

# Saving OUR GRASSES

EVEN AS DEVELOPERS THREATEN  
to swallow up surrounding farmland in the name of progress,  
an experiment is underway to turn back  
the hands of time.

**W**ASHINGTON College's Leslie Sherman, an environmental chemist specializing in soil chemistry, was surprised to learn that the tall prairie grasses she grew up with in the Midwest are also native to Maryland's Eastern Shore. "Most people thought the land along the Atlantic seaboard was heavily forested," Sherman says, "but evidence suggests it was predominantly grasslands during various periods in geologic history, i.e., since the last ice age." For the past four years, she and her students have been part of a Mid-Atlantic Coastal Plain grasslands restoration project at Chino Farms near

Chestertown. Their job is to analyze the effects of controlled burns on the soil nutrient composition within experimental plots of grasses. Sherman hypothesizes that the tri-yearly burns—simulating the deliberate burns that Native Americans performed hundreds of years ago—will improve the weathered soil depleted of nutrients.

Beyond the names of towns and rivers along the broad Eastern Seaboard that hint at the wildlife that once populated the region—from Buffalo, NY, to Elkton, MD—little evidence of the original habitat remains even in the most agricultural-based regions, as farmers have cultivated native grasslands out of existence to support row crop production. Prior to the

American Revolution, the heath hen (a prairie chicken) was a major source of protein in the Eastern United States. The last heath hen died on Martha's Vineyard in 1932.

The Chester River Field Research Center at Chino Farms, with its plots of bluestem, switchgrass, Indian grass and deertongue (among others), offers a glimpse at our past, if not the return of an extinct species. Here, scientists from the University of Maryland and Washington College are undertaking a restoration project supporting endangered grassland species in which migratory birds are major study indicators. The vista of grasses, woods and water is as it might have appeared before the dawn of the indus-

BY M A R C I A C . L A N D S K R O E N E R M ' 0 2

Dr. Henry Sears, pictured here with companions Hal and Lily, has provided farm access to conservationists and students interested in habitat restoration, soil chemistry, migratory bird populations and rural heritage preservation.



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trial age. It may also hold the key to the future. While the grasslands restoration project holds great promise for the preservation of flora and fauna, its early success has spawned another intriguing scientific study investigating how to grow and manage switchgrass as a biofuel. Not only could Americans cut their dependence on imported oil, but ecologically-threatened communities such as Chestertown could choose sustainable agriculture over housing development sprawl.

At the center of this experiment is Henry Sears, a surgical oncologist from Cambridge, MA, whose family has owned Chino Farms since World War II. Nine years ago, Sears, a birder and sometime hunter partial to quail and duck, became interested in implementing conservation measures on his land that might preserve the natural resources of the region and halt the decline of Maryland's disappearing bird population. Armed with information on warm-season grasses from the Department of Natural Resources, Sears began asking questions about the scientific parameters. He approached Douglas Gill, a University of Maryland biologist, for assistance.

"When we first started out," Sears recalls, "scientists had good ideas, but no data, as to whether [planting grasses] was the right thing to do, or how to manage it. Doug Gill called together a conference of conservationists from the Department of Natural Resources, The Wildlife Commission, Chesapeake Wildlife Heritage and the Academy of Natural Sciences to find out what was known about this, and we all sat down together at Chino Farms. It turns out that not only did we not know the answers, we didn't even know the questions. Doug put together the University of Maryland study that gets at the science behind it. From this initial meeting came many of the things we're doing today."

Native grasses are the rarest habitat in the world, says Gill, with less than 1% of the original Great Plains remaining. And of all the endangered species of wildlife, most are grasslands species. Since 240 acres of

low-production agricultural land were first planted in eight species of warm-season grasses, scientists have identified 261 species of plants. For Gill, the grasslands restoration project designer, this demonstrates the resilience and diversity of the seed bank. "Despite the human impact

and 150 years of altered landscape, in two years' time we had a prairie grassland."

A significant question for Henry Sears is how to mesh conservation measures with commercial agriculture. "This I thought we could answer because we have 3,000+ acres in commercial agricultural production," says Sears. He now spends his free hours roaming the fields with his hunting dogs, watching for quail, sparrow hawks and other signs that the grasslands experiment is working.

"Those animals that migrate are the best indicators—the neo-tropical migratory birds, as an example," says Sears. "Once we established our stands of grasses, the grasshopper sparrow returned in record numbers. The sedge wrens are back. The extremely rare dickcissel is here. This is fabulously exciting for ornithologists who had witnessed their decline."

Gill now brings high school students, undergraduates and graduate students to Chino Farms every summer to study the bird populations. Since monitors began banding the grasshopper sparrows, they have identified the oldest of the species—an adult male banded in 1999—who, Gill says, "returns to the same piece of real estate" to breed every



Henry Sears and Douglas Gill consider whether the burn will be slow enough to kill woody growth like this black locust.

year. Theirs is a "working vacation," he says, as the birds attempt four nests during the summer months in Queen Anne's County.

Gill is a former colleague of Wayne Bell, the inaugural director of the College's Center for the Environment and Society. When Leslie Sherman was

looking for a field research project, Bell told her about the grasslands restoration project at Chino and put her in touch with Sears. That was four years ago.

"I was fascinated at the thought of establishing grasslands out here," says Sherman, whose faculty position is supported by the Clare Booth Luce Foundation. "You need to manage them either by mowing, burning or grazing. Doug Gill decided to use controlled burning, and that's where we come in. The idea is to turn poor agricultural lands into native grasslands, using burning as a natural fertilizer for the soil and to remove competing woody vegetation. In the Midwest, scientists haven't found that burning makes much of an impact on the soil chemistry, but Midwestern soil is much more fertile. Here there is a measurable impact—a pulse release of nutrients—right after a burn. The pH goes up and makes nutrients more available, as well as supplying nutrients from the ash."

With research funds provided by the Luce Foundation, Sherman recruits chemistry students who help her take core soil samples before and after prescribed burns. For her initial study, she established a one-acre study plot within a 30-acre section. From a sampling grid they extracted 25 cores, which were sectioned much like slice-and-bake cookies and then analyzed in the lab. Kristin Koenig '05, a graduate student studying paper science and engineering at North Carolina State University, worked on the project for two years and is a co-author with Sherman on a paper published in Soil Science. Their paper describes the significant changes in the relationships



Professor Leslie Sherman prepares to take soil samples before a prescribed burn.

between organic matter, the cation exchange capacity (a value indicating soil's capacity to hold nutrients) and other soil chemical properties.

"This is one of those dynamic projects where you have to go with the flow," says Koenig, who spent two summers on the project. "You can't always burn when you want to because of the weather, but it motivated me to continue with environmentally-based research. This is part of what I think is so great about Washington College—you can get out in the field and get research experience that's not just in the laboratory."

Koenig, who majored in chemistry and environmental studies, also liked the camaraderie she encountered at the farm among the scientists working there, government agency representatives, the landowner and the farm manager. When Koenig was researching the Conservation Reserve Program for her senior thesis, manager Evan Miles was particularly helpful in sharing his insights. He was also receptive to the idea of employing a "free" fertilizer. Research suggests that the ideal burn would occur in the early spring, when farmers might normally apply liming material.

"We knew [the prescribed burn] would provide a positive environment for growing grasses," Sherman says, "but we weren't sure how long the benefits would last."

Prior to burning, the soil was slightly acidic and low in organic matter, cation exchange capacity and extractable cations, says Sherman. "Despite a relatively large degree of natural variability in soil pH among individual samples both before and after burning, the average soil pH increased significantly at all soil depths within the study area by 11 days after the prescribed burn."

Still, the positive effects of pH were short-lived. A year after the first prescribed burn, the soil pH was not appreciably better than in the pre-burn soil. This, she says, suggests that the soil might benefit from more frequent burns. Grasslands must be mowed or burned every third year, she notes; otherwise it becomes too dense to optimally serve as wildlife habitat.

On the other hand, some of the nutrients added to the soil from the ash still are present one year after the burn. Apparently, the nutrients have bonded tightly to the clay and organic matter in the soil.

The beauty of this restoration project is the synchronicity of nature: soils enriched through natural means rather than the application of lime support habitat native to the area, which in turn encourages the return of assorted wildlife, which in turn preserves a natural balance between the land, the water and the people who live there.

Sears received assistance in implementing his conservation management initiatives by enrolling in the government programs such as Rural Legacy and Open Space. In November 2001, Sears provided for the largest conservation easement in Maryland history when, in partnership with The Conservation Fund, he set out to protect the entire 5,000-acre farm from future development. The easement, and related conservation programs in affiliation with the Conservation Reserve Program and

dering Chino Farms came before Queen Anne's County's Board of Planning and Zoning. The irony is that the conservation easement in place at Chino Farms is a selling point. If developers have their way, the farmland on the outskirts of Chestertown will soon give way to suburban sprawl.

A quarter-mile from Route 544, Sears points to a large eagle's nest that has produced fledglings for the past several years. The U.S. Interior Department's Fish and Wildlife Service says 7,066 known nesting pairs now exist in the contiguous United States—a rebound that has prompted a federal proposal to remove the bird from the endangered species list. In February, the Interior Department proposed guidelines that would prohibit disturbing the bald eagle, if the bird comes off the list. "There are 114 single-family homes planned for the farm just to the south, says



A controlled burn takes about eight minutes to sweep through a 20-acre plot of tall grasses.

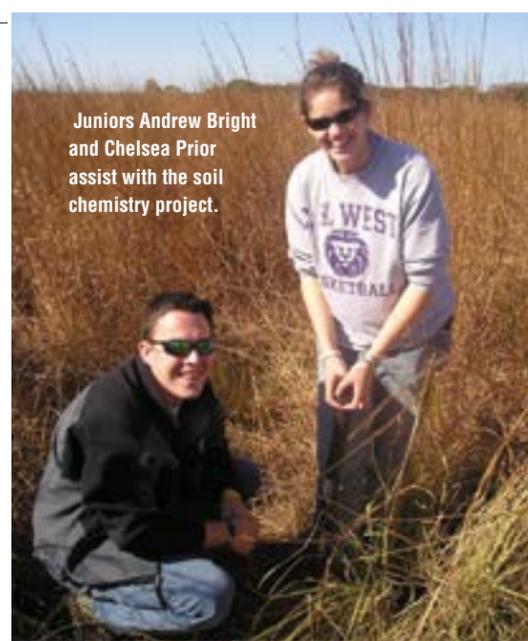
the Conservation Reserve Enhancement Program, among others, is safeguarding water quality in the Chesapeake Bay watershed. The property encompasses two and a half miles of Chester River shoreline, 600 acres of forest containing Delmarva bays, a 90-acre waterfowl sanctuary and important habitat for bald eagle, wild turkey and endangered fox squirrel.

The agricultural character of Chino Farms may be assured for future generations, but surrounding farms are facing extinction. In January alone, two housing development proposals for properties bor-

Sears. "How long do you think they'll stay there once those houses go in?"

The way Henry Sears sees it, not only are the natural habitat and farmers' livelihoods at risk, but the very nature of the community is at stake. The rural quality of life on Maryland's Eastern Shore has appealed to residents and visitors alike for decades. Many of those "newcomers" have made it their home. Some, like Henry Sears, are now working to preserve its agricultural character for all Marylanders.

Henry Sears' father and his friends from New York City first came to Mary-



Juniors Andrew Bright and Chelsea Prior assist with the soil chemistry project.

land's Eastern Shore for the canvasback duck shooting at Possum Point, a spit of land jutting into the Chester River above the Chester River Bridge. During World War II, the group disbanded, but kept the lease on the farm. Family lore has it that while Sears was on active duty in the Pacific Theatre, he received a telegram from the landowner, informing Sears that he would have to break the hunting lease because the farm was up for sale. Mr. Sears sent home a two-word response: "Buy it."

Sixty-three years later, on a warm January afternoon, Dr. Sears is giving a tour of the property. First stop beyond the house is a field overlooking Possum Point—or Can Point (short for Canvasback Point) as the Sears family had called it. But by the mid-1960s, the canvasbacks were gone, along with the river grasses that sustained them.

"When the canvasbacks disappeared," Sears recalls, "people complained that industrial pollutants coming from Baltimore were responsible for killing off the river grasses. That's rubbish. We, and our farming practices, were to blame. My father would have been horrified if he had realized that the herbicides he was using on the farm were responsible for the demise of the ducks."

Sears has since changed the way the farmland is managed, minimizing the use of chemicals. Swaths of grasses and stands of bamboo now protect the riverbanks from runoff and erosion.

"River grasses only grow where there's good water," Sears says, pointing to a small congregation of scaup, or bluebill diving ducks, in the distance. "I haven't seen those here since I was a kid. Of course there used to be a lot more, but to go

from nothing to this is very encouraging."

In addition to Sherman's soil chemistry studies, there are other natural resource experiments underway. When a stand of loblolly pines was cleared, hundreds of rare lady's slipper orchids emerged. "When we opened up the forest canopy we apparently simulated a natural burn," says Sears, who explains that the wild lady's slipper is fertilized by bumblebees that are attracted by burning. "Each of these plants has been identified and GPS-located."

The 90-acre lake is managed as a sanctuary for Canada geese and other waterfowl. Two and a half miles of shoreline are being planted in buffer grasses. The DNR is studying the wild turkey population now roaming in the woods of Chino Farms. And just up the road, land that has never been tilled is now being tested to determine its chemical and organic make-up. "By comparing this pristine seed bank with tillable soil," Sears says, "we can determine how badly other soils have been depreciated."

Other farm management questions are still to be resolved. How to eliminate invasive species such as black locusts, trumpet vine, sumac and phragmites without chemical applications?

Chino Farms is moving toward certification to grow organic crops. Farm manager Evan Miles has identified emerging markets for organic soybeans, both domestically and abroad. Farmers raising organically grown chickens require organically grown feed, and the Japanese are wild about organically grown nano soybeans.

Growing renewable bioenergy is also a tantalizing, if distant, prospect. The US Department of Agriculture has proposed switchgrass as an alternative energy source and, in his State of the Union Address in January, President George W. Bush pledged to cut America's oil dependence, reduce Middle Eastern petroleum imports and increase federal spending for research on alternative fuels. Bush's Advanced Energy Initiative includes \$150 million to perfect ways to turn corn stalks, wood chips, switchgrass and various kinds of plant waste into ethanol. In Canada, researchers have indicated that just one acre of harvested and pelletized switchgrass is sufficient to heat an average home for one year. Scientists at McGill University say switchgrass has tremendous potential to reduce carbon-dioxide emissions relative to other energy

sources and suggest it can meet all of Canada's fuel needs through domestic production.

What Sears likes about switchgrass is it costs "almost nothing" to produce. It's a perennial; it doesn't like heavy nitrogen so there's no need for chemical fertilizer; and, ultimately, it's good for the birds.

Sears recognizes that even as the region loses family farms to developers, the face of farming is changing.

"It's hard for us to compete with the Midwest," he says, "but specialty farming has a bright future. With the influx of newcomers to the area, the upside is that there is a demand for fresh, organic vegetables. And I'm not sure that animal husbandry won't make a comeback, as consumer reluctance to rely on Chicago meatpackers grows."

Sears is urging county planners to develop town-centered growth, rather than permit sprawl across farmland. "To establish the vitality of a town that's seen better days, to upgrade infrastructure of towns is much better than the current approach, but it's more expensive and there's little incentive. I hope the government gets the message that we won't tolerate unplanned growth. We should make it more difficult to build another strip mall and endeavor instead to encourage pedestrian traffic in our towns. If Queen Anne's County becomes a bedroom community, as it is threatening to become, the character of Chestertown will change."

This is the context that Washington College students appreciate when they are standing in the middle of a field, pounding core samplers into the hard ground. As Leslie Sherman and her students collect and analyze their soil samples and monitor the progress of their plots of grass, she is grateful for the opportunity to be part of a larger project that is becoming a model for other habitat restoration efforts and to demonstrate to her students how their work relates to the land management policy issues with which Henry Sears and other conservationists grapple every day. "We could never do a huge project like this alone," Sherman says. "It's a fantastic opportunity to have my little niche and to be a part of the larger scientific community invited to conduct test cases at Chino Farms. It's a wonderful collaborative effort." ▀

Marcia Landskroener is editor of the Washington College Magazine.