in a paper that Iowa State published in February 1995. These figures enable policy makers to select land for CRP enrollment according to their environmental aims, Babcock says.

Commodity prices determine the popularity of the program among farmers. In 1993, the owners of 63 percent of CRP land said that if prices remained stable, they'd grow crops on the acreage when their contracts expired, a Soil and Water Conservation Society study showed. The owners of 23 percent said they would use it as grass for hay or grazing.

However, if commodity prices jumped by 20 percent, more farmers, those owning 78 percent of the land, said that they would plant crops.

In fact, commodity prices have risen more than 20 percent since 1993, so Osborn expects that even more growers now want to farm their CRP property.

USDA and the Fish and Wildlife Service want the program to continue, in part because it saves much more money than it costs, Osborn says. A recent cost-benefit analysis by ERS shows benefits from the program worth $9.7 billion to $14.5 billion more than what the program costs, Osborn reported in November 1995 at a conference in St. Louis sponsored by the American Society of Agronomy, the Crop Science Society of America, and the Soil Science Society of America.

To calculate CRP's financial balance sheet, ERS economists took into consideration such costs as the $1.8 billion a year the government pays CRP landholders. They also considered the savings, such as what the government would have paid farmers in crop subsidies, the dollar savings of having less erosion and cleaner water, and the financial benefits to communities of having hunters and birders on CRP land.

Now farmers and environmentalists await Congress' decision on the program's worth. □