

Fire, Bison, and a

Just outside Manhattan, Kansas, stretch rolling hills blanketed in grass and flecked with limestone. Between them cut drainages lined with oak, hackberry, and ribbons of leafy green hedgerows. The slopes are stippled with color: purple scurfy pea and yellow Missouri primrose. There is an occasional herd of cattle, even bison. This is the Konza Prairie Biological Station, 3,487 hectares (8,617 acres) of protected tallgrass ecosystem jointly supported by The Nature Conservancy and Kansas State University (KSU).

I'm here on a research trip to accompany KSU ornithologist Alice Boyle for three days to glean insights from her ongoing study of Grasshopper Sparrows. My first two questions: Why Grasshopper Sparrows? Why Kansas?

Boyle also studies White-ruffed Manakins in Costa Rica, a line of research opened while pursuing her doctoral degree.

"I was a bit of a tropical snob," she says.

In 2013, after being hired as a biology professor at KSU, Boyle moved to eastern Kansas, a mecca for grassland birds.

"I was surprised," she says, "by how stunningly beautiful the prairie is once you get up close and personal with it. I've come to love sparrows as I never thought I would."

I, too, have made a journey toward sparrow appreciation. Over the past year, I've become increasingly curious about the family of birds known as Emberizidae. Birders know them as little brown jobs, that clade of cryptic and difficult-to-identify birds. In younger years I liked to avoid them altogether in favor of the more festive orioles and warblers. Only recently have I begun to see beauty in their streaked, striped, and checked plumage. In

*A birder looks
behind the scenes
at the secret lives
of the Grasshopper
Sparrows of the
Konza Prairie
of Kansas.*

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Little Brown Job

A little brown job with an odd song, the Grasshopper Sparrow breeds on prairies and in weedy pastures across much of the ABA Area. This article takes an in-depth look at the breeding ecology and management needs of the species. *Allegheny County, Pennsylvania; May 2013.*
Photo by © Geoff Malosh.

an effort to deepen my knowledge about sparrows, I've embarked on a creative writing project, a series of essays investigating the lives of various Emberizidae species.

The project has led me to the Flint Hills of eastern Kansas.

Sparrows and the Land

Zoom in on the landscape, focus on a single tall blade of grass, and you might find a sparrow perched thereon, its head thrown back at a sharp angle as it releases a buzzy song. The bird is decorated in fine patterns of gray and brown; a sliver of yellow traces the upper edge of either wing. This is a Grasshopper Sparrow. A member of the genus *Ammodramus*, this species has a characteristically flat forehead, stumpy neck, and short tail. Although grasshoppers are among its primary prey, the sparrow derives its name from the hissing, insect-like quality of its voice and not from its food source.

The range of the Grasshopper Sparrow stretches across much of the contiguous U.S. in summer, with wintering and resident populations along the southern edge, extending into Mexico. An extensive range, however, is not necessarily an indicator of a species' health.

Grasshopper Sparrows are what biologists call habi-



tat specialists. They have evolved to suit particular climates and ecosystems—in this case, prairies. Degradation and loss of prairie habitat have contributed to a long-term population decline in Grasshopper Sparrows.

There are several subspecies of Grasshopper Sparrows across the species' range, each exhibiting subtle differences in plumage, behavior, and habitat requirements. On the Konza Prairie, where the *perpallidus* subspecies breeds, Alice Boyle has observed a particularly interesting behavior.

Some sparrows within Boyle's study site return to the same nesting territories for two to three years in a row, while others find new territories partway through a single season. They may have an initial brood in May with one partner, then migrate to a different territory and have a second brood in mid-July with a second partner. This behavior, called breeding dispersal, has not been observed in eastern and Arizona Grasshopper Sparrow populations.

Boyle seeks to perceive the prairie through the eyes of a sparrow. The decision to disperse, Boyle speculates, is likely related to the patchwork landscape as sparrows seek territories that will increase their nesting success. But what, Boyle wants to know, are their particular requirements? What grazing and burning regimes do they favor and why? Such information is critical to conserving land, for the needs of the sparrow and other grassland species are complex. To thrive, they need a varied prairie landscape: shorter grass with bare patches for foraging and taller grass in which

to build a nest, but not so tall as to conceal the numerous predators, like snakes and weasels, that threaten a sparrow's daily existence. Conservationists want to manage the land with these needs in mind, thereby providing and protecting suitable habitat for Grasshopper Sparrow populations.

Tallgrass Prairie

Like sparrows, the prairie is underappreciated. Some view it as wasteland or, at best, cattle fodder. Tallgrass prairie, according to the U.S. National Park Service, once covered 170 million acres of North America, but less than 4% remains today. In the great westward expansion of the 19th century, it became land on which to build and cultivate. The prairie, in the opinion of many settlers and politicians, was in need of occupancy. With the development of a railroad spanning the Great Plains and the arrival of the steel plow, vast stretches of grassland were altered.

Historically, tallgrass prairie was influenced by grazing from bison and by fires set in motion by lightning and indigenous peoples. These two forces sculpted the grasslands, creating a mosaic-like landscape with a diversity of grass heights and types. Today, both of those forces are absent in their original forms. Bison in Kansas plunged from more than four million—the size of a single herd reported in 1871—to extinction by 1879. Cattle replaced them, but certain ranching practices, like yearly burning to bring up tender grass and overgrazing a single patch of land, destroyed large tracts of tallgrass ecosystem.

The Konza Prairie preserve is among the last segments of tallgrass prairie. It is here that biologists and ecologists seek to gain insights into the maintenance of the prairie, which can only exist as a result of human management. Researchers split the preserve into various watershed territories, each

The Konza Prairie Biological Station is split into territories called watersheds, each managed with various experimental grazing and burning strategies. This particular territory is grazed by introduced bison. *Geary County, Kansas; May 2016.*
Photo by © Saraiya Kanning.





This male Grasshopper Sparrow was caught with a mist net, then assigned a unique color pattern of plastic leg bands. Banding studies at the Konza Prairie give scientists insights into the long-term population dynamics of grassland birds. Geary County, Kansas; May 2016. Photo by © Saraiya Kanning.

with its own management regime of fire and grazing in varying frequency. Ongoing studies seek to observe the effects of each regime on the landscape, its flora, and its fauna.

Researchers at Konza understand that tallgrass prairies are recipes requiring the right measures of ingredients. According to O. J. Reichman, author of *Konza Prairie: A Tallgrass Natural History*, most plants and wildlife thrive when the prairie is burned every two to four years. Grazing and burning, in balanced amounts, work together to create a patchy landscape. This is the habitat for which Konza's Grasshopper Sparrows have evolved.

Bird Catching

How does one study Grasshopper Sparrows?

It starts with catching them. Following individual birds and knowing where they go both within and between seasons is at the heart of Boyle's study. Eventually, Boyle will have a pool of such data from which to adduce patterns and draw conclusions. Because my journey to Kansas coincides with the singing of males and pair formation, signifying the start of the breeding season in mid-May, our days in the field consist primarily of catching males.

To catch a male, Boyle and her team of university assistants must first use careful observation. A male will trace

the perimeters of his territory by singing from a series of favorite perches. The bird will not fly or perch beyond certain points, as though confronted by an invisible wall. Birds with neighboring territories may perch near each other and sing back and forth, but will rarely intrude on one another's established parcel of land.

Once Boyle knows a sparrow's favorite perches, she sets up a mist net made of fine black mesh in a flyway the sparrow is likely to cross between perches. At the base of the net, she places an iPod with speakers, covers it with grass, and sets it to play a recording of a singing male Grasshopper Sparrow.

During one such net attempt, Boyle backs away from the net in a hurry after setting the recording, waving that I should do likewise. A short distance from the net, we crouch in the grass and wait for the sparrow to advance.

"They watch you as much as you watch them," she says.

Our distance from the net could influence a bird's decision to approach the recording—particularly, she explains, if it has been caught before. She can tell a rookie from a veteran. Those that are wise to the net and Boyle's presence will fly above and around the net, or even inch closer and closer to the recording by hopping atop grass perches or scurrying

The ecology of prairie birds has always had an ephemeral aspect about it, and Grasshopper Sparrows face additional uncertainty in the Anthropocene Epoch. Chase County, Kansas; April 2014. Photo by © Brian E. Small.





This Grasshopper Sparrow nest, found on the Konza Prairie, holds two sparrow eggs (left) and two cowbird eggs (right). Geary County, Kansas; May 2016. Photo by © Saraiya Kanning.

on the ground. Such birds take patience; they need time to forget our presence. Rookies, on the other hand, hit the net in territorial fury shortly after the recording starts.

This particular male sings on all sides of the net without flying in. We eventually eat our lunches on a nearby slope overlooking the net, waiting for the sparrow. To the south a line of trees traces a creek. A Bell's Vireo warbles endlessly, and in the distant background our evasive sparrow continues to sing.

As we sit on our coats to avoid the ground still damp with dew, I ask Boyle about how ranchers fit into the research unfolding on Konza. Do they know about the studies? Do they use any of the various management regimes?

Yes, some. Information from multiple studies on Konza is disseminated in a conference ranchers can attend. Nonetheless, some ranchers still burn their land annually in order to bring up tender grass for their cattle, making the land inhospitable to all but blackbirds.

"What are the obstacles?" I ask.

"Inertia," she says. "Also, distrust of scientists and of intellectualism."

Some people don't want to be told what to do with their land. But, she stresses, there are also ranchers who consider themselves stewards of the land. They hate to see species like the Greater Prairie-Chicken disappear as much as the next person. There are some opportunities for collaboration. For example, The Nature Conservancy offers conservation easements with which landowners can donate a tract of their land to conservation efforts, sometimes in return for financial compensation. Many have taken advantage of the plan, thereby securing otherwise inaccessible habitat on private land.

We never catch that particular male and move on to other slopes.

Little Nest on the Prairie

Recording patterns of nest success, or the survival of young, is another critical component of Boyle's study. Under what circumstances—and under which management regimes—are Grasshopper Sparrows best able to fledge young?

Finding a nest starts with flushing a female. We're in the field, trudging across wet morning grass, when a small bird leaps from the ground and lands about 15 feet away, re-concealing itself amid the grass. In mid-flight, it lets out a single sharp *chip*. Alice explains that this is distinctly female behavior. We've flushed her at the nest, and she's not willing to fly too far away. Her *chip* is a weak attempt at a warning. We begin searching around our feet for signs of a nest.

The nests of prairie birds are difficult to find, for they are evolved to hide in tangles of grass, camouflaged from the eyes of predators. A Grasshopper Sparrow nest is a dome of grass with a side opening. As we search, we gently push aside clumps of grass and are cautious where we kneel or put our feet. I'm thinking of all those *Little House on the Prairie* shows I used to watch as a child, the way each episode opens with Laura Ingalls running and skipping down a prairie slope. Now I wonder, how many nests did she step on out there?

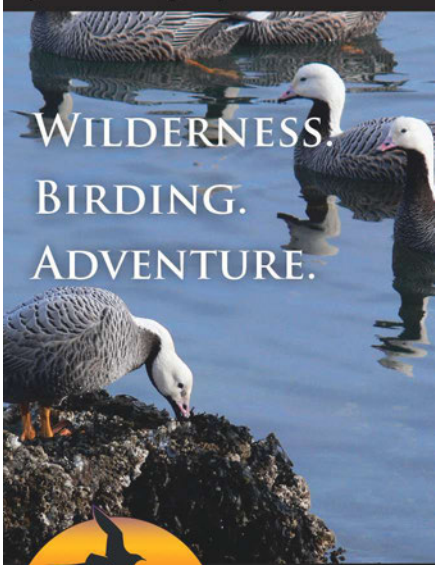
We find the nest, and in it four eggs. They are all spotted, but the spots on two of the eggs focus in a ring at the tapered end. The spots on the other two are evenly distributed.

"Cowbird eggs," Boyle says.


Cowbirds are as dangerous to Grasshopper Sparrows as predators. If a sparrow catches on that some of the eggs are not its own, it may abandon the nest. Nesting is an energy-intensive commitment. The entire breeding cycle occurs over 90 days, beginning in May and ending in late July, and many sparrows have two broods of three to six eggs each. At all times a Grasshopper Sparrow must assess where best to put its life forces. Abandoning a nest with cowbird eggs

Continued on page 46

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Continued from page 44

and starting elsewhere may better ensure the survival of enough of its own young. If a sparrow doesn't catch on to the alien eggs, it may spend the season expending energy to feed a species that will push out its nest-mates it grows twice as large as the host parent.

Boyle later marks the nest by spray-painting rocks 12 to 15 feet away. She places an iButton, a dime-sized device that records temperature, in the nest. A second iButton outside the nest records ambient temperatures. If the temperature within the nest drops for too long, matching the temperatures recorded by the second iButton, then Boyle can assume that incubating has ceased and the nest has been abandoned.

Being able to capture and band females is a rare opportunity. In the three years this study has been going on, Boyle has banded 1,204 Grasshopper Sparrows on Konza: 672 males, 133 females, and 399 of unknown sex. The pool of data for banded females is small. Flushing a female presents a chance to expand this pool. We immediately set out to raise the net.

The method for catching nesting females differs from catching territorial males. While the female sits tight in the grass, we set up two nets in a V shape between her and the nest. Then, we walk from behind and flush her into the net. Basically, we are playing a nasty trick on her. And it works.

Grasshopper Sparrow on the Konza Prairie. Watercolor on hot-press watercolor paper by © Saraiya Kanning.



After catching a bird, Boyle assigns it a pattern of four leg bands: one silver with an identification number and three colored. Each bird has a unique set of colors. In this way, a recapture can be identified from year to year and the life journey of an individual followed. It's how Boyle knows when a bird switches territory.

Boyle then completes a series of measurements on the bird. She places it face down in an old film canister and weighs it on a portable field scale. This female Grasshopper Sparrow weighs 17 grams, the equivalent of three U.S. quarters.

I get to hold the bird. Boyle reminds me to use the bander's grip, cushioning the sparrow's head between my index and middle finger. With the sparrow's frail frame tucked snugly into my hand, I contemplate the relentless struggle for survival that is a bird's life. Eat, breed, nest. Cowbird invasion. Abandon nest, start again, don't be eaten. Snakes. Tornadoes. Hooves through the grass. And now us. Environmental stressors are a major threat to survival, which takes on new significance as we enter the Anthropocene, an epoch in which humans are rapidly altering the biodiversity and ecosystems of Earth.

I open my hand. The bird lies stunned, unaware of the release. I look at Boyle, concerned.

"Give it a moment," Boyle says with confidence.

She's right. After a few seconds, the bird blinks and takes to the air with an emphatic *chip*.

Sources

For an introduction to the Konza Prairie Biological Station, see O. J. Reichman's *Konza Prairie: A Tallgrass Natural History* (University Press of Kansas, 1987).

For more information about Boyle's work with sparrows, as well as manakins and bats, visit aliceboyle.net.

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