



Tree Invasion

by Randy Rodgers
wildlife biologist, Hays

photos by Mike Blair

It's time to change the way we look at trees on the prairies. While trees provide habitat for some wildlife, they pose a serious threat to grassland-dependent species.

Randy Rodgers photo

“I think that I shall never see, anything so lovely as a tree.” At least, that’s the version of the first two lines of Joyce Kilmer’s poem, “Trees,” that I had in my head for years. I recently learned that the poem actually begins “I think that I shall never see/A poem lovely as a tree.” Either way, these words reflect deeply-held values for generations of Americans.

No doubt, I stand among the countless people who place great value on trees. As a boy, I climbed them, drew them, and explored kid-sized wilderness wherever I could roam through even an acre of them. My heroes

were Daniel Boone and Davy Crockett, woodsmen of the highest caliber, at least on TV. Now, I better understand the values of trees for shade, for respite from the wind, and as habitat for many species.

Perhaps those of us who live in prairie states value trees more than those who live in more timbered regions. Those roots go way back. Who hasn’t heard accounts of European settlers cursing the incessant wind, the blazing summer sun, and sheer exposure of the Great Plains? It’s not hard to understand why they and their descendants were determined to change this land.

As early as 1873, Nebraska Senator Phineas Hitchcock introduced the Timber Culture Act. As federal law, this legislation offered 160 acres of prairie land to anyone who would plant 40 of those acres to trees. Years later, University of Nebraska botany professor Charles Bessey advanced the idea that the vast grasslands of the Nebraska Sandhills should rightfully be pine forest. The level of enthusiasm with which his idea was embraced then, and even now, is evidenced by the Bessey Ranger District of the Nebraska National Forest near Halsey. There, about 30 square miles of man-planted forest, in

the middle of one of North America's greatest remaining grasslands, attest to our love for trees — and perhaps to our underdeveloped appreciation of grassland.

The weather of the Great Plains can be harsh and the beauty of our grasslands subtle. But I can't help but believe that Kilmer would also have waxed poetic had he seen a bluestem prairie's rosy glow in the refracted light of an October sunset. Unfortunately, too few of us appreciate the beauty or comprehend the true value of our Great Plains grasslands. This poor understanding of grasslands, coupled with our culture's love of trees, has laid the foundation for a change that threatens our signature landscape — the prairies — like nothing since John Deere's invention of the moldboard plow.

For more than a century, we have planted and nurtured trees across the Great Plains. The benefits were clear: windbreaks for farmsteads, crop fields, livestock, and wildlife allowed us to



Randy Rodgers photos

Eastern redcedars pose a serious threat to this midgrass prairie in Russell County. Trees can be controlled with fire, cutting, or spraying — sooner better than later.

bring the more moderate conditions and the wildlife of the east out onto the plains, at least on small scales. Alone, these tree plantings have altered, but perhaps not seriously threatened, our remaining prairie ecosystems. But our collective failure to understand the needs of our prairies has often resulted in grassland management or, more correctly, lack of management that has permitted some species of trees to escape their original planting sites. Fire, the prairie's natural ally, was often suppressed and grazing was sometimes misapplied, leading to a weakened prairie community vulnerable to what has become an onslaught of invasive trees. Such species are now swallowing our grasslands at an alarming rate.

It seems no Kansas prairie is

immune. Eastern redcedar, hedge (Osage orange), and blackjack oak have invaded substantial parts of our largest and best known prairie region, the Flint Hills. Russian olive, cedar, black locust, and honeylocust have rapidly spread across our central Kansas sand prairies. Redcedar is devouring the prairies of the Red Hills. In the Smoky Hills, cedar and hedge are the main culprits. Even in western Kansas, where dry conditions might seemingly prevent tree invasion, a hodgepodge of trees are making inroads into midgrass and shortgrass prairies, as well as many Conservation Reserve grasslands.

So, what's so bad about a mix of grassland and trees? After all, there are many natural savannas where trees and grasslands combine to make diverse and beautiful landscapes. It's not so much that there's anything intrinsically wrong with this combination. But it's the prairies, places that Kansans often take for granted, that actu-



Osage orange, commonly called hedge, can't be killed with fire. Reclaiming this pasture will require cutting and immediate treatment of the stumps with a herbicide.

ally are among Earth's most threatened landscapes. While there may be relatively fewer species present in any one place, the prairie's unique assemblage of wildlife is a rare treasure on the global scale. Many of us who live on the prairie suffer from the illusion that meadowlarks are somehow ordinary, when nothing could be further from the truth. Taken as a group,



Randy Rodgers photos

Even where mechanical removal of trees has occurred (note piles), failure to follow up with controlled burning has permitted small cedars to rapidly reinvade this pasture. Piling cut trees is not a good idea as this removes grassland from production for many years and creates habitat for mammalian predators.

populations of grassland birds have shown sharper and more widespread declines over recent decades than any other ecological or behavioral guild of birds in North America.

Grassland birds are probably the best indicator of the decline of our prairies because many of these species are sensitive to change. Foremost among them are our two species of prairie chickens. These birds are creatures of open spaces with clear horizons, but invasive trees have forced them from other-

wise suitable prairie habitat in many parts of our state. Greater prairie chickens have rapidly lost ground in southeastern Kansas, as shown by long-term surveys. The last time prairie chickens were observed on the 20-square-mile survey area in Montgomery County was in 1987. They disappeared from the Wilson County area by 2000, the Elk County area by 2002, and are all but gone on the Chautauqua County area. Survey areas in Woodson, Allen, and Anderson counties may be

next. While other factors like prairie conversion and fragmentation may be involved, it's a good bet that tree invasion has played a significant role in the greater prairie chicken's demise. Despite the fact that grasslands of adequate size are still present, lesser prairie chickens no longer occupy significant portions of their former range in Barber, Harper, Kingman, Pratt, Reno, Rice and Stafford counties. The most evident explanation is tree invasion. And trees now threaten occupied prairie chicken range farther west and north.

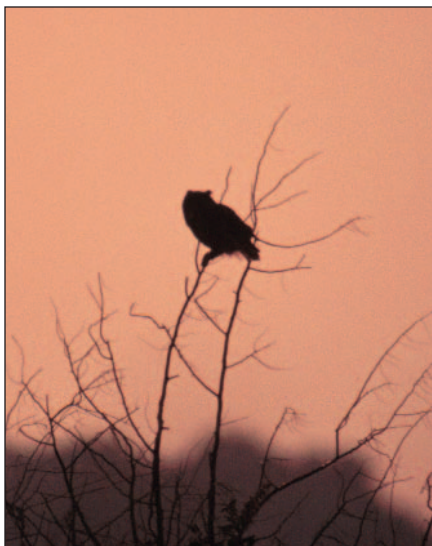
It may be confusing to hear that prairie chickens in the Flint Hills are disappearing in some areas because of too little fire. More attention has gone to the opposite situation; annual spring burning of vast sections of the central Flint Hills and the associated early-intensive grazing system have left greater prairie chickens and other ground dwelling birds with little or no residual nesting cover. Neither of these fire extremes are what's needed. Most prairie wildlife are adapted to a shifting mosaic of burned and unburned areas like that provided in the "patch burning - patch grazing"



The manager of one Barber County pasture (left of fence) has done a good job of controlling cedar invasion, but his neighbor has not. This creates a situation of continuous reinvasion of the well managed pasture with seed from the neighbor's trees.

system that mimics the dynamic landscape once created by fire and bison. That innovative system, developed at Oklahoma State University, is worthy of its own story. Suffice it to say that burning once every three years or even three years out of five would go far to improve the future of greater prairie chickens in the Flint Hills by maintaining prairie health, leaving nesting cover, and suppressing tree invasion.

Recent research has begun to offer an explanation of prairie chickens' intolerance of invading trees. By radio marking lesser prairie chickens, students of Kansas State University professor Robert Robel have revealed some important clues. While tree invasion was not an issue on the sandsage prairie study area, lesser prairie chickens showed a strong avoidance of man-made structures. These birds were virtually never located within a quarter-mile of power lines despite quality habitat near these structures. We can only guess why prairie chickens avoid vertical structures. A reasonable explanation is that eons of predation have favored survival of individuals that perceived vertical structures, trees included, as hunting perches for hawks and owls and, consequently, dangerous places for plump, meal-sized birds. If that's the case, then the prospect of even minor tree invasion of open prairie is more threatening to prairie



As trees encroach, the variety and number of predators increases.

chickens than we might have originally believed. This behavioral avoidance means it won't take a sweeping front of woodland but only widely-scattered trees to eliminate prairie chickens from what would otherwise be suitable habitat. This may be doubly true if trees establish on the higher ground preferred by prairie chickens.

Unfortunately, tree invasion

is not an issue just for prairie chickens. Accumulating scientific evidence suggests that relatively few trees can have major negative impacts on those species of birds that are highly dependent on open prairie — the so-called grassland obligate species. A recent study in Arizona indicated that communities of grassland songbirds begin to decline in habitats with as few as four junipers per acre. Research in Oklahoma and other states have shown that grassland birds directly decline as trees encroach. Part of this decline may be tied to behavioral avoidance of vertical structure, as has been seen with prairie chickens. Research in southwestern Missouri found that even diminutive Henslow's sparrows avoided woody cover, albeit to a lesser degree. But decreases in ground-nesting birds as trees encroach are not just a consequence of some behavioral quirk. As trees increase in prairie habitats, so does the variety and numbers of predators, both feathered and furred.

Before I go further, understand this: Predators are important and beautiful, and we must not make them scapegoats. Direct predator control aimed at benefiting grassland birds is neither desirable nor practical. If the decline in grassland birds is to be halted, it must happen through grassland reclamation (tree removal) and better grassland management systems that favor



Tree encroachment in many Kansas counties is partly responsible for the disappearance of prairie chickens.

healthy prairie environments and minimize predator opportunity. Having said that, who of us has not noticed that red-tailed hawks and great horned owls use trees and power line poles as hunting perches. Crows and magpies, both notorious nest predators, also increase in abundance as trees encroach on the prairie. The same goes for mammalian nest predators such as skunks, raccoons, and red foxes. The increased numbers of these predators inevitably decreases the survival and reproductive success of prairie birds.

Even popular game species that we normally don't associate with open prairie can suffer as trees improve predator habitat. Research in northeastern Colorado showed that pheasant hens nesting within 600 meters of tree plantings suffered much higher predation rates, mainly by great horned owls, than hens that nested further away. I hate to think of the number of trees that have been planted with the good, if misplaced, intentions of benefiting pheasants. In the short term, trees with low-

growing branches like eastern redcedar and Russian olive can offer pheasants winter cover. But as the trees grow, they become better predator habitat. What's more, both of these species are highly invasive. In northern states from Montana to Minnesota, wide plantings of evergreens may have limited value as severe winter habitat for pheasants. But in Kansas, trees' relatively small contribution for

winter cover does not offset the greater risk of increasing predators. As for taller deciduous trees, there's not one lick of evidence that they significantly benefit ring-necks, either here or up north.

For bobwhites, the story is similar. Any quail hunter recognizes the value of woody cover. But if they're paying attention, they also understand that it's low-growing woody cover, as offered by shrubs, that provides the greatest benefit. I recently had an opportunity to hear



Trees may allow nest parasites such as the brown-headed cowbird to better locate grassland birds' nests.

results of an excellent study in which bobwhites and raccoons were simultaneously monitored in the same area using radio transmitters. Not surprisingly, the very areas where quail had the poorest nest success were the same places where raccoons spent most of their time. And where were the raccoons hanging out? They were in old fields and pastures infested with eastern redcedar.

Besides increased predation, grassland songbirds have yet another threat that increases with tree encroachment: nest parasitism. No, I'm not talking about lice or ticks. I am talking about cowbirds. Cowbirds don't build their own nests but instead lay eggs in the clutches of other songbirds. The adults of the parasitized host species may not recognize the cowbird eggs as different and often raise the young cowbirds as their own. By diverting food resources, the cowbird nestlings have the effect of lowering the survival of the host species' own young. Several studies have documented greater cowbird activity



Prairie birds, such as the grasshopper sparrow, avoid otherwise suitable grassland habitat as trees invade. Trees provide perches and nesting sites for avian predators.

with poorer grassland bird reproduction near woodland edges. Researchers suggest that elevated perches provided by trees allow cowbirds to better locate nests of grassland birds and to synchronize their egg laying with the potential host.

Ironically, the greatest avian threat to grassland birds may be neither predator or nest parasite. Among our most seriously invasive tree species, eastern redcedar is the worst. The primary vectors that spread redcedar are certain woodland birds that were originally attracted to the plains by urban and rural tree plantings. These birds eat the cedar's berries, digest the fleshy parts, and expel the intact seeds while perching or in flight. The net effect is that redcedar has become a metastasizing cancer of the prairie.

So, what can be done? For starters, we need to get our terminology right. For as long as I can remember, Kansas wildlife managers, foresters, and soil conservationists have casually referred to any woody planting as a "tree" planting, even if all or most of what was planted were shrubs. Organizations like Pheasants Forever and Quail Unlimited routinely have done the same thing in counting among their accomplishments some huge number of "trees" planted. While professional conservationists may understand what this means, we've given too little thought to how this "tree" vernacular may have misled the general public.



Fire is an excellent tool to control trees on the prairie, but it's far more efficient when trees are small.

Shrubs were a natural component of many prairie systems and have a legitimate, if limited, place in grasslands. Trees have an altogether different effect.

It's critical for all of us, professional conservationists and laymen alike, to acknowledge that we've made mistakes. Inevitably, as our ecological knowledge grows, hindsight shows that some practices were not as clearly beneficial as once believed. Tree plantings at the hand of man, even some for perfectly legitimate purposes, were the initial sources of invasive trees in the western two-thirds of Kansas. But far more troubling is the fact that inappropriate tree plantings are still common.

I get a knot in my stomach each time I see invasive trees planted on Conservation Reserve grasslands. Inadequate management is already a problem for many CRP stands, and this can be exacerbated by

tree plantings. Because they're vulnerable to fire, planting and maintaining cedars in CRP almost assures that future controlled burns in these grasslands will be more difficult. Increased difficulty often translates to less frequent burns or no burns at all. What's more, the quality of habitat provided by these ungrazed grasses diminishes without fire, becoming too thick and matted for most wildlife to use. Where woody plantings are desired in grasslands, native shrubs are the best choice. They resprout after fire, often producing better wildlife habitat than

the previous older growth, and they can even become effective firebreaks.

Of course, conservation is an ongoing journey with frequent course corrections to cope with ever-changing conditions. The first steps in making a correction are to recognize a problem and to understand its causes. A recent agreement between Kansas State University's Kansas Forest Service and the Kansas Department of Wildlife and Parks illustrates their concern and has provided a good beginning. These agencies plan to cooperate in educating their own staffs, landowners, and the public as to where and what types of tree plantings pose a threat to prairies and prairie wildlife. At its heart, the agreement aims to discourage tree plantings on or near significant blocks of grassland, particularly if potentially invasive species are being considered.

Redirecting future plantings

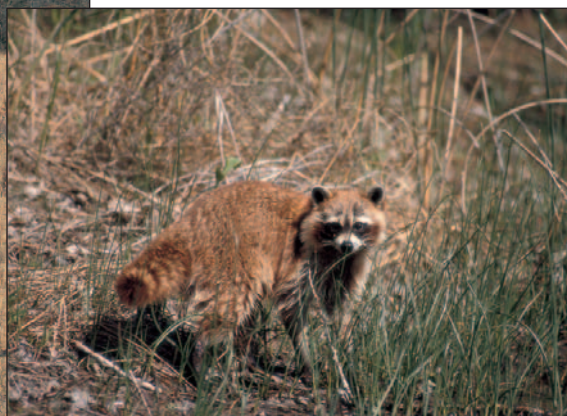
away from grasslands is a small step in the right direction, but rescuing Kansas prairies will take much more than some written agreement. More landowners and land managers, private and public, must recognize the magnitude of this threat. It's too easy to ignore little tree seedlings scattered around a pasture. But give them five years, and they start limiting livestock forage production and grassland wildlife habitat. Give them another five years, and it may be too late. It's when they're small that invasive trees are easiest to control with either fire, cutting, spot spraying, or some combination of efforts. Once invasive trees get out of hand, costs of removing them can become prohibitive. The old axiom, "an ounce of prevention is worth a pound of cure," may be an understatement when it comes

to tree invasion.

Excessive grazing pressure has left some livestock producers with few options. Controlled fire is the least expensive and best means of preventing tree invasion, but it takes adequate fuel — residual grass — to carry a fire hot enough to do the job. If grazing pressure has been too heavy, too little fuel remains, and the pasture may suffer not only from poor grazing management, but invading trees as well. As more trees invade and grow, less livestock forage is produced. If stocking rate is kept steady, grass condition further deteriorates, and pastures can become trapped in a cycle of decline that can be broken only by near heroic, expensive efforts. Some of Kansas' grasslands are already at this stage. With no intervention, more are just a few years away.

Many ranchers already do a good job of managing their pastures and preventing tree invasion, but some land managers do not. Many cases of tree invasion are rooted in an inadvertent failure to recognize the problem. Where that's the case, recognition of the value of our prairies and the threat posed by tree invasion may go far toward correcting the problem before it's too late.

Unquestionably, ranchers are the most important stewards of the prairies. Most recognize their own interest in preventing invasive trees from taking over grasslands. But many will need help from public and private sources, if prairies are to be maintained. Conservationists, public and private, must join with ranchers as allies in turning back this invasion. It will take money, time, and effort. The soldiers will range from ranchers to boy scouts, from government officials to private entrepreneurs. They must wield weapons like tree shears and pruning shears, chain saws and bow saws, drip torches and Tordon. In the process, they will better under-



Results of a study that monitored the activity of both bobwhites and raccoons with radio transmitters showed quail nesting success was poorest in areas where raccoons were most active. And raccoons spent much of their time in areas infested with redcedar.

stand the value of the prairie and the value of a helpful friend.

Grassland reclamation will not be a one-pass deal. The seeds have already been sown for a second wave of trees. If reclamation isn't done right and better grassland management doesn't follow, the second wave will be more aggressive than the first. Cutting hedge, locusts, or Russian olives without treating the stumps with the right herbicides is pointless. Burning and clipping cedars without follow-up fires and better grazing management could prove the same.

Of paramount importance is the need to assure that invasive trees advance no farther. Complacency toward our remaining uninvaded prairies would prove a huge mistake. Focusing just on the worst-invaded grasslands could leave our resources and resolve exhausted, only to discover new areas invaded.



Certain woodland birds spread redcedar by eating the berries and expelling the seeds in flight or while perched, which explains the cedars under this fence wire.

Of course, there are good uses and appropriate places for trees on the plains. But we have planted trees on the prairie with a near-religious fervor only to discover that some spread like hell. Those of us living on the Great Plains must come to realize that it is as much an act

of redemption for us to kill trees that invade our prairies as it is for others to plant trees in a forest clear cut. We must realize that on the prairie, occasional fire is an act of renewal, not destruction. We should applaud, not deride, those who properly and carefully apply it.

It is not for us on the plains to grow second-rate versions of the great deciduous forests of the east or the conifer forests of the west. Our responsibility is to guard our precious remaining prairies for ourselves and our children, for spectacular prairie chickens and tiny grasshopper sparrows, and for the other people and creatures of the Earth.

Maybe you remember the chorus of an old Joni Mitchell song. "Don't it always seem to go that you don't know what you've got 'till it's gone?" When it comes to our prairies, I hope the answer to that question is "No!" ♡



Randy Rodgers photo

Even in far western Kansas, tree invasion is a problem. These scattered Siberian elms, with more growth, will provide perches and nest sites for avian predators and reduce the value of this Greeley County Conservation Reserve stand for grassland wildlife.