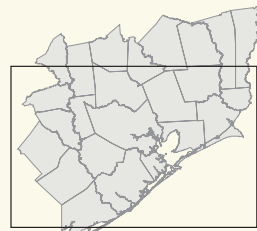


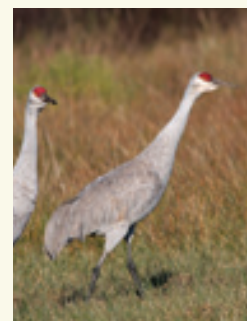
Prairie Systems





EARLY SETTLERS IN SOUTHEAST Texas described vast flat, wet coastal prairies covered with tall grasses and occasional mottes, or groves, of trees. The Texas coast once held 6.5 million acres of prairies, thick with chest-high grass that supported enormous numbers of prairie chickens. The grass was intermittently grazed by huge roaming herds of buffalo and cleansed of woody brush by fires set by nature and Native Americans.

Less than 1 percent of those 6.5 million acres of native prairies remains. Of all the ecosystems in the Houston Wilderness, prairies are the most endangered. They have been overgrazed, plowed, and otherwise developed nearly out of existence. These were mature prairies, covered with wildflowers in the spring and dominated by a mix of grasses such as little and big bluestem, switchgrass and eastern gamagrass, considered the big four of coastal prairie grasses.



*The Sandhill crane, *Grus Canadensis*, is one of the few species of crane in the world that is still common and it can be seen in the Houston Wilderness area's coastal prairie and wetland areas.*

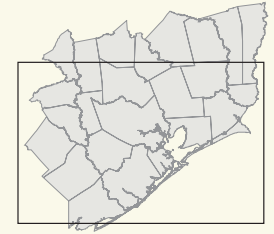
Many other plants go into a mature native prairie—as many as two to three hundred. A few are easily identified: goldenrod and asters coveted by butterflies, thorny dewberry vines and the not-so-desirable poison ivy, which takes on color in the fall. Prairies are subtle. Although from a distance they may look monotonous, up close they express an intricate chain of relationships that naturalists are still working to understand, for prairies are all about biodiversity.



Species that can be spotted in the Coastal Prairie ecoregion include from top left to right: Nine-banded armadillo *Dasypus novemcinctus*, an immature Assassin bug of the family Reduviidae;

and White-tailed deer, *Odocoileus virginianus*. Bottom left: Native prairie grasses include big bluestem, *Andropogon gerardii*; little bluestem, *Schizachyrium scoparium*; switchgrass,

Panicum virgatum; and eastern gamagrass, *Tripsacum dactyloides*.



To study a prairie is to study its plant life, but other functions should not be left out. The coastal prairies sit on level terrain made up of sedimentary deposits thousands of feet thick and covered with a slab of clayey soils known as gumbo. Such soils hold water for days, preventing floods by allowing water to percolate in slowly and enter the water table instead of running to the Gulf of Mexico. Deep-rooted prairie plants add to the land's absorptive capacity. The prairies are, in essence, gigantic flood retention ponds.

Coastal prairies, altered though they are, make up a large section of our region. They cut a swath about seventy-five miles wide along the coast, bumping into the pineywoods and the Big Thicket to the north and curving south into the Texas brush country. There are three large prairie areas: the Anahuac Prairie east of Houston, the Katy Prairie west of Houston, and the Lissie Prairie in Matagorda, Wharton and Fort Bend counties. Three major rivers—the Brazos, San Bernard and Colorado—cross the prairies, periodically flooding them.

At San Bernard National Wildlife Refuge federal land managers restored the classic tallgrass prairie of the coast. Conspicuous tall grasses such as bushy bluestem are easily identified by their feathery heads. Other grasses can be known by family rather than species. Even a grassland expert has difficulty identifying them. A grass might be *paspalum*, for example, but there are twenty-five kinds of *paspalum*, identifiable only by their flowers or by examining their seeds with a jeweler's loupe and a botany text. The San Bernard refuge, which borders the Gulf of Mexico only fifty miles from Houston, also holds salt-tolerant seacoast bluestem and cordgrasses.

Like the prairie grasses, prairie birds can be hard to identify. The ground-dwelling Henslow's sparrow, the abundant savannah sparrow, the subtly beautiful Le Conte's sparrow and the secretive sedge wren all thrive in the prairie habitat. A search

along the edge of an opening in the grasses may prove fruitful when a Le Conte's sparrow flushes, then alights in a hackberry tree and poses in the morning light. This bird is evenly streaked, with an orangish throat and pale breast, a subtle beauty well worth the search. Its breeding call resembles the sound of an insect: *tzeek-tzzzzzzz-tick, tzeek-tzzzzzzz-tick*. The grasshopper sparrow, a classic tallgrass nester, resembles the Le Conte's and may flush to a shrub. Henslow's sparrow wears a necklace of streaks around its throat.

The easiest birds to recognize on the coastal prairies are the sandhill cranes, great flocks of which often visit the San Bernard refuge and may be seen feeding on the grasslands of barrier islands. Unlike the endangered whooping cranes, which require pristine coastal marshes and blue crabs for their wintering habitat, sandhill cranes eat a more varied diet, and thus are more resilient in a changing landscape. Their cries from high above are one of the great natural signals that fall has arrived.

The prairies are such a subtle landscape that we are only now recognizing their intricacy, just as they have been all but obliterated. What will bring them back? Education and conservation carried out by passionate people is a first step. One of their leading enthusiasts is John Jacob, an environmental scientist who works in Clear Lake for Texas A&M University in the Sea Grant and Texas Cooperative Extension programs.

"What makes a prairie?" Jacob asks. "It is a function of climate. Houston straddles the prairie-forest line; we get both. Drier, hotter climate gets prairies. Wetter, colder gets forests. So we see forest extending west, but only in the river bottoms. Prairies are also a function of soil; they tend to like the clayey soils, which are found nearer to the coast."

Prairie features include pimple mounds and potholes. Pimple mounds are subtle room-sized bumps about a foot and a half or two feet high



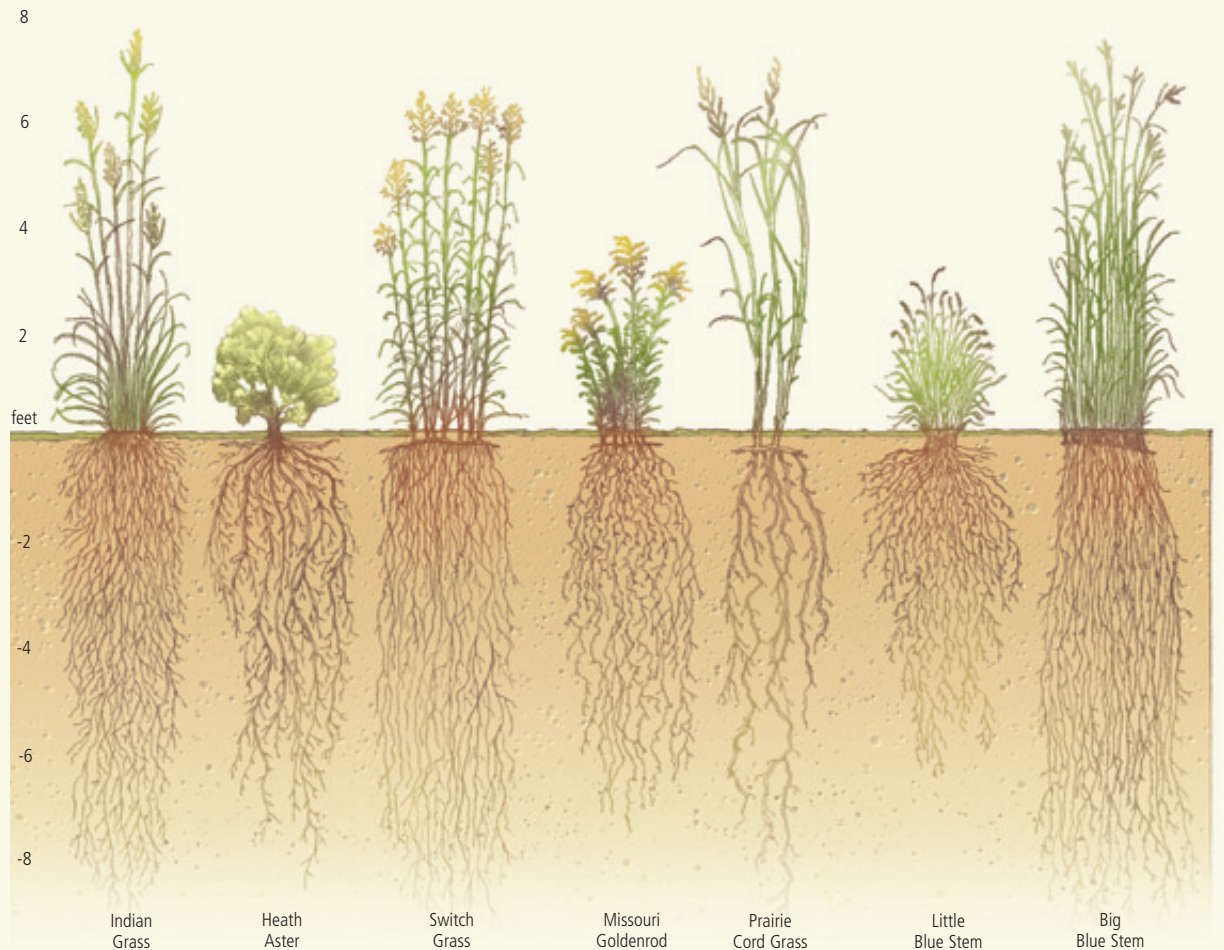
Flowers found in the Coastal Prairies ecoregion, top left to right: Spiderlily, *Hymenocallis liriosme*; Iris, *Iris brevicaulis*; Water lotus, *Nelumbo lutea*; Sensitive briar, *Schrankia hystricina*.

that were shaped by wind and water perhaps ten thousand years ago. Prairie potholes are shallow depressions no deeper than a pimple mound is high. These modest changes in elevation create biodiversity that is essential to the complex beauty of the prairie. Certain plants grow only on the drier ground of the elevated pimple mounds. One of the rare plants of the ecosystem, the prairie dawn flower, grows only on the slightly saline, sandy soils of certain pimple mounds. Prairie potholes sustain a completely different kind of vegetation. During the dry spells grasses may move in, but these areas are true wetlands. They hold seeds and roots and rhizomes of dormant wetlands plants that spring to life with the next rains, providing excellent habitat for ducks and shorebirds.

It is hard for most people to grasp such nuanced diversity in a landscape. For the last forty years, Glenn Aumann, a semi-retired professor and administrator at the University of Houston, has worked on what might be called Houston's prairie experimental center, a former World War II army camp adjacent to the Gulf Greyhound Park in La Marque, where he has 250 acres of climax prairie, perhaps the most mature and beautiful in the region. The University of Houston Coastal Center is a research center for prairies, 900 acres that Aumann believes is as valuable to the university as a library.

"How do you tell a prairie?" he asks. He drives out to his best prairie, a mile-long, one-hundred-and-seventy-acre rectangular field full of chest-high grass. By constant mowing and by poisoning

Coastal prairies contain three times more living plant material underground than above ground. The root systems of native prairie grasses can grow as deep as 20 feet underground, helping to stabilize the soil and absorb large quantities of water.





The Katy Prairie

Today's coastal prairies of southeast Texas are not the same natural systems that were in place when the first settlers arrived. They have been altered extensively since that time, particularly by farming and grazing. However, they still perform much of their natural ecological function. The altered prairies—the rice farms and the rangelands—are some of the best places in the Houston Wilderness region to see many of our spectacular bird species: large and graceful sandhill cranes, the carrion-eating crested caracara, large hawks such as the whitish ferruginous and the red-tailed, falcons like the merlin and the kestrel, and the magnificent wintering waterfowl.

In its natural state, the prairie with its extensive potholes was more a place of ducks than of geese. Although snow geese were always present along the Texas coast, their usage of the prairies increased dramatically with the onset of rice farming. For sheer exuberance, nothing matches the arrival of the snow geese in the fall.

Some bird migrations are quiet and stealthy, others riotous and cacophonous—celebrating their migratory success. The snow goose exemplifies the latter. The geese come south on a full moon behind the cold fronts of late October, lined up in V-formation, periodically switching leaders as they push southward. The changing leadership is highly practical as the lead bird works harder, breaking the force of the wind and cutting a path for the others to follow, a process known as “slipstreaming.”

The geese know the rivers and use them for navigation, following them down to the coastal prairies and then dispersing, some going east, some west, some returning, gathering in large concentrations on ponds and flooded fields. The flocks seem to get excited as more birds arrive, the snows with their white bodies and black wing-tips, and the blues—the eagle-headed blue morphs—with dark bodies and white heads.

Aar-rik, aar-rik, aar-rik—the high-pitched calls seemingly emanate from all directions at once. Flocks are coming in—circling in a funnel cloud that extends up into the blue sky—gathering on the flooded flat, white on green, stark and clear. The incoming flights arrive in waves, wings cupped, and feet down into the wind. Some of the birds in the higher flocks get excited and “tumble” downward, literally folding their wings and dropping several hundred feet with a to-and-fro motion, opening their wings only at the last second to catch the air for a careful landing next to a neighbor: quick, efficient, graceful. The sight and sound of snow geese heralds the coming of cool weather on the Texas coast. Fall has not arrived until the first flock of snow geese is sighted, the symbol of relief after another scorching summer.

One place to view this magnificent migration of snow geese and enjoy the beauty of our coastal prairies is on lands protected by the Katy Prairie Conservancy. The Katy Prairie stretches roughly from the Houston city limits west to Brookshire, northwest to Hempstead, and southwest to the Brazos River and encompasses over a thousand square miles. Dotted with traditional agricultural operations, yet increasingly encroached upon by development, this coastal prairie is in danger. The Katy Prairie Conservancy is working toward a long-term goal of conserving 50,000 to 60,000 acres to ensure the prairie's future.

The Katy Prairie Conservancy has several preserves where there are opportunities to see an abundance of wildlife. In addition to a wide variety of birds, one can see butterflies, coyotes, hawks, quail, jackrabbits and deer, as well as hike and enjoy a respite from the city. A great spot to view waterfowl is the conservancy's wildlife viewing platform, site 100 on the Great Texas Coastal Birding Trail. Located just off of Katy-Hockley Cut-off on Sharp Road, the viewing platform affords you an excellent view of an enhanced wetland and many birds.

The efforts of individuals and organizations, like the Katy Prairie Conservancy, to save the remaining coastal prairies—the modern rice farms and rangelands—are important, even though they have been transformed from their original state of centuries ago.

*Inhabitants of the Houston Wilderness coastal prairies include from left to right: Year round residents - the Burrowing owl, *Athene cunicularia* and Raccoon, *Procyon lotor*; and seasonal residents – Snow geese, *Chen caerulescens*.*



the ever-encroaching tallow trees, Aumann has kept it a native prairie. He wades into the field and begins handling the grass, petting it almost as someone else would pet a dog: big and little blue stem, tridens, eastern gamagrass and switchgrass. “If you have those you are close to having the makings of a prairie,” he says.

This prairie has twenty-seven different species of grass and two hundred and fifty flowering plants, he reports with pride. Last year the center sold 2,700 pounds of seed that was sent to Anahuac to reseed an old rice field. It is exceedingly difficult to restore a prairie. An old rice field can be planted with native seed and mowed and burned, and perhaps thirty or forty species will come back, says Aumann, but the whole range of plants may never come back. Yet, there is a small but important movement to reseed pastures and prairies with native grasses so that some biodiversity can return.

In spring the prairie blossoms into full glory, a shimmering field of tiny delicate flowers that will turn to abundant, windblown seed. But even in that showiest of seasons, a vital part of the prairie is never seen, for a huge amount of its biomass is underground. The roots of the bluestem, and other prairie grasses, may probe twenty feet underground, stabilizing the soil and absorbing large quantities of water. It is the native grasses that give the prairie its huge absorption capability, acting as natural detention ponds in wet times. The deep root systems are also beneficial to prairie grasses during times of drought, as they can take up moisture from deep in the soil. These native prairie grasses, with their deep and extensive root systems, are what make up the rich fertile soil that the settlers plowed up and changed forever.

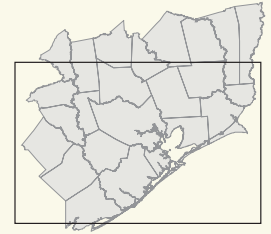
One native prairie near the town of West Columbia has become something of a sacred relic. The Nash Prairie is a 300-acre hayfield of native grass that has been mowed and hayed since the first

of Austin’s settlers came to the area in the 1820s. Situated along a county road north of the village of East Columbia, the Nash Prairie is part of the 17,000-acre Groce Ranch that also includes invaluable tracts of bottomland hardwood forest along the Brazos River. The ranch was left by its last owner, Kitty Nash Groce, to the West Columbia Hospital District Trustees and the tiny St. Mary’s Episcopal Church of the historic town of West Columbia.

In 1999 a new pastor named Peter Conaty came to the church. He arrived with the urban eyes of a man who had grown up in the middle of Manhattan, and when he and his wife discovered the three hundred acres of native prairie, something came over them. The prairie spoke to them. One theory of stewardship says that the church should sell its land to the highest bidder and take the money to further its mission. But Conaty found something sacred in the hay meadow itself, a meadow that has thrived all these years as part of a working ranch, and plans to keep it for the church.

He asked David Rosen, a botanist with the U.S. Fish and Wildlife Service, to survey the plants. Rosen has counted close to three hundred species. To most people the Nash Prairie seems nothing very special, just a mowed, unfenced pasture where big cylindrical hay bales appear in the fall. But the native prairie and its immense diversity of species is special and there are other examples of this prairie ecosystem right within the urban Houston area.

At the top of a ten-foot high viewing platform at the Armand Bayou Nature Center, naturalist Mark Kramer looks out at what he calls one of the rarest views in Texas, a native prairie. What makes this prairie even more remarkable is that its 2,400 acres of bayou wetlands and restored prairie are smack in the middle of an urban area, right in Harris County and ringed by Pasadena, Seabrook, Taylor Lake Village and the southern fringe of Houston. These lands escaped development because of the



work of Armand Yramategui, who helped raise \$6 million to save it. Visitors come to Armand Bayou mainly for its marshes and wetlands, for the chance to paddle the bayou and see big wading birds and the occasional osprey diving for a fish. But one of the essential projects of the nature center is its six hundred and fifty acres of prairie; plans are to expand this to nine hundred acres. Unlike the bayou and marshes, which tend to thrive if left alone, restored prairies need lots of intervention.

Kramer came to know the place when he was a teenager growing up in Pasadena. Now he helps manage the prairie. Fifteen thousand one-gallon pots of climax grasses have been planted here. Spider lilies bloom in one spot; they were planted too. Every year nature center volunteers collect plants and seed from places scheduled for development and bring them here. This prairie, he muses, is a living museum.

It requires constant effort to fight the invasive, woody Chinese tallow trees—imported for landscaping and now running wild through southeast Harris, Galveston and Brazoria counties. These non-natives are the enemies of prairie. Prairie grasses need full sun in order to flourish; the shade canopy of even small trees kills grass.

A primary weapon against woody plants is fire, either natural or set by human beings. Kramer hopes to burn the prairie completely every two years. Setting a fire in a prairie in the middle of an urban setting is a tricky business, but the center has been doing it safely since 1978, and now has permits to burn fifty acres instead of twenty-five acres at a time. These prescribed burns usually take place on a calm, sunny winter weekend with plenty of volunteers ringing the site, and an experienced fire boss managing the burn.

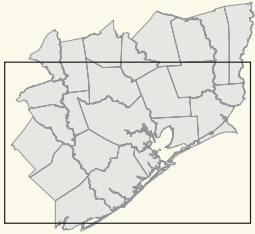
Volunteers wear knee-high rubber boots, long-sleeved cotton shirts and bandanas, and hats and sunglasses. They rub sunscreen on their faces because the ultraviolet light from the fire can burn as badly as the sun. They wield spray cans of water

and long-handled “flappers” with wide rubber mats to tamp down the flames. They are constantly alert to the weather forecast for any possibility that the wind will change direction. They stay in touch with radios and identify safe low-fuel escape routes in case the fire should get out of control.

The fire boss lights the downwind edge of the plot first, creating a burned-out section of prairie called a backfire, which will keep the main fire or head fire from advancing beyond the boundaries the team wants to burn. Then the other two sides of the plot are similarly “black lined,” or burned to provide a barrier. Finally the head fire is set, and the wind—(it must be a gentle one)—pushes the fire toward the backfire, where it collapses on itself and is snuffed out. The volunteers study all the embers and tamp them out before going home

Even though the prairie at Armand Bayou often holds standing water, the dry grass combusts readily and quickly exhausts itself, like paper burning. The nutrients in the thatch drop back into the ground to be reused by plants, and the warming of the soil promotes the growth of nitrogen-fixing bacteria. Everything grows up green and robust after a fire. Native Americans who lived on the coastal prairies may not have known how the chemistry of prairie fires acted, but they knew that fires worked.

Kramer often cites a passage from an early Texas explorer who compared the prairies to the elegance of vast, managed European estates—as though nature had created something so beautiful and orderly and pleasing to the eye that human hands must have made it. Such is the paradox of the prairie. What some people see merely as unimproved land is for others a carefully managed wilderness. Already the restored prairie at Armand Bayou holds about two hundred and fifty to three hundred species. The goal is to get that count much higher. An upsurge in plant species will take a while to show up; it takes time to grow a mature prairie.



Top right: Spicebush swallowtail, *Papilio (Pterourus) troilus*; Short-horned grasshopper, of the genus *Melanoplus*; Black & Yellow Argiope, *Argiope aurantia*.
Bottom right: The Attwater's Prairie chicken, *Tympanuchus cupido attwateri*, is an endangered species found in the Houston Wilderness coastal prairies ecoregion. There are only a few hundred birds left, mostly raised in captivity.

Emblem Bird of the Prairie

At 10,500 acres, the Attwater Prairie Chicken National Wildlife Refuge sixty miles west of Houston, near the town of Eagle Lake, may seem to have plenty of land to help save a bird perilously close to extinction. "People hear that and they think it's huge," says refuge manager Terry Rossignol, "but when you're talking about prairie-chickens, it's not huge enough."

The Attwater's prairie-chicken, a subspecies of the much more numerous greater prairie-chicken of the Midwest, once abounded in such numbers on the Texas coastal prairies that it seemed the birds could never disappear. In nineteenth-century shooting contests the birds were stacked up in piles as tall as a man. But as the prairies dissolved into plowed fields and cultivated pastures, the prairie-chicken population plummeted to just a few hundred birds today, nearly all of them raised in captivity.

Rossignol's mandate is to restore a wild breeding population of the Attwater's prairie-chicken, but success is far from certain. In this effort wildlife managers are fighting invasive plants such as Chinese tallow and deep-rooted sedge and bramble-thick McCartney rose, which all crowd out native grasses. And they are fighting predators. Raccoons, skunks, hawks, owls, bobcats, coyotes, fire ants and snakes all eat prairie-chickens.

The problem with restoring these birds is that they evolved to fill a slot near the bottom of the food chain. Unlike the endangered whooping crane, which is a top predator and lives as long as thirty-five years, prairie-chickens are prey, and their life expectancy is usually only a couple of years. Prairie-chickens are to prairies as shrimp are to bays: food for many other species. The Attwater's prairie-chicken evolved when there were millions of acres of prairie, not thousands. By laying clutches of a dozen eggs, and re-nesting if a nest were destroyed, the birds thrived through sheer numbers.

They have traditionally been noted for their interesting and showy courtship displays. Each spring the males would return to the same patch of bare ground called a lek to attract the hens, which gathered nearby to watch and listen. While stomping the ground rapidly, the males inflated their yellow throat sacs, emitting a sound like that of someone blowing over the neck of a bottle. This is the "booming" that early settlers reported as haunting the prairie for days and days. When hens approached, the males tangled in brief skirmishes to establish dominance. The victor quickly bred the female, which went off to nest and raise the young by herself.

At the U.S. Fish and Wildlife Service refuge near Eagle Lake, no wild birds are left. They are hand-raised from incubation, moved to outdoor pens protected from predators, and gradually introduced to the wild. Teams of wildlife biologists and university interns track their daily moves through tiny radio transmitters that are placed around the birds' necks. Although every fence post on the refuge bears a row of stiff wires to discourage hawks and owls from perching, predators such as horned owls and bobcats still get their share. Considering the prairie-chickens' average mortality rate of 50 percent, Rossignol is doing well to keep a few hundred going.

Additional captive breeding facilities are needed to increase production and release more birds in the wild. The Houston Zoo has one in Clear Lake on land owned by NASA. Others are being raised at Fossil Rim Wildlife Center in Glen Rose, the San Antonio Zoo, the Caldwell Zoo in Tyler, Sea World in San Antonio, and the Abilene Zoo.

But to establish more wild birds, more land is needed. Rossignol is working with landowners near his refuge, using federal financial incentives to expand the habitat available. What is certain is that the survival of the nearly extinct Attwater's prairie-chicken is all tied up in its name. In order to survive, it has to have more prairie.

